

### 3.4.2.4 Tools Users

At the Main Web GUI Interface Screen, select the **Tools** Tab and then **Users**. The User is presented with a screen that indicates the Users that are currently logged in to the Base Station and an instant messaging section to communicate with these Users (figure 37).

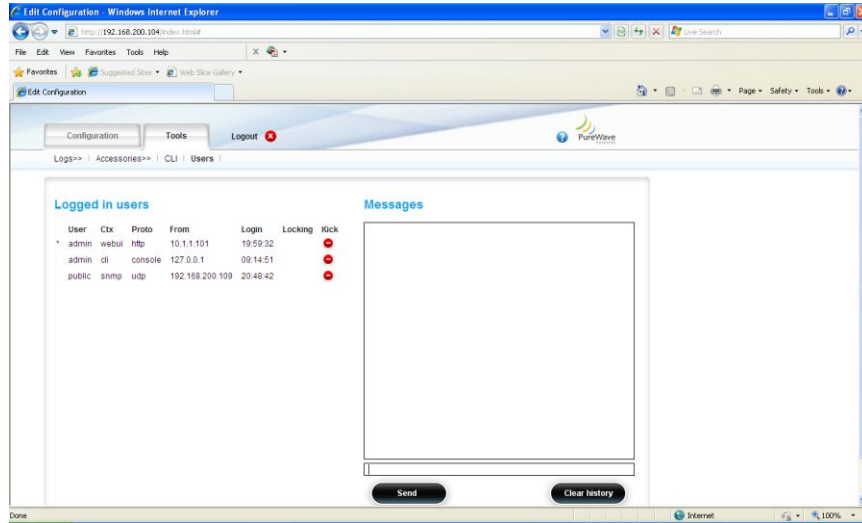


Figure 37: The Tools Tab Users Connected to Base Station

The User can also physically disconnect or "kick" off the User. The User simply has to select the **Kick** command option. A message board is provided to enable instant messages to be sent to the Users that are currently connected to the Base Station. The User simply has to enter the relevant message in the text box and then press **Send**. There is also the option to **Clear history** if required (refer to figure 38).

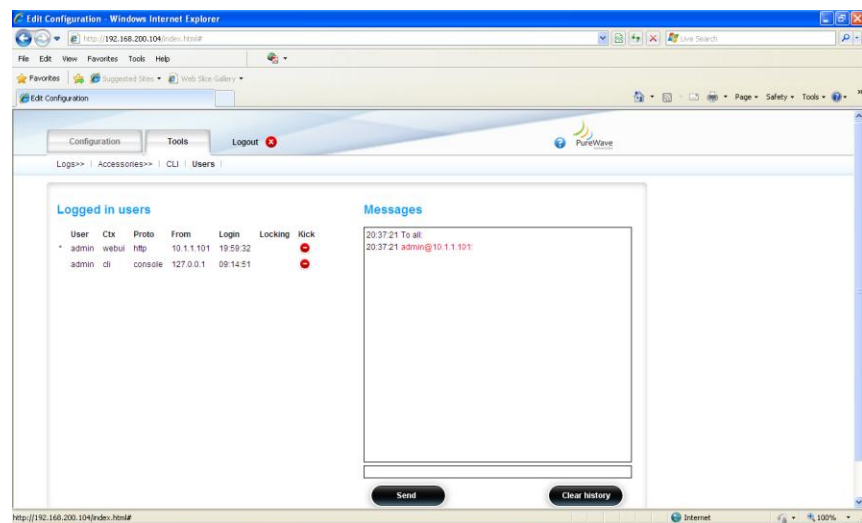


Figure 38: The Tools Tab Users Instant Messaging

## 3.5 Base Station Initial Configuration

### 3.5.1 System Architecture and Terminology

In this section we will configure the minimal set of parameters that must be appropriately set prior to deployment. It is important to first clarify some terminology related to the system architectural model.

In typical terminology, a Base Station is comprised of one or more co-located sectors. Each PureWave Quantum 6000 Base Station can be deployed either by itself, as a single-sector Base station, or as one sector in a multi-sectored Base station. In either case, each PureWave Quantum 6000 must be fully configured and provisioned in its entirety, as if it was a standalone Base Station.

The various Web Interface configuration parameters are organized into a hierarchical tree, and that some parameters are labeled as “Base Station” level and some “sector” level. Since the Quantum 6000 Base Station is really both a sector and a Base station, the differentiation is for organizational purposes, as well as compatibility with future multi-sector functionality or products.

Additionally, a Base Station must be connected to subscriber devices on the air-interface side and to a Core Network on the backhaul side. As discussed previously, PureWave Quantum 6000 Base Stations can flexibly support a variety of core network configurations, ranging from a simple router (“Standalone Mode”) to a full ASN-GW. It also has a built-in Radius client for connection to an external AAA server when in Standalone Mode.

### 3.5.2 Base Station Management Interface and Access Parameters

Table 10 lists the minimum set of management interface parameters that must be set prior to deployment. These parameters govern how an operator, administrator, or management system interfaces with and gains access to the Base Station. Before proceeding, please gather the information listed in the table. Factory default values are provided here as they are required for initial access.

Parameter	Description	Factory Default
Mgmt IP Address	IP address used for all external mgmt interfaces (CLI / Web / SNMP).	192.168.1.10
Mgmt IP Netmask	Mgmt interface IP netmask	255.255.255.0
Mgmt Default Gateway	Mgmt interface default gateway	192.168.1.254
Hostname	String name assigned to the Base Station.	quantum-bs
admin User Password	Unique password for default admin	admin123

Table 10: Base Station Management Interface and Access Parameters

To perform the initial configuration of the Base Station, it is recommended to configure the Management Interface Parameters via accessing through the Base Station Console Port. To complete this section you will need the data in Table 10.



If the management IP settings are "unknown" then the Base Station can only be accessed via its Console port (refer to section 3.3.1). Once the Base Station has been accessed, its management IP settings can be reset using the procedure detailed in section 3.4.



Even though the CLI may be accessed through the Ethernet ports, it is not the recommended method of changing the management interface parameters, as connectivity with the port will be lost immediately upon changing them.

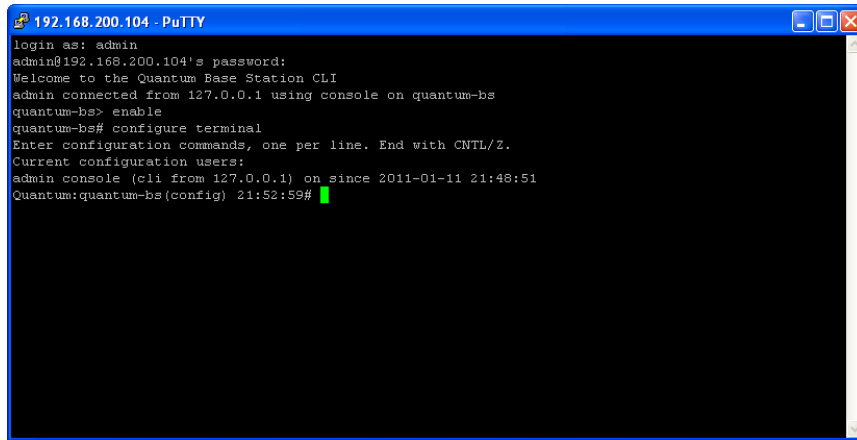
Log into the CLI (Section 3.3) and execute the commands as indicated to configure the Base Station access parameters. Text in brackets <...> should be replaced with your configuration data to replace the default values from the table above.

- (1) At the quantum-bs> prompt, type **enable**. This will drop the User into the enable mode and the prompt will change from > to # (refer to figure 39).

```
192.168.200.104 - PuTTY
login as: admin
admin@192.168.200.104's password:
Welcome to the Quantum Base Station CLI
admin connected from 127.0.0.1 using console on quantum-bs
quantum-bs> enable
quantum-bs#
```

Figure 39: Initial Connection to CLI

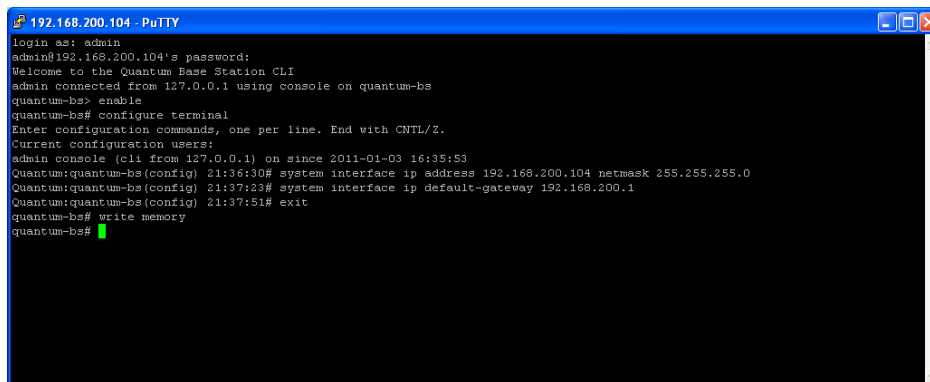
- (2) At the quantum-bs# prompt type **configure terminal**. The prompt will now indicate that the User is now in config mode and it will display the current Base Station time (figure 40).



```
192.168.200.104 - PuTTY
login as: admin
admin@192.168.200.104's password:
Welcome to the Quantum Base Station CLI
admin connected from 127.0.0.1 using console on quantum-bs
quantum-bs> enable
quantum-bs# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Current configuration users:
admin console (cli from 127.0.0.1) on since 2011-01-11 21:48:51
Quantum:quantum-bs(config) 21:52:59#
```

Figure 40: Base Station CLI Time

- (3) To set the Management IP address, at the Quantum:quantum-bs(config) prompt type ***system interface ip address <Mgmt IP Address> netmask <Mgmt IP Netmask>*** e.g. ***system interface ip address 192.168.200.104 netmask 255.255.255.0***
- (4) To set the default Gateway at the Quantum:quantum-bs(config) prompt type ***system interface ip default-gateway <Mgmt Default Gateway>*** e.g. ***system interface ip default-gateway 192.168.200.1***
- (5) To exit, at the Quantum:quantum-bs(config) prompt type ***exit***
- (6) The changes must be written to memory. At the quantum-bs# prompt type ***write memory*** (refer to figure 41).

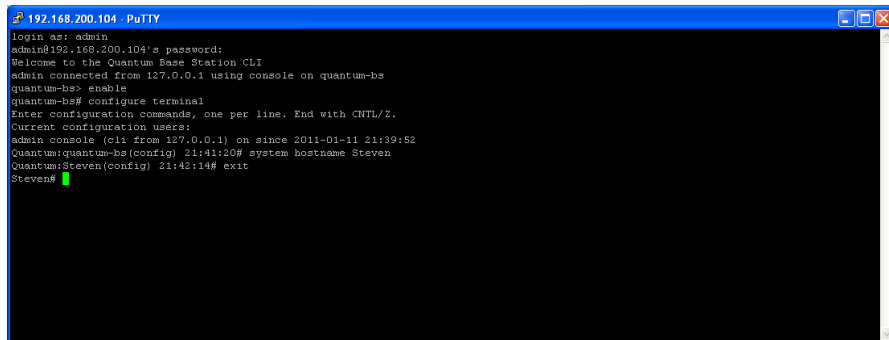


```
192.168.200.104 - PuTTY
login as: admin
admin@192.168.200.104's password:
Welcome to the Quantum Base Station CLI
admin connected from 127.0.0.1 using console on quantum-bs
quantum-bs> enable
quantum-bs# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Current configuration users:
admin console (cli from 127.0.0.1) on since 2011-01-03 16:35:53
Quantum:quantum-bs(config) 21:36:30# system interface ip address 192.168.200.104 netmask 255.255.255.0
Quantum:quantum-bs(config) 21:37:23# system interface ip default-gateway 192.168.200.1
Quantum:quantum-bs(config) 21:37:51# exit
quantum-bs# write memory
quantum-bs#
```

Figure 41: Base Station CLI Initial Configuration

- (7) The IP address change to the Base station is immediate and does not require a reboot.

- (8) Another useful command is the ability to change the default Quantum prompt. When the User is in the **config** mode, type **system hostname <Hostname>** (refer to Figure 42). The change must be written to memory and the Base Station has to be rebooted.



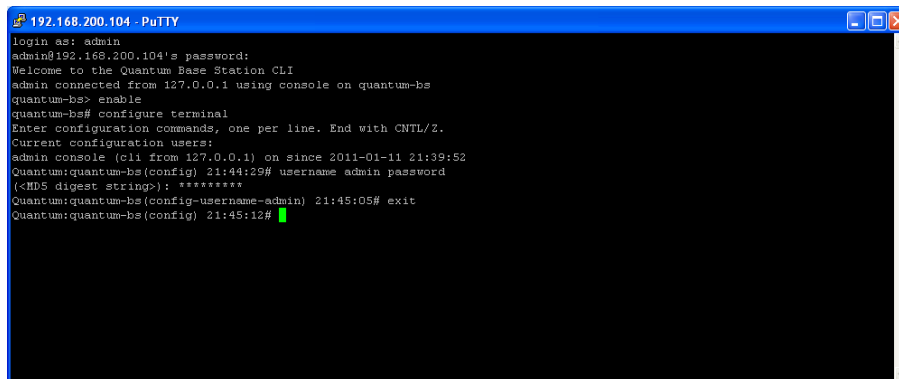
```

192.168.200.104 - PuTTY
login as: admin
admin@192.168.200.104's password:
Welcome to the Quantum Base Station CLI
admin connected from 127.0.0.1 using console on quantum-bs
quantum-bs> enable
quantum-bs# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Current configuration users:
admin console (cli from 127.0.0.1) on since 2011-01-11 21:39:52
Quantum:quantum-bs(config) 21:41:20# system hostname Steven
Quantum:Steven(config) 21:42:14# exit
Steven#

```

Figure 42: Base Station CLI Hostname Change

- (9) To change the username admin password, when the User is in the **config** mode, type
- **username admin password**
  - **Password <new admin User Password>**
- The change must be written to memory (Figure 43).



```

192.168.200.104 - PuTTY
login as: admin
admin@192.168.200.104's password:
Welcome to the Quantum Base Station CLI
admin connected from 127.0.0.1 using console on quantum-bs
quantum-bs> enable
quantum-bs# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Current configuration users:
admin console (cli from 127.0.0.1) on since 2011-01-11 21:39:52
Quantum:quantum-bs(config) 21:44:29# username admin password
(<MD5 digest string>): *****
Quantum:quantum-bs(config-username-admin) 21:45:05# exit
Quantum:quantum-bs(config) 21:45:12#

```

Figure 43: Base Station CLI Username Password Change

### 3.5.3 Base Station Configuration Parameters

There are a number of key parameters that must be configured, as a minimum, prior to deployment and operation of the Base Station. Table 11 is a list of these parameters. In addition to these key parameters, there are a number of other parameters that can be configured on the Base Station. Such parameters can be left in their default configuration for "nominal" Base Station operation but there is the option to

change based upon specific operating conditions. All parameters will be described in the following sections.

One point to make, is that in the context of the PureWave Quantum 6600, as this is a single sector Base Station, the terms “Sector” and “Base Station” are effectively synonymous. This fact is represented within the Web GUI Interface by the use of the number 1 at the appropriate menu option. The number 1 stands for Sector 1.

The key Base Station parameters that must be configured are:

Configuration Item	Description
Base Station Mode	Standalone Local Mode(default) or ASN Gateway Mode
ASN Gateway IP Address	IP Address of the ASN-GW (ASN-GW Mode only)
Base Station Radius IP Address	IP Address of the Radius Server (Standalone Mode only)
Base Station Radius Port	Radius Server Port (Standalone Mode only)
Base Station Radius Secret	Radius string secret (Standalone Mode only)
Sector IP address	IP Address of the sector’s datapath interface
Sector IP Netmask	Netmask of the sector’s datapath interface
Sector Default Gateway	Default gateway of the sector’s datapath interface
Sector BS-ID	Base Station ID of the sector
Sector CS Type	Convergence sub-layer type of the sector: Ethernet CS (default) or IPv4 CS
Sector Radio Center Frequency	Center frequency in kHz
Sector Channel Bandwidth	5 MHz, 7MHz, or 10 MHz (default)
Sector Radio Power Output	Preamble power output value per antenna (includes 3 dB preamble). Default : 36 dBm.
Sector Radio Antenna Gain	Antenna gain (dBi)
Sector Radio Cable Loss	Estimated external cable loss (dB)
Sector Antenna TX Mode	MIMO-A (default) or MIMO-AB
Sector DL:UL Frame Ratio	26:21, 29:18, 32:15, 35:12 (default) in 5MHz and 10MHz 23:9, 21:12, 17:15 in 7MHz
Sector Antenna TX Mode	MIMO-A (default) or MIMO-AB

Table 11: Base Station Sector Configuration Data

The Web GUI Interface will be used to configure the parameters that are required in Table 11. The starting point for all configurations is the Main Web GUI Interface Screen. The relevant parameters are distributed across a number of different menu options and hence screens and windows. Each of these options will be discussed in detail.



After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

### 3.5.3.1 Sector, General Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option and then **general** Main Menu Sub-Element. This will display the Sector Settings window (Figure 44).

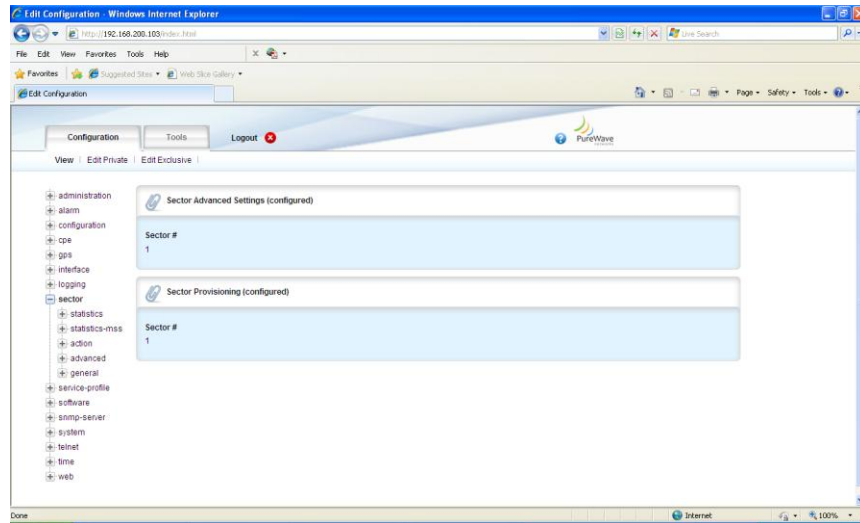


Figure 44: Sector Settings

There are two basic groups to this Sector option. These are:

- **Sector Advanced Settings (configured)**
- **Sector Provisioning (configured)**

The User now has to navigate to the next level, therefore at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **general** Main Menu Sub-Element and then **1**, this will display the key settings window. There are three distinct groups to this window (refer to Figure 45).

