



## Frequently Asked Questions

### I. General

**Q. What is RADWIN's WinLink™ 1000?**

**A.** WinLink™ 1000 is a high performance, high capacity, cost effective point-to-point broadband wireless solution.

WinLink™ 1000:

- Delivers both E1s/T1s and Ethernet services over a single radio link
- Installed and deployed in hours
- Operates in the 2.4 GHz and 4.9 - 5.9 GHz frequency bands
- Operational range of over 80 km /50 mi
- High capacity of 48 Mbps
- Breakthrough OFDM technology
- Certified for deployment in FCC, ETSI and CSA regulated countries

**Q. What are the key components of the WinLink™ 1000 solution?**

**A.** RADWIN's WinLink 1000 includes 1 Indoor unit, 1 Outdoor Unit, 1 antenna and 1 UV-protected CAT cable 100 meters long. WinLink 1000's easy-to-use Network Management System includes a configuration wizard as well as planning and remote link monitoring capabilities.

**Q. Who benefits from using WinLink™ 1000?**

**A.** WinLink 1000 addresses the needs of customers seeking carrier-class, cost-effective broadband access solutions that operate under the harshest weather conditions, even in non line of sight environments.

Our customers include:

- Carriers and WISPs
- Universities, hospitals, utilities and municipalities
- Large corporations and SMEs
- Private networks such as schools
- Public safety institutions, defense and military markets

**Q. What are some of the WinLink™ 1000 applications?**

**A.** WinLink 1000 supports a wide range of applications, including:

- Cellular backhaul
- Building to building connectivity
- Broadband access
- WiFi backhaul hotspots
- Private networks for security, military and public safety applications
- Video and security surveillance



**Q. What is the range of WinLink™1000?**

**A.** WinLink 1000 can reach a range of 80 km/50 mi. The actual range depends on a number of factors, including specific system configuration, weather conditions, topography, geographical terrain, etc.

**Q. How secure is WinLink™ 1000?**

**A.** WinLink 1000's proprietary air interface provides a layer of security. In addition, in Q3 2004 RADWIN has introduced an AES 128-bit key encryption scheme for optimal over-the-air security.

**Q. Why should I choose WinLink™ 1000 over competitor products?**

**A.** WinLink 1000 offers unmatched capabilities, including:

- High quality, carrier-grade performance
- Most competitive price in the market
- Support for both both TDM and Ethernet services
- Long range, even in non line of sight environments
- Ease of deployment – up and running in hours

**Q. Has WinLink 1000™ won any awards?**

**A.** Yes. RADWIN's WinLink 1000 received the Wireless Internet Service Providers Organization's President's Choice Award. The award is the organization's highest honor, representing the best of the best in the license exempt WISP industry.

**Q. Why is WinLink™ 1000 a technological breakthrough?**

**A.** WinLink 1000 is specifically tailored to maximize robustness and spectral efficiency in the sub-11 GHz bands. By controlling the intellectual property on all key components of the system - including the physical (PHY) layer, the medium access control (MAC) layer and the radio transceiver chip sets - RADWIN has created the optimal broadband solution. Key technical differentiators include:

- Unique OFDM (orthogonal frequency division multiplexing) approach to address multi-path effects in non line of sight conditions
- Enhanced air-interface with a mechanism for adaptive modulation, adaptive encoding - delivered on a burst-by-burst basis in both directions
- Automatic repeat and error correction
- Automatic channel selection
- Ease of installation, deployment and use

**Q. How can I buy WinLink™ 1000?**

**A.** RADWIN sells its WinLink 1000 solution through its network of distributors. To find the nearest RADWIN distributor in your area, send an email to [info@radwin.com](mailto:info@radwin.com).



**Q. How can I become a RADWIN Partner?**

A. For information on how to become a RADWIN partner send an email to [partners@radwin.com](mailto:partners@radwin.com).

## **II. WinLink 1000 Technology**

**Q. How many non-overlapping channels are available in WinLink™ 1000?**

A. WinLink 1000 uses 20MHz channel bandwidth to provide the following number of non-overlapping channels:

- 2.4GHz band (2.400 - 2.483GHz) – 3
- 4.9GHz band (4.940 - 4.990GHz) – 2
- 5.3GHz band (5.250 - 5.350GHz) – 5
- 5.4GHz band (5.470 - 5.725GHz) – 11
- 5.8GHz band (5.725 - 5.850GHz) – 5

**Q. What are the advantages of the unlicensed spectrum band in which WinLink™ 1000 operates?**

A. The unlicensed spectrum band delivers the following benefits:

- High availability of spectrum
- Eliminates the need to pay license fees
- Does not require obtaining permissions to install a link and eliminates bureaucratic headache
- Mature technology that enjoys competitive prices

**Q. What duplexing technique does WinLink™ 1000 support?**

A. WinLink 1000 is based on time division duplex (TDD) rather than frequency division duplex (FDD) to communicate over the air. TDD involves transmitting and receiving data on the same channel, unlike FDD which requires two dedicated channels: one for transmitting data and the other for receiving data. The advantage of TDD is that it optimizes the use of the channel according to the actual transmit-receive symmetry of the data traffic flow, similar to the manner in which Ethernet operates. FDD, on the other hand, has a fixed symmetry, so that spectrum is wasted should the traffic symmetry not match the FDD channel bandwidth allocation. Note that WinLink 1000 features extremely low latency, about 3 milliseconds for Ethernet services, and this is crucial when it comes to supporting real-time applications such as voice and video conferencing.

