

INTERVIEW

INTRACOM TELECOM GROUP NEWSLETTER | ISSUE 33



MWC™
Barcelona

28 February – 03 March 2022

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LONG RANGE PtMP mmWAVE NETWORKS WITH INNOVATIVE RADIO DESIGN

> PAGE 10

A STRUCTURED LoRAWAN PLANNING METHODOLOGY FOR SUCCESSFUL IoT PROJECTS

> PAGE 12

ADDRESSING BIG DATA MONITORING CHALLENGES

> PAGE 14

ENABLING BUILDING BLOCKS' INTEGRATION OF A DISTRIBUTION SYSTEM OPERATOR'S IT ECOSYSTEM

> PAGE 18

ENSURING BETTER AIR QUALITY FOR SUSTAINABLE CITIES

> PAGE 21

OPTIMIZING THE OPERATIONS FOR EV CHARGING POINT OPERATORS WHILE REDUCING THEIR TCO

> PAGE 24



INTRACOM
TELECOM



INTERVIEW

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ISSUE 33

OCTOBER 2021 - JANUARY 2022

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NEW PARTNERSHIP DEAL WITH TERAGO

In December 2021, the company announced a new partnership with TeraGo, Canada's leading nationwide provider of enterprise wireless network solutions, for the supply of its advanced wireless solutions, WiBAS™ G5 evo-BS and WiBAS™ G5 Connect+, operating at 24 GHz frequency band. TeraGo's strategic plan is to commercialize Fixed Wireless Access (FWA) in Canada utilizing millimetre-wave (mmWave) licensed spectrum, and by selecting the WiBAS™ G5 platform it will be able to provide faster and more reliable services to its subscribers. TeraGo is the inaugural user of WiBAS™ G5 at the 24 GHz band in North America and was given priority to test the full ecosystem of Intracom Telecom's FWA portfolio, at their lab and at the field.

"This is an exciting partnership for TeraGo, as we further expand our network capacities on a standardized platform, with compact design for an effortless rollout and zero-touch provisioning," said Osman Mohamednur, Sr. Director Network Business at TeraGo. "Utilizing Intracom Telecom's WiBAS™ G5 solutions, will enable TeraGo to go beyond what is expected to bring Canadian enterprises enhanced speeds, low latency and reliability to the market."

Dharminder Chanana, CEO of Intracom Telecom's subsidiary in the USA, Conklin-Intracom, stated: *"We are very pleased to partner with TeraGo, Canada's 5G pioneer, and support their vision. Our WiBAS™ G5 evo-BS and WiBAS™ G5 Connect+ solutions, already certified by ISED Canada, enable TeraGo to offer ultra-fast connectivity speeds to enterprise customers, in line with TeraGo's goal to improve its overall network capacity."*



TeraGo

PHYSICAL SECURITY PROJECT FOR ATHENS INTERNATIONAL AIRPORT

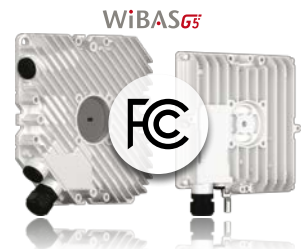
Intracom Telecom has reached an agreement with Athens International Airport (AIA) for the upgrading of its physical security information management of AIA outdoor infrastructures. Intracom Telecom will deploy its innovative software integration platform SISC², to provide AIA with modern technologies for objects verification, alarms triggering and identification of security breach events. Intracom Telecom has undertaken the design, supply and installation of ground surveillance radars (GSR), fiber optic intrusion detection sensors, night vision cameras and PSIM software management and integration components, ensuring unhindered interface and integration with existing systems/infrastructure, utilizing its solution for surveillance, collaboration, coordination and administration of diverse physical security events, SISC². The new PSIM system will enable AIA with 24-hour real-time intrusion detection monitoring,

alarming and notifications, situational awareness, composition of common operational picture, thus strengthening AIA capabilities and to protect its critical infrastructures against man made threats, natural disasters and catastrophes. Mr. Nikolaos Velentzas, General Manager of Intracom Telecom's Services Business Division, stated: *"We are proud to partner with AIA for such a critical physical security project and for the trust that AIA has shown to Intracom Telecom's solution. Our SISC² platform is a multiyear research product that can offer superior security management services. The Greek airport has a strong tool in their hands able to detect and address any security breach in their systems."*



WIBAS™ G5 FWA SOLUTIONS RECEIVE FCC COMPLIANCE

The FCC certification has been awarded for Intracom Telecom's advanced mmWave FWA solutions, WiBAS™ G5 evo-BS and WiBAS™ G5 Connect+, operating in TDD and FDD at 24 and 28 GHz bands respectively, alongside 5G systems. WiBAS™ G5 evo-BS demonstrates an exceptional deployment flexibility serving subscribers within a large area, extending to several miles away from the hub site, and it uses a variety of sectoral antennas ranging from 90° to full 360° coverage. Moreover, it operates at the 24 and 28 GHz Upper Microwave Flexible Use Service (UMFUS) band and its intelligent software enables to operate side by side with 5G systems in adjacent channels. WiBAS™ G5 Connect+ is an advanced terminal station operating both in TDD and FDD in the 24 and 28 GHz UNFUS spectrum. It is ideal for operators seeking to deploy quickly ultra-broadband service to subscribers and gaining precious time against Fiber to the Curb (FTTC) / Fiber to the Home (FTTH) solutions. *"We are always committed to serving our customers with state-of-the-art and reliable solutions, placing capacity and range of connectivity at the center of our innovation. The 5th generation of our FWA technology complies with the FCC standards and fulfils FCC's goal in bridging the digital divide in rural and sub-urban areas in the USA",* stated John Tenidis, Marketing Director of Intracom Telecom's wireless solutions portfolio.



➤ <http://www.intracom-telecom.com/WiBASG5-evoBS>

➤ <http://www.intracom-telecom.com/WiBASG5-ConnectPlus>

BOOSTING PERFORMANCE OF VIRTUALIZED NETWORK SERVICES

Taking advantage of AI & ML technique, combined with Intracom Telecom's strong telco network expertise and development excellence, the network operations can be optimized! In a video explainer Sotiris Bithas, Telco & Enterprise Software Solutions Marketing Director, outlines how you can intelligently & efficiently boost the performance of your virtualized Network Services, optimizing the utilization of your NFV infrastructure resources, while at the same time minimizing your operations energy footprint.

▶ <https://www.youtube.com/watch?v=YizeWuSuMLI>



NMS SYSTEM UPGRADE



The uni|MS™ R10 platform is now available, changing everyday work for Communication Service Providers who can experience new network lifecycle automation applications (NLA Apps), advanced Planning-Physical interworking and improved network assurance mechanisms that offer unprecedented efficiencies, elevating the concept of network management throughout the entire lifecycle of their radio transmission and access networks. Automating the massive deployment of new licensed network features and the escalation of unacknowledged alarms severity level, R10 offers a new paradigm on how NLA Apps disengage experts from laborious activities.

COMPLETION OF 47 PHOTOVOLTAIC PROJECTS IN GREECE IN 9 MONTHS

Intracom Telecom maintains its fast-paced rhythm in the project work it carries, having successfully completed 47 photovoltaic (PV) projects throughout Greece during the first 9 months of 2021. These projects were implemented by Ether, a member of the Group, with high specialization in the engineering – procurement – construction (EPC) of photovoltaic stations, of all capacities. Overcoming the challenging conditions prevailing in 2021 and the lack of basic equipment in the market, Ether delivered 9 projects with a total capacity of 4.5MW in Central Greece (including Attica), 6 projects in Etoloakarnania with a total capacity of 3.4MW, 4 projects with a total capacity of 2MW in Epirus and 28 projects with a total capacity of 19.5MW in Thessaly. Dr. Theodoros Pappas, General Manager of Ether, stated: *“Our 10 years of experience in the photovoltaic market, as well as our highly qualified design team, ensure the provision of superior end to end services, from the licensing process, to the design, procurement, construction, and maintenance of a PV station. At the same time, our wide network of partners, together with the reliability of Intracom Telecom Group, ensure the excellent construction of any PV investment.”*



R&D INNOVATOR OF THE YEAR AWARD



Last November, Intracom Telecom received the R&D Innovator of the Year 2021 InfoCom Award. This distinction is a reward of the efforts and results of company's R&D experts, whose creativity and passion continuously contribute to the evolution of technology. Intracom Telecom invests significantly in Research & Development operating 3 R&D centers in Greece and Italy, and employing over 1/3 of its personnel in R&D and production activities to develop cutting-edge products and competitive solutions. Representing the company, John Tenidis, Wireless Systems & Solutions Head, received the award during the 23rd InfoCom World conference held in Athens, Greece.

