



**WaveRider®**  
*The World's Wireless Web Company*

# ***LMS3200***

## ***User Guide***

Version A

# WaveRider Communications Inc.

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*Version A, September 2000*

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Because some states/jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

In no event will WaveRider's liability exceed the amount paid for the product.

## Regulatory Notices

This equipment has been tested and found to comply with the limits for a Class A Intentional Radiator, pursuant to Part 15 of the FCC Regulations and RCC-210 of the IC Regulations. These limits are intended to provide protection against harmful interference when the equipment is operated in a commercial/business/industrial 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. However, there is no guarantee that interference will not occur in a particular installation.

## Notice to User

Any changes or modifications to equipment that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

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# Preface

## About this Manual

WaveRider recommends that you read the following sections before you install and operate the LMS3200:

- [Software License Agreement](#) on page 2
- [Warranty](#) on page 4
- [Warnings and Advisories](#) on page 12
- [Regulatory Notices](#) on page 11

**NOTE:** The information contained in this manual is subject to change without notice.

## Regulatory Notices

### Industry Canada

Operators must be familiar with IC RSS-210 and RSS-102.

The LMS3200 CCU and EUM have been designed and manufactured to comply with IC RSS-210.



### WARNING!

To prevent radio interference to the licensed service, this device should be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

### Federal Communications Commission

The LMS3200 CCU and EUM have been designed and manufactured to comply with FCC Part 15.

The FCC ID for the LMS3200 equipment is OOX-WRM3200.

The transmitter of LMS3200 devices complies with Part 15.247 of the FCC rules.



## WARNING!

Operators must be familiar with the requirements of the FCC Part 15 Regulations prior to operating any link using this equipment. For installations outside the United States, contact local authorities for applicable regulations.

### Interference Environment

Manufacturers and operators of spread-spectrum devices are reminded that the operation of these devices is subject to the conditions that:

- any received interference, including interference from industrial, scientific, and medical (ISM) operations, must be accepted; and
- these devices are not permitted to cause harmful interference to other radio services.

If the operation of these systems does cause harmful interference, the operator of the spread-spectrum system must correct the interference problem, even if such correction requires the Part 15 transmitter to cease operation. The FCC does not exempt spread-spectrum devices from this latter requirement regardless of the application. The FCC strongly recommends that utilities, cellular stations, public safety services, government agencies, and others that provide critical communication services exercise due caution to determine if there are any nearby radio services that can be affected by their communications.

### Operational Requirements

In accordance with the FCC Part 15 regulations:

1. The maximum peak power output of the intentional radiator shall not exceed one (1) watt for all spread-spectrum systems operating in the 902-908 MHz band.
2. Stations operating in the 902-908 MHz band may use transmitting antennas of directional gain greater than 6 dBi, provided the peak output power from the intentional radiator is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. The operator of a spread-spectrum system is responsible for ensuring that the system is operated in the manner outlined in [Interference Environment](#) on page 12 and [Operational Requirements](#) on page 12.

## Warnings and Advisories

### General Advisory

Operator and maintenance personnel must be familiar with the related safety requirements before they attempt to install or operate the LMS3200 equipment.

It is the responsibility of the operator to ensure that the public is not exposed to excessive Radio Frequency (RF) levels. The applicable regulations can be obtained from local authorities.





### **WARNING!**

This system must be professionally installed. Antennas and associated transmission cable must be installed by qualified personnel. WaveRider assumes no liability for failure to adhere to this recommendation or to recognized general safety precautions.



### **WARNING!**

Do not operate the LMS3200 CCU or EUM without connecting a 50-ohm termination to the antenna port. This termination can be a 50-ohm antenna or a 50-ohm resistive load capable of absorbing the full RF output power of the transceiver. Failure to terminate the antenna port properly may cause permanent damage to the device.



### **WARNING!**

To comply with FCC RF exposure limits, the antenna for this transmitter must be fix-mounted on outdoor permanent structures to provide a separation distance of 32 cm (12 inches) or more from all persons to satisfy RF exposure requirements. The distance is measured from the front of the antenna and the human body. It is recommended that the antenna be installed in a location with minimal pathway disruption by nearby personnel.

# Customer Support

If you have any problems with the hardware or software, please contact WaveRider Communications Inc.

