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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d)OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended October 31, 2018

OR

o **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d)OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from_____to_____

Commission file number 001-36250

Ciena Corporation

(Exact name of registrant as specified in its charter)

Delaware	**23-2725311**
(State or other jurisdiction of Incorporation or organization)	(I.R.S. Employer Identification No.)
7035 Ridge Road, Hanover, MD	**21076**
(Address of principal executive offices)	(Zip Code)

(410) 694-5700
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value	**New York Stock Exchange**

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. YES ☑ NO o

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. YES o NO ☑

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. YES ☑ NO o

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). YES ☑ NO o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§232.405) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Act. (Check one):

Large accelerated filer ☑	Accelerated filer o	Non-accelerated filer o	Smaller reporting company o
			Emerging growth company o

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act) YES o NO ☑

The aggregate market value of the Registrant's Common Stock held by non-affiliates of the Registrant was approximately $3.7 billion based on the closing price of the Common Stock on the New York Stock Exchange on April 27, 2018.

The number of shares of Registrant's Common Stock outstanding as of December 17, 2018 was 156,481,822.

DOCUMENTS INCORPORATED BY REFERENCE

Part III of the Form 10-K incorporates by reference certain portions of the Registrant's definitive proxy statement for its 2019 Annual Meeting of Stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this report.

CIENA CORPORATION
ANNUAL REPORT ON FORM 10-K
FOR FISCAL YEAR ENDED OCTOBER 31, 2018

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PART I

Cautionary Note Regarding Forward-Looking Statements

This annual report contains statements that discuss future events or expectations, projections of results of operations or financial condition, changes in the markets for our products and services, trends in our business, business prospects and strategies and other "forward-looking" information. In some cases, you can identify "forward-looking statements" by words like "may," "will," "can," "should," "could," "expects," "future," "plans," "anticipates," "believes," "estimates," "predicts," "intends," "potential," "projects," "targets," or "continue" or the negative of those words and other comparable words. These statements may relate to, among other things, our competitive landscape; market conditions and growth opportunities; factors impacting our industry and markets; factors impacting the businesses of network operators and their network architectures; adoption of next-generation network technology and software programmability and automation of networks; our strategy, including our research and development, supply chain and go-to-market initiatives; efforts to increase application of our solutions in customer networks and to increase the reach of our business into new or growing customer and geographic markets; our backlog and seasonality in our business; expectations for our financial results, revenue, gross margin, operating expense and key operating measures in future periods; the adequacy of our sources of liquidity to satisfy our working capital needs, capital expenditures and other liquidity requirements; business initiatives including information technology (IT) transitions or initiatives; the impact of the Tax Cuts and Jobs Act and changes in our effective tax rates; and market risks associated with financial instruments and foreign currency exchange rates. These statements are subject to known and unknown risks, uncertainties and other factors, and actual events or results may differ materially due to factors such as:

- *our ability to execute our business and growth strategies;*
- *fluctuations in our revenue, gross margin and operating results and our financial results generally;*
- *the loss of any of our large customers, a significant reduction in their spending, or a material change in their networking or procurement strategies;*
- *the competitive environment in which we operate;*
- *market acceptance of products and services currently under development and delays in product or software development;*
- *lengthy sales cycles and onerous contract terms with communications service providers, Web-scale providers and other large customers;*
- *product performance or security problems and undetected errors;*
- *our ability to diversify our customer base beyond our traditional customers and to broaden the application for our solutions in communications networks;*
- *the level of growth in network traffic and bandwidth consumption and the corresponding level of investment in network infrastructures by network operators;*
- *the international scale of our operations;*
- *fluctuations in currency exchange rates;*
- *our ability to forecast accurately demand for our products for purposes of inventory purchase practices;*
- *the impact of pricing pressure and price erosion that we regularly encounter in our markets;*
- *our ability to enforce our intellectual property rights, and costs we may incur in response to intellectual property right infringement claims made against us;*
- *the continued availability, on commercially reasonable terms, of software and other technology under third-party licenses;*
- *the potential failure to maintain the security of confidential, proprietary or otherwise sensitive business information or systems or to protect against cyber attacks;*
- *the performance of our third-party contract manufacturers;*
- *changes or disruption in components or supplies provided by third parties, including sole and limited source suppliers;*
- *our ability to manage effectively our relationships with third-party service partners and distributors;*
- *unanticipated risks and additional obligations in connection with our resale of complementary products or technology of other companies;*
- *our ability to grow and maintain our new distribution relationships under which we will make available certain technology as a component;*
- *our exposure to the credit risks of our customers and our ability to collect receivables;*
- *modification or disruption of our internal business processes and information systems;*
- *the effect of our outstanding indebtedness on our liquidity and business;*
- *fluctuations in our stock price and our ability to access the capital markets to raise capital;*
- *unanticipated expenses or disruptions to our operations caused by facilities transitions or restructuring activities;*
- *our ability to attract and retain experienced and qualified personnel;*

- *disruptions to our operations caused by strategic acquisitions and investments or the inability to achieve the expected benefits and synergies of newly-acquired businesses;*
- *our ability to commercialize and grow our software business and address networking strategies including software-defined networking and network function virtualization;*
- *changes in, and the impact of, government regulations, including with respect to: the communications industry generally; the business of our customers; the use, import or export of products; and the environment, potential climate change and other social initiatives;*
- *the impact of the Tax Cuts and Jobs Act, changes in tax regulations and related accounting, and changes in our effective tax rates;*
- *future legislation or executive action in the U.S. relating to tax policy or trade regulation;*
- *the write-down of goodwill, long-lived assets, or our deferred tax assets;*
- *our ability to maintain effective internal controls over financial reporting and liabilities that result from the inability to comply with corporate governance requirements; and*
- *adverse results in litigation matters.*

These are only some of the factors that may affect the forward-looking statements contained in this annual report. For a discussion identifying additional important factors that could cause actual results to vary materially from those anticipated in the forward-looking statements, see "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Risk Factors" in this annual report. You should review these risk factors for a more complete understanding of the risks associated with an investment in our securities. However, we operate in a very competitive and rapidly changing environment and new risks and uncertainties emerge, are identified or become apparent from time to time. We cannot predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this annual report. You should be aware that the forward-looking statements contained in this annual report are based on our current views and assumptions. We undertake no obligation to revise or update any forward-looking statements made in this annual report to reflect events or circumstances after the date hereof or to reflect new information or the occurrence of unanticipated events, except as required by law. The forward-looking statements in this annual report are intended to be subject to protection afforded by the safe harbor for forward-looking statements contained in the Private Securities Litigation Reform Act of 1995.

Item 1. Business

Overview

We are a networking systems, services and software company, providing solutions that enable a wide range of network operators to deploy and manage next-generation networks that deliver services to businesses and consumers. We provide network hardware, software and services that support the transport, switching, aggregation, service delivery and management of video, data and voice traffic on communications networks. Our solutions are used by communications service providers, cable and multiservice operators, Web-scale providers, submarine network operators, governments, enterprises, research and education (R&E) institutions and other emerging network operators.

Our solutions include a diverse portfolio of high-capacity Networking Platform products, which can be applied from the network core to network access points, and which allow network operators to scale capacity, increase transmission speeds, allocate traffic and adapt dynamically to changing end-user service demands. We also offer Platform Software that provides management and domain control of our next-generation packet and optical platforms and automates network lifecycle operations, including provisioning equipment and services. In addition, through our comprehensive suite of Blue Planet Automation Software, we enable network operators to use network data and analytics to drive enhanced automation across multi-vendor and multi-domain network environments, accelerate service delivery and enable an increasingly predictive and autonomous network infrastructure. To complement our hardware and software solutions, we offer a broad range of attached and software-related services that help our customers design, optimize, integrate, deploy, manage and maintain their networks and associated operational environments. Through our complete portfolio of solutions, we enable our customers to transform their network into a dynamic, programmable environment driven by automation and analytics, which we refer to as the Adaptive Network. Our solutions for the Adaptive Network create business and operational value for our customers, enabling them to introduce new revenue-generating services, reduce costs and maximize the return on their network infrastructure investment.

Corporate Information and Access to SEC Reports

We were incorporated in Delaware in November 1992 and completed our initial public offering on February 7, 1997. Our principal executive offices are located at 7035 Ridge Road, Hanover, Maryland 21076. Our telephone number is (410)

694-5700, and our website address is www.ciena.com. We make our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports, available free of charge in the "Investors" section of our website as soon as reasonably practicable after we file these reports with the Securities and Exchange Commission (the "SEC"). We routinely post these reports, recent news and announcements, financial results and other important information about our business on our website at www.ciena.com. Information contained on our website is not a part of this annual report.

Industry Background

Network Traffic Growth and Increased Capacity Requirements

The markets in which we sell our communications networking solutions have seen significant changes in recent years. In particular, optical networks – which carry video, data and voice traffic by encoding digital information on multiple wavelengths of light traveling across fiber optic cables – have experienced strong traffic growth for several years. This growth, and the resulting requirements for increased network capacity and transmission speed, is being driven by an increasingly diverse set of communications services and applications. These services and applications, including those set forth below, are increasing the bandwidth and service demands placed upon networks and are challenging the business models of many network operators.

- *Cloud-Based Services.* Enterprises and consumers continue to replace locally-housed computing and storage by adopting a broad array of innovative cloud-based models – including Platform as a Service (PaaS), Software as a Service (SaaS) and Infrastructure as a Service (IaaS) – and an expanding range of cloud-based services that host key applications, store data, enable the viewing and downloading of content and utilize on-demand computing resources.

- *Over-the-Top (OTT) Services and Video Streaming*. OTT content refers to video, multimedia and other applications provided directly from the content source to the viewer or end user across a third-party network. Traffic from streaming and OTT services, including high definition and ultra-high definition video, has expanded with the increased availability of, and end-user demand for, video content accessible through a variety of devices and media.

- *On-Demand Services*. Users of communications services require an on-demand service level that allows them to be connected wherever and whenever they desire. Businesses rely upon enterprise services and data center connectivity that facilitate global operations, employee mobility and access to critical business applications and data. Consumers expect broadband services, including peer-to-peer internet applications, augmented reality applications and multimedia streaming and downloads, to be available on-demand.

- *Mobile Devices and Applications.* Traffic from mobile applications, including video, internet and data services, has expanded with the proliferation of smartphones, tablets and other wireless devices. Because so much of wireless traffic ultimately travels across a wireline network to reach its destination, growth in mobile communications continues to place demands upon wireline networks, including backhaul and fronthaul networks emanating from cell sites.

In addition, emerging services and applications present further challenges and are likely to place significant service, capacity and automation demands upon network infrastructures. These include:

- *Network Densification.* Increasing demand by businesses and consumers for data, content and related services are impacting network infrastructures, particularly at the edge of networks, where increased computing power and automation are required to meet the quality of experience required by these users. To cost-effectively address these demands, network operators will be required to adopt emerging wireless and wireline network architectures. Fifth-Generation wireless broadband technology (5G) is designed to enable significant increases in data consumption by a growing number of users and devices, thereby better supporting the "Internet of Things" and other emerging applications. "Fiber deep" initiatives by cable and multiservice operators are designed to push digital fiber-based communications closer to the end-user, increasing potential bandwidth to homes and enterprises and increasing data speeds while addressing power, space and operating costs. Implementation of these network densification initiatives is expected to have a significant effect on wireline networks.

- *Internet of Things*. As the number of networked connections between devices and servers grows, machine-to-machine-related traffic (M2M) is expected to represent an increasing portion of traffic as the Internet of Things evolves. These connections can provide value-added services and allow sharing of data that can be monitored and analyzed. We expect network traffic relating to the interconnection of devices to grow along with the widening adoption of internet and cloud-based content delivery, smart grid applications, health care and safety monitoring, resource and inventory management, home entertainment, consumer appliances, connected transportation and other M2M data applications.

- *Ultra-High Definition TV and Virtual and Augmented Reality.* Ultra-high definition TV and the advent of immersive technologies like 360° video, virtual reality and augmented reality are likely to place meaningful capacity and capability demands on networks as adoption of these technologies grows. The television, internet and consumer electronics industries are rapidly advancing these technologies and making them more widely available and affordable to consumers.

We believe that increased adoption of these services and applications will further increase traffic and capacity requirements and place additional service challenges on network infrastructures.

Network Transition to Programmable Networks with Enhanced Automation

To reduce costs and promote network efficiency and simplicity, network operators, particularly communications service providers, are increasingly looking to adopt next-generation infrastructures that are more open, programmable and automated. Networks today are still primarily physical in nature and are generally managed via inventory management, planning and fulfillment systems. Moving toward digital network transformation, operators are increasingly leveraging information technology (IT) strategies that emphasize software capabilities and automation through policy controlled and analytics-driven network solutions that are more predictive and can adapt more quickly to changing end-user demands. To bridge the existing gap between the operational realities of today and the hybrid networks and operations of the future – emphasizing virtual elements, automation and analytics – we expect expect network operators to adopt strategies that may include one or more of the following:

- *Orchestration.* Software-based orchestration simplifies the end-to-end creation, automation and deployment of services across multiple physical and virtual network domains. We believe software-based orchestration presents an opportunity to reduce network and operational complexity and offers an alternative to certain elements of traditional operations support and business support systems, which network operators have historically relied upon to support network management functions such as inventory, service provisioning, network configuration and fault management.

- *Network Function Virtualization (NFV)*. Through NFV, network operators can separate network services or capabilities from the physical network assets that traditionally provide these services or capabilities to end users. To reduce their dependence upon single-purpose hardware platforms and accelerate the time to market for new revenue-generating services, network operators are increasingly looking for solutions that enable network functions through software that runs on industry-standard servers, network and storage platforms.

- *Software-Defined Networking (SDN).* SDN seeks to simplify networks to create more open environments that ease management, support automation and quickly deliver customized services to end users, by enabling individual network elements to be directly programmable by standards-based software control. This results in end-to-end visibility of network flows, enabling the optimization of traffic paths and the control of data flows through a network.

We believe that adoption of these strategies will require network operators and their network solutions vendors to increasingly look to utilize an ecosystem of physical and virtual network resources. We expect that these network architectural approaches, in turn, will drive increased openness and interoperability of multi-vendor, multi-domain network environments, requiring an increased degree of cooperation, collaboration and interoperability among solutions providers.

Different Approaches to Design and Procure Network Infrastructure Solutions

Leading network operators are pursuing a diverse range of approaches, or “consumption models,” to manage the design and procurement of their network infrastructures. These consumption models include: the traditional systems procurement of fully integrated solutions including hardware, software and services from the same vendor; the procurement of a fully integrated hardware solution from one vendor with the separate use of a network operator’s own or another vendor’s SDN-based control; the procurement of an integrated photonic line system with open interfaces from one vendor and the separate or “disaggregated” procurement of modem technology from a different vendor; or the use of published reference designs and open source specifications for the procurement of off-the-shelf or commoditized hardware (often referred to as “white box” hardware) to be used with open source software. Further, a number of network operators, and certain of our suppliers, are pursuing the development and future deployment of smaller form factor, pluggable modem technology as an alternative to integrated platforms. In parallel, network operators are also exploring a range of alternatives to meet their software requirements, from licensing integrated and proprietary third party software solutions to fully utilizing open source software.

Many of these consumption models being pursued continue to be in their early stages of evaluation, and the models that ultimately emerge and their level of adoption will depend in significant part on the circumstances and strategies of certain network operators. We also believe that broader adoption of procurement models involving greater disaggregation remains uncertain, particularly for those network operators for whom such an approach would result in increased operational complexity, expense, and integration and support obligations. Based on our views of the market and customer interactions, we expect that the largest portion of deployed capacity, for at least the next few years, will continue to be through the purchase of fully integrated hardware solutions. We expect that customer consideration of a variety of consumption models will require network operators and vendors alike to assess, and possibly broaden, their offerings and commercial models over time, thereby placing premium on a vendor's ability to provide robust network solutions with the maximum amount of flexibility and choice.

Industry Consolidation

Our industry has experienced significant consolidation in recent years among our competitors, customers and suppliers alike. To drive scale and market share gains and meet the intense investment capacity required to keep pace with technology innovation, acquisition activity among vendors of networking solutions has increased. Among our customers, there have been significant horizontal and vertical consolidation activities by service providers and cable operators, with several such operators acquiring media and content companies. Customer consolidation can increase purchasing power and has in the past resulted in delays or reductions in network spending due to changes in strategy or leadership, the timing of regulatory approvals and debt burdens associated with such transactions. Finally, significant consolidation among component suppliers may reduce the number of independent suppliers and could disrupt our supply chain and adversely impact pricing. Consolidation activity across our industry can create opportunities and challenges for our business. We expect this trend to continue and it may have a significant impact on the entire industry, including the competitive landscape, the range sales opportunities for vendors and their supply chains.

Strategy

Our strategy is to leverage our technology leadership, diversify and expand our addressable markets, and drive the profitable growth of our business. Key initiatives of this strategy include:

Extend Innovation Leadership and Enable Customers to Realize an Adaptive Network. We are focused on pushing the pace of innovation in our markets and providing market-leading offerings that promote what we refer to as the Adaptive Network. Our Adaptive Network vision emphasizes programmable network infrastructure that leverages our WaveLogic coherent modem technology, enhanced IP capabilities in access and aggregation networks, and software control and automation capabilities. We are focused on providing market-leading programmable infrastructure innovation capable of providing advanced network telemetry and allowing for tuning of network capacity and speeds to meet changing needs. We are also introducing solutions with enhanced IP capabilities to help network operators make better operating decisions and to optimize their network performance and deliver a better user experience. We continue to invest in our automation solutions and believe that through automation, analytics and intent-based policies, we can enable an Adaptive Network that can rapidly scale, self-configure and self-optimize by assessing network pressures and demands.

Leverage Blue Planet for Intelligent, Closed-Loop Automated Networks. We seek to promote adoption of our Blue Planet Automation Software, highlighting its ability to transform network operations and management as well as IT and back office processes. Blue Planet is designed to automate, orchestrate and manage both physical and virtual network resources and their associated services across data centers and the wide area network (WAN). We believe that Blue Planet can transform legacy networks into "service ready" networks, accelerating the creation, delivery and lifecycle management of new, cloud-based services. We seek to enable closed-loop automation for networks by leveraging automation and orchestration, multi-domain inventory, topology and federation, analytics, machine learning and assurance. Through our acquisitions of Packet Design, LLC and DonRiver Holdings, LLC in fiscal 2018, we augmented our software offerings to include route optimization and assurance functionality and multi-domain inventory topology and visualization. We are also investing in professional services delivery to enable the sale of broader solutions that combine software and services. This solutions-based selling approach seeks to use insights into our customers' common operational and networking issues and positions Blue Planet software and services to enable the digital network transformation that our customers are seeking.

Promote Flexibility and Choice. Choice is an increasingly important element of our customers' networking approach and their efforts to manage network demands and costs. Our philosophy is rooted in enabling choice in the market by developing network solutions that address a range of different customer consumption models. Our desire to promote choice influences our development priorities as well as our go-to-market approach. We intend to offer a range of choice to customers across packet-optical convergence, coherent modem leadership and multi-vendor, multi-domain network automation software. We are pursuing "merchant modem" sales opportunities that leverage our Wavelogic modem leadership, directly and indirectly.

Merchant modems, often called transponders, are the combination of an optical chipset or ASIC with other key optical components that are sold independently of integrated systems. Merchant modem vendors often sell their modem technology in the form of an optical module or pluggable to a variety of market participants, including other original equipment manufacturers. While broader adoption of procurement models that emphasize disaggregation of hardware and software remains uncertain, we expect that a range of different consumption models will require us to broaden our existing offering and commercial models over time. We intend to offer solutions and pursue sales opportunities across a range of customer consumption models to drive the evolution of next-generation network infrastructures and to promote choice in our markets.

Focus Diversification on High-Growth Applications and Customer Segments. We believe that continued diversification of our business is important to address the dynamic industry environment in which we operate, to continue to grow our business, and to better withstand potential slowdowns adversely affecting particular geographies, markets or customer segments. Our strategy is to diversify our solutions offerings and customer base to address fast-growing applications and customer segments. We seek to increase adoption of our packet access and aggregation solutions and to secure and grow market share with our Blue Planet Automation Software platform. We are also pursuing opportunities with a diverse set of network operators in growth segments and geographies. Our go-to-market strategy seeks to capture additional market share with current customers and other Web-scale providers and emerging network operators, and to displace competitors in international markets, particularly in Asia-Pacific and India. We intend to use our direct and indirect sales channels to expand our sales with several other market verticals, including cable and multiservice operators, submarine network operators, enterprise customers and government and research and education (R&E) customers.

Customers and Markets

We sell our product and service solutions through direct and indirect sales channels to network operators in the following customer and market segments:

- *Communications Service Providers.* Our communications service provider customers, including regional, national and international wireline and wireless carriers, form our historical customer base and represent a majority of our revenue.

- *Web-scale Providers.* Our “Web-scale” provider customers include a diverse range of internet content providers and data center operators focused on applications such as search, social media, video, real-time communications and cloud-based service offerings as well as and other emerging network operators. As significant purchasers of capacity on submarine networks and from communications service providers on a global basis, these customers influence networking solution alternatives by those network operators.

- *Cable and Multiservice Operators (MSO).* Our customers include regional, national and international cable and multiservice operators.

- *Submarine Network Operators.* Our customers include service providers, Web-scale providers and consortia operators of submarine communications networks across the globe.

- *Enterprises.* Our enterprise customers include large, multi-site commercial organizations, including participants in the financial, health care, transportation, utilities, energy and retail industries.

- *Government, Research and Education (R&E).* Our government customers include federal and state agencies in the United States as well as international government entities. Our R&E customers include research and education institutions around the world, as well as communities or consortia including leaders in research, academia, industry and government.

A significant portion of our revenue is concentrated among a small number of customers. See the risk factor captioned “A small number of customers accounts for a significant portion of our revenue. The loss of any of these customers or a significant reduction in their spending could have a material adverse effect on our business and results of operations.” in Item 1A of this annual report.

Products and Services

We offer the market a comprehensive set of networking solutions that include hardware platforms and systems, our leading optical coherent modem technology and network software solutions. We also offer a broad set of service offerings that allow us to gain valuable insight into network and business challenges faced by our customers and to work closely with them in the assessment, planning, deployment and transformation of their networks.

Networking Platforms

Our Networking Platforms segment consists of our Converged Packet Optical and Packet Networking product portfolios.

Converged Packet Optical. Our Converged Packet Optical portfolio includes a range of hardware networking solutions that use our WaveLogic coherent optical technology and are optimized for the convergence of coherent optical transport, Optical Transport Network (OTN) switching and packet switching.

Our 6500 Packet-Optical Platform provides a flexible and scalable dense wavelength division multiplexing (DWDM) solution that adds capacity to core, regional, metro and submarine networks and enables efficient transport at high transmission speeds. This platform provides leading coherent wavelength capacities, from 40G to 400G, along with multi-layer control plane capabilities for scale and service differentiation. This platform, which includes several chassis sizes and a comprehensive set of line cards optimized for individual services or applications, can be used throughout the network, from customer premises to metropolitan networks, the regional core and submarine cable landing sites.

Our Waveserver family of products consists of stackable interconnect platforms that allow network operators to scale bandwidth and support high bandwidth interconnect applications, such as high-speed data transfer, content delivery, virtual machine migration and disaster recovery/backup between data centers. Waveserver is a specialized platform that is purpose-built for addressing data center and other space-constrained environments using a small footprint and low power design. With its full suite of management interfaces and open APIs, Waveserver is easy to operate and integrate into existing networks and facilitates deployment of on-demand cloud and high-capacity connectivity services.

Our 5400 family of Packet-Optical Platforms consist of multi-terabit reconfigurable switching systems that consolidate the functionality of an add/drop multiplexer and digital cross-connect into a single, high-capacity intelligent switching system. These products address both core and metro segments of communications networks and support key managed services, including Ethernet/TDM Private Line and IP services. Our Z-Series multi-layer switching and transport platforms are used in regional and metro networks and are designed to support a variety of use cases including Ethernet business services and Ethernet backhaul. These products provide for optical transport, traffic aggregation at the network edge and switching that is optimized for handoff at the network core.

Leveraging our WaveLogic coherent modem technology, we are taking steps to pursue merchant modem sales opportunities through our Optical Microsystems products. To date, we have not generated meaningful revenue through these activities; however, such sales will be reflected within the Converged Packet Optical product line of our Networking Platforms segment.

Packet Networking. Our Packet Networking products allow customers to simplify their network designs while delivering new, revenue-generating services. These products target applications primarily from the access to metro networks, where they aggregate and switch packet-based traffic to support such applications as Ethernet business services, mobile backhaul services, fiber deep, as well as ongoing network infrastructure scaling. Our Packet Networking products facilitate network cost effectiveness, including reduced costs associated with power and space, as compared to more complex, traditional IP routing network designs.

To date, revenue from our Packet Networking segment has been primarily related to our 3900 family of Service Delivery Switches and our 5000 family of Service Aggregation Switches and Platforms. These products support the access and aggregation tiers of telecommunications networks and have principally been deployed to support business services and wireless backhaul applications. Our 3900 family of Service Delivery Switches are purpose-built to fit small, medium and large customer sites as well as multi-tenant office and residential buildings. Our 5100 family of Service Aggregation Switches and Platforms provide aggregation to fill higher capacity links within both the metro access and aggregation tiers of networks, minimizing the number of router assets required in the core. The recent introduction of our 3900 family of Service Virtualization Platforms allows for customers to migrate towards software-based networking and services based on Network Function Virtualization.

Our Packet Networking portfolio also includes our 8700 Packetwave Platform, a multi-terabit packet switching platform for high-density metro networks and inter-data center wide area networks. The 8700 combines packet switching and coherent WaveLogic DWDM optical transport technologies for both data center networks and metro networks.

We have recently introduced our Adaptive IP solution, which leverages the Adaptive Network vision to deliver end-to-end IP-based services in a more simplified and modular manner than traditional router-based IP network designs. Adaptive IP at the programmable infrastructure layer is built upon the latest generation of our Service Aware Operating System (SAOS) within our Packet Networking platforms, which adds IP capabilities targeted towards 5G, IP VPN services and fiber deep applications. We have also recently introduced our 6500 Packet Transport System (PTS), which combines packet switching, control plane operation and integrated optics. Together with our 3900 platforms, PTS provides our service provider customers with a

complete solution to migrate their legacy TDM (SONET/SDH/PDH) services to a scalable, low operational cost packet solution.

Software and Software-Related Services

Our Software and Software-Related Services segment consists of our Blue Planet Automation Software and Services and our Platform Software and Services.

Blue Planet Automation Software and Services. Our Blue Planet Automation Software is a comprehensive, micro-services based open software suite that allows service providers to use enhanced knowledge about their networks to drive adaptive optimization of their services and operations. Blue Planet facilitates the evolution toward more efficient, modernized network operations with software-defined programmability that accelerates the delivery of on-demand services, reduces costs and enables a path toward a more predictive, autonomous network. We believe our Blue Planet solutions can enable network operators to minimize vendor-specific management silos, reduce network complexity and improve end-to-end service visibility and control. A number of applications can be deployed on the core platform, either individually or in any combination, and include:

- *Multi-Domain Service Orchestration (MDSO).* Network infrastructures are comprised of multiple technology layers and domains — such as the data center, cloud, metro, access and core networks — and it is often complex for network operators to offer services end-to-end in this environment. Blue Planet enables service orchestration across multiple network (physical and virtual) domains and multiple hardware and software vendors. By using open APIs and intent-based, model-driven templates, Blue Planet simplifies end-to-end services lifecycle management and increases service velocity by abstracting the complexity of underlying domains.

- *Inventory (BPI).* By integrating or "federating" data from multiple existing inventory and assurance systems and presenting it in a single dynamic view, network operators can gain real-time visibility into the topology and state of network and service resources from end to end. Integrating with legacy inventory systems, BPI helps network providers simplify and optimize key operational processes such as service fulfillment, network planning and service assurance. When integrated with other Blue Planet applications, BPI can leverage SDN and NFV to enable even greater levels of automation, deliver more dynamic services and respond more quickly to customers' rapidly changing requirements.

- *Route Optimization and Assurance (BP ROA).* Optimizing the delivery of IP services across the cloud, BP ROA combines routing, traffic and performance analytics for real-time, path-aware operational monitoring. These capabilities enable forensics for troubleshooting transient network problems that can cause service disruptions. Interactive modeling helps engineers predict the impact of network infrastructure and service changes, simulate new workloads for capacity planning and test failure scenarios to build more resilient networks.

- *NFV Orchestration (NFVO).* Blue Planet provides network operators with carrier-grade, NFV management and orchestration capabilities for instantiating and managing virtualized network functions and data center resources. NFVO uses an open, vendor-agnostic approach that allows network operators to select and scale those virtual network functions (VNFs) they wish to offer to their end customers.

- *Analytics.* Blue Planet Analytics incorporates big data analytics and machine-learning to generate network insights, thereby helping operators make smarter, data-driven business decisions. Analytics collects, processes and stores data from multiple sources across the network and leverages machine learning innovations for analysis and insights. Analytics enables the visualization and identification of network trends to create profitable services, better predict capacity requirements and anticipate potential network and service disruptions before they happen. We also offer a related Network Health Predictor application that provides preemptive network maintenance across the optical, Ethernet and IP layers of the network.

- *Blue Planet Services*. To complement our software portfolio, we offer a range of related services that include professional services for solution customization, software and solution support services, consulting and design, build-operate-transfer services and technical support relating to our software offerings. These services are focused on enhancing network automation and network analytics, enabling multi-vendor integration and support, and implementing programmable multi-domain next-generation networks.

The market relating to these software automation capabilities is in the early stages and, as such, revenue from our Blue Planet Automation Software platform has not been significant to date.

Platform Software and Services. Our software offerings also include our Platform Software, which provides analytics, data and planning tools to assist customers in managing our Networking Platforms products in their networks. Our Platform Software includes:

- *Manage, Control and Plan (MCP).* MCP software provides SDN-based domain control of our next-generation packet and optical networks, unifying Fault, Configuration, Accounting, Performance and Security (FCAPS) management of our multi-layer network infrastructure, with service management and online network planning. Built on Blue Planet's open, extensible microservices-based architecture, MCP marks a shift from legacy, fragmented network management software, to programmable, cloud-native operations that integrate into network operators' business processes. Lifecycle operations – including equipment commissioning, service provisioning, assurance and performance monitoring – are greatly automated and simplified through MCP. Providing granular resource management and control, MCP allows network operators to plan to meet customer service needs.

- *OneControl Unified Management System*. OneControl is an integrated network and service management solution that supports much of our Networking Platform product lines from a single software platform. OneControl offers end-to-end service creation, activation and assurance to enable rapid deployment of next-generation wavelength, OTN and packet services. It also provides visualization of fault and performance information for network health status and enables management functions, including network inventory, network element configuration backup, network element software delivery and security administration.

- *Platform Software Services.* To complement our Platform Software portfolio, we offer a range of related services that include software subscription services, consulting, network migration and integration, installation and upgrade support services, and technical support relating to our Platform Software offerings. These services are focused on enabling our customers to operate their Ciena networks most efficiently, and to modernize their operations through migration to our MCP domain control solution.

Our Platform Software offering also includes planning tools and a number of legacy software solutions that support our installed base of network solutions. As we gain further customer adoption of our MCP software platform and we transition features, functionality and customers to this platform, we expect revenue to decline for our legacy Platform Software solutions.

Global Services

To complement our Networking Platforms portfolio, we offer a broad suite of "attached services" that help our customers to design, optimize, deploy, integrate, manage and maintain their communications networks. We believe that our broad set of services offerings is a significant differentiator from our competitors. We believe that our services offerings and our close collaborative engagement with customers provide us with valued insight into network and business challenges faced by our customers, enabling them to achieve their desired outcomes for their network investment. Our services offerings enable us to work closely with our customers in the assessment, planning, deployment and transformation of their networks. We have begun a multi-year transformation process to enhance our service delivery capability and expand our service portfolio. Through these transformation initiatives, we believe we can improve the cost model of our services and drive greater incremental value for our customers in new ways.

Our Global Services portfolio includes a wide range of offerings to meet customer needs and maximize their network infrastructure investment throughout the network lifecycle. These services include:

- Planning and Design Services
    - Network advisory, consulting and design services;
    - Network optimization and modernization;
    - Reconfiguration and migration services;
    - Project management services, including staging, site preparation and installation support activities;
- Deployment Services
    - On-site and remote services to assist in deployment of networks including full turn-key solutions;
    - installation, turn-up and test services;
- Maintenance and Support Services
    - helpdesk and technical support assistance;
    - spares and logistics management;
    - engineering dispatch, preventive maintenance and on-site professional services; and
    - equipment repair and replacement;

- Managed network services, including 24/7 monitoring through our network operations center (NOC) services; and
- Analytics to provide insights into network health and operations with actionable recommendations

We also provide learning services to educate our customers and sales channels on the implementation, use, functionality and support of our solutions. We provide the services above using a combination of our technical support engineers and qualified and authorized third-party service partners.

Product Development

To remain competitive, we must continually invest in and enhance our Networking Platforms, adding new features and functionality and ensuring alignment with market demand. Through our development efforts we seek to enable network operators to achieve improved economics and efficiency, including with respect to price for performance, power consumption, space requirements and lifecycle operating costs. Our research and development strategy emphasizes software-enabled programmability, automation and open interfaces, and seeks to promote broad application of our solutions, including in submarine, long-haul, metropolitan and access networks, data center interconnect, enterprise networking and packet-based infrastructures for cloud-based service delivery. Our approach is also focused on designing products that address a range of emerging consumption models for networking solutions. Our current development efforts are focused upon:

- Enhancing and extending our Packet-Optical and Packet Networking solutions, including:
  - Coherent optical leadership and continued development of our WaveLogic coherent modems to advance transmission speed, spectral efficiency, power usage and reach;
  - Legacy service migration to next-generation packet infrastructures; and
  - Support of fiber densification initiatives, such as 5G and fiber deep.
- Developing products that enhance software-based network management, automation and control, service orchestration and network function virtualization, and analytics capabilities.

Our research and development efforts are also geared toward portfolio optimization and engineering changes intended to drive product and manufacturing cost reductions across our platforms.

We regularly review our existing solution offering and prospective development of new components, features or products, to determine their fit within our portfolio and broader corporate strategy. We also assess the market demand, technology evolution, prospective return on investment and growth opportunities, as well as the costs and resources necessary to develop and support these products. To ensure that our product development investments and solutions offerings are closely aligned with market demand, we continually seek input from customers and promote collaboration among our product development, marketing and sales organizations. In some cases, where we seek to utilize or gain access to complementary or emerging technologies or solutions, we may obtain technology through an acquisition or, alternatively, through initiatives with third parties pursuant to technology licenses, original equipment manufacturer (OEM) arrangements and other strategic technology relationships or investments. In addition, we participate in industry and standards organizations and, where appropriate, incorporate information from these affiliations throughout the product development process.

Sales and Marketing

Our Global Sales and Marketing organization includes a direct sales presence that is organized geographically around the following markets: (i) United States and Canada; (ii) Caribbean and Latin America; (iii) Europe, Middle East and Africa; and (iv) Asia-Pacific, Japan and India. Within each geographic area, we maintain specific teams or personnel that focus on a particular region, country, customer or market vertical. These teams include sales management, account salespersons and sales engineers, as well as services professionals and commercial management personnel, who ensure that we maintain a high-touch, consultative relationship with our customers.

We also maintain and have recently relaunched a global channel program that involves resellers, systems integrators, service providers and other third-party distributors who market and sell our products and services. We utilize these third party channel partners to market and sell our solutions into specific geographies, applications or customer verticals, including submarine networks, governments and Web-scale providers. We see opportunities to leverage these relationships to expand our addressable market, while at the same time reducing the financial and operational risk of entering additional markets.

To support our sales efforts, we engage in marketing activities to generate demand for our products and services. Our marketing strategy is highly focused on building our brand to create customer preference for Ciena, engaging in thought leadership programs to illustrate how our innovations solve customer business problems, and enabling our sales teams to drive customer adoption of our solutions. Our marketing team supports our sales efforts through a variety of activities, including

direct customer interaction, account-based marketing campaigns, portfolio marketing, industry events, media relations, industry analyst relations, social media, trade shows, our website and other marketing vehicles for our customers and channel partners.

Operations and Supply Chain Management

Our operations personnel manage our relationships with our third-party manufacturers and global supply chain, addressing component sourcing, manufacturing, product testing and quality, and fulfillment and logistics relating to the distribution and support of our products.

We utilize a sourcing strategy that emphasizes global procurement of materials and product manufacturing in lower cost regions. We rely upon third-party contract manufacturers, with facilities in Canada, Mexico, Thailand and the United States, to manufacture, support and ship our products, and therefore are exposed to risks associated with their businesses, financial condition and the geographies in which they operate. We also rely upon these contract manufacturers and other third parties to perform design and prototype development, component procurement, full production, final assembly, testing and distribution operations. Our manufacturers procure components necessary for assembly and manufacture of our products based on our specifications, approved vendor lists, bills of materials and testing and quality standards. Our manufacturers' activity is based on rolling forecasts that we provide to them to estimate demand for our products. We work closely with our manufacturers and suppliers to manage material, quality, cost and delivery times, and we continually evaluate their services to ensure performance on a reliable and cost-effective basis.

We currently use distribution partners to fulfill and deliver our products. We believe that our sourcing, manufacturing and distribution strategies allow us to conserve capital, lower costs of product sales, adjust quickly to changes in market demand and operate without dedicating significant resources to manufacturing-related plant and equipment.

As part of our effort to optimize our operations, we continue to focus on driving cost reductions through sourcing, rationalizing our contract manufacturers and supply chain, outsourcing or virtualizing certain activities, and consolidating distribution sites and service logistics partners. These efforts also include process optimization initiatives, such as vendor-managed inventory, and other operational models and strategies designed to drive improved efficiencies in our sourcing, production, logistics and fulfillment.

Backlog

Generally, we make sales pursuant to purchase orders placed by customers under framework agreements that govern the general commercial terms and conditions of the sale of our products and services. These agreements do not obligate customers to purchase any minimum or guaranteed order quantities. Moreover, we are periodically awarded business for new network opportunities or network upgrades following a selection process. In calculating backlog, we only include (i) customer purchase orders for products that have not been shipped and for services that have not yet been performed; and (ii) customer orders relating to products that have been delivered and services that have been performed, but are awaiting customer acceptance under the applicable contract terms. Generally, our customers may cancel or change their orders with limited advance notice, or they may decide not to accept our products and services, although instances of both cancellation and non-acceptance are rare. Backlog may be fulfilled several quarters following receipt of a purchase order, or in the case of certain service obligations, may relate to multi-year support period. As a result, backlog should not necessarily be viewed as an accurate indicator of future revenue for any particular period.

Our backlog was $1.26 billion as of October 31, 2018 as compared to $1.13 billion as of October 31, 2017. Backlog includes product and service orders from commercial and government customers combined. Backlog at October 31, 2018 includes approximately $226.8 million, primarily related to orders for products and maintenance and support services that are not expected to be filled or performed within fiscal 2019. Because backlog can be defined in different ways by different companies, our presentation of backlog may not be comparable with figures presented by other companies in our industry.

Seasonality

Like other companies in our industry, we experience quarterly fluctuations in customer activity due to seasonal considerations. We typically experience reductions in order volume toward the end of the calendar year, as the procurement cycles of some of our customers slow and network deployment activity by service providers is curtailed. This period coincides with the first quarter of our fiscal year. This seasonality in our order flows has often resulted in weaker revenue results in the first quarter of our fiscal year. These seasonal effects may not apply consistently in future periods and may not be a reliable indicator of our future revenue or results of operations.

Competition

Competition among networking solution vendors remains intense on a global basis. The markets in which we compete are characterized by rapidly advancing technologies, frequent introduction of new networking solutions and aggressive selling efforts, including using significant pricing pressure to displace incumbent vendors and capture market share. Competition for sales of communications networking solutions is dominated by a small number of very large, multi-national companies. Our competitors include Huawei, Nokia, Cisco, Juniper Networks and ZTE. As compared to us, many of these competitors have substantially greater financial, operational and marketing resources, significantly broader product offerings and more established relationships with service providers and other customer segments. Because of their scale and resources, they may be perceived to be a better fit for the procurement or network strategies of larger network operators. We also continue to compete with several smaller but established companies that offer one or more products that compete directly or indirectly with our offerings or whose products address specific niches within the markets and customer segments we address. These competitors include Infinera, ADVA and ECI. We also compete with a number of smaller companies that provide significant competition for a specific product, application, customer segment or geographic market.

Keeping pace with the market's demands for technology innovation requires considerable research and development investment capacity. As a result, some of our competitors, both large and small, have chosen to rely upon coherent modem technology developed by and procured from third-party "merchant" providers, including Acacia Communications, NTT Electronics (NEL) and Inphi. We may compete with these providers, either indirectly as a result of their technology being a key enabling technology for our competitors, or directly across emerging consumption models as we pursue our strategy of capturing market share within merchant modem sales opportunities.

The principal competitive factors applicable to our markets include:

- the ability to meet business needs and drive successful outcomes;
- functionality, speed, capacity, scalability and performance of network solutions;
- price for performance, cost per bit and total cost of ownership of network solutions;
- incumbency and strength of existing business relationships;
- ability to offer comprehensive networking solutions, consisting of hardware, software and services;
- time-to-market in delivering products and features;
- technology roadmap and forward innovation capacity;
- company stability and financial health;
- flexibility and openness of platforms, including ease of integration, interoperability and integrated management;
- ability to offer solutions that accommodate a range of different consumption models;
- space requirements and power consumption of network solutions;
- software and network automation capabilities;
- manufacturing and lead-time capability; and
- services and support capabilities.

As a result of the intense environment in which we compete, winning new opportunities can often require that we agree to unfavorable commercial terms or pricing and other onerous contractual commitments. These terms can adversely affect our results of operations. These terms can also lengthen our revenue recognition or cash collection cycles, add start-up costs to initial sales or deployment of our solutions, require financial commitments or performance bonds and place a disproportionate allocation of risk upon us.

We expect the competition in our industry to continue to broaden and to intensify as network operators pursue a diverse range of network strategies. As these changes occur, we expect that our business will overlap more directly with additional networking solution suppliers, including IP router vendors, data center switch providers and other suppliers or integrators of networking technology traditionally geared toward different network applications, layers or functions. In addition, as we seek increased customer adoption of our Blue Planet Automation Software, and network operator demands for software programmability, management and automation increase, we expect to compete more directly with software vendors and information technology vendors or system integrators. We may also face competition from system and component vendors, including those in our supply chain, who develop pluggable modem technology or other networking products based on off-the-shelf or commoditized hardware technology, referred to as "white box" hardware, particularly where a customer's network strategy seeks to emphasize deployment of such product offerings or to adopt a disaggregated approach to the procurement of hardware and software.

Patents, Trademarks and Other Intellectual Property Rights

The success of our business and technology leadership is significantly dependent upon our proprietary and internally developed technology. We rely upon the intellectual property protections afforded by patents, copyrights, trademarks and trade secret laws to establish, maintain and enforce rights in our proprietary technologies and product branding. We maintain an incentive program for inventions and patents that seeks to reward innovation and an internal invention review board that selects appropriate protection mechanisms for our technology. We regularly file applications for patents and have a significant number of patents in the United States and other countries where we do business. As of December 1, 2018, we had 1,620 issued U.S. patents, 244 pending U.S. patent applications, 315 issued non-U.S. patents and 154 pending non-U.S. patent applications.

We also rely on non-disclosure agreements and other contracts and policies regarding confidentiality with employees, contractors and customers to establish proprietary rights and to protect trade secrets and confidential information. Our practice is to require employees and relevant consultants to execute non-disclosure and proprietary rights agreements upon commencement of their employment or consulting arrangements with us. These agreements acknowledge our ownership of intellectual property developed by the individual during the course of his or her work with us. The agreements also require that these persons maintain the confidentiality of all proprietary information disclosed to them.

Enforcing proprietary rights, especially patents, can be costly, and we cannot be certain that the steps that we are taking will detect or prevent all unauthorized use. The industry in which we compete is characterized by rapidly changing technology, a large number of patents and frequent claims and related litigation regarding patent and other intellectual property rights. We have been subject to several claims related to patent infringement, including by competitors and also by non-practicing patent assertion entities, and we have been requested to indemnify customers pursuant to contractual indemnity obligations relating to infringement claims made by third parties. Intellectual property infringement assertions could cause us to incur substantial costs, including settlement costs and legal fees in the defense of related actions. If we are not successful in defending these claims, our business could be adversely affected. For example, we may be required to enter into a license agreement requiring us to make ongoing royalty payments; we may be required to redesign our products; or we may be prohibited from selling infringing technology in certain jurisdictions.

Our operating system software, Platform Software, Blue Planet Automation Software and other solutions incorporate software and components under licenses from third parties, including software subject to various open source software licenses. As network operators seek to adopt network infrastructures with increased software control and programmability and to utilize an open ecosystem of physical and virtual network resources provided by multiple third parties, we expect to incorporate into our solutions additional elements of open source software or license additional software or technology from third parties. We expect that these network architectural approaches will require increased openness and interoperability of multi-vendor, multi-domain network environments, requiring an increased degree of cooperation among solutions providers. Failure to obtain or maintain such licenses or other third-party intellectual property rights could affect our development efforts and market opportunities, or could require us to re-engineer our products or to obtain alternate technologies. Moreover, there is a risk that open source and other technology licenses could be construed in a manner that could impose unanticipated conditions or restrictions on our ability to commercialize our products.

Environmental Matters

Our business and operations are subject to environmental laws in various jurisdictions around the world, including the Waste Electrical and Electronic Equipment (WEEE) and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) regulations adopted by the European Union. We are also subject to disclosure and related requirements that apply to the presence of “conflict minerals” in our products or supply chain. We seek to operate our business in compliance with such laws relating to the materials and content of our products and product takeback and recycling. Environmental regulation is increasing, particularly outside of the United States, and we expect that our domestic and international operations may be subject to additional environmental compliance requirements, which could expose us to additional costs. To date, our compliance actions and costs relating to environmental regulations have not resulted in a material cost or effect on our business, results of operations or financial condition.

Employees

As of October 31, 2018, we had a global workforce consisting of 6,013 employees. We have not experienced any work stoppages, and we consider the relationships with our employees to be good. While we have been able to recruit and retain key personnel with the capabilities required by our business and markets, competition for highly skilled technical, engineering and other personnel with experience in our industry is intense. We believe that our future success depends in critical part on our continued ability to recruit, motivate and retain such qualified personnel.

Directors and Executive Officers

The table below sets forth certain information concerning our directors and executive officers:

Name	Age	Position
Patrick H. Nettles, Ph.D.	75	Executive Chairman of the Board of Directors
Gary B. Smith	58	President, Chief Executive Officer and Director
Stephen B. Alexander	59	Senior Vice President and Chief Technology Officer
James A. Frodsham	52	Senior Vice President and Chief Strategy Officer
Rick L. Hamilton	47	Senior Vice President, Global Software and Services
Scott A. McFeely	55	Senior Vice President, Global Products and Services
James E. Moylan, Jr.	67	Senior Vice President and Chief Financial Officer
Andrew C. Petrik	55	Vice President and Controller
Jason M. Phipps	46	Senior Vice President, Global Sales and Marketing
David M. Rothenstein	50	Senior Vice President, General Counsel and Secretary
Bruce L. Claflin (1)(2)	67	Director
Lawton W. Fitt (2)	65	Director
Patrick T. Gallagher (1)(3)	63	Director
T. Michael Nevens (2)	69	Director
Judith M. O'Brien (1)(3)	68	Director
Joanne B. Olsen (1)(3)	60	Director
Michael J. Rowny (2)	68	Director

(1) Member of the Compensation Committee

(2) Member of the Audit Committee

(3) Member of the Governance and Nominations Committee

Our Directors hold staggered terms of office, expiring as follows: Ms. Fitt, Dr. Nettles and Mr. Rowny in 2019; Ms. O'Brien and Mr. Smith in 2020, and Mr. Claflin, Mr. Gallagher and Mr. Nevens in 2021. In October 2018, Ms. Olsen was appointed to fill a newly created vacancy in the Board of Directors. Accordingly, she will stand for election at the 2019 Annual Meeting of stockholders and, if elected by stockholders, her term of office will expire in 2020.

Patrick H. Nettles, Ph.D. has served as a Director of Ciena since April 1994 and as Executive Chairman of the Board of Directors since May 2001. From October 2000 to May 2001, Dr. Nettles was Chairman of the Board of Directors and Chief Executive Officer of Ciena, and he was President and Chief Executive Officer from April 1994 to October 2000. Dr. Nettles serves as a Trustee for the California Institute of Technology and the Georgia Tech Foundation, Inc. Dr. Nettles also serves on the board of directors of The Progressive Corporation and previously served on the board of Axcelis Technologies, Inc., where he was independent chairman of the board. Dr. Nettles has previously served on the boards of directors of Apptrigger, Inc., formerly known as Carrius Technologies, Inc., and Optiwind Corp, a privately held company.

Gary B. Smith joined Ciena in 1997 and has served as President and Chief Executive Officer since May 2001. Mr. Smith has served on Ciena's Board of Directors since October 2000. Prior to his current role, his positions with Ciena included Chief Operating Officer and Senior Vice President, Worldwide Sales. Mr. Smith previously served as Vice President of Sales and Marketing for INTELSAT and Cray Communications, Inc. Mr. Smith also serves on the board of directors of CommVault Systems, Inc. and previously served on the board of directors of Avaya Inc. Mr. Smith is a member of the President's National Security Telecommunications Advisory Committee, the Global Information Infrastructure Commission and the Center for Corporate Innovation (CCI).

Stephen B. Alexander joined Ciena in 1994 and has served as Chief Technology Officer since September 1998 and as a Senior Vice President since January 2000. Mr. Alexander has previously served as General Manager of Products and Technology and General Manager of Transport and Switching and Data Networking.

James A. Frodsham joined Ciena in May 2004 and has served as Senior Vice President and Chief Strategy Officer since March 2010 with responsibility for our strategic planning and corporate development activities. Mr. Frodsham previously served as General Manager of Ciena's former Broadband Access Group and Metro and Enterprise Solutions Group. Prior to joining Ciena, Mr. Frodsham served as chief operating officer of Innovance Networks. Prior to that, Mr. Frodsham was

employed in senior level positions with Nortel Networks in product development and marketing strategy. Mr. Frodsham serves on the boards of directors of Innovance Networks and Relogix Inc.

Rick L. Hamilton joined Ciena in October 2016 and has served as Senior Vice President, Global Software and Services since February 2017. Mr. Hamilton is responsible for managing Ciena's Blue Planet Automation Software and Services portfolio. Mr. Hamilton previously served as Senior Vice President, Global Services & Automation. Prior to joining Ciena, he served as Corporate Vice President, Professional Services for Juniper Networks from January to October 2016. From January 2004 to December 2015, Mr. Hamilton served with Cisco Systems in various services leadership positions, including most recently as Vice President, Cloud & Managed Services.

Scott A. McFeely joined Ciena in March 2010 and has served as Senior Vice President, Global Products and Services since May 2018. Mr. McFeely is responsible for all aspects of Ciena's networking portfolio including research and development activities relating to its Converged Packet-Optical and Packet Networking portfolios, Platform Software and Services, product line management, supply chain operations, and Global Services. From November 2015 to May 2018, Mr. McFeely served as Senior Vice President, Networking Platforms. From March 2010 to October 2015, he served as Vice President, Global Portfolio Management and Business Operations. Mr. McFeely joined Ciena in connection with its acquisition of Nortel's Metro Ethernet Networks business, with which he spent more than 20 years in a variety of technical and management roles.

James E. Moylan, Jr. has served as Senior Vice President and Chief Financial Officer since December 2007.

Andrew C. Petrik joined Ciena in 1996 and has served as Vice President, Controller since August 1997. He also served as Treasurer from August 1997 to October 2008.

Jason M. Phipps joined Ciena in 2002 and has served as Senior Vice President, Global Sales and Marketing since February 2017. Mr. Phipps is responsible for Ciena's global sales organization and its marketing and communications functions. From January 2014 to February 2017, Mr. Phipps served as Vice President and General Manager, North America Sales, during which time he also oversaw the Global Partners & Channels practice, and from March 2011 to December 2013 he served as Vice President, Global Sales Operations. Mr. Phipps has also previously held a number of sales and marketing leadership positions with Ciena.

David M. Rothenstein joined Ciena in January 2001 and has served as Senior Vice President, General Counsel and Secretary since November 2008. Mr. Rothenstein served as Vice President and Associate General Counsel from July 2004 to October 2008 and previously as Assistant General Counsel.

Bruce L. Claflin has served as a Director of Ciena since August 2006. Mr. Claflin served as President and Chief Executive Officer of 3Com Corporation from January 2001 until his retirement in February 2006. Mr. Claflin joined 3Com as President and Chief Operating Officer in August 1998. Prior to 3Com, Mr. Claflin served as Senior Vice President and General Manager, Sales and Marketing, for Digital Equipment Corporation. Mr. Claflin also worked for 22 years at IBM, where he held various sales, marketing and management positions, including general manager of IBM PC Company's worldwide research and development, product and brand management, as well as president of IBM PC Company Americas. Mr. Claflin currently serves on the board of directors of IDEXX Laboratories, Inc., where he is the Chairman of the Nominating and Governance Committee. Mr. Claflin previously served on the board of directors of Advanced Micro Devices (AMD).

Lawton W. Fitt has served as a Director of Ciena since November 2000. From October 2002 to March 2005, Ms. Fitt served as Director of the Royal Academy of Arts in London. From 1979 to October 2002, Ms. Fitt was an investment banker with Goldman Sachs & Co., where she was a partner from 1994 to October 2002. Ms. Fitt currently serves on the boards of directors of The Carlyle Group LP, The Progressive Corporation and Micro Focus International PLC. Ms. Fitt also has previously served on the boards of directors of ARM Holdings PLC and Thomson Reuters Corporation. Ms. Fitt also serves as a director or trustee of several non-profit organizations.

Patrick T. Gallagher has served as a Director of Ciena since May 2009. Mr. Gallagher currently serves as Chairman of Harmonic Inc., a global provider of high-performance video solutions to the broadcast, cable, telecommunications and managed service provider sectors. From March 2008 until April 2012, Mr. Gallagher was Chairman of Ubiquisys Ltd., a leading developer and supplier of femtocells for the global 3G mobile wireless market. From January 2008 until February 2009, Mr. Gallagher was Chairman of Macro 4 plc, a global software solutions company, and from May 2006 until March 2008, served as Vice Chairman of Golden Telecom Inc., a leading facilities-based provider of integrated communications in Russia and the CIS. From 2003 until 2006, Mr. Gallagher was Executive Vice Chairman and served as Chief Executive Officer of FLAG Telecom Group and, prior to that role, held various senior management positions at British Telecom. Mr. Gallagher is also Chairman of Intercloud SAS, a Paris-headquartered provider of global private cloud connectivity services. Mr. Gallagher previously served on the board of directors of Sollers JSC.

T. Michael Nevens has served as a Director of Ciena since February 2014. Since 2006, Mr. Nevens has served as senior adviser to Permira Advisers, LLC, an international private equity fund. From 1980 to 2002, Mr. Nevens held various leadership positions at McKinsey & Co., most recently as a director (senior partner) and as managing partner of the firm's Global

Technology Practice. He also served on the board of the McKinsey Global Institute, which conducts research on economic and policy issues. Mr. Nevens has been an adjunct professor of Corporate Governance and Strategy at the Mendoza College of Business at the University of Notre Dame. Mr. Nevens also serves as the Chairman of the board of directors of NetApp, Inc. Mr. Nevens previously served on the board of directors of Altera Corporation.

Judith M. O'Brien has served as a Director of Ciena since July 2000. Since November 2012, Ms. O'Brien has served as a partner and head of the Emerging Company Practice Group at the law firm of King & Spalding. Ms. O'Brien served as Executive Vice President and General Counsel of Obopay, Inc., a provider of mobile payment services, from November 2006 through December 2010. From February 2001 until October 2006, Ms. O'Brien served as a Managing Director at Incubic Venture Fund, a venture capital firm. From August 1980 until February 2001, Ms. O'Brien was a lawyer with Wilson Sonsini Goodrich & Rosati, where, from February 1984 to February 2001, she was a partner specializing in corporate finance, mergers and acquisitions, and general corporate matters. Ms. O'Brien serves on the boards of directors of privately-held companies, Theatro Labs, Inc., Inform, Inc. and MagicCube, Inc. Ms. O'Brien has also previously served on the board of directors of Adaptec, Inc.

Joanne B. Olsen has served as a Director of Ciena since October 2018. Ms. Olsen previously served as Executive Vice President of Global Cloud Services and Support at Oracle from 2016 until her retirement in August 2017. In that role, she drove Oracle's cloud transformation services and support strategy, partnering with leaders across all business units. Ms. Olsen previously served as Senior Vice President and leader of Oracle's applications sales, alliances, and consulting organizations in North America from 2012 through 2016, and from 2010 through 2012 served in various general management positions at Oracle. Ms. Olsen began her career with IBM, where, between 1979 and 2010, she held a variety of executive management positions across sales, global financing and hardware. Ms. Olsen also serves on the board of directors of Teradata Corporation.

Michael J. Rowny has served as a Director of Ciena since August 2004. Mr. Rowny has been Chairman of Rowny Capital, a private equity firm, since 1999. From 1994 to 1999, and previously from 1983 to 1986, Mr. Rowny was with MCI Communications in positions including President and Chief Executive Officer of MCI's International Ventures, Alliances and Correspondent group, acting Chief Financial Officer, Senior Vice President of Finance, and Treasurer. Mr. Rowny's career in business and government has also included positions as Chairman and Chief Executive Officer of the Ransohoff Company, Chief Executive Officer of Hermitage Holding Company, Executive Vice President and Chief Financial Officer of ICF Kaiser International, Inc., Vice President of the Bendix Corporation, and Deputy Staff Director of the White House. Mr. Rowny has also previously served on the board of directors of Neustar, Inc.

Item 1A. Risk Factors

Investing in our securities involves a high degree of risk. In addition to the other information contained in this report, you should consider the following risk factors before investing in our securities.

Our revenue, gross margin and operating results can fluctuate significantly and unpredictably from quarter to quarter.

Our revenue, gross margin and results of operations can fluctuate significantly and unpredictably from quarter to quarter. Our budgeted expense levels are based on our visibility into customer spending plans and our projections of future revenue and gross margin. Visibility into customer spending levels can be uncertain, spending patterns are subject to change, and reductions in our expense levels can take significant time to implement. A significant portion of our quarterly revenue is generated from customer orders received in that same quarter (which we refer to as "book to revenue"). Accordingly, our revenue for a particular quarter is difficult to predict, and a shortfall in expected orders in a given quarter can materially adversely affect our revenue and results of operations for that quarter or future quarterly periods. Additional factors that contribute to fluctuations in our revenue, gross margin and operating results include:

- changes in spending levels or patterns by customers, particularly with respect to our service provider and Web-scale provider customers;
- order timing, volume and cancellations;
- backlog levels;
- the level of competition and pricing pressure in our industry;
- the impact of commercial concessions or unfavorable commercial terms required to maintain incumbency or secure new opportunities with key customers;
- the mix of revenue by product segment, geography and customer in any particular quarter;
- our level of success in achieving targeted cost reductions and improved efficiencies in our supply chain;
- the pace and impact of price erosion that we regularly encounter in our markets;
- our level of success in executing our strategy of capturing additional market share and displacing competitors;
- our incurrence of start-up costs, including lower margin phases of projects required to support initial deployments, gain new customers or enter new markets;
- technology-based price compression and the introduction of new platforms with improved price for performance;
- changing market, economic and political conditions;
- consolidation activity among our customers and suppliers;
- the timing of revenue recognition on sales, particularly relating to large orders;
- installation service availability and readiness of customer sites;
- availability of components and manufacturing capacity;
- adverse impact of foreign exchange; and
- seasonal effects in our business.

As a result of these factors and other conditions affecting our business and operating results, we believe that quarterly comparisons of our operating results are not necessarily a good indication of possible future performance. Quarterly fluctuations from the above factors may cause our revenue, gross margin and results of operations to underperform in relation to our guidance, long-term financial targets or the expectations of financial analysts or investors, which may cause volatility or decreases in our stock price.

A small number of customers account for a significant portion of our revenue. The loss of any of these customers or a significant reduction in their spending could have a material adverse effect on our business and results of operations.

A significant portion of our revenue is concentrated among a small number of customers. For example, our ten largest customers contributed 56.5% of our fiscal 2018 revenue. Historically, our largest customers by revenue principally consisted of large communications service providers. For example, AT&T and Verizon accounted for approximately 12.1% and 10.3% of fiscal 2018 revenue, respectively. As a result of efforts in recent years to diversify our business, our customer base, including some of our largest customers, currently includes Web-scale providers. In addition to their position among our largest customers by revenue, these customers are increasingly important contributors to our overall growth through both our direct sales to this market vertical and their impact on purchases by other network operators. During fiscal 2018, two Web-scale providers were among our top ten customers. Consequently, our financial results and our ability to grow our business are closely correlated with the spending of a relatively small number of customers in these segments. Changes in their levels of network spending or their consumption models for acquiring networking solutions could adversely affect our operating results.

Because a number of our largest customers and our largest customer segment are communications service providers, our business and results of operations can be significantly affected by market, industry or competitive dynamics adversely affecting this segment. Our communications service provider customers continue to face a rapidly shifting competitive landscape as cloud service operators, “over-the-top” (OTT) providers and other content providers challenge their traditional business models and network infrastructures. These dynamics have had an adverse effect on network spending levels in this segment. A number of our service provider customers, including AT&T, with whom we experienced declines in annual revenue during fiscal 2017 and fiscal 2018, have announced various procurement initiatives or efforts to reduce capital expenditures on network infrastructure in future periods that may adversely affect our results of operations. Moreover, a number of our communications service providers and cable operator customers, including AT&T, Verizon and Centurylink, have either recently announced significant acquisition transactions or are in the process of significant related integration activities, including the acquisition of media or content companies. Such transactions have in the past, and may in the future, result in spending delays or deferrals, or changes in preferred vendors, due to changes in strategy or leadership, the timing of regulatory approvals and debt burdens associated with such transactions. Our business and results of operations could be materially adversely affected by these factors and other market, industry or competitive dynamics adversely impacting our customer segments.

We do not have long-term contracts that obligate our customers, including our largest customers, to purchase any minimum or guaranteed volumes, and we conduct sales under purchase orders for which our customers often have the right to modify or cancel. We must regularly compete for and win business with existing customers. Moreover, Web-scale providers tend to operate on shorter procurement cycles than our traditional customers, which can require us to compete to re-win business with these customers more frequently than required with other customers segments. As such, there is no assurance that our incumbency will be maintained at any given customer or that our revenue levels from a customer in a particular period can be achieved in future periods. Customer spending levels can be unpredictable and our sales to any customer could significantly decrease or cease at any time. Our business and results of operations would be materially adversely impacted by the loss of a large customer or reductions in spending or capital expenditure budgets by our largest customers.

We face intense competition that could hurt our sales and results of operations, and we expect the competitive landscape in which we operate to continue to broaden to include additional solutions providers.

We face an intense competitive market for sales of communications networking equipment, software and services. Competition is intense on a global basis, as we and our competitors aggressively seek to capture market share and displace incumbent equipment vendors. A small number of very large vendors have historically dominated our industry, many of which have substantially greater financial and marketing resources, broader product offerings and more established relationships with service providers and other customer segments than we do. In addition, to drive scale and market share gains and meet the intense investment capacity required to keep pace with technology innovation, acquisition activity among vendors of networking solutions has increased. Consolidation in our industry may result in competitors with greater resources, pricing flexibility, or other synergies, that provide them with a competitive advantage.

Moreover, certain customers are adopting procurement strategies that seek to purchase a broader set of networking solutions from a single or small number of vendors. Because of their scale and resources, and a more diverse set of solution offerings, certain of our larger competitors may be perceived to be a better fit for the procurement or network operating and management strategies of large service providers. We also compete with a number of smaller companies that provide significant competition for a specific product, application, customer segment or geographic market. Due to the narrower focus of their efforts, these competitors may achieve commercial availability of their products more quickly or may be more attractive to customers in a particular product niche.

Generally, competition in our markets is based on any one or a combination of the following factors:

- the ability to meet business needs and drive successful outcomes;
- functionality, speed, capacity, scalability and performance of solutions;
- price for performance, cost per bit and total cost of ownership of solutions;
- incumbency and strength of existing business relationships;
- ability to offer comprehensive networking solutions, consisting of hardware, software and services;
- time-to-market in delivering products and features;
- technology roadmap and forward innovation capacity;
- company stability and financial health;
- flexibility and openness of platforms, including ease of integration, interoperability and integrated management;
- ability to offer solutions that accommodate a range of different consumption models;
- software and network automation capabilities;
- manufacturing and lead-time capability; and

- services and support capabilities.

Part of our strategy is to leverage our technology leadership and to aggressively capture additional market share and displace competitors, particularly with communications service providers internationally. In an effort to maintain our incumbency or to secure new customer opportunities, we have in the past, and may in the future, agree to aggressive pricing, commercial concessions and other unfavorable terms that result in low or negative gross margins on a particular order or group of orders. Competition can also result in onerous commercial and legal terms and conditions that place a disproportionate amount of risk on us.

We expect the competition in our industry to continue to broaden and to intensify, as network operators pursue a diverse range of network strategies and consumption models. As these changes occur, we expect that our business will compete more directly with additional networking solution suppliers, including IP router vendors, data center switch providers and other suppliers or integrators of networking technology. In addition, as we seek increased customer adoption of our Blue Planet Automation Software platform, and as network operator demands for software programmability, management and control increase, we expect to compete more directly with software vendors and information technology vendors or integrators of these solutions. We may also face competition from system and component vendors, including those in our supply chain, that develop networking products based on off-the-shelf or commoditized hardware technology, referred to as “white box” hardware, particularly where a customer's network strategy seeks to emphasize deployment of such product offerings or adopt a disaggregated approach to the procurement of hardware and software. Such an increase in competitive intensity, the emergence of new consumption models, or the entry of new competitors into our markets, may adversely impact our business and results of operations. If competitive pressures increase, or if we fail to compete successfully in our markets, our business and results of operations could suffer.

Our business and operating results could be adversely affected by unfavorable changes in macroeconomic and market conditions and reductions in the level of spending by customers in response to these conditions.

Our business and operating results depend significantly on general market and economic conditions. Market volatility and weakness in the regions in which we operate have previously resulted in sustained periods of decreased demand for our products and services, which has adversely affected our operating results. Macroeconomic and market conditions could be adversely affected by a variety of political, economic or other factors in the United States and international markets, which could in turn adversely affect spending levels of our customers and their end users, and could create volatility or deteriorating conditions in the markets in which we operate. Macroeconomic uncertainty or weakness could result in:

- reductions in customer spending and delay, deferral or cancellation of network infrastructure initiatives;
- increased competition for fewer network projects and sales opportunities;
- increased pricing pressure that may adversely affect revenue, gross margin and profitability;
- difficulty forecasting operating results and making decisions about budgeting, planning and future investments;
- increased overhead and production costs as a percentage of revenue;
- tightening of credit markets needed to fund capital expenditures by us or our customers;
- customer financial difficulty, including longer collection cycles and difficulties collecting accounts receivable or write-offs of receivables; and
- increased risk of charges relating to excess and obsolete inventories and the write-off of other intangible assets.

Reductions in customer spending in response to unfavorable or uncertain macroeconomic and market conditions, globally or in a particular region where we operate, would adversely affect our business, results of operations and financial condition.

Investment of research and development resources in communications networking technologies for which there is not an adequate market demand, or failure to sufficiently or timely invest in technologies for which there is market demand, would adversely affect our revenue and profitability.

The market for communications networking hardware and software solutions is characterized by rapidly evolving technologies, changes in market demand and increasing adoption of software-based networking solutions. We continually invest in research and development to sustain or enhance our existing hardware and software solutions and to develop or acquire new technologies including new software platforms. There is often a lengthy period between commencing these development initiatives and bringing new or improved solutions to market. During this time, technology preferences, customer demand and the markets for our solutions may move in directions that we had not anticipated. There is no guarantee that our new products, including our Blue Planet Automation Software platform, or enhancements to other solutions, will achieve market acceptance or that the timing of market adoption will be as predicted. As a result, there is a significant possibility that some of our development decisions, including significant expenditures on acquisitions, research and development costs, or investments in technologies, will not meet our expectations, and that our investment in some projects will be unprofitable. There is also a possibility that we

may miss a market opportunity because we failed to invest or invested too late, in a technology, product or enhancement sought by our customers. Changes in market demand or investment priorities may also cause us to discontinue existing or planned development for new products or features, which can have a disruptive effect on our relationships with customers. If we fail to make the right investments or fail to make them at the right time, competing solutions may be more attractive in the market. As a result, our competitive position may suffer, and our revenue and profitability could be adversely affected.

Network equipment sales to communications service providers, Web-scale providers and other large customers often involve lengthy sales cycles and protracted contract negotiations that may require us to agree to commercial terms or conditions that negatively affect pricing, risk allocation, payment and the timing of revenue recognition.

Our sales initiatives, particularly with communications service providers, Web-scale providers and other large customers, often involve lengthy sales cycles. These selling efforts often involve a significant commitment of time and resources by us and our customers that may include extensive product testing, laboratory or network certification, network or region-specific product certification and homologation requirements for deployment in networks. Even after a customer awards its business to us or decides to purchase our solutions, the length of deployment time can vary depending upon the customer's schedule, site readiness, the size of the network deployment, the degree of custom configuration required and other factors. Additionally, these sales also often involve protracted and sometimes difficult contract negotiations in which we may deem it necessary to agree to unfavorable contractual or commercial terms that adversely affect pricing, expose us to penalties for delays or non-performance and require us to assume a disproportionate amount of risk. To maintain incumbency with key customers for existing and future business opportunities, we may be required to offer discounted pricing, make commercial concessions or offer less favorable terms as compared to our historical business arrangements with these customers. We may also be requested to provide deferred payment terms, vendor or third-party financing or other alternative purchase structures that extend the timing of payment and revenue recognition. Alternatively, customers may insist upon terms and conditions that we deem too onerous or not in our best interest, and we may be unable to reach a commercial agreement. As a result, we may incur substantial expense and devote time and resources to potential sales opportunities that never materialize or result in lower than anticipated sales.

If the market for software solutions does not evolve in the way we anticipate or if customers do not adopt our Blue Planet solutions, we may not be able to monetize our software assets and realize a key part of our business strategy.

A key part of our business strategy depends on our ability to commercialize and gain market adoption for our Blue Planet Automation Software platform. If the markets relating to software solutions for network automation, including service orchestration, route optimization, analytics and assurance and SDN or NFV, do not develop as we anticipate, or if we are unable to increase market awareness and adoption of our Blue Planet solutions as a preferred solution within those markets, demand for our Blue Planet solutions may not grow. Our long-term success in the software market will depend to a significant extent on both potential customers recognizing the benefits of our next-generation Blue Planet software solutions, and the willingness of service providers and high-performance data center and other network operators to increase software programmability and automation within their networks. We have a limited history in commercializing and selling these software solutions and have only recently acquired elements of our Blue Planet portfolio to facilitate our go to market strategy for these solutions. Moreover, the market for these solutions is at an early stage, and it is difficult to predict important trends, including the potential growth, if any, of this market. If the market for these software solutions does not evolve in the way we anticipate or if customers do not adopt our solutions, we may not to be able to increase sales of our Blue Planet platform, and a key part of our business strategy would be adversely affected.

Changes in networking or procurement strategies by our customers could adversely affect our business, competitive position and results of operations.

Growing bandwidth demands and network operator efforts to reduce costs are causing network operators to consider a diverse range of approaches to the design and procurement of network infrastructure. We refer to these different approaches as "consumption models." These consumption models can include: the traditional systems procurement of fully integrated solutions including hardware, software and services from the same vendor; the procurement of a fully integrated hardware solution from one vendor with the separate use of a network operator's own SDN-based controller; the procurement of an integrated photonic line system with open interfaces from one vendor and the separate or "disaggregated" procurement of modem technology from a different vendor; or the use of published reference designs and open source specifications for the procurement of off-the-shelf or commoditized hardware (often referred to as "white box" hardware) to be used with open source software. In parallel, network operators are also exploring procurement alternatives for software solutions, ranging from integrated and proprietary software platforms to fully open source software. We believe that network operators will continue to consider a variety of different consumption models. Many of these approaches are in their very early stages of development and evaluation, and the types of models and their levels of adoption will depend in significant part on the nature of the circumstances and strategies of particular network operators. Among our customers, AT&T is pursuing network strategies that emphasize enhanced software programmability, management and control of networks, and deployment of "white box" hardware. Other network operators,

including our Web-scale customers, are playing a leading role in the transition to software-defined networking or the standardization of communications network solutions. We believe that the potential for different approaches to the procurement of networking infrastructure will require network operators and vendors to evolve and broaden their existing commercial models over time. Adoption of a range of consumption models may also alter and broaden our competitive landscape to include other technology vendors, including component vendors and software vendors. If we are unable to offer attractive solutions and commercial models that accommodate the range of consumption models ultimately adopted by our customers or within our markets, our business, competitive position and results of operations could be adversely affected.

We may experience delays in the development and production of our products that may negatively affect our competitive position and business.

Our hardware and software networking solutions, including our coherent optical modem components, are based on complex technology, and we can experience unanticipated delays in developing, manufacturing and introducing these solutions to market. Delays in product development efforts by us or our supply chain may affect our reputation with customers, affect our ability to seize market opportunities and impact the timing and level of demand for our products. The development of new technologies may increase the complexity of supply chain management or require the acquisition, licensing or interworking with the technology of third parties. As a result, each step in the development cycle of our products presents serious risks of failure, rework or delay, any one of which could adversely affect the cost-effectiveness and timely development of our products. We may encounter delays relating to engineering development activities and software, design, sourcing and manufacture of critical components, and the development of prototypes. In addition, intellectual property disputes, failure of critical design elements and other execution risks may delay or even prevent the release of these products. If we do not successfully develop or produce products in a timely manner, our competitive position may suffer, and our business, financial condition and results of operations could be harmed.

We rely upon third-party contract manufacturers and our business and results of operations may be adversely affected by risks associated with their businesses, financial condition and the geographies in which they operate.

We rely upon third-party contract manufacturers with facilities in Canada, Mexico, Thailand and the United States to perform a substantial portion of our supply chain activities, including component sourcing, manufacturing, product testing and quality, and fulfillment and logistics relating to the distribution and support of our products. There are a number of risks associated with our dependence on contract manufacturers, including:

- reduced control over delivery schedules and planning;
- reliance on the quality assurance procedures of third parties;
- potential uncertainty regarding manufacturing yields and costs;
- availability of manufacturing capability and capacity, particularly during periods of high demand;
- risks and uncertainties associated with the locations or countries where our products are manufactured, including potential manufacturing disruptions caused by social, geopolitical or environmental factors;
- changes in U.S. law or policy governing foreign trade, manufacturing, development and investment in the countries where we currently manufacture our products, including the World Trade Organization Information Technology Agreement or other free trade agreements;
- limited warranties provided to us; and
- potential misappropriation of our intellectual property.

These and other risks could impair our ability to fulfill orders, harm our sales and impact our reputation with customers. If our contract manufacturers are unable or unwilling to continue manufacturing our products or components of our products, or if our contract manufacturers discontinue operations, we may be required to identify and qualify alternative manufacturers, which could cause us to be unable to meet our supply requirements to our customers and result in the breach of our customer agreements. The process of qualifying a new contract manufacturer and commencing volume production is expensive and time-consuming, and if we are required to change or qualify a new contract manufacturer, we would likely lose sales revenue and damage our existing customer relationships.

A substantial portion of our products are manufactured by third-party contract manufacturers in Mexico. The United States, Canada and Mexico have only recently reached an agreement to update the North American Free Trade Agreement. The new United States-Mexico-Canada Agreement is not yet in effect and requires additional approvals, including legislative approval. In addition, the U.S. has generally indicated a willingness to revise, renegotiate, or terminate various multilateral trade agreements and to impose new taxes on certain goods imported into the U.S. Such steps, if adopted, could adversely impact our business and operations, and may make our products less competitive in the U.S. and other markets. At this time, it remains unclear what additional actions, if any, will be taken by the U.S. government with respect to such trade agreements, tax policy related to international commerce, or the imposition of tariffs on goods imported into the U.S. There can be no assurance that any future

legislation or executive action in the U.S. relating to tax policy and trade regulation would not adversely affect our business, operations and financial results.

Our reliance upon third-party component suppliers, including sole and limited source suppliers, exposes our business to additional risk and could limit our sales, increase our costs and harm our customer relationships.

We maintain a global sourcing strategy and depend on third-party suppliers in international markets for support in our product design and development, and in the sourcing of key product components and subsystems. Our products include optical and electronic components for which reliable, high-volume supply is often available only from sole or limited sources. We do not have any guarantees of supply from our third-party suppliers, and in certain cases we have limited contractual arrangements or are relying upon standard purchase orders. As a result, there is no assurance that we will be able to secure the components or subsystems that we require, in sufficient quantity and quality, and on reasonable terms. The loss of a source of supply, or lack of sufficient availability of key components, could require that we locate an alternate source or redesign our products, either of which could result in business interruption and increased costs and could negatively affect our product gross margin and results of operations. There are a number of significant technology trends or developments underway or emerging, including the Internet of Things, autonomous vehicles and mobile communication adoption, that have during fiscal 2018 and can be expected in the future to result in increased market demand for key raw materials or components. Increases in market demand or scarcity of resources or manufacturing capability have resulted, and may in the future result, in shortages in availability of important components for our solutions, product allocation challenges, deployment delays and increased lead times and delivery cycles.

We are exposed to risks relating to unfavorable economic conditions and a wide range of challenges affecting the businesses and results of operations of our component suppliers. These challenges can affect their material costs, sales, liquidity levels, ability to continue investing in their businesses, ability to import or export goods, ability to meet development commitments and manufacturing capability. For example, there have been a number of recent geopolitical events involving the governments of the United States and China – including potential tariffs and trade restrictions by both countries and China's announcement of a five-year plan to invest in a domestic optical components industry – may have an adverse impact on certain of our component suppliers in one or more of these respects. These and other industry, market and regulatory disruptions and challenges affecting our suppliers could expose our business to increased costs, loss or lack of supply, or discontinuation of components that can result in lost revenue, additional product costs, increased lead times and deployment delays that could harm our business and customer relationships.

We have experienced, and may experience in the future, consolidation among suppliers of our components. Consolidation in the optical components and semiconductor industry can result in a reduction in the number of suppliers available to us, which can negatively impact our ability to access components or the price we have to pay for such components. Moreover, our access to necessary components could be adversely impacted by evolving competitive landscapes, converging solutions offerings and competition from component vendors, including those in our supply chain, that develop competing networking products for emerging consumptions models, including pluggable modem technology or offerings based on off-the-shelf or commoditized hardware technology, referred to as "white box" hardware.

Our business and results of operations would be negatively affected if we were to experience any significant disruption or difficulties with key suppliers affecting the price, quality, availability or timely delivery of required components.

Product performance problems and undetected errors affecting the performance, reliability or security of our products could damage our business reputation and negatively affect our results of operations.

