RADWIN 2000 cellular backhaul deployment

RADWIN 2000 PORTFOLIO

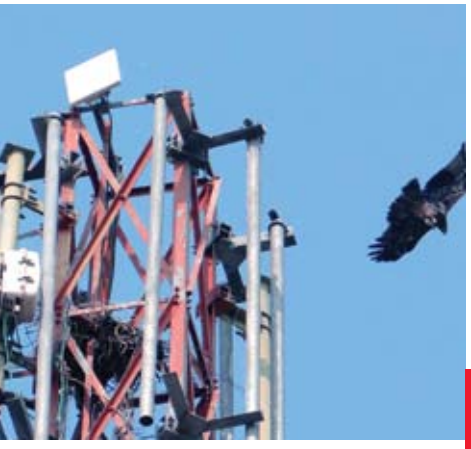
BUILT FOR BACKHAUL

The RADWIN 2000 portfolio of carrier-class sub-6 GHz products delivers ultra-capacity for long-ranges. Built for Backhaul, the radio links are optimized for all IP & Cellular Backhaul applications.

RADWIN The Wireless Choice

RADWIN 2000 Portfolio

Built for Backhaul



IP backhaul, India

Cellular backhaul installation, USA

The RADWIN 2000 portfolio offers licensed and license-exempt wireless broadband products that deliver up to 200 Mbps aggregate throughput. Supported bands include 2.3 GHz, 2.4 GHz, 3.4-3.7 GHz and 4.8-6.0 GHz. Compact and robust, RADWIN 2000 products provide native TDM (up to 16 E1s/T1s) + Ethernet, preparing operators for a seamless migration from TDM to all-IP networks.

RADWIN 2000 radios support multiple bands on the same platform, giving operators the flexibility to select the optimal band for transmission. Systems incorporate state-of-the-art technologies including MIMO and OFDM as well as advanced networking capabilities such as QoS and VLAN Tagging.

RADWIN 2000 radios can be deployed in a Point-to-Point and Multiple Point-to-Point topology, where as many as 16 units can be installed in a single site by using RADWIN 's Hub Site Synchronization (HSS) unit. Additionally, RADWIN's GPS-based Synchronization Unit (GSU) can be used to eliminate interference between sites in dense deployments. To ensure maximum service availability in case of equipment failure or link drop, RADWIN radios also offer built-in Ring protection functionality.

RADWIN's products comply with worldwide regulations and standards and are deployed globally by leading carriers, service providers, and public and private networks requiring high-capacity connectivity.

RADWIN 2000 Portfolio

Built for Backhaul

WiMAX backhaul, USA

IP backhaul in the Netherlands

RADWIN 2000 Portfolio Highlights

- Up to 200 Mbps net aggregate throughput
- Native TDM (up to 16 E1s/T1s) + Ethernet
- Long range - up to 120 Km/75 miles
- Telco-grade, incorporating advanced MIMO & OFDM technologies
- Multi-band radio supports multiple bands on same platform
- Extremely robust - systems operate in nLOS, high interference and harsh weather
- Extremely simple to install and maintain
- TDM service protection through Hot Monitored Standby
- Ethernet service protection through 1+1 and Ring topology

RADWIN 2000 Portfolio

RADWIN 2000 C-Series – Ultra-capacity radios delivering up to 200 Mbps net aggregate throughput (100 symmetric) and up to 16 E1s/T1s

RADWIN 2000 L-Series – Carrier-class radios delivering up to 50 Mbps symmetric throughput and up to 16 E1s/T1s

RADWIN 2000 PDH Series - Industry's first sub 6-GHz microwave PDH systems delivering up to 16 E1s/T1s + 10 Mbps symmetric Ethernet at most competitive prices

RADWIN 2000 C-Series

Ultra-Capacity Radios for IP & TDM Backhaul

Gas utility connectivity, Siberia

IP & TDM transmission in extreme temperatures, Russia

C-Series Highlights

- 200 Mbps net aggregate throughput
- Native TDM transport (up to 16 E1s/T1s + Ethernet)
- Long range - up to 120 Km/75 miles
- Single radio supports multiple bands
- Asymmetric capacity - fixed or dynamic channel allocation
- Built for harsh interference scenarios
- Ease of operation and maintenance
- Advanced MIMO, OFDM and Diversity technologies
- Enhanced QoS
- Ring and 1+1 service protection

