Carrier-grade microwave backhaul for street-level small-cell deployments

**A conversation with
Dr. Babis Papanastasiou,
Product Line Manager
Intracom Telecom**

**By Frank Rayal
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Frank Rayal. Hello, and welcome to this conversation with **Intracom Telecom**. My name is Frank Rayal. This conversation is part of a Senza Fili report on small-cell backhaul that gives an update on small-cell backhaul solutions and on the evolution of mobile operators' requirements for small-cell backhaul.

Today we are talking with Dr. Babis Papanastasiou of Intracom Telecom, who is the Product Line Manager for StreetNode and the WiBAS point to multipoint platform. Intracom Telecom is a leading vendor of PTP and PTMP wireless backhaul solutions.

Thank you, Babis, for being here with us today. To start I would like to ask you to give us a brief introduction about Intracom and your product line.

Babis Papanastasiou. Intracom has more than 15 years of experience in wireless technologies and provides a wide solution portfolio of PTP and PTMP technologies, having the ability of combining these two qualities together and providing the optimum solution to our customers.

We have also recently addressed the needs of small-cell backhaul with a new and, I believe, a very interesting solution, which we named StreetNode.

Frank Rayal. Can you position that product for us, please – how it works, and what is the frequency band that it operates in?

Babis Papanastasiou. We are positioning our solution in the microwave band. It is a microwave system operating in area-licensed frequencies. These are the 26, 28, 32 and 42 GHz frequency bands, where the operator has the ability of getting a license for a full

area and then has the ability to deploy the solution, without having to go back to an authority and get license for the backhaul per hop. This makes this solution very effective, to start with.

We also explored the benefits of the microwave technology. Microwave technology is a mature technology and has a lot of benefits. It is a carrier-grade technology, and we have taken all of the benefits of the technology, and now we have put them in a very attractive size, because StreetNode is a very small unit: it is only 4 liters in volume. It blends into the urban environment so that it is almost invisible, and it can be installed on a lamppost or on walls in an urban environment and provide a very efficient solution for the small-cell backhaul.

Because the solution is line of sight, it is very deterministic, which allows you to dimension your network. It is a carrier-grade solution, which we believe is mandatory for a backhaul solution.

Frank Rayal. Would you expand more on that? What do you mean by carrier-grade solution, and what are some of the features that the product has that would make it carrier-grade?

Babis Papanastasiou. First of all, the deterministic way you design the network makes you feel confident about the performance of the network. StreetNode

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has a high capacity: we are offering 540 mbps per sector or per link, and we can have aggregation hops with two channels of 56 MHz that can give 2.2 gbps capacity per aggregation node. It has minimal latency, at below 1ms. It has the quality of service and all the mechanisms that are needed for a carrier-grade solution.

Frank Rayal. As a PTMP solution, how many multipoints will the solution be able to support?

Babis Papanastasiou. I would like to make a note here and correct a misconception. It is not only a PTMP solution; it is a very flexible solution that can
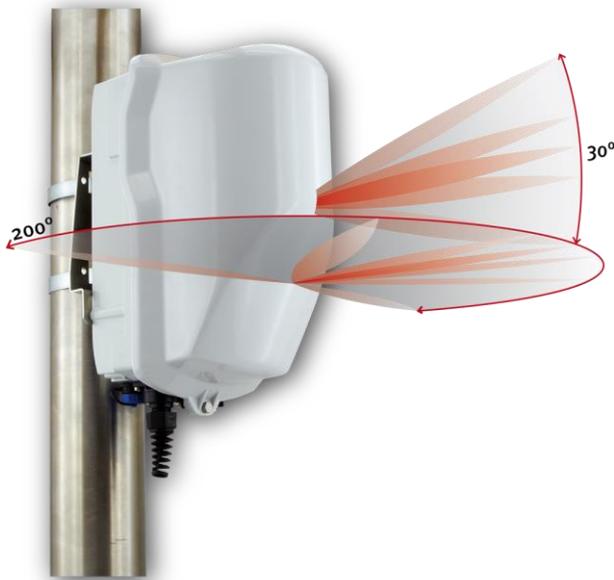

Figure 1. StreetNode PTMP microwave backhaul system. Source: Intracom

accommodate any type of architecture. It can be PTP and it can be PTMP and it can do relays, so we can extend the connectivity within the urban clutter and create relays that literally reach any location. It is a line-of-sight solution with carrier-grade characteristics of a line-of-sight technology, but also we have all these mechanisms that bypass the problem of line of sight.