Telephone: +1 416-502-3161

Fax: +1 416-502-2968

Email: [techsupport@waverider.com](mailto:techsupport@waverider.com)

URL: [www.waverider.com](http://www.waverider.com)

WaveRider offers a complete training program. Please contact your sales representative for training information.

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# 1

## Understanding the LMS3200

---

The LMS3200 system consists of three main components:

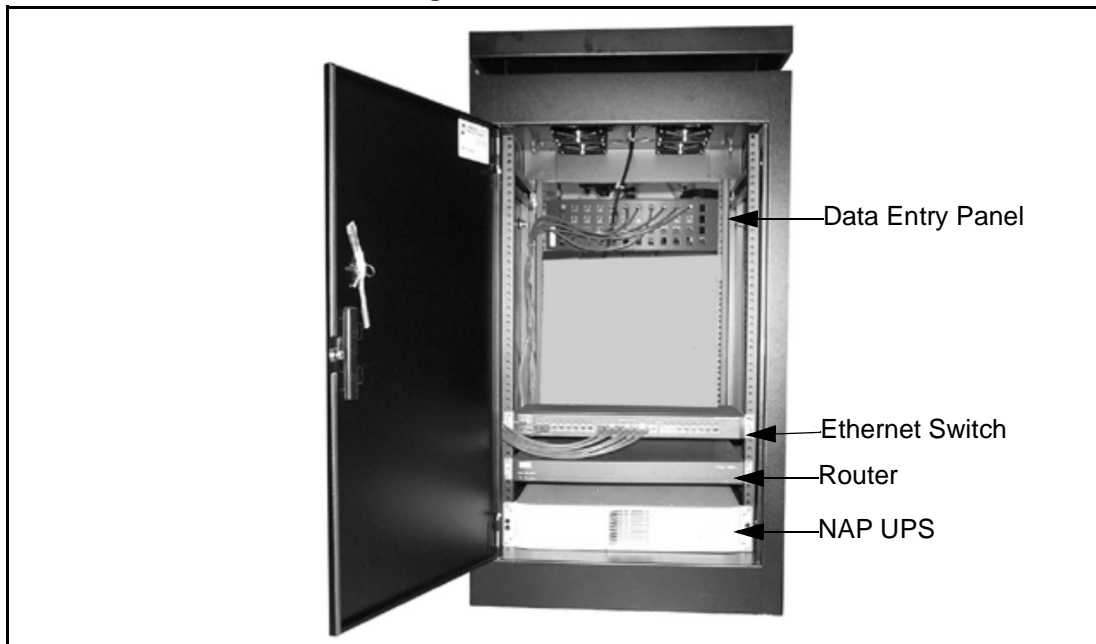
- Network Access Point (NAP)
- Communications Access Point (CAP)
- End User Modem (EUM)

### 1.1 NAP

---

The NAP acts as a gateway to the Internet. It is the connection point between the LMS3200 wireless network and the rest of the world. Information passes from the subscriber's PC or network through the LMS3200 network to the Internet.

**Figure 1 NAP Cabinet**



The NAP equipment includes the following components:

- data-entry panel
- Ethernet switch
- router
- uninterruptible power supply (UPS)
- NMS workstation

