



RIDE THE WIRELESS HIGHWAY WITH **RADWIN 5000 HPMP**

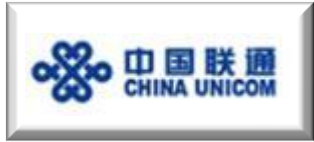
Sistemas Inalámbricos de alta capacidad

RADWIN

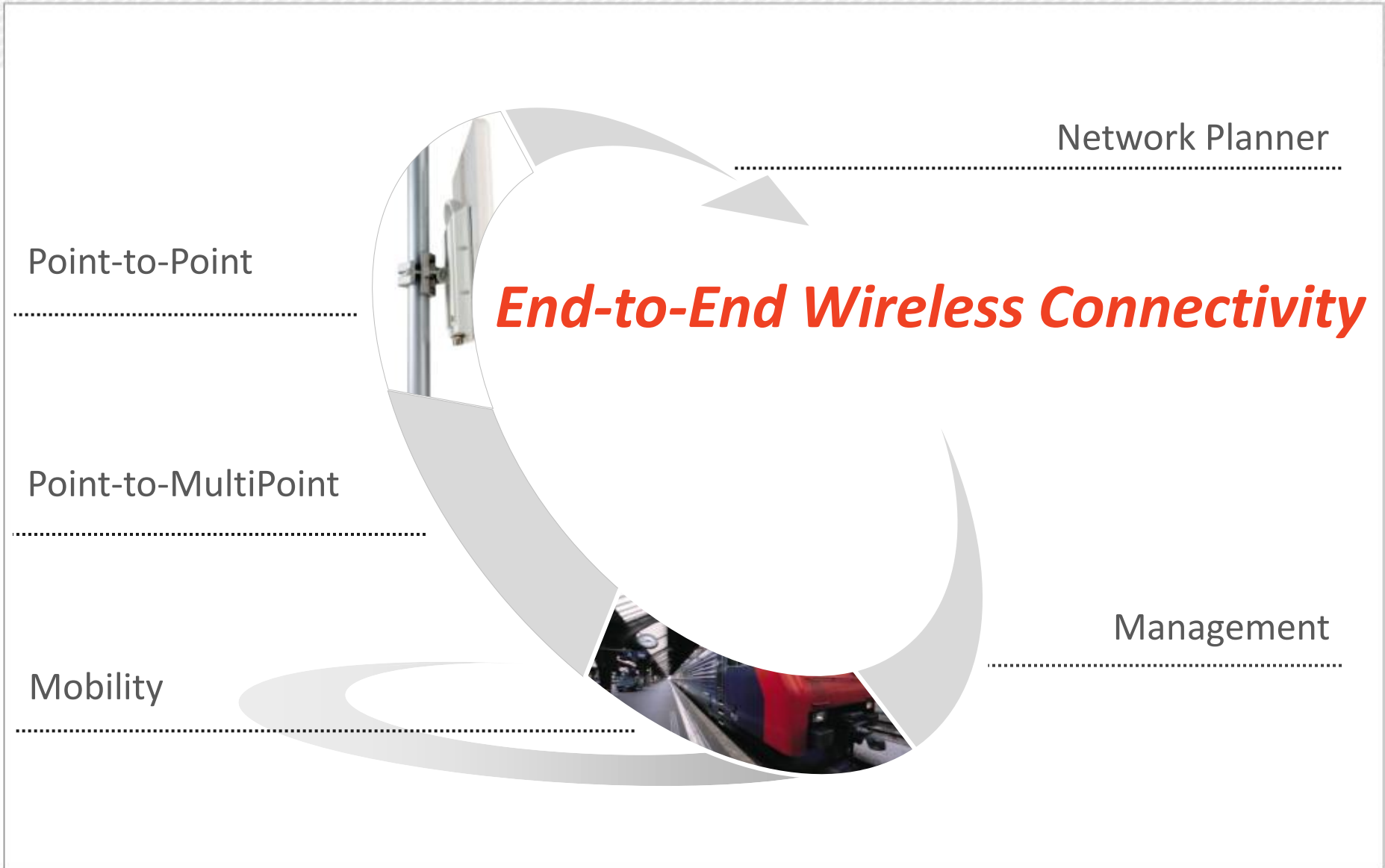
RADWIN at a Glance

- Leading provider of Sub-6GHz broadband wireless solutions
- Deployments in over 120 countries
- Offering Backhaul and access (last mile) solutions
- Market leading sub-6GHz portfolio for end to end connectivity.
 - Point to Point - Up to 200Mbps net throughput; up to 16xE1s/T1s+ Ethernet
 - Point to Multi-Point – Up to 200Mbps net throughput; Ethernet
- Target Segments: Cellular Operators, Service Providers, Surveillance & Security and variety of private networks verticals
- Customer base includes leading tier 1 cellular and fixed operators, globally
- Operating from Israel with regional headquarters in North America, Latin America, EMEA and APAC

RADWIN Technology Adopted by Tier 1 Carriers



RADWIN Provides:



RADWIN 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 Point-to-MultiPoint Portfolio

- Highest capacity Base Station
- Up to 200 Mbps throughput
- Up to 50Mbps per SU !
- Guaranteed SLA
- Highest Bps/Hz
- Long range (40Km)
- Carrier grade PtMP
- Frequency Bands: 3.3-3.8GHz and 4.9-6.0GHz

Base Stations	HBS 5200	200 Mbps
	HBS 5050	50 Mbps
Subscriber Units	HSU 550	50 Mbps
	HSU 520	20 Mbps
	HSU 510	10 Mbps
	HSU 505	5 Mbps

