



WinLink™ 1000 Family

High Capacity Carrier Class Radio System
for 2.4GHz, 4.9GHz and 5.XGHz Bands

Installation and Operation Manual

WinLink™ 1000

***Point-to-Point Wireless
Product Family***

Revision 3.0

WinLink 1000

Point-to-Point Wireless TDM/IP Revision 3.0 Installation and Operation Manual

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FCC–15 User Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance (RADWIN) could void the user's authority to operate the equipment.



Warning

It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden in accordance to FCC rules CFR47 part 15.204.

Quick Start Guide

Installation of WinLink 1000 should be carried out only by a qualified technician. If you are familiar with WinLink 1000, use this guide to prepare the units for operation.

1. Installing WinLink 1000 Units

ODU Package Contents:

- ODU
- Mast/Wall mounting kit
- WinLink 1000 Management software installation CD
- Mounting instructions
- Spare RJ-45 connector
- ODU to IDU cable at length ordered (optional)

IDU-E Package Contents:

- IDU-E
- 110V/240V adaptor
- IDU wall-mounting drilling template
- Spare RJ-45 connector

(Optional) IDU-C Package Contents:

- IDU-C
- For AC model, 110v/240 VAC with 3-prong connector cable
- For DC model, -48 VDC with 3-pin terminal block connector (green)
- IDU standard 1-U, 19" carrier rack
- Spare RJ-45 connector

Equipment Required:

- RJ-45 crimp tool (If pre-assembled cable is not used)

- Drill (for wall mounting only)
- IDU and ODU grounding cable
- 13 mm or 1/2" socket spanner
- ODU to IDU cable if not ordered (Outdoor class, CAT-5e, 4 twisted pairs)
- Cable ties
- Laptop running Windows 2000 or Windows XP

Before the installation

1. Install the WinLink 1000 software on the laptop.
2. Verify that all equipment and tools are available.

Performing Installation

→ To install the ODU:

1. At site **A**, route the ODU cable from the ODU location (on the roof) to the IDU location (inside the building). The maximum length is 100m.
2. Mount the ODU unit to the mast or wall, using the mounting kit.
3. Connect the RJ-45 connectors to both ends of the cable, use the pinout table and diagram below:

	IDU RJ-45	Wire Color	Function	ODU RJ-45
Twisted	1	White/Green	Ethernet (RxN)	1
	2	Green	Ethernet (RxT)	2
Twisted	3	White/Orange	Ethernet (TxT)	3
	4	Blue	Power (+)	4
Twisted	5	White\Blue	Power (+)	5
	6	Orange	Ethernet (TxN)	6
Twisted	7	White/Brown	Power (-)	7
	8	Brown	Power (-)	8

4. Secure the ODU and ground cables to the mast or brackets using cable ties.
5. Repeat the procedure at site **B**.

→ **To align the ODU:**

1. Connect power to the IDU.



Warning

Do not stand in front of a live outdoor unit.

The antenna used for this transmitter must be installed to provide a separation distance of at least 200 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

2. Align the site A ODU in the direction of the site B ODU.
3. Align the site B ODU in the direction of the site A ODU.
4. Alternating between each site, turn each ODU slowly listening to the buzzer beep sequence until optimal alignment is achieved.
5. Secure the site **A** and site **B** ODUs to the mast/wall.
6. Monitor the link quality for about 15 minutes to verify stability.
7. Connect the management station to one of the two IDUs in the link.
8. Start the WINLink Manager application.
9. Open the installation wizard and follow the installation steps.
10. After selection of the radio channel and the link rate, verify that the link quality bar in the WinLink manager is within the green range for TDM service and within the yellow range for Ethernet service.

Note

Achieve the best possible link quality values. In case of radio link loss, verify the ODU alignment, or change the radio channel in both sides of the link. When the radio link resumes continue the installation process.

Connecting User Equipment

→ **To connect user equipment to the IDU:**

1. Connect the user equipment (such as PBX) to the IDU RJ-45 port designated **Trunk**:
 - On the rear panel of the IDU-E.
 - On the front panel of the IDC-C,
2. Connect user hub/router or any other compatible device to the IDU RJ-45 port designated **LAN**:
 - On the rear panel of the IDU-E.

- On the front panel of the IDU-C.

Note *IDU-C has an integrated LAN switch that provide 2 port of 10/100BaseT. The Integrated LAN switch is not support spanning tree. The two LAN ports can be connected to 2 separated LAN segments but connection of both LAN ports to the same LAN segment will create a loop that fluid the network. Therefore, this configuration is prohibited.*

2. Operating WinLink 1000

WinLink 1000 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators and statistics data. Intervention is only required when WinLink 1000 must be configured to its operational requirements or diagnostic tests are performed:

Normal Indications

Upon turning on WinLink 1000, the PWR LED in the front panel lights to indicate that WinLink 1000 is on. The table below shows the correct status of the indicators after power-up.

Indicator	Color	Status
PWR	Green	On (only on IDU-E)
IDU	Orange Green	Blinks for short duration during startup Blinking slowly shows normal operation
ODU	Green	Blinking slowly shows normal operation
AIR I/F	Orange Green	Blinks for short duration during startup Blinking slowly shows normal operation
SERVICE	Green	Blinking slowly shows normal operation OFF when SERVICE selected is Ethernet only

Troubleshooting

If the WinLink 1000 is not operational, determine the cause and solution from the table below.

Led	Status	Remedy
PWR	Off	For the IDU-E, check that AC adapter is connected to the IDU and the AC power outlet.
IDU	Orange	Check that the IDU/ODU cable is properly wired and connected.
ODU	Red	Check that the IDU/ODU cable is properly wired and connected.
AIR I/F	Orange	Complete the installation procedure from the management software.
	Red	Check the ODU Antenna alignment. Check that the radio configuration of both site A and site B units are the same (channel and SSID).
SVC.	Off	Check the TDM service configuration in the NMS.
	Orange	Check that the system is not in loopback mode. Check the site B IDU ports and cables and site B external equipment.
	Red	Check the site A IDU ports, cables and external equipment.

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Chapter 1

Introduction

1.1 Overview

WinLink 1000 is a carrier-class, high capacity, Point-to-Point broadband wireless transmission system. WinLink 1000 combines legacy TDM and Ethernet services over 2.4GHz, 4.9GHz, and 5.xGHz license-exempt bands and is suitable for deployment in FCC, ESTI, or CSA regulated countries. The system provides up to 48 Mbps wireless link and supports ranges of up to 80 km (50 miles).

Application

Figure 1-1 illustrates a typical point-to-point application of two WinLink 1000 units.

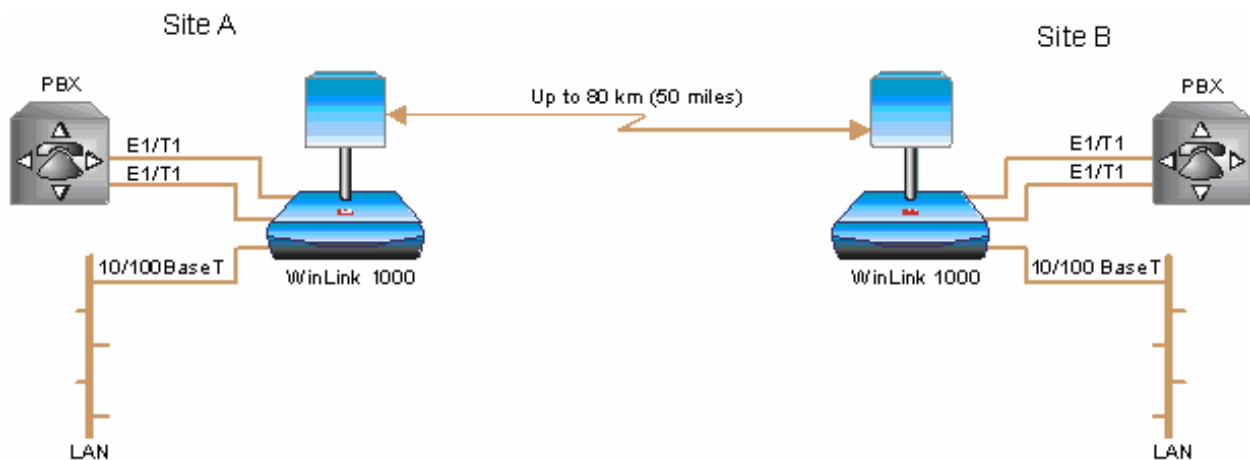


Figure 1-1. Typical Application

Features

Wireless Link

WinLink 1000 delivers up to 48 Mbps data rate for Ethernet and E1/T1 traffic. The system supports a variety of spectrum bands and can be configured to operate in any channel on the band with a carrier step resolution of 5 MHz.

WinLink 1000 operation complies with ETSI, CSA and the FCC 47CFR Part 15 and subpart C and E requirements.

WinLink 1000 employs Time Division Duplex (TDD) transmission. This technology simplifies the installation and configuration procedure.

There is no need to plan and to allocate separate channels for the uplink and downlink data streams.

Operation over 2.4GHz, 4.9 GHz, and 5.x GHz bands is not affected by harsh weather conditions, such as fog, heavy rain etc.

LAN Interface

The WinLink 1000 LAN port provides 10/100BaseT interfaces with auto negotiation and transparent VLAN support. Traffic handling is provided by a MAC-level self-learning bridge.

TDM Interface

The WinLink 1000 TDM interface accepts E1 or T1 traffic, supporting the following:

- Unframed operation (E1 and T1)
- AMI and B8ZS zero suppression (T1).

Management

WinLink 1000 has full local and remote management capabilities. The user-friendly SNMP-based management tool provides full end-to-end configuration, event log and performance monitoring capabilities.

Diagnostics and Performance Monitoring

WinLink 1000 supports activating local and remote loopbacks on E1/T1 links.

WinLink 1000 constantly monitors the data transmission process, evaluates received signal strength, and signal quality. It also monitors received traffic and frame rate (FPS) for local and remote units.

Optional External Antenna

WinLink 1000 supports configuration of an external antennae. In this configuration, the radio supplies an N-type connector that connects through a coax cable to the external antenna.

An external antenna can extend the range of the link, and in some cases, it might help to reduce environmental interferences. Various external antennae are available for the WinLink 1000 operating frequencies.

For example, an optional flat panel 28 dBi external antenna increases the operation range of WinLink 1000 up to 80 km (50 miles).

1.2 Physical Description

WinLink 1000 system consists of an Outdoor Unit (ODU) and an Indoor Unit (IDU). *Figure 1-2* illustrates a WinLink 1000 unit assembly.



Figure 1-2. WinLink 1000 Units

IDU-E

The IDU-E front panel includes five LEDs that display the status of E1/T1 and LAN, wireless link, self-test results, ODU-to-IDU link, and power status. For a detailed description of the front panel LEDs, see *Chapter 4*.

The rear panel of the indoor unit (IDU) includes the power, WAN, LAN and E1/T1, and ODU connectors. The rear panel LEDs are described in *Chapter 4*, and the wiring specifications detailed in *Appendix A*.

IDU-C

The IDU-C front panel includes four LEDs that display the status of E1/T1 and, wireless link, self-test results, and ODU-to-IDU link. For a detailed description of the front panel LEDs, see *Chapter 4*.

Technical Specifications

Air-Interface	<i>Technology</i>	OFDM
	<i>Frequency Band</i>	2.400–2.4835 GHz FCC/ETSI
		2.416–2.4835 GHz (Israel)
		4.940–4.990 GHz FCC
		5.250–5.350 GHz FCC
		5.470–5.725 GHz FCC/ETSI
		5.725–5.850 GHz FCC
	<i>Range</i>	Up to 80 km (50 miles)
	<i>Duplexing Method</i>	Time Division Duplex (TDD)
	<i>Capacity</i>	Configurable up to 48 Mbps
<i>Modulation</i>	OFDM – BPSK, QPSK, 16QAM, 64QAM	
<i>Channel setting Resolution</i>	5 MHz	
<i>Transmitter Power</i>	17 dBm max, for 4.9GHz 12.8 dBm max. <i>(Blocked by product SW and can not be changed).</i>	
<i>ODU Installation</i>	Mast or wall mounting	
LAN Interface	<i>PHY IF</i>	Up to 2 x 10/100BaseT, auto-sensing
	<i>Framing/Coding</i>	IEEE 802.3/U
	<i>Bridging</i>	Self-learning, up to 2000 MAC addresses
	<i>Line Impedance</i>	100Ω
	<i>VLAN Support</i>	Transparent
	<i>Connector</i>	RJ-45
E1 Interface	<i>Data Rate</i>	1, 2, 4 x E1
		Unframed (Transparent) 2.048 MHz
	<i>Line Interface</i>	HDB3
<i>Connector</i>	RJ-45	
T1 Interface	<i>Data Rate</i>	1, 2, 4 x T1
		Unframed (Transparent) 1.544 MHz

	<i>Line Interface</i>	AMI, B8ZS		
	<i>Connector</i>	RJ-45		
Indicators	<i>PWR (green)</i>	Power status		
	<i>IDU (green)</i>	IDU status		
	<i>ODU (green/red)</i>	ODU-to-IDU link status		
	<i>AIR I/F (green/red)</i>	Air Interface status		
	<i>SERVICE (green/red)</i>	E1/T1 signal status		
Power	<i>Source IDU-E</i>	100-240 VAC -48VDC via external AC/DC converter		
	<i>Source IDU-C</i>	100-240 VAC via cable & plug, or -24VDC or -48VDC from rack		
	<i>Power Consumption</i>	10W max - IDU-E and ODU 14W max - IDU-C and ODU		
	<i>Connector</i>	2-pin for IDU-E IDU-C: DC ver: 3-pin terminal block AC ver: 3-prong plug		
Physical	Outdoor Unit (ODU) with integrated antenna			
	<i>Height</i>	305 mm / 12 in		
	<i>Width</i>	305 mm / 12 in		
	<i>Depth</i>	58 mm / 2.3 in		
	<i>Weight</i>	3.3 kg / 7.2 lb		
	<i>Indoor Unit</i>	IDU-E	IDU-C	
	<i>Height</i>	44 mm / 1.7 in (1U)	43 mm / 1.7 in	
	<i>Width</i>	237 mm / 9.3 in	297 mm / 11.5 in	
	<i>Depth</i>	170 mm / 6.7 in	450 mm / 17.7 in	
	<i>Weight</i>	0.58 kg / 1.4 lb	1.5 kg / 3.3 lb	
	Environment	<i>Outdoor Unit (ODU)</i>		
<i>Enclosure</i>		All-weather case		

Temperature -35°C to 60°C/-31°F to 140°F

***Indoor Unit (IDU-E
and IDU-C)***

Temperature -5°C to 45°C/23°F to 113°F

Humidity Up to 90%, non-condensing

Antenna Characteristics	2.400– 2.4835 GHz	4.940– 4.990GHz	5.250– 5.350GHz	5.4470– 5.725GHz	5.725– 5.850GHz
	Integrated Antenna 1 ft				
Gain	16dBi		22dBi	22dBi	22dBi
Beam width	20°	N/A	9°	9°	9°
Polarization	Linear		Linear	Linear	Linear
External antenna 1 ft					
Gain		21 dbi	22 dBi	22 dBi	22 dBi
Beam width	N/A	9°	4.5°	4.5°	4.5°
Polarization		Linear	Linear	Linear	Linear
External Antenna 2 ft					
Gain	24dBi	27 dbi	28dBi	28dBi	28dBi
Beam width	8°	4.5°	4.5°	4.5°	4.5°
Polarization	Linear	Linear	Linear	Linear	Linear
External Antenna 3 ft					
Gain			32 dBi		32.5 dBi
Beam width	N/A	N/A	4.5°	N/A	4.5°
Polarization			Linear		Linear

* Antennas with higher gains are available

Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for WinLink 1000 system.

After installing the unit, refer to *Chapter 3* for configuration instructions and *Chapter 4* for operation instructions.

In case a problem is encountered, refer to *Chapter 5* for test and diagnostic instructions.



Warning

Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

Note

WinLink 1000 has three types of products:

- *Auto channel selection is not supported—Previous or Future release.*
 - *Auto channel selection supported—User can enable/disable auto channel configuration.*
 - *DFS—Auto channel is mandatory.*
-

2.1 WinLink 1000 System

WinLink 1000 system comprises the following units:

- **Outdoor Unit (ODU):** The ODU has 2 configurations: ODU with integrated antenna and ODU with N-Type connector for connection to an external antenna. Both ODU types have the same interface to the IDU. The ODU with integrated antenna has an enclosed aluminum frame with a front sealed plastic cover, containing an integrated transceiver with an antenna, RF module, modem and standard interfaces.

ODU includes a power connector that receives –48 VDC and a RJ–45 for Ethernet traffic from the indoor unit (IDU).

The ODU is attached to a mast using a special mounting kit, which is supplied with the unit.

- **Indoor Unit (IDU):** There are two types of IDU cages. IDU–E that is a plastic box of ½ x 19 in. and IDU–C that is based on a metal 19in. box address the carrier–class applications. IDU is the interface unit between the ODU and the user. It converts 100–240 VAC to –48VDC, and feeds the ODU by it. The IDU does not store any configuration data. Therefore, there is no need for additional configuration of the WinLink 1000 system when replacing an IDU.

2.2 Site Requirements and Prerequisites

For the IDU, allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature should be –45°C to 60°C/–49°F to 140°F (ODU), or –5°C to 45°C/23°F to 113°F (IDU) at a relative humidity of up to 90%, non–condensing.

Before starting the installation, use the [Link Budget Calculator](#) utility to calculate expected performance of the link. You can vary parameter inputs to the calculator to determine the optimum system configuration. The utility is described in *Appendix C*.

2.3 Package Contents

The WinLink 1000 packages include the following items:

ODU Package Containing:

- ODU
- Mast/Wall mounting kit plus mounting instructions
- WinLink 1000 Manager installation CD
- Spare RJ–45 Connector

IDU–E Package Contents:

- IDU–E

- 110V/240V adaptor
- IDU wall-mounting drilling template
- Spare RJ-45 connector

(Optional) IDU-C Package Contents:

- IDU-C
- For AC model, 110v/240 VAC with 3-prong connector cable
- For DC model, -24VDC or -48 VDC with 3-pin terminal block connector (green)
- IDU standard 1-U, 19" carrier rack
- Spare RJ-45 connector

External antenna (if ordered)

ODU/IDU Cable at length ordered (optional)

2.4 Installation and Setup

Physical installation of the WinLink 1000 system installation includes the following steps:

1. Installing ODU at both sites of the link.
2. Installing ODU cable and connecting ODU to IDU at both sites.
3. Connecting power.
4. Installing the management program on the network management station.
5. Running the Installation wizard from the management program.
6. Aligning the ODUs.
7. Connecting user equipment to the local and remote IDUs.

Figure 2-1 illustrates a typical installation of WinLink 1000 with an external antenna.

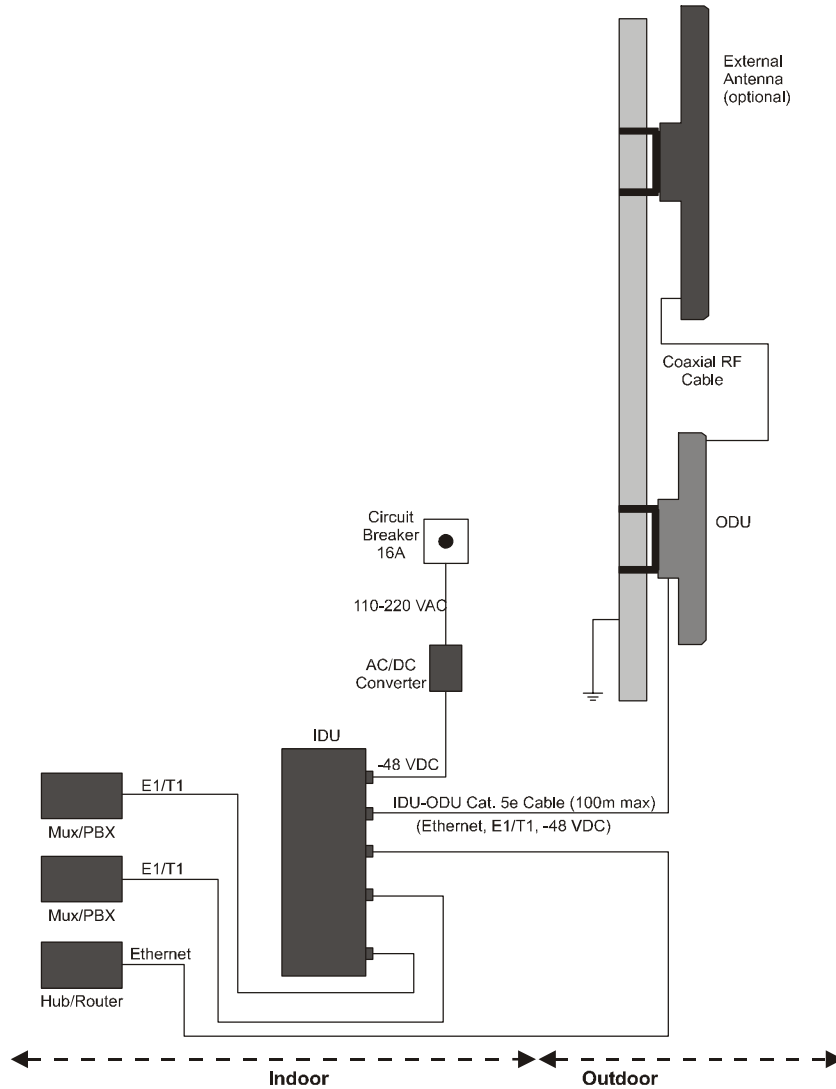


Figure 2-1. Typical Installation Diagram

Mounting the ODU

The ODU is the transmitting and receiving element of the WinLink 1000 system. The ODU can be mounted on a mast or a wall. In both installations, the supplied mounting kit is used to secure the ODU.

