

Ciena Corporation

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Rod Hall: I think we're going to get going. Good morning, everyone. Hope you had a good start to the day, fully caffeinated, Day 2 here at the Goldman Sachs Communacopia + Technology Conference. I'm still trying to learn the name of it.

I'm Rod Hall. I'm the hardware analyst at Goldman Sachs. I've done networking and telecom infrastructure for a long time, but my team and I also do consumer systems, consumer electronics stuff. So, we do a broad gamut of things.

We're very pleased to have Ciena with us today, one of our favorite infrastructure companies. Got David...

David Rothenstein: One? Not *the* favorite?

Rod Hall: We have a couple, actually, it turns out. You're not the only one out there.

But David Rothenstein, the SVP and Chief Strategy Officer and General Counsel – so, you have a lot of jobs, it seems. You must be pretty busy.

David Rothenstein: Yes, I get to regulate myself.

Rod Hall: So, welcome. Thanks for coming.

So, I guess before I jump into – I've got a bunch of specific questions. Maybe it would be good for you to give us and the investors, because you don't necessarily do these things all that often, a little bit of an overview of what you do, what you focus on day to day yourself in your role. And then, I'll jump into some specific questions. How about that?

David Rothenstein: That's great. Thanks, Rod. And thanks for having us. And nice to see everyone.

So, I've been at Ciena for twenty-one and a half years, through, I guess, two and a half different financial downturns. And my role has shifted over the course of time. As Rod said, I've been the General Counsel of Ciena since 2008, but I've been taking on additional roles over the course of time. I also am in charge of corporate real estate, sustainability, government relations. I ran human resources for a year. And I'm now the Chief Strategy Officer in charge, obviously, of looking at our strategic planning

processes, as well as corporate development with respect to strategic partnerships, M&A, venture capital investments, things like that.

Rod Hall: Great. Okay, David. Thank you. A lot of roles there over the years, too.

So, the biggest question that we're getting now – and of course, you probably are getting as well; I'm sure you've had this question 10 times in the last week, if not 20 – is related to supply. And one of the things that we're trying to puzzle out, I think, is we know that consumer electronics, certain areas, are very weak. TVs are very weak. PCs are extremely weak. We hear that – although Dell yesterday said that this isn't really happening with them, but we hear that at least some components are becoming more available out in the market somewhere, but they don't seem to be finding their way to companies like Ciena. And so, that's kind of a puzzle for us. We're wondering: (a) are those components fungible into companies like Ciena, or maybe they aren't; and (b) if they are fungible, where are they, and is it just a matter of time before they show up and things get better? So, I'm just curious kind of what's your take on all the supply situation right here as we sit.

David Rothenstein: A lot to unpack there, but let me try to kind of take it piece by piece.

So, in general, you're right. I mean, supply is the first, second, third question that we and I think all tech manufacturers are getting these days. From our standpoint – and I think it's really important to contextualize it – is that the vast majority of our supply chain are performing in accordance with their commitments. And yes, there are lead times that have been extended because of semi shortages and things like that. That's certainly well documented. But the vast majority of them – and I'd say 95% of our suppliers – are delivering in accordance with their commitments, which is good and I think echoes what a lot of others have been saying about some degrees of green shoots coming out of the supply chain.

What's happened to us, in particular, over the past few months is we've seen some more acute challenges beyond just semi, in that we've had a handful of suppliers who make very specific integrated circuits that go into our modem technology and they have effectively not delivered on their commitments that we were even hearing from them a few months ago, both in terms of volume and in terms of timing.

And the problem with that for us is because these are what we call them as – you may have heard the term – golden screws. These are very low value parts – \$1, \$5, \$20 parts – largely in terms of power management and control. And that gets to part of your question, Rod, in terms of why others are seeing a glut. These are very specific power management and control integrated circuits that go into our high-performing optics systems. And because they gate – they're incidental to the functionality of our modem technology, but they're essential to their manufacture; meaning, we can't get a modem out without these golden screws.