- **Key Settings.** This indicates the relevant sector, which as has been described in number 1. This is not a configurable parameter.
- **Sector General Administration (configured).** This is an indication whether the sector has been enabled to effect general administration. This can be configured.
- **Sector General Status.** This indicates the current status of the following parameters. These parameters are non-configurable:

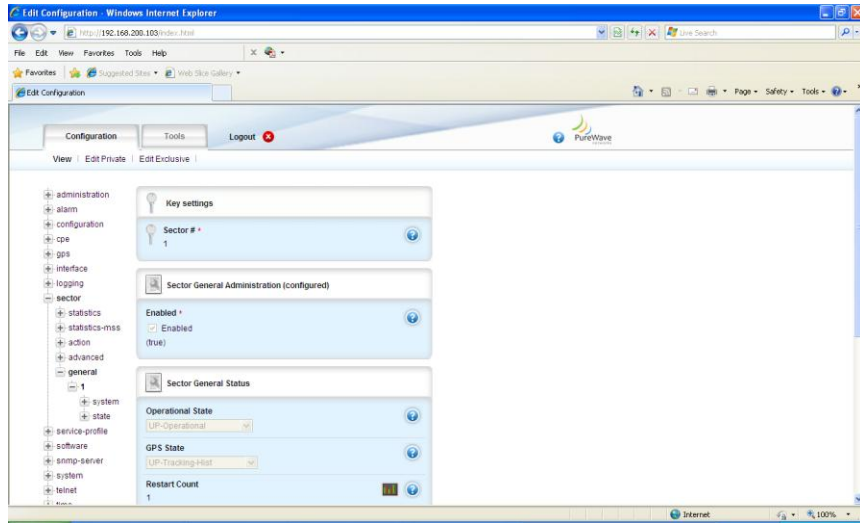


Figure 45: Sector General Options

The Key Settings are defined by the following parameters (refer to Figure 46):

- **Operational State.** This indicates if the Base Station is operational
- **GPS State.** This indicates the status of the Base Station GPS.
- **Restart Count.** This is a cumulative count of the number of sector restarts since the Base Station was power cycled.
- **Number of MSS Subscribers.** This is a count of the current Subscribers that are connected to the sector.
- **Number of Service Flows.** This is a count of the total number of Subscriber service flows that are currently configured.
- **Image Bank A Software Version.** The software that has been loaded into Bank A.
- **Image Bank B Software Version.** The software that has been loaded into Bank B.
- **Running Software Version.** This is the current operating version of software.
- **Last Reset Reason.** This provides a reason for the last sector reset.



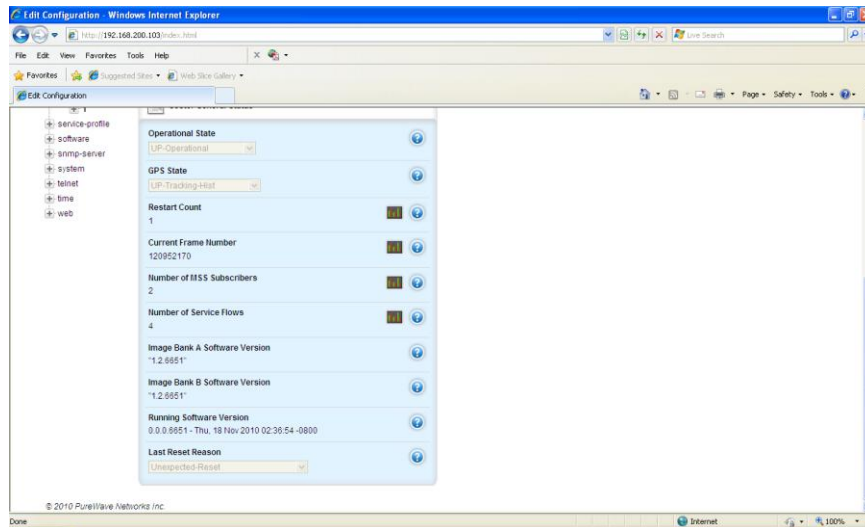


Figure 46: Sector General Configuration Parameters

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **general** Main Menu Sub-Element, **1** and then **system**. This will display the currently configured Sector General Provisioning window. There are a further two sub-elements to this window but only one is displayed.

These sub-elements are:

- **system**. This option enables the User to configure the parameters.
- **state**. This is a duplication of the windows and parameters that are contained within the system options. These are "read-only" screens and provide an indication as the current state or status of the system parameters.

The status of the following parameters are displayed and the User is free to configure as required (refer to Figure 47). To edit and configure then the User must enter the Edit Mode (select Edit Private/Exclusive):

- **Base Station ID**. This is the unique identifier that specifically identifies the Base Station to the Subscribers. It is not recommended that this is changed.
- **Cell ID**. This is a numeric identifier that the User will define to a cell (acceptable range is 0 to 31).
- **Convergence Sublayer Type**. This is the convergence sublayer type that is globally set for the sector. The available options are ETHERNET\_CS and IPv4\_CS. The default is ETHERNET\_CS.
- **Downlink Broadcast Rate**. This is a User defined parameter that specifies the maximum reserved Downlink (DL) rate for the purposes of IP broadcast traffic. This rate can be set up to 1Mbps and once set it is reserved and as such it is not available for Data Traffic. The default is 64000.

- **Mode.** This is the Base Station Mode and the available options are standalone-local (this is selected when the Base Station is used in a standalone mode and it is not connected to an ASN Gateway) the and asn-gateway (selected when the Base Station is connected to an ASN Gateway).

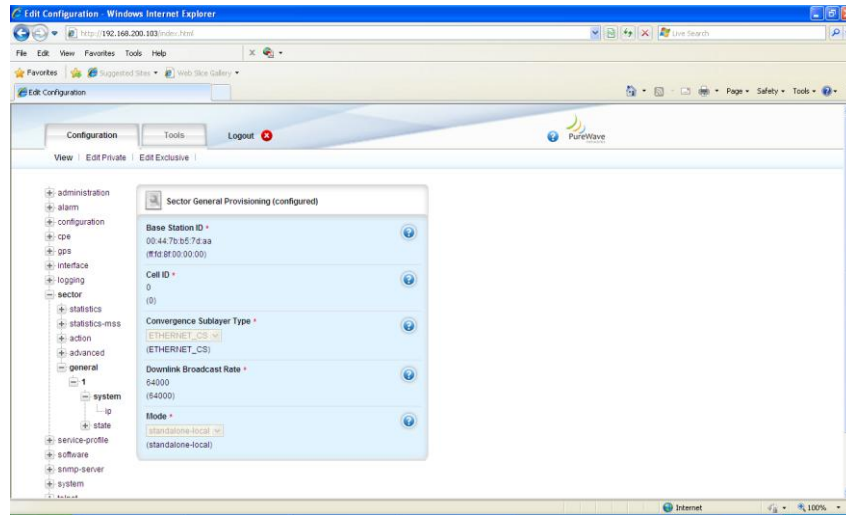


Figure 47: Sector General Provisioning Parameters

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **general** Main Menu Sub-Element, **1, system** and then **ip** and this will display the current configuration of the Sector External IP Address (refer to Figure 48). This is the Management IP Address through which the User is able to communicate to the Base Station. The Management IP parameters that the User can configure are:

- **Address.** This is the IP address
- **Netmask.** This is the netmask associated with the IP address
- **Gateway.** This is the defined gateway.

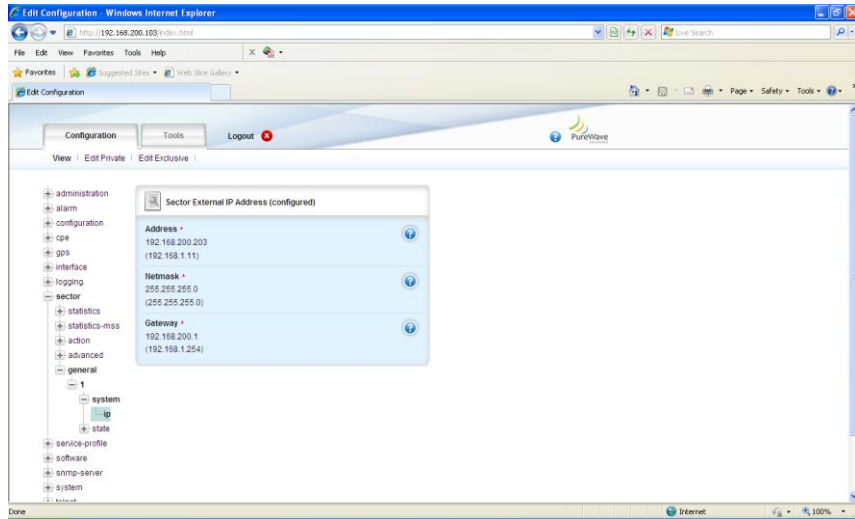


Figure 48: Sector External IP Address

To edit the parameter, the User must enter the Edit Mode (select Edit Private or Edit Exclusive). Once in the Edit Mode the User simply has to select the notepad icon and this will provide an option to edit the IP address (refer to Figure 49 and Figure 50).

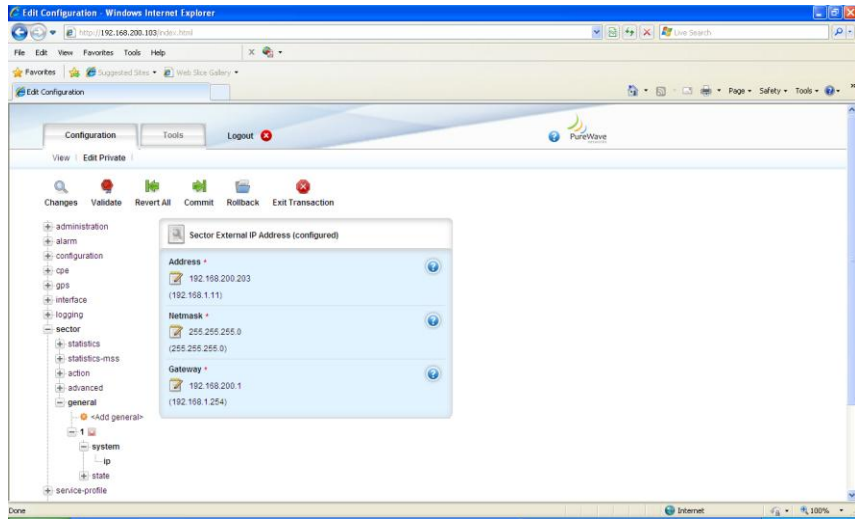


Figure 49: Sector External IP Address Configuration

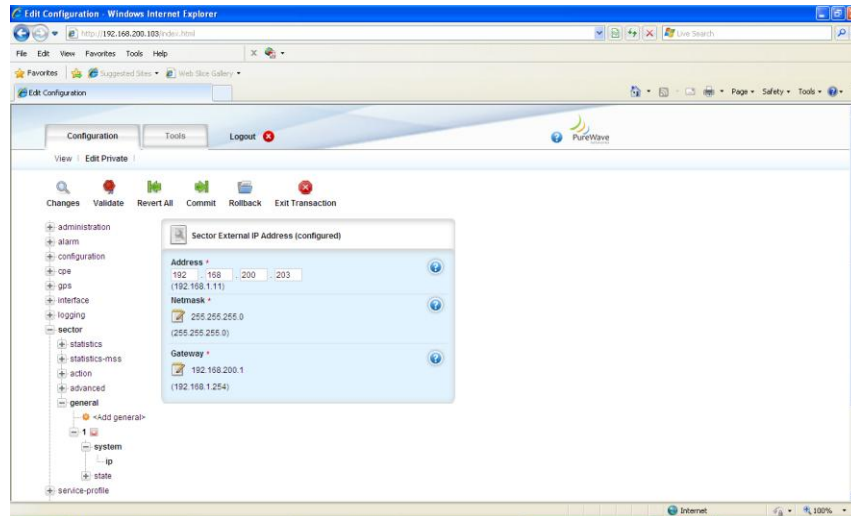


Figure 50: Sector External IP Address Changed

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **general** Main Menu Sub-Element, **1, state** and then **system**. This provides another view that will display the current configuration of the Sector. Even if the User enters the Edit Mode (select Edit Private or Edit Exclusive), no parameters are made available for editing. The options to configure these parameters are contained under the **system** and then **base station** options.

There are three distinct groups to this window (refer to Figure 51 and Figure 52).

- **Sector External ASN-Gateway.** This contains the parameters:
  - **IP Address.** This is the IP Address of the external ASN Gateway.
  - **Port Number.** This is the IP port number that is used to communicate with the ASN Gateway.
  - **Nwg-version.** This is the current firmware version of the ASN Gateway.
- **Sector General Provisioning**
  - **Base Station ID.** This is the unique identifier that specifically identifies the Base Station to the Subscribers.
  - **Cell ID.** This is a numeric identifier that the User will define to a cell.
  - **Convergence Sublayer Type.** This is the convergence sublayer type that is globally set for the sector.
  - **Downlink Broadcast Rate.** This is the maximum reserved Downlink (DL) rate for the purposes of IP broadcast traffic.
  - **Maximum Supported CPEs.** This specifies the maximum number of Subscriber CPEs (200) that can be connected to the Base Station.
  - **Mode.** This specifies whether the Base Station Mode is connected to an ASN Gateway.
- **Sector External Radius Server Settings**
  - **IP Address.** This is the IP Address of the external radius server.

- **Port Number.** This is the IP port number that is used to communicate with the external radius server for authentication purposes.
- **Secret.** This is the radius shared secret between the radius server and the Base Station.

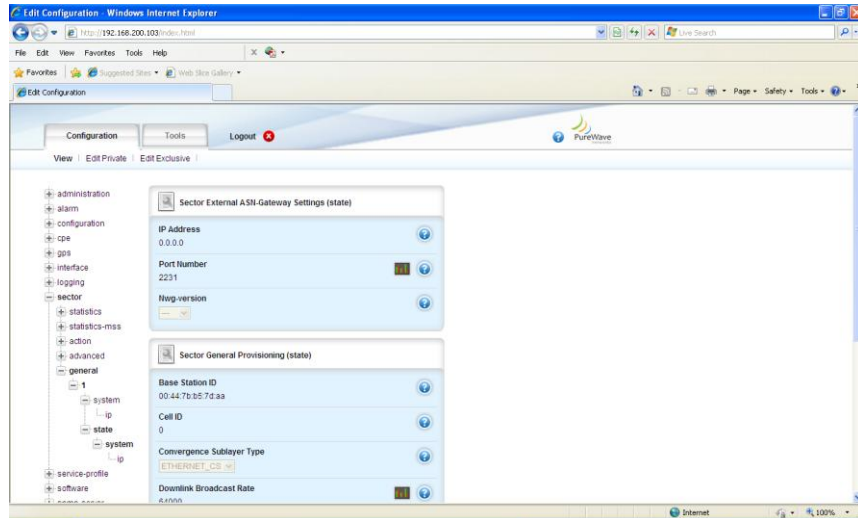


Figure 51: Sector External ASN Gateway Settings

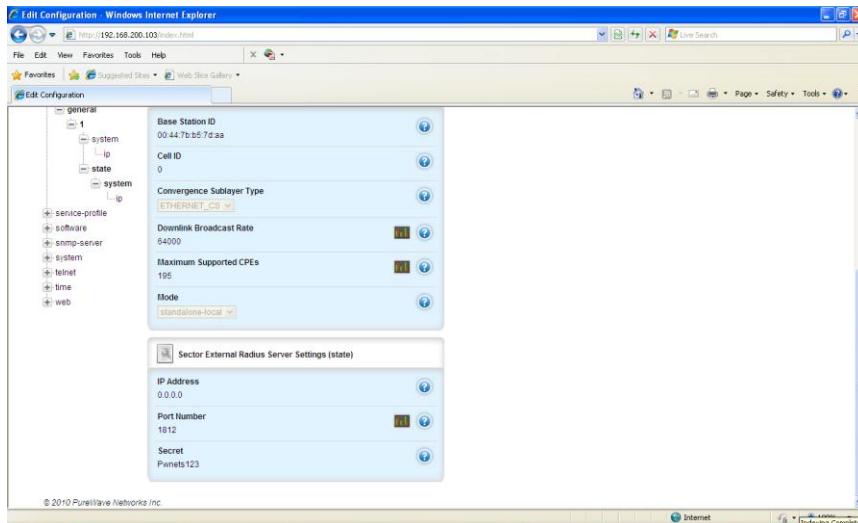


Figure 52: Sector External Radius Server Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **general** Main Menu Sub-Element, **1**, **state**, **system** and then **ip**. This provides another view that will display the current Management IP configuration of the Sector. Even if the User enters the Edit Mode (select Edit Private or Edit Exclusive), no parameters are made available for editing.

The following information is displayed in Figure 53.

- **Sector External IP Address.**
- **Netmask.**
- **Gateway.**

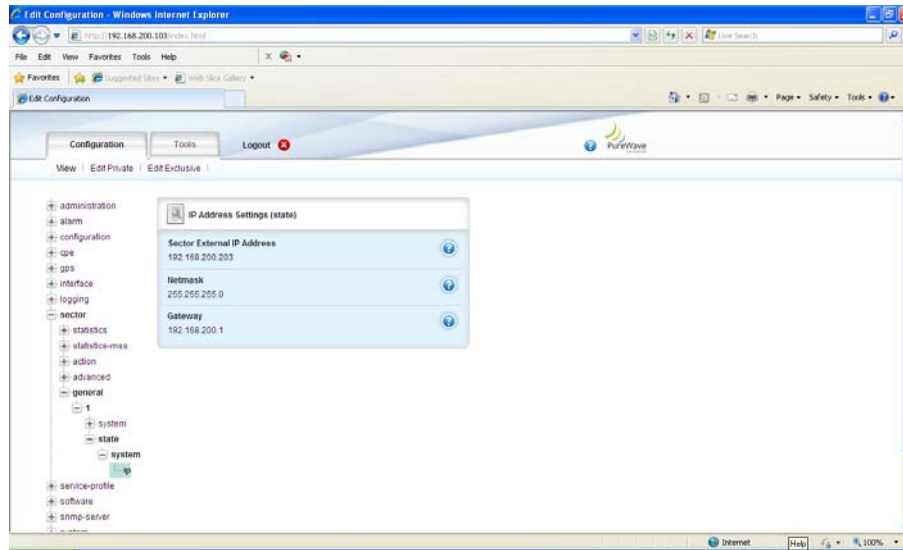


Figure 53: Sector External Radius Server Settings

### 3.5.3.2 Sector, Advanced Settings

At Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element and then **1**, this will display the key settings window. There are two further sub-elements to this window but the information is only displayed when the actual element is selected. These further sub-elements are (refer to Figure 54):

- **wimax.** These are the parameters that can be configured as defined by the WiMAX 802.16e specification.
- **radio.** These are the parameters that can be configured as part of the specific Base Station radio transmission configuration.
- **security**

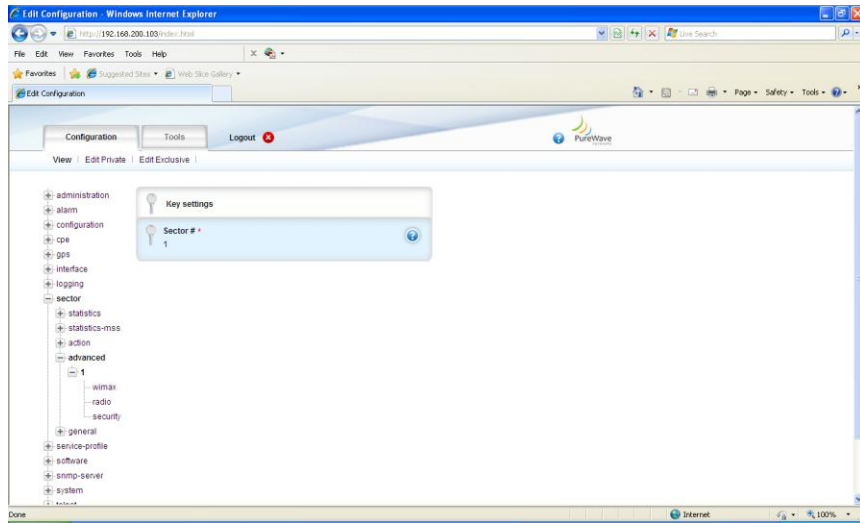


Figure 54: Sector Advanced Settings

To view the Sector WIMAX Settings, at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element, **1**, and then **wimax**. The display is split into two main sections. These sections do not fit onto one screen and therefore the User has to scroll down to view etc (refer to Figure 55 and Figure 56).

