Managing Configuration Files

Before using the WaveCenter Configuration Manager, be sure you understand the principles of configuration file management discussed below.

Opening and Loading Files

When you click on the BSU or subscriber Indoor Unit (CPE) icon on the WaveCenter Configuration Manager home screen, a new ("blank") configuration file is opened with the default parameters. You can then load an existing file by selecting **File — Open** from the menu bar, or the file open icon on the toolbar. The Configuration Manager will let you browse for the desired file.

> NOTE: Some screens have a new instance icon on the right side. This icon does not cause a new configuration file to be opened; rather, it causes a new instance to be opened, and is displayed only on pages which can be configured multiple times for multiple instances (such as multiple SNMP managers; see *Figure6-2*).

Saving Files

There are two methods for saving configuration files, as identified in *Table6-A*:

- Selecting **File — Save as** from the page menu line. The Configuration Manager will prompt for a file name*.*

- Clicking on the **Generate BSC Config** or **Generate Configuration File** (CPE) button. The Configuration Manager will prompt with the suggested file name in the format *bsc_<MACaddress>.cfg* or *cpe_<MACaddress>.cfg*, using the MAC address entered during configuration. See the discussion of file names below.

> NOTE: Some screens have a page save icon on the right side. This icon does not cause the configuration file to be saved; rather, it causes the current instance to be added to the configuration file which is being created or modified. The page save icon is displayed only on pages which can be configured multiple times for multiple instances (such as multiple SNMP managers; see *Figure6-2*).

File Names

Configuration files are required to have unique names so that each BSU and subscriber Indoor Unit can download the correct configuration file from the TFTP server. *Table6-B* identifies the naming convention suggested by Aperto, which uses MAC addresses to guarantee uniqueness. These are the default names used when you click on the **Generate BSC Config** or **Generate Configuration File** button, as described above.

While the naming convention identified in *Table 6-B* is recommended, it is not required. You can use any other format you wish, as long as the names are unique.

Table6-B   *Suggested Convention for Naming Configuration Files*

Configured Entity	File Name Format	Example
Base Station Unit	*bsc_<MACaddress>.cfg*	*bsc_00013b0002e4.cfg* (for MAC 00:01:3b:00:02:e4)
Subscriber	*cpe_<MACaddress>.cfg*	*cpe_00013b00025d.cfg* (for MAC 00:01:3b:00:02:5d)

Storage Location

To be accessed by the Base Station Units and subscriber Indoor Units when they boot, the configuration files must be specified in the DHCP server's configuration file and stored in the default directory (typically, *\tftpboot*) of the TFTP server. You can save directly to that directory when creating the configuration files, or save to a different location and then transfer the files before booting the configured units.

Configuration Template Files

It will often be efficient to create generic configuration files which can be used as templates when adding new BSUs, WSSs, or subscribers.

You create and save a configuration template the same way you create and save a configuration file, but save it with a descriptive file name rather than a file name linking it by MAC address to a specific unit. Then, when you want to use the template as the basis for a new configuration file, you load the template, make any changes necessary, and save the file using the correct file name for the new unit.

> NOTE: Similarly, you can base a new configuration file on an existing configuration file by loading the existing file, editing it, and saving it using the proper file name for the new unit.

Downloading Configuration Files

After the configuration files have been created and stored on the TFTP server, the configured devices need to be booted up. (The Base Station Unit must be operational when a subscriber Indoor Unit is initialized, or the initialization will fail.) The booted device will then automatically download its configuration from the TFTP server.

☞ *Each Base Station Unit and subscriber Indoor Unit stores its configuration in non-volatile memory. When it reboots, it downloads the latest configuration from the TFTP server if it is able to, and then makes any changes to its configuration based on a comparison of the downloaded configuration with the stored configuration. If the device cannot successfully download its configuration from the TFTP server, it operates with its stored configuration.*

USING THE WAVECENTER CONFIGURATION MANAGER

To configure a cell using the WaveCenter Configuration Manager, follow this general procedure:

1. Launch the WaveCenter Configuration Manager by clicking on the desktop icon. The program's home screen will be displayed, as shown in *Figure6-1*.

2. Click on the BSU icon. A BSU Configuration Manager window will open.

3. Configure the Base Station Unit as described later in this chapter, under the heading **Base Station Configuration**.

   > NOTE: If there are multiple BSUs, you may want to create and use a template file. See the section **Managing Configuration Files** earlier in this chapter.

4. When you are done, click on the **Generate BSC Config** button to save the BSU configuration.

5. Close the BSU Configuration Manager window. If there is another BSU to configure, return to step 2. If there is no other BSU to configure, go to step 6.

6. Click on the home page's subscriber Indoor Unit (CPE) icon. A subscriber CPE Configuration Manager window will open.

7. Configure the subscriber equipment as described in the section **Subscriber Equipment Configuration** later in this chapter.

   > NOTE: You may want to create and use a template file. See the section **Managing Configuration Files** earlier in this chapter.

8. When you are done, click on the **Generate Configuration File** button to save the subscriber configuration.

9. Close the CPE Configuration Manager window. If there is another subscriber to configure, return to step 6. If there is no other subscriber to configure, go to step 10.

10. Exit from the WaveCenter Configuration Manager.

11. Copy all of the configuration files to the default directory for the system's TFTP server, typically *\tftpboot* (unless you saved them directly to that directory).

BASE STATION CONFIGURATION

To configure a Base Station Unit, including the wireless radio interfaces (WSSs, or wireless subsystems), click on the BSU icon on the WaveCenter Configuration Manager home screen (*Figure 6-1*). The BSU Configuration Manager will open in a new window, as shown in *Figure 6-3*.

☞ *There are four required parameters for WSS/BSU configuration: WSS center frequency (***WSS — Frame*** menu); WSS subnet IP addresses and subnet masks (***WSS — Multiple Subnet*** menu); and BSU MAC address (***MAIN — General*** menu. All other parameters are optional.*
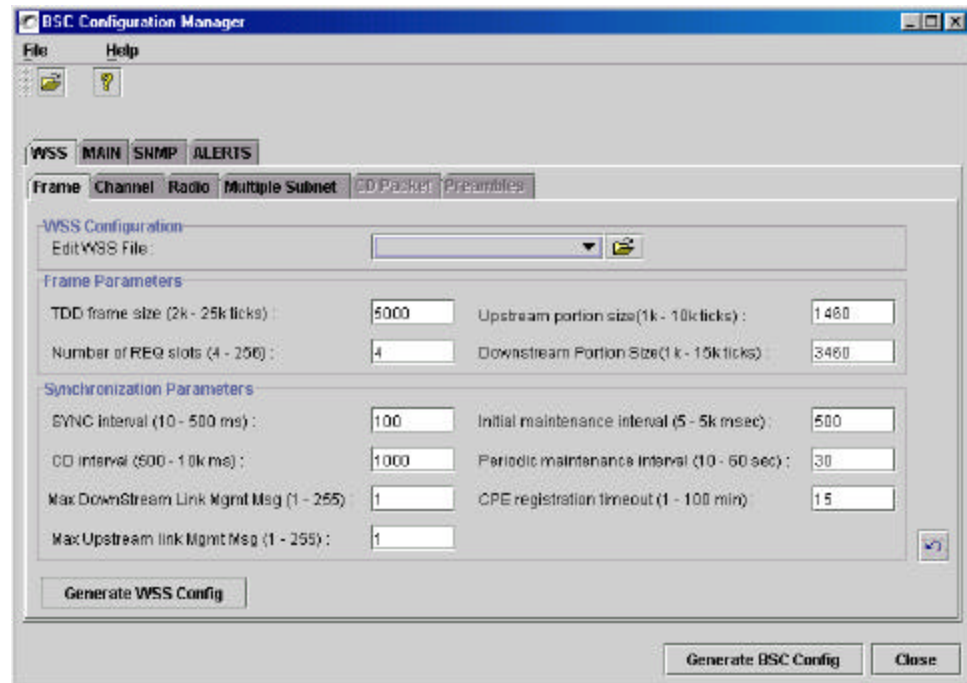
Figure6-3   Base Station Opening Menu (WSS — Frame)

There are four first-level menu tabs for BSU configuration, as shown by the upper row of tabs in *Figure6-3*:

- **WSS** — Used to configure each wireless subsystem (radio interface) on the Base Station Unit.

- **Main** — Used to specify various parameters for the Base Station Unit itself.

- **SNMP** — Used to configure the Base Station Unit for SNMP management.

- **Alerts** — Used to configure the Base Station Unit for email event alerts.

Configuring Wireless Subsystems (WSS)

Click on the **WSS** tab in the upper row. As the second row of tabs in *Figure6-3* shows, there are six menus for configuring a WSS:

- **Frame** — Used to specify how the wireless signal will be framed and synchronized.

- **Channel** — Used to configure the wireless communication channel.

- **Radio** — Used to configure the radio and antenna connected to the WSS.

- **Multiple Subnet** — Used to specify at least one subnet and mask per WSS.

- **CD Packet** —

- **Preamble** —

☞ *The* **WSS Configuration — Edit WSS File:** *field on the* **Frame** *menu allows you to load an existing WSS configuration file, causing all of the WSS menus to display the current settings for that WSS file. You can then either modify that file, or save it under another name.*

You will need to create a separate configuration for each WSS. The basic procedure is as follows:

1. Start with the **WSS — Frame** menu (*Figure6-3*). If desired, use the **Edit WSS File** field to load an existing WSS configuration as a template.

2. Complete the other WSS menus as described on the following pages.

3. Click on the **Generate WSS Config** button, and specify the WSS you are configuring.

4. Repeat for all WSSs.

Frame Parameters

Click on the **Frame** tab so that the screen illustrated in *Figure6-3* is displayed. Specify frame parameters as indicated in *Table 6-C*.

Table6-C   BSU — WSS — Frame Parameters

Parameter	Range (and Default)	Comments
Edit WSS File	file name (no default)	If desired, click on the File Open icon at the right of the field and then select a file to use as a template for the WSS to be configured.
TDD Frame Size	2000 to 25000 ticks (5000)	Advanced configuration parameter; change only if directed by Aperto Networks.
Number of REQ Slots	4 to 256 slots (4)	Advanced configuration parameter; change only if directed by Aperto Networks.
Upstream Portion Size	1000 to 10000 ticks (1460)	Adjust these parameters to alter the ratio of upstream to downstream bandwidth. Reduce the value of one by the amount you add to the amount of the other so the total remains the same (up + down = frame size - guardband).
Downstream Portion Size	1000 to 15000 ticks (3460)	
SYNC Interval	10 to 500 ms (100)	Advanced configuration parameter; change only if directed by Aperto Networks.
CD Interval	500 to 10000 ms (1000)	Advanced configuration parameter; change only if directed by Aperto Networks.
Downstream Max Link Mgmt Msg	1 to 255 (1)	Advanced configuration parameter; change only if directed by Aperto Networks.
Upstream Max Link Mgmt Msg	1 to 255 (1)	Advanced configuration parameter; change only if directed by Aperto Networks.
Initial Maintenance Interval	5 to 5000 ms (500)	Advanced configuration parameter; change only if directed by Aperto Networks.
Periodic Maintenance Interval	10 to 60 seconds (30)	Advanced configuration parameter; change only if directed by Aperto Networks.
CPE Registration Timeout	1 to 100 minutes (15)	Advanced configuration parameter; change only if directed by Aperto Networks.

Channel Parameters

Click on the **Channel** tab so that the screen illustrated in *Figure 6-4* is displayed. Specify channel parameters as indicated in *Table6-D*.
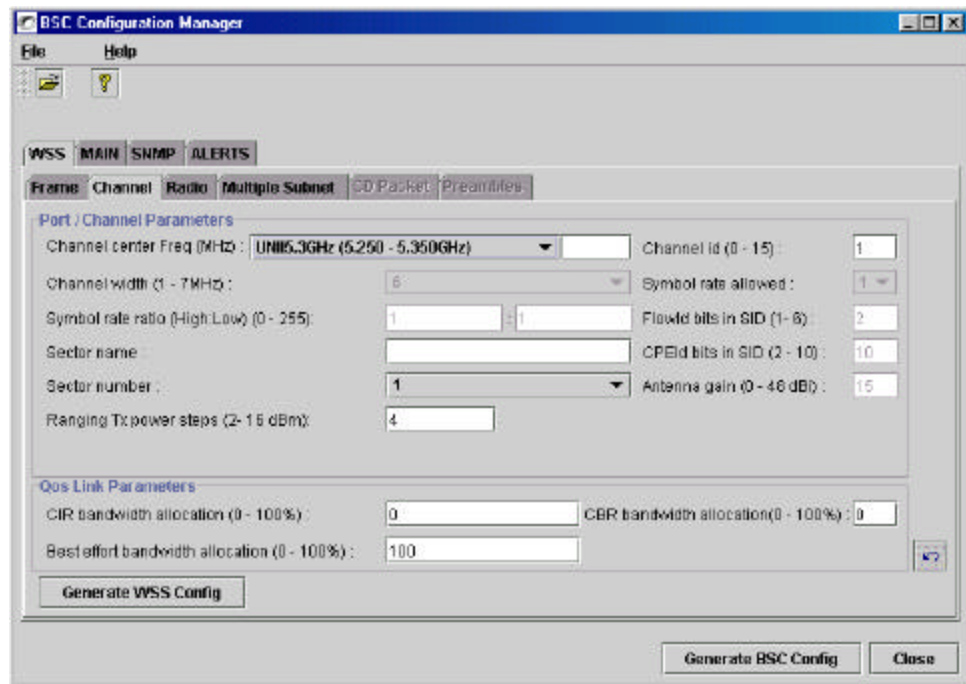

Figure6-4   WSS — Channel Menu

Table 6-D   BSU — WSS — Channel Parameters

Parameter	Range (and Default)	Comments
Channel Center Freq (MHz)	9 menu options for frequency range, plus center frequency field	Select the frequency range from the drop-down menu; then enter the channel center frequency to be used in communication with all subscribers in the sector. *Required field.*
Symbol Rate Ratio	range x to y : a to b (1 : 1)	Advanced configuration parameter; change only if directed by Aperto Networks. Not supported in R1P1.
Sector name	(no default)	Enter the name chosen for the sector served by this WSS.
Sector Number	1 to 6 (1)	Choose a number to identify the sector. Generally, you should use the WSS port number.
Channel Width	1000 to 7000 kHz (6000)	Not supported in R1P1.
Channel ID	0 to 15 (1)	Specify a channel identification number.
Symbol Rate Allowed	1 or 2 (1)	Advanced configuration parameter; change only if directed by Aperto Networks. Not supported in R1P1.
Flow ID Bits in SID	1 to 6 (2)	Advanced configuration parameter; change only if directed by Aperto Networks. Not supported in R1P1.
CPE ID Bits in SID	2 to 10 (10)	Advanced configuration parameter; change only if directed by Aperto Networks. Not supported in R1P1.
Ranging Tx Power Steps	2 to 16 dBm, (4)	Specify the step size for transmit power ranging.
Antenna Gain	0 to 48 dBi(15)	Not supported in R1P1.
CIR Bandwidth Allocation	0 to 100% (0)	Specify the percentage of the total bandwidth to be devoted to each of the three service classes.
CBR Bandwidth Allocation	0 to 100% (0)	The three percentages should total exactly 100%.
Best Effort Bandwidth Allocation	1 to 100% (100)	They should also correlate to the total bandwidths assigned to all subscribers in the sector, with appropriate oversubscription based on statistical multiplexing expectations.

