Sentry4G-900 Pico Base Station

Operating Manual
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Sentry 4G-900 Pico Base Station Operating Manual

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The information given in this document is reviewed regularly and any necessary corrections will be included in subsequent editions. We appreciate any suggested improvements. We reserve the right to make technical improvements without notice.

Warranty

One (1) year from date of purchase, return to factory. For warranty details, contact your customer service representative.

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1 Introduction

1.1 Overview

CalAmp Sentry 4G-900 Pico Base Station is a single sector station used to enhance outdoor and indoor WiMAX coverage and capacity. The unit is easily installable, powered by PoE and supports remote management.

The Sentry 4G-900 Pico Base Station provides full base station functionality necessary for serving a single sector and operating in the 902-928 MHz ISM band. It supports up to 512 subscriber units and its light weight and small footprint allow it to be easily mounted by one person on poles, street lamps or walls.

The Pico Base Station is a broadband wireless access system based on the 802.16e mobile WiMAX standard. Sentry 4G-900 systems are designed for robustness and simplicity, offering feature-rich services with low deployment and operation costs, for unmatched operator competitiveness and fast ROI.

The Pico Base Station provides all the functionality necessary to communicate with fixed and mobile subscriber units according to the service criteria and customer Service Level Agreements (SLA). The end-to-end Quality of Service (QoS) ensures the same high quality WiMAX experience is delivered to customers outside or inside his/her home or small office.

The Sentry 4G-900 Pico Base Station Web Manager application is used to provision and control Pico Base Stations and configure QoS for individual Subscriber Stations. The application provides Web Access to a single Pico Base Station from any network connection via a standard Browser (i.e. Explorer or FireFox).

The Pico Base Station Web Manager is used to initially define the basic communication parameters (i.e. IP address and bandwidth) *before* the unit is mounted on a pole. It can then be used to remotely access the Base Station, configure the required parameters, manage and monitor the unit.

1.2 Features

The Sentry 4G-900 Pico Base Station Web Manager application includes the following capabilities and features:

- Intuitive user interface and parameter groupings
- Dashboard monitoring for vital parameters with access to the relevant panes
- Quick Start window customized for Base Stations in standalone or in ASN Gateway topologies
- QoS profile setting tools for STANDALONE configuration
- Enables remote software upgrade and restore to previous versions
- Advanced communication monitoring and troubleshooting tools for CPEs and subscribers

2 Getting Started

The Base Station should be provisioned with basic parameters BEFORE it is mounted (i.e. on the pole) where physical access will be more challenging. This is easily and quickly accomplished by opening a Web session to the Base Station and using the Web Manager Quick Start screen.

This chapter provides the following information:

- How to open a Web session to the Base Station
- How to provision the unit via the Quick Start tab in two operation modes: ASN-Gateway (default mode) and standalone mode
- Navigating the Web Manager application

2.1 Opening a Web Session to the Base Station

A Web session can be opened to the Base Station using two methods: local and remote.

Local Web sessions are usually used during setup to provision the unit with the IP address provided by the system administrator and to configure basic parameters. All the parameters required for initial setup are concentrated in the Quick Start menu.

NOTE: Remote sessions are used during normal operation.

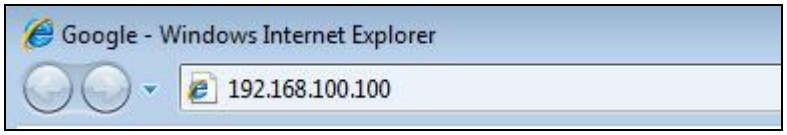
To open a local session

Note: The default IP address of the Base Station is 192.168.100.100

1. Verify that your computer is running Windows XP OS.
2. Use an Ethernet cross-cable to connect your computer (i.e. laptop) Ethernet port to the Base Station Ethernet management port.

   NOTE: Some laptops may not require a cross-cable to locally connect to an Ethernet port since automatic identification of cross-cable connections are supported. For these type of computers, a standard Ethernet may be connected locally to the Base Station.

3. Launch your Web Browser (i.e. Explorer or FireFox) and enter the Base Station default IP address in the address bar.



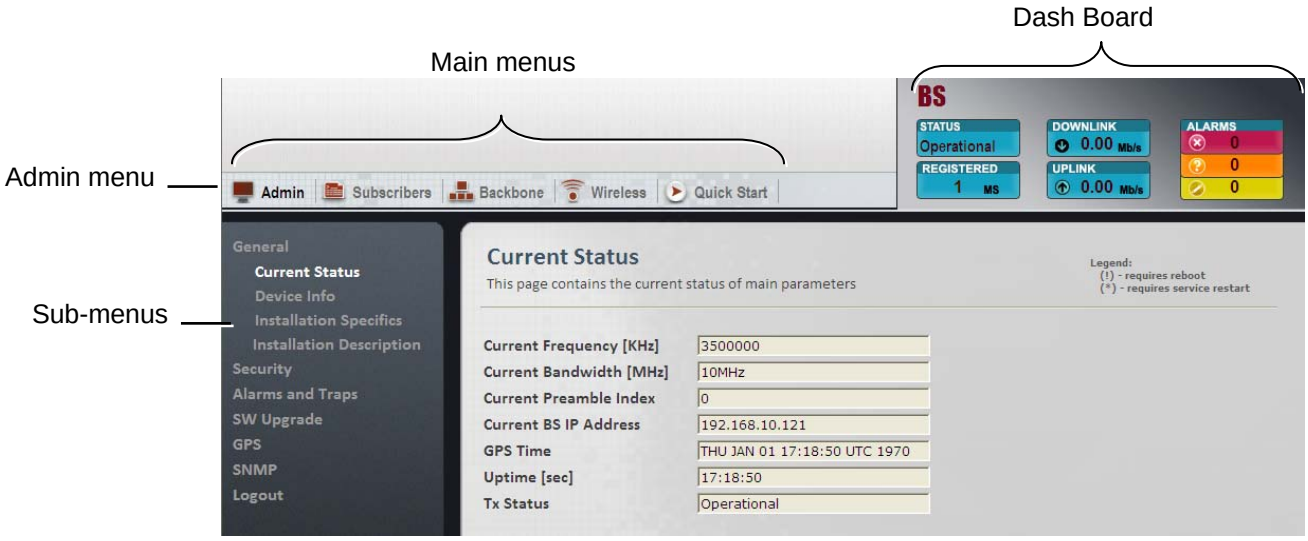
4. Press the **Enter** key. The login window appears.
5. In the Login window, enter your provided **User Name** and **Password**.

The Web Manager window appears. The window consists of:

- Dashboard showing the main readings – click on a reading to access the corresponding screen.
- Main menu options – the relevant sub-menus are displayed in the left pane
- The display area showing the currently selected sub-pane options.

For a detailed explanation on navigating the Web Manager, refer to section 2.3.

The Admin menu, Current Status sub-menu item is displayed by default, providing status information on the Base Station.



What next?

- To provision the unit (before physical mounting) - define the **Quick Start** parameters (see 2.2). *Once the Quick Start parameters have been defined, you will be able to access the Base Station remotely via an internet connection.*
- Learn how to navigate the Web Manager – refer to 2.3 Navigating the Web Manager Screen.

2.2 Initial Setup the Base Station via Quick Start

NOTE: The Quick Start menu is usually accessed for the first time via a local connection BEFORE the Base Station is mounted onto the pole.

The Quick Start screen concentrates the IP address and other basic parameters required to set up the Base Station and to perform basic operations; these include Base Station service control and reboot.

The Web Manager supports two operation modes, each with a dedicated Quick Start screen:

- **ASN Gateway** – this is the default mode, corresponding to an installation topology that includes an ASN Gateway. In this type of installation the QoS is configured through the Gateway. No QoS set up is required at the Base Station.
- **Standalone** – in this mode, the Base Station installation topology does NOT include an ASN Gateway. It is required to configure the Web Browser to run in this mode.

The operation mode can be verified and modified through the Web Manager (Backbone menu).

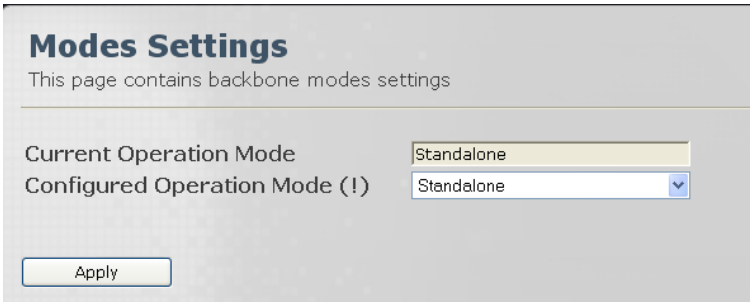
This section describes how to verify and modify the Web Manager mode according to the installation topology, and the Quick Start options for each mode.

2.2.1 Verifying and Setting Operation Mode – ASN Gateway or Standalone

The Web Manager is by default set to operate in ASN-GW mode. Configure the Web Manager operation mode to correspond the system topology: **Standalone** or **ASN-GW**. The selected mode affects some of the Web Manger features and displays.

To view and configure the operation mode

1. Click the **Backbone** menu option. Choose the **Backbone Admin** sub-menu and then the **Operation Modes**. The **Operation Modes** screen appears.



2. In the **Configured Operation Mode** field set the value to Standalone or ASN-GW according to the system topology and click **Apply.**

2.2.2 ASN-Gateway Mode Quick Start

Follow this instructions in this section if the Base Station is in an ASN Gateway topology.

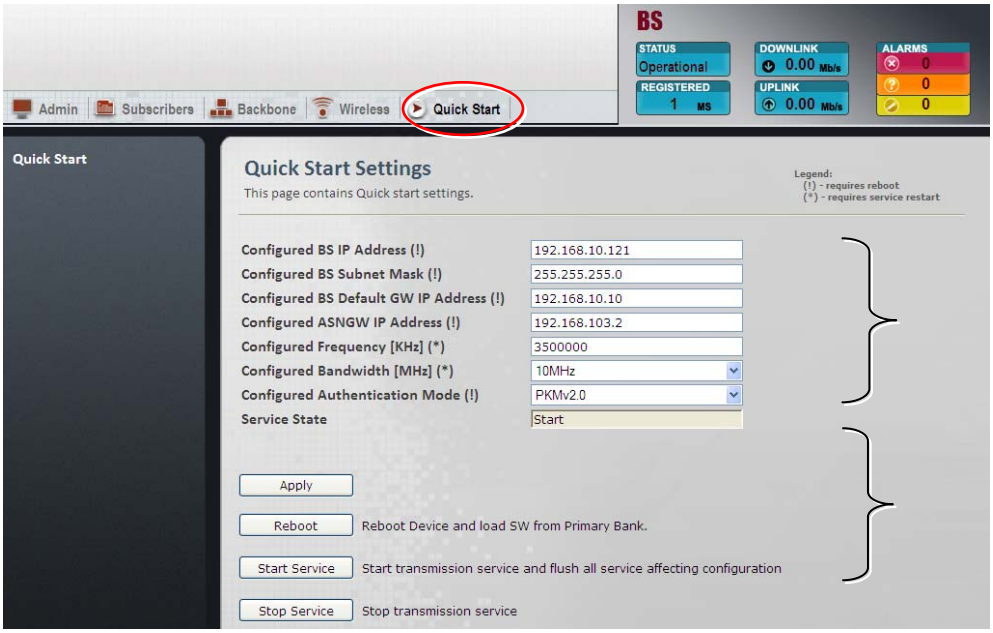
NOTE: All the parameters available in this pane, are also available in other panes corresponding to their parameter groups.

The Quick Start pane provides the basic parameters required for setting up the Base Station. These include the unit and ASN Gateway address, frequency, bandwidth, etc.

These parameters require re-starting the service (*) or rebooting the Base Station (!) as indicated. (See section 2.3.3). The necessary operation buttons are provided in the pane.

To set up the unit via the Quick Start pane

1. Click the **Quick Start** menu option. The **Quick Start** pane appears.



Basic communication parameters (Corresponding to mode: Standalone/ASN-GW)

Control options

The following operation buttons are available:

- **Apply** – implements changes performed by the user.
- **Reboot** – reboot device and load SW from Preliminary bank
- **Stop Service** / **Start Service** – two buttons used when service restart is required.

2. Update the required parameters in the Pane:
   - Base Station IP Address, Subnet Mask and Default GW (requires reboot).
   - ASN Gateway IP Address (requires reboot)
   - Base Station Center Frequency (requires service restart)
   - Base Station Bandwidth – Values: 3.5MHz, 5MHz, 7MHz, 10MHz. (requires service restart)
   - Authentication Mode:

- Null authentication – if this mode is selected, AAA Server parameters are not relevant.
- PKMv2.0 – select this mode if AAA Server is used.

3. Click **Apply** to save the changes. *The parameters will not be uploaded to the Base Station until the appropriate Restart or Reboot operation was performed.*
4. Depending on the parameters that were modified, perform the relevant operation in order to update the changes to the Base Station:
   - Restart the service (*) – click **Stop Service** and then **Start Service**
   - Reboot the Base Station (!) - click **Reboot**.

NOTE: (If necessary), to restore the factory defaults, click the **Factory Default** button.

The GPS link state shows the status of the GPS link:

- Auto – Default. Base Station waits for GPS synchronization before beginning transmission. This is usually the normal operation mode for multi-sector systems.
- Start – Base Station begins transmission without waiting for GPS synchronization. Used for single sector systems or for testing. The Stop option is used to discontinue transmission.
- Stop – Used to discontinue transmission initiated by Start.

NOTE: By default, GPS operation is enabled. To disable GPS (i.e. for operation in the lab or testing), refer to section 4.6.

2.2.3 Standalone Mode Quick Start

Follow this instructions in this section if the Base Station is in Standalone topology.

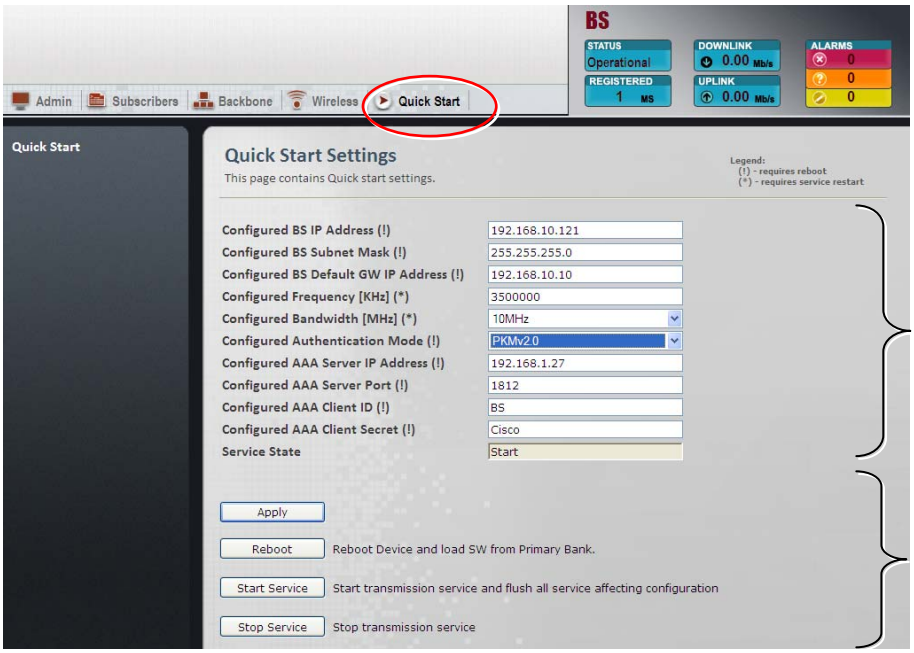
NOTE: All the parameters available in this pane, are also available in other panes corresponding to their parameter groups.

The Quick Start pane provides the basic parameters required for setting up the Base Station. These include the unit IP address parameters, frequency and bandwidth, and AAA Server settings.

These parameters require re-starting the service (*) or rebooting the Base Station (!) as indicated. (See section 2.3.3). The necessary operation buttons are provided in the pane.

To set up the unit via the Quick Start pane

1. Click the **Quick Start** menu option. The **Quick Start** pane appears.



The following operation buttons are available:

- **Apply** – implements changes performed by the user.
- **Reboot** – reboot device and load SW from Preliminary bank
- **Stop Service** / **Start Service** – two buttons used when service restart is required.