- **Sector WIMAX Settings (configured)**. These are the parameters that the User can Edit.
- **Sector WIMAX Settings (state)**. These are the current configurations values of the parameters.

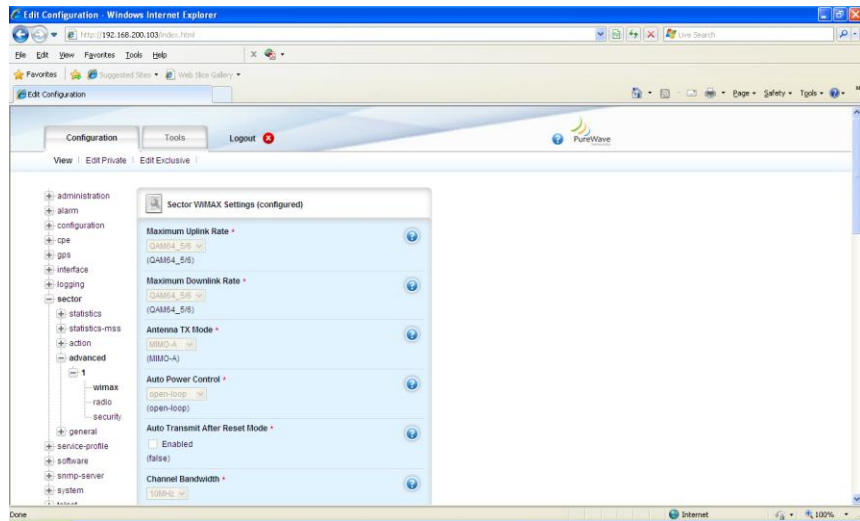


Figure 55: Sector Configured WIMAX Settings

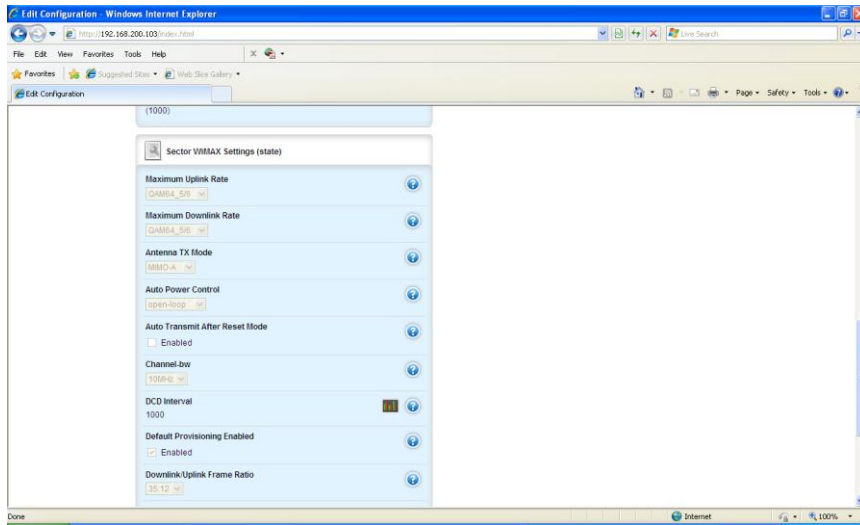


Figure 56: Sector State WIMAX Settings

If the User wants to configure any of the WiMAX parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via a drop down menu of choices, enabling of a check box or editing of a notepad icon.

After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

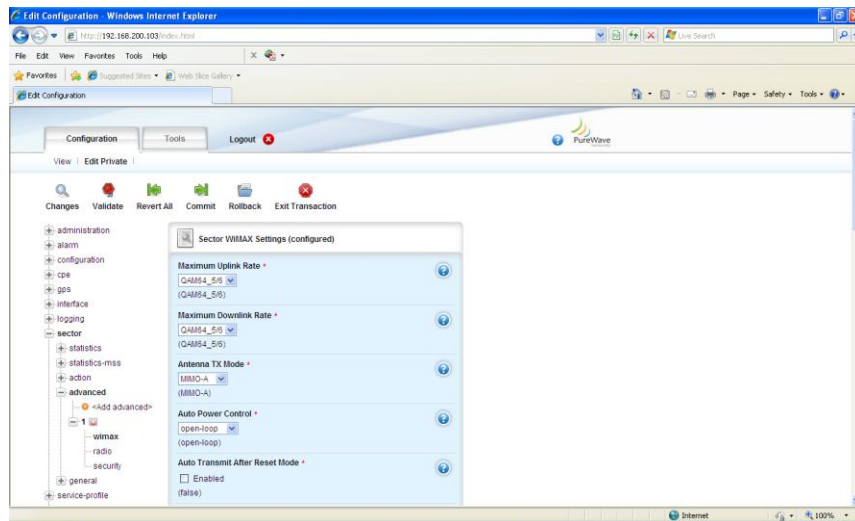


Figure 57: Sector WIMAX Settings Configuration



The Sector WiMAX Settings parameters that the User can configure are defined below:

- **Maximum Uplink Rate.** This parameter provides the means to globally fix the maximum modulation rate in the Uplink direction (defined as Subscriber to Base Station). If the User wants to dynamically adapt the rate to the maximum then the default value of QAM64\_5/6 can be left unchanged. Refer to Appendix A for an explanation of how the maximum modulation rate, defined as MCS Rate, effectively caps the system data throughput. If the User wants to physically cap the rate and hence cap the throughput, they are free to select from the following MCS rates:
  - QAM64\_5/6
  - QAM64\_3/4
  - QAM64\_2/3
  - QAM64\_1/2
  - QAM16\_3/4
  - QAM16\_1/2
  - QPSK\_3/4
  - QPSK\_1/2
- **Maximum Downlink Rate.** This parameter provides the means to globally fix the maximum modulation rate in the Downlink direction (defined as Base Station to Subscriber). The default is QAM64\_5/6 and the same options as maximum uplink rate parameter are available.
- **Antenna TX Mode.** This the option to define the Smart Antenna Capabilities that were described in section 2.3.2.3. The default setting is MIMO-A and the available options are:
  - MIMO-AB
  - MIMO-A
- **Auto Power Control.** The transmit power of a Subscriber is controlled via automatic algorithms in the Base Station. This control of the transmit power ensures optimum performance. The default is open-loop and the available options are:
  - open-loop. In the case of an open loop algorithm, the Base Station sends a signal to the Subscriber of the required settings and the Subscriber controls its transmit power dynamically.
  - closed-loop. In the case of closed loop, the Base Station controls the Subscriber transmit power settings with a full measurements loop.
- **Auto Transmit After Reset Mode.** When this is enabled the Base Station will automatically start transmitting upon a power cycle. If this is disabled, then the User will have to manually start the transmission.
- **Channel Bandwidth.** This is the current channel bandwidth of the radio transmission. The default is 10MHz and the options are:
  - 10MHz
  - 7 MHz
  - 5MHz
- **DCD Interval.** This is the WiMAX 802.16e DCD Interval value and it is to be defined in milliseconds. The default is 1000 (1 second) and the available range is 15 up to 10000.
- **Default Provisioning Enabled.** The User has the choice to enable or disable this feature. If this is enabled, then the Quality of Service (QoS) profile for the CPE will be the Default QoS that has been provisioned. This is defined as QoS profile "1". If this is disabled then the QoS profile will be that as defined for the particular CPE.

- **Downlink/Uplink Frame Ratio.** This is the ratio of downlink to uplink MAP symbols, refer to Appendix A and how this affects data throughput. The default option is 35:12 and the available options are:
  - 26:21
  - 29:18
  - 32:15
  - 35:12
- **Maximum Distance.** This is the maximum distance, defined in km, that a Base Station can transmit to a CPE. The default is set to 11 and the User can select in the range 1 to 24.
- **Noise and Interference Settings.** The default is 35. NI is defined as per the IEEE 802.16-e as the noise per tone in 0.5 db steps above the -150 dBm, where 0 is -150dbm and 35 is -132.5dbm per tone.
- **UCD Interval.** This is WiMAX 802.16e UCD Interval value and it is to be defined in milliseconds. Interval defined in milliseconds. The default is 1000 (1 second) and the available range is 15 up to 10000.
- **DL ECINR Report Support – Specifies the mode of CINR reporting to be provided from the CPEs. Disabling ECINR reporting should be done only in case of older CPE revisions that do not support ECINR reporting.**
- **5MHz Large Map Support – Available and applicable only in case of 5MHz channel bandwidth setting.**
- **Auto Noise Level Adjustment Support – Enables the automatic dynamic adjustment of NI and internal settings with respect to the measured noise level on the channel. The Noise measurement values can be seen in the radio tab.**

To view the Radio Settings, at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element, **1**, and then **radio**. The display is split into three main grouping sections. These sections do not fit onto one screen and therefore the User has to scroll down to view etc (refer to Figure 58 and Figure 59).

- **Radio Settings (configured).** These are the parameters that the User can Edit.
- **Radio Settings (state).** These are the current configurations values of the parameters.
- **Noise and Interference Measurements (status).** These are the current configurations values of the parameters. The Noise level is represented in 3 different measurement units.

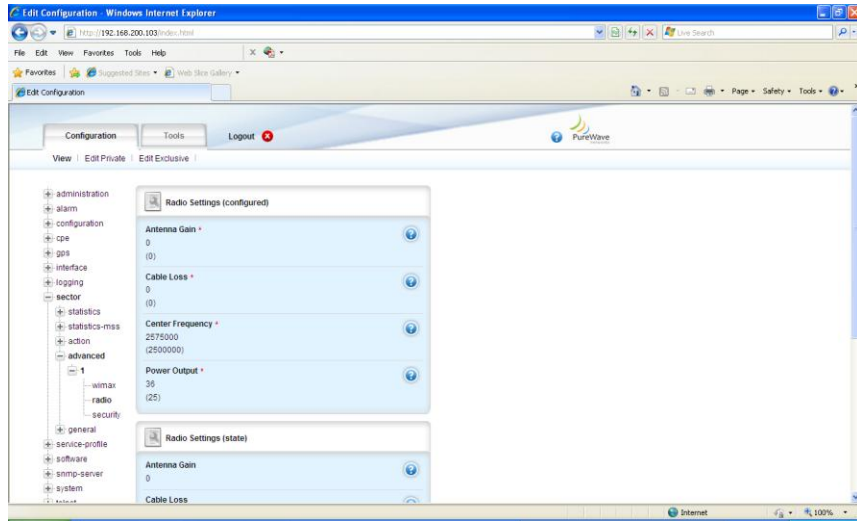


Figure 58: Sector Radio Configured Settings

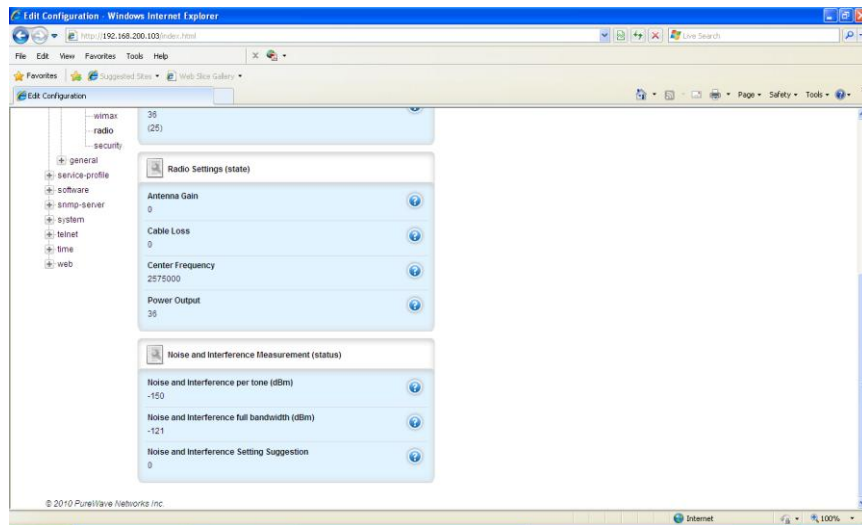


Figure 59: Sector Radio State Settings

If the User wants to configure any of the Radio parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via editing of a notepad icon (refer to Figure 60).

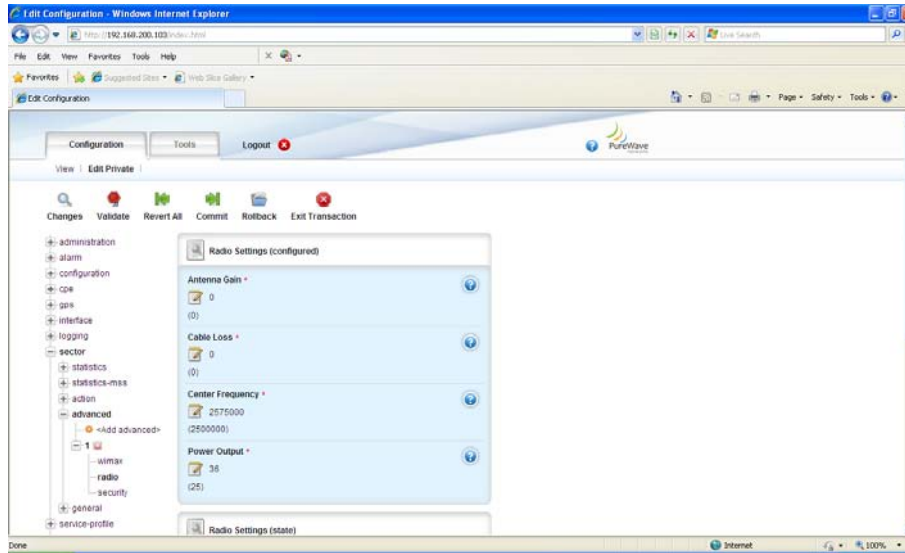


Figure 60: Sector Radio Settings Configuration

After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

The Radio Settings parameters that the User can configure are defined below:

- **Antenna Gain.** This is the gain (in dB) for the Antenna that the Base Station is connected to. The default setting is 0 but the User is free to enter any value.
- **Cable Loss.** This is a loss of the cable (in dB's) from the Base Station to the Antenna. The default setting is 0 but the User is free to enter any value.
- **Center Frequency.** This is the center frequency of the Base Station and it must match with what is configured on the Subscribers. The default setting is relative to the frequency range of operation of the Base Station. To re-configure, the center frequency has to be input in KHz.
- **Power Output.** This is the radio output power in dBm. The default setting is relative to the frequency range of operation of the Base Station. The User must ensure that the maximum output power is defined as described in section 2.3.2.2 "Computing EIRP Power".

Contention Based Mode may be enabled on the Radios to support the upper 25 MHz of the 3.65 GHz US ISM band. To utilize Wimax Contention Based Mode, at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element, **1**, and then **radio** and **contention-based mode**. The display is split into two grouping sections. These sections do not fit onto one screen and therefore the User has to scroll down to view etc (refer to Figure 61).

- **Mode (enable/disable).** Allows the feature to be enabled or disabled
- **Carrier Sense Threshold.** Set to -85.0 dBm

- **Carrier BackOff Frame.** Number of frames to wait when a carrier is detected
- **Carrier Sense Resume Frame.** Set to 752

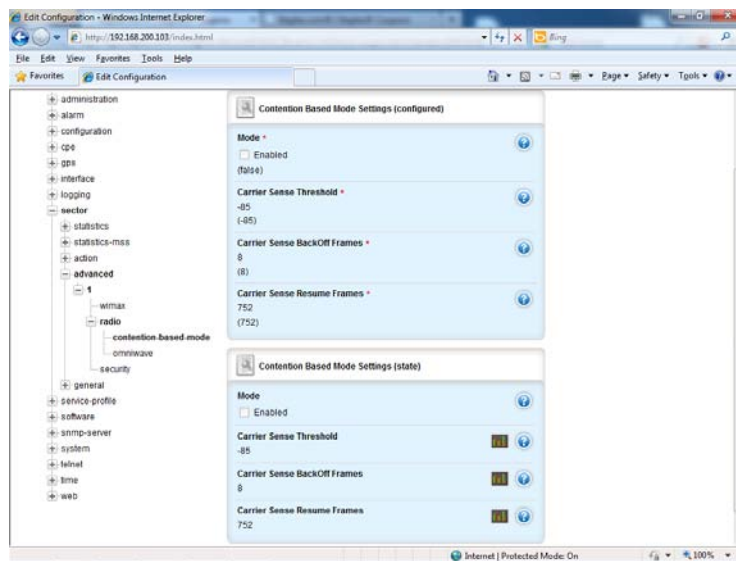


Figure 61 Contention Based Mode

Omniwave may be enabled on the radio level to support a 3x2x2 configuration. To utilize Omniwave, at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element, **1**, and then **radio** and **omniwave**.

- **Mode (enable/disable).** Allows the feature to be enabled or disabled
- **Status.** Current configuration (enabled or disabled)

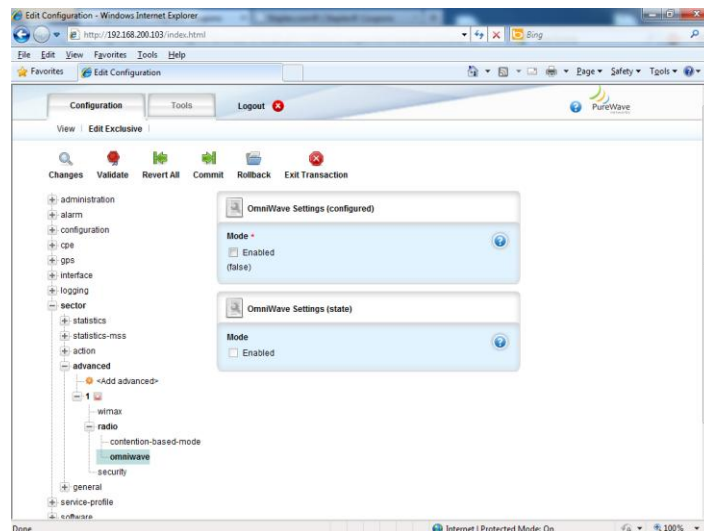


Figure 62 OmniWave Settings

To view the Security Settings, at the Main Web GUI Interface Screen select the **Configuration** Tab, select **sector** Main Menu Option, **advanced** Main Menu Sub-Element, **1**, and then **security**. The display is split into two main grouping sections (refer to Figure 63).

- **Security Settings (configured)**. These are the parameters that the User can Edit.
- **Security Settings (state)**. These are the current configurations values of the parameters.

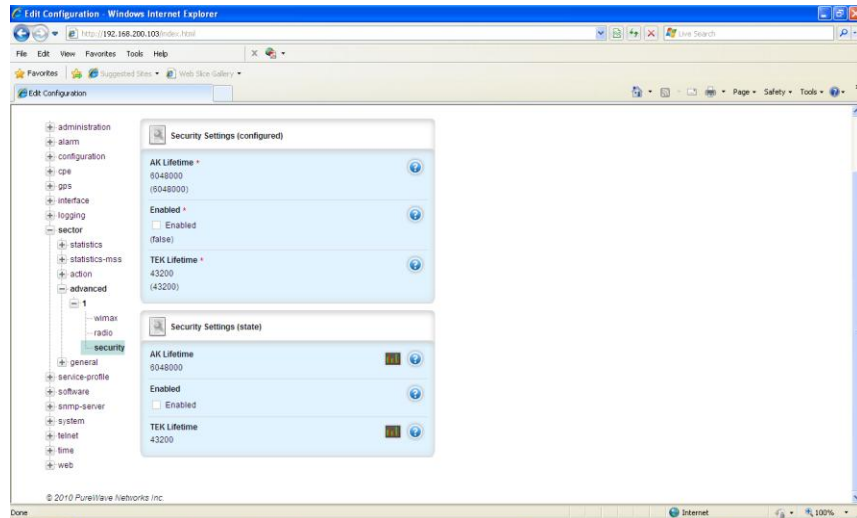


Figure 63: Sector Security Settings

If the User wants to configure any of the Security parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via an enabling of a check box or editing of a notepad icon (refer to Figure 64).

