

INTERVIEW

INTRACOM TELECOM GROUP NEWSLETTER | ISSUE 30

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INTRACOM
TELECOM



INTERVIEW

INTRACOM TELECOM GROUP NEWSLETTER

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NEW CEO AT INTRACOM TELECOM

Mr. Kartlos Edilashvili has been appointed to the position of acting Managing Director (CEO) in Intracom Telecom, replacing Mr. Mohamed Ahmed, who has decided to leave the Company due to personal reasons. Mr. Edilashvili has over 20 years of experience at C-level positions in international organizations, and in various diplomatic positions for the Republic of Georgia. He joined Intracom Telecom in 2013 as Internal Audit Director and Board Member and as of February 1, 2021, has been appointed as the Acting Managing Director (CEO) of Intracom Telecom. Mr. Edilashvili, commenting on his appointment as the new CEO, said: *"It is my privilege to become a leader of Intracom Telecom's professional team. Together we will take care of the company's legacy and continue stable growth. To grow sustainably in a current pandemic and post-COVID world, we have to engage with a firm will and determination. Together we will work for the good of the company and by preserving and further developing all existing activities we will strengthen our company's image as one of the leading technological and innovative in the country and the region".*



AMONG THE BEST POSITIONED RADIO SUPPLIERS WORLDWIDE

Intracom Telecom has been identified as a "best positioned supplier" for Telecom Infra Project's (TIP) OpenSoftHaul (OSH) global RFI, coordinated by the Wireless Backhaul Project Group (WBH PG). The WBH PG was organized and backed up by Axiata, Deutsche Telekom, MTN, Telefónica, and TIM Brasil. More specifically, during the RFI process, more than 20 leading technology providers participated in the three main categories of the required solution:

1. Full Outdoor Radios in microwave and millimetre-wave (HW ODU);
2. IDU Whitebox solutions (HW IDU); and
3. Operator configurable Network Operating System (NOS SW).



**TELECOM INFRA
PROJECT**

The company's fully outdoor solutions – MW OmniBAS™ and mmW UltraLink™ product families – were found fully compliant in the first category (HW ODU) and were among the best positioned radio solutions. In the rest categories, HW IDU and NOS SW, the company's proposals were again among the best, using solutions provided by our partner companies in the respective technologies.

INTEL RECOGNIZES INTRACOM TELECOM AS A SOLUTION PLUS PARTNER

Intracom Telecom was recognized with the "Solution Plus Partner" award in the Intel Network Builders 2020 Winners' Circle Awards program. This distinction acknowledges Intracom Telecom's contribution to the acceleration of 5th generation networks and virtual network transformation, as well as its outstanding collaboration with the Intel Network Builders ecosystem. The company's NFV-RI™ was recognized by Intel's Network Builders program for the delivery of virtualized and cloud-ready applications based on Intel technology, edge applications and 5G solutions integrated with commercial products. The AI-powered platform optimizes the execution of virtualized Network Services (NS) and the operation efficiency of the infrastructure they run on. Moreover, NFV-RI™ enables automated decision-making, optimizing distribution and configuration of resources under any traffic & collocation condition, so that Service Level Objectives (SLOs) are always maintained and resources are used cost-efficiently. All this adds up to solving a highly complex challenge that goes beyond human expertise, something that is highly required in the 5G era. Intracom Telecom became a valuable member within the Intel Network Builders ecosystem in 2017 and since then elevates its contribution constantly.

UPGRADING SECURITY OF THE HELLENIC GAS TRANSMISSION SYSTEM OPERATOR

Intracom Telecom has been awarded the project of upgrading the physical security of the facilities of the Hellenic Gas Transmission System Operator (DESFA) S.A., by combining modern technologies for objects verification, alarms triggering and identification of security breach events. Completion of the project is anticipated by April 2022. Within the frame of the contract the company has undertaken the design, supply and installation of all required hardware and software components, ensuring unhindered interface and integration with existing systems/infrastructure, utilizing SISC² platform, Intracom Telecom's solution for surveillance, collaboration, coordination and administration of diverse security and operations management related events. DESFA will benefit from Intracom Telecom's solution, installed in eleven DESFA facilities across Greece to provide 24-hour real-time monitoring. The Operator has decided to employ this modular and scalable software in order to further strength its security capabilities and protect its personnel and infrastructure against theft, vandalism, sabotage or any malicious action. In addition the operator will be able to provide assistance to the workers, especially when they work in emergency situations. The implemented physical security system will be managed from a central point – specifically DESFA's Physical Security Control Center – while regional and local physical security Control Centers across all DESFA facilities will be implemented so as to operate in remote locations. Mr. Nikolaos Velentzas, General Manager of Intracom Telecom's Services Business Division, stated: *"We are very pleased to cooperate with DESFA in such a significant project. It is a great opportunity for us to deploy our superior physical security management system, which meets all current physical security requirements for DESFA's critical infrastructure and at the same time enables the Operator to address future security requirements and upgrades."*

INTRACOM TELECOM CONCLUDES ONE MORE PROJECT FOR THE TRANSPORT & LOGISTICS SECTOR

Intracom Telecom completed a project in Slovenia for DARS d.d., the Slovenian agency responsible for the operation of the country's highways. Through its partner, Kompas Telekom, Intracom Telecom provides its ground-breaking OmniBAS™-OSDR all-outdoor microwave solution for the network upgrade of the road safety and the assurance of uninterrupted traffic flow on the motorway network. More specifically, in order to ensure safety in motorways, a fast and reliable critical Push-To-Talk communications is needed at highway junction and tunnels. Intracom Telecom's OmniBAS™-OSDR was chosen as the ideal microwave radio to replace the older unlicensed band microwave equipment in critical sites, so as to provide repeater site uninterrupted connectivity in licensed spectrum, avoiding disruptive radio interference and IP network downtime for such a critical application.



SUPPORTING THE HELLENIC COAST GUARD

Intracom Telecom successfully completed a project for the Hellenic Coast Guard (HCG) using Intracom Telecom's millimeter wave (mmWave) connectivity platform, the UltraLink™-FX80 CN. More specifically, the company designed the network and supplied its revolutionary multi-gigabit wireless radio in order to interconnect buildings and sites of HCG located in the wider area of the port of Piraeus. Following a tender carried out by the HCG, Intracom Telecom was awarded the project "Replacement of wireless connections of the Hellenic Coast Guard's central buildings". The offer made by the company was based on a best-of-breed technical solution that meet all requirements. Intracom Telecom used much of its international expertise in supplying its technology for mission critical private networks. The HCG benefits from Intracom Telecom's state-of-the-art equipment, enabling its HQ to maintain uninterrupted broadband connection with points of interest within the area of the Port of Piraeus, replacing older technologies. Apart from the enhanced internet connectivity, HCG also improved a number of internal web based and client-server applications, effectively transferring two-way audio, video, voice and data at ultra-high speeds, to and from the headquarters. The project also included migration services, trial period services and appropriate training. The HCG, a sensitive organization under the Ministry of Maritime Affairs and Insular Policy, acquired modern network infrastructures for its nerve center at the port of Piraeus, a key element towards succeeding in its mission for the surveillance and detection of intruders at Hellenic ports and the entire coastal line, one of the longest globally. John Tenidis, Marketing Director of Intracom Telecom's wireless solutions portfolio, commented: *"Intracom Telecom is honored to have been selected by the Hellenic Coast Guard (HCG) to supply its E-Band radio technology for a mission critical private network. Our company has the expertise to adapt its technology for special purpose networks, like the ones used by first responders. Our experience in Europe supplying similar networks, was put to the service of HCG and we are confident about the quality of the delivered network"*.

