RADWIN 2000 cellular backhaul deployment

RADWIN 2000 PORTFOLIO

BUILT FOR BACKHAUL

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

RAD WIN
The Wireless Choice

RADWIN 2000 Portfolio
Built for Backhaul

IP backhaul, India

Cellular backhaul installation, USA

The RADWIN 2000 portfolio offers products that are built for backhaul, delivering up to 200 Mbps aggregate throughput at a range of up to 120 km/75 miles. Compact and robust, RADWIN 2000 products pack native TDM (up to 16 E1s/T1s) + Ethernet on a single platform, preparing operators for a seamless migration from TDM to all-IP networks.

The RADWIN 2000 radios support multiple bands on the same platform (2.4 and 4.8-6 GHz), giving operators added flexibility to select the optimal band for transmission. Systems incorporate state-of-the-art technologies including MIMO, OFDM and Diversity together with RADWIN proprietary protocols to ensure unmatched robustness and resiliency in operation in the sub-6 GHz bands. All products can be deployed in both a Point-to-Point and Multiple Point-to-Point architecture.

RADWIN's products comply with worldwide regulations and standards and are deployed in over 120 countries by leading cellular carriers, service providers, ISPs as well as 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 on a single platform

• Telco-grade, incorporating advanced MIMO & OFDM technologies

• Long range - up to 120 km/75 miles

• Multi-band radio supports multiple bands on same platform (2.4 & 4.8-6 GHz)

• Robust - systems operate in tough conditions, harsh weather & high interference

• Extremely simple to install and maintain

• 1+1 Monitored Hot Standby support

RADWIN 2000 Portfolio

RADWIN 2000 C-Series – Ultra-capacity radios delivering up to 200 Mbps net aggregate throughput 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

* 100 Mbps supported in Phase I; 200 Mbps aggregate throughput supported from Q2/2010 by software upgrade

RADWIN 2000 C-Series

Mega-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 (up to 16 E1s/T1s) + Ethernet over the same link

- Long range - up to 120 km/75 miles

- Superior spectral efficiency

- Asymmetric capacity – dynamic allocation of uplink & downlink traffic, enabling more capacity at longer ranges

- Single radio supporting multiple bands (2.4 and 4.9–5.9 GHz)

- Robust and reliable

- Ease of operation and maintenance

* 100 Mbps supported in Phase I; 200 Mbps aggregate throughput supported from Q2/2010 by software upgrade

RADWIN 2000 C-Series

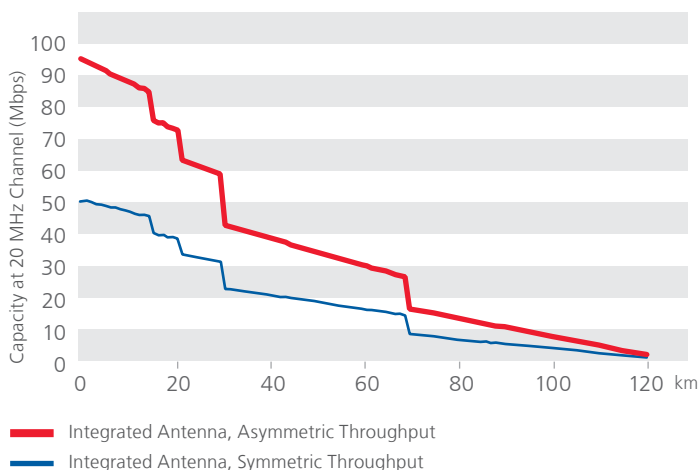### Mega-Capacity Radios for IP & TDM Backhaul

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 such as LTE/4G.

RADWIN 2000 C-Series products operate in symmetric and in adaptive asymmetric mode, whereby capacity is dynamically allocated between uplink and downlink based on traffic loads and air-interface conditions. Extremely simple to install and maintain, systems 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

Capacity at 20 MHz Channel (Mbps)

— Integrated Antenna, Asymmetric Throughput
— Integrated Antenna, Symmetric Throughput

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 carefully evaluated different communications options before handing the final decision over to the Deployed Solutions staff in Afghanistan. The RADWIN 2000 systems meet our requirements, without additional modification or equipment. "

Major Lee Hawkes
Ministry of Defence, UK

L-Series Highlights

- Up to 50 Mbps symmetric throughput and up to 16 E1s/T1s
- Native TDM transport
- Superior spectral efficiency
- Long range - up to 120 km/75 miles
- Single radio supporting multiple bands (2.4 and 4.8–6 GHz)
- Advanced MIMO, OFDM and Diversity technologies
- Highest availability in harsh interference scenarios
- 1+1 Monitored Hot Standby Support

