

**CONECTIVIDAD INALÁMBRICA DE ANCHO DE
BANDA DEDICADO PARA INSTITUCIONES
EDUCATIVAS**

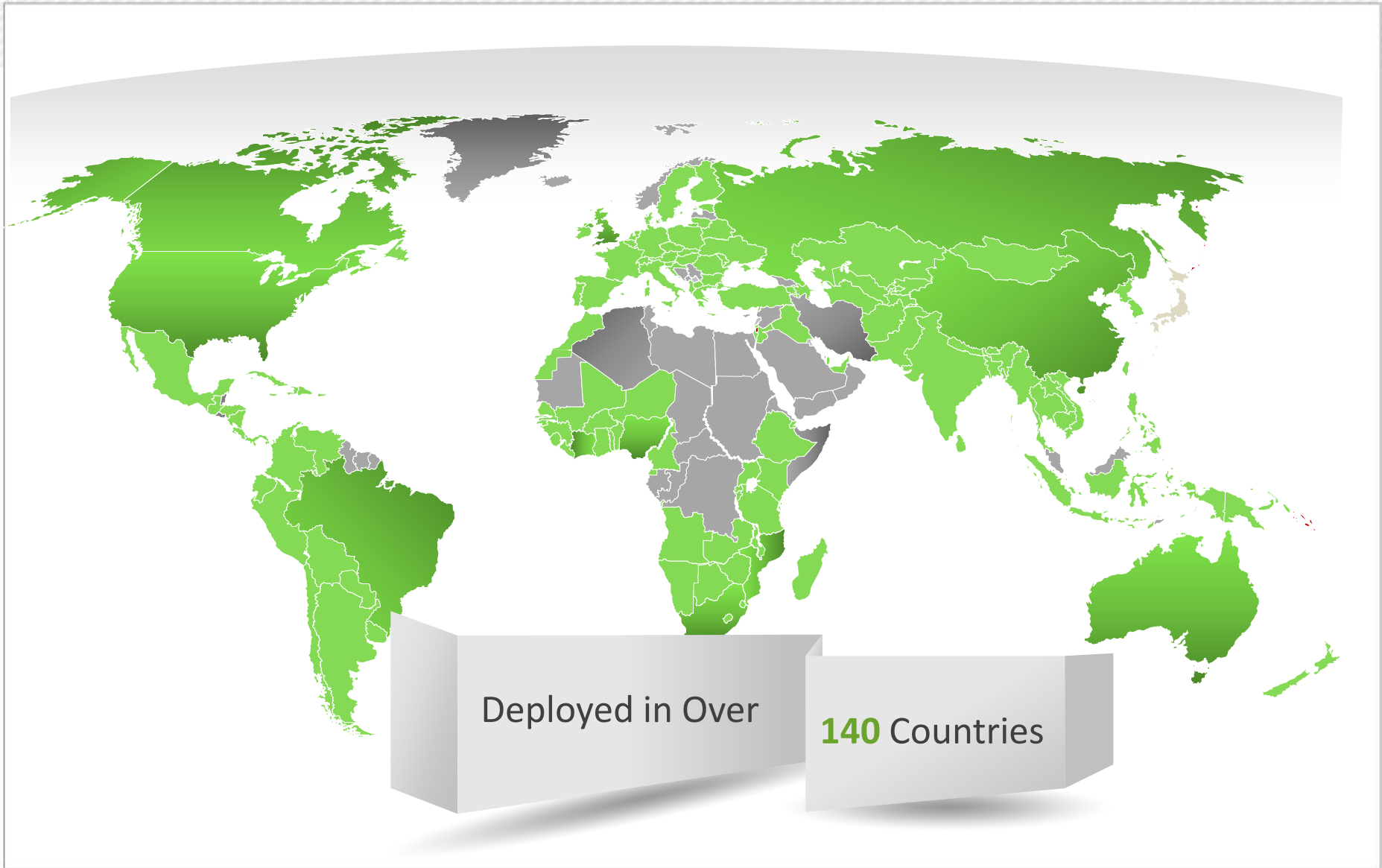
Agenda

1. Radwin at Glance
2. Wireless system requirements
3. Main products lines
4. Cases

RADWIN at a Glance

- Leading provider of Sub-6GHz broadband wireless solutions
- Deployments in over 150 countries
- Market leading sub-6GHz portfolio
 - Point to Point - Up to 200Mbps net throughput; up to 16xE1s/T1s+ Ethernet
 - Point to Multi-Point – Up to 250Mbps net throughput; Ethernet
 - Mobility- Up to 100Mbps net throughput
- Target Segments: Cellular Operators, Service Providers, Security & Surveillance, Transportation, Oil and Gas, and variety of private networks
- Operating from Israel with regional headquarters in North America, Latin America, EMEA and APAC

Global Deployments



RADWIN Technology

- Highly advanced radio technologies:
 - » OFDM
 - » MIMO
 - » Diversity
- Sophisticated air interface to ensure:
 - » Native Ethernet and Native TDM
 - » Interference mitigation techniques
 - » Robustness and link stability
- Unmatched performance at sub-6GHz



Target Markets

- Mobile carriers
 - » Rural to urban cellular backhaul
 - » Access for large corporations
- Fixed Service providers & ISPs
 - » IP backhaul for 4G /broadband PtMP
 - » Access for large corporations and SME
- Private Networks
 - » Government, Utilities, Transportation, Education, Healthcare, Enterprises
- Security & Surveillance Projects
 - » Homeland security, Municipality 'Safe City' projects, Border Control



