

RADWIN – Telco Grade Wireless Links

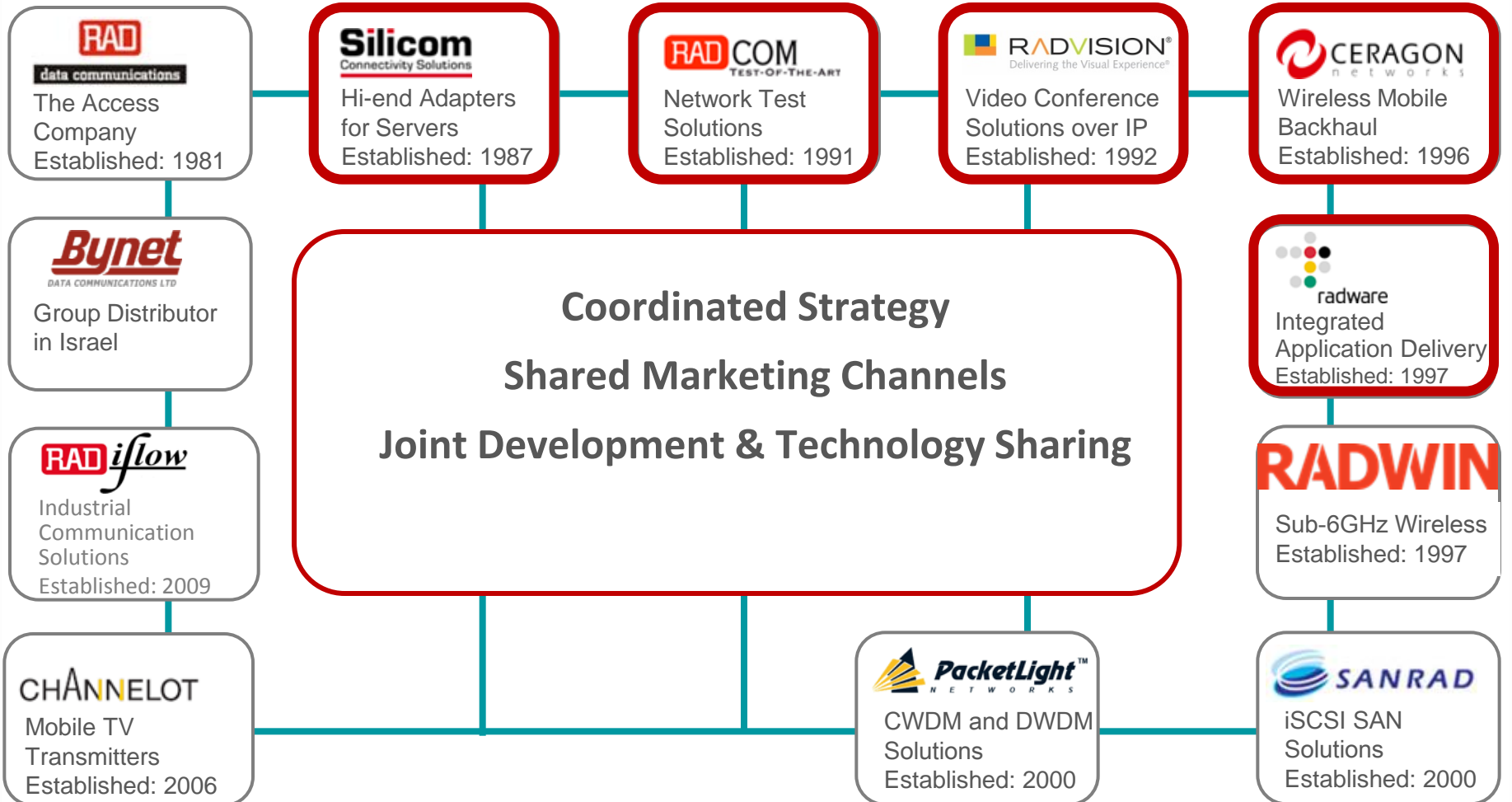
May 2013

RADWIN

RADWIN - Member of the RAD Group

No. of employees = 3,700

Group sales in 2011= \$1 Billion



RADWIN at a Glance

- Leading provider of 2-6GHz broadband outdoor wireless solutions
- Offering Telco Grade Backhaul and Access.

- *Licensed quality links in the Unlicensed & Wimax Bands*

- **Point to Point: 10 to 200Mbps net Ethernet plus 1-16 Native E1s**
- **Point to Multi-Point – Up to 250Mbps net Ethernet per Base Station**

RADWIN Target applications

- ***CCTV Projects*** – safe city, Borders

- ***Telecom operators & ISPs***
 - » IP Backhaul
 - » Access for business customers in Rural and Sub urban areas
 - » Fiber Backups
 - » Wifi Backhaul

- ***Private Networks***
 - » Government, Utilities
 - » Transportation, Education, Healthcare



RADWIN Target Applications

- **Mobile carriers**
 - » Rural cellular backhaul
 - » Near Line of site situations
 - » Temporary connections
 - » Special events
 - » Cell on wheels
 - » LTE Backhaul – In city Low visual impact
 - » Replace leased lines
 - » Femto Backhaul
- » **Military**
 - » Private networks , Border projects with Mobility



RADWIN – Telco Grade MIMO OFDM Wireless Links

Point to Point

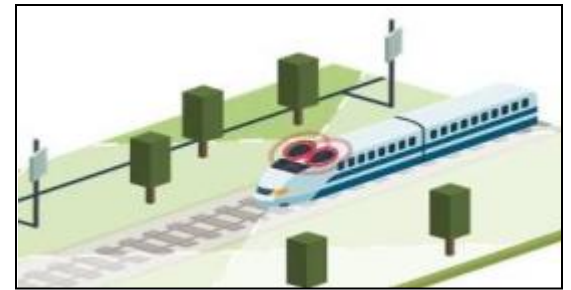
- 10- 200 Mbps Net Ethernet
- 1- 16 Native E1s
- Multi Band Radios 2-6GHz
- Long range to 120km

Point to Multi-Point

- Base Station with 250Mbps Net
- 32 Sub Units 5-100Mbps Net
- Secure SLA capacity to 30km
- 4.8-6GHz /3.3-3.8GHz /2.3-2.5GHz
2.5-2.7GHz

Mobility

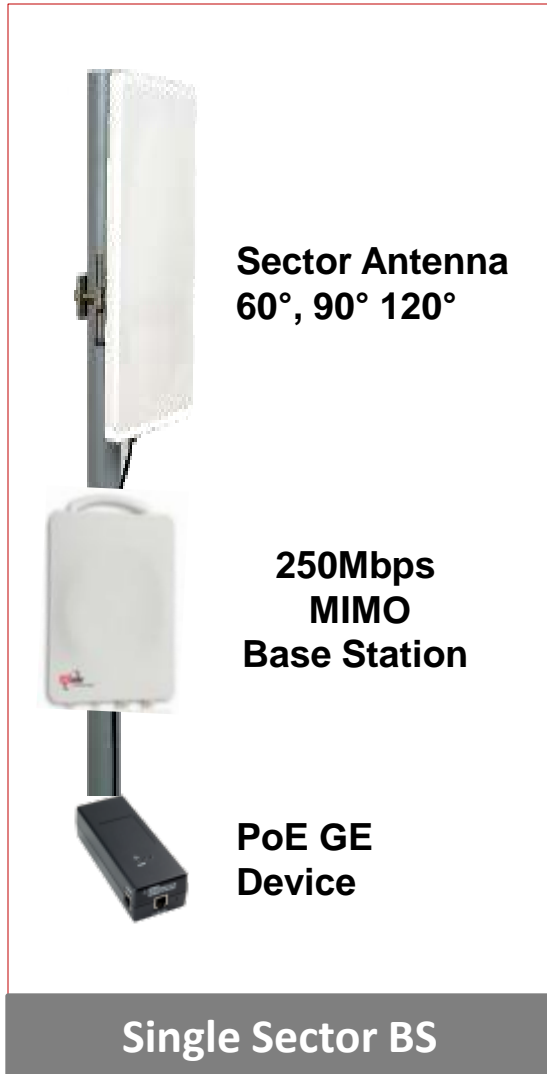
- PtMP Mobility Base Station 4.8-6GHz
- Deliver 50/100Mbps Net up to 200kmh
- Distance Between BS 2-4km
- Designed for Trains/Military/Marin