BUILDING A SOLID FOUNDATION IN THE CANADIAN MARKET



Innovation, Science and
Economic Development Canada

The company paves the way for further growth of business in the Canadian market by obtaining the Innovation, Science and Economic Development Canada (ISED) Certification for two of its leading wireless solutions - WiBAS™ G5 evo-BS and WiBAS™ G5 Connect+ operating at 24 GHz frequency band. Moreover, the E-Band radio UltraLink™-GX80, that is ideally suited for use in demanding transport applications requiring fiber-like capacity up to 10 Gbit/s full duplex, achieved compliance to the Canadian authority's regulations. Dimitris Pantelopoulou, Intracom Telecom R&D Director, stated: *“Getting recognized by the ISED signifies that our high quality product portfolio has the ability to meet the demands of every market in the world. As a matter of fact, we are testing the 24 GHz WiBAS G5 platform with an interested customer, as Canada is a premium location for testing suburban and rural FWA. Our WiBAS™ G5 evo-BS, WiBAS™ G5 Connect+ and UltraLink™-GX80, fully in line with ISED Canada's requirements, can contribute to enhancing the country's connectivity, and provide multiple Gbit/s capacities.”*

SMART CITY PROJECT IN GREECE

A smart city project has been implemented for the Municipality of Egaleo, Greece, using IoT technologies to upgrade and improve citizen experience and optimize Municipality's functions. The project will be delivered by Q1 2022. The Municipality selected Intracom Telecom, and its end-to-end orchestration platform uiTOP™ to monitor and manage Smart City infrastructure and applications, which include WiFi network, innovative system to monitor air quality and noise levels, as well as the wifio™ CrowdSensing solution to prevent overcrowding in the Egaleo grove. Nikolaos Velentzas, General Manager of Intracom Telecom's Services Business Division, stated: *"A significant project has just started and we are, therefore, happy for undertaking such a challenging deployment in Greece too. We are continuously seeking to create and strengthen connected societies by implementing innovative IoT technologies in order to modernize and interconnect any Municipality in Greece. Every single deployment is a unique opportunity for us to offer our knowledge and technology in order to improve citizens' quality of life."*



PAAS INTEROPERABILITY SOLUTION DEMO

In the framework of the OpenSourceMANO OSM12 Ecosystem Day, Intracom Telecom presented a demo of a Platform-as-a-Service (PaaS) interoperability solution between 5G/NFV Orchestrators and cloud-native Edge Computing Platforms. This demo presentation highlighted the Zero Touch Automation features of the developed end-to-end Network Slice Lifecycle Management solution and was a dissemination activity of the Edge Computing research work that Intracom Telecom is leading in context of the EU collaborative project 5G-VINNI, in collaboration with Telefonica.

➤ https://osm.etsi.org/wikipub/index.php/OSM12_Ecosystem_Day#Agenda

➤ <https://www.5g-vinni.eu/>



VALIDATING IMPLEMENTATION OF NFV & MEC SPECIFICATIONS AND APIS

In the framework of the ETSI NFV&MEC IOP Plugtests 2021, Intracom Telecom provided as Function Under Test (FUT), MEC-enabled Network Function Virtualization (NFV) deployment artifacts of the uiTOP™ solution, as part of its innovation activities within the H2020 5G-VICTORI project, supporting IoT Platform and Edge Computing features of Energy and Factories of the Future use case scenarios. The European Commission-supported multi-vendor interoperability (IOP) event attracted a total of 29 organizations for the assessment of the level of interoperability of their Network Function Virtualization (NFV) and Multi-access Edge Computing (MEC) solutions, while validating their implementation of NFV and MEC specifications and APIs.

➤ https://portal.etsi.org/Portals/0/TBpages/CTI/Docs/ETSI_NFV&MEC_IOP_2021_Plugtests_Report_v1_0_0.pdf

➤ <https://www.5g-victori-project.eu/>

MOVING TO CUSTOMER-FACING BANKS

Representing Intracom Telecom in the recent 19th Bank Management Conference, Nikos Tsantanis, Senior Product Marketing Manager, showcased a framework for generating value out of the enormous amounts of data that every bank manages, presenting real-life use cases on Data Governance, Big Data Analytics and AI-powered Sentiment Analysis technologies. To find out more on company's unique in-house engineering competence and talent, our solutions and global partnerships and last but not least, on how Intracom Telecom helps Financial Services Institutions leverage digital channels to streamline operations, cut costs and better serve your customers, please visit the link below:

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



GOLD MEMBERSHIP IN THE INTEL NETWORK BUILDERS WINNERS' CIRCLE

In November 2021, Intracom Telecom was awarded the Gold Membership in the Intel Network Builders Winners' Circle! We are continuing our strong collaboration aiming at helping CSPs improve their energy and resource footprint.

➤ <https://networkbuilders.intel.com/ecosystem/intracom-telecom>

FITCE TECHNOLOGY FORUM

In December 2021, Intracom Telecom was a Gold Sponsor of the FITCE Technology Forum held in Athens, Greece. This year's event focused on technologies and services for the Digital Transformation of companies and public sector. On behalf of Intracom Telecom, Dimos Kothris, IoT & Smart City Solutions Expert, presented real-life case studies on how digitization empowers sustainability.



NETWORK EQUIPMENT TRIALS IN NORTH AMERICA, EUROPE & ASIA PACIFIC

All laboratory and field tests on the WiBAS™ G5 PtMP system, with a number of 5G service providers in North America, Europe and Asia Pacific, using their 24 GHz, 26 GHz and 28 GHz spectrum, were successfully completed during the second half of 2021. More specifically, the company has performed five successful trials of the WiBAS™ G5 system that has demonstrated uninterrupted service and operational excellence. The WiBAS™ G5 has now reaffirmed its ability to deliver several hundreds of Mbps to subscribers at ranges of more than 5 km. John Tenidis, Marketing Director of Intracom Telecom's wireless solutions portfolio, stated: *"We would like to thank the participating companies for giving us the opportunity to prove, at the lab and at the field, the superior performance of the new WiBAS™ G5 system which is designed to connect homes and businesses in suburban and rural areas. This platform inherits from the mature WiBAS™ technology and enhances the hub and the subscriber terminals with smart software on board. Thanks to it, the radios can operate side by side with 5G systems in adjacent mmWave channels."*

ADVANCED RADIO PLANNER APPLICATION NOW AVAILABLE

At the end of 2021, the company presented the evolution of the Radio Planning facilities of its uni|MS™ platform, enhancing it with smart algorithms for the design and optimization of multi-frequency (6-42 GHz, 57-64 GHz & 71-86 GHz) wireless transport and FWA networks supporting both Point-to-MultiPoint (PtMP) and Point-to-Point (PtP) configurations for Intracom Telecom and third-party devices. The uni|MS™ platform now allows RF Planning Experts to fully focus on supervising the business and operational automations and validating the relevant parameters, avoiding time-consuming repetitive tasks. The uni|MS™ Radio Planner can be deployed as a standalone application, solely for the purpose of RF planning, or it can interwork with uni|MS™ Management and Control application modules, accelerating rollout and optimizing the network, in a closed-loop fashion, throughout the entire network lifecycle.



OPTIMIZING THE mmWAVE TECHNOLOGY FOR FWA



A Light Reading webinar entitled "Maximize benefits from disruptive mmWave technology for FWA", was sponsored in Q4 2021. The need of efficient purpose-built mmWave FWA solutions at the 24 GHz, 26 GHz, 28 GHz and 31 GHz bands with unique advantages against 5G FWA, has been highlighted, while Intracom Telecom's representatives showcased company's

innovative FWA possibilities. To watch the full webinar visit the link below:

➤ http://intracom-telecom.com/misc/LR_webinar.mp4

DISSEMINATION ACTIVITY FOR PROJECT MESON



In the context of company's participation in the national collaborative project MESON, in collaboration with National Technical University of Athens and University of Macedonia, Greece, Dr. Vasileios Theodorou, Senior Research Engineer at Intracom Telecom participated in the publication of the article entitled "Edge Cloud Selection: The Essential Step for Network Service Marketplaces". The article focuses on 5G network service ecosystems and introduces a novel distributed service discovery framework for Network Service Marketplaces (NSMs) in Edge Computing.

➤ <https://ieeexplore.ieee.org/abstract/document/9627824>

CLOUD NATIVE APPS WORKSHOP



In November 2021, along with Board of European Students of Technology (BEST) Thessaloniki, Intracom Telecom organized an online workshop entitled "Cloud and Cloud native telco and technologies".

Representatives of company's Software Development Center, Thessaloniki Branch, analyzed the essentials of cloud native applications, while provided insights about the company and discussed potential opportunities inside Intracom Telecom.



28 February – 03 March 2022

Stand **7B44**

BOOK YOUR MEETING

Should you wish to book a meeting with our team of experts, either in person at our stand or on-line at a convenient date and time, please scan the QR code



www.intracom-telecom.com





LONG RANGE PTMP MMWAVE NETWORKS WITH INNOVATIVE RADIO DESIGN

Having spent the two years since the announcement of the revolutionary WiBAS™ G5 evo-BS in 2019, Intracom Telecom developed new techniques to enhance the density of subscribers and the speed of connection, for its WiBAS™ mmWave FWA portfolio. The technological innovations are being introduced on the 28 GHz FDD hub radio WiBAS™ G5 dual-BS and on the 24 / 26 / 27 / 28 GHz TDD hub radio WiBAS™ G5 smart-BS. The subscriber density reaches 240 per hub and the available capacity goes up to 3.2 Gbps using wide channels of 100 MHz and 112 MHz, by activating 2 or 4 data streams on each hub radio. The advanced modem technology of WiBAS™ system enables the operation of the system at a maximum 1024 modulation scheme, therefore terminals can achieve total throughput of 1 Gbps. The signature feature of the WiBAS™ portfolio has always been the extended range, and this is reconfirmed for the WiBAS™ G5 dual-BS as well as for the WiBAS™ G5 smart-BS, and ranges up to 11 km can be considered along with all the other parameters which are accounted for when designing and deploying for radio service coverage.

The WiBAS™ G5 dual-BS and WiBAS™ G5 smart-BS are fully compatible with operating networks and their software-defined architecture enable future-proof deployments and feature enhancements through software licensing. Service Providers can instantly increase the total network capacity of an existing WiBAS™ deployment by operating the new hubs alongside the WiBAS™-OSDR and WiBAS™ G5 evo-BS hubs. The WiBAS™ G5 smart-BS operates at 5G mmWave frequencies alongside 5G NR networks. The WiBAS™ G5 dual-BS and WiBAS™ G5 smart-BS, just like any product of the company's FWA ecosystem, are SDR (Software Defined Radios) having the capability to be upgraded with software for new functionalities in the future.

