

CONFIGURATION GUIDE

RADWIN 5000

Release 4.9.75



RADWIN

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Chapter 1: Introduction

1.1 Scope of This Document

This document shows how to configure RADWIN 5000 radios and sectors. For a detailed description of how to physically install RADWIN 5000 radios, see the RADWIN 5000 Installation Manual.

1.2 RADWIN 5000 Overview

1.2.1 Sector

The RADWIN 5000 system consists of a “sector” that includes a base station, and at least one subscriber unit. The subscriber units are installed and work opposite the base stations.

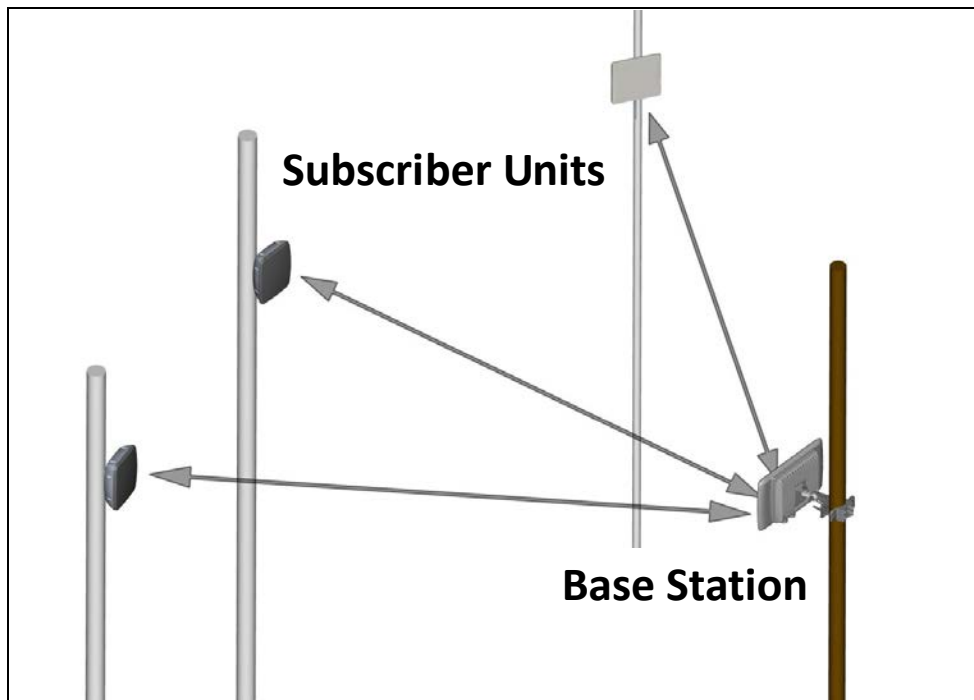


Figure 1-1: A RADWIN 5000 Sector

1.2.2 Base Station

There are three types of base stations, all of which are High Capacity Base Stations (HBS):

- **Large Form Factor (LFF)** - With an integrated or external antenna
- **Beamforming (JET)** - With an integrated antenna
- **Beamforming (DUO)** - With an integrated antenna, can work with two carrier frequencies

1.2.3 Subscriber Unit

There are three types of RADWIN 5000 subscriber units:

- *High Capacity Subscriber Unit (HSU)*
- *SU PRO/AIR EMB units*
- *SU PRO/AIR INT and SU PRO/AIR INT 3.x units*

High Capacity Subscriber Unit (HSU)

An HSU can have one of the following resource allocations:

- **CIR** - Committed Information Rate: receives a guaranteed percentage of resources
- **BE** - Best Effort: receives resources according to availability

In addition, an HSU can have one of the following form factors:

- **Large Form Factor (LFF)** - Its external appearance is similar to a Large Form Factor HBS, and can have an integrated or external antenna.
- **Small Form Factor (SFF)** - As its name implies, this unit is smaller than an LFF unit, but can also have an integrated or external antenna.

SU PRO/AIR EMB units

- SU **PRO** EMB - Can operate using the CIR or BE resource type
- SU **AIR** EMB - Can operate using the BE resource type only

SU PRO/AIR INT and SU PRO/AIR INT 3.x units

- SU **PRO** INT and SU **PRO** INT 3.x - Can operate using the CIR or BE resource type
- SU **AIR** INT and SU **AIR** INT 3.x - Can operate using the BE resource type only



With the exception of the frequency band, the SU **PRO/AIR** INT and SU **PRO/AIR** INT 3.x unit are identical in form factor and function. We will use the term SU **PRO/AIR** INT to refer to both models.

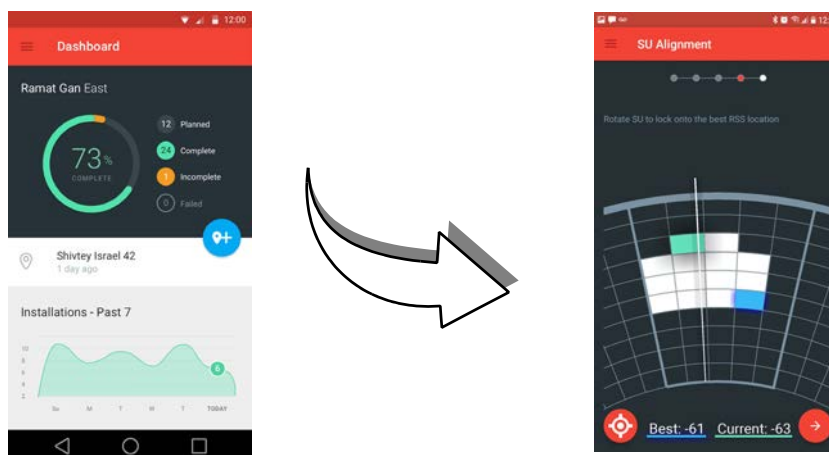
1.2.4 Method of Work

Both the base stations and the subscriber units communicate respectively, with the service provider and users. The communication protocol for both the service provider and the users is Ethernet.

1.3 Management Tools

1.3.1 WINTouch

WINTouch is a mobile application that guides you in installing and aligning SU **PRO/AIR** EMB and SU **PRO/AIR** INT subscriber units.



1.3.2 Web Interface

A Web Interface is available for SU **PRO/AIR** EMB, SU **PRO/AIR** INT, and DUO units. The Web Interface is integrated with the radio unit, and, unlike the RADWIN Manager, requires no external application. You merely enter the unit's IP address, user name and password, and log in.

1.3.3 RADWIN Manager

The RADWIN Manager is an SNMP-based management application, operating on your local computer, which manages a complete sector over a single IP address. Install the RADWIN Manager from <http://www.radwin.com/download>. A sample user interface is shown below:

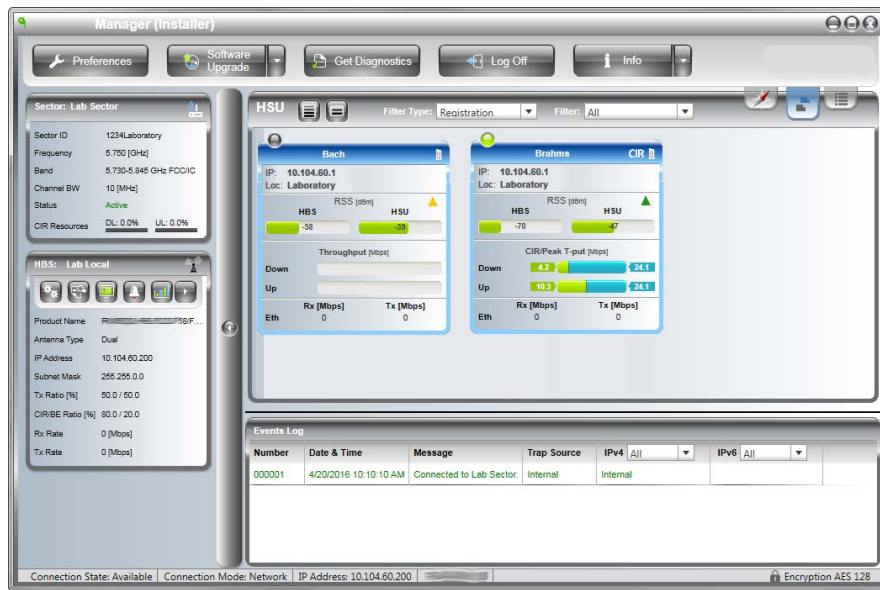


Figure 1-2: RADWIN Manager

1.3.4 Which Management Tool to Use

Depending on the product you are using, use the Management Tool indicated below. It is important to note that the DUO can only be managed using its Web Interface

Table 1-1: Which Management Tool to Use

Product	Primary Management Tool (full functionality)	Secondary Management Tool (limited functionality)
LFF, SFF, JET base stations	RADWIN Manager (Chapter 2)	None (use only the RADWIN Manager)
RADWIN JET DUO base stations	Web Interface ^a (Chapter 14)	None (use only its Web Interface)
LFF, SFF, subscriber units	RADWIN Manager (Chapter 2)	None (use only the RADWIN Manager)
SU PRO/AIR EMB SU PRO/AIR INT subscriber units	WINTouch for initial alignment (Section 1.3.1) RADWIN Manager for ongoing use (Chapter 2)	Web Interface (Chapter 13)

a. Rel. 4.9.34 and above. For earlier Releases, use the RADWIN Manager

1.4 Key Features of RADWIN 5000

1.4.1 General

- » Ethernet connectivity
- » Advanced OFDM & MIMO 2x2 for nLOS and NLOS performance
- » Enhanced interference mitigation capability
- » Inter & intra site sync to reduce self interference
- » Multiband radios: Different frequencies in the same radio unit
- » Dedicated Bandwidth ensuring SLA & latency
- » Regulations supported - FCC/IC/ETSI/WPC/MII/Universal
- » Up to 64 Subscriber Units per base station
- » Fully integrated with RADWIN Legacy solutions
- » Nomadic support

1.4.2 Beamforming Solutions (optional)

RADWIN 5000 JET and RADWIN JET DUO

- » Smart beamforming antenna, integrated in dedicated base station
- » On-the-fly beamforming capability reduces interference, increases efficiency
- » Narrow beam
- » Support for ethernet-based synchronization
- » Integrated GPS synchronization capability

RADWIN JET DUO

- » Multi-carrier platform for 3.x and 5.x GHz bands
- » 2 x 750Mbps when operated as a dual-band solution
- » Up to QAM 256, 2 x 80MHz
- » Exceptional interference immunity through 2nd gen. beamforming antenna with exceptionally small side lobes
- » Support 64 customers
- » Interfaces: Fiber (SFP) and GbE

1.5 What's New in Release 4.9.75

- » New Web UI for SU **PRO/AIR** EMB and SU **PRO/AIR** INT
- » SU **PRO/AIR** INT 3.x
- » Support for RADIUS user authentication
- » Additional diagnostic tools (iPerf loopback and TCP/IP sniffing)
- » Option for HTTPS restricted only log in



For complete and comprehensive characteristics of the specific model you are working with, refer to its Data Sheet.

1.6 Release Versions

Although this document is for Release 4.9.75, certain products and regulatory environments may use other versions. For more information, contact customer support.

1.7 Notifications

Notifications consist of Notes, Cautions, and Warnings:



Note: Draws your attention to something that may not be obvious



Caution: Risk of damage to equipment or of service degradation



Warning: Risk of danger to persons operating near the equipment

Chapter 2: RADWIN Manager Overview

2.1 Scope of this Chapter

This chapter shows you how to install the RADWIN Manager software on your managing PC, connect it to an operating base station and then log on. We then explain the use of the various objects on the RADWIN Manager main window.



Do not use the RADWIN Manager for the RADWIN JET DUO release 4.9.34 and above.

2.2 Installing the RADWIN Manager Application

2.2.1 Minimum System Requirements

Operating system specific PC resources required by the application are set out in [Table 2-1](#) below:

Table 2-1: PC Requirements for the RADWIN Manager Application

	Windows Version		
	XP Pro	Vista/7/8	
		32 bit	64 bit
Memory	512 Mb	1 Gb	2 Gb
Processor	P IV	P IV Dual Core	

Requirements common to all systems are:

- Hard disk: 1 GB free space
- Network: 10/100BaseT NIC
- Graphics: 1024x768 screen resolution with 16 bit color
- Any modern Web browser to view additional material, use the Web Interface or get help from the RADWIN Web site.

2.2.2 Installing the Software

Any PC running the RADWIN Manager application can be used to configure a RADWIN 5000 sector.

➤ To install the RADWIN Manager application:

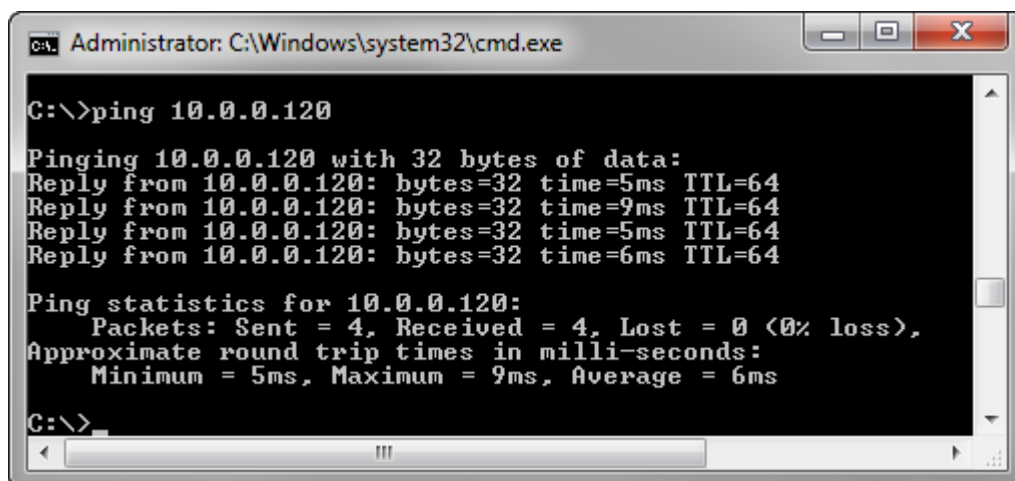
- Download the RADWIN Manager application from the website, and follow the wizard's instructions to install the application.

2.3 Initial Connection and Logon

1. Check that you have connectivity to the radio. You can do this by opening up a command line session (**Start|Run** and then type, **cmd**). At the command prompt, type

```
ping 10.0.0.120
```

You should see something like this:



```
Administrator: C:\Windows\system32\cmd.exe

C:\>ping 10.0.0.120

Pinging 10.0.0.120 with 32 bytes of data:
Reply from 10.0.0.120: bytes=32 time=5ms TTL=64
Reply from 10.0.0.120: bytes=32 time=9ms TTL=64
Reply from 10.0.0.120: bytes=32 time=5ms TTL=64
Reply from 10.0.0.120: bytes=32 time=6ms TTL=64

Ping statistics for 10.0.0.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 9ms, Average = 6ms

C:\>
```

Figure 2-1: Pinging a radio unit

Any other response from ping means that the radio is not connected properly. You can try each one of these steps, then ping again:

- Check that you are using the correct IP address
(it may have been changed from the default value shown above)
- Check your Ethernet connection
- Check the physical connection of the radio in the field

- If you do not succeed using these steps, seek assistance from RADWIN Customer Service.
- 2. Dismiss the command line session.
- 3. Open the RADWIN Manager from the desktop icon, or click **Start | Programs | RADWIN Manager | RADWIN Manager**.

The Log-on dialog box appears.

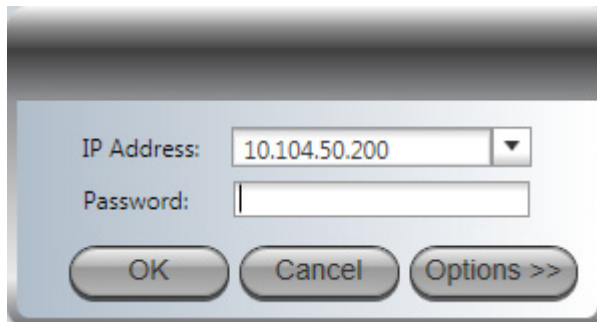


Figure 2-2: Log-on window -IPv4

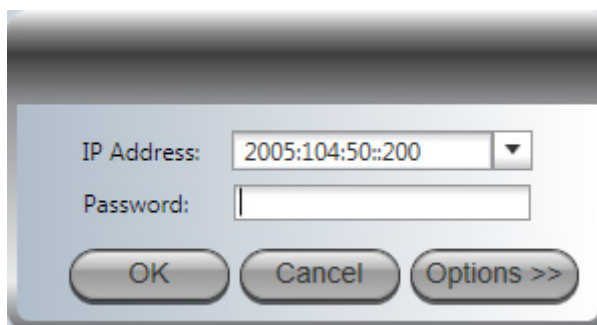
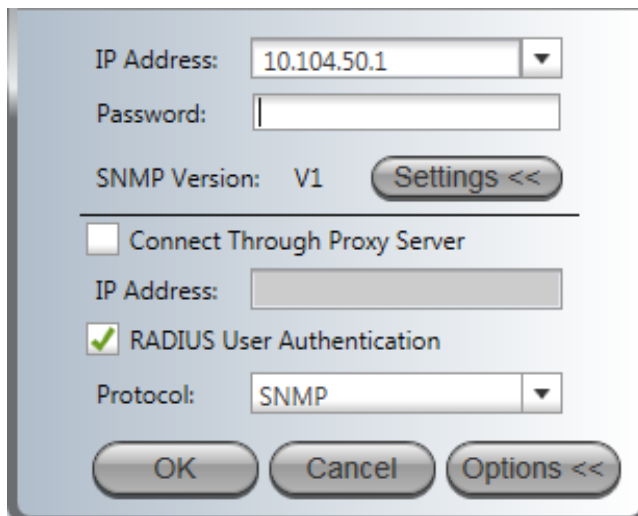


Figure 2-3: Log-on window - IPv6

2.4 The RADWIN Manager Log-on Concept

RADWIN 5000 supports SNMPv1 and SNMPv3 either separately or together. The log-on procedure differs slightly between operation under SNMPv1 and SNMPv3. In what follows below, we assume that SNMPv1 is in use. In [Figure 2-4](#) we show the difference between SNMPv1 and SNMPv3 at log-on time.

The RADWIN Manager provides three levels of access in one of two entry modes. To see them, click **Options** at any time in the Log on window ([Figure 2-2](#) above). You are offered an *extended* log-on window:



The image shows a software dialog box titled "Extended log-on window". It contains the following fields and controls:

- IP Address:** A text box containing "10.104.50.1" with a dropdown arrow on the right.
- Password:** An empty text box.
- SNMP Version:** A label followed by "V1" and a button labeled "Settings <<".
- Connect Through Proxy Server:** A checkbox that is currently unchecked, followed by the text "Connect Through Proxy Server".
- IP Address:** An empty text box, positioned below the proxy checkbox.
- RADIUS User Authentication:** A checkbox that is checked (indicated by a green checkmark), followed by the text "RADIUS User Authentication".
- Protocol:** A text box containing "SNMP" with a dropdown arrow on the right.
- Buttons:** At the bottom, there are three buttons: "OK", "Cancel", and "Options <<".

Figure 2-4: Extended log-on window

- If you wish to connect via a third party (for example, a different server or PC is connected directly to the unit, but your managing computer is not), place a checkmark next to **Connect through Proxy Server** and enter the IP address of the server or PC that is connected to the radio.
- **Connect using RADIUS Authentication** - If your system uses RADIUS authentication (see [RADIUS User Authentication](#) on page 4-14), place a checkmark here, and select the protocol used (SNMP or Telnet) .

To set the SNMP version, use the **Settings** button in [Figure 2-4](#). A log-on extension window opens:

Figure 2-5: Log on window showing SNMP settings.

- You may choose the SNMP version, but this is not required. SNMPv1 is the default (but this can be changed, (see [Protocol](#) on [page 4-23](#)). If your firewall blocks SNMPv3 messages and for security reasons cannot be changed, use SNMPv1.
- If you are logging in immediately after changing the authentication mode, make sure that the mode chosen in the **Authentication** pull-down menu on the log-on window (under SNMPv3/RADIUS Parameters in the figure above) is the same as the one you chose when you changed the authentication mode (see [Protocol](#) on [page 4-23](#)).
- Make sure the community parameters of SNMPv1 and if used, SNMPv3 parameters are entered correctly.



If your system uses the community.dat encrypted file that contains the SNMP community values, the RADWIN Manager will take these values from the file, and ignore whatever is written in the SNMP fields here. (see [Community Encryption](#) on [page 4-36](#)).

- If you are using Trap Authentication, enter the User and Password. The allocation and association of a trap address with a user is described in [Chapter 4](#).

The Network Manager should change the default passwords as soon as possible, particularly if SNMPv3 is to be used.

➤ **Continuing the log-on procedure:**

4. Enter the password.



- Leave the default Community passwords, **netman** for read-write, and **public** for read-only.
- If you are a user with read-only permission, then you may only log on as Observer.

2.5 Log-on Errors and Cautions

2.5.1 Unsupported Device

Attempting to connect to an unsupported device on an otherwise valid IP address (for example, a LAN printer) will result in the following error message:

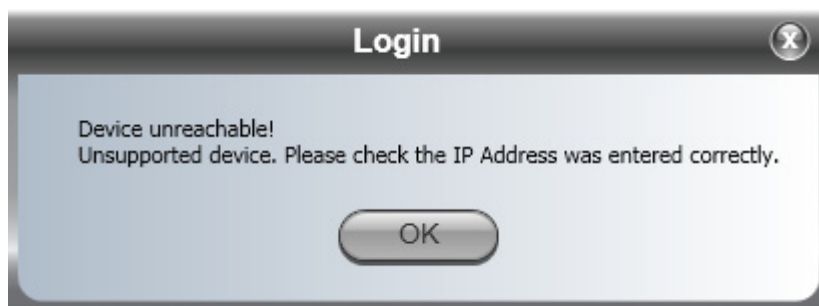


Figure 2-6: Unsupported device message

2.5.2 Incorrect IP Address

If the IP address chosen is invalid or the sector is unreachable, the following error message will be displayed:



Figure 2-7: Unreachable device message

2.5.3 Incorrect Password

If you type an incorrect password in the Login window, the following message will be displayed:



Figure 2-8: Invalid user type or password

2.5.4 SNMP Issues

Invalid read/write community string or SNMPv3 passwords, incompatible versions or authentication versions will result in a message similar to this:

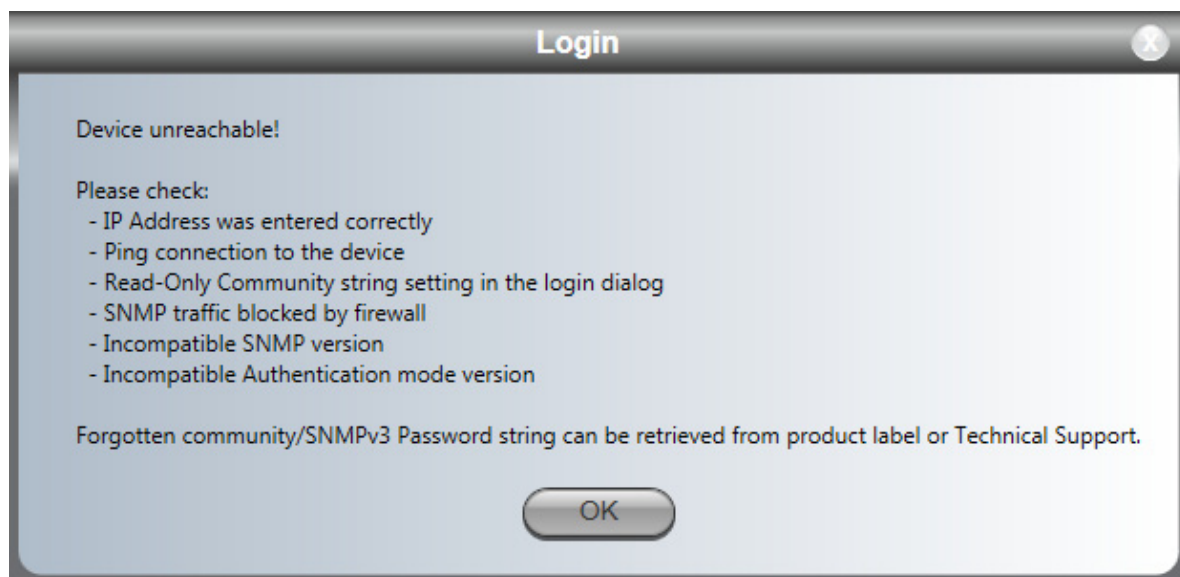


Figure 2-9: SNMP Issues

- **Contact your IT department to unblock SNMP via the firewall**
- **Make sure you are using the correct SNMP version**
- **If you are logging in immediately after changing the authentication mode:**
 - Make sure that the mode chosen in the **Authentication** pull-down menu on the log-on window (see “Log on window showing SNMP settings.” on page 2-5) is the same as the one you chose when you changed the authentication mode (see [Protocol](#) on page 4-23).

➤ **Lost or forgotten Community Strings¹:**

1. Send an email request to RADWIN Customer Service for an alternative key. Your email must include the serial number shown on the adhesive sticker on one of your radio units.
2. The reply contains an alternative key, which is a temporary master Community String. Copy/paste this key to both the Read-Only and Read-Write fields in the log-on window ([Figure 2-4](#)). This gets you to the RADWIN Manager main window.
3. Use the procedure on [page 4-30](#) to enter new Community Strings.

2.6 Sector Display Views

The RADWIN Manager offers three sector display views:

- » [Card View](#) (default)
- » [Map View](#)
- » [List View](#)

➤ **To switch between views:**

- Click the relevant tab. From left to right, the tabs are, [Map View](#), [Card View](#), and [List View](#). The active tab (List view in the illustration) is shown enlarged.



2.6.1 Card View

The default view for a sector is **Card view** and looks like this:

1. Not relevant if your system uses Community Encryption via the community.dat file (see [Community Encryption](#) on page [4-36](#))

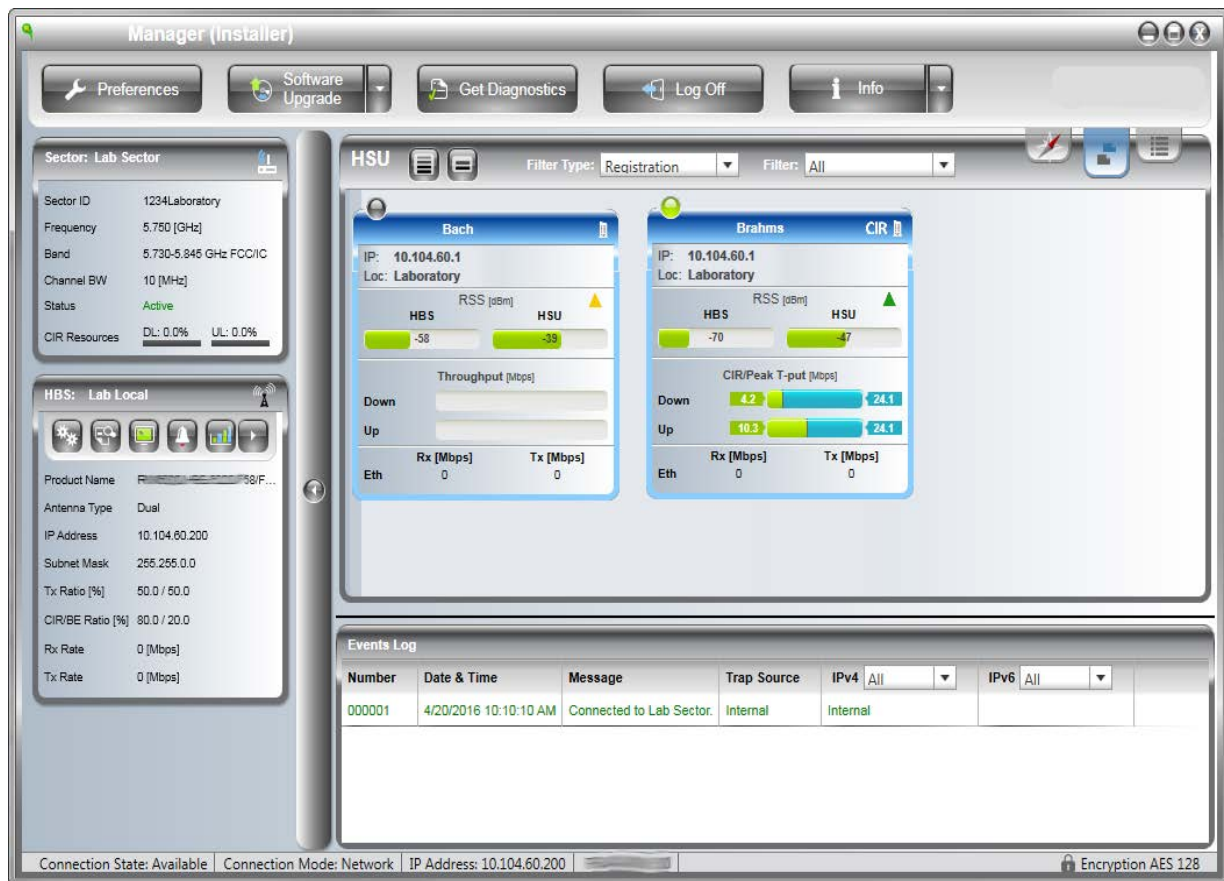


Figure 2-10: Default Sector display - Card view

Cards

The individual HSU display boxes are called **cards**.

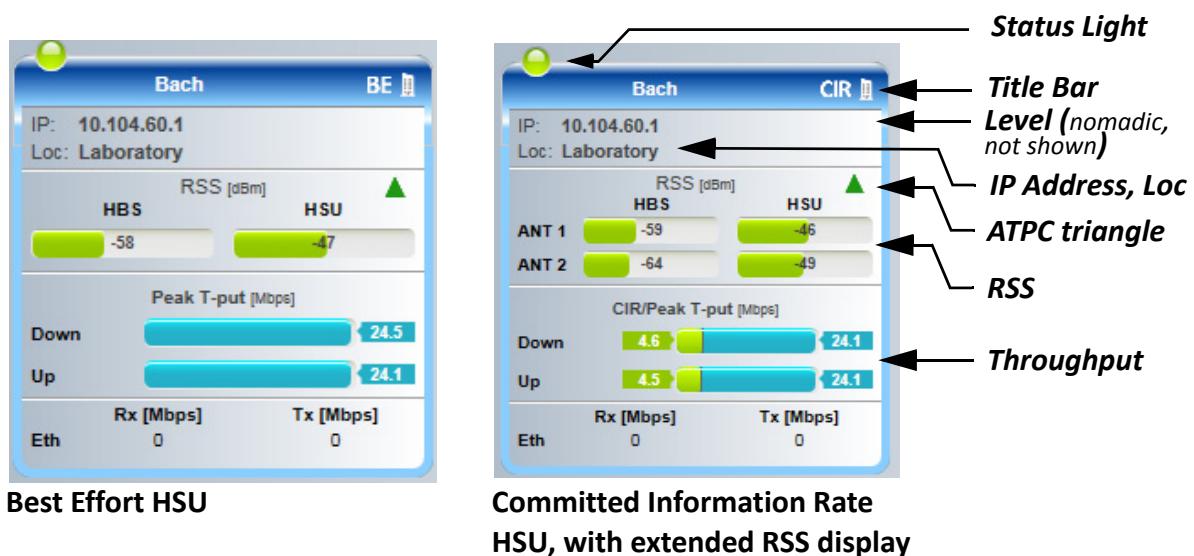


Figure 2-11: HSU Cards

Status Light: Shows the connection status of the selected unit.

Table 2-2: HBS status and HSU status light color codes

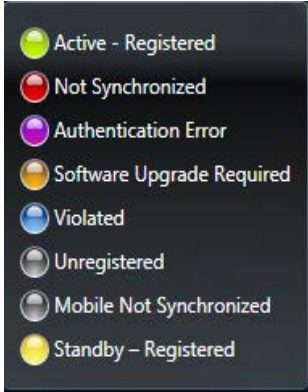



	Color	Description	
		HBS	HSU
	Green	Active	Registered, in sync
	Red	Inactive	Registered, no sync
	Purple	N/A	Authentication error
	Brown	N/A	Software Upgrade required
	Blue	N/A	Violated: belongs to another sector
	Gray	N/A	Static: Unregistered
			Mobile: Not synchronized
	Yellow	N/A	Registered, but in Standby mode

Figure 2-12: HBS/HSU Status lights

Title Bar: Shows HSU name and service category (BE or CIR)

IP & Loc: IP address and location as defined during Configuration or Registration

ATPC triangle: Indicates the ATPC mode (Static or Dynamic) and status of ATPC for this HSU.
Possible states are:

	Green	Dynamic range and rate achieved	Optimized transmit power and transmit data rate have been achieved for this HSU.
	Yellow	Dynamic range and rate not achieved	System is trying to achieve optimized transmit power and transmit data rate for this HSU.
	Red	Dynamic range and rate not according to the requested value	System was not able to achieve optimized transmit power or transmit data rate for this HSU.

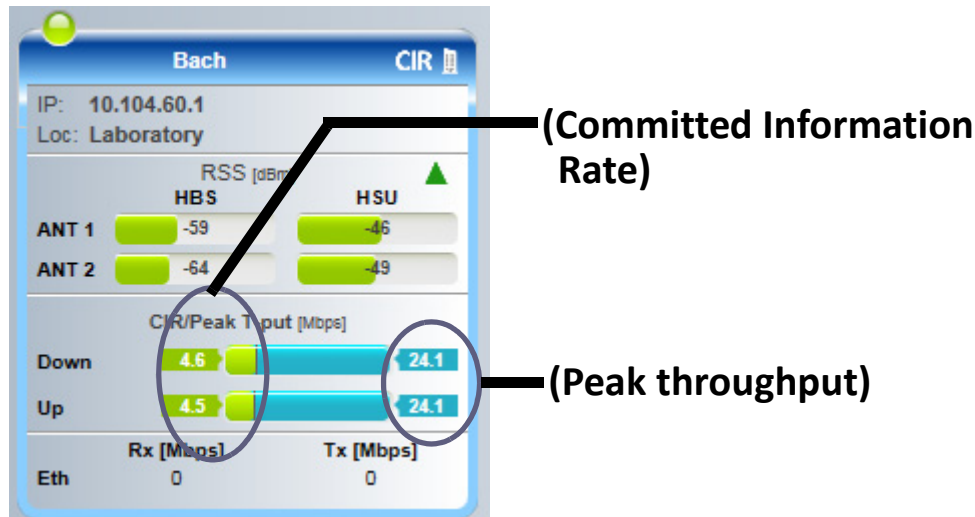
RSS: Radio signal strength for both the HBS and HSU are shown as bar graphs.

- They should be balanced. If for one HSU there is a consistent imbalance of even 1dBm or intermittent imbalances of 2-3 dBm, check its antenna connections and perhaps the unit itself. If several HSUs are out of balance, there may be a problem with the HBS.
- You can also set an extended RSS display, showing the RSS for each antenna (if relevant). See [Setting RADWIN Manager Preferences, Advanced](#) below.

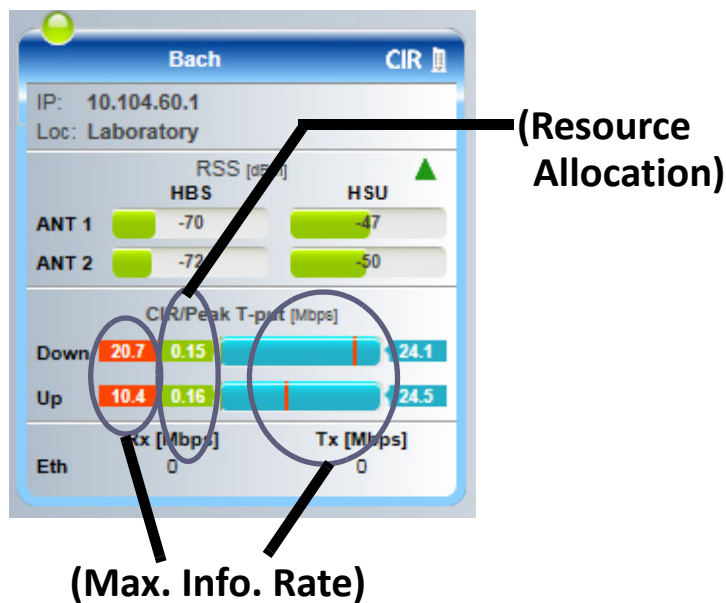
Throughput Downlink and Uplink:

The **light blue** part of each bar shows the peak throughput possible, subject to traffic conditions.

The **green** part of each bar shows the committed information rate, and only appears for an HSU whose resource type is defined as CIR (Committed Information Rate).



If the **Maximum Information Rate** or the **Resource Allocation** was changed during registration, these values will appear as shown (see [Registering a fixed HSU for service](#) on page 3-21. for more details):



Rx and Tx rates: At the bottom of the card are the Ethernet receive and transmit rates for the HSU. The little ball on the top left of each card is a status light, explained in [Table 2-6](#) below.

2.6.2 Map View

If you have an Internet connection, you can use **Map view**. The map view uses distinctive icons to distinguish between different types of HSUs and the HBS:




		
HBS	fixed HSU	nomadic HSU

Figure 2-13: Map view icons

The green “beacon” light on top of the icons changes color according to the unit’s status. The color codes are defined in [Table 2-6](#) below.

The **Map view** of the RADWIN Manager looks like this:



Figure 2-14: Sector display - Default Map view

If you do not have an Internet connection, the display background will be solid gray.

Any nomadic HSUs, having no predefined coordinates, are distributed evenly across the sector.

➤ **To relocate an HBS or HSU by setting latitude and longitude coordinates:**

1. From the Map View, right click the HBS (Bach@HBS.01) to open its Context menu and then **Configure**.
2. From the **System** tab, click the **Coordinates** button to open the Coordinates window and enter the required latitude and longitude.

Coordinates

☒ Decimal Degrees ☐ Degrees Minutes Seconds

Latitude (-89 to +89):

Longitude (-180 to +180):

Azimuth (0 to 360): Beamwidth (0 to 360):

You may enter the coordinates in decimal or degrees/minutes/seconds using the input template shown below:

Coordinates

☐ Decimal Degrees ☒ Degrees Minutes Seconds

(Input template: XX XX XX(.X) = 45 20 25.5)

Latitude (-89 to +89):

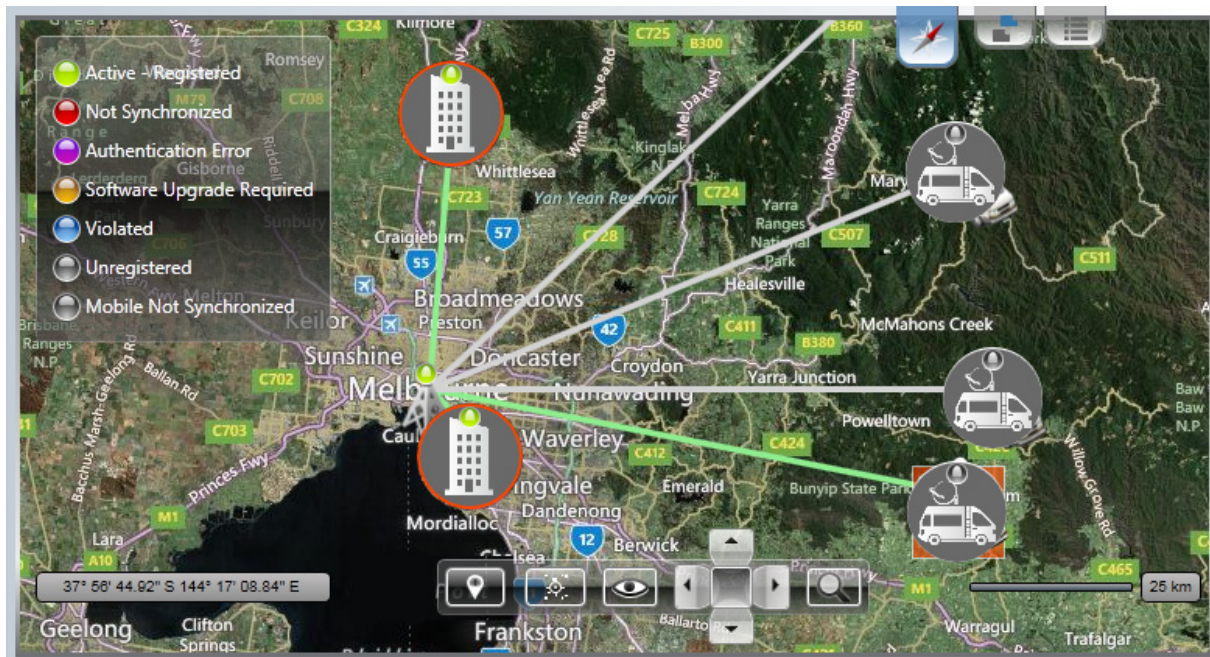
Longitude (-180 to +180):

Azimuth (0 to 360): Beamwidth (0 to 360):

3. HBS only: The Azimuth and Beam Width determine the sector center-line direction and angle. They are only used for initial default distribution of HSUs on the map.
4. Click **OK**. The unit is moved to the new location (possibly off-screen).
5. Repeat the previous four steps for each HSU in the sector. If at the end of the process, the HBS is off-screen, click the Center on Sector button to “fly” to the sector.