2. Update the required parameters in the Pane:
   - Base Station IP Address, Subnet Mask and Default GW (requires reboot).
   - Base Station Center Frequency (requires service restart)
   - Base Station Bandwidth – Values: 3.5MHz, 5MHz, 7MHz, 10MHz (default)
   - Authentication Mode:
     - Null authentication – if this mode is selected, AAA Server parameters are not relevant.
     - PKMv2.0 – if this mode is selected, configure the AAA Server parameters
   - AAA Server IP Address, Server Port, Client ID and Client Secret (AAA User Defined password)
3. Click **Apply** to save the changes. *The parameters will not be uploaded to the Base Station until the appropriate Restart or Reboot operation was performed.*
4. Depending on the parameters that were modified, perform the relevant operation in order to update the changes to the Base Station:
   - Restart the service (*) – click **Stop Service** and then **Start Service**
   - Reboot the Base Station (!) - click **Reboot**.

NOTE: (If necessary), to restore the factory defaults, click the **Factory Default** button.

The GPS link state shows the status of the GPS link:

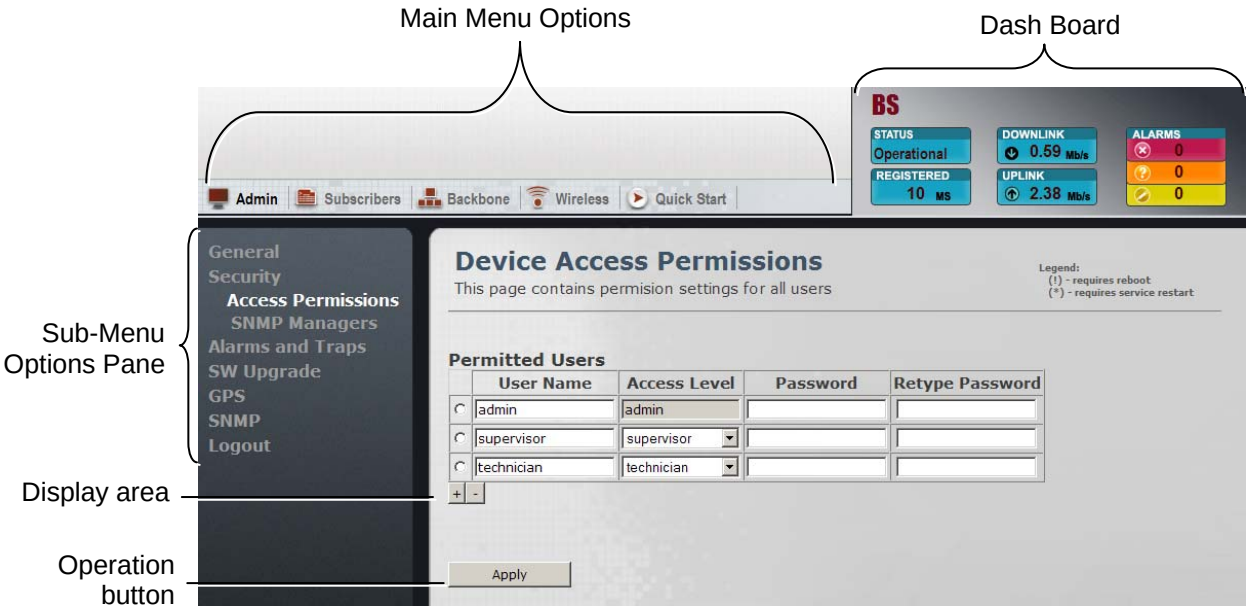
NOTE: By default, GPS operation is enabled. To disable GPS (i.e. for operation in the lab or testing), refer to section 4.6.

- Auto – Default. Base Station waits for GPS synchronization before beginning transmission. This is usually the normal operation mode for multi-sector systems.
- Start – Base Station begins transmission without waiting for GPS synchronization. Used for single sector systems or for testing. The Stop option is used to discontinue transmission.
- Stop – Used to discontinue transmission initiated by Start.

2.3 Navigating the Web Manager Screen

The Base Station management tool screens consist of four main areas:

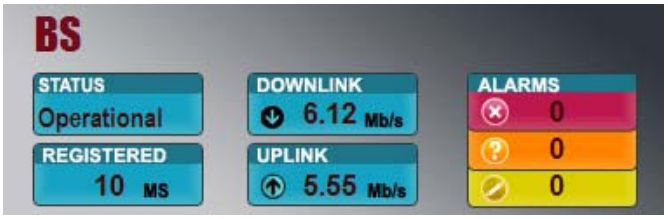
- **Dash Board** – Provides Base Station main status indications: Alarms, Up/Down rate, registration elapsed time, Base Station status. Clicking on the status items opens the relevant pane in the Display area.
- **Main Menu Options** – a set of menus, where clicking each menu displays the corresponding set of sub-menus in the Sub-Menu Options Pane.
- **Sub-Menu Options Pane** – a set of commands and sub-menus related to the selected menu option. Selecting a sub-menu item, displays the relevant options in the Work Area.
- **Display Area** – display corresponds to the selected sub-menu item.



2.3.1 Dash Board Options

The Dashboard is displayed on the Web Manager at all times, providing a glance view of vital parameters: Alarms, Up/Down rate, registration elapsed time, Base Station status.

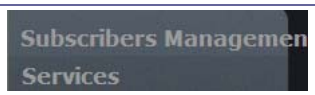
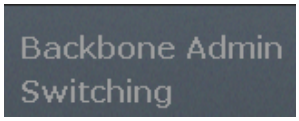
Clicking on the status items opens the relevant pane in the Display area.



Item	Click to open the..
Status – Current Tx Status	Base Station Main Status screen
Registered – Number of registered SS.	Subscriber Management screen
Downlink / Uplink– average rate of Down/Up link traffic.	Aggregate Throughput Statistics screen
Alarms – Provides a summary of the current number of system's raised alarms according to their severity.	System Alarms screen

2.3.2 Main Menu Options

Each of the menu options provides access to sub-menus displayed in the left window pane.

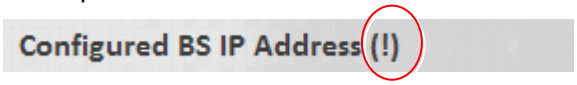
Admin - Access to general information on the base station (i.e. bandwidth, site details, access permissions etc.), SW upgrade and file management operations and activation settings, and Logout options	
Subscribers – Management of registered and provisioned SS and services (for Standalone operation mode).	
Backbone – Determine and set operation mode (Standalone / ASN-GW), Base Station and GW IP addresses; For *standalone* mode define Switching parameters; For *ASN-GW* mode define ASN-GW parameters.	

Wireless – Access to all WiMAX parameters configuration and diagnostics options.	
Quick Start – Access to all parameters required for initial set up of the system, depending on the operation mode (Standalone / ASN-GW).	

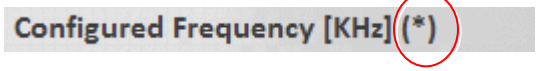
2.3.3 Modifying Parameters

Modified parameters are updated on the Base Station under three conditions, depending on the parameter:

- Some parameters do not require special operations - simply click **Apply** and they are updated on the Base Station.
- Some parameters affect the service – these are marked by an exclamation mark (!).

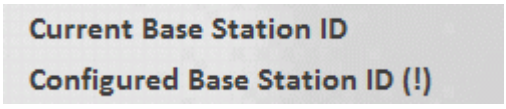
  To update these parameters, click **Stop Service** and then **Start Service** (in the **Quick Start** panel).
- Some parameters are updated after performing system reboot - these are marked by an asterisk (*****).

For parameters that require reboot or service restart, two values are displayed:

- The **current** value used by the Base Station.
- The **configured** value - typed by the user but not yet updated onto the Base Station. (Will be updated in the Base Station after the required restart/reboot operation).

  See example below.

2.4 Logout

Logging out from the session is done through the logout pane.

To access the Logout pane

1. Click the **Admin** menu option and then the **Logout** sub-menu option.
2. In the displayed Logout pane click the Logout button.

3 Backbone Configuration

The Base Station backbone parameters provide infrastructure settings of the system mode and other parameters. After configuring the system operation mode (Standalone or ASN-GW), the corresponding backbone parameters can be configured.

The following backbone configurations are described in this chapter:

- General parameters (system operation mode, Base Station and GW addresses)
- Standalone mode: Switching parameters and learned MAC addresses
- ASN-GW mode: Definition of ASN-GW to Base Station connection parameters (IP, tunneling, keep-alive)

3.1 Setting the Operation Mode

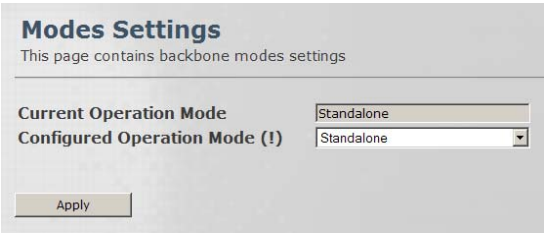
The system can operate in two configurations:

- *Standalone* mode
- *ASN-GW* mode (Default)

The operation mode defines whether system operation (such as QoS capabilities) are performed by the Base Station (Standalone mode) or by the ASN-GW (ASN-GW mode).

To access the Operation Mode pane

1. Click the **Backbone** menu option. The **Backbone Admin** sub-menu list is displayed in the Sub-Menu option pane.
2. From the **Backbone Admin** sub-menus choose **Operation Modes**. The Operation Modes pane is displayed.



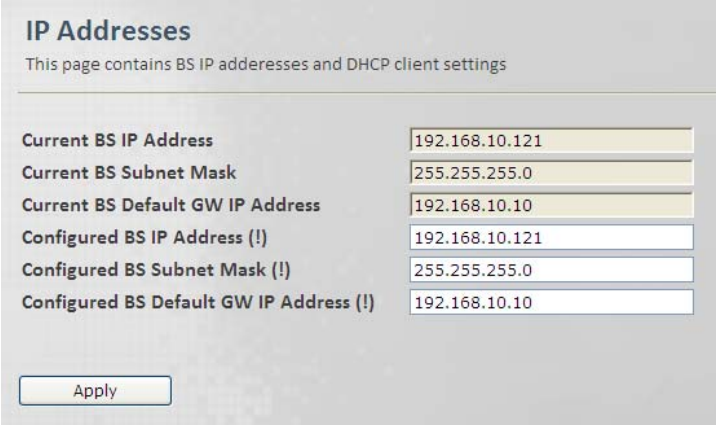
3. To change the system operation mode:
   - In the **Configured Operation Mode** field choose the required mode.
   - Click **Apply**.
   - Restart the service to reset the operation mode to the configured value.

3.2 Base Station and ASN-Gateway IP Address

The Base Station and ASN-GW IP addresses and subnet mask are configured via the IP Addresses pane..

To access the IP Addresses pane

1. Click the **Backbone** menu option. The **Backbone Admin** sub-menu list is displayed in the Sub-Menu option pane.
2. From the **Backbone Admin** sub-menus choose **IP Addresses**. The IP Addresses pane is displayed.



3. Define the required IP and subnet parameters and click **Apply.**
   - Base Station IP Address
   - Base Station Subnet Mask
   - Base Station Default GW IP Address
4. Restart the service to reset addresses according to the configured values.

3.3 Standalone: Switching parameters

The L2 switching related parameters define the L2 switching method, the MAC addresses table used by the switching mechanism, and the MAC addresses aging period (after which an unused MAC that appears in the table is ignored). These parameters are viewed and configured via the Backbone Switching sub panes.

3.3.1 Switching Settings

This pane provides configuration options for the L2 Switching mode and for the MAC address aging period.

To access the Switching Settings pane

1. Click the **Backbone** menu option and choose **Switching** and then **Switching Settings** from the sub-menus. The Switching settings pane is displayed.

2. Define the required parameters according to the following descriptions and click **Apply.**

Field	Description
Current/Configured Switching Mode	This parameter defines the traffic forwarding method: **L2 Switching** mode: traffic flooding is enabled. To dynamically learn about station locations, the Base Station listens to incoming frames and keeps a table of address information by inspecting the source MAC addresses. If the source MAC address is not in the address table already, it is recorded in the table. As a part of the forwarding decision, if destination MAC address is found, the frame can be forwarded to that address. If the address is not found in the table, the frame is flooded to all the CPEs (if it's a downlink packet) and to the CPEs and network interface (if it's an uplink packet). **Forward-to-router** mode (***To be used for testing purposes only!!!***): all traffic is forwarded to the upstream router (no flooding). Do NOT use it. Values: [L2 Switching; Forward-to-router]
MAC address Table Aging Time (300…1800) [sec]	Mac Address Table Aging period (in seconds), after which unused MAC address entries will be dropped. Values: 300-1800

3.3.2 MAC Addresses Table

This is a read-only pane, and displays the MAC addresses learned by the Base Station, that are used by the L2 switching mechanism.

To view the Switching MAC Addresses Table

1. Click the **Backbone** menu option and choose **Switching** and then **MAC Addresses Table** from the sub-menus. The MAC Addresses Table pane is displayed.

2. The displayed information details are provided in the following table:

Field	Description
Index	Unique identifier
MAC Address	Base Station learned MAC addresses
TTL	Time to Live (for datagrams in the network)
Interface	Type of interface

3.4 ASN-GW Mode: ASN Settings

When the Base Station is in ASN-GW mode, it is required to define the backbone ASN-GW parameters. These include the ASN-GW IP address, tunneling method (between the Base Station and the ASN-GW), and the Base Station ←→ ASN keep-alive intervals.

3.4.1 ASN-GW Link Settings

This pane provides configuration options for the ASN-GW IP and R6 parameters.

To access the ASN-GW Settings pane

1. Click the **Backbone** menu option and choose **ASN Settings** and then **ASN-GW Settings** from the sub-menus. The ASN-GW settings pane is displayed.

2. Define the required parameters according to the following descriptions and click **Apply.**

Field	Description
ASNGW IP Address	IP address to be used after configuration flashing or reboot.
Current R6 Flavor	Type of R6 tunneling used between the Base Station and the ASN-GW (e.g. CiscoXXXXXX)

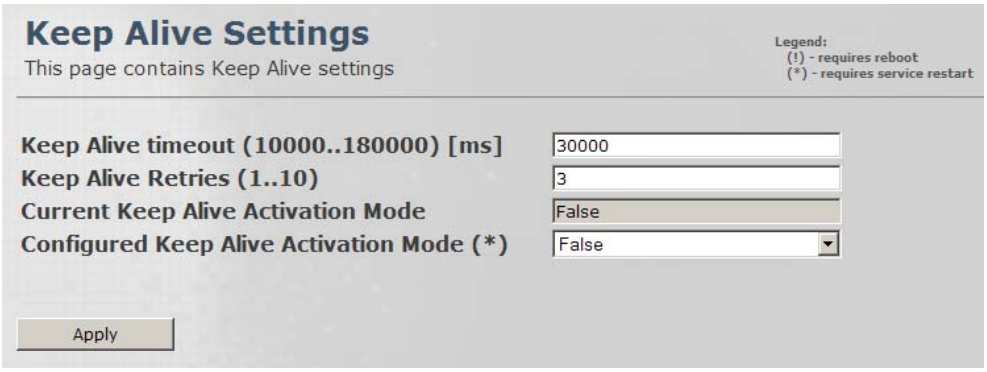
3. If the IP address has been configured, restart the service for the changes to be applied.

3.4.2 Keep Alive Settings

This pane provides configuration options for the keep-alive messages intervals and retries protocol.

To access the Keep Alive Settings pane

1. Click the **Backbone** menu option and choose **ASN Settings** and then **Keep Alive Settings** from the sub-menus. The Keep Alive settings pane is displayed.



