

The RADWIN logo is located in the top right corner of the slide. It consists of the word "RADWIN" in white, bold, uppercase letters, set against a red rectangular background. The background of the slide features a light gray diagonal line pattern and a blue and gray geometric design on the right side.

# RADWIN Wireless Solutions For Carriers

March 2015

## THE WIRELESS CONNECTIVITY CHOICE



# Agenda

RADWIN  
Introduction

RADWIN  
Portfolio

Carrier  
Applications



# RADWIN

Leading provider of broadband wireless solutions

Part of RAD Group

18 Regional offices worldwide

Deployments in over 150 countries

**RADWIN**



# RADWIN Target Segments:

Service Providers - Access & Backhaul

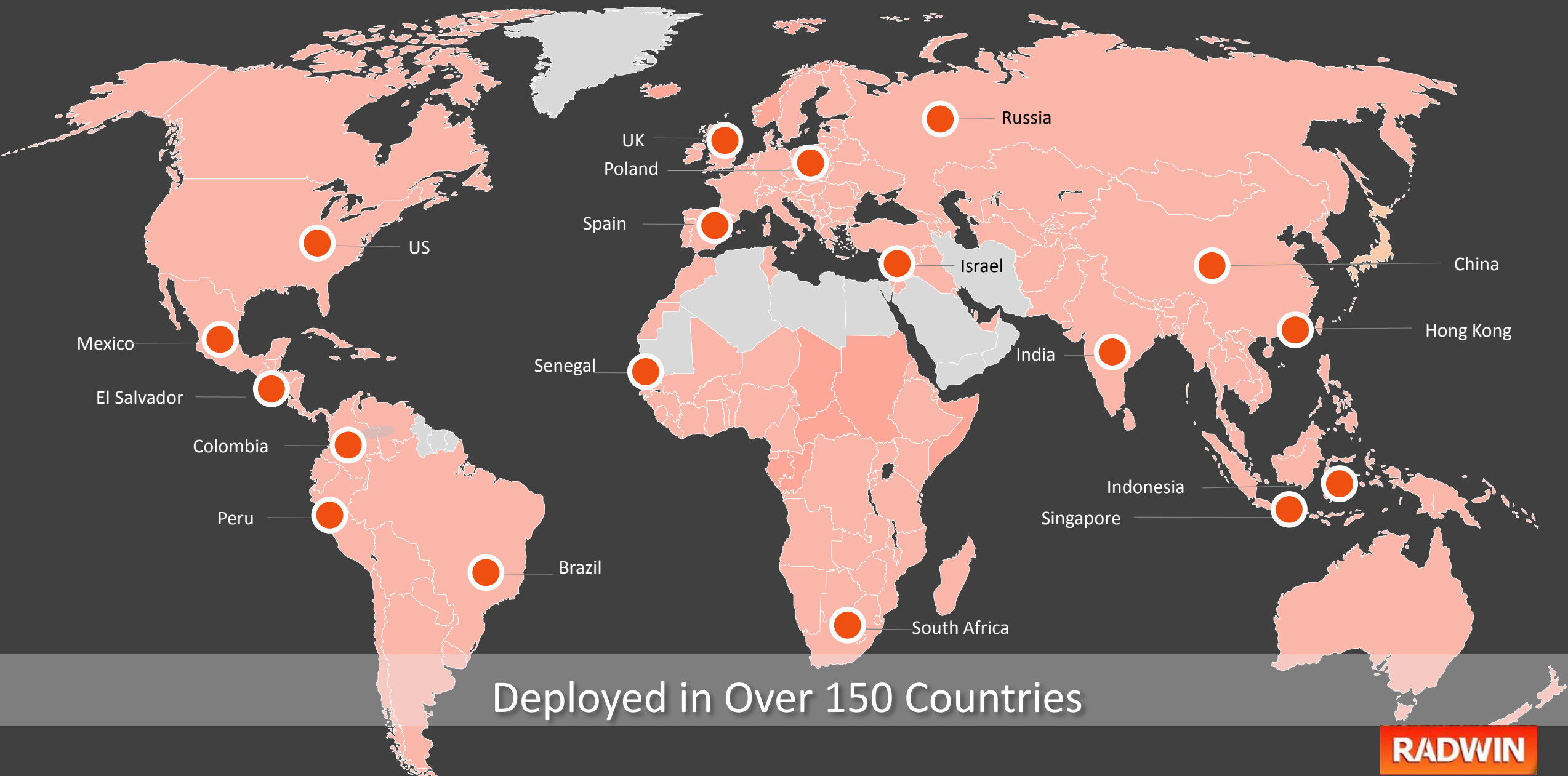
Cellular Operators – NLOS Small Cell Backhaul

Transportation

Security & Surveillance

Energy

**RADWIN**



Deployed in Over 150 Countries





# Offering



Point-to-Point  
*RADWIN 2000*



Point-to-MultiPoint  
*RADWIN 5000 JET*



Mobility  
FiberinMotion



Network Planner



Management



# RADWIN Solutions for Service Providers

Enterprise Access



High end residential access



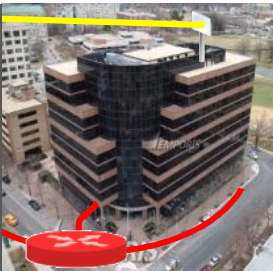
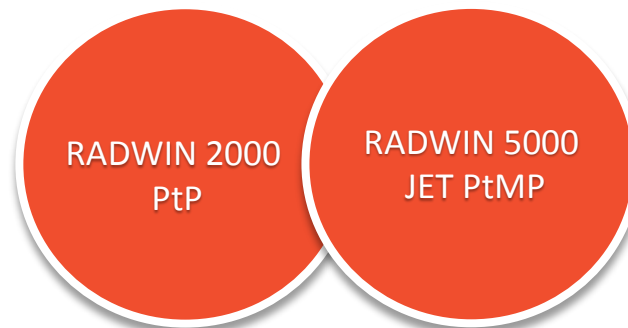
Multi Tenant Building backhaul




Public Government access



Fiber backup


WiFi AP Backhaul



Fiber Network extension



Cellular Backhaul



NLOS 3G/4G Small cell backhaul






# RADWIN Sub 6Ghz Technology Adopted by Tier 1 Carriers







# North American Service Providers using RADWIN



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## RADWIN Product Offering

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## RADWIN 2000 - Point-to-Point

- 10 to 750 Mbps
- 16 E1s/T1s and Ethernet
- Long range (120Km)
- Network protection
- Multi-band Radio: 2.3-2.7GHz, 3.3-3.8/3.65 GHz and 4.4-6.4GHz
- OFDM, MIMO, Antenna Diversity
- Easy to install

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# RADWIN 2000 Portfolio

Product Series	Max. Aggregate Throughput	Band (GHz)	Capacity upgrade	Target Applications
D+	750Mbps	5.1-5.8		IP backhaul
C+	250Mbps	4.9, 3.3-3.8/3.65		
C	200Mbps + 16 E1s/T1s	2.3-2.4, 2.5-2.7 3.3-3.8, 4.3-5.0, 4.9-6.0 5.7-6.4		IP+TDM Backhaul
B	*200Mbps + 8E1 /T1 *100Mbps + 8 E1s/T1s 50 Mbps + 8 E1s/T1s	4.9-6.0, 2.3-2.4	Capacity upgrade for Ethernet ONLY	IP +TDM
A	50Mbps + 8 E1s/T1s	4.9-5.9	Capacity upgrade for Ethernet ONLY	Access + Backhaul
	25Mbps + 4 E1s/T1s	4.9-5.9		
	10Mbps +2 E1/T1	4.9-5.9		