The development and production of sophisticated hardware and software for communications network equipment is highly complex. Some of our products can be fully tested only when deployed in communications networks or when carrying traffic with other equipment, and software products may contain bugs that can interfere with expected performance. As a result, undetected defects or errors, and product quality, interoperability, reliability and performance problems are often more acute for initial deployments of new products and product enhancements. We have recently launched, and are in the process of launching, a number of new hardware and software offerings, including evolutions of our WaveLogic coherent optical chipset, packet networking platforms and solutions targeting access and metro networks and data center interconnect applications. Unanticipated product performance problems can relate to the design, manufacturing, installation, operation and interoperability of our products. Undetected errors can also arise as a result of defects in components, software or manufacturing, installation or maintenance services supplied by third parties, and technology acquired from or licensed by third parties. From time to time we have had to replace certain components, provide software remedies or other remediation in response to defects or bugs, and we may have to do so again in the future. Remediation of such events could materially adversely impact our business and results of operations. In addition, we may encounter unanticipated security vulnerabilities relating to our products or the activities of our supply chain. Our products are used customer networks transmitting a range of sensitive information and any actual or perceived

exposure of our solutions to malicious software or cyber-attacks, could adversely affect our business and results of operations. Product performance, reliability, security and quality problems can negatively affect our business, and may result in some or all of the following effects:

- damage to our reputation, declining sales and order cancellations;
- increased costs to remediate defects or replace products;
- payment of liquidated damages, contractual or similar penalties, or other claims for performance failures or delays;
- increased warranty expense or estimates resulting from higher failure rates, additional field service obligations or other rework costs related to defects;
- increased inventory obsolescence;
- costs, liabilities and claims that may not be covered by insurance coverage or recoverable from third parties; and
- delays in recognizing revenue or collecting accounts receivable.

These and other consequences relating to undetected errors affecting the quality, reliability and security of our products could negatively affect our business and results of operations.

The international scale of our sales and operations exposes us to additional risk and expense that could adversely affect our results of operations.

We market, sell and service our products globally, maintain personnel in numerous countries, and rely upon a global supply chain for sourcing important components and manufacturing our products. Our international sales and operations are subject to inherent risks, including:

- social, political and economic conditions in countries outside the United States;
- effects of adverse changes in currency exchange rates;
- greater difficulty in collecting accounts receivable and longer collection periods;
- difficulty and cost of staffing and managing foreign operations;
- higher incidence of corruption or unethical business practices;
- less protection for intellectual property rights in some countries;
- tax and customs changes that adversely impact our global sourcing strategy, manufacturing practices, transfer-pricing, or competitiveness of our products for global sales;
- compliance with certain testing, homologation or customization of products to conform to local standards;
- significant changes to free trade agreements, trade protection measures, tariffs, export compliance, domestic preference procurement requirements, qualification to transact business and additional regulatory requirements; and
- natural disasters, epidemics and acts of war or terrorism.

Our international operations are subject to complex foreign and U.S. laws and regulations, including anti-bribery and corruption laws, antitrust or competition laws, environmental regulations and data privacy laws, among others. In particular, recent years have seen a substantial increase in anti-bribery law enforcement activity by U.S. regulators, and we currently operate and seek to operate in many parts of the world that are recognized as having a greater potential for corruption. Violations of any of these laws and regulations could result in fines and penalties, criminal sanctions against us or our employees, prohibitions on the conduct of our business and on our ability to offer our products and services in certain geographies, and significant harm to our business reputation. We cannot assure that our policies and procedures to ensure compliance with these laws and regulations and to mitigate these risks will protect us from all acts committed by our employees or third-party vendors, including contractors, agents and services partners. Additionally, the costs of complying with these laws (including the costs of investigations, auditing and monitoring) could adversely affect our current or future business.

The U.S. government has indicated a willingness to revise, renegotiate, or terminate various, existing multilateral trade agreements and to impose new taxes on certain goods imported into the U.S. Because we rely upon a global sourcing strategy and third-party contract manufacturers in markets outside of the U.S. to perform substantially all of the manufacturing of our products, such steps, if adopted, could adversely impact our business and operations, and may make our products less competitive in the U.S. and other markets. At this time, it remains unclear what additional actions, if any, the U.S. government will take with respect to such trade agreements, tax policy related to international commerce, or imposition of tariffs on goods imported into the U.S. There can be no assurance that any future legislation or executive action in the U.S. relating to tax policy and trade regulation would not adversely affect our business, operations and financial results.

The success of our international sales and operations will depend, in large part, on our ability to anticipate and manage effectively these risks. Our failure to manage any of these risks could harm our international operations, reduce our international sales, and could give rise to liabilities, costs or other business difficulties that could adversely affect our operations and financial results.

We may be required to write off significant amounts of inventory as a result of our inventory purchase practices, the obsolescence of product lines or unfavorable market or contractual conditions.

To avoid delays and meet customer demand for shorter delivery terms, we place orders with our contract manufacturers and component suppliers based on forecasts of customer demand. In a number of cases these suppliers may require longer lead times for fulfillment than we have with our customers. Thus, our practice of buying inventory based on forecasted demand exposes us to the risk that our customers ultimately may not order the products we have forecast or will purchase fewer products than forecast. As a result, we may purchase inventory in anticipation of sales that ultimately do not occur. We regularly incur, on a quarterly basis, expense provisions against excess or obsolete inventory. Market uncertainty can also limit our visibility into customer spending plans and compound the difficulty of forecasting inventory at appropriate levels. Moreover, our customer purchase agreements generally do not include any minimum purchase commitment. Also, customers often have the right to modify, reduce or cancel purchase quantities, and spending levels can be uncertain and subject to significant fluctuation. Our products are highly configurable, and certain new products have overlapping feature sets or application with existing products. Accordingly, it is increasingly possible that customers may forgo purchases of certain products we have inventoried in favor of a similar, newer product. We may also be exposed to the risk of inventory write-offs as a result of certain supply chain initiatives, including consolidation and transfer of key manufacturing activities. If we are required to write off or write down a significant amount of inventory, our results of operations for the applicable period would be materially adversely affected.

Our go to market activities and the distribution of our WaveLogic coherent technology within the merchant modem market could expose us to increased or new forms of competition, or adversely affect our systems business and results of operations.

We recently entered the merchant modem market to monetize our coherent optical technology, expand our addressable market and address a range of customer consumption models for networking solutions. Making our critical technology available in this manner could adversely impact the sale of products in our existing systems business. For example, our customers may choose to adopt disaggregated consumption models or third-party solutions that embed Ciena-designed optical modules instead of purchasing systems-based solutions from us. Accordingly, we may encounter situations where we are competing for opportunities in the market directly against a system from one of our competitors that incorporates Ciena-designed modules. Making this key technology available and enabling third-party sales of Ciena-designed modules may adversely affect our competitive position and increase the risk that third parties misappropriate or attempt to use our technology or related intellectual property without our authorization. These and other risks or unanticipated liabilities or costs associated with the sales of our WaveLogic coherent technology could harm our reputation and adversely affect our business and our results of operations. Our go to market activities and the distribution of our WaveLogic coherent technology within the merchant modem market could expose us to increased or new forms of competition, or adversely affect our systems business and results of operation.

Efforts to increase our sales and capture market share in targeted international markets may be unsuccessful.

Part of our business and growth strategy is to expand our geographic reach and increase market share in international markets through a combination of direct and indirect sales resources. We are also aggressively pursuing opportunities with service provider customers in additional geographies, including Asia-Pacific and India. This diversification of our markets and customer base has been a significant component of the growth of our business. Our efforts to continue to increase our sales and capture market share in international markets may ultimately be unsuccessful or may adversely impact our financial results, including our gross margin. Our failure to continue to increase our sales and market share in international markets could limit our growth and could harm our results of operations.

Our intellectual property rights may be difficult and costly to enforce.

We generally rely on a combination of patents, copyrights, trademarks and trade secret laws to establish and maintain proprietary rights in our products and technology. Although we have been issued numerous patents and other patent applications are currently pending, there can be no assurance that any of these patents or other proprietary rights will not be challenged, invalidated or circumvented, or that our rights will provide us with any competitive advantage. In addition, there can be no assurance that patents will be issued from pending applications or that claims allowed on any patents will be sufficiently broad to protect our technology. Further, the laws of some foreign countries may not protect our proprietary rights to the same extent as do the laws of the United States.

We are subject to the risk that third parties may attempt to access, divert or use our intellectual property without authorization. Protecting against the unauthorized use of our products, technology and other proprietary rights is difficult, time-consuming and expensive, and we cannot be certain that the steps that we are taking will prevent or minimize the risks of such unauthorized use. In addition, our intellectual property strategy must continually evolve to protect our proprietary rights in new solutions, including our software solutions. Litigation may be necessary to enforce or defend our intellectual property rights or to

determine the validity or scope of the proprietary rights of others. Such litigation could result in substantial cost and diversion of management time and resources, and there can be no assurance that we will obtain a successful result. Any inability to protect and enforce our intellectual property rights could harm our ability to compete effectively.

We may incur significant costs in response to claims by others that we infringe their intellectual property rights.

From time to time third parties may assert claims or initiate litigation or other proceedings related to patent, copyright, trademark and other intellectual property rights to technologies and related standards that are relevant to our business. The rate of infringement assertions by patent assertion entities is increasing, particularly in the United States. Generally, these patent owners neither manufacture nor use the patented invention directly, and they seek to derive value from their ownership solely through royalties from patent licensing programs.

We could be adversely affected by litigation, other proceedings or claims against us, as well as claims against our manufacturers, suppliers or customers, alleging infringement of third-party proprietary rights by our products and technology, or components thereof. Regardless of the merit of these claims, they can be time-consuming, divert the time and attention of our technical and management personnel, and result in costly litigation. These claims, if successful, could require us to:

- pay substantial damages or royalties;
- comply with an injunction or other court order that could prevent us from offering certain of our products;
- seek a license for the use of certain intellectual property, which may not be available on commercially reasonable terms or at all;
- develop non-infringing technology, which could require significant effort and expense and ultimately may not be successful; and
- indemnify our customers or other third parties pursuant to contractual obligations to hold them harmless or pay expenses or damages on their behalf.

Any of these events could adversely affect our business, results of operations and financial condition. Our exposure to risks associated with the use of intellectual property may increase as a result of acquisitions, as we would have a lower level of visibility into the development process with respect to such technology and the steps taken to safeguard against the risks of infringing the rights of third parties.

Our products incorporate software and other technology under license from third parties, and our business would be adversely affected if this technology were no longer available to us on commercially reasonable terms.

We integrate third-party software and other technology into our operating system, network management, and intelligent automation software and other products. As network operators adopt software management and control and virtualized network functions, we believe that we will be increasingly required to work with third-party technology providers. As a result, we may be required to license certain software or technology from third parties, including competitors. Licenses for software or other technology may not be available or may not continue to be available to us on commercially reasonable terms. Third-party licensors may insist on unreasonable financial or other terms in connection with our use of such technology. Our failure to comply with the terms of any license may result in our inability to continue to use such license, which may result in significant costs, harm our market opportunities and require us to obtain or develop a substitute technology.

Our solutions, including our Blue Planet Automation Software platform, utilize elements of open source or publicly available software. As network operators seek to enhance programmability and automation of networks, we expect that we and other communications networking solutions vendors will increasingly contribute to and use technology or open source software developed by standards settings bodies or other industry forums that seek to promote the integration of network layers and functions. The terms of such licenses could be construed in a manner that could impose unanticipated conditions or restrictions on our ability to commercialize our products. This increases our risks associated with our use of such software and may require us to seek licenses from third parties, to re-engineer our products or to discontinue the sale of such solutions. Difficulty obtaining and maintaining technology licenses with third parties may disrupt development of our products, increase our costs and adversely affect our business.

Data security breaches and cyber-attacks could compromise our intellectual property or other sensitive information and cause significant damage to our business and reputation.

In the ordinary course of our business, we maintain on our network systems, and the networks of our third-party providers, certain information that is confidential, proprietary or otherwise sensitive in nature. This information includes intellectual property, financial information and confidential business information relating to us and our customers, suppliers and other business partners. Companies in the technology industry have been increasingly subject to a wide variety of security incidents,

cyber-attacks and other attempts to gain unauthorized access to networks or sensitive information. Our network systems and storage applications, and those systems and storage and other business applications maintained by our third-party providers, have in the past and may in the future be subject to attempts to gain unauthorized access, breach, malfeasance or other system disruptions. In some cases, it is difficult to anticipate or to detect immediately such incidents and the damage caused thereby. If an actual or perceived breach of security occurs in our network, we could incur significant costs and our reputation could be harmed. While we continually work to safeguard our internal network systems and validate the security of our third party providers, to mitigate these potential risks, including through information security policies and employee awareness and training, there is no assurance that such actions will be sufficient to prevent cyber-attacks or security breaches. We have been subjected in the past to a range of incidents including phishing, emails purporting to come from an executive or vendor seeking payment requests, and communications from look alike corporate domains. While these have not had a material effect on our business or our network security to date, security incidents involving access or improper use of our systems, networks or products could compromise confidential or otherwise protected information, destroy or corrupt data, or otherwise disrupt our operations. These security events could also negatively impact our reputation and our competitive position and could result in litigation with third parties, regulatory action, loss of business, potential liability and increased remediation costs, any of which could have a material adverse effect on our financial condition and results of operations.

We rely on third-party resellers and distribution partners to sell our solutions, and our failure to effectively develop and manage these relationships could adversely affect our business and result of operations.

In order to sell into new geographic markets, diversify our customer base and broaden the application for our solutions, and to complement our global field resources, we rely on a number of third-party resellers, distribution partners and sales agents, both domestic and international, and we expect these relationships to be an important part of our business. There can be no assurance that we will successfully identify and qualify these resources or that we will realize the expected benefits of these sales relationships. Our failure to effectively identify, develop and manage our third-party sales relationships could adversely affect our business, growth and result of operations. We must also assess and qualify resellers, distribution partners and sales agents under our channel programs to ensure their understanding of and willingness and ability to adhere to our Code of Business Conduct and Ethics and ethical business practices. We may be held responsible or liable for the actions or omissions of these third parties. Actions, omissions or violations of law by our third-party sales partners or agents could have a material adverse effect on our business, operating results and financial condition.

Our failure to manage our relationships with third-party service partners effectively could adversely impact our financial results and relationships with customers.

We rely on a number of third-party service partners, both domestic and international, to complement our global service and support resources. We rely upon these partners for certain installation, maintenance and support functions. In addition, as network operators increasingly seek to rely on vendors to perform additional services relating to the design, construction and operation of their networks, the scope of work performed by our support partners is likely to increase and may include areas where we have less experience providing or managing such services. We must successfully identify, assess, train and certify qualified service partners in order to ensure the proper installation, deployment and maintenance of our products, as well as to ensure the skillful performance of other services associated with expanded solutions offerings, including site assessment and construction-related services. We must also assess and certify service partners in order to ensure their understanding of and willingness and ability to adhere to our Code of Business Conduct and Ethics and ethical business practices. Vetting and certification of these partners can be costly and time-consuming, and certain partners may not have the same operational history, financial resources and scale as we have. Moreover, certain service partners may provide similar services for other companies, including our competitors. We may not be able to manage our relationships with our service partners effectively, and we cannot be certain that they will be able to deliver services in the manner or time required, that we will be able to maintain the continuity of their services, or that they will adhere to our approach to ethical business practices. We may also be exposed to a number of risks or challenges relating to the performance of our service partners, including:

- delays in recognizing revenue;
- liability for injuries to persons, damage to property or other claims relating to the actions or omissions of our service partners;
- our services revenue and gross margin may be adversely affected; and
- our relationships with customers could suffer.

As our service offering expands and customers look to identify vendors capable of managing, integrating and optimizing multi-domain, multi-vendor networks with unified software, our relationships with third-party service partners will become increasingly important. If we do not effectively manage our relationships with third-party service partners, or if they fail to perform these services in the manner or time required, our financial results and relationships with customers could be adversely affected.

We may be adversely affected by fluctuations in currency exchange rates.

As a company with global operations, we face exposure to movements in foreign currency exchange rates. Due to our global presence, a significant percentage of our revenue, operating expense and assets and liabilities are non-U.S. Dollar denominated and therefore subject to foreign currency fluctuation. We face exposure to currency exchange rates as a result of the growth in our non-U.S. Dollar denominated operating expense in Canada, Europe, Asia and Latin America. An increase in the value of the U.S. Dollar could increase the real cost to our customers of our products in those markets outside the United States where we sell in Dollars, and a weakened Dollar could increase the cost of local operating expenses and procurement of materials or service that we purchase in foreign currencies. From time to time, we may hedge against currency exposure associated with anticipated foreign currency cash flows or assets and liabilities denominated in foreign currency. Such attempts to offset the impact of currency fluctuations are costly, and we cannot hedge against all foreign exchange rate volatility. Losses associated with these hedging instruments and the adverse effect of foreign currency exchange rate fluctuation may negatively affect our results of operations.

We may be exposed to unanticipated risks and additional obligations in connection with our resale of complementary products or technology of other companies.

We have entered into agreements with strategic supply partners that permit us to distribute their products or technology. We may rely upon these relationships to add complementary products or technologies, to diversify our product portfolio, or to address a particular customer or geographic market. We may enter into additional original equipment manufacturer (OEM), resale or similar strategic arrangements in the future. We may incur unanticipated costs or difficulties relating to our resale of third-party products. Our third-party relationships could expose us to risks associated with the business, financial condition, intellectual property rights and supply chain continuity of such partners, as well as delays in their development, manufacturing or delivery of products or technology. We may also be required by customers to assume warranty, indemnity, service and other commercial obligations, including potential liability to customers, greater than the commitments, if any, made to us by our technology partners. Some of our strategic supply partners are relatively small companies with limited financial resources. If they are unable to satisfy their obligations to us or our customers, we may have to expend our own resources to satisfy these obligations. Exposure to these risks could harm our reputation with key customers and could negatively affect our business and our results of operations.

We are a party to legal proceedings, investigations and other claims or disputes, which are costly to defend and, if determined adversely to us, could require us to pay fines or damages, undertake remedial measures or prevent us from taking certain actions, any of which could adversely affect our business.

In the course of our business, we are, and in the future may be, a party to legal proceedings, investigations and other claims or disputes, which have related and may relate to subjects including commercial transactions, intellectual property, securities, employee relations, or compliance with applicable laws and regulations. A description of certain of these matters can be found in Note 24, Commitments and Contingencies, in the Notes to Consolidated Financial Statements in Item 8 of Part II of this Report. Among these matters, in September 2017 we voluntarily contacted the Securities and Exchange Commission and the U.S. Department of Justice to advise them of an internal investigation that we initiated to determine whether certain payments to an individual employed by a customer in a country in the ASEAN region may have violated applicable laws and regulations, including the U.S. Foreign Corrupt Practices Act.

Legal proceedings and investigations are inherently uncertain and we cannot predict their duration, scope, outcome or consequences. There can be no assurance that these or any such matters that have been or may in the future be brought against us will be resolved favorably. In connection with any government investigations, in the event the government takes action against us or the parties resolve or settle the matter, we may be required to pay substantial fines or civil and criminal penalties and/or be subject to equitable remedies, including disgorgement or injunctive relief. And, other legal or regulatory proceedings, including lawsuits filed by private litigants, may also follow as a consequence. These matters are likely to be expensive and time-consuming to defend, settle and/or resolve, and may require us to implement certain remedial measures that could prove costly or disruptive to our business and operations. They may also cause damage to our business reputation. The unfavorable resolution of one or more of these matters could have a material adverse effect on our business, results of operations, financial condition or cash flows.

Our exposure to the credit risks of our customers and resellers may make it difficult to collect receivables and could adversely affect our revenue and operating results.

In the course of our sales to customers and resale channel partners, we may have difficulty collecting receivables, and our business and results of operations could be exposed to risks associated with uncollectible accounts. Lack of liquidity in the capital markets, macroeconomic weakness and market volatility may increase our exposure to these credit risks. Our attempts to

monitor customer payment capability and to take appropriate measures to protect ourselves may not be sufficient, and it is possible that we may have to write down or write off accounts receivable. Such write-downs or write-offs could negatively affect our operating results for the period in which they occur, and, if large, could have a material adverse effect on our revenue and operating results.

Growth of our business is dependent upon the proper functioning and scalability of our internal business processes and information systems. Adoption of new systems, modifications or interruptions of services may disrupt our business, processes and internal controls.

We rely upon a number of internal business processes and information systems to support key business functions, and the efficient operation of these processes and systems is critical to managing our business. Our business processes and information systems must be sufficiently scalable to support the growth of our business and may require modifications or upgrades that expose us to a number of operational risks. We continually pursue initiatives to transform and optimize our business operations through the reengineering of certain processes, investment in automation, and engagement of strategic partners or resources to assist with certain business functions. These changes require a significant investment of capital and human resources and may be costly and disruptive to our operations, and they could impose substantial demands on management time. These changes may also require changes in our information systems, modification of internal control procedures and significant training of employees or third-party resources. There can be no assurance that our business and operations will not experience disruption in connection with our current system upgrade or other initiatives. Even if we do not encounter these adverse effects or disruption in our business, the design and implementation of these new systems may be more costly than anticipated.

Our information technology systems, and those of third-party information technology providers or business partners, may also be vulnerable to damage or disruption caused by circumstances beyond our control, including catastrophic events, power anomalies or outages, natural disasters, viruses or malware, and computer system or network failures. We may also be exposed to cyber-security related incidents, including unauthorized access of information systems and disclosure or diversion of intellectual property or confidential data. There can be no assurance that our business systems or those of our third-party business partners will not be subject to similar incidents, exposing us to significant cost, reputational harm and disruption or damage to our business.

Outstanding indebtedness under our senior secured credit facilities may adversely affect our liquidity and results of operations and could limit our business.

We are a party to credit agreements relating to a $250 million senior secured asset-based revolving credit facility and an outstanding senior secured term loan with approximately $700.0 million repayable at maturity in fiscal 2025. The agreements governing these credit facilities contain certain covenants that limit our ability, among other things, to incur additional debt, create liens and encumbrances, pay cash dividends, redeem or repurchase stock, enter into certain acquisition transactions or transactions with affiliates, repay certain indebtedness, make investments, or dispose of assets. The agreements also include customary remedies, including the right of the lenders to take action with respect to the collateral securing the loans, that would apply should we default or otherwise be unable to satisfy our debt obligations.

Our indebtedness could have important negative consequences, including:

- increasing our vulnerability to adverse economic and industry conditions;
- limiting our ability to obtain additional financing, particularly in unfavorable capital and credit market conditions;
- debt service and repayment obligations that may adversely impact our results of operations and reduce the availability of cash resources for other business purposes;
- limiting our flexibility in planning for, or reacting to, changes in our business and the markets; and
- placing us at a possible competitive disadvantage to competitors that have better access to capital resources.

We may also enter into additional debt transactions or credit facilities, including equipment loans, working capital lines of credit, senior notes and other long-term debt, which may increase our indebtedness and result in additional restrictions upon our business. In addition, major debt rating agencies regularly evaluate our debt based on a number of factors. There can be no assurance that we will be able to maintain our existing debt ratings, and failure to do so could adversely affect our cost of funds, liquidity and access to capital markets.

Significant volatility and uncertainty in the capital markets may limit our access to funding on favorable terms or at all.

The operation of our business requires significant capital. We have accessed the capital markets in the past and have successfully raised funds, including through the issuance of equity, convertible notes and other indebtedness, to increase our cash position, support our operations and undertake strategic growth initiatives. We regularly evaluate our liquidity position, debt

obligations and anticipated cash needs to fund our long-term operating plans, and we may consider it necessary or advisable to raise additional capital or incur additional indebtedness in the future. If we raise additional funds through further issuance of equity or securities convertible into equity, or undertake certain transactions intended to address our existing indebtedness, our existing stockholders could suffer dilution in their percentage ownership of our company or our leverage and outstanding indebtedness could increase. Global capital markets have undergone periods of significant volatility and uncertainty in the past, and there can be no assurance that such financing alternatives will be available to us on favorable terms or at all, should we determine it necessary or advisable to seek additional capital.

The potential effects of the referendum on the UK's membership in the European Union remain uncertain.

In June 2016, the United Kingdom (UK) held a referendum in which voters approved an exit from the European Union (EU), commonly referred to as "Brexit," and in March 2017, notified the EU that it intended to exit as provided in Article 50 of the Treaty on European Union. The terms of the withdrawal are subject to ongoing negotiation that has created significant uncertainty about the future relationship between the UK and the EU. It is possible that the level of economic activity in this region will be adversely impacted and that there will be increased regulatory and legal complexities, including those relating to tax, trade, security and employees. Such changes could be costly and potentially disruptive to our operations and business relationships in these markets. In addition, Brexit could lead to economic uncertainty, including significant volatility in global stock markets and currency exchange rates, that may adversely impact our business. While we have adopted certain financial measures to reduce the risks of doing business internationally, we cannot ensure that such measures will be adequate to allow us to operate without disruption or adverse impact to our business and financial results in the affected regions.

Restructuring activities could disrupt our business and affect our results of operations.

We have often taken steps, including reductions in force, office closures, and internal reorganizations to reduce the size and cost of our operations, improve efficiencies, or realign our organization and staffing to better match our market opportunities and our technology development initiatives. We may take similar steps in the future as we seek to realize operating synergies, to optimize our operations to achieve our target operating model and profitability objectives, or to reflect more closely changes in the strategic direction of our business. These changes could be disruptive to our business, including our research and development efforts, and could result in significant expense, including accounting charges for inventory and technology-related write-offs, workforce reduction costs and charges relating to consolidation of excess facilities. Substantial expense or charges resulting from restructuring activities could adversely affect our results of operations and use of cash in those periods in which we undertake such actions.

If we are unable to attract and retain qualified personnel, we may be unable to manage our business effectively.

Competition to attract and retain highly skilled technical, engineering and other personnel with experience in our industry is intense, and our employees have been the subject of targeted hiring by our competitors. Competition is particularly intense in certain jurisdictions where we have research and development centers, including the Silicon Valley area of northern California, and we may experience difficulty retaining and motivating existing employees and attracting qualified personnel to fill key positions. Because we rely upon equity awards as a significant component of compensation, particularly for our executive team, a lack of positive performance in our stock price, reduced grant levels, or changes to our compensation program may adversely affect our ability to attract and retain key employees. In addition, none of our executive officers is bound by an employment agreement for any specific term. The loss of members of our management team or other key personnel could be disruptive to our business and, were it necessary, it could be difficult to replace members of our management team or other key personnel. If we are unable to attract and retain qualified personnel, we may be unable to manage our business effectively, and our operations and financial results could suffer.

Strategic acquisitions and investments could disrupt our operations and may expose us to increased costs and unexpected liabilities.

We may acquire or make investments in other technology companies, or enter into other strategic relationships, to expand the markets we address, diversify our customer base or acquire, or accelerate the development of, technology or products. To do so, we may use cash, issue equity that could dilute our current stockholders, or incur debt or assume indebtedness. Strategic transactions can involve numerous additional risks, including:

- failure to achieve the anticipated transaction benefits or the projected financial results and operational synergies;
- greater than expected acquisition and integration costs;
- disruption due to the integration and rationalization of operations, products, technologies and personnel;
- diversion of management attention;
- difficulty completing projects of the acquired company and costs related to in-process projects;

- difficulty managing customer transitions or entering into new markets;
- the loss of key employees;
- disruption or termination of business relationships with customers, suppliers, vendors, landlords, licensors and other business partners;
- ineffective internal controls over financial reporting;
- dependence on unfamiliar suppliers or manufacturers;
- assumption of or exposure to unanticipated liabilities, including intellectual property infringement or other legal claims; and
- adverse tax or accounting impact.

As a result of these and other risks, our acquisitions, investments or strategic transactions may not realize the intended benefits and may ultimately have a negative impact on our business, results of operation and financial condition.

Changes in government regulation affecting the communications industry and the businesses of our customers could harm our prospects and operating results.

The Federal Communications Commission (the "FCC") has jurisdiction over the U.S. communications industry, and similar agencies have jurisdiction over the communication industries in other countries. Many of our largest customers, including service providers and cable and multiservice network operators, are subject to the rules and regulations of these agencies, while others participate in and benefit from government-funded programs that encourage the development of network infrastructures. These regulatory requirements and funding programs are subject to changes that may adversely impact our customers, with resulting adverse impacts on our business.

In December 2017, the FCC voted to roll back its 2015 order regulating broadband internet service providers as telecommunications service carriers under Title II of the Telecommunications Act. This decision repeals net neutrality regulations that prohibit blocking, degrading or prioritizing certain types of internet traffic and restores the light touch regulatory treatment of broadband service in place prior to 2015. Although the FCC has preempted state jurisdiction on net neutrality, at least two states, Montana and New York have already taken executive action directed at reinstating aspects of the FCC's 2015 order. In addition, in September 2018, California passed legislation that seeks to reestablish net neutrality. Changes in regulatory requirements or uncertainty associated with the regulatory environment could delay or serve as a disincentive to investment in network infrastructures by network operators, which could adversely affect the sale of our products and services. Similarly, changes in regulatory tariff requirements or other regulations relating to pricing or terms of carriage on communications networks could slow the development or expansion of network infrastructures and adversely affect our business, operating results, and financial condition.

Government regulations affecting the use, import or export of products could adversely affect our operations, negatively affect our revenue and increase our costs.

The United States and various foreign governments have established certain trade and tariff requirements under which we have implemented a global approach to the sourcing and manufacture of our products, as well as the distribution and fulfillment to customers around the world. Changes or restrictions impacting the import of our components to manufacturing facilities outside of the U.S., the importation of finished goods to the U.S., or the export of products globally, would adversely affect our operations, increase our costs and adversely impact our revenue. Government regulation of usage, import or export of our products, or our technology within our products, or our failure to obtain required approvals for our products, could harm our international and domestic sales and adversely affect our revenue and costs of sales. Failure to comply with such regulations could result in enforcement actions, fines, penalties or restrictions on export privileges. In addition, costly tariffs on our equipment, restrictions on importation, trade protection measures and domestic preference requirements of certain countries could limit our access to these markets and harm our sales. These regulations could adversely affect the sale or use of our products, substantially increase our cost of sales and adversely affect our business and revenue.

Government regulations related to the environment, potential climate change and other social initiatives could adversely affect our business and operating results.

Our operations are regulated under various federal, state, local and international laws relating to the environment and potential climate change. If we were to violate or become liable under these laws or regulations, we could incur fines, costs related to damage to property or personal injury and costs related to investigation or remediation activities. Our product design efforts and the manufacturing of our products are also subject to evolving requirements relating to the presence of certain materials or substances in our equipment, including regulations that make producers for such products financially responsible for the collection, treatment and recycling of certain products. For example, our operations and financial results may be negatively affected by environmental regulations, such as the Waste Electrical and Electronic Equipment (WEEE) and Restriction of the

Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) that have been adopted by the European Union. Compliance with these and similar environmental regulations may increase our cost of designing, manufacturing, selling and removing our products. The SEC has adopted disclosure requirements regarding the use of "conflict minerals" mined from the Democratic Republic of Congo and adjoining countries ("DRC") and disclosure requirements with respect to procedures regarding a manufacturer's efforts to prevent the sourcing of such minerals from the DRC. Certain of these minerals are present in our products. SEC rules implementing these requirements may have the effect of reducing the pool of suppliers that can supply DRC "conflict free" components and parts, and we may not be able to obtain conflict free products or supplies in sufficient quantities for our operations. Because our supply chain is complex, we may face reputational challenges with our customers, stockholders and other stakeholders if we are unable to verify sufficiently the origins for the "conflict minerals" used in our products and cannot assert that our products are "conflict free." Environmental or similar social initiatives may also make it difficult to obtain supply of compliant components or may require us to write off non-compliant inventory, which could have an adverse effect on our business and operating results.

We may be required to write down the value of certain significant assets which would adversely affect our operating results.

We have a number of significant assets on our balance sheet as of October 31, 2018 and the value of these assets can be adversely impacted by factors related to our business and operating performance, as well as factors outside of our control. As of October 31, 2018, our balance sheet includes a $745.0 million net deferred tax asset. The value of our net deferred tax assets can be significantly impacted by changes in tax policy or our tax planning strategy. For example, the Tax Cuts and Jobs Act (the "Tax Act") required us to write down our net deferred tax asset by approximately $438.2 million in fiscal 2018. If any additional write downs are required, our operating results may be materially adversely affected.

As of October 31, 2018, our balance sheet also includes $298.0 million of goodwill. We test each reporting unit for impairment of goodwill on an annual basis and, between annual tests, if an event occurs or circumstances change that would, more likely than not, reduce the fair value of the reporting unit below its carrying value. As of October 31, 2018, our balance sheet also includes $486.0 million in long-lived assets, which includes $148.2 million of intangible assets. Valuation of our long-lived assets requires us to make assumptions about future sales prices and sales volumes for our products. These assumptions are used to forecast future, undiscounted cash flows upon which our estimates are based. The value of our net deferred tax asset above may also be subject to change in the future, based on our actual or projected generation of future taxable income. If market conditions or our forecasts for our business or any particular operating segment change, we may be required to reassess the value of these assets. We could be required to record an impairment charge against our goodwill and long-lived assets or a valuation allowance against our deferred tax assets. Any write down of the value of these significant assets would have the effect of decreasing our earnings or increasing our losses in such period. If we are required to take a substantial write down or charge, our operating results would be materially adversely affected in such period.

Failure to maintain effective internal controls over financial reporting could have a material adverse effect on our business, operating results and stock price.

Section 404 of the Sarbanes-Oxley Act of 2002 requires that we include in our annual report a report containing management's assessment of the effectiveness of our internal controls over financial reporting as of the end of our fiscal year and a statement as to whether or not such internal controls are effective. Compliance with these requirements has resulted in, and is likely to continue to result in, significant costs and the commitment of time and operational resources. Certain ongoing initiatives, including efforts to transform business processes or to transition certain functions to third-party resources or providers, will necessitate modifications to our internal control systems, processes and related information systems as we optimize our business and operations. Our expansion into new regions could pose further challenges to our internal control systems. We cannot be certain that our current design for internal control over financial reporting, or any additional changes to be made, will be sufficient to enable management to determine that our internal controls are effective for any period, or on an ongoing basis. If we are unable to assert that our internal controls over financial reporting are effective, market perception of our financial condition and the trading price of our stock may be adversely affected, and customer perception of our business may suffer.

Our stock price is volatile.

Our common stock price has experienced substantial volatility in the past and may remain volatile in the future. Volatility in our stock price can arise as a result of a number of the factors discussed in this "Risk Factors" section. During fiscal 2018, our closing stock price ranged from a high of $32.07 per share to a low of $19.57 per share. The stock market has experienced significant price and volume fluctuation that has affected the market price of many technology companies, with such volatility often unrelated to the operating performance of these companies. Divergence between our actual results and our forward-looking guidance for such results, the published expectations of investment analysts, or the expectations of the market generally, can

cause significant swings in our stock price. Our stock price can also be affected by market conditions in our industry as well as announcements that we, our competitors, vendors or our customers may make. These may include announcements by us or our competitors of financial results or changes in estimated financial results, technological innovations, the gain or loss of customers, or other strategic initiatives. Our common stock is also included in certain market indices, and any change in the composition of these indices to exclude our company would adversely affect our stock price. These and other factors affecting macroeconomic conditions or financial markets may materially adversely affect the market price of our common stock in the future.

Changes in effective tax rates and other adverse outcomes with taxing authorities could adversely affect our results of operations.

Our future effective tax rates could be subject to volatility or adversely affected by changes in tax laws, regulations, accounting principles, or interpretations thereof. The impact of income taxes on our business can also be affected by a number of items relating to our business. These may include estimates for and the actual geographic mix of our earnings; changes in the valuation of our deferred tax assets; the use or expiration of net operating losses or research and development credit arrangements applicable to us in certain geographies; and changes in our methodology for transfer pricing, valuing developed technology or conducting intercompany arrangements. On December 22, 2017, the Tax Act was signed into law and introduced significant changes to U.S. federal corporate tax law. These changes include a reduction to the federal corporate income tax rate, the current taxation of certain foreign earnings, the imposition of base-erosion prevention measures which may limit the deductions relating to certain intercompany transactions, and possible limitations on the deductibility of net interest expense or corporate debt obligations. Accounting for the income tax effects of the Tax Act requires significant judgments and estimates that are based on then current interpretations of the Tax Act and could be affected by changing interpretations of the Act, as well as additional legislation and guidance around the Act. Any refinements to tax estimates are difficult to predict and could impact our financial results. We are also subject to the continuous examination of our income tax and other returns by the Internal Revenue Service and other tax authorities and have a number of such reviews underway at any time. It is possible that tax authorities may disagree with certain positions we have taken and an adverse outcome of such a review or audit could have a negative effect on our financial position and operating results. There can be no assurance that the outcomes from such examinations, or changes in our effective tax rates, will not have an adverse effect on our business, financial condition and results of operations.

Item 1B. Unresolved Staff Comments

Not applicable.

Item 2. Properties

Overview. As of October 31, 2018, all of our properties are leased, and we do not own any real property. We lease facilities globally related to the ongoing operations of our three business segments and related functions. Our principal executive offices are located in two buildings in Hanover, Maryland.

Our largest facilities are our research and development centers located in Ottawa, Canada and Gurgaon, India. We also have engineering and/or service delivery facilities located in San Jose, California; Petaluma, California; Alpharetta, Georgia; Quebec, Canada; Austin, Texas; Pune, India; and Rostov and Taganrog, Russia. In addition, we lease various smaller offices in the United States, Canada, Mexico, South America, Europe, the Middle East and the Asia-Pacific region to support our sales and services operations. We believe the facilities we are now using are adequate and suitable for our business requirements.

Hanover, Maryland Headquarters Lease. We entered into an agreement dated November 3, 2011, with W2007 RDG Realty, L.L.C. relating to a 15-year lease of office space for our corporate headquarters in Hanover, Maryland, consisting of an agreed-upon rentable area of approximately 154,100 square feet.

Ottawa Leases. On October 23, 2014, Ciena Canada, Inc. entered into an 18-year lease agreement for the office building located at 5050 Innovation Drive, Ottawa, Canada, consisting of a rentable area of 170,582 square feet. In addition, on April 15, 2015, Ciena Canada, Inc. entered into a 15-year lease agreement for two new office buildings adjacent to the building at 5050 Innovation Drive, located at 383 and 385 Terry Fox Drive, Ottawa, Canada, consisting of a rentable area of approximately 254,318 square feet.

Gurgaon Leases. On October 12, 2016, Ciena India Pvt. Ltd. entered into a five-year rental agreement for an office building located at Plot No. 13, Echelon Institutional Sector 32, Gurgaon, which is adjacent to another building rented by Ciena India Pvt. Ltd., located at Plot No. 14, Echelon Institutional Sector 32, Gurgaon. The Gurgaon offices consist of a rentable area of approximately 282,580 square feet.

For additional information regarding our lease obligations, see Note 24 to the Consolidated Financial Statements included in Item 8 of Part II of this annual report.

Item 3. Legal Proceedings

The information set forth under the headings “Litigation” and “Investigations” in Note 24, Commitments and Contingencies, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report, is incorporated herein by reference.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant's Common Stock, Related Stockholder Matters and Issuer Purchases of Equity Securities

a) Our common stock is traded on the New York Stock Exchange under the stock symbol "CIEN."

As of December 14, 2018, there were approximately 946 holders of record of our common stock and 156,481,822 shares of common stock outstanding. We have never paid cash dividends on our capital stock. We currently intend to retain earnings for use in our business, and we do not anticipate paying any cash dividends in the foreseeable future.

Issuer Purchases of Equity Securities

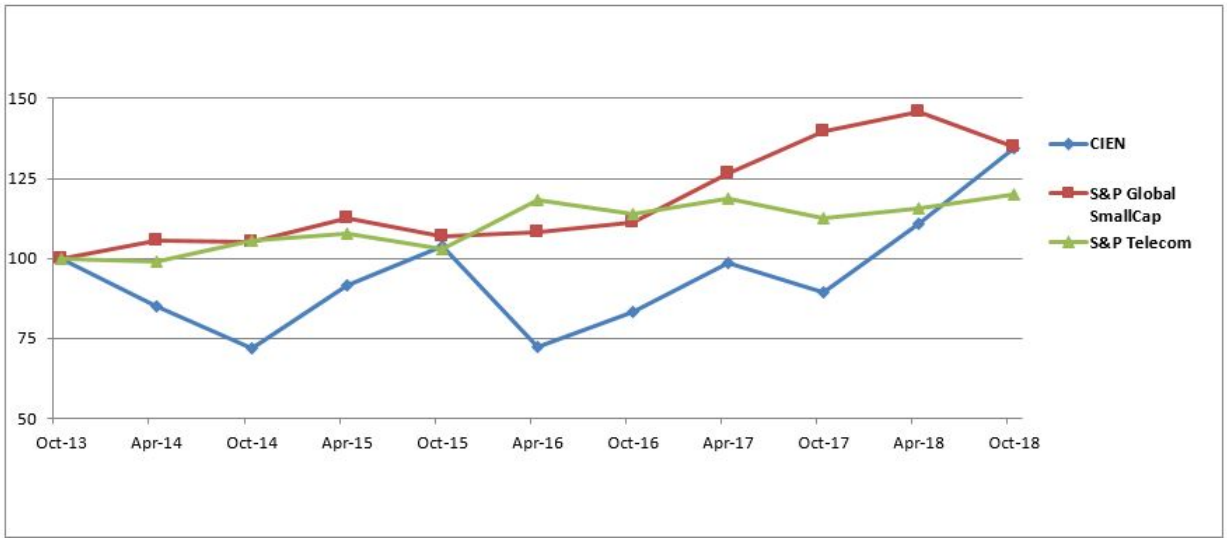
The following table provides a summary of repurchases of our common stock during the fourth quarter of fiscal 2018:

Period	Total Number of Shares Purchased (1)	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (1)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (in Thousands)
August 1, 2018 to August 31, 2018	425,900	$ 26.10	425,900	$ 214,097
September 1, 2018 to September 30, 2018	319,217	$ 30.69	319,217	$ 204,300
October 1, 2018 to October 31, 2018	517,566	$ 29.53	517,566	$ 189,019
Total	1,262,683	$ 28.66	1,262,683	

(1) On December 7, 2017, we announced that our Board of Directors authorized a program to repurchase up to $300 million of our common stock through the end of fiscal 2020. Shares reported in this table were repurchased under this program. Effective December 13, 2018, this program was terminated and replaced by a new program to repurchase up to $500 million of our common stock. The amount and timing of repurchases are subject to a variety of factors including liquidity, cash flow, stock price and general business and market conditions. The program may be modified, suspended, or discontinued at any time. See Note 19 to the Consolidated Financial Statements in Item 8 of Part II of this Report for information regarding the share repurchase program authorized by our Board of Directors.

Stock Performance Graph

The following graph shows a comparison of cumulative total returns for an investment in our common stock, the S&P Telecom Select Index and the S&P Global SmallCap Index from October 31, 2013 to October 31, 2018. The S&P Telecom Select Industry Index comprises stocks in the S&P Total Market Index that are classified in the Global Industry Classification Standard as alternative carriers, communications equipment, integrated telecom services and wireless telecom services sub-industries. The S&P Global SmallCap Index comprises the stocks representing the lowest 15% of float-adjusted market cap in each developed and emerging country. This graph is not deemed to be "filed" with the SEC or subject to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and the graph shall not be deemed to be incorporated by reference into any prior or subsequent filing by us under the Securities Act of 1933, as amended, or the Exchange Act.



Assumes $100 invested in Ciena Corporation, the S&P Telecom Select Index and the S&P Global SmallCap Index, respectively, on October 31, 2013 with all dividends reinvested at month-end.

(b) Not applicable.

(c) Not applicable.

Item 6. Selected Consolidated Financial Data

The following selected consolidated financial data should be read in conjunction with Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the Consolidated Financial Statements and the notes thereto included in Item 8, “Financial Statements and Supplementary Data” in Part II of this annual report. We have a 52 or 53-week fiscal year, which ends on the Saturday nearest to the last day of October in each year. For purposes of financial statement presentation, each fiscal year is described as having ended on October 31. Fiscal 2018 consisted of 53 weeks and fiscal 2017, 2016, 2015 and 2014 each consisted of 52 weeks.

	Year Ended October 31, (in thousands, except per share data)				
	2018 [1] [2] [3] [4]	2017 [2] [3] [4]	2016 [2] [3]	2015	2014
Revenue	$ 3,094,286	$ 2,801,687	$ 2,600,573	$ 2,445,669	$ 2,288,289
Gross profit	$ 1,314,690	$ 1,245,786	$ 1,161,576	$ 1,075,563	$ 948,352
Income from operations	$ 229,946	$ 214,722	$ 156,169	$ 100,448	$ 45,704
Provision (benefit) for income taxes	$ 493,471	$ (1,105,827)	$ 14,134	$ 12,097	$ 13,964
Net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584	$ 11,667	$ (40,637)
Basic net income (loss) per common share	$ (2.40)	$ 8.89	$ 0.52	$ 0.10	$ (0.38)
Diluted net income (loss) per potential common share	$ (2.49)	$ 7.53	$ 0.51	$ 0.10	$ (0.38)
Weighted average basic common shares outstanding	143,738	141,997	138,312	118,416	105,783
Weighted average diluted potential common shares outstanding	143,738	169,919	150,704	120,101	105,783
Net cash provided by operating activities	$ 229,261	$ 234,882	$ 289,520	$ 262,112	$ 89,816
Cash used for repurchase of common stock - repurchase program	$ 110,981	$ —	$ —	$ —	$ —
Cash, cash equivalents and investments	$ 953,374	$ 969,429	$ 1,143,035	$ 1,021,183	$ 776,982
Deferred tax asset, net	$ 745,039	$ 1,155,104	$ 1,116	$ —	$ —
Total assets	$ 3,756,523	$ 3,951,711	$ 2,873,575	$ 2,685,001	$ 2,058,842
Short-term and long-term debt, net	$ 693,450	$ 935,981	$ 1,253,682	$ 1,264,089	$ 1,451,064
Total liabilities	$ 1,827,189	$ 1,815,369	$ 2,107,234	$ 2,064,125	$ 2,128,457
Stockholders’ equity (deficit)	$ 1,929,334	$ 2,136,342	$ 766,341	$ 620,876	$ (69,615)

(1) See Note 2 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for additional information regarding the acquisitions of Packet Design, LLC (“Packet Design”) on July 2, 2018 and DonRiver Holdings, LLC (“DonRiver”) on October 1, 2018. See also Note 19 to the Consolidated Financial Statements in Item 8 of Part II of this Report for information regarding a share repurchase program authorized by our Board of Directors.

(2) See Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for additional information regarding changes in our short-term and long-term debt.

(3) See Note 18 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for additional information regarding changes in our weighted average basic and diluted potential common shares outstanding.

(4) Net income, deferred tax asset, net, total assets and stockholders’ equity for fiscal 2018 reflect a $472.8 million impact for the remeasurement of the net deferred tax assets and the federal transition tax and fiscal 2017 reflects a $1.2 billion deferred tax asset valuation allowance reversal. See Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for additional information.

No other factors materially affected the comparability of the information presented above.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis should be read in conjunction with our "Selected Consolidated Financial Data" and consolidated financial statements and notes thereto included elsewhere in this annual report.

Overview

We are a networking systems, services and software company, providing solutions that enable a wide range of network operators to deploy and manage next-generation networks that deliver services to businesses and consumers. We provide network hardware, software and services that support the transport, switching, aggregation, service delivery and management of video, data and voice traffic on communications networks. Our solutions are used by communications service providers, cable and multiservice operators, Web-scale providers, submarine network operators, governments, enterprises, research and education (R&E) institutions and other emerging network operators.

Our solutions include a diverse portfolio of high-capacity Networking Platform products, which can be applied from the network core to network access points, and which allow network operators to scale capacity, increase transmission speeds, allocate traffic and adapt dynamically to changing end-user service demands. We also offer Platform Software that provides management and domain control of our next-generation packet and optical platforms and automates network lifecycle operations including provisioning equipment and services. In addition, through our comprehensive suite of Blue Planet Automation Software, we enable network operators to use network data and analytics to drive enhanced automation across multi-vendor and multi-domain network environments, accelerate service delivery and enable an increasingly predictive and autonomous network infrastructure. To complement our hardware and software solutions, we offer a broad range of attached and software-related services that help our customers design, optimize, integrate, deploy, manage and maintain their networks and associated operational environments. Through our complete portfolio of solutions, we enable our customers to transform their network into a dynamic, programmable environment driven by automation and analytics, which we refer to as the Adaptive Network. Our solutions for the Adaptive Network create business and operational value for our customers, enabling them to introduce new revenue-generating services, reduce costs and maximize the return on their network infrastructure investment.

Market Opportunity

The markets in which we sell our communications networking solutions have seen significant changes in recent years, including rapid growth in bandwidth demand, proliferation of cloud-based services and heightened end-user service demands. We have also seen the impact of Web-scale network operators and their services on the business models and network infrastructures of communication service providers. These conditions have placed significant demands on networks and altered the overall competitive landscape of network operators. Existing and emerging network operators are competing to distinguish their service offerings and rapidly introduce differentiated, revenue-generating services, while managing the costs of their networks and seeking to ensure a profitable business model. Network operators are under pressure to constrain their capital expenditure budgets and cannot grow their network spending at the rate of bandwidth growth. As a result, the markets in which we operate expect new and more robust solutions that increase capacity or features and that are more cost-effective to operate. We believe that these dynamics, and the need to adapt to rapidly changing business and network demands, will cause network operators to leverage increased software-based network control and programmability and to evolve their infrastructures to be more automated.

Our Adaptive Network vision and our business strategy to capitalize on these market dynamics include the initiatives set forth in the "Strategy" section of the description of our business in Item 1 of Part 1 of this annual report.

Revenue Growth and Diversification of our Business During Fiscal 2018

During fiscal 2018, our revenue growth accelerated as we benefited meaningfully from our innovation leadership, the diversification of our business and efforts to take market share from competitors. We continue to diversify our solutions offerings and customer base to address fast-growing applications and customer segments, such as Web-scale providers and data center interconnection. These customers were important contributors to our overall growth during fiscal 2018 and are included among our largest customers by revenue. At the same time, a significant portion of our revenue and customer base continues to consist of sales to large communication service providers and cable operators. Our revenue growth benefited from a go-to-market strategy focused on generating new wins and capturing additional opportunities with service providers in international markets, particularly in our Asia-Pacific and India regions. We believe that continued diversification of our business is important to address the dynamic industry environment in which we operate, to continue to grow our business, and to better

withstand potential slowdowns which could adversely affect demand from particular geographies, markets, customers or customer segments.

We also believe that current market and competitive dynamics create opportunities for us to leverage our technology leadership and competitive position to displace competitors and capture additional market share. This strategy of share capture was an important contributor to our overall revenue growth during fiscal 2018, and it resulted in, and may continue to result in, fluctuations or reductions in our gross margin.

Investment in Blue Planet Automation Software Platform

We have continued to pursue both organic investment to pursue opportunities in the software automation market and acquisition opportunities to expand our software portfolio and business. On October 1, 2018, we acquired DonRiver Holdings, LLC (“DonRiver”), a global software and services company specializing in federated network and service inventory management solutions within the service provider Operational Support Systems (OSS) environment. On July 2, 2018, we acquired Packet Design, LLC (“Packet Design”), a provider of network performance management software focused on Layer 3 network optimization, topology and route analytics.

Balance Sheet Initiatives

Our cash balance and level of indebtedness were influenced by a number of balance sheet initiatives during fiscal 2018, which included the following.

Increased Stock Repurchase Program. During fiscal 2018, we repurchased $111.0 million of our common stock under a stock repurchase program. On December 13, 2018, we announced that our Board of Directors authorized a new program to repurchase up to $500 million of our common stock. This program replaces our previously authorized repurchase program, under which we were authorized to repurchase up to $300 million of our common stock through the end of fiscal 2020. We may purchase shares at management’s discretion in the open market, in privately negotiated transactions, in transactions structured through investment banking institutions, or a combination of the foregoing. We may also, from time to time, enter into Rule 10b5-1 plans to facilitate repurchases of shares under this authorization. The amount and timing of repurchases are subject to a variety of factors including liquidity, cash flow, stock price and general business and market conditions. The program may be modified, suspended, or discontinued at any time. For additional information, including our repurchase activities under the previously authorized program, see Note 19 and Note 25 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report and Item 5 of Part II of this annual report.

Issuer Conversion of 4.0% Convertible Senior Notes due December 15, 2020 (“2020 Notes”). On October 31, 2018, we exercised our option to convert the $187.5 million principal amount outstanding of our 2020 Notes into shares of Ciena common stock. In connection with this conversion, we issued approximately 9.2 million shares and the 2020 Notes ceased to be outstanding. In accordance with the "make-whole" provision, note holders were also entitled to certain additional shares of Ciena common stock upon conversion. We elected to deliver cash in lieu of these additional shares. The amount of cash in lieu of the additional shares was approximately $13.5 million, which was also paid on October 31, 2018. See Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information relating to our 2020 Notes.

Settlement Upon Conversion of 3.75% Convertible Senior Notes due October 15, 2018. On October 15, 2018, both our 3.75% Convertible Senior Notes due October 15, 2018 (Original) (the “Original Notes”) and our 3.75% Convertible Senior Notes due October 15, 2018 (New) (the “New Notes”) matured. Following conversion elections by the holders thereof, the outstanding Original Notes were converted in advance of maturity on October 15, 2018 and we issued approximately 3.0 million shares of Ciena common stock in settlement of such conversion. The Original Notes thereafter ceased to be outstanding. During the fourth quarter of fiscal 2018, we elected to settle conversion of the New Notes in a combination of cash and shares, provided that the cash portion would not exceed an aggregate amount of approximately $400 million. Upon conversion of the New Notes by the holders in advance of maturity, on October 15, 2018, we paid in cash an amount of $288.7 million representing the aggregate principal amount outstanding of the New Notes. The New Notes thereafter ceased to be outstanding. In addition, because Ciena common stock traded in excess of the $20.17 per share conversion price during an observation period from October 15, 2018 through November 9, 2018, on November 15, 2018, we paid an additional $111.3 million in cash and issued approximately 1.6 million shares with respect to the “in the money” portion of the notes in settlement of the conversion. See Notes 14 and 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information relating to our Original Notes and New Notes.

Term Loan Refinancing. On September 28, 2018, we refinanced our existing term loan in the aggregate principal amount of $394 million, maturing on January 30, 2022 (the "2022 Term Loan") into a term loan with an aggregate principal amount of $700 million maturing on September 28, 2025 (the "2025 Term Loan"). See Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information relating to our term loan refinancing.

Impact of Tax Cuts and Jobs Act

Our results of operations for fiscal 2018 have been impacted by enactment of the Tax Cuts and Jobs Act (the "Tax Act") in December 2017. Specifically, our results for fiscal 2018 include a $472.8 million tax charge consisting of the following:

- $438.2 million charge related to the remeasurement of U.S. net deferred tax assets at the lower statutory rate under the Tax Act; and
- $34.6 million charge related to a transition tax on accumulated historical foreign earnings and its deemed repatriation to the U.S.

See Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information related to the impact of the Tax Act.

Consolidated Results of Operations

Operating Segments

We have the following operating segments for reporting purposes: (i) Networking Platforms; (ii) Software and Software-Related Services; and (iii) Global Services. As of the first quarter of fiscal 2018, sales of our Optical Transport products are reflected within the Converged Packet Optical product line of our Networking Platforms segment for all periods presented. See Note 22 to our Consolidated Financial Statements included in Item 8 of Part II of this report.

Fiscal 2018 compared to Fiscal 2017

Revenue

During fiscal 2018, approximately 17.8% of our revenue was non-U.S. Dollar denominated, including sales in Euros, Canadian Dollars, Japanese Yen, Brazilian Reais, Argentina Pesos, Indian Rupee and British Pounds. During fiscal 2018 as compared to fiscal 2017, the U.S. Dollar fluctuated against these currencies. Consequently, our revenue reported in U.S. Dollars was slightly reduced by approximately $1.5 million, or 0.1%, net of hedging, as compared to fiscal 2017 due to fluctuations in foreign currency. The table below (in thousands, except percentage data) sets forth the changes in our operating segment revenue for the periods indicated:

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Revenue:						
Networking Platforms						
Converged Packet Optical	$ 2,194,519	70.9	$ 1,939,621	69.2	$ 254,898	13.1
Packet Networking	283,499	9.2	313,089	11.2	(29,590)	(9.5)
Total Networking Platforms	2,478,018	80.1	2,252,710	80.4	225,308	10.0
Software and Software-Related Services						
Platform Software and Services	173,949	5.6	145,009	5.2	28,940	20.0
Blue Planet Automation Software and Services	26,764	0.9	16,110	0.6	10,654	66.1
Total Software and Software-Related Services	200,713	6.5	161,119	5.8	39,594	24.6
Global Services						
Maintenance Support and Training	245,161	7.9	227,400	8.1	17,761	7.8
Installation and Deployment	128,829	4.2	117,524	4.2	11,305	9.6
Consulting and Network Design	41,565	1.3	42,934	1.5	(1,369)	(3.2)
Total Global Services	415,555	13.4	387,858	13.8	27,697	7.1
Consolidated revenue	$ 3,094,286	100.0	$ 2,801,687	100.0	$ 292,599	10.4

* Denotes % of total revenue

** Denotes % change from 2017 to 2018

- **Networking Platforms revenue** increased, primarily reflecting a product line sales increase of $254.9 million of our Converged Packet Optical products, partially offset by a product line sales decrease of $29.6 million of our Packet Networking products.
  - Converged Packet Optical primarily reflect sales increases of $252.8 million of our Waveserver stackable interconnect system and $68.9 million of our 6500 Packet-Optical Platform. These increases were partially

offset by sales decreases of $51.6 million of our 5410/5430 Reconfigurable Switching Systems and $7.9 million of our Z-Series Packet-Optical Platform. Increased sales of our Waveserver stackable interconnect system were primarily to Web-scale providers for data center interconnection applications. As we continue to diversify our business, Web-scale providers represent a growing portion of our business and are included among our largest customers during fiscal 2018. Increased sales of our 6500 Packet-Optical Platform were primarily to communications service providers, Web-scale providers and enterprise customers, partially offset by decreased sales to AT&T, cable and multiservice operators, and government customers.

  - Packet Networking reflects a sales decrease of $51.5 million of our 3000 and 5000 families of our service delivery and aggregation switches, primarily related to reduced sales to AT&T. This decrease was partially offset by a sales increase of $16.3 million of our 8700 Packetwave Platform.

- **Software and Software-Related Services segment revenue** increased, reflecting sales increases of $28.9 million of our Platform Software and Services and $10.7 million of our Blue Planet Automation Software and Services.

  - Platform Software and Services primarily reflect sales increases of $19.2 million in sales of our software and $9.7 million in sales of our software-related services. These increases primarily reflect sales increases of $17.9 million of our Manage, Control and Plan (MCP) software and $7.3 million in sales of our software subscription services.

  - Blue Planet Automation Software and Services primarily reflects sales increases of $8.4 million of services and $2.3 million of software. Increased services revenue primarily reflects increases of $3.3 million from professional services, $2.7 million in maintenance services and $1.4 million in professional services related to the Packet Design and DonRiver businesses acquired during fiscal 2018, respectively.

- **Global Services segment revenue** increased, primarily reflecting sales increases of $17.8 million of our maintenance support and training services and $11.3 million of our installation and deployment services.

Our operating segments engage in business and operations across four geographic regions: North America; Europe, Middle East and Africa (“EMEA”); Caribbean and Latin America (“CALA”); and Asia Pacific and India (“APAC”). Results for North America include only activities in the U.S. and Canada. The following table reflects our geographic distribution of revenue principally based on the relevant location for our delivery of products and performance of services. Our revenue, when considered by geographic distribution, can fluctuate significantly, and the timing of revenue recognition for large network projects, particularly outside of North America, can result in large variations in geographic revenue results in any particular quarter. The table below (in thousands, except percentage data) sets forth the changes in geographic distribution of revenue for the periods indicated:

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
North America	$ 1,886,450	61.0	$ 1,736,047	62.0	$ 150,403	8.7
EMEA	464,876	15.0	404,099	14.4	60,777	15.0
CALA	140,177	4.5	164,308	5.9	(24,131)	(14.7)
APAC	602,783	19.5	497,233	17.7	105,550	21.2
Total	$ 3,094,286	100.0	$ 2,801,687	100.0	$ 292,599	10.4

* Denotes % of total revenue

** Denotes % change from 2017 to 2018

- **North America revenue** primarily reflects sales increases of $112.4 million within our Networking Platforms segment, $29.6 million within our Software and Software-Related Services segment and $8.4 million within our Global Services segment. North America revenue reflects, in part, an annual decline in sales to AT&T from $448.9 million in fiscal 2017 to $374.6 million in fiscal 2018, as set forth below.

  - **Networking Platforms** segment revenue primarily reflects a product line increase of $150.5 million of Converged Packet Optical sales, partially offset by a product line decrease of $38.1 million of Packet Networking sales. Converged Packet Optical sales reflect an increase of $205.9 million in sales of our Waveserver stackable interconnect system primarily to Web-scale providers, partially offset by a $48.6

million decrease in sales of our 6500 Packet-Optical Platform, primarily reflecting decreased sales to AT&T, cable and multiservice operators and government customers. Packet Networking sales reflect a decrease of $45.5 million in sales of our 3000 and 5000 families of service delivery and aggregation switches, primarily related to reduced sales to AT&T.

- **Software and Software-Related Services** segment revenue primarily reflects sales increases of $20.3 million of our Platform Software and Services and $9.2 million of our Blue Planet Automation Software and Services. Platform Software and Services sales reflect increases of $15.2 million in platform software and $5.1 million in software-related services. These increases primarily reflect sales increases $17.0 million of our Manage, Control and Plan (MCP) software, $3.3 million of software subscription services and $1.5 million of our software training services. Blue Planet Automation Software and Services sales primarily reflect increases of $5.7 million of services and $3.4 million of software.
- **Global Services** segment revenue primarily reflects sales increases of $6.0 million of our maintenance support and training services and $2.9 million of our installation and deployment services.

- **EMEA revenue** primarily reflects sales increases of $49.2 million within our Networking Platforms segment, $9.8 million within our Global Services segment and $1.8 million within our Software and Software-Related Services segment.
  - **Networking Platforms** segment revenue primarily reflects a product line increase of $53.0 million in Converged Packet Optical sales, partially offset by a product line decrease of $3.9 million in Packet Networking sales. Converged Packet Optical reflects increases of $32.5 million in sales of our Waveserver stackable interconnect system primarily to Web-scale providers and $22.4 million in sales of our 6500 Packet-Optical Platform to communications service providers, Web-scale providers and enterprise customers.
  - **Global Services** segment revenue primarily reflects sales increases of $8.5 million of our maintenance and training support services and $1.6 million of our installation and deployment services, primarily to communications service providers.
- **CALA revenue** primarily reflects decreases of $23.3 million within our Networking Platforms segment and $2.9 million within our Global Services segment. These decreases were partially offset by a revenue increase of $2.1 million within our Software and Software-Related Services segment. The decrease in CALA revenue primarily relates to decreased sales to a cable and multiservice operator in Argentina and communications service providers in Brazil.
- **APAC revenue** primarily reflects sales increases of $87.0 million within our Networking Platforms segment, $12.4 million within our Global Services segment and $6.1 million within our Software and Software-Related Services segment, primarily reflecting increased sales in Japan and India.
  - **Networking Platforms** segment revenue primarily reflects product line increases of $72.0 million in Converged Packet Optical sales and $15.0 million of Packet Networking sales. Converged Packet Optical sales reflect sales increases of $114.2 million in sales of our 6500 Packet-Optical Platform to communications service providers and $9.1 million in sales of our Waveserver stackable interconnect system to communications service providers, Web-scale providers and government customers. These increases were partially offset by a $47.0 million decrease in sales of our 5410/5430 Reconfigurable Switching Systems, reflecting decreased sales to certain communications service providers. Packet Networking sales primarily reflect sales increases of $13.1 million in sales of our 8700 Packetwave Platform and $1.9 million in sales of our 3000 and 5000 families of service delivery and aggregation switches, primarily to a certain communication service provider in India.
  - **Software and Software-Related Services** segment revenue primarily reflects sales increases of $4.8 million of our Platform Software and Services and $1.3 million of our Blue Planet Automation Software and Services.
  - **Global Services** segment revenue primarily reflects increases of $9.5 million in sales of installation and deployment services and $3.6 million in our maintenance and training support services.

In fiscal 2018 and fiscal 2017, our top ten customers contributed 56.5% and 55.6% of revenue, respectively. Consequently, our financial results are closely correlated with the spending of a relatively small number of customers and can be significantly affected by market, industry or competitive dynamics affecting their businesses. Our reliance upon a relatively small number of customers also increases our exposure to changes in their spending levels, network priorities and purchasing strategies. The loss of a significant customer could have a material adverse effect on our business and results of operations, and our results of operations can fluctuate quarterly depending upon sales volumes and purchasing priorities with these large customers. Sales to

AT&T were $374.6 million, or 12.1% of total revenue in fiscal 2018, and $448.9 million, or 16.0% of total revenue in fiscal 2017. Verizon accounted for $318.0 million or 10.3% of total revenue for fiscal 2018 and $288.0 million, or 10.3% of total revenue in fiscal 2017. No other customer accounted for greater than 10% of our revenue in fiscal 2018 or fiscal 2017. While drivers of bandwidth growth and network evolution remain strong, our customers are under constant pressure to constrain their capital expenditure budgets and cannot grow their network spending at the rate of bandwidth growth. As a result, as we innovate and introduce new and more robust solutions that increase capacity or features, there is a market expectation of solutions that are more cost-effective from price for performance perspective than existing or competing solutions. The combination of this regular technology-driven price compression, price competition and pricing pressure in our markets and ongoing customer efforts to manage network costs can impact growth rates in our markets, and requires that we increase our volume of product shipments to maintain and grow revenue

Cost of Goods Sold and Gross Profit

Product cost of goods sold consists primarily of amounts paid to third-party contract manufacturers, component costs, employee-related costs and overhead, shipping and logistics costs associated with manufacturing-related operations, warranty and other contractual obligations, royalties, license fees, amortization of intangible assets, cost of excess and obsolete inventory and, when applicable, estimated losses on committed customer contracts.

Services cost of goods sold consists primarily of direct and third-party costs associated with our provision of services including installation, deployment, maintenance support, consulting and training activities and, when applicable, estimated losses on committed customer contracts. The majority of these costs relate to personnel, including employee and third-party contractor-related costs.

Our gross profit as a percentage of revenue, or “gross margin,” can fluctuate due to a number of factors, particularly when viewed on a quarterly basis. Our gross margin can fluctuate and be adversely impacted depending upon our revenue concentration within a particular segment, product line, geography, or customer, including our success in selling software in a particular period. Our gross margin remains highly dependent on our continued ability to drive product cost reductions relative to the price erosion that we regularly encounter in our markets. Moreover, we are often required to compete with aggressive pricing and commercial terms and, to secure business with new and existing customers, we may agree to pricing or other unfavorable commercial terms that adversely affect our gross margin. When we have success in taking share and winning new business, it can result in additional pressure on gross margin from these pricing dynamics and the early stages of these network deployments. Early stages of new network builds also often include an increased concentration of lower margin “common” equipment sales and installation services, with the intent to improve margin as we sell channel cards and maintenance services to customers adding capacity or services to their networks. Gross margin can be impacted by technology-based price compression and the introduction or substitution of new platforms with improved price for performance as compared to existing solutions that carry higher margins. Gross margin can also be impacted by changes in expense for excess and obsolete inventory and warranty obligations.

Service gross margin can be affected by the mix of customers and services, particularly the mix between deployment and maintenance services, geographic mix and the timing and extent of any investments in internal resources to support this business.

The tables below (in thousands, except percentage data) set forth the changes in revenue, cost of goods sold and gross profit for the periods indicated:

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Total revenue	$ 3,094,286	100.0	$ 2,801,687	100.0	$ 292,599	10.4
Total cost of goods sold	1,779,596	57.5	1,555,901	55.5	223,695	14.4
Gross profit	$ 1,314,690	42.5	$ 1,245,786	44.5	$ 68,904	5.5

* Denotes % of total revenue

** Denotes % change from 2017 to 2018

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Product revenue	$ 2,565,460	100.0	$ 2,318,581	100.0	$ 246,879	10.6
Product cost of goods sold	1,507,157	58.7	1,308,295	56.4	198,862	15.2
Product gross profit	$ 1,058,303	41.3	$ 1,010,286	43.6	$ 48,017	4.8

* Denotes % of product revenue

** Denotes % change from 2017 to 2018

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Service revenue	$ 528,826	100.0	$ 483,106	100.0	$ 45,720	9.5
Service cost of goods sold	272,439	51.5	247,606	51.3	24,833	10.0
Service gross profit	$ 256,387	48.5	$ 235,500	48.7	$ 20,887	8.9

* Denotes % of service revenue

** Denotes % change from 2017 to 2018

- **Gross profit as a percentage of revenue, or gross margin** reflects reduced product and service gross profits as described below. We encountered fluctuations or reductions in our gross margin during fiscal 2018 as a result of our strategy to leverage our technology leadership and to aggressively capture additional market share and displace competitors, particularly with communications service providers internationally. We were successful in executing our strategy during fiscal 2018, which allowed us to achieve meaningful revenue growth but which adversely impacted gross margins. Our continued success in implementing this strategy may require that we agree to aggressive pricing, commercial concessions and other unfavorable terms, and result in an increased mix of revenues from early stage deployments, any or all of which may result in low or negative gross margins on a particular order or group of orders.
- **Gross profit on products as a percentage of product revenue, or product gross margin,** decreased primarily as a result of our strategy to capture market share as described above and the impact of early stages of international network deployments with communications service provider customers, including an increased concentration of lower margin “common” equipment sales and lower mix of higher margin packet networking sales, partially offset by increased sales of our higher margin software platforms and product cost reductions.
- **Gross profit on services as a percentage of services revenue, or services gross margin,** decreased slightly, primarily as a result of reduced margins on our software services, which was primarily due to increased costs related to developing resources to promote our growth strategy.

Operating Expense

Operating expense increased in fiscal 2018 from the level reported for fiscal 2017 primarily due to increased research and development initiatives and increased selling and marketing resources.

Operating expense consists of the component elements described below.

- *Research and development expense* primarily consists of salaries and related employee expense (including share-based compensation expense), prototype costs relating to design, development, product testing, depreciation expense and third-party consulting costs.
- *Selling and marketing expense* primarily consists of salaries, commissions and related employee expense (including share-based compensation expense) and sales and marketing support expense, including travel, demonstration units, trade show expense and third-party consulting costs.

- *General and administrative expense* primarily consists of salaries and related employee expense (including share-based compensation expense) and costs for third-party consulting and other services.

- *Amortization of intangible assets* primarily reflects the amortization of both purchased technology and the value of customer relationships derived from our acquisitions.

- *Acquisition and integration costs* consist of expenses for financial, legal and accounting advisors and severance and other employee-related costs associated with our acquisition of Packet Design on July 2, 2018 and DonRiver on October 1, 2018. For more information on our acquisitions, see Note 2 to our Consolidated Financial Statements included in Item 8 of Part II of this report.

- *Significant asset impairments and restructuring costs* primarily reflect actions we have taken to better align our workforce, facilities and operating costs with perceived market opportunities, business strategies, changes in market and business conditions and significant impairments of assets.

During fiscal 2018, approximately 52.6% of our operating expense was non-U.S. Dollar denominated, including expenses in Canadian Dollars, British Pounds, Indian Rupees, Euros, Brazilian Reais and Australian Dollars. During fiscal 2018 as compared to fiscal 2017, the U.S. Dollar fluctuated against these currencies. Consequently, our operating expense reported in U.S. Dollars increased by approximately $9.7 million, or 0.9%, as compared to fiscal 2017 due to fluctuations in foreign currency. The table below (in thousands, except percentage data) sets forth the changes in operating expense for the periods indicated:

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Research and development	$ 491,564	15.9	$ 475,329	17.0	$ 16,235	3.4
Selling and marketing	394,060	12.7	356,169	12.7	37,891	10.6
General and administrative	160,133	5.2	142,604	5.1	17,529	12.3
Amortization of intangible assets	15,737	0.5	33,029	1.2	(17,292)	(52.4)
Acquisition and integration costs	5,111	0.2	—	—	5,111	100.0
Significant asset impairments and restructuring costs	18,139	0.6	23,933	0.9	(5,794)	(24.2)
Total operating expenses	$ 1,084,744	35.1	$ 1,031,064	36.9	$ 53,680	5.2

* Denotes % of total revenue

** Denotes % change from 2017 to 2018

- **Research and development expense** was adversely affected by $5.1 million as a result of foreign exchange rates, net of hedging, primarily due to a weaker U.S. Dollar in relation to the Canadian Dollar. Including the effect of foreign exchange rates, research and development expenses increased by $16.2 million. This increase primarily reflects increases of $21.7 million in employee and compensation costs, $4.5 million in technology and related costs, $3.2 million in professional services and $1.3 million in depreciation expense. These increases were partially offset by a benefit of $13.6 million for the ENCQOR grant reimbursement and $1.0 million in facilities and information technology costs. For more information on the ENCQOR grant, see Note 24 to our Consolidated Financial Statements included in Item 8 of Part II of this report.
- **Selling and marketing expense** was adversely affected by $4.3 million, as a result of foreign exchange rates, primarily due to a weaker U.S. Dollar in relation to the Euro. Including the effect of foreign exchange rates, sales and marketing expense increased by $37.9 million, primarily reflecting increases of $27.5 million in employee and compensation costs, $3.8 million in selling and marketing costs, $2.7 million in customer demonstration equipment, $1.9 million in professional services, $1.6 million in travel and entertainment costs and $1.5 million in facilities and information technology costs. These increases were slightly offset by a decrease of $1.0 million in depreciation expense.
- **General and administrative expense** increased by $17.5 million, primarily reflecting increases of $8.5 million in employee and compensation costs, $5.0 million in legal settlements, $4.3 million in professional services and $1.0

million in facilities and information technology costs. These increases were partially offset by a decrease of $2.2 million in legal fees.

- **Amortization of intangible assets** decreased due to certain intangible assets having reached the end of their economic lives. The decrease was partially offset by the addition of intangibles related to our acquisitions of Packet Design on July 2, 2018 and DonRiver on October 1, 2018.
- **Acquisition and integration costs** reflect expense for financial, legal and accounting advisors and severance and other employment-related costs related to our acquisition of Packet Design on July 2, 2018 and DonRiver on October 1, 2018.
- **Significant asset impairments and restructuring costs** for fiscal 2018 primarily reflect $14.9 million for workforce reductions and $3.9 million for unfavorable lease commitments in connection with with a portion of facilities located in Petaluma, California and in Gurgaon, India. For more information on our workforce reductions, see Note 3 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information.

Other items

The table below (in thousands, except percentage data) sets forth the changes in other items for the periods indicated:

	Fiscal Year					
	2018	%*	2017	%*	Increase (decrease)	%**
Interest and other income (loss), net	$ (12,029)	(0.4)	$ 913	—	$ (12,942)	1,417.5
Interest expense	$ 55,249	1.8	$ 55,852	2.0	$ (603)	(1.1)
Loss on extinguishment/modification of debt	$ (13,887)	(0.4)	$ (3,657)	(0.1)	$ (10,230)	279.7
Provision (benefit) for income taxes	$ 493,471	15.9	$ (1,105,827)	(39.5)	$ 1,599,298	(144.6)

* Denotes % of total revenue

** Denotes % change from 2017 to 2018

- **Interest and other income (loss), net** primarily reflects a $12.1 million loss reflective of a mark to market fair value adjustment related to the outstanding conversion feature of our “New” 3.75% Convertible Senior Notes and a $7.1 million unfavorable impact of foreign exchange rates on assets and liabilities denominated in a currency other than the relevant functional currency, net of hedging activity. These losses were partially offset by a $7.1 million gain in interest income due to higher interest rates on our investments during fiscal 2018.
- **Interest expense** decreased slightly, primarily due to a reduction in our aggregate outstanding debt in both fiscal 2018 and fiscal 2017. For more information, see Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report.
- **Loss on extinguishment and modification of debt** primarily reflects approximately $10.0 million of extinguishment of debt costs related to our conversion of the 2020 Notes and approximately $3.8 million in debt modification costs related to our term loan refinancing which both occurred in the fourth quarter of fiscal 2018. For fiscal 2017, this loss reflects $3.6 million in debt modification expenses related to the 2022 Term Loan that was entered into in the second quarter of fiscal 2017 and the exchange offer for our “New” 3.75% Convertible Senior Notes in the fourth quarter of fiscal 2017. For more information, see Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report.
- **Provision (benefit) for income taxes** during fiscal 2018 primarily reflects the impact of the Tax Act including $438.2 million in expense for the remeasurement of our net deferred tax assets and a $34.6 million charge related to a transition tax on accumulated historical foreign earnings and their deemed repatriation to the U.S. The fiscal 2017 benefit for income taxes primarily reflects a reversal of a deferred tax asset valuation allowance. See Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information.

Fiscal 2017 compared to Fiscal 2016

Revenue

During fiscal 2017, approximately 17.4% of our revenue was non-U.S. Dollar denominated, including sales in Euros, Canadian Dollars, Brazilian Reais, British Pounds and Japanese Yen. During fiscal 2017 as compared to fiscal 2016, the U.S. Dollar fluctuated against these currencies. As a result, our total revenue reported in U.S. Dollars during fiscal 2017 was adversely impacted by approximately $4.9 million or 0.2% as compared to fiscal 2016. The table below (in thousands, except percentage data) sets forth the changes in our operating segment revenue for the periods indicated:

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Revenue:						
Networking Platforms						
Converged Packet Optical	$ 1,939,621	69.2	$ 1,815,921	69.9	$ 123,700	6.8
Packet Networking	313,089	11.2	252,862	9.7	60,227	23.8
Total Networking Platforms	2,252,710	80.4	2,068,783	79.6	183,927	8.9
Software and Software-Related Services						
Platform Software and Related Services	145,009	5.2	117,251	4.5	27,758	23.7
Blue Planet Automation Software and Related Services	16,110	0.6	7,818	0.3	8,292	106.1
Total Software and Software-Related Services	161,119	5.8	125,069	4.8	36,050	28.8
Global Services						
Maintenance Support and Training	227,400	8.1	228,982	8.8	(1,582)	(0.7)
Installation and Deployment	117,524	4.2	130,916	5.0	(13,392)	(10.2)
Consulting and Network Design	42,934	1.5	46,823	1.8	(3,889)	(8.3)
Total Global Services	387,858	13.8	406,721	15.6	(18,863)	(4.6)
Consolidated revenue	$ 2,801,687	100.0	$ 2,600,573	100.0	$ 201,114	7.7

* Denotes % of total revenue

** Denotes % change from 2016 to 2017

- **Networking Platforms revenue** increased, reflecting product line sales increases of $123.7 million of our Converged Packet Optical products and $60.2 million of our Packet Networking products.
    - Converged Packet Optical primarily reflects sales increases of $100.8 million of our Waveserver stackable interconnect system, $61.5 million of our 6500 Packet-Optical Platform, $34.2 million of our 5430 Reconfigurable Switching System and $6.8 million of our OTN configuration for the 5410 Reconfigurable Switching System. These increases were partially offset by sales decreases of $49.9 million of our Z-Series Packet-Optical Platform and $7.4 million of our CoreDirector® Multiservice Optical Switches.
    - Packet Networking primarily reflects sales increases of $38.7 million of our 3000 and 5000 families of service delivery and aggregation switches, $11.9 million in initial sales of packet networking platform independent software and $10.2 million of our 8700 Packetwave Platform.
- **Software and Software-Related Services revenue** increased, primarily reflecting sales increases of $27.8 million in our Platform Software and Services and $8.3 of our Blue Planet Automation Software and Services.

- Platform Software and Services primarily reflects sales increases of $14.7 million of services and $13.1 million of software. These increases primarily reflect sales increases of $12.7 million of our OneControl Unified Management System and $12.5 million of software subscription services.
- Blue Planet Automation Software and Services primarily reflects sales increases of $4.2 million of professional services and $3.4 million of our software related to orchestration and V-WAN applications.

- **Global Services revenue** decreased, primarily reflecting sales decreases of $13.4 million of installation and deployment services, $3.9 million of consulting and network design services, and $1.6 million of maintenance support and training services. These sales decreases were primarily due to activity levels in the North America and CALA regions as described below.