2. Define the required parameters according to the following descriptions and click **Apply.**

Field	Description
Keep Alive timeout (10000..180000) [µs]	This value indicates the time interval (in µSec) that a Base Station waits for the keep-alive response before keep-alive request re-transmission.
Keep Alive Retries (1..10)	Max number of keep-alive re-transmissions
Keep Alive Activation Mode	Enable / Disable Keep Alive activation. Values: [True, False]

3. If the **Keep Alive Activation Mode** has been configured, reboot the Base Station for the changes to be applied.

4 Administration

The following administration operations are described in this chapter:

- View system information
- Configure traps and SNMP options
- Configure access permissions
- Software version update operations

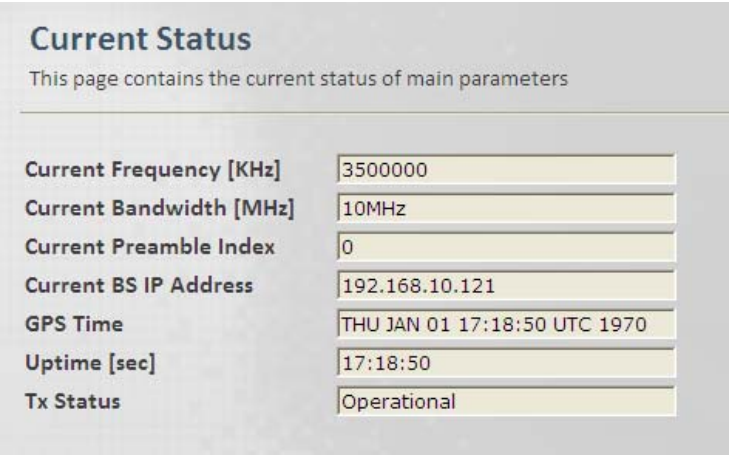
4.1 Viewing Device Status and Information

4.1.1 Main Status Pane

This pane provides status (read-only) information on the Base Station communication parameters.

To access the Main Status pane

1. Click the **Admin** menu option. From the **General** sub-menus choose **Current Status**. The Main Device Statuses pane is displayed.



2. The displayed information details are provided in the following table:

Field	Description
Current Frequency [KHz]	Current Frequency in KHz
Current Bandwidth [MHz]	Current Operative BW in Mhz; Must be one of the supported BWs
Current Preamble Index	Current Operative Preamble Index
Current Base Station IP Address	Current Base Station IP Address
Current ASN-GW IP Address	Current ASNGW IP Address
GPS Time	Time & Date in UTC; Source is Base Station GPS
Uptime [sec]	Running Time [sec] (from last restart)
Tx Status	Shows status of system operation.

4.1.2 Device Info

This pane provides Base Station hardware identification information (read only) such as Device Serial Number, Manufacturer identifier, etc.

To access the Device Info pane

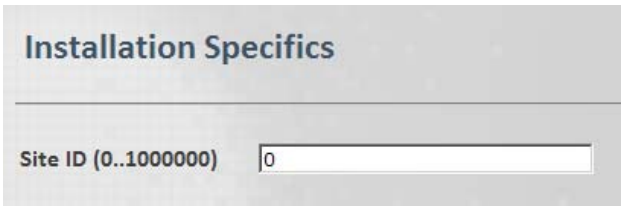
Click the **Admin** menu option and then the **General** sub-menu option. From the **General** sub-menus choose **Device Info**. The Device Info pane is displayed.

4.2 Base Station Identification Information

This information includes the site ID, Base Station location and antenna details.

To define Base Station identification information

1. Click the **Admin** menu option, the **General** sub-menu option and then choose **Installation Specific**. The Installation Specifics

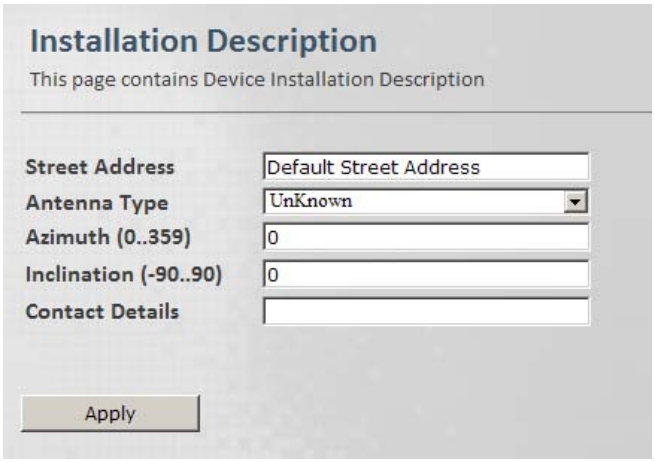


2. Define the **Site ID** as defined by the Network Operator and click **Apply.**

   Several Base Station may have the same site ID. Values: [0,1000000]

3. Enter more descriptions on the location of the Base Station:

   - Choose **Installation Description** (from the Admin menu, General sub-menus). The Installation Description pane appears.



   - Define the fields and click **Apply:**
     - Address of Base Station (up to 30 characters)
     - Antenna type: Omni, Directional or Unknown
     - Antenna Azimuth in degrees, as configured by the installer: 0 to 359
     - Inclination: Vertical inclination of antenna in degrees, as configured by the installer. Values: [-90,90]
     - Contact details: name, telephone ,etc. of service person that can be contacted.

4.3 Security

The Base Station is secured through access permissions and SNMP definitions. Up to three authentication levels are supported, where additional users can be defined according to the default authentication profiles.

4.3.1 Available Authentication Levels

Three authentication levels are available:

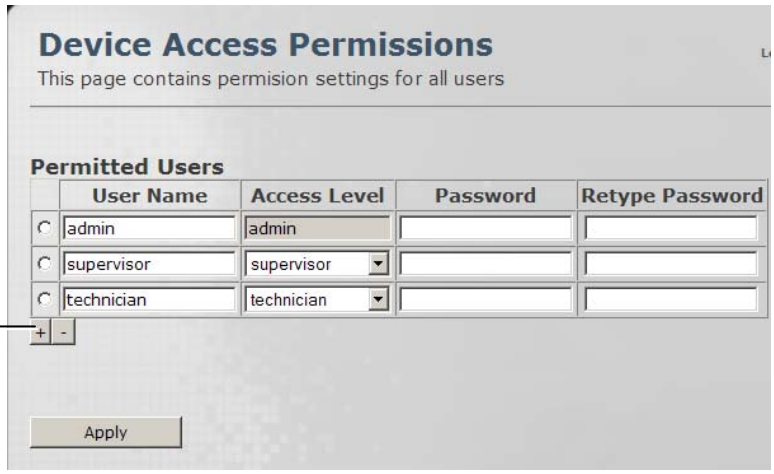
- Admin – highest level. Has access to all read and write options, including user definitions.
- Supervisor – has access to all Read and Write options except for User Definitions.
- Technician – has access to all Read options and limited access to configuration options.

4.3.2 Defining Users and their Access Permissions

This pane is used by the system administrator to define Base Station users granted with relevant permissions.

To view the Access Permissions pane

1. Click the **Admin** menu option and then the **Security** sub-menu option. From the **Security** sub-menus choose **Access Permissions**. The Access Permissions pane is displayed.



2. To Add a user:
   - Click the “+” sign at the bottom of the Users Table.
   - Enter the new User Name.
   - Select the relevant access level for that user.
   - Enter and retype the Password.
   - Click **Apply**.

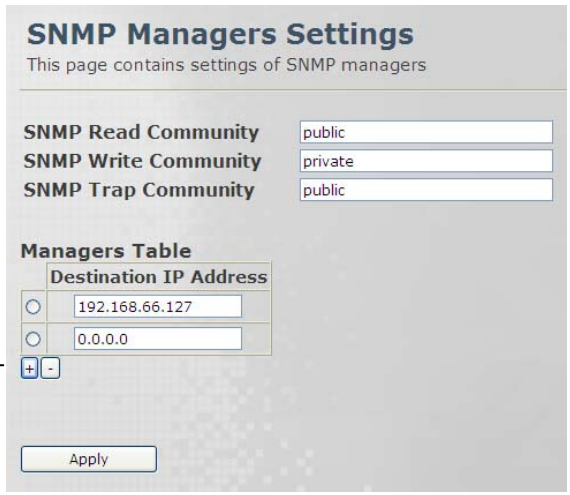
4.3.3 SNMP Settings and Trap Destination Addresses

This pane is used to define the IP destination addresses and the minimal severity of events sent to the corresponding IP Address destination.

Up to five IP Destination Addresses can be defined.

To access the SNMP Managers pane

1. Click the **Admin** menu option and then the **Security** sub-menu option. From the **Security** sub-menus choose **SNMP Managers**. The SNMP Managers pane is displayed.



2. Define the required parameters according to the following descriptions.
   - SNMP Read Community - can be used as a password to secure information retrieval.

     Public – no password (default)

     Private – password can be assigned
   - SNMP Write Community - can be used as a password to secure performing set commands.

     Public – no password (default)

     Private – password can be assigned
   - SNMP Trap Community - You can configure the SNMP service to send a trap when it receives a request for information that does not contain the correct community name and does not match an accepted host name.

     Public – no password (default)

     Private – password can be assigned
3. Add the IP Destination Addresses – these are the addresses to which traps will be sent:
   - Click the + sign to add a row to the table.

     Note: To remove the last row, click the "–" sign. To remove a selected row, mark the required row and then click the "–" sign.
   - Define the IP Destination Address to which the traps will be sent and click **Apply.**

4.4 Alarms and Traps

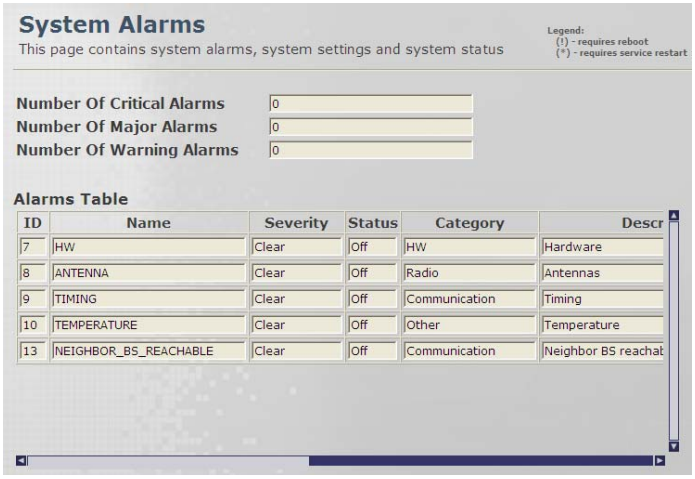
Use the Web Manager to view a summary of the currently generated alarms. You can also disable irrelevant alarms.

4.4.1 Viewing a Summary of System Alarms

This read-only screen provides a summary of the current system alarms.

To access the Alarms pane

1. Click the **Admin** menu option and then the **Alarms and Traps** sub-menu option. From the **Alarms and Traps** sub-menus choose **Alarms**. The System Alarms pane is displayed.

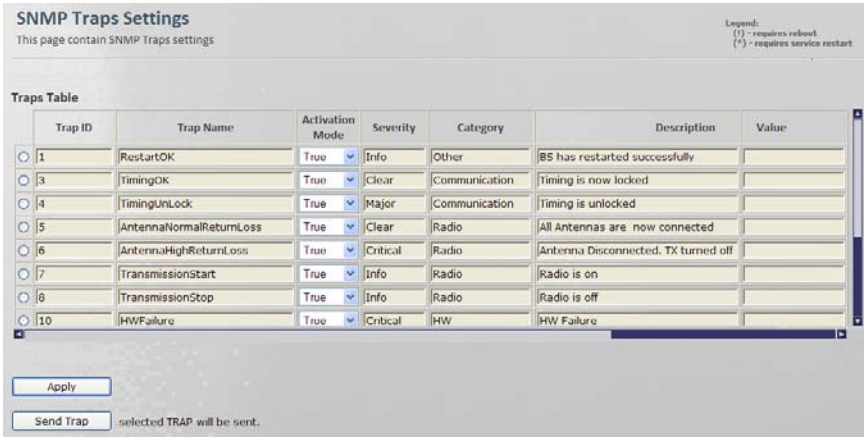


4.4.2 Traps – SNMP Trap Settings

Use this pane to select the traps that will be supported by this Base Station.

To access the Traps pane

1. Click the **Admin** menu option and then the **Alarms and Traps** sub-menu option. From the **Alarms and Traps** sub-menus choose **Traps**. The SNMP Traps Settings pane is displayed.



2. Select the traps to be supported by this unit as follows:
   - Set the **Activation Mode** of the relevant trap to **True**.
   - Click **Apply.**

Note: Use the **Send Trap** button to send the trap to the defined Destination Addresses.

4.5 Software Versions Management

Two software versions are stored on the Base Station s:

- One in the Main Directory
- One in the Secondary Directory

The Base Station can run software from either the Main or the Secondary directory as determined by the user; however, software from the Main directory is always run upon Base Station reboot or reset.

Therefore, it is recommended to run the desired software from the Main directory.

The software components saved in one directory can be copied to the other directory, allowing the user to save backups of software versions and to restore or update versions as required.

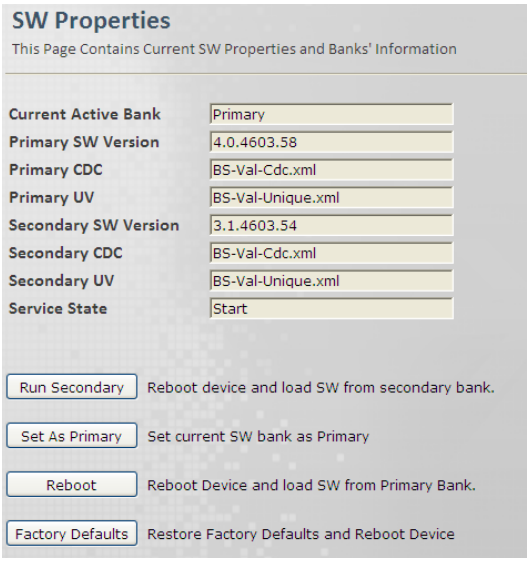
This sections describes how to perform these operations, navigating between both directories and external URL locations.

4.5.1 Activating Software Versions

This pane shows which software versions are currently loaded and provides options for switching between the main and secondary software versions.

To access the SW Operations pane

1. Click the **Admin** menu option and then the **SW Upgrade** sub-menu option. From the **SW Upgrade** sub-menus choose **SW Properties**. The SW Properties pane is displayed.



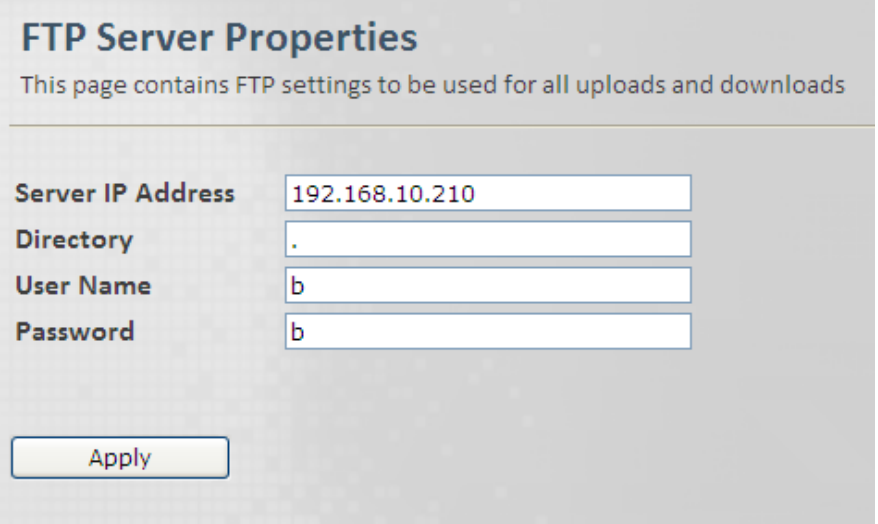
2. The following information is provided:
   - Current Active Bank - Primary or Secondary.
   - Primary SW version
   - Primary CDC
   - Primary UV
   - Secondary SW version
   - Secondary CDC
   - Secondary UV
   - Service State
3. The following operations can be performed:
   - **Run Secondary -** Reboot device and load from secondary
   - **Set as Primary -** Set current running SW as Primary
   - **Reboot -** Reboot device and load from main
   - **Factory Defaults –** Restore factory setup

4.5.2 FTP Server Configuration

Use this pane to define the location and access information of the FTP server in which software versions are stored.

To define the FTP Server parameters

1. Click the **Admin** menu option and then the **SW Upgrade** sub-menu option. From the **SW Upgrade** sub-menus choose **FTP Server**. The FTP Server Properties pane is displayed.



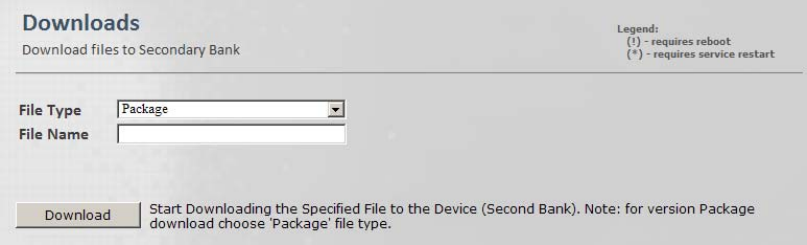
2. Define the FTP server parameters described below and click **Apply**:
   - Server IP Address
   - Directory – directory in which files are located
   - User Name and Password – your FTP User Name and Password.