\*Via license key



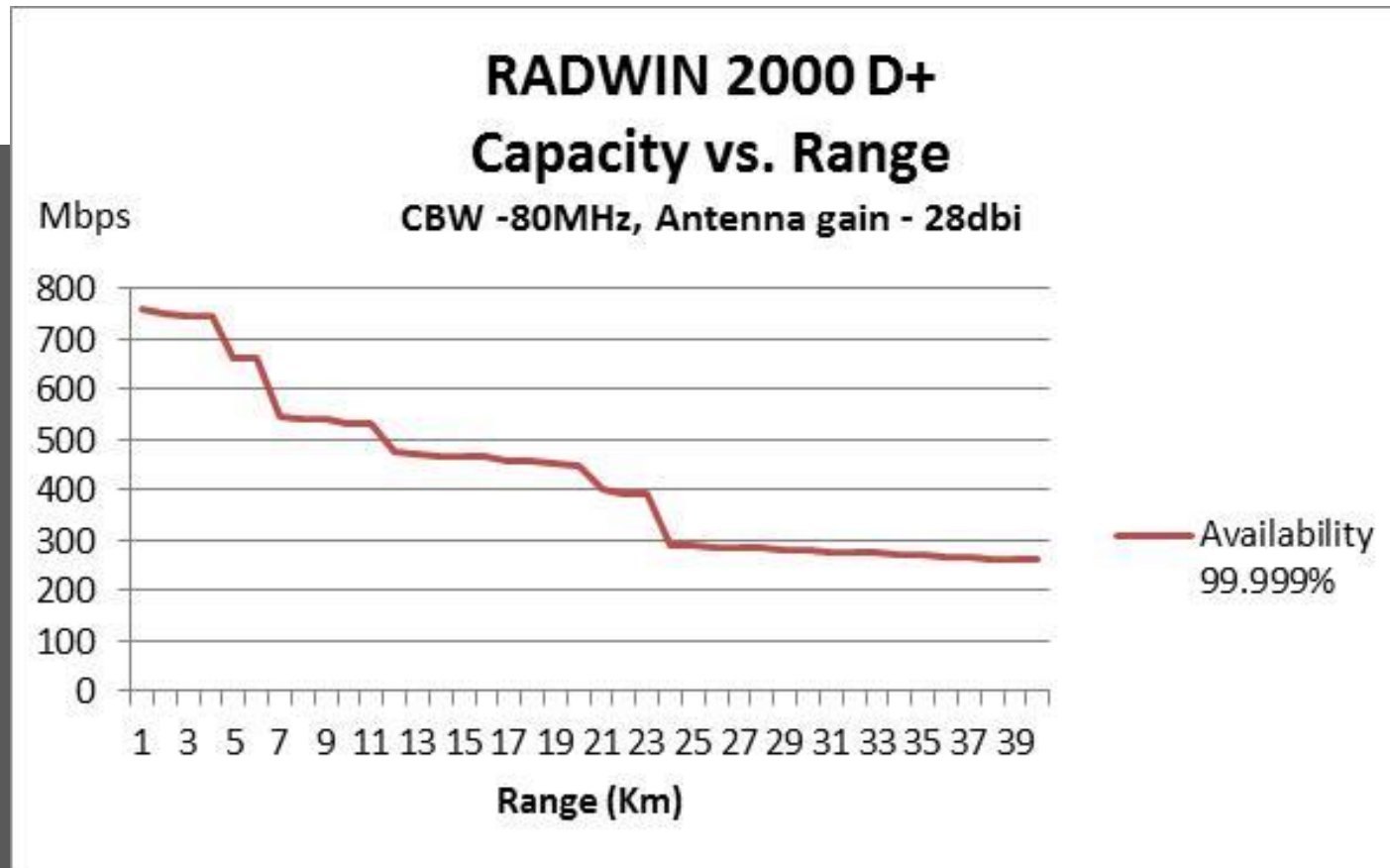
NEW

# RADWIN 2000 D+ Series

- Next Generation PtP for high capacity backhaul
  - 750Mbps @ 80MHz
  - 350Mbps @ 40MHz
  - MIMO 2x2 , 256QAM
  - Dynamic Channel BW (D-CBS) to assure highest capacity
- Connectorized / Integrated antenna
- Coexist with RADWIN 2000 legacy
- Incorporate the powerful RADWIN 2000 family air-interface to best address interference and multipath.
- 5.1 -5.8GHz FCC (5.3, 5.4 FCC grant @May/15)
- 5.4-5.8GHz ETSI
- Available in 30/1 /2015



# RADWIN 2000 D+ Series – Capacity Vs. Range





## RADWIN 2000 – Main Differentiators

- 10 to 750Mbps
- Ethernet & Native TDM
- Pay as you grow
- Outstanding interference mitigation
- Collocation – Save tower space, increase capacity
- Best and proven NLOS operation
- Multi-Band radio ensuring maximum radio planning flexibility

## RADWIN 5000 JET – Point-to-MultiPoint

- Base station with smart beamforming antenna
- Up to 250 Mbps per sector, 1 Gbps per cell
- Guaranteed SLA per end-user
- TDD network synchronization for greater radio capacity
- Long range – 40 Km / 25 miles
- Subscriber units – 10, 25, 50 Mbps, upgradeable to 100 Mbps
- Pay as you grow Subscriber units
- Backward compatible with RADWIN 5000 worldwide install base
- 3.3-3.8 / 3.65 GHz or 5.1-6.0 GHz in the same unit



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# RADWIN 5000 JET – Multi Service Platform

Based on Beamforming and a unique interference rejection technique  
Addressing comprehensive requirements for best-of-breed access, backhaul  
and NLOS Small Cell-Backhaul connectivity



Access Connectivity



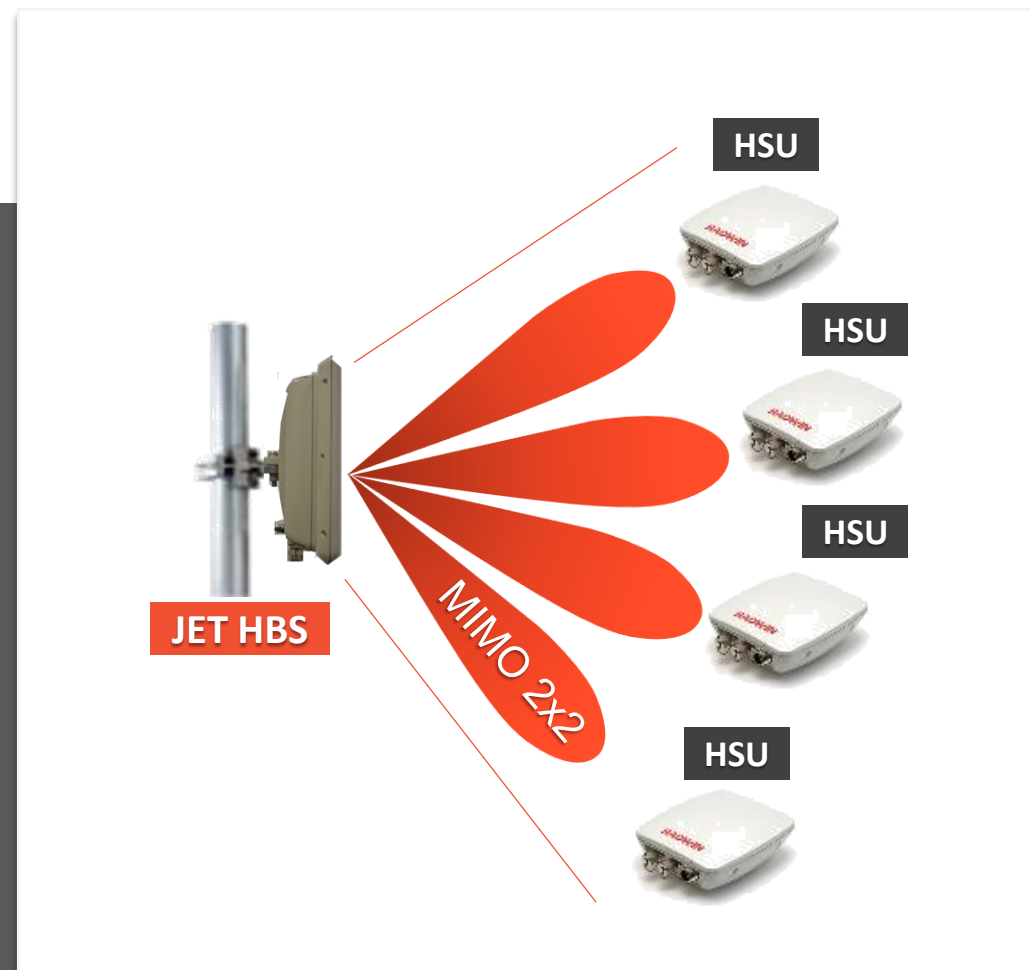
LTE Small Cells Backhaul



# RADWIN 5000 JET - Smart Beamforming Solution



- 250Mbps Base Station with Beamforming antenna
  - Remote units- existing RADWIN 5000 HSU 10 to 100Mbps





