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Installation Manual

Tsunami Multipoint Version 2.0

Proxim WIRELESS NETWORKS

Take your network further

Part Number 63179r2

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Second Edition, December 2003

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Regulatory Notice

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by Proxim Corporation may void the user's authority to operate this equipment.

This device complies with RSS-210 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

WARNING! This device must be professionally installed!

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About This Book

The following documents comprise the Tsunami Multipoint documentation set.

- The *Tsunami Multipoint BSU Quick Install* provides just enough information for the experienced professional to install the Tsunami Multipoint BSU.
- The *Tsunami Multipoint SU Quick Install* provides just enough information for the experienced professional to install the Tsunami Multipoint SU.
- The *Tsunami Multipoint Installation Guide* provides detailed installation information for the less experienced professional to install and initially configure the Tsunami Multipoint system. If you are uncertain about any of the procedures in the Quick Install, refer to this document on the Tsunami Multipoint CD.
- The *Tsunami Multipoint Reference Manual* provides conceptual, advanced configuration, and command reference information about the Tsunami Multipoint system. See the Reference Manual for information about:
  - Routing modes
  - Active Interference Rejection (A.I.R.)
  - Priority Queuing
  - Advanced Configuration Options
  - Command Reference
  - Troubleshooting

REQUIRED SOFTWARE AND FIRMWARE

Four major pieces of software are required to install the SU and BSU:

- Tsunami Multipoint Base Station Configuration Software Version 2.0
- Tsunami Subscriber Utility 2.0 (packaged with BSU Configuration Software Version 2.0)
- BSU firmware Version 2.0 binary code, identified as PMP_BSU_release2-0.mot
- SU firmware Version 2.0 binary code, identified as PMP_SU_release2-0.mot

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SAFETY INSTRUCTIONS

WARNING! IMPORTANT SAFETY INSTRUCTIONS: DO NOT DISCARD!

- Review this guide for important installation instructions BEFORE you attempt to install this product.
- This product is intended to be installed, used, and maintained by experienced telecommunications personnel only.
- This product has been evaluated to the U.S. and Canadian (Bi-National) Standard for Safety of Information Technology Equipment, including Electrical Business Equipment, CAN/CSA C22.2, No. 950-95 * UL 1950, Third Edition, including revisions through revision date March 1, 1998, which are based on the Fourth Amendment to IEC 950, Second Edition. In addition, this product was also evaluated to the applicable requirements in UL 1950, Annex NAE.

WARNING! This unit is intended for installation in accordance with Articles 110-18, 110-26, and 110-27 of the United States National Electric Code ANSI/NFPA 70; and per the applicable Articles in the Canadian Electric Code.

- This equipment must be installed in accordance with Article 810 of the United States National Electrical Code.
- Equipment is to be used with, and powered by, the power supplies provided only. A 15-Amp circuit breaker is required at the power source.
- Lightning surge protection is provided by the power supplies included with this product. Do not use any devices for this purpose other than those recommended by Proxim Corporation.

WARNING! This equipment is intended to be earthed. Use proper grounding methods. A 10 AWG earthing conductor at a minimum is to be used for this purpose.

- Do not connect or disconnect the power cable to the equipment when the power supply is plugged in an AC outlet.
- Servicing of this product should be performed by trained personnel only. Do not disassemble this product. By opening or removing any covers you may expose yourself to hazardous energy parts. Incorrect reassembly of this product can cause a malfunction, and/or electrical shock, when the unit is subsequently used.
- Do not insert any objects of any shape or size inside this product while powered. Objects may contact hazardous energy parts that could result in a risk of fire or personal injury.
- Do not spill any liquids of any kind on or inside this product.
- The maximum room ambient temperature (Tmra) for this product is –33 to +65 degrees Centigrade. The ambient temperature range for the power supply is 0-55 degrees Centigrade. Consideration should be given to installing this equipment in an environment compatible with the Tmra..
- Equipment is suitable for mounting on concrete or other noncombustible surface only.
- Do not remove or alter the Marking label provided on this product.
- The Base Station Unit operates at -48Vdc/1 A. The Subscriber Unit operates at +28Vdc/0.6 A.

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Chapter 1. Site Planning

The installation of a wireless network requires much the same basic planning as any wired network. The main difference is that the wireless signal requires some additional planning. This planning includes RF path planning, site preparation, and installation of outdoor components, such as outdoor units, antennas, lightning protection devices, and cabling suitable for outdoor conditions.

Although the technology implemented in this broadband fixed wireless system can make use of multi-path signals to reduce the effect of obstructions in the path, the characteristics of the path must be carefully examined. With this knowledge, components and network requirements can be correctly planned for your specific application.

This section provides insight into the planning necessary to prepare your site for your broadband fixed wireless system.

GENERAL CONSIDERATIONS

A basic consideration is the physical location of the sites at each end of the link. Because microwave signals travel in a straight line, a clear line-of-sight between antennas is ideal. Frequently, however, the locations of the desired links are fixed. When you cannot achieve a clear line-of-sight, you must plan accordingly.

Other general site considerations include:

- Whether a tower must be constructed (and whether permits are required)
- Possibility of future obstructions
  - Will trees grow high enough to interfere with the signal? Are there plans to erect buildings between the sites that may obstruct the path?
- Availability of grounding
  - Good grounding is important. Also, in areas prone to lightning, a lightning arrestor is strongly recommended.
- Distance between the indoor portion of the system and the user's network.
- Whether the SU may potentially be served by different BSUs. Prior to installation, try to determine the best BSU access and available sighting location.
- Whether strong RF interference exists in the neighborhood, within or adjacent to the operating frequency.

The following sections are provided to help you determine which information is critical to your site, and to aid in the decision-making process.

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SPECIFIC CONSIDERATIONS

Weather

You should research any unusual weather conditions common to the site location. These conditions can include excessive amounts of rain, wind velocity, or extreme temperature ranges. If extreme conditions exist that may affect the integrity of the radio link, take these conditions into consideration early in the planning process.

Rain

Except in extreme conditions, attenuation (weakening of the signal) due to rain does not require serious consideration for frequencies up to the range of 6 GHz. When microwave frequencies are at the 10-12 GHz range or higher, attenuation due to rain becomes much more of a concern, especially in areas where rainfall is of high density and long duration. The systems discussed in this manual operate at frequencies below 6 GHz, so rain is not a concern.

Temperature

Temperature can adversely affect the radio link when phenomena such as temperature inversion or very still air accompanied by stratification occur. Temperature inversion can negate clearances; still air, along with stratification, can cause severe refractive or reflective conditions, with unpredictable results.

Temperature inversions and stratification can also cause ducting, which may increase the potential for interference between systems that do not normally interfere with each other. Where these conditions exist, you should use shorter paths and adequate clearance.

Wind

Any system components mounted outdoors are subject to the effect of wind. You should know the direction and velocity of the wind common to the site. Antennas and their supporting structures must be able to prevent these forces from affecting the antenna or causing damage to the building or tower on which the components are mounted. Antenna designs react differently to wind forces. This is known as *wind loading*.

BSU and SU Wind Loading

Maximum operational wind speed during operation of BSUs and SUs is 50 m/s (112mph).

Survivable wind speed (tested to equivalent speed) is 90m/s (200mph).

The wind loading effect of the BSU and SU on their respective mounting masts is provided in Figure 1 (BSU) and Figure 2 (SU). The units of force in pounds can be converted to metric units by multiplying by 4.45 to obtain newtons, or by 0.45 to obtain kilograms of force. Similarly, foot-pounds can be multiplied by 1.36 to obtain Newton-meters, or by 0.138 to obtain kgm-meters.

Note: For definitions of wind loading specifications for antennas and towers, refer to TIA/EIA-195 (for antennas) or TIA/EIA-222 (for towers) specifications.

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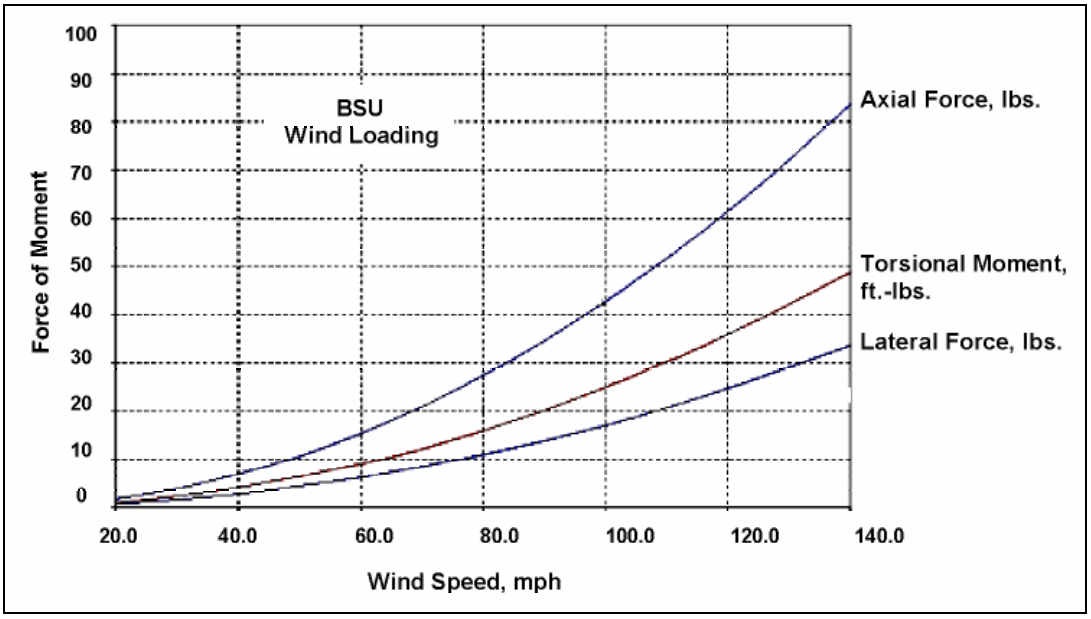


Figure 1. BSU Wind Loading Analysis

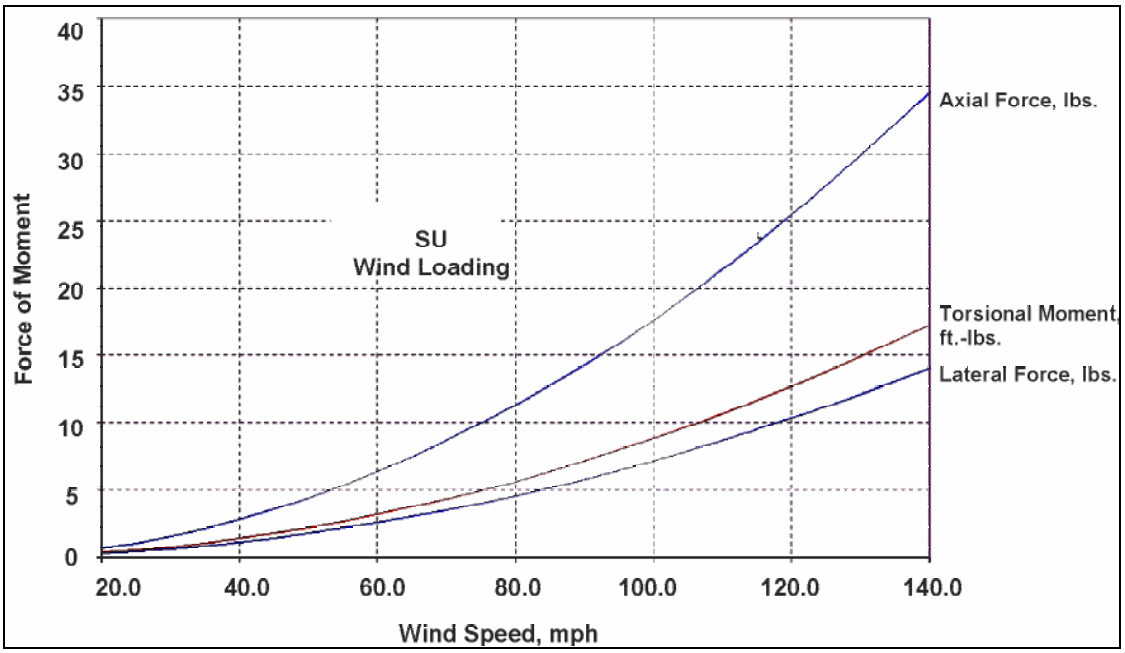


Figure 2. SU Wind Loading Analysis

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Lightning

You should always consider the potential for lightning damage to radio equipment when planning a wireless link. A variety of lightning-protection and grounding devices are available for use on buildings, towers, antennas, cables, and equipment that could be damaged by a lightning strike, whether located inside or outside the site.

Lightning protection requirements are based upon the exposure at the site, the cost of link down-time, and local building and electrical codes. If the link is critical and the site is in an active lightning area, attention to thorough lightning protection and grounding is critical.

Lightning Protection

To provide effective lightning protection, install antennas in locations that are unlikely to receive direct lightning strikes, or install lightning rods to protect antennas from direct strikes. Make sure that cables and equipment are properly grounded to provide low-impedance paths for lightning currents. Install surge suppressors on adjacent telephone lines and power lines.

Users should provide additional lightning protection for cables leading to the wireless radio as well as to and from the power supply in regions that have extreme lightning occurrences. This optional lightning protection should be placed at points close to where the cable passes through the bulkhead into the building, as well as near the BSU/SU. A grounding screw is provided on the BSU and SU.

For indoor applications, you can use the Erico LAN-RJ-45 Local Area Network Protector (see Erico's web site, http://www.erico.com for information); for outdoor applications, you can use lightning protectors from PolyPhaser (see the Polyphaser web site, http://www.polyphaser.com).

See "Appendix E. Lightning Protection Recommendations" on page 63 for more information.

Category 5 Cable

When the entire power and Ethernet cable is encased in steel conduit from the building entrance to the radio, no surge arrestors are required. Otherwise, each power and Ethernet cable requires one surge arrestor within two feet of the building entrance.

INTERFERENCE AND HOW TO AVOID IT

An important part of planning your broadband fixed wireless system is the avoidance of interference. Interference can be caused by effects outside the system. Good RF planning can overcome most interference challenges.

Note: The Tsunami Multipoint product line includes an A.I.R. (Active Interference Rejection) BSU that provides spectrum shielding. This BSU model can reject interference at the uplink location. If interference from other systems is a problem, Proxim recommends you use a BSU equipped with this feature.

Co-Channel and Adjacent Channel Interference

Co-channel interference results when another RF link is using the same channel frequency. Adjacent-channel interference results when another RF link is using an adjacent channel frequency. In selecting a site, a spectrum analyzer can be used to determine whether any strong signals are present and, if present, determine how close they are to the desired frequency. The further removed from your proposed frequency, the less likely they are to cause a problem.

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ANTENNAS

Antennas frequently play a key role in reducing the potential for interference. They come in a variety of configurations that have different gain and direction performance characteristics in the areas of gain and direction. Antennas that transmit/receive in all directions are known as **omni-directional**, while those that transmit/receive in one specific direction are categorized as **directional**. Antennas also vary in beamwidth, which is the aperture to which they can "see" signals. Larger antennas typically provide narrower beamwidths and can diminish interference from nearby transmitters by:

- Focusing RF energy from the intended destination
- Reducing the power of interfering sources not directly aligned to the antenna

Tsunami Multipoint Ethernet Systems use integrated directional antennas that transmit and receive a relatively narrow beamwidth of radio energy, improving system performance by reducing the likelihood that surrounding RF clutter will interfere with reception. The antennas with this system are directional and cannot be detached.

BSU Antenna Characteristics

Polarization: LHCP (Left-Hand Circular Polarization)
Azimuth Beamwidth: 60-degree
Elevation Beamwidth: 6-degree

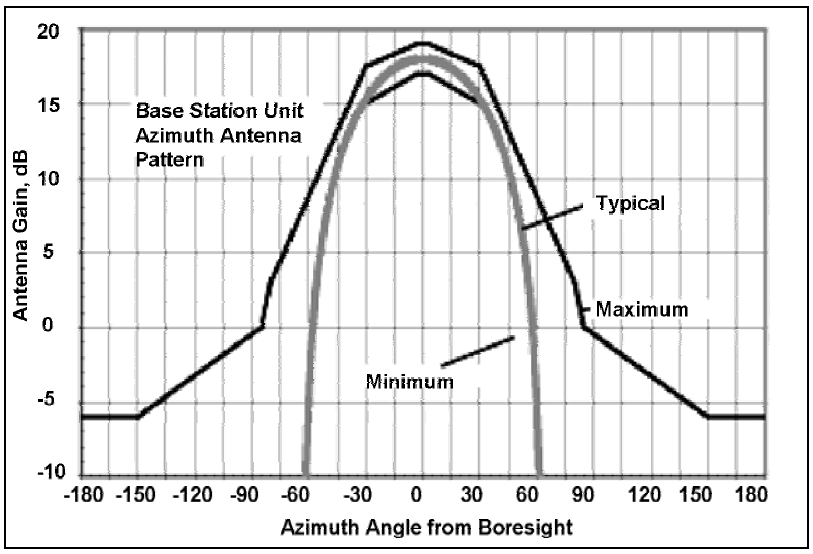


Figure 3. BSU Azimuth Antenna Pattern

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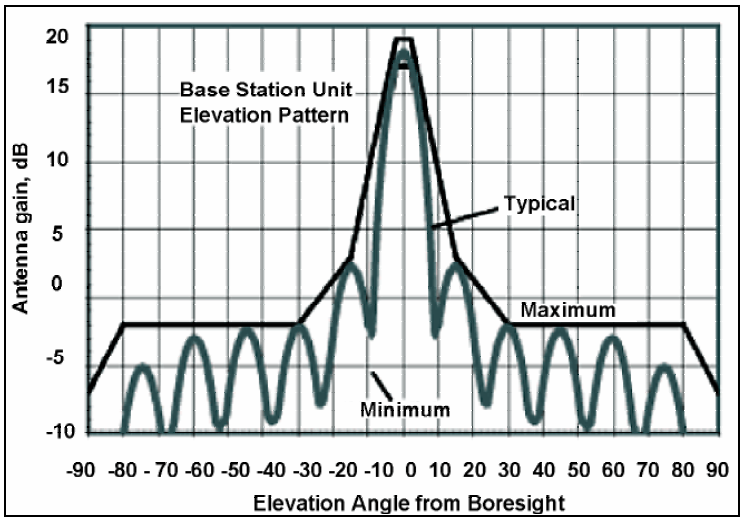


Figure 4. BSU Elevation Antenna Pattern

SU Antenna Characteristics

Polarization: LHCP
Beamwidth (Azimuth/Elevation): 10-degree

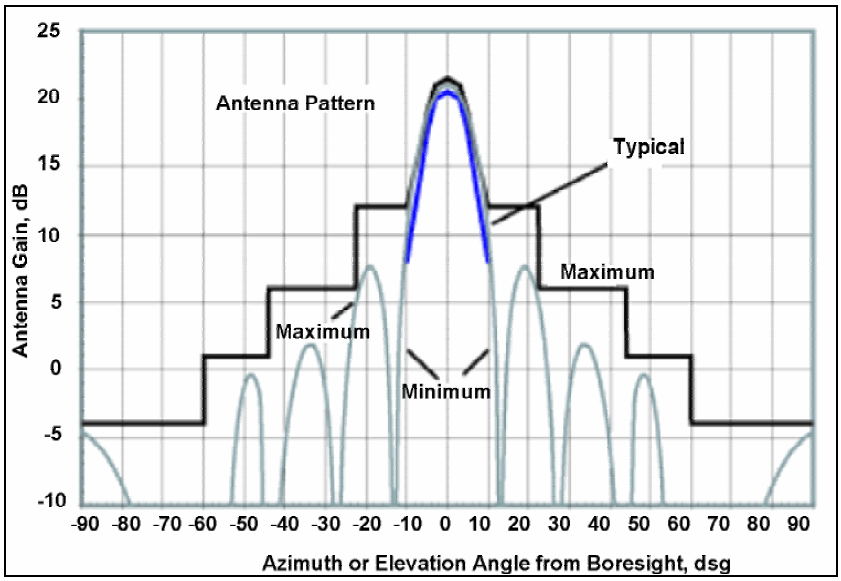


Figure 5. SU Antenna Pattern

Even when other licensees are not an issue, if you are using a network deployment using the “cell” approach, all these considerations are still important for reducing interference between your own adjacent installations. Antennas are tuned to operate on a specific group of frequencies.