And just to give you a data point to kind of play out that disproportionate impact, of the, say, top 10 biggest problem integrated circuit components that we're seeing today, that would be about \$5 million in cost, if we could get our hands on them today. That \$5 million of cost of those circuits would gate about \$1 billion of modem revenue for us. So, \$5 million equates to \$1 billion. And that really kind of sums up the nut of the problem, which is why we fell short of our Q3 expectations and why the guide for Q4 was also below our and the Street's expectations.

In terms of why perhaps others are seeing – particularly, you mentioned consumer electronics – part of the challenge is that these are not necessarily commoditized, that they're low value, they're low cost, but they're not necessarily commoditized. So, while some of these parts are used in other industries, like consumer electronics, also automotive, and that we think in many cases we've been allocated away from, in some of the cases that you're seeing the glut, they're just simply not – they're not fungible, they don't translate into that. And just even within our own portfolio, we've seen the problem with our modems on the optical portfolio. We have not seen the problem in our routing and switching portfolio. Those use a different set of power management and control integrated circuits. So, we don't have the same supply chain issues in that portfolio.

Rod Hall: Right. Right. So, how long do you think some of these – presumably, some of the capacity – well, I know for sure some of the capacity that makes this specialized stuff for you is also making, has been making chips for the PC industry and so on. So, that capacity can be repurposed. How long do you think before some of that free capacity starts to help things in terms of – how soon before the \$5 million starts getting served?

David Rothenstein: It's a fair question. Believe me, we're asking it ourselves. What we are doing is we're spending a lot of time with these suppliers, asking those same questions, having those types of discussions. And what we've said is we do expect an improvement in the volume and predictability of these integrated circuits as we move into our Fiscal '23, which is a month or two away from now. So, we do expect to see some improvement in that regard.

But the reality is we purchase, we procure over 10,000 different components, and trying to play a little bit of Whac-A-Mole in terms of what is available, when, is a bit difficult. But we do see some improvement in that regard, which should help address some of our issues in terms of the size of our backlog, which is great, but it also means that we're not servicing some of the customer demand. And frankly, that's not good. We're pretty upset about the current situation. We've had those discussions with our suppliers. Because by definition, it means we're not meeting our customers' needs, and that's not okay.

So, we do expect some improvement on those integrated circuits as we move into '23. In terms of the broader semiconductor issues, make your own assumption. The conventional wisdom is some degree of improvement back to normalcy with more regular lead times in some time in the middle or second half of 2023. And we think that's probably a reasonable assumption.

Rod Hall: Yes, it seems like that's the circular reference consensus view, but then things are breaking loose a lot faster than I think when that view was originally formed. And I think that view is informed by the fact that things have kept happening that nobody expected to happen in China, particularly with regards to lockdowns and stuff. So, we'll see whether that feels conservative now as we sit here today, but I guess we'll wait and see.

David Rothenstein: Trying to make predictions in the current uncertain environment is a bit of a fool's errand.

Rod Hall: Is there a –? How close to this are you, yourself? In your role, I wouldn't think too much, you're doing too much on this? Or is it just all hands to the pump, everybody is working on supply?

David Rothenstein: Well, I'm surely not the one who's going in and having the discussion (inaudible) our procurement team and the different suppliers. But we – our CEO, CFO, myself, and a lot of the executive leadership team's time is being spent on these issues with customer escalations, supplier discussions, and trying to answer the exact same questions that you're asking right now.

Rod Hall: One of the things that we're, I think, not great at in the investment community is thinking – we always start, we always ask the same questions about these kinds of things, but we really don't understand all the details underlying it and that you're having to deal with to execute. Is there anything that we should be asking that we're not? Any second-, third-order effects we should be thinking about or looking into that maybe you're not hearing as much from investors? Or do you think people are covering it pretty well as a subject?

David Rothenstein: I think people, by and large, have a read on the situation. If there's one thing that I would call out is that I do think there is sometimes a tendency in the current environment to focus really on the short-term nature of the supply chain challenges and what that means for the business. And that's entirely understandable.

