



- Daniel Newman: Hey, everybody. Welcome back to The Six Five Summit. I'm Daniel Newman, one of the hosts here at The Six Five, and I'm excited to bring you this day one Connected Intelligent Edge spotlight session with Mr. Shaun McCarthy, a veteran, an alumnus of The Six Five. Shaun, how you doing, my friend?
- Shaun McCarthy: Hey, Danny, how are you? I didn't realize I was a veteran. I think it's year two, but I appreciate that.
- Daniel Newman: You've been on The Six Five three, four, five times. You're a veteran of The Six Five Summit, but you're a veteran, you're an alumnus, you're a multi-timer here on The Six Five, and you are also the guy with the best hair in the industry. But my vote, by the way, in that particular category counts a lot less than how I feel about 5G, IoT or the metaverse, Shaun.
- Shaun McCarthy: Well, I'm feeling old now that you've said I've been on here so many times, but appreciate it.
- Daniel Newman: Don't let it age you this. You saw this event has a monster group of speakers, thought leaders, some of the biggest names in the industry. You as president of Nokia here in North America, Shaun, you're doing pretty big things yourself, and I want to talk to you about your vision around 5G, IoT, the metaverse. I know the metaverse... Please, hold on, everybody. We're talking industrial metaverse. We're talking about the part of the metaverse that's going to actually have big, big implications here with Shaun.
- This is something I've been on the record saying a number of times. First and foremost, Shaun, let's just start with your big macro view. You know this event was all about navigating rough waters. We're talking about maybe a more challenging economic period of time, but we're also in an era of very exciting growth. We're seeing 5G proliferate. We're seeing the data at the edge growing at exponential rates. We're seeing IoT helping to provide insights that drive analytics, AI, tools, technologies. What are you seeing? What's the macro view across 5G and IoT, Shaun?
- Shaun McCarthy: Thanks for asking. Really we're living in some pretty interesting times. I don't think there was a playbook on how to navigate the pandemic, the supply chain crisis, inflation, all the incredible crazy things, the war in Europe, just a lot of things happening at the same time. Some of these words you described, 5G and IoT and metaverse, they're kind of dirty words in the valley right now in a lot of ways because I think people are a little disappointed, and maybe it's because things were over-hyped. But I actually think we're living in an incredible time, especially when you think about innovation. It's actually not the technology that's so mind-blowing to me.
- It's the pace of innovation. I see you every week on TV talking about AI and generative AI and ChatGPT. I mean, that launched, what, end of last year, so like six, seven months ago this technology went live and it's completely revamped every business, everything across the planet. Every company is looking at what that means to their business. That's happened in such a short period of time. Actually I think we're about to hit an evolution of a really rapid cycle of innovation driven by 5G and IoT and the industrial metaverse.
- While some people feel like these things haven't lived up to the hype, I feel like the time is really coming now where all the pieces and parts are coming together and we're figuring out how to actually drive the outcomes that we've been talking about for so many years. I'm really optimistic about where we're headed. Like I said, we're working with a lot of companies today.



Really I describe it as this fusion of physical and digital world. There's this digital physical fusion that's coming together. What that allows you is to close that loop with human augmentation or in some cases with software automation as well.

But what you do is you create an environment where you have the ability to sense. We're sensing. We're building that digital world. We're thinking, right? That's the edge compute and the analytics in the AI. And then we're acting, that's where the loop gets closed and that can happen from an automated fashion, or the acting can happen with human augmentation. That's where that metaverse aspect of it comes in. I think we're living in a really, really exciting time and I think the pieces and parts are really finally coming together.

Daniel Newman:

Shaun, I love that you said that. I'm a big advocate for a number of industrial use cases for the metaverse. I've seen it in action. I've seen how it can help create more productivity on manufacturing floors. I've seen how it can help employees train and learn. I've seen instances with autonomous data replication where you can test and you can build products and you can run them through paces, shortened cycles of engineering and innovation to launch new products into market and design cycles. I think there's a lot of applications. I think we got a little bit confused because of that Meta company and that whole vision of are we going to be swimming in the social universes.

Because I do think, Shaun, what's going to happen is we're going to see our heads go from down to up. This is what I really think about. I think we're going to start to see more devices that are going to put screens in our peripherals and we're going to start having more of these physical digital interactions. But just the shift from the pandemic of going back out and being at events and being together and seeing that we like to travel, we like to have meals together, we like to go demonstrate products together at events, we like to travel, we like as humans interacting with humans.

While there is a partial opportunity to say, let's all get in a room together on a pair of goggles and design something, what I see more likely is we're going to say, hey, let's go to a meeting and maybe you wear a light framed glass where you can be chatting to somebody and they can be showing you something and you're sharing a screen as a peripheral while you're physically in the same space. And that's the stuff you're doing.

