

# WaveACCESS LINK and WaveACCESS NET

# **Quick Installation Guide**

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# Radiation Warnings for the WaveACCESS LINK SM1024 and the WaveACCESS NET CU132

#### FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this equipment may not cause harmful interference, and (2) this equipment must accept any interference received, including interference that may cause undesired operation.

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

**Warning:** Any changes or modifications of equipment, not expressly approved by Lucent Technologies, could void the user's authority to operate this equipment.

#### **Canadian Emissions Requirements**

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Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## Radiation Warnings for all Other WaveACCESS Devices

#### FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this equipment may not cause harmful interference, and (2) this equipment must accept any interference received, including interference that may cause undesired operation.

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- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to 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.

**Warning:** Any changes or modifications of equipment, not expressly approved by Lucent Technologies, could void the user's authority to operate this equipment.

#### Canadian Emissions Requirements:

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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## **About this Guide**

This guide provides quick installation procedures for the following products:

- WaveACCESS LINK BR132 and SM1024
- WaveACCESS NET CU132, SDR132 and MDR132

The guide contains the following chapters:

Chapter 1: Installing the WaveACCESS LINK System, page 1-1, describes the installation procedures for the WaveACCESS LINK BR132 and WaveACCESS LINK SM1024.

Chapter 2: Installing the WaveACCESS NET System, page 2-1, describes the installation procedures for the WaveACCESS NET CU132 central unit, the WaveACCESS NET SDR132 single-drop remote unit, and the WaveACCESS NET MDR132 multi-drop remote unit.

**Chapter 3: Technical Support**, page 3-1, provides contact information.

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## Installing the WaveACCESS LINK System

#### About this chapter:

This chapter describes the quick installation procedures for the **WaveACCESS LINK** product family, as follows:

- Introducing the WaveACCESS LINK Product Family, page 1-2, provides an overview of the WaveACCESS LINK BR132 and WaveACCESS LINK SM1024.
- The WaveACCESS LINK Antennas, page 1-3, describes the various antennas and cable options available with the WaveACCESS LINK units.
- Installing the Antennas, page 1-12, describes the considerations and procedures for installing the WaveACCESS LINK antennas.
- Installing the WaveACCESS LINK BR132, page 1-18, describes the procedures for installing the WaveACCESS LINK BR132.
- Installing the WaveACCESS LINK SM1024, page 1-24, describes the procedures for installing the WaveACCESS LINK SM1024.

## Introducing the WaveACCESS LINK Product Family

**WaveACCESS LINK** provides high-performance wireless Point-to-Point (P-t-P) solutions. As with all outdoor products, the **WaveACCESS LINK** products are also available in both end-user and OEM format.

WaveACCESS LINK end-user products are:

- WaveACCESS LINK BR132: A transparent P-t-P wireless bridge between two Ethernet networks. WaveACCESS LINK employs Frequency Hopping Spread-Spectrum (FHSS) technology at data rates of 3.2 and 1.6 Mbps. This high-performance Ethernet bridge links two separate networks at distances of up to 25 miles over line-of-sight situations. The bridge system is comprised of a master/slave pair of WaveACCESS LINK BR132 units. The WaveACCESS LINK BR132 units. The WaveACCESS LINK BR132 units. The WaveACCESS LINK BR132 unit is designed for indoor use, with the antenna placed outdoors.
- WaveACCESS LINK SM1024: A high-performance, P-t-P wireless synchronous modem that provides data rates of up to 1024 Kbps full-duplex or 2048 Kbps half-duplex. The WaveACCESS LINK SM1024 supports industry standard SNMP network management and is easily set up, configured and managed. The modem system is comprised of a master/slave pair of WaveACCESS LINK SM1024 units.

Both **WaveACCESS LINK** products support industry standard SNMP network management and include both MIB II, the bridge MIB, and a complete **WaveACCESS** proprietary MIB.

### The WaveACCESS LINK Antennas

This section describes the **WaveACCESS LINK** antennas and cable options, as follows:

- Antenna Types, below.
- Antenna Specifications, page 1-5.
- Cable Options, page 1-10.
- WARNING: The antenna connectors on the WaveACCESS LINK BR132 and the WaveACCESS LINK SM1024 front panel are nonstandard. Care should be taken that they are not damaged, since they cannot be replaced. Additionally, antennas other than those supplied with these products will not fit properly and might cause harmful interference.
- Note: All of the WaveACCESS LINK outdoor antenna options must be professionally installed. The cable kit provided with all external antennas must be used for all outdoor antenna installations. This kit includes a tension release cable from the non-standard connector on the WaveACCESS LINK unit to a standard N-type connector. These antennas must be professionally installed, complying with the certified antenna and cable kits. Please carefully review and follow the installation instructions included with each individual antenna kit. If you have any questions, please contact your nearest Technical Support center. Refer to *Chapter 3, Technical Support* for information.

### **Antenna Types**

The following section provides a description of the antennas that are most commonly used with the **WaveACCESS LINK** products, as follows:

- Parabolic Grid Antenna, page 1-4.
- Yagi Antenna, page 1-4.
- Omnidirectional Antennas, page 1-4.
- Planar Antenna, page 1-5.
- Parabolic Dish Antenna, page 1-5.

Direct Attach Dipole Antenna, page 1-5.

### **Parabolic Grid Antenna**

This is the highest gain antenna available for **WaveACCESS LINK** units. It is recommended for long range situations. Careful aiming of the antenna is required due to its small coverage angle.

### Yagi Antenna

The 14dBi Yagi antenna is used for medium range situations. It can be mounted both indoors and outdoors.

### **Omnidirectional Antennas**

There are three omnidirectional dipole antennas available for use with **WaveACCESS LINK** units, as follows:

• OM10 and OM08, for external mounting.

The OM10 (and to some extent the OM08) omni antenna has a very narrow elevation (vertical) beamwidth. Both the height and distance separation between the two sites must be taken into consideration when selecting this antenna. In most cases, it is suggested that you order the appropriate down tilt option ahead of time, if available for that particular antenna, in order to maximize the coverage area.

• OM05, for mounting either indoors or outdoors.

When these antennas are mounted on a mast, they should be located as high as possible in order to avoid any other object being located near them.

### Planar Antenna

This antenna is suitable for mounting on a wall. It is the best choice when wide angle coverage is required, with good isolation from the back.

### **Parabolic Dish Antenna**

This is a high-gain directional antenna. This antenna is designed for outdoor mounting and can withstand extreme weather conditions.

This antenna has a very narrow beam (only 18° horizontally), therefore, it should only be used when conditions require it, or when a very narrow coverage area is required.

### **Direct Attach Dipole Antenna**

The smallest and simplest antenna option is an omnidirectional dipole antenna. A pair of these antennas attaches directly to the front panel on the **WaveACCESS LINK** unit. This antenna type is used only indoors and does not require professional installation. It has a non-standard connector, and therefore it cannot, and should not, be replaced with any other antenna.

### **Antenna Specifications**

The tables on the following pages illustrate antenna options and their specifications. These figures reflect a 6-10 dB fade margin over ideal free space propagation and use the shortest permitted cable (see the minimum cable segment length in the table on page 1-11). The ranges illustrated assume that the same antenna model has been installed on both sides of the link.

The available antenna options depend on your country's regulations (for example, FCC Part 15, ETSI ETR-328, and so on). Not all options may be available in your country.

The minimum segment length listed in the tables on page 1-11 indicate the minimum certified cable length per cable type. You should never attempt to use antenna cables with a loss of less than 1.3 dB. For range calculations involving a different set of parameters (antenna types, cable losses, antenna aiming offset, and so on), refer to the Excel-based calculation tool on the enclosed diskette. Use this spreadsheet to determine your optimal setup and expected performance, or call your nearest Technical Support center. Refer to *Chapter 3, Technical Support*, for information.

Where antennas with narrow elevation beamwidths are employed, with the remote unit at a significant height difference, the remote unit may not be within the main beam of the antenna. To avoid this situation, optimize the antenna tilt for the remote unit.

The tables on the subsequent pages provide the following information:

- U.S. Antenna Options, page 1-7.
- Canadian Antenna Options, page 1-8.
- European (ETSI) Antenna Options, page 1-8.
- Physical Characteristics of the Antennas, page 1-9.

The following table illustrates *U.S. Antenna* options when both sides utilize the same antenna type:

Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 16QAM <sup>*</sup> (miles)	Range at QPSK <sup>*</sup> (miles)
Omni	5 dBi 8 dBi 10 dBi	360° / 38° 360° / 15° 360° / 8°	N/A N/A 0°, 2°, 4°	0.1 0.2 0.4	0.5 1.0 1.5
Parabolic Grid	24 dBi	10°	N/A	10	20
Yagi	14 dBi	34° / 30°	N/A	1.6	5.1
Planar	6 dBi	75° / 65°	N/A	0.2	0.6
Parabolic Dish	19 dBi	18° / 20°	+/- 10°	3.1	12.2
Dipole	2 dBi	360° / 75°	N/A	0.1	0.4

\* For the **WaveACCESS LINK BR132**, 16QAM translates into 3.2 Mbps, and QPSK translates into 1.6 Mbps.

<sup>&</sup>lt;sup>\*</sup> For the **WaveACCESS LINK SM1024**, 16QAM translates into 2048 Kbps half-duplex or 1024 Kbps full-duplex, and QPSK translates into 512 Kbps full-duplex.

