

**In a changing world,  
Raditek product quality  
and performance is  
consistently the best..**

**RADITEK inc**

## **TELECOM PRODUCT PRESENTATION**

### **“WIRELESS WITHOUT BOUNDARIES”**

# OVERVIEW

Rural networks to compliment RADITEK's  
Satcom networks.

Point-to-Point 6-38GHz

Licensed bands

+

Wireless Broadband Solutions  
400MHz - 6GHz Point-to-Point  
and Point-to-Multipoint

Licensed and Unlicensed bands

# *RADITEK* INC.

- **Worldwide supplier of fixed wireless, telecommunications and broadband networking equipment**
- **Provider of turnkey services**
- **Corporate Headquarters in San Jose, CA**
- **Global coverage**
- **Privately held**
- **Founded & Staffed by experienced telecommunications executives**



# Market Focus

- **North America:**

- Radio Broadcast
- Local & State Government (Security)
- Independent Telephone Companies
- Enterprise
- ISPs
- System Integrators



- **International:**

- Cellular Backhaul
- Carriers / Telcos
- Energy
- Utilities
- Banking
- Government
- ISPs



# P to P Technology Focus

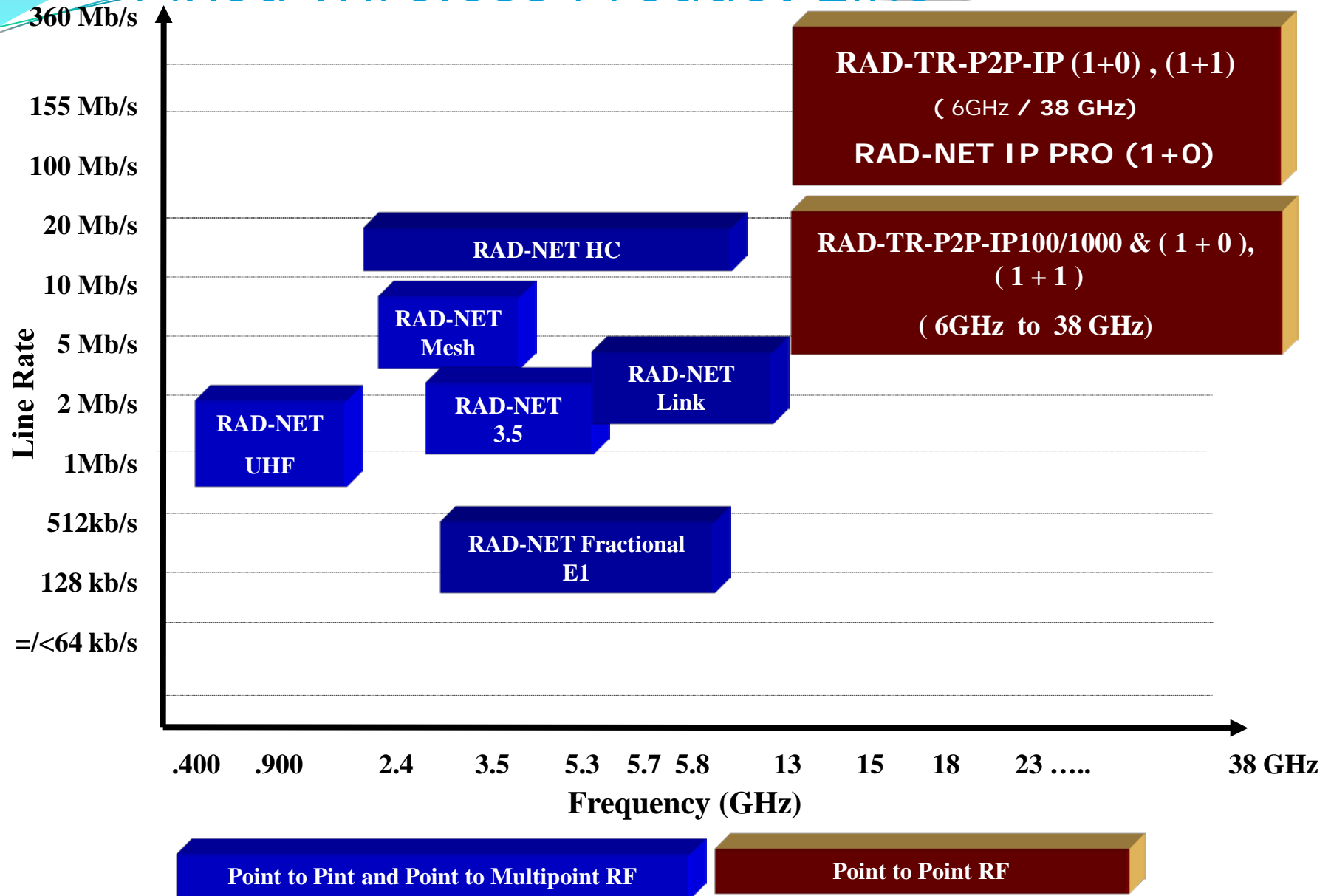
- Licensed frequency bands (400 MHz to 38 GHz).
- Voice capacities from Sub T1/E1 to OC24 Rates.
- Data rates from 9.6 Kbps to 1 Gbps.
- SNMP Real time performance monitoring.
- Robust Modulation schemes.
- High Reliability.
- Fixed Wireless Access Broadband.
- License Exempt frequency bands (ISM, UNII, 24, 60 GHz).
- Point to Point Access and Backhaul radios.
- Point to Multipoint Access.
- WiFi, (802.11a,b,g,n) low cost, Point to Multipoint and Point to Point
- WiMAX Technology (Fixed 802.16d & 802.16e)
- MESH Access.



# Market Sectors

- Operators (Fixed and Mobile)
- Utilities
- ISP's
- Enterprise
- Energy
- Government (Mobile & Surveillance)
- Military Satcom, DAMA/SCPC etc
- Disaster recovery, Police, Homeland Security etc
- Private internet networks: SOHO to Fortune 500!

# Fixed Wireless Product Line





# Telecom Product Lines – Lower Frequencies

- **Licensed Radios:**

- Available:
  - Mobile Data System 400-750MHz, 1W
  - Bridge Radio 3.3, 3.5GHz (wi-max) , 200mW
  - 4.9 GHz Home Security (USA) Band

- **License Free Radios (ISM Band) (p2p mesh) :**

- 600 MHz 5 Watts
- 900MHz available:
  - Mobile Data System 1W OFDM
- 2.4GHz (wi-fi p2p) available:
  - Bridge Radio 100mW, 802.11b
  - Bridge Radio 500mW, 802.11b
  - Bridge Radio 1W, 802.11b
  - Bridge Radio 2W, 802.11b
  - Hotspot Radio 200mW 802.11g/b (ofsm)
- 5GHz (wi-fi p2p) available:
  - Bridge Radio 100mW & 200mW, 802.11a/b/g w/Ext. antenna, TDD
  - Bridge Radio EIRP=46dBm 802.11a/b/g w/Integral antenna, TDD
  - Bridge Radio EIRP=32dBm 802.11a/b/g w/EXT &INT antenna, TDD
  - Bridge Radio High Speed (130 Mbps aggregate) FDD



**RAD-NET FAMILY**



# RAD-NET HDR

- HDR (High Data Rate) speed in licensed free bands [5GHz]
  - Up to 65 Mbps one way [130 Mbps, aggregate]
  - Programmable channel W [5, 10, 20, 40 MHz]
- FDD technology for lower latency
  - Less than 1 ms for low data speed
- Easy to install single unit architecture [ODU]
  - Housing made up of durable aluminum casting
- External antenna [standard], integral antenna [23 dBi, optional]
- Long range with fairly high payloads
  - Tx power ranging from 23 to 28 dBm [64 QAM for BPSK]
- Bridge/router
- Security
  - DES, AE, 3 DES Encryption
  - Radius Authentication
  - Firewall and NAT
  - VLAN (virtual LAN) and PPPoE P2P +power over ethernet)
- Management
  - SNMP (simole network managemnt protocol) v1 only