37 TURNKEY PV PROJECTS ACROSS GREECE

Intracom Telecom through its subsidiary Ether, a company specializing in the design and Engineering – Procurement – Construction (EPC) of photovoltaic (PV) parks, has successfully completed 37 photovoltaic projects across the country. Despite the challenging conditions created by the pandemic and the lack of basic equipment in the market of photovoltaics during the period September - November 2020, the company managed to successfully carry out the below projects:

- » 20 projects of 500KW, with a total capacity of 10MW, in Attica
- » 14 projects, with a total capacity of 4.6MW, in Etoloakarnania
- » 3 projects of 500KW, with a total capacity of 1.5MW, in Larissa

"We are very pleased that our Group's experienced design team and its integrated network of partners throughout Greece managed to complete so many projects throughout Greece, supported the company in overcoming difficulties and ensured that the projects – as always – would be carried out with accuracy, high quality, speed and on budget.", Mr. Anastasios Dimopoulos, Vice President of Intracom Telecom's BoD and Managing Director of Ether, highlighted.





BECOMING PART OF UKWISPA'S FAMILY

During the upcoming years, the UK government has committed to helping every property in the land receive gigabit-capable broadband, and for this to be achieved there is a need for high performance Fixed Wireless Access, as it is an essential, cost effective and timely solution. A single mmW gigabit base station can provide immediate coverage to many properties at gigabit speeds. The company, thus, has committed to bring its technology to help develop the UK Fixed Wireless Access market and has joined forces with UKWISPA, by becoming Gold Technology Partner, to engage with UK stakeholders. As a first step towards this commitment the company has hosted its first webinar through UKWISPA, entitled "Ultra-Broadband Fixed Wireless Access at mmW bands", through which attendees and UK based ISPs learned more about Intracom Telecom's Ultra Broadband mmW FWA solutions for residential and enterprise customers, how these solutions improve the quality of service, and offer scalability & ease of deployment, what future innovations are expected, and many more. David Burns, Chairman of UKWISPA, stated: *"Intracom Telecom's technology is already exploited worldwide including the USA, Europe and the Far East and we are delighted that they have decided to bring this experience to the UK. There are over 100 Wireless Internet Service Providers (WISPs) across the UK and their role in delivering Gigabit Britain cannot be overstated. We hope that Intracom Telecom's expertise and technology will help WISPs build ultrafast networks faster and help UK businesses and homes receive the broadband they deserve quickly and inexpensively".*

» <https://www.ukwispa.org>



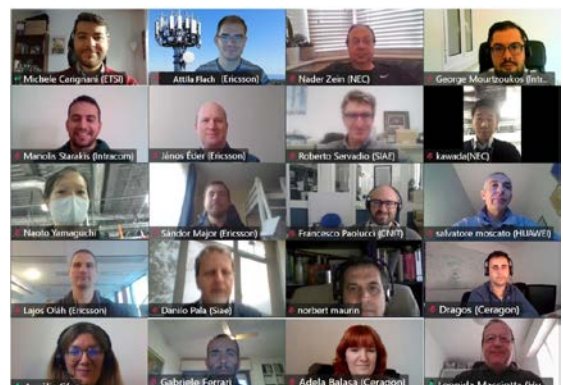
INTRACOM TELECOM CONTRIBUTES TO SDN STANDARDIZATION

The company participated in the 3rd ETSI mWT Plugtest with UltraLink™-GX80 and uni|MS™ SDN Domain Controller, demonstrating compliance to the IETF MDSC-PNC Interface (MPI) for:

- » Network Discovery, by retrieving the Microwave, Ethernet and Ethernet Service Topology information
- » E2E L2 Service Provisioning
- » LLDP Interoperability, used for inter-domain link discovery

This interoperability test event was a complete success and of great significance for all stakeholders, given the broad participation of the MW/mmWave industry. Intracom Telecom's product portfolio continuously adopts the latest SDN standards, and is ready for SDN production deployments to support 5G network transformation.

» <https://bit.ly/2N3y1BJ>



2H2020 VIRTUAL REVIEWS & PLENARY MEETINGS

The second half of 2020, and more specifically September, October and November, was filled with online reviews and plenary meetings organized by research projects that Intracom Telecom participates in. More specifically, 5G-VICTORI, an "advanced 5G validation trials across multiple vertical industries" project, organized on September 15-16 its 4th plenary meeting, while its intermediate review took place on October 8. In addition, one of the company's "5G long-term evolution" projects, TERAWAY, had also its intermediate review on October 6. It is noteworthy to mention that both of the projects' progress was evaluated as very satisfactory, despite some occasional unavoidable delays due to the COVID-19 pandemic. Furthermore, three more projects - ARIADNE, 5G-VINNI and BlueSpace - organized their plenary meetings on September 22-24, October 27-29 and November 12 respectively.



NEW BEYOND 5G PROJECT: MARSAL

Intracom Telecom's presence in the EU 5G PPP research framework was further reinforced with the recently awarded project MARSAL (Machine Learning-Based, Networking and Computing Infrastructure Resource Management of 5G and Beyond Intelligent Networks) in the context of the "5G PPP – Smart Connectivity beyond 5G" call. The project targets the development and evaluation of a complete framework for the management and orchestration of network resources in 5G and beyond. It aims to utilize a converged optical wireless network infrastructure in the access and fronthaul/midhaul segments and exploit the application of the novel distributed cell-free concept. Intracom Telecom's main role is to provide SDN-enabled wireless transport for the interconnection of MARSAL's cell-free Central Processing Units (CPUs). MARSAL will start on 01/01/2021 and run for 36 months.



➤ <https://www.marsalproject.eu>

INTELLIGENT ASSISTANTS FOR FLEXIBILITY MANAGEMENT

A new 3-year collaborative co-funded project, iFLEX, started on the 1st of November 2020 with the participation of Intracom Telecom. The project aims at empowering the consumers by making it as easy as possible for them to participate in Demand Response (DR) services. A core concept of the project is the iFLEX Assistant, a novel software agent that acts between consumers, and their energy systems, various stakeholders and external systems, helping them to achieve mutual benefits through local energy management and participation in DR. The iFLEX Assistants are designed to provide a common approach to enhance user experience, level of automation and personalization in a wide variety of DR services. In this project, Intracom Telecom will implement Natural User Interfaces (NUIs) for interacting with the iFLEX Assistants and will design and develop the DR Aggregator's suite of applications (flexibility aggregation, management, optimization, trading).



➤ <https://www.iflex-project.eu>

A WORKSHOP ON ENERGY FOOTPRINT OPTIMIZATION

During TM Forum's Digital Transformation World Series (DTWS) Intracom Telecom and Cosmote organized a workshop, which took place on November 5, 2020. Through this workshop the companies explored the journey into optimizing the energy footprint of NFV infrastructure, in the context of the "AIOps Autonomous Service Assurance" Catalyst that was powered by the recently launched NFV Resource Intelligence (NFV-RI™) platform. Attendees learned how a CSP can leverage AI and closed-loop automation to reduce the energy consumption of dataplane Virtual Network Functions, without affecting end-user experience. In addition, guest speakers, such as Emma Collins, Product Owner for Platform Telemetry and Automation of Intel and Chris Macnamara, Principal Software Engineer in Network Platforms Group of Intel, conveyed key insights into the solution.

➤ <http://www.intracom-telecom.com/nfvri>



WEBINARS REPLAY

On October 6, 2020 Intracom Telecom and its subsidiary in USA hosted a webinar on 24/28 GHz networks. The goal of the webinar was to assist all the interested participants in evaluating and choosing the most fitting and efficient 24/28 GHz strategy. From the importance of ultra-broadband FWA solutions to materialize the RDOF objectives, to 24/28 GHz use cases and FWA alternative solutions, including mmWave 5G, the company offered its extensive know-how and wide expertise on FWA solutions.

▶ <https://bit.ly/3q3fl3D>

On November 17, 2020 the company conducted, in Spanish, an insightful webinar on Ultra Broadband mmWave Fixed Wireless Access. Intracom Telecom's senior representatives analyzed everything on:

- » Ultra Broadband mmWave FWA for residential and enterprise customers
- » Point-to-MultiPoint with options for GBs service, miles of reach and coverage
- » Improved quality of service
- » Scalability and ease of deployment
- » Future innovations, expansions and evolution

This webinar was part of the company's commitment to bring its groundbreaking technology and know-how, so as to help in the development of the Latin America & Iberian Fixed Wireless Access market.

