

# ADTRAN, Inc.

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**Samik Chatterjee:** Good afternoon. I'm Samik Chatterjee, the Networking Equipment Analyst. The next company we have in this room is ADTRAN. With us is CFO Roger Shannon.

Roger, thanks for participating on the conference. Thanks for your time. It's really a pleasure to host you here. I believe you wanted to start with a few prepared remarks before I dive into questions.

**Roger Shannon:** I, first off all, want to thank you for the invitation, and you guys do JP Morgan as an institution, does just this fantastic professional job putting these on. It's always a pleasure. We have a very good meeting. We always enjoy our trip.

For anyone not familiar with ADTRAN, we are a broadband access company for all that entails. It's an exciting time to be in the space given the...what we expect to be a very strong growth and demand for broadband access, speeds, low latency. This ubiquity in the demand for broadband is, we think, starting to reach a new inflection point.

ADTRAN brings significant differentiation within our space primarily from the breadth to the portfolio that we bring. We'll talk a little bit more about the different types of access products and portfolios from fiber, to copper, to coax, to software.

What positions us uniquely is that we have a broad and innovative portfolio that covers the entire landscape from the copper, and coax on LAN to the most advanced deployments of fiber. On the other end, we continue to make investments in those fiber rollout as we talk about.

That differentiation in that product portfolio is augmented by a very strong services offering. We've seen very dramatic growth in our services business over the past couple of years as we help service providers who don't necessarily have the infrastructure to more quickly deploy ours and others' products into their network.

The services is really been a strong differentiation for us, as well as our innovation. We have an

incredibly strong R&D groups spread amongst Huntsville, Germany, and India, run hand off on an agile basis 24/7 around the clock.

That's helped us differentiate ourselves in terms of the innovation and the breadth of products that we bring. With that, I'm happy to answer any questions you have. We're excited to be able to tell the ADTRAN story.

**Samik:** Thanks for that overview. I wanted to start at a broad level, look at more of the 30,000-foot view here. Two primary segments when we think about the company, broadband access and customer-premises devices. What's the content opportunity here for ADTRAN as you look at...

You talked about being at a good point in terms of broadbanded option, etc., so how should we think about the content of opportunities across both these segments?

**Roger:** We segment the business in terms of segments in terms of products, which is our hardware and our software and then our services. Then we break into categories, the categories being access and aggregation, which is more head-end, closer to the central office, closer to the service provider.

Secondly is customer devices, which is like it sounds, CPE and more customer-facing, which includes what historically had been in our enterprise networks division before resegmenting a couple of years ago of IP business gateway switches, routers, access points, but now also includes the customer side of our PON networks of the ONTs, the ONUs.

That's in the customer devices segment, whereas the OLT or the head-end of the PON network is in access and aggregation. Then finally we have traditional other products, which are still in demand and sold, but we're not investing in and are toward the end of their lifecycle, like ADSL types of products.

The access and aggregation is the largest and fastest-growing segment of our portfolio. That's driven by what I mentioned in my opening statement about this increase in consumer demand for speed and access. I don't have to tell anybody how the user's demand for everything from entertainment and information has changed from traditional wire line to over the top and wireless.

We see that growing with the continuation of IoT, with artificial intelligence, AR, VR, driverless cars, trucks, all that, and the advent of 5G coming up.

With the faster speeds, that's really driven our growth in the PON side, the fiber side both in GPON where we're focused on in GPON2 initiative with a large US tier one, XGS-PON which is a 10-gig PON technology thus reducing cost, and taking over for GPON as well as our traditional GPON products.

On the other side of that within our access navigation, you could think about these carriers in the economics of delivering fiber to the prem. There's been a lot of talk, and excitement about doing that, but when you get into the logistics, and the economics of it, it's often very challenging to trench all the way into the premise, and make the economic case work for full fiber to the prem.

These carriers in these MSOs obviously have a very extensive distribution of copper wire access, and coax access assets. Our products in the access navigation like super vectoring GDOT fast help them extend the life of those products. Made better economics sense for them.

We can talk about where PON makes more sense versus the continuation of a coax, or a copper asset. The advantage for us is we're able to work with each individual carrier to meet their needs. Sometimes the carrier like a large US tier one that we'll talk about that's recently gone through a merger kind of looks at all the above type of strategy.

On the consumer devices, it's a value add for us in that things like IP gateways, switches, routers, we're not going to go broadly market those products like a CISCO would.

