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Conference Debate Session VIII – Edge Computing Driven Transformation of Data, Management, and Applications

Introduced & Chaired by Gerry Christensen, Founder & CEO, Mind Commerce

Panellists:

Kevin Deierling	Senior VP of Marketing, Mellanox Technologies
Rick Calle	Head of Business Development, Microsoft AI Research/M12
Sreelakshmi Sarva	Advisor, Head of Product Strategy, NetFoundry

Gerry Christensen, Founder & CEO, Mind Commerce

Edge computing. First of all, what is it? I had a conversation recently with another analyst. I think we were about 15 minutes into the discussion before I realised that she was thinking edge compute as in a smartphone or maybe a wearable or may be some kind of customer prem device, and I was thinking, an extension of core cloud computing. The latter is what I think of most of the time when I talk about it, and for the purposes of this discussion unless I state otherwise or unless one of the panels state otherwise that's what I'm talking about.

But again, what is it or more to the point, where is it? I talk to a lot of leading-edge compute companies as part of research practice. One of the things that I was really surprised in talking to them is, it's kind of all over the place. From a deployment perspective we feel that we will find some edge computing at the base station, so that would be a lot of edge computing. In some cases, there will be an extension of existing datacentres, whereas instead of having one main datacentre you might have regional datacentres.

Then there are a whole of other issues that come up such as: who owns it, who manages it, who controls it? In some cases, it's hard to even discern unless you're one of [unclear] what it looks like. I was in New York City recently and I saw some 5G remote radio heads and BBUs. Right next to it was a bunch of boxes. Pretty sure it was edge computing. Not positive but it was certainly a good location for it.

What I'm going to do is run through a few initial slides here. Then I'm going to turn things over to the panel. We've got a great panel here. I'll let them introduce themselves. Let's go ahead to tee this up. Not a lot about Mind Commence. We'll be in the press pack if you want to find out more.

One of the assertions that I've made in some of our research and in groups like this is that edge computing is already there. It's already there for 4G, LTE in particular at a lot of wireless implementations. It's not like it's an entirely new thing, but what's going to be really new and important with 5G is arguably it's going to be a requirement. By that I don't mean a requirement for bandwidth, I mean a requirement to preserve the latency gains that we're going to have with 5G.

We all know that with 5G right now we're rolling out the non-standalone, so we're going to need that standalone. We're going to need to have a core in order to have the proper amount of latency, but I would argue we're also going to have to have edge. What does edge do for us? It enables us to not have to go all the way through the core for all the packets. It enables us to go directly to the internet in some cases or in other cases, if there's caching, to do the processing right there where the application engagement is happening.

What is it needed for? There are three classes of 5G services. There's the so-called enhanced mobile broadband which is arguably an extension of what we're already doing with 4G. A good example of 5G may be cloud-based gaming. There is what they call a URLLC, the ultra-reliable low-latency communications apps. That would be things like critical communications in virtual reality. I don't think of that as critical communications like public-safety-critical, but certainly critical in the sense that you need to have really low latency or it's not going to be a meaningful useful experience.

Another category is the so-called massive MTC, the massive machine-type communications, massive in the sense that when 5G rolls out for IOT support it's going to be highly scalable. What I'd like to talk about as part of this discussion is, what does that mean for each one? I'm going to ask the panel to share some use-case scenarios with us, and here those are.

One of the things that we find when we look at these different classifications of services is they have some of the same needs for edge computing but in some cases they have overlapping needs that are exclusive to the other ones. Some of them require a higher degree of reliability and others do not. That can be a problem. That can be a real challenge.

Here's a diagram that I've used in the past to speak to some of the issues around edge computing with respect to things like security and things like data usage, in other words, what data needs to be sent back to the core computing versus what data could be

processed in real time. One of the advantages of edge computing is you process things closer to where things are happening and you may be able to make some real-time business decisions.

One of the things that I believe edge is going to set up is data-as-a-service opportunities. Whereas right now data as a service is available for static data, data-lake type implementations. With edge computing, all of a sudden there'll be a new thing available which will be real-time data.

With that what I'd like to do is tee things up for our panel. We've got a very distinguished panel here. I think I'd like to let them introduce themselves. I'll start with Rick at Microsoft.

Rick Calle, Head of Business Development, Microsoft AI Research/M12

Good morning, almost good afternoon. I'm with Microsoft M12 which is Microsoft's corporate venture division or arm. As well I work with Microsoft research in business development for new technologies coming out of Microsoft research, so I have an interesting view outside and inside.