BENEFITS

- » High density of terminals per sector (240) due to multi-carrier radio technology
- » Ultrafast speed of connection per subscriber due to wide channels (FDD up to 112 MHz⁽¹⁾, TDD up to 100 MHz⁽²⁾)
- » Large service area footprint (up to 11 km range)⁽³⁾
- » Support of various service profiles with advanced QoS scheduling
- » Radio and capacity planning tools for predicted performance and optimized network deployment
- » Effortless rollout employing zero-touch provisioning automated procedures
- » Rapid network expansion - just add terminals at the served sites
- » Easy upgrade at the field with new features due to Software Defined Radio (SDR) technology

HIGHLIGHTS

- » Operation at mmWave area-licensed frequencies
- » Robust hitless adaptive modulation up to 1024-QAM
- » Up to 3.2 Gbps aggregate sector capacity
- » Exceptional system performance, full hierarchical QoS support and carrier-grade protection mechanisms
- » Advanced error correction coding without data retransmission, which consumes valuable capacity resources
- » Low latency for delay-sensitive transmission
- » Flexible mode of operation (Air Frame fully compatible with 5G deployments)⁽²⁾
- » Advanced VLAN translation features enabling both direct or wholesale service models
- » Eth OAM support, enabling operators to provide manageable L2 end-to-end services to their customers
- » PPPoE intermediate Agent support (CPE side) for easy and robust user authentication.
- » Multiple power options - direct DC or through PoE injector
- » Extremely reliable radio design with high MTBF figures
- » uni|MS™ Radio Link Planning add-on; closed-loop integrated platform

WiBAS^{G5}
dual-BS

» <http://www.intracom-telecom.com/WiBASG5-dualBS>

WiBAS^{G5}
smart-BS

» <http://www.intracom-telecom.com/WiBASG5-smartBS>

⁽¹⁾ WiBAS™ dual-BS

⁽²⁾ WiBAS™ smart-BS

⁽³⁾ Range up to 11 km can be considered along with all the other parameters which are accounted for when designing and deploying for radio service coverage.



A STRUCTURED LoRaWAN PLANNING METHODOLOGY FOR SUCCESSFUL IoT PROJECTS

THANASIS OIKONOMOU

Senior IoT Product Marketing Engineer, ICT Services & Solutions

PARASKEVI PANAGOPOULOU

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THE NEED FOR A STRUCTURED LoRaWAN PLANNING METHODOLOGY

LoRaWAN is the one of the most popular connectivity choices for implementing IoT projects which incorporate verticals such as smart lighting, smart parking, waste management, smart metering and many more. Among its numerous advantages are extended coverage (a few kilometres in rural areas), high reliability, low battery consumption, low cost of implementation and ease of expandability. However, one or more of these advantages can be lost if the network isn't planned and designed carefully, through a structured methodology which combines theoretical models and on-site verification.

Guaranteeing LoRaWAN coverage during the planning phase is essential. IoT sensors might communicate only a few times a day or week, so every transmission matters and the network should not allow packets to be lost. A well designed network is free from network congestion due to repeated join efforts or retransmissions. In addition, when the nodes operate under stress-free transmission parameters their battery lasts longer. Finally, it's also important that the planning methodology produces an optimal number of required LoRaWAN gateways, keeping the cost of investment low.

INTRACOM TELECOM'S INNOVATIVE APPROACH

Intracom Telecom's multi-year expertise both in IoT projects and in RF network design has led to a definition of a well-structured methodology for planning LoRaWAN deployments. The methodology is a hybrid approach combining theoretical modeling of signal propagation through 3D simulations of terrain and building landscapes in addition to actual on-site measurement verifications.

Intracom Telecom's methodology begins with a broad set of candidate points of installation of LoRaWAN gateways. The points are evaluated with respect to their installation feasibility in addition to the results of simulation, based on selected models of electromagnetic waves propagation. Important evaluation factors of the candidate installation points comprise the existence of mounting masts and uninterruptible power supply for the gateways, the surrounding area terrain and the existence of obstacles that may impede the propagation of the electromagnetic waves as well as the coverage and overlap revealed from the theoretical simulation. The simulation is based on multiple propagation models and parameters, so that the coverage performance of each point is assessed under simulated conditions which are worse than the ideal in order to boost the reliability of

the network under design. The theoretical coverage simulations take into account not only the terrain but also objects, such as trees and buildings in the area. Such an approach leads to an optimal set of installation points that combine strong reception power within the covered area in addition to adequate redundancy for increased reliability.

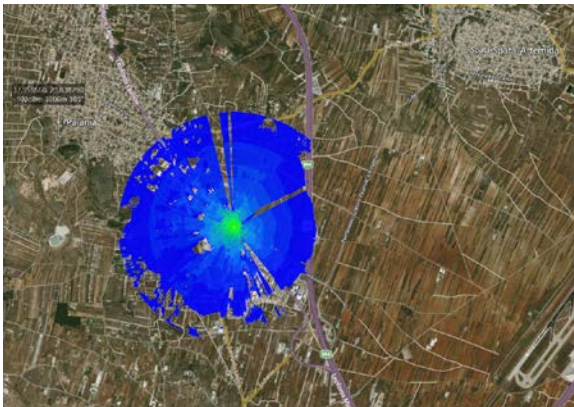


Figure 1: Theoretical coverage of a LoRaWAN gateway at Intracom Telecom campus

The above theoretical results are then assessed with on-site measurements. This is an essential step since theoretical models do not always fully depict reality. More specifically, sensors that in theory may seem to have weak or no reception signal may in reality have good coverage and vice versa. One reason that this may happen are the peculiarities of the verticals under study. For example, a parking sensor will be covered by a car which in reality will reduce the strength of its received signal, something that the theoretical model does not take into account. Another reason that calls for on-site verification is the fact that the theoretical models may not include recent changes in urban landscape, such as the erection of new buildings which will impede the signal propagation. Intracom Telecom can carry out detailed on-site coverage verification by using portable equipment. The results of the theoretical models versus the on-site measurement are compared and analyzed using Intracom Telecom's in-house developed software tool.

Intracom Telecom provides a holistic approach in the design and implementation of a LoRaWAN network, from desk to the field, to help customers achieve low OpEx, improved RoI and project longevity



Figure 2: Overlapping of theoretical LoRaWAN coverage vs actual on-site measurements at Intracom Telecom campus

By overlapping the results of the theoretical analysis and on-site measurements, the network designer can identify where the two differ. Subsequently the designer is able to tune the theoretical model with parameters that can be derived from the real measurements and re-run the simulation to get more accurate results. In addition, decisions related to sensor locations with poor coverage can be taken based on the overlapped information. The designer can choose among relocating a LoRaWAN gateway, investing in a new LoRaWAN gateway or even considering an alternative connectivity technology (e.g. NB-IoT) for a small number of locations. In any case, the designer has both the information and the tools to justify the finalized network topology.

CONCLUSION

With the above methodology, LoRaWAN network designers experience an unprecedented number of benefits. First, optimal sensor placement is proven and results in extended battery life. Also, gateway positioning adjustment can be easily simulated and justified mostly from the comfort of their office. And even in cases of “no coverage”, the results of the above methodology will lead them to the optimal approach. Finally, the whole process can lead to designing a network that accommodates expansion easily.

It is worth mentioning that the above methodology can be also applied in existing deployments. Combining the theoretical analysis and on-site verification, poor coverage areas can be identified and modifications will be proposed. Also, the battery lifetime and replacement costs can be predicted and thus, IoT sensors for a new vertical will be efficiently introduced in the existing network. Finally, having a comprehensive image of the network coverage, the costs of NB-IoT “patches” in areas of lack of adequate coverage are calculated. ■



ADDRESSING BIG DATA MONITORING CHALLENGES

KONSTANTINOS ANASTASAKOS
Product Manager, Telco & Enterprise Software

INTRODUCTION

Today one of the key success indicators across all industries is their degree of digital transformation adoption. This digital conversion is originated and empowered by the unprecedented evolution of Data Analytics and Big Data, regarding larger and more complex structures. The soaring demand for faster processing power and larger storage space has led to new and innovative technologies with a variety of sophisticated tools. In practice often it is needed to combine multiple tools to meet hardware and software requirements, but then it becomes increasingly difficult to control and monitor such systems due to their complexity and diversity.

THE CHALLENGES

There can be numerous specific challenges when monitoring large data structures, starting from the collection of traces and logfiles, to the analysis phase until finally resolving an incident.

Equally hard is to provide observability towards distinguished applications and hardware units, since the volume of potentially displayed information is enormous and the processing time should be kept to a minimum.

At the **collection stage**, the more diverse the gathered traces, the greater the number of access points for the monitored resources, with the latter scattered across the big data ecosystem. There might exist applications or hardware units completely lacking monitoring capabilities without generating any logfiles, or these could be partially supervised by the overall monitoring system.

At the **analysis stage**, during incident's investigation, the troubleshooter is usually confronted with massive volumes of generated logfiles and alerts, which create an irrepressible and chaotic situation. Furthermore, the processed logfiles might be unsynchronized and incompatible between them, since they were generated at different times by

various systems or applications. Lineage and historical data retention might not be supported by all systems, which could contribute significantly to the root cause exploration.

A significant manual effort and labor cost accompanies the troubleshooting process, proportional to the number of faults and the complexity of the environment. As a result, the efficiency of monitoring mechanisms regarding large data analytics structures is rather poor, hard to audit and intricate to improve.