Appendix B describes the mast/wall installation instructions.

A WinLink 1000 link operates in pairs of two WinLink 1000 systems with the same configuration. Both systems must be installed, and the antennas of the outdoor units must be aligned for maximum throughput.



Prior to connecting cables to the ODU, the protective earth terminal (screw) of the ODU must be connected to an external protective ground conductor or to a grounded mast.

Only a qualified person using the proper safety equipment should climb the antenna mast. Only trained professional installers should be used when installing or dismantling ODUs and masts.

→ To mount the ODU:

1. Verify that the ODU mounting brackets are properly grounded.
2. Attach the ODU unit to the mast. Refer to [Appendix B](#) for the ODU mounting instructions.
3. Connect the ground cable to the chassis point on the ODU.
4. Attach the ODU cable to the RJ-45 connector. Refer to [Appendix A](#) for the connector pinout.
5. Secure the cables to the mast or brackets using provided UV-rated cable ties.
6. Repeat the procedure at the remote site.

Note *Do not tightly secure the ODU to its mounting brackets, until the alignment process of the antenna is complete.*

When installing the ODU, it is important to check that there are no direct obstructions in front of the ODU or interference from man-made obstacles.

Connecting the ODU to the IDU

The ODU cable conducts all the user traffic between the IDU and the ODU. The ODU cable also provides -48 VDC supply to the ODU. The maximum length for one leg of the ODU cable is 100m (328 ft) in accordance with 10/100BaseT standards.

ODU cable is supplied pre-assembled with RJ-45 connectors, at the length specified when ordering. If the ODU cable was not ordered, use Cat. 5e shielded cable, the wiring specifications are given in [Appendix A](#).

1. Route the cable from the ODU location into the building, leaving some spare. Secure the cable along its path.

2. Connect the ODU cable to the RJ-45 connector on the IDU panel designated WAN. *Figure 2-2* illustrates a typical panel of the IDU-E and IDU-C.

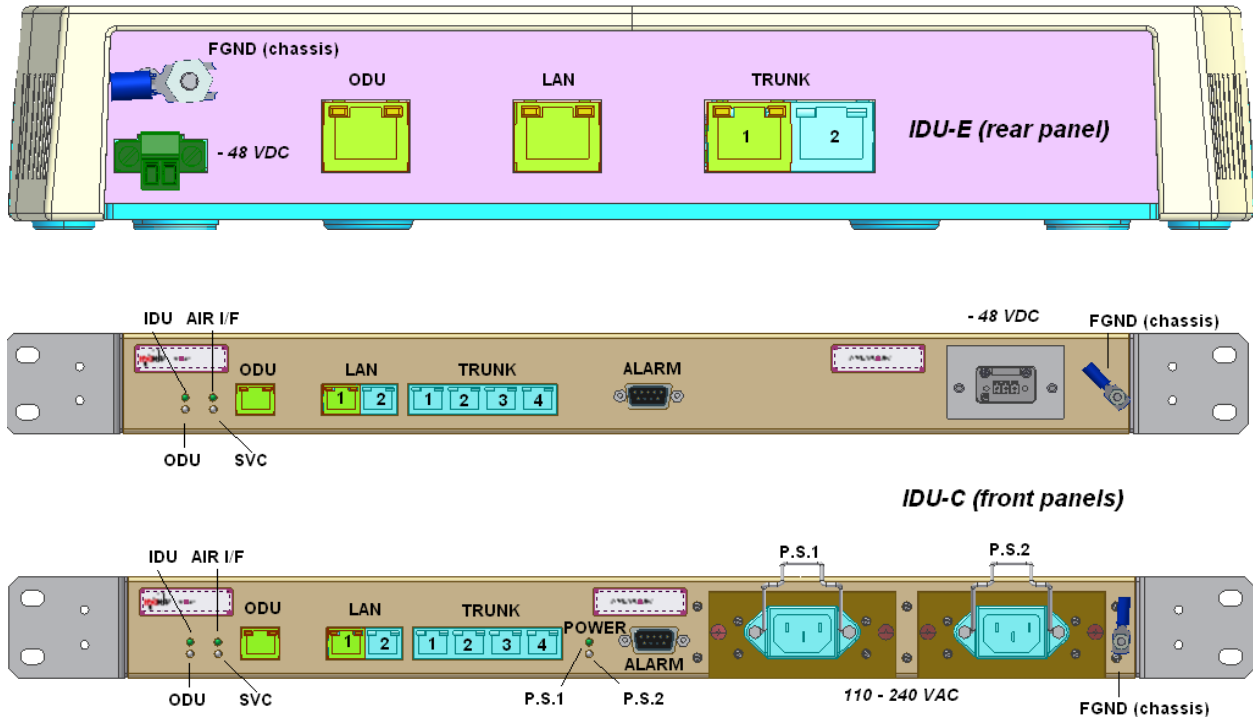


Figure 2-2. IDUs connector panels

Note *Other models may have a different configuration for these panels.*

Connecting the Power



Before connecting any cable, the protective earth terminals of the AC/DC power must be connected to the protective ground conductor of the mains power cord. (Applies to both IDU models.) If you are using an extension cord (power cable) make sure it is grounded as well. Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Power is supplied to WinLink 1000 via an external AC/DC converter, which receives power from 110–240 VAC source and converts it to –24VDC or –48 VDC.

→ To connect the power IDU-E:

1. Connect the 2-pin plug of the AC/DC converter to the 2-pin DC power connector on the IDU-E rear panel.
2. Connect the AC/DC converter 3-prong plug to mains outlet.

→ To connect the power for IDU-C:

- For AC power model, connect the AC cable 3-prong plug to mains outlet.
- For DC power model, connect to DC supply on the rack (male connector for the terminal block is included).

Installing WinLink 1000 Management Software

WinLink 1000 management application is distributed on CD-ROM as an executable file. The application has the following PC requirements:

- Memory: 128 MB RAM
- Disk: 1 GB free hard disk space
- Processor: Pentium 3 or higher
- Network: 10/100BaseT NIC
- Graphics: Card and Monitor that supports 1024×768 screen resolution with 16 bit color
- Operating system: Windows 2000/XP
- Microsoft Explorer 5.01 or later.

→ To install the WinLink 1000 management program:

1. Insert the CD-ROM into your CD-ROM drive.
2. If the installation does not start automatically, run WinLink.exe from the CD-ROM drive.
3. Follow the on screen instructions of the installation wizard to complete setup of the WinLink 1000 Management program in the desired location.

→ To perform initial setup:

1. Power up the site **A**'s IDU (see *Connecting the Power* on page 2-6). Wait about 1 minute.
2. Power up the site **B** IDU.

3. Connect the management station to the LAN.

Any PC running the WinLink 1000 Management application can be used to configure WinLink 1000 units.

→ To start WinLink manager:

1. From the **Start** menu, point to Programs, point to **WinLink Manager**, and then click **WinLink Manager**.

The password/IP request dialog appears.



Figure 2-3. Login Screen

2. Select the suitable option for the IP Address field:

- Enter the IP address of the ODU — *default value 10.0.0.120*.

Note *The IP address is defined later during link configuration.*

- (optional) If user is connected directly to the IDU LAN port, use the adjacent list arrow to select Local Connection.

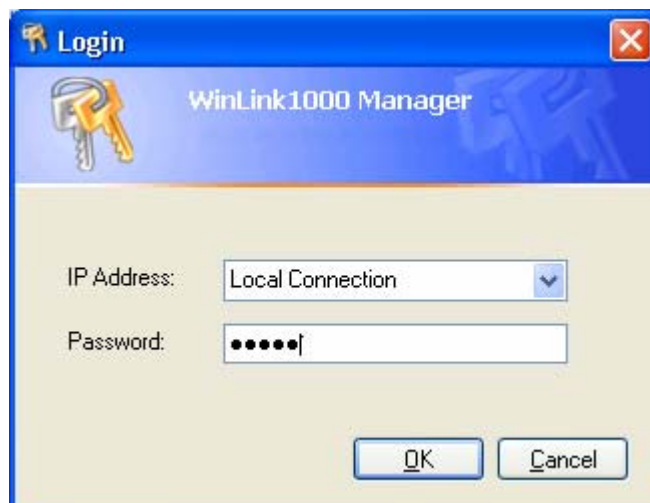


Figure 2–4. Login via Local Connection Screen

3. Enter the password
 - Default password – *admin* (see Chapter 4 for *Changing the Password*)

The WinLink Manager Main menu is displayed (see Figure 2–5).

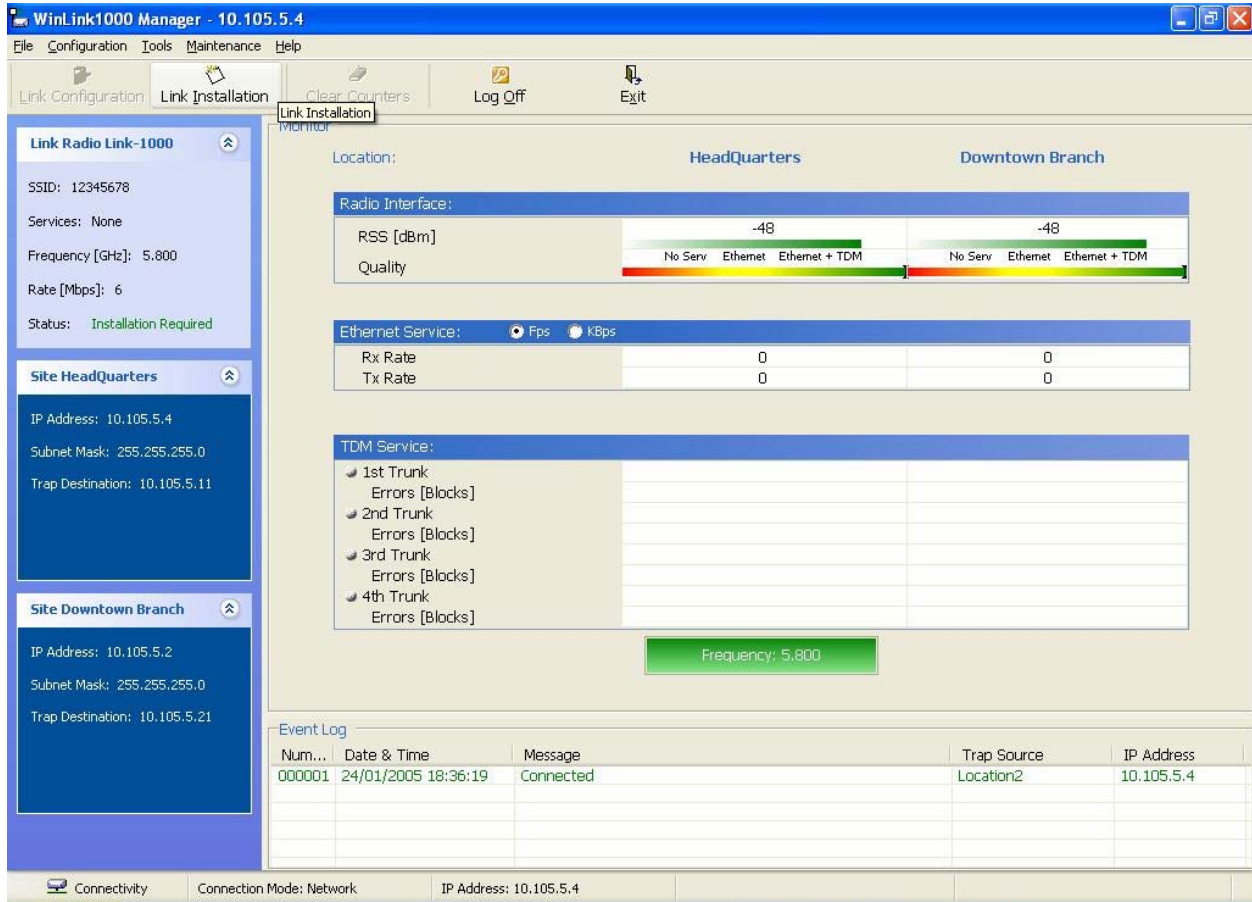


Figure 2–5. Main Menu

Aligning the WinLink 1000 ODUs

Perform the WinLink 1000 ODU alignment using the Buzzers located inside the ODUs. Alignment of a WinLink 1000 link must be performed by two people simultaneously, at site **A** and at site **B**.

➔ To align the ODUs via ODU Buzzer:

1. Verify that power is connected to the IDUs at both sites.



Do not stand in front of a live radio terminal.

2. Align the site A ODU in the direction of the site B ODU.
3. Align the site B ODU in the direction of the site A ODU
4. Alternating between each site, turn each ODU slowly while listening to the buzzer beep sequence for the Best Signal sound, until optimal alignment is achieved.
5. Secure the site **A** and site **B** ODUs to the mast/wall.
6. Monitor the link quality for about 15 minutes to verify stability.




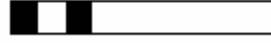


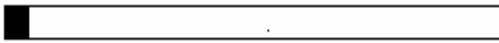
Buzzer Sequence	 =buzzer on  =buzzer off	Description
		Best Signal so far
		Signal quality increased
		No change in signal
		Signal quality decreased
		No air link

Figure 2-6. Beeper Sequence for ODU Alignment

Installing the Link

Installation and definition of all parameters are applied to both sides of the link.

→ To install the link:

1. Verify that the management station is properly connected to the same LAN as the IDU, and the WinLink Manager application is running.
2. In the toolbar, click the **Link Installation** button.

The Installation wizard opens, (see [Figure 2-7](#)).

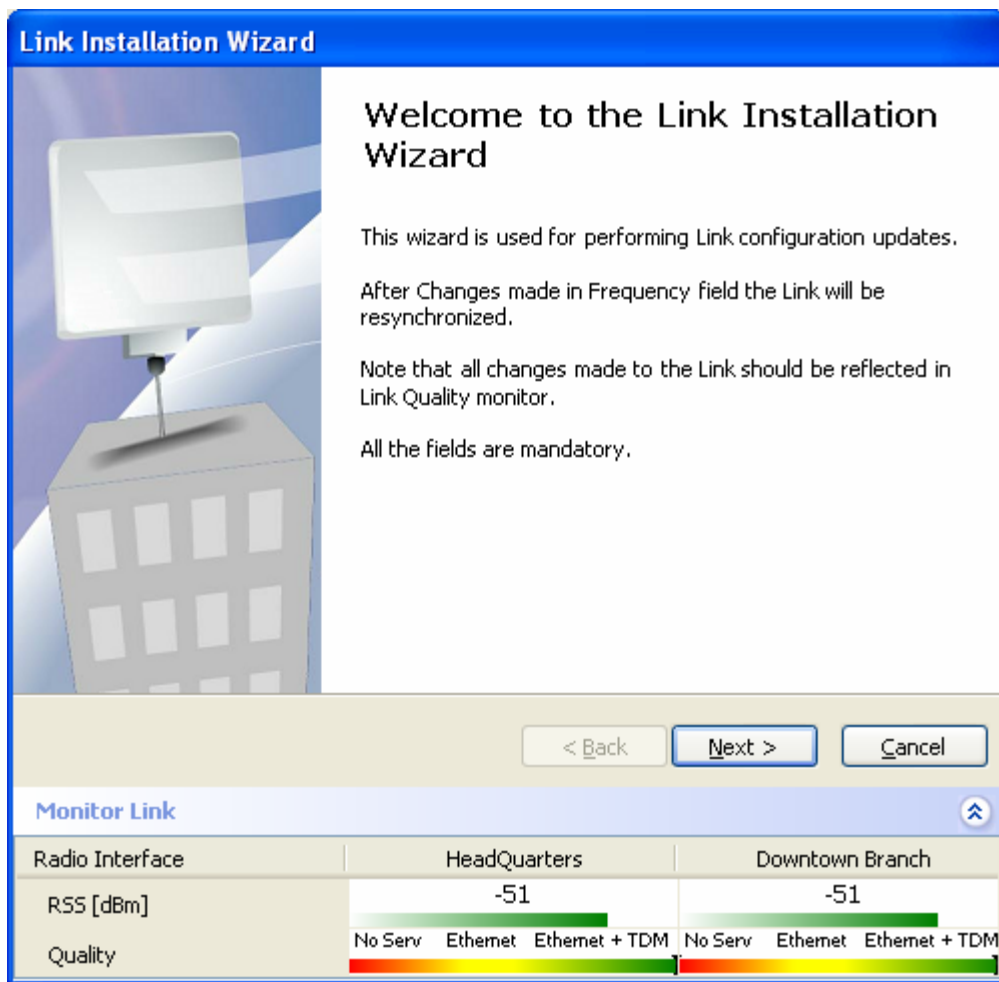


Figure 2-7. Link Installation Wizard

3. Click next to proceed with the Installation procedure.
The system dialog box opens (see *Figure 2-8*)

Radio Interface	HeadQuarters	Downtown Branch
RSS [dBm]	-51	-51
Quality	No Serv Ethernet Ethernet + TDM	No Serv Ethernet Ethernet + TDM

Figure 2-8. Installation Wizard, System dialog box

4. Enter a SSID (System ID) minimum of eight characters. The ID is initially factory set.

Notes • Both sites of a link must always have the same number

5. Enter Link name for the link identification.
6. Enter a name for site 1.
7. Enter a name for site 2.
8. Click **Next**.

The Channel Select dialog box appears (see [Figure 2-9](#) for previous releases).

Note For release 1.1.6 and above refer to [Figure 2-10](#), page 2-14. For 5.4GHz DFS according to ETSI standard, refer to [Figure 2-11](#) on page 2-15.

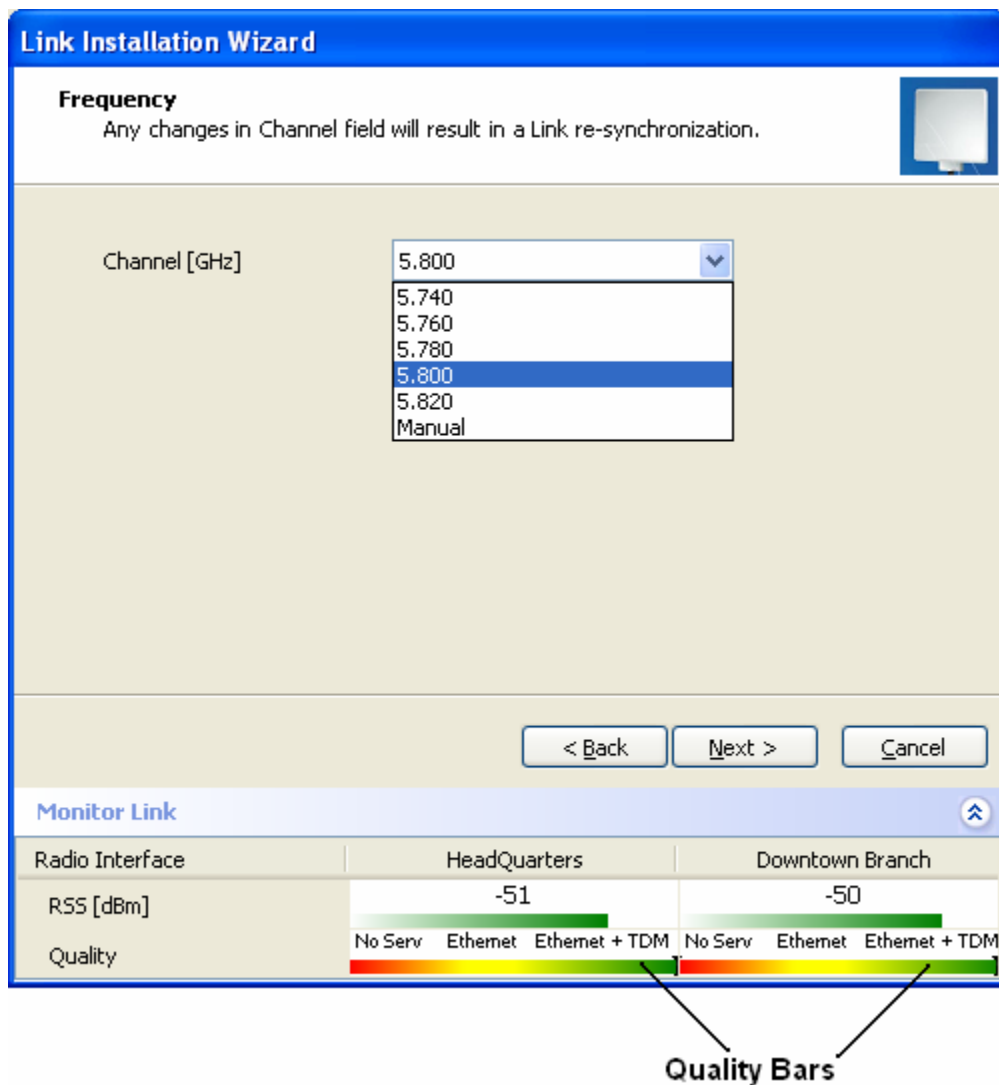


Figure 2-9. Installation Wizard, Channel Select dialog box

9. Select the required operating channel.

The pull down list shows the ISM frequencies available.

