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PRESENTATION

**Voice-Over**

What do we mean when we say, "All you need is an idea and Intel inside?"

That in today's fast moving high-tech world, big ideas are powered by a one-of-a-kind partnership with Intel, because our customer-first approach is more than just a byline.

From the moment we put the silicon in Silicon Valley, Intel has been accelerating the industry in big ways.

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No one else is this obsessed with engineering a brighter future.

That's why we're driving the industry's biggest inflection points, putting intelligence where it's needed most, in ways that only Intel can, with the multi-architecture approach that empowers our customers to transform their businesses from the inside out.

We're democratizing AI in big ways, combining software and hardware to open up new possibilities.

And we're moving that innovation around the world at lightning speeds with our advances in 5G.

Collaborating with global operators and creating a new vision for networks of the future.

We're taking intelligence and bringing it to the edge.

Accelerating business outcomes with over 30,000 Edge to Cloud solution deployments.

And we're taking that same innovation to the streets, deploying new technology and advanced data layers to make autonomous driving not only possible, but safe and seamless.

Every day, we create world-changing technology that enriches the lives of every person on earth, making bold moves, because Intel has the unique portfolio breadth and depth, plus the global scale to serve as an unparalleled catalyst for our partners’ biggest ambitions.

So, if you've got a big idea, let's go off and do something wonderful together.

**Christopher J. Tan**

Hello, welcome everybody to the Intel Network Builders Enterprise Networks Insights Series. My name is Christopher Tan. I'm the Global ISV Partner Sales Manager for APAC at Intel, and I'm your host today for the webinar. Thank you for taking the time to join us today for this webinar, titled “Trends for Private Networking”.

We will start today with the presentation by Red Hat, and then head into the fireside chat with our presenters.

Before we start, I want to point out some features of the BrightTALK platform that may improve your experience. There is a Question tab below your viewer. I encourage you, our live audience, to please ask questions at any time. There is also an Attachments tab for additional documents and reference materials, which pertains to this presentation, which you can download. Please take the time to provide feedback using the survey tool. Your feedback is incredibly valuable to us in providing the content that you want to see and the solutions you need. Please take about five minutes to give us your thoughts after the webinar.

Intel Network Builders Enterprise Networks Insights Series takes place live every month, so check the channel to see what is upcoming, and access our growing library of recorded content. In addition to the resources you see here, we also offer comprehensive NFV and 5G training platforms through Intel Network Builders University. You can find a link for this program in the Attachments tab as well.

Today we are pleased to welcome Michael Tadault from Red Hat and Thomas Sennhauser from Intel. Michael Tadault is the Chief Technologist Telco in Red Hat’s APAC Office of Technology. He helps telco service providers become more agile, innovative, and efficient by adopting technologies like cloud native development, containers, virtualization, and open hybrid cloud, as well as changing their processes and culture to make the best use of these technologies.

Thomas Sennhauser is Chief Technologist and Business Lead for APJ for networking and communication business based in Singapore. He is responsible for supporting service providers, network equipment providers, and partners in their transformation journey with a focus on Intel’s initiatives related to communications network transformation and 5G wireless technology.

Welcome, Michael and Thomas, and thank you for taking the time to join us today.

Now, I hand over the platform to Michael to start his presentation. Over to you, Michael.

**Michael Tadault**

Thank you, Chris. Thanks for having me and Red Hat here. It's a pleasure to talk at this webinar series. So, I'm going to share what we at Red Hat, what trends we see in private networking.

Well, first, let's define better the topic, and what does it mean? So, some people call it private cellular networking or non-public mobile networks, there are different terms to call it, but fundamentally what it means is that you deploy a cellular network, which is dedicated typically to an enterprise or to a public organization, and the key reasons for doing this are highlighted on the slides.

