Verizon

Demystifying Fixed Wireless Access

CORPORATE PARTICIPANTS

John LeVasseur
Verizon – Distinguished Architect

James Weaver
Cradlepoint – Digital Product Marketing

Dan Sheehan
Verizon – Distinguished Architect

PRESENTATION

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John LeVasseur

All right. Hello, everyone. Thanks for joining us as we kick off our 2021 webinar series, Demystifying Fixed Wireless Access. We're glad to have you with us today. I'm excited to be your host and moderator for today's discussion. For a little background, I'm John LeVasseur. I've been with Verizon for about 26 years, working on wireless solutions in various architectures for our enterprise customers. Fixed wireless access is one of the products I've spent a lot of time working on in recent time. In this series, our goal is to bring you the latest insights and benefits on wireless access and what it can bring to your business. Those benefits include increased agility, ease of use, mobility, and lower cost.

I'm joined by our panelists today, including Dan Sheehan, a distinguished solutions architect with Verizon. Dan has been with Verizon for about 13 years primarily in a wireline role, although recently he's installed thousands of units with wireless connections in his career. We're also joined by James Weaver. James is a Cradlepoint Director of Product Marketing. He's been with Cradlepoint for four years, and has been working with customers on 5G fixed wireless access recently.

Dan, as our wireless expert, thanks for joining us today and sharing some of your insights with us.

Dan Sheehan

Thanks, John. It's great to be here.

John LeVasseur

No problem, and James, thank you to you and Cradlepoint for joining with us today. Really a valued partner of Verizon's and we appreciate your time.

James Weaver

I feel the same, John. It'll be great to chat today.

John LeVasseur

All right, great. So, if you two are ready to go, I'm going to suggest we just dive in and get started. So, just really quick I want to explain to everyone, you're in a BlueJeans event right now. And BlueJeans events has two functionalities we're going to use today. The first is a polling function. So, to the right edge of your screen, you should see a button with three little bars in it, and that's the polling button. So, at various points throughout the presentation today, we'll extend some polls that you'll be able to participate in that will help guide us through the conversation today. And then additionally, in the Q&A. There's a Q&A pod where you can ask questions, and post those out to us so that we can answer your questions as we move along through today's presentation.

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Well, we'll probably answer all the questions at the end, but if you have a question, feel free to put it in that chat pod because we'll see them as we move through the presentation today.

All right, so all of that said, let's do our first poll. How familiar are you with fixed wireless access is the first poll question. If you could answer that question, we'll cover the poll results here in just a little bit, but I think it's probably a good time for us to dive in and talk about what fixed wireless really is. So, let's begin demystifying fixed wireless access for everyone, and so that first question that we need to answer really is, what is fixed wireless access, and what does that mean?

Fixed wireless access is about leveraging our award-winning Verizon wireless network to achieve your business goals with a modern 4G or 5G connection to the internet. This is about using a broadband alternative for connectivity for your locations. This service replaces the traditional last mile connectivity to your site that would normally be wired with a wireless link, one that is not reliant on the same conduit or wire to enter your building. We've seen customers leverage this type of connectivity in a variety of use cases to solve their business challenges, including mobility, retail, small office, home office, banks and ATMs, construction sites, and also temporary work locations like vaccination centers.

What are the benefits of fixed wireless access? So, the benefits of fixed wireless access really come in these four buckets. Control is the first bucket. Verizon provides a portal where customers can turn up and turn down their services very easily in much less time than it would take to deploy a wired solution, and our partner Cradlepoint provides a great portal where you can manage your wireless devices at the edge remotely and configure them through software managed in the cloud. It's a great functionality they call NetCloud Manager.

The second big benefit is mobility. If you have a use case that needs mobility, this is really the solution for you. The connection doesn't have to live at a single primary location. It can be moved around to other work locations that you may need to use. Think about a bus or a mobile meal truck, or other use cases like that, that's where this solution really shines its major benefit for mobility.

Next up is flexibility. So, once you have a wireless connection deployed, typically our customers will keep it there and use it as a backup connectivity for their primary connection if it should go down. Other customers use it as a primary connection for their sites, because of its deployability and speeds that are available, and it's able to meet their business needs that they don't have to rely on those buried cables anymore, or those long install times or long upgrade times to get the services that they need.

The last big benefit is ease of deployment. So, when compared with setting up a traditional broadband connection, in a fixed wireless access application, it can be deployed in much shorter times, typically a week or two, to accomplish getting the circuit and getting the hardware delivered to your location. And then setting up the equipment using NetCloud Manager can be done remotely, and your location can be up and running in a few minutes.