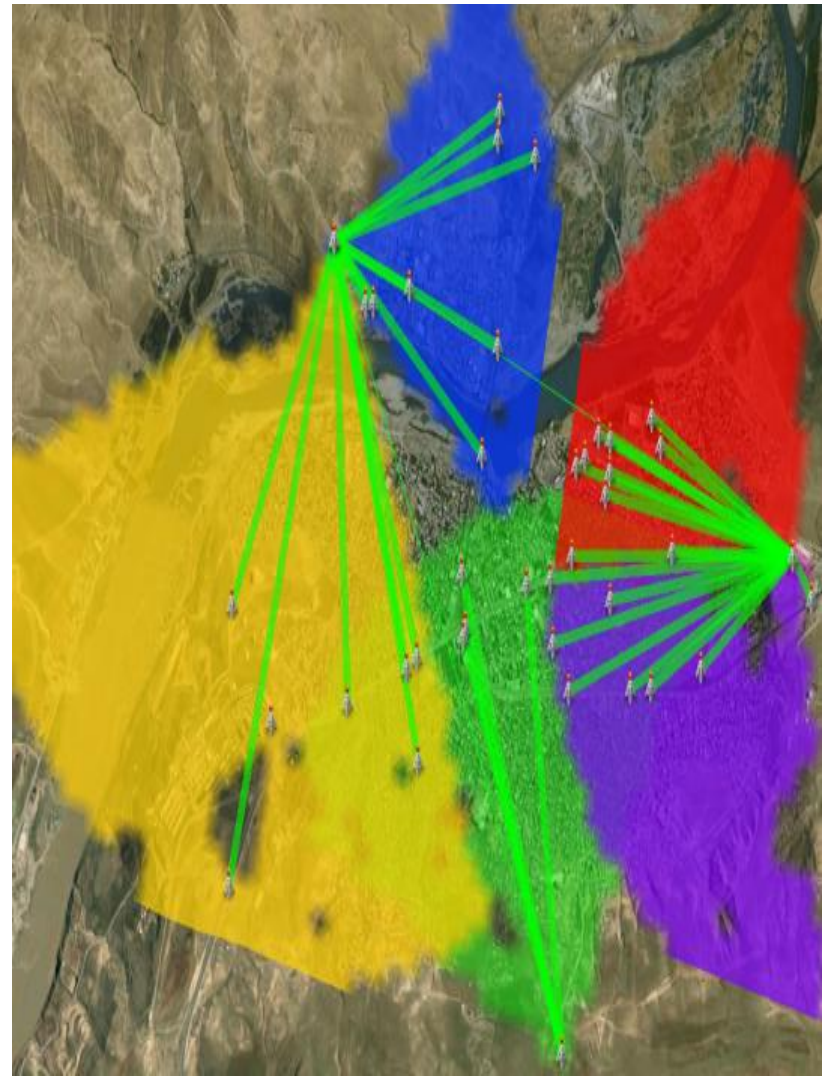


RADWIN Broadband Mobility Solution

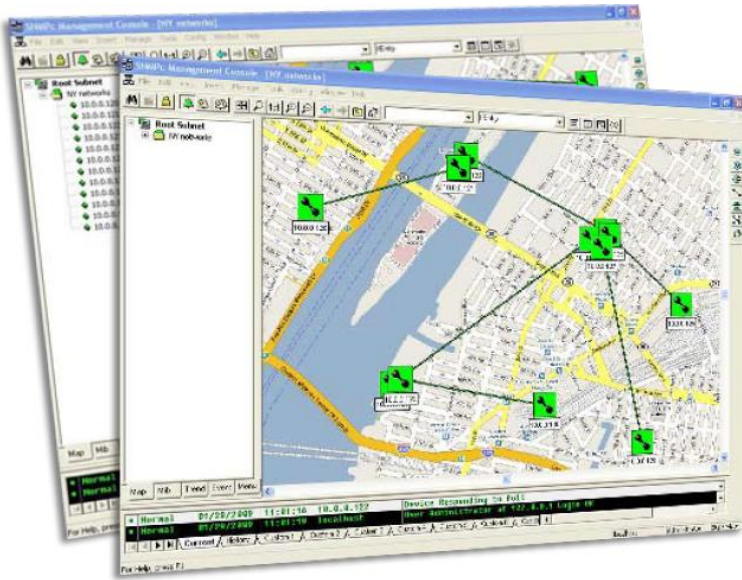
- **HIGH CAPACITY** - 30Mbps net throughput
- **WIDE COVERAGE** - Base stations up to 10km apart
- **DEDICATED LINK** – Guaranteed bandwidth per mobile unit
- **CONTINUOUS CONECTIVITY** - both above-ground and underground
- **LOW LATENCY** - suitable for VoIP and video applications
- **HIGH SPEED** - Up to 200Km/h, designed for higher speeds
- **ROBUST** – Operates in extreme weather and in near and none line-of-sight
- **SEAMLESS HANDOVER** - Between base stations to ensure uninterrupted service
- **MULTIBAND** - Supporting 4.8-6.0 GHz frequency bands
- **HIGH POWER** – Up to 25dBm !
- **CERTIFIED** - Complies with the European railway standard **EN50155**

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

Point-to-Point Portfolio

- High capacity wireless links
- Up to 200 Mbps throughput
- OFDM, MIMO, Antenna Diversity
- Up to 16 E1s/T1s and Ethernet
- Interference mitigation: FEC, ARQ, ACS, adaptive rate and modulation, and Multiband
- Long range (120Km)
- Redundancy (1+1, SECUR technology)
- Radio: 2.3-2.7GHz, 3.3-3.8GHz and 4.4-4.5 GHz, Multiband 4.9 -6.GHz
- IP 67
- Easy to install and competitive pricing

RADWIN 2000-C	200 Mbps
RADWIN 2000-B	50 Mbps



RADWIN PtP Portfolio in a Glance

Product Series	Max. Throughput	Target Applications
Radwin 2000 C	<ul style="list-style-type: none">▪ 200 Mbps net aggregate (Symmetric . or Asymmetric)▪ Support up to 16E1s / T1s▪ OFDM & MIMO▪ Networking capabilities: VLAN, QinQ, QoS	IP & TDM backhaul
Radwin 2000 B	<ul style="list-style-type: none">• 50 Mbps net aggregate (Symmetric . or Asymmetric)• Support up to 8E1s/T1s▪ OFDM & MIMO▪ Networking capabilities: VLAN, QinQ, QoS-	IP + TDM access
WinLink 1000 Access Pro	<ul style="list-style-type: none">▪ 6 Mbps full duplex▪ OFDM▪ Software upgrade to 18 Mbps Full Duplex	IP Access

RADWIN 2000 - 3.x GHz

Product Series	Max. Throughput	Target Applications
C-Series	<ul style="list-style-type: none">▪ 100 Mbps net aggregate throughput▪ Support up to 16E1s / T1s▪ 20, 10, 5MHz channel BW	IP+TDM backhaul
X-Series	<ul style="list-style-type: none">▪ 20 Mbps net aggregate throughput▪ Support up to 3 E1s/ 4 T1s▪ 20, 10, 5MHz channel BW	IP+TDM Access



RIDE THE WIRELESS HIGHWAY WITH **RADWIN 5000 HPMP**

RADWIN 5000

High Capacity Point to Multipoint System

RADWIN

PtMP Industry Solutions Segmentation

Capacity (Mbps)

200

40

- For Business and High end applications

- 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



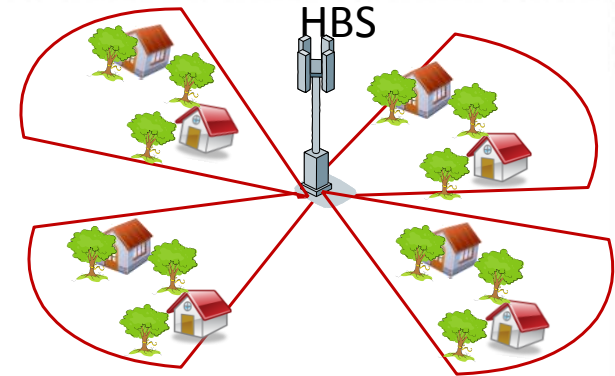
Residential

Enterprise

End user

RADWIN 5000 HPMP Solution Highlights

- High capacity per Sector
 - » 200Mbps aggregate throughput
- Ethernet connectivity
- Symmetric or asymmetric operation.
- High capacity end user equipment –10, 20, 50Mbps
- Up to 32 SUs per sector
- Guaranteed SLA and capacity per Subscriber Unit
- Small and constant latency- 4 to 20msec typical
- Wide range of frequency bands multiband in 4.8 to 6GHz,
- **3.3 to 3.8 GHz up to 100 Mbps @20 MHz**



