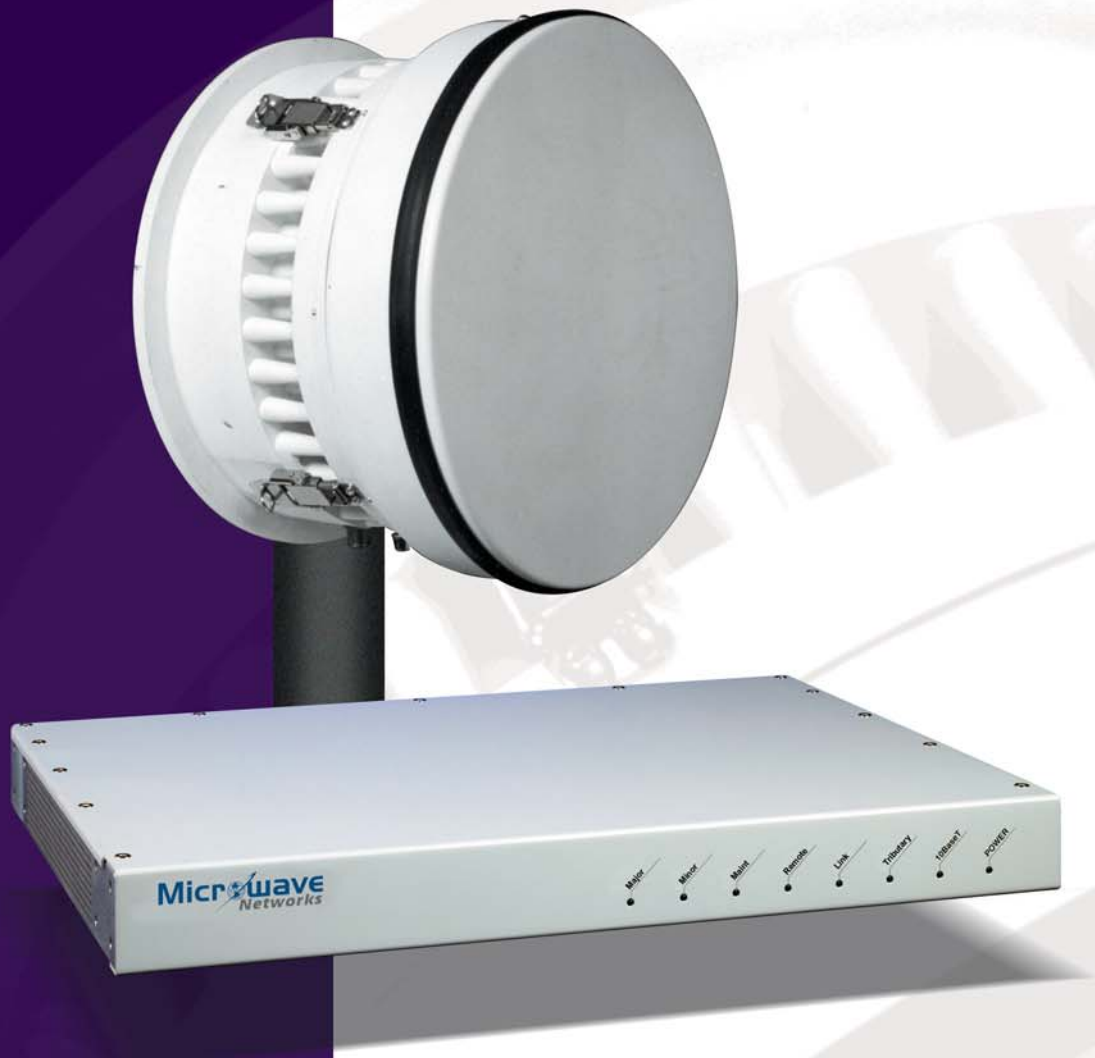


Pinnacle

Digital Microwave Radios

Operating at 13, 15, 18, 23, 26 & 38 GHz
With Capacities of 155 Mbit/s OC-3/STM1
Ethernet 100BaseT

Pinnacle radios are specifically designed for high capacity synchronous and IP based applications including first and last mile network access, Sonet/SDH ring closure, and cellular base station backhaul. Pinnacle radios are meeting the growing demand for more bandwidth while maintaining high spectrum efficiency.

Pinnacle's versatile design allows low-cost transmission of high-capacity data through narrow or congested spectrum. This spectral efficiency is complimented by a physical architecture that promotes rapid and cost-effective installations. Using multiple plug-in modules, the indoor unit (IDU) provides various customer signal interface(s) as well as access to the SNMP and local management ports for on-site commissioning and maintenance. The outdoor unit (ODU) consists of an RF unit directly integrated with a low-profile antenna - all connected to the IDU through a single coaxial cable. For critical paths, Pinnacle can also be configured for redundant hardware protection (1+1) using either a single or dual antenna design.