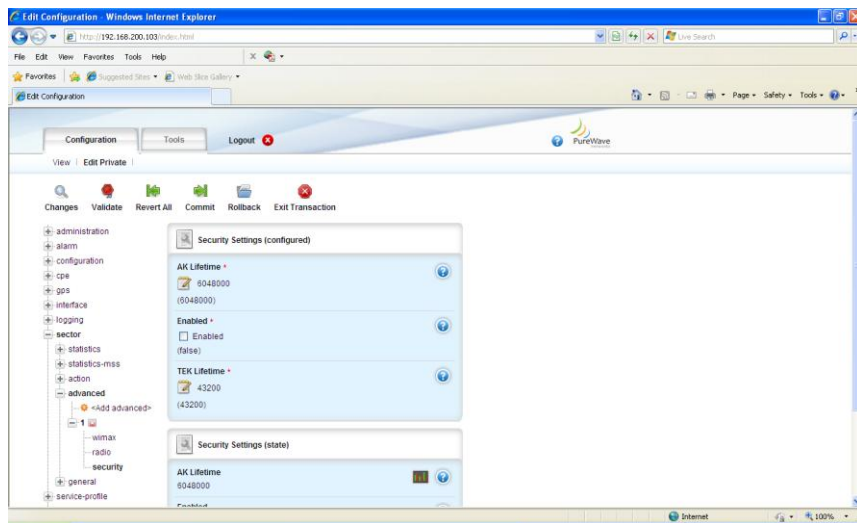


Figure 64: Sector Security Settings Configuration

After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

The Security Settings parameters that the User can configure are defined below:

- **AK Lifetime.** This stands for Authorization Key lifetime. It is used when authentication and encryption is enabled. It is periodically re-generated by the Base Station after a request is received from a Subscriber following expiration of this timeout. The default setting is 6048000 but the User is free to enter any value.
- **Enabled.** This indicates whether the Security Feature has been enabled or not.
- **TEK Lifetime.** This stands for Traffic Encryption Key lifetime. It is used when authentication and encryption is enabled. It is periodically re-generated by the Base Station after a request is received from a Subscriber following expiration of this timeout. The default setting is 43200 but the User is free to enter any value.

### 3.5.3.3 System Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab and then select **system** Main Menu Option. This will display the System Settings window. The system menu option has three further sub-elements , these being (refer to Figure 65):

- **base-station.** This details various Base Station parameters.
- **reset.** This is a means for the User to default the Base Station back to its "out of the box" initial configuration values.

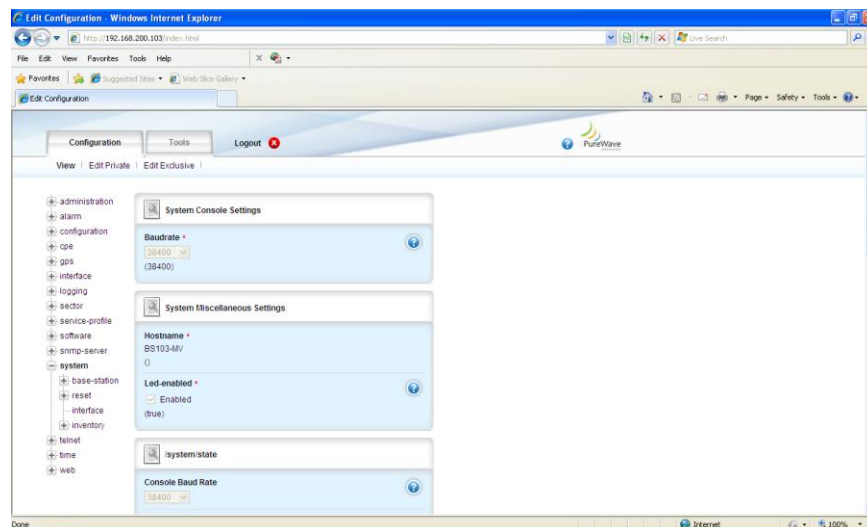


Figure 65: System Settings

The System display is split into seven main grouping sections. These sections do not fit onto one screen and therefore the User has to scroll down to view etc. An indication as to whether there are any User configurable parameters included in the grouping is provided. If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via a drop down menu of choices, an enabling of a check box or editing of a notepad icon.

- **System Console Settings.**
- **System Miscellaneous Settings.**
- **/system/state.** This option does not contain any User configurable parameters.
- **System General Settings.**
- **System Identification Setting.** This option does not contain any User configurable parameters.
- **System Utilization Statistics.** This option does not contain any User configurable parameters.

The parameters that the User can configure and the relevant grouping section that they belong are outlined below. After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

- **System Console Settings.**
  - **Baudrate.** This is the baud rate that is configured for serial connection via the Base Station Console Port. The default is 38400 and the available options are 115200, 57600, 38400, 19200 and 9600.
- **System Miscellaneous Settings.**
  - **Hostname.** This is a free format text field for the User to specify a hostname.
  - **Led-enabled.** The User can enable or disable the LED indicators for the Base Station.
- **System General settings.**
  - **Name.** This is a free format text field for the User to specify a name to the Base Station.
  - **Location.** This is a free format text field for the User to specify a location to the Base Station.
  - **Contact.** This is a free format text field for the User to specify a contact for the Base Station.

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **system** Main Menu Option and then the **base-station** Main Menu Sub-Element. This will display the External ASN-Gateway Settings window (refer to Figure 66).



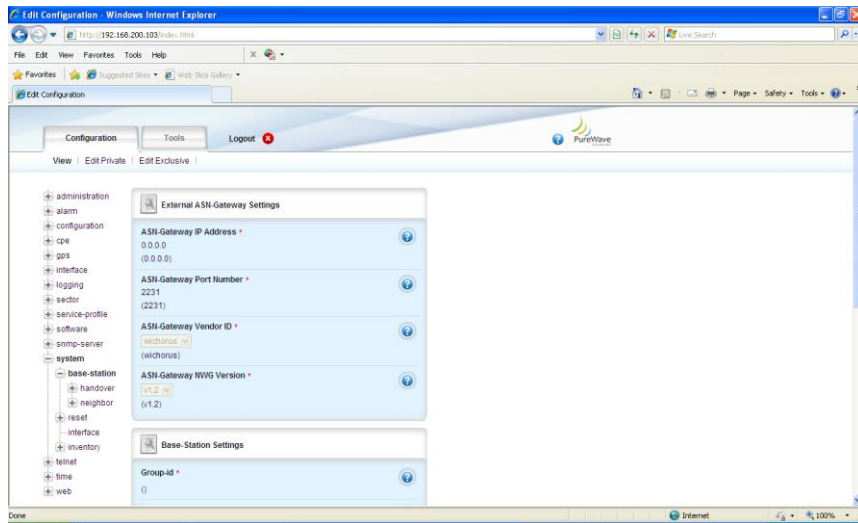


Figure 66: System External ASN Gateway Settings

The System display is split into four main grouping sections. These sections do not fit onto one screen and therefore the User has to scroll down to view etc. An indication as to whether there are any User configurable parameters included in the grouping is provided. If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via a drop down menu of choices or editing of a notepad icon.

- **External ASN-Gateway Settings.** These are the settings for any external ASN Gateway that is connected to the Base Station.
- **Base-Station Settings.** These are the settings for the Base Station.
- **External Radius Server Settings.** These are the settings for the external Radius Server, if configured.
- **/system/base-station/neighbor.** These are settings which are broadcasted by the base station so that the CPE understands which neighboring Base Stations to scan

The parameters that the User can configure and the relevant grouping section that they belong are outlined below. After making the various configuration changes, the User will need to "**Commit**" and "**Save**" the changes.

- **External ASN-Gateway Settings.**
  - **ASN-Gateway IP Address.** This is the IP address of the ASN Gateway that the Base Station is connected to. An IP address has to be provided if the Base Station has been configured to operate in ASN Gateway mode.
  - **ASN-Gateway Port Number.** This is the Port Number that the Base Station use to communicate with the ASN Gateway.

- **ASN-Gateway Vendor ID.** This User has the option to select and store the vendor of the ASN Gateway. The current options are Wichorus and Cisco.
- **ASN-Gateway NWG Version.** This User has the option to select and store the current firmware version of the ASN Gateway. The current options are v1.2 and v1.3.
- **Base-Station Settings**
  - **Group-id.** This is a free format text field.
  - **Group-descr.** This is a free format text field.
  - **Mode.** This defines the mode of operation for the Base Station. The default option is standalone-local and the available options are asn-gateway and standalone-local.
- **External Radius Server Settings**
  - **Radius Server IP Address.** If the Base Station has been configured to use an external Radius Server, then its IP address would be provided here.
  - **Radius Server Port Number.** This is the Port Number that the Base Station use to communicate with the Radius Server.
  - **Secret.** This is the radius "secret" that is shared between the Base Station and the Radius Server.

The system, base-station menu option has two further sub-elements, **handover** and **neighbor**.

- **handover.** This is where triggers are set for handover operation (see Figure 67). By default, there are no triggers. For handover operation at least two triggers must be set, one for scanning and one for handover. This information is incorporated into DCD message sent by the base station. This may be left unconfigured if no handover is desired. For each trigger following needs to be configured:
  - **Trigger Index:** A user defined unique number between 1-8.
  - **Average Duration:** Trigger averaging duration is the time measured in number of frames over which the metric measurements are averaged.
  - **Trigger Type:** This defines trigger metric, CINR or RSSI
  - **Trigger Function:** This parameter specifies the function for the trigger type chosen earlier. Select one from the dropdown menu.
  - **Trigger Action:** This parameter specifies the action, scanning or handover, to take when trigger criteria is met. Select from the dropdown menu.
  - **Trigger Value:** This parameter specifies the value for corresponding to the trigger type and function selected above.

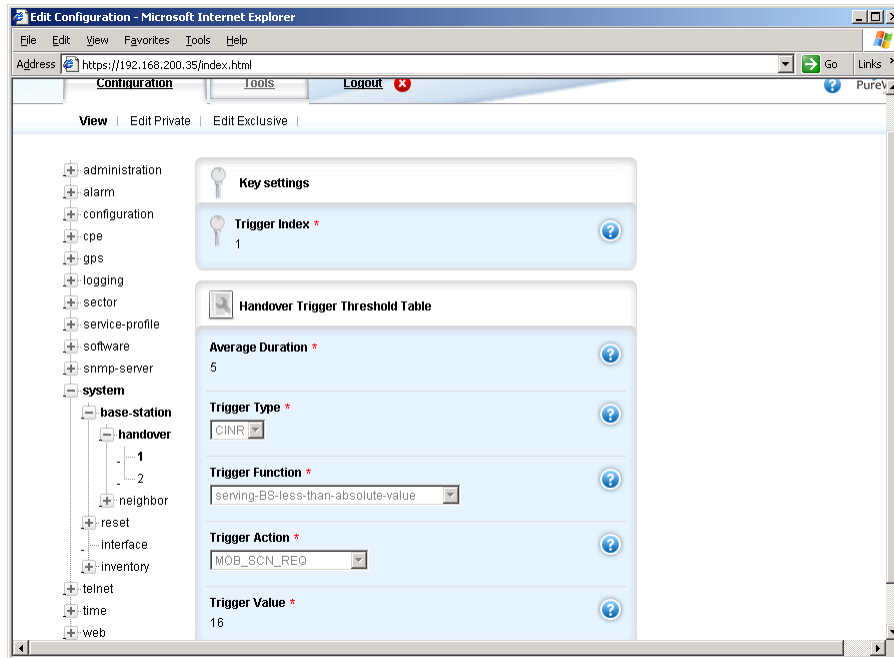


Figure 67 System Handover Trigger Setting

- **neighbor.** This is the place to configure information about neighbor base stations (Figure 68). This is required for handover operation. This can be left unconfigured if no handover is required. For each neighbor, following needs to be configured:
  - a. **BS id:** This is the BSID of neighbor bs. Use upper case letters only. BSID of the neighboring base stations should have same operator id as the serving base station., i.e. the upper 6 bytes should be same.
  - **IP Address:** This is the IP address of the neighbor base station.
  - **Preamble Index:** This is the preamble-index of the neighbor base station.
  - **BS Index:** This is a user defined number in the range of 1-254. The index of 255 has a special meaning. When this index is set to 255 then the neighbor will be considered as a non-Purewave base station, and Purewave base station will unconditionally accept the handover request. No backbone communication will take place.
  - **BS Frequency:** This is the frequency of the neighbor base station in KHz.

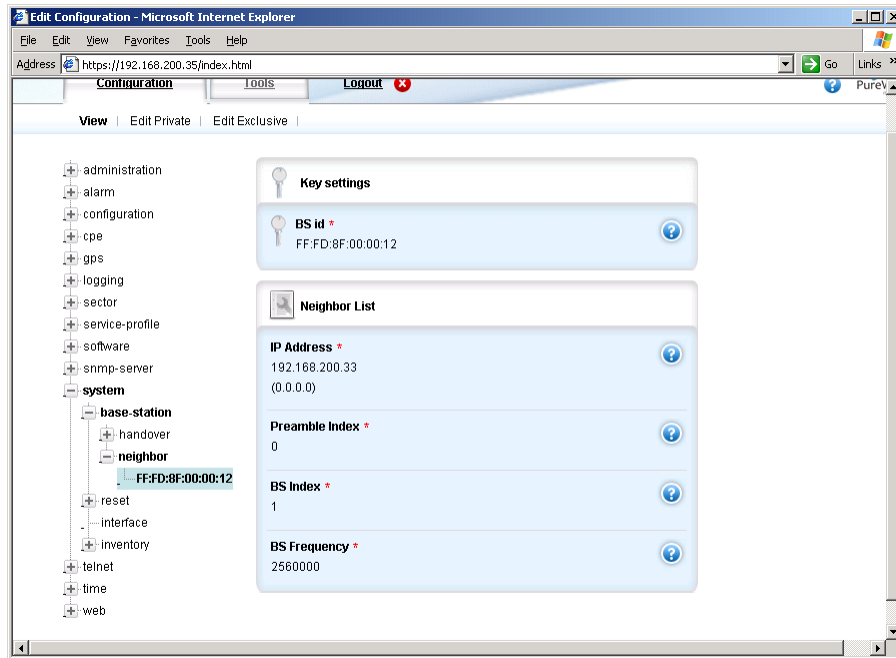


Figure 68 Neighbor configuration

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **system** Main Menu Option, **reset** Main Menu Sub-Element and then **factory/Default**. This provides the User with a reset system to factory defaults option (refer to Figure 69). The User has to select **Perform** Command Menu Option to erase the startup configuration and reboot the system. Afterwards the system will come up with the factory default configuration.

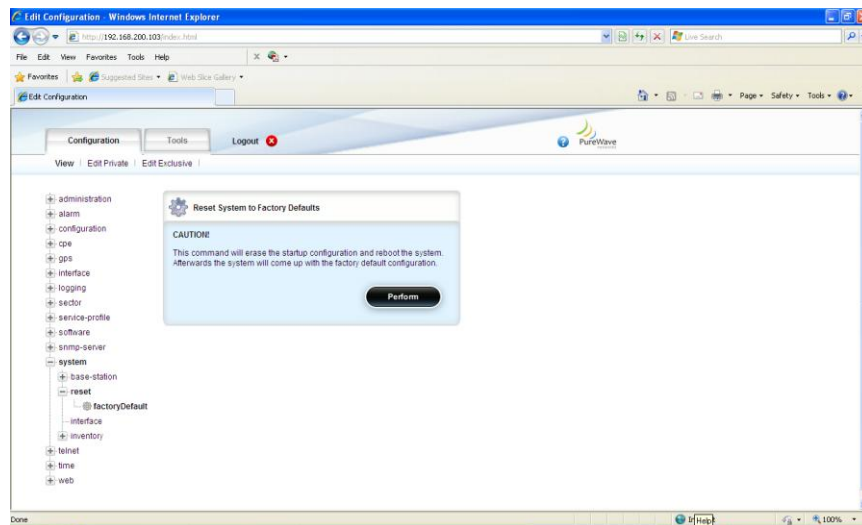


Figure 69: System Reset to Default Option

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **system** Main Menu Option, **reset** Main Menu Sub-Element and then **interface**. This provides the User with the options to configure the System Management Static IP Address (refer to Figure 70). If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via editing of a notepad icon.

The parameters to configure for the Base Station Static Management IP Address are:

- **Address**
- **Netmask**
- **Default Gateway**

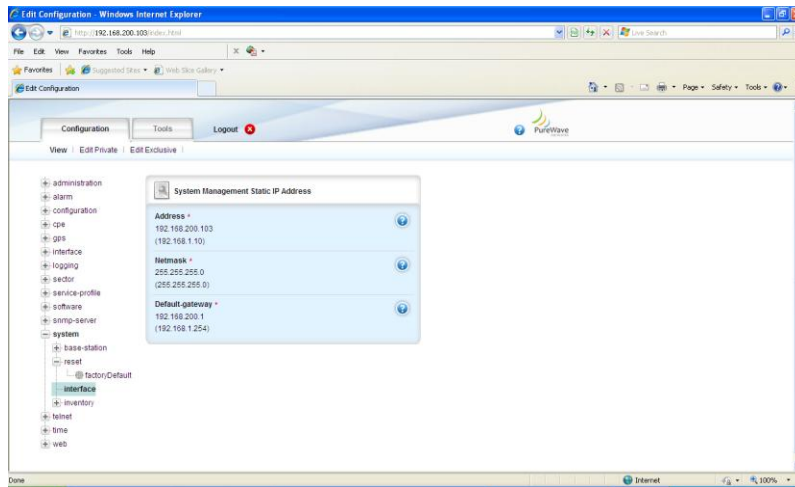


Figure 70: System Management Static IP Address

At the Main Web GUI Interface Screen select the **Configuration** Tab, select **system** Main Menu Option and then **inventory** Main Menu Sub-Element. This will provide the User with an inventory checklist of the internal hardware modules of the Base Station (refer to Figure 71).

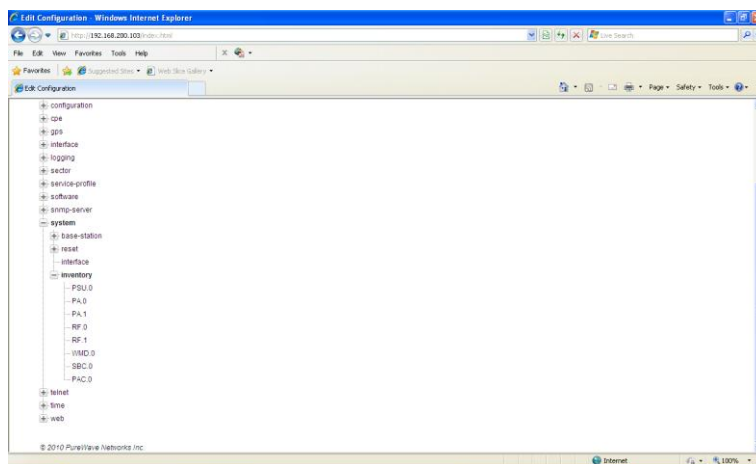


Figure 71: System Base Station Inventory

### 3.5.3.4 GPS Settings

The use of a GPS for air frame synchronization is mandatory if more than one Base Station is installed in a geographical area where potential radio transmissions could interfere with one another. GPS is enabled or disabled via the **GPS** option.

At the Main Web GUI Interface Screen select the **Configuration** Tab and then select the **gps** Main Menu Option. This will display the GPS Settings and Status window (Figure 72). The **gps** Main Menu Option has no further sub-elements .