▶ <https://bit.ly/2NcCvGh>

Last September, Conklin-Intracom, Intracom Telecom's subsidiary in the USA, hosted a webinar to discuss the need & challenges for Service Providers to launch a competitive Video service. As made evident, with today's rapidly changing TV landscape, DIY IP Video is not for everyone. However, as a complement, TV is the most effective way to prevent the transformation of your broadband service into a commodity. The solution is providing hosted TV as a service, which eliminates the capital and operational headache associated with DIY TV. Conklin-Intracom, being a trusted Video solution vendor & partner in the North American market for years, shares the expertise and offers smart solutions to challenging problems!

▶ <https://bit.ly/3rFtsN5>

ENABLING ULTRA-FAST BROADBAND IN RURAL AREAS

Dharminder Chanana, CEO of Conklin-Intracom, describes the opportunities & challenges that CSPs are facing when it comes to Ultra-Fast Broadband in Rural Areas. "...one may say that connecting the unconnected is a challenge, especially for the operators and the ISPs ready to take up this opportunity by deploying FWA networks", he notes. But as he highlights later on "advanced purpose-built FWA technology exists today for implementation of ultra-fast networks operating at the frequency bands 24.5-29.5 GHz, with channels at least 100 MHz wide, and achieving throughput that exceeds 550 Mbps (downlink) per subscriber... Such a PtMP technology, that combines advanced networking and Quality of Service (QoS) features, along with exceptional radio performance, can offer unparalleled flexibility to the ISPs' need to provide a "fixed" style of ultra-fast broadband experience without the costs of building an expensive 5G core and RAN or fiber network in the last mile." . To read the full article as published in "The CCA Voice" Fall/Winter 2020 Digital edition visit <https://bit.ly/3txvFfn>.



<https://bit.ly/3cVKRnc>



<https://bit.ly/2Z7xLEp>

UN GLOBAL COMPACT - COP REPORT 2020

As a member of the UN Global Compact, Intracom Telecom submitted its annual Communication on Progress (CoP) Report for 2020, including a description of practical actions the company has taken within the Framework of the 10 UN Global Compact Principles. Due to the COVID-19 pandemic, the report focused on the actions that our company undertook in order to protect the Health & Safety of its employees. Intracom Telecom is an active member of Global Compact Network Hellas since January 2015.



Global Compact Network
Hellas



<https://bit.ly/2MKAGjZ>

NOVEL IP MW LONG HAUL SOLUTIONS EXTEND 5G REACH IN REMOTE AREAS

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INTRODUCTION

5G network deployments have started and a wide variety of 5G services have already launched in metropolitan areas in many countries. Extending the 5G reach everywhere is vital in order to achieve the vision of a global 5G era. Novel IP Microwave (MW) Long-Haul (LH) backhaul solutions are ready to address effectively the rollout challenges and bring 5G to remote areas.

WHAT IS MW LH AND WHY IS IMPORTANT FOR 5G

MW Point-to-Point (PtP) transmission systems that operate in licensed frequency bands 6-42 GHz have been widely used in 3G / 4G backhaul networks, enabling high speed, carrier Ethernet connections over short and long ranges. Modern MW IP PtP solutions (like OmniBAS™) are also becoming part of the 5G ecosystem by offering multi-Gigabit IP capacity, smart network control and provisioning intelligence with the injection of IP/MPLS.

A sub-set of the MW PtP solutions are the MW LH (Long Haul) systems. LH term identifies the MW PtP links having the following characteristics:

- » Operate at lower frequency bands: 6L, 6U, 7, 8, 11 GHz
- » Enable reliable wireless connection at longer ranges, usually 25 to 50 Km or more
- » Use large parabolic dish antennas, 1.8 to 4.6m
- » Utilize a multitude of RF carriers for increased capacity and enhanced protection.

MW LH solutions are widely used around the world and their importance is well recognized. In Table 1, the market share split between MW LH and MW SH applications is provided, both in terms of radio units sold, and in terms of revenue per solution type (Source: independent analysts & Intracom Telecom).

While the LH transceiver (radio) percentage is ~5% worldwide, the relevant

revenue it generates is ~15% of the total MW market value. The main reasons are the premium service that LH links provide and the equipment required to provide a LH solution, which generally entails redundant / high availability components and larger antennas.

In the dawn of the 5G world, availability of capable LH solutions is even more essential so as to enable Multi-Gigabit IP connectivity of the 5G base stations in remote rural areas and/or islands. In such cases, where fiber is not available or it is too costly to build, the wireless transmission is the only reliable backhaul means to support 5G networks and to close fiber rings. Of course, 5G poses new challenges that MW LH solutions need to address.

ESSENTIAL REQUIREMENTS OF LH SOLUTIONS IN 5G NETWORKS

The essential requirements of MW LH systems in 5G networks can be grouped in three main categories:

- » Multi-Gigabit backhaul capacity
- » Flexible carrier aggregation for maximum spectrum utilization and link resiliency
- » Robust RF performance for extended link range and availability

Table 1: World Wide Transceivers / Revenue Share by Architecture

	2017		2018		2019	
	Units	Revenue	Units	Revenue	Units	Revenue
Short Haul (SH)	96%	85%	95%	85%	94%	84%
Long Haul (LH)	4%	15%	5%	15%	6%	16%

Multi-Gigabit backhaul capacity

One of the main goals of 5G is to enable enhanced Mobile Broadband with very high speeds that can reach up to 1 Gbps depending on the 5G spectrum used. Estimations regarding required 5G backhaul capacity per site (up to 2025) converge to the following throughputs:

- » Rural : 0.3-2 Gbps
- » Suburban: 1-5 Gbps
- » Urban : 5-20 Gbps

At the LH frequency bands, RF carriers with wider channel sizes 112 MHz are not available, so operators need to use narrower channels 28 / 40 / 56 MHz. The solution to increase the capacity is to combine many RF carriers together, up to 8, in one link. This can be achieved by employing advanced Radio Link Aggregations - RLA N+O techniques (may also be called as Carrier Aggregation - CA) to consolidate in the physical layer multiple (N) carrier transmissions over the same or different frequency band(s) with same or different channel sizes.

The RF carriers may have the same polarization or utilize both the Vertical (V) and Horizontal (H) polarizations on the same carrier along with XPIC functionality. Note that RLA 4+0 / 8+0 applies to LH XPIC 2+0/4+0, where 2/4 carriers with V polarization and 2/4 carriers with H polarization are used in a LH link.

Table 2 indicates the total radio throughput (without any compression) achieved with RLA 2+0 / 4+0 / 8+0 for different modulations and channel sizes.

In almost all cases of RLA 4+0 and 8+0 the offered radio throughput of the LH link is well above 1 Gbps and can reach up to 4.4 Gbps, thus easily accommodating the needs of rural and suburban 5G networks. It is also possible to form RLA groups utilizing carriers with different channel sizes. As

Table 2: Radio Throughput (Gbps) for various LH RLA N+O configurations

Channel (MHz) – RLA N+O	Modulation		
	1024 QAM	2048 QAM	4096 QAM
28 MHz – RLA 2+0	0.45	0.51	0.55
40 MHz – RLA 2+0	0.61	0.68	0.75
56 MHz – RLA 2+0	0.91	1.01	1.11
28 MHz – RLA 4+0 (or LH XPIC 2+0)	0.91	1.01	1.11
40 MHz – RLA 4+0 (or LH XPIC 2+0)	1.23	1.36	1.51
56 MHz – RLA 4+0 (or LH XPIC 2+0)	1.82	2.02	2.22
28 MHz – RLA 8+0 (or LH XPIC 4+0)	1.82	2.02	2.22
40 MHz – RLA 8+0 (or LH XPIC 4+0)	2.46	2.73	3.02
56 MHz – RLA 8+0 (or LH XPIC 4+0)	3.64	4.03	4.44

an example, RLA 8+0 with 4 channels 40 MHz and 4 channels 28 MHz will provide total aggregated radio throughput 2.37 Gbps at 2048-QAM.