Here is a sample outcome:



We have located the entire sector to Melbourne, Australia (vs. [Figure 2-14](#)) in accordance with our Radio Plan. The grey lines and icons are pre-registered place-holders for additional nomadic HSUs.

You can make manual location adjustments using the GUI.

➤ **To relocate an HBS or HSU using the GUI:**

1. Select the unit to move by clicking it. It is surrounded by a brown box or perimeter.
2. Mouse-over the top edge of the box to get a context button bar as shown in.

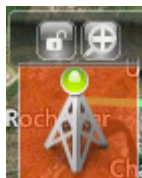


Figure 2-15: Selected HBS or HSU with context button bar

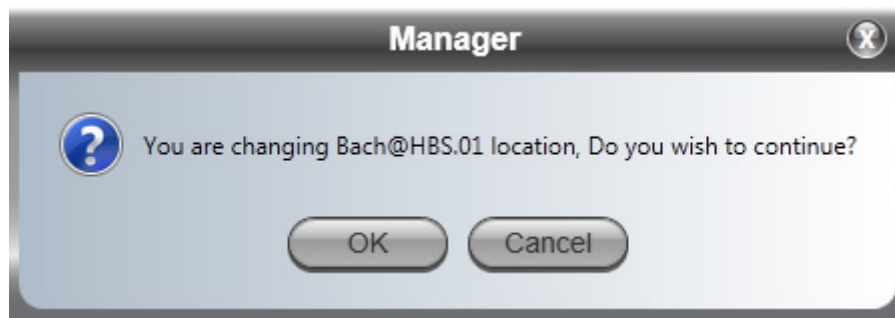
The functions of the buttons (from left to right) are as follows:

Table 2-3: Unit Context Button bar functions

Button	Tool tip	Purpose
Center	Unlock / Lock Item	Unlock to drag on map, lock to secure position
Right	Zoom in	Show more background detail. Also displays the unit status window if not already visible ^a

a. You can also zoom in/out using the mouse scroll wheel.

3. Click the **Unlock** button. Drag the tower icon to its new location. You must confirm the change:



The change is then carried out.



There is no “undo” function. If you inadvertently move the unit to a wrong place, you will have to restore its position by hand.

2.6.3 List View

The **List view** looks like this:

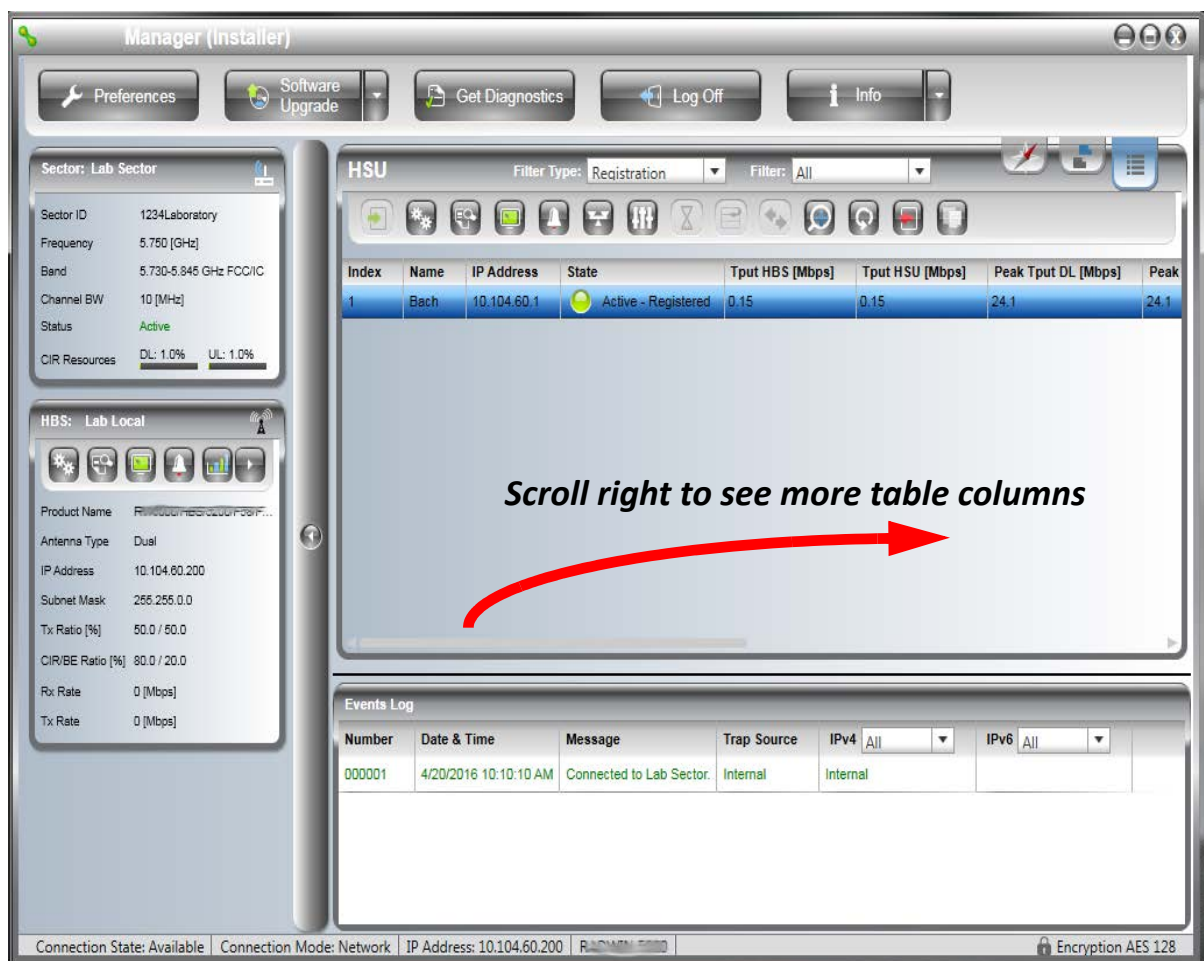
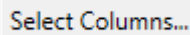


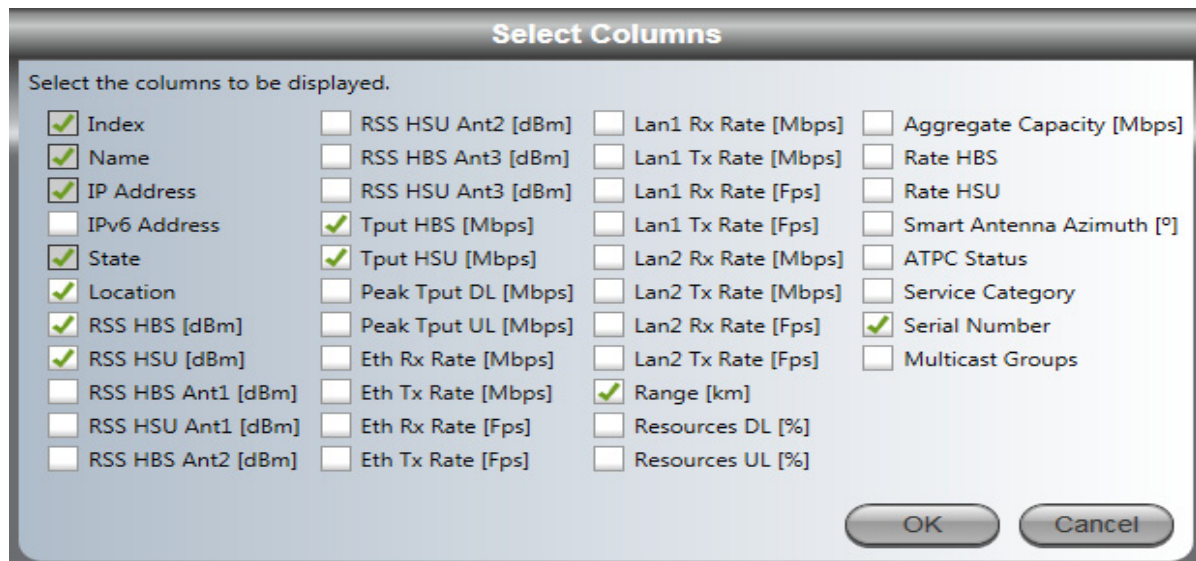
Figure 2-16: Sector display - List view

At the bottom of the HSU display panel is a thin horizontal scroll bar. Use it to see further details about the displayed HSUs. The status indicator ball has the same meaning as it does for the HSU cards and map icons. For details, see [Table 2-6](#) below.

You may restrict the displayed fields to those of interest. Right click anywhere in the list and you are offered a **Select Columns** button:



Click it to open the field choice menu:



Select Columns

Select the columns to be displayed.

<input checked="" type="checkbox"/> Index	<input type="checkbox"/> RSS HSU Ant2 [dBm]	<input type="checkbox"/> Lan1 Rx Rate [Mbps]	<input type="checkbox"/> Aggregate Capacity [Mbps]
<input checked="" type="checkbox"/> Name	<input type="checkbox"/> RSS HBS Ant3 [dBm]	<input type="checkbox"/> Lan1 Tx Rate [Mbps]	<input type="checkbox"/> Rate HBS
<input checked="" type="checkbox"/> IP Address	<input type="checkbox"/> RSS HSU Ant3 [dBm]	<input type="checkbox"/> Lan1 Rx Rate [Fps]	<input type="checkbox"/> Rate HSU
<input type="checkbox"/> IPv6 Address	<input checked="" type="checkbox"/> Tput HBS [Mbps]	<input type="checkbox"/> Lan1 Tx Rate [Fps]	<input type="checkbox"/> Smart Antenna Azimuth [°]
<input checked="" type="checkbox"/> State	<input checked="" type="checkbox"/> Tput HSU [Mbps]	<input type="checkbox"/> Lan2 Rx Rate [Mbps]	<input type="checkbox"/> ATPC Status
<input checked="" type="checkbox"/> Location	<input type="checkbox"/> Peak Tput DL [Mbps]	<input type="checkbox"/> Lan2 Tx Rate [Mbps]	<input type="checkbox"/> Service Category
<input checked="" type="checkbox"/> RSS HBS [dBm]	<input type="checkbox"/> Peak Tput UL [Mbps]	<input type="checkbox"/> Lan2 Rx Rate [Fps]	<input checked="" type="checkbox"/> Serial Number
<input checked="" type="checkbox"/> RSS HSU [dBm]	<input type="checkbox"/> Eth Rx Rate [Mbps]	<input type="checkbox"/> Lan2 Tx Rate [Fps]	<input type="checkbox"/> Multicast Groups
<input type="checkbox"/> RSS HBS Ant1 [dBm]	<input type="checkbox"/> Eth Tx Rate [Mbps]	<input checked="" type="checkbox"/> Range [km]	
<input type="checkbox"/> RSS HSU Ant1 [dBm]	<input type="checkbox"/> Eth Rx Rate [Fps]	<input type="checkbox"/> Resources DL [%]	
<input type="checkbox"/> RSS HBS Ant2 [dBm]	<input type="checkbox"/> Eth Tx Rate [Fps]	<input type="checkbox"/> Resources UL [%]	

OK Cancel

The grayed out items are always displayed. The other items can be included or removed by clicking on the checkbox next to them.

Some items may not be relevant for this product; they can be ignored.

2.7 The RADWIN Manager Main Window - HBS

The following sections describe the panels of main window shown in [Figure 2-10](#).

2.7.1 HBS Main Button Menu

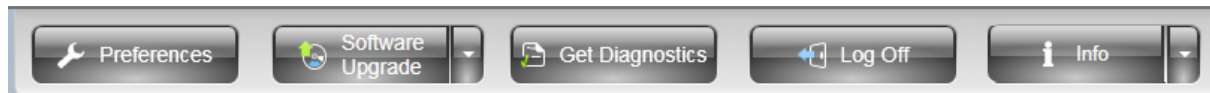


Figure 2-17: HBS main button menu

Table 2-4: HBS main button bar functions

Menu Item	Purpose	Cross Reference
Preferences	Monitor - File location, interval and throughput units	Monitor
	Events - Color coding for events log and events log file location	Events
	Advanced - Enable/disable check for updates, Monitoring interval and timeout, map view background mode	Advanced
Software Upgrade	Perform software upgrade for a sector	Upgrading an Installed Sector
SWU side arrow	Bulk backup of HBS and HSU software	Bulk Software Backup
Get Diagnostics	Run and store diagnostics for all or some members of a sector	Monitoring and Diagnostics
Log Off	Return to log-on window	
Info side arrow	Link Budget Calculator	App Note “Link Budget Calculator”
	Check Updates	
	About	

2.7.2 Sector Status Panel

Sector-level parameters are set before the base station is activated and are applicable for each HSU in the sector.

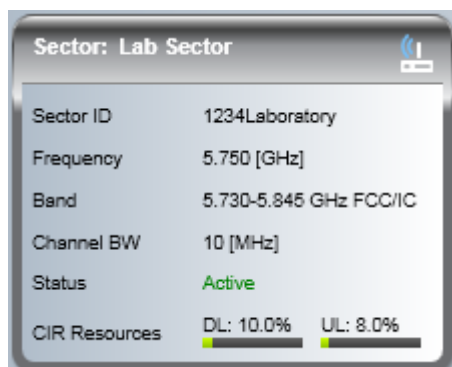


Figure 2-18: Sector Status panel

Sector ID: The name of the sector. When configuring HSUs, make sure their Sector ID is the same as that here, otherwise connection may not be possible.

Frequency, Band: The Frequency and Frequency Band in use in the sector.

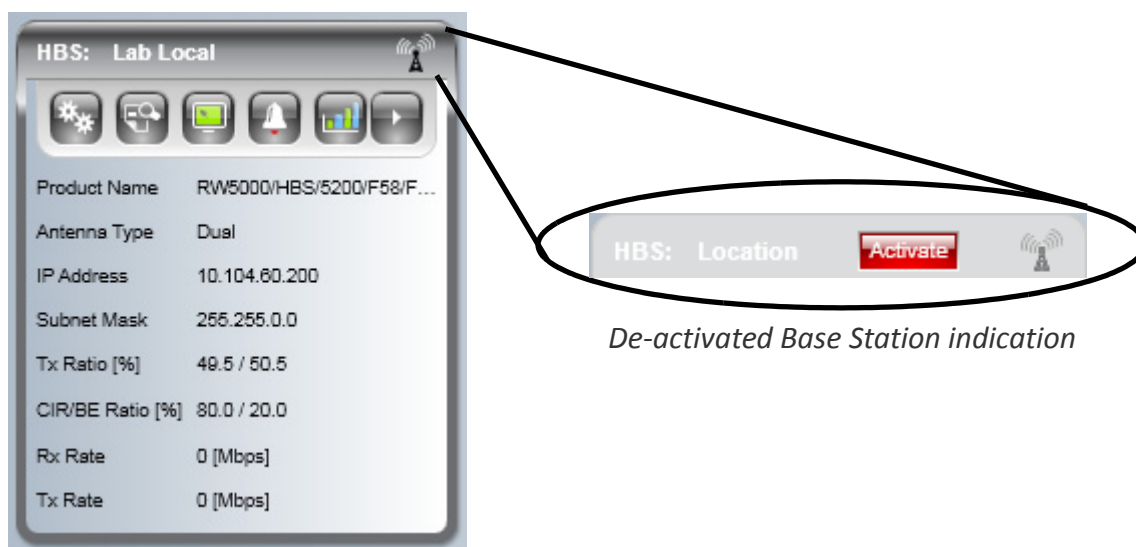
Channel BW: Bandwidth of the specific channel. This can be configured.

Status: Indicates whether the HBS has been activated or not.

CIR Resources: Indicate what percentage of the allocated CIR resources are being used by the sector at any given moment.

2.7.3 Base Station Panel

The Base Station panel shows basic information for the connected Base Station.



De-activated Base Station indication

Figure 2-19: Base Station detail Panel

Activate: Appears in the header if the base station is not activated.

Product Name: As ordered from your supplier

Antenna Type: Dual or Single

IP Address: Base Station IP address














Subnet Mask: Base Station subnet mask

Tx Ratio: Shows the allocation of throughput between downlink and uplink traffic at the HBS. Here it is set to 49.5% downlink and 50.5% uplink. The Tx Ratio is not only sector-wide: If you use an HSS to collocate several HBSs (to cover adjacent sectors), they must all use the same Tx Ratio.

CIR/BE Ratio: Shows what percentage of resources in the sector is used for CIR traffic, and what percentage is used by BE traffic.

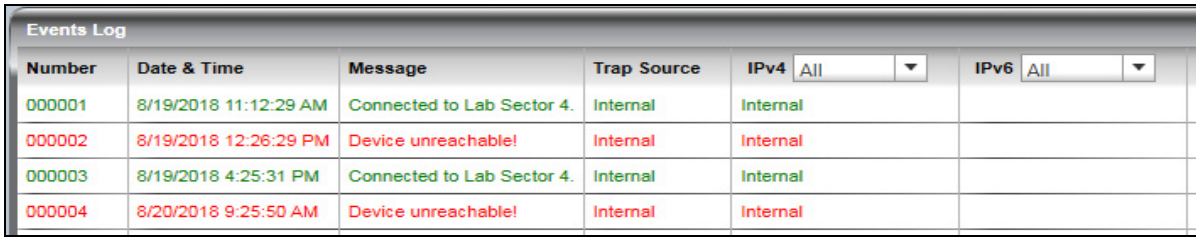
Rx Rate and **Tx Rate**: Ethernet traffic receive and transmit rates through the HBS under load.

Table 2-5: HBS Detail Panel button bar functions

Menu Icon	Purpose	Cross Reference
	HBS Configuration	Configuring an HBS
	Recent Events Log	Recent Events
	Performance Monitor	Performance Monitoring
	Active Alarms	Active Alarms
	Spectrum View	Spectrum View
	 Change Band	Changing the Sector Band
	 HSU Connection Table	HSU Connection Table
	 Bridge Table	Bridge Table
	 Service Categories	Service Categories
	 Locate On Map	
	 Reset	
	 Deactivate	Deactivating the HBS

2.7.4 HBS Events Log

The events are displayed in the Events Log in the lower right-hand panel of the RADWIN Manager main window:



Number	Date & Time	Message	Trap Source	IPv4	IPv6
000001	8/19/2018 11:12:29 AM	Connected to Lab Sector 4.	Internal	Internal	
000002	8/19/2018 12:26:29 PM	Device unreachable!	Internal	Internal	
000003	8/19/2018 4:25:31 PM	Connected to Lab Sector 4.	Internal	Internal	
000004	8/20/2018 9:25:50 AM	Device unreachable!	Internal	Internal	

Figure 2-20: Events Log panel

The Events Log records system failures, loss of synchronization, loss of signal, compatibility problems and other fault conditions and events.



Event types include events from all links for which this managing computer has been defined as the traps address. Only events from RADWIN equipment will be shown.

Alarms (traps) are displayed in the Events Log. The Events Log may be saved as a text file.

The Events Log includes the following fields:

- » Sequential number (ID)
- » Date and time stamp
- » Message
- » Trap source
- » IP address of the ODU that initiated alarm - IPv4 or IPv6. Use the pull-down menu here to filter the list according to the indicated criteria.

For complete information about internal traps and alarms see [Chapter 7](#).

The events log provides a color coded event list. Blue items (like the one in [Figure 2-20](#)) are informational. You can set the color coding for critical, cautionary and informational messages from the **Preferences** button.

The Events Log is horizontally scrollable if it is too wide for your computer display.

Use the top left drop-down list to filter the messages:

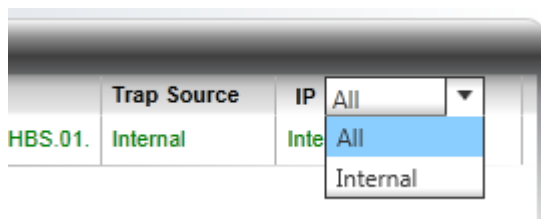


Figure 2-21: Events Log filter selection

2.7.5 HBS Main Window - HSUs Panel

➤ To switch between displays:

- Click the relevant tab. From left to right, the tabs are, [Map View](#), [Card View](#), and [List View](#). The active tab (List view in the illustration) is shown enlarged.



Map View

Here is the Map view:

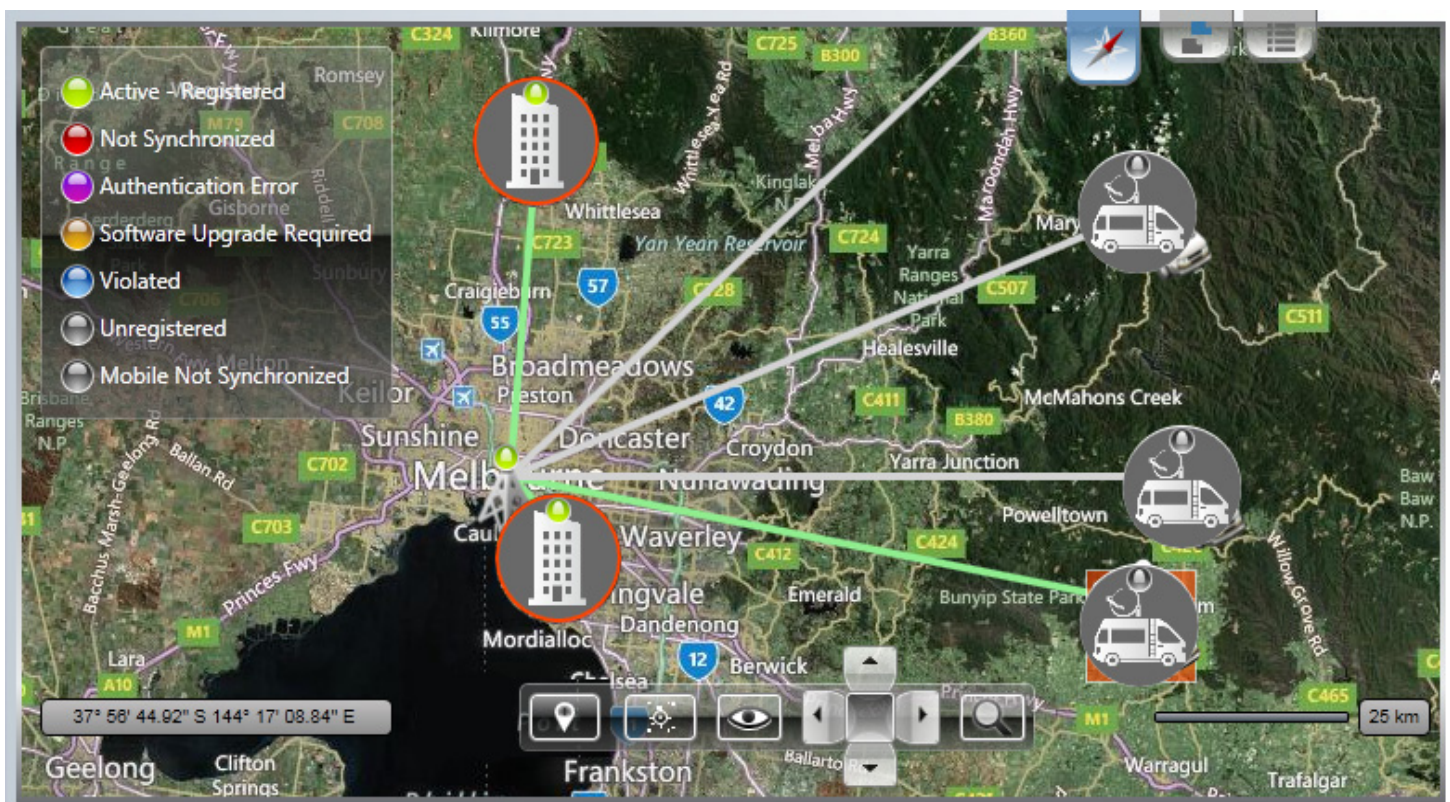


Figure 2-22: HBS Main Window - Map view

HBS/HSU Status Lights


HBS/HSU Status light appear on the tower graphic,  and the HSU detail (for example, [Figure 2-28](#)).

Table 2-6: HBS status and HSU status light color codes

Color	Description	
	HBS	HSU
Green	Active	Registered, in sync
Red	Inactive	Registered, no sync
Purple	N/A	Authentication error
Brown	N/A	Software Upgrade required
Blue	N/A	Violated: belongs to another sector
Gray	N/A	Static: Unregistered
		Mobile: Not synchronized
Yellow	N/A	Registered, but in Standby mode

Figure 2-23: HBS/HSU Status lights

Navigation Tool bar

The left hand display box shows the latitude and longitude of the point on the map under the tip of the mouse cursor.

The right hand bar is the distance scale as defined by the numeric label - 25 km in the example.



Figure 2-24: Navigation Tool bar

Table 2-7: Navigation tool bar button functions




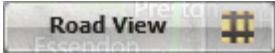

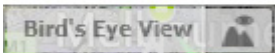





Menu Icon	Purpose
	Show/Hide the HBS/HSU Status lights (Figure 2-23)
	Center on the sector

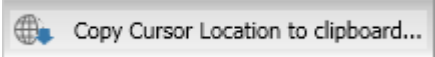
Table 2-7: Navigation tool bar button functions (Continued)

Menu Icon	Purpose
	    <p>Shows different map views. Aerial View and Show Labels are set by default.</p>
	<p>Navigation buttons: Moves the sector about on the displayed map.</p>
	 <p>Shows different levels of map detail</p>

The zoom item  is a convenience function. The four side buttons show the detail level associated with the zoom slider position. Alternatively, you may click one of the side buttons to get directly to the indicated zoom level. The default level is “Region” corresponding roughly to an area sufficient to display the whole sector.

Other Mouse Navigation Functions

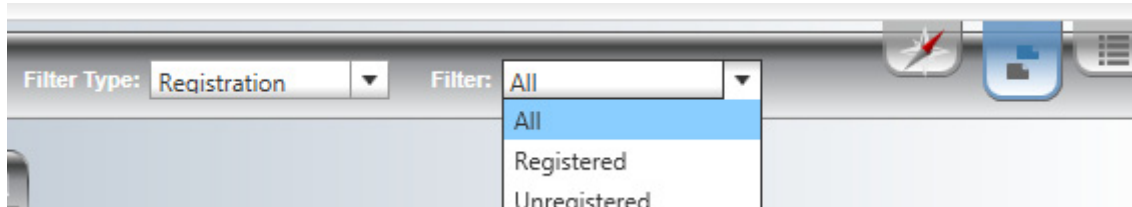
- Double clicking the mouse or rotating the scroll wheel forward causes the view to zoom in (become larger, more detailed)
- Rotating the scroll wheel back causes the view to zoom out (become smaller, less detailed)
- Moving the mouse over the map with the right button depressed drags the sector (centered on the HBS) in the direction of movement.

Right clicking anywhere on the map opens up this  close to the mouse location. Clicking this button copies the mouse cursor location as a comma separated text mode latitude-longitude pair to the clipboard. Here is a copy/pasted example: -37.58896, 145.69000.

Card View

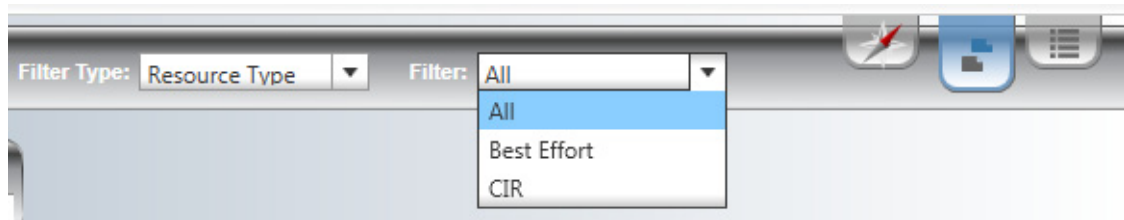
If you have a large number of HSUs in the sector, it may be helpful to filter the display. You have the following choices:

- Filter according to registration status:



- or -

- Filter according to resource type:



The following cases have colored fields indicating a problem requiring your attention:



Figure 2-25: HSU status cards indicating problems

If you mouse-over the colored RSS area, you will receive a tool tip telling you that RSS for Radio 1 is higher than for Radio 2, or something similar. The color codes have the following meanings:

- Normal white/green together with a consistent RSS imbalance may be caused by different TX Power settings at each site. There is no warning indicator but it may be easily corrected using **Configure | Tx & Antenna** or by rerunning the Configuration wizard.
- A yellow warning color will be displayed for an RSS difference of more than 8 dBm between the two polarizations on the same site (the RSS display is the combination of both polarizations on this site)
- A red warning color indicates an RSS difference of more than 16 dB between the two polarizations on the same site

The latter two cases are usually the result of a physical problem at the indicated site. Probable causes are:

- Interference
- Antenna polarity problem
- ODU malfunction

This is a normal situation:

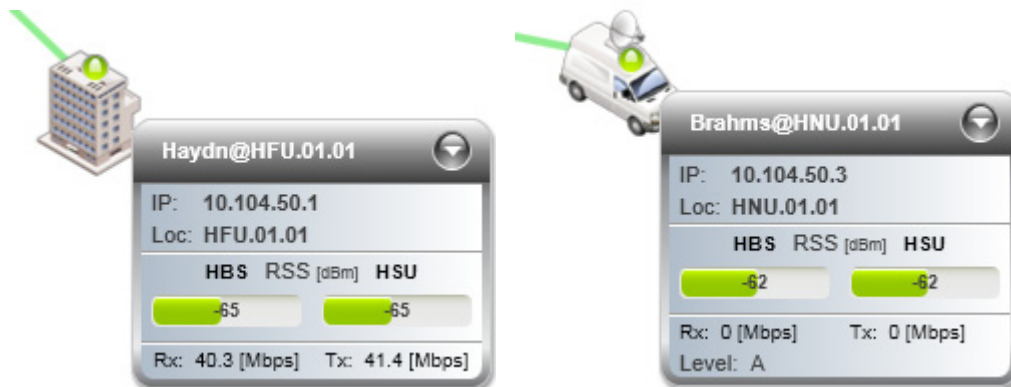


Figure 2-26: HSU status cards: Left: fixed HSU Right: nomadic HSU

The arrow on the top right hand corner can be used to minimize or restore full detail. Here is

the HSU status box minimized:



This device is useful for a large sector with a small display.

Right click an HSU image to get its context menu:

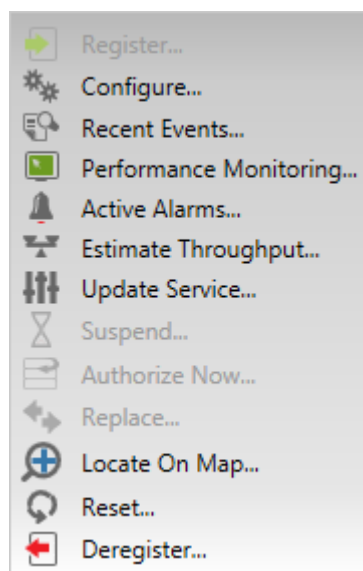


Figure 2-27: HSU display - context menu (right click)

The following case has colored fields indicating a problem requiring your attention:



Figure 2-28: HSU card- indicating a problem

If you mouse-over the colored RSS area, you will receive a tool tip telling you that RSS for Radio 1 is lower than for Radio 2, or something similar. We will provide further detail about these color codes below.

Right click a HSU to get its context menu:

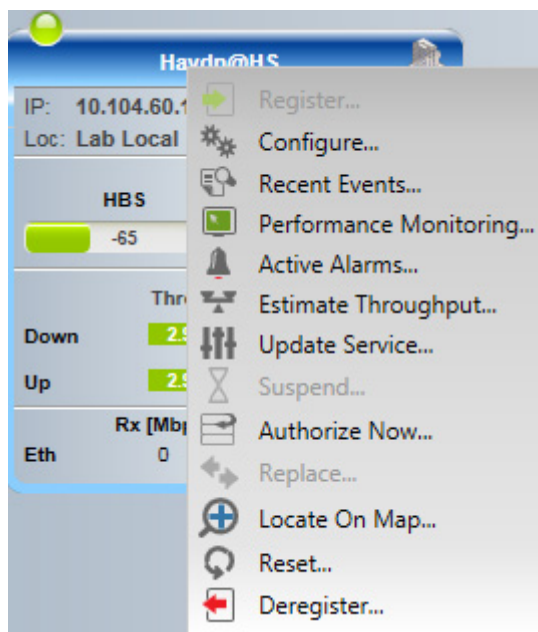


Figure 2-29: HSU display - context menu (right click)

List View

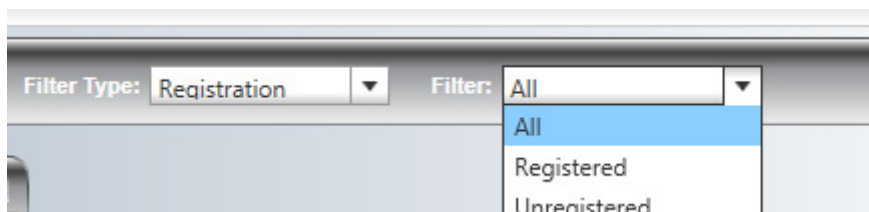
List view functionality is obtained by selecting a HSU and using the top button bar to configure it.

Index	Name	IP Address	State	Location	RSS HBS [dBm]	RSS HSU [dBm]	Tput HBS [Mbps]	Tput HSU [Mbps]	Peak Tput DL [Mbps]	Peak Tput UL [Mbps]
1	Mozart@HFU.01.02	10.104.50.2	Active - Registered	HFU.01.02	-65	-66	7	1.8	51.7	50.9
2	Haydn@HFU.01.01	10.104.50.1	Active - Registered	HFU.01.01	-65	-66	7	1.7	51.7	50.7
3	Brahms@HNU.01.01	10.104.50.3	Active - Registered	HNU.01.01	-63	-62	2.6	0.88	26.6	25.5
4	Name_4		Not Synchronized	Location						
5	Name_4		Not Synchronized	Location						
6	Name_3		Not Synchronized	Location						

Figure 2-30: HSUs on HBS display - extract. Scroll right for more HSU fields

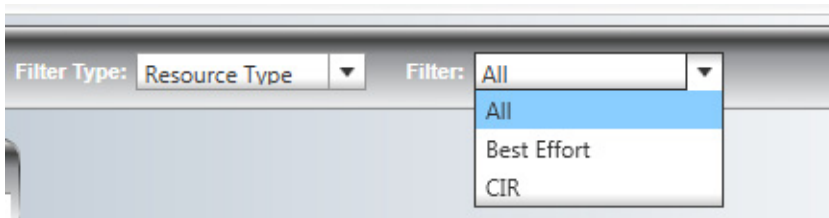
If you have a large number of HSUs in the sector, it may be helpful to filter the display. You have the following choices:

- Filter according to registration status:



- or -

- Filter according to resource type:













The button bar in [Figure 2-30](#) follows the same pattern as the context menus in [Figure 2-29](#).

Table 2-8: HBS main window context menu and button bar functions

Menu Item	Menu Icon	Purpose	Cross Reference
Register		Register a HSU to a sector	Registering a fixed HSU for service
Configure		Site configuration for the HSU	Configuring an HSU from the HBS Main Window
Recent Events		Recent events log per HSU	Recent Events
Performance Monitoring		Performance Monitoring per HSU	Performance Monitoring

Table 2-8: HBS main window context menu and button bar functions (Continued)

Menu Item	Menu Icon	Purpose	Cross Reference
Active Alarms		Display Active Alarms	Active Alarms
Estimate Throughput		Estimate throughput per HSU	Throughput Checking
Update Service		Change resource type and/or MIMO modeHSU	Updating HSU Services
Suspend ...		Suspend Service	Suspending an HSU
Authorize Now		Authorize registration of an HSU when RADIUS option is used, and Install Confirmation Required is enabled.	RADIUS
Replace		Replace a HSU	Replacing an HSU
Locate on Map		Fly to this HSU on the Map Display	
Reset		Reset the HSU	
Deregister		Deregister the HSU	Deregistering an HSU
Copy HSUList		Copies HSU List (showing serial no). to clipboard	

2.8 Logging on to an HSU directly

You can log on to an HSU without first logging on to its HBS. This can be done directly via an ethernet connection to the HSU, or “over the air”, which is via its HBS.

Via ethernet connection: The log on procedure is the same as that of an HBS
(see [The RADWIN Manager Log-on Concept](#) on page 2-3)

Over the air: You will receive the following caution:

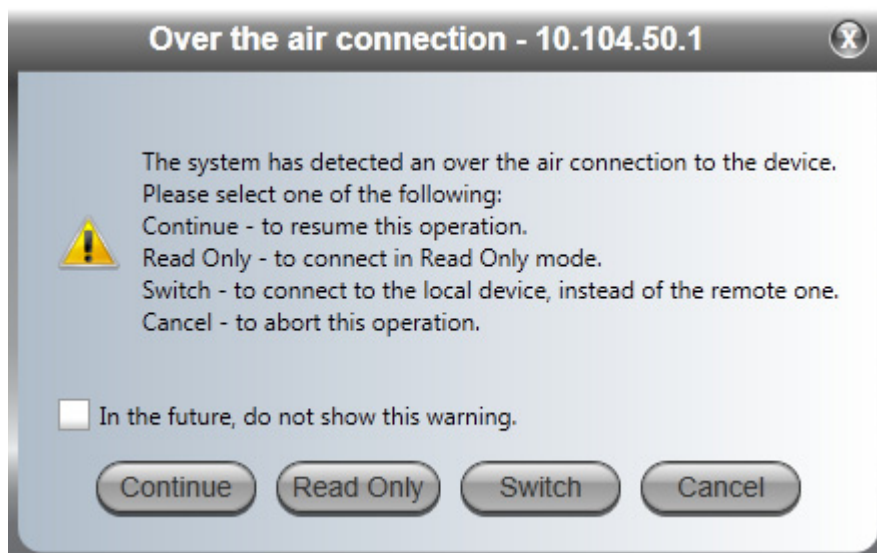


Figure 2-31: Logging on to a HSU over the air

Click **Continue** to dismiss the caution, and a variation of the main window appears:

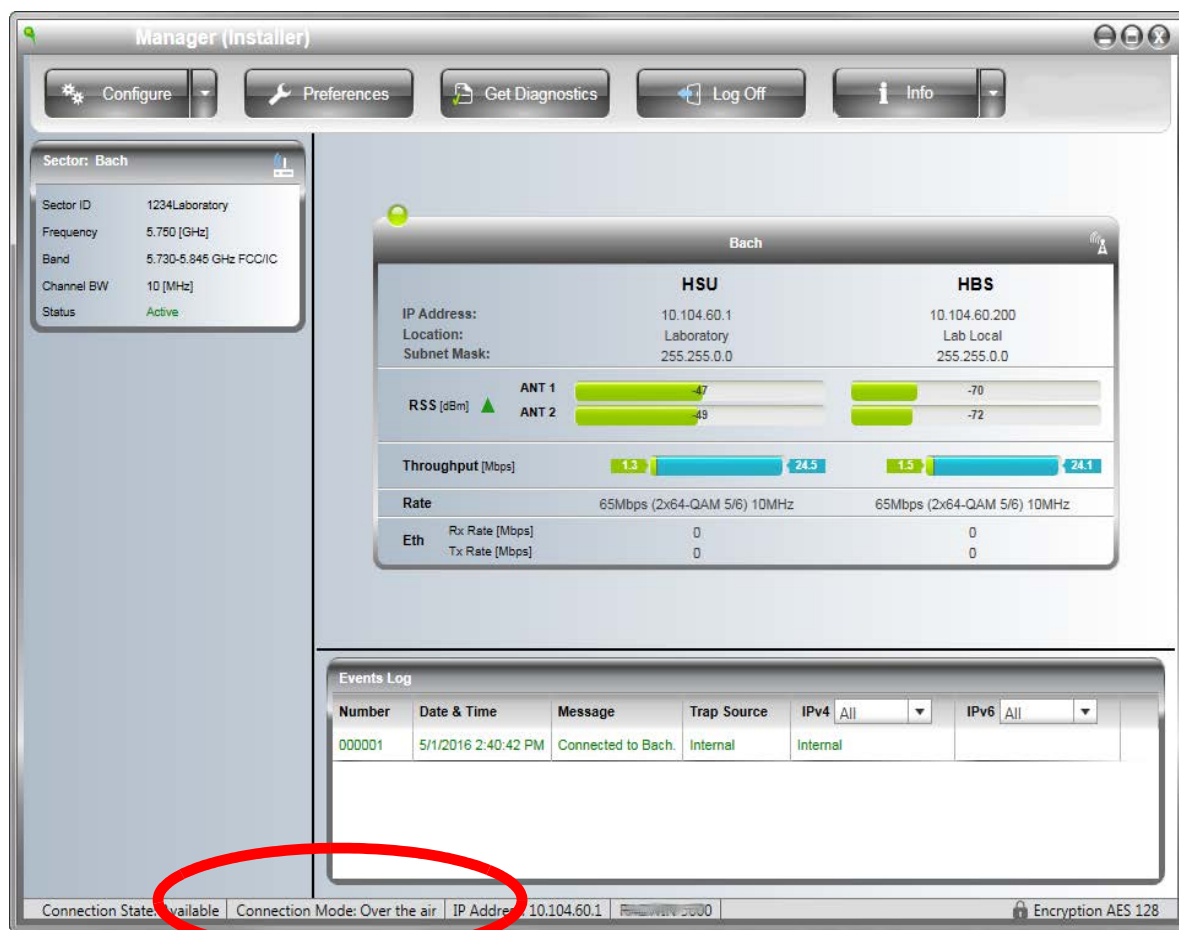


Figure 2-32: Opening RADWIN Manager window - HSU

The direct log on window differs only in the bottom status bar where the Connection Mode will show *Network* instead of *Over the air*. There are several functional differences between the log on modes, which we will explain in the following chapters.

