## Draft

*Debate Session II:*
*Is SDN Ready for the Enterprise?*

Chaired by: Camille Mendler

**Principal Analyst, Ovum**

<u>Panellists</u>:

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|---|---|
| John Bukowsky | Senior Director, Cloud Networking, Citrix |
| Arpit Joshipura | VP Dell Networking |
| Perry Eekhout | Regional Manager Central Europe, Emulex |
| Perry Romano | Director of Business Development, Service Providers, Gigamon |
| James Thornborrow | Director of EMEA, Glue Networks |
| Jacob Rapp | Global Leader of Marketing HP |

**Camille Mendler**

Great, good morning everyone. My name's Camille Mendler, I'm an analyst with Ovum. My job this morning is to usher and manage a conversation about another important aspect of software-defined networking which is the usage of SDN, the rationale for SDN in the Enterprise. I have a cast of characters here. Slightly smaller than the last panel, so that means no one's falling off the stage, which is good. I'm just going to briefly go through a few market trends to tee it up before we open up into the discussion.

Just to let the organisers know, I'm a bit of a loose cannon because I don't have a watch. So you can either wave at me or I'm willing to swap a watch for one of these fine loom bands made by one of my offspring. So just FYI. I think we've got about 40 minutes or so. You'll shout at me? I think you're good at that, aren't you Manek?

Okay, great, let's get onto the next slide. I think I'm in control, is that right? Let me see if this works. Am I supposed to point it in a particular direction? I am pressing the button. Oh, I have to switch it on first. I'm great with technology. Okay, it's on.

Right, so is SDN ready for the Enterprise? Yes, there is a lot of hype about SDN and with any market, there are similarities to what's gone on before. I think that we have to acknowledge this in the context of software-defined networking. Like any industry, at the beginning there is a lot of - shall we say, a lot of activity. It's a bit wild, it's a little unstructured. We are still very much at the early stages despite the fact that we've been talking about software-defined networking for how long, boys? Three, four years, something like that - 2007, okay, so he claims it's 2007. We can do a search.

But I would argue that today, still today, the SDN market is a bit of a free for all. Since I was given the opportunity to mention movies, since the gentleman from Telstra did this - what was the movie? Perfect Storm. I'm going to mention other types of movies. In fact, there's a whole class of movies that are reflective of the SDN market. They are the spaghetti western, is what I would say.

So I think that the SDN market is very much like this today. It's got its own drama, this whole storyline. We've got the good, the good guys on this very righteous mission to lower cost, to change the dynamism of provisioning services networking, creating new network - new service opportunities, changing fundamentally how enterprises across the world have been buying, managing that work.

Then we've got some bad issues. I'm not saying bad people, I'm saying that there are challenges around the fact that we have legacy vendors - there's nothing wrong with being a legacy vendor, let me say that, I'm not saying anything about that - but I'm saying that there is billions and billions of dollars to be won or lost. It all depends where you come from in the market. So there's a certain level, there's, I think, a lot of uncertainty as a result of that situation. Logically, a lot of vendors that have an established customer base, not wanting to lose that trust and progressing on.

Of course the ugly aspect, which is also the good aspect, it's just that actually the level of anarchy in the market, the market anarchy through the start-ups, the new companies that are the darlings of the stock market, they go crash and burn the next, they might be acquired, might not be acquired. All of that brings uncertainty and certain, perhaps, ugliness to the market. So there's a lot of rule setting that people are trying to make, trying to make acquisitions of land, assets, et cetera.

We can say that this has happened again and again with different types of technologies. In fact arguably, it's been said there's similarities with the SS7 market. Years ago, the SS7 signalling was a huge transformation - in this context, not in the enterprise but in the telco network. So we had the same issue of legacy, moving from proprietary to open environments, correct? I think one of the fundamental differences with SDN, however, is that in fact the legacy vendors are as eager to market, to sell SDN technology as the start-ups. That's a real difference from other types of transformations that have happened before.

Going back to the enterprise, SDN started as a concept for the enterprise, but what has happened is, if you can see - maybe you can't see this slide - but as we've learned from the last presentation, the telcos have stolen the limelight around SDN.  Why?  Because they themselves of course are enterprises with enormous networks and datacentres as well.  The need for them is entirely teed up with the transformation of their business, their business model.  So SDN, if you do surveys around SDNs and I have and many of my peers in the market have, the telcos are very much into that.  That's for reasons of the network expansion but also the datacentre.

