

Site Preparation

Planning the Link Site

Overview

Link site planning consists of a set of surveys, which must be carried out before any equipment is brought to the site. If for some reason, the outcome of any of these surveys is negative, site re-location will need to be considered.

A Site Survey consists of three stages:

1. Preliminary survey - The proposed link is analyzed **in the office** using a topographic map.
2. Physical survey - The locations of the RADWIN 1000/2000 indoor and outdoor equipment are determined **on-site**.
3. Radio Frequency (RF) survey - It is recommended that the installation area be scanned with a spectrum analyzer, to identify RF interference so as to determine a clear channel for RADWIN 1000/2000 installation (**on-site**).

The Site Survey

Introduction

RADWIN 1000/2000 wireless links must be planned before installation. The designated installation site must be appraised to determine that the wireless system is able to operate efficiently and provide connectivity without signal degradation.

RADWIN 1000/2000 offers a wide operating frequency range. A free frequency channel must be determined within the operating range, for optimum performance.

Recommended Equipment

Stage 1: Preliminary Survey

- Topological map of the area

- Urban map of the area
- Compass

Stage 2: Physical Survey

- 100 meter tape measure
- Ohmmeter, to check ground connection
- Binoculars
- Map
- Digital camera
- Paper, pencil, and a clipboard
- GPS device (optional)
- Compass (optional)

Stage 3: RF Survey

- Spectrum Analyzer with Max Hold function and screen capture facility that can store multiple images, for documentation purposes
- RF accessories (connectors and cables)
- Communication devices (for example, cellular phones, or a set of walkie-talkies)

Stage 1: Preliminary Survey

A preliminary survey is necessary before visiting potential installation sites. As much detail as possible should be obtained about the two designated ODU installation sites and the area between them.

➤ **To perform a preliminary survey:**

1. Mark the two designated installation sites on a topographic map of the area.
2. Measure the distance between the sites; check that it is within the specified range of the RADWIN 1000/2000.
3. On the urban map, check for developed areas situated between the two installation sites. Pay attention to these areas when performing the physical site survey; there may be tall buildings, RF towers, or transmitters, which could cause interference to the link.
4. Check the area between the two sites for obstructions such as:
 - High ground - hills or mountains
 - Lakes or large bodies of water. Water has a reflection effect on RF signals like a building. This type of reflection causes the received amplitude to be reduced. As a rule of thumb, the presence of a large body of water between the link sites may double the required antenna height.
5. Determine and record the compass bearings between both ODUs, relative to north.
6. If there are obstructions between the two sites, calculate the Fresnel Zone (see appendix **D** for details).

7. If the site chosen does not meet requirements, consider alternative sites.
8. Use the Link Budget Calculator (on the CD supplied with the RADWIN 1000/2000 or using the RADWIN Manager) to determine the expected performance.

Stage 2: Physical Survey

The physical site survey reviews the environment of the proposed RADWIN 1000/2000 installation location, to ensure that the link sites are suitable for the wireless network. The results of the physical site survey should be recorded.



Note

It is advisable to go on a clear day, so you can more easily see any obstructions between the two sites.

➤ To perform a physical survey:

1. From the compass readings taken in the preliminary survey, find the azimuth (horizontal position) that the ODU should face towards the second ODU.
2. Using binoculars, locate any obstructions such as tall trees, high buildings, hills or mountains. Look for other RF towers between the two sites. Mark the locations of the obstructions on the map.
3. Determine the location for the ODU (having regard for existing rooftop installations and tower space). It should be above any obstructions, considering the Fresnel zone (see appendix D).
4. If you need to install the ODU on a tower, make sure that the tower is far away from overhead electric power lines.
5. Determine a location for the indoor equipment; it should be as close as possible to the ODU. At an existing site, there is probably an equipment room with cable-routing channels.



Note

The IDU - ODU cable length limit is 100m, in accordance with IEEE 10/100BaseT standards.

6. Measure and record the path length of the cable from the ODU position to the indoor equipment room.
7. Determine the ground and lightning connection points of the installation. The RADWIN 1000/2000 ODU and IDU must both be grounded.
8. Using the Ohmmeter, measure and record the resistance of the required installation to the grounding point. The resistance must be less than 10 ohm.

9. Review the results of the physical site survey. Decide if the site is suitable for the RADWIN 1000/2000 wireless network installation.
 - If the site is suitable, continue with stage 3, the RF survey
 - If the site is not suitable, survey another site

Additional Outdoor Site Requirements

The ambient outdoor operating temperature should be -35 to 60°C (-31 to 140°F).

Additional Indoor Site Requirements

The following requirements guarantee proper operation of the system:

- For IDU-C units, allow at least 90 cm (36 ") of front clearance for operating and maintenance accessibility. Allow at least 10 cm (4 ") clearance at the rear of the unit for signal lines and interface cables
- The ambient operating temperature should be 0 to 50°C (32 to 122 °F) at a humidity of up to 90%, non condensing

Stage 3: RF Survey

The RF survey examines the wireless environment of the RADWIN 1000/2000 installation site, to determine whether there are available channels within the RADWIN 1000/2000 operating frequency band. An RF survey is performed using a spectrum analyzer.

It is advisable to familiarize yourself with the spectrum analyzer before going out on site, specifically the Max Hold and Marker functions.

You should perform the RF survey at both proposed link sites.

The survey should be carried out during a busy time of day, to best judge the worst-case radio interference. Allow 2-4 hours duration for a good RF survey.



Note

It is possible to install the RADWIN 1000/2000 link and use the RADWIN Manager to find a clear channel. Each frequency channel can be evaluated in turn. Achievement of a clear channel is indicated by the Quality bar on the Channel Setting window (see [figure 4-13](#)) becoming green.

Hardware Installation

This chapter sets out the requirements and procedures for the hardware installation and alignment of a RADWIN 1000/2000 link in accordance with the prior planning as set out in chapter 2. It is intended to guide qualified field technicians.



Outdoor units and antennas should be installed **ONLY** by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may expose the end user or the service provider to legal and financial liabilities. RADWIN and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.

Safety Practices

Preventing overexposure to RF energy

To protect against overexposure to RF energy, install the ODUs so as to provide and maintain minimal separation distances from all persons.

When the system is operational, avoid standing directly in front of the antenna. Strong RF fields are present when the transmitter is on. The ODU must not be deployed in a location where it is possible for people to stand or walk inadvertently in front of the antenna.

Grounding

All RADWIN products should be grounded during operation. In addition:

- The **ODU** should be earthed by a wire with diameter of at least **12AWG**.

The RADWIN 1000/2000 ODU must be properly grounded to protect against lightning. It is the user's responsibility to install the equipment in accordance with Section 810 of the National Electric Code, ANSI/NFPA No.70-1984 or Section 54 of the Canadian Electrical Code. These codes describe correct installation procedures for grounding the outdoor unit, mast, lead-in wire and discharge unit. It

also lays down the size of grounding conductors and connection requirements for grounding electrodes.

The RADWIN 1000/2000 ODU must be grounded to a Protective Earth as described in appendix E and in accordance with the Local Electrical Regulations.

- The earth lug on the **IDU-C** should be connected to the protective earth at all times, by a wire with a diameter of **18 AWG** or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Further, you should -

- Always make the ground connection first and disconnect it last
- Never connect telecommunication cables to ungrounded equipment
- Ensure that all other cables are disconnected before disconnecting the ground

More detailed guidelines are supplied in appendix E.

Protection against Lightning

The use of lightning protection is dependent on regulatory and end user requirements. All of RADWIN outdoor units are designed with surge limiting circuits to minimize the risk of damage due to lightning strikes. RADWIN recommends the use of additional surge arrestor devices to protect the equipment from nearby lightning strikes.

See appendix E for detailed installation instructions of lightning protection devices.

General

- It is recommended that installation of the outdoor unit be contracted to a professional installer.
- Before working on equipment connected to power lines or telecommunication lines, you should remove jewelry or any other metallic object that may come into contact with energized parts.
- Use extreme care when installing antennas near power lines.
- Use extreme care when working at heights.
- When using an AC power source for RADWIN 1000/2000 always use the AC power adapter supplied by RADWIN.
- Use the right tools. In addition to standard tools required for any kind of ODU or antenna installation, RADWIN 1000/2000 requires additional specific tools detailed on [page 3-5](#) below.

Package Contents

The RADWIN 1000/2000 packages include the following items:

ODU Package Contents

The ODU package contains:

- One ODU - see [figure 3-2](#) below for front and rear view
- An ODU mounting kit - see [figure 3-1](#) below
- A CD containing -
 - the RADWIN Manager
 - Quick Start Guide
 - User Manual
 - Link Budget Calculator
- Label showing the MAC address and the alternative Community string. The label is self-adhesive. You should keep this label safe
- Cable glands (to be used with the ODU-IDU cable)

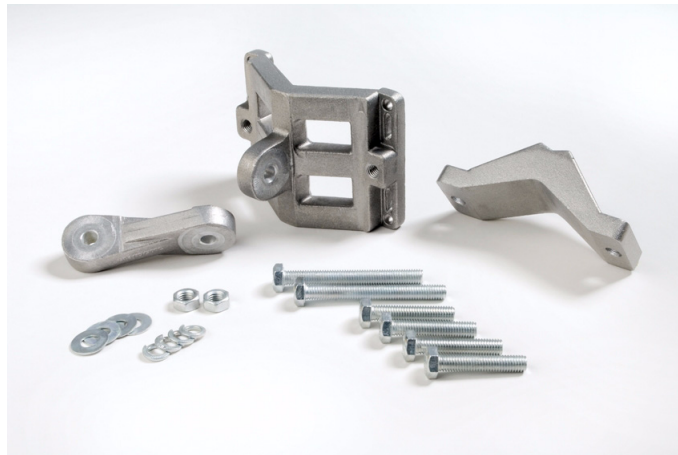


Figure 3-1: ODU Mounting kit

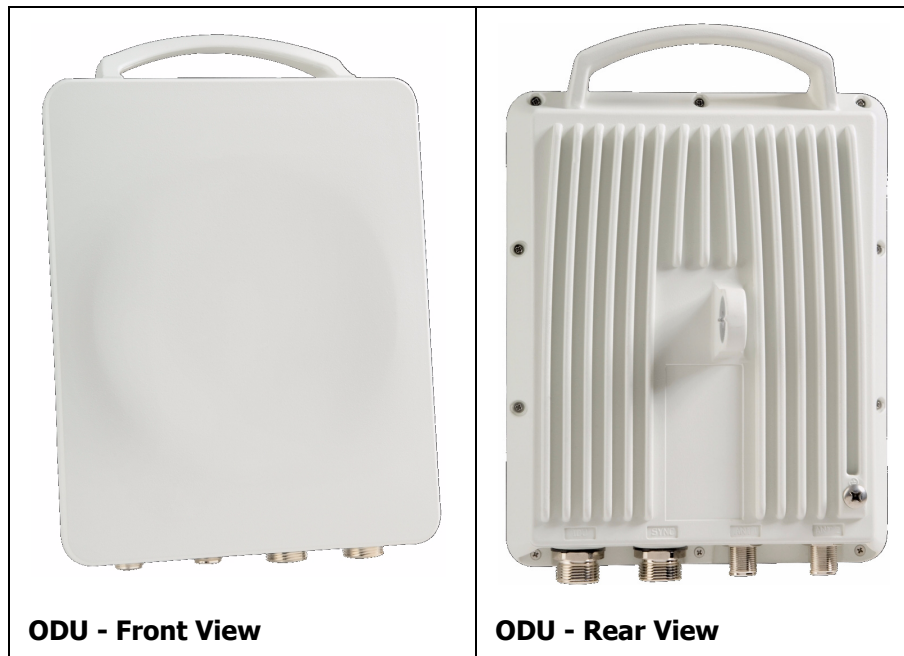
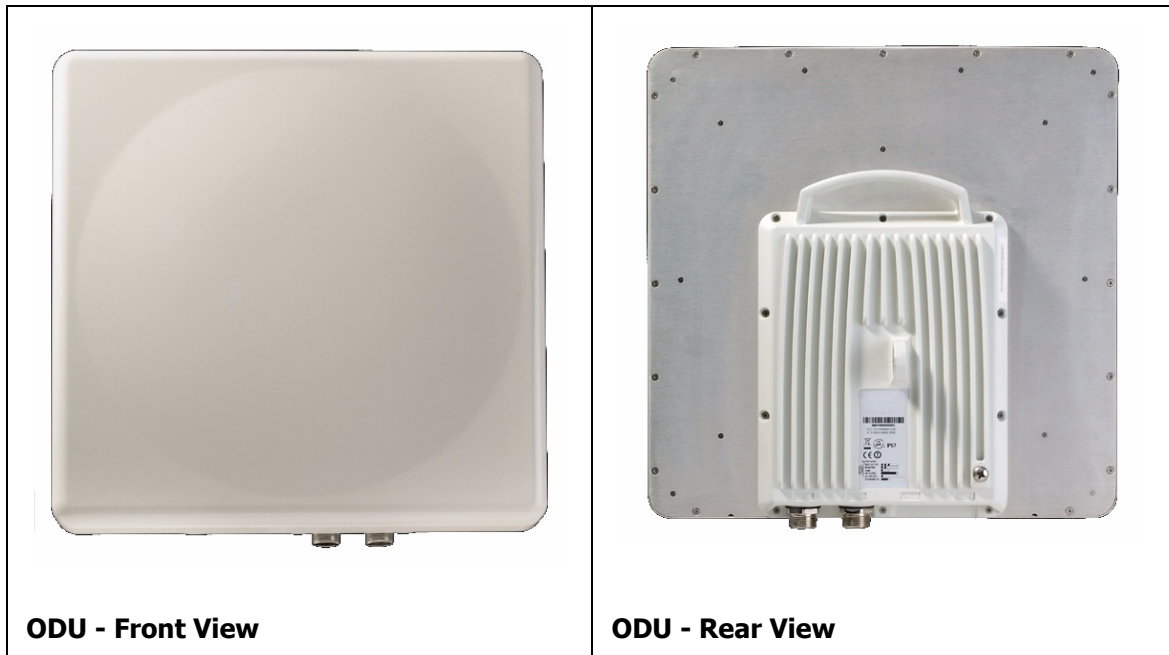


