BeamReach
Networks

BeamPlex

BRU-100 and BRU-150 Remote Unit

Installation and Maintenance Service Utilities

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This document applies to System Software versions subsequent to that which is listed here, unless the document is reissued due to software feature upgrades. The software release notes will indicate the applicable document revision level.

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Extending the Broadband Horizon

Introduction

In This Chapter:

This chapter introduces the service utilities for the BRU-100 and BRU-150 Remote Unit. It also provides reference information regarding the installation process.

Overview

This section describes the intended use of this document and introduces the service utilities used for remote unit installation and maintenance.

A remote unit is the subscriber termination equipment for the BeamPlex™ broadband wireless access system. It communicates with its associated base station through an RF signal path; and it communicates with the subscriber's computer through an Ethernet cable.

The service utilities are used to set configuration parameters, initiate the phases of service activation, and monitor the status of a remote unit.

Scope and Purpose

The service utilities are applicable for professional installation and diagnosis of both the BRU-150 and BRU-100 models of remote unit, which are described below. Both models are designed with the same electronics so the service utilities will work with either one of them.

⚠ **Caution**: Read the section BRU-150 Self-Install Remote Unit on page 8 about required configuration before delivery to the subscriber.

This document is primarily for technicians who perform a manual BRU-150 installation. The BRU-150 is designed for subscriber self-installation. If the subscriber encounters problems during or after self-installation, technicians will use these service utilities to resolve the problems.

For system release 1.1, the existing installation manuals listed in the section Reference Documents on page 9 accurately describe the physical installation process. However, the BRU-100 documents describe the use of the RIT (Remote Unit Installation Tool) which has now been replaced by the service utilities described here. Installers should use this document for configuring the BRU-100 until the installation manuals have been revised.

Important Notices

Warning: This device is a radio frequency transmitter. It is required to comply with FCC RF exposure requirements for transmitting devices. A minimum separation distance of 8 inches (20 cm) or more must be maintained between the antenna and all persons during device operations to ensure compliance with the FCC's rules for Radio Frequency Exposure. If this minimum distance cannot be maintained, exposure to RF levels that exceed the FCC's limits may result. This equipment must not be co-located with any other transmitting antenna.

Note: 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 the 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.

Note: Any changes or modifications to this equipment that are not approved by BeamReach Networks could void your authority to operate the equipment if such changes or modifications affect the regulatory compliance specified in Appendix A.

Remote Unit Models

The BeamPlex Broadband Wireless Access System offers two models of remote units for CPE, as shown in Figure 1-1:
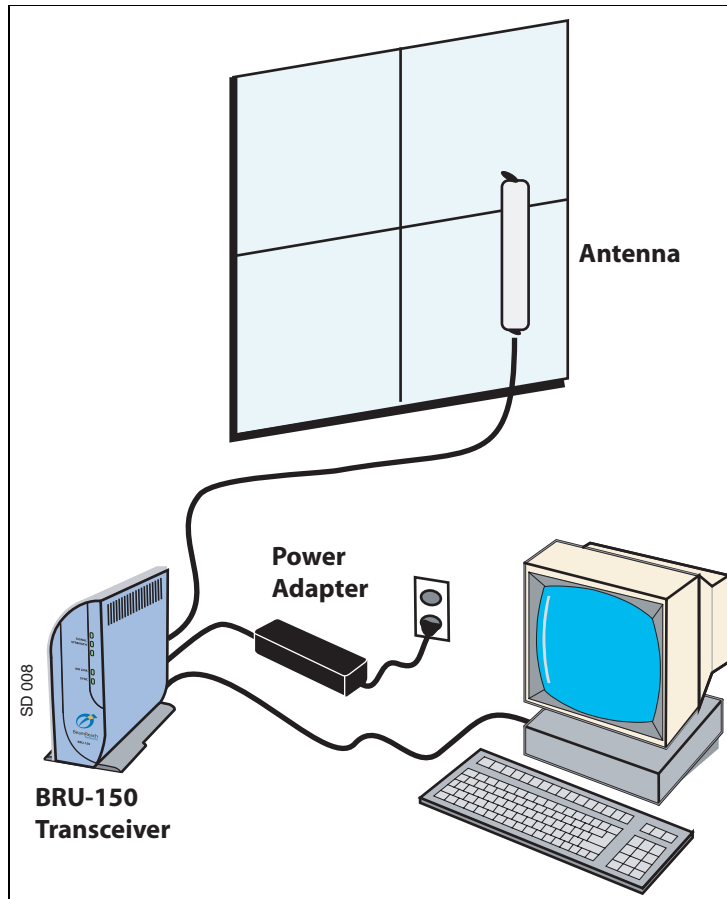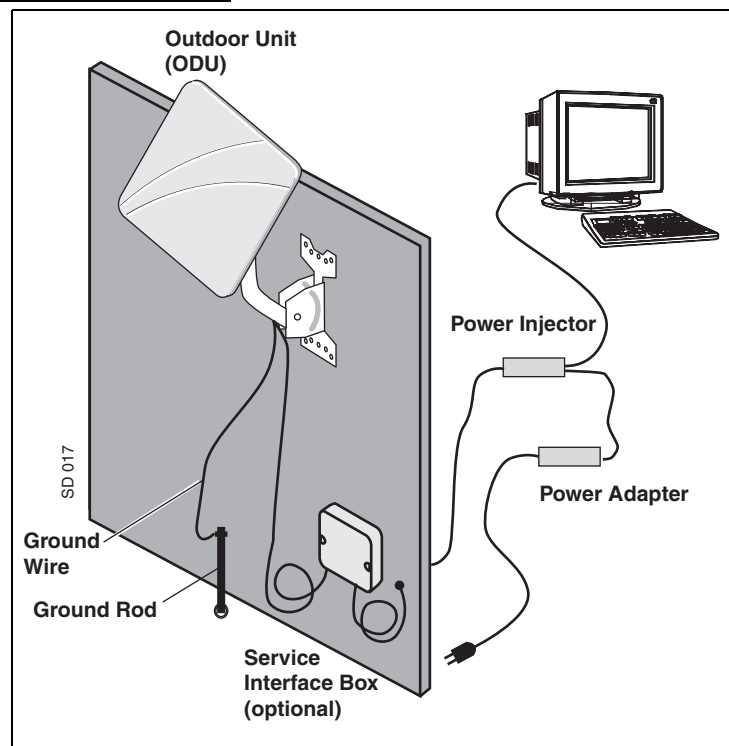
Figure 1-1   Remote Unit Models

Remote Unit Service Utilities

The service utilities are two applets designed to support the installation and maintenance of a remote unit:

BRU Installation Tool (BRUIT)

The installation tool consists of a set of GUI windows that guide the installer through the steps of the configuration and activation process. Latitude/longitude coordinates of the subscriber's premise and compass bearings to the closest base stations are used to accurately point the antenna in areas of difficult reception. The GUI contains a signal strength indicator and other technical displays. Installers can set certain configuration parameters and install software upgrades with this tool.

The BRUIT is used primarily for BRU-100 professional installations. It is also used for onsite technical support if a subscriber encounters problems with either model of remote unit.

BRU Status Monitor

The status monitor displays information about the state of the air link between the remote unit and the base station. It provides a utility to change the IP address in the remote unit, and it performs a basic continuity check between the PC and the remote unit, and between the PC and base station.

The status monitor utility is part of the service utilities, but it was designed for the subscriber and is installed on their computer.

BRU-150 Transceiver Features

This section introduces the physical features of the displays and connections on the BRU-150 Transceiver.