RADWIN Technology Adopted by Tier 1 Carriers



RADWIN Verticals Market

Video Surveillance



Oil & Gas and Utilities



Public Safety Networks



Mining



Transportation



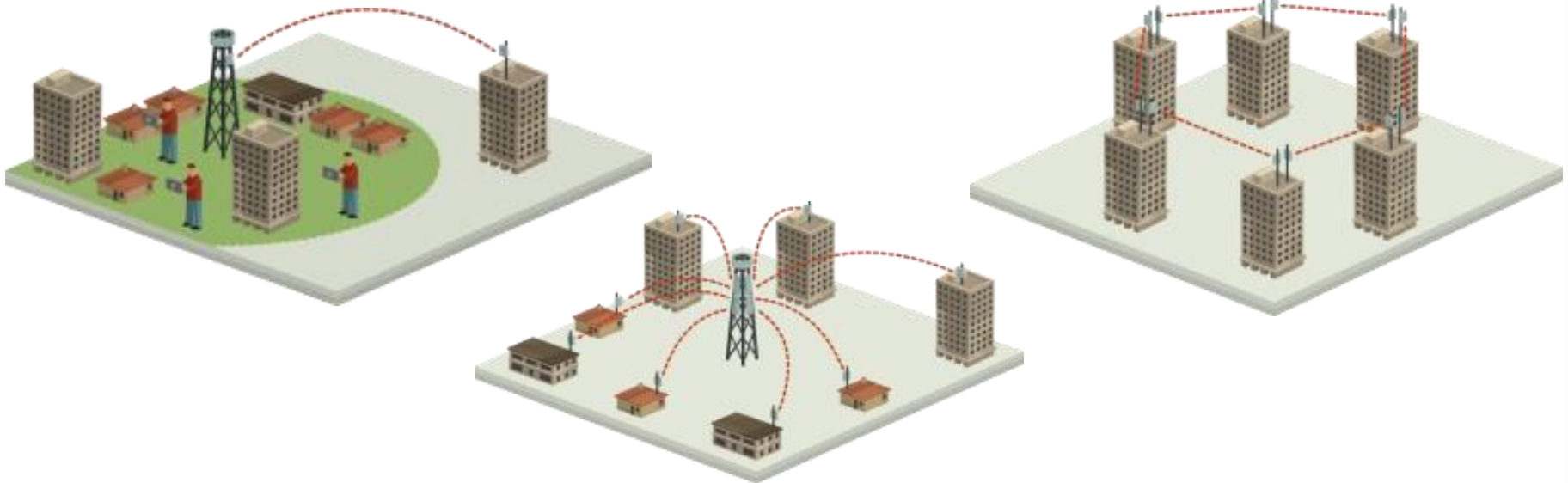
Perimeter & Border Security



WIRELSS SYSTEM REQUIRMENTS

Scope of the wireless system

The purpose the access wireless system is to provide end to end connectivity to universities, and divers types of schools. Therefore is to offer point to point or point to multipoint high capacity, and dedicated bandwidth links for VoIP, data transmission, video surveillance, WiFi backhaul applications



Wireless system requirements

| PARAMETER | COMMENT |
|----------------------------------|--|
| Capacity in Mbps | <p>Real throughput or dedicated bandwidth assignment. A minimum dedicated bandwidth should be assigned to every entity or school.</p> <p>Normally a minimum and a maximum throughput is established example, 2 Mbps minimum and up to 10 mbps for a elementary or high school.</p> |
| Frequency band | <p>Licensed such as 3.3 GHz or Unlicensed . In case of unlicensed radios they need to support the available spectrum . Example 5.3 GHz, 5.4 GHz and 5.8 GHz.</p> |
| Processing Capacity | <p>VoIP and video surveillance application are based on small packets, therefore a high processing capacity in packet per second is required example 250,000 pps.</p> |
| Interference mitigation technics | <p>Interference mitigation technics such as OFDM, MIMO, diversity, FEC, Advance ARQ, adaptive modulation, intersite and intrasite synchronization and a must in unlicensed bands, as well as non stop transmission air interface.(not WiFi air interface)</p> |

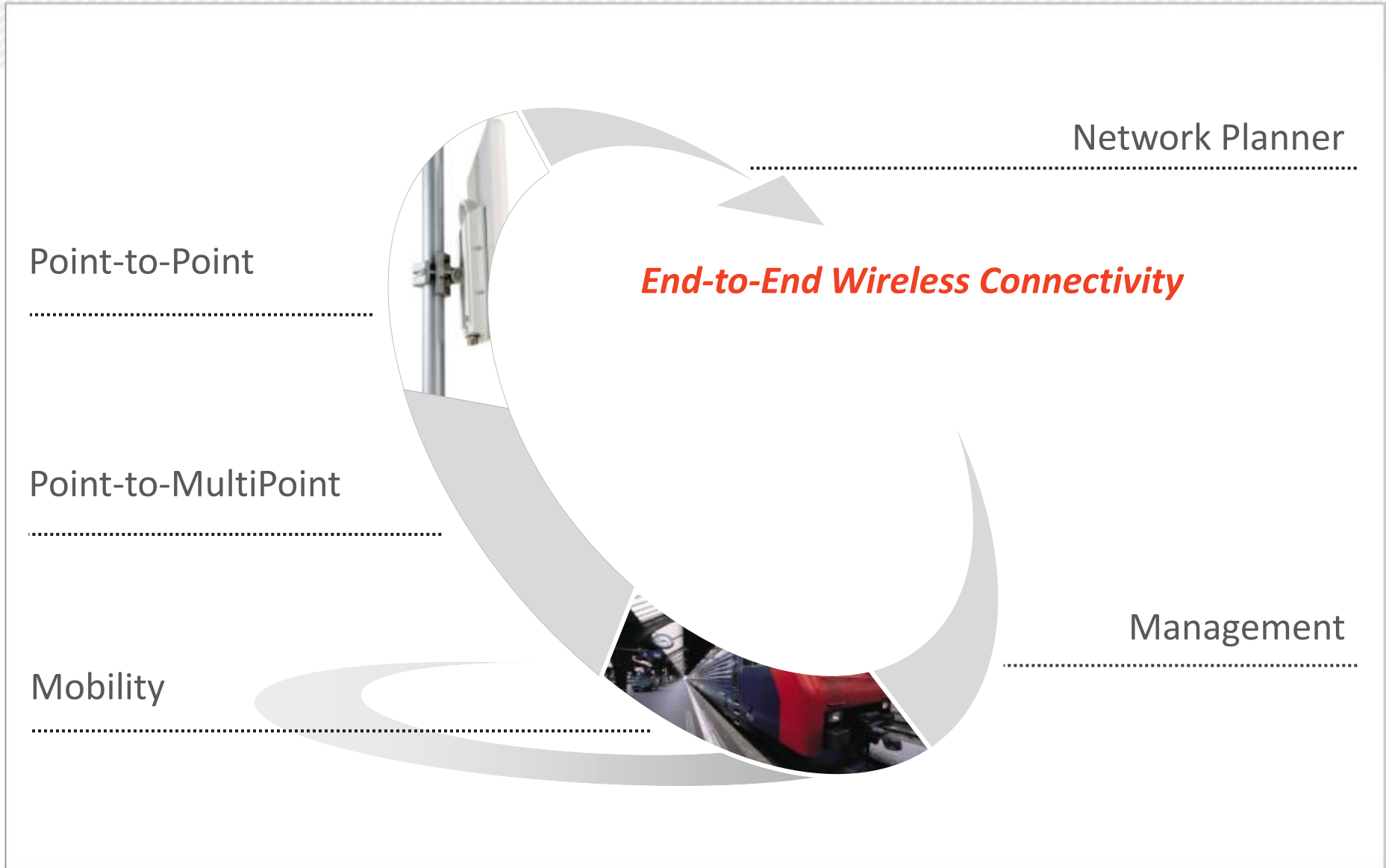
Wireless system requirements

| PARAMETER | COMMENT |
|------------------------|---|
| Tools | Planning tools are needed to design and develop the network engineering. Also NMS has to be implemented to perform the regular configuration, alarms monitoring, and diagnostic and maintenance activities. |
| Water proof protection | Outdoor radio require IP 67 protection level certification. It is important in all sensitive communication , but also in rural or insolated areas with high maintenance cost. |

| PROTECTION | QUALIFICATION |
|------------|--|
| IP 64 | No ingress of dust + splashing water |
| IP 65 | No ingress of dust + water jets |
| IP 66 | No ingress of dust + powerful water jets |
| IP 67 | No ingress of dust + Immersion up to 1 m |