The Manual option allows you a User defined channel, within the system frequency band.

Selecting a new channel causes the system quality to change. The quality bar shows the adjustment until the system finds the best quality link.

Note *The installation of products that support automatic channel selection is performed in a user defined channel, called the installation channel. After selecting the channel, the list of channels for automatic channel selection can be modified.*

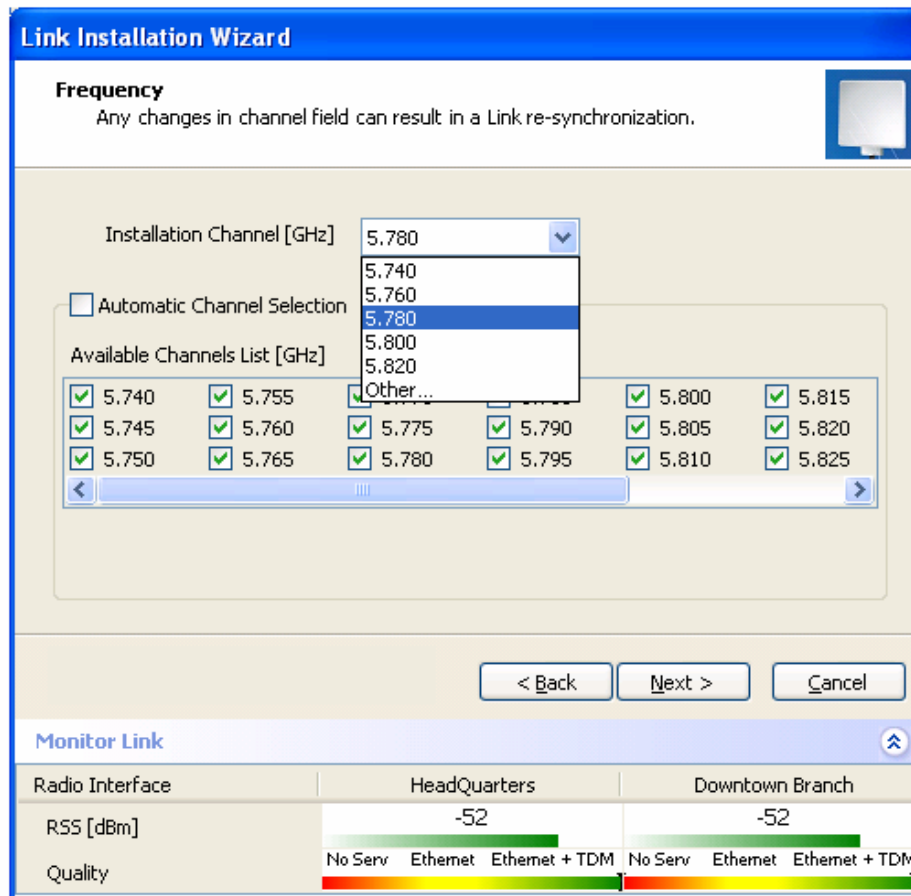


Figure 2-10. Installation Wizard, Channel Select dialog box (Automatic Channel Select enabled)

Note This feature is for the 5.4GHz ETSI version product only.
 DFS/TPC-Dynamic Frequency Select/Transmit Power control: according to ETSI standard for the unlicensed band that eliminates interruption of the wireless data equipment to the radar service.

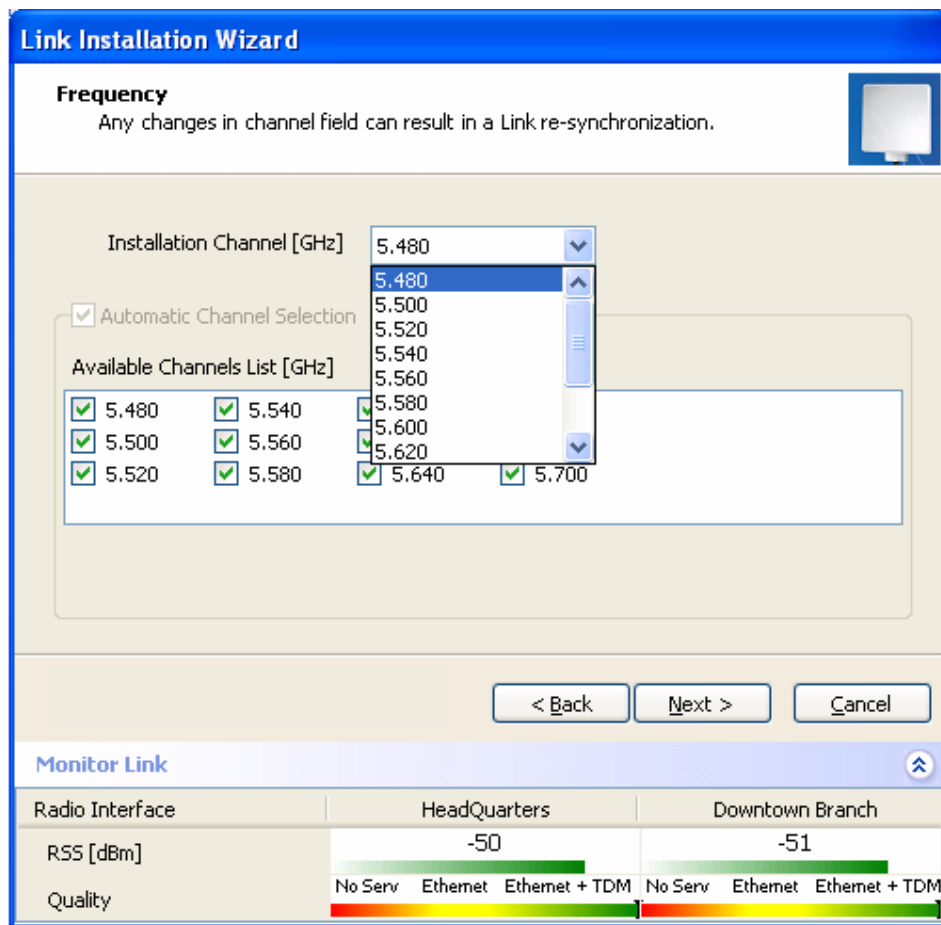


Figure 2-11. Installation Wizard, Channel Select dialog box (Supporting DFS, ETSI standard requirement)

10. Click **Next**.

The Rate Select dialog box appears (see [Figure 2-12](#))
[Table 1-1](#) lists throughput rates and capacities.

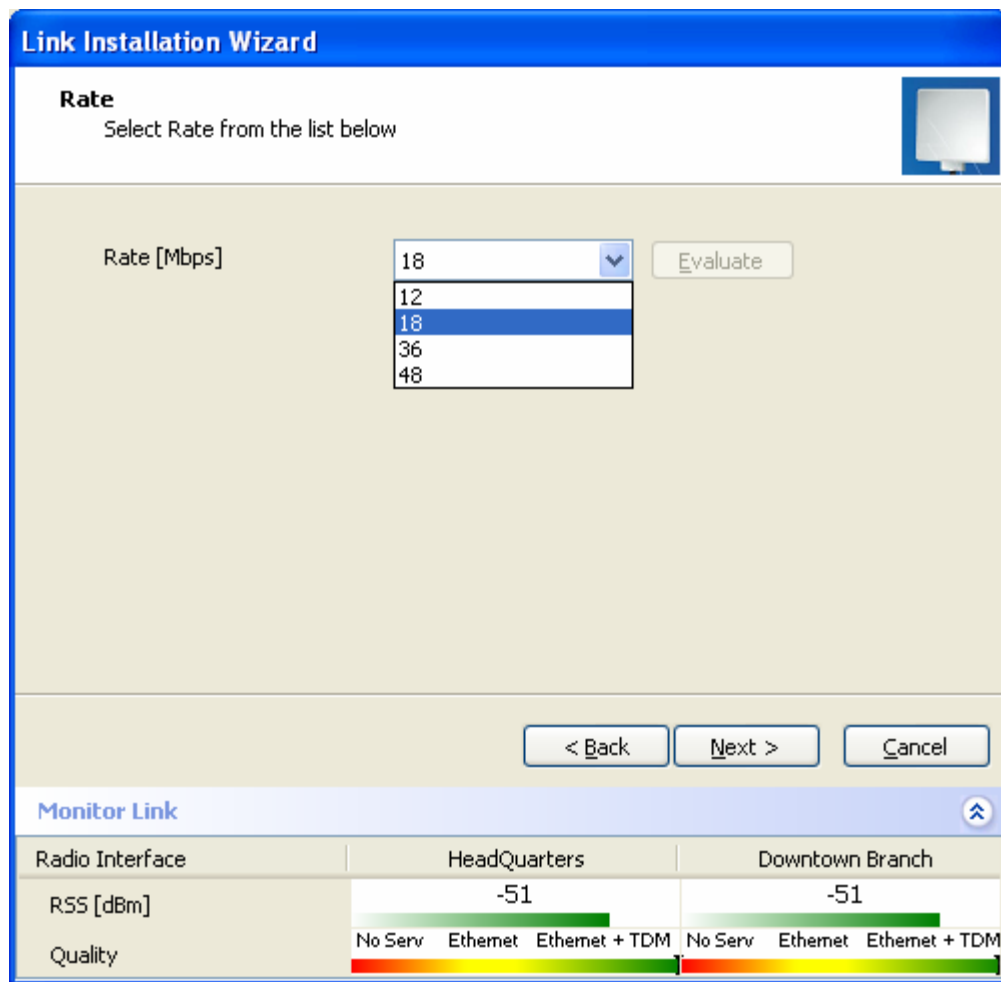


Figure 2-12. Installation Wizard, Rates dialog box

11. Select a suitable air interface rate according to the services required.
12. Click **Evaluate**.
13. A question box pops up, asking if you want to re-evaluate the link. Click **Yes** to change the rate **No** to keep the existing rate.

Selecting a new rate causes the system quality to change. The quality bar shows the adjustment until the system finds the best quality link.
14. Click **Next**.

The Service Parameters dialog box appears (see [Figure 2-13](#)).

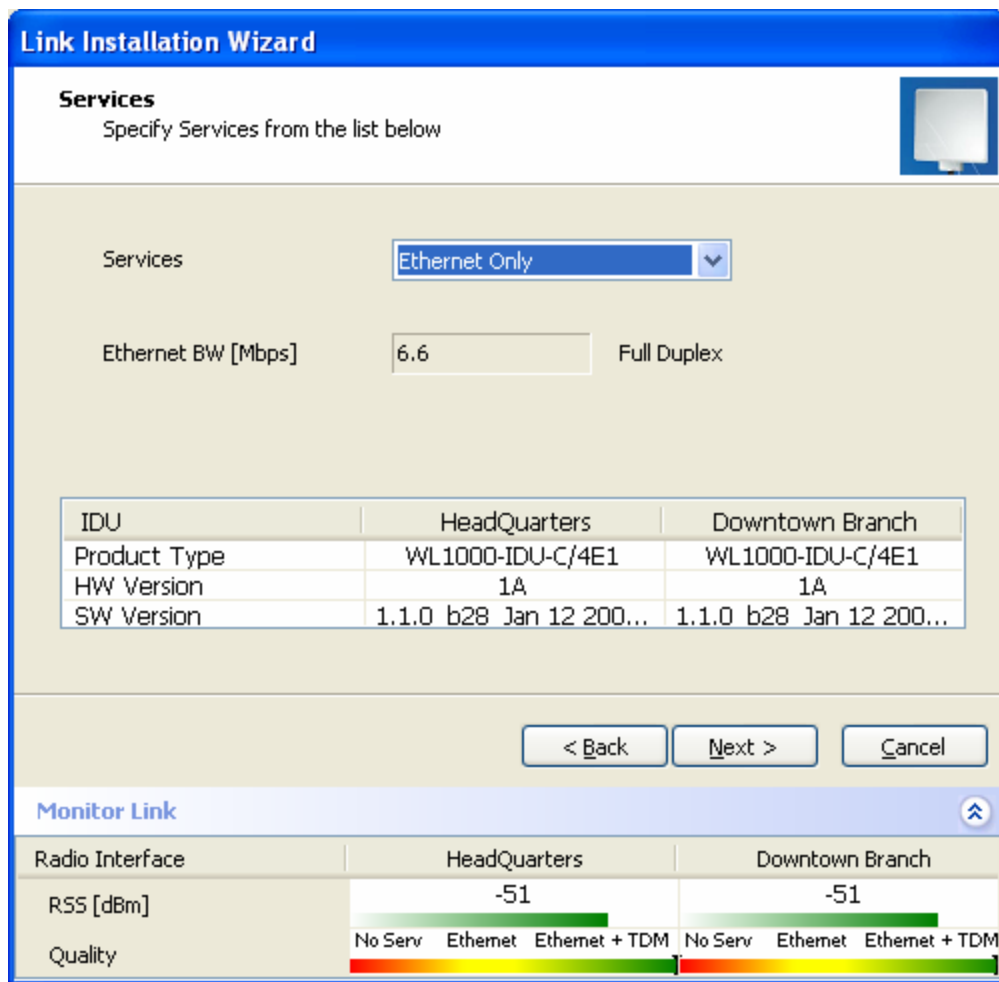


Figure 2-13. Installation Wizard, Services dialog box

15. In the Service dialog box, select one of the following:

- E1/T1 – Select the E1/T1 field, if you intend to transmit E1/T1 data and Ethernet data.
The Ethernet BW field shows the remaining bandwidth in Mbps available for Ethernet. The available bandwidth depends on the number of E1/T1 ports selected.
- Select the Ethernet field, if you intend to transmit Ethernet data only

16. Click **Next**.

The Finish screen appears (see [Figure 2-14](#)).

The Finish screen shows a summary of the link configuration, the alignment is complete.

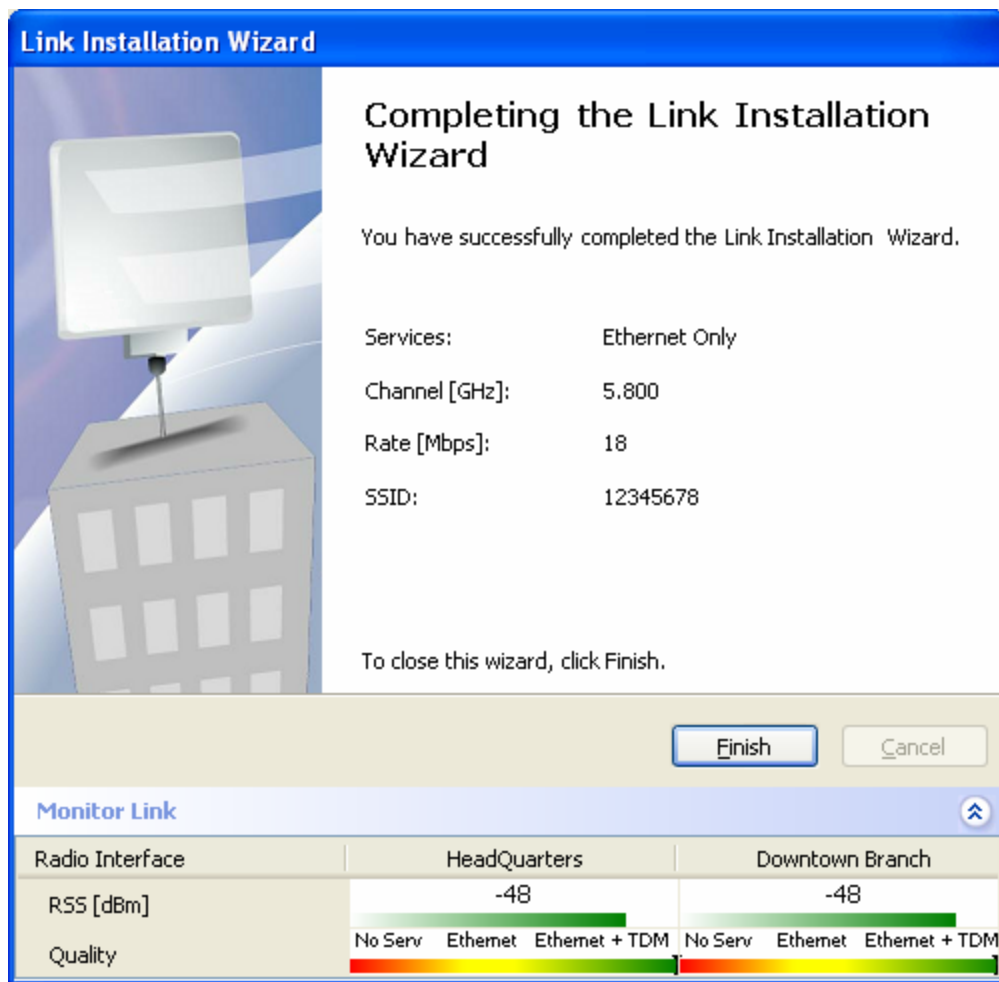


Figure 2-14. Installation Wizard, Finish Screen

17. Click **Finish** to complete the installation wizard.

When the wireless link is established between the site **A** and site **B** units, the Link Status indication bar of the Main menu is within the green area.

18. Verify that the radio signal strength (RSS) in the Main menu is according to expected results.

Connecting the User Equipment

The IDU-E is a standalone desktop, wall-mounted unit. This unit has both front and rear panel connections.

The optional IDU-C is a standalone rack mounted unit. This unit has only front panel connections.

Figure 2-2 illustrates the typical panels of the IDUs.

→ To connect user equipment to the IDU:

1. Connect user E1 /T1 traffic to the appropriate IDU panel RJ-45 port designated **Trunk**. Refer to [Appendix A](#) for the connector pinout.
2. Connect user hub/router or any other compatible device to the appropriate IDU panel RJ-45 port designated **LAN**. Refer to [Appendix A](#) for the connector pinout.

Note *IDU-C has an integrated LAN switch that provides 2 ports of 10/100BaseT. The integrated LAN switch does not support spanning tree.*

The two LAN ports can be connected to two separate LAN segments, but connection of both LAN ports to the same LAN segment will create a loop that floods the network. Therefore, this configuration is prohibited.

Note *Use a straight cable for router connection.*

Chapter 3

Configuration

This chapter describes configuration procedures that are performed after the link has been installed, synchronized, and the link configuration has been performed by wizard.

- Note** *WinLink 1000 has three types of products:*
- *Auto channel selection is not supported—Previous or Future release.*
 - *Auto channel selection supported—User can enable/disable auto channel configuration.*
 - *DFS—Auto channel is mandatory.*
-

3.1 Performing Configuration of WinLink 1000

After installing the link, the system configuration can be altered.

