Transcript from a conversationbetween Keith Parsons, Chuck Lukaszewski, and Mehmet Yavuz about the partnership of Celona and Aruba announced November,17th, 2020:

**Note. This transcript has been edited for clarity and ease of reading. If you notice any mistakes or misrepresentations in the transcripts, please contact help@wlanpros.com

A Special Announcement from Aruba & Celona
November 17th, 2020

Keith:
Welcome. my name is Keith Parsons and today I have Mehmet and Chuck with me. and we'll be talking about Celona and Aruba and some announcements they may want to mention today.

First. can we do a couple of introductions?

Mehmet you want to introduce yourself and the company you work with?

Mehmet:
Thanks, Keith. Hi everyone. I'm Mehmet Yavuz. I'm the co-founder and CTO here at Celona. My background is in Cellular Wireless. I was VP of Engineering at Qualcomm for more than 15 years, working on the design and development of 3G, 4G, and 5G networks. I was leading the small cells and indoor cellular efforts at Qualcomm Corporate R&D.

In 2018 I left sunny San Diego and moved to the Bay Area. I was the CTO at Ruckus for a while, and then at the beginning of 2019, we started Celona where I was one of the cofounders and CTO there.

Keith:
Sounds like a nice background. You have both the cellular side and the Wi-Fi side

Chuck?

Chuck:
Thanks for having us. I'm Chuck Lukaszewski. I'm VP of Wireless Strategy at Aruba. We are the networking division of Hewlett Packard Enterprise.

I'm familiar with a lot of folks probably in the audience and I'm very excited to be able to be here together with Celona today and talk to you about an exciting new development.

Keith:
We have Celona and Aruba here today, anything you want to perhaps announce for us?

Mehmet:
We have some exciting news. We have a partnership with Aruba.
At Celona we bring LTE and 5G technologies to enterprises which really compliments Wi-Fi.

What we have been hearing from the end customers is that they need both Wi-Fi and LTE in their environment. What better way to do this than with a trusted partner like Aruba who is a leader in the enterprise space?

At Celona we offer a complete end to end solution for CBRS LTE and 5G, including both indoor and outdoor APs, Core Network Management Systems, and so forth.

Unlike the traditional LTE solutions, we have a similar vision with Aruba in terms of ease of deployment; cloud networking solution; and integration with role-based policies in an enterprise environment.

So, we feel great about our partnership with Aruba

It also serves as a great validation of Celona honestly. Also, with Aruba, we gain a wide market reach, which means we can basically sell more and sell faster.

Keith:
That sounds like a good combination.

Chuck from Aruba's standpoint why Celona?

Chuck:
Maybe just provide a little more granularity on the partnership. Aruba will be reselling Celona's product portfolio; they'll be on the Aruba price list. we have been monitoring and studying the private LTE opportunity for quite a few years now.

The audience probably doesn't know HPE is a very significant provider of
core software servers and storage as well as professional services to operators all over the world.

We have a huge presence at Mobile World Congress every year. Actually right next to the Qualcomm booth where Mehmet and I used to "bop" back and forth.

In terms of the "Why Celona and why now?" first of all our customers have been asking us increasingly about private LTE over the last year as the CBRS band initially was open for GAA operations.

And we'll talk about the acronyms later so if those are new to you.

And then of course the PAL auction completed just in the last few months, so we thought that the time really is ripe for a partnership.

Secondly, the Celona team, a lot of whom are good friends and have worked at Aruba in the past, think very differently than the traditional cellular equipment providers.

The Celona product is really designed by enterprise networking people for enterprise network architects or customers.

Just the whole way the Celona solution is built is really best in class. it's designed to plug into enterprise architectures in a way that is very novel and offers a lot of flexibility.

Finally, you know in terms of "why Aruba?" we're uniquely positioned I think to really help partner with Celona and bring them to a lot of this sort of medium and larger sized customers that we've served for many years whom we think are probably in the best position to make early investments in CBRS and help prove the market

Keith:
So, it's a partnership and Celona is still selling Celona gear and Aruba will also be selling Celona gear.