RADWIN Product Portfolio

**POINT TO MULTIPOINT RW5000
PRODUCT OFFERING**

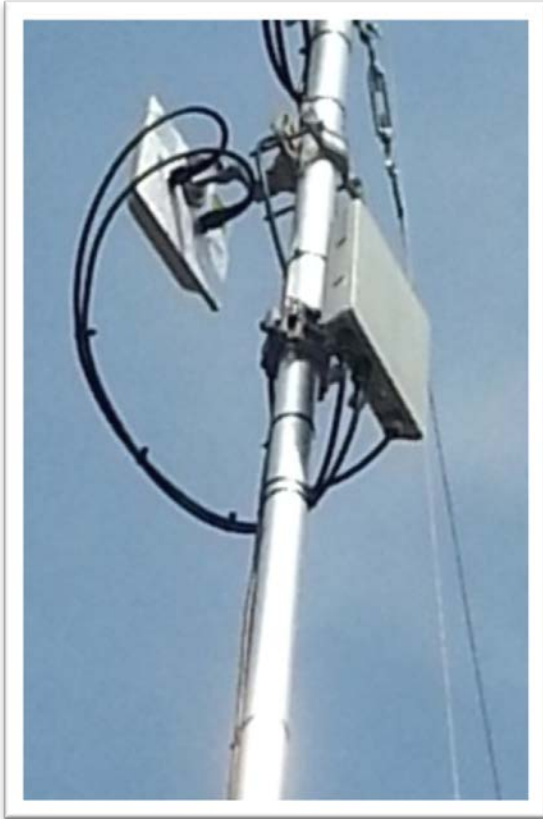
RADWIN HBS 5000 Product Line High Capacity PtMP



- **HSB 5200 MIMO Base Station**
 - » **250Mbps** Net Capacity @ 40MHz
 - » 114Mbps Net Capacity @20MHz
- **HSB 5050 MIMO Base Station**
 - » 50Mbps Net Capacity
- **Multi Band Base Stations**
 - » Universal 4.8-6GHz (5/10/20/40MHz)
 - » ETSI 5.4GHz & 5.8GHz (10/20/40MHz)
 - » ETSI & Universal 3.3-3.8GHz (5/10/20MHz)
 - » 2.3-2.5GHz & 2.5-2.7GHz



RADWIN HBS 5000 High Capacity PtMP



- **32** Subscriber Units per Base Station
- Asymmetric traffic to 90/10% in each direction
- Small form factor & fully outdoor IP67
- Designed for long range up to 30km



RADWIN HBS 5200 High Capacity PtMP

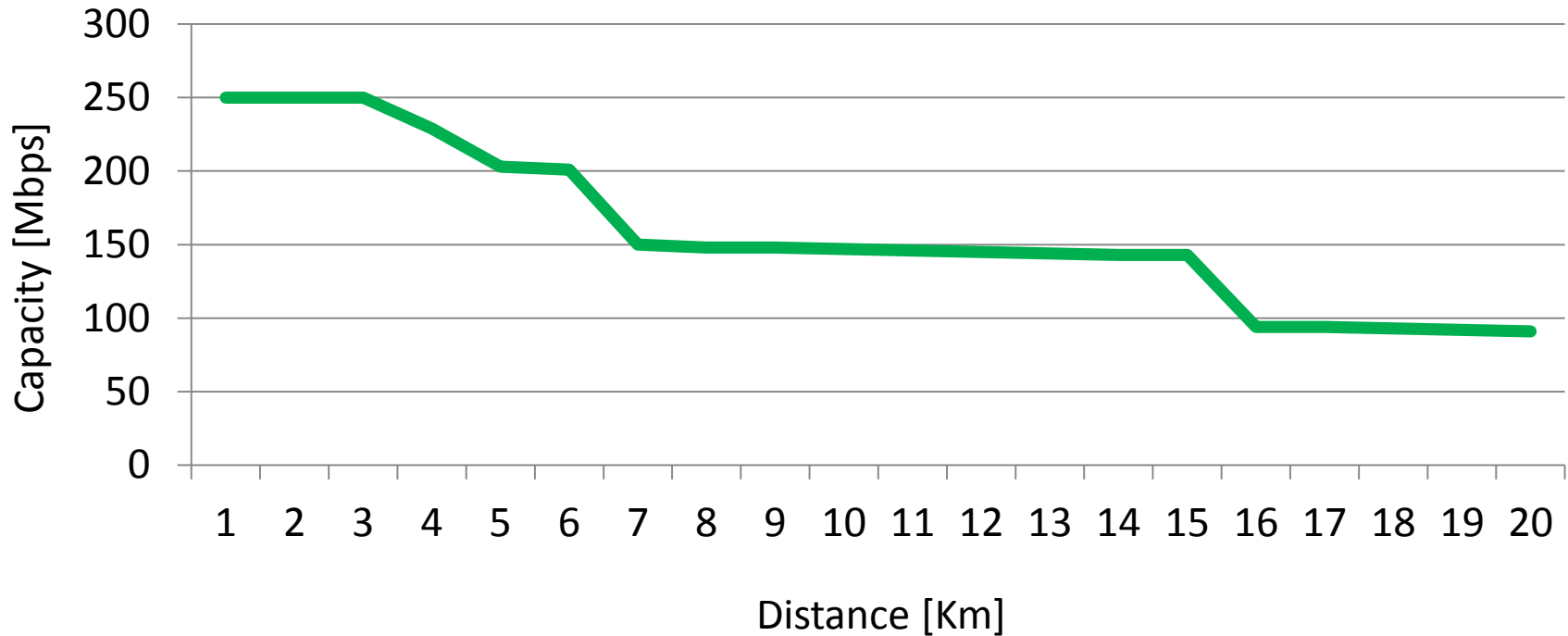


- Unique Per Subscriber Configuration
 - » MIMO or Diversity / MIR /Adaptive Modulation
- Enhanced QoS – 4 level queue per SU
- Networking features – VLAN, QinQ per SU
- Dedicated bandwidth per SU **ensuring SLA & latency**
- Low latency, min < 3msec , typical 4 to 10msec
- Channel BW – 5, 10, 20, 40 MHz



RADWIN 5000 – Highest Capacity Vs Range in the Market

Sector Capacity vs. Range



Assumptions:

- 15dBi HBS antenna
- 23dBi HSU antenna
- 40MHz Channel BW
- Adaptive rate, MiMo
- 5.x GHz Universal

Subscriber Units - HSUs 5/10/25 Mbps aggregate

- » Support 5/10/25Mbps net aggregate capacity with license upgrade
- » Connectorized & Integrated Antenna
- » 5.4 Universal & ETSI
- » Operated with PoE devices
- » Works with all RADWIN Base-stations
- » -8 to 25 dBm
- » Power consumption < 12 Watt
- » Integrated antenna 15dBi 20x20cm
good to few km

Connectorized HSU-505



Integrated HSU-505



Subscriber Units - HSUs 50 -100 Mbps aggregate



HSU550

- 50Mbps Net Aggregate Capacity
- With license to 100Mbps net aggregate
- HSU has 23dbi integrated Antenna
- Optimal for business class customers, backhaul & fiber backup