Note *Installation and definition of all parameters are applied to both sides of the link.*

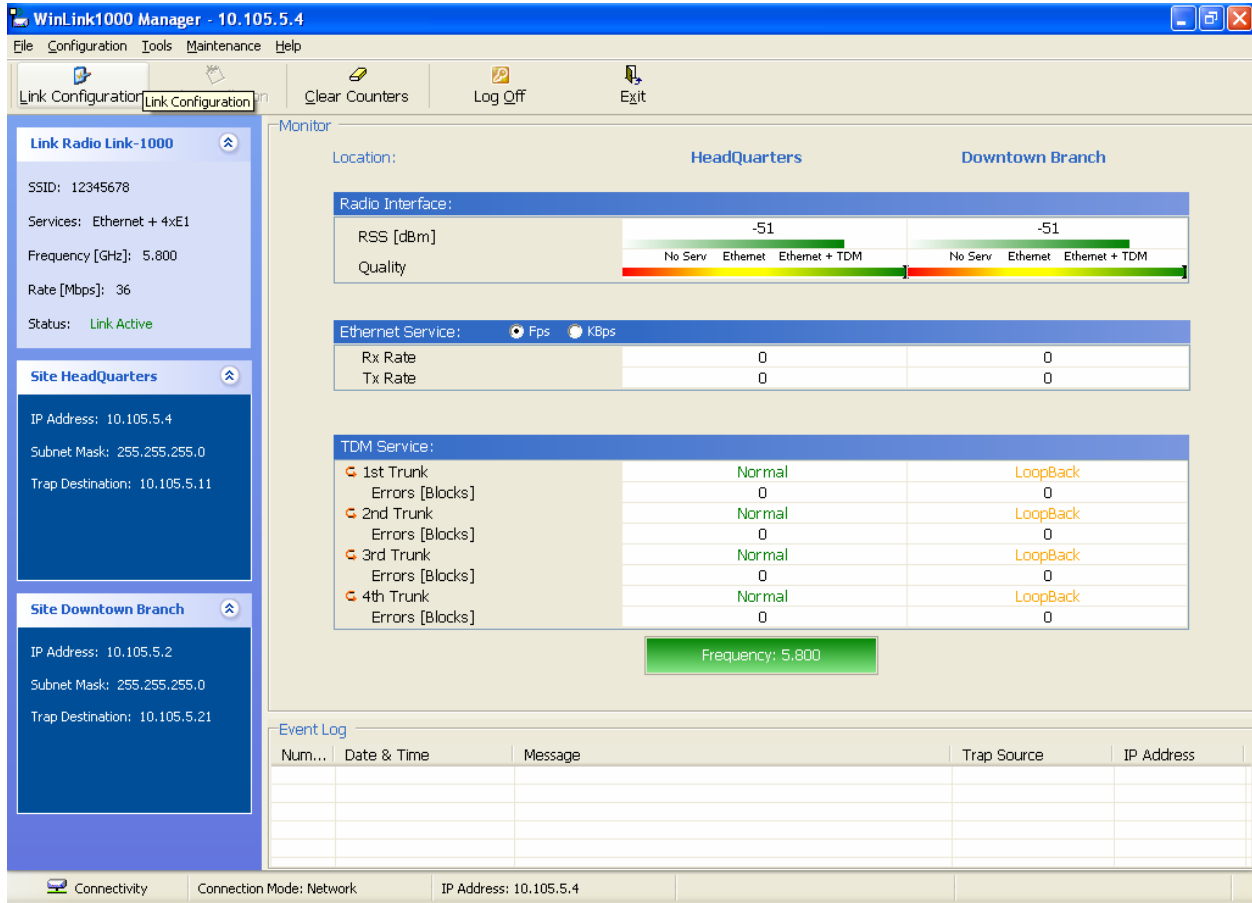


Figure 3-1. WinLink Manager Main Menu

➔ To change general parameters:

1. In the Main menu, click the **Link Configuration** button.
2. The Configuration Wizard opens.

The wizard is used to make configuration changes.

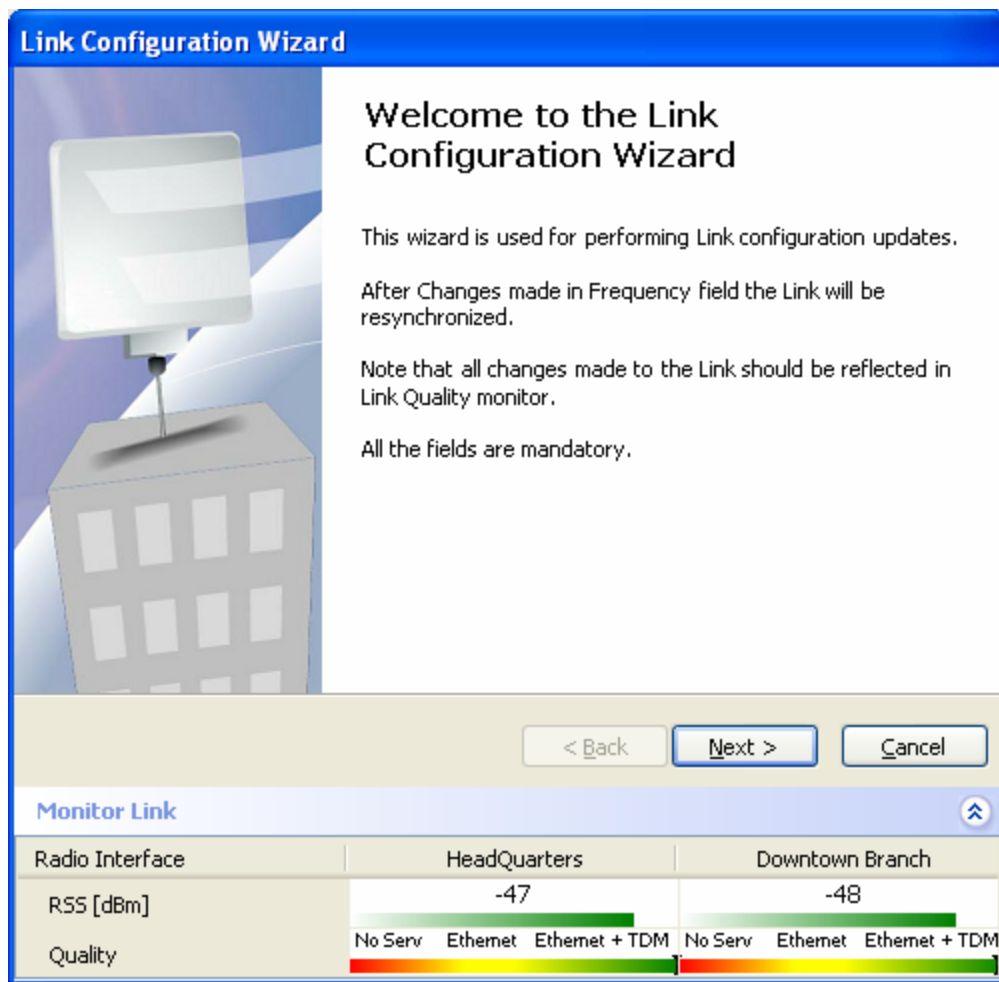


Figure 3-2. Configuration Link Wizard

3. Click **Next**.
4. The Link Configuration dialog box appears (see [Figure 3-3](#)).

System
Fill the attribute fields below

SSID: 12345678

Link Name: Radio Link-1000

Site 1: HeadQuarters

Site 2: Downtown Branch

< Back Next > Cancel

Monitor Link

Radio Interface	HeadQuarters	Downtown Branch
RSS [dBm]	-47	-48
Quality	No Serv Ethernet Ethernet + TDM	No Serv Ethernet Ethernet + TDM

Figure 3-3. Link Configuration, System dialog box

5. In the System dialog box, enter the new data to for the link. All fields with a white background can be edited.
6. Click **Next**.

The Frequency dialog box appears (see [Figure 3-4](#)).

*For releases 1.1.6 and above, refer to [Figure 3-6](#) on page 3-6.
For 5.4GHz DFS according to ETSI standard, refer to [Figure 3-6](#) on page 3-7.*

7. Select the required operating channel frequency.

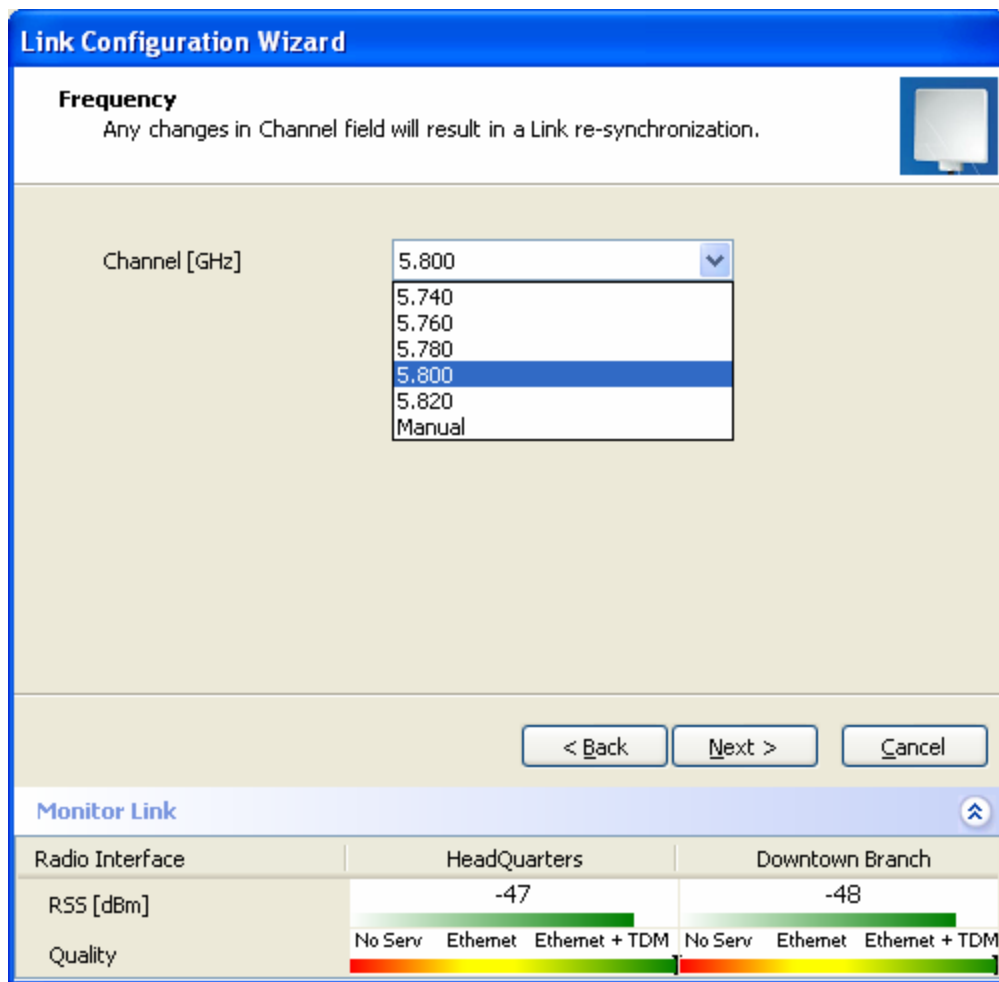


Figure 3–4. Link Configuration, Channel select dialog box

Selecting the Manual option provides the capability to configure the channel in 5 MHz steps in the specified band of the product.

Note *Some of the products support the Automatic channel selection. The mode is activated in normal operation mode. During installation the user must select the channel manually in order to optimize the antenna alignment. Enabling automatic channel selection is performed by clicking on the Automatic channel selection check box. After selecting this mode, the available channel list is enabled, and the user can select which channels are used for the automatic selection (at least two channels must be selected). The reselect channel button is used to change to a new channel from the available channels list.*

Note *By reselecting channel, the radio starts scanning all the channels from the available channels list and looks for radio activity in each of the channels. It tries to select the optimal channels. If another channels is desired the operating channel must be removed from the available channel list.*

Some product configurations support the DFS/TPC ETSI Standard. In this standard, The Radio is detects Radars and selecting only channels were no active Radars. According to the standard, a channel with active Radar is prohibited for 30 minutes. Also before any transmission the device probe the channel for Radar for a period of 60 seconds before it can start transmission.

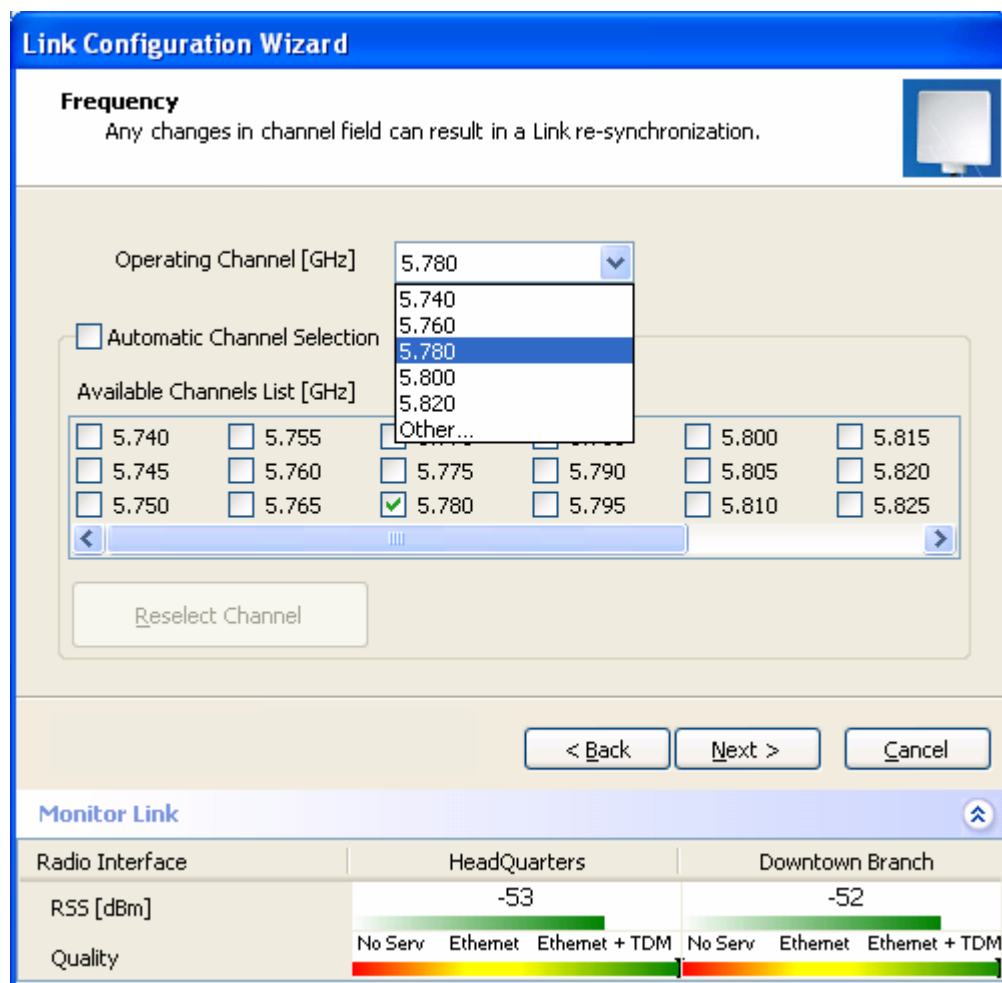



Figure 3–5. Link Configuration, Channel select dialog box with Automatic Channel select

Note *This feature is for the 5.4GHz ETSI version product only.*
DFS/TPC – Dynamic Frequency Select / Transmit Power control – ETSI standard for the unlicensed band that eliminates interruption of the wireless data equipment to the radar service.

The  sign on the configuration Wizard and Status bar indicates that the radar detection is on.

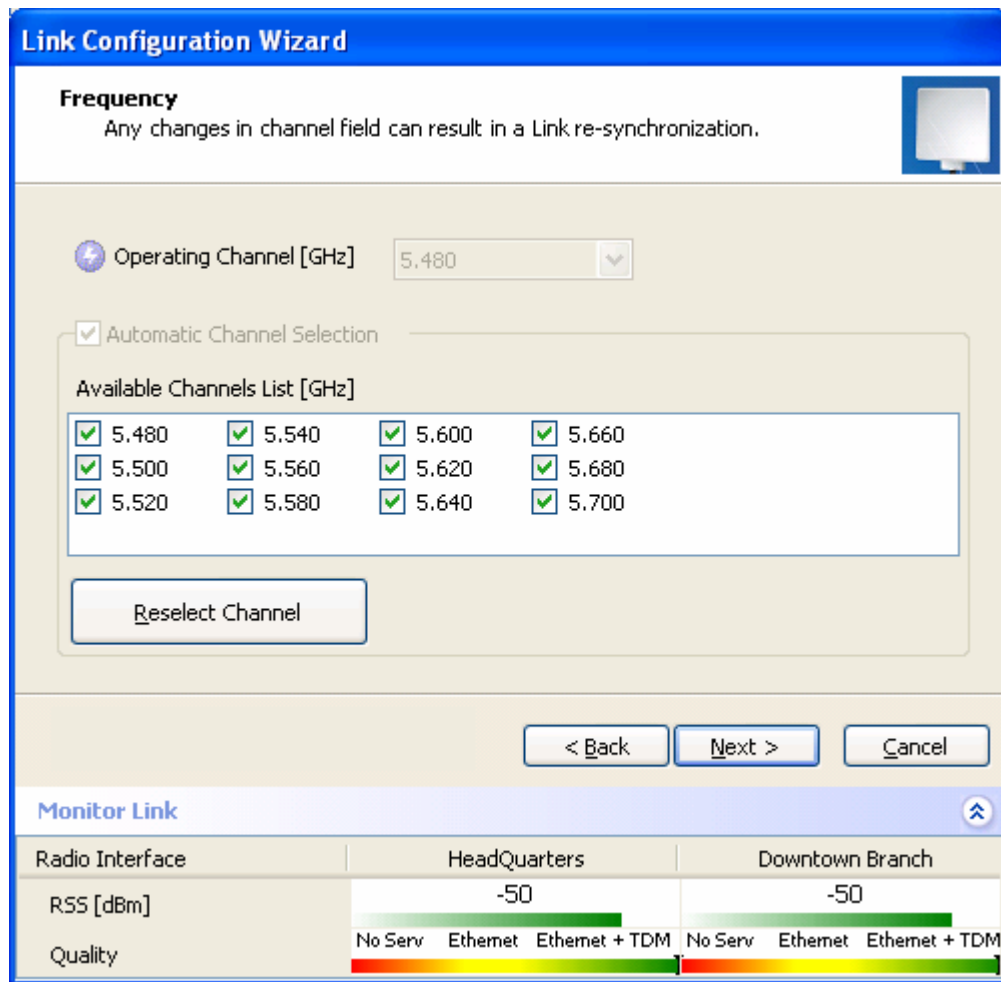


Figure 3–6. Link Configuration, Channel select dialog box with DFS

Note *Automatic channel selection cannot be unchecked, due to ETSI standard requirements.*

A Channel reselection process interrupts the service for the period of scanning and re-synchronization of the link. In most of the product this process takes few seconds. In products that support DFS/TPC this process might take few minute (each channel must be monitored for a 60 seconds before any transmission can start).

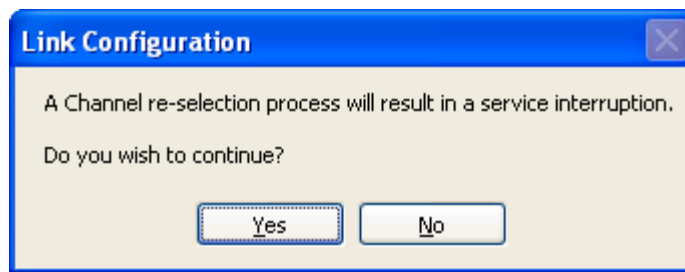


Figure 3-7. Channel reselection confirmation dialog box

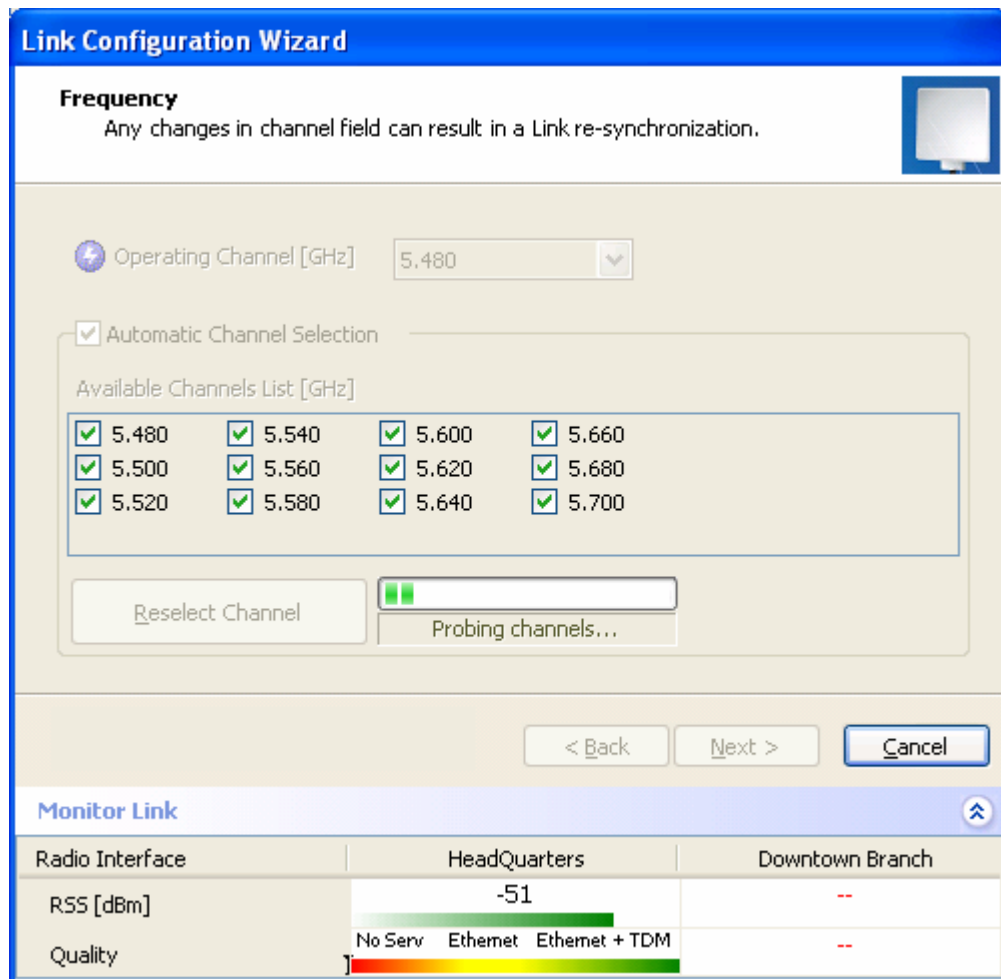


Figure 3-8. Reselection process

Note Reselection process can take up to few minutes. A bar with activity displays the progress of the reselection process.



