

# RADITEK

## Telecom Point to Point Radio

# Point to Point Radio Family

## RADTR-P2P-6-38-IP170MB-a9



### PDH 4-16E1s/E3 and/or Ethernet up to 170Mbps 6-38GHz

#### Applications

Ethernet IP  
Cellular Backhaul

TDM/PDH/IP Radio Networks  
Trunking or Access Networks

#### Features & Benefits

- Cost-effective high-capacity PDH and Ethernet IDU for microwave and millimeter-wave radios
  - 170 Mbps throughput
- Optimized for efficient cellular backhaul and private network applications
- Flexible modem and multiplexer
  - Programmable Bandwidths and Symbol Rates

- Programmable Modulation Modes (up to 256 QAM)
  - Programmable FEC
  - Mix PDH and Ethernet traffic
- Flexible technology allows arbitrary bandwidth occupancy from a single IDU via software command

- Built-in PDH and Ethernet line interfaces
  - PDH: 16x E1
  - Built-in 2-port Ethernet with port-based VLAN & QO features
- Optional hot stand-by operation
  - Protect 2 ODUs from single IDU
- Optional errorless receive switching for diversity
- Single cable interface to Outdoor Unit
- Extensive link management inter-face support
  - Web-based link management
  - SNMP monitoring and craft menu applications
- Low-power design -20 to -72 VDC
- Uses less than 58 Watts
- Field-upgradeable firmware
- 1U 19-inch indoor rack mount unit

- Low-cost point to point FDD/PDH digital microwave radio system for E1 payload.
- Support capacities up to 16 E1 lines or E3\* (34 Mbps) and Wayside Ethernet Full Duplex capacity up to 8.4 Mbps.
- Frequency ranges from 6 to 38 GHz. It is available in Non-Protected (1+0) and protected (1+1) mode in HSB, MHSB, frequency diversity (FD), and space diversity (SD) configuration. It is also configurable for Repeater Operation. It can be mounted directly on properly equipped antenna, or it can be mounted separately and connected using standard UBR flange series waveguide.

Carrier-grade standards for performance, reliability, and quality.

- Flexible combinations of interfaces:
  - IP interfaces: 2x10/100Base-T
  - PDH interfaces: 4xE1 to 16xE1 or E3\*
- Software-configurable:
  - Capacity (8 Mbps to 170 Mbps)
  - Modulation (QPSK, 8QAM, 16QAM, 32QAM, 64QAM 128QAM and 256QAM)
  - Channel bandwidth (3.5, 7 MHz, 14 MHz, and 28 MHz)
  - IP-PDH payload throughput-allocation
  - 1+1 configuration with no additional switching hardware
  - Hitless (errorless) Rx protection switching

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- Hot-Standby, Space-Diversity, Frequency-Diversity, Tributary-Diversity
- Support of ring applications with East/West aggregate payload and local add/drop for E1s
- Auxiliary EOW voice and data channels
- SNMP management with integral routing
- Configuration backup via removable NVRAM
- Common 1RU IDU for all frequency bands, capacities, modulations and channel bandwidths
- Built-in BER Monitor
- Superior receiver sensitivity and system gain performance

### **Technical Information**

**The Indoor Unit** is an extremely versatile high-capacity IDU solution. A single, low-cost design is approved for the CEPT market. It offers Flexible Signal Processing architecture allows complete flexibility in combining Telco circuit-switched data (up to 16 E1s) and packet data (Ethernet) within the selected transport capacity.

Additional line interfaces can be accommodated via an optional line card. The transport capacity can be provisioned and monitored via the web-based Link Manager or craft interface. SNMP monitoring is provided.

The TR-170MB provides significant flexibility in a low-cost mechanical design. It is feature-rich including SNMP, built-in ODU protection, auxiliary control and alarms, and a craft command-line interface.

### **Customer Network Data Interface Options**

#### Physical

- Ethernet Full duplex 100BaseTX
- E3—Full duplex E3\*
- 4, 8 or 16 xE1 Full Duplex E1

#### Connector

- Ethernet RJ-45
- BNC Female 75 Ohm
- Nx E1 2xRJ-48C, HDCompliance
- Ethernet IEEE 802.3
- E3\* ITU-T, Telcordia
- Nx E1 ITU-T

#### Auxiliary Connections

- RS232 Data Service Channel
- Alarm Port Two Form C relay alarm outputs and two TTL inputs

#### Options

- Additional Modem/IF for single chassis protected or east/west mode
- Switching Fabric for drop-and-insert between TDM/IP traffic