Rather, our strategy is to work with the tier one, tier two carriers where we can deliver the entire end to end network, and selectively play our niche to help their value proposition where they don't care about the brand name. They care about the quality, and they care about somebody who can be a one stop shop.

Obviously and intuitively as the GPON and EPON business grows on the access and agg side, we'll also see a growth in the ONTs that are in the consumer device side.

**Samik:** Just to follow up on that, you mentioned that growth in the access and aggregation is going to drive growth in the customer devices, and the ONT side of that, but how closely is that linked?

When you go through with one carrier, or access and aggregation for that particular customer, does it necessarily drive, or upgrade in the customer devices as well for that customer?

**Roger:** On the PON side, it certainly does, and it's kind of a sequencing event. The carrier has to deploy the head, and the optical line terminal, OLT first before they can even start rolling the services out, and turning up customers.

The first step in deploying a PON network, the customer side, the ONUs, ONTs are success based. Each customer that they turn up when the technician comes out, they'll deploy that device.

It's certainly a much lower price-point device in the OLT where the OLT will have a large number report, and serve many lines. This is an individual unit, but they certainly are lean. There's just a sequencing of the OLT, and then the ONT.

**Samik:** Let's talk about the industrial bit. When we look at the numbers for overall in terms of technology adoption, PON has like 50 percent market share currently, and it's gaining share from DSL since the early 2000s.

However, at the same time, we notice that cable hasn't really changed much in terms of share. It's not gone up materially, not gone down materially. What's driving, first of all this great adoption for PON, but why hasn't really cable shifted down materially because of the adoption of PON?

**Roger:** I think that's certainly been a case. If you look at the US versus in particular the Eastern countries where there is a much higher penetration of fiber and PON. What we've seen in the US is the invasion tends to come in cycles.

Also there's been a pretty dramatic shift, like I mentioned at the beginning, of how our customers, and consumers demand their information.

In the early days of PON when it first began to roll out, there was a lot of excitement and buzz around the gigabit speeds and getting fiber to your home and all that that brings.

I think the realization quickly set in that, like I mentioned, the economics of that, of trenching to individual units, say, tearing up drywall and apartment buildings or condos or streets, especially in areas that are already built out can be a financial hurdle.

At the same time, I think we're just now starting to see, in this latest cycle, the drivers that demand for it, where before if you think about the consumer, it had been they'd been happy to surf the Internet, serious gamers playing games, where they would have a cable TV package. Really, that's only fairly recently started to change.

Getting above that 50 percent penetration level to the next level is going to be driven by that speed demand. Then, it's going to be further driven, we believe, by the rapid advancement of 5G, which just by the nature of 5G technology, is going to have a exponential increase in the number of small cells and radios required to deliver it.

Each one of those is going to require fiber access. You're talking a 10 to 100x increase in the amount of fiber that's going to feed those radios. In our optimism around this cycle that we're in, there's a number of factors that's driving that.

Even carriers that are not necessarily doing fiber to the prem are pushing fiber deeper into their network and the cable companies in particular. You think about the largest cable company.

While they are still planning to deploy coax in their existing footprint, they're pushing fiber deeper and upgrading to DOCSIS 3.1 in the intermediate term to deliver faster speeds over their coax.

The number two cable company, in contrast, is doing fiber to the prem and we have that business. Actually, from our latest acquisition, we have the EPON business for both of the MSO providers.

We do see that ramping the largest one. In the most near term, we'll be deploying EPON more in greenfields and in areas where the economics dictate in the medium term. I think everyone acknowledges that the MSO space and the carrier space will transition to all-IP.

**Samik:** In your comments that you mentioned that there was initially a lot of enthusiasm about getting fiber deeper into the network and there still is about getting fiber to the premise as much as possible. I just want to check with you.

Obviously, there's a lot of enthusiasm there, but when you track it in real world, given that once the cable customers and the carrier look through that economics and find that OK, this is what it costs us to do this deployment, how are installations and implementations in the real world tracked relative to your expectations?

When you started the year, the amount of deployments you are expecting, are those tracking pretty much in line or is enthusiasm running ahead of what real-life deployments are?

**Roger:** I think it's a little both and it's situational. You could look at on one hand, the Google

Fiber deployments where there was extensive plans and lots of buzz, lots of enthusiasm around that.

