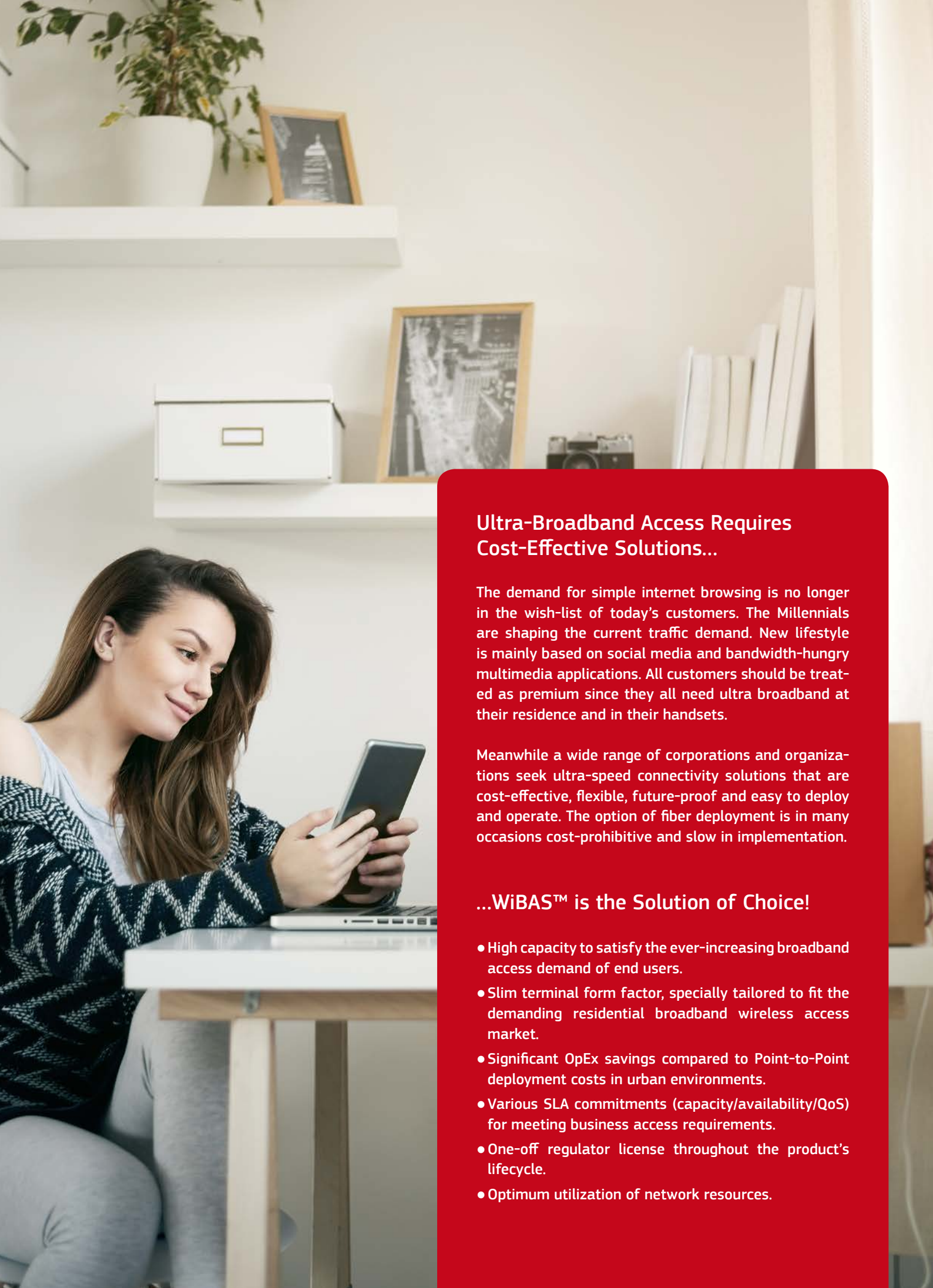
WiBAS

Ultra-Broadband Fixed Wireless Access



Ultra-Broadband Access Requires Cost-Effective Solutions...

The demand for simple internet browsing is no longer in the wish-list of today's customers. The Millennials are shaping the current traffic demand. New lifestyle is mainly based on social media and bandwidth-hungry multimedia applications. All customers should be treated as premium since they all need ultra broadband at their residence and in their handsets.