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Antenna Polarization

The Tsunami Multipoint system uses **left-hand circular polarization** (LHCP). As a result, the signal is successfully received regardless of the orientation of the antenna. Circular polarization also provides protection against multi-path degradation of the signal quality.

Towers

When planning antenna placement, it might be necessary to build a free-standing tower for the antenna. Regulations and limitations define the height and location of these towers with respect to airports, runways, and airplane approach paths. These regulations are controlled by the FAA. In some circumstances, the tower installations must be approved by the FAA, registered with the FCC, or both.

To ensure compliance, review the current FCC regulations regarding antenna structures. These regulations (along with examples) are on the FCC web site at http://wireless.fcc.gov/antenna/ .

PATH PLANNING

To get the most value from a wireless system, path planning is essential. In addition to the fact that radio signals dissipate as they travel, many other factors operate on a microwave signal as it moves through space. All of these must be taken into account, because any obstructions in the path can attenuate the signal.

Calculating a Link Budget

A **link budget** is a rough calculation of all known elements of the link to determine whether the signal will have the proper strength when it reaches the other end of the link. To make this calculation, consider the following information.

- A signal degrades as it moves through space. The longer the path, the more loss it experiences. This free-space path loss is a factor in calculating the link viability. Free-space path loss is easily calculated for miles or kilometers.
- Availability represents the quality of a link. It is the ratio of the time that the link is available to the total time. This serves as a guide to the service you can expect, on the average, over a period of one year.

You can lower the bit error rate (BER), resulting in greater reliability, by reducing the data throughput or reducing the distance between the BSU and the SU.

Unlicensed Frequencies (U-NII)

The FCC has identified the frequencies from 5.725 to 5.825 GHz as Unlicensed National Information Infrastructure (U-NII). This band can be used by anyone without having to obtain a license. However, you must use radio equipment that is “type approved” by the FCC or local government for use within the specific band.

PMP RADIO INFORMATION

The following sections provide information about the Tsunami Multipoint radio components. See “Appendix C. Technical Specifications” on page 51 for product technical specifications.

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Channel/Frequency Plans

Tsunami Multipoint offers several frequency plans to provide a means for overcoming interference. If one part of the 5.8 GHz spectrum is occupied when you deploy the product, you can select a different frequency plan to bypass the interfering frequency. Plan 4 is the default. Operating frequencies in the 5 and 6 plans overlap. See "Change the Frequency Plan and Operating Frequency" on page 45 for more information.

Bandwidth

The Tsunami Multipoint offers four modulation modes: QAM16 (60 Mbps), QAM8 (40 Mbps), QPSK3Q (30 Mbps), and QPSK1H (20 Mbps) with equal bandwidth occupancy (3 dB BW at 20.75MHz, 26dB BW at 26MHz). Downlink and uplink signals are divided into time slots, with the number of slots per frame varying, depending upon the current modulation mode and data rate. Furthermore, the ratio of slots assigned to downlink and uplink is configurable (within limits; see "setFirstInboundSlot" in the *Tsunami Multipoint Reference Manual* for details)

Tx Power and Antenna Specifications

See "Tx Power," "txPowerLevel," and "Antennas" in the *Tsunami Multipoint Reference Manual.*

Power Control

Each SU automatically adjusts its transmit power so the strength of its signal at the BSU does not exceed the limitation imposed by the Inbound Power Control (IPC) margin. This ensures fair access for all SUs regardless of distance from the BSU. In addition, IPC can be increased to overcome interference. See the "IPC" command in the *Tsunami Multipoint Reference Manual* for more information.

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Chapter 2. Deploying the Base Station Unit (BSU)

This chapter describes how to mount and deploy the Base Station Unit including the GPS Antenna (required when you install multiple BSUs at the same location).

UNPACKING THE SYSTEM

The product's shipping boxes should be left intact and sheltered until arrival at the installation site. If the shipping container shows signs of damage, immediately notify the transportation company. Upon receipt, inspect contents to make sure no parts are missing or damaged.

Proxim recommends that you retain all the packaging materials (including all internal boxes). In the unlikely event that the equipment must be returned to the factory, use the original packing materials for return shipment. The packaging materials are also recommended for transporting the equipment from location to location.

Unpack the following items from the contents of the shipping box. In addition to these items, you will require an additional CAT5 cross-over or straight-through cable (see step 5) and a BSU power adapter (the BSU's power supply is ordered and shipped separately; the power supply's CPN number is 58526).



Figure 6. Base Station Unit Components

MOUNTING THE BASE STATION UNIT

Before mounting the BSU, note the serial number of the unit along with the name of the site at which the unit was installed. Keep this information in a safe place. The serial number is required to obtain support from Proxim.

You can mount the outdoor component of your Tsunami Multipoint Base Station Unit directly to a pole with an outside diameter of 1-½ to 4-½ inches.

Mounting the BSU is essentially a two-step process:

1. Assemble the BSU's mounting components on the ground (ground work).
2. Mount the BSU to a pole using the mounting components.

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Tsunami Base Station Unit System		
Title	**Part Number**	**Quantity**
BSU Installation Kit, consisting of the following:	58691	
CD-Tsunami Multipoint Base Station CD	58686	1 each
Assembly Cable, WAC, CAT5, 50 M	59424	1 each
Contact Kit, Positronic	59431	1 each
Contact Kit, AMP	59432	1 each
Mounting hardware (see the following figure)	61981	1 set
BSU Quick Install Guide	66189	1 each

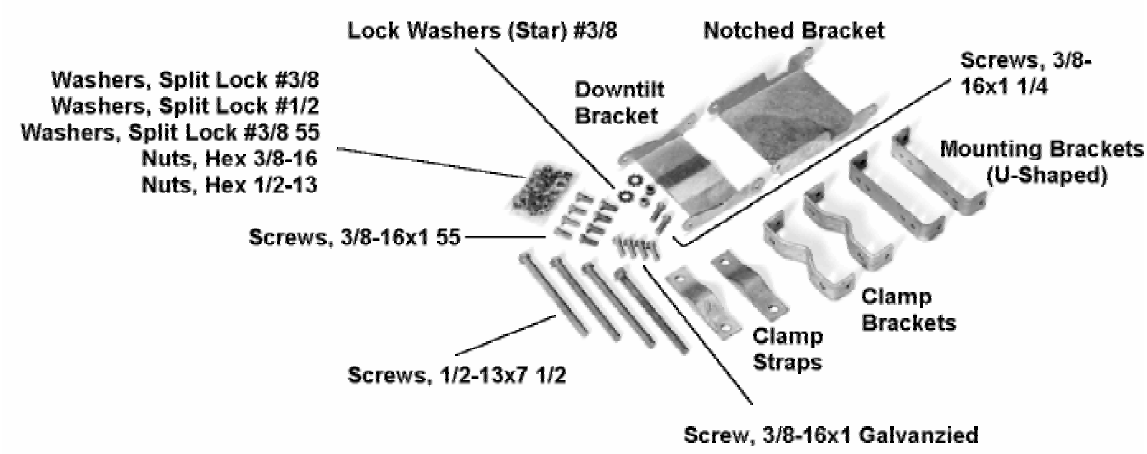


Figure 7. BSU Mounting Hardware

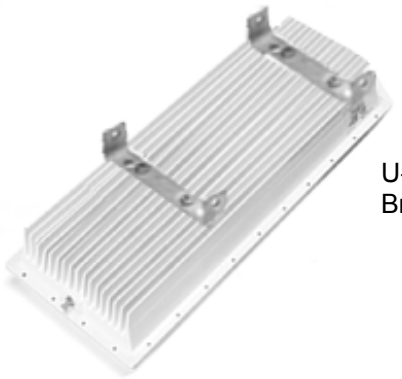
Required Tools: 9/16” (14-23 mm) wrench
6” (155 mm) crescent wrench

Note: Torque all #3/8 bolts and nuts 250 ± 10 in-lbs.

BSU Mounting: Ground Work

To assemble the BSU’s mounting components:

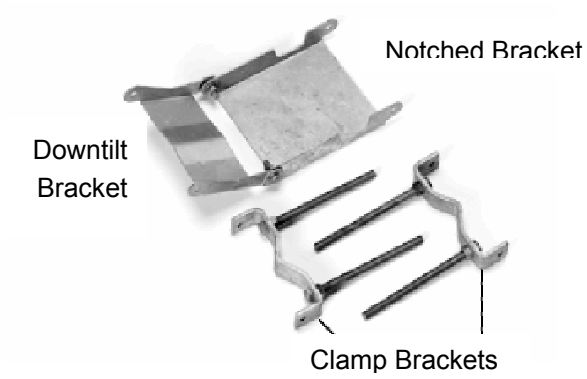
1. Place the BSU face (transmitter side) down on a flat surface.
2. Attach the two (U-shaped) galvanized mounting brackets to the back of the BSU using the four stainless steel 3/8-16, hex head screws and four #3/8 split lock washers (shown in the following figure).

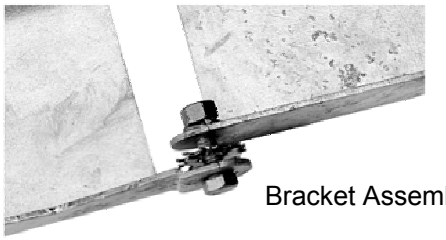


U-shaped Mounting Brackets Attached

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3. Insert two ½-13x7 ½ screws through one of the clamp brackets (M-shaped) and secure the bolts using two ½-13 hex nuts. Repeat this step for the other set of ½-13x7 ½ screws, clamp bracket, and ½-13 hex nuts (see the following figures).
4. Connect the downtilt bracket to the notched bracket using two $^{3}/_{8}$-16x1 1/4 hex head screws, # $^{3}/_{8}$ split lock washers, # $^{3}/_{8}$ (star) lock washers, and $^{3}/_{8}$-16 hex nuts (see the following figures).




Bracket Assembly

5. Attach the downtilt/notched bracket assembly to the U-shaped mounting bracket near the middle of the BSU using two sets of $^{3}/_{8}$-16x1 ¼ hex head screws, # $^{3}/_{8}$ split lock washers, and $^{3}/_{8}$-16 nuts.

Note: This mounting method lets you point the BSU down when mounted on a pole; to point the BSU up, attach the downtilt/notched bracket assembly to the U-shaped mounting bracket near the bottom of the BSU.


Bracket assembly attached to mounting bracket

6. Attach one of the ½-13x7 ½ screws/clamp bracket assemblies to the U-shaped mounting bracket near the end of the BSU using two sets of $^{3}/_{8}$-16x1 ¼ hex head screws, # $^{3}/_{8}$ split lock washers, and $^{3}/_{8}$-16 hex nuts (see the following figure). (In this configuration, the BSU points down when mounted on a pole.)
7. Attach the other ½-13x7 ½ screws/clamp bracket assembly to the downtilt bracket using two sets of $^{3}/_{8}$-16x1 ¼ hex head screws, # $^{3}/_{8}$ split lock washers, and $^{3}/_{8}$-16 hex nuts (shown in the following figure).

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½-13 x 7 ½ Screws/Clamp Bracket Assemblies Attached

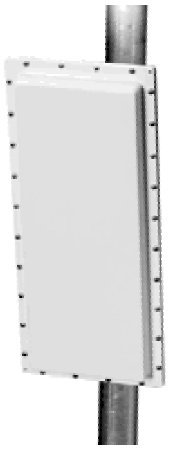
Mounting the BSU to a Pole

To mount the BSU to a pole using the attached mounting components:

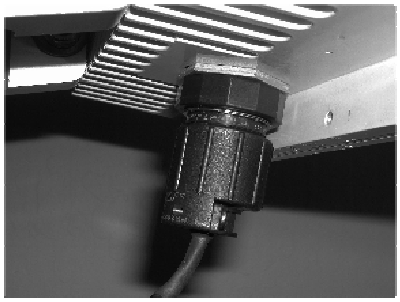
1. Lash the unit to the pole or use a hoisting rope to keep the unit in place while you mount it. Slide the two strap clamps over the two sets of 1/2-13x7 1/2 screws and secure the strap clamps using four # ½ split lock washers and four ½-13 hex nuts (shown in the following photo).



Strap Clamps attached and Mounted BSU



2. To adjust the up/down tilt (-10º to +5º), move the top or bottom of the BSU (depending on how you installed the downtilt/notched bracket assemblies) until the unit is roughly positioned at the correct angle.
3. Connect the supplied CAT5 cable to the BSU's Power and Ethernet port as described in the following notes. Then screw on the outer ring to secure the cable in place.



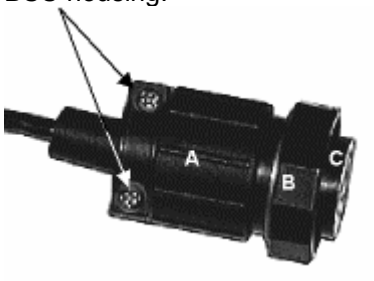
BSU's Power and Ethernet Connector

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The Base Station Unit (BSU) is shipped with a dust cover over the large 18-pin connector. Keep this cover on until ready to mate with cable connector to avoid getting the connector wet.

To ensure proper weatherproofing, follow these procedures to connect the supplied CAT5 cable to the BSU's Power and Ethernet port.

A. Check the BSU connector. The only moving part should be the plastic nut ("B"), which screws onto the BSU housing.



B. If there is any movement or play between parts A and C, you must tighten these parts before proceeding; otherwise you could cause connector pins to disconnect or break when you apply the weatherproofing tape. To tighten, first loosen (but do not remove) the connector's screws (indicated with arrows in the previous figure).

C. Then, while holding the pin connection portion (1), turn the bottom portion (2) clockwise until there is no more movement, making sure you do not over-tighten.



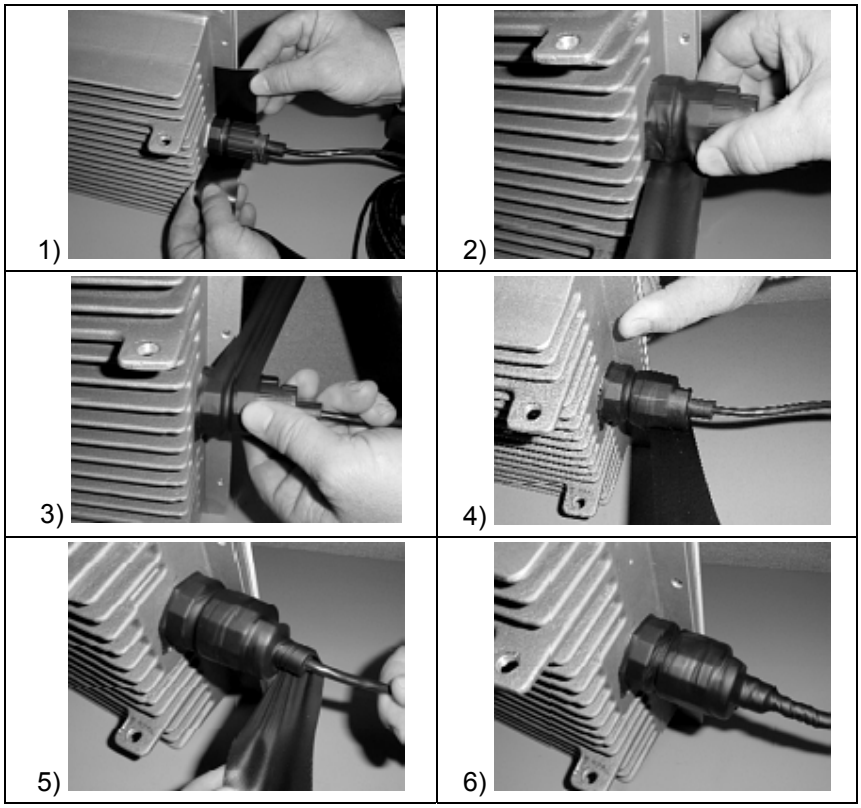
D. Re-tighten the screws.

E. When mating the BSU to the cable connector, first apply a bead of silicone grease or RTV to the 3mm-wide outward-most flange on the BSU connector (or in the outer ring of the cable-end mating connector).

F. Then tighten the plastic nut on the cable end to 16 inch-lbs (1.81 N-m). The cable connector must be tightened onto the BSU sufficiently to compress a small O-ring that resides inside the male BSU connector. If the O-ring is missing or insufficiently compressed, moisture can get through into the connector pins.