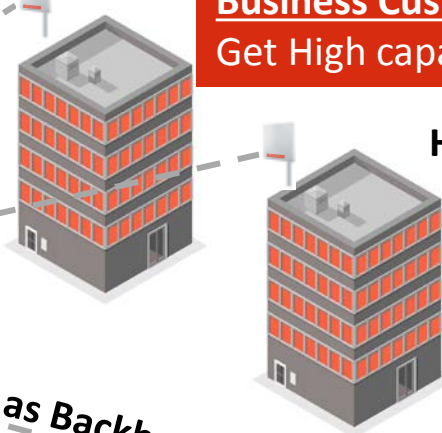


RADWIN enables ISPs to provide “Fiberclass™” wireless connectivity to Business & residential customers

**RW5200 Base Station 5GHz
250Mbps Net Capacity with
Dynamic Bandwidth Allocation**



**Business Customers
Get High capacity SLA**



HSU 50 to 100Mbps

HSU 50Mbps as Backhaul

**Low Cost, non SLA
Base station**

**Premium Residential users
Connect directly to Radwin
for SLA service**



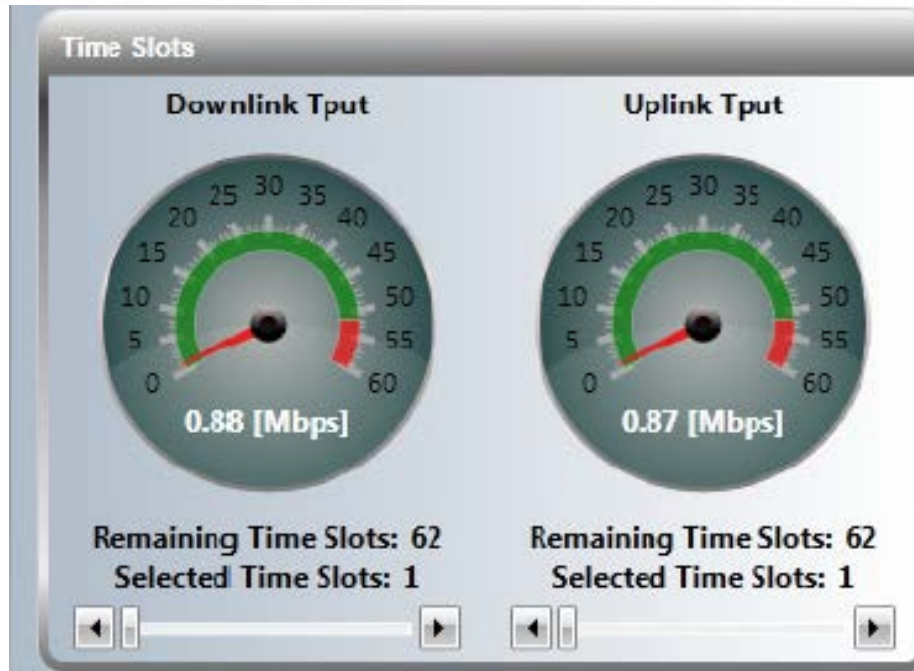
HSU 5-25Mbps



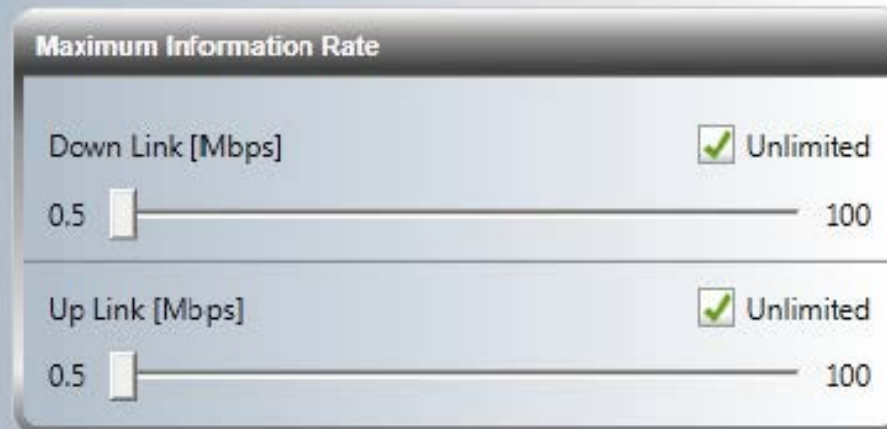
**Low cost Residential users
best effort service**

MIR and CIR Per HSU

Set CIR



Set MIR



Base station Main View

RADWIN Manager (Operator)

[Preferences](#)
[Software Upgrade](#)
[Get Diagnostics](#)
[Log Off](#)
[Help](#)
RADWIN

Sector: Bach@HBS.01

Sector ID: EBGX20061334
 Frequency: 0.700 [GHz]
 Band: 0.725-0.800 GHz FDD/C
 Channel BW: 20 [MHz]
 Status: Active
 Time Slot: UL/DL: 19% 57%

HBS: HBS.01

Product Name: RW5000/HBS/5000/FS&F...
 Antenna Type: Dual
 IP Address: 10.104.50.200
 Subnet Mask: 255.255.0.0
 Trap Destination: 0.0.0.0
 Tx Rate [%]: 50.0 / 50.0
 Rx Rate: 2.6 [Mbps]
 Tx Rate: 2.6 [Mbps]

Updates

NEW!
**Capacity
licensing for
RW5000
Subscriber Units**

HSU Filter: All

Mozart@HF...

IP: 10.104.50.2
Loc: HFU.01.02

RSS [dBm]

HBS: -66 HSU: -66

Throughput [Mbps]

Downlink: 51.7
Uplink: 50.9

Rx: 0 [Mbps] Tx: 0 [Mbps]

Brahma@H...

IP: 10.104.50.3 Level: A
Loc: HNU.01.01

RSS [dBm]

HBS: -63 HSU: -63

Throughput [Mbps]

Downlink: 26.6
Uplink: 25.5

Rx: 0 [Mbps] Tx: 0 [Mbps]

Haydn@HF...

IP: 10.104.50.1
Loc: HFU.01.01

RSS [dBm]

HBS: -65 HSU: -65

Throughput [Mbps]

Downlink: 51.7
Uplink: 50.6

Rx: 2.6 [Mbps] Tx: 2.6 [Mbps]

Name_2

IP: Level: A
Loc: Location

RSS [dBm]

HBS: HSU:

Throughput [Mbps]

Downlink:
Uplink:

Rx: [Mbps] Tx: [Mbps]

Name_3

IP: Level: B
Loc: Location

RSS [dBm]

HBS: HSU:

Throughput [Mbps]

Downlink:
Uplink:

Rx: [Mbps] Tx: [Mbps]

Name_4

IP: Level: C
Loc: Location

RSS [dBm]

HBS: HSU:

Throughput [Mbps]

Downlink:
Uplink:

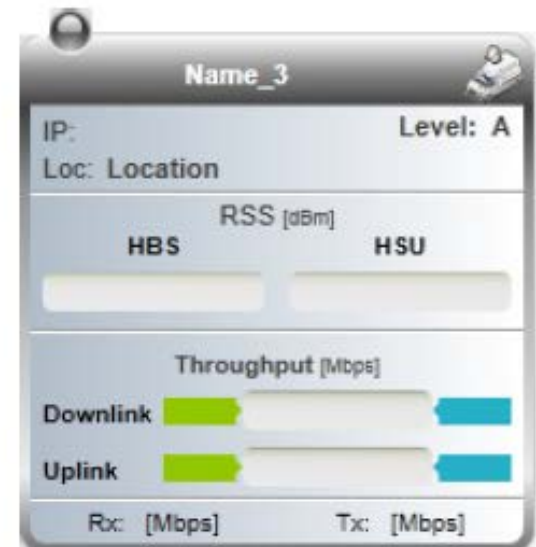
Rx: [Mbps] Tx: [Mbps]