The BRU-150 is designed for the subscriber, so its displays and controls are designed for simple functionality.

Default configuration button recessed behind front panel.

· **Cycles power to the unit**
· **Sets IP address to 192.168.1.1**
· **Sets subnet to 255.255.255.0**
· **Sets BSOC to -1**

Use a paper clip or similar object to actuate the reset button.

LEDs illuminate progressively from the bottom up as the signal strength increases.

Each LED also has three stages:

· **Slow blink at lowest signal**
· **Fast blink at medium signal**
· **Solid at highest signal**

SIGNAL STRENGTH

Solid green when authentication completes.

Flickers green when data is being passed.

AIR LINK

SYNC

Red while unit is booting up.

Flashing amber while unit auto-searches for a base station.

Solid green when synchronization and ranging completes.

Flickers green when data is being passed.

Solid amber if synchronization did not complete.

BeamReach Networks

BRU-150

IDU 001

Figure 1-2   Transceiver Front Panel

**Amber LED -- Steady when Ethernet link is established.
Flickers when data is being passed**

DATA

Ethernet

Green LED -- Flickers when data is being passed.

ANTENNA

48V ---.7A

Power
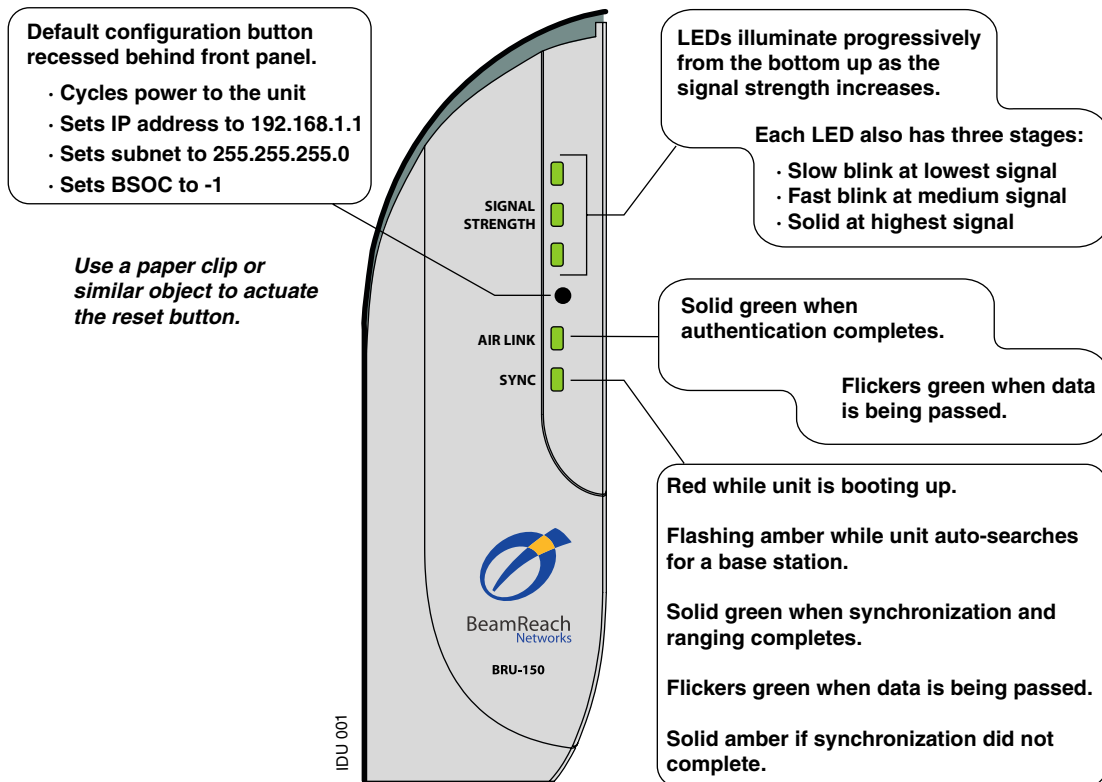
IDU 002

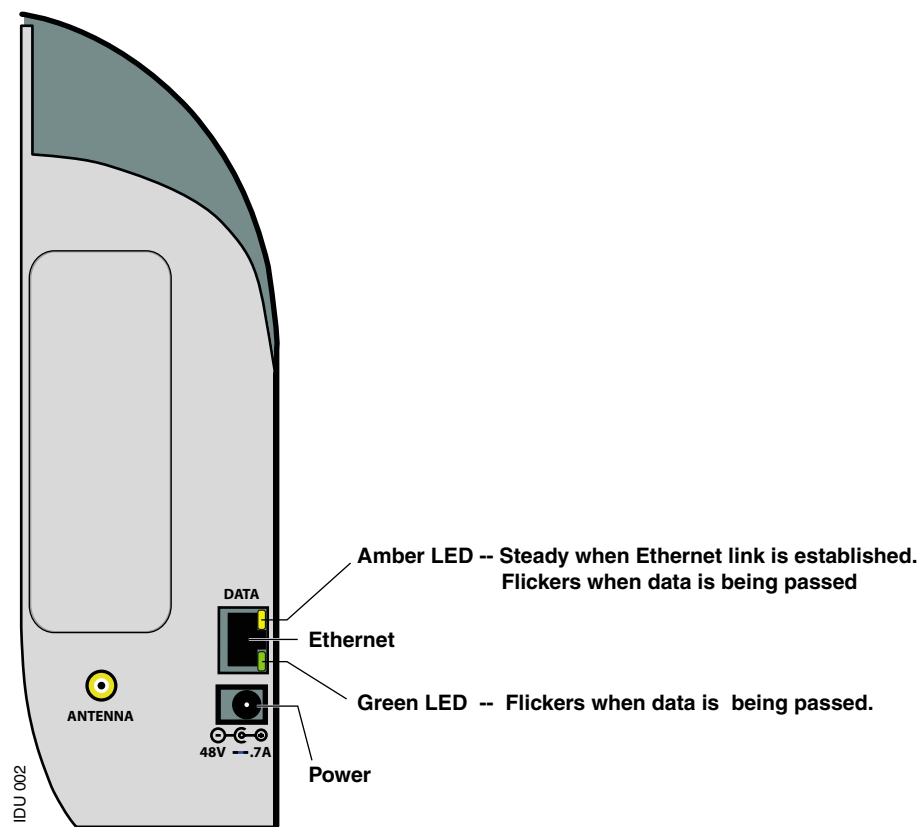**Figure 1‑3   Transceiver Rear Panel**

Installation Overview

This section overviews the installation steps for the BRU-150 and BRU-100 remote units.

BRU-150 Self-Install Remote Unit

The BRU-150 is designed for the subscriber to self-install the unit. However, for system release 1.1 the configuration process has not been fully automated. You must manually set the Local RUID (remote unit identification) before delivering the unit to the subscriber. This parameter uniquely identifies this remote unit to the base station.

Prior to sending the remote unit to a subscriber, you must determine the Local RUID that will be assigned to this unit. Your company should have developed a plan for Local RUID assignment.

Note: The Local RUID is normally associated with a particular subscriber. You must ensure the correct BRU-150 is being delivered to a subscriber based on the Local RUID assignment.

The Local RUID is configured into the Transceiver of the BRU-150 with the BRUIT (installation tool). At Step 3 in the BRUIT you will open the BRU Configuration window and set a value for the Local RUID.

The subscriber will use the BRU-150 *Installation Quick Guide* to accomplish the installation. If a subscriber is in an area with difficult reception, you may need to make a service call to perform a manual installation using precise antenna-pointing techniques.

