



ETSI

Wireless without  
Boundaries

## IP1000c Series Microwave Radio System



Indoor Unit



Outdoor Unit

Outdoor Unit +  
Antenna



6 - 38  
GHz

L

300+  
Mbps

LOS

GbE

PTP

Split  
in/out

### Over 300/600\* Mbps Ethernet and/or TDM with SDH

#### Features & Benefits

- Licensed Frequency Bands
- Point to Point Link
- 4, 8, 16, 28, 32, 54, 63 E1 Interface options
- 1 or 2 x STM-1 Option
- Low Latency Ethernet over 300/600\* Mbps
- Adaptive Modulation for increased availability\*
- Jumbo Frames up to 9600 Bytes
- Field upgradeable by Plug-in Assembly
- RF, IF, Digital Loop back Capability
- Built-in BER Monitor
- Delay Setting for Hitless (errorless) switching
- Wide Operating Temperature Range
- Wide DC Power Input Range
- Low Power Consumption
- SNMP Management
- Up to 300 Meter separation between IDU and ODU
- Small attractive profile

#### IP1000c Overview

This full duplex (FD) point to point IDU and ODU microwave full duplex radio system is a flexible, low-cost, feature-rich solution for microwave radios in the global telecommunications market.

WNI-1000c Ethernet radio system is a full-featured compact split mount digital radio offering full duplex committed data rates up to 311 Mbps in IP based networks. The radio supports software configurable capacity selection between 100 and 311 Mbps in either 28 or 56 MHz channel bandwidths. Utilizing proprietary advanced ASIC modem technology using advanced Forward Error Correction (FEC) Trellis Coded Modulation (TCM) provides superior performance and reliability at a low cost. Trellis Coded Modulation provides significant performance improvements to system gain and interference immunity translating in to smaller antennas and increase operating range.

Additional features in the WNI-1000c are field replaceable common payload interfaces, built-in upgradeability to 1+1 hardware protection, engineering voice orderwire, auxiliary data channel, and optional element management software.

WNI-1000c is ideally suited for backhaul networks, WiMAX operators, ISPs, next generation mobile, and enterprise/campus networks requiring a low cost highly competitive Gigabit IP scalable radio system that exceeds carrier-grade standards for reliability, quality, and environmental compliance.

The IDU incorporates a unique, single-chip ASIC modem featuring integrated FEC with selectable coding rates. Modulation and data throughput rates are QPSK to 256 QAM and 11-311 Mbps respectively. Standard interfaces include 16x E1 and 100/1000BaseTX. Plug-in options allow for STM-1, or 2xSTM-1.

- incorporates digital filtering for the various data bandwidths.
- is designed to support protected and east/west repeater configurations in a single 1RU chassis.
- offers volume capacity and proven performance for applications worldwide
- represents a new generation of PDH IDUs at the most competitive prices in the market today.
- is designed to simplify product logistics and overall product life cycle costs.
- the upgradeable architecture reduces capital and operating expenditures for field installation, maintenance, training, and spares while maximizing product reliability.
- includes advanced features such as support for ring/consecutive point configurations. This creates a self-healing redundancy that is more reliable than traditional point-to-point networks.

\* Over 600 Mbps with either aggregate capacity or the use of XPIC



# Technical Information

## KEY FEATURES

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

## BENEFITS

- Low Cost Means More cost effective
- Quick to Deploy
- Network Option Cards for Easy Upgrade and Expansion
- Easily Deployed and Activated

## APPLICATIONS

- Ethernet IP
- PDH or STM-1 Radio Networks
- Cellular Backhaul
- Trunking or Access Networks

## SERVICES AVAILABLE

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

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

[www.wniglobal.com](http://www.wniglobal.com)

The **IP1000c** is a low-cost point to point FDD/PDH, STM-1 and IP digital microwave radio system for Ethernet or E1 payload.

The **IP1000c** Series products support capacities over 300/600\* Mbps Ethernet + E1s (any part of which can be allocated to E1 capacity up to 63xE1s).

The **IP1000c** 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. The IP1000c is also configurable for Repeater Operation. It can be mounted directly on properly equipped antennas using our snap-on mount, or it can be mounted separately and connected using standard UBR flange series waveguide.

The **IP1000c** meets carrier—grade standards for performance, reliability, and quality.

## Customer Network Data Interface Options

### Physical

- Ethernet Full duplex 100BaseTX
- STS-1 Full duplex STS-1
- STM-1 Full duplex STM-1, Single Mode 1310 nm
- SONET Full duplex
- Nx E1 Full Duplex E1

### Connector

- Ethernet RJ-45
- STS-1 BNC Female 75 Ohm
- STM-1 BNC
- SONET Type fiber SC
- Nx E1 2xRJ-48C, HD60

### Compliance

- Ethernet IEEE 802.3
- STS-1 ITU-T, Telcordia
- STM-1 ITU-T
- SONET Telcordia
- Nx E1 ITU-T

### Auxiliary Connections

- Voice Service Channel 6 Wire, PTT Handset
- Data Service Channel 64kbps
- Alarm Port Two Form C relay alarm outputs

### Options

- Additional Modem/IF for single chassis protected or east/west mode
- Switching Fabric for drop-and-insert between TDM/IP traffic
- E1 High Density Cable



Protected (1+1) or Twice (2x) throughput configuration (2+0)