Versatile

- Plug-In data interface modules are field interchangeable and allow simple access to all standard interfaces
- Transport for ATM and SONET/SDH based systems
- 100 BaseT Interface is ideal for LAN, WAN & ISP
- Last-mile spur access
- Cell based network back haul for GSM, PCS, Cellular, 3G

Easy To Install & Operate

- Typical install time of less than 3 hours
- Integrated ODU/Antenna assembly
- Up to 1000 feet separation between ODU/IDU
- Simple graphical interface for initial set-up and maintenance
- Internal loopbacks, separate TX/RX switching, remote software downloads
- SNMP management interface

Reliable

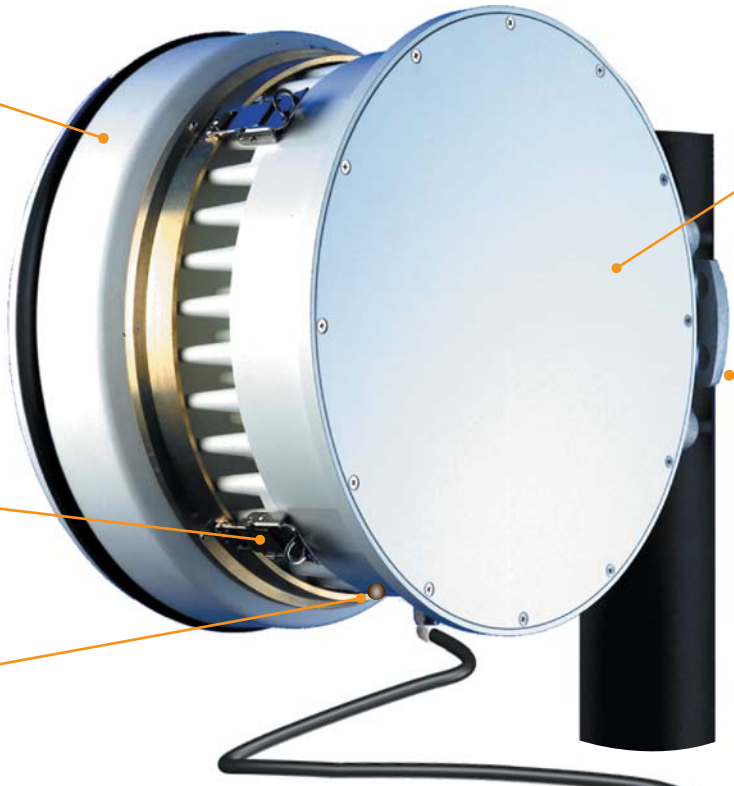
- Highly integrated MMIC, DSP, and flash technologies
- Extended MTBF
- Increased availability using redundant configuration
- Complete Digital Design
- Designed and Manufactured using ISO 9001 Standards

Technical Advantages

- 128 QAM modulation allows narrow 28 MHz operation
- Offers a high gain option for wideband channels
- Advanced forward error correction (FEC)
- Automatic Transmit Power Control (ATPC)
- Dual FLASH memory for software backup
- Common IDU reduces sparing and operating costs

OUTDOOR UNIT 13, 15, 18, 23, 26 & 38 GHz

Integrated RF /Antenna assembly
Eliminates waveguide loss, allows polarization selection and simplifies RF replacement without affecting antenna alignment.



INDOOR UNIT 155 Mbit/s, STM-1/OC-3

IDU to ODU Connection
Single Coax Cable (RG-8 up to 300m)

Accessory Port (Async Service Channel & HSB interconnection)

Local Control Craft Terminal or PC Interface (RS 232)

Network Management (10 Base-T SNMP)

+24 or -48 VDC

Back Panel

Rack Mountable Either Direction

Alarm Relays

Modem Port for Remote Dial-in Access

Plug-In Line Interface Module

Alarm/Status LEDs

Front Panel

Technical Specifications[1,2]

System Parameters

Frequency Bands:	13-38 GHz
Frequency Stability:	±2 ppm
Residual BER:	$<10^{-13}$
Transmitter Type:	Digital modulator, up-converter
Power Control (ATPC):	0 to 25 dB
Receiver Type:	Down converter, coherent demodulation

Standards Compliance

System:	FCC Part 101, ETSI EN 301 751
Antenna:	FCC Part 101 Category A or ETSI high-performance, BABT 211 ZV Class 2
EMC:	FCC Part 15 Class B, ETSI ETS 300 385, EN 301 489
Payload/Interface:	SONET applicable standards, ITU-T G.703, G.707, G.783, G.823, G.826, G.957, G.958

