



## Expanding the Edge with Connectivity, Interoperability and Integration

Johnathan Collins ([00:05](#)):

Welcome. This is a smarter world podcast, focusing on the issues and technology behind today's connected world. I'm your guest host Jonathan Collins research director for Smart Home and Smart Health coverage at ABI research. So we're ABI research, been helping a range of players examine the far range of potential of edge computing and how it can drive growth and the value and appeal of smart home.

[\(00:27\)](#):

That's why I'm very happy to host this particular episode where we'll be discussing expanding edge capabilities and how combined with wireless connectivity, interoperability, and integration that will drive the next wave of smart home innovation. Now the potential for edge computing in the smart home will be driven by a number of factors. These will range across emerging consumer needs and why the smart home market functionality and potential. But realizing intelligent edge computing in the smart home will also demand support from a range of technology suppliers across hardware and software. And from device manufacturers to system providers. Today, we're talking with NXP and Belkin to explore their different perspectives on the potential for edge in the smart home. From NXP, I'm joined by Tom Panell, senior marketing director for wireless and from Belkin, we have Carl Jansen senior director of product management for the smart home. We'll come to you both.

Tom Panell ([01:21](#)):

Thanks for having us.

Johnathan Collins ([01:22](#)):

So before we dive into today's topic, perhaps Tom and Carl, you can tell us a bit about your role and how you view the expansion of the edge.

Tom Panell ([01:29](#)):

Yeah. So I'll go ahead and start. My role is to manage our products for edge processing. So that includes wireless and processors. How I define the edge is these are devices that either sense something or they're small actuators or they're controlled devices that allow a human to interact with a larger machine or interface to the cloud. To make that a little more tangible, a temperature sensor that would run for five years, that sits in my refrigerator is an example of a simple edge product, but a rechargeable smartwatch, like my Garmin Phoenix is an edge product that's a little bit more complex. And then lastly, something like a thermostat or an alarm panel that has richer HMI would also be an example of an edge product.

Carl Jansen ([02:22](#)):





I'm going to sell a smart home [inaudible 00:02:25] and clothing of [inaudible 00:02:26] brand alive for the last 12 year and we've gone through several transitions in the smart home space. For us an edge device can mean several things. For us it simply means that something was processed inside your home, or something is managed and all the data and connectivity is done inside your home, meaning that everything will still work in your smart home when the internet is down. So in other words, the edge can both mean something that's processed on any device, like interacting with voice control directly on the device versus going for cloud for translation. But more importantly for us, is that it can be home logic is managed inside the home, even if that's on a master home device. That's how we find the edge.

Johnathan Collins ([03:10](#)):

Right. You raised an interesting point and that's around smart homes having different topologies. So you might have a gateway or you might have devices talking directly to the cloud. Are we talking about different edge processes for those two different classes of devices?

Carl Jansen ([03:24](#)):

From our perspective when we talk about the edge, even though there are translations involved that can still be an edge device, but preferably we want to make sure that the technology can speak freely with each other. Not just that they speak the same language, but also that the networking protocol allows us secure [inaudible 00:03:42] connection.

Tom Panell ([03:42](#)):

Yeah, Carl touched on the networking and wireless aspects. I want to dig a little deeper into some of the other technologies that allow for some of the decision-making that Carl alluded to earlier. Firstly, if we look at the edge of the edge, so the very edge you have low power requirements, and these generally run on batteries. And so low power battery management is very difficult. You have to have the right mix of hardware and peripherals, an excellent MPU and MCU to manage or to do this processing. But the hardware is only one part. We have to provide software to make it easy for device maker to optimize their products for that end application. Jonathan, you're asking, "Do we have a range of products?" The answer to that is yes because in the simplest form, like I talked about earlier, you have the sensor and then at the more complex form, you have something like a watch or a thermostat or an alarm panel. These are a wide range of processors and have a lot of different capability needs from both the hardware and software perspective. So these technologies are very, very wide ranging.

Johnathan Collins ([04:57](#)):

So if we drill down on some examples, what's Belkin delivering that involves edge computing and edge processing?