All right, let's talk about how the solution works. Verizon today provides these solutions and fixed wireless access into different network types. We have our 4G network depicted on the right, and our 5G network depicted on the left. The difference between 4G and 5G today comes down to the equipment that we use for an on-site deployment. Today for 5G services, we're delivering service with a receiver, and that receiver has to be professionally mounted on the exterior of a building today. That's likely to change in the future, but for today, this is what we're using, and it's really a great service. With our 4G system, you can deploy a router typically inside a business location, and you don't need any complex antennas. Oftentimes, you can just deploy it with the existing antennas because 4G service is fairly ubiquitous. And then you just connect your other devices that need that backhaul functionality to that device that we provide, and then you're ready to go, your solution should be up and running, and all of your applications should work just like they would over any other broadband connection.

All right, so let's take a look at the poll results for the first poll. It looks like some of you are most of you are somewhat familiar with fixed wireless, and that's really great. We're going to talk more about the benefits of fixed wireless and how it can work for your business as we move forward.

So, for our second poll, we're going to ask, how satisfied are you with your current network configuration? And with that, I'm going to transition to Dan and Dan is going to go deeper into some of the industry and where we're headed with fixed wireless access. Dan?

Dan Sheehan

Well, thanks, John. Good to be here again. Let's take a look at what's happening in the fixed wireless access space, and why businesses are moving to fixed wireless access.

There are three things for us to consider. The first is the environment. So, industry growth. According to Mordor Intelligence, the global fixed wireless access market is expected to register a capital annualized growth rate of 73% starting now and through 2026. That's pretty phenomenal growth. Second, Verizon has invested over $145 billion to meet the surging demand in wireless and to make our network ready for 5G. And if you read the news, Verizon just spent another $45 billion on supplementary C-band spectrum, and that's going to help us further extend the reach and throughput of our 5G network.

The second thing to consider is the ubiquity of Verizon wireless coverage. As you mentioned, our LTE business internet product is available in 2.68 million square miles of the US. That's pretty ubiquitous. Our 5G Business Internet, which is our wireless service, is available in 24 cities and growing, while our 5G Home Internet is available in 30 cities and also growing.

So, the third area to consider is the business trend towards wireless access for what we call the last mile. So, what is the last mile? It's the relatively expensive and complex delivery of cables and wiring from the service providers office to a customer's home or office. Also, businesses are eager to leverage fixed wireless access for the last mile, both public and private networks, so we think about internet traffic, but we can also bring that traffic to our MPLS network known as Private IP. So, why are businesses doing this? Let's take a look at the benefits of fixed wireless access. Let's go to the next slide and investigate.

OK, so businesses are able to use fixed wireless access as a replacement for broadband. Let's review why they would want to do so. The first of course is cost control, consistent pricing, you know what you're going to pay right up front, compared to broadband where you're going to observe different pricing. It could be in the same city, but certainly around the country. It's an opportunity for businesses to aggregate that broadband connectivity with Verizon being a single carrier, and eliminate broadband aggregation services, where you would pay somebody else to manage your billing and the services with those providers. Secondly, as you mentioned, John, it's quick to deploy, so ready to go installation. You can order a bundled service through Verizon, and there's no waiting for access circuit delivery or trenching into your office. Third, also, as you mentioned, it's flexible and reliable. Network coverage virtually anywhere you need it today. By doing so, it's going to add diversity to your last mile potentially, so you can keep some wireline connection at a given site and supplement with wireless. And lastly, it's cost effective. There are no capital expenses for construction or build-out just to get access to your site.

So, those are some of the reasons why businesses are leveraging fixed wireless access. Now, on the next slide, let's take a look at how businesses are leveraging and can leverage fixed wireless access.

OK, so let's review the scenarios of how businesses are deploying fixed wireless access, whether as a primary or only connection, or as a parallel connection, or as a backup connection. So, as a single, primary, and only connection, we're seeing companies use that scenario for branch offices, small branch offices, home office workers, and pop-up mobile locations like you described, whether that could be a food truck, or a kiosk. And lastly, an interesting application that we see is using it for out-of-band access into a data closet. Under data closet, you have switches, routers, firewalls, and to remotely administer those devices, you need out-of-band access, and typically that's a POTS line, but we're seeing customers replace POTS lines because they're expensive and difficult to manage, and using fixed wireless access instead.