Figure 3-9. Reselection process "channel not active in list"

8. Click **Next**.

The Rate Select dialog box appears (see *Figure 3-10*)

Table 1-1 lists throughput rates and capacities.

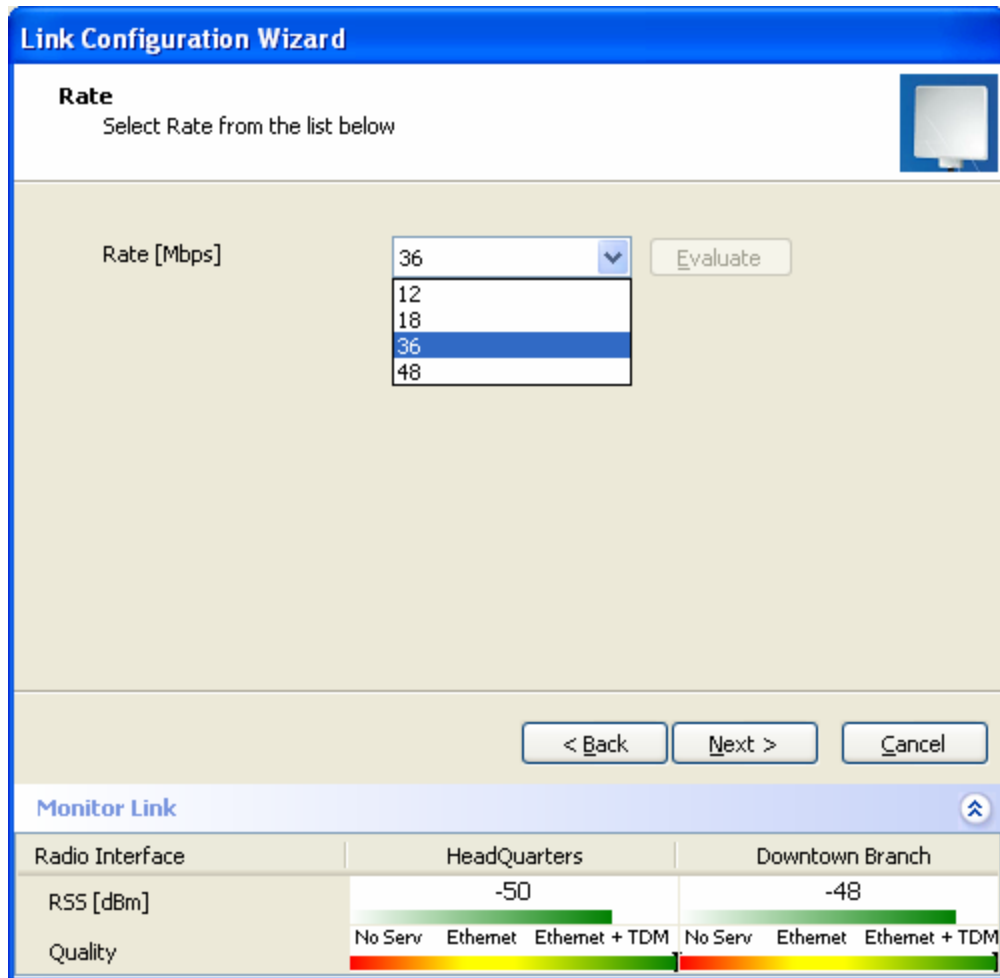


Figure 3-10. Air Interface Rate select Dialog Box

9. Select a suitable air interface rate according to the services required.

10. Click **Evaluate**.

Note *The Evaluate button becomes enabled when a new rate has been selected.*

11. A question box pops up, asking if you want to re-evaluate the link. Click **Yes** to change the rate or **No** to keep the existing rate.

Selecting a new air-interface rate causes the system to change its air-interface rate and commence evaluation of the link performance at the new air-interface rate. This process of evaluation takes a few seconds.

12. Click **Next**.

The Service Parameters dialog box appears.

Configuring Service Parameters

In the Service Parameters dialog box configure E1/T1 (x1 or x2) and Ethernet parameters.

→ To configure E1/T1 and Ethernet:

1. In the Service dialog box, select one of the following:
 - E1/T1 – Select the E1/T1 field, if you intend to transmit E1/T1 data and Ethernet data.
The Ethernet BW field shows the remaining bandwidth in Mbps available for Ethernet. The available bandwidth depends on the number of E1/T1 ports selected.
 - Select the Ethernet field, if you intend to transmit Ethernet data only

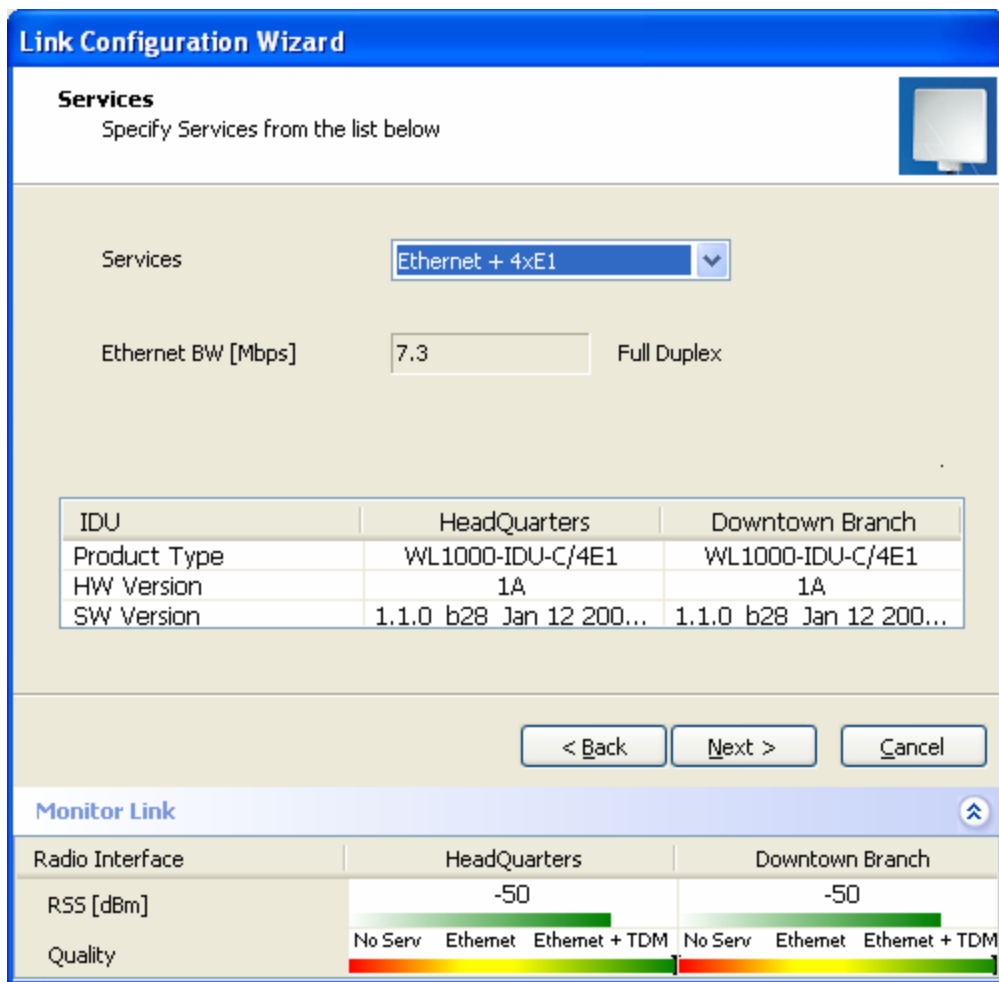


Figure 3-11. Service Parameters Dialog Box, E1/T1 Interface

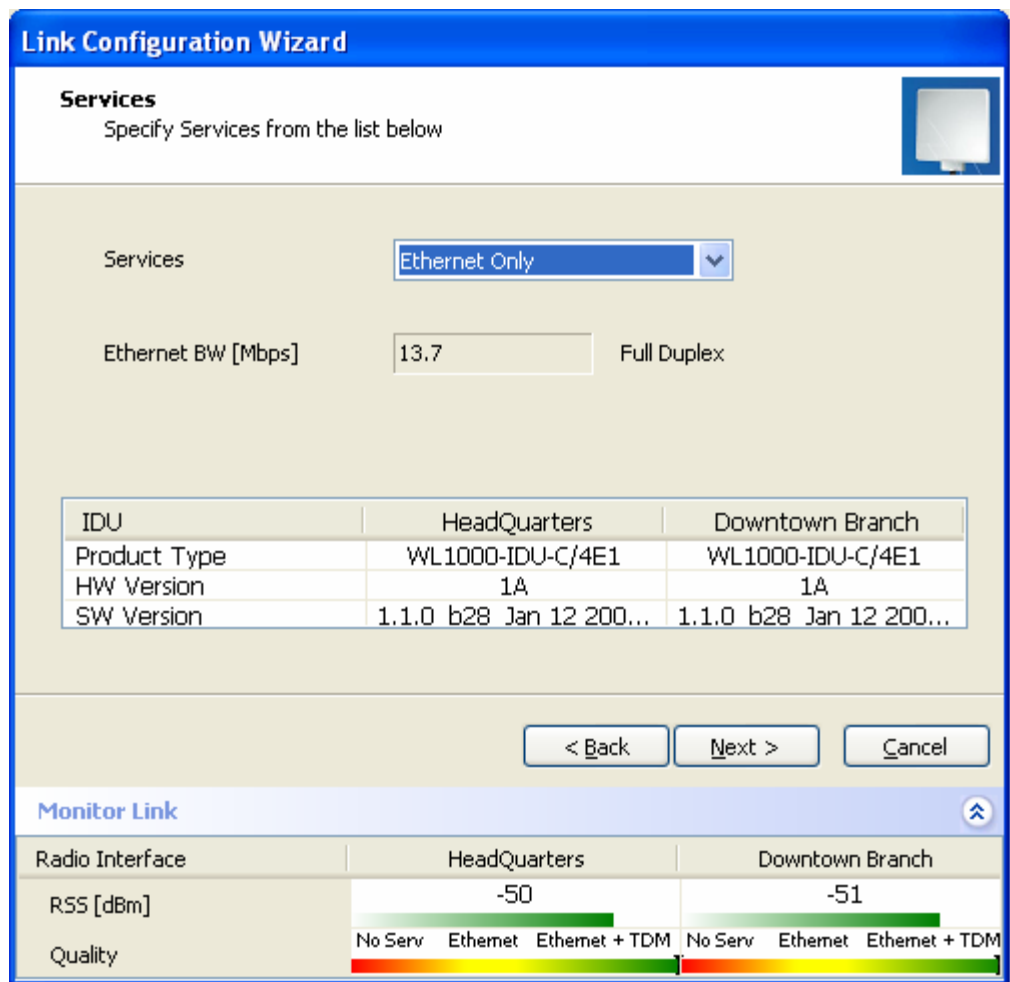


Figure 3-12. Service Parameters Dialog Box, Ethernet only Interface

2. Click **Next**.

The Finish screen appears (see [Figure 3-13](#)).

The Finish screen shows a summary of the link configuration.

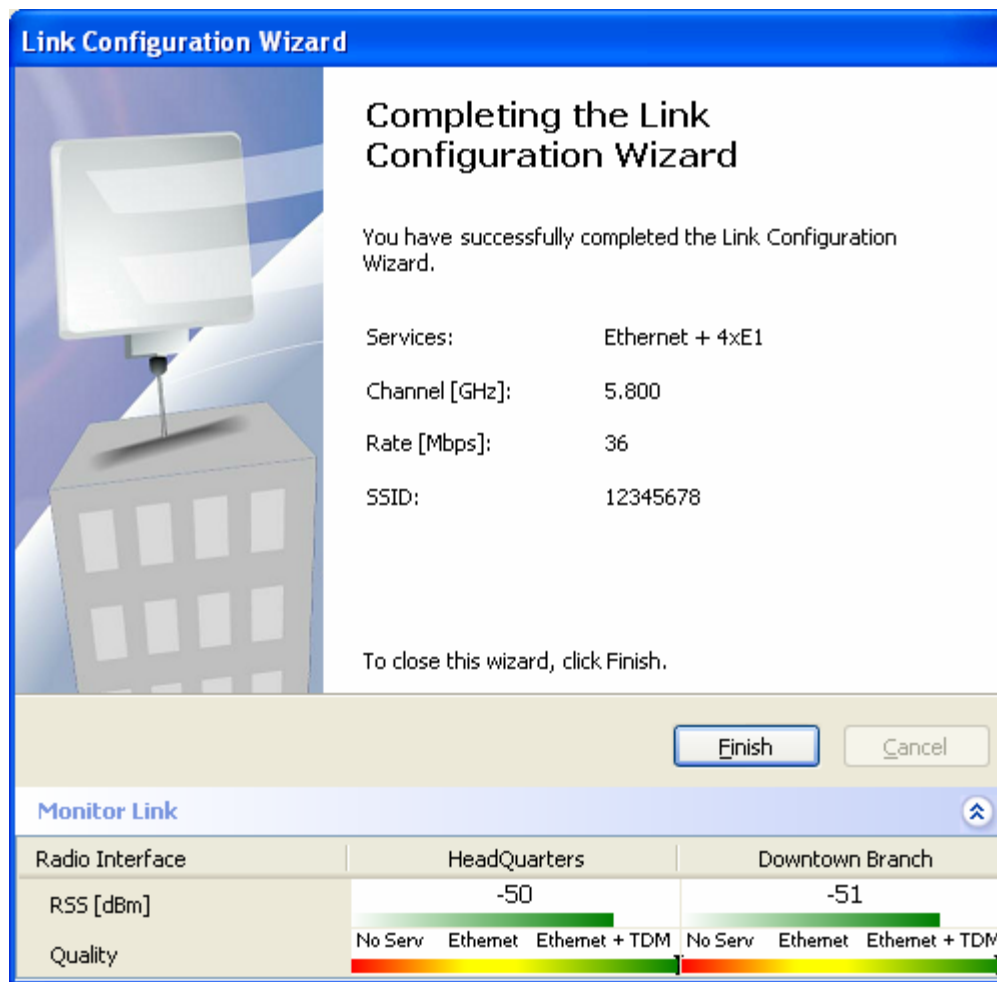


Figure 3-13. Configuration Link, Finish screen

3. Click **Finish** to complete the configuration wizard.
The Main screen is displayed.

Editing the Configuration Parameters

The configuration parameters can be edited for each site individually without running a wizard.

→ To edit the Configuration Parameters:

1. Click **configuration** from the main menu.
2. Select which site to configure.

The configuration dialog box opens. (See [Figure 3-14](#))

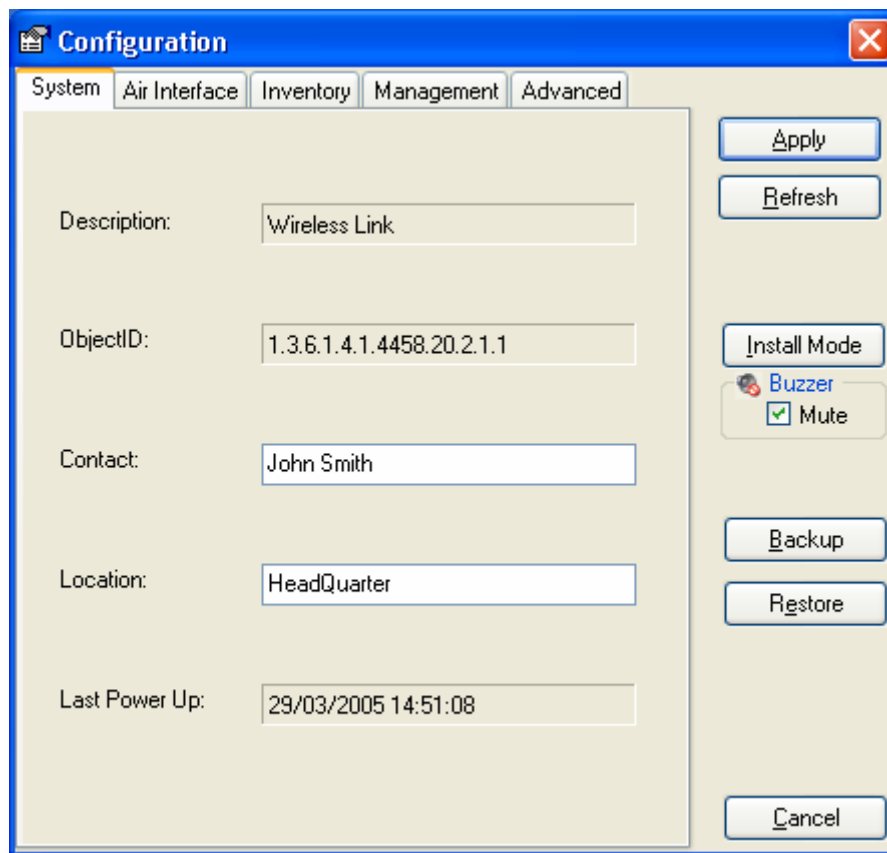


Figure 3-14. Configuration Dialog Box

3. In the Configuration dialog box, edit the data to for the link:
 - System Tab – The contact person and location details can be edited.
 - Air Interface Tab – Used for changing the transmit power
 - Inventory Tab – This screen is read only and cannot be edited
 - Management Tab – To configure the IP address, Subnet Mask, Default Gateway, and the Trap Destination.
 - Backup button – Save a “backup” ini file with current configuration.
 - Restore button – Load the “backup” ini created by the Backup button.
 - Install Mode – return to Install Mode for the entire link. The Buzzer can be muted by selecting the Mute check box before click the Install Mode button.
4. Click **Apply** to save the changes.

Changing the Transmit Power

Each ODU can be configured to have a different transmit power level.

→ To change the Transmit Power:

1. Click **configuration** from the main menu.
2. Select which site to configure.

The configuration dialog box opens.

3. Click the Air Interface Tab. (See *Figure 3-15*)
4. Select the required Transmit Power Level (See Figure 3-15, below).

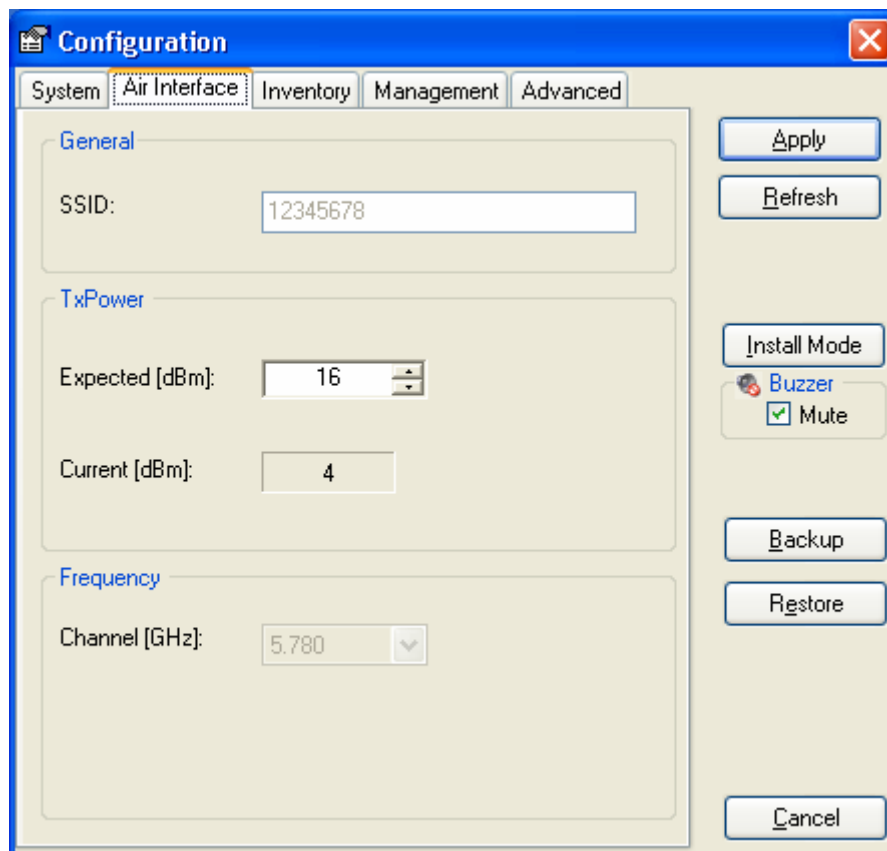


Figure 3-15. Changing the Transmit Power

Defining the Management Addresses

Each site must be configured separately, first site A then site B.