The table below (in thousands, except percentage data) sets forth the changes in geographic distribution of revenue for the periods indicated:

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
North America	$ 1,736,047	62.0	$ 1,689,263	65.0	$ 46,784	2.8
EMEA	404,099	14.4	393,705	15.1	10,394	2.6
CALA	164,308	5.9	195,085	7.5	(30,777)	(15.8)
APAC	497,233	17.7	322,520	12.4	174,713	54.2
Total	$ 2,801,687	100.0	$ 2,600,573	100.0	$ 201,114	7.7

* Denotes % of total revenue

** Denotes % change from 2016 to 2017

- **North America revenue** primarily reflects sales increases of $34.7 million within our Networking Platforms segment and $25.7 million within our Software and Software-Related Services segment, partially offset by a revenue decrease of $13.6 million within our Global Services segment.
  - **Networking Platforms** segment revenue primarily reflects product line increases of $29.0 million of Packet Networking sales and $5.8 million of Converged Packet Optical sales.
    - **Packet Networking** primarily reflects sales increases of $15.5 million in sales of our 3000 and 5000 families of service delivery and aggregation switches and $11.9 million of packet networking platform independent software. Packet Networking sales have traditionally been concentrated, with significant sales to AT&T. However, during fiscal 2017, a significant portion of the growth benefited from sales to other network operators.
    - **Converged Packet Optical** primarily reflects a sales increase of $85.7 million of our Waveserver stackable interconnect system, partially offset by sales decreases of $48.2 million of our Z-Series Packet-Optical Platform, $14.8 million of our 6500 Packet-Optical Platform and $13.3 million of our 5430 Reconfigurable Switching System. The revenue increase for our Waveserver stackable interconnect system primarily reflects increased sales to Web-scale providers.
  - **Software and Software-Related Services** reflects sales increases of $22.8 million of our Platform Software and Services and $2.8 million of our Blue Planet Automation Software and Services. Platform Software and Services revenue primarily reflects increases of $11.5 million in sales of our software and $11.3 million in sales of services, principally software subscription.
  - **Global Services** primarily reflects sales decreases of $9.0 million for installation and deployment activities and $5.0 million in maintenance support and training. Installation and deployment activities were impacted by the contribution of sales of our Waveserver stackable interconnect system, which does not typically include installation services.
- **EMEA revenue** primarily reflects increases of $5.4 million within our Networking Platforms segment and $5.4 million within our Software and Software-Related Services segment.
  - **Networking Platforms** segment revenue primarily reflects product line increases of $3.7 million in Packet Networking sales and $1.7 million in Converged Packet Optical sales.

- **CALA revenue** primarily reflects decreases of $22.1 million within our Networking Platforms segment and $8.9 million within our Global Services segment. The decrease in CALA revenue primarily relates to decreased sales to certain communications service providers in Brazil and to AT&T in Mexico.
    - **Networking Platforms** segment revenue primarily reflects a product line decrease of $25.8 million of Converged Packet Optical sales partially offset by a product line increase of $3.7 million of Packet Networking sales. Converged Packet Optical sales primarily reflect decreases of $15.8 million of our 5430 Reconfigurable Switching System and $3.4 million of our 6500 Packet-Optical Platform.
    - **Global Services** segment revenue primarily reflects reduced installation and deployment activities which reflect the decrease in sales of our Networking Platforms products as described above.
- **APAC revenue** primarily reflects increases of $165.9 million within our Networking Platforms segment, $4.9 million within our Software and Software-Related Services segment and $3.9 million within our Global Services segment. Revenue contribution from India in fiscal 2017 was a significant driver of our annual revenue growth.
    - **Networking Platforms** segment revenue primarily reflects product line increases of $142.0 million of Converged Packet Optical sales and $23.9 million of Packet Networking sales.
        - Converged Packet Optical primarily reflects an increase of $79.5 million in sales of our 6500 Packet-Optical Platform, primarily due to increases in sales through our strategic relationship with Ericsson in Australia and sales to service providers in India and Japan. The revenue increase within Converged Packet Optical also reflects an increase of $64.3 million of our 5430 Reconfigurable Switching System sales primarily due to a service provider in India.
        - Packet Networking primarily reflects increases of $15.9 million in sales of our 3000 and 5000 families of service delivery and aggregation switches and $8.0 million in sales of our 8700 Packetwave Platform primarily to certain communication service providers in India.

Cost of Goods Sold and Gross Profit

The tables below (in thousands, except percentage data) set forth the changes in revenue, cost of goods sold and gross profit for the periods indicated:

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Total revenue	$ 2,801,687	100.0	$ 2,600,573	100.0	$ 201,114	7.7
Total cost of goods sold	1,555,901	55.5	1,438,997	55.3	116,904	8.1
Gross profit	$ 1,245,786	44.5	$ 1,161,576	44.7	$ 84,210	7.2

* Denotes % of total revenue

** Denotes % change from 2016 to 2017

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Product revenue	$ 2,318,581	100.0	$ 2,117,472	100.0	$ 201,109	9.5
Product cost of goods sold	1,308,295	56.4	1,176,304	55.6	131,991	11.2
Product gross profit	$ 1,010,286	43.6	$ 941,168	44.4	$ 69,118	7.3

* Denotes % of product revenue

** Denotes % change from 2016 to 2017

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Service revenue	$ 483,106	100.0	$ 483,101	100.0	$ 5	—
Service cost of goods sold	247,606	51.3	262,693	54.4	(15,087)	(5.7)
Service gross profit	$ 235,500	48.7	$ 220,408	45.6	$ 15,092	6.8

* Denotes % of service revenue

** Denotes % change from 2016 to 2017

- **Gross profit as a percentage of revenue, or gross margin** reflects improved services gross profit partially offset by reduced product gross profit.
- **Gross profit on products as a percentage of product revenue, or product gross margin,** decreased primarily as a result of market-based price erosion partially offset by product cost reductions and increased software platform sales.
- **Gross profit on services as a percentage of services revenue, or services gross margin,** increased, primarily due to increased sales of higher margin software subscription services and decreased sales of lower margin installation and deployment services.

Operating expense

The table below (in thousands, except percentage data) sets forth the changes in operating expense for the periods indicated:

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Research and development	$ 475,329	17.0	$ 451,794	17.4	$ 23,535	5.2
Selling and marketing	356,169	12.7	349,731	13.4	6,438	1.8
General and administrative	142,604	5.1	132,828	5.1	9,776	7.4
Amortization of intangible assets	33,029	1.2	61,508	2.4	(28,479)	(46.3)
Acquisition and integration costs	—	—	4,613	0.2	(4,613)	(100.0)
Significant asset impairments and restructuring costs	23,933	0.9	4,933	0.2	19,000	385.2
Total operating expenses	$ 1,031,064	36.9	$ 1,005,407	38.7	$ 25,657	2.6

* Denotes % of total revenue

** Denotes % change from 2016 to 2017

- **Research and development expense** was adversely affected by $2.0 million as a result of foreign exchange rates, net of hedging, primarily due to a weaker U.S. Dollar in relation to the Canadian Dollar. Including the effect of foreign exchange rates, research and development expenses increased by $23.5 million. This increase primarily reflects increases of $17.6 million in employee and compensation costs and $9.5 million in facilities and information technology costs largely due to facilities transitions. These increases were partially offset by decreases of $2.9 million in professional services and $1.1 million in prototype expense.
- **Selling and marketing expense** increased by $6.4 million, primarily reflecting increases of $1.5 million in facilities and information technology costs, $1.5 million in technology and related costs, $1.4 million in employee and compensation costs and $1.1 million in travel and related costs.
- **General and administrative expense** increased by $9.8 million, primarily reflecting increases of $4.5 million for employee and compensation costs, $2.9 million for professional services and legal fees and $1.2 million for facilities and information technology costs.

- **Amortization of intangible assets** decreased due to certain intangible assets having reached the end of their economic lives.
- **Acquisition and integration costs** incurred during fiscal 2016 reflects expense for financial, legal and accounting advisors and severance and other employee compensation costs, related to our acquisition of Cyan on August 3, 2015 and our acquisition of certain high-speed photonics components ("HSPC") assets of TeraXion, Inc. ("TeraXion") and its wholly-owned subsidiary on February 1, 2016.
- **Significant asset impairments and restructuring costs** during fiscal 2017 primarily reflects a $13.7 million asset impairment related to a trade receivable for a single customer in the APAC region, $5.9 million for workforce reductions and $4.4 million for unfavorable lease commitments and relocation costs incurred in connection with our research and development center facility transitions in Ottawa, Canada. For more information on our workforce reductions, see Note 3 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information.

Other items

The table below (in thousands, except percentage data) sets forth the changes in other items for the periods indicated:

	Fiscal Year					
	2017	%*	2016	%*	Increase (decrease)	%**
Interest and other income (loss), net	$ 913	—	$ (12,569)	(0.5)	$ 13,482	107.3
Interest expense	$ 55,852	2.0	$ 56,656	2.2	$ (804)	(1.4)
Loss on extinguishment and modification of debt	$ (3,657)	(0.1)	$ (226)	—	$ (3,431)	1,518.1
Provision for income taxes	$ (1,105,827)	(39.5)	$ 14,134	0.5	$ (1,119,961)	(7,923.9)

* Denotes % of total revenue

** Denotes % change from 2016 to 2017

- **Interest and other income (loss), net** primarily reflects $11.9 million of improved impact of foreign exchange rates on assets and liabilities denominated in a currency other than the relevant functional currency, net of hedging activity.
- **Interest expense** decreased slightly, primarily due to a reduction in our aggregate outstanding debt due to the refinancing of our 2022 term loans during the second quarter of fiscal 2017 and the maturity of the 2017 Notes on June 15, 2017. This decrease was offset by higher interest expense related to our new facilities in Ottawa, Canada which are subject to capital lease accounting treatment.
- **Loss on extinguishment and modification of debt** reflects $3.6 million in debt modification expenses related to the 2022 Term Loan that was entered into in the second quarter of fiscal 2017 and the exchange offer of our New Notes in the fourth quarter of fiscal 2017.
- **Provision for income taxes** decreased primarily due to a reversal of a deferred tax asset valuation allowance. See Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information.

Segment Profit

The table below (in thousands, except percentage data) sets forth the changes in our segment profit for the respective periods:

	Fiscal Year			
	2018	2017	Increase (decrease)	%*
Segment profit:				
Networking Platforms	$ 581,113	$ 578,039	$ 3,074	0.5
Software and Software-Related Services	$ 69,808	$ 32,536	$ 37,272	114.6
Global Services	$ 172,205	$ 159,882	$ 12,323	7.7

* Denotes % change from 2017 to 2018

- **Networking Platforms segment profit** slightly increased, primarily due to higher sales volume, partially offset by reduced gross margin as described above and increased research and development costs.
- **Software and Software-Related Services segment profit** increased, primarily due to higher sales volume and lower research and development costs, partially offset by reduced gross margin on software-related services.
- **Global Services segment profit** increased, primarily due to higher sales volume.

The table below (in thousands, except percentage data) sets forth the changes in our segment profit for the respective periods:

	Fiscal Year			
	2017	2016	Increase (decrease)	%*
Segment profit:				
Networking Platforms	$ 578,039	$ 544,744	$ 33,295	6.1
Software and Software-Related Services	$ 32,536	$ 7,123	$ 25,413	356.8
Global Services	$ 159,882	$ 157,915	$ 1,967	1.2

* Denotes % change from 2016 to 2017

- **Networking Platforms segment profit** increased, primarily due to higher sales volume, as described above, resulting in increased gross profits, slightly offset by increased research and development costs. Research and development costs primarily reflect increased expenses relating to the continued development of our coherent modem technology, including our WaveLogic Ai coherent optical chipset, and relocation costs in connection with our research and development center facility transitions in Ottawa, Canada.
- **Software and Software-Related Services segment profit** increased reflecting higher sales volume, as described above, and improved gross margin, partially offset by increased research and development costs. Research and development costs primarily reflect increased expenses relating to the continued development of our Blue Planet software platform.
- **Global Services segment profit** increased, primarily due to improved gross margin, as described above, partially offset by lower sales volume.

Liquidity and Capital Resources

Overview. For the fiscal year ended October 31, 2018, we generated $229.3 million in cash from operations, as our net loss (adjusted for non-cash charges) provided $380.0 million which exceeded our working capital requirements of $150.7 million. Our net loss (adjusted for non-cash charges) reflects a non-cash tax provision of $463.6 million primarily related to the enactment of the Tax Act. For additional information on the non-cash tax provision, see Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report. For additional details on our cash from operations, see the discussion below entitled “Cash from Operations.”

Total cash, cash equivalents and investments decreased by $16.1 million during fiscal 2018. There were several transactions or initiatives that occurred in fiscal 2018 that significantly impacted our cash, cash equivalents and indebtedness:

- *Term Loan Refinancing*. On September 28, 2018, we refinanced our existing 2022 Term Loan in the aggregate principal amount of $394.0 million, into a term loan with an aggregate principal amount of $700 million maturing on September 28, 2025 (the "2025 Term Loan"). This resulted in net proceeds of $305.1 million and debt issuance costs of $1.9 million.
- *Settlement Upon Conversion of 2018 Notes*. On October 15, 2018, both our 3.75% Convertible Senior Notes due October 15, 2018 (Original) (the "Original Notes") and our 3.75% Convertible Senior Notes due October 15, 2018 (New) (the "New Notes") matured. Following conversion elections by the holders thereof, the outstanding Original Notes were converted in advance of maturity on October 15, 2018 and we issued approximately 3.0 million shares of Ciena common stock in settlement of such conversion. During the fourth quarter of fiscal 2018, we elected to settle the conversion of the New Notes in a combination of cash and shares, provided that the cash portion would not exceed an aggregate amount of approximately $400 million. Upon conversion of the New Notes by the holders in advance of maturity, on October 15, 2018, we paid in cash an amount of $288.7 million representing the aggregate principal amount outstanding of the New Notes.
- *Stock Repurchase Program.* During fiscal 2018, we repurchased $111.0 million of our common stock under our stock repurchase program.
- *Acquisitions of Packet Design and DonRiver.* On July 2, 2018 we acquired Packet Design for $40.4 million, net of cash acquired, and on October 1, 2018, we acquired DonRiver for upfront cash consideration of $42.3 million, net of cash acquired, plus contingent consideration. See Note 2 to our Consolidated Financial Statements included in Item 8 of Part II of this report for more information regarding the three-year earn-out arrangement in connection with the DonRiver acquisition.
- *Issuer Conversion of 2020 Notes*. On September 20, 2018, we elected to exercise an option to convert the $187.5 million principal amount of 2020 Notes outstanding into shares of Ciena common stock. On the October 31, 2018 conversion date, we issued approximately 9.2 million shares of common stock and paid cash of $13.5 million to satisfy an additional make-whole share obligation to the note holders.

See Notes 2, 16 and 19 to our Consolidated Financial Statements included in Item 8 of Part II of this report for information relating to these transactions.

The decrease in cash also reflects (i) cash used in investing activities for capital expenditures of $67.6 million; (ii) cash used from financing activities for capital lease obligations of $3.6 million; (iii) stock repurchased upon vesting of our stock units award to employees relating to tax withholding of $4.8 million; and (iv) payments on our term loan of $4.0 million. Proceeds from the issuance of equity under our employee stock purchase plans provided approximately $23.1 million and our settlement of certain foreign currency forward contracts provided $9.4 million in cash during the period.

The following table sets forth changes in our cash and cash equivalents and investments in marketable debt securities (in thousands):

	October 31,		Increase
	2018	2017	(decrease)
Cash and cash equivalents	$ 745,423	$ 640,513	$ 104,910
Short-term investments in marketable debt securities	148,981	279,133	(130,152)
Long-term investments in marketable debt securities	58,970	49,783	9,187
Total cash and cash equivalents and investments in marketable debt securities	$ 953,374	$ 969,429	$ (16,055)

Principal Sources of Liquidity. Our principal sources of liquidity on hand include our cash and investments, which as of October 31, 2018 totaled $953.4 million, as well as our ABL credit facility. Ciena and certain of its subsidiaries are parties to a senior secured asset-based revolving credit facility (the "ABL Credit Facility") providing for a total commitment of $250 million with a maturity date of December 31, 2020. We principally use the ABL Credit Facility to support the issuance of letters of credit that arise in the ordinary course of our business and thereby to reduce our use of cash required to collateralize these instruments. As of October 31, 2018, letters of credit totaling $61.7 million were collateralized by our ABL Credit Facility. There were no borrowings outstanding under the ABL Credit Facility as of October 31, 2018.

Foreign Liquidity. The amount of cash, cash equivalents and short-term investments held by our foreign subsidiaries was $67.8 million as of October 31, 2018. We intend to reinvest indefinitely our foreign earnings. If we were to repatriate these accumulated historical foreign earnings, the provisional amount of unrecognized deferred income tax liability related to foreign withholding taxes would be approximately $23.0 million. See Note 20 to our Consolidated Financial Statements included in Item 8 of Part II of this report.

Settlement of Debt Conversion Liability. On November 15, 2018, we paid $111.3 million and issued 1.6 million shares in settlement of the remaining debt conversion liability related to the conversion of the 3.75% Convertible Senior Notes due 2018 (the "New Notes").

Stock Repurchase Authorization. On December 13, 2018, we announced that our Board of Directors authorized a program to repurchase up to $500 million of our common stock. The amount and timing of repurchases are subject to a variety of factors including liquidity, cash flow, stock price and general business and market conditions. The program may be modified, suspended, or discontinued at any time. This program terminates and replaces in its entirety the previous stock repurchase program authorized in fiscal 2018.

Liquidity Position. We regularly evaluate our liquidity position, debt obligations and anticipated cash needs to fund our operating or investment plans and may consider capital raising and other market opportunities that may be available to us. We regularly evaluate alternatives to manage our capital structure and reduce our debt and may continue to opportunistically pay down or refinance our outstanding debt. Based on past performance and current expectations, we believe that cash from operations, cash, cash equivalents and investments and other sources of liquidity, including our ABL Credit Facility, will satisfy our working capital needs, capital expenditures and other liquidity requirements associated with our operations, through at least the next 12 months.

Cash from Operations

The following sections set forth the components of our $229.3 million of cash provided by operating activities for fiscal 2018:

Cash provided by net loss (adjusted for non-cash charges)

The following tables set forth (in thousands) our net loss adjusted for non-cash charges during fiscal 2018:

	Year ended October 31, 2018
Net loss	$ (344,690)
Adjustments for non-cash charges:	
Loss on extinguishment of debt	10,039
Loss on fair value of debt conversion liability	12,070
Depreciation of equipment, building, furniture and fixtures, and amortization of leasehold improvements	84,214
Share-based compensation costs	52,972
Amortization of intangible assets	25,806
Deferred taxes	463,631
Provision for doubtful accounts	2,700
Provision for inventory excess and obsolescence	30,615
Provision for warranty	20,992
Other	21,685
Cash provided by net loss (adjusted for non-cash charges)	$ 380,034

Working Capital

Our working capital used $150.7 million of cash during fiscal 2018. The following tables set forth (in thousands) the major components of the reduction in working capital:

	Year ended October 31, 2018
Cash used in accounts receivable	$ (168,357)
Cash used in inventories	(27,445)
Cash used in prepaid expenses and other	(21,425)
Cash provided by accounts payable, accruals and other obligations	85,798
Cash used in deferred revenue	(19,344)
Cash used in working capital	$ (150,773)

As compared to the end of fiscal 2017:

- The $168.4 million of cash used in accounts receivable during fiscal 2018 reflects higher sales volume in the fourth quarter of fiscal 2018 as compared to fiscal 2017;
- The $27.4 million in cash used in inventory during fiscal 2018 primarily reflects increases in finished goods to meet customer delivery schedules;
- Cash used in prepaid expenses and other during fiscal 2018 was $21.4 million, primarily reflects increased government grant receivables and other non-customer receivables partially offset by lower prepaid value added taxes and lower deferred deployment costs;
- The $85.8 million of cash provided by accounts payable, accruals and other obligations during fiscal 2018 reflects increased inventory purchases at the end of fiscal 2018; and
- The $19.3 million of cash used in deferred revenue represents a decrease in advanced payments received from customers prior to revenue recognition.

Our days sales outstanding (DSOs) were 92 days for fiscal 2018 as compared to 80 days for fiscal 2017. Our inventory turns increased from 4.9 turns during fiscal 2017 to 5.7 turns during fiscal 2018.

Cash paid for interest

The following tables set forth (in thousands) our interest paid during fiscal 2018:

	Year ended October 31, 2018
3.75% Convertible Senior Notes, due October 15, 2018 (New)[1]	$ 10,827
3.75% Convertible Senior Notes, due October 15, 2018 (Original) [1]	2,298
4.0% Convertible Senior Notes, due December 15, 2020[2]	7,500
Term Loan due January 30, 2022 [3]	15,594
Term Loan due September 28, 2025 [4]	1,980
Interest rate swaps[5]	94
ABL Credit Facility[6]	1,500
Capital leases	4,957
Total	$ 44,750

(1) The final interest payment owing on both issues of our 2018 Notes was paid during the fourth quarter of fiscal 2018.

(2) The final interest payment on our 2020 Notes was paid during the third quarter of fiscal 2018.

(3) Interest on the 2022 Term Loan was payable periodically based on the interest period selected for borrowing. The 2022 Term Loan bore interest at LIBOR plus a spread of 2.50% subject to a minimum LIBOR rate of 0.75%. On September 28, 2018, we refinanced and replaced this term loan with the 2025 Term Loan. See Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this report for more information.

(4) Interest on the 2025 Term Loan is payable periodically based on the interest period selected for borrowing. The 2025 Term Loan bears interest at LIBOR plus a spread of 2.00% subject to a minimum LIBOR rate of 0.00%. As of the end of fiscal 2018, the interest rate on the 2025 Term Loan was 4.28%.

(5) We entered into floating-to-fixed interest rate swap in a total amount of $350 million on October 1, 2018 that fixed the LIBOR rate of approximately 50% of the principal amount of the 2025 Term Loan at 2.957% through September 2023.

(6) During fiscal 2018, we utilized the ABL Credit Facility to collateralize certain standby letters of credit and paid $1.5 million in commitment fees, interest expense and other administrative charges relating to our ABL Credit Facility.

For additional information about our convertible notes, term loans (including the refinancing of our 2022 Term Loan into the 2025 Term Loan), ABL Credit Facility and interest rate swaps see Notes 14, 16 and 17 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report and Item 7A of Part II of this annual report.

Contractual Obligations

The following is a summary of our future minimum payments under contractual obligations as of October 31, 2018 (in thousands):

	Total	Less than one year	One to three years	Three to five years	Thereafter
Principal due on Term Loan due September 28, 2025[1]	$ 700,000	$ 7,000	$ 14,000	$ 14,000	$ 665,000
Interest due on Term Loan due September 28, 2025[1]	203,797	30,187	59,630	58,414	55,566
Payments due under interest rate swaps [1]	11,814	2,397	4,807	4,610	—
Operating leases [2]	150,608	28,912	45,668	28,981	47,047
Purchase obligations [3]	379,096	379,096	—	—	—
Capital leases - equipment	1,419	1,281	138	—	—
Capital leases - buildings [4]	113,862	7,373	15,104	15,974	75,411
Payment due on debt conversion - cash settlement [5]	111,268	111,268	—	—	—
Payment due on debt conversion - equity settlement [5]	52,944	52,944	—	—	—
Other obligations	830	796	34	—	—
Total [6]	$ 1,725,638	$ 621,254	$ 139,381	$ 121,979	$ 843,024

(1) Interest on the 2025 Term Loan and payments due under the interest rate swaps is variable and calculated using the rate in effect on the balance sheet date. For additional information about our term loans and the interest rate swaps, see Notes 14 and 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report and Item 7A of Part II of this annual report.

(2) Does not include variable insurance, taxes, maintenance and other costs that may be required by the applicable operating lease. These costs are not expected to have a material future impact.

(3) Purchase obligations relate to purchase order commitments to our contract manufacturers and component suppliers for inventory. In certain instances, we are permitted to cancel, reschedule or adjust these orders. Consequently, only a portion of the amount reported above relates to firm, non-cancelable and unconditional obligations.

(4) This represents the total minimum lease payments due for all buildings that are subject to capital lease accounting. Does not include variable insurance, taxes, maintenance and other costs required by the applicable capital lease. These costs are not expected to have a material future impact.

(5) This represents the fair value of the total obligation for the cash and equity portion of the conversion feature incurred in conjunction with the November 15, 2018 settlement of the New 3.75% Convertible Senior Notes. See Notes 14 and 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report

(6) As of October 31, 2018, we also had $15.9 million of other long-term obligations on our Consolidated Balance Sheet for unrecognized tax positions that are not included in this table because the timing or amount of any cash settlement with the respective tax authority cannot be reasonably estimated.

Some of our commercial commitments, including some of the future minimum payments in operating leases set forth above and certain commitments to customers, are secured by standby letters of credit collateralized under our ABL Credit Facility or restricted cash. Restricted cash balances are included in other current assets or other long-term assets depending upon the duration of the underlying letter of credit obligation. The following is a summary of our commercial commitments secured by standby letters of credit by commitment expiration date as of October 31, 2018 (in thousands):

	Total	Less than one year	One to three years	Three to five years	Thereafter
Standby letters of credit	$ 61,726	$ 19,171	$ 24,564	$ 12,221	$ 5,770

Off-Balance Sheet Arrangements

We do not engage in any off-balance sheet financing arrangements. In particular, we do not have any equity interests in so-called limited purpose entities, which include special purpose entities (SPEs) and structured finance entities.

Critical Accounting Policies and Estimates

The preparation of our consolidated financial statements requires that we make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expense, and related disclosure of contingent assets and liabilities. By their nature, these estimates and judgments are subject to an inherent degree of uncertainty. On an ongoing basis, we reevaluate our estimates, including those related to share-based compensation, bad debts, inventories, intangible and other long-lived assets, goodwill, income taxes, warranty obligations, restructuring, derivatives and hedging, and contingencies and litigation. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Among other things, these estimates form the basis for judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. To the extent that there are material differences between our estimates and actual results, our consolidated financial statements will be affected.

We believe that the following critical accounting policies reflect those areas where significant judgments and estimates are used in the preparation of our consolidated financial statements.

Revenue Recognition

We recognize revenue when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; the price to the buyer is fixed or determinable; and collectibility is reasonably assured. Customer purchase agreements and customer purchase orders are generally used to determine the existence of an arrangement. Shipping documents and evidence of customer acceptance, when applicable, are used to verify delivery or services rendered. We assess whether the price is fixed or determinable based on the payment terms associated with the transaction and whether the sales price is subject to refund or adjustment. We assess collectibility based primarily on the creditworthiness of the customer as determined by credit checks and analysis, as well as the customer's payment history. Revenue for maintenance services is deferred and recognized ratably over the period during which the services are to be performed. Shipping and handling fees billed to customers are included in revenue, with the associated expenses included in product cost of goods sold.

Software revenue is recognized when persuasive evidence of an arrangement exists, delivery has occurred, the fee is fixed or determinable, and collectibility is probable. In instances where final acceptance criteria of the software are specified by the customer, revenue is deferred until there are no uncertainties regarding customer acceptance.

We limit the amount of revenue recognition for delivered elements to the amount that is not contingent on the future delivery of products or services, future performance obligations or subject to customer-specified return or refund privileges.

Revenue for multiple element arrangements is allocated to each unit of accounting based on the relative selling price of each delivered element, with revenue recognized for each delivered element when the revenue recognition criteria are met. We determine the selling price for each deliverable based upon the selling price hierarchy for multiple-deliverable arrangements. Under this hierarchy, we use vendor-specific objective evidence ("VSOE") of selling price, if it exists, or third-party evidence ("TPE") of selling price if VSOE does not exist. If neither VSOE nor TPE of selling price exists for a deliverable, we use our best estimate of selling price ("BESP") for that deliverable. For multiple element software arrangements where VSOE of undelivered maintenance does not exist, revenue for the entire arrangement is recognized over the maintenance term.

VSOE, when determinable, is established based on our pricing and discounting practices for the specific product or service when sold separately. In determining whether VSOE exists, we require that a substantial majority of the selling prices for a product or service fall within a reasonably narrow pricing range. We have generally been unable to establish TPE of selling price because our go-to-market strategy differs from that of others in our markets, and the extent of customization and differentiated features and functions varies among comparable products or services from our peers. We determine BESP based

upon management-approved pricing guidelines, which consider multiple factors including the type of product or service, gross margin objectives, competitive and market conditions and the go-to-market strategy, all of which can affect pricing practices.

Our total deferred revenue for products was $42.5 million and $49.1 million as of October 31, 2018 and October 31, 2017, respectively. Our services revenue is deferred and recognized ratably over the period during which the services are to be performed. Our total deferred revenue for services was $127.0 million and $135.9 million as of October 31, 2018 and October 31, 2017, respectively.

In May 2014, the FASB issued Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers*, a new accounting standard related to revenue recognition. ASC 606 supersedes nearly all U.S. GAAP on revenue recognition and eliminated industry-specific guidance. The underlying principle of ASC 606 is to recognize revenue when a customer obtains control of promised goods or services at an amount that reflects the consideration that is expected to be received in exchange for those goods or services. It also requires increased disclosures including the nature, amount, timing and uncertainty of revenues and cash flows related to contracts with customers.

For multiple element software arrangements where vendor-specific objective evidence ("VSOE") of undelivered maintenance does not exist, we currently recognize revenue for the entire arrangement over the maintenance term. The adoption of ASC 606 will require us to determine the stand alone selling price for each of the software and software-related deliverables at contract inception, and we consequently note that certain software deliverables will be recognized at a point in time rather than over a period of time.

We also note that certain installation and deployment, and consulting and network design services, will be recognized over a period of time rather than at a point in time.

We have considered the impact of the guidance in ASC 340-40, *Other Assets and Deferred Costs; Contracts with Customers*, and the interpretations of the FASB Transition Resource Group for Revenue Recognition (TRG) with respect to capitalization and amortization of incremental costs of obtaining a contract. In conjunction with this interpretation, we have elected to implement the practical expedient allowing for incremental costs to be recognized as an expense when incurred if the period of the asset recognition is one year or less, and amortized over the period of performance, if the period of the asset recognition is greater than one year.

We elected to implement ASC 606 using the modified retrospective approach whereby the cumulative effect at adoption will be presented as an adjustment to the opening balance of accumulated deficit. The comparative information will not be restated and will continue to be reported under the accounting standards in effect for those periods. ASC 606 will be effective for us beginning in the first quarter of fiscal 2019.

We do not expect that ASC 606 will have a material impact on total revenue for fiscal 2019 as we believe the revenue that will be accelerated from certain software arrangements consistent with the changes in timing as described above will be largely offset by a reduction of revenue from software arrangements where revenue was previously deferred in prior periods and recognized ratably over time as required under the current standard. This preliminary assessment is based on the types and number of revenue arrangements currently in place. The exact impact of ASC 606 will be dependent on the facts and circumstances at adoption and could vary from quarter to quarter. For further discussion of ASC 606, see Note 1 to our Consolidated Financial Statements in Item 8 of Part II of this annual report.

Business Combinations

We record acquisitions using the purchase method of accounting. All of the assets acquired, liabilities assumed, contractual contingencies and contingent consideration are recognized at their fair value as of the acquisition date. The excess of the purchase price over the estimated fair values of the net tangible and net intangible assets acquired is recorded as goodwill. The application of the purchase method of accounting for business combinations requires management to make significant estimates and assumptions in the determination of the fair value of assets acquired and liabilities assumed in order to allocate purchase price consideration properly between assets that are depreciated and amortized from goodwill. These assumptions and estimates include a market participant's use of the asset and the appropriate discount rates for a market participant. Our estimates are based on historical experience, information obtained from the management of the acquired companies and, when appropriate, include assistance from independent third-party appraisal firms. Our significant assumptions and estimates can include, but are not limited to, the cash flows that an asset is expected to generate in the future, the appropriate weighted-average cost of capital, and the cost savings expected to be derived from acquiring an asset. These estimates are inherently uncertain and unpredictable. In addition, unanticipated events and circumstances may occur which may affect the accuracy or validity of such estimates. During fiscal 2016, we completed the acquisition of TeraXion's HSPC assets for a purchase price of $32.0 million.

During fiscal 2018, we completed the Packet Design acquisition for a purchase price of $41.1 million and the DonRiver acquisition for a purchase price of $54.2 million, including a contingent consideration component. See Note 2 to the Consolidated Financial Statements included in Item 8 of Part II of this annual report for more information regarding these transactions and the three-year earn-out arrangement in connection with the DonRiver acquisition.

Share-Based Compensation

We estimate the fair value of our restricted stock unit awards based on the fair value of our common stock on the date of grant. Our outstanding restricted stock unit awards are subject to service-based vesting conditions and/or performance-based vesting conditions. We recognize the estimated fair value of service-based awards as share-based expense ratably over the vesting period on a straight-line basis. Awards with performance-based vesting conditions require the achievement of certain financial or other performance criteria or targets as a condition to the vesting, or acceleration of vesting. We recognize the estimated fair value of performance-based awards as share-based expense over the performance period, using graded vesting, which considers each performance period or tranche separately, based upon our determination of whether it is probable that the performance targets will be achieved. At the end of each reporting period, we reassess the probability of achieving the performance targets and the performance period required to meet those targets, and the expense is adjusted accordingly. Determining whether the performance targets will be achieved involves judgment, and the estimate of expense may be revised periodically based on changes in the probability of achieving the performance targets. Revisions are reflected in the period in which the estimate is changed. If any performance goals are not met, no compensation cost is ultimately recognized against that goal and, to the extent previously recognized, compensation cost is reversed.

Share-based compensation expense is taken into account based on awards granted. In the event of a forfeiture of an award, the expense related to the unvested portion of that award is reversed. Reversal of share-based compensation expense based on forfeitures can materially affect the measurement of estimated fair value of our share-based compensation. See Note 21 to our Consolidated Financial Statements in Item 8 of Part II of this annual report for information regarding our assumptions related to share-based compensation and the amount of share-based compensation expense we incurred for the periods covered in this report. As of October 31, 2018, total unrecognized compensation expense was $77.3 million, which relates to unvested restricted stock units and is expected to be recognized over a weighted-average period of 1.45 years.

Ciena is required to record excess tax benefits or tax deficiencies related to stock-based compensation as income tax benefit or expense when share-based awards vest or are settled.

Reserve for Inventory Obsolescence

We make estimates about future customer demand for our products when establishing the appropriate reserve for excess and obsolete inventory. We write down inventory that has become obsolete or unmarketable by an amount equal to the difference between the cost of inventory and the estimated market value based on assumptions about future demand and market conditions. Inventory write downs are a component of our product cost of goods sold. Upon recognition of the write down, a new lower cost basis for that inventory is established, and subsequent changes in facts and circumstances do not result in the restoration or increase in that newly established cost basis. In an effort to limit our exposure to delivery delays and to satisfy customer needs, we purchase inventory based on forecasted sales across our product lines. In addition, part of our research and development strategy is to promote the convergence of similar features and functionalities across our product lines. Each of these practices exposes us to the risk that our customers will not order products for which we have forecasted sales, or will purchase less than we have forecasted.

We have experienced write downs due to changes in our strategic direction, discontinuance of a product or introduction of newer versions of our products, declines in the sales of or forecasted demand for certain products, and general market conditions. We recorded charges for excess and obsolete inventory of $30.6 million, $35.5 million and $33.7 million in fiscal 2018, 2017 and 2016, respectively. Our inventory net of allowance for excess and obsolescence was $262.8 million and $267.1 million as of October 31, 2018 and October 31, 2017, respectively.

Allowance for Doubtful Accounts Receivable

Our allowance for doubtful accounts receivable is based on management’s assessment, on a specific identification basis, of the collectibility of customer accounts. We perform ongoing credit evaluations of our customers and generally have not required collateral or other forms of security from customers. In determining the appropriate balance for our allowance for doubtful accounts receivable, management considers each individual customer account receivable in order to determine collectibility. In doing so, we consider creditworthiness, payment history, account activity and communication with such customer. If a customer’s financial condition changes, or if actual defaults are higher than our historical experience, we may be

required to take a charge for an allowance for doubtful accounts receivable which could have an adverse impact on our results of operations.

During fiscal 2017, Ciena's allowance for doubtful accounts included a provision for a significant asset impairment of $13.7 million for a trade receivable related to a single customer in the APAC region. Our accounts receivable, net of allowance for doubtful accounts, was $786.5 million and $622.2 million as of October 31, 2018 and October 31, 2017, respectively. Our allowance for doubtful accounts was $17.4 million and $17.6 million as of October 31, 2018 and October 31, 2017, respectively.

Goodwill

Our goodwill was generated from the acquisition of (i) Cyan during fiscal 2015, (ii) the HSPC assets of TeraXion during fiscal 2016, (iii) Packet Design on July 2, 2018, and (iv) DonRiver on October 1, 2018. The goodwill from these acquisitions is primarily related to expected synergies. Goodwill is the excess of the purchase price over the fair values assigned to the net assets acquired in a business combination. We test goodwill for impairment on an annual basis, which we have determined to be the last business day of fiscal September each year. We also test goodwill for impairment between annual tests if an event occurs or circumstances change that would, more likely than not, reduce the fair value of the reporting unit below its carrying value.

The first step in the process of assessing goodwill impairment is to compare the fair value of the reporting unit with the unit's carrying amount, including goodwill. If this test indicates that the fair value is less than the carrying value, then step two requires goodwill impairments to be measured on the basis of the fair value of the reporting unit relative to the reporting unit's carrying amount. A non-cash goodwill impairment charge would have the effect of decreasing earnings or increasing losses in such period. If we are required to take a substantial impairment charge, our operating results would be materially adversely affected in such period. As of October 31, 2018 and October 31, 2017, the goodwill balance was $298.0 million and $267.5 million, respectively. There were no goodwill impairments resulting from our fiscal 2018 and 2017 impairment tests and no reporting unit was determined to be at risk of failing step one of the goodwill impairment test. See Note 2 to the Consolidated Financial Statements included in Item 8 of Part II of this annual report.

Long-lived Assets

Our long-lived assets include equipment, building, furniture and fixtures, finite-lived intangible assets, in-process research and development, and maintenance spares. As of October 31, 2018 and October 31, 2017 these assets totaled $486.0 million and $456.3 million, net, respectively. We test long-lived assets for impairment whenever events or changes in circumstances indicate that the assets' carrying amount is not recoverable from its undiscounted cash flows. Our long-lived assets are assigned to asset groups which represent the lowest level for which we identify cash flows. We measure impairment loss as the amount by which the carrying amount of the asset or asset group exceeds its fair value.

Deferred Tax Assets

Pursuant to Accounting Standards Codification ("ASC") Topic 740, Income Taxes, we maintain a valuation allowance for a deferred tax asset when it is deemed to be more likely than not that some or all of the deferred tax asset will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income (including the reversals of deferred tax liabilities) during the periods in which those deferred tax assets will become deductible. In evaluating whether a valuation allowance is required under such rules, we consider all available positive and negative evidence, including prior operating results, the nature and reason for any losses, our forecast of future taxable income, utilization of tax planning strategies, and the dates on which any deferred tax assets are expected to expire. These assumptions and estimates require a significant amount of judgment and are made based on current and projected circumstances and conditions.

Quarterly, we perform an analysis to determine the likelihood of realizing our deferred tax assets and whether sufficient evidence exists to support reversal of all or a portion of the valuation allowance. During the fourth quarter of fiscal 2017, this analysis consisted of the evaluation of all available positive and negative evidence, including our improved profitability in fiscal 2016 and fiscal 2017. We also considered third-party estimates of market growth and our internal projections of future profitability as indicated in our annual update to our operating plan for fiscal 2018 and our long-term strategic forecast which were completed during the fourth quarter of fiscal 2017. We also considered our strong performance against our annual operating plans in recent years and our ability to utilize tax planning strategies. Based on this analysis, we concluded that it was more likely than not that the majority of our U.S. deferred tax assets will be realized, and we therefore reversed most of the valuation allowance against those deferred assets. This reversal resulted in a one-time, non-cash income tax benefit of $1.2 billion and a $26.0 million adjustment to additional paid-in capital. The valuation allowance balance at October 31, 2018 was

$142.7 million and the corresponding net deferred tax asset was $745.0 million. We will continue to evaluate future financial performance to determine whether such performance is both sustained and significant enough to provide sufficient evidence to support reversal of all or a portion of the remaining valuation allowance. The value of our net deferred tax asset may be subject to change in the future, depending upon our generation or projections of future taxable income, as well as changes in tax policy or our tax planning strategy. For further discussion, see Note 20 to the Consolidated Financial Statements included in Item 8 of Part II of this annual report.

Warranty

Our liability for product warranties, included in other accrued liabilities, was $44.7 million and $42.5 million as of October 31, 2018 and October 31, 2017, respectively. Our products are generally covered by a warranty for periods ranging from one to five years. We accrue for warranty costs as part of our cost of goods sold based on associated material costs, technical support labor costs and associated overhead. Material cost is estimated based primarily upon historical trends in the volume of product returns within the warranty period and the cost to repair or replace the equipment. Technical support labor cost is estimated based primarily upon historical trends and the cost to support the customer cases within the warranty period. The provision for product warranties, net of adjustments for previous years' provisions, was $21.0 million, $8.0 million and $15.5 million for fiscal 2018, 2017 and 2016 respectively. The provision for warranty claims may fluctuate on a quarterly basis depending upon the mix of products and customers in that period. If actual product failure rates, material replacement costs, service or labor costs differ from our estimates, revisions to the estimated warranty provision would be required. These adjustments for previous years provisions had the effect of reducing warranty provisions by $9.7 million and $5.3 million for fiscal 2017 and 2016 respectively. During fiscal 2018, we determined that failure rates for prior estimates remained unchanged, and accordingly did not make any adjustments for previous fiscal year provisions not yet settled. As a result, our warranty provision for fiscal 2018 increased as compared to these prior years. See Note 13 to the Consolidated Financial Statements included in Item 8 of Part II of this annual report. An increase in warranty claims or the related costs associated with satisfying our warranty obligations could increase our cost of sales and negatively affect our gross margin.

Effects of Recent Accounting Pronouncements

See Note 1 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for information relating to our discussion of the effects of recent accounting pronouncements.

Unaudited Quarterly Results of Operations

The tables below (in thousands, except per share data) set forth the operating results in our consolidated statements of operations for each of the eight quarters in the period ended October 31, 2018. Our revenue can fluctuate from quarter to quarter as a result of a number of factors, including changes in customer spending levels or networking strategies, order timing and volume, backlog levels, timing of revenue recognition and other competitive dynamics. As our business has evolved, including the sales of our solutions to meet the "on-demand" service requirements of both our customers and their end-users, the amount of quarterly revenue that we recognize in a quarter from customer orders received in that same quarter (which we refer to as "book to revenue") has increased as compared to our historical periods. Increased reliance on book to revenue introduces a number of risks, including the inherent difficulty in forecasting the amount and timing of book to revenue in any given quarter, and may increase the likelihood of fluctuations in our results. This information is unaudited, but in our opinion reflects all adjustments (consisting only of normal recurring adjustments) that we consider necessary for a fair statement of such information in accordance with generally accepted accounting principles. The results for any quarter are not necessarily indicative of results for any future period.

	Oct. 31, 2018	Jul. 31, 2018	Apr. 30, 2018	Jan. 31, 2018	Oct. 31, 2017	Jul. 31, 2017	Apr. 30, 2017	Jan. 31, 2017
Revenue:								
Products	$ 743,867	$ 691,758	$ 604,226	$ 525,609	$ 616,216	$ 610,742	$ 584,630	$ 506,993
Services	155,489	127,059	125,752	120,526	128,233	117,977	122,392	114,504
Total revenue	899,356	818,817	729,978	646,135	744,449	728,719	707,022	621,497
Cost of goods sold:								
Products	421,583	399,886	372,568	313,120	352,992	341,197	327,295	286,811
Services	79,698	67,388	64,103	61,250	65,772	59,446	61,487	60,901
Total costs of goods sold	501,281	467,274	436,671	374,370	418,764	400,643	388,782	347,712
Gross profit	398,075	351,543	293,307	271,765	325,685	328,076	318,240	273,785
Operating expenses:								
Research and development	134,983	121,133	116,924	118,524	119,108	117,729	121,623	116,869
Selling and marketing	112,791	95,395	97,359	88,515	95,877	86,739	88,551	85,002
General and administrative	44,539	38,212	38,976	38,406	36,181	35,569	34,990	35,864
Amortization of intangible assets	4,654	3,837	3,623	3,623	3,661	3,837	10,980	14,551
Acquisition and integration costs	3,778	1,333	—	—	—	—	—	—
Significant asset impairments and restructuring costs	1,460	6,359	4,359	5,961	15,059	2,203	4,276	2,395
Total operating expenses	302,205	266,269	261,241	255,029	269,886	246,077	260,420	254,681
Income from operations	95,870	85,274	32,066	16,736	55,799	81,999	57,820	19,104
Interest and other income (loss), net	(13,357)	(1,543)	1,296	1,575	1,344	(848)	6	411
Interest expense	(14,873)	(13,611)	(13,031)	(13,734)	(13,926)	(13,415)	(13,308)	(15,203)
Loss on extinguishment and modification of debt	(13,887)	—	—	—	(692)	—	(2,924)	(41)
Income before income taxes	53,753	70,120	20,331	4,577	42,525	67,736	41,594	4,271
Provision (benefit) for income tax	(10,224)	19,280	6,475	477,940	(1,117,531)	7,726	3,568	410
Net income (loss)	$ 63,977	$ 50,840	$ 13,856	$ (473,363)	$ 1,160,056	$ 60,010	$ 38,026	$ 3,861
Basic net income (loss) per common share	$ 0.45	$ 0.35	$ 0.10	$ (3.29)	$ 8.11	$ 0.42	$ 0.27	$ 0.03
Diluted net income (loss) per potential common share	$ 0.34	$ 0.34	$ 0.09	$ (3.29)	$ 7.32	$ 0.39	$ 0.25	$ 0.03
Weighted average basic common shares outstanding	143,659	143,400	143,975	143,922	143,097	142,464	141,743	140,682
Weighted average diluted potential common shares outstanding	157,745	159,998	147,973	143,922	158,791	172,112	165,273	142,184

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk related to changes in interest rates and foreign currency exchange rates. The following discussion about these market risks includes forward-looking statements. Actual results could differ materially from those projected in these forward-looking statements.

Interest Rate Sensitivity. We currently hold investments in U.S. government obligations and commercial paper with varying maturities. See Notes 5 and 6 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for information relating to investments and fair value. These investments are sensitive to interest rate movements, and their fair value will decline as interest rates rise and increase as interest rates decline. The estimated impact on these investments of a 100 basis point (1.0%) increase in interest rates across the yield curve from rates in effect as of the balance sheet date would be a $1.4 million decline in value.

Our earnings and cash flows from operations would be exposed to changes in interest rates because of the floating rate of interest in our 2025 Term Loan if such loan was not hedged using floating-to-fixed rate interest rate swaps. See Note 14 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report. The 2025 Term Loan bears interest at LIBOR plus a spread of 2.00%, subject to a minimum LIBOR rate of 0.00%. We have entered into interest rate swap arrangements ("interest rate swaps") that fix the LIBOR rate of approximately 50% of the 2025 Term Loan principal amount at 2.957% through September 2023. As such, a 100 basis point (1.0%) increase in the LIBOR rate as of our most recent LIBOR rate setting would increase our annualized interest expense by approximately $3.5 million on our 2025 Term Loan as recognized in our Consolidated Financial Statements. See Note 16 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report for information relating to our 2025 Term Loan.

Foreign Currency Exchange Risk. As a global concern, our business and results of operations are exposed to and can be impacted by movements in foreign currency exchange rates. For example, the announcement of the United Kingdom (UK) referendum in which voters approved an exit from the European Union (EU), commonly referred to as "Brexit," has previously caused, and may continue to cause, significant volatility in currency exchange rate fluctuations. Because we sell globally, some of our sales transactions and revenue are non-U.S. Dollar denominated, with the Canadian Dollar, Euro, British Pound and Brazilian Real being our most significant foreign currency revenue exposures. If the U.S. Dollar strengthens against these currencies, our revenue for these transactions reported in U.S. Dollars would decline. For our U.S. Dollar denominated sales, an increase in the value of the U.S. Dollar would increase the real costs of our products to customers in markets outside the United States, which could impact our competitive position. During fiscal 2018, approximately 17.8% of revenue was non-U.S. Dollar denominated. During fiscal 2018 as compared to fiscal 2017, the U.S. Dollar strengthened against a number of foreign currencies, including the Brazilian Real and Argentine Peso primarily offset by weakening against the Euro. Consequently, our revenue reported in U.S. Dollars was minimally impacted by approximately $1.5 million or 0.1%. As it relates to costs of goods sold, employee-related and facilities costs associated with certain manufacturing-related operations in Canada represent our primary exposure to foreign currency exchange risk.

With regard to operating expense, our primary exposure to foreign currency exchange risk relates to the Canadian Dollar, British Pound, Euro, Indian Rupee, Brazilian Real and Australian Dollar. During fiscal 2018, approximately 52.6% of our operating expense was non-U.S. Dollar denominated. If currencies strengthen against the U.S. Dollar, costs reported in U.S. Dollars will increase. During fiscal 2018, research and development expense was adversely affected by approximately $5.1 million, net of hedging, primarily due to the weakening of the U.S. Dollar in relation to the Canadian Dollar in comparison to fiscal 2017. Also, sales and marketing expense was adversely affected by $4.3 million, as a result of foreign exchange rates, primarily due to a weaker U.S. Dollar in relation to the Euro in fiscal 2018 in comparison to fiscal 2017.

From time to time, we use foreign currency forward contracts to reduce variability in certain forecasted non-U.S. Dollar denominated cash flows. Generally, these derivatives have maturities of 24 months or less and are designated as cash flow hedges. At the inception of the cash flow hedge, and on an ongoing basis, we assess whether the forward contract has been effective in offsetting changes in cash flows attributable to the hedged risk during the hedging period. The effective portion of the derivative’s net gain or loss is initially reported as a component of accumulated other comprehensive income (loss) and, upon the occurrence of the forecasted transaction, is subsequently reclassified to the line item in the Consolidated Statement of Operations to which the hedged transaction relates. Any net gain or loss associated with the ineffectiveness of the hedging instrument is reported in interest and other income (loss), net.

Ciena Corporation, as the U.S. parent entity, uses the U.S. Dollar as its functional currency. However, some of our foreign branch offices and subsidiaries use the local currency as their functional currency. During fiscal 2018, we recorded $19.4 million in foreign currency exchange losses, as a result of monetary assets and liabilities that were transacted in a currency other than the entity’s functional currency, and the re-measurement adjustments were recorded in interest and other income (loss), net on the Consolidated Statement of Operations. From time to time, we use foreign currency forwards to hedge these balance sheet exposures. These forwards are not designated as hedges for accounting purposes, and any net gain or loss associated with these derivatives is reported in interest and other income (loss), net. During fiscal 2018, we recorded gains of

$6.8 million from these derivatives. See Notes 1, 4 and 14 to our Consolidated Financial Statements included in Item 8 of Part II of this annual report.

Item 8. Financial Statements and Supplementary Data

The following is an index to the consolidated financial statements:

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Ciena Corporation:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Ciena Corporation and its subsidiaries (the "Company") as of October 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income (loss), changes in stockholders' equity (deficit), and cash flows for each of the three years in the period ended October 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of October 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of October 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended October 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of October 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, the Company changed the manner in which it accounts for share-based compensation in 2018.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Report of Management on Internal Control Over Financial Reporting under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the

company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP
Baltimore, Maryland
December 21, 2018

We have served as the Company's auditor since 1992.

CIENA CORPORATION
CONSOLIDATED BALANCE SHEETS
(in thousands, except share data)

	October 31,	
	2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	$ 745,423	$ 640,513
Short-term investments	148,981	279,133
Accounts receivable, net	786,502	622,183
Inventories, net	262,751	267,143
Prepaid expenses and other	198,945	197,339
Total current assets	2,142,602	2,006,311
Long-term investments	58,970	49,783
Equipment, building, furniture and fixtures, net	292,067	308,465
Goodwill	297,968	267,458
Other intangible assets, net	148,225	100,997
Deferred tax asset, net	745,039	1,155,104
Other long-term assets	71,652	63,593
Total assets	$ 3,756,523	$ 3,951,711
LIABILITIES AND STOCKHOLDERS' EQUITY (DEFICIT)		
Current liabilities:		
Accounts payable	$ 340,582	$ 260,098
Accrued liabilities and other short-term obligations	340,075	322,934
Deferred revenue	111,134	102,418
Current portion of long-term debt	7,000	352,293
Debt conversion liability	164,212	—
Total current liabilities	963,003	1,037,743
Long-term deferred revenue	58,323	82,589
Other long-term obligations	119,413	111,349
Long-term debt, net	686,450	583,688
Total liabilities	$ 1,827,189	$ 1,815,369
Commitments and contingencies (Note 24)		
Stockholders' equity:		
Preferred stock — par value $0.01; 20,000,000 shares authorized; zero shares issued and outstanding	—	—
Common stock — par value $0.01; 290,000,000 shares authorized; 154,318,531 and 143,043,227 shares issued and outstanding	1,543	1,430
Additional paid-in capital	6,881,223	6,810,182
Accumulated other comprehensive loss	(5,780)	(11,017)
Accumulated deficit	(4,947,652)	(4,664,253)
Total stockholders' equity	1,929,334	2,136,342
Total liabilities and stockholders' equity	$ 3,756,523	$ 3,951,711

The accompanying notes are an integral part of these consolidated financial statements.

CIENA CORPORATION
CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share data)

	Year Ended October 31,		
	2018	2017	2016
Revenue:			
Products	$ 2,565,460	$ 2,318,581	$ 2,117,472
Services	528,826	483,106	483,101
Total revenue	3,094,286	2,801,687	2,600,573
Cost of goods sold:			
Products	1,507,157	1,308,295	1,176,304
Services	272,439	247,606	262,693
Total cost of goods sold	1,779,596	1,555,901	1,438,997
Gross profit	1,314,690	1,245,786	1,161,576
Operating expenses:			
Research and development	491,564	475,329	451,794
Selling and marketing	394,060	356,169	349,731
General and administrative	160,133	142,604	132,828
Amortization of intangible assets	15,737	33,029	61,508
Acquisition and integration costs	5,111	—	4,613
Significant asset impairments and restructuring costs	18,139	23,933	4,933
Total operating expenses	1,084,744	1,031,064	1,005,407
Income from operations	229,946	214,722	156,169
Interest and other income (loss), net	(12,029)	913	(12,569)
Interest expense	(55,249)	(55,852)	(56,656)
Loss on extinguishment and modification of debt	(13,887)	(3,657)	(226)
Income before income taxes	148,781	156,126	86,718
Provision (benefit) for income taxes	493,471	(1,105,827)	14,134
Net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584
Basic net income (loss) per common share	$ (2.40)	$ 8.89	$ 0.52
Diluted net income (loss) per potential common share	$ (2.49)	$ 7.53	$ 0.51
Weighted average basic common shares outstanding	143,738	141,997	138,312
Weighted average diluted potential common shares outstanding	143,738	169,919	150,704

The accompanying notes are an integral part of these consolidated financial statements.

CIENA CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)

	Year ended October 31,		
	2018	2017	2016
Net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584
Change in unrealized gain (loss) on available-for-sale securities, net of tax	26	(590)	217
Change in unrealized loss on foreign currency forward contracts, net of tax	(1,674)	(295)	(823)
Change in unrealized gain (loss) on forward starting interest rate swaps, net of tax	6,199	6,185	(445)
Change in accumulated translation adjustments	686	8,012	(1,152)
Other comprehensive income (loss)	5,237	13,312	(2,203)
Total comprehensive income (loss)	$ (339,453)	$ 1,275,265	$ 70,381

The accompanying notes are an integral part of these consolidated financial statements.

CIENA CORPORATION
CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY (DEFICIT)
(in thousands, except share data)

	Common Stock Shares	Par Value	Additional Paid-in-Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit		Total Stockholders' Equity (Deficit)
Balance at October 31, 2015	135,612,217	$ 1,356	$6,640,436	$ (22,126)	$(5,998,790)		$ 620,876
Net income	—	—	—	—	72,584		72,584
Other comprehensive loss	—	—	—	(2,203)	—		(2,203)
Issuance of shares from employee equity plans	4,155,410	42	23,049	—	—		23,091
Share-based compensation expense	—	—	51,993	—	—		51,993
Balance at October 31, 2016	139,767,627	1,398	6,715,478	(24,329)	(5,926,206)		766,341
Net income	—	—	—	—	1,261,953		1,261,953
Other comprehensive income	—	—	—	13,312	—		13,312
Issuance of shares from employee equity plans	3,275,600	32	20,380	—	—		20,412
Share-based compensation expense	—	—	48,360	—	—		48,360
Reversal of deferred tax asset valuation allowance	—	—	25,964	—	—	25,964	25,964
Balance at October 31, 2017	143,043,227	1,430	6,810,182	(11,017)	(4,664,253)		2,136,342
Net loss	—	—	—	—	(344,690)		(344,690)
Other comprehensive income	—	—	—	5,237	—		5,237
Reclassification of cash conversion feature	—	—	(152,142)	—	—		(152,142)
Conversion of convertible notes into common shares	12,236,146	122	261,981	—	—		262,103
Repurchases of common stock - repurchase program	(4,290,801)	(44)	(110,937)	—	—		(110,981)
Issuance of shares from employee equity plans	3,484,018	37	23,090	—	—		23,127
Share-based compensation expense	—	—	52,972	—	—		52,972
Shares repurchased for tax withholdings on vesting of restricted stock units	(154,059)	(2)	(4,755)	—	—		(4,757)
Effect of adoption of new accounting standard	—	—	832	—	61,291		62,123
Balance at October 31, 2018	154,318,531	$ 1,543	$6,881,223	$ (5,780)	$(4,947,652)		$1,929,334

The accompanying notes are an integral part of these consolidated financial statements.

CIENA CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Year Ended October 31,		
	2018	**2017**	**2016**
Cash flows from operating activities:			
Net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Loss on extinguishment of debt	10,039	—	—
Loss on fair value of debt conversion liability	12,070	—	—
Depreciation of equipment, building, furniture and fixtures, and amortization of leasehold improvements	84,214	77,189	63,394
Share-based compensation costs	52,972	48,360	51,993
Amortization of intangible assets	25,806	45,713	78,298
Deferred taxes	463,631	(1,126,732)	(1,116)
Provision for doubtful accounts	2,700	18,221	1,701
Provision for inventory excess and obsolescence	30,615	35,459	33,713
Provision for warranty	20,992	7,965	15,483
Other	21,685	22,417	24,929
Changes in assets and liabilities:			
Accounts receivable	(168,357)	(66,123)	(26,074)
Inventories	(27,445)	(91,567)	(53,000)
Prepaid expenses and other	(21,425)	(33,834)	30,047
Accounts payable, accruals and other obligations	85,798	33,897	7,153
Deferred revenue	(19,344)	1,964	(9,585)
Net cash provided by operating activities	229,261	234,882	289,520
Cash flows used in investing activities:			
Payments for equipment, furniture, fixtures and intellectual property	(67,616)	(94,600)	(107,185)
Restricted cash	117	(54)	11
Purchase of available for sale securities	(286,824)	(299,038)	(365,191)
Proceeds from maturities of available for sale securities	410,109	335,075	230,612
Purchase of cost method investment	(1,767)	—	(4,000)
Settlement of foreign currency forward contracts, net	9,385	(2,810)	(18,506)
Acquisition of businesses, net of cash acquired	(82,670)	—	(32,000)
Net cash used in investing activities	(19,266)	(61,427)	(296,259)
Cash flows from financing activities:			
Proceeds from issuance of long-term debt, net	305,125	—	248,750
Payment of long-term debt	(292,730)	(233,554)	(266,116)
Payment for make-whole provision upon conversion of long-term debt	(13,453)	—	—
Payment for modification of term loans	—	(93,625)	—
Payment of debt issuance costs	(1,936)	(722)	(3,987)
Payment of capital lease obligations	(3,624)	(3,562)	(5,966)
Shares repurchased for tax withholdings on vesting of restricted stock units	(4,757)	—	—
Repurchases of common stock - repurchase program	(110,981)	—	—
Proceeds from issuance of common stock	23,127	20,412	23,091
Net cash used in financing activities	(99,229)	(311,051)	(4,228)
Effect of exchange rate changes on cash and cash equivalents	(5,856)	494	(2,389)
Net increase (decrease) in cash and cash equivalents	104,910	(137,102)	(13,356)
Cash and cash equivalents at beginning of fiscal year	640,513	777,615	790,971
Cash and cash equivalents at end of fiscal year	$ 745,423	$ 640,513	$ 777,615
Supplemental disclosure of cash flow information			
Cash paid during the fiscal year for interest	$ 44,750	$ 47,235	$ 46,897
Cash paid during the fiscal year for income taxes, net	$ 26,900	$ 22,136	$ 15,268
Non-cash investing and financing activities			
Purchase of equipment in accounts payable	$ 5,118	$ 6,214	$ 15,030
Equipment acquired under capital leases	$ —	$ —	$ 5,322
Building subject to capital lease	$ —	$ 50,370	$ 8,993
Construction in progress subject to build-to-suit lease	$ —	$ —	$ 39,914
Contingent consideration for acquisition of business	$ 10,900	$ —	$ —

Conversion of 3.75% convertible senior notes, due October 15, 2018 (Original) into 3,038,208 shares of common stock	$ 61,270	$ —	$ —
Conversion of 4.0% convertible senior notes, due December 15, 2020 into 9,197,943 shares of common stock, net	$ 214,286	$ —	$ —

The accompanying notes are an integral part of these consolidated financial statements.

CIENA CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(1) CIENA CORPORATION AND SIGNIFICANT ACCOUNTING POLICIES AND ESTIMATES

Description of Business

Ciena Corporation ("Ciena" or the "Company") is a networking systems, services and software company, providing solutions that enable a wide range of network operators to deploy and manage next-generation networks that deliver services to businesses and consumers. Ciena provides network hardware, software and services that support the transport, switching, aggregation, service delivery and management of video, data and voice traffic on communications networks. Ciena's solutions are used by communications service providers, cable and multiservice operators, Web-scale providers, submarine network operators, governments, enterprises, research and education (R&E) institutions and other emerging network operators.

Ciena's solutions include a diverse portfolio of high-capacity Networking Platform products, which can be applied from the network core to network access points, and which allow network operators to scale capacity, increase transmission speeds, allocate traffic and adapt dynamically to changing end-user service demands. Ciena also offers Platform Software that provides management and domain control of our next-generation packet and optical platforms and automates network lifecycle operations including provisioning equipment and services. In addition, through its comprehensive suite of Blue Planet Automation Software, Ciena enables network operators to use network data and analytics to drive enhanced automation across multi-vendor and multi-domain network environments, accelerate service delivery and enable an increasingly predictive and autonomous network infrastructure. To complement its hardware and software solutions, Ciena offers broad range of attached and software-related services that help customers design, optimize, integrate, deploy, manage and maintain their networks and associated operational environments. Ciena's complete portfolio of solutions enables customers to transform their network into a dynamic, programmable environment driven by automation and analytics, which Ciena refers to as the Adaptive Network. Ciena's solutions for the Adaptive Network create business and operational value for customers, enabling them to introduce new revenue-generating services, reduce costs and maximize the return on their network infrastructure investment.

Basis of Presentation

The accompanying consolidated financial statements include the accounts of Ciena and its wholly owned subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation.

Ciena has a 52 or 53 week fiscal year, which ends on the Saturday nearest to the last day of October in each year (November 3, 2018, October 28, 2017 and October 29, 2016 for the periods reported). Fiscal 2018 consisted of a 53-week fiscal year. Fiscal 2017 and fiscal 2016 each consisted of a 52-week fiscal year. For purposes of financial statement presentation, each fiscal year is described as having ended on October 31.

Business Combinations

Ciena records acquisitions using the purchase method of accounting. All of the assets acquired, liabilities assumed, contractual contingencies and contingent consideration are recognized at their fair value as of the acquisition date. The excess of the purchase price over the estimated fair values of the net tangible and net intangible assets acquired is recorded as goodwill. The application of the purchase method of accounting for business combinations requires management to make significant estimates and assumptions in the determination of the fair value of assets acquired and liabilities assumed, in order to properly allocate purchase price consideration between assets that are depreciated and amortized from goodwill. These assumptions and estimates include a market participant's use of the asset and the appropriate discount rates for a market participant. Ciena's estimates are based on historical experience, information obtained from the management of the acquired companies and, when appropriate, include assistance from independent third-party appraisal firms. Significant assumptions and estimates can include, but are not limited to, the cash flows that an asset is expected to generate in the future, the appropriate weighted-average cost of capital and the cost savings expected to be derived from acquiring an asset. These estimates are inherently uncertain and unpredictable. In addition, unanticipated events and circumstances may occur which may affect the accuracy or validity of such estimates.

Use of Estimates

The preparation of the financial statements and related disclosures in conformity with Generally Accepted Accounting Principles ("GAAP") requires management to make estimates and judgments that affect the amounts reported in the consolidated financial statements and accompanying notes. Estimates are used for selling prices for multiple element arrangements, shared-based compensation, bad debts, valuation of inventories and investments, recoverability of intangible

assets, other long-lived assets and goodwill, income taxes, warranty obligations, restructuring liabilities, derivatives, contingencies and litigation. Ciena bases its estimates on historical experience and assumptions that it believes are reasonable. Actual results may differ materially from management's estimates.

Cash and Cash Equivalents

Ciena considers all highly liquid investments purchased with original maturities of three months or less to be cash equivalents. Any restricted cash collateralizing letters of credit is included in other current assets and other long-term assets depending upon the duration of the restriction.

Investments

Ciena's investments are classified as available-for-sale and are reported at fair value, with unrealized gains and losses recorded in accumulated other comprehensive income (loss). Ciena recognizes losses in the income statement when it determines that declines in the fair value of its investments below their cost basis are other-than-temporary. In determining whether a decline in fair value is other-than-temporary, Ciena considers various factors, including market price (when available), investment ratings, the financial condition and near-term prospects of the investee, the length of time and the extent to which the fair value has been less than Ciena's cost basis, and Ciena's intent and ability to hold the investment until maturity or for a period of time sufficient to allow for any anticipated recovery in market value. Ciena considers all marketable debt securities that it expects to convert to cash within one year or less to be short-term investments, with all others considered to be long-term investments.

Ciena has minority equity investments in privately held technology companies that are classified in other long-term assets. These investments are carried at cost because Ciena owns less than 20% of the voting equity and does not have the ability to exercise significant influence over the company. Ciena monitors these investments for impairment and makes appropriate reductions to the carrying value when necessary. As of October 31, 2018, the combined carrying value of these investments was $8.1 million. Ciena has not estimated the fair value of these cost method investments because determining the fair value is not practicable. Ciena has not evaluated these investments for impairment as there have not been any events or changes in circumstances that Ciena believes would have had a significant adverse effect on the fair value of these investments.

Inventories

Inventories are stated at the lower of cost or market, with cost computed using standard cost, which approximates actual cost, on a first-in, first-out basis. Ciena records a provision for excess and obsolete inventory when an impairment has been identified.

Segment Reporting

Ciena's chief operating decision maker, its chief executive officer, evaluates the company's performance and allocates resources based on multiple factors, including measures of segment profit (loss). Operating segments are defined as components of an enterprise that engage in business activities that may earn revenue and incur expense, for which discrete financial information is available, and for which such information is evaluated regularly by the chief operating decision maker for purposes of allocating resources and assessing performance. Ciena has the following operating segments for reporting purposes: (i) Networking Platforms, (ii) Software and Software-Related Services, and (iii) Global Services. See Note 22 below.

Goodwill

Goodwill is the excess of the purchase price over the fair values assigned to the net assets acquired in a business combination. Ciena tests goodwill for impairment on an annual basis, which it has determined to be the last business day of fiscal September each year. Ciena also tests goodwill for impairment between annual tests if an event occurs or circumstances change that would, more likely than not, reduce the fair value of the reporting unit below its carrying value.

The first step in the process of assessing goodwill impairment is to compare the fair value of the reporting unit with the unit's carrying amount, including goodwill. If this test indicates that the fair value is less than the carrying value, then step two requires goodwill impairments to be measured on the basis of the fair value of the reporting unit relative to the reporting unit's carrying amount. A non-cash goodwill impairment charge would have the effect of decreasing earnings or increasing losses in such period. If Ciena is required to take a substantial impairment charge, its operating results would be materially adversely affected in such period.

Long-lived Assets

Long-lived assets include: equipment, building, furniture and fixtures; intangible assets; and maintenance spares. Ciena tests long-lived assets for impairment whenever triggering events or changes in circumstances indicate that the asset's carrying amount is not recoverable from its undiscounted cash flows. An impairment loss is measured as the amount by which the carrying amount of the asset or asset group exceeds its fair value. Ciena's long-lived assets are assigned to asset groups that represent the lowest level for which cash flows can be identified.

Equipment, Building, Furniture and Fixtures and Internal Use Software

Equipment, building, furniture and fixtures are recorded at cost. Depreciation and amortization are computed using the straight-line method over useful lives of two to five years for equipment and furniture and fixtures and the shorter of useful life or lease term for leasehold improvements.

Qualifying internal use software and website development costs incurred during the application development stage, which consist primarily of outside services and purchased software license costs, are capitalized and amortized straight-line over the estimated useful lives of two to five years.

Intangible Assets

Ciena has recorded finite-lived intangible assets as a result of several acquisitions. Finite-lived intangible assets are carried at cost less accumulated amortization. Amortization is computed using the straight-line method over the expected economic lives of the respective assets, up to seven years, which approximates the use of intangible assets.

Ciena has recorded in-process research and development projects acquired as the result of an acquisition as indefinite-lived intangible assets. Upon completion of the projects, the assets will be amortized on a straight-line basis over the expected economic life of the asset, which will be determined on that date. Should the project be determined to be abandoned, and if the asset developed has no alternative use, the full value of the asset will be charged to expense.

Maintenance Spares

Maintenance spares are recorded at cost. Spares usage cost is expensed ratably over four years.

Concentrations

Substantially all of Ciena's cash and cash equivalents are maintained at a small number of major U.S. financial institutions. The majority of Ciena's cash equivalents consist of money market funds. Deposits held with banks may exceed the amount of insurance provided on such deposits. Because these deposits generally may be redeemed upon demand, management believes that they bear minimal risk.

Historically, a significant percentage of Ciena's revenue has been concentrated among sales to a small number of large communications service providers. Consolidation among Ciena's customers has increased this concentration. Consequently, Ciena's accounts receivable are concentrated among these customers. See Note 22 below.

Additionally, Ciena's access to certain materials or components is dependent upon sole or limited source suppliers. The inability of any of these suppliers to fulfill Ciena's supply requirements, or significant changes in supply cost, could affect future results. Ciena relies on a small number of contract manufacturers to perform the majority of the manufacturing for its products. If Ciena cannot effectively manage these manufacturers or forecast future demand, or if these manufacturers fail to deliver products or components on time, Ciena's business and results of operations may suffer.

Revenue Recognition

Ciena recognizes revenue when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; the price to the buyer is fixed or determinable; and collectibility is reasonably assured. Customer purchase agreements and customer purchase orders are generally used to determine the existence of an arrangement. Shipping documents and evidence of customer acceptance, when applicable, are used to verify delivery or services rendered. Ciena assesses whether the price is fixed or determinable based on the payment terms associated with the transaction and whether the sales price is subject to refund or adjustment. Ciena assesses collectibility based primarily on the creditworthiness of the customer as determined by credit checks and analysis, as well as the customer's payment history.

Revenue for maintenance services is deferred and recognized ratably over the period during which the services are performed. Shipping and handling fees billed to customers are included in revenue, with the associated expenses included in product cost of goods sold.

Software revenue is recognized when persuasive evidence of an arrangement exists, delivery has occurred, the fee is fixed or determinable, and collectibility is probable. In instances where final acceptance criteria of the software are specified by the customer, revenue is deferred until there are no uncertainties regarding customer acceptance.

Ciena limits the amount of revenue recognition for delivered elements to the amount that is not contingent on the future delivery of products or services, future performance obligations or subject to customer-specified return or refund privileges.

Revenue for multiple element arrangements is allocated to each unit of accounting based on the relative selling price of each delivered element, with revenue recognized for each delivered element when the revenue recognition criteria are met. Ciena determines the selling price for each deliverable based upon the selling price hierarchy for multiple-deliverable arrangements. Under this hierarchy, Ciena uses vendor-specific objective evidence ("VSOE") of selling price, if it exists, or third-party evidence ("TPE") of selling price if VSOE does not exist. If neither VSOE nor TPE of selling price exists for a deliverable, Ciena uses its best estimate of selling price ("BESP") for that deliverable. For multiple element software arrangements where VSOE of undelivered maintenance does not exist, revenue for the entire arrangement is recognized over the maintenance term.

VSOE, when determinable, is established based on Ciena’s pricing and discounting practices for the specific product or service when sold separately. In determining whether VSOE exists, Ciena requires that a substantial majority of the selling prices for a product or service falls within a reasonably narrow pricing range. Ciena has been unable to establish TPE of selling price because its go-to-market strategy differs from that of others in its markets, and the extent of customization and differentiated features and functions varies among comparable products or services from its peers. Ciena determines BESP based upon management-approved pricing guidelines, which consider multiple factors including the type of product or service, gross margin objectives, competitive and market conditions, and the go-to-market strategy, all of which can affect pricing practices.

Warranty Accruals

Ciena provides for the estimated costs to fulfill customer warranty obligations upon recognition of the related revenue. Estimated warranty costs include estimates for material costs, technical support labor costs and associated overhead. Warranty is included in cost of goods sold and is determined based upon actual warranty cost experience, estimates of component failure rates and management’s industry experience. Ciena’s sales contracts do not permit the right of return of the product by the customer after the product has been accepted.

Accounts Receivable, Net

Accounts receivable includes both billed accounts receivable and unbilled accounts receivable due from customers. Unbilled accounts receivable is derived from contract arrangements whereby the billing term is post the revenue recognition term. Ciena’s allowance for doubtful accounts is based on its assessment, on a specific identification basis, of the collectibility of customer accounts. Ciena performs ongoing credit evaluations of its customers and generally has not required collateral or other forms of security from them. In determining the appropriate balance for Ciena’s allowance for doubtful accounts, management considers each individual customer account receivable in order to determine collectibility. In doing so, management considers creditworthiness, payment history, account activity and communication with the customer. If a customer’s financial condition changes, Ciena may be required to record an allowance for doubtful accounts for that customer, which could negatively affect its results of operations.

Research and Development

Ciena charges all research and development costs to expense as incurred. Types of expense incurred in research and development include employee compensation, prototype equipment, consulting and third-party services, depreciation, facility costs and information technology.

Government Grants

Ciena accounts for proceeds from government grants as a reduction of expense when there is reasonable assurance that Ciena has met the required conditions associated with the grant and that grant proceeds will be received. Grant benefits are

recorded to the particular line item of the Consolidated Statement of Operations to which the grant activity relates. See Note 24 below.

Advertising Costs

Ciena expenses all advertising costs as incurred.

Legal Costs

Ciena expenses legal costs associated with litigation as incurred.

Share-Based Compensation Expense

Ciena measures and recognizes compensation expense for share-based awards based on estimated fair values on the date of grant. Ciena estimates the fair value of each option-based award on the date of grant using the Black-Scholes option-pricing model. This model is affected by Ciena's stock price as well as estimates regarding a number of variables, including expected stock price volatility over the expected term of the award and projected employee stock option exercise behaviors. Ciena estimates the fair value of each restricted stock unit award based on the fair value of the underlying common stock on the date of grant. In each case, Ciena only recognizes expense in its Consolidated Statement of Operations for those stock options or restricted stock units that are expected ultimately to vest. Ciena recognizes the estimated fair value of performance-based awards as share-based expense over the performance period, using graded vesting, which considers each performance period or tranche separately, based upon Ciena's determination of whether it is probable that the performance targets will be achieved. At the end of each reporting period, Ciena reassesses the probability of achieving the performance targets and the performance period required to meet those targets, and the expense is adjusted accordingly. Ciena uses the straight-line method to record expense for share-based awards with only service-based vesting. See Note 21 below.

Income Taxes

Ciena accounts for income taxes using an asset and liability approach. This approach recognizes deferred tax assets and liabilities for the expected future tax consequences attributable to differences between the carrying amounts of assets and liabilities for financial reporting purposes and their respective tax bases, and for operating loss and tax credit carryforwards. In estimating future tax consequences, Ciena considers all expected future events other than the enactment of changes in tax laws or rates. Valuation allowances are provided if, based upon the weight of the available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

In the ordinary course of business, transactions occur for which the ultimate outcome may be uncertain. In addition, tax authorities periodically audit Ciena's income tax returns. These audits examine significant tax filing positions, including the timing and amounts of deductions and the allocation of income tax expenses among tax jurisdictions. Ciena is currently under audit in India for 2012 and 2014 through 2017, and in Canada for 2011 through 2015. Management does not expect the outcome of these audits to have a material adverse effect on Ciena's consolidated financial position, results of operations or cash flows. Ciena's major tax jurisdictions and the earliest open tax years are as follows: United States (2015), United Kingdom (2015), Canada (2011), India (2012) and Brazil (2013). Limited adjustments can be made to Federal U.S. tax returns in earlier years in order to reduce net operating loss carryforwards. Ciena classifies interest and penalties related to uncertain tax positions as a component of income tax expense.

Ciena has not provided for U.S. deferred income taxes on the cumulative unremitted earnings of its non-U.S. affiliates, as it plans to indefinitely reinvest these foreign earnings outside the U.S. As of October 31, 2018, the cumulative amount of such temporary differences for which a deferred tax liability has not been recognized totaled approximately $336 million. If these earnings were distributed to the U.S. in the form of dividends, or otherwise, or if the shares of the relevant foreign subsidiaries were sold or otherwise transferred, Ciena would be subject to additional U.S. income taxes (subject to an adjustment for foreign tax credits) and foreign withholding taxes.

Ciena is required to record excess tax benefits or tax deficiencies related to stock-based compensation as income tax benefit or expense when share-based awards vest or are settled.

The Tax Act includes provisions that do not affect Ciena in fiscal 2018, including a provision designed to tax global intangible low-taxed income ("GILTI"). Due to the complexity of the GILTI tax rules, this provision and related tax accounting will continue to be evaluated. An accounting policy choice is allowed to either treat taxes due on future U.S. inclusions related to GILTI in taxable income as a current-period expense when incurred (the "period cost method") or factor such amounts into

the measurement of deferred taxes (the “deferred method”). The calculation of the deferred balance with respect to the new GILTI tax provisions will depend, in part, on analyzing global income to determine whether future U.S. inclusions in taxable income are expected related to GILTI and, if so, what the impact is expected to be. Ciena is electing to use the period cost method for future GILTI inclusions. Additionally, Ciena is electing to use the incremental cash tax savings approach when determining whether a valuation allowance needs to be recorded against the U.S. net operating loss (“NOL”) due to the GILTI inclusions.

The Tax Act also introduced an alternative tax known as the base erosion and anti-abuse tax (BEAT). An accounting policy choice can be made on whether or not to consider the impact of BEAT on its valuation allowance. Ciena continues to evaluate very recent regulatory guidance in order to assess its impact. Accordingly, an accounting policy choice has not yet been made.

Loss Contingencies

Ciena is subject to the possibility of various losses arising in the ordinary course of business. These may relate to disputes, litigation and other legal actions. Ciena considers the likelihood of loss or the incurrence of a liability, as well as Ciena’s ability to estimate the amount of loss reasonably, in determining loss contingencies. An estimated loss contingency is accrued when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Ciena regularly evaluates current information available to it in order to determine whether any accruals should be adjusted and whether new accruals are required.

Fair Value of Financial Instruments

The carrying value of Ciena’s cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities approximates fair market value due to the relatively short period of time to maturity. For information related to the fair value of Ciena’s convertible notes and term loans, see Note 16 below.

Fair value for the measurement of financial assets and liabilities is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. Ciena utilizes a valuation hierarchy for disclosure of the inputs for fair value measurement. This hierarchy prioritizes the inputs into three broad levels as follows:

- Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities;
- Level 2 inputs are quoted prices for identical or similar assets or liabilities in less active markets or model-derived valuations in which significant inputs are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument; and
- Level 3 inputs are unobservable inputs based on Ciena’s assumptions used to measure assets and liabilities at fair value.