THE TRADITIONAL APPROACHES ARE INSUFFICIENT

Typical solutions for monitoring Big Data clusters involve a combination of numerous monitoring tools, dedicated to individual resources and targeting specific metrics. Some of the common tools that are integrated within enterprise data environments - such as Cloudera Manager for Cloudera distributions, are limited to basic monitoring

functions. Other commercial tools such as Datadog, Splunk and others, may offer high degree of monitoring capabilities and customizations, but their cost escalates proportionally to the volume of the data stored and function served.

Alternative methods, using open-source tools, include Elastic Stack for logfiles and tracing, Nagios for checking the status of servers, hosts and network. Regarding monitoring of hardware structures, racks and power units, these are often monitored via their own specialized software lacking any graphical user interface.

There is a clear need for an innovative monitoring solution, capable to handle metrics from a diverse range of resources and applications, correlate their metrics and visualize the results via a common tool and a user-friendly interface.

“THE 4 GOLDEN SIGNALS”

Any proper monitoring system focuses its metric mechanism to “4 Golden Signals” the Latency, the Traffic, the Errors and the Saturation. “Latency” measures the amount of time needed to send a request and receive a response, regardless of being successful or unsuccessful, which is highly impacted by the distributed number of servers within the cluster. “Traffic” measures the total number of requests served by the system. “Errors” is the number of failed requests, while “Saturation” depicts the utilization of the system, emphasizing on the most critical resources.

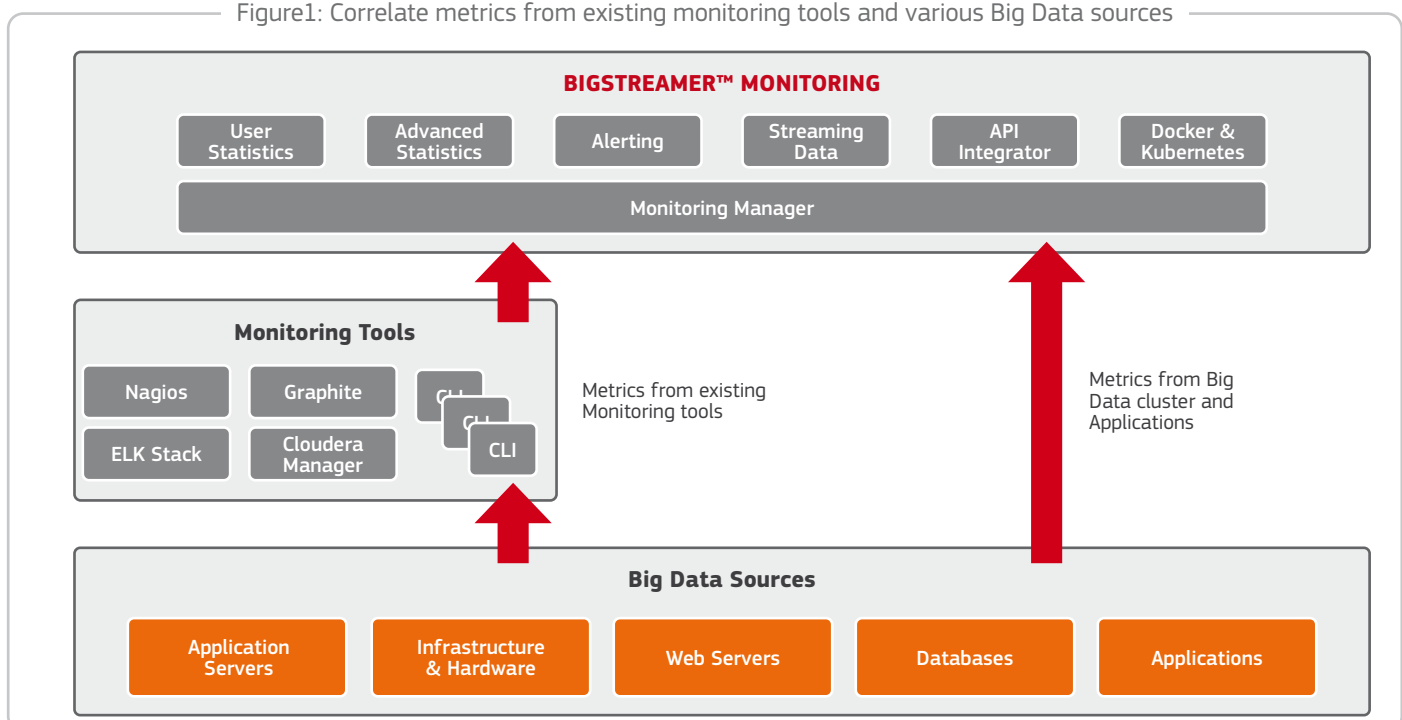
A SOLUTION DERIVED FROM INTRACOM TELECOM’S RICH EXPERIENCE

Intracom Telecom has an extensive experience on installation, configuration and consultation of Big Data ecosystems, for more than a decade across various industries and business interests. Through this knowledge and expertise emerges “BigStreamer™ Monitoring”, a solution capable to collect, analyze and visualize critical information generated by Big Data components, applications, data sources and hardware units.

BigStreamer™ Monitoring is capable of ingesting metrics either directly from data sources, or indirectly by available metrics processed by other monitoring tools (see Figure 1). Direct data sources include but are not limited to application servers, hardware structures, web servers, database servers, specific applications and others. Indirect data includes ready metrics generated by other commonly used monitoring tools such as Cloudera Manager, Nagios, various hardware supervision tools, Graphite, Elastic Stack.

Collected metrics are stored as timeseries and then further analyzed to create meaningful graphs and visualizations. The access and interaction with the tool is powered by an intuitive, web-based graphical user interface.

Figure1: Correlate metrics from existing monitoring tools and various Big Data sources



ARTICLE

BigStreamer™ Monitoring offers a rich and interactive User Experience that supports a great number of visualizations, charts, graphs, while being highly customizable. Standard offered features may be extended through plug-ins to support additional functions if & when required (see Figure 2).

Figure 2: Display critical metrics via customized widgets on central dashboard



BIGSTREAMER™ MONITORING ARCHITECTURE

BigStreamer™ Monitoring consists of a main “Manager” module, which is the central starting dashboard and optional autonomous modules serving specialized monitoring functions (see Figure 3), including:

- » **Advanced Statistics:** A group of detailed performance metrics on flows and storage areas in a Big Data cluster.
- » **User Statistics:** A unique mechanism that allows the monitoring of volume changes on critical data
- » **Alerting:** A holistic alerting module with configured rule-based Alerts, Thresholds and KPIs per data entity.
- » **Streaming Data:** A mechanism to monitor real-time data processing tools, such as Kafka and StreamSets pipelines.
- » **Docker & Kubernetes:** A mechanism that allows monitoring of containers, Dockers and Kubernetes clusters.

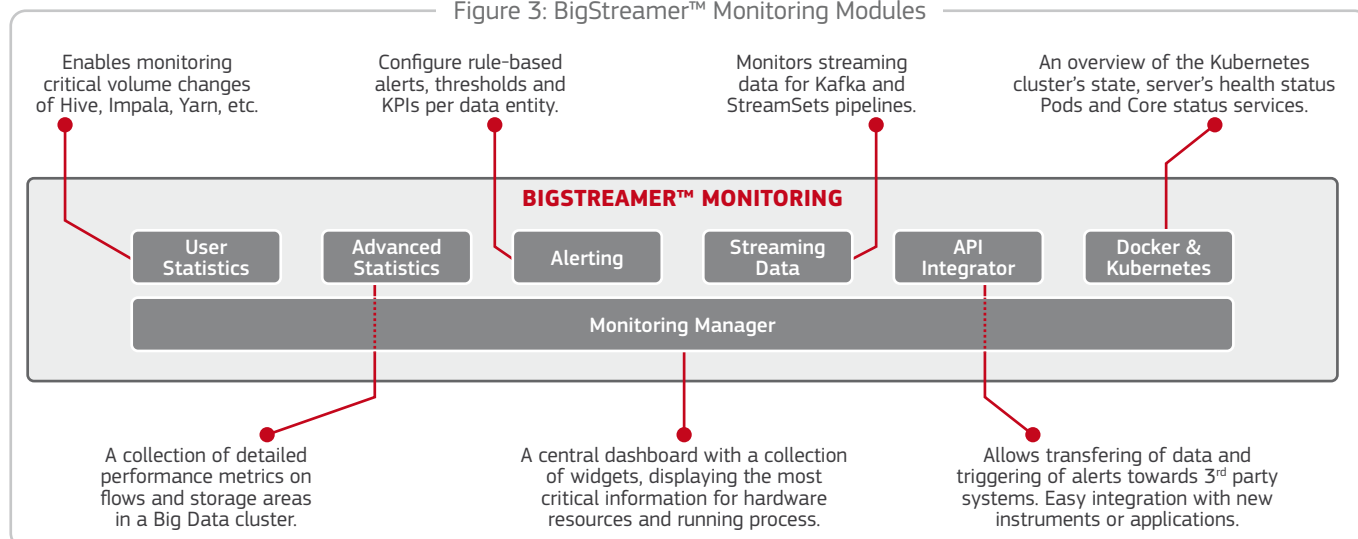
» **API Integrator:** A module that provides easy integration and communication of any new application. Northbound APIs allow the communication and transferring of data, and triggering of alerts towards any 3rd party systems. Southbound APIs allow the smooth integration of new instruments, applications or data flows.