→ To define the Management Addresses:

1. Click **configuration** from the main menu.
2. Select which site to configure.

The configuration dialog box opens.

3. Click the Management Tab (see *Figure 3-16*).
4. Enter the IP address of the ODU in the IP address field.

Note *If performing configuration from the WinLink manager, the IP address is entered in the login screen (Figure 2-3)*

5. Enter the Subnet Mask.
6. Enter the Default Gateway.
7. Enter the Trap Destination. This is the IP address of the PC running the management application. The event log will be stored at this address.

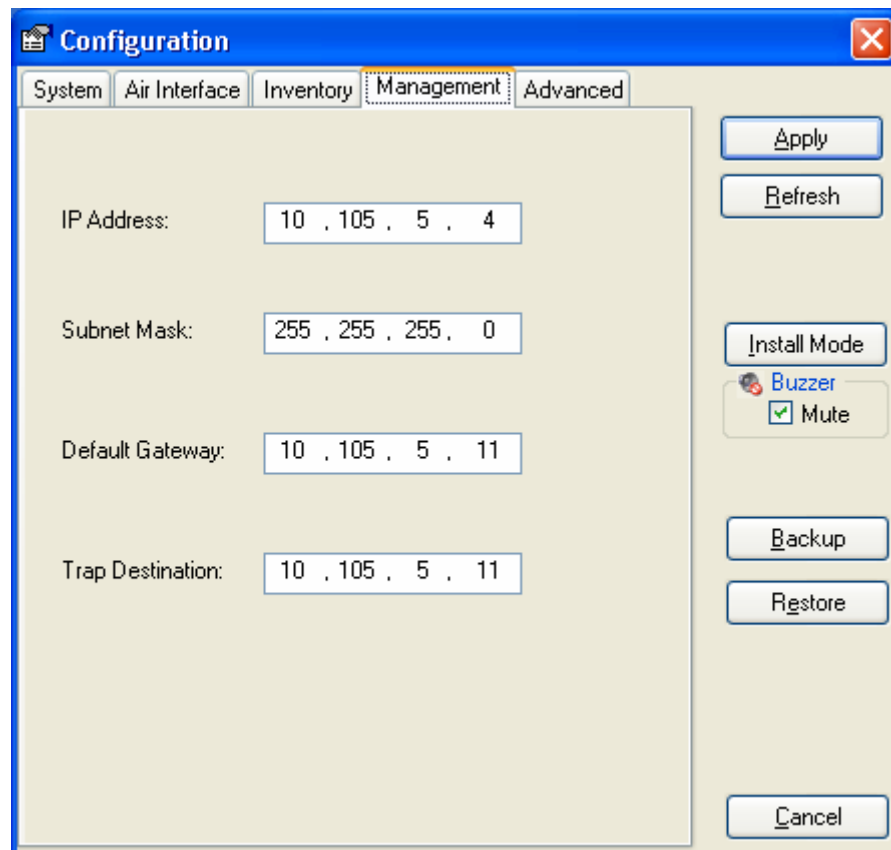


Figure 3-16. Configuration, Management

- Notes** *The Install mode button opens the Main Window for installation mode for reinstalling the link.*
- The Backup and Restore buttons are for saving and restoring the configuration files.*

3.2 Bridge Configuration

Bridge configuration is required in various network topologies, such as protection (1+1) and ring application.

Detailed description

The bridge configuration parameters are available from the Advanced tab of the site configuration dialog box (Figure 3-17). There are two parameters:

- ODU bridge mode
- IDU Aging time

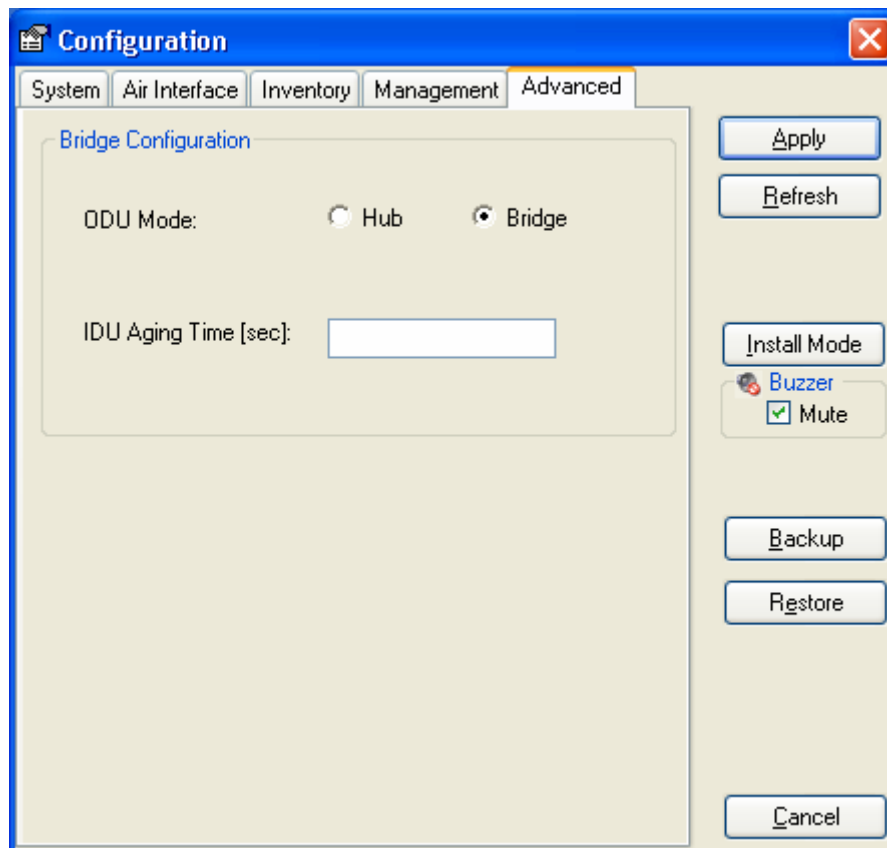


Figure 3-17. Site configuration dialog box

ODU Bridge Mode

This parameter controls the ODU mode with two optional values,

- Bridge Mode (default) (Figure 3-17). In "bridge" mode the ODU performs both learning and aging, the aging time of the ODU is fixed.
- Hub Mode – in "hub" mode the ODU transparently forward the all the packets over the wireless link.

Note *Changing these parameters requires system reset.*

IDU Aging time

This parameter controls the IDU (E and C) aging time.

The IDU has 2K MAC address learning table. The aging time parameter controls the time each MAC address is dropped from the table. Default value is 300 (sec).

Note *Change to these parameters is effective immediately.*

Note *Each side of the link can be configured separately.*

The following list detail common configurations, both sides are configured with the same values.

- Standard (Default) Configuration for Ethernet Applications
IDU-E or IDU-C aging is set to 300 sec (ODU is set to Bridge mode, Figure-1).
- Fast aging mode (for rapid network topology changes)
IDU-E or IDU-C aging is set to 1 seconds, ODU is set to Hub mode (Figure 3-18).

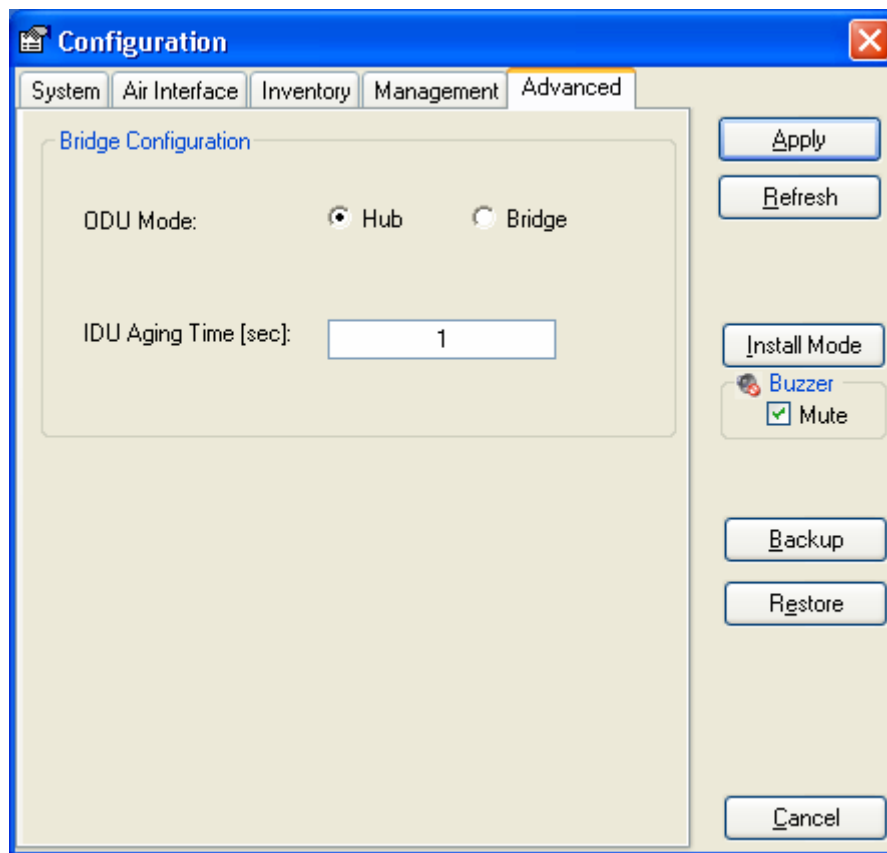


Figure 3-18. Hub mode selected

Chapter 4

Operation

This chapter provides the following information for WinLink 1000:

- WinLink 1000 front panel indicators on IDU-E and rear panel on IDU-C.
- Operating procedures (turn-on, front panel on IDU-E and rear panel on IDU-C indications, performance monitoring and turn-off)

4.1 Indicators

Panel Indicators

The panels of WinLink 1000 include a series of LED indicators that show the operating status of the unit. Figure 4-1, below shows the front panel of the WinLink 1000 unit, Table 4-1 describes the indicators.

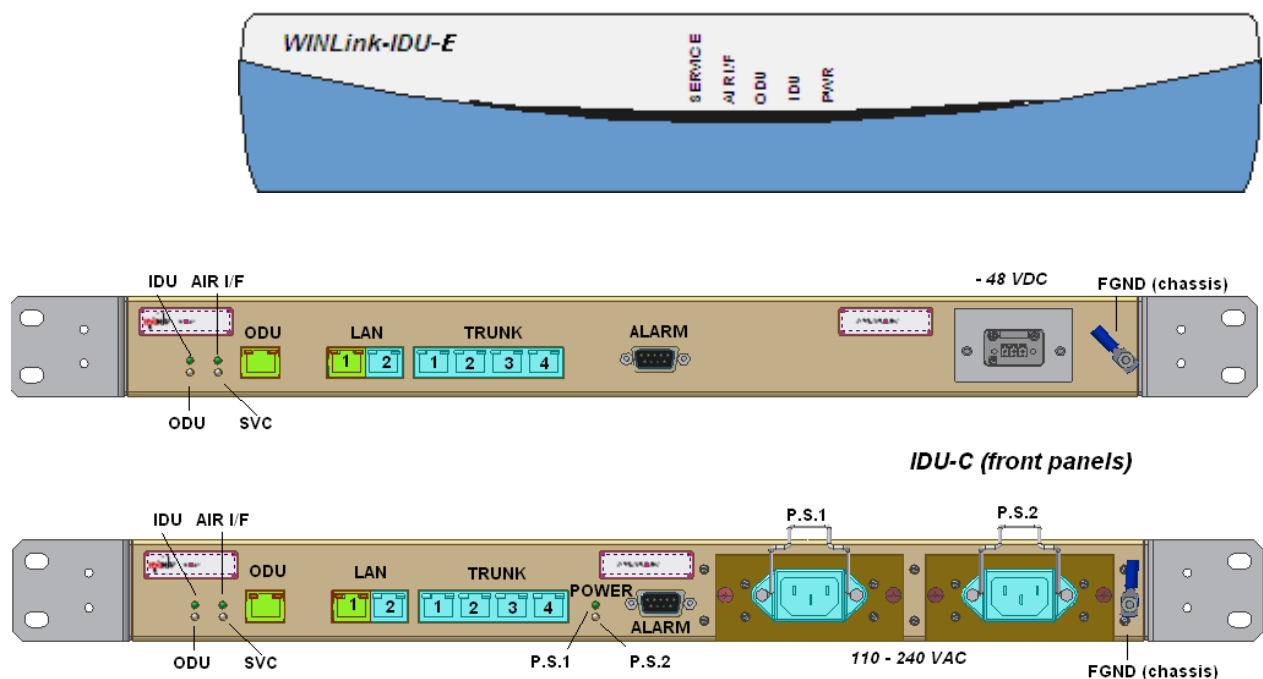


Figure 4-1. IDU Panels LEDs

Table 4-1. IDU Panel LEDs

Name	Color	Function
PWR	Green	ON - A power supply is ON IDU-E only
IDU	Green	ON- IDU operational
	Orange	ON- During power-up only
	Red	ON - Failure
ODU	Green	ON - ODU-to-IDU communication link is operating
	Red	ON - ODU-to-IDU communication link is disrupted
AIR I/F	Green	ON - Wireless link is synchronized
	Orange	ON - During installation only
	Red	ON - Wireless link lost synchronization
SERVICE	Green	ON - E1 or T1 line is synchronized
	Orange	ON - Alarm detected at the remote interface ON - Local or Remote loopback
	Red	ON - Alarm detected at the local interface

Connector LED Indicators

The IDU connectors of WinLink 1000 have LED indicators that show the operating status. [Table 4-4](#) describes the indicators.

Table 4-2. WAN/LAN LEDs

Name	Color	Function	Location
LINK	Green	ON - Good Ethernet link integrity	WAN/LAN connectors
ACT	Yellow	Blinks according to the Ethernet traffic	WAN/LAN connectors

Table 4-3. TDM Traffic Indicators

Function	Green LED	Red LED
OK	On	Off
AIS	Off	On
LOS	Off	On
Loopback	On	Blinking

4.2 Operating WinLink 1000

Turning On WinLink 1000

→ To turn on WinLink 1000:

- Connect the AC/DC converter to the IDU-E power connector and to the mains; or -48VDC from rack or AC 110-240VAC.

The PWR indicator lights up and remains lit as long as the IDU is receiving power.

WinLink 1000 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators and statistics data. Intervention is only required when WinLink 1000 must be configured to its operational requirements, or diagnostic tests are performed.

Normal Indications

Upon turning on WinLink 1000, the PWR LED in the IDU front panel lights to indicate that WinLink 1000 is on. [Table 4-4](#) shows the correct status of the indicators at power-up.

Table 4-4. WinLink 1000 Indicators at Startup

Indicator	Color	Status
PWR	Green	ON IDU-E only
IDU	Orange Green	ON for short duration during startup ON during normal operation
ODU	Green	ON—shows normal operation
AIR I/F	Orange Green	ON for short duration during startup ON shows normal operation
SERVICE	Green	ON shows normal operation OFF when Service is configured for Ethernet only

If the above LED indications do not appear following initial power turn-on, refer to [Chapter 5](#) for the diagnostic test instructions.

Note *During normal operation, the PWR led stays ON; all other LEDs blink at approximately a four second cycle.*

Turning Off WinLink 1000

- ➔ To turn off WinLink 1000:
 - (IDU-E) Remove the AC/DC converter power cord from the mains.
 - (IDU-C) Remove 48VDC from rack or AC 110-240VAC (IDU-C).

Changing the Password

- ➔ To change the password
 1. From the Tools menu, select Change Password
 2. The Change Password dialog box appears.
 3. Enter current password, and new password.
 4. Click Ok to confirm.

4.3 Managing WinLink 1000

Before starting a management session, make sure that a communication link between local and remote units exists, the Link Status indication bar in the middle of the Main menu must be green; the *Radio Link – Sync* message appears in the event log (see Figure 4–2).

The screenshot displays the WinLink1000 Manager software interface. The window title is "WinLink1000 Manager - 10.105.5.4". The interface is divided into several sections:

- Menu bar:** File, Configuration, Tools, Maintenance, Help.
- Toolbar:** Link Configuration, Link Installation, Clear Counters, Log Off, Exit.
- Link details:**
 - Link Radio Link-1000
 - SSID: 12345678
 - Services: Ethernet + 4xE1
 - Frequency [GHz]: 5.800
 - Rate [Mbps]: 36
 - Status: Link Active
- Site A details:**
 - Site Headquarters
 - IP Address: 10.105.5.4
 - Subnet Mask: 255.255.255.0
 - Trap Destination: 10.105.5.11
- Site B details:**
 - Site Downtown Branch
 - IP Address: 10.105.5.2
 - Subnet Mask: 255.255.255.0
 - Trap Destination: 10.105.5.21
- Monitor:**
 - Location: Headquarters, Downtown Branch
 - Radio Interface: RSS [-51, -50], Quality (No Serv, Ethernet, Ethernet + TDM)
 - Ethernet Service: Rx Rate (8840, 8886), Tx Rate (8901, 8827)
 - TDM Service: 1st Trunk (Normal, 0), 2nd Trunk (Normal, 0), 3rd Trunk (Normal, 0), 4th Trunk (Normal, 0)
 - Frequency: 5.800
- Event Log:** Table with columns: Num..., Date & Time, Message, Trap Source, IP Address.
- Connected to LAN:** Connectivity, Connection Mode: Network, IP Address: 10.105.5.4

Annotations on the right side of the image point to specific elements: "Link quality" points to the RSS and Quality bars; "Frames rate Traffic rate" points to the Ethernet Service table; "TDM service details" points to the TDM Service table; and "Link status" points to the Frequency bar.

Figure 4–2. Main Menu, Wireless Link is Active

The WinLink Manager Main menu consists of the following elements:

- Toolbar – includes buttons serving for:
 - Changing configuration parameters of operating wireless link, assigning text files for storing alarms, statistics and configuration data (Link Configuration button)
 - Performing preliminary configuration of the system (Link Installation button). This button is disabled once a link is defined.
 - Clearing error counters (Clear Counters button)
 - Logging off WinLink Manager (Log Off button)

- Exiting WinLink Manager (Exit button)
- Menu bar
 - File Menu – Log off, and exit
 - Configuration – use for link configuration, individual site configuration or link installation
 - Tools – set preferences, event log handling, change password
 - Maintenance – Loopbacks, system reset.
- Link details pane – summarizes information on the radio frequency, air interface rate, type of TDM service, and IP details of the local and remote WinLink 1000 units.
- Monitor pane – displays the link quality between local and remote devices and the following statistics:
 - Local/remote received traffic rate (in kbps)
 - Local/remote received frames rate (in fps)
 - Radio link status
 - E1 or T1 link status
 - Radio signal strength (RSS) in dBm
 - Block error rate
- Event log – stores both alarms and traps:
 - Alarms and traps also generated by NMS (e.g. counter clear, device unreachable, etc.)
- Traps:
 - **Monitoring for radar activity on channel <frequency> GHz.** – Apply to DFS/TPC products only. T trap is issued when the ODU starts the looking for radar.
 - **Radar activity was detected in <site>, on channel <frequency> GHz.** Apply to DFS/TPC products only. The ODU detected radar. The channel is prohibit for 30 minutes.
 - **Transmitting on channel <frequency> GHz.** – The ODU started transmission on a channel.
 - **Channel scanning in progress.** The ODU start searching the remote ODU in all channels.
 - Configuration problem detected. Link installation required.

- **TDM Service – Alarm.** (added in 1.1.3)
 - **TDM Service – Normal.** (added in 1.1.3)
- **To change link configuration parameters:**
1. In the Main menu, click **Configure Link**.
The Configure Link wizard appears. See [Chapter 3](#) for configuration details.
 2. Click **Next**.
 3. Continue through the configuration wizard and define the Link name and ID, Channel, Rate and Services.
 4. Once you finish changing configuration parameters, click **Finish**.
The system takes a few seconds to activate the link with the new configuration.

Resetting WinLink 1000

Note *In order to maintain the communication link, always reset the remote WinLink 1000 first.*

- **To reset WinLink 1000:**
1. Click on **maintenance**, select the remote WinLink 1000 to reset.
 2. Click on **maintenance**, select the local WinLink 1000 to reset.

Saving WinLink 1000 Configuration in a File

WinLink 1000 management software allows you to save configuration parameters of the local and remote units on the management station as an INI file. Each site is saved in a separate INI file.

- **To save configuration in a file:**
1. From the Configuration menu, select the site to backup.
The Configuration dialog box opens (see [Figure 3-9](#)).
 2. Click **Backup**.
 3. In the Save As dialog box, indicate in which folder and under what name configuration file is to be saved, and click **Save**.