By distinguishing between inputs that are observable in the marketplace, and therefore more objective, and those that are unobservable, and therefore more subjective, the hierarchy is designed to indicate the relative reliability of the fair value measurements. A financial asset’s or liability’s classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement.

Restructuring

From time to time, Ciena takes actions to better align its workforce, facilities and operating costs with perceived market opportunities, business strategies and changes in market and business conditions. Ciena recognizes a liability for the cost associated with an exit or disposal activity in the period in which the liability is incurred, except for one-time employee termination benefits related to a service period, typically of more than 60 days, which are accrued over the service period. See Note 3 below.

Foreign Currency

Certain of Ciena’s foreign branch offices and subsidiaries use the U.S. Dollar as their functional currency because Ciena Corporation, as the U.S. parent entity, exclusively funds the operations of these branch offices and subsidiaries. For those subsidiaries using the local currency as their functional currency, assets and liabilities are translated at exchange rates in effect

at the balance sheet date, and the statement of operations is translated at a monthly average rate. Resulting translation adjustments are recorded directly to a separate component of stockholders' equity. Where the monetary assets and liabilities are transacted in a currency other than the entity's functional currency, re-measurement adjustments are recorded in interest and other income (loss), net on the Consolidated Statement of Operations. See Note 4 below.

Derivatives

Ciena's 3.75% Convertible Senior Notes due October 15, 2018 (the "New Notes") included a conversion feature that is accounted for as a separate embedded derivative. The embedded conversion feature is recorded at fair value on a recurring basis using the underlying stock price, time to maturity and expected volatility of Ciena's stock and conversion price. These changes are included in interest and other income (loss), net on the Consolidated Statement of Operations.

From time to time, Ciena uses foreign currency forward contracts to reduce variability in certain forecasted non-U.S. Dollar denominated cash flows. Generally, these derivatives have maturities of 24 months or less. Ciena also has interest rate swap arrangements to reduce variability in certain forecasted interest expense associated with its term loan. All of these derivatives are designated as cash flow hedges. At the inception of the cash flow hedge, and on an ongoing basis, Ciena assesses whether the derivative has been effective in offsetting changes in cash flows attributable to the hedged risk during the hedging period. The derivative's net gain or loss is initially reported as a component of accumulated other comprehensive income (loss), and, upon occurrence of the forecasted transaction, is subsequently reclassified to the line item in the Consolidated Statement of Operations to which the hedged transaction relates.

Ciena records derivative instruments in the Consolidated Statements of Cash Flows within operating, investing, or financing activities consistent with the cash flows of the hedged items.

From time to time, Ciena uses foreign currency forward contracts to hedge certain balance sheet foreign exchange exposures. These forward contracts are not designated as hedges for accounting purposes, and any net gain or loss associated with these derivatives is reported in interest and other income (loss), net on the Consolidated Statement of Operations.

See Notes 6 and 14 below.

Computation of Net Income (Loss) per Share

Ciena calculates basic earnings per share ("EPS") by dividing earnings attributable to common stock by the weighted average number of common shares outstanding for the period. Diluted EPS includes other potential dilutive shares that would be outstanding if securities or other contracts to issue common stock were exercised or converted into common stock. Ciena uses a dual presentation of basic and diluted EPS on the face of its income statement. A reconciliation of the numerator and denominator used for the basic and diluted EPS computations is set forth in Note 18 below.

Software Development Costs

Ciena develops software for sale to its customers. GAAP requires the capitalization of certain software development costs that are incurred subsequent to the date technological feasibility is established and prior to the date the product is generally available for sale. The capitalized cost is then amortized using the straight-line method over the estimated life of the product. Ciena defines technological feasibility as being attained at the time a working model is completed. To date, the period between Ciena achieving technological feasibility and the general availability of such software has been short, and software development costs qualifying for capitalization have been insignificant. Accordingly, Ciena has not capitalized any software development costs.

Newly Issued Accounting Standards - Effective

In January 2017, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2017-01 *("ASU 2017-01")*, *Business Combinations: Clarifying the Definition of a Business*, which clarifies the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisition or disposal of assets or businesses. The amendments in this update provide a screen to determine when a set of assets is not a business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set of assets is not a business. Ciena adopted ASU 2017-01 during the first quarter of fiscal 2018.

In August 2017, the FASB issued ASU No. 2017-12 *("ASU 2017-12"), Derivatives and Hedging: Targeted Improvements to Accounting for Hedging Activities*, which improves the financial reporting of hedging relationships to better portray the economic results of an entity's risk management activities in its financial statements and make certain targeted improvements to simplify the application of the hedge accounting guidance in current GAAP. The amendments in this update better align an entity's risk management activities and financial reporting for hedging relationships, through changes to both the designation and measurement guidance for qualifying hedging relationships and presentation of hedge results. Ciena adopted ASU 2017-12 during the first quarter of fiscal 2018. For hedges for which Ciena has elected to exclude the spot-forward difference from assessment of effectiveness, Ciena has elected to amortize the difference on a straight-line basis. Ciena will record amortization in earnings each period with an offsetting entry to other comprehensive income, and all changes in fair value over the term of the derivative in other comprehensive income. The application of this accounting standard did not have a material impact on Ciena's Consolidated Financial Statements.

In March 2016, the FASB issued ASU No. 2016-09 *("ASU 2016-09"), Improvements to Employee Share-Based Payment Accounting*, which provides guidance on several aspects of accounting for share-based payment transactions, including the accounting for income taxes, forfeitures, and statutory tax withholding requirements, as well as classification on the statement of cash flows. Ciena adopted ASU 2016-09 during the first quarter of fiscal 2018. In connection with the adoption of this guidance, Ciena recognized approximately $62.1 million of deferred tax assets related to previously unrecognized tax benefits. This was recorded as a cumulative-effect adjustment to accumulated deficit as of the beginning of the first quarter of fiscal 2018. Additionally, the consolidated statements of cash flows will include excess tax benefits as an operating activity, on a prospective basis as a result of the adoption. Finally, Ciena has elected to recognize forfeitures when they occur, rather than to estimate the impact of forfeitures when the award is granted. Accordingly, Ciena recognized approximately $0.8 million for this change through a cumulative effect adjustment recorded to opening accumulated deficit in the first quarter of fiscal 2018.

Newly Issued Accounting Standards - Not Yet Effective

In May 2014, the FASB issued Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers*, a new accounting standard related to revenue recognition. ASC 606 supersedes nearly all U.S. GAAP on revenue recognition and eliminated industry-specific guidance. The underlying principle of ASC 606 is to recognize revenue when a customer obtains control of promised goods or services at an amount that reflects the consideration that is expected to be received in exchange for those goods or services. It also requires increased disclosures including the nature, amount, timing, and uncertainty of revenues and cash flows related to contracts with customers.

For multiple element software arrangements where vendor-specific objective evidence ("VSOE") of undelivered maintenance does not exist, Ciena currently recognizes revenue for the entire arrangement over the maintenance term. The adoption of ASC 606 will require Ciena to determine the stand alone selling price for each of the software and software-related deliverables at contract inception, and Ciena consequently notes that certain software deliverables will be recognized at a point in time rather than over a period of time.

Ciena also notes that certain installation and deployment, and consulting and network design services, will be recognized over a period of time rather than at a point in time.

Ciena has considered the impact of the guidance in ASC 340-40, *Other Assets and Deferred Costs; Contracts with Customers*, and the interpretations of the FASB Transition Resource Group for Revenue Recognition (TRG) with respect to capitalization and amortization of incremental costs of obtaining a contract. In conjunction with this interpretation, Ciena has elected to implement the practical expedient allowing for incremental costs to be recognized as an expense when incurred if the period of the asset recognition is one year or less, and amortized over the period of performance, if the period of the asset recognition is greater than one year.

Ciena elected to implement ASC 606 using the modified retrospective approach whereby the cumulative effect at adoption will be presented as an adjustment to the opening balance of accumulated deficit. The comparative information will not be restated and will continue to be reported under the accounting standards in effect for those periods. ASC 606 will be effective for Ciena beginning in the first quarter of fiscal 2019.

Upon adopting ASC 606 at the beginning of fiscal 2019, the cumulative effect adjustment will reduce accumulated deficit by approximately $49.2 million. This cumulative effect adjustment is primarily driven by a reduction to deferred product revenue of approximately $30.2 million related to software arrangements and an increase to unbilled accounts receivable of approximately $29.6 million primarily related to installation and deployment and consulting and network design service arrangements, with additional amounts related to hardware sales and other adjustments. In addition to the adjustment to deferred revenue and unbilled accounts receivable, other adjustments at transition include immaterial adjustments to billed

accounts receivable, deferred product costs, prepaid service costs and other current and non-current assets, and other liabilities. The adjustment to other current and non-current assets is primarily for capitalized incremental contract acquisitions costs. The cumulative effect adjustment is recorded net of tax with the direct tax effect recorded primarily as an increase in deferred tax liability.

In February 2016, the FASB issued ASU No. 2016-02 *("ASU 2016-02")*, *Leases*, which requires an entity to recognize assets and liabilities on the balance sheet for the rights and obligations created by leased assets and to provide additional disclosures. ASU 2016-02 is effective for Ciena beginning in the first quarter of fiscal 2020. Under current GAAP, the majority of Ciena's leases for its properties are considered operating leases, and Ciena expects that the adoption of this ASU will require these leases to be classified as financing leases and to be recognized as assets and liabilities on Ciena's balance sheet. Ciena is continuing to evaluate other possible impacts of the adoption of ASU 2016-02 on its Consolidated Financial Statements and disclosures.

In August 2018, the FASB issued ASU No. 2018-13 ("*ASU 2018-13*"), *Fair Value Measurement (Topic 820): Disclosure Framework* which modifies the disclosure requirements on fair value measurements. ASU 2018-13 is effective for Ciena beginning in the first quarter of fiscal year 2020, early adoption is permitted. Adoption of ASU 2018-13 will not have a material effect on Ciena's financial position or results of operations.

In August 2018, the FASB issued ASU No. 2018-15 ("*ASU 2018-15*"), *Intangibles - Goodwill and Other-Internal-Use Software* which aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. ASU 2018-15 is effective for Ciena beginning in the first quarter of fiscal year 2020, early adoption is permitted. Ciena is currently evaluating this guidance to determine the impact on its Consolidated Financial Statements and disclosures.

(2) BUSINESS COMBINATIONS

DonRiver Holdings, LLC Acquisition

On October 1, 2018, Ciena acquired DonRiver Holdings, LLC ("DonRiver"), a global software and services company specializing in federated network and service inventory management solutions within the service provider Operational Support Systems (OSS) environment. This transaction has been accounted for as the acquisition of a business.

During the fourth quarter of fiscal 2018, Ciena incurred approximately $3.5 million of acquisition-related costs associated with this transaction. These costs and expenses include fees associated with financial, legal and accounting advisors and other employment-related costs.

The following table summarizes the purchase price for the acquisition (in thousands):

	Amount	
Cash	$	43,283
Contingent consideration		10,900
Total purchase price	$	54,183

The following table summarizes the final purchase price allocation related to the acquisition based on the estimated fair value of the acquired assets and assumed liabilities (in thousands):

	Amount
Cash and cash equivalents	$ 1,025
Accounts receivable	4,790
Prepaid expenses and other long term assets	372
Goodwill	10,453
Customer relationships and contracts	37,700
Developed technology	9,700
Deferred revenue	(193)
Other current and long term liabilities	(9,664)
Total purchase price	$ 54,183

The acquisition of DonRiver includes a $28.5 million three-year earn-out arrangement that consists of both a contingent consideration element and a contingent compensation element. The contingent consideration element requires additional cash consideration to be paid based on the future revenues generally derived from the DonRiver business over a 25-month period from the acquisition date through October 31, 2020. The undiscounted amounts potentially payable by Ciena under the contingent consideration element range from $0.0 million to $15.0 million in the aggregate over the period. Any amounts earned under the contingent consideration element are payable in the first quarters of fiscal 2019, fiscal 2020 and fiscal 2021. The $10.9 million fair value of the contingent consideration element as of the acquisition date was estimated by applying the income approach based upon a discounted cash flow technique using Monte Carlo simulations. The contingent compensation element of the earn-out arrangement includes an employment condition for the selling shareholders who became employees of Ciena upon the completion of the acquisition. The range of amounts that Ciena could pay under the contingent compensation element is between $0.0 million and $13.5 million in the aggregate over the period. Any amounts earned under the contingent compensation element are payable in the first quarters of fiscal 2021 and fiscal 2022. These amounts will be accrued over the period earned and recorded as expense in the Consolidated Statement of Operations.

Customer relationships and contracts represent agreements with existing DonRiver customers. Customer relationships and contracts are amortized on a straight line basis over their estimated useful life of seven years. Fair value was determined using the multi-period excess earnings method based on the present value of the incremental after-tax cash flows (or “excess earnings”) attributable to customer relationships for a discrete projection period.

Developed technology represents purchased technology that had reached technological feasibility and for which DonRiver had substantially completed development as of the date of acquisition. Fair value was determined using future discounted cash flows related to the projected income stream of the developed technology for a discrete projection period. Cash flows were discounted to their present value as of the closing date. Developed technology is amortized on a straight line basis over its estimated useful life of seven years.

The goodwill generated from the acquisition of DonRiver is primarily related to expected synergies. The total goodwill amount was recorded in the Software and Software-Related Services segment. The goodwill related to this acquisition is not deductible for tax purposes.

Pro forma disclosures have not been included due to immateriality.

Packet Design, LLC Acquisition

On July 2, 2018, Ciena acquired Packet Design, LLC (“Packet Design”), a provider of network performance management software focused on Layer 3 network optimization, topology and route analytics, in a cash transaction for approximately $41.1 million in cash. This transaction has been accounted for as the acquisition of a business.

During fiscal 2018, Ciena incurred approximately $1.6 million of acquisition-related costs associated with this transaction. These costs and expenses include fees associated with financial, legal and accounting advisors and severance and other employment-related costs, including payments to certain former Packet Design employees.

The following table summarizes the final purchase price allocation related to the acquisition based on the estimated fair value of the acquired assets and assumed liabilities (in thousands):

	Amount
Cash and cash equivalents	$ 642
Accounts receivable	1,525
Prepaid expenses and other	450
Equipment, furniture and fixtures	31
Goodwill	20,304
Customer relationships and contracts	2,200
Developed technology	21,900
Accounts payable	(165)
Accrued liabilities	(657)
Deferred revenue	(5,176)
Total purchase price	$ 41,054

Customer relationships and contracts represent agreements with existing Packet Design customers. Customer relationships and contracts are amortized on a straight line basis over their estimated useful life of three years.

Developed technology represents purchased technology that had reached technological feasibility and for which Packet Design had substantially completed development as of the date of acquisition. Fair value was determined using future discounted cash flows related to the projected income stream of the developed technology for a discrete projection period. Cash flows were discounted to their present value as of the closing date. Developed technology is amortized on a straight line basis over its estimated useful life of five years.

The goodwill generated from the acquisition of Packet Design is primarily related to expected synergies. The total goodwill amount was recorded in the Software and Software-Related Services segment. The goodwill related to this acquisition is not deductible for tax purposes.

Pro forma disclosures have not been included due to immateriality.

TeraXion HSPC Asset Acquisition

On February 1, 2016, Ciena, through a Canadian subsidiary, acquired certain high-speed photonics components (“HSPC”) assets of TeraXion Inc. (“TeraXion”) and its wholly-owned subsidiary for approximately $32 million in cash. The assets purchased include TeraXion’s high-speed indium phosphide and silicon photonics technologies, as well as the underlying intellectual property. These technologies support the development of Ciena’s WaveLogic coherent optical chipsets. This transaction has been accounted for as the acquisition of a business.

The following table summarizes the final purchase price allocation related to the acquisition of the HSPC assets based on the estimated fair value of the acquired assets and assumed liabilities (in thousands):

	Amount
Inventory	$ 119
Fixed assets	1,381
Developed technology	16,468
In-process technology	3,949
Goodwill	10,083
Total purchase price	$ 32,000

Developed technology represents purchased technology that had reached technological feasibility and for which TeraXion had substantially completed development as of the date of acquisition. Fair value was determined using future discounted cash flows related to the projected income stream of the developed technology for a discrete projection period. Cash flows were discounted to their present value as of the closing date. Developed technology is amortized on a straight line basis over its estimated useful life of five years.

In-process technology represents purchased technology that had not reached technological feasibility as of the date of acquisition. Fair value was determined using future discounted cash flows related to the projected income stream of the in-process technology for a discrete projection period. Cash flows were discounted to their present value as of the closing date. Upon completion of the in-process technology, it will be amortized on a straight line basis over its estimated useful life, which will be determined on that date.

The goodwill generated from the acquisition of the HSPC assets was primarily related to expected synergies and has been allocated to the Networking Platforms segment. The goodwill is not deductible for income tax purposes.

Pro forma disclosures have not been included due to immateriality.

(3) RESTRUCTURING COSTS

Ciena has undertaken a number of restructuring activities intended to reduce expense and better align its workforce and costs with market opportunities, product development and business strategies. The following table sets forth the restructuring activity and balance of the restructuring liability accounts for the fiscal years indicated (in thousands):

	Workforce reduction	Consolidation of excess facilities	Total
Balance at October 31, 2015	$ 591	$ 688	$ 1,279
Additional liability recorded	2,844 (1)	2,089	4,933
Cash payments	(2,567)	(807)	(3,374)
Balance at October 31, 2016	868	1,970	2,838
Additional liability recorded	5,883 (2)	5,432 (4)	11,315
Adjustment to previous estimates	—	(1,048)	(1,048)
Cash payments	(5,460)	(4,706)	(10,166)
Balance at October 31, 2017	1,291	1,648	2,939
Additional liability recorded	14,853 (3)	3,890 (5)	18,743
Cash payments	(14,036)	(3,799)	(17,835)
Balance at October 31, 2018	$ 2,108	$ 1,739	$ 3,847
Current restructuring liabilities	$ 2,108	$ 502	$ 2,610
Non-current restructuring liabilities	$ —	$ 1,237	$ 1,237

(1) During fiscal 2016, Ciena recorded a charge of $2.8 million of severance and other employee-related costs associated with a workforce reduction of approximately 75 employees.

(2) During fiscal 2017, Ciena recorded a charge of $5.9 million of severance and other employee-related costs associated with a workforce reduction of approximately 100 employees.

(3) During fiscal 2018, Ciena recorded a charge of $14.9 million of severance and other employee-related costs associated with a workforce reduction of approximately 240 employees.

(4) Reflects unfavorable lease commitments and relocation costs incurred in connection with our research and development center facility transitions in Ottawa, Canada.

(5) Reflects unfavorable lease commitments in connection with a portion of facilities located in Petaluma, California and in Gurgaon, India.

(4) INTEREST AND OTHER INCOME (LOSS), NET

The components of interest and other income (loss), net, were as follows (in thousands):

	Year Ended October 31,		
	2018	2017	2016
Interest income	$ 13,703	$ 6,579	$ 4,058
Gain (loss) on non-hedge designated foreign currency forward contracts	6,791	(1,198)	(23,355)
Foreign currency exchange gains (losses)	(19,434)	(4,376)	5,870
Loss on fair value of debt conversion liability	(12,070)	—	—
Other	(1,019)	(92)	858
Interest and other income (loss), net	$ (12,029)	$ 913	$ (12,569)

Ciena Corporation, as the U.S. parent entity, uses the U.S. Dollar as its functional currency; however, some of its foreign branch offices and subsidiaries use the local currency as their functional currency. During fiscal 2018 and fiscal 2017, Ciena recorded $19.4 million and $4.4 million, respectively, in exchange rate losses, as a result of monetary assets and liabilities that were transacted in a currency other than the entity's functional currency, and the re-measurement adjustments were recorded in interest and other income (loss), net. For fiscal 2018, the majority of the foreign currency exchange rate losses relate to Ciena's Brazilian and Argentinian subsidiaries owing U.S. Dollars to Ciena Corporation. In fiscal 2016, Ciena recorded $5.9 million in foreign currency exchange gains. From time to time, Ciena uses foreign currency forwards to hedge these balance sheet exposures. These forwards are not designated as hedges for accounting purposes, and any net gain or loss associated with these derivatives is also reported in interest and other income (loss), net. During fiscal 2018, Ciena recorded a gain of $6.8 million from non-hedge designated foreign currency forward contracts. For fiscal 2017 and fiscal 2016, Ciena recorded losses of $1.2 million, and $23.4 million respectively, from non-hedge designated foreign currency forward contracts.

(5) SHORT-TERM AND LONG-TERM INVESTMENTS

As of October 31, 2018, investments are comprised of the following (in thousands):

	October 31, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
U.S. government obligations:				
Included in short-term investments	$ 139,365	$ —	$ (347)	$ 139,018
Included in long-term investments	59,029	—	(59)	58,970
	$ 198,394	$ —	$ (406)	$ 197,988
Commercial paper:				
Included in short-term investments	$ 9,963	$ —	$ —	$ 9,963
	$ 9,963	$ —	$ —	$ 9,963

As of October 31, 2017, investments are comprised of the following (in thousands):

	October 31, 2017			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
U.S. government obligations:				
Included in short-term investments	$ 249,498	$ —	$ (305)	$ 249,193
Included in long-term investments	49,910	—	(127)	49,783
	$ 299,408	$ —	$ (432)	$ 298,976
Commercial paper:				
Included in short-term investments	$ 29,939	$ 1	$ —	$ 29,940
	$ 29,939	$ 1	$ —	$ 29,940

The following table summarizes the legal maturities of debt investments at October 31, 2018:

	October 31, 2018	
	Amortized Cost	Estimated Fair Value
Less than one year	$ 149,328	$ 148,981
Due in 1-2 years	59,029	58,970
	$ 208,357	$ 207,951

(6) FAIR VALUE MEASUREMENTS

As of the dates indicated, the following tables summarize the fair value of assets and liabilities that were recorded at fair value on a recurring basis (in thousands):

	October 31, 2018			
	Level 1	Level 2	Level 3	Total
Assets:				
Money market funds	$ 590,684	$ —	$ —	$ 590,684
U.S. government obligations	—	197,988	—	197,988
Commercial paper	—	69,888	—	69,888
Foreign currency forward contracts	—	133	—	133
Forward starting interest rate swaps	—	779	—	779
Total assets measured at fair value	$ 590,684	$ 268,788	$ —	$ 859,472
Liabilities:				
Foreign currency forward contracts	$ —	$ 3,231	$ —	$ 3,231
Debt conversion liability	—	164,212	—	164,212
Contingent consideration	—	—	10,900	10,900
Total liabilities measured at fair value	$ —	$ 167,443	$ 10,900	$ 178,343

	October 31, 2017			
	Level 1	Level 2	Level 3	Total
Assets:				
Money market funds	$ 511,355	$ —	$ —	$ 511,355
U.S. government obligations	—	298,976	—	298,976
Commercial paper	—	89,865	—	89,865
Foreign currency forward contracts	—	227	—	227
Forward starting interest rate swaps	—	218	—	218
Total assets measured at fair value	$ 511,355	$ 389,286	$ —	$ 900,641
Liabilities:				
Foreign currency forward contracts	$ —	$ 2,129	$ —	$ 2,129
Total liabilities measured at fair value	$ —	$ 2,129	$ —	$ 2,129

As of the dates indicated, the assets and liabilities above were presented on Ciena's Consolidated Balance Sheet as follows (in thousands):

	October 31, 2018			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents	$ 590,684	$ 59,925	$ —	$ 650,609
Short-term investments	—	148,981	—	148,981
Prepaid expenses and other	—	133	—	133
Long-term investments	—	58,970	—	58,970
Other long-term assets	—	779	—	779
Total assets measured at fair value	$ 590,684	$ 268,788	$ —	$ 859,472
Liabilities:				
Accrued liabilities	$ —	$ 3,231	$ —	$ 3,231
Debt conversion liability	—	164,212	—	164,212
Other long-term obligations	—	—	10,900	10,900
Total liabilities measured at fair value	$ —	$ 167,443	$ 10,900	$ 178,343

	October 31, 2017			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents	$ 511,355	$ 59,925	$ —	$ 571,280
Short-term investments	—	279,133	—	279,133
Prepaid expenses and other	—	227	—	227
Long-term investments	—	49,783	—	49,783
Other long-term assets	—	218	—	218
Total assets measured at fair value	$ 511,355	$ 389,286	$ —	$ 900,641
Liabilities:				
Accrued liabilities	$ —	$ 2,129	$ —	$ 2,129
Total liabilities measured at fair value	$ —	$ 2,129	$ —	$ 2,129

Ciena did not have any transfers between Level 1 and Level 2 fair value measurements during the periods presented.

Ciena's Level 3 liability is included in other long-term obligations and reflects a contingent consideration element of a three-year payout arrangement associated with Ciena's purchase of DonRiver in the fourth quarter of fiscal 2018. See Note 2 above. The contingent consideration is valued by applying the income approach based upon a discounted cash flow technique using Monte Carlo simulations. As of October 31, 2018, there was no change to the fair value.

(7) ACCOUNTS RECEIVABLE

Accounts receivable includes $40.9 million and $26.1 million of unbilled receivables as October 31, 2018 and October 31, 2017, respectively. As of October 31, 2018, one customer accounted for 10.0% of net accounts receivable. As of October 31, 2017, two customers together accounted for 23.0% of net accounts receivable. Ciena has not historically experienced a significant amount of bad debt expense. During fiscal 2017, Ciena's allowance for doubtful accounts includes a provision for a significant asset impairment of $13.7 million for a trade receivable related to a single customer in the APAC region. The following table summarizes the activity in Ciena's allowance for doubtful accounts for the fiscal years indicated (in thousands):

Year ended October 31,	Beginning Balance	Provisions	Net Deductions	Ending Balance
2016	$ 2,963	$ 1,701	$ 701	$ 3,963
2017	$ 3,963	$ 18,221	$ 4,604	$ 17,580
2018	$ 17,580	$ 2,700	$ 2,902	$ 17,378

(8) INVENTORIES

As of the dates indicated, inventories are comprised of the following (in thousands):

	October 31, 2018	October 31, 2017
Raw materials	$ 67,468	$ 52,898
Work-in-process	9,589	18,623
Finished goods	188,575	185,488
Deferred cost of goods sold	48,057	61,340
	313,689	318,349
Provision for excess and obsolescence	(50,938)	(51,206)
	$ 262,751	$ 267,143

Ciena writes down its inventory for estimated obsolescence or unmarketable inventory by an amount equal to the difference between the cost of inventory and the estimated net realizable value based on assumptions about future demand and market conditions. During fiscal 2018, fiscal 2017 and fiscal 2016, Ciena recorded a provision for excess and obsolescence of $30.6 million, $35.5 million, and $33.7 million, respectively, primarily related to the decrease in the forecasted demand for certain Converged Packet Optical products. Deductions from the provision for excess and obsolete inventory relate to disposal activities.

The following table summarizes the activity in Ciena’s reserve for excess and obsolete inventory for the fiscal years indicated (in thousands):

Year ended October 31,	Beginning Balance	Provisions	Disposals	Ending Balance
2016	$ 53,001	$ 33,713	$ 24,211	$ 62,503
2017	$ 62,503	$ 35,459	$ 46,756	$ 51,206
2018	$ 51,206	$ 30,615	$ 30,883	$ 50,938

(9) PREPAID EXPENSES AND OTHER

As of the dates indicated, prepaid expenses and other are comprised of the following (in thousands):

	October 31, 2018	October 31, 2017
Prepaid VAT and other taxes	$ 82,518	$ 91,647
Product demonstration equipment, net	37,623	40,713
Prepaid expenses	32,987	26,114
Other non-trade receivables	25,716	9,655
Deferred deployment expense	19,342	26,934
Financing receivable	626	2,049
Derivative assets	133	227
	$ 198,945	$ 197,339

Depreciation of product demonstration equipment was $9.0 million, $10.0 million and $10.7 million for fiscal 2018, 2017 and 2016, respectively.

(10) EQUIPMENT, BUILDING, FURNITURE AND FIXTURES

As of the dates indicated, equipment, building, furniture and fixtures are comprised of the following (in thousands):

	October 31,	
	2018	2017
Equipment, furniture and fixtures	$ 504,714	$ 486,451
Building subject to capital lease	71,968	76,702
Leasehold improvements	94,195	87,763
	670,877	650,916
Accumulated depreciation and amortization	(378,810)	(342,451)
	$ 292,067	$ 308,465

During fiscal 2018, fiscal 2017 and fiscal 2016, Ciena recorded depreciation of equipment, building, furniture and fixtures, and amortization of leasehold improvements of $75.3 million, $67.2 million and $52.7 million, respectively.

(11) INTANGIBLE ASSETS

As of the dates indicated, intangible assets are comprised of the following (in thousands):

	October 31,					
	2018			2017		
	Gross Intangible	Accumulated Amortization	Net Intangible	Gross Intangible	Accumulated Amortization	Net Intangible
Developed technology	$ 373,581	$ (285,233)	$ 88,348	$ 341,255	$ (266,693)	$ 74,562
In-process research and development	—	—	—	671	—	671
Patents and licenses	3,565	(1,958)	1,607	7,165	(6,535)	630
Customer relationships, covenants not to compete, outstanding purchase orders and contracts	374,620	(316,350)	58,270	334,642	(309,508)	25,134
Total intangible assets	$ 751,766	$ (603,541)	$ 148,225	$ 683,733	$ (582,736)	$ 100,997

During fiscal 2018 and 2017, certain fully amortized intangible assets of approximately $5.0 million and $34.0 million, respectively, were eliminated from gross intangible assets and accumulated amortization during the period, with no corresponding impact to the income statement. These assets were primarily technology for products no longer being sold by Ciena.

The aggregate amortization expense of intangible assets was $25.8 million, $45.7 million and $78.3 million for fiscal 2018, fiscal 2017 and fiscal 2016, respectively. Expected future amortization of intangible assets for the fiscal years indicated is as follows (in thousands):

Year Ended October 31,	
2019	$ 35,375
2020	34,019
2021	30,841
2022	24,820
2023	10,011
Thereafter	13,159
	$ 148,225

(12) GOODWILL

The following table presents the goodwill allocated to our operating segments as of October 31, 2018 and October 31, 2017, as well as the changes to goodwill during fiscal 2018. (in thousands):

	Balance at October 31, 2017	Acquisitions	Impairments	Translation	Balance at October 31, 2018
Software and Software-Related Services	$ 201,428	$ 30,757	$ —	$ —	$ 232,185
Networking Platforms	66,030	—	—	(247)	65,783
Total	$ 267,458	$ 30,757	$ —	$ (247)	$ 297,968

(13) OTHER BALANCE SHEET DETAILS

As of the dates indicated, other long-term assets are comprised of the following (in thousands):

	October 31,	
	2018	2017
Maintenance spares inventory, net	$ 45,679	$ 46,872
Minority equity investments	8,056	6,000
Forward starting interest rate swaps	779	218
Deferred debt issuance costs, net [1]	720	1,041
Financing receivable	—	1,052
Other	16,418	8,410
	$ 71,652	$ 63,593

(1) Deferred debt issuance costs relate to Ciena's ABL Credit Facility (described in Note 17 below). The amortization of deferred debt issuance costs for Ciena's ABL Credit Facility is included in interest expense, and was $0.3 million, $0.3 million and $0.4 million for fiscal 2018, fiscal 2017 and fiscal 2016, respectively.

As of the dates indicated, accrued liabilities and other short-term obligations are comprised of the following (in thousands):

	October 31,	
	2018	2017
Compensation, payroll related tax and benefits	$ 140,277	$ 113,272
Warranty	44,740	42,456
Vacation	42,507	39,778
Capital lease obligations	3,547	3,772
Interest payable	1,072	3,612
Other	107,932	120,044
	$ 340,075	$ 322,934

The following table summarizes the activity in Ciena's accrued warranty for the fiscal years indicated (in thousands):

Year ended October 31,	Beginning Balance	Current Year Provisions [1]	Settlements	Ending Balance
2016	$ 56,654	$ 15,483	$ 19,813	$ 52,324
2017	$ 52,324	$ 7,965	$ 17,833	$ 42,456
2018	$ 42,456	$ 20,992	$ 18,708	$ 44,740

[1] As a result of actual failure rates lower than expected, Ciena adjusted its fiscal 2017 provisions for warranty. These adjustments for previous fiscal year provisions had the effect of reducing warranty provisions by $9.7 million and $5.3 million for fiscal 2017 and 2016 respectively. During fiscal 2018, Ciena determined that failure rates for prior estimates remained unchanged, and accordingly did not make any adjustments for previous fiscal year provisions not yet settled. As a result, Ciena's warranty provision for fiscal 2018 increased as compared to these prior years.

As of the dates indicated, deferred revenue is comprised of the following (in thousands):

	October 31,	
	2018	2017
Products	$ 42,474	$ 49,135
Services	126,983	135,872
	169,457	185,007
Less current portion	(111,134)	(102,418)
Long-term deferred revenue	$ 58,323	$ 82,589

As of the dates indicated, other long-term obligations are comprised of the following (in thousands):

	October 31,	
	2018	2017
Capital lease obligations	$ 68,245	$ 73,407
Income tax liability	15,894	15,445
Deferred tenant allowance	7,244	8,162
Straight-line rent	6,750	7,267
Contingent consideration	10,900	—
Other	10,380	7,068
	$ 119,413	$ 111,349

The following is a schedule by fiscal years of future minimum lease payments under capital leases and the present value of minimum lease payments as of October 31, 2018 (in thousands):

Year Ending October 31,	Amount
2019	$ 8,654
2020	7,674
2021	7,569
2022	7,883
2023	8,090
Thereafter	75,413
Net minimum capital lease payments	115,283
Less: Amount representing interest	(43,491)
Present value of minimum lease payments	71,792
Less: Current portion of present value of minimum lease payments	(3,547)
Long-term portion of present value of minimum lease payments	$ 68,245

(14) DERIVATIVE INSTRUMENTS

Foreign Currency Derivatives

During fiscal 2018 and fiscal 2017, Ciena entered into forward contracts to hedge its foreign exchange exposure from its forecasted cash flows in order to reduce the variability in its Canadian Dollar and Indian Rupee denominated expense, which principally relates to research and development activities, its British Pound denominated expense, which principally relates to sales and marketing activities, and its Euro denominated revenue. The notional amount of these contracts was approximately $163.2 million and $86.1 million as of October 31, 2018 and October 31, 2017, respectively. These foreign exchange contracts have maturities of 24 months or less and have been designated as cash flow hedges.

During fiscal 2018 and fiscal 2017, in order to hedge its foreign exchange exposure from certain balance sheet items, Ciena entered into forward contracts to mitigate risk due to volatility in the Brazilian Real, Canadian Dollar, Euro, Australian Dollar, British Pound Sterling, and Mexican Peso. The notional amount of these contracts was approximately $162.6 million and $83.4 million as of October 31, 2018 and October 31, 2017. These foreign exchange contracts have maturities of 12 months or less and have not been designated as hedges for accounting purposes.

Interest Rate Derivatives

Ciena is exposed to floating rates of LIBOR interest on its term loan borrowings (see Note 16 below) and has hedged such risk by entering into floating to fixed interest rate swap arrangements ("interest rate swaps"). During the fourth quarter of fiscal 2018, Ciena refinanced its existing 2022 Term Loans into a new 2025 Term Loan, increasing the aggregate outstanding principal to $700 million and extending the maturity to September 2025 (see Note 16 below). In conjunction with the refinancing, Ciena unwound its existing interest rate swaps for a cash gain of $6.8 million, which was recorded in Other Comprehensive Income, and entered into new floating-to-fixed interest rate swaps. The new interest rate swaps fix the LIBOR rate of approximately 50% of the principal amount of the 2025 Term Loan at 2.957% through September 2023. The total notional amount of these interest rate swaps in effect as of October 31, 2018 was $350.0 million.

Ciena expects the variable rate payments to be received under the terms of the interest rate swaps to offset exactly the forecasted variable rate payments on the equivalent notional amounts of the term loans. These derivative contracts have been designated as cash flow hedges.

Other information regarding Ciena’s derivatives is immaterial for separate financial statement presentation. See Notes 4 and 6 above.

Debt Conversion Liability Associated With 3.75% Convertible Senior Notes due October 15, 2018 (“New Notes”)

The New Notes provided Ciena the option, at its election, to settle conversions of such notes for cash, shares of its common stock, or a combination of cash and shares equal to the aggregate amount due upon conversion. On August 30, 2018, Ciena notified the noteholders that it had elected to settle conversion of the New Notes in a combination of cash and shares, provided that the cash portion would not exceed an aggregate amount of $400 million. Ciena became obligated to settle a portion of the conversion feature in cash and reclassified the cash conversion feature from equity to a derivative liability at its current fair value of $152.1 million. As of October 31, 2018, Ciena recorded a loss of approximately $12.1 million related to the change in fair value of the embedded conversion feature. On November 15, 2018, Ciena paid approximately $111.3 million in cash and issued 1.6 million shares in settlement of this embedded conversion feature.

(15) ACCUMULATED OTHER COMPREHENSIVE INCOME

The following table summarizes the changes in accumulated balances of other comprehensive income ("AOCI"):

	Unrealized Gain/(Loss) on Available-for-Sale Securities	Unrealized Gain/(Loss) on Foreign Currency Forward Contracts	Unrealized Gain/(Loss) on Forward Starting Interest Rate Swaps	Cumulative Foreign Currency Translation Adjustment	Total
Balance at October 31, 2015	$ (78)	$ (268)	$ (5,522)	$ (16,258)	$ (22,126)
Other comprehensive gain (loss) before reclassifications	217	(1,453)	(4,101)	(1,152)	(6,489)
Amounts reclassified from AOCI	—	630	3,656	—	4,286
Balance at October 31, 2016	139	(1,091)	(5,967)	(17,410)	(24,329)
Other comprehensive gain (loss) before reclassifications	(590)	1,290	3,669	8,012	12,381
Amounts reclassified from AOCI	—	(1,585)	2,516	—	931
Balance at October 31, 2017	(451)	(1,386)	218	(9,398)	(11,017)
Other comprehensive gain (loss) before reclassifications	26	(3,242)	6,011	686	3,481
Amounts reclassified from AOCI	—	1,568	188	—	1,756
Balance at October 31, 2018	$ (425)	$ (3,060)	$ 6,417	$ (8,712)	$ (5,780)

All amounts reclassified from AOCI related to settlement (gains) losses on foreign currency forward contracts designated as cash flow hedges impacted revenue, research and development expense or sales and marketing expense on the Consolidated Statements of Operations. All amounts reclassified from AOCI related to settlement (gains) losses on forward starting interest rate swaps designated as cash flow hedges impacted interest and other income (loss), net on the Consolidated Statements of Operations.

(16) SHORT-TERM AND LONG-TERM DEBT

Outstanding Term Loan Payable

The net carrying values of Ciena's term loans were comprised of the following for the fiscal periods indicated (in thousands):

	October 31, 2018	October 31, 2017
Term Loan Payable due January 30, 2022	$ —	$ 392,972
Term Loan Payable due September 28, 2025	693,450	—
	$ 693,450	$ 392,972

Deferred debt issuance costs deducted from the carrying amounts of the term loans totaled $4.3 million at October 31, 2018 and $3.1 million at October 31, 2017. Deferred debt issuance costs are amortized using the straight-line method, which approximates the effect of the effective interest rate method, through the maturity of the term loans. The amortization of deferred debt issuance costs for these term loans is included in interest expense, and was $0.7 million and $0.5 million during fiscal 2018 and fiscal 2017, respectively. The carrying values of the term loans listed above are also net of any unamortized debt discounts.

2025 Term Loan

On September 28, 2018, Ciena, as borrower, and Ciena Communications, Inc. and Ciena Government Solutions, Inc., as guarantors, entered into an Increase Joinder and Refinancing Amendment to Credit Agreement with the lenders party thereto and the Administrative Agent (the "Refinancing Agreement"), pursuant to which Ciena refinanced its existing 2022 Term Loan (as described under "2022 Term Loan" below) into a term loan with an aggregate principal amount of $700 million maturing on September 28, 2025 (the "2025 Term Loan"). In connection with the transaction, Ciena received a loan in the amount of $699.1 million, net of original discount, from the 2025 Term Loan and simultaneously repaid $394.0 million of outstanding principal under the 2022 Term Loan, resulting in proceeds of $305.1 million. The 2025 Term Loan requires Ciena to make installment payments of $1.75 million on a quarterly basis. Based on the continuation of existing lenders and the addition of new lenders, this arrangement was primarily accounted for as a modification of debt and, as such, $3.8 million of debt issuance costs associated with the 2025 Term Loan were expensed. The aggregate balance of $2.4 million of debt issuance costs and approximately $1.4 million of original discount from the 2022 Term Loan, $1.9 million of debt issuance costs associated with new lenders for the 2025 Term Loan, and approximately $0.9 million of original discount from the 2025 Term Loan, were included in the carrying value of the 2025 Term Loan.

The Refinancing Agreement amends the Term Loan Credit Agreement (as defined below) and provides that the 2025 Term Loan will, among other things:

- amortize in equal quarterly installments in aggregate amounts equal to 0.25% of the principal amount of the Refinancing Term Loan as of September 28, 2018, with the balance payable at maturity;
- be subject to mandatory prepayment provisions upon the occurrence of certain specified events substantially similar to the Existing Term Loan, including certain asset sales, debt issuances and receipt of annual Excess Cash Flow (as defined in the Credit Agreement);
- bear interest, at Ciena's election, at a per annum rate equal to (a) LIBOR (subject to a floor of 0.00%) plus an applicable margin of 2.00%, or (b) a base rate (subject to a floor of 1.00%) plus an applicable margin of 1.00%; and
- be repayable at any time at Ciena's election, provided that repayment of the 2025 Term Loan with proceeds of certain indebtedness prior to March 28, 2019 will require a prepayment premium of 1.00% of the aggregate principal amount of such prepayment.

Except as amended by the Refinancing Agreement, the remaining terms of the Term Loan Credit Agreement remain in full force and effect.

The principal balance, unamortized debt discount, deferred debt issuance costs and net carrying value of Ciena's 2025 Term Loan were as follows as of October 31, 2018 (in thousands):

	Principal Balance	Unamortized Discount	Deferred Debt Issuance Costs	Net Carrying Value
Term Loan Payable due September 28, 2025	$ 700,000	$ (2,300)	$ (4,250)	$ 693,450

The following table sets forth the carrying value and the estimated fair value of Ciena's 2025 Term Loan (in thousands):

	October 31, 2018	
	Carrying Value[1]	Fair Value[2]
Term Loan Payable due September 28, 2025	$ 693,450	$ 702,625

(1) Includes unamortized debt discount and debt issuance costs.

(2) Ciena's term loan is categorized as Level 2 in the fair value hierarchy. Ciena estimated the fair value of its 2025 Term Loan using a market approach based upon observable inputs, such as current market transactions involving comparable securities.

2022 Term Loan

On January 30, 2017 Ciena entered into an Omnibus Refinancing Amendment to the Credit Agreement, Security Agreement and Pledge Agreement (the "Refinancing Agreement"). The Refinancing Agreement refinanced prior term loans into a single term loan with an aggregate principal amount of $400 million (the "2022 Term Loan"). The 2022 Term Loan required Ciena to make installment payments of approximately $1.0 million on a quarterly basis.

Convertible Notes Payable

As of October 31, 2018, there were no outstanding convertible notes payable or principal amounts owing with respect thereto. The net carrying values of Ciena's convertible notes payable was comprised of the following for the fiscal periods indicated (in thousands):

	October 31, 2018	October 31, 2017
3.75% Convertible Senior Notes due October 15, 2018 (Original)	$ —	$ 61,071
3.75% Convertible Senior Notes due October 15, 2018 (New)	—	287,221
4.0% Convertible Senior Notes due December 15, 2020	—	194,717
	$ —	$ 543,009

Deferred debt issuance costs that were deducted from the carrying amounts of the convertible notes payable totaled $2.1 million at October 31, 2017, there are no deferred debt issuance costs attributed to convertible notes outstanding at October 31, 2018. Deferred debt issuance costs are amortized using the straight-line method, which approximates the effect of the effective interest rate method, through the maturity of the convertible notes payable. The amortization of deferred debt issuance costs for these convertible notes are included in interest expense, and were $1.4 million, $1.8 million and $2.7 million during fiscal 2018, fiscal 2017 and fiscal 2016, respectively. The carrying values of the term loans listed above as of October 31, 2017 are also net of any unamortized debt discounts.

3.75% Convertible Senior Notes, due October 15, 2018

On October 18, 2010, Ciena completed a private placement of 3.75% Convertible Senior Notes due October 15, 2018 (the "Original Notes"), in aggregate principal amount of $350.0 million. At the election of the holder, the Original Notes were convertible prior to maturity into shares of Ciena common stock at a conversion rate of 49.5872 shares per $1,000 in principal amount, which is equivalent to an initial conversion price of approximately $20.17 per share. On August 2, 2017, Ciena completed an offer to exchange the Original Notes for a new series of 3.75% Convertible Senior Notes due 2018 (the "New Notes") and an exchange fee of $2.50 per $1,000 original principal amount, or $0.7 million. Following settlement of the exchange, $61.3 million in aggregate principal amount at maturity of Original Notes and $288.7 million in aggregate principal amount at maturity of the New Notes were outstanding. Except with respect to the additional cash settlement option upon conversion, the New Notes were issued on substantially the same terms as the Original Notes including the holder conversion option and interest payment dates described above. Since the calculated fair value of the liability component was greater than the fair value of the New Notes, the adjustment to equity for the cash conversion feature was immaterial. This arrangement was accounted for as a modification of debt and, as such, $0.7 million of debt issuance costs associated with the New Notes was expensed, and the aggregate balance of $1.2 million of debt issuance costs for the Old Notes and approximately $0.7 million of original discount from the New Notes were included in the carrying value of the New Notes.

Conversion of Original Notes. Following conversion elections by the holders thereof, the Original Notes were converted in advance of maturity during the fourth quarter of fiscal 2018 and Ciena issued approximately 3.0 million shares of its common stock in settlement of such conversion. The Original Notes thereafter ceased to be outstanding.

Conversion of New Notes. The New Notes provided Ciena the option, at its election, to settle conversions of such notes for cash, shares of its common stock, or a combination of cash and shares equal to the aggregate amount due upon conversion.
During the fourth quarter of fiscal 2018, Ciena elected to settle conversion of the New Notes in a combination of cash and shares, provided that the cash portion would not to exceed an aggregate amount of approximately $400 million. As a result of this election, Ciena became obligated to settle a portion of the conversion feature in cash and reclassified the cash conversion feature from equity to a derivative liability at its current fair value of $152.1 million. The embedded conversion feature was remeasured in earnings through period end and was settled on November 15, 2018. See Notes 14 and 25 for more information on this liability and settlement. Following conversion elections by the holders thereof, the New Notes were converted in advance of maturity during the fourth quarter of fiscal 2018 and Ciena paid an amount of $288.7 million in cash, representing the aggregate principal amount of the notes, on October 15, 2018. The New Notes principal thereafter ceased to be outstanding.

4.0% Convertible Senior Notes due December 15, 2020

On December 27, 2012, Ciena issued $187.5 million in aggregate principal amount of 4.0% Convertible Senior Notes due December 15, 2020 (the "2020 Notes") in separate private offerings in exchange for $187.5 million in aggregate principal amount of a then existing issue of convertible notes maturing in 2015. The principal amount of the 2020 Notes also accreted at a rate of 1.85% per year commencing December 27, 2012, compounding on a semi-annual basis. The accreted portion of the principal payable at maturity did not bear interest and was not convertible into shares of Ciena's common stock. The 2020 Notes were convertible prior to maturity, at the option of the holder, into shares of Ciena's common stock at a conversion rate of 49.0557 shares of common stock per $1,000 in original principal amount, which is equal to an initial conversion price of $20.39 per share. In addition, the indenture provided that Ciena could elect to convert the 2020 Notes, in whole or in part, at any time on or prior to December 15, 2020, if the daily volume weighted average price of the common stock equals or exceeds 130% of the conversion price then in effect for at least 20 trading days in any 30 consecutive trading day period, provided that upon such an election the conversion rate would be adjusted to include an amount of additional shares, determined by reference to a make-whole table, payable in Ciena common stock, or its cash equivalent. On September 20, 2018, Ciena elected to exercise its option to convert the entire principal amount outstanding into shares of Ciena common stock, with such conversion to occur on October 31, 2018 (the "Conversion Date"). Upon the Conversion Date, Ciena issued approximately 9.2 million shares of its common stock and paid cash of $13.5 million, having elected to satisfy its additional make-whole share obligation in cash.

Accounting guidance issued by the FASB requires the issuer of convertible debt instruments with cash settlement features, including partial cash settlement, to account separately for the liability and equity components of the instrument. Under this guidance, the debt is recognized at the present value of its cash flows discounted using the issuer's nonconvertible debt borrowing rate at the time of issuance, and the equity component is recognized as the difference between the proceeds from the issuance of the note and the fair value of the liability. The reduced carrying value on the convertible debt results in a debt discount that is accreted back to the convertible debt's principal amount through the recognition of non-cash interest expense over the expected life of the debt, which results in recognizing the interest expense on these borrowings at effective rates approximating what Ciena would have incurred had nonconvertible debt with otherwise similar terms been issued.

Because the additional make-whole shares could be settled in cash or common stock at Ciena's option, the debt and equity components were accounted for separately. Ciena measured the fair value of the debt component of the 2020 Notes using an effective interest rate of 7.0%. As a result, Ciena attributed $170.4 million of the fair value of the 2020 Notes to the debt component. The debt component was netted against the face value of the 2020 Notes to determine the debt discount. The debt discount was accreted over the period from the date of issuance to the contractual maturity date, resulting in the recognition of non-cash interest expense. In addition, Ciena recorded $43.1 million within additional paid-in capital representing the equity component of the 2020 Notes. There was no net tax expense recorded at that time due to Ciena's full valuation allowance against its deferred tax assets.

Because the 2020 Notes contained both debt and equity elements as described above, Ciena allocated the fair value of the consideration transferred (cash and shares) between (i) the debt component to reflect the extinguishment of the debt and (ii) the equity component to reflect the reacquisition of the embedded conversion option. The fair value of the 2020 notes was calculated by Ciena immediately prior to its derecognition in the fourth quarter of fiscal 2018. Accordingly, Ciena recorded a $9.9 million loss on extinguishment of debt, representing the difference between the calculated fair value of the debt and the carrying amount of the debt component, including any unamortized debt discount or issuance costs. The remainder of the consideration was allocated to the reacquisition of the equity component.

(17) ABL CREDIT FACILITY

Ciena Corporation and certain of its subsidiaries are parties to a senior secured asset-based revolving credit facility (the "ABL Credit Facility") providing for a total commitment of $250 million with a maturity date of December 31, 2020. Ciena principally uses the ABL Credit Facility to support the issuance of letters of credit that arise in the ordinary course of its business and thereby to reduce its use of cash required to collateralize these instruments.

As of October 31, 2018, letters of credit totaling $61.7 million were collateralized by the ABL Credit Facility. There were no borrowings outstanding under the ABL Credit Facility as of October 31, 2018.

(18) EARNINGS (LOSS) PER SHARE CALCULATION

The following table (in thousands except per share amounts) is a reconciliation of the numerator and denominator of the basic net income (loss) per common share ("Basic EPS") and the diluted net income (loss) per potential common share ("Diluted EPS"). Basic EPS is computed using the weighted average number of common shares outstanding. Diluted EPS is computed using the weighted average number of the following, in each case, to the extent the effect is not anti-dilutive: (i) common shares outstanding, (ii) shares issuable upon vesting of restricted stock units, (iii) shares issuable under Ciena's

employee stock purchase plan and upon exercise of outstanding stock options, using the treasury stock method, (iv) shares underlying Ciena's outstanding convertible notes for which Ciena uses the treasury stock method (New Notes), and (v) shares underlying Ciena's outstanding convertible notes for which Ciena uses the if-converted method.

Numerator

	Year Ended October 31,		
	2018	2017	2016
Net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584
Less: Loss on fair value of debt conversion liability [1]	(12,894)	—	—
Add: Interest expense associated with 0.875% Convertible Senior Notes due 2017	—	853	4,801
Add: Interest expense associated with 3.75% Convertible Senior Notes due 2018 (Original Notes)	—	7,224	—
Add: Interest expense associated with 4.0% Convertible Senior Notes due 2020	—	8,691	—
Net income (loss) used to calculate Diluted EPS	$ (357,584)	$ 1,278,721	$ 77,385

Denominator

	Year Ended October 31,		
	2018	2017	2016
Basic weighted average shares outstanding	143,738	141,997	138,312
Add: Shares underlying outstanding stock options, employee stock purchase plan and restricted stock units	—	1,354	1,311
Add: Shares underlying 3.75% Convertible Senior Notes due 2018 (New Notes)	—	404	—
Add: Shares underlying 0.875% Convertible Senior Notes due 2017	—	3,032	11,081
Add: Shares underlying 3.75% Convertible Senior Notes due 2018 (Original Notes)	—	13,934	—
Add: Shares underlying 4.0% Convertible Senior Notes due 2020	—	9,198	—
Diluted weighted average shares outstanding	143,738	169,919	150,704

(1) On October 15, 2018, we settled our New Notes with an aggregate principal amount of $288.7 million. It was our intent to settle the principal amount of the New Notes in cash; accordingly, the principal amount was excluded from the determination of diluted earnings per share. On August 21, 2018, we changed our policy and decided to settle the payment of the conversion premium in cash and stock; see Note 16 above. Prior to this change, for EPS purposes we accounted for the conversion feature using the treasury stock method by adjusting the diluted weighted-average common shares if the effect was dilutive. As a consequence of our change in policy described above, the numerator for the computation of diluted earnings per common share was adjusted for any dilutive changes in the estimated value of the debt conversion liability during the period of August 20, 2018 through August 30, 2018, the date at which we began to account for the conversion feature as a derivative. There were no adjustments to diluted weighted average shares outstanding subsequent to our change in policy. See Note 14 above. For the fiscal year ended October 31, 2018, the adjustment to the numerator had the effect of reducing the diluted earnings per share by $0.09.

EPS

	Year Ended October 31,		
	2018	2017	2016
Basic EPS	$ (2.40)	$ 8.89	$ 0.52
Diluted EPS	$ (2.49)	$ 7.53	$ 0.51

The following table summarizes the weighted average shares excluded from the calculation of the denominator for Diluted EPS due to their anti-dilutive effect for the fiscal years indicated (in thousands):

	Year Ended October 31,		
	2018	2017	2016
Shares underlying stock options and restricted stock units	2,235	958	1,882
Add: Shares underlying 3.75% Convertible Senior Notes due 2018 (New Notes)	1,780	—	—
3.75% Convertible Senior Notes due October 15, 2018 (Original Notes)	2,883	—	17,355
4.0% Convertible Senior Notes due December 15, 2020	9,123	—	9,198
Total shares excluded due to anti-dilutive effect	16,021	958	28,435

(19) STOCKHOLDERS' EQUITY

Stock Repurchase Program

On December 7, 2017, Ciena announced that its Board of Directors authorized a program to repurchase up to $300 million of Ciena's common stock. A summary of the stock repurchase program, reported based on trade date, is summarized as follows:

	Shares Repurchased	Weighted-Average Price per Share	Amount Repurchased (in thousands)
Cumulative balance at October 31, 2017	—	$ —	$ —
Repurchase of common stock under the stock repurchase program	4,290,801	25.86	110,981
Cumulative balance at October 31, 2018	4,290,801	$ 25.86	$ 110,981

The purchase price for the shares of Ciena's stock repurchased is reflected as a reduction of common stock and additional paid-in capital.

Stock Repurchases Related to Restricted Stock Unit Tax Withholdings

Historically, Ciena satisfied employee tax withholding obligations due upon the vesting of stock unit awards through directed open market sales. Beginning in the fourth quarter of fiscal 2018, Ciena changed this practice to begin the repurchase of shares of common stock delivered with respect to such stock units in settlement of employee tax withholding obligations due upon the vesting of such awards. The purchase price of $4.8 million for the shares of Ciena's stock repurchased is reflected as a reduction to stockholders' equity. Ciena is required to allocate the purchase price of the repurchased shares as a reduction of common stock and additional paid-in capital.

(20) INCOME TAXES

For the periods indicated, the provision (benefit) for income taxes consists of the following (in thousands):

	Year Ended October 31,		
	2018	2017	2016
Provision (benefit) for income taxes:			
Current:			
Federal	$ 8,327	$ —	$ —
State	8,219	6,342	5,281
Foreign	13,294	14,563	9,969
Total current	29,840	20,905	15,250
Deferred:			
Federal	475,951 (1)	(1,047,699) (1)	—
State	(8,202)	(77,429) (1)	—
Foreign	(4,118)	(1,604)	(1,116)
Total deferred	463,631	(1,126,732)	(1,116)
Provision (benefit) for income taxes	$ 493,471	$ (1,105,827)	$ 14,134

(1) The income tax expense for 2018 includes the impact of the remeasurement of the net deferred tax assets and the federal transition tax. See further discussion below. The income tax benefit for fiscal 2017 includes the reversal of a significant portion of the valuation allowance on Ciena's deferred tax assets in the U.S. as described below.

For the periods indicated, income before provision for income taxes consists of the following (in thousands):

	Year Ended October 31,		
	2018	2017	2016
United States	$ 106,972	$ 114,242	$ 58,237
Foreign	41,809	41,884	28,481
Total	$ 148,781	$ 156,126	$ 86,718

Ciena's foreign income tax as a percentage of foreign income may appear disproportionate compared to the expected tax based on the U.S. federal statutory rate and is dependent upon the mix of earnings and tax rates in foreign jurisdictions.

For the periods indicated, the tax provision (benefit) reconciles to the amount computed by multiplying income before income taxes by the U.S. federal statutory rate of 35% (23.41% for fiscal 2018, see note below) as follows:

	Year Ended October 31,		
	2018	2017	2016
Provision at statutory rate	23.41 %	35.00 %	35.00 %
Deferred tax assets remeasurement	294.56 %	— %	— %
State taxes	(0.16)%	2.29 %	4.00 %
Foreign taxes	1.22 %	(0.35)%	3.11 %
Research and development credit	(8.80)%	(15.38)%	(22.61)%
Non-deductible compensation	3.39 %	3.45 %	5.16 %
Fair value of debt conversion liability	1.90 %	— %	— %
Transition tax	23.23 %	— %	— %
Valuation allowance	(11.95)%	(739.97)%	(7.33)%
Other	4.88 %	6.67 %	(1.03)%
Effective income tax rate	331.68 %	(708.29)%	16.30 %

On December 22, 2017, the Tax Cuts and Jobs Act (the "Tax Act") was enacted. The Tax Act significantly revises the U.S. corporate income tax by, among other things, lowering the statutory corporate income tax rate (the "federal tax rate") from 35% to 21% effective January 1, 2018, implementing a modified territorial tax system, and imposing a mandatory one-time transition tax on accumulated earnings of foreign subsidiaries that were previously tax deferred. As a fiscal-year taxpayer, certain provisions of the Tax Act impact Ciena in fiscal 2018, including the change in the federal tax rate and the one-time transition tax, while other provisions will be effective at the beginning of fiscal 2019, including the implementation of a modified territorial tax system, other changes to how foreign earnings are subject to U.S. tax, and adoption of an alternative tax system.

As a result of the decrease in the federal tax rate from 35% to 21% effective January 1, 2018, Ciena has computed its income tax expense for the October 31, 2018 fiscal year using a blended federal tax rate of 23.41%. Ciena remeasured its deferred tax assets and liabilities ("DTA") using the federal tax rate that will apply when the related temporary differences are expected to reverse.

During fiscal 2018, Ciena recorded a tax expense of $493.5 million, primarily related to the Tax Act which consists of the following:

- a $438.2 million charge related to the remeasurement of U.S. net deferred tax assets at the lower statutory rate under the Tax Act; and
- a $34.6 million charge related to a transition tax on accumulated historical foreign earnings and its deemed repatriation to the U.S.

In December 2017, the SEC issued Staff Accounting Bulletin No. 118, which addresses how a company recognizes provisional amounts when it does not have the necessary information available, prepared or analyzed (including computations) in reasonable detail to complete its accounting for the effect of the changes due to the Tax Act. The measurement period ends

when a company has obtained, prepared and analyzed the information necessary to finalize its accounting, but cannot extend beyond one year. The final impact of the Tax Act may differ from the above amounts to the extent they are provisional due to changes in interpretations of the Tax Act, legislative action to address questions that arise because of the Tax Act, changes in accounting standards for income taxes and related interpretations in response to the Tax Act, and any updates or changes to estimates used in the provisional amounts. In the fourth quarter of fiscal 2018, Ciena recorded a $10.5 million benefit to the provisional amounts originally recorded in the first quarter of fiscal 2018 related to the U.S transition tax on accumulated earnings of foreign subsidiaries. Ciena has determined that the $34.6 million of tax expense for the U.S. transition tax on accumulated earnings of foreign subsidiaries is a provisional amount and a reasonable estimate as of October 31, 2018. Ciena is able to reduce the transition tax payable through the utilization of research and development credits which previously had a valuation allowance. The net transition tax payable is $8.6 million. Ciena has further determined that the $438.2 million of tax expense for DTA remeasurement is complete. Ciena is also required to make accounting policy elections as a result of the Tax Act. These include whether a valuation allowance is recorded for the estimated effect of the application of GILTI and BEAT or if these will be treated as period costs when incurred. Ciena has made an accounting policy election to record an $8.6 million provisional valuation allowance against the U.S. NOL due to an anticipated incremental cash tax cost projected to be generated by the new GILTI tax rules that begin to apply to Ciena in fiscal 2019. Ciena's analysis of the new BEAT rules, as well as the very recent regulatory guidance and how they may impact the company, continue to progress. Accordingly, Ciena has not made an accounting policy election on whether to establish a valuation allowance for the estimated impact for BEAT. Ciena is also required to elect to either treat taxes due on future GILTI inclusions in U.S. taxable income as a current period expense when incurred or reflect such portion of the future GILTI inclusions in U.S. taxable income that relate to existing basis differences in Ciena's current measurement of deferred taxes. Ciena's accounting policy election is to treat the taxes due on future U.S. inclusions in taxable income under GILTI as a period cost when incurred.

The significant components of deferred tax assets and liabilities are as follows (in thousands):

	October 31,	
	2018	2017
Deferred tax assets:		
Reserves and accrued liabilities	$ 40,959	$ 56,597
Depreciation and amortization	353,838	451,385
NOL and credit carry forward	483,495	803,622
Other	9,397	29,398
Gross deferred tax assets	887,689	1,341,002
Valuation allowance	(142,650)	(185,898)
Deferred tax asset, net of valuation allowance	$ 745,039	$ 1,155,104

A reconciliation of the beginning and ending amount of unrecognized tax benefits, excluding interest and penalties, is as follows (in thousands):

	Amount
Unrecognized tax benefits at October 31, 2015	$ 27,536
Increase related to positions taken in prior period	2,187
Increase related to positions taken in current period	2,654
Reductions related to expiration of statute of limitations	(1,709)
Unrecognized tax benefits at October 31, 2016	30,668
Increase related to positions taken in prior period	122
Increase related to positions taken in current period	111,412
Reductions related to expiration of statute of limitations	(620)
Unrecognized tax benefits at October 31, 2017	141,582
Decrease related to positions taken in prior period	(46,400)
Increase related to positions taken in current period	2,482
Reductions related to expiration of statute of limitations	(1,301)
Unrecognized tax benefits at October 31, 2018	$ 96,363

As of October 31, 2018 and 2017, Ciena had accrued $3.5 million and $4.0 million of interest and penalties, respectively, related to unrecognized tax benefits within other long-term liabilities in the Consolidated Balance Sheets. Interest and penalties of $1.1 million and $1.2 million were recorded to the provision for income taxes during fiscal 2018 and fiscal 2016, respectively. During fiscal 2017, Ciena recorded a net benefit for interest and penalties in its provision for income taxes of $0.6 million, primarily as a result of recognizing a portion of previously unrecognized tax benefits. If recognized, the entire balance of unrecognized tax benefits would impact the effective tax rate. Over the next 12 months, Ciena does not estimate any material changes in unrecognized income tax benefits.

Ciena has not provided for U.S. deferred income taxes on the cumulative unremitted earnings of its non-U.S. affiliates, as it plans to indefinitely reinvest these foreign earnings outside the U.S. As of October 31, 2018, the cumulative amount of such temporary differences for which a deferred tax liability has not been recognized is an estimated $336 million. If these earnings were distributed to the U.S., Ciena would be subject to additional foreign withholding taxes of approximately $23.0 million. Additionally, there are no other significant temporary differences for which a deferred tax liability has not been recognized.

As of October 31, 2018, Ciena continues to maintain a valuation allowance against net deferred tax assets of $142.7 million primarily related to state and foreign net operating losses and credits that Ciena estimates it will not be able to use.

The following table summarizes the activity in Ciena's valuation allowance against its gross deferred tax assets (in thousands):

Year ended October 31,	Beginning Balance	Additions	Deductions	Ending Balance
2016	$ 1,495,672	$ —	$ 5,892	$ 1,489,780
2017	$ 1,489,780	$ —	$ 1,303,882	$ 185,898
2018	$ 185,898	$ 23,720	$ 66,968	$ 142,650

As of October 31, 2018, Ciena had a $1.27 billion net operating loss carry forward and a $0.1 billion income tax credit carry forward which both begin to expire in fiscal year 2021. Ciena's ability to use net operating losses and credit carry forwards is subject to limitations pursuant to the ownership change rules of the Internal Revenue Code Section 382.

Ciena adopted ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting*, in the first quarter of fiscal 2018. In connection with the adoption of this guidance, Ciena recognized approximately $62.1 million of deferred tax assets related to previously unrecognized tax benefits. This was recorded as a cumulative-effect adjustment to retained earnings as of the beginning of the first quarter of fiscal 2018.

(21) SHARE-BASED COMPENSATION EXPENSE

Ciena has outstanding equity awards issued under its 2017 Omnibus Incentive Plan (the "2017 Plan"), its 2008 Omnibus Incentive Plan, and certain legacy equity plans and equity plans assumed as a result of previous acquisitions. All equity awards granted on or after March 23, 2017 are made exclusively from the 2017 Plan. Ciena also makes shares of its common stock available for purchase under its Amended and Restated 2003 Employee Stock Purchase Plan (the "ESPP"). Each of the 2017 Plan and the ESPP are described below.

2017 Plan

The 2017 Plan has a ten-year term and authorizes the issuance of awards including stock options, restricted stock units (RSUs), restricted stock, unrestricted stock, stock appreciation rights (SARs) and other equity and/or cash performance incentive awards to employees, directors and consultants of Ciena. Subject to certain restrictions, the Compensation Committee of the Board of Directors has broad discretion to establish the terms and conditions for awards under the 2017 Plan, including the number of shares, vesting conditions, and the required service or performance criteria. Options and SARs have a maximum term of ten years, and their exercise price may not be less than 100% of fair market value on the date of grant. Repricing of stock options and SARs is prohibited without stockholder approval. Certain change in control transactions may cause awards granted under the 2017 Plan to vest, unless the awards are continued or substituted for in connection with the transaction.

The 2017 Plan authorizes and reserves 8.9 million shares for issuance. In addition, any shares that remained available for issuance under the 2008 Plan as of March 23, 2017 were added to the 2017 Plan and are available for issuance thereunder. The number of shares available under the 2017 Plan will also be increased from time to time by: (i) the number of shares subject to outstanding awards granted under Ciena's prior equity compensation plans that are forfeited, expire or are canceled without delivery of common stock following the effective date of the 2017 Plan, and (ii) the number of shares subject to awards assumed or substituted in connection with the acquisition of another company. As of October 31, 2018, the total number of

shares authorized for issuance under the 2017 Plan is 8.9 million and approximately 7.2 million shares remained available for issuance thereunder.

Stock Options

There were no stock options granted by Ciena during fiscal 2018, fiscal 2017 or fiscal 2016. Outstanding stock option awards granted to employees in prior periods are generally subject to service-based vesting conditions and vest over a four-year period. The following table is a summary of Ciena's stock option activity for the periods indicated (shares in thousands):

	Shares Underlying Options Outstanding	Weighted Average Exercise Price
Balance as of October 31, 2017	875	$ 30.19
Granted	—	—
Exercised	(179)	12.75
Canceled	(420)	35.46
Balance as of October 31, 2018	276	$ 33.52

The total intrinsic value of options exercised during fiscal 2018, fiscal 2017 and fiscal 2016 was $2.2 million, $3.1 million and $5.7 million, respectively.

The following table summarizes information with respect to stock options outstanding at October 31, 2018, based on Ciena's closing stock price on the last trading day of Ciena's fiscal 2018 (shares and intrinsic value in thousands):

	Options Outstanding at October 31, 2018				Vested Options at October 31, 2018			
Range of Exercise Price	Number of Underlying Shares	Weighted Average Remaining Contractual Life (Years)	Weighted Average Exercise Price	Aggregate Intrinsic Value	Number of Underlying Shares	Weighted Average Remaining Contractual Life (Years)	Weighted Average Exercise Price	Aggregate Intrinsic Value
$ 5.34 — $ 11.16	14	1.31	$ 8.30	$ 323	14	1.31	$ 8.30	$ 323
$ 11.34 — $ 16.79	64	3.63	13.53	1,191	64	3.62	13.52	1,185
$ 17.50 — $ 25.36	11	5.6	18.44	156	11	5.55	18.21	151
$ 32.06 — $ 37.10	54	3.97	35.60	—	54	3.97	35.60	—
$ 37.82 — $ 55.63	133	4.59	46.29	—	132	4.59	46.29	—
$ 5.34 — $ 55.63	276	4.13	$ 33.52	$ 1,670	275	4.12	$ 33.56	$ 1,659

Assumptions for Option-Based Awards

Ciena recognizes the fair value of stock options as share-based compensation expense on a straight-line basis over the requisite service period. Ciena did not grant any option-based awards during fiscal 2018, fiscal 2017, or fiscal 2016.

Restricted Stock Units

A restricted stock unit is a stock award that entitles the holder to receive shares of Ciena common stock as the unit vests. Ciena's outstanding restricted stock unit awards are subject to service-based vesting conditions and/or performance-based vesting conditions. Awards subject to service-based conditions typically vest in increments over a three or four-year period. However, the 2017 Plan permits Ciena to grant service-based stock awards with a minimum one-year vesting period. Awards with performance-based vesting conditions (i) require the achievement of certain operational, financial or other performance criteria or targets; or (ii) measure Ciena's total shareholder return as compared to an index of peer companies, a condition of vesting of such awards, in whole or in part. Ciena recognizes the estimated fair value of performance-based awards, net of estimated forfeitures, as share-based compensation expense over the performance period, using graded vesting, which considers each performance period or tranche separately, based upon Ciena's determination of whether it is probable that the performance targets will be achieved. At the end of each reporting period, Ciena reassesses the probability of achieving the performance targets and the performance period required to meet those targets.

The following table is a summary of Ciena's restricted stock unit activity for the period indicated, with the aggregate fair value of the balance outstanding at the end of each period, based on Ciena's closing stock price on the last trading day of the relevant period (shares and aggregate fair value in thousands):

	Restricted Stock Units Outstanding	Weighted Average Grant Date Fair Value Per Share	Aggregate Fair Value
Balance as of October 31, 2017	4,143	$ 21.46	$ 86,721
Granted	2,713		
Vested	(2,155)		
Canceled or forfeited	(299)		
Balance as of October 31, 2018	4,402	$ 22.26	$ 140,943

The total fair value of restricted stock units that vested and were converted into common stock during fiscal 2018, fiscal 2017 and fiscal 2016 was $54.3 million, $49.5 million and $50.3 million, respectively. The weighted average fair value of each restricted stock unit granted by Ciena during fiscal 2018, fiscal 2017 and fiscal 2016 was $22.46, $23.29 and $19.81, respectively.

Assumptions for Restricted Stock Unit Awards

The fair value of each restricted stock unit award is based on the closing price on the date of grant. Share-based expense for service-based restricted stock unit awards is recognized ratably over the vesting period on a straight-line basis.

Share-based expense for performance-based restricted stock unit awards is recognized ratably over the performance period based upon Ciena's determination of whether it is probable that the performance targets will be achieved. At each reporting period, Ciena reassesses the probability of achieving the performance targets and the performance period required to meet those targets. The estimation of whether the performance targets will be achieved involves judgment, and the estimate of expense is revised periodically based on the probability of achieving the performance targets. Revisions are reflected in the period in which the estimate is changed. If any performance goals are not met, no compensation cost is ultimately recognized against that goal and, to the extent previously recognized, compensation expense is reversed.

Share-based compensation expense is recognized only for those awards that are ultimately expected to vest. In the event of a forfeiture of an award, the expense related to the unvested portion of that award is reversed. Reversal of share-based compensation expense based on forfeitures can materially affect the measurement of estimated fair value of our share-based compensation.

Amended and Restated Employee Stock Purchase Plan (ESPP)

Under the ESPP, eligible employees may enroll in a twelve-month offer period that begins in December and June of each year. Each offer period includes two six-month purchase periods. Employees may purchase a limited number of shares of Ciena common stock at 85% of the fair market value on either the day immediately preceding the offer date or the purchase date, whichever is lower. The ESPP is considered compensatory for purposes of share-based compensation expense. Pursuant to the ESPP's "evergreen" provision, on December 31 of each year, the number of shares available under the ESPP increases by up to 0.6 million shares, provided that the total number of shares available at that time shall not exceed 8.2 million. Unless earlier terminated, the ESPP will terminate on January 24, 2023.

During fiscal 2018, fiscal 2017 and fiscal 2016, Ciena issued 1.1 million, 1.0 million and 1.1 million shares under the ESPP, respectively. At October 31, 2018, 4.9 million shares remained available for issuance under the ESPP.

Share-Based Compensation Expense

The following table summarizes share-based compensation expense for the periods indicated (in thousands):

	Year Ended October 31,		
	2018	2017	2016
Product cost of goods sold	$ 2,984	$ 2,672	$ 2,457
Service cost of goods sold	2,616	2,487	2,479
Share-based compensation expense included in cost of goods sold	5,600	5,159	4,936
Research and development	13,518	12,957	13,870
Sales and marketing	14,246	12,846	15,138
General and administrative	19,709	17,321	17,342
Acquisition and integration costs	—	—	714
Share-based compensation expense included in operating expense	47,473	43,124	47,064
Share-based compensation expense capitalized in inventory, net	(101)	77	(7)
Total share-based compensation	$ 52,972	$ 48,360	$ 51,993

As of October 31, 2018, total unrecognized share-based compensation expense was $77.3 million which relates to unvested restricted stock units and is expected to be recognized over a weighted-average period of 1.45 years.

(22) SEGMENT AND ENTITY WIDE DISCLOSURES

Segment Reporting

Ciena manages its business, measures its performance and allocates its resources based on the following operating segments:

- *Networking Platforms* reflects sales of Ciena's Converged Packet Optical and Packet Networking product lines.
  - Converged Packet Optical — includes the 6500 Packet-Optical Platform, the 5430 Reconfigurable Switching System, Waveserver® stackable interconnect system, the family of CoreDirector® Multiservice Optical Switches and the OTN configuration for the 5410 Reconfigurable Switching System. This product line also includes sales of the Z-Series Packet-Optical Platform. As of the first quarter of fiscal 2018, sales of Optical Transport products are also reflected within the Converged Packet Optical product line for all periods presented.
  - Packet Networking — includes the 3000 family of service delivery switches and service aggregation switches and the 5000 family of service aggregation switches. This product line also includes the 8700 Packetwave Platform, the Ethernet packet configuration for the 5410 Service Aggregation Switch, and the 6500 Packet Transport System (PTS), which combines packet switching, control plane operation, and integrated optics.

  The Networking Platforms segment also includes sales of operating system software and enhanced software features embedded in each of the product lines above. Revenue from this segment is included in product revenue on the Consolidated Statement of Operations.

- *Software and Software-Related Services* reflects sales of the following:
  - Ciena's Blue Planet Automation Software and Services, which is a comprehensive, open software suite that allows customers to use enhanced knowledge about their network to drive adaptive optimization of their services and operations. Ciena's Blue Planet Automation Platform includes multi-domain service orchestration (MDSO), network function virtualization (NFV), management and orchestration (NFV MANO), analytics, network health predictor (NHP), route optimization and assurance (ROA), inventory management and Ciena's SDN Multilayer Controller and virtual wide area network (V-WAN) application. Ciena acquired the NHP and ROA software solutions as a part of its acquisition of Packet Design. Ciena acquired the inventory management and ROA software solutions from DonRiver and Packet Design, respectively. Services includes sales of subscription, installation, support, consulting and design services related to Ciena's Blue Planet Automation Platform.
  - Ciena's Platform Software and Services, which provides analytics, data, and planning tools to assist customers in managing Ciena's Networking Platforms products in their networks. Ciena's platform software includes its Manage, Control and Plan (MCP) domain controller solution, OneControl Unified Management System, ON-Center® Network and Service Management Suite, Ethernet Services Manager, Optical Suite Release and Planet Operate. As Ciena seeks further adoption of its MCP software platform and transitions features, functionality and customers to this platform, Ciena expects revenue declines for its other platform software solutions. Software-related services includes sales of subscription, installation, support, and

consulting services related to Ciena's software platforms and operating system software and enhanced software features embedded in each of the Networking Platforms product lines above.

Revenue from the software portions of this segment is included in product revenue on the Consolidated Statements of Operations. Revenue from services portions of this segment is included in services revenue on the Consolidated Statements of Operations.

- *Global Services* reflects sales of a broad range of Ciena's services for consulting and network design, installation and deployment, maintenance support and training activities. Revenue from this segment is included in services revenue on the Consolidated Statement of Operations.

Ciena's long-lived assets, including equipment, building, furniture and fixtures, finite-lived intangible assets, and maintenance spares, are not reviewed by the chief operating decision maker for purposes of evaluating performance and allocating resources. As of October 31, 2018, equipment, building, furniture and fixtures totaling $292.1 million primarily supports asset groups within Ciena's Networking Platforms and Software and Software-Related Services segments and Ciena's unallocated selling and general and administrative activities. As of October 31, 2018, $29.7 million of Ciena's intangible assets were assigned to asset groups within Ciena's Networking Platforms segment and $118.5 million of Ciena's intangible assets were assigned to asset groups within Ciena's Software and Software-Related Services segment. As of October 31, 2018, all of the maintenance spares totaling $45.7 million were assigned to asset groups within Ciena's Global Services segment.

Segment Revenue

The table below (in thousands, except percentage data) sets forth Ciena's segment revenue for the respective periods indicated:

	Year Ended October 31,		
	2018	2017	2016
Revenue:			
Networking Platforms			
Converged Packet Optical	$ 2,194,519	$ 1,939,621	$ 1,815,921
Packet Networking	283,499	313,089	252,862
Total Networking Platforms	2,478,018	2,252,710	2,068,783
Software and Software-Related Services			
Platform Software and Services	173,949	145,009	117,251
Blue Planet Automation Software and Services	26,764	16,110	7,818
Total Software and Software-Related Services	200,713	161,119	125,069
Global Services			
Maintenance Support and Training	245,161	227,400	228,982
Installation and Deployment	128,829	117,524	130,916
Consulting and Network Design	41,565	42,934	46,823
Total Global Services	415,555	387,858	406,721
Total revenue	$ 3,094,286	$ 2,801,687	$ 2,600,573

Segment Profit

Segment profit is determined based on internal performance measures used by Ciena's chief executive officer to assess the performance of each operating segment in a given period. In connection with that assessment, the chief executive officer excludes the following items: selling and marketing costs; general and administrative costs; amortization of intangible assets; acquisition and integration costs; significant asset impairments and restructuring costs, interest and other income (loss), net; interest expense; loss on extinguishment of debt; and provision (benefit) for income taxes.