Once mated, over-wrap the connectors (as demonstrated in the following table) with stretchy black self amalgamating tape (such as CTB-15 CATV TAPE-X5-BK-UN part #22150000 from DSG – CANUSA 173, Commerce Boulevard, Loveland, Ohio 45140, Tel. 1-800-422-6872) to ensure a better water seal.

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4. Connect the other end of the CAT5 cable to the BSU's power supply. (The BSU's power supply is ordered and shipped separately. The power supply's CPN number is 58526.)
5. Plug the power supply into an electrical outlet.

Note: To ensure proper grounding, use the hole on the back of the BSU and the provided grounding screw to attach a ground wire to the BSU. Use wire grounding techniques in accordance with your local electrical codes.

INSTALLING THE GPS ANTENNA

If you do not plan to install multiple BSUs in the same geographical area, you will not require a GPS antenna; however, you still should weatherproof the GPS connector in the same manner as the BSU Power and Ethernet connector; the plastic water protection cap is not sufficient.

If you plan to install multiple BSUs in the same geographical area (for example, one BSU might interfere with another), you must install the supplied GPS antenna (a small metal plate with a black 2"x 2" antenna and thin cable) on each BSU. Each BSU uses a global positioning system (GPS) to synchronize its clock with other BSUs. You also must set each BSU to MultiSector mode (see "Configuring the System for MultiSector Mode" on page 26).

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Mounting the GPS Antenna

To install the GPS antenna:

1. Position the GPS antenna in a location where the antenna plate is parallel to the earth/horizon and the black antenna bump-up can be attached to the BSU (as shown in the following figure). The GPS antenna should be exposed to as much of the sky as possible so it can acquire at least four GPS satellites to extract timing signals for the BSU transmission synchronization.

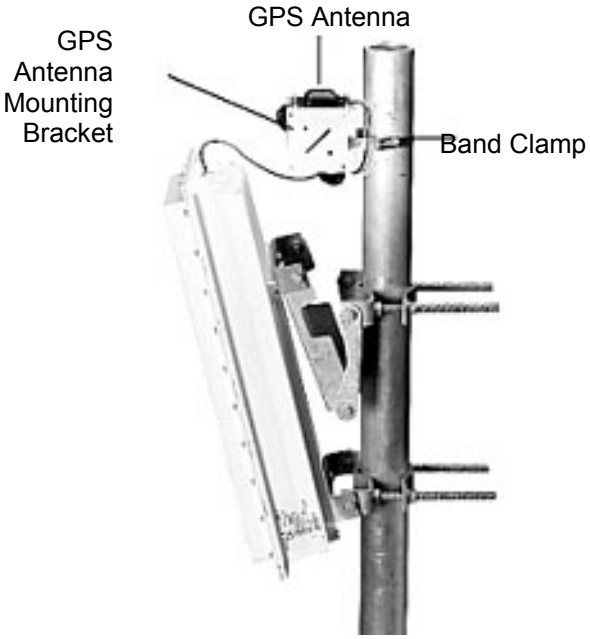


Figure 8. GPS Antenna Mounted on BSU

2. Insert the band clamp through the slots in the GPS antenna-unit mounting bracket and around the mounting pole. Tighten the clamp around the mounting pole and then tighten the screw in the clamp to secure the GPS antenna mounting bracket to the mounting pole.
3. Attach the GPS antenna to the GPS antenna mounting bracket using the #10-32x3/8 SEM screws (the screws with attached washers).
4. Remove the water-protection cap from the top of the BSU and screw on the cable from the GPS antenna to the connector on the top of the BSU.
5. Waterproof the GPS connector in the same manner shown in the previous section about BSU connections.

INSTALLING BSU CONFIGURATION SOFTWARE

The next step is to configure the BSU. The BSU is configured from a PC running the BSU Configuration Software (Versions 1.4 or later). This PC communicates with the BSU through its Ethernet port. Directions for installing the BSU Configuration Software are given in “Appendix B. Installing the Software and Upgrading Firmware” on page 46.

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Operating in a Test Environment

Prior to installation outdoors, you may want to operate the equipment indoors in a test environment to become familiar with the operating configurations and performance. Furthermore, in situations in which it is extremely difficult (very low temperature) or costly (on a mountain top) to install or replace the equipment, you may want to verify operation in an indoor test environment prior to actual installation in the field. All of the configuration and testing information described in the previous chapters, with the exception of the actual mounting of the units, apply to an indoor test deployment.

Warnings and Considerations for an Indoor Deployment

Review the following important warnings and considerations before turning on any Tsunami Multipoint equipment indoors.

WARNING! ***All persons should be at least 5 feet (1.5 meters) away from any antenna when any products are operational.***

Place the antennas at least 30 feet apart, facing each other.

- To minimize the multi-path phenomenon, the BSU should be configured to use the lowest transmit power level (6 dBm) and the most reliable modulation technique (20 Mbps mode). In addition, the BSU must have GPS disabled (see "Configuring the System for MultiSector Mode" on page 26) and be facing the SU.
- Do not set up your laptop or stand between the antennas.
- Attempt to minimize the movement of objects within the test environment to prevent changes in radio propagation patterns. Radio signals behave differently indoors than outdoors. The severe multipath environment that can exist in some indoor set-ups can lead to higher then expected BER.
- For best results, connect at least one computer to the BSU and to each SU.
- Install the BSU first before installing any SUs.
- Once a link has been established, check the RSL at the SU, and if too high, intentionally miss-point the antenna slightly to reduce the receive power.

CONFIGURING THE BASE STATION

Keep in mind the following when configuring a BSU:

- The configuration commands are NOT case-sensitive.
- See the **Operator Commands** section of the software's Help menu (or the Reference manual) for additional information about command syntax.
- The BSU does not provide an on-screen response to many of the available commands (that is, if a command is entered with an allowable value, the BSU simply accepts the entered value without providing any feedback. If a invalid value is entered, the BSU notifies the user that an invalid value was entered).
- The BSU saves the configuration settings periodically (approximately every two minutes). Therefore, after issuing the last configuration change, wait two minutes before recycling power or turning off the unit to ensure that all of your changes take effect.

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To configure the Base Station, you will:

- Set the BSU IP Address
- Start the BSU Configuration Software
- Configure the BSU's IP Setting
- Set the BSU Terminal ID
- Set the Desired Operating Mode
- Disable Range Security
- Set the BSU Data Rate
- Set the Desired Frequency Plan and Operating Frequency
- Select Transmit Power and Auto Enable Mode
- Set the Desired Routing Mode

Setting the BSU IP Address

The computer and the BSU must be members of the same IP subnet to communicate. On the computer that has the Base Station Configuration Software installed, change the IP address for its Ethernet card to **192.168.20.xx** with a **255.255.255.0** subnet mask (**xx** can be any number between 1 and 254).

The BSU and SU can be on different subnets.

Note: The BSU's default IP address is 192.168.20.253 with a subnet mask of 255.255.255.0.

Starting the BSU Configuration Software

From the Windows **Start** menu, select **Programs → Base Station Configuration Software**.

Enter **dspconf** to view the BSU's current configuration settings. If you do not get a response to this command, confirm that the computer and BSU are on the same IP subnet.

Note: The BSU configuration software's menu bar reads "Base Station Configuration Software" when the computer and BSU are connected to the same physical network. If the menu bar reads "Configuration Software" only, the two devices are not on the same physical network. Confirm that they are connected to the same Ethernet network, check the Ethernet cables, and confirm that the BSU is powered on before continuing.

Configuring the BSU's IP Setting

To change the BSU's IP address from the default value:

1. On the computer that has the Base Station Configuration Software installed, change the IP address for its Ethernet card to **192.168.20.xx** with a **255.255.255.0** subnet mask (where **xx** can be any number between 1 and 254; Proxim recommends using 10 to avoid using the same IP address as the BSU or SU).

   The computer and BSU must be members of the same IP subnet to communicate.

   Note: The BSU's default IP address is **192.168.20.253** with a subnet mask of **255.255.255.0**.

   The Multi-BSU Configuration Software displays the IP address of the BSU in the tab. This can be used if you are unsure of the IP address of the BSU.

2. Run the Base Station Configuration Software on the computer (from the Windows **Start** menu, select **Programs → Tsunami Multipoint Base Station Configuration Software**.

3. Configure the BSU's IP settings:

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Enter **setIP <IP address>**, where **<IP address>** is the new IP address you want to assign to the unit. For example, enter **setIP 192.168.20.10** to assign this IP address to the BSU.

A. Close the Base Station Configuration Software and change the computer's IP address so that it is in the same IP network as the BSU's new IP address. (**Note:** The subnet mask of the BSU is still set to 255.255.255.0.) Restart the computer if necessary.

B. Open the Base Station Configuration Software and use the **dspconf** command to verify that the BSU and computer can communicate.

- Enter **set Subnet <subnet mask>**, where **<subnet mask>** designates a subnet mask. Proxim recommends using a subnet mask no wider than 255.255.248.0.

Note: A host on a network is defined by an IP address and a subnet mask. Each one individually does not contain enough information to define the host. Typically, both can be changed simultaneously. Unfortunately, the Tsunami Multipoint software requires changing them sequentially. It does not matter which is changed first as long as the user ensures that the host running the configuration software and the BSU always are in the same subnet so they can communicate with each other.

- If desired, enter **gateway <gateway address>** where **<gateway address>** designates the IP address of the network's gateway.

Note: A gateway is a device that routes traffic between networks. A gateway is used only in IP Routing mode. When a BSU operating in IP routing mode receives a packet from the wireless link to be transmitted onto the wireline side, it first checks to see whether the packet is destined for a host in its local subnet. If the packet is destined to a different subnet, the BSU checks to determine whether a gateway is defined. If so, it delivers the packet to the gateway (which forwards it to the proper network). If no gateway is defined, the BSU discards the packet.

The decision to set a gateway at the BSU depends upon the details of the network topology. If the BSU is connected to a router port , the IP address of the port typically serves as the BSU gateway.

Setting the BSU Terminal ID

To set the BSU's Terminal ID, enter **setID <Terminal ID>**, where **<Terminal ID>** is a number between 1 and 2048). For example, **setID 1** sets the BSU's Terminal ID to 1.

Note: Each BSU in a network must have a unique Terminal ID if they are to be managed by the SNMP Toolkit.

Setting the Proper GPS Operating Mode

Use the **setFrameSync** command to set the proper GPS operating mode.

Note: When performing indoor tests, or if GPS synchronization is not required, Frame Synchronization must be set to Independent mode (**setFrameSync 1**). A BSU's transmitter does not turn on if FrameSync is set to MultiSector while indoors. FrameSync should be set to one of the MultiSector modes only when multiple BSUs are installed in the field at the same site; these modes enable a BSU's GPS receiver so it can synchronize its frame timing with other BSUs. See "Configuring the System for MultiSector Mode" on page 26 for details about configuring and testing MultiSector operation.

Disabling Range Security

The Range Security feature is used to warn the BSU when an SU has moved. If you are not installing the SU at its final location, disable the range security feature to keep the SU/BSU from sending a range security message when

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the SU is installed at the desired location. Enter **rangeSecurity 0** (zero) to disable this feature. You can enable it later once the SUs have been installed in the field (see "Range Security" on page 42).

Setting the BSU Data Rate

Using the **modulation** command (modulation <0 (60Mbps) | 1 (40 Mbps) | 2 (30 Mbps) | 3 (20 Mbps)>), set the desired BSU data rate**.**

Note: The data rate cannot be set higher than the BSU's maximum burst rate.

Setting the Desired Frequency Plan and Operating Frequency

Tsunami Multipoint offers a choice of three different frequency plans for the 5.8 GHz band. They are the 4-channel, 5-channel, and 6-channel frequency plans. All three plans cover the same nominal frequency range but differ in the number of channels used and the exact center frequencies (and overlap) of each channel. See "Frequency Plans" **Error! Bookmark not defined.** for the exact center frequencies used for each plan.

Note that the bandwidth (BW) occupancy is 20.75 MHz for 3 dB BW and 26 MHz for 26 dB BW. If one part of the 5.8 GHz spectrum is occupied when you deploy the product, you can select a different frequency plan to bypass the interfering frequency.

- Use the **freqPlan** command to set the frequency plan ((**freqPlan** < 4 (four channel | 5 (channel) | 6 (channel)>).
- Once you select a frequency plan, you can select the desired center frequency using the **frequency** command.

Selecting Transmit Power and AutoEnable Mode

- Set the BSU's desired transmit power level using the **txPowerLevel** command. (Typically, the power level is set to 17 dBm in the field (maximum setting) and 6 dBm for indoor range testing (minimum level).)
- Set the desired transmit power auto-enable mode with the **txPowerAutoEnable** command (**txPowerAutoEnable < 0 (off) | 1 (on)**>. When auto-enable is set to **on**, the BSU automatically starts transmitting after any power cycle.

Setting the Desired Routing Mode

Using the **routingMode** command, select either **Bridging** or **IP routing** mode (**routingMode** < **0** | **1**>, with **0** specifying **IP Routing** and **1** specifying **Bridging**).

Notes:

- Proxim recommends using **Bridging** mode, as this mode lets you pass traffic without re-configuring your network. The default IP routing mode combined with the default access mode of **Restricted** on the SU prevents any traffic from flowing without first using the **addSUIP** command to authorize the IP address of the host behind the SU (or having the host behind the SU obtain its IP address from a DHCP server behind the router).
- After you issue the **routingMode** command, you may need to clear the PC's ARP table. (Restarting the PC used to configure the BSU does this.)

Turning on the BSU

Turn on the BSU using the **txPower** command (**txPower** <0 (off) | 1 (on)>).

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At this point the BSU is configured, transmitting, and ready to operate. Also, see "Advanced Configuration Options" and "Command Reference" in the *Tsunami Multipoint Reference Manual* for information about the other commands used to configure the BSU (such as setting proxy, RIP, static IPs, and so on).

Adding Subscribers to the BSU Database

Note: Add an SU to the BSU's database before installing or turning on the SU; SUs cannot enter the network unless they are entered in the BSU database.

To add an SU to the database:

1. Identify the Subscriber Units (SUs) you intend to use with this BSU and write down each device's MAC address (which is printed on the product label and identified as **MAC ID**).
2. Add the first SU to the BSU's database by entering **addSU <MAC address> <Terminal ID>**.
   - When entering the MAC address, separate each pair of digits with a colon or a blank space.
   - The Terminal IDs range from 1 to 1023; assign a unique ID to each BSU and SU in a cell. For example, if the SU's MAC address is 00-04-44-12-34-56 and you want to assign Terminal ID 2 to this SU, enter **addSU 00:04:44:12:34:56 2**.
3. Configure the SU's IP settings:
   - Use **setSUIP <Terminal ID> <IP address>** to set the SU's IP address. Proxim suggests that you configure each SU with a unique IP address in the same IP subnet as the BSU in Bridging mode and configure each SU with a specific subnet in IP routing mode.
   - Enter **setSUSubnet <Terminal ID> <subnet mask>** to set the SU's subnet mask.
4. Repeat steps 2 and 3 for each SU that you want to add to the Tsunami Multipoint system.
5. Enter **dspSU** to view the list of SUs that have been added to the BSU's database.
6. Install the SUs as described in "Chapter 3. Deploying the Subscriber Unit" on page 28.

Configuring the System for MultiSector Mode

If you are installing the BSU at a location in which one BSU may interfere with another, set the unit to **MultiSector** mode. This enables the GPS receiver and synchronizes the TDD timing to the GPS signal. All BSUs, operating in this mode transmit and receive at the same time (within a pre-determined tolerance).

In addition to turning on MultiSector mode, the ratio of downlink-to-uplink slots and frame duration must be set the same for all BSU's at the same cell site. Together, synchronization to GPS and identical uplink/downlink ratio eliminate the possibility of a BSU transmitting while a co-located BSU is receiving. This synchronization is achieved using the timing signal supplied by the GPS receiver. The GPS receiver must see four satellites to obtain an accurate time. Once time has been initialized, the receiver can keep accurate time even if it sees only a single satellite.

There are two MultiSectors modes; **auto-restart** and **auto-resync**. The difference between these modes is the manner in which the BSU synchronizes its timing to GPS after an outage. (See the *Tsunami Multipoint Reference Manual* for more information.)

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To configure the BSU for MultiSector Mode, use the **setFrameSync** command (**setFrameSync <0 (MultiSector with auto-restart | 1 (independent – NOT multisector) | 2 (MultiSector with auto-resync**). MultiSector mode with auto-resync is the recommended mode. To turn off MultiSector Mode, enter **setFrameSync 1**, indicating Independent (GPS is not used).

Testing the GPS Receiver

The GPS Receiver Test examines the quality of the GPS signal. This test should only be used once MultiSector mode has been enabled, as described in the previous section.

Note: The BSU must have the GPS antenna connected to receive GPS signals. See "Mounting the GPS Antenna" on page 21.

Follow these steps to run the test:

1. Open the Base Station Configuration Software.
2. Enter **BSUlog 1 1**.
3. The second output column is **GPS sync**, which reads –**1** until the GPS acquires the requisite number of satellites. When this number reads 0, GPS has acquired at least one satellite; when it reads 4, at least four satellites have been acquired and GPS is functional.
4. Once a minimum of four satellites has been acquired, enter **BSUlog 0** to turn off BSU log.
5. Enter **pp3d 1** to start the GPS test.

   The Base Station Configuration Software reports the following values (from left to right):

Column 1:	Time error in half-chip; this value should be less than 80
Column 2:	Frequency error
Column 3:	Synchronize filter; this value must equal 20
Column 4:	Not applicable
Column 5:	GPS message; this value must be 4
Column 6:	Visible sat; this value must be 4
Column 7:	Time of week in 10 ms
Columns 8 & 9:	Not applicable

   GPS synchronization is working properly if the timing error given in Column 1 is less than 80, Columns 3 and 5 read 20 and 4, respectively, and the number of visible satellites is at least four (Column 6) 6.
6. Enter **pp3d 0** (zero) to end the GPS test.

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Chapter 3. Deploying the Subscriber Unit

MOUNTING THE SUBSCRIBER UNIT (SU)

Before mounting the SU, note the MAC address and the serial number of the unit along with the name of the site at which the unit was installed. Keep this information in a safe place. The MAC address is required to add the SU to the BSU database and the serial number is required to obtain support from Proxim.