Carl Jansen ([05:02](#)):

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We recently launched our first product we consider a native integration where we basically don't need our own app or onboarding device. You can onboard it with an NFC that's built into the device that automatically connects you with in the first case Apple Home Kit, which is the first ecosystem to allow that option of fully native integration. And then everything's basically managed through the apple home device, which can be an Apple TV or an Apple Home Pod. So that's our first attempt to enter the native integration market where app and cloud is not needed anymore. And this is a much more seamless onboarding experience for the customer where you don't need to download an app, sign up for an account, find what network you want the device to connect to them, [inaudible 00:05:48] update. All of that stuff is now fully seamless. From the network selection in that device automatically detect if you have thread border router, which we're going to talk more about in a moment, but thread border routers basically like a low power access point, similarly to Wi-Fi access points.

[\(06:07\)](#):

So it's not really a gateway that translates anything. It's more like the export or outage get the device connected to your network. If you don't have a thread border router, which currently is supported by Home Pub Mini and the new latest Apple team, then we'll fall back to Bluetooth. So even that needs to be managed, but from a functionality point of view, that device and peripheral, which only broadcast a button press in this case, this one will stage product is status button controller that fits with your Decora faceplates it could be put next to regular switches. But what it does, it's just broadcast signal when the user presses the button and then the edge processing happens on their Apple Home device. So this is Home Kit right now, but in the future, we believe with a matter protocol, just on an application layer, we'll be able to connect to more devices, including the Google ecosystem, which is very popular, and some Alexa smart things.

[\(07:07\)](#):

But the key here is that the processing of the signal and knowing what to do when you press the button happens on a home device that's inside your home. It doesn't have to travel to the cloud to figure out what to connect to. That's real world application. Only the more advanced example of that for us is camera quality. We have launched camera products in the past, and we're looking at other camera products in the future with ads processing, where the actual home device can today do artificial intelligence on the ads inside your home to detect whether it's a car, an animal or a person. So all of that is now processed on the edge. So there's no need to be streaming several of the video streams to the cloud to have advanced processing. The processing is now so powerful and physical, you can now do this locally on the edge.

Johnathan Collins [\(07:46\)](#):

So Carl, you mentioned the advantages to the consumer, but what are the benefits to Belkin in these devices? Is it just in appealing to the consumer or are there advantages beyond that to Belkin itself?

Carl Jansen [\(08:03\)](#):





For us, the user experience is key. With 12 years' history of devices with several generations, with modern products that you have to maintain and update firmwares and keep all customers happy, both the ones that bought your products many years ago and the ones that are buying them today is becoming an increasingly difficult challenge. It's getting nearly impossible to have a near perfect experience for everyone with these mixed systems. So for us, the clear benefit is it takes that burden away where it basically streamlines both the conductivity parts of wording all these translations and APIs with different ecosystems and taking that burden from the user, from having to sign up for a dedicated account. There's a lot of concerns about privacy and having a data storage somewhere, and now users don't have to worry about that. So the benefit for our users would benefit us because we can focus on making quality products that do what we are best at and not having to worry about those things that bring us very little value.

Johnathan Collins ([09:00](#)):

So Tom, Carl mentioned the great increase in processing capabilities required by these devices. What's NXP doing to deliver and support those requirements?

Tom Panell ([09:08](#)):

Yeah. When I was listening to Carl, he was talking about a really wide range of technologies from NFC for onboarding, to a stateless controller that runs on a battery, to a video application or photo application that relies on AI and ML. And I think that really demonstrates the challenge for a company like NXP to deliver this range of processing, because you can imagine there's quite a bit of different cost points along that continuum, as well as different performance points across that continuum. But to put it simply we deliver on hardware, software, and system solutions to our customers to make it easy for them to make or easier to make these products. We make a massive investment in process innovations with our fab partners that is really at the atomic level or the core of how we deliver exceptional hardware.

([10:10](#)):

These atoms need to be put together in a way that creates a hardware platform that allows a customer to scale their platform across a wide range of products. So when I'm talking about scale, I'm meaning moving from something simple to something more complex and having it be as much as incremental as we possibly can so that they can reuse technologies across their portfolio. That happens in the software where we try to take a holistic approach to delivering software. That means when a customer does something simple and a customer does something more complex that this software is reusable across that platform. This is really a concept that we call Edge Fast, which really is a promise of the scalability or interoperability across our hardware portfolio. And then lastly, we pull it all together in a system solution, which in its simplest form is really just an example application on our EVK. But we also make some specific hardware, software instances that are more closely approximate end customer applications. So you can see we're putting together a combination of hardware inside of an IC that runs the software that then puts it together on a board that really tries to accelerate a customer's time to market.