With our solution, our proposition, we can reach any location by implementing relays in the urban environment.

If you were talking about strictly PTMP, we can aggregate from a single hub 30 terminals, but it is not only a multipoint solution, it is a very flexible solution that can adapt to the needs of a specific network deployment.

Frank Rayal. The support for relays is interesting because, as you have mentioned, you will be able to go deep into the urban clutter. Can you expand on that to help the audience understand the relay functionality?

Babis Papanastasiou. First of all, we explore the benefit of the multipoint, where from a single hub you can have many terminals, and this in principle gives you less equipment, which then translates to less expense. But then you cannot really reach all points from a central aggregation point. You need to expand connectivity with a very flexible solution, and this is another key point to our proposition: we have a single hardware unit that is defined by software for different modes of operation.

The unit inside the urban clutter can operate as a terminal, as a relay PTP extension or as a relay PTMP extension in the clutter. By putting together one or two units on a lamppost, we can extend the connectivity and reach locations that do not have direct line of sight.

Frank Rayal. The product has a feature that supports a self-alignment. Can you expand on that?

Babis Papanastasiou. That is another key point about our proposition, because we need to bring intelligence into our solution. We are talking about a dense deployment of small cells, and, for a massive deployment, we need to have the intelligence in our solution that will simplify the installation, provisioning and, later, maintenance of the network.

Autoprovisioning is a key feature of our solution because we expect unskilled personnel to carry out the installation tasks. Aligning a PTP link can be very complex and time consuming. Imagine the locations where this is going to happen. This is going to happen in an urban environment with a lot of traffic, cars and people going by, so you need something that will be realized very quickly.

Autoalignment gives this option, because the system has the ability to find the optimum position and location, and to align to the other end automatically. You power up the system and it will find the best alignment.
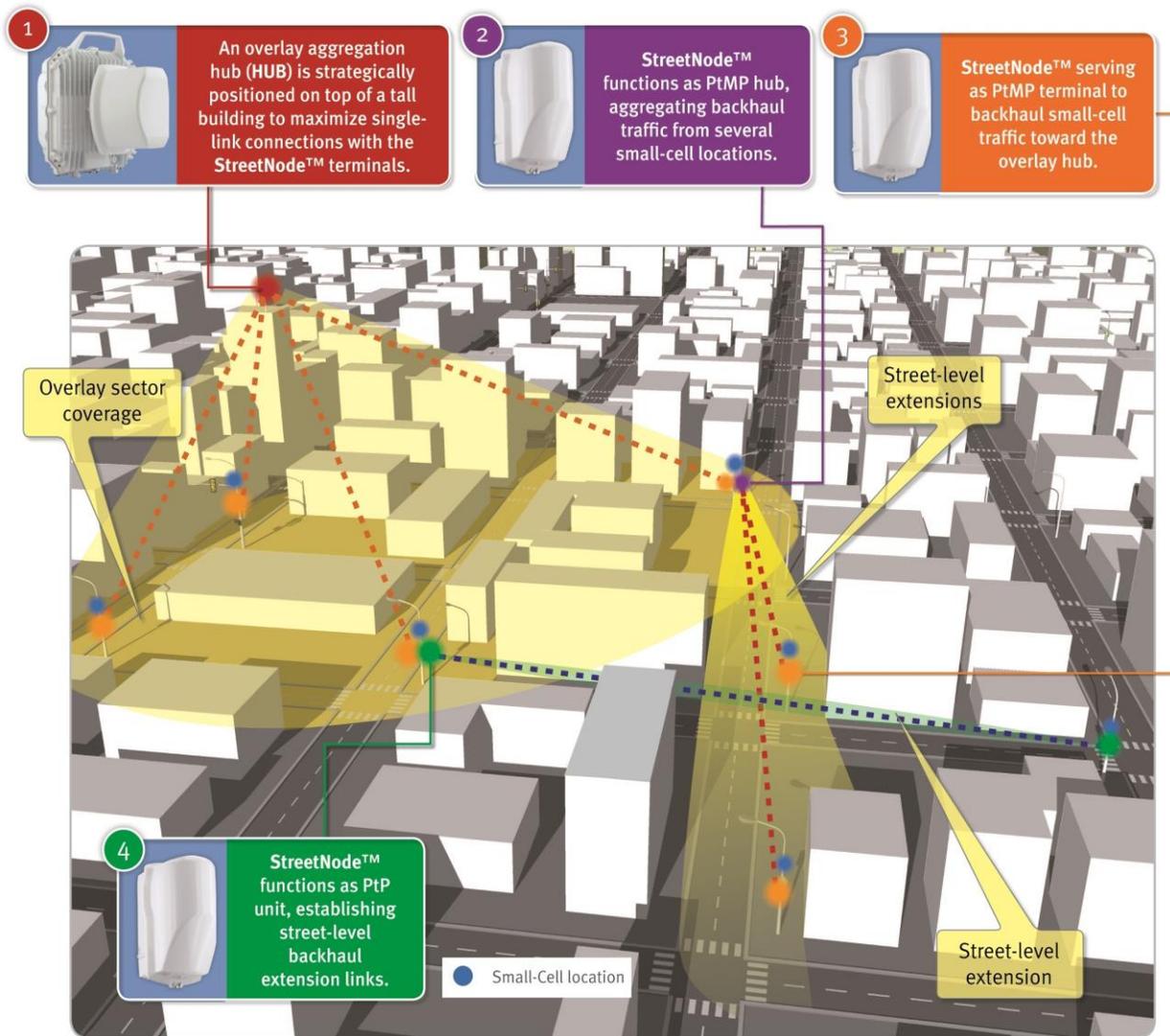
1 An overlay aggregation hub (HUB) is strategically positioned on top of a tall building to maximize single-link connections with the StreetNode™ terminals.

