



Viavi Solutions: End-to-end, real-time solutions to optimize RAN performance

A conversation with Kashif Hussain
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In collaboration with



Viavi Solutions

RAN optimization solutions

Viavi Solutions, until recently known as JDSU, has a wide portfolio of solutions for wireline, wireless and cloud service providers. In the wireless space, Viavi helps service providers plan, test, monitor, optimize and generate revenues from their networks. RAN optimization is a key focus area for Viavi, and one that benefits from the company's wide end-to-end perspective on wireless networks.

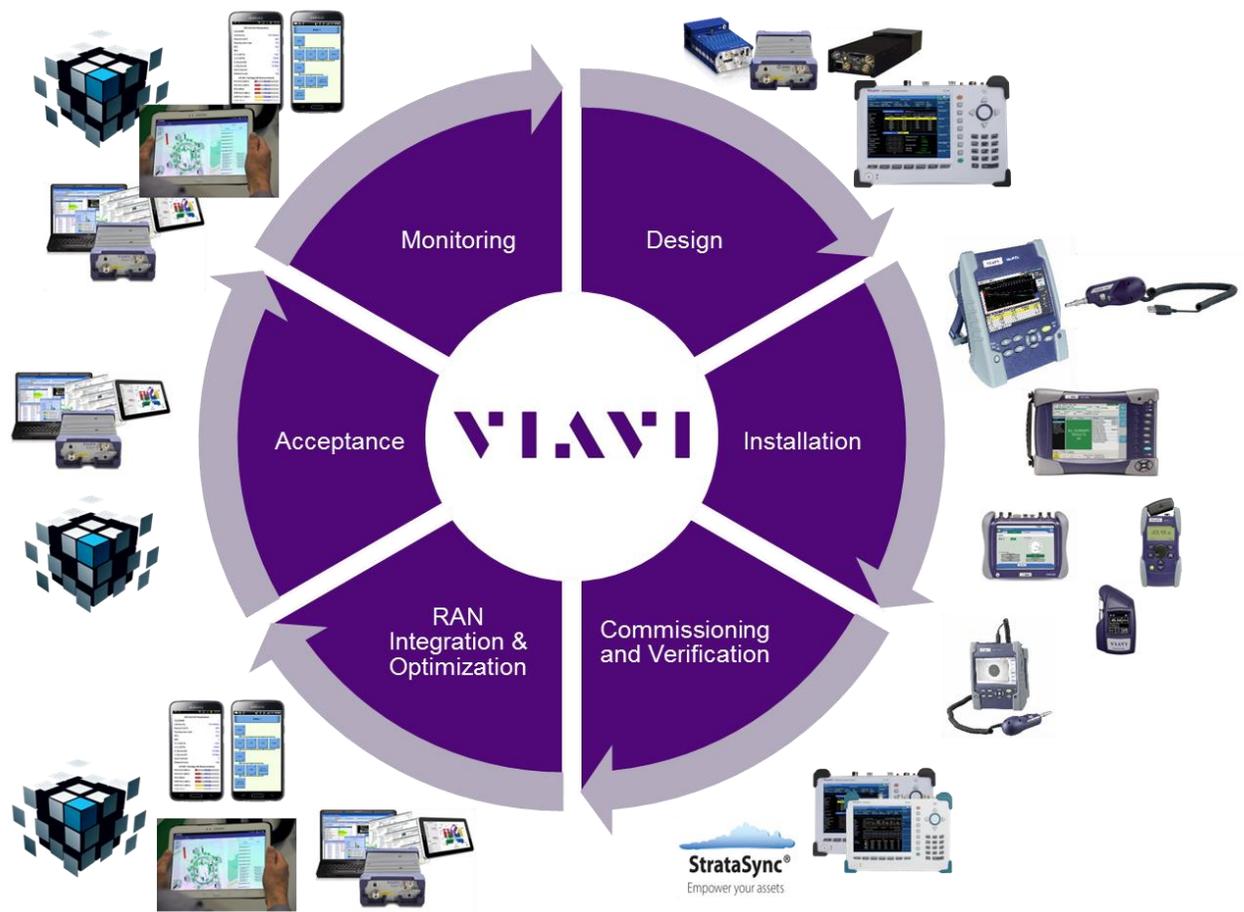
Having that big picture enables Viavi to provide operators the intelligence they need not only to optimize the RAN, but to understand what happens in the rest of the network and to identify what factors, both within the RAN and outside of it, drive RAN performance – or cause problems. With the increasing complexity of network infrastructure, traffic load and subscriber QoE expectations, it is crucial for operators to identify weaknesses and problems in their RAN, and to trace their causes – which may stem from other parts of the network. Increasingly, problems originate from QoE issues, which are notoriously difficult to relate to traditional network KPIs.

