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EMEA IT SPOTLIGHT

FINAL

Conference Debate Session II - 5G: Forget the Hype, It's Time to Explore What's Happening Today

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Panellists:

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Ian Keene

I thought I might be talking something that was pretty unrelated to cyber security and threats and whatever, but in the news today what is the biggest thing about 5G is exactly that; cyber security. That's one of the hyped things because what's so different about 5G than any other G or any other national communications network? I'm at a loss to that but the threat of security of 5G is very hot in the agenda now and it has got very, very political. So one of the big hyped things is politicians are getting hyped up about it.

Of course people trying to sell equipment for 5G are very hyped up about it because they need to make revenue, sales are going down and they need a big injection of new technology and there's a lot of hype. Gartner did a survey of enterprises in a number of countries really and the expectations of industry are really huge about 5G, what it can do, and it really will not meet expectations, certainly not in the timeline. People

expect that 5G is going to deliver so much this year or next year, and it's going to take a few years before it could possibly get to that point.

What's really happening today, that's what I want to look at now and what I would like to do is open this up for the panel and for all of you to really express your opinion on what you think is happening because there's so many different viewpoints and whenever I look at a press article or talk to anyone about 5G everyone has a different viewpoint about what's going to happen, if anything. So you've seen this triangle on the left hand side many times. I copied it from the model of the 3GPP thing about what is wonderful about 5G? More broadband. Yeah, okay, but you can have more broadband on 4G and whatever. You just have to construct it in a different way. Lots of small cells, for example, give you more broadband.

Super low latency. I don't know about all the manufacturers but late last year I saw Huawei were demonstrating they could get pretty much similar low latency from a re-engineered 4G as they could 5G. So, big deal. But a massive IOT, and the question is who needs it? Who needs massive IOT? What is there in things like LoRa networks, for example, or Sigfox or Narrowband 4G or 2G networks? What is such a big deal about 5G? A colleague of mine, Nick Jones, looked at the applications, the common applications for IOT over the next five years, the different industries and applications, and there really weren't that many applications that would need the attributes of 5G because it could be done in other ways. So there's a lot of hype about it.

Put what you think is going to happen, what 5G will deliver in that triangle because we're seen things like driverless cars. Yeah, sure, cities are going to invest so much money in driverless cars, but as soon as you get out of the centre of the city it doesn't work. What's the point in that? You can walk along the street and play virtual reality games. Big deal. Who's going to pay for that? So you've got all these applications which sound great, are super hyped, but what are they going to do, who's going to pay for them? So what I would like to come out of this is for you, not for me to tell you, but for you to think and stick in that triangle what you think will actually work and bring benefit to consumers, to enterprises, to the whole industry.

But what people confuse about 5G and the standards is there's other things happening on the right hand side. Edge computing. Okay, edge computing generally. Forget about 5G or wireless. Edge computing, people are looking at that and all the 5G vendors are factoring in edge computing capability in their solutions at the moment. Network slicing, a great idea and can one do it now in existing networks? Yeah, but it's incredibly clunky and so to build a whole new network and to actually bring in things like software defined network, network function, virtual network functionality, you can do that on a new network but it's so, so difficult to do it and stick it on an existing legacy network.

A massive memo, massive antenna are raised. This is something that there has been a huge amount of investment in R&D for many years. It started off with the Wi-Fi industry and then it was taken up by the network equipment manufacturers, like ZTE, Huawei, Ericsson, Nokia, Samsung and a lot of development into massive arrays of antennas. But it fits in with 5G because 5G works on a number of different radio

bands, whereas in the existing radios bands we have now it just doesn't make sense because the antennas are too big, they're too heavy, masts won't support them et cetera. So I would say probably the more interesting thing is the stuff on the right hand side that just happens to be stuck into what we call 5G.

So what are the attractions? Well, for communications service providers, mobile operators but I guess also fixed operators, particularly in the U.S., is they're looking for new revenues and they're thinking, 5G, okay, let's look at new enterprise services. These are generally network providers, particularly the mobile guys, who have no idea how to sell to enterprises. They could offer them a group SIM card plan and things like that but they can't do much else. They don't know how to sell to them, and this is one of the conversations I have many times with mobile operators.

Okay, we can see with 5G we can develop new applications with edge computing, with network slicing et cetera for specific vertical industries, but how the heck do we sell to them, sell to these enterprises? It's a difficult thing because they really don't have a darn clue in 99 percent of the cases and they're trying to find their way forward, what sort of [unclear] system should they bring on, and certainly the previous panel, how do you get industry IOT and control systems and how do you meld that with communications systems, and there are problems. There are real big problems they're getting. So that's not [unclear] but it's a hope.