High capacity PtMP for bandwidth demanding applications and guaranteed SLA

RADWIN Point-to-MultiPoint Portfolio

- Highest capacity Base Station
- OFDM, MIMO and Diversity
- Up to 200 Mbps throughput
- Up to 50Mbps per SU !
- Guaranteed SLA
- Highest Bps/Hz
- Long range (40Km)
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- Frequency Bands: 3.3-3.8GHz and 4.9-6.0GHz

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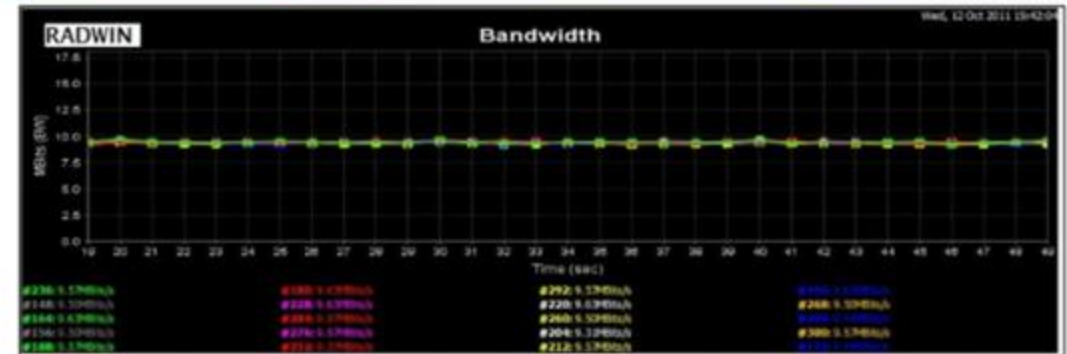
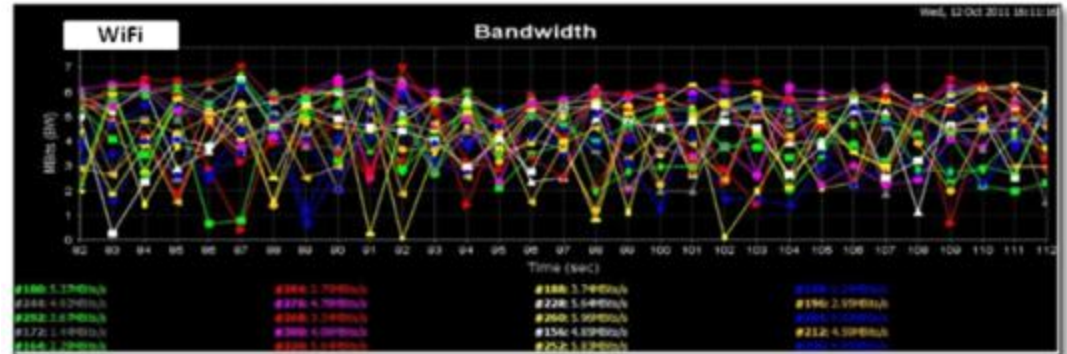


RADWIN 5000 – 3.x GHz Portfolio

Product Series	Max. Throughput	Target Applications
HBS 5100	<ul style="list-style-type: none">▪ 100 Mbps net aggregate (Symmetric . or Asymmetric)▪ 5 , 10 and 20 MHz▪ OFDM, MIMO and Diversity▪ 90° Sector antenna	IP backhaul
HSU	<ul style="list-style-type: none">▪ 20 Mbps or 10 Mbps net aggregate (Symmetric . or Asymmetric)▪ High gain integrated antenna or connectorized	TDM + IP

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

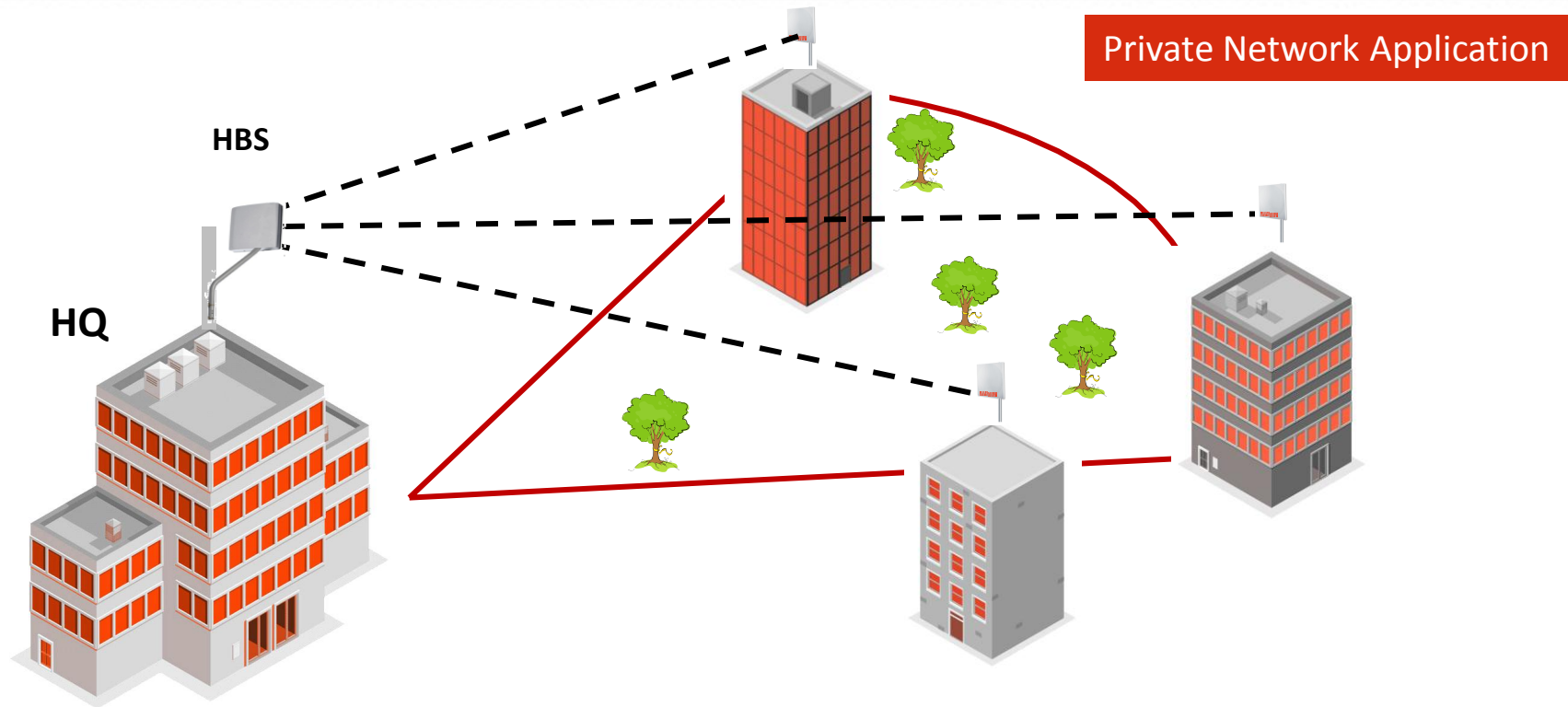


Throughput versus Time

Stable Bandwidth is imperative for Video!