It is noted that legacy LH links were based on configurations of type N+1, meaning that one of the available carriers was reserved as backup and remained unused until one of the active ones was down. The benefits of the LH RLA N+O approach are the following:

- » Higher total capacity because all carriers are active
- » Better load balancing among more carriers
- » Increased availability

Flexible carrier aggregation across different frequency bands for maximum spectrum utilization and link resiliency

MW LH links operate at lower frequency bands 6L, 6U, 7, 8, 11 GHz, where spectrum is scarce and saturated. In most cases it is difficult for regulatory authorities to allocate 4 or more carriers in the same frequency band. This can be resolved by combining and aggregating carriers at different bands. It would be easier to obtain licenses for 2 carriers at 6L or 7 GHz and another 2 carriers at 6U or 8 GHz, respectively. In such case it will be possible to operate a LH link with configuration 4+0, thus providing the capacity required for 5G. In addition, such a link configuration

may offer superior resiliency because deep selective fading hits will not affect extended parts of the spectrum used.

For optimum RF spectrum utilization, it is also significant to allow all possible carrier arrangements such as: ACCP (adjacent channel co-polarization), ACAP (adjacent channel alternative-polarization) and XPIC or CCDP (co-channel dual polarized).

Therefore, flexible carrier aggregation across different frequency bands for maximum spectrum utilization and increased resiliency is of utmost importance for 5G LH solutions.

Robust RF performance for extended link range and availability

MW LH systems must enable very long range links with assured reliability and the highest RF performance. In practice, each LH link has its own very specific parameters that depend on sites location, antenna heights and size, terrain and other geoclimatic factors. Therefore, a detailed RF planning analysis per LH link need be carried out to determine the expected performance.

However, there are key technical features that contribute to maximizing the RF performance in terms of capacity, range and availability:

- » High Power ODUs, with TX power up to 31 dbm per carrier, will improve the link budget extending the link range

- » Advanced radio and baseband algorithms to alleviate the adverse propagation phenomena such as selective fading caused by multipath reflections. This can be partially handled by employing advanced equalization algorithms, such as fast Adaptive Time Domain Equalizer (ATDE) that can track notch frequency changes faster than 100 MHz/sec with notch depth variation 16 dB and rate 100 dB/sec. In the rare case that the ATDE does not track the frequency selective changes then the ACM mechanism reduces the modulation without errors.
- » Smart Automatic Coding and Modulation (ACM) algorithms that take into account both the signal strength and the quality of the link through the error correction algorithm (LDPC) stress to achieve optimal and robust modulation changes.
- » Receive (RX) Diversity Techniques such as Space Diversity (SD), using 2 antennas that help to combat severe multipath effects, e.g. in cases of over sea propagation. In SD links, the performance can be further improved by 3 dB using digital Maximal Ratio Combiner (MRC) techniques that optimally combine the RX signals of the two antennas. Additional to RX signal combining, SD links also employ hitless selection of the RX decoder outputs to achieve further robustness and offer error free reception.

- » Very low overall insertion losses (typically 4 dB at link) in the multi-carrier RF system between ODUs and antennas.

ESSENTIAL COMPONENTS OF NOVEL IP MW LH SOLUTIONS

Legacy MW LH solutions were based on an all-indoor architecture, where both baseband and RF components were installed indoors. These systems were optimized for TDM/STM traffic and are not appropriate for full-packet MW LH.

Today, the most capable MW LH architecture is based on split-mount systems consisting of Indoor Units (IDUs) and Outdoor Units (ODUs) that are connected to the IDU modem cards using IF cable. The benefits of such solutions are:

- » Use of IP ready IDUs make the transition to IP LH easier
- » Installation of RF parts in ODUs close to the antennas reduces the cabling losses
- » Synergies with split-mount IP MW systems reduce operator's CAPEX and OPEX.

It is worth mentioning that LH split-mount solutions are becoming the main trend increasing their market share over LH all-indoor solutions (Source: independent analysts & Intracom Telecom), as shown in Table 3.

	Revenue	
	Split-Mount	All-Indoor
2017	47%	53%
2018	55%	45%
2019	65%	35%

Table 3: World Wide Radio Unit Share by LH Architecture

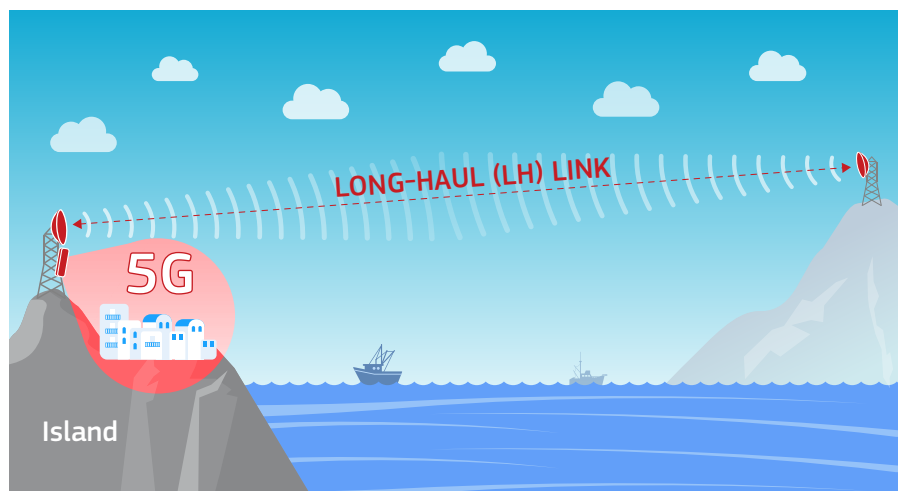
The key building blocks of a novel split-mount IP MW LH system for 5G networks along with their advantages are outlined as:

- » LH IDUs based on available modular IP IDUs (like Intracom Telecom's OmniBAS™-4W) and equipped with new modem cards with embedded carrier aggregation (CA) capability for 2 carriers over one IF interface, offer double capacity and advanced functionality to ensure robust RF performance
- » LH compact High Power ODUs supporting 2 carriers (CA) per unit enable extended link ranges while saving space on the antenna pole. In addition, a modular composition comprising a band-free base unit and an advanced duplexer greatly simplify operator's logistics.
- » LH RF broadband Circulators that combine 2 LH ODUs to a single antenna for link configurations 4+0 / 8+0 enable flexible carrier utilization.

CONCLUSIONS

Novel IP Microwave (MW) Long Haul (LH) solutions can offer multi-Gigabit IP throughput, enable superior RF performance for extended link ranges and resiliency and allow optimum spectrum utilization. Therefore, they are more than capable to connect 5G base stations in remote rural areas and islands thus extending the 5G reach everywhere. ■

For more information, contact us at omnibas@intracom-telecom.com.



UNFOLDING THE NETWORK LIFECYCLE MANAGEMENT CONCEPT

WHAT'S NEW WITH UNIJMS™ R9!

With the General Availability (GA) of R9, Intracom Telecom's unijMS™, redefines the management activities throughout Planning, Rollout, Optimization and Maintenance phases of the radio transmission and access networks. An exciting collection of offerings in the form of network lifecycle automation applications (NLA Apps), leveraging RF planning, network management and SDN control capabilities, introduces operational agility and generates added value from both network and human resources.

"Our goal is to empower Service Providers' operational transformation. The unijMS™ NLA Apps form the new paradigm on how complex tasks and processes can be automated throughout the network lifecycle and offer unprecedented efficiencies", said Intracom Telecom Marketing Manager for Data Analytics, Artificial intelligence, Management & Orchestration, Christos Rizos.