RAD-NET FAMILY

# RAD-NET Product Family

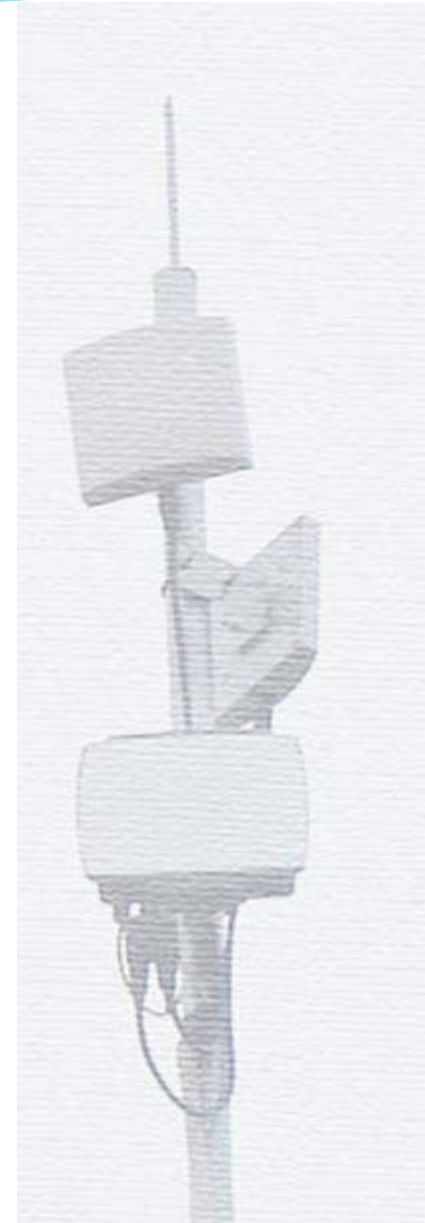
- PtoP Application: Licensed & License Free Freq Bands, IP only
- PtoP Application: Licensed & License Free Freq Bands, IP plus E1/T1
- PtoMP Application: Licensed Freq Bands (1<sup>st</sup> or 2<sup>nd</sup> tier)
- PtoMP Application: License Free Freq Bands (2<sup>nd</sup> or last mile)
- Wireless Networks
- Product Lines:
  - Licensed Broadband Wireless Access, 3.3 to 3.7GHz, 4.9 GHz
  - ISM Band Bridge Radio: 900MHz
  - ISM Band Radio (2.4GHz series)
  - ISM Band Radio (5GHz series)

RAD-NET FAMILY

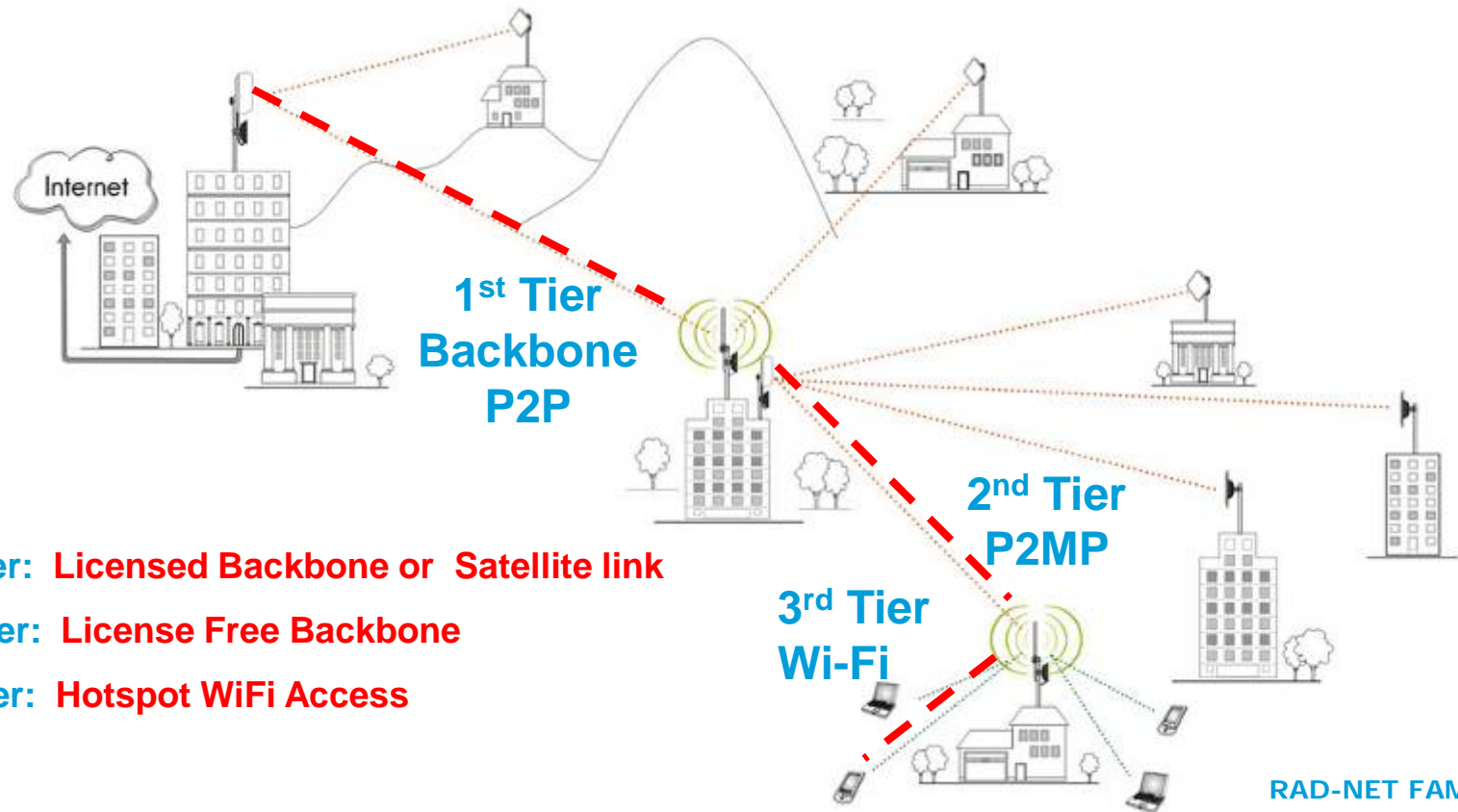
# P to P and P to MP RAD-NET Wireless Family



**RAD-NET FAMILY**



# Wireless Network



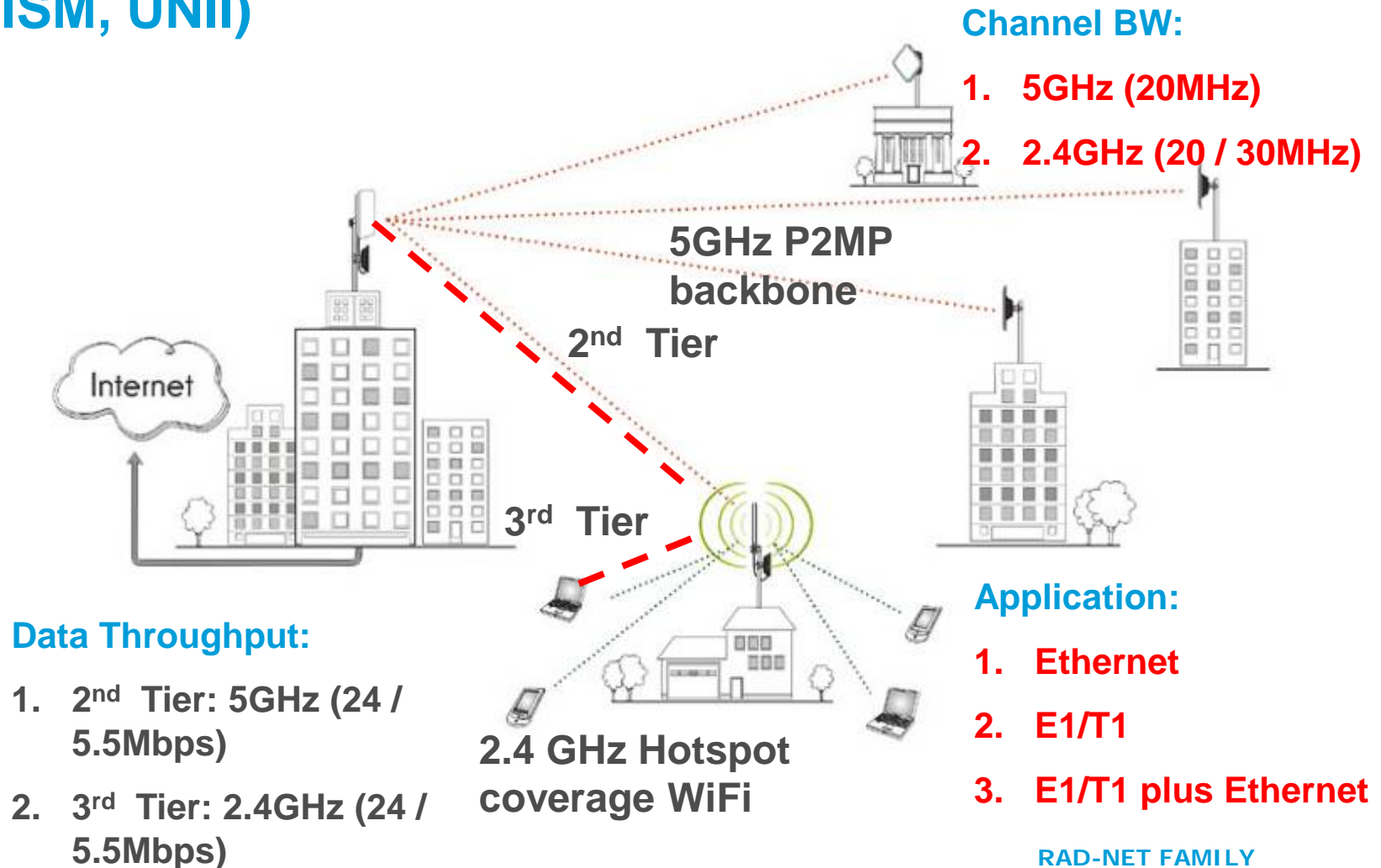
**1st Tier: Licensed Backbone or Satellite link**