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Programmable Modulation Modes	QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM		
Programmable Channel BWs	CEPT/ETSI – 3.5, 7, 14 and 28 MHz		
Programmable Symbol Rates	2 to ~24 M baud 2 Mbps – 170 Mbps		
Programmable Forward Error Correction	<ul style="list-style-type: none"> <li>Configurable Reed-Solomon coding</li> <li>Configurable interleaving frame length</li> </ul>		
End-to-end latency	≤ 1 ms		
Link quality metrics	Supports ITU-T G.826		
Spurious and Out-of-Band Emissions	ETSI compliant		
Interference Immunity	ETSI compliant		
	Modulation	Net bps	Eb/No (dB)
	QPSK	1.81	8.8 dB
Sensitivity Threshold for BER of 10 <sup>-8</sup> (RS-encoded with T=12 error-correcting)	8PSK	2.72	12.2 dB
	16QAM	3.62	12.3 dB
	32 QAM	4.53	14.4 dB
	64 QAM	5.44	16.9 dB
	128 QAM	6.34	19.4 dB
	256 QAM	7.24	21.9 dB
Line Interfaces	16xE1 with Ethernet, *optional 32xE1 or E3 — others per customer request		

#### Compliance – Summation

##### Outdoor Unit (ODU) Interface

Intermediate Freq. Range Tx: 350 MHz, Rx: 140 MHz  
Emissions Bandwidths ETSI  
ODU Command Interface ODU specific

##### Modem Capability

Capacity Options Throughput from 1 – 170 Mbps  
Modulation Programmable: QPSK, 16-QAM, 32-QAM, 64-QAM, 128-QAM, or 256-QAM  
FEC (Trellis Coded Modulation concatenated with Reed-Solomon Coding)

##### Network Management

Support SNMP  
Connector 2x10/100BaseTX

##### Environmental

Temperature –5° to +45°C (IDU)  
Relative Humidity 0 to 95%, non-condensing  
Power 50-75 Watts (depending on Network Data Interface and ODU version)  
ODU: –33° to +55°C, 100% Humidity

##### Payload Parameters

IP Interface 2x10/100BaseT, RJ-45 connector  
Standards Compliance IEEE 802.3ab, 802.1Q  
User Data Channel 64 kbps, V.11, DB-15 connector  
Voice Order wire 19.2 kbps, Standard handset interface

##### Mechanical

Dimensions 1RU, ETSI compliant

##### Configuration

Radio Protection 1+0 or 1+1 Hot standby, 'hitless' receiver switching with either frequency or space diversity  
Tributary Protection Single or Dual tributary  
Dual IF and power redundant feed (1+1 configuration)

##### Mechanical/Environmental

Dimensions IDU: 1U, 444.5 mm W x 240 mm D x 44.5 mm H  
Operating Temperature IDU: –5° to +45°C, ODU: –33° to +55°C (ODU)  
Altitude 4500 meters  
Humidity IDU: 95% non-condensing, ODU: 100% all-weather  
Power Input nominal –48V DC (–40.5 to –57 VDC)  
Power Consumption IDU+ODU: 1+0: M60 watts, 1+1 M115W  
Power Connector 2-pin male  
Cooling Natural Convection  
IDU-ODU Interface Coaxial N-type connector  
ODU Cable Belden 9913/RG-8, up to 300m\*  
Standards Compliance ETSI ETS 300 019  
\* longer with LMR400 or equivalent