Radio Parameters

Click on the **Radio** tab so that the screen illustrated in *Figure6-5* is displayed. Specify radio parameters as indicated in *Table6-E.*
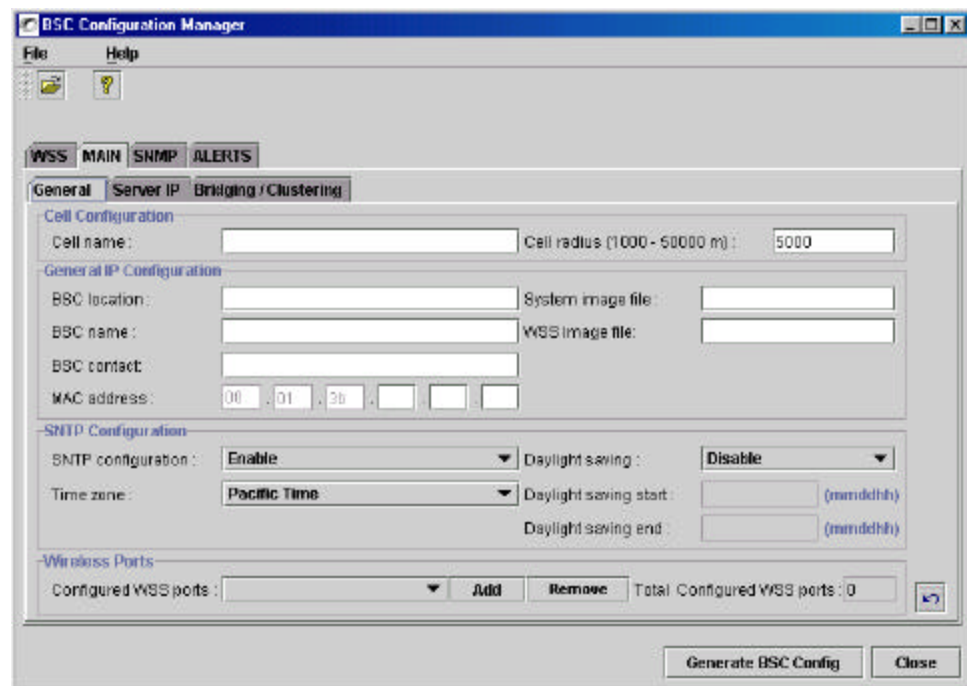
Multiple Subnet Parameters

Click on the **Multiple Subnet** tab so that the screen illustrated in *Figure6-6* is displayed.

Specify the WSS IP address and subnet mask for the first (and typically only) subnet, as indicated in *Table6-F* . Click on the save icon when you are finished.

You must specify at least one subnet and mask before generating the WSS configuration file.

If desired, create another subnet by clicking on the new instance icon. Specify the WSS IP address and subnet mask for the new subnet. Click on the save icon when you are finished.

Repeat for as many subnets as desired.

CD Packet Parameters

CD Packet parameters are not supported in R1P1.

Preamble Parameters

A configurable preamble is not supported in R1P1.
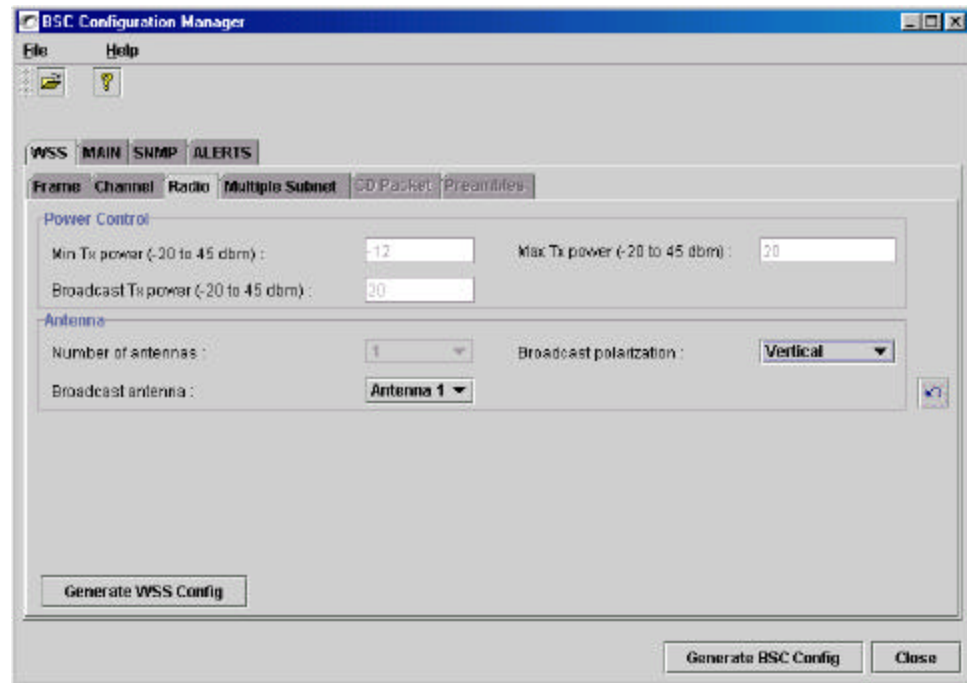
Figure6-5   WSS — Radio Menu

Table6-E   BSU — WSS — Radio Parameters

Parameter	Range (and Default)	Comments
Min Tx Power	-20 to 4 dBm (-12)	Specify the minimum transmit power allowed in power ranging. Not supported in R1P1.
Broadcast Tx Power	-20 to 4 dBm (20)	Specify the transmit power used for broadcasts to all subscribers. Not supported in R1P1.
Max Tx Power	-20 to 4 dBm (20)	Specify the maximum transmit power allowed in power ranging. Not supported in R1P1.
Number of Antennas	1 or 2 (1)	Specify whether this sector uses 1 or 2 antennas. Not supported in R1P1.
Broadcast Antenna	Antenna 1 or 2 (1)	If this sector uses 2 antennas, specify the antenna to be used for broadcasts to all subscribers. Not supported in R1P1.
Broadcast Polarization	Horizontal, Vertical, Horizontal & Vertical (Vertical)	Specify the antenna polarization used for broadcasts to all subscribers.
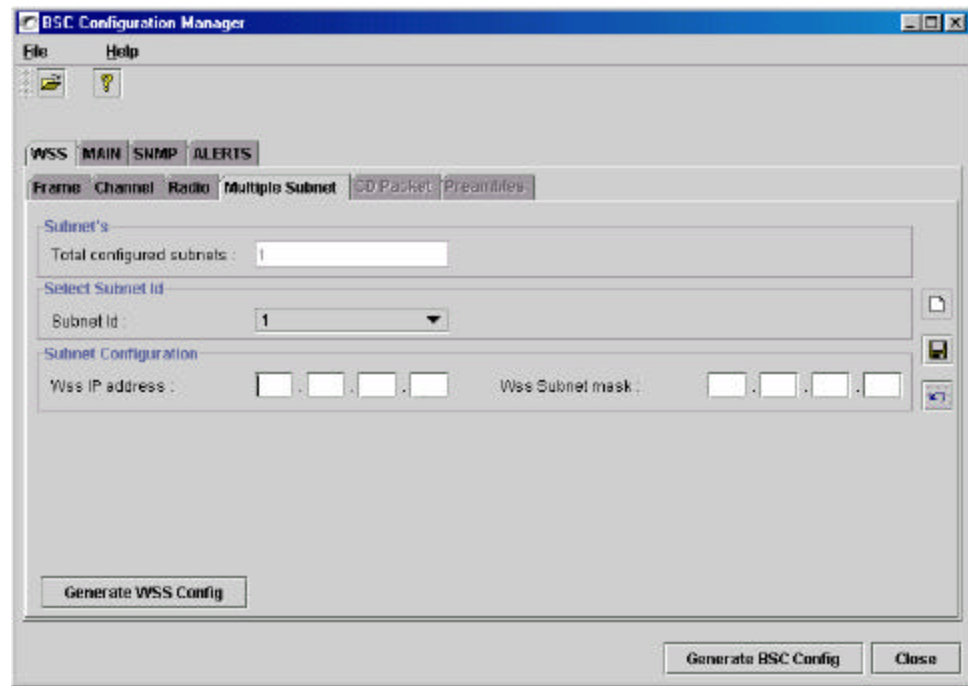
Figure6-6   WSS — Multiple Subnets Menu

Table6-F   BSU — WSS — Multiple Subnet Parameters

Parameter	Range (and Default)	Comments
Total Configured Subnets		Read-only field; increments each time a new subnet is added using the new instance icon.
Subnet ID		Read-only field indicating subnet being configured.
WSS IP Address	xxx.xxx.xxx.xxx (no default)	Enter the IP address for the WSS subnet. Typically this will follow the standard gateway address convention for subnets. *Required field (one instance).*
WSS Subnet Mask	xxx.xxx.xxx.xxx (no default)	Enter the subnet mask which defines the subnet address range. *Required field (one instance).*

Configuring the Main Base Station Parameters

Click on the **MAIN** tab in the upper row. As the second row of tabs shows, there are three menus for configuring the main base station parameters:

- **General** — Used for cell, IP, and SNTP (time) configuration, and for specifying the active wireless subsystems (WSS).

- **Server IP** — Used for specifying the IP addresses of the various servers accessed by the Base Station.

- **Bridging/Clustering** — Used to create multi-sector clusters, and to enable or disable bridging between subscribers in the same sector or cluster.

General Parameters

Click on the **General** tab so that the screen illustrated in *Figure 6-7* is displayed. Specify parameters as indicated in *Table 6-G*.

Figure 6-7   MAIN — General Menu

Table6-G   BSU — MAIN — General Parameters

Parameter	Range (and Default)	Comments
Cell Name	Up to 79 characters (no default)	Enter the name chosen for the cell served by the BSU.
Cell Radius	1000 to 50000 meters (**5000**)	
BSU Location	Up to 79 characters (no default)	Enter text identifying the location of the BSU.
BSU Name	Up to 79 characters (no default)	Enter the name chosen for the BSU.
BSU Contact	Up to 79 characters (no default)	Enter contact information regarding the BSU.
MAC Address	00:01:3b:xx:xx:xx (no default)	Complete the MAC address of the BSU as identified by a label on the BSU. (All Aperto MAC addresses begin with 00:01:3b.) ***Required field.***
System Image File	*file name*	Identifies the system software which should be running on the BSU. If different software is running, the BSU will attempt to download the specified software from the TFTP server.
WSS Image File	*file name*	Identifies the WSS software which should be running on the BSU. If different software is running, the BSU will attempt to download the specified software from the TFTP server.
SNTP Configuration	**Enable** or **Disable** (**Enable**)	Specify whether the BSU will obtain date and time from an SNTP server. (The SNTP server is specified in the DHCP server configuration.)
Time Zone	*Drop-down menu of time zones worldwide.*	Select the appropriate time zone from the drop-down menu.
Daylight Saving	**Enable** or **Disable** (**Disable**)	Specify whether daylight saving time will be observed.
Daylight Saving Start	mmddhh (no default)	Enter the date at which daylight savings time will start.
Daylight Saving End	mmddhh (no default)	Enter the date at which daylight savings time will end
Configured WSS Ports	(drop-down menu)	Read-only field identifying the number of WSS ports which have been configured (using **WSS** menu set and **Generate WSS Config** button).
Total WSS Ports	0 to 6 (**0**)	Specify the number of WSS ports to be configured.

Server IP Parameters

Click on the **Server IP** tab so that the screen illustrated in *Figure6-8* is displayed. Three server IP addresses are configurable, as identified in *Table6-H*. Specify any server IP addresses as desired.

> *Syslog and SMTP server identifications made on this menu will be overridden by Syslog and SMTP server identifications made in the DHCP server configuration.*

> NOTE: TFTP and DHCP server addresses are not configurable; they are learned from the DHCP server when the BSU boots up.

Bridging/Clustering Parameters

Click on the **Bridging/Clustering** tab so that the screen illustrated in *Figure6-9* is displayed. Specify bridging and clustering options as described in *Table6-I*.

> *Clustering allows two or more WSSs to be on the same subnet, which can provide greater efficiency in the use of IP addresses. Subscriber-to-subscriber (CPE-to-CPE) bridging makes communications between subscribers in the same subnet more efficient.*

Configuring SNMP Parameters

Click on the **SNMP** tab in the upper row, so that the screen illustrated in *Figure6-10* is displayed.

Specify parameters for Host 1, as indicated in *Table6-J*. Click on the save instance icon when you are finished.

If desired, open a new Host by clicking on the open instance icon. Specify parameters for the new host. Click on the save instance icon when you are finished. Repeat for as many hosts as desired (to a maximum of 32).
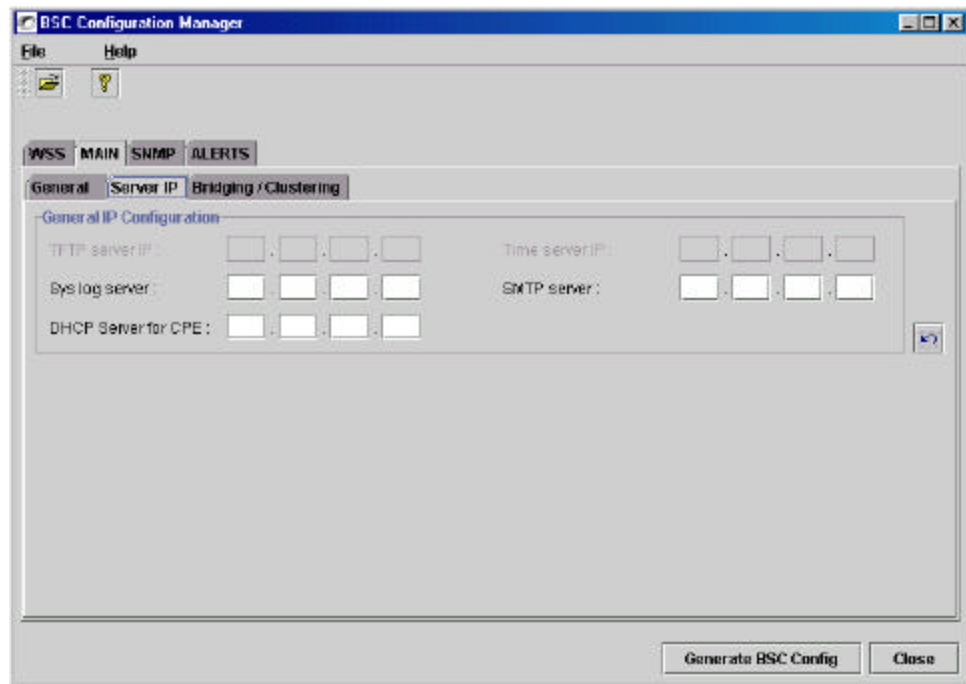
Figure6-8   MAIN — Server IP Menu

