



## What's Hot in Networking? & Analyst Views

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### Transcript

#### Featured Speakers:

**Analyst Chair:** Jeremiah Caron, Global Head of Research & Analysis – Technology Group, GlobalData  
Mansour Karam, President & Founder, Apstra  
John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco  
Kevin Deierling, SVP, Networking, NVIDIA  
Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company

#### Mark Fox, CEO, NetEvents

Hi, Welcome, everybody. This is Mark Fox CEO NetEvents. Welcome to our NetEvents interactive webinar on What's Hot in Networking. I'd like to introduce you to Jerry Caron, who many of you have met over the years at NetEvents. Jerry is Global Head of research and analysis at GlobalData, heading up the whole Technology Group there. And Jerry will introduce us to our distinguished panel today. So over to you, Jerry.

#### Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData

Thanks very much, Mark. And welcome, everybody I'm looking forward to sharing this. It should be a really excellent panel on what's hot networking, a lot going on there. As Mark said I'm the head of research and analysis for the technology group within GlobalData, we have research and advisory services across the whole technology and telecom spectrum, but within GlobalData what's quite interesting is we're just one of 18 different vertical industries that we have the market advisory and insight services in. And that's extremely helpful because it provides my team, our team access to insights from strategy leaders across all these other vertical industries, which is actually critical to understanding technology and how technology is, is used tactically, but also importantly in terms of driving business strategies. So, I'm going to share a few thoughts with you. You could change the slide please. Joining



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me today, distinguished panel, and I'm going to devote as much time to their thoughts as possible as I chair this panel, but with us is Mansour Karam, president, founder of Apstra, John Apostolopoulos, who is the VP and CTO of what's now called the intent based networking group and innovation labs at Cisco. Also joining us is Bob Friday, CTO, and co-founder of Mist, which as you all know, is now a Juniper company. And then finally, Kevin Deierling SVP networking at Nvidia, and it's funny saying Nvidia but it is now Nvidia. So welcome to Kevin. If you could switch to the next slide, please. Thank you. Just a quick word. I have to say that, you know, extraordinary times. We all know that, but it's been really fascinating watching what's, what's been happening. Obviously the health care workers and emergency services teams and people working in supermarkets and people who are doing things that make the world run like garbage collection, all these things, they're the real superstars of this COVID-19 situation that we're all in. But I would add to that, IT and networking alongside there. What has happened in terms of the rapid and instant shift to the way businesses operate, and also the shift, or acceleration of the way we work, we deal with our personal lives and interact with our friends and family center. All have never depended upon technology more than they did the past couple months. And the performance was outstanding. I think we all should be really proud to be a part of an industry that was so integral to us getting along as human beings, not just from the business perspective during the discussion crisis. So, next slide, please. I'm just going to leave you with a start with a couple of thoughts. The, as I said, we operate in 18 different industries and we're able to tap into knowledge we can get from them. And, you know, one of the things I'll point out is just a shift in priorities during the past couple months before COVID-19 when we asked about you know, what are what are your key priorities? Unsurprisingly, the far leader was sales let's, let's bring in money, you know, and, and contract delivery and the things and looking at new markets and, and all that these were the priorities before COVID-19. But if you go to the next slide, the that there was a sudden shift in all of that. You know, the most important thing that businesses business leaders We're thinking about where first and foremost employee safety. And secondly, survival, business continuity, just getting things done further down and this will kick into gear as we move forward next quarter after that. But things like sales growth and whatnot, were not the priorities there. There were bigger fish to fry as the as the as the saying goes. And it'll be very interesting to watch to see how that evolves. As some of the environments and societies open up a bit. Over time. There's still way too early to tell what the true impact of COVID-19 will be. But this was an indicator of how people's minds shifted. Beginning Next slide, please. Now I want to apologize because this slide didn't transfer into the into the deck that we're using today. Well at all. So there's no much information to look at there. But what it would say we will get this into your hands, by the way. was the question was, how has COVID-19 affected your IT budgets for 2020. This was part of a major study we do every year, it's actually across over 5000 Enterprises. However, only about 3000 we were able to actually inject COVID-19 related questions. The so it's a very big survey across all major vertical industries. And it's all leadership positions not just it leadership but just general and what happened was 58% said that there IT budgets we're going in for the remainder of this year, we're going to decrease either buy slightly around 2% or so, or more significantly above 10 10 10%. From what they originally thought at the beginning of 2020. That's probably not to be. That's probably expected. For many of you. I think. People just don't know what their business budgets going to be. And we do have other data that didn't pop in here that shows it actually, in the month of the critical months of March and April, there was a spike in spending in some areas for sure, as they move their employees to working from home or also building out their security, support and moving applications to the cloud, etc. But generally, if you think about most

businesses, now they're looking forward and going we don't know what the economic situation is going to be. So it's not surprising to see that they're expecting to spend less overall. Next slide, please. terms of priorities over the next two years and again, this is this is information taken very recently. So it is COVID-19 impacted, if you will, you know, not surprising that this sort of, there's interest in all these areas, obviously. And, and again, trying to project two years, what they're gonna have money to spend on is difficult, but clearly collaboration, the need to really make that robust, make it business class, make it somewhat permanent. You know, one of the things that we've observed is a lot of what we're what we're seeing now, that represented a sudden shift for some business will become permanent, or at least partially, and businesses are thinking about that and also thinking about Automation may be accelerating their efforts to automate processes. Again, expecting to be in a constricted economic environment. Next slide, please. Again, another one it doesn't project. But I wanted to close by talking about networking specifically in this big study that I talked about. It's very granular. It looks at all the different technology types. And we did ask about networking specifically we do every year. And interestingly, while we saw the expectation that IT budgets were going to be less throughout the rest of this year, actually, the vast majority said that on networking, they expect it to be at least flat or increase. And I think that's for pretty obvious reasons to the extent to which they're going to recover and support their employee base. They're going to have to invest in networking. At the very minimum. They may not have been In a lot of other things other than collaboration, for example, but networking is one area that they do expect to see increase investment. So with that, that leads is a nice segue. Next slide, please, into our discussion, the hottest technologies in, in networking, and I'm going to kick things off by we have three subjects we want to address, certainly, and then we have a more open ended about other technologies that we all should be watching. But the first area is going to be wireless. The and to the first question, I'm going to ask the panel and kick off the discussion will be to john to john, from Cisco. about that. The first thing I want to ask you, john is just, I've been attending Cisco Live and I noticed that the enterprise networking group is now intent based networking. what's that all about? But then also in terms of wireless? It's a really, really hot topic, more so than ever, perhaps. I know you're really excited about what's going on. So if you could talk a bit about what we should be focused on, that'd be great.

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Sure, sure. Let's see. So first, you're asked about the change of enterprise networking into intent based networking. What happened about six years ago, we started looking at what are the some of the key enterprise use cases we need to solve in the future. And that's what led to what we now call intent based networking, which we did in campus for wired and wireless, across wham, across data center. And originally we were building those separate solutions and then start integrating them together. Last fall, we decided it's better to bring all of these together into a single business unit because that way we can create more better integrated solutions for our customers. And that's what led to this name change this, this change in organization, as well as the same change that that you've noticed? It's funny because people never can know intent based networking. his mentor knows all about it right? Many people know all about it, but when you talk with others it's a little bit of a surprise. I think mincer has a book he's going to share in a few minutes. So that's awesome. Yeah, so for wireless is incredibly exciting right now I'm very excited. I know Bob's as excited as many of us here are two things that that are really special I think that are happening now. And I'll talk about Wi Fi First of all, because we're all using Wi Fi.