So, first of all, it means sometimes there is an area of a country which is not covered by the public cellular network, so there's a lack of connectivity. So, typical examples like this are, for example, mining. The other reason is that there are obviously enterprises today that already have wireless networks, like for example, Wi-Fi, but then maybe there are some performance issues, there are some bandwidth issues that these networks are having reliability issues that these networks cannot perform. So, using 5G, first it was 4G and now 5G technology, is probably more suitable for some of these mission critical applications. For examples like public safety. And again, some of these enterprise equipments are quite unique and they require a customization and specific SLAs which are unique and they are better achieved by having a private network.

Reliability can be also very important, and although public networks are already very reliable, in some use cases like public safety, they have to be even more reliable, and for example, in the case of a catastrophic natural disaster, you may not be able to rely on the public network. In some cases, also, when this is deployed by an enterprise, they could get additional revenue streams from these private networks. Thelast key reason is data security. If you really have some extremely sensitive data, sharing it on the public network is sometimes not an option.

So, what are the use cases that we are seeing now for private 5G networks? Well, the difference with 5G is that it enables things that were not possible in previous private cellular networks, which were built on 3G or 4G. Some of these things are obviously related to the increased bandwidth that is offered by 5G, in some cases, the lower latency that 5G is going to enable, and there is also what is now possible with 5G technology. It’s also possible for telco service provider to share the existing infrastructure using a technology called network slicing, which makes it easier and more profitable to deploy private 5G networks.

So, the use cases are linked to industry verticals that are highlighted here, and there's some horizontal solutions that I can comment to many verticals, like video analytics. Video analytics is a typical example. You have video cameras, and then you use modern machine learning technology to, detect what is happening in a factory or whether the workers are working the proper security gear.

We are seeing also things like shipping ports. They need extensive networks, and they're looking at 5G private networks to improve their operations by, much more automation, but this requires, a very precise location of every devices in the port. There are many other use cases. I mentioned earlier, for example, mining. Here, the reason is very simple. It's very remote, there is no public network, and Wi-Fi was never designed to cover, a wide area of events. So, that was an obvious use for private networks, and the use cases are being improved with 5G.

Then, at the same time, what is also happening in the industry, and our audience has probably heard about this more and more, we also have edge computing, which is becoming one of the hottest discussed trends in the telco industry, and here, what it means, is that you are, putting computing resources much closer to where the data is produced. So, instead of relying just on centralized data center resources or centralized public clouds, it makes sense for some use cases, to do a local processing of the data. There are several reasons to do that.

One is that if you want to have quick action on the data that is being produced, for example, stopping very quickly an assembly line because you have detected an anomaly using a video analytic solution, maybe you have to use very low latency to reduce the amount of failed components that you are going to produce. So, low latency is one of the key reasons to do that.

The other thing, again, let's take the example of video analytics, if you do machine learning inference on these video streams coming from dozens, if not hundreds of video cameras, it is obvious that this has to be done locally, because it would be too expensive to backhaul the traffic to a centralized data center or to a public cloud. So, video analytics is one of the key use cases that can be achieved using edge computing.

The other one is data sovereignty. You want to have total control of your data, which means that it should not leave the location where it's produced or not go very far away where it was produced.

Another key reason is autonomous operation and removing any dependency on a centralized computing location.

This is not new. Enterprises, factories, all these verticals, have been deploying IT systems locally to do these kind of things, but what we are saying here with edge computing is that like cloud computing, this could be now provided by a third party, who will provide edge computing services to different enterprises, and the reason is the very same reason that enterprises are moving more and more to cloud computing and public cloud services.They want to outsource IT, and the operation of IT infrastructure. There is no reason that we cannot apply exactly the same trend to edge computing. Here, what we mean is that these edge computing resources are not provided by the enterprises themselves, but by a third party, which could be a public cloud service provider and, where I'm going to focus the discussion today, by a telco cloud service provider.

Edge computing also is already happening, and if you look at the use cases that I've shown for private networks and the use cases for edge computing, they mostly overlap. These are the same use cases.

