



Wireless without
Boundaries

ETSI

IP170ew Series Microwave Radio System



Indoor Unit



Outdoor Unit

Outdoor Unit +
Antenna



6 - 38
GHz

L

170
Mbps

LOS

FE

PTP

S
I/O

PDH 4-16E1s/E3 and/or Ethernet up to 170 Mbps

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
- FlexBand™ 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 & QoS features
- Optional hot stand-by operation
 - Protect 2 ODU's from single IDU
- Optional errorless receive switching for diversity
- Single cable interface to Outdoor Unit
- Extensive link management interface 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

IP170ew

The **IP170** is a low-cost point to point FDD/PDH digital microwave radio system for E1 payload.

The **IP170** Series products support capacities up to 16 E1 lines or E3* (34 Mbps) and Wayside Ethernet Full Duplex capacity up to 8.4 Mbps.

The **IP170** operates in 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.

The **IP170** meets 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
- 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.

The IDU 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 IP170 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

KEY FEATURES

- 1RU Standalone
- Flexible Tx and Rx IF to ODU
- Standard Interfaces
- E3 Option
- Supports Customized NMS, SNMP

BENEFITS

- Low Cost Means Better Margins
- Quick to Deploy
- Network Option Cards for Easy Upgrade and Expansion
- Easily Deployed and Activated

APPLICATIONS

- Ethernet IP
- TDM/PDH/IP Radio Networks
- Cellular Backhaul
- Trunking or Access Networks

SERVICES AVAILABLE

- Technical Support
- Installation and Setup
- Maintenance
- Application Support
- Hardware Support
- Guaranteed Warranty

For more information on any of our products or services please visit us on the Web at:

www.wniglobal.com

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, HD60

Compliance

- 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



Protected (1+1) Mount

Programmable Modulation Modes	QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM		
Programmable Channel BWs (FlexBand™)	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	• Configurable Reed-Solomon coding • Configurable interleaving frame length		
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
	8PSK	2.72	12.2 dB
Sensitivity Threshold for BER of 10 ⁻⁸ (RS-encoded with T=12 error-correcting)	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		

RF/ODU Specifications

Description	Specifications - Typical													
Frequency Range	6L	6U	7	8	10	11	13	15	18	23	26	28	32	38
	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
Transmitter														
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) Slew Rate	± 1.5 dB (max) 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 6GHzTR252.04													
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.)			
Receiver														
Receiver Noise Figure @ -65 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 _{BNC})	4.5 (typical) @ -20 dBm RSL, 0.1 (typical) @ -90 dBm RSL, monotonic													
RSL versus V _{BNC}	RSL (dBm) = 15.77 V _{BNC} -91.58													
RSL Accuracy** (@V _{BNC}) (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			
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

Compliance - Summation

* Special order—please consult your salesperson or the factory

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

Mechanical

Dimensions 1RU, ETSI compliant

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 Orderwire 19.2 kbps, Standard handset interface

Configuration

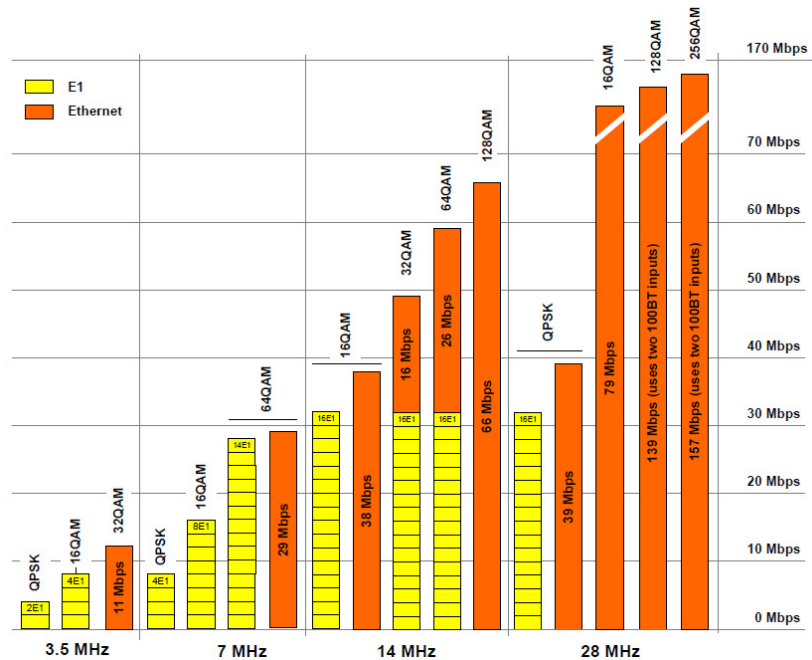
Radio Protection 1+0 or 1+1 Hot standby, 'hitless' receiver switching with either frequency or space diversity
Tributary Protection Single or Dual tributary
Dual IF and power redundant feed (1+1 configuration)

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 +24 or -48V DC (-20 to -72 VDC)
Power Consumption IDU+ODU: 1+0: ≤60 watts, 1+1 ≤115W
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
Local Access Ethernet 10Base-T, RJ-45
Remote IDU Access Out-of-band integrated routing over link and interconnected



ODU—Front/Back



IP170-2 IDU Protected Version
2x RF for ODUs

LANs

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Specifications and availability are subject to change without notice.

Performance specifications are for 1+0 configurations and optimum conditions and may be affected by location, environment, and other operating conditions.

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