**2nd Tier: License Free Backbone**

**3rd Tier: Hotspot WiFi Access**

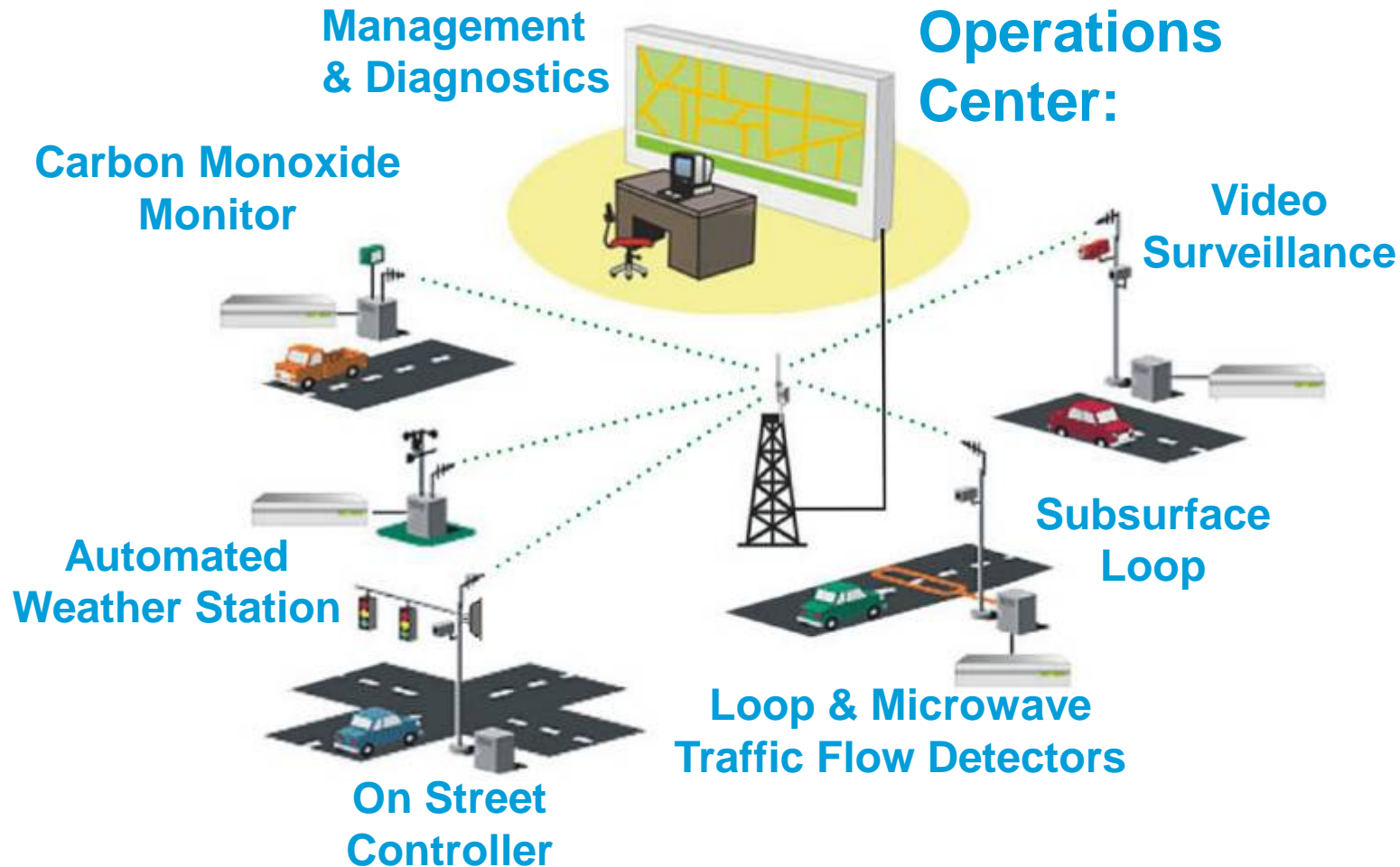
# Pt to Multi Pt Application

## License Free Frequency Bands (ISM, UNII)



# Wireless Traffic Monitoring and Control

800/900 MHz NLOS Radio





# NLOS Real Time Monitoring

**UHF High Power NLOS Mobile System - using 5W radios**

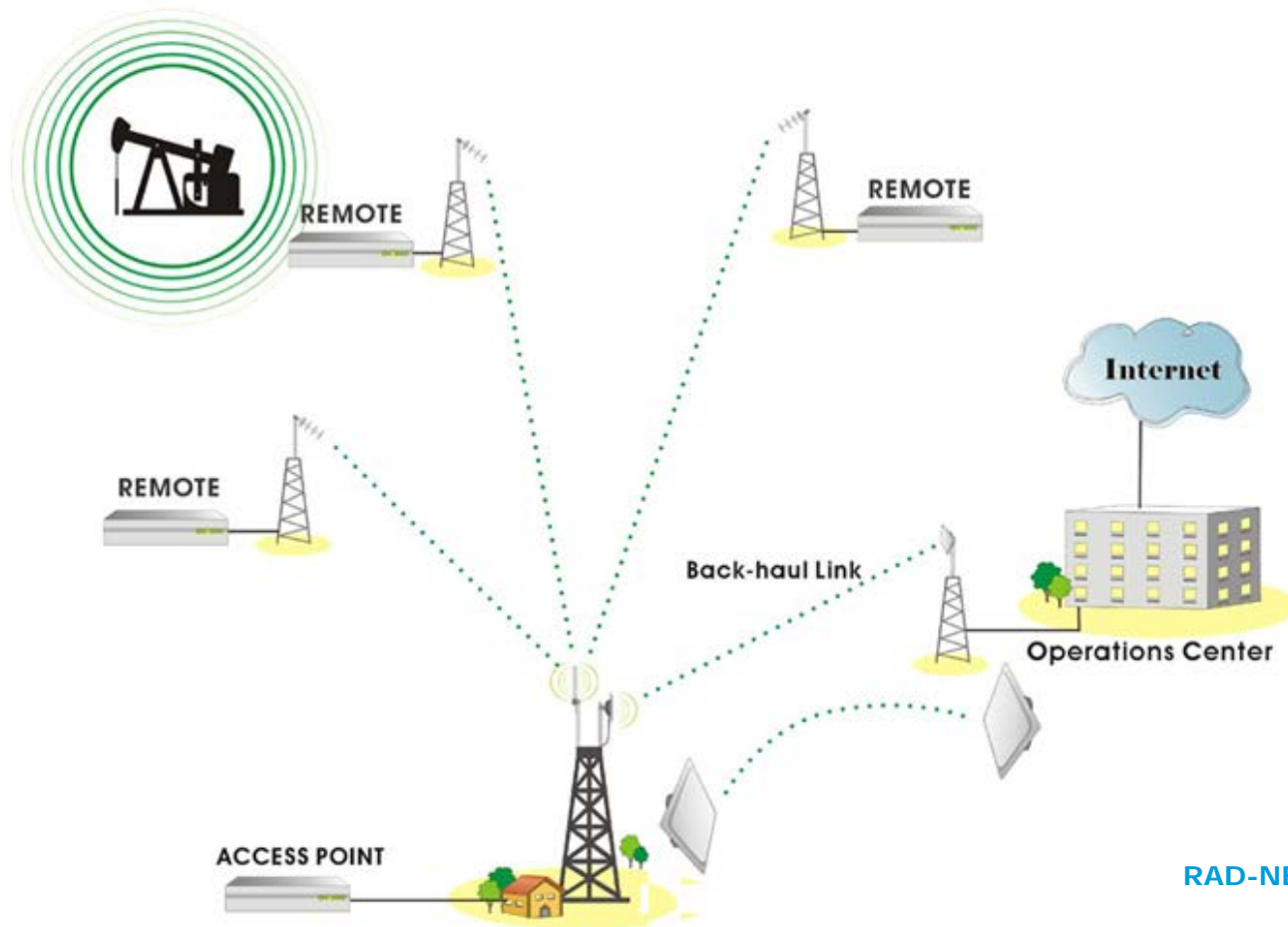


**RAD-NET FAMILY**



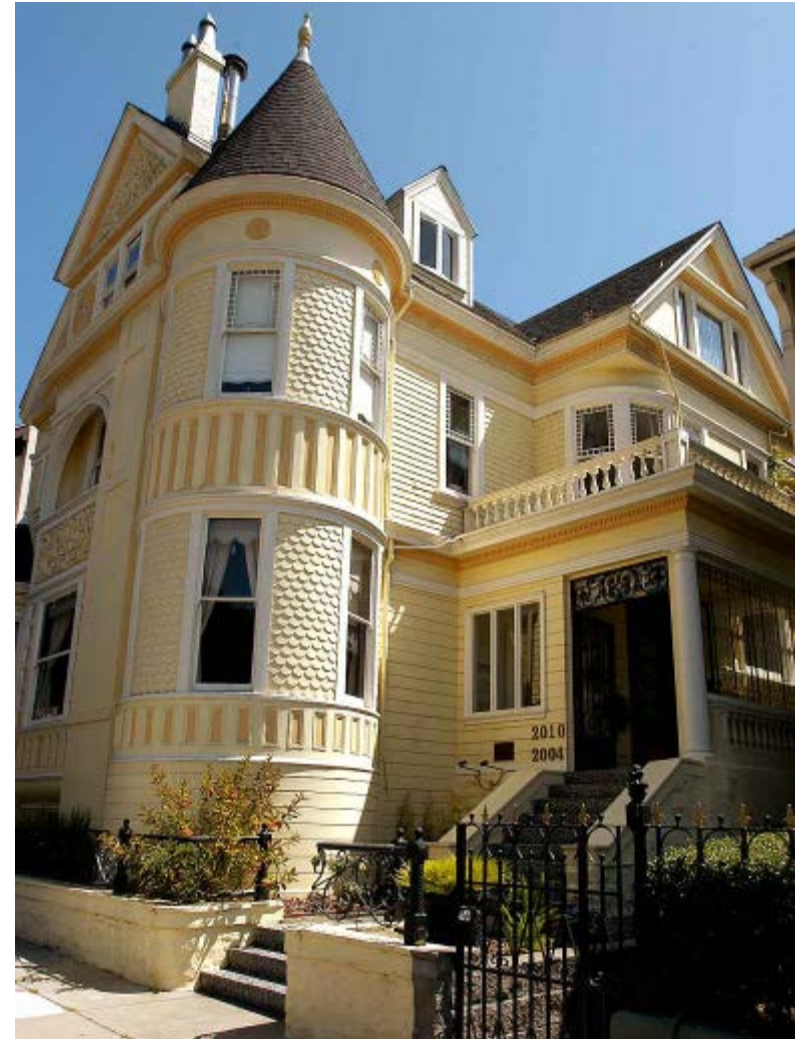
# MSCADA Network

**RAD-NET 900MHz Radio - with Back-Haul Link using RAD-NET 5GHz Radio or use our low cost Satellite SCPC/DAMA modem**



# Customer Example: in the Home

- Eliminates dead spots
  - Larger homes or dense construction materials
  - Wired or wireless clients
- Customer installed
  - 15 minutes to setup
  - No configuration needed
- Centrally managed
  - Web hosted management
  - Authorized user list and WEP



Radnet

# RAD-Mesh-Indoor



- Indoor mesh AP (**access point**)
- AP, Gateway, and Repeater all in one
- 802.11 b/g (60mW)
- POE, RP-SMA connector