The table below (in thousands) sets forth Ciena's segment profit and the reconciliation to consolidated net income during the respective periods indicated:

	Year Ended October 31,		
	2018	2017	2016
Segment profit:			
Networking Platforms	$ 581,113	$ 578,039	$ 544,744
Software and Software-Related Services	69,808	32,536	7,123
Global Services	172,205	159,882	157,915
Total segment profit	823,126	770,457	709,782
Less: non-performance operating expenses			
Selling and marketing	394,060	356,169	349,731
General and administrative	160,133	142,604	132,828
Amortization of intangible assets	15,737	33,029	61,508
Acquisition and integration costs	5,111	—	4,613
Significant asset impairments and restructuring costs	18,139	23,933	4,933
Add: other non-performance financial items			
Interest and other income (loss), net	(12,029)	913	(12,569)
Interest expense	(55,249)	(55,852)	(56,656)
Loss on extinguishment and modification of debt	(13,887)	(3,657)	(226)
Less: Provision (benefit) for income taxes	493,471	(1,105,827)	14,134
Total net income (loss)	$ (344,690)	$ 1,261,953	$ 72,584

Entity Wide Reporting

Ciena's operating segments each engage in business across four geographic regions: North America; Europe, Middle East and Africa ("EMEA"); Asia-Pacific ("APAC"); and Caribbean and Latin America ("CALA"). North America includes only activities in the United States and Canada. The following table reflects Ciena's geographic distribution of revenue principally based on the relevant location for Ciena's delivery of products and performance of services. For the periods below, Ciena's geographic distribution of revenue was as follows (in thousands):

	Year Ended October 31,		
	2018	2017	2016
North America	$ 1,886,450	$ 1,736,047	$ 1,689,263
EMEA	464,876	404,099	393,705
CALA	140,177	164,308	195,085
APAC	602,783	497,233	322,520
Total	$ 3,094,286	$ 2,801,687	$ 2,600,573

North America includes $1.77 billion, $1.63 billion and $1.58 billion of United States revenue for fiscal years ended October 31, 2018, 2017 and 2016, respectively. No other country accounted for at least 10% of total revenue for the periods presented above.

The following table reflects Ciena's geographic distribution of equipment, building, furniture and fixtures, net, with any country accounting for at least 10% of total equipment, building, furniture and fixtures, net, specifically identified. Equipment, building, furniture and fixtures, net, attributable to geographic regions outside of the United States and Canada are reflected as "Other International." For the periods below, Ciena's geographic distribution of equipment, building, furniture and fixtures, net, was as follows (in thousands):

	October 31,	
	2018	2017
Canada	$ 198,028	$ 203,491
United States	75,479	90,482
Other International	18,560	14,492
Total	$ 292,067	$ 308,465

While we have benefited from the diversification of our business and customer base, our ten largest customers contributed 56.5% of fiscal 2018 revenue, 55.6% of fiscal 2017 revenue and 51.1% of fiscal 2016 revenue.

For the periods below, customers accounting for at least 10% of Ciena's revenue were as follows (in thousands):

	October 31,		
	2018	2017	2016
AT&T	$ 374,576	$ 448,943	$ 479,077
Verizon	318,013	288,048	n/a
Total	$ 692,589	$ 736,991	$ 479,077

n/a Denotes revenue representing less than 10% of total revenue for the period

Both customers purchased products and services from each of Ciena's operating segments.

(23) OTHER EMPLOYEE BENEFIT PLANS

Ciena has a Defined Contribution Pension Plan that covers a majority of its Canada-based employees. The plan covers all Canada-based employees who are not part of an excluded group. Total contributions (employee and employer) cannot exceed the lesser of 18% of participant earnings and an annual dollar limit (CAD$26,230 (approximately $34,364) for 2018). This plan includes a required employer contribution of 1% for all participants and a 50% matching of participant contributions up to a total annual maximum of CAD$3,000 (approximately $3,930) per employee. During fiscal 2018, 2017 and 2016, Ciena made matching contributions of approximately CAD$5.1 million (approximately $6.7 million), CAD$4.7 million (approximately $6.2 million) and CAD$4.5 million (approximately $5.9 million), respectively.

Ciena has a 401(k) defined contribution profit sharing plan. Participants may contribute up to 60% of pre-tax compensation, subject to certain limitations. The plan includes an employer matching contribution equal to 50% of the first 6% an employee contributes each pay period. Ciena may also make discretionary annual profit contributions up to the IRS regulated limit. Ciena has made no profit sharing contributions to date. During fiscal 2018, 2017 and 2016, Ciena made matching contributions of approximately $5.8 million, $5.7 million and $5.4 million, respectively.

(24) COMMITMENTS AND CONTINGENCIES

Canadian Grant

During the second quarter of fiscal 2018, Ciena entered into agreements related to the Evolution of Networking Services through a Corridor in Quebec and Ontario for Research and Innovation ("ENCQOR") project with the Canadian federal government, the government of the province of Ontario and the government of the province of Quebec to develop a 5G technology corridor between Quebec and Ontario to promote research and development, small business enterprises and entrepreneurs in Canada. Under these agreements, Ciena can receive up to an aggregate CAD$57.6 million (approximately $45.0 million) in reimbursement from the three Canadian government entities for eligible costs over a period commencing on February 20, 2017 and ending on March 31, 2022. Ciena anticipates receiving recurring disbursements over this period. Amounts received under the agreements are subject to recoupment in the event that Ciena fails to achieve certain minimum investment, employment and project milestones. During fiscal 2018, Ciena recorded a CAD$16.6 million (approximately $12.9 million) benefit as a reduction in research and development expense, related to eligible costs that it incurred from the commencement date of February 20, 2017 to October 31, 2018, because it believes it has complied with the conditions of the agreements entitling it to this amount. In future periods, through the term of these agreements, Ciena expects to record a quarterly benefit to operating expense of approximately CAD$2.95 million (approximately $2.3 million) related to these grants. As of October 31, 2018, amounts receivable from this grant were CAD$7.5 million (approximately $5.7 million).

Foreign Tax Contingencies

Ciena is subject to various tax liabilities arising in the ordinary course of business. Ciena does not expect that the ultimate settlement of these liabilities will have a material effect on its results of operations, financial position or cash flows.

Litigation

As a result of the acquisition of Cyan in August 2015, Ciena became a defendant in a securities class action lawsuit. On April 1, 2014, the first of two purported stockholder class action lawsuit was filed in the Superior Court of California, County of San Francisco, against Cyan, the members of Cyan's board of directors, Cyan's former Chief Financial Officer, and the underwriters of Cyan's initial public offering. The cases were consolidated as Beaver County Employees Retirement Fund, et al. v. Cyan, Inc. et al., Case No. CGC-14-538355. The consolidated complaint alleges violations of federal securities laws on behalf of a purported class consisting of purchasers of Cyan's common stock pursuant or traceable to the registration statement and prospectus for Cyan's initial public offering in April 2013, and seeks unspecified compensatory damages and other relief. On May 19, 2015, the proposed class was certified. During the fourth quarter of fiscal 2018, the parties agreed to the terms of a settlement of the action, which settlement is subject to notice to class members and approval by the court. The terms of the proposed settlement, which include a release and dismissal of all claims against all defendants without any liability or wrongdoing attributed to them, are not material to the Company's financial results. There is no assurance that the court will ultimately approve the settlement.

Internal Investigation

During fiscal 2017, one of Ciena's third-party vendors raised allegations about certain questionable payments to one or more individuals employed by a customer in a country in the ASEAN region. Ciena promptly initiated an internal investigation into the matter, with the assistance of outside counsel, which investigation corroborated direct and indirect payments to one such individual and sought to determine whether the payments may have violated applicable laws and regulations, including the U.S. Foreign Corrupt Practices Act ("FCPA"). In September 2017, Ciena voluntarily contacted the SEC and the U.S. Department of Justice ("DOJ") to advise them of the relevant events and the findings of Ciena's internal investigation. On December 10, 2018, the DOJ advised that it has declined to prosecute this matter and that its investigation into the matter is now closed. Ciena continues to cooperate fully with the SEC in its investigation into this matter.

Ciena's operations in the relevant country have constituted less than 1.5% of consolidated revenues as reported by Ciena in each fiscal year from 2012 through 2017. Ciena does not currently anticipate that this matter will have a material adverse effect on its business, financial condition or results of operations. However, as discussions with the SEC are ongoing, the ultimate outcome of this matter cannot be predicted at this time. As of the filing of this Report, no provision with respect to this matter has been made in Ciena's consolidated financial statements. Any determination that Ciena's operations or activities are not in compliance with the FCPA or other applicable laws or regulations could result in the imposition of fines, civil and criminal penalties, and equitable remedies, including disgorgement or injunctive relief.

In addition to the matters described in "Litigation" and "Internal Investigation" above, Ciena is subject to various legal proceedings, claims and other matters arising in the ordinary course of business, including those that relate to employment, commercial, tax and other regulatory matters. Ciena is also subject to intellectual property related claims, including claims against third parties that may involve contractual indemnification obligations on the part of Ciena. Ciena does not expect that the ultimate costs to resolve such matters will have a material effect on its results of operations, financial position or cash flows.

Lease Commitments

Ciena has certain minimum obligations under non-cancelable leases expiring on various dates through 2032 for equipment and facilities. The following table summarizes our future annual minimum lease commitments under non-cancelable leases that are not recorded on the balance sheet as of October 31, 2018 (in thousands):

	2019	2020	2021	2022	2023	Thereafter	Total
Operating leases	$ 28,912	$ 24,348	$ 21,320	$ 15,839	$ 13,142	$ 47,047	$ 150,608

Rental expense for fiscal 2018, fiscal 2017 and fiscal 2016 was approximately $24.1 million, $30.9 million and $26.6 million, respectively. In addition, Ciena paid approximately $1.9 million, $2.7 million and $0.8 million during fiscal 2018,

fiscal 2017 and fiscal 2016, respectively, related to rent costs for restructured facilities and unfavorable lease commitments, which were offset against Ciena's restructuring liabilities and unfavorable lease obligations. The amount for operating lease commitments above does not include variable expenses relating to insurance, taxes, maintenance and other costs required by the applicable operating lease. These costs are not expected to have a material impact on Ciena's financial condition, results of operations or cash flows.

(25) SUBSEQUENT EVENTS

Stock Repurchase Program

On December 13, 2018, Ciena announced that its Board of Directors authorized a program to repurchase up to $500 million of its common stock. The amount and timing of repurchases are subject to a variety of factors including liquidity, cash flow, stock price and general business and market conditions. The program may be modified, suspended, or discontinued at any time. This program terminates and replaces in its entire the previous stock repurchase program authorized in fiscal 2018. From the end of the fiscal year ending October 31, 2018 through December 17, 2018, Ciena did not repurchase shares of its common stock under this prior stock repurchase program.

Settlement of Conversions of 3.75% Convertible Senior Notes due October 15, 2018 ("New Notes")

During the fourth quarter of fiscal 2018 Ciena elected to settle the conversion of the New Notes prior to maturity in a combination of cash and shares, with the cash portion not to exceed an aggregate amount of approximately $400 million. Per the settlement provisions of the indenture governing conversion of the New Notes, an amount of $288.7 million (representing the aggregate principal amount) was paid in cash on October 15, 2018. During the relevant settlement period, Ciena's shares traded at a volume weighted average price in excess of the $20.17 per share conversion price. As such, Ciena paid $111.3 million in excess of the aggregate principal amount in cash, and $52.9 million settled in shares, or 1.6 million shares. These amounts were recorded as debt conversion liability at fiscal year-end October 31, 2018 and were settled during the first quarter of fiscal 2019.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures

As of the end of the period covered by this report, we carried out an evaluation under the supervision and with the participation of management, including our Chief Executive Officer and Chief Financial Officer, of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended). Based upon this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this report.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended) during the most recently completed fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Report of Management on Internal Control Over Financial Reporting

The management of Ciena Corporation is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934).

The internal control over financial reporting at Ciena Corporation was designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America. Internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of Ciena Corporation;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with accounting principles generally accepted in the United States of America;
- provide reasonable assurance that receipts and expenditures of Ciena Corporation are being made only in accordance with authorization of management and directors of Ciena Corporation; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on the consolidated financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements.

Management of Ciena Corporation assessed the effectiveness of the Company's internal control over financial reporting as of October 31, 2018. Management based this assessment on criteria for effective internal control over financial reporting described in "COSO 2013 Internal Control — Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, management determined that, as of October 31, 2018, Ciena Corporation maintained effective internal control over financial reporting. Management reviewed the results of its assessment with the Audit Committee of our Board of Directors.

PricewaterhouseCoopers LLP, independent registered public accounting firm, who audited and reported on the consolidated financial statements of Ciena Corporation included in this annual report, has also audited the effectiveness of Ciena Corporation's internal control over financial reporting as of October 31, 2018, as stated in its report appearing in Item 8 of Part II of this annual report.

/s/ Gary B. Smith	/s/ James E. Moylan, Jr.
Gary B. Smith	James E. Moylan, Jr.
President and Chief Executive Officer	Senior Vice President and Chief Financial Officer
December 21, 2018	December 21, 2018

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Information relating to our directors and executive officers is set forth in Part I of this annual report under the caption “Item 1. Business—Directors and Executive Officers.”

Additional information responsive to this item concerning our Audit Committee and regarding compliance with Section 16(a) of the Exchange Act is incorporated herein by reference from our definitive proxy statement with respect to our 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Form 10-K.

As part of our system of corporate governance, our board of directors has adopted a code of ethics that is specifically applicable to our chief executive officer and senior financial officers. This Code of Ethics for Senior Financial Officers, as well as our Code of Business Conduct and Ethics, applicable to all directors, officers and employees, are available on the “Corporate Governance” page of our website at http://www.ciena.com. We intend to satisfy any disclosure requirement under Item 5.05 of Form 8-K regarding an amendment to, or waiver from, a provision of the Code of Ethics for Senior Financial Officers, by posting such information on our website at the address above.

Item 11. Executive Compensation

Information responsive to this item is incorporated herein by reference from our definitive proxy statement with respect to our 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Form 10-K.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Information responsive to this item is incorporated herein by reference from our definitive proxy statement with respect to our 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Form 10-K.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Information responsive to this item is incorporated herein by reference from our definitive proxy statement with respect to our 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Form 10-K.

Item 14. Principal Accountant Fees and Services

Information responsive to this item is incorporated herein by reference from our definitive proxy statement with respect to our 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Form 10-K.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) 1. The information required by this item is included in Item 8 of Part II of this annual report.

2. The information required by this item is included in Item 8 of Part II of this annual report.

3. Exhibits: See Index to Exhibits, which is incorporated by reference in this Item. The Exhibits listed in the accompanying Index to Exhibits are filed herewith or incorporated by reference as part of this annual report.

(b) Exhibits. See Index to Exhibits, which is incorporated by reference in this Item. The Exhibits listed in the accompanying Index to Exhibits are filed herewith or incorporated by reference as part of this annual report.

(c) Not applicable.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized on the 21st day of December 2018.

Ciena Corporation

By: /s/ Gary B. Smith
Gary B. Smith
President, Chief Executive Officer and Director

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the date indicated.

Signatures	Title	Date
/s/ Patrick H. Nettles, Ph.D. Patrick H. Nettles, Ph.D.	Executive Chairman of the Board of Directors	December 21, 2018
/s/ Gary B. Smith Gary B. Smith (Principal Executive Officer)	President, Chief Executive Officer and Director	December 21, 2018
/s/ James E. Moylan, Jr. James E. Moylan, Jr. (Principal Financial Officer)	Sr. Vice President, Finance and Chief Financial Officer	December 21, 2018
/s/ Andrew C. Petrik Andrew C. Petrik (Principal Accounting Officer)	Vice President, Controller	December 21, 2018
/s/ Bruce L. Claflin Bruce L. Claflin	Director	December 21, 2018
/s/ Lawton W. Fitt Lawton W. Fitt	Director	December 21, 2018
/s/ Patrick T. Gallagher Patrick T. Gallagher	Director	December 21, 2018
/s/ T. Michael Nevens T. Michael Nevens	Director	December 21, 2018
/s/ Judith M. O'Brien Judith M. O'Brien	Director	December 21, 2018
/s/ Joanne B. Olsen Joanne B. Olsen	Director	December 21, 2018
/s/ Michael J. Rowny Michael J. Rowny	Director	December 21, 2018

INDEX TO EXHIBITS

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Here-with (X)
		Form and Registration or Commission No.	Exhibit	Filing Date	
3.1	Amended and Restated Certificate of Incorporation of Ciena Corporation	8-K (000-21969)	3.1	3/27/2008	
3.2	Second Amended and Restated Bylaws of Ciena Corporation	8-K (001-36250)	3.1	1/27/2017	
4.1	Specimen Stock Certificate	10-K (000-21969)	4.1	12/27/2007	
10.1	Ciena Corporation 2017 Omnibus Incentive Plan*	8-K (001-36250)	10.1	3/29/2017	
10.2	Form of Employee Restricted Stock Unit Agreement for Ciena Corporation 2017 Omnibus Incentive Plan*	—	—	—	X
10.3	Form of Director Restricted Stock Unit Agreement for Ciena Corporation 2017 Omnibus Incentive Plan*	—	—	—	X
10.4	Form of Performance Stock Unit Agreement for Ciena Corporation 2017 Omnibus Incentive Plan*	—	—	—	X
10.5	Form of Market Stock Unit Agreement for Ciena Corporation 2017 Omnibus Incentive Plan*	—	—	—	X
10.6	2008 Omnibus Incentive Plan*	8-K (000-21969)	10.1	3/27/2008	
10.7	Amendment (No. 1) to Ciena Corporation 2008 Omnibus Incentive Plan dated April 14, 2010*	8-K (000-21969)	10.1	4/15/2010	
10.8	Amendment (No. 2) to Ciena Corporation 2008 Omnibus Incentive Plan dated March 21, 2012*	8-K (000-21969)	10.1	3/23/2012	
10.9	Amendment (No. 3) to Ciena Corporation 2008 Omnibus Incentive Plan dated April 10, 2014*	10-Q (001-36250)	10.1	6/11/2014	
10.10	Amendment (No. 4) to Ciena Corporation 2008 Omnibus Incentive Plan dated March 24, 2016*	10-Q (001-36250)	10.2	6/8/2016	
10.11	Form of 2008 Omnibus Incentive Plan Restricted Stock Unit Agreement (Employee)*	10-K (000-21969)	10.18	12/22/2011	
10.12	Form of 2008 Omnibus Incentive Plan Non-Qualified Stock Option Agreement (Employee)*	10-Q (000-21969)	10.2	6/4/2009	
10.13	Form of 2008 Omnibus Incentive Plan Restricted Stock Unit Agreement (Director)*	10-Q (000-21969)	10.3	6/4/2009	
10.14	Amended and Restated 2003 Employee Stock Purchase Plan*	10-Q (001-36250)	10.1	6/7/2017	
10.15	Employee Stock Purchase Plan Enrollment Agreement*	10-Q (001-36250)	10.2	6/7/2017	
10.16	Cyan, Inc. 2006 Stock Plan*	S-1 (333-187732)	10.2.1	4/4/2013	

Exhibit Number	Exhibit Description	Incorporated by Reference: Form and Registration or Commission No.	Exhibit	Filing Date	Filed Here-with (X)
10.17	Cyan, Inc. 2013 Equity Incentive Plan*	S-1 (333-187732)	10.3.1	4/4/2013	
10.18	Ciena Corporation 2000 Equity Incentive Plan (Amended and Restated ONI Systems Corp. 2000 Equity Incentive Plan)*	10-K (000-21969)	10.37	12/11/2003	
10.19	Form of Stock Option Award Agreement for executive officers under Ciena Corporation 2000 Equity Incentive Plan*	8-K (000-21969)	10.1	11/4/2005	
10.20	Form of Non-Statutory Stock Option Award Agreement for directors under Ciena Corporation 2000 Equity Incentive Plan*	8-K (000-21969)	10.4	11/4/2005	
10.21	Form of Restricted Stock Unit Award Agreement for directors under Ciena Corporation 2000 Equity Incentive Plan*	8-K (000-21969)	10.5	11/4/2005	
10.22	World Wide Packets, Inc. 2000 Stock Incentive Plan, as amended*	S-8 (333-149520)	10.1	3/4/2008	
10.23	Deferred Compensation Plan, effective as of November 1, 2016*	S-8 (333-214594)	10.1	11/14/2016	
10.24	Ciena Corporation Amended and Restated Incentive Bonus Plan, as amended December 15, 2011*	10-K (000-21969)	10.26	12/22/2011	
10.25	U.S. Executive Severance Benefit Plan*	10-Q (000-21969)	10.1	6/9/2011	
10.26	Form of Indemnification Agreement with Directors and Executive Officers*	10-Q (000-21969)	10.1	3/3/2006	
10.27	Change in Control Severance Agreement dated November 1, 2016, between Ciena Corporation and Gary B. Smith*	10-K (000-21969)	10.23	12/21/2016	
10.28	Change in Control Severance Agreement dated November 1, 2016 between Ciena Corporation and Executive Officers*	10-K (000-21969)	10.24	12/21/2016	
10.29	Lease Agreement by and between Ciena Canada, Inc. and Innovation Blvd. II Limited dated as of October 23, 2014+	10-K (001-36250)	10.36	12/19/2014	
10.30	Amendment No. 1 to the Lease Agreement dated October 23, 2014, between Innovations Blvd II Limited and Ciena Canada, Inc., dated April 15, 2015.	8-K (001-36250)	10.3	6/3/2015	
10.31	Lease Agreement between Ciena Canada, Inc. and Innovation Blvd. II Limited, dated April 15, 2015	8-K (001-36250)	10.4	6/3/2015	
10.32	Lease Agreement dated November 3, 2011 between Ciena Corporation and W2007 RDG Realty, L.L.C. ++	10-K (000-21969)	10.34	12/22/2011	
10.33	ABL Credit Agreement, dated August 13, 2012, by and among Ciena Corporation, Ciena Communications, Inc. and Ciena Canada, Inc., as the borrowers, the lenders party thereto, Deutsche Bank AG New York Branch, as administrative agent and collateral agent, Bank of America, N.A., as syndication agent, and Morgan Stanley Senior Funding, Inc. and Wells Fargo Bank, National Association, as co-documentation agents ++	10-Q (000-21969)	10.1	9/5/2012	
10.34	Amendment to ABL Credit Agreement, dated August 24, 2012, by and among Ciena Corporation, Ciena Communications, Inc. and Ciena Canada, Inc., as the borrowers, and Deutsche Bank AG New York Branch, as administrative agent ++	10-Q (000-21969)	10.2	9/5/2012	

Exhibit Number	Exhibit Description	Incorporated by Reference: Form and Registration or Commission No.	Exhibit	Filing Date	Filed Here-with (X)
10.35	Omnibus Second Amendment to ABL Credit Agreement and First Amendment to U.S. Security Agreement, Canadian Security Agreement, U.S. Pledge Agreement, U.S. Guaranty and Canadian Guaranty, entered into as of March 5, 2013, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Canada, Inc., and Deutsche Bank AG New York Branch	10-Q (000-21969)	10.2	3/13/2013	
10.36	Third Amendment to ABL Credit Agreement, dated July 15, 2014 by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc. Ciena Canada, Inc., Deutsche Bank AG New York Branch, as administrative agent and collateral agent, and the lenders party thereto.	10-Q (001-36250)	10.1	9/9/2014	
10.37	Omnibus Fourth Amendment to Credit Agreement and First Amendment to U.S. Pledge Agreement and Canadian Pledge Agreement, dated April 15, 2015.	8-K (001-36250)	10.2	6/3/2015	
10.38	Fifth Amendment to ABL Credit Agreement dated July 2, 2015, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc. Ciena Canada, Inc., Deutsche Bank AG New York Branch, as administrative agent and collateral agent, and the lenders party thereto.	10-Q (001-36250)	10.2	9/9/2015	
10.39	Sixth Amendment to ABL Credit Agreement dated January 8, 2016, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc. Ciena Canada, Inc., Deutsche Bank AG New York Branch, as administrative agent and collateral agent, and the lenders party thereto.	10-Q (001-36250)	4.1	3/9/2016	
10.40	Joinder Agreement under ABL Credit Agreement and Related Agreements as of March 15, 2013 by and between Ciena Government Solutions, Inc. and Deutsche Bank AG New York Branch, as Administrative Agent and as Collateral Agent, for the benefit of the Secured Creditors++	10-Q (000-21969)	10.2	6/12/2013	
10.41	Amended and Restated Security Agreement, dated August 13, 2012, amended and restated as of July 15, 2014, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., and Deutsche Bank AG New York Branch, as Collateral Agent++	10-Q (001-36250)	10.2	9/9/2014	
10.42	Amended and Restated Pledge Agreement, dated August 13, 2012, amended and restated as of July 15, 2014, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., and Deutsche Bank AG New York Branch, as Pledgee++	10-Q (001-36250)	10.3	9/9/2014	
10.43	U.S. Guaranty, dated August 13, 2012, by and among Ciena Corporation and Ciena Communications, Inc., as guarantors, and Deutsche Bank AG New York Branch, as administrative agent ++	10-Q (000-21969)	10.5	9/5/2012	
10.44	Canadian Guaranty, dated August 13, 2012, by and between Ciena Canada, Inc., as guarantor, and Deutsche Bank AG New York Branch, as administrative agent ++	10-Q (000-21969)	10.7	9/5/2012	
10.45	Amended and Restated Canadian Security Agreement, dated August 13, 2012, amended and restated as of July 15, 2014, by and among Ciena Canada, Inc., each other assignor from time to time party thereto, and Deutsche Bank AG New York Branch, as Collateral Agent.++	10-Q (001-36250)	10.4	9/9/2014	

Exhibit Number	Exhibit Description	Incorporated by Reference: Form and Registration or Commission No.	Exhibit	Filing Date	Filed Here-with (X)
10.46	Second Amended and Restated Canadian Security Agreement, dated August 13, 2012, amended and restated as of July 15, 2014 and further amended and restated as of January 8, 2016 by and among Ciena Canada, Inc., each other assignor from time to time party thereto, and Deutsche Bank AG New York Branch, as Collateral Agent.++	10-Q (001-36250)	4.2	3/9/2016	
10.47	Credit Agreement, dated July 15, 2014, by and among Ciena Corporation, the lenders party thereto, and Bank of America, N.A., as Administrative Agent++	10-Q (001-36250)	10.5	9/9/2014	
10.48	First Amendment to Credit Agreement, dated July 15, 2014 and First Amendment to Certain Pledge Agreements (U.S. Pledge Agreement, dated July 15, 2014 and Canadian Pledge Agreement, dated December 12, 2014), dated April 15, 2015.++	8-K (001-36250)	10.1	6/3/2015	
10.49	Second Amendment to Credit Agreement, dated July 15, 2014, by and among Ciena Corporation, the lenders party thereto, and Bank of America, N.A., as Administrative Agent., dated July 2, 2015++	10-Q (001-36250)	10.1	9/9/2015	
10.50	Third Amendment to Credit Agreement, dated July 15, 2015, by and among Ciena Corporation, the lenders party thereto, and Bank of America, N.A., as Administrative Agent., dated June 29, 2017++	10-Q (001-36250)	10.3	9/7/2017	
10.51	Incremental Joinder and Amendment Agreement under the Credit Agreement and Related Agreements dated as of April 25, 2016 by and between Ciena Corporation, Bank of America, N.A. as Administrative Agent, Ciena Communications, Inc. and Ciena Government Solutions, Inc.	10-Q (001-36250)	10.1	6/8/2016	
10.52	Omnibus Refinancing Amendment to Credit Agreement (dated as of July 15, 2014, as amended), Security Agreement, and Pledge Agreement, dated as of January 30, 2017, by and among Ciena Corporation, as borrower, Ciena Communications, Inc. and Ciena Government Solutions, Inc., as guarantors, Bank of America, N.A. as administrative agent, and the lenders party thereto.	10-Q (001-36250)	10.1	3/8/2017	
10.53	Increase Joinder and Refinancing Amendment to Credit Agreement, dated September 28, 2018, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., Bank of America, N.A., as administrative agent, and the lenders party thereto. ++	8-K (001-36520)	10.1	10/1/2018	
10.54	Guaranty, dated July 15, 2014, by and among Ciena Communications, Inc., Ciena Government Solutions, Inc. and Bank of America, N.A., as Administrative Agent.++	10-Q (001-36250)	10.6	9/9/2014	
10.55	Term Loan Security Agreement, dated July 15, 2014, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., and Bank of America, N.A., as Collateral Agent. ++	10-Q (001-36250)	10.7	9/9/2014	
10.56	Omnibus Amendment to Security Agreement and Pledge Agreement, dated September 28, 2018, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., and Bank of America, N.A., as Administrative Agent.++	—	—	—	X
10.57	Term Loan Pledge Agreement, dated July 15, 2014, by and among Ciena Corporation, Ciena Communications, Inc., Ciena Government Solutions, Inc., and Bank of America, N.A., as Pledgee.++	10-Q (001-36250)	10.8	9/9/2014	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Here-with (X)
		Form and Registration or Commission No.	Exhibit	Filing Date	
10.58	Intellectual Property License Agreement dated as of March 19, 2010 between Ciena Luxembourg S.a.r.l. and Nortel Networks Limited#	10-Q (000-21969)	10.3	6/10/2010	
21.1	Subsidiaries of registrant	—	—	—	X
23.1	Consent of Independent Registered Public Accounting Firm	—	—	—	X
31.1	Certification of Chief Executive Officer Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934 as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	—	—	—	X
31.2	Certification of Chief Financial Officer Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934 as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	—	—	—	X
32.1	Certification of Chief Executive Officer Pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	—	—	—	X
32.2	Certification of Chief Financial Officer Pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	—	—	—	X
101.INS	XBRL Instance Document	—	—	—	X
101.SCH	XBRL Taxonomy Extension Schema Document	—	—	—	X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document	—	—	—	X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document	—	—	—	X
101.LAB	XBRL Taxonomy Extension Label Linkbase Document	—	—	—	X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document	—	—	—	X

*	Represents management contract or compensatory plan or arrangement
+	Pursuant to Item 601(b)(2) of Regulation S-K, certain schedules and exhibits referenced in the table of contents have been omitted. Ciena hereby agrees to furnish supplementally a copy of any omitted exhibit or schedule to the SEC upon request. In addition, representations and warranties included in these agreements, as amended, were made by the parties to one another in connection with a negotiated transaction. These representations and warranties were made as of specific dates, only for purposes of these agreements and for the benefit of the parties thereto. These representations and warranties were subject to important exceptions and limitations agreed upon by the parties, including being qualified by confidential disclosures, made for the purposes of allocating contractual risk between the parties rather than establishing these matters as facts. These agreements are filed with this report only to provide investors with information regarding its terms and conditions, and not to provide any other factual information regarding Ciena or any other party thereto. Accordingly, investors should not rely on the representations and warranties contained in these agreements or any description thereof as characterizations of the actual state of facts or condition of any party, its subsidiaries or affiliates. The information in these agreements should be considered together with Ciena's public reports filed with the SEC.
++	Representations and warranties included in these agreements, as amended, were made by the parties to one another in connection with a negotiated transaction. These representations and warranties were made as of specific dates, only for purposes of these agreements and for the benefit of the parties thereto. These representations and warranties were subject to important exceptions and limitations agreed upon by the parties, including being qualified by confidential disclosures, made for the purposes of allocating contractual risk between the parties rather than establishing these matters as facts. These agreements are filed with this report only to provide investors with information regarding its terms and conditions, and not to provide any other factual information regarding Ciena or any other party thereto. Accordingly, investors should not rely on the representations and warranties contained in these agreements or any description thereof as characterizations of the actual state of facts or condition of any party, its subsidiaries or affiliates. The information in these agreements should be considered together with Ciena's public reports filed with the SEC.
#	Certain portions of these documents have been omitted based on a request for confidential treatment submitted to the SEC. The non-public information that has been omitted from these documents has been separately filed with the SEC. Each redacted portion of these documents is indicated by a "[*]" and is subject to the request for confidential treatment submitted to the SEC. The redacted information is confidential information of the Registrant.

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

RESTRICTED STOCK UNIT AGREEMENT

Ciena Corporation, a Delaware corporation, (the "Company"), hereby grants restricted stock units ("Restricted Stock Units") relating to shares of its common stock, $0.01 par value (the "Stock"), to the individual named below as the Grantee, subject to the vesting and other terms and conditions set forth in this Restricted Stock Unit Agreement, including the attached terms and conditions and any appendix attached hereto (with supplemental or distinct terms or notices applicable for non-U.S. employees) (together, the "Agreement"). This grant is subject to the terms and conditions set forth in (i) this Agreement, (ii) the Ciena Corporation 2017 Omnibus Incentive Plan (as it may be amended from time to time, the "Plan"), and (iii) the grant details for this award contained in your account with the Company's selected broker. Capitalized terms not defined in this Agreement are defined in the Plan and have the meaning set forth in the Plan.

Grant Date: _____

Grant Number: _____

Name of Grantee: _____

Grantee's Employee Identification Number: _____

Number of Restricted Stock Units Covered by Grant: _____

Vesting Schedule: _____

[One-fourth of this Grant will vest on the first March 20, June 20, September 20, or December 20 following the first anniversary of the grant date and, one-sixteenth of the number of Stock Units granted will vest on each March 20, June 20, September 20, and December 20 thereafter, provided you remain in Service.]

[OR]

[One-sixteenth of this Award will vest on March 20, June 20, September 20 and December 20 of each calendar year following the Grant Date, provided that (i) the initial vesting date above shall be at least 30 days from the Grant Date, and (ii) you must remain in Service with the Company or any Affiliate on each applicable vesting date unless otherwise provided in this Agreement.]

By accepting this grant (whether by signing this Agreement or accepting the grant electronically via the website of the Company's selected broker), you agree to the terms and conditions in this Agreement and in the Plan and agree that the Plan will control in the event any provision of this Agreement should appear to be inconsistent unless otherwise stated herein.

Grantee: _____
(Signature)

Ciena Corporation: _____
Name: David M. Rothenstein
Title: Senior Vice President, General Counsel and Secretary

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

RESTRICTED STOCK UNIT AGREEMENT
TERMS AND CONDITIONS

Restricted Stock Unit Transferability	This grant is an award of Restricted Stock Units in the number of Restricted Stock Units set forth on the first page of this Agreement (or, in the case of electronic delivery, as set forth in the grant details for this Award set forth in the Company's selected broker's website), subject to the vesting conditions described in this Agreement. Your Restricted Stock Units may not be transferred, assigned, pledged, or hypothecated, whether by operation of Applicable Law or otherwise, nor may the Restricted Stock Units be made subject to execution, attachment, or similar process.
Vesting	Your Restricted Stock Units will vest as indicated on the first page of this Agreement (or, in the case of electronic delivery, in accordance with the grant details for this award set forth the Company's selected broker's website), provided you remain in Service with the Company or any Affiliate on each applicable vesting date and meet any applicable vesting requirements set forth in this Agreement. Any resulting fractional shares shall be rounded up to the nearest whole share; provided, that you may not vest in more than the number of Restricted Stock Units set forth on the cover sheet of this Agreement. Except as provided in this Agreement, or in any other agreement between you and the Company, no additional Restricted Stock Units will vest after your Service has terminated.
Share Delivery; Vested Restricted Stock Units; Tax-Related Items	Shares of Stock underlying the vested portion of the Restricted Stock Units will be delivered to you by the Company as soon as practicable following the applicable vesting date for those shares of Stock, but in no event beyond 2½ months after the end of the calendar year in which the shares would have been otherwise delivered. On the vesting date (or as soon as practicable thereafter), a brokerage account in your name will be credited with shares of Stock representing the number of shares that vested under this grant (the "Vested Shares") net of any Tax-Related Items (as defined below), as applicable. If the vesting date is not a trading day, the Vested Shares will be delivered on the next trading day (or as soon as practicable thereafter).

Regardless of any action the Company or the Affiliate to whom you provide Services (the "Employer") takes with respect to any or all income tax, social insurance, payroll tax, payment on account or other tax-related items related to the Restricted Stock Units and/or your participation in the Plan and legally applicable to you ("Tax-Related Items"), you acknowledge that the ultimate liability for all Tax-Related Items is and remains your responsibility and may exceed the amount actually withheld by the Company or the Employer, if any. You further acknowledge that the Company and/or the Employer (1) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting, or settlement of the Restricted Stock Units, the issuance of shares of Stock upon settlement of the Restricted Stock Units, the subsequent sale of shares of Stock acquired pursuant to such issuance and the receipt of any dividends and/or any dividend equivalents; and (2) do not commit to and are under no obligation to structure the terms of the award or any aspect of the Restricted Stock Units to reduce or eliminate your liability for Tax-Related Items or achieve any particular tax result. Further, if you have become subject to tax in more than one jurisdiction, you acknowledge that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

By accepting this award, you authorize the Company and/or the Employer, or their respective agents, at their discretion, to satisfy any applicable withholding obligations with regard to all Tax-Related Items by one or a combination of the following: (a) withholding from your wages or other cash compensation paid to you by the Company and/or the Employer; (b) withholding from proceeds of the sale of Vested Shares either through a voluntary sale or through a mandatory sale arranged by the Company (on your behalf pursuant to this authorization without further consent) (an "Automatic Sale"); or (c) withholding shares of Stock to be issued upon vesting of the Restricted Stock Units, provided, however, that if you are a Section 16 officer of the Company under the Act, as amended, then the Company will withhold in shares of Stock under this subsection (c) upon the relevant taxable or tax withholding event, as applicable, unless the use of such withholding method is problematic under applicable tax or securities law or has material adverse accounting consequences, in which case, the obligation for Tax-Related Items may be satisfied by one or a combination of methods (a) and (b) above; or (d) any other method of withholding determined by the Company and permitted by applicable law.

You further acknowledge that, in the event of an Automatic Sale, this irrevocable written instruction is intended to constitute an instruction pursuant to Rule 10b5-1 of the Exchange Act with the Automatic Sale intended to comply with these requirements. As such, all provisions hereof shall be interpreted consistent with Rule 10b5-1 and shall be automatically modified to the extent necessary to comply therewith. The Company shall be responsible for the payment of any brokerage commissions relating to any Automatic Sale.

	Depending on the withholding method, the Company may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding rates or other applicable withholding rates, including maximum applicable rates in your jurisdiction(s) to the extent permitted by the Plan, in which case you may receive a refund of any over-withheld amount in cash and will have no entitlement to the equivalent in Stock. If the obligation for Tax-Related Items is satisfied by withholding in shares of Stock, for tax purposes, you are deemed to have been issued the full number of shares of Stock subject to the Vested Shares, notwithstanding that a number of the shares of Stock are held back solely for the purpose of paying the Tax-Related Items due as a result of any aspect of your participation in the Plan. The Company may refuse to issue or deliver the shares of Stock or the proceeds of the sale of shares of Stock, if you fail to comply with your obligations in connection with the Tax-Related Items.
Forfeiture of Unvested Restricted Stock Units	Except as specifically provided in this Agreement or as may be provided in other agreements between you and the Company, no additional Restricted Stock Units will vest after your Service with the Company, the Employer, or any Affiliate has terminated for any reason, and you will forfeit to the Company all of the Restricted Stock Units that have not yet vested or with respect to which all applicable restrictions and conditions have not lapsed upon such termination of your Service.
Deferral of Compensation	Delivery of shares underlying any award of Restricted Stock Units and treatment hereunder shall be subject to any deferral election validly made by eligible participants under the Ciena Corporation Deferred Compensation Plan or any successor plan.
Death	If your Service terminates because of your death, the unvested Restricted Stock Units granted under this Agreement will automatically vest as to the number of Restricted Stock Units that would have vested had you remained in Service for the 12-month period immediately following your death.
Disability	If your Service terminates because of your Disability, the unvested Restricted Stock Units granted under this Agreement will automatically vest as to the number of Restricted Stock Units that would have vested had you remained in Service for the 12-month period immediately following your termination on account of Disability.
Termination For Cause	If your Service is terminated for Cause, then you shall immediately forfeit all rights to your Restricted Stock Units, and this award shall immediately terminate.

Leaves of Absence

For purposes of this grant, your Service does not terminate when you go on a *bona fide* leave of absence approved by the Company, if the terms of your leave provide for continued Service crediting, or when continued Service crediting is required by Applicable Law. The Company will determine, in its sole discretion, whether and when a leave of absence constitutes a termination of Service under the Plan.

Retention Rights

Neither your Restricted Stock Units nor this Agreement give you the right to be retained by the Company, the Employer, or any Affiliate in any capacity, and your Service may be terminated at any time and for any reason.

Shareholder Rights

You have no rights as a shareholder unless and until the shares of Stock relating to the Restricted Stock Units have been issued to you (or an appropriate book entry has been made). Except as described in the Plan or herein, no adjustments are made for dividends or other rights if the applicable record date occurs before your shares of Stock are issued (or an appropriate book entry has been made).

If the Company pays a dividend on its shares of Stock, you will, however, be entitled to receive a cash payment equal to the per-share dividend paid on the shares of Stock times the number of Restricted Stock Units that you hold as of the record date for the dividend; provided, however, such Dividend Equivalents Rights shall not vest or become payable unless and until the Restricted Stock Units to which the Dividend Equivalent Rights correspond become vested and nonforfeitable pursuant to this Agreement or the Plan.

Nature of Grant

In accepting the award and the Restricted Stock Units, you acknowledge, understand, and agree that:

(1) the Plan is established voluntarily by the Company, it is discretionary in nature, and it may be modified, amended, suspended, or terminated by the Company at any time;

(2) the grant of the Restricted Stock Units is voluntary and occasional and does not create any contractual or other right to receive future grants of Restricted Stock Units, or benefits in lieu of Restricted Stock Units, even if Restricted Stock Units have been granted in the past;

(3) all decisions with respect to future Restricted Stock Unit grants, if any, will be at the sole discretion of the Company;

(4) your participation in the Plan is voluntary;

(5) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not intended to replace any pension rights;

(6) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end of Service payments, bonuses, holiday pay, long-service

awards, pension or retirement or welfare benefits, or similar payments;

(7) the Restricted Stock Unit grant and your participation in the Plan will not be interpreted to form or amend a Service contract or relationship with the Company, the Employer, or any Affiliate;

(8) the future value of the underlying shares of Stock is unknown and cannot be predicted with certainty;

(9) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from termination of your Service relationship with the Company or the Employer (for any reason whatsoever and whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), and in consideration of the grant of the Restricted Stock Units, you irrevocably agree never to institute any claim against the Company, the Employer, or any Affiliate, waive your ability, if any, to bring any such claim, and release the Company, the Employer, and any Affiliate from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by accepting this award of Restricted Stock Units, you shall be deemed irrevocably to have agreed not to pursue such claim and agree to execute any and all documents necessary to request dismissal or withdrawal of such claims;

(10) in the event of termination of your Service relationship (whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), your right to vest in the Restricted Stock Units under the Plan, if any, will terminate effective as of the date that you are no longer actively providing Services to the Company, the Employer, or any Affiliate as a Service Provider and will not be extended by any notice period mandated under local law (*e.g.*, active Service as a Service Provider would not include a period of “garden leave” or similar period); the Committee shall have the exclusive discretion to determine when you are no longer actively providing Services for purposes of your Restricted Stock Units grant;

(11) the Restricted Stock Units and the benefits evidenced by this Agreement do not create any entitlement, not otherwise specifically provided for in the Plan or by the Company in its discretion, to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company, nor to be exchanged, cashed out, or substituted for, in connection with any corporate transaction affecting the Stock (including a Corporate Transaction);

(12) unless otherwise agreed with the Company, the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of same, are not granted as consideration for, or in connection with, the service you may provide as a director of an Affiliate of the Company; and

(13) the following provisions apply only if you are providing Services outside the United States:

(A) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation or salary for any purpose and in no event should be considered as compensation for, or relating in any way to, past Services for the Company, the Employer, or any Affiliate; and

(B) you acknowledge and agree that neither the Company, the Employer, nor any Affiliate shall be liable for any foreign exchange rate fluctuation between the Employer's local currency and the United States dollar that may affect the value of any proceeds from the sale of shares of Stock acquired under the Plan.

Data Privacy

You hereby explicitly and unambiguously consent to the collection, use, and transfer, in electronic or other form, of your personal data as described in this Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Employer, the Company, and its Affiliates for the exclusive purpose of implementing, administering, and managing your participation in the Plan.

You understand that the Company and the Employer may hold certain personal information about you, including, but not limited to, your name, home address, email address and telephone number, date of birth, social security or social insurance number, passport number or other identification number, salary, nationality, job title, any shares of Stock or directorships held in the Company, details of all Restricted Stock Units or any other entitlement to shares of Stock awarded, canceled, exercised, vested, unvested, or outstanding in your favor, for the exclusive purpose of implementing, administering, and managing the Plan ("Data").

You understand that Data will be transferred to E*Trade Financial Services, Inc., or such other stock plan service provider as may be selected by the Company in the future, which is assisting the Company with the implementation, administration, and management of the Plan.

You understand that the recipients of the Data may be located in the United States or elsewhere, and that the recipients' country (e.g., the United States) may have different data privacy laws and protections than your country.

You understand that you may request a list with the names and addresses of any potential recipients of the Data by contacting your local human resources representative. You authorize the Company, E*Trade Financial Services, Inc., and any other possible recipients which may assist the Company (presently or in the future) with implementing, administering, and managing the Plan to receive, possess, use, retain, and transfer the Data, in electronic or other form, for the sole purpose of implementing, administering, and managing your participation in the Plan.

You understand that Data will be held only as long as is necessary to implement, administer, and manage your participation in the Plan.

You understand that you may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data, or refuse or withdraw the consents herein, in any case without cost, by contacting in writing your local human resources representative or the Company's stock administration department.

Further, you understand that you are providing the consents herein on a purely voluntary basis.

If you do not consent, or if you later revoke your consent, your employment status or Service with the Employer will not be affected; the only consequence of refusing or withdrawing your consent is that the Company would not be able to grant Restricted Stock Units or other equity awards to you or administer or maintain such awards.

Therefore, you understand that refusing or withdrawing your consent may affect your ability to participate in the Plan.

For more information on the consequences of your refusal to consent or withdrawal of consent, you understand that you may contact your local human resources representative or the Company's stock administration department.

Finally, upon request of the Company or the Employer, you agree to provide an executed data privacy consent form (or any other agreements or consents that may be required by the Company and/or the Employer) that the Company and/or the Employer may deem necessary to obtain from you for the purpose of administering participation in the Plan in compliance with the data privacy laws in your country, either now or in the future. You understand and agree that you will not be able to participate in the Plan if you fail to provide any such consent or agreement requested by the Company and/or the Employer.

No Advice Regarding Grant

The Company is not providing any tax, legal, or financial advice, nor is the Company making any recommendations regarding your participation in the Plan, or your acquisition or sale of the Stock underlying your Restricted Stock Units. You are hereby advised to consult with your own personal tax, legal, and financial advisors regarding your participation in the Plan before taking any action related to the Plan.

Applicable Law and Venue	The Restricted Stock Units and the provisions of this Agreement are governed by, and subject to, the laws of the State of Delaware, without regard to the conflict of law provisions. For purposes of litigating any dispute that arises under this award or the Agreement, the parties hereby submit to and consent to the jurisdiction of the State of Delaware, and agree that such litigation shall be conducted in the state courts of Delaware, or the federal courts for the District of Delaware, and no other courts, where this grant is made and/or to be performed. ***You agree to waive your rights to a jury trial for any claim or cause of action based upon or arising out of this Agreement or the Plan.***
Language	If you have received this Agreement or any other document related to the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.
Electronic Delivery and Acceptance	The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means or request your consent to participate in the Plan by electronic means. You hereby consent to receive such documents by electronic delivery and agree to participate in the Plan through an on-line or electronic system established and maintained by the Company, the Company's designated broker, or their respective third parties. If you fail to submit a written rejection of this award to the Company's Stock Administration Department prior to the date on which this award initially vests, this award shall be deemed accepted by you and the terms of this award and the Plan shall apply to the same extent as if you had accepted your award electronically via the website of the Company's selected broker.
Severability	The provisions of this Agreement are severable, and if any one or more provisions are determined to be illegal or otherwise unenforceable, in whole or in part, the remaining provisions shall nevertheless be binding and enforceable.
Waiver	You acknowledge that a waiver by the Company of breach of any provision of this Agreement shall not operate or be construed as a waiver of any other provision of this Agreement, or of any subsequent breach of this Agreement.
Country-Specific Provisions: Appendix A	Notwithstanding any provisions in this Agreement, this award of Restricted Stock Units shall be subject to any additional terms and conditions set forth in Appendix A to this Agreement for your country. Moreover, if you relocate to one of the countries included in Appendix A, the terms and conditions for such country will apply to you, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons.

Foreign Account / Assets Reporting and Exchange Controls	Depending upon the country to which laws you are subject, you may have certain foreign asset and/or account reporting requirements and exchange controls which may affect your ability to acquire or hold shares of Stock under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of shares of Stock) in a brokerage or bank account outside your country of residence. Your country may require that you report such accounts, assets or transactions to the applicable authorities in your country. You may be required to repatriate sale proceeds or other funds received as a result of your participation in the Plan to your country through a designated bank or broker within a certain time after receipt. You are responsible for knowledge of and compliance with any such regulations and should speak with your own personal tax, legal and financial advisors regarding the same.
Insider Trading / Market Abuse Laws	You acknowledge that, depending on your country, you may be subject to insider trading restrictions and/or market abuse laws, which may affect your ability to acquire or sell shares of Stock or rights to shares of Stock (e.g., Restricted Stock Units) under the Plan during such times as you are considered to have "inside information" regarding the Company (as defined by the laws in your country). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable insider trading policy of the Company. You acknowledge that it is your responsibility to comply with any applicable restrictions, and you should consult with your own personal legal and financial advisors on this matter.
Imposition of Other Requirements	The Company reserves the right to impose other requirements on your participation in the Plan, on the award, on the Restricted Stock Units, and on any shares of Stock acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require you to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

This Agreement is not a stock certificate or a negotiable instrument.

APPENDIX A
TO
RESTRICTED STOCK UNIT AGREEMENT
FOR GRANTEES LOCATED OUTSIDE THE UNITED STATES

Terms and Conditions

This Appendix A includes additional terms and conditions that govern the Restricted Stock Units granted to Grantees who reside in the countries listed herein. These terms and conditions are in addition to or, if so indicated, in replacement of the terms and conditions set forth in the Agreement. Any capitalized term used in this Appendix A without definition shall have the meaning ascribed to such term in the Plan or the main body of this Agreement, as applicable.

Notifications

This Appendix A also includes information regarding exchange control, foreign asset and/or account, securities and other laws in effect in the respective countries as of March 2017. Such laws are often complex and change frequently. As a result, the Company strongly recommends that you not rely on the information herein as the only source of information relating to the consequences of your participation in the Plan because the information may be out of date at the time your Restricted Stock Units vest or you sell shares of Stock. In addition, the information is general in nature and might not apply to your particular situation, and the Company is not in a position to assure you of any particular result. Accordingly, you are advised to seek appropriate professional advice as to how the relevant laws in your country may apply to your situation.

Finally, note that if you are a citizen or resident of a country other than the one in which you are currently working and/or residing, or are considered a resident of another country for local law purposes or if you transfer employment and/or residency to another country after the Grant Date, the information contained herein may not be applicable to you in the same manner. In addition, the Company shall, in its sole discretion, determine to what extent the additional terms and conditions included herein will apply to you under these circumstances.

ARGENTINA

Terms and Conditions

Acknowledgment of Nature of Grant. The following provision supplements the Nature of Grant section of the Agreement:

In accepting the grant of the Award, you acknowledge and agree that the grant of the Award is made by the Company (not the Employer) in its sole discretion and that the value of any Awards or shares of Stock acquired under the Plan shall not constitute salary or wages for any purpose under Argentine labor law, including the calculation of (i) any labor benefits including, but not limited to, vacation pay, thirteenth salary, compensation in lieu of notice, annual bonus, disability, and leave of absence payments, or (ii) any termination or severance indemnities.

If, notwithstanding the foregoing, any benefits under the Plan are considered for purposes of calculating any termination or severance indemnities, you acknowledge and agree that such benefits shall not accrue more frequently than on an annual basis.

Notifications

Securities Law Information. Neither the Restricted Stock Units nor the underlying shares of Stock are publicly offered or listed on any stock exchange in Argentina. The offer is private and not subject to the supervision of any Argentine governmental authority.

Exchange Control Information. Exchange control regulations in Argentina are subject to frequent change. You are solely responsible for complying with any exchange control obligations that you may have in connection with participation in the Plan and should consult with your personal legal advisor regarding same.

AUSTRALIA

Notifications

Australia Offer Document. The grant of Restricted Stock Units under the Plan is intended to comply with the provisions of the Corporations Act 2001, ASIC Regulatory Guide 49 and ASIC Class Order 14/1000. Additional details are set forth in the Australia Offer Document, which is provided with the Agreement.

Tax Information. Subdivision 83A-C of the Income Tax Assessment Act, 1997, applies to Restricted Stock Units granted under the Plan, such that the Restricted Stock Units are intended to be subject to deferred taxation.

AUSTRIA

Notifications

Exchange Control Information. You understand that if you hold shares of Stock acquired under the Plan outside of Austria, you will be required to submit reports to the Austrian National Bank as follows: (i) on a quarterly basis if the value of the shares of Stock as of any given quarter meets or exceeds €30,000,000; and (ii) on an annual basis if the value of the shares of Stock as of December 31 meets or exceeds €5,000,000. If quarterly reporting is required, the reports must be filed on or before the 15th day of the month following the last day of the respective quarter. The deadline for filing the annual report is January 31 of the following year.

When shares of Stock are sold or a dividend is paid on the shares of Stock, you understand that you may have exchange control obligations if you hold the cash proceeds outside Austria. If the transaction volume of all of your accounts abroad meets or exceeds €10,000,000, you understand that you must report the movements and balances of all accounts on a monthly basis, as of the last day of the month, on or before the 15th day of the following month.

BELGIUM

Notifications

Foreign Account / Assets Reporting Information. If you are a Belgian resident, you are required to report any taxable income attributable to the grant of the Restricted Stock Units on your annual tax return. In addition, you are required to report any security (e.g., shares of Stock acquired under the Plan) or bank accounts (including brokerage accounts) opened and maintained outside Belgium on your annual tax return. You also are required to complete a separate report providing the Central Contact Point of the National Bank of Belgium with details regarding any such account, including the account number, the name of the bank in which such account is held and the country in which such account is located the first time you report the foreign security and/or bank account on your annual tax return. The forms to complete this report are available on the website of the National Bank of Belgium.

BRAZIL

Terms and Conditions

Compliance with the Law. In accepting the grant of the Restricted Stock Units, you acknowledge your agreement to comply with applicable Brazilian laws and to pay any and all applicable tax associated with the vesting of the Restricted Stock Units and the sale of any shares of Stock acquired under the Plan and the receipt of any dividends.

Acknowledgment of Nature of Grant. The following provision supplements the Nature of Grant section of the Agreement:

By participating in the Plan, you acknowledge, understand and agree that (i) you are making an investment decision, (ii) shares of Stock will be issued to you only if you remain in Service through each vesting date, and (iii) the value of the shares of Stock is not fixed and may increase or decrease in value without compensation to you.

Notifications

Exchange Control Information. If you hold assets and rights outside Brazil with an aggregate value exceeding US$100,000, you will be required to prepare and submit to the Central Bank of Brazil an annual declaration of such assets and rights, including: (i) bank deposits; (ii) loans; (iii) financing transactions; (iv) leases; (v) direct investments; (vi) portfolio investments, including shares of Stock acquired under the Plan; (vii) financial derivatives investments; and (viii) other investments, including real estate and other assets. Please note that foreign individuals holding Brazilian visas are considered Brazilian residents for purposes of this reporting requirement and must declare at least the assets held abroad that were acquired subsequent to the date of admittance as a resident of Brazil. Individuals holding assets and rights outside Brazil valued at less than US$100,000 are not required to submit a declaration.

CANADA

Terms and Conditions

Restricted Stock Units Payable Only in Shares of Stock. Notwithstanding any discretion in the Plan or the Agreement to the contrary, Restricted Stock Units granted in Canada shall be paid in shares of Stock only and do not provide any right for you to receive a cash payment.

The following provisions will apply if you are a resident of Quebec:

Language Consent. The parties acknowledge that it is their express wish that the Agreement, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English.

Les parties reconnaissent avoir exigé la rédaction en anglais de cette convention, ainsi que de tous documents, avis et procédures judiciaires, exécutés, donnés ou intentés en vertu de, ou liés directement ou indirectement à, la présente convention.

Data Privacy. This provision supplements the Data Privacy section of the Agreement:

You hereby authorize the Company and the Company's representatives to discuss with and obtain all relevant information from all personnel, professional or not, involved in the administration and operation of the Plan. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to disclose and discuss the Plan with their advisors. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to record such information and to keep such information in your employee file.

Notifications

Securities Law Information. You are permitted to sell shares of Stock acquired through the Plan through the designated broker appointed under the Plan, if any, provided the resale of shares of Stock acquired under the Plan takes place outside of Canada through the facilities of a stock exchange on which the Stock is listed. Currently, the Stock is listed on the New York Stock Exchange.

Foreign Account / Assets Reporting Information. Foreign property, including Restricted Stock Units, shares of Stock acquired under the Plan and other rights to receive shares (e.g., Restricted Stock Units) of a non-Canadian company

held by a Canadian resident must generally be reported annually on a Form T1135 (Foreign Income Verification Statement) if the total cost of the foreign property exceeds C$100,000 at any time during the year. Thus, such Restricted Stock Units must be reported - generally at a nil cost - if the C$100,000 cost threshold is exceeded because other foreign property is held by you. When shares of Stock are acquired, their cost generally is the adjusted cost base ("ACB") of the shares. The ACB would ordinarily equal the fair market value of the shares at the time of acquisition, but if you own other shares of the same company, this ACB may have to be averaged with the ACB of the other shares. You should consult with your personal tax advisor to determine your reporting requirements.

COLOMBIA

Terms and Conditions

Acknowledgment of Nature of Grant. The following provision supplements the Nature of Grant section of the Agreement:

You acknowledge that pursuant to Article 128 of the Colombian Labor Code, the Plan and related benefits do not constitute a component of your "salary" for any legal purpose. To this extent, they will not be included and/or considered for purposes of calculating any and all labor benefits, such as legal/fringe benefits, vacations, indemnities, payroll taxes, social insurance contributions and/or any other labor-related amount which may be payable.

Notifications

Exchange Control Information. Investments in assets located abroad (including shares of Stock) are subject to registration with the Central Bank (Banco de la República) if your aggregate investments held abroad (as of December 31 of the applicable calendar year) equal or exceed US$500,000. Further, when shares of Stock (or other investments) held abroad are sold, you may either choose to keep the resulting sums abroad, or to repatriate them to Colombia. If you choose to repatriate funds to Colombia and have not registered the investment with Banco de la República, you will need to file with Banco de la República Form No. 5 upon conversion of funds into local currency, which should be duly completed to reflect the nature of the transaction. If you have registered the investment with Banco de la República, then you will need to file with Banco de la República Form No. 4 upon conversion of funds into local currency, which should be duly completed to reflect the nature of the transaction. You should obtain proper legal advice in order to ensure compliance with applicable Colombian regulations.

DENMARK

Terms and Conditions

Stock Options Act. You acknowledge that you received an Employer Statement in Danish which sets forth the terms of your Restricted Stock Units under the Act on Stock Options.

Notifications

Exchange Control and Tax Reporting Information. You must complete a "Declaration V" form in connection with the deposit of any securities (including shares of Stock acquired under the Plan) into a bank or brokerage account outside of Denmark. The form is available on the website of the Danish Tax Authorities. In connection with filing Declaration V to the Danish Tax Authorities, the bank or broker with which the securities are deposited (the "depositary") may sign a statement according to which the depositary undertakes an obligation, without further request, to forward certain information concerning the shares on an annual basis to the Danish tax authorities. However, if the depositary will not agree to sign such a statement you are personally responsible for submitting the required information as an attachment to your annual tax return. It is only necessary to submit a Declaration V form the first time securities are deposited with a depositary outside of Denmark. However, if the securities are transferred to a different depositary or if you begin using a new depositary, a new Declaration V is required. Generally, the Declaration V must be submitted by the depositary no later than on February 1 of the year following the calendar year to which the information relates.

However, if you are responsible for submitting the information, you must submit the required information as an attachment to your annual tax return.

In addition, if you hold shares of Stock or cash in an account outside of Denmark, you are required to report the existence of such an account to the Danish Tax Authorities by completing a "Declaration K" form and submitting it to the Danish Tax Authorities following opening of the account. The form is available on the website of the Danish Tax Authorities. A separate form must be submitted for each account held outside of Denmark that holds shares of Stock or cash which are taxable in Denmark. The Declaration K requirement is in addition to the Declaration V requirement discussed above. You should consult with your personal legal advisor to ensure compliance with the applicable requirements.

FRANCE

Terms and Conditions

Tax Information. The Restricted Stock Units are not intended to be French tax-qualified Awards.
Language Consent. By signing and returning this Agreement, you confirm having read and understood the documents relating to the Plan which were provided to you in the English language. You accept the terms of those documents accordingly.

En signant et renvoyant ce Contrat vous confirmez ainsi avoir lu et compris les documents relatifs au Plan qui vous ont été communiqués en langue anglaise. Vous en acceptez les termes en connaissance de cause.

Notifications

Foreign Account / Assets Reporting Information. You may hold shares of Stock acquired under the Plan outside of France provided that you declare all foreign accounts, whether open, current, or closed in your income tax return. Failure to comply could trigger significant penalties.

GERMANY

There are no country-specific provisions.

HONG KONG

Terms and Conditions

Sale of Shares. Shares of Stock received at vesting are accepted as a personal investment. If the Award vests within six months of the Grant Date, you agree that you will not dispose of the shares of Stock acquired prior to the six-month anniversary of the Grant Date.

Securities Law Information. Warning: The contents of this document have not been reviewed by any regulatory authority in Hong Kong. You are advised to exercise caution in relation to the offer. If you are in any doubt about any of the contents of the Agreement or the Plan, you should obtain independent professional advice. Neither the grant of the Restricted Stock Units nor the issuance of shares of Stock upon vesting constitutes a public offering of securities under Hong Kong law and are available only to employees, directors or consultants of the Company, the Employer or an Affiliate. The Agreement, the Plan and other incidental communication materials (i) have not been prepared in accordance with and are not intended to constitute a "prospectus" for a public offering of securities under the applicable securities legislation in Hong Kong and (ii) are intended only for the personal use of each eligible employee, director or consultant of the Company, the Employer or an Affiliate and may not be distributed to any other person.

Notifications

Nature of Scheme. The Company specifically intends that the Plan will not be an occupational retirement scheme for purposes of the Occupational Retirement Schemes Ordinance ("ORSO"). Notwithstanding the foregoing, if the Plan is deemed to constitute an occupational retirement scheme for the purposes of ORSO, the grant of the Restricted Stock Units shall be void.

INDIA

Exchange Control Information. You must repatriate all proceeds resulting from the sale of shares of Stock issued upon vesting of the Restricted Stock Units to India within 90 days of receipt and all proceeds from the receipt of cash dividends within 180 days of receipt, or within any other time frame prescribed under applicable Indian exchange control laws as may be amended from time to time. You will receive a foreign inward remittance certificate ("FIRC") from the bank where you deposit the foreign currency. You should maintain the FIRC as evidence of the repatriation of funds in the event the Reserve Bank of India or the Employer requests proof of repatriation. You are responsible for complying with applicable exchange control laws in India.

IRELAND

Director Notification Information. If you are a director, shadow director, or secretary of an Irish Affiliate, pursuant to the Companies Act 2014, you must (a) notify that Affiliate in writing if you receive or dispose of an interest exceeding in the aggregate 1% of the share capital of the Company (e.g., Restricted Stock Units, shares of Stock or debenture), (b) if you become aware of the event giving rise to the notification requirement, or (c) if you become a director or secretary if such an interest exceeding 1% in the aggregate of the share capital of the Company exists at the time. This notification requirement also applies with respect to the interests of a spouse, civil partner, or minor children (whose interests will be attributed to the director, shadow director, or secretary). You should consult your personal legal advisor to ensure compliance with the applicable requirements.

ISRAEL

Terms and Conditions

Mandatory Sale Restriction. To facilitate compliance with local tax requirements, you agree to the sale of any shares of Stock to be issued to you upon vesting. The sale will occur (i) immediately upon vesting, (ii) following your termination of Service, or (iii) within any other time frame as the Company determines to be necessary to comply with local tax requirements. You further agree that the Company is authorized to instruct its designated broker to assist with the mandatory sale of such shares of Stock (on your behalf pursuant to this authorization) and you expressly authorize the Company's designated broker to complete the sale of such shares of Stock. You acknowledge that the Company's designated broker is under no obligation to arrange for the sale of the shares of Stock at any particular price. Upon the sale of the shares of Stock, the Company agrees to pay you the cash proceeds from the sale, less any brokerage fees or commissions and subject to any obligation to satisfy the Tax-Related Items.

You further agree that any shares of Stock to be issued to you shall be deposited directly into an account with the Company's designated broker. The deposited shares of Stock shall not be transferable (either electronically or in certificate form) from the brokerage account. This limitation shall apply both to transfers to different accounts with the same broker and to transfers to other brokerage firms. The limitation shall apply to all shares of Stock issued to you under the Plan, whether or not you remain in Service.

ITALY

Terms and Conditions

Data Privacy. This provision replaces the Data Privacy section of the Agreement in its entirety:

You understand that the Company and the Employer are the Privacy Representatives of the Company in Italy and may hold certain personal information about you, including, but not limited to, your name, home address, email address and telephone number, date of birth, social insurance, passport or other identification number, salary, nationality, job title, any shares of Stock or directorships held in the Company or any Affiliate, details of all Restricted Stock Units or any other entitlement to shares of Stock awarded, canceled, vested, unvested or outstanding in your favor, and that the Company and the Employer will process said data and other data lawfully received from third parties ("Personal Data") for the exclusive purpose of managing and administering the Plan and complying with applicable laws, regulations and Community legislation. You also understand that providing the Company with Personal Data is mandatory for compliance with laws and is necessary for the performance of the Plan and that your refusal to provide Personal Data would make it impossible for the Company to perform its contractual obligations and may affect your ability to participate in the Plan. You understand that Personal Data will not be publicized, but it may be accessible by the Employer as the Privacy Representative of the Company and within the Employer's organization by its internal and external personnel in charge of processing, and by E*Trade Financial Services, Inc. or any other data processor appointed by the Company. The updated list of Processors and of the subjects to which Personal Data are communicated will remain available upon request from the Employer.

The Controller of Personal Data processing is Ciena Corporation, with registered offices at 7035 Ridge Road, Hanover, Maryland 21076, United States of America, and, pursuant to Legislative Decree no. 196/2003, its Privacy Representative in Italy is Ciena Ltd. Piazzale Biancamano, 8 Milano 20121 Italy.

Furthermore, Personal Data may be transferred to banks, other financial institutions or brokers involved in the management and administration of the Plan. You understand that Personal Data may also be transferred to the independent registered public accounting firm engaged by the Company, and also to the legitimate addressees under applicable laws. You further understand that the Company and its Affiliates will transfer Personal Data amongst themselves as necessary for the purpose of implementation, administration and management of your participation in the Plan, and that the Company and its participating Affiliates may each further transfer Personal Data to third parties assisting the Company in the implementation, administration and management of the Plan, including any requisite transfer of Personal Data to E*Trade Financial Services, Inc. or any other third party with whom you may elect to deposit any shares of Stock acquired under the Plan or any proceeds from the sale of such shares. Such recipients may receive, possess, use, retain and transfer Personal Data in electronic or other form, for the purposes of implementing, administering and managing your participation in the Plan. You understand that these recipients may be acting as Controllers, Processors or persons in charge of processing, as the case may be, according to applicable privacy laws, and that they may be located in or outside the European Economic Area, such as in the United States or elsewhere, in countries that do not provide an adequate level of data protection as intended under Italian privacy law.

Should the Company exercise its discretion in suspending all necessary legal obligations connected with the management and administration of the Plan, it will delete Personal Data as soon as it has accomplished all the necessary legal obligations connected with the management and administration of the Plan.

You understand that Personal Data processing related to the purposes specified above shall take place under automated or non-automated conditions, anonymously when possible, that comply with the purposes for which Personal Data is collected and with confidentiality and security provisions as set forth by applicable Italian data privacy laws and regulations, with specific reference to Legislative Decree no. 196/2003.

The processing activity, including communication, the transfer of Personal Data abroad, including outside of the European Economic Area, as specified herein and pursuant to applicable Italian data privacy laws and regulations, does not require your consent thereto as the processing is necessary to performance of law and contractual obligations related to implementation, administration and management of the Plan. You understand that, pursuant to section 7 of the Legislative Decree no. 196/2003, you have the right at any moment to, including, but not limited to, obtain confirmation that Personal Data exists or not, access, verify its contents, origin and accuracy, delete,

update, integrate, correct, block or stop, for legitimate reason, the Personal Data processing. To exercise privacy rights, you should contact the Employer. Furthermore, you are aware that Personal Data will not be used for direct marketing purposes. In addition, Personal Data provided can be reviewed and questions or complaints can be addressed by contacting your human resources department.

Plan Document Acknowledgment. By accepting the Restricted Stock Units, you acknowledge that you have received and reviewed a copy of the Plan, the Agreement and this Appendix A in their entirety and fully accept all provisions thereof. You further acknowledge that you have read and specifically and expressly approve the following provisions of the Agreement: Restricted Stock Unit Transferability; Vesting; Share Delivery; Vested Restricted Stock Units; Tax-Related Items; Forfeiture of Unvested Restricted Stock Units; Retention Rights; Shareholder Rights; Nature of Grant; Applicable Law and Venue; Language; Electronic Delivery and Acceptance; Severability; Imposition of Other Requirements and the Data Privacy section included in this Appendix A.

Notifications

Foreign Account / Assets Reporting Information. If you are an Italian resident and hold investments or financial assets outside of Italy (e.g., cash, Restricted Stock Units, shares of Stock) during any fiscal year which may generate income taxable in Italy (or if you are the beneficial owner of such an investment or asset even if you do not directly hold the investment or asset), you are required to report such investments or assets on your annual tax return for such fiscal year (on UNICO Form, RW Schedule, or on a special form if you are not required to file a tax return).

JAPAN

Notifications

Foreign Account / Assets Reporting Information. You are required to report details of any assets held outside of Japan as of December 31st (including shares of Stock acquired under the Plan), to the extent such assets have a total net fair market value exceeding ¥50 million. Such report will be due by March 15th each year. You should consult with your personal tax advisor as to whether the reporting obligation applies to you and whether you will be required to report details of your outstanding Restricted Stock Units, as well as shares of Stock, in the report.

KOREA

Notifications

Exchange Control Information. Exchange control laws require Korean residents who realize US$500,000 or more from the sale of shares of Stock (including shares of Stock acquired under the Plan) or the receipt of dividends to repatriate the proceeds to Korea within three years of the sale/receipt.

MEXICO

Terms and Conditions

Acknowledgement of the Agreement. By accepting the Restricted Stock Units, you acknowledge that you have received a copy of the Plan and the Agreement, including this Appendix A, which you have reviewed. You further acknowledge that you accept all the provisions of the Plan and the Agreement, including this Appendix A. You also acknowledge that you have read and specifically and expressly approve the terms and conditions set forth in the "Nature of Grant" section of the agreement, which clearly provide as follows:

(1) Your participation in the Plan does not constitute an acquired right;

(2) The Plan and your participation in the Plan are offered by the Company on a wholly discretionary basis;

(3) Your participation in the Plan is voluntary; and

(4) The Company and its Affiliates are not responsible for any decrease in the value of any shares of Stock acquired at vesting of the Restricted Stock Units.

Labor Law Acknowledgement and Policy Statement. By accepting the Restricted Stock Units, you acknowledge that Ciena Corporation, with registered offices at 7035 Ridge Road, Hanover, Maryland 21076, U.S.A., is solely responsible for the administration of the Plan. You further acknowledge that your participation in the Plan, the grant of Restricted Stock Units and any acquisition of shares of Stock under the Plan do not constitute a Service relationship between you and the Company because you are participating in the Plan on a wholly commercial basis and your sole employer is Ciena Communications Mexico S.A. de C.V. or Ciena Mexico S.A. de C.V. ("Ciena-Mexico"). Based on the foregoing, you expressly acknowledge that the Plan and the benefits that you may derive from participation in the Plan do not establish any rights between you and Ciena-Mexico, and do not form part of the employment conditions and/or benefits provided by Ciena-Mexico, and any modification of the Plan or its termination shall not constitute a change or impairment of the terms and conditions of the Service relationship between you and the Employer.

You further understand that your participation in the Plan is the result of a unilateral and discretionary decision of the Company, therefore, the Company reserves the absolute right to amend and/or discontinue your participation in the Plan at any time, without any liability to you.

Finally, you hereby declare that you do not reserve any action or right to bring any claim against the Company or any Affiliate for any compensation or damages regarding any provision of the Plan or the benefits derived under the Plan, and that you therefore grant a full and broad release to the Company, its Affiliates, branches, representation offices, shareholders, officers, agents and legal representatives, with respect to any claim that may arise.

Spanish Translation

Términos y Condiciones.

Reconocimiento del Contrato. Al aceptar las Acciones usted reconoce que ha recibido una copia del Plan y del Contrato, incluyendo el presente Anexo A, el cuál ha sido revisado por usted. Asimismo usted acepta todas y cada una de las condiciones del Plan y del Contrato, así como del presente Anexo A. Usted también acepta que ha leído y aprobado en todos y cada uno de sus términos lo establecido en el apartado de "Naturaleza del Otorgamiento" del Contrato, el cuál claramente establece que:

(1) Su participación en el Plan no constituye un derecho adquirido;

(2) El Plan y su participación en el mismo son ofrecidos por la Empresa sobre una base enteramente discrecional;

(3) Su participación en el Plan es voluntaria; y

(4) La Empresa y sus Afiliadas no son responsables por cualquier descenso en el valor de las Acciones adquiridas al momento de maduración de dichas Acciones.

Reconocimiento de la Ley Laboral y Condiciones de la Política. Al aceptar las Acciones, usted reconoce que Ciena Corporation, con oficinas registradas en 7035 Ridge Road, Hanover, Maryland 21076, E.E.U.U., es la única responsable de la administración del Plan. Asimismo usted reconoce que su participación en el Plan, el otorgamiento de Acciones y cualquier adquisición de Capital bajo el Plan no constituye una relación de Servicios entre usted y la Empresa, ya que usted está participando en el Plan sobre una base netamente comercial, y su único y exclusivo patrón lo es Ciena Communications México, S.A. de C.V. ó Ciena México, S.A. de C.V. ("Ciena-México").

En relación con lo anterior, usted expresamente reconoce que el Plan y los beneficios que deriven de su participación

en el mismo no establecen o constituyen ningún derecho entre usted y Ciena-México, y tampoco forman parte de sus condiciones de trabajo y/o beneficios o prestaciones otorgadas por Ciena-México, y cualquier modificación al Plan o la terminación del mismo no generarán cambios o impedimentos a los términos y condiciones de la relación de Servicios entre usted y su Patrón.

Asimismo usted acepta que su participación en el Plan es el resultado de una decisión unilateral y discrecional de la Empresa, por lo tanto la Empresa se reserva el derecho para modificar y/o descontinuar su participación en el Plan en cualquier momento, y sin que lo anterior le ocasione un perjuicio a usted.

Finalmente, usted declara y acepta que no se reserva acción o derecho alguno que ejercitar con posterioridad en contra de la Empresa o cualquier Afiliada por alguna compensación o daños y perjuicios relacionado con alguna cláusula del Plan o de los beneficios derivados del mismo, por lo que en este acto usted otorga el más amplio finiquito que en derecho proceda en favor de la Empresa, sus Afiliadas, sucursales, oficinas de representación, accionistas, agentes y representantes legales, en relación con cualquier posible contingencia que pudiera derivarse del presente.

NETHERLANDS

There are no country-specific provisions.

POLAND

Notifications

Exchange Control Information. Polish residents are obligated to transfer funds via bank accounts if the transferred amount in a particular transaction exceeds PLN 15,000. Polish residents are required to store the documents connected with foreign exchange transactions for a period of five years, as measured from the end of the year in which such transaction occurred.

Polish residents holding foreign securities (including shares of Stock) and/or maintaining accounts abroad must report information to the National Bank of Poland. Polish residents holding foreign securities will be required to file quarterly reports with information on transactions and balances regarding foreign securities if the value (calculated individually or together with other assets/liabilities possessed abroad) exceeds PLN 7 million. The reports must be filed on special forms available on the website of the National Bank of Poland. You are responsible for complying with all applicable exchange control regulations.

SAUDI ARABIA

Notifications

Securities Law Information. This Appendix A, the Agreement and any other Plan materials related to the grant of Restricted Stock Units under the Plan, may not be distributed in the Kingdom except to such persons as are permitted under the Offers of Securities Regulations issued by the Capital Market Authority.
The Capital Market Authority does not make any representation as to the accuracy or completeness of the Agreement including this Appendix A, the Plan or any other document relating to the offer of Restricted Stock Units under the Plan, and expressly disclaims any liability whatsoever for any loss arising from, or incurred in reliance upon, any part of the Agreement including this Appendix A, the Plan or any other document relating to the offer of Restricted Stock Units under the Plan. You are hereby advised to conduct your own due diligence on the accuracy of the information relating to the securities. If you do not understand the contents of the Agreement including this Appendix A or any other document relating to the offer of Restricted Stock Units under the Plan, you should consult an authorized financial advisor.

SINGAPORE

Terms and Conditions

Restrictions on Sale and Transferability. You hereby agree that any shares of Stock acquired pursuant to the Restricted Stock Units will not be offered for sale in Singapore prior to the six-month anniversary of the Grant Date, unless such sale or offer is made pursuant to the exemption under Part XIII Division I Subdivision (4) (other than section 280) of the Securities and Futures Act (Chap. 289, 2006 Ed.) ("SFA").

Notifications

Securities Law Information. The grant of the Restricted Stock Units is being made pursuant to the "Qualifying Person" exemption" under section 273(1)(f) of the SFA on which basis it is exempt from the prospectus and registration requirements under the SFA and the grant of the Restricted Stock Units is not made to you with a view to the shares of Stock being subsequently offered for sale to any other party. The Plan has not been lodged or registered as a prospectus with the Monetary Authority of Singapore.

Chief Executive Officer and Director Notification Requirement. The Chief Executive Officer ("CEO"), directors, associate directors or shadow directors of a Singapore Affiliate are subject to certain notification requirements under the Singapore Companies Act. Specifically, such directors must notify the Singapore Affiliate in writing of an interest (e.g., Restricted Stock Units, shares of Stock, etc.) in the Company or any related company within two business days of (i) its acquisition or disposal, (ii) any change in a previously-disclosed interest (e.g., upon vesting of Restricted Stock Units or when shares of Stock acquired under the Plan are subsequently sold), or (iii) becoming the CEO or a director

SPAIN

Terms and Conditions

Acknowledgment of Nature of Grant. The following provision supplements the Nature of Grant section of the Agreement:

In accepting the Restricted Stock Units, you consent to participate in the Plan and acknowledge that you have received a copy of the Plan, the Agreement and this Appendix A.

You understand that the Company has unilaterally, gratuitously and in its sole discretion decided to grant Restricted Stock Units under the Plan to individuals who may be Service Providers of the Company or any Affiliate throughout the world. The decision is a limited decision that is entered into upon the express assumption and condition that any grant will not economically or otherwise bind the Company or any Affiliate. Consequently, you understand that the Restricted Stock Units are granted on the assumption and condition that the Restricted Stock Units and any shares of Stock issued upon vesting of the Restricted Stock Units are not part of any employment contract (either with the Company or any Affiliate) and shall not be considered a mandatory benefit, salary for any purposes (including severance compensation) or any other right whatsoever. Further, you understand that the Restricted Stock Units would not be granted to you but for the assumptions and conditions referred to herein; thus, you acknowledge and freely accept that should any or all of the assumptions be mistaken or should any of the conditions not be met for any reason, then the grant of the Restricted Stock Units and any right to the Restricted Stock Units shall be null and void.