KEY BENEFITS AND TAKEAWAYS

- » The major advantage of BigStreamer™ Monitoring is that it provides a single access point for monitoring multiple applications and services
- » It introduces the “5 second rule”, allowing with a glance on the overview dashboard to check on the most critical information of the monitored systems
- » When needed, it allows drilling down into more detailed dashboards and graphs providing enhanced information
- » Metrics can be collected and correlated from a range of different types of resources and existing monitoring frames like Cloudera Manager, Elastic stack, etc., or directly from database servers, applications and hardware units
- » Data metrics can be also collected from multiple networks and Big Data clusters
- » Retrieved data metrics can be further analyzed and cluster’s performance can be audited
- » All the metrics can be synchronized via common tools and interfaces, allowing easy and fast access for maintenance, troubleshooting, dimensioning and resource planning purposes. ■

To find out more on BigStreamer™ Monitoring, please visit www.intracom-telecom.com/bigstreamer.

Figure 3: BigStreamer™ Monitoring Modules



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FOR STREAMING
ANALYTICS**



**AI-DRIVEN
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TRANSFORMATION**



**CUSTOMER
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**INTRACOM
TELECOM**

ENABLING BUILDING BLOCKS' INTEGRATION OF A DISTRIBUTION SYSTEM OPERATOR'S IT ECOSYSTEM

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INTRODUCTION

The ever increasing penetration of distributed Renewable Energy Systems (DRES) into the electricity distribution network entails significant challenges for the Distribution System Operators (DSOs). Such challenges emerge due to the transition from the traditional architecture whereby power flows from centralized production to the loads at the edges of the grid to a new architecture whereby bidirectional power flows happen on the lines, due to the presence of DRES.

Digitization allows DSOs to apply technology-driven responses to such challenges. As distribution systems gradually become digitized, the DSOs' operations' centres evolve on parallel to take on new roles to manage and control them.

Various digital tools serve this evolution, performing a variety of functions, indicatively related to power quality monitoring; fault detection, isolation, and service restoration; voltage variance optimization, spatio-temporal electric load forecasting; generation

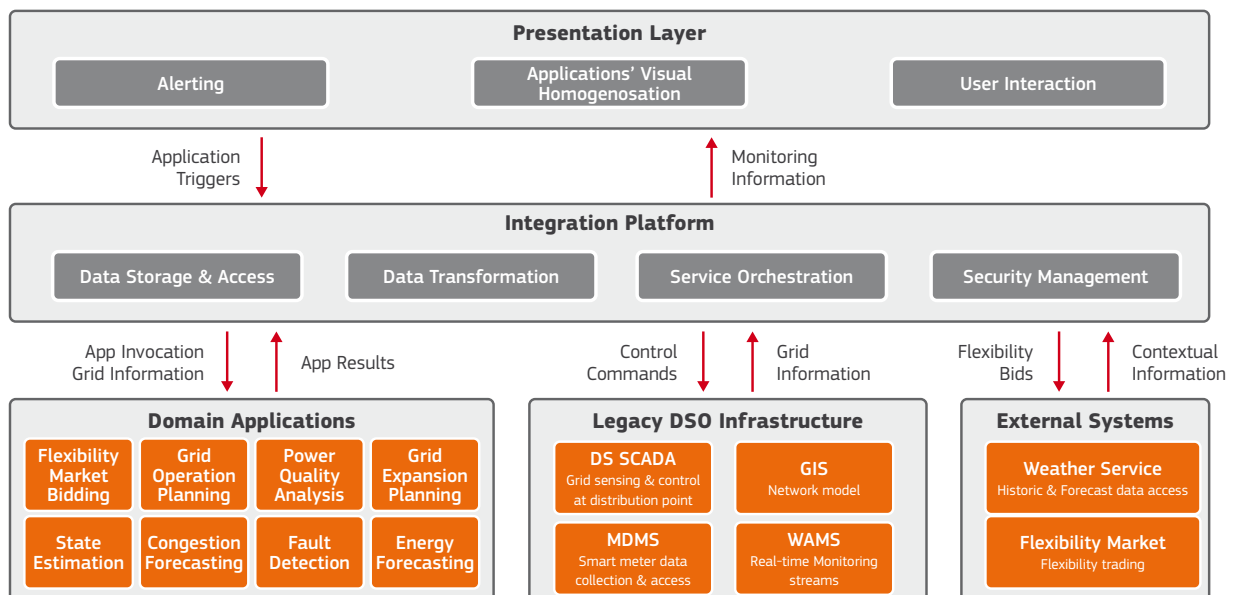
and flexibility forecasting, etc. Tools related to the techno-economic analysis of grid expansion and network planning can also be present.

This results in an IT ecosystem with numerous building blocks, resembling to the notion of a toolbox. Such a toolbox can be built upon a modular architecture enabling the introduction of and integration with components that realize specific applications and services for the DSOs. Such business intelligence tools are part of the Domain Applications layer (see Figure 1).

The applications are facilitated by an Integration Platform enabling access to grid monitoring information stemming from the legacy DSO infrastructure through standard and secure interfaces. The Integration Platform also enables the creation and management of service composites, enabling the cooperation among domain applications.

Finally, the Presentation layer provides a “mash up” of the tools of the Domain Applications layer, enabling monitoring and alerting as well as user intervention in the workflow.

Figure 1: Layered architecture of a DSO Toolbox and indicative components of the applications' & services' layer



THE INTEGRATION PLATFORM

No matter the level of intelligence of IT solutions that are used by the DSOs to tackle certain problems of their business domain, a persisting challenge is that of integration and interoperability among such solutions. In many cases the DSO's IT ecosystem is composed of many different legacy systems and subsystems, rather than a monolithic Distribution Management System (DMS). In such context, the need for an information exchange bus emerges. And, ultimately, there is a need for integration of the decision support functions (business intelligence layer) with the actions' execution functions (control plane).

Our Integration Platform addresses exactly these needs. It serves as a standards-based secure integration mechanism, providing also storage of / access to data that are fed by third party systems, making them available to the different business applications of the toolbox.

From a software architecture perspective the microservice paradigm is applied for the design of the solution. Following this paradigm, a collection of light-weight, loosely-coupled services is utilized – each one offering a single business capability. This offers great scalability, modularity as well as the capability of decentralized governance (implementation decisions).

The main design elements of the Integration Platform are the following:

» API Gateway

Acts as a single-entry point for all clients as well as an edge service for exposing micro-services to the outside world (through the Integration Platform API). It acts as an intermediate in all incoming communications and routes them towards the respective components of the Integration Platform. Also, it provides handling of authority validation (via integration with Security Server).

» Service Registry

It exposes the interfaces of the microservices to the routing engine as well as their operational status. It provides core functionalities related to service discovery; service routing information; and service monitoring and management.

» Security Server

It comprises a security infrastructure offering authentication, authorization and accounting functionality and enabling the control of access to the network resources.

» Business Process Manager

It provides service scheduling and orchestration for the implementation of different business flows.

» Microservice

It comprises an application offering an autonomous business capability exposed through a REST interface, via the API Gateway, while being also able to invoke services of external systems. For data-related functions the Microservice is responsible for transforming the incoming data to the Canonical Data Model.

» Data Store

Different data stores can be used as repositories for persistently storing and managing collections of data stemming from different legacy systems and third party applications: Indicatively we refer to relational databases for storing data closer to a relational model (e.g., smart meter asset information); time series databases for storing the various sensing data and results of applications that are in timeseries form; and triplestore (or RDF store) for storing IEM CIM data in their native format.



THE PRESENTATION LAYER

The presentation layer of the toolbox aims to provide Graphical User Interface (GUI) for the DSO's personnel, via a “mash-up” of the different tools of interest for the DSO. This solution relieves the user from the problem of interacting with multiple user interfaces (of even different tool providers) enabling access to their functionalities in a single environment.

An integral part of presentation layer is a central dashboard where the user can monitor the status of each application. For real-time applications a notification interface is supported alerting the user about new events and facilitating the decision making. Dedicated user interfaces are provided for each tool of the toolbox, following a different design pattern depending the type of application (e.g. planning or operational functions). Whenever meaningful we utilize reusable components enabling presentation of info into relevant domain contextual information. For example, for the presentation of grid planning or operation info we use network graphs representing the model of the grid. Such graphs can be visualized on geographical maps or plotted via a layout algorithm (single line diagram form), overlaying relevant info (e.g. power quality events, congestions, faults, feeder isolation).