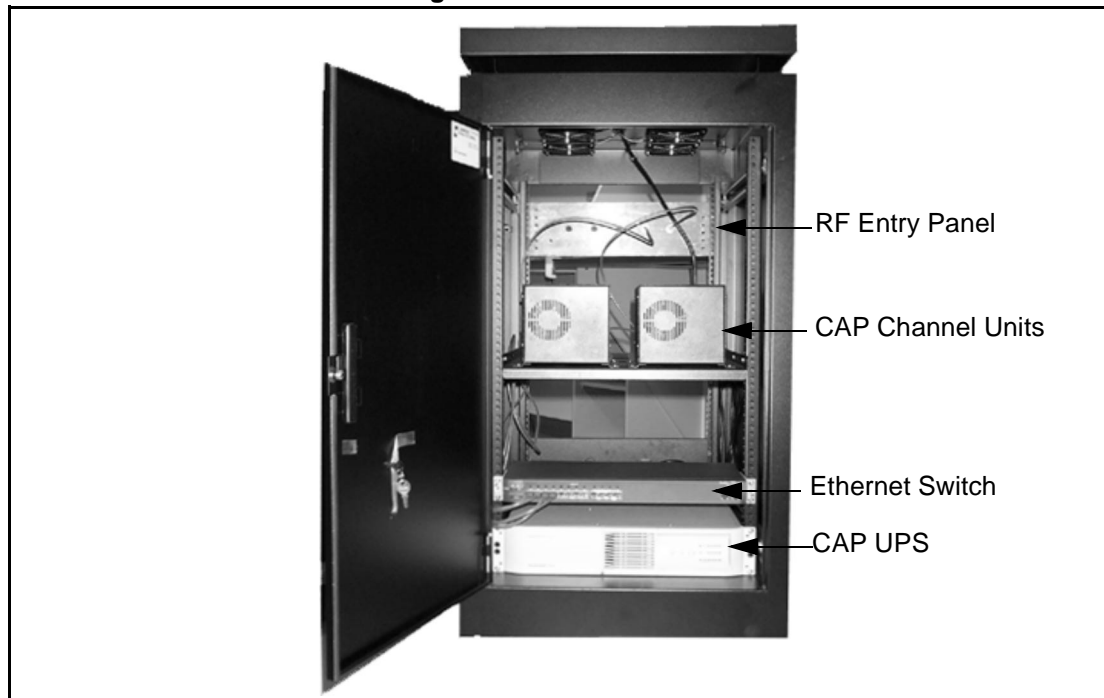
The data entry panel, switch, router, and UPS are enclosed within a free-standing equipment cabinet. The NMS workstation is located near the cabinet and is connected to it by an Ethernet network cable.

## 1.2 CAP

---

The CAP serves a routing function for the LMS3200 data communication by providing a collection point for the EUM data, and translating this data to a single data stream. It also acts as a distribution point for data received from the NAP by translating the data from a single data stream into multiple radio signals. This information then transmits to the appropriate EUMs.

**Figure 2 CAP Cabinet**



The CAP equipment includes the following components:

- RF entry panel
- CAP channel units (CCUs)
- Ethernet switch
- uninterruptible power supply (UPS)
- RF subsystem, including antenna, antenna tower, lightning arrestors, cabling, and connectors
- stand-alone backhaul equipment
- additional CCU and RF switch matrix for channel unit redundancy (optional)

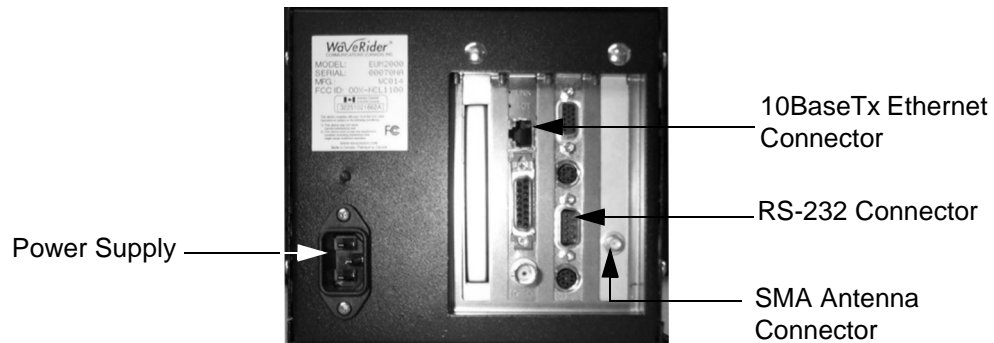
## 1.3 EUMs

---

The EUM is a self-contained wireless router that connects directly to a subscriber's network or computer. The EUM provides raw data of up to 2.75 Mbps between the EUM and a CCU using wireless IP routing to create direct high-speed Internet access gateway to and from a local area network (LAN).

The EUM functions as a radio that transmits or receives data from a local network through an Ethernet connection, then transmits or receives the coded data through a radio link to the CCU radio on the CAP.