# Beamforming Benefits

- High sector capacity due to high system gain
- Interference immunity similar to PtP
- High frequency reuse – Spectrum efficiency
- Excellent nLOS/ NLOS

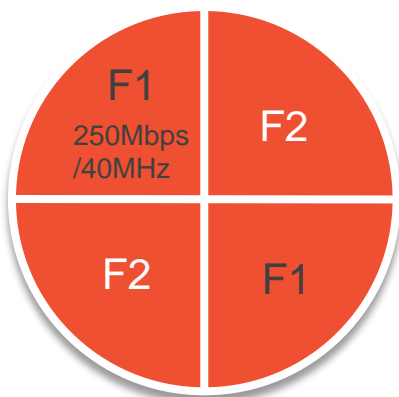
- Ideal for operation in
  - Heavily congested unlicensed bands
  - Licensed bands that lack available spectrum





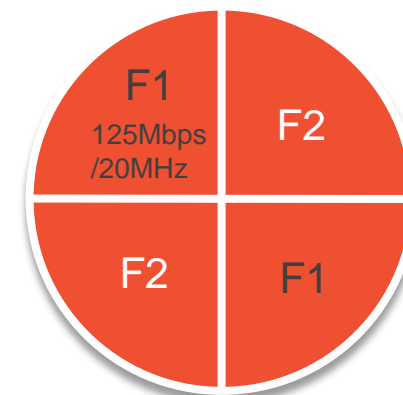
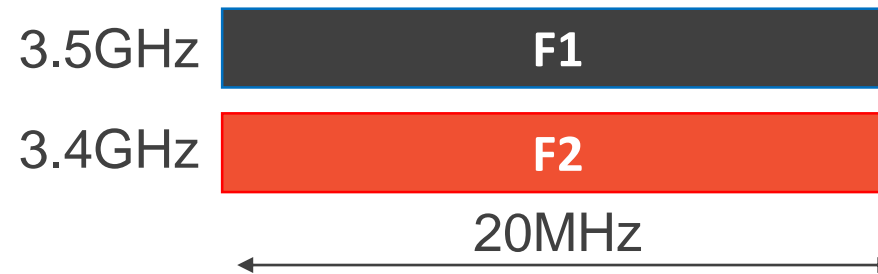
# RADWIN 5000 JET Cell Capacity

## 5.X GHz cell capacity



- 250Mbps / Sector
- **1Gbps / site over 2 x 40MHz**
- 128 users (250 in Q2/15)

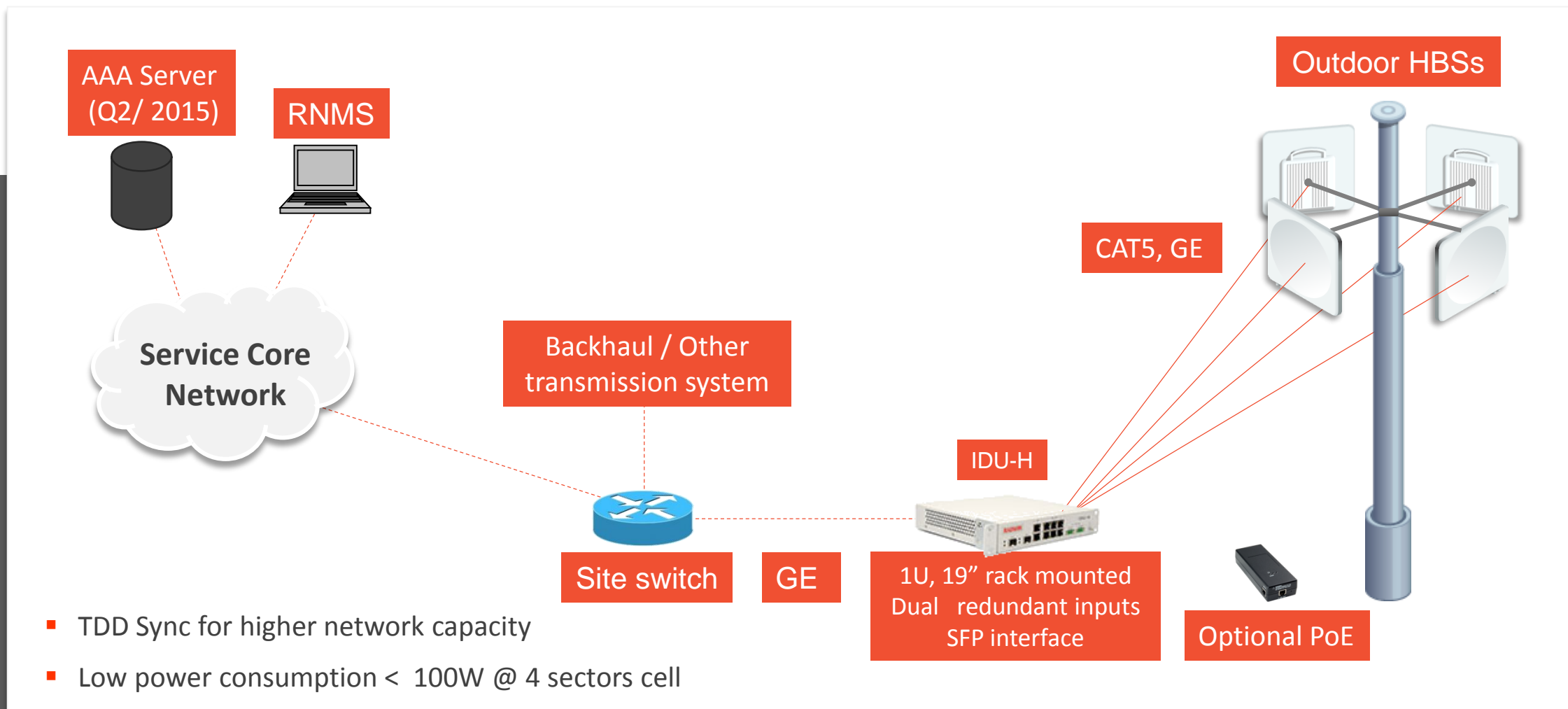
## License band cell capacity



- 125Mbps / Sector
- **400 Mbps / site over 2 x 20MHz**
- 128 users (250 in Q2/15)



# RADWIN 5000/ 5000 JET Network Architecture





# RADWIN 5000 FiberClass Wireless PtMP - Base Station Portfolio

Base Station Product	Max Throughput	Target Applications	Frequency band (GHz)
<b>RADWIN 5B00 (JET) Beamforming HBS</b>	250Mbps	<ul style="list-style-type: none"><li>Corporate Access</li><li>WiFi backhaul</li><li>HD Video Surveillance</li></ul>	5.4-5.8 3.3-3.8/ 3.65
RADWIN 5200	250Mbps		2.3-2.4 2.5-27 4.9-6.0 3.3-3.8/ 3.65 5.7-6.4
RADWIN 5050	50Mbps	<ul style="list-style-type: none"><li>Remote areas</li><li>Small Video Surveillance networks</li></ul>	2.3-2.4 4.9-6.0
RADWIN 5025	25Mbps		4.9-6.0