Here I just show you that the telcos themselves are building a lot of datacentre estate.  The past four and a bit years they've built approximately 1 million square metres of datacentre space and today are basically opening up about 50 soccer fields of datacentres every single year.  So they are a big demander of this type of technology, potentially.  For them, SDN is really the glue between bonding the old network business and the cloud business, integrating those together.  We'll hear more about that from the session after mine.

But enterprises, do they want to get any - do they really understand SDN?  What do they expect to gain from it? So we surveyed approximately 3000 enterprises a few months ago.  This came out in July.  This is a global survey and the various types of benefits that enterprises believe they're going to get from SDN.  Yes, there's the cost issues, integration with services, service agility.  Some of these types of aspects.  What I find interesting is 95% of these organisations that we spoke to claim they know about what SDN is.  Only 5% say they don't understand it.  I don't believe to be the case and I'll ask the panel to comment on that.  I think there is a disconnect.  I think that some enterprises believe that there are certain SDN benefits that they can achieve, maybe not all of them.  Let's not forget the fact that just like the telcos, they've got to migrate.  This is an internal investment, there's an investment cycle prescribed by organisational structure.

Then lastly, this dynamic of, if the telcos themselves invest in SDN, will it make them more competitive in selling services to enterprises such as organisations like Telstra that are changing their business model, and others.  There is some argumentation for that.  If you ask about enterprises, some of the - besides cost and security and certain other aspects, what are differentiating capabilities for them to switch service providers, certainly acceleration, performance-related issues, more diversity in services are important issues for them.

What I would close by suggesting is that in the long run, certainly my belief is that the capabilities that you will see and be sold on as an enterprise, the SDN proposition has to be aligned whether you're in the enterprise or the telco space.  If you're in enterprise buying telco services, there has to be a removal of the walls between the public and the private network in terms of functionality.  That is really where we need to have a more united front, perhaps, in terms of the development of this SDN market.

So let me turn now to the panel which represents I think the diversity of this market.  If I can click to the - yes, sorry, that was my final little joke.  Let's get onto the panel and here they are.

So what I'd like to do is have each person in the panel, since we have the leisure of time, not for a lecture but for a description of what you do, to represent where they stand in the value chain. The key proposition and the clients they're addressing. Are they addressing enterprises and telcos?

So let's start with John from Citrix. By the way, if I think you're going on too long, I will interrupt you. That's my prerogative.

**John Bukowsky**

Okay, well I'll try not to do that. John Bukowsky with Citrix. So if you take Tom Homer's excellent opening presentation and you changed a little bit of his dialogue from Telstra to Citrix, you'd have a little bit of our story. He talked about web-scale IT and he talked about the hybrid cloud, personal cloud, mobile enterprise and internet of things. We call that the software-defined workspace. For 25 years, Citrix has been breaking down barriers so that we could implement technology for individuals, you, to use any device to access all of your information at any time in any location. That fundamentally has been our model.

We believe, inherent to our vision and our strategy, as a company we believe that work is not a place. Work is what people do, and we need to give both telcos and enterprises the tools necessary to enable their workforce. We're a software company, we're also a systems company and we provide an end-to-end solution. We focus on security and quality of experience of what's being delivered. So desktops being delivered to any device, as an example. A Windows desktop being delivered to an iPad as an example. But to do that requires a full systems view of infrastructure. It includes networking. We have a portfolio of network products to include an ADC [WAN] optimisation, traffic optimisation.

Our success in those products today, we're a $2.9 billion company, we have over 300,000 enterprise customers, we have 10,000 partners and we're in 100 countries worldwide. Our experience in working with both enterprise and service providers is that in ADC, layers 4 through 7 is a critical element to SDN's success. Layers 4 through 7 has the application knowledge that passes onto the layer 2, layer 3, which is what an SDN is controlling to ensure that the optimal datacentre configuration and network configuration is made available to those applications and end users.

**Camille Mendler**

Okay, let me stop you there. Let's keep it going.

**John Bukowsky**

That's exactly where I'm [transitioning].

**Camille Mendler**

Okay, good. Let's - Arpit from Dell.

**Arpit Joshipura**

All right, so I guess this is my - I don't know, fifth, sixth, seventh NetEvent, so I'm kind of a veteran here I guess. I think I know several of you guys. Dell is an end-to-end service provider, solutions provider. I think to answer your questions very succinctly, we play in the infrastructure place, the software play and the end-to-end solution play, both for enterprises and for telcos as SDN and [unclear].