I'm using Wi Fi right now many of the people online are probably using it to listen, well Wi Fi works. It works great, but slowly because so many of us are using it the bandwidth is getting congested the spectrums getting congested. One of the major things that the Federal Communications Commission, the FCC in the US has done has opened up the six gigahertz band for Wi Fi for unlicensed, which means we can use Wi Fi in the six gigahertz band. And that's awesome because that's 1200 megahertz wide a spectrum. It's a humongous amount of spectrum and we believe it opened up a whole new set of applications and so forth. So that's really exciting. And that's the big problem that I think all of us have faced with Wi Fi is just getting on the Wi Fi network. At work, Wi Fi works great at home, Wi Fi works great. But if you go to an airport or a restaurant, and so forth, they ask you who you are, and you have to sign in and so forth. And, and that's cumbersome. And also even when you get on the network, you may or may not be secure. So it's a bad experience both for you as well as for the venue owner who owns the Wi Fi network. So I've been many attempts over the years to try to solve this problem. In my group. We started looking at it and we realized that there's both technical and business issues why it hasn't been solved before. So we try to make a solution that worked for both. And we came up with something that's called Open Roaming, which is currently being standardized by the wireless broadband Alliance WPA and this allows automatic and secure onboarding on Wi Fi network. Another big thing that the WPA just announced like 10 days ago. So this is really hot news is an effort by, as they call it, 31 pioneering companies. This is the first set of companies which are part of this and the 31 of them to create a single global federated Wi Fi network. And to put this in context, whenever we go whenever we travel today, throughout the world, and we turn our cell phone on, are able to get on the cellular network really easily. And as long as we're willing to pay any roaming fees they charge we can get on. Historically, you couldn't do that with Wi Fi. What we're what we're trying to do with this ecosystem for Open Roaming is to allow you to go anywhere in the world and be able to easily and securely get on a Wi Fi network. And I'm happy to talk later if there's questions about how that works. But these are some things I'm very excited about. I know my colleagues have other things they're very excited about too.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Super Yeah, Bob, Bob Friday, I know that you're quite focused on the wireless environment as well. Do you agree with John, you have other things you'd like us to be thinking about?

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

I said, you know, for me personally, like John said, I started my wireless career in the early 80s, when the unlicensed mobile first came out. And so I have to really thank the FCC for my personal fortune because my whole unlicensed spectrum rule and six gigahertz now, they just released another gigahertz of spectrum at 60 gigahertz. And that's going to, you know, probably inspire another whole new round of innovations. And I think when we look at Cisco's 2019 DNI data, you know, what that really shows is that 70% of all internet traffic is on some wireless network. And 50% or more of that is on some Wi Fi network, you know, and what I've seen over my career is I've watched Wi Fi go from kind of a nice to have no backhaul airspace days, you know, to a must have, you know, when we saw Intel put Wi Fi into laptops. And that's when Wi-Fi became a must have an enterprise. And I think what we're seeing right now is a paradigm shift to where Wi Fi and wireless is really becoming business critical. And I think that is a big shift I'm seeing in the market right now. Now we're starting to see enterprise customers actually putting robots onto these networks, or they're pretty customer and mobile apps on these networks. So I

think we're seeing that we're, our whole society is going mobile. I think you're seeing our specter and regulators respond to that, you know, and they're responding to it with that, you know, with 100 years of spectrum regulation, you know, what the response is really is get more unlicensed spectrum. And we're starting to see shared spectrum like CB rs 30, come into play. Now. So we're starting to see that, you know, become a bigger part of the enterprise play. As for me, personally, I can add, I have a lot to thank you guys in the FCC. Thank you every year now.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Great, all right. So before we leave this this topic and move to the next, Kevin or Mansour, anything you want to want to add to this to this discourse on the on the wireless side of things.

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, I'll jump in. You know, I think the discussion on Wi Fi is great. But the other huge innovation that's happening right now is in the world of 5G. And they are we're not getting new spectrum, we just need to use the spectrum that we have more efficiently. And to do that is a tremendous amount of technology involved in the baseband codecs. So new type of modulation schemes, new type of forward error correction, really, really heavy lifting from a compute side. And that's where companies like myself come in with Nvidia and the GPUs. We're doing software defined radio, what we call cloud ran for 5G we actually just introduced a new blog today that we published on a technology called 5G for 5G because to build out a scale out platform, you actually need to build something that's highly distributed. And it's software defined and hardware accelerated. And that's what we do on the networking side. Because to do this, instead of using regular appliances, which are sort of fixed function that make you go climb up the radio tower, when you want to change your radio algorithms and replace a appliance here, we can do that in software. But to do that, you need really precise timing, something on the order of 20 nanosecond synchronized synchronization between the nodes. And so we've done that inside of our networking. And we work with lots of partners, including folks like Juniper and Cisco, to deploy that out into the market and App Store, obviously, as well on the IBM so we think there's tremendous opportunities, not just on the enterprise, but 5G at the edge. You know, I think Bob mentioned some of the things that are happening with robotics and all of the edge computing so Wireless was going to be a huge play there. And latency is

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

critical. It just made a quick question to me, Kevin, do you think 5G is actually starting to incorporate unlicensed spectrum? I mean, I see some sense for 5G kind of starting encompass everything now.

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, you know, I think it's the jury's out there. It's trying. And that's the great thing about unlicensed and we'll sort of have people out there doing that. The more nimble and adaptable and the faster you can get to market, the more likely it is you'll succeed in that unlicensed space. And, you know, we'll see what happens there. I think the jury's still out.

**Mansour Karam, President & Founder, Apstra**

It just one comment I'll make is, you know, as we see Wi Fi becoming a first class citizen, and of course, we all know the importance of Wi Fi. What you know, to me, it's, there are two themes that I see. And you know, the Wi Fi coming to this prominence is kind of driving this as well as one is a multi vendor So, you know, as we, as we know, now, there are so many great offerings, Wi Fi offerings, best of breed offerings from multiple vendors. And so you know, we see enterprises very often to choose one vendor for Wi Fi that is separate from, let's say, the vendor that they use for their SD LAN or their data center, or the campus switching. And so more often now what we see is environments that are inherently multi vendor. And when for example, with what's going on with COVID, you need to quickly make changes pivot. Instead, multi vendor is key. And then management of this mental multi vendor environment through software becomes key as well. So having the ability to having software that is capable of essentially managing the provisioning. The policies for those multi vendor environments, becomes critical. So I'd say You know, with the rise of Wi Fi, we're seeing an acceleration of the importance of software and the importance of multi vendor.