Viavi offers these solutions for RAN optimization:

- RANAdvisor, a drive-testing solution for RF planning, optimization, voice and data testing, interference analysis for all cellular interfaces and Wi-Fi. Viavi's TrueSite extends the RANAdvisor capabilities to an Android client.

- CellAdvisor is a suite that includes base station, RF, signal, and cable and antenna analyzers. They are test tools used for the deployment and operation of cell sites, monitoring the performance of all site components.
- Rubix, a near-real-time RF monitoring solution that reduces the need for drive testing and enables operators to quickly resolve network problems as they arise.

- ariesoGEO is a platform that collects and analyzes subscriber trace data and geolocation intelligence to optimize performance and support SON functionality.
- xSIGHT characterizes and optimizes QoE for real-time mobile assurance.
- StrataSync, a cloud-based solution, manages and integrates the other Viavi solutions.



Viavi end-to-end solution for HetNets deployments

Source: Viavi Solutions

Viavi Solutions

End-to-end, real-time solutions to optimize RAN performance

A conversation with Kashif Hussain, Solutions Marketing Manager, Viavi Solutions

Monica Paolini: Today's conversation is with Kashif Hussain, Solutions Marketing Manager at Viavi Solutions.

Kashif, can you tell us what you work on at Viavi Solutions, in terms of optimizing the RAN?

Kashif: At Viavi Solutions, we are in the instrumentation business. Formerly, we were JDSU; we just rebranded as Viavi Solutions. All of our instrumentation side deals with products that help the customer manage, integrate and optimize their network from an end-to-end perspective. When I say end-to-end, I mean from the core, starting with the IMS, all the way to the RF link.

On the RAN aspect of it, I'm responsible for the wireless side – products like CellAdvisor, RANAdvisor, TrueSite. We have a new product coming out, Rubix, which is a real-time, post-processing optimization solution. I'm responsible for all those products, delivering the ability for customers to optimize their network in real time.

Monica: What are the main changes you are seeing in terms of optimizing the RAN? We've been optimizing the RAN forever, but now, operators are starting to face new challenges.

Kashif: Just like you said, RAN optimization has been there from day one. The difference that we see is that as the networks continue to grow, the density of the network is growing too.

Before, we used to have a macro cell, where you had a radio at the base of the tower, an antenna at the top, and coax cables going between them. Macro-cell coverage area is large; the power transmit is about 43 dBm.

Now, we are seeing that data demand is increasing, and more than 70% of the data is coming from users inside buildings.

Networks are evolving in the direction of small cells and DAS. Femto cells were already out there, but we see a considerable growth of these smaller networks.

And as these smaller networks continue to grow, they need to be managed. The scale is very different now. Before, you would see – in a much larger metroplex area – hundreds of cell sites added in a year. Now, we are talking about thousands of cell sites.

When you're launching thousands of small cells, it means your RF environment is constantly changing. It's not a function of a week or two weeks; it can be changing daily, because you are bringing in more and more cell sites.

Now with the larger scale, what you cannot do is keep on sending drive-test teams out there. So you need to build in and automate some of the

functions. As we've already seen in our industry with 3GPP's standards, SON is there to help with that – with automatic neighbor relations, or determination of PCIs or scrambling codes.

We are complementing all those available tools out there with our solution, which can help customers use their existing tools in a much shorter process and much more streamlined fashion.