Retain or improve consumer average revenue per user, yes, but how much money are mobile operators willing to spend to do that? It's a competitive thing. So that's all down to competition. Big hope for IOT. Really, most for 5G. But again, I question what can 5G deliver that systems today can't?

The biggest thing for me is the attraction of 5G's more new frequency bands in the low band width, like long distance stuff, like sub-two gigahertz frequencies. Regulators are giving up new frequencies, which is great. 5G isn't going to deliver anything that 4G couldn't or 3G couldn't, or, come to that, 2G couldn't in those frequency bands because it's such lower band width, but new frequency bands. High bands, okay. We see a lot of stuff coming out of the U.S. now, like fixed wireless broadband for the home et cetera, typically 28 gigahertz frequency bands. It's like, yeah, you can do it if you've really got the demand and people are willing to pay the money. So we see a big hype about that, a big expectation from Verizon, for example, AT&T in the U.S.

When I talk to European mobile operators that have access to these types of frequencies they say, what's the point, because broadband access is so cheap in comparison in Europe that it's impossible to make any money out of building a new network to provide mobile broadband. Just stick with the wires and stuff you've already got because it's a very poor investment opportunity. But for sure, maybe for enterprises it's a new way of connectivity for enterprises, and I know a number of mobile operators in Europe are looking at their central cities and whatever and introducing this for that.

But it's the mid band is the important thing. That is a whole big chunk of frequency in Europe generally that is being opened up around about - [centering] around 3.5

gigahertz and there's a huge chunk of frequency that offers far more band width than mobile operators have at present, and that is the interesting opportunity and that is what makes Europe and, come to that, most of Asia very different to what's happening in the U.S. where that big frequency chunk hasn't been released and instead they're looking at CBRS, Citizens Broadband Radio Service, which could use 5G but it's not regulated in the same way.

So the big mobile operators do not have frequency licences for that. Many other people get frequency licences too. So when you look at 5G and you look at what's happening in the U.S. also say, well, hang on, what's happening in the U.S. actually is what is probably going to happen in Europe and probably isn't what's going to happen in Asia.

But the big thing is why would mobile operators want to put in 5G? Well, okay, you've got the hype, so you can get your consumers to say, hey, latest technology, I must buy it, but it's the lowest cost per byte because networks are getting fuller and fuller, they're hitting their top capacity and mobile operators need to spend money on improving it, and the lowest cost way of doing it I would suggest is 5G. It's much cheaper than building more smaller cells on 4G and whatever. You've got this brand new chunk of band width and it brings in things like massive antenna arrays et cetera that enable it.

This is a picture I took late last year in London. On the right hand side you've got a standard 4G antenna. It's big, it's very heavy, it's got loads of cables coming out of it to feed into a radio unit that's operating outside of this picture that then goes into a very large base band unit. On the left hand side is a 5G array operating at the higher frequency. The antenna is smaller. The 5G weighs way less than half - I think about a third of the weight, so it can actually be stuck on the same mast without having to strengthen the mast and it's got the radio processing embedded in it so you don't have to have a remote radio unit and you've got a nice, little, thin cable there instead of the big, thick coax cables coming up.

That will have outside, at least, roughly the same range as the old 4G. It will have a massively increased band width for consumers and putting that in place in a city like London is much, much lower cost than having to procure more sites for more 4G radio based stations. So it's just an accounting thing. So what does 5G bring? It brings cheaper mobile networks.

Equipment vendors. Okay, they're having a pretty tough time. You look at the reports, apart from Huawei I suppose who always seem to do well, but they're in a pretty tough time. So new frequency licences mean new radio sales. Great for them. They're hoping it, and new handset sales too. An interesting thing is a new core network product because if they're going to introduce new enterprise services or new consumer services, like virtual reality, games et cetera, then they need a new core network because the old one just isn't going to be able to deliver that and they need to do things like edge computing and whatever.

It gives them an opportunity to introduce things, like software defined networking, that they've been talking about doing for the last - I've given up - eight years or so, a

long time, but it's very hard to bang a square peg in a round hole. But with a new core network 5G could be the reason why they do invest in a new core network and it could be a unifying core. Opportunities not only in sales - sorry, there's a typo there - and service opportunities to introduce new services.