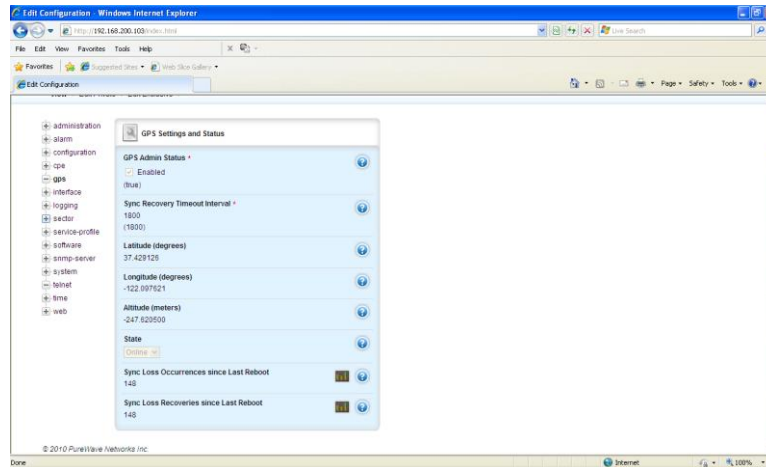


Figure 72: GPS Settings and Status

The GPS Settings display is split into one main group sections. An indication as to whether there are any User configurable parameters included in the group is provided. If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via an enabling of a check box or editing of a notepad icon.



A GPS antenna **MUST** be connected to the base Station before setting GPS Admin Status to “Enabled”.

The GPS Settings and Status window contains (refer to figure 69):

- **GPS Admin Status.** This is an indication of the GPS Admin Status. The options are enabled and disabled with disabled as the default.
- **Sync Recovery Timeout Interval.** The Base Station has a Sync Recovery feature, whereby the Base Station is automatically reset if GPS sync is lost for more than a specified timeout period. The timeout period (in seconds) is specified via the *Sync Recovery Timeout Interval* parameter. The default value is 1800 seconds.

- **Latitude (degrees).** This is the latitude location of the GPS receiver. This is not a User configurable parameter.
- **Longitude (degrees).** This is the longitude location of the GPS receiver. This is not a User configurable parameter.
- **Altitude (meters).** This is the altitude in meters, above sea level of the GPS receiver. This is not a User configurable parameter.
- **State.** This is an indication of the state of the GPS receiver. This is not a User configurable parameter.
- **Sync Loss Occurrences since Last Reboot.** This is a cumulative count of the number of GPS sync losses since the Base Station was last reset. This is not a User configurable parameter.
- **Sync Loss Recoveries since Last Reboot.** This is a cumulative count of the number of GPS sync recoveries since the Base Station was last reset. This is not a User configurable parameter.

The GPS will be in one of the states below from startup and until it is operational and providing synchronization to the base station.

- **Offline.** The 1 PPS from the satellite signal is not detected, so basic synch lock has not occurred. This can be also seen as there should not be any coordinates if the GPS is “offline”
- **INIT:** GPS state which dictates whether or not the BASE STATION will start transmission if the GPS is enabled.
  - **INIT-Initializing**
  - **INIT-Tracking-1-OSO**
  - **INIT-Tracking-2-STO-Init**
  - **INIT-Tracking-3-STO-Start**
- **UP:** GPS is operational (up).
  - **UP-Tracking-Done.** Base Station will begin transmission
  - **UP-Tracking-Hist.** Last GPS state indicating a steady state.
  - **UP-Holdoff**
  - **UP-ReAcquire**
  - **UP-Retrack**
- **DOWN:** GPS is not operational (down).
  - **DOWN-Unreliable**
  - **DOWN-Recovery**

### 3.5.3.5 Time Settings

It is important that the Base Station maintain an accurate date and time so that system logs are aligned and may be correlated with other network activity and trouble reports. Although the date and time must be initially set by the user, the Base Station supports the Network Time Protocol (NTP) to maintain its accuracy. The use of NTP is optional

At the Main Web GUI Interface Screen select the **Configuration** Tab and then select the **time** Main Menu Option. This will display the System Date and Time Settings and the display is split into one main group section (refer to Figure 73). In addition, the time menu option has a single further sub-element.

The further sub element is:

- **ntp**. These are the NTP time settings.

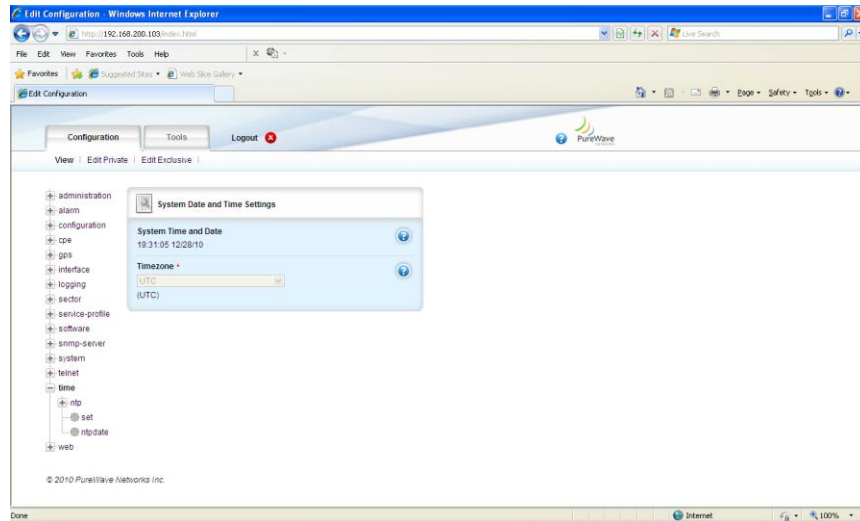


Figure 73: Time Settings

An indication as to whether there are any User configurable parameters included in the group is provided. If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via drop down menu.

The System Date and Time Settings window contains:

- **System Time and Date.** This is an indication of current date and time. This is not a User configurable parameter.
- **Timezone.** This is an indication of the timezone. The User is free to select their respective timezone and multiple options are available via the dropdown menu.

To view the Network Time Protocol Settings then at the Main Web GUI Interface Screen select the **Configuration** Tab, select **time** Main Menu Option and then **ntp** Main Menu Sub-Element. The display is split into two main grouping sections (figure 71).

- **Network Time Protocol Settings.** This is an indication as to whether NTP has been enabled. The options are enabled and disabled with disabled as the default.
- **NTP Server Settings.** This is an indication of the IP address, the NTP protocol version and whether the server is enabled of the NTP server. If the User wants to configure the NTP settings



then they can edit, delete or add another NTP server. If the User enters the Edit mode for this parameter, then a further sub element with two more windows appear and the User can edit as required (refer to figure 72). The User can configure:

- **Ip-address.** This is the IP Address of the NTP Server.
- **Version.** This is the protocol version of the NTP Server.
- **Enabled.** This indicates whether the NTP Server is enabled.

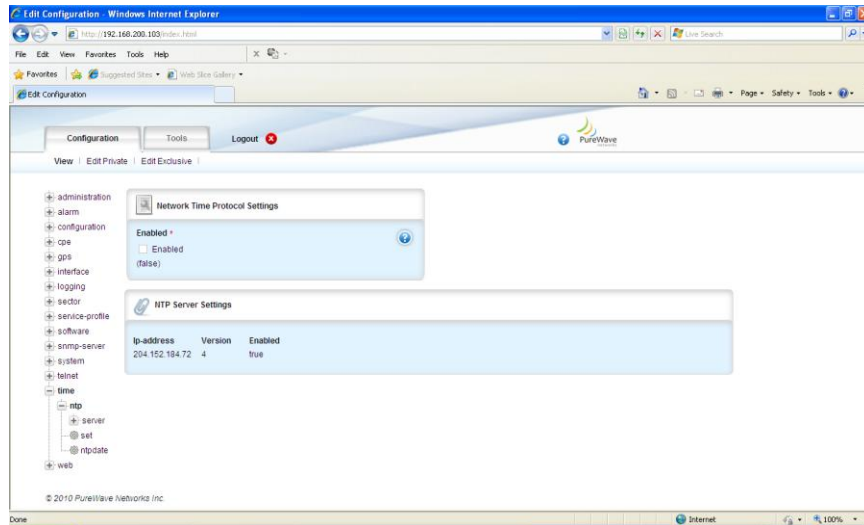


Figure 74: Time NTP Server Settings

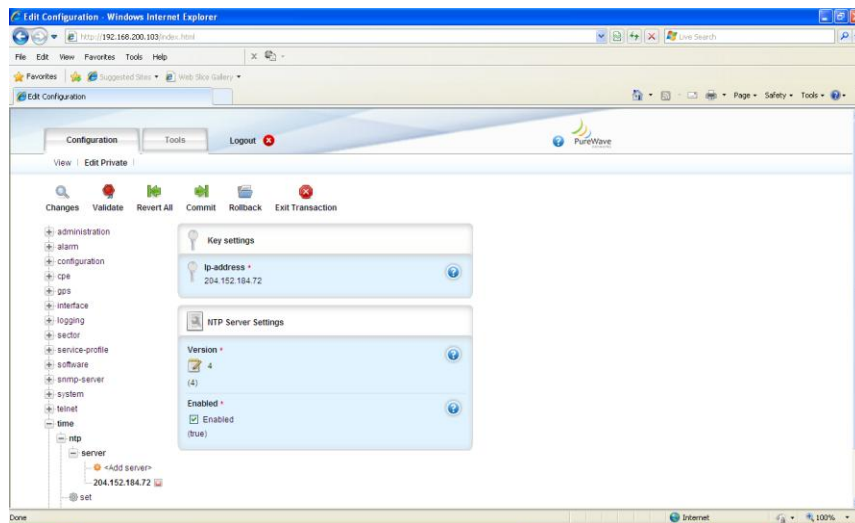


Figure 75: Time NTP Server Configuration

To view the current System Time and Date Settings then at the Main Web GUI Interface Screen select the **Configuration** Tab, select **time** Main Menu Option and then the **set** Main Menu Sub-Element. The display is split into two main grouping sections (refer to Figure 76).

- **Set System Time and Date.** This is a text box that contains the **Perform** Command Menu Option.
- **Set System Time and Date.** The User is free to configure the Time and Date. The dialog time is specified in 24-hour format and includes milliseconds (“Ms”), which may simply be set to 0. **TzH** is the timezone hours offset from Coordinated Universal Time (UTC) and is between -23 and +23. **TzM** is the timezone minutes offset from Coordinated Universal Time (UTC) and is between 0 and 59. Once these parameters have been configured, the User must select the **Perform** Command Menu Option for the changes to be effected.

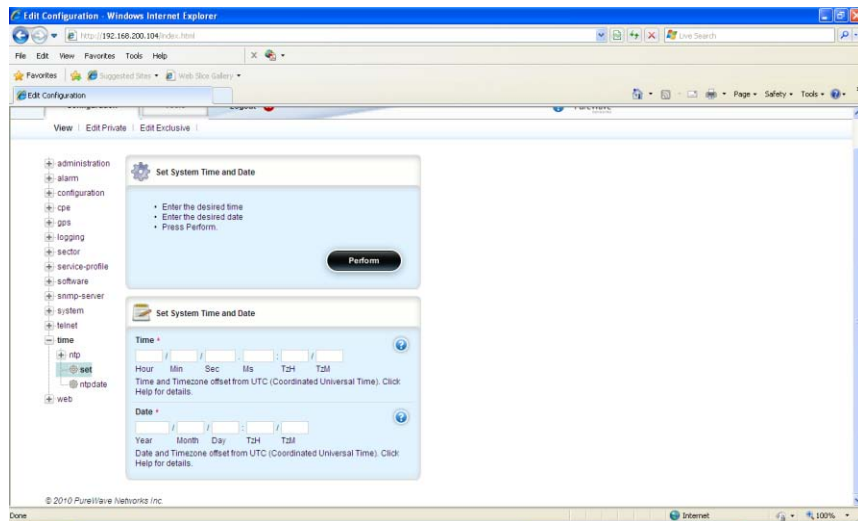


Figure 76: Time NTP Server System Set

To view the NTP Time/Date Synchronization then at the Main Web GUI Interface Screen select the **Configuration** Tab, select **time** Main Menu Option, then **ntp** Main Menu Sub-Element and then **ntpdate**. The display is split into two main grouping sections (refer to Figure 77).

- **NTP Time/Date Synchronization.** This command will perform a one-time synchronization to the selected NTP server. To apply the User simply needs to select the **Perform** command button.
- **NTP Time/Date Synchronization.** The User can configure the NTP Server IP address to perform the one time synchronization with.

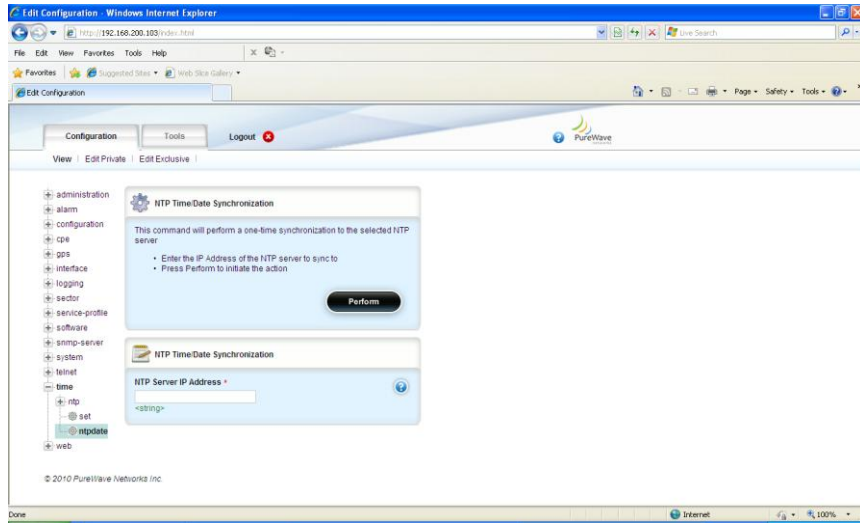


Figure 77: Time NTP Server Synchronization Update

### 3.5.3.6 Telnet Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab and select the **telnet** Main Menu Option. This will display the **/telnet/server** Settings and the display is split into one main group section (refer to Figure 78). There are no further sub-element associated with this option.

The /telnet/server settings are:

- **Enabled.** This indicates whether the telnet option has been enabled or not. This is a User configurable value that is edited via a check box.

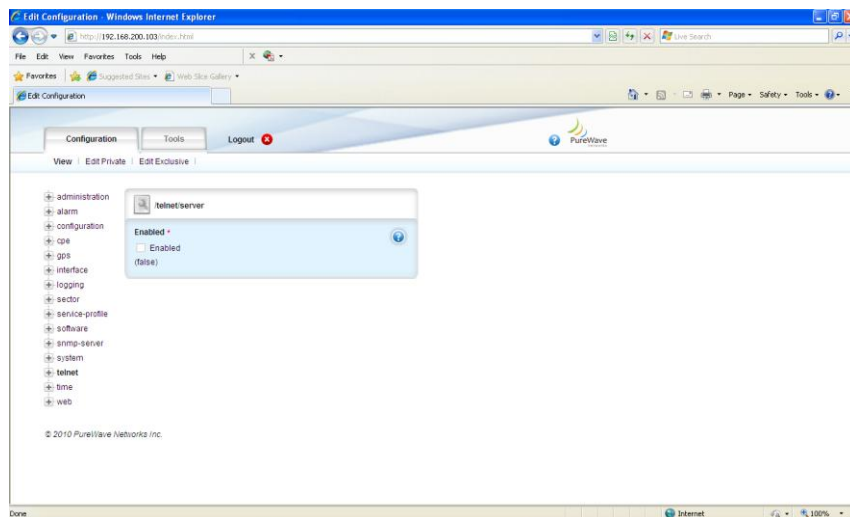


Figure 78: Telnet Server Enabled

### 3.5.3.7 Telnet Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab and select the **web** Main Menu Option. This will display the web Settings and the display is split into two main grouping sections (refer to Figure 79). There are no further sub-element associated with this option. The main grouping sections are:

- **Web Server HTTP Support.** This indicates the Base Station HTTP options. The configuration options are:
  - **Enabled.** This indicates whether the HTTP Support option has been enabled or not. This is a User configurable value that is edited via a check box. The default configuration is disabled.
  - **Port Number.** This is the port number for HTTP Support. This is a User configurable value that is edited via a notepad icon.
- **Web Server HTTPS Support.** This indicates the Base Station HTTP options. The configuration options are:
  - **Enabled.** This indicates whether the HTTPS Support option has been enabled or not. This is a User configurable value that is edited via a check box. The default option is enabled.
  - **Port Number.** This is the port number for HTTPS Support. This is a User configurable value that is edited via a notepad icon.

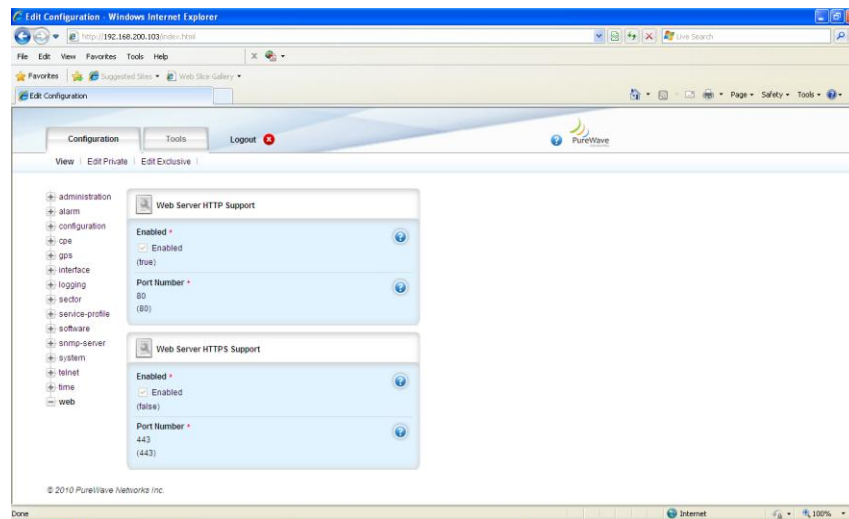


Figure 79: Web Server HTTP Support

### 3.5.3.8 Configuration Settings

All the Base Station configuration parameters are contained and stored local on the Base Station in flash memory, via a number of configuration files. The User has the complete control to perform a variety of functions such as copy, move, delete and restore etc on these files. This presents a User with an option,

in the event that they would like to re-configure a Base Station or the Subscriber CPE profiles they can copy and export a configuration file which can then easily be edited and downloaded back onto the Base Station. This is an alternative approach to the screen by screen configuration method that is detailed in this User Guide.

At the Main Web GUI Interface Screen select the **Configuration** Tab and select the **configuration** Main Menu Option. This will display the configuration Settings and the display is split into two main grouping sections (refer to figure 77). There are ten Main Menu Sub-Elements associated with the **configuration** Main Menu Option. The main grouping sections are:

- **Configuration File Operation Status.** This indicates the Configuration File operation status when the User is downloading or uploading a configuration file. The parameters that are displayed are as follows.
  - **State.** This indicates execution state of the configuration command. It is not a configurable parameter and simply states the current status, for example Idle.
  - **Download Progress.** This provides an indication of the completion percentage of the configuration file that is being downloaded. This is not a configurable parameter.
  - **Upload Progress.** This provides an indication of the completion percentage of the configuration file that is being uploaded. This is not a configurable parameter.
- **Configuration Files.** This is a list of the configuration files on the Base Station. There is no configurable parameters for these files and the information that is presented for each file is:
  - **Name.**
  - **Size.** The size of the file is in bytes.
  - **Modified.** This is the date and time that the file was last modified.

The ten Main Menu Sub-Elements are essentially the actions that can be performed on a configuration file. The User is not required to be in Edit Mode to perform any of these actions, the action is presented to them directly at each Main Menu Sub-Element option. These are:

- **copy**
- **move**
- **delete**
- **export**
- **import**
- **write**
- **backup**
- **restore**
- **download**
- **upload**
- **files**

The Main Menu Sub-Elements will be examined in detail. The same display elements are presented when the User navigates to each of these 10 Main Menu Sub-Elements. The display is split into two main grouping sections (refer to Figure 80).