MAIN PRODUCT LINES

RADWIN Provides:



RADWIN 2000 Point-to-Point Portfolio

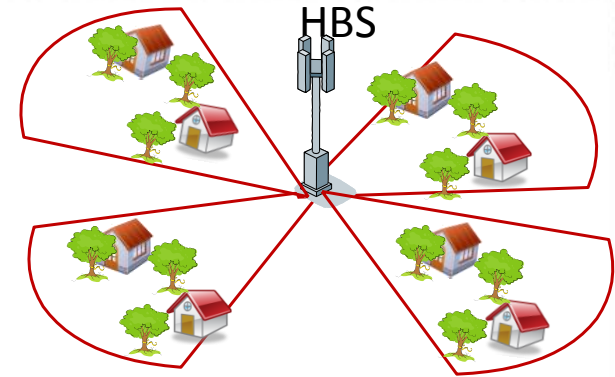
- High capacity wireless links
- Up to 200 Mbps throughput
- Up to 16 E1s/T1s and Ethernet
- Seamless migration to IP
- Long range (120Km)
- Redundancy (1+1, SECUR technology)
- Multi-band Radio: 2.3-2.7GHz, 3.3-3.8GHz and 4.4-6.4GHz
- OFDM, MIMO, Antenna Diversity
- Easy to install
- Competitive pricing

| | |
|---------------|--------------|
| RADWIN 2000-C | 200 Mbps |
| RADWIN 2000-B | 50 Mbps |
| RADWIN 2000-A | 10 / 25 Mbps |



RADWIN 5000 HPMP Solution Highlights

- High capacity per Sector
 - » 250Mbps aggregate throughput
- Ethernet connectivity
- Symmetric or asymmetric operation.
- High capacity end user equipment –5,10, 25, 50Mbps
- Up to 32 SUs per sector.
- Guaranteed SLA and capacity per Subscriber Unit
- Small and constant latency- 4 to 10msec typical under full sector load
- Wide range of frequency bands - 4.8 to 6GHz, 3.3-3.8GHz & 2.4 GHz
- **3.3 to 3.8 GHz up to 100 Mbps @20 MHz**



High capacity PtMP for bandwidth demanding applications and guaranteed SLA

RADWIN 5000 Point-to-MultiPoint Portfolio

- Highest capacity Base Station
- Up to 250 Mbps throughput
- OFDM, MIMO, Antenna Diversity
- Up to 50Mbps per SU !
- Guaranteed SLA
- Highest Bps/Hz
- Long range (40Km)
- Carrier grade PtMP
- Frequency Bands: 2.3-2.4 GHz, 2.5-2.7 GHz, 3.3-3.8GHz and 4.9-6.0GHz

| Point-to-MultiPoint | | |
|---------------------|------------|----------|
| Base Stations | HBS 5200 | 250 Mbps |
| | HBS 5050 | 50 Mbps |
| | HBS 5025 | 25 Mbps |
| Subscriber Units | HSU 550 | 50 Mbps |
| | HSU 520/25 | 25 Mbps |
| | HSU 510 | 10 Mbps |
| | HSU 505 | 5 Mbps |
| | HSU 5610 | 10 Mbps |



PtMP Industry Solutions Segmentation

Capacity (Mbps)

250

40

For Business and High end

- Built for residential mass market
- Requires Licensed band only (3.x, 2.x)
- 35Mbps/ sector, limited to 10MHz
- Mostly downlink capacity
- complex Network (ASN, AAA)
- No Roadmap



- Native 802.11n
- Nor QoS neither guaranteed SLA (Air interface is not scheduled)
- Available only in unlicensed 2.4, 5.x band
- Address low end residential
- Low cost BS & CPE but unstable performance as technology is for indoor