As Red Hat, we have been very instrumental in enabling edge computing for telco service providers, because there is one workload, which is not only related to private network, virtualized radio access network, or vRAN. There are some leading service providers around the world, for example, Rakuten Mobile, who have already deployed a completely virtualized radio access network, and that's really an innovation that happened in the telco industry. In the telco industry, they have built private networks, which are mostly used for hosting virtualized mobile core networks, and now these private telco clouds, or what we call the telco cloud, are being extended to the edge. The first edge workloads that we are seeing being virtualized and supported by a niche telco cloud are the radio access networks, with things like vRAN and also Open RAN, and at the same time, the mobile core network itself gets distributed.

This can also be applied, and I will show it later in some diagrams, to private networks, which can also benefit from that trend. You see in this slide that what we are clearly focusing our strategy at Red Hat on the reduced backhaul. Especially regarding video streams, we think that AI/ML are going to be the first industrial use cases that are going to be deployed at the edge for the very simple reason that the cost of backhauling so much data, and to inference it in a centralized data center, would be too expensive. In some cases, also the lower latency is quite important. Here, you see a number of use cases like factory automation, predictive maintenance, process control, augmented reality that requires low latency, and so this is starting to happen, and the first use cases around that are being deployed.

Coming back to private 5G networks, and also edge computing, how these two relate. So, what are the implementation options? Well, one model would be for an enterprise to deploy a private cellular network on their own. In this case, your private 5G network. There are some large companies with the R&D and have the skills to do that completely separate from the public mobile networks. I'm not going to cover that, because I'm working for the telco service providers at Red Hat, so I'm going to focus more about what can be the role of telco service providers in offering, and how they can help enterprises use private 5G networks.

One of the key things, that a telco service provider brings is the experience in operating and managing a mobile network. One model that is shown here is the model that’s not yet deployed, but something that is possible going forward with 5G, is the mobile network infrastructure, especially the core network that the mobile service provider has deployed. All this infrastructure can be sliced. This is what is called network slicing, which means that it looks like you have different instances of mobile infrastructure, but in reality, it's something that is common, and it's maybe the same hardware from the same vendor, and it's one single entity managed by the mobile service provider, but it’s sliced, so this brings some economies of scale, because they don't need to deploy a separate core network, separate infrastructure for every single private network they offer to enterprises. Then, of course, you still have to deploy on-prem on the site of the factory, or of the mine, or the port. You still have to deploy wireless infrastructure, which is symbolized here by radio units, distributed units. This is then managed by a single, potentially, core network or a sliced core network.

The other thing I wanted to highlight here, is for example, you have a pure connectivity model, where the telco service provider is just offering the private connectivity. I think more interesting is that the telco service provider could combine this with edge computing, and instead of just offering the mobile connectivity, he could also offer, at a minimum, the the Infrastructure as a Service, or Platform as a Service, PaaS, capabilities that would be needed by these applications running at the edge, and making use of that private 5G network.

So, therefore, here we see that also he could offer an edge computing or the--sorry, the ETSI has coined this Multi-Access Edge Computing Platform at the same time it is providing also the local mobile network infrastructure, and everything still controlled by a centralized control plane for centralized operation and management. So, we are going to explore this and we think that's one of the most promising models, and the one that is where the telco service partner is going to be likely to attract more revenue.

And then there are different business models and revenue streams for telco service provider. The basic model here, and is extracted from a study by STL Partners, which is a consulting firm based out of the UK, and the basic model is Model A. The service provider is providing the wireless connectivity and maybe, to some extent, the edge computing resources like Infrastructure as a Service and Platform as a Service. There's a more extensive model where the service provider is also providing system integration for building these applications that the enterprises will require. So, it will help put these applications on top of this edge computing platform, help with the installation and help the enterprise set up, so it's an SI job.