RADWIN 2000 C-Series

Ultra-Capacity Radios for IP & TDM Backhaul

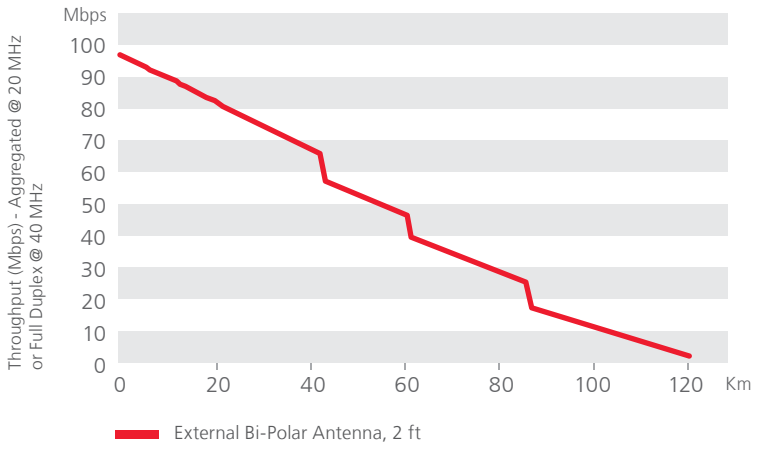
RADWIN 2000 C is the ultimate backhaul solution for IP & TDM networks.

Reaching 200 Mbps aggregate throughput and providing IP and TDM over the same link make this product ideal for today's and tomorrow's networks, preparing operators for the seamless migration from legacy TDM to all-IP networks.

RADWIN 2000 C-Series products deliver IP with end-to-end QoS. The solutions operate in symmetric and in adaptive asymmetric mode where channel capacity is dynamically allocated between uplink and downlink based on traffic loads and air-interface conditions. Extremely simple to install and maintain, the RADWIN 2000 C-Series solutions operate flawlessly in the most challenging environments, including non line-of-sight scenarios, interference-ridden environments and extreme temperatures.

For operators who want to break the capacity barrier and meet the skyrocketing demand for broadband, the RADWIN 2000 C-Series is the right choice.

RADWIN 2000 Total Throughput Performance



RADWIN 2000 L-Series

Built for High Capacity IP & TDM Applications

Operation in high-interference, NYC, USA

Multiple PtP deployment

RADWIN 2000 L-Series

Built for High Capacity IP & TDM Applications

The RADWIN 2000 L-Series provides up to 50 Mbps symmetric throughput and a flexible combination of native TDM (up to 16 E1s/T1s) and Ethernet, enabling operators to cost-effectively support converged IP + TDM networks.

The RADWIN 2000 L-Series radios fit a broad range of Cellular & IP backhaul applications and provide broadband connectivity to large corporates and high capacity for private networks. The L-Series radios offer a compelling price/performance ratio that is unprecedented in the industry.

> "We chose RADWIN 2000 because it allowed us to carry our VOIP traffic as well as providing the speed and reliability we need for our data systems. We also reduce CAPEX & OPEX because the solutions are just a fraction of the cost of alternative systems."
>
> Steve Hemphill, IT Director, Baldwin City School District, Kansas, USA

L-Series Highlights

- Up to 50 Mbps symmetric throughput and up to 16 E1s/T1s
- Native TDM transport
- Long range - up to 120 Km/75 miles
- Single radio supports multiple bands
- Extensive networking capabilities
- Ease of operation and maintenance
- Advanced MIMO, OFDM and Diversity technologies
- Built for harsh interference scenarios
- Ring and 1+1 service protection

RADWIN 2000 PDH Series

Sub-6 GHz Microwave Systems for Cellular Backhaul

PDH Series Highlights

- Up to 16 E1s/T1s + 10 Mbps symmetric throughput
- Native TDM transport
- Long range - up to 120 Km/75 miles
- Single radio supports multiple bands
- Built for harsh interference scenarios
- Extensive networking capabilities
- Advanced MIMO, OFDM and Diversity technologies
- Ring and 1+1 service protection
- Ease of operation and maintenance
- Outstanding cost/ performance value