Lack of MIMO Diversity

- No guaranteed SLA



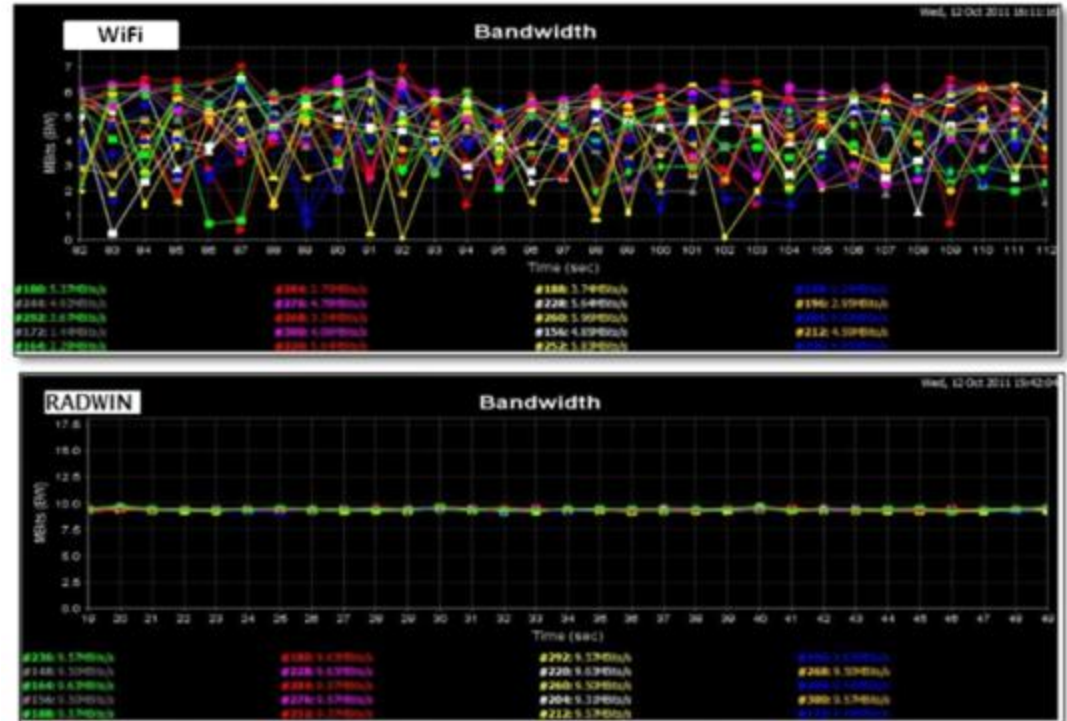
Residential

Enterprise

End user

RADWIN vs. leading 802.11n Wi-Fi solution in NLOS Scenario

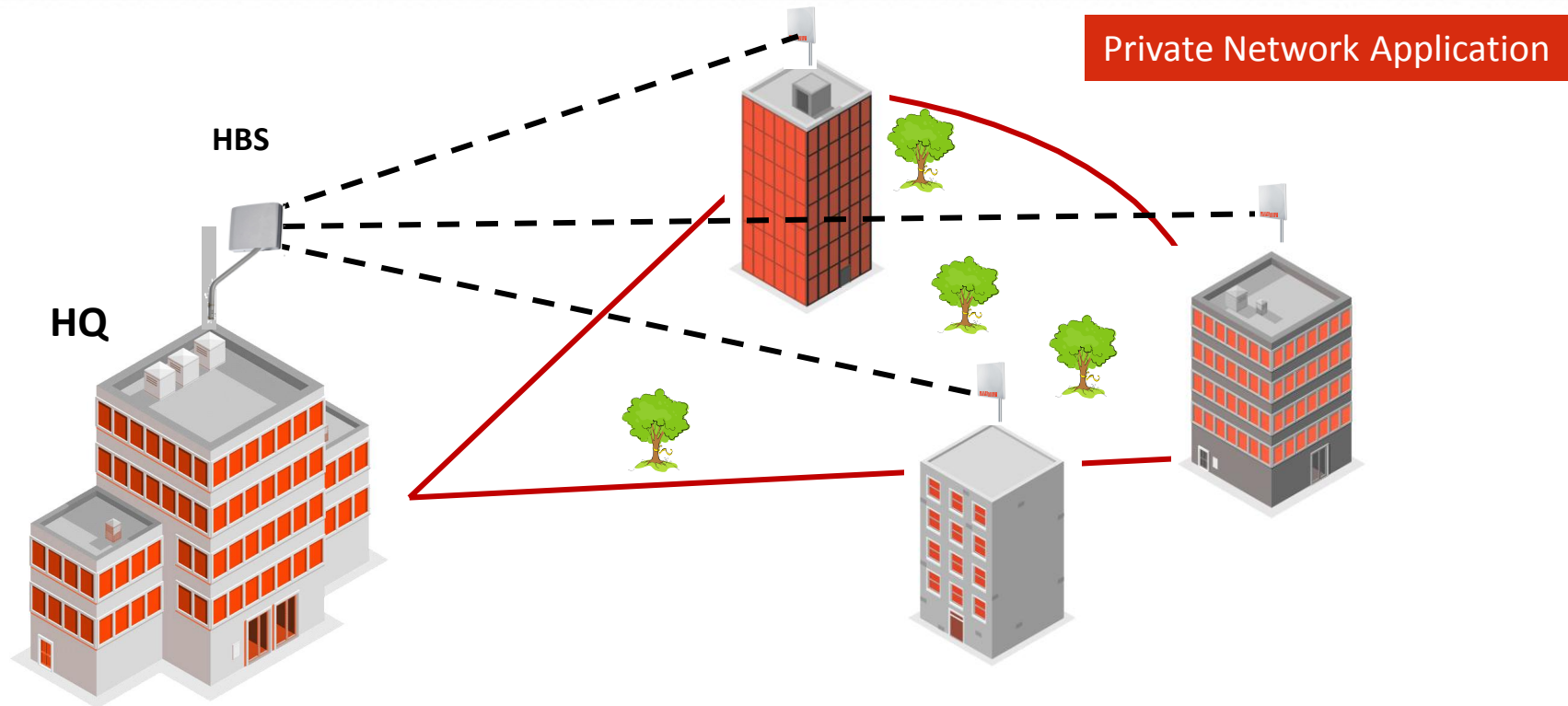
- 4 TCP streams have been transmitted over the wireless link
- RADWIN – Stable Bandwidth in all 4 streams
- WiFi – Fluctuated bandwidth is all 4 streams due to errors in the link



Throughput versus Time

Stable Bandwidth is imperative for Video!