Johnathan Collins ([11:42](#)):

So we've heard about a range of devices in the smart home that can support edge and the range of applications that can be driven through edge computing. We've also heard about wireless connectivity and a single way of addressing these devices. That's becoming increasingly important. So how do you see the role of wireless connectivity as it interacts with greater use of edge processing?

Tom Panell ([12:03](#)):

For wireless, it really needs to be frictionless. So when you add wireless to a product, it has its pluses and minuses. From a consumer point of view, it's easy to install because there's no wires to run through their house. From my point of view, it's a little bit more complicated to deliver because it makes the end product a little bit more complex. There's now a stack that you have to integrate. There's a hardware in RF design. There's linked budgets that you have to worry about. Most people will want a wireless device because it's more convenient. Wifi and Bluetooth, if I can go kind of a further up to talk about protocols, wifi and Bluetooth are currently ubiquitous. They're in everybody's home today, but they have drawbacks. Wifi is expensive to implement. There's more components that a customer needs to use on their board.

([12:59](#)):

When I say a customer like a system integrator or an end product manufacturer, they have to use more components on the devices are a little bit more expensive. They're also more power hungry. VLE on the other hand is more simple, but it doesn't have the robustness. And when I say robustness, I'm talking about the reliability, the link budget, the distance that you can connect in a home. So it has its drawbacks. That's why things like SUB-GHz and 15.4 have really emerged in this marketplace because they have a more robust user experience. These are generally less expensive, that's why they have a place in the market. So I think, these as if we can focus on the smart home, it's really 15.4 technologies that in my opinion are going to win in a lot of these end sensor applications. And then of course, wifi, I think is still going to have a huge place in the smart home.

Carl Jansen ([14:04](#)):

Yeah. Also Tom, and I can add to that. From our perspective, we've been using wifi on the [inaudible 00:14:10] side for almost from the beginning and that's for the reason of simplicity. But like you said, wifi has drawbacks like costs. It's also time and latency is a huge factor in smart home. As an example, if you're streaming a Netflix movie and it's buffering two seconds and it [inaudible 00:14:29] two seconds later, you're fine with that as long as your audio is synched with your picture. And as you also notice that as a user. But if your light bulb turns on two seconds after you click the button on the wall, that's not a great experience. So there's different keys between these different protocols. So SUB-GHz, as mentioned has been low power as key, but also meshing has been easier to bring range and extension to network. Latency has been great. But here more recently, the biggest problem I see with low power and 15.4 has been the



translation aspect which brings both additional latency, but also expandability on application layer, because if add a new feature, you have to make sure that that features supported both on the API and the low power side, when the API on the gateway side, when it talk to the gateway, so you almost have to be upgrading the firmware for a gateway or bridge.

Johnathan Collins ([15:22](#)):

That's great Carl. You alluded to the long history of wireless and the smart home. And it's certainly been a battleground for competing approaches. Tom you've outlined the drawbacks and benefits of some of their specific offerings. We've seen ZigBee and Z-Wave, Bluetooth and wifi and other long-term proprietary offerings. Now we've talked about the value of IP all the way to the device. What's changed now and what's giving it greater momentum?

Carl Jansen ([15:44](#)):

I think the key change that I see is that the industry has come together. We have the leaders in the smart home ecosystem space being Apple, Amazon and Google in the US, coming together and join forces on making that happen. I think that's the biggest challenge I see.

Tom Panell ([15:58](#)):

Yeah I think you were alluding to Matter, the new a Project Chip. So Matter is the new name for Project Chip. We alluded to interoperability and that's really what we're dancing around here and Matter guarantees that interoperability. Matter is running on open thread, which is a 15.4 radio. As importantly, it defines an application layer that enables thread to inter-operate with other thread devices, but also for it to inter-operate with wifi devices. And Carl talked about not having this translation layer. That's a key point of thread. This is all IP based. So without having to deconstruct the packet and reform the packet, you can now have a protocol that just works. So it's more secure, it's more reliable and it's all being brought together by industry leaders that the Carl alluded to earlier on the CSA, which is formerly the ZigBee Alliance is really driving this new initiative around Matter and it's really based on what had been done in the past.