As an Aruba reseller, is this going to just be a new SKU they can order like any other item?

Chuck:
I think that's the vision initially. Because it's a new technology we're probably going to be a little careful about who gets involved in which opportunities, as I'm sure you can appreciate. but the ultimate vision is that this would be like any other Aruba product available to the channel.

Keith:
One of the unique things about Celona is they don't act like a big cell company. they're not Nokia or Ericsson, and it's designed to integrate well.

Say you had an Aruba infrastructure; switches, routers, racks, APs, PoEs, all the things that we normally do for wireless, what extra parts would you need to add this Celona layer?

Mehmet:
Here you're seeing the Celona architecture and it has multiple components. But the first question is,

"Isn't LTE and 5G complicated? How do you make it simple to deploy and operate?"

We've been really working hard to bring an integrated end to end solution that is like a one-stop-shop infrastructure and integrates well with the enterprise.

First, you see the cellular radios here, which is a collection of LTE and 5G access points. We provide both indoor and outdoor APs which are plug and play and covers a variety of use cases.

The RAN is the APs both indoor and outdoor, and then we have the Celona Edge. Which basically all the APs connect to the Celona Edge over the local enterprise network. And it's a complete software solution. It's essentially a cloud-native service play.

And then we have RAN and the Edge.

The SIM activated devices are configured through the cloud-hosted Celona Orchestrator. This is the brains of the whole network.

As the fourth component, we provide the SIMs, which are required for LTE and 5G for the end devices.

Our customers can provision the SIMs remotely using the device management services.

At the end of the day they plug in the APs to connect to the local Internet, then they download the Celona Edge software, and then they log into the Orchestrator and activate the network and mobile devices.

We basically created an overlay network that's up and running in minutes. This is the part that you were talking about earlier in terms of an overlay solution.

Chuck:
Can I just jump in for a second?

Keith, this is part one of the answer to your question actually with respect to the Celona overlay itself. One of the things that are so exciting about this for us is it's a complete turnkey package. this is not the normal scenario in the cellular space today.

Deploying a private LTE network from most suppliers is a little bit like building a kit car or maybe a kit airplane. It's a real "do it yourself operation" with a lot of different components and a lot of duct tape.

Celona has done a really beautiful and elegant job of sort of doing for private LTE what Aruba did for Wi-Fi. You'll remember we also introduced the overlay concept.

Keith:
The radios are obviously APs, they have a different name in the cellular world but we'll call them APs. Is the Edge an actual appliance or it's a cloud-based system?

Mehmet:
The Edge is essentially a software solution, a cloud-based software solution. And our customers typically run Edge on their environment. Sometimes, if a customer really requires an appliance, we can ship them an appliance. but a majority of the time, it's cloud-native software they download and can run on their VM environment or server environment as they need. In some cases, can even run on the cloud as well.

Usually, they prefer the Edge to run close to where their enterprise applications are because that's one of the benefits of LTE and 5G - to bring predictable reliable performance for those applications.

Chuck:
You're looking at effectively two overlay networks side by side, which then leverage a common core infrastructure. From a RAN perspective or radio access network. if you don't know the RAN term, you're going to be very familiar with it from here out.

But I want to just also then emphasize the LAN and the compute bit. Another aspect of this which is novel, and we'll talk about a little more I think in a few minutes, the Celona solution is designed to plug into an enterprise infrastructure and it imitates other enterprise network devices from a Layer 2 Layer 3 perspective.

For those in the audience who don't know, cellular devices don't have a 48bit MAC address, that's an IEEE thing that we see in Ethernet and Wi-Fi. it's done differently in the cellular system. To connect those two RANs, those two network types together, and then be able to apply policy in a sophisticated way in the enterprise, requires some real innovation, which Celona has done.

And then on the router part, I want to highlight just that particular box for a minute. There's another aspect of the partnership that I think we're going to see that is really useful. We recently announced the acquisition of a company called Silver Peak, which is a very significant player in the software-defined WAN business.