High Capacity Inter-Office connectivity

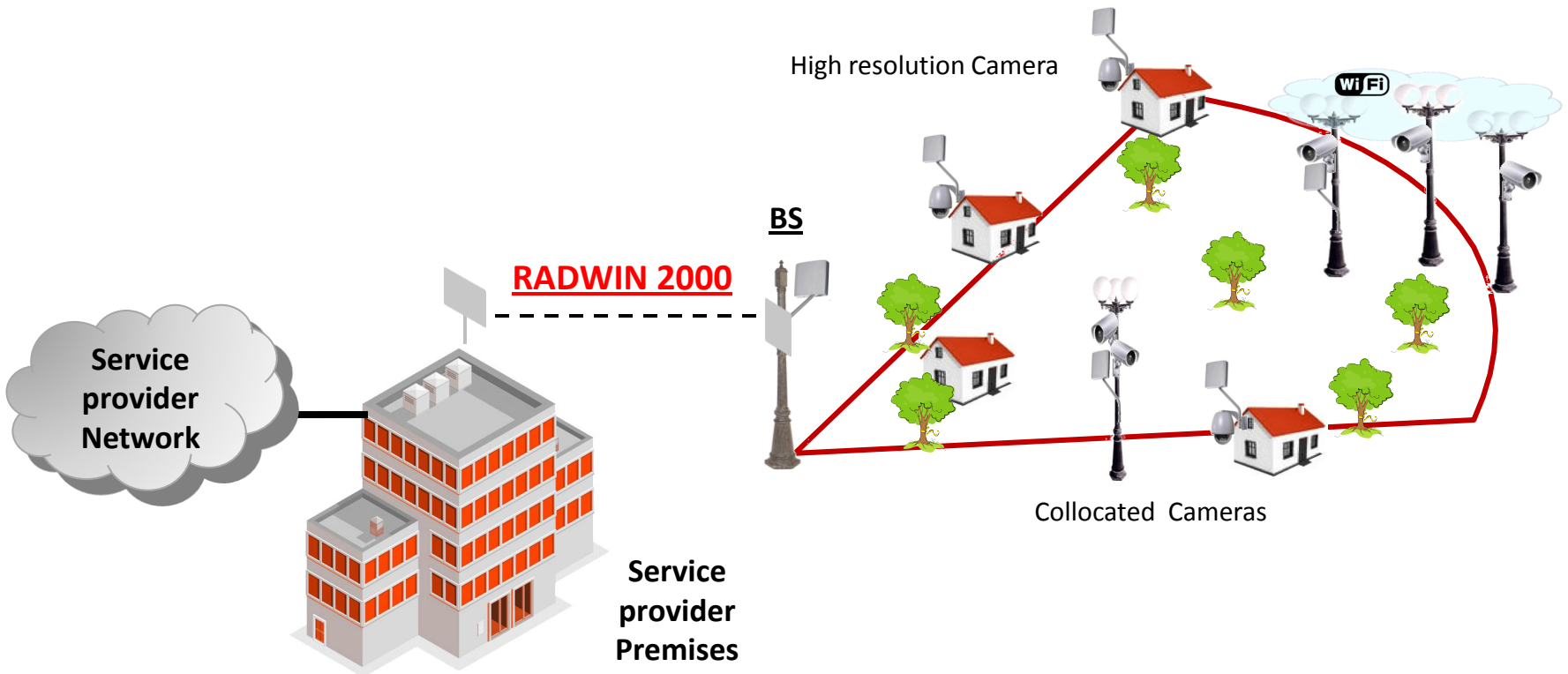


- Two modes of operations:
 - » WLAN : Traffic from branch to branch is switched back by the BS
 - » "Access" – Higher network hierarchy switches the traffic

Safe City –Video surveillance

Private Network Application

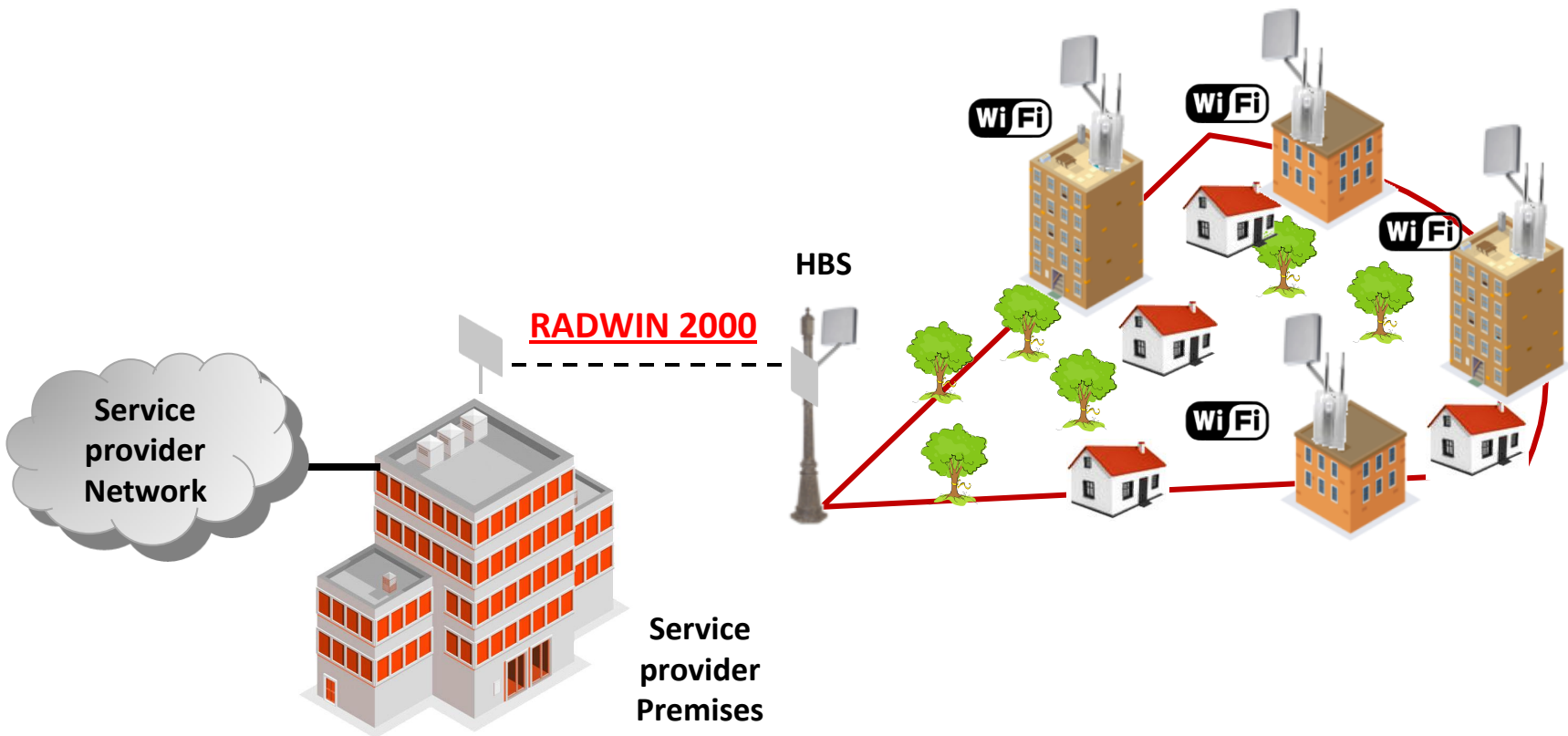
- Access to high capacity cameras, collocated cameras
- Backhaul of mesh WiFi cloud, carrying Video surveillance



Multi Tenants Building – WiFi Backhaul

Service Provider Application

- Residential building are covered through WiFi AP
- WiFi AP are backhauled by RADWIN 5000



Urban - High Capacity SLA Corporate Access

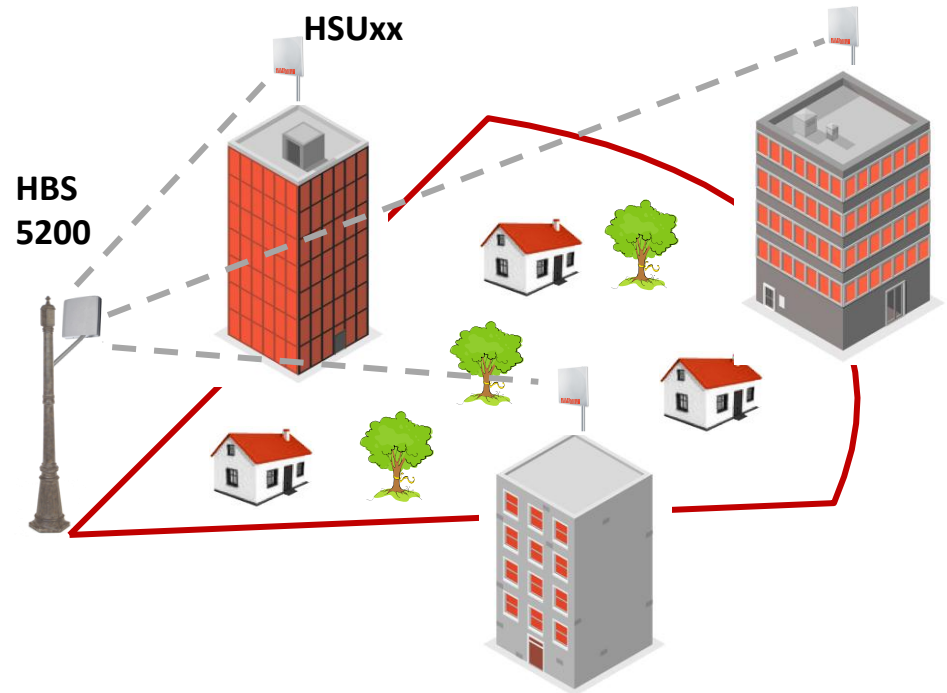
SUs range 2km @20MHz Channel BW

- Sector Capacity- 92Mbps
 - » 7 clients @ 6Mbps
 - » 3 clients @ 10Mbps
 - » 1 client @ 20Mbps