2.8.1 HSU Main Button Menu

The HSU main button menu is similar to the HBS main button menu. The only new item is in the **Configure** button, while the **Software Upgrade** button does not appear.

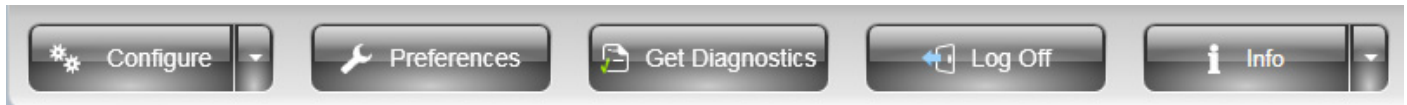
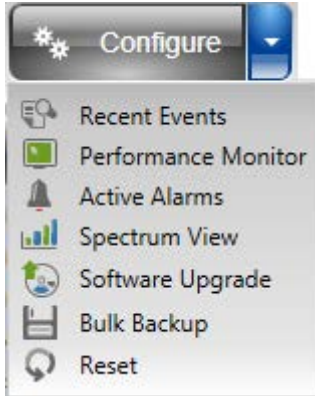


Figure 2-33: HSU main button menu

Table 2-9: HSU main button bar functions

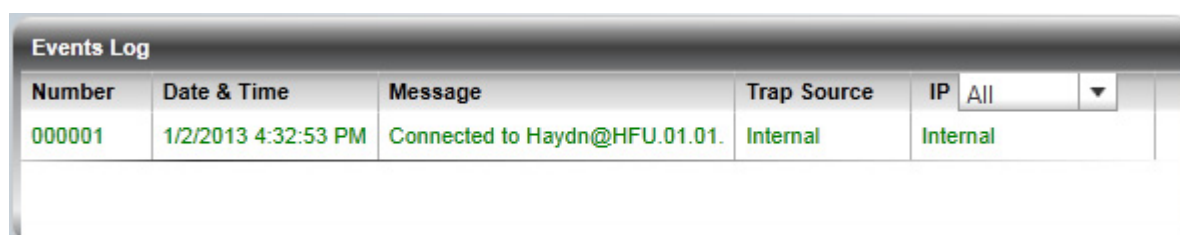
Menu Item	Purpose
Configure	<p>The Configure button opens HSU site configuration. The additional functions in the detail menu work in the same way as the corresponding functions for the HBS.</p>  <p>See Backup, Restore, and Upgrade for the fifth and sixth items.</p>
Preferences	Monitor - File location, interval and throughput units
	Events - Color coding for events log and events log file location
	Advanced - Enable/disable check for updates, Monitoring interval and timeout
Get Diagnostics	Run and store diagnostics for all or some members of a sector
Log Off	Return to log-on window
Info side arrow	Link Budget Calculator
	Check for updates
	About

2.8.2 HSU Link Status

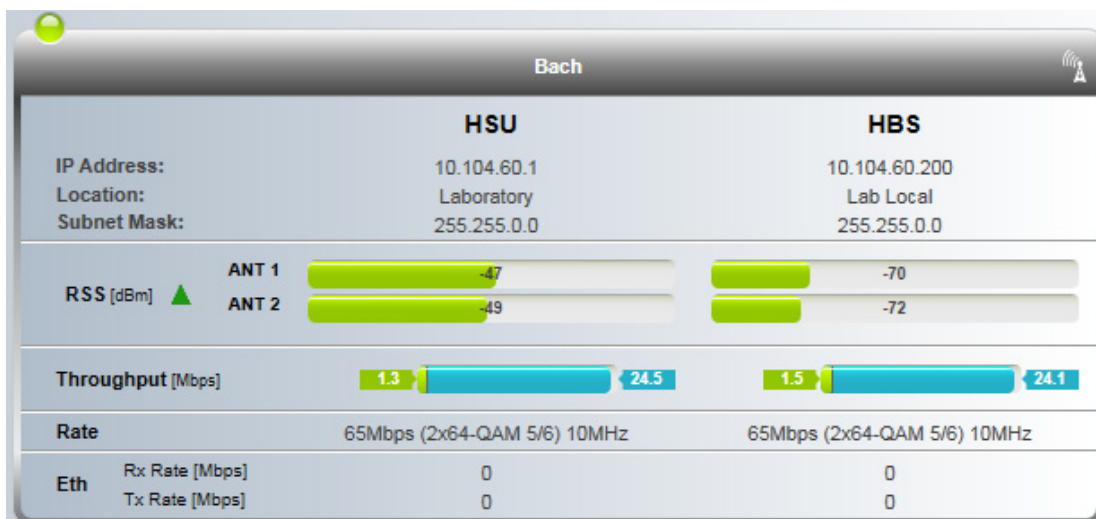


2.8.3 HSU Events Log

The HSU events display is functionally identical to that of the HBS.



2.8.4 HSU Link Performance



The HSU Link Performance panel shows the same fields as in [Figure 2-26](#). For convenience we also display the corresponding parameters for the HBS. The throughput bar graphs and labels have the same meaning as the corresponding items on the HSU cards.

2.9 Setting RADWIN Manager Preferences

The **Preferences** tab relates to the way the Manager displays certain items for the connected unit. They are completely local to the managing computer.



Each technician servicing a sector must set up his managing computer with his own preferences.

2.9.1 Monitor

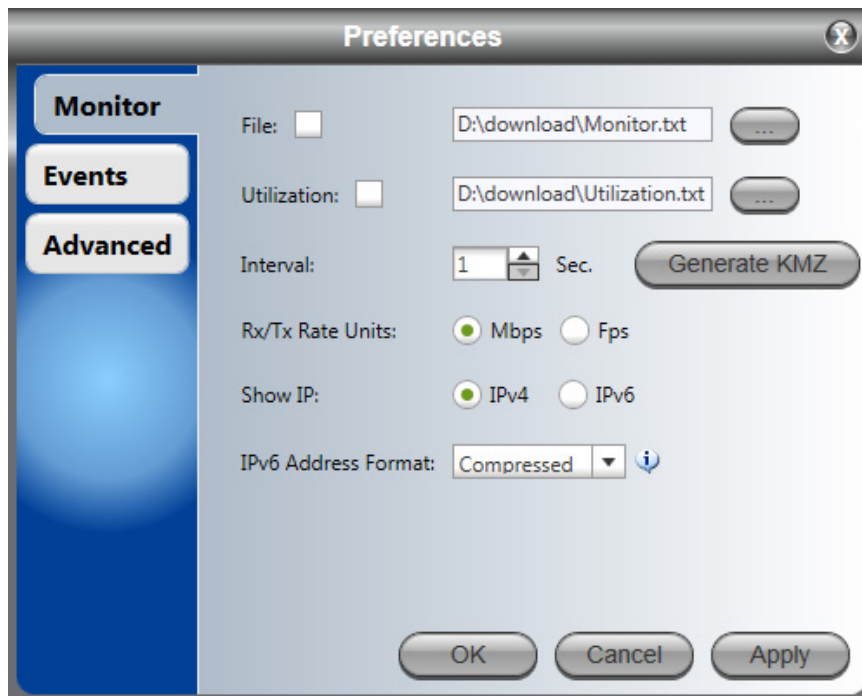


Figure 2-34: Monitor Preferences

The **Monitor file** contains a vast amount of information and can become inordinately large very quickly. Choose a longer sampling interval if you intend to store this information for a lengthy duration.

For the HBS, this file shows details for the HBS itself and all registered HSUs.

Use distinctive file names for HBS and HSU Monitor files.

The content of the Monitor file is discussed in more detail in [Chapter 7](#).

Interval: Save the data every X seconds to the Monitor file (and the Utilization file if relevant). X can be an integer value only, and from 1 to 60.

Utilization: This option appears for the HBS only. The *Utilization file* stores SBM data.

Generate KMZ: This button is not in use.

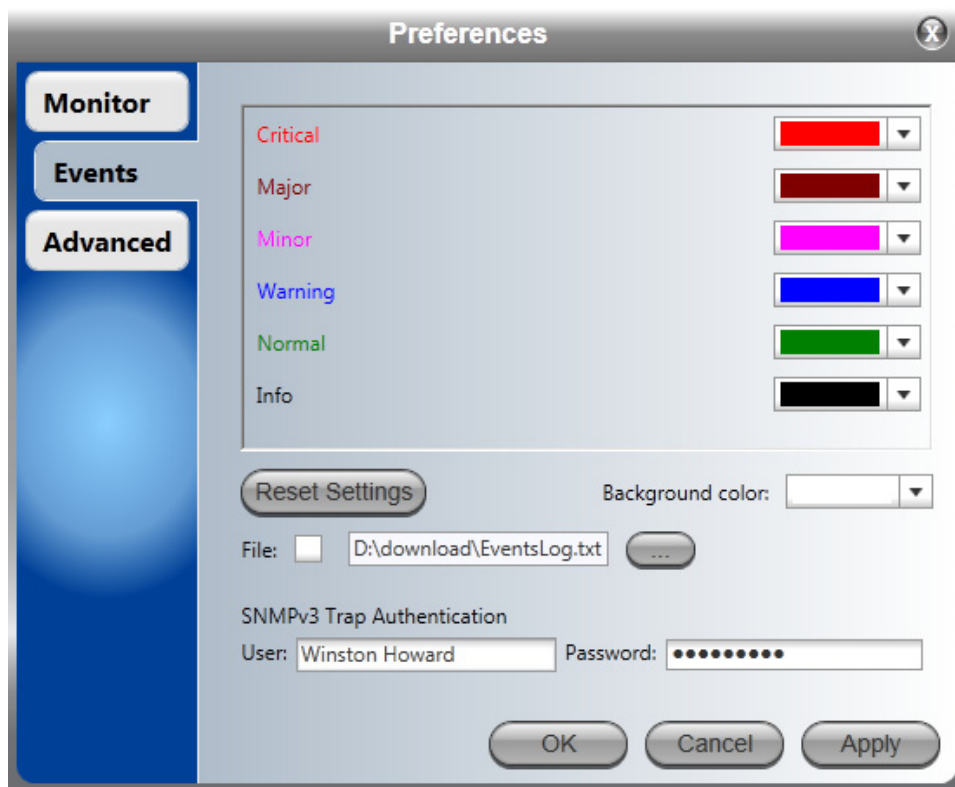
Rx/Tx Rate Units: Choose Mega bits per second (Mbps), or Frames per second (Fps)

The **Show IP** item is useful if you are using both IPv4 and IPv6 addresses. The choice of compressed addresses will drop leading zeros and use the :: notation where appropriate. For example, the expanded address, FE80:0000:0000:0000:5AFE:00AA:20A2 compresses to Fe80::5AFE:AA:20A2.



Switching the **Show IP** and **Address Format** items result in immediate display updating without the need to press **OK** or **Apply**.

2.9.2 Events



Here you may choose your own color coding for the Recent Event display (see [Monitoring and Diagnostics](#)).

You may also choose a location and file name for the events log for storage. These settings are per HBS or HSU. To avoid over-writing, you should use file names reflecting their source ODU.

The SNMPv3 User and Password are relevant if you are using SNMPv3. In this, case trap messages are keyed to the user name and password and not visible to anyone else. The preferences entered here, relate to trap messages sent to the specified user if specified or to all trap messages, otherwise. For associating a user with a trap address, see [Chapter 4, Managing the Sector with the RADWIN Manager](#).

2.9.3 Advanced

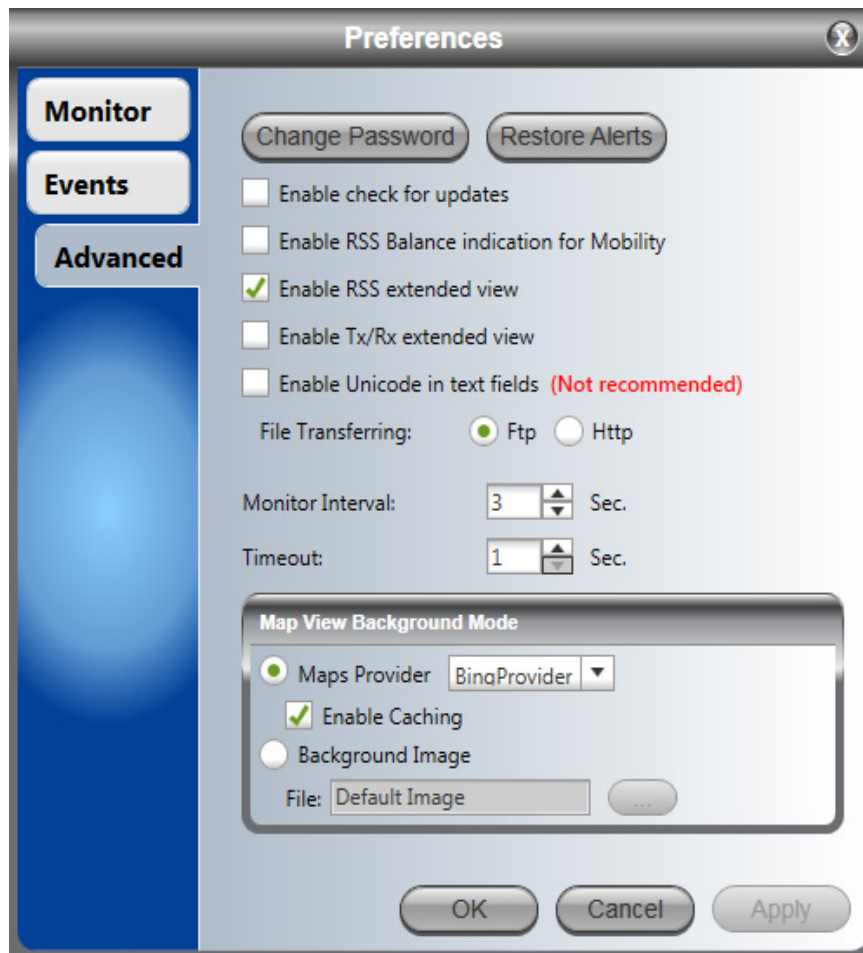


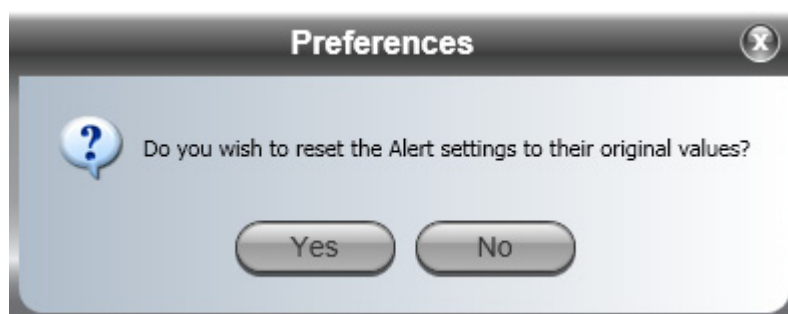
Figure 2-35: Advanced Preferences - HBS

Change Password

You may change your log-on password here from the default, **admin**.

Restore Alerts

Many alert messages in the RADWIN Manager have an option of the form “Do not show this message again”. These alert messages can be reverted to their default state (shown) by clicking the **Restore Alerts** button. You will be asked to confirm:



Check for Updates

If you are not connected to the Internet, disable the Check for updates check box.

Enable RSS Balance Indication for Mobility

Not in use.

Enable RSS Extended View

Checking this box enables an extended card in Table view. See [Figure 3-5](#) and [Figure 6-2](#).

Enable Tx/Rx Extended View

Not in use.

Enable Unicode in text fields

Checking this box allows you to type unicode characters in text fields. We do not recommend enabling this option.

File Transferring

Relevant for SU **PRO/AIR** EMB and SU **PRO/AIR** INT when working opposite an HBS JET unit only: if your system has extensive FTP firewalls, or other FTP blocks, you may see an error message indicating an FTP problem when you try to carry out a software upgrade. In that case, we recommend that you try to perform the upgrade via HTTP. Do this by checking the HTTP radio button here. Then click **OK** or **Apply**.

Monitoring and Timeout Intervals

The monitoring interval determines the lowest interval between request to the ODU for status updates. The timeout (default 1 sec, maximum 5 sec) may have to be increased if you are on a slow network.

Setting the Map View Background Mode (HBS only)

You have a choice of two map providers, a default or a self-chosen background. If you log on without an Internet connection, you will get a default gray background or, if you have caching enabled, your last used map.

Chapter 3: Initial Configuration with the RADWIN Manager

3.1 Scope of this Chapter

Sector installation has two phases:

- Configuring and activating the HBS
- Bringing up the HSUs - configuration and registration

The same RADWIN Manager program is used for both the HBS and the HSUs, but not for the RADWIN JET DUO. See [Chapter 14, Managing a RADWIN JET DUO Sector](#) for instructions on configuring the RADWIN JET DUO.

Much of the process is common to both types of ODU. We will cover the HBS in detail; for the HSUs we will concentrate on those items which are different.

This chapter covers fixed and nomadic HSU configurations. Mobile HSUs are covered in [Chapter 2](#).

3.2 Concepts

A HBS out of the box, must be configured with:

- Basic RF parameters such as frequency band, channel bandwidths and Sector ID
- Networking parameters such as IP address, subnet mask and default gateway

Inactive	As soon as the unit is connected to voltage, it is in an inactive state, powered up, configurable but not transmitting anything.
Activation	Upon activation , the HBS will commence transmitting and receiving packets related to sector management only, but no data relating to service. Activation and Deactivation are effected quite simply by clicking a toggle button.

Discovery	Assuming that the Sector HSUs are mounted aligned and powered up, the HSUs will discover the HBS establishing links for management only. At this point the HSUs may be managed over the air.
Register	As soon as the HSUs are configured to your satisfaction, you must register them on the HBS. Registration of an HSU enables service traffic between the HSU and the HBS. The HBS keeps track of registered HSUs by maintaining a table of their MAC addresses. Registered fixed HSUs set an internal flag so that they cannot register simultaneously to more than one HBS. Although you configure an SU PRO/AIR EMB or SU PRO/AIR INT from its Web Interface, you must register it using the RADWIN Manager.
Resource Type	During the registration process, you determine the resource type for each HSU ^a . This can be Best Effort (BE), where traffic is passed according to available bandwidth, or Committed Information Rate (CIR), where a guaranteed bandwidth is allotted to the HSU.
MIR	For each registered HSU, you can set separately, the uplink and downlink Maximum Information Rate (MIR) in Mbps or leave it as Unlimited .
Connection Table	You may also manage an HSU Connection table to enable and disable connectivity between HSUs in a sector.
Nomadic	HSUs may be fixed or nomadic. The latter may be move around within and across sectors.
Disable	To disable an HSU you must deregister it. (A suspend mechanism is also available, to suspend service on an HSU for a limited period.)

*a. Unless the HSU is an SU **AIR** EMB or SU **AIR** INT model, which can only use BE resource type.*

3.3 Working with Nomadic HSUs

Each nomadic HSU is allocated to one of four HBS levels labelled A, B, C and D. Some operating parameters for each level (such as VLAN, MIR, QoS, resources, fixed rate, Spatial Multiplexing/Diversity antenna mode) can be different for each level allowing for broad prioritization of service between different types of nomadic units. This requires that each nomadic HSU be assigned a level to join a sector.

A nomadic HSU may only send and receive service traffic while stationary. A nomadic HSU detects that it is time to seek another HBS upon sync loss. Upon entering and stopping in a new sector, it may take several seconds to establish sync with the sector HBS.

Changing any of VLAN, MIR, QoS, fixed rate, Spatial Multiplexing/Diversity antenna mode for one configured HSU at a given level, changes all other HSUs at that level. If you add a new HSU to a sector (by direct connection) at a given level, at sync time, it will acquire the existing parameters for that level.

3.4 Workflow

In this chapter, we assume that you are familiar with the graphical user interface described in [Chapter 2](#), including Geographic location.

Prepare the following list of parameters for each radio unit:

Table 3-1: Radio Unit Parameters

Parameter		Remark
IP	Address	
	Net Mask (if using IPv4) Subnet Prefix Length (if using IPv6)	
	Default Gateway	
Protocol		Can be set to SNMPv3 or both v1 and
Contact		Optional
Name		Location of Contact - optional
Unit Serial Number		
Latitude		
Longitude		

In addition, prepare these parameters for each sector:

Table 3-2: Sector-Wide Parameters

Parameter	Remark
Sector ID	Inherited by all communicating fixed HSUs
Network ID	Inherited by all communicating nomadic HSUs.
Band	Inherited by all communicating HSUs
Channel Bandwidth	Inherited by all communicating HSUs

3.5 The Initial RADWIN Manager Main Window

Here is the initial main display:

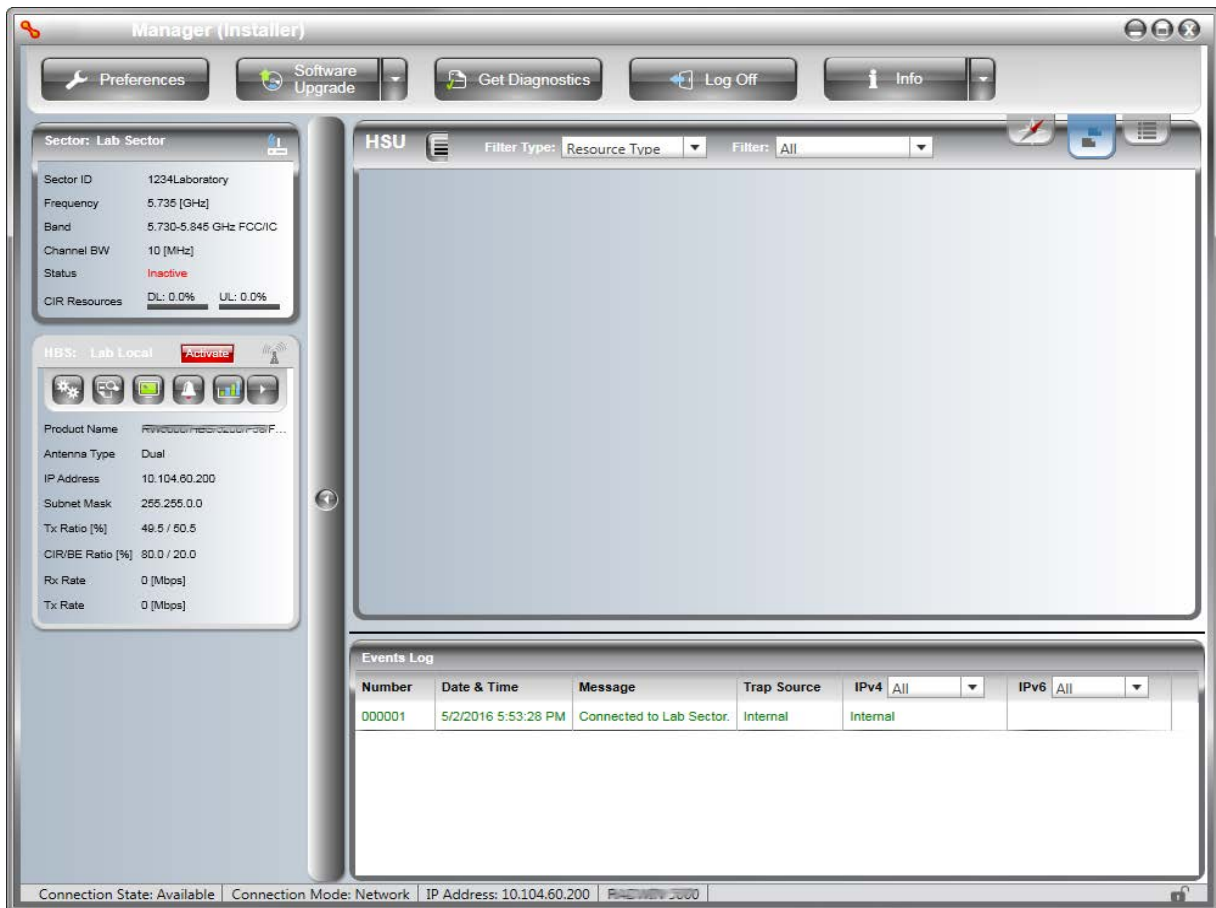


Figure 3-1: Main window for un-configured HBS ODU

Notice the red icon on the top left corner of the window. It will change to green as soon as the HBS is configured and activated. Here is the work-flow:

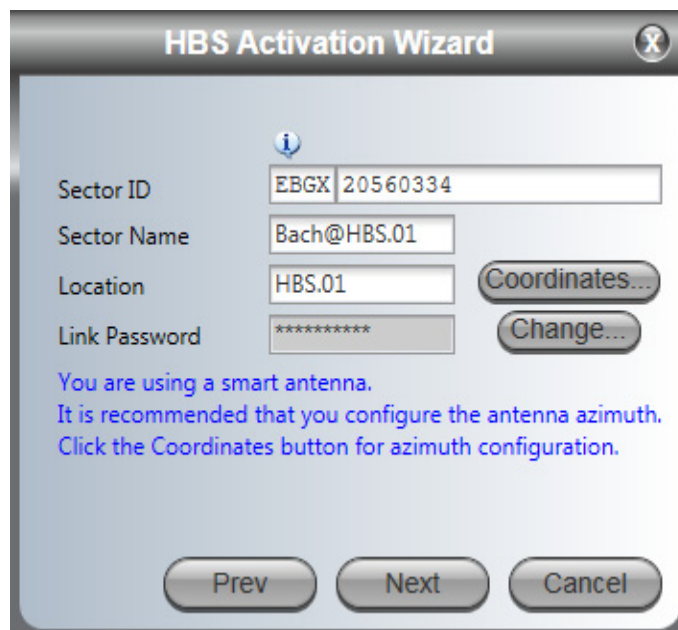
1. Activate the HBS which includes setting its IP address. It will then “see” the deployed HSUs regardless of their IP address.
2. Configure the HSUs
3. Register the HSUs to the HBS for traffic
4. Complete HSU configuration including HSU Connection Table and any other required fine tuning.

3.6 Activating an HBS

➤ To activate an HBS:



1. Click **Next**:



2. Enter the Sector ID, Name and Location. All fields are mandatory.



If you are working with the JET beam-forming antenna, a message noting that you are working with a “smart antenna” will appear on this screen (as shown above).

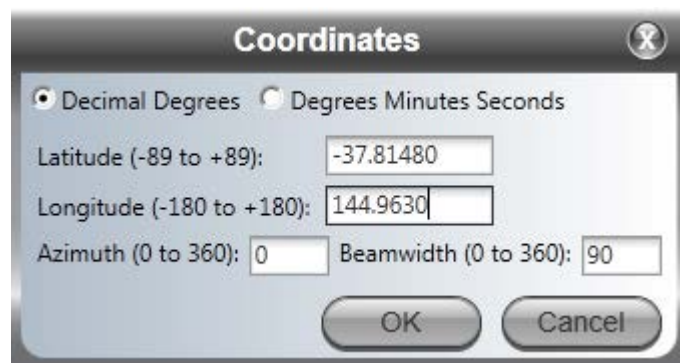
About the Sector ID:

- An unregistered HSU will establish a link with the first HBS it detects and inherit the Sector ID from the HBS.
- As soon as the HSU is registered for service with the HBS, the HSU's inherited Sector ID can no longer be changed while linked: It is "locked" into the HBS. This mechanism prevents an HSU close to a sector boundary from "drifting" between HBSs for adjacent sectors.
- If you need to change the Sector ID of the HSU, you must de-register it, then follow instructions in see [Air Interface](#) on page 6-4.
- The Sector ID is split into two parts.
 - If the sector is part of a network having non-fixed HSUs, or if using a Secured Network ID (See page 4-8), then each Sector ID for each device must have the same first four characters. These four characters are the *Network ID*.
 - For a network consisting of sectors with fixed HSUs only, or for a sector not using a Secured Network ID (See page 4-8), the split is not important.



- In the example above, the Sector ID is split into a four character Network ID (EBGX) and the remaining part (20561334).
 - For further instructions on configuring the Sector ID and Network ID, see [Air Interface](#) on page 6-4.
 - Choose your Sector ID carefully.
- The Sector Name and Location are convenience items but should be chosen to ensure that the sector is documented and easily identifiable in your RF planning.
3. Open the Coordinates dialog. The coordinates dialog that appears depends if you are using a passive antenna for the HBS, or the JET active beam-forming antenna for the HBS:

Passive antenna HBS:



Coordinates

☒ Decimal Degrees ☐ Degrees Minutes Seconds

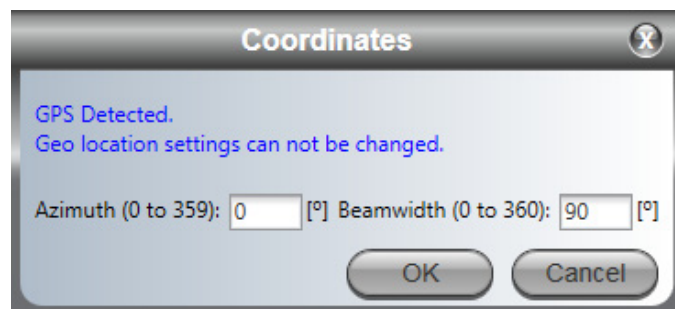
Latitude (-89 to +89):

Longitude (-180 to +180):

Azimuth (0 to 360): Beamwidth (0 to 360):

OK Cancel

JET HBS:



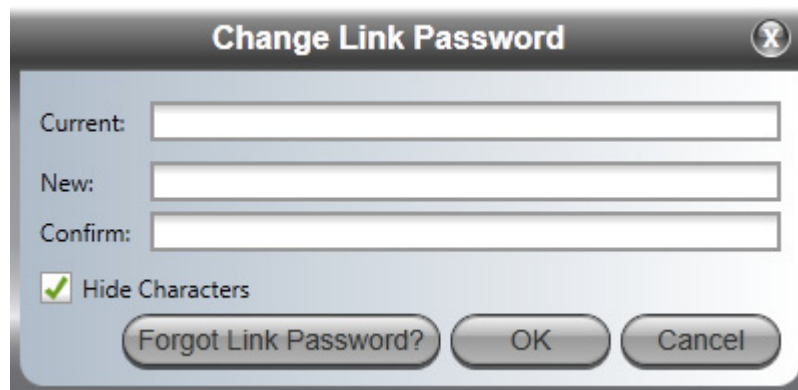
Coordinates

GPS Detected.
Geo location settings can not be changed.

Azimuth (0 to 359): [°] Beamwidth (0 to 360): [°]

OK Cancel

4. If you are using the passive antenna option, set the location of the HBS in accordance with your plan.
If you are using the JET active beam-forming antenna, the location of the HBS is set by the GPS and cannot be changed manually.
5. The Link Password may also be changed by clicking **Change**:



Change Link Password

Current:

New:

Confirm:

☒ Hide Characters

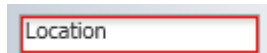
Forgot Link Password? OK Cancel

Full details for changing the Link Password may be found on [page 4-34](#).

It is best left as is if there is no pressing need to change it.



If you skipped an entry, it will be framed in red like this:



Location

6. From the previous Activation Wizard window, click **Next**.



The screenshot shows the 'HBS Activation Wizard' window. At the top, the title bar says 'HBS Activation Wizard'. Below it, there's a section for 'IP Version' with a dropdown menu set to 'IPv4 Only'. Underneath, there's a section for 'IPv4' with four input fields: 'IP Address' (10.104.50.200), 'Subnet Mask' (255.255.0.0), 'Default Gateway' (10.104.10.21), and an empty 'IPv6 Address' field. Below these, there's a section for 'IPv6' with two input fields: 'Subnet prefix length' (64) and an empty 'Default Gateway' field. At the bottom, there are three buttons: 'Prev', 'Next', and 'Cancel'.

Here you may enter the IP details if you did not do it earlier. You can choose to enable only IPv4, IPv6, or both methods. Once you have entered the correct addresses, click **Next**.

7. The next window is used to set the frequency and channels.



The screenshot shows the 'HBS Activation Wizard' window. At the top, the title bar says 'HBS Activation Wizard'. Below it, there's a section for 'Operating Channel [GHz]' with a dropdown menu set to 'Other' and a numeric input field set to 5.735. Below that, there's a section for 'Channel Bandwidth [MHz]' with a dropdown menu set to 20. At the bottom, there's a checkbox labeled 'Automatic Channel Selection' which is currently unchecked. At the bottom of the window, there are three buttons: 'Prev', 'Next', and 'Cancel'.

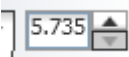
The default frequency is the lowest available (5.735 GHz) in the operating band, here, 5.730 - 5.845 GHz FCC/ISED.

8. Click **Other** to see other available bands for this HBS.



9. For our purposes, we choose 5.820 GHz:



Observe that the right hand spin-wheel  is no longer displayed. Had you left **Other** enabled, you could have chosen a frequency by working through those available in 5MHz increments.

10. Choose the required Channel Bandwidth:



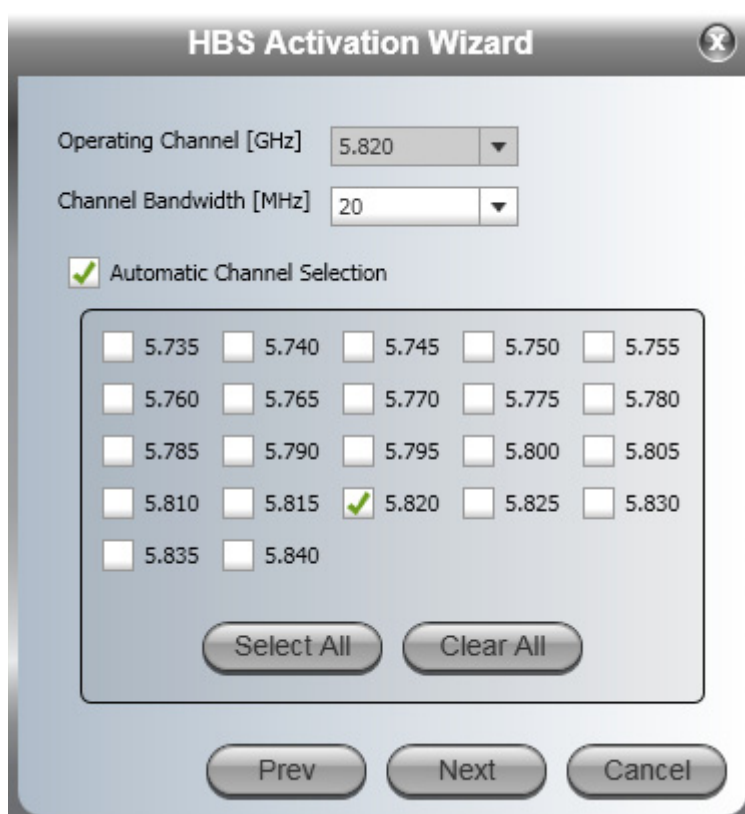
The HBS Activation Wizard dialog box shows the following configuration:

- Operating Channel [GHz]: 5.820
- Channel Bandwidth [MHz]: 20 (with a dropdown menu open showing options: 5, 10, 20, 40)
- Automatic Channel Selection: ☐
- Buttons: Prev, Next, Cancel



If your hardware supports 250 Mbps net aggregate capacity, you should choose 40 MHz Channel Bandwidth to enable it.

11. To use ACS, check the Automatic Channel Selection box:



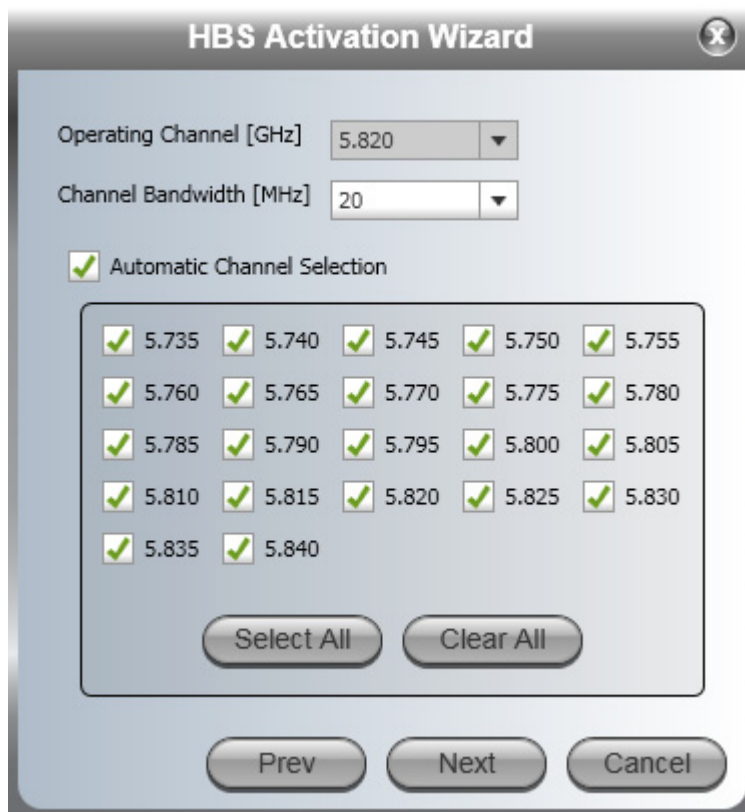
The HBS Activation Wizard dialog box shows the following configuration:

- Operating Channel [GHz]: 5.820
- Channel Bandwidth [MHz]: 20
- Automatic Channel Selection: ☒
- Channel Selection Grid:

<input type="checkbox"/> 5.735	<input type="checkbox"/> 5.740	<input type="checkbox"/> 5.745	<input type="checkbox"/> 5.750	<input type="checkbox"/> 5.755
<input type="checkbox"/> 5.760	<input type="checkbox"/> 5.765	<input type="checkbox"/> 5.770	<input type="checkbox"/> 5.775	<input type="checkbox"/> 5.780
<input type="checkbox"/> 5.785	<input type="checkbox"/> 5.790	<input type="checkbox"/> 5.795	<input type="checkbox"/> 5.800	<input type="checkbox"/> 5.805
<input type="checkbox"/> 5.810	<input type="checkbox"/> 5.815	<input checked="" type="checkbox"/> 5.820	<input type="checkbox"/> 5.825	<input type="checkbox"/> 5.830
<input type="checkbox"/> 5.835	<input type="checkbox"/> 5.840			

Buttons: Select All, Clear All, Prev, Next, Cancel

You can perform a customized channel selection or click **Select All** to check all the channel boxes as shown:



The HBS Activation Wizard dialog box shows the following configuration:

- Operating Channel [GHz]: 5.820
- Channel Bandwidth [MHz]: 20
- ☒ Automatic Channel Selection
- Channel selection grid (all channels are checked):

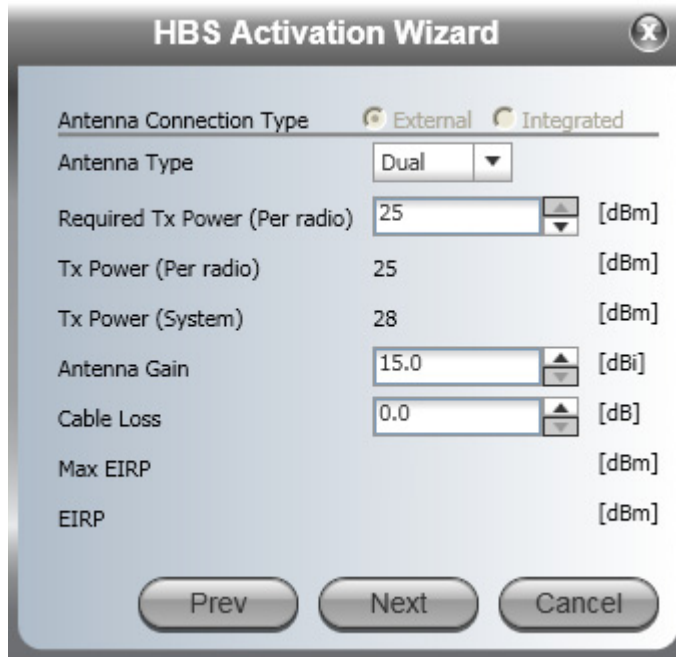
<input checked="" type="checkbox"/> 5.735	<input checked="" type="checkbox"/> 5.740	<input checked="" type="checkbox"/> 5.745	<input checked="" type="checkbox"/> 5.750	<input checked="" type="checkbox"/> 5.755
<input checked="" type="checkbox"/> 5.760	<input checked="" type="checkbox"/> 5.765	<input checked="" type="checkbox"/> 5.770	<input checked="" type="checkbox"/> 5.775	<input checked="" type="checkbox"/> 5.780
<input checked="" type="checkbox"/> 5.785	<input checked="" type="checkbox"/> 5.790	<input checked="" type="checkbox"/> 5.795	<input checked="" type="checkbox"/> 5.800	<input checked="" type="checkbox"/> 5.805
<input checked="" type="checkbox"/> 5.810	<input checked="" type="checkbox"/> 5.815	<input checked="" type="checkbox"/> 5.820	<input checked="" type="checkbox"/> 5.825	<input checked="" type="checkbox"/> 5.830
<input checked="" type="checkbox"/> 5.835	<input checked="" type="checkbox"/> 5.840			
- Buttons: Select All, Clear All, Prev, Next, Cancel

Automatic channel selection at the HBS makes little sense beyond configuration time. You may leave all or several of the channels selected for now. In practice, after having fully configured the sector you would disable all but the actual operating channel.