Prior to this, Gerry, I was at Qualcomm. When you talk about 5G, when you talk about edge computing, Qualcomm was all about that from the silicon side, so we can maybe have a few discussions on that. I don't know if some of the folks from SpyCloud are here. They're one of our portfolio companies. I was just trying to think of whom have we invested in who's here. SpyCloud. [Scintiant] is an edge computing AI chip company that we've invested in. There are some security companies, cybersecurity and what have you, so pretty much across the gamut for edge and datacentre.

Kevin Deierling, Senior VP of Marketing, Mellanox Technologies

Hi, I'm Kevin. I moved so you wouldn't notice I was still on the panel. But it's interesting. In the first panel I was on we talked about smart secure cloud. Then I was more talking about our internet switches here. Really for IOT we're talking about what we call an IO processing unit, an IPU. Maybe I should call it an IOT processing unit. It reflects the reason I'm here on this panel. It reflects the breadth of our product lines, but here it's what we call an IPU or an IO processing unit.

Sreelakshmi Sarva, Advisor, Head of Product Strategy, NetFoundry

I am Sree Sarva. I head Products for NetFoundry. Edge computing is definitely an emerging space for us. Whether it's cloud service provider or datacentre-based networking or edge computing, some of the requirements around zero trust networking and security in some of the panels that we have heard earlier stay true irrespective of where the workload resides. We'll talk more about it during the panel.

Gerry Christensen, Founder & CEO, Mind Commerce

Thank you, Sree, for filling in at the last minute as well. I'd like to start with you. One of the things that comes up at least for me all the time with edge computing is, almost a rhetorical question, why do we need it? That encourages another question which is, what are some of the use cases for it? From your perspective share some of the use cases that you've seen, heard or that you anticipate in the future.

Sreelakshmi Sarva, Advisor, Head of Product Strategy, NetFoundry

I'll answer the first question, what does edge mean? As Kevin mentioned, there are different connotations, different descriptions of the edge. If you think about edge it's no different than cloud computing. It's a different manifestation of a cloud computing paradigm where instead of hosting the workload in a specific could service provider's infrastructure you're hosting it closer to wherever the users are, the devices are, mainly because of the nature of the applications which require real-time data processing or low-latency type requirements which require workload to be placed closer to the user, whether it's confined within a datacentre or it's confined closer to a cell tower in the form of a micro-datacentre, or if it's hosted in a cloud service provider's datacentre. You want this edge compute to pretty much manage and orchestrate the workload as if you were hosting it in any of the cloud providers as environments, for example.

The requirements that hold good for cloud automation would still hold good for an edge computing environment, whether it is manageability and booting of the device or manageability of the infrastructure, network and security, constraints around the edge compute and the architecture. How does this edge compute tie into your back-end datacentre or to the preferred cloud of your choice? It's important that the applications that are being targeted for the edge, and we'll talk about it in a moment, require an architecture that will let these apps speak to the back-end datacentres or cloud service providers in air-gapped manner.

Coming to the use cases, the use cases I would like to categorise in three different ways: wherever there's a requirement for business automation or the way people interact with things, be it smart metering or industrial automation, factory automation type use cases or real-time processing of the way people communicate, more immersive collaboration or communication mechanisms that are evolving in the area or space. Those are some of the primary drivers. Clearly IOT is one area that's driving edge adoption. As it starts to emerge we will see more and more enterprises adopting it.

Gerry Christensen, Founder & CEO, Mind Commerce

Kevin, how about you take that as well. I'd love to hear a specific use case maybe for a particular industry vertical.

Kevin Deierling, Senior VP of Marketing, Mellanox Technologies

I like to use the analogy of the human visual system and think about, the brain was the inspiration for deep neural networks and AI processing and then that running on GPUs. If you think about visual systems though it turns out that in your eye the retina is actually an edge computer. It's doing a tremendous amount of processing. It's not a digital camera that's sending individual pixels to your brain and all of the visual systems is done in the cortex of your brain. It doesn't work that way. If it did there would be too much data going through the optical nerve to your brain. Your eye is actually doing pre-processing. It detects motion. It's directional-specific. Up, down, left, right, certain neurons only fire if they see those directions.

It detects visual bilateral symmetry. What does that mean? If things are reflected, maybe two eyes are looking at you, maybe something is about to eat you, it sends a signal to your brain that that would be useful information. Maybe it's somebody of your own species that's looking at you. That's also useful information if they're interested in you. Very interesting.