RADWIN 5000 HPMP Scenarios

High Capacity Inter-Office connectivity



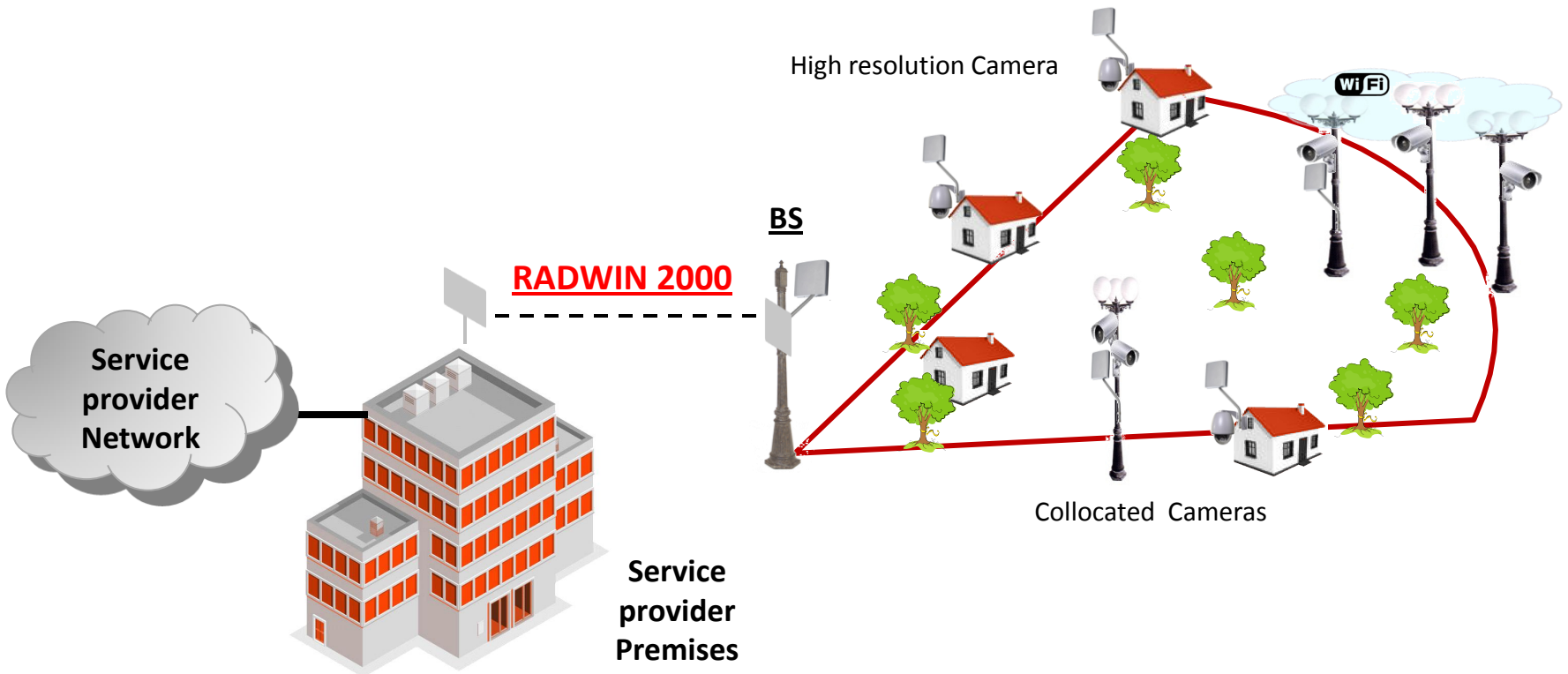
- Two modes of operations:

- » 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

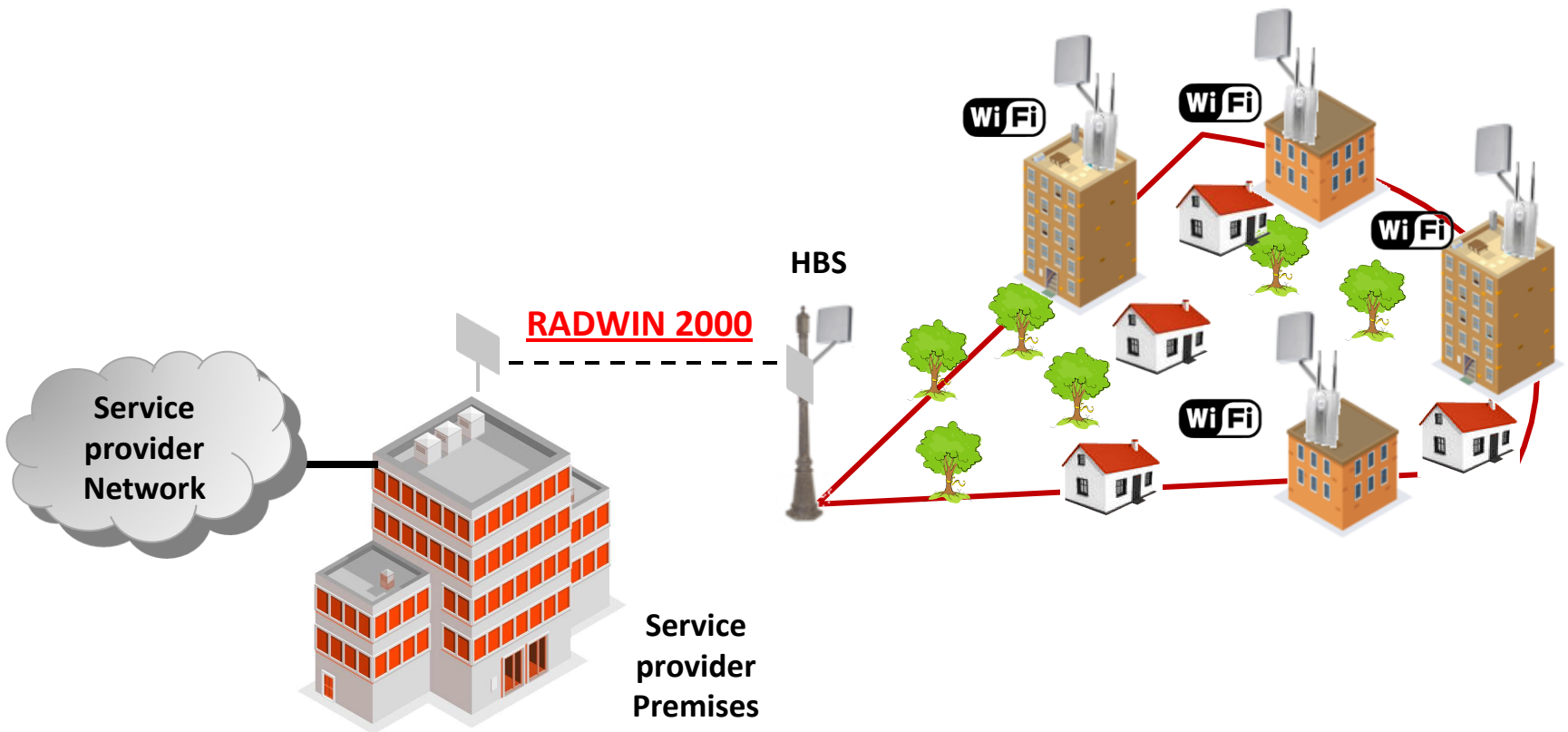
- Access to high capacity cameras, collocated cameras
- Backhaul of mesh WiFi cloud, carrying Video surveillance