The following table illustrates *Canadian Antenna* options when both sides utilize the same antenna type:

Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 16QAM* (Km)	Range at QPSK* (Km)
Omni	5 dBi 8 dBi 10 dBi	360° / 38° 360° / 15° 360° / 8°	N/A N/A 0°, 2°, 4°	0.2 0.4 0.6	0.8 1.6 2.5
Parabolic Grid	24 dB	10°	N/A	11.2	32
Yagi	14 dBi	34° / 30°	N/A	1.6	6.3
Planar	6 dBi	75° / 65°	N/A	0.3	1.0
Parabolic Dish	19 dBi	18° / 20°	+/- 10°	5.0	19.9
Dipole	2 dBi	360° / 75°	N/A	0.2	0.6

The following table illustrates *European (ETSI)* Antenna options when both sides utilize the same antenna type:

Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 16QAM <sup>°</sup> (Km)	Range at QPSK <sup>*</sup> (Km)
Parabolic Grid	24 dBi	10°	N/A	3.7	11
Yagi	14 dBi	34° / 30°	N/A	1.2	4.2
Dipole	2 dBi	360° / 75°	N/A	0.2	0.6

- \* For the **WaveACCESS LINK BR132**, 16QAM translates into 3.2 Mbps, and QPSK translates into 1.6 Mbps.
- \* For the **WaveACCESS LINK SM1024**, 16QAM translates into 2048 Kbps half-duplex or 1024 Kbps full-duplex, and QPSK translates into 512 Kbps full-duplex.

Antenna Type	Gain	Catalog No.	Size (inches)	Mast Outside Diam. (inches)
Omni	10 dBi 8.1 dBi 5.1 dBi	OM10 OM08 OM05	48 x 2.25 30 x 1.5 13.5 x 1.3	0.75 - 4.0 ≤2
Parabolic Grid	24 dBi	PG24	27 x 32	0.75 - 2
Yagi	14 dBi	YG14	26 x 3.5	≤ 2.125
Planar	8 dBi	PN08	4 x 3.8	N/A
Parabolic Dish	19 dBi	PS19	19.25 È x 10	1.75 - 4.0
Dipole	2 dBi	DP02	2	N/A

The following table describes the physical characteristics of the antennas:

### Ø

#### Notes:

Some antennas have a female N-type connector, while some antennas have a male N-type connector. In case of the latter, a female-to-female N-type adapter should be supplied with the antenna.

All antennas should be mounted in a vertical polarization configuration (refer to the installation instructions included with each antenna kit).

### **Cable Options**

All antennas, with the exception of the direct attach dipole, come with a 20' LMR-400 cable kit, unless otherwise ordered. The standard kit consists of the following:

- A 2-foot tension release cable that connects on one side to the non-standard Main connector on the front panel, and on the other side to a standard N-type male connector. This cable is relatively thin and functions as a stress relief between the long and thick antenna cable and the unit.
- A 20-foot low-loss cable with male N-type connectors on either end.

The effect of the standard kit's losses on the system's range is included in the antennas options tables on pages 1-7 through 1-8.

Note: All RF cables, including the tension release cable, have to be anchored down in order to minimize the risk of breaking the WaveACCESS LINK RF connector(s) and/or having the cables pulling the system. The provided cable clamps should be anchored to a solid object or wall.

### **Cable Coverage**

In order to cover distances greater than 20 feet between the antenna and the **WaveACCESS LINK** unit, you may order additional segments of 20-foot LMR-400 cable or use another type of cable, as shown on following page. All segments have the same male-male N-type connectors. Using a female-female adapter, they can be easily extended to any multiple of 20 feet. Each additional cable segment, on either side of the link, reduces the system's range by 20%. You can also use other cable types (see the tables below) to increase the distance between the antenna and the **WaveACCESS LINK** unit. When doing so, note the minimum lengths required for each cable type.

The following	table provides	U.S.	Cable Assemb	ly o	ptions:
				-	

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/100 ft)	Minimum Segment Length (ft)
LMR-400	Flexible, 0.4	6.7	20
LMR-600	Flexible, 0.6	4.4	30
LMR-900	Flexible, 0.9	2.9	45
LMR-1200	Flexible, 1.2	2.2	60
LMR-1700	Flexible, 1.7	1.7	80
LDF4-50A	Heliax 1/2", 0.63	3.9	35
LDF5-50A	Heliax 7/8", 1.10	2.2	60
LDF6-50	Heliax 1-1/4", 1.55	1.6	85

The following table provides *Canadian and European Cable Assembly* options:

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/10 m)	Minimum Segment Length (m)
LMR-400	Flexible, 0.4	2.20	6.1
LMR-600	Flexible, 0.6	1.43	9.1
LMR-900	Flexible, 0.9	0.97	13.7
LMR-1200	Flexible, 1.2	0.73	18.3
LMR-1700	Flexible, 1.7	0.56	24.4
LDF4-50A	Heliax 1/2", 0.63	1.28	10.7
LDF5-50A	Heliax 7/8", 1.10	0.72	18.3
LDF6-50	Heliax 1-1/4", 1.55	0.52	25.9

### **Installing the Antennas**

The **WaveACCESS LINK** antennas may be placed either indoors or outdoors.

Before you install the unit, you must choose a good location for your antennas to ensure a line of sight to the other **WaveACCESS LINK** products. You must also ensure the shortest possible distance between the **WaveACCESS LINK** unit and the antennas, in order to minimize cable loss.

▲ WARNING: The WaveACCESS LINK antennas should ONLY be installed by experienced antenna installers familiar with local building and safety codes and, wherever necessary, licensed by appropriate government regulatory bodies. Failure to do so may void the Product Warranty as well as expose the end user to legal and financial liabilities. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury, damage or violation of government regulations associated with the installation of the antennas.

The installer is also responsible for ensuring that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines. These guidelines imply that no human may conceivably be found within one foot of the front of the antennas. If such a situation is likely to occur, the installer is responsible for placing the appropriate caution signs to warn the public. Lucent Technologies, its agents, resellers, or distributors, are not liable for exposure to excessive RF energy levels due to improper antenna installation.

The Maximum Permissible Exposure guidelines are 1 foot (30 cm) from the **WaveACCESS LINK** unit, as based on the National Council on Radiation Protection and Measurement (NCRP). If the antennas are in an accessible area, an appropriate warning sign **must** be installed in the appropriate place.

### **Indoor Placement**

For optimal reception when used indoors, the **WaveACCESS LINK** antennas should be placed in front of a window or other opening with a clear line of sight to the other **WaveACCESS LINK** synchronous modem. If using an antenna other than the directly attached dipole omnidirectional antenna pair, make sure that it is solidly attached to a wall or other restraining structure.

**WARNING:** The **WaveACCESS LINK** high-gain antennas should be mounted so that the main beam is pointing away from heavy human traffic areas.

### **Outdoor Placement**

The **WaveACCESS LINK** units were designed for indoor use only. If you are using the outdoor connection option, you must use the supplied cable (see the tables on page 1-11.

Note: Installing a WaveACCESS LINK unit outdoors will void its warranty.

Using outdoor antennas may enable you to increase the range of your **WaveACCESS LINK** system for the following reasons:

- It is possible to install larger (for example, higher gain) antennas.
- It is less likely that the path will be obstructed.
- Performance may be improved due to height from ground.
- Multipath problems caused by reflections off objects (for example, buildings) are reduced.

### **Antenna Installation Procedure**

#### To install the antennas:

- 1. Mount the antennas using the enclosed brackets, following the instructions included with the antenna and cable kit that you purchased.
- 2. Align the antennas so that it is pointing directly towards the other unit in the pair (referred to as "gross adjustment").
- 3. Please insure that antenna polarization (horizontal or vertical) is identical on the receiving and transmitting ends.
- 4. Install the WaveACCESS LINK unit as near to the antennas as possible in order to minimize the cable length, as shown in the illustration below. If you require longer cables, please contact your local distributor to get an extension. Do not attempt to use cables other than those recommended for use with the WaveACCESS LINK units as this may cause the system to malfunction and invalidate your warranty.



- ▲ WARNING: Using an antenna or cable other than those supplied or recommended for use with the WaveACCESS LINK unit, whether installed indoors or outdoors, could cause degradation of the system and could void your authority to operate this equipment. In addition, the use of unauthorized antennas or external amplifiers violates Federal law and FCC regulations. Doing so may void the Product Warranty, as well as expose the end user to legal and financial liabilities.
- WARNING: The WaveACCESS LINK antennas emit high radio frequency energy levels. In situations where unauthorized persons may approach within 1 ft (30 cm) of the front of the antennas, an appropriate warning sign should be placed near the WaveACCESS LINK antennas.

### **Power Compliance**

The system, if required by regulation, performs transmit power adjustment based on the installed antenna and cable. The antenna filter unit, if required, goes between the tension release cable and the antenna cable, and is used to limit the emissions to comply with your country's requirements.

Make sure that you enter the correct antenna and cable parameters in the antenna configuration software so that it complies with your country's requirements. In addition, do not attempt to dispense with the use of the filter in conjunction with the unit. Incorrect antenna parameters and/or dispensing with the use of the filter may cause the system to malfunction and invalidate your warranty. ▲ WARNING: Willfully entering incorrect values in the antenna parameters software and/or avoiding the use of an antenna filter, as supplied with the WaveACCESS NET units, could cause degradation of the system and void the authority to operate this equipment. In addition, improper transmit power settings and/or the lack of use of a required antenna filter violates unlicensed band radio frequency regulations. This may void the Product Warranty, as well as expose the end user to legal and financial liabilities.

### **Lightning Protection**

It is highly recommended that you connect the shield/enclosure of the antenna and/or cable to a ground before the entrance to the building. This will provide some lightning protection.