You understand and agree that, as a condition of the grant of the Restricted Stock Units, the termination of your status as a Service Provider for any reason (including the reasons below) will automatically result in the loss of the Restricted Stock Units to the extent the Restricted Stock Units have not vested as of the date you are no longer actively providing Service to the Company or the Employer. In particular, you understand and agree that any unvested Restricted Stock Units as of the date you are no longer actively providing Service will be forfeited without entitlement to the underlying shares of Stock or to any amount of indemnification in the event of a termination of your status as a Service Provider

by reason of, but not limited to, resignation, retirement, disciplinary dismissal adjudged to be with cause, disciplinary dismissal adjudged or recognized to be without cause (i.e., subject to a "*despido improcedente*"), individual or collective dismissal adjudged or recognized to be without cause, individual or collective dismissal on objective grounds, whether adjudged or recognized to be with or without cause, material modification of the terms of employment under Article 41 of the Workers' Statute, relocation under Article 40 of the Workers' Statute, Article 50 of the Workers' Statute, unilateral withdrawal by the Employer and under Article 10.3 of the Royal Decree 1382/1985. You acknowledge that you have read and specifically accept the conditions referred to in the following provisions of the Agreement: Vesting, Share Delivery; Vested Restricted Stock Units, Tax-Related Items and Nature of Grant.

Notifications

Exchange Control Information. To participate in the Plan, you agree to comply with exchange control regulations in Spain. The acquisition of shares of Stock under the Plan must be declared for statistical purposes to the Dirección General de Comercio e Inversiones (the "DGCI"). Because you will not acquire the shares of Stock through the use of a Spanish financial institution, you agree to make the declaration by filing a D-6 form with the DGCI. Generally, the D-6 form must be filed each January while the shares of Stock are owned. In addition, the sale of shares of Stock must also be declared on D-6 form filed with the DGCI in January, unless the sale proceeds exceed the applicable threshold (currently €1,502,530), in which case, the filing is due within one month after the sale.

In addition, you may be required to electronically declare to the Bank of Spain any foreign accounts (including brokerage accounts held abroad), any foreign instruments (including shares of Stock acquired under the Plan), and any transactions with non-Spanish residents (including any payments of shares of Stock made pursuant to the Plan), depending on the balances in such accounts together with the value of such instruments as of December 31 of the relevant year, or the volume of transactions with non-Spanish residents during the relevant year.

Foreign Account / Assets Reporting Information. To the extent that you hold rights or assets (e.g., cash or shares of Stock held in a bank or brokerage account) outside of Spain with a value in excess of €50,000 per type of right or asset (e.g., shares of Stock, cash, etc.) as of December 31 each year, you are required to report information on such rights and assets on your tax return for such year. After such rights or assets are initially reported, the reporting obligation will only apply for subsequent years if the value of any previously-reported rights or assets increases by more than €20,000 or if you transfer or dispose of any previously-reported rights or assets. The reporting must be completed by March 31. Failure to comply with this reporting requirement may result in penalties. Accordingly, you are advised to consult with your personal tax and legal advisors to ensure that you are properly complying with your reporting obligations.

SWEDEN

There are no country-specific provisions.

SWITZERLAND

Notifications

Securities Law Information. The offering of the Plan is considered a private offering in Switzerland and is, therefore, not subject to registration in Switzerland. Neither this document nor any other materials relating to the Plan (i) constitutes a prospectus as such term is understood pursuant to article 652a of the Swiss Code of Obligations, (ii) may be publicly distributed nor otherwise made publicly available in Switzerland, or (iii) have been or will be filed with, approved or supervised by any Swiss regulatory authority, including the Swiss Financial Market Supervisory Authority (FINMA).

UNITED ARAB EMIRATES

Notifications

Securities Law Information. The Restricted Stock Units are only being offered to employees and are in the nature of providing equity incentives to employees of the Company's Affiliates in the United Arab Emirates. Any documents related to the Restricted Stock Units, including the Plan, the Agreement and other grant documents ("Restricted Stock Unit Documents"), are intended for distribution only to such employees and must not be delivered to, or relied on by, any other person. Neither the Ministry of Economy nor the Dubai Department of Economic Development have approved the Plan or the Agreement nor taken steps to verify the information set out therein, and have no responsibility for such documents. You, as a prospective stockholder, should conduct your own due diligence on the securities. If you do not understand the contents of the Restricted Stock Unit Documents, you should consult an authorized financial advisor.

UNITED KINGDOM

Terms and Conditions

Taxes. This section supplements the Share Delivery; Vested Restricted Stock Units, Tax-Related Items section of the Agreement:

Without limitation to the provisions contained in the Share Delivery; Vested Restricted Stock Units, Tax-Related Items section of the Agreement, you agree that you are liable for all Tax-Related Items and hereby covenant to pay all such Tax-Related Items as and when requested by the Company or the Employer or by Her Majesty's Revenue and Customs ("HMRC") (or any other tax authority or any other relevant authority). You also agree to indemnify and keep indemnified the Company and the Employer against any Tax-Related Items that they are required to pay or withhold on your behalf or have paid or will pay to HMRC (or any other tax authority or any other relevant authority).

Joint Election. As a condition of your participation in the Plan and of the vesting of the Restricted Stock Units, you agree to accept any liability for secondary Class 1 National Insurance Contributions which may be payable by the Company and/or the Employer with respect to the vesting of the Restricted Stock Units or otherwise payable in connection with the shares of Stock and the right to acquire shares of Stock ("Employer NICs").

Without limitation to the foregoing, you agree to execute a joint election with the Company or the Employer, the form of such joint election being formally approved by HMRC (the "Joint Election"), and any other required consents or elections as provided to you by the Company or the Employer. You further agree to execute such other joint elections as may be required between you and any successor to the Company or the Employer.

If you do not enter into a Joint Election, or if the Joint Election is revoked at any time by HMRC, the Restricted Stock Units shall cease vesting and become null and void, and no shares of Stock shall be acquired under the Plan, without any liability to the Company, the Employer and/or any Affiliate.

You further agree that the Company and/or the Employer may collect the Employer NICs by any of the means set forth in the Share Delivery; Vested Restricted Stock Units, Tax-Related Items section of the Agreement, as supplemented above.

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

RESTRICTED STOCK UNIT AGREEMENT

Ciena Corporation, a Delaware corporation, (the "Company"), hereby grants restricted stock units ("Restricted Stock Units") relating to shares of its common stock, $0.01 par value (the "Stock"), to the individual named below as the Grantee, subject to the vesting and other terms and conditions set forth on this Restricted Stock Unit Agreement, including the attached terms and conditions (together, the "Agreement"). This grant is subject to the terms and conditions set forth in (i) this Agreement, (ii) the Ciena Corporation 2017 Omnibus Incentive Plan (as it may be amended from time to time, the "Plan"), and (iii) the grant details for this award contained in your account with the Company's selected broker. Capitalized terms not defined in this Agreement are defined in the Plan and have the meaning set forth in the Plan.

Grant Date: _____

Grant Number: _____

Name of Grantee: _____

Grantee's Employee Identification Number: _____

Number of Restricted Stock Units Covered by Grant: _____

Vesting Schedule: _____

This Grant will vest in full on [the first anniversary of the date of grant][March 20, 2018], subject your continued service on behalf of the Company.

By accepting this grant (whether by signing this Agreement or accepting the grant electronically via the website of the Company's selected broker), you agree to the terms and conditions in this Agreement and in the Plan and agree that the Plan will control in the event any provision of this Agreement should appear to be inconsistent unless otherwise stated herein.

Grantee: _____
(Signature)

Ciena Corporation: _____
Name: David M. Rothenstein
Title: Senior Vice President, General Counsel and Secretary

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

RESTRICTED STOCK UNIT AGREEMENT
TERMS AND CONDITIONS

Restricted Stock Unit Transferability	This grant is an award of Restricted Stock Units in the number of Restricted Stock Units set forth on the first page of this Agreement, subject to the vesting conditions described in this Agreement. Your Restricted Stock Units may not be transferred, assigned, pledged, or hypothecated, whether by operation of Applicable Law or otherwise, nor may the Restricted Stock Units be made subject to execution, attachment, or similar process.
Vesting	Your Restricted Stock Units will vest as indicated on the first page of this Agreement, provided you remain in Service on each applicable vesting date and meet any applicable vesting requirements set forth in this Agreement. Any resulting fractional shares shall be rounded up to the nearest whole share; provided, that you may not vest in more than the number of Restricted Stock Units set forth on the cover sheet of this Agreement. Except as provided in this Agreement, or in any other agreement between you and the Company, no additional Restricted Stock Units will vest after your Service has terminated.
Share Delivery Pursuant to Vested Restricted Stock Units; Withholding Tax	Shares of Stock underlying the vested portion of the Restricted Stock Units will be delivered to you by the Company as soon as practicable following the applicable vesting date for those shares, but in no event beyond 2½ months after the end of the calendar year in which the shares would have been otherwise delivered. On the vesting date (or as soon as practicable thereafter), a brokerage account in your name will be credited with shares of Stock representing the number of shares that vested under this grant (the "Vested Shares") net of any Tax-Related Items (as defined below), as applicable. If the vesting date is not a trading day, the Vested Shares will be delivered on the next trading day. The Company will determine the number of the Vested Shares necessary to cover the amount of federal, state, local, and foreign taxes that the Company is required to withhold with respect to the Restricted Stock Unit vesting, rounding up to the nearest whole Share of Stock (the "Withholding Shares").

Regardless of any action the Company or the Affiliate to whom you provide Services (the "Employer") takes with respect to any or all income tax, social insurance, payroll tax, payment on account or other tax-related items related to the Restricted Stock Units and/or your participation in the Plan and legally applicable to you ("Tax-Related Items"), you acknowledge that the ultimate liability for all Tax-Related Items is and remains your responsibility and may exceed the amount actually withheld by the Company or the Employer, if any. You further acknowledge that the Company and/or the Employer (1) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting, or settlement of the Restricted Stock Units, the issuance of shares of Stock upon settlement of the Restricted Stock Units, the subsequent sale of shares of Stock acquired pursuant to such issuance and the receipt of any dividends and/or any dividend equivalents; and (2) do not commit to and are under no obligation to structure the terms of the award or any aspect of the Restricted Stock Units to reduce or eliminate your liability for Tax-Related Items or achieve any particular tax result. Further, if you have become subject to tax in more than one jurisdiction, you acknowledge that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

By accepting this award, you authorize the Company and/or the Employer, or their respective agents, at their discretion, to satisfy any applicable withholding obligations with regard to all Tax-Related Items by one or a combination of the following: (a) withholding from your wages or other cash compensation paid to you by the Company and/or the Employer; (b) withholding from proceeds of the sale of Vested Shares either through a voluntary sale or through a mandatory sale arranged by the Company (on your behalf pursuant to this authorization without further consent) (an "Automatic Sale"); or (c) withholding shares of Stock to be issued upon vesting of the Restricted Stock Units, provided, however, that if you are a Section 16 officer of the Company under the Act, as amended, then the Company will withhold in shares of Stock under this subsection (c) upon the relevant taxable or tax withholding event, as applicable, unless the use of such withholding method is problematic under applicable tax or securities law or has material adverse accounting consequences, in which case, the obligation for Tax-Related Items may be satisfied by one or a combination of methods (a) and (b) above; or (d) any other method of withholding determined by the Company and permitted by applicable law.

You further acknowledge that, in the event of an Automatic Sale, this irrevocable written instruction is intended to constitute an instruction pursuant to Rule 10b5-1 of the Exchange Act with the Automatic Sale intended to comply with these requirements. As such, all provisions hereof shall be interpreted consistent with Rule 10b5-1 and shall be automatically modified to the extent necessary to comply therewith. The Company shall be responsible for the payment of any brokerage commissions relating to any Automatic Sale.

	Depending on the withholding method, the Company may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding rates or other applicable withholding rates, including maximum applicable rates in your jurisdiction(s) to the extent permitted by the Plan, in which case you may receive a refund of any over-withheld amount in cash and will have no entitlement to the equivalent in Stock. If the obligation for Tax-Related Items is satisfied by withholding in shares of Stock, for tax purposes, you are deemed to have been issued the full number of shares of Stock subject to the Vested Shares, notwithstanding that a number of the shares of Stock are held back solely for the purpose of paying the Tax-Related Items due as a result of any aspect of your participation in the Plan. The Company may refuse to issue or deliver the shares of Stock or the proceeds of the sale of shares of Stock, if you fail to comply with your obligations in connection with the Tax-Related Items.
Forfeiture of Unvested Restricted Stock Units	Except as specifically provided in this Agreement or as may be provided in other agreements between you and the Company, no additional Restricted Stock Units will vest after your Service has terminated for any reason, and you will forfeit to the Company all of the Restricted Stock Units that have not yet vested or with respect to which all applicable restrictions and conditions have not lapsed upon such termination of your Service.
Deferral of Compensation	Delivery of shares underlying any award of Restricted Stock Units and treatment hereunder shall be subject to any deferral election validly made by eligible participants under the Ciena Corporation Deferred Compensation Plan or any successor plan.
Death	If your Service terminates because of your death, the unvested Restricted Stock Units granted under this Agreement shall accelerate and become immediately vested in full upon the date of your death.
Disability	If your Service terminates because of your Disability, the unvested Restricted Stock Units granted under this Agreement shall accelerate and become immediately vested in full upon your termination on account of Disability.
Retirement	If your Service terminates because of your retirement (in accordance with such guidelines as approved by the Board), on or after the first anniversary of the Grant Date, the unvested Restricted Stock Units granted under this Agreement shall accelerate and become immediately vested in full upon the date of your retirement.
Corporate Transaction	Upon or in connection with a Corporate Transaction, your unvested Restricted Stock Units shall accelerate and become immediately vested in full upon the effective date of the Corporate Transaction.

Termination For Cause	If your Service is terminated for Cause, then you shall immediately forfeit all rights to your Restricted Stock Units, and this award shall immediately terminate.
Leaves of Absence	For purposes of this grant, your Service does not terminate when you go on a *bona fide* leave of absence approved by the Company, if the terms of your leave provide for continued Service crediting, or when continued Service crediting is required by Applicable Law. The Company will determine, in its sole discretion, whether and when a leave of absence constitutes a termination of Service under the Plan.
Retention Rights	Neither your Restricted Stock Units nor this Agreement give you the right to be retained by the Company or any Affiliate in any capacity, and your Service may be terminated at any time and for any reason.
Shareholder Rights	You have no rights as a shareholder unless and until the shares of Stock relating to the Restricted Stock Units have been issued to you (or an appropriate book entry has been made). Except as described in the Plan or herein, no adjustments are made for dividends or other rights if the applicable record date occurs before your shares of Stock are issued (or an appropriate book entry has been made). If the Company pays a dividend on its shares of Stock, you will, however, be entitled to receive a cash payment equal to the per-share dividend paid on the shares of Stock times the number of Restricted Stock Units that you hold as of the record date for the dividend; provided, however, such Dividend Equivalents Rights shall not vest or become payable unless and until the Restricted Stock Units to which the Dividend Equivalent Rights correspond become vested and nonforfeitable pursuant to this Agreement or the Plan.
Applicable Law	The Restricted Stock Units and the provisions of this Agreement are governed by, and subject to, the laws of the State of Delaware, without regard to the conflict of law provisions. For purposes of litigating any dispute that arises under this award or the Agreement, the parties hereby submit to and consent to the jurisdiction of the State of Delaware, and agree that such litigation shall be conducted in the state courts of Delaware, or the federal courts for the District of Delaware, and no other courts, where this grant is made and/or to be performed. ***You agree to waive your rights to a jury trial for any claim or cause of action based upon or arising out of this Agreement or the Plan.***

Data Privacy	In order to administer the Plan, the Company may process personal data about you. Such data includes the information provided in this Agreement, other appropriate personal and financial data about you, such as home address, email address and business addresses and other contact information, payroll information, social security or social insurance number, passport number or other identification number, and any other information deemed appropriate by the Company to facilitate the administration of the Plan. By accepting this Restricted Stock Unit award, you consent to the Company's processing of such personal data and the transfer of such data outside the country in which you work or are employed, including, with respect to non-U.S. residents, to the United States, to transferees who shall include the Company and other persons designated by the Company to administer the Plan.
Consent to Electronic Delivery	Certain statutory materials relating to the Plan have been delivered to you in electronic form. By accepting this grant, you consent to electronic delivery and acknowledge receipt of these materials, including the Plan and Plan prospectus.
Non-U.S. Residents	If you are a non-U.S. resident, additional terms and conditions with respect to your award may apply as set forth on the Stock Administration page of the MyCiena intranet.

This Agreement is not a stock certificate or a negotiable instrument.

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

PERFORMANCE STOCK UNIT AGREEMENT

Ciena Corporation, a Delaware corporation, (the "Company"), hereby grants performance stock units relating to shares of its common stock, $0.01 par value (the "Stock"), to the individual named below as the Grantee, subject to the performance and vesting and other terms and conditions set forth in this Performance Stock Unit Agreement, including the attached terms and conditions and any appendix attached hereto (together, the "Agreement"). This grant is subject to the terms and conditions set forth in (i) this Agreement, (ii) the Ciena Corporation 2017 Omnibus Incentive Plan (the "Plan") and (iii) the grant details for this award contained in your account with the Company's selected broker. Capitalized terms not defined in this Agreement are defined in the Plan, and have the meaning set forth in the Plan.

Grant Date: _____

Grant Number: _____

Name of Grantee: _____

Grantee's Employee Identification Number: _____

Number of Performance Stock Units Covered by Grant: _____

By accepting this grant (whether by signing this Agreement or accepting the grant electronically via the website of the Company's selected broker), you agree to the terms and conditions in this Agreement and in the Plan and agree that the Plan will control in the event any provision of this Agreement should appear to be inconsistent unless otherwise stated herein.

Grantee: _____
(Signature)

Ciena Corporation: _____
Name: David M. Rothenstein
Title: Senior Vice President, General Counsel and Secretary

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

PERFORMANCE STOCK UNIT AGREEMENT
TERMS AND CONDITIONS

Performance Stock Unit Transferability

This grant is an award of performance stock units in the number of units set forth on the first page of this Agreement (or, in the case of electronic delivery, as set forth in the grant details for this Award set forth in the Company's selected broker's website), subject to the performance and vesting conditions described in this Agreement ("Restricted Stock Units"). Your Restricted Stock Units may not be transferred, assigned, pledged or hypothecated, whether by operation of Applicable Law or otherwise, nor may the Restricted Stock Units be made subject to execution, attachment or similar process.

Performance Earning

All or a portion of your Restricted Stock Units may be earned during the Company's fiscal year 2017 (the "Performance Period") based on the Company's achievement of the performance goals set forth in Appendix A to this Agreement.

The number of Restricted Stock Units issuable under this award may be increased by up to 100% of the grant amount if and to the extent that the goals in Appendix A are exceeded in accordance with the embedded tables set forth therein.

The Compensation Committee of the Board of Directors will determine, in its sole and absolute discretion, whether (and to what extent) the performance goals have been met and, based on that determination, the number of Restricted Stock Units that have been earned during the Performance Period.

Any portion of your Restricted Stock Units that is not earned by the end of the Performance Period will be forfeited.

Vesting

If Restricted Stock Units are earned during the Performance Period, the aggregate number of such earned Restricted Stock Units shall vest in three equal installments (each approximately one-third of the aggregate earned Restricted Stock Units) on December 20, 2017, December 20, 2018 and December 20, 2019 (each a "Vesting Date"), provided you remain in Service through the Vesting Date. Any resulting fractional shares shall be rounded up to the nearest whole share; provided, that you may not vest in more than the number of Performance Stock Units set forth on the cover sheet of this Agreement. Any earned but unvested Restricted Stock Units will be forfeited in their entirety in the event that you cease to be employed by the Company for any reason prior to a Vesting Date.

Share Delivery Pursuant to Vested Restricted Stock Units; Tax-Related Items

Shares of Stock underlying the vested portion of the Restricted Stock Units will be delivered to you by the Company as soon as practicable following the applicable vesting date for those shares of Stock, but in no event beyond 2½ months after the end of the calendar year in which the shares would have been otherwise delivered. On the vesting date (or as soon as practicable thereafter), a brokerage account in your name will be credited with shares of Stock representing the number of shares that vested under this grant (the "Vested Shares") net of any Tax-Related Items (as defined below), as applicable. If the vesting date is not a trading day, Vested Shares will be delivered on the next trading day (or as soon as practicable thereafter).

Regardless of any action the Company or the Affiliate to whom you provide Services (the "Employer") takes with respect to any or all income tax, social insurance, payroll tax, payment on account or other tax-related items related to the Restricted Stock Units and/or your participation in the Plan and legally applicable to you ("Tax-Related Items"), you acknowledge that the ultimate liability for all Tax-Related Items is and remains your responsibility and may exceed the amount actually withheld by the Company or the Employer, if any. You further acknowledge that the Company and/or the Employer (1) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting, or settlement of the Restricted Stock Units, the issuance of shares of Stock upon settlement of the Restricted Stock Units, the subsequent sale of shares of Stock acquired pursuant to such issuance and the receipt of any dividends and/or any dividend equivalents; and (2) do not commit to and are under no obligation to structure the terms of the award or any aspect of the Restricted Stock Units to reduce or eliminate your liability for Tax-Related Items or achieve any particular tax result. Further, if you have become subject to tax in more than one jurisdiction, you acknowledge that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

By accepting this award, you authorize the Company and/or the Employer, or their respective agents, at their discretion, to satisfy any applicable withholding obligations with regard to all Tax-Related Items by one or a combination of the following: (a) withholding from your wages or other cash compensation paid to you by the Company and/or the Employer; (b) withholding from proceeds of the sale of Vested Shares either through a voluntary sale or through a mandatory sale arranged by the Company (on your behalf pursuant to this authorization without further consent) (an "Automatic Sale"); or (c) withholding shares of Stock to be issued upon vesting of the Restricted Stock Units, provided, however, that if you are a Section 16 officer of the Company under the Act, as amended, then the Company will withhold in shares of Stock under this subsection (c) upon the relevant taxable or tax withholding event, as applicable, unless the use of such withholding method is problematic under applicable tax or securities law or has material adverse accounting consequences, in which case, the obligation for Tax-Related

	Items may be satisfied by one or a combination of methods (a) and (b) above; or (d) any other method of withholding determined by the Company and permitted by applicable law. You further acknowledge that, in the event of an Automatic Sale, this irrevocable written instruction is intended to constitute an instruction pursuant to Rule 10b5-1 of the Exchange Act with the Automatic Sale intended to comply with these requirements. As such, all provisions hereof shall be interpreted consistent with Rule 10b5-1 and shall be automatically modified to the extent necessary to comply therewith. The Company shall be responsible for the payment of any brokerage commissions relating to any Automatic Sale. Depending on the withholding method, the Company may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding rates or other applicable withholding rates, including maximum applicable rates in your jurisdiction(s) to the extent permitted by the Plan, in which case you may receive a refund of any over-withheld amount in cash and will have no entitlement to the equivalent in Stock. If the obligation for Tax-Related Items is satisfied by withholding in shares of Stock, for tax purposes, you are deemed to have been issued the full number of shares of Stock subject to the Vested Shares, notwithstanding that a number of the shares of Stock are held back solely for the purpose of paying the Tax-Related Items due as a result of any aspect of your participation in the Plan. The Company may refuse to issue or deliver the shares of Stock or the proceeds of the sale of shares of Stock, if you fail to comply with your obligations in connection with the Tax-Related Items.
Forfeiture of Unvested Restricted Stock Units	Except as specifically provided in this Agreement or as may be provided in other agreements between you and the Company, no additional Restricted Stock Units will vest after your Service has terminated for any reason and you will forfeit to the Company all of the Restricted Stock Units that have not yet vested or with respect to which all applicable restrictions and conditions have not lapsed upon such termination of your Service.
Deferral of Compensation	Delivery of shares underlying any award of Restricted Stock Units and treatment hereunder shall be subject to any deferral election validly made by eligible participants under the Ciena Corporation Deferred Compensation Plan or any successor plan
Death	If your Service terminates because of your death, the Restricted Stock Units earned, but not yet vested, under this Agreement will automatically vest as to the number of Restricted Stock Units earned prior to the date of death.
Disability	If your Service terminates because of your Disability, the Restricted Stock Units earned, but not yet vested under this Agreement will automatically vest as to the number of Restricted Stock Units earned prior to the date of Disability.

Termination For Cause

If your Service is terminated for Cause, then you shall immediately forfeit all rights to your Restricted Stock Units, whether or not previously earned, and this award shall immediately terminate.

Leaves of Absence

For purposes of this grant, your Service does not terminate when you go on a *bona fide* leave of absence approved by the Company, if the terms of your leave provide for continued Service crediting, or when continued Service crediting is required by Applicable Law. The Company will determine, in its sole discretion, whether and when a leave of absence constitutes a termination of Service under the Plan.

Retention Rights

Neither your Restricted Stock Units nor this Agreement give you the right to be retained by the Company, the Employer or any Affiliate in any capacity and your Service may be terminated at any time and for any reason.

Shareholder Rights

You have no rights as a shareholder unless and until the shares of Stock relating to the Restricted Stock Units have been issued to you (or an appropriate book entry has been made). Except as described in the Plan or herein, no adjustments are made for dividends or other rights if the applicable record date occurs before your shares of Stock are issued (or an appropriate book entry has been made).

If the Company pays a dividend on its Stock, you will, however, be entitled to receive a cash payment equal to the per-share dividend paid on the Stock times the number of vested Restricted Stock Units that you hold as of the record date for the dividend; provided, however, such Dividend Equivalents Rights shall not vest or become payable unless and until the Restricted Stock Units to which the Dividend Equivalent Rights correspond become vested and nonforfeitable pursuant to this Agreement or the Plan.

Nature of Grant

In accepting the award and the Restricted Stock Units, you acknowledge, understand and agree that:

(1) the Plan is established voluntarily by the Company, it is discretionary in nature and it may be modified, amended, suspended or terminated by the Company at any time;

(2) the grant of the Restricted Stock Units is voluntary and occasional and does not create any contractual or other right to receive future grants of Restricted Stock Units, or benefits in lieu of Restricted Stock Units, even if Restricted Stock Units have been granted in the past;

(3) all decisions with respect to future Restricted Stock Unit grants, if any, will be at the sole discretion of the Company;

(4) your participation in the Plan is voluntary;

(5) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not intended to replace any pension rights;

(6) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end of Service payments, bonuses, holiday pay, long-service awards, pension or retirement or welfare benefits or similar payments;

(7) the Restricted Stock Unit grant and your participation in the Plan will not be interpreted to form or amend a Service contract or relationship with the Company, the Employer or any Affiliate;

(8) the future value of the underlying shares of Stock is unknown and cannot be predicted with certainty;

(9) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from termination of your Service relationship with the Company or the Employer (for any reason whatsoever and whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), and in consideration of the grant of the Restricted Stock Units, you irrevocably agree never to institute any claim against the Company, the Employer or any Affiliate, waive your ability, if any, to bring any such claim, and release the Company, the Employer and any Affiliate from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by accepting this award of Restricted Stock Units, you shall be deemed irrevocably to have agreed not to pursue such claim and agree to execute any and all documents necessary to request dismissal or withdrawal of such claims;

(10) in the event of termination of your Service relationship (whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), your right to vest in the Restricted Stock Units under the Plan, if any, will terminate effective as of the date that you are no longer actively providing Services to the Company, the Employer or any Affiliate as a Service Provider and will not be extended by any notice period mandated under local law (*e.g.*, active Service as a Service Provider would not include a period of “garden leave” or similar period); the Committee shall have the exclusive discretion to determine when you are no longer actively providing Services for purposes of your Restricted Stock Units grant;

(11) the Restricted Stock Units and the benefits evidenced by this Agreement do not create any entitlement, not otherwise specifically provided for in the Plan or by the Company in its discretion, to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company, nor to be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Stock (including a Corporate Transaction);

12) unless otherwise agreed with the Company, the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of same, are not granted as consideration for, or in connection with, the service you may provide as a director of an Affiliate of the Company; and

(13) the following provisions apply only if you are providing Services outside the United States:

(A) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation or salary for any purpose and in no event should be considered as compensation for, or relating in any way to, past Services for the Company, the Employer or any Affiliate; and

(B) you acknowledge and agree that neither the Company, the Employer nor any Affiliate shall be liable for any foreign exchange rate fluctuation between the Employer's local currency and the United States dollar that may affect the value of any proceeds from the sale of shares of Stock acquired under the Plan.

Forfeiture: Recoupment

This Award shall be subject to mandatory repayment by the Grantee to the Company (i) to the extent set forth in the Plan or this Award Agreement or (ii) to the extent the Grantee is, or in the future becomes, subject to (A) any Company or Affiliate "clawback" or recoupment policy that is adopted by the Company, including to comply with the requirements of Applicable Law, or (B) any Applicable Law that imposes mandatory recoupment, under circumstances set forth in such Applicable Law.

Data Privacy

You hereby explicitly and unambiguously consent to the collection, use and transfer, in electronic or other form, of your personal data as described in this Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Employer, the Company and its Affiliates for the exclusive purpose of implementing, administering and managing your participation in the Plan.

You understand that the Company and the Employer may hold certain personal information about you, including, but not limited to, your name, home address, email address and telephone number, date of birth, social security or social insurance number, passport number or other identification number, salary, nationality, job title, any shares of Stock or directorships held in the Company, details of all Restricted Stock Units or any other entitlement to shares of Stock awarded, canceled, exercised, vested, unvested or outstanding in your favor, for the exclusive purpose of implementing, administering and managing the Plan ("Data").

You understand that Data will be transferred to E*Trade Financial Services, Inc., or such other stock plan service provider as may be selected by the Company in the future, which is assisting the Company with the implementation, administration and management of the Plan.

You understand that the recipients of the Data may be located in the United States or elsewhere, and that the recipients' country (e.g., the United States) may have different data privacy laws and protections than your country.

You understand that you may request a list with the names and addresses of any potential recipients of the Data by contacting your local human resources representative.

You authorize the Company, E*Trade Financial Services, Inc. and any other possible recipients which may assist the Company (presently or in the future) with implementing, administering and managing the Plan to receive, possess, use, retain and transfer the Data, in electronic or other form, for the sole purpose of implementing, administering and managing your participation in the Plan.

You understand that Data will be held only as long as is necessary to implement, administer and manage your participation in the Plan.

You understand that you may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data or refuse or withdraw the consents herein, in any case without cost, by contacting in writing your local human resources representative or the Company's stock administration department. Further, you understand that you are providing the consents herein on a purely voluntary basis.

If you do not consent, or if you later revoke your consent, your employment status or Service with the Employer will not be affected; the only consequence of refusing or withdrawing your consent is that the Company would not be able to grant Restricted Stock Units or other equity awards to you or administer or maintain such awards.

Therefore, you understand that refusing or withdrawing your consent may affect your ability to participate in the Plan.

For more information on the consequences of your refusal to consent or withdrawal of consent, you understand that you may contact your local human resources representative or the Company's stock administration department.

Finally, upon request of the Company or the Employer, you agree to provide an executed data privacy consent form (or any other agreements or consents that may be required by the Company and/or the Employer) that the Company and/or the Employer may deem necessary to obtain from you for the purpose of administering participation in the Plan in compliance with the data privacy laws in your country, either now or in the future. You understand and agree that you will not be able to participate in the Plan if you fail to provide any such consent or agreement requested by the Company and/or the Employer.

No Advice Regarding Grant	The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding your participation in the Plan, or your acquisition or sale of the Stock underlying your Restricted Stock Units. You are hereby advised to consult with your own personal tax, legal and financial advisors regarding your participation in the Plan before taking any action related to the Plan.
Applicable Law and Venue	The Restricted Stock Units and the provisions of this Agreement are governed by, and subject to, the laws of the State of Delaware, without regard to the conflict of law provisions. For purposes of litigating any dispute that arises under this award or the Agreement, the parties hereby submit to and consent to the jurisdiction of the State of Delaware, and agree that such litigation shall be conducted in the state courts of Delaware, or the federal courts for the District of Delaware, and no other courts, where this grant is made and/or to be performed. ***You agree to waive your rights to a jury trial for any claim or cause of action based upon or arising out of this Agreement or the Plan.***
Language	If you have received this Agreement or any other document related to the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.
Electronic Delivery and Acceptance	The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means or request your consent to participate in the Plan by electronic means. You hereby consent to receive such documents by electronic delivery and agree to participate in the Plan through an on-line or electronic system established and maintained by the Company, the Company's designated broker, or their respective third parties. If you fail to submit a written rejection of this award to the Company's Stock Administration Department prior to the date on which this award initially vests, this award shall be deemed accepted by you and the terms of this award and the Plan shall apply to the same extent as if you had accepted your award electronically via the website of the Company's selected broker.
Severability	The provisions of this Agreement are severable, and if any one or more provisions are determined to be illegal or otherwise unenforceable, in whole or in part, the remaining provisions shall nevertheless be binding and enforceable.
Waiver	You acknowledge that a waiver by the Company of breach of any provision of this Agreement shall not operate or be construed as a waiver of any other provision of this Agreement, or of any subsequent breach of this Agreement.

Foreign Account / Assets Reporting and Exchange Controls	Depending upon the country to which laws you are subject, you may have certain foreign asset and/or account reporting requirements and exchange controls which may affect your ability to acquire or hold shares of Stock under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of shares of Stock) in a brokerage or bank account outside your country of residence. Your country may require that you report such accounts, assets or transactions to the applicable authorities in your country. You may be required to repatriate sale proceeds or other funds received as a result of your participation in the Plan to your country through a designated bank or broker within a certain time after receipt. You are responsible for knowledge of and compliance with any such regulations and should speak with your own personal tax, legal and financial advisors regarding the same.
Insider Trading / Market Abuse Laws	You acknowledge that, depending on your country, you may be subject to insider trading restrictions and/or market abuse laws, which may affect your ability to acquire or sell shares of Stock or rights to shares of Stock (e.g., Restricted Stock Units) under the Plan during such times as you are considered to have "inside information" regarding the Company (as defined by the laws in your country). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable insider trading policy of the Company. You acknowledge that it is your responsibility to comply with any applicable restrictions, and you should consult with your own personal legal and financial advisors on this matter.
Imposition of Other Requirements	The Company reserves the right to impose other requirements on your participation in the Plan, on the award, on the Restricted Stock Units, and on any shares of Stock acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require you to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

Canadian Residents

With respect to Canadian residents only:

Restricted Stock Units Payable Only in Shares of Stock. Notwithstanding any discretion in the Plan or the Agreement to the contrary, Restricted Stock Units granted in Canada shall be paid in shares of Stock only and do not provide any right for you to receive a cash payment.

The following provisions will apply if you are a resident of Quebec:

Language Consent. The parties acknowledge that it is their express wish that the Agreement, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English.

Les parties reconnaissent avoir exigé la rédaction en anglais de cette convention, ainsi que de tous documents, avis et procédures judiciaires, exécutés, donnés ou intentés en vertu de, ou liés directement ou indirectement à, la présente convention.

Data Privacy. This provision supplements the Data Privacy section of the Agreement:

You hereby authorize the Company and the Company's representatives to discuss with and obtain all relevant information from all personnel, professional or not, involved in the administration and operation of the Plan. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to disclose and discuss the Plan with their advisors. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to record such information and to keep such information in your employee file.

Notifications

Securities Law Information. You are permitted to sell shares of Stock acquired through the Plan through the designated broker appointed under the Plan, if any, provided the resale of shares of Stock acquired under the Plan takes place outside of Canada through the facilities of a stock exchange on which the Stock is listed. Currently, the Stock is listed on the New York Stock Exchange.

Foreign Account / Assets Reporting Information. Foreign property, including Restricted Stock Units, shares of Stock acquired under the Plan and other rights to receive shares (e.g., Restricted Stock Units) of a non-Canadian company held by a Canadian resident must generally be reported annually on a Form T1135 (Foreign Income Verification Statement) if the total cost of the foreign property exceeds C$100,000 at any time during the year. Thus, such Restricted Stock Units must be reported - generally at a nil cost - if the C$100,000 cost threshold is exceeded because other foreign property is held by you. When shares of Stock are acquired, their cost generally is the adjusted cost base ("ACB") of the shares. The ACB would ordinarily equal the fair market value of the shares at the time of acquisition, but if you own other shares of the same company, this ACB may have to be averaged with the ACB of the other shares. You should consult with your personal tax advisor to determine your reporting requirements.

This Agreement is not a stock certificate or a negotiable instrument.

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

MARKET STOCK UNIT AGREEMENT

Ciena Corporation, a Delaware corporation, (the "Company"), hereby grants market stock units relating to shares of its common stock, $0.01 par value (the "Stock"), to the individual named below as the Grantee, subject to the performance and vesting and other terms and conditions set forth in this Market Stock Unit Agreement, including the attached terms and conditions and any appendix attached hereto (together, the "Agreement"). This grant is subject to the terms and conditions set forth in (i) this Agreement, (ii) the Ciena Corporation 2017 Omnibus Incentive Plan (the "Plan") and (iii) the grant details for this award contained in your account with the Company's selected broker. Capitalized terms not defined in this Agreement are defined in the Plan, and have the meaning set forth in the Plan.

Grant Date: _____

Grant Number: _____

Name of Grantee: _____

Number of Market Stock Units Covered by Grant: _____

By accepting this grant (whether by signing this Agreement or accepting the grant electronically via the website of the Company's selected broker), you agree to the terms and conditions in this Agreement and in the Plan and agree that the Plan will control in the event any provision of this Agreement should appear to be inconsistent unless otherwise stated herein.

Grantee: _____
(Signature)

Ciena Corporation: _____
Name: David M. Rothenstein
Title: Senior Vice President, General Counsel and Secretary

CIENA CORPORATION
2017 OMNIBUS INCENTIVE PLAN

MARKET STOCK UNIT AGREEMENT
TERMS AND CONDITIONS

Market Stock Unit Transferability

This grant is an award of market stock units in the number of units set forth on the first page of this Agreement (or, in the case of electronic delivery, as set forth in the grant details for this Award set forth in the Company's selected broker's website), subject to the performance and vesting conditions described in this Agreement ("Restricted Stock Units"). Your Restricted Stock Units may not be transferred, assigned, pledged or hypothecated, whether by operation of Applicable Law or otherwise, nor may the Restricted Stock Units be made subject to execution, attachment or similar process.

Performance Earning

Your Restricted Stock Units may be earned during the three-year period beginning with the Company's fiscal year 2018 and continuing through the Company's fiscal year 2020 (the "Performance Period") based on the Company's achievement of the performance goal set forth in Appendix A to this Agreement.

The number of Restricted Stock Units issuable under this award will be determined in accordance with the performance goal set forth in Appendix A and, specifically, the detail and the embedded table set forth therein.

The Compensation Committee of the Board of Directors will determine, in its sole and absolute discretion, whether (and to what extent) the performance goal has been met and, based on that determination, the number of Restricted Stock Units that have been earned during the Performance Period.

Any portion of your Restricted Stock Units that is not earned by the end of the Performance Period will be forfeited.

Vesting

If Restricted Stock Units are earned during the Performance Period, the aggregate number of such earned Restricted Stock Units shall vest on December 20, 2020 (the "Vesting Date"), provided you remain in Service through the Vesting Date. Any resulting fractional shares shall be rounded up to the nearest whole share; provided, that you may not vest in more than 200% of the number of Market Stock Units set forth on the first page of this Agreement. Any earned but unvested Restricted Stock Units will be forfeited in their entirety in the event that you cease to be employed by the Company for any reason prior to the Vesting Date.

Share Delivery Pursuant to Vested Restricted Stock Units; Tax-Related Items

Shares of Stock underlying the vested portion of the Restricted Stock Units will be delivered to you by the Company as soon as practicable following the Vesting Date, but in no event beyond 2½ months after the end of the calendar year in which the shares would have been otherwise delivered. On the Vesting Date (or as soon as practicable thereafter), a brokerage account in your name will be credited with shares of Stock representing the number of shares that vested under this grant (the "Vested Shares") net of any Tax-Related Items (as defined below), as applicable. If the Vesting Date is not a trading day, Vested Shares will be delivered on the next trading day (or as soon as practicable thereafter).

Regardless of any action the Company or the Affiliate to whom you provide Services (the "Employer") takes with respect to any or all income tax, social insurance, payroll tax, payment on account or other tax-related items related to the Restricted Stock Units and/or your participation in the Plan and legally applicable to you ("Tax-Related Items"), you acknowledge that the ultimate liability for all Tax-Related Items is and remains your responsibility and may exceed the amount actually withheld by the Company or the Employer, if any. You further acknowledge that the Company and/or the Employer (1) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting or settlement of the Restricted Stock Units, the issuance of shares of Stock upon settlement of the Restricted Stock Units, the subsequent sale of shares of Stock acquired pursuant to such issuance and the receipt of any dividends and/or any dividend equivalents; and (2) do not commit to and are under no obligation to structure the terms of the award or any aspect of the Restricted Stock Units to reduce or eliminate your liability for Tax-Related Items or achieve any particular tax result. Further, if you have become subject to tax in more than one jurisdiction, you acknowledge that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

By accepting this award, you authorize the Company and/or the Employer, or their respective agents, at their discretion, to satisfy any applicable withholding obligations with regard to all Tax-Related Items by one or a combination of the following: (a) withholding from your wages or other cash compensation paid to you by the Company and/or the Employer; (b) withholding from proceeds of the sale of Vested Shares either through a voluntary sale or through a mandatory sale arranged by the Company (on your behalf pursuant to this authorization without further consent) (an "Automatic Sale"); or (c) withholding shares of Stock to be issued upon vesting of the Restricted Stock Units, provided, however, that if you are a Section 16 officer of the Company under the Act, as amended, then the Company will withhold in shares of Stock under this subsection (c) upon the relevant taxable or tax withholding event, as applicable, unless the use of such withholding method is problematic under applicable tax or securities law or has material adverse accounting consequences, in which case, the obligation for Tax-Related Items may be satisfied by one or a combination of methods (a) and (b) above; or (d) any other method of withholding determined by the Company and permitted by applicable law.

You further acknowledge that, in the event of an Automatic Sale, this irrevocable written instruction is intended to constitute an instruction pursuant to Rule 10b5-1 of the Exchange Act with the Automatic Sale intended to comply with these requirements. As such, all provisions hereof shall be interpreted consistent with Rule 10b5-1 and shall be automatically modified to the extent necessary to comply therewith. The Company shall be responsible for the payment of any brokerage commissions relating to any Automatic Sale.

Depending on the withholding method, the Company may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding rates or other applicable withholding rates, including maximum applicable rates in your jurisdiction(s) to the extent permitted by the Plan, in which case you may receive a refund of any over-withheld amount in cash and will have no entitlement to the equivalent in Stock. If the obligation for Tax-Related Items is satisfied by withholding in shares of Stock, for tax purposes, you are deemed to have been issued the full number of shares of Stock subject to the Vested Shares, notwithstanding that a number of the shares of Stock are held back solely for the purpose of paying the Tax-Related Items due as a result of any aspect of your participation in the Plan.

The Company may refuse to issue or deliver the shares of Stock or the proceeds of the sale of shares of Stock, if you fail to comply with your obligations in connection with the Tax-Related Items.

Forfeiture of Unvested Restricted Stock Units

Except as specifically provided in this Agreement or as may be provided in other agreements between you and the Company, no additional Restricted Stock Units will vest after your Service has terminated for any reason and you will forfeit to the Company all of the Restricted Stock Units that have not yet vested or with respect to which all applicable restrictions and conditions have not lapsed upon such termination of your Service.

Deferral of Compensation	Delivery of shares underlying any award of Restricted Stock Units and treatment hereunder shall be subject to any deferral election validly made by eligible participants under the Ciena Corporation Deferred Compensation Plan or any successor plan.
Death	If your Service terminates because of your death, the Restricted Stock Units earned, but not yet vested, under this Agreement will automatically vest as to the number of Restricted Stock Units earned prior to the date of death.
Disability	If your Service terminates because of your Disability, the Restricted Stock Units earned, but not yet vested under this Agreement will automatically vest as to the number of Restricted Stock Units earned prior to the date of Disability.
Termination For Cause	If your Service is terminated for Cause, then you shall immediately forfeit all rights to your Restricted Stock Units, whether or not previously earned, and this award shall immediately terminate.
Leaves of Absence	For purposes of this grant, your Service does not terminate when you go on a *bona fide* leave of absence approved by the Company, if the terms of your leave provide for continued Service crediting, or when continued Service crediting is required by Applicable Law. The Company will determine, in its sole discretion, whether and when a leave of absence constitutes a termination of Service under the Plan.
Retention Rights	Neither your Restricted Stock Units nor this Agreement give you the right to be retained by the Company, the Employer or any Affiliate in any capacity and your Service may be terminated at any time and for any reason.
Shareholder Rights	You have no rights as a shareholder unless and until the shares of Stock relating to the Restricted Stock Units have been issued to you (or an appropriate book entry has been made). Except as described in the Plan or herein, no adjustments are made for dividends or other rights if the applicable record date occurs before your shares of Stock are issued (or an appropriate book entry has been made). If the Company pays a dividend on its Stock, you will, however, be entitled to receive a cash payment equal to the per-share dividend paid on the Stock times the number of vested Restricted Stock Units that you hold as of the record date for the dividend; provided, however, such Dividend Equivalents Rights shall not vest or become payable unless and until the Restricted Stock Units to which the Dividend Equivalent Rights correspond become vested and nonforfeitable pursuant to this Agreement or the Plan.
Nature of Grant	In accepting the award and the Restricted Stock Units, you acknowledge, understand and agree that: (1) the Plan is established voluntarily by the Company, it is discretionary in nature and it may be modified, amended, suspended or terminated by the Company at any time; (2) the grant of the Restricted Stock Units is voluntary and occasional and does not create any contractual or other right to receive future grants of Restricted Stock Units, or benefits in lieu of Restricted Stock Units, even if Restricted Stock Units have been granted in the past; (3) all decisions with respect to future Restricted Stock Unit grants, if any, will be at the sole discretion of the Company; (4) your participation in the Plan is voluntary; (5) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not intended to replace any pension rights; (6) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end of Service payments, bonuses, holiday pay, long-service awards, pension or retirement or welfare benefits or similar payments; (7) the Restricted Stock Unit grant and your participation in the Plan will not be interpreted to form or amend a Service contract or relationship with the

Company, the Employer or any Affiliate;

(8) the future value of the underlying shares of Stock is unknown and cannot be predicted with certainty;

(9) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from termination of your Service relationship with the Company or the Employer (for any reason whatsoever and whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), and in consideration of the grant of the Restricted Stock Units, you irrevocably agree never to institute any claim against the Company, the Employer or any Affiliate, waive your ability, if any, to bring any such claim, and release the Company, the Employer and any Affiliate from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by accepting this award of Restricted Stock Units, you shall be deemed irrevocably to have agreed not to pursue such claim and agree to execute any and all documents necessary to request dismissal or withdrawal of such claims;

(10) in the event of termination of your Service relationship (whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), your right to vest in the Restricted Stock Units under the Plan, if any, will terminate effective as of the date that you are no longer actively providing Services to the Company, the Employer or any Affiliate as a Service Provider and will not be extended by any notice period mandated under local law (*e.g.*, active Service as a Service Provider would not include a period of "garden leave" or similar period); the Committee shall have the exclusive discretion to determine when you are no longer actively providing Services for purposes of your Restricted Stock Units grant;

(11) the Restricted Stock Units and the benefits evidenced by this Agreement do not create any entitlement, not otherwise specifically provided for in the Plan or by the Company in its discretion, to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company, nor to be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Stock (including a Corporate Transaction);

12) unless otherwise agreed with the Company, the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of same, are not granted as consideration for, or in connection with, the service you may provide as a director of an Affiliate of the Company; and

(13) the following provisions apply only if you are providing Services outside the United States:

(A)the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation or salary for any purpose and in no event should be considered as compensation for, or relating in any way to, past Services for the Company, the Employer or any Affiliate; and

(B)you acknowledge and agree that neither the Company, the Employer nor any Affiliate shall be liable for any foreign exchange rate fluctuation between the Employer's local currency and the United States dollar that may affect the value of any proceeds from the sale of shares of Stock acquired under the Plan.

(3) all decisions with respect to future Restricted Stock Unit grants, if any, will be at the sole discretion of the Company;

(4) your participation in the Plan is voluntary;

(5) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not intended to replace any pension rights;

(6) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end of Service payments, bonuses, holiday pay, long-service awards, pension or retirement or welfare benefits or similar payments;

(7) the Restricted Stock Unit grant and your participation in the Plan will not be interpreted to form or amend a Service contract or relationship with the Company, the Employer or any Affiliate;

(8) the future value of the underlying shares of Stock is unknown and cannot be predicted with certainty;

(9) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from termination of your Service relationship with the Company or the Employer (for any reason whatsoever and whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), and in consideration of the grant of the Restricted Stock Units, you irrevocably agree never to institute any claim against the Company, the Employer or any Affiliate, waive your ability, if any, to bring any such claim, and release the Company, the Employer and any Affiliate from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by accepting this award of Restricted Stock Units, you shall be deemed irrevocably to have agreed not to pursue such claim and agree to execute any and all documents necessary to request dismissal or withdrawal of such claims;

(10) in the event of termination of your Service relationship (whether or not in breach of contract or local employment laws in the country where you reside, even if otherwise applicable to your employment benefits from the Employer, and/or later found to be invalid), your right to vest in the Restricted Stock Units under the Plan, if any, will terminate effective as of the date that you are no longer actively providing Services to the Company, the Employer or any Affiliate as a Service Provider and will not be extended by any notice period mandated under local law (*e.g.*, active Service as a Service Provider would not include a period of “garden leave” or similar period); the Committee shall have the exclusive discretion to determine when you are no longer actively providing Services for purposes of your Restricted Stock Units grant;

(11) the Restricted Stock Units and the benefits evidenced by this Agreement do not create any entitlement, not otherwise specifically provided for in the Plan or by the Company in its discretion, to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company, nor to be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Stock (including a Corporate Transaction);

12) unless otherwise agreed with the Company, the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of same, are not granted as consideration for, or in connection with, the service you may provide as a director of an Affiliate of the Company; and

(13) the following provisions apply only if you are providing Services outside the United States:

(A) the Restricted Stock Units and the shares of Stock subject to the Restricted Stock Units, and the income from and value of such Restricted Stock Units, are not part of normal or expected compensation or salary for any purpose and in no event should be considered as compensation for, or relating in any way to, past Services for the Company, the Employer or any Affiliate; and

(B) you acknowledge and agree that neither the Company, the Employer nor any Affiliate shall be liable for any foreign exchange rate fluctuation between the Employer's local currency and the United States dollar that may affect the value of any proceeds from the sale of shares of Stock acquired under the Plan.

Forfeiture: Recoupment

This Award shall be subject to mandatory repayment by the Grantee to the Company (i) to the extent set forth in the Plan or this Award Agreement or (ii) to the extent the Grantee is, or in the future becomes, subject to (A) any Company or Affiliate "clawback" or recoupment policy that is adopted by the Company, including to comply with the requirements of Applicable Law, or (B) any Applicable Law that imposes mandatory recoupment, under circumstances set forth in such Applicable Law.

Data Privacy

You hereby explicitly and unambiguously consent to the collection, use and transfer, in electronic or other form, of your personal data as described in this Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Employer, the Company and its Affiliates for the exclusive purpose of implementing, administering and managing your participation in the Plan.

You understand that the Company and the Employer may hold certain personal information about you, including, but not limited to, your name, home address, email address and telephone number, date of birth, social security or social insurance number, passport number or other identification number, salary, nationality, job title, any shares of Stock or directorships held in the Company, details of all Restricted Stock Units or any other entitlement to shares of Stock awarded, canceled, exercised, vested, unvested or outstanding in your favor, for the exclusive purpose of implementing, administering and managing the Plan ("Data").

You understand that Data will be transferred to E*Trade Financial Services, Inc., or such other stock plan service provider as may be selected by the Company in the future, which is assisting the Company with the implementation, administration and management of the Plan.

You understand that the recipients of the Data may be located in the United States or elsewhere, and that the recipients' country (e.g., the United States) may have different data privacy laws and protections than your country.

You understand that you may request a list with the names and addresses of any potential recipients of the Data by contacting your local human resources representative.

You authorize the Company, E*Trade Financial Services, Inc. and any other possible recipients which may assist the Company (presently or in the future) with implementing, administering and managing the Plan to receive, possess, use, retain and transfer the Data, in electronic or other form, for the sole purpose of implementing, administering and managing your participation in the Plan.

You understand that Data will be held only as long as is necessary to implement, administer and manage your participation in the Plan.

You understand that you may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data or refuse or withdraw the consents herein, in any case without cost, by contacting in writing your local human resources representative or the Company's stock administration department. Further, you understand that you are providing the consents herein on a purely voluntary basis.

If you do not consent, or if you later revoke your consent, your employment status or Service with the Employer will not be affected; the only consequence of refusing or withdrawing your consent is that the Company would not be able to grant Restricted Stock Units or other equity awards to you or administer or maintain such awards.

Therefore, you understand that refusing or withdrawing your consent may affect your ability to participate in the Plan.

For more information on the consequences of your refusal to consent or withdrawal of consent, you understand that you may contact your local human resources representative or the Company's stock administration department.

Finally, upon request of the Company or the Employer, you agree to provide an executed data privacy consent form (or any other agreements or consents that may be required by the Company and/or the Employer) that the Company and/or the Employer may deem necessary to obtain from you for the purpose of administering participation in the Plan in compliance with the data privacy laws in your country, either now or in the future. You understand and agree that you will not be able to participate in the Plan if you fail to provide any such consent or agreement requested by the Company and/or the Employer.

No Advice Regarding Grant

The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding your participation in the Plan, or your acquisition or sale of the Stock underlying your Restricted Stock Units. You are hereby advised to consult with your own personal tax, legal and financial advisors regarding your participation in the Plan before taking any action related to the Plan.

Applicable Law and Venue

The Restricted Stock Units and the provisions of this Agreement are governed by, and subject to, the laws of the State of Delaware, without regard to the conflict of law provisions.

For purposes of litigating any dispute that arises under this award or the Agreement, the parties hereby submit to and consent to the jurisdiction of the State of Delaware, and agree that such litigation shall be conducted in the state courts of Delaware, or the federal courts for the District of Delaware, and no other courts, where this grant is made and/or to be performed. ***You agree to waive your rights to a jury trial for any claim or cause of action based upon or arising out of this Agreement or the Plan.***

Language

If you have received this Agreement or any other document related to the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

Electronic Delivery and Acceptance	The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means or request your consent to participate in the Plan by electronic means. You hereby consent to receive such documents by electronic delivery and agree to participate in the Plan through an on-line or electronic system established and maintained by the Company, the Company's designated broker, or their respective third parties. If you fail to submit a written rejection of this award to the Company's Stock Administration Department prior to the date on which this award initially vests, this award shall be deemed accepted by you and the terms of this award and the Plan shall apply to the same extent as if you had accepted your award electronically via the website of the Company's selected broker.
Severability	The provisions of this Agreement are severable, and if any one or more provisions are determined to be illegal or otherwise unenforceable, in whole or in part, the remaining provisions shall nevertheless be binding and enforceable.
Waiver	You acknowledge that a waiver by the Company of breach of any provision of this Agreement shall not operate or be construed as a waiver of any other provision of this Agreement, or of any subsequent breach of this Agreement.
Foreign Account / Assets Reporting and Exchange Controls	Depending upon the country to which laws you are subject, you may have certain foreign asset and/or account reporting requirements and exchange controls which may affect your ability to acquire or hold shares of Stock under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of shares of Stock) in a brokerage or bank account outside your country of residence. Your country may require that you report such accounts, assets or transactions to the applicable authorities in your country. You may be required to repatriate sale proceeds or other funds received as a result of your participation in the Plan to your country through a designated bank or broker within a certain time after receipt. You are responsible for knowledge of and compliance with any such regulations and should speak with your own personal tax, legal and financial advisors regarding the same.
Insider Trading / Market Abuse Laws	You acknowledge that, depending on your country, you may be subject to insider trading restrictions and/or market abuse laws, which may affect your ability to acquire or sell shares of Stock or rights to shares of Stock (e.g., Restricted Stock Units) under the Plan during such times as you are considered to have "inside information" regarding the Company (as defined by the laws in your country). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable insider trading policy of the Company. You acknowledge that it is your responsibility to comply with any applicable restrictions, and you should consult with your own personal legal and financial advisors on this matter.

Imposition of Other Requirements

The Company reserves the right to impose other requirements on your participation in the Plan, on the award, on the Restricted Stock Units, and on any shares of Stock acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require you to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

Canadian Residents

With respect to Canadian residents only:

Restricted Stock Units Payable Only in Shares of Stock. Notwithstanding any discretion in the Plan or the Agreement to the contrary, Restricted Stock Units granted in Canada shall be paid in shares of Stock only and do not provide any right for you to receive a cash payment.

The following provisions will apply if you are a resident of Quebec:

Language Consent. The parties acknowledge that it is their express wish that the Agreement, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English.

Les parties reconnaissent avoir exigé la rédaction en anglais de cette convention, ainsi que de tous documents, avis et procédures judiciaires, exécutés, donnés ou intentés en vertu de, ou liés directement ou indirectement à, la présente convention.

Data Privacy. This provision supplements the Data Privacy section of the Agreement:

You hereby authorize the Company and the Company's representatives to discuss with and obtain all relevant information from all personnel, professional or not, involved in the administration and operation of the Plan. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to disclose and discuss the Plan with their advisors. You further authorize the Company, the Employer, any Affiliate and the administrator of the Plan to record such information and to keep such information in your employee file.

Notifications

Securities Law Information. You are permitted to sell shares of Stock acquired through the Plan through the designated broker appointed under the Plan, if any, provided the resale of shares of Stock acquired under the Plan takes place outside of Canada through the facilities of a stock exchange on which the Stock is listed. Currently, the Stock is listed on the New York Stock Exchange.

Foreign Account / Assets Reporting Information. Foreign property, including Restricted Stock Units, shares of Stock acquired under the Plan and other rights to receive shares (e.g., Restricted Stock Units) of a non-Canadian company held by a Canadian resident must generally be reported annually on a Form T1135 (Foreign Income Verification Statement) if the total cost of the foreign property exceeds C$100,000 at any time during the year. Thus, such Restricted Stock Units must be reported - generally at a nil cost - if the C$100,000 cost threshold is exceeded because other foreign property is held by you. When shares of Stock are acquired, their cost generally is the adjusted cost base ("ACB") of the shares. The ACB would ordinarily equal the fair market value of the shares at the time of acquisition, but if you own other shares of the same company, this ACB may have to be averaged with the ACB of the other shares. You should consult with your personal tax advisor to determine your reporting requirements.

This Agreement is not a stock certificate or a negotiable instrument.

OMNIBUS AMENDMENT TO SECURITY AGREEMENT AND PLEDGE AGREEMENT

This OMNIBUS AMENDMENT TO SECURITY AGREEMENT AND PLEDGE AGREEMENT (this "Amendment") is entered into as of September 28, 2018, by and among Ciena Corporation, a Delaware corporation (the "Borrower"), Ciena Communications, Inc., a Delaware corporation ("CCI"), Ciena Government Solutions, Inc., a Delaware corporation ("CGSI" and, together with the Company and CCI, collectively, the "Loan Parties") and Bank of America, N.A., as administrative agent (in such capacity, the "Administrative Agent"). Capitalized terms used but not otherwise defined herein shall have the respective meanings ascribed to such terms in the Credit Agreement (as defined below).

RECITALS

WHEREAS, the Borrower, the Lenders from time to time party thereto, and the Administrative Agent are parties to that certain Credit Agreement, dated as of July 15, 2014 (as amended through and including the date hereof, the "Credit Agreement"), pursuant to which, among other things, the Lenders have agreed, subject to the terms and conditions set forth therein, to make certain loans and other financial accommodations to the Borrower;

WHEREAS, the Loan Parties and the Administrative Agent are parties to that certain Security Agreement, dated as of July 15, 2014 (as amended prior to, and otherwise in effect on, the date hereof, the "Existing Security Agreement")

WHEREAS, the Loan Parties and the Administrative Agent are parties to that certain Term Loan Pledge Agreement, dated as of July 15, 2014 (as amended prior to, and otherwise in effect on, the date hereof, the "Existing Pledge Agreement"); and

WHEREAS, the Loan Parties, the Administrative Agent and each Lender party to the Credit Agreement, desire to amend the Existing Pledge Agreement and the Existing Security Agreement, as provided herein.

NOW, THEREFORE, in consideration of the foregoing, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

SECTION 1. **Amendments to Security Agreement**. Each of the parties hereto agrees that, effective on the Amendment Effective Date (as defined below), the Existing Security Agreement (other than Exhibits B, C and D and the Annexes attached thereto) as in effect on the date hereof shall be amended to delete the stricken text (indicated textually in the same manner as the following example: ~~stricken text~~) and to add the double-underlined text (indicated textually in the same manner as the following example: double-underlined text) as set forth in the pages of the Security Agreement attached as Annex I hereto.

SECTION 2. **Amendments to Pledge Agreement**. Each of the parties hereto agrees that, effective on the Amendment Effective Date, the Existing Pledge Agreement (other than the Annexes attached thereto) as in effect on the date hereof shall be amended to delete the stricken text (indicated textually in the same manner as the following example: ~~stricken text~~) and to add the double-underlined text (indicated textually in the same manner as the following example: double-underlined text) as set forth in the pages of the Term Loan Pledge Agreement attached as Annex II hereto.

SECTION 3. (a) **Reference To and Effect Upon the Loan Documents**. From and after the Amendment Effective Date, (i) the term "this Agreement", "hereunder", "hereof" or words of like import in

the Security Agreement, and all references to the Security Agreement in any other Loan Document, shall mean the Security Agreement as modified hereby, (ii) the term "this Agreement", "hereunder", "hereof" or words of like import in the Pledge Agreement, and all references to the Pledge Agreement in any other Loan Document, shall mean the Pledge Agreement as modified hereby and (iii) this Amendment shall constitute a "Loan Document" for all purposes of the Credit Agreement and the other Loan Documents.

SECTION 4. **Effectiveness**. In accordance with Section 10.1 of the Credit Agreement, Section 8.2 of the Security Agreement and Section 24 of the Pledge Agreement, this Amendment shall become effective at the time (the "Amendment Effective Date") when each of the following conditions has been satisfied:

(a) the Administrative Agent shall have received duly executed signature pages for this Amendment signed by the Loan Parties and the Administrative Agent.

SECTION 5. **Amendment, Modification and Waiver**. This Amendment may not be amended, modified or waived except as permitted by Section 10.01 of the Credit Agreement. The execution, delivery and effectiveness of this Amendment shall not, except as expressly provided herein, operate as a waiver of any right, power or remedy of any Lender or the Administrative Agent under any of the Loan Documents, nor, except as expressly provided herein, constitute a waiver or amendment of any provision of any of the Loan Documents

SECTION 6. **Entire Agreement**. This Amendment, the Credit Agreement and the other Loan Documents constitute the entire agreement among the parties hereto with respect to the subject matter hereof and thereof and supersede all other prior agreements and understandings, both written and verbal, among the parties hereto with respect to the subject matter hereof. Except as expressly set forth herein, this Amendment shall not by implication or otherwise limit, impair, constitute a waiver of, or otherwise affect the rights and remedies of any party under, the Security Agreement or Pledge Agreement, as applicable, nor alter, modify, amend or in any way affect any of the terms, conditions, obligations, covenants or agreements contained in the Security Agreement or the Pledge Agreement, as applicable, all of which are ratified and affirmed in all respects and shall continue in full force and effect.

SECTION 7. **GOVERNING LAW. THIS AMENDMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER SHALL BE GOVERNED BY, CONSTRUED AND INTERPRETED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK.**

SECTION 8. **Severability**. If any provision of this Amendment is held to be illegal, invalid or unenforceable, the legality, validity and enforceability of the remaining provisions of this Amendment shall not be affected or impaired thereby. The invalidity of a provision in a particular jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

SECTION 9. **Counterparts; Effectiveness**. This Amendment may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery by telecopier or other electronic means of an executed counterpart of a signature page to this Amendment shall be effective as delivery of an original executed counterpart of this Amendment.

SECTION 10. **WAIVER OF JURY TRIAL.** EACH PARTY HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS AMENDMENT OR ANY OTHER LOAN

DOCUMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY OR THEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY). EACH PARTY HERETO (A) CERTIFIES THAT NO REPRESENTATIVE, AGENT OR ATTORNEY OF ANY OTHER PERSON HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PERSON WOULD NOT, IN THE EVENT OF LITIGATION, SEEK TO ENFORCE THE FOREGOING WAIVER AND (B) ACKNOWLEDGES THAT IT AND THE OTHER PARTIES HERETO HAVE BEEN INDUCED TO ENTER INTO THIS AMENDMENT AND THE OTHER LOAN DOCUMENTS BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.

[*Signature Pages to follow*]

IN WITNESS WHEREOF, this Amendment has been duly executed by the parties hereto as of the date first written above.

CIENA CORPORATION

By: /s/ Jiong Liu
Name: Jiong Liu
Title: Vice President and Treasurer

CIENA COMMUNICATIONS, INC.

By: /s/ Jiong Liu
Name: Jiong Liu
Title: Vice President and Treasurer

CIENA GOVERNMENT SOLUTIONS, INC.

By: /s/ Jiong Liu
Name: Jiong Liu
Title: Vice President and Treasurer

BANK OF AMERICA, N.A.
as Administrative Agent

By: /s/ Priscilla Ruffin
Name: Priscilla Ruffin
Title: AVP

ANNEX I

AMENDMENTS TO SECURITY AGREEMENT

[Amended Security Agreement to follow]

TERM LOAN SECURITY AGREEMENT

among

CIENA CORPORATION,

EACH OTHER GRANTOR
FROM TIME TO TIME PARTY HERETO

and

BANK OF AMERICA, N.A.,
as COLLATERAL AGENT

Dated as of July 15, 2014

TERM LOAN SECURITY AGREEMENT, dated as of July 15, 2014, made by each of the undersigned grantors (each, a "Grantor" and, together with any other entity that becomes a grantor hereunder pursuant to Section 8.12 hereof, the "Grantors") in favor of BANK OF AMERICA, N.A., as collateral agent (in such capacity, together with any successor collateral agent, the "Collateral Agent"), for the benefit of the Secured Parties (as defined below). Certain capitalized terms as used herein are defined in Article VII hereof. Except as otherwise defined herein, all capitalized terms used herein and defined in the Credit Agreement (as defined below) shall be used herein as therein defined.

W I T N E S S E T H:

WHEREAS, Ciena Corporation, a Delaware corporation (the "Company"), each lender from time to time party thereto (collectively, the "Lenders") and Bank of America, N.A., as administrative agent (in such capacity, together with any successor administrative agent, the "Administrative Agent") have entered into a Credit Agreement, dated as of July 15, 2014 (as amended, modified, restated and/or supplemented from time to time, the "Credit Agreement"), pursuant to which the Lenders have agreed, on a several basis, to make Loans to the Company upon the terms and subject to the conditions set forth therein;

WHEREAS, pursuant to the Guaranty, each Grantor (other than the Company) has jointly and severally guaranteed to the Secured Parties the payment when due of all Guaranteed Obligations as described (and defined) therein;

WHEREAS, it is a condition precedent to the making of Loans to the Company that each Grantor shall have executed and delivered to the Collateral Agent this Agreement; and

WHEREAS, each Grantor will benefit from the incurrence of Loans by the Company;

NOW, THEREFORE, in consideration of the foregoing and other benefits accruing to each Grantor, the receipt and sufficiency of which are hereby acknowledged, each Grantor hereby makes the following representations and warranties to the Collateral Agent for the benefit of the Secured Parties and hereby covenants and agrees with the Collateral Agent for the benefit of the Secured Parties as follows:

ARTICLE I

SECURITY INTERESTS

1.1. Grant of Security Interests. (a) As security for the prompt and complete payment and performance when due of the Obligations, each Grantor does hereby assign and transfer unto the Collateral Agent, and does hereby pledge and grant to the Collateral Agent, for the benefit of the Secured Parties, a continuing security interest in all of the right, title and interest of such Grantor in, to and under all of the following personal property (and all rights therein) of such Grantor, or in which or to which such Grantor has any rights, in each case whether now existing or hereafter from time to time acquired or arising and regardless of where located:

1. each and every Account (and all rights to receive payments, indebtedness and other obligations (whether constituting an Account, Chattel Paper (including Electronic Chattel Paper), Instrument, Document or General Intangible));
2. all cash and Money;
3. the Cash Collateral Account and all monies, securities, Instruments and other investments deposited or required to be deposited in the Cash Collateral Account;
4. all (x) Deposit Accounts, collection accounts, disbursement accounts and lock boxes and all cash, Money, checks, other negotiable instruments, funds and other evidences of payments held therein or credited thereto, (y) Securities Accounts and Security Entitlements and Securities credited thereto, and all cash, Money, checks, marketable securities, Financial Assets and other property held therein or credited thereto, and (z) Commodity Accounts and all cash, Money, marketable securities, Financial Assets and other property held therein or credited thereto;
5. all Chattel Paper (including, without limitation, all Tangible Chattel Paper and all Electronic Chattel Paper);
6. all Commercial Tort Claims set forth on Annex E hereto or for which notice is required to be provided pursuant to Section 3.1 below;
7. all Contracts, together with all Contract Rights arising thereunder;
8. all Documents;
9. all Equipment;
10. all Fixtures;
11. all Goods;
12. all Instruments;
13. all Intellectual Property;
14. all Promissory Notes;
15. all Inventory;
16. all Investment Property;
17. all Letter-of-Credit Rights (whether or not the respective letter of credit is evidenced by a writing);
18. all General Intangibles;
19. all Payment Intangibles (including corporate and other tax refunds);
20. all Permits;
21. all books and records (including all books, databases, customer lists, and records, whether tangible or electronic, which contain any information relating to any of the foregoing);
22. with respect to each right to payment or performance included in each of the foregoing, any Supporting Obligation that supports such payment or performance and any Lien that secures such right to payment or performance or secures any such Supporting Obligation; and

23. all substitutions, replacements accessions, Proceeds and products of any and all of the foregoing, including collateral security and guarantees with respect to any of the foregoing and all cash, Money, insurance proceeds, Instruments, Securities, Financial Assets, income, royalties, payments, licensing, damages and Deposit Accounts constituting Proceeds of the foregoing (all of the above, the "Collateral").

(b) Notwithstanding anything herein to the contrary, in no event shall the security interests and Liens granted under Section 1.1(a) hereof attach to, and the term "Collateral" (and the component terms thereof) shall not include, (i) any property, interest or other rights for so long as the grant of such security interest shall constitute or result in (A) a breach or termination pursuant to the terms of, or a default under, any General Intangible, lease, license, contract, agreement or other document, (B) a breach of any law or regulation which prohibits the creation of a security interest thereunder (other than to the extent that any such term specified in clause (A) or (B) above is rendered ineffective pursuant to Section 9-406, 9 407, 9-408 or 9-409 of the UCC (or any successor provision or provisions) of any relevant jurisdiction or any other then-applicable law (including any applicable bankruptcy laws) or principles of equity) or (C) require the consent of a Governmental Authority to permit the grant of a security interest therein (and such consent has not been obtained); provided, however, that such security interest shall attach immediately at such time as the condition causing such abandonment, invalidation, unenforceability breach or termination shall no longer be effective and to the extent severable, shall attach immediately to any portion of such property or other rights that does not result in any of the consequences specified in clause (A), (B) or (C) above; (ii) the Pledge Agreement Collateral, including any asset of a Grantor excluded from the Pledge Agreement Collateral pursuant to the proviso to Section 3.1 of the Pledge Agreement or the corresponding provision of any other Pledge Agreement, as applicable; (iii) any treasury stock of a Grantor or other Margin Stock, in each case, unless the Secured Parties have made any necessary filings with the FRB in connection therewith and the Grantors have provided the Collateral Agent an executed Form FR U-1; provided however, that each applicable Grantor shall provide to the Secured Parties notice of the existence any Margin Stock (other than treasury stock) that would constitute Collateral absent this proviso at the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement and, thereafter, such Margin Stock shall constitute Collateral to the extent the Secured Parties have made such necessary filings with the FRB in connection therewith and the Grantors have provided the Collateral Agent an executed Form FR U-1; (iv) Deposit Accounts the balance of which consists (x) exclusively of withheld income taxes, employment taxes, or amounts required to be paid over to certain employee benefit plans and (y) segregated deposit accounts constituting and the balance of which consists solely of funds set aside in connection with tax, payroll and trust accounts, and in the event constituting "Excluded Assets" (or such similar term) under the ABL Credit Documents, any other account of the type described in clause (iv) not otherwise constituting a Deposit Account; (v) any Vehicles and other assets subject to certificates of title (other than to the extent such rights can be perfected by the filing of a financing statement under the UCC); and (vi) any United States "intent-to-use" Trademark application prior to the filing of a "Statement of Use" or "Amendment to Allege Use" with respect thereto, to the extent, if any, that, and solely during the period, if any, in which the grant of a security interest therein would impair the validity or enforceability of such application under applicable federal law (other than to the extent such rights can be perfected by the filing of

a financing statement under the UCC) (the assets described in preceding clauses (i) through (vi) hereof, collectively, the "Excluded Assets");

(c) The security interest of the Collateral Agent under this Agreement extends to all Collateral which any Grantor may acquire, or with respect to which any Grantor may obtain rights, at any time during the term of this Agreement.

(d) The Liens hereunder are granted as security only and shall not subject the Administrative Agent or any other Secured Party to, or transfer or in any way affect or modify, any obligation or liability of any Grantor with respect to any of the Collateral or any transaction in connection therewith.

(e) Notwithstanding anything herein to the contrary, the Grantors make no representations or warranties hereunder, and the covenants hereunder shall not apply, in respect of the Excluded Assets.

1.2. For purposes of enabling the Collateral Agent to exercise rights and remedies under this Agreement (but without limiting the other provisions of this Agreement), each Grantor hereby grants to the Collateral Agent and its agents, representatives and designees an irrevocable, nonexclusive, royalty free license, rent-free license and rent-free lease (which will be binding on any successor or assignee of such Grantor) to, after the occurrence and during the continuance of an Event of Default, have access to and use all of such Grantor's (x) Real Property (including the buildings and other improvements thereon), Equipment and fixtures (whether or not considered Real Property) and (y) Intellectual Property (including, without limitation, all Domain Names, Patents, Trademarks, Copyrights, Trade Secrets and object code and access to all media, written or electronic, in which any licensed items may be recorded or stored and to all computer software and programs used for the compilation or printout thereof, as well as an irrevocable, nonexclusive license to grant to any third party a sub-licensable sub-license to use the foregoing rights, but excluding any source code) for which the Collateral Agent hereby agrees to take all commercially reasonable actions in connection with its use of such intellectual property to protect such Grantor's rights and interest in such Intellectual Property (provided that in any event, the Collateral Agent shall not have any liability in connection therewith, other than liability which is the direct result of the Collateral Agent's gross negligence or willful misconduct, as determined by a court of competent jurisdiction in a final and non-appealable decision), for the purpose of (i) arranging for and effecting the sale, distribution or other disposition of Collateral located on any such Real Property, including the manufacture, production, completion, packaging, advertising, distribution and other preparation of such Collateral (including, without limitation, work-in-process, raw materials and complete Inventory) for sale, distribution or other disposition, (ii) selling (by public auction, private sale, going out of business sale or similar sale, whether in bulk, in lots or to customers in the ordinary course of business or otherwise and which sale may include augmented Inventory of the same type sold in any Grantor's business), (iii) storing or otherwise dealing with the Collateral, (iv) collecting all Accounts and copying, using and preserving any and all information relating to the Collateral, and (v) otherwise dealing with

the Collateral as part of the exercise of any rights or remedies provided to the Collateral Agent hereunder or under the other Credit Documents, in each case without the interference by any Grantor or any other Subsidiary of the Company and without incurring any liability to any Grantor or any other Subsidiary of the Company, except any liability which is the direct result of the Collateral Agent's gross negligence or willful misconduct (as determined by a court of competent jurisdiction in a final and non-appealable decision). Each Grantor will, and will cause each of its Restricted Subsidiaries to, cooperate with the Collateral Agent and its agents, representatives and designees in allowing the Collateral Agent to exercise the foregoing rights. To the extent that any asset of any Grantor in which the Collateral Agent has access or use rights as provided above is to be sold or otherwise disposed of after the occurrence and during the continuance of an Event of Default, such Grantor shall, if requested by the Collateral Agent in writing, cause the buyer to agree in writing to be subject to, and comply with the terms of, this Section 1.2. The Collateral Agent shall have the right to bring an action to enforce its rights under this Section 1.2, including, without limitation, an action seeking possession of the applicable Collateral and/or specific performance of this Section 1.2.

1.3. Power of Attorney. Subject to the Intercreditor Agreement, until this Agreement is terminated in accordance with its terms, each Grantor hereby constitutes and appoints the Collateral Agent its true and lawful attorney, irrevocably, with full power after the occurrence of and during the continuance of an Event of Default (in the name of such Grantor or otherwise) to act, require, demand, receive, compound and give acquittance for any and all moneys and claims for moneys due or to become due to such Grantor under or arising out of the Collateral, to endorse any checks or other instruments or orders in connection therewith and to file any claims or take any action or institute any proceedings which the Collateral Agent may deem to be necessary or advisable to protect the interests of the Secured Parties, which appointment as attorney is coupled with an interest.

ARTICLE II

GENERAL REPRESENTATIONS, WARRANTIES AND COVENANTS

Each Grantor represents, warrants and covenants, which representations, warranties and covenants shall survive execution and delivery of this Agreement, as follows:

2.1. Necessary Perfection Action. The provisions of this Agreement (when executed and delivered by all parties thereto) are effective to create in favor of the Collateral Agent, for the benefit of the Secured Parties, a legal, valid and enforceable security interest in all right, title and interest of the Grantors in all of the Collateral described herein, and when (i) proper UCC financing statements have been filed in the appropriate filing offices against each Grantor, (ii) the recordation of Intellectual Property Security Agreements with the United States Patent and Trademark Office and the United States Copyright Office, as applicable and (iii) the Collateral Agent has obtained "control" (within the meaning of the UCC) of the Controlled Deposit Accounts, the Collateral Agent, for the benefit of the Secured Parties, shall have a perfected security interest in all right, title and interest in all of the Collateral to the extent such security interest can be perfected by (i) filing a UCC

financing statement under the UCC, (ii) filing with the United States Patent and Trademark Office and the United States Copyright Office, or, (iii) with respect to the Controlled Deposit Accounts, by the Collateral Agent having "control", subject to no other Liens other than Permitted Liens.

2.2. No Liens. Such Grantor is, and as to all Collateral acquired by it from time to time after the date hereof such Grantor will be, the owner of all Collateral free from any Lien, security interest, encumbrance or other right, title or interest of any Person (other than Permitted Liens), and such Grantor shall defend the Collateral against all claims and demands of all Persons at any time claiming the same or any interest therein adverse to the Collateral Agent (other than Permitted Liens).

2.3. Other Financing Statements. As of the date hereof, there is no financing statement (or similar statement or instrument of registration under the law of any relevant jurisdiction) covering or purporting to cover any interest of any kind in the Collateral (other than financing statements, similar statements or instruments of registration filed in respect of Permitted Liens), and so long as the Termination Date has not occurred, such Grantor will not execute or authorize to be filed in any public office any financing statement (or similar statement or instrument of registration under the law of any jurisdiction) or statements relating to the Collateral, except financing statements filed or to be filed in respect of and covering the security interests granted hereby by such Grantor or in connection with Permitted Liens.

2.4. Location of Inventory and Equipment. All Inventory and Equipment having a net book value in excess of $1,000,000 held on the date hereof by each Grantor, other than any such Inventory and Equipment (i) in transit or out for repair, (ii) at customer, resellers, supplier or contract manufacturer locations, (iii) located outside of the United States or (iv) at locations used solely by such Grantor for purposes of warehousing spare parts, is located at one of the locations shown on Annex F hereto for such Grantor.