Shaun McCarthy:

We see there as being three distinct metaverses. You're right. I mean, I think the consumer metaverse is the one that most people think about when they think of metaverse, because they think about Zuckerberg and they think about Meta and they think about this futuristic world where you're hanging out in a lounge in a virtual world. We see there being a consumer metaverse, an enterprise metaverse, and then this industrial metaverse. The consumer metaverse, that's like Patrick Moorhead's house on a Friday night. They're putting on VR goggles. They're playing Dance Dance Revolution. By the way, there's a lot of really cool things that are going to come out of that.

Maybe you're doing fitness classes at home. There's probably a lot of really cool things that will come from that, but it's over hyped and it's probably the least of the exciting ones. The enterprise metaverse is really around collaboration and simulations and learning. Actually, I was thinking about this the other night because I don't know about you, but I like to torture my kids by making them watch old movies that I watched growing up. The enterprise metaverse is like



Bill & Ted's Excellent Adventure coming to real life, where you're learning from these historical figures. Who knows? 100 years from now maybe there'll be an AI Daniel Newman teaching AI to kids in 100 years.

It's sort of a hologram version of you, but it's this concept of really, really truly immersive learning, immersive collaboration. Again, I think there's a lot of pretty cool use cases for that. But the industrial metaverse is where we're going to rethink the way we operate industries. We start talking to people in these various industries, manufacturing, of course, but everything around every type of plants, every type of mine, every type of ports where we need to orchestrate things. Some of these industries, they haven't changed the way they build products, the way they operate in 35 years. Just think about how much technology has changed in five years.

Daniel Newman: Six months.

Shaun McCarthy: Six months, exactly. It's 35 years they haven't changed the way they operate. That's when you come in there and you say, hey, what if everything is a sensor? What if everything is a sensor and I have a digital copy of everything? What if I have this compute power where I can process all that data and I can build applications and analytics? And then how do I close that loop? How do I close that loop? And to your point, maybe I close that loop with human augmentation where I have someone that has light frame AR glasses with instructions on how to modify the equipment. Maybe there's a hologram overlaid on top of the equipment itself so I can see exactly where I turn it.

I get notified when I've turned that bolt to the exact torque. This is happening. By the way, I haven't said 5G once, right? What's happening is you can only do this with this network, with this network that can be secure, that can be reliable, that has milliseconds of latency. When you don't respond to that sensor triggering something, lives could be at stake. The things can get very, very dangerous in some of these plants when you look. That's where things have to be rock solid in terms of the network. There's tremendous amount of use cases. It's going to really change the way industries are run and operated, and it's way overdue if it's been 35 years in some of these things.

Daniel Newman: Yeah, absolutely. Your CEO did a really good job at the MWC Nokia Strategy Session talking about that. I really enjoyed seeing how you parse it. That's also how you're able to manufacture a market, because I think what ends up happening is because we overgeneralize. All AI is not ChatGPT. All metaverse is not socially drinking coffee in some app. There's so many use cases. By creating these three segments, I think you did a really good job of redesigning.

Shaun, one of the things I think that also helps the market appreciate the development of a new technology metaverse is being able to provide real world examples. I'd love to hear from Nokia what you can share about real world use cases or examples even of these metaverse deployments.

Shaun McCarthy: Yeah, no, we've got a lot of real-world examples. At the end of the day, these all start with private network deployments. We have several hundred production private cellular deployments across the globe. It's still early days to the market, but to give you a sense of scope of the market, while I'm talking about several hundreds of network deployments, this market,



this entire metaverse economy is predicted be between eight to \$13 trillion by 2030. It's going to be this enormous market. And then the other sense of scale to give you is today the traffic from the industrial metaverse, it's essentially zero.

What dominates mobile traffic is mobile video traffic. By 2026, the traffic from the industrial metaverse is predicted to surpass that of mobile video traffic. This thing is going to be a hockey stick and it's going to come out of nowhere. We've got a bunch of real world deployments and I'll share you maybe one detailed one. But just to give you a high level, we're deployed in ports where everything needs to be orchestrated, because in ports, time is literally money. You cannot afford seconds of downtime. We got private networks deployed in ports. We're deploying networks in mines.

I'll give you a different mining example, but the traditional mining example is around allowing the machines to be operated remotely. That has huge productivity, as well as huge safety benefits because, A, it takes an hour to get a mile into the ground and a mile over to the machine just to get in it and start operating it. And B, obviously there's a lot of risk when you're putting a human that far deep underground. We're doing a lot in mines. We're doing all the things you'd expect in factories and warehouses around things like AMRs, autonomous mobile robots, AGVs, automated guided vehicles, and then some of the augmented reality applications as well where you're getting a bit of a heads-up display.

But I'll give you an example, a real world example is in mining... We're working with a company who builds these incredibly long, incredibly hardened conveyor belts for mine. These conveyor belts, Daniel, are two miles long. It takes over a year to build the thing. You got this two mile long conveyor belt. And then when this thing is running, there's all kinds of issues that can go wrong. Predictive maintenance is a really, really important thing. We have a use case where we have drones that are deployed, and these drones are live streaming video feed over the private network to edge compute.