# RADWIN 5000 / 5000 JET Subscriber Units Portfolio

Subscriber units	Max Throughput	Configuration
HSU – 510	10Mbps	Competitive priced  Integrated Antenna or Connectorized unit 17dbi, 23dbi @5.x 13dbi, 20dbi @3.x  Capacity licensing 10 to 100Mbps
HSU – 525	25Mbps	
HSU- 550	50Mbps	

Con. / 17dbi or 13bi unit



23i or 20dbi unit





## RADWIN 5000 – Main Differentiators

- High interference immunity similar to Point-to-Point
- Industry's highest throughput in real operation
- Optimized frequency reuse
- Robust operation in nLOS / NLOS
- Simplified network planning
- Secured SLA – Capacity and Latency
- Intra & Inter site TDD sync saving tower space and increasing capacity
- Long range (40km)

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## RADWIN Radio Planner (R-Planner)

- Designing & analyzing a wireless network
- Easy-to-use web application
- Integrated analysis tools
- Report generator
- Product data base access
- Google Earth add-In



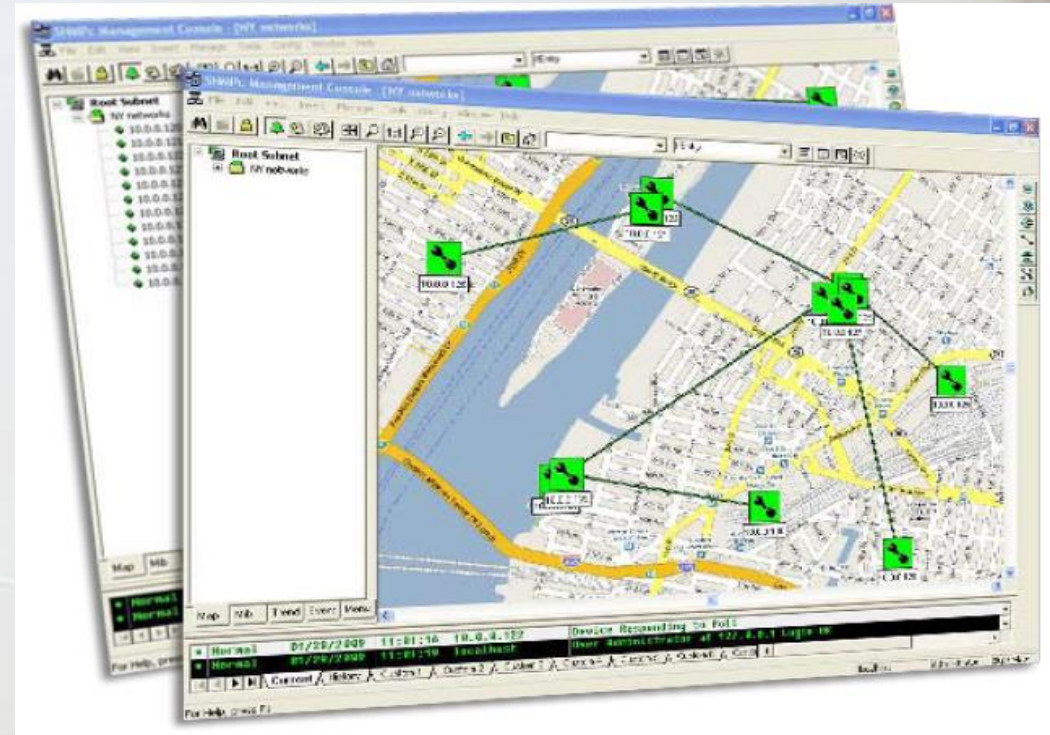
The Most Advanced PtP and PtMP Planning Tool

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## RADWIN Network Manager – RNMS

- Intuitive, easy-to-use
- Network management
- Performance monitoring
- Network configuration
- Trend reports