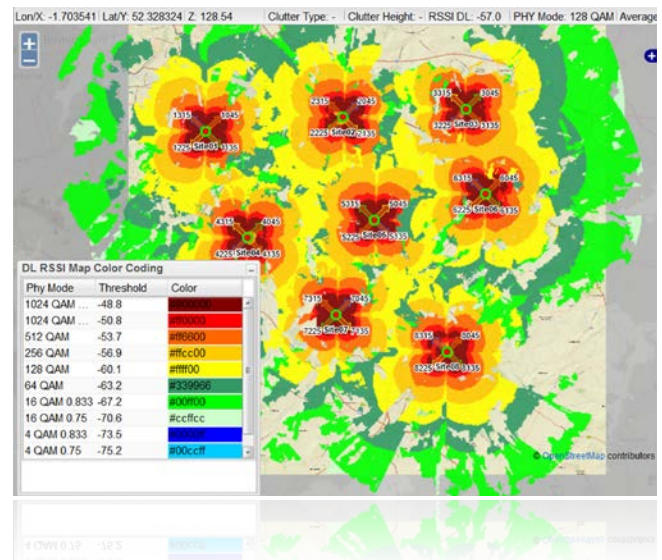
UNIJMS™ R9 HIGHLIGHTS

Redefining network lifecycle management with NLA Apps

The Radio Link Acceptance Testing App supervises multiple installation teams concurrently and verifies actual deployment vs planned criteria. Continuous Radio Links auditing enforces the optimization decisions at run time with Power Consumption Optimization App improving efficiency for RLA links. The sophisticated Correlation App reduces the number of alarms and links specific faults with corrective reconfigurations. All NLA Apps effectively disengage the experts from repetitive actions.

Boosting user experience

Linking the Planning & Physical views under a single pane-of-glass removes communication barriers between planners, operators and field engineers and aligns relevant interventions in an unprecedented manner. Furthermore, the new on-line help facility embeds searchable administration and operation manuals and together with other UI enhancements drastically improve decision-making.



Automating complex tasks

Accepting new customer in FWA network is now fully automated. The whole process of conducting accurate coverage and capacity calculations as well as evaluating the best among a number of candidate sectors, is now easily performed via a REST API. The API integrates Service Provider's OSS/BSS with unijMS™ smart algorithms that can be configured and maintained by a single RF expert. Moreover, advanced QoS profiles can be created based on easy to use templates, and associated with network services to successfully streamline the service provisioning process.

Simplifying operations

New network-wide reports for PtP audit the network health based on composite KPIs for Link Availability, Radio Error, Interference, Stability and Utilization at configurable time periods while Fault administration is further enhanced with intuitive filtering, bulk editing of alarm attributes and flexible display options to proactively execute insightful troubleshooting.

Assuring stability

The five nodes geo-cluster, a new reliability deployment scheme for disaster-recovery, coupled with several architectural improvements, efficiently enforce a stable operations environment with the highest levels of security and performance assured. ■

For more information on unijMS™ Release Notes and status of previous unijMS™ Releases, please contact us at unims_support@intracom-telecom.com.

PAVING THE ROAD TO A SMART CITY

THE PAPAGOS-CHOLARGOS MUNICIPALITY PROJECT

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Project Manager, Intracom Telecom



Intracom Telecom has proudly completed the installation and commissioning of its largest Smart City project in Papagos-Cholargos Municipality, in Athens, Greece.

Papagos-Cholargos is a suburban city in the east of Athens, with an area of 8.6 km² and a population of 44,500.

The project was awarded in September 2019 following an international open tender, commenced in May 2020, and was completed in time and within budget, in November 2020, as a result of the excellent cooperation and coordination of efforts with our partners Globiltd Ltd and Globitel S.A.

Under the Energy Service Contract scheme, the union of the above companies has undertaken the implementation and 12 years maintenance of all the smart cities systems and software.

The poor condition of the existing lighting system along with the careful selection of the most suitable and efficient LED streetlights available, resulted in astonishing savings of 82%, which corresponds to a reduction of 5,356 GWh and 6,154 tons of CO₂ emissions annually. The city already benefits ~€880,000 annually from reduced power bills; part of these savings are used to compensate the union both for the initial investment and for the 12-years operation and maintenance services.

An important extra benefit for the city is the fact that it is relieved from all the maintenance works for the duration of the contract, therefore all the corresponding human and financial resources can be re-allocated at will.

THE PROJECT IN NUMBERS



5,372

new lights installed



€880,000

savings from power reduction*



64,800 m²

free Wi-Fi coverage



6,154 tons

less CO₂ emissions*



228

smart lighting group controllers



162

smart parking spaces

*Calculated for a 12-year period

ENERGY SAVINGS – THE ESCO MODEL

The Energy Service Contract scheme gives the opportunity to municipalities and large facility operators who wish to avoid CapEx, to proceed in major energy saving interventions at literally zero cost. In the case of Papagos, Intracom Telecom undertook the effort and cost of all the design, procurement, installation and 12-years operation and maintenance of the system, being compensated by a share of the value of the achieved power savings in the municipal outdoor lighting network.

PROJECT SCOPE

The project consists of three smart city applications, the IoT platform and the maintenance software.

Smart Lighting

The city street lighting had deteriorated to a quite problematic condition following decades of poor maintenance. The



detailed design, conducted by Globiled Ltd, according to the strict standards of EN 13201:2015, started with the recording of all the city lighting network characteristics, including topology, power distribution and control equipment, down to each and every installed bracket, luminaire and bulb. The calculations and simulations that followed revealed an impressive power saving potential, while improving light intensity and distribution characteristics. Legacy lights, consisting of high pressure sodium (HPS) and metal halide (HID) lamps, varying from 23W up to 1,000W each, consumed vast amounts of energy and delivered inadequate lighting performance, posing a danger both for pedestrian and vehicle traffic.



Within just six months, 5,372 luminaires have been substituted, with high efficiency Globiled LED ones. Note that white light sources, such as the LED used, have been shown to double driver peripheral vision and improve driver brake reaction time by at least 25%. Showcasing unique environmental sensitivity, special care was taken, altering the initial design and installing special orange color (2,000°K) streetlights in the streets adjacent to the protected area of mountain Ymittos, in order not to disturb local wild fauna.

All the smart lighting infrastructure operation is wirelessly monitored, logged and managed by the uiTOP™ Unified IoT platform, which also records the power consumption and automatically detects malfunctions.

Smart Parking

Intracom Telecom installed 162 parking spot IoT sensors, much more than the 100 requested in the RfP, with no additional cost for the city, in order to maximize the effect of the application. Several installation sites were evaluated in cooperating with the city authorities, ending with the selection of both a big part –



1,040m – of a major city avenue and a municipal open space parking with a capacity of 25 parking spots. Special care was taken in the redesign of the open space parking,

to improve both the internal traffic and the capacity, resulting in 36 parking spots including two special spaces for people with disabilities.

A very reliable and trustworthy vendor (Urbiotica from Spain) supplied the underground spot sensors along with 8 repeaters and 2 gateways. The mesh network design was tailored to the specific local conditions, tested and optimized to provide the required redundancy and reliability.

Free Public Wi-Fi

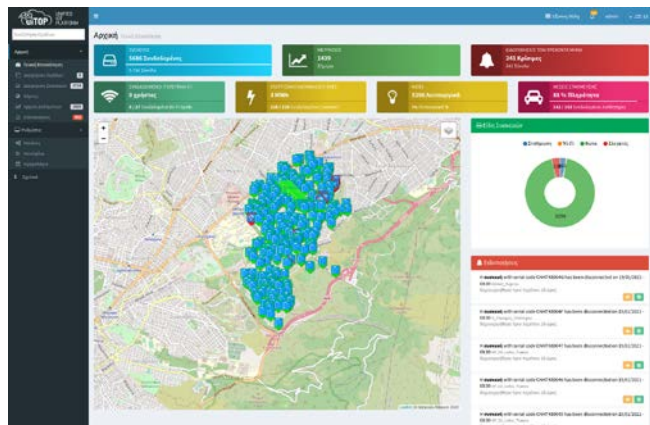
Twelve outdoor access points (AP) were installed in five areas of high citizen traffic, like the city hall area, public squares and sports fields. Detailed survey and preliminary study was conducted in no less than 12 candidate sites prior to the final selection, in cooperation with the city authorities, of the application areas. The selected hardware was the highly reliable and configurable outdoor access points AP-375 of Aruba. Special care was given to the selection and design of the cabinets that house the supplementary equipment (routers, PoE injectors etc.) in order to ensure maximum reliability in outdoor harsh conditions with minimal maintenance needs. Internet connectivity is supplied by wired VDSL connections, whose cost is undertaken by Intracom Telecom for the whole duration of the contract. The public Wi-Fi access network cover a total of more than 64,800m², and is already serving hundreds of citizens and visitors every day.



uiTOP™ Hardware Infrastructure

The top class characteristics of Intracom Telecom's uiTOP™ IoT platform defined the specifications of the relevant hardware. The use of dedicated servers was decided following a detailed cost analysis of the cloud alternative. The highest security and reliability standards, imposed by Intracom Telecom's best practices and not from the RfP requirements, dictated the use of redundant, quality hardware in a highly secure environment.