Then, reality somewhat set in on the economics of that and they've taken a different model. Fortunately, in Huntsville where we are, we did get Google Fiber deployed and it's been a very positive thing for our city. It's a moderately sized city.

In other instances, it's like the economic situation I described for the carriers, is does it financially make sense to replace what they currently have in copper or coax given that ADTRAN can deploy vectoring technologies that gets copper up to 100 meg?

Or super vectoring technologies like we're doing in Europe right now to get copper up to 350 meg speeds? Or even the G.fast technology that AT&T has selected us for?

It's going to begin deploying later this year for them to use that can get one gig speed over copper or coax into where you put the fiber to the side of the building.

Then, you pick up the existing wiring that's already pre-deployed into the living units, and not have to tear up those dry walls and deliver gig speeds there.

I think this continued innovation in copper and coax has probably delayed the build-out of the fiber. They're deploying fiber where they have to, where it makes sense, where it's demand.

Currently, but in the future, the combination of IOT, AI, IR, and 5G is absolutely pushing demand and we expect to see a pickup.

**Samik:** That's helpful just to understand what's going on in real terms. Within customer set that you addressed, you've highlighted the cable [inaudible] as the largest opportunity for ADTRAN on your earnings calls.

Can you outline what makes them the greatest opportunity set for ADTRAN in terms of content? What's driving your outlook there?

**Roger:** Yeah, when we looked at it, it's pretty simple. The fact of the matter is that we were not as strong a player in the 60 percent of the market where customers receive their fixed broadband access.

The carrier space accounts for about 40 percent of the market and actually has been losing some share where the cable space is about 60 and has been staying steady to increasing share.

Given that we were only playing very meaningfully in 40 percent of the market, but our domain expertise in outside plant hardening and deployment as well as SDN and being a closer adjacency in EPON technology versus in GPON, It just made sense to strategically grow into that market.

We had to think about what's the best way to do that. We think we'd been very successful in a short period of time of becoming the market leader in the EPON side. About two years ago, we acquired the number two position from CommScope when they decided to divest their active PON products.

They had just done a transaction and they weren't focused on their core passive business, but had strong customer relationships that they wanted to see get into the right hands. It's great timing for us.

Then this past March, just a few weeks ago, we closed on the acquisition of Sumitomo's North American EPON business, which is the leading EPON deployment and solution in North America. They're the incumbent and they're the only approved solution at Comcast at the largest provider.

In a very short period of time, we've gone from aspirational to the far and away the market leading position in EPON, just at the time that we expect to see that growth start, again, with Charter taking more a direct route and Comcast going EPON for greenfields and then moving that direction over time with brownfield.

**Samik:** Similarly, just focusing on the opportunities for ADTRAN, what's the opportunity on the services side? Do you see that as a growth area for the company? Is there any opportunity on wireless as well?

**Roger:** Yes, I think, like I mentioned in the beginning, we've differentiated ourself with our services business. We've gotten questions before of, were you forced to do services by the carriers?

No, really, it's something that we want to do and we think we're good at. It creates a deeper relationship with the carriers, creates more stickiness, helps us understand their networks and their needs better.

The slowdown that we had over Q4 and Q1 with a large US tier one had a high services component to it. We saw a slowdown in our services business in Q1. At the same time, we are starting to gain traction internationally with our services.

With our largest European tier one, where we've been actively deploying, vectoring, and super-vectoring, we're now have won some services engagements there.

We like that business, it is accretive at the operating profit level, though not necessarily at the gross margins. Strategically, it gets us in deeper with the customer.

On the wireless side, we see two big opportunities there. The first one, I already briefly touched on with 5G, and that is the fiber access feeds to all these radios.

This may be news that you know already, but if you think about 4G versus 5G. A 4G sub-5 GHz wave will go a long way or go through buildings, it'll go multiple miles, whereas 5G above 5GHz doesn't like rain, doesn't like trees, really doesn't like walls.

It's going to require just a tremendous densification of small cell radios that are either going to need to be fiber fed or that will have kind of a self-forming mesh network. We're very excited about the fixed wireless space.

If you break wireless down, you've got the traditional mobile that everyone's used to with their mobile phones, but we're going to see, in 5G, we're going to see more of fixed wireless, where a radio beam will be formed and directed to a location with a receiver on the outside.

We are in commercial trials and have gotten wins with a number of carriers in fixed wireless. We're partnering with a number of players who are kind of emerging in that fixed wireless space. We think it is very synergistic to the fiber fed access business and it's something that we're very focused on right now.