And of course, the most extensive model will be that maybe for some verticals, the telco service provider will be able to offer a managed service. In this case, they're going to be offering a complete service that is going to be consumed by the enterprise. The big advantage of that model is, it provides recurring revenue streams on top of the connectivity revenues. But of course, the challenge with these different models is, it necessitates different skills, especially in IT system integration, as well as in building a complete solution. This will depend on what are the skills of a service provider and what is the appetite of a telco service provider to go into these areas.

And now let's come back. If a telco service provider decides to build private networks using such a model, there is a fundamental choice that he has to make. He has to choose between dedicated point solutions, which is very much how telco service providers have operated a lot of the times, or a common horizontal solution based on open source innovation. Here you see you have different vertical point solutions, bespoke solutions. Here you have one common platform that can be used for many different use cases and workloads. We think that the right model is the best model to go, because it doesn’t make sense for a telco to define one solution maybe for mining, another one for retail stores, another one maybe for ports. It’s just not scalable. We clearly think that using a single platform-based approach is the best one.

This is what I have highlighted here in this slide. Using a single platform for all the different workloads, which provides consistent operations faster time to market, and increased innovation, especially if this is based on open source technology.

Here, you can see that the three different important workloads for private networks and edge computing are sitting on the same horizontal platform. The mobile core workloads, the radio access network, as well as the edge computing solutions. And the applications that are really important for enterprises.

So, the way it would look like is the same workloads or network functions, but here there is a standardization on a common telco cloud platform to host all of these workloads. And the standardization is possible for the public network as well as for the private networks. Because this provides the maximum consistent operations across the board the maximum cost savings and provides the most scalable solution.

So, that’s what Red Hat is providing. We are providing such a platform that can host all of these workloads. It’s based on open source technology, which provides all the innovation that you have seen in the last two decades, all the software innovation. And of course, the value of a platform is the value of its partner ecosystem. And that’s also something that we have been working on a lot, especially in collaboration with Intel.

The solution we are bringing to the market to respond to this need, is the OpenShift container platform, to host these three key workloads, the core network, the 5G core network, the radio access network. So of course you need this for private network, as well as the edge application or the MEC application, with a focus on the AI/ML application. And we also bring management tools that make this kind of solution extremely scalable, because you will have hundreds, if not thousands of these OpenShift Kubernetes clusters if you deploy many of these private networks, together with edge computing.

And below, it just highlights that we also have made this platform very small for edge footprints.

So, first of all, to be able to attract edge application developers you should not require that these developers know anything about mobile networks. So, again, this goes against an edge siloed solution which is where people need to know mobile networks and have mobile networks expertise. The MEC component or edge computing component of that solution needs to be attractive to developers who are used to developing using containers, using CI/CD pipelines and common development tools. That’s exactly what a platform like OpenShift provides with a lot of cloud native development tools to enable quick continuous integration, and continuous deployment. Some of them I highlighted here.

And then if you are interested, you can read an IDC whitepaper which highlights the benefit of some of these developer tools. There are things like service mesh serverless, which are also becoming more and more important and making the life of developers easier.

The other important thing that I would like to highlight is that applications at the edge are usually just part of a bigger application. And again, you don’t want to change the habits of a developer. He's probably already used to developing on top of public clouds for generic IT applications. And there is no reason that when you are developing the part of your application that’s running on the edge typically a machine learning inference with some business logic, that you want to have a completely different development platform. That’s exactly what our OpenShift container platform offers. You can use exactly the same platform both for developing and for running applications on the edge with this bare metal on-premises deployment, as well as any on the public clouds.

On the public clouds, they can also consume the container platform as a fully managed service, which is what more and more enterprises want to do. They don’t want to deal with managing a container platform.

The message here is, the development platform should be horizontal, it should be available on all footprints. The edge, yes, private data centers, but also all the public clouds. This is what Red Hat OpenShift can offer.

It’s also a very popular platform. That’s also very important. What is the popularity and the acceptance of the platform in the IT world, in general? Here you can see, this was an industry analysis of last year. OpenShift is very popular for mission critical workloads already.