For safety reasons, an antenna installed outdoors should be fitted with a lightning arrestor. Such devices protect the **WaveACCESS LINK BR132** and **SM1024**, as well as the life of any person in contact with the wireless unit, if the antenna is struck by lightning.

The optional **WaveACCESS LINK** lightning arrestor has the same connector arrangement as the low-loss 20-foot cables (male/male). As a result, it can be installed between any two cable segments (the antenna and the tension release cable are also considered cables for this purpose). However, the best location for the arrestor is just before the cable's entrance to the building. In either case, the arrestor must be mounted outside the building.

The arrestor offered with **WaveACCESS LINK** products is self-resetting, meaning that no maintenance is needed, even following a lightning strike. Follow the installation instructions provided for the arrestor and ensure that the grounding solution is in accordance with these instructions. ▲ WARNING: A lightning arrestor should be installed on any antenna mounted outdoors. Failure to do so may void the Product Warranty. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury or damage caused by lightning striking the antenna.

After you have installed the antenna, the installation of the WaveACCESS LINK BR132, on page 1-18, and the WaveACCESS LINK SM1024, on page 1-24, are simple processes, as described in the following sections.

### Installing the WaveACCESS LINK BR132

This section provides the following information for quick installation of the **WaveACCESS LINK BR132**, using the default settings.

- Packing List, below.
- Installation Procedure, page 1-19.
- Basic Software Configuration, page 1-23.

## **Packing List**

The **WaveACCESS LINK BR132** arrives in a single package that includes the following items:

- Two WaveACCESS LINK BR132 wireless bridge units, configured as a master/slave pair.
- One power adapter complete with a 5' (1.5m) cord.
- Two optional omnidirectional dipole antennas for indoor use (if ordered).
- Software diskette.
- This Quick Installation Guide.
- CD-ROM containing documentation.
- Adapter cables for X.21 and V.35 connection.

You also should have received a second package that includes the **WaveACCESS LINK** antenna and cable kit you ordered with the system. This kit typically includes the antenna, antenna cable(s), tension release cable, female-to-female N-type adapter (if necessary), external filter (for certain specific antennas in Europe or ETSI compliant countries), RF cable clamps and a lightning arrestor (if ordered).

Note: If any of these items are incomplete or missing, you might not be able to install the WaveACCESS LINK BR132. In such cases, contact your nearest Technical Support Center. Refer to Chapter 3, Technical Support for information.

### Installation Procedure

The **WaveACCESS LINK BR132** is placed indoors, as near as possible to the antenna. Installation of the **WaveACCESS LINK BR132** requires the following steps:

- Step 1: Connecting the Antennas, below.
- Step 2: Connecting to the Network, page 1-20.
- **Step 3: Powering up the BR132**, page 1-21.

### **Step 1: Connecting the Antennas**

The first step is to connect the antennas to the **BR132**. The front panel of the **BR132** has two antenna connectors. This provides for the installation of two antennas when diversity is needed. However, in most cases, one antenna is enough. The optional, directly attached dipole omnidirectional antenna set is provided as a pair, and all other antenna kits include a single antenna and cable.

#### To connect the BR132 antennas:

- When using a single antenna, connect it to the front panel connector marked Main, as shown below.
- When using two antennas, use the connector marked Aux for diversity.



▲ WARNING: Due to FCC rules, the antenna connectors are non-standard. Take care that they are not damaged, because they cannot be replaced. Use only the supplied tension release cable. Other connectors will not fit properly and may cause harmful interference.

#### To install the dipole antennas:

- 1. Carefully position each antenna over one of the screw-in connectors on the front panel.
- 2. Slowly tighten each antenna nut over the panel connector. Before the final tightening of the connectors, make sure the antennas are pointing slightly away from each other (forming a "V" shape).

### **Step 2: Connecting to the Network**

This step involves connecting the **BR132** to the network.

#### To connect the BR132 to the network:

- 1. Connect one end of the cable to the network. This could be to a hub, switch, or any other Ethernet connectivity device, but not a computer. (To directly connect to a computer, a special crossover cable is required).
- 2. Insert the opposite end of the cable into the socket marked ETHERNET on the back panel of the **BR132**.

The WaveACCESS LINK BR132 is now connected to the network.

### Step 3: Powering Up the BR132

This step involves powering up the BR132.

- To power up the BR132:
  - 1. Insert the power supply connector to the DC IN socket located on the back panel of the **BR132**, shown below, and make sure that it is securely connected.



- 2. Insert the power supply plug into the mains.
- WARNING: Use only the supplied power supply. Using a different power supply may damage the WaveACCESS LINK BR132 and invalidate the FCC certification.
- Note: Always connect the power supply to the BR132 first, and only then plug it in.
- 3. On the back panel of the BR132, switch the unit on. The *PWR* LED on the front of the unit lights up, signaling that the **BR132** has powered up.

First, the **BR132** enters the Xmodem<sup>\*</sup> software load status for about 10 seconds. The *OK* LED then blinks for 5-10 seconds, which signals that the initial system software (also called *Version 0*) has loaded correctly and the **WaveACCESS LINK BR132** has completed its self-test routine. After 10 seconds, the programmable system software (or *Version 1*) will have loaded and the *OK* LED will be continuously lit. For an explanation of the difference between the initial system software and the programmable system software, refer to the *WaveACCESS LINK User's Guide*.

- Note: If you have connected the **BR132** to the Ethernet network, the *Link* LED will be continuously lit. This indicates that the network has detected a hub (or similar device).
- Note: The Sync LED has two states, blinking or continuously lit. When the Sync LED is blinking, it signals that the two bridges have not synchronized. Whenever the Sync LED is lit continuously, it means that the two WaveACCESS LINK bridges have synchronized and are communicating.

Once the Sync LED has lit up on both systems, it indicates that the antennas have been aligned. However, fine adjustment of the alignment may still be necessary using the RSSI monitor, or the SNMP option, as described in the WaveACCESS LINK User's Guide. If the two bridges do not synchronize, even though the antennas are perfectly aligned, it could be due to errors basic software configuration. in the Refer to WaveACCESS LINK User's Guide for a description of the basic software configuration, make the required modifications and then recheck the Sync LED.

Xmodem is an asynchronous modem protocol used for transferring files (uploading and downloading). It is used to save or upgrade the system's software. Refer to the *WaveACCESS LINK User's Guide* for further details.

The User's Guide also provides a full description of all the LEDs on the front panel.

After you have completed these steps, your BR132 is working and ready for final configuration and fine antenna adjustment.

### **Basic Software Configuration**

The WaveACCESS LINK BR132 units are shipped as a master/slave pair, with a default configuration.

It is mandatory to define the ESS-ID of the units, before commencing use. This procedure is described below.

Certain other basic parameters may be configured in order to change the default values in the BR132, if necessary. These parameters can be configured using either the system monitor or a Bootp server with TFTP capabilities. Refer to the WaveACCESS LINK User's *Guide* for detailed instructions on configuration options.

### To define the ESS-ID:

- 1. Using the system monitor, access the Main menu, press 1. The Configuration menu is displayed.
- In the Configuration menu, press 1. The Host ID 2. Configuration screen is displayed.
- 3. Press 8 and type in the ESS-ID.
- 4. Press S to save your work in flash memory.
- 5. Repeat this procedure for each BR132, giving each one the same ESS-ID.



 ${\mathscr F}$  This completes the quick installation procedures for the WaveACCESS LINK BR132.

## Installing the WaveACCESS LINK SM1024

This section provides the following information for quick installation of the **WaveACCESS LINK SM1024**, using the default settings.

- Packing List, below.
- Installation Procedure, page 1-25.
- **Basic Software Configuration**, page 1-30.

## **Packing List**

The **WaveACCESS LINK SM1024** arrives in a single package that includes the following items:

- Two WaveACCESS LINK SM1024 wireless synchronous modems, configured as a master/slave pair.
- One power adapter complete with a 5' (1.5m) cord.
- Optional adapter cable for X.21 and V.35 connection.
- Software diskette.
- This Quick Installation Guide.
- CD-ROM containing documentation.
- Two optional omnidirectional dipole antennas for indoor use (if ordered).

You also should have received a second package that includes the **WaveACCESS LINK** antenna and cable kit you ordered with the system. This kit typically includes the antenna, antenna cable(s), tension release cable, female-to-female N-type adapter (if necessary), external filter (for certain specific antennas in Europe or ETSI compliant countries), RF cable clamps and a lightning arrestor (if ordered).

Note: If any of these items are incomplete or missing, you might not be able to install the WaveACCESS LINK SM1024. In such cases, contact your nearest Technical Support Center. Refer to Chapter 3, Technical Support, for information.

### **Installation Procedure**

The **WaveACCESS LINK SM1024** is placed indoors, as near as possible to the antenna. Installation of the **SM1024** requires the following steps:

- Step 1: Connecting the Antennas to the SM1024, below.
- Step 2: Connecting to the Synchronous Network, page 1-26.
- Step 3: Connecting to the Ethernet Network (Optional), page 1-26.
- Step 4: Powering Up the SM1024, page 1-27.

# Step 1: Connecting the Antennas to the SM1024

The first step is to connect the antennas to the WaveACCESS LINK SM1024.

To connect the antennas to the WaveACCESS LINK SM1024:

Follow the same procedure as for the **WaveACCESS LINK BR132**, as described in *Step 1: Connecting the Antennas to the BR132*, on page 1-19.

▲ WARNING: Due to FCC rules, the antenna connectors are non-standard. Take care that they are not damaged, because they cannot be replaced. Use only the supplied tension release cable. Other connectors will not fit properly and may cause harmful interference.