Table6-H   BSU — MAIN — Server IP Parameters

Parameter	Range (and Default)	Comments
TFTP Server IP	N/A	Non-configurable field.
Time Server IP	N/A	Non-configurable field.
Syslog Server	xxx.xxx.xxx.xxx decimal (no default)	If the BSU is to log event messages to a Syslog server, enter its IP address. (If a Syslog server is identified in the DHCP server, this address will be overridden.)
SMTP Server	xxx.xxx.xxx.xxx decimal (no default)	If the BSU is to send email alert messages, enter the SMTP server's IP address. (If an SMTP server is identified in the DHCP server, this address will be overridden.)
DHCP Server for CPE	xxx.xxx.xxx.xxx decimal (no default)	If subscribers are to use a different DHCP server than the BSU, specify the subscribers' DHCP server here. (This address will be the DHCP server known by the BSU's DHCP relay agent.)
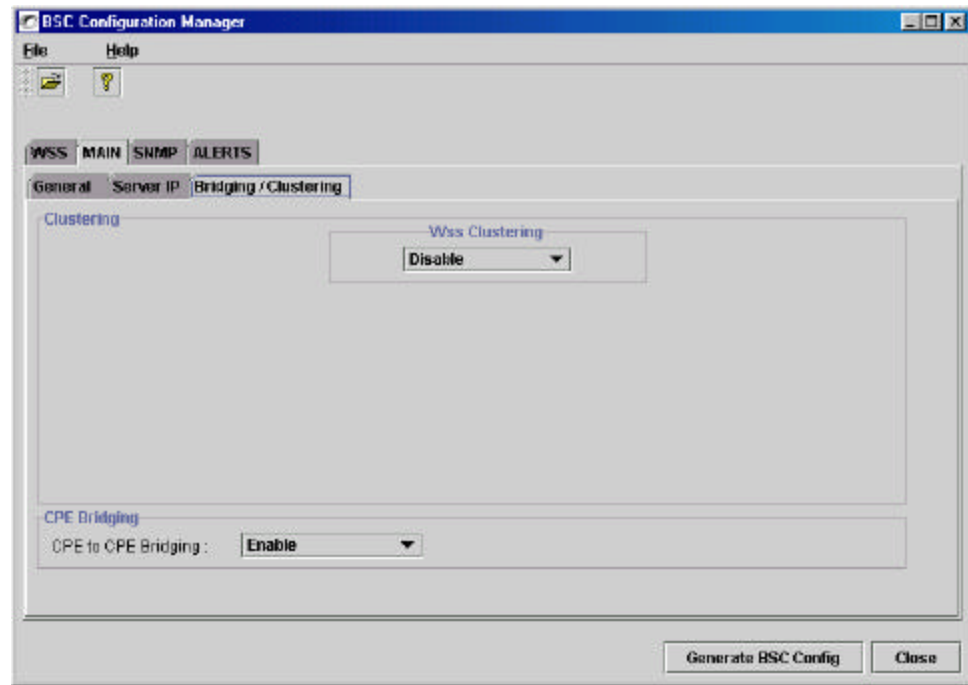
Figure6-9   MAIN — Bridging/Clustering Menu

Table6-I   BSU — MAIN — Bridging/Clustering Parameters

Parameter	Range (and Default)	Comments
WSS Clustering	**Enable** or **Disable** (**Disable**) *	Specify whether WSSs will be clustered. If **Disable** is specified, the **Cluster** fields will be unavailable.
Cluster I	Any 2 or more config-ured WSS ports	Select a configured WSS, and then click on the clus-ter in which it will be included.
Cluster II	Any 2 or more config-ured WSS ports	
Cluster III	Any 2 or more config-ured WSS ports	
CPE-to-CPE Bridging	**Enable** or **Disable** (**Enable**) *	Specify whether bridging between subscribers in the same WSS/cluster will be enabled.
* *If WSS Clustering is to be enabled, CPE-to-CPE Bridging must be enabled.*		
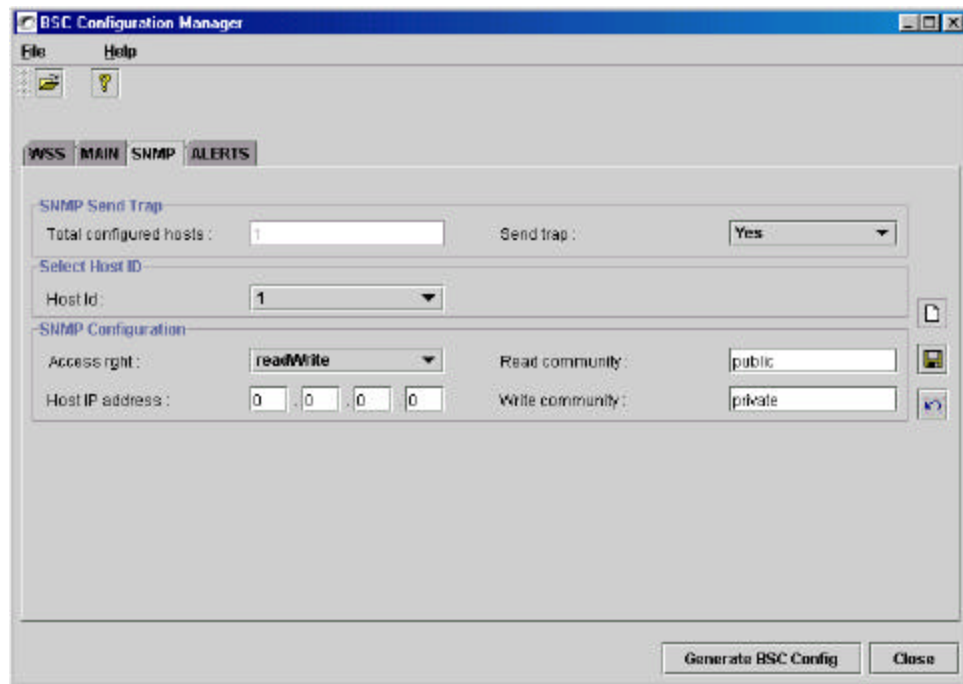
Figure6-10   SNMP Menu

Table6-J   BSU — SNMP Parameters

Parameter	Range (and Default)	Comments
Total Configured Hosts	1 to 32	Read-only field indicating how many SNMP hosts have been specified.
Send Trap	**Yes** or **No** (**Yes**)	Specify whether SNMP traps will be sent to trap-enabled hosts (per **Access Right** configurations).
Host ID	1 to 32 (increments as instances are opened)	Identifies the SNMP host being configured.
Access Right	**readOnly**, **readWrite**, **roWithTraps**, **rwWithTraps**, **trapsOnly** (**readWrite**)	Specify the access the SNMP host will have
Host IP Address	xxx.xxx.xxx.xxx decimal (**0.0.0.0**)	Specify the IP address of the SNMP host.
Read Community	Up to 79 characters (**public**)	Specify the name of the community which will have read access to the BSU.
Write Community	Up to 79 characters (**private**)	Specify the name of the community which will have write access to the BSU.

Configuring Email Alert Parameters

Click on the ALERT tab in the upper row, so that the screen illustrated in *Figure6-11* is displayed. Specify email alert parameters as indicated in *Table6-K*.
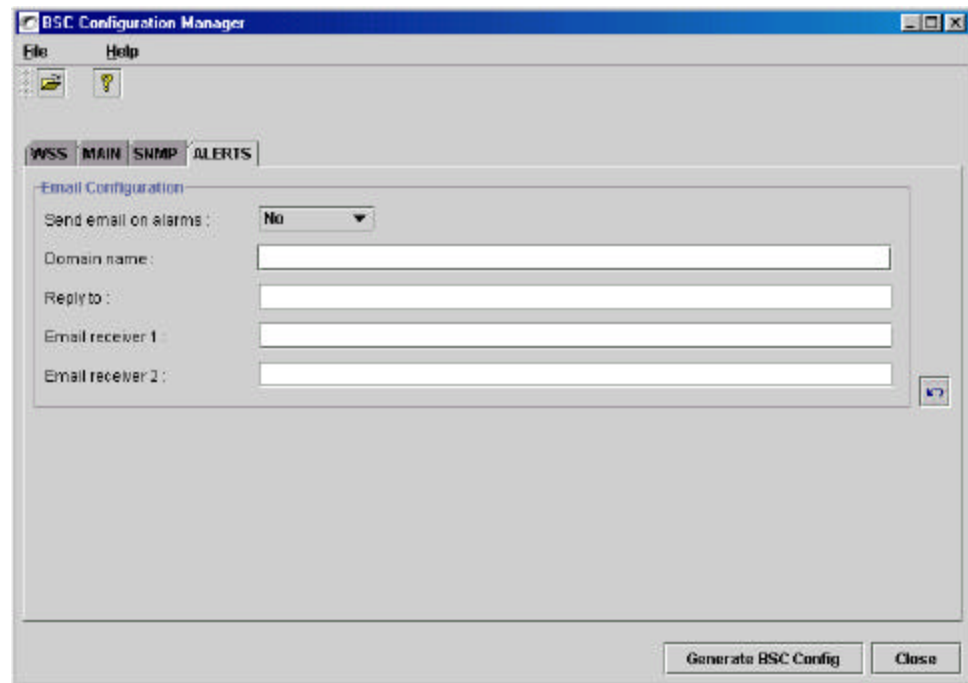
Figure6-11   ALERT Menu

Table6-K   BSU — ALERTS Parameters

Parameter	Range (and Default)	Comments
Send Email on Alarms	**Yes** or **No** (**No**)	Specify whether email alert message will be sent.
Domain Name	Up to 63 characters (no default)	Specify the email domain name for the BSU.
Reply To	Up to 63 characters (no default)	Enter the sending email address for alert messages.
Email Receiver 1	any email address	Enter the email address(es) to which alert messages will be sent.
Email Receiver 2	any email address	

SUBSCRIBER CONFIGURATION

To configure subscriber equipment, click on the CPE icon on the WaveCenter Configuration Manager home screen (*Figure6-1*). The CPE Configuration Manager will open in a new window, as shown in *Figure6-12*.

There are nine tabs for subscriber equipment configuration, as shown in *Figure6-12*:

- **System** — Used to specify basic information about the subscriber equipment.

- **SNMP** — Used to control SNMP access to the subscriber equipment.

- **Packet Filter** — *Not supported in R1P1.*

- **Service Flow** — Used to define Service Flows for the subscriber.

- **Classifier** — Used to specify the classifiers that will cause packets to be assigned to the various Service Flows.

- **Routing** — *Not supported in R1P1.*

- **Alerts** — Used to configure the subscriber equipment for email event alerts.

- **NAT** — Used to configure a subscriber Indoor Unit's NAT routing.

- **DHCP** — *Not supported in R1P1.*
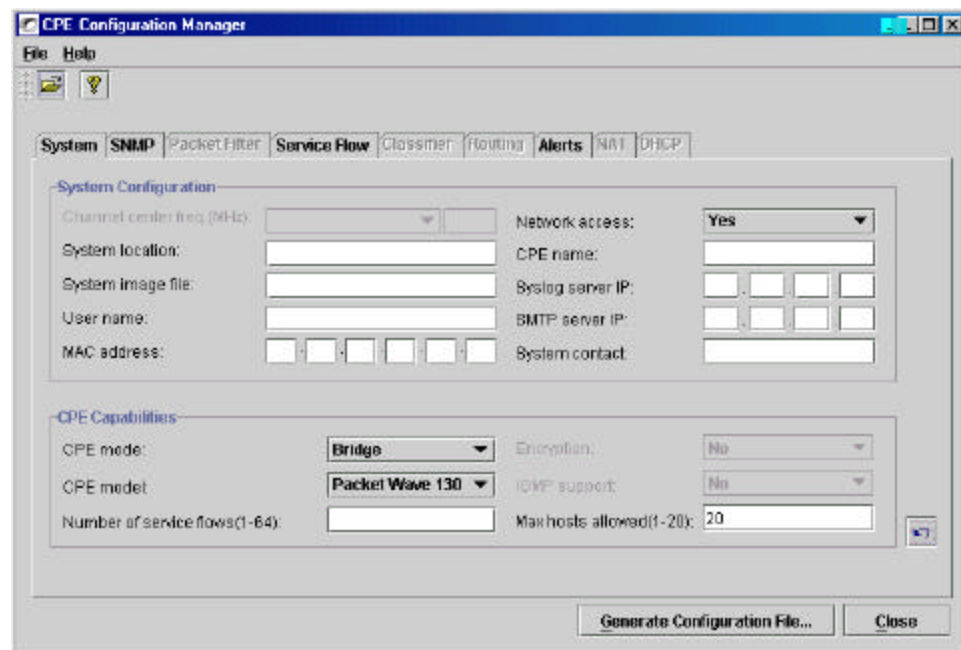
Figure6-12   CPE Opening Menu (System)

Configuring Subscriber System Parameters

Click on the **System** tab so that the screen illustrated in *Figure6-12* is displayed. Specify subscriber system parameters as indicated in *Table6-L*.

Table6-L   CPE — System Parameters

Parameter	Range (and Default)	Comments
Channel Center Frequency	N/A	Read-only field identifying the center frequency established when the subscriber equipment was initialized.
Network Access	Yes or No (Yes)	Specify whether the subscriber will be allowed on the network. This field may be set to No to essentially disable subscriber equipment.
System Location	Up to 79 characters (no default)	Enter text identifying the subscriber's location.
CPE Name	Up to 79 characters (no default)	Enter a name or description of the subscriber site.
System Image File	N/A	Identifies the software which should be running on the Indoor Unit. If different software is running, the subscriber Indoor Unit will attempt to download the specified software from the TFTP server.
Syslog Server IP	xxx.xxx.xxx.xxx decimal (no default)	If desired, enter the address of a syslog server which will receive event logs directly from this subscriber Indoor Unit.
User Name	(no default)	Enter a name for the subscriber.
MAC address	00:01:3b:xx:xx:xx (no default)	Complete the MAC address of the subscriber Indoor Unit as identified by a label on the unit's rear panel. (All Aperto MAC addresses begin with 00:01:3b.)
SMTP Server IP	xxx.xxx.xxx.xxx decimal (no default)	If desired, enter the address of a mail server which will administer email alerts for this subscriber.
CPE Mode	Bridge, Router, NAT (Bridge)	Specify the subscriber Indoor Unit model, and whether the unit will function as a bridge, router, or NAT router. (If the CPE Model specified does not match the actual unit installed, the configuration file will be rejected when it is downloaded to the subscriber Indoor Unit. In R1P1, the PacketWave 130 is the only model supported.)
CPE Model	PW110, PW120, PW130 (PW130)	
Number of Service Flows	1 to 64 (no default)	Specify the maximum number of service flows which can be defined for this subscriber.
Encryption		*Not supported in R1P1.*
IGMP Support		*Not supported in R1P1.*
Max Hosts Allowed	1 to 20	Specify the maximum number of user hosts which the subscriber Indoor Unit will support.