Meanwhile a wide range of corporations and organizations seek ultra-speed connectivity solutions that are cost-effective, flexible, future-proof and easy to deploy and operate. The option of fiber deployment is in many occasions cost-prohibitive and slow in implementation.

...WiBAS™ is the Solution of Choice!

- High capacity to satisfy the ever-increasing broadband access demand of end users.
- Slim terminal form factor, specially tailored to fit the demanding residential broadband wireless access market.
- Significant OpEx savings compared to Point-to-Point deployment costs in urban environments.
- Various SLA commitments (capacity/availability/QoS) for meeting business access requirements.
- One-off regulator license throughout the product's lifecycle.
- Optimum utilization of network resources.

Overview

WiBAS™, a state-of-the-art Point-to-MultiPoint (PtMP) native Ethernet microwave product line, perfectly fits demanding operator needs. Specially designed for high-speed multi-service applications, WiBAS™ offers a wide service area footprint reaching distant underserved areas and locations lacking telecommunications infrastructure.

WiBAS™ optimally addresses today's requirements for ultra-broadband Fixed Wireless Access (FWA) and smooth migration to networks with 5G speeds. With a powerful core engine and field-proven reliability, WiBAS™ provides significant CapEx & OpEx savings to operators requiring to deploy and provision their network quickly and effectively while maintaining a low-enough TCO to achieve viable service pricing levels. WiBAS™ opens up new horizons in reaching underserved residential as well as business customers.

Employing today's most advanced technologies, WiBAS™ enables a wide range of profitable business plans, providing a key differentiator of operator success.

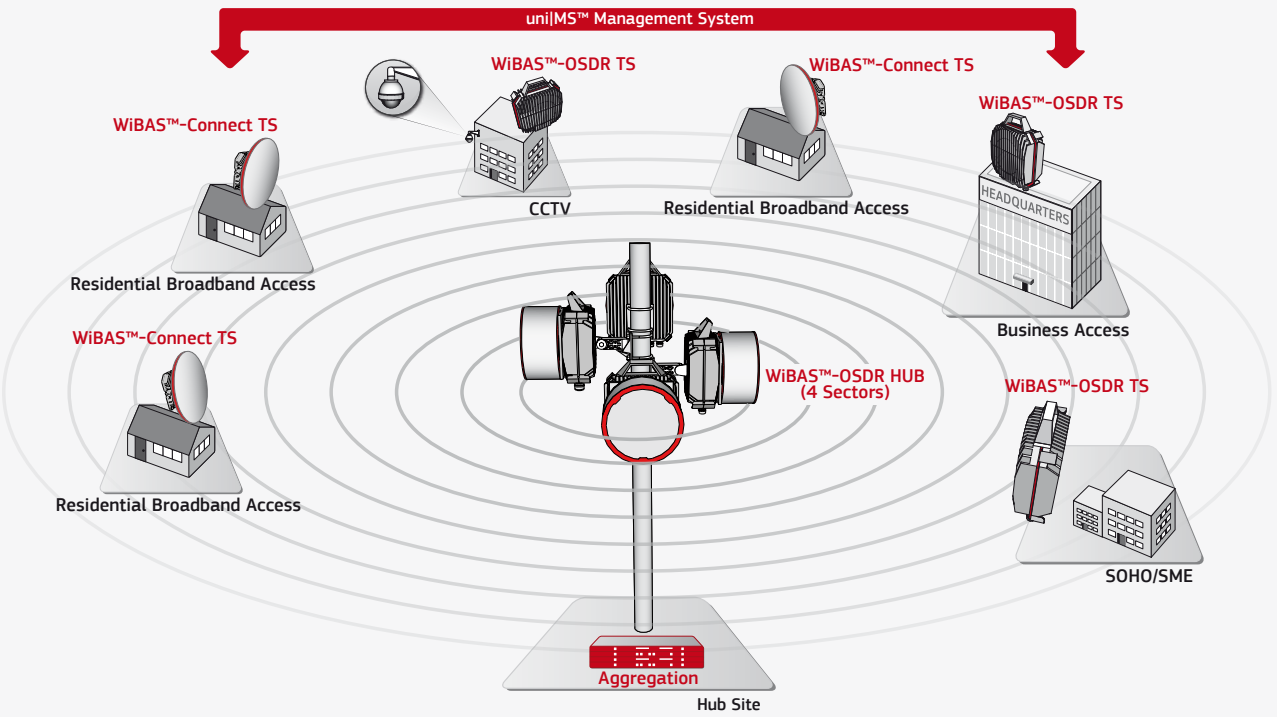
Figure 1 depicts a WiBAS™ Base Station serving several remote sites – through all-outdoor WiBAS™ Terminal Stations – to deliver high-bandwidth access services with high availability and assured Quality of Service (QoS).