On the edge compute, we've got software applications that are doing machine vision analytics. Basically video becomes the sensor. When I say everything is a sensor, it's not necessarily like a little button that checks the temperature. Video is the sensor. We have machine vision software that's going through the video. It's analyzing the video that's coming in live from these drones. It's keeping an eye on infrared and all kinds of other things that it can notice to determine maintenance, heat, challenges. When there's an issue or something that needs to be resolved, that triggers to a human to go, and that human has augmented reality with data about the conveyor belt.

It's this completely closed loop where how else would you know when and where to go and get ahead of this maintenance issue before a fire breaks out, because that's what'll happen if these things overheat and something gets jammed. You find out too late. It's a really cool use case that touches all the pieces I described where you have sensors, you're sensing, you're thinking with the software, and then you're acting with the augmented human interaction. Really cool use case. It's like the possibilities are endless when you think about those attributes, I'm sensing, I'm thinking, I'm acting, and what can I do with software in a robust network that allows me to make millisecond type decisions.

Daniel Newman:

We have a couple minutes left here, Shaun, and I want to talk about one of the thoughts of the day as it pertains to 5G. It's monetization. We all know the improved performance. It's been



something that's been promised. I was writing the year of 5G back in 2018, '19, and here we are in '23 and we've definitely seen big movement. We've seen improvements. We're seeing spectrum being deployed. We're seeing better back haul, higher bandwidth. We're seeing some new apps. I guess I just say, first of all, is the industrial metaverse the killer app for 5G? And if so, is this going to be the driver of monetization? If not, what are some of the other ways that you see 5G being monetized?

Shaun McCarthy: Yeah, yeah, no. Listen, I think all along we've said 5G is going to get monetized in the enterprise. We think the industrials is that area where it's going to be monetized. Because at the end of the day, everything I'm talking about is really for uncarpeted spaces. Carpeted spaces, IT type applications, wifi actually does the trick. There's no real benefit to bringing 5G into the enterprise. It's really into industry. But we always say enterprise, we mean industry. You can only do these things with 5G. 5G is the right technology that's unlocking this. Is it the killer app? Listen, I think it's the killer platform. What I mean by that is we need to not think about 5G as being the killer app.

Because no customer says, "I want 5G for my mind." They say, "No, I want the predictive maintenance for my two-mile-long conveyor belt that I spent I don't know how many tens of millions of dollars on. By the way, I lose money every time it's not working." It's the outcome. It's not good enough to ship the network. It's about shipping the outcome. We just did a thing, we just announced a press release with Belgium, not the city, with Belgium. It's about drones in a box for first responders. They don't want the network. They want the outcome that you get from the drones.

We need to be thinking as an industry, if we want to monetize 5G, we need to be thinking about the whole picture in those outcomes, not just the network. Yes, I do. I think it's the platform that we're going to build these things upon. I think there's a lot we need to do as an industry to enable and make that. I'll just say really quickly, I mean, the other killer app, if you will, for 5G is fixed wireless.

Daniel Newman: Well, yeah.

Shaun McCarthy: I'm really about closing the digital divide. It's something we need to do. There's still about 100 million people in the United States, which is a third of the US, that are either underserved or not served at all. 85 million of that 100 million are underserved, which means they get 100 mega or less. 15 million aren't served at all. We got to solve for that problem. At Nokia, we're a big player in fiber. Seven out of 10 fiber connected homes are based on Nokia fiber. We're a big fan of fiber. I personally want fiber in my house. But at the end of the day, there's a lot of locations you can't get fiber. There's tough geographies.

There's markets where houses are spread apart too far. Just time to market. Fixed wireless is doing an amazing job. We've got customers that have continued to grow that business in a very sustainable way. Fixed wireless, I think, is going to be one. We're going to continue to monetize there. It's going to solve for that digital divide or play its role in solving for the digital divide. But the big, big monetization opportunity is really about this industrial metaverse. But again, it's not about the network, it's about the things that we build on top of that network, and that's how we need to think about it.



Daniel Newman: Well, Shaun, I really appreciate you spending some time here. This is a big wave that continues. I know people are talking about 6G, but we've got a lot of 5G ahead of us. I know people have made varying declarations about metaverse, but we have a significant set of applications for the metaverse that will change a number of industries. I know the work you're doing at Nokia is very influential, and I really appreciate, Shaun, that you continue to be a veteran, alumnus, here on The Six Five. Don't let it age you. It's a great platform for thinkers like you and I hope to have you back really soon.

Shaun McCarthy: Great seeing you. Take care.

Daniel Newman: All right, everybody, stay with us for more. Day one here in the Connected Intelligent Edge track. We appreciate you. Check out all the videos. There are more. They're on demand if you can't watch them in real time. We hope to see you soon.