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

Yeah, okay. Yeah. I think the only thing I'd add I think ultimately, right. I mean, I think people just want to be connected the internet. I don't think the average person cares whether it's cellular or Wi Fi is one our mobile operators that do the best they can keep us connected with whatever spectrum is available.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

I agree with that. Yeah, it was interesting. We work with lots of operators. And one of the one of the things that we observed in the March, April timeframe that they were talking about a lot was a there was no huge spike in mobile broadband usage. And that's because everyone was home using Wi Fi. And then their fixed networks, you know, and so it was quite interesting. That was their issue was more about traffic management and shifting it and locations, whatnot, and not a huge spike in the use of mobile broadband. And that's for obvious reasons. And I think that later we're going to address this topic of private LTE and 5G Where that fits in as a key networking topic, but for now let's pivot to the second main area that we promised we would we would address which is advances in cloud edge and optimizing the application experience. And so Kevin, will kick this one off with you. Everybody's talking about distributed data centers and the competing moving computing to the edge that that was at the beginning of this year, the hot topic. And so what are the big issues architects need to be thinking about? As we move to this world where we have a cloud edge computing?

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, so I think the big picture is that you're no longer really programming servers. The new unit of computing is a data center, and you actually are running a distributed application across the entire data center. And with the edge, it really fragments even farther. So instead of a giant, centralized Data Center that has 10,000 computers, you have 10,000 data centers at the edge each of them with a smaller rack, but still performing all kinds of new functionality. And the key things that you have to consider there are cloud native, so that you can dynamically do things, you have to be secure. Because everything is untrusted. In the edge, you're going to be plugging in cameras and devices that you simply have no control over. There's no security guard the way there is a centralized giant data



center. And then making everything software defined in hardware accelerate. And doing all of that together really requires a lot of horsepower, a lot of innovation, AI and machine learning because all of these edge applications are unsupervised. When we look at the way people use the applications today for IoT, it's mostly the phone and they're curated by humans that are controlling what's happening and it's really pretty slow, the response time that a human needs to respond is actually pretty slow, when suddenly you're controlling things that need to react in real time that are curated by humans that have latencies of the, you know, 10, millisecond sort of timeframe. You really need autonomous AI machines, you need networking that is reliable that delivers. You know, you can't have hiccups in your network that have huge latencies. So it really changes everything, and then the security that I mentioned as well.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Okay, just a quick follow up. Can you just explain a bit more about what you mean by cloud native networking versus other networking?

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, so in the traditional networking environment, you really had extremely long lived sort of monolithic applications. The cloud turned that on its head. So if you're going to deliver huge amounts of scalability to millions of users or millions of devices, You no longer can build a giant monolithic platform that runs on one computer. First of all, the problems that you're solving are much too large, you need a distributed mode. And to do that reliably and scalable Lee, you have gone to what's called the container based solution. So instead of having a monolithic app, you have these ephemeral containers that are coming and going all the time. And you need to automate everything. So automation of the networking that connects between all of them, the discovery overlay networks with things like VX Lan, all of this is dynamic coming and going so that you can scale up and build the data center that you need to run your application. And when you're programming, you're not programming the server, you're programming the entire data center. And it's going to dynamically compose exactly the computer that you need in that data center. So maybe you have a huge AI task if you're running something like 5G and the radio Cloud radio, maybe you have something that needs a ton of data. So you need more storage connectivity, and doing that dynamically with containers that are coming and going all the time. You simply can't manage that with a very smart IT guy sitting in the corner. Everything needs to be automated and coming and going dynamic.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Okay, great. JOHN. Quick, turn it over to you for a second or two. Obviously, Cisco is working a lot with cloud providers. What do you what are you seeing in terms of the key areas for them in cloud networking?

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Sure, yes. So what happens is, Kevin mentioned how modern art or modern enterprise applications are distributed. And what happens then is often distributed. One cloud, multiple clouds on prem, which could be edge and other places have all these different places where you have components here,



these cloud native components, micro services and so forth operations. And you want to network all of them really well in order to get the latencies and the reliability and so forth that was mentioned. So this includes things, for example, to go from a site to a cloud, or from one cloud to another cloud, because you may use AWS for certain things as your for other things, so forth, or as well as site to cloud to cloud to site in order to leverage the backbones that the cloud providers have for a cross continent or cross ocean sort of really fast connectivity, and stuff like that. So networking is especially important in this context. In addition, what people really care about, it's not the networking, right? We don't care about networking, we actually care about applications. And then the question is, how can you get the applicant what the application developers and DevOps want to accomplish with their applications, to the cloud native networking, and to the network and in general, historically, this has been a troubling problem because the DevOps people try to describe what they want to do. To the net ops people, and then an ops people try to put it in the network and so forth. But that takes a while and isn't as automated. A number of the colleagues here had mentioned the importance of automation. One of the things that we have done recently with Google with Google Cloud Platform, platform GCP, is to automate going from the dev ops that ops. So what we're doing right now, and this is with proof of concepts, is the application developer and the dev ops can describe what the trainer accomplish with their application with the different flows and so forth. What are the network requirements, that gets incorporated in something called service directory that Google has. And then our SD LAN manager, V manager basically subscribes to and gets that content gets add metadata for the application and the Dev, the net ops and can use that to set the network policies and security policies. And so what that happens is it automates the In the connection between DevOps and the network policies and security policies, and if the business decides to make a change to reprioritize, or to move compute from one place to another, or whatever makes most sense for them, it can very quickly be turned into reality. Similarly, if from the network side, you realize, hey, for whatever reason, this region of the country is extra congested, or this denial of service attack or something occurring, that feedback can be provided to the DevOps people. And then they can migrate their cloud apps to a different or different region. So it really makes a more natural connection between the DevOps or creating this cloud native applications as well as the SD LAN and the cloud to cloud networking and so forth. So the a lot of exciting things happen in building these bridges to make these application distributed applications work much, much better.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Great, thanks, John. Mansour or Bob. Any comments before we move to the next topic?

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

I think what we're seeing the trend right is, as all the applications kind of go to the cloud, and you know, workers and employees and people go to their homes and remote, I think people are looking to the on ramp to the internet, right? That edge cloud as a place to deal with the data plane, right? I mean, we knew that all the content management guys, all the content went to the edge early on, in the early days of the internet. So we see look at things like gaming internet requires low latency, they want to start moving compute and storage to the edge. I do think the one issue that we're gonna have to deal with is, you know, data centers tend to be built in their power centers. the on ramp to the internet, typically is not near the world's largest power, you know, dams and stuff. So I think that's gonna be wanting to



move more compute storage to the on ramp to the internet, you know, where's all the power to power all these new data centers that are moving to those online Rams?