Best fit for

- Ultra-broadband FWA for sub-urban and rural residential areas
- Competitive Service Providers planning to develop business with high-end customers to offer legacy and broadband access services (telephony, Web/IP services, metro Ethernet connectivity, etc.)
- Public sector organizations, utility companies, banks, etc. needing to deploy own resilient & backup networks in underserved areas, or in areas lacking wireline infrastructure
- Government authorities for secure private networks (CCTV, LAN, infokiosk)
- Network access providers planning to offer bitstream services to WISPs

WiBAS

[Fig. 1] *Typical Network Architecture*



Residential Access

Residential broadband access concerns customers mostly engaged with Internet browsing and basic content downloading and those who require more advanced offerings, with video streaming or VoIP support. Residential access also concerns a market that is price-sensitive as far as the CPE price is concerned. High performance is the priority in this market. Wireless ISPs (WISPs) that plan to deploy wireless broadband networks for their customers in attractive monthly packages need to select equipment vendors that will provide low CapEx solutions and generate profitable investments.

The use of WiBAS™-Connect Terminal Stations in WiBAS™ system perfectly fits all the above market requirements. WiBAS™-Connect Terminal Stations operate in area licensed bands (10.5, 26 and 28 GHz) guaranteeing QoS and, along with its very small size, appealing design and very low power consumption offers extremely-reliable broadband access connectivity to SMEs and residential customers in urban and also in the underserved rural areas. WiBAS™-Connect allows up to 90 CPE devices to be registered in the same sector sharing 1 Gigabit of aggregate capacity, without needing hardware upgrades at the hub. Committed capacity can be delivered to every subscriber due to the advanced rate enforcement and hierarchical QoS mechanisms.

Business Access

WiBAS™ delivers the high resiliency and reliability required to fulfill demanding customer SLAs. The capability for sectors along with the rapid network deployment and high-capacity sectors enable WiBAS™ to become a successful alternative to wireline and other wireless solutions, thus realizing fast investment payback.

For enterprises and SMEs, WiBAS™ implements LAN-to-LAN / Call Center fixed wireless connections, also providing high-speed Internet access. Sophisticated packet classification, per-service prioritization and Layer 2 / Layer 3 VPNs, allow delivering Carrier Ethernet services, such as:

- Permanent VLAN connections for geographically-dispersed branches running demanding data applications (CRM, ERP, FTP, etc.)
- Interconnections among heterogeneous networks with QoS preservation enabling differentiated business applications (such as VoIP and data transfer services).
- Committed capacity per terminal station due to the advanced rate enforcement and hierarchical QoS mechanisms.

Large enterprises are able to connect their Call Centers to provider's voice-switched network for a fraction of incumbent's cost. WiBAS™ easily integrates existing systems – IP PBX / Soft Switches / PSTN Gateways / Management & Billing, etc.

Assured H-QoS

The WiBAS™ advanced and comprehensive hierarchical QoS mechanisms effectively address the operator requirements for a multi-service portfolio by implementing:

- Multiple classification criteria including Ethernet, IP and MPLS QoS parameters.
- Air service flow establishment based on VLAN and/or classification rules.
- Data filtering, policing and shaping per air service flow.

WiBAS™ provides operators the means to offer SLA assurance. Multiple services with specific information rate can easily be provisioned over a single air link. An indicative – but not limiting – scenario is presented in the table.

Service Class	Class Priority	Information Rate, Mbit/s	
		CIR	EIR
Voice	1	0.5	0
Video	2	6	0
Gold data	3	2	15
Silver data	4	1	12
Bronze data	5	0.5	8
Default	6	0	8

WiBAS™-OSDR

Maximizing Network Flexibility

WiBAS™-OSDR PtMP Hub with sectoral antenna

The all-new OSDR platform now replaces the previous generations of WiBAS™ product family (split-mount radios). Standing for Outdoor Software-Defined Radio, OSDR delivers state-of-the-art IP connectivity in demanding heterogeneous network (HetNet) backhaul applications. OSDR employs advanced Ethernet and traffic processing functionality to demonstrate exceptional radio performance. Depending on customer-selected software, OSDR operates as an all-outdoor PtMP base station / hub, a PtMP terminal or a PtP radio, providing at the same time perfect synergy with the other Intracom Telecom radio offerings (OmniBAS™ and StreetNode™). The OSDR platform key characteristics include:

