The Economics of 5G Densification

Teena Maddox (00:04):

This is The Smarter World Podcast, focusing on the issues and technology behind today's connected world. I'm your guest host, Teena Maddox, associate managing editor with Tech Republic.

(00:15):

In this episode, we'll discuss the economics of 5G network densification. 5G is poised to deliver a number of compelling benefits, dramatically higher speeds, lower latency, improved spectrum efficiency, wider channel bandwidth. But without network densification, 5G won't be able to fulfill its promise. As operators continue to prepare the infrastructure for the 5G era, there are a number of trade-offs to consider in terms of cost, complexity, and time. A lot of it comes down to the economics with operators needing to weigh the potential return on each investment. Today, I'm joined by Tareq Bustami, SVP and GM of Network Edge Processing at NXP Semiconductors and Garima Garg, Director of Technology Strategy at Verizon Wireless.

Tareq Bustami (01:04):

Hi, Teena.

Garima Garg (01:04):

Hello, Teena.

Teena Maddox (01:05):

We're going to talk a little bit about each of these important components. And first, I want to ask Garima, what surprised you the most about the 5G rollout?

Garima Garg (01:15):

Yeah, that's a good question, Teena. We have just started to scratch the surface for 5G. There's a lot more to learn and innovate. For me, something that was not so much of a surprise, but different from 4G is the need of heterogeneous network. 5G is envisioned to provide services with massive connectivity, super fast speed, ultra low latency and low energy consumption. 5G communication systems not only will be more advanced, but complex, too. To achieve these goals, we need convergence of heterogeneous wireless technologies from macro cells to small cells to pico cells, outdoor deployments in variety of form factors and location as well as indoor deployment and extension of radio signals from outdoor to indoor. You're seeing a complex mesh of all possible solutions, and I'm sure there are more to come.

Teena Maddox (02:03):

Tareq, what surprised you the most about the rollout?

Tareq Bustami (02:05):

Well, NXP is part of the 5G ecosystem, which is think of it as a group of Silicon players, OEMs, ODMs that build the equipment, software vendors, et cetera, that enables folks like Verizon and others to deploy a new wireless technology like 5G. Now when I look back and look at the ecosystem, I thought the ecosystem has developed fairly quickly. We've developed good solutions to very, very difficult technical challenges that come around 5G like the bandwidth itself being 20 times as high as LTE, the lower latency challenges, the RF difficulties, including millimeter wave. Yeah, I think my surprise is the technical community has really embraced and rose to the challenge and took these difficult problems and solved them really well.

Teena Maddox (02:53):

Garima, we've heard about network densification in the past such as with LTE. So why is it important now and what problem are you solving?

Garima Garg (03:00):

So successful implementation for 5G will certainly depend on network densification, which is basically increasing available network capacity through adding more cell sites, including macro sites and building sites, small cell deployments. Densification is absolutely one of the key things to enable 5G to be able to deliver the promise of high speeds and ultra-low latency, and to able to deliver these multi-gig speeds that we talk about. 5G replaces higher frequencies than previous technologies we have seen and higher frequencies needs more densification.

Teena Maddox (03:32):

That makes sense. Tareq, what is your take on that? What problem are you solving with network densification?

Tareq Bustami (03:38):

We see densification as just an integral part of how you deliver 5G, the potential it has to the consumer. The challenges of capacity and coverage will only get worse. There are areas, frankly, where the ecosystem needs to catch up. For example, small cells, CPE, repeaters, et cetera. These are areas that we have to now focus on as a way to deliver the full potential of 5G.

(04:02):

One area that's interesting and it's key to NXP is the idea of software defined radio or software defined baseband. We think an operator has to develop and deploy different form factors across the different [lobes 00:04:15] whether it's in a different access point with a different form factor, small cell, CPE, or a large macro base station. And all of that requires a flexible system on your chip that you can program to play, for example, a CPE roll. And then that same SoC can be doubling up as a small cell solution using a different software load. And so, these are key components we think from an NXP perspective that really are enabling technologies to make network densification happen.