The outdoor component of the Subscriber Unit (SU) is designed to directly mount to a pole. Using the supplied U-bolts, you can mount the SU to a 1-1/4 inch to 1-3/4 inch pole (outside diameter). Using optional mounting brackets, you can mount the SU to a wall or other flat surface.



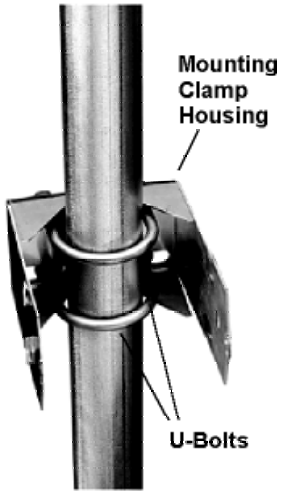
Figure 9. Subscriber Unit Installation Kit

Tsunami Subscriber Unit System		
Title	**Part Number**	**Quantity**
SU Installation Kit, consisting of the following:	58676	
Power Supply, LINEAR, 24 WATT, 24V @ 1A[a]	62059	1 each
Cable Assembly, CAT5, WRR Outdoor, 25M	59399	1 each
Tsunami Multipoint SU Quick Install Guide	65751	1 each
Mounting hardware	58676	1 set
[a] 220V, SWITCHING, 28V @ 1A REGULATED power supply and international power cord available.		

Note: The following instructions assume that you will slide the SU's mounting bracket/pole assembly onto a pole. If this is not practical (for example, the pole is too tall or its top and bottom are permanently mounted to structures), follow these steps, but assemble the mounting bracket/pole assembly around the pole.

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1. Insert the two U-bolts into the mounting clamp housing and attach the two # 5/16 nuts and 5/16 flat washers.
2. Slide the mounting clamp housing/pole clamp assembly down the pole.



3. Squeeze the sides of the mounting clamp housing and slide it inside the flange protruding from the back of the SU until the pins extend into the holes on the side of the flange.



4. Insert the two #10-32 screws in the sides of the mounting clamp housing/pole clamp assembly and loosely attach the two #10-32 nuts.



Note: Complete “Connecting Cables” before aiming the SU.

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5. After you aim the SU (see “Aiming the SU” on page 32), tighten the two #10-32 screws and nuts to secure the SU in position.

Connecting Cables

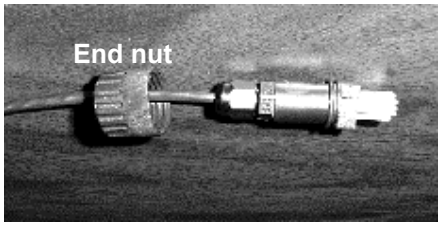
The following steps detail how to connect the cables between the radio, power adapter, and your network.

For each radio/power adapter set, perform these steps:

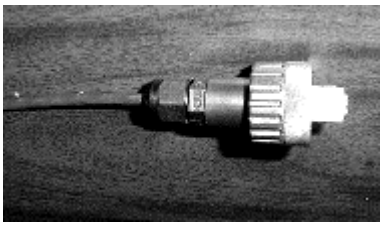
1. Insert the RJ-45 connector on the CAT5 cable into the RJ-45 port on the back of the SU until the locking tab clicks; slide the Woodhead body over the RJ-45 connector until it is fully seated. Hand-tighten the Woodhead connector; do not use the wrench to tighten the connector.



RJ-45 Connector



End nut seated on RJ-45 connector



Woodhead Cover Placed over RJ-45

2. Tighten the end nut to seal the connector to the housing, and tighten the gland to seal the assembly to the cable.

Note: Be sure the Tsunami Multipoint Subscriber Unit connector is properly “contacted” or the unit may fail; you should hear a “click” when installing the cable connector to its chassis.

3. Weatherproof the connection with waterproof butyl tape, as shown in the following photos:

   The first photo depicts the connector before weatherproofing. You will add three layers of tape; one strip of butyl tape and two strips of electrician’s tape are required.



   First, wrap the connector using the first strip of electrician’s tape, as shown in photos 2, 3, and 4. This serves as a base for the butyl tape, letting you remove the butyl tape easily when necessary.







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Next, in the same manner, apply a layer of butyl tape over the electrician's tape, as shown in photos 5 – 8.

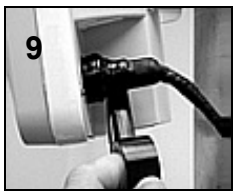








Finally, apply a layer of black electrician's tape over the butyl tape for further protection, as shown in photos 9 and 10; the butyl tape alone is not UV protected.





4. Connect a standard CAT5 cable (not supplied) to the RJ-45 port on the power adapter. Connect the other end of the cable to a switch or hub on your network or directly to a PC.

   To directly connect the radio to a PC, use a ***straight-through Ethernet cable*** between the network interface card in the PC and the RJ-45 port on the power adapter. Use a ***cross-over Ethernet cable*** if connecting the power adapter to a switch or a hub.

WARNING!

The maximum length of the CAT5 cable allowed between the radio unit and the power adapter is 75 meters. The total length between the radio unit and PC, switch, or other network device, including the cabling from the radio unit and the power adapter and the cable from the power adapter to the network device, is 100 m.

5. If you are connected to a switch or a hub, connect a PC to the same switch or hub to which you connected the radio. Each PC is used to configure and control its associated radio.
6. Connect the power adapter to a grounded AC power source. The radio will emit a small chirp to indicate that it is receiving power.

Note: To ensure proper grounding, use the hole on the back of each SU and the provided grounding screws to attach a ground wire to each radio. Use wire grounding techniques in accordance with your local electrical codes.

INSTALLING THE SUBSCRIBER UTILITY SOFTWARE

The subscriber utility is used in the antenna pointing process and must be installed to finish the SU installation.

1. Identify the computer on which you plan to run the Subscriber Utility.

Note: See "System Requirements for Base Station Configuration Software" on page 46 for operating system and hardware requirements.

2. Insert the Tsunami MP CD (provided with the product) into the computer's CD-ROM drive and open the CD's **config software** folder.

Note: If the computer has Microsoft IIS (Internet Information Services) running, disable or uninstall it before running the Subscriber Utility.

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3. Double-click **susetup.htm** or use a Web browser to open the file.
4. Place a checkmark next to the **Include VM in download** option to install Java Virtual Machine (VM).

> **Note:** You need not add VM if your computer already has the appropriate version of VM installed. Proxim recommends you install VM with the Subscriber Utility software.

5. Click the **Start Installer for Windows** button to begin the software installation.
6. Follow the on-screen instructions to install the software.
7. Click **Done** when the installation is finished to close the installer.

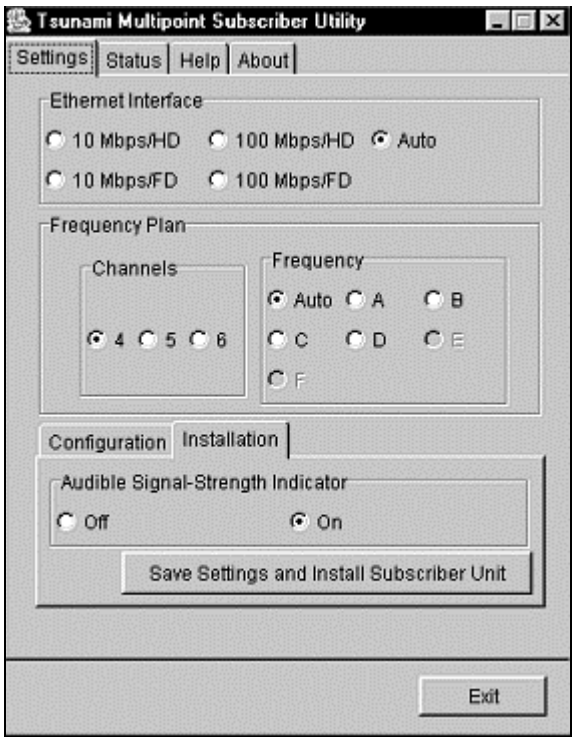
AIMING THE SU

The PC and the SU must be members of the same IP subnet to communicate properly. If the PC is on a different subnet, you can configure the SU, but you cannot successfully take it out of aiming mode and the SU cannot establish a link with the BSU.

On the PC that has the Subscriber Utility installed, change the IP address for its Ethernet card to **192.168.20.xx** with a **255.255.255.0** subnet mask, where **xx** can be any available number between 1 and 254. Proxim recommends using **10** to avoid using the same IP address as the BSU or SU). You can run the Multi-BSU configuration software to verify the IP address of the SU that is displayed in the tab.

The SU is shipped from the factory in aiming mode (with Channel **4** and Frequency **Auto**) so that you can install and aim it without having to first run the Subscriber Utility. You must run the Subscriber Utility, however, to take the SU out of aiming mode in order to establish a link with the BSU.

1. Launch the Subscriber Utility.
2. Choose the desired frequency plan and operating frequency.

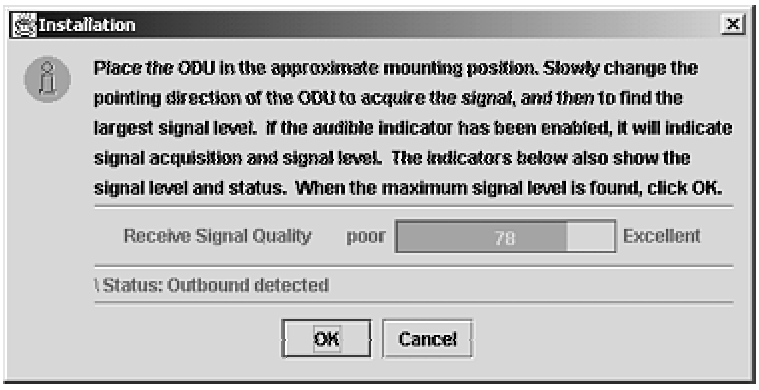


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The factory default is the **4**-channel frequency plan and frequency A**uto** (the SU looks through all frequencies). Selecting a specific frequency forces the SU to search for a BSU on that specific frequency only. When the **Auto** option is selected, the SU searches all frequency channels for a given plan until it finds the strongest signal.

Note: Proxim recommends the SU be configured for a specific frequency

3. Turn on the **Audible Signal-Strength Indicator** (if not already set to **On**).
4. Click **Save Settings and Install Subscriber Unit** to launch the aiming tool.



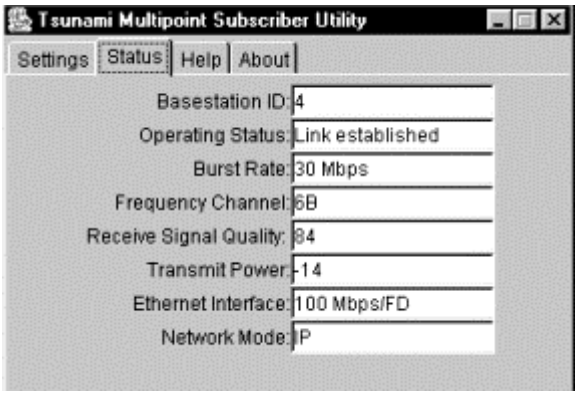
5. Slowly adjust the position of the SU until you have maximized the strength of the radio signal.
   - The SU beeps after it has detected a signal from the BSU. The beeps increase in frequency as the strength of the signal received from the BSU increases.
   - The Receive Signal Quality indicator within the Subscriber Utility's Installation window reports the strength of the radio signal.
6. Click **OK** to close the aiming tool.

If you have left the Base Station Configuration Software running on the computer connected to the BSU, a notification is displayed once the SU has successfully joined the network (this is known as a "net entry" notification).

DISPLAYING LINK STATUS INFORMATION

The **Status** window displays the current information at the SU, as well as information about the link between the BSU and the local SU. To display the **Status** window, launch the Subscriber Utility and then select the **Status** tab.

The **Status** window is displayed, as shown in the following figure (the fields are described following the figure).



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If all of the fields within the **Status** window are blank (except for **Operating Status** where you read **"ODU not connected"**), this most likely means that the BSU has assigned a new IP address to the SU that is not within the same subnet as the IP that you have assigned to the NIC card on the PC running the Subscriber Utility.

If the **Status** window is similar to the previous figure, proceed to "Confirming Network Activity." If you receive an **"ODU not connected"** message in the **Operating Status** field, perform the following.

On the computer that is connected to the SU, launch the Multi-BSU Configuration Software. Once this software connects to the attached SU, the "Configuration Software" banner changes to "Subscriber Configuration Software." At this point, the "Connection 1:" tab indicates the new IP address of the SU.

You must now change the IP address of the PC that is running the Subscriber Utility software to a new address within the same subnet as that of the SU.

Status Window Field Descriptions	
Base Station ID	Displays the Terminal ID assigned to the BSU with which the SU communicates.
Operating Status	When the link status between the BSU and local SU changes (for example, when you first power up the units, change their configuration, and so on) the following status messages appear in this field: **Searching for Outbound:** SU searches for an outbound signal (that is, a signal transmitted from the BSU) **Inbound fine sync:** Indicates outbound signal detected and the SU is attempting to synchronize with the inbound signal **Link established:** Indicates the link is established between the BSU and local SU. **Note:** The **No connection** message indicates that the software is unable to establish a link between the BSU and local SU. Also, the **ODU Not Connected** message indicates that the PC used to configure the SU is not communicating with it. See "Troubleshooting" in the *Tsunami Multipoint Reference Manual* for possible causes and solutions to these problems.
Burst Rate	Shows the current Modulation setting. See "Specify the Desired Modulation (Data Rate)" on page 44 for information.
Frequency Channel	Shows the current channel plan/frequency setting (for example, 4C). See "Change the Frequency Plan and Operating Frequency" on page 45 for information. By default, the SU is set to automatically search for the correct frequency channel.
Receive Signal Quality (dBm)	Shows the quality of signal received by the local SU (in dBm). This value represents the estimated received signal level, plus an offset of 120 dB. A received signal quality level over 40 (which represents a signal level of -80 dBm) shows an acceptable signal quality for 20 MB modulation mode. More signal is required for higher modulcations. You can use this field to fine tune BSU/SU alignment. After you mount the units outdoors, check the Receive Signal Quality value as you make fine adjustments to the BSU/SU alignment until you obtain optimal signal quality.
Transmitter Power	Shows the SU's current transmitter power (-30 to +36).
Ethernet Interface	Shows the current Ethernet interface setting. If the Ethernet interface was set to auto-netotiate, this entry contains the results of the auto-negotiation.
Network Mode	Shows the current network mode: **Bridging** or **IP Routing**.

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CONFIRMING NETWORK ACTIVITY

Attempt to ping from a computer connected to:

- An SU to the BSU
- The BSU to the SU

The BSU and SU must have different IP addresses to do this. If the BSU and SU are configured with the same IP address, the local unit responds to the ping (that is, if the BSU and SU have the same IP address and you ping the BSU from a host connected to the SU, the SU responds to the ping).

Note: Because of the learning bridge filter of the Tsunami Multipoint system, Proxim recommends you do not move a computer that was behind one end of the link to the other end of the link. The learning bridge filter learns local hosts connected to the Ethernet port (up to 16 at the BSU and the SU) and prevents traffic from being sent to the wireless port for those hosts. This is based upon the MAC address of the host. For this reason, Proxim recommends that you test the Tsunami Mutlipoint with two PCs, one behind the BSU and one behind the SU. You can clear the learning bridge filter on the BSU or SU by first disconnecting the PC and then rebooting the BSU or SU before moving the PC to the other side.

If the ping tests are unsuccessful, attempt the following:

- Check all IP and computer configurations (for example, if you attempt to ping the BSU from the SU configuration computer and the BSU and SU's are in separate networks you must have the configurations computers gateway set to the SU for the ping to work.)
- Adjust the network's IP settings, if necessary, to achieve IP connectivity.

If this procedure fails, see "Chapter 4. System Diagnostics and Operating Tips" on page 36 for information about running system diagnostics to make sure the equipment is operating as expected and to help debug possible link problems.

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Chapter 4. System Diagnostics and Operating Tips

This section describes several diagnostic tests you can perform once the Tsunami MP equipment is installed. These tests assist you in determining whether the equipment is functioning as expected. In addition, we include some miscellaneous useful information for deploying a Multipoint network.

RADIO DIAGNOSTICS

Use the diagnostic tools described in this section to determine if your wireless link is stable. You can also use these tools to help fine-tune antenna positions to establish a good link.

BSU and SU Logs

You can display BSU and SU logs to help troubleshoot possible link reliability and interference issues. These tools have no impact on data traffic, and can be used in conjunction with configuration parameters (such as IPC settings, modulation modes, and operating frequencies) and possible antenna relocation to obtain the best possible path. The goal is to maximize the Es/N0 ratio.

Displaying the BSU Log

Follow these steps to enable the BSU log:

1. Enter **BSUlog (Terminal ID> <time>** where <Terminal ID> is the Terminal ID of the SU to be monitored and <time> specifies the polling period (in seconds).