For operation using Licensed 3.X bands under FCC part 90 subpart Z and ISSED RSS-197 supporting 3.650-3.700 GHz: The HBS does not commence any type of transmission until the Activation process is completed, in compliance with those regulations.

12. Click **Next**. The Antenna type and Tx Power window is presented:

The image shows a software window titled "HBS Activation Wizard". At the top, there are two radio buttons: "External" (which is selected) and "Integrated". Below this, there is a list of parameters with their current values and units. The parameters are: "Antenna Type" (Dual), "Required Tx Power (Per radio)" (25 [dBm]), "Tx Power (Per radio)" (25 [dBm]), "Tx Power (System)" (28 [dBm]), "Antenna Gain" (15.0 [dBi]), "Cable Loss" (0.0 [dB]), "Max EIRP" ([dBm]), and "EIRP" ([dBm]). At the bottom of the window, there are three buttons: "Prev", "Next", and "Cancel".

Parameter	Value	Unit
Antenna Connection Type	External	
Antenna Type	Dual	
Required Tx Power (Per radio)	25	[dBm]
Tx Power (Per radio)	25	[dBm]
Tx Power (System)	28	[dBm]
Antenna Gain	15.0	[dBi]
Cable Loss	0.0	[dB]
Max EIRP		[dBm]
EIRP		[dBm]

The choice of Tx Power, antenna gain and cable loss (between the radio and the antenna) determines the EIRP and is affected by such considerations as radio limitations and regulatory restrictions.

If you are using an integrated antenna, you can only choose the Required Tx Power.

Before completing antenna installation, you might like to consider the background information about setting antenna parameters, in [Appendix B](#):



You can change the antenna gain or the cable loss only if your user type is Installer. Changing the antenna gain or cable loss values can cause a violation of local regulations. You must check your local regulations if you plan to change these values.

Choose your Antenna Type, Required Tx Power, Antenna Gain and Cable Loss. Click **Next**.

13. The Summary window of the Wizard is displayed.



Check that all information showed is correct, then click **Activate**. After a few moments the sector HSUs will be displayed in the RADWIN Manager HSU panel.

Note the Sector ID and its first four digits, the Network ID.

The field-installed HSUs appear in a Table view:

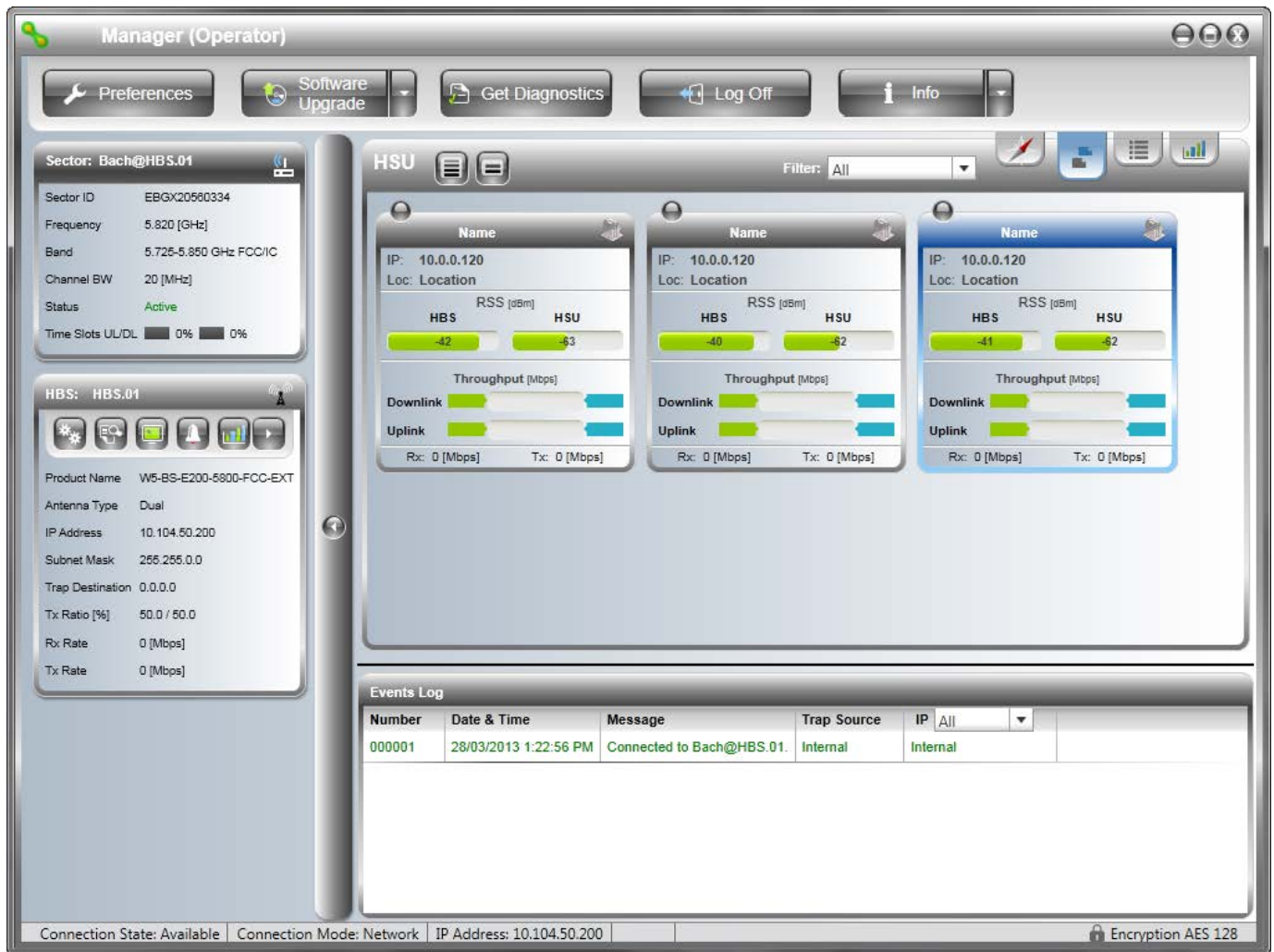


Figure 3-2: Activated HBS recognizing installed but unconfigured HSUs

If there are too many HSUs for the Table view, switch to the scrollable List view.

14. If you are using Local Connection, log out and log back in to the HBS on its IP address.

At this point, you are able to configure the HSUs for service.

You may have observed that operating frequency 5.735 GHz shown, is not what we chose (5.820 GHz). The HBS tries to optimize the frequency to minimize interference effects.

We next configure and register the HSUs. For fixed HSUs you can do this in either order. For nomadic HSUs you must define the HSU as Nomadic prior to registration. We will show the method below. Our preference is to carry out configuration first for all HSUs.

3.7 Configuring a fixed HSU From the HBS

The HSU activities described in this section, may be carried out any time - regardless of whether or not the HSU is registered for service or not. These activities include among other things, setting the Location, Contact, Name and IP address.

The procedures in this section should be carried out for each fixed HSU in the sector.

➤ **To configure a fixed HSU from the HBS:**

1. Right click an HSU to get its context menu:

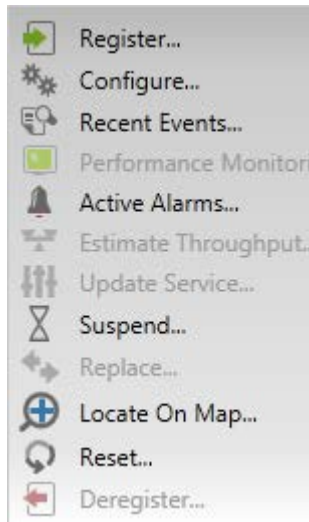


Figure 3-3: HSU Context menu

2. Click **Configure**. The Configuration dialog is displayed. If you have not already, enter a Name Contact and Location:

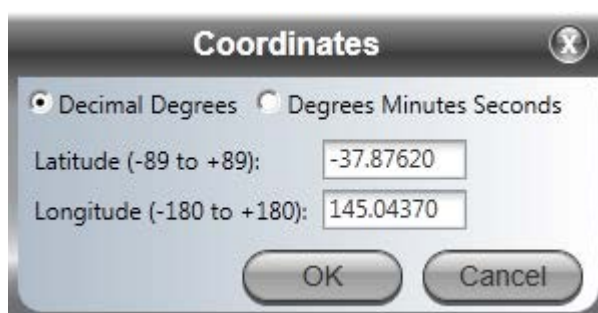


Location is a site name - typically a building or tower name. **Contact** is the contact person at that Location and **Name** is the Contact location. It might be just a telephone number. Here are our entries:



The screenshot shows the 'HSU Configuration Name' dialog box. It has a title bar with a close button. Below the title bar are four buttons: 'Backup', 'Restore', 'Buzzer Off', and 'Refresh'. The main area is divided into two sections. On the left is a 'System' list with several entries. On the right is a configuration area for a selected system. The configuration area contains the following fields: 'Description' (Wireless Link), 'ObjectID' (1.3.6.1.4.1.4458.20.6.1.2), 'Name' (Haydn@HFU.01.01), 'Contact' (Haydn), 'Location' (HFU.01.01), and 'Last Power Up' (07/07/2013 11:21:16). There is a 'Coordinates...' button next to the 'Location' field. At the bottom are three buttons: 'OK', 'Cancel', and 'Apply'.

3. Set the Coordinates (latitude and longitude) for the HSU as shown in the Sector Plan:



The screenshot shows the 'Coordinates' dialog box. It has a title bar with a close button. Below the title bar are two radio buttons: 'Decimal Degrees' (selected) and 'Degrees Minutes Seconds'. Below these are two input fields: 'Latitude (-89 to +89):' with the value '-37.87620' and 'Longitude (-180 to +180):' with the value '145.04370'. At the bottom are two buttons: 'OK' and 'Cancel'.

4. Set the HSU Tx Power (possibly as required by regulations). Click **Tx & Antenna**. The following dialog is displayed:

The screenshot shows the 'HSU Configuration Name' dialog box with the 'Tx & Antenna' tab selected. The dialog has a title bar with a close button. Below the title bar are four buttons: 'Backup', 'Restore', 'Buzzer Off', and 'Refresh'. The main area contains the following settings:

Parameter	Value	Unit
Antenna Connection Type	<input checked="" type="radio"/> External <input type="radio"/> Integrated	
Antenna Type	Dual	
Required Tx Power (Per radio)	5	[dBm]
Tx Power (Per radio)	5	[dBm]
Tx Power (System)	8	[dBm]
Antenna Gain	15.0	[dBi]
Cable Loss	0.0	[dB]
Max EIRP		[dBm]
EIRP	23	[dBm]

At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Apply'.

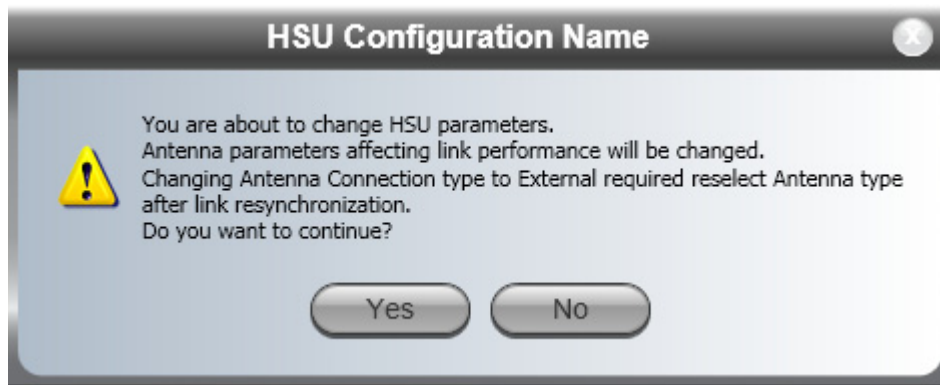
Set the Antenna Connection Type, Antenna Type, Required Tx Power, Antenna Gain and Cable Loss as required. For our example, we use external antennas, we set Tx Power to 5 dBm and the Antenna Gain to 15 dBi. If you click apply, you receive a confirmation request like this:

The screenshot shows the 'HSU Configuration Name' dialog box with a confirmation message. The message text is:

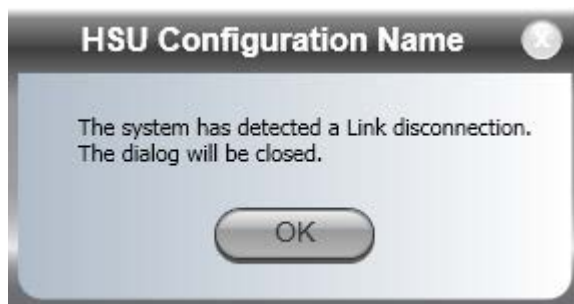
Warning: You are about to change HSU parameters. Antenna parameters affecting link performance will be changed. This process will result in a Link re-synchronization. Do you want to continue?

At the bottom of the dialog are two buttons: 'Yes' and 'No'.

There are several variations of this message window, depending on what you change:



5. In any event, clicking **Yes** results in a further message appearing:

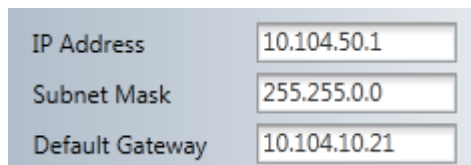


6. Click **OK**. The HSU display area refreshes with the newly configured HSU in its new location in the sector.
7. Reopen the Configuration dialog for the HSU and then open the **Management** tab.



The screenshot shows the 'HSU Configuration Haydn@HFU.01.01' window. At the top, there are buttons for 'Backup', 'Restore', 'Buzzer Off', and 'Refresh'. On the left, a sidebar contains a 'Management' button. The main area is divided into two sections: 'IPv4' and 'IPv6'. The 'IPv4' section has fields for 'IP Address' (10.0.0.120), 'Subnet Mask' (255.0.0.0), and 'Default Gateway' (0.0.0.0). The 'IPv6' section has fields for 'IPv6 Address', 'Subnet prefix length' (64), and 'Default Gateway'. Below these are three buttons: 'Trap Destination', 'VLAN', and 'Protocol'. At the bottom right are 'OK', 'Cancel', and 'Apply' buttons.

Change the default HSU IP Address, Subnet mask and Default Gateway as shown:



This image shows a close-up of the configuration fields. The 'IP Address' field contains '10.104.50.1', the 'Subnet Mask' field contains '255.255.0.0', and the 'Default Gateway' field contains '10.104.10.21'.

8. For now, we will leave the remaining fields. Click **OK** to exit the Configuration window. You will be offered a cautionary message:



The screenshot shows a dialog box titled 'HSU Configuration Name'. It contains a yellow warning triangle icon and the text: 'You are about to change HSU parameters. This process will last several seconds. Do you want to continue?'. At the bottom are 'Yes' and 'No' buttons.

Click **Yes**. The newly entered parameters for the HSU will be displayed following the next sync loss/restore to the HSU. You can achieve the same thing by issuing a reset to the HSU from its context menu.

The screenshot shows a configuration window for a nomadic HSU. The title bar says 'Bach'. The main area contains the following fields:

- IP: 10.104.60.1
- Loc: Laboratory
- RSS [dBm] section with two columns: HBS and HSU.

	HBS	HSU
ANT 1	-59	-40
ANT 2	-64	-43
- Throughput [Mbps] section with two rows: Down and Up. Each row has a text input field.
- Rx [Mbps] and Tx [Mbps] section with two columns: Rx [Mbps] and Tx [Mbps]. Each column has a text input field.

- Repeat steps 1 to 8 for each HSU.

3.8 Configuring a nomadic HSU From the HBS

➤ To configure a nomadic HSU from the HBS:

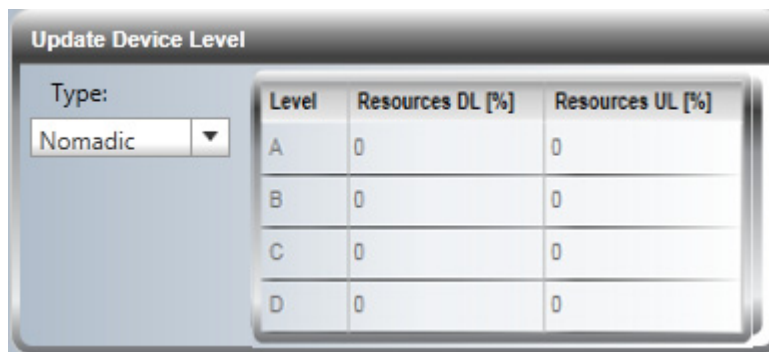
- Carry out steps 1 to 7 as in the previous section for a fixed HSU.
- Open the **Nomadic** tab:

The screenshot shows the 'HSU Configuration Brahms@HNU.01.01' window. The 'Nomadic' tab is selected in the left sidebar. The main area is titled 'Update Device Level' and contains a table with the following data:

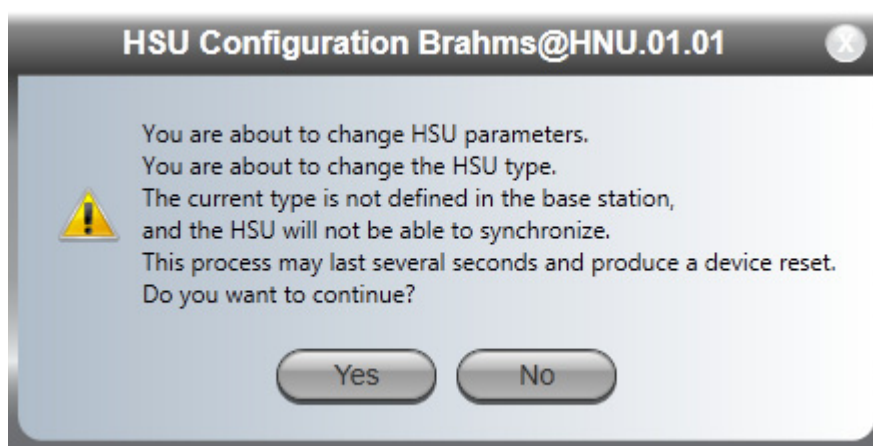
Level	Resources DL [%]	Resources UL [%]
A	0	0
B	0	0
C	0	0
D	0	0

The 'Type' dropdown is set to 'Fixed'. At the bottom, there are 'OK', 'Cancel', and 'Apply' buttons.

- From the Type list, choose **Nomadic**. The right hand Level list is enabled:



- The four levels enable you to split nomadic HSUs into up to four service groups with (for example) different QoS parameters. Choose level A and then **OK**. The percentage of resources allocated to the HSU will be updated during the registration process. You are offered the following confirmation message:

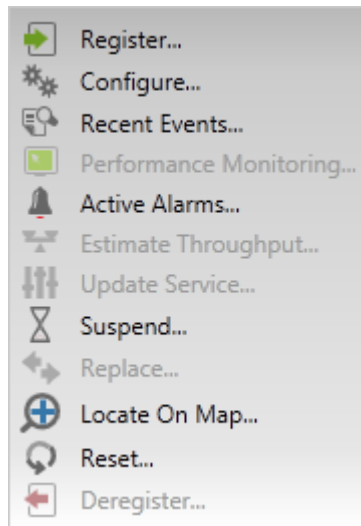


The HSU no longer appears on the HBS Table view. It will return following registration, to which we now turn.

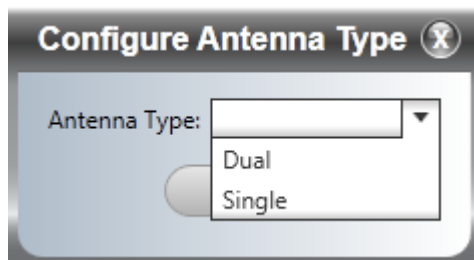
3.9 Registering a fixed HSU for service

➤ **To register a fixed HSU for service:**

- Right click a fixed HSU to get its context menu:



2. Click **Register...** If you are using an external antenna, and did not configure the antenna type for the HSU, you are asked to do so now:



Choose the required type and click **OK**.

The Registration window opens:

HSU Registration - P07030E000A0003B

Name: Resource Type: ⓘ

Location: MIMO Modes:

Geo Location:

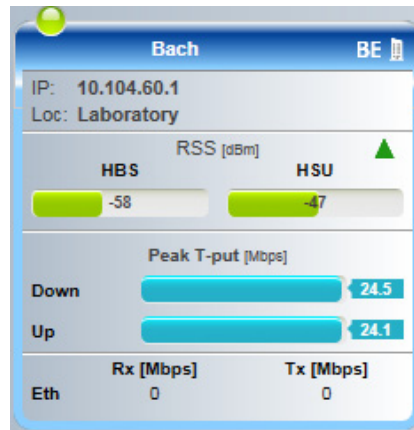
Maximum Information Rate (General MIR)

Down Link [Mbps] ☒ Unlimited
0.5 100

Up Link [Mbps] ☒ Unlimited
0.5 100

3. You may edit or add the site **Name**, **Location** and **Coordinates**.
4. If you are registering an SU **AIR** EMB or SU **AIR** INT, the **Resource Type** can only be BE (Best Effort). Skip to Step 6.
5. Select the **Resource Type** for the HSU. This can be CIR (Committed Information Rate), or BE (Best Effort):
 - **BE** grants the HSU resources as they become available in the sector.
 - **CIR** grants the HSU with a certain guaranteed percentage of resources of those already allocated to CIR traffic in the sector (see [Air Interface](#) on page 4-3). You set this percentage in the MIR window.
6. Check a **MIMO Mode** for this HSU:
 - **Spatial Multiplexing** (default) splits the data in to two streams on transmission and recombines it on reception providing maximum throughput. This provides a higher throughput.
 - **Diversity** transmits the same data on both streams. This mode helps to ensure more reliable data transmission in a noisy environment, although throughput will be lower.
 - **Auto Selection** instructs the system to choose whichever mode is most efficient.

- If you chose the **BE** resource type in Step 5. above, your unit is an SU **AIR** EMB or SU **AIR** INT, click the **Register** button. In a few moments, the HSU will be registered, and look somewhat like this:



The Peak Throughput (T-put) shows whatever throughput value the system was able to achieve for the HSU, in both directions. Note the color is light blue, showing that the throughput is not guaranteed, but on a Best Effort basis. This completes the registration process for a BE unit.

- If you chose the **CIR** resource type in Step 5. above, click the **Evaluate** button. Service evaluation takes a few seconds during which the window is darkened and inactive.

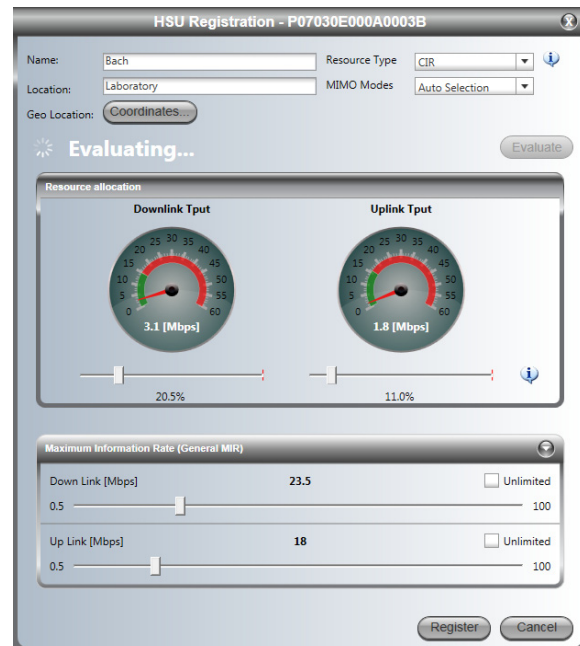
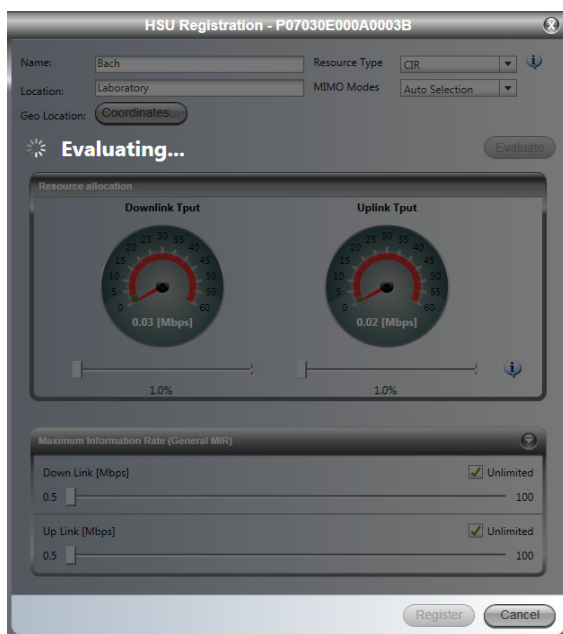
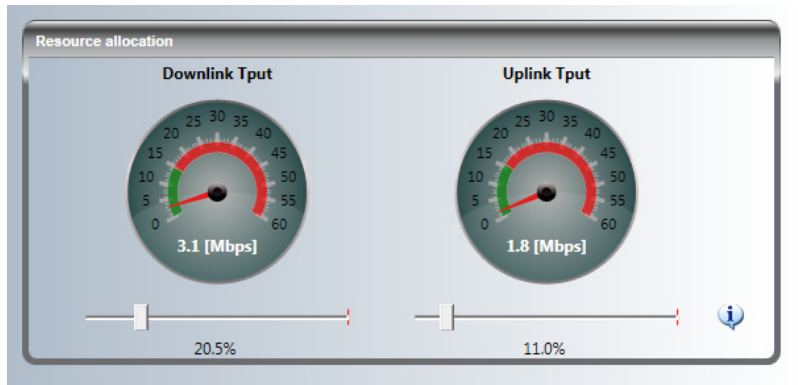


Figure 3-4: HSU Registration dialog

Notice that the Evaluating activity icon continues to rotate after completion of the evaluation. The Manager maintains dynamic monitoring of the sector for injection into the sector of HSUs elsewhere and accordingly reduces the available resources.

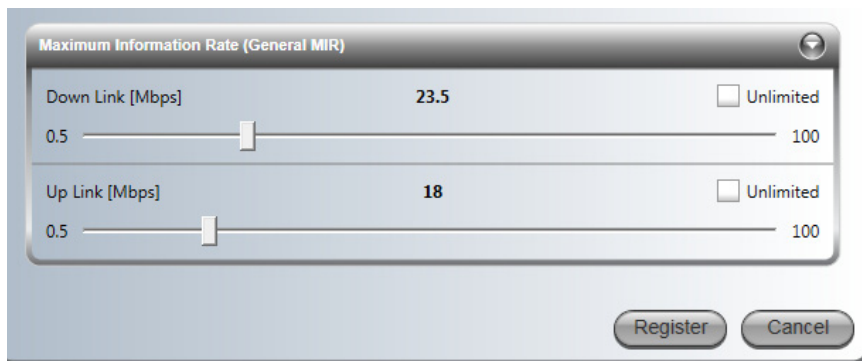
- Resource allocation:** Use the sliders to choose the percentage of resources to be allocated to the HSU. This is the percentage of available resources in the sector.

Obviously, you must make sure that the resource percentages of all the HSUs in the sector do not add up to more than 100%.



The resource allocations may be changed later.

10. Open the **Maximum Information Rate** window. Use the sliders to set here the maximum throughput rate you want for the specific HSU in each direction: down link, and up link, from 0.5 Mbps to a maximum of 100 Mbps. You can choose a value, or click the Unlimited checkbox.
 - If you chose the CIR resource type in Step 5. above, you must choose a value here before continuing.



You may defer this step and carry it out using the HSU **Configure->Ethernet** option (see [Maximum Information Rate](#) on page 4-70).

11. Click **Register** to complete the process. Here is a typical result:

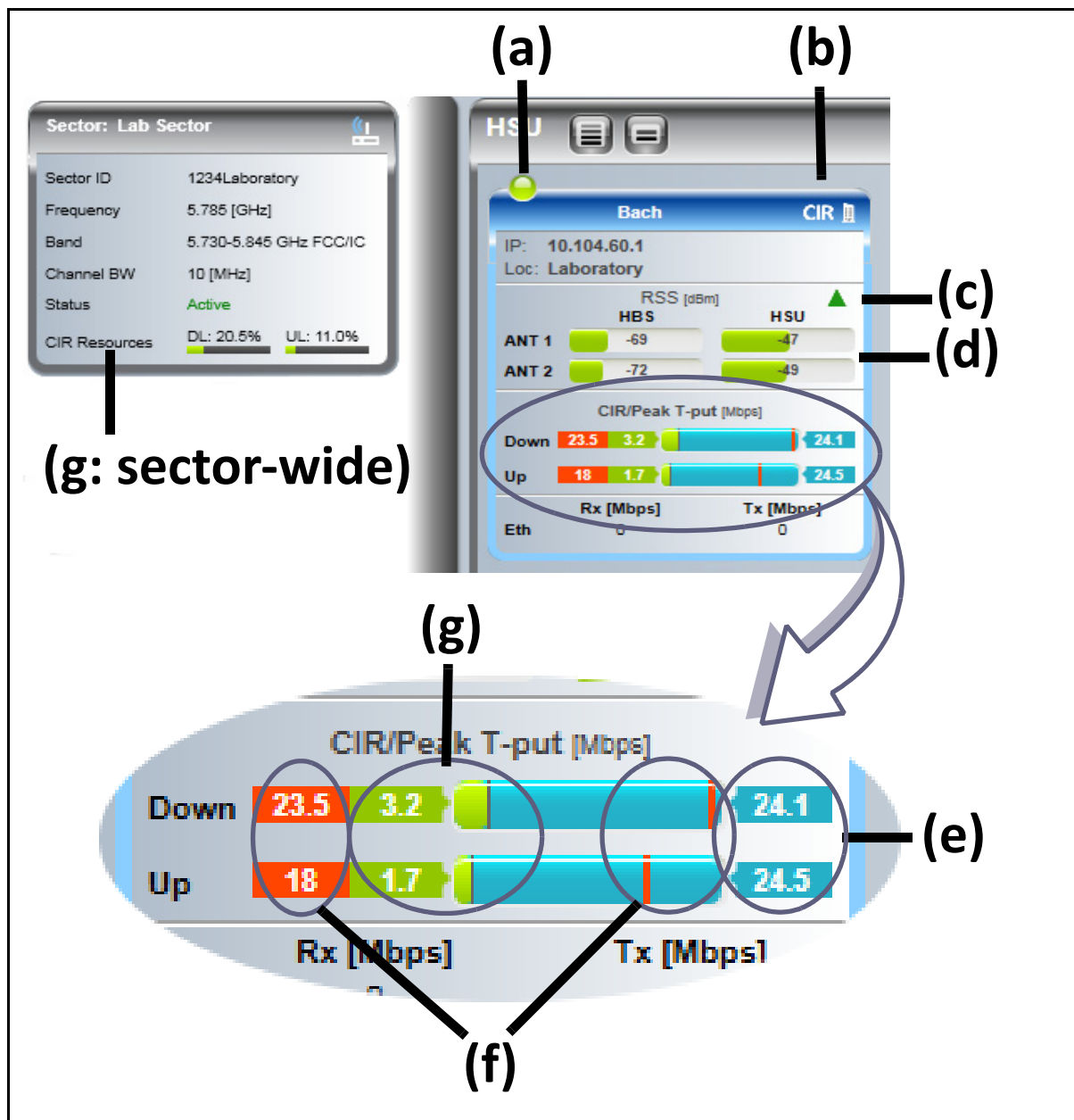


Figure 3-5: A registered HSU card - extended view

Observe the following:

- The registered HSU icon LED is now green.
- CIR appears in the top right of the HSU card, indicating that the resource type for the HSU is *Committed Information Rate*.
- The ATPC Status triangle shows green - indicating that the dynamic range and rate have been achieved (see [Cards](#) on page 2-9).
- Since we have enabled RSS Extended View in Preferences (see [Enable RSS Extended View](#)), the radio signal strength for each antenna is shown.
- The maximum possible throughput is shown here. If the MIMO mode chosen in Step 6. was Diversity, this value would be smaller.

- f. The Maximum Information Rate chosen in Step 10. is shown here by the numbers in red, and by the red lines on the graph. Had these numbers been higher than the maximum possible throughput, they would not appear, as they would not affect anything.
- g. The resource allocation chosen in Step 9. is shown here both graphically and as a number value. What appears on the HSU card is relevant for the selected HSU only, but the CIR resource bar shown on the top left reflects the this allocation for the whole sector.

12. Repeat the above steps for each fixed HSU.

3.10 Registering a nomadic HSU for service

➤ To configure nomadic HSUs from the HBS:

1. Open the HBS Configuration window and then its Nomadic Tab:

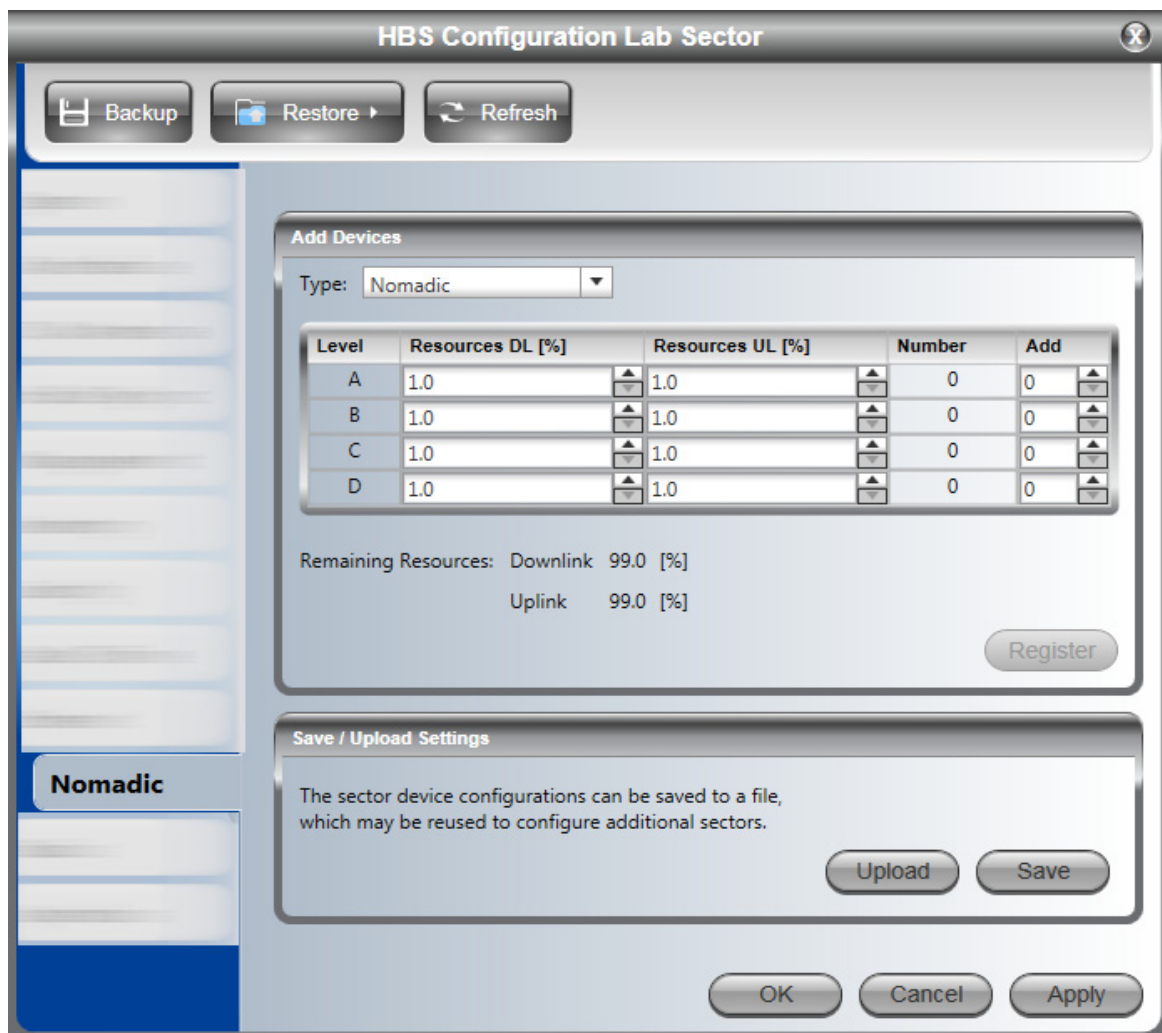


Figure 3-6: HBS Nomadic Configuration

2. In the **Add Devices** window, click the Add spin wheel buttons and the Resources spin-wheels as shown.

Add Devices

Type: Nomadic

Level	Resources DL [%]	Resources UL [%]	Number	Add
A	4.5	1.0	0	2
B	7.5	4.0	0	1
C	11.5	7.0	0	1
D	16.5	18.0	0	0

Remaining Resources: Downlink 54.5 [%]
Uplink 62.5 [%]

Register

Save / Upload Settings

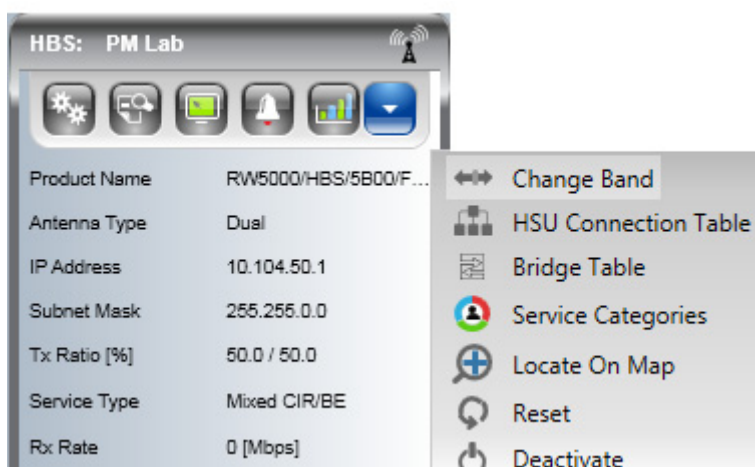
The sector device configurations can be saved to a file, which may be reused to configure additional sectors.

Upload **Save**

3. Click the **Register** button to register the HSUs. One HSU can only have one level. Shown above is configuration information for 4 HSUs. A Nomadic HSU can only have the CIR resource type - it cannot have the BE type.
4. You may use the bottom dialog to save or upload a saved HBS configuration.
5. Exit the Configuration dialog.