4.5.3 Downloading Software Versions

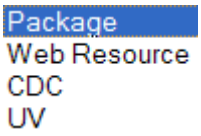
This pane is used to download a new SW version from the FTP server to the Base Station Secondary SW directory.

To download SW to the Base Station Secondary SW directory

1. Click the **Admin** menu option and then the **SW Upgrades** sub-menu option. From the **SW Upgrades** sub-menus choose **Downloads**. The SW Downloads pane is displayed.



2. Select the Type of File to be downloaded:



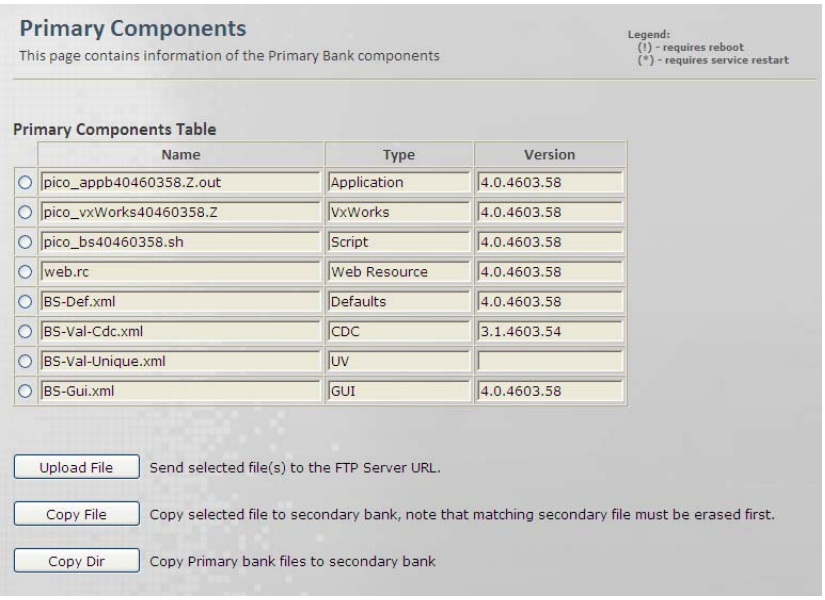
3. In the Download **File Name,** enter the name of the file to be downloaded.
4. Click **Download.** The specified file will be downloaded from the predefined FTP server to the BTS Secondary SW directory.

4.5.4 Managing Main Software Components

This pane provides options for copying selected Main software files to a user defined URL or to the Base Station Secondary software directory.

To access the Primary Bank (Main Version) pane

1. Click the **Admin** menu option and then the **SW Upgrade** sub-menu option. From the **SW Upgrade** sub-menus choose **Primary Bank**. The SW Primary Version Components pane is displayed.



2. Update the required parameters in the Pane table according to the following descriptions.

Field	Description
Name	SW Component Name (e.g. Base Station -GUI, etc.)
Type	Type of the SW component. Values: Package, Application, VxWorks, Blob, Script, Web Resource, Defaults, CDC, Regulation, UV, GUI
Version	SW Component Version

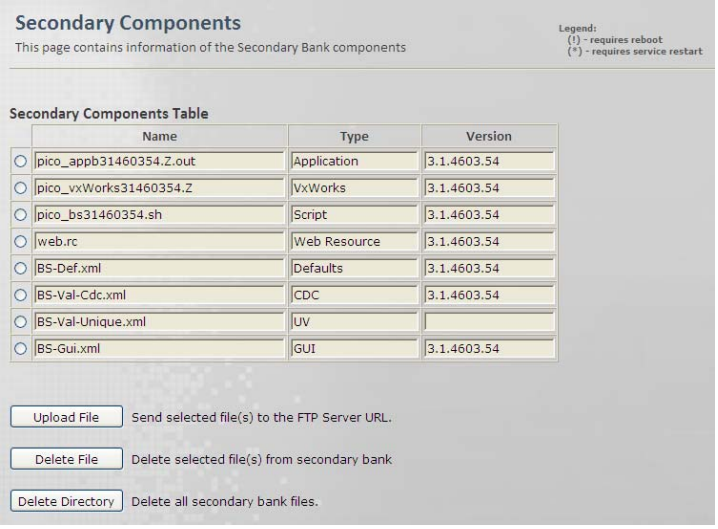
3. Click one of the buttons:
   - **Upload File -** Send selected files to the specified URL
   - **Copy File -** Copy selected file to secondary.
   - **Copy Dir -** Copy main zone files to secondary zone.

4.5.5 Managing Secondary Software Version Files

This pane provides options for uploading selected Secondary software version files to a specified URL and for removing selected files.

To access the Secondary Bank (Version) pane

1. Click the **Admin** menu option and then the **SW Upgrade** sub-menu option. From the **SW Upgrade** sub-menus choose **Secondary Bank**. The SW Secondary Bank Components pane is displayed.



2. Update the required parameters in the Pane table according to the following descriptions.

Field	Description
Name	SW Component Name (e.g. BSP, CPLD)
Type	Type of SW component. Values: Package, Application, VxWorks, Blob, Script, Web Resource, Defaults, CDC, Regulation, UV, GUI
Version	SW Component Version

3. Click one of the buttons:
   - **Upload File -** Send selected files to the specified URL
   - **Delete File -** Delete selected file from the secondary storage.
   - **Delete Directory -** Delete all secondary files.

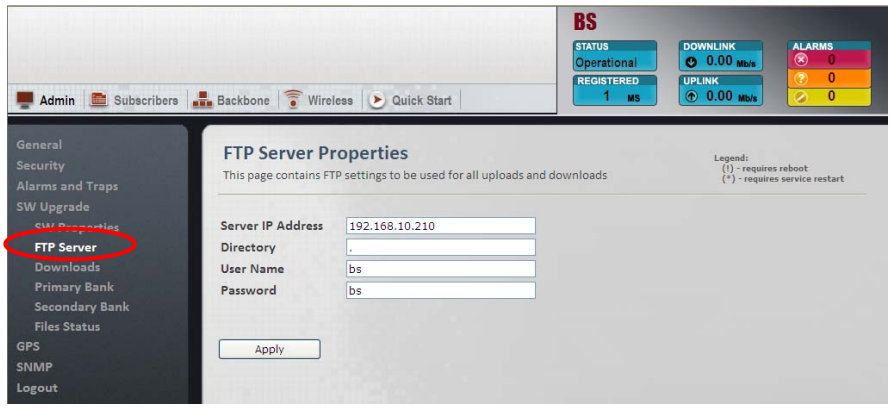
4.5.6 Upgrade from Version 3.0.4602.yy

This procedure consists of the following steps:

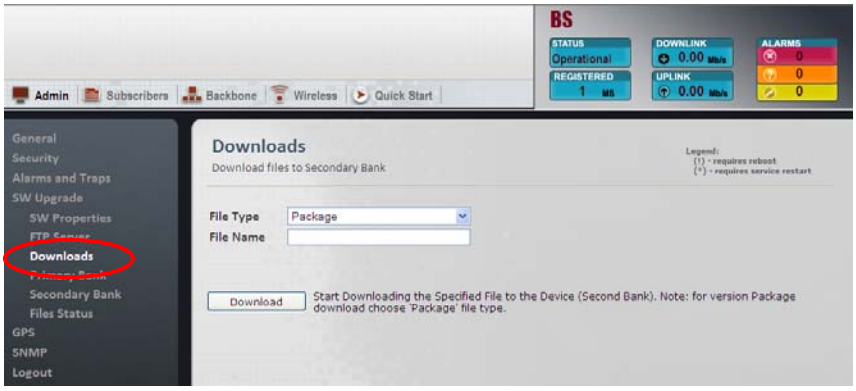
1. Automatically loading a set of files as a package to the secondary directory
2. Running the version and verifying unit operation.
3. Setting the version to run from the Main directory.

4.5.6.1 Loading the New Version to the Secondary Directory

1. Configure FTP server from which the new software file will be downloaded:
   - From the **Admin** menu, select **SW Uprade** and choose **FTP Server.**

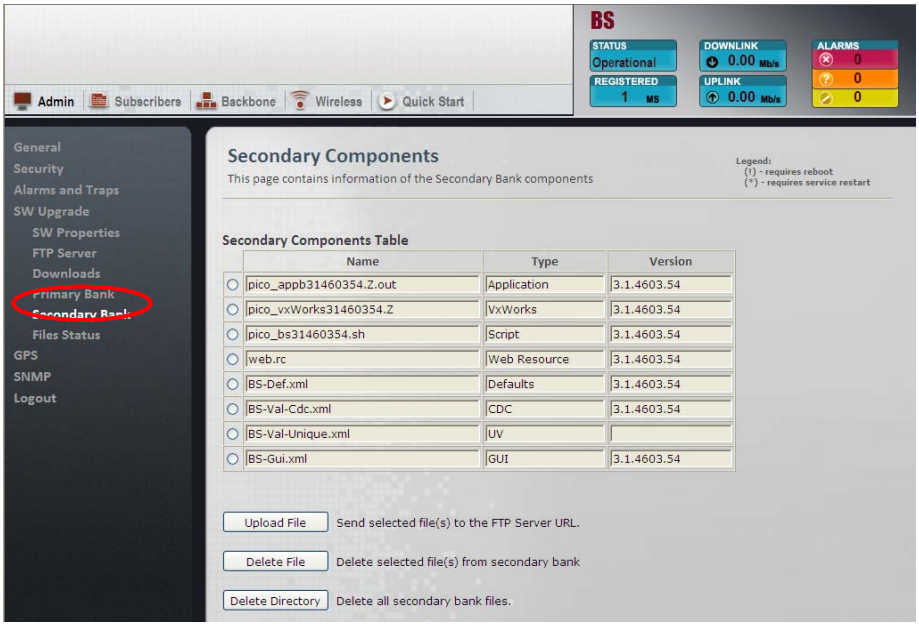


   - Type the IP of the FTP server.
   - Type the directory on which the software file is stored
   - Type your FTP Server User Name and Password.
   - Click **Apply.**
2. Download the files to the Secondary Directory by doing the following:
   - In the left pane, under **SW Upgrade**, click **Downloads**.



   - Select the **File Type** as **Package.**
   - Click **Download** to begin the process.

3. Verify that the downloaded version is saved into the Secondary Directory:
   - Under **SW Upgrade,** choose **Secondary Bank.**

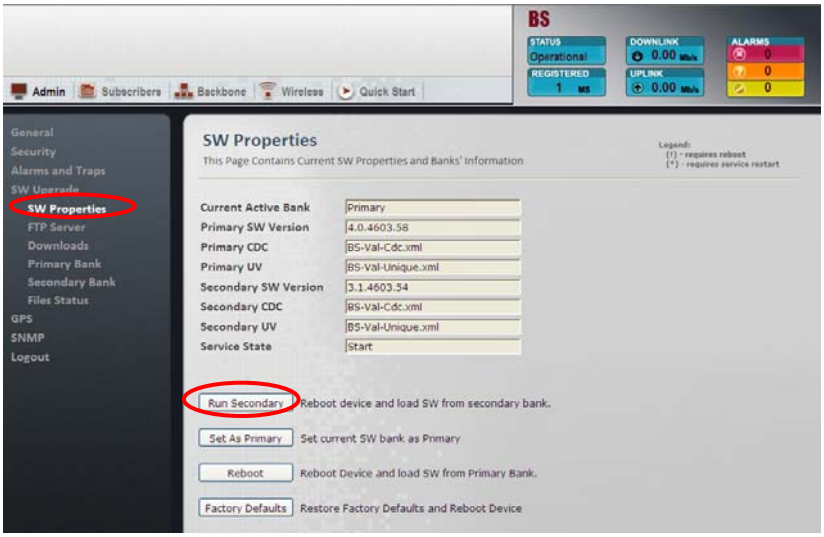


   - Under **Secondary Components Table**, verify that the software components are downloaded to the Secondary directory.

4.5.6.2 Running the New Software Version

Run the Secondary software version:

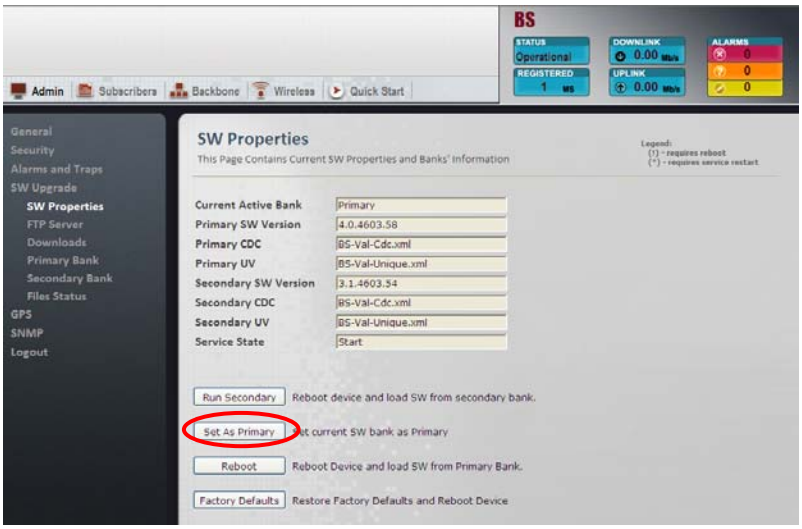
- Under **SW Upgrade**, choose **SW Properties**.



- Click **Run Secondary**. The Base Station will reset and the Secondary files will be loaded. This will take about 2 minutes.

4.5.6.3 Setting the Version to Run from the Primary Directory

Click **Set as Primary**. The software files will run from the Primary directory.



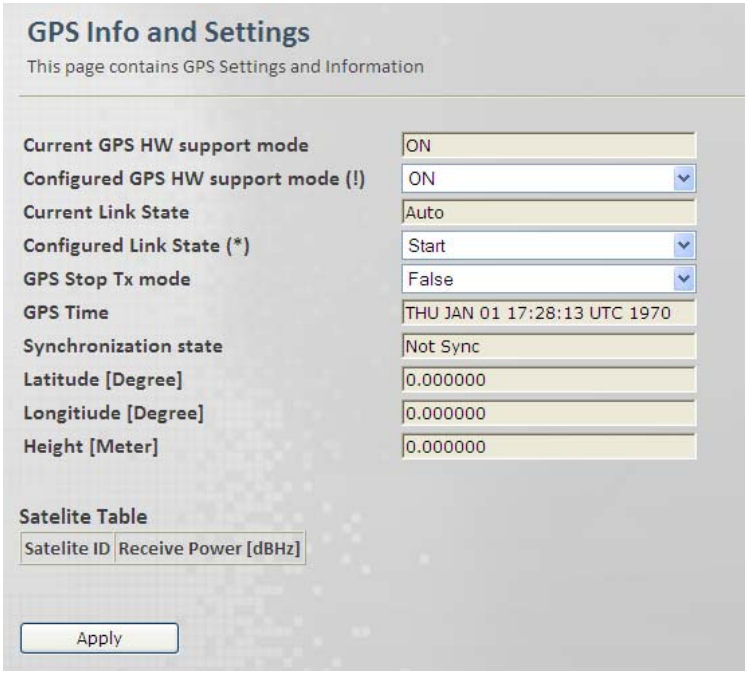
The Software Upgrade procedure is now complete.

4.6 GPS Settings

The Base Station is set up by default, to operate with GPS. This section provides instructions on disabling the GPS for troubleshooting purposes or for lab operation conditions.

To access the GPS Info and Settings pane

1. Click the **Admin** menu option and then the **GPS** sub-menu option. From the **GPS** sub-menus choose **Info and Settings**. The GPS Info and Settings pane is displayed.



2. To disable (or re-enable) the GPS, set the GPS HW Support mode and click **Apply**:
   - OFF - used in special cases. System does not attempt to synchronize with GPS. For example, for maintenance, or installations with a single Base Station. Or in cases where GPS is not relevant and we do not want device to continuously attempt to synchronize.
   - ON – normal operation.
3. To troubleshoot or for maintenance, use the Link State option – used for troubleshooting or for turning off Tx during maintenance. (Values: Stop, Start, Auto)
   - Auto – Default. Transmission is codependent on GPS and cannot be interrupted. Tx is stopped only if GPS is not synchronized (not controlled by user).
   - Start and Stop – used to start and stop Tx.
4. Set the GPS Stop Tx mode - Determine if the Base Station will continue transmitting after hold over.
   - False – off. Default.
   - True – on. Base Station continues transmitting after hold-over.