BRU-100 Professional Install Remote Unit

The installation process for the BRU-100 is described in detail in the installation documents listed in the following section. The service utilities are used in place of the RIT (Remote Unit Installation Tool) currently described in those documents.

Reference Documents

The following technical publications from BeamReach Networks describe the installation process for the two remote unit models:

- BRU-150 Installation Quick Guide, 1106333-02
- BRU-100 Installation and Configuration, 1106138-01
- BRU-100 Installation Summary, 1106138-03

Preparation

In This Chapter:

This chapter describes preparation tasks for the installation of a remote unit.

Service Computer

This section describes the requirement for the service computer that will host the service utilities and be used in the field to install remote units. These requirements also apply to the subscriber's computer.

Computer

The service utilities are designed to run on a computer with a Windows® 2000 or later operating system. For field service, a portable (laptop) computer is used.

The computer must be configured with

- – an Ethernet (NIC) card,
- – a PPPoE client, and;
- – a CD drive.

Ethernet Cable

The service computer connects to the remote unit through an Ethernet cable.

BRU-150

Use a CAT 5 Ethernet straight-thru cable with RJ-45 plug (male) connectors on both ends to connect the computer to a BRU-150 Transceiver.

BRU-100

For the current version of the BRU-100 remote unit, a cable is supplied with the installation kit that mates with the round connector on the Outdoor Unit and has an RJ-45 connector on the other end. You will need this cable and the installation power injector to connect the service computer to the Outdoor Unit. Follow the instructions in the BRU-100 *Installation and Configuration* manual, or the *Installation Summary* guide, using the service computer in place of the RIT.

The next version of the BRU-100 will have a standard RJ-45 jack in place of the round connector, and the installation power injector will not be needed.

IP Address

The service computer must have a static IP address that is compatible with the remote unit's address, which is delivered with the default address of 192.168.1.1. Set the IP address in the service computer as follows:

- IP address `192.168.1.X`

  Where X is any number between 2 and 255. If the number you choose causes a conflict with another network device, you will see an error message. If this occurs, try a different number for the X value.

- Subnet mask `255.255.255.0`

Software

This section lists the software files you must load onto the service computer prior to a service call.

Service Utilities

The service utilities are not packaged in an installation shield at this time. The files are delivered in a self-extracting Zip file (`bruit.exe`) on a CD. Create a new directory on the service computer and unzip the files into it. Open the applications by executing these files:

- `BRU-IT.exe` — BeamPlex Remote Unit Installation Tool
- `BRU-Mon.exe` — BeamPlex Remote Unit Monitor

You may to create shortcuts to these files for ease of use.

Software Image

You must also download and store the current remote unit *software image file*, which contains updates to the operating system. Step 3 in the installation tool allows you to read the software version currently in the remote unit, and to send a new image file if an update is indicated.

A software image file is provided by BeamReach Networks and should be stored in your system on a TFTP server.

Service Order File

A service order file is generated by the SAM (Service Activation Module) of the BeamPlex Element Management System. The service provider inputs customer data into the SAM for each BRU-100 subscriber.

▶ BRU-100

For a BRU-100 installation, you must also download a service order file for each subscriber who will receive an installation on the pending service trip. This file contains the subscriber's latitude and longitude estimated coordinates and the coordinates of the closest base stations. This data is retrieved when you enter the customer number in Step 4 of the installation procedure. The customer number is the numeric part of the service order file name. For example, service order file `SO_567891.xml` denotes a customer number of 567891.

▶ BRU-150

A service order file may not exist for a subscriber with a BRU-150. You will need a file only if you have to perform a manual installation. In this case, there is a default service file included with installation tool that can be used. Its file name is `SO_1467854.xml` and it is in the same directory in the service computer as the installation tool files.

Edit this default file to change the following data:
- **–** BSOC (base station offset code) – The remote unit uses this code to identify a base station.
- **–** Base station coordinates – The latitude/longitude coordinates of the three closest base stations in your service area.

Note: You must obtain the BSOC and coordinates from the engineers that configured the base station.

This XML file can be easily edited with a text editor, such as the Notepad or Wordpad applications that come standard with Windows operating systems.

A portion of the service order file as read by a text editor is shown in . The file contains data on three base stations.

When changing the latitude/longitude coordinates, be sure to maintain the proper format (including quote marks) and the exact number of digits:

Latitude: dd:mm.mmmC

Longitude: ddd:mm.mmmC

Where:

d = degrees
m = minutes
C = compass (N or S latitude; E or W longitude)

An example of 1-degree, 1-minute West is   `"001:01.000W"`

```
<SO SERVICE-ORDER-NUM="1467854"
SUBSCRIBER-NAME=
SUBSCRIBER-ADDRESS=
SUBSCRIBER-PHONE=
STRUCTURE-TYPE=
STRUCTURE-MATERIAL=
STRUCTURE-HEIGHT=
REQUESTED-SERVICE-TYPE="1"
SERVICE-ORDER-STATUS=
ROOF-INSTALL-OK=
RESIDENTIAL-OR-BUSINESS=
SERVICE-ORDER-DATE="
SCHEDULED-INSTALL-DATE=
AVAILABLE-SERVICE-TYPE="Service 1"
SUBSCRIBER-SITE-ELEVATION="23"
EST-SUBSCRIBER-SITE-LATITUDE="37.23.657N"
EST-SUBSCRIBER-SITE-LONGITUDE="122.01.819W"
ABOVE-ROOF-REQUIRED="true"
COVERAGE-SURVEY-REQUIRED="true"
PRIMARY-BASE-ID="1"
PRIMARY-BASE-NAME="Sunnyvale Base"
PRIMARY-BSOC="4"
PRIMARY-BRN-UPPER-CH-ID="39"
PRIMARY-BRN-LOWER-CH-ID="3"
PRIMARY-BASE-LATITUDE="37:23.657N"
PRIMARY-BASE-LONGITUDE="122:01.819W"
PRIMARY-SPREAD-FACTORS="2"
PRIMARY-AVE-FLS-TX-POWER="4"
PRIMARY-BASE-ELEVATION="15"
SECONDARY-BASE-ID="2"
SECONDARY-BASE-NAME="MountainView Base"
SECONDARY-BSOC="4"
SECONDARY-BRN-UPPER-CH-ID="41"
SECONDARY-BRN-LOWER-CH-ID="5"
SECONDARY-BASE-LATITUDE="37:23.280N"
SECONDARY-BASE-LONGITUDE="122:02.980W"
SECONDARY-SPREAD-FACTORS="2"
SECONDARY-AVE-FLS-TX-POWER="4"
SECONDARY-BASE-ELEVATION="20"
TERTIARY-BASE-ID="3"
TERTIARY-BASE-NAME="San Jose Base"
TERTIARY-BSOC="10"
TERTIARY-BRN-UPPER-CH-ID="39"
TERTIARY-BRN-LOWER-CH-ID="3"
TERTIARY-BASE-LATITUDE="37:94.393N"
TERTIARY-BASE-LONGITUDE="122:99.615W"
TERTIARY-SPREAD-FACTORS="2"
TERTIARY-AVE-FLS-TX-POWER="4"
TERTIARY-BASE-ELEVATION="25"/>
```

Figure 2-1   Service Order File Contents

Equipment and Material

The BRU-150 is a subscriber self-install unit and does not require any additional equipment or materials. If a service call is needed to resolve installation problems or reception problems, the following equipment may be needed depending on the specific situation:

- A compass for determining the bearing to a base station from the subscriber's location. The compass should have a bearing ring, which is a ring around the face with graduation marks in degrees.