([17:17](#)):

It's being built upon the ZigBee cluster libraries, which are really product definitions of the various things that we may use in our daily lives. So that provided a really great starting point for Matter and it's just going to evolve from there. And I think what's changed here. We've seen in the industry, different initiatives to bring us all together, but it's never before then driven so hard by so many players. And this is what I think is different now. Matter is really taking hold because there's such a commitment by Google, Amazon, and apple, and then also device makers, product makers like us, and then folks like Belkin driving this. This is the difference now.

Carl Jansen ([18:05](#)):

Added to that maybe one more thing that also I've seen more from a technical point of view is that memory size in the devices have increased, which still has been a traditional challenge of



bringing IP to these low power devices as the stack goes and the security become more dominant. The numbers has increased and the prices dropped or stayed the same for larger memory sources which has been a key enabler.

Tom Panell ([18:27](#)):

This is a challenge because memory is an expensive thing to add to a device. And the memory has, as you've alluded to, Carl has grown a lot relative to where it has been in the past, and this is a challenge. So I think delivering more memory, both flash and SRAM is a challenge. And also wireless. Adding wireless to a product increases the costs. But I think as wireless becomes more ubiquitous as we move to advance nodes these are going to resolve themselves over time where the incremental cost of adding wireless, even with the increase in memory is going to be accessible for even the most simple products. So I think this is the exciting part about where we are right now in this evolution. From my perspective is we were now able to deliver a lot of capability at a really nice cost point. That's really accessible for a lot of products.

Johnathan Collins ([19:30](#)):

So Carl, when you look at Matter certification, what's the impact on a smart home device manufacturer like Belkin?

Carl Jansen ([19:36](#)):

I think very similar to mentioned before, not having to deal with translations the same goes for APIs between ecosystems. We don't have to make dedicated skills for supporting Alexa as an example, or integrating a dedicated API still to support any third party ecosystem. It doesn't mean that I often get asked, "Does that mean The Home Kit API and that Google Home would go away?" I don't believe so. I think they will still exist. That the Matter will be supporter as the common language for the role, this be a richer set of features that are supported as a competitive factor with the native language of the different ecosystems. In an analogy, similar to spoken languages Matter becomes like speaking English. My native language is Icelandic. I prefer to speak Icelandic if I meet an Icelandic person. That's just how we can communicate together, but we have a richer set if we communicate directly. So you know that if you buy a product in store that's going to work with your ecosystem no matter what ecosystem you have at home.

Johnathan Collins ([20:34](#)):

Obviously there's a lot of value in the collection of smart home data. With Matter removing a lot of that interaction between the device manufacturer and the smart home consumer, setting an app on the phone and creating their own login. Do you lose any value in that customer connection?

Carl Jansen ([20:53](#)):

I don't think so. I get this question a lot. People are saying, "Aren't you afraid you're going to lose the connection with the customer and not being able to offer services and so on?" I don't



think that's the case. And the reason is that it's a matter of not being afraid of technology evolution, just drive forward. This is where things are going. Whether you like it or not, then you should not fight it. You should embrace it. And then compete on the services we add on top of these people's systems. None of the ecosystems are going to be closed doors. I think with user consent, you can ask them to get access to their home data and then you get things that you're not just developing devices that could be all the devices you have in your home network to offer a certain service. So I think that's where things are going.

Johnathan Collins ([21:34](#)):

Absolutely. And that reflects the way that we look at smart home at ABI research. We have a concept of the transformational smart home, and that's really where the smart home becomes the foundation for a whole range of other applications that's just at the top of those smart home capabilities. So it's on the foundation is really dependent upon the establishment of industry standards. How important is NXP's role in their development and how do you see those standards developin?g

Tom Panell ([22:03](#)):

Industry standards are foundational to what we do, particularly in the wireless space. We focus on industry standards, such as open thread, wifi, BLE, ZigBee, NFC. And in fact, we drive many of these industry standards. Let's talk UWB, for example, NFC are two key examples where NXP has driven. Then of course, more recently wifi is an area that we're driving and leading. NXP and Freescale before that we're both founding members in the 15.4. So we've got a rich history of really driving these standards. And this is something that we focus on. I believe that these standards are at the foundation of what it's going to require to really make the smart home great. We can't have these niche things around proprietary hardware and software because it's not scalable for many manufacturers to do that. And so the CSA is bringing a lot together, as I mentioned before, and these standards are critical for us at NXP.