Private LTE systems will need some amount of wide-area connectivity that is purpose-built. So, for example, if in the neutral host case, I have to connect voice calls to a cellular operator core. That's going to have to be done over some type of VPN.

If I think about an enterprise customer with dozens, or hundreds, or maybe even thousands of sites, that WAN router bit, which is so small in this diagram, actually starts to get fairly complex. Again, the Aruba portfolio is kind of uniquely positioned to combine and unlock the value and make the solution much more deployable.

Keith:
Mehmet, you want to continue with the parts here? I'm gathering the blue ones are Celona and the orange ones are Aruba?

Mehmet:
Exactly. You see the APs here, you see the Celona Edge that we talked about, and then you have the Cloud Orchestrator. That's how all these different pieces come together.

You see the symmetry with the Wi-Fi components here? The key aspects are the plug and play nature of the APs and the Edge. The integration of this whole solution to the enterprise backend in terms of the policy management and device management, also just using existing switches and so forth.

This is really very different than what is out there today. If you look at the current cellular and LTE solutions, they are basically a separate network that is deployed with their own infrastructure. They provide no integration with the enterprise, giving no visibility to the IT.

So, we are really excited to bring this solution as a complement to Wi-Fi in the enterprise environment. There are several unique features that we bring in. I think we'll talk about those. We can also talk about the technical features that come in with the CBRS and LTE.

Keith:
How does CBRS make Wi-Fi better when adding this new LTE component. If I was a customer, why would I need that? Why wouldn't I just put in more Wi-Fi?

Chuck:
It's absolutely true that there will be CBRS deployments with single radio end devices,
endpoint devices, which we call UEs in the cellular world. Examples of those might be IoT devices, video cameras or sensors, maybe autonomous guided vehicles.

Our customers again have been talking to us for some time about multiband, multi-radio endpoints which have a Band 48 radio, LTE radio, and a Wi-Fi radio. They want to be able to use both in interesting ways.

For example, if I think about a rail yard, a container terminal, it's a couple of square kilometers. You would want to be able to have really economical wide-area coverage, with good speed good rates, and reliability.

But I probably don't have a lot of vertical assets with power and backhaul technology like CBRS which is really tailor-made for that.

Maybe when I roll indoors, I've got an existing Wi-Fi footprint so I want to roam from one to the other. The two technologies are very complementary in that respect. And there are all kinds of other use cases along that vein.

I used the term "RANs" earlier. Enterprises already have multiple RANs today; Bluetooth, Zigby, Wi-Fi. This is just an extension of an existing buying trend to add cellular RANs to the enterprise portfolio.

Keith:
Well, we've known that cellular frequencies and LTE technology are way better than Wi-Fi for a lot of situations. In the past, we haven't been able to, as Wi-Fi engineers, take advantage of that because you have to deal with all the MNOs. That can be very complex both politically and business-wise.

Mehmet, is there something that Celona is doing to make that easier for a company to integrate and get access to that LTE without having to deal with all the big MNOs?

Mehmet:
Absolutely. One key ingredient here we have to talk about is the CBRS band. This is what Chuck was talking about earlier, the broadband radio system.

Here the FCC allows the use of the 150MHz spectrum by entities like enterprises. It is not the traditional license spectrum anymore; it is a new band. LTE and 5G devices work on this band. You can deploy your own network in this band and utilize those devices as part of your network. You can utilize mobile devices as part of your network.

This is a key ingredient and we've been driving this for quite some time. The discussions have been going on for I think almost six years. As of the end of 2019, this band became commercial.

Now you have spectrum. You don't need a licensed spectrum, you have the CBRS spectrum. All you need is a solution as we describe here, which integrates with your existing enterprise infrastructure and leverages this spectrum.

This is a clean predictable spectrum that integrates into your own premise, in your own enterprise environment which you can have at the end of the day as part of the network.

This brings a bunch of benefits as you said, and it complements Wi-Fi. First of all, it's new spectrum, clean spectrum, up to 150MHz of spectrum.