Figure 3-2: Connectorized ODU - Front and rear views



ODU - Front View

ODU - Rear View

Figure 3-3: Integrated ODU - Front and rear views

IDU Package Contents

The IDU package contains:

- IDU-C - see [figure 3-4](#) below.
- 19" rack mounting kit - see [figure 3-5](#) below
- Two DC power plugs for power cables - see [figure 3-5](#) below



Figure 3-4: IDU-C Package contents - the IDU-C



Figure 3-5: IDU-C Package contents - the mounting kit and DC power plugs

External Antenna Package Contents

- Antenna
- RF cable 1m (3') long; two cables supplied with bipolar antennas, single cable supplied with monopolar antennas
- Mounting kit

Additional Tools and Materials Required

The following is a list of the equipment and materials required to install RADWIN 1000/2000 hardware.

Tools and Materials

- Crimping tool for RJ-45 (if the ODU-IDU cable is without connectors)
- Spanner/wrench 13 mm (1/2")
- Drill (for wall mounting only)
- Cable ties
- Sealing material

Cables and connectors

- ODU grounding cable 12AWG
- IDU grounding cable 18AWG
- ODU-IDU cable (outdoor class, CAT-5e, 4 twisted pairs, 24AWG)

Hardware Installation Sequence

The following steps are required to install the RADWIN 1000/2000 system:

1. Mounting the ODUs, page [page 3-6](#).
2. Mounting the external antennas (if used), page [page 3-7](#).
3. Mounting the Lightning Protection devices (if used), page [page 3-7](#).
4. Outdoor connections, page [page 3-8](#).
5. Mounting the IDUs, page [page 3-8](#).
6. Indoor connections, page [page 3-11](#).
7. Aligning the ODUs/antennas, page [page 3-12](#).

See [figure 3-6](#) below, which illustrates a typical installation of RADWIN 1000/2000 with an external antenna.

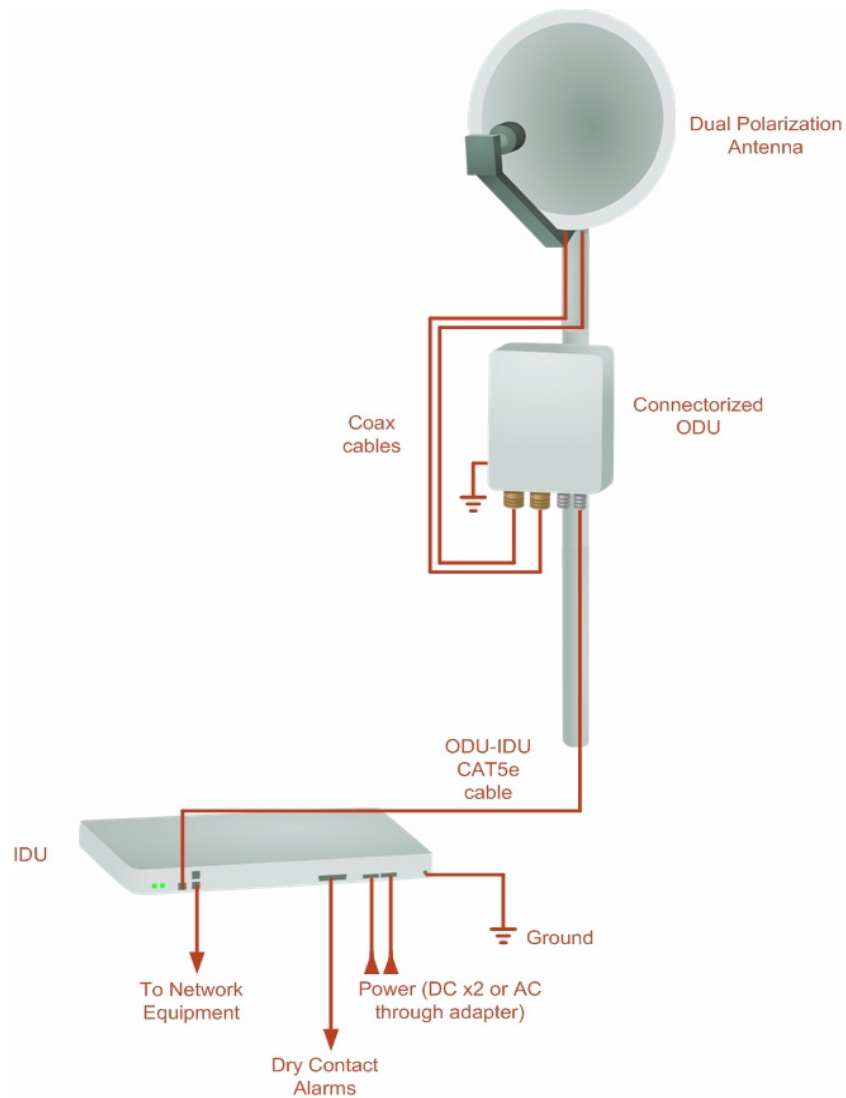


Figure 3-6: Typical Installation Diagram (with external antenna)

The installation steps are detailed in the following sections.

Outdoor installation

Mounting the ODU

The ODU can be mounted on a pole or a wall. In both installations, the supplied mounting kit is used to secure the ODU.



Note

A mast-sited ODU typically uses a pole attached to the mast.

A RADWIN 1000/2000 link operates in pairs of two ODUs with the same configuration. Both ODUs must be installed, and the antennas aligned for maximum throughput.

**Warning**

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 pole.

- Only a qualified person using the proper safety equipment should climb the antenna mast
- Only qualified professional personnel should install or dismantle ODUs and masts

➤ To mount the ODU on a pole or a wall:

1. Ensure that the ODU is properly grounded.
2. Mount the ODU onto the pole or wall. Ensure that the unit is oriented so that the cable connectors are at the bottom. **(If they are on top, water may penetrate into the unit causing damage.)**
3. Refer to [Appendix C, Pole and Wall Installation](#) for detailed ODU mounting kit contents and schematics.

**Note**

Do not tighten the ODU to its mounting brackets until the alignment process of the antenna is complete.

Ensure that there are no direct obstructions in front of the ODU or interference from man-made obstacles.

Mounting external antennas

If you are using ODU with an integrated antenna, skip to [Mounting the Lightning Protection Devices](#) below.

The supplied mounting kit is used to mount the antenna onto a pole. The antennas must be aligned for maximum throughput.

**Warning**

Do not stand in front of a live antenna.

➤ To mount an external antenna:

1. To mount an external antenna ensure that the antenna is properly grounded and then mount the antenna onto the pole. Refer to [Appendix C, Pole and Wall Installation](#) for detailed antenna mounting instructions.
2. Follow the mounting instructions supplied with the antenna.

Mounting the Lightning Protection Devices

The use of lightning protection is dependent on regulatory and end user requirements. The RADWIN 1000/2000 ODU is designed with surge limiting circuits to minimize the risk of damage due to lightning strikes. RADWIN

recommends the use of additional surge arrestor devices to protect the equipment from nearby lightning strikes.

Refer to appendix E for detailed installation instructions of lightning protection devices.

Outdoor Connections

➤ To complete the outdoor connections:

1. Connect the ground cable to the ODU chassis as marked on the ODU.
2. Connect the antenna cable(s) to the ODU.
3. Connect the lightning protection device to the ODU (see appendix E).
4. Attach the ODU-IDU cable to the ODU RJ-45 connector (see appendix B for the connector pin-out)
5. Screw in the cable glands to ensure hermetic sealing of the ODU.
6. Secure the cables to the pole, mast or brackets using UV-rated cable ties.

Indoor Installation

Mounting the IDUs

The RADWIN 1000/2000 IDUs are all rack mounted, as shown in [figure 1-6](#). A front panel keyed schematic of a rack mounted IDU-C is shown in [figure 3-7](#) below.

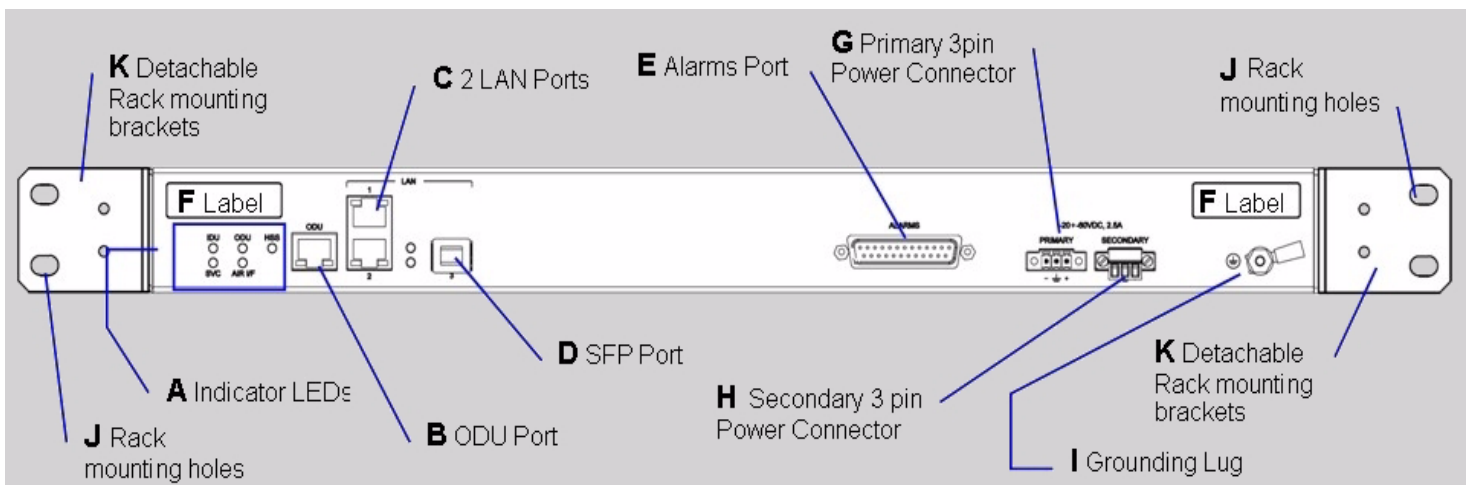


Figure 3-7: IDU-C front panel

In [figure 3-8](#) we display a perspective view of the IDU-C:

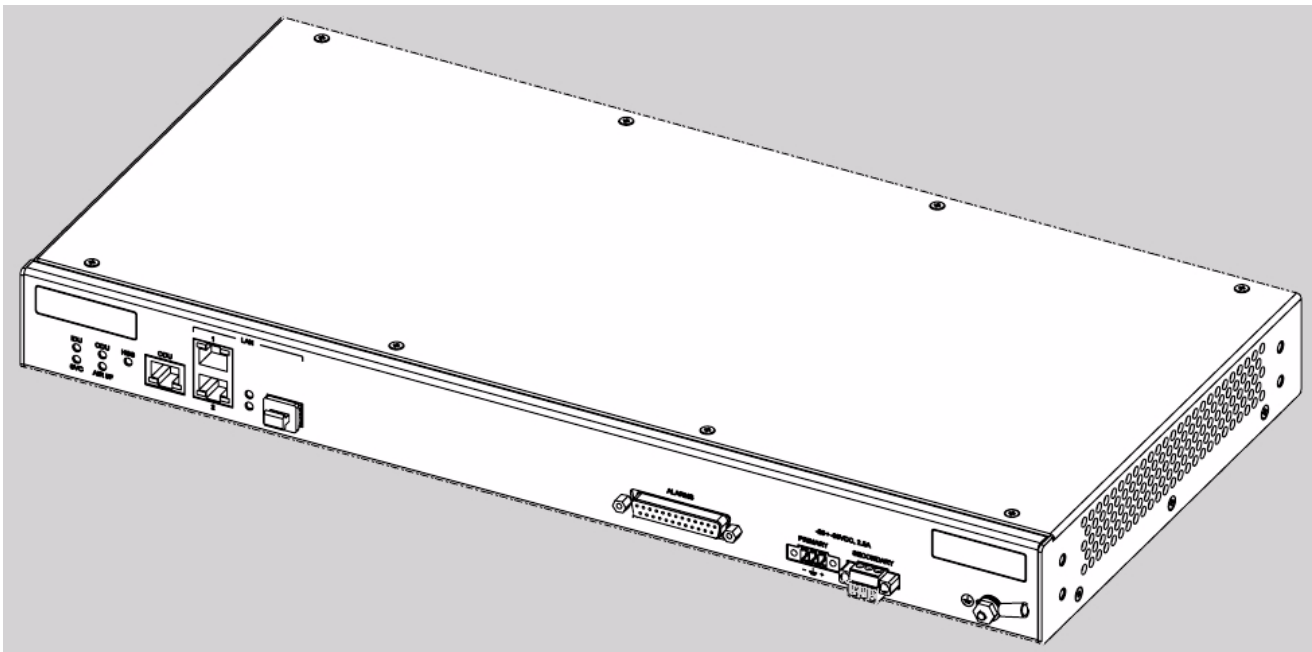


Figure 3-8: IDU-C - A perspective view

Further description of the keyed items in [figure 3-7](#) is shown in [table 3-1](#) below:

Table 3-1: Components of an IDU-C front panel

Key	Label	Remarks
A	Indicator LEDs	See figure 3-9 .
B	ODU Port	RJ-45 connector, see table B-1 .
C	2 LAN Ports	Ethernet, RJ-45 connector, see table B-2
D	SFP Port	The IDU-C is SFP ready.
E	Alarm Ports	Standard DB25 female connector, see table B-3 .
F	Label indent	Place for adhesive identification labels
G	Primary 3 pin Power Connector	Standard 3 pins in line power connector, see table B-4 .
H	Secondary 3 pin Power Connector	Standard 3 pins in line power connector, see table B-4 .
I	Grounding Lug	Use the lug supplied
J	Rack mounting holes	
K	Detachable Rack mounting brackets	

The Indicator LEDs (Item A in [table 3-1](#) above) are shown in more detail in [figure 3-9](#) below:



Figure 3-9: IDU-C LEDs

The purpose of the LEDs is shown in **table 3-2** below:

Table 3-2: IDU-C Front Panel LEDs

Name	Color	Function
IDU	Green Green Red	IDU operational During power-up only Failure
ODU	Green Red	ODU-to-IDU communication link is operating ODU-to-IDU communication link is disrupted
AIR I/F	Green Orange Red	Wireless link is synchronized During installation mode only Wireless link lost synchronization
SVC		Off
HSS		Off

➤ **To mount an IDU (using figure 3-7 above):**

1. If the rack already holds other equipment, ensure that it is properly grounded.



Warning

Do not proceed with installation into a “live” rack unless it is properly grounded.

2. Attach the rack mounting brackets (K) to the IDU.
3. Bolt the IDU into an empty slot in the rack, ensuring that it sits securely.
4. Ground the IDU to the rack using grounding lug I. The IDU should be left permanently grounded.



Note

Instead of using the rack mounting brackets, the IDU may be rail mounted using the four screw holes on each of its sides.

Connecting power to the IDU

The IDU-C has redundant power connection circuits (items G and H in [figure 3-7](#) above). An enlarged schematic of the power connectors is shown in below:

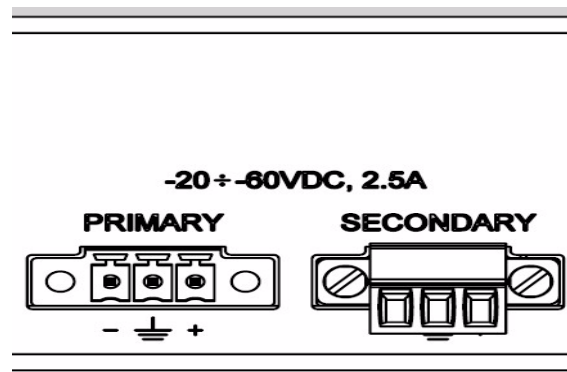


Figure 3-10: DU-C ower connectors

The connectors are 3 pin in line female, with polarities (left to right) minus, ground, plus. To avoid damage to the IDU, always use an AC/DC adapter supplied by RADWIN.

Ensure that the IDUs at both sites are powered up.

Connecting the ODU to the IDU

The ODU-IDU cable conducts all the user traffic between the IDU and the ODU, and also provides power to the ODU. The maximum length of the ODU-IDU cable is 100m (328 ') in accordance with 10/100BaseT standards.

The ODU-IDU cable is supplied pre-assembled with RJ-45 connectors, at the length specified when ordering, or as a cable drum with spare connectors. If the ODU-IDU cable was not ordered, use an outdoor class, CAT-5e 24AWG shielded cable. See appendix [B](#) for Wiring Specifications.

To connect the ODU to the IDU, route the cable from the ODU to the IDU, secure the cable along its path and connect the cable to the ODU RJ-45 connector on the IDU (see item B in [figure 3-7](#) above).

Installing a Link using PoE Devices

The PoE device is a very simple unit having a power input connector and two Ethernet ports. It is AC powered, and has a power LED.

➤ To prepare a link using PoE devices:

1. To connect the ODU to the PoE device, route the cable from the ODU to the PoE device, secure the cable along its path and connect the cable to the P-LAN-OUT RJ-45 connector on the PoE device.
2. Connect it to AC power.
3. Repeat steps 1 to 2 for the second link.

Connecting User Equipment

➤ To connect user equipment to the IDU:

- Connect user switch/router or any other compatible device to the IDU panel RJ-45 ports designated LAN (see item C in [figure 3-7](#) above).

Refer to appendix [B](#), [Wiring Specifications](#), for connector pinouts.



Note

Do not connect two LAN ports to the same network, or flooding may occur.

➤ To connect user equipment to the PoE device:

- Connect a user switch, router or any other compatible device to the PoE device RJ-45 port designated LAN-IN. Refer to appendix [B](#), [Wiring Specifications](#), for connector pinouts.

Connecting and Aligning ODUs / Antennas

You perform antenna alignment using the ODU's audible tone.

To speed up the installation time, alignment of a RADWIN 1000/2000 system should be performed by two teams simultaneously, at site A and at site B.

➤ To align ODUs with integrated antennas or external bipolar antennas:

1. For external bipolar antennas: Using a coax cable with N-Type connectors, connect the vertical polarization connector of the antenna to the ANT 1 connector of the ODU.
2. For external bipolar antennas: Using a coax cable with N-Type connectors, connect the horizontal polarization connector of the antenna to the ANT 2 connector of the ODU.
3. Ensure that power is connected to the IDUs at both sites.
4. Ensure normal operation of the IDUs by the LED indications on the front panel.

Provided that site A detects the signal from site B, the ODU starts beeping 20 seconds after power up, and continues beeping until the ODUs are aligned, and the installation is complete.

In the following steps, "antenna" refers both to an external antenna and an integrated antenna.

5. Direct the antenna of site B in the direction of site A. This is simplified if a previous site survey has been completed and azimuths are known.
-



Warning

When aligning the antennas, do not stand in front of a live antenna.

6. Make a horizontal sweep of 180 degrees with the site A antenna so that the strongest signal from site B can be detected.
7. Slowly turn the site A antenna back towards the position of site B, listening to the tone until the best signal is reached. See the following figure for audible signal variations.

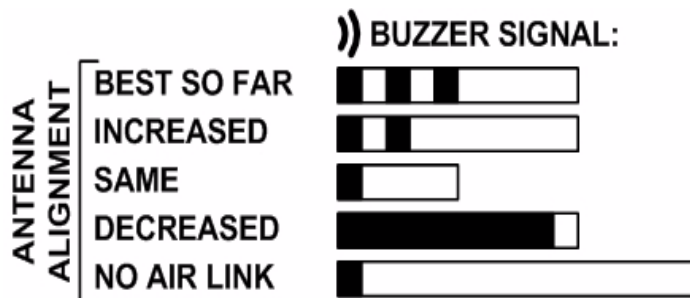


Figure 3-11: BEEP Sequence for antenna alignment



Note


- Three beeps and a pause is 'best signal so far'
- Two beeps and a pause is 'signal quality increased'
- One beep and pause is 'no change in signal'
- Long beep and short pause is 'signal quality decreased'
- One beep and a long pause is 'no air link'
- Any other signal does not relate to antenna alignment

8. Secure the site A antenna to the pole/wall.
9. Repeat steps 4 to 8 for site B.

➤ **To align two external monopolar antennas:**



Note

The ODU buzzer only works on the radio connected to the ANT 1 connector marked . You will therefore need to use ANT 1 to align both antennas in turn. Upon completion of the alignment procedure, you may connect the two antennas to ANT 1 and ANT 2 connectors.

1. Using a coax cable with N-Type connectors, connect one antenna to the ANT 1 connector of the ODU.
2. Follow the steps 3 to 7 above to align the antenna connected to the ODU connector ANT 1 on both sides of the link.
3. On both sides of the link, disconnect the antenna connected to the ODU connector ANT 1. Connect the other antenna to connector ANT 1 and follow the steps 3 to 7 above to align the second antenna.
4. Secure the antennas to the pole/wall.
5. Restore one of the antennas to ANT 2 on both sides of the link.

Link Installation: The RADWIN Manager

This chapter explains how to use the RADWIN Manager to install a radio link.

Installing the RADWIN Manager Application

Minimum System Requirements

The RADWIN Manager application is distributed on a CD. Operating system specific PC resources required by the application are set out in [table 4-1](#) below:

Table 4-1: PC Requirements for the RADWIN Manager Application

	Windows 2000	Windows XP Pro	Windows Vista
Memory	128 MB	512 MB	1 GB
Processor	P III	P IV	P IV Dual Core

Requirements common to all systems are:

- Hard disk: 1 GB free space
- Network: 10/100BaseT NIC
- Graphics: 1024x768 screen resolution with 16 bit color
- Microsoft Explorer version 5.01 or later

Installing the Software

➤ To install the RADWIN Manager application:

1. Insert the CD into the CD/DVD drive of your computer.

The CD opening screen appears:



2. Choose **Install** RADWIN Manager and follow the on-screen instructions of the installation wizard to complete the setup of the RADWIN Manager application.

If the installation program fails to start, browse to your CD/DVD drive, chose the setup.exe program and run it.

Any PC running the RADWIN Manager application can be used to configure a RADWIN 1000/2000 link.