Events Log

Number	Date & Time	Message	Trap Source	IP
000001	13/03/2013 0:23:46 AM	Connected to Bach@HBS.01.	Internal	Internal

Connection State: Available | Connection Mode: Network | IP Address: 10.104.50.200 | RADWIN 5000 | Encrypted Link

Detailed view per HSU



BS Map View

RADWIN Manager (Operator)

Preferences | Software Upgrade | Get Diagnostics | Log Off | Help | **RADWIN**

Sector: Bach@HBS.01

Sector ID: EBGX20501304
 Frequency: 5.755 [GHz]
 Band: 5.725-5.850 GHz FCC11C
 Channel BW: 20 [MHz]
 Status: Active
 Time Slots UL/DL: 10% / 57%

HBS: HBS.01

Product Name: RW5000/HBS/S200/F56F...
 Antenna Type: Dual
 IP Address: 10.104.50.200
 Subnet Mask: 255.255.0.0
 Trap Destination: 0.0.0.0
 Tx Ratio [%]: 50.0 / 50.0
 Rx Rate: 0 [Mbps]
 Tx Rate: 0 [Mbps]

Updates

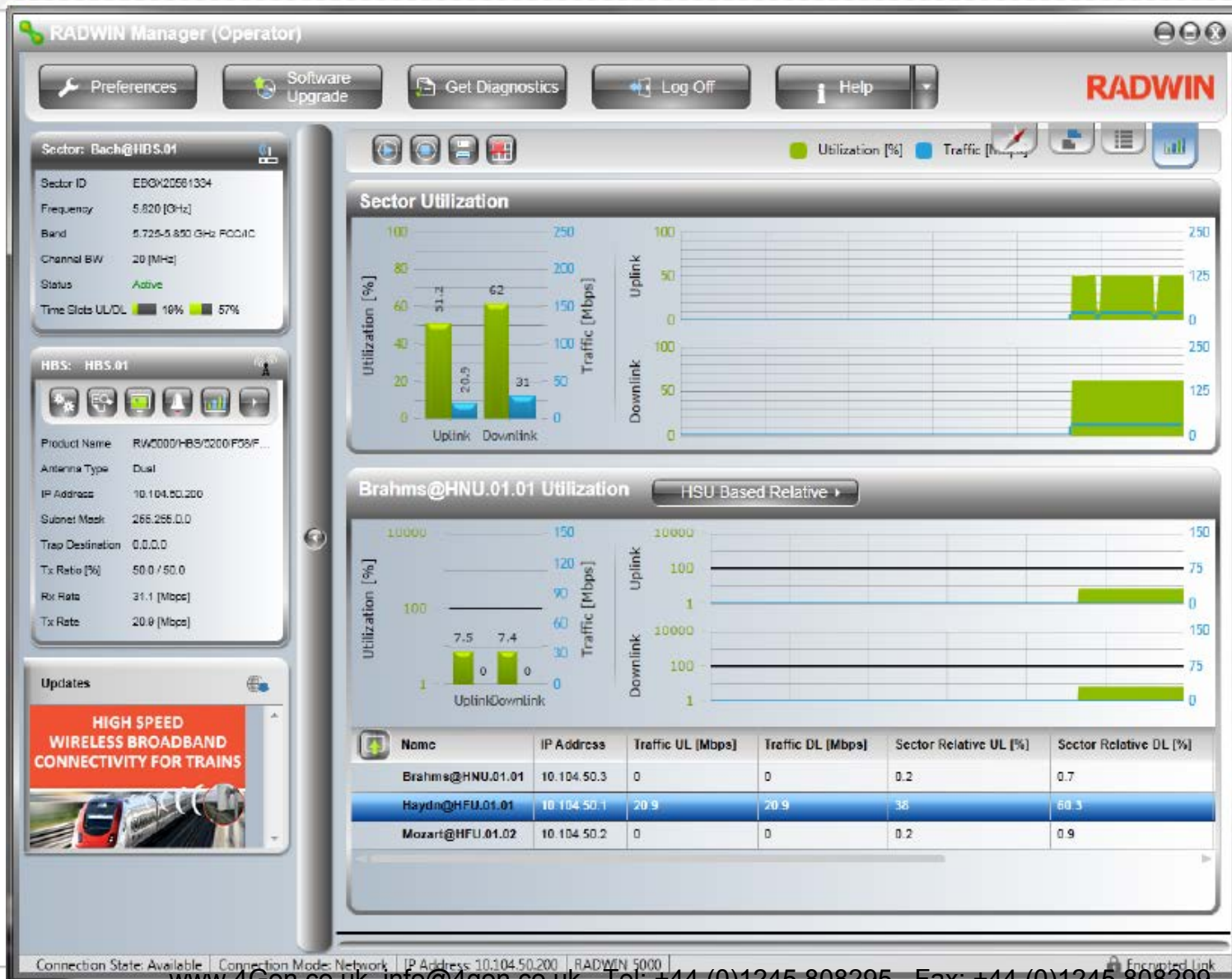
NEW! Capacity licensing for RW5000 Subscriber Units

Events Log

Number	Date & Time	Message	Trap Source	IP
000001	13/03/2013 9:23:46 AM	Connected to Bach@HBS.01.	Internal	Internal

Connection State: Available | Connected Mode: Network | IP Address: 10.104.50.200 | RADWIN 5000 | Registered Link

Utilization View



RW5000 PtMP High Capacity Designed for

- CCTV Projects with IP Cameras for safe city and Police
- Telecom & ISPs connecting business customers in Rural and Sub Urban areas