5. The remaining parameters are read-only and provide information on the GPS status and location.

5 QoS Management

NOTE: The QoS capabilities are only relevant for *Standalone* configuration. In ASN-GW mode, QoS management is performed through the ASN-GW.

By default, Subscriber Stations (SS) are assigned a Best Effort (BE) service profile for the UL and DL channels. Only the maximum bandwidth can be configured for the default service profile.

In addition, any SS can be assigned a number of user defined uplink and downlink Service Flows (SF) that together make up the service profile corresponding to the QoS requirements of that SS.

For example, a profile can consist of the following service flows: a flow matching VoIP needs, another matching video conferencing needs and a third matching web browsing needs.

The service flows are defined and allocated as SS profiles through the **Subscribers** set of screens.

5.1 QoS Definition Flow

The steps below summarize the procedure for defining SFs and assigning them to SSs (as a QoS profile):

1. Define a set of Service Flows (SFs) for the UL and for the DL.
2. For each SF define the relevant attributes: Classification-Rule-Priority, Scheduling, Min and Max rates, Latency, etc.
3. For each defined SF, you may define relevant classifiers. These are used to determine the traffic to which this rule (SF) will be applied.

   The traffic can be defined according to the source of traffic or according to the type or any (logical OR) combination: DSCP range, port range, IP address source or destination, etc.
4. Define the MAC address of the SS to which the SFs will be assigned.
5. Define a QoS profile to the selected SS by assigning it the relevant Service Flows.

Note: For every SF change, it is required to perform service-restart to any CPE to which that SF has been allocated.

5.2 Defining Service Flow(s)

Any number of service flows can be defined for the uplink and for the downlink. The Service Flows are defined via the **Unicast Services Setting** screen.

5.2.1 The Unicast Service Pane

The Unicast Service Settings pane is used to define a pool of Service Flows, where each flow can be assigned a range of attributes. Selected SFs are then assigned to defined Subscriber Stations to create SS specific profiles.

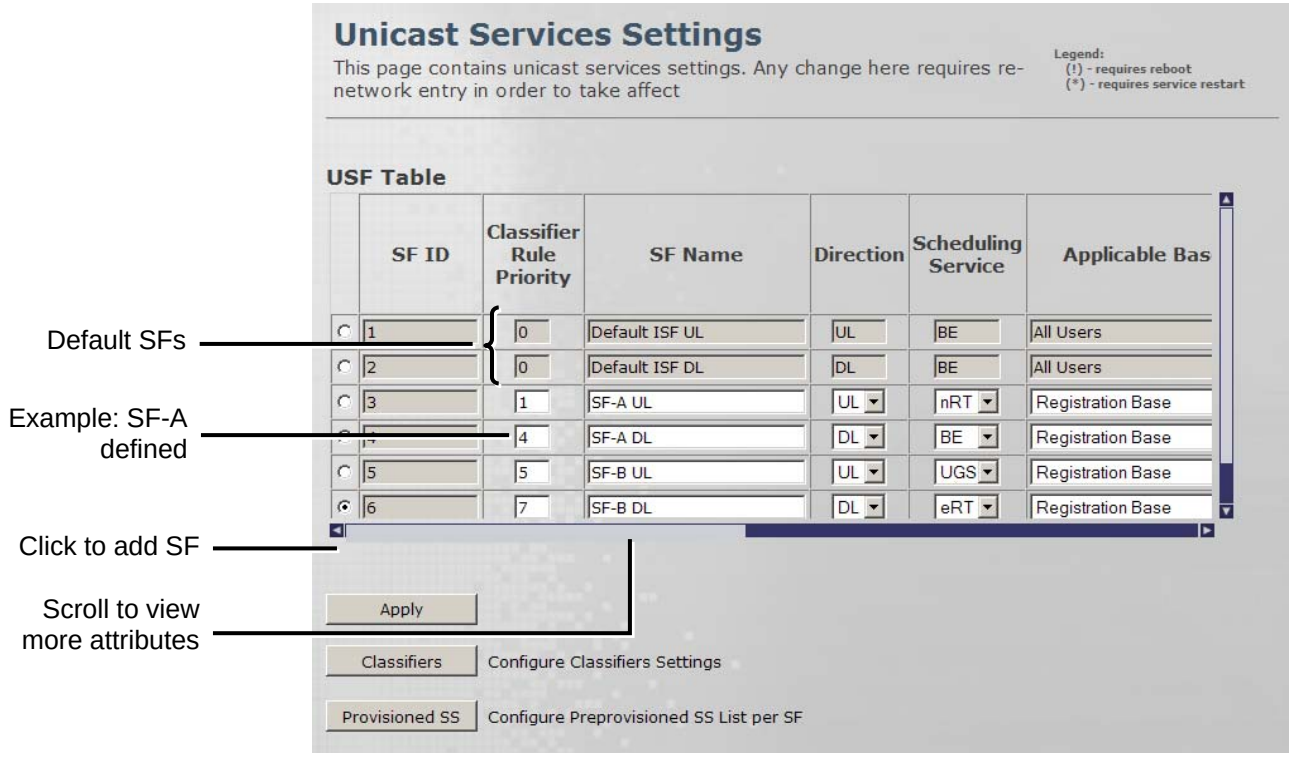
To access the Unicast Services pane

Click the **Subscribers** menu option, from the Subscribers sub-menus choose **Services**. The **Unicast Services Settings** pane appears.

The pane lists the two default SFs and provides options adding more SFs.

The following operation buttons are available:

- **Apply** – implements changes on the selected row.
- **Classifiers** – invokes classifier-definition-screen (relevant to the selected row).
- **Provisioned SS** – shows the SS associated with the selected SF.



Working with the Unicast Service Settings pane

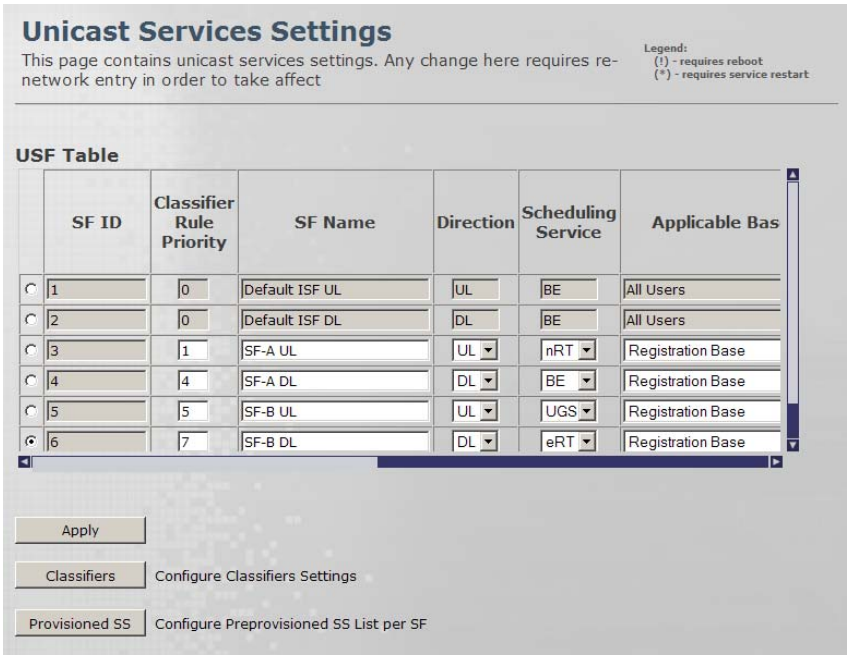
- The top two rows display the default (BE) UL and DL Service Flows and their attributes. Only the Max BW value can be modified for the default SFs.
- Up to 30 rows can be added (by clicking the '+' sign).
- Each SS can be assigned up to 4 SFs
- To add a Service Flow, click the (+) sign at the bottom of the table, define the parameters and click **Apply.**
- To delete a Service Flow – select the radio-button in the relevant row and click the (-) sign at the bottom of the table.
- After performing any change in SF definition, the CPE is required to re-access the network for changes implementation.

5.2.2 Defining Service Flows

The default SF do not provide QoS to the Subscriber Station. QoS is only provided by assigning the SS a profile based on the user defined Service Flows. This section describes how to define SFs and the available attributes.

To define a Service Flow

1. Click the **Subscribers** menu option, from the Subscribers sub-menus choose **Services**. The **Unicast Services Settings** pane appears.



2. Add an SF (row) by clicking the (+) sign.
3. Configure the SF attributes according to the descriptions in the following table and then click **Apply**.

Note: If Classifiers are to be assigned, click the **Classifiers** button AFTER clicking **Apply**.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>SF ID</td><td>Read only. Service Flow ID automatically provided by the system after applying the changes.</td></tr>
<tr><td>Classification Rule Priority</td><td>Classification rule priority: 0 to 255
The Priority Level determining how the SF data will be classified.
The same priority can be assigned to an UL and to a DL SF. The Classification Rule Priority must be unique for each SF UL or SF DL. This parameter is related to the selected classifer.</td></tr>
<tr><td>SF Name</td><td>User assigned unique name identifying the Service Flow. The name should include the SF direction (UL or DL).</td></tr>
<tr><td>Direction</td><td>Direction to which SF is assigned - Downlink or Uplink</td></tr>
<tr><td>Scheduling Service</td><td>Service Scheduling Flows supported by WiMAX.
<table>
<tr><th>Service Flow Designation</th><th>Defining QoS Parameters</th><th>Application Examples</th></tr>
<tr><td>UGS - Unsolicited Grant Services</td><td>Maximum sustained rate
Maximum latency tolerance
Jitter tolerance</td><td>Voice over IP (VoIP) without silence suppression</td></tr>
<tr><td>RT – Real-Time Polling service</td><td>Minimum reserved rate
Maximum sustained rate
Maximum latency tolerance
Traffic priority</td><td>Streaming audio and video, MPEG (Motion Picture Experts Group) encoded</td></tr>
<tr><td>nRT – Non-Real-Time Polling service</td><td>Minimum reserved rate
Maximum sustained rate
Traffic priority</td><td>File Transfer Protocol (FTP)</td></tr>
<tr><td>BE – Best-effort service</td><td>Maximum sustained rate
Traffic priority</td><td>Web browsing, data transfer</td></tr>
<tr><td>eRT – Extended-Real-Time Polling service</td><td>Minimum reserved rate
Maximum sustained rate
Maximum latency tolerance
Jitter tolerance
Traffic priority</td><td>VoIP with silence suppression</td></tr>
</table></td></tr>
<tr><td>Applicable Base</td><td>Determines the group of subscribers to which the SF will be assigned.
Registration Base - assigns the SF to the explicitly configured (registered) SS.
All Users - this SF will be applied to all subscribed SSs. Select this option to set this as the default profile.</td></tr>
<tr><td>Min Rate [Kbits/sec]</td><td>Minimum bandwidth rate for this SF.</td></tr>
</table>

Max Rate [Kbits/sec]	Maximum rate for this SF. A value of '0' provides unlimited rate.
Max Latency [µsec] (UGS, RT, eRT)	Relevant only for UGS, RT and eRT. A value of '0' does not put a limit on latency. Maximum Latency (delay) for this SF. Set value according to the type of service (i.e. <100ms for Voice and Video applications.
Unsolicited Grant [µsec] Interval (UGS, eRT)	Relevant if the UGS – UGI - TBD A value of '0' provides unlimited UGI.
Tolerated Jitter (UGS only) [µsec]	the UGS tolerated jitter parameter…. A value of '0' does not put a limit on jitter.
Unsolicited Polling Interval (RT, nRT) [µsec]	The maximal nominal interval between successive polling grants opportunities for this Service Flow, especially used for silence period of VoIP traffic with silence suppression.
Has Classifiers	Read only. Displays whether or not this SF is assigned Traffic Classifiers. Values: [True, False] To configure the SF Classifiers see 5.2.2.2.

4. If required, define the Traffic classifiers according to the following section.
5. Reset the SS-Base Station connectivity:

   Resetting the connection of a single SS (in case the SF is applied on a *Registration Base*):

   - Click the **Subscribers** menu option. Choose the **Subscriber Management** sub-menu and then the **Registered SS**.
   - In the displayed **Registered SS Information** pane select the radio button of the requested SS and click the **Deregister** button.

   Resetting the connection of *all* registered SSs (in case the SF is applied to *All Users*):

   - Click the **Quick Start** menu option.
   - In the displayed **Quick Start** pane click the **Stop Service** button, and then click the **Start Service** button.

5.2.2.1 Bandwidth Latency and Jitter Guidelines

Class	Application	Bandwidth Guideline		Latency Guideline	Jitter Guideline
4	Web Browsing & Instant Messaging	Moderate	10 kbps to 2 Mbps	N/A	N/A
5	Media Content Downloads	High	> 2 Mbps	N/A	N/A

Class	Application	Bandwidth Guideline		Latency Guideline		Jitter Guideline	
1	Multiplayer Interactive Gaming	Low	50 kbps	Low	< 25 msec	N/A	
2	VoIP & Video Conference	Low	32 to 64 kbps	Low	< 160 msec	Low	<50 msec
3	Streaming Media	Low to High	5 kbps to 2 Mbps	N/A		Low	<100 msec

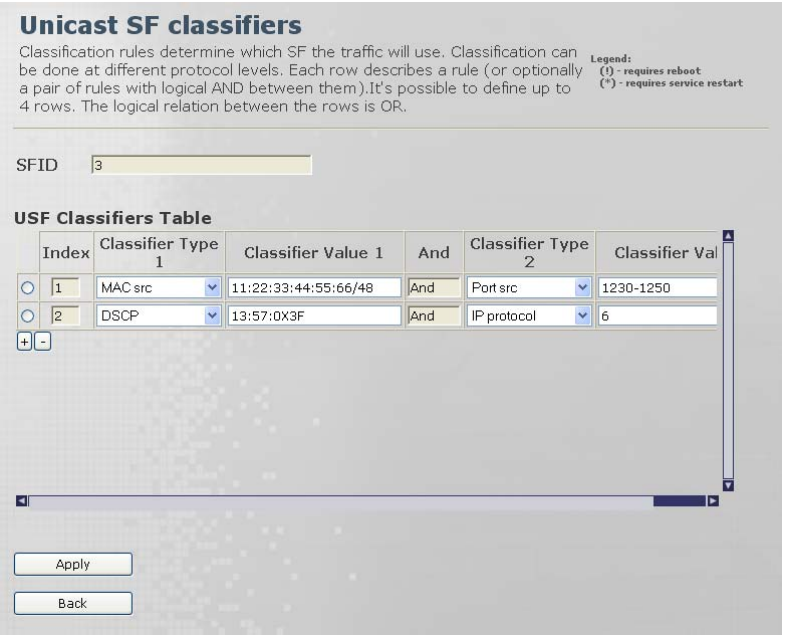
5.2.2.2 Defining Traffic Classifiers for the SF

The Unicast Classifier pane is used to select the traffic to which the SF will be applied. The traffic can be selected according to various parameter types: traffic source and destination, DSCP and IP protocol.

Up *to four classifiers* can be defined for *each SF* where the data is analyzed according to each of the classifiers (logical 'OR') assigned to the SF. Each classifier consists of either one or two filtering values (e.g. traffic source from a specific IP address and a specific Port, DSCP range of traffic type, etc.), where the classifier is defined according to *both* (logical 'AND').

To define Unicast SF Classifiers

1. (If you are not already in the Unicast Services pane), access the **Unicast Services** pane (by clicking the **Subscribers** menu option and choosing **Services** from the sub-menu).
2. Select the relevant SF row and click the **Classifiers** button. The **Unicast SF Classifiers** screen appears.



The following operation buttons are available:

- **Apply** – used to apply changes to selected classifier
- **Back** – go back to the SF screen (to choose another SF).

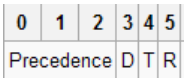
3. Click the '+' sign to add a new row.
4. Update the required parameters in the Pane table according to the following descriptions and click **apply** to implement the changes *for each row*.

NOTE: Once the classifier for the SF has been defined, the SF configuration is complete and the SF can be assigned to the desired SSs.