Restoring a Configuration File

Configuration files (*.ini) can be uploaded from the management station, if the WinLink 1000 database becomes corrupted. This can also be used to distribute verified configuration files to all other units that use the similar configuration.

→ **To restore a configuration file to WinLink 1000:**

1. From the Configuration menu, select the site to reconfigure.

The Configuration dialog box opens (see *Figure 3-9*).

2. Click **Restore**.
3. From the Open dialog, select *.ini file to upload and click **OK**.

Displaying the WinLink 1000 Inventory

The WinLink 1000 inventory includes information on the hardware, firmware and software versions of the local and remote units.

→ **To display inventory:**

- In the Configuration dialog box (see *Figure 3-9*), click the **Inventory** tab.

The local and remote inventory information is displayed (see *Figure 4-3*).

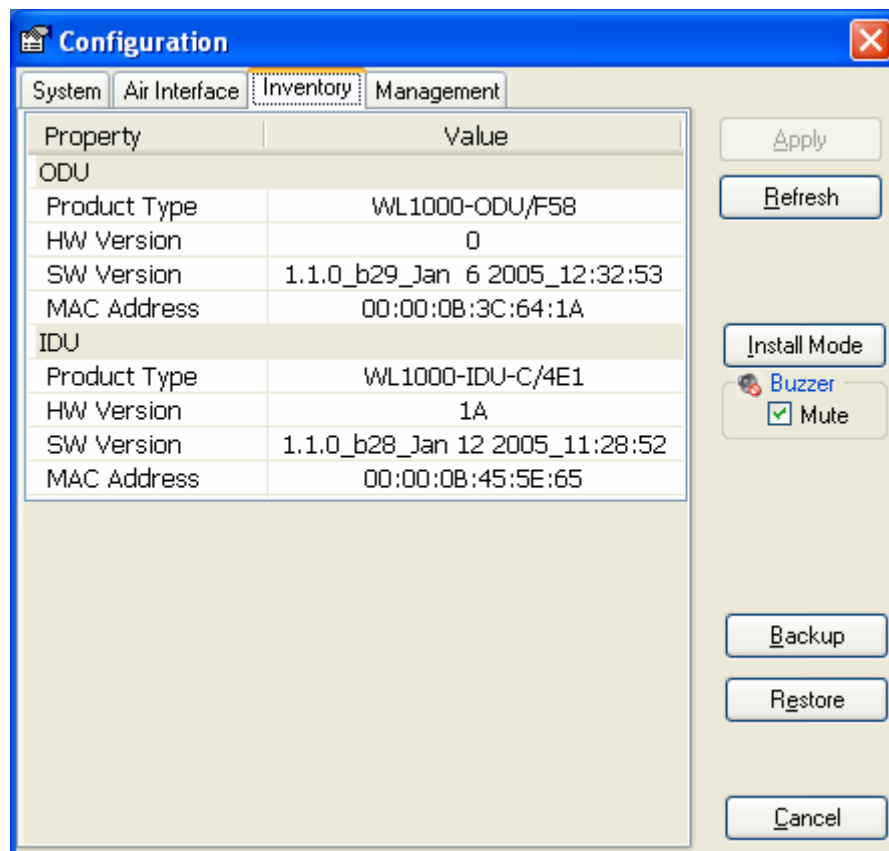


Figure 4-3. WinLink 1000 Inventory

Chapter 5

Diagnostics and Troubleshooting

This chapter describes the WinLink 1000 diagnostic functions, which include:

- Status indications, alarms, power-up self-test
 - Statistics collection
 - Diagnostic tests (local and remote loopbacks on E1 or T1 link).
-
-

5.1 Error Detection and Alarms

WinLink 1000 detects fault conditions of the radio and user links and initiates alarms to alert the user.

***Note** To store the event log, first define the IP address, subnet mask, default gateway and trap address of the management PC, see [Chapter 3](#) for details.*

Alarms (traps) are displayed in the Event Log in the lower panel of the Main Menu screen. The alarm log is saved as a TXT file.

The event log includes the following fields:

- Sequential number (ID)
- Date and time stamp
- Message
- Trap source
- IP address of the ODU that initiated alarm.

Table 5-1. WinLink 1000 Alarms and Information Messages

Message	Description
Radio Link – Sync	Radio link is synchronized
Radio Link – Out Of Sync	Radio link lost synchronization
Link Has Been Reset	ODU was reset due to internal problem
TDM Interface – Normal	TDM interface is operating properly
TDM Interface – LOS	Loss of Synchronization is reported by TDM interface
TDM Interface – LOS	Loss of Signal is reported by TDM interface
TDM Interface – AIS	Alarm Indication Signal is reported by TDM interface
TDM Interface – Loopback	A loopback is active on TDM interface
Link Resetting	Wireless link reset from the management station. This alarm is caused by automatic reset after link configuration.
Local ODU Resetting	The local ODU reset from the management station.
Monitor was stopped since no connection to the link	No ODU-to-IDU traffic was detected during the last 20 minutes.

5.2 Collecting and Saving Statistics

WinLink 1000 constantly monitors traffic over the radio link and collects the following statistics data:

- Site 1 /Site 2 received traffic rate (in Kbps)
- Site 1 /Site 2 received frames rate (in Fps)
- Radio signal strength (in dBm)
- Error (Blocks).


The statistics (monitor) log and event log can be saved as TXT files. New alarms are automatically added to the text file, as they enter the event log.

➔ **To save event log or monitor log:**

1. From the Tools menu, choose **Preferences**.

The Preferences dialog box appears (see [Figure 5-1](#)).

2. From the Preferences dialog box, select the file to save.

3. Click the check box to open the file for saving.
4. Click the  button and in the Select File dialog box indicate in which folder and under what name the alarm log file is to be saved, and click **OK**.
5. Set the time interval for adding data to the file.

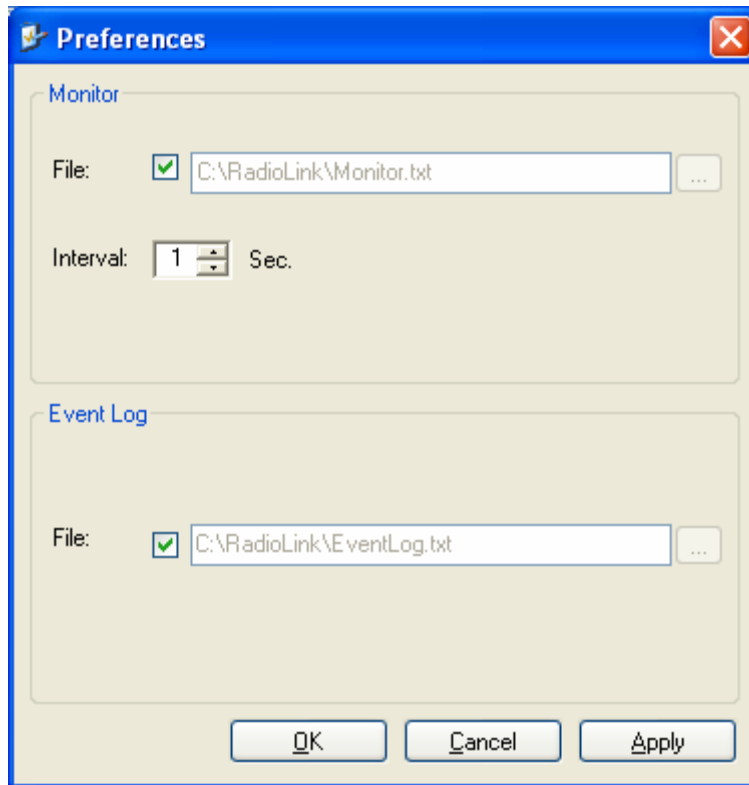


Figure 5-1. Preferences Dialog Box, Event Log Tab

5.3 Running Diagnostic Loopbacks

WinLink 1000 supports activation of the internal and external loopbacks on the local and remote units.

➔ **To activate a loopback:**

1. From the Maintenance menu, choose **Set Loopbacks**.

The Loopbacks dialog box appears (see [Figure 5-2](#)).

2. From the Local or Remote drop-down box, select a loopback that you intend to run, and click **OK**.

A confirmation message appears.

3. Click **OK** to activate a loopback.

WinLink 1000 activates selected loopback. A loopback status arrow in the Main menu turns green to indicate an active loopback.

→ **To deactivate a loopback:**

- From the From the Local or Remote drop-down box of the Loopbacks dialog box, select **None** and click **OK**.

A loopback is deactivated and the corresponding status arrow in the Main menu becomes dimmed.

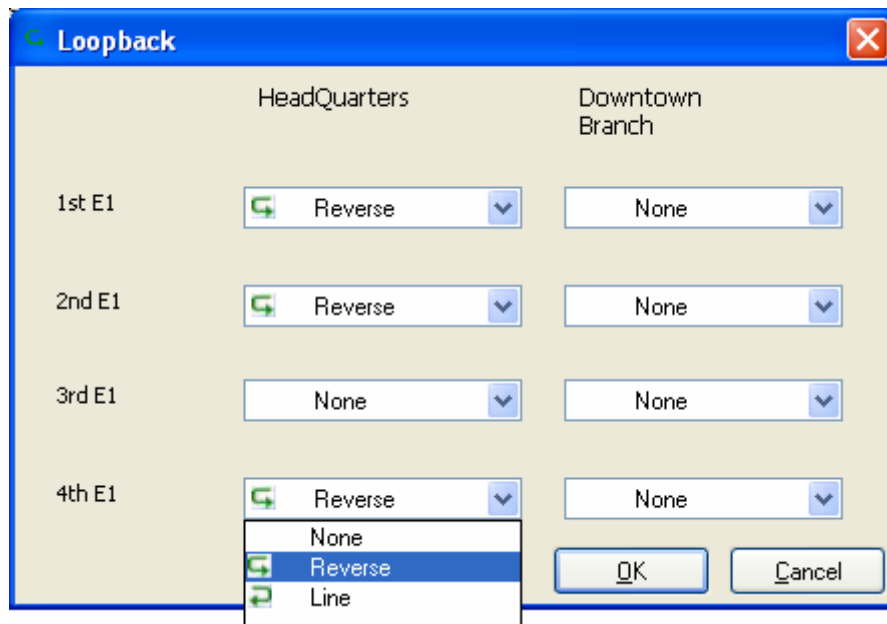


Figure 5-2. Loopbacks Dialog Box

Local External Loopback

Local WinLink 1000 can be set to an external loopback to test the local E1/T1 port and its connection to the local side user equipment. In this mode, data coming from the local user equipment is looped back to it (see [Figure 5-3](#)). This loopback is initiated from a management station connected to the local unit.

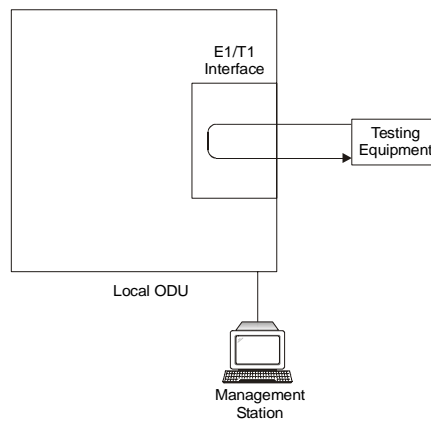


Figure 5-3. Local External Loopback

Remote Internal Loopback

Remote WinLink 1000 can be set to an internal loopback to test connection between the local and remote units, the local E1/T1 port and its connection to the local side user equipment. In this mode, data coming from the local WinLink 1000 is looped back to it (see [Figure 5-4](#)). This loopback is initiated from a management station connected to the local unit.

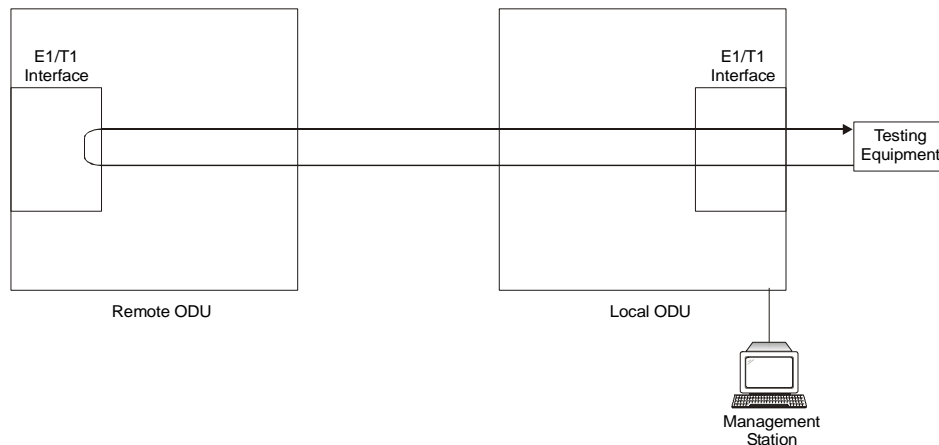


Figure 5-4. Remote Internal Loopback

Remote External Loopback

Remote WinLink 1000 can be set to an external loopback to test the remote E1/T1 port and its connection to the remote side user equipment. In this mode, data coming from the remote user equipment is looped back to it (see [Figure 5-5](#)). This loopback is initiated by an inband command sent from a management station connected to the local unit.

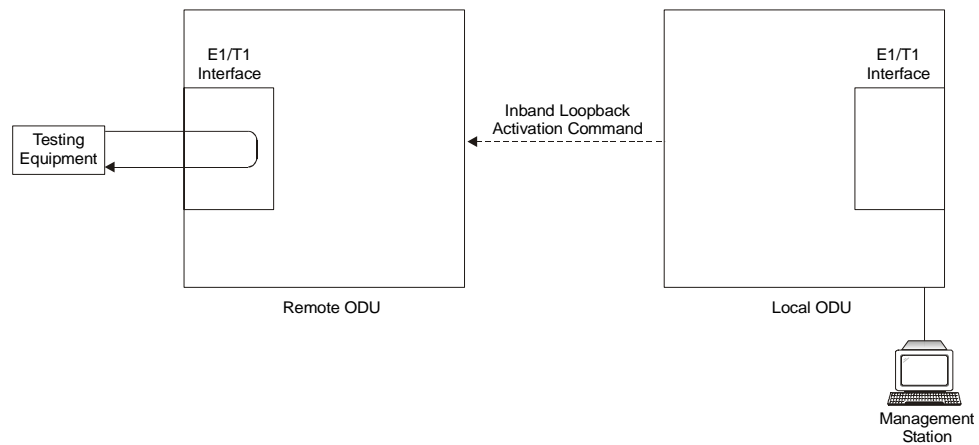


Figure 5-5. Remote External Loopback

Local Internal Loopback

Local WinLink 1000 can be set to close an internal loopback to test connection between the local and remote units, remote E1/T1 port and its connection to the remote side user equipment. In this mode, data coming from the remote user equipment is looped back to it (see [Figure 5-6](#)). This loopback is initiated by an inband command sent from a management station connected to the local unit.

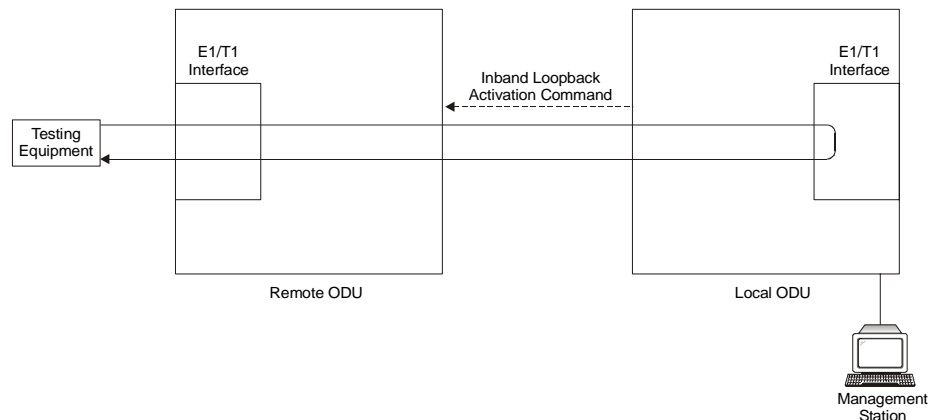


Figure 5-6. Local Internal Loopback

5.4 Troubleshooting

The WinLink 1000 LEDs show faults in the system or the link. Use Table 5-2 to diagnose the fault.

Table 5-2. Troubleshooting with WinLink 1000 LEDs

Led	Status	Remedy
PWR	Off	Check that AC adapter is connected to the IDU and the AC power outlet.
IDU	Orange	Check that the IDU/ODU cable is properly wired and connected.
ODU	Red	Check that the IDU/ODU cable is properly wired and connected.
AIR I/F	Orange	Complete the installation procedure from the management software.
	Red	Check the ODU Antenna alignment. Check that the radio configuration of both site A and site B units are the same (channel and SSID).
SERVICE	Off	Check the TDM service configuration in the NMS.
	Orange	Check that the system is not in loopback mode. Check the site B IDU ports and cables and site B external equipment.
	Red	Check the site A IDU ports, cables and external equipment.

5.5 Frequently Asked Questions

Air Interface

Q: What performance issues will arise due to environmental conditions?

A: The WinLink 1000 is not sensitive to environmental conditions. However if heavy rain or snowfall is expected we can ensure the performance by allowing a higher fade margin in the budget link planning calculations.

Q: When using the WinLink 1000, what is the potential for interference between our system and other cellular or wireless Networks devices?

A: The WinLink 1000 is a robust system. However, since it operates in unlicensed band, there maybe some interference. Nevertheless, the fact that we can manually set the frequency gives us the flexibility to find a clear channel. In addition each WinLink 1000 link uses unique user configurable SSID code.

Q: What protocol does the WinLink 1000 use, i.e. 802.11?

A: WinLink 1000 uses a proprietary protocol; this protocol contains improved options that more efficiently support the clock reconstruction from the TDM services.

Q: What type of security is offered on the WinLink 1000?

A: The WinLink 1000 has two levels of security:

- Each unit uses a unique SSID – link specific code (up to 24 alphanumeric characters)
- Proprietary protocol protects from eavesdropping from other systems.

Q: Can we use horizontal and vertical polarization on the same frequency to double the number of wireless links?

A: Installing two WinLink 1000 systems in the same band with cross polarization provides 20–25 dB separations. Nevertheless, since there are reflections, the cross polarization separation is decreased and spatial separation is recommended.

Q: In BAND C, can you add the frequency of 5.735 to the manual selection in order to increase the number of 20 MHz channels to six?

A: Currently the system provides 5 fixed channels. Yet, the manual frequency setting provides more flexibility of spectrum selection, including 5.735 MHz.

Q: Can I use the WinLink 1000 with any vendor external antenna?

A: Yes. RADWin supplies the WinLink 1000 external ODU with an N-type typical connector. Any vendor external antenna that can be cascaded to our external unit can be use without problem. Please note that dB losses in the cascading cable between the external ODU and antenna should be taken into consideration. (In the supplied cascading cable of one meter we have 1 dB loss)

Q: Do we need to add external arrestors on WinLink 1000 cables?

A: The WinLink ODU includes arrestors and lightning protection. Therefore there is no need to add additional arrestors.

Q: What is the sensitivity for each rate of the WinLink 1000?

A: The sensitivities are:

- Rate 12 Mbps -84 dB
- Rate 18 Mbps -81 dB
- Rate 36 Mbps -74 dB
- Rate 48 Mbps -68 dB

Q: Does WinLink 1000 use DSSS technique?

A: No, WinLink 1000 uses the advanced OFDM technique.

Management

Q: Can we manage WinLink 1000 using SNMP other then the supplied management software that comes with the units?

A: Yes. The WinLink 1000 is SNMP based, when using other SNMP software, and after implementing RADWin MIB's, the WinLink 1000 can be managed.

Q: Can WinLink 1000 be managed and configured via Telnet?

A: No. Use only the WinLink software manager.

Q: After reselection Channel Reselection link is not established for long time. How can I recover the link?

A: Click "cancel", then open the site configuration dialog and set the unit to install mode. The remote side of the link shall enter install mode on the installation channel.

Services

Q: What is the actual Ethernet data rate and maximum throughput?

A: The Max net throughput of the WinLink 1000 is Full Duplex 18 Mbps.

Note *The WinLink 1000 is a symmetrical system*

Q: Does WinLink 1000 withhold any MAC Addresses?

A: The WinLink 1000 is a layer 2 Bridge (VLAN transparent). The built in switch contains a MAC Address table up to 2047.

Q: What are the BER values expected in the WinLink 1000 link?

A: 1E-10 (according to BER sensitivity threshold)

Antennas and Cables

Q: Can I use any category 5e cable in order to connect the IDU and ODU?

A: The cable should be suitable for outdoor use, and shielded Category 5e.

Competitive

Q: What are the main advantages of the WinLink 1000 solution (e.g., wireline, wireless, etc.) over other possible alternatives?