**Camille Mendler**

Okay, so you will be positioned in all of those different client spaces.

**Arpit Joshipura**

Yes.

**Camille Mendler**

Fantastic, Perry from Emulex - Perry number 1. There's two Perrys so it's a Perry [gestalt] type thing. Anyway, go on.

**Perry Eekhout**

I'm [surely not] number 1. So thank you. I'm Perry from Emulex. Before I give you our view on SDN, let's get a couple of words on Emulex itself. So for everybody who doesn't know Emulex, we are a provider of fibre-channel 10 gigabit Ethernet and 40 gigabit Ethernet connectivity solutions for basically all major server and storage vendors. So one of the very interesting things we have seen over the past years developing is that the standard server is getting - I almost want to say, more and more powerful and therefore more and more used in environments where you [mightn't] have found them five, six, seven years ago.

So one of these developments caused the converge infrastructure to come up, see storage protocols running over standard Ethernet. The next phase we are seeing is going in two other directions, there are actually two major focuses there. We see that latency is getting more and more important. The other thing is that we see that this standard server is getting, not just in the enterprise, but also in the telco environments, plus in - I almost want to say the [hyper scale 0:15:14.1] web servers. What happens there is that all of these different environments have different requests for the connectivity and at different...

**Camille Mendler**

It's more complex, is what you're saying?

**Perry Eekhout**

It's getting more complex. So all of a sudden we are not just talking about a normal connectivity for a server. So what we are doing is trying to give all these different requirements an [upload] on the networking side plus allowing, with an open API, to

use specific mechanisms for their different requirements and process that directly on the connectivity side, without being a burden for the application or the server itself.

**Camille Mendler**

Okay, great.

**Perry Eekhout**

Thank you.

**Camille Mendler**

Perry number 2.

**Perry Romano**

Good morning.

**Camille Mendler**

From Gigamon.

**Perry Romano**

From Gigamon, yes. I want to just make reference to the wild, wild west and the cowboys here. Think of Gigamon as the sheriff. We are - provide active visibility to the network infrastructure no matter what the topology is or the speed or the feed is, and we provide that visibility to all the analytics, the security devices and management platforms that a typical large enterprise or service provider might have to effectively drive that network and provide performance there. So we are agnostic to the network infrastructure, as I said the technology SDN, NFV, pure Ethernet or a combination thereof. We see that environment being hybrid for a number of years to come.

With a perfect storm of these applications and this network transformation happening, we see visibility playing a bigger part of the effective, successful deployments of these technologies.

**Camille Mendler**

And management thereof?

**Perry Romano**

And management thereof, yes.

**Camille Mendler**

Okay, well let's move to discussing hybrid environments. So James at Glue.

**James Thornborrow**

Yep, thank you.  One of the challenges that faces every enterprise is the static nature of their [web].  It's one of the key pinch points in delivering a lot of the applications we focused on this morning; security, cloud, bring your own device, empowering mobile.  We're a Cisco development partner.  What we enable is service providers and enterprises to either provision their wide area network CPE much, much faster, zero touch, or to engage in an agile nature with their key applications.  So some of our customers will say, I'd like, for example, my financial applications to be priority 1 for the last two weeks in a quarter, but I want my - when our CEO does his earnings call five days after that, we'd quite like video to be priority 1.  Introduce real agility to what hitherto has been a very static environment.

If they try and do that in a manual way without our service around SDN, the risk associated with human involvement, the cost of the change management alone from an enterprise is a big enough task, but when you look at that for a service provider, it just isn't happening.  So what Glue enables both the service providers and the enterprises, is a true multi-[tenant] function to automate a lot of that functionality.

**Camille Mendler**

So automated scripts and people typing on a command line and...

**James Thornborrow**

You could look at it like that.  No scripting involved, this isn't TCP - TFTP, forgive me, basic load and [pray] to devices, but config management from a template-rich infrastructure aware cloud based service.

**Camille Mendler**

Okay.  Now, last but not least, Jacob has something to say, I suspect, about what HP - well quite a lot, I'd imagine, what HP's doing in the market.

**Jacob Rapp**

Yeah, definitely.  But first I guess I'll back up my 2007 statement I made.

**Camille Mendler**

Was it earlier than 2007?