- The top grouping section provides a description and instructions of the action.
- The bottom grouping section provides the mechanism to perform the action.

Another common theme throughout the Main Menu Sub-Element is the ability to select a configuration file for an action. The relevant files are presented to the User via a drop down menu or the files are listed under the files Main Menu Sub-Element option. To view the files then at the Main Web GUI Interface Screen select the **Configuration** Tab and select the **files** Main Menu Option. This will display all the relevant files.

The explanation for each file is:

- **.cnf (configuration) files** are created by the export command and can only be read by the import command. The data in the file is saved as a series of CLI commands. This file is in ASCII format and can be edited within a text editor.
  - **profile.cnf** file is the Base Station configuration file.
  - **cpe.cnf** is the Subscriber CPE configuration file.
- The **backup.bak.tgz** is the non-editable database backup configuration stored in a compressed format. This file is created with the **backup** command and can only be read by the **restore** command.

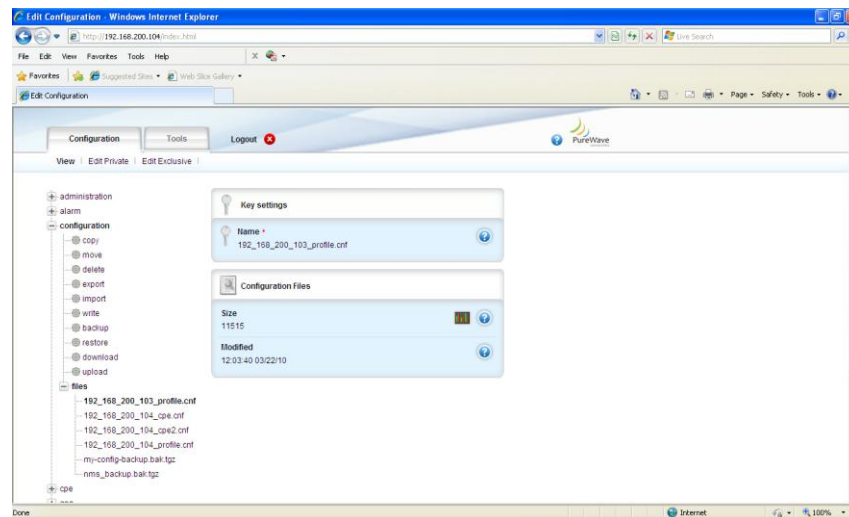


Figure 80: Configuration Settings

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **copy** Main Menu Sub-Element. This will display window to copy a configuration file.

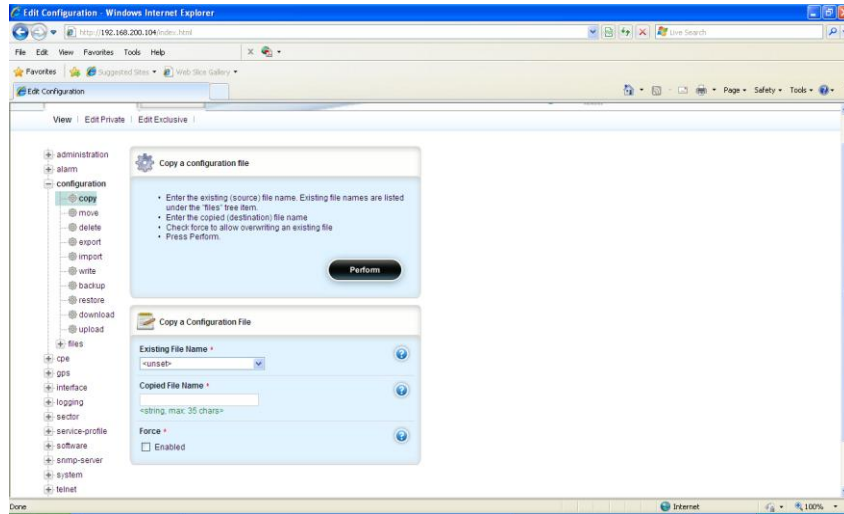


Figure 81: Configuration Copy Settings

The procedure to copy a file is (refer to Figure 81):

- (1) Select the file to be copied from the drop down menu of the **Existing File Name** field.
- (2) Enter the copied file name in the **Copied File Name** field.
- (3) Enable the **Force** field if the User wants to overwrite an existing file on the Base Station.
- (4) The User must then press the **Perform** Command Menu Option.
- (5) The relevant file will now be copied and the results of this action will be displayed (Figure 82).

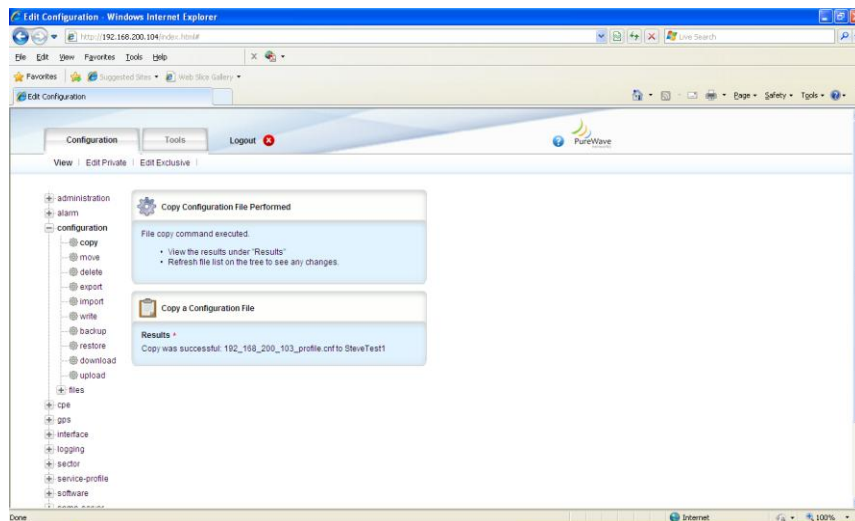


Figure 82: Configuration Copy Successful

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **move** Main Menu Sub-Element. This will display window to move or rename a configuration file (Figure 83).

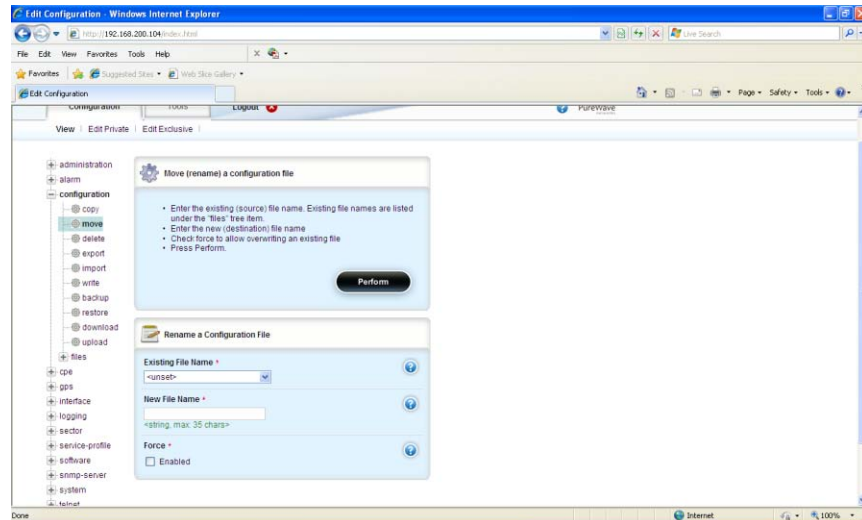


Figure 83: Configuration Move Settings

The procedure to rename a file is:

- (1) Select the file to be renamed from the drop down menu of the **Existing File Name** field.
- (2) Enter the new file name in the **New File Name** field.
- (3) The User must then press the **Perform** Command Menu Option.
- (4) The relevant file will now be renamed and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **delete** Main Menu Sub-Element. This will display window to delete a configuration file (refer to Figure 84).



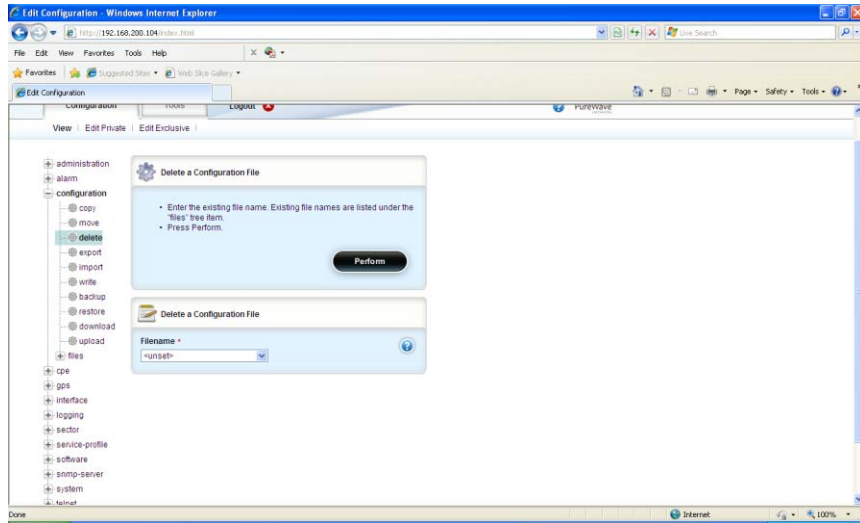


Figure 84: Configuration Delete Settings

The procedure to delete a file is:

- (1) Select the file to be renamed from the drop down menu of the **Filename** field.
- (2) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you really want to delete the file?".
- (3) The relevant file will now be renamed and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **export** Main Menu Sub-Element. This will display window to export a configuration file (refer to Figure 85). The export option creates an ASCII file that can be physically edited by the User. The file will be stored in flash on the Base Station and the User will have to upload it off the Base Station.

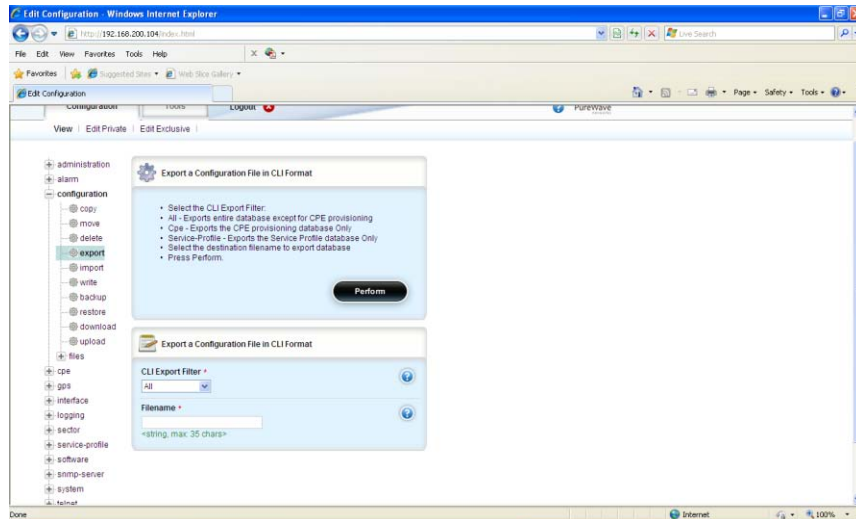


Figure 85: Configuration Export Settings

The procedure to export a file is:

- (1) Select the CLI export filter from the drop down menu of the **CLI Export Filter**. The options are:
  - **All**. This will export the entire configuration database except for Subscriber CPE provisioning.
  - **CPE**. This will export the Subscriber CPE provisioning database only.
  - **Service-Profile**. This will export the Service Profile database only.
- (2) Enter the destination filename to export the database in the **Filename** field.
- (3) The User must then press the **Perform** Command Menu Option.
- (4) The relevant file will now be renamed and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **import** Main Menu Sub-Element. This will display window to import a configuration file (refer to Figure 86). The import option will import a configuration into the running configuration.



Overwriting the configuration file can have serious consequences. The User must proceed with care.

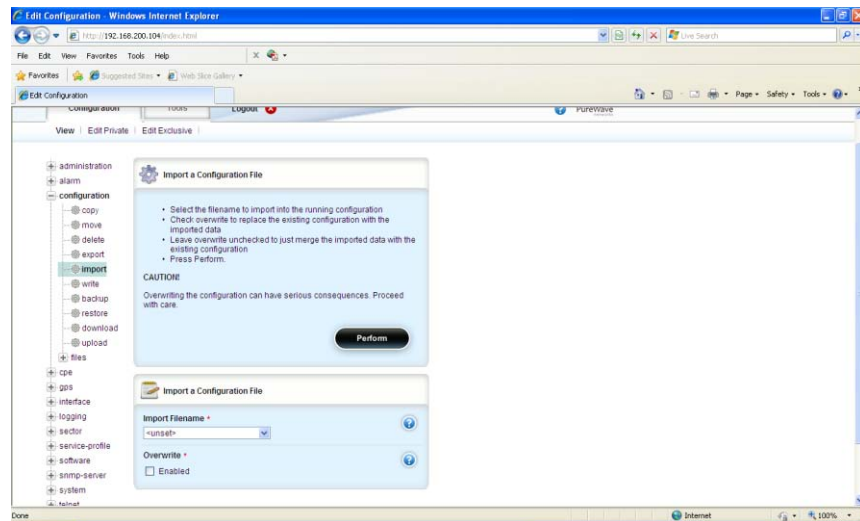


Figure 86: Configuration Import Settings

The procedure to import a file to the Base Station:

- (1) Select the filename to import into the running configuration from the drop down menu of the **Import Filename**.
- (2) If the User enables the **Overwrite** field, then this will replace the existing CPE configuration data with the imported data. This will only work with files created with the export CPE option. Trying to load other files with the overwrite option set will result in an error message.
- (3) If the User does not enable the **Overwrite** field, then the imported data will be merged with the existing configuration.
- (4) The User must then press the **Perform** Command Menu Option.



The Import command can take several minutes to complete. Please wait until this process is completed before going on to make any other configuration changes.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **write** Main Menu Sub-Element. This will display window to write a configuration

file (refer to Figure 87). The write procedure will copy the running configuration to startup. The new startup configuration will be effective at the next reboot of the Base Station.



Please note that changes will not be persistent and survive a restart unless the write command is issued after the changes are made.

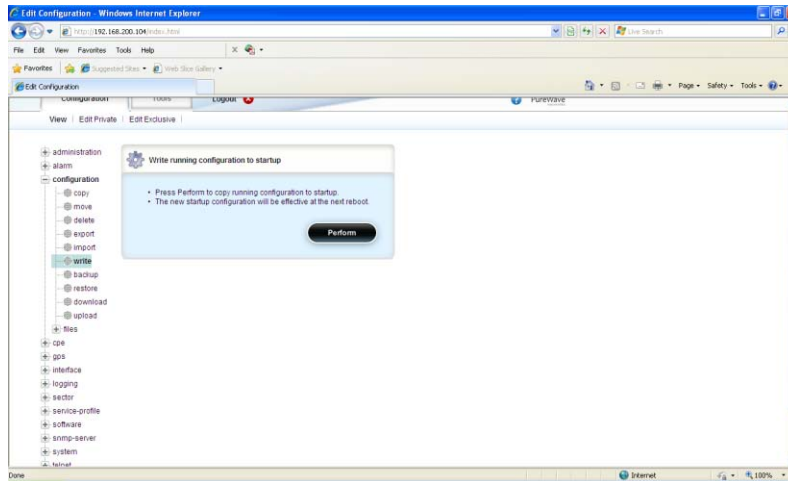


Figure 87: Configuration Write Settings

The procedure to write the configuration is:

- (1) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you really want to write the file?".
- (2) The relevant configuration will now be written and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **backup** Main Menu Sub-Element. This will display window to backup a configuration file (refer to Figure 88). The backup procedure will create a binary backup of the entire database which is compressed into a tar.gz file. This is effectively the essence of the Base Station but it cannot be edited by the User.

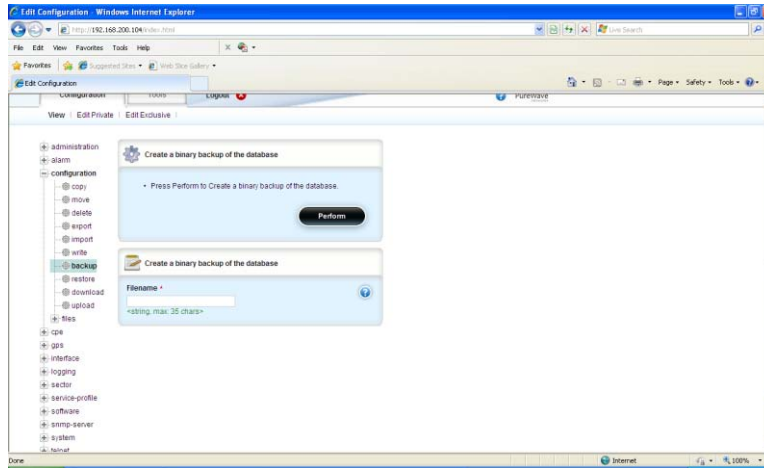


Figure 88: Configuration Backup Settings

The procedure to backup a database is:

- (1) Select the filename to create a binary backup of the database in the **Filename** field.
- (2) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you really want to delete the file?".
- (3) The relevant file will now be renamed and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **restore** Main Menu Sub-Element. This will display window to restore a configuration file (refer to Figure 89). The procedure will restore a binary backup of the entire database. This procedure will affect a reboot of the Base Station.

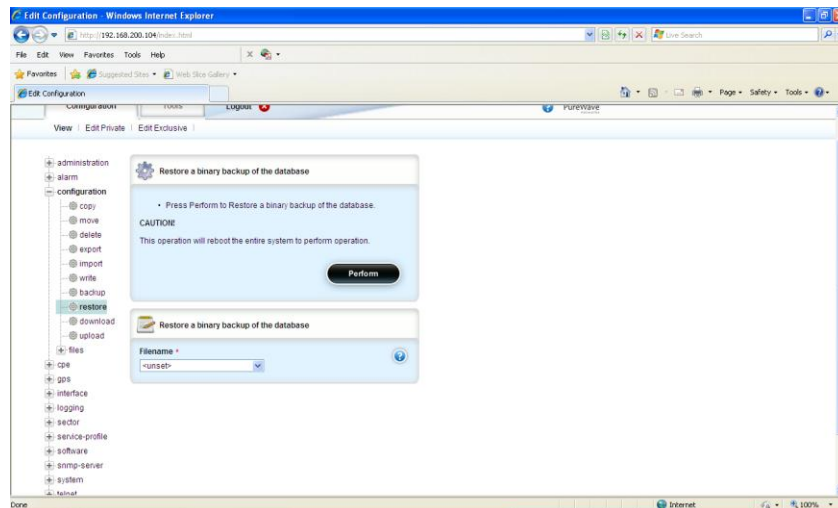


Figure 89: Configuration Restore Settings

The procedure to restore a database is:

- (1) Select the filename to restore a binary backup of the database in the **Filename** field.
- (2) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you really want to delete the file?".
- (3) The relevant file will now be renamed and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **download** Main Menu Sub-element. This will display window to download a configuration file to a remote server (refer to Figure 90). Prior to downloading the file, the User must ensure that an FTP Server has been configured and is running. There are a number of free commercially available FTP Servers that can be used. A key step in the process is to ensure that the URL for the file is set to be the FTP Home directory. For the purposes of upload and download, think of the Base Station as client in relation to the FTP as the server. The download process will therefore download from the Server to the Base Station.