You can put more business-critical applications in this band. We see a lot of use cases that really can leverage this new spectrum with the private LTE and the 5G technology.

Keith:
Talk a little bit about the 150MHz of spectrum and about the PAL auctions we just had. Can you describe what PAL is and GAA? And why an enterprise, even if there was a PAL auction in their area, still has access to spectrum?

Mehmet:
Basically, we said there's 150MHz of spectrum. This is kind of divided into two groups. One is the PAL; the Priority Access Layer, and that goes up to 70MHz.

The second part is GAA; General Authorized Access. It's also referred to as the "Third Tier". It has at least 80MHz and can go higher depending on how much PAL is used. Essentially there are some incumbents as well that may use a small fraction of the spectrum in certain locations. But essentially if you're an enterprise you have access to 80MHz of the GAA. If the remaining 70MHz is not used by the incumbents or the PAL, the recently auctioned second tier, then you can even expand your spectrum usage from 80 up to 150.

We've done a lot of analysis based on this PAL auction recently. Our analysis shows that pretty much all the enterprises should have access to 100 to 120MHz of spectrum out of the 150.

There are a lot of different aspects here. If, for example, a PAL is not deployed, if that license is not used, the enterprise has the rights to use that remaining part of the spectrum. Many indoor deployments get a lot of isolation from the outdoor deployments and so forth.

The summary is, you have at least 80MHz, probably 100 to 120.

Keith:
So basically, those enterprises who are afraid,

"If I get into this, is someone is going to take away my spectrum?"

They can feel confident that they'll be able to have spectrum (if they design it properly) and no one's going to take it away?

Chuck:
Yes, exactly. And so the sound byte for what Mehmet was just talking about which the policy folks use is "use it or share it". And that is a fundamentally new concept in spectrum management. It took a lot of years, with a lot of people to get the FCC to adopt that approach.

What that means is exactly what Mehmet was saying. Even if an entity has bought the PAL in a particular county, until and unless they actually deploy equipment in a given location that spectrum is available for GAA use. And even for the entities that acquired PALs.

The PAL auction generated about 46 billion in proceeds, most of which were bid by traditional cellular providers as well as some of the cable providers.

If you think about where a cellular company puts towers it's near freeways, it's near dense metropolitan areas. There are lots of other spaces in a lot of counties that are not necessarily going to have CBRS coverage from a PAL holder. So net-net the analysis that Mehmet is talking about is we do believe there's going to be more than adequate spectrum, indefinitely, to run multiple different types of enterprise use cases.

Mehmet:
Spectrum is really important, right? Clean spectrum is of utmost importance. And the way that LTE and 5G technologies are designed is such that even if you have a spectrum of 80MHz let's say, if all the PAL is taken, you're left with 80MHz. You still get great performance because the network, the whole technology is designed that way.

Look at operators like Verizon or AT&T. The whole spectrum they have today is barely more than 100MHz. In the world of cellular, 80MHz or 100MHz of spectrum is a lot of spectrum. It's designed to be efficient to use the spectrum.

Then you can get cell splitting and always densify the network. I just wanted to put that into the context of the cellular space.

Keith:
I think that leads to a great segue to the next question specifically about spectrum. We're used to talking about 20s, and 40s, and 80s in the Wi-Fi world and now even maybe the 160s. And then the whole new 6Gig area which we're not even going to touch today.

But that 80 that you talked about, why is the technology different? And what are the slices that you're looking for in a CBRS deployment? You're not going to dedicate all 80 like we would in Wi-Fi. Could you talk about that?

The second part of that question is, what are the differences from an AP standpoint? One of our Wi-Fi APs covers a certain size area. What are the areas the CBRS AP would cover?

Mehmet:
Your first question, how is 80MHz good, and what is different there?

It's really essentially the OFDMA technology that has been in place with LTE for more than a decade now. Where essentially the infrastructure, the APs are working in concurrence. They are time-synchronized and the data exchange is kind of well-coordinated. Each mobile device, each end device gets a certain fraction of the spectrum during operation.