- A GPS receiver to determine the coordinates of the subscriber's locations. Alternative methods are discussed in the section Step 4 Antenna Pointing Calculations on page 27.

Installation Tool

In This Chapter:

This chapter provides operating instructions for the BRU Installation Tool application of the service utilities.

Preface

The procedures in this chapter describe using the installation tool for installing a BRU-150 remote unit.

As discussed in Chapter 1, the BRU-150 is designed for subscriber self-installation. However, some subscribers may be in locations where reception is difficult and they were unable to establish an airlink with the base station. Or the signal strength may be too low to provide adequate service. For these occasions, the installation tool provides a method for precise antenna pointing to acquire the base station signal and to maximize the received signal level.

The installation tool can also be used in place of the RIT for a BRU-100 installation.

The sequential windows in the installation tool GUI contain explanations to guide you through the basic remote unit installation process. Images of those windows are presented in this chapter with special instructions and more technical explanations of the process.

The specific features and capabilities in this utility that do not exist in the subscriber's self-installation process include:

- Subscriber's location coordinates
- Direction and distance to the three nearest base stations
- More details on signal strength and link status
- Ability to change remote unit configuration
- Control over with which base station the remote unit connects

BRU-150 Pre-Configuration

Caution: Remember that all BRU-150 remote units must be pre-configured with the Local RUID before being delivered to the subscriber.

As described in the section BRU-150 Self-Install Remote Unit on page 8, you must manually set the Local RUID (remote unit identification) before delivering any BRU-150 to a subscriber for self-installation. This parameter uniquely identifies this remote unit to the base station. This is accomplished in Step 3 of the installation tool GUI.

Antenna Location

The BRU-150 antenna is designed to mounted on the inside surface of a window that faces the general direction of a base station. Follow these guidelines for selecting a location at a subscriber premise with difficult reception:

- Locate the antenna as high as possible in the building.

- Select a window that does have large obstructions such as dense trees or a building close to it.

- Do not mount the antenna in a window that has a metal screen.

- Do not locate the antenna near other sources of electromagnetic radiation, such as computer monitors, televisions, microwave ovens, or wireless telephones.

Per FCC rules, 8 inches (20 cm) or more of separation between the antenna and all persons must be maintained. This refers to the radiating side of the antenna, which faces out the window.

Installation Tool Operation

You must complete the preparation tasks described in Chapter 2 before leaving on a service call.

Refer to the BRU-150 *Installation Quick Guide* for the physical installation.

Open the installation tool by executing the `BRU-IT.exe` file.

Step 1   Physical Installation
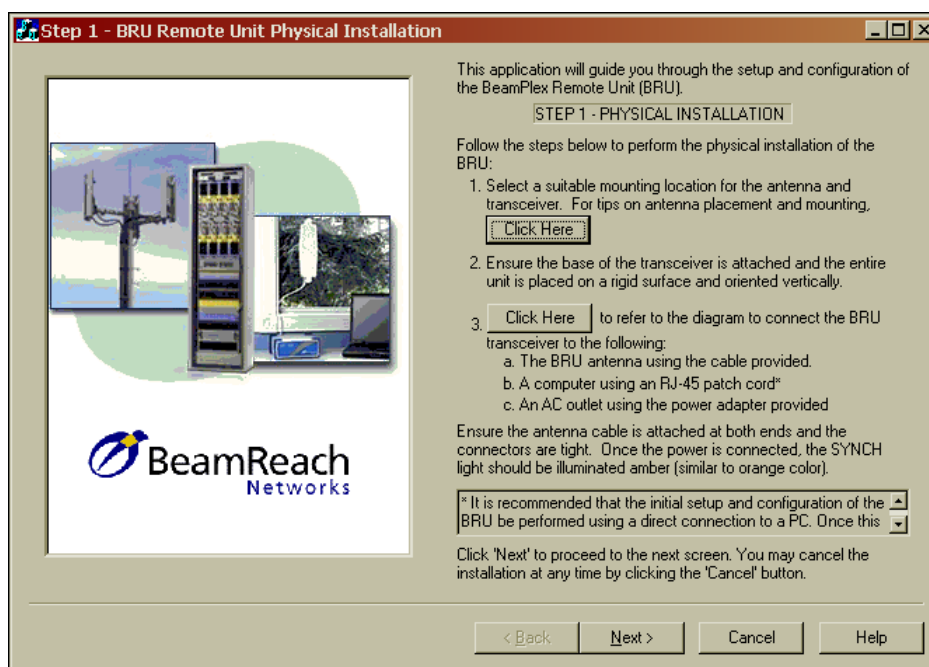
This window provides guidance for installing the BRU-150 components. Use the pop-up windows from the **Click Here** buttons, or see the *Installation Quick Guide*.

If you are installing a BRU-100, see the *Installation and Configuration* manual or the *Installation Summary* guide.

▶ **LAN Connection**

If the subscriber's computer will be connected to a LAN, first connect the computer directly to the remote unit for set-up. After you complete the installation process a hub or switch can be added. The use of a router is not supported at this time due to addressing conflicts. For system release 1.3, BeamReach will provide instructions for setting the IP address for use on a LAN.

Step 2   Login

Both models of remote unit come from the factory with the same default IP address and password:

```
192.168.1.1   field
```

Step 3   Status Check
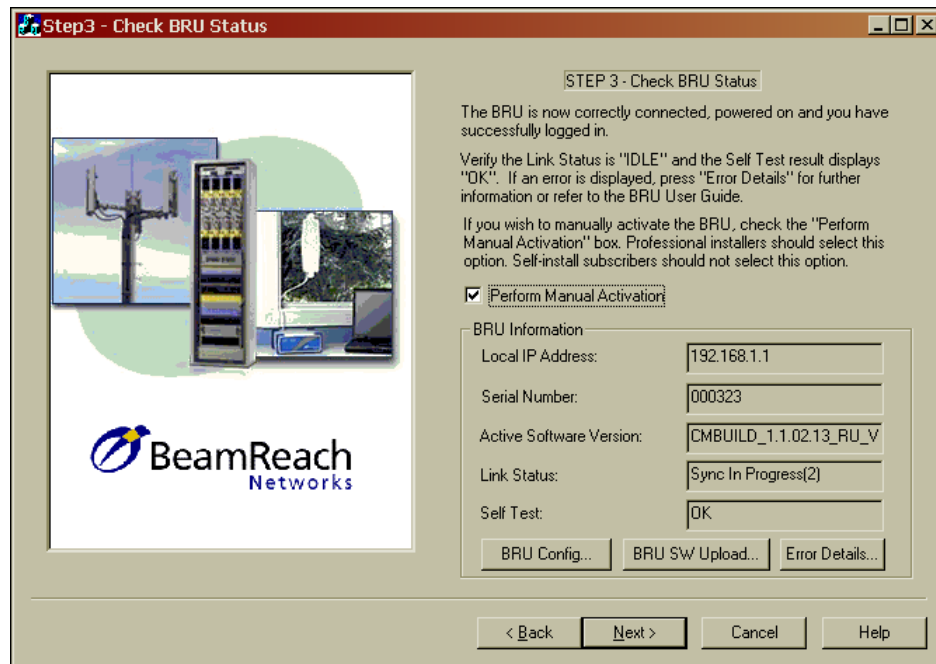
Note: You must enable the **Perform Manual Activation** check box or the
utility will revert to the automated self-install routine.

This step reads certain data from the remote unit and displays it in the
window. It also initiates a self-test and displays the results.