At the same time, context is king, and I think one cannot and should not lose sight of the broader industry demand drivers, these secular demand drivers that we believe are incredibly strong, are incredibly durable. We can talk about what they are. But I do see a little bit of that being lost in terms of a longer-term view. Because yes, there are uncertainties right now, whether it be supply chain shortages, a land war in Europe, a pandemic, highest inflation for decades here in the U.S., inflation in Europe for totally different reasons – does that lead to a recession? If so, when and how deep? – labor shortages, a war for talent. You have any number of different uncertainties. And it's easy to sit here and say, well, why would you invest in anything right now?

But our view is that these demand drivers – the cloud adoption across the customer segments, whether it be service providers, cloud providers, or enterprises – is so strong and will continue to persist, that our strategic thesis is we're going to invest and continue to invest into the uncertainty, both with our organic growth initiatives and possibly inorganic accelerants to that growth.

Rod Hall: I mean, that's one of the – we have more interest in infrastructure technology companies, like yours, than we do just about anything else we cover. So, investors, I think, appreciate that. Wall Street tends to work on the things that it's a rate of change business. So, they work on the things that they don't understand even – I think most people do understand the growth drivers longer term, maybe with minor differences.

David Rothenstein: Glad to hear that.

Rod Hall: So, costs. Let's talk about costs a little bit. Everybody is seeing higher costs and components, logistics. Could you just recap the margin impact that those have had on Ciena, specifically, and talk a little bit about the trajectory of margins from here as this hopefully improves over time?

David Rothenstein: Absolutely. So, what we've said, historically, is that our target margin range is in the mid-40s percent. It was meaningfully higher during the pandemic, and that was entirely a function of mix, where network operators simply were not doing any new deployments or build-outs. It was just pure capacity ads, which carry proportionately higher margin. So, we were seeing margins in the high-40s in 2020 and 2021.

What we've seen in the past year or so is, obviously, a degradation in the margin profile, and that's really for two reasons. One is these semi shortages, which have directly resulted in what we call higher exception costs. Think broker fees. When we have to go into the open market and procure available components, we're paying fees to the brokers to be able to access those materials. There's also higher freight and delivery costs, expedite fees. Just getting your hands on anything right now in the semi space and

delivering it to our customers costs more. So, our costs on that line would be about four times typical this year, and that's resulting in about a 400-basis point impact on our margins right now.

Additive to that is these acute integrated circuit challenges right now. Because they gate so disproportionately the modems that I talked about, that's an additional about 200 basis points of impact that we saw in Q3, and we expect to see, at least until things normalize in that regard.

So, roughly, you add the two together, roughly a 600-basis point impact. We do think things will improve, as I said, certainly on the latter issue. That will improve into '23. The semi issue, again, make your own assumptions about that. Our view is that we absolutely see line of sight to getting back to our target mid-40s gross margin range. However, we don't think that's going to occur in Fiscal '23. The reality is on semis it's not as though a light switch is going to flip and all of a sudden everything will be good. It's going to take some time for this capacity to come online, to burn down backlog in inventory, and then to normalize back. So, it will take a little bit of time.

Rod Hall: What about work-arounds? You guys have talked about redesigns. How's that going? When does it start to impact? Is it already impacting your ability to serve backlog?

David Rothenstein: So, it's a good question. So, what we talked about is we're not just sitting on our hands and waiting for these suppliers to deliver these integrated circuits. We have the beginning of our Q2, in earnest, set a number of different things to mitigate the risk. You mentioned engineering alternatives. One is to qualify alternative sources of supply. Another is to redesign certain of our products to accept different alternative components. Those, by definition, take time. These are not Jelly Bean parts. These are highly sophisticated pieces of equipment with, as I said, thousands of parts on a chip that fits on the tip of your finger. So, that does take some quarters to instantiate. We do expect to start seeing the benefit of some of those efforts as we move into '23. And while we're waiting for that, we're continuing to procure equipment on the open market, placing large advanced POs, and of course working with these suppliers.