**Figure 3 End User Modem (EUM)**



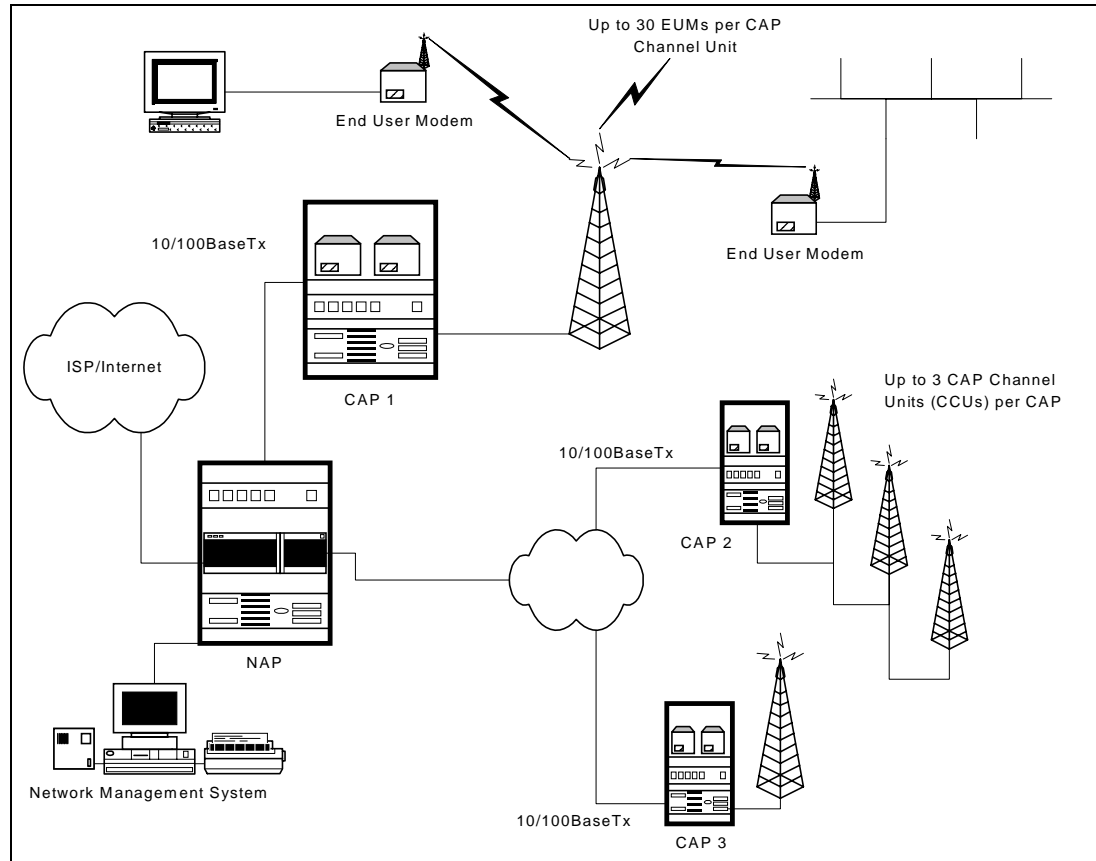
The EUM equipment includes the following components:

- wireless EUM unit with serial, Ethernet, and radio frequency (RF) connections
- outdoor antenna
- supporting equipment, including a power cord and cables

## 1.4 Network Configuration

[LMS3200 System Components](#) on page 5 shows the connections between the components of the LMS3200 system, the Internet, and the customer's PC or network.

**Figure 4 LMS3200 System Components**



## 1.5 Data Flow

From the simplest perspective, the LMS3200 system consists of the NAP, CAP, and EUM. The communications between these devices is controlled by routers. The NAP contains a router, the CAP contains a CCU, which is essentially a router, and the EUM, which also acts as a router. Each router has two (or more) connections on it.

- The NAP router connects to the WISP (WAN) and the CCU in the CAP (LAN).
- The CCU connects to the NAP (Ethernet) and to multiple EUMs (radio).
- The EUM connects to the CCU (radio) and the subscriber's PC or network (Ethernet).

[System Data Flow](#) on page 6 further illustrates the connections between the Internet, the LMS3200 equipment, and the subscriber's computer or LAN. It also identifies typical default IP addresses for each router.