2.5. Chief Executive Office, Record Locations. The chief executive office of such Grantor is, on the date of this Agreement, located at the address indicated on Annex A hereto for such Grantor. During the period of the four calendar months preceding the date of this Agreement, the chief executive office of such Grantor has not been located at any address other than that indicated on Annex A in accordance with the immediately preceding sentence, in each case unless each such other address is also indicated on Annex A hereto for such Grantor.

2.6. Legal Names; Type of Organization (and Whether a Registered Organization and/or a Transmitting Utility); Jurisdiction of Organization; Location; Organizational Identification Numbers; Federal Employer Identification Number; Changes Thereto; etc. As of the date hereof, the exact legal name of each Grantor, the type of organization of such Grantor, whether or not such Grantor is a Registered Organization, the jurisdiction of organization of such Grantor, such Grantor's Location, the organizational identification number (if any) of such Grantor, the Federal Employer Identification Number (if any) and whether or not such Grantor is a Transmitting Utility, is listed on Annex B

hereto for such Grantor. Such Grantor shall not change its legal name, its type of organization, its status as a Registered Organization (in the case of a Registered Organization), its status as a Transmitting Utility or as a Person which is not a Transmitting Utility, as the case may be, its jurisdiction of organization, its Location, its organizational identification number (if any) or its Federal Employer Identification Number (if any) from that used on Annex B hereto, except that any such changes shall be permitted (so long as not in violation of the applicable requirements of the Loan Documents and so long as same do not involve (x) a Registered Organization ceasing to constitute same or (y) such Grantor changing its jurisdiction of organization or Location from the United States or a State thereof to a jurisdiction of organization or Location, as the case may be, outside the United States or a State thereof) if (i) it shall have given to the Collateral Agent not less than 10 days' prior written notice of each change to the information listed on Annex B (as adjusted for any subsequent changes thereto previously made in accordance with this sentence), together with a supplement to Annex B which shall correct all information contained therein for such Grantor, and (ii) in connection with the respective change or changes, it shall have taken all action reasonably necessary or requested by the Collateral Agent to maintain the security interests of the Collateral Agent in the Collateral intended to be granted hereby at all times fully perfected and in full force and effect. In addition, to the extent that such Grantor does not have an organizational identification number on the date hereof and later obtains one, such Grantor shall promptly thereafter notify the Collateral Agent of such organizational identification number and shall take all actions reasonably requested by the Collateral Agent to the extent necessary to maintain the security interest of the Collateral Agent in the Collateral intended to be granted hereby fully perfected and in full force and effect.

2.7. Trade Names; etc. As of the date hereof, such Grantor does not have or operate in any jurisdiction under, or in the five years preceding the date hereof has not had or has not operated in any jurisdiction under, any trade names, fictitious names or other names except its legal name as specified in Annex B and such other trade or fictitious names as are listed on Annex C hereto for such Grantor.

2.8. Certain Significant Transactions. During the one year period preceding the date of this Agreement, no Person shall have merged or consolidated with or into any Grantor, and no Person shall have liquidated into, or transferred all or substantially all of its assets to, any Grantor, in each case except as described in Annex D hereto. With respect to any transactions so described in Annex D hereto, the respective Grantor shall have furnished such information with respect to the Person (and the assets of the Person and locations thereof) which merged with or into or consolidated with such Grantor, or was liquidated into or transferred all or substantially all of its assets to such Grantor, and shall have furnished, or caused to be furnished, to the Collateral Agent such UCC lien searches as may have been requested by the Collateral Agent with respect to such Person and its assets, to establish that no security interest (excluding Permitted Liens) continues perfected on the date hereof with respect to any Person described above (or the assets transferred to the respective Grantor by such Person), including without limitation pursuant to Section 9-316(a)(3) of the UCC.

2.9. Recourse. This Agreement is made with full recourse to each Grantor and pursuant to and upon all the warranties, representations, covenants and agreements on the part of such Grantor contained herein and in the other Loan Documents and otherwise in writing in connection herewith or therewith.

ARTICLE III

SPECIAL PROVISIONS CONCERNING ACCOUNTS; CONTRACT RIGHTS; INSTRUMENTS; CHATTEL PAPER AND CERTAIN OTHER COLLATERAL

3.1. [Reserved.]

3.2. [Reserved.]

3.3. Direction to Account Debtors; Contracting Parties; etc. Subject to the Intercreditor Agreement, upon the occurrence and during the continuance of an Event of Default (but without limiting the provisions of the Credit Agreement), if the Collateral Agent so directs any Grantor, such Grantor agrees (x) to cause all payments on account of the Accounts and Contracts to be made directly to the Cash Collateral Account, (y) that the Collateral Agent may, at its option, directly notify the obligors with respect to any Accounts and/or under any Contracts to make payments with respect thereto as provided in the preceding clause (x), and (z) that the Collateral Agent may enforce collection of any such Accounts and Contracts and may adjust, settle or compromise the amount of payment thereof, in the same manner and to the same extent as such Grantor. Subject to the Intercreditor Agreement, without notice to or assent by any Grantor, the Collateral Agent may, upon the occurrence and during the continuance of an Event of Default, apply any or all amounts then in, or thereafter deposited in, the Cash Collateral Account toward the payment of the Obligations in the manner provided in Section 5.4 of this Agreement. The reasonable out-of-pocket costs and expenses of collection (including reasonable out-of-pocket attorneys' fees), whether incurred by a Grantor or the Collateral Agent, shall be borne by the relevant Grantor. The Collateral Agent shall deliver a copy of each notice given to any such obligors referred to in the preceding clause (y) to the relevant Grantor, provided that (x) the failure by the Collateral Agent to so notify such Grantor shall not affect the effectiveness of such notice or the other rights of the Collateral Agent created by this Section 3.3 and (y) no such notice shall be required if an Event of Default of the type described in Section 8.01(f) of the Credit Agreement has occurred and is continuing.

3.4. Modification of Terms; etc. Except (w) in accordance with such Grantor's ordinary course of business, (x) as otherwise in such Grantor's reasonable business judgment, (y) as permitted by the Credit Agreement or (z) as permitted by Section 3.5 hereof, no Grantor shall rescind or cancel any indebtedness evidenced by any Account or under any related Contract, or modify any term thereof or make any adjustment with respect thereto, or extend or renew the same, or compromise or settle any dispute, claim, suit or legal proceeding relating thereto, or sell any Account or any related Contract, or interest therein, without the prior written consent of (x) prior to the Discharge of the ABL Obligations, the ABL Collateral Agent and (y) thereafter, the Collateral Agent. Except to

the extent otherwise permitted by this Agreement or the Credit Agreement, no Grantor will do anything to impair the rights of the Collateral Agent in the Accounts or Contracts.

3.5. Collection. Except as such Grantor otherwise determines in its reasonable business judgment, each Grantor shall endeavor in accordance with reasonable business practices to cause to be collected from the account debtor named in each of its Accounts or obligor under any related Contract, as and when due (including, without limitation, amounts which are delinquent, such amounts to be collected in accordance with generally accepted lawful collection procedures) any and all amounts owing under or on account of such Account or related Contract, and apply promptly upon receipt thereof all such amounts as are so collected to the outstanding balance of such Account or under such related Contract. Except as otherwise directed by the Collateral Agent after the occurrence and during the continuation of an Event of Default, any Grantor may allow in the ordinary course of business as adjustments to amounts owing under its Accounts and related Contracts (i) an extension or renewal of the time or times of payment, or settlement for less than the total unpaid balance, which such Grantor finds appropriate in accordance with its reasonable business judgment, (ii) a refund or credit due as a result of returned or damaged merchandise or improperly performed services or for other reasons which such Grantor finds appropriate in accordance with its reasonable business judgment and (iii) such other adjustments which such Grantor finds appropriate in accordance with its reasonable business judgment.

3.6. Instruments. If any Grantor owns or acquires any Instrument of $10,000,000 or more constituting Collateral (other than (x) checks and other payment instruments received and collected in the ordinary course of business and (y) any Instrument subject to pledge pursuant to the Pledge Agreement), such Grantor will, at the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Collateral Agent in its sole discretion, notify the Collateral Agent thereof, and upon request by the Collateral Agent will promptly deliver such Instrument to the Collateral Agent appropriately endorsed to the order of the Collateral Agent.

3.7. Grantors Remain Liable Under Accounts. Anything herein to the contrary notwithstanding, the Grantors shall remain liable under each of the Accounts to observe and perform all of the conditions and obligations to be observed and performed by them thereunder, all in accordance with the terms of any agreement giving rise to such Accounts. Neither the Collateral Agent nor any other Secured Party shall have any obligation or liability under any Account (or any agreement giving rise thereto) by reason of or arising out of this Agreement or the receipt by the Collateral Agent or any other Secured Party of any payment relating to such Account pursuant hereto, nor shall the Collateral Agent or any other Secured Party be obligated in any manner to perform any of the obligations of any Grantor under or pursuant to any Account (or any agreement giving rise thereto), to make any payment, to make any inquiry as to the nature or the sufficiency of any payment received by them or as to the sufficiency of any performance by any party under any Account (or any agreement giving rise thereto), to present or file any claim, to take any

action to enforce any performance or to collect the payment of any amounts which may have been assigned to them or to which they may be entitled at any time or times.

3.8. Grantors Remain Liable Under Contracts. Anything herein to the contrary notwithstanding, the Grantors shall remain liable under each of the Contracts to observe and perform all of the conditions and obligations to be observed and performed by them thereunder, all in accordance with and pursuant to the terms and provisions of each Contract. Neither the Collateral Agent nor any other Secured Party shall have any obligation or liability under any Contract by reason of or arising out of this Agreement or the receipt by the Collateral Agent or any other Secured Party of any payment relating to such Contract pursuant hereto, nor shall the Collateral Agent or any other Secured Party be obligated in any manner to perform any of the obligations of any Grantor under or pursuant to any Contract, to make any payment, to make any inquiry as to the nature or the sufficiency of any performance by any party under any Contract, to present or file any claim, to take any action to enforce any performance or to collect the payment of any amounts which may have been assigned to them or to which they may be entitled at any time or times.

3.9. Letter-of-Credit Rights. At any time any Grantor becomes a beneficiary under a letter of credit with a stated amount of $10,000,000 or more in the aggregate, such Grantor shall (x) prior to the Discharge of the ABL Obligations, upon the request of the Collateral Agent and (y) following the Discharge of the ABL Obligations, at the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Collateral Agent in its sole discretion, notify the Collateral Agent thereof and, upon the request of the Collateral Agent following the Discharge of the ABL Obligations, such Grantor shall, pursuant to an agreement in form and substance reasonably satisfactory to the Collateral Agent, use its commercially reasonable efforts to (i) arrange for the issuer and any confirmer of such letter of credit to consent to an assignment to the Collateral Agent of the proceeds of any drawing under such letter of credit or (ii) arrange for the Collateral Agent to become the transferee beneficiary of such letter of credit, with the Collateral Agent agreeing, in each case, that the proceeds of any drawing under the letter of credit are retained by the Collateral Agent and to be applied as provided in this Agreement only after the occurrence and during the continuance of an Event of Default.

3.10. Commercial Tort Claims. Each Commercial Tort Claim in an amount of $3,000,000 or more of each Grantor in existence on the date of this Agreement is described in Annex E hereto. If any Grantor shall at any time after the date of this Agreement acquire a Commercial Tort Claim in an amount (taking the greater of the aggregate claimed damages thereunder or the reasonably estimated value thereof) of $10,000,000 or more, such Grantor shall, at the time of delivery of the financial statements required to be delivered pursuant to Sections 6.01(a) and (b) of the Credit Agreement, as such date may be extended from time to time by the Collateral Agent in its sole discretion, notify the Collateral Agent thereof in a writing signed by such Grantor and describing the details thereof and shall grant to the Collateral Agent in such writing a security interest

therein and in the proceeds thereof, all upon the terms of this Agreement with such writing to be in form and substance reasonably satisfactory to the Collateral Agent.

3.11. Chattel Paper. Subject to the Intercreditor Agreement, upon the request of the Collateral Agent made at any time or from time to time, each Grantor shall promptly furnish to the Collateral Agent a list of all Electronic Chattel Paper constituting Collateral held or owned by such Grantor. Furthermore, if requested by the Collateral Agent following the Discharge of the ABL Obligations, each Grantor shall promptly take all actions which are commercially reasonably so that the Collateral Agent has "control" of all Electronic Chattel Paper, to the extent that the aggregate value or face amount of such Electronic Chattel Paper equals or exceeds $10,000,000 in the aggregate, in accordance with the requirements of Section 9-105 of the UCC. Each Grantor will promptly (and in any event within 10 days) after any request by the Collateral Agent following the Discharge of the ABL Obligations deliver all of its Tangible Chattel Paper to the Collateral Agent, to the extent that the aggregate value or face amount of such Tangible Chattel Paper equals or exceeds $10,000,000 in the aggregate.

3.12. Controlled Deposit Accounts. (a) Within 60 days after the date hereof (or such longer period as may be agreed by the Collateral Agent in its sole discretion), each applicable Grantor agrees to use commercially reasonable efforts to enter into control agreements with the relevant account bank with respect to each Deposit Account that is subject to a control agreement on the date hereof pursuant to the ABL Credit Agreement which control agreements shall (i) name each of the Collateral Agent and Deutsche Bank AG New York Branch as secured parties and (ii) replace the existing control agreement with respect to such Deposit Account.

(b) Following the Discharge of ABL Obligations, each Grantor agrees within 60 days (or such longer period as may be agreed by the Collateral Agent in its sole discretion) to cause account control agreements to be entered into with the relevant account banks so that the Collateral Agent has "control" of any Deposit Account (other than any Excluded Account) with an average daily balance greater than $1,000,000, to the extent any such Deposit Account is not then subject to a control agreement entered into in accordance with clause (a) of this Section 3.12.

(c) If, prior to the Discharge of the ABL Obligations, any Grantor shall subsequently acquire any Deposit Account that is required to be subject to a control agreement pursuant to the terms of the ABL Credit Agreement, such Grantor shall use commercially reasonable efforts to ensure that such control agreement names each of the Collateral Agent and Deutsche Bank AG New York Branch as secured parties. If, following the Discharge of ABL Obligations, any Grantor shall subsequently acquire any Deposit Account (other than any Excluded Account), with an average daily balance greater than $1,000,000, such Grantor shall comply with the provisions of clause (b) of this Section 3.12 within 60 days (or such longer period as may be agreed by the Collateral Agent in its sole discretion) of acquiring such Deposit Account.

3.13. Recordable Intellectual Property. (a) Annex G hereto sets forth as of the date hereof a complete and accurate list of all Recordable Intellectual Property that each Grantor owns. Each Grantor represents and warrants that as of the date hereof it is the sole owner of all right, title and interest in all Recordable Intellectual Property listed in Annex G hereto, except where the failure to have such sole ownership could not reasonably be expected, either individually or in the aggregate, to have a Material Adverse Effect. Each Grantor represents and warrants that:

1. (i) no Recordable Intellectual Property listed in Annex G hereto has been canceled nor is any cancelation or opposition action pending, to the knowledge of any Responsible Officer of such Grantor;

2. (ii) all such Recordable Intellectual Property is valid and subsisting;

3. (iii) such Grantor is not aware of any pending third-party claim that any of said registrations of Recordable Intellectual Property are invalid or unenforceable; and

4. (iv) such Grantor has not been advised in writing by counsel or by the relevant Intellectual Property Office, nor is such Grantor otherwise aware of any reason, that any of said applications of Recordable Intellectual Property will not mature into registrations,

5. other than, in the case of each of the foregoing clauses (i) – (iv), as would not reasonably be expected to have, either individually or in the aggregate, a Material Adverse Effect.

6. Each Grantor hereby grants to the Collateral Agent an absolute power of attorney to sign, solely upon the occurrence and during the continuance of an Event of Default, any document which may be required by the United States Patent and Trademark Office, any domain name registrar, the United States Copyright Office or any other governmental authority in order to effect an assignment of all right, title and interest in any Intellectual Property constituting Collateral, and record the same.

(b) Each Grantor agrees, within 60 days of the end of each fiscal year, to notify the Collateral Agent in writing of the name and address of, and to furnish such pertinent information that may be available to such Grantor with respect to: (i) any party who such Grantor reasonably believes is infringing, misappropriating, diluting or otherwise violating any of such Grantor's rights in and to any Intellectual Property in any manner that would reasonably be expected to have a Material Adverse Effect, or (ii) any party, to the knowledge of any Responsible Officer of such Grantor, claiming that any Grantor or the conduct of any Grantor's business infringes, misappropriates, dilutes or otherwise violates any Intellectual Property right of any third party in any manner that would reasonably be expected to have a Material Adverse Effect. Each Grantor further agrees to take all necessary action, in accordance with its reasonable business judgment, with respect to any Person infringing, misappropriating, diluting or otherwise violating any Intellectual Property owned by it if failure to do so would reasonably be expected to have a Material Adverse Effect.

(c) Each Grantor agrees to use its Trademarks that are material to the business of the Company and its Restricted Subsidiaries, taken as a whole, in interstate commerce during the time in which this Agreement is in effect to the extent required by the laws of the United States or other jurisdictions, as applicable, to maintain its rights in such Trademarks and to take all such other actions as are reasonably necessary to preserve such Trademarks as trademarks or service marks under the laws of the United States or other jurisdictions, as applicable (other than any such Trademarks that are deemed by a Grantor in its reasonable business judgment to no longer be material to the conduct of such Grantor's business).

(d) Each Grantor shall, at its own expense, diligently maintain all registrations and applications for registration included in the Recordable Intellectual Property that are material to the business of the Company and its Restricted Subsidiaries, taken as a whole, in accordance with its reasonable business judgment, including but not limited to filing affidavits of use and applications for renewals of registration for all such Recordable Intellectual Property constituting registered Trademarks and timely payment of all post-issuance fees required to maintain in force its rights under each such Recordable Intellectual Property constituting issued Patent or registered Copyright, and shall pay all fees and disbursements in connection therewith and shall not abandon any such registration, filing of affidavit of use or application of renewal prior to the exhaustion of all administrative and judicial remedies without prior written consent of the Collateral Agent, not to be unreasonably withheld (other than with respect to registrations and applications deemed by such Grantor in its reasonable business judgment to be no longer prudent to pursue).

(e) At its own expense, each Grantor, in accordance with its reasonable business judgment, shall diligently prosecute all material applications for (i) United States Patents listed in Annex G hereto and (ii) Copyrights listed in Annex G hereto, in each case for such Grantor and shall not abandon any such application prior to exhaustion of all administrative and judicial remedies (other than applications that are no longer material or are deemed by such Grantor in its reasonable business judgment to no longer be necessary in the conduct of Grantor's business), absent written consent of the Collateral Agent not to be unreasonably withheld.

(f) In the event that any Grantor, either itself or through any agent, employee, licensee or designee, files an application for or acquires any Recordable Intellectual Property following the date hereof, then the provisions of this Agreement shall automatically apply thereto and any such Intellectual Property shall automatically constitute part of the Collateral and shall be subject to the Collateral Agent's security interest, without further action by any party, and such Grantor shall within 60 days of the end of each fiscal year execute and deliver any and all agreements, instruments, documents and papers, including any applicable Intellectual Property Security Agreement, as necessary to evidence and perfect the Collateral Agent's security interest in such Recordable Intellectual Property provided that such agreements, instruments, documents and papers (the "Writings") are consistent with the terms of and conditions of this Agreement, and each Grantor hereby appoints the Collateral Agent as its attorney-in-fact to execute and file such Writings, solely upon the occurrence and during the continuance of an Event of Default and solely for the foregoing purposes, all acts of such attorney being hereby ratified and confirmed; such power, being coupled with an interest, is irrevocable until this Agreement is terminated.

ARTICLE IV

PROVISIONS CONCERNING ALL COLLATERAL

4.1. Protection of Collateral Agent's Security. Except as otherwise permitted by the Loan Documents, no Grantor will do anything to impair the rights of the Collateral Agent in the Collateral. Each Grantor will at all times maintain insurance, at such Grantor's own expense to the extent and in the manner provided in the Credit Agreement. Except to the extent otherwise permitted to be retained by such Grantor or applied by such Grantor pursuant to the terms of the Credit Agreement and the Intercreditor Agreement, the Collateral Agent shall, at the time any proceeds of such insurance are distributed to the Secured Parties, apply such proceeds in accordance with Section 5.4 hereof. Each Grantor assumes all liability and responsibility in connection with the Collateral acquired by it and the liability of such Grantor to pay the Obligations shall in no way be affected or diminished by reason of the fact that such Collateral may be lost, destroyed, stolen, damaged or for any reason whatsoever unavailable to such Grantor.

4.2. Additional Information. Each Grantor will, at its own expense, from time to time upon the reasonable request of the Collateral Agent, promptly (and in any event within 10 days after its receipt of the respective request) furnish to the Collateral Agent such information with respect to the Collateral (including the identity of the Collateral or such components thereof as may have been requested by the Collateral Agent, the value and location of such Collateral, etc.) as may be requested by the Collateral Agent. Without limiting the forgoing, each Grantor agrees that it shall promptly (and in any event within 10 days after its receipt of the respective request) furnish to the Collateral Agent such updated Annexes hereto as may from time to time be reasonably requested by the Collateral Agent.

4.3. Financing Statements. Each Grantor agrees to execute and deliver (or cause to be executed and delivered) to the Collateral Agent such financing statements, in form reasonably acceptable to the Collateral Agent, as the Collateral Agent may from time to time reasonably request or as are reasonably necessary or desirable in the opinion of, and at the request of, the Collateral Agent to establish and maintain a valid, enforceable, perfected security interest in the Collateral as provided herein and the other rights and security contemplated hereby. Each Grantor will pay any applicable filing fees, recordation taxes and related expenses relating to its Collateral. Each Grantor hereby authorizes the Collateral Agent to file any such financing statements without the signature of such Grantor where permitted by law (and such authorization includes describing the Collateral as "all assets" of such Grantor or words of similar effect). Notwithstanding the foregoing, if reasonably requested by any Grantor, the Collateral Agent shall, at Grantor's expense, make such filings as may be reasonably requested to evidence that the security interests hereunder do not attach to any property that constitutes Excluded Assets.

4.4. Further Actions. The Company shall, and shall cause each other Grantor to, at their own expense, take such other actions as are required by Section 6.12 of the Credit Agreement.

ARTICLE V

REMEDIES UPON OCCURRENCE OF AN EVENT OF DEFAULT

5.1. Remedies; Obtaining the Collateral Upon Default. Each Grantor agrees that, subject to the Intercreditor Agreement, if any Event of Default shall have occurred and be continuing, then and in every such case, the Collateral Agent, in addition to any rights now or hereafter existing under applicable law and under the other provisions of this Agreement, shall have all rights as a secured creditor under any UCC, and such additional rights and remedies to which a secured creditor is entitled under the laws in effect in all relevant jurisdictions and may:

(i) personally, or by agents or attorneys, immediately take possession of the Collateral or any part thereof, from such Grantor or any other Person who then has possession of any part thereof with or without notice or process of law, and for that purpose may enter upon such Grantor's premises where any of the Collateral is located and remove the same and use in connection with such removal any and all services, supplies, aids and other facilities of such Grantor;

(ii) instruct the obligor or obligors on any agreement, instrument or other obligation (including, without limitation, the Accounts and the Contracts) constituting the Collateral to make any payment required by the terms of such agreement, instrument or other obligation directly to the Collateral Agent and may exercise any and all remedies of such Grantor in respect of such Collateral;

(iii) instruct all banks which have entered into a control agreement with the Collateral Agent to transfer all monies, securities and instruments held by such depositary bank to the Cash Collateral Account;

(iv) sell, assign or otherwise liquidate any or all of the Collateral or any part thereof in accordance with Section 5.2 hereof, or direct such Grantor to sell, assign or otherwise liquidate any or all of the Collateral or any part thereof, and, in each case, take possession of the proceeds of any such sale or liquidation;

(v) take possession of the Collateral or any part thereof, by directing such Grantor in writing to deliver the same to the Collateral Agent at any reasonable place or places designated by the Collateral Agent, in which event such Grantor shall at its own expense:

(x) forthwith cause the same to be moved to the place or places so designated by the Collateral Agent and there delivered to the Collateral Agent;

(y) store and keep any Collateral so delivered to the Collateral Agent at such place or places pending further action by the Collateral Agent as provided in Section 5.2 hereof; and

(z) while the Collateral shall be so stored and kept, provide such security and maintenance services as shall be reasonably necessary to protect the same and to preserve and maintain it in good condition;

(vi) exercise the rights granted under Section 1.3 hereof;

(vii) apply any monies constituting Collateral or proceeds thereof in accordance with the provisions of Section 5.4;

(viii) license or sublicense, on a royalty free, rent basis, whether on an exclusive or nonexclusive basis, any Intellectual Property included in the Collateral (in the case of Trademarks, subject to reasonable quality control and subject to those exclusive licenses granted by Grantors in effect on the date hereof and those granted by any Grantor hereafter to the extent permitted by the Credit Agreement) for such term and on such conditions and in such manner as the Collateral Agent shall in its sole judgment determine, it being understood that any such license, may be exercised, at the option of the Collateral Agent, only upon the occurrence and during the continuation of an Event of Default; provided, that any such license shall be binding upon the Grantors notwithstanding any subsequent cure of an Event of Default;

(ix) take any other action as specified in clauses (1) through (5), inclusive, of Section 9-607(a) of the UCC;

it being understood that each Grantor's obligation so to deliver the Collateral is of the essence of this Agreement and that, accordingly, upon application to a court of equity having jurisdiction, the Collateral Agent shall be entitled to a decree requiring specific performance by such Grantor of said obligation. By accepting the benefits of this Agreement and each other Collateral Document, the Secured Parties expressly acknowledge and agree that this Agreement and each other Collateral Document may be enforced only by the action of the Collateral Agent acting upon the instructions of the Required Lenders and that no other Secured Party shall have any right individually to seek to enforce or to enforce this Agreement or to realize upon the security to be granted hereby, it being understood and agreed that such rights and remedies may be exercised by the Collateral Agent for the benefit of the Secured Parties upon the terms of this Agreement and the other Collateral Documents.

5.2. Remedies; Disposition of the Collateral. If any Event of Default shall have occurred and be continuing, then, subject to the Intercreditor Agreement, any Collateral repossessed by the Collateral Agent under or pursuant to Section 5.1 hereof and any other Collateral whether or not so repossessed by the Collateral Agent, may be sold, assigned, leased or otherwise disposed of under one or more contracts or as an entirety, and without the necessity of gathering at the place of sale the property to be sold, and in general in such manner, at such time or times, at such place or places and on such terms as the Collateral Agent may, in compliance with any mandatory requirements of applicable law, determine to be commercially reasonable. Any of such Collateral may be sold, leased or otherwise disposed of, in the condition in which the same existed when taken by the Collateral Agent or after any overhaul or repair at the expense of the relevant Grantor which

the Collateral Agent shall determine to be commercially reasonable. Any such sale, lease or other disposition may be effected by means of a public disposition or private disposition, effected in accordance with the applicable requirements (in each case if and to the extent applicable) of Sections 9-610 through 9-613 of the UCC and/or such other mandatory requirements of applicable law as may apply to the respective disposition. The Collateral Agent may, without notice or publication, adjourn any public or private disposition or cause the same to be adjourned from time to time by announcement at the time and place fixed for the disposition, and such disposition may be made at any time or place to which the disposition may be so adjourned. To the extent permitted by any such requirement of law, the Collateral Agent may bid for and become the purchaser (and may pay all or any portion of the purchase price by crediting Obligations against the purchase price) of the Collateral or any item thereof, offered for disposition in accordance with this Section 5.2 without accountability to the relevant Grantor. If, under applicable law, the Collateral Agent shall be permitted to make disposition of the Collateral within a period of time which does not permit the giving of notice to the relevant Grantor as hereinabove specified, the Collateral Agent need give such Grantor only such notice of disposition as shall be required by such applicable law. Each Grantor agrees to do or cause to be done all such other acts and things as may be reasonably necessary to make such disposition or dispositions of all or any portion of the Collateral valid and binding and in compliance with any and all applicable laws, regulations, orders, writs, injunctions, decrees or awards of any and all courts, arbitrators or governmental instrumentalities, domestic or foreign, having jurisdiction over any such sale or sales, all at such Grantor's expense.

5.3. Waiver of Claims. Except as otherwise provided in this Agreement, EACH GRANTOR HEREBY WAIVES, TO THE EXTENT PERMITTED BY APPLICABLE LAW, NOTICE AND JUDICIAL HEARING IN CONNECTION WITH THE COLLATERAL AGENT'S TAKING POSSESSION OR THE COLLATERAL AGENT'S DISPOSITION OF ANY OF THE COLLATERAL, IN EACH CASE AFTER THE OCCURRENCE AND DURING THE CONTINUANCE OF AN EVENT OF DEFAULT, INCLUDING, WITHOUT LIMITATION, ANY AND ALL PRIOR NOTICE AND HEARING FOR ANY PREJUDGMENT REMEDY OR REMEDIES, and each Grantor hereby further waives, to the extent permitted by law:

(i) all damages occasioned by such taking of possession or any such disposition except any damages which are the direct result of the Collateral Agent's gross negligence or willful misconduct (as determined by a court of competent jurisdiction in a final and non-appealable decision);

(ii) all other requirements as to the time, place and terms of sale or other requirements with respect to the enforcement of the Collateral Agent's rights hereunder; and

(iii) all rights of redemption, appraisement, valuation, stay, extension or moratorium now or hereafter in force under any applicable law in order to prevent or delay the enforcement of this Agreement or the absolute sale of the Collateral or any portion thereof, and each Grantor, for itself and all who may claim under it, insofar as it or they now or hereafter lawfully may, hereby waives the benefit of all such laws.

Any sale of, or the grant of options to purchase, or any other realization upon, any Collateral shall operate to divest all right, title, interest, claim and demand, either at law or in equity, of the relevant Grantor therein and thereto, and shall be a perpetual bar both at law and in equity against such Grantor and against any and all Persons claiming or attempting to claim the Collateral so sold, optioned or realized upon, or any part thereof, from, through and under such Grantor.

5.4. Application of Proceeds. (a) Subject to the Intercreditor Agreement, all moneys collected by the Collateral Agent (or, to the extent the Pledge Agreement or any other Collateral Document requires proceeds of collateral under such other Collateral Document to be applied in accordance with the provisions of this Agreement, the Pledgee, under, and as defined in, the Pledge Agreement or collateral agent under such other Collateral Document) upon any sale or other disposition of the Collateral (or the collateral under the relevant Collateral Document), in connection with the Collateral Agent's exercise of remedies following the occurrence and during the continuance of an Event of Default, together with all other moneys received by the Collateral Agent hereunder or under any other Collateral Document, shall be applied as follows:

(i) first, to the payment of all amounts owing the Collateral Agent and the Administrative Agent in their respective capacities as such in accordance with the terms of the Loan Documents;

(ii) second, to the payment in full of the Obligations owing to the Secured Parties on a pro rata basis in accordance with the respective amounts of the Obligations; and

(ii) third, to the Grantors and/or other Persons entitled thereto.

(b) For purposes of applying payments received in accordance with this Section 5.4, the Collateral Agent shall be entitled to rely upon the Administrative Agent for a determination (which the Administrative Agent agrees (or shall agree) to provide upon request of the Collateral Agent) of the outstanding Obligations owed to the Secured Parties.

(c) It is understood that the Grantors shall remain jointly and severally liable to the extent of any deficiency between the amount of the proceeds of the Collateral and the aggregate amount of the Obligations.

(d) It is understood and agreed by each Grantor and each Secured Party that the Collateral Agent shall have no liability for any determinations made by it in this Section 5.4, in each case except to the extent resulting from the gross negligence or willful misconduct of the Collateral Agent (as determined by a court of competent jurisdiction in a final and non-appealable decision). Each Grantor and each Secured Party also agrees that the Collateral Agent may (but shall not be required to), at any time and in its sole discretion, and with no liability resulting therefrom, petition a court of competent jurisdiction regarding any application of Collateral in accordance with the requirements hereof, and the Collateral Agent shall be entitled to wait for, and may conclusively rely on, any such determination.

5.5. Remedies Cumulative. Each and every right, power and remedy hereby specifically given to the Collateral Agent shall be in addition to every other right, power and

remedy specifically given to the Collateral Agent under this Agreement, the other Loan Documents or now or hereafter existing at law, in equity or by statute and each and every right, power and remedy whether specifically herein given or otherwise existing may be exercised from time to time or simultaneously and as often and in such order as may be deemed expedient by the Collateral Agent. All such rights, powers and remedies shall be cumulative and the exercise or the beginning of the exercise of one shall not be deemed a waiver of the right to exercise any other or others. No delay or omission of the Collateral Agent in the exercise of any such right, power or remedy and no renewal or extension of any of the Obligations shall impair any such right, power or remedy or shall be construed to be a waiver of any Default or Event of Default or an acquiescence thereof. No notice to or demand on any Grantor in any case shall entitle it to any other or further notice or demand in similar or other circumstances or constitute a waiver of any of the rights of the Collateral Agent to any other or further action in any circumstances without notice or demand. In the event that the Collateral Agent shall bring any suit to enforce any of its rights hereunder and shall be entitled to judgment, then in such suit the Collateral Agent may recover reasonable expenses, including reasonable attorneys' fees, and the amounts thereof shall be included in such judgment.

5.6. Discontinuance of Proceedings. In case the Collateral Agent shall have instituted any proceeding to enforce any right, power or remedy under this Agreement by foreclosure, sale, entry or otherwise, and such proceeding shall have been discontinued or abandoned for any reason or shall have been determined adversely to the Collateral Agent, then and in every such case the relevant Grantor, the Collateral Agent and each holder of any of the Obligations shall be restored to their former positions and rights hereunder with respect to the Collateral subject to the security interest created under this Agreement, and all rights, remedies and powers of the Collateral Agent shall continue as if no such proceeding had been instituted.

ARTICLE VI

INDEMNITY

6.1. Indemnity. (a) The parties hereto agree that the terms of Section 10.04 of the Credit Agreement are incorporated herein by reference, *mutatis mutandis*. If and to the extent that the obligations of any Grantor under this Section 6.1 are unenforceable for any reason, such Grantor hereby agrees to make the maximum contribution to the payment and satisfaction of such obligations which is permissible under applicable law.

6.2. Indemnity Obligations Secured by Collateral; Survival. Any amounts paid by any Indemnitee as to which such Indemnitee has the right to reimbursement hereunder or under the other Loan Documents shall constitute Obligations secured by the Collateral. The indemnity obligations of each Grantor contained in this Article VI shall continue in full force and effect notwithstanding the full payment of all of the other Obligations and notwithstanding the full payment of all the Notes issued, and Loans made, under the Credit Agreement and the payment of all other Obligations and notwithstanding the discharge thereof and the occurrence of the Termination Date.

ARTICLE VII

DEFINITIONS

The following terms shall have the meanings herein specified. Such definitions shall be equally applicable to the singular and plural forms of the terms defined.

"ABL Collateral Agent" shall have the meaning provided in the Intercreditor Agreement.

"Account" shall mean any "account" as such term is defined in the UCC, and in any event shall include but shall not be limited to, all rights to payment of any monetary obligation, whether or not earned by performance, (i) for property that has been or is to be sold, leased, licensed, assigned or otherwise disposed of, (ii) for services rendered or to be rendered, (iii) for a policy of insurance issued or to be issued, (iv) for a secondary obligation incurred or to be incurred, (v) for energy provided or to be provided, (vi) for the use or hire of a vessel under a charter or other contract, (vii) arising out of the use of a credit or charge card or information contained on or for use with the card, or (viii) as winnings in a lottery or other game of chance operated or sponsored by a State, governmental unit of a State, or person licensed or authorized to operate the game by a State or governmental unit of a State. Without limiting the foregoing, the term "account" shall include all Health-Care-Insurance Receivables.

"Administrative Agent" shall have the meaning provided in the recitals of this Agreement.

"Agreement" shall mean this Security Agreement, as the same may be amended, modified, restated and/or supplemented from time to time in accordance with its terms.

"Cash Collateral Account" shall mean a non-interest bearing cash collateral account maintained with, and in the sole dominion and control of, the Collateral Agent for the benefit of the Secured Parties.

"Chattel Paper" shall mean "chattel paper" as such term is defined in the UCC. Without limiting the foregoing, the term "Chattel Paper" shall in any event include all Tangible Chattel Paper and all Electronic Chattel Paper.

"Collateral" shall have the meaning provided in Section 1.1(a) of this Agreement.

"Collateral Agent" shall have the meaning provided in the first paragraph of this Agreement.

"Collateral Documents" shall have the meaning provided in the Credit Agreement.

"Commercial Tort Claims" shall mean "commercial tort claims" as such term is defined in the UCC.

"Commodity Account" shall mean all "commodity accounts" as such term is defined in the UCC.

"Company" shall have the meaning provided in the recitals of this Agreement.

"Contract Rights" shall mean all rights of any Grantor under each Contract, including, without limitation, (i) any and all rights to receive and demand payments under any or all Contracts, (ii) any and all rights to receive and compel performance under any or all Contracts and (iii) any and all other rights, interests and claims now existing or in the future arising in connection with any or all Contracts.

"Contracts" shall mean all contracts between any Grantor and one or more additional parties (including, without limitation, any Swap Contracts, licensing agreements and any partnership agreements, joint venture agreements and limited liability company agreements).

"Controlled Deposit Accounts" shall mean Deposit Accounts that are subject to the "control" of the Collateral Agent.

"Copyrights" shall mean all: (a) copyrights (whether statutory or common law, whether registered or unregistered and whether published or unpublished) all mask works (as such term is defined in 17 U.S.C. Section 901, et seq.), and all copyright registrations and applications therefor, including, without limitation, the copyright registrations and applications in the United States Copyright Office listed in Annex G; (b) rights and privileges arising under applicable law with respect to such copyrights; and (c) renewals and extensions thereof and amendments thereto.

"Copyright Security Agreement" shall mean a copyright security agreement, in the form attached hereto as Exhibit B, executed and delivered by a Grantor in favor of the Collateral Agent for the benefit of the Secured Parties.

"Credit Agreement" shall have the meaning provided in the recitals of this Agreement.

"Deposit Accounts" shall mean all "deposit accounts" as such term is defined in the UCC and all other demand, deposit, time, savings, cash management, passbook and similar accounts.

"Discharge of ABL Obligations" shall have the meaning provided in the Intercreditor Agreement.

"Documents" shall mean "documents" as such term is defined in the UCC.

"Domain Names" shall mean all Internet domain names and associated URL addresses in or to which any Grantor now or hereafter has any right, title or interest.

"Electronic Chattel Paper" shall mean "electronic chattel paper" as such term is defined in the UCC.

"Equipment" shall mean any "equipment" as such term is defined in the UCC, and in any event, shall include, but shall not be limited to, all machinery, equipment, furnishings, fixtures and vehicles now or hereafter owned by any Grantor and any and all additions, substitutions and replacements of any of the foregoing and all accessions thereto, wherever located, together with all attachments, components, parts, equipment and accessories installed thereon or affixed thereto.

"Event of Default" shall mean any Event of Default under, and as defined in, the Credit Agreement.

"Excluded Account" shall mean (i) any withholding tax, fiduciary account, employee benefit, trust, payroll or escrow account, (ii) any zero balance Deposit Account provided the amount on deposit therein does not exceed the amount necessary to cover outstanding checks, amounts necessary to maintain minimum deposit requirements and amounts necessary to pay the depositary institution's fees and expenses, (iii) any Deposit Account maintained outside of the United States and (iv) any Deposit Account or Securities Account maintained in connection with pledges of cash or Cash Equivalents permitted under Section 7.01(e), (f), (p), (s), (u) or (x) of the Credit Agreement.

"Excluded Assets" shall have the meaning provided in Section 1.1(b) of this Agreement.

"Financial Assets" shall mean all present and future "financial assets" as such term is defined in the UCC.

"Fixture" shall mean "fixture" as such term is defined in the UCC.

"General Intangibles" shall mean "general intangibles" as such term is defined in the UCC.

"Goods" shall mean "goods" as such term is defined in the UCC.

"Grantor" shall have the meaning provided in the first paragraph of this Agreement.

"Health-Care-Insurance Receivable" shall mean any "health-care-insurance receivable" as such term is defined in the UCC.

"Instrument" shall mean "instruments" as such term is defined in the UCC.

"Intellectual Property" shall mean (a) all intellectual and similar property of any Grantor of every kind and nature now owned or hereafter acquired by any Grantor, including inventions, designs, Patents, Copyrights, Licenses, Trademarks, Software, Trade Secrets, confidential or proprietary technical and business information, know-how, show-how or other data or information, software and databases and all embodiments or fixations thereof and related documentation, registrations and franchises, and all additions, improvements and accessions to, and books and records describing or used in connection with, any of the foregoing; (b) rights corresponding to any of the foregoing throughout the world, including as provided by international treaties or conventions, and all other rights of any kind whatsoever accruing thereunder or pertaining thereto; (c) income, royalties, damages, claims, and payments now or hereafter due or payable under

and with respect to any of the foregoing, including damages and payments for past and future infringements, misappropriations, or other violations thereof; and (d) rights to sue for past, present, and future infringements, misappropriations, or other violations of any of the foregoing, including the right to settle suits involving claims and demands for royalties owing.

"Intellectual Property Security Agreement" shall mean a Copyright Security Agreement, a Patent Security Agreement or a Trademark Security Agreement.

"Inventory" shall mean merchandise, inventory and goods, and all additions, substitutions and replacements thereof and all accessions thereto, wherever located, together with all goods, supplies, incidentals, packaging materials, labels, materials and any other items used or usable in manufacturing, processing, packaging or shipping same, in all stages of production from raw materials through work in process to finished goods, and all products and proceeds of whatever sort and wherever located any portion thereof which may be returned, rejected, reclaimed or repossessed by the Collateral Agent from any Grantor's customers, and shall specifically include all "inventory" as such term is defined in the UCC.

"Investment Property" shall mean "investment property" as such term is defined in the UCC.

"Lenders" shall have the meaning provided in the recitals of this Agreement.

"Letter-of-Credit Rights" shall mean "letter-of-credit rights" as such term is defined in the UCC.

"Licenses" shall mean any and all licenses, agreements, consents, orders, franchises and similar arrangements in respect of the licensing, development, use or disclosure of any Intellectual Property.

"Location" of any Grantor, shall mean such Grantor's "location" as determined pursuant to Section 9-307 of the UCC.

"Margin Stock" shall have the meaning provided in Regulation U.

"Money" shall mean all present and future "money" as defined in Article 1 of the UCC.

"Non-Voting Equity Interests" shall mean all Equity Interests of any Person which are not Voting Equity Interests.

"Obligations" shall have the meaning provided in the Credit Agreement.

"Patents" shall mean all (a) industrial designs, letters patent, certificates of inventions, all registrations and recordings thereof, and all applications for letters patent, including registrations, recordings and pending applications in the United States Patent and Trademark Office listed in Annex G, and (b) reissues, continuations, divisions, continuations-in-part, renewals or

extensions thereof, and the inventions disclosed or claimed therein, including the right to make, use and/or sell the inventions disclosed or claimed therein and all improvements thereto.

"Patent Security Agreement" shall mean a patent security agreement, in the attached hereto as Exhibit C, executed and delivered by a Grantor in favor of the Collateral Agent for the benefit of the Secured Parties.

"Permits" shall mean, to the extent permitted to be assigned by the terms thereof or by applicable law, all licenses, permits, consent, approval, rights, orders, variances, franchises or authorizations of or from any Governmental Authority or agency.

"Pledge Agreement Collateral" shall mean all "Collateral" as defined in the Pledge Agreement.

"Pledge Agreement" shall mean the Term Loan Pledge Agreement dated of even date herewith by Ciena Corporation, each other Pledgor from time to time party thereto and the Collateral Agent, as pledgee.

"Proceeds" shall mean all "proceeds" as such term is defined in the UCC and, in any event, shall also include, but not be limited to, (i) any and all proceeds of any insurance, indemnity, warranty or guaranty payable to the Collateral Agent or any Grantor from time to time with respect to any of the Collateral, (ii) any and all payments (in any form whatsoever) made or due and payable to any Grantor from time to time in connection with any requisition, confiscation, condemnation, seizure or forfeiture of all or any part of the Collateral by any Governmental Authority (or any person acting under color of Governmental Authority) and (iii) any and all other amounts from time to time paid or payable under or in connection with any of the Collateral.

"Recordable Intellectual Property" shall mean (i) any Patent issued by or applied for issuance with the United States Patent and Trademark Office, (ii) any Trademark registered or applied for registration with the United States Patent and Trademark Office, (iii) any Copyright registered or applied for registration with the United States Copyright Office and (iv) any material License granting to any Grantor any exclusive right to use, copy, reproduce, distribute, prepare derivative works, display or publish any records or other materials pertaining to a Copyright registered with the United States Copyright Office.

"Registered Organization" shall have the meaning provided in the UCC.

"Regulation U" shall mean Regulation U of the Board of Governors of the Federal Reserve System of the United States as from time to time in effect and any successor to all or a portion thereof.

"Securities Accounts" shall mean all present and future "securities accounts" as such term is defined in Article 8 of the UCC, including all monies, "uncertificated securities," and "securities entitlements" (each as defined in Article 8 of the UCC) contained therein.

"Security" means all present and future "securities" as such term is defined in Article 8 of the UCC.

"Security Agreement Supplement" shall mean a security agreement supplement, in the form attached hereto as Exhibit A, signed and delivered to the Collateral Agent for the purpose of adding a Restricted Subsidiary as a party hereto pursuant to Section 8.12 and/or adding additional property to the Collateral.

"Security Entitlements" shall mean all present and future "security entitlements" as such term is defined in Article 8 of the UCC.

"Software" shall mean all computer software, programs and databases (including, without limitation, source code, object code and all related applications and data files), firmware and documentation and materials relating thereto, together with any and all maintenance rights, service rights, programming rights, hosting rights, test rights, improvement rights, renewal rights and indemnification rights and any substitutions, replacements, improvements, error corrections, updates and new versions of any of the foregoing.

"State" shall mean any state of the United States.

"Supporting Obligations" shall mean any "supporting obligation" as such term is defined in the UCC, now or hereafter owned by any Grantor, or in which any Grantor has any rights, and, in any event, shall include, but shall not be limited to all of such Grantor's rights in any Letter-of-Credit Right or secondary obligation that supports the payment or performance of, and all security for, any Account, Chattel Paper, Document, General Intangible, Instrument or Investment Property.

"Tangible Chattel Paper" shall mean "tangible chattel paper" as such term is defined in the UCC.

"Termination Date" shall have the meaning provided in Section 8.8(a) of this Agreement.

"Trade Secrets" shall mean any confidential and proprietary information, including inventions, formulae, algorithms, production procedures, know-how, methods, techniques, marketing, plans, analyses, proposals, customer lists, supplier lists, specifications, models, personal information, data collections, source code and object code of a Grantor worldwide whether written or not.

"Trademarks" shall mean all: (a) trademarks, service marks, certification marks, domain names and associated URLs, trade names, corporate names, company names, business names, fictitious business names, trade styles, trade dress, logos, slogans, other source or business identifiers, designs and general intangibles of like nature, all registrations and recordings thereof, and all registrations and applications filed in connection therewith, including registrations and registration applications in the United States Patent and Trademark Office that are listed in Annex G, (b) all extensions or renewals of any of the foregoing, (c) goodwill associated therewith or symbolized thereby, (d) other assets, rights and interests that uniquely reflect or embody such

goodwill, and (e) rights and privileges arising under applicable law with respect to the use of any of the foregoing.

"Trademark Security Agreement" shall mean a trademark security agreement, in the form attached hereto as Exhibit D, executed and delivered by a Grantor in favor of the Collateral Agent for the benefit of the Secured Parties.

"Transmitting Utility" shall have the meaning given such term in Section 9-102(a)(80) of the UCC as in effect on the date hereof.

"Vehicles" shall mean all cars, trucks and other vehicles covered by a certificate of title law of any state.

"Voting Equity Interests" of any Person shall mean all classes of Equity Interests of such Person entitled to vote in the election of the board of directors of such Person (or such equivalent governing body of such Person).

"UCC" shall mean the Uniform Commercial Code as in effect from time to time in the State of New York; provided that, if perfection or the effect of perfection or non-perfection or the priority of any Lien on any Collateral is governed by the Uniform Commercial Code as in effect in a jurisdiction other than New York, "UCC" means the Uniform Commercial Code as in effect from time to time in such other jurisdiction for purposes of the provisions hereof relating to such perfection, effect of perfection or non-perfection or priority.

ARTICLE VIII

MISCELLANEOUS

8.1. Notices. Except as otherwise specified herein, all notices, requests, demands or other communications to or upon the respective parties hereto shall be in writing and shall be sent or delivered by mail, telecopy or courier service and all such notices and communications shall, when mailed, telecopied or sent by courier, be effective when deposited in the mails, delivered to the overnight courier, or sent by telecopier, except that notices and communications to the Collateral Agent or any Grantor shall not be effective until received by the Collateral Agent or such Grantor, as the case may be. All notices and other communications shall be in writing and addressed as follows:

(a) if to any Grantor, c/o:

Ciena Corporation
7035 Ridge Road
Hanover, Maryland 21076
Attention: Treasurer's Office
Facsimile: (410) 865-8901

with a copy to:

Ciena Corporation
7035 Ridge Road
Hanover, Maryland 21076
Attention: General Counsel's Office
Facsimile: (410) 865-8001

(b) if to the Collateral Agent, at:

Bank of America, N.A.
Agency Management
900 West Trade Street
Mail Code: NC1-026-06-03
Charlotte, NC 28255-0001
Attention: Priscilla Baker
Telephone: 980-386-3475
Facsimile: 704-409-0918
Electronic Mail: ~~priscilla.l.baker@baml.com~~priscilla.l.baker@baml.com

or at such other address or addressed to such other individual as shall have been furnished in writing by any Person described above to the party required to give notice hereunder.

8.2. Waiver; Amendment. Except as provided in Sections 8.8, 8.12 and 8.15 hereof and Section 10.01 of the Credit Agreement, none of the terms and conditions of this Agreement or any other Collateral Document may be changed, waived, modified or varied in any manner whatsoever unless in writing duly signed by each Grantor directly affected thereby (it being understood that the addition or release of any Grantor hereunder or under another Collateral Document shall not constitute a change, waiver, discharge or termination affecting any Grantor other than the Grantor so added or released) and the Collateral Agent (with the written consent of the Required Lenders).

8.3. Obligations Absolute. The obligations of each Grantor hereunder shall remain in full force and effect without regard to, and shall not be impaired by, (a) any bankruptcy, insolvency, reorganization, arrangement, readjustment, composition, liquidation or the like of such Grantor; (b) any exercise or non-exercise, or any waiver of, any right, remedy, power or privilege under or in respect of this Agreement or any other Secured Debt Agreement; or (c) any amendment to or modification of any other Secured Debt Agreement or any security for any of the Obligations (in each case), whether or not such Grantor shall have notice or knowledge of any of the foregoing.

8.4. Successors and Assigns. This Agreement shall create a continuing security interest in the Collateral and shall (i) remain in full force and effect, subject to release and/or termination as set forth in Section 8.8 hereof, (ii) be binding upon each Grantor, its successors and assigns, provided however, that except as otherwise permitted by the Credit Agreement, no Grantor shall assign any of its rights or obligations hereunder without the prior written consent of the Collateral Agent (with the consent of the Required Lenders), and (iii) inure, together with the rights and remedies of the Collateral Agent

hereunder, to the benefit of the Collateral Agent, the other Secured Parties and their respective successors, transferees and assigns. All agreements, statements, representations and warranties made by each Grantor herein or in any certificate or other instrument delivered by such Grantor or on its behalf under this Agreement shall be considered to have been relied upon by the Secured Parties and shall survive the execution and delivery of this Agreement and the other Loan Documents regardless of any investigation made by the Secured Parties or on their behalf.

8.5. Headings Descriptive. The headings of the several sections of this Agreement are inserted for convenience only and shall not in any way affect the meaning or construction of any provision of this Agreement.

8.6. GOVERNING LAW; SUBMISSION TO JURISDICTION; VENUE; WAIVER OF JURY TRIAL. (a) THIS AGREEMENT AND ANY CLAIMS, CONTROVERSY, DISPUTE OR CAUSE OF ACTION (WHETHER IN CONTRACT OR TORT OR OTHERWISE) BASED UPON, ARISING OUT OF OR RELATING TO THIS AGREEMENT AND THE TRANSACTIONS CONTEMPLATED HEREBY SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAW OF THE STATE OF NEW YORK.

(b) EACH GRANTOR IRREVOCABLY AND UNCONDITIONALLY AGREES THAT IT WILL NOT COMMENCE ANY ACTION, LITIGATION OR PROCEEDING OF ANY KIND OR DESCRIPTION, WHETHER IN LAW OR EQUITY, WHETHER IN CONTRACT OR IN TORT OR OTHERWISE, AGAINST THE COLLATERAL AGENT, ANY SECURED PARTY OR ANY RELATED PARTY THEREOF IN ANY WAY RELATING TO THIS AGREEMENT, ANY OTHER COLLATERAL DOCUMENT OR THE TRANSACTIONS RELATING HERETO OR THERETO, IN ANY FORUM OTHER THAN THE COURTS OF THE STATE OF NEW YORK SITTING IN NEW YORK COUNTY AND OF THE UNITED STATES DISTRICT COURT OF THE SOUTHERN DISTRICT OF NEW YORK, AND ANY APPELLATE COURT FROM ANY THEREOF, AND EACH OF THE PARTIES HERETO IRREVOCABLY AND UNCONDITIONALLY SUBMITS TO THE JURISDICTION OF SUCH COURTS AND AGREES THAT ALL CLAIMS IN RESPECT OF ANY SUCH ACTION, LITIGATION OR PROCEEDING MAY BE HEARD AND DETERMINED IN SUCH NEW YORK STATE COURT OR, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, IN SUCH FEDERAL COURT. EACH OF THE PARTIES HERETO AGREES THAT A FINAL JUDGMENT IN ANY SUCH ACTION, LITIGATION OR PROCEEDING SHALL BE CONCLUSIVE AND MAY BE ENFORCED IN OTHER JURISDICTIONS BY SUIT ON THE JUDGMENT OR IN ANY OTHER MANNER PROVIDED BY LAW. NOTHING IN THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT SHALL AFFECT ANY RIGHT THAT THE COLLATERAL AGENT OR ANY SECURED PARTY MAY OTHERWISE HAVE TO BRING ANY ACTION OR PROCEEDING RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT AGAINST ANY GRANTOR OR ITS PROPERTIES IN THE COURTS OF ANY JURISDICTION.

(c) EACH GRANTOR IRREVOCABLY AND UNCONDITIONALLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY OBJECTION THAT IT MAY NOW OR HEREAFTER HAVE TO THE LAYING OF VENUE OF ANY ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT IN ANY COURT REFERRED TO IN PARAGRAPH (B) OF THIS SECTION. EACH OF THE PARTIES HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, THE DEFENSE OF AN INCONVENIENT FORUM TO THE MAINTENANCE OF SUCH ACTION OR PROCEEDING IN ANY SUCH COURT.

(d) EACH PARTY HERETO IRREVOCABLY CONSENTS TO SERVICE OF PROCESS IN THE MANNER PROVIDED FOR NOTICES IN SECTION 8.1. NOTHING IN THIS AGREEMENT WILL AFFECT THE RIGHT OF ANY PARTY HERETO TO SERVE PROCESS IN ANY OTHER MANNER PERMITTED BY APPLICABLE LAW.

(e) EACH PARTY HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY OR THEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY). EACH PARTY HERETO (A) CERTIFIES THAT NO REPRESENTATIVE, AGENT OR ATTORNEY OF ANY OTHER PERSON HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PERSON WOULD NOT, IN THE EVENT OF LITIGATION, SEEK TO ENFORCE THE FOREGOING WAIVER AND (B) ACKNOWLEDGES THAT IT AND THE OTHER PARTIES HERETO HAVE BEEN INDUCED TO ENTER INTO THIS AGREEMENT AND THE OTHER LOAN DOCUMENTS BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.

8.7. Grantors' Duties. It is expressly agreed, anything herein contained to the contrary notwithstanding, that each Grantor shall remain liable to perform all of the obligations, if any, assumed by it with respect to the Collateral and the Collateral Agent shall not have any obligations or liabilities with respect to any Collateral by reason of or arising out of this Agreement, nor shall the Collateral Agent be required or obligated in any manner to perform or fulfill any of the obligations of any Grantor under or with respect to any Collateral.

8.8. Termination; Release. (a) On the Termination Date, this Agreement shall terminate (provided that all indemnities set forth herein including, without limitation in Section 6.1 hereof, shall survive such termination) and the Collateral Agent, at the request and expense of the respective Grantor, will promptly execute and deliver to such Grantor a proper instrument or instruments (including UCC termination statements on form UCC-3) acknowledging the satisfaction and termination of this Agreement, and will duly assign, transfer and deliver to such Grantor (without recourse and without any representation or warranty) such of the Collateral as may be in the possession of the

Collateral Agent and as has not theretofore been sold or otherwise applied or released pursuant to this Agreement. As used in this Agreement, "Termination Date" shall mean the date on which the Payment in Full of the Obligations has occurred.

(b) In the event that any part of the Collateral is sold or otherwise disposed of (to a Person other than a Credit Party) in connection with a sale or disposition permitted by Section 7.05 of the Credit Agreement or is otherwise released pursuant to the Credit Agreement, and the proceeds of such sale or disposition (or from such release) are applied in accordance with the terms of the Credit Agreement to the extent required to be so applied, the Collateral Agent, at the request and expense of such Grantor, will duly release from the security interest created hereby (and will promptly execute and deliver such documentation, including termination or partial release statements, including UCC-3s, subordination agreements and the like in connection therewith to evidence the release of such item of Collateral or to subordinate its interest in such item of Collateral) and assign, transfer and deliver to such Grantor (without recourse and without any representation or warranty) such of the Collateral as is then being (or has been) so sold or otherwise disposed of, or released, and as may be in the possession of the Collateral Agent and has not theretofore been released pursuant to this Agreement. In the case of any sale or disposition of any Collateral permitted under Section 7.05 of the Credit Agreement (unless sold to another Credit Party), the security interest created hereby on such Collateral shall be automatically released without the need for further action by any Person. Furthermore, upon the release of any Guarantor from the Guaranty in accordance with the provisions thereof, such Grantor (and the Collateral at such time assigned by the respective Grantor pursuant hereto) shall be automatically released from this Agreement, and the Collateral Agent, at the request and expense of such Grantor being released, will promptly execute and deliver such documentation, including termination or partial release statements, including UCC-3s, and the like in connection therewith) and assign, transfer and deliver to such Grantor (without recourse and without any representation or warranty) the Collateral of such Grantor being released.

(c) At any time that a Grantor desires that the Collateral Agent take any action to acknowledge or give effect to any release of Collateral pursuant to the foregoing Section 8.8(a) or (b), such Grantor shall deliver to the Collateral Agent a certificate signed by a Responsible Officer of such Grantor stating that the release of the respective Collateral is permitted pursuant to such Section 8.8(a) or (b). At any time that the Company or the respective Grantor desires that a Subsidiary of the Company which has been released from the Guaranty be released hereunder as provided in the penultimate sentence of Section 8.8(b) hereof, it shall deliver to the Collateral Agent a certificate signed by a Responsible Officer of the Company and the respective Grantor stating that the release of the respective Grantor (and its Collateral) is permitted pursuant to such Section 8.8(b).

(d) The Collateral Agent shall have no liability whatsoever to any other Secured Party as the result of any release of Collateral by it in accordance with, or which the Collateral Agent in good faith believes to be in accordance with, this Section 8.8.

8.9. Counterparts. This Agreement may be executed in any number of counterparts and by the different parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all of which shall together

constitute one and the same instrument. A set of counterparts executed by all the parties hereto shall be lodged with the Company and the Collateral Agent.

8.10. Severability. Any provision of this Agreement which is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof, and any such prohibition or unenforceability in any jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

8.11. The Collateral Agent and the other Secured Parties. The Collateral Agent will hold in accordance with this Agreement all items of the Collateral at any time received under this Agreement. It is expressly understood and agreed that the obligations of the Collateral Agent as holder of the Collateral and interests therein and with respect to the disposition thereof, and otherwise under this Agreement, are only those expressly set forth in this Agreement and in Section 9 of the Credit Agreement. The Collateral Agent shall act hereunder on the terms and conditions set forth herein and in Section 9 of the Credit Agreement.

8.12. Additional Grantors. It is understood and agreed that any Domestic Subsidiary of the Company that desires to become a Grantor hereunder, or is required to execute a counterpart of this Agreement after the date hereof pursuant to the requirements of the Credit Agreement or any other Loan Document, shall become a Grantor hereunder by (x) executing a counterpart hereof and delivering same to the Collateral Agent or by executing a Security Agreement Supplement and delivering the same to the Collateral Agent, in each case as may be requested by the Collateral Agent (provided such Security Agreement Supplement shall not require the consent of any Grantor), (y) delivering supplements to Annexes A through G, inclusive, hereto as are necessary to cause such Annexes to be complete and accurate with respect to such additional Grantor on such date and (z) taking all actions as specified in this Agreement as would have been taken by such Grantor had it been an original party to this Agreement, in each case with all documents required above to be delivered to the Collateral Agent and with all documents and actions required above to be taken to the reasonable satisfaction of the Collateral Agent and upon such execution and delivery, such Subsidiary shall constitute a Grantor hereunder.

8.13. ABL Priority Collateral. Notwithstanding anything herein to the contrary, prior to the Discharge of ABL Obligations, the requirements under this Agreement to deliver or grant control over ABL Priority Collateral to the Collateral Agent, or to give any notice to any Person or in respect of the provision of voting rights or the obtaining of any consent of any Person, in each case in connection with any ABL Priority Collateral, shall be deemed satisfied if the Grantors comply with the requirements of the similar provision of the applicable ABL Credit Document (as defined in the Intercreditor Agreement). Until Discharge of ABL Obligations, the delivery of any ABL Priority Collateral to the ABL Collateral Agent (as defined in the Intercreditor Agreement) pursuant to the ABL Credit Documents as bailee or agent for the Collateral Agent shall satisfy any delivery requirement hereunder or under any other Loan Document.

8.14. Intercreditor Agreement. This Agreement and the other Loan Documents are subject to the terms and conditions set forth in the Intercreditor Agreement in all respects and, in the event of any conflict between the terms of the Intercreditor Agreement and this Agreement, the terms of the Intercreditor Agreement shall govern. Notwithstanding anything herein to the contrary, the Lien and security interest granted to the Collateral Agent pursuant to any Loan Document and the exercise of any right or remedy in respect of the Collateral by the Collateral Agent (or any Secured Party) hereunder or under any other Loan Document are subject to the provisions of the Intercreditor Agreement and in the event of any conflict between the terms of the Intercreditor Agreement, this Agreement and any other Loan Document, the terms of the Intercreditor Agreement shall govern and control with respect to the exercise of any such right or remedy. Without limiting the generality of the foregoing, and notwithstanding anything herein to the contrary, no Loan Party shall be required hereunder or under any Loan Document to take any action with respect to the Collateral that is inconsistent with the provisions of the Intercreditor Agreement.

8.15. Release of Grantors. If at any time (a) all of the Equity Interests of any Grantor (or, to the extent any Collateral Document requires releases thereunder to occur in accordance with the provisions of this Agreement, the pledgor, transferor, mortgagor or other corresponding party under such other Collateral Document) owned by the Company and its Restricted Subsidiaries are sold (to a Person other than the Company or any of its Restricted Subsidiaries) in a transaction permitted pursuant to the Credit Agreement (and which does not violate the terms of any other Loan Document then in effect) or (b) a Grantor becomes an Excluded Subsidiary, then, at the request and expense of the Company, the respective Grantor shall be immediately released as a Grantor pursuant to this Agreement without any further action hereunder (and upon the reasonable request of the Company and at the expense of the Grantors, the Collateral Agent (or, to the extent any other Collateral Document requires releases thereunder to occur in accordance with the provisions of this Agreement, the pledgee, assignee, mortgagee or other corresponding party under such other Collateral Document) shall execute and deliver such instruments of release as are reasonably necessary to evidence the release of such Grantor and otherwise reasonably satisfactory to the Collateral Agent). At any time the Company desires that a Grantor be released from this Agreement as provided in this Section 8.15, the Company shall deliver to the Collateral Agent a certificate signed by a Responsible Officer of the Company stating that (i) the transaction is permitted pursuant to the Credit Agreement (and does not violate the terms of any other Loan Documents then in effect) or such Grantor has become an Excluded Subsidiary, as applicable, and (ii) the release of the respective Grantor is permitted pursuant to this Section 8.15.

FORM OF SECURITY AGREEMENT SUPPLEMENT

SECURITY AGREEMENT SUPPLEMENT dated as of _____, ____, between [NAME OF GRANTOR] [_____], a [_____] corporation (the "**Grantor**") and BANK OF AMERICA, N.A. (or any successor collateral agent), as Collateral Agent.

WHEREAS, CIENA CORPORATION, a Delaware corporation, the other Grantors party thereto and BANK OF AMERICA, N.A., as Collateral Agent are parties to a Term Loan Security Agreement dated as of July 15, 2014 (as heretofore amended and/or supplemented, the "**Security Agreement**") under which the Borrower and the other Grantors party thereto have secured certain of the Borrower's obligations and the Guarantors have secured their respective guarantees thereof (the "**Secured Obligations**");

WHEREAS, [NAME OF GRANTOR] [_____] desires to become [is] a party to the Security Agreement as a Grantor thereunder;[1] and

WHEREAS, terms defined in the Security Agreement (or whose definitions are incorporated by reference in the recitals of the Security Agreement) and not otherwise defined herein have, as used herein, the respective meanings provided for therein;

NOW, THEREFORE, in consideration of the foregoing and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. *Party to Security Agreement*[2]. The Grantor acknowledges that, by signing this Security Agreement Supplement and delivering it to the Collateral Agent, the Grantor becomes a "Grantor" for all purposes of the Security Agreement and will become a party to the Security Agreement and will thereafter have all the rights and obligations of a Grantor thereunder and be bound by all the provisions thereof as fully as if the Grantor were one of the original parties thereto.

2. *Grant of Liens*. (a) In order to secure the Secured Obligations, the Grantor grants to the Collateral Agent for the benefit of the Secured Parties a continuing security interest in all the following property of the Grantor, whether now owned or existing or hereafter acquired or arising and regardless of where located (the "**New Collateral**"):

[describe property being added to the Collateral][3]

(b) With respect to each right to payment or performance included in the Collateral from time to time, the Lien granted therein includes a continuing security interest in (i) any Supporting Obligation that supports such payment or performance and (i) any Lien that (x) secures such right to payment or performance or (y) secures any such Supporting Obligation.

(c) The foregoing Liens are granted as security only and shall not subject the Collateral Agent or any other Secured Party to, or transfer or in any way affect or modify, any obligation or liability of the Grantor with respect to any of the New Collateral or any transaction in connection therewith.

3. [Reserved.]

4. *Representations and Warranties*. (a) The Grantor is duly organized, validly existing and in good standing under the laws of [jurisdiction of organization].

(b) The Grantor has delivered a Perfection Certificate to the Administrative Agent. The information set forth therein is correct and complete as of the date hereof. Within 60 days after the date hereof, the Grantor will furnish to the Administrative Agent a file search report from each UCC filing office listed in such Perfection Certificate, showing the filing made at such filing office to perfect the Liens on the New Collateral.

(c) The execution, delivery and performance by the Grantor of this Security Agreement Supplement and each other Loan Document to which it is a party has been duly authorized by all necessary corporate or other organizational action, and do not and will not (i) contravene the terms of any of the Grantor's Organization Documents; (ii) conflict with or result in any breach or contravention of, or the creation of any Lien (other than Liens created under the Loan Documents) under, or require any payment to be made under (A) any material Contractual Obligation to which the Grantor is a party or affecting the Grantor or the properties of the Grantor or any of its Restricted Subsidiaries or (B) any order, injunction, writ or decree of any Governmental Authority or any arbitral award to which the Grantor or its property is subject; or (iii) violate any Law.

(d) No approval, consent, exemption, authorization, or other action by, or notice to, or filing with, any Governmental Authority or any other Person is necessary or required in connection with (a) the execution, delivery or performance by the Grantor of this Security Agreement Supplement or any other Loan Document, (b) the grant by the Grantor of the Liens granted by it pursuant to the foregoing Section 2 and the other Collateral Documents, or (c) the perfection or maintenance of the Liens created under the foregoing Section 2 and the other Collateral Documents (including, subject to the Intercreditor Agreement, the first priority nature thereof) other than (i) those that have already been obtained and are now in full force and effect, (ii) filings to perfect the Liens created by the foregoing Section 2 and the other Collateral Documents, (iii) those actions as contemplated by Section 2.1 of Security Agreement, and (iv) filings of the Loan Documents with the SEC after the Closing Date in accordance with the requirements thereof.

(e) The Security Agreement as supplemented hereby constitutes a valid and binding agreement of the Grantor, enforceable in accordance with its terms, except as limited by (i) applicable bankruptcy,

insolvency, fraudulent conveyance or other similar laws affecting creditors' rights generally and (ii) general principles of equity.

(f) Each of the representations and warranties set forth in Article II of the Security Agreement is true as applied to the Grantor and the New Collateral. For purposes of the foregoing sentence, references in said Sections to a "Grantor" shall be deemed to refer to the Grantor, references to Annexes to the Security Agreement shall be deemed to refer to the corresponding Annexes to this Security Agreement Supplement, references to "Collateral" shall be deemed to refer to the New Collateral, and references to the "Effective Date" shall be deemed to refer to the date on which the Grantor signs and delivers this Security Agreement Supplement.

5. *Governing Law*. This Security Agreement Supplement shall be construed in accordance with and governed by the laws of the State of New York.

IN WITNESS WHEREOF, the parties hereto have caused this Security Agreement Supplement to be duly executed by their respective authorized officers as of the day and year first above written.

[NAME OF GRANTOR]

By: _____

Name:

Title:

BANK OF AMERICA, N.A., as Collateral Agent

By: _____

Name:

Title:

Annex A
to Security Agreement
Supplement

SCHEDULE OF CHIEF EXECUTIVE OFFICES

Name of Grantor	Address of Chief Executive Office

Annex B
to Security Agreement
Supplement

SCHEDULE OF LEGAL NAMES, TYPE OF ORGANIZATION
(AND WHETHER A REGISTERED ORGANIZATION AND/OR
A TRANSMITTING UTILITY), JURISDICTION OF ORGANIZATION

LOCATION AND ORGANIZATIONAL IDENTIFICATION NUMBERS
AND FEDERAL EMPLOYER IDENTIFICATION NUMBERS

Exact Legal Name of Grantor	**Type of Organization (or, if the Grantor is an Individual, so indicate)**	**Registered Organization? (Yes/No)**	**Jurisdiction of Organization**	**Grantor's Location (for purposes of NY UCC § 9-307)***	**Grantor's Organization Identification Number (or, if it has none, so indicate)**	**Federal Employer Identification Numbers**	**Transmitting Utility? (Yes/No)**

Annex C
to Security Agreement
Supplement

SCHEDULE OF TRADE AND FICTITIOUS NAMES

[●]

Annex D
to Security Agreement
Supplement

DESCRIPTION OF CERTAIN SIGNIFICANT TRANSACTIONS OCCURRING WITHIN ONE YEAR PRIOR TO THE DATE OF THE SECURITY AGREEMENT

[●]

Annex E
to Security Agreement
Supplement

DESCRIPTION OF COMMERCIAL TORT CLAIMS

[●]

Annex F
to Security Agreement
Supplement

SCHEDULE OF INVENTORY AND EQUIPMENT

Annex G
to Security Agreement
Supplement

SCHEDULE OF INTELLECTUAL PROPERTY

ANNEX II

AMENDMENTS TO PLEDGE AGREEMENT

[Amended Pledge Agreement to follow]

TERM LOAN PLEDGE AGREEMENT

among

CIENA CORPORATION,

EACH OTHER PLEDGOR
FROM TIME TO TIME PARTY HERETO

and

BANK OF AMERICA, N.A.,

as PLEDGEE

Dated as of July 15, 2014

TERM LOAN PLEDGE AGREEMENT

TERM LOAN PLEDGE AGREEMENT, dated as of July 15, 2014 (as the same may be amended, restated, modified and/or supplemented from time to time, this "Agreement"), among each of the undersigned pledgors (each, a "Pledgor" and, together with any other entity that becomes a pledgor hereunder pursuant to Section 32 hereof, the "Pledgors") and BANK OF AMERICA, N.A., as collateral agent (in such capacity, together with any successor collateral agent, the "Pledgee"), for the benefit of the Secured Parties (as defined below). Certain capitalized terms as used herein are defined in Section 2 hereof.

W I T N E S S E T H :

WHEREAS, Ciena Corporation, a Delaware corporation (the "Company"), each lender from time to time party thereto (collectively, the "Lenders") and Bank of America, N.A., as administrative agent (in such capacity, together with any successor administrative agent, the "Administrative Agent") have entered into a Credit Agreement, dated as of July 15, 2014 (as amended, modified, restated and/or supplemented from time to time, the "Credit Agreement"), pursuant to which the Lenders have agreed, on a several basis, to make Loans to the Company upon the terms and subject to the conditions set forth therein;

WHEREAS, pursuant to the Guaranty, each Pledgor (other than the Company) has jointly and severally guaranteed to the Secured Parties the payment when due of all Guaranteed Obligations as described (and defined) therein;

WHEREAS, it is a condition precedent to the making of Loans to the Company that each Pledgor shall have executed and delivered to the Pledgee this Agreement; and

WHEREAS, each Pledgor will benefit from the incurrence of Loans by the Company;

NOW, THEREFORE, in consideration of the foregoing and other benefits accruing to each Pledgor, the receipt and sufficiency of which are hereby acknowledged, each Pledgor hereby makes the following representations and warranties to the Pledgee for the benefit of the Secured Parties and hereby covenants and agrees with the Pledgee for the benefit of the Secured Parties as follows:

1. SECURITY FOR OBLIGATIONS. This Agreement is made by each Pledgor for the benefit of the Secured Parties to secure the prompt and complete payment and performance when due of the Obligations.

2. DEFINITIONS. (a) Unless otherwise defined herein, all capitalized terms used herein and defined in the Credit Agreement shall be used herein as therein defined. Reference to singular terms shall include the plural and vice versa.

(b) The following capitalized terms used herein shall have the definitions specified below:

"ABL Agent" shall have the meaning given such term in the Intercreditor Agreement.

"Administrative Agent" shall have the meaning set forth in the recitals hereto.

"Adverse Claim" shall have the meaning given such term in Section 8-102(a)(1) of the UCC.

"Agreement" shall have the meaning set forth in the first paragraph hereto.

"Canadian Subsidiary" shall mean any Restricted Subsidiary of the Company incorporated, organized or established or resident for the purposes of the Income Tax Act (Canada) as amended, in Canada or any province or territory thereof.

"Certificated Security" shall have the meaning given such term in Section 8-102(a)(4) of the UCC.

"Clearing Corporation" shall have the meaning given such term in Section 8-102(a)(5) of the UCC.

"Collateral" shall have the meaning set forth in Section 3.1 hereof.

"Collateral Accounts" shall mean any and all accounts established and maintained by the Pledgee in the name of any Pledgor to which Collateral may be credited.

"Company" shall have the meaning set forth in the recitals hereto.

"Credit Agreement" shall have the meaning set forth in the recitals hereto.

"Discharge of ABL Obligations" shall have the meaning given such term in the Intercreditor Agreement.

"Domestic Corporation" shall have the meaning set forth in the definition of "Stock".

"Domestic Non-Subsidiary" shall mean a Domestic Person that is not a Subsidiary.

"Domestic Person" shall mean a Person that is organized under the laws of the United States, any State thereof or the District of Columbia.

"Event of Default" shall mean any Event of Default under, and as defined in, the Credit Agreement.

"Financial Asset" shall have the meaning given such term in Section 8-102(a)(9) of the UCC.

"Foreign Corporation" shall have the meaning set forth in the definition of "Stock".

"Immaterial Certificated Security Investment" shall have the meaning set forth in Section 3.2(a)(i) hereof.

"Instrument" shall have the meaning given such term in Section 9-102(a)(47) of the UCC.

"Intercreditor Agreement" shall have the meaning given such term in the Credit Agreement.

"Investment Property" shall have the meaning given such term in Section 9-102(a)(49) of the UCC.

"Lenders" shall have the meaning set forth in the recitals hereto.

"Limited Liability Company Assets" shall mean all assets, whether tangible or intangible and whether real, personal or mixed (including, without limitation, all limited liability company capital and interest in other limited liability companies), at any time owned by any limited liability company.

"Limited Liability Company Interests" shall mean the entire limited liability company membership interest at any time owned by any Pledgor in any limited liability company.

"Location" of any Pledgor shall mean such Pledgor's "location" as determined pursuant to Section 9-307 of the UCC.

"Margin Stock" shall have the meaning provided in Regulation U.

"Material Subsidiary" shall mean any Restricted Subsidiary that would be a "significant subsidiary" as defined in Article 1, Rule 1-02 of Regulation S-X, promulgated pursuant to the Securities Act, as such Regulation S-X as in effect from time to time.

"Non-Voting Equity Interests" shall mean all Equity Interests of any Person which are not Voting Equity Interests.

"Notes" shall mean (x) all intercompany notes at any time issued to each Pledgor and (y) all other promissory notes from time to time issued to, or held by, each Pledgor (other than promissory notes issued in connection with the extensions of trade credit by any Pledgor in the ordinary course of business).

"Obligations" shall have the meaning given to such term in the Credit Agreement.

"Partnership Assets" shall mean all assets, whether tangible or intangible and whether real, personal or mixed (including, without limitation, all partnership capital and interest in other partnerships), at any time owned by any general partnership or limited partnership.

"Partnership Interest" shall mean the entire general partnership interest or limited partnership interest at any time owned by any Pledgor in any general partnership or limited partnership.

"Pledge Agreement Supplement" shall mean a pledge agreement supplement, in a form reasonably satisfactory to the Pledgee and attached hereto as Exhibit A, signed and delivered to the Pledgee for the purpose of adding a Restricted Subsidiary as a party hereto pursuant to Section 32 and/or adding additional property to the Collateral.

"Pledged Limited Liability Company Interests" shall mean all Limited Liability Company Interests at any time pledged or required to be pledged hereunder.

"Pledged Notes" shall mean all Notes at any time pledged or required to be pledged hereunder.

"Pledgee" shall have the meaning set forth in the first paragraph of this Agreement.

"Pledgor" shall have the meaning set forth in the first paragraph hereof.

"Proceeds" shall have the meaning given such term in Section 9-102(a)(64) of the UCC.

"Registered Organization" shall have the meaning given such term in Section 9-102(a)(70) of the UCC.

"Regulation U" shall mean Regulation U of the Board of Governors of the Federal Reserve System of the United States as from time to time in effect and any successor to all or a portion thereof.

"Securities Account" shall have the meaning given to such term in 8-501 of the UCC.

"Securities Act" shall mean the Securities Act of 1933, as amended, as in effect from time to time.

"Securities Intermediary" shall have the meaning given such term in Section 8-102(14) of the UCC.

"Security" and "Securities" shall have the meaning given such term in Section 8-102(a)(15) of the UCC and shall in any event include all Stock and all Notes.

"Security Entitlement" shall have the meaning given such term in Section 8-102(a)(17) of the UCC.

"State" shall mean any state of the United States.

"Stock" shall mean (x) with respect to corporations incorporated under the laws of the United States or any State thereof or the District of Columbia (each, a "Domestic Corporation"), all of the issued and outstanding shares of capital stock of any Domestic Corporation at any time owned by any Pledgor and (y) with respect to corporations which are not Domestic Corporations (each, a "Foreign Corporation"), all of the issued and outstanding shares of capital stock or other Equity Interests of any Foreign Corporation at any time owned by any Pledgor.