OK, and as you can see on the slide, fixed wireless access can also be used in combination with a traditional wireline connection. So, here are two ways to augment an existing wireline network with accompanying diagrams. So, on the parallel connection side, on the left, what we see is a wireline circuit staying in place, and then supplementing that environment with a second connection, which is

cellular or wireless, and then it can load balance between the two connections. So, a popular technology today is SD-WAN, or software-defined networking. So, those applications, software-defined networking can help application traffic be directed based on the quality of the connection based upon what the application needs. So, that's really good for mission critical locations, and business applications, which require diversity.

Finally, then, backup connections, this is super popular, and it has been for a long time. So, you have a wireline connection in place, but for those critical locations where you really cannot be down, failing over to cellular is an excellent, and many times the only, option. Like I mentioned, also for out-of-band access, replacing that POTS line, so you can still get into the location if wires are cut to get into the location, so you can administer and use your network when the wires are down. So, network resiliency comes in not only for physical disasters, like a backhoe, or a tree falling on wires, but also in extreme weather situations like hurricanes. So, several of my customers are in hurricane-prone areas, and this has worked just great for them.

So, John, those are the reasons why businesses are using fixed wireless access. Back to you.

John LeVasseur

Thanks, Dan. Appreciate that. All right, so let's take a look at our second poll, and no surprises here. Many of you have answered that there's room for improvement and that you have a wish list for how you could improve your network. Only one of you was very satisfied with their network, and I think that's somebody I would envy. I think most of us are in that same position where we're certainly looking for alternatives for our connectivity for our locations.

All right, so with that, we're going to do a third poll now. The third poll is, where do you see the best use of fixed wireless technology in your business? All right, and so now we're going to hand to James. James with Cradlepoint is going to talk about some customer experiences and their perspective at Cradlepoint for fixed wireless access. James?

James Weaver

Thank you, and John mentioned that I spent a fair amount of time with customer use cases, and one of the questions that inherently comes up is, how far do we take wireless, and my main answer for that question is take wireless where wired won't work, and you can see from this slide, there are many areas where wired just will not work. It's not very good at day one. It's not a diverse path for failover. It's not very good in a vehicle, because that takes a long cord, and it's not very good when you have lots of sites to manage and have to get last mile providers around. It certainly isn't very good at remote examinations and an SME experience, and there are just some places where it just doesn't work, like remote parks for video surveillance cameras, and so forth.

So, in that, you may stand back and say, all right, why then do we need 5G? If 4G can cover all of these values today, why do we need them? And the answer is here. It's simply that 5G will make every one of these use cases better. So, if you're using failover for small sites today, wireless failover, where you can now look at medium to large sites. If you have it in a medium site, and it's only failing over critical traffic, you can now fail over all traffic. If you are using wireless for day one, you can now look beyond day one. If you are taking your applications out to the customer, physically taking it to them via mobile or via kiosk or so forth, well, now you can start to have immersive applications, create that stickiness that comes with this technology. And as Dan mentioned, if you are already enjoying the benefits of this aggregated – are only using one carrier for your buildings, for all your sites, well, you can now look at larger sites, instead of just the smaller sites. Any kind of thing that you're doing with detail today that is as part of an SME experience will just get better, and I will tell you, there will be more applications developed with 5G than we will expect. It's interesting. When you look back at 4G, and we were just getting into it, nobody thought you could stand on a corner and order up a private person to come give you a ride and to have the whole thing taken care of through electronic credit card exchange all in the palm of your hand. Nobody thought that, but here we are. Uber and Lyft have absolutely turned the transportation for hire industry upside down, and we absolutely believe the same thing will happen with 5G.

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All right. Well, the thing I'd like to just focus on our next our next slide is around the concept of management. Actually, I'm not going to talk about management quite yet. What I'm going to talk about is organizations are really just looking at your peers. And we did this survey as part of a study called the Wireless State of the WAN Report in 2020. We asked the question, what are your plans for LTE and 5G within the next three years? And what was most interesting to me is that only 9% of those respondents said that they weren't going to do anything, which means that the other 91% are doing at least something in some part of their network. And then this middle figure, this 53%, that said, hey, we are going to use some kind of combination between LTE and 5G only within the next three years, tells me that people are paying attention. People are watching what's happening with 5G, they're being very cerebral about it, and they're looking at how applications with a 4G and 5G combination, or a 5G only, will help make their businesses more competitive.