Figure 2: DSO Toolbox home page

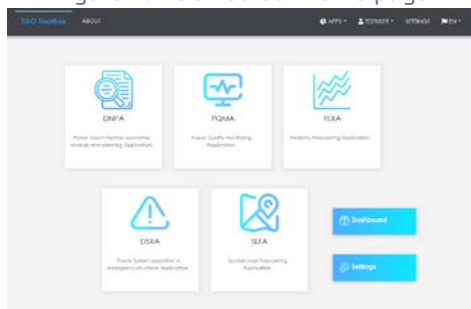
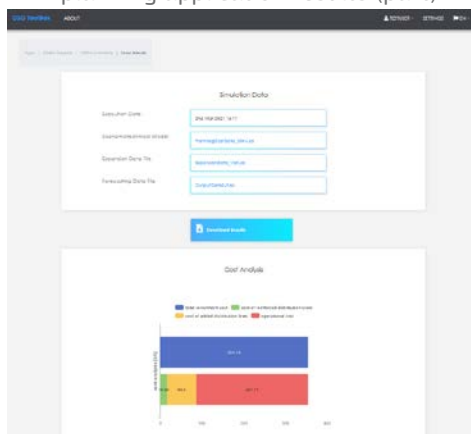


Figure 3: Example of network expansion & planning application results (part)



SOLUTION INSTANTIATION IN THE COLLABORATIVE PROJECT “DSO TOOLBOX”

“DSO Toolbox” is the codename of a collaborative research project co-funded by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH-CREATE-INNOVATE (project code: T1EDK-00450). In this project, Intracom Telecom is the Coordinator and collaborated with a research laboratory from the National Technical University of Athens (NTUA) which designed and implemented a set of tools for techno-economic analysis of distribution network expansion and planning; distribution grid flexibility forecasting; spatial load forecasting; power system operation in emergency situations (self-healing); and, power quality monitoring. Our Integration Platform enables the integration of these tools while our Presentation Layer provides an interactive dashboard for the visualisation of the severity, localisation and timeline of daily domain events (e.g., faults, critical events), their relation to grid's assets and mitigation actions planned by the applications of the DSO Toolbox. Indicative screenshots of the dashboard are presented in Figures 2-5. ■

Figure 4: Example of self-healing application results (part)

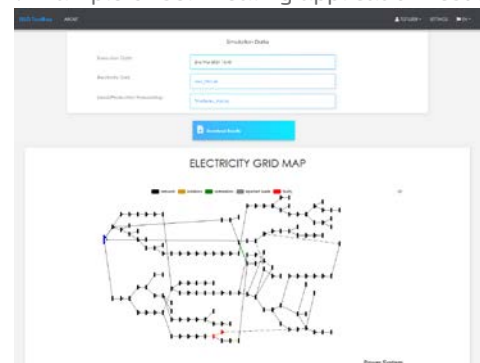
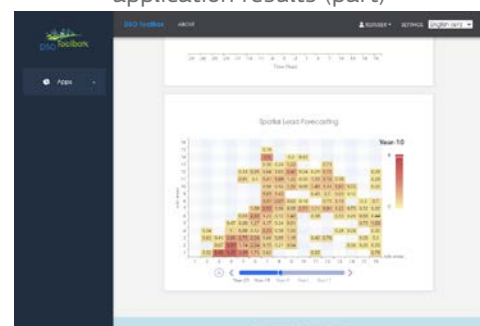


Figure 5: Example of spatial load forecasting application results (part)



ENSURING BETTER AIR QUALITY FOR SUSTAINABLE CITIES

DIMOS KOTHRIS

IoT & Smart City Solutions Expert, Telco & Enterprise Software

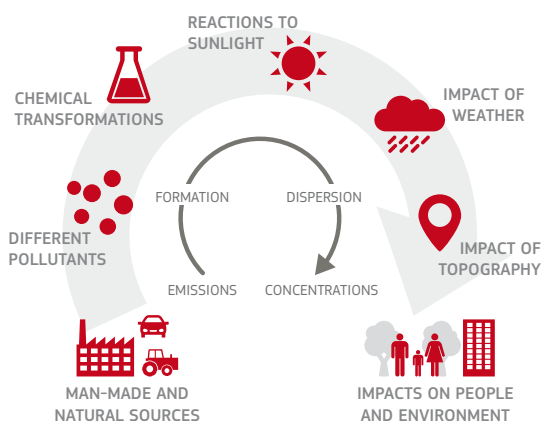
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INTRODUCING AIR QUALITY MONITORING IN BELGRADE

The city of Belgrade is considered as one of the most polluted capitals in Europe facing prolonged and serious air pollution issues. Responding to this pressing challenge, Belgrade's environmental protection agency issued an international open tender with the aim to combat the growing problem especially in "stressed" areas in and around the city. Intracom Telecom answered to this great challenge & was recently awarded this significant contract to provide an air quality monitoring & forecasting solution for the city. The solution is expected to help the city of Belgrade to achieve a better situational awareness of air pollution in areas of interest, fortify its ability to respond with proactive measures to safeguard public health and last but not least, support the creation of a cleaner and sustainable environmental strategy for the future.

The complex mechanisms affecting air pollution



AIR POLLUTION: A GLOBAL HEALTH THREAT

Air pollution is not a problem that only the Republic of Serbia is struggling with; it remains a key challenge for many developed and developing countries and is part of the wider environment crisis which remains a growing and profound threat affecting the wellbeing of billions of lives and ecosystems around the globe, with many man-made and natural causes.

A review from the global burden of disease (GBD) recently showed that it is one of the top ten risk factors for health globally, resulting in seven million deaths worldwide each year according to World Health Organization (WHO) estimates. WHO has also classified air pollution as the leading environmental cause of cancer, whilst a grim prediction made by the Organization for Economic Co-operation and Development (OECD) estimates that it will also be the top cause of environmentally related deaths worldwide by 2050.

THE CHALLENGE IN THE CITY OF BELGRADE

In 2020 the Environmental Protection Agency (SEPA) of Serbia reported that hazardous particle matter concentrations (PM2.5 & PM10) were found in many cities to be above the allowed limits (number of days with excessive concentrations). Along the same lines, the European Environmental Agency mentioned in a recent report that the ex-

ARTICLE

PM CONCENTRATIONS IN SERBIA EXCEEDS E.U. & W.H.O. STANDARDS

			 World Health Organization
PM2.5 ▶	36µg/m ³ ↑	25µg/m ³	10µg/m ³
PM10 ▶	53µg/m ³ ↑	40µg/m ³	20µg/m ³

posure of the urban population to particulate matter concentrations in Serbia was two times higher than in the EU. As a result, Serbia ranks very high in Europe for pollution related deaths. The facts that have emerged from such reports, highlight the importance of reliable monitoring of air quality and the need for interventions to reduce the burden of air pollution in Serbia.

THE PROJECT OBJECTIVES

Monitoring and modelling air pollution reliably is a challenging task that requires taking into account many parameters and complex environmental interactions that affect pollutant concentrations and their dispersion in the air. Thus the collection and processing

of large and diverse data sets and the ability to model accurately and robustly such phenomena are key considerations and innovation milestones in Intracom Telecom's solution, which has been designed to address several key project objectives:

- » Track in real time a wide variety of air quality & environmental parameters, pollutants & related indexes and identify emerging trends
- » Support alignment with National and International/EU regulations
- » Empower informed preemptive measures (e.g. health warnings) to safeguard public health by leveraging air quality forecasts and reports
- » Measure the effectiveness of environmental campaigns (e.g. public incin-tivization)

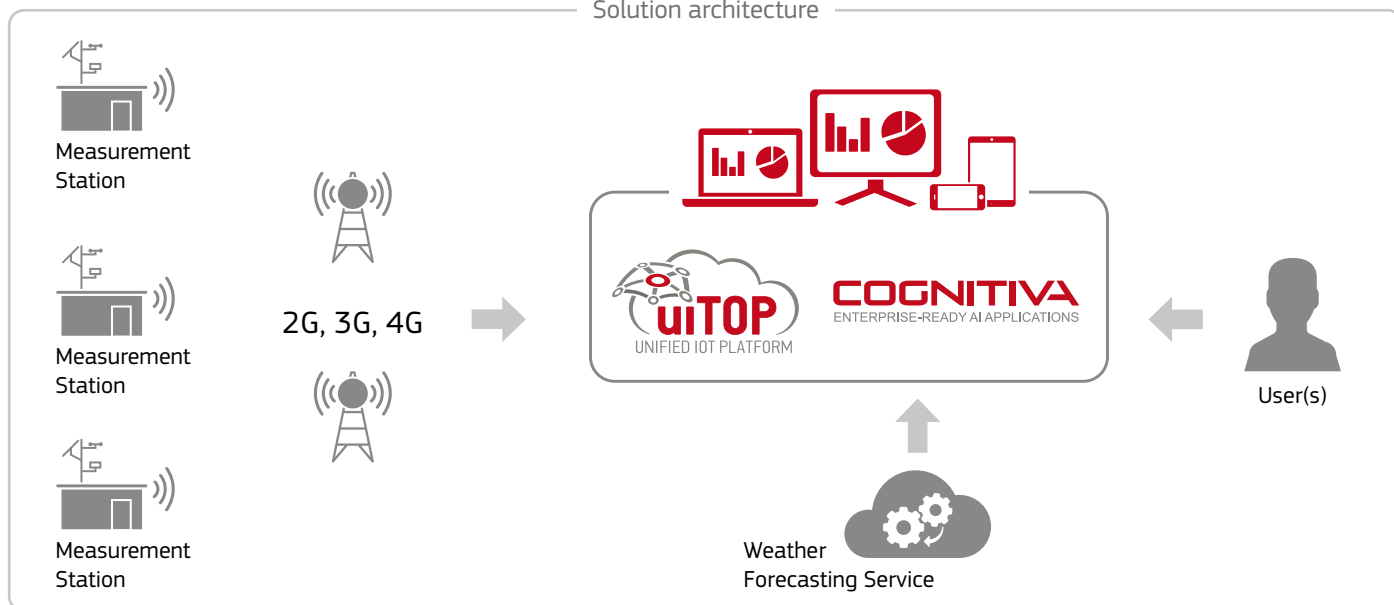
» Support the design of environmental goals & policies for a healthier future.