The following table provides a description of the Classifier types and values. The Type and Values are the same for Classifier 1 and for Classifier 2.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Index</td><td>Read Only. Unique number, assigned by the system after applying the changes.</td></tr>
<tr><td>Classifier Type 1/2</td><td>Type of traffic classifier.
Values:
 

DSCP Range Mask (DSCP field, providing differentiated services codepoint.) The DSCP is actually the first six-bits of the TOS (Type of Service) byte of the IP packet header)
MAC address (Source/Destination);
IP address (Source/Destination);
Port Range (Source/Destination);
IP Protocol (IP header field determining the protocol (TCP/ UDP/…)</td></tr>
<tr><td>Classifier Value 1/2</td><td>The specific traffic-classification value, in accordance to the Classifier Type 1 field. Below are descriptions and examples of values according to the classifier type:
<table>
<tr><th>For…. (Classifier Type)</th><th>Classifier Value Description</th><th>Classifier Value Example</th><th>Comment</th></tr>
<tr><td>MAC (src/dest)</td><td>MAC/Mask</td><td>11:22:33:44:55:66/48</td><td>/Mask is optional</td></tr>
<tr><td>IP address (src/dest)</td><td>IP/Mask</td><td>192.168.1.1/32</td><td>/Mask is optional</td></tr>
<tr><td>Port Range (src/dest)</td><td>port range</td><td>1230-1250</td><td></td></tr>
</table>
</td></tr>
</table>

Field	Description			
	DSCP Range Mask	toslow:toshigh:tosmask (range of TOS values followed by the TOS mask)	13:57:0x3F	 **3 bits:** IP precedence bits value: 0-7, Indicate datagram importance. Default - 0 (higher is better). **Bits 3,4,5**: Values: D,T,R **requesting**: low delay, high throughput, high reliability
	IP Protocol	IP Protocol	6	6 is TCP range:0-255

5. Reset the SS- Base Station connectivity:

   Resetting the connection of a single SS (in case the SF is applied on a *Registration Base*):

   - Click the **Subscribers** menu option. Choose the **Subscriber Management** sub-menu and then the **Registered SS**.
   - In the displayed **Registered SS Information** pane select the radio button of the requested SS and click the **Deregister** button.

   Resetting the connection of *all* registered SSs (in case the SF is applied to *All Users*):

   - Click the **Quick Start** menu option.
   - In the displayed **Quick Start** pane click the **Stop Service** button, and then click the **Start Service** button.

5.3 QoS Assignment to Subscribers

After defining the pool of SFs (e.g. for UL A, DL A, UL B, DL B…), these SFs can be assigned to specific SSs according to QoS requirements.

To do so, define the MAC address of the SSs in the Pre-Provisioned SS screen, and then assign it the relevant SFs.

After assigning the SFs to a SS, Re-set the connection between the SS and the SF.

Note: Re-setting the connection between the SS and the Base Station is required when applying any change to an SF that is allocated to that SS.

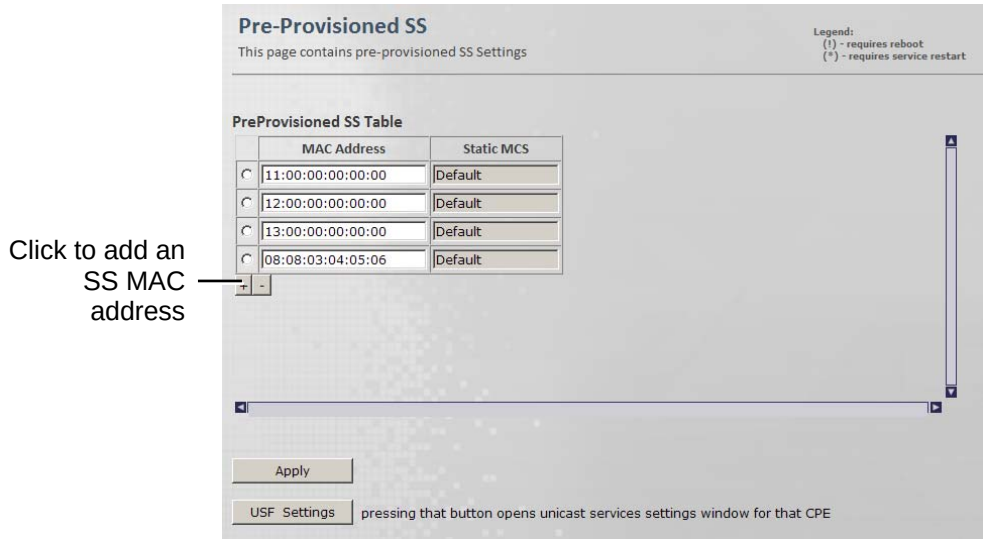
This section details the required steps for assigning the defined SFs to specific SSs.

5.3.1 Assigning Service Profiles to Subscriber Stations

Subscriber Stations (SS) can be assigned a number of (pre-defined) Service Flows (SFs), where the combined SFs serve to create the Service Profile for the SS.

To access the Pre-Provisioned SS pane

1. Click the **Subscribers** menu option and from the **Subscriber Management** sub-menu option choose **Pre-Provisioned SS**. The Pre-Provisioned SS pane appears.

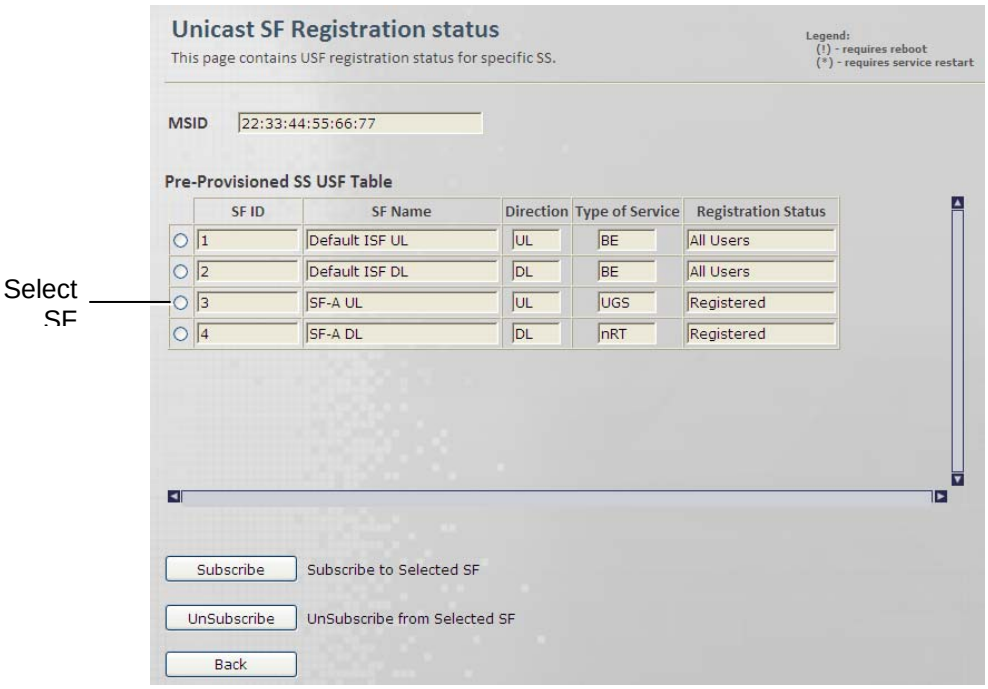


2. To add Subscriber Stations to the list:
   - Click the '+' sign. A row is added.
   - Enter the SS MAC Address. The Static MCS (CPE Specific Configuration) will be displayed.
   - Click **Apply**.
   - Repeat the procedure for any additional SS to be added to the list.

(To Remove the last row click the '**–**' sign. To remove a selected row, mark that row and click the '**–**' sign.

3. To assign a service profile to an SS in the list:

   Check the radio-button for the first SS to be assigned QoS and click the **USF Settings** operation button. The following screen appears.



   The screen provides the following interfaces:

   - MAC address of the selected SS
   - List of the available Service Flows
   - Operation buttons for assigning and disassociating service flows from a SS

   The following operation buttons are available:

   - **Subscribe** – used to assign the selected SF to the SS
   - **Unsubscribe** – used to disassociate the selected SF from the SS
   - **Back** – go back to the Pre-Provisioned SS screen (to choose another SS).

4. Select an SF row, and click the **Subscribe** button. The SF is assigned to the SS.

5. Reset the SS- Base Station connectivity:

   Resetting the connection of a single SS (in case the SF is applied on a *Registration Base*):

   - Click the **Subscribers** menu option. Choose the **Subscriber Management** sub-menu and then the **Registered SS**.
   - In the displayed **Registered SS Information** pane select the radio button of the requested SS and click the **Deregister** button.

Resetting the connection of *all* registered SSs (in case the SF is applied to *All Users*):

- Click the **Quick Start** menu option.
- In the displayed **Quick Start** pane click the **Stop Service** button, and then click the **Start Service** button.

6. Repeat the above procedure to assign additional SFs to the SS as required.

5.4 Monitoring and Maintaining Registered SSs Connections

This pane displays a table summarizing the registered SS units basic operation information, and provides basic maintenance operation buttons.

To access the SS Lists pane

1. Click the **Subscribers** menu option and then the **Subscriber Management** sub-menu option. Choose **Registered SS** sub menu. The Registered SS Information pane is displayed.

2. The following information is available:

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Number of Registered SS devices</td><td>Range [0,1000]</td></tr>
<tr><td>SS Table</td><td>The displayed table provides the following information for each SS:
<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>MS ID</td><td>MAC Address of SS</td></tr>
<tr><td>Connections</td><td>Number of DL & UL connections, associated with that MSID</td></tr>
<tr><td>State</td><td>SS Operation state.
Values: init, DL Synchronization, Handover DL acquisition, UL Acquisition, Ranging, Handover ranging, Capabilities negotiation, Authorization, Registration, DHCP, TOD, TFTP, Operational, Sleep, IDLE, Aborted</td></tr>
<tr><td>Basic CID</td><td></td></tr>
</table></td></tr>
</table>

3. Use the available buttons to perform additional operations:
   - **Connections** - SS connection hidden subtab table will be opened
   - **Capabilities –** SS Capabilities hidden subtab will be opened
   - **Security –** SS Security context hidden subtab will be opened
   - **UL Statistics –** Provides UL Statistics
   - **DL Statistics -** Provides DL Statistics
   - **RF Statistics -** Provides RF Statistics
   - **Deregister –** Reset the connection between the Base Station and the selected SS (Base Station shall send DEREG request to the SS and delete the SS from the lists).

6 Wireless (WiMAX) Parameters

The Wireless option includes the following sub menu options:

- Networking
- Radio and Frame
- Security
- MAC
- Diagnostics

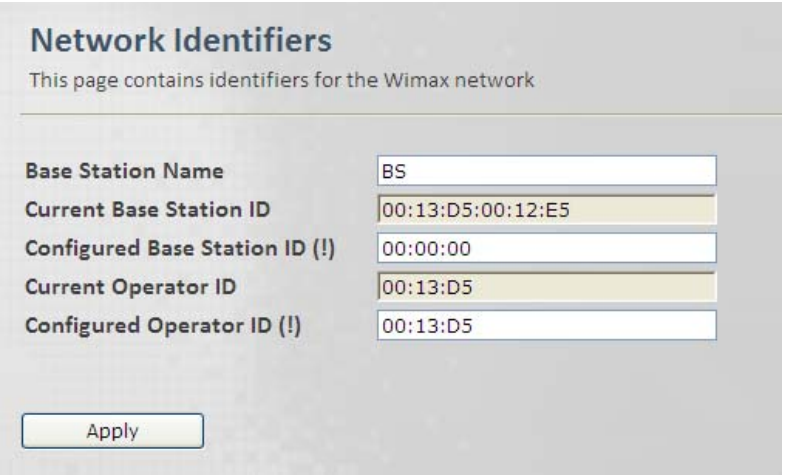
The sub-menus' fields and operations are described below.

6.1 Network Identifiers

The Network Identifiers pane is used to define the Base Station name, unique ID and Network Access Provider ID.

To access the Network Identifiers pane

1. Click the **Wireless** menu option and then the **Wireless Admin** sub-menu option. The **Network Identifiers** pane is displayed.



2. Enter the Configured Base Station Unique ID, keeping the following in mind:
   - Current Base Station Unique ID - Last 3 octets of Base Station -ID TLV as appear in NWG stage 3.
   - This ID should not be part of the MAC address, in order to allow mix of vendors.
3. Enter the Base Station Name and the Configured Operator (Network Access Provider) ID.
4. Click **Apply**.

6.2 Radio and Frame

Radio and Frame configurations and capabilities.

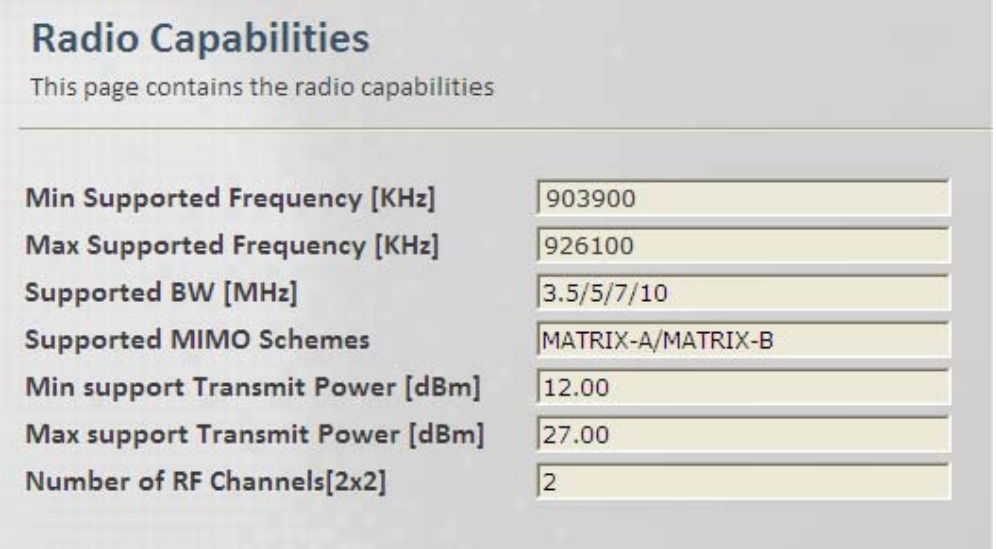
Radio configurable parameters should be set within the valid range of values. This range is determined by the specific country regulations, and in accordance to the device capabilities.

6.2.1 Radio Capabilities read Only

This pane displays the Device HW Radio configurations and capabilities.

To access the Radio Capabilities pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **Radio Capabilities**. The Radio Capabilities pane is displayed.



2. The Pane displays information as follows:

Field	Description
Min / Max Supported Frequency [KHz]	Min / Max supported frequency range. Values: Min to Max, Separated by a comma. Example: 1350,1450
Supported BW [KHz]	Supported bandwidths in KHz. Values are separated by commas. Example: 5000,7000,10000
Supported MIMO Schemes	Supported MIMO schemes. Values: Matrixes separated with comma: A,B

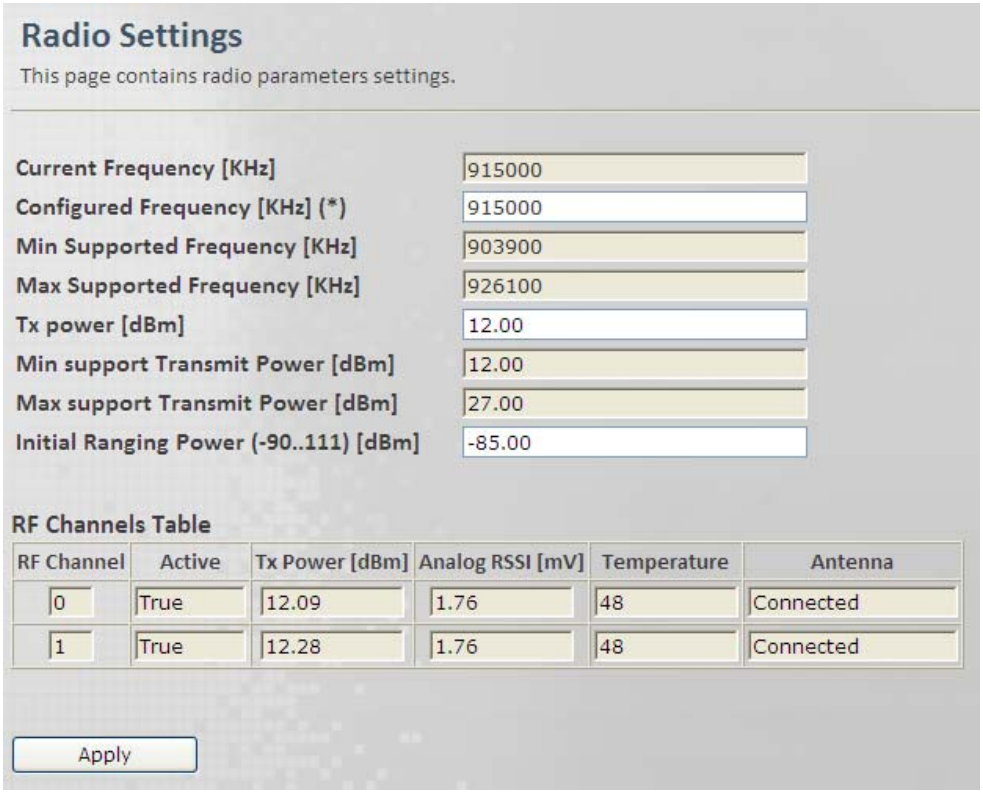
Field	Description
Min / Max support Transmit Power [dBm]	Min / Max support Transmit Power [dbm]. Values: Min and Max separated by comma. Example: 10,36
Number of RF Channels[2x2]	Number of RF TX Channels

6.2.2 Radio Settings

This pane provides Radio parameters settings.