The eye is doing that remote processing. We see the exact same thing in IOT. So if we look at a specific application of now the self-driving cars and even any car, that's accumulating a massive amount of information. When that car pulls up there's a tremendous amount of data. When you plug into a charger in a parking lot somewhere at the store, you can't send all that data to the cloud. You have weeks' worth of accumulated data inside an automobile.

What we see with our IO processing units is they're doing effectively compression. They're extracting features that are relevant. So don't send all the raw data to the cloud. It's just inefficient. Instead remotely extract features. What were the characteristics? What are the temperatures? What experiences did that car see over the course of weeks potentially between charges? Then send that extracted feature information. That's one example where we've seen it.

Gerry Christensen, Founder & CEO, Mind Commerce

I love that analogy. If we could continue with that analogy we could think of the eye and your optic nerve as an API. Your eye in that analogy would be the edge computing, your brain would be the core cloud, and the optic nerve would be a proprietary API. Hopefully nobody ever hacks into that.

Along those lines it would be interesting to talk a little more about the ecosystem. Rick, what do you think? Do you see any unique areas in ecosystem where maybe some companies that you're involved in, like start-ups, are doing anything particular that you think would add a lot of value as the ecosystem evolves?

Rick Calle, Head of Business Development, Microsoft AI Research/M12

I like that eye analogy. We do hack the eye. Optical illusions. Those are effectively things that zap your retina and your visual cortex. We can't do DDoS and those kinds

of - maybe we could. If you zap people with lasers you deny them - somehow. Use cases, I like that. If I think about edge, I've done a lot of work in this. Your company did a pretty good report of this too, Mind Commerce.

It seems to me in the industry if you think about enterprises that have tons of data either in the field or in the corporation, big challenges are two, just two. What's the use case they can deploy? Basically it comes down to, why? Why would they even want to do edge? The second thing is, how do you deploy it out to some edge device? Those are the two gaps.

It takes an enterprise to put some things together, for instance - here I'm going to make up an example but I'll give you a concrete one - let's say a brick and mortar store. Let's call it Target, Walmart, Sam's Club, Costco, you name it, wants to understand the activity in their store. Where are the hotspots? Where is glass breaking? Where are there people chattering? Where are kids running lose? Those are analytics. Those are things they need to know, but they need to worry about privacy. So you can't use cameras. You can't send that stuff to the cloud. People don't want to be observed.

You could use sound as an example. Take someone in the company. How do I detect activity? How do I do it privately? What can I use to measure it? That's the hard part. It's that ideation gap that I see as being a challenge. Next part is, how do you then put that down on a device that runs on a battery? What are the tools and mechanisms? After you've done a proof of concept in the cloud, how do I get it on that chip or server that's in the back closet of Target? All these things are edge computing.

Use case. Here's a company that put it together. FarmBeats. I don't know if you know this start-up. There are others in Israel like this. Imagine you want to detect disease coming out of your crops as they're growing and you want to detect it right away without sending people out in the field. Why not send drones out there? Just fly around autonomously. You can pretty much have them - like your autonomous driving car, you can have autonomous drones today. Let's build that, and they did, and then do the processing on the edge.

The other part of IOT of the use cases is cost. Why do you want to do stuff on the edge? Privacy and cost. It takes too much money to upload [bytes] of data for this car or terabytes for this vision system that's on a drone. Terabytes per second of data. So you want to crunch it on the edge on battery power and try to do the smarts locally. Those are two interesting use cases that we've run into.

Gerry Christensen, Founder & CEO, Mind Commerce

An open question for the panel, whoever wants to take it, or I'll pick somebody. Edge computing: is it going to be managed much in the same way as - I'll use the AWS example - a core cloud and/or will there be some differences? One of the things I think about a lot is the need for APIs, the need for an open ecosystem where you have managed service providers and many different app providers involved. I think we touched on orchestration earlier today and also yesterday, so we could probably talk all day about just that. But what are your thoughts around that? How do we have security

- we should probably talk about security here in a minute as well - and privacy in that kind of world where we're opening it up and yet we have another place of attack, not just the core cloud but the edge? Thoughts or comments on that. Would anyone like to take that?

Sreelakshmi Sarva, Advisor, Head of Product Strategy, NetFoundry

I can take that. On the [API] and automation front as Kyle was mentioning in the previous session, I think having a uniform abstraction of where your workload resides - whether it's on-prem datacentre or a core cloud provide or the edge compute - automation is the key. Having a way to manage these workloads through an API or an automated way of deploying, not just [unclear] provisioning but ongoing maintenance is the key.