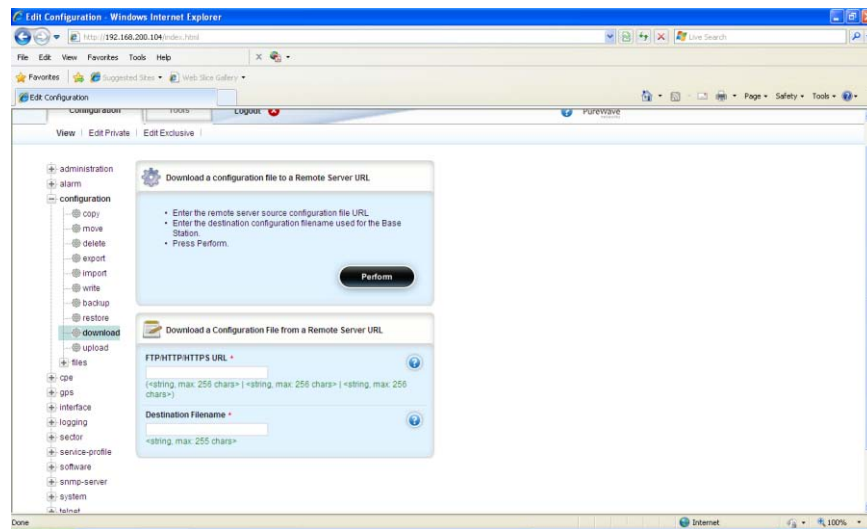


Figure 90: Configuration Download Settings

The procedure to download a file from a remote server is:

- (1) Enter the remote server source configuration URL in the **FTP/HTTP/HTTPS URL** field. Acceptable examples are:
  - ftp://192.168.10.1/filename
  - http://my.host-name.com/dir/filename
  - ftp://username:password@noc.big\_co.com:2323/dir/filename

- (2) Enter the destination configuration used filename used for the Base Station is the **Destination Filename** field.
- (3) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you want to download the file?".
- (4) The relevant file will now be downloaded and the results of this action will be displayed.

At the Main Web GUI Interface Screen select the **Configuration** Tab, then **configuration** Main Menu Option and then the **upload** Main Menu Sub-Element. This will display window to upload a configuration file to a remote server (refer to Figure 91). Prior to uploading the file, the User must ensure that a FTP Server has been configured and is running.

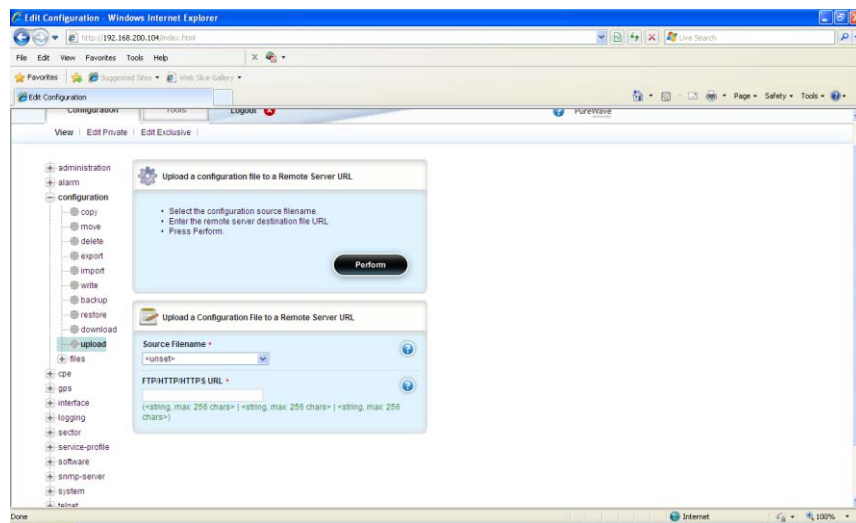


Figure 91: Configuration Upload Settings

The procedure to upload a file to a remote server is:

- (1) Enter the configuration source filename in the **Source Filename** field.
- (2) Enter the remote server destination file URL in the **FTP/HTTP/HTTPS URL** field. Acceptable examples are:
  - ftp://192.168.10.1/filename
  - http://my.host-name.com/dir/filename
  - ftp://username:password@noc.big\_co.com:2323/dir/filename
- (3) The User must then press the **Perform** Command Menu Option. A prompt box will now appear and the User is requested to confirm "Do you want to upload the file?".
- (4) The relevant file will now be uploaded and the results of this action will be displayed.



To ensure that the User has a stored backup of the running configuration file, then the User would **export** and then **upload** the relevant files. To restore a previously stored file from its remote location, then the User would **download** and then **import**.

### 3.5.4 Connecting a Subscriber Station

The procedures for provisioning each make and model of Subscriber CPE device vary and hence are beyond the scope of this document. However, PureWave have prepared general documentation that details recommend procedures to configure specific Subscriber units. Please refer to this documentation for further details.



When a Subscriber CPE is powered on and configured for an appropriate Base Station, if that Base Station is configured for auto-provisioning, the Subscriber CPE will automatically connect to the Base Station and it will be assigned the default Client Profile (Client Profile 1).

The User however has the complete flexibility to pre-configure the Subscriber CPE and has the capability to assign it to a specific Client Profile.

The procedure to configure a Subscriber CPE is:

- (1) For the particular Subscriber CPE that you wish to provision please record the Subscriber MAC address. This is written on the CPE label.
- (2) At the Main Web GUI Interface Screen select the **Configuration** Tab and then the **cpe** Main Menu Option. This will display a list of all Subscriber CPEs that have been specifically configured on the Base Station (refer to Figure 92). If there are none listed then none have been configured.

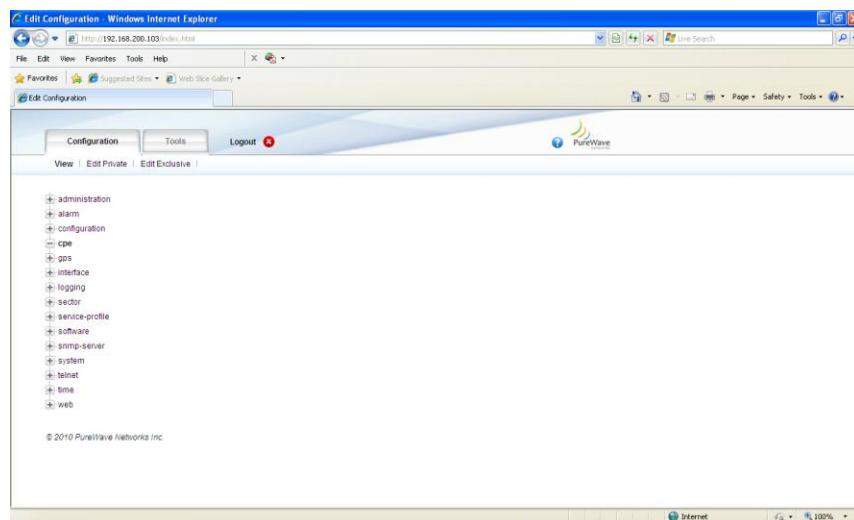


Figure 92: CPE Main Menu Option



- (3) The User now has to enter the Edit Mode (select Edit Private or Edit Exclusive). The **<Add cpe>** option will appear (refer to Figure 93).

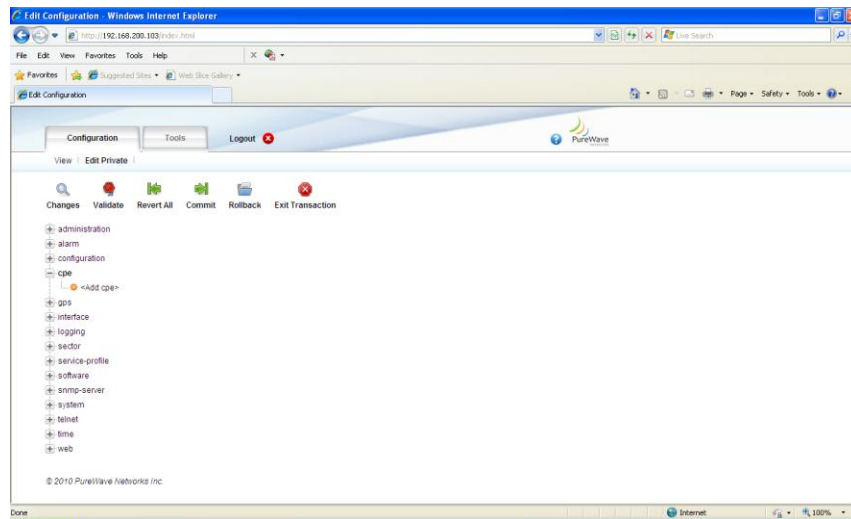


Figure 93: Add Subscriber CPE Option

- (4) The User must select the **<Add cpe>** option. A **Key Settings** window will appear. The User is prompted to enter the Subscriber CPE **MAC Address**. The MAC Address must be entered in **Upper Case** letters only and using a colon (:) to separate the digits, e.g. 00:17:C4:8F:9B:34. If the User selects the **"?"** Command Menu Option within the window then a reminder prompt will be displayed. Once the MAC Address has been entered the User must select the Add command button (refer to Figure 94).

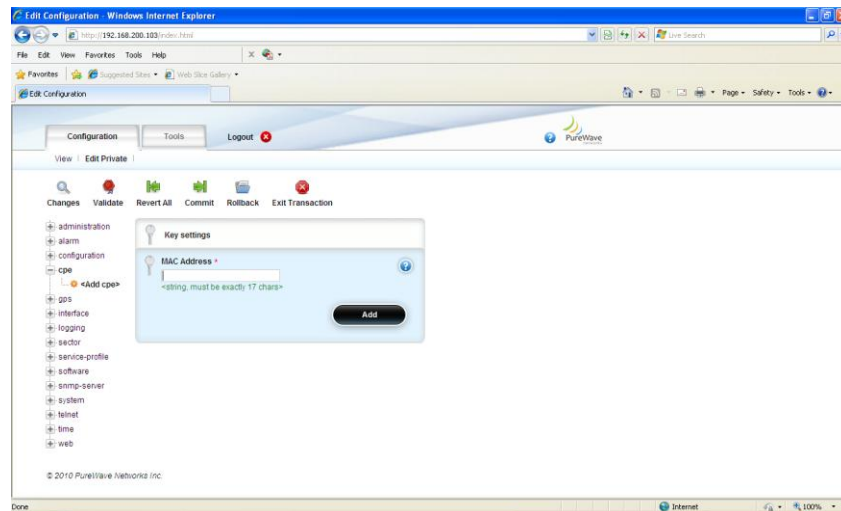


Figure 94: Add Subscriber CPE MAC Address

- (5) The User will now be presented with the Subscriber configuration options. The options to select are (refer to Figure 95):
- **Convergence Sublayer Type.** The User can select from a drop down menu. The default option is Ethernet\_CS and the available options are:
    - IPV4\_CS
    - ETHERNET\_CS . This is the default setting, the Base Station operates in Standalone mode.
  - **Client Profile.** This profile can be selected from a drop down menu. The User can select <unset> or from one of the user configured profiles (1 through 8).
  - **IP Address.** Applicable/Visible only when the CPE is configured for IPV4\_CS Convergence Sublayer mode and the base station operated in Stand Alone mode. 0.0.0.0 value (default) means that the CPE will obtain its IP address through DHCP Server. When changed from the defaults value a static IP address is used for the Provisioning. The CPE device must be configured with the same IP address.
  - **IP Netmask.** Applicable/Visible only when the CPE is configured for IPV4\_CS Convergence Sublayer mode and the base station operated in Stand Alone mode. Defines the Subnet Mask. Currently only a single IP Address is possible, thus the default value of 255.255.255.25.255 should not be changed!
  - **Customer ID.** This is a free format text field that enables the User to uniquely define a Subscriber. This is edited by selecting the notepad icon.
  - **Maximum Uplink Rate.** The **User can** select the maximum uplink modulation rate. This will effectively provide a cap on the maximum data traffic rate. This direction is defined as the Subscriber to Base Station. This is selected via the drop down menu and the options are:
    - QAM64 5/6
    - QAM64 3/4
    - QAM64 2/3
    - QAM64 1/2
    - QAM16 3/4
    - QAM16 1/2
    - QPSK 3/4
    - QPSK 1/2
  - **Maximum Downlink Rate.** The User can select the maximum downlink modulation rate. This will effectively provide a cap on the maximum data traffic rate. This direction is defined as the Base Station to Subscriber. This is selected via the drop down menu and the options are:
    - QAM64 5/6
    - QAM64 3/4
    - QAM64 2/3
    - QAM64 1/2
    - QAM16 3/4
    - QAM16 1/2
    - QPSK 3/4
    - QPSK 1/2

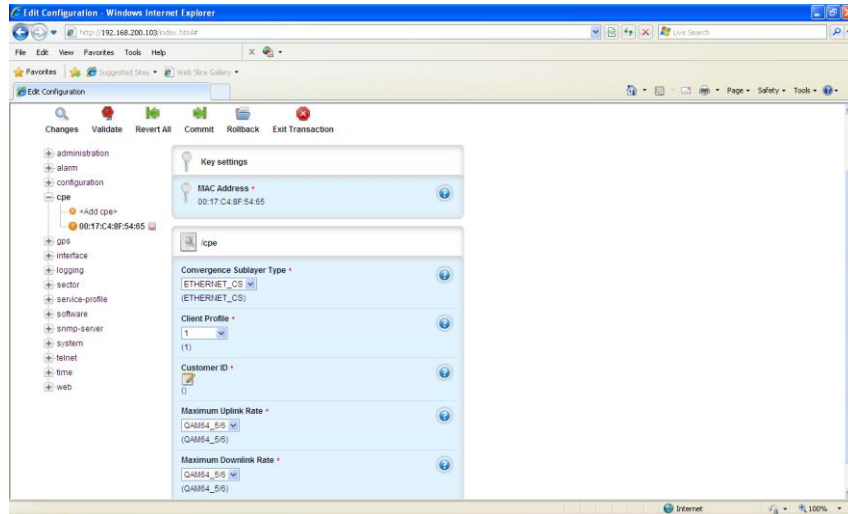


Figure 95: Add Subscriber CPE Settings

- (6) Once the Subscriber options have been selected, the User can then Validate the changes. The User simply selects the Validate command button. A window indicating whether the Validation is successful or not will appear (refer to Figure 96). If successful then the User has to select the OK command button.

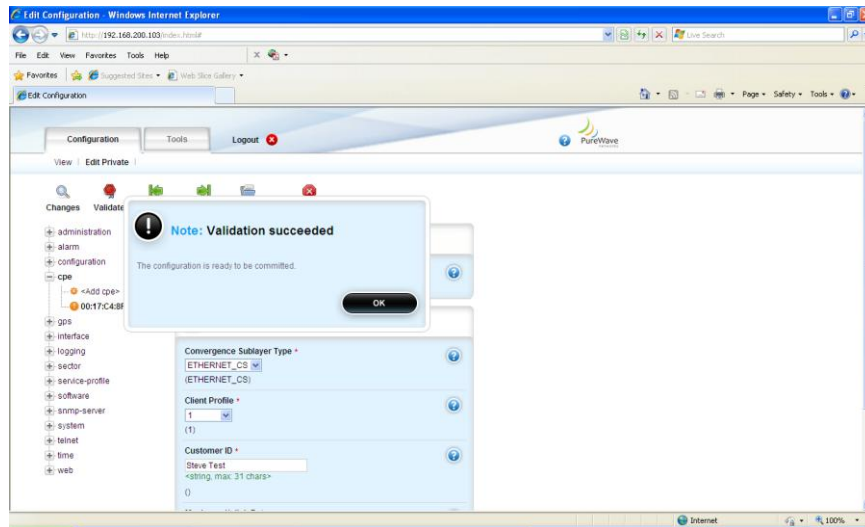


Figure 96: Add Subscriber CPE Validation

- (7) After performing the Validation, the final step is to execute the Commit procedure. The User simply has to select the Commit command button. A window prompting the User to commit the changes will appear. To effect the commit the User has to select the OK command button (refer to Figure 97). A further window indicating that the commit changes succeeded will appear.

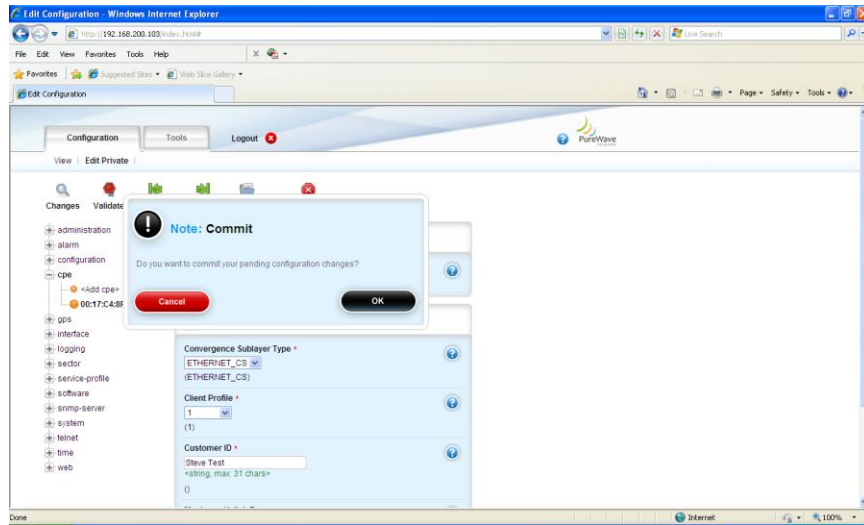


Figure 97: Add Subscriber CPE Commit

- (8) The Subscriber configuration details will now be displayed.

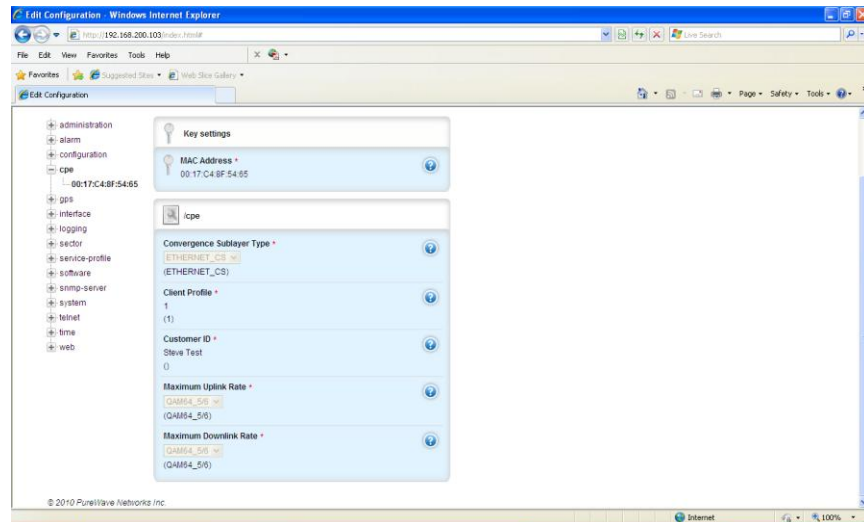


Figure 98: Subscriber CPE Configured Settings

- (9) If the User wants to delete a previously configured Subscriber, then the option to delete is available. When the User is in the Edit Mode, there is a red cross box positioned next to the end of the Subscriber MAC Address listing. If the User positions the cursor over the box then the message Remove cpe:cpe appears (refer to Figure 99). The User simply selects this box. The User must then commit the changes.