Wi-Fi EQUIPMENT

# Outdoor Housing



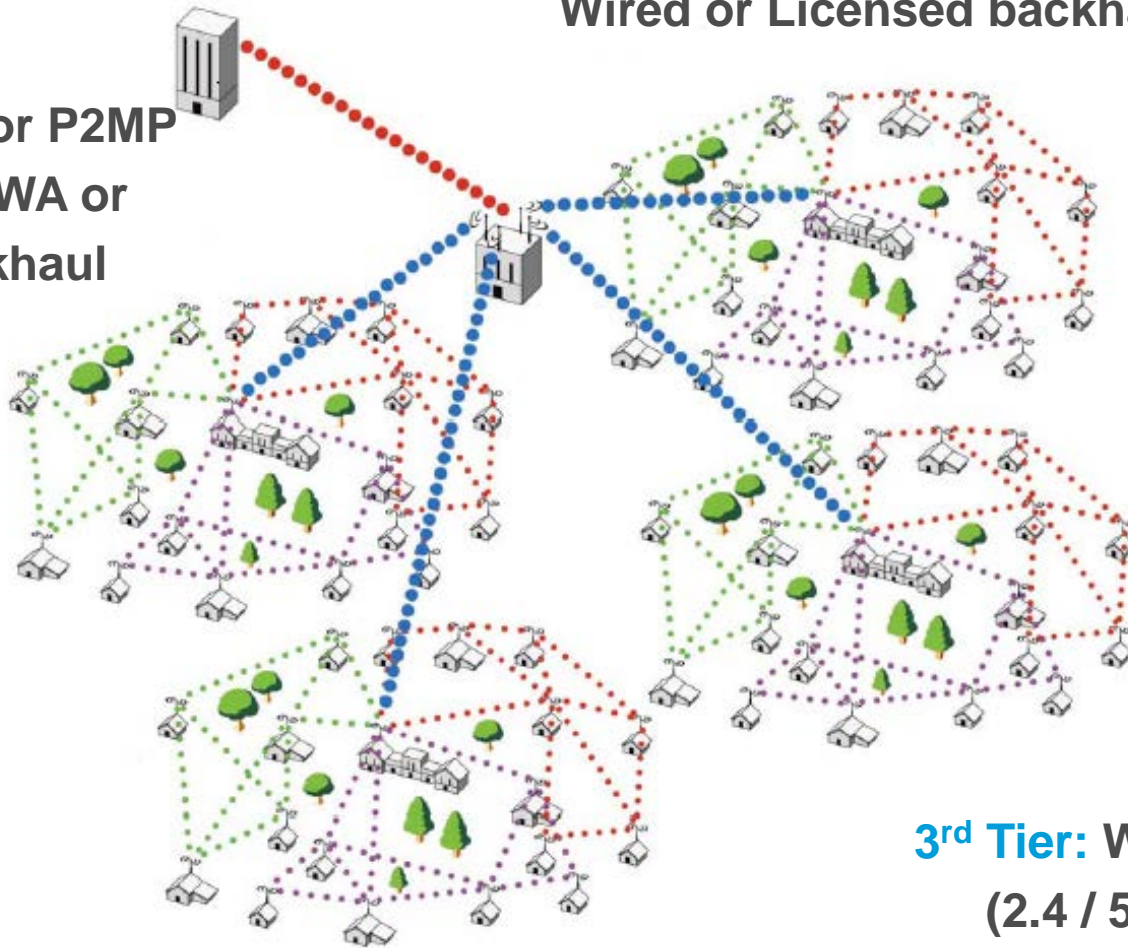
- Same board as Indoor
- NEMA-4 Box

Wi-Fi EQUIPMENT

# MESH WLL Architecture

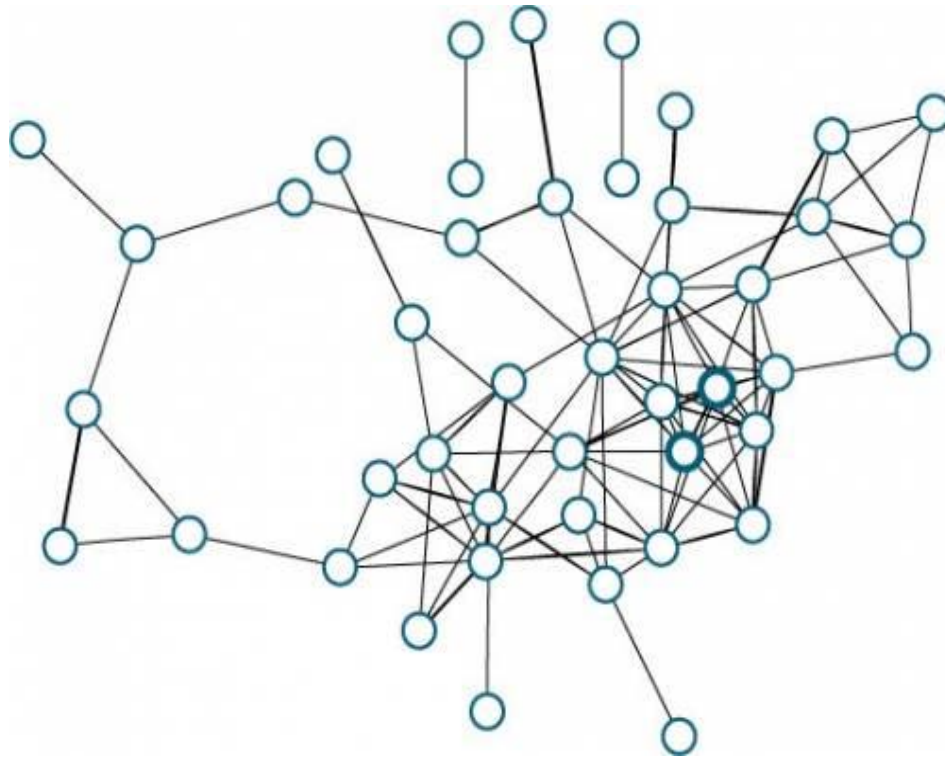
**1<sup>st</sup> Tier:** P2P Satcom VSAT,  
Wired or Licensed backhaul

**2<sup>nd</sup> Tier:** P2P or P2MP  
Licensed BWA or  
Wi-Fi backhaul



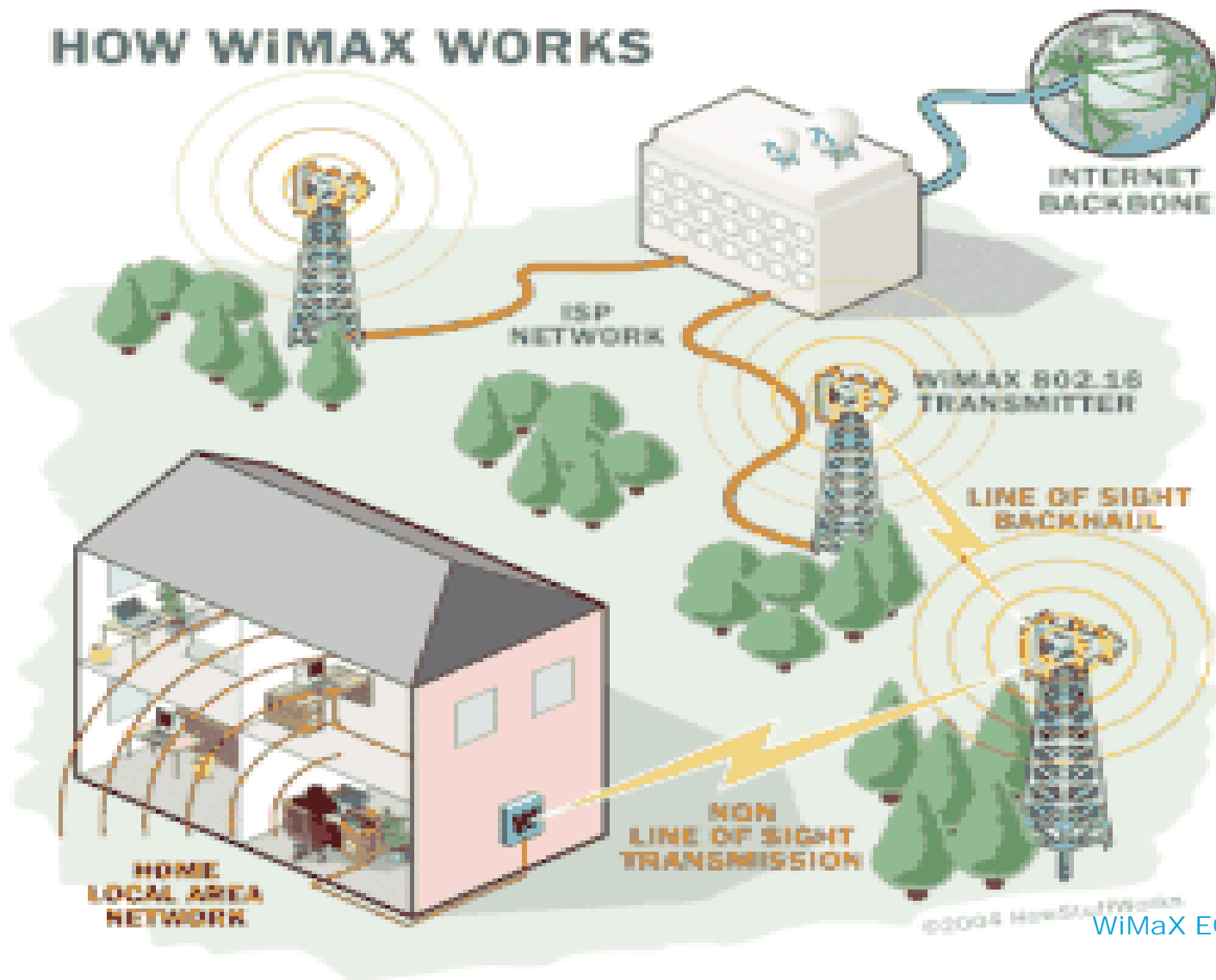
**3<sup>rd</sup> Tier:** WiFi **MESH** Network  
(2.4 / 5GHz dual band)

# Mesh Networking



- Allows an Access Point to act as a wireless repeater
- With a single Internet connection, spreads it around a large area (1km<sup>2</sup>)
- Mesh idea is not new
  - What's new is lower cost, easy to use Mesh.