Rod Hall: Great. So, backlog has continued to grow, and you guys have recently – the latest disclosure is a \$4.4 billion number, which is kind of mind-boggling in terms of its size. But I think our revenue estimate next year is \$4 billion, or something like it. It's about just over \$4 billion. So, your backlog is bigger than our revenue estimate. So, I wonder how that's affecting customer perceptions. And are you concerned that it puts you in any kind of competitive disadvantage or creates any kind of friction that way with customers? Just curious how those conversations are going, given people are having to wait so long for things.

David Rothenstein: Obviously, topical. You're right, the backlog has grown exponentially. Just to dimension it for you, we were at \$2.1 billion coming out of our last fiscal year, and in nine months it's now at \$4.4 billion, which is a mind-blowing number. And that's great, and it's not great, for different reasons. It's great, obviously, because we have, as you said, significant line of sight to the next period of time in terms of being able to service that backlog and turn it into revenue. It's not great because, by definition, as I said, we're not servicing that demand for our customers. And so, that is a problem.

We do think that growth rate of the backlog is of course going to have to normalize. That's just not sustainable. When it normalizes exactly how, we don't know. What I think has been nice is that we've not seen, as we've said, we've not seen any cancellations of orders. And we've heard questions about double-ordering and forward-ordering, and the

reality is our customers would take all this equipment tomorrow if they could get their hands on it. So, I think those are kind of a little bit of red herrings, to be honest. So, the demand environment in the two-plus decades I've been at Ciena has never been stronger.

Now, in terms of how the customers feel about that, well, those are hard conversations. We're obviously at allocation mode. The good news is because we have more absolute and relative demand because of our size, we are shipping more equipment than anybody else. I don't want you to think that we're just sitting here not doing anything. We're shipping a lot. But we're not shipping enough to meet our customers needs. So, those are conversations that we are having on calls on a daily basis with our customers, having to make difficult allocation calls. Because by definition, they're not meeting their in-service customer requirements and their own internal objectives in terms of rolling out network services.

So, at the end of the day, we've not seen any cancellations. The demand continues to grow. So, we feel good about that from a customer relationship standpoint. But we'd be tone deaf to think that there is no potential impact. And so, can competitors in any particular account or route or opportunity rifle-shot their limited allocation to provide equipment more quickly than we? In a corner case, that certainly is happening. But overall, we think to whatever extent that is happening, once these more acute issues start ameliorating and we're able to get those modems out the door, that share will be recovered and, frankly, increased relatively quickly.

Rod Hall: And you have control of that situation. You can decide where you want to take the risk that happens, where you don't.

David Rothenstein: We do. And we are being thoughtful and selective about that. We operate primarily on a first-in, first-out basis; first come, first served. And the reality is that primarily the North America providers, the tier one service providers and the cloud providers, got in queue earlier than perhaps some of the ones did internationally.

Rod Hall: Well, let's talk about more fun things now. Let's draw a line under supply. Network edge. There's been a lot of momentum that way, particularly for Ciena. We've seen you emerge in Verizon's small-cell deployments. We didn't think that would happen. We thought that would be passive optical, and it ended up active switch. The AT&T win recently. There just seems like there's an awful lot of active optical stuff going on in access that wasn't going on before. And I wonder how big of an opportunity do you think this is. Is it purely a U.S. phenomenon? Do you see this emerging in Europe, as well? Kind of strategically, how important is that for the company?

David Rothenstein: So, the way we think about our strategic priorities, Rod, is, obviously, from an optical standpoint we are the hunted. We have the world's leading technology innovation, best of breed, largest market share, and everyone is gunning for us.

Conversely, in the area that you're talking about, which I'll call kind of broadly next-generation metro and edge, we are the hunter. It's not as though we're new to this space. We've been doing Layer 2 access and aggregation for a very long time. But some of the examples you're raising, I think are good ones because we have deliberately leaned into next-gen metro and edge as a growth opportunity for us over the past several years. And in fact, we see that as, far and away, the biggest CAGR of our addressable market over the next several years. Optical transport will grow, software automation will grow, but next-gen metro and edge is going to go significantly higher. It's the largest source of what we said is going to be an increase in our addressable market from approximately \$13 billion to \$22 billion over the next several years. It's metro and edge. Think cloud

services, think cross-haul applications, think Ethernet data services, and then, what you mentioned, residential (inaudible).