Last but not least, the ecosystem gives you the value of a platform. OpenShift has an extensive ecosystem of IT building blocks for developers to build their application. That is key.

Overall, all of these things make this container platform very attractive for general IT development, and therefore, it’s very attractive for developing applications at the edge.

The second ecosystem that is very important for such a platform is as a telco service provider, you also want to have choice of the networking workloads that you use to deploy the private networks. The main workloads we are talking about are, radio access networks and EPC/5G cores. As you can see, the Red Hat OpenShift has already achieved very wide acceptance by the telco industry and every single major vendor has either already offered their 5G cores on OpenShift, already tested them, or is about to-- or this is in the pipeline and will come out soon.

Just very quickly, as a couple of proof points, you can see here that many different vendors have already validated their 5G core networks, as well in some cases vRAN workloads on top of the OpenShift container platform.

One of the highlights I will show here, which is completely public, for example, Foxconn Industrial Internet has a complete solution for Industry 4.0 including private networking.

And that leads me to the end of the presentation, where I would just like to highlight, to make this easier to consume by telco service providers, it’s very important to develop solution blueprints, the reference architecture which makes the deployments of such solutions less risky, and also faster.

One of the key partners we are working with on this is, of course, Intel. We have a very long-standing relationship with Intel since we started this Linux journey. There is something called the-- Converged Edge Reference Architecture, and I think that now there's a new name for that. There is the Intel Smart Edge.

This is reference architecture and blueprints to enable solution providers, ISVs to quickly define a solution for the edge. So, this is running, and we have tested this on top of our container platform. The other key things that we have done together with Intel was also, for example-- OK, so OpenShift is based on Kubernetes and cloud native technology. I think both Intel and Red Hat were instrumental in adapting Kubernetes for the requirements of the telco service provider, with things like data packet acceleration, very precise timing for which is very important for the radio access network. And also some other technologies, which are very important for high throughput workloads. You know, you see something like DPDK, which is also very important for enabling some of these workloads like the 5G core.

The other thing that we’d like to highlight, is also some solution for networking, which can be used to reduce the footprint for example of a 5G core network, this is called Barefoot. That’s, highlighted in one of the solutions that I'm going to show here.

So, just some examples of what we have done in this area. So, I highlighted we have a partnership with Foxconn Industrial. In fact, they have deployed a complete Industry 4.0 solution already for themselves in some of their leading factories in East Asia using 5G. And they are offering this also as a solution to other manufacturers.

We have developed 5G in a box solution for private networks together with Lenovo and Casa Systems, which offers 5G, RAN, and core network, and NearbyComputing, which offers orchestration for edge applications. This is also based on the Intel Smart Edge blueprints.

As I mentioned earlier, the Intel solution is used in a solution like the Kaloom Distributed Edge. And here, in fact, in just three rack units, you can have an entire UPF, the switching fabric for all your edge service, as well as your OpenShift control plane, meaning that it’s a very small footprint for an optimized edge.

And last but not least, we have also developed a reference architecture for MEC edge computing and CBRS, together with Dell Technologies and CommScope. This is also based on the Intel Smart Edge footprint.

If you are interested there are more details about these solutions in the references below.

Thank you for listening. Back to you, Chris.

**Christopher J. Tan**

Thank you, Michael, for the excellent presentation. You covered a lot of ground, and I think lots of stuff there for the audience to take in.

I'd like to transition, at this point, to our fireside chat session for the webinar, and also bring in Thomas for his point of view on some of these topics that we talked about.

Again you shared a lot of use cases, the technology challenges, some of the opportunities there. Maybe, at this point, I just want to kind of talk also about the business side of things, and have your take on it. If, today, you are a telco service provider, maybe from your views you could share with us working with some of the customers in the region, what are the business challenges, right, for them to get to private 5G networking? And maybe I’ll have a view from Thomas and then I’ll have the view from Michael.

So, Thomas, what is your view in terms of what are the business challenges that telcos will face or possibly could face when they are trying to look at private 5G solutions?