RADWIN 2000 PDH Series

Sub-6 GHz Microwave Systems for Cellular Backhaul

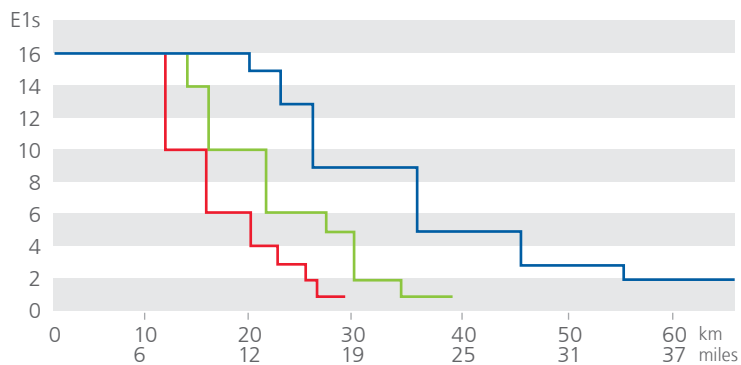## RADWIN 2000 PDH Series

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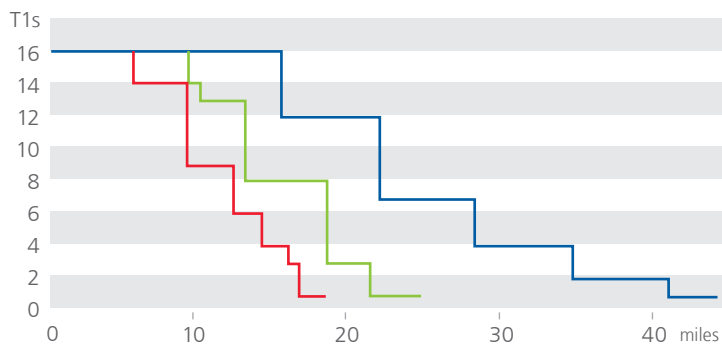
RADWIN 2000 PDH is built for all cellular backhaul applications, and is the optimal solution for expanding networks to rural areas, providing enhanced 3G coverage and enabling operation in non line-of-sight environments. For carriers who want to extend their networks rapidly and realize fast return on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

PDH Series Highlights

- Up to 16 E1s/T1s + 10 Mbps Ethernet

- Native TDM transport

- Multi-band radio supporting multiple bands on one platform (2.4 and 4.9–6 GHz)

- Advanced radio technologies inside: OFDM, MIMO and Diversity

- High Availability & Reliability – systems operate in challenging conditions including extreme temperatures and tough terrain

- 1+1 Monitored Hot Standby support

- Most competitive price in the industry

RADWIN 2000 TDM Performance

E1 Performance*

T1 Performance*

Legend: ─── Integrated antenna   ─── 2ft antenna   ─── 3ft antenna

* Typical performance at 5.8 GHz with 99.99% availability

❝ 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
Max Throughput	
RADWIN 2000 C-Series	100 Mbps net aggregate throughput and up to 16 E1s/T1s (200 Mbps available in Q2/2010)
RADWIN 2000 L-Series	50 Mbps symmetric throughput and up to 16 E1s/T1s
RADWIN 2000 PDH Series	Up to 16 E1s/T1s + 10 Mbps Ethernet
Radio	
Range	Up to 120 km/75 miles
Frequency Bands	Multi-band radio supporting 2.402 - 2.472 GHz and 4.800 - 6.060 GHz
Channel Bandwidth	20 MHz 10/20/40 MHz available in Q2/2010
Max Tx Power	25 dBm @ 4.8 - 5.9 GHz; 26 dBm @ 2.x GHz; 20 dBm @ 6.0 GHz
Adaptive Modulation & Coding	Supported
Automatic Channel Selection	Supported
Diversity	Supported
Spectrum View	Supported
Duplex Technology	TDD
Error Correction	FEC k = 1/2, 2/3, 3/4, 5/6
Encryption	AES 128
Hub Site Synchronization (HSS)	Up to 16 collocated links (RADWIN 2000 and WinLink 1000)

Radio Parameters								
Modulation	2x2 MIMO-OFDM							
	BPSK	QPSK		16QAM		64QAM		
FEC Rate	1/2	1/2	3/4	1/2	3/4	2/3	3/4	5/6
Maximum 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

TDM Interface

Number of Ports	Up to 16
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: 8msec)
Impedance	E1: 120Ω, balanced T1: 100Ω, balanced
Jitter & Wander	According to ITU-T G.823, G.824
Monitored Hot Standby (MHS)	1+1 with RADWIN 2000 link or WinLink 1000 link

Ethernet Interface

Ethernet Ports	2 in IDU-C; 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 Support	VLAN transparent for user traffic; Separation for management traffic
Information Rate	Configurable in steps of 1Kbps
Connector	RJ-45
Maximum Frame Size	2048 Bytes
Latency	3 msec (typical)
Impedance	100Ω

Management

Link Management Application	RADWIN Manager
Protocol	SNMP and Telnet
NMS Application	RADWIN NMS (RNMS)

Mechanical

Dimensions	ODU with Integrated Antenna: 37.1(w) x 37.1(h) x 11(d) cm; 3.5 kg / 7 lbs ODU Connectorized: 19.5(w) x 27.0(h) x 8.0(d) cm; 1.8 kg / 3.6 lbs IDU-C: 43.6(w) x 4.4(h) x 21(d) cm; 1.5 kg / 3.3 lbs

Power

Power Feeding	-20 to -60 VDC (dual feed) Optional AC/DC adapter
Power Consumption	< 35 W (IDU+ODU)

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

Radio Regulations

FCC	47CFR, Part 15 Subparts C&E; Part 90 Subpart Y
IC (Canada)	RSS-210, RSS-111
ETSI	EN 301 893; EN 302 502
WPC (India)	GSR-38
MII (China)	5.8 GHz Band Regulation

Safety

FCC/IC (cTUVus)	UL 60950, CAN/CSA 60950-1 C22.2
ETSI	EN/IEC 60950-1; CE

EMC

FCC	47CFR Class B, Part15, Subpart B
ETSI	EN 300 386, EN 301 489-1, EN 301 489-4
CAN/CSA-CEI/IEC	CISPR 22-04 Class B
CAN/CSA-CEI/IEC AS/NZS	CISPR 2

Corporate Headquarters

T. +972.3.766.2900
E. sales@radwin.com

www.radwin.com

RADWIN
The Wireless Choice