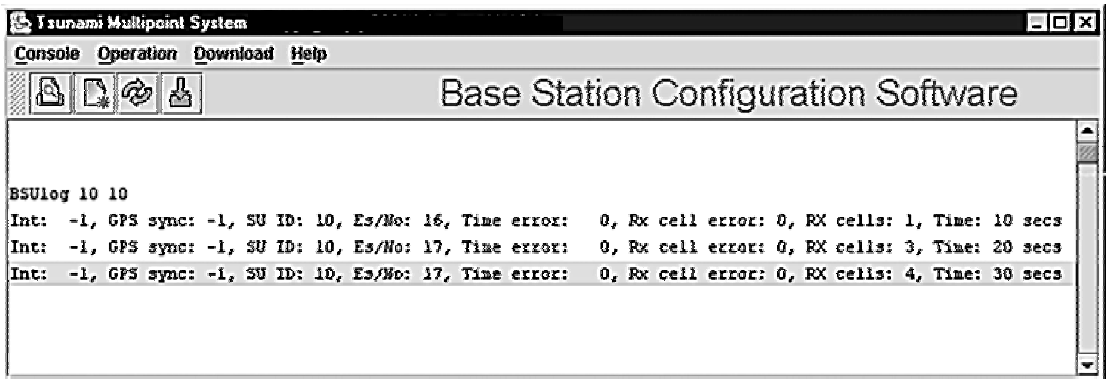


Figure 10. BSU Log

2. When finished, disable the BSU log by entering **BSUlog 0** (zero).

Monitor the Es/No ratio (Es/No reports the energy per symbol-to-noise spectral density ratio (in dB)). Low Es/N0 or varying Es/N0 can indicate path or interference problems. The Es/No requirement varies based on the modulation mode as follows:

20 Mbps: Es/No > 4 + IPC value
30 Mbps: Es/No > 5 + IPC value
40 Mbps: Es/No > 9 + IPC value
60 Mbps: Es/No > 12 + IPC value

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In addition, the BSU log provides the following information:

Int	Relative interference of the power received at the BSU (a value of 0 (zedr0) nominally shows no interference).
GPS Sync	-1 indicates GPS sync is disabled; 4 indicates GPS sync is enabled. GPS sychronization is used when the system is in MultiSector mode (multiple BSUs installed in the same location). See “Configuring the System for MultiSector Mode” on page 26 for more information).
SU ID	The Terminal ID of the monitored SU
Time error	Shows the uplink (or inbound) ranging error
Rx cell error	Shows the number of lost uplink cells
Rx cells	Shows the total number of uplink cells
Time	Shows the cumulative polling time (in seconds)

Displaying the SU Logs

You can display two different types of SU logs: **SUlog1** and **SUlog2**. To display the SU logs, install the Base Station Configuration Software on the PC used to configure the SU (see “Installing the Base Station Configuration Software” for information) and then execute the commands described below.

Follow these steps to enable an SU log:

1. Enter **SUlog1 <time>** or **SUlog2 <time>** where <time> specifies the polling period (in seconds). (Specify **SUlog1** to display SUlog1; specify **SUlog2** to display SUlog2. See the information below for details about these two logs.)
2. When finished, disable the SU log by entering **SUlog1 0** (zero) or **SUlog2 0** (zero) (depending upon which log you displayed).

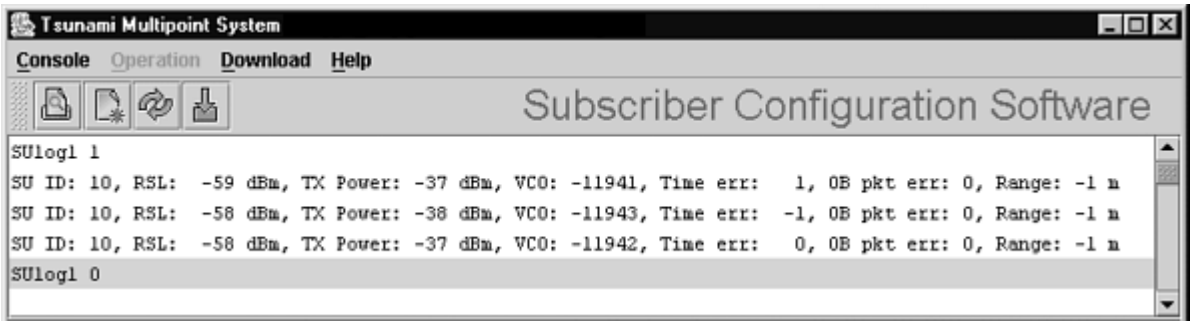


Figure 11. SU Log 1

Note: You also can display the SU logs if you are at the BSU by first connecting remotely into the SU. See the **remote** command in the *Tsunami Mutlipoint Reference Manual*.

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SUlog1 provides the following information:

SU ID	The Terminal ID of the monitored SU.
RSL	Shows the shows the RSL (receiver signal level) at the output of the antenna (in dBm).
TX Power	Shows the SU's TX power at the input to the antenna (in dBm).
VCO	Shows the relative frequency offset of the VCO (voltage control oscillator) (in Hz).
Time error	Shows the synchronization error (in $^{1}/_{512}$ symbol), generally magnitude (should be less than 8).
OB pkt error	Shows the number of out-of-sequence outbound packets.
Range	Shows the SU's distance from the BSU (in meters).

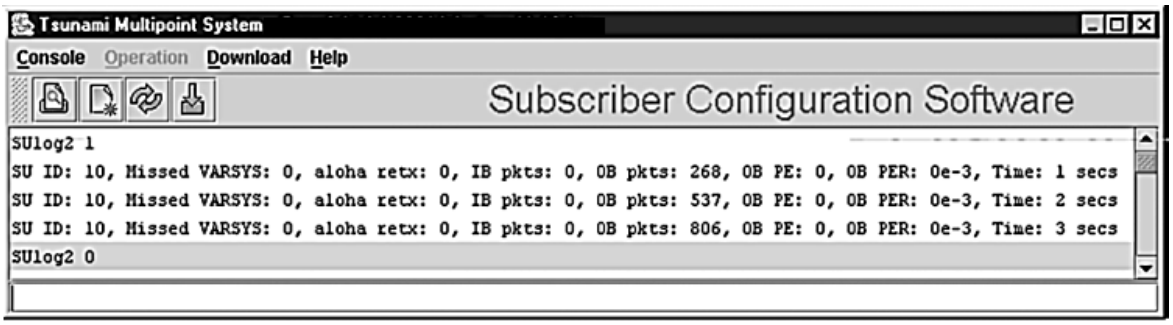


Figure 12. SU Log 2

SUlog2 provides the following information:

SU ID	The Terminal ID of the monitored SU.
Missed VARSYS	Shows the number of missing downlink control packets.
aloha retx	Shows the number of packets retransmitted due to collisions (collisions are a normal event on contingent channels. An excessive number may indicate a problem).
IB pkts	Shows the number of inbound packets transmitted.
OB pkts	Shows the number of outbound packets received.
OB PE	Shows the number of outbound packet errors.
OB PER	Shows the error rate for outbound packets received.
Time	Shows the cumulative polling time (in seconds).

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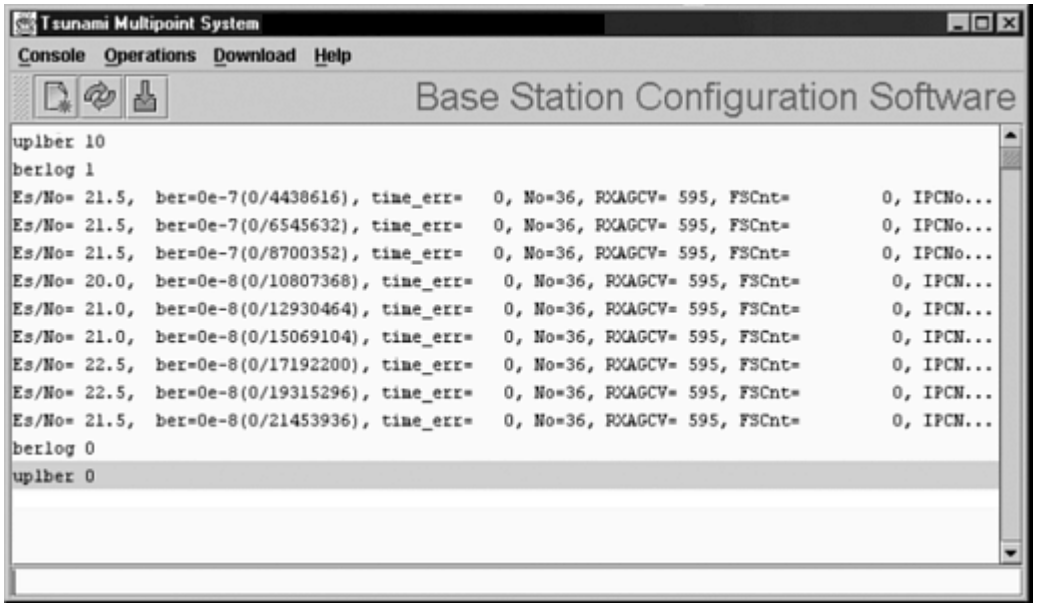
Uplink BER Test

The Uplink BER Test determines the BER (bit error rate) of the uplink signal. This is an out-of-service diagnostic tool and the data connection is terminated for the length of the test. Use this tool to determine whether the link is stable (that is, there are no bit errors). You can also monitor these test results to fine tune antenna alignment to get the strongest link possible.

Note: Do not run this test if users are sending data across the radio link.

Follow these steps to run the Uplink BER Test:

1. Open the Base Station Configuration Software.
2. Enter **uplber <Terminal ID>** to start the test for a particular SU. <Terminal ID> is the Terminal ID of the SU of interest.
3. Enter **berlog 1** to view the test results.



4. Monitor the BER test results. The Es/No is reported in column 1 and BER is reported in column 2. The BER should initially read **0E-6** or **oE-7** but then change to **0E-8** and finally to **0E-9** while the test is running. This corresponds to 0 (zero) bit errors. The numbers in parentheses indicates the number of errors over the total. **1E-6** indicates a bit error rate of 1 bit error received for every million bits sent.
5. When finished, disable the Uplink BER Test by first entering **berlog 0** (zero) and then entering **uplber 0** (zero).

Note: The data connection does not resume until the **uplber 0** (zero) command has been issued.

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NETWORK CONFIGURATION TIPS

Keep the following points in mind when configuring your PMP network.

Tips for Testing PMP Network Under IP Routing Mode

- Make sure to configure the BSU such that:
  - If the BSU is connected to a router, the router port to which the BSU is connected is defined as the BSU's default gateway. Also, make sure the BSU is specified as the router port's default gateway.
  - The IP addresses of the BSU and the router port reside in the same subnet (this is required).
- Make sure that an SU and its directly connected devices are in the same subnet. The subnet address of a device can be obtained by performing a logical "AND" of the device's IP address with its subnet mask. A subnet mask of 255.255.255.0 implies that there are 255 IP addresses within the same subnet.
- If the IP address of a PC connected to a SU is not dynamically assigned:
  - Make sure the PC's IP address appears in the SU's static IP list (see "addSUIP Command" in the *Tsunami Multipoint Reference Manual*). Otherwise, if the SU is running in Restricted mode, the PC cannot access the wireless network.
  - Configure the PC to point to the SU as its default gateway.
- In the latest firmware release, the proxy setting is turned on automatically; do not change this setting.

Tips for Anyone Operating the PMP Network

- When changing back and forth between Bridging mode and IP Routing mode (see "routingMode Command" in the *Tsunami Multipoint Reference Manual*), always remember to manually clear the ARP table of your PC.
- When a computer was once behind one end of the link and is later used at the other end, the learning bridge filter prevents traffic from being sent to the computer unless the far end is rebooted. The learning bridge filter holds 16 static entries that are removed at power-up and also when new devices are learned (first-in first-out).
- Do not turn off the power of the Base Station Unit "at-will," because the Base Station Unit might be saving internal variables or configuration parameters to the flash memory at that moment. Always wait for a minute after entering an operator command before shutting down the BSU.
- Always follow the simple proxy rule and fundamental principles concerning subnets and default gateways in planning and analyzing the PMP network. A good understanding of basic IP networking is required, regardless of whether you operate the PMP network in IP Routing or Bridging mode.
- If you cannot get the network to work, there is most likely a setup error. Check the network configuration using the tips above and try again.

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PROTECTING THE SYSTEM

Tsunami Multipoint provides ways to prevent unauthorized users from communicating with the BSU and SUs. You can password-protect the system to prevent unauthorized access and use the Range Security option to determine whether unauthorized SUs have entered the network.

Password Protection

Tsunami Multipoint provides two levels of password protection:

- **user level** – lets the user display the system's current status only.
- **admin level** – lets the user display the system's status and change its configuration.

The default password is "null." Password protection for either password level (user or admin) can be turned on and off. By default, password protection is turned off.

Passwords can be from 1 to 16 characters; any combination of alphanumeric characters is allowed, except for these special characters: " , . ' ‘ ^ { } | \ / ; :] [( )

If you forget your password, contact Proxim's Customer Service department with the MAC address of the BSU to obtain a new password. See "Appendix F. Technical Support and Training" on page 67 for Proxim's contact information.

Specifying a User-Level Password

To define the user-level password, from the BSU console enter:

setpw user<oldpw><newpw><newpw>

where:

<oldpw> = the old password (the default password is "null")
<newpw> = the new password

After defining the new user-level password, enter **logout**. Log in with the new password (see Logging In on page 42 for information).

Specifying an Admin-Level Password

To define the admin-level password, from the BSU console, enter:

setpw admin<oldpw><newpw><newpw>

where:

<oldpw> = the old password (the default password is "null")
<newpw> = the new password

After defining the new admin-level password, enter **logout**. Log in with the new password.

Note: If you specify either level of password without specifying a password for the other level, when you log out or restart the BSU, the system comes up in password-protected mode. Log in and enter the password you specified. For example, if you specify "admin" for the admin-level password and then log out or restart the BSU, enter **login admin** to access the system. This allows access to the admin-level.

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Turning Off Password Protection

To turn off password protection, from the BSU console, enter **setpw<level><oldpw><null><null>** where:

<level> = either **admin** or **user**, depending upon which level of password protection you want to remove. For example, if the current admin password is “superuser,” to remove the admin password, enter **setpw admin superuser null null**.

<oldpw> = the old password.

If you turn off both display-level and user-level password protection, restart the BSU to refresh its memory.

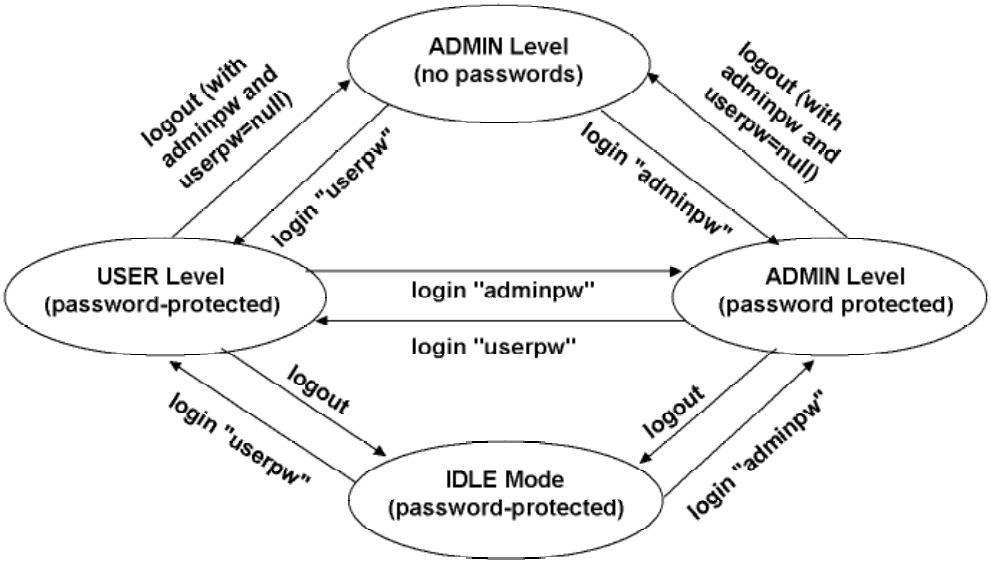


Figure 13. Password Definition/Usage Diagram

Logging In

If password protection is turned on, you must “log in” to the system to either display system status (user-level privileges) or change the system’s configuration (admin-level privileges).

To log in, enter **login <password>** where <password> is either the user-level or admin-level password.

Range Security

Theory of Operation

The Range Security option warns if a potentially unauthorized SU has entered the network. Specifically, when an SU enters the network and the Range Security option is on, the BSU compares the range value reported by the SU during the current network entry with the range reported at the time of the last network entry (for that SU). If these values differ by more than 75 meters, the range alarm is set to **1** (from zero) and a warning message is printed on the BSU Configuration Software console. This alarm remains set until the range security feature is reset.

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More specifically, Range Security works as follows:

- Whenever an SU enters the network, the range between the SU and the BSU is reported. If this is the first time the SU has entered the network (since being added to the BSU's database), the range simply is stored. This range can be examined using either the **dspSU** or **dspActiveSU** commands. On subsequent network entries, when range security is enabled, the BSU compares the range reported on the current network entry with the range reported on the most recent past network entry. If these ranges differ by more than 75 meters, the following occurs

  A. The net entry message contains a warning of the form "SU id reported wrong range x meters previous range was y meters," where **id** is the SU id, **x** is the range at which the SU attempted to enter, and **y** is the range of the previous network entry. This message is displayed only the first time the SU enters at the incorrect range.

  B. The range alarm changes from zero (0) to one (1). The range alarm is displayed whenever a **dspSU** or **dspActiveSU** command is issued. The range alarm remains set until range security is reset

  C. The range displayed in response to a **dspSU** or **dspActiveSU** command is the latest range at which the unit entered.

  D. The SU cannot enter the network and transmit data.

- When range security is activated, it is active for all SUs attached to a BSU. Similarly, when range security is turned off, it is turned off for all SUs attached to a BSU.

Range Security Commands

To activate the Range Security option, from the BSU console enter **rangeSecurity 1.** (Similarly, you can use SNMP to set **rangeSecurity** to **1**). This automatically clears all range alarms. To turn off range security, enter **rangeSecurity 0**. When turned off, the system still updates the range whenever an SU enters the network; however, it does not print a warning message or change the range alarm from 0 to 1 if an SU enters at a different range. Turning off range security does not reset the range alarm to zero. The range alarm is reset only when range security is turned on.

The Range Security feature can be reset simply by turning it off (rangeSecurity 0) and then turning it back on (rangeSecurity 1).

Changing the Location of an SU

Use the following procedure if you must change the location of an SU (or BSU), for example, if the BSU and SUs are first deployed on an indoor range and then moved outdoors.

1. Turn-off range security at the BSU.
2. Move the SU(s) (and/or BSU) to its final location.
3. Let the SU(s) re-enter the network
4. Once the SU(s) have re-entered the network turn on range security (**rangeSecurity 1**).

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Appendix A. Initial Settings

SPECIFY THE DESIRED MODULATION (DATA RATE)

To configure the BSU to use the modulation setting required by your application (20, 30, 40, or 60 Mbps), from the BSU console, enter **modulation <mode number>**, where:

<mode number> =

0 (zero) = QAM16 (60 Mbps)
1 = QAM8 (40 Mbps)
2 = QPSK3Q (30 Mbps)
3 = QPSK1H (20 Mbps)

The BSU automatically restarts and then comes up with the new modulation setting. The Subscriber Units adopt the new modulation setting (the new modulation setting appears in the **Burst Rate** field on the **Status** page of the Subscriber Utility).