And we have been leaning in organically and with partnerships. We did – the win at AT&T that spoke of was a very significant residential pond win for us, taking away incumbency from one of our competitors. And we now have significant momentum in that space, with over 40 different customers. And that we expect will continue to increase. I mean, you look at the rate of fiber broadband deployments going on in the U.S. right now. We expect more fiber to be deployed in the next five years in the U.S. than in the past 15 years, combined.

And then you've got, obviously, the rural broadband subsidies with be it under the Infrastructure and Jobs Act, in (inaudible), and things like that. So, there's some significant catalysts there, and that's why we're leaning in, in that space.

And then you mentioned, as well, (inaudible) router, which was a nice win, that tier one service provider in North America. We're very happy that win, as well.

So, we are the challenger. But make no mistake, we're not naive. We're going into a very competitive space with very significantly large and well-resourced competitors in the space. But overall, we think that the combination of the fact that we're leading with our optics – and the reality is IP and optical are converging; I think that's proven now – the fact that we've got existing customer relationships, and the fact that we come at it with a very nice, cohesive, closed-loop software automation story, I think provides us with significant competitive differentiation to succeed in the space.

Rod Hall: That's what I wondered about, is whether it's the software automation story that's making these edge sales for you. Or how would –? Is that the way you would characterize your advantage? Or do you think there are other things also driving people to purchase Ciena in a place that they haven't historically used you?

David Rothenstein: I think it really depends upon the customer and the application, Rod, to be honest, but it's certainly absolutely a factor. In some cases, it could be a leading factor. In some cases, it's a factor, along with the things I mentioned, like the optics and the capacity and the programmability, that we bring along with it. In some cases, it's the customer relationships. It's not as though we're talking to the customer for the first time. We've been selling to them for, in some cases, 20 or 30 years.

But make no mistake, I mean, software automation is key. Service providers need to be able to adopt cloud principles to make their networks more operationally efficient. 5G – and I know you don't want to talk about 5G – we're at the very early stages of 5G. And 5G fuels the need for modernization of OSS/BSS. And that is all about these new innovative services that need end-to-end services, life cycle automation. And that's what (inaudible) is all about.

Rod Hall: You've got the advantage of your colleague, Steve Alexander, who's leading a lot of that next-gen (inaudible) of the future kind of work and thinking, I think.

David Rothenstein: That's right.

Rod Hall: Let's talk about 800-gig a little bit. Last quarter, you mentioned that WaveLogic 5 Extreme modem cumulative shipments were over 44,000, up to that point anyway. Can you talk about revenue contribution of 800-gig at this point? Or give us any kind of hints as to how big that might be from a revenue point of view?

David Rothenstein: So, we don't disclose, Rod, the separate revenue proportion from 800-gig. We do disclose port shipments, and they're continuing to increase.

The way I would think about 800-gig is less about 800-gig as a cycle itself, and more about the fact that Ciena has the highest performing optical engine in the world. What might increase – to your question, what might increase the take rate of deployments of 800-gig? Really, it's two things that drive those decisions. One is client rate. And the reality is the majority of networks are still on 100- and, in some cases, 400-gig. But the ability to carry a client anywhere without having to regenerate the signal is significant. It's significant both in terms of service performance and in terms of the cost and the economic value position. So, that's one. It's the client rate. The second is spectral efficiency, and our ability to drive more bits on the fiber than anyone else goes straight to the cost-per-bit analysis.

So, our view is that 800-gig is a proxy for WaveLogic 5 for us, which is the world's leading, both in terms of technology and market share, 800-gig engine. But for us, if you're a network operator and you've got growing bandwidth traffic and fiber constraints, we're the obvious choice.

Rod Hall: Right. We've explained that 800-gig and things like that are more brands than they are actual speeds and that the speed is how the thing performs in the field and those results vary.