# HOW WiMAX WORKS





# Fixed WiMax EQUIPMENT

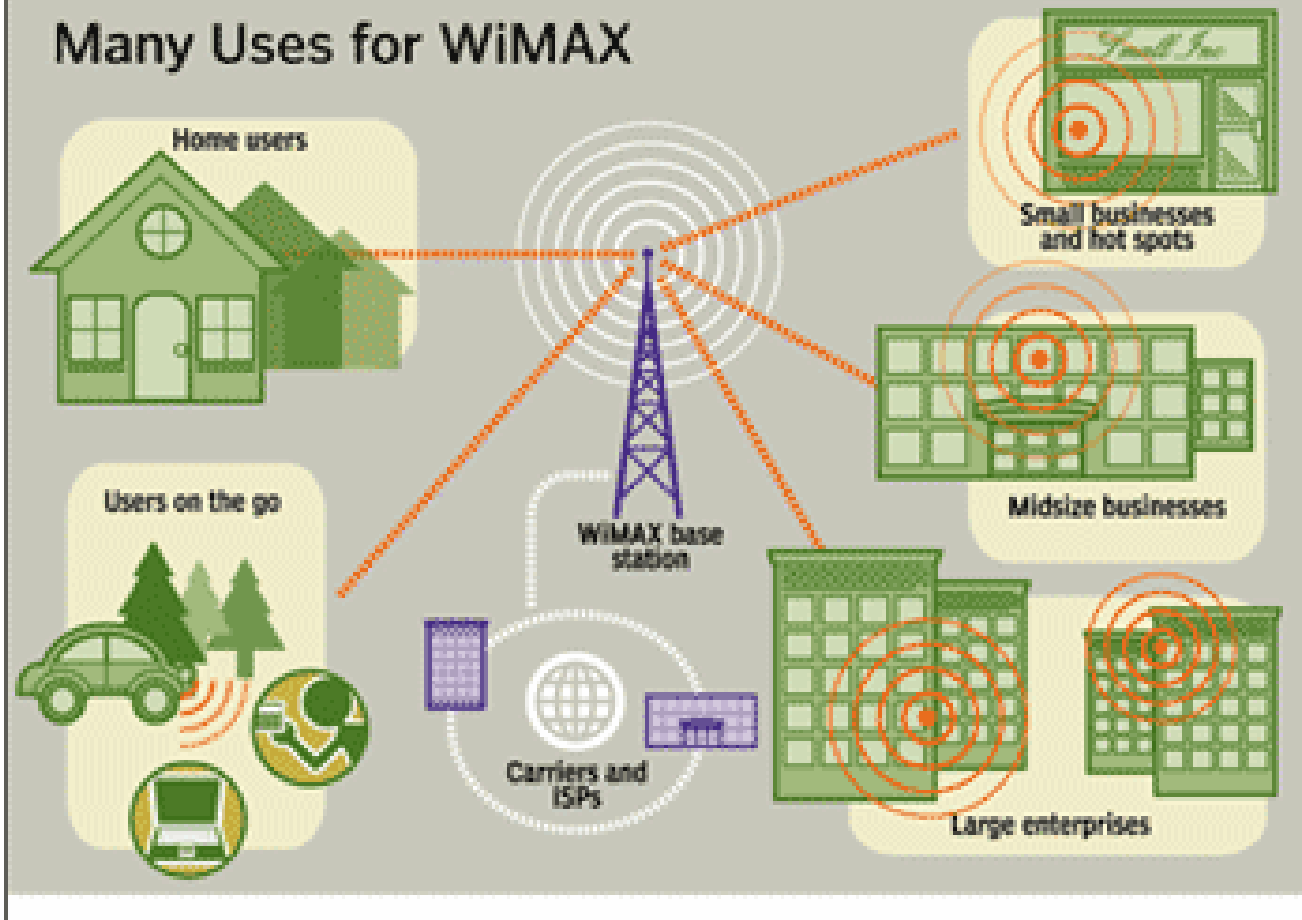
## 802.16d

**Innovative base  
station design, easy to  
deploy.**



WiMaX EQUIPMENT

## Many Uses for WiMAX



WiMax EQUIPMENT

## Range (Line of Sight)

Antenna	Expected Range (Outdoor LOS)
2 dBi omni	200m
5 dBi omni	300m
10 dBi omni	1km
24 dBi directional	5km

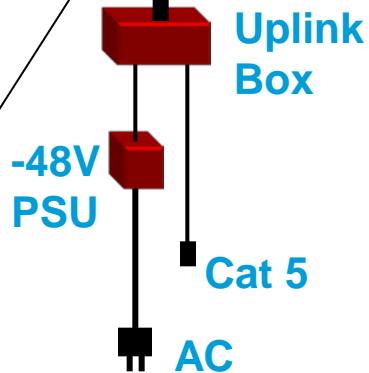
- Use antennas to increase range
  - Low cost, readily available
- Power amplifiers discouraged
  - Expensive and often noisy

# 1 Sector Base Site

with optional -48V Power Supply

45-120°, or Omni

**Start with just one  
base station**



WiMax EQUIPMENT

# WiMAX IDU

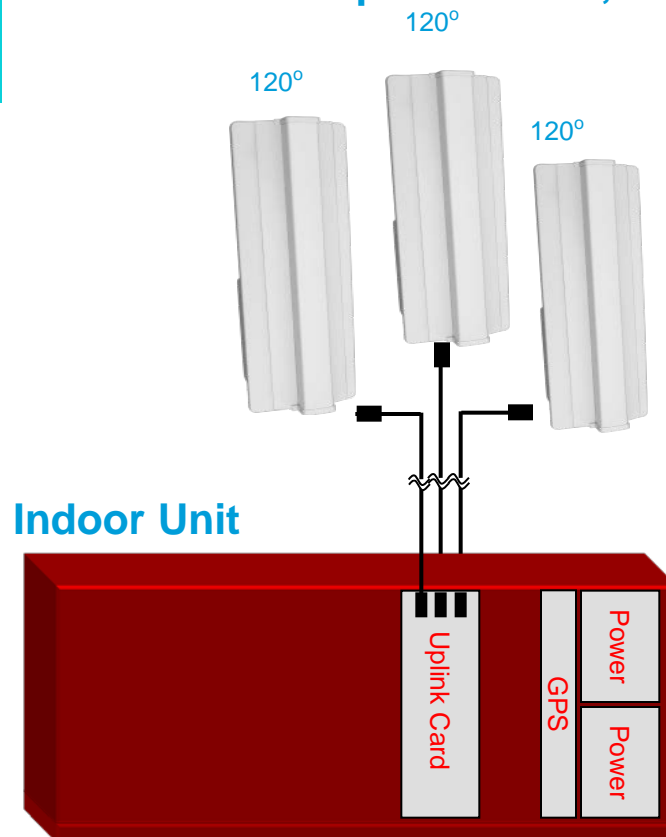
- WiMAX IDU BTS



**Grow to 3 base stations...**

## 3 Sector Base Site

without optional EMS, -48V

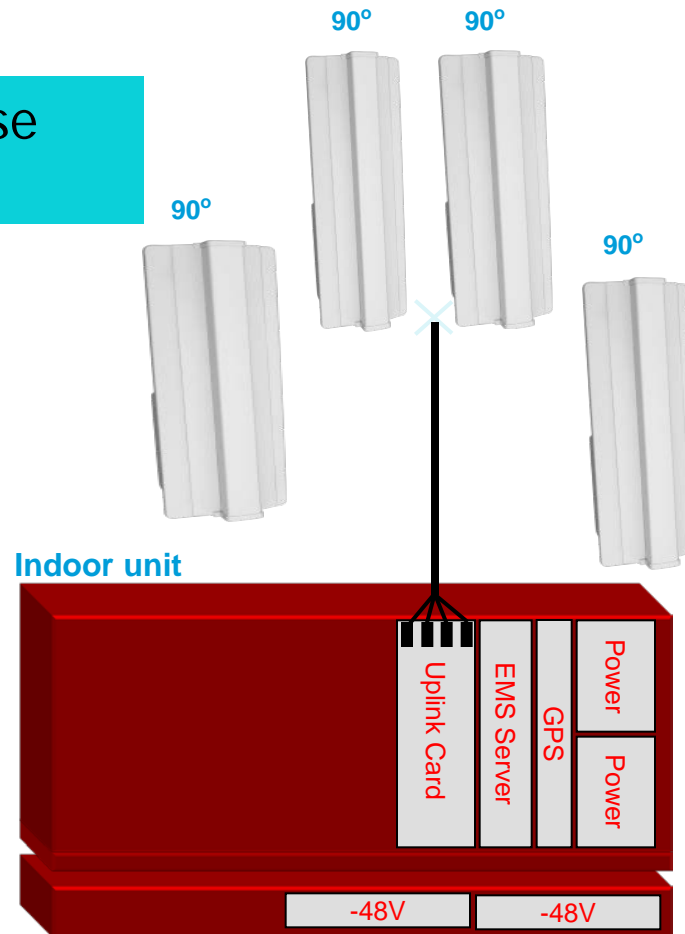


WiMax EQUIPMENT

# 4 Sector Base Site

with EMS, -48V

Add a 4<sup>th</sup> base station...