## Initial System Requirements

Network Interface	Network Processor	Modem	Intermediate Frequency
<p><b>Standard Configuration</b></p> <ul style="list-style-type: none"> <li>Scalable Ethernet</li> <li>16x E1 Wayside or Traffic</li> <li>In-band Control Channel</li> <li>10/100/1000 BaseTx and 1000 BaseSx Ethernet</li> </ul>	<p><b>Standard Configuration</b></p> <ul style="list-style-type: none"> <li>Flexible Platform Processor</li> <li>OAM&amp;P</li> <li>Security</li> <li>Built-in Web Server</li> </ul>	<p><b>Standard Configuration</b></p> <ul style="list-style-type: none"> <li>Flexible modulation: QPSK - 256QAM</li> <li>Selectable Error - Correction Coding</li> <li>Equalization</li> <li>Pre-distortion</li> <li>Built-in Link Support: BER</li> <li>* future</li> </ul>	<p><b>Standard Configuration</b></p> <ul style="list-style-type: none"> <li>Transmit: 350 MHz</li> <li>Receive: 140 MHz</li> </ul>
<p><b>Options</b></p> <ul style="list-style-type: none"> <li>Additional 16x E1</li> <li>1 or 2xSTM-1</li> <li>Multi-channel STM-1</li> </ul>		<p><b>Option</b></p> <ul style="list-style-type: none"> <li>Adaptive Modulation (choose any 3 constellations)</li> <li>Second plug-in modem for protected or east/west mode</li> </ul>	<p><b>Options</b></p> <ul style="list-style-type: none"> <li>Variable Digital IF for various bandwidths</li> <li>Second IF for plug-in modem for protected or east/west mode</li> </ul>

# RF/ODU Specifications

Description	Specifications - Typical														
Frequency Range	6L	6U	7	8	10	11	13	15	18	23	26	28	32	38	
	<b>Frequency Bands (GHz)</b>														
	<b>5.9 to 6.4</b>	<b>6.4 to 7.1</b>	<b>7.1 to 7.9</b>	<b>7.9 to 8.5</b>	<b>10.0 to 10.685</b>	<b>10.7 to 11.7</b>	<b>12.7 to 13.3</b>	<b>14.4 to 15.4</b>	<b>17.7 to 19.7</b>	<b>21.2 to 23.6</b>	<b>24.2 to 26.5</b>	<b>27.5 to 29.5</b>	<b>31.8 to 33.4</b>	<b>37.0 to 40.0</b>	
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 Pwr (dBm) Max. @ QPSK	30.0	30.0	30.0	30.0	27.0	28.0	26.0	26.0	25.0	25.0	25.0	25.0	23.0	23.0	
Xmtr Attn Step (dB)	5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	
Xmit Pwr Range (dBm)	-10+30	-10+30	-10+30	-10+30	-10+27	-10+28	-1+26	-10+26	-10+25	-10+25	-10+25	-10+25	-10+23	-10+23	
Xmit Power at 128 QAM	24.0	24.0	24.0	24.0	21.0	21.0	18.0	18.0	17.0	17.0	17.0	17.0	16.0	16.0	
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 TR3I 1.32 and TR151 .614, ± 9 ppm for 6GHzTR252.04														
Synthesizer Step Size	250 (except for 8GHz TR3I 1.32:529.464 and TR151.614:530.091, 6GHz TR252.04:352.976)														
Modulation	QPSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM														
Output Return Loss	> 10 dB											> 6 dB (> 10 Opt.)			
<b>Receiver</b>															
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 Threshold*	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				
<b>ODU Interface</b>															
Connector Type	N Type														
Cable Impedance	50 Ohms														
TX IF Frequency	350 MHz														
RX IF Frequency	140 MHz														
<b>Primary Power</b>															
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)														
<b>CW Rejection</b>															
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								
<b>Environmental, Etc.</b>															
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.

# Compliance - Summation

## Outdoor Unit (ODU) Interface

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

## Modem Capability

\*Capacity Options Throughput over 300 Mbps. XPIC Option provides over 600 Mbps—link is 600/1200 Mbps aggregate  
Modulation Programmable: QPSK, 16-QAM, 32-QAM, 64-QAM, 128-QAM, 256-QAM  
FEC (Trellis Coded Modulation concatenated with Reed-Solomon Coding)

## Network Management

Support SNMP  
Connector 10/100BaseTX

## Environmental

Temperature -5° to +55°C  
Relative Humidity 0 to 95%, non-condensing  
Power 50-75 Watts (depending on Network  
Data Interface and ODU type)

## Mechanical

Dimensions 1RU, ETSI compliant

## Payload Parameters

IP Interface 4x100/1000BaseT, RJ-45 connector, 1x1000BaseSC SFP  
Standards Compliance IEEE 802.3ab, 802.1Q  
User Data Channel 64 kbps, V.11, DB-15 connector  
Voice Orderwire 64 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  
Power Protection Dual inputs with redundant feed (1+1 configuration)  
Voice EOW Interface Standard handset interface  
User Channel Interface V.11 or G.703, DB-15 connector

## Mechanical/Environmental

Dimensions IDU: 1U, 444.5 mm W x 240 mm D x 44.5 mm H  
ODU: 267 mm Diameter x 89 mm H  
Weight IDU: 4.0 Kg, ODU: 4.7 Kg  
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 -48V DC (-40.5 to -57 VDC)  
Power Consumption ODU: 1+0: ≤65 watts, 1+1 ≤130 watts  
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 LANs  
Craft Interface VT-100, via local craft RS-232/DB-9 port or remote via telnet session  
External Alarms 4 inputs and 3 Form-C outputs, DB-25 connector

Standards Compliance ETSI EN 302 217-2, ETSI EN 301 489, ETSI EN 300 132-2, IEC EN 60950

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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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