David Rothenstein: Anybody can announce a hero experiment with 800-gig, or we've seen some recently with 1.2 terabytes. And I think history speaks for itself in terms of others overhanging the market. And what actually gets delivered and when, I think has been proven out quite clearly over time.

Rod Hall: So, let's talk about web-scale a little bit. You've been a leader there in DCI. Revenue growth slowed a little bit the last couple of years there. And I don't know if you want to talk a little bit about what's going on with demand in web-scale, more broadly, maybe not just for you, but for everyone. And then, what you would kind of expect going forward in terms of growth there, not necessarily for Ciena, but just for that whole market.

David Rothenstein: So, the web-scale provider – and by the way, we're guilty of this, as well. We talk about it in terms of web-scale or GCNs or ICPs. I'll just refer to them as cloud providers: the Google's, the Facebook's, the Amazon's, Microsoft.

The way we think about that customer segment for us is, unlike the service providers who have a different need – they need to (inaudible) we talked about, they need to transform their networks and these distributed decentralized approaches – the cloud providers really need to do something different. They need to transform their networks at massive scale. So, they've got their existing data center infrastructure that they're refreshing, and they've got new data center build-outs. Why? Because they need to host the massive demand for cloud services and cloud applications, anything-as-a-service. And then take that and interconnect into the service provider regions to create this kind of globally distributed cloud edge. And so, we don't see that diminishing at all over the next several years.

Now, in terms of the demand, what we've seen over the past few years is hypergrowth in CapEx from the cloud providers. That growth rate is going to have to moderate. That's not sustainable. However, we expect to see a meaningful growth rate on CapEx for these guys in terms of low double digits over the next several years. So, we don't see that

demand going away, at all. They are driving the lion's share of decision making and traffic around the world, and we expect that to continue.

Rod Hall: Great. Okay. And then another thing on the cloud provider side of things, Google just published a white paper not too long ago talking about optical switching as a replacement for the aggregation layer, which is usually handled by Ethernet-switching products, (inaudible) routing-switching products. So, curious what you think about that. Have you guys been looking at that? Talking to people about that kind of opportunity? I know direct detect (ph) is not really what Ciena does, but maybe does that eventually move into a coherent sort of an application for you?

David Rothenstein: Look, I think it's interesting – maybe it's just interesting to me because I've been doing this for so long – that higher data rates in the data center are driving the same kind of architectural discussion shifts that we saw 10 years ago in the WAN. In this case, what we're talking about is the need for taking coherent optical technology in the form of an optical switch into the data center.

And I think the answer is, yes, we do see that as an opportunity for us over time. It's a logical extension of what we do. How big? How soon? I don't know. My guess is right now, just given where cloud providers are at, I think that's probably an opportunity you could see for Ciena in the 2025 range and beyond.

Rod Hall: Right. It's funny to me, when I talk to hyperscale engineers, they've just invented some incredible thing, from their point of view. And having been around telecoms my entire life and started as a network engineer, I usually tell them that was done in telecoms 50 years ago. I mean, many, many of these things are being – the wheels are being recreated. So, it's just kind of funny to watch.

Let's talk about international growth a little bit. Can you talk a little bit about what you see going on there? Particularly, India is kind of exciting opportunities. We look out into the next year. Any international comments you might have in terms of growth expectations or other areas or projects that you think investors ought to be focused on?

David Rothenstein: So, I think to meet our longer-term objectives – and we've said pretty clearly our longer-term top line growth is 6% to 8%, supply chain issues and resulting impacts notwithstanding – to meet that over time, we are going to need to continue to grow our share internationally. That is a fact. And we have operations around the world. We count, outside of the China PTTs, virtually all of the largest service providers and cloud providers as our customers. And that's great, but it needs to continue, and there are a variety of different opportunities.

You mentioned one, in terms of India. India is interesting. Because in '18 and '19, the big remaining three – there used to be 20 – the remaining three – in terms of Reliance Jio, Bharti Airtel, and Vodafone Idea – spent a lot of money investing in building out their networks. And we were the backbone for all of those and took significant market share.

That was before the Indian government effectively excluded Huawei from future (inaudible).