THE WIRELESS CONNECTIVITY CHOICE

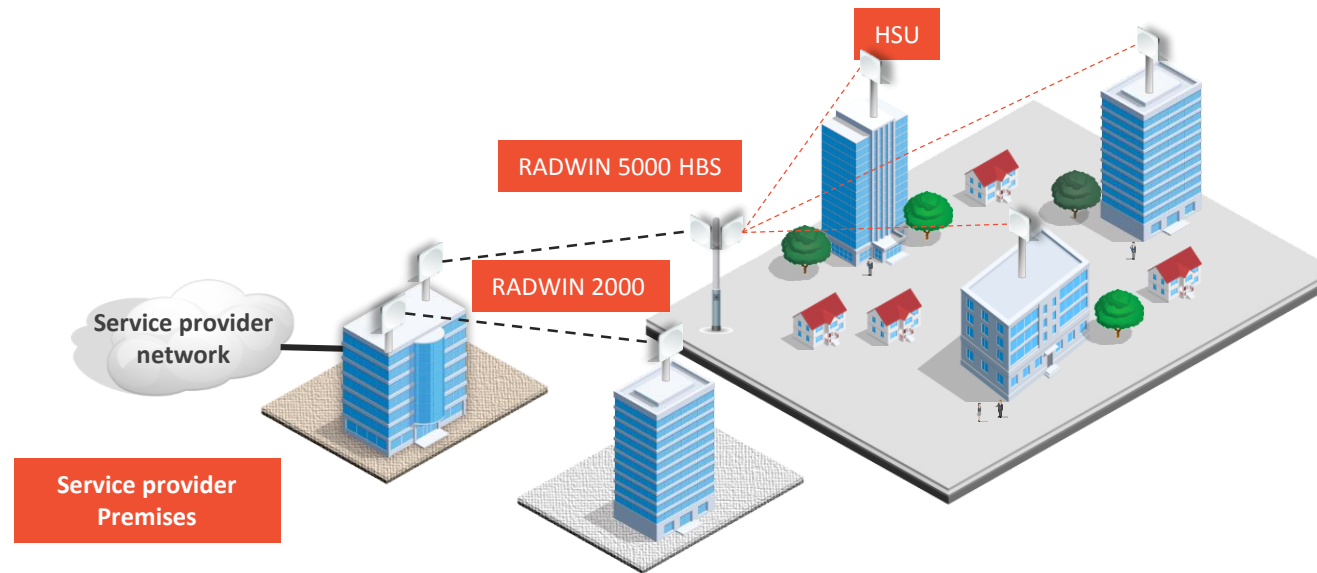


## Carrier Applications

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# Enterprise Access



## VALUE PROPOSITION:

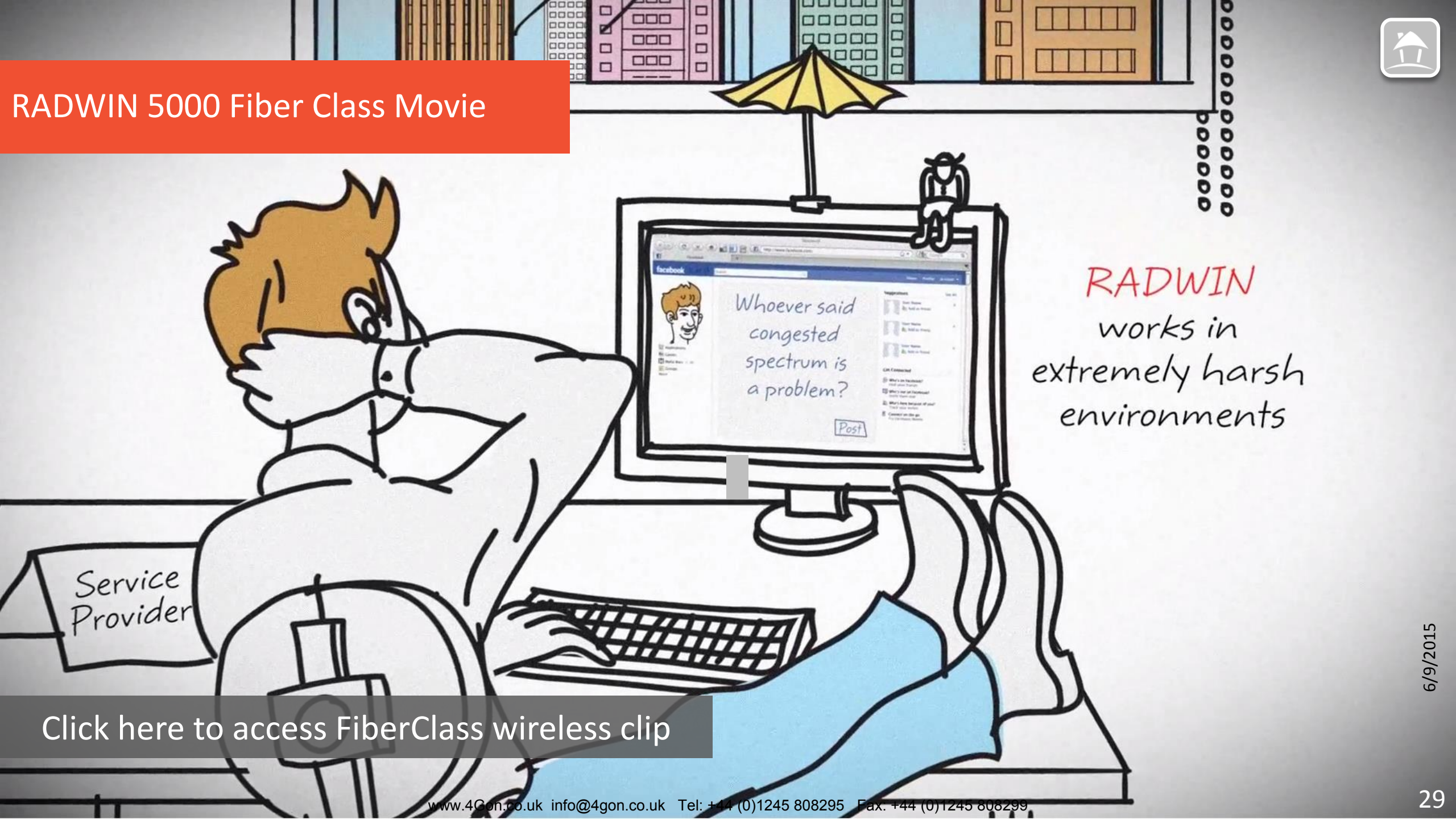
- Secured BW per site, 5 to 200Mbps per customer
- Alternative to DSL/fiber or MW when no license
- PtP or PtMP
- Multi service connectivity: voice, IP Data, E1/T1

## DIFFERENTIATORS:

- nLOS and NLOS wireless link
- Licensed and unlicensed
- Best in class interference mitigation
- Full solution: Backhaul and Access



# RADWIN 5000 Fiber Class Movie



*RADWIN*  
works in  
extremely harsh  
environments

[Click here to access FiberClass wireless clip](#)



# Case study: Agile Networks Delivers Broadband to Enterprises with RADWIN

## Partner:

Agile Networks, Ohio, NA.

## Project:

Expand its network to deliver statewide high-speed wireless broadband

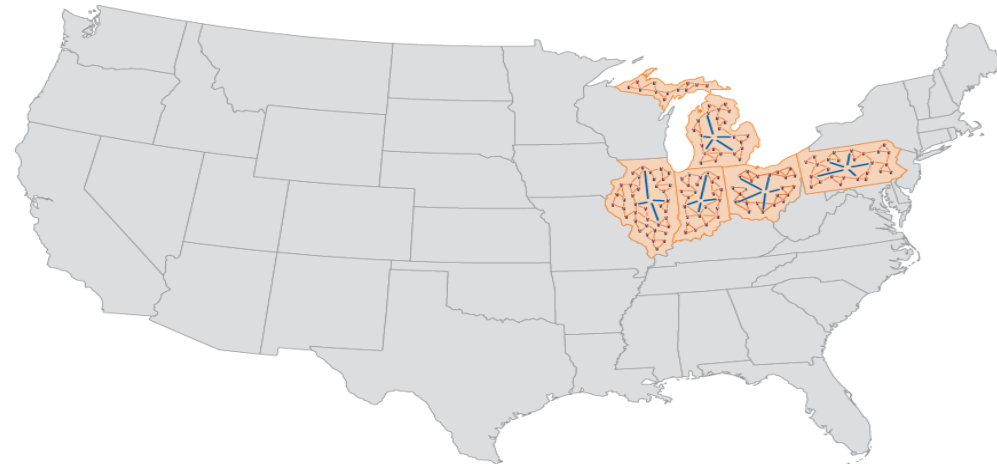
- Carrier-grade solutions
- High throughput - 250 Mbps over long ranges
- Guaranteed SLAs to their end-customers
- Solutions built for rigors of harsh outdoor environments
- Ease of installation

# AGILE NETWORKS

Connect

Empower

Transform



*“RADWIN outperformed all other vendor equipment, delivering fiber-like quality service at just a fraction of the cost of T1/E1 lines.”*

*Kyle Quillen, Chief Technology Officer, Agile Networks*

6/9/2015

Confidential Information

www.4Gon.co.uk info@4gon.co.uk Tel: +44 (0)1245 808295 Fax: +44 (0)1245 808299

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3



# Case study: largest Internet Service Provider in California Selects RADWIN

## Partner:

California Internet, Business ISP

## Project:

Last mile connectivity in dense urban areas

Tested all major brands and found RADWIN to be the best in terms of:

- Bandwidth management
- Jitter
- RF noise handling
- Overall data throughput



*“We put 3 major radio vendors through an intensive analysis in some of the noisiest RF environments and bands while testing link jitter and over all data throughput. **RADWIN** came out on top every time. Not by a small margin. The competitors were literally not in the same ball park. After our complete evaluation our choice was easy. Couple that with the **excellent response and expertise** of RADWIN’s support team.”*  
California Internet,  
Business ISP, the #1 Rated  
ISP in the state

6/9/2015



# iBurst Deployed BB Access in 3.6GHz

## Customer:

- iBurst, ISP, South Africa - Largest high-capacity wireless IP network in the country

## Project:

- Move enterprise from PtP to PtMP due to lack of spectrum

## Why RADWIN:

- Provide enterprise access with capacity of up to 20 Mbps
- Enable the delivery of triple-play high-speed voice, video « and data services
- Fast, simple installation and same-day service activation « Lowest total cost of ownership



*To date : over 150 base stations provide high capacity connectivity to more than 800 enterprise customers scattered in areas as far as 14 km/ 8.7 miles from the base stations. Some sectors serve 25 customers or more*





# Connecting 1000 Offices Over unlicensed band

## Customer:

- Entel, ISP, Chile

## Project:

- Deliver broadband access to over 1000 offices in Chile

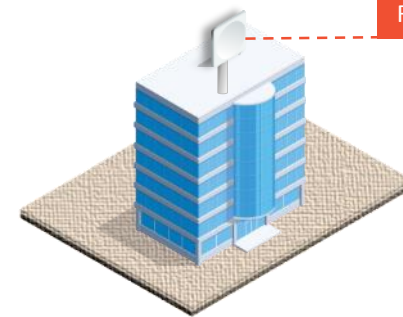
## Why RADWIN:

- Narrow channel bandwidth – enables installing more links simultaneously
- Robust air interface
- Reliability
- Fast supply times