Starting the RADWIN Manager

➤ To start the RADWIN Manager:

1. Connect the managing computer to one of the two LAN ports as shown in **figure 4-1** below:



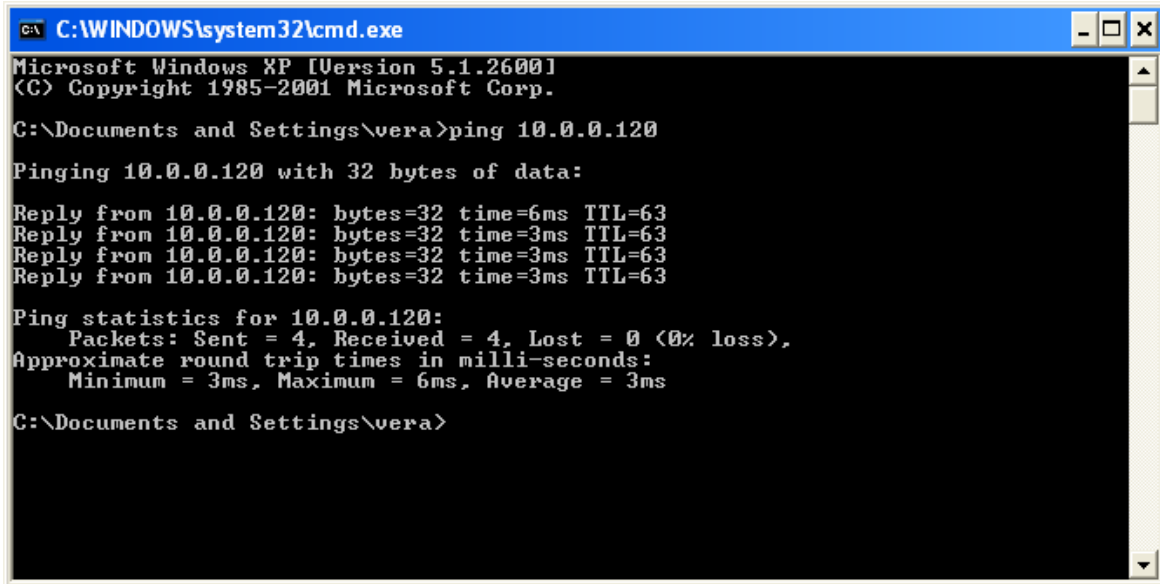
Figure 4-1: LAN ports on the front panel of the IDU-C

If you are not using a direct connection as above, ensure that you have IDU to managing computer connectivity (e.g. through a LAN).

2. Check that you have connectivity to the ODU. You can do this by opening up a command line session (**Start | Run** and then type, **cmd**). At the command prompt, type

ping 10.0.0.120

You should see something like this:



```

C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\vera>ping 10.0.0.120

Pinging 10.0.0.120 with 32 bytes of data:

Reply from 10.0.0.120: bytes=32 time=6ms TTL=63
Reply from 10.0.0.120: bytes=32 time=3ms TTL=63
Reply from 10.0.0.120: bytes=32 time=3ms TTL=63
Reply from 10.0.0.120: bytes=32 time=3ms TTL=63

Ping statistics for 10.0.0.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 6ms, Average = 3ms

C:\Documents and Settings\vera>
  
```

Figure 4-2: Pinging an uninstalled and unconfigured link

Any other response from ping means that the ODU is not responding. Check your Ethernet connection and that both the the IDU and ODU are switched on and then try again. If you do not succeed, seek assistance from RADWIN Customer Support.

3. Dismiss the command line session.
4. Double-click the RADWIN Manager icon on the desktop, or click **Start | Programs | RADWIN Manager | RADWIN Manager**.

The Login dialog box appears.

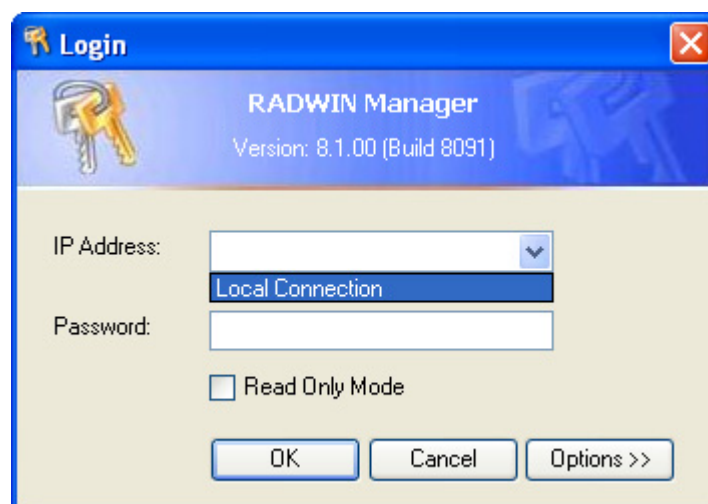


Figure 4-3: Login Screen

5. Type an IP address for the ODU (if you connect through a network), or click Local Connection (if you are connected directly to the IDU port).



1. If you log in on Local Connection, but your physical connection is **not** local (i.e. anything other than a direct connection between the managing computer and the IDU), then any configuration you carry out may affect other links in the network.
2. If you log in via an over-the-air IP address, you will receive a warning. If you reset the site to which you are connected to factory settings, you can lock yourself out of the Link.
3. Network login (IP address to the ODU) is recommended.



The default IP address for the ODU is 10.0.0.120. The subnet mask is 255.0.0.0.

The actual IP address is defined during link configuration (see [Site Management: IP Address and VLAN](#) on page 6-4).

6. Enter the password



The default password is **admin** (see [Changing the Log On Password](#) on page 4-7).

7. If you are a user with Read-Write permission, click Options to enter the Community options.



RADWIN 1000/2000 is protected with Community passwords. A user may be defined with read-only permission or with read-write permission (see [page 6-14](#) for more details).



Figure 4-4: Login Screen with Community options visible

- If you are using the system for the first time, leave the default Community passwords, **netman** for read-write, and **public** for read-only.
- If Community values were previously defined, enter them under Community in the Read-Only or Read-Write boxes.
- If you are a user with read-only permission, click the Read Only Mode check box.

The RADWIN Manager main window is displayed (see [figure 4-7](#)).

Login Errors

Unsupported Device

Attempting to connect to an unsupported device will result in the following error message:

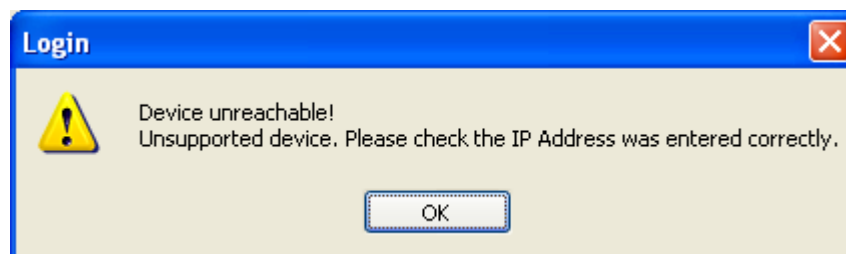


Figure 4-5: Unsupported device message

Incorrect IP Address

If the IP address chosen is invalid or the link is unreachable, the following error message will be displayed:

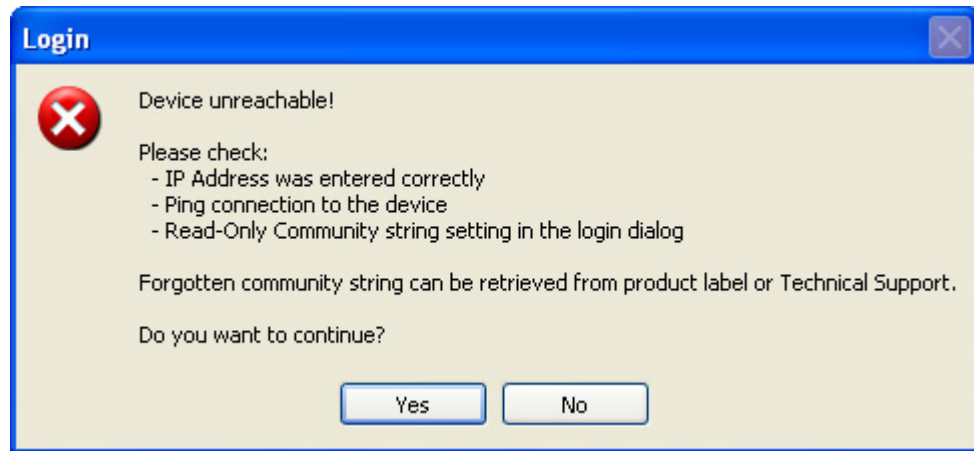




Figure 4-6: Unreachable device message

In both of the above situations, you will see a warning graphic  alongside the IP Address field.

Incorrect Password

If you type an incorrect password in the Login screen, you will see a warning graphic  alongside the password field.

Continuing without an IP Address

The RADWIN Manager provides limited “offline” functionality when there is no accessible IDU/ODU. It is primarily for setting managing computer related parameters and running the Link Budget Calculator. The offline functionality is shown in [table 4-2](#) below. The table does not show menu items grayed out.

Table 4-2: RADWIN Manager: Offline Functionality

Menu level			Function	Reference
Top	+1	+2		
File				
		Log Off	Return to Log On dialog. Same as Log Off button	
		Exit	Exit the RADWIN Manager. Same as Exit button	
Tools				
		Change Password	Change the Log On password dialog	page 4-7
		Events Log		page 7-10
			Clear Events	Clear local events log
			Save to File	Save events log data to a file
Help				
		RADWIN Manager Help	View online help version of the User Manual	
		Link Budget Calculator	Calculator opened in default browser	Appendix D
		Get Diagnostics Information	Obtain system information	page 7-1
		About RADWIN Manager	RADWIN Manager build information	

Changing the Log On Password

➤ **To change the log on password:**

1. From the Tools menu, select **Change Password**.
The Change Password dialog box appears.
2. Enter the current password, and the new password.
3. Click **OK** to confirm.

Installing the Link: First steps

At this point the main window of the RADWIN Manager should be displayed:

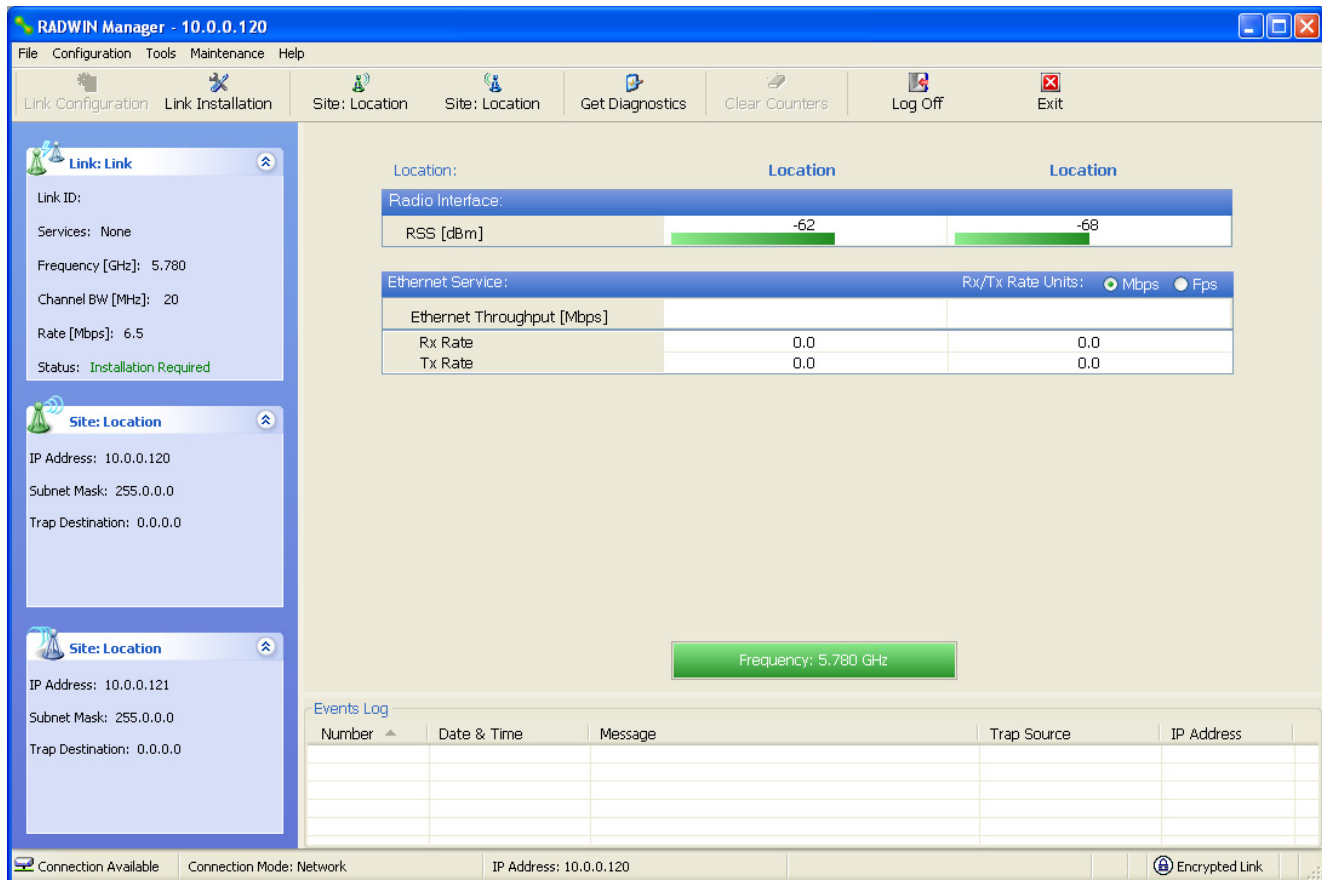


Figure 4-7: Opening RADWIN Manager window prior to installation

A detailed field by field description of the contents of the RADWIN Manager main window may be found in chapter 5.