To access the Radio Settings pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **Radio**. The Radio Settings pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

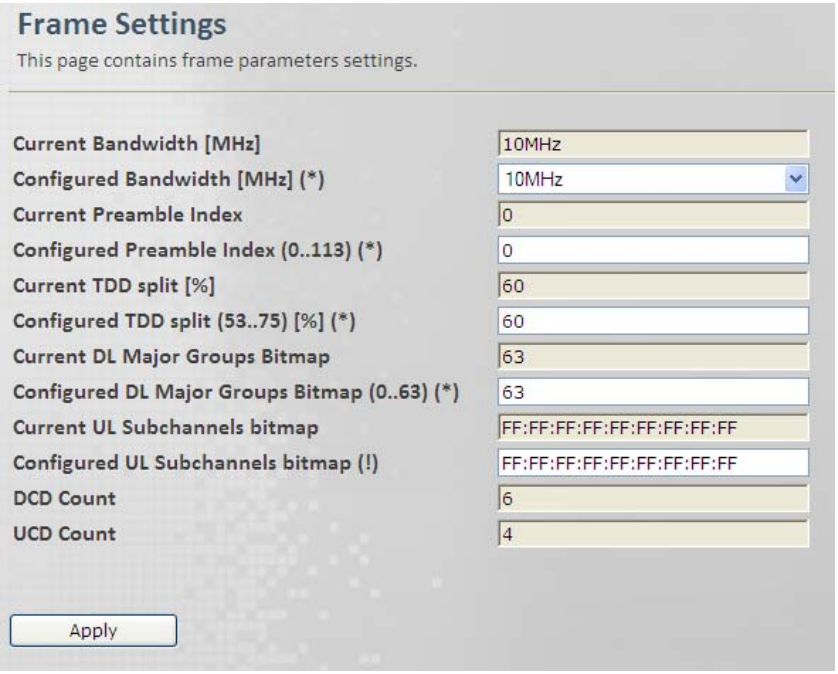
Field	Description
Frequency [KHz]	Current / Configured Frequency. This value will be in use after the next reboot or configuration flashing. Values: must be within the range of allowed frequencies (i.e. between the **Min Supported Frequency** and **Max Supported Frequency** fields – see below)
Min / Max Supported Frequency [KHz]	Min / Max frequency supported by the Base Station (read-only). Values: Min to Max separated by a comma. Example: 1350,1450
Tx power [dBm]	Tx Transmit Power Setting. Configured Tx power should be in the valid range, as determined by the regulations and the device capabilities (i.e. **Min Supported Transmit Power** and **Max Supported Transmit Power** fields, see below).
Min / Max support Transmit Power [dBm]	Min / Max supported transmission power by the Base Station (read-only). Values: Min and Max separated by a comma. Example: 10,36
Initial Ranging Power [dBm]	Maximum Initial Ranging Power. (Look for WiMAX def). If received power exceeds the maximum Initial ranging power, signal will not be accepted. Limits signal levels of third party equipment – used to minimize possible interference. Values: [-90,111]
RF Channel	RF Unit Name or ID. Values: [0,1]
Active	This Parameter sets\shows the Transmission Activation Status of the Base Station . Values: False - disabled True - enabled
Tx Power	RF unit Transmit Power (Tx) [dBm]. Values: [-50,100]
Analog RSSI	Analog RSSI level [dBm].
Temperature	RF2 Temperature [Celsius].
Antenna	Antenna Connectivity Status. Values: [Connected, Disconnected]

6.2.3 Frame

This pane provides Frame parameters settings.

To access the Frame pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **Frame**. The Frame Settings pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

Field	Description
Bandwidth [MHz]	Configured Bandwidth. This value will be in use in the next service. Configured BW must be one of the supported BWs. Values: 3.5MHz 5MHz 7MHz 10MHz Default: 10
Preamble Index	Configured Frame Preamble Index: Preamble Index allows the SS to perform frequency and time synchronization. The value should be different for neighboring Base Station.

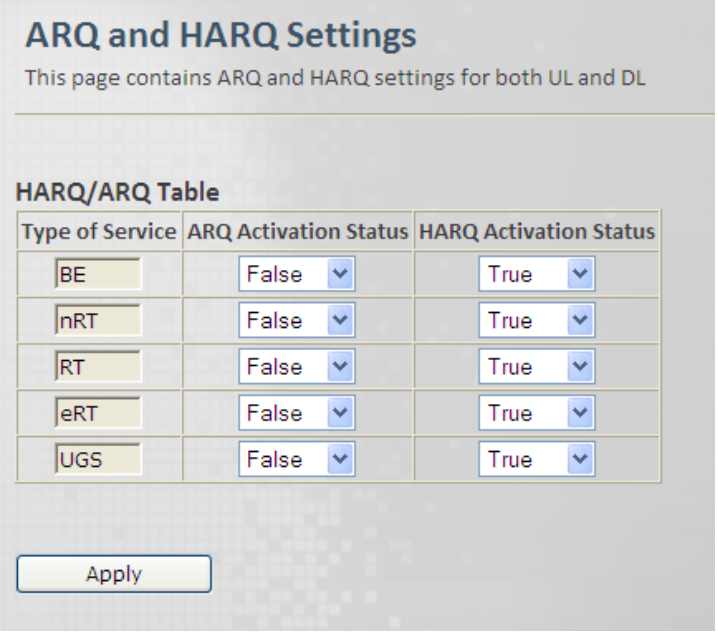
Field	Description
	Values: [0,113] Default: 0
TDD Split [%]	Current / Configured DL frame resources [%]: Ratio (in percentage) between DL and UL. Values: [53,75] Default: 66
DL Major Groups Bitmap (0..63)	Each bit 1-6 represents one Major or Minor group of DL resources (1-6 correspondingly). Note at least one major group shall be selected. Values: [0,63] Default: 63
UL Subchannels Bitmap	UL Sub-channels Bitmap
DCD Count	Downlink Channel Descriptor Count.
UCD Count	Uplink Channel Descriptor Count.

6.2.4 ARQ and HARQ

This pane provides HARQ and ARQ parameters settings for UL and DL.

To access the ARQ and HARQ pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **ARQ and HARQ**. The ARQ and HARQ Settings pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

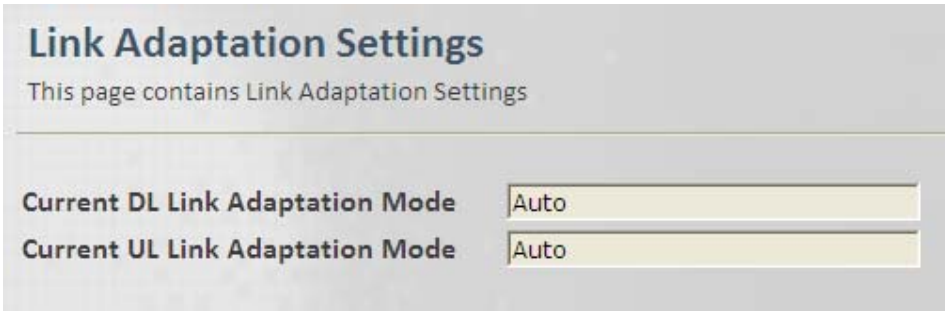
Field	Description
Type of Service	This parameter defines ARQ and HARQ per type of service when operating in local mode. Default: BE, nRT, RT, eRT, UGS
ARQ Activation Status	This parameter specifies the activation status of ARQ for local mode per type of service. Values: [False, True] Default: False, False, False, False, False
HARQ Activation Status	This parameter specifies the activation status of HARQ for local mode per type of service. Values: [False, True] Default: True, True, False, False, False

6.2.5 Link Adaptation

This is a read only pane that provides the status of the UL and DL adaptation mode.

To access the Link Adaptation pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **Link Adaptation**. The Link Adaptation Settings pane is displayed, showing the UL and DL adaptation mode.

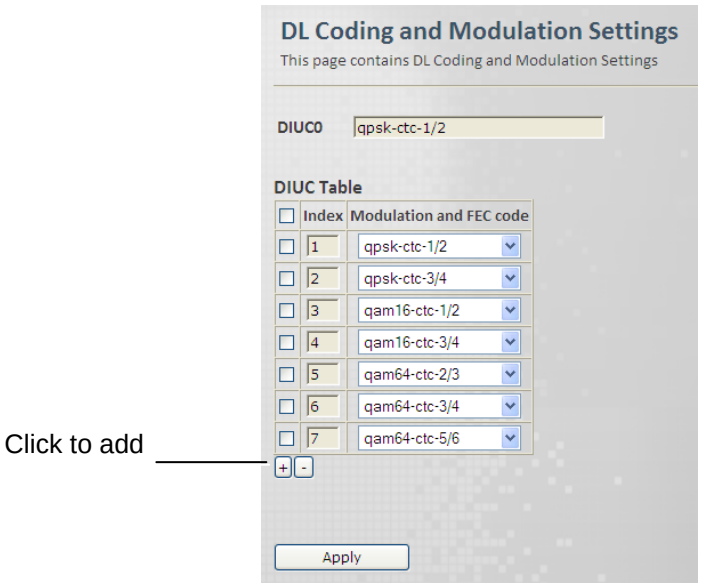


6.2.6 DL Modulation

This pane provides a table with DL Coding and Modulation settings.

To access the DL Modulation pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **DL Modulation**. The DL Coding and Modulation Settings pane is displayed.



Click to add

2. To Add a row (max 11 rows) to the table click the '**+**' sign. To Remove the last row click the '**–** ' sign. To remove a selected row, mark the row and click the '**–**' sign.

3. Update the required parameters in the Pane table according to the following descriptions and click **Apply.**

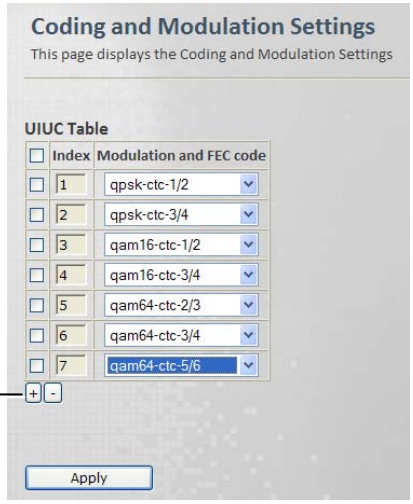
Field	Description
Index	DIUC Index Table Index is for: 0 - IUC 0 1 - IUC 1 2 - IUC 2 : 12- IUC 12 Values: [0,11] Default: 0
Modulation and FEC code	Values: qpsk-ctc-1/2 qpsk-ctc-3/4 qam16-ctc-1/2 qam16-ctc-3/4 qam64-ctc-2/3 qam64-ctc-3/4 qam64-ctc-5/6

6.2.7 UL Modulation

This pane provides a table with UL Coding and Modulation settings.

To access the UL Modulation pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **UL Modulation**. The UL Coding and Modulation Settings pane is displayed.



2. To Add a row (max 11 rows) to the table click the '**+**' sign. To Remove the last row click the '**–** ' sign. To remove a selected row, mark the row and click the '**–**' sign.

3. Update the required parameters in the Pane table according to the following descriptions and click **Apply.**

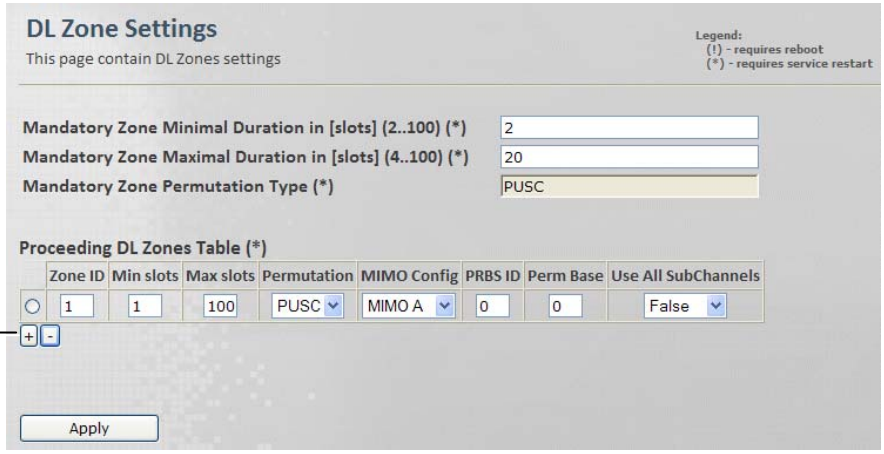
Field	Description
Index	UIUC Index Table Index is: 0- IUC 0 (FFB) 1- IUC 1 2- IUC 2 : 10- IUC 10 Values: [0,11] Default: 0
Modulation and FEC code	Values: qpsk-ctc-1/2 qpsk-ctc-3/4 qam16-ctc-1/2 qam16-ctc-3/4 qam64-ctc-2/3 qam64-ctc-3/4 qam64-ctc-5/6

6.2.8 DL Zones

This pane provides DL Zone settings.

To access the DL Zones pane

1. Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **DL Zones**. The DL Zone Settings pane is displayed.



Click to add

2. To Add a row to the table click the **'+'** sign. To Remove the last row click the **'–'** sign. To remove a selected row, mark the row and click the **'–'** sign.
3. Update the required parameters in the Pane table according to the following descriptions and click **Apply.**

Field	Description
Mandatory Zone Minimal Duration in [slots]	Minimal Zone Duration in [slots]. Must not exceeds DL/UL ratio. Values: [4,100] Default: 4
Mandatory Zone Maximal Duration in [slots]	Maximal Zone Duration in [slots] Must be greater or equal to: Min-Number-Of-Slots-In-Time-Axis Values: [4,100] Default: 4
Mandatory Zone Permutation Type	Permutation Type: a label showing the permutation type of Zone 0. Values: PUSC FUSC Default: PUSC
Zone ID	Zone ID Values: [0,10] Default: 1
Min slots	Minimal duration in slots. Must not exceeds DL/UL ratio. Values: [0,100] Default: 0
Max slots	Maximal duration in slots. Must be greater or equal to of that zone: Min-Number-Of-Slots-In-Time-Axis. Values: [0,100] Default: 100
Permutation	Permutation Type (Base) Values: 0 - PUSC 1 - FUSC 2 – AMC Default: PUSC
MIMO Config	MIMO Configuration Values: SISO MIMO A MIMO B Default: MIMO A

Field	Description
PRBS ID	Pseudo random bit sequence (PRBS). Determines carrier and pilot position. Values: [0,2] Default: 0
Perm Base	The permutation base (PermBase) is used together with the WiMAX physical layer profile to compute the subcarrier-to-sub-channel map used by a given cell. Values: [0,31] Default: 0
Use all Sub Channels	Use All Sub Channels (Disable sub channels rotation). Values: True/False Default: False

6.2.9 Feedback Channel

This pane provides CQICH setting options.

To access the Feedback Channel (CQICH) pane

Click the **Wireless** menu option and then the **Radio and Frame** sub-menu option. From the **Radio and Frame** sub-menus choose **Feedback Channel**. The Feedback Channel Settings pane is displayed.

The pane displays the current feedback type.