Right from the day you deploy the infrastructure to onboarding your first or end application, it becomes extremely important around the manageability and operability of the environment, especially on the edge compute site. The lessons learned from the cloud compute paradigm can definitely be applied and leveraged for edge compute when it comes to API and manageability and automation.

Coming to security I just wanted to say that given the edge is a manifestation of cloud, the anticipation is that there would be a lot more distributed edge compute deployed across the geographies. Like I said, it could be a micro-datacentre, nearest cell tower or at a remote location where your administrators or operators do not have access. Security becomes paramount. It's not something that the cloud provider or the datacentre have direct access to. Hence having an air-gapped environment both from a network and app-level, security becomes extremely important where even if the infrastructure gets compromised for whatever reason there shouldn't be any lateral movement in the way they gain access to the app, so the data which is a premium, which is the reason why the infrastructure is being hosted.

What I'd like to say is, silicon-to-cloud security becomes paramount, of importance. I can lean on Kevin to talk about how they are solving the trusted execution environment in order to drive the silicon route of trust for applications deployed at the edge.

Kevin Deierling, Senior VP of Marketing, Mellanox Technologies

Thanks. That's a great softball pitch. The IPU that we talked about, the I/O processing unit, a critical piece of that is that you have a [hardware] route of trust built into the processor itself. The devices at the edge have to maintain their own keys, have key management integral to them and basically be able to authenticate everything, do secure firmware updates. All that has to be built.

The nice thing - and I think to your point about APIs - before I was at Mellanox I was the chief architect of a company called Silver Spring Networks that built the smart meters. There was a question earlier about the security in the smart meters. I did the

chips that did the security in those meters, and it was before the standards were defined, before the APIs and this idea of a secure route of trust had been defined.

Fortunately, on my team I had a guy that was working on the security who was from Russia originally and then had lived in Israel. I can tell you there is no more paranoid person in the world that I've ever met than this one guy. When we started talking about the supply chain for building those secure meters and how we were going to get these keys into them, he started asking, where are you going to build those? Well, we'll probably do it at a contract manufacturer. Where is the contract manufacturer? Maybe in Mexico, maybe in Taiwan, maybe in China. We'll program it in with the secure keys, the private keys? You don't think there'll be a wire coming out of the computer to [sniff] the keys? We actually ended up building something that really is what is today a secure route of trust where the chip itself has a random number generated and defines its own keys. I designed it. I can't even break the smart meters.

That's going to be come critical. APIs in my opinion on the IOT market is what is limiting the market, because these markets are all fragmented. If everybody goes off and invents their own - for this specific application here's your API - companies like ourselves will not be able to drive our innovation. So we're looking to folks like Microsoft and others to define an API. We really need these APIs to become standardised so we can sell to a broad range of IOT applications using standard APIs.

Gerry Christensen, Founder & CEO, Mind Commerce

Here's another one, unless you want to pick up on that, Rick. You start with this, Rick. Who owns the edge, who manages the edge, and who uses the edge?

Rick Calle, Head of Business Development, Microsoft AI Research/M12

That's a tough one. You would give me that one, wouldn't you? Why don't I start with manage? Ultimately that's the system in greater - whoever puts together that edge thing. Edge as you've heard could be anywhere from just a datacentre in a box, in the back closet - it could be your communications hub. You see that model where your wi-fi, maybe even 5G, LTE backhaul is in a hub that might be in a [ceiling] somewhere or there's compute in that, or it could even be these little battery-powered devices.

I think it's tough to say one answer to who manages that, but let's pick a segment. Let's take that middle segment where it's the hub or these devices like raspberry pie type. It's quad-core arm or some sort of computing device of that calibre. Maybe IPU has more or less...

Male

Arms, lots of arms.

Panel Speaker – Male

That's the *de facto* standard. Anyone who is going to do edge computing for enterprise or for commercial product will probably use that unless they need something that's battery-powered. That's a whole different story. They'll use Qualcomm or someone else.

At that point it starts with route of trust. At that point above that, once you have a secure route and a secure way to boot up and test, that tells you, did someone take over my device? Did someone try to hack in and put some new firmware so that now it's owned by some guy sitting in Vladivostok or in Greenland somewhere, or who knows where? Or is it still owned by the enterprise that deployed it? That's the key thing, attestation, route of trust, and a way to revoke that stuff. Once you have that in the hardware - and now there are multiple vendors, and now I hear of Mellanox with this - then there's a software layer on top that manages all of that stuff, those keys and the certificates.