The procedure required to make the link functional has three phases:

1. **Link Installation** - which we will detail below.

Installation actually gets the link operational by setting the link parameters. It uses a fixed channel at the lowest possible modulation, BPSK at 6.5Mbps and will work under the harsh interference condition.



During the installation procedure, the definition of all parameters is automatically applied to both sides of the link.

2. **Link Configuration** - described in chapter 5.

Configuration provides much the same functionality as Installation, but for a running link. A fallback to Installation mode is provided for situations which cannot be handled without resetting the link, such as antenna realignment and IDU or ODU replacement.

The Link Installation and Configuration phases are both carried out with Wizards, which “walk you through” the processes. The Wizards are visually quite similar and will be described in detail below.

3. **Site Configuration** - described in chapter 6.

Site specific configuration for each side of the link is available at any time - under a running link or under the restricted Installation mode.

Site Configuration consists of a set of panels, which may be invoked individually in any order, as needed.



Note

An installed and configured link can be returned to installation mode for re-installation and configuration from last settings or from factory settings.

- Reversion to installation mode requires a complete break in the link service
- Configuration mode may vary the service throughput and quality, but without a service break

Default Settings

The default settings of the RADWIN 1000/2000 configuration parameters are listed in **table 4-3** below:

Table 4-3: Default Settings

Parameter	Default Value
ODU IP Address	10.0.0.120
Subnet Mask	255.0.0.0
Trap destination	0.0.0.0
Manager Login password	admin
Link ID	Link
Site 1	Site
Site 2	Site
Link Password	wireless-bridge
Rate	Adaptive
Ethernet Configuration	Auto Detect
Radio Link Failure Actions	No action
Bridge or Hub mode	Hub Mode, Aging time = 300 sec
Community values	Read-write – netman Read-only – public

Front Panel LEDs on the IDU-C

The front panel LEDs on the IDU provide basic information about link status.

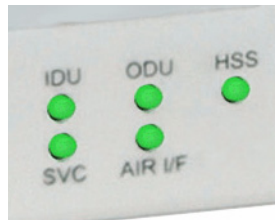


Figure 4-8: IDU-C Front Panel LEDs

The following table describes the indicators:

Table 4-4: Front Panel LEDs

Name	Color	Function
IDU With Ethernet only	Green	During power-up only
	Green	IDU operational
	Red	Failure
ODU	Green	ODU-to-IDU communication link is operating
	Red	ODU-to-IDU communication link is disrupted
AIR I/F	Green	Wireless link is synchronized
	Orange	During installation mode only
	Red	Wireless link lost synchronization
SVC		Off
HSS		Off

Installation Menu and Toolbar Functionality

The RADWIN Manager menu functionality is displayed in [table 4-5](#). The Toolbar buttons are detailed in [table 4-6](#).

Table 4-5: RADWIN Manager main menu functionality

Menu level			Function	Reference	
Top	+1	+2			
File					
		Log Off		Return to Log On dialog. Same as Log Off button	
		Exit		Exit the RADWIN Manager. Same as Exit button	
Configuration					
		Link Configuration		Run the Configuration Wizard. Not available in installation mode	
		1 Configure <Site 1 name>		Provides limited configuration for site. Has a path to return to installation mode	
		2 Configure <Site 2 name>		Provides limited configuration for site. Has a path to return to installation mode	
		Link Installation		Runs the Installation Wizard. Not available in configuration mode	
Tools					
		Performance Monitoring Report			
		Active Alarms			
			1 <Site 1 name>	Shows active alarms for <Site 1 name>	
			2 <Site 2 name>	Shows active alarms for <Site 1 name>	
		Change Password		Change the Log On password dialog	page 4-7
		Events Log			page 7-10
			Clear Events	Clear local events log	
			Save to File	Save events log file	
	Preferences		Local preferences dialog		

Table 4-5: RADWIN Manager main menu functionality (Continued)

Menu level			Function	Reference	
Top	+1	+2			
Maintenance					
		Clear counters	Disabled		
		Loopbacks	Disabled		
		Reset	1 <Site 1 name>	Reset <Site 1 name> ODU	
			2 <Site 2 name>	Reset <Site 2 name> ODU	
Help					
		RADWIN Manager Help	View online version of the User Manual		
		Link Budget Calculator	Calculator opened in default browser	Appendix D	
		Get Diagnostics Information	Obtain system information	page 7-1	
		About RADWIN Manager	Manager build and system information		

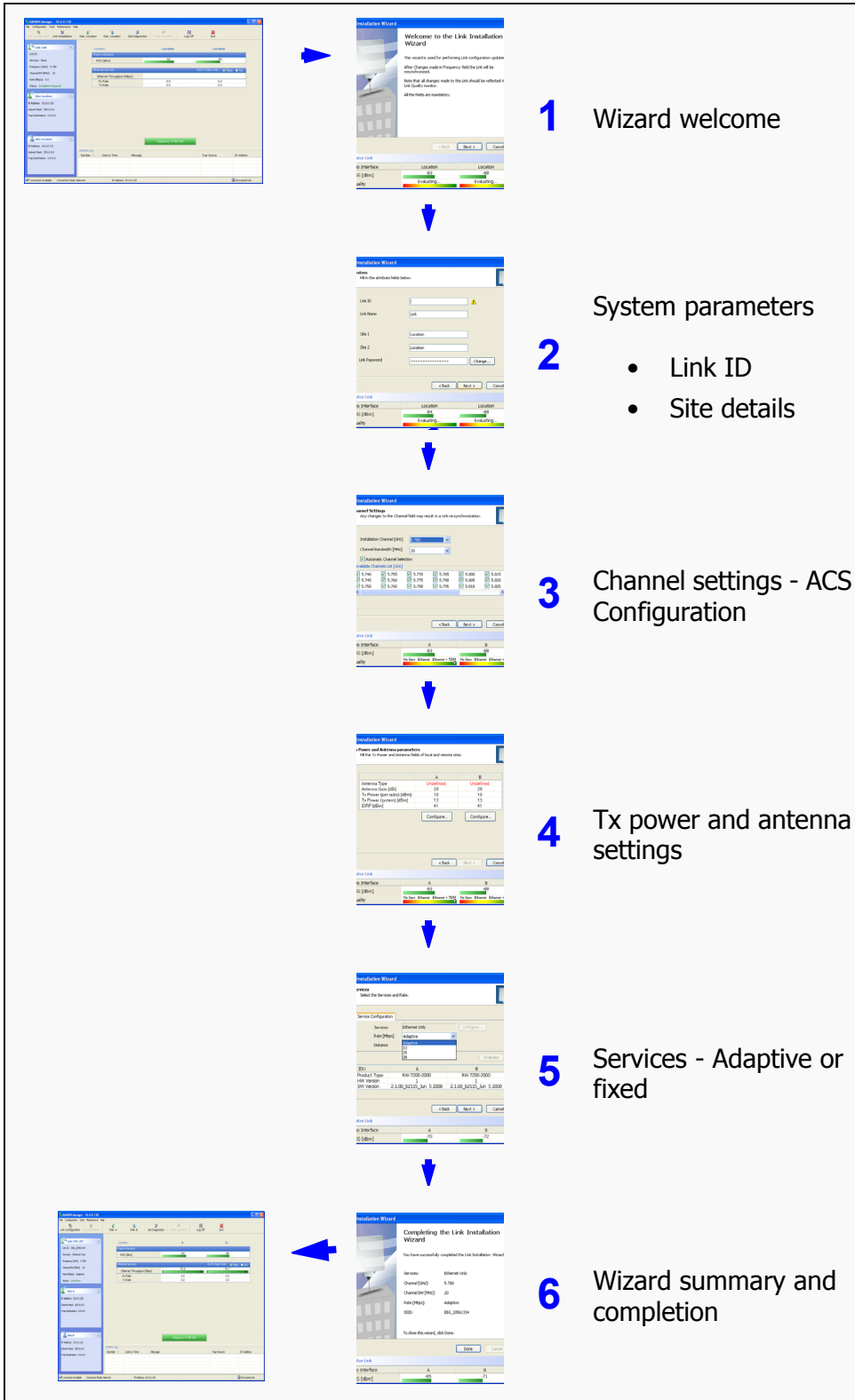
Table 4-6: RADWIN Manager Toolbar

Item	Description
Link Configuration	Changes configuration parameters of an operating wireless link; assigns text files for storing alarms, statistics and configuration data. This button is disabled until a link installation has been completed
Link Installation	Performs preliminary configuration of the system. This button is disabled after the link is installed
Site: <Site 1 name>	Opens the Site configuration dialog for Site A. Same as Configuration 1 Configure <Site 1 name>
Site: <Site 2 name>	Opens the Site configuration dialog for Site B. Same as Configuration 2 Configure <Site 2 name>
Get Diagnostics	Obtain system information
Clear Counters	Disabled
Log off	Closes the current session and logs off RADWIN Manager
Exit	Exits RADWIN Manager

Installing the Link: Overview

The Installation wizard has seven steps as shown in [table 4-7](#) below.

Table 4-7: Link Installation Wizard



Installing the Link: Step 1, Start the Wizard

In the tool bar of the RADWIN Manager main window, click the **Link Installation** button. The Link Installation button is only accessible if antennas are properly aligned. If this box is “grayed out”, you should align the antennas as set out in [Connecting and Aligning ODUs / Antennas](#) on [page 3-12](#).

The Installation Wizard opens:

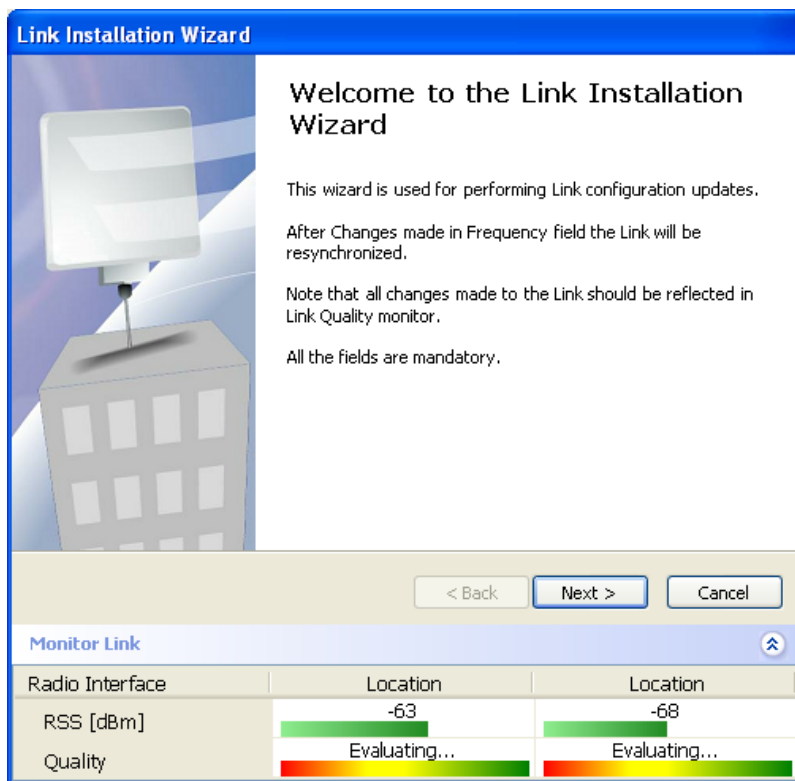


Figure 4-9: Link Installation Wizard

The bottom data area reproduces the corresponding data from the main window - which the above panel obscures. See [page 5-7](#) for a field by field description of this data area.