This step is where you access the BRU Configuration window. See the
section Service Order File on page 14 for a discussion of the BRU
Configuration window parameters and the service order file. If the remote
unit has failed to connect with a base station, verify the parameter values
in the BRU Configuration window as described below.

This step is also where you upload a new software image file. See the
section below for instructions.

The **Error Details** and **Help** buttons are not functional at this time.

▶ **BRU Configuration**

Step 1   Click the **BRU Config** button to open the configuration window.

Step 2   Verify or change the values of the following parameters:

Parameter	Value
Local RUID	*Per your network plan*
BSOC	*Per your network plan*
Lower Channel ID	3
Upper Channel ID	39
Operating Subband	1

Click **Set** after each value that you change.

Step 3   Click **Close** when you are finished.
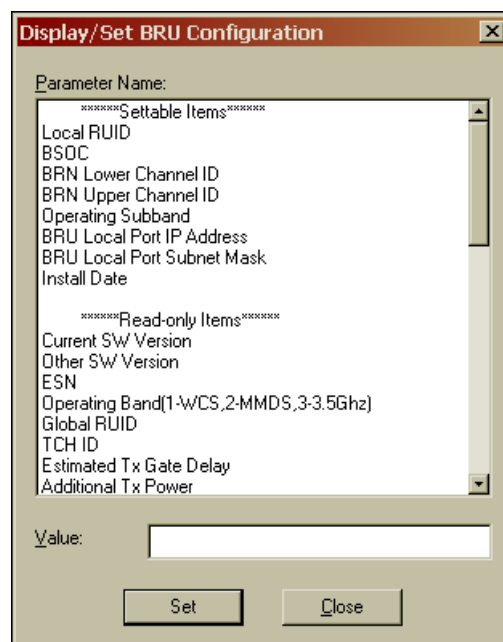
▶ **BRU Software Upload**

Step 1   Determine if the system software needs to be updated.

a. Read the `Active Software Version` field in the Step 3 window. In the example shown above, the software version is 1.1.02.13. The `Current SW Version` in the **BRU Configuration** window also displays the software version.

b. Look at the name of the image file you downloaded to the service computer (Software Image on page 13). The file name contains the version number. For example, an image file `odu-1_1_2_14.dnl` would contain software version 1.1.02.14, which is a later version than the one being displayed.

Step 2   If the software needs to be updated, click the **BRU Software Upload** button. A standard Open File dialog appears.

Step 3   Navigate to the new file and click **Open**. The upload process then begins and the status window shown below opens.

The transfer will take a few minutes and the ongoing status will display in the window.

After the upload is complete, the remote unit will automatically reboot to activate the new software. You must log in with the installation tool again to proceed with the installation.

Software Upload Information

Step 4   Antenna Pointing Calculations

This window locates the closest base stations based on latitude/longitude coordinates. If you know the direction to the base stations (by using a map, for example) you do not have to input coordinates or use the calculated pointing directions. Also see the section Antenna Location on page 21.

▶ Calculate Base Station Direction

Step 1

Enter the customer number, which is the numerical part of the file name of the service order. In the example above, the file name is `SO_1467854.xml`. See the section Service Order File on page 14 for more discussion. Then click **Load**, which causes the tool to read the data in the service order file.

Tip: Enter a single character into the **Customer Number** field, then click **Load**. An **Open File** dialog appears where you can navigate to the service order file.

Step 2

Enter the coordinates of the subscriber's location. These must be entered in the proper format, as described in the Coordinates section below. If you need to find these coordinates, see the Coordinates section.

Tip: If the subscriber coordinates were entered into the service order file, you can leave the latitude/longitude fields blank.

Step 3   Click the **Calculate** button. The tool then uses the latitude/longitude coordinates in the service order for the base station and those entered for the subscriber to derive the **Direction** and **Distance** values in the table at the bottom of the window.

Interpret the table as follows:

> **Code** – Information only. The base station offset code identifies the base station.

> **Direction** – The bearing, in degrees, to the base station. The graduations begin at North (0 degrees) and progress clockwise around the compass.

> **Distance** – The distance to the base station in miles.

Step 4   Use a compass and the **Direction** bearing for **Base1** to find a suitable location for the antenna.

▶ Coordinates

If you need to determine the latitude/longitude coordinates for the subscriber, they are best derived from a GPS receiver on site.

An alternative is to use a web site that will derive the coordinates from the subscriber's address. One such commercial site is `www.maps.com`. Zoom in the map and the coordinates are displayed.

Coordinates from a web source may need interpretation. Using maps.com as an example:

> Longitude and latitude (in that order) are displayed:
> ```
> -121.90159  37.39689
> ```

> Negative values denote West longitude and South latitude. Positive values denote East longitude and North latitude.

> The fractional part of the degree must be converted to minutes and rounded to three decimal points:
> .90159 x 60 = 54.095   .39689 x 60 = 23.813

The coordinates 121:54.095W and 37:23.813N can now be entered into the GUI.

Note: The latitude/longitude values must be entered in the exact format and with the exact number of digits shown in the GUI.

Enter latitude/longitude values in this format, where d = degrees and m = minutes:

`dd:mm.mmmN` (or S)   Latitude

Example: `21:02.123S`

`ddd:mm.mmmW` (or E)   Longitude

Example: `002:45.500E`

Step 5   Antenna Pointing

This step includes the antenna pointing process and establishing the initial airlink with a base station.

▶ Background Information

Steps 5 and 6 establish the airlink communication channel between the remote unit and the base station. There are four critical processes involved:

- **Synchronization** – Acquire and maintain time and frequency synchronization with the base station.

- **Ranging** – Adjust ODU power levels and transmission intervals so that the time slots carrying data arrive at the base station at the proper time.

- **Registration/Authentication** – Store base station offset code in the remote unit to identify with which base station the remote unit will communicate. Store a database record for this remote unit in the BeamPlex Element Management System (BMS). Associate the remote unit to the base station, then to the BMS.

Synchronization and ranging occur in Step 5, while registration and authentication occur in Step 6. This sequence is divided into two steps so that you can ensure that the unit is receiving an adequate signal level in Step 5 before you begin the registration process. This is important because if you need to establish a link with a different base station after registration, you must manually delete the remote unit from the first base station's database.
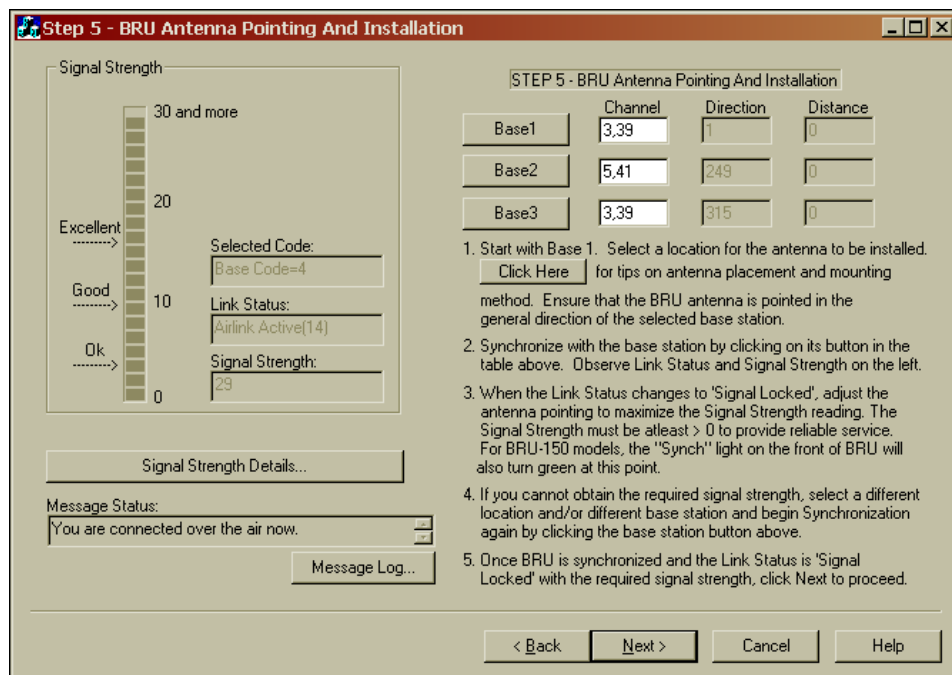
▶ **Working the GUI**

Approximate Values:

Excellent: −104 dBm
Good: −112 dBm
OK: −122 dBm

Step 1 Hold the antenna (or temporarily install it) at the location determined in Step 4, then click **Base1**.