3.11 Deactivating the HBS

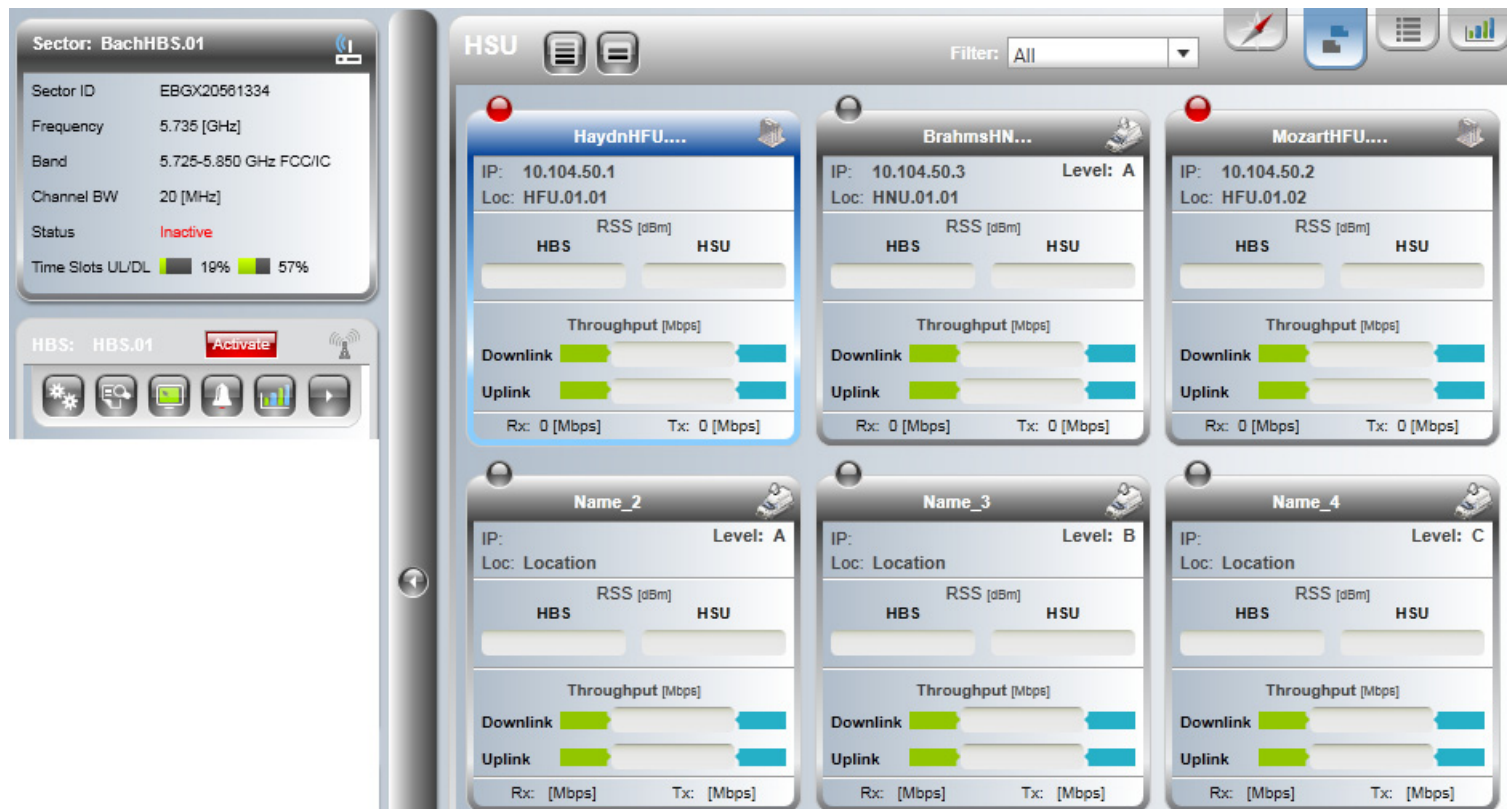
From the HBS button bar, click the right hand button followed by **Deactivate**.



You are offered a cautionary message:



If you proceed, the HBS display will change to reflect the deactivated state:



Notice that the HSUs remain registered, and will return to full service after the HBS is re-activated.

3.12 Deregistering an HSU

A HSU may be deregistered by using the Deregister entry in an HSU context menu or using the



button from an HSU button bar.



Note

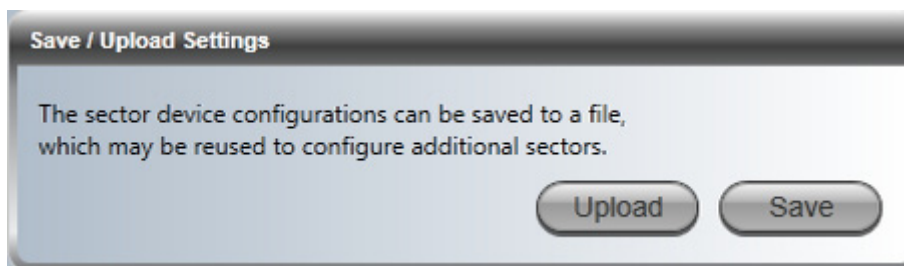
If **RADIUS** is enabled, its register status definition will take precedence (see the *RegisterAvailability* parameter in the users file), unless you enable Install Confirmation Required.

3.13 Where has my HSU gone?

Suppose that you installed two collocated HBSs with contiguous sectors. It is possible that an HSU located close to the common sector boundary may “discover” the wrong HBS. A HSU can be “forced” across to another HBS by changing its Sector ID to that of the required HBS. The method for doing this is covered in [Chapter 6](#).

3.14 Saving the HBS Settings for Reuse as a Template

Refer to [Figure 3-6](#) of which the following is an excerpt:



Following any further fine tuning, open up the HBS Nomadic tab, and click **Save**. You are offered the standard Save File dialog. Save the HBS Nomadic settings file (MobilitySettings.mob) to a convenient location. For our example we changed the file name to NomadicSettings.mob.

3.15 Creating Nomadic Entries for a Sector from a HBS Template

The saved settings file may be used as a template for further sectors.

- **To create a sector from a HBS Nomadic settings file:**
1. Starting with a new HBS and HSUs, log on to the HBS.
 2. Activate the HBS (see [Activating an HBS](#) on page 3-5).
 3. Open the **Nomadic** tab in the **Configuration** window. In the Save / Upload Settings window, click **Upload**.

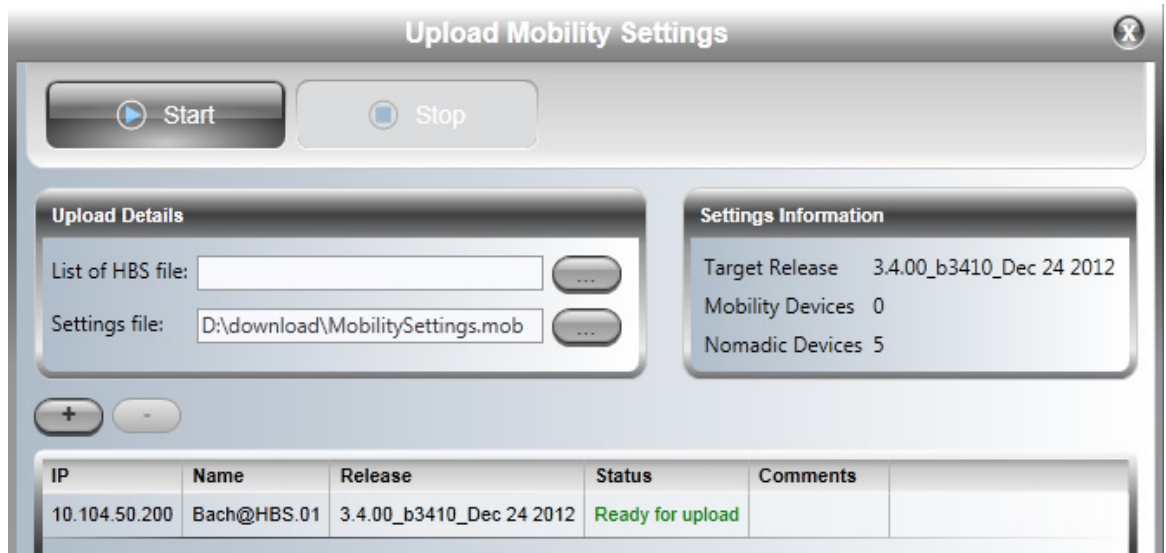


Figure 3-7: Preparing to upload the Nomadic file

4. In our case we have one HBS, so it is sufficient to enter the Nomadic file as shown and then click **Start**. After a few moments, the Status field indicates Done.

IP	Name	Release	Status	Comments
10.104.50.200	Bach@HBS.01	3.4.85_b3503_Jan 12 2014	Done	

The result is as expected:



Notice that our one “real” nomadic HSU has come up configured and registered. The fixed HSUs must be registered by hand.

➤ **To create a sector from a HBS IP list and a Nomadic settings file:**

1. In the window of [Figure 3-7](#), enter a HBS list file. The format of the file is lines of
<IP address> <Read-Write community>

For example,

10.104.50.200 netman

All of the HBSs need to be activated and accessible (via a switch) to the managing computer. They need not be on the same sub-net.

Alternatively, enter them one by one using the Plus button.

Any un-activated HBSs will be shown as unavailable:

IP	Name	Release	Status	Comments
10.104.50.200			Device is not ready	HBS is in inactive state.

2. Make any further changes to the displayed list using the Plus/Minus buttons.
3. Click **Start** to commence the process.
4. The list window will indicate the success or otherwise of the upload for each HBS.



Note

For more options, see [Working in the UNI environment and with 3.xGHz](#) on page 6-6

Chapter 4: Managing the Sector with the RADWIN Manager

4.1 Scope of this Chapter

This chapter deals with managing the sector from the HBS. It covers HBS Configuration and HSU Configuration from the HBS. HSU direct or over-the-air configuration is a little different and is covered in [Chapter 6](#).

4.2 Configuring an HBS

4.2.1 Configuration Menu Buttons

Open the Configuration window.



The **Backup** and **Restore** buttons provide for backup and restore of the HBS software, and sector configuration. For details on working with these, see [Chapter 8, Backup, Restore, and Upgrade](#).

The **Refresh** button restores the current window to its previous state abandoning any changes you made, provided that you did not click **Apply** or **OK**.

We will work through each of the Configuration tabs in turn with emphasis on tabs or features not encountered in the previous chapters.

4.2.2 System

HBS Configuration Bach@HBS.01

Backup Restore Refresh

System

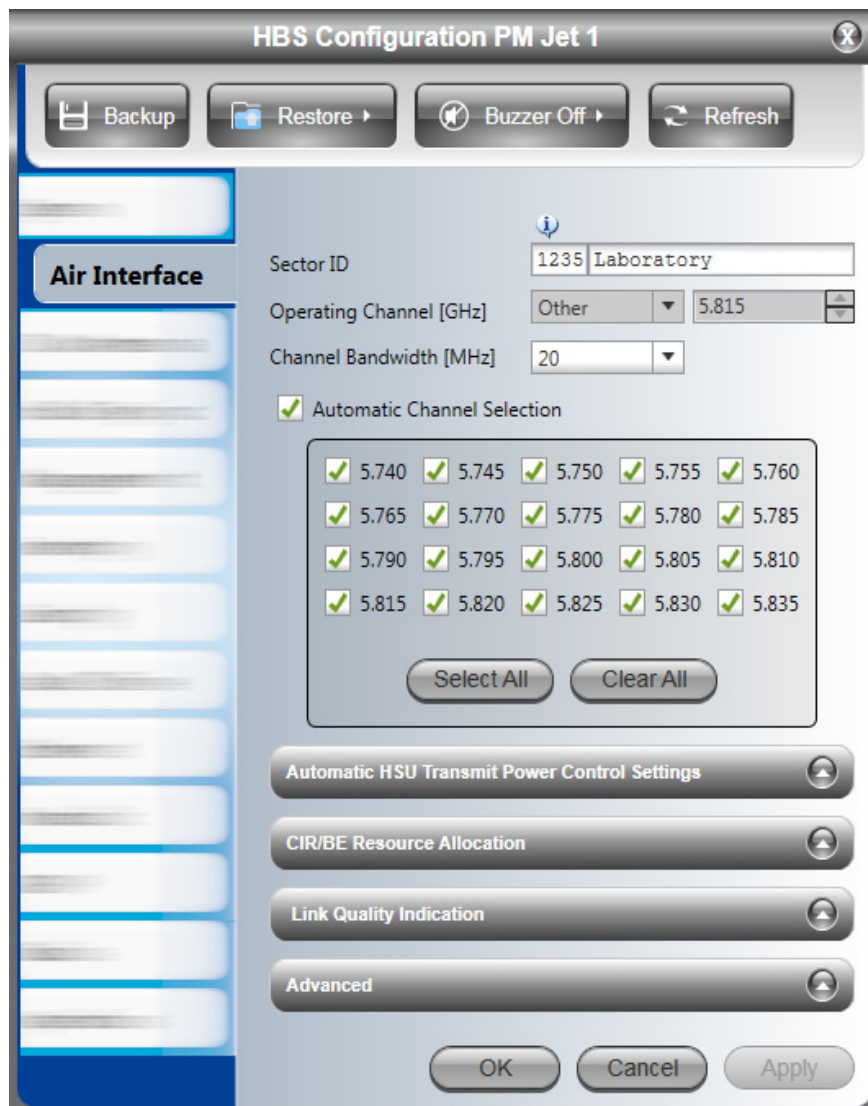
Air Interface
Tr. & Antennas
Radio Site Sync
Management
Inventory
Security
Data & Time
Ethernet
Network
Operations

Description Wireless Link
ObjectID 1.3.6.1.4.1.4458.20.5.1.2
Name Bach@HBS.01
Contact Person
Location HBS.01 Coordinates...
Last Power Up 07/07/2013 11:20:59

OK Cancel Apply

These items are convenience fields. **Name** and **Location** are typically entered during HBS activation. You may like to change **Contact** here, not set during activation. The **Coordinates** button opens the same window as used during activation.

4.2.3 Air Interface



Sector ID: Set the Sector ID here. The value will “percolate” to all registered HSUs. It will of course, be “picked up” by newly installed and registered HSUs.

Operating Channel: You can change the operating channel (only to those channels for which there is hardware support) if Automatic Channel Selection is not enabled. In order for the new channel to take effect you must deactivate then reactivate the HBS.

Channel Bandwidth: You can choose the channel bandwidth even if Automatic Channel Selection is enabled. The changes will be sector-wide, and affect which RSS Threshold power levels are available.

Automatic Channel Selection: Allows you to choose the channel automatically. We recommend you do this only at configuration time.

WiMax Coexistence Parameters: This option (not shown here) allows you to configure the HBS so that neighboring WiMax equipment will not interfere. It is only applicable for HBS units working in the 3.x GHz range (see the Hub Site Synchronization application note).

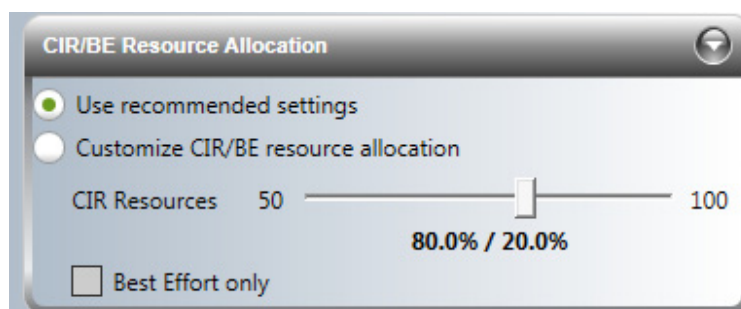
ATPC: Automatic HSU Transmit Power Control

Automatic HSU Transmit Power Control enables the HBS to optimize the transmit power of all HSUs in the sector. This is done by configuring the desired RSS (radio signal strength) threshold level. The HBS then tunes the transmission power of the HSUs to give this RSS value.

- **Mode:** Select **Disabled**, **Static**, or **Dynamic** from the pull-down menu.
 - **Disabled:** Disables the ATPC option
 - **Static:** Instructs the HBS to find an optimal transmit RSS value for the HSUs. The HBS then locks on to this power value and does not change it until this configuration option is changed.
 - **Dynamic:** Instructs the HBS to find an optimal transmit RSS value for the HSUs. The HBS will change this power value from time to time when needed.
- **RSS Threshold:** The desired RSS level which the HBS refers to in order to tune the transmission power of the HSUs. The best power level depends on the radio plan, but is also influenced by your choice of Channel Bandwidth.

The ATPC triangle in the HSU card will turn green, red or yellow (see [Card View](#) on page 2-8) in accordance with the status of this mode. ATPC Status can be added to the List View in the Main Window (see [List View](#) on page 2-15).

CIR/BE Resource Allocation:



If the sector you are working with has a combination of CIR and Best Effort HSUs, this option allows you to set what percentage of the sector resources are allocated to CIR units and what percentage are allocated to BE units.

- If you have only BE units, check the Best Effort only box. This is like setting CIR/Best Effort Ratio to 0.0%/100.0%. If you have at least one CIR unit, this box is disabled.
- If you have only CIR units, move the slider to the far right, and get 100% for CIR. This is the most efficient use of resources for a sector with only CIR units.

You can set this before any fixed HSUs are registered, and if you choose 100% of one kind or another, you will be limited when registering the HSUs to that resource type.

When you register a specific HSU, you choose what percentage of the specific resource type (CIR or BE) to allocate to this HSU (see [Figure 3-4, HSU Registration dialog](#)).

Click the **Use recommended settings** radio button to set the CIR/Best Effort to 80%-20%.

Link Quality Indication:

This option allows you to configure the HBS to send an indication when link quality degrades. There are three parameters, evaluated per link (HBS-HSU pair):

- BLQ** **Baseline Link Quality:** Value that the throughput of the link should have. Configured at the HSU for the uplink and downlink separately.
- Th** **Indication Threshold:** A percentage of the Baseline Link Quality below which the link quality is considered to be degraded. Configured at the HBS.
- tF** **Indication Time:** Time that the degradation must persist (T_h) before an indication is issued. Setting this parameter to an appropriate value can prevent the system from reacting to brief peaks (or valleys) of link quality value (throughput) change that do not disturb link functionality. Configured at the HBS.

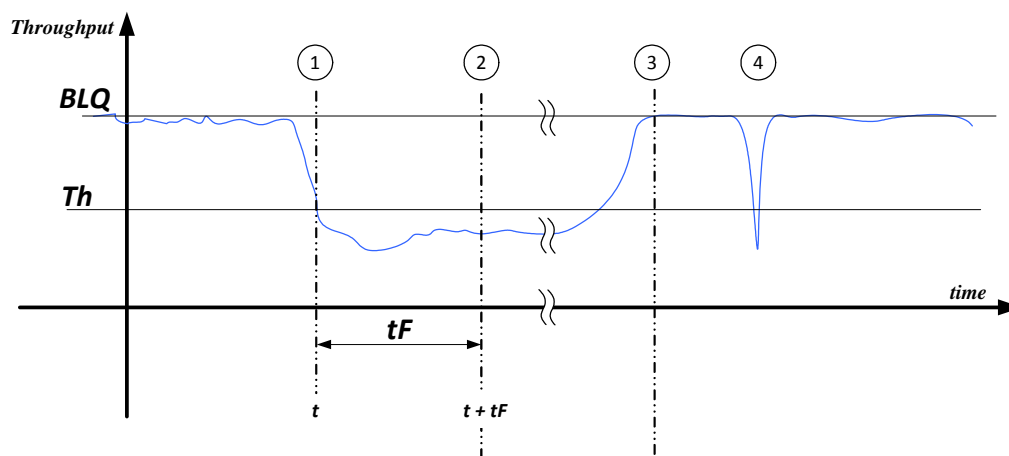


Figure 4-1: Link Quality Indication parameters

In [Figure 4-1, Link Quality Indication parameters](#), the blue line represents the real-time throughput value of the link.

- ① The user has set the baseline link quality (**BLQ**) and the indication threshold value (**Th**). At time t , the signal throughput of the link decreases below this threshold. This causes the system to start a clock to measure the persistence of the low throughput condition.
- ② From the time t to the time $t + tF$ (**indication time**), the low throughput condition persisted. An indication of link degradation is then issued.
- ③ The user has taken whatever measures necessary to rectify the link degradation, and the signal recovers. At that point an indication is issued that the link quality degradation condition no longer exists.
- ④ For link quality degradation that lasts for a shorter period of time than tF (indication time), no indication is issued.

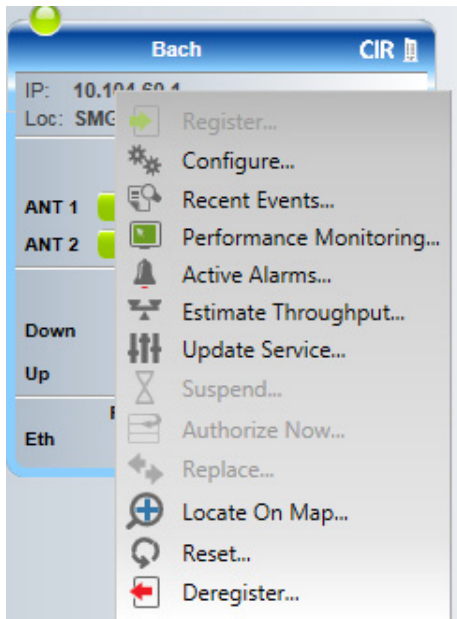
Configure Link Quality Degradation indication as follows:



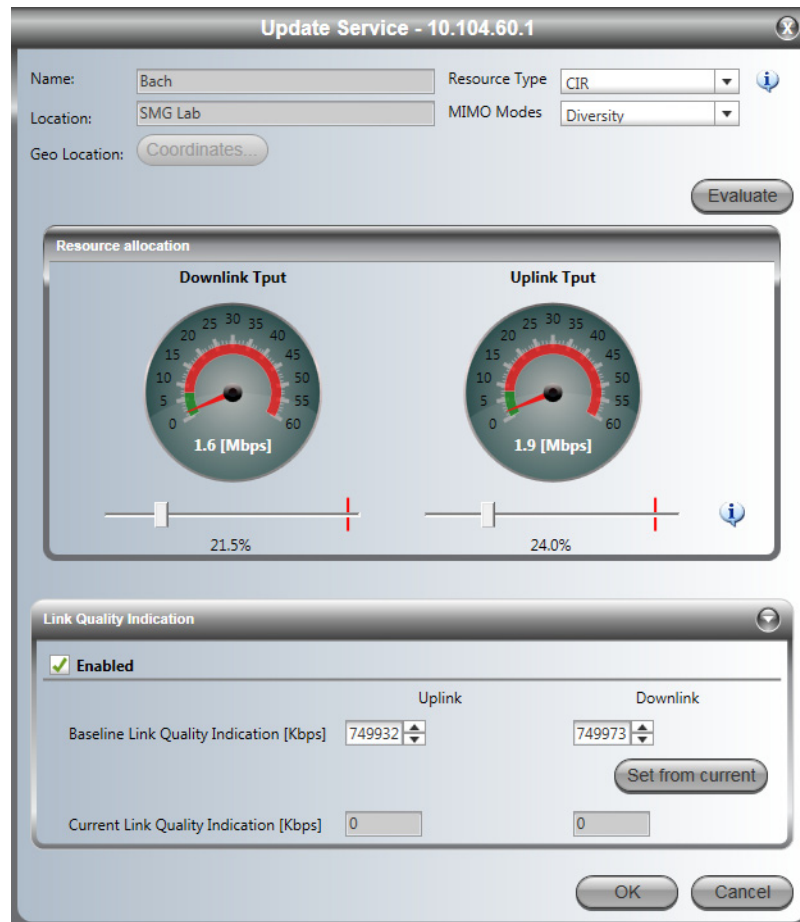
This feature is not supported by the SU **AIR** EMB, SU **AIR** INT, or by a Nomadic HSU. When using the SU **PRO** EMB or SU **PRO** INT, its resource allocation must be set to BE.

HSU side

1. Click on the HSU card.
2. Right-click to get its context menu:



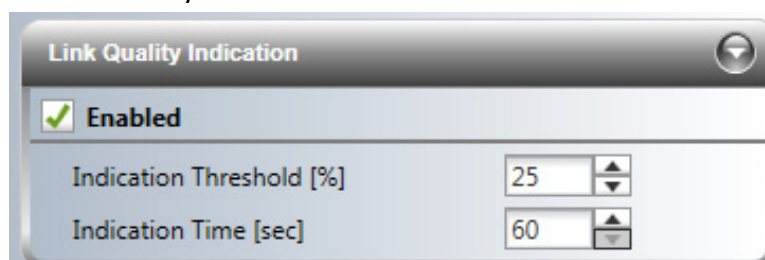
3. Select **Update Service**. The following window will appear:



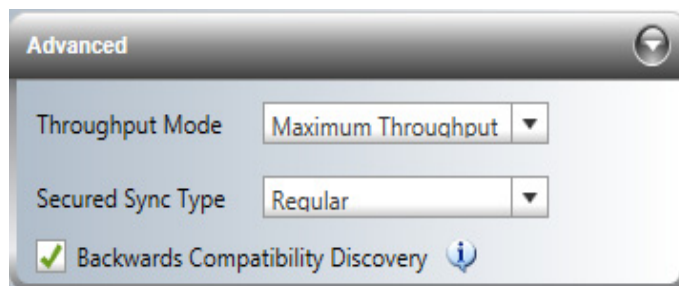
4. If the Link Quality Indication section is not open, click on the down arrow to open it.
5. Place a checkmark next to **Enabled** to enable this feature.
6. Select the **Baseline Quality Indication** for the uplink and for the downlink in kilo-bits per second (Kbps). They do not have to be the same.
7. You can set this value from the current throughput value by clicking on **Set from current**.
8. Click **OK**.

HBS side

1. Open the HBS configuration window
2. Select the **Air Interface** tab.
3. Open the Link Quality Indication section.



4. Place a checkmark next to **Enabled** to enable this feature.
5. Select the Indication Threshold (**Th**) in percent value, relative to the baseline link quality value.
6. Select the Indication Time (**tF**) in seconds.
7. From the Air Interface tab, click **OK** or **Apply**.

Advanced:

This option provides three functions:

Throughput Mode: This determines how the Adaptive Modulation mechanism works.

Maximum Throughput (default) should be chosen if throughput is more important than higher delay

(If configuring a sector for FCC UCBP, see [Chapter B, Operating Under the FCC Unrestricted Contention Based Protocol](#) for further instructions).

Optimized Latency minimizes delay at the expense of lower throughput.

Secured Sync Type: This determines whether or not the HSU must have the same Network ID as the HBS to establish a link. The Network ID is the first 4 digits of the Sector ID (see [Air Interface](#) on page 6-4 for instructions on configuring the HSU's Network ID).

- To enable this option, select **Secured Network ID** from the pull-down menu.
- To disable this option, select **Regular** from the pull-down menu.



If the Secured Sync Type is Secured Network ID, and the wrong Network ID was entered in the HSU, the unit will not establish a link and will be prevented from doing so for 10 minutes. Correct the Network ID, and at the end of this 10 minute period, the HSU will be able to synchronize with the HBS.

Backwards Compatibility Discovery: This allows HSUs with firmware older than Release 4.6 (those without the percentage-based DBA mechanism) to discover HBSs with Release 4.6 or above. To work properly, the firmware of the HSU must be upgraded to firmware that is compatible with that of the HBS. This upgrade can be carried out either via local connection or over-the-air. See [Chapter 8, Backup, Restore, and Upgrade](#).

4.2.4 Tx & Antenna

This tab is available for both the HBS and HSUs. It has the same meaning in both cases.

If you are working with an external antenna, the parameters indicated can be changed; if you are working with an integrated antenna, only the Required Tx Power can be changed.

The screenshot shows the 'HBS Configuration' window for 'Bach@HBS.01'. The 'Tx & Antenna' tab is selected in the left sidebar. The main area contains a table of configuration parameters. At the top, there are 'Backup', 'Restore', and 'Refresh' buttons. Below the table, there are 'OK', 'Cancel', and 'Apply' buttons.

Antenna Connection Type		<input checked="" type="radio"/> External	<input type="radio"/> Integrated
Antenna Type	Dual		
Required Tx Power (Per radio)	5		[dBm]
Tx Power (Per radio)	5		[dBm]
Tx Power (System)	8		[dBm]
Antenna Gain	15.0		[dBi]
Cable Loss	0.0		[dB]
Max EIRP	43		[dBm]
EIRP	23		[dBm]

For the HBS, changes made here may affect link quality and in the case of antenna type, cause a sector re-sync.

Changing the antenna type for an HSU will cause a re-sync to that site only.

4.2.5 Hub Site Sync [HSS]

HBS Configuration Bach@HBS.01

Backup Restore Refresh

Operation	Independent Unit
Synchronization	N/A
External Pulses	Not Detected
Ethernet Sync	N/A
RFP	N/A

Hub Site Sync

☐ Enabled

Operational state Independent Unit

Protocol: Ethernet

Ethernet Protocol Parameters

Domain: Default

VLAN

☒ Enabled

VLAN ID: 1997 VLAN Priority: 7

Discovery

Options: All

Start Discovery

OK Cancel Apply

To enable HSS, check the **Enabled** check box.

RFP E

☒ Enabled

Operational state

Hub Sync Client - Continue Tx

Hub Sync Master

Hub Sync Client - Continue Tx

Click **Apply** or **OK** to enable HSS.



HSS support for RADWIN 5000 HBSs is model dependent

There are many options for Hub Site Synchronization. See the Hub Site Synchronization application note for more details.

4.2.6 Management

You can change the IP address, subnet mask and gateway. Note that if you do so, you will lose connection with the unit. Re-login to re-establish connection.

HBS Configuration PM Jet 1

Backup Restore Refresh

Management

IP Version: IPv4 Only

IPv4

IP Address: 10.104.50.1

Subnet Mask: 255.255.0.0

Default Gateway: 10.104.10.21

IPv6

IPv6 Address:

Subnet prefix length: 64

Default Gateway:

SysLog server IP Address: 0.0.0.0

RADIUS User Authentication

Trap Destination

VLAN

Protocol

OK Cancel Apply

IP Version

You may configure a link for IPv4, IPv6 or both:

IP Version: IPv4 + IPv6

IPv4

IP Address:

Subnet Mask: 255.255.0.0

Default Gateway: 10.104.10.21

Here we choose both and enter the IPv6 addresses:

IP Version: IPv4 + IPv6

IPv4

IP Address: 10.104.50.200

Subnet Mask: 255.255.0.0

Default Gateway: 10.104.10.21

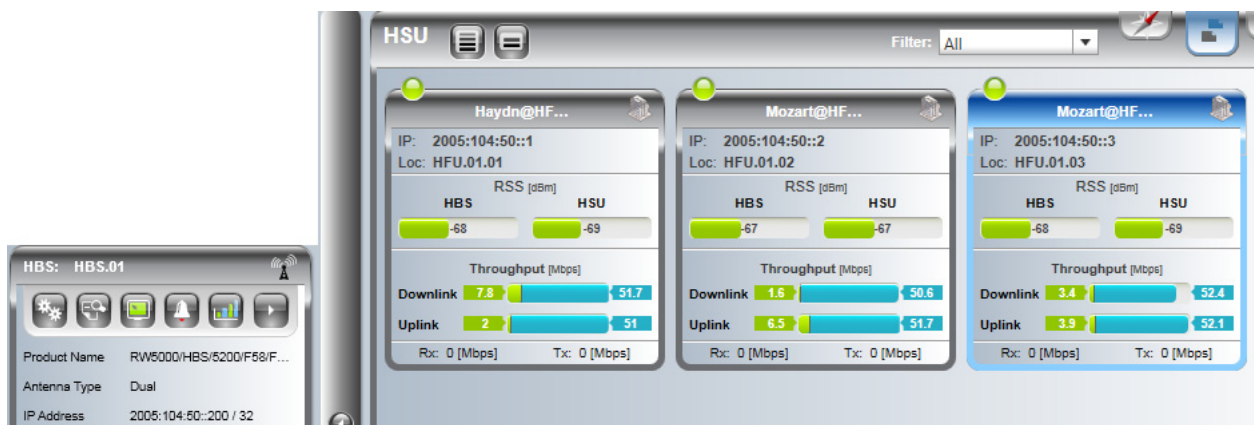
IPv6

IPv6 Address: 2005:104:50::200

Subnet prefix length: 32

Default Gateway: 2005:104:20::21

Using both IP versions is useful in conjunction with applications that do not fully support IPv6. Here are the results of setting IPv6 addresses for both sites and enabling **Show IP** to IPv6 in **Preferences | Monitor**:



The three sub-windows, Trap Destinations, VLAN Management and Protocol dialogs are generic to the HBS and the HSUs (direct or over-the-air) and are discussed below.

Syslog server IP address

This field shows the IP address of a Syslog server to which the specific radio unit sends Syslog messages. This is configured per individual unit.

➤ To change a Syslog server IP address:

1. Open an entry with its edit button:

SysLog server IP Address: 10.104.70.201

The following entry window is displayed:



2. Enter the Syslog destination IP Address, and click **OK**. It could be the IP address of the managing computer. The Syslog events will be stored at the address chosen.

RADIUS User Authentication

This option enables you to set lists of individuals and IP addresses that are permitted to manage radio units. The lists consist of a user/permissions list (which uses a RADIUS server), an access control list for IP addresses, or your own “white list”, which does not use a RADIUS server.



This RADIUS option is used to authenticate management access to the radios in the sector. It is **not** used to authorize the various HSU radios in the sector. That RADIUS option is described elsewhere (see [RADIUS](#) on page 4-53).

Operation

This option uses parameters stored on both the HBS and the RADIUS server as follows:

HBS- based parameters:

- » A list of IP addresses from which management access is permitted is stored on the HBS. There are two lists:
 - A RADIUS-based Authentication Control List (ACL)
 - A non-RADIUS-based “White List”
- » SNMP community definition is defined and stored in the HBS¹.
- » The HBS then applies this information to each HSU in turn.

RADIUS Server-based parameters:

- » User name, password and a permissions list are stored in a RADIUS server. This list is in addition to and independent of the IP address lists stored in the HBS.
- » When logging on, the HBS queries the RADIUS server for this information.

1. The SNMP community may be different for the HSUs, depending on your system configuration

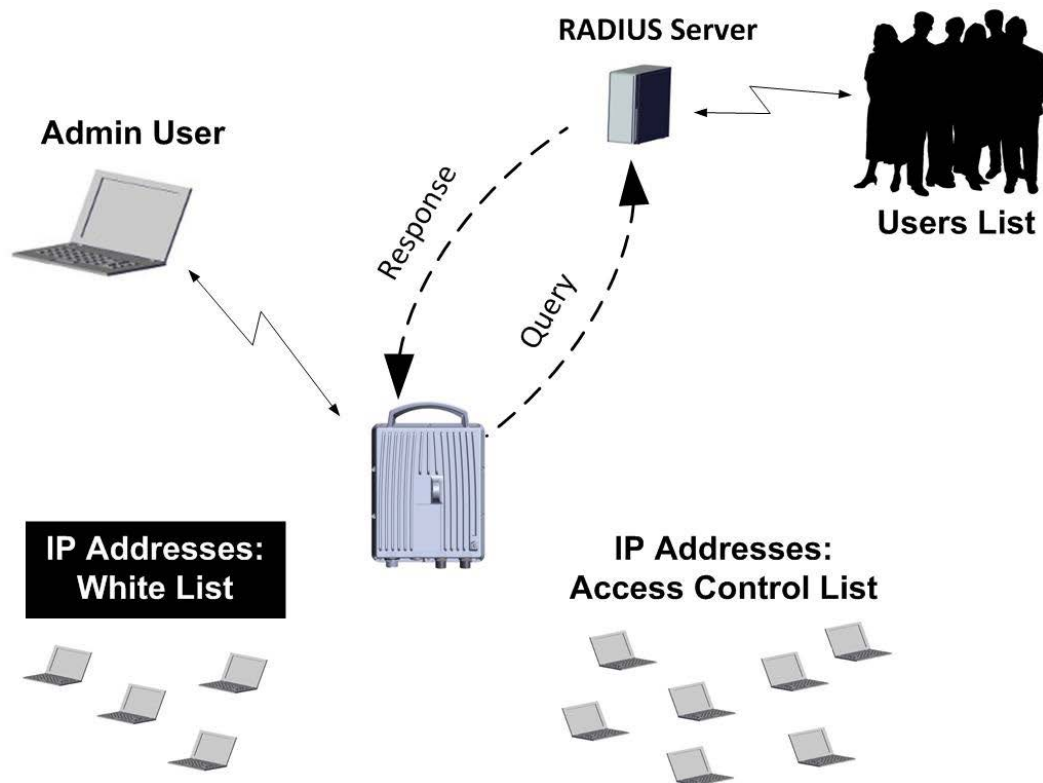


Figure 4-2: RADIUS Authentication set up

Customer Preparations

1. You must supply a server that operates the RADIUS protocol. Make sure you have:
 - The IP address of the RADIUS server.
 - The port of the RADIUS server to which the HBS must connect.
 - The Secret of the RADIUS server.
2. Prepare the following parameters for the RADIUS server:
 - a. User profile definitions. These are usually, but not always, confined to the following definitions:
 - HBS Read-Only, HSU Read-Only
 - HBS Read-Write, HSU Read-Write
 - HBS Read-Only, HSU Read-Write
 - b. Permitted users. Each one must have:
 - Username
 - Password
 - Timeout value (in seconds)
 - User profile choice
3. Prepare a list of IP addresses for the Access Control List (ACL). This will be a list of IP addresses from which management access to the HBS is permitted. This list is

stored on the HBS, but works only when a RADIUS server is connected, and when RADIUS authentication mode is enabled.

4. Prepare a “white list” of IP addresses. This will be a list of IP addresses from which management access to the HBS is permitted. This list is stored on the HBS, and is independent of a RADIUS server, although it works only when RADIUS authentication mode is enabled.

Prepare Files for the RADIUS Server

Prepare two files for the RADIUS server: Data Dictionary supplement, and Users definitions.

Data Dictionary supplement:

This is a supplement to the standard RADIUS Data Dictionary. This file defines the user profiles. Add this text to the end of the standard RADIUS Data Dictionary. An example supplement looks as follows:

```
#vendor id
VENDOR      RADWIN      4458

BEGIN-VENDORRADWIN

# User Permissions Profile, the attribute starts with "number"=10 in
# order not to collide with previous RADWIN RADIUS definitions for HSU
# Authorization
ATTRIBUTE RADWIN_UserProfile 10 integer

VALUE RADWIN_UserProfile ReadOnlyHbsReadOnlyHsu      1
VALUE RADWIN_UserProfile ReadWriteHbsReadWriteHsu    2
VALUE RADWIN_UserProfile ReadOnlyHbsReadWriteHsu     3

ATTRIBUTE RADWIN_SessionTimeout 11 integer

END-VENDORRADWIN
```

The above example shows that the UserProfile is defined as attribute “10”, to differentiate it from other attributes defined in this file.

- The first profile definition is called “1”, and is defined as allowing any user with this profile to have Read-Only access to the HBS or any HSU.
- The second profile definition is called “2”, and is defined as allowing any user with this profile to have Read-Write access to the HBS or any HSU.
- The third profile definition is called “3”, and is defined as allowing any user with this profile to have Read-Only access to the HBS and Read-Write access to any HSU.

Users definitions

The Users file (users.conf) defines the list of users who are allowed to access this sector (HBS), what user profile each one has, and a timeout value (in seconds) after which access is denied. An example appears as follows:

```
# User Name = SectionHead, Password = SunBoss_365, Read-Only
# permissions HBS and HSU, Timeout 24h
SectionHeadCleartext-Password := "SunBoss_365"
    RADWIN_UserProfile = 2
    RADWIN_SessionTimeout = 86400

# User Name = LocalTech, Password = Moon_Crater, Read-Only permissions
# HBS, Read-Write permissions HSU, Timeout 1h
LocalTechCleartext-Password := "Moon_Crater"
    RADWIN_UserProfile = 1
    RADWIN_SessionTimeout = 3600
```

This above example shows that there are two users with the following user names:
SectionHead, and **LocalTech**.

SectionHead has a password = SunBoss_365

His user profile is “2”, meaning he has read and write access to all radios (according to the definition of user profile 2 in the dictionary example shown above)

His timeout value is 86,400 seconds, meaning that he has 24-hour access from the time of his log on. Note that the RADWIN Manager will automatically re-authenticate the user before this timeout expires.

LocalTech has a password = Moon_Crater

His user profile is “1”, meaning he has read-only access to all radios (according to the definition of user profile 1 in the dictionary example shown above)

His timeout value is 3600 seconds, meaning that he has 1-hour access from the time of his log on.

Configuring the RADIUS User Authentication Option

Log on to the HBS with full read-write and administration privileges, to set up the parameters below.

From the Configuration dialog box, click the **Management** tab, then the **RADIUS User Authentication** button:

The screenshot shows the 'RADIUS User Authentication' dialog box. It has a title bar with a close button. Inside, there is a checked checkbox for 'RADIUS Authentication'. Below it is a 'NAS Identifier Convention' section with a pull-down menu currently set to 'Device Name'. A red note states: 'NAS Identifier Convention change will also affect 802.1x configuration.' The main area contains two sections: 'Authentication RADIUS Servers' and 'Access Control List'. The 'Authentication RADIUS Servers' section has a table with columns 'IP Address', 'Port', and 'Status'. It shows two entries, both with IP '0.0.0.0' and Port '1812', and Status 'Not tested'. To the right of each row are three icons: a gear, a red 'X', and a document. The 'Access Control List' section has a table with columns 'IP Address' and 'Subnet Mask'. It shows ten entries, all with '0.0.0.0' for both fields. To the right of each row are the same three icons (gear, red 'X', document). Below the table is a red note: 'Note : The local PC should not be removed from the access list'. At the bottom, there is a checked checkbox for 'Enable Access Control List' and a 'White Access List' section with an up arrow icon. At the very bottom are 'Cancel' and 'OK' buttons.