**Samik:** I was going to get to this later in the conversation, but since it's come up a couple times, so you mentioned super-vectoring a couple of times already. Last quarter, your gross margins weren't impacted because of the expansion of super-vectoring with a particular customer, I believe.

For the investors and me who doesn't understand super-vectoring and what's really the

attractiveness of that particular [inaudible] , can you sort of just simplistically help us understand what is the customer gaining with the super-vectoring, and why is the initial footprint expansion at a lower margin right now?

**Roger:** OK, and there's two dynamics behind the answer to that question.

Vectoring and super-vectoring are both copper-based technologies. At the most basic level, if you think about the difference between copper and optical, optical is light-based, and there's no degradation or attenuation of the signal. It just stays. If it's a one gig line, it stays one gig, over, or the length of the run.

With copper, you've got a twisted pair of copper and its radio frequency. Those signals, those packets are going up and down at the same time, and they, for lack of a better term, they run into each other. It's that friction slows it down.

The way to think of vectoring and super-vectoring is like noise canceling headphones for copper. Vectoring enables speeds of up to 100 meg over copper and super-vectoring enables speeds of 350 meg. This is over a substantial length, over 3,000 or 4,000 feet.

The way that it's deployed is that fiber is deployed to the node in the neighborhood. Then our technology, through system level vectoring cards and then vectoring line cards, using this kind of software management of the noise, reduces that noise, kind of creates a more frictionless path.

Super-vectoring currently is not being deployed in the US in a meaningful way. It's being widely deployed in Europe right now, as you talked about, and we called that out with our large European tier one.

We have 70 percent or so with our footprint, we had finished up their vectoring project in 2017. Then as they had stated in their plan, their objective was then to immediately roll into super-vectoring. As part of the European Gigabit Society, they were going to 100 meg and they were going to 200 plus meg.

The challenge with PON with fiber in Europe is even more so, I think, in that location as opposed to the US, in that you've got very dense neighborhoods, old cobbled streets, whereas it's much more of a challenge to trench.

This customer has been very successful in deploying this super-vectoring technology to get up to

350 megabits speeds. In fact, they have recently awarded us the trial for a new technology that we're going to be starting with them in 2019, which is a combination of the two copper technologies that we have.

It actually bonds or it takes two copper lines super-vectored, bonds them together, runs it to the side of this building that I was describing and then picks up the G.fast DPU at the side of the building. Then delivers that 700 meg speed into the building over existing infrastructure.

Rather than having to push the fiber deeper into that work, they're able to pull the fiber farther out and leave it at the node. It's some very innovative things that have extended the life of copper.

As to your margin question, the difference between the US and international, particularly in European markets, is that the Chinese are allowed to compete in international markets, whereas, they're not in US for very valid security reasons.

There's obviously been a lot of talk in the news around the Chinese telecom companies, ZTE and Huawei, in the last few weeks in the steps that the US government's taken for security reasons.

They are, at this point in time, permitted to participate in European deployments and they bring, because of the pricing influence that it brings to bear. We generally say that on average, European gross margins are about 10 points below US gross margins.

Then even within those European gross margins, the mix of the product we're deploying will have a significant difference.

When we say that we're having initial deployments in super-vectoring, if that initial deployment is greenfield, where we're putting out more standardized equipment, more common equipment like the chassis and the PODS and that sort of thing, that's going to be at a lower margin. Once we start to fill that up with the super-vectoring and line cards, then that's going to be at a richer margin.

We had talked about there was a higher percentage of this greenfield in Q1, and Q2, we are, like we discussed on the call, experiencing a strengthening of the mix to the vectoring line card.

You kind of think of it a little bit like the razor-razor blade or the printer-printer cartridge, it's, the mix can be a little leaner with the initial build out and then once you start filling those cards up, the mix richens.

**Samik:** [inaudible] , the domestic business briefly. You've had challenges on the domestic business just given some of the customer consolidation there. What's your outlook on getting that business back to where it was just in terms of getting that recovery in customer spend? Do you think it's a 2018 event? Or do you think it's sort of further out?

**Roger:** What we're talking about is a large US tier one carrier that had a merger in 2017. Then at the, towards the end of the fourth quarter of 2017, they put on hold the vectoring program that we had just started, really, and we're in year one of a three year plan where they were planning to deploy vectoring to six to seven million households across the US.