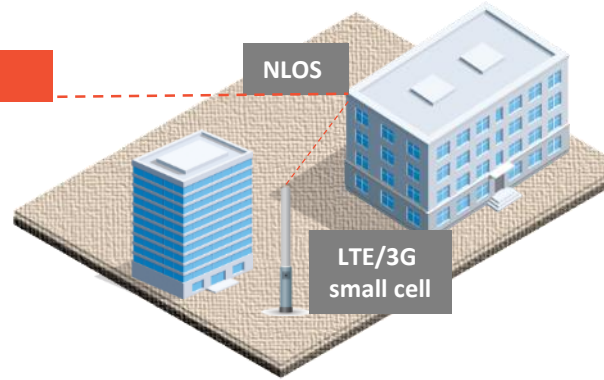


# Small Cell NLOS Backhaul



Service Provider Macro site

RADWIN 2000 / 5000



Small cell NLOS Backhaul

## VALUE PROPOSITION:

- NLOS backhaul of 3G/LTE Small cell at street level
- Up to 400MbpsMbps (future 1Gbps)

## DIFFERENTIATORS:

- Outstanding Interference Mitigation
- Comprehensive portfolio
  - (PtP & PtMP)
  - Licensed and unlicensed band
- Integrated with the small cell network
- Planning and performance prediction



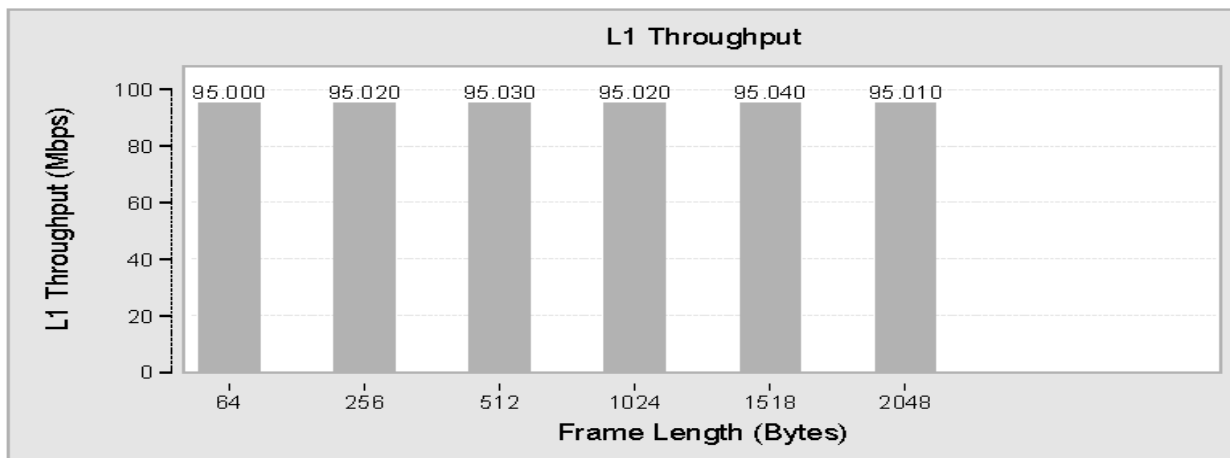
# Small Cell Trials (Germany, France, USA)



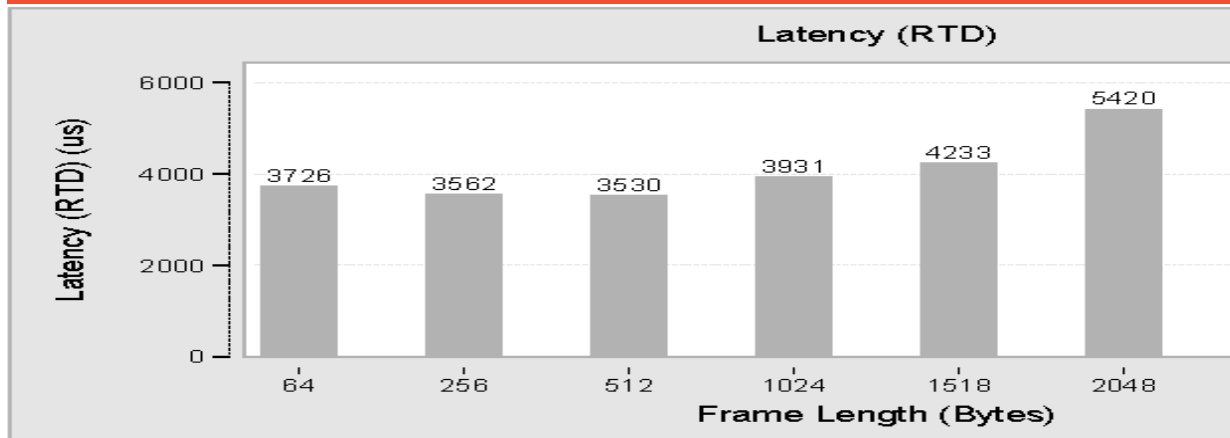


# ATP with the customer

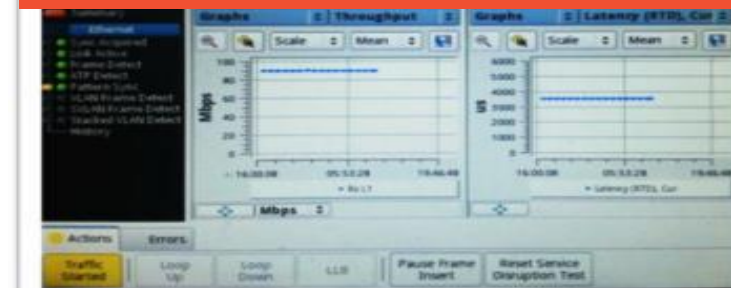
## Throughput Test Results:



## Latency (RTD) Test Results:



## 18 Hrs. Stability Test: Full Capacity <4 ms Round Trip Delay



## Survey Kit:





# 23 Days Stability Test – Service Availability

Throughput	Service Availability
> 87 Mbps	99.9939%
> 76 Mbps	99.9969%
>70 Mbps	99.9979%
> 61 Mbps	100%

Throughput	Service Availability
> 87 Mbps	99.972%
> 76 Mbps	99.99%
>70 Mbps	99.99595%
> 44 Mbps	100%

Throughput	Count
61 Mbps - 70 Mbps	2
70 Mbps - 76 Mbps	1
76 Mbps - 87 Mbps	3
87 Mbps - 95 Mbps	98819
<b>Total</b>	<b>98825</b>