All right, now I'm going to tell you about management, and this is where companies that maybe you only have a handful of sites, if you only have three or four sites on wireless, yes, you can do it the same way you do with your regular WAN network and use command line and things like that, but we have companies with 15,000 sites. At the network edge, there are a lot of endpoints, and that's where management becomes really important. The great thing about NetCloud Manager, it was built in the cloud age and so there are click boxes, there are buttons you click, and there are wizards. It's that kind of management as opposed to the command line that some of us grew up with. But it also gives the ability to have modern features. So, for instance, all the remote monitoring that you can think of that Dan spoke about in terms of this out-of-band management, the ability to go through the air, into a router, and figure out what's going on. Even if the DNS service isn't working, even if IP isn't working, you'll get this connection because it goes directly from the console port of the adapter to the router. The ability to take over a desktop.

One of the interesting things, too, about this kind of platform is that you can look at your cellular usage, you can look at cellular health, you can look at pool dating, all those kinds of things work together. When you start looking at 5G, you get the same opportunity to then say, all right, how is my 5G doing compared to 4G? Am I really getting the value out of it that I want? And so, I would highly encourage you, as you look at solutions, to really think about the platform, because one, the platform will have all your edge endpoints, including wired, and all your applications, such as in-vehicle, all in one platform that you can manage very easily. It's not uncommon for our customers to have tens of thousands of sites and it's managed by one person, maybe two people, and that's the kind of management we'd expect in a modern world.

All right, so if we move to the next piece, what I want to do here is share with you some actual customer engagements, and give you a little bit of a flavor of what your peers are doing with what we call wireless WAN, but a lot of these will be focused squarely on fixed wireless access. One of the first ones I want to bring up is Fort Benning, and we are very aware of the consternation that this COVID pandemic cost us. Well, think about Fort Benning with tens of thousands of troops, and with the requirement to be able to quarantine troops. They effectively had to create a small city of quarantine. 34 acres of temporary tents, they needed Wi-Fi for the troops, they needed Wi-Fi for the medical devices, they needed to POS, point of sale, instruments, and they needed emergency response, and they were able to set this up very quickly. You can see from the diagram what happened. We have a partner that takes these this wireless WAN equipment in a kit and opens it up, the antennas are there, and off it goes. That's the kind of flexibility that helps organizations like Fort Benning.

United Oil is another great example where they had 30-some-odd different to wire providers, it was complicated, it was expensive to manage. They went completely wireless at their gas stations. It allowed them to really simplify their management, and they were able to do other services, like they took over their ATM revenue because of the simplicity and being able to handle that and get the fees from the ATM, and to run several other kinds of services as well.

All right, I'm next going to show you four more case studies that are squarely focused, again, on fixed wireless access, and the first one is Pandora Jewelry, who was expanding very, very quickly, and they couldn't afford to wait four or five weeks for a wired connection. It cost them money, and so they brought in wireless to do day one deployment, and what they would do is they would keep that wireless router afterward, and that would be – or their wireless adapter, whichever they chose, and that would then be their failover to their wired scenario, and it worked really well, really seamless, allowed them to keep the revenue flowing.

Fox Sports is interesting. We have a number of customers that just simply have to bring their own network, either because of the environment that Fox Sports works in, or because they're in an airport or other places where the host is just not willing to share, and so something like Fox Sports is not just about the satellite signal. It's about keeping all the inner – keeping all the data squared away from an internet connection over the air through the cellular network, and that allows them to be very, very flexible. We also have retailers taking their wares to places like the US Open tennis tournament and be able to sell to very high end customers right on-premise.

Jackson Hewitt is a customer whose seasonal and so they will go into Walmart stores for six months at a time and actually prepare tax returns right there. Well, Walmart isn't too willing to lend them a piece of their network. They just aren't, as you would expect, and so they bring their own, and this allows them to go into a store in hours as opposed to weeks, and to be able to keep the same phone numbers and to be able to take those same temporary stores and put them in other places.

And then you remember I talked about this concept where you use wireless where wired won't work. This is a really good thing example with Dollar General. So, they had about 2,000 of their 13,000 stores that just could not get good, wired connectivity, but they were able to get cellular connectivity, and so they would run their stores in those areas completely on a cellular network, where they use, in this case, LTE for their primary connectivity. And it's very easy for the IT organization, it's an easy overlay as I have explained.

All right, so these are the case studies that your peers are doing, we're doing these very often, very frequently and as Dan showed, it's growing, and it's exciting business. The future of our WAN network, particularly the WAN edge will be very much mixed between wired and wireless and those who see this, I think will put themselves in the best position, the best competitive position for years to come.

With that, John, I'll turn it back to you.

John LeVasseur

James, that was really great, appreciate it.

So, I think you and I, or rather Cradlepoint and Verizon are seeing the same kind of momentum in business. Customers are looking for alternatives or how they connect and certainly seeking to improve their connectivity at their various sites, so thanks a lot for your insights there.