So, it's not the CSMA, or generally TDM kind of avoidance. It's really an OFDMA type of approach. This provides flexibility in terms of whichever device needs some throughput at every time instance. Every one millisecond kind of time usage. The scheduler keeps scheduling packets and you can have many users simultaneously be scheduled on the downlink and the uplink.

The other fact is the interference concept is different in that multiple APs can simultaneously transmit data and they can simultaneously receive data.

So, it's different in that regard. And as you densify the network you get additional cell splitting type of capacity.

It all goes back to how predictable and how deterministic the QoS is. That's the key benefit that cellular brings.

In terms of what peak rates you achieve, there is always some difference you will see. The more spectrum, the higher peak rates you can get. But the predictability part is always there with the LTE and the capacity can come with the densification.

Keith:
Do you want to talk about the differences in how you would deploy a Wi-Fi AP versus a CBRS AP?

Chuck:
Maybe a little bit about the coverage areas, and we're still working some of this out. Obviously, the band just got open so a good part of the next four quarters is going to be getting out and actually doing field trials at real customers and understanding how the propagation varies in different types of facilities. But as a general planning rule of thumb, we say that one CBRS AP is good for about the same area that four Wi-Fi APs will cover. So say 10,000 square feet or 1,000 square meters as compared with 2,500 square feet or 250 square meters in an indoor setting.

Outdoors, it's actually a completely different ball game. Pound for pound, if you limited yourself to what a Wi-Fi radio can transmit at, a CBRS radio is probably capable of doing half a million square feet or more.

The rules actually permit radically higher power levels for outdoor CBRS access points, up to I think it's 47dBm EIRP. Just on that basis alone we can cover even larger areas.

For folks in the audience that do outdoor deployments or cover very large areas and are used to the challenges and trying to find those vertical assets, this is a unique capability.

Mehmet:
This outdoor 47dBm 51 Watts EIRP is per 10MHz. As you get to like 40 or 80 it also goes up and it can cover really a few million square feet kind of area. It depends on the specific environment where it is deployed. The indoor is limited to 1 watt 30dBm EIRP. Those are two categories as defined by CBRS as CBRS devices.

Keith:
What are some use cases both of you see that you're heading out for first? The first type of deployment you're looking to tackle here?

Chuck:
Think about public venues, there isn't enough spectrum period. So, more megahertz is always good. Data consumption is only continuing to grow exponentially.

There are customers in the public venue space, for example, where they want all of the unlicensed spectrum available for Wi-Fi. Maybe they want to move the back of house applications off of Wi-Fi primarily to free it up for guests or fans.

A related scenario is we have customers that maybe are dealing with challenged spectrum conditions. Here's a great example. Maybe some of the audience have done this. walk into an electronics retailer today and fire up a multichannel packet capture. It's a pretty terrifying PCAP to look at. There are hundreds or thousands of devices that are sending management traffic across the entire band. If you're the retailer and you're trying to do point of sale applications it can actually be really hard to do that in that type of environment. We see customers with that kind of need.

Then of course know we've already talked about the range benefits, particularly in the outdoor scenario. Being able to cost-effectively target coverage to different areas based on the cost profile.

Keith:
Mehmet any targets that you're starting to go after now?

Mehmet:
There are a lot of verticals where we see really interesting applications. And we see a lot of interest in those verticals for the CBRS and LTE. It goes back to those key aspects that Chuck outlined.

The first one is the ability to deploy a separate wireless network that operates on a clean spectrum for business-critical applications. For these specific devices, they have an interest in guaranteed performance it becomes a great solution.

Some examples are health care or retail. This is where we see the voice communication devices or even some point of sales devices being put into a network like this. Also, for auto coverage, there are a lot of examples of that.

We can highlight education use cases, higher ed, college campuses. We see a lot of campus safety or emergency response applications. They are putting lots of IP cameras on the campus as well as to provide coverage for the campus police or the facilities for their handheld devices. They are also connecting a lot of IoT devices in the general campus area.