**Jacob Rapp**

No, so actually - so 2007 is when actually HP first started collaborating with Stanford on Project Ethane which later became OpenFlow.  So that's where the 2007 came from.

**Camille Mendler**

Which is related but not...

**Jacob Rapp**

Yes, related but not as well.

**Camille Mendler**

You might want to explain - I don't know if anyone's interested but...

**Jacob Rapp**

Yeah, definitely. So I think SDN has been evolving over - since 2007 to mean a lot more than just OpenFlow. HP's main focus, besides being in the server networking and storage business as well as many other different software, security and different technologies, we need to look at the end to end, across the enterprise, service provider cloud. Because ultimately, customers are asking us, specifically in enterprise, how does my user experience the application itself? Software-defined networking being an enabler. Actually something that Tom said in the beginning presentation really resonates with where our strategy is with the software-defined networking is that it's a fundamental shift in the way enterprises are consuming software.

So we [unclear] announced the SDN app store and ecosystem about a year ago and tomorrow actually we're announcing the next wave of that ecosystem and app store. Really it's about fundamentally changing how networking is done and that software model. So moving from just the technology that we've been building up since 2007 and also the solutions.

**Camille Mendler**

Okay, so let's explore this a little bit more, because we need to understand what is SDN and what it isn't. SDN apps, they're not going to be like Office 365, are they? So can you give us a taste of what an SDN app looks like?

**Jacob Rapp**

Yeah, absolutely, I think it's built upon the foundation of simple and open infrastructure. So whatever underlying protocol, whether it's OpenFlow or just like a [NetCom] or DX-LAN or whatever, choose your standard out there, but it's built upon an abstraction layer.

**Camille Mendler**

No, let's start in a more basic - I'm an engineer in an enterprise. Do they go to the marketplace? Is it as simple as that?

**Jacob Rapp**

Yeah, absolutely.

**Camille Mendler**

What problem are they trying to solve? Let's talk about what problems they're trying to solve.

**Jacob Rapp**

So I think we see three fundamental areas; security, cloud and mobility. So if we deep dive into one of those, let's take security, they're looking at specifically solving a problem. They don't necessarily want just another security app, because they have, probably, way too many of them and that's what we hear from them constantly. There's too much [unclear]. So they want to find a way to reimagine their security with SDN. So one of our security apps that we actually announced last year is our SDN network protector application which utilises SDN to help reimagine who you secure [your] own device in the enterprise.

**Camille Mendler**

Okay, nice example.

**Jacob Rapp**

That's one example.

**Camille Mendler**

Okay, well John, let's go back to you because Citrix, of course, has been associated with, well, freedom of movement but also security. Can you add to that in terms of SDN applications?

**John Bukowsky**

Well actually an ADC would be an SDN application. It could be...

**Camille Mendler**

Spell that out for everyone who didn't catch that.

**John Bukowsky**

ADC, application delivery controller, I apologise.

**Camille Mendler**

That's right, which is one of your key propositions.

**John Bukowsky**

Which is one of our key products. An ADC sees all the traffic, sees all the application traffic. It knows the context of the content of the traffic. It passes to a controller the information necessary to do switch configuration. So what it enables inside the datacentre and the software-defined datacentre, because this is where it's really critical, is it enables a - from a layer 2 to a layer 7 view of the network and f the datacentre. It's the big value [prop] that we offer.

**Camille Mendler**

Okay, well let me flip to Perry 2. Sorry, this is my shorthand; it makes it a little bit easier. But could you talk a little bit about what you'd call and SDN application?

**Perry Romano**

[Unclear] again from a monitoring perspective, we would consider interoperability, if you will, with the SDN controller. That's where we play. From a monitoring application perspective. We would - we have software that would be sitting on that controller that would interoperate with our boxes and our solutions to provide that access, if you will, to the traffic in that topology or that network environment.

**Camille Mendler**

Okay, and then moving - because I want to just ask one more question - the same question to one more person and then we'll move on - James, if you could just add a little bit about how you would describe an SDN application in the context of organisations with a variety of network environments.

**James Thornborrow**

I would say Glue is an SDN application. So a business case would be a business demanding more home working and to realise some of the real estate consolidations and that kind of business case. But then an engineer saying, well I therefore need to embrace collaboration and want to put some kit in people's homes to give them more business productivity. I want to embrace hybrid networking, so I want to get more local broadband to branch offices. More for less. To do all that, I need to enable some features that may already exist in my existing infrastructure, so sweating the asset that I've already bought.