So how does a mobile operator cope with things like edge computing? One of the largest European mobile operators I was talking to fairly recently, they're looking at saying, instead of having a data centre to run their core network they were thinking of expanding it to maybe 100 remote data centres to bring stuff closer to the edge, so you have much lower latencies and you reduce the amount of traffic on your core network. But some enterprises are saying, I actually wanted this edge computing in my premises. So that's a great opportunity for more sales for equipment vendors but a huge headache and security, again, headache for mobile operators. So it's not an easy thing to achieve.

Consumers, more band width in urban areas. Great, everyone wants that; new services, new applications, new games, better video applications and in some countries better fixed broadband services. But I'll say this is very, very country-specific and many countries in Europe the average revenue for broadband service is so low that it doesn't really make sense to invest in new infrastructure to compete there.

But enterprises, which again is the main thing we want to talk about, is customised enterprise services, vertical industry focused and I've had many, many conversations with clients, particularly in the large scale manufacturing. When I say large scale I'm talking people like Mercedes-Benz and Boeing and things like that who are very, very disappointed and frustrated with what Wi-Fi can deliver right now in terms of cost, reliability, service levels. Particularly for mission critical applications it's something they don't like and they would love something different. So there's great opportunity there in manufacturing, in oil and gas and in transportation.

So opportunities there, but how do these services get to these industries is the thing? The mobile operators say, well, we're not quite sure how to do it. You've got the equipment vendors saying, we'll be the third party and we can actually understand vertical industries better than you. But the fact is that's just marketing. I'm not so sure they do. Then you've got the typical suppliers to industry that really don't interact very much with the networking and IT community. So there's a big problem there.

But there is an opportunity for network slicing to deliver industry-specific things. I was talking to - actually it's getting on a year ago now with this CEO of the Port Authority in Hamburg and saying, I want virtual networks, I want one that will deal with mission critical, cannot fail issues, I need one that will cope with high definition video, broadband, I need one that will cope with a massive internet of things, whatever, but I just want one network but I want to split it up into at least three virtual networks with different attributes. So there is opportunity but how the heck do we get there is a question I have for the panel. Also, something lower cost and more reliable than Wi-Fi.

For example, I was talking to an oil company at a refinery and they needed to renew their network, Wi-Fi network, and it was massively expensive, not only in capex but in opex to renew it with Wi-Fi, as they have at the moment, and something like even 4G could actually really reduce the cost for them. But they don't want to sign this long term agreement with a cellular operator that locks them in. So there are issues here but it can be lower cost and more reliable. Then we've got the thing about Wi-Fi 6 and whatever, so Wi-Fi is moving on too. So the problems that we see the industry has with Wi-Fi as we know it now, maybe in a year or so's time that will be solved to some extent.

But one thing is for sure. Talking to mobile network operators we think at least 40 percent of them in developed markets will be promoting private cellular networks next year. I'm not saying they're going to succeed in selling them but they're certainly going to promote them. So this is going to be a new thing; a new development in networking opportunities for enterprises.

These are my thoughts. The likelihood of success going forward, pretty low in IOT because there's so many other ways of doing it, to be honest. More mobile band width, that's the biggest seller and it's happening now, it's happening in Asia and it's starting to happen in Europe right now. Let's put in 5G, get some early adopters in there and whatever and let's take the strain off the existing network. Enterprise digital platforms, I think there will be success but exactly who is going to be the winner on this I don't know. Is it going to be the equipment vendors, the mobile operators, the industry-specific vendors? That's to be talked about.

Enhanced mobile services for consumers, yeah, but how much money are they going to pay? Fixed wireless access, is it going to work in the U.S.? Well, the jury is out on that I would say still. What are going to be the operating costs for Verizon, for example? Who knows? It's all hope. But I think there are many, many areas that is going to be a failure, apart from maybe high end business connectivity, and that's it. So I've talked enough, I think probably too much. So I would like to pass it over to the panel. So your names have disappeared from the slide. So guys, what I would like you to do is to introduce yourselves, although some of you are introduced, but what is your interest in 5G and what do you think is the best opportunity for your organisation in 5G? What is the biggest hope?

Atchison Frazer

Well, I'll start with that question since I'm the only vendor up here surrounded by analysts.

Ian Keene

Well, no. Also analyst companies, what is the biggest hope for you with 5G; how are you going to make money out of it?