How do you actually ask for and actually do a firmware update securely? Microsoft is in that space, we have something called IOT Hub, or Azure IOT, I think some of your partners. I won't call it Windows on IOT, but you can think of it as the operating system that's above the hardware layer. That manages it, if you will, at some level, but then your app really is the thing and your deployment really has to manage – when do you update, where do I put the date, how secure is it, do I do AI on the edge? That's really my thing, how do I get AI models from the cloud and have them running on that Edge device?

That's another challenge, how do I deploy an update – update models and then get data back that I can then retrain on privately? So, who owns it? Usually it's whomever deployed that system.

Panel Speaker – Male

Can I just jump in quick? I think if you say, who owns the Edge, it's a scary answer, but we do. It's the consumers that are deploying all these things. I just was thinking about myself - and I've got cameras in my house, I have a music server, I plug my drone into my network, and I know a lot about security and I know all the things I should do but I don't do. I don't secure my home network, and so it really comes back to that software APIs. We can't leave it up to people like me, even. I'm a techie, and I still don't do it. So, it needs to be automated.

It's incumbent on the vendors, and the API vendors, and the software vendors, that we're building these products that – and there should be something that says, hey here's the stamp of approval that you plug this in and it is intrinsically secure. I know the meters are secure, we went to great lengths to make that secure, but it needs to be everywhere. Everything we're going to plug in with IOT devices. We can't leave it up to – certainly not to me, and definitely not my wife.

Sreelakshmi Sarva, Advisor, Head of Product Strategy, NetFoundry

It's more of an ecosystem, you know. There's an infrastructure for wider software layers, silicon providers, an orchestration layer, and at the end of the day, the applications that define the Edge. So it's more of an ecosystem, at least that's what we are seeing today in the market, and I think more and more they will converge to a certain set of providers managing and owning the platform.

Gerry Christensen, Founder & CEO, Mind Commerce

Great answers, and with that we're going to go ahead and wrap up, because we're about out of time. I think that those were really good answers, because one of the things that I've seen with our research into this as well is that it's many things to many people. There are actually many hands touching it, and it's going to be probably an order of magnitude more complex than core computing because of that. Especially when we start having applications that we can only just imagine right now We can imagine some of them, like virtual reality. The hard thing to imagine is how they will actually be used. So, thank you very much to the panel, I really appreciate it, and thank you all for listening.

Conference Round-Up – Analyst reflections and predictions for the future.

Chair: Jeremiah Caron

Global Head of Research and Analysis – Technology Group, Global Data

Panellists:

Name   Job Title

Erin Dunne   Director of Research Services, Vertical Systems Group

Scott Raynovich   Principle Analyst, Futuriom

Brad Casemore   Research VP – Datacenter Networks, IDC

Vikram Phatak   Founder, NSS Labs

Panel Speaker - Male

Thank you. Hi everybody, Jerry Caron, back again from Global Data, and I'm joined – I'm really going to just lead a conversation for just a few minutes, not very long, with some of the analysts attending here. So, I'm going to let these guys introduce themselves. Erin, we'll start with you. Real quick, who are you, and pitch your stuff for a second or two?

Panel Speaker – Female

You guys already know who I am, because I sat in a panel or so ago, but my name is Erin Dunne, I direct the research practice for Vertical Systems Group. We're a market research and consulting firm. We're based out of Boston. We track the wireline, data services industries, layer one through three. However, that doesn't work anymore with SD-WAN, so now it's four through seven also. We specifically track the enterprise migration from legacy services, how those decisions are made, and into the emerging services markets.

Chair

Cool, that was sort of quick. Excellent.

Panel Speaker – Male

Scott Raynovich, Principle Analyst, Futuriom, my own firm. I'm a research analyst and cloud infrastructure networking and security.

Chair

And, the lead guitarist in a rock band.

Panel Speaker – Male

Brad Casemore, I also chaired a panel earlier. I'm Research VP for Datacenter Networking at IDC. What that means is all the hardware and software infrastructure that you would find in a data centre all the way up the stack, from layer two up to layer seven.

Panel Speaker – Male

Vikram Phatak, founder of NSS Labs. We test the world's service tree products. Customers are banks, governments, folks like that. We have a model of similar consumer reports, so that that the money is flowing in the right direction and keeps everybody honest.