**Thomas Sennhauser**

Yes, a really good question. I think one of the challenges is the industry knowledge which the telco operator maybe have, maybe not have, because you need to understand the industry, where you want to go in and what is the business benefit. Because in general, in the telco industry where we come from, we talk a lot about connectivity. How to build the connectivity. But when it comes to private, 5G private networking, edge, it’s more around the application you run on top of it. As Michael said you want to deploy an application very close to the customer where the data is created.

And I think that’s a business challenge for the telco operators to bring those business benefits to the enterprises and also focus into which is the right industry to start with and drive that development into that.

So, I would say that’s, from my point of view, really one of the challenges to get there and I think that’s where the world is. I think the technology is ready to do it, it’s really more on that business model and how to drive that for them.

The other part is also a little bit depending on the country. 5G is in the last couple, two, three years now commercially available. There are also questions around some countries have unlicensed, some have a licensed model, so depending on that, that’s also some impacting, not from a technology point of view, but again from a business model point of view, how can you create value to the enterprise customers.

**Christopher J. Tan**

OK, and maybe, Michael, you would like to comment on that as well?

**Michael Tadault**

Sure, yes, I completely share the view of Thomas because telcos are usually presenting the same thing to many people. That’s the normal business model. Even when they have B2B business, it’s mainly wholesale or SIM cards, so it’s a very horizontal model.

The transition to that kind of model where you focus on a specific enterprise customer is difficult. Some telcos already do it, so they will be in a better position to do that, because they already have extensive B2B arms with more sophisticated, system integration capabilities. It will be easier for them. So, these are some of the challenges.

And there's also, obviously, a skill challenge knowing the industry, being able to deploy these solutions, which is going to be slightly different from a public network.

I would like also to highlight this is an opportunity, at the same time. The telco is in a unique position to provide these services, because of their expertise in providing a cellular network. They can bring that expertise and the relationship with these enterprises already. They have complained in the 4G world that they build the network and the OTT took all the business, but you also have sales. You have this unique relationship with customers already. They trust you for wireless connectivity, but it’s also an opportunity to provide these private networks. And also, they have some capabilities, which are unique, which is also highlighted by one of my colleagues, when I talk to him.

So, example, roaming between a private network and a public network. That’s something that they can be in a very good position to offer, and to offer first. So, they have also unique capabilities to offer such kinds of features will make a differentiation.

Aat the same time, we also see other entities like the big public cloud providers moving into the realm of networking and they have IT skills, but they don’t have the wireless skills. So, they have to be careful, because they know maybe somebody else is going to take that market.

So, it’s also an opportunity to sales.

**Christopher J. Tan**

This is good to hear. We talk about some of these challenges and the skill sets in the industry. You shared a whole list of use cases out there that we, from a technology point of view, we think is possible, and some of the nearer term ones, like the Industrial 4.0 stuff and things like that.

Bringing this back to maybe this regionand the telcos that we know of. What will be your advice in terms of what is probably the best near term use cases, and why? Why do you think these are the ones? And the second part of the question, obviously, would be if they choose these use cases, what would be that path for them to commercialization look like, and how do they monetize that investment?

Michael, maybe you'd like to start off with that.

**Michael Tadault**

Sure. Again the ideal use case for a telco is a horizontal use case, because it’s building one thing that you can provide to as many customers as possible. When we look at these different use cases for edge computing, private networking that I highlighted, one of the use cases is really linked to the local processing of data, because some things are really not possible in a centralized model, so they have to be decentralized, which favors edge computing. And they are also enabled by a private 5G network, because now you can connect all of these devices and you can get a lot of data from them, because you have a 5G network. But at the same time, because there's so much data to process, you have to do it locally.