Atchison Frazer

You actually - I think your second bullet was highly relevant to Versa versus an SD-WAN player. There are three Vs. Actually Gartner says there are three Vs that really matter in the market; Viptela, VeloCloud and Versa. So we believe that 5G will be a huge market driver for SD-WAN. You talked about the network slicing. We can do that today, and we do for a lot of our clients, but it's highly limited. A good example is retail. I think digital transformation and 5G actually gives traditional brick and mortar retail an opportunity to change the game where they're being disrupted by Amazon and other kinds of e-commerce.

But the ability to slice that network beyond something conventional, like what we're doing now, which, let's say guest Wi-Fi is separate from your corporate Wi-Fi or your POS system is separate from the ATM network et cetera. You can almost start to do micro-services because 5G will enable you to do tenex slicing. So latency for a specific application, for example, could be a micro-service that is dedicated to one slide. IOT per device could be another slice. Video streaming.

All the kinds of things in retail that everyone knows can help change the game with the greater band width at a lower cost, the ability to accommodate more devices and the fact that now that you have way more devices you still need to collect the data and analyse the data, and SD-WAN does that as well in a single pane of glass. But I've also increased the attack service in a way. Micro-segmentation helps you - it's a great defensive manoeuvre and most of our enterprise customers deploy Versa SD-WAN for that purpose.

But if now you're slicing the network and accommodating way more devices at each node you have to have embedded security. So we're one of the few vendors that actually - I would disagree with Joel a little bit deep packet inspection. We're actually - we are expecting a payload. So we don't just send a packet on at the best optimal LAN path. We're actually determining whether it's a good packet or not. I think we're the only ones that do that in the same envelope. So I think as you slice the network into more micro-slices, the ability to do that real time security is even more important.

Ian Keene

Do you think that mobile operators are actually going to buy into this, because they're obviously very security conscious and it's a completely different concept to what they have been building - using for their network for the past 30 years.

Atchison Frazer

I don't know if I would agree with that. Verizon is one of our strategic partners and investor in the company. They run Versa as a managed security service now. I think the ability for them to add 5G with SD-WAN and secure SD-WAN is a huge differentiator against other operators that really don't do security, and there are a number of those. Comcast is one of our partners. They don't really do security.

Ian Keene

So you can see more buy-in going forward?

Atchison Frazer

Absolutely, because if you're going to manage the network and then offer additional services that you can increase your RPU with, you can decrease [unclear] because of the loyalty of those applications. The end user, in the case of retail, are actually keeping folks in the store front and introducing a different customer experience, that's beyond just simply being the plumbing and providing a circuit at a good cost and a good bit rate.

Ian Keene

Kevin, to you next. Where do you see as a research company the biggest opportunity in 5G; how would you best advise your customers?

Kevin Restivo

First and foremost, let me just talk about the evolution because I think we've quickly gotten into the weeds and let's find some of the opportunities. What is remarkable so far when looking at the operators is that looking at standardisation of 5G. Over the last two years the industry has stuck with its timeline. So all that hard work has made some of those opportunities that we're alluding to already possible. But it's very much - as far as specific opportunities go for the operators I think we're talking about an evolution, not a revolution from the start, if I was to put a cliché or a phrase to it, from the beginning point.

The reason that is is because we're starting from a non-stand alone point as opposed to stand alone. So really if look at Mobile World Congress and all the examples, all the marketing hype, the hype cycle as you might put it at Gartner, associated with 5G that is really - we're looking at the second iteration of 5G the way I see it. So initially we're looking at faster data rates. So it's almost like 4G plus that we're going to see first. So in other words, temper your expectations versus the promise of 5G. So that would be some general advice that I would start with as well too. So that's my answer to your question to start with.

Speaker Name

Joel, where do you see 5G impacting the business that you do?

Joel Stradling

Yeah, sure. So I would separate between consumer and enterprise. I'm am enterprise services analyst, so I can't really go into consumer. All I know from my colleague, Emma Mohr-McClune, [that as a] consumer is that the winning strategies for mobile operators today is around SLAs for consumers, but it's a very tough space for them but they're starting to go there, and then also these membership communities. That's

where the potential is for subscriptions. I can't say much more about that segment as, again, that's not where I'm at.

But from the enterprise side, 5G to me is just a wireless link. That's all it is. It's nothing more exciting. It's a big one. It's a big, fat wireless link but that's all it is. What is interesting for me and I see the opportunities developing is the fusion when you combine it with SD-WAN and I'm so glad Atchison is here on this panel for addressing it from that point, and when you combine it with edge computing. So I really learned and appreciated a lot at Mobile World Congress right here earlier in the year where the innovation area, innovation centre was about the fusion of 5G, IOT, SD-WAN and edge and I think that resonates with me.