**Mansour Karam, President & Founder, Apstra**

Yeah. So maybe the only thing I'll add here is that yes, we're seeing these data centers get more and more distributed. And so, you know, for all these reasons that were mentioned. And so, you know, one of the challenges, and yes, the applications are really important, but another big challenge is the data itself, right? And, and when you're measuring a lot, and there is this, this needs to collect all this telemetry and all the state, I think, an interesting problem is how to manage data. And in app specifically, we have spent a lot of time figuring out ways to essentially analyze data closer to the source so that you get the insights that are needed in an intent driven way based on the things that you care about. So that you're not essentially storing this data at the edge or having to, you know, essentially ship it really far from its source, you know, ultimately incurring a lot of costs and hoarding the data. And so there are a lot of interesting problems here in terms of, you know, how to manage this data, how to get insights from this data as close as possible to the source. And maybe one more thing is, of course, this also highlights the importance, again, of software, you know, this having that a software first approach here, where, if you have distributed data centers, what's really important is the ability to manage them remotely. And I think we can talk about this more as we progress in this session.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Okay, thanks. So the automation topic is specifically we moved to our third promised topic, intelligent network automation through intent based networking. So the I mentioned in my notes and our studies, what are people We're going to focus more on going forward in there in the next couple years than they thought they were at the beginning of this year. Automation was one of the one of the one of the clear ones. And that could be applied that term can be applied to lots of different things, obviously, but it also can be applied to how you manage network. So sticking with you, man, sir, if we don't mind. How is your view and what you're observing COVID-19 impacting technology investments and to what extent it related to that, will businesses demand that they get better ROI from their data centers going forward?

**Mansour Karam, President & Founder, Apstra**

Yeah, absolutely. So you highlight that, that COVID-19 really emphasized the importance of the network. And I think, you know, we all feel a you know, a sense of pride but also a lot of responsibility here and in delivering on networking technology. that allow people to essentially go on with their lives in this crisis, I think, you know, compared to, in this particular case, in this pandemic, I think this is the first time we, we really see this networking in action and really, you know, saving us all right. And I think that is important, and that's working, allowing people to still connect with their families be hundred percent productive and even more productive working from home. This is all due to, to networking. And it's quite remarkable. In fact, you know, now that we've proven this works, I think that the effects are going to be lasting, I think, to your points, Jerry, but it also, I think, to me, the other point that highlights is the importance of automation. And I think automation and intent based networking guys are closely related, intent based networking is just, you know, a powerful way to deliver on automation, where you essentially abstract the, you know, what you're trying to accomplish from the specifics of the how, and

you know, Marc Andreessen, I think it was nine years ago, predicted that software was going to eat the world. And certainly we're, we're seeing that. But with this pandemic, and when you have crisis like that, organizations have the need to pivot very quickly change plans very quickly. And you can't do that. Unless you have the right. Proper software, the right software approach. And I think that, you know, essentially automation software specifically is what enables companies to have the ability to pivot. And so I think that it's ultimately there's this really importance of having best of breed software. I think intent based networking is one of those best of breed software's that, that enable that and I think you know, when organizations are working with vendors, I think it's important for them to consider Who are these vendors that are delivering those best of breed software's today, this is a genuine software vendors that will deliver these types of solutions. And I think that can make a stark difference. And, you know, between essentially surviving or in the next crisis or not having the ability to do that.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Okay, great. John, just in terms of the I'm not going I'm not going to delve into this. It's intended intent based networking, Asher versus Cisco thing, although I do welcome you to both address that if you if you'd like. But I just want to throw a question to you. In some of the notes when we spoke previously, you had noted that automation is huge, obviously a big deal for Cisco as it is for lots of companies. But you, you focus on assurance as well. What do you mean by assure assurance and why is it important?

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Sure, MLA, I think all my colleagues on the panel also believe I should Both automation assurance are really important automation is to get it get the to automate whatever you're trying to do to do it quickly based on the intent. But then in addition, after it's automated, you want to check to see is the network or the applications working the way they should? If they are great, you can get the green light on the dashboard, so forth. If not, you're gonna identify, is there a problem? What is the problem? Where is the problem? And then how can we easily fix it. And that's really important, because that's how we can very, very quickly ensure that the network's is solving things. Not that historically, this was done by humans, humans would detect if there's a problem. Humans would also try to diagnose it. Now we're using much more machine learning to help us quickly detect that problem exists. And using things such as machine reasoning to do root cause analysis and figure out Hey, this is specifically what is causing the problem. And this is how I would go about this is the recommended solution for how to actually fix it. So this is a place where a large amount of AI comes into play. We use artificial intelligence both to automate both to optimize the automation, as well as to do this assurance in an automated way. And so both automation and assurance I think are really important for us for successful businesses.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Just anybody can comment on this. And Kevin, certainly add with it. Do you feel that the business environment the architects and network managers are ready to hand the keys over to automation and AI, whether it be for automation or for assurance? I mean, is this are we building momentum in that understanding and that skill set and that mindset?

### **Kevin Deierling, SVP, Networking, NVIDIA**

I think so I think so. I think they're ready because we, you know, Nvidia is AI I mean, we're doing AI and what John was talking about, there was closing the loop between telemetry and action. And we talked about something that we call for the IT guys time to innocence. Because often there's something that's broken. And the first guy you blame is the networking guy. And often it's an application or a database or something else that's happening or your land provider, whatever it might be. And so, but figuring out the time to innocence, what that is, is really important. And so if you can take the underlying telemetry, and we actually introduced some technology called what just happened, that says in our asex, in our switch basics that will feed a ton of data, but very specific about the actual cause of any underlying packet drops or latency issues, etc. And then to close the loop with AI. And so there's platforms out there that we have like the eg x, which is an edge platform that has the GPU that runs not only the 5G network, codec stack, but it can also do that closed loop now Organic can do natural language processing that we were talking about. And I think the world is realizing that AI is not a threat to the technologist, but rather it's a tool. It's just yet another tool. And so I think it's a matter of education. But smart CIOs and smart IT guys are not afraid that they're gonna lose their job. They just need to do some hard work to understand how to use these advanced new tools that are available. Yeah, I might add, I mean, I when I when I work with enterprise, IT administrators, I think there's two new technologies that they're dealing with right now. One is cloud. I mean, I think ultimately, they're starting to understand that cloud is fundamentally a better way to develop and maintain software. And they're starting to see the value that in the cloud is really what's driving the automation with API's. You know, we're moving from kind of a CI COI world into this API world. And that's where a lot of the automation is coming from. And I would say the second thing they're dealing with AI now, my personal experience with dealing with enterprise IT guys, they don't trust anybody. They don't trust the new guy and they don't trust the virtual AI assistant. In either case, they have though the virtual AI assistants has to earn their trust, right. So there has to be mechanisms for feedback into the AI assistance for them to start to trust. And I would say we're starting to see where they're starting to trust AI to actually help them solve problems automating. So I think we're in the early days of AI, I think cloud are a little bit farther along. I think the other major transition we're seeing, you know, I've seen over the years, it's going from Seelye into dashboards, I think we're really moving to more of a conversational interface, you know, the Star Trek, you know, computer, you know, I think people are gonna start getting data, you know, information out of their networks in a much more conversational manner going forward. I think we're starting to see the death of the dashboard. You know, this little chair dashboard problems going to start fading away.

