

Stratum 100 Wireless Ethernet Bridge

Installation
and
Maintenance
Guide



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FCC Regulatory Compliance

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

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 manuals, 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.

The following information is for FCC compliance of unlicensed, intentional radiators. This equipment complies with FCC Regulation 15.407 as relating to point-to-point wireless communication.

Modifications to this product not expressly approved by Wavespan Corporation could void the FCC approval and the user's right to operate the product.

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Safety Warning

Before aiming the antenna or working near the antenna, read all of this manual and follow the instructions carefully.



DO NOT STAND IN FRONT OF THE ANTENNA WHILE POWER IS ON.



Be sure to provide adequate grounding and lightning protection. Do not install the Outdoor Unit near overhead electrical wires.

This unit is intended for point-to-point operation over an unobstructed line-of-sight path. It is the responsibility of the installer to ensure the unit is properly installed in compliance with the FCC's guidelines for maximum permissible radio frequency exposure outlined in CFR 47 Section 1.1307(b)(1), preventing excess exposure to all persons. The installed radiating device should be inaccessible to unauthorized personnel. The installed unit should be positioned to guarantee no direct continuous exposure to people within 5 feet of the antenna. During installation use caution to avoid excess exposures to directed antenna radiation within 3 feet of the front of the antenna.

The transmit power output from the Stratum 100 is less than 15 milliwatts. However, after the gain of the standard 18-inch square antenna, the Effective Radiated Power is approximately 5.2 watts. Microwave radiation can cause tissue heating, potentially affecting the eyes, causing permanent damage to vision.

Precautions when Rack Mounting the Stratum 100

When rack mounting your Stratum 100, you should the following precautions for safety and to ensure proper operation of the equipment:

The maximum ambient temperature for the Stratum 100 IDU is 50degrees C. Care should be taken that when installed in a rack, whether closed or open, **the ambient temperature within the rack should not exceed 50 degrees C.**

Stratum 100 IDUs have fans and ventilation holes to ensure proper air flow and maintain correct internal temperature. **Do not block the fans or ventilation holes.**

When mounting any equipment in racks, **you must take into account mechanical loading of the rack.** Heavier equipment should be placed near the bottom of the rack and equipment should not be mounted in such a way as to cause instability. Special precautions should be taken with mountings that slide out for easier access to equipment. Such mountings can cause instability of the rack resulting in unsafe conditions and possible tipping of the rack.

Ensure that the power source, wiring and over-current protection to rack mounted equipment is rated such that it can support the cumulative load of all equipment. **Do not exceed the capacity of the wiring or over-current protection.**

Reliable grounding of the Stratum 100 is required.

The rack should also be grounded. If power distribution strips are used, ensure that they are properly grounded.

Contents

About this Manual.....	1
Whom This Manual is Intended For	1
Additional Reading	1
How This Manual Is Organized	1
Conventions	1
Introduction	3
Some Definitions	3
Standard Configuration	3
Installation	5
Installation Overview	5
Preliminary Preparation: The Path Survey & Cable Installation	5
Step 1. Installing and Mounting the ODUs	5
Step 2. Installing the Cabling from the IDUs to the ODUs	5
Step 3. Installing the IDUs	5
Step 4. Aiming the Antennas	5
Step 5. Connecting to Ethernet	6
Step 6. Verifying Correct System Operation	6
Step 7. (Optional) Connecting a Modem to the AUX Port	6
Step 8. Connecting to a PBX or other T1 device.	6
Assembling Tools and Cables Before You Begin	6
For installing the ODUs	6
For the cabling between each IDU and associated ODU unit	6
For installing the IDUs	6
Step 1. Installing and Mounting the ODUs	7
Setting Antenna Polarization	7
Attaching the Antenna Mount	7
Antenna Mast Requirements	7
Attaching Mount On Mast	7
Grounding the ODU and Mast	8
Lightning Protection	8
Step 2. Installing the Cabling from the IDUs to the ODUs	9
Routing Cables	9
Attaching the Cables	9
Weatherproofing the Outdoor Connectors	9
Step 3. Installing the IDUs	10
Environmental Requirements	10
Unpacking and Installing the Hardware	10
Attaching the Power Cable	10
Accessing the User Interface Software	12
Setting up the Second IDU	16

Step 4. Aiming the Antennas	17
Modulation Level	17
Transmit (Tx) Power	17
Understanding the Built-in Aiming LED Indicator	17
Aiming the First Antenna	18
Aiming the Second Antenna	18
Verifying the Aim and Path Quality	18
Canceling Antenna Aiming Mode	19
Bringing the Link Up	20
If there are Problems...	21
Step 5. Connecting to Ethernet	22
Connecting the Hardware	22
Setting the Ethernet Parameters	22
Connecting Ethernet to the Other IDU	22
Verifying Ethernet Connectivity	23
Step 6. Verifying Correct System Operation	24
Clearing Old Alarms and Events	24
Checking that Packets are Transmitting	24
Step 7. (Optional) Installing a Modem or other Device on the AUX Port	26
Configuring the Modem Settings for Administrators Dialing In	26
Configuring Dialing Out to Send SNMP Traps	26
Setting PPP Configuration for Other Devices	26
Step 8. Connecting to a PBX	27
Maintaining and Monitoring the Stratum 100	29
Understanding the LEDs on the Front Panel	29
Connecting to the Stratum 100	29
Using the Console Port	29
Using Telnet and a VT100 Terminal Emulator	31
Using Telnet and a Web Browser	32
Remote Access through the Modem on the AUX Port	33
PPP Access Through the AUX Port	34
Accessing a Stratum 100 From its Remote Companion Stratum 100 (Through the Wireless Link)	35
Using SNMP	36
Dialing Out with Alarms using SNMP	36
Navigating in the VT100 User Interface	38
Moving the Cursor	38
Selecting Menu Choices and Commands	38
Read-Only Fields	38
Editable Fields	38
Toggle Fields	38
Applying Changes	38
Exit to Previous Screen	38
Navigating in the HTML Interface	39
Viewing Alarms and Events	39
Clearing Old Alarms and Events	39
Performance Monitoring	39
Checking that Packets are Going Over the Wireless Link	40
Checking that Packets are Being Bridged to/from the Ethernet Link	41
Checking the Status of the T1 Link	43
Setting Security Parameters	45
Setting Passwords for Access	45
Changing the Automatic Logout Timer	45
Checking Incoming Calls on the AUX Port	46
Adjusting T1 Settings	46
Adjusting the PPP Parameters for Directly Connected Devices on the AUX Port	47
Changing the Communication Settings on the Console Port	47

Troubleshooting.....49

 Troubleshooting Strategies 49

 Diagnosing Problems using the LEDs on the Front Panel 50

 Understanding Alarms and Events 50

 Viewing Alarms and Events 50

 Clearing Old Alarms and Events 51

 Understanding the Different Alarm and Event Messages 52

 Running Diagnostics 53

 Running Diagnostic Tests 53

 Checking Software Versions and Configuration 54

 Installation Problems 54

 Other Common Problems 54

 Contacting Technical Support 55

 ... Through Your Reseller or Dealer 55

 ... Through Wavespan 55

Appendix A: Technical Specifications57

Index59

About this Manual

Thank you for purchasing a Wavespan Stratum 100 wireless Ethernet bridge.

Whom This Manual is Intended For

Additional Reading

How This Manual Is Organized

Conventions

Introduction

The Stratum 100 is a wireless Ethernet bridge designed to deliver dedicated full-duplex 100 Mbps connectivity with fiber reliability. The Stratum 100 transports all Ethernet traffic types in addition to providing connection for two T1 channels.

A standard configuration Stratum 100 link is shipped with a pair of Indoor Units (IDUs) and Outdoor Units (ODUs). The standard configuration ODUs include integrated 18-inch square flat antennas and two-axis adjustable antenna mounts. The 18-inch flat antennas will support a full-reliability link over distances from across the street to up to 5 miles.

Some Definitions

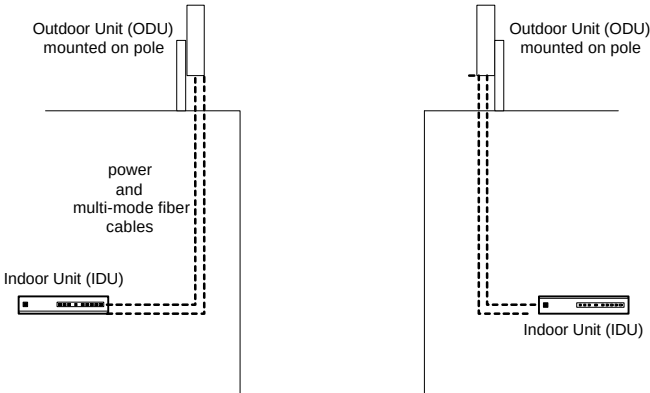
The Stratum 100 consists of two units:

- The **Indoor Unit (IDU)** is a rack-mounted unit which contains the electronic bridging components. The IDU can be located in any convenient climate-controlled location inside your building.
- The **Outdoor Unit (ODU)** consists of an antenna integrated with other system components. The ODU must be mounted within line of sight of another Stratum 100 (typically on the roof) in order for communications to occur.

In addition, the IDU and ODU communicate via two multi-mode fibers, one each for transmit and receive. An additional twisted pair connection is required to supply power from the IDU to the ODU.

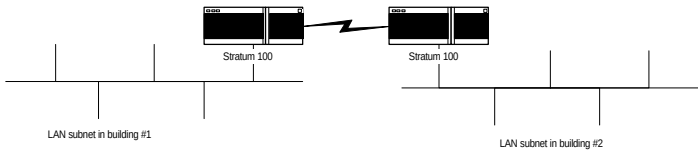
Standard Configuration

The diagram below shows the standard configuration, which has two buildings, each with their own roof-mounted ODU and the IDU inside the building bridging the traffic to the Ethernet.