#### Step 2: Connecting to the Synchronous Network

The next step is to connect the **WaveACCESS LINK SM1024** to the synchronous network.

- To connect the SM1024 to the synchronous network:
  - 1. Connect one end of a standard terminated data cable (not provided) to the interface you ordered.
  - Note: The SM1024 is available with RS-530, V.35, and X.21 interfaces.
  - 2. Connect one end of the cable to the device being connected (such as a computer, FRAD or synchronous switch).
  - Insert the opposite end of the cable into the socket marked LINE INTERFACE on the back panel of the WaveACCESS LINK SM1024,.

The SM1024 is now connected to the network.

Note: The SM1024 is provided with internal clocking as a default. In order to change it to external clocking, refer to the WaveACCESS LINK User's Guide.

#### Step 3: Connecting to the Ethernet Network (Optional)

If you wish to use SNMP management, you need to connect the **SM1024** to your Ethernet network. To do this, a standard RJ-45 Ethernet cable (not provided) is required.

#### To connect the SM1024 to your Ethernet network:

- Connect one end of the cable to the network. This could be to a hub, switch, or any other Ethernet connectivity device, but not to a computer. (To directly connect to a computer, a special crossover cable is required).
- 2. Insert the opposite end to the socket marked ETHERNET on the back panel of the SM1024.

The **WaveACCESS LINK SM1024** is now connected to the Ethernet network.

### Step 4: Powering Up the SM1024

#### To power up the WaveACCESS LINK SM1024:

1. Insert the power supply connector to the DC IN socket located on the back panel of the **SM1024**, as shown below, and make sure that it is securely connected.

|--|

- 2. Insert the power supply plug into the mains.
- WARNING: Use only the supplied power supply. Using a different power supply may damage the WaveACCESS LINK SM1024 and invalidate the FCC certification.
- Note: Always connect the power supply to the SM1024 first and only then plug it in.
- 3. On the back panel of the **SM1024**, turn the unit on. The *PWR* LED on the front of the unit lights up, signaling that the **SM1024** has powered up.

First, the **SM1024** enters the Xmodem<sup>\*</sup> software load status for about 10 seconds. The *OK* LED then blinks for 5-10 seconds, which signals that the initial system software (also called *Version 0*) has loaded correctly and the **SM1024** has completed its self-test routine. After 10 seconds, the programmable system software (or *Version 1*) will have loaded and the *OK* LED will be continuously lit. For an explanation of the difference between the initial system software and the programmable system software, refer to the *WaveACCESS LINK User's Guide*.

- **Note:** If you have connected the **SM1024** to the Ethernet network, the *Link* LED will be continuously lit, to indicate that the network has detected a hub (or similar device).
- Note: The Sync LED has two states, either blinking or continuously lit. When the Sync LED is blinking, it signals that the two modems have not synchronized. Whenever the Sync LED is lit continuously, it signals that the two SM1024 modems have synchronized and are communicating.

Once the *Sync* LED has lit up on both systems, it indicates that the antennas have been aligned. However, fine adjustment of the alignment may still be necessary using the RSSI monitor, or the SNMP option, as described in the *WaveACCESS LINK User's Guide*. If the two modems do not synchronize, even though the antennas are perfectly aligned, it could be due to errors in the basic software configuration. Refer to the *WaveACCESS LINK User's Guide* for a description of the basic software configuration, make the required modifications, and then recheck the *Sync* LED.

Xmodem is an asynchronous modem protocol used for transferring files (uploading and downloading). It is used to save or upgrade the system's software. Refer to the *WaveACCESS LINK User's Guide* for further details.
The *WaveACCESS LINK User's Guide* provides a full description of all the LEDs on the front panel.

After you have completed these steps, your **WaveACCESS LINK SM1024** wireless synchronous modem is working and ready for final configuration and fine antenna adjustment.

#### Connecting the WaveACCESS LINK SM1024 to a Multiplexer

If you connect the **SM1024** to a mulitplexer, you must use an internal FIFO that is at least 256 bits in length in order to overcome clock jitters in the **SM1024** unit.

## **Basic Software Configuration**

The WaveACCESS LINK SM1024 synchronous modems are shipped as a master/slave pair, with a default configuration.

It is mandatory to define the ESS-ID of the units, before commencing use. This procedure is described below.

Certain basic parameters may be configured in order to change the default values of the SM1024. For example, you can change the antenna type or cable length, or perform fine antenna adjustment, by reconfiguring the unit. This can be achieved by using the system monitor, or by using a Bootp server with TFTP capabilities. Refer to the WaveACCESS LINK User's Guide for detailed instructions on how to perform these configurations.

#### To define the ESS-ID:

- 1. Using the system monitor, access the *Main* menu, press 1. The *Configuration* menu is displayed.
- 2. In the Configuration menu, press 1. The Host ID Configuration screen is displayed.
- 3. Press 8 and type in the ESS-ID.
- 4. Press **S** to save your work in flash memory.
- Repeat this procedure for each BR132, giving each 5. one the same FSS-ID.



 ${\mathscr F}$  This completes the quick installation procedures for the WaveACCESS LINK SM1024.

## 2 Installing the WaveACCESS NET System

This chapter describes the quick installation procedures for the **WaveACCESS NET** product family.

#### About this chapter:

This chapter includes the following:

- Introducing the WaveACCESS NET Product Family, page 2-2, provides an overview of the WaveACCESS NET CU132, SDR132 and MDR132 units.
- WaveACCESS NET CU132 Antennas, page 2-3, describes the antennas and cable options available for the WaveACCESS NET CU132.
- Installing the WaveACCESS NET CU132, page 2-15, describes the procedures for installing the WaveACCESS NET CU132.
- WaveACCESS NET Remote Unit Antennas, page 2-21, describes the antenna and cable options available for the WaveACCESS NET SDR132 and MDR132.
- Installing the WaveACCESS NET Remote Units, page 2-32, describes the procedures for installing the WaveACCESS NET SDR132 and MDR132.

## Introducing the WaveACCESS NET Product Family

**WaveACCESS NET** is a Point-to-Multipoint (P-t-M) wireless access system capable of supporting hundreds of remote sites (with a single workstation or a complete network at each remote site). **WaveACCESS NET** employs Frequency Hopping Spread-Spectrum (FHSS) technology at data rates of 3.2 and 1.6 Mbps. The fully digital FHSS radio provides protection against interference and enables operation of collocated systems, thereby increasing overall data throughput. **WaveACCESS NET** has been optimized for IP traffic and provides high-speed networking at distances of several miles.

The **WaveACCESS NET** system is comprised of the following:

- ◆ WaveACCESS NET CU132: A wireless P-t-M central unit that can support up to 60 remote sites at a data rate of 3.2 Mbps each. Using unique RFStacker<sup>™</sup> technology, up to ten WaveACCESS NET CU132 units can be collocated in a single site, creating a cell of up to 600 remote units at a data rate of up to 25 Mbps.
- ✦ WaveACCESS NET SDR132: A standalone wireless LAN adapter, designed to connect to any computer's Ethernet adapter card and allow fast linking of any workstation to the Internet or Intranet.
- WaveACCESS NET MDR132: A wireless LAN adapter, designed to wirelessly connect a group of computers to the WaveACCESS NET network.

## WaveACCESS NET CU132 Antennas

This section describes the **WaveACCESS NET CU132** antenna and cable options, as follows:

- Antenna Types, below.
- Antenna Specifications, page 2-5.
- Cable Options, page 2-9.
- Installing the Antenna, page 2-11.
- ▲ WARNING: The antenna connectors on the WaveACCESS NET CU132 front panel are non-standard. Care should be taken that they are not damaged since they cannot be replaced. In addition, antennas other than those supplied with these products will not fit properly and might cause harmful interference.
- Note: All of the WaveACCESS NET outdoor antenna options must be professionally installed. The cable kit provided with all external antennas must be used for all outdoor antenna installations. This kit includes a tension release cable from the non-standard connector on the WaveACCESS NET unit to a standard N-type connector. These antennas must be professionally installed, complying with the certified antenna and cable kits. Please carefully review and follow the installation instructions included with each individual antenna kit. If you have any questions, please contact your nearest Technical Support center. Refer to in Chapter 3, Technical Support for information.

## **Antenna Types**

The following section provides a description of the antennas that are most commonly used with the **WaveACCESS NET** products:

- Omnidirectional Antennas, page 2-4.
- Parabolic Dish Antenna, page 2-4.
- Sector Panel Antennas, page 2-4.
- Narrow Sector Panel Antennas, page 2-5.

#### **Omnidirectional Antennas**

The omnidirectional dipole antennas available for use with the **WaveACCESS NET CU132** are intended for external mounting and should be used when full 360° coverage is desired. When these antennas are mounted on a mast, they should be located as high as possible in order to avoid any other object being located beside it.

The **OM10** (and to some extent the **OM08**) omni antenna has a very narrow elevation (vertical) beamwidth. Both the height and distance separation between the two sites must be taken into consideration when selecting this antenna. In order to maximize the coverage area, you may want to order the appropriate down tilt option ahead of time, if it is available for that particular antenna.

#### **Parabolic Dish Antenna**

This is a high-gain directional antenna. This antenna is designed for outdoor mounting and can withstand extreme weather conditions.

This antenna has a very narrow beam (only 18° horizontally). Therefore, it should only be used when conditions require it, or when a very narrow coverage area is required.

#### **Sector Panel Antennas**

These antennas are suitable for sectorization of the Central Unit Point of Presence (POP). They are the best choice when several wide angle coverage sectors are required.