Teena Maddox (04:46):

Tareq, I have another question for you. What does all of this mean to the end user? How do they benefit from densification?

Tareq Bustami (04:52):

Well, Teena, densification translates to direct benefits to the user. It means lower power footprint. It means longer battery life. Also, it means these new features that are coming from 5G will be rolled out quickly to the end user by virtue of having a software-defined SoC and architecture. That means new baseband upgrades will come over the air using the very same hardware equipment that's used today.

Teena Maddox (05:20):

Garima, what is your take on how the end user benefits from densification?

Garima Garg (05:22):

We just established a vast dense network of towers and small cells will give you our best 5G experience. That means to a customer quicker downloads, much lower lag and significant impact on how we live, work and play. The connectivity benefits of 5G are expected to make businesses more efficient and give consumer access to more information faster than ever before. So your use cases like connected cars, smart community, industrial IoT, immersive education, they're all going to rely on 5G networks, and that's something customers should be looking forward to.

Teena Maddox (05:55):

I have another question for you, Garima. 5G allows for both millimeter wave and sub-6 gigahertz. Is one a clear winner so far?

Garima Garg (06:03):

That's a good one, Teena. The ideal 5G setup includes high band millimeter wave 5G in densely populated urban areas with sub-6 spectrum providing enough coverage for suburban and rural areas. Both spectrums are winners in my eyes. The millimeter wave spectrum is a whole new ball game. It can carry massive amount of data at very high speed with minimum latency. It will also accommodate massive increase in data demands from consumers whether they are mobile first users or sophisticated and fully connected industry innovators. Sub-6, on the other hand, will help quick 5G deployments, thanks to its ability to deliver high speeds while still offering a better penetration.

Teena Maddox (06:42):

Tareq, what about you? Do you see one as the clear winner so far?

Tareq Bustami (06:46):

No, I agree with Garima. Both are needed and both have to be though built in a way without having to reinvent the wheel, and what do I mean by that? The digital sign of the equipment really has to be RF agnostic, right? So whether or not we're doing millimeter wave or sub-6, the investment you make in the digital side of things, meaning the silicon and qualification behind that and the software, interoperability, all of that has to be as streamlined as possible. Otherwise, you really can't manage the R&D investment and the time to market aspect of it. And really, that's the path that we're taking from an NXP perspective. We're trying to standardize on the digital part of the SoC to be common to millimeter wave and sub-6. And we're working internally within NXP and with partners on the [RFIC 00:07:32] side of things to make sure that there's a vibrant ecosystem for both millimeter wave and sub-6.

Teena Maddox (07:38):

Tareq, how successful will the OpenRAN be? Is it just to add 5G to existing networks or as greenfield deployments or both?

Tareq Bustami (07:47):

I think like everything else, Teena, we've always set unrealistic expectations for us. I think for us, it won't be a light switch. It won't just turn on from traditional base stations and we go tomorrow into an OpenRAN environment. This will take a while. It will be a phased approach. It will be a long time. We'll see both technologies living together. If you look at the deployments in Japan and North America, there have been success stories with greenfield players that have deployed O-RAN, and hasn't been easy and comes with technical challenges, but have been managed and have been successful in those deployments. I'd say the ecosystem itself is still in the development phase. So there are existing and new RU and the new players are coming along. It's been up and coming, but they're coming up the learning curve. And over time, I think you will see more and more of this O-RAN being deployed in the market.

Teena Maddox (08:42):

Garima, what is your take on the success of Open-RAN?

Garima Garg (08:45):

Yeah, I'm in the same school of thought as Tareq. I think very successful. We all know with any technology, it takes time to mature. OpenRAN technology will open up connections between vendors baseband and radio products, and thereby allowing operators like us to mix and match products from different vendors. It allows operators to more easily slot in new hardware vendors in its network and this gives way to flexibility and innovation. OpenRAN also offers benefits in terms of network management and fosters a very healthy multi-vendor ecosystem. However, right, there's no free lunch. So these benefit might also come with some challenges such as complexity, new hardware, other software requirements, and major dependencies.