Typical system configuration, showing the two ODUs, mounted on the roofs of two adjacent buildings and the associated IDUs located inside the buildings.

In topological (logical) terms, the Stratum 100 is simply a bridge between two subnets of your network as shown in the diagram below.



Installation

Installation Overview

The steps required to install the Stratum 100 are described below. The first step requires engineering experience and knowledge that is beyond the scope of this book.

Preliminary Preparation: The Path Survey & Cable Installation

Before beginning installation, you must have a path survey completed, including line-of-sight path planning, antenna supports, and pre-installation preparation. The path survey should also specify the expected signal strength between the two antennas. The path survey is typically done by your engineering staff or by your reseller. The process of doing a path survey is beyond the scope of this book. If you have questions or problems about the path survey, contact your reseller or Wavespan sales/technical support. The remainder of this manual assumes that you have completed the path survey and chosen locations for the IDUs and ODUs.

Step 1. Installing and Mounting the ODUs

As part of your path survey, an appropriate site must be selected for the two ODUs. Typically each ODU is attached to a pole on the roof, or in some cases, a tower. Installation of the appropriate pole or tower is not covered in this manual. Instead, installation should be in accordance with the findings of the Path Survey.

Note that your antenna supports require an earth ground for lightning and static protection.

Step 2. Installing the Cabling from the IDUs to the ODUs

After the ODU location has been chosen, you must run a multi-mode fiber cable and a twisted pair (DC power) cable from the ODU location to the IDU location.

Step 3. Installing the IDUs

Each IDU must be installed in either a rack or on a tabletop. Unpacking and setting up the IDU is described in detail below. Each IDU unit requires a controlled environment and an AC power outlet (3-prong, with ground).

Step 4. Aiming the Antennas

The next step requires you to aim the antennas so that they are correctly aligned and the signal strength is maximized.

Step 5. Connecting to Ethernet

Once the antennas have been correctly aimed, you can connect the IDUs to the network and allow data transmission to begin.

Step 6. Verifying Correct System Operation

When all of the other steps are complete, you must check that data transmission is occurring correctly.

Step 7. (Optional) Connecting a Modem to the AUX Port

A modem can be connected to the AUX port to allow remote dial-in management for the Stratum 100. This is an optional feature.

Step 8. Connecting to a PBX or other T1 device.

The Stratum 100 can be used to provide two high-speed T1 connections between buildings. These T1 channels can be used to interconnect PBXs, channel banks, video codecs or other T1 devices, channelized or unchannelized. The T1 interface is industry standard DSX-1.

Assembling Tools and Cables Before You Begin

You will need the following tools before beginning the installation:

For installing the ODUs

- ½” socket and/or open-end wrenches
- Philips screwdriver

For the cabling between each IDU and associated ODU unit

- 62.5 micron fiber, multi-mode 850 nanometer cable (for data transmission)
Two cables are required.
- Twisted pair cable (for DC power connection) 2 pairs of 18 AWG

Note that the cable length will be different for each IDU/ODU pair, depending on the distance between them.

For installing the IDUs

- 100Base-TX or 10Base-T cable suitable for connecting the Stratum 100 to your Ethernet network.
- OR
- Media Independent Interface Adpater suitable for connecting the Stratum 100 to your Ethernet network via another media such as fiber.
- PC or laptop running HyperTerminal, or an equivalent VT-100 emulator. The PC or laptop must have a serial port with DB-9 male connector or adapter to accept the DB-9 female connector on the supplied serial cable.

Step 1. Installing and Mounting the ODUs

The instructions below describe how to assemble and mount a single IDU. You must repeat the installation for each ODU.

Remove the ODU, pre-assembled Antenna Mount and Accessory Kit from their shipping cartons. Save all packing materials in case you need them later.

Using the foam packing material to **protect the painted surfaces of the antenna**, carefully place the ODU on a tabletop with the antenna facing down. The paint provides an important extra barrier to UV from sunlight.

Set aside the accessory kit. You will use this hardware to attach the antenna mount to the ODU, and to attach the complete ODU to a supporting mast.

Setting Antenna Polarization

Antenna polarization must be the same at both ends of any link. For single links, **vertical polarization** is a good default. There is no performance difference. For multiple links located on the same rooftop, alternating the antenna polarization of independent links is recommended.

If the coaxial connectors are facing **down** the antennas operate with **vertical** polarization. **Connectors facing right or left produces horizontal polarization.**

Attaching the Antenna Mount

Slightly loosen the six 5/16-18 bolts on the Antenna Mount slotted elevation arms and angle brackets so that they can be positioned for the next step.

Position the Antenna Mount on the ODU so that the **angle bracket attached to the two elevation arms** is along the edge with the coax connectors (vertical polarization). The other angle bracket is bolted to the opposite edge.

Use 5/16-20x1” hex-head bolts, flat washers and lock nuts at three corners of the ODU as shown. The next step describes the corner with the ground wire.

Locate the ground wire, which has #10 and 5/16” lugs on its ends.

Place a 1x5/16” hex head bolt through the 5/16” lug of the ground wire, followed by a 5/16” flat washer. Place this bolt, ground lug and flat washer through the angle bracket and ODU corner hole nearest to the #10 ground stud on the back plate of the ODU. Secure with a flat washer and lock nut as shown.

Tighten all four corner bolts securely.

Place a #10 flat washer over the #10 ground stud, followed by the ground wire and a #10 lock washer. Tighten this nut, but **do not over-torque**.

Note: Avoid scratching the painted surfaces of the ODU during antenna mount installation.

Antenna Mast Requirements

The *ODU* must be mounted on a **tubular steel or aluminum mast 1.9 to 3.9 inches in diameter using the remaining hardware supplied in the antenna mount accessory kit**. The mast must be stable, not able to bend or rotate under extreme weather conditions, and must provide a line-of-sight path to the other end of your link.

Attaching Mount On Mast

This section illustrates installation on a vertical mast. A horizontal support is perfectly acceptable.

Cut the length of rubber collar material (using a sharp knife) so that it wraps around your mast with a **small gap (.10 - .25 inch) between the ends**.

Select the proper size hose clamp and install the rubber collar securely on the mast. This collar is used to hold the weight of the *ODU* during installation and antenna alignment.

For masts **1.9 to 2.5 inches in diameter** use **3.5 inch** long hex-head bolts for each yoke. For masts **2.5 to 3.9 inches in diameter** use the **4.5 inch** long hex-head bolts.

Use a **safety rope, or second person** to hold the ODU in position on the mast, resting on the rubber collar as shown. Install the top clamping yoke first. Install the bottom yoke last.

Note: Be careful not to drop the ODU. The weather seals protecting the antenna and microwave transceiver can be damaged.

Visually aim the antenna as precisely as possible in azimuth and elevation. Use a map and compass to set the correct direction. Tighten both yokes and elevation arms securely until you are ready for antenna aiming.

Position mount on clamp, install top yoke first

Install bottom yoke last

Grounding the ODU and Mast

In Section 7.1 you connected the ODU’s ground stud to the antenna mount, which in turn must be grounded through the metallic mast. These important ground connections provide a short circuit path for static that could build up on the ODU, potentially damaging the microwave transceiver or degrading performance. This protection depends on the metallic mast or antenna support being properly connected to an earth ground.

A building’s electrical system ground is typically not a good earth ground because it can have high currents flowing through it that result from an imbalance in the distribution of the single-phase load throughout a building. Ground loops can result if two pieces of equipment are grounded to the electrical system ground and if there is a voltage difference between the ground points. For electrical protection it is important that the Stratum 100 Indoor and ODUs are grounded to an earth ground that does not have a voltage difference between the Indoor and ODUs.

Lightning Protection



Damage to your Stratum 100 Indoor or ODUs caused directly or indirectly by lightning is not covered under the manufacturer’s warranty.

If your ODU is located where nearby or direct lightning strikes are possible, especially on the top of a tall building, a lightning rod and grounding system installed by a licensed professional are highly recommended. In addition, the use of lightning arrestors in the two coaxial cables (located in-line at the cable entry point to the building or at the rear of the IDU) with an earth ground is highly recommended. Wavespan and its authorized resellers can recommend suppliers of suitable coaxial lightning arrestors with Type-N connectors and ground posts.

The purpose of in-line lightning arrestors in the coaxial cables is to protect the IDU from high voltages induced by nearby lightning or a direct lightning strike at the ODU. The ideal location for in-line lightning arrestors would be at the point where the coaxial cables enter the building. This involves separate cables from the ODU to the point of entry, and additional cables from there to the IDU. The next best approach is to locate in-line lightning arrestors at the rear of the IDU, with a separate heavy-guage (#10 or #8) earth ground running directly from the lightning arrestors to a proper grounding system.

Step 2. Installing the Cabling from the IDUs to the ODUs

Routing Cables

Label both ends of each cable, one cable for **Tx** (transmit) and one for **Rx** (receive), before you route them.

Run cables through existing roof vents if possible. Weatherproof the entry point and protect the cable from sharp metal edges. Secure the cable to prevent abrasion due to movement in the wind.

Attaching the Cables

Be sure that the IDU power switch is OFF before connecting the cables to the **ODU**.

Attach the Tx and Rx cables to their respective connectors on the Indoor and **ODUs**. Hand-tighten all connectors firmly.

Weatherproofing the Outdoor Connectors

Wrap the outdoor Tx and Rx coaxial connectors using CoaxSeal or similar weatherproofing tape to create a sealed moisture barrier around the connectors after they are tightened on the ODU.