"Termination Date" shall have the meaning set forth in the Security Agreement.

"Transmitting Utility" has the meaning given such term in Section 9-102(a)(80) of the UCC.

"UCC" shall mean the Uniform Commercial Code as in effect from time to time in the State of New York; provided that, if perfection or the effect of perfection or non-perfection or the priority of any Lien on any Collateral is governed by the Uniform Commercial Code as in effect in a jurisdiction other than New York, "UCC" means the Uniform Commercial Code as in effect from time to time in such other jurisdiction for purposes of the provisions hereof relating to such perfection, effect of perfection or non-perfection or priority.

"ULC" means an unlimited company, an unlimited liability company or an unlimited liability corporation incorporated pursuant to, or otherwise governed by, the laws of any of the provinces or territories of Canada.

"ULC Shares" shall mean shares in any ULC at any time owned or otherwise held by any Pledgor.

"Uncertificated Security" shall have the meaning given such term in Section 8-102(a)(18) of the UCC.

"Voting Equity Interests" of any Person shall mean all classes of Equity Interests of such Person entitled to vote.

3. PLEDGE OF SECURITIES, ETC.

3.1 Pledge. To secure the Obligations now or hereafter owed or to be performed by such Pledgor (but subject to the proviso at the end of this Section 3.1), each Pledgor does hereby grant and pledge to the Pledgee for the benefit of the Secured Parties, and does hereby create a continuing security interest in favor of the Pledgee for the benefit of the Secured Parties in, all of its right, title and interest in and to the following, whether now existing or hereafter from time to time acquired (collectively, the "Collateral"):

(a) each of the Collateral Accounts, including any and all assets of whatever type or kind deposited by such Pledgor in any such Collateral Account, whether now owned or hereafter acquired, existing or arising, including, without limitation, all Financial Assets, Investment Property, monies, checks, drafts, Instruments, Securities or interests therein of any type or nature deposited or required by the Credit Agreement or any other Loan Document to be deposited in such Collateral Account, and all investments and all certificates and other Instruments (including depository receipts, if any) from time to time representing or evidencing the same, and all dividends, interest, distributions, cash and other property from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of the foregoing;

(b) all Securities owned or held by such Pledgor from time to time and all options and warrants owned by such Pledgor from time to time to purchase Securities, together with all rights, privileges, authority and powers of such Pledgor

relating to such Securities in each such issuer or under any organizational document of each such issuer, and the certificates, instruments and agreements representing such Securities and any and all interest of such Pledgor in the entries on the books of any financial intermediary pertaining to such Securities;

(c) all Limited Liability Company Interests owned by such Pledgor from time to time and all of its right, title and interest in each limited liability company to which each such Limited Liability Company Interest relates, whether now existing or hereafter acquired, including, without limitation, to the fullest extent permitted under the terms and provisions of the documents and agreements governing such Limited Liability Company Interests and applicable law:

(A) all its capital therein and its interest in all profits, income, surpluses, losses, Limited Liability Company Assets of such limited liability company and other distributions to which such Pledgor shall at any time be entitled in respect of such Limited Liability Company Interests;

(B) all other payments due or to become due to such Pledgor in respect of Limited Liability Company Interests, whether under any limited liability company agreement or otherwise, whether as contractual obligations, damages, insurance proceeds or otherwise;

(C) all of its claims, rights, powers, privileges, authority, options, security interests, Liens and remedies, if any, under any limited liability company agreement or operating agreement, or at law or otherwise in respect of such Limited Liability Company Interests;

(D) all present and future claims, if any, of such Pledgor against any such limited liability company for monies loaned or advanced, for services rendered or otherwise;

(E) all of such Pledgor's rights under any limited liability company agreement or operating agreement or at law to exercise and enforce every right, power, remedy, authority, option and privilege of such Pledgor relating to such Limited Liability Company Interests, including any power to terminate, cancel or modify any such limited liability company agreement or operating agreement, to execute any instruments and to take any and all other action on behalf of and in the name of such Pledgor in respect of such Limited Liability Company Interests and any such limited liability company, to make determinations, to exercise any election (including, but not limited to, election of remedies) or option or to give or receive any notice, consent, amendment, waiver or approval, together with full power and authority to demand, receive, enforce, collect or receipt for any of the foregoing or for any Limited Liability Company Asset of such limited liability company, to enforce or execute any checks, or other instruments or orders, to file any claims and to take any action in connection with any of the foregoing; and

(F) all other property hereafter delivered in substitution for or in addition to any of the foregoing, all certificates and instruments representing or evidencing such other property and all cash, securities,

interest, dividends, rights and other property at any time and from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of the foregoing;

(d) all Partnership Interests owned by such Pledgor from time to time and all of its right, title and interest in each partnership to which each such Partnership Interest relates, whether now existing or hereafter acquired, including, without limitation, to the fullest extent permitted under the terms and provisions of the documents and agreements governing such Partnership Interests and applicable law:

(A) all its capital therein and its interest in all profits, income, surpluses, losses, Partnership Assets of any such partnership and other distributions to which such Pledgor shall at any time be entitled in respect of such Partnership Interests;

(B) all other payments due or to become due to such Pledgor in respect of Partnership Interests, whether under any partnership agreement or otherwise, whether as contractual obligations, damages, insurance proceeds or otherwise;

(C) all of its claims, rights, powers, privileges, authority, options, security interests, Liens and remedies, if any, under any partnership agreement or operating agreement, or at law or otherwise in respect of such Partnership Interests;

(D) all present and future claims, if any, of such Pledgor against any such partnership for monies loaned or advanced, for services rendered or otherwise;

(E) all of such Pledgor's rights under any partnership agreement or operating agreement or at law to exercise and enforce every right, power, remedy, authority, option and privilege of such Pledgor relating to such Partnership Interests, including any power to terminate, cancel or modify any partnership agreement or operating agreement, to execute any instruments and to take any and all other action on behalf of and in the name of such Pledgor in respect of such Partnership Interests and any such partnership, to make determinations, to exercise any election (including, but not limited to, election of remedies) or option or to give or receive any notice, consent, amendment, waiver or approval, together with full power and authority to demand, receive, enforce, collect or receipt for any of the foregoing or for any Partnership Asset, to enforce or execute any checks, or other instruments or orders, to file any claims and to take any action in connection with any of the foregoing; and

(F) all other property hereafter delivered in substitution for or in addition to any of the foregoing, all certificates and instruments representing or evidencing such other property and all cash, securities, interest, dividends, rights and other property at any time and from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of the foregoing;

(e) all Securities Accounts, Financial Assets and Investment Property owned by such Pledgor from time to time;

(f) all Security Entitlements owned by such Pledgor from time to time in any and all of the foregoing; and

(g) all Proceeds of any and all of the foregoing;

provided that (i)(x) no Voting Equity Interests of any Foreign Subsidiary which represents more than 66% of the total combined voting power of all classes of Voting Equity Interests of the respective Foreign Subsidiary shall be pledged hereunder, provided, however, that immediately upon the amendment of the Code to allow the pledge of a greater percentage of Stock in a Foreign Subsidiary without causing a repatriation (or deemed repatriation) of earnings or adverse tax consequences, the Equity Interests shall include, and the security interest granted by each Pledgor shall attach to, such greater percentage of Voting Equity Interests of each directly owned Foreign Subsidiary that is a Subsidiary of such Pledgor to secure all other Obligations and (y) each Pledgor shall be required to pledge hereunder 100% of the Non-Voting Equity Interests of each Foreign Subsidiary at any time and from time to time acquired by such Pledgor, which Non-Voting Equity Interests shall not be subject to the limitations described in the preceding clause (x) and (ii) notwithstanding anything herein to the contrary, in no event shall the security interest and lien granted under Section 3.1 hereof attach to, and the term "Collateral" (and the component terms thereof) shall not include, (x) any Equity Interests owned by any Pledgor in any Person for so long as the grant of such security interest shall constitute or result in (A) other than in the case of a Wholly-Owned Subsidiary of the Company, a breach or termination pursuant to the terms of, or a default under, any Indebtedness assumed by the Company or any of its Subsidiaries pursuant to Section 7.02(j) of the Credit Agreement or any organizational document of such Person (although the Company will use its commercially reasonable efforts to endeavor that the organizational documents of a Subsidiary do not contain a restriction on the pledge thereof), (B) if such Person is organized under the laws of any foreign jurisdiction (other than Canada or any province or territory thereof), a breach of any law or regulation which prohibits the creation of a security interest thereunder (other than to the extent that any such term specified in clause (A) or (B) above is rendered ineffective pursuant to Section 9-406, 9-407, 9-408 or 9-409 of the UCC (or any successor provision or provisions) of any relevant jurisdiction or any other then-applicable law (including the Bankruptcy Code) or principles of equity) or (C) if such Person is organized under the laws of any foreign jurisdiction (other than Canada or any province or territory thereof), require the consent of a Governmental Authority to permit the grant of a security interest therein (and such consent has not been obtained); provided however, that such security interest shall attach immediately at such time as the condition causing such abandonment, invalidation, unenforceability, breach or termination shall no longer be effective and to the extent severable, shall attach immediately to any portion of such property or other rights that does not result in any of the consequences specified in clause (A), (B) or (C) above ~~and~~, (y) any Margin Stock unless the Secured Parties have made any necessary filings with the FRB in connection therewith and the Pledgors have provided the Pledgee with an executed Form FR U-1; provided further, that each applicable Pledgor shall provide to the Secured Parties notice of the existence of any Margin Stock (other than treasury stock) that would constitute Collateral absent this proviso at the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) and 6.01(b) of the Credit Agreement and, thereafter, such Margin Stock shall constitute Collateral to the extent the Secured Parties have made such necessary filings with the FRB in connection therewith and the Pledgors have provided the Pledgee with an

executed Form FR U-1., and (z) in the event constituting "Excluded Assets" (or such similar term) under the ABL Credit Documents or if the ABL Credit Documents are no longer in effect, (A) any Equity Interests owned by any Pledgor in any Excluded Subsidiary under clause (a), (f), (g) or (h) of the definition thereof and (B) any interests in Joint Ventures and other non-Wholly-Owned Subsidiaries to the extent, and for so long as, a pledge thereof is not permitted by the terms of its Organization Documents, joint venture agreement or shareholder agreement or similar contractual obligation or, with respect to a Joint Venture, any agreement evidencing Indebtedness of such Joint Venture (in each case, after giving effect to the applicable anti-assignment provisions of the UCC of any relevant jurisdiction or other applicable laws or principles or equity).

3.2 Procedures. (a) To the extent that any Pledgor at any time or from time to time owns, acquires or obtains any right, title or interest in any Collateral, such Collateral shall automatically (and without the taking of any action by such Pledgor) be pledged pursuant to Section 3.1 of this Agreement and, in addition thereto, subject to the Intercreditor Agreement, such Pledgor shall (to the extent provided below) take the following actions as set forth below (as promptly as practicable and, in any event, no later than the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion) after it obtains such Collateral) for the benefit of the Pledgee and the other Secured Parties:

(i) with respect to a Certificated Security (other than (x) a Certificated Security credited on the books of a Clearing Corporation or Securities Intermediary, (y) a Certificated Security issued by (A) any Foreign Subsidiary of the Company that is not a Material Subsidiary or (B) a Person that is not a Subsidiary and is organized under the laws of a foreign jurisdiction or (z) a Certificated Security issued by a Domestic Non-Subsidiary, which Certificated Security has a book value or purchase price (whichever is greater) of less than $10,000,000 (an "Immaterial Certificated Security Investment")), such Pledgor shall physically deliver such Certificated Security to the Pledgee, endorsed to the Pledgee or endorsed in blank; provided that, notwithstanding the foregoing, with respect to (1) a Certificated Security issued by any Foreign Subsidiary of the Company that is not a Material Subsidiary or (2) an Immaterial Certificated Security Investment, such Pledgor shall (as promptly as practicable and, in any event, no later than the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion) after it obtains such Collateral, notify the Pledgee thereof and, upon the request of the Pledgee, such Pledgor shall physically deliver any such Certificated Security to the Pledgee, endorsed to the Pledgee or endorsed in blank;

(ii) with respect to an Uncertificated Security (other than an Uncertificated Security credited on the books of a Clearing Corporation or Securities Intermediary) issued by a Restricted Subsidiary of the Company (other than any Foreign Subsidiary of the Company that is not a Material Subsidiary), such Pledgor shall cause the issuer of such Uncertificated Security to duly authorize, execute, and deliver to the Pledgee, an agreement for the benefit of the Pledgee and the other Secured Parties substantially in the form of Annex H hereto (appropriately completed to the reasonable satisfaction of

the Pledgee and with such modifications, if any, as shall be reasonably satisfactory to the Pledgee) pursuant to which such issuer agrees to comply with any and all instructions originated by the Pledgee without further consent by the registered owner and not to comply with instructions regarding such Uncertificated Security originated by any other Person other than a court of competent jurisdiction (it being understood that the Pledgee shall not deliver any such instructions until after the occurrence and during the continuance of an Event of Default); provided that, notwithstanding the foregoing, with respect to an Uncertificated Security issued by any Foreign Subsidiary of the Company that is not a Material Subsidiary, such Pledgor shall (as promptly as practicable and, in any event, no later than the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion) after it obtains such Collateral, notify the Pledgee thereof and, upon the request of the Pledgee, such Pledgor shall otherwise comply with the delivery requirements of this clause (ii);

(iii) with respect to a Certificated Security, Uncertificated Security, Partnership Interest or Limited Liability Company Interest issued by a Restricted Subsidiary of the Company (other than any Foreign Subsidiary that is not a Material Subsidiary) in a Security Account or credited on the books of a Clearing Corporation or Securities Intermediary (including a Federal Reserve Bank, Participants Trust Company or The Depository Trust Company), such Pledgor shall promptly notify the Pledgee thereof and shall promptly use commercially reasonable efforts to take (x) all actions required (i) to comply with the applicable rules of such Clearing Corporation or Securities Intermediary and (ii) to perfect the security interest of the Pledgee under applicable law (including, in any event, under Sections 9-314(a), (b) and (c), 9-106 and 8-106(d) of the UCC) and (y) such other actions as the Pledgee deems necessary or reasonably desirable to effect the foregoing; provided that, notwithstanding the foregoing, with respect to a Certificated Security, Uncertificated Security, Partnership Interest or Limited Liability Company Interest issued by any Foreign Subsidiary of the Company that is not a Material Subsidiary in a Security Account or credited on the books of a Clearing Corporation or Securities Intermediary (including a Federal Reserve Bank, Participants Trust Company or The Depository Trust Company), such Pledgor shall (as promptly as practicable and, in any event, no later than the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion) after it obtains such Collateral, notify the Pledgee thereof and, upon the request of the Pledgee, such Pledgor shall otherwise use commercially reasonable efforts to comply with the requirements of subclauses (x) and (y) of this clause (iii);

(iv) with respect to a Partnership Interest or a Limited Liability Company Interest (other than a Partnership Interest or Limited Liability Company Interest (x) credited to a Security Account or on the books of a Clearing Corporation or Securities Intermediary, (y) issued by a (A) Foreign Subsidiary of the Company that is not a Material Subsidiary or (B) a Person that is not a Subsidiary and is organized under the laws of a foreign jurisdiction

or (z) that constitutes an Immaterial Certificated Security Investment (or would constitute an Immaterial Certificated Security Investment if such Partnership Interest or Limited Liability Company Interest were represented by a certificate)), (1) if such Partnership Interest or Limited Liability Company Interest is represented by a certificate and is a Security for purposes of the UCC, the procedure set forth in Section 3.2(a)(i) hereof, and (2) if such Partnership Interest or Limited Liability Company Interest is not represented by a certificate and is an Uncertificated Security for purposes of the UCC, the procedure set forth in Section 3.2(a)(ii) hereof; provided that, notwithstanding the foregoing, with respect to (1) a Partnership Interest or a Limited Liability Company Interest issued by any Foreign Subsidiary of the Company that is not a Material Subsidiary or (2) an Immaterial Certificated Security Investment (or a Partnership Interest or a Limited Liability Company Interest that would constitute an Immaterial Certificated Security Investment if such Partnership Interest or Limited Liability Company Interest were represented by a certificate), such Pledgor shall, (as promptly as practicable and, in any event, no later than the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion) after it obtains such Collateral, notify the Pledgee thereof and, upon the request of the Pledgee, such Pledgor shall otherwise comply with the requirements of this clause (iv);

(v) with respect to any Note with a value equal to $10,000,000 or more, physical delivery of each such Note to the Pledgee, endorsed in blank, or, at the request of the Pledgee, endorsed to the Pledgee; and

(vi) with respect to cash proceeds from any of the Collateral described in Section 3.1 hereof upon the occurrence and continuance of an Event of Default, upon the Pledgee's written request, (i) establishment by the Pledgee of a cash account in the name of such Pledgor over which the Pledgee shall have "control" within the meaning of the UCC and at any time any Default or Event of Default is in existence no withdrawals or transfers may be made therefrom by any Person except with the prior written consent of the Pledgee and (ii) deposit of such cash in such cash account.

(a) In addition to the actions required to be taken pursuant to Section 3.2(a) hereof, each Pledgor shall take the following additional actions, subject to the Intercreditor Agreement, with respect to the Collateral:

(i) with respect to all Collateral of such Pledgor whereby or with respect to which the Pledgee may obtain "control" thereof within the meaning of Section 8-106 of the UCC (or under any provision of the UCC as same may be amended or supplemented from time to time, or under the laws of any relevant State other than the State of New York), such Pledgor shall take all actions requested from time to time by the Pledgee as may be necessary or reasonably advisable in the reasonable judgment of the Pledgee so that "control" of such Collateral is obtained and held by the Pledgee in accordance with Section 3.2(a) hereof; provided that within 60 days after the date hereof (or such longer period as may be agreed by the Pledgee in its sole discretion), each applicable Pledgor agrees to use commercially reasonable efforts to enter into control agreements with the relevant account bank

with respect to each Securities Account that is subject to a control agreement pursuant to the ABL Credit Agreement which control agreements shall (i) name each of the Pledgee and Deutsche Bank AG New York Branch as secured parties and (ii) replace the existing control agreement with respect to such Securities Account;

(ii) each Pledgor shall cause, and hereby authorizes the Pledgee to cause, appropriate financing statements (on appropriate forms) under the Uniform Commercial Code as in effect in the various relevant States, covering all Collateral hereunder (with the form of such financing statements to be reasonably satisfactory to the Pledgee), to be filed in the relevant filing offices so that at all times the Pledgee's security interest in all Investment Property and other Collateral which can be perfected by the filing of such financing statements (in each case to the maximum extent perfection by filing may be obtained under the laws of the relevant States, including, without limitation, Section 9-312(a) of the UCC) is so perfected. Notwithstanding the foregoing, if reasonably requested by any Pledgor, the Pledgee shall, at such Pledgor's expense, make such filings as may be reasonably requested to evidence that the security interests hereunder do not attach to any property that is excluded from the Collateral pursuant to the proviso to Section 3.1 hereof; and

(iii) Following the Discharge of ABL Obligations, each Pledgor agrees within 60 days (or such longer period as may be agreed by the Pledgee in its sole discretion) with respect to any Securities Account (other than an Excluded Account (as defined in the Security Agreement)) with an average daily balance greater than $1,000,000, to take all actions requested from time to time by the Pledgee (including, without limitation, the execution and delivery of control agreements to the extent any such Pledgor has not entered into control agreements naming the Pledgee as a secured party in accordance with clause (i) of this subsection (b)) as may be necessary or reasonably advisable in the reasonable judgment of the Pledgee so that "control" of such Securities Accounts are obtained following the termination of the ABL Credit Agreement and thereafter, held by the Pledgee .

3.3 Subsequently Acquired Collateral. If any Pledgor shall acquire (by purchase, stock dividend, distribution or otherwise) any additional Collateral at any time or from time to time after the date hereof, such Collateral shall automatically (and without any further action being required to be taken) be subject to the pledge and security interests created pursuant to Section 3.1 hereof and, furthermore, such Pledgor will thereafter take (or cause to be taken) all action with respect to such Collateral in accordance with the procedures set forth in Section 3.2 hereof, and will, at the time of delivery of any financial statements required to be delivered pursuant to Section 6.01(a) or 6.01(b) of the Credit Agreement, as such date may be extended from time to time by the Pledgee in its sole discretion, deliver to the Pledgee supplements to Annexes A through G hereto as are necessary to cause such Annexes to be complete and accurate at such time; provided that a supplement to Annex D shall only be required in connection with the acquisition of any Note with a value equal to $3,000,000 or more. Without limiting the foregoing, each Pledgor shall be required to pledge hereunder in accordance with the terms hereof the Equity Interests of any Foreign Subsidiary at any time and from time to time after the date hereof acquired by such Pledgor, provided that (x) any such pledge of Voting Equity Interests of any Foreign Subsidiary shall be subject to the provisions of clause (x) of the proviso to Section 3.1 hereof and (y) each Pledgor shall be required to pledge hereunder 100% of the Non-Voting Equity Interests of each Foreign Subsidiary at any time and from time to time acquired by such

Pledgor. Notwithstanding the foregoing, (i) if, prior to the Discharge of the ABL Obligations, any Pledgor acquires any Securities Account that is required to be subject to a control agreement pursuant to the terms of the ABL Credit Agreement, such Pledgor shall use commercially reasonable efforts to ensure that such control agreement names each of the Pledgee and Deutsche Bank AG New York Branch as secured parties and (ii) if, following the Discharge of the ABL Obligations, any Pledgor acquires any Securities Account (other than an Excluded Account (as defined in the Security Agreement)) with an average daily balance greater than $1,000,000, the Pledgor shall comply with the provisions of Section 3.2(b)(iii) within 60 days (or such longer period as may be agreed by the Pledgee in its sole discretion) of acquiring such Securities Account.

3.4 Transfer Taxes. Each pledge of Collateral under Section 3.1 or Section 3.3 hereof shall be accompanied by any transfer tax stamps required in connection with the pledge of such Collateral.

3.5 Certain Representations and Warranties Regarding the Collateral. Each Pledgor represents and warrants that on the date hereof: (i) each Restricted Subsidiary of such Pledgor, and the direct ownership thereof, is listed in Annex B hereto; (ii) the Stock (and any warrants or options to purchase Stock) of each Restricted Subsidiary held by such Pledgor consists of the number and type of shares of the stock (or warrants or options to purchase any stock) of the corporations as described in Annex C hereto; (iii) such Stock referenced in clause (ii) of this paragraph constitutes that percentage of the issued and outstanding capital stock of the issuing corporation as is set forth in Annex C hereto; (iv) the Notes with a value equal to $1,000,000 or more held by such Pledgor consist of the promissory notes described in Annex D hereto where such Pledgor is listed as the lender; (v) the Limited Liability Company Interests of each Restricted Subsidiary held by such Pledgor consist of the number and type of interests of the Persons described in Annex E hereto; (vi) each such Limited Liability Company Interest referenced in clause (v) of this paragraph constitutes that percentage of the issued and outstanding equity interest of the issuing Person as set forth in Annex E hereto; (vii) the Partnership Interests of each Restricted Subsidiary held by such Pledgor consist of the number and type of interests of the Persons described in Annex F hereto; (viii) each such Partnership Interest referenced in clause (vii) of this paragraph constitutes that percentage or portion of the entire partnership interest of the issuing Person as set forth in Annex F hereto; (ix) the exact address of each chief executive office of such Pledgor is listed on Annex G hereto; and (x) such Pledgor has complied with the respective procedure set forth in Section 3.2(a) hereof with respect to each item of Collateral described in Annexes C through F hereto.

3.6 Conflicts with Foreign Pledge Agreements. To the extent that there is any overlap between, or conflict with, the provisions of this Agreement and any Foreign Pledge Agreement, such Foreign Pledge Agreement shall prevail with respect only to (i) any provision relating to the pledged collateral described in and covered under such Foreign Pledge Agreement and (ii) any provision where adherence to the law governing such Foreign Pledge Agreement is required for such Foreign Pledge Agreement to be enforceable in accordance with its terms.

4. APPOINTMENT OF SUB-AGENTS; ENDORSEMENTS, ETC.

The Pledgee shall have the right to appoint one or more sub-agents for the purpose of retaining physical possession of the Collateral, which may be held (in the discretion of the Pledgee) in the name of the relevant Pledgor, endorsed or assigned in blank or in

favor of the Pledgee or any nominee or nominees of the Pledgee or a sub-agent appointed by the Pledgee.

5. VOTING, ETC., WHILE NO EVENT OF DEFAULT OR SPECIFIED DEFAULT. Unless and until there shall have occurred and be continuing an Event of Default, each Pledgor shall be entitled to exercise any and all voting and other rights pertaining to the Collateral owned by it, and to give consents, waivers or ratifications in respect thereof; provided that, in each case, no vote shall be cast or any consent, waiver or ratification given or any action taken or omitted to be taken which would violate, or result in a breach of any covenant contained in, any of the terms of any Loan Document, or in a manner adverse to the interests of the Pledgee or any other Secured Party in the Collateral in any material respect, unless permitted by the terms of the Loan Documents. All such rights of each Pledgor to vote and to give consents, waivers and ratifications shall cease following written notice from the Pledgee in case an Event of Default has occurred and is continuing (provided that no such notice shall be required if any Event of Default under Section 8.01(f) of the Credit Agreement has occurred and is continuing), and Section 7 hereof shall become applicable.

6. DIVIDENDS AND OTHER DISTRIBUTIONS. Unless and until there shall have occurred and be continuing an Event of Default and following written notice from the Pledgee (provided that no such notice shall be required if any Event of Default under Section 8.01(f) of the Credit Agreement has occurred and is continuing), all cash dividends, cash distributions, cash Proceeds and other cash amounts payable in respect of the Collateral shall be paid to the respective Pledgor. The Pledgor shall be entitled to receive directly, subject to the other terms of this Agreement:

(i) all other or additional stock, notes, certificates, limited liability company interests, partnership interests, instruments or other securities or property (including, but not limited to, cash dividends other than as set forth above) paid or distributed by way of dividend or otherwise in respect of the Collateral;

(ii) all other or additional stock, notes, certificates, limited liability company interests, partnership interests, instruments or other securities or property (including, but not limited to, cash subject to the first sentence of this Section 6) paid or distributed in respect of the Collateral by way of stock-split, spin-off, split-up, reclassification, combination of shares or similar rearrangement; and

(iii) all other or additional stock, notes, certificates, limited liability company interests, partnership interests, instruments or other securities or property (including, but not limited to, cash) which may be paid in respect of the Collateral by reason of any consolidation, merger, exchange of stock, conveyance of assets, liquidation or similar corporate or other reorganization.

All cash dividends, cash distributions or other cash payments which are received by any Pledgor contrary to the provisions of this Section 6 or Section 7 hereof shall be received in trust for the benefit of the Pledgee, shall be segregated from other property or funds of such Pledgor and shall be promptly paid over to the Pledgee as Collateral in the same form as so received (with any necessary endorsement).

7. REMEDIES IN CASE OF AN EVENT OF DEFAULT. If there shall have occurred and be continuing an Event of Default, then and in every such case, subject to the Intercreditor Agreement, the Pledgee shall be entitled to exercise all of the rights, powers and remedies (whether vested in it by this Agreement, any other Loan Document or by law) for the protection and enforcement of its rights in respect of the Collateral, and the Pledgee shall be entitled to exercise all the rights and remedies of a secured party under the UCC as in effect in any relevant jurisdiction and also shall be entitled, without limitation, to exercise the following rights, which each Pledgor hereby agrees to be commercially reasonable:

(i) Following written notice to such Pledgor (provided that no such notice shall be required if any Event of Default under Section 8.01(f) of Credit Agreement has occurred and is continuing), to receive all amounts payable in respect of the Collateral otherwise payable under Section 6 hereof to such Pledgor;

(ii) to transfer all or any part of the Collateral into the Pledgee's name or the name of its nominee or nominees;

(iii) to accelerate any Pledged Note which may be accelerated in accordance with its terms, and take any other lawful action to collect upon any Pledged Note (including, without limitation, to make any demand for payment thereon);

(iv) to appoint by instrument in writing a receiver (which term as used in this Agreement includes a receiver and manager) or agent of all or any part of the Collateral and remove or replace from time to time any receiver or agent;

(v) to institute proceedings in any court of competent jurisdiction for the appointment of a receiver of all or any part of the Collateral;

(vi) to vote (and exercise all rights and powers in respect of voting) all or any part of the Collateral (whether or not transferred into the name of the Pledgee) and give all consents, waivers and ratifications in respect of the Collateral and otherwise act with respect thereto as though it were the outright owner thereof (each Pledgor hereby irrevocably constituting and appointing the Pledgee the proxy and attorney-in-fact of such Pledgor, with full power of substitution to do so);

(vii) at any time and from time to time to sell, assign and deliver, or grant options to purchase, all or any part of the Collateral, or any interest therein, at any public or private sale, without demand of performance, advertisement or, notice of intention to sell or of the time or place of sale or adjournment thereof or to redeem or otherwise purchase or dispose (all of which are hereby waived by each Pledgor), for cash, on credit or for other property, for immediate or future delivery without any assumption of credit risk, and for such price or prices and on such terms as the Pledgee in its absolute discretion may determine, provided at least 10 days' written notice of the time and place of any such sale shall be given to the respective Pledgor. The Pledgee

shall not be obligated to make any such sale of Collateral regardless of whether any such notice of sale has theretofore been given. Each Pledgor hereby waives and releases to the fullest extent permitted by law any right or equity of redemption with respect to the Collateral, whether before or after sale hereunder, and all rights, if any, of marshalling the Collateral and any other security or the Obligations or otherwise. At any such sale, unless prohibited by applicable law, the Pledgee on behalf of the Secured Parties may bid for and purchase all or any part of the Collateral so sold free from any such right or equity of redemption. Neither the Pledgee nor any other Secured Party shall be liable for failure to collect or realize upon any or all of the Collateral or for any delay in so doing nor shall any of them be under any obligation to take any action whatsoever with regard thereto; and

(viii) to set off any and all Collateral against any and all Obligations, and to withdraw any and all cash or other Collateral from any and all Collateral Accounts and to apply such cash and other Collateral to the payment of any and all Obligations.

8. REMEDIES, CUMULATIVE, ETC. Each and every right, power and remedy of the Pledgee provided for in this Agreement or in any other Loan Agreement, or now or hereafter existing at law or in equity or by statute shall be cumulative and concurrent and shall be in addition to every other such right, power or remedy. The exercise or beginning of the exercise by the Pledgee or any other Secured Party of any one or more of the rights, powers or remedies provided for in this Agreement or any other Loan Document or now or hereafter existing at law or in equity or by statute or otherwise shall not preclude the simultaneous or later exercise by the Pledgee or any other Secured Party of all such other rights, powers or remedies, and no failure or delay on the part of the Pledgee or any other Secured Party to exercise any such right, power or remedy shall operate as a waiver thereof. No notice to or demand on any Pledgor in any case shall entitle it to any other or further notice or demand in similar or other circumstances or constitute a waiver of any of the rights of the Pledgee or any other Secured Party to any other or further action in any circumstances without notice or demand. The Secured Parties agree that this Agreement may be enforced only by the action of the Pledgee, acting upon the instructions of the Required Lenders, and that no other Secured Party shall have any right individually to seek to enforce or to enforce this Agreement or to realize upon the security to be granted hereby, it being understood and agreed that such rights and remedies may be exercised by the Pledgee for the benefit of the Secured Parties upon the terms of this Agreement and the other Collateral Documents.

9. RECEIVER'S POWERS. (a) Any receiver appointed by the Pledgee pursuant to Section 7 hereof is vested with the rights and remedies which could have been exercised by the Pledgee in respect of any Pledgor or the Collateral and such other powers and discretions as are granted in the instrument of appointment and any supplemental instruments. The identity of the receiver, its replacement and its remuneration are within the sole and unfettered discretion of the Pledgee.

(b) Any receiver appointed by the Pledgee pursuant to Section 7 hereof will act as agent for the Pledgee for the purposes of taking possession of the Collateral, but otherwise and for all other purposes (except as provided below), as agent for the Pledgors. The receiver may sell, lease, or otherwise dispose of Collateral in accordance with the terms hereof as agent for the Pledgors or as agent for the Pledgee as the Pledgee may determine in its discretion. Each Pledgor agrees to ratify and confirm all actions of the receiver acting

as agent for such Pledgor so long as such actions are taken in accordance with the terms hereof.

(c) The Pledgee, in appointing or refraining from appointing any receiver, does not incur liability to the receiver, the Pledgors or otherwise and is not responsible for any misconduct or negligence of such receiver except to the extent resulting from the gross negligence or willful misconduct of the Pledgee (as determined by a court of competent jurisdiction in a final and non-appealable decision) (it being agreed that appointing or refraining to appoint any receiver in the reasonable judgment of the Pledgee's or based on the advice of advisors or counsel shall not constitute gross negligence or willful misconduct).

10. ULC SHARES. (a) Notwithstanding anything else contained in this Agreement or any other document or agreement among all or some of the parties hereto, each Pledgor is the sole registered and beneficial owner of all its Collateral that is ULC Shares and will remain so until such time as such ULC Shares are effectively transferred into the name of the Pledgee, any of the Secured Parties, or any nominee of the foregoing or any other Person on the books and records of such ULC. Accordingly, such Pledgor shall be entitled to receive and retain for its own account any dividend on or other distribution, if any, in respect of ULC Shares that are Collateral and shall have the right to vote such ULC Shares and to control the direction, management and policies of any ULC to the same extent as such Pledgor would if such ULC Shares were not pledged to the Pledgee for the benefit of the Secured Parties pursuant hereto. Nothing in this Agreement or any other document or agreement among all or some of the parties hereto is intended to, and nothing in this Agreement or any other document or agreement among all or some of the parties hereto shall, constitute the Pledgee, any of the Secured Parties or any Person other than a Pledgor, a member of any ULC for the purposes of Companies Act (Nova Scotia), the Business Corporations Act (British Columbia), the Business Corporations Act (Alberta) or any other applicable legislation until such time as notice is given to such Pledgor and further steps are taken hereunder or thereunder so as to register the Pledgee, any of the Secured Parties or any nominee of the foregoing, as specified in such notice, as the holder of shares of such ULC. To the extent any provision hereof would have the effect of constituting the Pledgee or any of the Secured Parties a member of a ULC prior to such time, such provision shall be severed herefrom and ineffective with respect to Collateral that is shares of such ULC without otherwise invalidating or rendering unenforceable this Agreement or invalidating or rendering unenforceable such provision insofar as it relates to Collateral that is not shares of such ULC.

(b) Except upon the exercise of rights to sell or otherwise dispose of Collateral that is ULC Shares if there shall have occurred and be continuing an Event of Default, no Pledgor shall cause or permit, or enable any ULC in which it holds ULC Shares that are Collateral to cause or permit, the Pledgee or any other Secured Party to: (a) be registered as a shareholder or member of a ULC; (b) have any notation entered in its favour in the share register of a ULC; (c) be held out as a shareholder or member of a ULC; (d) receive, directly or indirectly, any dividends, property or other distributions from a ULC by reason of the Pledgee or any other Secured Party holding a security interest in a ULC or ULC Shares; or (e) act as a shareholder or member of a ULC, or exercise any rights of a shareholder or member including the right to attend a meeting of, or to vote the shares of, a ULC.

11. APPLICATION OF PROCEEDS. (a) Subject to the Intercreditor Agreement, all monies collected by the Pledgee upon any sale or other disposition of, any collection from, or other realization upon all or any part of, the Collateral (whether or not expressly characterized as such) in connection with the exercise of its rights and remedies in accordance with this Agreement, together with all other monies received by the Pledgee hereunder, shall be applied in the manner provided in Section 5.4 of the Security Agreement.

(b) It is understood and agreed that each Pledgor shall remain jointly and severally liable with respect to the Obligations to the extent of any deficiency between the amount of the proceeds of the Collateral pledged by it hereunder and the aggregate amount of the Obligations.

(c) It is understood and agreed by each Pledgor and each Secured Party that the Pledgee shall have no liability for any determinations made by it in this Section 11, in each case except to the extent resulting from the gross negligence or willful misconduct of the Pledgee (as determined by a court of competent jurisdiction in a final and non-appealable decision). Each Pledgor and each Secured Party also agrees that the Pledgee may (but shall not be required to), at any time and in its sole discretion, and with no liability resulting therefrom, petition a court of competent jurisdiction regarding any application of Collateral in accordance with the requirements hereof, and the Pledgee shall be entitled to wait for, and may conclusively rely on, any such determination.

12. PURCHASERS OF COLLATERAL. Upon any sale of the Collateral by the Pledgee hereunder (whether by virtue of the power of sale herein granted, pursuant to judicial process or otherwise), the receipt of the Pledgee or the officer making such sale shall be a sufficient discharge to the purchaser or purchasers of the Collateral so sold, and such purchaser or purchasers shall not be obligated to see to the application of any part of the purchase money paid over to the Pledgee or such officer or be answerable in any way for the misapplication or nonapplication thereof.

13. INDEMNITY. The parties hereto agree that the terms of Section 10.04 of the Credit Agreement are incorporated herein by reference, *mutatis mutandis*. If and to the extent that the obligations of any Pledgor under this Section 13 are unenforceable for any reason, such Pledgor hereby agrees to make the maximum contribution to the payment and satisfaction of such obligations which is permissible under applicable law. The indemnity obligations of the each Pledgor contained in this Section 13 shall continue in full force and effect notwithstanding the Payment in Full of the Obligations.

14. PLEDGEE NOT A PARTNER OR LIMITED LIABILITY COMPANY MEMBER. (a) Nothing herein shall be construed to make the Pledgee or any other Secured Party liable as a member of any limited liability company or as a partner of any partnership and neither the Pledgee nor any other Secured Party by virtue of this Agreement or otherwise (except as referred to in the following sentence) shall have any of the duties, obligations or liabilities of a member of any limited liability company or as a partner in any partnership. The parties hereto expressly agree that, unless the Pledgee shall become the absolute owner of Collateral consisting of a Limited Liability Company Interest or a Partnership Interest pursuant hereto, this Agreement shall not be construed as creating a partnership or joint venture among the Pledgee, any other Secured Party, any Pledgor and/or any other Person.

(b) Except as provided in the last sentence of paragraph (a) of this Section 14, the Pledgee, by accepting this Agreement, did not intend to become a member

of any limited liability company or a partner of any partnership or otherwise be deemed to be a co-venturer with respect to any Pledgor, any limited liability company, partnership and/or any other Person either before or after an Event of Default shall have occurred. The Pledgee shall have only those powers set forth herein and the Secured Parties shall assume none of the duties, obligations or liabilities of a member of any limited liability company or as a partner of any partnership or any Pledgor except as provided in the last sentence of paragraph (a) of this Section 14.

(c) The Pledgee and the other Secured Parties shall not be obligated to perform or discharge any obligation of any Pledgor as a result of the pledge hereby effected.

(d) The acceptance by the Pledgee of this Agreement, with all the rights, powers, privileges and authority so created, shall not at any time or in any event obligate the Pledgee or any other Secured Party to appear in or defend any action or proceeding relating to the Collateral to which it is not a party, or to take any action hereunder or thereunder, or to expend any money or incur any expenses or perform or discharge any obligation, duty or liability under the Collateral.

15. FURTHER ASSURANCES; POWER-OF-ATTORNEY. (a) Each Pledgor agrees that it will, at such Pledgor's own expense, file and refile, or cause to be filed or refiled, under the UCC or other applicable law such financing statements, continuation statements and other documents, in form reasonably acceptable to the Pledgee, in such offices as the Pledgee (acting on its own or on the instructions of the Required Lenders) may reasonably deem necessary or appropriate and wherever required or permitted by law in order to perfect and preserve the Pledgee's security interest in the Collateral hereunder and hereby authorizes the Pledgee to file financing statements and amendments thereto relative to all or any part of the Collateral (including, without limitation, financing statements which list the Collateral specifically and/or "all assets" as collateral) without the signature of such Pledgor where permitted by law, in such offices as the Pledgee may reasonably deem necessary or advisable or wherever required or permitted by law in order to perfect and preserve the Pledgee's security interest in the Collateral hereunder and agrees to do such further acts and things and to execute and deliver to the Pledgee such additional conveyances, assignments, agreements and instruments as the Pledgee may reasonably require or deem advisable to carry into effect the purposes of this Agreement or to further assure and confirm unto the Pledgee its rights, powers and remedies hereunder or thereunder.

(b) Each Pledgor hereby constitutes and appoints the Pledgee its true and lawful attorney-in-fact, irrevocably, with full authority in the place and stead of such Pledgor and in the name of such Pledgor or otherwise, from time to time after the occurrence and during the continuance of an Event of Default, in the Pledgee's discretion, to act, require, demand, receive and give acquittance for any and all monies and claims for monies due or to become due to such Pledgor under or arising out of the Collateral, to endorse any checks or other instruments or orders in connection therewith and to file any claims or take any action or institute any proceedings and to execute any instrument which the Pledgee may deem necessary or advisable to accomplish the purposes of this Agreement, which appointment as attorney is coupled with an interest.

16. THE PLEDGEE AS COLLATERAL AGENT. The Pledgee will hold in accordance with this Agreement all items of the Collateral at any time received under this Agreement. It is expressly understood, acknowledged and agreed by each Secured Party

that by accepting the benefits of this Agreement each such Secured Party acknowledges and agrees that the obligations of the Pledgee as holder of the Collateral and interests therein and with respect to the disposition thereof, and otherwise under this Agreement, are only those expressly set forth in this Agreement and in Section 9 of the Credit Agreement. The Pledgee shall act hereunder on the terms and conditions set forth herein and in Section 9 of the Credit Agreement. Notwithstanding the foregoing, the ABL Collateral Agent (as defined in the Intercreditor Agreement) has agreed pursuant to Section 5.04 of the Intercreditor Agreement to hold that part of the Collateral that is in its possession or control (or in the possession or control of its agents or bailees), including, without limitation, any Securities Accounts, as collateral agent and as bailee for the Pledgee.

17. TRANSFER BY THE PLEDGORS. Subject to the Intercreditor Agreement, except as permitted by the terms of the Loan Documents prior to the Termination Date, no Pledgor will sell or otherwise dispose of, grant any option with respect to, or mortgage, pledge or otherwise encumber any of the Collateral or any interest therein.

18. REPRESENTATIONS, WARRANTIES AND COVENANTS OF THE PLEDGORS. (a) Each Pledgor represents, warrants and covenants as to itself and each of its Restricted Subsidiaries that:

(i) it is the legal, beneficial and record owner of, and has good and marketable title to, all of its Collateral consisting of one or more Securities, Partnership Interests and Limited Liability Company Interests and that it has sufficient interest in all of its Collateral in which a security interest is purported to be created hereunder for such security interest to attach (subject, in each case, to no pledge, Lien, mortgage, hypothecation, security interest, charge, option, Adverse Claim or other encumbrance whatsoever, except the Liens and security interests created by this Agreement or permitted under the Loan Documents);

(ii) it has full power, authority and legal right to pledge all the Collateral pledged by it pursuant to this Agreement;

(iii) this Agreement has been duly authorized, executed and delivered by such Pledgor and constitutes a legal, valid and binding obligation of such Pledgor enforceable against such Pledgor in accordance with its terms, except to the extent that the enforceability hereof may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforcement is sought in equity or at law);

(iv) except to the extent already obtained or made, no consent of any other party (including, without limitation, any stockholder, partner, member or creditor of such Pledgor or any of its Restricted Subsidiaries) and no consent, license, permit, approval or authorization of, exemption by, notice or report to, or registration, filing or declaration with, any Governmental Authority is required to be obtained by such Pledgor (which has not been obtained or made) in connection with (a) the execution, delivery or performance of this Agreement by such Pledgor, (b) the validity or enforceability of this Agreement against such Pledgor, (c) the perfection of the Pledgee's security interest in such Pledgor's Collateral or (d) except for (i) compliance with or as may be required by applicable securities laws and (ii) the consent of the landlord under the Ottawa Capitalized Lease, or any renewal,

replacement, refinancing or extension thereof, to any Transfer (as defined in the Ottawa Capitalized Lease as in effect on the original date thereof) (or similar term contained in any renewal, replacement, refinancing or extension of the Ottawa Capitalized Lease) not permitted by the terms thereof, the exercise by the Pledgee of any of its rights or remedies provided herein;

(v) neither the execution, delivery or performance by such Pledgor of this Agreement, nor compliance by it with the terms and provisions hereof nor the consummation of the transactions contemplated hereby: (i) will contravene any provision of any applicable law, statute, rule or regulation, or any applicable order, writ, injunction or decree of any court, arbitrator or governmental instrumentality, domestic or foreign, applicable to such Pledgor; (ii) will conflict or be inconsistent with or result in any breach of any of the terms, covenants, conditions or provisions of, or constitute a default under, or result in the creation or imposition of (or the obligation to create or impose) any Lien (except pursuant to the Collateral Documents) upon any of the properties or assets of such Pledgor or any of its Restricted Subsidiaries pursuant to the terms of any indenture, lease, mortgage, deed of trust, credit agreement, loan agreement or any other material agreement, contract or other instrument to which such Pledgor or any of its Restricted Subsidiaries is a party or is otherwise bound, or by which it or any of its properties or assets is bound or to which it may be subject; or (iii) will violate any provision of the certificate of incorporation, by-laws, certificate of partnership, partnership agreement, certificate of formation or limited liability company agreement (or equivalent organizational documents), as the case may be, of such Pledgor or any of its Restricted Subsidiaries;

(vi) all of such Pledgor's Collateral (consisting of Securities, Limited Liability Company Interests and Partnership Interests) of any Restricted Subsidiary has been duly and validly issued, and in the case of any Stock of a Domestic Corporation is fully paid and non-assessable and is subject to no options to purchase or similar rights;

(vii) each of such Pledgor's Pledged Notes constitutes, or when executed by the obligor that is a Restricted Subsidiary thereof will constitute, the legal, valid and binding obligation of such obligor, enforceable in accordance with its terms, except to the extent that the enforceability thereof may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforcement is sought in equity or at law); and

(viii) the security interests created under this Agreement (when executed and delivered by all parties hereto) are effective to create in favor of the Pledgee, for the benefit of the Secured Parties, a legal, valid and enforceable security interest in all right, title and interest of the Pledgors in all of the Collateral, and when proper UCC financing statements have been filed in the appropriate filing offices against each Pledgor and the Pledgee has obtained "control" (within the meaning of the UCC) of the Collateral, the Pledgee, for the benefit of the Secured Parties, shall have a perfected security interest in all Collateral to the extent such security interest can be perfected by filing a UCC financing statement under the UCC or by the Pledgee having "control" of the Collateral, subject to no security interests of any other Person (other than Permitted Liens), subject to the terms of the Intercreditor Agreement.

(b) Each Pledgor covenants and agrees that it will defend the Pledgee's right, title and security interest in and to such Pledgor's Collateral and the proceeds thereof against the claims and demands of all persons whomsoever (other than Permitted Liens); and each Pledgor covenants and agrees that it will have like title to and right to pledge any other property at any time hereafter pledged to the Pledgee by such Pledgor as Collateral hereunder as provided herein and will likewise defend the right thereto and security interest therein of the Pledgee and the other Secured Parties.

19. LEGAL NAMES; TYPE OF ORGANIZATION (AND WHETHER A REGISTERED ORGANIZATION AND/OR A TRANSMITTING UTILITY); JURISDICTION OF ORGANIZATION; LOCATION; ORGANIZATIONAL IDENTIFICATION NUMBERS; FEDERAL EMPLOYER IDENTIFICATION NUMBERS; CHANGES THERETO; ETC.As of the date hereof, the exact legal name of each Pledgor, the type of organization of such Pledgor, whether or not such Pledgor is a Registered Organization, the jurisdiction of organization of such Pledgor, such Pledgor's Location, the organizational identification number (if any) of each Pledgor, the Federal Employer Identification Number (if any) and whether or not such Pledgor is a Transmitting Utility, is listed on Annex A hereto for such Pledgor. No Pledgor shall change its legal name, its type of organization, its status as a Registered Organization (in the case of a Registered Organization), its status as a Transmitting Utility or as a Person which is not a Transmitting Utility, as the case may be, its jurisdiction of organization, its Location, or its organizational identification number (if any) or its Federal Employer Identification Number (if any), except that any such changes shall be permitted (so long as not in violation of the applicable requirements of the Loan Documents and so long as same do not involve (x) a Registered Organization ceasing to constitute same or (y) any Pledgor changing its jurisdiction of organization or Location from the United States or a State thereof to a jurisdiction of organization or Location, as the case may be, outside the United States or a State thereof) if (i) it shall have given to the Pledgee not less than 10 days' prior written notice of each change to the information listed on Annex A (as adjusted for any subsequent changes thereto previously made in accordance with this sentence), together with a supplement to Annex A which shall correct all information contained therein for such Pledgor, and (ii) in connection with the respective change or changes, it shall have taken all action reasonably requested by the Pledgee to maintain the security interests of the Pledgee in the Collateral intended to be granted hereby at all times fully perfected and in full force and effect. In addition, to the extent that any Pledgor does not have an organizational identification number on the date hereof and later obtains one, such Pledgor shall promptly thereafter deliver a notification to the Pledgee of such organizational identification number and shall take all actions reasonably satisfactory to the Pledgee to the extent necessary to maintain the security interest of the Pledgee in the Collateral intended to be granted hereby fully perfected and in full force and effect.

20. PLEDGORS' OBLIGATIONS ABSOLUTE, ETC. The obligations of each Pledgor under this Agreement shall be absolute and unconditional and shall remain in full force and effect without regard to, and shall not be released, suspended, discharged, terminated or otherwise affected by, any circumstance or occurrence whatsoever (other than termination of this Agreement pursuant to Section 22 hereof), including, without limitation:

(i) any renewal, extension, amendment or modification of, or addition or supplement to or deletion from any Loan Document (other than

this Agreement in accordance with its terms), or any other instrument or agreement referred to therein, or any assignment or transfer thereof;

(ii) any waiver, consent, extension, indulgence or other action or inaction under or in respect of any such agreement or instrument including, without limitation, this Agreement (other than a waiver consent or extension with respect to this Agreement in accordance with its terms);

(iii) any furnishing of any additional security to the Pledgee or its assignee or any acceptance thereof or any release of any security by the Pledgee or its assignee;

(iv) any limitation on any party's liability or obligations under any such instrument or agreement or any invalidity or unenforceability, in whole or in part, of any such instrument or agreement or any term thereof; or

(v) any bankruptcy, insolvency, reorganization, composition, adjustment, dissolution, liquidation or other like proceeding relating to any Pledgor or any Restricted Subsidiary of any Pledgor, or any action taken with respect to this Agreement by any trustee or receiver, or by any court, in any such proceeding, whether or not such Pledgor shall have notice or knowledge of any of the foregoing.

21. SALE OF COLLATERAL WITHOUT REGISTRATION. (a) If an Event of Default shall have occurred and be continuing and any Pledgor shall have received from the Pledgee a written request or requests that such Pledgor cause any registration, qualification or compliance under any federal or state securities law or laws to be effected with respect to all or any part of the Collateral consisting of Securities, Limited Liability Company Interests or Partnership Interests, such Pledgor as soon as practicable and at its expense will use its best efforts to cause such registration to be effected (and be kept effective) and will use its best efforts to cause such qualification and compliance to be effected (and be kept effective) as may be so requested and as would permit or facilitate the sale and distribution of such Collateral consisting of Securities, Limited Liability Company Interests or Partnership Interests, including, without limitation, registration under the Securities Act, as then in effect (or any similar statute then in effect), appropriate qualifications under applicable blue sky or other state securities laws and appropriate compliance with any other governmental requirements; provided, that the Pledgee shall furnish to such Pledgor such information regarding the Pledgee as such Pledgor may request in writing and as shall be required in connection with any such registration, qualification or compliance. Each Pledgor will cause the Pledgee to be kept reasonably advised in writing as to the progress of each such registration, qualification or compliance and as to the completion thereof, will furnish to the Pledgee such number of prospectuses, offering circulars and other documents incident thereto as the Pledgee from time to time may reasonably request, and will indemnify, to the extent permitted by law, the Pledgee and all other Secured Parties participating in the distribution of such Collateral consisting of Securities, Limited Liability Company Interests or Partnership Interests against all claims, losses, damages and liabilities caused by any untrue statement (or alleged untrue statement) of a material fact contained therein (or in any related registration statement, notification or the like) or by any omission (or alleged omission) to state therein (or in any related registration statement, notification or the like) a material fact required to be stated therein or necessary to make the statements therein not misleading, except insofar as the same may have been caused by an untrue statement or

omission based upon information furnished in writing to such Pledgor by the Pledgee or such other Secured Party expressly for use therein.

(b) If at any time when the Pledgee shall determine to exercise its right to sell all or any part of the Collateral consisting of Securities, Limited Liability Company Interests or Partnership Interests pursuant to Section 7 hereof, and such Collateral or the part thereof to be sold shall not, for any reason whatsoever, be effectively registered under the Securities Act, as then in effect, the Pledgee may, in its sole and absolute discretion, sell such Collateral or part thereof by private sale in such manner and under such circumstances as the Pledgee may deem necessary or advisable in order that such sale may legally be effected without such registration. Without limiting the generality of the foregoing, in any such event the Pledgee, in its sole and absolute discretion (i) may proceed to make such private sale notwithstanding that a registration statement for the purpose of registering such Collateral or part thereof shall have been filed under such Securities Act, (ii) may approach and negotiate with a single possible purchaser to effect such sale, and (iii) may restrict such sale to a purchaser who will represent and agree that such purchaser is purchasing for its own account, for investment, and not with a view to the distribution or sale of such Collateral or part thereof. In the event of any such sale, the Pledgee shall incur no responsibility or liability for selling all or any part of the Collateral at a price which the Pledgee, in its sole and absolute discretion, may in good faith deem reasonable under the circumstances, notwithstanding the possibility that a substantially higher price might be realized if the sale were deferred until the registration as aforesaid.

22. TERMINATION; RELEASE. (a) On the Termination Date, this Agreement shall terminate (provided that all indemnities set forth herein including, without limitation, in Section 13 hereof shall survive any such termination) and the Pledgee, at the request and expense of such Pledgor, will execute and deliver to such Pledgor a proper instrument or instruments (including UCC termination statements) acknowledging the satisfaction and termination of this Agreement (including, without limitation, UCC termination statements and instruments of satisfaction, discharge and/or reconveyance), and will duly release from the security interest created hereby and assign, transfer and deliver to such Pledgor (without recourse and without any representation or warranty) such of the Collateral as may be in the possession of the Pledgee or any of its sub-agents hereunder and as has not theretofore been sold or otherwise applied or released pursuant to this Agreement, together with any moneys at the time held by the Pledgee or any of its sub-agents hereunder and, with respect to any Collateral consisting of an Uncertificated Security issued by a Subsidiary of the Company (other than an Uncertificated Security credited on the books of a Clearing Corporation or Securities Intermediary), a termination of the agreement relating thereto executed and delivered by the issuer of such Uncertificated Security pursuant to Section 3.2(a)(ii) or by the respective partnership or limited liability company pursuant to Section 3.2(a)(iv)(2).

(b) In the event that any part of the Collateral is sold or otherwise disposed of (to a Person other than a Loan Party) at any time prior to the Termination Date, in connection with a sale or disposition permitted by Section 7.05 of the Credit Agreement, or is otherwise released pursuant to the Credit Agreement, and the proceeds of such sale or disposition (or from such release) are applied in accordance with the terms of the Credit Agreement to the extent required to be so applied, the Pledgee, at the request and expense of such Pledgor, will duly release from the security interest created hereby (and will execute and deliver such documentation, including termination or partial release statements and the like in connection therewith) and assign, transfer and deliver to such Pledgor (without

recourse and without any representation or warranty) such of the Collateral as is then being (or has been) so sold or otherwise disposed of, or released, and as may be in the possession of the Pledgee (or, in the case of Collateral held by any sub-agent designated pursuant to Section 4 hereof, such sub-agent) and has not theretofore been released pursuant to this Agreement. Furthermore, upon the release of any Guarantor from the Guaranty in accordance with the provisions thereof, such Pledgor (and the Collateral at such time assigned or pledged by the respective Pledgor pursuant hereto) shall be released from this Agreement. In the case of any such sale or disposition of any property constituting Collateral in a transaction permitted pursuant to Section 7.05 of the Credit Agreement, the Liens created by this Agreement on such Collateral shall be automatically released without need for further action by any Person.

(c) At any time that any Pledgor desires that the Pledgee deliver any release or such other documentation as provided in the foregoing Section 22(a) or (b), such Pledgor shall deliver to the Pledgee (and the relevant sub-agent, if any, designated pursuant to Section 4 hereof) a certificate signed by a Responsible Officer of such Pledgor stating that the release of the respective Collateral is permitted pursuant to Section 22(a) or (b) hereof. At any time that the Company or the respective Pledgor desires that a Guarantor which has been released from the Guaranty be released hereunder as provided in the penultimate sentence of Section 22(b), it shall deliver to the Pledgee a certificate signed by a Responsible Officer of the Company and the respective Pledgor stating that the release of the respective Pledgor (and its Collateral) is permitted pursuant to such Section 22(b).

(d) The Pledgee shall have no liability whatsoever to any other Secured Party as the result of any release of Collateral by it in accordance with, or which the Pledgee in good faith believes to be in accordance with, this Section 22.

23. NOTICES, ETC. Except as otherwise specified herein, all notices, requests, demands or other communications to or upon the respective parties hereto shall be sent or delivered by mail, telecopy or courier service and all such notices and communications shall, when mailed, telecopied or sent by courier, be effective when deposited in the mails, delivered to the overnight courier, or sent by telecopier, except that notices and communications to the Pledgee or any Pledgor shall not be effective until received by the Pledgee or such Pledgor, as the case may be. All notices and other communications shall be in writing and addressed as follows:

(a)if to any Pledgor, at:

c/o Ciena Corporation
7035 Ridge Road
Hanover, Maryland 21076
Attention: Treasurer’s Office
Facsimile: (410) 865-8001

with a copy to:

7035 Ridge Road
Hanover, Maryland 21076
Attention: General Counsel’s Office
Facsimile: (410) 865-8901

(b) if to the Pledgee, at:

Bank of America, N.A.
Agency Management
900 West Trade Street
Mail Code: NC1-026-06-03
Charlotte, NC 28255-0001
Attention: Priscilla Baker
Telephone: 980-386-3475
Facsimile: 704-409-0918
Electronic Mail: priscilla.l.baker@baml.com

or at such other address or addressed to such other individual as shall have been furnished in writing by any Person described above to the party required to give notice hereunder.

24. WAIVER; AMENDMENT. Except as provided in Sections 32 and 34 hereof and Section 10.01 of the Credit Agreement, none of the terms and conditions of this Agreement may be changed, waived, modified or varied in any manner whatsoever.

25. SUCCESSORS AND ASSIGNS. This Agreement shall create a continuing security interest in the Collateral and shall (i) remain in full force and effect, subject to release and/or termination as set forth in Section 22 hereof, (ii) be binding upon each Pledgor, its successors and assigns; provided, however, that no Pledgor shall assign any of its rights or obligations hereunder without the prior written consent of the Pledgee, and (iii) inure, together with the rights and remedies of the Pledgee hereunder, to the benefit of the Pledgee, the other Secured Parties and their respective successors, transferees and assigns. All agreements, statements, representations and warranties made by each Pledgor herein or in any certificate or other instrument delivered by such Pledgor or on its behalf under this Agreement shall be considered to have been relied upon by the Secured Parties and shall survive the execution and delivery of this Agreement and the other Loan Documents regardless of any investigation made by the Secured Parties or on their behalf.

26. HEADINGS DESCRIPTIVE. The headings of the several Sections of this Agreement are inserted for convenience only and shall not in any way affect the meaning or construction of any provision of this Agreement.

27. GOVERNING LAW; SUBMISSION TO JURISDICTION; VENUE; WAIVER OF JURY TRIAL. (a) THIS AGREEMENT AND ANY CLAIMS, CONTROVERSY, DISPUTE OR CAUSE OF ACTION (WHETHER IN CONTRACT OR TORT OR OTHERWISE) BASED UPON, ARISING OUT OF OR RELATING TO THIS AGREEMENT AND THE TRANSACTIONS CONTEMPLATED HEREBY SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAW OF THE STATE OF NEW YORK.

(b) EACH PLEDGOR IRREVOCABLY AND UNCONDITIONALLY AGREES THAT IT WILL NOT COMMENCE ANY ACTION, LITIGATION OR PROCEEDING OF ANY KIND OR DESCRIPTION, WHETHER IN LAW OR EQUITY, WHETHER IN CONTRACT OR IN TORT OR OTHERWISE, AGAINST THE PLEDGEE, ANY SECURED PARTY OR ANY RELATED PARTY

THEREOF IN ANY WAY RELATING TO THIS AGREEMENT, ANY OTHER COLLATERAL DOCUMENT OR THE TRANSACTIONS RELATING HERETO OR THERETO, IN ANY FORUM OTHER THAN THE COURTS OF THE STATE OF NEW YORK SITTING IN NEW YORK COUNTY AND OF THE UNITED STATES DISTRICT COURT OF THE SOUTHERN DISTRICT OF NEW YORK, AND ANY APPELLATE COURT FROM ANY THEREOF, AND EACH OF THE PARTIES HERETO IRREVOCABLY AND UNCONDITIONALLY SUBMITS TO THE JURISDICTION OF SUCH COURTS AND AGREES THAT ALL CLAIMS IN RESPECT OF ANY SUCH ACTION, LITIGATION OR PROCEEDING MAY BE HEARD AND DETERMINED IN SUCH NEW YORK STATE COURT OR, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, IN SUCH FEDERAL COURT. EACH OF THE PARTIES HERETO AGREES THAT A FINAL JUDGMENT IN ANY SUCH ACTION, LITIGATION OR PROCEEDING SHALL BE CONCLUSIVE AND MAY BE ENFORCED IN OTHER JURISDICTIONS BY SUIT ON THE JUDGMENT OR IN ANY OTHER MANNER PROVIDED BY LAW. NOTHING IN THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT SHALL AFFECT ANY RIGHT THAT THE PLEDGEE OR ANY SECURED PARTY MAY OTHERWISE HAVE TO BRING ANY ACTION OR PROCEEDING RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT AGAINST ANY PLEDGOR OR ITS PROPERTIES IN THE COURTS OF ANY JURISDICTION.

(c) EACH PLEDGOR IRREVOCABLY AND UNCONDITIONALLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY OBJECTION THAT IT MAY NOW OR HEREAFTER HAVE TO THE LAYING OF VENUE OF ANY ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT IN ANY COURT REFERRED TO IN PARAGRAPH (B) OF THIS SECTION. EACH OF THE PARTIES HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, THE DEFENSE OF AN INCONVENIENT FORUM TO THE MAINTENANCE OF SUCH ACTION OR PROCEEDING IN ANY SUCH COURT.

(d) EACH PARTY HERETO IRREVOCABLY CONSENTS TO SERVICE OF PROCESS IN THE MANNER PROVIDED FOR NOTICES IN SECTION 23. NOTHING IN THIS AGREEMENT WILL AFFECT THE RIGHT OF ANY PARTY HERETO TO SERVE PROCESS IN ANY OTHER MANNER PERMITTED BY APPLICABLE LAW.

(e) EACH PARTY HERETO HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS AGREEMENT OR ANY OTHER COLLATERAL DOCUMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY OR THEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY). EACH PARTY HERETO (A) CERTIFIES THAT NO REPRESENTATIVE, AGENT OR ATTORNEY OF ANY OTHER PERSON HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PERSON WOULD NOT, IN THE EVENT OF LITIGATION, SEEK TO ENFORCE THE FOREGOING WAIVER AND (B) ACKNOWLEDGES THAT IT AND THE OTHER PARTIES HERETO HAVE BEEN INDUCED TO ENTER INTO THIS AGREEMENT

AND THE OTHER LOAN DOCUMENTS BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.

28. PLEDGOR'S DUTIES. It is expressly agreed, anything herein contained to the contrary notwithstanding, that each Pledgor shall remain liable to perform all of the obligations, if any, assumed by it with respect to the Collateral and the Pledgee shall not have any obligations or liabilities with respect to any Collateral by reason of or arising out of this Agreement, except for the safekeeping of Collateral actually in Pledgee's possession, nor shall the Pledgee be required or obligated in any manner to perform or fulfill any of the obligations of any Pledgor under or with respect to any Collateral.

29. COUNTERPARTS. This Agreement may be executed in any number of counterparts and by the different parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all of which shall together constitute one and the same instrument. A set of counterparts executed by all the parties hereto shall be lodged with the Company and the Pledgee.

30. SEVERABILITY. Any provision of this Agreement which is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof, and any such prohibition or unenforceability in any jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

31. RECOURSE. This Agreement is made with full recourse to each Pledgor and pursuant to and upon all the representations, warranties, covenants and agreements on the part of such Pledgor contained herein and in the other Loan Documents and otherwise in writing in connection herewith or therewith.

32. ADDITIONAL PLEDGORS. It is understood and agreed that any Wholly-Owned Domestic Subsidiary of the Company that is required to become a party to this Agreement after the date hereof pursuant to the requirements of the Credit Agreement shall become a Pledgor hereunder by (x) executing a counterpart hereof, or a Pledge Agreement Supplement in the form attached hereto as Exhibit A, and delivering the same to the Pledgee (provided such Pledge Agreement Supplement shall not require the consent of any Pledgor), (y) delivering supplements to Annexes A through G hereto as are necessary to cause such annexes to be complete and accurate with respect to such additional Pledgor on such date and (z) taking all actions as specified in this Agreement as would have been taken by such Pledgor had it been an original party to this Agreement, in each case with all documents required above to be delivered to the Pledgee and with all documents and actions required above to be taken to the reasonable satisfaction of the Pledgee and upon such execution and delivery, such Subsidiary shall constitute a Pledgor hereunder.

33. LIMITED OBLIGATIONS. It is the desire and intent of each Pledgor and the Secured Parties that this Agreement shall be enforced against each Pledgor to the fullest extent permissible under the laws applied in each jurisdiction in which enforcement is sought. Notwithstanding anything to the contrary contained herein, in furtherance of the foregoing, it is noted that the obligations of each Pledgor constituting a Guarantor have been limited as (and to the extent) provided in the Guaranty.

34. ABL PRIORITY COLLATERAL. Notwithstanding anything herein to the contrary, prior to the Discharge of ABL Obligations, the requirements under this Agreement to deliver or grant control over ABL Priority Collateral to the Pledgee, or to give any notice to any Person or in respect of the provision of voting rights or the obtaining of any consent of any Person, in each case in connection with any ABL Priority Collateral, shall be deemed satisfied if the Pledgors comply with the requirements of the similar provision of the applicable ABL Credit Document (as defined in the Intercreditor Agreement). Until the Discharge of ABL Obligations, the delivery of any ABL Priority Collateral to the ABL Collateral Agent (as defined in the Intercreditor Agreement) pursuant to the ABL Credit Documents as bailee for the Pledgee shall satisfy any delivery requirement hereunder or under any other Loan Document.

35. INTERCREDITOR AGREEMENT. This Agreement and the other Loan Documents are subject to the terms and conditions set forth in the Intercreditor Agreement in all respects and, in the event of any conflict between the terms of the Intercreditor Agreement and this Agreement, the terms of the Intercreditor Agreement shall govern. Notwithstanding anything herein to the contrary, the Lien and security interest granted to the Pledgee pursuant to any Loan Document and the exercise of any right or remedy in respect of the Collateral by the Pledgee (or any Secured Party) hereunder or under any other Loan Document are subject to the provisions of the Intercreditor Agreement and in the event of any conflict between the terms of the Intercreditor Agreement, this Agreement and any other Loan Document, the terms of the Intercreditor Agreement shall govern and control with respect to the exercise of any such right or remedy. Without limiting the generality of the foregoing, and notwithstanding anything herein to the contrary, no Loan Party shall be required hereunder or under any Loan Document to take any action with respect to the Collateral that is inconsistent with the provisions of the Intercreditor Agreement.

36. RELEASE OF PLEDGORS

. At any time (a) all of the Equity Interests of any Pledgor owned by the Company or any other Pledgor are sold (to a Person other than the Company or any of its Restricted Subsidiaries) in a transaction permitted pursuant to the Credit Agreement or (b) a Pledgor becomes an Excluded Subsidiary, then such Pledgor shall be released as a Pledgor pursuant to this Agreement without any further action hereunder (it being understood that the sale of all of the Equity Interests in any Person that owns, directly or indirectly, all of the Equity Interests in any Pledgor shall be deemed to be a sale of all of the Equity Interests in such Pledgor for purposes of this Section), and upon the reasonable request of the Company and at the expense of the Pledgors, the Pledgee is authorized and directed, and hereby agrees, to execute and deliver such instruments of release as are reasonably requested by the Pledgor to evidence the release of such Pledgor. At any time that the Company desires that a Pledgor be released from this Agreement as provided in this Section 36, the Company shall deliver to the Pledgee a certificate signed by a Responsible Officer of the Company stating that (i) the transaction is permitted pursuant to the Credit Agreement or such Pledgor has become an Excluded Subsidiary, as applicable, and (ii) the release of the respective Pledgor is permitted pursuant to this Section 36. The Pledgee shall have no liability whatsoever to any other Secured Party as a result of the release of any Pledgor by it in accordance with, or which it believes to be in accordance with, this Section 36.

* * * *

*** * * *EXHIBIT A**
to Pledge Agreement

[FORM OF PLEDGE AGREEMENT SUPPLEMENT]

PLEDGE AGREEMENT SUPPLEMENT dated as of _____, _____, between [Name of Pledgor] (the "Pledgor") and Bank of America, N.A., as Pledgee.

WHEREAS, CIENA CORPORATION, a Delaware corporation (the "Borrower"), CIENA COMMUNICATIONS, INC., a Delaware corporation ("CCI"), CIENA GOVERNMENT SOLUTIONS, INC., a Delaware corporation ("CGSI" and together with CCI, each a "Guarantor" and collectively the "Guarantors," and the Guarantors together with the Borrower hereinafter referred to collectively as the "Pledgors") and BANK OF AMERICA, N.A., as Pledgee, are parties to a Term Loan Pledge Agreement dated as of July [15], 2014 (as amended, modified, restated or supplemented from time to time and as heretofore amended and/or supplemented, the "Pledge Agreement") under which the Borrower secures certain of its obligations and the Guarantors secure their respective guarantees thereof (the "Secured Obligations");

WHEREAS, [Name of Pledgor] desires to become [is] a party to the Pledge Agreement as a Pledgor thereunder; and

WHEREAS, terms defined in the Pledge Agreement (or whose definitions are incorporated by reference in Section 2 of the Pledge Agreement) and not otherwise defined herein have, as used herein, the respective meanings provided for therein;

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[1] If the Pledgor is the Borrower, delete this recital and Section 1 hereof.

Signature Page to Term Loan Pledge Agreement

NOW, THEREFORE, in consideration of the ~~premises and the mutual promises and agreements contained herein, and for other~~foregoing and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto ~~hereby~~ agree as follows:

Party to Pledge Agreement.[1] The Pledgor acknowledges that, by signing this Pledge Agreement Supplement and delivering it to the Pledgee, the Pledgor becomes a "Pledgor" for all purposes of the Pledge Agreement, becomes a party to the Pledge Agreement, will thereafter have all the rights and obligations of a Pledgor thereunder and will be bound by all the provisions thereof as fully as if the Pledgor were one of the original parties thereto. The Pledgor further acknowledges that its obligations hereunder are subject to all the provisions of the Pledge Agreement applicable to the obligations of a Pledgor thereunder.

Grant of Liens. In order to secure the Secured Obligations now or hereafter owed or to be performed by such Pledgor (but subject to the proviso at the end of Section 3.1 of the Pledge Agreement), the Pledgor does hereby grant and pledge to the Pledgee for the benefit of the Secured Parties, and does hereby create a continuing security interest in favor of the Pledgee for the benefit of the Secured Parties in, all of its right, title and interest in and to the following property of the Pledgor, whether now owned or existing or hereafter from time to time acquired or arising and regardless of where located (the "New Collateral").

[describe property being added to the Collateral] [2]

With respect to each right to payment or performance included in the Collateral from time to time, the Lien granted therein includes a continuing security interest in i) any supporting obligation that supports such payment or performance and ii) any Lien that (x) secures such right to payment or performance or (y) secures any such supporting obligation.

The foregoing Liens are granted as security only and shall not subject the Pledgee or any other Secured Party to, or transfer or in any way affect or modify, any obligation or liability of the Pledgor with respect to any of the New Collateral or any transaction in connection therewith.

Delivery of Collateral. Concurrently with delivering this Pledge Agreement Supplement to the Pledgee, the Pledgor is complying with the provisions of 3.2 of the Pledge Agreement with respect to

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[1] Delete this Section if the Pledgor is the Borrower or is already a party to the Pledge Agreement.

[2] If the Pledgor is not already a party to the Pledge Agreement clauses (a) through (g) of, and the proviso to, Section 3.1 of the Pledge Agreement may be appropriate.

Investment Property (as defined in Section 9-102 of the UCC), in each case if and to the extent included in the New Collateral at such time.

Representations and Warranties. 6) The Pledgor is duly organized, validly existing and in good standing under the laws of [jurisdiction of organization].

The execution, delivery and performance by the Pledgor of this Pledge Agreement Supplement and each other Loan Document to which it is a party has been duly authorized by all necessary corporate or other organizational action, and do not and will not i) contravene the terms of any of the Pledgor's Organization Documents; ii) conflict with or result in any breach or contravention of, or the creation of any Lien (other than Liens created under the Loan Documents) under, or require any payment to be made under (1) any material Contractual Obligation to which the Pledgor is a party or affecting the Pledgor or the properties of the Pledgor or any of its Restricted Subsidiaries or (2) any order, injunction, writ or decree of any Governmental Authority or any arbitral award to which the Pledgor or its property is subject; or iii) violate any Law.

No approval, consent, exemption, authorization, or other action by, or notice to, or filing with, any Governmental Authority or any other Person is necessary or required in connection with (a) the execution, delivery or performance by the Pledgor of this Pledge Agreement Supplement or any other Loan Document, (b) the grant by the Pledgor of the Liens granted by it pursuant to the foregoing Section 1 and the other Collateral Documents, or (c) the perfection or maintenance of the Liens created under the foregoing Section 1 and the other Collateral Documents (including, subject to the Intercreditor Agreement, the first priority nature thereof) other than (i) those that have already been obtained and are now in full force and effect, (ii) filings to perfect the Liens created by the foregoing Section 1 and the other Collateral Documents, (iii) those actions as contemplated by Section 3.2 of the Pledge Agreement, and (iv) filings of the Loan Documents with the SEC after the Closing Date in accordance with the requirements thereof.

The Pledge Agreement as supplemented hereby constitutes a valid and binding agreement of the Pledgor, enforceable in accordance with its terms, except as limited by 3) applicable bankruptcy, insolvency, fraudulent conveyance or other similar laws affecting creditors' rights generally and 4) general principles of equity.

Each of the representations and warranties set forth in Sections 3.5 and 18 of the Pledge Agreement is true as applied to the Pledgor and the New Collateral. For purposes of the foregoing sentence, references in said Sections to a "Pledgor" shall be deemed to refer to the Pledgor, references to Annexes to the Pledge Agreement shall be deemed to refer to the corresponding Annexes to this Pledge Agreement Supplement, references to "Collateral" shall be deemed to refer to the New Collateral, and references to the "Effective Date" shall be deemed to refer to the date on which the Pledgor signs and delivers this Pledge Agreement Supplement.

Governing Law. This Pledge Agreement Supplement shall be construed in accordance with and governed by the laws of the State of New York.

~~*Signature Page to Term Loan Pledge Agreement*~~

~~#86092395v12~~

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~~*Signature Page to Term Loan Pledge Agreement*~~

~~#86092395v12~~

IN WITNESS WHEREOF, the ~~Pledgor, the Pledgee and the Issuer~~parties hereto have caused this Pledge Agreement Supplement to be duly executed by their ~~duly elected~~respective authorized officers as of the day and year first above written.

[NAME OF PLEDGOR]

By: _____

Name:

Title:

Bank of America, N.A., as Pledgee

By: _____

Name:

Title:

Annex A
to Pledge Agreement
Supplement

Schedule of Legal Names, Type of Organization (and Whether a Registered Organization and/or a Transmitting Utility), Jurisdiction of Organization, Location and Organizational Identification Numbers

Exact Legal Name of Pledgor	**Type of Organization (or, if the Pledgor is an Individual, so indicate)**	**Registered Organization? (Yes/No)**	**Jurisdiction of Organization**	**Pledgor's Location (for purposes of NY UCC § 9-307)***	**Pledgor's Organization Identification Number (or, if it has none, so indicate)**	**Transmitting Utility? (Yes/No)**

Annex B
to Pledge Agreement
Supplement

Schedule of Subsidiaries

SUBSIDIARIES

[_____]

Annex C
to Pledge Agreement
Supplement

Schedule of Stock

SCHEDULE OF STOCK

1. **[Name of Pledgor]**

Name of Issuing Corporation	Type of Shares	Number of Shares	Percentage Owned	Certificate No.	Sub-Clause Section 3.2(a)

Annex D
to Pledge Agreement
Supplement

Schedule of Notes

[___]

Annex E
to Pledge Agreement
Supplement

Schedule of Limited Liability Company Interests

SCHEDULE OF LIMITED LIABILITY COMPANY INTERESTS

1. **[Name of Pledgor]**

Name of Issuing Limited Liability Company	Type of Interest	Percentage Owned	Sub-Clause Section 3.2(a)

Annex F
to Pledge Agreement
Supplement

Schedule of Partnership Interests

[__]

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to Pledge Agreement
Supplement

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EXHIBIT 21.1

Subsidiary	Jurisdiction of Incorporation or Organization
Ciena Communications, Inc.	Delaware
Ciena Canada, Inc.	Canada

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 (Nos. 333-217001, 333-91294, 333-103328, 333-123509, 333-123510, 333-149520, 333-149929, 333-166125, 333-180332, 333-180333, 333-195498 and 333-214594) and on Post Effective Amendment No. 1 on Form S-8 to Form S-4 (No. 333-204732) of Ciena Corporation of our report dated December 21, 2018 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Baltimore, Maryland
December 21, 2018

EXHIBIT 31.1

CIENA CORPORATION
CERTIFICATION OF CHIEF EXECUTIVE OFFICER

I, Gary B. Smith, certify that:

1. I have reviewed this annual report of Ciena Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: December 21, 2018

/s/ Gary B. Smith

Gary B. Smith

President and Chief Executive Officer

EXHIBIT 31.2

CIENA CORPORATION
CERTIFICATION OF CHIEF FINANCIAL OFFICER

I, James E. Moylan Jr., certify that:

1. I have reviewed this annual report of Ciena Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: December 21, 2018

/s/ James E. Moylan Jr.

James E. Moylan Jr.

Senior Vice President and Chief Financial Officer

EXHIBIT 32.1

CIENA CORPORATION

Written Statement of Chief Executive Officer
Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

The undersigned, the Chief Executive Officer of Ciena Corporation (the "Company"), hereby certifies that, to his knowledge, on the date hereof:

(a) the Report on Form 10-K of the Company for the year ended October 31, 2018 filed on the date hereof with the Securities and Exchange Commission (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(b) information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Gary B. Smith

Gary B. Smith

President and Chief Executive Officer

December 21, 2018

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to Ciena Corporation and will be retained by Ciena Corporation and furnished to the Securities and Exchange Commission or its staff upon request.

EXHIBIT 32.2

CIENA CORPORATION

Written Statement of Chief Financial Officer
Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

The undersigned, the Chief Financial Officer of Ciena Corporation (the "Company"), hereby certifies that, to his knowledge, on the date hereof:

(a) the Report on Form 10-K of the Company for the year ended October 31, 2018 filed on the date hereof with the Securities and Exchange Commission (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(b) information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ James E. Moylan Jr.

Senior Vice President and Chief Financial Officer

December 21, 2018

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to Ciena Corporation and will be retained by Ciena Corporation and furnished to the Securities and Exchange Commission or its staff upon request.