Click **Next** to proceed with the installation procedure.

Installing the Link: Step 2, System Parameters

The system dialog box opens:

Link Installation Wizard

System
Fill in the attribute fields below.

Link ID ⚠

Link Name

Site 1

Site 2

Link Password

< Back | Radio Interface | Location | Location |
| --- | --- | --- |
| RSS [dBm] | -64 | -68 |
| Quality | Evaluating... | Evaluating... |

Figure 4-10: : Installation Wizard, System dialog box

➤ **To complete Installation Step 2:**

1. Enter a Link ID. (Link ID - must be unique for each link in the area). The Link ID must include at least eight alphanumeric characters. Up to 24 characters are allowed. You should use a Link ID composed of both alphabetic and numeric characters.



Note

Both sides of a link must have the same Link ID.

2. Enter a Link Name for the link identification. The default name is "Link". You should change it.
3. Enter names for Site 1 and Site 2. The default names are both "Location". You should change them. Throughout this manual, we use A for Site 1 and B for Site 2.

- Optionally enter a new Link Password.



If the Link Password is incorrect a link is established but configuration cannot be performed and no services are available. A new link password may be obtained from RADWIN Customer Support or use the alternative password supplied with the product. (see for more details).

The link password is peculiar to the link itself and should not be confused with the RADWIN Managerlog on password.

- Click **Next**.

The default link with a rate of 6.5 Mbps is evaluated.

The Channel Setting dialog box appears. Proceed to [Installing the Link: Step 3, Channel Settings](#), below.

Changing the Link Password

The default password is **wireless-bridge**. Optionally, you can change the link password as explained here.

➤ **To change the link password:**

- Click the Change button in the System dialog box.
The Change Link Password dialog box opens.



Use the Hide characters check box for maximum security

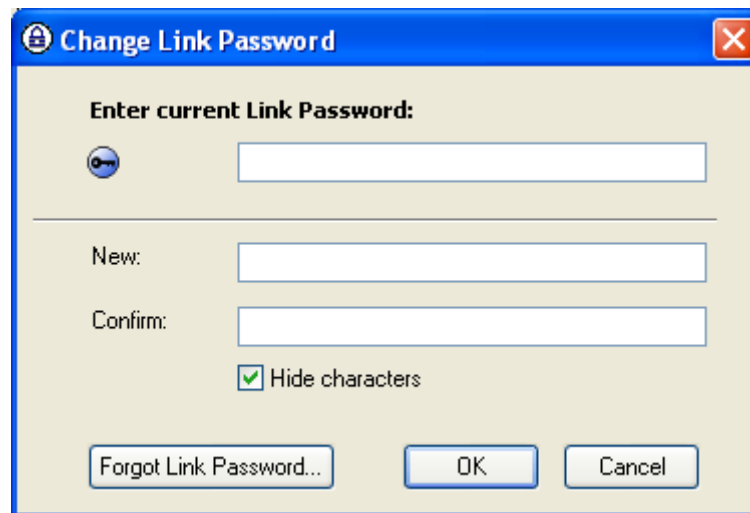


Figure 4-11: Change Link Password dialog box

- Enter the current link password (The default link password for a new ODU is wireless-bridge).

If you have forgotten the Link Password, click the Forgotten Link Password button. The following window is displayed:

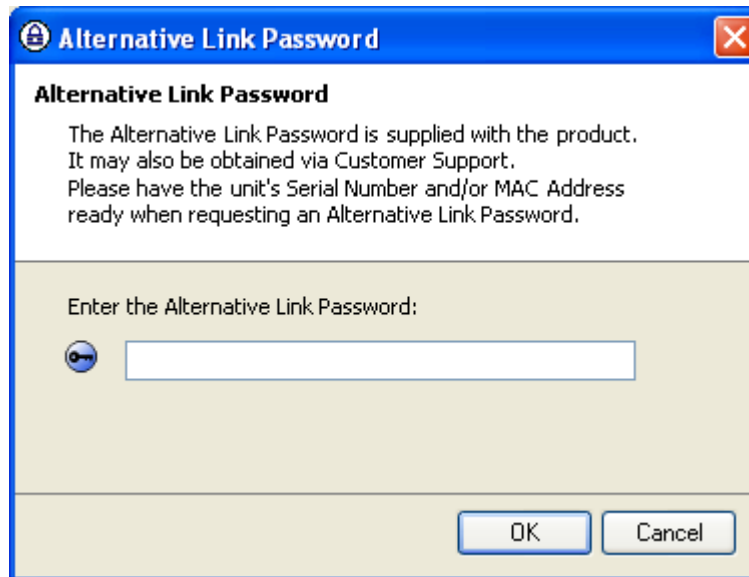


Figure 4-12: Lost or forgotten Link Password recovery

Follow the instructions to use the Alternative Link Password, and click **OK** to finish. You are returned to the window in [figure 4-11](#) above. Continue with the next step.

3. Enter a new password.
4. Retype the new password in the Confirm field.
5. Click **OK**.
6. Click **Yes** when asked if you want to change the link password.
7. Click OK at the Password changed success message.



- Restoring Factory Defaults returns the Link Password to **wireless-bridge**.
- If the link is inactive, then the link password may also be changed from the Site Configuration dialogs. See [page 6-14](#).

Installing the Link: Step 3, Channel Settings

RADWIN 1000/2000 systems have a feature called Automatic Channel Selection (ACS). In the event of sync loss, ACS chooses the first available channel in a list of monitored channels nominated in the Channel settings window of [figure 4-13](#) below. A channel switch takes place sufficiently fast as to ensure no loss of service.

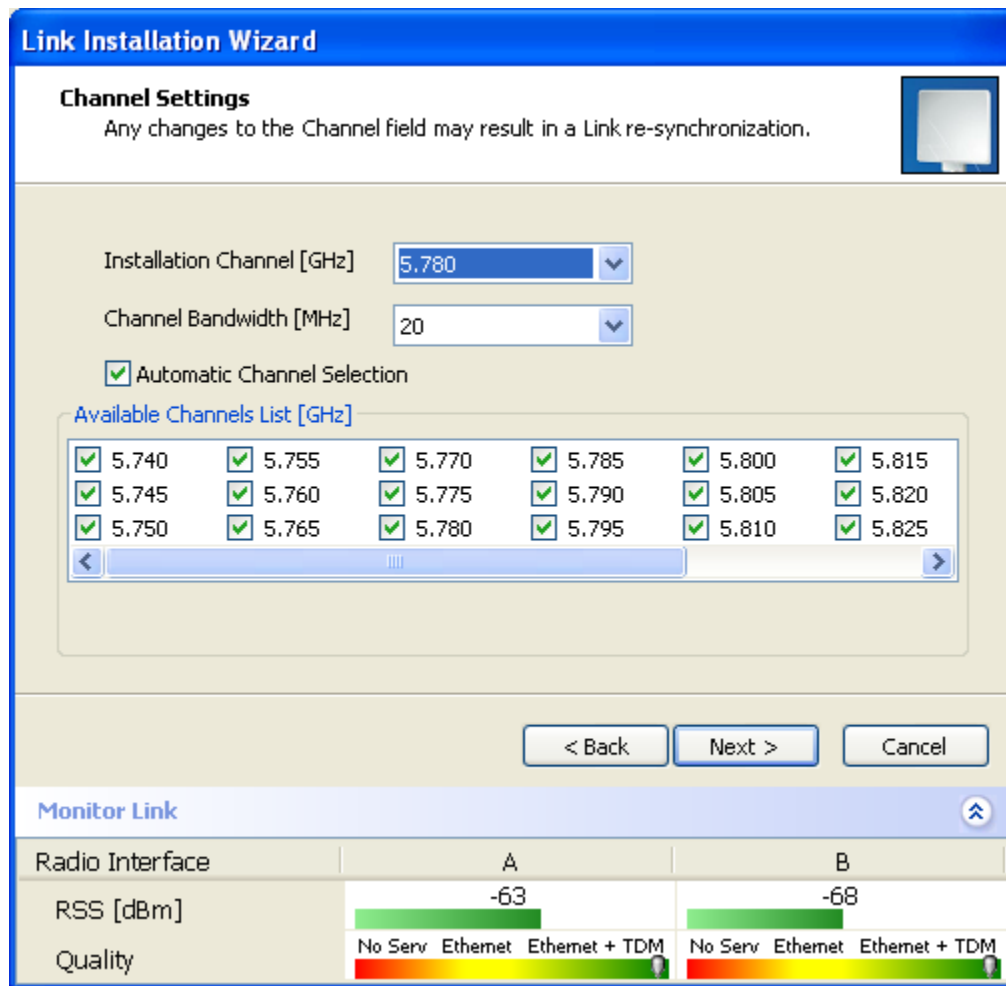


Figure 4-13: Channel Settings - Automatic Channel Selection

The default frequency for the product is shown.

➤ **To select channels to be used by the link:**

1. Select the main frequency from the Installation Channel box.

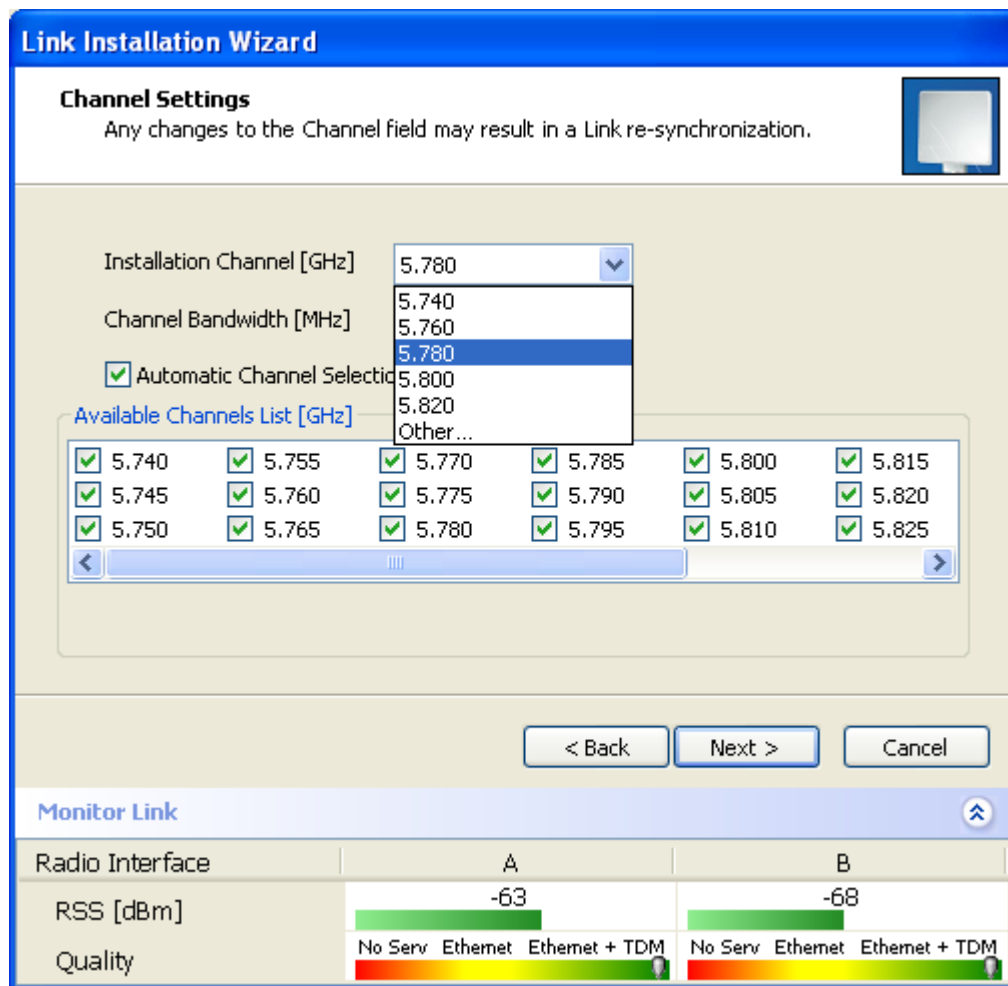


Figure 4-14: Channel Settings - Showing available installation rates



For version 2.1, channel bandwidth is set to 20 MHz and cannot be changed.