To go one step further, at the same event Vodafone and Juniper had their 5G SD-WAN ambulance, which I thought was a very interesting proof of concept and, again, it's here locally. The Catalonian government have deployed some 5G antennas and they've deployed an SD-WAN leveraging their vendor Juniper for that. Of course they have other vendors that are involved with their SD-WAN [store] and SDN and that was about critical comms.

So the ambulance crew - the ambulance was fitted with many cameras and the camera was doing these live feeds to a surgeon in a hospital or somebody at home who's an expert to try and save that person's life. Again, one might say, well, you can do that today, you can do it, that's just a video feed in an ambulance. But the level of criticality and the band width there and the QRS mechanisms make it more suitable for a life saving event. So I think those unique proof cases are what need to come out now and we'll start to see more traction.

Audience Q&A

Ian Keene

I've neglected the audience and I ought to ask if there are any questions because we're getting [unclear] on time. What are your thoughts about - can someone say what they think is the most hyped thing about 5G that they think will never happen?

Unidentified Male

It's like the M25 [unclear] need to be replicated.

Ian Keene

Well, that's my viewpoint too. But maybe we're wrong. Maybe it will transform medical care, maybe it will transform industry communications, but maybe it won't.

Abraham Joseph

Hi, Abraham Joseph, IOT Insights from the U.K. It seems to me that there probably is a significant opportunity in manufacturing. What does the panel think?

Joel Stradling

I agree. I think it's a similar area to the proof of concept I spoke about but also the wires. I think factory owners are very interesting in not having wires anymore and then the edge of the network will be [right in the compass] and you did allude to that too, the edge coming right out. Our industry likes to go through these cycles. There's an irony there where everybody was pushing stuff up into the cloud and now it's coming back again. I'll stop because there are other panellists and we don't have much time.

Atchison Frazer

I think you made a really good point on the transport. So part of the reason why you deploy SD-WAN is you want transport diversity. So imagine the options that you now have. You've got MPLS, you've got commodity internet, wireless. Now you have 5G but not just 5G but tenex the slices within 5G. Manufacturing with industrial IOT and being able to handle that unpredictable demand on your network traffic I think would be a huge market driver.

Abraham Joseph

So one final one. I think maybe we've underplayed the importance of low latency and what maybe the opportunities that might unleash. I appreciate that remote surgery might be a little away but there are some critical applications, especially around safety and so on, where low latency might be quite important. What does the panel think?

Atchison Frazer

I'll take a quick shot at that. That is part of the rationale for SD-WAN as well, is to be able to identify applications that are at low latency or business critical, prioritise the WAN path for those applications. In our case we can actually assign an SLA to low latency. We're inspecting every single packet across a range of quality scores, including a mOS, for example, for voice or some other kind of real time application. Again, with 5G the ability to do that I think it becomes way more realistic.

Ian Keene

So you don't actually need 5G to do that but maybe it will need the next generation of technology for people to introduce it because you could do low latency on 4G if you wanted to, but people don't. They don't bother. They don't see a business case. The question I have is will they actually see a business case to do it in 5G or is it just going to be too complicated, too unsecure for it to ever happen?

Atchison Frazer

Would you agree there's vehicle opportunity associated with low latency? That's one of the clichés of off-cited examples but there are others. The most visible examples or the ones most cited are consumer and connected vehicles but I think there's commercial vehicle applications as well too.

Ian Keene

Yeah, there's lots of opportunity there. It's just that I look at how slow mobile operators are to change their business model, and we talk about these great opportunities and there's a great opportunity in many enterprise applications and services. But are these guys really able to step up and deliver them? That's the question I've got. Personally I think there's a great interest in the CBRS spectrum in the U.S. where you could actually deploy 5G and you could be any sort of type of service operator. You don't have to have a national licence that has cost you billions of dollars. You can go and do it. I think we can see some interesting stuff coming out of that and there's moves in Europe, in Germany, for example, to open up some spectrum for...

Male

Is there a spectrum?

Ian Keene

...short licences and maybe that type of change in regulation is needed before we're really going to see all this stuff happening because you leave it to the mobile operators it's going to take 20 years to happen.

Atchison Frazer

Yeah, I couldn't agree more about the speed and the agility of the operators and they're notoriously bad at opening up their networks to application [unclear]. But those applications, I think because of latency and the other purported benefits of 5G, will arise one way or another.