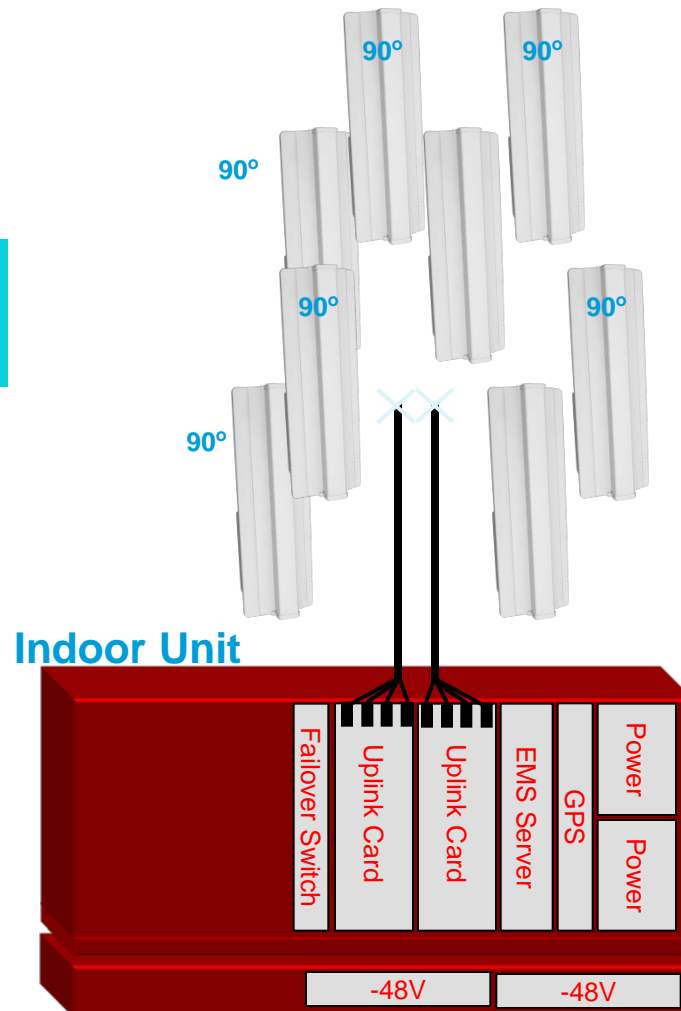




# 4 Sector Base Site with Failover

with EMS, -48V

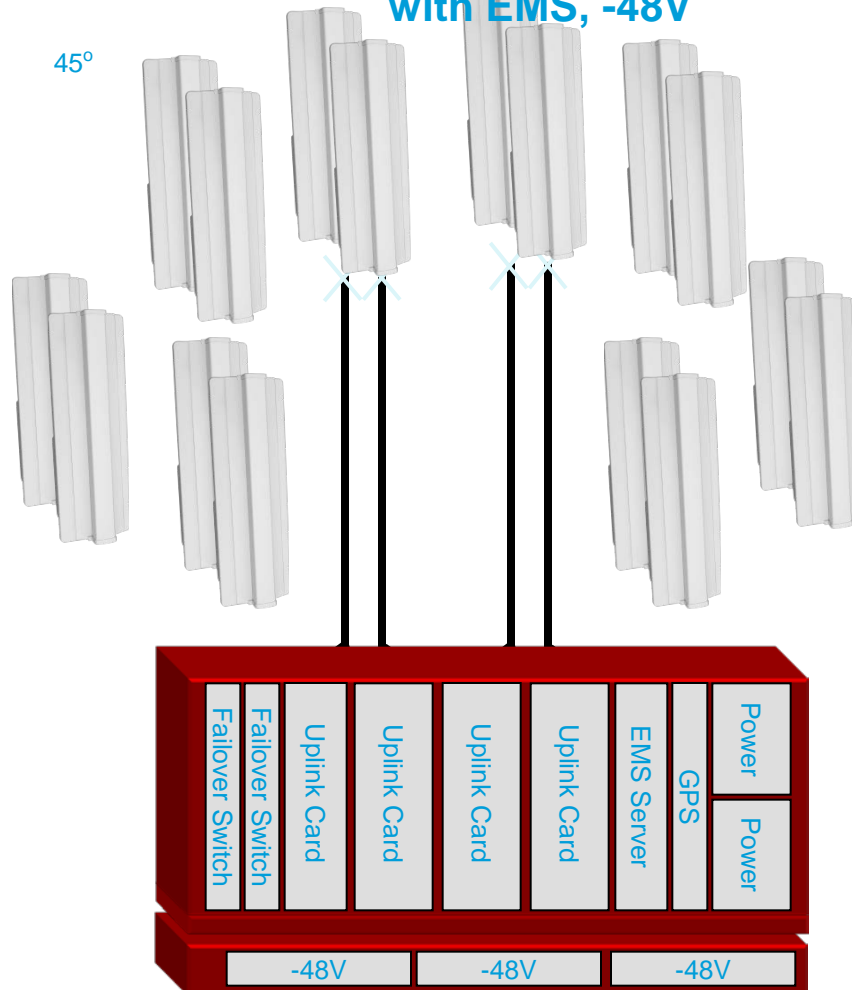
**Add failover capability...**



WiMax EQUIPMENT

# Maximum Build out: 8 Sector Base Site with **Failover**

with EMS, -48V



Grow to 8 sectors,  
while protecting  
your initial  
investment...

WiMax EQUIPMENT

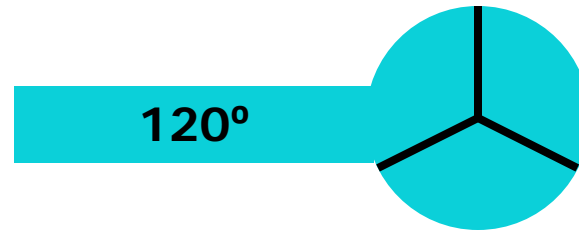
**Self-install indoor  
WiMAX subscriber  
unit.**