Step 3. Installing the IDUs

Environmental Requirements

The IDU requires a protected environment with its temperature maintained between 0° and 55° C (32° – 131° F), and less than 95% relative humidity, non-condensing. The environment should be free from extremes in temperature, dust, humidity, shock, vibration and RF fields to ensure the IDU’s operation within published specifications.

Because the IDUs have cooling fans, they can be rack mounted or stacked without spaces between them. **A clearance of at least one inch on both sides is required for ventilation.** Be sure that the ventilating perforations on the sides and rear (near connectors) are not blocked by cables or other equipment. Better ventilation, resulting from air space around the IDU, improves equipment reliability.

Unpacking and Installing the Hardware

1. Remove the IDU from its shipping carton.
2. Locate and set aside the accessory kit (with cables and mounting hardware) supplied in this carton. Save all packing materials in case you need them later.
3. Read the FCC Regulatory Compliance notice and Safety Warnings at the beginning of this manual.

IDU Accessory Kit Packing List

The IDU Kit contains

- rack mounting brackets and hardware,
- rubber mounting feet, (for tabletop use only)
- AC line cord,
- RJ-45 console cable (straight-through CAT-5 cable),
- RJ-45-to-DB-9 console adapter, and
- clamp-on ferrite filter for the 10Base-T cable.

Rack Mounting the IDU

Three sets of rack mounting bracket hole patterns allow the IDU to be mounted with its connectors facing the rear or front. A center pattern also allows the IDU to be mounted in center rail racks or on the surface of a wall if the brackets are installed facing down as shown.

Attach the two rack mounting brackets on each side of the IDU as shown. Use four #8-32x1/2” Pan Head screws and #8 lock washers (under the screw head) for each bracket. Tighten the screws securely.

Mount the IDU in an equipment rack near your networking equipment (hub, server, switch, or router) to which it will be connected. Use two #12-24x3/4” screws in each rack bracket to mount the unit.

Tabletop Installation of the IDU

If you are installing the unit on a tabletop, attach the (4) self-adhesive rubber feet to the bottom of the unit near the corners. **The rubber feet are not used if you rack mount the IDU.**

Attaching the Power Cable

Make sure the ON/OFF switch is OFF or “0”. Attach the AC power cord to the rear of the unit and plug it into a grounded AC outlet. Do not turn the power on until you have connected the management console (described below).

Accessing the User Interface Software

Connecting the Management Console

Note: A straight-through data cable is provided for connecting your PC or laptop as a setup or management console.

Locate the data cable supplied in the accessory kit. Attach one end to the RJ-45 **CONSOLE** port connector on the rear of the Indoor Unit.

Install the **RJ-45 to DB-9 adapter** on the other end of this console cable.

Connect the **DB-9 adapter** to your PC or laptop **COM port**.

Note: It is important to use the DB-9 adapter supplied by Wavespan, even if you use a DB-9 to DB-25 adapter to match your PC or laptop COM port. The adapter supplied by Wavespan converts the RJ-45 CONSOLE port wiring to standard COM port wiring.

To perform the initial setup of the Stratum 100, you must connect a PC system running a VT-100 terminal emulator such as the HyperTerminal utility. The communications settings for the console terminal must be:

- 9600 baud
- 8 bits
- no parity
- 1 stop bit
- no flow control

Turning on the IDU

After you have finished mounting the IDU, connect the AC power cable to the back of the unit and turn on the power switch. Once the PC is attached to the console port and the power is turned on, you will see the following introductory screen:

Stratum 100 Wireless Broadband Communication System

Software Version 00.01c

Copyright (c) 1996 - 1998

Access Level: [?]

Password: [?]

Entering the Password

When it is configured at the factory, the Stratum 100 is preset to have the following:

Access Level: **superuser**
Password: **wavespan**

After you enter these two fields, the Main Menu screen will appear as shown below.

----- Stratum 100 Main Menu -----

System Status: STBY - NOT CONNECTED - ALARM

NEW [Alarms & Events..]

System Date/Time: 1999-02-19,11:06:18.0

----- Local -----

----- Remote -----

Device Name: DEFAULT ?

Device Location: DEFAULT ?

Link Description: DEFAULT ?

IDU Serial Number: 00000 ?

ODU Serial Number: ? ?

Ethernet Address: 00:60:c1:00:01:35 ?

IP Address: 192.168.10.134 ?

Alarms: DISABLED ?

[System Admin..]

[Reports..]

[Utilities..]

[Diagnostics..]

[Remote]

[Remote Exit]

[Logout]

Specifying Initial Settings

From the main menu, use the arrow key to move to the **System Admin** field. Press Enter to go to the system administration menu as shown below.

----- System Administration -----

System Status: STBY - NOT CONNECTED - ALARM

NEW [Alarms & Events..]

System Date/Time: [1999-02-19,11:16:01.0]

System Administrator: [DEFAULT]

Device Name: [DEFAULT]

Device Location: [DEFAULT]

Link Description: [DEFAULT]

Circuit Identifier: [DEFAULT]

Alarms: [Disabled]

Link Up/Down: [Down]

[Link Setup..]

[Passwords..]

[Console Port..]

[SNMP..]

[Ethernet Config..]

[T1 Config..]

[Modem Config..]

[PPP..]

[^Apply]

[^OK]

[^Cancel]

Enter correct values on the fields on this screen.



To update a field, use the down arrow key to move to that field. Type the desired value and press Enter. Then press the down arrow to move to the next field.

After all changes are made, press the down arrow until [^Apply] is highlighted, and press Enter to accept and save your changes.

If you do not choose [^Apply] your changes will not be saved.

First, set the correct date and time. This time should be very accurate as it will be used as a time stamp for the bridging functions of the Stratum 100.

The text fields displayed on this screen that are informational only. However it is useful to have correct values set here.

- The **System Administrator** field is a text string that contains the name of the administrator responsible for this Stratum 100 unit.
- The **Device Name** and **Device Location** simply specify text strings that identify this IDU/ODU combination.
- The **Link Description** and **Circuit Identifier** describe the location and circuit of the wireless link.

Finally, use the arrow key to go to the **Alarms** field. Press the space bar to toggle the value to **Enabled**.

Finally, press the down arrow until [^ **Apply**] is selected. Press Enter to apply and save your changes.

Alternately, you can press Ctrl A from anywhere on the screen to save your changes.

Setting Antenna Aiming Mode

Use the down arrow key to move to **Link Setup** and press Enter to go to the link setup menu.

----- Link Set-Up -----

System Status: AIMING - NOT CONNECTED - ALARMNEW [Alarms & Events..]

----- Link Parameters -----

Transmit Power Level: [Low]
Link ID: [DEFAULT]
Antenna Aiming: [Enabled]

[^Apply] [^OK] [^Cancel]

Specify the **Transmit PowerLevel** by using the space bar to toggle between low and high power. Typically low power is used for links spanning less than 800 feet and high power is used for links over longer distances.

Enter a 10-digit value for the **Link ID** field. This value will be used as a security hash code, and it **must** be the same value for both IDUs.

Set the **Antenna Aiming** field to be **Enabled**.

Press Ctrl A to apply your changes.

Use the down arrow to move to the **Ok** field and press Enter to leave this menu.

Setting the IP Address (Optional)

If you wish to access the IDU through Telnet for remote management, you must assign an IP address. If you will not be accessing the unit remotely, you can skip this step.

From the System Administration Menu, use the down arrow to go to **Ethernet Config** and press Enter to go to the Ethernet Configuration menu.



If you wish to manage the system remotely via SNMP, you must set an IP address.

Ethernet Configuration

System Status: OPERATE - CONNECTED - OK [Alarms & Events..]

Physical Interface

Auto Negotiation: [Disabled]
Speed: [10 Mb]
Duplex: [Half-Duplex]
Interface Type: [RJ45]

TCP/IP

IP Address: [192.168.3.202]
IP Subnet Mask: [255.255.255.0]
Default Gateway: [192.168.3.1]

Spanning Tree

Spanning Tree State: [Enabled]
Hello Time: [2]
Forward Delay: [15]
Max Age: [20]
Bridge Priority: [32768]
Port Cost: [100]
Port Priority: [128]

[^Apply] [^OK] [^Cancel]

Use the down arrow to go the **TCP/IP** section of the screen and enter the **IP Address**, **IP Subnet Mask**, and **Default Gateway** (if needed).

Press Ctrl A to apply your changes. Use the down arrow to go to **OK** and press Enter to leave this menu.

You have now specified all of the basic configuration parameters for the IDU and you can unplug the computer from the console port.

Setting up the Second IDU

The second IDU unit should be installed and configured in exactly the same way. Note that you must use the **same** Link ID for the second IDU.

Step 4. Aiming the Antennas

Modulation Level

The Wavespan 5800 operates using a default modulation level of 256-QAM for links in the range of 330 feet to 5 miles. This provides maximum throughput with full link reliability. For longer link distances a Wavespan 5800 system with the standard 18 inch flat antennas can be configured in software to operate using lower modulation levels, operating with slightly reduced throughput over longer distances with full reliability. Refer to the table at the bottom of this page that describes the relationship between modulation level, range, and throughput.

An optional configuration of the Outdoor Unit is available, without the standard 18-inch flat antenna, that provides a Type-N antenna connector for use with higher gain standard parabolic antennas. The use of optional parabolic antennas can support 10 Mbits/sec full-duplex throughput over distances up to 30 miles or more.