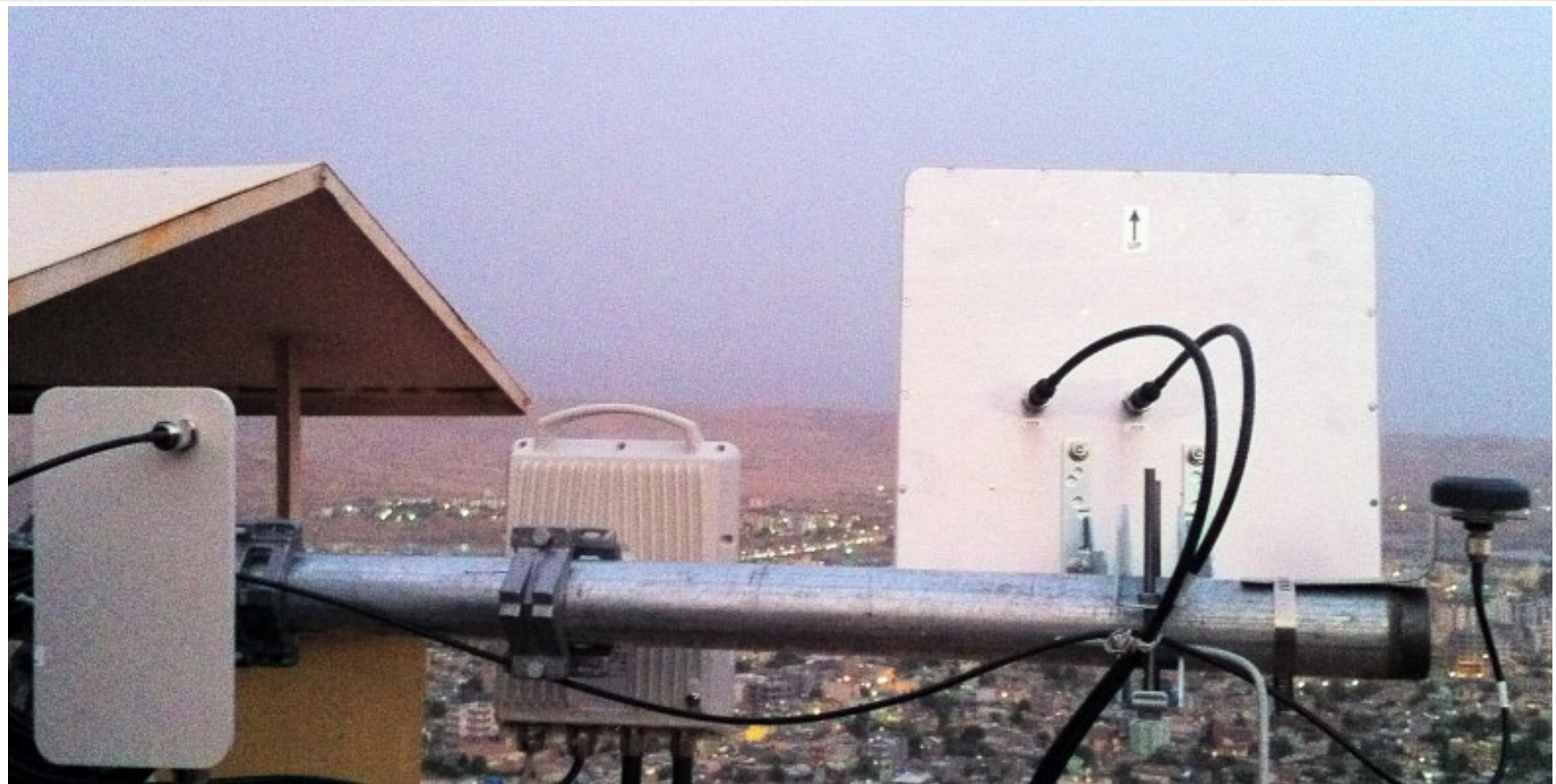
RW5000 PtMP High Capacity Designed for

- IP Backhaul :
 - » For outdoor WiFi
 - » Wimax Base stations
 - » Femto cells

- Building to Building private networks



Tower Site – example of real site installation



GSU
GPS Sync Unit

Base Station

Sector antenna

GPS antenna

RADWIN 5000 - New HSU5610

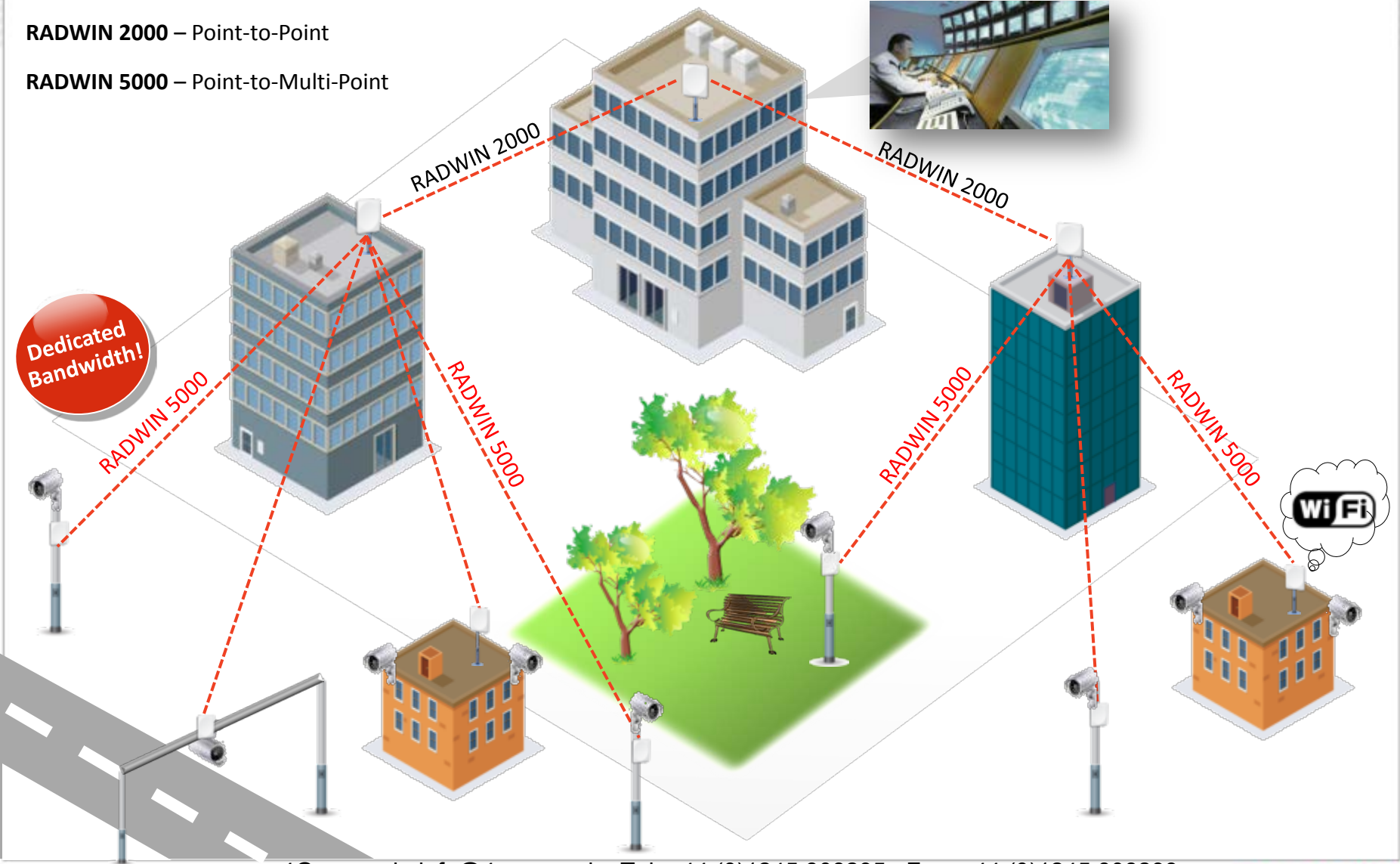
- » 10Mbps Net aggregate asymmetric capacity
- » Direct AC Power feeding and POE Port for IEEE 802.3af Cameras
- » Connect an IP Camera directly to the HSU subscriber unit
- » Save cabling, POEs, external connecting box



RADWIN Solutions for Safe City

RADWIN 2000 – Point-to-Point

RADWIN 5000 – Point-to-Multi-Point

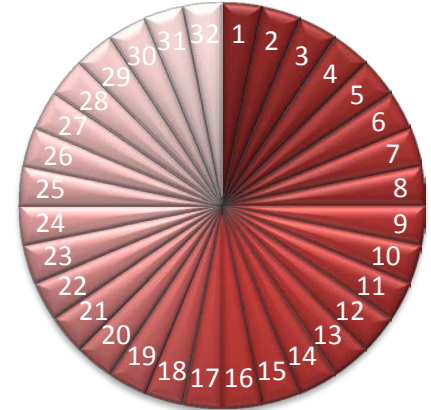


Subscriber Sites – examples of real site installation



RADWIN PtMP Differentiators

- Superior Image quality, guaranteed via **dedicated bandwidth per camera site**
- **Fixed** and low latency for zero video “hiccups”
- Robust Performance in dense urban areas with None Line of Sight
- Outstanding Interference mitigation in unlicensed frequency bands



Time Slot Allocation Per Camera Site



Case Study: The 2012 African Cup Championship Games

- **Customer:** Government of Gabon
- **Project:**
 - » Secure the African Cup of nations football championship games
 - » Provide high capacity connectivity to multiple cameras spread in 45 sites including stadiums, main junctions and access roads



Case Study: The 2012 African Cup Championship Games

Requirements:

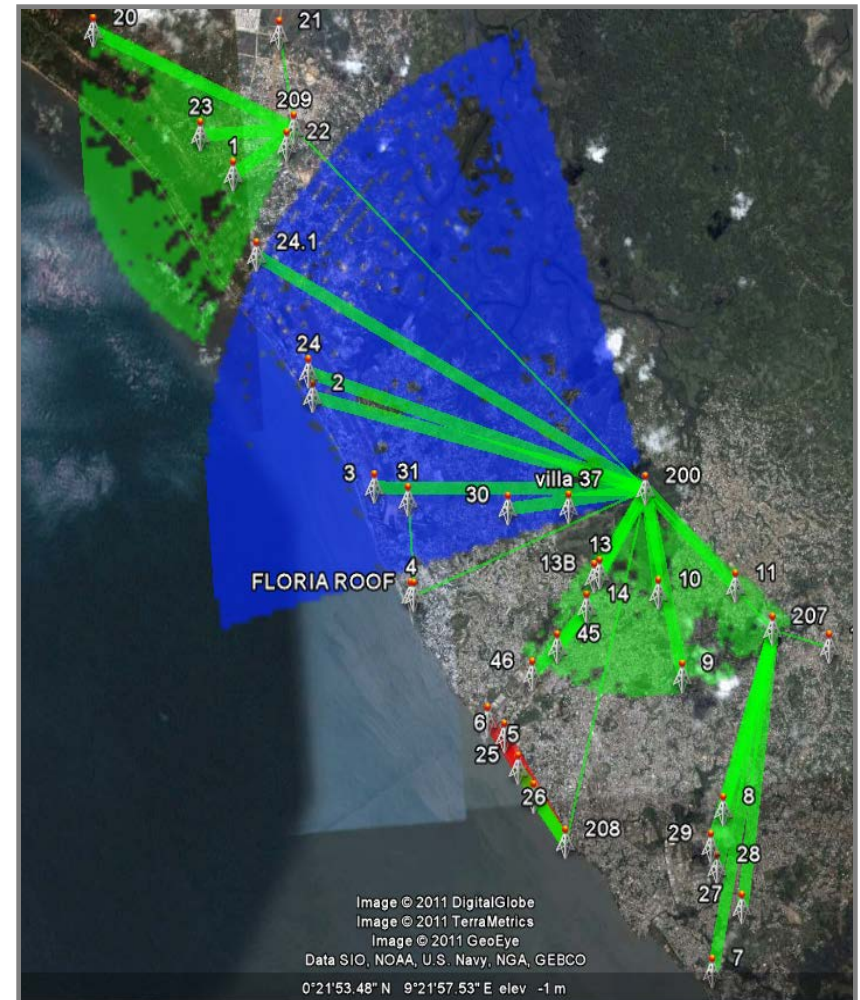
- 10Mbps per site
- At least 1 PTZ and 2 Fixed cameras per site
- Limited frequencies at 3.5GHz, 5.9GHz
- Backhaul to Control Center
- Provide full planning
- Remote support during installations



Case Study: The 2012 African Cup Championship Games

RADWIN Solution:

- 6 RW5000 Base Station sectors to cover ALL sites
- RADWIN 2000 for backhaul to Command Center and additional sites connectivity
- 3 Base Stations used 12deg antennas
- Minimum of 99.999% availability
- 92% Uplink, 8% Downlink



Case Study: The 2012 African Cup Championship Games

4 Cameras (3 Fixed, 1 PTZ) – 12Mbps by HSU 520



3 Cameras (2 Fixed, 1 PTZ) – 10 Mbps by HSU 520



Real Time Video Monitoring at Control Center



High Capacity connectivity to Stadium Cameras



RADWIN Product Portfolio

POINT TO POINT PRODUCT OFFERING



RADWIN 2000 C - High Capacity IP & TDM Backhaul

- **200 Mbps** net aggregate throughput at 40MHz
- Asymmetric Automatic up to 184/16Mbps
- Multi Band Radios
 - » **4.8-6GHz, 3.4-3.8GHz & ETSI 5.4/5.8GHz**
- 5/10/20/40 MHz channel bandwidth
- QoS 4 queues 802.1p & Diffserv
- 10/100/1000 Ethernet interface
- High Processing Power for Triple Play Support – 148,000 VOIP PPS
- Native TDM 1- 16 E1s + Ethernet
- Web based NMS – for easy access and control
- Optimized for high capacity IP backhaul applications



RADWIN 2000 C - 2 ODU Models available

- **ODU INT - with flat panel Integrated Antenna MIMO 23dbi 37x37cm**
 - » Recommended to use for the following distances at 99.99 availability and LOS
 - 5km in ETSI 5.4GHz 30dBi EIRP
 - 7km in ETSI 5.8GHz 36dBi EIRP
 - 10km in Universal Mode 48dBi EIRP
- For other cases such as 99.999 or other conditions, pls check the Radwin LBC Link Budget at www.radwin.com/planner



RADWIN 2000 C - 2 ODU Models available

- **ODU EXT - Connected to a dish 60cm 28dBi dual Pole**
- To be used up to the following distances at 99.99 availability and LOS
- From 5km to 8km in ETSI 5.4GHz 30dBi EIRP
- From 7km to 12km in ETSI 5.8GHz 36dBi EIRP
- From 10km to 20km in Universal Mode 53dBi EIRP



RADWIN 2000 C - 2 ODU Models available

- **ODU EXT - Connected to a dish 90cm 32dBi dual pole**
- To be used up to the following distances at 99.99 availability and LOS
- From 8km to 15km in ETSI 5.4GHz 30dBi EIRP
- From 12km to 20km in ETSI 5.8GHz 36dBi EIRP
- From 20km to 70km in Universal Mode 53dBi EIRP
 - » Max distance is 120km



RADWIN 2000 B

Medium Capacity & Great Price for IP Backhaul

- **50 Mbps** net aggregate throughput
 - » Asymmetric Automatic to 5/45Mbps
- Multi Band Radios **4.8-6GHz**, & **ETSI 5.4/5.8GHz**
- 5/10/20 MHz channel bandwidth



2 Models available

- 1: ODU with 15dbi embedded antenna for use up to 3km
 - » ODU also have connectorized in the same ODU
- 2: ODU with INT 23dBi antenna



RW 2000A PTP New ! Low Visual Impact - MIMO Link

» 2 Models available:

- 10Mbps Aggregate Net Capacity
- 25Mbps Aggregate Net Capacity
- License capacity from 10 to 25Mbps



- Very Small Form Factor
- Comply with RADWIN 2000 features (except of HSS)
- Radio mode: MIMO / Single / Diversity
 - » **Max net capacity remains in all modes !!!**
- Optimal performance in short distance NLOS
- Support 5/10/20 MHz channel BW
- ODU EXT and ODU INT with 15.5dBI antenna available
- Compatible with IDU-C/E and PoEs



RADWIN 2000X

3GHz PTP link

- **20Mbps** Aggregate Capacity
- Asymmetric Automatic
- Multi Band Radio 3.4-3.8GHz
- 5MHz channel bandwidth
- 10/100 Ethernet interface
- Optimized for Cellular Backhaul



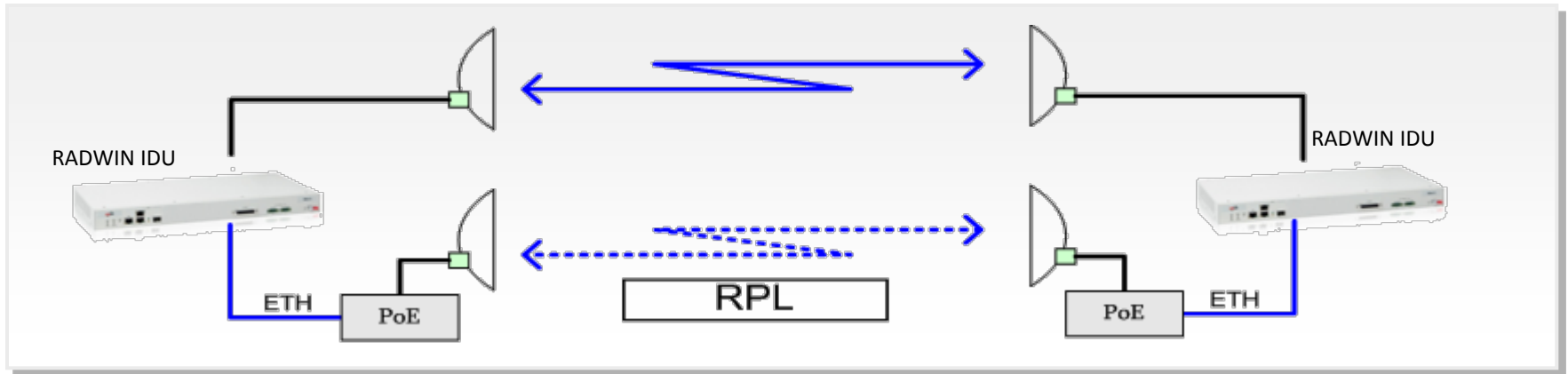
All RADWIN 2000 (C/B/L/X) PTP Links Support