In manufacturing warehouse environments, these mission-critical use cases with dedicated devices on this network, with a guaranteed SLA becomes very important.

I would like to tell you about how we create these different slices for different applications to ensure end to end guaranteed SLAs for those devices.

Keith:
I have an iPhone 11, and an iPhone 12 coming. What are the devices that support CBRS today? How would someone in the audience pull out their phone and find out if it's CBRS capable?

Mehmet:
On our website, we keep track of all these devices. I think in our labs JR has done tests more with more than 40 devices already. So pretty much this band is a mainstream band now. Going forward with all the devices, you will be seeing this band supported. But very specifically today, on a lot of smartphones, from the iPhones to Samsung Galaxies, and LGs and so on and so forth, they all support the band.

There's also a lot of gateways, and bridges, and IoT gateways as they call it which connects various end devices to this network. So, if you have an IP camera that you want to connect to this network, you don't need the IP camera to have CBRS support, all you need is internet connectivity. It can connect it to an Ethernet bridge on an IoT gateway.

There is a very healthy ecosystem of the gateways/routers/bridges out there as well.

Keith:
Do I need a physical SIM, or an eSIM, or a dual SIM device? Can you please clarify which devices use that extra SIM?

Mehmet:
Yes. The SIM goes to all devices. That's part of the end-to-end security and device-based security in the LTE technology. So, we provide the SIM for the end devices. Today, as a commercial solution, we provide physical SIMs. In the coming few months, really in early 2021, we'll be supporting eSIM as well.

And again, the key aspect here is all the SIM technology is crucial. You want to make it easy to operate and manage right? So, that's why it's part of our solution.

As I mentioned earlier, the device activation, and tying it to the policy management of the enterprise is all done through the Orchestrator. This is really a very streamlined way of operation.

Today, you need to put in a physical SIM card. In a few months, you won't even need to do that. You will be able to remotely provision the devices. It's very similar to MDM device management that enterprise IT is using today.

Chuck:
I just heard a presentation by the president of the CBRS Alliance who said, I think as of last month, there were over 105 certified devices on the market. That's up from I think maybe just a handful, less than a year ago. There are devices coming on the market every single month.

Keith:
Good trajectory.

Mehmet:
Let's look at the MicroSlicing feature. We talked about the predictable performance, ensuring SLAs are met, and this is exactly how we do it.

I'm very excited about this. This is a feature where we provide this end-to-end QoS for all the different applications running in the network. Our customers can enforce strict SLAs for these applications on different devices.

On the radio, you have a specific QoS scheduler which ensures the quality of service. On the Edge, we have the ability to dedicate network resources for different slices.

Then you have the KPI level monitoring on the Orchestrator. For folks who are maybe familiar with the 5G networks slicing concept, what we have here is a very granular approach to that network slicing. that's why we call it MicroSlicing.

Each individual app on a specific device, on the device group, can be assigned to guarantee SLAs in terms of latency packet delivery rate and throughput.

For example, you can have IP cameras with a guaranteed bandwidth of maybe 5Mbps on the uplink. You can have automated guided vehicles with a guaranteed end to end latency of 30ms. We make all of this operation really easy from the enterprise perspective.

Keith:
Here's a two-part question. One is it dynamically changing the amount of spectrum each device pulls from the available spectrum? And how does it then ride on top of the Layer 2, Layer 3 network and use the QoS we already have in the enterprise?

Mehmet:
Great question. The first part, in terms of how much spectrum is used, it's really part of the radio access network. It's part of the AP where it does the scheduling of the resources at every time slot. So, every one millisecond the scheduler looks at all the resource blocks.

Think about it as frequency tones. It's dependent on the channel condition of a certain device which is on the channel quality report. It's also based on how much data needs to be transmitted. And based on the priority and the SLA requirements, the schedule decides which set of devices to schedule. That happens both on the downlink and uplink.

That's the QoS schedule required and it happens dynamically every millisecond.

And the second part of your question Keith was?