Transmit (Tx) Power

Set the same transmitter power output for both Master and Slave units in accordance with the table below. **Find the distance closest to the actual range of your link** and set the **Tx Power** parameter by typing the value shown, then press **ENTER**. If your link distance is greater than 5 miles, and your system is equipped with the standard 18-inch antennas, it will be necessary to set the modulation level lower than 256-QAM.

The positive Tx Power values must be typed **without a “+” sign**. The negative values must be typed as “-?”, **using the minus sign** followed by the single digit power level, without a space in-between.

If your link is shorter than 2 miles, it is important that you set the transmit power (**Tx PWR**) level of both ends as described. Excess transmit power for short link distances may cause unnecessary interference to other links, and overload of the receivers in your link, which can degrade the bit-error-rate performance, causing some dropped packets.

Understanding the Built-in Aiming LED Indicator

Note: The Outdoor Unit has a high-intensity LED that indicates signal acquisition and strength.

Aiming LED: Indications

1. On (solid) means the Outdoor Unit is being supplied power but is **not configured in aiming mode**.
2. One long flash every 5 seconds means that the local unit **is in aiming mode** but is **not able to lock on the aiming signal** from the other end. The Master is transmitting, the Slave is not.
3. Three quick flashes per second means the local unit is locked on the aiming signal **but is not aimed in the peak region (within 6 dB of the highest signal detected so far)**. **Both ends are transmitting**.
4. Fifteen quick flashes per second means that the local unit **is locked on the aiming signal and is aimed in the peak region (within 6 dB of the highest signal detected so far)**. A sampling circuit ‘remembers’ the highest level seen as you scan the antenna from side to side and top to bottom, allowing you to record and find the ‘edges’ of the peak region.
5. One quick flash every 10 seconds means the unit is in **normal operation, not in the aiming mode**.
6. Off (solid) means the unit is **off** or has a **cable fault**.

A (0 – 5 VDC) aiming voltage is also available on the BNC connector in the center.

The peak signal value is stored as you sweep side-to-side. The LED guides you back to the correct peak value.

Aiming Technique

Slowly (over about 5 seconds) sweep the Outdoor Unit in azimuth (side to side) covering a 90-degree arc, and in elevation covering a 30-degree arc (centered on the line-of-sight path). This will allow the peak sampling circuit to record the highest level in the center of the peak region. The link may go in and out of lock as you sweep; it will re-lock within 3 seconds. The peak signal level will be retained in memory as long as you are in aiming mode. The flash rate will be 15 per second in the narrow peak signal region, and 3 per second in the surrounding in-lock region. The peak signal region will be roughly 10 degrees wide with the standard 18-inch square antennas. The flashing pattern will guide you back to the peak.

By capturing the peak level one axis at a time, you can see the left and right or upper and lower edges of the peak. Position the antenna in the geometric center of the peak region in both azimuth and elevation for optimum link performance.

Note: Aiming is easiest if you have two people with cell phones for coordination, one at each antenna.

Aiming the First Antenna

1. Loosen the Bolts

You will need a 1/2-inch open-end or socket wrench for aiming. Make sure that the bolts on the upper and lower yokes have been loosened just enough to be able to rotate the antenna on the mast. The rubber collar supports the weight of the Outdoor Unit during aiming.

Antenna mount side view with rubber collar

Note: Re-read Antenna Aiming Technique to be sure you can ‘see’ the edges of the peak region.

2. Set Azimuth in Center of Peak Signal

Using the antenna aiming technique described in Section 13.2, watch the LED to find the edges of the peak signal while rotating the antenna 90 degrees in azimuth (side to side). Position the antenna in the center of the peak region. Tighten the upper and lower yokes securely on the mast.

Note: To position the antenna exactly in the center of the peak signal region you can use a permanent marker to identify the edges of the peak on the lower yoke or on the mast, and on the elevation arms for the step below.

3. Set Elevation in Center of Peak Signal

Loosen the two bolts holding the elevation arms at the angle bracket and the two bolts through the slots of both arms. Using the antenna aiming technique described above, watch the LED to find the peak signal while raising and lowering the antenna in elevation. Set the antenna in the center of the peak region. Securely tighten the four bolts at both ends of the elevation arms. Also securely tighten the two bolts on the upper angle bracket.

Aiming the Second Antenna

Repeat exactly this same process for the other end of your link.

The first unit’s antenna typically does not need to be re-aimed after the second is aimed. You can easily re-peak the first unit after the master end is aimed.

Verifying the Aim and Path Quality

It is important to check signal strength and link performance before using the link for ‘live’ network traffic. This will ensure that your line-of-sight path and antenna aiming are satisfactory. To check signal strength, connect to the user interface of either Stratum 100 unit (as described starting on page 12).

Receive Signal Strength Indicator (RSSI)

The **Report** screen shows the **RSSI** value which represents the average signal level on all clear channels, and is updated once per second during normal operation. To see the Reports screen, choose **Reports** from the main menu.

----- Reports -----

System Status: STBY - NOT CONNECTED - ALARM [Alarms & Events..]

System Name: DEFAULT

System Uptime: 1999-03-11,13:34:59.0

IDU Temperature: 0

ODU Temperature: 0

RSSI: 0

[T1 Channel 1 Status]

[T1 Channel 2 Status]

[Modem Status]

[LAN Status]

[Session Status]

[RF Link Status]

[^Cancel]

MODULATION	MIN. RSSI		TYP. RANGE	
			(18 inch antenna)	
256-QAM	-63	dBm	5	miles
64-QAM	-66	dBm	8	miles
16-QAM	-69	dBm	11	miles
QPSK	-74	dBm	18	miles

Typical RSSI values for clear paths

For a properly installed link at 5 miles, and a Tx Power output of +8 dBm, the typical **RSSI** value should be above **−63 dBm** (a smaller negative number in the range of −55 to −63 dBm) for 256-QAM operation. For lower level modulation the minimum RSSI values are shown above. **A Wavespan Stratum 100 link, with the standard 18-inch antenna or an optional higher gain parabolic antenna, must be set up to meet the minimum RSSI values in this table in order to deliver specified reliability in all weather conditions.**

If the RSSI value is more than 3 dB lower than the Aiming value or the values in the table above, one of the following is likely: (a.) the link has been set up over a distance that is too long, (b.) the antennas are not both aimed correctly, or (c.) there are obstacles blocking or too close to the line of sight path (inadequate Fresnel Zone clearance). It may operate satisfactorily, but will have lower fade margins than are ideal.

To ensure the lowest possible bit error rate and overall link reliability, the RSSI should not be operated higher than −55 dBm (it must be between −55 and the Minimum RSSI shown in the table above). If your link’s RSSI is higher than −55 dBm, set the transmit power of both ends lower (keeping both ends the same) until the level is −55 dBm on the average.

Canceling Antenna Aiming Mode

In the **Link Setup** screen, use the down arrow to move the highlight bar to **Antenna Aiming Mode**. Press the space bar to toggle the mode from Enabled to **Disabled** aiming mode. Choose [^Apply] to save your change, and then choose [^OK] to return to the System Administration screen.

Bringing the Link Up

From System Administration, use the down arrow to move to the **Link Up/Down** field and then press the space bar to toggle its value to **Up**.
Choose [^**Apply**] to save your change, and then choose [^**OK**] to return to the Main Menu screen.

If there are Problems...

Step 5. Connecting to Ethernet

Connecting the Hardware

Note: The MII port and 10Base-T port cannot both be used at the same time. Also, the AUI port is only half duplex.

Attach a data cable (not provided) to the **100Base-TX port** on the Indoor Unit. . For a hub or switch, use a straight through data cable. For a router use a crossover cable.

Install the snap-on ferrite filter **as close as possible to the rear panel RJ-45 connector** as shown. This snap-on filter is required on the 10Base-T cable for FCC certification of the Indoor Unit.

Plug the other end of this data cable into your network.

Setting the Ethernet Parameters

From the System Administration Menu, use the down arrow to go to **Ethernet Config** and press Enter to go to the Ethernet Configuration menu.

Ethernet Configuration

System Status: OPERATE - CONNECTED - OK [Alarms & Events..]

Physical Interface

Auto Negotiation: [Disabled]
Speed: [10 Mb]
Duplex: [Half-Duplex]
Interface Type: [RJ45]

TCP/IP

IP Address: [192.168.3.202]
IP Subnet Mask: [255.255.255.0]
Default Gateway: [192.168.3.1]

Spanning Tree

Spanning Tree State: [Enabled]
Hello Time: [2]
Forward Delay: [15]
Max Age: [20]
Bridge Priority: [32768]
Port Cost: [100]
Port Priority: [128]

[^Apply] [^OK] [^Cancel]

Use the down arrow to go the **Physical Interface** section of the screen. You must either enable **Auto Negotiation** or specifically set the speed and duplex. (These fields are toggled by pressing the space bar.) You must also specify the **Interface Type** (RJ45 or MII).

The IP address information in the **TCP/IP** section is only required if you will be accessing the unit remotely via Telnet.

If you wish to use spanning tree, you can set those parameters now.

Press Ctrl A to save (apply) your changes. Use the down arrow to go to **OK** and press Enter to leave this menu.

Connecting Ethernet to the Other IDU

Connect the Ethernet cable to the second IDU in the same manner as the first one. Use the console port to set the Ethernet parameters.

Verifying Ethernet Connectivity

From the Main Menu, use the down arrow to highlight the [**Diagnostics**] selection and press Enter to go to the Diagnostics menu.

----- Diagnostics -----
System Status: STBY - NOT CONNECTED - ALARMNEW [Alarms & Events..]