There is a drop in the antenna gain at 90° edges (as much as 3 dB). Therefore, you should overlap these antennas and try to use only half the beamwidth as the sector width. When using these antennas (especially the ST16), down tilt must be taken into consideration.

#### **Narrow Sector Panel Antennas**

These antennas are suitable for narrow sectorization of the Central Unit POP. They are the best choice when the remote sites are clustered in small areas. With these antennas, there is a sharp cutoff of the antenna gain. Therefore, you should overlap them using approximately half the beamwidth as the sector width.

## **Antenna Specifications**

The tables on the following pages show the antenna options and their specifications. These figures reflect a 6-10 dB fade margin over ideal free space propagation and use the shortest permitted cable (see the minimum cable segment length in the table on page 2-10). It is assumed that the remote end (WaveACCESS NET SDR132 or WaveACCESS NET MDR132) uses its largest antenna, PG24, and the shortest permitted cable. The central antenna is assumed to have a horizontal deviation from the remote equal to a quarter of its horizontal beamwidth.

Ø

**Note:** Irrelevant in the case of Omni antennas.

The available antenna options depend on your country's regulations (for example, FCC Part 15, ETSI ETR-328, and so on). Not all options may be available in your country.

The minimum segment length listed in the tables on page 2-10 indicates the minimum certified cable length per cable type. You should never attempt to use antenna cables with a loss of less than 1.3 dB. For range calculations involving a different set of parameters (antenna types, cable losses, antenna aiming offset, and so on), refer to the Excel-based calculation tool on the enclosed diskette. Use this spreadsheet to determine your optimal setup and expected performance or call your Technical Support center. Refer to *Chapter 3*, *Technical Support* for information.

Where antennas with narrow elevation beamwidths are employed, and the remote unit is located at a significant height difference, the remote unit may not be within the main beam of the antenna. To avoid this situation, optimize the antenna tilt for the remote unit.

The tables on the subsequent pages provide the following information:

- U.S. Antenna Options, page 2-7.
- Canadian Antenna Options, page 2-7.
- European (ETSI) Antenna Options, page 2-8.
- Physical Characteristics of the Antennas, page 2-8.

Antenna Type	Gain	Beamwidth Down Tilt Horizontal/ Vertical		Range at 3.2 Mbps (miles)	Range at 1.6 Mbps (miles)
Omni	10 dBi 8 dBi 5 dBi	360° / 8° 360° / 15° 360° / 38°	0°, 2°, 4° N/A N/A	1.9 1.5 1.1	7.7 6.1 4.4
Parabolic Dish	19 dBi	18° / 20°	+/- 10°	5.4	20
Sector Panel	16 dBi 12 dBi	90° / 7° 90° / 10°	w/brackets N/A	3.9 2.6	15.3 10.3
Narrow Sector Panel	20 dBi 17 dBi	22° / 10° 22° / 22°	w/brackets +/- 10°	6.1 4.3	20 17.2
Dipole	2 dBi	360° /75°	N/A	0.9	3.6

The following table provides U.S. Antenna options:

#### The following table provides *Canadian Antenna* options:

Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 3.2 Mbps (Km)	Range at 1.6 Mbps (Km)
Omni	10 dBi 8 dBi 5 dBi	360° / 8° 360° / 15° 360° / 38°	0°, 2°, 4° N/A N/A	2.2 1.8 1.3	7.9 6.3 4.5
Parabolic Dish	19 dBi	18° / 20°	+/- 10°	6.3	22.3
Sector Panel	16 dBi 12 dBi	90° / 7° 90° / 10°	w/brackets N/A	4.4 3.0	15.8 10.5
Narrow Sector Panel	20 dBi 17 dBi	22° / 10° 22° / 22°	w/brackets +/- 10°	7.0 5.0	25.0 17.7
Dipole	2 dBi	360° / 75°	N/A	1.0	3.1

Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 3.2 Mbps (Km)	Range at 1.6 Mbps (Km)
Omni	10 dBi 8 dBi	360° / 8° 360° / 15°	0°, 2°, 4° N/A	0.9 0.7	3 2.5
Sector Panel	16 dBi 12 dBi	90° / 7° 90° / 10°	w/brackets N/A	1.4 0.9	5 3.5
Narrow Sector Panel	20 dBi	22° / 10°	w/brackets	2.3	8.3
Dipole	2 dBi	360° / 75°	N/A	0.2	0.8

The following table provides *European (ETSI)* Antenna options:

The following table describes the physical characteristics of the antennas:

Antenna Type	Gain	Catalog No.	Size (inches)	Mast Outside Diam. (ins.)
Omni	10 dBi 8.1 dBi 5.1 dBi	OM10 OM08 OM05	48 x 2.25 30 x 1.5 13.5 x 1.3	0.75-4.0 ≤2
Parabolic Dish	19 dBi	PS19	19.25"È x 10	1.75-4.0
Sector Panel	16.1 dBi 12.5 dBi	ST16 ST12	42 x 6.1 x 2.8 26 x 3 x 1	1.25-4.0
Narrow Sector Panel	20 dBi 17 dBi	PN20 PN17	24 x 11.8 x 3 12.6 x 11.8 x 3	0.75-3 0.75-3

#### Notes:

Some antennas have a female N-type connector, and some antennas have a male N-type connector. In case of the latter, a female-to-female N-type adapter should be supplied with the antenna.

All antennas should be mounted in a vertical polarization configuration (see the installation instructions included with each antenna kit).

## **Cable Options**

All antennas come with a 20' LMR-400 cable kit, unless otherwise ordered. The standard kit consists of the following:

- A 2-foot tension release cable that connects on one side to the non-standard Main connector on the panel, and on the other side to a standard N-type male connector. This cable is relatively thin and functions as a stress relief between the long and thick antenna cable to the unit.
- A 20-foot low-loss cable with male N-type connectors on either end.

The effect of the standard kit's losses on the system's range is included in the antenna options tables on pages 2-7 and 2-8.

Note: All RF cables, including the tension release cable, have to be anchored down in order to minimize the risk of breaking the WaveACCESS NET CU132's RF connector(s) and/or having the cables pulling the system. The provided cable clamps should be anchored to a solid object or wall.

#### **Cable Coverage**

In order to cover distances greater than 20 feet between the antenna and the **WaveACCESS NET CU132**, you may order additional segments of 20-foot LMR-400 cable or use another type of cable, as shown on following page. All segments have the same male-male N-type connectors. By using a female-female adapter, they can be easily extended to any multiple of 20 feet. Each additional cable segment, on either side of the link, reduces the system's range by 20%. You can also use other cable types (see the tables below) to increase the distance between the antenna and the **WaveACCESS NET CU132**. When doing so, note the minimum lengths are required for each cable type.

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/100 ft)	Minimum Segment Length (ft)
LMR-400	Flexible, 0.4	6.7	20
LMR-600	Flexible, 0.6	4.4	30
LMR-900	Flexible, 0.9	2.9	45
LMR-1200	Flexible, 1.2	2.2	60
LMR-1700	Flexible, 1.7	1.7	80
LDF4-50A	Heliax 1/2", 0.63	3.9	35
LDF5-50A	Heliax 7/8", 1.10	2.2	60
LDF6-50	Heliax 1-1/4", 1.55	1.6	85

The following table provides U.S. Cable Assembly options:

The following table provides *Canadian and European Cable Assembly* options:

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/10 m)	Minimum Segment Length (m)
LMR-400	Flexible, 0.4	2.20	6.1
LMR-600	Flexible, 0.6	1.43	9.1
LMR-900	Flexible, 0.9	0.97	13.7
LMR-1200	Flexible, 1.2	0.73	18.3
LMR-1700	Flexible, 1.7	0.56	24.4
LDF4-50A	Heliax 1/2", 0.63	1.28	10.7
LDF5-50A	Heliax 7/8", 1.10	0.72	18.3
LDF6-50	Heliax 1-1/4", 1.55	0.52	25.9

## Installing the Antenna

The **WaveACCESS NET** antenna is always placed outdoors. The **CU132** is installed indoors and connected to the outdoor antenna using the supplied cable.

Note: Installing a WaveACCESS NET unit outdoors will void its warranty.

Before you install the unit, you must choose a good location for your antenna to ensure a line of sight to the other **WaveACCESS NET SDR132** and **WaveACCESS NET MDR132** remote stations. You must also ensure the shortest possible distance between the **CU132** and the antenna, in order to minimize cable-loss.

▲ WARNING: The WaveACCESS NET CU132 antenna should be installed ONLY by experienced antenna installers familiar with local building and safety codes and, wherever necessary, licensed by appropriate government regulatory bodies. Failure to do so may void the Product Warranty as well as expose the end user to legal and financial liabilities. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury, damage or violation of government regulations associated with the installation of the antenna.

The installer is also responsible for ensuring that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines. Those guidelines imply that no human may conceivably be found within one foot of the front of the antenna. If such a situation is likely to occur, the installer is responsible for placing the appropriate caution signs to warn the public. Lucent Technologies, its agents, resellers, or distributors, are not liable for exposure to excessive RF energy levels due to improper antenna installation.

The Maximum Permissible Exposure guidelines are 1 foot (30 cm) for the **WaveACCESS NET** unit, as based on the National Council on Radiation Protection and Measurement (NCRP). If the antenna is in an accessible area, an appropriate warning sign **must** be installed in the appropriate place.