2 StreetNode™ functions as PtMP hub, aggregating backhaul traffic from several small-cell locations.

3 StreetNode™ serving as PtMP terminal to backhaul small-cell traffic toward the overlay hub.

Overlay sector coverage

Street-level extensions

4 StreetNode™ functions as PtP unit, establishing street-level backhaul extension links.

● Small-Cell location

Street-level extension

Figure 2. StreetNode combines overlay coverage and street-level extensions for optimum small-cell backhaul. Source: Intracom

Furthermore, the system will do the autoprovisioning. All of the configuration parameters, all of the profiles are created offline, and downloaded directly to the node. By the time you power up the device, very simply, in a few minutes, the node will automatically go alive.

Frank Rayal. How would you describe the competitive advantage of your solution and technology over others?

Babis Papanastasiou. First, we are talking about a frequency band that is already there. It is a block spectrum allocation, which can be reused very easily and provides a very efficient solution. With the relays we can reach everywhere with carrier-grade performance. It is a very flexible solution: we have a single hardware unit, which can be software defined in various operation modes, either PTP or PTMP.

Imagine how much logistics are simplified when you can deal with a single hardware unit that operates in different modes and provides reach anywhere in the clutter. Exploiting the benefits of the multipoint architecture with less equipment and expense is something that should be highly considered.

Frank Rayal. Is this spectrum widely available, and do you have any ideas on the cost of spectrum? How does it factor into the operator business case?

Babis Papanastasiou. It is available in England. The higher spectrum bands are less utilized, and recently we saw the higher bands open up in many countries. We also have seen a very attractive licensing scheme adopted by the authorities. That makes this spectrum quite attractive.

I would also like to mention that our solution is deployed at street level. The microwave transmission at street level is decoupled from whatever happens at the rooftop level. We could have traditional

microwave links rooftop to rooftop and, at the same time, without any interference, we can reuse the same spectrum inside the clutter and provide very efficient solutions. Many tier-one operators today may have this spectrum, which may be underutilized, so effectively they can deploy our solution without any additional cost.

Frank Rayal. When you are speaking with operators, what do you hear as the major issues they encounter in small-cell deployments and backhaul? How have you addressed those in your product line?

Babis Papanastasiou. Small cells are a very hot topic, and all the tier-one operators have been preparing for this. Providing a solution that is carrier grade is important, and carrier-grade backhaul is a requirement. Having the capacity and latency requirements to satisfy upcoming RAN technologies like LTE and LTE-Advanced is important.

The automated procedures that we bring in our solutions, which will simplify the deployment, are also a very important issue.

And of course we must have a unit that is not "telecom": a unit that will blend in with the urban environment, and it will be almost invisible, because at the end of the day all the operators must have authorization to install telecom equipment on a lamppost or on a wall in an urban area.