----- Ping Test -----
Target IP Addr: [0.0.0.0]Target:
Timeout (seconds): [0]Count: 0
[Start_Ping] [Stop_Ping]

----- Loopback Tests -----
T1 Ch 1: [DISABLE]
T1 Ch 2: [DISABLE]
System: [DISABLE]
[Apply_Loopback]

----- BER Tests -----
Channel: [T1_Ch1]Test: [Mark]
Time: 0Errors: 0Rate: 0
[Start_BER] [Stop_BER] [Reset_Counters]

----- Other Tests -----
[View Power-On-Self-Test Results][^Cancel]

To verify Ethernet connectivity, enter the IP address of the remote Stratum 100 in the **Target IP Addr:** field. Set the **Timeout** value with the number of seconds to perform the ping test. Pings will be sent once per second for the specified time.

Use the down arrow to highlight the [**Start_Ping**] choice and press Enter to begin the test.

As the test proceeds, the **Target** field will be updated to show if the target responded. This field will display **Not Found** if the target does not respond. If the target responds correctly, this field will display **Alive**.

Step 6. Verifying Correct System Operation

To verify that the system is operating correctly, connect a PC system to the serial console port of one of the IDUs and log in to the system as described starting on page 12.

Clearing Old Alarms and Events

While the system was being configured, a number of spurious alarms were generated. It will be easier to see if the system is working correctly if those alarms are deleted. To do this, from the Main Menu, use the down arrow to move to the **Alarms and Events..** item. Press Enter to go to the Alarms menu.

----- Alarms & Event Log -----		
System Status: OPERATE - NOT CONNECTED - ALARM		
Time Stamp	Description	Type

1999-03-11,13:35:07.0	ODU Link Failure	A
1999-03-11,13:35:03.0	Warm Start	E
1999-03-11,08:32:43.0	System Diagnostic Ended	E
1999-03-11,08:20:04.0	System Diagnostic Started	E
1999-03-11,08:19:58.0	System Diagnostic Ended	E
1999-03-11,08:19:16.0	System Diagnostic Started	E
1999-03-11,08:19:13.0	System Diagnostic Ended	E
1999-03-11,08:18:58.0	System Diagnostic Started	E
1999-03-11,08:18:51.0	System Diagnostic Ended	E
1999-03-11,08:18:39.0	System Diagnostic Started	E
1999-03-11,08:18:37.0	System Diagnostic Ended	E
1999-03-11,08:18:11.0	System Diagnostic Started	E
1999-03-11,08:18:04.0	System Diagnostic Ended	E
1999-03-11,08:17:47.0	System Diagnostic Started	E

[Clear All Alarms]	[Clear All Events]	Mode: [WRAP WHEN FULL]
[Page Up]	[Page Down] [Home] [End]	[^Apply] [^OK] [^Cancel]

Use the down arrow to go to the **Clear All Alarms** item. Press Enter.

Use the down arrow to go to the **Clear All Events** item. Press Enter.

Use the down arrow to go to **OK** and press Enter to leave the screen.

Checking that Packets are Transmitting

From the Main Menu, use the down arrow to move to the **Reports..** selection. Press Enter to display the Reports Menu.

----- Reports -----

System Status: OPERATE - NOT CONNECTED - ALARMNEW [Alarms & Events..]

System Name: DEFAULT

System Uptime: 1999-03-11,13:34:59.0

IDU Temperature: 0

ODU Temperature: 0

RSSI: 0

[T1 Channel 1 Status]

[T1 Channel 2 Status]

[Modem Status]

[LAN Status]

[Session Status]

[RF Link Status]

[^Cancel]

Checking that Packets are Going Over the Wireless Link

Use the down arrow to select **RF Link Status**. Press Enter to display that report. When the link is working correctly, the **Rx Corrupt Packets** and **Rx Overruns** should both be zero.

When packets are being transmitted, the **Tx Packet Count** and the **Rx Packet Count** fields will increase as data is transmitted across the wireless link. To verify that these counts are increasing, wait for a few seconds and then press Ctrl U to update the counters.

Use the down arrow to move to **Cancel** and press Enter to leave this report screen.

Checking that Packets are Being Bridged to/from the Ethernet Link

From the Reports Menu, use the down arrow to go to **LAN Status** and press Enter to display that report.

The **Rx** counter shows the number of packets that were received from the Ethernet link and bridged. The **Tx** counter shows the number of packets that were received from the wireless link and transmitted to the Ethernet link.

Note that Ethernet packets and RF packets are not the same thing, because of the different transmission requirements of the two media.

Use the down arrow to move to **Cancel** and press Enter to leave this report screen.

Step 7. (Optional) Installing a Modem or other Device on the AUX Port

The AUX port on the back of the Stratum 100 is a standard RJ45 connector. You may connect any standard modem to that port. You can then manage the Stratum 100 by dialing directly into the modem.

To do this, simply connect a standard RJ45 serial cable to your modem.

Configuring the Modem Settings for Administrators Dialing In

System Admin
Modem Config

----- Modem Configuration -----

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

Dial String 1: [AT]

Dial String 2: [AT]

Init String 1: [AT]

Init String 2: [AT]

Dial Out Time Interval: [60]

Dial Out Attempts: [5]

----- Port Parameters -----

Baud Rate: [9600]

Stop Bits: [1]

Parity: [None]

Handshake: [None]

Data Bits: [8]

[^Apply] [^OK] [^Cancel]

Configuring Dialing Out to Send SNMP Traps

Setting PPP Configuration for Other Devices

26 • Installation

Stratum 100 Installation and Maintenance Guide

Step 8. Connecting to a PBX

Maintaining and Monitoring the Stratum 100

Understanding the LEDs on the Front Panel

On the front panel of the Stratum 100 are LEDs that provide a quick verification that the unit is operating correctly. The LEDs are also discussed in more detail in the Troubleshooting section, beginning on page xx.

LED Name	Normal Display:	... which Indicates:
Status	off	No alarms or events.
Test	off	No testing currently in progress.
RF Link	on (solid green)	RF link to companion Stratum 100 is active and available.
LAN Link	on (solid green)	LAN is available. This applies only if the RJ45 link is being used. If using MII, check the MII adapter for status LEDs.
LAN Tx	blinking green	Each blink indicates a packet received from the RF link and sent to the Ethernet.
LAN Rx	blinking green	Each blink indicates a packet received from the Ethernet.
Dx	on (solid green)	Full duplex. Applies to RJ45 link only; if using MII, check the MII adapter for status LEDs.
	on (solid amber)	Half duplex. Applies to RJ45 link only; if using MII, check the MII adapter for status LEDs.
10/100	on (solid green)	100 Mbps operation
	on (solid amber)	10 Mbps operation
		If no data is being received, then this LED will be solid amber.
T1 CH1	green	Channel receiving ok; if the T1 channel is disabled, this LED will be off.
T1 CH2	green	Channel receiving ok; if the T1 channel is disabled, this LED will be off.

Connecting to the Stratum 100

Using the Console Port

The RJ45 connector on the back of the Stratum 100 labeled CONSOLE allows you to connect any standard RS232C terminal emulator that supports VT100. Of course this method

requires physical access to one of the Stratum 100 IDU units (both units, if the wireless link is not available).

Note: It is important to use the DB-9 adapter supplied by Wavespan, even if you use a DB-9 to DB-25 adapter to match your PC or laptop COM port. The adapter supplied by Wavespan converts the RJ-45 CONSOLE port wiring to standard COM port wiring.

The simplest way to access the console is to connect a PC system running a VT-100 terminal emulator such as the HyperTerminal utility. The communications settings for the console terminal must be:

- 9600 baud
- 8 bits
- no parity
- 1 stop bit
- no flow control

Once the PC is attached to the console port and the power is turned on, you will see the following introductory screen:

Stratum 100 Wireless Broadband Communication System

Software Version 00.01c

Copyright (c) 1996 - 1998

Access Level: [?]

Password: [?]

Entering the Password

When it is configured at the factory, the Stratum 100 is preset to have the following:

Access Level: **superuser**

Password: **wavespan**

After you enter these two fields, the Main Menu screen will appear and you can monitor and manage the Stratum 100 as described later in this manual.

Using Telnet and a VT100 Terminal Emulator

If you have configured an IP address for your Stratum 100, you can access it using Telnet. To do this, simply use your standard Telnet utility and specify the IP address of the Stratum 100. Once the Telnet connection has been established, you will be able to see the following introductory screen:

Stratum 100 Wireless Broadband Communication System

Software Version 00.01c

Copyright (c) 1996 - 1998

Access Level: [?]]

Password: [?]]

Entering the Password

When it is configured at the factory, the Stratum 100 is preset to have the following:

Access Level: **superuser**

Password: **wavespan**

After you enter these two fields, the Main Menu screen will appear as shown below.

----- Stratum 100 Main Menu -----

System Status: STBY - NOT CONNECTED - ALARM

NEW [Alarms & Events..]

System Date/Time: 1999-02-19,11:06:18.0

----- Local -----

----- Remote -----

Device Name: DEFAULT ?

Device Location: DEFAULT ?

Link Description: DEFAULT ?

IDU Serial Number: 00000 ?

ODU Serial Number: ? ?

Ethernet Address: 00:60:c1:00:01:35 ?

IP Address: 192.168.10.134 ?

Alarms: DISABLED ?

[System Admin..] [Reports..] [Utilities..] [Diagnostics..]

[Remote] [Remote Exit] [Logout]

Using Telnet and a Web Browser

You can also access the Stratum 100 interface using Telnet and a Web browser. Simply specify the IP address of the Stratum 100 in the **Address** field of your browser, and the HTML interface will appear:

<<screen shot>>

Remote Access through the Modem on the AUX Port

If you have connected an optional modem to the AUX port, you can access the Stratum 100 remotely by dialing in to the modem. Once the dial connection is established, you will see the opening screen:

Stratum 100 Wireless Broadband Communication System

Software Version 00.01c

Copyright (c) 1996 - 1998

Access Level: [?]]