- ▲ WARNING: Using an antenna or cable other than those supplied or recommended for use with the WaveACCESS NET units, whether installed indoors or outdoors, could cause degradation of the system and could void your authority to operate this equipment. In addition, the use of unauthorized antennas or external amplifiers violates Federal law and FCC's regulations. This may void the Product Warranty, as well as expose the end user to legal and financial liabilities.
- WARNING: The WaveACCESS NET antenna emits high radio frequency energy levels. In situations where unauthorized persons may approach within 1 ft (30 cm) of the front of the antenna, an appropriate warning sign should be placed near the WaveACCESS NET antennas.

#### **Antenna Installation Procedure**

Following are the steps required to install the antenna for the **WaveACCESS NET CU132**:

#### > To install the antenna:

- 1. Mount the antenna using the enclosed brackets, following the instructions included with the antenna and cable kit that you purchased.
- 2. Align the antenna so that it is pointing directly towards the remote units that the **CU132** needs to cover.
- 3. Please insure that antenna polarization (horizontal or vertical) is identical on the receiving and transmitting ends.

4. Install the **CU132** as near the antenna as possible to minimize the cable length. If you require longer cables, contact your local distributor to get an extension. (See page 2-16 for the installation procedure.)



#### **Power Compliance**

The system, if required by regulation, performs transmit power adjustment based on the installed antenna and cable. The antenna filter unit, if required, goes between the tension release cable and the antenna cable and is used to limit the **WaveACCESS NET** emissions to comply with your country's requirements.

Make sure that you enter the correct antenna and cable parameters in the antenna configuration software so that it complies with your country's requirements. In addition, do not attempt to dispense with the use of the filter in conjunction with the **WaveACCESS NET** units. Incorrect antenna parameters and/or dispensing with the use of the filter may cause the system to malfunction and invalidate your warranty. ▲ WARNING: Willfully entering incorrect values in the antenna parameters software and/or avoiding the use of an antenna filter, as supplied with the WaveACCESS NET units, could cause degradation of the system and void the authority to operate this equipment. In addition, improper transmit power settings and/or the lack of use of a required antenna filter violates unlicensed band radio frequency regulations. This may void the Product Warranty, as well as expose the end user to legal and financial liabilities.

#### **Lightning Protection**

It is highly recommended that you connect the shield/enclosure of the antenna and/or cable to a ground before the entrance to the building. This will provide some lightning protection.

For safety reasons, an antenna installed outdoors should be fitted with a lightning arrestor. Such devices protect the **WaveACCESS NET CU132**, as well as the life of any person in contact with the wireless access unit if the antenna is struck by lightning.

The optional **WaveACCESS NET** lightning arrestor has the same connector arrangement as the antenna cable segments (male/male). As a result, it can be installed between any two cable segments (the antenna and the tension release cable are also considered cables for this purpose). However, the best location for the arrestor is just before the cable's entrance to the building. In either case, the arrestor must be mounted outside the building.

The arrestor that you can purchase with the **CU132** is self-resetting, meaning that maintenance is not needed, even following a lightning strike. Follow the installation instructions provided for the arrestor and ensure that the grounding solution is in accordance with these instructions.

WARNING: A lightning arrestor should be installed on any antenna mounted outdoors. Failure to do so may void the Product Warranty. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury or damage caused by lightning striking the antenna.

# Installing the WaveACCESS NET CU132

This section provides the following information for quick installation of the **WaveACCESS NET CU132**, using the default settings.

- Packing List, page 2-15.
- Installation Procedure, page 2-16.
- **Basic Software Configuration**, page 2-20.

**IMPORTANT:** The **WaveACCESS NET CU132** must be installed *before* you install additional **WaveACCESS NET** station adapters in the network.

## **Packing List**

The **WaveACCESS NET CU132** arrives in a single package that includes the following items:

- WaveACCESS NET CU132 wireless central unit.
- One power adapter complete with a 5' (1.5m) cord.
- Software diskette.
- ◆ This Quick Installation Guide.
- CD-ROM containing documentation.

You also should have received a second package that includes the **WaveACCESS NET** antenna and cable kit you ordered with the system. This kit usually includes the antenna, antenna cable(s), tension release cable, female-to-female N-type adapter (if necessary), external filter (for certain specific antennas in Europe or ETSI compliant countries), RF cable clamps and a lightning arrestor (if ordered).

Note: If any of these items are incomplete or missing, you might not be able to install the WaveACCESS NET CU132. In such cases, please contact your nearest Technical Support Center. Refer to Chapter 3, Technical Support for information.

### **Installation Procedure**

The **WaveACCESS NET CU132** is placed indoors. It should be placed as close as possible to the antenna. The installation of the **WaveACCESS NET CU132** requires the following steps:

- Step 1: Connecting the Antenna to the CU132, below.
- Step 2: Connecting to the Network, page 2-17.
- Step 3: Connecting Several Collocated CU132s, page 2-17.
- Step 4: Powering up the CU132, page 2-18.

## Step 1: Connecting the Antenna to the CU132

The first step is to connect the antenna to the CU132.

- When using a single antenna, connect it to the front panel connector marked Main, as shown below.
- When using two antennas, use the connector marked Aux for diversity.



▲ WARNING: Due to FCC rules, the antenna connectors are non-standard. Take care that they are not damaged, because they cannot be replaced. Use only the supplied tension release cable. Other connectors will not fit properly and may cause harmful interference.

#### Step 2: Connecting to the Network

This step involves connecting the **CU132** to the network.

- To connect the CU132 to the network:
  - 1. Connect one end of a standard 10Base-T RJ-45 Ethernet cable to the hub or router.
  - 2. Insert the opposite end of the cable into the socket marked ETHERNET on the back panel of the **CU132**.

The **CU132** is now connected to the network.

#### Step 3: Connecting Several Collocated CU132s

This step is necessary only if you have a large or multi-sectored POP with more than one **WaveACCESS NET CU132**. This step entails connecting different **CU132** devices together using a standard 10Base-T (UTP) Ethernet cable. The cable is attached from one of the two EXT connectors on the back panel of one unit, to the alternate EXT connector on another unit. By connecting all the units in this manner, you effectively "daisy-chain" them. You may use a category 5 Ethernet cable of up to 100 meters in length.

**Note:** The EXT sockets are the same as the Ethernet socket. Take care to ensure the cables for connecting collocated units are not inserted into the Ethernet socket.

## To connect several collocated WaveACCESS NET CU132s:

 Insert one end of the cable into the EXT 1 or the EXT 2 connector on the back panel of the CU132, shown below:

|--|

2. Insert the opposite end of the cable into the alternate connector (either EXT 1 or EXT 2) on the back panel of the next CU132 unit.



**WARNING:** Take care not to insert either end of the cable into the Ethernet connector.

Note: For further information about connecting collocated units, and testing the connection, refer to the *WaveACCESS NET User's Guide.* 

#### Step 4: Powering Up the CU132

This step involves powering up the WaveACCESS NET CU132.

#### To power up the CU132:

- Insert the power supply connector to the DC IN socket located on the back panel of the CU132 and make sure that it is securely connected.
- 2. Insert the power supply into the mains.
- **WARNING:** Use only the supplied power supply. Using a different power supply may damage the **CU132** and invalidate the FCC certification.

Note: Always connect the power supply to the unit first, and only then plug it in.

3. On the back panel of the **CU132**, switch the unit on. The *PWR* LED on the front of the unit lights up, signaling that the **CU132** wireless central unit has powered up.

First, the **WaveACCESS NET** unit enters the Xmodem<sup>\*</sup> software load status for about 10 seconds. The *OK* LED then blinks for 5-10 seconds, which signals that the initial system software (also called *Version 0*) has loaded correctly and the **CU132** has completed its self-test routine. After 10 seconds, the programmable system software (or *Version 1*) will have loaded and the *OK* LED will be continuously lit.

- Note: If you have connected the **CU132** to the Ethernet network, the *Link* LED will be continuously lit. This is to signal that a router (or similar device) has been detected over the network.
- Note: The Sync LED has two states, blinking or continuously lit. A blinking Sync LED signals that the unit is not communicating with another central unit. A continuously lit Sync LED indicates that the CU132 has discovered a collocated CU132 and they are communicating.

For a full description of all the LEDs on the front panel of the **CU132**, refer to the *WaveACCESS NET User's Guide*.

After you have completed these steps, your **WaveACCESS NET CU132** central unit is working and ready for basic configuration and fine antenna adjustment.

<sup>&</sup>lt;sup>\*</sup> Xmodem is an asynchronous modem protocol used for transferring files (uploading and downloading). It is used to save or upgrade the system's software. Refer to the *WaveACCESS NET User's Guide* for further information.

### **Basic Software Configuration**

It is mandatory to define the ESS-ID of the central unit, before commencing use. This procedure is described below.

Certain other basic parameters may be configured in order to change the default values in the **CU132**, if necessary. These parameters can be configured using either the system monitor or a Bootp server with TFTP capabilities. Refer to the *WaveACCESS NET User's Guide* for detailed instructions on configuration options.

#### To define the ESS-ID:

- 1. Using the system monitor, access the Main menu, press 1. The Configuration menu is displayed.
- 2. In the Configuration menu, press 1. The Host ID Configuration screen is displayed.
- 3. Press 8 and type in the ESS-ID.
- 4. Press S to save your work in flash memory.
- 5. Repeat this procedure for each BR132, giving each one the same ESS-ID.

This completes the quick installation procedures for the *WaveACCESS NET CU132*.