So trying to roll out something like IWAN from Cisco or performance routing to make the best use of that secondary or tertiary circuit, needs some intelligence. If you can do that without the complexity, you need an application that can deliver it for you and automate some of that functionality.

**Camille Mendler**

All right, well we'll get some more examples later on but I'd like to just move now to the how you sell this. How you message this to enterprises. Now Dell has been working with enterprises for I forget how many years now. There's been a significant anniversary. I'm just wondering how you do that with your established sales force? Are you telling them to - are they using that terminology, SDN? Who are they speaking to within the enterprise, is that changing?

**Arpit Joshipura**

That's actually a very good question because...

**Camille Mendler**

We aim to please.

**Arpit Joshipura**

There are really five steps to any technology adoption, we all know that, we've been through this a long time. The first step is just getting terminologies in place. The second step is, once we've passed that, what are the use cases. The third step is, okay we've got that, how do you get there? What's the path to get there? The fourth step is, how do you convert the people and organisation? Then the fifth is reap the benefits.

So we are in step number 3 and going to step 4, which is really around what path we go and how do we sell to people and how do we change the organisations. So fundamentally, we believe that there are two organisational challenges that an enterprise is facing. The first organisational challenge is one of who is in power? Is it going to be the server admins or is it going to be the network admins, and/or a combination? The second challenge they are facing is what is the skillset required?

**Camille Mendler**

Well yes, that's a really - how that skillset's got to change.

**Arpit Joshipura**

Right. So from a Dell perspective, what we have taken an approach on, because we have server storage, networking, the whole software stack in house, in an open manner, we have solutions that are targeted to both. Because there are - within an organisation, if an...

**Camille Mendler**

You might have solutions, who knows about the sales people though. There's always that sales [training] initially.

**Arpit Joshipura**

Correct, so you go into the - you train the appropriate organisation in their language. Train the network guy in the network language, you train the server guy in the server language in what they understand.

**Camille Mendler**

Okay, so it's complex for the vendors to sell this stuff as well. So let's hear from Perry 1 who's been - you've been navigating this as well, correct? So can you give a bit of colour around trying to sell this concept?

**Perry Eekhout**

Yes, sure. You have to...

**Camille Mendler**

Because Emulex clearly has been doing a lot on the [service] side, right? You've been typically serving one particular interest group, you've built deep relationships with them, correct?

**Perry Eekhout**

Yes, we do. But you have to look at it from the Emulex perspective. There are two ways we go to market. Actually we have our big OEM partners who take our products and build that into their servers. So we naturally listen to what they are saying and we just heard from [Dell] what the steps are. We take naturally these steps and these requirements up in the way we develop our products. The other way, what we naturally do as well, is go to do different - I almost want to say verticals, which you can find in the market and [pair it]...

**Camille Mendler**

Okay, switch verticals, that's a good one to explore. Because those with very large networks, financial service, yes?

**Perry Eekhout**

Yeah, for example. So basically the broad distinction we make is we naturally talk about telcom and enterprises and within enterprises you have different verticals again. So I think the real way how we address this is naturally look at the different case studies for these. What we find in telco environments, we heard this morning about the NFV for example, is that they have different requirements. Thus, for us, it's very important to provide a technology which is open enough to give...

**Camille Mendler**

Deal with everything, okay. Do you think - any of you could answer this - do you think that the size of the total opportunity has been distracting you from selling to enterprise perhaps?

**Jacob Rapp**

I can weigh in on that. So we actually did create a separate business specifically for NFV within HP in order to nurture that environment. But I think from an enterprise perspective, that's where we see actually the most adoption of software-defined networking. It's gone mainstream for us because we've laid the foundation...

**Camille Mendler**

Mainstream in a particular sliver perhaps.

**Jacob Rapp**

Actually, mainstream across the different verticals. So it's not just your bleeding edge any more, or education even.

**Camille Mendler**

What do you guys think?

**Arpit Joshipura**

I agree. So I've said - I told in a couple of years - again, remember that we are in the third and fourth phases. So it's really deployment. 2014 is the major transition year for deploying and getting the benefits. So we're moving into the fifth phase here. Across all industries. Now, keep in mind every vertical and the size of the enterprise within the vertical will choose a different path. Now we don't have time to go into the specific paths.

**Camille Mendler**

We don't, no.