2. Click the check box if Automatic Channel Selection is required.
3. The Available Channels List contains all of the allowable channels for the link. Check the channels that can be automatically selected.

Selecting a new channel causes the system quality to change. The Quality bar provides an indication of the link quality from poor (red) to good (green) as shown in the bottom of [figure 4-13](#) above.

4. Click **Next**.

Installing the Link: Step 4, Tx Power and Antenna Settings

The Tx Power and Antenna Parameters dialog appears.

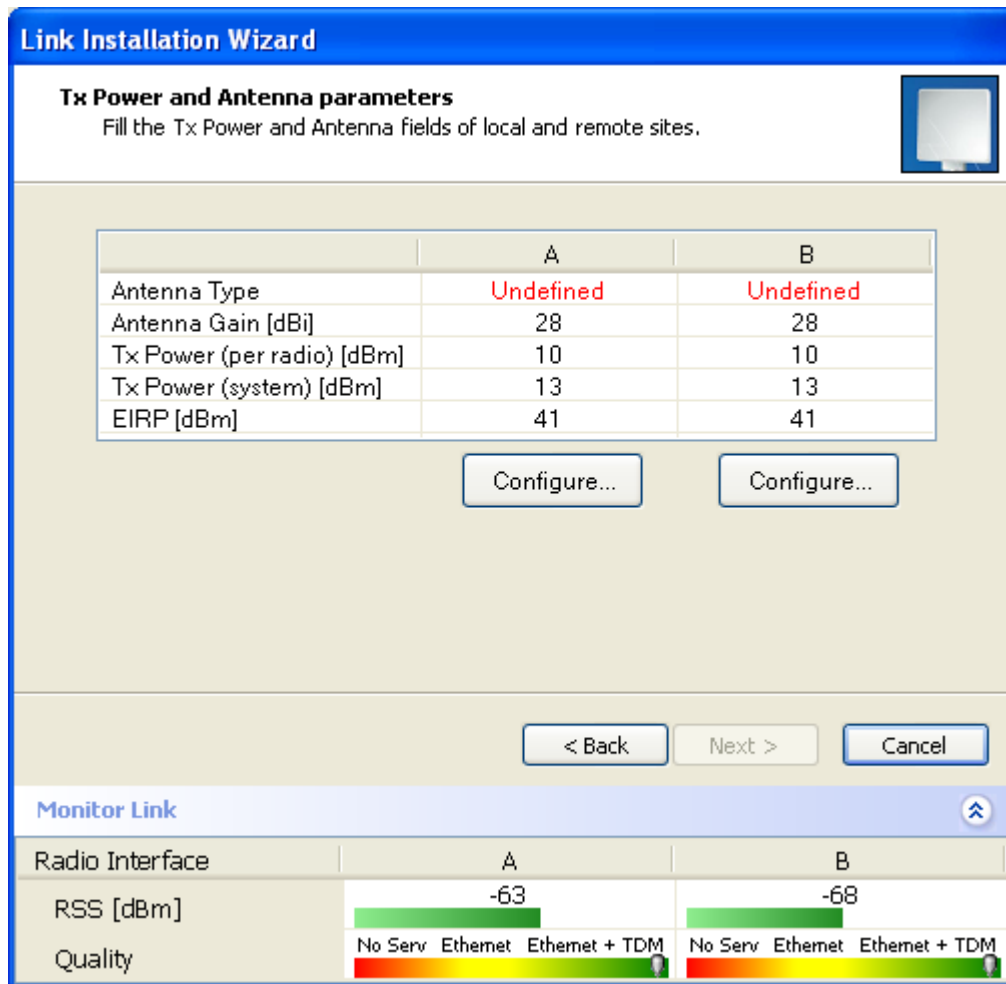


Figure 4-15: Transmission Power and Antenna Parameters

The choice of Tx power, antenna gain and cable loss determines the EIRP and is affected by such considerations as radio limitations and regulatory restrictions.

Before proceeding to antenna installation details, the following background information should be considered:

General

Each RADWIN 1000/2000 ODU is made of two radio transceivers (radios). The radios make use of algorithms that utilize both polarization and space diversity resulting in enhanced capacity, range and link availability. The number of antennas (i.e. radios) used is determined by user configuration and by automatic system decisions, explained below.

Dual Antennas at Both Sites

Using dual antennas at both sites (single bipolar antenna or two monopolar antennas) enables the use of MIMO technology. With MIMO the system doubles the link capacity. At the same time, it keeps the same rate and modulation per radio as was used with single antenna, thus increasing capacity, range and availability.

For example with a dual antenna RADWIN 1000/2000 can transmit at modulation of 64QAM and FEC of 0.83 and get an air rate of 130 Mbps, compared to 65 Mbps with single antenna.

To work in this mode, each antenna port must be connected to an antenna, the RSS level in both receivers should be balanced and a minimal separation between the antennas must be maintained. (For example, by using dual polarization antennas a cross polarization separation is attained).

Upon selecting Antenna Type as Dual, RADWIN 1000/2000 automatically doubles the air rates.

RADWIN Manager indicates a case of unbalanced RSS between the two antennas.

Single Antennas at Both Sites

By selecting a single antenna at both sites the ODUs operate with a single radio that is connected to the ANT 1 connector. The second radio is automatically shut down.

Single and Dual Antennas

In this mode one of the sites uses the ODU with a single antenna while the other site uses the ODU with a dual antenna.

The advantages in this mode in comparison to using a single antenna in both sites are doubled total Tx power and additional polarization and/or space diversity.

RADWIN 1000/2000 automatically switches to this mode if one of the ODUs is connected to a dual antenna or if the RSS at one of the ODU receivers is below minimal level.

The air rates used in this mode are same as when using single antennas in both sites.

The rates used by RADWIN 1000/2000 are shown in Table 4-5 below:

Table 4-8: RADWIN 1000/2000 Transmission rates

Radio	Modulation	FEC	Air-Rate [Mbps]
Single	BPSK	1/2	6.5
Single	QPSK	1/2	13
Single	QPSK	3/4	19.5
Single	16QAM	1/2	26
Single	16QAM	3/4	39
Single	64QAM	2/3	52
Single	64QAM	3/4	58.5
Single	64QAM	5/6	65
Dual	BPSK	1/2	13
Dual	QPSK	1/2	26
Dual	QPSK	3/4	39
Dual	16QAM	1/2	52
Dual	16QAM	3/4	78
Dual	64QAM	2/3	104
Dual	64QAM	3/4	117
Dual	64QAM	5/6	130

Considerations for Changing Antenna Parameters

Let:

maxAllowedTx Power denote the maximum Tx Power practically available from an ODU. It appears as **Tx Power per Radio** in [figure 4-16](#) below.

maxRegEIRP denote the maximum EIRP available by regulation. It will be determined by three factors:

- per band/regulation
- per channel bandwidth
- antenna gain

It appears in [figure 4-16](#) as **Max EIRP**.

maxRegTxPower denote the maximum regulatory Tx Power for the equipment, also having regard the above three points

maxODUTxPower denote the maximum Tx Power of the ODU, itself depending on the air rate used.

Then, the following relationship must be satisfied:

$$\text{maxAllowedTxPower} \leq \min(\text{maxRegEIRP} - \text{AntennaGain} + \text{CableLoss}, \text{maxRegTxPower}) \quad \dots (*)$$

These parameters are controlled as follows:

➤ **To set Tx power and configure antennas:**

1. Click the Configure buttons in turn to configure the antennas on both sides of the link. Each one offers a dialog like this:

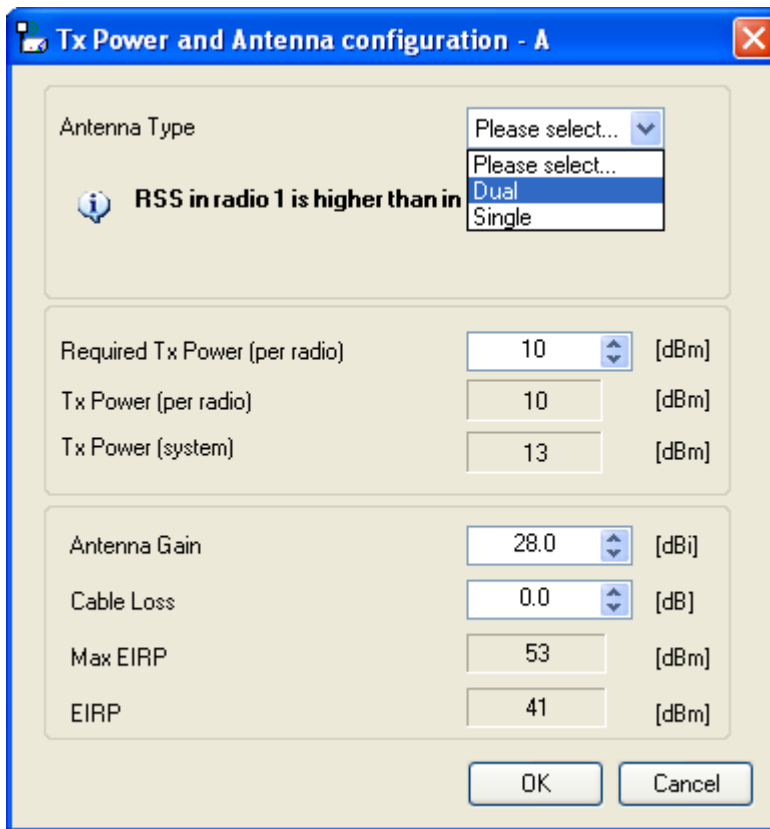


Figure 4-16: Antenna configuration dialog with opened type selection

2. Choose the antenna type and required transmission (Tx) power for the first site and click **OK**. Repeat the process for the second site.

The Tx power (per radio) indicates the power of each radio inside the ODU and is used for Link Budget Calculations. The Tx power (System) shows the total transmission power of the ODU and is used to calculate the EIRP according to regulations.



To see the relationship between Tx Power (radio) and TX Power (system), note that $dBm = 10 \times \log_{10} \text{milliWatt}$ so that if you double the power in milliWatts (for two radios) then dBm will increase by $10 \times \log_{10} 2 \approx 3$.

3. Set the Antenna Gain and Cable Loss. If do this you will receive a warning message:

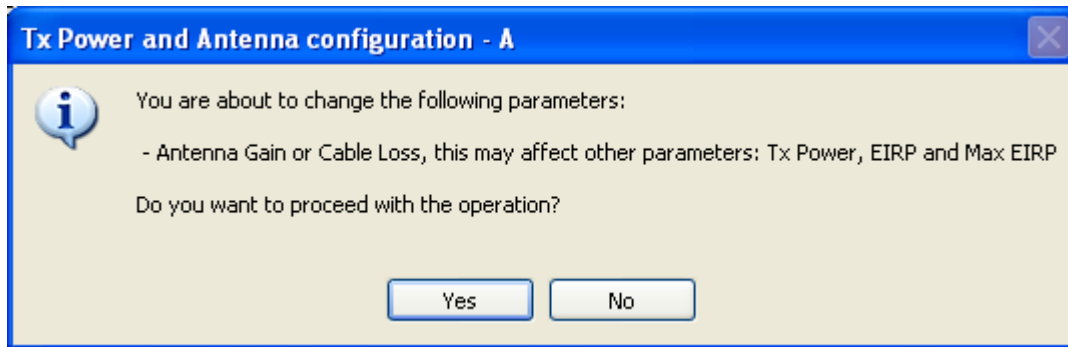


Figure 4-17: Antenna parameters change warning



- The Max EIRP level will be automatically set according to the selected band and regulation.
- The EIRP level is the sum of the System Tx power and the Antenna Gain minus the Cable Loss.