##### Management

Protocol SNMPv1

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### RF/ODU Specifications

Description	Specifications - Typical														
	6L	6U	7	8	10	11	13	15	18	23	26	28	32	38	
Frequency Range	Frequency Bands (GHz)														
	5.9 to 6.4	6.4 to 7.1	7.1 to 7.9	7.9 to 8.5	10.0 to 10.685	10.7 to 11.7	12.7 to 13.3	14.4 to 15.4	17.7 to 19.7	21.2 to 23.6	24.2 to 26.5	27.5 to 29.5	31.8 to 33.4	37.0 to 40.0	
T/R Spacing (MHz)	240, 252.04	340	154, 160, 161, 168, 196, 245	119, 126, 151.614, 208, 266, 311.32	65, 91, 143.5, 230, 350	490, 500, 530	266	315, 420, 475, 490, 640, 644, 728	1010, 1560	1008, 1200, 1232	TBA	TBA	TBA	TBA	
<b>Transmitter</b>															
Type	Dual Conversion – Transmitter Power by Modulation Type														
Xmit Power (dBm)	30.0	30.0	27.0	27.0	27.0	27.0	20.0	20.0	19.0	19.0	19.0	N/A	N/A	19.0	
Xmtr Attn Step (dB)	1	1	1	1	1	1	1	1	1	1	1	N/A	N/A	1	
Xmit Pwr Range (dBm)	-10+27	-10+27	-10+27	-10+27	-10+27	-10+27	-1+20	-10+20	-10+19	-10+19	-10+19	N/A	N/A	-10+19	
TX Power Accuracy at Maximum Command(s)	± 1.5 dB (max)														
Slew Rate	7.85 kHz/us														
	Group Delay over 48MHz														
Linear	< 5.0 ns														
Parabolic	< 7.0 ns														
Channel Flatness	2 dB, within ±43% of channel BW referenced from center frequency														
TX Spectrum Mask	Meets ESTI Requirements														
Tx Power Accuracy over Command Range (Max)	± 2.0 dB (max)														
Output Power Muted	< -50 dBm														
Frequency Accuracy	± 7 ppm maximum, includes temp variation and aging, ± 8 ppm for 8GHz TR31 1.32 and TR151 .614, ± 9 ppm for 6GHz TR252.04														
Synthesizer Step Size	250 (except for 8GHz TR311.32:529.464 and TR151.614:530.091, 6GHz TR252.04:352.976)														
Modulation	QPSK, 16QAM, 32QAM, 64QAM														
Output Return Loss	> 10 dB											> 6 dB (> 10 Opt.)			
<b>Receiver</b>															
Receiver Noise Figure @ -85 dBm RSL (dB)	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	7.0	7.0	N/A	8.0	8.0	
Synthesizer Step Size (KHz)	250 (except for 8 GHz TR 311.32 : 529.464 and TR 151.614 : 530.091, 6 GHz TR 252.04 : 352.976)														
Typical High RSL* (dBm)	-20 (QPSK, 16/32 QAM)														
Typical Thresholds (-dBm)*	QPSK ~92, 16 QAM ~85, 32 QAM ~78, 64 QAM ~75, 128 QAM ~69, 256 QAM ~63														
CW Interferences*	Meets ETSI Requirements														
Receive Signal Level Indicator (V <sub>BNC</sub> )	4.5 (typical) @ -20 dBm RSL, 0.1 (typical) @ -90 dBm RSL, monotonic														
RSL versus V <sub>BNC</sub>	RSL (dBm) = 15.77 V <sub>BNC</sub> - 91.58														
RSL Accuracy** (@V <sub>BNC</sub> ) (dB) (Max)	± 3.0, -70 ≤ RSL ≤ -30 dBm														
RSL Accuracy** (dB)	±2 -70 dBm to -30 dBm, ±3 -90 dBm to -20 dBm over temperature and frequency														
Input Return Loss (dB)	≥ 10											≥ 6 (≥ 10 optional)			
Group Delay	Total over 12 MHz (Narrow)					Linear over 28 MHz (Wide)					Parabolic over 28 MHz (Wide)				
Typical (ns)	100					10					10				

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ODU Interface														
Connector Type	N Type													
Cable Impedance	50 Ohms													
TX IF Frequency	350 MHz													
RX IF Frequency	140 MHz													
ODU's Primary Power														
Power Dissipation	33.0 to 72.0 VDC, either polarity: 52 (Nom @ 48), 58 (Max @ 33) Watts						19.2 to 72.0 VDC, either polarity: 40 (Nom @ 48), 48 (Max @ 19.2)							
Protection Circuit	Power and protected by IDU (inrush current – ETS 300 132-2)													
CW Rejection														
CW Rejection to adjacent channels	56 MHz (Wide) ± 56 MHz >9 dB ± 112 MHz >20 dB							14 MHz (Narrow) ± 14 MHz >9 dB ± 28 MHz >20 dB						
Environmental, Etc.														
Operating	ETS 300 019-2-4 Class 4M5 to (-33 +55°C)													
Cold Start Conditions	Power Supply Operational @ -45°C, ODU will transmit, no guarantee of quality of service.													
Storage	ETS 300-019-2-1													
Transport	ETS 300-019-2-2													
Mechanical	Weight (3.7 kg), Size (107mm D x 225mm H x 225mm W)													
Finish	(Corro-Coat PE 71-190Z (Powder Coat), Gloss White													
Ground Lug	M5 x .8 x 9.5 long													
Antenna Interface (WR and/or Circ. Inch)	***	***	1.025	1.025	.75 or .740	.75 or .740	.75 or .620	.62 or .560	.42 or .455	.42 or .375	.42 or .370	N/A	.28 or .250	.219

\* Compliance depends on Customer's unique MODEM attributes.

\*\* An additional offset in accuracy should be expected for customer modulation bandwidths different than those used for receiver calibration.

\*\*\* Dielectrically loaded rectangular waveguide interface (non-standard). Requires external waveguide transition to WR137.

Contact Factory for Test Conditions and Specification Changes

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