**Arpit Joshipura**

But I can assure you that as we work with our customers; universities will go down one path, large enterprises, even financials.

**Camille Mendler**

The point is to give them choice. Okay. We've only got a few more minutes left, I want to make sure the audience, if they have any burning questions now should tee them up.

# Audience Q&A

**Camille Mendler**

Tony, go on. You've usually got a good question. I'm forcing you, aren't I? We'll wait for a mic to arrive.

**Tony Savvas**

So the natural progression when you guys sort the market out, what do you say about the software-defined datacentre? Because a lot of people are confused about that from research I've read elsewhere. You've talked about the confusion in SDN, how do you then move onto the software-defined datacentre.

**Jacob Rapp**

I think it has to be interrelated.

**Camille Mendler**

It is interrelated.

**Jacob Rapp**

I think some companies look at just the datacentre, such as one that's missing from this conference, in silos. So we look - you have to look at it from an end-to-end - software-defined datacentres definitely need a defined - software-defined storage, networking...

**Camille Mendler**

So are you suggesting you cannot succeed in this market unless you have an end-to-end view? If you think your SDN proposition is purely in one part, you've been defeated to begin with. Is that what you're saying?

**Jacob Rapp**

Absolutely. You've got to think about it from the user to the application.

**Arpit Joshipura**

Can I add one more thing? Just to clarify terminology again. Five, seven, 10 years ago we started the wave of software-defined servers, VMs. Then came SDN network, we're in the midst of defining storage, software-defined storage. The three together make software-defined datacentres. You don't stop there. You go all the way to the end clients. So what's the software-defined PC? Or [VDI], virtual desktop. So you've got to go all the way end-to-end.

**Camille Mendler**

[Well] perhaps we've got bits and we're filling in the bits, is that right?

**Arpit Joshipura**

It's the whole proposition.

**Jacob Rapp**

It's such a key point. It's actually a very poignant question. Because the software-defined datacentre created a bunch of VMs. Those VMs, before it was a physical server attached to a port on a switch, well then what happened is you had all these VMs and you'd move VMs with VMware's VMotion. As you moved those VMs from one physical device to another that was attached to a different switch, all of a sudden the policy associated with that switch, DLAN, access control lists, all of a sudden that went away. Now the only way you could handle that was to create fabric that the VM was attached to the policy in the fabric. What controls that fabric? And SDN controller.

So now you have an SDN controller that can tell that fabric to tell those VMs where traffic is supposed to flow. Now that's going [up-stack] into our area players 4 through 7. That's the generation of the [path].

**Camille Mendler**

All right, well we're going to have to wrap it up but these gentlemen are still going to be around over the next couple of days. One final question to you, very quick-fire answer, when will SDN be mainstream in your view? You're saying already, today. Is it mainstream?

**John Bukowsky**

Yes.

**Camille Mendler**

Okay, you say mainstream toady?

**John Bukowsky**

Yeah.

**Camille Mendler**

You say?

**Jacob Rapp**

I say - if you look to [unclear] we're getting to that mainstream.

**Perry Eekhout**

I think parts of the concept are mainstream, yeah.

**Camille Mendler**

Mainstream.

**Perry Romano**

Two to three years.

**Camille Mendler**

Two to three years, okay. James?

**James Thornborrow**

Two years, about 2015, 2016 I think.

**Camille Mendler**

Okay, and Jacob?

**Jacob Rapp**

I think you already heard from me, mainstream. Just one example, just real quickly, [Bama Foods] is one of our customer that's a perfect example. Not a technology company, frozen [dough] manufacturer. So...

**Camille Mendler**

Which we'll hear about more tomorrow, I suspect, is that right?

**Jacob Rapp**

Absolutely, so multiple different [apps]...

**Camille Mendler**

You've got a head-to-head later on today, have you not?

**Jacob Rapp**

Yes, absolutely.

**Camille Mendler**

Okay, well bring that one out then. Thank you very much for teeing up this debate and conversation which is going to continue. Thank you very much, boys.

**Manek Dubash**

Nice one. Thank you Camille and thank you to the panel for a fascinating debate. We will be continuing this discussion, I think, with the two, if I may call them this, hardware behemoths who will be going head to head after our coffee break. Can I just, on a personal note, say that I think five perfect storm mentions in the first session is really quite a record. Keep it up guys, let's have more.

Okay, let's go and get some coffee.

[End]