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The Network Challenges for IoT Applications

Guest Speaker Presentation by
Galeal Zino, Founder, NetFoundry

Galeal Zino

Okay, good morning. Going to keep this relatively simple and hopefully draw on the expertise in the room for some interactive Q&A. Going to very quickly describe one challenge and one opportunity in the IoT space, specifically industrial IoT.

I'll start with a use-case on the opportunity side, specifically with identity, and let's trace this out, starting with a device - this device can be any type of industrial IoT device, a sensor, a camera, et cetera. This device can have an identity; it can be a very secure identity, hardware root of trust secure type identity. That identity can be passed to the network in a secure manner, along with some metadata, to the point where the network can then be built to use that identity to drive its behaviour. As an example, the network receives the identity and, let's say, metadata such as the latitude and longitude of the device. The network controller then looks at that data and compares it to the policy.

If, for example, that device is somewhere where it shouldn't be, maybe the policy tells the network to spin-up a software-defined network to divert that data to a honeypot network - a honeypot network where we can find out who has taken control of the device, or maybe why, or maybe observe what they're doing. Maybe the device is so

secure and the use case is so sensitive that the network policy says kill switch - completely turn off the network to that device.

So two very simple examples of how you can use identity as the basis of secure industrial IoT networking. Now we know security requires multiple layers and that's just one of the layers. The exciting part, because we are making this all software, you can have that type of interaction between the context of the device, such as identity, and a dynamic real-time network that is purpose built to essentially honour those contexts, or be driven by those contexts.

That said I'm going to flip back to my one challenge. Let's take a relatively widely discussed topic like connected factory. We all understand how valuable it would be to have connected factories; we understand the business benefits of Just-in-Time manufacturing. So in our heads, it's easy to view a factory becoming connected. Now, in reality, for Just-in-Time manufacturing, you need secure reliable connectivity from the supply chain - which is a variety of suppliers on a variety of networks, its multi-cloud as the panel earlier said, and the production line, which is in a series of factories that are extremely tightly controlled, with very mature processes for regulatory compliance and quality control, industrial grade processes, literally, from a security and a liability perspective.

Somehow, across those multiple networks and clouds, multiple suppliers, multiple production lines or assembly lines, we're going to securely exchange data in real time that is going to key Just-in-Time manufacturing. In other words the data had better be accurate, better get there in time, and it certainly can't be compromised from a security perspective.

So putting those two together in opportunity, like using identity to drive a network, the challenge of Just-in-Time manufacturing. We feel that there's not many more interesting challenges to take on in the world of industrial IoT, in the world of networking. From an industry perspective, we feel it's extremely exciting in that it's largely greenfield; we will largely be building these solutions from scratch. The OT world, the factory site is largely not even networked today, period, and we have to get from there to Just-in-Time manufacturing.

I'm going to pause there, with all the expertise in the room; I would love questions and comments and to make this interactive.

Audience Q&A

Steve Cassidy, PC Pro

I'm interested in the idea that Just-in-Time involves production line to production communication, and it's an assertion I hear a lot around IoT where people are convinced that the high count of IoT devices are all going to talk to each other. As I understand Just-in-Time, the in-Time is the delay while the sales team figure out what the margin

is, and how they're actually going to the profit for the business out of the order they're getting.

So I'm intrigued; have you got any concrete examples of conversations happening between groups of IoT devices in factories that are only connected by a market, or by an order, because it seems to me that's a bold assertion to make and it doesn't match how people do manufacturing at the moment.

Galeal Zino

I think it's extremely bold; I think if you look at the Industry 4.0, next Industrial Revolution-type folks who are experts in that field, they say the same thing. An analogy I saw which was interesting, was with Dell computers, who were one of the first to kind of pioneer custom-built computers and automate the back-end to the point where they could do so economically and efficiently. I think whether we can do that in Just-in-Time manufacturing, not only obviously from a secure networking perspective, but from a data analytics perspective and a human perspective, is absolutely the challenge of this concept of Fourth Industrial Revolution.

Unidentified Male Speaker

So I have a complementary question about the networks within the factory. So we talk about the [Last Mile Network] and maybe we can talk about the last 1000 [inaudible] which is, I believe, to be [mesh networks] which reach out to the corners where you could have really valuable information, which might be needed to get the full picture. So can you talk about how you're able to leverage these mesh networks, if at all?

Galeal Zino

Yeah, the network inside the factory is actually as interesting as the end-to-end network, specifically if you look at what National Instruments, Cisco and others are doing for what they call time-sensitive networking, and I'm not an expert in that field. But, if you Google it, they are essentially building the factory inside - excuse me, building the network inside the factory to a completely different set of standards than we have today.

So I completely agree; you have a variable like that of a network being purpose-built, time-sensitive network, and I name National Instruments and Cisco because I happen to know, but I'm sure there's plenty of others working on this - it is cross-industry type effort. Then you marry it with essentially the networks outside the factory that we were discussing earlier, the various suppliers and partners in that supply chain, absolutely can work well together. In fact, I would say, they need to work well together, because again, at the end of the day, any compromise in either of those networks, defeats the purpose of connected factory.