## WaveACCESS NET Remote Unit Antennas

This section describes the **WaveACCESS NET** remote unit antenna and cable options, as follows:

- Antenna Types, page 2-22.
- Cable Options, page 2-25.
- Installing the Antenna, page 2-27.
- ▲ WARNING: The antenna connectors on the front panel of the WaveACCESS NET remote units are non-standard. Care should be taken that they are not damaged, since they cannot be replaced. In addition, antennas other than those supplied with these products will not fit properly and might cause harmful interference.

Note: All of the WaveACCESS NET antenna options must be professionally installed. The cable kit provided with all external antennas must be used for all outdoor antenna installations. This kit includes a tension release cable from the non-standard connector on the WaveACCESS NET remote unit to a standard N-type connector. These antennas must be professionally installed, complying with the certified antenna and cable kits. Please carefully review and follow the installation instructions included with each individual antenna kit. If you have any questions, please contact your nearest Technical Support center.

## **Antenna Types**

The tables on the following pages show the antenna specifications for the **WaveACCESS NET** remote antennas. These figures reflect a 10 dB fade margin over ideal free space propagation and assume the use of the shortest permitted cable (see the minimum cable segment length in the table on page 2-25) and the use of a **WaveACCESS NET CU132** central unit with an OM10 omnidirectional antenna.

The available antenna options depend on the your country's regulations (for example, FCC Part 15, ETSI ETR-328, and so on). Not all options may be available in your country.

The minimum segment length listed in the tables on page 2-25 indicate the minimum certified cable length per cable type. You should never attempt to use antenna cables with a loss of less than 1.3 dB.

#### **Parabolic Grid Antenna**

This is the highest gain antenna available for the **WaveACCESS NET** remote units. It is recommended for long range situations. Careful aiming of this antenna is required due to its small coverage angle.

The following table displays Parabolic Grid antenna specifications when communicating with a **WaveACCESS NET CU132** utilizing a 10 dBi omni antenna:

Country Antenna Specifications	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 3.2 Mbps	Range at 1.6 Mbps
U.S.	24 dBi	10°	N/A	1.9	7.7 miles
Canadian	24 dBi	10°	N/A	2.2	7.9 Km
European (ETSI)	24 dBi	10°	N/A	0.9	3 Km

#### Yagi Antenna

The 14 dBi Yagi antenna is used for medium-range situations. It can be mounted both indoors and outdoors.

The following table displays Yagi antenna specifications when communicating with a **CU132** utilizing a 10 dBi omni antenna:

Country Antenna Specifications	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 3.2 Mbps	Range at 1.6 Mbps
U.S.	14 dBi	34° / 30°	N/A	0.6	2.4 miles
Canadian	14 dBi	34° / 30°	N/A	1.0	4.0 Km
European (ETSI)	14 dBi	34° / 30°	N/A	0.5	1.8 Km

Physical characteristics of the WaveACCESS NET antennas:

Antennas Type	Gain	Catalog No.	Size (inches)	Mast Outside Diam. (inches)
Parabolic Grid	24 dBi	PG24	27 x 32	0.75 - 2
Yagi	14 dBi	YG14	26 x 3.5	≤ 2.125

The following table describes the specifications of additional optional antennas that can be used with the **WaveACCESS NET** remote units when communicating with a **CU132** utilizing a 10 dBi omni antenna:

Country	Antenna Type	Gain	Beamwidth Horizontal/ Vertical	Down Tilt	Range at 3.2 Mbps	Range at 1.6 Mbps
U.S.	Omni	5 dBi	360° / 38°	N/A	0.2	0.9
	Parabolic Dish	19 dBi	18° / 20°	+/- 10°	1.1	miles 4.3 miles
	Dipole	2 dBi	360° / 75°	N/A	0.2	0.7
						miles
Canada	Omni	5 dBi	360° / 38°	N/A	0.4	1.4 Km
	Parabolic Dish	19 dBi	18° / 20°	+/- 10°	1.8	7.0 Km
	Dipole	2 dBi	360° / 75°	N/A	0.3	1.2 Km
Europe (ETSI)	Dipole	2 dBi	360° / 75°	N/A	0.2	0.8 Km

## **Cable Options**

All antennas come with a 20' LMR-400 cable kit, unless otherwise ordered. The standard kit consists of the following:

- A 2-foot tension release cable that connects on one side to the non-standard Main connector on the panel and on the other side to a standard N-type male connector. This cable is relatively thin and functions as a stress relief between the long and thick antenna cable and the unit.
- A 20-foot low-loss cable with male N-type connectors on either end.

The effect of the standard kit's losses on the system's range is included in the antenna options tables on pages 2-22 and 2-23.

Note: All RF cables, including the tension release cable, have to be anchored down in order to minimize the risk of breaking the WaveACCESS NET RF connector(s) and/or having the cables pulling the system. The provided cable clamps should be anchored to a solid object or wall.

#### **Cable Coverage**

In order to cover distances greater than 20 feet between the antenna and the **WaveACCESS NET** remote units, you may order additional segments of 20-foot LMR-400 cable or use another type of cable, as shown on following page. All segments have the same male-male N-type connectors. By using a female-female adapter, they can be easily extended to any multiple of 20 feet. Each additional cable segment, on either side of the link, reduces the system's range by 20%. You can also use other cable types (see the tables below) to increase the distance between the antenna and the **WaveACCESS NET** remote units. When doing so, note which minimum lengths are required for each cable type.

The following table provides *U.S. Cable Assembly* options:

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/100 ft)	Minimum Segment Length (ft)
LMR-400	Flexible, 0.4	6.7	20
LMR-600	Flexible, 0.6	4.4	30
LMR-900	Flexible, 0.9	2.9	45
LMR-1200	Flexible, 1.2	2.2	60
LMR-1700	Flexible, 1.7	1.7	80
LDF4-50A	Heliax 1/2", 0.63	3.9	35
LDF5-50A	Heliax 7/8", 1.10	2.2	60
LDF6-50	Heliax 1-1/4", 1.55	1.6	85

The following table provides *Canadian and European Cable Assembly* options:

Cable Number	Type and Outer Diameter (inches)	Attenuation Coefficient (dB/10 m)	Minimum Segment Length (m)
LMR-400	Flexible, 0.4	2.20	6.1
LMR-600	Flexible, 0.6	1.43	9.1
LMR-900	Flexible, 0.9	0.97	13.7
LMR-1200	Flexible, 1.2	0.73	18.3
LMR-1700	Flexible, 1.7	0.56	24.4
LDF4-50A	Heliax 1/2", 0.63	1.28	10.7
LDF5-50A	Heliax 7/8", 1.10	0.72	18.3
LDF6-50	Heliax 1-1/4", 1.55	0.52	25.9

### **Installing the Antenna**

The **WaveACCESS NET** remote unit antenna is always placed outdoors. The **WaveACCESS NET** remote units are installed indoors and connected to the antenna using the supplied cable.

Note: Installing a WaveACCESS NET remote unit outdoors will void its warranty.

Before you install the remote unit, you must choose a good location for your antenna to ensure a line of sight to the **WaveACCESS NET CU132**. You must also ensure the shortest possible distance between the **WaveACCESS NET SDR132** or **WaveACCESS NET MDR132** remote units and the antenna, in order to minimize cable loss.

▲ WARNING: The WaveACCESS NET remote unit antenna should be installed ONLY by experienced antenna installers familiar with local building and safety codes and, wherever necessary, licensed by appropriate government regulatory bodies. Failure to do so may void the Product Warranty as well as expose the end user to legal and financial liabilities. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury, damage or violation of government regulations associated with the installation of the antenna.

The installer is also responsible for ensuring that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines. These guidelines imply that no human may conceivably be found within one foot of the front of the antenna. If such a situation is likely to occur, the installer is responsible for placing the appropriate caution signs to warn the public. Lucent Technologies, its agents, resellers, or distributors, are not liable for exposure to excessive RF energy levels due to improper antenna installation. The Maximum Permissible Exposure guidelines are 1 foot (30 cm) from the **WaveACCESS LINK** unit, as based on the National Council on Radiation Protection and Measurement (NCRP). If the antennas are in an accessible area, an appropriate warning sign **must** be installed in the appropriate place.

#### **Antenna Installation Procedure**

Following are the steps required to install the antenna for the WaveACCESS NET MDR132 or SDR132:

#### To install the remote unit antenna:

- 1. Mount the antenna using the enclosed brackets, following the instructions included with the antenna and cable kit that you purchased.
- 2. Align the antenna so that it is pointing directly towards the **WaveACCESS NET CU132**.
- Install the WaveACCESS NET remote units as near to the antenna as possible in order to minimize the cable length. If you require longer cables, contact your local distributor to get an extension.



- ▲ WARNING: Using an antenna or cable other than those recommended or supplied with the WaveACCESS NET, whether installed indoors or outdoors, could cause degradation of the system and could void the authority to operate this equipment. In addition, the use of unauthorized antennas or external amplifiers violates Federal law and FCC regulations. Doing so may void the Product Warranty, as well as expose the end user to legal and financial liabilities.
- WARNING: The WaveACCESS LINK antennas emit high radio frequency energy levels. In situations where unauthorized persons may approach within 1 ft (30 cm) of the front of the antennas, an appropriate warning sign should be placed near the WaveACCESS LINK antennas.

#### **Power Compliance**

The system, if required by regulation, performs transmit power adjustment based on the installed antenna and cable. The antenna filter unit, if required, goes between the tension release cable and the antenna cable, and is used to limit the emissions to comply with your country's requirements.