One of our new products, Rubix, is a real-time solution. Today, the steps that need to be taken to optimize a DAS, though trivial, take a lot of time. For example, somebody has to walk the whole venue and upload the data, and somebody has to download that data at the back office. They have to post-process the data, analyze it, and determine whether they need to make some changes, whether there was an antenna not turned on, or whether something was missing. Based on that information, they have to take certain actions: maybe call the construction crew back to the site to re-optimize the cell site.

As you can imagine, sometimes these in-building environments, such as convention centers, require access. It may take days to go back to the site.

With Rubix, as you are walking through the site, it gets the data automatically loaded up to the network and post-processed. It generates reports that are ready and right there for engineers anywhere in the world, who can log in – wherever they are walking, they can just log in and see how the data looks and whether there is something missing.

For example, there are certain tools built in. One is the antenna tool, which tells you if you have a missing antenna, the antenna is not working, or it's

not transmitting at the level it should be. You can take action right away, and this saves our customers time and money.

Monica: This solution relies on real data from real networks; it's not simulated. There seems to be a shift toward collecting real data in real time, and being able to process huge amounts of data and to act on it right away, instead of using the traditional approach of collecting data in a lab.

Kashif: This is not like what you used to have: when you brought a site on air, you used to have something like a loading function, an orthogonal channel noise simulation or OCNS. We used to add load to the network and do testing. Today, we're talking about real users.

In addition, Viavi is working on an ariesoGEO platform, which collects information at truly the user level. It is not even a tester, it is real-time users who are in the network. As network users make phone calls or download data, ariesoGEO collects the RF information, and only the RF information, up to Layer 3. It shows how the call was getting connected and whatnot.

We have an analytical engine behind it, which tells you where the hotspots and the interference issues and other problems are. Within a building, you can figure that out. It is quite accurate in real time, and it takes the actual user experience – and the user application experience.

We have built these functionalities, and we are working with our customers to further modify them to make it easier for a customer to optimize the network on a real-time basis.

Monica: You're trying to address a real challenge. What operators really care about is QoE, making

sure that their subscribers are happy about the service they're receiving. This is very difficult to capture, because the established KPIs help, but they don't necessarily pinpoint whether there is a problem with QoE, or what the problem is.

You need a lot of data to understand where a problem comes from in the first place – or whether there even is a problem. I guess you can help operators to address this challenge?

Kashif: I'll just take a use case: interference. It is one of the big issues.

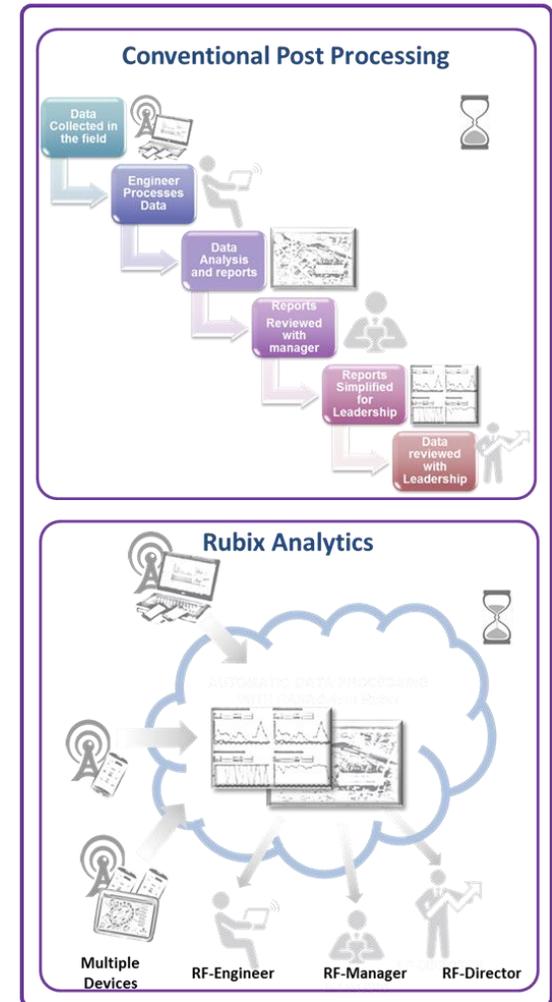
As these networks continue to grow, you will see more and more interference. We have built solutions using our Arieso platform and our CellAdvisor platform to help customers identify interference issues much quicker.