Configuring Subscriber SNMP Parameters

Click on the **SNMP** tab so that the screen illustrated in *Figure6-13* is displayed. Specify SNMP management parameters as indicated in *Table 6-M*.
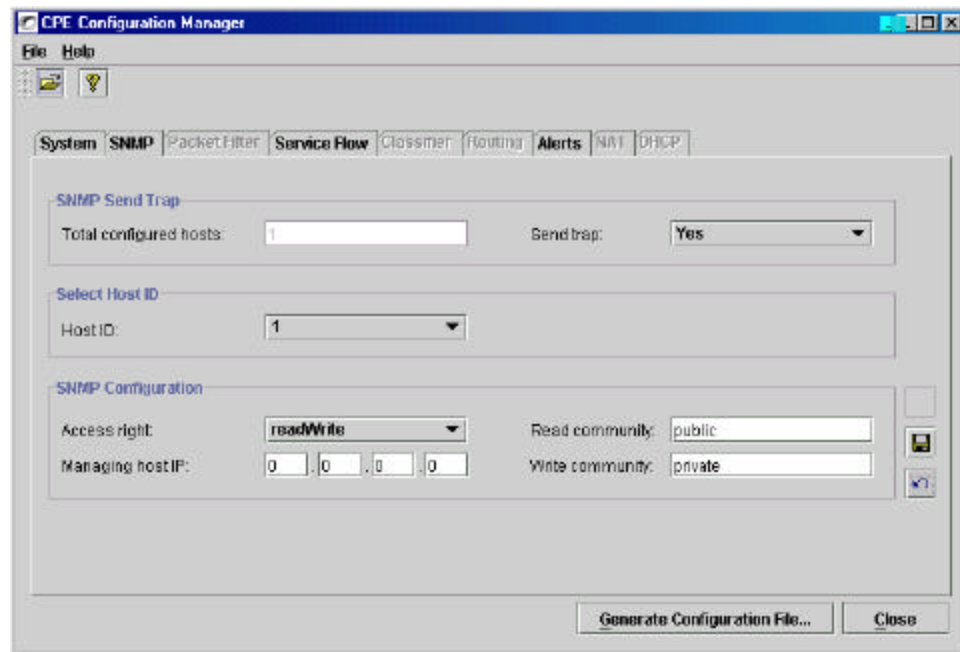
Figure6-13   SNMP Menu

Table6-M   *CPE — SNMP Parameters*

Parameter	Range (and Default)	Comments
Total Configured Hosts	1 to 32	Read-only field indicating how many SNMP hosts have been specified.
Send Trap	**Yes** or **No** (**Yes**)	Specify whether SNMP traps will be sent to trap-enabled hosts (per **Access Right** configurations).
Host ID	1 to 32 (increments as instances are opened)	Identifies the SNMP host being configured.
Access Right	readOnly, readWrite, roWithTraps, rwWithTraps, trapsOnly (readWrite)	Specify the SNMP access this master will have.
Host IP Address	xxx.xxx.xxx.xxx decimal (0.0.0.0)	Specify the IP address of this SNMP manager.
Read Community	Up to 79 characters (public)	Specify the name of the community which will have read access to the subscriber Indoor Unit.
Write Community	Up to 79 characters (private)	Specify the name of the community which will have write access to the subscriber Indoor Unit.

Configuring Packet Filters

This feature is not supported in R1P1.

classifiers to allow the service pro

ple services with different quality-

and QoS levels have been determ

scribers by defining a set of servi
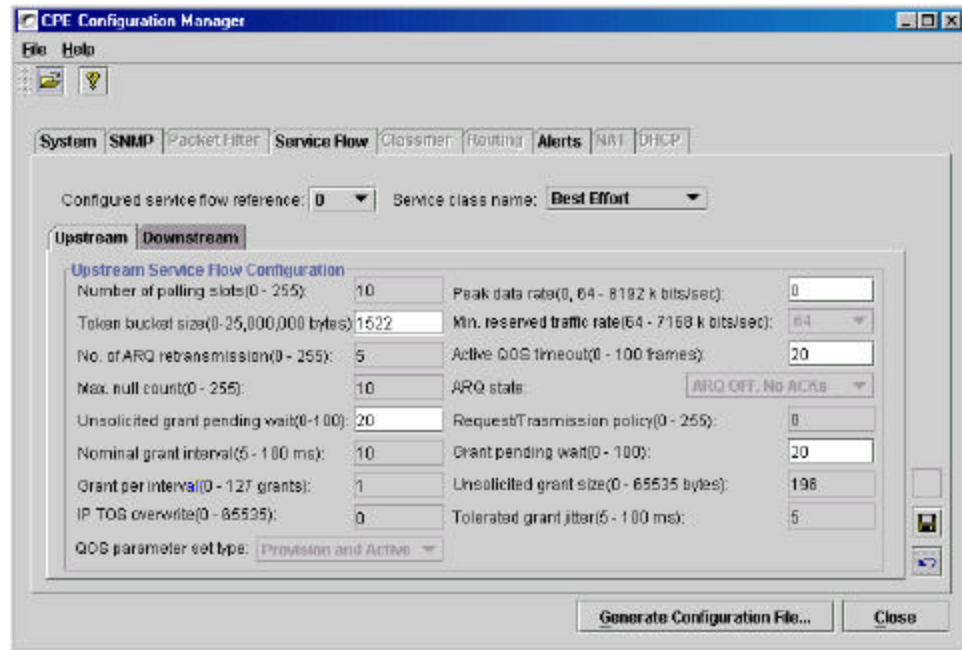
Figure 6-14   Service Flow — Upstream Menu
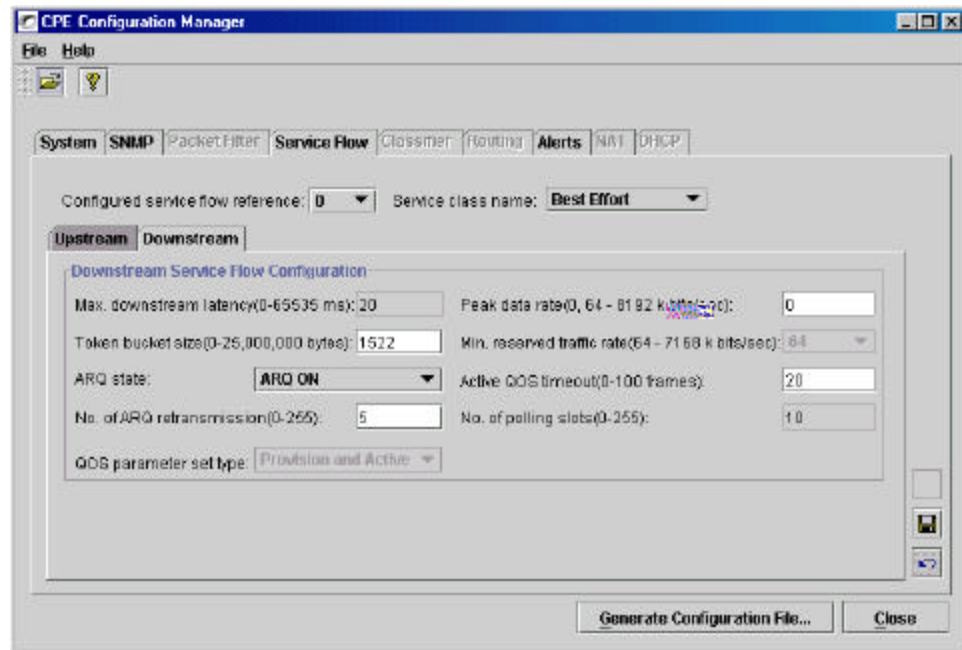
Figure 6-15   Service Flow — Downstream Menu

Table6-N   CPE — Service Flow Upstream Parameters

Parameter	Range (and Default)	Comments
Configured Service Flow Reference	Identifies service flow displayed (1 to 64)	Select from drop-down menu. (Menu identifies all service flows which have been created. Maximum may be less than 64 depending on)
Service Class Name	Best Effort, CIR, CBR (Best Effort)	Select the class of service for this service flow from the drop-down menu. (Must be the same for both upstream and downstream.)
Number of Polling Slots	0 to 255 (10)	Not supported in R1P1.
Token Bucket Size	0 to 25000 kbytes (1522)	Specify the size of the token bucket for this service flow.
No. of ARQ Retransmissions	0 to 255 (5)	Not supported in R1P1.
Max. Null Count (CBR Only)	0 to 255 (10	Not supported in R1P1.
Unsolicited Grant Pending Wait	0 to 100 frames (20)	Specify the grant waiting period for this service flow.
Normal Grant Interval	5 to 100 ms (10)	Not supported in R1P1.
Grant per Interval	0 to 127 grants (1)	Not supported in R1P1.
IP TOS Overwrite	0 to 65535 (0)	Not supported in R1P1.
Peak Data Rate	Menu: 64 to 8192 kbps (0/BE & CIR, 64/CBR)	Specify the peak data rate for this service flow
Min. Reserved Traffic Rate	Menu: 64 to 8192 kbps (blank)	If the service class is CBR, specify the minimum data rate for this service flow
Active QoS Timeout	0 to 100 frames (20)	Specify the active QOS timeout for this service flow.
ARQ State	ARQ On: ARG Off, Return ACKs; ARQ Off, No ACKs (ARQ On)	Not supported in R1P1.
Request/Transmission Policy	0 to 255 (0)	Not supported in R1P1.
Grant Pending Wait	0 to 100 frames (20)	Not supported in R1P1.
Unsolicited Grant Size	0 to 100 frames (20)	Not supported in R1P1.

Table6-N   CPE — Service Flow Upstream Parameters (Continued)

Parameter	Range (and Default)	Comments
Tolerated Grant Jitter	5 to 100 ms (5)	Not supported in R1P1.
QoS Parameter Set Type		Not supported in R1P1.

Table6-O   CPE — Service Flow Downstream Parameters

Parameter	Range (and Default)	Comments
Max. Downstream Latency	0 to 65535 ms (20)	
Token Bucket Size	0 to 25000 kbytes (1522)	
ARQ State	ARQ On: ARG Off, Return ACKs; ARQ Off, No ACKs (ARQ On)	
No. of ARQ Retransmissions	0 to 255 (6)	
Peak Data Rate	Menu: 64 to 8192 kbps (0/BE & CIR, none/CBR)	
Min. Reserved Traffic Rate	Menu: 64 to 7168 kbps (64/CIR, none/BE & CBR)	
Active QoS Timeout	0 to 100 frames (20)	
No. of Polling Slots	0 to 255 (0)	
QoS Parameter Set Type	Provisioned Set, Active Set, Provisioned and Active (Provisioned Set)	Not supported in R1P1

Configuring Service Flow Classifiers

In a multiservice environment, classifiers are used to direct subscriber traffic to different service flows. Therefore, until at least two service flows have been defined, the **Classifier** tab will be grayed out.

Note that upstream and downstream traffic are separately assigned to service flows.

See *Table6-P* for definitions of the classifier parameters.

To define service flow classifiers:

1. Click on the **Classifier** tab and then the **Upstream** tab so that the screen illustrated in *Figure6-16* is displayed.

2. Assign upstream traffic to a service flow as follows:

   a. Specify the parameter(s) that will define the classifier.

   b. Choose the service flow to which traffic matching this classifier will be directed by selecting from the **Service Flow Reference** menu.

   c. Click on the save instance icon when done.

3. Click on the **Downstream** tab so that the screen illustrated in *Figure6-17* is displayed. Assign downstream traffic to a service flow as follows:

   a. Specify the parameter(s) that will define the classifier.

   b. Choose the service flow to which traffic matching this classifier will be directed by selecting from the **Service Flow Reference** menu.

   c. Click on the save instance icon when done.

4. To define another set of upstream and downstream classifiers, click on the new instance icon. Note that the **Classifier Reference** field will increment.

   a. Click on the **Upstream** tab, choose the service flow to which traffic matching this classifier will be directed by selecting from the **Service Flow Reference** menu, alter parameters as desired, and click on the save instance icon.

   b. Click on the **Downstream** tab, choose the same service flow as for upstream traffic from the **Service Flow Reference** menu, alter parameters as desired, and click on the save instance icon.

5. Repeat step 4 until all classifiers have been defined.

☞ *Before generating the configuration file, be sure there is at least one upstream classifier and one downstream classifier assigned to each service flow which has been defined.*
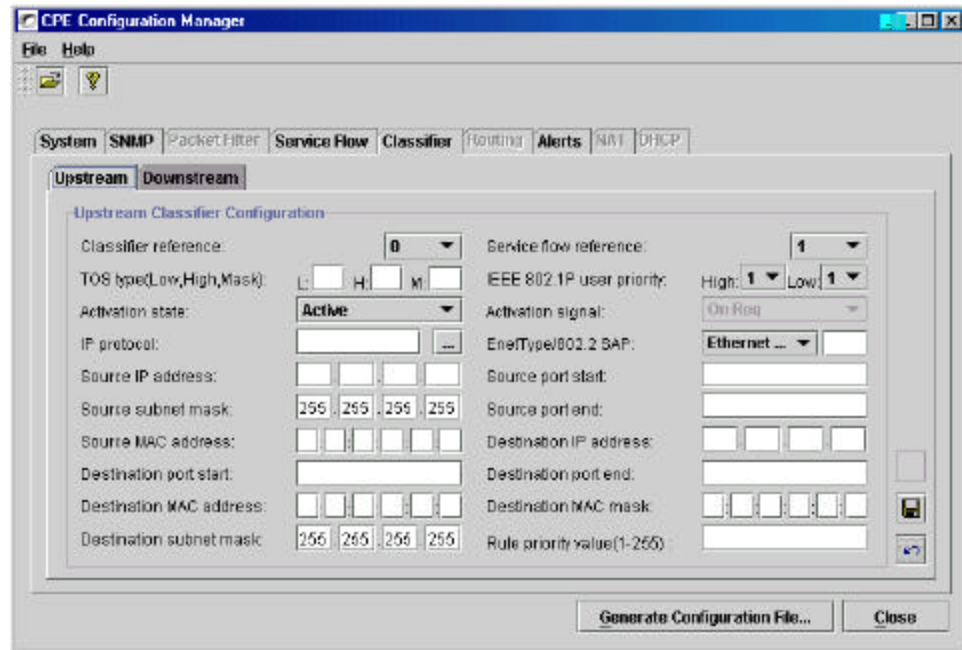
Figure6-16   Classifier — Upstream Menu
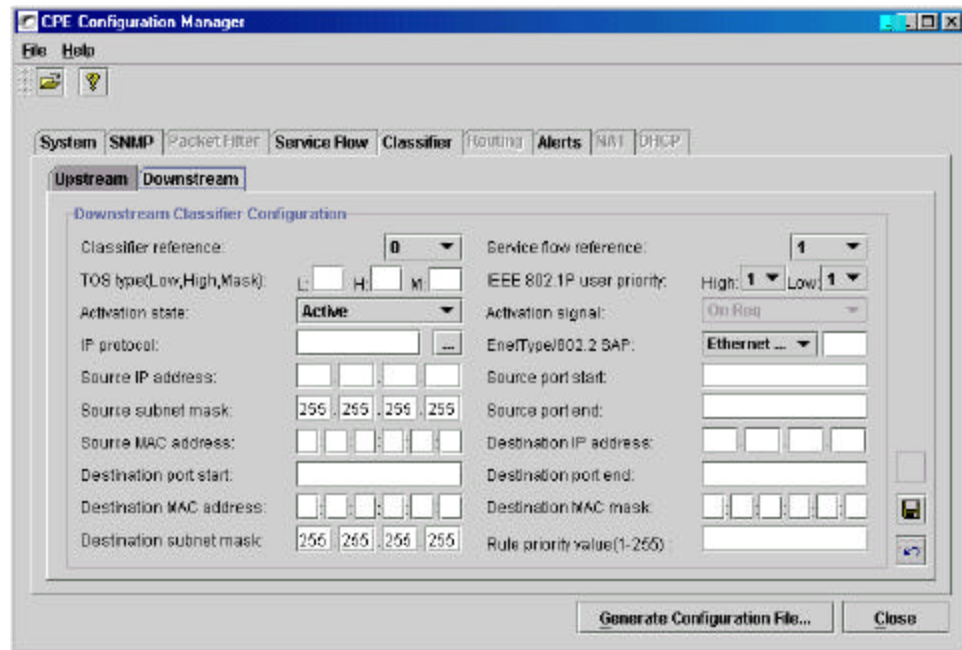
Figure6-17   Classifier — Downstream Menu

Table6-P   CPE — Classifier Parameters

Parameter	Range (and Default)	Comments
Classifier Reference	N/A	ID number of the current classifier; increments as each new instance is opened.
Service Flow Reference	Menu of existing SIDs (0)	Choose the service flow to which packets matching this classifier will be assigned.
TOS Type (Low, High, Mask)		If desired, specify the matching parameters for the IP ToS byte range and mask. An IP packet with IP ToS byte value "ip-tos" matches this parameter if tos-low <= (ip-tos AND tos-mask) <= tos-high.
IEEE 802.1P User Priority, High and Low	1 to 7 for each (1)	Specify the high and low limits for user priority.
Activation State	Inactive or Active (Active)	Specify whether this classifier is to be active or inactive. (This allows classifiers to be defined, then turned on or off.)
Activation Signal		
IP Protocol *	Any, ICMP-1, TCP-6, UDP-17 (Any)	
EnetType/802.2 SAP *	(no default)	Specify the Ethernet frame type: For Version 2 or SNAP Ethernet Frame type, enter a value from 10000 -to 1FFFF For IEEE 802.2 Ethernet Frame Type, enter a value from 20000 to 2FFFF
Source IP Address *	xxx.xxx.xxx.xxx decimal (no default)	Specify a source by IP address.
Source Subnet Mask *	xxx.xxx.xxx.xxx decimal (255.255.255.255)	Specify a destination subnetwork by entering an IP subnet mask.
Source Port Start *	0 to 65535 (no default	Specify a range of destination ports.
Source Port End *	0 to 65535 (no default	
Source MAC Address *	xx.xx.xx.xx.xx.xx hexadecimal (no default)	Specify a source by MAC address.
Destination IP Address *	xxx.xxx.xxx.xxx decimal (no default)	Specify a destination by IP address.
Destination Subnet Mask *	xxx.xxx.xxx.xxx decimal (255.255.255.255)	Specify a destination subnetwork by entering an IP subnet mask.