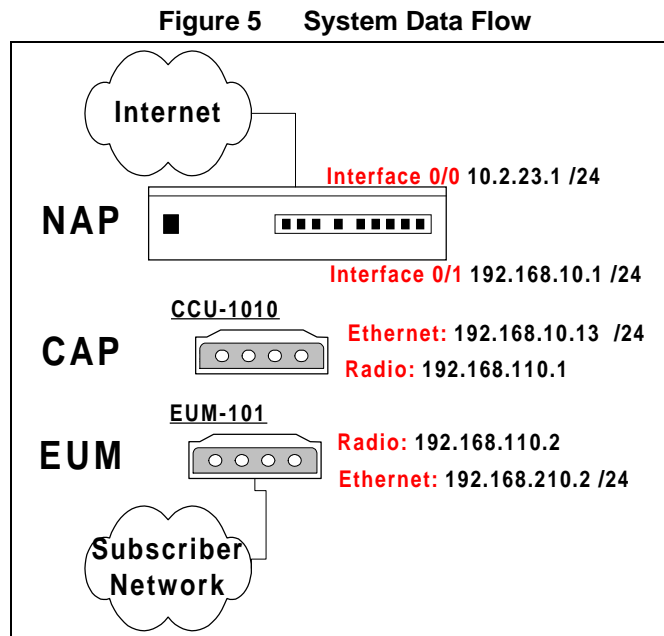


Figure 5 shows the default IP addresses for the NAP router, CCU, and EUM. The WAN interface IP address for the NAP router will change to reflect the subnetwork of the ISP. The EUM Ethernet IP will also change to reflect the subscriber's subnetwork address.



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# 2

## Installing the NAP and the CAP

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The first step in setting up your LMS3200 network is to link the NAP to the CAP. WaveRider recommends that you set up the NAP and CAP using the default settings initially. After the network is operational, you can optionally change the network addresses to suit your needs using the LMS Network Management System (NMS) software.

The basic procedure for setting up the LMS3200 system, including the CAP to NAP link, is as follows:

1. Set up the CAP.
2. Set up the backhaul for the CAP to NAP link.
3. Set up the NAP.
4. Set up the NMS Workstation.
5. Configure SNMPc Server.
6. Initialize and configure the NMS software.
7. Verify the CAP and NAP link is operational.
8. Configure CCUs.
9. Configure and deploy EUMs in your network.

This chapter describes the procedures to set up the LMS3200 CAP to NAP components.

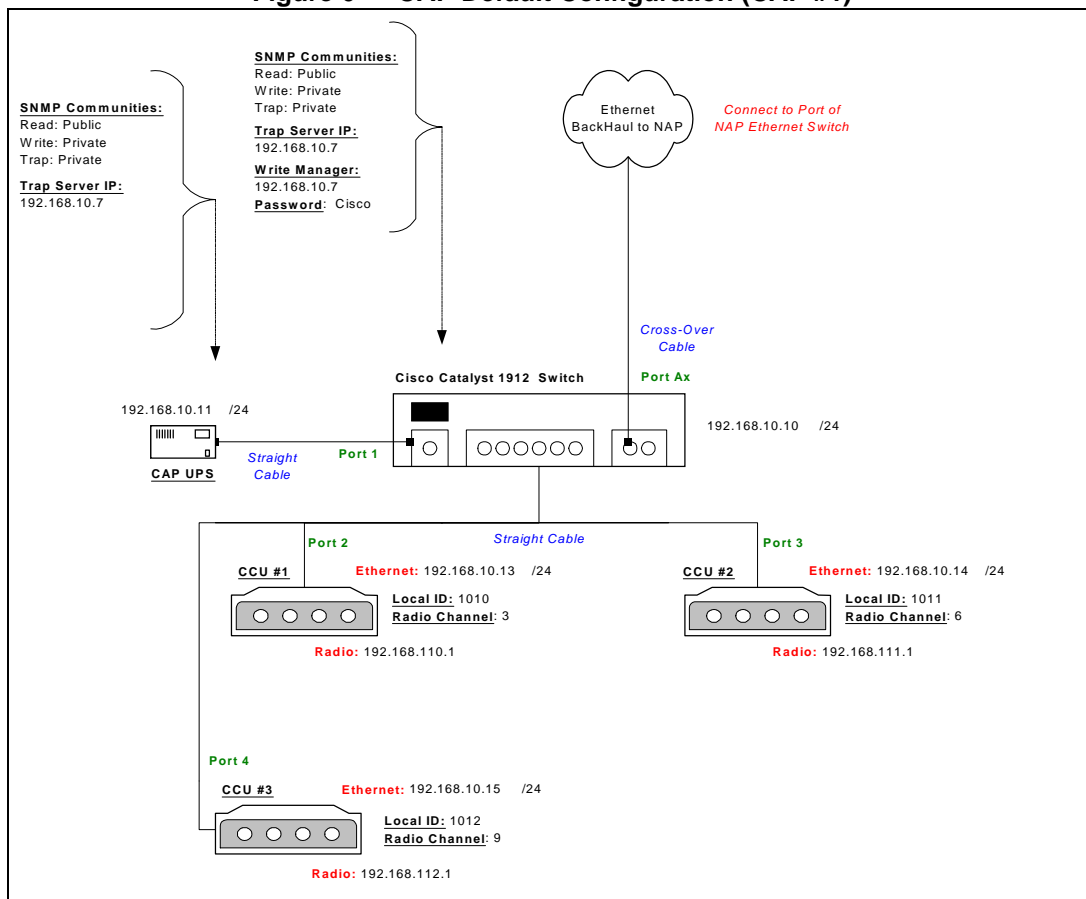
## 2.1 Setting up the CAP Using the Default Configuration