RADWIN 2000 PDH Series

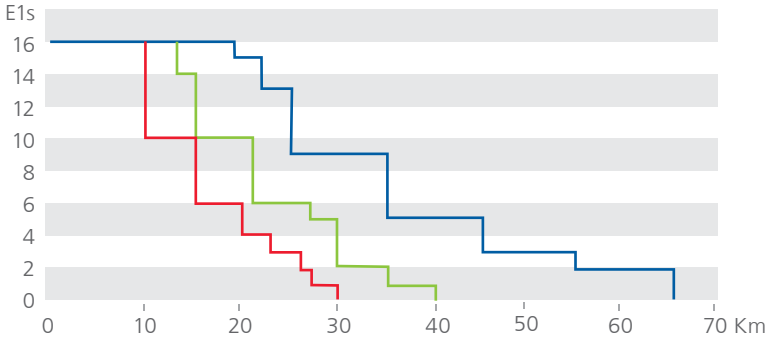
Sub-6 GHz Microwave Systems for Cellular Backhaul

RADWIN 2000 PDH is the industry's first sub 6-GHz microwave PDH system delivering up to 16 E1s/T1s + 10 Mbps symmetric Ethernet. Designed to address carriers' cellular backhaul requirements, RADWIN 2000 PDH provides high-end performance, capacity and range never before seen in its price category.

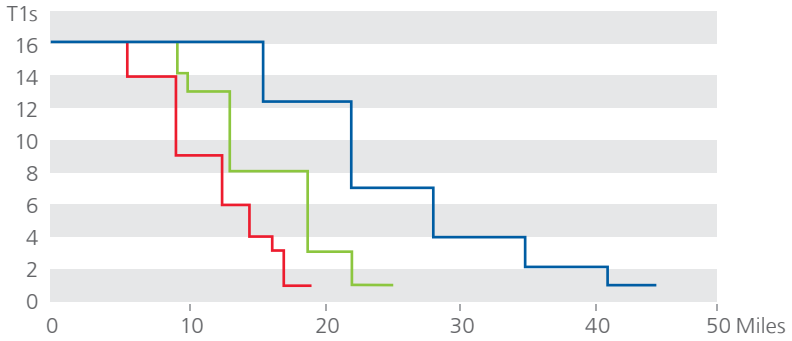
RADWIN 2000 PDH is built for cellular backhaul applications. It is the optimal solution for expanding networks to rural areas, providing enhanced 3G coverage in the city and enabling operation in non line-of-sight environments. For carriers who want to extend their networks rapidly and realize fast return on investment (ROI), RADWIN 2000 PDH is the natural choice.

RADWIN 2000 TDM Performance

E1 Performance*



T1 Performance*



Integrated antenna 2ft antenna 3ft antenna

* Typical performance at 5.8 GHz with 99.99% availability

RADWIN 2000 Specifications

> “We chose RADWIN 2000 because we liked the throughput of 100 Mbps which was the perfect fit for our requirements. The installation was easy and fast, and connectivity was easily achieved even in a difficult 5.8 GHz band where the spectrum is very tight.”
>
> Kevin Kluge,
> Planning Engineer,
> Bug Tussel Wireless Carrier,
> Wisconsin, USA

Configuration								
Architecture	ODU: Outdoor Unit with Integrated Antenna or Connectorized Unit for External Antenna IDU: Indoor Unit or PoE device							
IDU to ODU Interface	Outdoor CAT-5e cable; Maximum cable length: 100m							
Max Throughput								
	Aggregated	Symmetric	Asymmetric	TDM				
RADWIN 2000 C-Series	200 Mbps	100 Mbps	100 Mbps	Up to 16 E1s/T1s				
RADWIN 2000 L-Series	100 Mbps	50 Mbps	-					
RADWIN 2000 PDH Series	20 Mbps	10 Mbps	-					
Radio								
Range	Up to 120 Km/75 miles							
Frequency Bands	2.302-2.472 GHz, 3.400-3.700 GHz and 4.800-6.060 GHz Multi-band radios supported							
Channel Bandwidth	C-Series	L-Series	PDH Series					
	10/20/40 MHz	10/20 MHz	10/20 MHz					
Maximum Tx Power	25 dBm @ 4.8 - 6.0 GHz; 26 dBm @ 2.x GHz; 26 dBm @ 3.x GHz							
Adaptive Modulation & Coding	Supported							
Automatic Channel Selection	Supported							
Diversity	Polarization and Spatial diversity supported							
Spectrum View	Supported							
Duplex Technology	TDD							
Encryption	AES 128							
TDD Synchronization	In-site synchronization Inter-site synchronization via GSU unit							
Radio Parameters								
Modulation	2x2 MIMO-OFDM							
	BPSK	QPSK		16QAM		64QAM		
Forward Error Correction (FEC) Rate	1/2	1/2	3/4	1/2	3/4	2/3	3/4	5/6
Air Rate [Mbps]	13	26	39	52	78	104	117	130
Sensitivity (dBm) @ BER <10E-11, 20MHz	-88	-86	-83	-81	-80	-72	-70	-67