Table6-P   ***CPE — Classifier Parameters (Continued)***

Parameter	Range (and Default)	Comments
Destination Port Start *	0 to 65535 (no default	Specify a range of destination ports.
Destination Port End *	0 to 65535 (no default	
Destination MAC Address *	xx.xx.xx.xx.xx.xx hexa-decimal (no default)	Specify a destination host by MAC address.
Destination MAC Mask *	xx.xx.xx.xx.xx.xx hexa-decimal (no default)	Specify a range of destination hosts by MAC address mask.
Rule Priority Value	0 to 255 (no default)	Specify a priority value for this classifier rule. Rule priority has to be unique for each classifier in the system.
* *All of these fields are optional, and may be specified as desired to define a classifier rule.*		

Configuring Routing Functions

Standard routing capability is not supported by the PacketWave 130. Therefore, this menu is not supported in R1P1.

Configuring Subscriber Email Alerts

Click on the **Alerts** tab so that the screen illustrated in *Figure 6-18* is displayed. Specify email alert parameters as indicated in *Table6-Q*.
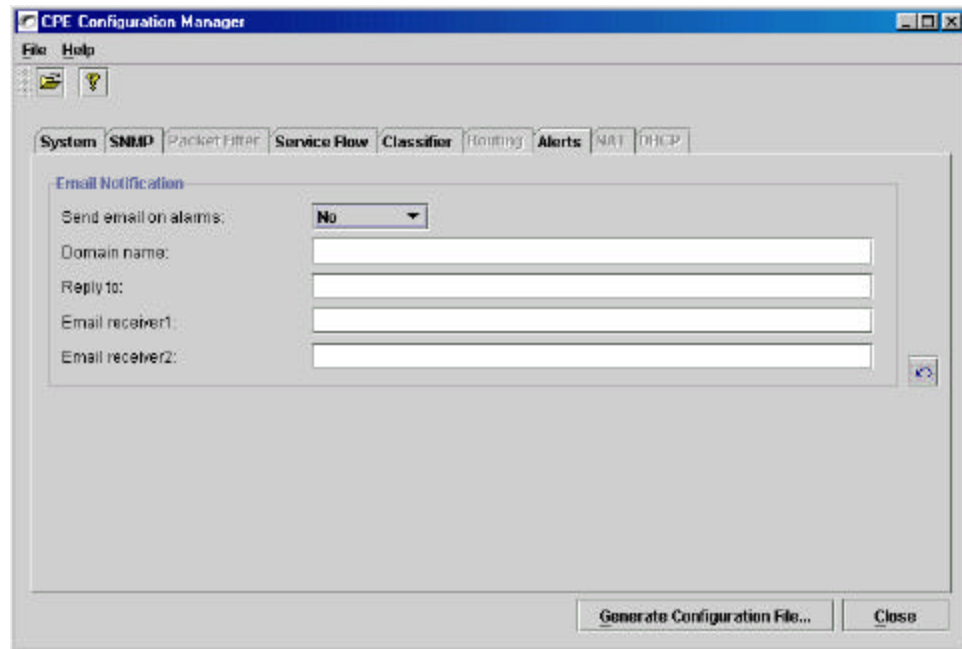
Figure6-18   Alerts Menu

Table6-Q   CPE — ALERTS Parameters

Parameter	Range (and Default)	Comments
Send Email on Alarms	**Yes** or **No** (**No**)	Specify whether email alert message will be sent. (If **No**, the other fields will be unavailable.
Domain Name	??????	Specify the email domain name for the subscriber.
Reply To	????	Enter the sending email address for alert messages.
Email Receiver 1	any email address	Enter the email address(es) to which alert messages will be sent.
Email Receiver 2	any email address	

Configuring NAT Routing

Network Address Translation (NAT) routing is performed only if the subscriber Indoor Unit is configured for NAT mode. If the subscriber Indoor Unit is configured as a bridge, the NAT tab will grayed out.

To configure NAT routing, click on the **NAT** tab so that the screen illustrated in *Figure6-19* is displayed. Specify NAT parameters as indicated in *Table6-R*.
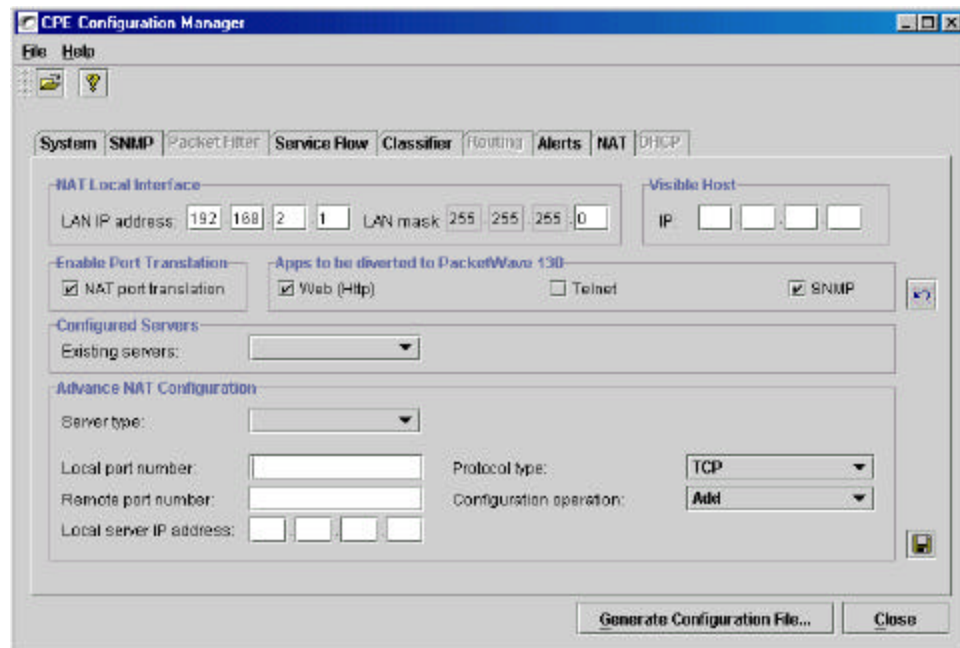
Figure6-19 ***NAT Menu***

Table6-R   CPE — NAT Parameters

Parameter	Range (and Default)	Comments
LAN IP Address	xxx.xxx.xxx.xxx decimal (192.168.2.1)	Enter the IP address of the subscriber Indoor Unit's Ethernet LAN interface. This will be the default gateway for the LAN and will typically follow the gateway addressing convention.
LAN Mask	xxx.xxx.xxx.xxx decimal (255.255.255.0)	Enter the subnet mask which defines the LAN subnet.
Visible Host	xxx.xxx.xxx.xxx decimal (no default)	Enter the IP address of a host on the LAN which will respond to the subscriber Indoor Unit's wireless interface IP address.
Enable Port Translation	checked or unchecked (checked)	Check the NAT Port Translation box to enable port translation; uncheck the box to disable.
Apps to be diverted to PacketWave 130	Web (checked) Telnet (unchecked) SNMP (checked)	Check boxes corresponding to applications which are to be diverted to the PacketWave 100.
Existing Servers	(Drop-down menu)	Menu of servers defined on the LAN subnet.
Server Type	FTP, HTTP, IMAP2, SNMP, POP3, SMTP, Telnet, TFTP, Other (no default)	Use these fields to define (add or delete) servers on the LAN subnet, and to specify the parameters of the servers.
Local Port Number	Read-only, per Server Type	
Remote Port Number	Default follows Local Port Number	
Local Server IP Address	xxx.xxx.xxx.xxx decimal (192.0.1.0)	
Protocol Type	(Drop-down menu)	
Configuration Operation	Add or Delete (Add)	

Configuring the Subscriber Indoor Unit's DHCP Server

This menu is not supported in R1P1.

OTHER CONFIGURATION METHODS

Only configuration changes made using the WaveCenter Configuration Manager can affect the PacketWave System's configuration file on the TFTP server.

A limited set of configuration changes can be made in real time via the Web and SNMP interfaces. But such changes are not recorded in, and cannot be saved to, the configuration files on the TFTP server. When the configured equipment (Base Station Unit or subscriber Indoor Unit) is rebooted, it will revert to the parameters in the stored configuration file, and all changes made via the Web interface or SNMP will be lost.

Therefore, configuration changes via the Web Interface or SNMP are recommended only for testing and troubleshooting purposes. Should a configuration change need to be made permanent, you must use the WaveCenter Configuration Manager to update the relevant configuration file on the TFTP server.

> NOTE: If a configuration change is made to operating parameters using the Web or SNMP interface, and then duplicated using the CM and saved to the TFTP server, the change will essentially survive a reboot. This is a way to make permanent configuration changes without immediately rebooting the system.
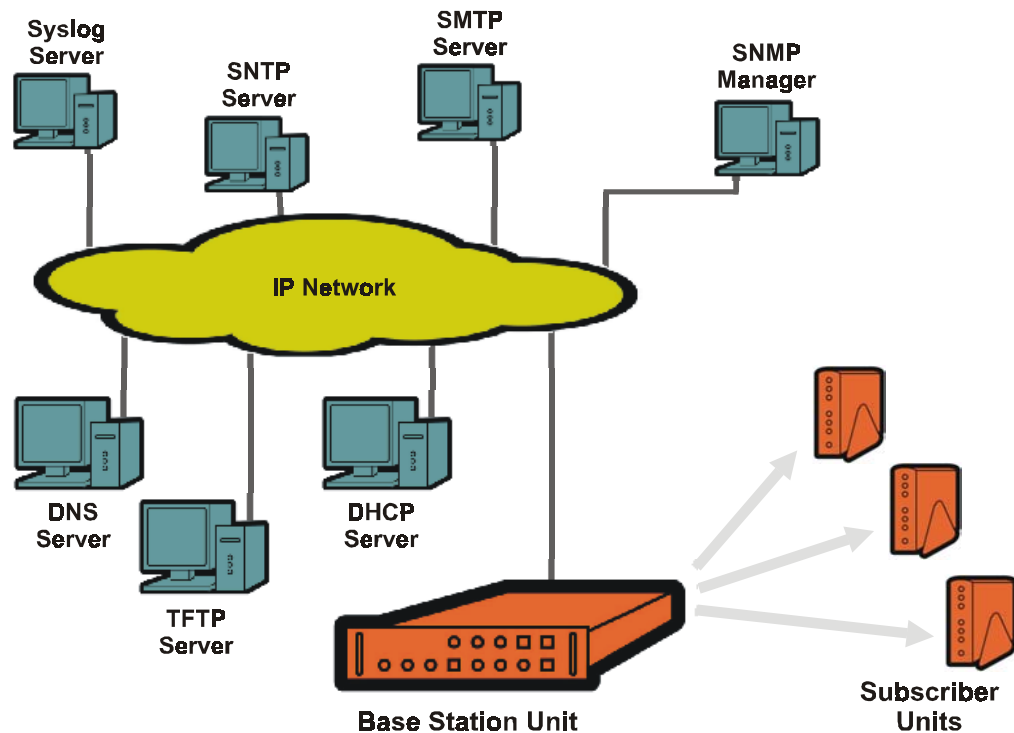
Figure 7-1   PacketWave System Servers

Required and Recommended Servers

Make sure that the Base Station Unit can access the following servers:

- **DHCP Server** — The server from which the Base Station Units and subscriber Indoor Units obtain:
    - IP addresses
    - Subnet masks
    - Default gateways
    - TFTP server IP address
    - Other server IP addresses
    - BSU and SU configuration file names

    > NOTE: If the DHCP and the BSU are not on the same subnet, the BSU's subnet must include a DHCP relay agent to pass the BSU's DHCP requests to the proper DHCP server. Also, subscriber Indoor Units can collectively be assigned a different DHCP server than the one used by the BSU.

- **TFTP Server** — The server from which the Base Station Units and subscriber Indoor Units download configuration files.

- **SNTP Server** — A Simple Network Time Protocol server is recommended for synchronizing the PacketWave Base Station Unit's date and time with other systems on the network. (If there is no SNTP server, the Base Station Unit's date and time must be set via the Web interface.)

  > NOTE: Subscriber Indoor Units obtain the date and time from the BSU. Whenever the BSU's date/time is changed, it downloads the new date/time to all subscriber Indoor Units.

- **DNS Server** — Access to a DNS server is necessary for the resolution of Internet domain names.

Optional Servers

Depending on the features and functions to be implemented, additional servers may be required. These servers can be identified in the DHCP server configuration or in the BSU configuration.

> NOTE: If different servers of a particular type are identified, the server identified in the DHCP configuration will prevail.

- **SMTP Server** — A Simple Mail Transfer Protocol server is required for the emailing of event alerts. (Alternatively, this server can be identified in the BSU configuration.)

- **Syslog Server** — A syslog server may be specified for logging of event messages from the Base Station Units. (Alternatively, this server can be identified in the BSU configuration.)

- **DHCP Server for CPE** — A different DHCP server than the one used for the BSU can be specified for Subscriber Indoor Units.

- **SNMP Managers** — All Base Station Units and subscriber Indoor Units include SNMP (Simple Network Management Protocol) agents which can be accessed by an SNMP manager for monitoring and limited configuration.

The SMTP, Syslog, and CPE DHCP servers can be identified via the WaveCenter Configuration Manager's **BSU — MAIN — IP Servers** screen. (The SMTP and Syslog servers can also be specified in the DHCP server's configuration file.) The SNMP managers are identified via the **BSU — SNMP** and **CPE — SNMP** screen

Preparing the TFTP Server

The PacketWave System uses the TFTP server for storing files and downloading them to Base Station Units and subscriber Indoor Units on request. Any third-party or public domain TFTP server may be used.

Ensure that configuration files for all Base Station Units and subscriber Indoor Units are stored in the default directory (typically *\tftpboot*) of the TFTP server, and that the TFTP server is running.

Configuring the DHCP Server

A variety of DHCP servers are available. Their configurations follow the same general principles, but vary in implementation, terminology, and user interfaces. DHCP configuration should be performed by personnel knowledgeable about both DHCP in general and the particular DHCP server to be used. Whichever DHCP server is employed, it should be configured to include the parameters identified in *Table 7-A*.