The CAP is the first component that you should set up. It consists of the following factory configured components:

- Cabinet with power bar and fans
- Exide 5119 Uninterruptible Power Supply (UPS)
- Cisco Catalyst 1912 Switch
- CAP Channel Units (CCUs) complete with cables, bulkhead lightning arrestor, power cords, antennas, and cables

The CAP configuration can include 1 to 3 CCUs, depending on your requirements. Refer to [CAP Default Configuration \(CAP #1\)](#) on page 8 for the default configuration for the CAP components. [Figure 6](#) shows CCU configuration.

**Figure 6 CAP Default Configuration (CAP #1)**



To set up the CAP with the default configuration, use the steps described below:

1. Ensure that your CAP site has been prepared to support the CAP requirements, including CCU antenna structures, power, grounding, and lightning protection.



## WARNING!

**This system must be professionally installed. Antennas and associated transmission cable must be installed by qualified personnel. WaveRider assumes no liability for failure to adhere to this recommendation or to recognized general safety precautions.**

2. Reconnect the Exide 5119 UPS battery. Refer to [Reconnecting the UPS Battery After Shipping](#) on page 9.
3. Plug the CAP UPS power cable into a 110 or 220 V AC power source using the provided cable.
4. Set up your backhaul equipment and connect to the CAP. Refer to [Setting up your Backhaul Equipment](#) on page 11 for more information.

After you have set up the CAP, the next step is to set up the NAP. Refer to [Setting up the NAP Using the Default Configuration](#) on page 12.

### 2.1.1 Reconnecting the UPS Battery After Shipping

The Exide 5119 UPS is shipped with the battery bank disconnected and the rear breaker on the rear power distribution bar in the “OFF” position. Reconnect the battery and place the power switch to the “ON” position. Complete the following instructions before powering up the unit.



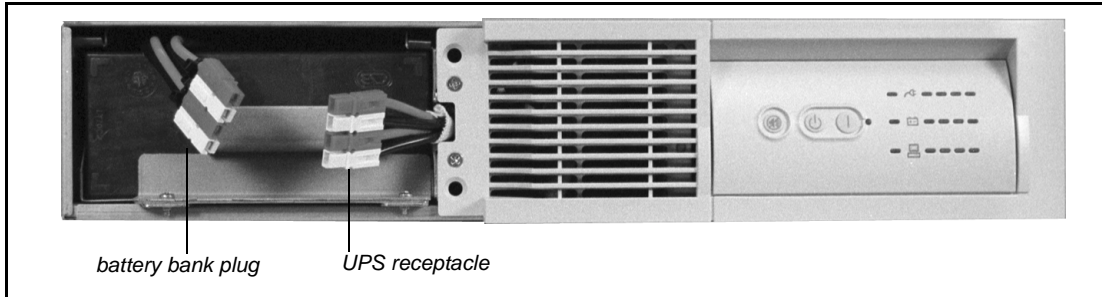
## WARNING!