What we saw in India I think is, frankly, the best – not the only, but the best – use case for what happens when you run your networks hot. They ran their networks extremely hot during the pandemic. And so, what we're seeing right now in India is really the beginning stages of what we think will be a significant investment cycle by all three

service providers there. One, because of the need for the capacity infill to meet their demand. And two, because they're just starting their 5G public rollouts there.

So, that, we see as a meaningful opportunity for us over the next several years. And the fact that Huawei is not there, we were doing well there beforehand, and that will only present additional opportunities for us. But make no mistake, our competitors are looking at it the same way.

And elsewhere, certainly I think Western Europe, in general, I think is a very interesting battleground. I'm sure Huawei is on the tip of your tongue in terms of what that means for us there. And I think, unlike the U.S. and Canada and maybe parts of, like, Japan, where decisions have been made to exclude Huawei, Western Europe is still pretty much a battleground for those Huawei displacement opportunities. And I think that's also a meaningful share gain opportunity for us over the course of time.

Rod Hall: I would think Nokia is fighting hard to try to get in there as well, although it doesn't seem like their road map is quite as robust as yours from an optical point of view.

Plugables. Well, actually, before I do that, let me see if anybody's got any questions, because we're down to eight minutes left here. Does anybody in the audience have any questions for David?

Anybody?

All right, I'm going to jump into plugables, and then if you have a question just raise your hand and we'll get a mic to you, and you can ask it.

So, plugables is a pretty interesting strategic challenge/opportunity for Ciena. I wonder if you could talk a little bit about that. The TAM, the company has talked about \$500 million of TAM in the past. A lot of investors worry about disruption and what eventually plugables mean for distance manufacturers like Ciena. So, I wonder if you could just kind of encapsulate your thinking on plugables a little bit for us.

David Rothenstein: I will try to encapsulate. It could be a 20-minute (inaudible).

Rod Hall: Especially the strategic side of it. What does it look like longer term?

David Rothenstein: I do remember back in – and you'll remember this, Rod – back in 2018, the conventional wisdom was that plugs presented an existential threat to the optical system solution business. We're sitting here in 2022, and that has not instantiated, at all.

Here's our view on plugs. There's a lot of talk about it, a lot written about it, but our view is that we are incredibly well positioned to take advantage of the plugable consumption model with our customers. And the nearest and best analogy is what happened when cloud providers looked on a substitutional basis to take optical technology inside their data center shelves. And what happened there is that led to a disaggregation in applied systems into open line systems, and we were able to serve that need very well with our Wave server and reconfigurable line system products. So, we know what we're doing in this regard when things get disaggregated.

And really, that's what plugs are. It's just an entirely different form factor. Will there be substitutional on the optical systems? Yes, there will be. But we feel that we're incredibly well positioned to serve that need.

I would also point out that this is really, for the next several years, a cloud provider opportunity. Yes, there are service providers who do have an interest in plugs, but the take rate, just like with open line systems, is significantly longer with service providers, just given the nature of their network needs and their applications, than cloud providers. And so, service providers are always going to lag in this regard.

But overall, in terms of plugs, we believe that we have and will continue to have the best available plugs out there and we'll compete very effectively in that market.

Rod Hall: What I – the thing I worry about with plugs is disintermediation. So, I was worried that maybe an Arista or somebody is going to sell a switch router box, the plugs go into that, that's facing the WAN, but it's their automation software that then is utilized. But is that correct? Is that something you worry about? Or is it there's still an optical layer of automation that goes on there?

David Rothenstein: I worry about everything, Rod, of course.

Rod Hall: You're a lawyer.

David Rothenstein: It's my job.

Look, I think there have been some pretty notable examples where certain cloud providers tried to do things differently – I'm not going to name them – to build their own white box switch, to take their own software on top of it, and to disaggregate even further. And for a lot of different reasons, those haven't worked out. And the reality is it's because coherent optics are really hard. It's complicated, the investment capacity is significant, and it takes a long time.