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 Access

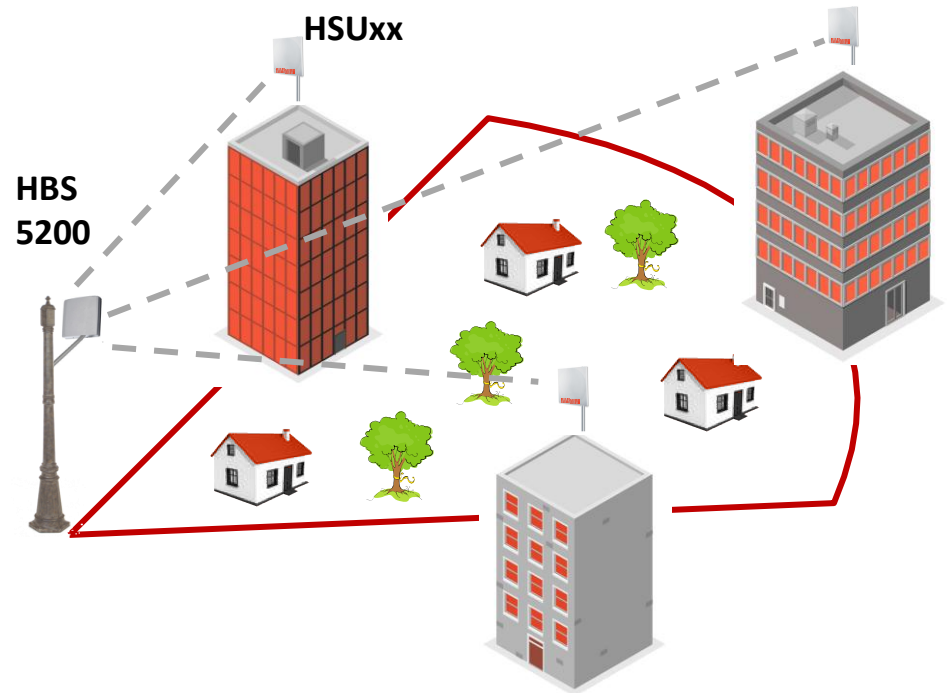
SUs range 2km @20MHz Channel BW

- 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

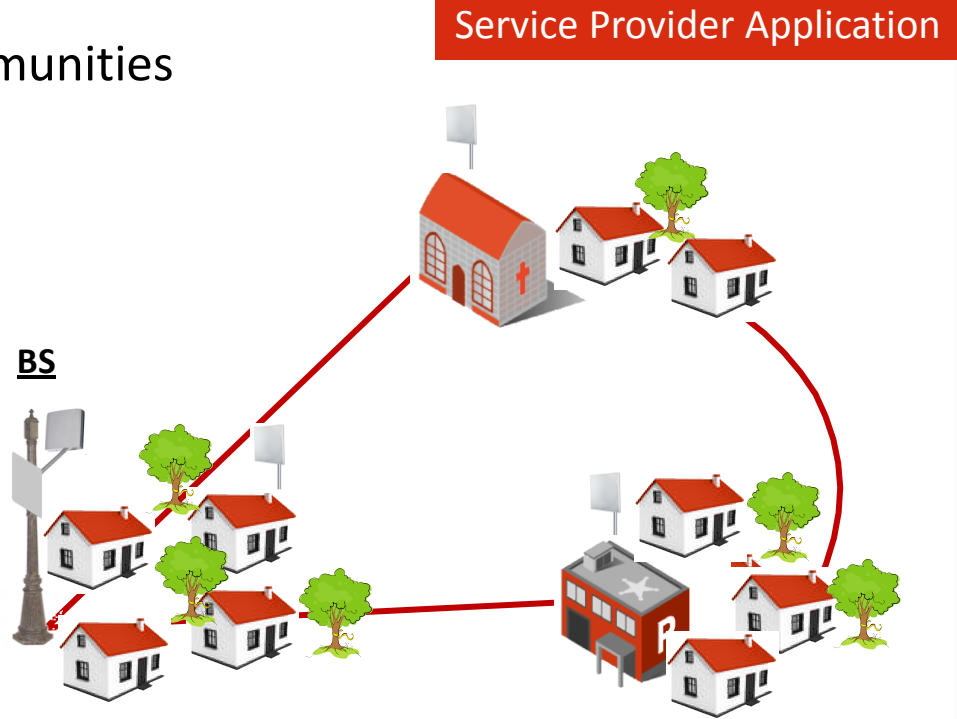
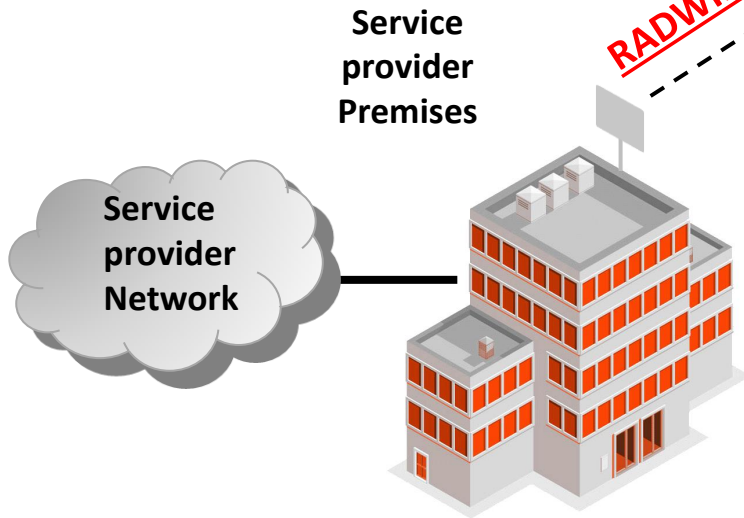