RADWIN 2000 Specifications

Ethernet Interface	
Number of Ports	2 in IDU-C and IDU-E; 1 in PoE device 10/100BaseT with Auto-Negotiation (IEEE 802.3u) Framing/Coding IEEE 802.3
SFP Port	Supported in IDU-C (type FE)
VLAN	802.1Q, 802.1P and QinQ Tagging (supported in IDU-C and IDU-E RW-71XX)
QoS	4 levels
Maximum Information Rate	Configurable in steps of 1Kbps
Connector	RJ-45
Maximum Frame Size	2048 Bytes
Latency	3 msec (typical)
Service Protection	Built-in support: 1+1 and Ring topology
TDM Interface	
Number of Ports	Up to 16 E1s/T1s in IDU-C; 2 E1s/T1s in IDU-E
Type	E1/T1 configurable by RADWIN Manager
Framing	Unframed (transparent)
Timing	Independent timing per port, Tx and Rx
Connector	RJ-45
Standards Compliance	ITU-T G.703, G.826
Line Code	E1: HDB3 @ 2.048 Mbps T1: B8ZS/AMI @ 1.544 Mbps
Latency	Configurable: 5-20 msec (default: 8 msec)
Impedance	E1: 120Ω, balanced T1: 100Ω, balanced
Jitter & Wander	According to ITU-T G.823, G.824
Service Protection	Monitored Hot Standby (MHS) 1+1 in IDU-C
Management	
Link Management Application	RADWIN Manager
Protocol	SNMP and Telnet
NMS Application	RADWIN NMS (RNMS)
Mechanical	
Dimensions and Weight	ODU with Integrated Antenna: 37.1cm(w) x 37.1cm(h) x 11cm(d); 3.5 kg / 7 lbs ODU Connectorized: 19.5cm(w) x 27.0cm(h) x 8.0cm(d); 1.8 kg / 3.6 lbs IDU-C: 43.6cm(w) x 4.4cm(h) x 21cm(d); 1.5 kg / 3.3 lbs IDU-E: 22cm(w) x 4.4cm(h) x 17cm(d); 0.5kg / 1.1 lbs
Power	
Power Feeding	-20 to -60 VDC (dual feed in IDU-C) 100-240 VAC, 50/60 Hz
Power Consumption	< 35W (ODU+IDU) < 25W (ODU+PoE device)
Environmental	
Operating Temperatures	ODU: -35°C to 60°C / -31°F to 140°F IDU: 0°C to 50°C / 32°F to 122°F
Humidity	ODU: 100% condensing, IP67 (totally protected against dust and immersion up to 1m) IDU-C: 90% non-condensing
Shock and Vibration	EN 300 019-2-4 IEC 60068-2 Class4M5
Radio Regulations	
FCC	47CFR, Part 15 Subparts C&E; Part 90 Subpart Y
IC (Canada)	RSS-210, RSS-111
ETSI	EN 300 328; EN 301 893; EN 302 502
WPC (India)	GSR-38
MII (China)	5.8 GHz Band Regulation
Safety	
FCC/IC (cTUVus)	UL 60950-1, UL 60950-22, CAN/CSA C22.2 60950-1, CAN/CSA C22.2 60950-22
ETSI	EN/IEC 60950-1, EN/IEC 60950-22
EMC	
FCC	47CFR Class B, Part15, Subpart B
ETSI	EN 300 386, EN 301 489-4
CAN/CSA	CISPR 22-04 Class B
AS/NZS	CISPR 22:2006 Class B

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RADWIN The Wireless Choice

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