With our Arieso platform, we take the real-time data and show where the hotspots are, where interference is. Then, using our CellAdvisor solution, we literally triangulate on where the interference issues are.

Managing interference is a three-step process. First, you have to find out whether there is interference, and whether that's the source of your problem. Second, you have to detect where the interference is. Third, you can get a general idea of where the interference location is, and then pinpoint and isolate the source of interference.

Customers need to do all of these things. Now, the challenge is on a much larger scale.

You also have to do it in a much shorter time frame now, because when customers have to add thousands of cell sites – as opposed to just



Rubix™ real-time data analysis

Source: Viavi Solutions

hundreds back when you had MSC and BSC – they need faster solutions for optimization, deployment, everything.

That's Viavi's view: we want to offer solutions that our customers can quickly implement and deploy in their networks, to optimize their networks to be ahead of the game, and to always have enough

capacity available for their users, delivering the best QoE.

Monica: Doing this in real time is challenging, but you need to deal with the problem when it arises. You have to deal with a lot of data, because there are so many variables to take care of. You need to have an end-to-end platform, because you don't know where the problem is. You don't know whether it is interference in the RAN or something in the core.

I know that some operators think, "This is so much data that we have to deal with, it's going to be a nightmare."

Kashif: Yeah, you're right. That's the reason we believe in a smart solution. It's not anymore that you can just send thousands of people out in the field collecting data and optimizing performance.

That's the reason we have to look at it end to end. It has to start from the point of inception when you think about deploying a cell site. Am I deploying a small cell in the right place? The Arieso solution can help you with that.

Then the next step is, OK, I have deployed the small cell; have I tested and certified each and every link? For example, is my backhaul the problem? Is fiber a problem? Because now you're connecting all these fiber links between the baseband unit and the radio units. Or is it my RF link?

We cover all those aspects. The CellAdvisor helps with the fiber and the coax cable deployment. We have a backhaul assurance solution, and we offer FTTA, with fiber certification. On the RF side, we have a RAN optimization solution, which is our two-sided solution, and our real-time solution,

Rubix, which I have already talked about. To get further insight into a packet's life, we have our xSIGHT solution; it can show you the packet traversing from the core of the network all the way to the RF link – and it can show whether you are having any problem with any of the nodes, whether it is an IMS node, a core node, or any of the SGWs or PGWs.

We provide that insight to the customer from the real traffic, to figure out where the problems are.

Monica: You do this in real time, but what does real time mean here? If you are too coarse, you don't capture the fluctuations in the network, but if you are too granular, you capture irrelevant fluctuations in network behavior. What is the right point, the sweet spot in doing that?

Kashif: I'll give you an example of our Rubix solution. The key thing is that everybody wants real time. Real time comes with a cost. How much data can I be transferring at one time?

If you look at the Layer 3 information in the RF world, there are tons of data you could be generating. If you try to send all that data over the RF link, you can become a source of contention when there is a game going on and users are streaming video of it. We don't do that.

What we do is, basically, we capture all the data, we save it, but we only transfer what is necessary in real time. And when I say real time, we're not talking about hours or 30 minutes, we're talking about a few minutes in which we send basic KPI measures – such as accessibility, throughput and retainability – over the air link.

Dropped-calls data and other access variables are sent back to our cloud-based system, which

calculates all the KPIs and can create all these plots in real time.

If you are in a bad RF environment, of course, at that instant of time the data may not be sent. But as soon as you get back in, the data starts coming back again, and you complete the whole picture. You still have a complete picture of how your venue or how your in-building environment was.

Monica: SON is another set of tools to optimize the RAN. How do your solutions work in relationship with SON?

Kashif: SON is essential now. 3GPP put it in its standards, because if you're bringing thousands of new cell sites into a network, you cannot rely on manually adding each and every cell site.

For example, if you add 10,000 cell sites in a month, or in a year, for that matter, that's close to 1,000 cell sites a month. If you have to do that, and if the deployment time for one small cell is, say, a week to two weeks, we are talking about hundreds of teams in the field. That is not possible.