SPECIFY THE BSU'S GATEWAY ADDRESS

A gateway is a device that routes traffic between networks. A gateway can be set only if the BSU is operating in IP routing mode. When a BSU operating in IP routing mode receives a packet from the wireless link to be transmitted onto the wireline side, it first checks to see whether the packet is destined for a host in its local subnet. If the packet is destined to a different subnet, the BSU checks to see whether a gateway is defined. If so, it delivers the packet to the gateway (which forwards it to the proper network). If no gateway is defined, the BSU discards the packet.

The decision to set a gateway at the BSU depend upon the details of the network topology. If the BSU is connected to a router port , the IP address of the port typically serves as the BSU gateway. To specify the BSU's gateway address, from the BSU console, enter **gateway <gateway address>** where <gateway address> is the IP address of the gateway.

SELECT THE ROUTING MODE

Set the BSU to operate in **IP Routing** or **Bridging** mode. A BSU is set to **IP Routing** mode by default. See the **routingMode** command in the *Tsunami Multipoint Reference Manual* for more information about these modes. After you change the routing mode, the BSU restarts and forces all the SUs in its sector to restart. The BSU and SUs then come up in the new routing mode.

- To select **Bridging** as the routing mode, from the BSU console, enter **routingMode 1**. Proxim recommends Bridging mode as the most "plug-and-play" mode of operation.
- To select **IP Routing** as the routing mode, enter **routingMode 0** (zero).

Note: The default **IP routing** mode combined with the default access mode of **Restricted** on the SU prevents any traffic from flowing until the **addSUIP** command is issued to authorize the IP address of the host behind the SU, or until the host behind the SU obtains its IP address from a DHCP server behind the router.

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CHANGE THE FREQUENCY PLAN AND OPERATING FREQUENCY

Tsunami Multipoint offers several frequency plans and operating frequencies to provide a means for overcoming interference. If one part of the 5.8 GHz spectrum is occupied when you deploy the product, you can select a different frequency plan to bypass the interfering frequency.

To select a frequency plan and operating frequency, specify a frequency plan (4, 5, or 6), then one of the available frequencies (one of four frequencies for plan 4, one of five frequencies for plan 5, one of six frequencies for plan 6). Plan 4 is the default frequency plan. Operating frequencies in plans 5 and 6 overlap. See “Frequency Plans” **Error! Bookmark not defined.** for details about the available frequency plans and operating frequencies.

To select a frequency plan, from the BSU console, enter **freqPlan<frequency plan>** where <frequency plan> is **4**, **5**, or **6**.

To select an operating frequency, from the BSU console, enter **frequency<frequency ID>** where <frequency ID> is:

For plan 4: **A**, **B**, **C**, or **D**
For plan 5: **A**, **B**, **C**, **D**, or **E**
For plan 6: **A**, **B**, **C**, **D**, **E**, or **F**

For example, to change to the **5e** plan, enter **freqPlan 5**; then enter **frequency e**.

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Appendix B. Installing the Configuration Software and Upgrading Firmware

Four major pieces of software are required to install the SU and BSU:

- Tsunami Multipoint Base Station Configuration Software Console, Version 2.0 (BSU 2.0 Console)
- Tsunami Subscriber Utility 2.0 (packaged with the Base Station Configuration Software)
- BSU Firmware Version 2.0 binary code, identified as **PMP_BSU_release2.0.mot**
- SU Firmware Version 2.0 binary code, identified as **PMP_SU_release2.0.mot**

If the BSU and SU are new from the factory they are preloaded with BSU Firmware Version 2.0 and SU Firmware Version 2.0, respectively. Proxim recommends that all equipment be upgraded to Firmware Version 2.0, following these steps:

1. Install the new BSU 2.0 Configuration Software. This step is optional, but recommended
2. Install Subscriber Utility 2.0
3. Install BSU Firmware Version 2.0
4. Install SU Firmware Version 2.0

Methods for upgrading SU equipment from previous versions to Version 2.0 follow, including remote over-the-air download and local download instructions.

BSU AND SU SYSTEM REQUIREMENTS

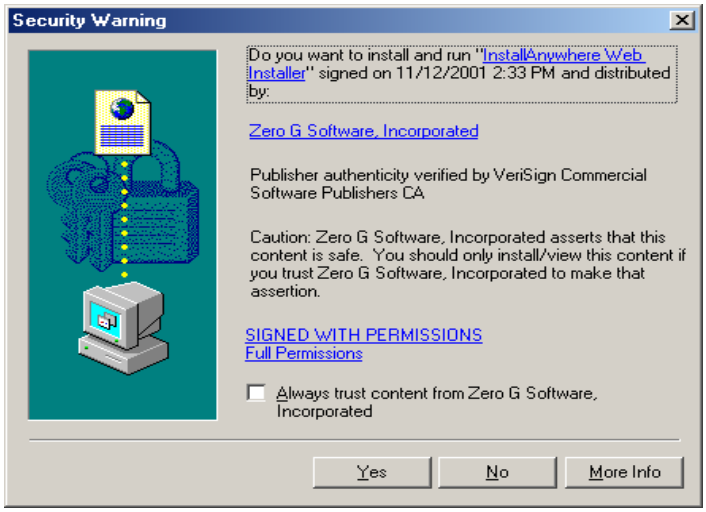
Hardware	Multimedia PC with a Pentium 200 MHz or higher processor (300 MHz recommended).
Operating System	Microsoft Windows® 98, NT 4.0, Me, 2000, XP.
Java 2 Virtual Machine (JVM)	SDK or runtime (1.2.2_12 or later, 1.3.1_03 is provided).
Memory	64 MB for Windows® 95/98 or Windows® Me; 128 MB for Windows® NT 4.0 workstation, Windows® 2000 Professional, or Windows® XP Professional (256 MB RAM is recommended).
Hard Drive	2 GB hard disk with up to 250 MB of available hard-disk space.
ROM Drive	Double speed (2x) or faster CD-ROM/DVD-ROM.
Network Interface Card	10/100 Mbps NIC with RJ-45 input.
Input Devices	Standard IBM-PC compatible 101-key style keyboard, PS2 or USB compatible mouse, or a compatible pointing device.
Monitor	Super VGA 16-bit or higher monitor supporting 800 x 600 screen resolution; coordinated video driver for installed video card; VGA not supported.
Graphics Card	PCI, AGP, or on-board graphics card supporting 16-bit 640 x 480 video resolution or higher. Must Support 16-bit color.
Video Driver	Must support 16-bit color.
Browser	Microsoft Internet Explorer 5.0 software or later (6.0 recommended); other browsers also supported.
Optional Hardware	16-bit sound card with speakers or headphones for audible alarm; 6-foot power strip with power surge protection.
Optional Software	Microsoft Personal Web Server, Internet Information Server (IIS), or Apache 1.3.x can be served by VAR for over the Internet console installation.

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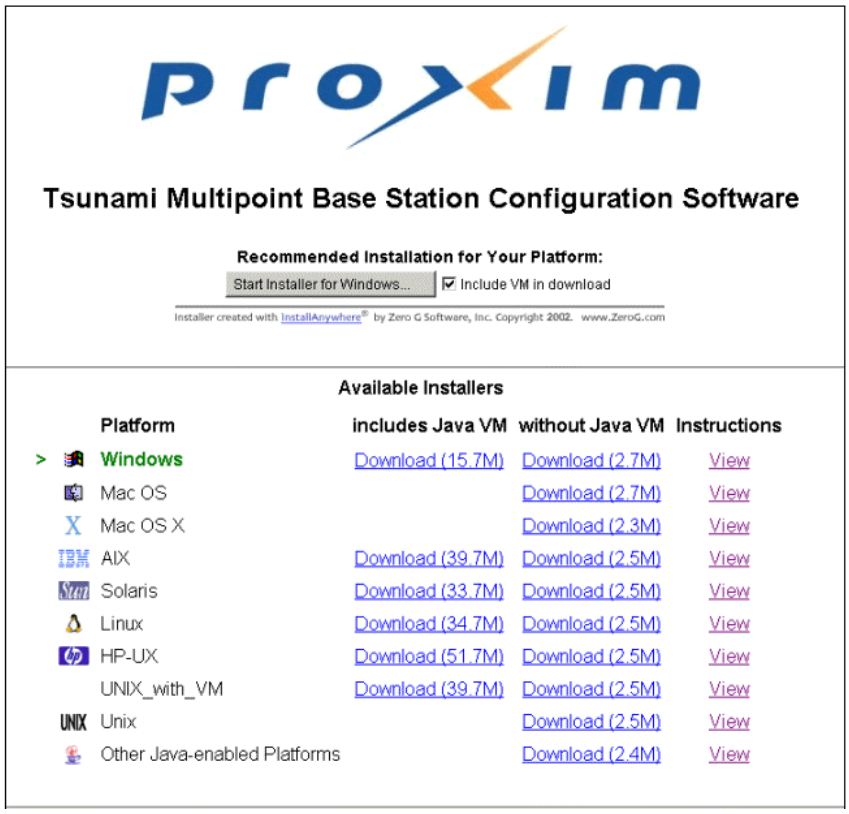
INSTALLING THE BASE STATION CONFIGURATION SOFTWARE

To install the BSU/SU Configuration Software:

1. From the Windows Explorer **Console2.0** directory, double-click on the **BSU** folder.
2. Double-click on the Install icon (or **install.exe**). Two windows open simultaneously: **InstallAnywhere Web Installer — Microsoft Internet Explorer** (in disabled mode) superimposed by **Security Warning** (in enabled mode).



3. Click the **Yes** button on the Security Warning window to close this window and view the Base Station Configuration Software window.



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For the remainder of this procedure, only default settings are used. Select the applicable installer for your network environment when performing these steps.

4. Click **Download 15.7M** to download the Tsunami Multipoint Base Station configuration software and Java VM; click **Download 2.7M** to download the Tsunami Multipoint Base Station configuration software without Java VM.
5. After the download completes, double-click on **BS.exe** to begin installation.
6. When the Tsunami Multipoint Base Station Configuration Software **Introduction** window is displayed; click **Next**.
7. Click **Next** on the "Important Information" window once you have completed reading the text. When the License Agreement window is displayed, accept the terms of the License Agreement; then click **Next** to proceed with the installation.
8. Click the **Next** button after making your choices on the following windows:
   - **Choose Install Folder** (you can select the default folder or specify another folder)
   - **Choose Java Virtual Machine** (you can select the default machine or specify another machine)
   - **Pre-Installation Summary** (summarizes the installation choices you have made)
9. When the **Install Complete** window is displayed, click on **Done** to return to the Web Installer window; then close the Web Installer window.

INSTALLING THE SUBSCRIBER UTILITY SOFTWARE

To install the Subscriber Utility software:

1. Identify the computer on which you plan to run the Subscriber Utility.

   Note: See "BSU and SU System Requirements" on page 46 for operating system and hardware requirements.

2. Insert the Tsunami MP CD (provided with the product) into the computer's CD-ROM drive and open the CD's **config software** folder.

   Note: If the computer has Microsoft IIS (Internet Information Services) running, disable or uninstall it before running the Subscriber Utility.

3. Double-click **susetup.htm** or use a Web browser to open the file.
4. Click to place a checkmark next to the **Include VM in download** option to install Java Virtual Machine (VM).

   Note: You need not add VM if your computer already has a version of VM installed.

5. Click the **Start Installer for Windows** button to begin the software installation.
6. Follow the on-screen instructions to install the software.
7. Click **Done** when the installation is finished to close the installer.
8. Launch the Subscriber Utility.

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FIRMWARE DOWNLOADS

Firmware can be downloaded to the BSU using the local console. Firmware can be downloaded to the SU either over-the-air or from a local console (by attaching a PC with the Base Station Configuration Software to the SU).

Proxim recommends you download new code as follows:

1. Download the new code to the SUs and verify that they re-enter the network.
2. Download new code to the BSU.

Remote Over-the-Air Download to SUs

You can upgrade your SUs to Version 2.0 from the Base Station Configuration Software Console of the BSU. Normally, all SUs in the network are upgraded at the same time. However, if one or more SUs fail to receive the download code correctly, the upgrade is aborted and a second attempt must be made. SUs that have been upgraded successfully ignore reprogramming of the same codes.

To download remotely to SUs:

1. From the BSU Console, confirm that SUs have established a link with the BSU by issuing a **dspActiveSU** command. Make note of the SUs in the network.
2. Select the **Download** menu.
3. Select **Remote Firmware**; a **Download — File Selection** window is displayed.
4. From the **Look In** search field, select the binary file to be downloaded (**PMP_SU_release2-0.mot**) from the appropriate directory. The BSU Console automatically processes the selected binary codes and, once finished, displays an output of “Elapsed [time]” in seconds.
5. Let the SUs re-enter the network. It usually takes no more than five minutes for the SUs to enter the network from the start of the download. The following messages are displayed at the BSU Console for each SU as it enters the network:

   118 Received NetEntry Request from Eth<*SUs Ethernet address*>
   119 NetEntry completed: Assigned terminal ID <*ID#*>, IP<*SUs IP address*>, and VLAN ID <SU VLAN ID#> in VLAN mode.

6. Issue **dspActiveSU** to verify that the SUs have entered the network successfully. If an SU fails to enter the network, use the local download procedure in the following section.
   - If the SU was correctly upgraded, the display reads **ver 20032000**.
   - If the SU failed to upgrade and the link was restored, the display most likely reads **ver 20021400** or **20021500**.
7. If any SU that re-entered the network failed to upgrade to Version 2.0, repeat steps 2 through 6, or upgrade the failing SUs using the “Local Download to SUs” method.

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Local Download to SUs

You can use this method to upgrade SUs that have not been deployed or have failed to successfully download using the remote over-the-air procedure. Using this procedure, individual SUs are upgraded through their Ethernet/Power cable.

This procedure requires the Tsunami Multipoint Base Station Configuration Software application be loaded on the PC attached to the SU (SU 1.,4 or 1.5 Console). The window label appears as "Tsunami Multipoint Subscriber Utility Configuration Software."

To download locally to an SU:

1. From the Subscriber Utility 1.4 or 1.5 console, select the **Download** menu.
2. Select **Local Firmware**.
3. From the **Look In** search field, choose the binary file to be downloaded (**PMP_SU_release2-0.mot**) from the appropriate directory and click **Select**. The download requires about 2 minutes. Once the download is complete, the banner indicating **Version 2.0** is displayed.

If the download does not complete successfully, as indicated by a checksum mismatch or a failure to reboot, cycle power to the SU and repeat, starting at step 1.

Local Download to the BSU

Use this download method to upgrade BSUs after the SUs have been upgraded to Version 2.0. The BSU is upgraded through its Ethernet/Power cable using the BSU Configuration Software console.

To locally download to the BSU:

1. From the BSU console, select the **Download** menu.
2. Select **Local Firmware**.
3. From the **Look In** search field, choose the binary file to be downloaded (**PMP_BSU_release2-0.mot**) from the appropriate directory and click **Select**.
4. Once the upgrade is successful, if there were SUs connected to the BSU, they re-acquire net entry. For each SU connection, two messages are displayed:

   120 Received NetEntry Request from Eth<SU's Ethernet address>
   121 NetEntry completed: Assigned terminal ID<ID#>, VLAN ID 1, IP<SU's IP address>

   It normally takes less than a minute and a half for the SUs to re-acquire NetEntry with the BSU from the time the local download started.
5. If there were no SUs connected to the BSU, after the upgrade succeeds, the version banner is displayed with version 20032000, following by three messages:

   114 Completed flash sector verification
   103 DB check completed
   107 Save NV configuration Parameters

   Once the SUs are re-connected to the BSU, expect the same behavior as specified in step 4.

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Appendix C. Technical Specifications

The following technical specification is for reference purposes only. Actual product performance and compliance with local telecommunications regulations can vary from country to country. Proxim Corporation only ships products that are type approved in the destination country.

BURST-RATE LIMIT

Product	Burst-Rate Limit	Also Supports
Base Station Unit	60 Mbps 20 Mbps	20-40 Mbps burst rates
Subscriber Unit	60 Mbps 20 Mbps	20-40 Mbps burst rates

DOWNLINK/UPLINK THROUGHPUT

Burst Rate	D/L Throughput	U/L Throughput
20 Mbps	9 Mbps	8 Mbps
30 Mbps	13.5 Mbps	12 Mbps
40 Mbps	18 Mbps	16 Mbps
60 Mbps	27 Mbps	24 Mbps

Note: The above calculations are typical and based upon a 50/50 downlink (D/L) uplink (U/L) division of slots (see "firstinboundSlot Command" in the *Tsunami Multipoint Reference Manual*). SU throughput may be limited by a provider's Service Level Agreement or other D/L U/L settings.

FREQUENCY PLANS

The following table defines the frequencies associated with each plan.

Channel Plan	Frequency
4A	5743.86 MHz
4B	5764.61 MHz
4C	5785.36 MHz
4D	5806.11 MHz

Channel Plan	Frequency
5A	5742.19 MHz
5B	5758.79 MHz
5C	5775.39 MHz
5D	5791.99 MHz
5E	5808.59 MHz

Channel Plan	Frequency
6A	5740.40 MHz
6B	5754.23 MHz
6C	5768.07 MHz
6D	5781.90 MHz
6E	5795.73 MHz
6F	5809.57 MHz

TX POWER

BSU ..... +6 to +17 dBm (into antenna port)
SU..... -48 to +15 dBm (into antenna port)

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ANTENNA

BSU ..... Integrated, LHCP (left-hand circular polarization) 18 dBi
SU..... Integrated, LHCP 21 dBi

RECEIVER SENSITIVITY

Burst Rate	Threshold
60 Mbps	-77 dBm
40 Mbps	-81 dBm
30 Mbps	-86 dBm
20 Mbps	-89 dBm

MAXIMUM DISTANCE BETWEEN BASE STATION AND SUBSCRIBER UNIT

BURST-RATE	CLOS[1]	NLOS[2]
60 Mbps	3 miles/5 km	1.2 miles/2 km
40 Mbps	4 miles/6.6 km	2 miles/3.5 km
30 Mbps	5 miles/8.3 km	2.4 Miles/4 km
20 Mbps	6 miles/10 km	3 miles/5 km

[1]Clear-Line-of-Sight distance is calculated for 99.995% availability assuming no obstructions in the first Fresnel Zone.