SUs range 6km @20MHz Channel BW

- Sector Capacity- 75Mbps
 - » 7 clients @ 5Mbps
 - » 2 clients @ 10Mbps
 - » 1 client @ 20 Mbps

Service Provider Application

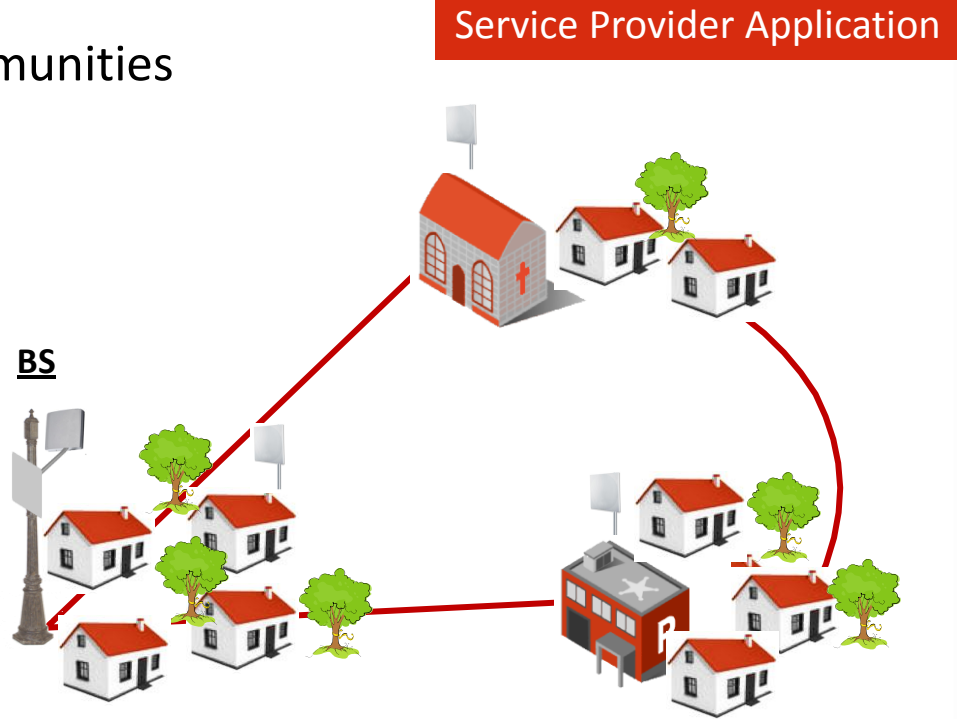
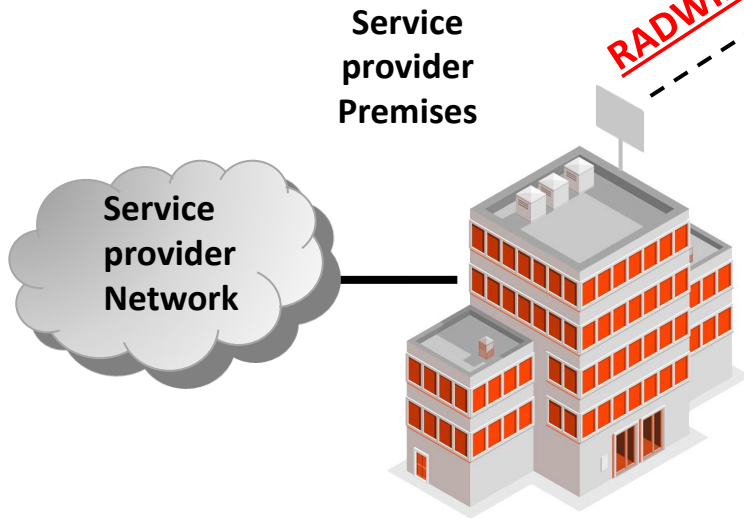