So, the entire strategy of Red Hat has to be focusing on AI, machine learning-related use cases, and we are building an ecosystem around this. To be more specific, my personal opinion is, there's going to be a lot around video analytics. Why video analytics? Because there's so much data. Maybe some use cases you need a full HD camera, you need maybe 4K in the future, whatever, but there is too much data to process to put this in a centralized location. So, this forces you to use edge computing, and this is enabled by 5G the high bandwidth video cameras et cetera.

So, I personally believe as part of a subset of AI/ML, the video analytics is the number one horizontal use case that you can apply to all industries. It’s applicable to retail stores. We have been successful enabling a use case like this with a Japanese fixed telco. It’s about theft detection in stores. We have been involved in another project in EMEA where, in fact, they're using video analytics for crowd detection, crowd management.

And it makes a lot of sense. As an enterprise, maybe I don’t want to develop my own video analytics solution, I want to buy it as a consumable service. And then the combination of private 5G networks and edge computing, together with this managed solution makes a lot of sense.

**Christopher J. Tan**

OK, and Thomas, would you like to add-- to bring in on this?

**Thomas Sennhauser**

Yes, no, no, I just want to double-down on Michael’s feedback on the video analytics. I agree on that too. I think that’s really the no-brainer.

And the other part is also, as Michael already said, another topic is also you can have different sub-use cases with the same technology. So, you can have one video stream and you can then have different applications on top of it, which through different AI/ML stuff on top of it, which makes it even more reusable, and from a cost point of view, much, much easier to leverage that. So, that’s I think really a critical point. And we see that. I mean we have a lot of use cases in different industries, and really, the most common one is definitely the video analytics.

When it comes a little bit on the focus point at telcos we have a lot of discussion where should we start? Which is the right industry? What is the right part?

I think one of the key things is there is a lot of nice and cool and very, very impressive demos around with all the use cases at the end of the day, which are very attractive when you have a lab or when you do a demo with customers, which are impressive, you know. But I think to be where they think the money is, and money means where can an enterprise save costs, where is really where they can get things which they can really save OpEx cost or CapEx cost in the long run? And I think that’s where-- if I would be a telco-- that’s where I would start.

From an industry point of view, my personal view again is it’s really in the mining, in the oil industry, and in manufacturing. Why? Because they are the places where you have either high maintenance cost of equipment, which if they go down or they have one hour not working, you lose suddenly a few hundred thousand dollars. The other part is they need a lot of analytics about maintenance et cetera. There's a lot of video analytics for security if something is happening that you can secure your people. So, there's a lot of this easier use cases to develop and to be successful. Versus maybe in other industries, which are nice but the cost savings are just not there, so that’s a little bit the part, I think, which people should look into and start from that.

**Christopher J. Tan**

Yes, great insights. Sorry, yes-- Michael, sorry.

**Michael Tadault**

There's one thing I would like to add here is that coming back to the video analytics use case. And I think here this highlights again the importance of having a common platform that you can reuse for many use cases.

So, if we took the video analytics use case you are going to do a local inference, which is applying your machine learning model. Typically, this might require a GPU. GPU is quite an expensive piece of equipment. It’s better you have this on a horizontal platform that you can share with all use cases.

This is where we have worked together with Intel in enabling this Kubernetes platform and doing things like, sharing of these devices across whether it’s networking-- we have done a lot of work with Intel on this-- sharing this very expensive piece of equipment among different workloads.

We are not sure what's going to be the killer use case. Nobody knows that. We are all conjecturing about that. But if you invest in a future-proof platform, that is able to support all of these use cases including sharing all the resources that are needed for all these different applications, you're securing your investment, instead of a point solution only for one use case.

**Christopher J. Tan**

Good, yes, good advice there. The final question I want to put to the two of you is, if I'm a telco and now I agree with you, I bought in, I want to go do this, how do I start, and why would I choose Intel and Red Hat as opposed to, -- you showed the ecosystem, there's a lot of others, it’s so confusing, right. Where do I start, right? Maybe you give some advice on what does Intel and Red Hat bring to the table to help me make my first step? Maybe, Thomas, you'd like to comment?