CAUTION: **Take special care to ensure that the BSU and subscriber configuration file names entered in the DHCP configuration are exactly the same as the files created using the WaveCenter Configuration Manager and stored on the TFTP server. A newly-installed unit will not be able to operate properly if it cannot locate and download its configuration file.**

Table 7-A   *DHCP Configuration Requirements*

Servers	Required: TFTP Recommended: SNTP, DNS Optional: SNMP, SMTP, POP3
Subnets (Scopes)	Subnets / Subnet Masks Routers / Gateways
Each Base Station Unit	Hardware Ethernet / MAC address Fixed IP address for backhaul interface configuration file name
Each Subscriber Indoor Unit	Hardware Ethernet / MAC address Fixed IP address for wireless interface configuration file name
Subscriber Hosts	IP addresses if the subscriber Indoor Unit functions as a bridge DNS server if the subscriber Indoor Unit functions as a NAT router

SYSTEM START-UP

Once all of the configuration files have been created, start the PacketWave System by performing the following steps:

1. Verify that all of the configuration files have been saved in the default directory on the TFTP server.

2. Verify that the TFTP server is running and accessible.

3. Verify that the DHCP server has been configured for network addresses and for all BSUs and subscribers.

4. Verify that the DHCP server is running and accessible.

5. Boot the Base Station Unit. It will download its configuration, obtain its IP address, and initialize automatically.

6. When the Base Station Unit has finished initializing, boot the subscriber Indoor Units.

7. Initialize each subscriber Indoor Unit using the CPE Installation Tool, as described in the *PacketWave 100 Series Subscriber Equipment Installation and Operation* manual. When a subscriber Indoor Unit has been initialized, it will download its configuration, obtain IP addresses, and join the network.

ADDING BASE STATION UNITS AND/OR SUBSCRIBERS

To add one or more Base Station Units and/or subscribers to an existing cell:

1. Launch the WaveCenter Configuration Manager.

2. Use the Configuration Manager to create configuration files for the new device(s) as described in Chapter 6.

3. Save or copy the configuration file(s) to the default directory of the TFTP server.

4. Add the required information about the device(s) in the DHCP server's configuration file.

5. Boot the new devices.

OTHER CONFIGURATION METHODS

Only configuration changes made using the WaveCenter Configuration Manager affect the PacketWave System's configuration data base.

A limited set of configuration changes can be made in real time via the Web and SNMP interfaces, but such changes are not permanently stored. When the configured equipment (Base Station Unit or subscriber Indoor Unit) is rebooted, it will revert to the stored configuration, and all changes made via the Web interface or SNMP will be lost.

Therefore, configuration changes via the Web Interface or SNMP are recommended only for testing and troubleshooting purposes. Should a permanent configuration change need to be made, you must use the WaveCenter Configuration Manager to update the relevant configuration files on the TFTP server.

8

MANAGEMENT INTERFACES

The PacketWave system supports real-time monitoring and limited "on-the-fly" configuration changes via a Web-browser-accessed Graphical User Interface (GUI) and SNMP. There is also a simple command line interface (CLI) for basic troubleshooting and debugging.

WEB INTERFACE (GUI)

Each Base Station Unit and Subscriber Unit includes a Java-based graphical user interface (GUI) which runs on a standard Web browser (Netscape 4.74 or higher, or Internet Explorer 5.0). Functions of the Web GUI include:

- Viewing network topology.

- Monitoring status and performance.

- Reviewing configuration.

- Making basic configuration changes.

- Resetting Base Station Units, BSU wireless interfaces (WSSs), and subscriber Indoor Units.

Accessing the Web Interface

To access the graphical user interface:

1. Establish a connection and open your Web browser.

2. Enter the URL, *http://<BSU IP address>/bsc.htm*.

3. Respond to the user name prompt with **Aperto** and to the password prompt with **Aperto**.

> NOTE: The user name and password are case-sensitive, so be sure to capitalize the **A** in **Aperto**.

4. If the browser prompts that it needs to load a plug-in, allow it to do so.

5. Wait for the Web interface home page to open, as shown in *Figure8-1*.

The Web GUI pages share the basic elements identified in *Figure 8-1*.

Using the Base Station Unit's Web GUI

When you open the BSU's Web GUI, you are at the BSU Home Page shown in *Figure8-1*. A main menu and submenus allow you to navigate easily among the various BSU pages.

Network Views

From the BSU Home Page, you can view the BSU and its wireless interfaces. Hyperlinks allow you to navigate through the BSU connections as indicated in *Figure8-1 through Figure8-3*.

*The first time you select the Cell View page (Figure8-3), your browser may prompt that it wants to download Java applets. Click on the **OK** button to allow the download. The applets will then be cached in the browser, so downloading will not be required in the future.*

The connectivity views provide a quick way to identify the configured Base Station Units, sectors (WSS), and subscribers, and to check their status. The arrows pointing to the subscriber Indoor Units in *Figure8-1 and Figure8-2* indicate wireless channel status: green if good or red if down.

Color-coding of the cell view, shown in *Figure8-3*, is indicated by the legend on the cell view page.

Status indications on the topology views are updated dynamically every 30 seconds.
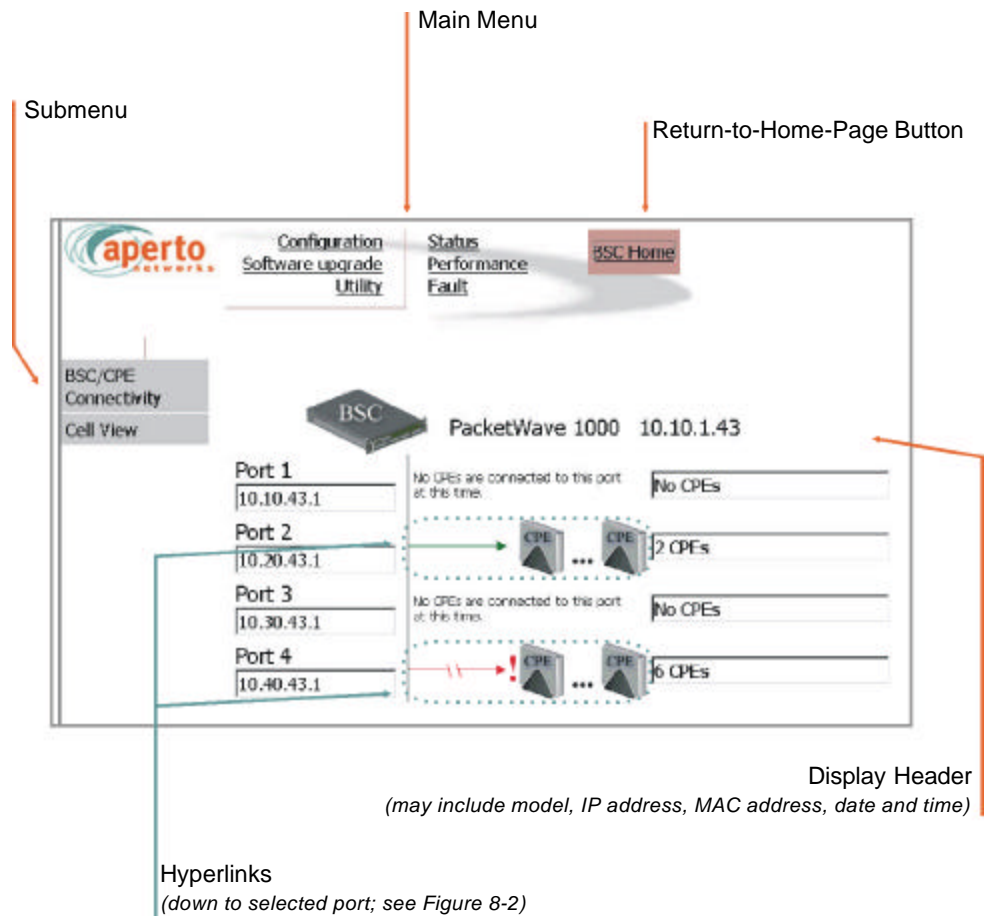
Figure8-1   BSU Home: BSU/SU Connectivity, All Wireless Ports
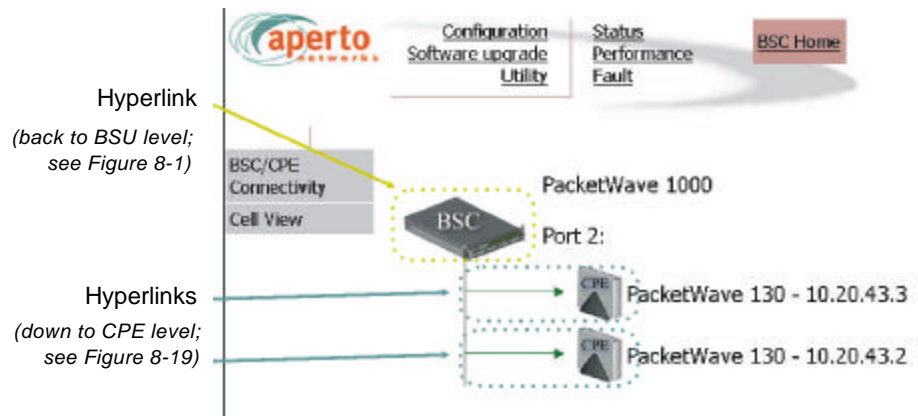
Figure8-2 **BSU Home: BSU/SU Connectivity, Select Port**
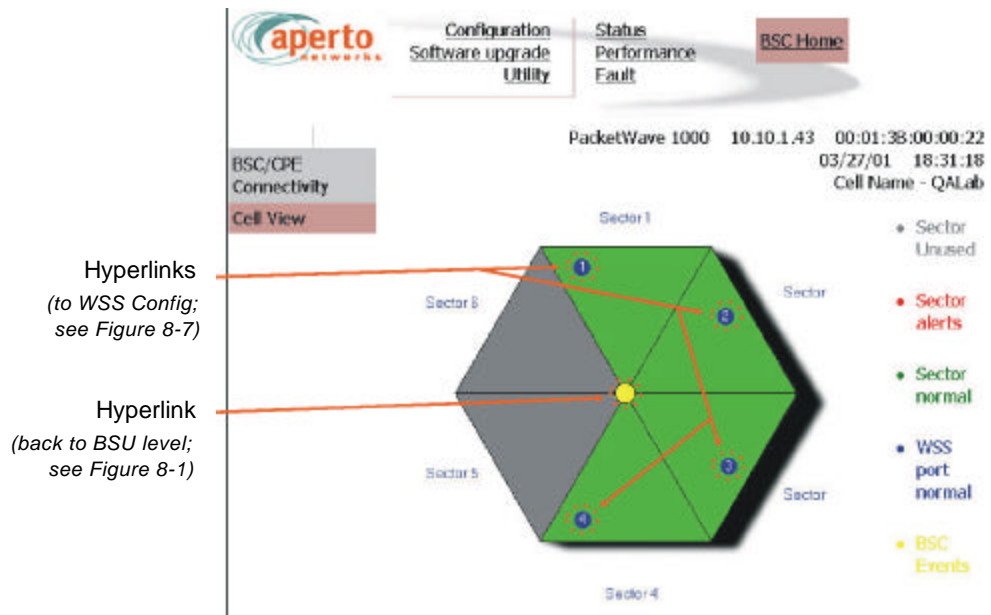
Figure8-3 **BSU Home: Cell View**

Configuration Pages

The Web GUI lets you check, and in some cases alter, the configuration of the Base Station Unit. There are five configuration pages which may be displayed, as indicated by the submenu at the left of the page; they are illustrated in *Figure8-4 through Figure8-8*.

System Configuration

As shown in *Figure8-4*, the system configuration page identifies:

- Ethernet parameters
- DHCP and other server settings
- Operating software and configuration files, and current boot status.

Only the IP address of the System Log Server can be altered via this page. Click on the **Submit** button to activate any change made on this page.
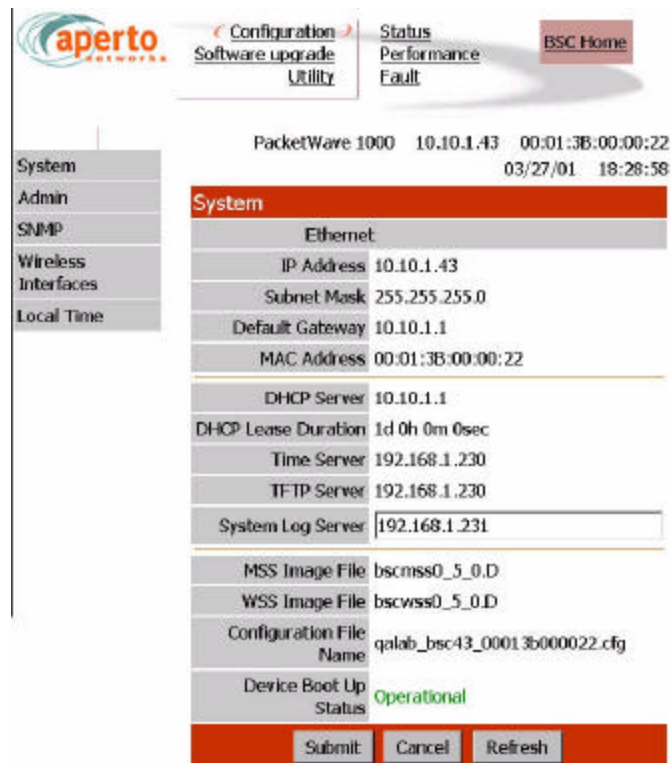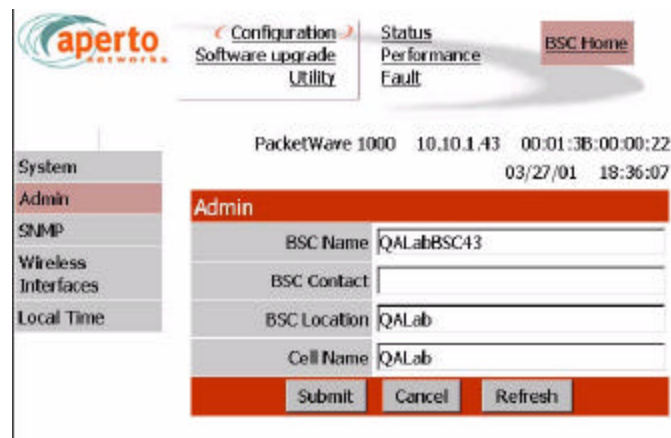
Figure8-4   System Configuration Page

Administrative Configuration

As shown in *Figure8-5*, the administrative configuration page allows viewing and altering of text fields related to BSU and cell administration. These text fields can be used for whatever information system administrators deem useful.

Click on the **Submit** button to activate any changes made on this page.

Figure8-5   Administrative Configuration Page

Wireless Port Configuration

As shown in *Figure8-7,* the wireless interface configuration page displays framing, sync, and channel parameters. These advanced parameters cannot be changed in the Web GUI; they can be altered only via the WaveCenter Configuration Manager, as described in Chapter 6.

Figure8-7*   *WSS Configuration Page

Local Time Configuration

As shown in *Figure 8-8*, the local configuration page allows the specification of the local time zone and daylight savings time options. These adjustments will be applied to the time received from the Base Station Unit's SNTP server.

Alternatively, the obtaining of system time from the SNTP server can be disabled, and the time entered on this page.

Click on the **Submit** button to activate any changes made on this page.