The **Message Status** box indicates synchronization in progress. When it detects a signal strong enough to register on the **Signal Strength** bar, and light one LED on the transceiver, it locks on to that base station.

The **Signal Strength** bar indicates the received signal level. A level near the **OK** mark is recommended. If the signal level is low, try rotating the antenna slowly while monitoring the **Signal Strength** bar, which refreshes once per second.

If the signal level does not improve, move the antenna to another likely location and click **Base1** again. This restarts the synchronization process.

Tip: If an installation is requires repeated attempts at acquiring an adequate signal, you may need to compare the results from different antenna locations and/or different base stations. This is accomplished with the **Signal Strength Details** button. An example of the display window is shown below. This data can be saved as a text file and compared against other attempts.

Step 2 If you do not obtain an adequate signal from **Base1**, repeat this process with **Base2** and then with **Base3** as needed.

Step 3 If no antenna location results in clearly superior signal, then review the signal strength detail reports that were saved, as described above. The next section provides guidance in interpreting the data in those reports.
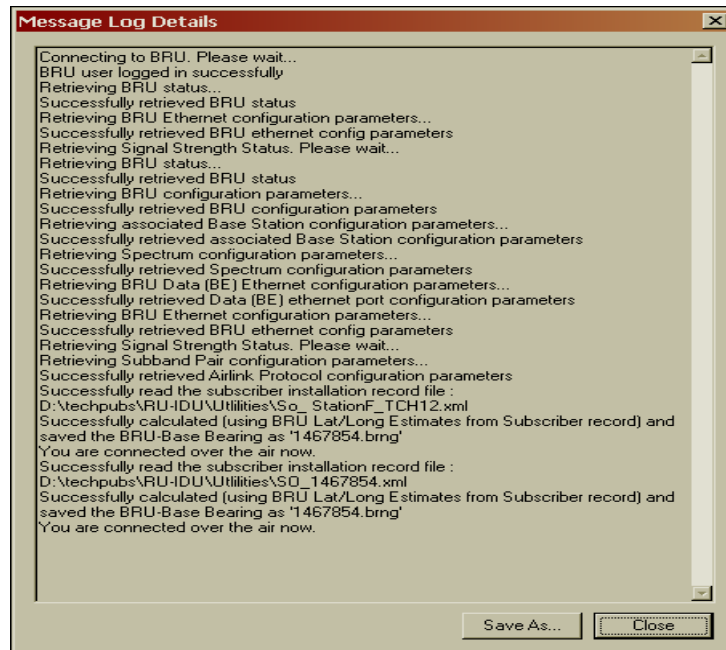
▶ **Signal Strength Details**
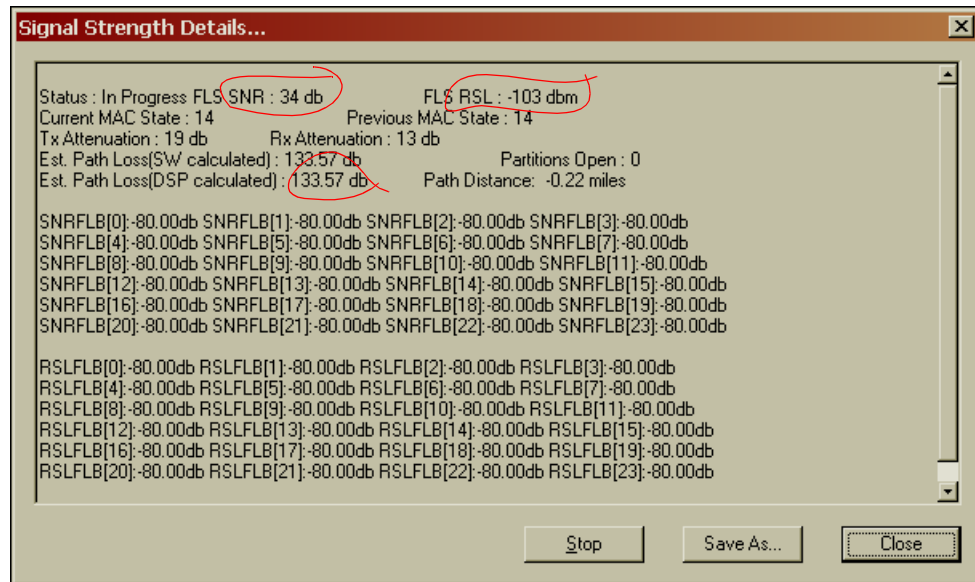
Look for the following three data types, listed here in order of importance:

♦ `RSL` (received signal level)

High value preferred. Note that these are negative numbers.

♦ `SNR` (signal/noise ratio)

High value preferred.

♦ `Est. Path Loss`

Low value preferred.

Use your best judgement as to which antenna location and which base station produces the best signal. A signal that registers near the **OK** mark is reliable, but the data rate will likely be 700 Kbps (downlink) as opposed to the maximum rate of 1.5 Mbps.

Note: If an adequate signal for the subscriber's needs cannot be attained after all efforts, a BRU-100 remote unit should be considered for this subscriber.

▶ **Message Log**

The message log records the sequence of important events throughout the installation process.

Refer to this log as needed to determine the status of the installation.

Step 6   Service Activation

Clicking the **Service Activation** button initiates the registration and authentication routines.

The **Link Status** and **Message Status** fields will indicate when the airlink has been established. The **Airlink** LED on the transceiver illuminates at this point.

Step 7   IP Address

As discussed in the section LAN Connection on page 23, changing the default IP address is normally required only when the remote unit connects to a router.