That is why in SON we have features like ANR, and we have automation of PCI and identification of the cell site.

However, this is not the complete picture. When we talk about SON, we look at the complete picture.

That's why we need integrated solutions that can take into account the overall network experience, looking at how each and every application is behaving – not just looking at the RF side of it, but taking into account how each and every user is getting the field experience. And based on that, we provide insight to help the customer decide where

and how to control the RF, whether to add more neighbors or anything like that.

Our ariesoGEO platform does this. It complements the SON solution. We could call it Arieso SON, because it complements the current industry SON solution, taking it from the RF to the next level, where now we're offering and integrating the application piece of it. Now you can truly see the end-user experience at the application level, and optimize network parameters to improve user QoE.

Monica: Do you think operators have changed their attitude, their perception of real-time analysis? If so, why?

Kashif: Actually, the historical data still has some significance and value, because whenever you are planning a network, you have to look at what the trends are: year over year, how my network is doing, how my data utilization is growing, and all that stuff. That still has huge importance for the operator, and it will continue to be that way.

However, the real-time solutions that customers are looking for are for the end-user experience. We have to realize users pay a lot of money, and they have a lot of options to go from one network to another.

If you look at the ARPU that we command in North America, it is significant. For that, customers demand a great-quality network. If they don't get that, they will switch to somebody else.

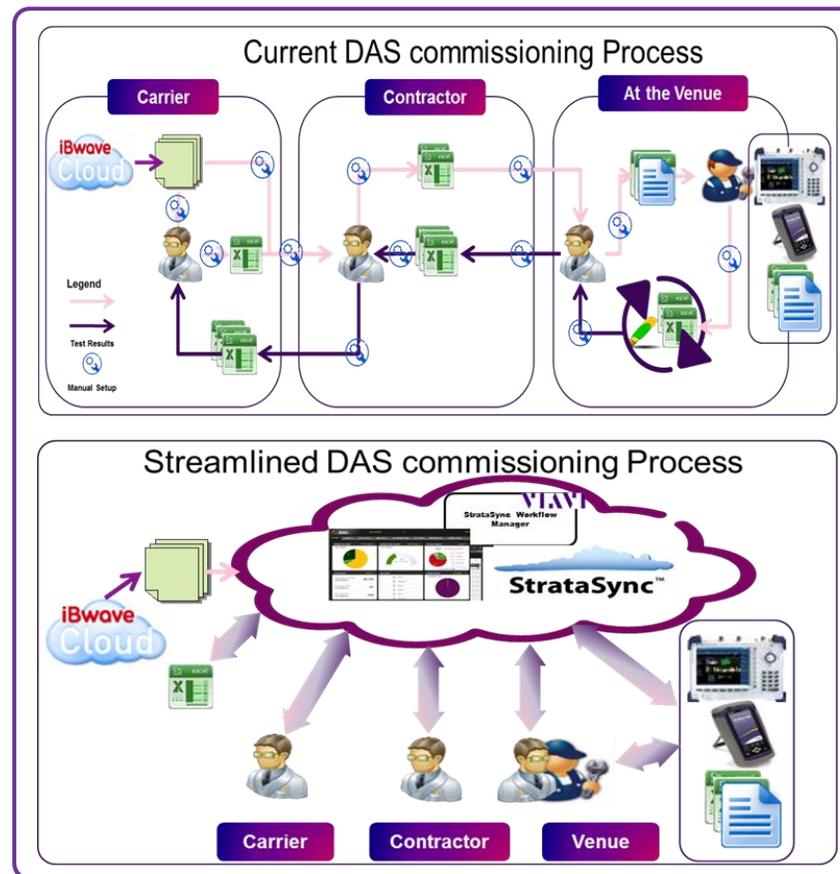
Operators understand that; as a result, they have more focus on real-time optimization. Tier 1 operators in the USA have implemented real-time optimization solutions in their network, especially for the macro side of it.

There are still some challenges on the small-cell side. That's where we play a vital role. On the small cells, there can be one remote radio and multiple antennas associated with it, so identifying which antenna or which link failed is still a challenge for BSC- and RNC-based solutions. That's where we come in and where we offer these streamlined optimization solutions.