Make sure that you enter the correct antenna and cable parameters in the antenna configuration software so that it complies with your country's requirements. In addition, do not attempt to dispense with the use of the filter in conjunction with the **WaveACCESS NET** remote unit. Incorrect antenna parameters and/or dispensing with the use of the filter may cause the system to malfunction and invalidate your warranty. ▲ WARNING: Willfully entering incorrect values in the antenna parameters software and/or avoiding the use of an antenna filter, as supplied with the WaveACCESS NET units, could cause degradation of the system and void the authority to operate this equipment. In addition, improper transmit power settings and/or the lack of use of a required antenna filter violates unlicensed band radio frequency regulations. This may void the Product Warranty, as well as expose the end user to legal and financial liabilities.

### **Lightning Protection**

It is highly recommended that you connect the shield/enclosure of the antennas and/or cable to a ground before the entrance to the building. This will provide some lightning protection.

For safety reasons, the antenna should be fitted with a lightning arrestor. Such devices protect the **WaveACCESS NET** remote unit, as well as the life of any person in contact with the wireless access station when the antenna is struck by lightning.

The optional **WaveACCESS NET** lightning arrestor has the same connector arrangement as the antennas cable segments (male/male). As a result, it can be installed between any two cable segments (the antennas and the tension release cable are also considered cables for this purpose). The best location for the arrestor is just before the cable's entrance to the building and must be mounted outside the building. The arrestor you can purchase with the **WaveACCESS NET** remote units is self-resetting, meaning that maintenance is not needed, even following a lightning strike. Follow the installation instructions provided for the arrestor and ensure that the grounding solution is in accordance with these instructions.

WARNING: A lightning arrestor should be installed on any antenna mounted outdoors. Failure to do so may void the Product Warranty. Lucent Technologies, its agents, resellers, or distributors, are not liable for injury or damage caused by lightning striking the antenna.

## Installing the WaveACCESS NET Remote Units

This section provides the following information for quick installation of the **WaveACCESS NET** remote units, **SDR132** or **MDR132**:

- Packing List, below.
- Installation Procedure, page 2-32.
- Basic Software Configuration, page 2-37.

## **Packing List**

The **WaveACCESS NET** remote unit arrives in a single package that includes the following items:

- Either a WaveACCESS NET SDR132 Single-Drop Remote, or a WaveACCESS NET MDR132 Multi-Drop Remote.
- One power adapter complete with a 5' (1.5m) cord.
- Software diskette.
- This Quick Installation Guide.
- CD-ROM containing documentation.
- For the WaveACCESS NET SDR132 only, an optional 4' (1.2m) 10Base-T Ethernet crossover cable.

You also should have received a second package that includes the WaveACCESS NET antenna and cable kit you ordered with the system. This kit typically includes the antenna, antenna cable(s), tension release cable, female-to-female N-type adapter (if necessary), external filter (for certain specific antennas in Europe or ETSI compliant countries), RF cable clamps and a lightning arrestor (if ordered).

lash Note: If any of these items are incomplete or missing, you might not be able to install the WaveACCESS NET SDR132 or the WaveACCESS NET MDR132. In such cases, please contact your nearest Technical Support center. Refer to Chapter 3, Technical Support for information.

#### Installation Procedure

The WaveACCESS NET MDR132 and/or SDR132 unit is placed indoors. It should be placed as close as possible to the antenna. The installation of the WaveACCESS **NET** remote units requires the following steps:

- Step 1: Connecting the Antenna to the Remote Units, below.
- Step 2: Connecting to the Computer or Network, page 2-33.
- Step 3: Powering up the Remote Units, page 2-35.

#### **Step 1: Connecting the Antenna** to the Remote Units

The first step is to connect the antenna to the remote units

When using a single antenna, connect it to the front panel connector marked Main, as shown on the following page.

When using two antennas, use the connector, marked Aux for diversity, as shown below:



**WARNING:** Due to FCC rules, the antenna connectors are non-standard. Take care that they are not damaged, because they cannot be replaced. Use only the supplied tension release cable. Other connectors will not fit properly and may cause harmful interference.

## Step 2: Connecting to the Computer or Network

This step involves connecting the **WaveACCESS NET SDR132** and **MDR132** to your computer or network.

#### **Connecting the WaveACCESS NET SDR132**

The **SDR132** can be connected to your computer's Ethernet adapter in one of two ways:

By connecting the provided Ethernet 10Base-T crossover cable from the SDR132 to the computer.

Or,

By connecting the SDR132 directly to the network and having the computer access the wireless LAN adapter through the Ethernet using a standard 10Base-T Ethernet cable.

- To connect the WaveACCESS NET SDR132 to your computer's Ethernet adapter using the 10Base-T crossover Ethernet cable:
  - 1. Connect one end of the provided crossover Ethernet cable to the computer.
  - 2. On the back panel of the **SDR132**, insert the other end of the cable into the socket marked ETHERNET.
- To connect the WaveACCESS NET SDR132 to a computer through an Ethernet network:
  - 1. Connect the **SDR132** to the network using a standard (10Base-T) Ethernet cable.
  - 2. Configure the **SDR132** to accept the computer's MAC address using either Bootp or the built-in system monitor, as described in the *WaveACCESS NET User's Guide*.

The **SDR132** is now connected and ready to be powered up.

#### **Connecting the WaveACCESS NET MDR132**

The **MDR132** can be connected to your Ethernet network.

- To connect the MDR132 to the Ethernet network:
  - 1. Connect one end of a standard Ethernet cable (10Base-T) to the network or hub.
  - 2. On the back panel of the **MDR132**, insert the other end of the cable into the socket marked ETHERNET. The adapter automatically learns the local network's environment.

The **MDR132** is now connected and ready to be powered up.
### Step 3: Powering up the WaveACCESS NET Remote Units

This step involves powering up the **WaveACCESS NET** remote units.

- To power up the WaveACCESS NET SDR132 and MDR132:
  - 1. Insert the round power adapter connector into the DC IN socket located on the back panel of the remote unit, and make sure that it is securely connected.

|--|--|

- 2. Insert the power adapter plug into a power outlet
- WARNING: Use only the supplied power adapter. Using a different power adapter may damage the WaveACCESS NET remote unit and invalidate the FCC certification.
- Note: Always connect the power adapter to the remote unit first, and only then connect the power.
- 3. On the back panel of the remote unit, turn the unit on. The *PWR* LED on the front of the unit lights up, signaling that the **WaveACCESS NET** unit has powered up.

First, the **SDR132** enters the Xmodem<sup>\*</sup> software load status for about 10 seconds. The *OK* LED then blinks for 5-10 seconds, which signals that the initial system software (also called *Version 0*) has loaded correctly and the **SDR132** has completed its self-test routine. After 10 seconds, the programmable system software (or *Version 1*) will have loaded and the *OK* LED will be continuously lit.

The *Sync* LED indicates whether or not the remote unit has synchronized with a central unit. It blinks while the remote unit attempts to connect to a CU132 and is continuously lit when association has taken place and communication is established. Refer to the following section for further information about LEDs.

Note: The SDR132 must receive a communications packet from the computer's Ethernet card in order to synchronize with a CU132. The easiest way to achieve this is to first turn on the SDR132 and only afterwards to turn on your computer. This will ensure that the two systems communicate properly. If the Sync LED does not light up, try shutting down your computer and restarting. If you still have problems, you may need to change the ESS-ID. Refer to WaveACCESS NET User's Guide for further details.

For a full description of all the LEDs on the front panel of the **WaveACCESS NET SDR132** and **MDR132**, refer to the *WaveACCESS NET User's Guide*.

Xmodem is an asynchronous modem protocol used for transferring files (uploading and downloading). It is used to save or upgrade the system's software. Refer to the *WaveACCESS NET User's Guide* for further information.

### **Basic Software Configuration**

It is mandatory to define the ESS-ID of the remote unit, before commencing use. This procedure is described below.

Certain other basic parameters may be configured in order to change the default values in the remote unit, if necessary. These parameters can be configured using either the system monitor or a Bootp server with TFTP capabilities. Refer to the *WaveACCESS NET User's Guide* for detailed instructions on configuration options.

### To define the ESS-ID:

- 1. Using the system monitor, access the Main menu, press 1. The Configuration menu is displayed.
- 2. In the Configuration menu, press 1. The Host ID Configuration screen is displayed.
- 3. Press 8 and type in the ESS-ID.
- 4. Press S to save your work in flash memory.
- 5. Repeat this procedure for each BR132, giving each one the same ESS-ID.

This completes the quick installation procedures for the WaveACCESS NET remote units.

# **3** Technical Support

The most recent software and user documentation for all **WaveACCESS** products can be found on our Internet and FTP sites:

World Wide Web: http://wavelan.com

FTP Server: http://ftp.wavelan.com/pub

If you encounter problems when installing or using this product, or would like information about other **WaveACCESS** products, please contact your local Authorized **WaveACCESS** Reseller or regional Lucent Technologies Sales Office. Addresses of resellers and sales offices can be found on the **WaveACCESS** website.

If local or regional support is unavailable, you can obtain assistance at the email addresses or telephone numbers listed below.

#### WaveACCESS Regional Support

U.S.A.	usasupport@wavelan.com
Caribbean, Latin America, Canada	calasupport@wavelan.com
Europe, Middle East, Africa	emeasupport@wavalan.com
Asia, Pacific	apasupport@wavelan.com

### WaveACCESS Global Support

U.S.A., Canada	Voice:	+1 800 WAVELAN +1 888 4 LUCENT
	Fax:	+1 937 445 5552
Asia Pacific	Voice:	+852 2506 5366
Caribbean, Latin America, Canada	Voice:	+1 954 835 2975
Europe, Middle East, Africa	Voice:	+31 35 687 2509

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