**Q. Which standards does WinLink™ 1000 support?**

A. WinLink 1000 supports the Radio, Safety, EMC, Telecom and Environmental standards set out by FCC, ETSI and CSA, per the specific frequency band.



**Q. Can the WinLink™ 1000 outdoor unit withstand harsh environmental conditions?**

**A.** Yes. The WinLink 1000 outdoor unit is waterproof, and built to withstand even the most extreme weather conditions, namely:

- Temperatures: -35°C - 60°C / -31°F - 140°F
- Humidity: up to 90% non-condensing

WinLink 1000 is installed in parts of the world which have the harshest weather conditions. It fully complies with the International Engineering Consortium's IP-67 standard (an indication of how well a device resists entry of solid objects and water).

**Q. What technologies are incorporated into WinLink™ 1000?**

**A.** WinLink 1000 incorporates innovative technologies in order to enable longer operational range, higher capacity and greater reliability. Technologies include: OFDM (Orthogonal Frequency Division Multiplexing), error correction, ARQ, adaptive encoding and modulation, automatic channel selection as well as directional antennas.

**Q. How does OFDM work?**

**A.** OFDM enables achieving high data rates by using several overlapping carrier waves instead of just one. This means that communications are continuously supported, even in situations of multi-path interference. In contrast, single carrier systems operating under the same conditions would lose their link. OFDM technology can be compared to a multi-lane highway. Even in cases where one lane is blocked, the remaining lanes will enable traffic to continue flowing without interruption. Incorporating OFDM into the WinLink 1000 solution, delivers the following key benefits:

- Immunity to multi-path interference environments
- System operation under the harshest weather and geographical terrain conditions, in some cases even non-line-of-sight deployments

**Q. How does WinLink 1000 handle interference?**

**A.** WinLink 1000 provides a number of means to handle interference, including:

- ARQ
- Non-stop transmission mechanism
- Adaptive modulation based on OFDM
- Automatic channel selection
- Advanced Forward Error Correction
- Directional antenna design



### **III. WinLink™ 1000 Installation**

**Q. How do I align the WinLink™ 1000 antenna?**

**A.** WinLink 1000 antenna alignment is made easy thanks to the “signal buzzer” in the system’s outdoor unit, which emits audible beeps to indicate optimal antenna alignment. This procedure is extremely accurate, simple and cuts the lengthy alignment process to mere minutes.

**Q. Is it possible to align the WinLink™ 1000 antenna in a crowded environment?**

**A.** Yes. Unlike other systems, WinLink 1000 does not rely on power indicators to estimate the received signal level. Instead, it uses a unique signature per link to ensure accurate and rapid antenna alignment in crowded environment.

**Q. What is the maximum distance between WinLink™ 1000’s indoor and outdoor unit?**

**A.** 100m.

**Q. Is it possible to install WinLink™ 1000 on both V and H polarization?**

**A.** Yes. The standard mounting kit which comes with each WinLink 1000 outdoor unit supports both V and H polarizations.

**Q. Do I need a special cable or connectors to connect the WinLink™ 1000 indoor and outdoor units?**

**A.** No. 1 UV-protected CAT cable 100 meters long comes with the system. Additional cables and connectors can be ordered through RADWIN.

**Q. Can I connect an external antenna to WinLink™ 1000?**

**A.** Yes. There exist two options for connecting an antenna to the WinLink™ 1000 outdoor unit: 1) Using an integrated antenna. 2) Using an external antenna, which can be ordered through RADWIN.

**Q. Is it possible to install multiple WinLink™ 1000 units in the same site?**

**A.** Yes. Multiple WinLink 1000 units can be co-located at a given site, for instance, on one building or tower. RADWIN provides guidelines to assist customers in these situations.

**Q. What is the maximum throughput of WinLink™ 1000?**

**A.** WinLink 1000 has a bi-directional net throughput of 18 Mbps.

**Q. What is the average one-way latency of WinLink™ 1000?**

**A.** The average latency is:

- Ethernet traffic < 3 milliseconds
- E1/T1 traffic < 8 milliseconds



**Q. What is WinLink™ 1000's power supply?**

**A.** WinLink 1000 supports a power supply of -48 VDC, and in some models -24 VDC.

**Q. What configuration software comes with WinLink™ 1000?**

**A.** WinLink 1000 comes with configuration and management software - WinLink Manager. WinLink Manager is based on a standard SNMP protocol and its easy-to-use Web based GUI enables remote monitoring and configuration of the WinLink point-to-point units. In addition, the WinLink Manager provides interfaces for SNMPc and HPoV applications, providing a cost-effective solution for large projects.