As a result of this merger and the new management that came in, that management being more enterprise and fiber focused, had some time taken to look at both the residential market and understand the copper market. They want to make sure that the capital they were deploying on copper is money well spent in terms of how long it would last and what kind of competitive opportunities it brings.

Going back to the breadth of our portfolio, the good news for us is that we are able to work with them on vectoring, we're introducing super-vectoring to them. We're approved for G.fast with them and we are installed and able to deploy GPON with them.

Where the dynamics are changing, I guess, and to directly answer your question, we don't in the near term, see getting back to the level that we were at in mid-2017, because it was a very significant project that was on a number of cities, city-by-city basis.

They're looking at it now about how do they most effectively economically deploy the right technology that allow them to attract and retain customers. They kind of see this sweet spot of a 50 to 80 meg speeds in most areas. Or some areas where consumer demands dictate PON, GPON deployments and they'll do that.

They're looking at it really more on a neighborhood by neighborhood, block-by-block basis as opposed to a city-by-city basis. They have implemented a kind of a financial model that is being used for each project, not just each city, but each project.

It's really has slowed down the process. The evaluation in terms of projects getting turned loose and rolled out, it's taken longer than we expected and maybe than what they expected.

We do think they are going to continue to invest in the residential network. It's an important source of revenue in cash-flow form. We are in very active dialog and interaction with them as we look at the different opportunities.

**Samik:** Let me see if there are any questions in the audience. Let me then follow-up if there are no questions, just on next generation PON, that you're looking at. I believe there is a project that you're investing heavily in right now.

**Roger:** That's right.

**Samik:** Testing and collaboration with customer.

How does the timing look in terms of commercial deployment there? Also, when we think about sort of next generation PON, what is the impact on the financials for the company? Is it better margin? How do you treat that opportunity of the financials?

**Roger:** Yeah, so next generation PON or NG-PON2, as you'll often hear it referred, it's a very innovative technology that takes, as opposed to having different strands of fiber for different networks and having a single wavelength over that one fiber, we're able to take a single fiber at 40 gig and break it up into four different wavelengths or colors.

What this large US tier one's doing is called the One Fiber initiative. Where they have a residential Fios and they have a business low-cost Internet and they have 4G backhaul and fronthaul today, their vision and their plan from a cost savings and opex and efficiency perspective, is to bring all those together into a single network that's able to go over the different wavelengths over this single fiber.

As you say, we have invested heavily in it over in the past six quarters or so. We had been selected as a finalist, along with another provider. We are, like we said on the call, we expected for May, we are at kind of a peak interaction right now as we speak. Those can expect to come out of the lab shortly, and we do expect to go into field trial later this year as we talked about.

It is progressing well. We see, just even beyond this customer. We see tremendous opportunity as they bring their networks together in kind of a One Fiber world driven by this densification from 5G. We're pleased with our progress on it.

**Samik:** Good. Just because you're referring to that customer, so it's not only that customer, but

when we look at sort of all the service provider customers, there is a big amount of investment that's going to come through for that they need to make in the network, when, particularly keeping in mind, like that's a GPON or even like [inaudible] or all the 5G architecture.

Now, we've started to hear more recently sort of a narrative around pricing pressure, just given that the service providers are trying to be a bit more aggressive on the pricing. Some of that might be tied to just the amount of investment that's coming down the pipeline.

What are you seeing with your service provider customers, especially with this customer where you have such big projects? Is that driving them to look at the rest of the business that they have with you and drive more aggressive pricing there?

**Roger:** We have not seen that in a meaningful way. I guess the good news [laughs] is, this project's not getting repriced because it's not been priced yet, and that's kind of where we are, too. In addition to doing the technical rollout, we're finalizing all the commercial aspects of it, as well.

What's important about this project is, and I haven't talked on this as much, but the investment in our Mosaic Cloud Platform and SDN and all that entails driving NG-PON2 and G.fast. I mean, that in itself is going to help them deliver these opex savings and cost savings and how they turn up [inaudible] .

I certainly take your point. That's something that's just our business. We have to manage that. I think it's nothing new and we've traditionally, historically been very successful with that and each generation been able to add functionality and reduce the price.

I think ADTRAN probably does that better than anyone in terms of managing our supply chain, in terms of our innovation, our R&D and how we're able to take cost out.

**Samik:** Thank you for your participation in the conference. Thanks for the time today.

**Roger:** I enjoyed it, thank you very much.