All right, so let's discuss poll three. So, poll three was "Where do you see the best use for fixed wireless access technology?" and just barely eking out the win is on-the-go businesses like food trucks, trade shows etc. And that certainly is something that we're seeing. What we're also seeing a whole lot of customers use it in their fixed locations. So, retail stores, branch connectivity and many of the use cases that James just described you can see kind of fall into that.

Small office and home office, boy, this has been the year – last year was the year – for small office and home office to just really explode for 4G and 5G connectivity. So, really fantastic. Thank you for your input on the poll.

So, the fourth poll is going to be, "Would you run your enterprise network edge on a fixed wireless access?" Kind of a question leading into do you trust this network? Is it something that you believe in today? And that's certainly what we're seeing from some of our customers.

All right, so now we're at the Q&A portion of our session and I would encourage you to use the Q&A chat pod to the bottom right edge of your screen. You should see a little Q&A icon and if you click there, you can type in your question and we will see your question. And I think, if I remember correctly, users can like your question and that will upvote it so that we can answer those questions. We don't have very many in the chat pod now, so let's just go ahead and dive in.

All right, so the first question, and this is a question we get asked all the time, is "If my data is being transmitted wirelessly over a long distance, how secure is my data over fixed wireless access?"

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The best way to answer that question is to say that 4G and 5G standards have built in air interface encryption. And so, basically, as the data leaves your device, the wireless device and enters into the wireless medium, it is encrypted for that whole route over the network. And so, that broadcasted portion of your data is broadcasted in an encrypted fashion.

So, it's very difficult to intercept and it's impossible to break by today's standards. And so, we feel like the data is very secure today. Many of our customers will bring their own additional security, so that they do an end-to-end security model for their application needs, whether it's PCI compliance or HIPAA or other regulatory compliance that they're working to adhere to. Often, customers will implement some form of end-to-end encryption in order to secure their data even further.

All right. Some other questions that we're commonly asked are, "What equipment do I need in order to take advantage of fixed wireless access?"

And for a perspective on that, I think we'll start with Dan and then we'll go to James. So, Dan, what's your perspective on what equipment do customers need to have?

Dan Sheehan

You bet, John, thanks. So, at a very high level, you need a router, it's a Layer 3 device as you want to get some data where you want it to go. Inside of that router or externally, you're going to need a modem, so sometimes those modems are built right into the router, sometimes they're modular. You can plug them in now and when a new technology comes in, remove them, and plug in something else. And thirdly, you'll need to think about antennas. A lot of times, wireless routers that have a cellular modem built in, they'll have what I call "rabbit ears", and a lot of times, those will be just fine, and the router will tell you how good is my signal strength to the tower. If that's not enough, James, do you want to add to the mix here and maybe talk about antennas and other considerations.

James Weaver

And Dan, that's exactly right. Those are the three components. What is great, though, is there's a lot of combinations you can use with those three components. Those antennas that you talked about, sometimes we call them "paddle antennas" but rabbit ears works just fine, they are built for certain frequencies and they're powerful antennas. But the only reason you'd go to an external antenna is to change the location.

So, let's say that your router is in a wiring closet and there's a lot of metal or a lot of cement around it, then you'll look at some other ways to extend that antenna, and you can do it two ways. You can actually extend with an antenna cable. Now, you can't go too far, because you have what's called "attenuation", and so you start to get some signal degradation. Or you could use an adapter, so you'll actually take a little adapter and it actually will be placed somewhere for better reception, and then you have ethernet going back to the router that Dan talked about. And you lose nothing across the ethernet connection. And those are fully self-contained with power, some are built for outside like John mentioned, and are very weather resistant, so those are some great options that you have.

And so, I think you first start with an all-in-one option if you have that ability. Dan talked about the SD-WAN capabilities, but then if you need to get just a little better signal, then you have those options with the antennas.

John LeVasseur

Great, guys, thanks a lot, appreciate that.

All right, so we had a couple of questions in the chat pod. One was, "Will we receive a recorded version after the call?"

And the answer to that is, yes, you'll have access within a few days post the event, so you all will have access to this meeting here pretty soon.

Another great question in the chat pod is, "Does Verizon have a private 5G strategy? If so, how do we get visibility to this?"

OK, so private 5G is defined a couple of different ways. I want to start by breaking that down. There's private network connectivity, which is where the wireless edge, in the case of the fixed wireless application can be private and not on the internet, and the answer is we're about to offer that. We haven't begun offering that solution just yet, but we will be offering it soon. What this means is that the 5G endpoint is not a node on the internet, it doesn't have an addressable IP address, so devices on the internet can't get to it. And the answer is we don't have that solution available yet, but it's coming.