Rural Broadband – Connecting Communities

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

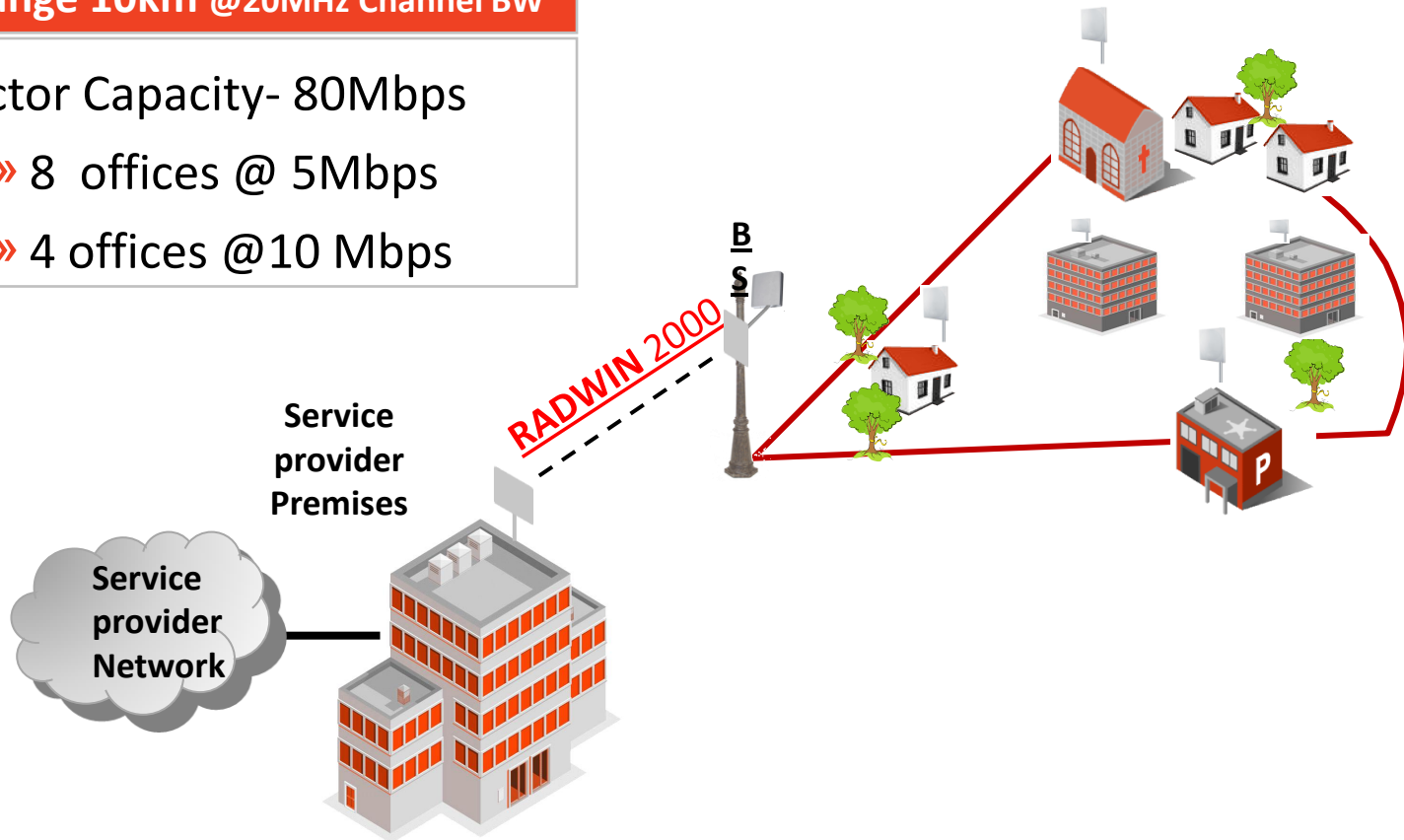
Government Broadband – in 3.x GHz

Government connectivity

Broadband connection to hospitals, and police stations and offices:

SU range 10km @20MHz Channel BW

- Sector Capacity- 80Mbps
 - » 8 offices @ 5Mbps
 - » 4 offices @10 Mbps



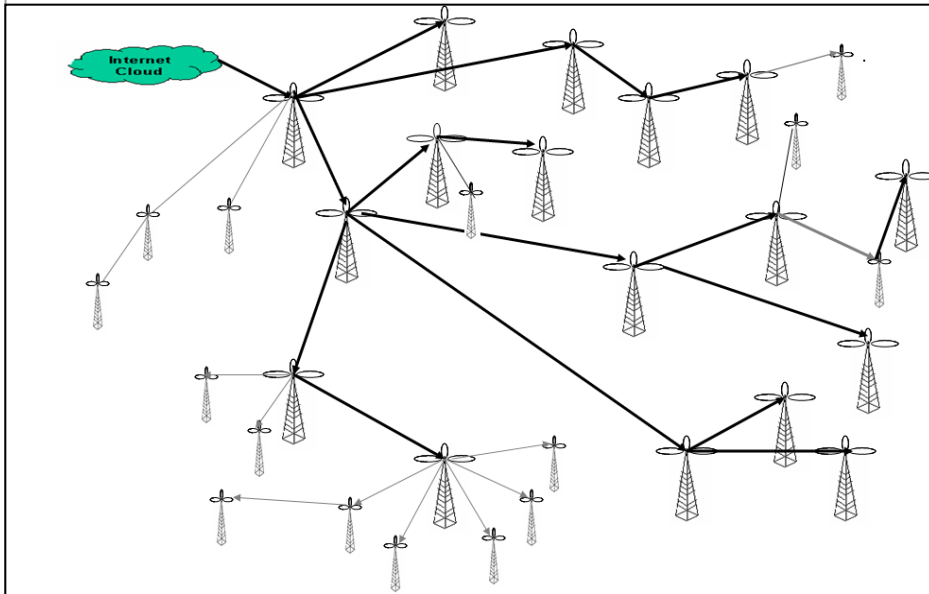
APPLICATIONS: RURAL AND SOCIAL CONNECTIVITY

The GURU Mantra of “RURAL Connectivity Model

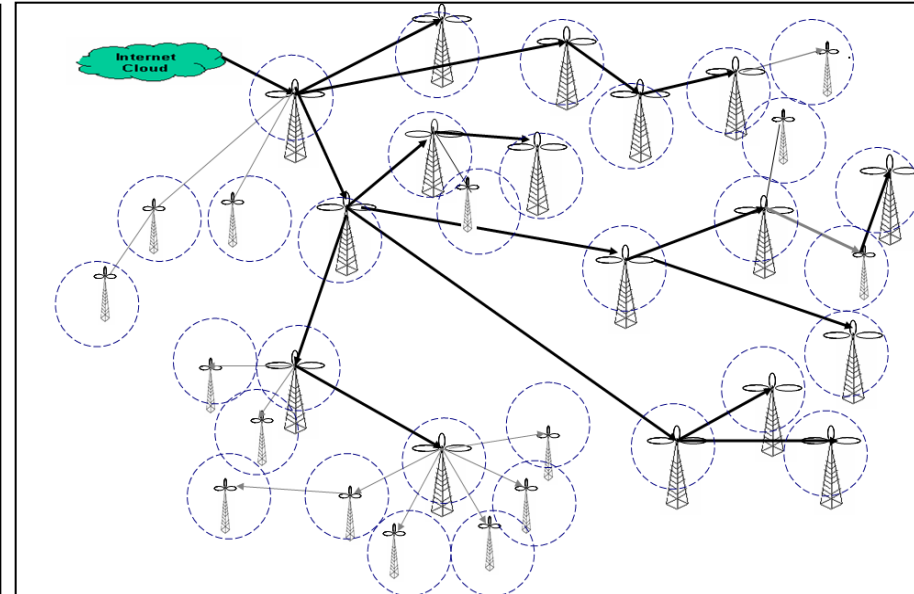
- 1. EXTEND** to a location close to the target area
(done by PTP and MP2P)
- 2. EXPAND** from this location to fill the needs of
the target area *(done by PMP and MP2P)*
- 3. RAMP UP**

Proposed Akshaya Model

Phase 1 – **EXTEND** - Create a backbone using PTP and Multiple-Point-to-Point Radios