Keith:
Going across the infrastructure, the QoS that we already have on Layer 2 and Layer 3

Mehmet:
So, how do you define these slices is really where we stitch the two worlds together.

As the packets come into the LTE/5G network we need to take these packets. For that purpose, we can use the DHCP markings, or we can use the 5 Tuples in terms of the destination IP, Port and source, IP and Port.

This is how we identified these different application flows. Then we basically attach it to the specific QoS flows within the LTE and 5G.

Notice one thing that Chuck mentioned earlier, this kind of framework has the ability to expand to WAN as well.

So, if you have certain DHCP markings on the WAN side with the SD-WAN, then you can also stitch this whole thing together, outside enterprise on the backhaul priority as well.

Chuck:
Keith, let me offer a couple of thoughts here as well. I'll back up to the previous question. Most folks in the audience are obviously deeply familiar with WWM and Wi-Fi QoS.

In Wi-Fi there are four Qs:
- Voice
- Video
- Best Effort and
- Background

To the extent that people do mark those.

Let's say I'm running a voice app. There's a lot of plumbing needed to make that happen from end to end, which you were you were alluding to. But other than marking that category, you kind of trust the infrastructure to do the best job it can. Ultimately, it's unlicensed spectrum. The scheduler in the access point is doing the best job it can but it's not solving for any particular target.

What's different here is LTE has I think it's 16 different QoS levels and they have very specific budgets for packet delay, 50ms, 100ms, up to several 100ms. And then you know what's the packet drop, or an error rate that's allowed.

This has a much more granular ability to control it. The schedulers are effectively scored on the ability to hit these KPIs.

When Mehmet's talking about KPI's there are numerical targets. You can think of it as an upgrade to the QoS. It's what we've enjoyed for some time in Wi-Fi, which works very well. But in a health care environment, in an AGV scenario or so on, you could completely understand a network architect wanting to feel more comfortable with numbers.

Say I want this QCI class specifically, with respect to the network integration part.

Again, something that really differentiates the Celona solution here is how it integrates with the enterprise network. The state of the art in egress is pretty primitive, in terms of what folks in the audience are used to dealing with. Most private LTE solutions are doing very simple sort of either DNS redirection or just simple source and adding.

And there's no guarantee it's even marking at all that's available. The software on egress is not terribly sophisticated. And of course, there's no guarantee you can then plumb that the rest of the way for the different slices.

By contrast, what Celona has done is effectively be able to provide for role-based access control at the point of interface. At the border between the CBRS network and the enterprise network. They're doing this in such a way that we can actually apply the same enterprise policy we do in the core and in the forwarding elements, to that traffic.

So, it makes the plumbing for the end-to-end QoS a lot more straightforward. And it delivers what effectively are 5G features in a 4G context.

Keith:
What's Neutral Host? It's a term I've heard, and how does Celona play into Wi-Fi calling across a neutral host capability?

Mehmet:
So, Neutral Host is the ability of these private LTE/5G networks to provide service to operate their devices, right?

Think about a retail big box store where customers walk in with their operator provided devices. How do you provide service to those devices beyond the enterprise devices?

The digital host aspect is such that you can have one network, which is your private LTE network, that can also serve devices from multiple operators as the same infrastructure.

It's kind of neutral to different operators. The benefit of the CBRS/LTE, of course, is the cellular nature of technology, right?

The waveform identifiers, all of those things are the things that are understood by the end devices - mobile devices as somebody walks into that big box retail store. It's the same cellular technology that smartphone uses.

What we provide is on the back end is the capability to connect to the operator networks from this CBRS LTE network to enable that kind of interface with the operator. And that has a few different flavors. We support these different ways of doing it.

As an end-to-end solution, we have the complete solution to interface with the operators.

I also like to say it's essentially a business kind of arrangement, right? The operators need to come in and agree with that kind of interface for a specific deployment.

That's kind of where we are right now. It's kind of a case-by-case basis. It's not a blanket solution that we can say will work everywhere in every deployment. It is more of a business development going on.