But there's another kind of private 5G, which is referred to as a "private network", which is the industry term for having your own 5G system installed at your premise if you're a factory or a manufacturing site or maybe a mine. There are different use cases where we're looking at building 5G networks for customers on their premise. And the answer is, yes, you should reach out to us. There will be an email that you receive following this event that will take you to a link where you can request one of us to reach out and contact you, one of the Verizon employees to reach out to you, and we will certainly make sure that we allocate a resource to have that conversation and share what we're looking at in that arena. But absolutely, we're working hard on that on my team, so would love to talk to you.

Another great question. "I'm assuming 5G is significantly faster than 4G LTE, how much of a drop would users see or notice?"

So, when you're on a 5G connection today, Verizon offers 5G in three different speed fixed wireless today. The entry level speed tier is 100-megabit per second. The mid-tier is 200-megabit per second. And the top tier is 400-megabit per second for business customers. And so, those are the three price points that are available, or speed tiers that are available for 5G services.

When I look at 4G services, we have four speed tiers available there, three-meg, 10-meg, 25-meg, and 50-meg. So, there's definitely a speed difference between the two offerings, and if you're in a 5G configuration with us, the 5G receiver also has 4G capabilities built into it, so if 5G, for whatever reason, stops functioning or goes down, it would immediately hand down to 4G services.

And so, implied in your question is how much of a drop would that user notice. If it's a single user, they may not notice that much of a decrease, because 50-meg is often enough for a single user depending on what they're doing. But if they need 400-meg and they drop down to 50, that's a pretty noticeable drop.

So, it's going to depend on what your use case is and what they're doing with the connectivity, but I would say those are the speed tiers, and hopefully, that defines what that difference might look like.

Do you guys want to add anything to that, or did I pretty well cover it, Dan.

Dan Sheehan

Well, I think you said it really good, John. You framed it in terms of the price plans that we have, the different speed tiers and the price plans. So, I guess I would add to the question, our M2M plan, are those available for fixed wireless access and would we notice different speeds there.

John LeVasseur

It depends on the M2M plan. Most of them are unfettered, so they don't have a speed cap on them, but it depends on the plan structure that the customer has.

One of the things we do at Verizon is we try and contour the plans that are available to what the customer needs. And so, we'll work with finance, we'll work with our offer development and our sales teams to determine what's the right price plan or mix to suit the customer's application, and that's what we'll create and make available for them.

Dan Sheehan

And I think I heard you say it there are higher theoretical speeds, and certainly, we observe those out in the wild. John, I think that was opportunity knocking, you might want to go get that.

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James Weaver

One of the things that, I think, customers want to consider we talk about all the time is the lifecycle of your product. So, generally speaking, when you buy, for instance, an endpoint of some sort, whether it's an all-in-one router, it's an adapter, it's going to last three, five, seven years, whatever your kind of standard processes for your company. And during that timeframe, a lot can happen and if you're following Verizon, Verizon is moving very quickly in this space. And so, you'll want to buy prepared for 5G speeds that will be during the lifecycle of your product.

So, right now, we're in the beginning and it's a little bit depending upon where you're at in the metropolitan area and so forth, but just note, it's moving quickly and so you'll want to prepare your network and prepare your purchase plans to accommodate within, really, a five-year lifecycle.

John LeVasseur

That's great, James, thanks for that. Appreciate that.

All right, so let's do our fourth poll... let's review our fourth poll results and then we'll jump into our fifth poll. So, "Would you run your enterprise network on a fixed wireless access edge?"

It looks like most of you are "Yes" and some of you are thinking about it, which is great. That's pretty much what we see when we engage with customers. Everyone is curious about how they can leverage wireless access, and having a great partner like Cradlepoint and a service like Verizon and our network has just made this foundational technology for many of our customers. So, we'd certainly love to speak with you more about it if there's interest there.

All right, so poll number five is going to be – this is our last poll – is going to be, "What topic would you like to learn more about in regards to fixed wireless access?" this is selfishly intended to help us point to our next session that we'll host on this topic.

So, there's a couple more questions in chat. Let me go back over there. The next question is a really good one from Michael. The question is, "Fixed wireless access seems to align with network-as-a-service strategies, how flexible are the rate plans, costs, and speed tiers?"