### **Mansour Karam, President & Founder, Apstra**

We talked about animation, we talked about assurance, you know, when we talk about intent based networking. I think for us, I think when we talk about business or networking, it's important to understand that assurance is part of automation, it is completely as part of this part of automation. And this is what we call closed loop automation, right? You know, automating in an open loop fashion, when you're just essentially automating a bunch of commands, using a script can be extremely dangerous, right? You know, you could, that's the surest way to, you know, get so many, so much of your network out of commission, right? Create a massive outage, because you don't have that feedback loop that tells you whether what you're automating at a very fast rate, you know, is essentially delivering on your intent, right. And so this is why assurance is really part of automation. And we talked about intent based

networking. It's this really powerful automation, that's closed loop that not just you know, configures the network but also is collecting all the telemetry ensuring that through this closed loop validation that your network is delivering on You're intense. I'd say that's number one. The other point I'll make here, and you know, I think this is a good debate to have, as, you know, sometimes when I, when I hear, folks, when they talk about assurance, they immediately bring up machine learning and artificial intelligence. And I think that there is a role for those technologies. But at the end, when you're operating a network, I think the most important thing is predictable performance. Right? I mean, one could argue that the goal of engineering is predictable performance, you know, if you have a plane, and you know, if it works, nine out of 10 times, but you know, one out of 10 times it crashes, it's not a great plan. No one's going to use it. I mean, essentially, unpredictable. Performance is horrible. And so, when we talk about assurance, I think that's one you know, one approach that Apstra has taken as to say, or wish they can say, look, you need to have deterministic performance and there is a lot have knowledge that you already have in your infrastructure, and you need to use that knowledge to deliver this deterministic performance to have this so that your network itself is predictable. So for example, if you're trying to self heal, right, and you know, the insight that you get is right is correct nine out of 10 times and you can, you can't use that to sell feel, you know, the insights you get, you know, this anomaly that you're getting, that's telling you that there is a problem, you need to have a very high confidence that indeed this is a problem. And only then can you go in and sell feel, and I think that, you know, while machine learning, you know, has promised and AI in it has use cases. You know, I think that in the context of self healing, very quickly, you're going to have the challenge and so this is why in knowledge base approach is it far better one, in operating in actually delivering on this self driving self feeding experience?

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

One thing I might add there, 20 years ago when I did aerospace, I think the other big change is really the software, fundamental software architectures. I mean, 20 years ago, we were writing embedded software architectures on top of one, you Linux boxes, right? You know, the other fundamental thing this is back to the cloud, is we moved from these embedded software architectures to these microservices distributed architectures in the cloud. That by itself brings a lot more reliability and speed, right. The speed at which I can fix a bug right now is a matter of a week, as opposed to months back in my old days. So I think the other fundamental things that foundation is changing. We're moving from embedded software architecture to microservices architectures, and that this gives you a better foundation on which to build now. Yeah, yeah,

**Mansour Karam, President & Founder, Apstra**

Maybe one thing one other thing I'll say when it comes to automation, right. In generally networking, you have the architects and the operators, right. So you know, traditionally the architects are the ones that come up with the design, right. And then They does the keys to the operators, and then the operators, you know, essentially operate this network. And this is why, you know, we've seen over the last 30 years with this notion of Brownfield and legacy networking essentially, as soon as you toss your keys to the operator, the operator is going to make these changes which are either on documented or documented in this obscure ways. And ultimately, you're drifting from this, you know, original design that the architect has had in mind. And so another really big important tenet here of intent based networking is that it's a unified tool that both architects and operators use so that not only do you build



and design your network, the first time using the intent based networking approach, but you it's the set same tool that you're using for every time you need to make a change in your network, whether you're adding or deleting (Inaudible) or you know, making a change adding a virtual construct. It needs to be recorded in a single source of truth. It needs to be self-documented, it needs to be other than If you need to have the ability to roll back, go back, go back in time having this time machine ability of, you know, rolling back to where you were three, three days ago. And all of that can be done in software, if you have this tool that unifies operators and architects, and certainly that has been our approach. And that's what we think is a key part of the definition of intent based networking. And then I showed this this book, but you know, we're quite excited about it. Jeff Doyle, on our team is a renowned author, I think all of us have read his book. And you can download it from our from our website, your audience can download it from our website. And it actually summarizes these important concepts of intent based networking. So I thought I'd show it to you guys.

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

The other thing I might add is I can run this automation thing is do I'm working. I mean, right now, I'm working in the industry, a couple different groups around the data thing because the other big thing is we start to try to automate the end to end user experience, right? Because we're not really managing boxes anymore, right? We're trying to solve some sort of Indian application or user experience problem is really we need to start gathering data from different distributed sources in this leads to data lakes warehouses, and there's got to be a better way to get the data that you need to answer questions. Right. And I think what we're starting to see is people are starting to virtualize, leave the data in place, figure out what question you're trying to answer, and then pull the data you need. Because right now we're seeing the industry right, try to take all the data stick in some big data like it didn't really never works as well as they think it does. You know, they spent a year and then they know and then they don't get nearly as much insight as they think they're going to get out.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Let's move to the fourth phase of this. With the minutes we have left before the Q&A session, which was designed to be a quick-fire discussion of other key networking technologies. There's one we definitely everybody wants to get to. But before we do that, I do want to follow up with you, Bob, you know, in terms of, you know, missed is I would assume part of the missed proposition to your partners and to your customers is this notion of sort of validating the, the increased efficiency or, or ROI of, you know, ai driven network management. And so making it real as opposed to just a hyped theoretical possibility. It could, could you dive into that? I mean, I know, you address the general issue of AI and the paradigm of network management, but just to go a bit further and where we are at, are we able to improve operational efficiency, or approve, excuse me, operational efficiency and the, and the savings that go along with that? Are we at that point?

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

Yeah, I will say, you know, as I said before, you know, compared to where I was doing 20 years ago at airspace, we were trying to help guys manage boxes. Yeah, what AI is really letting us do in combination with kind of what I call unlimited computing storage, you know, except for my Amazon bill, right? There's no limit to what compute and storage I can bring to bring to bear on a problem now.



We're really moving to a paradigm of trying to help our enterprise customers deal with end to end user application experience problems. Right. And that is really the fundamental paradigm shift, and you're starting to see us turn the customer success model upside down. You know, with AI, you know, for most of us, right, we probably cause our customers more pain, but the software bugs we ship, you know, our customers should not have to send us back a support ticket, you know, we should know exactly when the hardware software goes wrong inside of their networks. And so that is really where I'm seeing AI is starting to make a difference right now. I would say personally, that the best example I've seen where we all know the deep learning neural network is disrupting a lot of the industries out there in computer vision stuff. for networking. I've seen like people lstm neural network model fills the role allowing us to get to anomaly detection with low false positives, where we can actually start finding anomalies inside of networks now without, you know, generating a lot of noise for the IT guy, you know, so that's a specific example where AI deep learning is actually starting to make a difference inside of our networking environment. And, you know, back to the general the other question is, we do it guys do not trust these AI virtual assistants anymore. They trust the new IT guy and their staff. And so that's where the virtual assistant has to basically start providing feedback. Why did it come up with the answer? So I think we're in terms of the hype reality cycle, we are starting to see AI make a difference. We are starting to see you know, vendors actually use AI inside their customer support models right now, where we can actually basically send a support ticket to the customer before he sends us a support ticket.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Okay, thank you for that. In the notes I got from everybody about the key quickfire type top networking technologies. Everyone wants to talk about 5G. So John, I'm going to flip it to you what? What are your thoughts on 5G? Obviously, deployments have been slowed down considerably the what the operators thought they were going to do for obvious reasons. Even the most bullish like AT&T said now, yesterday, yesterday, I think they said they're going to slow those down. Nevertheless, it's coming. What, uh, what about the relationship between Wi Fi and 5G? Just your quick thoughts, and then we'll get those from the others as well, because everyone sort of said they wanted to mention this.