Rural Broadband – Connecting Communities

Broadband connection to remote communities

SU range 20km @20MHz Channel BW

- Sector Capacity- 48Mbps
 - » 8 villages @ 6Mbps



SU range 30km @20MHz Channel BW

- Sector Capacity- 30Mbps
 - » 5 villages @ 6Mbps

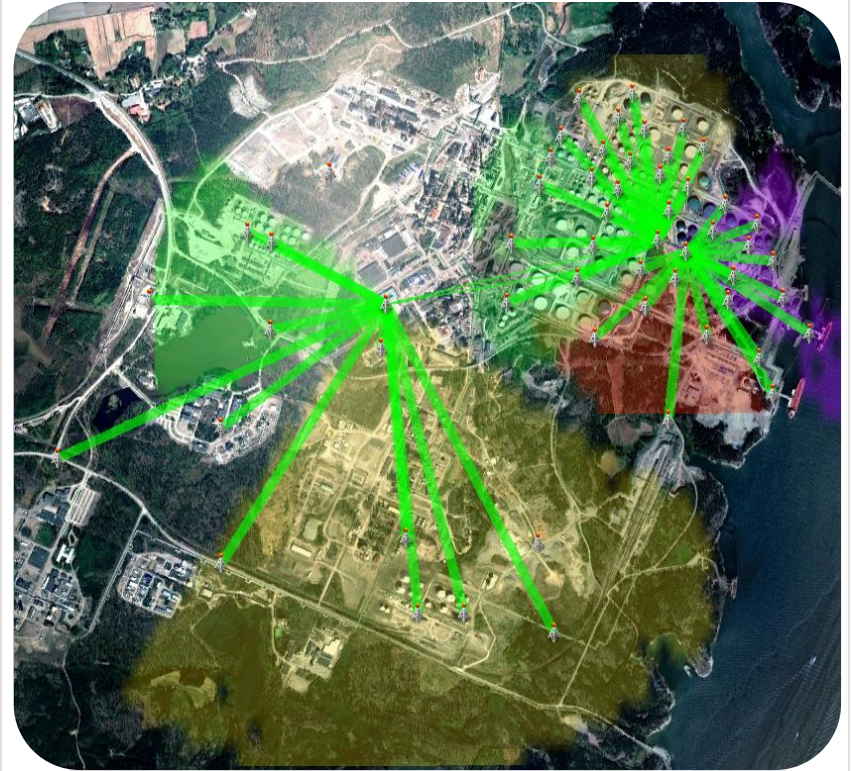
FiberinMotion™ Overview

- **HIGH CAPACITY:**
 - » Up to 100 Mbps per base station (HBS)
 - » Up to 100 Mbps per mobile unit (HMU)
- **WIDE COVERAGE** – Up to 10km
- **DEDICATED LINK** – Guaranteed bandwidth per mobile unit
- **CONTINUOUS CONECTIVITY** - above-ground and underground
- **LOW LATENCY** - suitable for VoIP and video applications
- **HIGH SPEED** - Up to 200Km/h
- **ROBUST** – Operates in extreme weather and harsh conditions
- **FAST HANDOVER** - to ensure uninterrupted service
- **CERTIFIED** - Complies with **EN50155, EN 50121** railway standards

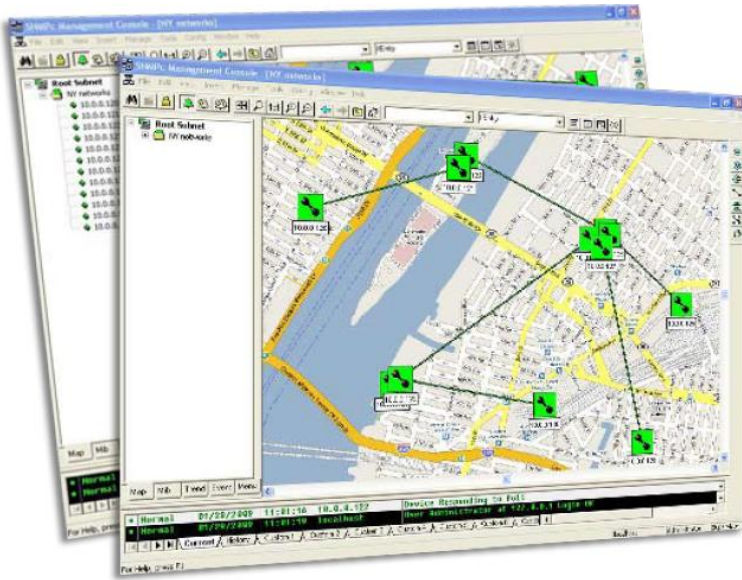


RADWIN Radio Planner (R-Planner)

- Easy-to-use web application
- Professional platform for designing & analyzing a wireless network
- Integrated analysis tools
- Built-in report generator
- Complete product data base access and Google Earth add-In



RADWIN Network Manager – RNMS

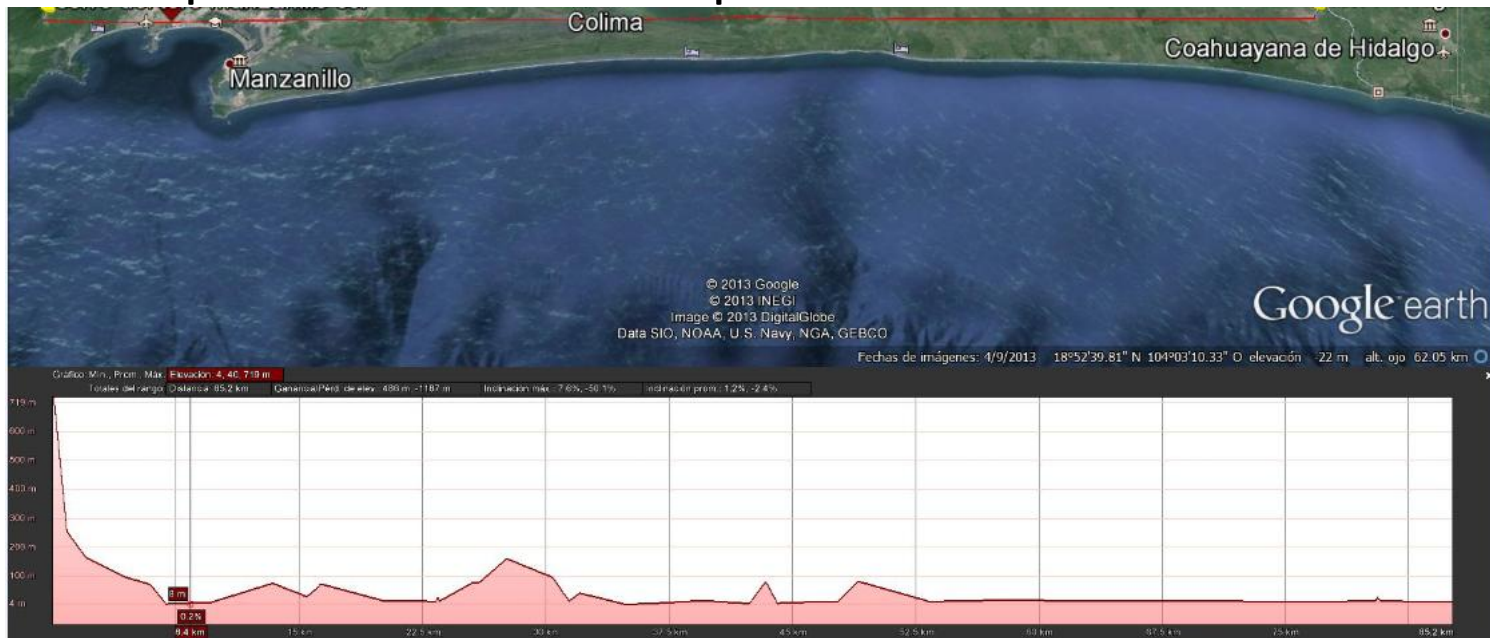


- Enables management of all RADWIN links in a network from the control center.
- Intuitive, easy-to-use
- Provides a full range of network monitoring, configuration and management capabilities
- Performance monitoring and trend reports

Casos de Escuelas

Enlace más largo

- Bahía de Santiago en Manzanillo Colima a Coahuayana de Hidalgo Michoacán
- 85 Km
- 130 Mbps con antenas de 4 pies 34 dBis



RADWIN APAC PARTNERS MEETING 2012

Riding the wireless highway together!



Ernet – Case Study

Project Background & Scope

- Department of Information Technology (DIT), Govt. of India intended to implement an e-infrastructure project at 247 schools of Rajasthan state in the District of Jaipur and Ajmer by providing computer peripherals and Internet connectivity.
- For the purpose DIT has nominated ERNET India as a nodal agency for project implementation, management, operations and monitoring on behalf of Department.
- ERNET under the scope of this tender intended to select an equipment manufacturer / System Integrator / Service Provider for establishment of WiMAX or wireless based Ethernet radios Network for the 247 schools for E-education, internet, intranet and other applications as may be required.