- Software-defined radio
- Highest spectral efficiency
- Very high transmit power and gain
- Zero-footprint, all-outdoor and environmentally-friendly design
- High-performance sectoral antennas (90°, 180°)
- 2 x GbE interfaces
- Power over Ethernet

Highlights

- **1 Gbit/s aggregate capacity**
- **Native Ethernet packet technology**
- **Support for 90 terminals per sector (WiBAS™-Connect)**
- **Zero-touch provisioning for easy installation and terminal station network entry**
- **Exceptional system performance, full hierarchical QoS support and Carrier-grade protection mechanisms**
- **Low latency for delay-sensitive transmission**
- **Hitless adaptive modulation up to 1024-QAM**
- **Dynamic Bandwidth Allocation (DBA) and statistical multiplexing**
- **Powerful network management (uni|MS™) with integrated radio planning module**

WiBAS™ micro-BS

Omnidirectional Coverage

WiBAS™ micro-BS is an all-outdoor compact PtMP MW Base Station operating in the 28 GHz area-licensed Band. Coupled with an omnidirectional sectoral antenna, it can be installed at the center of a village to serve any demanding subscriber within a large area footprint. Its key characteristics are:

- 360-degree coverage with omnidirectional antenna
- Fully compatible with all WiBAS™ Terminal Stations
- 2 x GbE interfaces
- Advanced QoS capabilities.

WiBAS™ micro-BS with Omnidirectional antenna

WiBAS™-Connect

Efficient Wireless Broadband Access

WiBAS™-Connect with panel antenna

The WiBAS™-Connect terminal station allows denser sectors - up to 90 terminals per sector - to include residential and SMB customers, making it ideal for low-CapEx radio access deployments.

Aggregation Units

- 2 RU (OmniBAS™-8W)
- Supports aggregation of up to eight all-outdoor radios/hubs
- 2 x GbE electrical / 4 x GbE optical in control card (option for 10GbE optical)
- Interface cards: 16/32 x E1, 2/4 x STM-1, 4 x GbE

CBAN

- 1 RU, half-rack
- 4 x GbE electrical, PonE-enabled
- 16 x E1 (OmniBAS™-4P)
- 2/4 x GbE optical
- 10GbE optical (OmniBAS™-10P)

OmniBAS™-4P/-10P

Managing WiBAS™ Networks

WiBAS™ networks are managed by uni|MS™, a carrier-class element, network and service management platform, following the concept of simple and unified management for networks, infrastructure and systems.

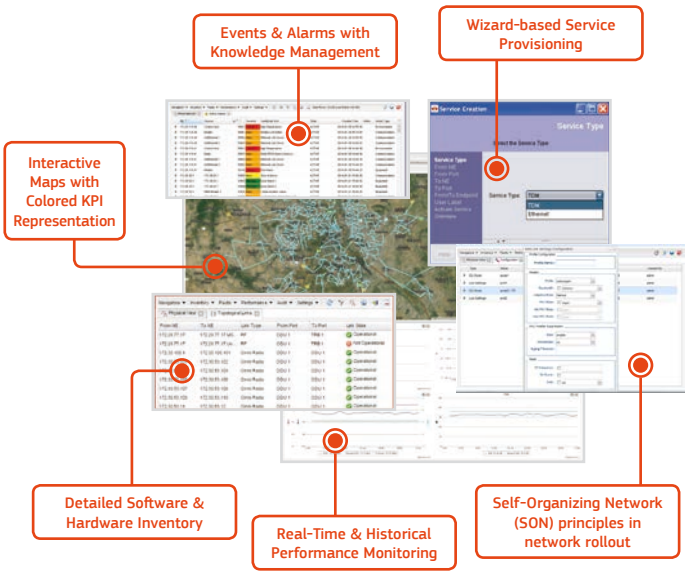
uni|MS™, already trusted by Communication Service Providers (CSPs) around the world, automates management and monitoring tasks to eliminate error prone and time-consuming manual efforts. Everything is included in one simple installation and no complex configurations are required.

With uni|MS™, operators are proactively informed about degrading network conditions in order to avoid service-affecting problems.