In order to ensure maximum reliability and performance, the uiTOP™ hardware was installed in Intracom Telecom premises in Peania. A state of the art server room was selected, featuring double power supply supported with UPS and emergency power generator, double internet connectivity, enhanced dual climate control, fire detection and suppression systems and access control.



The servers, firewalls, switches and all the hardware used were from top class vendors and were all connected in cluster so as to ensure uninterrupted operation in case of any single failure.

uiTOP™ unified IoT platform

To provide a complete solution a platform has been installed that collects, processes and performs extensive analysis of data received from different type of sensors currently including Wi-Fi, parking & lighting. The platform is cloud native, micro service, and serverless based. The ultimate goal of the uiTOP™ platform is the improvement of the Quality of Life and the creation of a measurable benefit for the citizens and the businesses of the Municipality, without administrative burden of the executives of the Municipality.

The platform provides a dashboard where the overall picture of the Municipality operations will be captured in an intelligible and comprehensible way on a single screen, in order to minimize the operational complexity between the services of the Municipality and to assist the decision makers in the database of "real-live" data.

The ability to communicate with various external software, such as AIMMS, CMMS etc., through APIs (Application Programming Interface) increases the possibilities, as well as the quality of the provided information. In this way, the Municipality has the opportunity to make the appropriate decisions and/or to take actions based on the prevailing conditions at any given time. Both the maps and the generated reports can be customized and expanded according to Municipality needs.

UNIQUE PROJECT MANAGEMENT CHALLENGES

Various challenges had to be addressed within the project. The association of three companies jointly implemented the works, being supervised by an independent consultant appointed by the Municipality. At the same time, in the daily life of the project, there had to be close cooperation with the municipality monitoring committee, supervising the implementation process. All the above factors had the inevitable consequence of complex communication channels that had to be established between all the involved parties.

The issue of communication was also exacerbated by the special conditions created by the pandemic crisis. It was crucial for all parties to handle all the problems that arose from remote working and other restrictions, such as delays from suppliers. The project execution phase required additional procedures and great attention in daily communication. The adjustments had to be made swiftly, with an effort from all involved parties. Note that, although it was a major concern, no time extension was requested due to the special COVID-19 circumstances.

In addition, quality, cost and time were crucial factors, which despite all adversities and difficulties, were all improved in comparison with the initial design.

NEXT STEPS

The project brought unprecedented challenges which were transformed to valuable experience in all the fields of design, implementation and management of projects with high technical complexity, involvement of many parties and strict time constraints. It now constitutes a showcasing live reference given its position in Athens, quite close to Intracom Telecom's headquarters. Experience was capitalized and shall be immediately exploited in upcoming smart city projects both in Greece and abroad.

Intracom Telecom, following its early involvement in the sector, has developed the most comprehensive and technologically advanced portfolio of integrated Smart City solutions. ■

Check our Smart City solution portfolio at <http://www.intracom-telecom.com/smartcity>.



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UTILIZE LATEST IOT TECHNOLOGY TOWARDS OPTIMAL
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ARTICLE

WIFIO™ CROWDSENSING TECHNOLOGY CONTRIBUTING TO THE PANDEMIC FIGHT

PANAGIOTIS PAPAGEORGIOU
Software Engineer, Intracom Telecom

COVID-19 AND WI-FI

The COVID-19 outbreak has created a worldwide state of emergency, challenging governments, municipalities and businesses alike with finding effective solutions to create a safe environment for citizens, staff and customers. Health systems all over the world have been overwhelmed by the spread of the virus forcing governments to proceed with lockdowns in most countries. When cities and businesses reopen, it is done with rigorous mandated government and health agency requirements for social distancing. In an effort to ease the situation, public and private sectors are trying to show their social responsibility.

One such example is the Federal Communications Commission's "Keep Americans Connected" pledge signed by Telecommunication Companies in the USA. As part of this pledge, these companies provide free services to students in their coverage areas and free public Wi-Fi hotspots that students could access for some portion of each day while sitting in their cars or otherwise being physically isolated from others in their houses.

However, more ways in which technology can aid are sought after. Intracom Telecom's wifio™ latest CrowdSensing module enables Wi-Fi operators with multi-vendor network topology to be notified about crowd concentration in the vicinity of their Access Point devices, allowing them to aid in respecting appropriate social distancing regulations and fighting the pandemic.

CROWDSENSING & MONITORING BY TELECOM OPERATORS

Every Wi-Fi device, regardless of whether they are connected to a network or not, periodically broadcasts probe messages in its vicinity, revealing its current status and certain identification details about it. Enterprise grade Access Points that are managed through WLAN Controllers are able to capture these messages and relay them to their WLAN Controllers. Wi-Fi operators with their networks of enterprise Access Points that span densely populated cities, could make use of these collections of Wi-Fi probes to estimate whether certain Access Points are flooded with different probe messages from devices, therefore getting indications if the Access Points' area of vicinity is crowded.

wifio™ CrowdSensing builds upon this idea by being able to communicate with a wide range of different WLAN Controllers used by Wi-Fi operators to manage their Access Points and retrieve aggregated statistics from them, revealing the number of Wi-Fi devices that are near each Access Point. Moreover, wifio™ CrowdSensing does not simply retrieve these statistics in an automated and uniform way, it also offers a configurable alerting system that allows relevant groups of email holders to be notified when a significant increase in crowd concentration is detected.

Consequently, these features enable operators to effectively aid in the battle against COVID-19 and also do so in a totally anonymous, non-GDPR infringing way, since wifio™ CrowdSensing strictly gathers and stores data from WLAN

Controllers that only reveal the number of Wi-Fi devices around an Access Point device, with no unique personal information about their owners whatsoever.

At the moment, Intracom Telecom works closely with AOTEC, an association of several regional Service Providers in Spain that jointly form a large network of multi-vendor Wi-Fi Access Points across the country. AOTEC is looking for ways to aid with the deterrence of COVID-19 and is considering wifio™ CrowdSensing, given of course the fact that Intracom Telecom's platform is already deployed in Spain, following the launch of the MEGARED Roaming Wi-Fi service, powered by Intracom Telecom's wifio™ platform.

WIFIO™ CROWDSENSING APPLICATION STACK

In order to offer the aforementioned features and ensure its efficiency, wifio™ CrowdSensing includes a set of different application components with well-defined roles. For explanatory purposes, the wifio™ CrowdSensing application stack can be divided into 3 layers:

- » the Data Gathering Components
- » the Control Components, and
- » the Dashboard Components

Each section of components cooperates with another layer, as needed, with a bi-directional flow of data between them. Going into details, the Data Gathering Components layer consists of the Wi-Fi Probe Collectors, the OpenDistro ElasticSearch database and the wifio™ AccessPointManager application.

A Wi-Fi probe Collector, as its name implies, is a lightweight agent that periodically queries the WLAN Controller of an Operator and receives information about the number of Wi-Fi client devices that surround each of its Access Points. Currently, wifio™ CrowdSensing implements Wi-Fi probe Collectors for Aruba, Cambium, Ubiquity and Cisco Meraki (Cloud based) WLAN Controllers that separately work to extract data and store them in the OpenDistro ElasticSearch time series database in a uniform manner.

One of the core advantages of wifio™ CrowdSensing's decoupled architecture is the ease with which new WLAN Controller Vendors can be supported by it,



simply by writing new Wi-Fi Probe Collector agents for them.

Continuing with final Data Gathering component, wifio™ AccessPointManager, allows Wi-Fi operators to register their WLAN Controllers with it and manage them from a centralized interface. Furthermore, for each registered WLAN Controller, crucial information is automatically gathered about its Access Points, such as their Geographical Coordinates.