IP Address	Port	Status
0.0.0.0	1812	Not tested
0.0.0.0	1812	Not tested


IP Address	Subnet Mask
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0
0.0.0.0	0.0.0.0

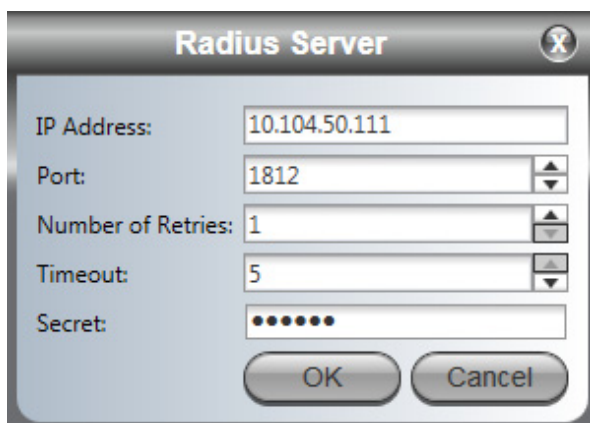
RADIUS Authentication: Click this box to enable working with a RADIUS server for authentication.

NAS Identifier Convention: Choose Device Name or Device Location from the pull-down menu.

Authentication RADIUS Servers: This shows a list of the available authentication RADIUS servers: their IP addresses, their connection Ports (this is usually 1812), their Statuses (Not Tested, Testing, or Connected), and three more buttons:

		
Edit Server Parameters	Clear Server Configuration	Check Server Connectivity

Edit Server Parameters . Click this button to open the RADIUS server parameters dialog box:



The dialog box titled "Radius Server" contains the following fields and controls:

- IP Address:** Text field with value "10.104.50.111".
- Port:** Spin box with value "1812".
- Number of Retries:** Spin box with value "1".
- Timeout:** Spin box with value "5".
- Secret:** Password field with 6 dots.
- Buttons:** "OK" and "Cancel".


IP Address: Enter the IP Address of the RADIUS server here


Port: Enter the communication port to which the HBS connects (usually 1812)

Although you can use the same IP for the different functions of the RADIUS server, you must still use a different port for each function.

Number of Retries: If the first attempt at establishing a connection with the RADIUS server was unsuccessful, carry out this number of retries before moving on to the next available RADIUS server.

Timeout: If there is no response from the RADIUS server after this many seconds, disconnect. A message will appear indicating this situation.

Clear Server Configuration . Click this button to remove the specific RADIUS server from the list.

Check Server Connectivity . Click this button to test the connectivity of the specific RADIUS server. Its status will change to Testing, and if the connection is successful, will further change to Connected.





Any time you close the RADIUS User Authentication tab, you must click the Check Server Connectivity button again to re-establish connectivity.

Access Control List

Click this pull-down menu to open the list of IP addresses from which access to the HBS is permitted.

This list is applicable only if the **RADIUS Authentication** and the **Enable Access Control List** box has a checkmark in it.



Each item in each of these lists shows an IP address and subnet mask.

To remove the item from the list, use this button:	
To edit the IP address, and/or subnet mask, use this button:	

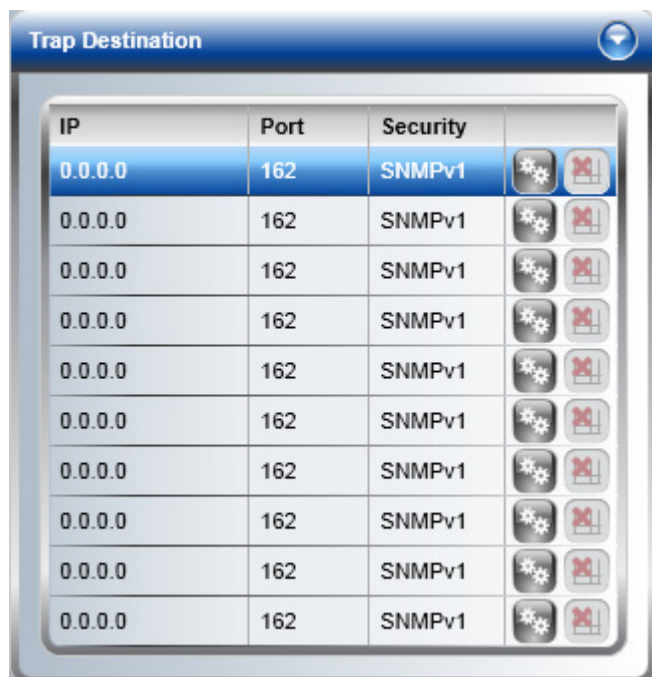
White Access List

Click this pull-down menu to open the list of IP addresses from which access to the HBS is permitted.

Although the HBS does not query the RADIUS server for authentication for this list, this list is nevertheless applicable only if the **RADIUS Authentication** box has a checkmark in it.

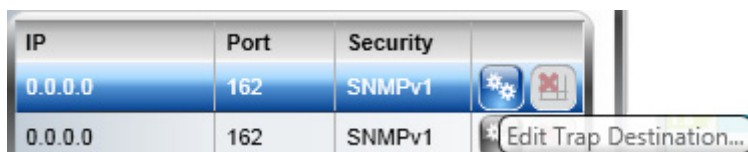
To remove the item from the list, use this button:	
To edit the IP address, and/or subnet mask, use this button:	

Trap Destinations



➤ To change a trap IP address:

1. Open an entry with its edit button:



The following entry window is displayed:

Trap Destination

IP Address:

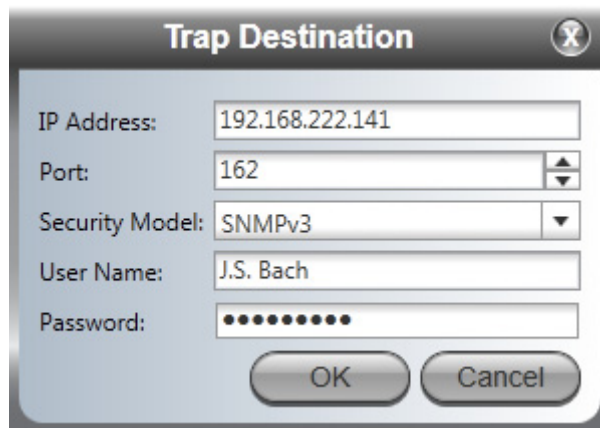
Port:

Security Model:

User Name:

Password:

2. Enter the Trap Destination IP Address and Port. It could be the IP address of the managing computer. The events log will be stored at the addresses chosen.
3. You may choose between SNMPv1 or SNMPv3. The choice is made on a unit-by-unit basis. If you choose SNMPv1, you may only enter an IP address and port number. For SNMPv3, you must supply a user name and password:



Trap Destination

IP Address: 192.168.222.141

Port: 162

Security Model: SNMPv3



User Name: J.S. Bach

Password: ••••••••

OK Cancel

- Click **OK** to save your choice.

Note that for each active trap destination, the **Clear Trap Destination** button is enabled:

IP	Port	Security	
192.168.222.141	162	SNMPv3	
0.0.0.0	162	SNMPv1	

Clear Trap Destination

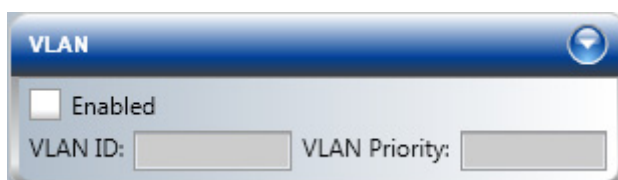
VLAN (for Management)

VLAN Management enables separation of user traffic from management traffic whenever such separation is required. It is recommended that each member of a sector be configured with different VLAN IDs for management traffic. (This reduces your chances of accidentally locking yourself out of the sector.)



VLAN IDs are used by RADWIN products in three separate contexts: Management VLAN, Traffic VLAN and Ethernet Ring. It is recommended that you use different VLAN IDs for each context.

➤ To enable VLAN for management:



VLAN

☐ Enabled

VLAN ID: VLAN Priority:

Figure 4-3: VLAN for Management

- In the window of [Figure 4-3](#), check the **Enabled** box.
- Enter a VLAN ID. Its value should be between 2 and 4094.

After entering the VLAN ID, only packets with the specified VLAN ID are processed for management purposes by the HBS/HSU ODU. This includes all the protocols supported by the ODU (ICMP, SNMP, Telnet and NTP). Using VLAN for management traffic affects all types of management connections (local, network and over the air).

- Enter a Priority number between 0 and 7.

The VLAN priority is used for the traffic sent from the ODU to the managing computer.

4. Change the VLAN ID and Priority of the managing computer NIC to be the same as those of steps 2 and 3 respectively.
5. Click **Apply** or **OK**.

Lost or forgotten VLAN ID

If the VLAN ID is forgotten or there is no VLAN traffic connected to the ODU, then reset the relevant ODU.

During the first two minutes of connection, the ODU uses management packets both with and without VLAN. You may use this period to reconfigure the VLAN ID and priority.

Protocol

Supported protocols are shown in [Figure 4-4](#):

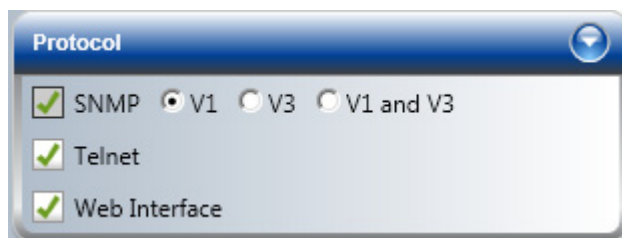
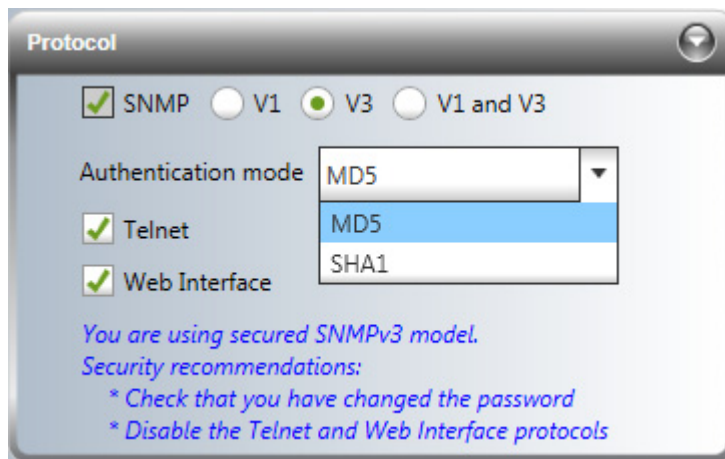


Figure 4-4: Supported protocols

SNMP support is permanently enabled. You may choose between SNMPv1, SNMPv3 or both. If you choose SNMPv3, you will be offered the following cautionary message:



You can leave the default authentication mode for SNMPv3 as MD5 (message digest algorithm), or change it to SHA1 (secure hash algorithm).

For a sector managed as part of a network, direct access to a HBS/HSU using Telnet is considered to be a security breach. Telnet access may be enabled or disabled by clicking the Protocol tab and enabling/disabling Telnet access using the Telnet check-box.

- For further details about Telnet access see [page 4-87](#).

The Telnet access mode (when available), is site specific. If for example, you want Telnet access from specific sector members, you should enable it for these sites and disable it elsewhere.

Conversely, If the Telnet or Web Interface access modes pose a general security risk, you must disable them for each sector member separately.

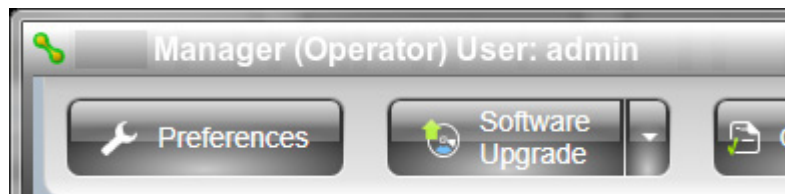
Multiuser Support under SNMPv3

If you chose SNMPv3 or both versions, you are asked to log on again (see [Chapter 2, The RADWIN Manager Log-on Concept](#)):

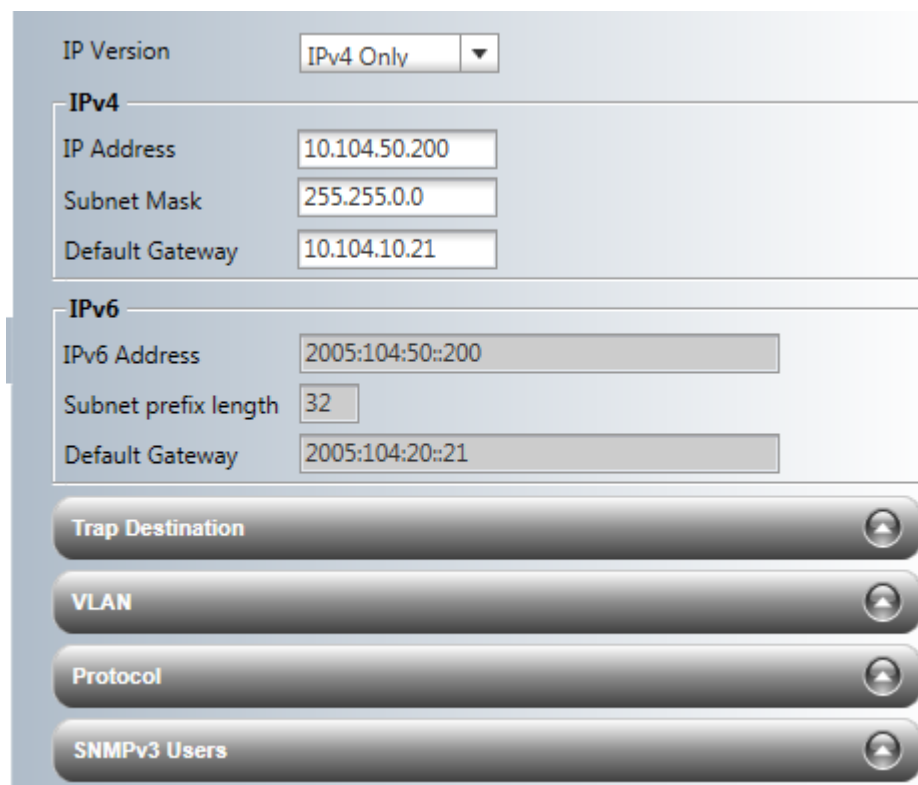
For the first log-on under SNMPv3, use username **admin**, and password **admin** as well.

Note the following two changes:

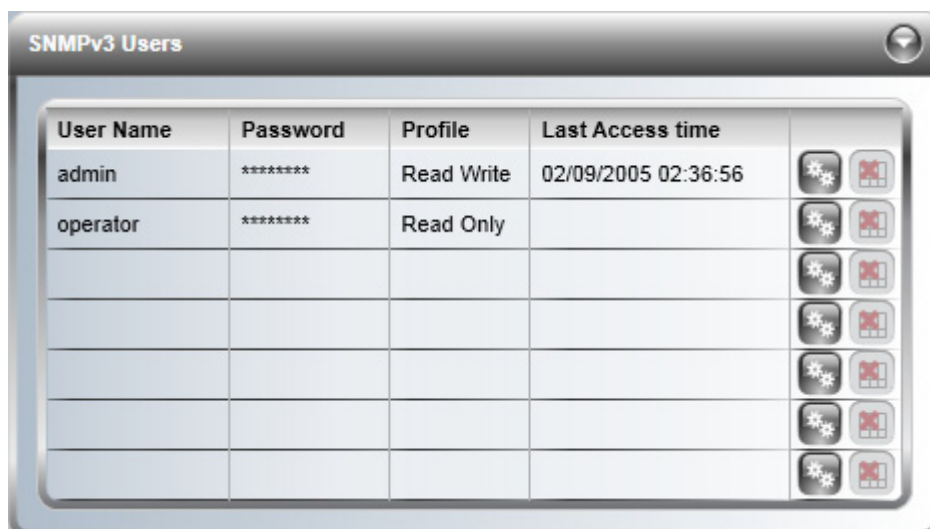
- The title bar now shows the SNMPCv3 user name:



- There is an additional button, **SNMPv3 Users**, in the Management window:



Using the new button opens up the following entry list:



To make any of the following changes, you must be logged on as user **admin**. The SNMPv3 passwords for admin and operator are as follows:

Table 4-1: SNMPv3 predefined users

User Name	Password	Profile
admin	netwireless	Read Write
operator	netpublic	Read Only

➤ **To add an SNMPv3 user:**

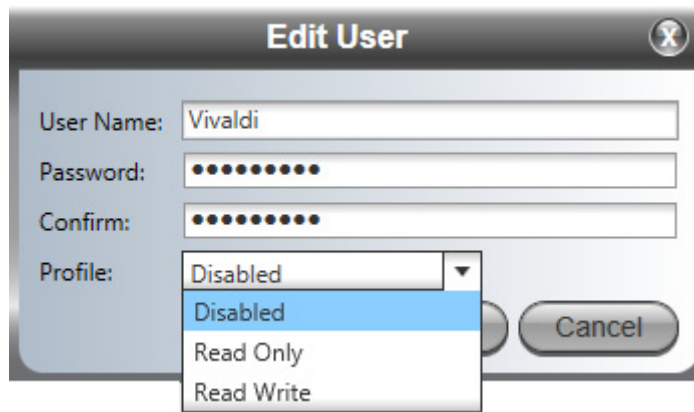
1. Click the right hand edit icon on any empty line of the list:



2. An Edit window is displayed:

Figure 4-5: Add or Edit a user

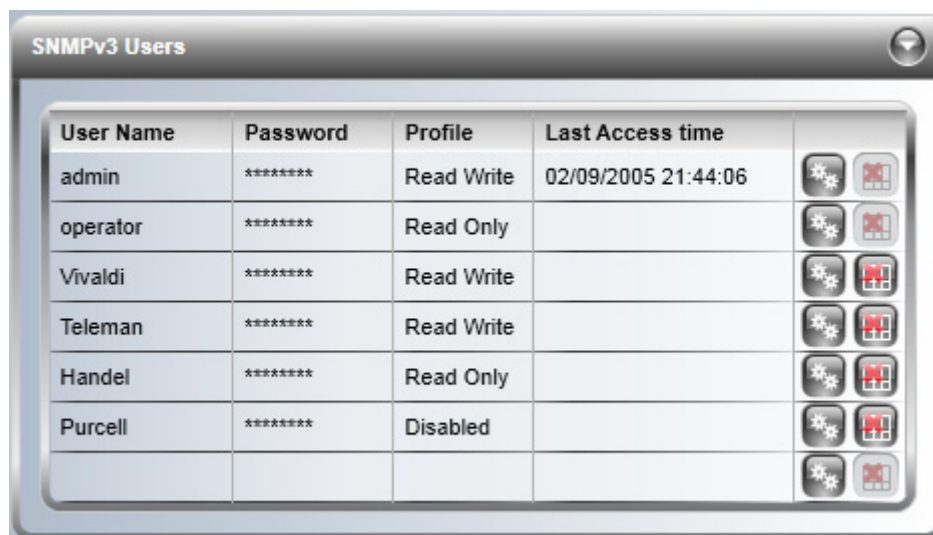
3. Enter a user name and password. Confirm the password as indicated.
4. Choose a Profile:



The 'Edit User' dialog box contains the following fields and options:

- User Name: Vivaldi
- Password: [masked with dots]
- Confirm: [masked with dots]
- Profile: A dropdown menu with 'Disabled' selected. The menu is open, showing options: Disabled, Read Only, and Read Write.
- Buttons: OK and Cancel.

- Read Only provides Observer level log-on access.
 - Read Write provides Operator level log-on access
 - Disabled stores the user details in the data base for future use. It must be changed to Read Only or Read Write to become usable.
5. Click OK to accept. Here is the result of adding one more Read Write user, one Read Only User and one “Disabled” user:



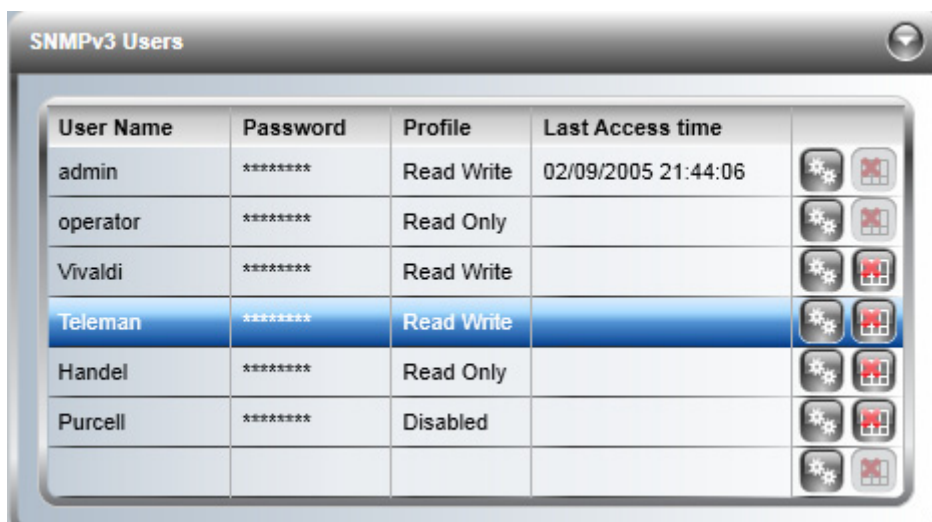
User Name	Password	Profile	Last Access time	
admin	*****	Read Write	02/09/2005 21:44:06	[edit] [delete]
operator	*****	Read Only		[edit] [delete]
Vivaldi	*****	Read Write		[edit] [delete]
Teleman	*****	Read Write		[edit] [delete]
Handel	*****	Read Only		[edit] [delete]
Purcell	*****	Disabled		[edit] [delete]
				[edit] [delete]

Figure 4-6: SNMPv3 users list

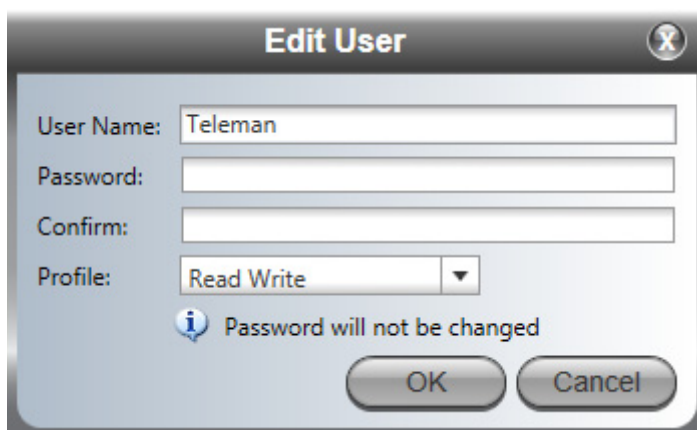


To edit an existing user:

1. Use the same procedure as above to choose a user for editing. For illustration, we will correct the spelling of Teleman's name:



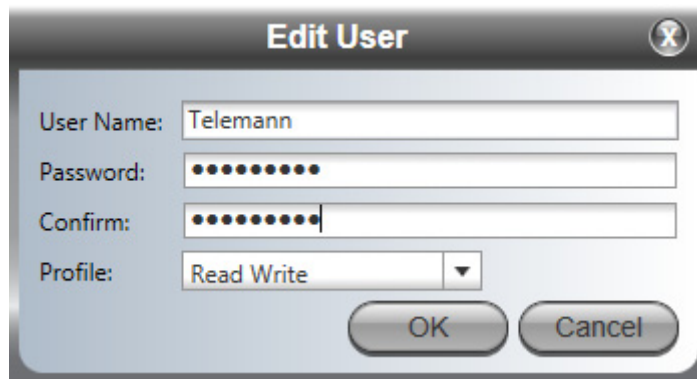
2. Click the edit button:



3. Correct the spelling of the name:



4. Enter and confirm the user's password:



The 'Edit User' dialog box contains the following fields and controls:

- User Name:** Text field containing 'Telemann'.
- Password:** Password field with masked characters (dots).
- Confirm:** Password field with masked characters (dots).
- Profile:** Dropdown menu showing 'Read Write'.
- Buttons:** 'OK' and 'Cancel' buttons at the bottom right.

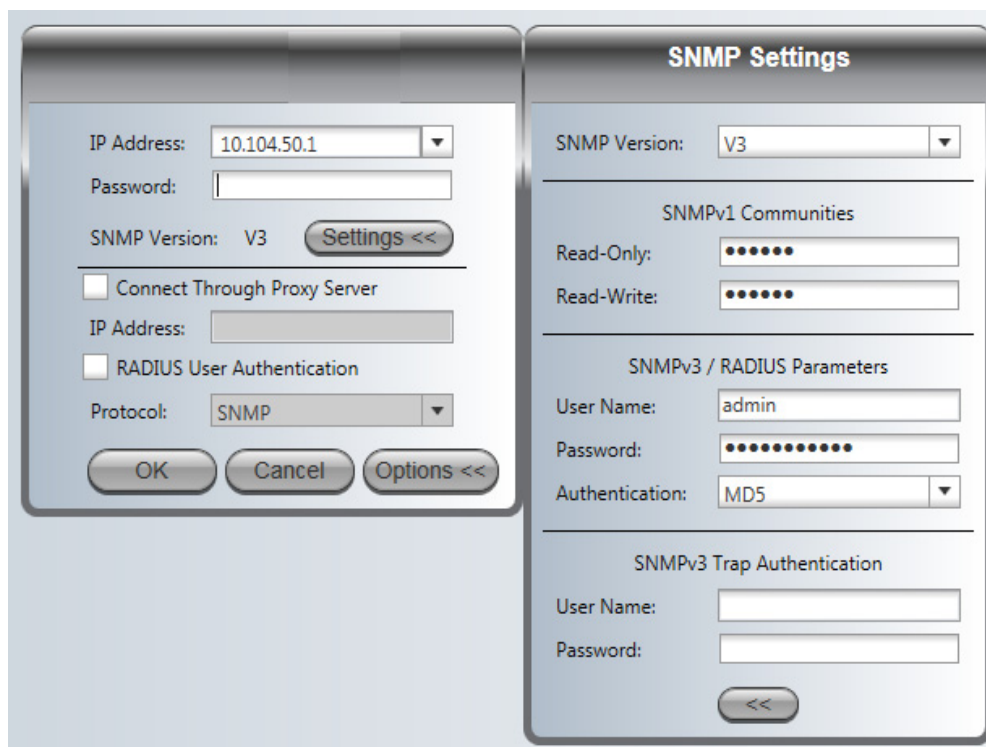
5. Click **OK** to finish. The change will be reflected in the display of [Figure 4-6](#).
6. Use the same method to change the user's profile.



Passwords are never displayed as clear text. If a user loses his password, the only way to correct the situation is to delete the user name and re-create the same user name with another password.

Logging on via SNMPv3

1. The default log-on dialog is shown below. In the right hand window, enter the SNMPv3 user name and password.



The dialog is split into two panes. The left pane contains:

- IP Address:** Dropdown menu showing '10.104.50.1'.
- Password:** Empty password field.
- SNMP Version:** Dropdown menu showing 'V3'.
- Buttons:** 'Settings <<', 'OK', 'Cancel', and 'Options <<'.
- Checkboxes:** 'Connect Through Proxy Server' (unchecked) and 'RADIUS User Authentication' (unchecked).
- IP Address:** Empty text field.
- Protocol:** Dropdown menu showing 'SNMP'.

The right pane is titled 'SNMP Settings' and contains:

- SNMP Version:** Dropdown menu showing 'V3'.
- SNMPv1 Communities:**
 - Read-Only:** Password field with masked characters (dots).
 - Read-Write:** Password field with masked characters (dots).
- SNMPv3 / RADIUS Parameters:**
 - User Name:** Text field containing 'admin'.
 - Password:** Password field with masked characters (dots).
 - Authentication:** Dropdown menu showing 'MD5'.
- SNMPv3 Trap Authentication:**
 - User Name:** Empty text field.
 - Password:** Empty password field.
 - Button:** '<<' button at the bottom.

Figure 4-7: Default SNMPv3 log-on dialog

2. In the main window of the RADWIN Manager, we see **admin** in the title bar:



Make sure you do not change the Authentication mode from what you chose before logging off.



Logging on with RADIUS user authentication

- This is only relevant if RADIUS user authentication is used in your system.
- Contact your system integrator/operator for the correct RADIUS user name, password, and protocol.
 1. The default log-on dialog is shown below.
 2. Place a checkmark next to RADIUS User Authentication.
 3. Select the protocol used (SNMP or Telnet)
 4. Make sure the RADIUS Parameters (use name and password) as shown in the right hand window are correct.

The image shows a configuration window for the RADWIN Manager. It is divided into two main panels. The left panel contains fields for 'IP Address' (10.103.60.201), 'Password', 'SNMP Version' (V1), and a 'Settings <<' button. Below these are checkboxes for 'Connect Through Proxy Server' and 'RADIUS User Authentication' (which is checked). There is also a 'Protocol' dropdown set to 'SNMP' and buttons for 'OK', 'Cancel', and 'Options <<'. The right panel is titled 'SNMP Settings' and contains sections for 'SNMPv1 Communities' (Read-Only and Read-Write fields), 'SNMPv3 / RADIUS Parameters' (User Name: admin, Password: masked, Authentication: MD5), and 'SNMPv3 Trap Authentication' (User Name and Password fields). A '<<' button is at the bottom of the right panel.

4.2.7 Inventory

This section shows the various identification items for the radio unit, including its software version.



Not all units display the same parameters.

The Inventory information will be required by Customer Service should you require assistance.

4.2.8 Security

This section applies to both the HBS and HSUs unless stated otherwise.



Figure 4-8: Sector Security settings

The Security dialog enables you to change the Link Password and the SNMP Community strings, create an encrypted SNMP Community string value file, set 802.1x authentication¹ conditions, as well as change the [Security Mode](#). If you have AES 256 Encryption support, the check box will be enabled at the HBS. This item does not appear on the HSU Configuration panel. For details about configuring and using AES 256, see [Configuring AES 256 Encryption Support](#).

1. This option works for the RADWIN 5000 JET and SU **PRO/AIR** EMB and SU **PRO/AIR** INT only

SNMP Communities



In this section, “ODU” may be either an HBS or an HSU.

Each radio unit communicates with the RADWIN Manager using the SNMPv1 or SNMPv3 protocol. The SNMPv1 protocol defines three types of communities:

- **Read-Only** for retrieving information from the ODU
- **Read-Write** to configure and control the ODU
- **Trap** used by the ODU to issue traps.

The Community string must be entered at log on¹. You must know the password and the correct Community string to gain access to the system. You may have read-only privileges. It is not possible to manage the ODU if the read-write or the read Community values are forgotten. A new Community value may be obtained from RADWIN Customer Service for the purpose of setting new Community. You must also have available the serial number or the MAC address of the ODU.

The read-write Community strings and read-only Community strings have a minimum of five alphanumeric characters. (**bru1** and **bru4097** are not permitted). Changing the trap Community is optional and is done by clicking the check box.

Editing SNMPv1 Community Strings

When editing these strings, both read-write and read-only communities must be defined.

Upon logging on for the first time, use the following as the current Community:

- For Read-Write Community, use **netman**.
- For Read-Only Community, use **public**.
- For Trap Community, use **public**

➤ To change a Community string²:

1. Type the current read-write Community (default is **netman**).
2. Choose the communities to be changed by clicking the check box.
3. Type the new Community string and re-type to confirm. A community string must contain at least five and no more than 32 characters excluding SPACE, TAB, and any of ">#@|*?;:."
4. Click **OK** to save.

1. If your system is using the community.dat file, it will access this file for the Community String values, and you will not need to enter any at log on. But only those units with corresponding Community String values will be accessible.

2. If your system is using the community.dat file, this change will only affect the unit, not the community.dat file, and as such will render the unit inaccessible upon next log on, unless the file is updated.

Editing SNMPv3 Passwords

To commence the process, you must enter the current Read-Write Community password as shown in the first field of [Figure 4-9](#) below. Change the Read-Write and Read-Only passwords as indicated. A password must be between 8 and 31 characters long. The same character restrictions for the SNMPv1 community strings also apply here.

Change Community/Password - Bach@HBS.01

Enter current Read-Write Community/SNMPv3 Password

☒ Read-Write Community/SNMPv3 Password

New:

Confirm:

☒ Read-Only Community/SNMPv3 Password

New:

Confirm:

☒ Trap Community(SNMPv1 only)

New:

Confirm:

☒ Hide Characters

Figure 4-9: Changing the Community Strings/Passwords

Forgotten SNMPv1 Community String

If the read-write Community string is unknown, an alternative Community key can be used. The alternative Community key is unique per ODU and can be used only to change the Community strings. The alternative Community key is supplied with the product, and should be kept in a safe place.

If both the read-write Community and the alternative Community key are unavailable, then an alternative Community key can be obtained from RADWIN Customer Service using the ODU serial number or MAC address. The serial number is located on the product label. The serial number and the MAC address are displayed in the Site Configuration inventory tab.

When you have the alternative Community key, click the **Forgot Community** button and enter the Alternative Community key ([Figure 4-10](#)). Then change the read-write Community string.



If your system uses the community.dat encrypted file that contains the SNMP community values, the above is not relevant.

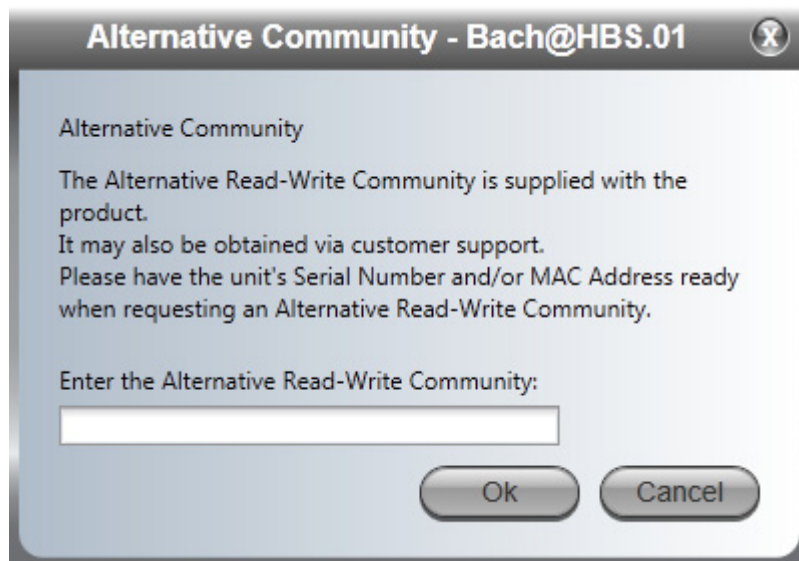


Figure 4-10: Alternative Community Dialog box

Changing the Link Password

This item is available as follows:

- At an isolated HBS (No active HSUs)
- At an isolated HSU
- Never for an active HSU

Here are the details:

The default password is **wireless-p2mp**. Optionally, you can change the link password as explained here.

➤ To change the link password:

1. Open the **Security** tab (Figure 4-8).

The Change Link Password dialog box opens.



Use the Hide characters check box for maximum security

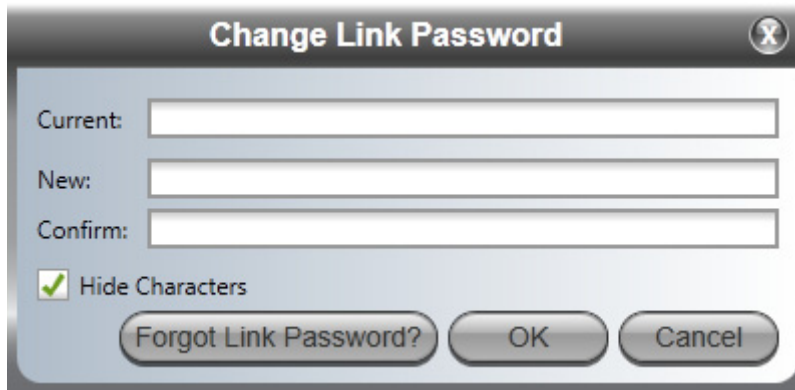


Figure 4-11: Change Link Password dialog box

2. Enter the current link password (The default link password for a new ODU is **wireless-p2mp**).

If you have forgotten the Link Password, click the Forgotten Link Password button. The following window is displayed:

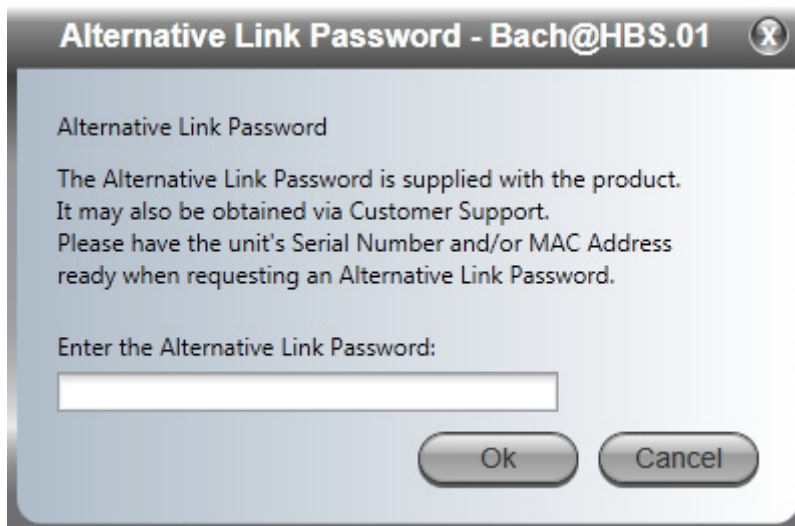


Figure 4-12: Lost or forgotten Link Password recovery

Follow the instructions to use the Alternative Link Password, and click **OK** to finish. You are returned to the window in [Figure 4-11](#) above. Continue with the next step.

3. Enter a new password.
4. Retype the new password in the Confirm field.
5. Click **OK**.
6. Click **Yes** when asked if you want to change the link password.
7. Click **OK** at the *Password changed* success message.



- A link password must contain at least eight but no more than 16 characters excluding SPACE, TAB, and any of ">#@|*?;."
- Restoring Factory Defaults returns the Link Password to **wireless-p2mp**.

Community Encryption

This option only appears when accessing the configuration window from the HBS, but is relevant for all units.

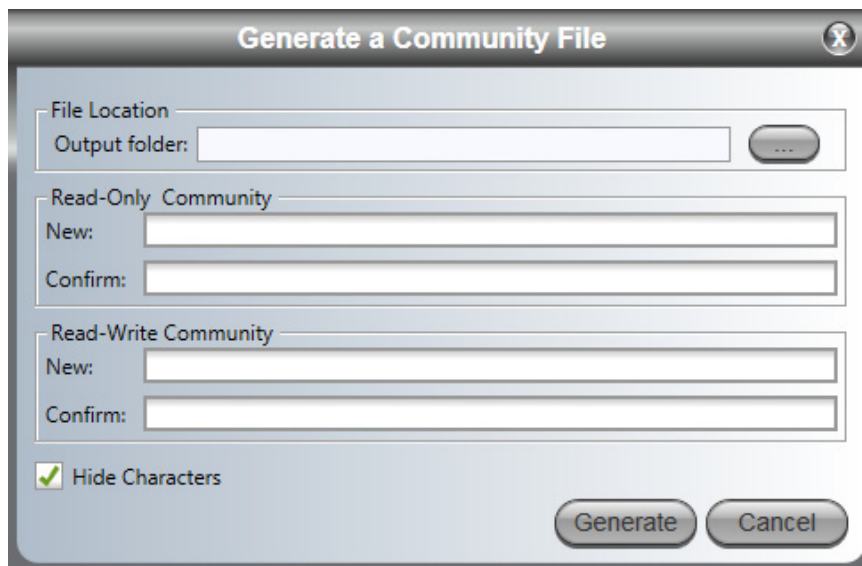
- For certain installations and work environments, alternative values of the SNMP community values could be desirable, as opposed to the default values.
- It is possible to set up such alternative values of SNMP communities for **all** equipment in a system, and for the RADWIN Manager to allow access to only those radios with these community values.

Do this as follows:

1. Record such alternative SNMP community string values in each radio using the process described above (“SNMP Communities” on page 4-32 through “Editing SNMPv3 Passwords” on page 4-33).
2. Set up a *community.dat* file that contains these values:
 - a. From the Security tab, click the **Create File** button next to **Community Encryption**:



- b. In the field that appears, enter the new Read-Only and Read-Write community values.