Step 8   Installation Status
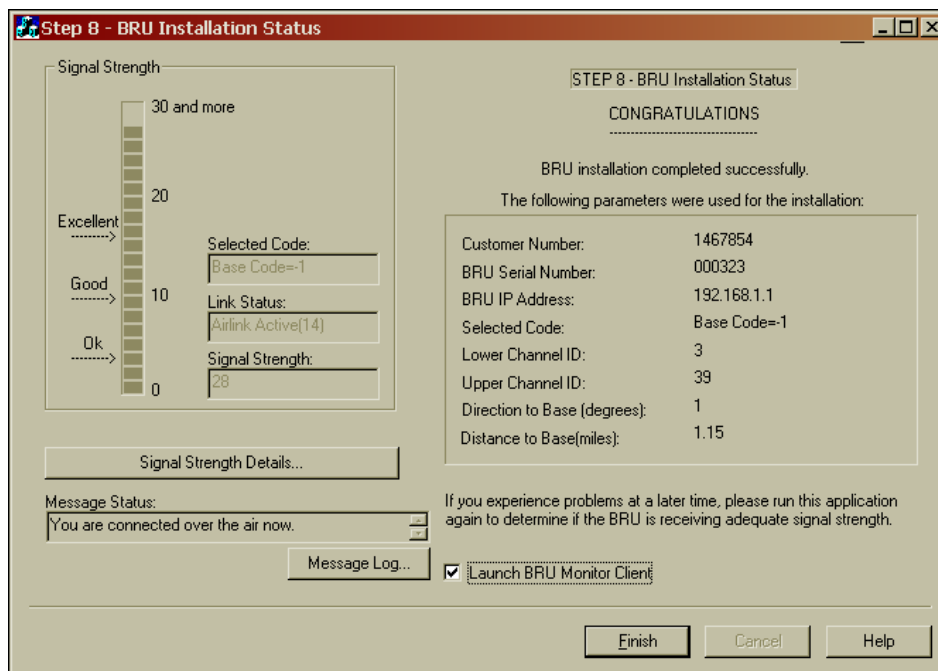
This final window provides a summary of the installation and airlink statistics.

If you enable the **Launch BRU Monitor Client** check box, the status monitor application will open, and the installation tool will close, when you click **Finish**.

Other Technical Features

This section presents two additional features of the BRU-150 that you will use.

Default Configuration Button

There is a default configuration button located behind the front panel of the BRU-150 transceiver, as shown in Figure 1-2 on page 6.
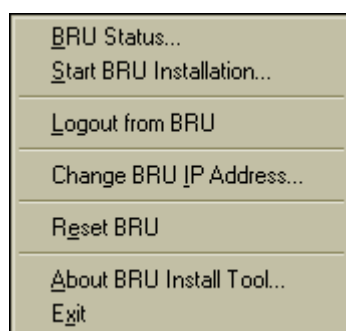
Actuating this button causes the following actions:

- Cycles power to the transceiver
- Sets the IP address to the default 192.168.1.1
- Sets the subnet mask to the default 255.255.255.0
- Sets the base station offset code to the default -1

Insert a paper clip, or similar object, through the hole in the front panel to actuate the button.

Shortcut Menu

When either the status monitor or installation tool applications are opened, an icon appears in the Windows system tray of the service computer. When you close the application window, the system tray icon still remains and the application runs in the background.

Right-click the system tray icon to access this shortcut menu. Note that the menu commands differ depending on which of the service utilities are open. When the status monitor is open, the `Start BRU-150 Installation` command is not present.

The commands on this menu are described below.

BRU-150 Status	Opens the Status Monitor application.
Start BRU-150 Installation	Opens the installation tool.
Logout from BRU-150	Ends the connection between the service utilities and BRU-150.
Change BRU-150 IP Address	Opens the Status Monitor to the BRU-150 IP Address Setting page.
Reset BRU-150	Cycles power to the BRU-150. Note that cycling power does not accomplish a full reset. Configuration data is stored in non-volatile memory and is not affected by power cycling. Actuating the reset button on the transceiver erases this data.
About BRU-150 Self-Install Software	Standard product splash screen.
Exit	Closes whichever application is open. This command is the only way to completely close the applications.

Pre-Production

Status Monitor

In This Chapter:

This chapter describes the status monitor window of the service utilities.

Overview

The three tabbed pages in the status monitor window provide the following functions:

- **Signal Strength Monitor**
    - Displays the signal strength from the base station
    - Displays base code, link status, and signal strength data
    - Provides links to detailed reports on signal strength and the message log

- **IP Address Setting**
    - Sets a new IP address in the remote unit

- **Diagnostics**
    - Tests connectivity between the host PC and the remote unit, and between the remote unit and the base station.

Open the status monitor by executing the file `BRU-Mon.exe`.

The status monitor is also installed on the subscriber's computer during the installation process. It is intended to provide limited functionality to technically-oriented subscribers. For the less technical subscribers, it is an information source they may be asked to read during a telephone technical support session.

Status Monitor Displays

This section provides details of the GUI displays in the status monitor.

Signal Strength Monitor
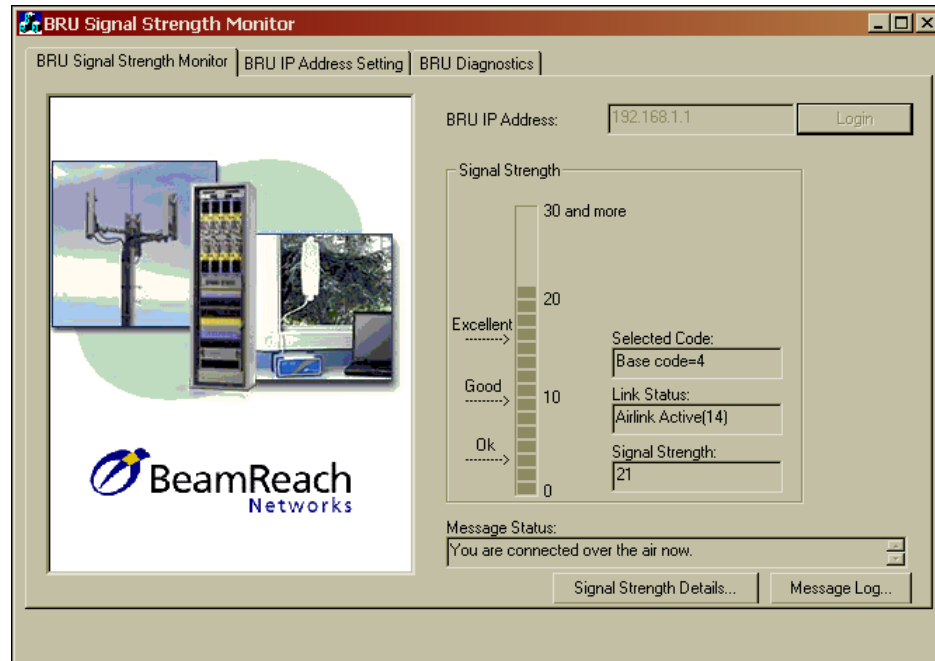
This page contains the following features:

- **Login**

  Use the remote unit default IP address of 192.168.1.1 to log in.

  You do not need to log in if the status monitor is opened after the installation tool and the remote unit have established a connection. The login field will be greyed out.

  If the remote unit is reset or power-cycled after establishing the connection, you must log in again.

- **Signal Strength (Bar)**

  The graduation numbers on the dynamic bar display are relative, they do not have a unit of measure. The approximate signal levels at the guidance marks are as follows:

  0 = Approximately -127 dBm

  OK = Approximately -122 dBm

  Good = Approximately -112 dBm

  Excellent = Approximately -99 dBm

  The display's maximum is -80 dBm.

- **Selected Code**

  This is the base station offset code, which is a unique identifier the remote unit uses to distinguish one base station from another. The displayed code indicates the base station with which the remote unit is registered.

- **Link Status**

  This is the current functional status of the remote unit. The status information is used primarily for technical service calls. A fully functional unit has a status of `Airlink Active (14)`.