**Low cost outdoor  
WiMAX subscriber  
unit.**

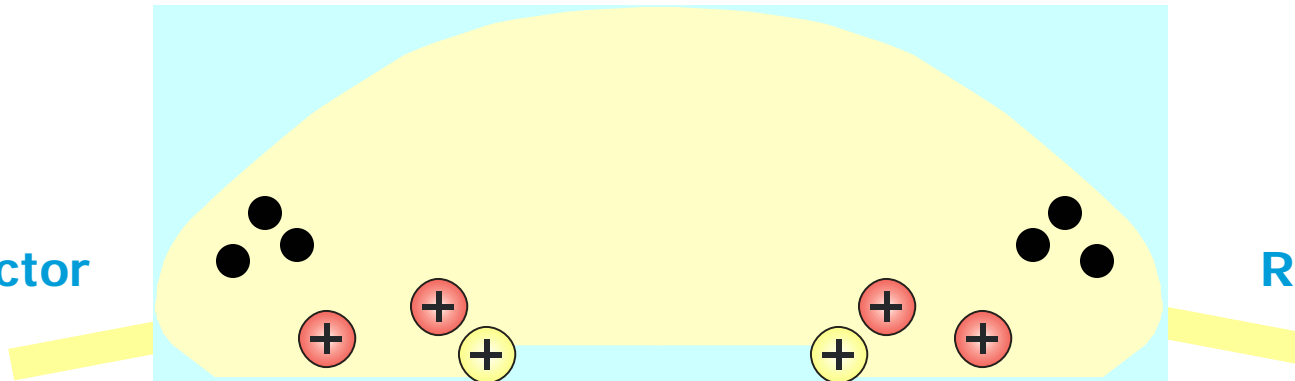


# Innovative field adjustable sectoral antenna



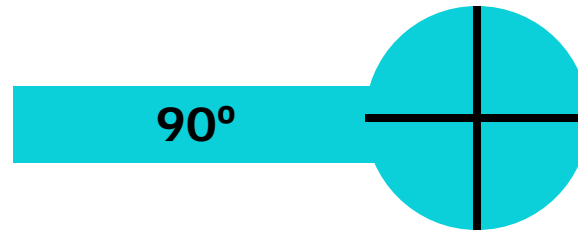
Top of Base Station Antenna

Reflector

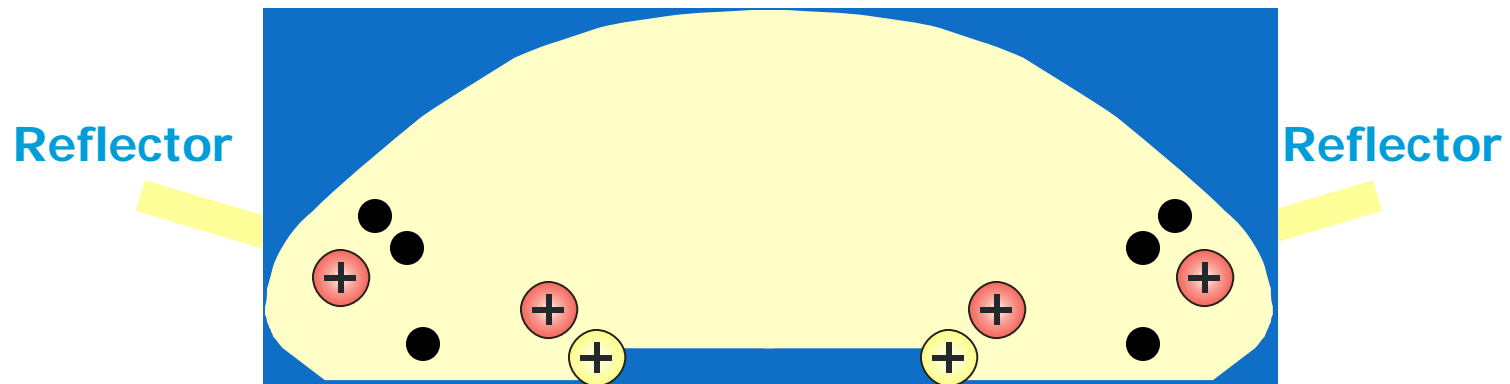


Wi-Fi / WiMax  
EQUIPMENT

# Innovative field adjustable sectoral antenna

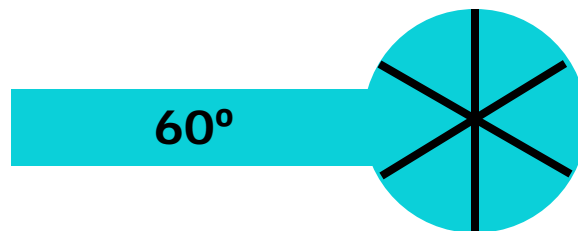


Top of Base Station Antenna

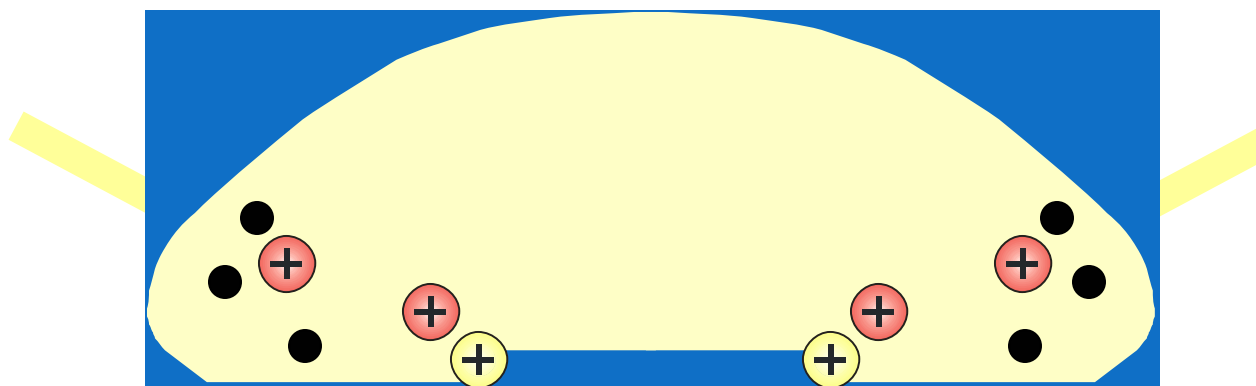


WiFi / WiMaX  
EQUIPMENT

# Innovative field adjustable sectoral antenna

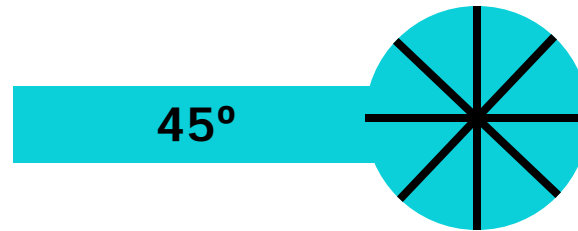


Top of Base Station Antenna

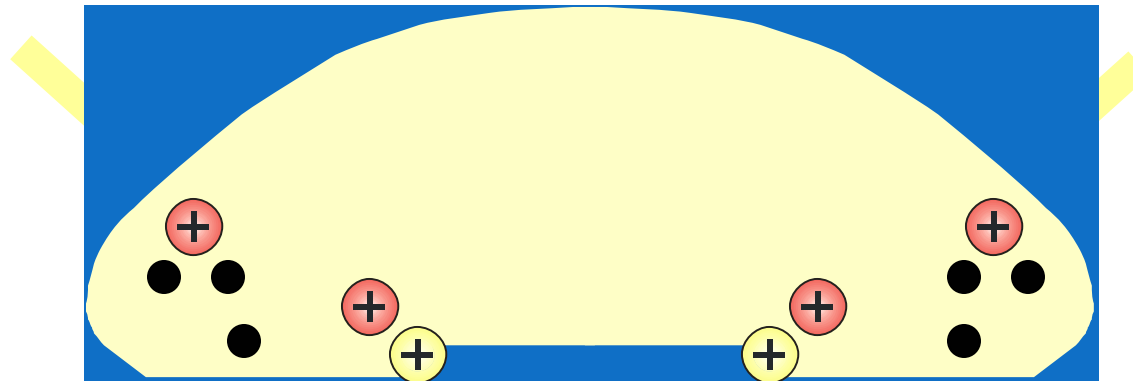


Wi-Fi /WiMax  
EQUIPMENT

# Innovative field adjustable sectoral antenna



Top of Base Station Antenna



WiFi /WiMaX  
EQUIPMENT



# High Capacity Licensed Products Overview

## Point to Point Hybrid Series:

- Point-to-Point licensed, carrier-class IP radio
  - IP170 optimized for Fast Ethernet (16-150Mbps)
  - Up to 16 x E1s
- Split-configuration architecture:
  - 1RU frequency-independent IDU
  - Compact capacity-independent ODU covering 6 to 40GHz

RAD-TR-P2P



# Key Features

- Hybrid capability:
- Up to >150 Mbps Ethernet
- Up to 16 E1s /T1s
- Software-selectable capacity and channel bandwidth

## **RAD-TR-P2P licensed, Carrier Class Point to Point**

- **16Mbps (7MHz)**
- **37Mbps (14MHz)**
- **66Mbps (28MHz)**
- **100 Mbps (28 MHz)**
- **150 Mbps (28 MHz)**

RAD-TR-P2P

# Modem Functionality

	16Mbps	37Mbps	66Mbps	100/150Mbps
7MHz	16QAM			
14MHz		16QAM		
28 MHz			16QAM	64/128QAM
	100Mbps	160Mbps	200Mbps	250/300 Mbps
28/40 MHz	16QAM	64QAM	128QAM	
50/56 MHz			64QAM	128QAM

RAD-TR-P2P

# High Capacity Licensed Products Overview

## **RAD-TR-P2P**

- Point-to-point licensed, carrier-class IP radio