Johnathan Collins ([23:17](#)):

So as the standards evolve and the technologies enable edge processing develop and becomes increasingly adopted, where do you see the edge? And how does that evolve over time? What are the new technologies and devices that will be supported?

Tom Panell ([23:30](#)):

My perspective edge is going to evolve. Open source is a key thing for us in the evolution. I think that's an area that is really a differentiator when we talk about Matter, that's fully open source and what that's doing is it's making it possible for device manufacturers like Belkin to have lots of options. And that generally creates competition in the market and it actually drives innovation rather than creating obstacles to customers, switching vendors, or even developing the product. So I see open source as an equalizer, and it really is a way of opening up the markets. And I think that's a key evolution. We can go a little further in the way of AI and ML,





which I think is a key thing for NXP. And again, you see things like open source, really driving in that area as well.

Carl Jansen ([24:33](#)):

Yeah. I couldn't agree more on, I think that the value of that vendors should focus on is not having the best thread stack out there is the open thread is focused on having a better thread stack than other vendors. With [inaudible 00:24:46] as the device manufacturer have the same stack across the board. What brings value to us is the integration of these technologies into a solution that's quick to bring to market.

Tom Panell ([24:55](#)):

I think Carl, also from my point of view, the really key thing is, we've spent a lot of time in the past on interoperability between stacks and interoperability between one vendor's stack and another vendor's stack. And that is not productive. I think having this common stack really allows both of us to focus on the end product, which is the most important thing for our mutual customers.

Carl Jansen ([25:23](#)):

Yep. I agree. And in terms of where smart home is going and the edge, I would say now that we can focus on moving forward and we don't have to worry about this interpretability and on connectivity issues, we can now focus on the future. That's the key, similar to the self-driving car. We need the self-driving home. That's going to be the interesting era hat where companies can differentiate.

Johnathan Collins ([25:42](#)):

So it's clearly an exciting time for smart home, but let's take a little detour. How you both using smart products in your daily lives? What's the applications and the devices that you use the most?

Tom Panell ([25:55](#)):

I think I'm a little bit more advanced than say most of my neighbors and friends in this regard. We have a full complement of lights, switches, plugs, shades, and security. This is all connected. But ultimately I have to balance my desire to automate things with my wife's desire for me to automate things. It can get frustrating for my wife because her voice isn't always recognized by our voice recognition product. And HMI can also be a little bit confusing for people if they're not using the product a lot. So for us, our only limitation is ourselves in terms of know what we're able to accept and ultimately cost as well. It shouldn't cost me several hundred more to add wireless to my motorized shade. So I'm excited about helping drive the full cost of the ownership of these products down into something that everyone can afford.

Carl Jansen ([26:57](#)):





Yeah. I completely echo that the wife factor, I think everybody has the same. My wife doesn't like to use wash controls at all. And actually it was my wife that inspired me to put the Waymo stage product on the roadmap. She's saying, "I just want a single button to press when I go to bed. And it just turned off everything and close the shades. I don't want to try to have somebody understand what I'm saying." Often the simplicity is often overlooked. Personally I have pretty much everything in my home connected. You can think about several cameras, all my door locks are automated, my shades and my lighting, and I've gone through several generations. So I'm not the normal average user.

Johnathan Collins ([27:33](#)):

Thanks for joining me in this discussion about smart homes, especially about the greater intelligence that edge processing brings and the greatest simplicity of communications interoperability.

Tom Panell ([27:43](#)):

Thank you.

Carl Jansen ([27:43](#)):

My pleasure.

Johnathan Collins ([27:45](#)):

My pleasure. This has been another episode of the Smarter World podcast with me, your guest host, Jonathan Collins. Thank you for listening. We'll see you next time.