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Great. Yeah. So you asked about Wi Fi and 5G, these devices have both and one of them and both Wi Fi six and 5G are based on the same fundamental radios and MAC layer technology. So they're both really good. Well, what these devices are going to do in the future is to use both of them and at any point in time, they'll choose Which is the best one to use and use that in order to optimize application experience and minimize cost. And if it makes sense to use both of them, they'll use both of them. One other thing I should mention is that somebody else meant said here, what people care about is applications. And that means end to end performance. And there's one of this may be on one of these devices on let's say, a campus network, there's another one, it could be a server in a data center or in the cloud or in somebody's 5G at home. And to get the end to end you need to go across the enterprise network and certified as 5G network. So then you want to actually optimize across that combination. If you just did an enterprise network, you won't work if you just do a 5G network, it won't work, you have to do both. Now in enterprise, we've been doing API driven orchestration for a while within the network. The good thing about 5G and the 5G core which is going to come out in 2021, is the

5G core will also have APIs that allow you to do that within an SSP. 5G network. So then an enterprise customer can say, hey, for this application, I want this sort of end to end network segment with the security this QoS. And it can make it can do that within its own network, as well as make a request via something we call unified domain controller to its SP, that's the AT&T, Verizon and so forth, to set up that slice in the in the SPS network, so you can get to the end to end. And that's really what's going to give you the great application performance. So that's something which I think is coming in the next few years. And it can have a big impact on enterprise use cases. And the key thing once again, is we need to do this across all of the networks involved, because anywhere there's a bottleneck, it just ruins the entire experience.

**Kevin Deierling, SVP, Networking, NVIDIA**

The other thing that was mentioned there that John mentioned was the bandwidth slicing to give quality of service guarantees. He also mentioned the coexistence of 5G and the new Wi Fi stuff. In some of these unlicensed bands to do that, you actually need 5G to do some things that it hasn't historically done. So things like listen before talk, which Wi Fi does, things like, you know, transmit power control, which Wi Fi does, and that allows total existence of multiple devices in this shared spectrum. And so again, with all of those things, adopting a cloud native architecture for the 5G core, and slicing for QoS. And being able to have all of these new capabilities and features, it really has to be software defined. So the platforms that we introduced with AI are software defined, but hardware accelerated. So all of that control and codecs are running on industry standard platforms. So we could run this or eg X can run in a UCS platform, for example, which is a server running software that can do all of that. And then we automated and so things like IBM intent based networking to guarantee an end to end level. Now, John's raised the whole issue of end to end processing networks. But the infrastructure is there with 5G. And I think that's really critical is that you'll be able to do that in a way that Wi Fi will be challenged because in the 5G world there isn't the service provider to guarantee those sorts of controls. You think I mean, ever maybe chime in for me, I think the, the, the three GPP world and the I triple E world, it's getting very blurry between 5G Wi Fi. Now if you look at the physical layer, they're all headed off DMA. They almost got the same physical layer. But the only difference the back end is all going IP, you know, Google 5G, it's going to open ran distributed, open ran type of architecture, IP architectures. Now, the subtle differences in the Mac there right now how we access the spectrum. And what I said as we look at the spectrum right now, we can see that spectrum is really going We got gigahertz of unlicensed spectrum we got 150 megahertz of CBR s three and a half gigahertz shared spectrum. And then most mobile operators may have 100 to 200 megahertz of licensed spectrum in different theory. So for me 5G is going to become a very blurry I think the lines between Wi Fi and 5G are going to blur together. And 5G I think is a very broad spectrum topic right? It's not like release 17 is 5G millimeter wave. What exactly is 5G now? So for me, it's a very 5G means keep me connected to the internet. I really don't care whether it's Wi Fi cellular license, you know, my mobile operator TV connected to the internet as best you can.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Yeah, very, very few businesses that we've talked to are really religious about 5G versus Wi Fi. they reckon they're going to need both debated especially manufacturers and whatnot. The only ones who were pretty religious about it are Ericsson and Nokia. So



**Mansour Karam, President & Founder, Apstra**

But maybe then maybe just to one, you know, just to chime in here. When I think of 5G, I think, increased bandwidth, right? I just mentioned manufacturing in, there is going to be some of the IoT applications where you're going to have been collecting a lot of data and manufacturers would like to go and, you know, collect all of this data and bring it to centers of data where they can launch this data. And I think that whether it's using high performance computing or other techniques, ultimately, this means that we're going to need more and more data centers and these data centers have to be automated and distributed and so on. So when I think 5G I just see you know, the, you know, just in massive growth in the amount of data that's gonna have to be processed, which ultimately is going to increase all of the the importance of all of the things we talked about, whether it's networking or software remote control and automation. And, you know, and data sets There's across the board,

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

I thought you were at a point I would give you is like I've seen several customers now on their SD win backhauls, you know, where they've gone from two fixed broadband circuits with a standby cellular circuit to where the cellular has gotten low, more reliable and low cost enough that they're going with basically one broadband circuit, and basically an on demand cellular circuit. And that kind of tells you, you know, you know, Wi Fi cellular they're both getting reliable enough that businesses are starting to rely on more and more for critical business services.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Yeah. Okay. Well, I think, excellent point. Thank you for that. And thank you for all the comments. It was really, really good. But I do know we want to turn it over to QA. So I'll hand it over. Do we have any questions that we can we can start? start answering Hello.

**George Rickman, NetEvents**

Hello. I'm just here to remind everyone that if they would like to ask a question, they need to raise their hand using the hand raised option on their menu bar. Just looking out for anyone that's raised a hand. I have a question here from Hector Pizarro. I'm just gonna let him talk now. Hector, you have to unmute your microphone. Can you please state your full name, your publication and where your publications based? And then your question please.

**Hector Pizarro, DiarioTi**

Certainly, my name is Hector Pizarro and I'm based in Santiago in Chile, and I work for DiarioTI, an IT publications for Spanish speaking IT pros. And I have a question to john. I understand that the open roaming was a Cisco initiative. So I was wondering why did you hand it over to the wireless broadband Alliance? And second question is that I understand there is an open invitation from the alliance to companies to join the initiative. So I wondered what companies should join the Alliance.



**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

These are wonderful questions. First of all, the reason we basically donated this technology to wda and their sanitizing is because this can help the entire Wi Fi industry. And we believe this is very important because it basically everybody uses Wi Fi throughout the world and this is a problem that everybody deals with, I deal with it. Frequently getting on a network right? And open Roam dramatically simplifies that and makes it more secure. And it also helps with privacy too. So if there are questions later, I'll be able to help with that. Some of the tier second tier second question, which was who should participate in this, some of the companies that have signed on for open roam and if you look at the wireless broadband Alliance website, you can see all of them, but some of them include device manufacturers. Some of them include infrastructure manufacturers, like people who make Wi Fi infrastructure like Cisco. Also, service providers like Verizon, Dutch, Telecom, orange, others, and also people who own towers and distributed infrastructure and Boingo and so forth says a wide range of different companies who have joined us, because they all feel that if by joining this effort, it can help make Wi Fi much more ubiquitous, and it can help with the connections which we all wish we all need to do it safely. And also to do it in a way that could facilitate new services and also facilitate privacy. Improved privacy.