Moving on to the Control Components, this layer contains the OpenDistro ElasticSearch Alert Engine as well the CrowdSensing Backend application. The OpenDistro ElasticSearch Alert Engine enables Administrators to configure Notifications that will be triggered when certain data begin to appear in the database and email predefined groups of recipients with relevant messages.



On the other hand, the CrowdSensing Backend application, has the role of aggregating the data previously stored in OpenDistro ElasticSearch and the AccessPointManager application and is able to create new data feeds that showcase the number of devices found near the geographical coordinates of each Access Point. Last but not least, this application automatically configures the AccessPointManager application as well as the Alert Engine Notifications system previously detailed in order to meet the needs of the Operator.

Finally but most importantly, in the Dashboard Components, in order to avoid directly using the more technical-oriented interface of the CrowdSensing Backend application, the CrowdSensing Dashboard offers a simplified and intuitive user-friendly interface. Using the Dashboard, Wi-Fi operators can register their WLAN Controllers, see information about their Access Points and configure alerts without directly configuring any of the previous

components. Moreover, interactive maps are presented that showcase how crowded each Access Point is by using an appropriate color to signify status (green for non-crowded, red for crowded and so on).

CONCLUSION

During these challenging times, Intracom Telecom, is showing its social responsibility by providing its wifio™ CrowdSensing solution that enables municipalities, governments, healthcare systems, enterprises and other Wi-Fi operators in aiding with adherence to the regulations for social distancing and limiting the spread of the disease through the use of their Wi-Fi networks.

This solution will be vital in the months to come as it will allow people to move around safely, not being afraid of getting infected, providing thus valuable safety information and keeping the public healthy, all in a totally anonymized and GDPR-compliant manner.

Furthermore, wifio™ CrowdSensing's decoupled architecture easily allows it to be integrated with future Access Point or WLAN Controllers from different vendors, a factor that will surely prove useful in the hands of Wi-Fi operators around the world, who wish to support the fight against the pandemic, but are also looking for ways to leverage their Wi-Fi investments.

Intracom Telecom's efforts, however, do not end here. The wifio™ CrowdSensing solution is continuously being enhanced with new features such as heat maps of activity and alerting Wi-Fi owners about congestion in boarding queues of airports, among others, that will enable it to further aid in this time of crisis. ■

For more information, contact us at wifio@intracom-telecom.com.

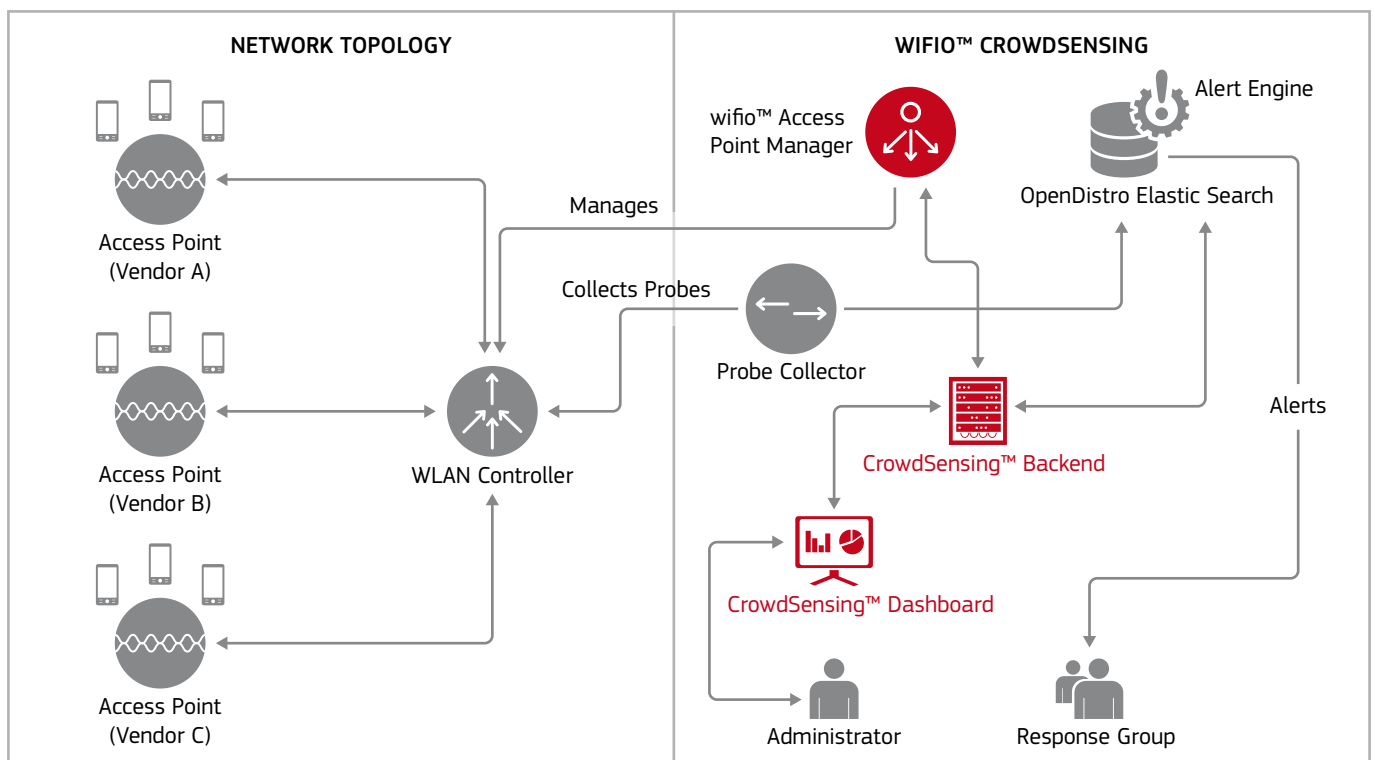


Figure 1: wifio™ CrowdSensing application



NFV-RI

RESOURCE INTELLIGENCE

ENABLING AUTONOMOUS NETWORKS



Metrics dashboard displaying system & application telemetry in real time



Intuitive topology diagram showing VNF placement & resource utilization



Different optimization workflows supported by the platform



**ENERGY
EFFICIENCY**



**HIGH
PERFORMANCE**



**PREDICTABLE
PERFORMANCE**



**HIGH INFRASTRUCTURE
UTILIZATION**

Intracom Telecom's NFV Resource Intelligence™ (NFV-RI™) is an AI-powered platform that realizes autonomous service assurance. It decides automatically the ideal distribution and configuration of resources, under any traffic & colocation condition, so that Service Level Objectives (SLOs) are always maintained and resources are used cost-efficiently - solving a highly complex challenge that goes beyond human expertise. Intracom Telecom's NFV-RI™ optimizes the execution of virtualized Network Services (NS) and the operation of the infrastructure they run.



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WHAT IS OPENSOFTHAUL?

ANDREAS SYRENGELAS

Senior Product Manager, Wireless Network Systems, Intracom Telecom

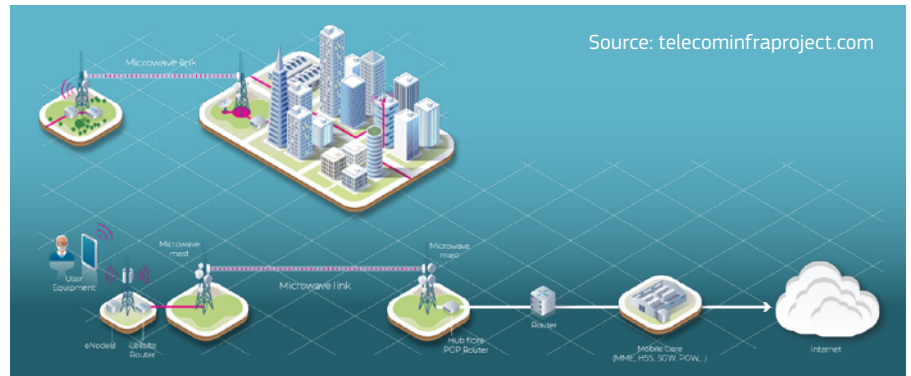
INTRODUCTION

The OpenSoftHaul (OSH) is an Operator-defined Wireless Backhaul solution which comes as the next wave of disaggregation in backhaul networks, Complementing TIP backhaul solutions and helping the service providers to overcome the challenges they face when building Wireless Backhaul networks. The OSH Product aims to boost the backhaul capacity with Multi-band Frequencies, enables Multi-Vendor interoperability with Open Standardized interfaces & Targets Lower footprint, power consumption and overall Total Cost of Ownership.