Frank Rayal. Can you also comment on redundancy? How does it apply to the small-cell environment?

Babis Papanastasiou. Having a multipoint solution, we can easily make redundant the most critical point: the hub. We can have hubs that provide coverage, and these are deployed in a redundant way. When one aggregation point fails, we will have a standby that will take over the process. Redundancy is critical in aggregation, and this is where we offer it.

Frank Rayal. What do you think are the major costs that the operator would encounter in a small-cell deployment, and how does your solution address the issue of maintaining a low total cost of ownership?

Babis Papanastasiou. The multipoint technology brings less equipment. Having one aggregation point connected to many terminals translates into less expense. In terms of spectrum license and fees, the area-licensed spectrum pricing is very attractive, and most importantly, it is fixed, so the operator knows exactly how much to pay. It is not an expense that will grow in time with more links. Regardless of the number of the deployed links, the operator knows exactly how much the spectrum license will cost.

This is very important, as it may be the case that they have already acquired the spectrum and it is currently underutilized, which means that it will effectively add no cost. Furthermore, the automated alignment process we have introduced will simplify installation, which means less install time. Making the product small and compact simplifies site acquisition and probably the cost.

Frank Rayal. How do you compare your solution to other backhaul solutions, let's say those that operate in the sub-6 GHz or in the 60 GHz spectrum? How do you see your solution fitting within the overall space in backhaul?

Babis Papanastasiou. The small-cell market is a new market, and we have very high expectations yet to be realized. Probably by next year we will see the market growing.

The major competitor for us is the sub-6 GHz, non-line-of-sight backhaul, where there are many issues. Probably the bandwidth is not enough. If the spectrum is licensed, it could be expensive. If it is unlicensed, then it is not a carrier-grade solution. If the spectrum is not there, it means that there is not enough capacity to address the requirements of small-cell backhaul.

Non-line-of-sight solutions give a statistical dimensioning of the network. They have a varying performance, and by no means they are a carrier-grade solution. In the long run, I believe that sub-6 GHz frequencies are going to be used for the access network to address the increasing need for bandwidth.

On the other end, we have the millimeter-wave technology. It is a very new technology, yet to be proven. Our solution is based on a proven technology. Millimeter-wave technology has very narrow pencilbeams, which could create some problems – for example, pole sway could be a problem – whereas our solution is based on microwave, a known and proven technology. The engineers know how to plan and design microwave networks. What we are proposing here is to transfer this knowledge to the street level.

Frank Rayal. How do you see your product evolving in the future, and what features do you plan to add?

Babis Papanastasiou. We would like the product to cover all the area-licensed bands we see coming – 26, 28, 32, and 42 GHz. We plan to address all these area-licensed bands in the product evolution, as well as carrier-grade networking, and to provide all the features for quality of service, OAM certification and MPLS. All of these issues are going to be addressed in our solution.

Ultimately, we would like to see our solution integrated with a small cell and effectively have a single unit that combines the small cell and the backhaul in one box.

Frank Rayal. Thanks, Babis, for being with us here and for this conversation about your products, the StreetNode and the PTMP wireless platform.

This conversation is part of a Senza Fili report on small-cell backhaul that provides an overview of small-cell backhaul solutions, along with in-depth conversations, like this one that we just had, from meeting with vendors who participated in the report. I would like to thank the audience for listening in and mention that this report can be downloaded from the Senza Fili website at **www.senza-fili.com**.

Acronyms

LTE	Long term evolution
MPLS	Multiprotocol label switching
OAM	Operations administration and maintenance
PTMP	Point to multipoint
PTP	Point to point
RAN	Radio access network

About Senza Fili

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About the author

Frank Rayal is a telecom industry professional with over 20 years of experience working with network operators and system vendors to develop and deploy innovative wireless solutions. He is a founding partner at Xona Partners a boutique management and technology advisory firm specialized in TMT and a founding member of small cell backhaul pioneer BLiNQ Networks. Frank held senior product management, marketing and business development positions at Ericsson, Redline, and Metawave. He holds a BS in Electrical Engineering from Case Western Reserve University, Cleveland, OH, and a MSc in Electrical Engineering and an MBA from the University of Toronto, Canada. Frank is a Senior Member of the IEEE, and a member of Professional Engineers Ontario.