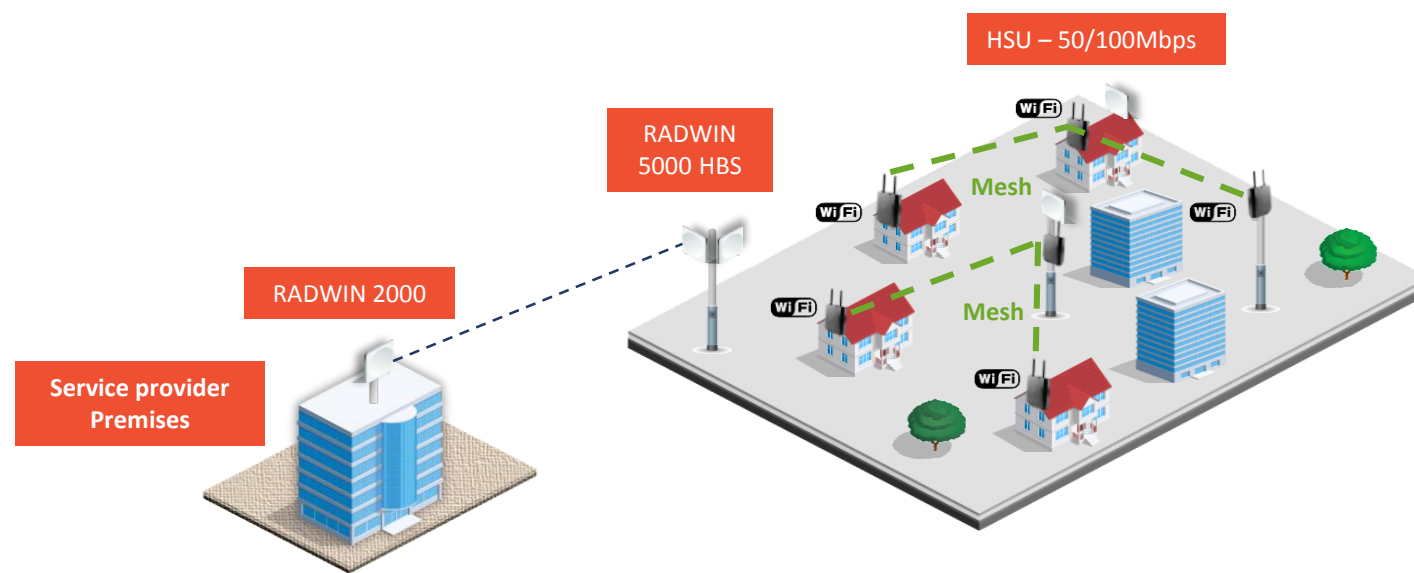
Throughput	Count
44 Mbps - 70 Mbps	4
70 Mbps - 76 Mbps	5
76 Mbps - 87 Mbps	18
87 Mbps - 95 Mbps	98798
<b>Total</b>	<b>98825</b>

**SISLI2-SISLI3**

**SISLI3-SISLI2**



# WiFi AP Backhaul



## VALUE PROPOSITION:

- 1st & 2nd level aggregation of WiFi AP
- Up to 250Mbps per BS site
- HSU aggregate traffic of 3-4 APs
- Up to 100Mbps/WiFi aggregation point
- licensed or unlicensed band
- nLOS and NLOS backhaul

## DIFFERENTIATORS:

- Secured SLA
- Robust performance in unlicensed band
- nLOS and NLOS excellent performance



# WiFi Backhaul in DaNang- Vietnam

## Customer:

- Network is operated by Municipality

## Project:

- Be the first VietNam's "e-city" by 2020. Backhaul of 50 WiFi APs in Danang where fiber is not available

## Why RADWIN:

- TDD Network synchronization
- High Capacity SU
- End to End solution including RNMS
- R-planner, RADWIN Radio planning facility





# WiFi Backhaul in DaNang- Vietnam cont.



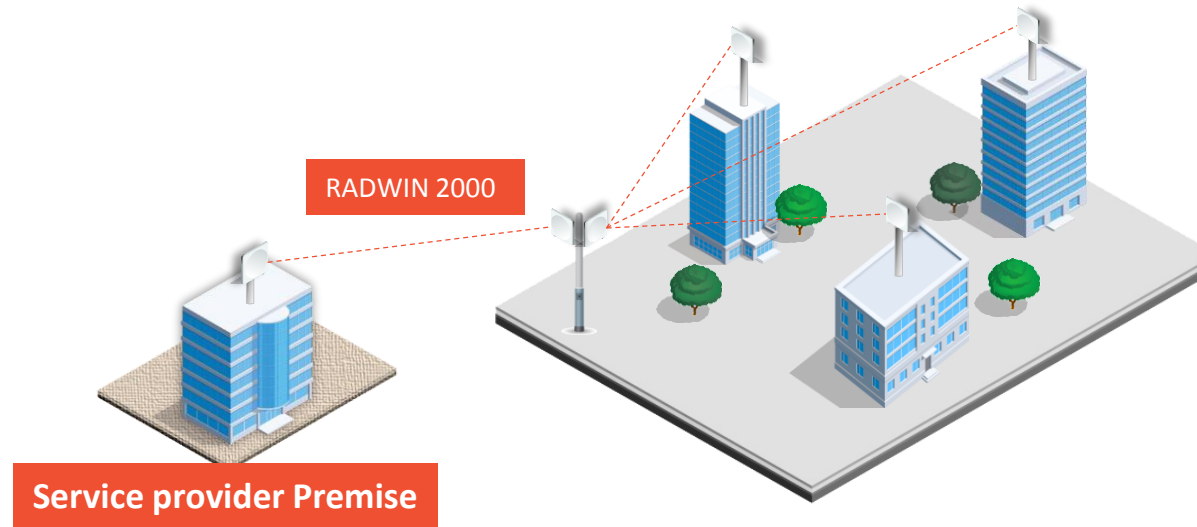
**Real NLoS wireless links**

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# IP Backhaul to Multi Tenants Building



## VALUE PROPOSITION:

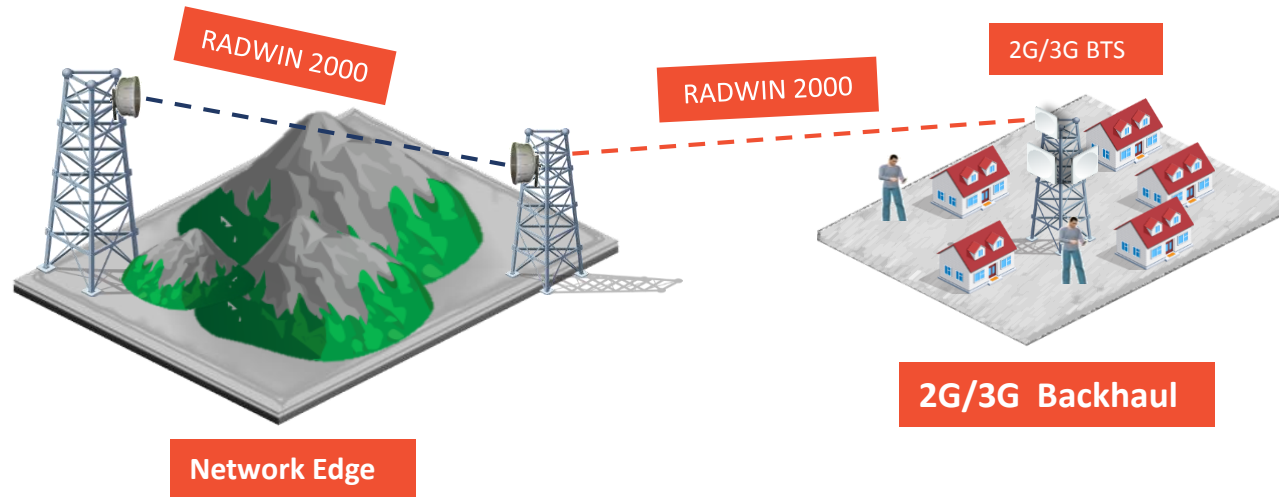
- 1st and 2nd level traffic aggregation from residential buildings
- In building connectivity is done by other Wireless solution or cable

## DIFFERENTIATORS:

- Up to 250Mbps Base station
- Up to 100Mbps per building
- Outstanding Interference mitigation
- Easy installation



# IP Backhaul to Multi Tenants Building



## VALUE PROPOSITION:

- Lower Civil Infrastructure CapEx:
  - Fewer towers, lower heights
  - Smaller antenna, twisted pair cable
  - Renewable energy sources
- Lower OpEx
  - Installation time
  - Lower Technicians skills
  - Can save MW license cost

## DIFFERENTIATORS:

- Long range – 120km
- Robust link over nLOS /LOS
- IP+ E1/T1 interface
- Link operation over though train
- Built in tool for antenna alignment
- Carrier grade unit, IP67



# AIS Chooses RADWIN for Cellular Backhaul

## Customer:

- AIS, largest carrier in Thailand

## Project:

- Cellular backhaul for rural network expansion (w/ NSN)