- Robust Telco Grade RADWIN designed MIMO OFDM Radios
- Multi Band ODUs
- HSS and GPS ODU Sync to prevent cross interference
- Long range operation to 120km
- Low and Stable latency of 2-3msec
- Spectrum Viewer
- 128 AES bit encryption in hardware



All RADWIN 2000 (C/B/L/) PTP Links Support

- Support 1+1 for Ethernet or E1s and Ring Topology



- Low Power consumption 13-35watts
- Diversity mode for nLOS and highly interfered area
- Adaptive Modulation with 8 Levels BPSK to 64 QAM
- Max Tx Power 25dbi
- Small Footprint and low weight (ODU Radio 1.8Kg / 19x27cm)

All RADWIN 2000 (C/B/L/) PTP Links Support

- Immunity to Interference
- Optimized TCP algorithm
- Comply to IP67 for extreme weather
- Non-interrupted Transmission
- Quick and simple Installation via Intuitive GUI



All RADWIN 2000 (C/B/L/) PTP Links Support

- Operate at nLOS conditions

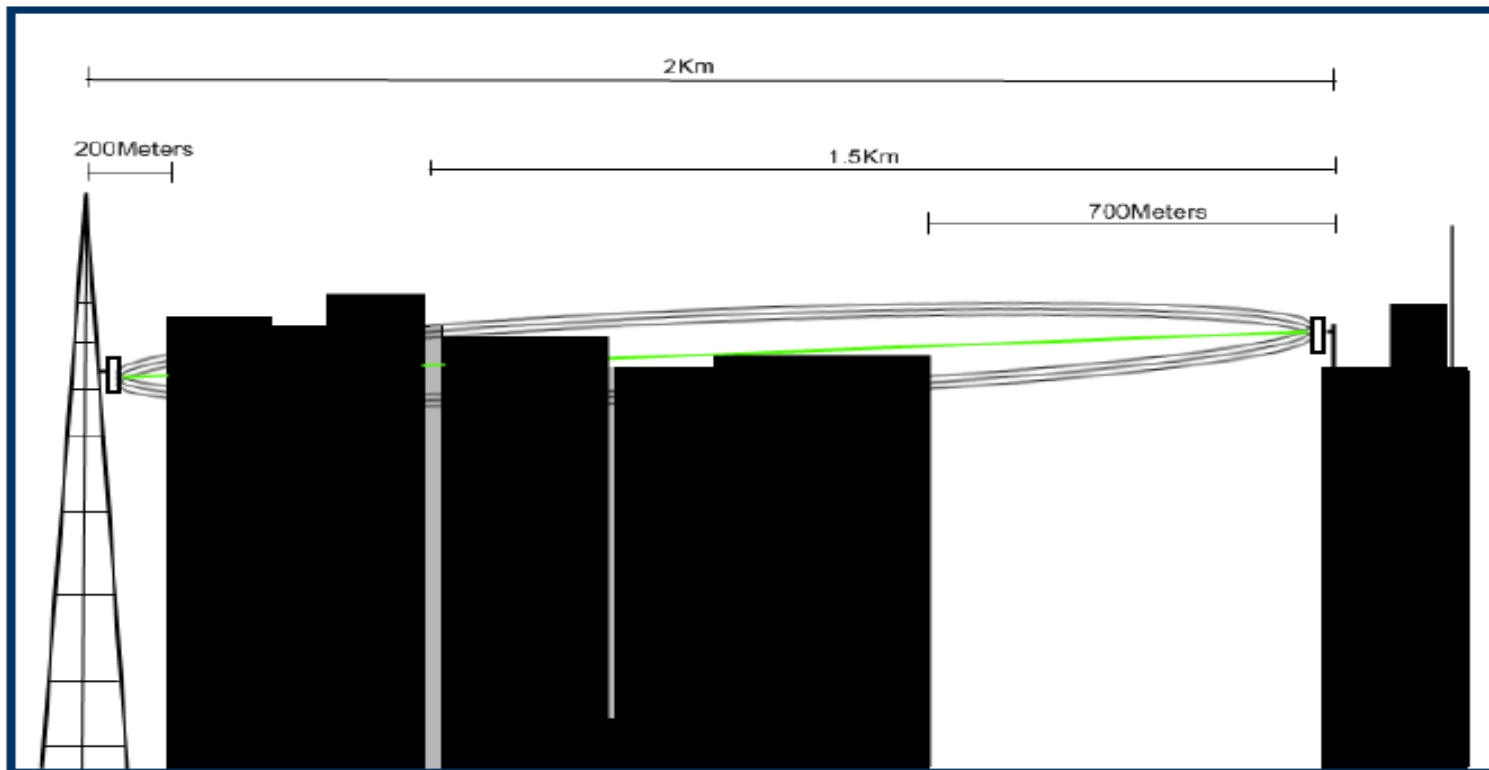


Figure 36 Link path sketch

POE

- GB and FE supported in the same model
- POE can work with ALL Radwin Radios



P/N	Product Description
RW-9921-1011	AC 220V EU Plug POE

IDU-C

- ✓ Telco Grade Indoor Unit 19" 1U
- ✓ Dual Power Supply with redundancy
- ✓ 2 GB Ethernet Ports / Native TDM E1s / SFP Port
- ✓ Independent clock per TDM port
- ✓ VLAN/QinQ,
- ✓ 1+1 Ethernet redundancy
- ✓ Ring topology
- ✓ -20 to -60V DC or 220V AC
- ✓ Dry contacts for Alarms



4 Models

- Ethernet Only
- Ethernet + 4E1
- Ethernet + 8E1
- Ethernet + 16E1

IDU-E

- ✓ 2 Ethernet Ports / 2 E1 Ports
- ✓ 9.5 inch / 24cm
- ✓ 1+1 Ethernet redundancy
- ✓ Ring topology
- ✓ VLAN/QinQ
- ✓ Single power supply
- ✓ Independent clock per TDM port