Phase 2 – **EXPAND** - Create an access over this backbone using PMP and Multiple-Point-to-Point Radios



Branching Units
Repeater Units

Extend: Radwin 2000 Backhaul

- High capacity wireless links
- Up to 200 Mbps throughput
- OFDM, MIMO, Antenna Diversity
- Up to 16 E1s/T1s and Ethernet
- Interference mitigation FEC, ARQ, ACS and adaptive rate and modulation.
- Long range (120Km)
- Redundancy (1+1, SECUR technology)
- Radio: 2.3-2.7GHz, 3.3-3.8GHz and 4.4-4.5 GHz, Multiband 4.9 -6.GHz
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Expand: Radwin 5000

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Radwin 5000 as a complement to WiMAX in 3.3 GHz

WiMAX Forum Certification Program

....the exclusive organization dedicated to certifying the interoperability of IEEE 802.16e products,

Fixed WiMAX certification profiles

Profile name	Spectrum band	Channel bandwidth	Duplexing	Status
ET01	3.4–3.6GHz	3.5MHz	TDD	Active
ET02	3.4–3.6GHz	3.5MHz	FDD	Active

Mobile WiMAX certification profiles

Profile name	Spectrum band	Channel bandwidth	Duplexing	Status
MP01	2.3–2.4GHz	8.75MHz	TDD	Active
MP02	2.3-2.4GHz	5,10MHz	TDD	2009*
MP05	2.496–2.69GHz	5 and 10MHz	TDD	Active
MP09	3.4–3.6GHz	5MHz	TDD	4Q2008*
MP10	3.4–3.6GHz	7MHz	TDD	4Q2008*
MP12	3.4–3.6GHz	10MHz	TDD	4Q2008*

There is no Certification Profile in 3.3-3.4 GHz

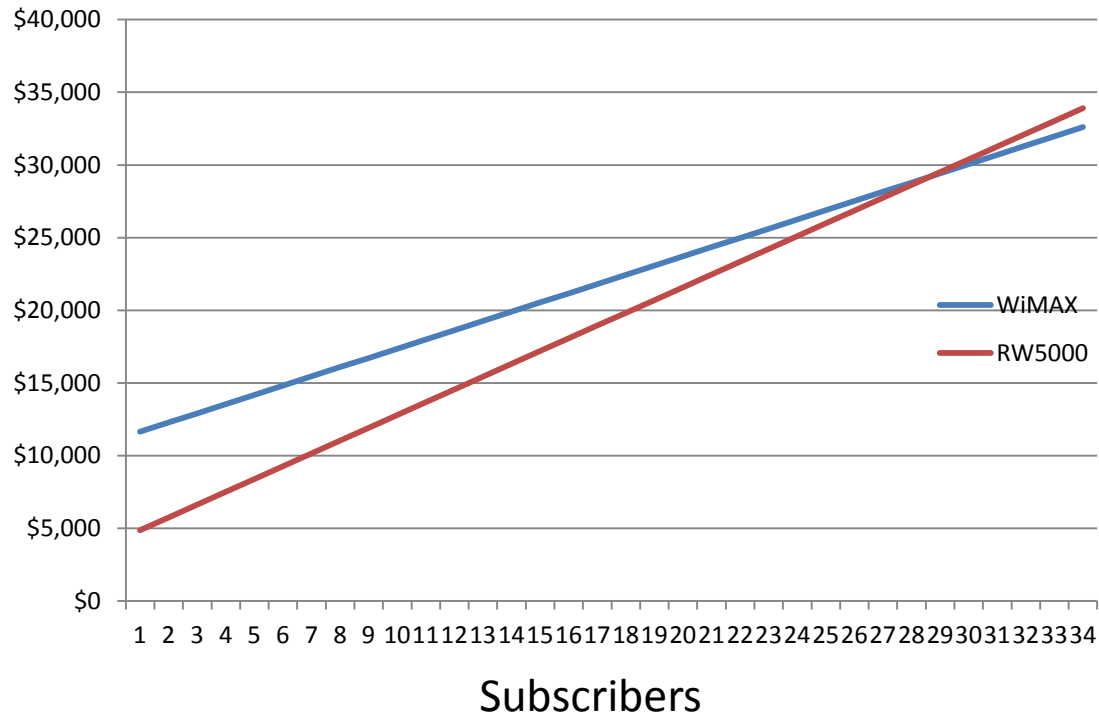
Radwin 5000 as a complement to WiMAX in 3.3 GHz

Technology	Spectral efficiency	Example a 20 MHz sector	comments
WiMAX 802.16.d	2.7 bits/Hz	54 Mbps	Today
WiMAX 802.16e	3.5 bits/Hz	70 Mbps	Today
WiMAX 802.16.m	5 -6 bits/Hz	100 Mbps	Expected
Radwin 5000	5 bits/Hz	100 Mbps	Today

RW 5000 offers higher rates . Complements WiMAX in applications that require higher throughput.

Radwin 5000 as a complement to WiMAX in 3.3 GHz

CAPEX for 1 sector and n x Subscribers



RW 5000 is more cost effective in low density environments.
Complements WiMAX in rural networks

Radwin 5000 – closing the digital gap

Radwin 5000 last mile solution applies when :

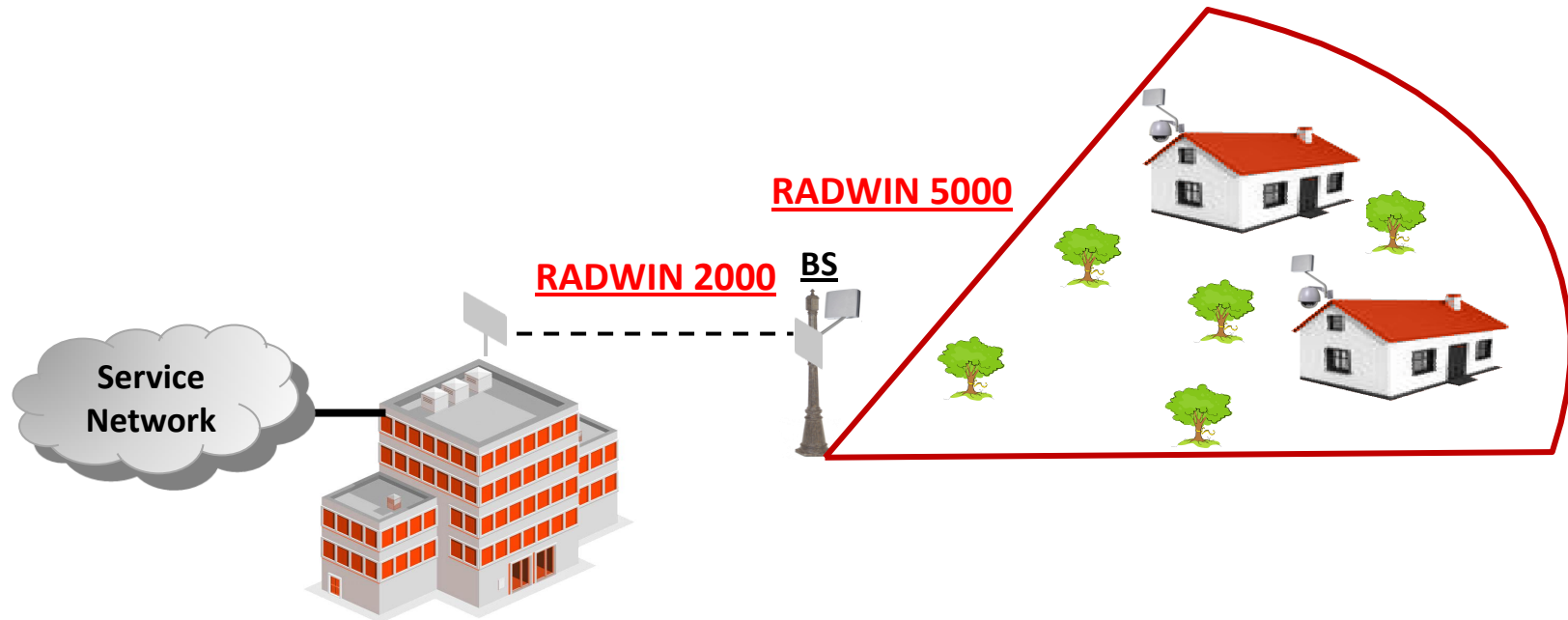
- There is a need of high throughput and SLA . (hospitals, government offices...Universities).
- There is a low density of user in a given area. (rural areas).
- There is a need of more than one application such as Volp, data, backhaul for WiFi systems, video surveillance in schools .
- There is a change in the paradigm of the social connectivity projects: offering now higher rates to every body...the demand of throughput grows every day.