ADDRESSING THE NEED FOR AIR QUALITY MONITORING

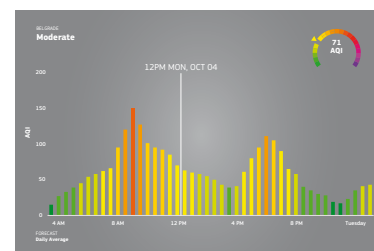
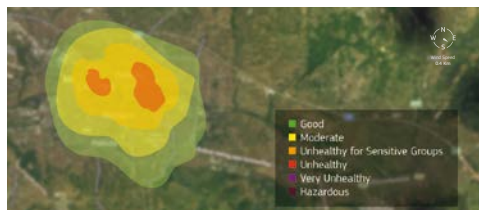
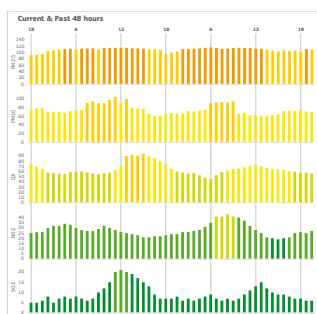
The comprehensive solution that Intracom Telecom is deploying to meet the needs of the City of Belgrade combines powerful features from two of its key products, namely uiTOP™ and Cognitiva™, both of which are to be hosted and seamlessly integrated on its cloud infrastructure. The architecture of the solution is shown in the figure below.

A wide network of specialized air quality measurement stations (in the form of containers) are supplied, installed and configured by project partner Ecomaks Solutions, who is a distributor of air and water quality control equipment in the Balkan region. The stations are equipped with an extensive number and variety of specialized devices, including meteorological sensors, analyzers for continuous measurement of sulfur, nitric and carbon oxides, ozone and suspended particles (PM10 & PM2.5) among others. Each station also con-

Solution architecture



Air Quality Index (AQI) visualizations and reporting examples



tains a data logging system which collects and stores data from the various instruments and transmits them to the central platform via a cellular network.

The data streams coming from the measurement stations are initially received and processed by Intracom Telecom's flagship Unified IoT Orchestration Platform (uiTOP™). uiTOP™ implements a horizontal IoT layer enabling management and control of Intelligent things from different vertical domains such as Smart Lighting, Smart Parking, Waste Management, Environmental Monitoring, Smart Health, Transport, Energy and Utilities. It leverages powerful open APIs enabling communication with a wide range of sensors and devices as well as the creation and hosting of smart applications. For the specific project, uiTOP™ is tasked with data ingestion and storage, integration with 3rd party systems (i.e. weather services) and secure user access. uiTOP™ also provides the main web-based UI environment with advanced capabilities including interactive maps, time-series graphs, heat-maps, device grouping, custom alarms and analytics, with emphasis on providing authorized users with an intuitive and easy application environment to work with.

uiTOP™ is also responsible for feeding the Cognitiva™ system with appropriately formatted environmental data, so that the latter can generate future air quality predictions. Cognitiva™ is an application suite which is capable of employing advanced AI/ML techniques to make sense of data that are accumulated by organizations, empowering them with action based insights and reports. For the needs of the project, Cognitiva™ is configured to derive short-term (24 hours) and mid-term (next 4 days) forecasts for the Air Quality Index (AQI) and individual pollutant concentrations. Given the need for enhanced forecasting accuracy, advanced Machine Learning models based on XGBoost (Extreme Gradient Boosting), LSTM (Long Short-Term Memory) Networks and ARIMA (Auto-Regressive Integrated Moving Average) have been adapted to account for each pollutant

and station separately. Forecasts are produced daily and sent back to uiTOP™ for visualization, alarms and report generation.

In the current phase of the project the system is being fine-tuned to meet customer specific requirements and several measurement stations are being deployed at sites of interest. The solution is expected to be operational in 15 sites within Q1 of 2022, with additional deployments planned within the same year.

SOLUTIONS FOR EVERY CITY'S ENVIRONMENTAL CHALLENGES

Intracom Telecom's offering is designed to address all requested business, operational, and technical requirements of the City of Belgrade for air pollution management and be ready to cater for future needs in terms of expansions or the introduction of new sensors or features. The use of social, population or traffic data may be evaluated in the future to further enhance the forecasting accuracy if required. Last but not least, the uiTOP™ platform, with its open and flexible architecture, already powers a noise monitoring solution in Serbia, while it may support any additional smart city vertical solution required.

Intracom Telecom's air quality monitoring and forecasting solution is part of a wider environmental solution portfolio supported by a strong ecosystem of partners, having been selected by several cities in South Eastern Europe and beyond, to efficiently address the environmental challenges they face. ■

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

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

OPTIMIZING THE OPERATIONS FOR EV CHARGING POINT OPERATORS WHILE REDUCING THEIR TCO

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EV CHARGING DRIVERS AND MARKET

The European Union commission is working through a package of proposals to reduce CO2 emissions by at least 55% till 2030, compared to 1990 levels. These proposals are coded with the iconic name «Fit for 55» and contain legislative initiatives to promote 'Green Deal' policy. For the automotive industry the target for CO2 emissions of new cars will be zero by 2035, which means practically the end of internal combustion engines (petrol and diesel).

The Electro Vehicle (EV) market in Europe and worldwide is steadily increasing and new EV models are coming up continuously from car manufacturers. Due to EV battery price reduction, price parity with petrol and diesel cars is expected to be a fact soon. Approximately 6M public EV chargers will be needed by 2030 at European level and one fast

charging station per 60 km on highways is expected. (<https://www.electrive.com/2021/07/14/eu-commission-presents-fit-for-55-climate-package>).

For Greece, large or medium-sized municipalities have to prepare an Electric Vehicle Charging Plan (ΣΦΗΟ) for establishment of publicly accessible charging points and provide at least one charging point per 1,000 municipality inhabitants. Taxi stands and Bus stations are included herein as well as smaller municipalities. Moreover, publicly accessible or controlled access areas like Commercial Hubs (shopping centers, supermarkets), Workplaces with Car parking lots, Airport parkings, Hotels, Hospitals, Car Rental or Repair companies, Entertainment and Restaurants, Shared Charging on Multi-Dwell properties, Gas stations, Governmental locations are potentially EV charger deployment domains.

INTRACOM TELECOM POSITIONING

Intracom Telecom cooperates with internationally acknowledged companies in the field of EV charging and can meet the market requirements with the following EV charger categories:

1. AC chargers equipped with one (1) socket of up to 22KW power supply, intended mainly for (semi) private parking spaces
2. AC chargers equipped with two (2) sockets up to 22KW each, suitable for private, semi-public or public areas.
3. DC charger, up to 50KW supply for semi-private or public spaces
4. DC chargers of 60KW - 300KW for locations with higher power requirements

Intracom Telecom develops and provides software for EV chargers operation management, health monitoring and EV usage reporting.



The total EV charging solution provided by Intracom Telecom covers the specifications of publicly accessible EV charging points, in accordance to Greek Legislation (Law 4439/2016, KYA 42863/438, Law 4710/2020) which incorporates the relevant European directive and defines the EV chargers (IEC 61851) and sockets (IEC 62196-2 Type 2) specifications for the public stations as well as provisions for EV chargers installation in various locations and electro-mobility market. In addition, our offering complies with HEDNO's technical requirements for Public Access Mode 3 EV Chargers as well as connection to electricity network requirements.

CHARGING MODES AND SOCKET TYPES

Depending on the communication protocol between the car and the charging point, there are 4 charging Modes for EVs. Mode 1 and 2 are for residential use and Mode 3 and Mode 4 for public (semi-private, public access) stations. The Mode of charging is independent of the connectors used on each case.

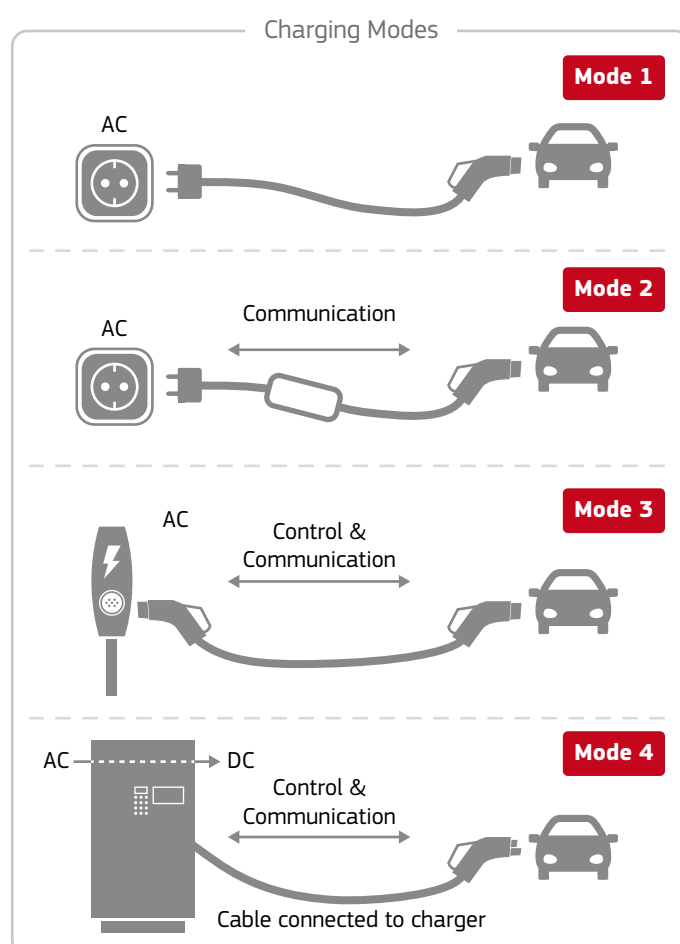
» **Mode 1** provides up to 16A/11KW AC charging for private places, but with no communication, control or protection protocol. It is not recommended since there is no guarantee that RCD (residual circuit detector) is included in the building installation.

» **Mode 2** provides up to 32A/22KW AC charging for private places. This mode uses an in-line integrated electronics box which emulates the communication of an external charging point (of Mode 3) and allows the cable (instead of the charging point) to communicate with the car. This device provides protection and communication through cable. It does not provide any control.