Password: [?]]

Entering the Password

When it is configured at the factory, the Stratum 100 is preset to have the following:

Access Level: **superuser**

Password: **wavespan**

After you enter these two fields, the Main Menu screen will appear as shown below.

----- Stratum 100 Main Menu -----

System Status: STBY - NOT CONNECTED - ALARM NEW [Alarms & Events..]

System Date/Time: 1999-02-19,11:06:18.0

----- Local ----- ----- Remote -----

Device Name: DEFAULT ?

Device Location: DEFAULT ?

Link Description: DEFAULT ?

IDU Serial Number: 00000 ?

ODU Serial Number: ? ?

Ethernet Address: 00:60:c1:00:01:35 ?

IP Address: 192.168.10.134 ?

Alarms: DISABLED ?

[System Admin..] [Reports..] [Utilities..] [Diagnostics..]

[Remote] [Remote Exit] [Logout]

PPP Access Through the AUX Port

The AUX port can also be used for direct access (similar to the CONSOLE port). The AUX port uses PPP and it is typically connected to a terminal server or PBX.

To set the PPP parameters of the AUX port choose **System Admin** and then select **PPP..** from the **System Administration** screen.

----- PPP Configuration -----

System Status: STBY - NOT CONNECTED - ALARMNEW [Alarms & Events..]

----- PPP Options -----

Connection Types: [NONE]User: [default]

Remote IP: [127.0.0.1]

Authentication: [PAP][Dial Out] [Hangup]

----- Secrets File -----

[]

[]

[]

[]

----- Options -----

[]

[]

Link Status:

[^Apply] [^OK] [^Cancel]

<<description of fields>>

If you are connected to a Stratum 100 IDU, and the wireless link is up, you can log in to the companion Stratum 100 by choosing the **System Admin..** command from the main menu. From the System Administration screen, select **Remote** to log on to the remote IDU.

Stratum 100 Wireless Broadband Communication System

Copyright (c) 1996 - 1998

When it is configured at the factory, the Stratum 100 is preset to have the following:

Password: **wavespan**

```

----- Stratum 100 Main Menu -----
System Status: STBY - NOT CONNECTED - ALARM      NEW [ Alarms & Events.. ]

System Date/Time:      1999-02-19,11:06:18.0

----- Local -----          ----- Remote -----

Device Name:           DEFAULT          ?
Device Location:       DEFAULT          ?
Link Description:      DEFAULT          ?
IDU Serial Number:     000000          ?
ODU Serial Number:     ?                ?
Ethernet Address:      00:60:c1:00:01:35 ?
IP Address:            192.168.10.134  ?
Alarms:                DISABLED        ?

-----
[ System Admin.. ]  [ Reports.. ]  [ Utilities.. ]  [ Diagnostics.. ]

[ Remote ]          [ Remote Exit ]                  [ Logout ]
-----

```

Stratum 100 Installation and Maintenance Guide

Using SNMP

Once the Stratum 100 is installed, you can use SNMP to manage and monitor it. To enable traps by your SNMP manager, you must first access the Stratum 100 through some other method (e.g. through the console port) and configure SNMP access.

To enable SNMP management, select **System Admin..** from the main menu. Then choose **SNMP** from the System Administration screen.

----- SNMP Management -----

System Status: STBY - NOT CONNECTED - ALARM [Alarms & Events..]

Read Community String: [public]

Write Community String: [private]

Trap Community String: [snmptrap]

SNMP Trap Destinations IP Addr Screening

[0.0.0.0] [0.0.0.0]

[0.0.0.0] [0.0.0.0]

[0.0.0.0] [0.0.0.0]

[0.0.0.0] [0.0.0.0]

[0.0.0.0] [0.0.0.0]

SNMP Agent: [Disabled]

IP Screening: [Disabled]

[^Apply] [^OK] [^Cancel]

Enter the desired values on the SNMP Management screen. Then choose the **SNMP Agent** field and use the space bar to toggle the value to **Enabled**.

Choose **Apply** to save your changes and then select **OK** to close the screen.

Dialing Out with Alarms using SNMP

You can also configure the AUX port to be used as a dial out line to send SNMP traps to a specified location. To do this, choose **System Admin** from the main menu. From the System Administration screen, select **Modem Config** to set up the dial out information.

----- Modem Configuration -----

System Status: STBY - NOT CONNECTED - ALARM

NEW [Alarms & Events..]

Dial String 1: [AT]

Dial String 2: [AT]

Init String 1: [AT]

Init String 2: [AT]

Dial Out Time Interval: [60]

Dial Out Attempts: [5]

----- Port Parameters -----

Baud Rate: [9600]

Stop Bits: [1]

Parity: [None]

Handshake: [None]

Data Bits: [8]

[^Apply] [^OK] [^Cancel]

<<description of fields>>

Stratum 100 Installation and Maintenance Guide

Maintaining and Monitoring the Stratum 100 • 37

Navigating in the VT100 User Interface

The user interface uses standard VT100 conventions.

Moving the Cursor

The **UP/DOWN arrow keys** move the cursor to the next or previous selection (see Accessing the User Interface Console). The **TAB** key also advances the cursor to the next selection.

Selecting Menu Choices and Commands

Selectable items are shown in square brackets. For example,

[Modem Status]

Selectable items that also have a keyboard are shown with the

Read-Only Fields

These fields display information that cannot be edited in the current screen. They might be edited in another screen. The cursor will not highlight Read-Only fields.

Editable Fields

You may type any alpha or numeric characters in Editable Fields. The backspace key can be used in these fields. You must press **ENTER** before going on, to register the new contents.

Toggle Fields

Use the **space bar** to select the fixed choices. (You do not need to press Enter after setting a toggle field).

Applying Changes

Type **CTRL A** (or move cursor to ^**Apply** and press ENTER) to apply changed settings without exiting this screen. **Changes only take effect if you apply them.** Type **CTRL O** (or ^OK) to apply changes and exit to the previous screen. Some changes in the Link Setup screen will automatically reboot the system when you apply them (you will be prompted first).

Exit to Previous Screen

Type **CTRL C** to **EXIT** the display of this screen and go back to the previous screen. If you had not applied any changes, they will not be retained after exiting the current screen.

Navigating in the HTML Interface

The HTML interface uses different conventions for navigating through the screens.

Viewing Alarms and Events

Clearing Old Alarms and Events

While the system was being configured, a number of spurious alarms were generated. It will be easier to see if the system is working correctly if those alarms are deleted. To do this, from the Main Menu, use the down arrow to move to the **Alarms and Events..** item. Press Enter to go to the Alarms menu.

----- Alarms & Event Log -----		
System Status: OPERATE - NOT CONNECTED - ALARM		
Time Stamp	Description	Type

1999-03-11,13:35:07.0	ODU Link Failure	A
1999-03-11,13:35:03.0	Warm Start	E
1999-03-11,08:32:43.0	System Diagnostic Ended	E
1999-03-11,08:20:04.0	System Diagnostic Started	E
1999-03-11,08:19:58.0	System Diagnostic Ended	E
1999-03-11,08:19:16.0	System Diagnostic Started	E
1999-03-11,08:19:13.0	System Diagnostic Ended	E
1999-03-11,08:18:58.0	System Diagnostic Started	E
1999-03-11,08:18:51.0	System Diagnostic Ended	E
1999-03-11,08:18:39.0	System Diagnostic Started	E
1999-03-11,08:18:37.0	System Diagnostic Ended	E
1999-03-11,08:18:11.0	System Diagnostic Started	E
1999-03-11,08:18:04.0	System Diagnostic Ended	E
1999-03-11,08:17:47.0	System Diagnostic Started	E

[Clear All Alarms]	[Clear All Events]	Mode: [WRAP WHEN FULL]
[Page Up]	[Page Down] [Home] [End]	[^Apply] [^OK] [^Cancel]

Use the down arrow to go to the **Clear All Alarms** item. Press Enter.

Use the down arrow to go to the **Clear All Events** item. Press Enter.

Use the down arrow to go to **OK** and press Enter to leave the screen.

Performance Monitoring

A variety of reports and statistics are provided to help you check system performance and manage the Stratum 100.

From the Main Menu, use the down arrow to move to the **Reports..** selection. Press Enter to display the Reports Menu.

----- Reports -----

System Status: OPERATE - NOT CONNECTED - ALARMNEW [Alarms & Events..]

System Name: DEFAULT

System Uptime: 1999-03-11,13:34:59.0

IDU Temperature: 0

ODU Temperature: 0

RSSI: 0

[T1 Channel 1 Status]

[T1 Channel 2 Status]

[Modem Status]

[LAN Status]

[Session Status]

[RF Link Status]

[^Cancel]

Checking that Packets are Going Over the Wireless Link

Use the down arrow to select **RF Link Status**. Press Enter to display that report.

----- RF Link Status -----

System Status: STBY - NOT CONNECTED - ALARM[Alarms & Events..]

----- Local -----

Tx Pkt Count: 763

Tx Byte Count: 48832

Rx Pkt Count: 0

Rx Byte Count: 0

Rx Bcast: 0

Rx Mcast: 0

Rx Corrupt Packets: 0

Rx Overruns: 0

----- Remote -----

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[RF Pkt Interval][RF Error Interval]

Start Time: 1999-03-15,10:43:52.0[^Update][Clear][^Cancel]

When the link is working correctly, the **Rx Corrupt Packets** and **Rx Overruns** should both be zero.

When packets are being transmitted, the **Tx Packet Count** and the **Rx Packet Count** fields will increase as data is transmitted across the wireless link. To verify that these counts are increasing, wait for a few seconds and then press Ctrl U to update the counters.