**The UPS is capable of generating sufficient voltage to cause bodily harm. Use extreme caution when working with high voltage equipment.**

## To Reconnect the UPS Battery

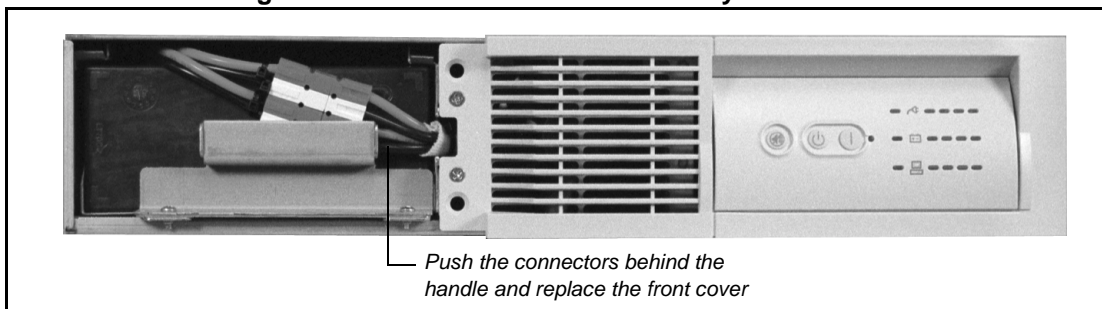
1. Open or remove the front and rear doors on the cabinet.
2. Pull the front cover off the UPS to expose the battery connection.

**Figure 7 Exide 5119 UPS with Battery Disconnected**



3. To reconnect the battery, plug the battery bank plug into the UPS receptacle.

**Figure 8 Exide 5119 UPS with Battery Connected**



4. Align the front cover in position and snap it back in place.
5. Place the breaker on the rear power distribution bar of the UPS in the "ON" position.  
The UPS battery is fully charged before shipping.
6. Plug the UPS into the power source to maintain the charge in the battery.

## 2.1.2 Setting up your Backhaul Equipment

The type of backhaul equipment for your site depends on the following conditions:

- expected traffic load
- available backhaul infrastructure
- distance between the CAP and the NAP

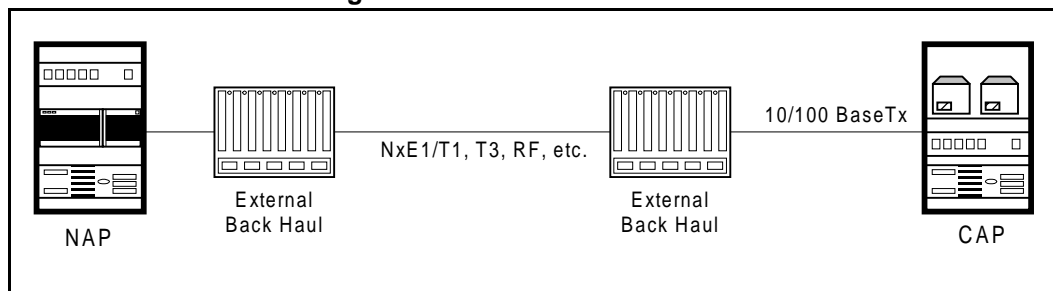
The backhaul can be either a wired connection to the NAP or a connection through an external unit that provides a transparent connection at the Ethernet Layer 2 transport.



**TIP:** The WaveRider NCL line of wireless routers provides a cost-effective solution to establish a wireless backhaul solution.

[CAP to NAP Backhaul](#) on page 11 shows a simple backhaul configuration.

**Figure 9 CAP to NAP Backhaul**



**NOTE:** Because the backhaul can be configured in many different ways, provisioning a backhaul interface for the LMS3200 requires application engineering. For information on WaveRider backhaul equipment, contact your **WaveRider Sales Representative**.