Teena Maddox (09:27):

That sounds good. So Garima, what other applications do you see enabled by 5G in the next year or two?

Garima Garg (09:34):

Yeah, in the next year or two will be really interesting. We're going to notice it's not just about fast speed. Some of the use cases I'm particularly excited about in the next couple of years, number one is IoT. Imagine inexpensive sensors that can detect unsafe chemicals in water and proactively notify authorities about possible health risks or intelligent use of resources that can help reduce energy consumption or even support a smart energy management system. The second one I want to highlight is the healthcare where, whether you're a hospital inpatient or at risk patient at home, new devices and sensors could really revolutionize the care you receive while also lowering the healthcare cost. And last, but not the least, gaming, right? The super fast speeds, massive bandwidth and low latency of 5G ultra wide are helping to make gaming more collaborative, competitive, and accessible.

Teena Maddox (10:29):

Tareq, what about you? What other applications do you see enabled by 5G in the near future?

Tareq Bustami (10:34):

I think in addition to what Garima mentioned, private networks and industry 4.0, this is not just interest in this space. We're now seeing some real investment taking place in this area. The concept is that you will have underlying networks like 5G that are at the core of smart factories, future connected machines and intelligent AI. And the idea, again, a reliable low latency network is really an ideal intersect to build this new smart factory from. And that's an area NXP's excited about and well positioned to enable this use case in the future.

(11:10):

Another one that's also worth mentioning is the edge compute. The idea behind this is to get the network to be itself the cloud, right, or getting the cloud closer to the to the consumer. And we've seen multiple announcements, including the Verizon-Amazon announcement that took place last year. And this really will open up new use cases for developers doing work on smart cars, smart cities, and even IoT.

Teena Maddox (11:35):

Tareq, where do you see 5G headed, the big question?

Tareq Bustami (11:38):

I think where we started, we're barely scratching the surface. We're barely getting started when it comes to 5G. This is something that's going to take a decade to be rolling out. The first deployments are now in place and momentum is building, but there are new phases that are yet

to come. We discussed the concepts of densification, fixed wireless access, private networks, small cells, all of that has to come in to really realize the full potential of 5G. When I look at the ecosystem itself developing nicely, we need to push on certain areas of it to catch up, but a lot of learning still ahead of us, and there'll be some meandering and adjustments that are required as we go through it.

Teena Maddox (12:18):

Garima, what is your take on where 5G is headed?

Garima Garg (12:21):

Yeah, just to add to what Tareq said, right, crazy fast phone speeds are great, but 5G could radically change the way you're going to drive in future or shop or visit the doctor's office. It's going to shake up how we live and work. So 5G literally has the potential to transform not only internet broadband service, but it also enables new application and use cases say from connected cars that Tareq talked about, smart devices and IoT, smart cities, connected factories we talked about and the list goes on.

(12:53):

I know I've heard people say the word disrupted is an understatement when it comes to 5G. So one of the major things we are looking forward is how MEC and 5G can change the entire industry. I know Tareq mentioned it in the previous question, a lot of the most exciting 5G application that leverage machine learning inference such as smart factories, smart cars often can't afford the latency that is associated with the round trip from a device to cloud and back. The 5G and mobile edge computing, we reduce the amount of network hubs so latency sensitive parts of the application can be located as close to the network edge as possible, delivering unprecedented levels of computing power to the farthest reaches of the network. So imagine the number of use cases that we can unlock from here from what we talked about like in manufacturing or in transportation or in entertainment industry. I think it's just a start and there's lot more to unlock when it comes to 5G.

Teena Maddox (13:53):

Thanks very much, Tareq and Garima, for joining me for the conversation today.

Garima Garg (13:57):

Thank you, Teena, for having me.

Tareq Bustami (13:58):

Thanks for having us. Appreciate it.

Teena Maddox (14:01):

This has been another episode of The Smarter World Podcast with me, Teena Maddox. Thanks for listening and see you next time.