Choosing **RF Pkt Interval** will display a screen that shows packet intervals. <<??>>

----- RF Packet Intervals -----									
System Status: STBY - NOT CONNECTED - ALARM					[Alarms & Events..]				
Local: Current Interval 04:45					Remote: Current Interval 04:45				
	TxPkt	RxPkt	Brdcast		TxPkt	RxPkt	Brdcast		
00:00	0	0	0		?	?		?	
00:15	0	0	0		?	?		?	
00:30	0	0	0		?	?		?	
00:45	0	0	0		?	?		?	
01:00	0	0	0		?	?		?	
01:15	0	0	0		?	?		?	
01:30	0	0	0		?	?		?	
01:45	0	0	0		?	?		?	
02:00	0	0	0		?	?		?	
02:15	0	0	0		?	?		?	
02:30	0	0	0		?	?		?	
02:45	0	0	0		?	?		?	
03:00	0	0	0		?	?		?	
03:15	0	0	0		?	?		?	

[Page Up] [Page Down] [Home] [End]					[^Update] [^Cancel]				

Choosing RF Error Interval will display a screen that shows error intervals. <<??>>									
----- Error Intervals -----									
System Status: STBY - NOT CONNECTED - ALARM					[Alarms & Events..]				
Local: Current Interval 04:45					Remote: Current Interval 04:45				
	RxCorrpt	RxOvrns			RxCorrpt	RxOvrns			
00:00	0	0			?	?			
00:15	0	0			?	?			
00:30	0	0			?	?			
00:45	0	0			?	?			
01:00	0	0			?	?			
01:15	0	0			?	?			
01:30	0	0			?	?			
01:45	0	0			?	?			
02:00	0	0			?	?			
02:15	0	0			?	?			
02:30	0	0			?	?			
02:45	0	0			?	?			
03:00	0	0			?	?			
03:15	0	0			?	?			

[Page Up] [Page Down] [Home] [End]					[^Update] [^Cancel]				

Use the down arrow to move to **Cancel** and press Enter to leave this report screen.

Checking that Packets are Being Bridged to/from the Ethernet Link

From the Reports Menu, use the down arrow to go to **LAN Status** and press Enter to display that report.

----- LAN Status -----			
System Status: STBY - NOT CONNECTED - ALARM		[Alarms & Events..]	
----- Local -----		----- Remote -----	
Tx Pkt Count:	30302		?
Rx Pkt Count:	0		?
Rx Bcast:	0		?
Rx Mcast:	0		?
Tx Discarded Pkt:	0		?
Tx Deferred :	0		?
Tx Errored :	3		?
Tx Frames Lost:	0		?
Collisions :	3		?
Rx Discarded Pkt:	0		?
Rx Bad CRC :	0		?
Rx Oversize :	0		?
Rx Jabber :	0		?
Rx Alignment Errors:	0		?

Link: READY	Auto-Neg: DISABLED	Speed: 100 MB	Duplex: FULL-DUPLEX
[LAN Pkt Intvls] [Tx Error Intvls] [Rx Error Intvls]			
-----1999-03-15,10:43:52.0 -----[^Update]-[Clear]-[^Cancel]--			

The **Rx** counter shows the number of packets that were received from the Ethernet link and bridged. The **Tx** counter shows the number of packets that were received from the wireless link and transmitted to the Ethernet link.

Note that Ethernet packets and RF packets are not the same thing, because of the different transmission requirements of the two media.

Use the down arrow to move to **Cancel** and press Enter to leave this report screen.

LAN Pkt Intvls

----- LAN Packet Intervals -----							
System Status: STBY - NOT CONNECTED - ALARM				[Alarms & Events..]			
Local: Current Interval 05:00				Remote: Current Interval 05:00			

	TxPkt	RxPkt	Brdcast		TxPkt	RxPkt	Brdcast
00:00	75	0	0	?	?	?	?
00:15	75	0	0	?	?	?	?
00:30	75	0	0	?	?	?	?
00:45	75	0	0	?	?	?	?
01:00	75	0	0	?	?	?	?
01:15	75	0	0	?	?	?	?
01:30	75	0	0	?	?	?	?
01:45	75	0	0	?	?	?	?
02:00	75	0	0	?	?	?	?
02:15	75	0	0	?	?	?	?
02:30	75	0	0	?	?	?	?
02:45	75	0	0	?	?	?	?
03:00	75	0	0	?	?	?	?
03:15	75	0	0	?	?	?	?

[Page Up] [Page Down] [Home] [End]				[^Update] [^Cancel]			

Tx Error Intvls

----- Tx Error Intervals -----										
System Status: STBY - NOT CONNECTED - ALARM						[Alarms & Events..]				
Local: Current Interval 05:00						Remote: Current Interval 05:00				
	TxDrp	TxErd	TxLost	TxDef	Coll	TxDrp	TxErd	TxLost	TxDef	Coll
00:00	0	0	0	0	0	?	?	?	?	?
00:15	0	0	0	0	0	?	?	?	?	?
00:30	0	0	0	0	0	?	?	?	?	?
00:45	0	0	0	0	0	?	?	?	?	?
01:00	0	0	0	0	0	?	?	?	?	?
01:15	0	0	0	0	0	?	?	?	?	?
01:30	0	0	0	0	0	?	?	?	?	?
01:45	0	0	0	0	0	?	?	?	?	?
02:00	0	0	0	0	0	?	?	?	?	?
02:15	0	0	0	0	0	?	?	?	?	?
02:30	0	0	0	0	0	?	?	?	?	?
02:45	0	0	0	0	0	?	?	?	?	?
03:00	0	0	0	0	0	?	?	?	?	?
03:15	0	0	0	0	0	?	?	?	?	?

[Page Up] [Page Down] [Home] [End]						[^Update] [^Cancel]				

Rx Error Intvl

----- Rx Error Intervals -----										
System Status: STBY - NOT CONNECTED - ALARM						[Alarms & Events..]				
Local: Current Interval 05:00						Remote: Current Interval 05:00				
	RxDrp	RxCRC	RxGnt	RxJab	RxAlg	RxDrp	RxCRC	RxGnt	RxJab	RxAlg
00:00	0	0	0	0	0	?	?	?	?	?
00:15	0	0	0	0	0	?	?	?	?	?
00:30	0	0	0	0	0	?	?	?	?	?
00:45	0	0	0	0	0	?	?	?	?	?
01:00	0	0	0	0	0	?	?	?	?	?
01:15	0	0	0	0	0	?	?	?	?	?
01:30	0	0	0	0	0	?	?	?	?	?
01:45	0	0	0	0	0	?	?	?	?	?
02:00	0	0	0	0	0	?	?	?	?	?
02:15	0	0	0	0	0	?	?	?	?	?
02:30	0	0	0	0	0	?	?	?	?	?
02:45	0	0	0	0	0	?	?	?	?	?
03:00	0	0	0	0	0	?	?	?	?	?
03:15	0	0	0	0	0	?	?	?	?	?

[Page Up] [Page Down] [Home] [End]						[^Update] [^Cancel]				

Checking the Status of the T1 Link

- Reports
- T1 Channel 1 Status / T1 Channel 2 Status

T1 Channel 1 Status

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

Channel 1 Alarm Status:

NO ALARM

----- Local -----

Error

Severely Error

Severely Error Framing

Unavailable

Line Error

Burst Error

Degraded

% AS

% EFS

% ES

% SES

% DM

% BES

0

0

0

0

0

0

0

0

0

0

0

0

0

----- Remote -----

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[T1 Channel 1 Intervals]

[T1 Channel 1 Statistics]

-----1999-03-15,10:43:52.0 -----

[^Update]-[Clear]-[^Cancel]-

T1 Channel 1 intervals

T1 Channel 1 Intervals

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

Local: Current Interval 04:45

Remote: Current Interval 04:45

ES

SES

SEFS

US

BES

DM

LES

00:00

00:15

00:30

00:45

01:00

01:15

01:30

01:45

02:00

02:15

02:30

02:45

03:00

03:15

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[Page Up] [Page Down] [Home] [End]

[^Update] [^Cancel]

T1 Channel 1 Statistics

----- T1 Channel 1 Statistics -----													
System Status: STBY - NOT CONNECTED - ALARM							[Alarms & Events..]						
Local: Current Interval 04:45							Remote: Current Interval 04:45						
	%AS	%EFS	%ES	%SES	%DM	%BES	%AS	%EFS	%ES	%SES	%DM	%BES	
00:00	0	0	0	0	0	0	?	?	?	?	?	?	?
00:15	0	0	0	0	0	0	?	?	?	?	?	?	?
00:30	0	0	0	0	0	0	?	?	?	?	?	?	?
00:45	0	0	0	0	0	0	?	?	?	?	?	?	?
01:00	0	0	0	0	0	0	?	?	?	?	?	?	?
01:15	0	0	0	0	0	0	?	?	?	?	?	?	?
01:30	0	0	0	0	0	0	?	?	?	?	?	?	?
01:45	0	0	0	0	0	0	?	?	?	?	?	?	?
02:00	0	0	0	0	0	0	?	?	?	?	?	?	?
02:15	0	0	0	0	0	0	?	?	?	?	?	?	?
02:30	0	0	0	0	0	0	?	?	?	?	?	?	?
02:45	0	0	0	0	0	0	?	?	?	?	?	?	?
03:00	0	0	0	0	0	0	?	?	?	?	?	?	?
03:15	0	0	0	0	0	0	?	?	?	?	?	?	?
[Page Up] [Page Down] [Home] [End]							[^Update] [^Cancel]						