However, as you've seen in the industry today, operators realize the importance of real-time optimization. That's why they're already focusing much more heavily on real time, rather than the traditional methods of collecting data and taking action in a few days or a few weeks.

Monica: When you have a HetNet, the different layers interact with each other. In a small-cell co-channel deployment, interference becomes a complex issue, because it is not just neighboring cells, it is cells at different layers too. All this becomes much more complex to manage.

Kashif: Absolutely. When you talk about ANR, you are managing the load on the traffic too. When you have layers of cells, from a UE perspective macro-cell downlink is always stronger than downlink with a small cell – because the power transmitted by a macro cell is 43 dBm, compared to maybe a few hundred mW, to 1 or 2 W on a small cell.



Streamlined DAS deployment process

Source: Viavi Solutions

The key challenge with that is: you have deployed a cell site, but are you really taking a true ROI off that cell site? We have features in the 3GPP standards that get the user to stay on the small cell. But this causes interference.

That's where we come in; we identify the sources of interference. Are they true interference sources? Do we have to manage and optimize the cell site, reduce the coverage area of the macro? Maybe, maybe not. Do I have to increase the

coverage of the small cell? Do I have to change the direction of the antennae? Do I have the proper handoffs set up, or the thresholds between the macro and the small cells?

All of those things have to be considered. The funny thing is that the scale has changed. It's no longer about a few cell sites, like 10 or 20. We're talking about hundreds of cell sites, and you might not even know of them as an operator in some cases – for example, femtos. When you talk about HetNets, it can be a femto, it can be a metro, or it can be a pico cell – it truly depends.

In most cases, operators know where the cell sites are, but in some cases they may not know. That's why you have to have smarter solutions to help you optimize the network and identify these sources of interference.

We have a feature in our CellAdvisor that we call RAN Interference Location (RAN IL). You can identify the interference location through that, using our Arieso platform, which can pinpoint the core areas where you will have interference issues, by using your drop-call information, interference information, and signal-to-noise ratio. You can plot it on a chart, and then you can do triangulation to figure out where those interference areas are. Customers need those smarter solutions to quickly identify and isolate these issues.

Monica: Where is the cost saving mostly coming from when you do this sort of more aggressive RAN optimization – real time, end to end, and automated?

Kashif: We have to look at the costs from a couple of standpoints. One is the cost of losing a user, number one. You cannot demand a high ARPU and keep on providing not-optimal service.

The second is when you are thinking about deploying a small cell. First, you need to identify where the small cell should be deployed. That's where you need a solution like Arieso's location intelligence solution, which can tell you where the hotspot is and where you need to, for example in a big macro area, put the small cell so that you can get the best ROI for that cell site. Because if you deploy a small cell that is not taking much traffic, you have made an investment that may not be giving you a good return.

That's why to get the best return, it is essential to first identify where to put the small cell. Once the small cell site is there, you need to optimize it to make sure it is taking the traffic that you spent money for.

Otherwise, the small cell may be providing coverage, but users may still be going to the macro cell. You may not be truly utilizing the investment that you made, and you may impact the QoE of all the users on the macro cell. Because all users – those who should be on the macro and those who should be on the small cell – are on the macro, and this causes contention. Let's say I'm watching a video, but the quality is bad, because there are too many users.

Next, if I'm not using it right, am I causing a QoE issue? And if I am causing a QoE issue, I'm going to have churn, and that churn means I cannot demand that ARPU that I was getting before.

It is a balancing act that operators have to play, and they have to be careful where they deploy cell sites and how they manage their current network.

Monica: I have a final question for you. What are you working on at Viavi right now? What are the hot areas that you want to address in the future?

Kashif: That's top secret. No, I'm just kidding. Actually, we are constantly working with our customers.

We are focusing primarily on moving away from the traditional approach. I won't say we are completely moving away, because those networks have to be managed, those networks that are already deployed out there – but we are enhancing our solutions.