6.3 Security - Authentication Settings

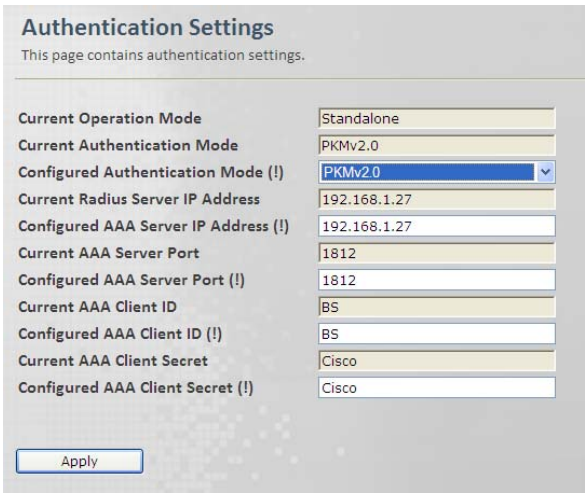
This pane provides security protocol, timers and counter settings. The pane displays relevant parameters according to the system operation mode:

- Standalone mode: requires definition of AAA server parameters
- ASN-GW node: only Operation and authentication mode parameters are relevant.

6.3.1 Standalone Authentication Settings

To access the Protocol and Timers pane

1. Click the **Wireless** menu option and then the **Wireless Security** sub-menu option. From the **Wireless Security** sub-menus choose **Authentication**. The Authentication configuration pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

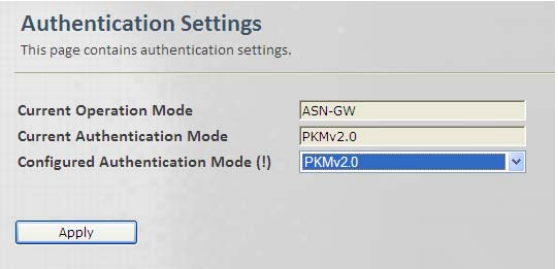
Field	Description
Current Operation Mode	Specifies the operation mode, normal mode is ASNGW, Standalone mode is designed for demos. Values: Standalone, ASN-GW
Authentication Mode	A string specifying the authentication mode. Values: Null authentication PKMv2.0 Default: PKMv2.0 (Null when Current-Operation-Mode is standalone)
Current Radius Server IP Address	Current Radius Server IP Address

Configured AAA Server IP Address	AAA Server IP Address, Server Port, Client ID and Client Secret (AAA User Defined password
AAA Server Port, Client ID, Client Secret	AAA Parameters
TEK Lifetime	Traffic Encryption Key Lifetime in [sec]. Values: [1800,604800] Default: 43200

6.3.2 ASN-GW Authentication Settings

To access the Protocol and Timers pane

1. Click the **Wireless** menu option and then the **Wireless Security** sub-menu option. From the **Wireless Security** sub-menus choose **Authentication**. The Authentication configuration pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

Field	Description
Current Operation Mode	Specifies the operation mode, normal mode is ASNGW, Standalone mode is designed for demos. Values: Standalone, ASN-GW
Authentication Mode	A string specifying the authentication mode. Values: Null authentication PKMv2.0 Default: PKMv2.0 (Null when Current-Operation-Mode is standalone)

6.4 MAC

The MAC configurations menus are displayed according to the Base Station operation mode:

- Standalone mode – A single pane is available, providing the UCD/DCD time interval and the UCD/DCD number of notifications.
- ASN-GW mode – three panes are available, describing the MAC settings, Neighbor Base Stations and DCD triggers.

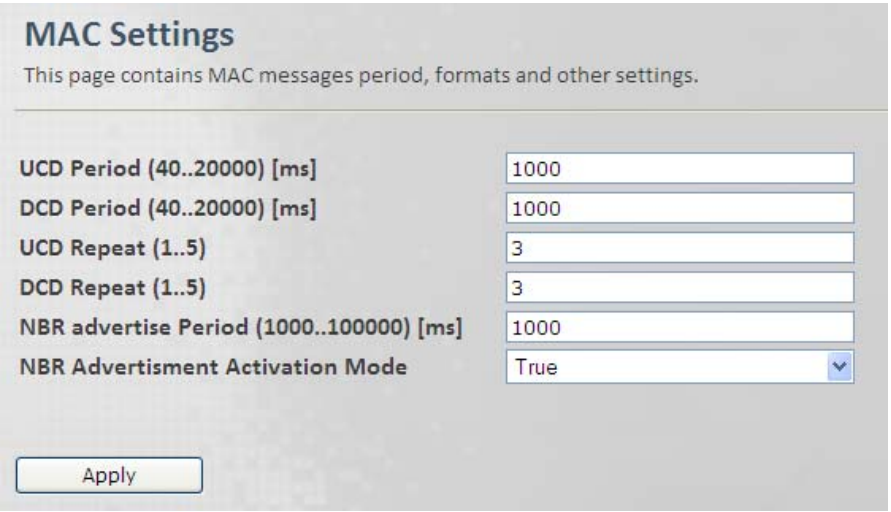
The following sections describe the ASN-GW mode MAC screens.

6.4.1 General Info – MAC Settings

This pane provides general MAC settings such as MAC messages time intervals, formats, etc.

To access the General Info – MAC Settings pane

1. Click the **Wireless** menu option and then the **MAC** sub-menu option. From the **MAC** sub-menus choose **General Info**. The General Info MAC Settings pane is displayed.



2. Update the required parameters in the Pane according to the following descriptions and click **Apply.**

Field	Description
UCD Period	Defines the time interval (in [ms]), after which the UCD appears (e.g. every 100 ms). Values: [5,20000] Default: 1000
DCD Period	Defines the time interval(in [ms]) after which the DCD appears (e.g. every 100 ms). Values: [5,20000] Default: 1000

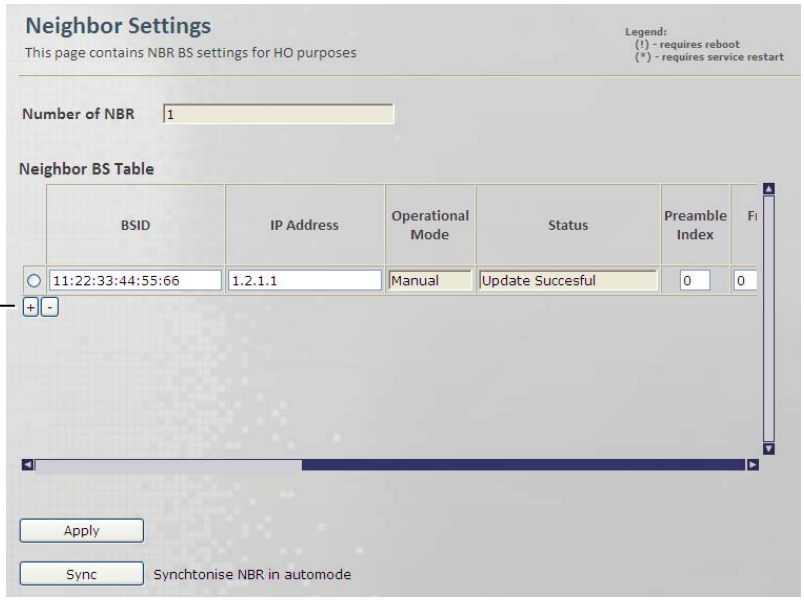
Field	Description
UCD Repeat	Number of UCD message notifications before new message appears. Values: [1,5] Default: 3
DCD Repeat	Number of DCD message notifications before new message appears. Values: [1,5] Default: 3
NBR advertise Period	Period in frames to advertise neighboring Base Station. Values: [1000,100000] Default: 1000
NBR Advertisement Activation Mode	Enable/Disable Base Station advertisement of NSP in NBR TLV message broadcasting. Values: False - disable, True – enable Default: True

6.4.2 Neighbor Base Station

This pane provides a table of the Neighbor Base Station's details – used for handover.

To access the Neighbor Base Station Settings pane

1. Click the **Wireless** menu option and then the **MAC** sub-menu option. From the **MAC** sub-menus choose **Neighbor Base Station**. The Neighbor Base Station Settings pane is displayed.



2. To Add a row to the table click the '**+**' sign. To Remove the last row click the '**–**' sign. To remove a selected row, mark the row and click the '**–**' sign.
3. Update the required parameters in the Pane table and click **Apply.**

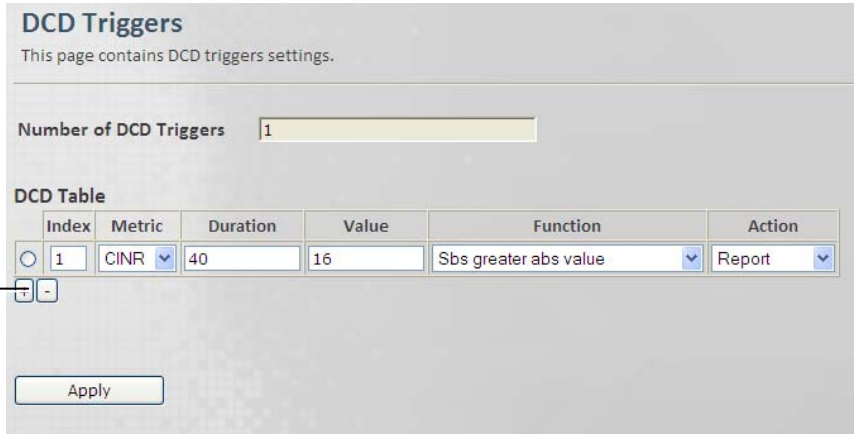
   The table provides neighboring Base Stations attributes.

6.4.3 DCD Triggers

This pane provides a table of the DCD Trigger Settings. Timing for handover triggers. Look for neighbors in order to perform handover……

To access the DCD Triggers Settings pane

1. Click the **Wireless** menu option and then the **MAC** sub-menu option. From the **MAC** sub-menus choose **DCD Triggers**. The DCD Triggers Settings pane is displayed.



2. To Add a row to the table click the "**+**" sign. To Remove the last row click the "**–**" sign. To remove a selected row, mark the row and click the "**–**" sign.
3. Update the required parameters in the Pane table according to the following descriptions and click **Apply.**

Field	Description
Number of DCD Triggers	Number of configured DCD triggers
Index	DCD Trigger Index. Default: 0
Metric	This parameter specifies the DCD metric. Values: CINR RSSI RTD Default: CINR
Duration	This parameter specifies the average interval in frames duration. Values: [1,100]

Field	Description
	Default: 40
Value [1/4, 1/2 , 1/F dB]	Trigger value is the value used in comparing measured metric. The value quota measurement depends on the trigger type (metric) as follows: • For RSSI – [1/4dB] • For CINR – [1/2 dB] • For RTD – [1/Fs] (frequency sample) Default: 16
Function	This parameter specifies the function used for the metric. Values: Nbs greater abs value Nbs less abs value Nbs greater rel value Nbs less rel value Sbs greater abs value Sbs less abs value Default: Sbs greater abs value
Action	Action performed upon reaching trigger condition. Values: Report Handover Scanning Default: Report

6.5 Diagnostics

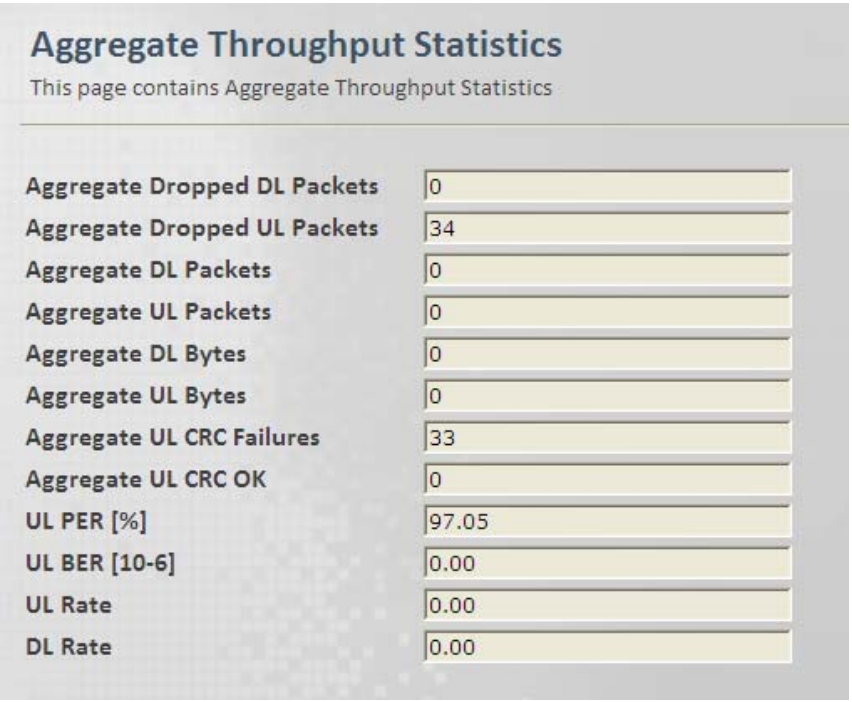
Information regarding the throughput values.

6.5.1 Aggregate Throughput

This pane provides read only aggregated Throughput Values (i.e. Dropped Packets, CRC failures, etc.).

To access the Aggregate Throughput pane

1. Click the **Wireless** menu option and then the **Diagnostics** sub-menu option. From the **Diagnostics** sub-menus choose **Aggregate Throughput**. The Aggregated Throughput Values pane is displayed.



2. The parameters displayed in the Pane are according to the following descriptions:

Field	Description
Aggregated Dropped DL / UL Packets	Total number of aggregated Dropped DL / UL Packets since last reset.
Aggregated DL / UL Packets	Total number of Aggregated DL / UL Packets since last reset.
Aggregated DL / UL Bytes	Total number of Aggregated DL / UL Bytes since last reset.
Aggregated UL CRC Failures	Total number of Aggregated UL CRC Failures since last reset.
Aggregated UL CRC OK	Total number of Aggregated UL CRC OK since last reset.
UL PER [%]	UL Packet Error Rate
UL BER [10-6]	UL Bit Error Rate
UL / DL Rate	UL / DL Rate

7 List of Acronyms

Term	Description
AAA	Authentication Authorization Accounting
AES	Advanced Encryption Standard
AMC	Adaptive Modulation and Coding
API	Application Programming Interface
ASN	Access Service Network
ASP	Application Service Provider
ATPC	Automatic Transmit Power Control
BE	Best Effort
BPSK	Binary Phase Shift Keying
BS	Base Station
BWA	Broadband Wireless Access
cBS	Compact Base Station
CPE	Customer Premise Equipment
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
EAP	Extensible Authentication Protocol
ErtPS	Extended Real-Time Polling Service
FFT	Fast Fourier Transfer
FTP	File Transfer Protocol
FUSC	Fully Used Sub-Channelization
GW	Gateway
HA	Home Agent
HTTP	Hypertext Transport Protocol
ICMP	Internet Control Message Protocol
IDU	Indoor Units
IEEE	Institute of Electronic and Eclectic Engineers
IGMP	Internet Group Multicast Protocol
IMS	IP Multimedia System
IP	Internet Protocol
IPSec	IP Security
LAN	Local Area Network
LOS	Line-of-sight
MAC	Media Access Control

Term	Description
MAI	Multiple Access Interference
MAN	Metropolitan Area Network
MGCP	Media Gateway Control Protocol
MIMO	Multiple-Input, Multiple-Output
MIP	Mobile IP
MSG	Multi-Service Gateways
NAP	Network Access Provider
NMS	Network Management System
NLOS	Non-line-of-sight
nrtPS	Non-Real Time Polling Service
NSP	Network Service Provider
OAM	Operations and Maintenance
ODU	Outdoor Units
OFDM	Orthogonal Frequency Division Multiplexing
OFDMA	Orthogonal frequency division multiple access
pBS	Pico Base Station
PDA	Personal Digital Assistant
PMIP	Proxy Media IP
POP	Point of Presence
PPTP	Point-to-Point Tunneling Protocol
PUSC	Partially used sub-channelization
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
rtPS	Real-Time Polling Service
SF	Service Flow
SIP	Session Initiation Protocol
SLA	Service Level Agreements
SNMP	Simple Network Management Protocol
SS	Subscriber Station
STC	Space-time coding
SU	Subscriber Unit
TCP	Transmission Control Protocol
TDD	Time Division Duplex
TFTP	Trivial File Transfer Protocol

Term	Description
UDP	User Datagram Protocol
UGS	Unsolicited Grant Service
VoIP	Voice over IP
VPN	Virtual Private Network
WAN	Wide Area Network
WiMAX	Worldwide Interoperability for Microwave Access