- c. In **File Location**, select a location to save the *community.dat* file. At this stage, this location can be anywhere, but when creating a new installation package for the RADWIN Manager using this file, it must be located in the *Files* folder of your RADWIN Manager installation to be operative. For example: **C:\Program Files (x86)\RADWIN\RADWIN Manager\Files**.
- d. Once you have entered all the values, click **Generate**. A *community.dat* file will be generated and placed in the location you chose.

3. When logging on to the RADWIN Manager, RADWIN Manager will check if there a *community.dat* file in the *Files* folder:
 - a. If such a file exists:
 - The community strings are decrypted from the file, and checked with those on the radio units. If they correspond, access to the radio units is allowed.
 - If the community strings do not correspond to those on a radio unit or units, then access to those units with different community strings is not allowed.
 - If the user changes the community string values on the radio using the process described above (“SNMP Communities” on page 4-32 through “Editing SNMPv3 Passwords” on page 4-33), RADWIN Manager will still take the community string values from the *community.dat* file, whose values do not now correspond to those on the unit, and access to the unit will be denied.
 - b. If such a file does not exist:
 - The community strings have their default value.
 - If the user changes the community string values on the radio using the process described above (“SNMP Communities” on page 4-32 through “Editing SNMPv3 Passwords” on page 4-33), RADWIN Manager will use these new values.
4. It is possible to create this *community.dat* file once, and include it in the standard install package of the RADWIN Manager.

802.1x Authentication

This is a port-based Network Access Control (PNAC) authentication mechanism based on the IEEE 802.1x standard. This mechanism involves three parties: a supplicant, an authenticator, and an authentication server.

In the RADWIN 5000 implementation, the supplicant is the customer premises equipment, (CPE) the authenticator is the SU **PRO/AIR** EMB or SU **PRO/AIR** INT & HBS¹, and the authentication server is a customer-supplied RADIUS server. This works as follows (see also [Figure 4-13, 802.1x Authentication & Accounting Scheme](#)):

1. The authenticator requests credentials from the supplicant (CPE). Usually a username and password.
2. The supplicant (CPE) supplies these credentials to the authenticator.
3. The authenticator forwards these credentials to the authentication RADIUS server.
4. The authentication RADIUS server provides a response to the authenticator - approved or not approved.
5. The authenticator then either enables the supplicant (CPE) to connect or disables it from connecting.

You must configure your authentication RADIUS server to recognize the credentials of the CPE.

1. This feature works with the SU **PRO/AIR** EMB or SU **PRO/AIR** INT as the subscriber unit only.

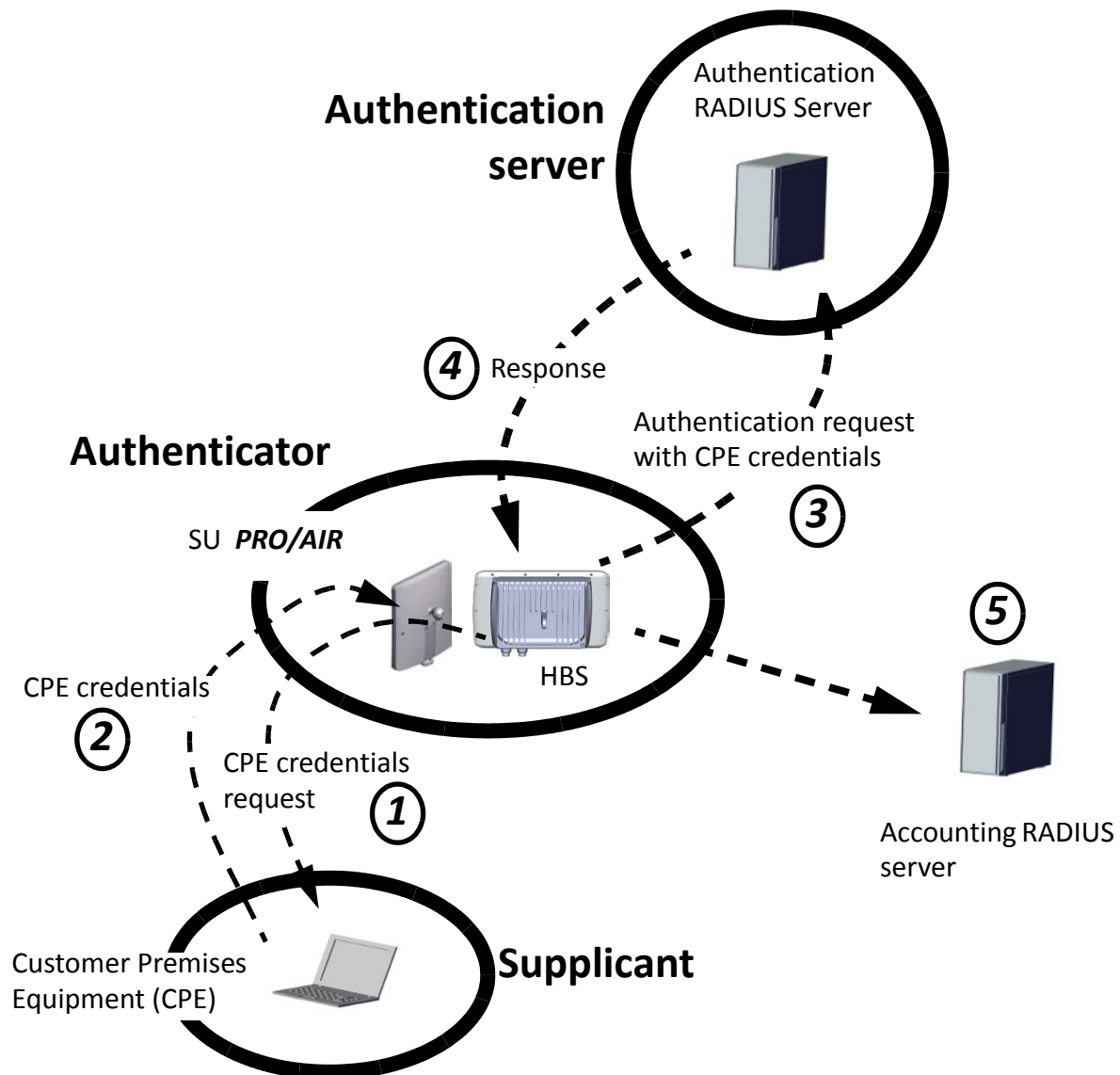


Figure 4-13: 802.1x Authentication & Accounting Scheme

Configure this feature as follows:

1. Click the **Security** tab.
2. Click the **802.1x** pull-down menu. The following screen will appear:

802.1x

☒ Enable 802.1x

Re-authentication: 30 Sec

☒ Enable 802.1x Accounting Mode

NAS Identifier Convention: Device Name

Authentication RADIUS Servers

IP Address	Port	Status
0.0.0.0	1812	Not tested
0.0.0.0	1812	Not tested

Accounting RADIUS Servers

IP Address	Port	Status
0.0.0.0	1813	Not tested
0.0.0.0	1813	Not tested

Figure 4-14: 802.1x Authentication settings

- Place a checkmark next to **Enable 802.1x** to enable this option. Enabling or disabling this option is traffic-affecting.
- Next to **Re-authentication**, choose how often the authentication process is done (in seconds). The more often you choose to undertake this process, the better the security, but requires more resources.



802.1x Authentication and protocol filtering cannot be configured simultaneously (see [Sector Protocol Filtering](#) on page 4-49 and see [Protocol Filtering](#) on page 4-71).

- Place a checkmark next to **Enable 802.1x Accounting Mode** to enable the system to forward to the accounting RADIUS server the identity of the supplicants who have supplied credentials. This can be the same RADIUS server. Choose the NAS Identifier Convention: that is, upon what basis this report is made: by the Device Name of the supplicant or the Device Location.



The NAS Identifier Convention chosen here will also change the NAS Identifier Convention for the RADIUS option (see [RADIUS](#) on page 4-53), even though the RADIUS server here and that used in the RADIUS option are not necessarily the same server.




RADIUS Servers

(relevant for both **Authentication** and **Accounting**)


The Authentication RADIUS Server is used for the authentication functions, and the Accounting RADIUS Server is used for the accounting function. Note the following:

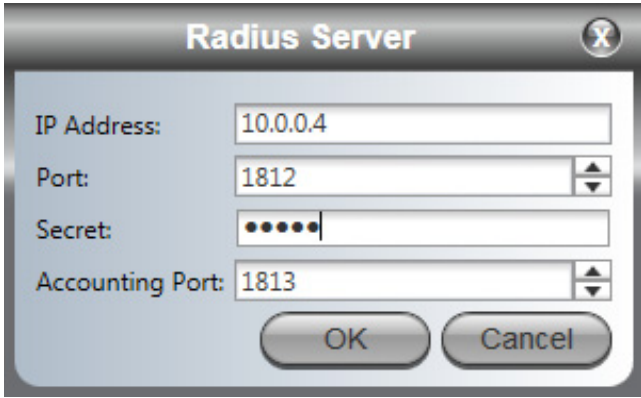
- You must define servers for both functions
- If you do not define servers for both functions, the results will be unpredictable
- The servers can be the same servers

This shows a list of the available RADIUS servers, their IP addresses, their connection Ports (this is usually 1812), their Statuses (Not Tested, Testing, or Connected), and three more buttons:

		
Edit Server Parameters	Clear Server Configuration	Check Server Connectivity

These buttons are described below:

Edit Server Parameters  . Click this button to open the RADIUS server parameters dialog box:



The dialog box titled "Radius Server" contains the following fields and buttons:

- IP Address:** Text field with value "10.0.0.4"
- Port:** Spin box with value "1812"
- Secret:** Password field with five dots
- Accounting Port:** Spin box with value "1813"
- Buttons:** "OK" and "Cancel"


IP Address: Enter the IP Address of the RADIUS server here. This RADIUS server need not be the same RADIUS server as used for authorization (see [RADIUS](#) on page 4-53).


Port: Enter the communication port to which the HBS connects (usually 1812).

Although you can use the same IP for the different functions of the RADIUS server, you must still use a different port for each function.

Secret: The secret of the RADIUS server.

Accounting Port: Enter the communication port to which the HBS reports on supplicants who have supplied credentials (usually 1813). This is relevant only if **Enable 802.1x Accounting Mode** is checked.

Clear Server Configuration  . Click this button to remove the specific RADIUS server from the list.

Check Server Connectivity  . Click this button to test the connectivity of the specific RADIUS server. Before it is tested, its status will be **Not Tested**, upon pressing, its status will change to **Testing**, and if the connection is successful, will further change to **Connected**. If the connection is not successful, the status can be either **Timeout** or **Bad Secret**, depending on the situation.



Any time you close the **Security** tab, you must click the Check Server Connectivity button again to re-establish connectivity.

Security Mode

The RADWIN 5000 offers an enhanced version of its usual secured method of working, which offers extra protection against unauthorized access of the system.

It is performed on a unit-by-unit basis, and is independent of sector structure or hierarchy¹.

Implement this mode as follows:

1. Change the SNMP management interface to SNMPv3:

Use the [Management](#) tab, [Protocol](#) pull-down menu (see page [4-23](#))

- a. Choose the SNMPv3 radio button. Choose SNMPv3 only, not “V1 and V3”
- b. Disable Telnet and the Web Interface
- c. You can use either the MD5 or SHA1 authentication mode
- d. Click **Apply**. You will be asked to log in again ([Chapter 2, The RADWIN Manager Log-on Concept](#)). Make sure you have the proper SNMPv3 user name and password.

2. Click the **Security** tab

3. Click the **Security Mode** pull-down menu. The screen will appear as follows:

1. If configuring one unit for SNMPv3 and Enhanced Security, its counterpart must also be configured for SNMPv3, but need not be configured with Enhanced Security.

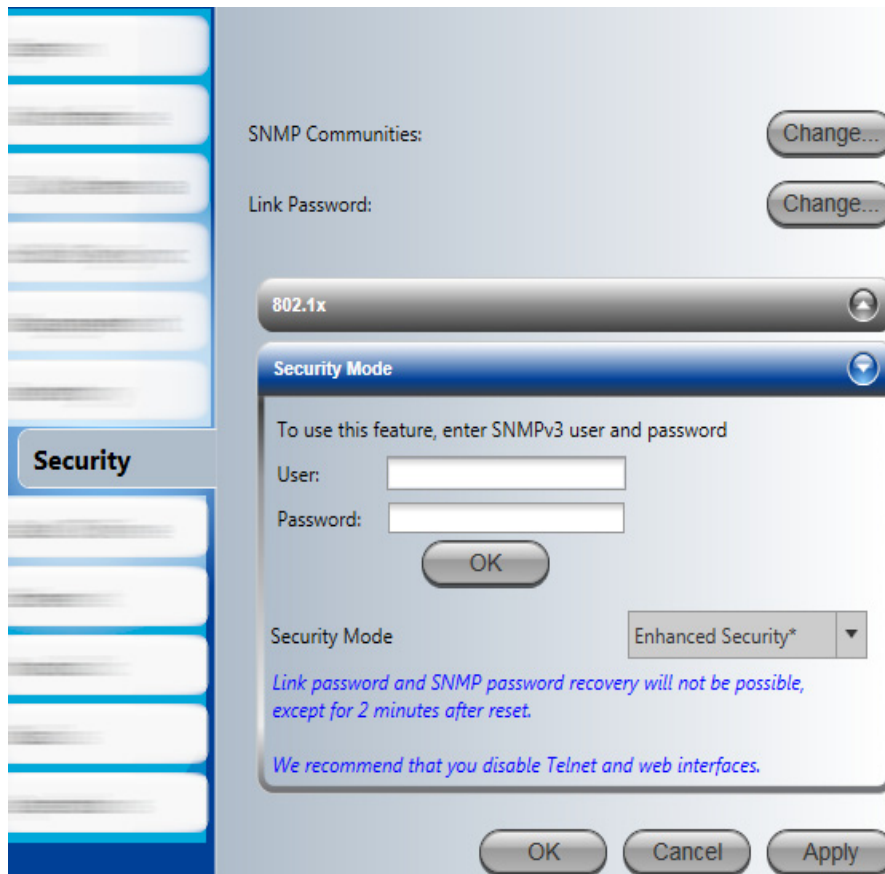


Figure 4-15: Security Mode settings

4. Enter the SNMPv3 user name and password.
5. Click **OK**. The screen will appear as follows:

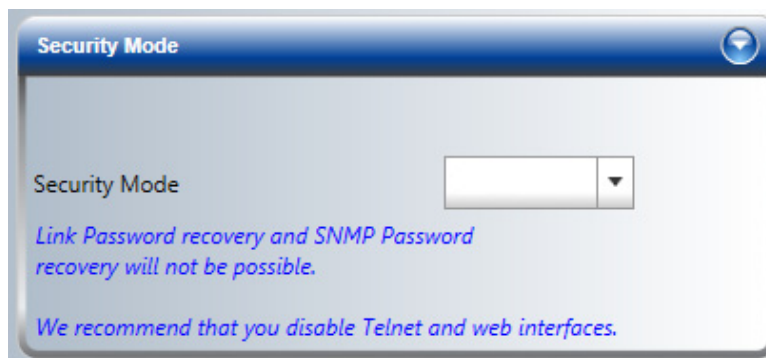


Figure 4-16: Choosing the Security Mode

6. From the Security Mode pull-down menu, select the security mode. There are three options:

Secured:	RADWIN 5000 secured operation
-----------------	-------------------------------

	Immediately implement the enhanced security option.
Enhanced Security*:	When and if the unit is reset, there is a 2-minute grace period where the enhanced security option is temporarily removed. After this time, the enhanced security option is re-established automatically.
Enhanced Security:	Immediately implement the enhanced security option.

7. Click **OK** or **Apply**.

Note the following when using the enhanced security mode:

- The SNMP management interface must be SNMPv3:
Use the [Management](#) tab, [Protocol](#) pull-down menu (see page [4-23](#))
- If configuring an HSU for SNMPv3, its HBS must also be configured for SNMPv3.
- The Local Connection feature is disabled (as it is based on SNMPv1)
- Alternative Community/Password is disabled
- Link Password is disabled
- VLAN recovery is disabled

4.2.9 Date & Time

Setting the Date and Time

The ODU maintains a date and time. The date and time should be synchronized with any Network Time Protocol (NTP) version 3 compatible server.

During power-up the ODU attempts to configure the initial date and time using an NTP Server. If the server IP address is not configured or is not reachable, a default time is set.

When configuring the NTP Server IP address, you should also configure the offset from the Universal Coordinated Time (UTC). If there is no server available, you can either set the date and time, or you can set it to use the date and time from the managing computer. Note that manual setting is not recommended since it will be overridden by a reset, power up, or synchronization with an NTP Server.



The NTP uses UDP port 123. If a fire wall is configured between the ODU and the NTP Server this port must be opened.
It can take up to 8 minutes for the NTP to synchronize the ODU date and time.

To set the date and time:

1. Determine the IP address of the NTP server to be used.
2. Test it for connectivity using the command (Windows XP and 7), for example:
`w32tm /stripchart /computer:216.218.192.202`

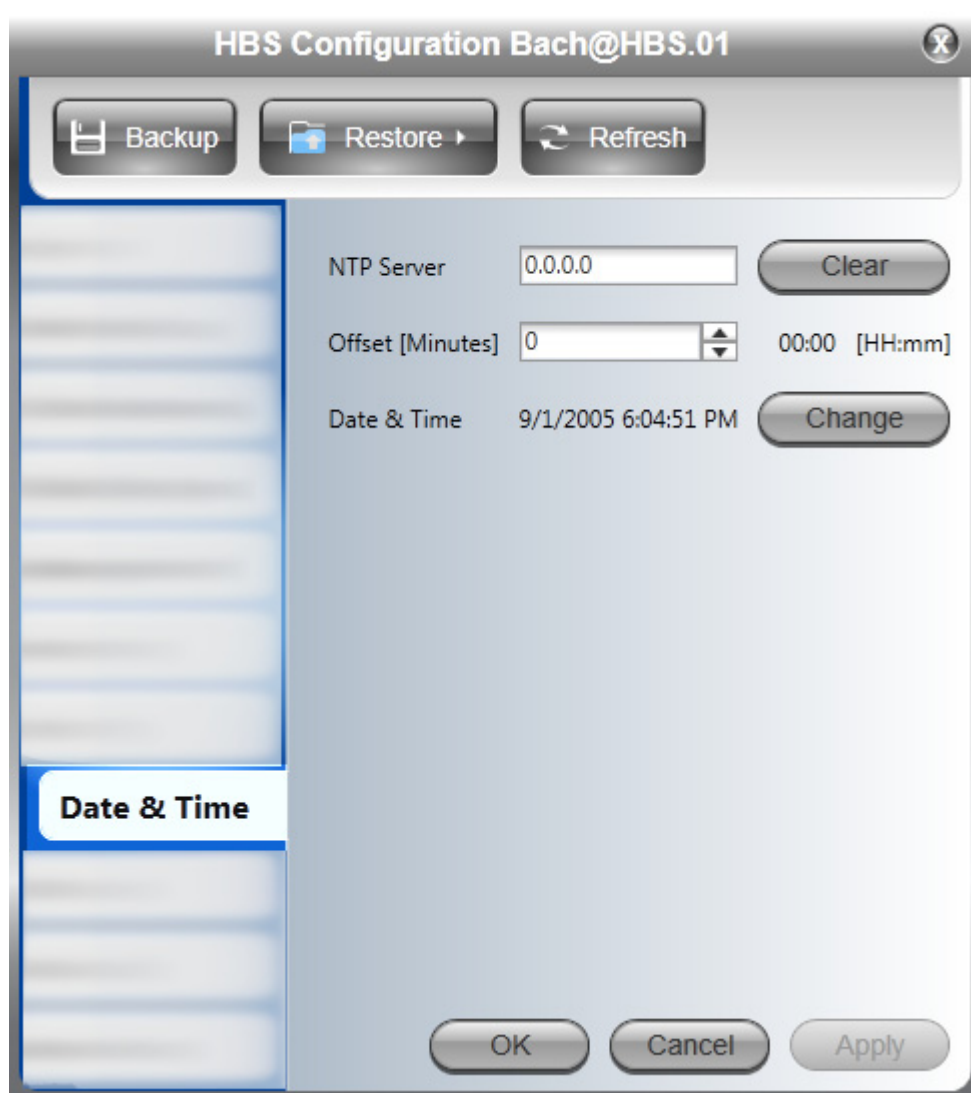


Figure 4-17: Date and Time Configuration

3. If entering an IP address for the NTP Server, click **Clear**, and then enter the new address.
4. Set your site Offset value in minutes ahead or behind GMT¹.
5. To manually set the date and time, click Change and edit the new values.

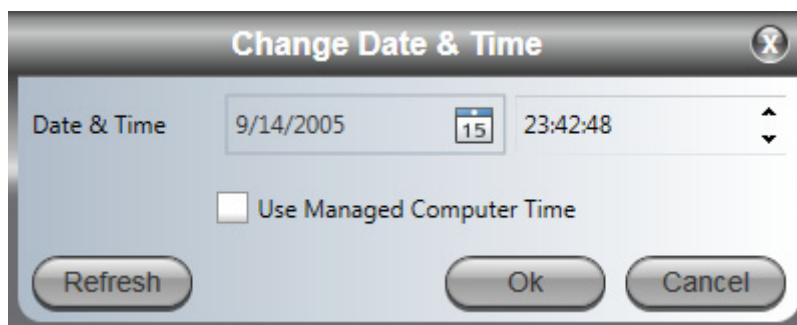


Figure 4-18: Change Date and Time

1. Greenwich Mean Time

- Click **OK** to return to the Configuration dialog.

4.2.10 Ethernet

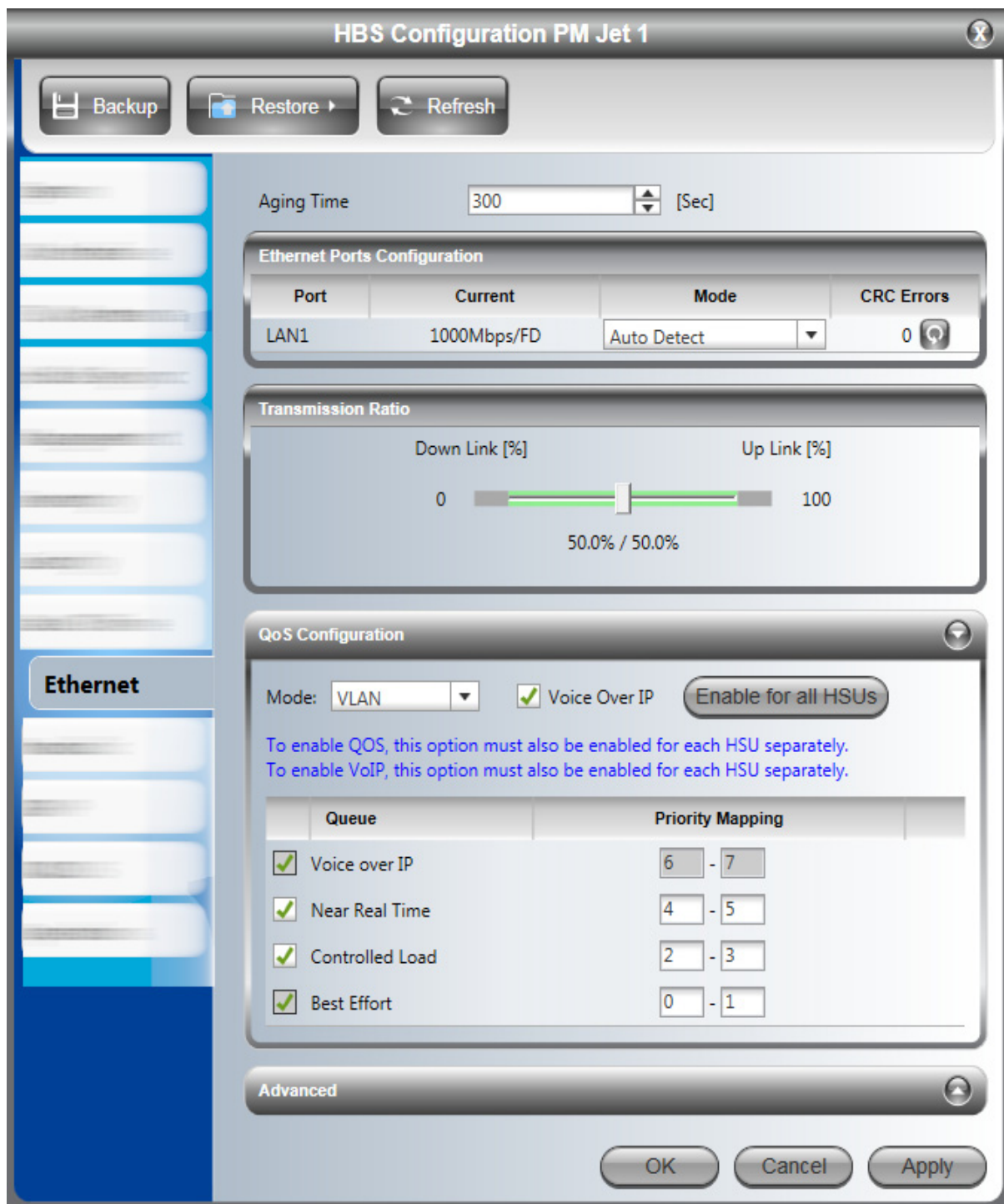


Figure 4-19: Setting Ethernet services

Aging Time

The HBS works in **Bridge Mode**. In Bridge mode, it performs both learning and aging, forwarding only relevant packets over the sector. The aging time of the HBS is by default, 300 seconds.

Ethernet Ports Configuration

- The ODU (or LAN1) Ethernet port mode is configurable for line speed (10/100/1000BaseT) and duplex mode (half or full duplex).
- Line speed 1000BaseT is only available if the HBS is connected to a GbE PoE device.
- An Auto Detect feature is provided, whereby the line speed and duplex mode are detected automatically using auto-negotiation. Use manual configuration when attached external equipment does not support auto-negotiation. The default setting is Auto Detect.
- The icon next to the CRC error count may be clicked to reset the counter to zero.

Transmission Ratio

The **Transmission Ratio** (Tx Ratio, Asymmetric Allocation) shows the allocation of throughput between downlink and uplink traffic at the HBS. The Transmission Ratio is not only sector-wide: If you use Hub Site Synchronization to collocate several HBSs (to cover adjacent sectors), they must all use the same Transmission Ratio.

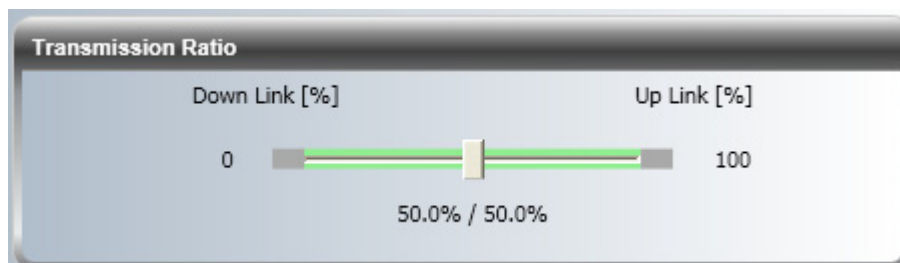


Figure 4-20: HBS Collocated client or independent unit

If it is an HSS master, you will see something like this:

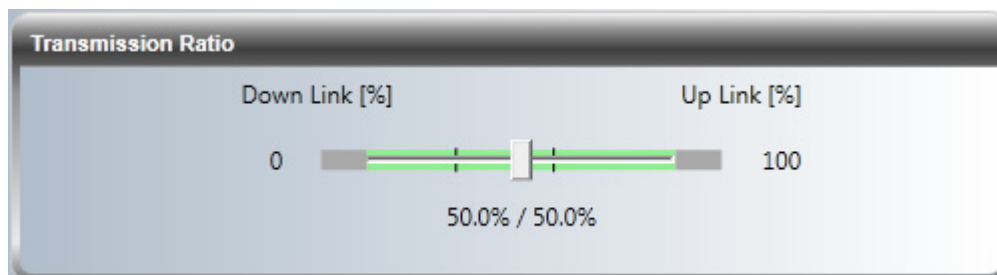
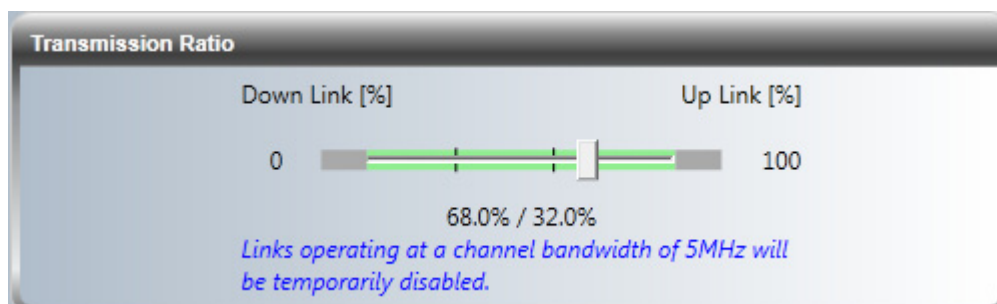


Figure 4-21: HBS Collocated master

Moving the slider to the right yields the following:





The allowable range is from 50/50 % to 75/25 %. Setting values beyond this range will cause unpredictable results. You must ensure that the range remains within allowable values. There is no fail-safe.

The effective available range for Asymmetric allocation is determined by channel bandwidth as shown as well as link distance. In this context, “link” is any collocated RADWIN HBS, not necessarily a RADWIN 5000 HBS.

QoS Configuration

To use the Ethernet QoS feature, see [Chapter 10](#) (includes VoIP configuration).

Advanced

Broadcast and Multicast Flooding Protection: Broadcast and Multicast Flooding Protection provides a measure of protection by limiting multicast and/or broadcast packets. Broadcast and Multicast Flooding Protection can be configured separately. This feature works in the downlink direction only.

You may wish to un-check either or both of these items if your application is based on multicast and/or broadcast packets - for example, video surveillance using multicast downlink.

Sector Multicast MIR [Kbps]: This is the same as Multicast Flooding Protection, but the units in this case are kilo-bits per second and not percent. This feature works in the downlink direction only.

DHCP Relay Agent (Option 82): Allows a Dynamic Host Configuration Protocol (DHCP) relay agent (in this case the HBS) to insert specific information to a DHCP request it received from a client, and forward the information together with the request to a DHCP server.

This capability allows the residential operator (which has the DHCP server) to distinguish which DHCP IP request came from which HSU. With that information, the residential operator can set rules regarding IP address and resource allocation. For example, if there are too many IP requests coming from one HSU, it is possible to limit the IP addresses allocated to that equipment.

In the framework of the RADWIN 5000, this works as follows:

- The HSU receives DHCP requests from equipment connected to it.
- The HSU forwards these requests to the HBS.
- The HBS appends the parameters that were configured (either Serial Number, MAC address or Name of the HSU and that of the HBS¹) to the message, and forwards the request message with the appended data to the DHCP server. This is therefore a DHCP client request.

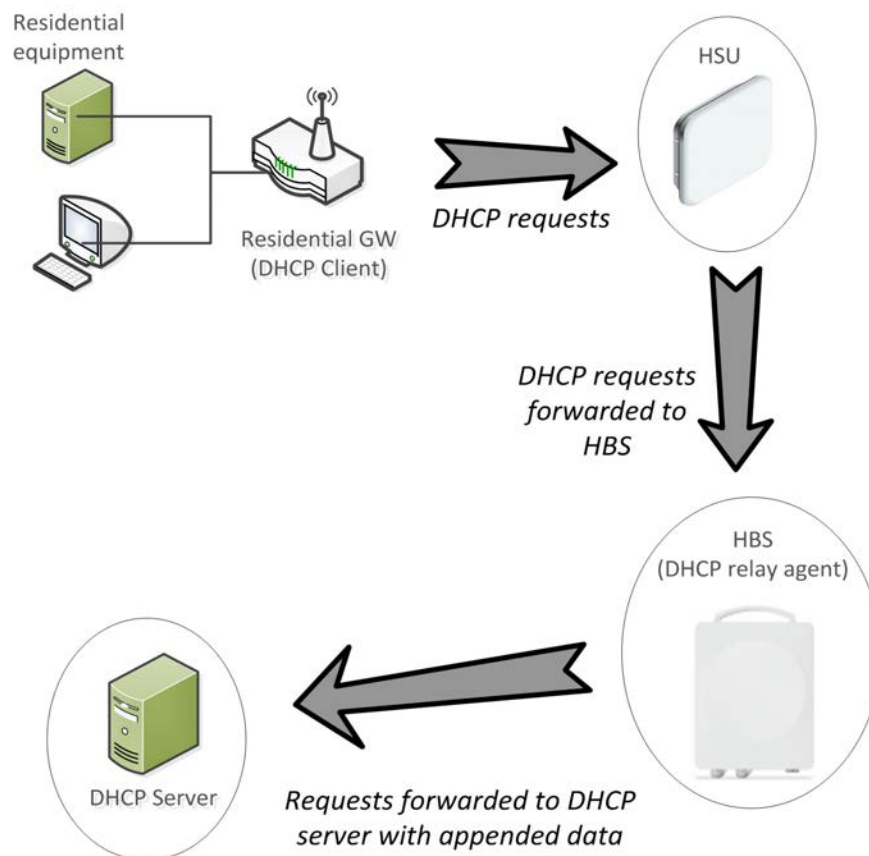


Figure 4-22: DHCP Relay Agent (Option 82): Method of operation

➤ To configure the DHCP Relay Agent feature:

- Place a checkmark next to **DHCP Relay Agent (Option 82)** to enable this feature.
- From the pull-down menu labeled **Circuit-ID source**, choose which parameter of the HBS will be sent to the DHCP server - its MAC address, Serial Number, or Name (see [System](#) on page 4-2 to learn how to change the name of the HBS).

1. The RADWIN JET DUO is limited to appending the MAC address only

- From the pull-down menu labeled **Remote-ID source**, choose which parameter of the HSU will be sent to the DHCP server - its MAC address, Serial Number, or Name (see [System](#) on page 4-67 to learn how to change the name of the HSU).

To simplify the message, it is possible to add the Remote-ID source data directly onto the end of the Circuit-ID data, that is, to concatenate it onto the Circuit-ID field. If you wish to do this, place a checkmark in the **Concatenate into Circuit-ID** field box.

- Make sure to configure your DHCP Server to accept these values of the parameters.

To apply any of the changes you have made in the Ethernet tab, click **Apply**, then **OK**, or just **OK**.



It is also possible to filter *all* DHCP client responses from the HSU side, per HSU. This is possible only using the SU **PRO/AIR** EMB or SU **PRO/AIR** INT (see [Protocol Filtering](#) on page 4-71), and if done, the DHCP Relay Agent (Option 82) cannot be implemented.

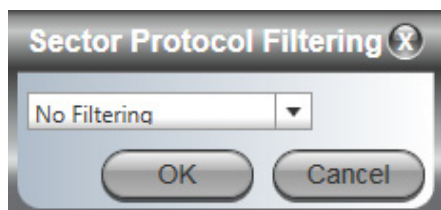


It is also possible to filter *all* DHCP Server responses throughout the sector. This is possible only using the JET HBS. If done, the DHCP Relay Agent (Option 82) cannot be implemented.

Sector Protocol Filtering

This option (relevant for the JET HBS, SU **PRO/AIR** EMB, and SU **PRO/AIR** INT only) allows you to prevent non-PPPoE or DHCP traffic that is being sent from customer equipment to the HSUs from being forwarded to the HBS.

Click on the **Change ...** button next to Sector Protocol Filtering, then select the desired option from the **Sector Protocol Filtering** pull-down menu:



There are 5 options:

- No Filtering:** Do not block any non-PPPoE (Point-to-Point over Ethernet) or DHCP traffic that comes from customer equipment connected to the subscriber unit.
- PPPoE:** PPPoE only - prevents non-PPPoE packets coming from customer equipment connected to the subscriber unit from being forwarded to the HBS.

The “No Filtering” or “PPPoE” option must be chosen if you are planning to use the DHCP Relay Agent (Option 82) (see [Advanced](#) on page 4-47).

DHCP Server: Prevent DHCP Server responses from customer equipment from being forwarded to the HBS. DHCP Client responses can be forwarded.

DHCP Client¹: Prevent DHCP Client requests from customer equipment from being forwarded to the HBS. DHCP Server responses can be forwarded.

DHCP Client & Server:

Prevent DHCP Client and DHCP Server requests from customer equipment from being forwarded to the HBS.

Once you have chosen your option, click **OK**.



Sector Protocol Filtering and 802.1x Authentication cannot be configured simultaneously (see [802.1x Authentication](#) on page 4-37).

1. If the DHCP Relay Agent (Option 82) is checked, DHCP Client and DHCP Client & Server options will not appear

4.2.11 Nomadic

See [page 3-27](#) for a full explanation of the Nomadic options.

The screenshot shows the 'HBS Configuration Lab Sector' window. At the top, there are three buttons: 'Backup', 'Restore', and 'Refresh'. On the left side, there is a sidebar with a 'Nomadic' tab selected. The main area contains two panels. The top panel, titled 'Add Devices', has a 'Type' dropdown set to 'Nomadic'. Below it is a table with four rows (A, B, C, D) and five columns: 'Level', 'Resources DL [%]', 'Resources UL [%]', 'Number', and 'Add'. Each row has input fields and up/down arrows for the resource percentages and the number of devices. Below the table, it shows 'Remaining Resources: Downlink 99.0 [%]' and 'Uplink 99.0 [%]'. A 'Register' button is at the bottom right of this panel. The bottom panel, titled 'Save / Upload Settings', contains a text box explaining that configurations can be saved to a file for reuse. It has 'Upload' and 'Save' buttons. At the very bottom of the window are 'OK', 'Cancel', and 'Apply' buttons.

Level	Resources DL [%]	Resources UL [%]	Number	Add
A	1.0	1.0	0	0
B	1.0	1.0	0	0
C	1.0	1.0	0	0
D	1.0	1.0	0	0

Remaining Resources: Downlink 99.0 [%]
Uplink 99.0 [%]

The sector device configurations can be saved to a file, which may be reused to configure additional sectors.

4.2.12 IGMP

The IGMP (Internet Group Management Protocol) snooping option allows conversion of multicast IPTV traffic that arrives at the HBS to be unicast towards an HSU, according to the IGMP request from customer premises equipment connected to the given HSU.