Key Features of uni|MS™:

- **Illustrative visualization that boosts user experience**
- **Unified management that simplifies operations**
- **Unique Self-Organizing Network (SON) capabilities**
- **Web-based architecture for access from anywhere**
- **Scalability for managing unlimited number of NEs**
- **Out-of-the-box setup that allows installation in less than 20 min.**
- **Ever-expanding feature set feasible through modules**

The mediation with all Intracom Telecom and third-party managed elements of the network is implemented through technology drivers, for carrying out Fault, Configuration, Performance & Security management functions through a powerful and intuitive Web-based user interface featuring online and offline interactive maps that display network topology based on devices' geographical coordinates.



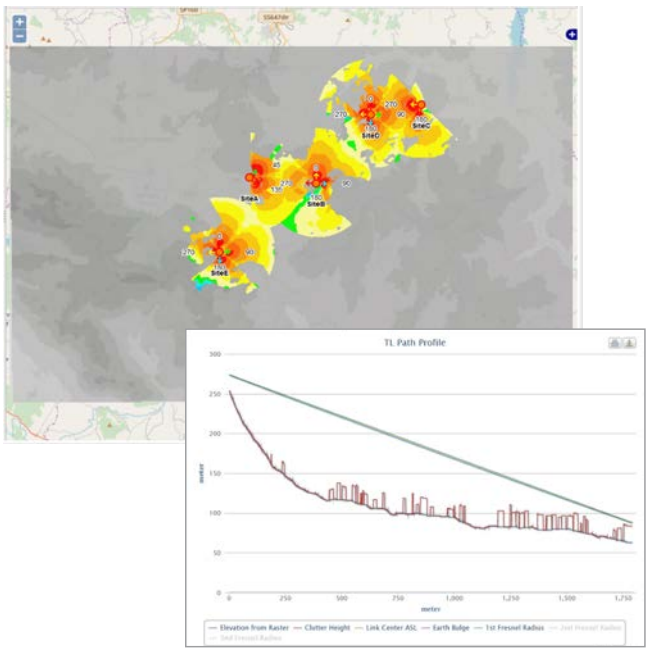
Insightful network operations with uni|MS™

RAN Design & Optimization

Intracom Telecom's uni|MS™ platform embeds a fully-featured RF planning tool that closes the loop by automating WiBAS™ radio network's planning, rollout, optimization and maintenance stages under a single pane-of-glass. The key features of this RF planning tool include:

- Coverage analysis, detailed link and interference analysis.
- Support for 3D buildings maps.
- Multi-user access with privileges.
- Planning and physical view integration (roadmap).
- Export of coverage maps in common formats (Google Earth / ASCII, etc.).
- Easy project migration from other radio planning tools (through .csv files).
- Support for standard DEM/DSM formats (ASCII Grid and BIL).
- Support for standard radio and antenna equipment files.
- ITU standards and digital maps included.
- Multi-vendor equipment files.

Coverage Results on Map



LOS Analysis

Why Intracom Telecom

One-stop Shop
- Comprehensive portfolio of end-to-end radio access & backhaul solutions
- Proven integration & interoperability
- State-of-the-art end-to-end management suite

Established Wireless Vendor
- Growing and continuous presence for a variety of access and transmission solutions
- Growing brand name recognition for PtP and PtMP solutions

Recognized for Service Excellence
- Extensive implementation track record
- Specialized & highly experienced personnel
- Consulting, design, implementation & support
- Commitment to adding customer value

Continuous Innovation
- Innovating in the wireless access and transmission field for over one and a half decade
- Successful development and deployment of PtP and PtMP systems with numerous operators in Europe, the Middle East, the CIS, Asia and Africa
- Investing heavily on the continuous evolution of its wireless product lines
- Adopting latest standards and most advanced technologies to deliver wireless solutions that best fit customer current and future needs

About Intracom Telecom

Intracom Telecom is a global telecommunication systems and solutions vendor operating for over 40 years in the market. The company has become the benchmark in fixed wireless access and it successfully innovates in the 5G/4G wireless fronthaul, backhaul and small-cell SON backhaul international arena. Intracom Telecom offers a comprehensive revenue-generating software solutions portfolio and a complete range of ICT services, focusing on IoT, SDN/NFV, Big Data analytics & data-driven intelligence, and Smart City solutions. The company also addresses the Energy & Utilities industry, emphasizing on smart metering & end-to-end IT solutions. Intracom Telecom is also active in the defence systems sector providing security integrated systems for critical infrastructure protection and border surveillance. The company has extensive know-how and a proven track record serving more than 100 renowned customers in over 70 countries. Intracom Telecom maintains own R&D and production facilities, and operates subsidiaries worldwide.

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