» **Mode 3** provides up to 63A/43KW AC charging for public places and communication to the EV with protection and charging control. Type 2 (or Mennekes) plug is used in Europe for Mode 3.

» **Mode 4** provides Rapid (50KW) or Ultra-rapid (till ~300KW) charging for public spaces with Direct current (DC). It by-passes the car embedded EV charger, charging directly to the EV car battery. Type 2-CCS (Combined Charging System) or CHAdeMO plugs are used for Mode 4.

Charging time is affected by the size of the battery (capacity), the state of the battery (empty vs full), the max charging rate of the vehicle (max rate the vehicle on-board charger can accept), the max charging rate of the charging point (provided power), as well as environmental factors (colder ambient temperature increases charging time). The charging time for AC chargers may range from 2 to 8 hours and for 50KW-DC chargers ranges from 25' to 45' for 70-90% of the battery capacity.



AC CHARGERS OVERVIEW

The AC chargers can be ground, pole or wall mounted with the following basic characteristics:

- » The maximum Output Power is 22KW per socket, for up to two 3-phase Type 2 sockets
- » The chargers have protection devices per socket and a separate switch for the protection of the charger controller. They also provide overvoltage protection and interruption for safety reasons of the charging circuit in case of relay contacts welding. (Hardware-redundant Cut-off). Moreover, chargers provide an energy meter per socket which is certified according to the MID (Measuring Instrument Directive) 2014/32/EU.
- » User Identification takes place through RFID cards, smartphone App (use of QR code) or central management software and Graphics Screen provides instruction display with interaction capability for end user.
- » Communication with the Management Center is supported through OCPP (Open Charge Point Protocol) protocol with Ethernet or 4G connectivity
- » Possibility of Load Management for simultaneous charging of more cars

with dynamic power adjustment. Load Management is provided:

- for power sharing between the sockets of the same charger
 - between different chargers statically or dynamically shared and
 - through a central software management system
- » Casing is made of high quality and durability material, resistant to extreme weather conditions and access protection is provided through locking

Different AC models and variants inherit aforementioned characteristics:

- » Model providing 1 x 11KW or 1x 22KW socket
- » Model providing 2 x 11KW or 2x 22KW sockets for (semi) public access locations. In addition there is a variant especially useful for cluster of chargers in parking lots which provides embedded bus-bar equipment for supplying power on a bus topology, thus avoiding additional electrification costs required on star topology.
- » Model with 2 x 22 KW AC sockets, suitable for ground mounting on public access spaces (e.g pavements) where metering and connection devices (MCB, strain relief) should be hosted in chargers' properly configured compartment, according to Distribution Operator (HEDNO) requirements.

DC CHARGERS OVERVIEW

DC chargers are ground mounted and share the afore-mentioned characteristics of AC chargers supporting concurrently one (1) DC charging session (Mode 4) at 24, 50 or >50KW power output and one (1) AC 22KW charging session (Mode 3). According to the European Union regulatory framework, DC charging stations must be equipped with a Type 2-CCS plug, but at the same time allow the existence of a plug according to the CHAdeMO standard, or AC charging.

DC chargers may have up to 3 outputs:

1. one DC Type 2 - CCS
2. one DC CHAdeMO type with the possibility of using only one of the two DC at any time and
3. one Type 2 AC 22KW.

Different models and variants are available on this product family:

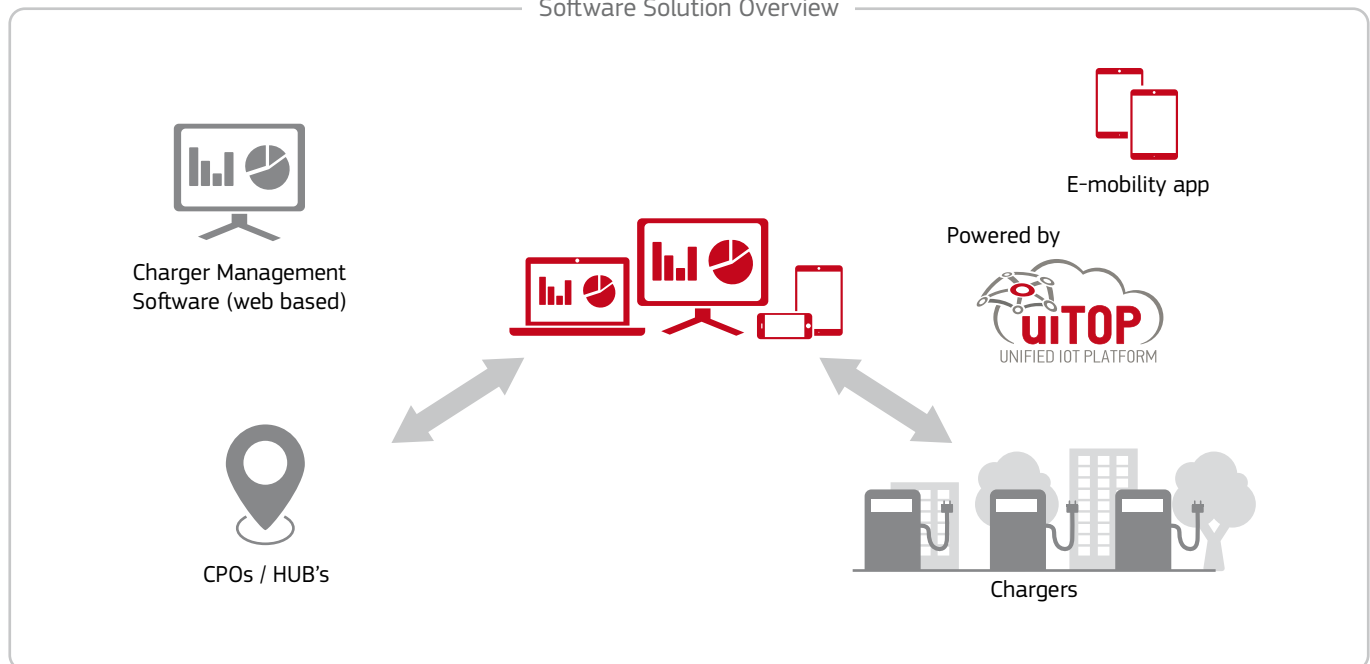
- » 24KW
- » 50KW
- » Greater power models (> 50KW till 300KW).

EV CHARGER MANAGEMENT SW

The electric vehicle charger management platform is a necessary part of the overall solution for the effective, safe, and efficient remote monitoring and management of the charging infrastructure. Intracom Telecom offers a scalable and comprehensive charger management SW solution, powered by its in-house uiTOP™ unified IoT orchestration platform that helps Charging Point Operators (CPOs) optimize operations and reduce their TCO. Additionally, an e-Mobility Service Provider (e-MSP) application can be provided for drivers allowing them to easily find charging points of interest, manage charging & payments and review historical trans-



Software Solution Overview



actions. The SW solution is pre-integrated with the offered chargers but can be expanded to include additional charger equipment types and manufacturers through open protocol standards such as OCPP, REST. The charging management software exposes a web based interface through which authorized users can gain valuable business and operational insights, tweak the infrastructure, manage monetization and expand the network.

Key features include:

- » Real time monitoring of chargers (location on map, operating status, active faults, etc.)
- » Easy management and configuration of chargers (arbitrary grouping, restarting the charger, locking the charging function, etc.)
- » Comprehensive load & tariff (session, time, KWh) management
- » Billing & payments enablement (Charging Point Operator / e-MSP / Customers)
- » Access to historical transactions
- » Creation of tailored reports related to Usage, Energy consumption, Maintenance, Revenue generation, etc.
- » Activation of configurable alerts (charger faults, communication failure, unexpected usage, etc.).
- » An open API for integration with third party system systems (CRM, ERP), service providers (CPOs for roaming, e-MSPs, payment service providers) or Grid operators.
- » Smart city extensions (create synergies with city infrastructures – i.e. lighting, parking, etc.).

PROFESSIONAL SERVICES

Intracom Telecom with Ether have joined forces to provide a full range of professional services which complement the HW & SW and provide a Turn-key EV Charging Solution. These services include site survey, electromechanical design and licensing issuance followed by EV charger installation. Such Installation includes connection with supply cables to the low voltage of the electricity distribution network as well as EV charging signage, painting of the parking points and concrete bases construction for placing the chargers with protective barriers installation in front of the charger. Afterwards, charger configuration and communication tests with the remote management SW takes place and Solution training ensures customer familiarization with both HW and SW. Moreover, Technical Support and Maintenance (for charger and end user) as well as Preventive EV charger maintenance during and after the HW warranty is offered. ■

DEPLOY ULTRA-BROADBAND LONG RANGE FWA NETWORKS



WiBAS^{G5}
dual-BS



3.2
Gbps
capacity



240
subscribers
density



11
kilometers
coverage



WiBAS^{G5}
smart-BS

Intracom Telecom has developed new techniques to enhance the density of subscribers and the speed of connection. The technological innovations are being introduced on the 28 GHz FDD hub radio WiBAS™ G5 dual-BS and on the 24 / 26 / 27 / 28 GHz TDD hub radio WiBAS™ G5 smart-BS. The subscriber density reaches 240 per hub and the available capacity goes up to 3.2 Gbps using wide channels of 100 MHz and 112 MHz. The signature feature of the WiBAS™ portfolio has always been the extended range, and this is reconfirmed for the new products WiBAS™ G5 dual-BS as well as for the WiBAS™ G5 smart-BS, reaching connections of up to 11 km.



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