[2]Near-Line-of-Sight distance is for a typical installation with moderate multipath/shadowing due to terrain and structures.

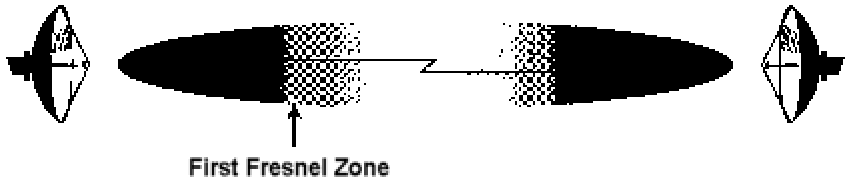


Figure 14. Fresnel Zones

The Fresnel Zone refers to the radio beam. The radio signal's path length and frequency determine the Fresnel Zone's width and shape. When a large part of the Fresnel Zone is blocked, some of the radio signal's energy is lost.

SYSTEM

Operating Frequency Range..... 5725-5825 MHz
Radio Access Method ..... TDMA
Duplexing..... Time Division Duplex (TDD)
Integrated Antenna (BSU)..... 19 dBi (60° Azimuth. X 6° Elevation) LHCP
Integrated Antenna (SU) ..... 20 dBi (10° Azimuth. X 10° Elevation) LHCP
Max Subscriber Units/BSU..... 1,023
Frequency Channels ..... 4 non-overlapping, 5 and 6 overlapping available
Regulatory Compliance..... FCC Part 15-400 (U-NII), IC RSS21 0

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STANDARDS COMPLIANCE AND INTERFACES

Ethernet Interface	10/100 Base-T
Ethernet Connector	RJ-45 female
BSU indoor-outdoor cable	Circular plastic connectors with Category 5 cable
SU indoor-outdoor cable	RJ-45 (outdoor) and DIN (indoor) over CAT5 (UV) cable
Standards Compliance	IEEE 802.1d Bridging Mode (a subset of the 802.d standard) IEEE 802.1q VLAN

CONFIGURATION AND MANAGEMENT

BSU Configuration

Configuration	via Ethernet or Wireless Manager (future release)
SNMP	AgentMIB II (future release)
Security	Authentication, IP/MAC Filtering, passwords
Software Upgrades	Downloadable Base Station reprogramming

SU Configuration

Configuration	Automatic
Security	Authentication, IP/MAC Filtering
Software Upgrades	Over-the-air Subscriber Unit programming

POWER/ENVIRONMENT SAFETY

Electrical

Base Station Unit	-36 to –60 Volts DC, 1.25 Amps
Base Station Unit Power Brick	100-240 Volts AC
Base Station Unit Power Block	48 Volts DC
Subscriber Unit	18 to 28 Volts DC, 0.8 Amps
Subscriber Unit Power Brick	115 or 100-240 Volts AC

Operational Temperature

Indoor	0° to 55° C
Outdoor	-25° to 65° C

Humidity

Indoor	95% non-condensing
Outdoor	5% to 100%, condensing
EIVIC	FCC Class B
Safety	UL-1950
Environmental Compliance	ETS 300 019

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PHYSICAL DIMENSION

Base Station (Outdoor Unit)

Size (WxHxD)..... 10.2 x 24 x 6.6 inches/25.9 x 61 x 16.8 cm
Weight ..... 20 lbs/9 kg

Base Station Power Brick (Indoor Unit) [sold separately]

Size (WxHxD)..... 37.4 x 70.9 x 24.8 inch/95 x 180 x 63 cm
Weight ..... 1.5 lbs/0.7 kg

Subscriber Unit (Outdoor Unit)

Size (WxHxD)..... 10.5 x 10.5 x 6.8 inches/26.5 x 26.5 x 17.4 cm
Weight ..... 10 lbs/4.5 kg

Subscriber Unit Power Brick (Indoor Unit)

Size (SxHxD)..... 36 x 5.1 x 2.6 inch/92 x 130 x 67 cm
Weight ..... 2.7 lbs/1.2 kg

INSTALLATION DETAILS

Base Station Unit (outdoor unit)..... Pole mounting, 1.5-4.5” diameter (w/supplied U-bolts)
Subscriber Unit (outdoor unit) ..... Pole mounting, 1.25-1.75” diameter (w/supplied U-bolts)

OPTIONAL ACCESSORIES

Base Station Unit

Connector kit ..... P/N ACC-5300, Item #61653
BSU Power Brick..... P/N 201-40100, Item #58441

Subscriber Unit

Wall mounting kit ..... P/N ACC-40100, Item #58197
Connector kit ..... P/N ACC-5200, Item #59438

TSUNAMI MULTIPOINT VERSION 2.0 BSU MODELS

20 Mbps..... 58523
20 Mbps connectorized 63005
20 Mbps A.I.R..... 62365

60 Mbps..... 58524
60 Mbps connectorized 63006
60 Mbps A.I.R..... 62366

The above products comply with the requirements of the European Directive 1999/5/EC, the Radio and Telecommunications Terminal Equipment Directive, Low Voltage Directive 73/23/EEC, and the Electromagnetic compatibility Directive 89/336/EEC. (Original copies of the Declaration of Conformity are available on file.)

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TSUNAMI MULTIPOINT VERSION 2.0 SU MODELS

20 Mbps 110V 58515
20 Mbps 110/220V 58516
20 Mbps connectorized 61747

60 Mbps 110V 58519
60 Mbps 110/220V 58520
60 Mbps connectorized 61749

The above products comply with the requirements of the European Directive 1999/5/EC, the Radio and Telecommunications Terminal Equipment Directive, Low Voltage Directive 73/23/EEC, and the Electromagnetic compatibility Directive 89/336/EEC. (Original copies of the Declaration of Conformity are available on file.)

DECLARATION OF CONFORMITY

The Tsunami Multipoint products listed in the previous section are in conformity with the following standards:

Safety	IEC60950, 2nd Edition: 1991 + A1 + A2 + A3 + A4
Immunity	ETSI EN301 489-1; ETSI EN301 489-4; EN55024/CISPR24
Emissions	ETSI EN301 489-1; ETSI EN301 489-4; EN55022; EN61000-3-2; EN61000-3-3
Radio	ETSI EN 300 440-2; ETSI EN 300 440-1
Environmental	ETSI EN300 019-2-4; IEC 60068-2-1; IEC 60068-2-2; IEC 60068-2-14; IEC 60068-2-30; IEC 60068-2-56

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Appendix D. Constructing Power and Ethernet Cables

SUBSCRIBER UNIT POWER AND ETHERNET CABLE

Perform the following steps to construct a Subscriber Unit power and Ethernet cable of the desired length.

CAUTION **For best results this cable should be constructed by professional cable manufacturer or by experienced personnel with proper tools. Contact Proxim Customer Service or Sales for recommendations for a manufacturer near your vicinity.**

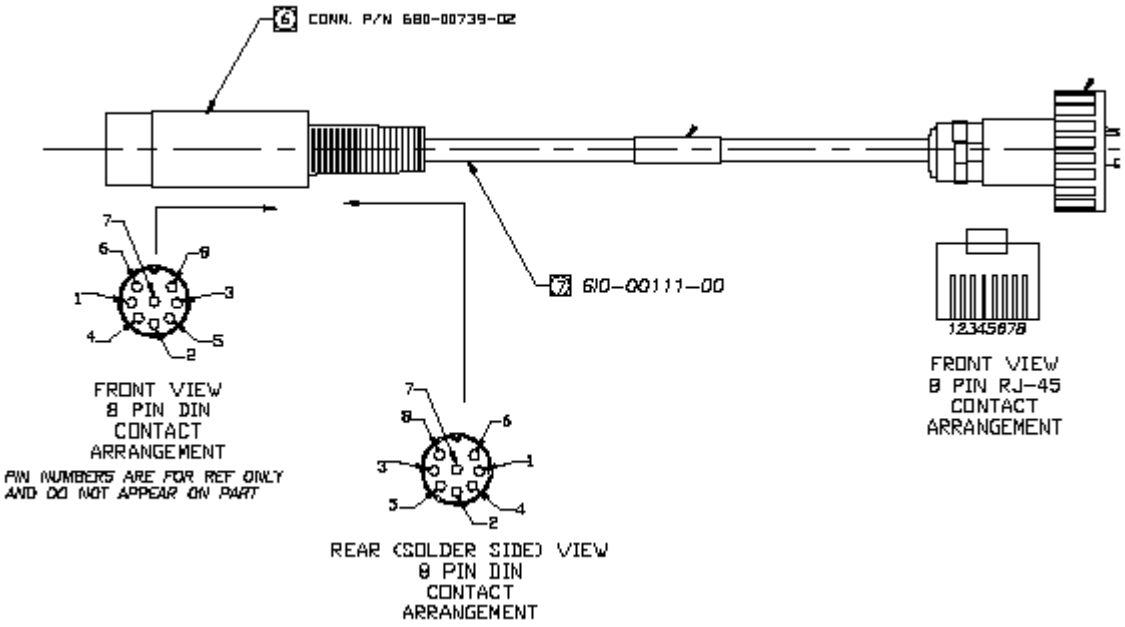


Figure 15. 8-Pin DIN and RJ-45 Contact Arrangements

Perform the following steps to construct an interface cable of the desired length.

WARNING! Interface cable length should not exceed 75 m.

Required Materials

The following is a list of the materials required to assemble an interface cable.

- CAT5 UV cable (75 meters maximum).
- One each 8-pin DIN male connector with cover (solder type) or one each 8-position DIN male connector (crimp type).
- One each Woodhead weatherproof RJ-45 connector.

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Assembling the 8-Pin DIN Connector

To assemble the 8-pin DIN connector:

1. Slide the jacket of the 8-pin DIN connector over one end of the CAT5 UV cable.
2. Prepare the CAT5 cable ends by removing 0.75” of the main jacket. Do not cut the twisted pair wires.
3. Remove 0.06” of insulation from the end of each wire in each twisted pair.
4. Solder each wire prepared in step 3 to the appropriate cup on the DIN connector. Refer to the following table for information.

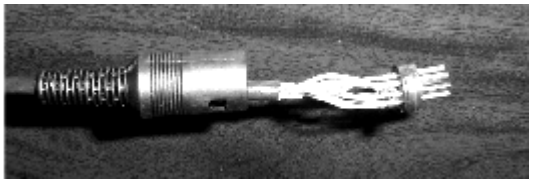


Figure 16. Soldered Wires on 8-Pin DIN Connector

Interface Cable Pin Assignments			
DIN Pin	**Color**	**Signal**	**RJ-45 Plug Pin**
2 8 7	Orange Orange/White	+24 VDC - 24 VDC	4 5
6 8 8	Brown Brown/White	+24 VDC - 24 VDC	7 8
5 8 3	Green Green/White	Tx+ Tx-	1 2
1 8 4	Violet Violet/White	Tx+ Rx-	3 6

5. Assemble the metal shell over the DIN connector; make sure the DIN connector fits into the slots of the metal shell.



Figure 17. Metal Shell Placed Over 8-Pin DIN Connector

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6. Using small pliers, crimp the metal strain relief over the CAT5 cable. Do not cut into the cable. Slide the jacket over the completed assembly.

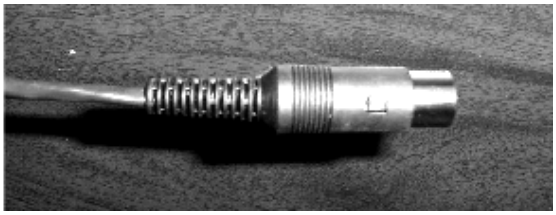


Figure 18. Jacket Placed Over 8-Pin DIN Connector

ASSEMBLING THE RJ-45 (WOODHEAD) WEATHERPROOF CONNECTOR

CAUTION	**For best results this cable should be constructed by professional cable manufacturer or by experienced personnel with proper tools. Contact Proxim Customer Service or Sales for recommendations for a manufacturer in your vicinity.**

To assemble the RJ-45 (Woodhead) connector:

1. Slide the threaded Wooodhead cover over the bare end of the CAT5 cable.
2. Slide the body of the Woodhead connector over the bare end of the CAT5 cable.
3. Remove 0.5” of jacket from the CAT5 cable. Do not cut the wires of the twisted pairs.



Figure 19. CAT5 Cable with Insulation Removed

4. Insert the ends of the twisted pairs into the RJ-45 connector positioning wire color code (see the table on the previous page).
5. Crimp the wires into the RJ-45 connector using an RJ-45 crimp tool.

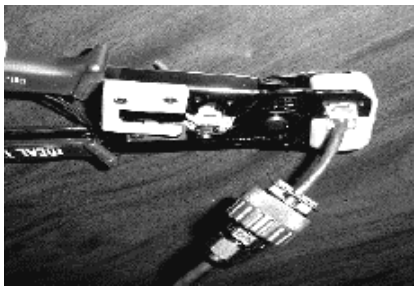


Figure 20. Wires Crimped into RJ-45 Connector

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6. Slide the threaded Woodhead cover over the completed assembly and loosely tighten it down to the cable.

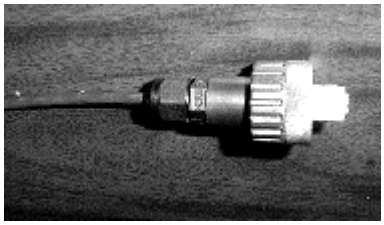


Figure 21. Woodhead Cover Placed Over RJ-45 Connector

7. When connecting the cable to an SU, insert the RJ-45 connector into the SU's Power and Ethernet port until the locking tab clicks, slide the Woodhead body over the RJ-45 connector until it is seated, tighten the end nut to seal the connector to the housing, and tighten the gland to seal the assembly to the cable.

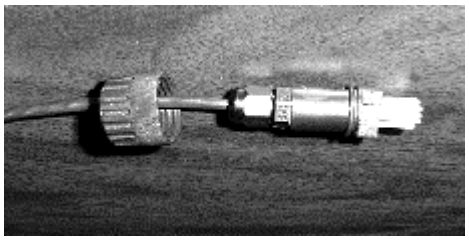


Figure 22. End Nut Seated on RJ-45 Connector

BSU POWER AND ETHERNET CABLE

This section describes how to construct a Power and Ethernet cable for a BSU. This cable has the following connectors:

- 18-pin Positronic connector
- 8-pin AMP connector

Installing an 18-Pin Positronic Connector

Perform the steps following the figure to install an 18-pin positronic connector on the cable.

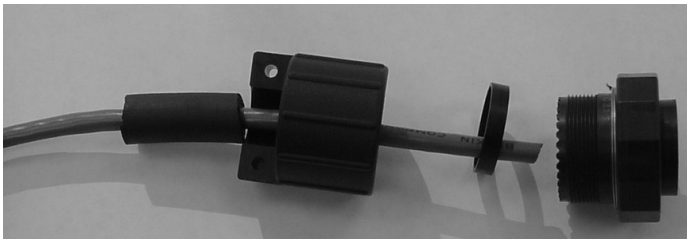


Figure 23. 18-Pin Positronic Connector

1. Cut 750-00891-00 tubing or Proxim approved equivalent to 1.25" +/- 0.1".
2. Using silicone spray or equivalent lubricant, spray the end of the wire, then slide the tubing onto the wire, approximately 4" out of the way.
3. Slide the backshell with the ½" (inside diameter) rubber cable seal onto the wire.

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4. Crimp the connector pins onto the individual wires using a Positronic crimping tool 9507 (crimping frame) and 9502-20 (die).
5. Insert the 1.9" (outside diameter) 1/8" wide plastic ring inside the rear of the connector.
6. Insert the crimped pin/wire assemblies in the appropriate holes in the rear of the connector.
7. Attach the backshell to the connector by threading it clockwise onto the connector.

Note: You need a FR19MF1822K0 connector plug (no pins required, housing only) to get a better grip on the connector. A good grip is required to sufficiently torque the backshell to provide a good seal. When torquing the backshell, make sure the CAT5 cable can still rotate freely inside the backshell so it does not get broken.

8. Using silicone spray, slide the tubing into the cable seal inside the backshell until it is flush with the end of the connector.
9. Install the backshell clamp over the tubing and wire.

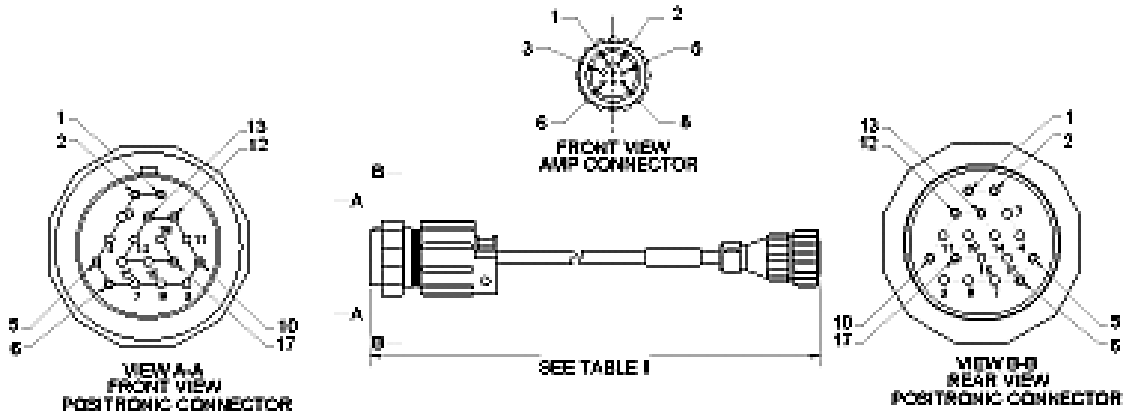


Table I - Wiring			
Pin Pos	**Color**	**Signal**	**AMP Pin**
17 10	orange white/orange	48VDC+ 48VDC-	1 2
6 5	brown white/brown	48VDC+ 48VDC-	3 4
12 13	violet white/violet	Rx+ Rx-	7 8
1 2	green white/green	Tx+ Tx-	5 6

Table II – Cable Length	
Dash No	**Length**
-01	25m-.1m
-02	50m-.1m
-03	75m-.1m

Figure 24. BSU Power and Ethernet Cable Connectors

About Crimping

Loose piece contacts are designed to be crimped with crimp tooling (hand tools, die assemblies, or crimping heads), but can be done with normal hand tools. The applicable crimp tooling for the contacts is described later in this section. Read the documentation included with the crimp tooling for the proper crimping procedure.