Chair

Thanks. So, what I've asked each of these guys to do is just to have a think about whats the story is. A lot of people here are journalists and you are going to be writing stories and thinking about what you've seen and putting it together for your constituents, your readership. To do that, I've asked them to think about - okay two ways of looking at it, what was perhaps the most – what were or what was the most enlightening, surprising, or uplifting thing that you learned in the past couple of days? Another way of looking at that though is what are the most questionable, disturbing, or dubious things that you have heard? So, I'm going to go one by one and ask that.

Let me just do a quick recap. Beginning yesterday, we talked about AI and there was a lot of scepticism expressed around that. Then there was security. Then there was security again. Today there was security again, and then there was security again. A rather big theme of the two days. My take-away on that is that we are absolutely stuffed. We're in big trouble, we should all go up to the mountains in a cave, frankly. That's what I heard. Multi-cloud, we talked about that, it's hard to deal with it, that's what I learned. 5G, it's a slow roll. Personally, the Huawei situation, being driven out of this

country is not helping, because we do analysis at - product level analysis of all sorts of solutions, but we do radio access network and 5G core., Huawei is, in our opinion clearly the best at the moment.

So, 5G, slow roll. SD-Wan - it's about the overlay, agility, visibility, nailed up networks aren't going to go away. Cloud security, management issue – it's a management issue, not a technology issue, that was my big take-away from that. The data centre enterprise hyper scale, I heard a couple of things there but democratisation of SDN, virtualisation, analytics, and automation is going to be important. The digital transformation fails when infrastructure transformation is poor. That made a lot of sense to me. Fortunately, it was attributed to some company called Gartner, but, whatever, it still made a lot of sense to me.

Then finally, Edge computing. The quote I took away from there is, we own the Edge. Yes, love that. Alright, so that's kind of what we heard over the last couple of days. Erin, let's start with you.

Panel Speaker – Female

First of all, you paid of really good attention to everybody speaking, so that's – somebody was listening. I'm not sure if it was us, but it was definitely Jerry.

Chair

That's my job

Panel Speaker – Female

I have an anecdote, which I think might drive home a lot of what we heard. We heard Ted, from, I think, Spy Cloud on one of the security panels just recently talk about the mortgage scam. That is you're closing on your house, you're going to move the money for the tile, this, that, and the other. That happened to me. So, you're looking at it, and the good thing about it is that it happened in a way that the financial advisors around my company made sure that I didn't get scammed, because they said this is happening all the time. We can predict how it's going to happen, so we're going to give you a codeword verbally. If this word is not in your email when it says to transfer the money, it's a scam.

So, I thought that was really interesting that stuff like that is happening and these kinds of organisations are taking what you think are kind of old-school tactics to make sure that you are safe. So, that was my first anecdote.

My second thought is that with all the security, which is not something that I typically cover, it's frankly terrifying, and I don't know what to do. I've heard differing options from everyone, whether it's from the enterprise or the consumer space, so I'm going to leave it at terrifying.

My third, you asked what's uplifting, I don't know if I heard anything truly uplifting here. I think we need to work on that, except that this space is a little more interesting than it has been maybe in years gone past. There's a lot of interesting stuff happening. So, that's uplifting, and I think there's a little more energy in the space, so I feel like we're on a really good track. As we move forward between security, between the new

networking technologies, between the wireless and the wireline, I think we're on a good track.

Chair

Okay. I'm actually going to skip – because you started the security thing, I'm going to Vikram. So, your thoughts really quickly, but I came away with a similar sentiment to what you heard. It's like the technology industry has to do better than it's doing now, frankly. Scott put up a slide with tonnes of logos. It's amazing the number of logos, and it wasn't even the tip of the iceberg, right? The technology industry is very good at making money from security, from the security problem, but not necessarily so good about solving it perhaps. That's a bit harsh, I understand that, but Vikram, what are your thoughts?

Panel Speaker – Male

I think that's probably fair. It's – so which question should we start with?

Chair

Well I would say, what's the story for the journalists from the past couple of days? What were the highlights, or what were the lowlights, if you want to take that approach?

Panel Speaker – Male

Okay, so from my lowlights, I think it's that we haven't yet hit rock bottom, but we're probably not too far away from it. The highlight is actually - what I'm hearing is that we're a little further along than I realised with some of the Edge computing, cloud, 5G. When you start putting all of those pieces together, it's a paradigm shift. We're not going to be computing the same way five years from now than we are today. It's not even 10 years out. We didn't talk about it, but when we start adding quantum, which actually does lend itself more towards AI, weather patterns, things like that, all the different probabilities of things happening - that becomes really interesting.