Payload

Capacity:	155.52 Mbit/s
Type:	Clear channel or SONET/SDH regenerator section
Electrical Interface:	CMI, BNC connectors
Optical Interface:	Single or multi-mode Intra-office, short or long haul SC, ST or FC connectors
Service Channels:	19.2 Kbits asynchronous; RS-232 2 x 64 Kbits synchronous; G.703
Wayside Channel:	T1 or E1; G.703
Ethernet User Interface:	100 BaseT 100 BaseT + 2T1/2E1 100 BaseT + 2T1/2E1 + DS3/E3

Frequency Dependent Parameters

General	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	38 GHz
Frequency Range	12.75 - 13.25 GHz	14.4 - 15.35 GHz	17.7 - 19.7 GHz	21.2 - 23.6 GHz	24.5 - 26.5 GHz	37.0 - 40.0 GHz
T/R Spacing	266 MHz	420, 490, 728 MHz	1010, 1560 MHz	1008,1200, 1232 MHz	1008 MHz	700, 1260 MHz
ETSI Specifications	EN 300 234 Class 5B	EN 300 234 Class 5B	EN 300 430 Class 5A	EN 300 198 Class 5A	EN 300 431 Class 5A	EN 300 197 Class 5A
Standard Bandwidth						
Output Power	-	-	18.0 dBm	17.0 dBm	17.0 dBm	17.0 dBm
Channel Bandwidth	-	-	40 or 55 MHz	50 or 56 MHz	56 MHz	50 or 56 MHz
Modulation	-	-	32 or 16 QAM	16 QAM	16 QAM	16 QAM
Threshold @ 10^{-6} BER	-	-	-71 or -73 dBm	-71 dBm	-71 dBm	-70 dBm
FCC Emission Designator	-	-	40M0F7W	50M0F7W	-	50M0F7W
Narrow Bandwidth						
Output Power	18.0 dBm	19.0 dBm	15.5 dBm	14.5 dBm	14.5 dBm	14.5 dBm
Channel Bandwidth	28 MHz	28 MHz	27.5 MHz	28 MHz	28 MHz	28 MHz
Modulation	128 QAM	128 QAM	128 QAM	128 or 256 QAM	128 QAM	128 or 256 QAM
Threshold @ 10^{-6} BER	-69 dBm	-69 dBm	-69 dBm	-68 dBm	-68 dBm	-67 dBm
FCC Emission Designator	-	-	-	25M0F7W	-	25M0F7W

General Parameters

Antenna

Type:	Parabolic reflector; integrated or external
Diameter:	1' (30 cm), 1.5' (45 cm), 2' (60 cm), 3' (90 cm) 4' (120 cm), 6' (180 cm)
Wind Loading:	Operational: 100 mph (160 km/h) Survival: 125 mph (220 km/h)
Polarization:	Linear (vertical or horizontal)
Adjustment Angle:	±35˚ elevation, ±15˚ azimuth

Power

Standard Input:	-36 VDC to -60 VDC
Optional Input (2):	24 VDC ± 20%
Power Consumption:	115 watts (non-protected); 240 watts (protected)

Environmental

Temperature:	
Operational Range:	ODU: -50˚C to +55˚C
Full Performance:	ODU: -33˚C to +55˚C / IDU: -5˚C to +45˚C
Relative Humidity:	ODU: 100% IDU: up to 95% non-condensing
Altitude:	15,000 feet (4,500 m)

Mechanical

IDU Dimensions:	1 RU (4 cm) x 19" (44.5 cm) x 12" (30.5 cm) (h x w x d)
IDU Weight:	4.7 lbs. (2.14 kg)
ODU Dimensions:	38 GHz: 13" x 13" x 12" (33 x 33 x 30.5 cm) (h x w x d) 13/15/18/23/26 GHz: 11.8" x 9" x 6.3" (30 x 23 x 16 cm) (h x w x d)
ODU Weight:	15.4 lbs. (7 kg) includes RF assembly only
IDU to ODU Connection:	1 coaxial cable up to 1000' (300 m), Belden 9913 (RG-8) or equivalent, 2 'N' type male connectors

Network Management

Type:	Integral SNMP agent, Craft Terminal Interface (CTI), GUI interface
Physical Interface:	PPP over RS-232 modem port (up to 56 Kbit/s) 10 BaseT Ethernet port VT100 craft terminal port (9.6 Kbit/s)
User Interface:	SNMP, CTI via Telnet, CTI via direct serial interface, GUI interface
Security:	3-level password protection, Challenge Protocol (CHAP) security
Remote Software Updates:	Flash download via TFTP over Ethernet or dial-up PPP
NMS Compatibility[3]:	OpenView™, NetView™, or any SNMP-based NMS
NM IP Rating:	IP addresses for radios and third-party equipment accessible over multiple cascaded links

Protected Branching Loss

	Primary	Standby
Transmit	1.5 dB	6.5 dB
Receive	1.5 dB	6.5 dB

Footnotes: 1.) All specifications are subject to change without notice.
2.) Non-protected specifications.
3.) Openview™ and Netview™ are registered trademarks of Hewlett Packard Corporation and IBM Corporation