WIRELESS BACKHAUL TIP'S PROJECT GROUP

Telecom Infra Project (TIP) is a global community of companies and organizations that are driving infrastructure solutions to advance global connectivity. Founded in 2016, TIP is a community of diverse members that includes hundreds of companies – from service providers and technology partners, to systems integrators and other connectivity stakeholders. All members are working together to develop, test and deploy open, disaggregated, and standards-based solutions that deliver the high quality connectivity that the world needs.

The goal of the Wireless Backhaul TIP's project group is to create an ecosystem to further advance wireless backhaul technology to help overcome traditional delays in deployments and meet critical time to market requirements with effective use of resources.



This group will work toward providing improvements to overall system performance with reliability and proactive capacity adjustments. The Wireless Backhaul solution will address ease of site configuration and turn up by reducing configuration overlap.

Technologies

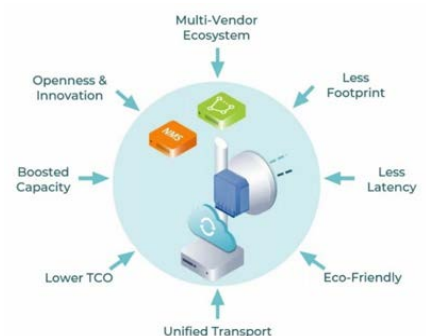
- » Boosting backhaul capacity with Dual Frequency bands, reducing the footprint on towers and extending the reach of millimeter waves (mmWave) while maintaining high overall availability.
- » White box approach to support interoperability, allowing TIP Project Group-specified hardware from different sources to work with software from different sources.
- » Enhanced manageability and automate provisioning via a Multi-Vendor SDN controller, ensure open interfaces, interoperability with 3rd party SDN controllers, and supporting wide range of applications.
- » Converged microwave-aware DCSG to router and wireless backhaul solution under one platform to create a unified transport solution.

OPENSOFTHAUL: DISAGGREGATED WHITE BOX SOLUTION

This solution is a wireless backhaul transport solution, adopting the principles of an open and disaggregated architecture. The document “Disaggregated White Box - Technical Specification” analyzes and assesses the potential options that may apply towards an open wireless backhaul transport solution and provide hardware and software requirements and features for HW and SW implementations.

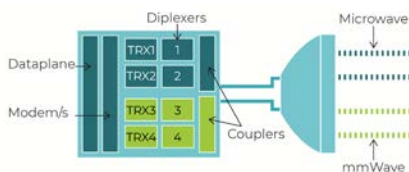
This Unified Transport solution with centralized processing, capable to utilize microwave and mmWave frequency bands, provides the following benefits:

- » One box can handle router and microwave functionality



- » Reduction in power consumption, less space and lower cost
- » Unified and improved router to radio functionality
- » Capacity and connectivity upgrade that supports the 5G needs.

Software and hardware can be from different sources. This flexibility, the White Box Wireless Backhaul concept, allows operators to deploy a software driven network.



Source: telecominfraproject.com

Notes:

- » "Disaggregated White Box - Technical Specification" document can be found at: <https://bit.ly/3jdKhvt>
- » "Disaggregated Cell Site Gateway - Technical Specification" document can be found at: <https://bit.ly/3tFTbx9>

INTRACOM TELECOM'S WIRELESS BACKHAUL EVOLUTION AND TIP

Intracom Telecom is an active member of TIP community. The company follows the developments and participates in the writing of functionality and interoperability test cases. In addition, it partic-

Disaggregated Cell Site Gateways

The definition of open and disaggregated white box cell site gateway devices that operators can deploy in their current 2G/3G/4G cell sites, as well as in the upcoming 5G deployments. A 1RU fully-featured cell site router with a wide range of Ethernet connectivity options for client and network sides. Supports Layer-2, Layer-3 and MPLS features, with native time synchronization protocols.

ipates in test cases execution, providing innovative solution(s) that includes its own radio devices along with 3rd party cell site gateway devices (white boxes) loaded with 3rd party Network Operating System (NOS).

The solution that will be tested consists of the following items:

- » Intracom Telecom devices
 - UltraLink™-GX80 (enhanced version, currently in beta)
- » White boxes (DCSG)
 - DELTA AGCV2085
 - ALPHA STX-60D-126F
- » NOS
 - ADVA Ensemble Activator

Apart from the UltraLink™, OmniBAS™ family is also examined on how it can be modernized to fit better into the OpenSoftHaul concept. The possibility to connect the OmniBAS™ powerful radio units (ODU) with modern DCSG devices (directly or by using an intermediate modem concentrator) will further enhance the OmniBAS™ family and will provide additional options to operators in order to fit their existing (or new) OmniBAS™ equipment into a modern wireless backhauling network with the required capacity and functionality to support current and new (5G) needs.

OPENSOFTHAUL RFI

Axiata, Deutsche Telekom, MTN, Telefónica, and TIM Brasil have been coordinating a joint RFI to assess the global technology landscape for building the first-in-the-world service providers-driven Open and Disaggregated wireless backhaul solutions as a part of the TIP's Wireless Backhaul Project Group (WBH PG). The industry's leading hardware and software technology providers have been asked to participate in the RFI, share information on their current technical capabilities and supported features to measure the level of compliance, and their plans to build

solutions that fulfill the OpenSoftHaul (OSH) technical requirements developed in TIP.

Following the technical evaluation, last October, the operators have identified Intracom Telecom as a "best positioned supplier" among more than twenty leading technology providers who participated in the three main categories of the required solution:

- » Full Outdoor Radios in microwave and millimetre-wave (HW ODU);
- » IDU Whitebox solutions (HW IDU), and
- » Operator configurable Network Operating System (NOS SW)

The full announcement can be found at <https://bit.ly/2MX7Vkd>

OTHER TIP'S PROJECT GROUPS

Wireless Backhaul is not the only Project Group of the TIP community. The following Project Groups have also been created:

- » End to End Network Slicing
- » Millimeter Wave Networks
- » Non-Terrestrial Connectivity Solutions
- » OpenCellular
- » Open Core Network
- » Open Optical & Packet Transport
- » OpenRAN
- » Wi-Fi
- » Wireless Backhaul

In addition, the following Solution Groups exist:

- » Connected City Infrastructure
- » Network as a Service (Naas)
- » Open Automation ■

To find out more on TIP, you may visit <https://telecominfraproject.com>.

WHOM DO YOU TRUST FOR YOUR 5G NETWORK?



WiBAS™ G5 Connect+

Compact and lightweight PtMP Terminal Station operating in the 24.25-29.50 GHz bands, supporting both FDD and TDD duplexing modes. Capable of achieving net L1 throughput of up to 930 (DL) / 630 (UL) Mbit/s @ 112 MHz (FDD) and up to 730 (DL) / 85 (UL) Mbit/s @ 100 MHz (TDD, 8:1 split ratio). It accommodates advanced Ethernet networking features and 2-stage Hierarchical QoS, whilst its auto-entry / authentication / provisioning capabilities allow for fast and easy network deployment. Guaranteed perfect synergy with all available WiBAS™ Base Stations.



UltraLink™-GX80

Ultra-high performance all-outdoor E-Band radio (71-76 / 81-86 GHz) delivering a capacity of up to 10 Gbit/s Full Duplex that is ideal for backhauling multi-Gigabit access base stations. Its integrated Ethernet Bridge offers comprehensive Carrier Ethernet networking functionality. It supports advanced packet-based Synchronization capabilities and it provides industry leading system gain resulting in exceptional E-Band link range performance. Combined with MW radios it can be configured in an all-outdoor dual-band solution further enhancing link range and availability.



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