Setting Security Parameters

Setting Passwords for Access

System Admin
Passwords..

```
----- WS5800 System Passwords -----
System Status: STBY - NOT CONNECTED - ALARM           [ Alarms & Events.. ]

---- User ID ----   ---- Password ----

SuperUser:          [wavespan          ]
Maintenance:        [                  ]
Operator:           [wavespan          ]
User:               [wavespan          ]

[ ^Apply ] [ ^OK ] [ ^Cancel ]
-----
```

Checking Incoming Calls on the AUX Port

Reports
Modem Status

----- Modem Status -----		
System Status: STBY - NOT CONNECTED - ALARM		[Alarms & Events..]
	---- Local ----	---- Remote ----
Incoming Call Count:	0	?
Outgoing Call Count:	0	?
Unsuccessful Incoming Call Count:	0	?
Unsuccessful Outgoing Call Count:	0	?
Incoming Connect Time:	00:00:00	?
Outgoing Connect Time:	00:00:00	?
[Zero Stats]		
Start Time: 1999-03-11,13:35:01.0		[^Update] [^Cancel]

Zeroing the Stats

Looking at Session Status

Reports
Session Status

----- Sessions -----			
System Status: STBY - NOT CONNECTED - ALARM		[Alarms & Events..]	
Connection Type	Client IP Address	Access Level	Login Time

[*RS-232	N/A	SUPERUSER	1999-03-15,15:09:25.0]
[			]
[			]
[^Cancel]			

Adjusting T1 Settings

System Admin
T1 Config

T1 Configuration

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

Channel 1 Enable:

[Disabled]

Channel 2 Enable:

[Disabled]

Channel 1 Software Key:

[NO KEY]

Channel 2 Software Key:

[NO KEY]

Channel 1 Framing Mode:

[ESF]

Channel 2 Framing Mode:

[ESF]

Channel 1 Line Coding Format:

[B8ZS]

Channel 2 Line Coding Format:

[B8ZS]

[^Apply]

[^OK]

[^Cancel]

Adjusting the PPP Parameters for Directly Connected Devices on the AUX Port

System Admin
PPP..

PPP Configuration

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

PPP Options

Connection Types:

[NONE]

Remote IP:

[127.0.0.1]

User:

[default]

Authentication:

[PAP]

[Dial Out]

[Hangup]

Secrets File

[]

[]

[]

[]

Options

[]

[]

Link Status:

[^Apply]

[^OK]

[^Cancel]

Changing the Communication Settings on the Console Port

----- Console Port Configuration -----

System Status: STBY - NOT CONNECTED - ALARM [Alarms & Events..]

----- Port Parameters -----

Baud Rate: [9600]

Stop Bits: [1]

Parity: [None]

Handshake: [None]

Data Bits: [8]

Auto Logout (min): [30]

[^Apply] [^OK] [^Cancel]

Troubleshooting

Troubleshooting Strategies

- To troubleshoot problems with the Stratum 100, do the following steps to isolate the location of the problem:
1. Check the LEDs on both IDU units
 2. Check the current alarms and events for both IDU units
 3. Look at the reports and status info in the Reports menu for both IDU units
 - 4.
- <<Is this approach useful? Suggestions for steps to follow? –HH>>

Diagnosing Problems using the LEDs on the Front Panel

On the front panel of the Stratum 100 are LEDs that provide important status information.

LED Name	Normal Display:	... which Indicates:	Error Display:	... which Indicates:
Status	off	No alarms or events.	on (solid red)	Pending alarms; alarms can be reviewed from the [Alarms & Events..] selection from the console.
Test	off	No testing currently in progress.	on (solid amber)	Antenna Aiming mode, or Diagnostics are currently in progress.
RF Link	on (solid green)	RF link to companion Stratum 100 is active and available.	on (solid red)	No connectivity is available to the companion Stratum 100. For connectivity to be available, the two units must have authenticated and the link must be enabled from the console.
LAN Link	on (solid green)	LAN is available. This applies only if the RJ45 link is being used. If using MII, check the MII adapter for status LEDs.	off	No carrier detected on the RJ45 connector.
LAN Tx	blinking green	Each blink indicates a packet received from the RF link and sent to the Ethernet.	off	No data is being transmitted to the Ethernet.
LAN Rx	blinking green	Each blink indicates a packet received from the Ethernet.	off	No data is being received from the Ethernet.
Dx	on (solid green)	Full duplex. Applies to RJ45 link only; if using MII, check the MII adapter for status LEDs.		
	on (solid amber)	Half duplex. Applies to RJ45 link only; if using MII, check the MII adapter for status LEDs.		
10/100	on (solid green)	100 Mbps operation		
	on (solid amber)	10 Mbps operation		
T1 CH1	on (solid green)	Channel receiving ok; if the T1 channel is disabled, this LED will be off.	on (solid amber)	No data is being received (T1 is not available).
T1 CH2	on (solid green)	Channel receiving ok; if the T1 channel is disabled, this LED will be off.	on (solid amber)	No data is being received (T1 is not available).

Understanding Alarms and Events

Viewing Alarms and Events

While the system was being configured, a number of spurious alarms were generated. It will be easier to see if the system is working correctly if those alarms are deleted. To do this, from the Main Menu, use the down arrow to move to the **Alarms and Events..** item. Press Enter to go to the Alarms menu.

----- Alarms & Event Log -----		
System Status: OPERATE - NOT CONNECTED - ALARM		
Time Stamp	Description	Type

1999-03-11,13:35:07.0	ODU Link Failure	A
1999-03-11,13:35:03.0	Warm Start	E
1999-03-11,08:32:43.0	System Diagnostic Ended	E
1999-03-11,08:20:04.0	System Diagnostic Started	E
1999-03-11,08:19:58.0	System Diagnostic Ended	E
1999-03-11,08:19:16.0	System Diagnostic Started	E
1999-03-11,08:19:13.0	System Diagnostic Ended	E
1999-03-11,08:18:58.0	System Diagnostic Started	E
1999-03-11,08:18:51.0	System Diagnostic Ended	E
1999-03-11,08:18:39.0	System Diagnostic Started	E
1999-03-11,08:18:37.0	System Diagnostic Ended	E
1999-03-11,08:18:11.0	System Diagnostic Started	E
1999-03-11,08:18:04.0	System Diagnostic Ended	E
1999-03-11,08:17:47.0	System Diagnostic Started	E

[Clear All Alarms]	[Clear All Events]	Mode: [WRAP WHEN FULL]
[Page Up]	[Page Down] [Home] [End]	[^Apply] [^OK] [^Cancel]

Clearing Old Alarms and Events

Use the down arrow to go to the **Clear All Alarms** item. Press Enter.

Use the down arrow to go to the **Clear All Events** item. Press Enter.

Use the down arrow to go to **OK** and press Enter to leave the screen.

Understanding the Different Alarm and Event Messages

The table below lists all of the alarm and event messages that are displayed in the **Alarms & Events** screen.

Description	Alarm/Event (A/E)	Situation Where Alarm/Event Occurs
LAN Link Down	A	
LAN Admin Down	A	
RF Link Down - Manual	E	This event occurs when someone has manually set the Link Up/Down field to be Down. This event is cleared when the field is restored to Up .
RF Link Down	A	
RF Link Admin Down	A	
Out of Frame Defect	A	
ODU Link Failure	A	
Loss of Signal Failure	A	
Loss of Frame Failure	A	
Alarm Indication Signal	A	
Antenna Aiming Started	E	This event happens when someone has set antenna aiming mode from either end of the link.

Running Diagnostics

Running Diagnostic Tests

System Admin
Diagnostics..

Diagnostics

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

Ping Test

Target IP Addr: [0.0.0.0] Target:
Timeout (seconds): [0] Count: 0

[Start_Ping] [Stop_Ping]

Loopback Tests

T1 Ch 1: [DISABLE]
T1 Ch 2: [DISABLE]
System: [DISABLE]

[Apply_Loopback]

BER Tests

Channel: [T1_Ch1] Test: [Mark]

Time: 0 Errors: 0 Rate: 0

[Start_BER] [Stop_BER] [Reset_Counters]

Other Tests

[View Power-On-Self-Test Results] [^Cancel]

Reviewing the Results of the Startup Diagnostics

Power-Up Diagnostics Results

Test	Result
Data Processor Framer Memory.....	Passed

[^Cancel]

Checking Software Versions and Configuration

Utilities (from main menu)

----- Utilities -----

System Status: STBY - NOT CONNECTED - ALARM

[Alarms & Events..]

----- Local -----

----- Remote -----

ODU Version

Boot ROM: ?
Firmware: ?
Hardware: ?

IDU Version

SCNM Boot ROM: 00.01g
SCNM Software: 00.01k
DP Boot ROM: 00.15
DP Software: 00.16
Framer: DEV 36
Hardware: X11B

[Update]

[Restore Defaults]

[Device Reset]

[^Cancel]

Resetting the Stratum 100s

Restoring Default Configurations

Installation Problems

Signal Strength Too Low – aiming problems

Link Down

No data exchanging – bad hash code?

Other Common Problems

Contacting Technical Support

... Through Your Reseller or Dealer

If you purchased your Stratum 100 through a reseller or dealer, you should contact them directly for support.

... Through Wavespan

If you are still having problems after consulting this manual, contact us at our Web site at:

<http://www.wavespan.com>

or send electronic mail to:

support@wavespan.com

You can fax questions 24 hours a day to:

1 650 919 0191

Our Customer Support line is staffed by engineers from 9 a.m. to 5 p.m. Monday through Friday (Pacific Time) at

1 650 919-0190

Appendix A: Technical Specifications

Index

Error! No index entries found.