But meanwhile, there's an interesting aspect that I also want to highlight. There are devices with dual SIM. If I'm an enterprise and if I'm providing devices to my workforce I now have the option to give them dual SIM devices.

What can happen is in these dual SIM devices, like iPhones, etc., you can have one SIM from a mobile network operator, and the second SIM can be the Celona provided SIM for the Enterprise Network.

As these devices are inside the enterprise facility they can use the CBRS/LTE network. As they go outside and leave the enterprise, they can fall back to the operator network using the second SIM. This is a solution available today already with enterprise control devices.

Keith:
Final question and this is more targeted at our audience of Wi-Fi professionals. This is big news. This is Aruba and Celona getting together. A partnership. How would a Wi-Fi professional get engaged? Are there classes they need to take? What kind of things do they need to study? How would they want to go about getting involved in this partnership? Chuck or Mehmet either of you can answer this

Chuck:
Let me start because I'm a Wi-Fi person, as everybody I think in the audience is well aware. I'll just talk for a second about my journey over the last few years coming up to speed on LTE.

It is a very different technology from one perspective. But as Mehmet mentioned, you have the underlying air interface which is very similar. Wi-Fi and the cellular community have been exchanging technologies for years and years and years.

Wi-Fi 802.11A - Wi-Fi 1 was the first large-scale use of OFDM, which is the basis of OFDMA which is what LTE uses. and of course, Wi-Fi 6 adopted OFDMA as a technology this seeding back and forth has been going on for a long time. So, at that level a lot of the concepts, like the modulations, are similar.

If you've studied some of the basic RF functions that you'd get in a CWNA type of certification, those are going to translate directly.

I think where people are going to maybe struggle is in trying to put together the "Kit Airplane" with the duct tape if you will. The potential struggle is having to master all the different system components in a cellular core and figuring out how those plug into the RAN.

The beautiful thing about Celona is the way that they've thought about the problem. They basically said, "OK we want to hide all that complexity. It's got to look and feel like any other kind of enterprise networking equipment."

There's a radio on one side, there's an Ethernet out the other side. And all that sophistication in the box is really not that relevant. You don't have to be an expert on it. I think they've really made it a lot simpler.

But to help folks along, there's a lot of documentation becoming available in the next few months. Aruba has a whole series of white papers coming out. Some very technical that will have bibliographies of some of the good books that have been helpful to me and my staff in coming up to speed.

And also, some less technical kind of more strategy white papers which in turn will build on the good documentation that Celona is creating.

Mehmet:
Yeah, absolutely. I have to say I've been amazed by Chuck's knowledge about cellular as well. He's really digging deep into many different aspects.

But in terms of the education part from the Celona side, I would really recommend folks go to www.Celona.io we have a lot of material in there from different videos to actual hands-on tests with different devices.

You can always sign up for a product demonstration. You can request a free trial to get the equipment to test it in your own environment.

Join the Frequency Community to learn from the others who are really also testing these different devices in their own environment and share notes and "know-how".

Keith:
Those are some great answers. About a year ago I took the CBRS training and course. I also presented at the Wi-Fi Trek in Nashville said this is really where we as Wi-Fi professionals need to focus. We've got this. We need to be on top of this.

So, if you're currently not up to speed on CBRS, we'll have some items in the show notes, some links you can go to. Hopefully, we'll get some of the white papers from the Aruba team. You can obviously go to the Celona site and learn from there and join their Frequency Group to engage a little more.

I'd like to thank Mehmet and Chuck for sharing their time with us today. This is big news. I really appreciate you giving me a chance to talk to you about this. any last words?

Chuck:
Just thanks for the time and I echo Mehmet's call to customers that are interested in really looking to see what this can do in your environments. Contact your Aruba account representative and we'd be delighted to work with you to pull that together.

Mehmet:
Thank you so much for this. I think it's really great, very exciting times. I'm looking forward to this partnership and the deployments in the field.

Keith:
Thanks for letting us have a chance to hear your announcement today. Best of luck to both Celona and Aruba moving forward in this space.