Figure8-8   Time Configuration Page

Software Upgrade Options

The HTML upgrade page illustrated in *Figure8-9* lets you upgrade the Web GUI by writing new pages from files to the BSU. For example, you might have pages translated into a language other than English which you want to load in place of the English-language pages.

If you have an HTML page to upload, you can type in the file name or browse for it. When the file name is specified, click on the **Load** button to load the file into the Base Station Unit's Web GUI agent.
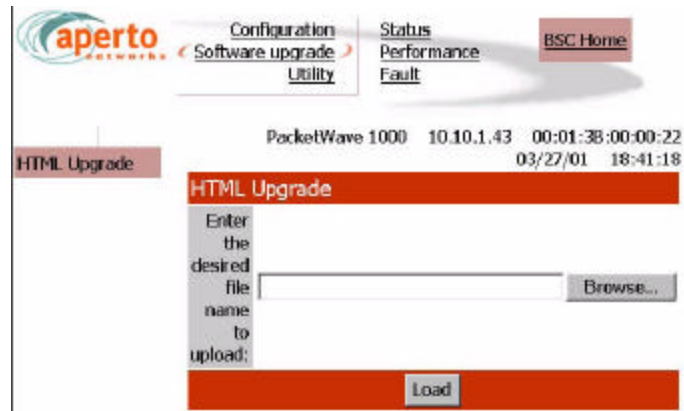
Figure8-9   HTML Upgrade Page

Device Control Utilities

The device control page, illustrated in *Figure8-10*, provides access to several important functions:

- Resetting the entire BSU.

- Resetting a selected WSS.

- Restoring factory defaults for *all* BSU configuration options.

The interface will prompt for confirmation before performing any selected functions.
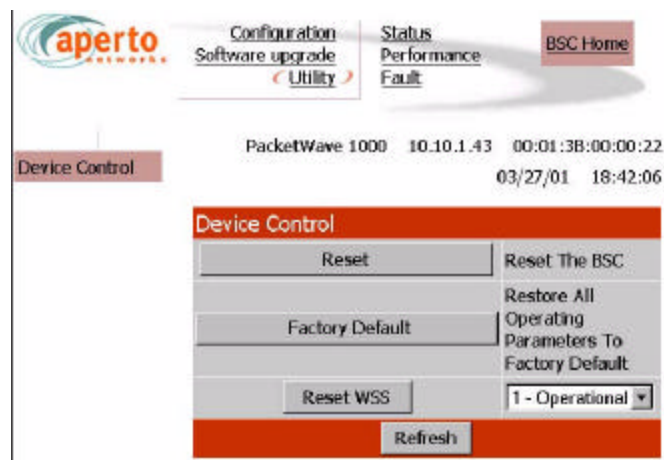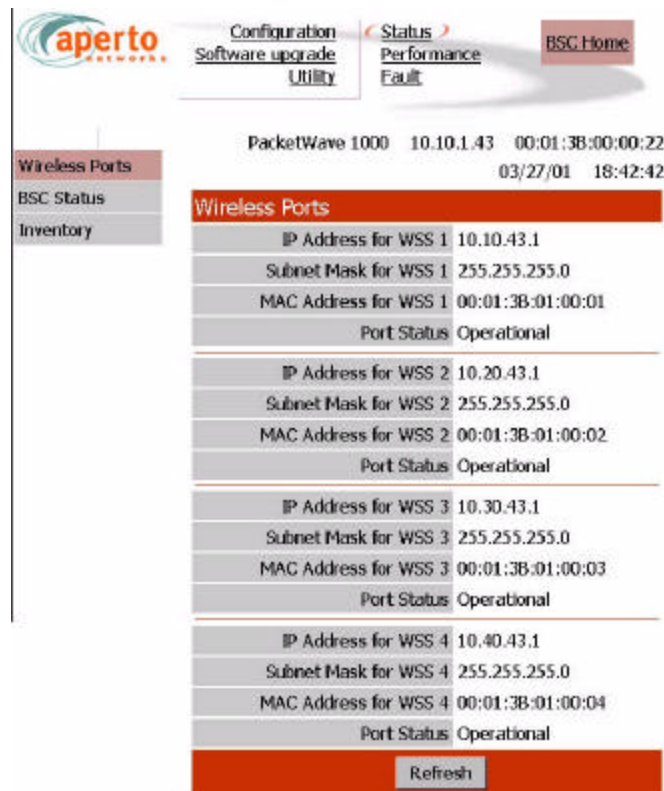
Figure8-10   Device Control Page

Status Displays

The BSU Web GUI includes the status pages shown in *Figure8-11 through Figure8-13*. These provide a snapshot of the current status of the Base Station Unit, its WSSs, and its connected subscribers (CPE).

> NOTE: The data base used to generate these pages is updated in real time. However, the pages do not update dynamically; you must click on the **Refresh** button to see later status.

No configuration or other operation can be initiated from these pages.

Figure8-11   Wireless Port Status Page

Figure8-12   BSU Status Page

Figure8-13   Inventory Page

Performance Monitoring

The BSU Web GUI provides wireless channel performance information on the pages illustrated in *Figure8-14 through Figure 8-16*.

As shown in *Figure8-14 and Figure8-15*, transmitted and received byte counts are presented graphically for all wireless ports (WSS).

☞ *These data base used to generate these displays is updated in real time, and the pages are automatically updated every 30 seconds.*

As shown in *Figure8-16*, transmitted and received byte counts for all subscribers in all sectors (wireless ports) are listed in a text format.

> NOTE: The data base used to generate this page is updated in real time. However, the pages do not update dynamically; you must click on the **Refresh** button to see later status.
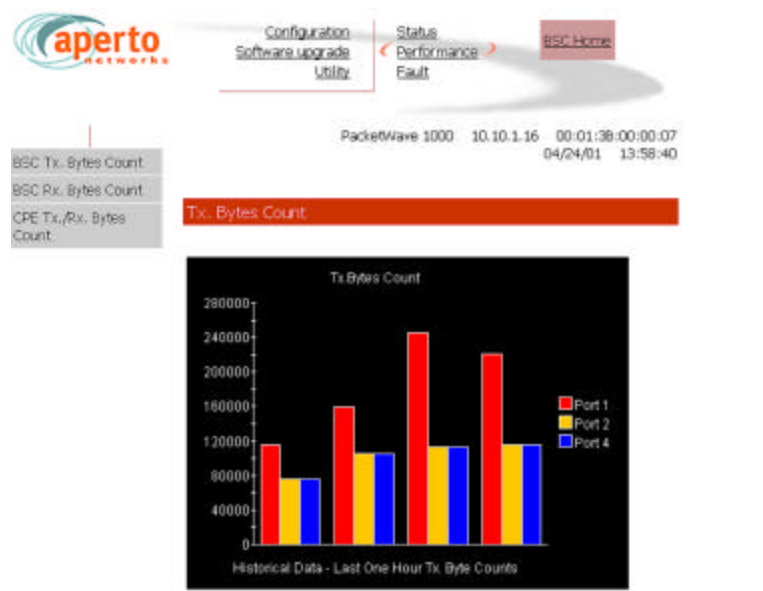
Figure8-14   BSU Transmitter Performance Page
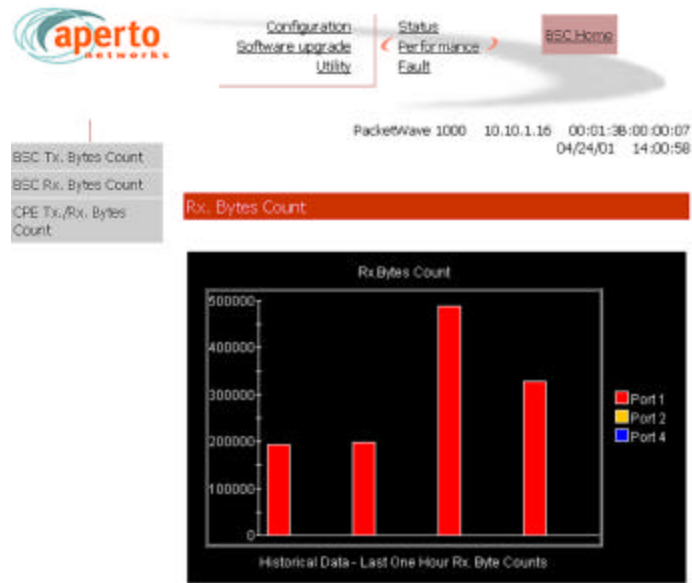
Figure8-15   BSU Receiver Performance Page
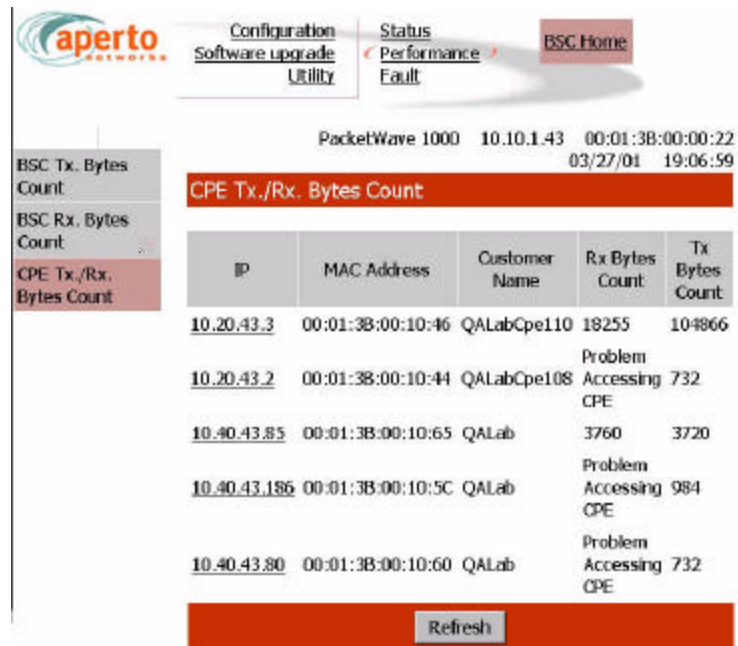
Figure8-16   BSU CPE Performance Page

Fault Reporting

The BSU fault reporting functions include an event log and email configuration, as shown in *Figure8-17 and Figure8-18*.

Event Log Page

The event log page, shown in *Figure8-17*, includes all logable events reported by the Base Station Unit and its connected subscribers.

> NOTE: The data base used to generate the log is updated in real time. However, the pages do not update dynamically; you must click on the **Refresh** button to see later status.

You can empty the log by clicking on the **Clear All Events** button.

Figure8-17   ***BSU Event Log Page***

E-mail Page

As shown in *Figure8-18*, the E-mail configuration page allows the viewing and alter-ing of Email event reporting parameters:

- The address of the SMTP server (may be configured here, on the DHCP server, or in the BSU configuration).

- The BSU's E-mail domain name.

- Reply-to and receiver E-mail addresses.

- A test E-mail may be sent.

- Event reporting via E-mail may be turned on and off as desired.

Click on the **Submit** button to activate any changes made on this page.

Figure8-18   BSU Email Configuration Page

Using the Subscriber Indoor Unit's Web GUI

The subscriber Indoor Unit's GUI may be accessed via the BSU Web GUI (see *Figure8-2 and Figure8-3*), or by directly addressing the subscriber Indoor Unit (*http://<wireless interface IP address>/cpe.htm*). In either case, a new network connection is being requested, so the system prompts for a user name and password. Respond to each prompt with **Aperto**.

NOTE: The user name and password are case-sensitive

The subscriber (CPE) home page is illustrated in *Figure8-19*. It provides access to a range of pages similar to those for the Base Station Unit.

As shown in *Figure8-19*, the subscriber (CPE) home page provides a graphical representation of BSU-to-subscriber equipment connectivity. The arrow pointing to the subscriber Indoor Unit icon indicates wireless channel status: green if good or red if down.

☞   *Status indications on the connectivity view are updated dynamically every 30 seconds.*
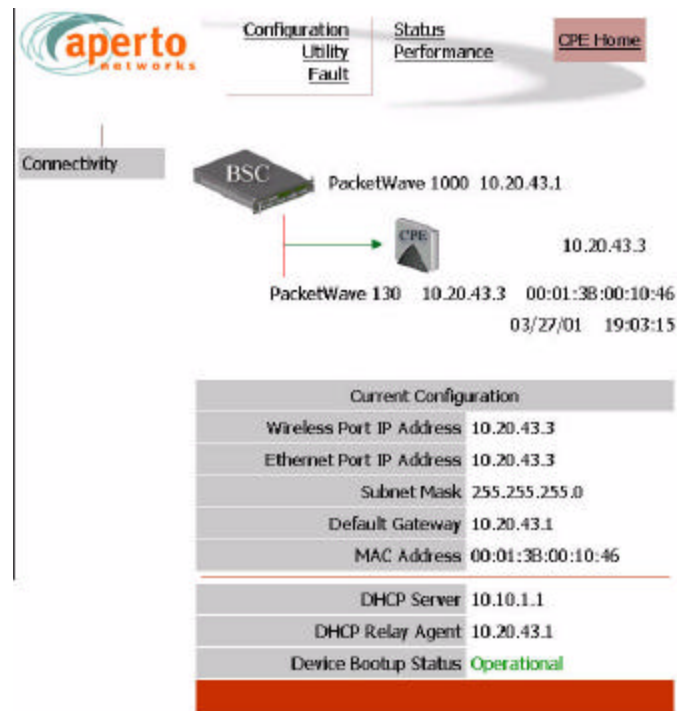

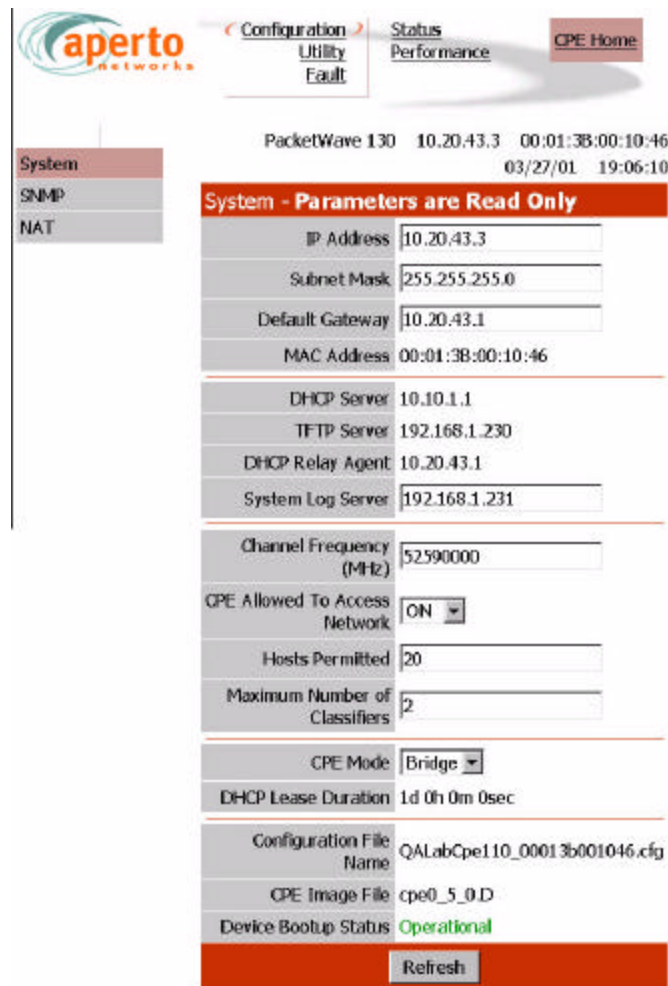**Figure8-19   Subscriber Home Page: Connectivity View**

Configuration Pages

The Web GUI lets you check, and in some cases alter, the configuration of the subscriber equipment. There are four configuration pages which may be displayed, as indicated by the submenu at the left of the page; they are illustrated in *Figure8-20 through Figure8-23*.