So, that's a great question. In terms of 4G price plans, the reason we have an assortment of price plans with different speed tiers is intended to meet that customer variability and the applications and services that they need. We have very low speed plans that can be used for backup services. But at any time, the customer can go into our site and upgrade their plan to meet their need at the time. If the site is going to be down and you know it's going to be down for weeks, because I don't know, the fiber was cut and you know that there's a major issue, or maybe it's a natural disaster like we've seen in recent years, and you know your connectivity is going to need to be on wireless for an extended period of time, you can go into our site and make the appropriate adjustment to the plans that are available.

And then the other thing I would say is if you're finding it's not flexible enough, make sure you're communicating with our teams so that we can take that information back and determine what we can do here at Verizon to better meet your needs. We're always trying to refine and sharpen our pencil and make sure we're doing the best we can for our customers. Customers are a major stakeholder in our business, clearly, and we want to make sure that we're moving to results that bring the benefits that they need.

So, thanks for that question, Michael.

Dan, did you want to say anything on that one too?

Dan Sheehan

No, that was a great answer, I appreciate it.

John LeVasseur

All right, very good. So, the next question is, "When a customer sees a lack of coverage at a specific site, is there a mechanism within Verizon ops to help extend or improve coverage assuming the antennas don't resolve this?"

I think this is a great question for James to talk first. James, do you have an outlook on what can be done at the edge device? Maybe that's a good place to start.

James Weaver

Yes, so from an edge device – let's talk about inside the building. Well, the first thing you'd want to do is... and let me just say too, doing a proof of concept is super easy with wireless. Literally, you bring the device over, you set it on your desk, you power it up, and by the time it was shipped to the office, your IT team has already setup the configuration in the cloud, it downloads that configuration and off you go.

So, there you are, you've got it on your desk, you see what the reception is. The first thing you'll want to do is if there is some opportunity to move the actual adapter or router around, then you move that. If you're not able to do that, then you look at antenna options. But I would say even before that, you really need to have a site survey.

So, this is where you engage with Verizon and Cradlepoint, we do this all day long, there are experts come in and you determine, hey, is it an all-in-one router with paddles or is it an adapter, and then you really do that preemptively and then you can do some of the adjustments I just talked about.

And then you go outside if you need to. So, we just launched a 5G adapter not too long ago in the Australian market, it's our first market out there, and we found that that was important for the mid-band spectrum to have it outside and a lot of customers went that direction, and we started to see lots of different ways that they started to do that.

Once you're outside, and if there still is a signal problem, there is some tuning you can do, particularly on the 5G side that you can do in terms of directional antennas and so forth. If directional antennas don't work, then I'll hand it back to you, John, and Dan, and that's where you'll take it over from the Verizon side.

John LeVasseur

No problem. So, typically, when a customer does a site survey or conducts a site survey with us, we can determine where's best to place that equipment, where's best to place that antenna so that you can get a suitable service. If we find you can't get a suitable service – and by the way, that only happens in about 4% of the tens of thousands of sites I've deployed in my career – so if we find that to be the case, sometimes we'll make a recommendation about a repeater or some other device that could be used to take an external signal and pull that into your building and reradiate it and make it stronger.

Your question about is there a mechanism at Verizon operations to be able to mitigate that, we have a few mechanisms to do that, there, the site survey that will help look at it. We also have our network team that we can involve to look at the area and determine if we're having a cell side issue or if there's something that can be done to remediate. But I think the chances of us changing the macro network to meet a specific business' needs are usually very slim. Occasionally, we'll find an issue with the cell tower where, perhaps, we can tune it a little better or maybe turn it a little bit to make the coverage better for customers, but in my career, I've only seen that a few times. The majority of the times it's about the sales team and us engaging technically with the customer to try and solve these kinds of obstacles with a repeater or with an antenna or a site survey, as James kind of talked about.

Dan, did you want to add anything to this? I know you've had the same experience I've had.

Dan Sheehan

No, we'll leave it at that. We do have a few more questions, so if we have time to get to those, I think that will be more beneficial.

John LeVasseur

All right, great, so I'll jump to the next one. "What kind of latency is possible in milliseconds and how is it measured for SLA enforcement?" OK, great question.

So, let me start by saying the bad news. The bad news is this is a broadband service that Verizon is extending today. So, we don't have a traditional SLA that we extend for the service. We have some SLOs, which are service level objectives that we're working towards hitting all the time in the network, and I'm really proud to say working at Verizon, we do a great job hitting our SLOs. Our SLO on latency is about 100 milliseconds in 4G, and it's about 10, 20 milliseconds in 5G, it just depends on where you're going and what application you're connecting to. But we measure it, typically, in time from the device to the edge of our network, the gateway in our network.