Joel Stradling

To your point, I think auction spectrum brought quite a bit of capacity.

Sibahle Malinga

Thanks so much. My name is Sibahle from ITWeb in South Africa. Ian, I would actually like to turn your own question around and pose it to the panellists where you asked what are those overrated expectations that we have from 5G because there are technical complexities and requirements and there are many applications that we won't actually get to see even this year as far as your mission critical applications are concerned. So what has been the overrated technologies that we're anticipating to see

from 5G, whereas in reality it may take a while before we actually see deployment of those solutions?

Atchison Frazer

I think that's an analyst question.

Joel Stradling

I'm happy to - I'll have a go at that one.

Ian Keene

What's the biggest pile of bullshit you've seen from 5G?

Atchison Frazer

Don't say SD-WAN.

Joel Stradling

I would say mostly the hype on the applications is exciting. I think the possibilities are very interesting, only limited by our imaginations. What the main hype has been it's going to come now, and it's not coming now. That's the only thing I would say, is the time scale and then the lack of standards, which you spoke about too. But one single app, I don't really have one that I think has been hyped up. It's just the timing has been...

Atchison Frazer

I don't have a particular example either but if you went to - if you've been to other conferences, and I won't name vendors or operators but, frankly, most of the examples I've seen over the past couple of months are years out. So if you look at - some operators, for example, have demonstrated the 5G networks as an access hub or a control hub and I think that's an example of a second iteration of 5G as opposed to now. But I don't want to pick on any one company, frankly.

Ian Keene

Are we being cut off now?

Atchison Frazer

We don't have enough analysts on this panel. We need more.

Rik Turner

Exactly that. I couldn't agree more. So it's Rik Turner from Ovum. I would like to begin, by the way, by answering. I think the great opportunity for analyst firms in 5G is that with the more complexity that there is and the more acronyms, the more money we are going to make explaining it to people. So roll on 5G and loads of work for me.

Ian Keene

So we need to make it more complicated?

Rik Turner

Bloody right, and the more the better. Invent - god, you're Gartner. You guys get to invent all of the acronyms.

Ian Keene

We're not too bad on acronyms.

Rik Turner

But I do security rather than telco networking and therefore it's all a bit of a mystery to me, 5G, although people are talking about it a lot in the security space as well. So I wanted to throw kind of a techno-political question at you gents since there are so many analysts on this panel. Last week, week before, the national security committee in the U.K., there was a big leak where Theresa May - you may have heard of her, she's our prime minister for another few weeks - she apparently was favouring letting Huawei into the 5G networks of the U.K. and five of her ministers were against it so one of them brilliantly decided to leak it to the press and he was fired. But nevertheless, the argument still goes on. The most interesting thing about that, obviously the great fear is that Huawei is essentially the Chinese government and therefore will be able with 5G to tell the Chinese government exactly what I'm doing every second of the day, what applications and what network slice I am working on and all these other...

Ian Keene

[Unclear].

Rik Turner

Exactly. They've got GPS. What more do they need? But...

Atchison Frazer

They have a back door on all their products.

Rik Turner

And back doors and all the other good stuff.

Atchison Frazer

Every single product has a garage.

Rik Turner

Yeah, absolutely. If I was - I don't doubt that...

Atchison Frazer

Anyone can hack.

Rik Turner

I was going to say, no doubt the NSA already knows all about this anyway from all the Cisco routers that I'm going over. So, whatever. But the point - somebody did actually make a very interesting point. One of the opponents within the government made a very interesting point about 5G, a technical point. He said, look, Theresa May and her crowd who favour Huawei in the U.K. 5G network, they say, what we're going to do is we're not going to let them into the core network where everything will be - you will be able to steal all that information about where people are going. We're just going to let them - because they've got such good antenna technology, we're only going to let them into the edge network and...

Atchison Frazer

I don't think that's going to fly.

Rik Turner

Well, exactly.

Atchison Frazer

Was that before or after the CFO was arrested in Canada?

Rik Turner

I couldn't agree more. What the guy said was - what the opponent said of that was that with 5G you can't tell the difference anymore between the edge and the cloud.

Atchison Frazer

Let's ask Joel. Joel, internet WAN links, are those weak or strong typically on the network?

Joel Stradling

[Inaudible].

Atchison Frazer

Exactly.

Rik Turner

Okay. Thank you.

Ian Keene

Well, thank you, panel. Thank you very much indeed, and thank you, audience.

[end]