Providing VS to schools

Camera Resolution	Mega Pixels	Mbps / Camera	Number of Camera per Sector @20 MHz
			RADWIN 5000 (100Mbps)
704x288 (2CIF)	0.2MP	0.82Mbps	122
704x576 (4CIF)	0.4MP	1.65Mbps	61
1280x1024 (H.264)	1.3MP	2.05Mbps	49
2048x1536 (H.264)	3MP	4.7Mbps	21
2600x1950 (H.264)	5MP	7.8Mbps	13
6400x1200 (H.264)	8MP	20Mbps	5

- Capacity @20MHz channel
- 25 Frames Per Second (FPS)
- RADWIN 5000 double the numbers of cameras in 40MHz channel

More services to schools- Video surveillance



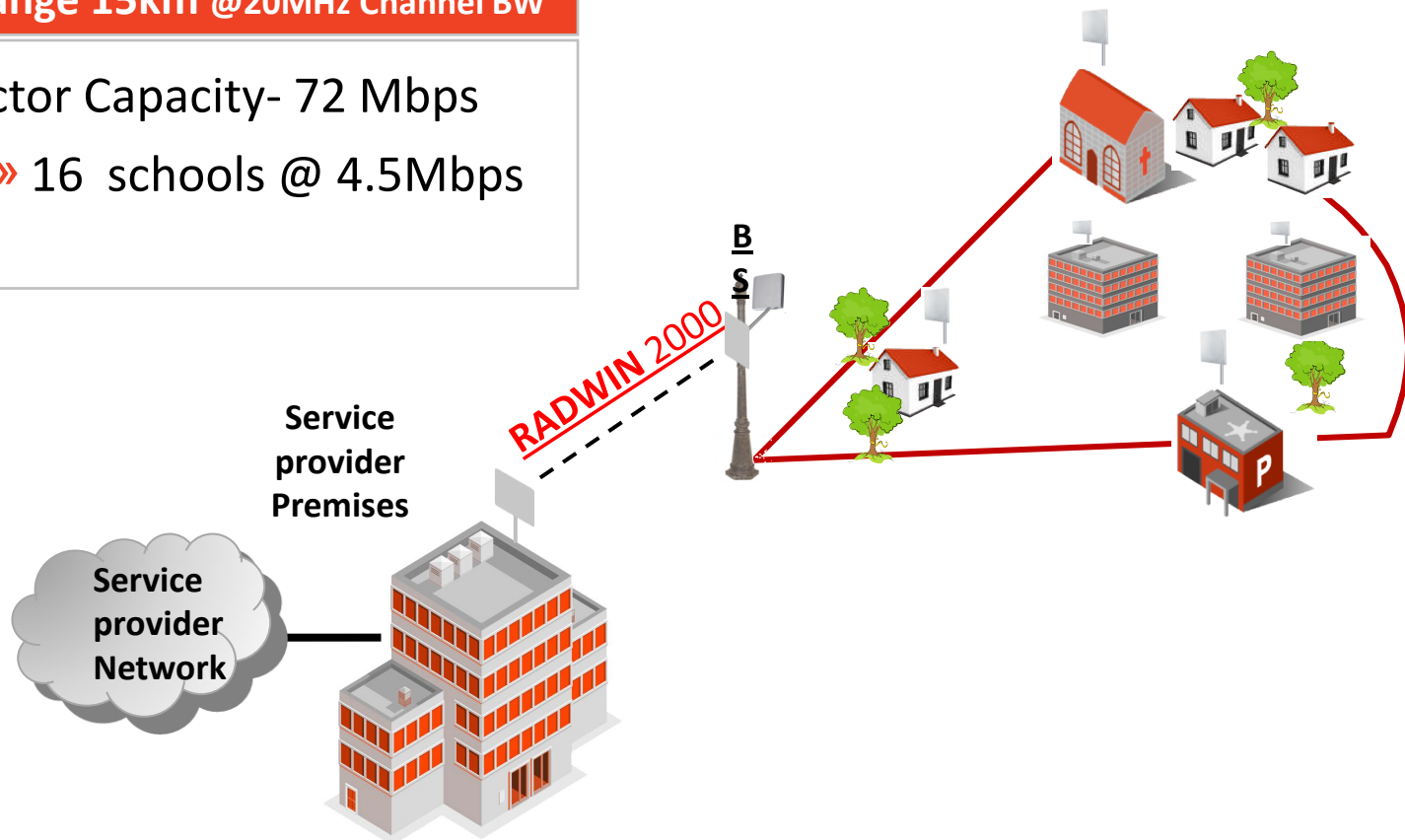
SERVICE	DEDICATED BANDWIDTH
Internet – Data Access	2 Mbps
Voice Services	0.1-0.3 Mbps
Video Surveillance	1.6-2 Mbps
Total	4 Mbps

Rural Broadband – in 3.x GHz

Broadband connection to school:

SU range 15km @20MHz Channel BW

- Sector Capacity- 72 Mbps
 - » 16 schools @ 4.5Mbps



Social connectivity

RADWIN - Resumen

- Alta capacidad en acceso inalámbrico de hasta 200 Mbps,
- Mayor eficiencia espectral; mejor uso del espectro.
- Alto rendimiento en condiciones adversas: con OFDM, MIMO y DIVERSIDAD.
- Sistema multi-banda que ofrece mayor flexibilidad de implantación.
- En seguridad: mayor cantidad de cámaras de video vigilancia; con ancho de banda dedicado.
- Conectividad: Alta capacidad y bajo costos de inversión para zonas rurales y proyectos de gobierno.

Gracias

QUESTIONS

RADWIN