And I'll say, in 4G, we're hitting that 100 milliseconds basically all the time. I think it's down around 40 milliseconds now is typically what I observe.

In 5G, we're hitting it in spades. We're getting one to five millisecond latency to our gateway. I think the highest I've seen is about nine milliseconds. So, it depends on the service that you're subscribed to, but I wanted to make sure I answered your question directly. It's not an SLA today, there's no penalty in the clause of the contract, but there are service level objectives that Verizon works to hit, and we can certainly talk to you more about those if we need to.

Do either of you want to add anything?

Dan Sheehan

That was very clear.

John LeVasseur

I'm going to keep trucking then.

Next question, I guess last question from [Indie]. "We currently see a limited number of data plans that cap out very quickly. When will we see greater data plans or unlimited options from Verizon?"

So, let me make sure I articulate this clearly, because there are different plans with different restrictions that Verizon has. So, first, let me say in terms of 5G, there's no restrictions. In 5G data plans today for 5G business internet, or for 5G consumers, there are no caps and no restrictions. Customers are able to use 5G connectivity for any use case at the maximum speed they want 24 hours a day, seven days a week with no caps on the data plan, which is great. And certainly, 5G is where we're headed.

With 4G data plans today, we do have different cap levels, different cap levels for usage, and they are just the speed tiers ranked against different sizes of data plan. And so, when will we see those plans go to greater numbers? I think we're seeing it every few months the pricing is iterating, or every few quarters the pricing has been iterating here at Verizon. And it's just due to the competitive nature of our industry, but it's also because we're starting to shift traffic from this 4G network, where all of the customers are, over to the 5G network where there are fewer customers today. And there's a great deal more efficiency in 5G in terms of the air interface and the frequencies that we have available.

Dan talked about the C-band investment where we spent $53 billion on spectrum. So, that's just freeing up additional resources for us to use.

As we migrate some of these customers from 4G onto 5G, we'll be able to get, I think, more creative and more competitive in the 4G usage space. But today, it's kind of where we are. We're certainly willing to talk with different customers about their potential use cases and what their needs are to see how we can better meet their needs.

So, please make sure you're working with us and we'll see if we can meet that need a little bit better.

Dan Sheehan

John, if you don't mind, I'll chime in there. So, I think it is not very well known that 5G is truly unlimited, that you're not restricted on the amount of data that's throughput. So, that's very good news and why, frankly, the market is so excited about 5G.

In the LTE space, sometimes where customers can stumble is, hey, how much data do I need? And by the way, with LTE, there are technological limitations that are why a company will put data caps out there. So, I know that Cradlepoint and Verizon are happy to help customers in that scenario.

So, if you want to deploy and you have locations that need LTE, work with Verizon and Cradlepoint and we will help you get the answer to how much data you need at a site and try to make that not very complicated for you.

James, is there anything you'd like to say in that regard?

James Weaver

Yes, and we can also help through NetCloud Manager. So, there are a lot of rich data planning and data predicting tools in there, as well as the ability to look across all of your devices, handle things like pooled plans so that we're really taking the surprise out of it. And so, that combined with some of the things you mentioned, Dan, customers should feel very, very safe in going to a metered plan at this point.

John LeVasseur

Awesome, guys, thanks a lot. So, we've got about 10 minutes until the hour, it's probably a good time for us to start wrapping up. Let's talk a little bit about the fifth poll, the last results that we got. So, what topic would you like to learn more about as we talk about fixed wireless access?

It looks like the overwhelming winner is 5G and its potential, and I think we just started to tap into that with these last few questions. So, we'll be glad to come back and conduct another symposium or another discussion on 5G and its potential for everyone. We also had some folks answer "network transformation", which is a very common topic here too, and so we'll make sure we cover both of those in future sessions. So, thanks a lot for those.

All right, so we covered lots of great stuff today. I really appreciate everyone spending their time with us today. Dan and James, thanks a lot for the thoughtful discussion and for spending time here today.

You've heard us talk a lot about fixed wireless access and what it can deliver for your deployment needs, mobility, reliability, control of your business, and help drive more efficiency, improve connectivity, and deliver critical data securely and quickly to your sites. Keep your eye open for a follow-up email with his topic and the series for our next topic as well as information about how you can reach us and where you can learn more on what we discussed today. And you can always reach out to your Verizon account team, if you have one, and Verizon will certainly support you.

Thanks very much to the audience for joining us today. I appreciate everyone's time. Have a great Tuesday.