2 Models

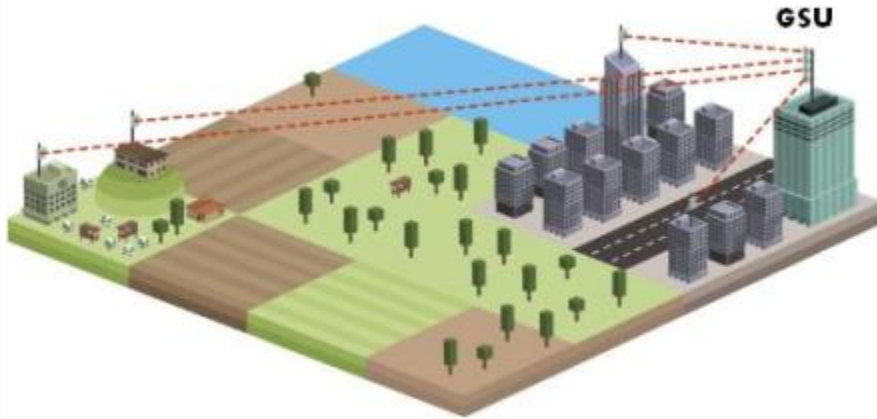
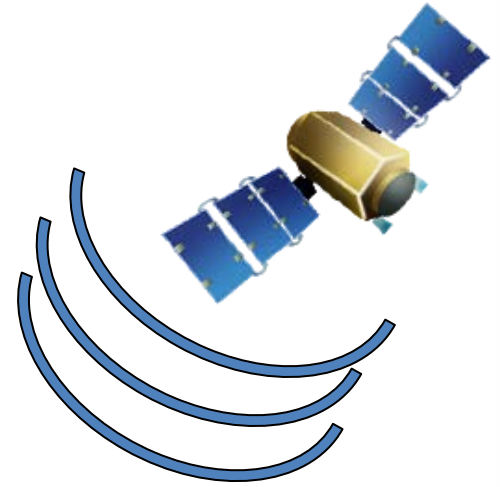
Ethernet Only

Ethernet + 2E1

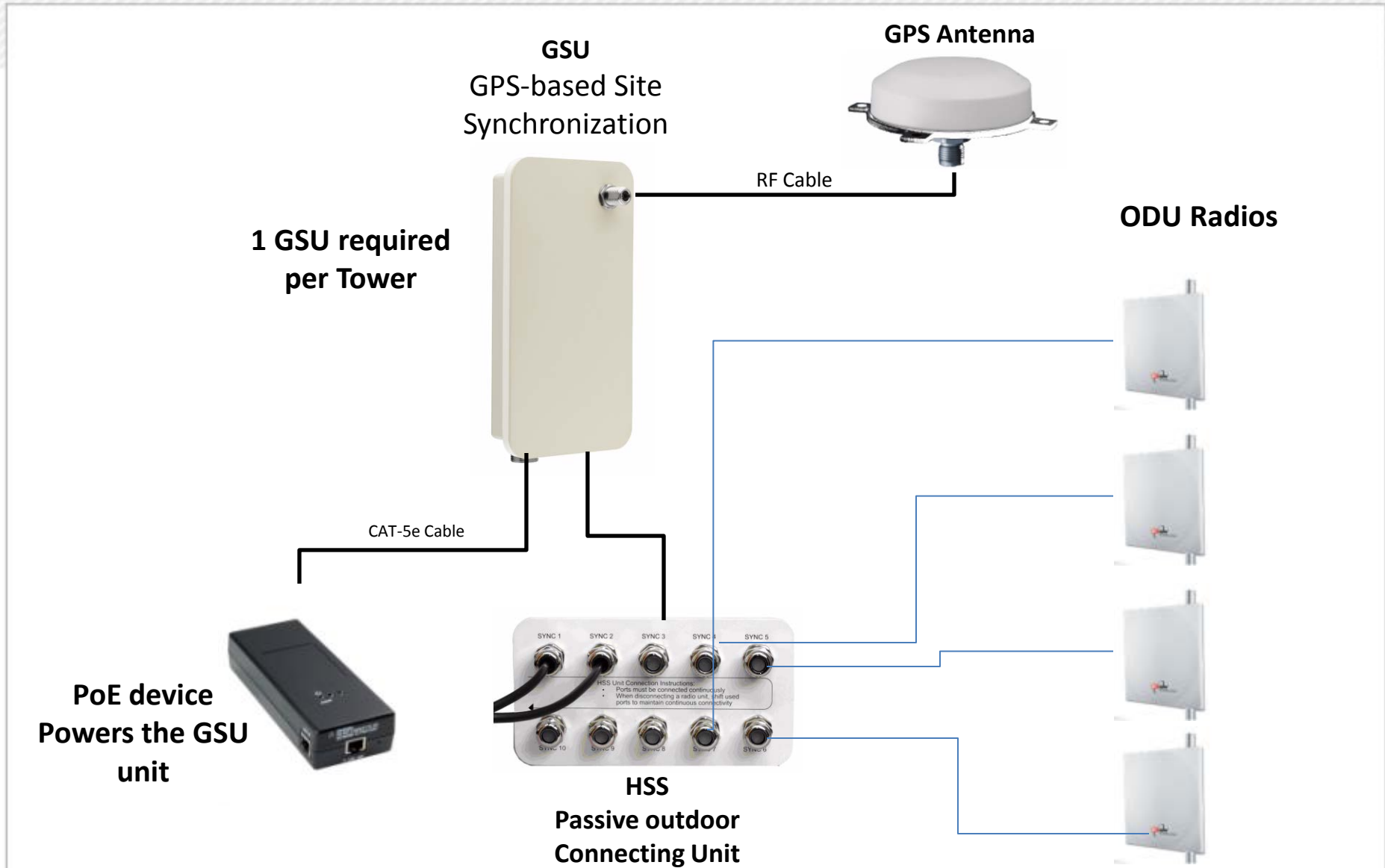
ELIMINATING CROSS INTERFERENCE

ALL RADWN RADIOS PTP & PTMP CAN BE SYNC

RADWIN Eliminates Link Interference Via GPS Synchronization of Multiple Towers

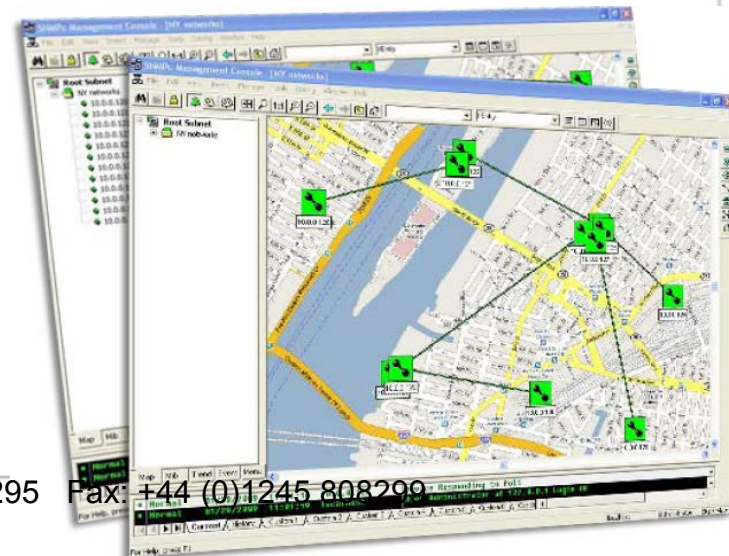


GPS Tower synchronization



RNMS – RADWIN's Network Manger

- Comprehensive and easy to use NMS for RADWIN's networks.
- Designed for service providers and carrier NOCs
- Basic Package – Manage up to 1000 Radios
- Premium Package – Manage up to 25,000 Radios
- Event monitoring, Performance monitoring, Trend reports and more
- Switches to RADWIN Manager by clicking the network icon
- Quick access to the inventory information of RADWIN links



About
RADWIN

www.4Gon.co.uk info@4gon.co.uk Tel: +44 (0)1245 808295

PtP

PtMP

RNMS

Summary

Fax: +44 (0)1245 808290

New Lightning Protector

- Accessories – New RADWIN Lightning Protector:

P/N	Product Description
RW-9924-0006	Outdoor Lightning Protection Unit for 10/100/1000Base-T
RW-9924-0007	Kit of 10 Outdoor Lightning Protection

- » Main capabilities:

- Support 10/100/1000 Base T
- Support up to 1000Mb
- Fully outdoor - IP67
- Small form factor and easy installation
- Protection towards high current spikes



New Cable Extender



» Main capabilities:

- Extend ODU to POE/IDU cable to 200meters
- Support FE

P/N	Product Description
RW-9924-0008	Cable Extender to 200meters, connect between 2 x 100meter cables