Now, that said, are we continuing to engage with our cloud provider customers on different methods of disaggregating the procurement of optical technology? The answer is, of course. And we'll continue to listen to them and be in the best position to serve their needs. But in terms of some existential disintermediation threat, we don't see it that way.

Rod Hall: I've always wondered whether there's any layer of automation that even if a plugable is going into an active box – maybe it's a switch router, or something like that – there could still be a Ciena automation layer on top of that? Is that a possibility with plugables? Or not really? I just don't really understand whether it is.

David Rothenstein: The answer is, absolutely. That is the beauty of an open architecture approach and a multi-vendor approach, is that you can – whether it's the line system, whether it's the plugable optics, whether it's the software that wraps around it – you can play at all or any of those particular elements of the overall solution.

Rod Hall: Right. Right. Let's talk a little bit about competition, and then I want to get into maybe your – get you to give me a macro forecast. Just kidding.

But could you talk a little bit about what you're seeing competitively out there right now? Who's your toughest competitor? What's going on with competition? It's kind of hard to judge. I mean, it doesn't – it looks like, if anything, competition has gotten less aggressive, especially with Huawei's exit. But I don't know how you would see things out there.

- David Rothenstein: I'd go back to where I kind of broke down our strategic priorities. On optical, the competition is well known, I mean, in terms – we believe that we have, far and away, the best coherent optical technology on the market. I think that's been proven.
- You've got Infinera out there with a single wavelength 800-gig solution. You've got Cisco with Acacia. And then, some smaller players. Overall, we feel very good about our competitive positioning in optical, and continue to do so.
- As I mentioned on metro and edge or routing and switching, we're more of the disruptor in that regard, but feel that the competition is strong, but we're capable of differentiating ourselves. In pond, for example, Nokia is the big dog in that space.
- And then, overall, when you talk about the convergence of IP and optical, certainly Cisco and that routed optical networking infrastructure is the biggest competitive threat.
- But if I had to pick it over the next three to five years, personally, we see it boiling down to the Big Three: ourselves, Nokia and Cisco with Acacia.
- Rod Hall: And then software asset-wise, you bought Vyatta, Blue Planet. Anything else – do you feel like your software portfolio now is pretty complete? Or do you think there's a lot more opportunity to expand that, either organically or inorganically? Is there anything missing from that portfolio?
- David Rothenstein: I think the answer is yes to both of those questions. I'm not being glib. We have, as you said, built out the portfolio so that – we believe it's a comprehensive closed-loop automation portfolio, with the acquisition of Packet Design for routing optimization insurance; with DonRiver for (inaudible) and inventory; with Centina for unified analysis and assurance. We believe – and then with, obviously, the virtual routing capabilities from Vyatta. We believe that we have a very nice, comprehensive, differentiated solution.
- Now, that said, we are always looking at opportunities to build out gaps in the portfolio, to meet particular customer needs or particular application sets. And so, that's an area, along with others, that we continue to look at inorganic opportunities to accelerate growth.
- Rod Hall: And then, lastly, I'll ask you a macro question, but not on the overall economy, more on Europe, specifically. I think, to put it mildly, things don't seem like they're going all that well there. So, I'm curious whether you've gotten any signal back from service providers, customers there maybe indicating that they're looking to reduce investment as they look out into next year. Or do people seem like they're just kind of par for the course, continuing forward?
- David Rothenstein: There are smarter economists around this conference than me in terms of trying to predict what's going to happen. We are not seeing any of that from our customers, whether in Europe or, frankly, anywhere else, going back to my point about the demand drivers.
- I'm not going to say that any industry is recession-proof, because that would be foolhardy. At the same time, the needs for network connectivity over the next several years are only going to increase, for all the trends and the reasons that we've talked about. It's going to result in the need for more optical bandwidth. It's going to need – the need for more data transfers into the cloud and the need for more cloud CapEx. And so, we don't see anybody indicating to us a slowdown in demand.

Rod Hall: Great. Okay. Well, we're out of time, unfortunately. I've got 10 more questions, but really appreciate it. Thank you, David.

David Rothenstein: It's my pleasure. Thanks for having me here.

Rod Hall: Thanks, everyone.