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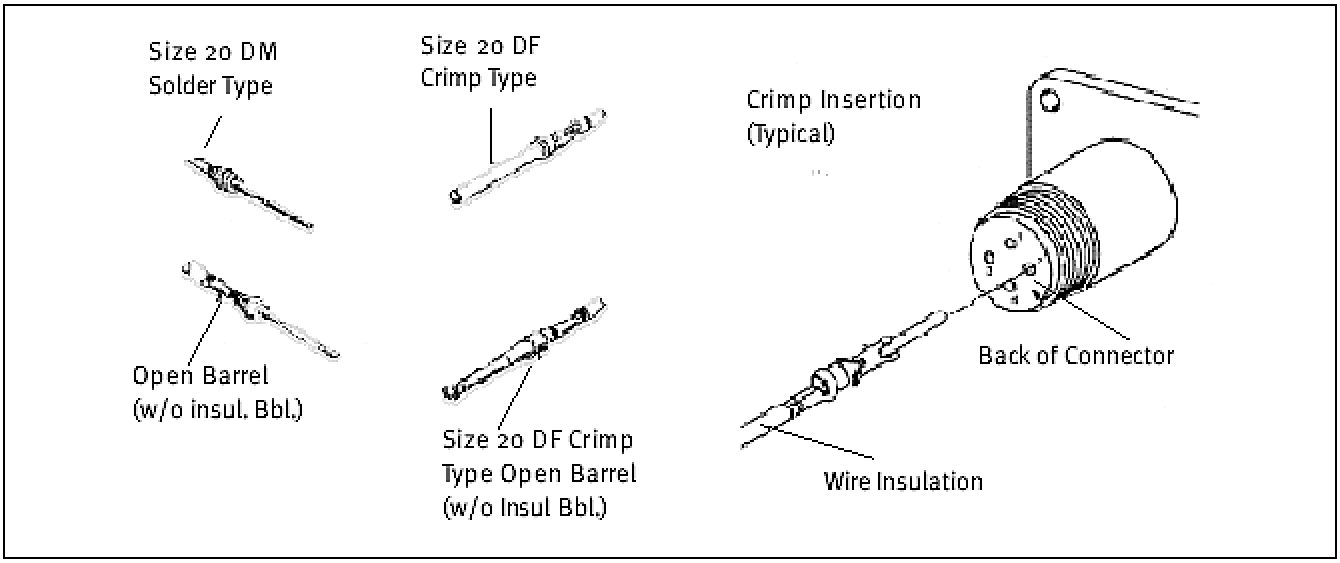


Figure 25. Crimping Styles and Insertion

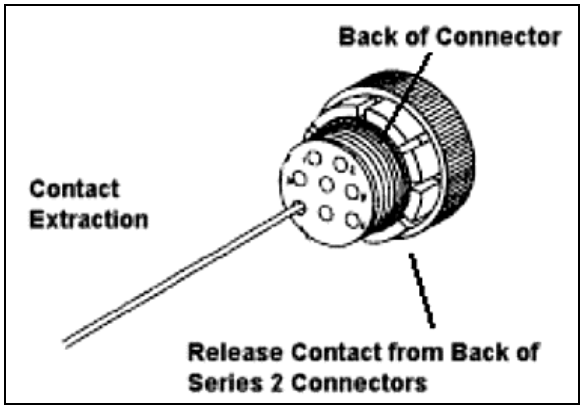


Figure 26. Indoor Portion of Power and Ethernet Cable

Wire Size and Preparation

Contacts are available for the wire sizes specified. Prepare the wire for crimping by stripping the insulation. DO NOT nick, scrape, or cut the stranded or solid wire conductor while stripping the insulation.

Note: When using twisted pair cable, cut one wire shorter than the other.

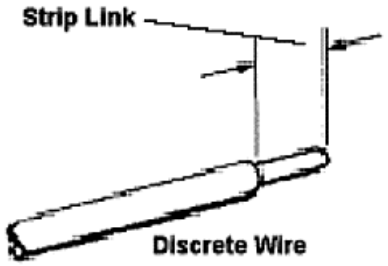


Figure 27. Wire Preparation

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Tooling

AMP hand crimping tools and applicators are available for applying crimp type contacts. Also, insertion and extraction tools assist in assembly and repair. See the documentation included with the tool for more information.

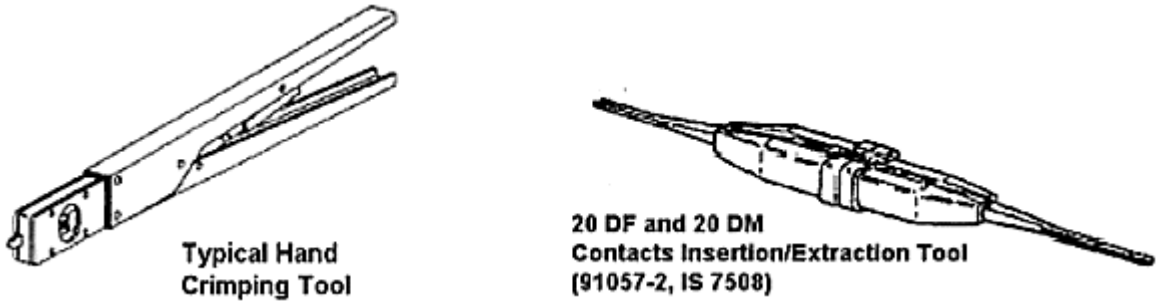


Figure 28. BSU Cable Construction Tools

INSTALLING THE AMP CPC CONNECTOR WITH SHIELD AND STRAIN RELIEF

The indoor end of the BSU Power and Ethernet cable uses an 8-pin circular plastic AMP connector with crimp contacts. The connector is a reverse sex plug with male connector pins. The plug provided is not weather tight and is meant for indoor use only. The connector uses a shield to cover the pin end of the wires and has a strain relief clamp with two self-tapping screws to clamp the cable sheath to the connector.

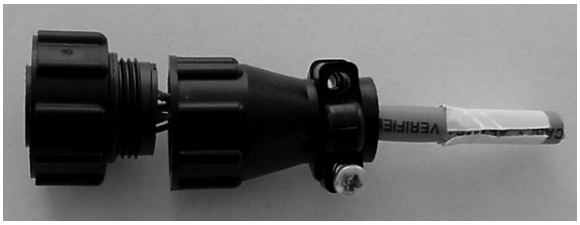


Figure 29. 8-Pin AMP Connector

To install the AMP CPC connector on the BSU Power and Ethernet cable:

1. Install the shield on the cable before removing the cable jacket. Slide the shield onto the cable so that the threaded, large-diameter end faces the end of the cable.
2. Crimp the contacts to the wires according to the documentation included with the crimp tooling. Pins are size 20 DM and the wire strip length is 0.100”.
3. Insert the contacts into the housing one at a time by gripping the insulation of the wire directly behind the contact and aligning the contact with the back of the desired contact cavity.
4. Insert each contact straight into the cavity until it bottoms, then pull back lightly on the wire to be sure the contact is locked in place.
5. Thread the shield onto the connector and tighten the shield finger-tight.
6. Screw in the strain relief over the end of the cable using the two supplied Phillips head screws.

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Appendix E. Lightning Protection Recommendations

This appendix describes Proxim Lightning Protection Recommendations for:

- Tsunami Multipoint Base Station Unit 40400-25/-65
- Tsunami Multipoint Subscriber Unit 40100-251/-252/-651/-652

WHAT IS LIGHTNING PROTECTION?

All outdoor electronic equipment is susceptible to lightning damage. Proper grounding to national and local codes is instrumental in providing human safety. Lightning Protection is used when a customer wants to maximize the reliability of the electronic system by diverting the excess energy that can be induced on any transmission lines (data, power) through a series of surge protection devices. The energy is dissipated through heat and also diverted to ground.

WHAT LIGHTNING PROTECTION IS BUILT INTO THE TSUNAMI EQUIPMENT?

All Tsunami Multipoint and QuickBridge equipment have built-in lightning protection on both the power supply lines and the Ethernet lines. There are TVS diodes that provide protection to IEC 61000-4-5. Proxim Corporation uses “well-design” practices in incorporating these devices in the Tsunami Multipoint and QuickBridge products.

WHY IS ADDITIONAL PROTECTION RECOMMENDED?

Lightning, even with the built-in protection, can still damage outdoor Tsunami equipment. This can occur for any number of reasons, such as an improperly grounded installation or if the amount of transient energy from nearby lightning exceeds what the devices can handle.

If a Tsunami unit fails due to damage from lightning, the link is out-of-service until the unit is replaced or repaired. An external, revertive protection device can provide a higher level of protection, and greater probability of surviving lightning transients without damage to the Tsunami equipment. If damage does occur, most likely it is to the lightning protection devices and not the Tsunami equipment. Remember, even with external lightning protection, damage can still occur to the Tsunami outdoor unit.

RECOMMENDATION

Proxim recommends the following for its Tsunami Multipoint products:

	Installation Requirement		
Proxim Product	**Industrial**	**Commercial**	**SOHO**
Tsunami Multipoint Base Station Unit (BSU) 30/60 Mbps Models	(1)	(1)	(1) or (2) (up to 50 meters)
Tsunami Multipoint Subscriber Unit (SU) 30/60 Mbps Models	(1)	(1) or (2) (up to 50 meters)	(1) or (2) (up to 50 meters)
(1) PolyPhaser 101-1218W-A.1 CAT5 Data Protector PolyPhaser Corporation 2225 Park Place, Minden, Nevada 89423		(2) Transtector 1101-TSU Surge Supressor Transtector Systems, Inc. 10701 Airport Drive Hayden Lake, ID 83835	

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PolyPhaser CAT5 Data Protector

This is a heavy-duty aluminum, weather-tight enclosure for outdoor use that serves to protect the Tsunami outdoor unit, as well as the indoor power adapter and connected line equipment inside the roof penetration. This product can be used for all CAT5 cable lengths up to 100 meters from the outdoor Tsunami unit to the indoor power adapter.

The Polyphaser Data Protector uses Cascade Technology. This is a multi-stage technology that is superior to single stage because of high surge current capacity and fast response time. The unit is designed to fit in-line onto the outdoor CAT5 cable, using two weatherized plug openings for the cable to enter and exit. The existing cable is cut, dressed, and reconnected onto two sets of 8 screw terminals inside the Data Protector.

Delivery: Available from authorized Proxim reseller or installer off-the-shelf.

Transtector Systems Surge Supressor

This outdoor-use, molded plastic, weather-tight enclosure is a surge suppressor designed to protect the Tsunami Multipoint SU and the QuickBridge unit from lightning damage. This product can be used for CAT5 cable lengths up to 50 meters from the outdoor Tsunami unit to indoor power adapter.

The 1101-TSU uses silicon avalanche suppression diodes (SASD) to provide lower voltage protection level (VPL). This technology provides a superior protection level over traditional gas tube type devices. The unit is designed to fit onto a CAT5 cable in a pass-through configuration. The input and output connections can be made at two sets of 8-screw terminals, or two 8-pin DIN style connectors.

This arrangement allows the installation of the connectorized CAT5 cable directly into the Surge Suppressor, or with a cut cable.

Delivery: Available from authorized Proxim reseller or installer off-the-shelf.

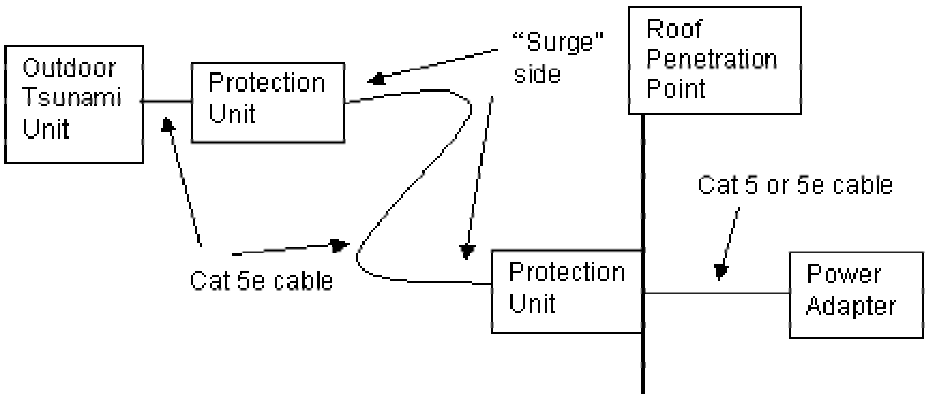
PHYSICAL CONSIDERATIONS

How are the Lightning Protection Units Connected to the CAT5 Cable?

The lightning protection units recommended are designed to be installed in-line onto the CAT5 cable that connectors the outdoor (RF) Tsunami unit (Base Station, Subscriber Unit, QuickBridge) and the indoor power adapter.

The lightning protection device has a **Surge** (cable-facing) side, and an Equipment (equipment-facing) side. The Equipment side faces the outdoor Tsunami unit or the indoor power adapter. The Surge side faces the long length of cable; when installing two lightning protection units, each unit's Surge side face one another.

See pin-out information for each unit in "Lightning Protection Specifications" on page 65 for connecting the cable to the protection device.



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WHERE SHOULD THE PROTECTION UNITS BE LOCATED?

At least one unit should be installed near every outdoor Tsunami unit. General guidelines are:

- Locate protection unit as close to the outdoor Tsunami unit as possible, where the lightning protection unit can be securely mounted to a flat surface ***and*** grounded properly. Ideally, this should be no further than five feet away from the outdoor unit.
- Locate one unit at the roof penetration point, outside, so that the cable immediately enters the building after the protection unit. This unit is optional if the distance from the first unit to the roof penetration point is relatively short (under 15 feet).

Installing two units provides the maximum protection against lightning damage to the outdoor Tsunami unit and the indoor power adapter, especially if the CAT5 cable length is greater than 15 meters.

LIGHTNING PROTECTION SPECIFICATIONS

PolyPhaser 101-1218W-A.1 Data Protector

Surge: BellCore 1089 10/100μsec, 100A
Temperature: -40°C to +65°C storage/operating +50°C

Maximum Characteristics Data:

Turn-on: +7.0 VDC ± 10%
Resistance: 1 ohm
Capacitance: 15 pf Line to Ground, 30 pf Line to Line
Data Rate: Up to 100Mbps (100BT)

Maximum Characteristics DC:

Turn-on: ± 68 VDC ± 10%
Resistance: 0.02 ohm
User Current: 2A max.
Size L x W x T: 6.53” x 2.77” x 1.25”

Pinout and Wiring Specifications:

Surge Side	Equipment Side	Application	Wire Color
Vdc in	VDC out	48Vdc	White/Orange
RTN in	RTN out	Ground	Orange
Vdc in	VDC out	48Vdc	White/Brown
RTN in	RTN out	Ground	Brown
Tx+ in	Tx+ out	Tx +	Green
Tx- in	Tx- out	Tx -	White/Green
Rx+ in	Rx+ out	Rx +	Violet
Rx- in	Rx- out	Rx -	White/Violet
GND	GND	Shield, if req.	N/A

Note: VDC in (out) and RTN in (out) pinouts are based upon applying a negative or positive 48 FDC to the VDC terminal and applying the **dc ground to RTN.**

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For additional information, go to www.polyphaser.com.

Contact Information:

Polyphaser Corporation
2225 Park Place
P. O. Box 9000
Minden, Nevada 89424

(702) 782-2511
(702) 782-4476 (fax)

Transtector Systems ALPU-TSU Surge Suppressor

Surge: ..... IEEE 10/1000 Long Wave, 150 A peak
Temperature: .....-40°C to +80°C operating and storage

Ethernet Characteristics:

Transfer Rate: CAT5
Maximum Continuous Operating Voltage: .....20 VDC
Protection Mode: .....Line to Line, Line to Ground
Response Time (max): .....5 nanoseconds
Standby Power (max): .....<0.5 Watt
Peak Power: .....5000 Watts

DC Characteristics:

Service Voltage: .....20 VDC
Maximum Continuous Operating Voltage: .....80 VDC
Response Time (max): .....5 nanoseconds
Standby Power (max): .....<0.5 Watts
Peak Power: ..... 20,000 Watts
Protection Mode: .....Line to Line
Size: .....L x W x T: 6.13" x 4.5" x 2.5"

Pinout and Wiring Specifications:

Surge Side	Equipment Side	Application	Wire Color
VDC in	VDC out	48 VDC	White/Orange
RTN in	RTN out	Ground	Orange
VDC in	VDC out	48 VDC	White/Brown
RTN in	RTN out	Ground	Brown
Tx+ in	Tx+ out	Tx +	Green
Tx- in	Tx- out	Tx -	White/Green
Rx+ in	Rx+ out	Rx +	Violet
Rx- in	Rx- out	Rx -	White/Violet
GND	GND	Shield, if req.	N/A

For additional information, go to www.transtector.com.

Contact information:

Transtector Systems
OEM Division
10701 Airport Drive
Hayden Lake, ID 83858

(208) 762-6069
(208) 752-6155 (fax)
oem@transtector.com

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Appendix F. Technical Support

If you are having a problem using a Tsunami Multipoint and cannot resolve it with the information in "Appendix A. Troubleshooting" in the *Tsunami Multipoint Reference Manual*, gather the following information and contact Proxim Technical Support:

- What kind of network are you using?
- What were you doing when the error occurred?
- What error message did you see?
- Can you reproduce the problem?

Be sure to:

- Note the serial number of the product before installation. Keep this information in a safe place. The serial number is required to obtain support and can be found only on the back of the unit.
- Obtain an RMA number before sending any equipment to Proxim for repair.

Have the following logs from the affected equipment before calling Technical Support:

- SUlog1
- SUlog2
- BSUlog (for each affected SU)
- uplber, berlog (for each affected SU)

Access Knowledgebase:

Ask a Wireless WAN Product question and get an express response: **WANsupport@proxim.com**

E-mail Technical Support: WANtechnicalsupport@proxim.com

To receive E-mail technical support, be sure to include the serial number and MAC address of the product or products in question. We will be unable to respond to your inquiry without this information.

Call Technical Support:

Toll Free +1-866-674-6626 or +1-408-542-5390
Hours: 6:00 a.m. to 5:00 p.m. M-F Pacific Time

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