A:

- Easy and intuitive installation using audio indication
- Easy configuration using the management software of overall link site to site – there is no need to travel between the two sites in order to change the configuration
- Easy migration between transition channels – site to site
- Full backup option – backup and restore using ini files
- Very light ODU (1.5 kg)
- No RF losses between IDU and ODU
- Robust Air Interface Layer 2 ARQ insures “error-free” Ethernet service even in harsh conditions. Retransmit mechanism for TDM insures low BER
- Integrated up to 4 E1 /T1 and Ethernet radio over one single product.
- Supports a variety of applications Voice and Data over single radio – no need for external mediation device.
- Smooth migration to VoIP applications
- Carrier class compliant with ITU standards for E1 and T1
- Low and constant TDM latency (8 msec)
- Extremely accurate recovered clock low cost replacement to PDH radios.

5.6 Technical Support

Technical Support for this product can be obtained from the local distributor from whom it was purchased.

Appendix A

Wiring Specifications

A.1 ODU-IDU Cable

The ODU-IDU cable is standard CAT-5, 4 twisted-pair 24 AWG FTP. The ODU-IDU cable is terminated in RJ-45 connectors on both ends. It is covered by a cable gland on the ODU side for hermetic sealing.

Table A-1 shows the connector pinout.

Table A-1. ODU-IDU Cable Connector Pinout

IDU RJ-45	Wire Color	Function	ODU RJ-45
1	Green/White	Ethernet (RxN)	1
2	Green	Ethernet (RxT)	2
3	Orange/White	Ethernet (TxT)	3
4	Blue	Power (+)	4
5	Blue/White	Power (+)	5
6	Orange	Ethernet (TxN)	6
7	Brown/White	Power (-)	7
8	Brown	Power (-)	8

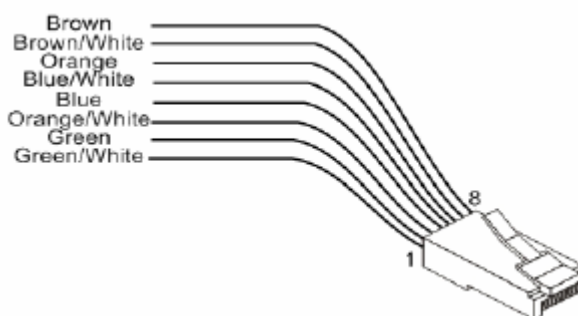


Figure A-1. RJ-45 wiring for IDU-ODU cable

A.2 User Port Connectors

The IDU includes ports for connecting E1/T1 and 10/100BaseT Ethernet user devices.

Trunk Port

The Trunk (E1/T1) interface terminates in an 8-pin RJ-45 balanced connector, wired in accordance to [Table A-2](#).

Table A-2. E1/T1 Connector Pinout

Pin	Function
4,5	Receive (input)
1,2	Transmit (output)

LAN Port

The LAN 10/100BaseT interface terminates in an 8-pin RJ-45 connector, wired in accordance to [Table A-3](#).

Table A-3. Fast Ethernet Connector Pinout

Pin	Signal	Function
1	TD (+)	Transmit Data (positive)
2	TD (-)	Transmit Data (negative)
3	RD (+)	Receive Data (positive)
6	RD (-)	Receive Data (negative)

A.3 IDU-C connectors

Table A-4. Terminal Block 3-pin -48VDC

Pin	Connection
Right	'+'
Center	Chassis
Left	'-'

Table A-5. Alarm Connector (Dry-Contact)

Pin	Description
1	Input #1 Positive
6	Input #1 Negative
2	Input #2 Positive
7	Input #2 Negative
3	Output #1 NC pin
8	Output #1 COM pin
4	Output #1 NO pin
9	Output #2 COM pin
5	Output #2 NO pin

Appendix B

Mast and Wall Installation

B.1 Mounting the ODU

The ODU can be mounted on a mast or a wall.

ODU Mounting Kit Contents

The ODU mounting kit includes the following items:

- One Large Clamp (see figure B-1)
- One Small Clamp (see figure B-2)
- One Arm (see figure B-3)
- Four Screw hex head M8x40
- Two Screw hex head M8x70
- Four Washer flat M8
- Three Washer spring M8
- Two M8 Nuts

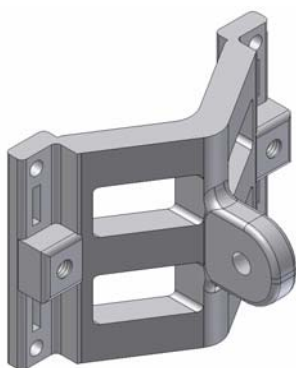


Figure B-1. Large Clamp

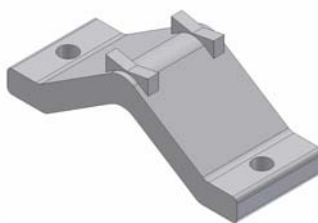
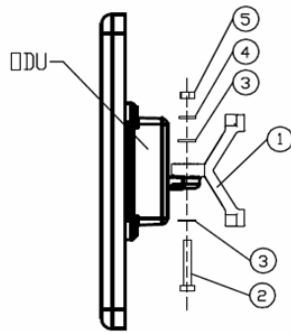


Figure B-2. Small Clamp

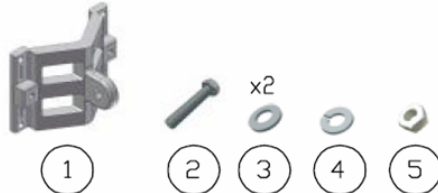


Figure B-3. Arm

Mounting WinLink 1000 on a Mast

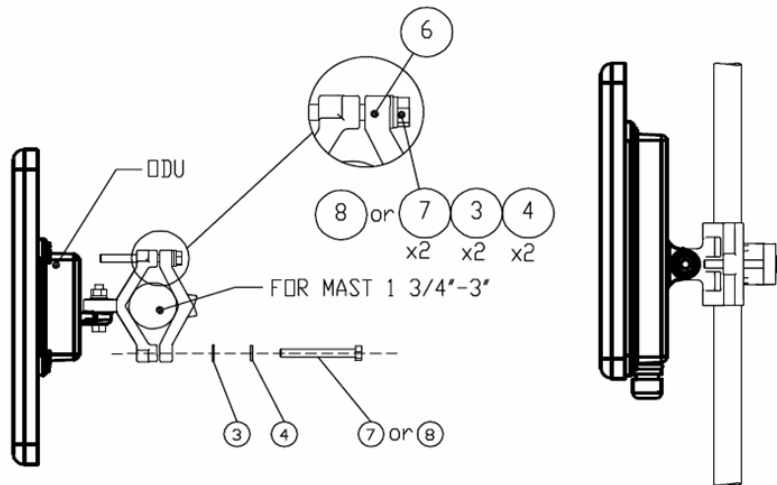


ITEM	DESCRIPTION	QTY
1	Clamp	1
2	Screw hex head M8x40	1
3	Washer flat M8	4
4	Washer spring M8	3
5	Nut M8	1
6	Clamp	1
7	Screw hex head M8x40 (for 1 3/4" dia mast)	2
8	Screw hex head M8x70 (for greater size of mast)	2



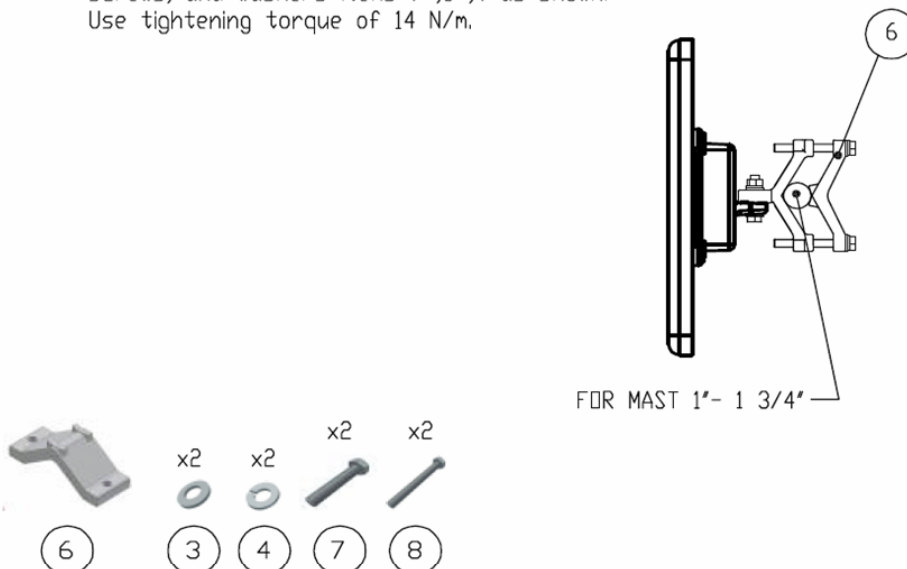
STEP 1

Attach item 1 to the base (mate knurled surfaces) using items 2, 3, 4, 5 as shown. Use tightening torque of 24 N/m.

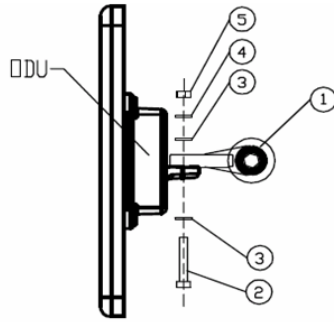


STEP 2

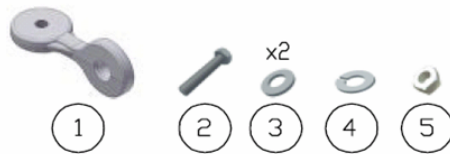
Tighten the antenna to the mast, using item 6, screws, and washers items 7, 3, 4 as shown. Use tightening torque of 14 N/m.



Mounting WinLink 1000 on a Wall

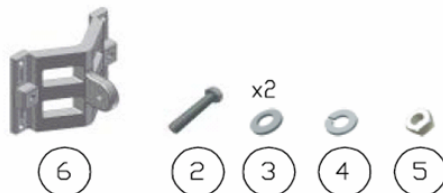
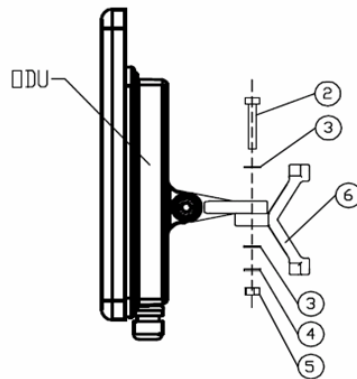


Installation Kit		
ITEM	DESCRIPTION	QTY
1	Arm	1
2	Screw hex head M8x40	2
3	Washer flat M8	4
4	Washer spring M8	2
5	Nut M8	2
6	Base wall	1



STEP 1

Attach item 1 to the base
(mate knurled surfaces)
using items 2, 3, 4, 5 as shown.
Use tightening torque of 24 N/m.

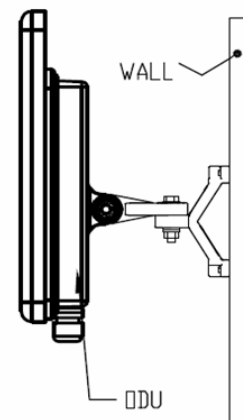


STEP 2

Attach item 6 to the arm
(mate knurled surfaces)
using items 2, 3, 4, 5 as shown.
Use tightening torque of 24 N/m.

STEP 3

Install ant. to wall
(hardware supplied by customer)



B.2 Mounting an External Antenna

The optional external antenna can be mounted on a mast.

External Antenna Mounting Kit Contents

The external antenna mounting kit includes the following items:

- Twelve flat washers
- Eight spring washers
- Eight hex nuts
- Four bolts
- One U-bracket
- One pivoting bracket
- Two metal strap clamps.

➔ **To install external antenna on the mast:**

1. Attach the U-bracket to the back of the antenna using four flat washers, four spring washers and four hex nuts.
2. Attach the pivoting bracket to the U-bracket using eight flat washers, four spring washers, four hex nuts and four bolts.
3. Pass both strap clamps through the vertical slots in the pivoting bracket.
4. Attach the antenna to the mast using the two strap clamps.
5. Adjust the required tilt using the angular scale and tighten all bolts and nuts at the required position.

Appendix C

Link Budget Calculator

C.1 Overview

The Link Budget Calculator is a utility for calculating the expected performance of the WinLink wireless link and the possible configurations for a specific link range.

The utility allows you to calculate the expected RSS of the link, and find the type of services and their effective throughput as a function of the link range and deployment conditions.

The Link Budget Calculator is supplied on the WinLink Manager CD. After installation, it may also be accessed from the menu bar of the WinLink Manager (see Figure C-1).

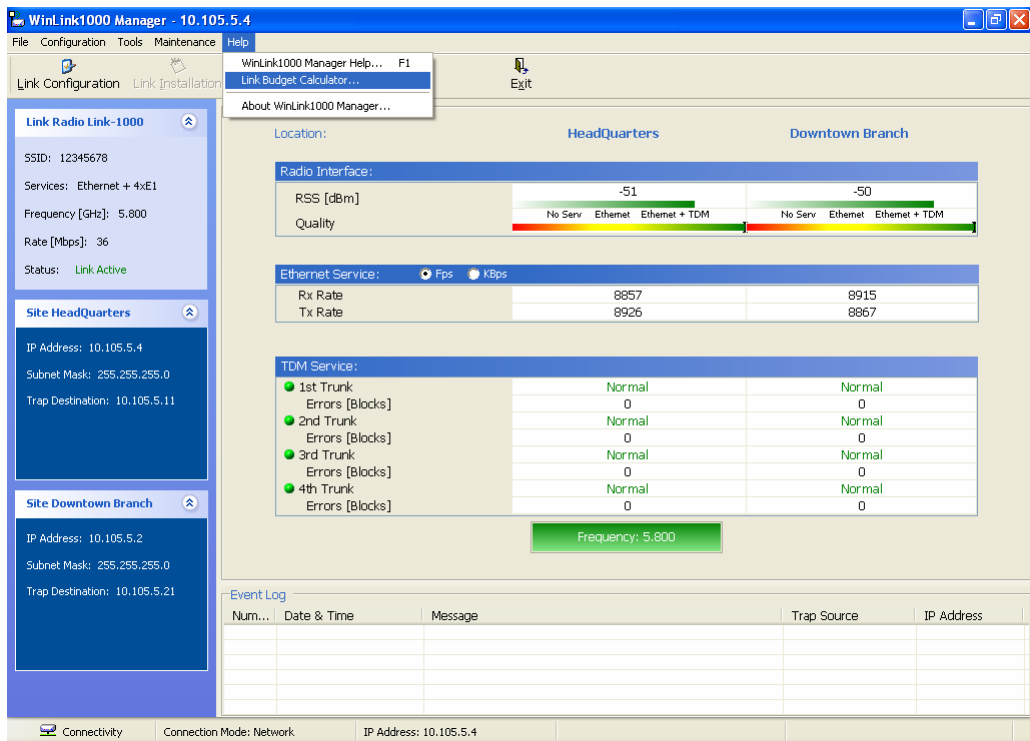


Figure C-1. Accessing the Link Budget Manager Calculator

C.2 Using the Link Budget Calculator

The Link Budget Calculator comprises of one table where all the link parameters are defined.

WinLink - Link Budget

Product	WL1000-ODUIF58IEXT
Rate	48Mb/s
Frequency / Duplex / Channel	5.8 GHz / TDD / 20 MHz
Tx Power	10 dBm
Tx Antenna Gain	28 dB
Rx Antenna Gain	28 dB
Cable Loss	1 dB
Fade Margin	6 dB
Tx Power EIRP	37 dBm / 5 Watt
Min Range	.1 Km / .1 Miles
Max Range	8 Km / 3.7 Miles
Expected Performance	
Distance	6 Km
Expected RSS	-59 dBm
Services	Ethernet Only
Ethernet Rate (Full Duplex)	17.5 Mb/s @ Ethernet Only
Recommended antenna height	9 Meter / 30 Feet
<input type="button" value="Calculate"/>	

Figure C-2. Link Budget Screen

→ To calculate the link budget

1. Select your WinLink system product from the dropdown list of products.
2. Select the rate from the dropdown list. The rate defines the air-interface rate in Mbps. The system operates in TDD mode and has overhead of the air-interface protocol and therefore the accurate actual throughput is provided in the 'Service' Row and the effective Ethernet throughput is provided in the 'Ethernet Rate'.

Note *Throughput can be decreased as a function of range due to propagation delay.*

The remaining fields are completed automatically depending on the product selected in the product field. Standard WinLink system parameters are entered as default. Fields in blue boxes may be edited if non-standard antennas and cables are used.

The Fade margin is the minimum margin that is required for LOS conditions. For degraded link conditions, a larger fade margin should be taken into account.

The Tx power EIRP for the system is given in dBm and Watts.

3. Select the required link distance and units of distance, kilometers or miles.

4. Click Calculate

The Expected Performance parameters are calculated and displayed in the lower part of the table.

- Expected RSS – this is the number that the WinLink Manager software shows when the WinLink ODUs are best aligned.
 - Services – Maximum E1 /T1 services possible whilst maintaining full duplex Ethernet throughput.
 - Ethernet Rate – Maximum throughput available with the chosen system.
5. If the expected performance is not suitable for your application, select a different data rate and re-calculate.

Appendix D

TDM Clock Configuration

D.1 Overview

This appendix describes the WINLink 1000 TDM clock configuration. The following picture describes the E1 or T1 service configuration.

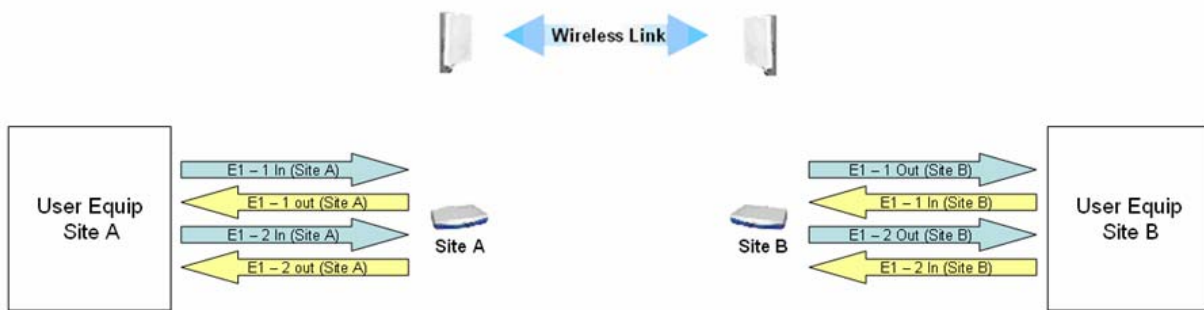


Figure D-1. E1 or T1 service configuration

D.2 External clock requirements

WINLink 1000 system assumes that all external equipments connected to a single site use the same transmit clock. In the picture above, E1 - 1 in (site A) and E1 - 2 in (site A) must use the same clock. E1 - 1 in (site B) and E1 - 2 in (site B) must also use the same clock, but this clock can be a different clock that used in site A. The system automatically selects a specific trunk for clocking according to the rules described below.

D.3 Clock selection

WINLink 1000 automatically selects a single trunk for the timing. The trunk is selected according to the following rules:

- Smaller trunk number
- Both ends line state is in Normal
- Each line state change in the selected trunk re-triggers a new clock selection according the above rules.

If the selected trunk is in Los of Signal state, the **WINLink 1000** uses its internal clock.

There are two methods to configure the user equipment.

- Master / Slave mode – One of the sites is defined as the clock master while the other site is configured as a time loop (received clock)
- Independent (Plesynchronous) Mode – Each site is configured as timing Master

In both user configurations **WINLink 1000** system re-generates the selected *IN* clock of the opposite site and use it as the *OUT* clock for all trunks.

In case that there is no *IN* clock in the selected trunk, **WINLink 1000** use its internal clock (and re-generate it in the opposite site as an *OUT* clock).

Note *It is user responsibility to verify that all IN clocks of a site are derived from a single clock source.*

D.4 Behavior in fault configuration

Where there are different transmit clocks at the external equipments of the same site, pattern slips are expected. The pattern slip rate is proportional to the clock difference. For example if in site A E1 – 1 in clock is 2.048 Mb/s and E1 – 2 in clock is 2.048 Mb/s + 1 PPM and all trunks are in normal state, a pattern slip of up to 2000 bits is expected in trunk 2 every 1000 seconds.

Example 1

Site A clocks: E1-1 IN and E1-2 IN differ, and all trunks are in normal condition, **WINLink 1000** shall use trunk 1 for the timing and the second trunk shall experience pattern slips (the rate of the pattern slips is dependent on the ratio between the different clocks)

Example 2

Trunk 1 is disconnected and trunk 2 is in normal condition. **WINLink 1000** shall select trunk 2 for clock timing. Since trunk 1 is disconnected it uses an internal clock as an input clock. The OUT clock of both trunks is the re-generated clock IN 2, and therefore **WINLink 1000** shall display error blocks on clock 1 (represents the clock difference between the internal clock and the IN 2 clock).

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