**Thomas Sennhauser**

Yes, maybe I start with it. Yes, I think that the thing is, as you say, there's a lot in the market now, and it’s sometimes a bit confusing. So, I think the benefit working with Intel and Red Hat together is, as Michael said before you don’t want to deploy siloes of these kinds of things, and then you have to deploy different services, and you cannot leverage. So, you want to build a kind of a platform, which allows you to run multiple services on the same platform. So, that’s one thing.

The other part is there is a lot of knowledge we-- the two companies have over the last three, four years where we spend a lot of time on edge and private networking. And private networking, just to be clear, is not something new just because of 5G. There was private networking also in 4G. So, it’s nothing which is completely new now. With 5G, of course, there are more use cases -- you know, latency and a lot of the things is getting easier to get there, so that’s why we see a lot of demand on that side. And we have a lot of blueprints which we can start to help on the architecture, on sizing. You know, what is the right sizing parameter for that and why is that?

The other part is we have labs where we have joined-- where we can bring in partners to run on our platform, testing that. A lot of them is already there. We have a super open ecosystem. Because at the end of the day, there is not a single partner or vendor in the market who can solve your problem.

And as Michael also said nobody really knows-- there's not a killer application in the market, so you need to have an open platform which doesn’t have any lock-in on anything, so that you are flexible in the future. And the other part is also the sharing. Maybe some place you have some specific capability, which you want to be able to share to different services and not always have to build the full block directly into that.

And the other part is really the partners we can bring together to drive that. And not only on the POC and trials. We can also have it on the business case and give input, and industry-neutral parameters, which can help to drive that journey together with the operators, with enterprises together.

**Christopher J. Tan**

Michael, would you like to add to your view?

**Michael Tadault**

Yes, so there's one thing that, we have to thank Intel. Thomas just talked about the openness, so the big thing we have to thank Intel and others is that you have opened the network, to general purpose computing.

OK, so in the past, all the mobile network infrastructure was black box things provided by the big network providers. What has happened in the last couple of years is that the mobile core, and now more and more the radio access network is also deployable on these general Intel-based servers, which enables the small footprint and the economies of scale.

So, it’s not just the applications at the edge that you can put now on these generic servers, it’s also the core, as well as the radio access network.

So, in fact you can have the same platform. This is thanks to Intel and the great ecosystem together with Red Hat that we have created, so that almost everyone except maybe the radio unit is now running on a general purpose computing server.

But it’s very difficult for telcos to do that, they should also not look at this in a siloed way. That’s the problem I see. Because to have this small footprint and have these maximum economies of scale of a single platform, which can host both the mobile network component as well as the edge applications, they need to collaborate and have a common strategy across the B2B department across the mobile infrastructure department. Otherwise the B2B guys are going to choose one solution for private networks, and the guys deploying the big networks, which is also getting public networks virtualized and other solutions. Whereas, in fact, they could synergize and put their requirements in common.

So, that’s one of the things, also it’s not where you start, but it’s advice in the way to approach this problem. Again, if it’s too siloed, it will not result in an optimized solution.

**Christopher J. Tan**

Yes, great discussion that we had, right. I wish we had more time, but we’re kind of out of time now. And I'd like to thank Thomas and Michael today for a great session sharing. We may have not addressed every question that the audience out there might have and so we would love to hear from you and we have now shown you some contacts that you can feel free to reach out to us if you have further questions.

With that, I'd like to thank you for joining us today. Please be sure to fill out the five-minute survey in the Attachments tab. Your feedback is very valuable for us in providing the content that you want to see and the solutions that you need out there.

Also, be sure to join us next time, November 18 at 1 p.m. Singapore Time. We have another wonderful webinar coming up titled “Finding New Paths to Enterprise Growth in the Disrupted Communications Landscape”, and this is done in conjunction with Accenture.

So, once again thank you for joining us today, and this concludes our webcast. Have a good day ahead, thank you.