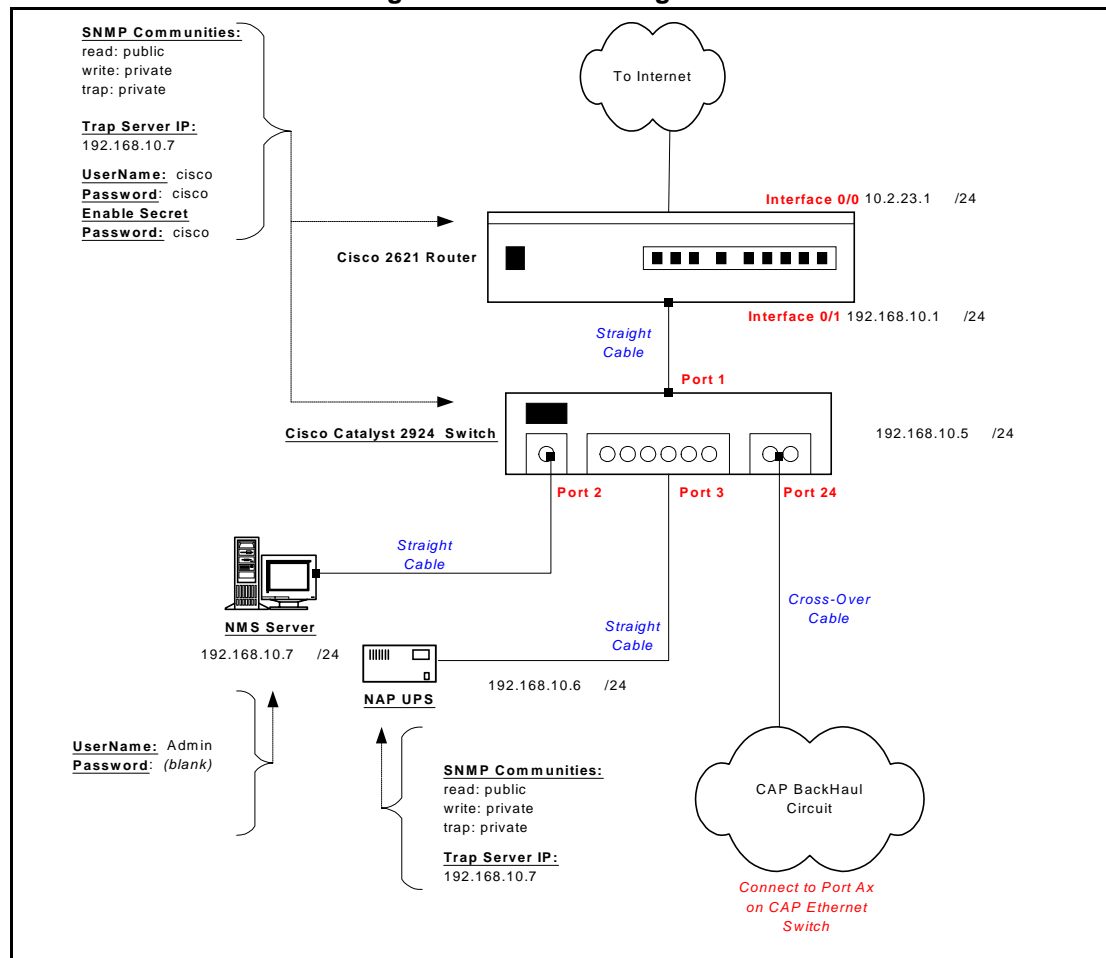
## 2.2 Setting up the NAP Using the Default Configuration

After you have set up the CAP, the next step is to set up the NAP. The NAP consists of the following factory configured components:

- Cabinet complete with power bar and fans
- Cisco Catalyst 2924 Switch
- Cisco 2621 Router
- Exide 5119 Uninterruptible Power Supply (UPS)
- NMS Workstation complete with monitor, keyboard, mouse, internal backup tape unit, printer, and cables
- APC Back-UPS PRO 650 (NMS Workstation UPS)

The NAP components all use the default configuration shown in [NAP Configuration](#) on page 12.

**Figure 10 NAP Configuration**



Use the following procedure to set up a NAP:

1. Ensure that your NAP site has been prepared to support the NAP requirements, including power, grounding, and lightning protection.
2. Reconnect the Exide 5119 UPS battery. Refer to [Reconnecting the UPS Battery After Shipping](#) on page 9.
3. Plug the NAP UPS power cable into a 110 or 220 V AC power source using the provided cable.
4. Connect the backhaul equipment to a free RJ-45 Ethernet port on the front panel of the NAP switch. Backhaul equipment must provide transparent Ethernet Layer 2 transport between the NAP and CAP. Refer to [Setting up your Backhaul Equipment](#) on page 11 for more information.
5. Power up the NAP.

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