## Why RADWIN:

- Selected over 10 other vendors
- Carrier-class performance – met rigid technical requirements & field trials
- Links comply with NTC (Thailand's radio body) regulations – do not emit over 1 Watt EIRP
- Links operate over water to connect islands
- Operation in nLOS scenarios, including jungles
- Low power consumption fit for solar panels





# Cellular Backhaul in Rural Mexico

## Costmer:

- Grupo Iusacell, Cellular & PCS operator, Mexico

## Project:

- Cellular backhaul in rural villages

## Why RADWIN:

- Lower CAPEX and OPEX
- Fast implementation times
- RADWIN's systems operate in nLOS where other systems failed
- Phase 1: Using WinLink 1000 for rural villages with no LOS,  
Phase 2 Using RADWIN 2000:
  - Hundreds Huawei UMTS sites backhauled by RADWIN 2000 links!
  - Hundreds links include up to 4 TDM ports, 350 links are IP only



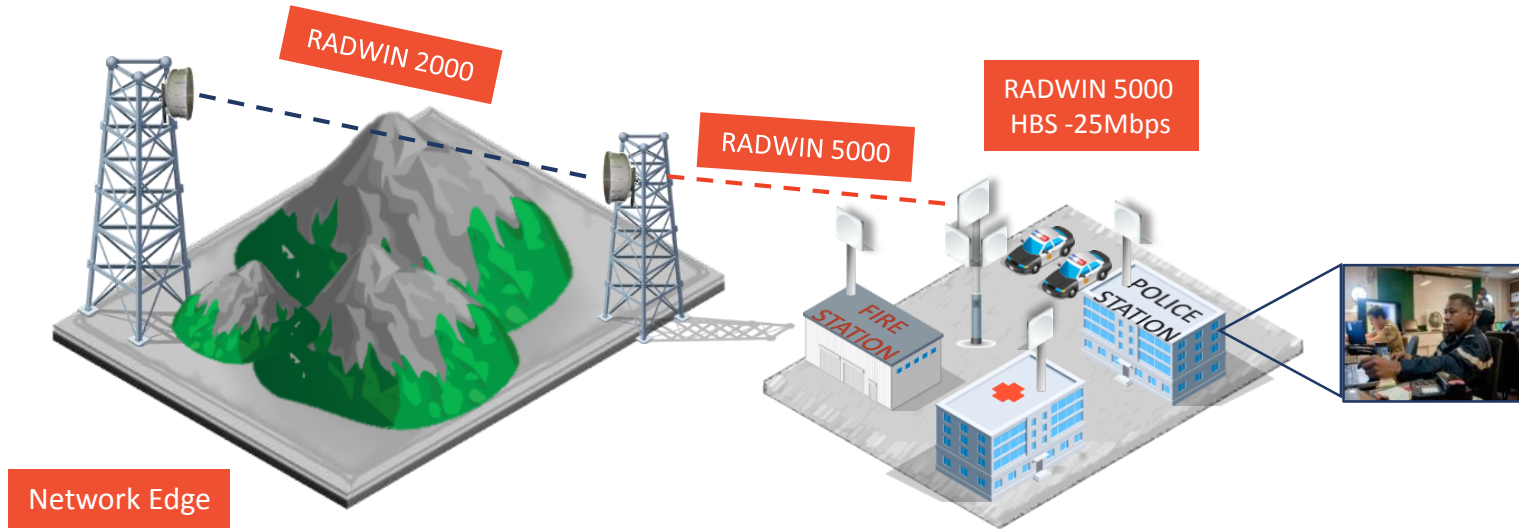
*"We use RADWIN for cellular backhaul because it is a carrier-class solution. RADWIN enabled us to reduce the implementation time of our new network and significantly reduce CAPEX & OPEX."*

Jose Manuel Villaseñor, Director, Grupo Iusacell

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# Public / Gov. Access



## VALUE PROPOSITION:

- Broadband connectivity of public entities in remote rear

## DIFFERENTIATORS:

- Cost effective Base station for low capacity areas (HBS-25)
- Secured SLA per user
- Long range PtMP – 40km



# RADWIN Access and Backbone Topology

## Customer:

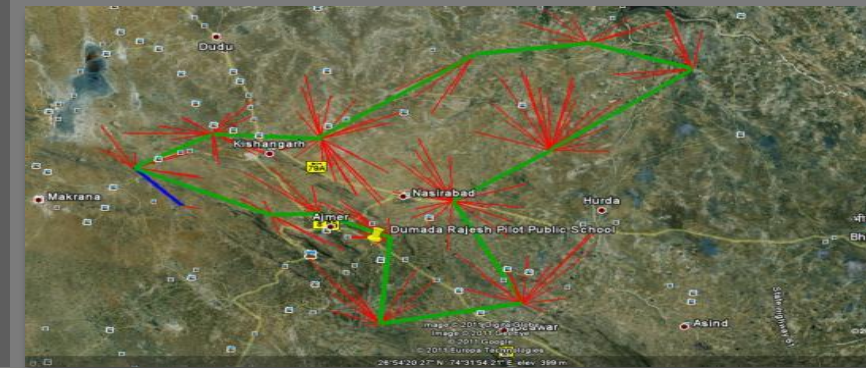
- ERNET- Education and Research Network , Communication & Information Technology Ministry in India Project

## Project:

- Providing e-infrastructure for 247 schools in two districts of Rajasthan state

## Why RADWIN:

- Succeeded in connecting 9 locations which were declared non feasible by competition
- Was the only PtMP product that supports 4 Mbps full duplex of up to 25 Mbps
- RADWIN 2000 Provides the backbone with built-in RING topology for protection
- Collocation (TDD sync.) is supported with RADWIN 2000 and RADWIN 5000
- Support very low latency & excellent performance in nLOS





# Grupo Azteca Deploys RADWIN 5000 in Rural

## Customer:

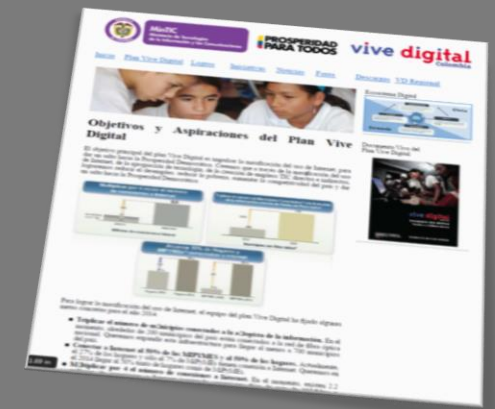
- Colombia government reducing the digital gap in rural . Grupo Azteca from Mexico launched TotalPlay in Colombia

## Project:

- Connect 700 municipalities to the internet & 3 institutions in each municipality. Main technology – Fiber & , Wireless in the Last mile

## Why RADWIN:

- Good experience with RADWIN from previous projects
- Excellent results in the tests prior to final selection
- Cost effective solution (HBS -25) for the rural market
- Secured SLA for the institutions





# BTC Deploys RADWIN 5000 in BB Rural

## Customer:

- BTC, Cellular & Fixed Operator in Botswana

## Project:

- Country wide broadband connectivity of Rural Gov. facilities Border Control, Schools, Libraries, Police, RAC, Government Dept., Wildlife, Game Parks etc.

## Why RADWIN:

- Support high capacity in long range (20km , 4Mbps Full duplex)
- Provide secured SLA
- Simple installation & maintenance, overcoming rural operational challenges







# Gilat Deployed RADWIN in Rural Peru

## Customer:

- Gilat Satellite Networks Peru, Selling to the Peruvian Government FITEL

## Project:

- Social inclusion, reaching out to the rural, Voice & Data services provision to 200+ remote villages, few private lines to businesses in some villages

## Why RADWIN:

- Carrier grade & long rich RADWIN 2000 and 5000
- Advanced QoS for VoIP
- Better POC performance than the competition
- Professional Service (PS) professionalism, detailed and dependable planning



PERU



Thank You!  
Any Questions?

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