- **Signal Strength (Value)**

  This field provides a numerical display of the signal strength shown in the dynamic bar display. See the explanation above for Signal Strength (Bar).
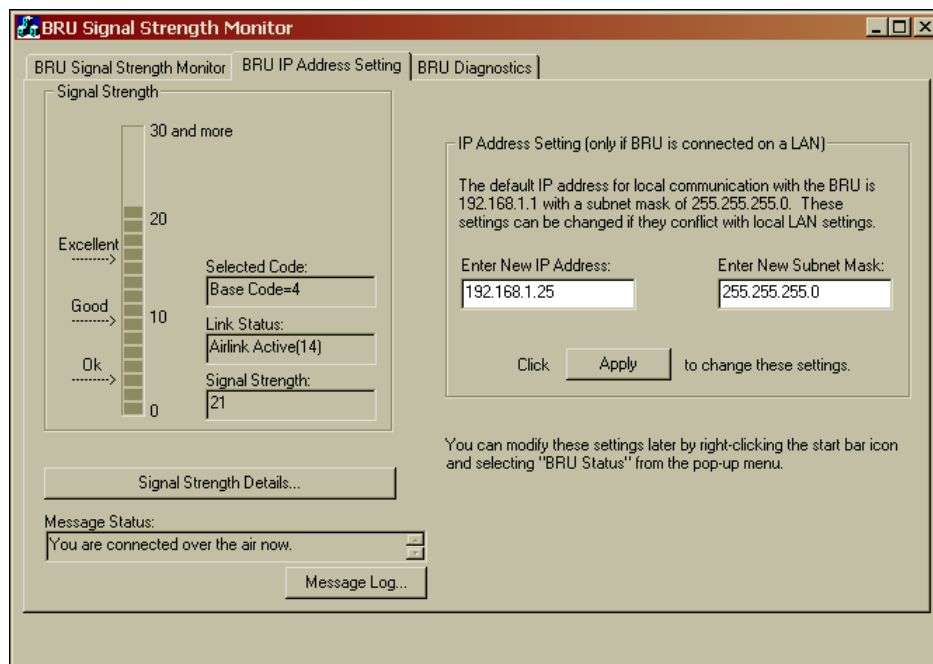
- **Signal Strength Details**

  This button generates a report containing highly technical data. This is discussed in the section Signal Strength Details on page 31.

- **Message Log**

  This button opens a log of the current session. This is discussed in the section Message Log on page 32.

IP Address Setting

Use this page to change the IP address in the remote unit, if necessary. The default factory address of 192.168.1.1 will work for a remote unit that is connected directly to the host PC. The address may need to be changed for a LAN connection. See the section for more discussion.

NOTE: The text shown above in this window describes an old default address. This display will be changed in the next release.

The **Signal Strength Details** and **Message Log** buttons are the same as those on the previous page.

Diagnostics
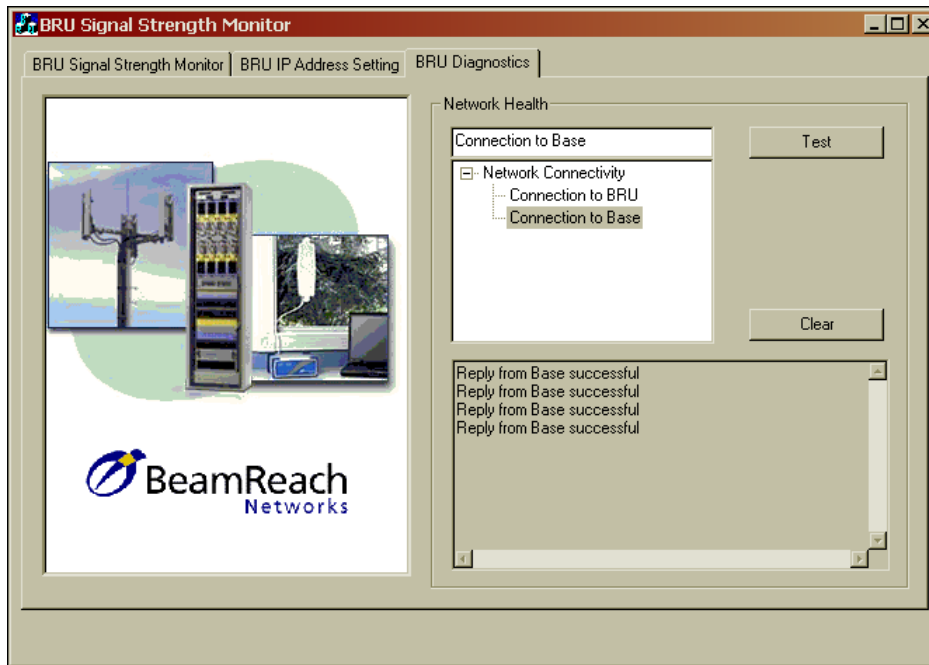
This page allows you test the connectivity from the host PC to the remote unit, and from the host PC to the base station.

In the **Network Health** pane, expand the `Network Connectivity` branch by clicking the `+` symbol.

Select either the `BRU` or the `Base` sub-branch from the display.

Click the **Test** button then observe the results in the lower panel.

Click the **Clear** button to clear the lower panel display, if desired.

Remote Unit Specifications

In This Appendix:

This appendix presents technical specifications for the BRU-100 and BRU-150 Remote Unit. The listed specifications are applicable to both models unless otherwise indicated.

Functional Characteristics

Interfaces:	10/100 Ethernet
Frequency Range:	2305 – 2320 MHz and 2345 – 2360 MHz,
Active Channel Bandwidth:	1.25 Mhz, paired
Access Method:	OFDMA, SDMA
Duplex Method:	TDD
Protocols:	IP, UDP, TCP, PPPoE, SNMP, RTP, FTP, L2TP, IPSec
Air Link Security:	128 bit private key encryption and authentication
Service Rate:	variable from 64 Kbps to 1.5 Mbps
Service Classes:	Best Effort

User Throughput

Bits/symbol	Modulation	Downstream	Upstream
4	32 QAM	1.5 Mbps	1.2 Mbps
3	16 QAM	1.1 Mbps	900 Kbps
2	8 PSK	770 Kbps	600 Kbps

Radio Characteristics

Transmit Power:	+30 dBm average
Active Channel Bandwidth:	1.25 Mhz, paired
Modulation:	OFDM, 32 QAM, 16 QAM, 8 PSK (adaptive)

Antenna Characteristics

	BRU-100	BRU-150
Bore Sight Gain:	18 dBi nominal	11 dBi minimum
Azimuthal Beam width:	20 degrees nominal	90 degrees nominal
Polarization:	Vertical	Vertical
Separation Distance	8 in. (20 cm)	

Minimum distance between radiating surface and any person,
per FCC rules for RF exposure.

Physical Characteristics

	BRU-100	BRU-150
Antenna Cable:	Cat5 outdoor; Maximum 50 m (150 feet) length	RG-223 Maximum 47 cm (120 in.) length
Power Source:	110-220 VAC 750 mA, 50-60 Hz Power adapter converts to 48 VDC	110-220 VAC 750 mA, 50-60 Hz Power adapter converts to 48 VDC

Physical Dimensions

	BRU-100 (ODU)	BRU-150 (Transceiver)
Height:	39 cm (15.5 in)	22.9 cm (9.0in.)
Width:	39 cm (15.5 in)	11.0 cm (4.3 in.)
Depth:	6.5 cm (2.5 in)	23.2 cm (9.1 in.)
Weight:	4.7 kg (10.5 lb)	1.4 kg (3.1 lb)

Environmental Characteristics

	BRU-100 (ODU)	BRU-150 (Transceiver)
Operating Temperature:	–40°C to +50°C	+5°C to +35°C
Relative Humidity (max, operating):	100%	95%

Regulatory Compliance

Regulatory Compliance:	FCC Title 47: Part 15 (class B); Part 27 (WCS bands A and B)
Safety Compliance:	UL 60950

Information subject to change without notice.

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