**Hector Pizarro, Diarioti**

Thank you.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

If you have any more questions.

**George Rickman, NetEvents**

I have another question from Alan Zeichick, I'm just going to unmute his microphone.

**Alan Zeichick, Camden Associates**

Hi, everyone. I'm Alan Zeichick with Camden Associates. I also write for many publications and I'm based in Phoenix, Arizona. And it's good. Good to see all of you. Many of you were people I know very well. So I was wondering what is the timeframe on open roaming and some of these other advanced Wi Fi technologies, and what sort of changes will take you End User devices laptops, phones, and so on. I mean when we talk about something we might see in three years or something we might see in 10 years. Okay,

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

I would say open up with right now all ATT devices support hotspot to Dotto, which is the foundation of open roaming. So I think it's an immediate right now, right? There's actual enterprise customers who are doing pass point roaming right now.

**Alan Zeichick, Camden Associates**

Oh, excellent.



**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

And the broader open Roman, which solves a lot of the security issues and solves a lot of the business issues too, as well as improved privacy and so forth. The intention is to have that roll out later this year in 2020. That's what those companies who've added their names to the ecosystem at the wireless broadband Alliance that's what we're trying to accomplish. So this is going to effort there will take a while to go across many venues. About the world. But the intention is to bring these out quite quickly. By the way, at the Mobile World Congress this year it was cancelled unfortunately. But a deployment we were doing there was that everybody who registered to the mobile Congress would be able to automatically get on the Wi Fi network. As soon as they landed in the city, in at the airport in Barcelona on the trains in the city centre, as well as Farah, which is the venue for the mobile Congress. Unfortunately, we didn't do it this year because it was cancelled. But we had it also last year and last year, about over 20,000 people were automatically added on that was an early PLC, we're trying to showcase that it could work and learn about the problems because of those early PLCs and a great success. This is why so many people are interested to use it and this is why the wireless broadband Alliance decided they also wanted to take it and standardize it and drive it forward.

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

But I would remind and I think the point is past point roaming has been around For several years, like Boingo right now every airport Boingo has actually supports it right now.

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Yeah, but it's much more than passport and Roman as you know, as you know, Bob, because all these privacy issues and security issues, too. And that's where things get especially interesting. We can talk a while on this as badly as a short answer. There's a lot of information on the on the wireless broadband Alliance website, and they have an all day. session tomorrow, Friday, where people can attend and listen to a variety of people from many different companies talk about what why they're interested in this. I just mentioned this. I know there's limited time and there's a lot of topics in networking that we may want to cover. So I'll pass it back to Jerry.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Do you have any further questions?

**Guy Matthews, AI Business**

Hi there. And Jerry, question for you. Your own decks suggested that one of the things hit by, by COVID has been good digital transformation seems to go right down the agenda in terms of priority for variety. But surely, we've been told all these years that it's, you know, kind of critical and central to all these good things we're talking about today to make them all work. So what's happened there?

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Yeah, my, my judgment on that is that you have to look at it short term, mid term, long term, short term digital transformation, when right out the window, you know, that people had things that they needed



to do. However, in a lot of ways, the you could also say that those companies who were sitting on the fence or were are unsure about whether how aggressively they want to become digital. There, they're not there anymore. Right? So this is is been like a landmark event in the concept of digital economy and digital transformation. You know, the businesses that were really not into it, who were talking about not doing anything while they're doing something now they're at least in terms of how digital transformation applies to their own employees, or how it applies to their e commerce platforms, or custom interaction or whatever. I think what the data showed though, was the capability to spend money on it now is limited. Going forward. I think it's going to be perhaps a different story, at least that's my view is that this has been a transformational moment for the concept of digitalization or however you want to phrase, the term

**Mansour Karam, President & Founder, Apstra**

Maybe if I, if I may add. This is like an instant in time. Right, then people are just worried about employee safety. Right? I mean, that would be the primary thing that they're carrying, that they care about. But, you know, how does an organization in today's world and with, with a pandemic, like this one survive without being digitally transformed? Right, like you, you know, everything that's like physical is going away, and you're doing everything, you know, virtually, if you want to buy something, you're not going to the store. You're ordering it from, from your, your favorite ecommerce site. Correct. And maybe the, I think I mentioned is that, you know, gardener has had famously said that you're three times more likely to fail in your digital transformation initiative if you don't transform your network. And so I think that, you know, indirectly a lot of customers today are contributing to the digital transformation by transforming the network right now, you The network is so critical. And everyone is investing there. And they're making it software driven. They're automating it, which at the end is the foundation for digital transformation. You know, so this is a submission in my mind is as critical as ever. And there is a lot of other data that shows over the years that if it does, if an organization does, it doesn't digitally transform, they lose their ability to compete. And you know, many Fortune 500 companies actually either disappear over time, but from 1954 to 2000, I think, you know, 88% of the companies that were in the fortune 500 company, fortune 500, then are no longer in existence today. And I see that today the cycle is accelerating and certainly with a pandemic, we're going to see it accelerated even further.

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, I think I'd love to see Jerry update that report because what people were thinking in March and what they were thinking in April is actually quite different. It's such as dynamic title like COVID Here we are, you know, doing events, which would have been a physical event doing it online. And we're running AI in the background with otter to actually capture the transcript. And so digital transformation is almost invisible people but every see cmo in the world is saying, Hey, we're not doing this physical event. You know, john mentioned that the Mobile World Congress was canceled. Well, there's events happening. We just did open compute project. We did it online. There's all kinds of the largest, you know, trade show we do every year is called GTC, which is our big Technology Conference. We did it online. We had millions of viewers online. So digital transformation is happening in a big way. And I think that people pivoted from fear. And in March when we first went into lockdown to, oh my goodness, how do we keep our business running? How do we keep people informed? How do we engage? And



so I would be really interested if you go back and redo that just even a month or two later. I think you'll see different results.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Yeah, I think I think the one of the things that we've been emphasizing is that what's happened is, is really just an acceleration of things that are already happening. So the fact of the matter is that digital transformation, that term had been losing popularity, because so many people were engaged in it already. You know, so was sort of a, you know, people were well on our way to doing were they doing enough of it, were they truly there? depends on your definition. But for sure, you know, clearly, again, this period of time, the past couple months, has really made every business a digital business. If not, they're out of business.

**Kevin Deierling, SVP, Networking, NVIDIA**

So there's a great rebranding opportunity for you Jerry just need to rebrand it before Gartner does.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Any other questions?