Unidentified Male Speaker

You mentioned time-sensitivity and, in general production, people seem to be very sensitive about the reliability of their infrastructure. How are you going to make sure that they trust you, that they let you, you as an IT company, in their [valuable super-

protected, super-working] production environment, without affecting or slowing down their processes?

Galeal Zino

Absolutely the challenge. I see it two ways; one, the factories generally have more mature security, quality, safeguards, processes, frameworks than let's say the traditional IT world, because they have to. Because a breach, or an issue, or even a deviation from process or spec within a factory, can be disastrous. So you have a very mature set of processes, you have people who understand those processes, and abide by those processes in their day-to-day life. A bit different than the IT world, where we heard several experts yesterday tell us about how a huge part of the problem is simply the people understanding a process and following the process.

So I think in the case of connected factory we actually have an advantage, in that we have a certain culture established; I think the challenge is fitting the network into that culture. We're almost going that opposite way of IT which is very interesting, but nonetheless quite a challenge - completely agree.

I know we're due to speak with Michael; is this the right timing?

Guest Speaker Interview & QA - Galeal Zino, Founder, NetFoundry and Michael Howard, Senior Research Director, Carrier Networks, IHS Markit

Michael Howard

Well, Galeal, I talked to you a few weeks ago and found out a little bit about, and I don't know what people here already heard, but where did you get the idea for NetFoundry? How did you name it NetFoundry? Maybe I'll say one thing; you know that I think when I looked at your technology and you described what it did and what it can do, I thought of it as instant, secure, intent-based, dynamic, on-demand software-defined network slice with SLA. Does that kind of do it? Or overdo it?

Galeal Zino

I love all those words. Let's start from the beginning; NetFoundry, in terms of the name, the application making the network. The context of the application, like identity - making the network. The owners of the application, IT, network engineering, application developers, application providers - making the network. Michael, what I mean by making the network is, literally networks that are specific to the application.

If you put yourself in the shoes of one of those folks today, and this is where the genesis of NetFoundry is; our developers, our engineers, our IT folks, just like everyone else, have historically been tasked with making our applications work over general purpose Swiss Army knife type networks - very difficult. With digital transformation, with the train coming right at us, it's becoming mission impossible to the point where we believe we actually need ability to make application-specific networks.

Michael Howard

I left out application-specific - a critical part of it. But all of these other technologies I mentioned are characteristics, allow you to build an application-specific network?

Galeal Zino

Yeah, and I think, Michael, the characteristics you mentioned are what is actually more important from a business perspective, right. What is driving digital transformation is the need for agility, for speed, for economics. Quite frankly today the network is an anchor on that digital transformation journey and we want to flip the script and we want to give the developers and the engineers the ability to make the network actually an enabler of their digital transformation journey.

Michael Howard

The network has a lot of inertia, for sure.

Galeal Zino

Yeah, absolutely. Well fortunately, thanks to a lot of good work by some of the folks who were on the previous panel, we are now starting to have programmable networks. We're moving from a hardware-anchored regime of custom hardware, on custom ASICs, to networks that have the proper APIs exposed, they run on merchant silicon and they're programmable, so they give us the opportunity to change the networking paradigm.

Michael Howard

I guess I should say programmable network in there too. I mean all of the buzzwords but really if you have not abstracted but what's the salient feature - yeah, it allows you to build agile networks on demand, as you need it, for a specific application. How do you guarantee that you get the resources, that someone intends the network slice, the network that you create to have?

Galeal Zino

Absolutely the challenge, right; we're moving from very homogenous single cloud, or no-cloud, networks, private networks, private circuits, custom hardware - now we're talking multi-cloud. An individual application is not even an application anymore - it's not a monolithic application; it's a composite of micro-services and APIs across multiple clouds and multiple networks, and they all need to work if the application is going to work.

So I think, Michael, you hit the nail on the head, in that very Internet distributed, high-velocity environment, right, and this is before we're even talking about AI powered apps, machine learning empowered apps that are moving that much more quickly. The challenge becomes how do we make it predictable and reliable and consistent, even though the pieces underneath are not necessarily predictable, reliable or consistent?

Michael Howard

Yeah, that is required in an industrial setting that you were talking about, but the industry setting is very constricted, contained and built for that operation, and protected from the outside. Whereas you can create networks across - when you say multi-network, we're talking about different operators and perhaps many operators involved in the access of one carrier's network and the metro of another, an Internet exchange onto the backbone of another, et cetera. It's really hairy and messy, and it seems like magic to be able to do it.

Galeal Zino

Yeah, and that is why we fundamentally believe we need to re-invent the networking paradigm. Quite frankly Michael, with a general purpose Swiss Army knife type network, we don't believe that the needs of each of those applications can be met; sometimes you need a very specific tool for the job. While a general purpose Swiss Army knife type network is great - it worked fine for client server error, it worked fine when there's a centre of gravity for applications and people and private data centres. In this new digitally transformed world, with the distribution of velocity we're talking about, we believe you actually need application-specific networks that are literally specific to, and controlled by the context of the application.