If inequality (*) above is violated, then the following warning window is displayed:

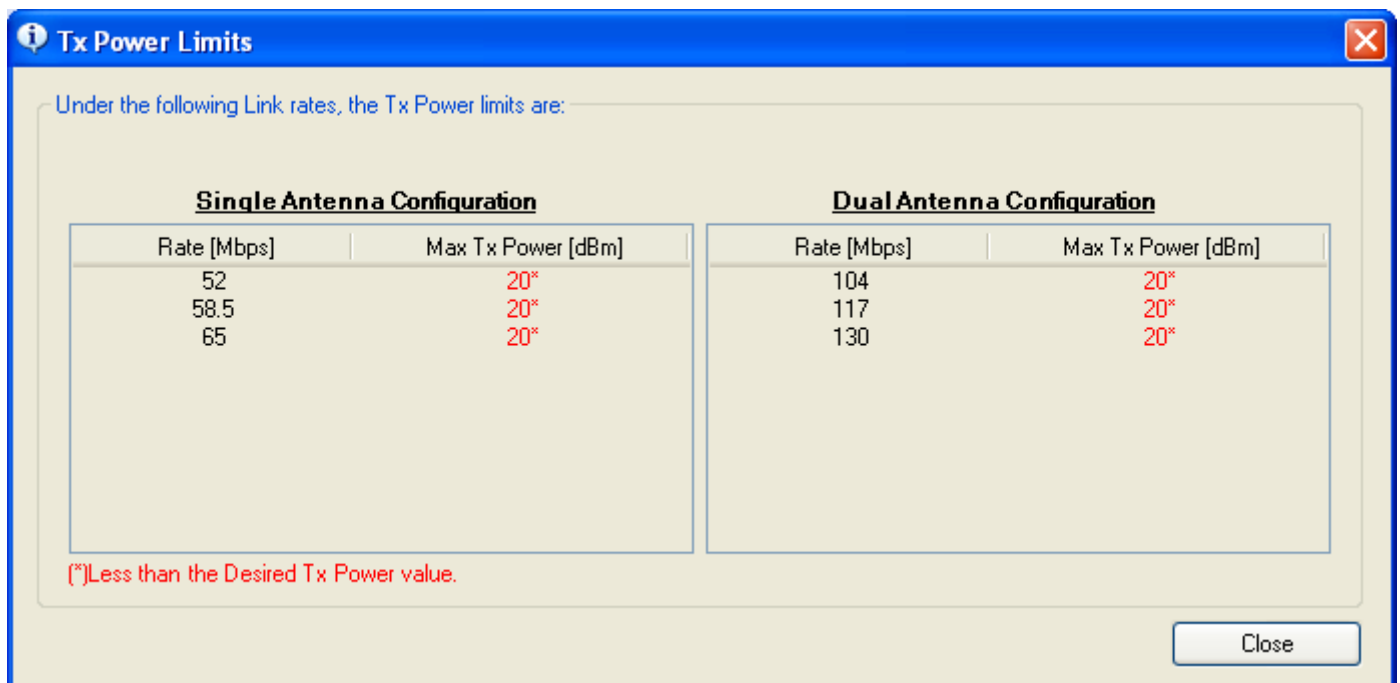


Figure 4-18: Tx Power Limits

The precise relationship between the items in inequality (*) and the window of [figure 4-16](#) is follows:

- Required Tx Power (per radio) will be adjusted down to the lesser of the value entered and **maxAllowedTxPower**
- TxPower (system) is **maxAllowedTxPower + 3** (for 2 radios)
- Max EIRP is **maxRegEIRP**.
- EIRP is **maxAllowedTx Power + Antenna Gain - Cable Loss**

The table in **figure 4-18** only shows rates where the maximum Tx Power is the limitation, rather than regulations.



Recall that **maxAllowedPower** and **maxEIRP** are regulatory. In an unregulated environment, the only limit is **maxODUTxPower**.

When you close the window of **figure 4-18**, the change you requested will **not** be honored, and you will need to try again.

4. When you are finished with Tx Power configuration, Click **Next**.

Installing the Link: Step 5, Services

The Services dialog appears:

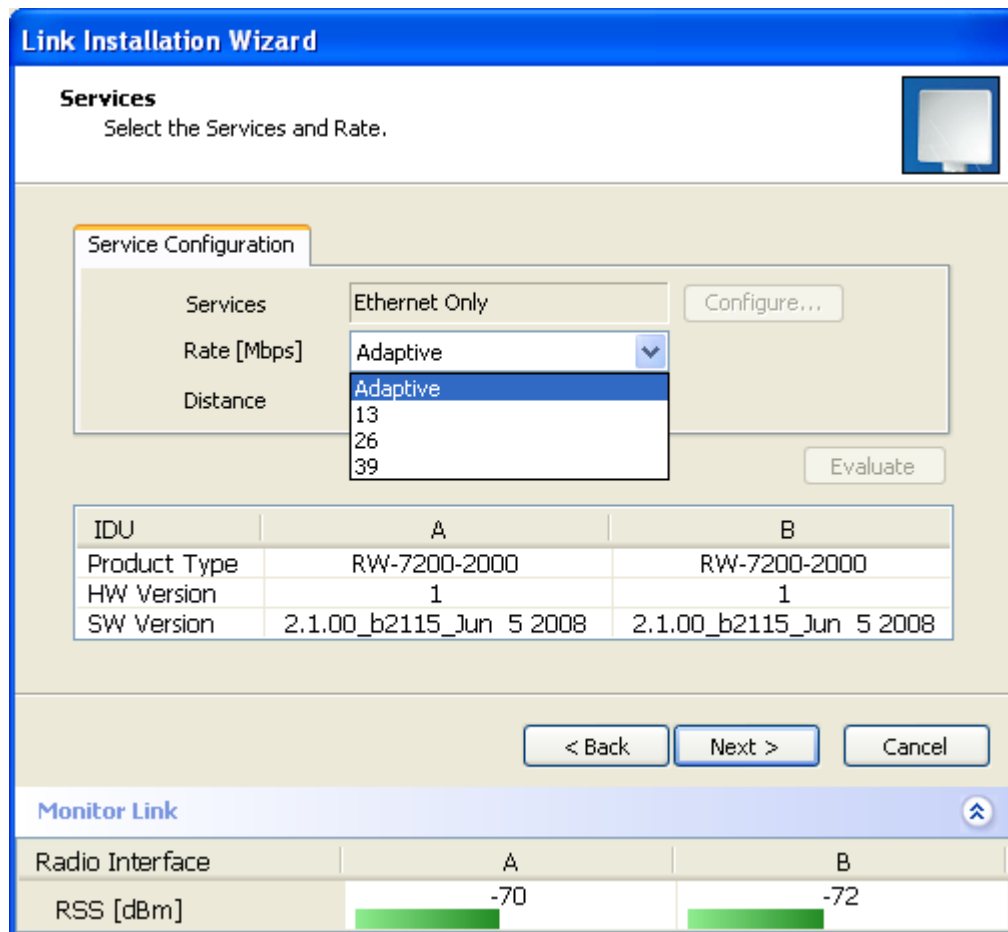


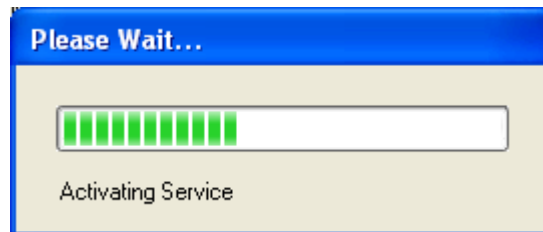
Figure 4-19: Services and Rates dialog

For version 2.1, Ethernet Only is the only available service. You may choose a specific modulation rate or use Adaptive.

➤ **To choose a modulation rate:**

1. Choose Adaptive or one of the available rate (see [page 1-3](#) for information about Automatic Adaptive Rate).
2. Click **Next** to continue.

The service is activated as show below:



Installing the Link: Step 6, Installation Summary and Exit

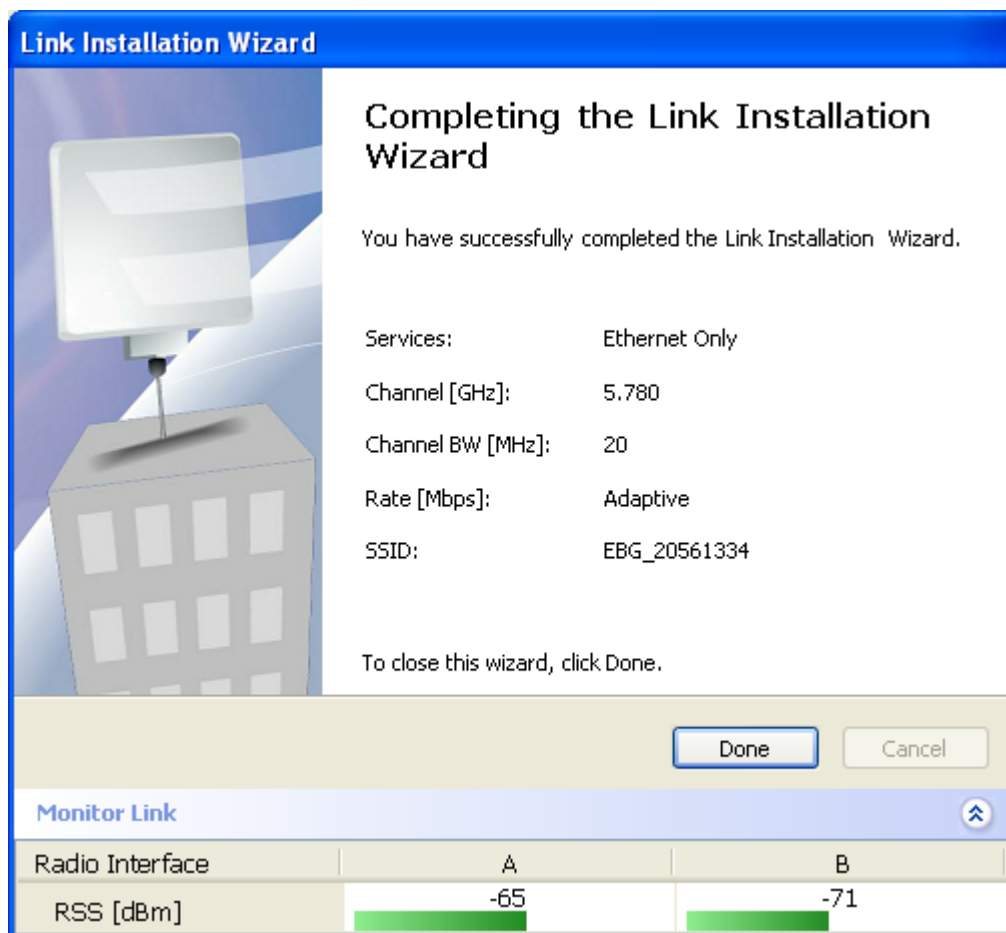


Figure 4-20: Installation Wizard Exit Summary

Click **Done** to return to the main window.

The main window now reflects the installation:

The screenshot shows the RADWIN Manager interface with the following data:

Location:	A	B
Radio Interface:		
RSS [dBm]	-64	-66
Ethernet Service:		
Ethernet Throughput [Mbps]	51.6	51.7
Rx Rate	0.0	0.0
Tx Rate	0.0	0.0

Site A Configuration:

- IP Address: 10.0.0.120
- Subnet Mask: 255.0.0.0
- Trap Destination: 0.0.0.0

Site B Configuration:

- IP Address: 10.0.0.121
- Subnet Mask: 255.0.0.0
- Trap Destination: 0.0.0.0

Link Details:

- Link ID: EBG_20561334
- Services: Ethernet Only
- Frequency [GHz]: 5.785
- Channel BW [MHz]: 20
- Rate [Mbps]: Adaptive
- Status: Link Active

Figure 4-21: Main window of the manager after installation

➤ **To verify the installation:**

- Verify that the Radio Signal Strength (RSS) is according to expected results as determined by the Link Budget Calculator.



Installation mode, as described above, may be re-entered using **Configuration | 1 Configure Site A** and **Installation Mode** the Site Configuration dialog. Some Installation mode functionality may cause a break in link service.

If you can accomplish link changes without breaking the service, always prefer to use Configuration mode, described in chapter 5.