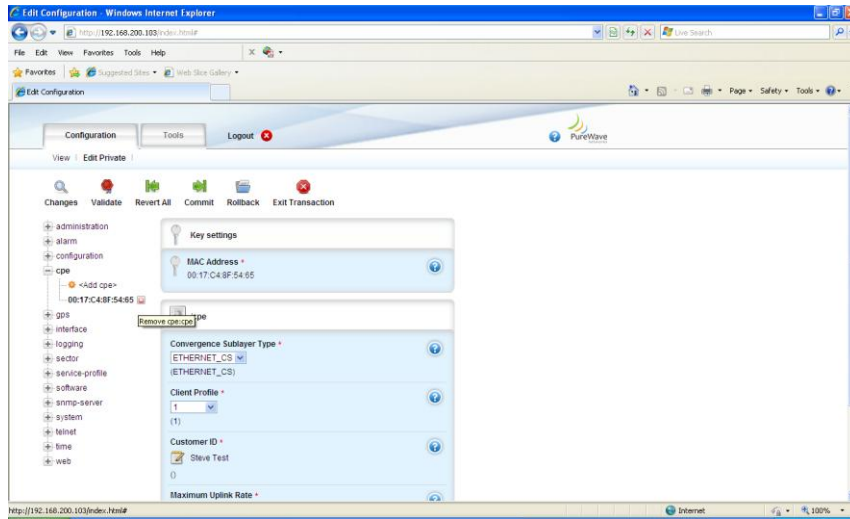


Figure 99: Subscriber CPE Delete

### 3.5.5 Subscriber CPE Client Profiles

The process to create a QoS (Quality of Service) Client Profile on the Subscriber CPE is relatively straightforward. The basic concept flow diagram is detailed in Figure 100.

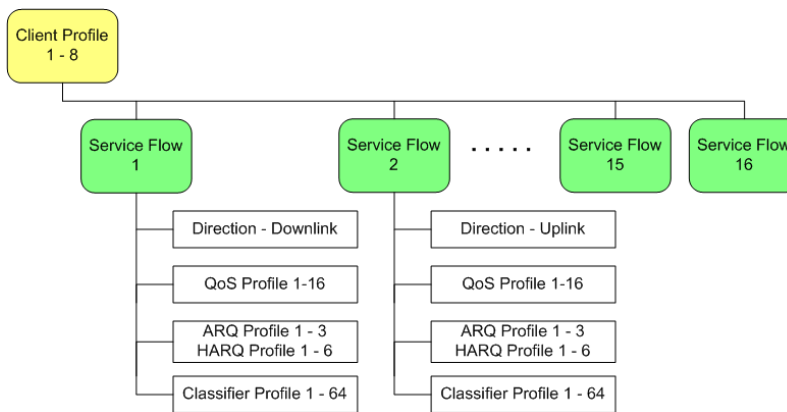


Figure 100: Subscriber CPE Provisioning Flow Concepts

The Service Profile system through the use of Client Profiles, create multiple data connections that suit the need of the Operator or Service Level Agreements. The Client Profile is the top level in a complex hierarchy that provides a large degree of flexibility in service offerings.

Client Profiles are assigned to individual Subscriber CPE's and within each client profile there is the ability to throttle throughput, and organize types of traffic into specific connection types. The use of ARQ/HARQ is also contained within this system.

The Subscriber CPE Client Profile contains a Service Flow for both the uplink and the downlink directions. The Service Flow is created from the following components:

- The direction of flow of traffic
- The specific Quality of Service (QoS) type, e.g. Best Effort (BE) or Unsolicited Grant Service (UGS) etc that is to be applied.
- ARQ and/or HARQ definitions. These are the error recovery mechanisms.
- Packet Classifiers. This will classify on a packet by packet basis depending on the defined classification criteria. For example, the conditions under which the packet is to be transported and/or which Service flow it is to be assigned.

A Client Profile is a set a Service Flows that correspond to a specific Service Level Agreement assigned to a customer. Each Client Profile supports up to 16 service flows and each service flow is uni-directional. A set of service flows includes an Uplink and a Downlink direction.

**Tip**

When designing Client Profiles, it is important to understand how the throughput rating mechanism works. In the event of contradicting parameters being set, the system will allocate to a Subscriber CPE the lower of the parameters. For example, assume a conflict between the Client Profile setting the maximum uplink rate of 2Mbps and the QoS Profile setting the maximum sustained rate to 1Mbps. In this example, the system will limit the uplink rate to 1Mbps.

---

Figure 101 demonstrates a typical "Best Effort" type of Client Profile. Consider a packet that is flowing in the downlink direction (i.e. Base Station to Subscriber CPE). The same concept applies in the uplink direction.

- A packet flow from the network and into the Base Station. It is destined for the Subscriber CPE.
- The packet is then processed by the Classifiers rules that have been defined. In this example these are the Downlink Packet Classifier.
- If the packet is subject to the Classifier rule then it is processed and classified as defined by that rule. Packets that are not subject to the rule are then identified as a Non Classified Packet.
- The Non Classified Packets are then passed out of the Base Station and are now subject to the relevant Service Flow definitions. In this example this would be Best Effort.

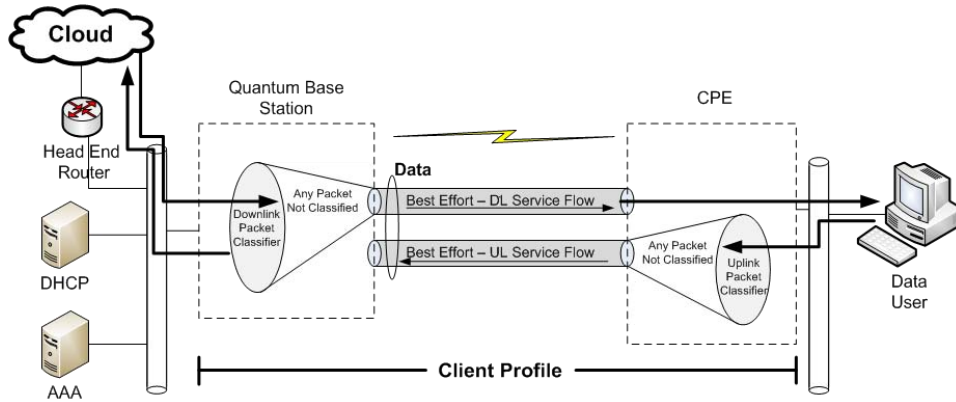


Figure 101: Typical Best Effort Client Profile

Figure 99 demonstrates a more complex but still typical "Voice and Data" type of application.

- In this example there is a VoIP Packet Classifier defined. This has been associated to an eRTPS Service Flow. Non Classifier packets have been set to a Best Effort Service Flow.
- Any packet that enters from the Network will be tested against the Classifier rules. A VoIP packet will therefore be transmitted downlink via eRTPS and everything else via Best Effort.

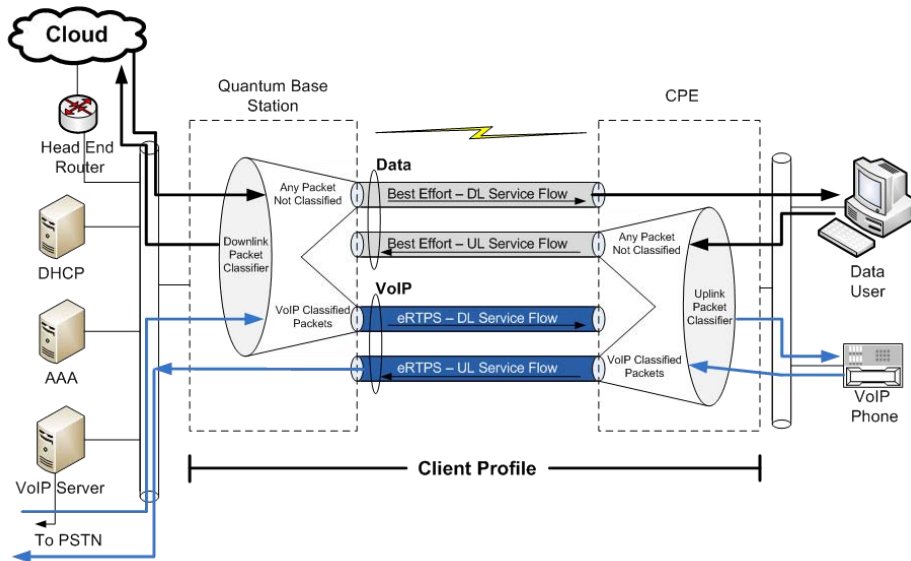


Figure 102: Typical Voice and Data Client Profile



By default the Base Station is pre-configured with a number of profiles for Classifier, HARQ, ARQ, QoS and Client. The User has the complete freedom and flexibility to use these pre-defined profiles or they can edit accordingly.

At Main Web GUI Interface Screen select the **Configuration** Tab and then the **service-profile** Main Menu Option. This window details the information for the service profile Main Menu Option. There are five Main Menu Sub-Elements and window is split into five main grouping sections (refer to Figure 103). The five main grouping sections provide a summary of the information that can be obtained by selecting and navigating down into the Main Menu Sub-Element level.

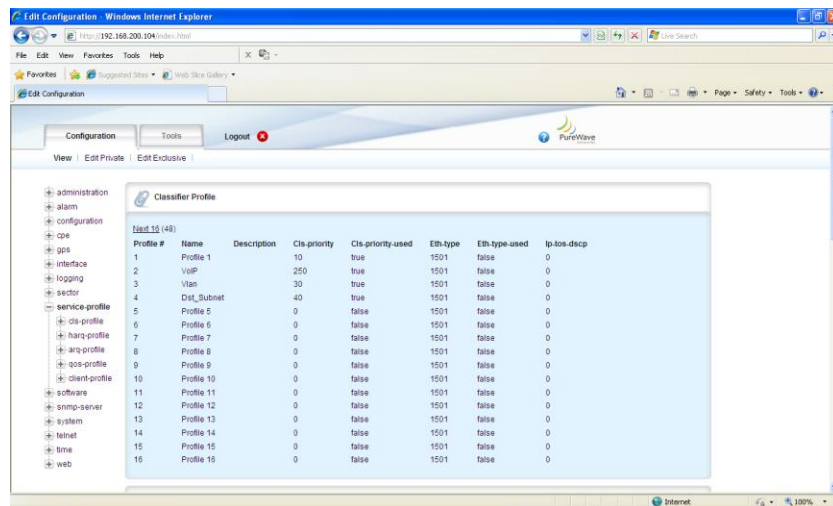


Figure 103: Service Profile Menu Option

The Main Menu Sub-Elements are:

- **cls-profile.** These are the Classifier profiles.
- **harq-profile.** These are the Hybrid ARQ (automatic recovery) profiles.
- **arq-profile.** These are the ARQ profiles.
- **qos-profile.** These are the Quality of Service profiles.
- **client-profile.** These are the Client profiles.

This just provides an indication of the information that is displayed. A description of the variables will be provided when the Main Menu Sub-Elements are described. The five main grouping sections are:

- **Classifier Profiler.** The User can define up to 64 Classifier profiles. A list of profiles (up to 16 at a time) and the following information is displayed for each Classifier:
  - **Profile #**
  - **Name**
  - **Description**
  - **Cls-priority**
  - **Cls-priority-used**



- *Eth-type*
- *Eth-type-used*
- *Ip-tos-dscp*
- **Hybrid ARQ Profile.** The User can define up to 8 profiles and the following information is displayed for each profile:
  - *Profile #*
  - *Name*
  - *Description*
  - *Enable*
  - *Channel-mapping*
  - *Num-retries*
  - *Pdu-sn-support*
- **ARQ Profile.** The User can define up to 3 profiles and the following information is displayed for each profile:
  - *Profile #*
  - *Name*
  - *Description*
  - *Enable*
  - *Deliver-in-order*
  - *Window-size*
  - *Timeout-tx-delay*
  - *Timeout-rx-delay*
- **QoS Profile.** The User can define up to 16 profiles and the following information is displayed for each QoS profile:
  - *Profile #*
  - *Name*
  - *Max-sustained-traffic-rate*
  - *Max-latency*
  - *Data-delivery-service*
  - *Traffic-priority*
  - *Max-traffic-burst*
- **Client Profile.** The User can define up to 8 profiles and the following information is displayed for each Client profile:
  - *Profile #*
  - *Description*
  - *Max-dl-rate*
  - *Max-pps*
  - *Max-ul-rate*
  - *Min-dl-reserved-rate*
  - *Min-ul-reserved-rate*

At Main Web GUI Interface Screen select the **Configuration** Tab and then the **service-profile** Main Menu Option. If the User now enters the Edit Mode, then they can either Edit or Delete any of all the profiles that have been configured as a default. If the User decides to Edit any of these profiles then they are immediately navigated to the relevant Main Menu Sub-Element level.

The information that is presented at the **service-profile** Main Menu Option level is simply a summary of what is actually available for each of the profiles. The User can navigate to the respective Main Menu Sub-Element level for full viewing and configuration capabilities.



If the User wants to configure any of the parameters then they must enter the Edit Mode (select Edit Private or Edit Exclusive) and edit as necessary. The methods to Edit the parameters will be offered via a drop down menu of choices, an enabling of a check box or editing of a notepad icon.

These Profiles will now be described in detail.

### 3.5.5.1 Classifier Profile

This profile will classify on a packet by packet basis depending on the defined classification criteria. For example, the conditions under which the packet is to be transported and/or which Service flow it is to be assigned.

At Main Web GUI Interface Screen select the **Configuration** Tab, then the **service-profile** Main menu Option and then the **cls-profile** Main Menu Sub-Element. This User is presented with all the 64 pre-configured default profiles. These are displayed 16 at a time. To physically view all the profile configuration parameters then the User must actually select a profile and two main grouping sections are presented (refer to Figure 104).

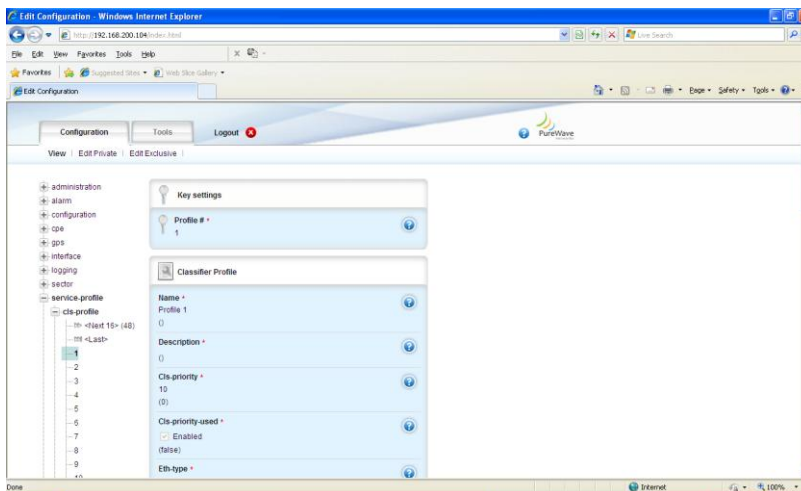


Figure 104: Service Profile Classifier Profile

The main grouping sections are:

- **Key settings.** This simply displays:
  - **Profile #**
- **Classifier Profile.** This displays all that the available configuration parameters. These are:
  - **Name.** This is the profile name and it is a text field
  - **Description.** This is the profile description and it is a text field.
  - **Cls-priority.** This User can assign a priority to the classifier. The priority is assigned as a number in the range 0 to 255. The default priority is 0 (no priority).
  - **Cls-priority-used.** This is a check box to enable/disable the priority rule.
  - **Eth-type.** This is the Ethernet Type. This is assigned as a number in the range 1501 to 65535. This represents the value in decimal format.
  - **Eth-type-used.** This is a check box to enable/disable the Ethernet Type rule.
  - **Ip-tos-dscp.** This is the IP TOS Descriptor. This is assigned as a number in the range 0 (default) to 63.
  - **Ip-tos-dscp-used.** This is a check box to enable/disable the IP TOS Descriptor rule.
  - **Ip-protocol.** This is the IP Protocol. This is assigned as a number in the range 0 (default) to 255.
  - **Ip-protocol-used.** This is a check box to enable/disable the IP Protocol rule.
  - **Dest-ip-addr-prfx.** This is the IP Destination Address and Prefix (mask length). Configuration examples are 192.0.0.0/2, 192.168.0.0/3, 192.1468.254.0/23 and 192.168.1.1/32.
  - **Dest-ip-addr-used.** This is a check box to enable/disable the IP Destination Address rule.
  - **Src-ip-addr-prfx.** This is the IP Source Address and Prefix (mask length). Configuration examples are 192.0.0.0/2, 192.168.0.0/3, 192.1468.254.0/23 and 192.168.1.1/32.
  - **src-ip-addr-used.** This is a check box to enable/disable the IP Source Address rule.
  - **Dest-port-start.** This is the Destination Port Low Limit. This is assigned as a number in the range 0 (default) to 65535.
  - **Dest-port-end.** This is the Destination Port High Limit. This is assigned as a number in the range 0 (default) to 65535.
  - **Dest-ip-port-used.** This is a check box to enable/disable the Destination Port rule.
  - **Src-port-start.** This is the Source Port Low Limit. This is assigned as a number in the range 0 (default) to 65535.
  - **Src-port-end.** This is the Source Port High Limit. This is assigned as a number in the range 0 (default) to 65535.
  - **Src-ip-port-used.** This is a check box to enable/disable the Source Port rule.
  - **Vlan-id.** This is the VLAN ID Tag. This is assigned as a number in the range 0 (default) to 4095.
  - **Vlan-id-used.** This is a check box to enable/disable the VLAN ID rule.
  - **Vlan-user-priority-low.** This is the VLAN User Priority Low Byte. This is assigned as a number in the range 0 (default) to 7.

- **Vlan-user-priority-high.** This is the VLAN User Priority High Byte. This is assigned as a number in the range 0 (default) to 7.
- **Vlan-user-priority-used.** This is a check box to enable/disable the VLAN User Priority rule.

The System is pre-configured with 64 default profiles. If the User wants to add any of their own configurations, they must delete a profile before they can add and configure a new one.

When in Edit mode, the User is presented with (refer to **Figure 105**):

- **<Add cls-profile>.** If the User selects this option and there is available profile to be added then they can simply add and then they will be dropped directly into the configuration window.
- A List of all the profiles with a red box beside each profile. If the User navigates to the red icon then this will present the User with the ability to delete the profile.

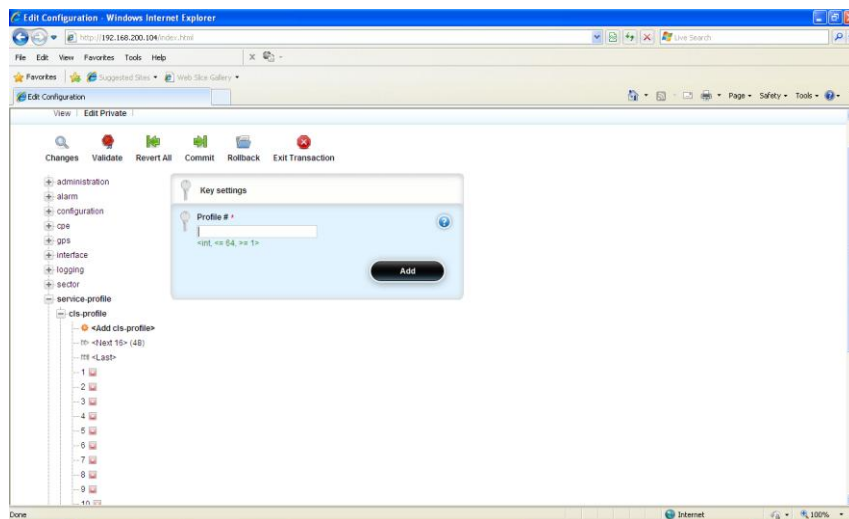


Figure 105: Service Profile Classifier Profile Edit Capability

### 3.5.5.2 HARQ Profile

At Main Web GUI Interface Screen select the **Configuration** Tab, then the **service-profile** Main Menu option and then the **harq-profile** Main Menu Sub-Element. This User is presented with all the 6 pre-configured default profiles. To physically view all the profile configuration parameters then the User must actually select a profile and two main grouping sections are presented (refer to **Figure 106**).