**Guy Matthews, AI Business**

Yeah, question. Hi there question for Mansour and Kevin. I, I don't have much information but I believe there is a joint announcement today in Europe that has been made. I wonder if you could tell us a bit more about that breaking news,

**Mansour Karam, President & Founder, Apstra**

Well, it's a joint customer announcement. You know, it's there - Beelastic - they're Switzerland's first hundred Gig E native Infrastructure as a Service and bare metal service provider. They have you know, this essentially what they want is to enable service for their customers, to their customers to provision their own services. And in order to do that, they needed to be simple. So minimum complexity, and they needed it to be high performance. And I think that was afforded that they have deployed a combined solution with Nvidia, right. And, you know, Kevin, I'll let you speak to that. But maybe what else speak to is there recognize the importance of automation and this powerful automation and that deployed apstras intent based networking platform, essentially, to get, you know, the simplicity that there needs, the agility that they need, in delivering those services while keeping their options open and having that flexibility to bring in new vendors, like, for example, Nvidia, and so you know, it's a it's a it's exciting to have the news finally out and certainly where we're excited about it. Kevin, I don't want to say more.

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, so I think it's amazing that I've gotten this far through a session and hadn't said 100 gig or 25. But it's a wireless session. Obviously, with all of the improvements that are happening here with Wi Fi, six and 5G, the bandwidth that's being offered to customers is a lot more. And so 100 G, which seemed like lunatic fringe stuff just a couple years ago, is really becoming mainstream because it doesn't take that many users on one of these advanced wireless networks. And the best way to make your wireless networks work well is to keep your wired networks out of the way make Oh, you know, have enough

bandwidth there that everything just works. We love. You know, this this partner with the elastic this customer because they use that video across the board, they used our GPUs, they used our networking and they even use cumulus which we just acquired which is the the Network operating system. So it's really a great use case for us. And, you know, I think all of this new wireless that we're talking about and all the new spectrum that's coming online is actually going to drive the wired business inside the cloud across clouds to the Enterprise's, etc. So I think the networking business is really has a vibrant and LPL.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Thanks. Do we have one more question that I think we need to wrap up?

**Hector Pizarro, DiarioTi**

It's a more general question more for the headlines in for the for the panel. Do you think that the networking industry in other words, the companies you represent, were prepared for such an unexpected search in network traffic that COVID has with it. And I'm thinking of, particularly from remote working and surely from home, online entertainment. So I'm thinking of, for instance of Microsoft assure, which was a time struggling a bit in certain regions to cope with the demand for teams. So if you were not prepared as an industry, would you tell us about the lessons that you have learned?

**Kevin Deierling, SVP, Networking, NVIDIA**

Yeah, so I'll jump in and say that, generally, this was a supply chain issue. That Yeah, there's a huge uptick in demand. It helps if you're already growing very rapidly, and you have customers that, you know, suddenly drop a huge amount of upside because their businesses were already growing or you're gaining market share, then you're probably built your infrastructure and your operations team to be able to support them. upside, and Cova just, you know, amplified everything. So I think the other thing is, is that for companies that have paranoid operations people they were already thinking about, you know, disaster recovery and what happens, and factory shutdown, we had a whole factory that shut down and various countries, and it was staged over time, you know, China shut down first and then India later and things like that. And we really, you know, if your operations team was already thinking about disaster recovery and having multiple supply chains, then I think we were able to meet the upside demands that we saw as a result of COVID. So whether you know, that's just good planning ahead of time where we ready for COVID No, but anything can happen and you should be ready for everything if you're running your company on the basis of being prepared for anything and at any time.

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Maybe I would look at this a little bit from our customers perspective for a second, because what happens is that for some of our customers, for instance, they there were a variety of things they were doing, which they were required to do, or they own policies, in their own buildings, in campuses, and so forth. And then suddenly, all of those things was before they only were limited to do in their work buildings, think about banks here, think about financial institutions, and so forth, then they had to do those from home. And then there are huge changes in terms of not only wire not only the access to their applications, but security, cyber threats, so forth. And so from, from an individual company's point of view for a network vendor, that's one thing but helping our customers continue their business

continuity. When they our customers had to do a dramatic change in with respect to all the policies they had for They actually did their business that I think was one of the hardest things. And that's the thing we were. I think the entire network industry has worked very hard to help all our customers through this terrible event. That's, that's affecting all of us.

**Bob Friday, CTO and Co-founder of Mist - a Juniper Networks company**

I mean, from your perspective, that kind of echo Kevin, I mean, I think we saw two kind of two reactions. The first was supply chain. You know, we saw our customers pull things in, there was a quick we actually had a surge in q2 when they first heard this. And I think that was a tip of the hat to the supply operations team, right, because they had to step up and respond to that. And so I think that was preparation. I think that's back to you know, you, the operations teams really don't get credit much into I think COVID is a example where now they got the spotlight put on them. I think this the second reaction we're seeing at Juniper and I think this is everywhere else is really that safety thing, right, the business continuity and watching businesses respond To how do we create a safe environment to bring employees and customers back into the into a more normal world again? So I think that from Jr. perspective, it's turned out, responding very well. I mean, the ops flight teams stepped up and did their part. And now the facilities guys are starting to bring open the buildings back up. Right? And how do we get you back on back to normal get back to normal operations?

**Mansour Karam, President & Founder, Apstra**

From another perspective, first of all, we're not a hardware company. So luckily, we didn't have to deal with supply chain issues. But, you know, I think that's echo what was added in terms of, you know, customer realizing the importance of software, right, the importance of the right automation software, the ability to transpose these policies straight into your, you know, a different completely different work environment. Right. And I think that a lot of companies that weren't prepared, essentially struggled, whereas those that had that software abstraction, that that enabled that certainly fared better. Maybe one thing, one more thing I'll say is that from an abstract perspective, we were quite lucky in that we were distributed already. I think a lot of companies are, but from our perspective, we have developers everywhere. And we already had the tools and the guidelines in place that enabled everyone to work well, remotely. And in fact, what was surprising to me is that how quickly we were able to transition certainly our IT guys did a phenomenal job and kind of became by beefing up the bandwidth and the capabilities. But also hear that many of our developers tell us that they're more productive than ever. Right? And so, you know, not having to commute not being distracted having the ability to really focus. I think that, you know, this was quite revealing, and which we're also having the ability to talk to customers over, you know, over, video conference and so on. And so this is why I You know, it made us realize that not only this works well, but it may even be a better model. And so this is why I think these changes are going to be lasting and profound.

**Jerry Caron, Global Head of Research & Analysis – Technology Group, GlobalData**

Yeah. That's a great way to end. I think. I've heard that many, many, many times for many, many people have helped productivity is really spiked and, and we can thank networking, at least in part for Thank you very much, everybody for your time. Those of you in the media and certainly the panel members, John Apostolopoulos from Cisco. Thank you. Kevin Deierling from Nvidia Thank you. By the



way, Kevin, I don't know whether it's the glasses or whatever. But I thought for a minute we had Juergen Klopp, the manager of Liverpool on the on the call. I know it's not I know. I know. It's you. I don't think you'd have been able to discuss the things you've done a footballer. Thank you Mansour Karam from Apstra and of course thank you Bob Friday from Juniper Mist. With that, goodbye and thank you.

**Kevin Deierling, SVP, Networking, NVIDIA**

Thank you. Thank you Jerry.

**John Apostolopoulos, Vice President & Chief Technology Officer Intent-Based Networking Group & Innovation Labs, Cisco**

Thank you.