Where specifically cloud comes in to help, is when, for example, Microsoft has Office 365. We use it, I don't know how many of you folks use it, but probably a lot of you. There's no reason for the IT administrator to have to be the expert in securing your exchange server, securing your SAP server, securing your Oracle, securing your Linux, all the different things. Nobody can be an expert at everything.

The opportunity for the cloud is, with SUN and 5G, is you can actually have secure communications to an expert system that's being manged and secured by the folks that built it, who know better than anybody else. So, it shifts the paradigm to more of a service provider paradigm, but it becomes – and responsibility. Because otherwise, it's clear that technology has exploded horizontally, and security just can't keep up. There are around 2000 security vendors, last I heard, it's a ridiculous number. Most companies have 40 plus vendors that they are trying to support, large companies. It's not sustainable the way we are doing it now. There are not enough people, et cetera, but if you move to a model where you've got a cloud, SUN, 5G, zero trust models, I think Ted was talking about. It changes everything into a more sustainable path.

Chair

Yeah, I think from the session that I moderated on AI - it was interesting because David Sheraton said, we're really – humans are really bad at some things. So, he contradicted himself, frankly, he positioned himself as an AI sceptic, but then went on to prove the case as to why we need AI, or AI driven tools. More security, as you put it.

Panel Speaker – Male

Thanks, that's where I'm a bit of a sceptic, just because I think that complexity is the enemy of security, and we have an enormous amount of complexity. These products are built by engineers, and they expect engineers to run them oftentimes. So that's the gap between my mom and dad, who definitely don't have sophistication on a home user, or even many office workers that come in to be in actuarial or whatever they do - marketing. They don't have the sophistication, and so the security providers, I think, really need to step up to – like the way Apple did with the iPhone, make something that is very easy for the average person to use, so that they don't have to worry about it.

Chair

Cool. Alright, Mr Raynovich, what's the story? You used to be an editor, what's the story, what's the take-away from the past couple of days?

Panel Speaker – Male

I think there's about to be a huge salvation in the SD-Wan space, so if I were a journalist, I'd be poking around. I'm not saying I heard anything in the hallways, but, so many…

Chair

Can you name some names?

Panel Speaker – Male

Well, I'm just saying, if you look at the – well you had a nice leader board there which - I've kind of relapsed with my leader board. So I think it was a four-horse race you depicted it as. The top four, we won't give them any more free advertising than they already got, but…

Panel Speaker - Male

Every year it's the leaders but…

Chair

So bad news for Nokia and Nuage then I guess is what you're saying, to name one?

Panel Speaker – Male

Nuage, they have the tools,. I think they missed an opportunity to become an SD-Wan player. They have something that could be SD-Wan, they just – it's a marketing question. But the point is that there are, as Gartner says, more than 50 - I don't know, it's more than 50. I've seen about 30. Four of them are the leaders, so there can't be that many. But, there's a lot of other large companies that you mentioned, like Nokia, Ericsson. Where's Juniper's SD-Wan strategy? That seems to change every three or four months. So, these larger companies are probably going to have to buy some of the

– not the number one through three, but the number five through 10, to get a new strategy. So, I would be watching that.

I'll get on my soap box when I read the financial media and the technology media. It's funny, you get two different views. But going back to your point about security, one of my theories - it's more about management. I think Ted backed that up when he was doing his demonstration. Very cool demo. Clearly the tools are out there, but what did he talk about mostly? Human behaviour. We have trouble exchanging and I ask people, who's not using a VPN? Half the people – the technology is there but people choose not to use it. The other thing is the financial managers and the managers of these big companies, if you go through all the big breaches, Equifax, Target, the commonality is they could have fixed it, but they didn't, and usually it was a financial decision.

We were talking earlier, go look at the Equifax share price. It went like this, and then they got slapped on the wrist and fined whatever it was – and the share price, by the way, is at a new high. So, those of you in the media, can we hold these people accountable, is there some way? Apparently, they are not being held accountable at all. They compromise all of our credit records, and put them out as though – Ted told us that now all of our credentials, and credit records, and social security numbers are floating around there in the dark web, and the Equifax executives are making more money than ever before. So, I don't know where that soap box goes, but how do we hold these people accountable? That's kind of a rant, I don't know if it's…

Chair

Yeah, you basically said that - I had said earlier, that maybe the technology industry needed to do better about industry security. But actually, it's really not the technology sellers, it's the…

Panel Speaker – Male

Exactly, it's the fires, I mean the Equifax could have fixed – Vikram's more knowledgeable than perhaps I am but from what I understand they could have fixed it, ahead of time, and they knew it was a problem but they wouldn't spend the money.