  - M100 optimized for Fast Ethernet (16-100Mbps)
  - H1000 optimized for Gigabit Ethernet (100-300Mbps)
- Split-configuration architecture:
  - 1RU frequency-independent IDU
  - Compact capacity-independent ODU covering 6 to 40GHz

**RAD-TR-P2P**



# P2P Key Features

- Field-replaceable plug-in supporting flexible network growth: from legacy PDH (4E1 to 63E1) and beyond
- Software-selectable capacity and channel bandwidth

## – M100

- 16Mbps (7MHz)
- 37Mbps (14MHz)
- 66Mbps (28MHz)
- 100Mbps (28MHz)  
(True FE throughput)

## – H1000

- 150Mbps (28MHz)  
(True FE throughput)
- 160Mbps (40MHz)
- 200Mbps (40/50MHz)
- 250Mbps (50MHz)
- 300+ Mbps (56 MHz)

RAD-TR-P2P

# P2P Technical Features

- **Multiple-band: UHF, 4, 5, 5.8, 6, 7~8, 11, 13, 15, 18, 23, 26, 38 GHz**
- **Supports QCPK/8CPK modulations**
- **Single coaxial cable IDU interface**
- **Software configurable channel selection**
- **Configurable IF frequencies and telemetry to match customers' IDU**
- ***Standard SMT technology to minimize***
- ***Easy assembling and maintenance due to modular design***
- ***Die-casting design for all mechanical parts***
- ***Compact and portable design***

RAD-TR-P2P

## P2P ODU (Outdoor Unit)

- **Frequencies:**

Covers various ranges of ITU-R rec., for example:

Band	Range	T/R Spacing	Min. No. Sub-bands
7 GHz	7.125-7.725	154/161/196/245	2 to 16
8 GHz	8.275-8.500	119/ 126/151/266/311.32 /614	2 to 6
11 GHz	10.700-11.700	490 / 530	4 to 7
13GHz	12,750-13.250	266	4
15GHz	14.400-15.350	315/420 /475/490 640/644/728	2 to 4
18 GHz	17.700-19.700	1010/1092.5	3 to 4
23 GHz	22.000-23.600	1008/1200/1232	2 to 7
38 GHz	37.044-39.950	700/1260	2 to 4

# Turn-Key Operations