> NOTE: NAT configuration applies only to PacketWave 120 and 130 models.

System Configuration

As shown in *Figure8-20*, the system configuration page provides an overview of the subscriber's wireless network connection and operating parameters. *These parameters are read-only.*
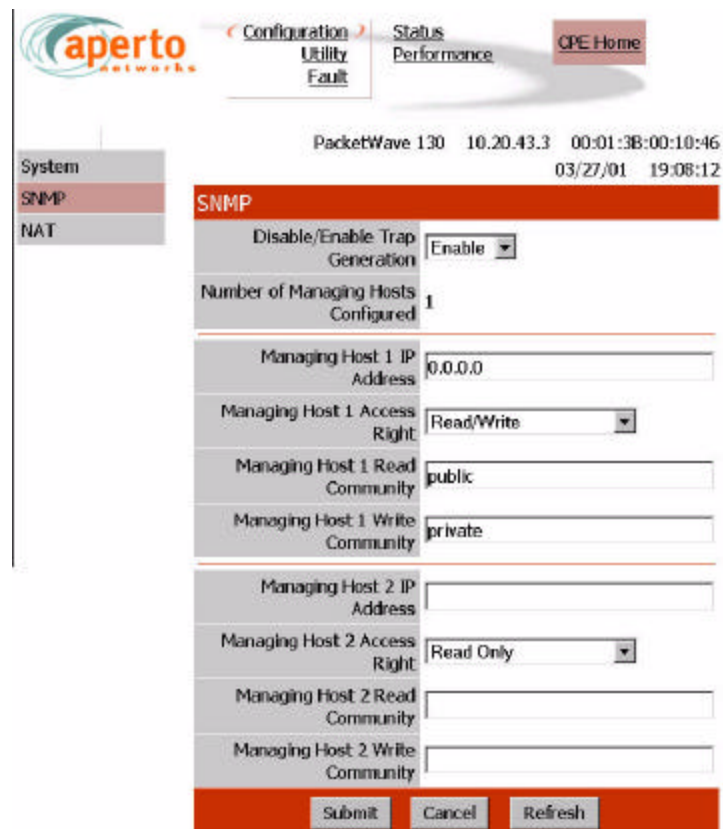

Figure8-20   Subscriber System Configuration Page

SNMP Configuration

As shown in *Figure8-21*, the SNMP configuration page allows the viewing and altering of the subscriber Indoor Unit's SNMP parameters:

- Whether traps will be generated by the Indoor Unit.

- What SNMP manager(s) will be recognized, and what level of access they will have.

Click on the **Submit** button to activate any changes made on this page.

Figure8-21   Subscriber SNMP Configuration Page

NAT Configuration

As shown in *Figure8-22 and Figure8-23*, there are two configuration pages related to NAT (Network Address Translation) routing by the subscriber Indoor Unit. These read-only pages apply only when the Indoor Unit is in NAT mode.

To move between the two NAT configuration pages, click on the hyperlinks at the bottoms of the pages.

☞ *NAT configuration should be performed by a knowledgeable network administrator.*

Figure8-22   Subscriber NAT — Configuration Page

Figure 8-23   Subscriber NAT — Configured Rules Page

Device Control Utilities

The device control page, illustrated in *Figure 8-24*, provides access to a pair of important functions:

- Resetting the subscriber Indoor Unit.
- Restoring factory defaults for *all* subscriber equipment configuration options.

The interface will prompt for confirmation before performing a selected function.

Figure 8-24   Subscriber Device Control Page

Fault Reporting

The subscriber fault reporting functions include an event log and email configuration, as shown in *Figure8-25 and Figure8-26*.

Event Log Page

The event log page, shown in *Figure8-25*, includes all logable events reported by the subscriber Indoor Unit.

> NOTE: The data base used to generate the log is updated in real time. However, the pages do not update dynamically; you must click on the **Refresh** button to see later status.

You can empty the log by clicking on the **Clear All Events** button.

Figure8-25   Subscriber Event Log Page

Status and Performance Statistics

The subscriber (CPE) status page, shown in *Figure8-27*, identifies the subscriber Indoor Unit, its software and hardware, and its current operational status.

As shown in *Figure8-28*, the performance page provides transmit and receive statistics in a table format.

> NOTE: The data used to generate these pages is updated in real time. However, the pages do not update dynamically; you must click on the **Refresh** button to see new information. No configuration or other operation can be initiated from these pages.

Figure8-27   Subscriber Status Page

Figure8-28   Subscriber Performance Page

SNMP

Each subscriber Indoor Unit includes an SNMP agent. Each Base Station Unit includes an SNMP agent plus a proxy agent for the subscriber Indoor Units. The agents support the following MIBs:

- SNMP MIB (RFC 1157)

- MIB II (RFC 1213)

- Aperto private MIB

- Additional MIBs, as appropriate, for plug-in backhaul modules.

The complete MIBs are provided on the PacketWave CD-ROM, and are available on the Aperto Web site, *www.apertonet.com*.

The SNMP agents support trap reporting. Trap-reporting parameters can be specified via the Configuration Manager and the Web GUI as well as via SNMP.

NOTE: SNMP parameters are read-only in R1P1.

SYSLOG

The Base Station Unit and subscriber Indoor Unit supports logging of event messages to a designated server according to the Syslog protocol. The Syslog server may be identified in the DHCP configuration or the BSU and SU configuration files.

COMMAND LINE INTERFACE (CLI)

Each Base Station Unit and subscriber Indoor Unit includes a simple command line interface (CLI) accessible via telnet and, for the BSU, directly via the front panel.

To use the CLI:

1. Establish a connection in one of the following ways.

    - Telnet to the Base Station Unit's or subscriber Indoor Unit's IP address. Enter the correct user name (**Aperto**) and password (**Aperto**) as prompted.

    - Connect a computer directly to the BSU's **RS-232** port, and open a terminal emulator configured for 38.4K baud, 8 bits, 1 stop bit, no parity. Press **Return** until prompted for **Login**. Enter the correct user name (**Aperto**) and password (**Aperto**).

FAULT REPORTING

The PacketWave Base Station Units and subscriber Indoor Units can be configured to report events by several means:

- Email event messages.

- SNMP traps.

- Logging to a Syslog server.

- Event logs presented on request via SNMP or Web GUI.

Reported events are identified in *Table8-A*.

Table8-A   Reported Events

Fault Event	Description
Cold Start	BSU, WSS, or subscriber Indoor Unit has performed a full hardware boot.
Warm Start	BSU, WSS, or subscriber Indoor Unit has performed a software reboot.
Authentication Failure	Invalid user name or password?
Port N Link Down	WSS port (number N) has gone down.
Port N Link Up	WSS port (number N) has come up.
BSU Up	BSU has started normal operation.
BSU Down	BSU has ceased normal operation.
CPE Sync Acquired	BSU has acquired wireless channel synchronization with a specific subscriber Indoor Unit.
CPE Up	Subscriber Indoor Unit has started communication with the BSU.
CPE Down	Subscriber Indoor Unit has ceased communication with the BSU.
DHCP Failed	A failure has occurred in the retrieval of required data from the DHCP server.

SPECIFICATIONS

BASE STATION UNIT

Interfaces

Radio — 4 Wireless Subsystems (WSS), each with the following interfaces:

    Signal port (F connector)

    Xmt and Rcv test ports (F and BNC connectors, respectively)

    Radio control port (RJ45)

Backhaul Port — 100Base-T Ethernet (RJ45)

Local Craft Interface — RS232 serial port (DB9)

Alarm/Control — NO/NC/Common dry contact relay

External Clock Input — 10 MHz timing reference (BNC)

Multiple BSU Synchronization — 2 Main and 2 Alternate ports (BNC)

Operation

Data Rates — 384 kbps to 10 Mbps; Bursts up to 20 Mbps

Frequency Bands —

    2.5-2.686 GHz (MMDS),

    3.4-3.7 GHz (FWA)

    5.25-5.35 GHz (UNII)

    5.725-5.875 GHz (UNII)

Duplexing Mode — Time Division Duplexing (TDD)

Error Control — Advanced MAC-layer ARQ; Reed Solomon FEC with variable block length and correction factor

Networking

Protocols —

    IP RIP2 routing

    Variable-length SubnetMask (VLSM),

    Classless Internet Domain Routing (CIDR)

QoS — IP DiffServ and ToS

Service Classes —

    CBR (constant bit rate)

    CIR (committed information rate)

    BE (best effort)

DHCP — client and relay agent

Management

Centralized management via PacketWave Configuration Manager (CM)

Embedded web agent supporting SNMP, web browser, and CLI interfaces

SNMP (RFC 1157), MIB II (RFC 1213), Ethernet bridge MIB (RFC 1493)

Software upgrades through TFTP

LED Indicators

Power

Radio — Transmit, Receive, Status (for each WSS)

Ethernet — Link, Transmit, Receive

Multi-unit Sync — Main and Alt

Power Requirements

AC Option — 85 to 265 V ac, 47-63 Hz

DC Option — 37 to 75 V dc

Power Consumption — 300 W maximum (base configuration)

Dimensions and Weight

W x H x D — 19 x 3.5 x 23.5 inches (48.3 x 8.9 x 59.7 cm)

Mounting — Standard 19-inch rack

Weight — 38 pounds (17 kg)

Environmental

Operating Temperature — 32 to 104 °F (0 to 40 °C)

Humidity — 10% to 90% noncondensing

Regulatory Approvals

FCC Part 15 Class B, CE, UL, CSA, EN (in process)

Plug-In Modules (Future)

OC-3/STM-1 Backhaul

Connector — Duplex SC

Line Rate — 155.52 Mbps

Line Framing — SONET STS-3c/SDH STM-1

Reach — MMF Short Reach (2 km) and SMF Medium Reach (15 km)

ATM —

RFC 1483, IP over ATM

RFC 1577, Classical IP over ATM

VBR-rt, VBR-nrt, and UBR

POS —

RFC 1619 PPP over SONET/SDH

RFC 1662 PPP in HDLC-like Framing

IP DiffServ

DS3/E3 Backhaul

Connector — BNC

Line Rate — 44.736 Mbps (DS3); 34.368 Mbps (E3)

Line Framing — C-bit parity (DS3); G.751 (E3)

Line Coding — B3ZS (DS3); HDB3 (E3)

Dual WSS (Wireless Subsystems)

Connectors, LEDs, RF, network protocol, and management features are the same as for the built-in WSS interfaces

RADIOS AND ANTENNAS

See Tables A-1 and A-2

TableA-1   *PacketWave Base Station Radios*

	2.5 GHz	3.5 GHz	5.3 GHz	5.8 GHz
General				
Frequency Range	2500 to 2686 MHz	3400 to 3700 MHz	5250 to 5350 MHz	5725 to 5875 MHz
Channel Widths Supported	From 1 to 6 MHz in 1 MHz steps	1.75, 3.5, and 7.0 MHz	From 1 to 6 MHz in 1 MHz steps	From 1 to 6 MHz in 1 MHz steps
Modulation	QPSK and 16QAM, Adaptive			
Duplexing	Time Division Duplexing (TDD)			
Transmitter				
Maximum EIRP	33 dBm (per US FCC requirements, 18 dBi antenna			

ACPR at Maximum EIRP
    First Adjacent (3 MHz from F_0)
    Second Adjacent (6 MHz from F_0)
	-37 dBc
	-60 dBc
		—	TBD
			TBD
				TBD
				TBD

ACPR at Maximum EIRP (7 MHz spacing)
    F_0 + 5.6 MHz
    F_0 + 7.0 MHz
    F_0 + 14.0 MHz
	—	-32 dBc
		-37 dBc
		-50 dBc
			—	—

Transmitter Gain	-10 to 25 dB	-15 to 20 dB	-15 to 20 dB	-15 to 20 dB
Maximum Switching Time	2 µs, 10-90%			
Maximum Group Delay	1.3 µs			
Receiver				
Maximum Receiver Noise Figure	5.0 dB	5.5 dB	6.5 dB	6.5 dB
Receiver Gain	30 ±tbd dB	30 ±3 dB	30 ±3 dB	30 ±3 dB
Minimum Receiver Input, IP3	-15 dBm	-10 dBm	-10 dBm	-10 dBm
Maximum Switching Time	2 µs, 10 to 90%			
Synthesizer				
Maximum Phase Noise (10 kHz offset)	-86 dBc/Hzt	-83 dBc/Hzt	-83 dBc/Hzt	-83 dBc/Hzt
Reference Frequency	10 MHz ±500 Hz			
Antenna Port				
Connectors	4 female N-type			
Signal Port				
Connector	Female F-type			

TableA-1 PacketWave Base Station Radios (Continued)

	2.5 GHz	3.5 GHz	5.3 GHz	5.8 GHz
Impedance	75 ohms			
10 MHz Reference Level	100 mVpp to 5 Vpp, sinusoidal			
IF Signal	44 MHz			
Maximum IF Signal Level	7 dBm			
DC Voltage Range	10 to 20 V			
Maximum Current Draw at +12 V	950 mA			
Worst Case Return Loss	-15 dB			
Control Port				
Connector	RJ45 female			
Maximum Data Rate	4 Mbps			
Maximum CAT-5 Cable Length	150 ft			
Radio Alarms Reported	Transmitter Overpower Accuracy, ±1 dB VCXO Lock Synthesizer Lock Undervoltage, less than 9.5 V			
Environmental				
Operating Temperature	-22 to 140 °F (-30 to 60 °C)			
Storage Temperature	-40 to 257 °F (-40 to 125 °C			
Relative Humidity	0 to 100%			
W x H x D, without mounting bracket	TBD	TBD	TBD	TBD
Weigh	TBD	TBD	TBD	TBD
Regulatory Approvals	FCC Part 15, UL	ETSI, CE	FCC Part 15, UL, U-NII	FCC Part 15, UL, U-NII

TableA-2   PacketWave Base Station Antennas: 60º Sectors

	2.5 GHz	3.5 GHz	5.3 GHz	5.8 GHz
General				
Number of Antennas for Spacial Diversity	2			
Minimum Gain	15 dBi	15 dBi	16 dBi	15 dBi
Maximum VSWR	2.0:1			
Maximum Input Power	6 W			
Polarization	Dual Horizontal and Vertical			
Minimum Cross-Polarization Isolation	20 dB			
Minimum Front-to-Back Isolation	30 dB			
Maximum Sidelobe Level	-30 dB at ±90º			
Maximum H-V/Diversity Switching Time	1 µs			
3 dB Beamwidth: Azimuth (horizontal) Elevation (vertical)	60º 9º with null fill			
Connectors				
Base Station Signal	Female N-type			
Base Station Control	Female RJ45			
Antenna	4 female N-type			
Environmental				
Operating Temperature	-22 to 140 °F (-30 to 60 °C)			
Storage Temperature	-40 to 257 °F (-40 to 125 °C)			
Wind, Operational	75 mph (120 km/hr)			
Wind, Survival	125 mph (200 km/hr)			
Relative Humidity	0 to 100%			
Physical				
W x H x D, without mounting bracket	TBD	TBD	TBD	TBD
Elevation Adjustment	TBD			
Mounting Pole Diameter	2 to 4.5 inches (5.1 to 11.4 cm)			
Weight	TBD	TBD	TBD	TBD
Regulatory Approvals	FCC Part 15, UL, CE			