Panel Speaker – Male

I think the issue is that they had so many different problems. How do you prioritise? After the fact, it's very – not to defend them, because they shouldn't have breached, but this is a problem that's faced by team managers, security managers, financial decision-makers every day. Every dollar put on security is a dollar I'm not spending on marketing and growing my business. So, there is a limited amount of resources, and even with a limited amount of money, the attack surface is growing exponentially. It's growing far too quickly for people to keep tabs on.

Chair

Yeah, let's go back to typewriters and paper. Brad, we need to hear from you, because we're drawing toward the end of the morning session. So, Brad over to you.

Panel Speaker – Male

Thanks very much. I think obviously we've heard a lot about security, and I think some great points have already been made by the others on the panel. One thing I will say, is that we have seen through all of these sessions that we are now moved into an era where it's DX. DX is the goal, but the means are cloud. Cloud is both the destination and cloud is an operating model. That means you need much greater agility, and also means that you do need to transform your infrastructure, because if you don't - and this is true for the network - you will be the long pole in the tent. You will be the thing that's holding up agility. You will be the thing that's holding up flexibility, you will be the element that's also discouraging portability of applications and the speed of your business.

There's a direct correlation there and often we treat the network as still this separate silo, but it isn't anymore. The silos are being broken down and the network, architecturally and operationally, has to be much faster.

This brings us to an important point, and that's that it's not easy change for the network, because if you think about this traditionally - some of us have been around long enough - there was almost a silent conspiracy between the vendor community and the buyers. Really a conspiracy of complexity. The products were very complex to operate, and you said earlier, you know the complexity is the enemy of security. It's also the enemy of agility. We can't go on the way we have been going. We do have to automate extensively. We have to see a direct correlation between the modernisation of your infrastructure and the success of your business in a digital era. It has huge implications for the network.

Chair

Excellent. I think we aught to wrap it up there. I think we've actually gone long. I appreciate you guys – the comments from everybody. [Malik] am I wrapping this up, or are you coming up and wrapping it up?

Facilitator

I'm going to let you wrap it up. I'm going to wrap up the conference.

Chair

Okay, well, much appreciated, Vikram, Brad, Scott, and Erin, and thank you all.

Facilitator

Thanks for the brain power, thanks for your insights, and thank you everyone, in fact, who's spent their time and energy making this conference what it is. I've got a couple of tasks here before we all head off for lunch, the first of which is to announce the winner of our tweet competition.

Now I've got some prizes here. I'm hoping my beautiful assistant will come and hand them out to people. So, Laura, if you'd like to come on down? She's not here – okay. I'll have to do it on my own then, won't I? Unless George, you're going to come down and be my beautiful – no, he's not going to come. Right, okay, we have our list of winners. So, we have three people, one, two, three. The prizes are – first prize is a Belkin power box, a battery - a large battery for charging your phone. We have a tile, which will help you not lose your keys, or whatever else you attach it to. And we have

a bunch of macadamia milk chunk shortbread cookies, and that's the third prize. So, let's go in reverse order, shall we? The third prize is awarded [Prazes Stefan Kasmurek] - I hope I've pronounced that right - if you'd like to come on up? Congratulations. Thank you, well done.

The second prize was won by none other than Yan Guldentops, who wins the tile. Where are you Yan? Congratulations.

The top prize was won by the ever-tweeting [Linda Canty]. Your name was everywhere. Well done.

Obviously, I'm going to talk about, in a minute - about future events, but I have a personal thing I need to do, because this is actually my last Net Event. I'm going to go off into the blue wild beyond and retire. Now some of you might say, well so what? But I've been doing this for about 23 years or so, and so it's a bit of a milestone. It's been a fun 23 years and I've enjoyed it immensely. There have been some great people to meet and I've had conversations with – drink at the bar, and all that kind of stuff. So, it's just to say, the next one you probably won't see me, but here we are. That's the way it goes, and that's it.

[Applause]

So, I'm going to retire and look after my bees. Right, okay, let's move on to the next Net Event, which is in Portugal in May next year. So, we will see – you will see yourselves then, and of course the next one here is on about a year's time. So, have a great year, and I hope you enjoy your lunch, enjoy the sessions this afternoon. Have fun, take care.

[Applause]

[end]