Michael Howard

That what everybody wants; I want my own network. Somebody's infrastructure may be several operators' infrastructures out there, but I want my network.

Galeal Zino

Yeah, Michael, and that's exactly what the application developers and dev-ops type folks are telling us, right; they need control, they need hooks. They don't necessarily want to manage that network or own that network, but they want that application to control that network. I think, Michael, the analogy is similar to what we've seen with infrastructure as a service with Amazon AWS, with Microsoft Azure, right. I can spin-up and compute in their clouds, I don't know how Amazon is allocating their compute blocks to your VM as opposed to my VM, but it just magically works, right.

I think the challenge is to be able to offer that type of environment for the network, so that you are abstracted from the underlying complexity, yet have the ability to have your application get the reliability performance velocity that it needs.

Michael Howard

Well it's interesting in our global survey work about [STN NV], in fact this year's fifth annual survey, 61 per cent of the world's CapEx represented in it, very high on the list of applications that operators want in order to provide services to their customers, is network as a service - essentially network slicing. Essentially what you're doing with NetFoundry. Are you selling to operators so that they can use your technology to deliver services to enterprise? Who's your target market? I don't know if you mentioned it earlier, do you have any customers you can talk about?

Galeal Zino

Sure. So NetFoundry is a platform, it's a cloud-native platform. So it is used by individual developer - Fortune 100 type enterprises, operators, because it is a platform like Amazon AWS. What is important to us is enabling those folks to innovate in ways that we haven't even thought of, and I can give a specific customer example, which is public. Integron announced this several months ago; Integron manages about a million IoT devices worldwide, healthcare IoT. In this specific case, Michael, you and I are in like some type clinical drug trial, and we start off in a controlled environment, like a hospital, and then eventually we move to our homes.

When we leave, they give us a little goodie bag with a bunch of things in it, and one of those things is an Android tablet and it's running an Integron app. Then when we go home and we take our meds, and we eat and we sleep and we whatever we do, and we record it all on that app. Now that data needs to securely and reliably go to the hospital, the large pharmaceutical, whoever is administrating the trial, but of course you and I are on our home network, coffee shop Wi-Fi or whatever. So in that case, Integron took our SDK, took our software, integrated it with their app, so that we could provide them the ability, regardless of that last mile network, to securely and reliably transmit it to the folks who needed it.

Very application-specific where we didn't even pretend to dream of the application, but we gave them the tools such that they could use it as they needed to.

Michael Howard

I see a dissolvable IoT sensor in each pill, in the future. Well who knows?

Galeal Zino

Yeah, it's interesting and, Michael, you know form factor can go from a dissolvable pill to, let's say, a dialysis machine, right - a home dialysis machine that again needs secure reliable connectivity over a Wi-Fi.

Michael Howard

[Inaudible] operation, right. Well your technology seems to go beyond [STUN]; there's a lot STUN companies; do you think you're the next big thing, and they're going to be out of business soon?

Galeal Zino

So we are the evolution of SDX; we are the next generation of software defined networking. They are very different in their purpose. STUN connects Site 1 to Site 2; you put a CP on Site 1, you put a CP on Site 2, and you can use your STUN to get the reliability and performance and security you need between Site 1 and Site 2.

NetFoundry is software; NetFoundry is built to connect the application, especially in places where there is not CPE, for example your home with your dialysis machine, or the IoT device in another setting, cloud and software as a service. We believe that the next generation of SDX is actually connecting the applications rather than connecting sites and that's what NetFoundry is purpose-built to do.

Michael Howard

Cisco and Viptela should look out?

Galeal Zino

Well, I imagine Cisco and Viptela are quite busy with their integration. I will say, Michael that the overall pie here is with digital transformation, with tens of billions of IoT devices, with 5G on the horizon - the overall need for a network has never been higher and it is the proverbial hockey stick, right. So I think there is plenty of room for plenty of folks; we're not trying to be everything to everybody. What we are trying to do, is make sure that when applications need to connect, regardless of what network they're using, what hardware they're using, vendor, Telco - that they have a completely software based agnostic way to connect those applications.

Michael Howard

Wow. So the MPLS world revenue's something - a couple hundred billion dollars, are you going to make a dent in that with your technology; do you think in 10 years that will take a big nose dive, the revenue from that?

Galeal Zino

Well if we were in a flat world, Michael, and on the demand side was flat and I was an MPLS provider, I'd be quickly looking for another line of work, no question about it. That said as we were talking about, the demand is actually going up like this, so I think the MPLS providers will find ways to pivot to be able to build on what they have today. But, as far as their existing business, yes, we are going to take a large chunk out of that existing business.

Michael Howard

Yeah, I think I agree to the extent that I think MPLS revenue worldwide for operators won't go down; it's these new technologies that are soaking up a lot of the increasing, increasing, increasing bandwidth that's being used and needed to be used. So I think that's going to end it. Well thank you.

Galeal Zino

Michael, a pleasure. Thank you.

[Applause]

[end]