Often, real-time solutions are cost effective for the customer. For example, Rubix significantly reduces costs if you look at it from an in-building and DAS perspective. We have use cases that show that. We are adding more and more features onto our instrumentation in the cloud to make it easy for the customer.

For example, in a DAS scenario, where you have a lot of fiber going between the head end and the remote radios, all of that stuff has to be certified and tested, and multiple partners are involved. We are streamlining that, putting it in the cloud. Any customer or any member of that customer team – for example, a contractor, venue operator, service provider, or construction crew guy – can have access to the test tool and what tests need to be done, what the results are, and whether the site is ready.

That all is happening in real time, meaning as soon as I test my fiber and certify it, guess what? Results get directly uploaded from the tool. Our technician does not even have to take an action.

We are doing that for our fiber and coax products too. That streamlines the whole process. You don't have to wait while the sweep test or the pin test is done. As soon as you do it, the data get uploaded right there and everybody has access.

It saves time and money. We are looking at solutions that can streamline the overall process of optimization, deployment and integration on cell sites. Doesn't matter what kind of cell site it is.

Glossary

3GPP	Third Generation Partnership Project
ANR	Automatic neighbor relation
ARPU	Average revenue per user
BSC	Base station controller
DAS	Distributed antenna system
FTTA	Fiber to the antenna
HetNet	Heterogeneous network
IL	Interference Location
IMS	IP multimedia subsystem
LTE	Long Term Evolution
MSC	Mobile switching center
OCNS	Orthogonal channel noise simulation

PCI	Physical cell ID
PGW	Packet gateway
QoE	Quality of experience
RAN	Radio access network
RF	Radio frequency
RNC	Radio network controller
ROI	Return on investment
SGW	Serving gateway
SON	Self-organizing network
UE	User equipment

About Viavi Solutions



Viavi offers fully integrated and interoperable solutions for network testing, performance optimization, and service assurance. Designed to support the most complex IT and communications networks of today and tomorrow, our solutions help you get the best possible performance from your network investments. We deliver the precision intelligence and flexibility you need to cost-efficiently scale operations, transition to next-gen technologies, and diversify revenue opportunities for greater profitability.

About Kashif Hussain



Kashif Hussain is the Solution Marketing Manager at Viavi Solutions (formerly JDSU) for the Wireless Business Unit. He has more than eighteen years of industry experience; his expertise in RF, DAS, HetNets, and LTE comes from developing, managing, supporting, marketing and consulting on major mobile communications projects. He has held various senior roles at MobileNet, Tektronix Communications, Ericsson and Nortel, and also authored a patent for wireless products.

**This conversation is included in the Senza Fili report
“The smart RAN. Trends in the optimization of spectrum and network resource utilization,”
prepared in collaboration with RCR Wireless News and available for download
from www.rcrwireless.com and www.senzafiliconsulting.com**

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About Senza Fili



Senza Fili provides advisory support on wireless data technologies and services. At Senza Fili we have in-depth expertise in financial modeling, market forecasts and research, white paper preparation, business plan support, RFP preparation and management, due diligence, and training. Our client base is international and spans the entire value chain: clients include wireline, fixed wireless and mobile operators, enterprises and other vertical players, vendors, system integrators, investors, regulators, and industry associations.

We provide a bridge between technologies and services, helping our clients assess established and emerging technologies, leverage these technologies to support new or existing services, and build solid, profitable business models. Independent advice, a strong quantitative orientation, and an international perspective are the hallmarks of our work. For additional information, visit www.senzafiliconsulting.com or contact us at info@senzafiliconsulting.com or +1 425 657 4991.

About the interviewer



Monica Paolini, PhD, is the founder and president of Senza Fili. She is an expert in wireless technologies and has helped clients worldwide to understand technology and customer requirements, evaluate business plan opportunities, market their services and products, and estimate the market size and revenue opportunity of new and established wireless technologies. She has frequently been invited to give presentations at conferences and has written several reports and articles on wireless broadband technologies. She has a PhD in cognitive science from the University of California, San Diego (US), an MBA from the University of Oxford (UK), and a BA/MA in philosophy from the University of Bologna (Italy). You can reach her at monica.paolini@senzafiliconsulting.com.