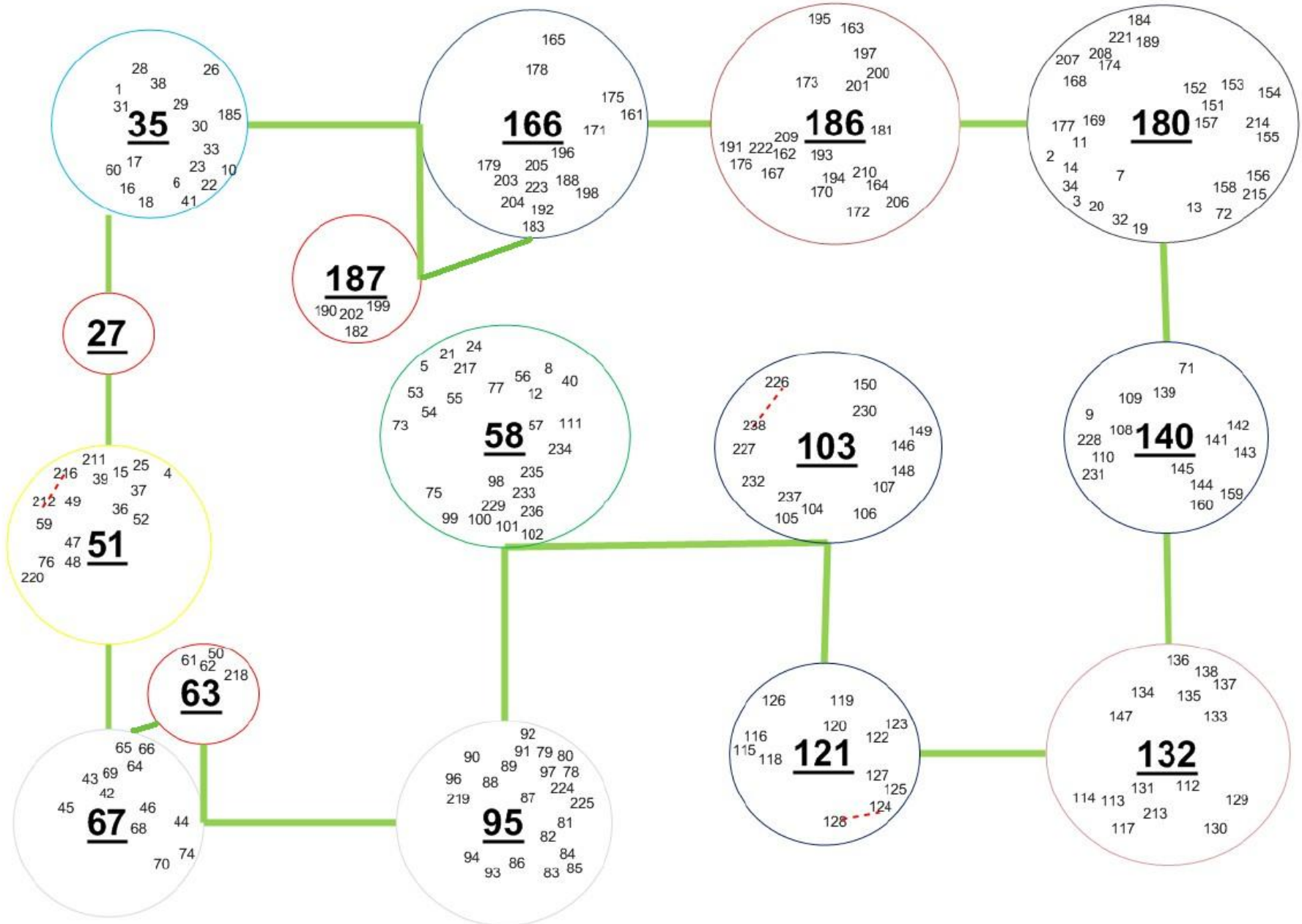
Tender Requirements

- 4 Mbps throughput at each locations.
- 100 Mbps Backbone with redundancy.
- Systems to support Multicast transmission.
- Entire solutions should be managed by single NMS systems.
- Bidder should submit the Survey report and network diagram.
- Systems should be environmentally proven as Ajmer is desert area and temperatures goes up to 49/50 degree Celsius.
- Offered product should have technical centre locally in India.

Challenges

- nLOS Deployment.
- 100 Mbps Backbone with Redundancy.
- Fast and Rapid Deployment.
- Single NMS for entire wireless network.
- Collocation deployment
- Minimum 4 Mbps Throughput at each Location in PtMP at distances up to 25 Km.
- Latency – 15 Msec in PtMP and 4 Msec in PTP

Network Diagram



Google Earth Image

The image is a screenshot of the Google Earth application. The main window displays a satellite map of a region in Rajasthan, India. A network of red lines radiates from several central points, forming a complex web. A prominent green path is overlaid on the map, connecting several of these central points. A yellow pushpin is placed on the map near the location of 'Dumada Rajesh Pilot Public School'. The map includes labels for various locations: Dudu, Kishangarh, Makrana, Ajmer, Nasirabad, Hurda, Dumada Rajesh Pilot Public School, Asind, and Bhilwara. A yellow shield icon with 'NH 79A' is visible near Kishangarh. The Google Earth interface is visible at the top, showing the title bar 'Google Earth', a menu bar with 'File', 'Edit', 'View', 'Tools', 'Add', and 'Help', and a toolbar with various navigation and tool icons. The Windows taskbar is visible at the bottom, showing the 'start' button and several open applications: 'Sent Items - Micr...', 'FW: Ajmer - Mes...', and 'Google Earth'. The system clock shows '6:14 AM'. The map itself has a copyright notice: 'Image © 2011 DigitalGlobe', 'Image © 2011 GeoEye', '© 2011 Google', and '© 2011 Europa Technologies'. The coordinates '26°54'20.27" N 74°31'54.21" E elev 399 m' are displayed at the bottom center. The Google logo and '© 2010' are in the bottom right corner. The text 'State/Highway 61' is written vertically on the right side of the map. The 'Eye alt 205.60 km' indicator is in the bottom right corner of the map area.

RADWIN Winning Points

- Connected Nine location which was declared Non Feasible by other competitor.
- Only product which support 4 Mbps and up to 25 Mbps in Point to Multipoint solution.
- Proposed RW2000 as Backbone which has in-built Ring Protection
- Provide complete Network diagram with Ring topology.
- Support collocation deployment.
- Support Integrated and external antenna provision in same hardware provides flexibility to users.
- Support very low latency.
- Support maximum distances up to 40 Km.

Gracias



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