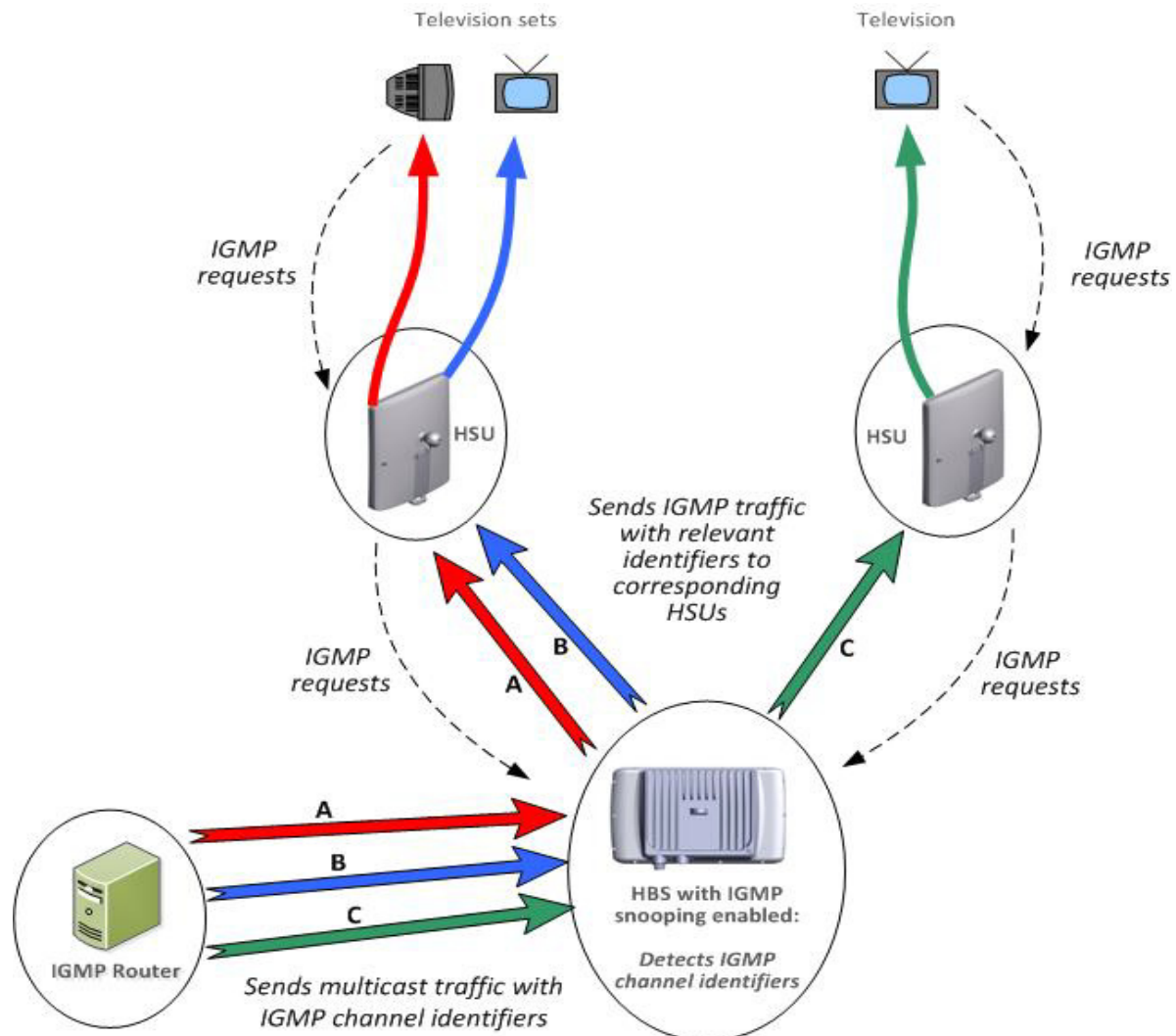


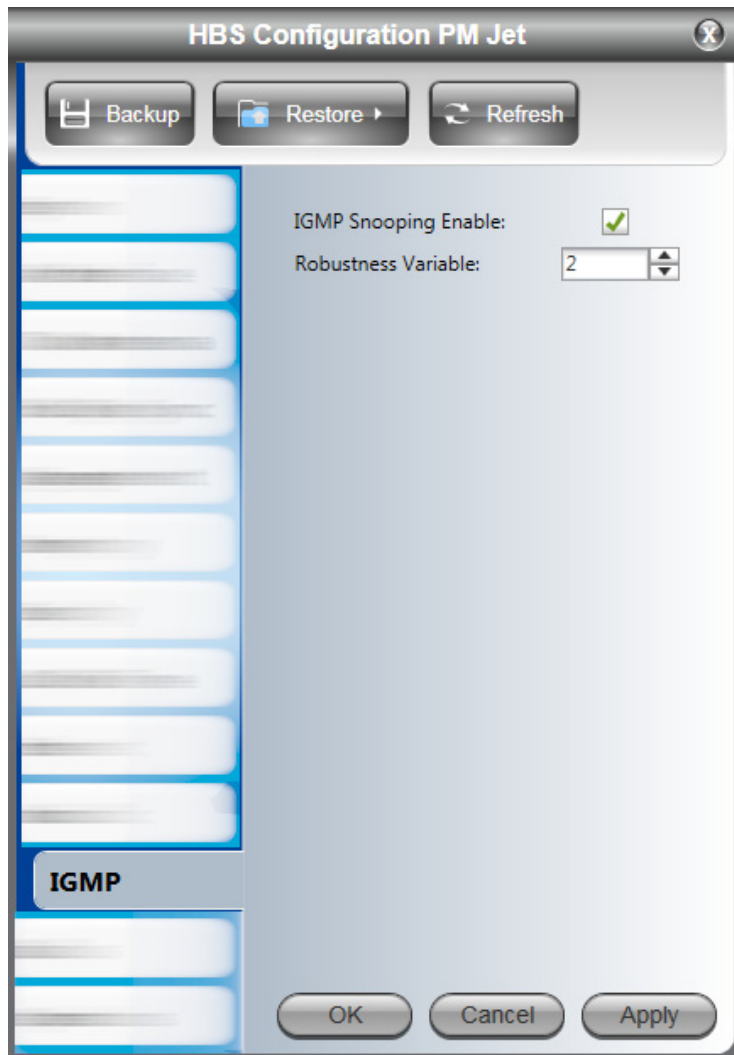
Figure 4-23: IGMP operation with the RADWIN 5000

- Customer's television (or setup box) sends IGMP requests.
- The HSU forwards this request in the uplink direction.
- The HBS detects ("snoops") the IGMP tag, and sends the corresponding multicast traffic in the downlink direction to those HSUs whose customer equipment sent an IGMP request with the same multicast group. Messages from other multicast groups are blocked.

Configure IGMP snooping for the sector from the IGMP tab: click **IGMP Snooping Enable** to enable this option.

Set the **Robustness Variable**. This determines how many non-responses the HBS must "receive" (actually "not receive") from a CPE in response to an IGMP query before removing it

from the IGMP multicast group. The higher this value is, the more reliable the IGMP operation.



4.2.13 RADIUS

This option enables the HBS to validate and authorize HSU service based on information in a RADIUS server. You can also set a separate RADIUS server for accounting. You define service categories based on parameters set in the RADWIN Manager.

Operation

This option works as follows:

- » HSU definition and assignment information is saved in the authorization RADIUS server.
- » Service categories are defined using the RADWIN Manager and are stored in the HBS.
- » The HBS queries the authorization RADIUS server periodically for HSU definition and assignment information.
- » The HBS then applies this information to each HSU in turn.
- » The results are sent to the accounting RADIUS server.

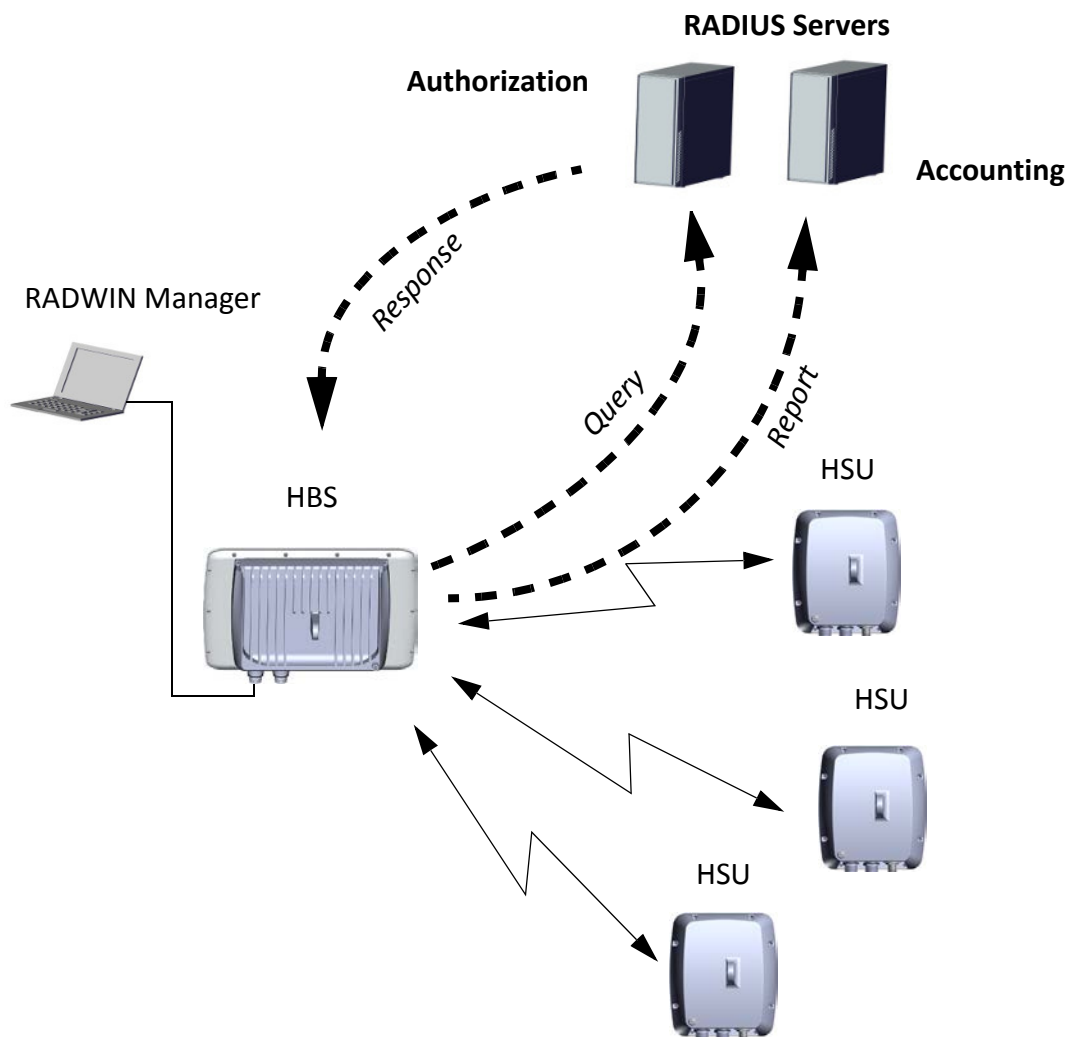


Figure 4-24: Service Validation and Authorization via a RADIUS Server

To change HSU definitions and assignments, update the information in the authorization RADIUS server. You do not need to access the HBS or the RADWIN Manager at all to make this change, as the HBS automatically queries the authorization RADIUS server periodically for status updates.

Customer Preparations

1. You must supply servers that operates the RADIUS protocol. Both authorization and accounting RADIUS servers can be the same device.



This RADIUS server need not be the same RADIUS server as used for 802.1x authentication (see [802.1x Authentication](#) on page 4-37).

2. Prepare the following parameters for both RADIUS servers:

- A username and password for the HBS.

- The IP address of the RADIUS server.
 - The port of the RADIUS server to which the HBS must connect.
 - The Secret of the RADIUS server.
3. Prepare the following configuration information for each HSU in your sector. This information will be saved in the authorization RADIUS server:
- Serial number (acquired from your vendor, see [Inventory](#) on page 4-69)
 - Name
 - Location
 - VLAN identifier (if relevant)
 - Register Availability (whether or not to register this specific HSU)
 - Desired service category
4. Prepare the service category definitions that you will set using the RADWIN Manager (see [RADIUS](#) on page 4-53), for use in the authorization RADIUS server. Up to 8 categories can be defined; each category sets the following parameters:
- Uplink Resources
 - Downlink Resources
 - Resource Type (CIR or Best Effort)
 - Maximum Information Rate (MIR) Up (sector-wide)
 - Maximum Information Rate (MIR) Down (sector-wide)
 - Protocol filtering
Select the protocol filtering desired, if any (see [Protocol Filtering](#) on page 4-71). However, be careful to make sure there are no contradictions in the definitions of the protocol filtering versus the definitions of DHCP 82 enablement (see [Advanced](#) on page 4-47). Protocol filtering cannot be implemented at all with 802.1x authentication (see [802.1x Authentication](#) on page 4-37)
 - QoS Configuration queues (for uplink and again for downlink):
 - Real Time (and its Strict Weight percentage, MIR and TTL (Time-to-Live)
 - Near Real-Time
 - Controlled Load
 - Best Effort
 - VoIP queue, if applicable

(For more details on the QoS and VoIP parameters, see [Quality of Service](#) on page 10-1)

Prepare Files for the RADIUS Servers

Prepare two files for the authorization RADIUS server: Data Dictionary supplement, and Users definitions. The accounting RADIUS server only needs the Data Dictionary supplement.

» Data Dictionary supplement:

This is a supplement to the standard RADIUS Data Dictionary. This file defines the attributes that are used by the RADIUS server as configuration parameters for the HSUs. Add

this text to the end of the standard RADIUS Data Dictionary. An example supplement looks as follows:

```
#vendor id
VENDOR      RADWIN      4458

BEGIN-VENDORRADWIN
#Service category to translate between the number and its name
ATTRIBUTE   RADWIN_ServiceCategory1integer
VALUE       RADWIN_ServiceCategory Residential1 1
VALUE       RADWIN_ServiceCategory Residential2 2
VALUE       RADWIN_ServiceCategory Residential3 3
VALUE       RADWIN_ServiceCategory Residential4 4
VALUE       RADWIN_ServiceCategory Business1 5
VALUE       RADWIN_ServiceCategory Business2 6
VALUE       RADWIN_ServiceCategory Business3 7
VALUE       RADWIN_ServiceCategory Business4 8

#for HSU's serial number
ATTRIBUTE   RADWIN_SerialNumber2string

#HSU name return from Radius server
ATTRIBUTE   RADWIN_Name3      string

#HSU location return from Radius server
ATTRIBUTE   RADWIN_Location4string

#HSU vlan id return from Radius server
ATTRIBUTE   RADWIN_Vlan5      integer

#is the HSU enable or disabled , if enable register or update id necessary otherwise
deregister if necessary
ATTRIBUTE   RADWIN_RegisterAvailability6integer

VALUE       RADWIN_RegisterAvailabilityDisable0
VALUE       RADWIN_RegisterAvailabilityEnable1

END-VENDOR RADWIN
```

The above example shows that the first attribute is the Service Category. Following that definition is a list of the Service Categories. In this case, ServiceCategory 1 is called “Residential1”, ServiceCategory 2 is called “Residential2”, etc. These terms must be used precisely as shown here when you set the service categories in the RADWIN Manager.

The second attribute is the SerialNumber, the third is the Name (of the unit), then Location, then the Vlan tag, and whether or not the HBS should register the HSU.

» Users definitions (for authorization RADIUS server only)

The Users file (users.conf) defines the list of HSUs for this sector. Each HSU serial number is listed, and together with this serial number, the configuration information prepared in Step 3. above. Save this file in the same location as the Data Dictionary file.

An example of a Users file appears as follows.



Although the Users file has the definitions of the HSUs, it does not determine which HSU belongs to which HBS. The HBS tried to connect with any available HSUs.

```
#### SETUP 10.112.5.200 - Jig4x ####
```

```
radiusCleartext-Password := "radius", RADWIN_SerialNumber == "VERIFI2X5KLXY444"  
    RADWIN_ServiceCategory = 1,  
    RADWIN_Name = "Name4.4",  
    RADWIN_Location = "Loc4.4",  
    RADWIN_Vlan = 44,  
    RADWIN_RegisterAvailability = 1
```

```
radiusCleartext-Password := "radius", RADWIN_SerialNumber == "VERIF2X5KLXY2221"  
    RADWIN_ServiceCategory = 2,  
    RADWIN_Name = "Name4.3",  
    RADWIN_Location = "Loc4.3",  
    RADWIN_Vlan = 33,  
    RADWIN_RegisterAvailability = 1
```

This above example shows that the HBS called “Jig4x” has an IP address of 10.112.5.200, and has two HSUs connected:

The first HSU has a serial number of VERIFI2X5KLXY444. This is a unique number that is supplied by your vendor for this specific HSU (see [Inventory](#) on page 4-30). This unit has a ServiceCategory of “1”, which translates into “Residential1” according to the Data Dictionary above. Its name is “Name4.4”, and Location is “Loc4.4” and will appear as such in the RADWIN Manager (see [System](#) on page 4-2). It has a VLAN, and is defined as 44 (see [Management](#) on page 4-11). This also instructs the HBS to register this HSU.

The second HSU has a serial number of VERIF2X5KLXY2221, a ServiceCategory of “2”, which translates into “Residential2”, its name is “Name4.3”, and Location is “Loc4.3”, it has a VLAN (defined as 33). Here, too, the HBS is instructed to register this HSU.



If you add HSUs to the sector, make sure you update the Users file on the RADIUS server, otherwise the HBS will not register them, and you will see an error message.

Configuring the RADIUS Option

From the Configuration dialog box, click the RADIUS tab.

HBS Configuration PM Jet 1

Backup Restore Refresh

☒ Enable Authorization Mode

Radius Servers Configuration

User Name: radius

Password: *****

☒ Install Confirmation Required

☒ Enable HSU Accounting Mode

NAS Identifier Convention: Device Name

Authorization RADIUS Servers

IP Address	Port	Status
0.0.0.0	1812	Not tested
0.0.0.0	1812	Not tested

Accounting RADIUS Servers

IP Address	Port	Status
0.0.0.0	1813	Not tested
0.0.0.0	1813	Not tested

Server connectivity test required.

Service Categories

OK Cancel Apply

Enable Authorization Mode: Enable working with a RADIUS server.

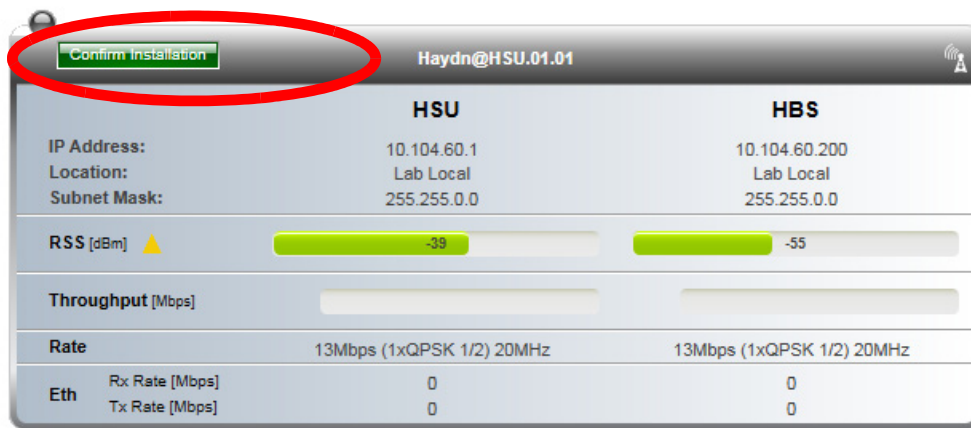
RADIUS Servers Configuration: Enter the User Name and Password that the RADIUS servers use to identify and verify that the HBS is allowed to work with it.

Install Confirmation Required: If this is enabled, then when the HBS tries to register the HSUs in its sector, each HSU must permit the HBS to do so. If this is not enabled, the HBS can register the HSUs in its sector without further action.

This option is useful, if for instance a technician is installing an HSU, and it is not quite ready to be activated.

To confirm installation from the HSU side, there are two options:

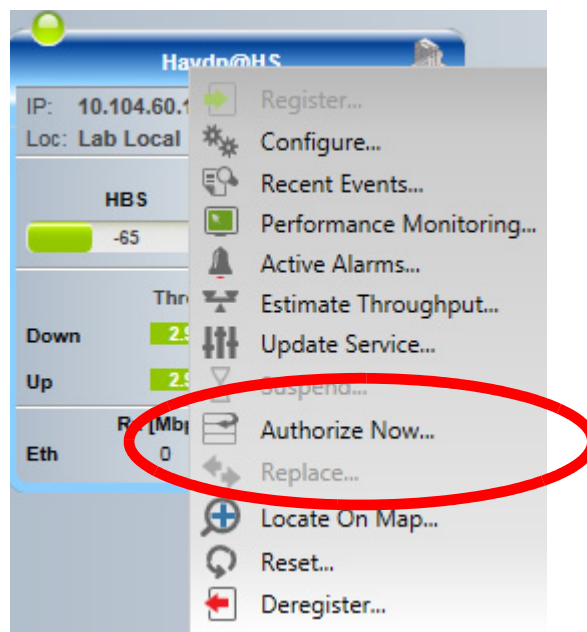
- **OPTION 1:** Log on to the specific HSU. Once an attempt at registration is made, you will see a **Confirm Installation** button on the HSU card:



Click the **Confirm Installation** button.

OR

- **OPTION 2:** Right-click the HSU card, select **Authorize Now**.



Enable HSU Accounting Mode: If this is enabled, then each time the HBS authorizes an HSU in its sector, it reports this fact to the accounting RADIUS server. Choose the NAS Identifier Convention: that is, upon what basis this report is made: by the Device Name of the HSU or the Device Location.



Note

The NAS Identifier Convention chosen here will also change the NAS Identifier Convention for the 802.1x Authentication option (see [802.1x Authentication](#) on page 4-37), even though the RADIUS server here and that used in the 802.1x Authentication option are not necessarily the same server.




RADIUS Servers

(relevant for both **Authorization** and **Accounting**)


The Authorization RADIUS Server is used for the authorization functions, and the Accounting RADIUS Server is used for the accounting function. Note the following:

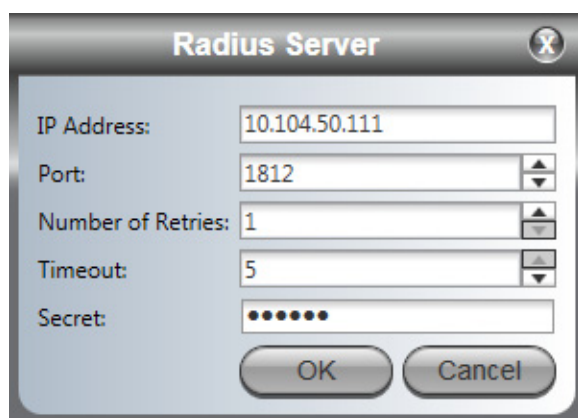
- You must define servers for both functions
- If you do not define servers for both functions, the results will be unpredictable
- The servers can be the same servers

This shows a list of the available RADIUS servers, their IP addresses, their connection Ports (this is usually 1812), their Statuses (Not Tested, Testing, or Connected), and three more buttons:

		
Edit Server Parameters	Clear Server Configuration	Check Server Connectivity

These buttons are described below:

Edit Server Parameters  . Click this button to open the RADIUS server parameters dialog box:



The dialog box titled "Radius Server" contains the following fields and controls:

- IP Address:** Text field with value "10.104.50.111"
- Port:** Spin box with value "1812"
- Number of Retries:** Spin box with value "1"
- Timeout:** Spin box with value "5"
- Secret:** Password field with 6 dots
- Buttons:** "OK" and "Cancel" buttons at the bottom.

IP Address: Enter the IP Address of the RADIUS server here

Port: Enter the communication port to which the HBS connects (usually 1812)


Although you can use the same IP for the different functions of the RADIUS server, you must still use a different port for each function.


Number of Retries: If the first attempt at establishing a connection with the RADIUS server was unsuccessful, carry out this number of retries before moving on to the next available RADIUS server.

Timeout: If there is no response from the RADIUS server after this many seconds, disconnect. A message will appear indicating this situation.

Secret: Secret of the RADIUS server.

Accounting Port: Enter the communication port to which the HBS reports on HSUs which it has authorized (usually 1813). This is only relevant if **Enable HSU Accounting Mode** was checked.

Clear Server Configuration  . Click this button to remove the specific RADIUS server from the list.

Check Server Connectivity  . Click this button to test the connectivity of the specific RADIUS server. Its status will change to Testing, and if the connection is successful, will further change to Connected.



Any time you close the RADIUS tab, you will need to click the Check Server Connectivity button again to re-establish connectivity.

Service Categories

Click this button to open the dialog box where you define the Service Categories.

Category Name	Uplink Resources	Downlink Resources	Resource Type	MIR Up [Mbps]	MIR Down [Mbps]	Filtering
Residential1	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Residential2	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Residential3	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Residential4	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Business1	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Business2	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Business3	1.0	1.0	Best Effort	0.0	0.0	No Filtering
Business4	1.0	1.0	Best Effort	0.0	0.0	No Filtering

Radius authorization is disabled
Radius's client DHCP filtering conflict with DHCP 82 option configuration.

OK Cancel

Figure 4-25: Service Categories

Category Name: The names of the categories here must be the exact same name as those in the Data Dictionary supplement (see [Data Dictionary supplement](#): on page 4-55).

Define the other parameters according to the values prepared in Step 4. on [page 4-55](#), and click **OK**.

The QoS parameters (prepared in Step 4. on [page 4-55](#)) are accessed by clicking this button:



from the Service Categories dialog box. The following screen appears:

QoS - Residential1

☒ Voice Over IP

QoS Uplink Configuration

Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/> Real Time	<input checked="" type="checkbox"/> 0	0.5	300
<input checked="" type="checkbox"/> Near Real Time	<input type="checkbox"/> 15	0.5	500
<input checked="" type="checkbox"/> Controlled Load	<input type="checkbox"/> 25	0.5	500
<input checked="" type="checkbox"/> Best Effort	<input type="checkbox"/> 40	0.5	500

QoS Downlink Configuration

Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/> Real Time	<input checked="" type="checkbox"/> 0	0.5	500
<input checked="" type="checkbox"/> Near Real Time	<input type="checkbox"/> 20	0.5	500
<input checked="" type="checkbox"/> Controlled Load	<input type="checkbox"/> 25	0.5	500
<input checked="" type="checkbox"/> Best Effort	<input type="checkbox"/> 40	0.5	500

OK Cancel

Set the various Quality of Service parameters here (including VoIP, if needed), and click **OK**. QoS parameters are described in [Chapter 10, Quality of Service](#).

The HSUs receive their service characteristics in accordance with the definition of the Service Category (here) and the Service Category to which they were assigned based on the files in the authorization RADIUS server.



Caution

However, if you manually change any of these parameters (via **Update Service** or **Configure -> Ethernet** from the HSU's right-click menu), the new values you have set will remain, even though they do not correspond to those in any defined Service Category.

If you change the assigned Service Category of such an HSU (using the files in the authorization RADIUS server), then the next time the HBS receives updated information from the authorization RADIUS server, it will change these parameters to correspond to those of the new Service Category.

4.2.14 Operations

This section applies to both HBSs and HSUs.

Reverting to Factory Settings

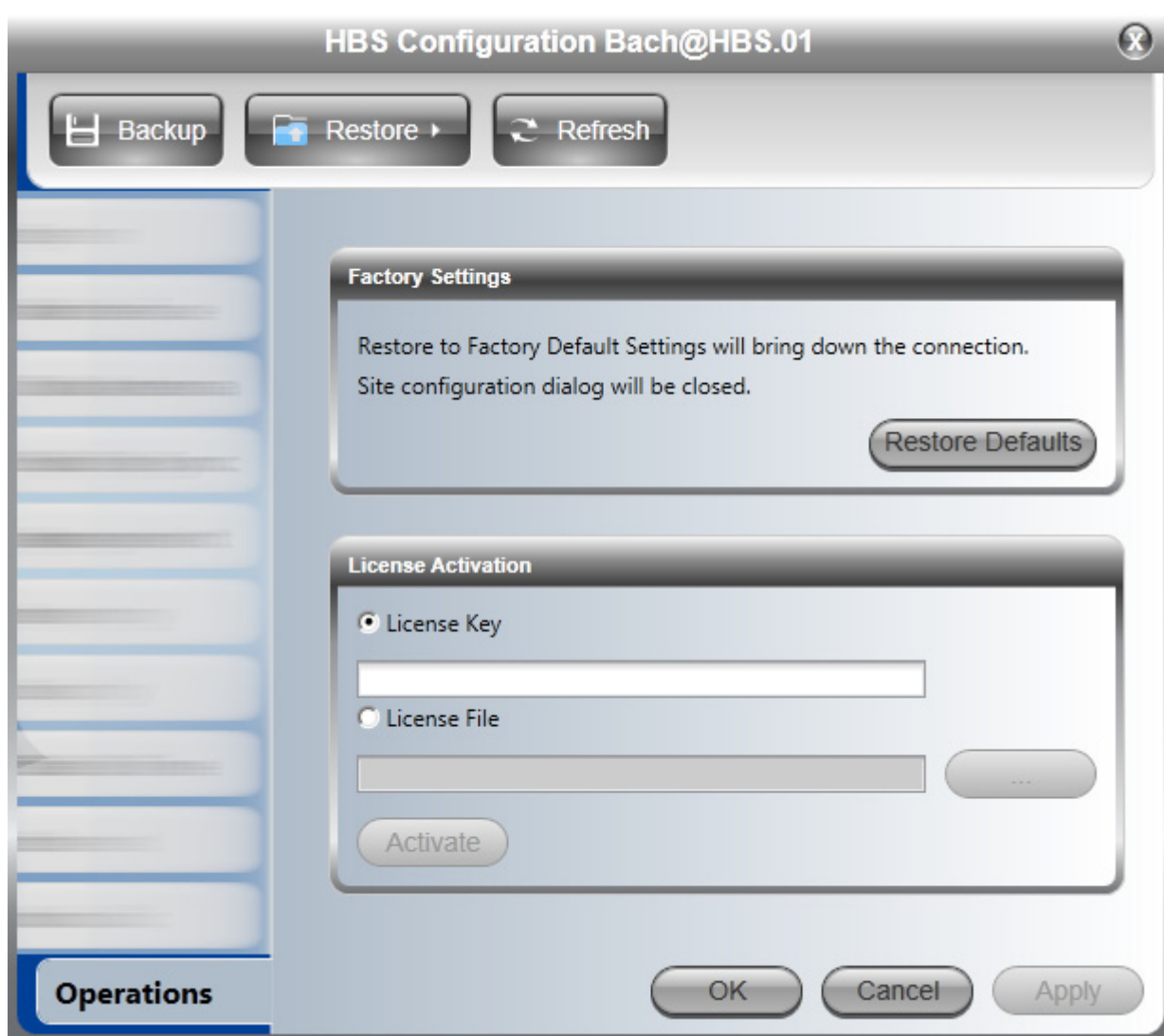
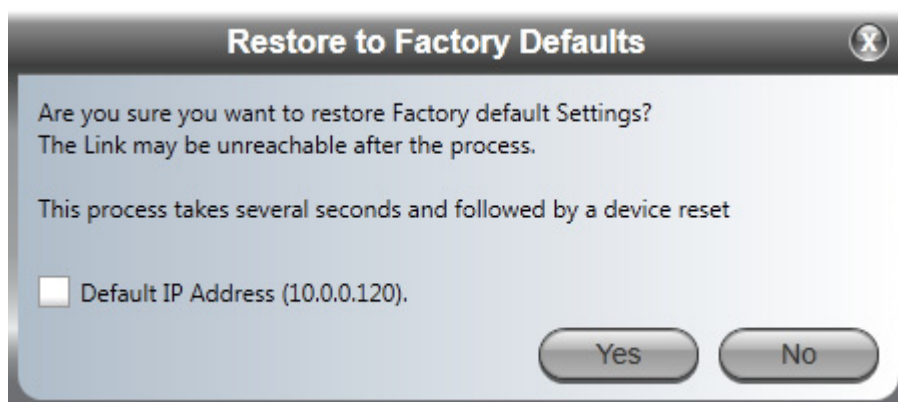


Figure 4-26: Restore Factory Settings and License Activation

Clicking the Restore Defaults button opens the following self explanatory dialog:



License Activation

You may add additional bands or capacity using the license Activation facility. Additional bands (if available) are obtained using the Change Band function, described below. Capacity upgrade is described in [Chapter 11](#).

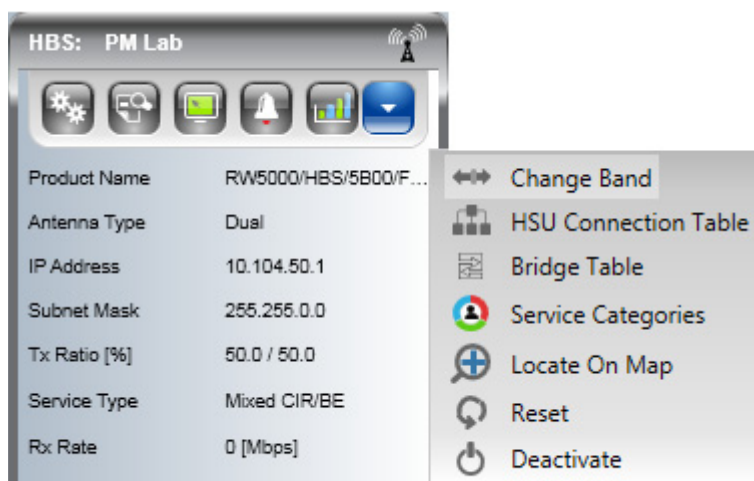
For a single band, enter the supplied license Key and click **Activate**. If you have a list of them (a text file), use the **License File** option.

In some instances it may involve purchasing the relevant license from RADWIN. Contact Customer Service for details.

To obtain and install additional bands, see page [4-82](#).

4.3 HSU Connection Table

From the HBS button bar, click the right hand button followed by HSU **Connection Table**.



The following table is displayed:

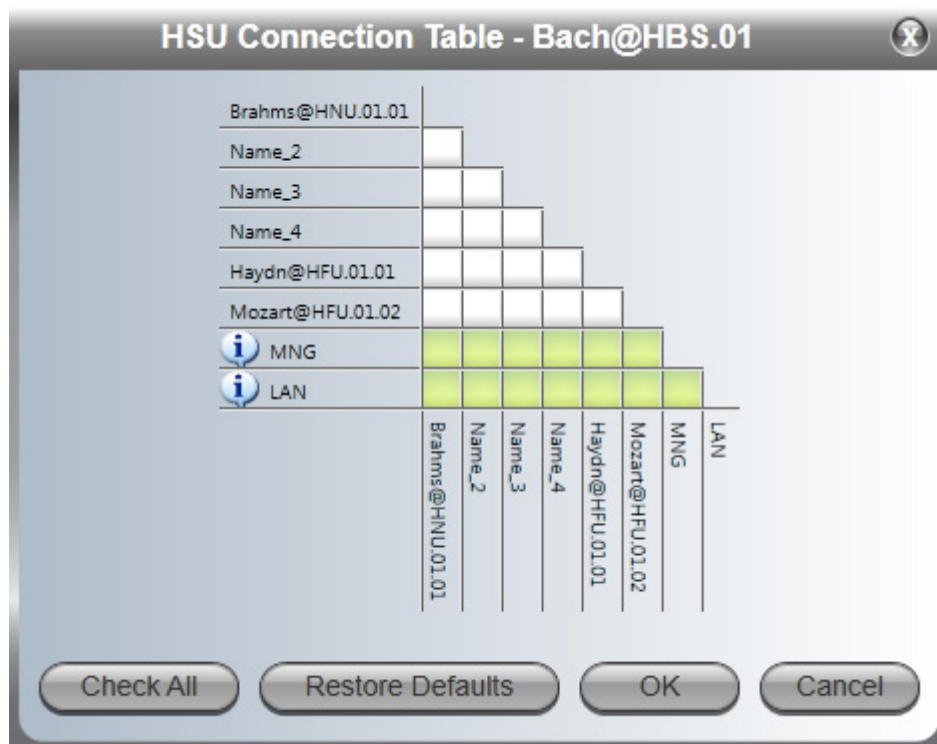


Figure 4-27: HSU Intercommunication - Connection Table

The green shaded squares show intercommunicating elements within the sector.

- MNG refers to management traffic which should always be open between HSUs and the HBS.
- LAN refers to service traffic between the HBS and the HSUs.

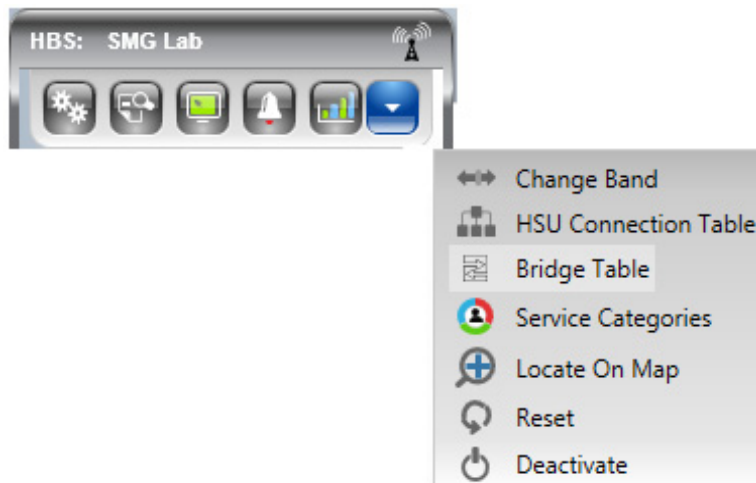
As shown, the two HSUs may not communicate between themselves. Clicking the top white square enables communication (via the HBS) between them.

You may disable all traffic between the HBS and the HSUs and restore it using this device.

4.4 Bridge Table

The Bridge Table provides a list of MAC addresses of the subscriber units in the sector of the HBS. This table can be saved in an external *.csv file.

From the HBS button bar, click the right hand button followed by **Bridge Table**:



The following table is displayed:

A screenshot of the 'HBS Bridge Table Lab Sector 4' window. It features a 'Save' button and a 'Refresh' button at the top. Below these is a table with four columns: 'Number', 'HSU Name / Interface', 'HSU Location', and 'MAC Address'. The table contains two rows of data. Below the table is a large empty area for additional information or logs.

Number	HSU Name / Interface	HSU Location	MAC Address
1	Bach_10.104.60.1	SMG Lab	00:15:67:58:2e:18
2	HBS LAN1	SMG Lab	90:e2:ba:93:14:71

Figure 4-28: Bridge Table

The name of the subscriber units, their locations, and MAC addresses are shown.

- Click **Save** to save this information in an external comma separated variable (*.csv) file
- Click **Refresh** to refresh the table (if subscriber units have been added or removed for example).

4.5 Configuring an HSU from the HBS Main Window

Right click an HSU for its context menu and click **Configure** to open the HSU Configuration window.

4.5.1 Configuration Menu Buttons

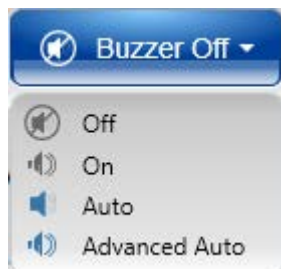


The **Backup** and **Restore** buttons provide for backup and restore of the HSU software



A backup (full or configuration) may be restored to another HSU provided that the product IDs and revision levels of the source and target HSUs are identical. In addition, the capacity and supported bands must be the same for the source and restored HSUs.

The **Buzzer** button turns the buzzer On or Off (not relevant for the SU **PRO/AIR** EMB or SU **PRO/AIR** INT).



- The Auto position means that the Buzzer will beep as shown in [Figure 4-29](#) during installation or upon sync loss. The main use of the buzzer tone is for HSU antenna alignment.
- The Advanced Auto position means that the buzzer will beep continuously at different rates upon sync loss, antenna mis-alignment and other events for up to two minutes following restoration of sync.

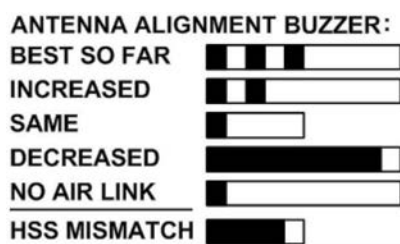


Figure 4-29: Antenna beep sequence

The **Refresh** button restores the current window to its previous state abandoning any changes you made, provided that you did not click **Apply** or **OK**.

The configuration tabs for the HSU are usually identical with those of the HBS (see [Configuring an HBS](#) on page 4-1).

4.5.2 System

Identical with the HBS tab - see [System](#) on page 4-2

4.5.3 Tx & Antenna

Identical with the HBS tab - see [Tx & Antenna](#) on page 4-9, except for the following:

- You can change the MIMO mode of the antenna(s) from MIMO to Diversity or Auto Selection. For more on antennas and these modes, see the RADWIN 5000 Installation Manual.

4.5.4 Management

Identical with the HBS tab - see [Management](#) on page 4-11, with the exception of the SU **PRO/AIR** EMB and SU **PRO/AIR** INT, as shown below.

The SU **PRO/AIR** EMB and SU **PRO/AIR** INT will show the following:

The screenshot shows the 'HSU Configuration ULC_2' window. At the top are 'Backup', 'Restore', and 'Refresh' buttons. The left sidebar has a 'Management' tab selected. The main configuration area includes:

- IP Version:** A dropdown menu set to 'IPv4 Only'.
- IPv4 Section:**
 - IP Address:** Text field with '10.104.50.200'.
 - Subnet Mask:** Text field with '255.255.255.0'.
 - Default Gateway:** Text field with '10.104.50.100'.
- IPv6 Section:**
 - IPv6 Address:** Text field with '::11.0.0.0'.
 - Subnet prefix length:** Text field with '64'.
 - Default Gateway:** Text field with '::10.0.0.0'.
- SysLog server IP Address:** Text field with '0.0.0.0' and a settings icon.
- Trap Destination:** A button with an up arrow.
- VLAN:** A button with an up arrow.
- Protocol:**
 - ☒ SNMP, with radio buttons for V1 (selected), V3, and V1 and V3.
 - ☐ Telnet.
 - Web Interface:** A dropdown menu set to 'Http'.

At the bottom are 'OK', 'Cancel', and 'Apply' buttons.

Figure 4-30: SU **PRO/AIR** EMB and SU **PRO/AIR** INT Configuration - HTTPS

Note the following:

- RADIUS User Authorization button is not available
- The unit can only have an IPv4 address

- The SU **PRO/AIR** EMB or SU **PRO/AIR** INT can be configured for HTTP, HTTPS, or both. To do this, choose the protocol you want from the **Web Interface** pull-down menu, then click **Apply**.

When you log on to the SU **PRO/AIR** EMB or SU **PRO/AIR** INT Web Interface, use the protocol you chose here.

4.5.5 Inventory

Identical with the HBS tab - see [Inventory](#) on page 4-30

4.5.6 Security

Identical with the HBS tab - see [Security](#) on page 4-30, except:

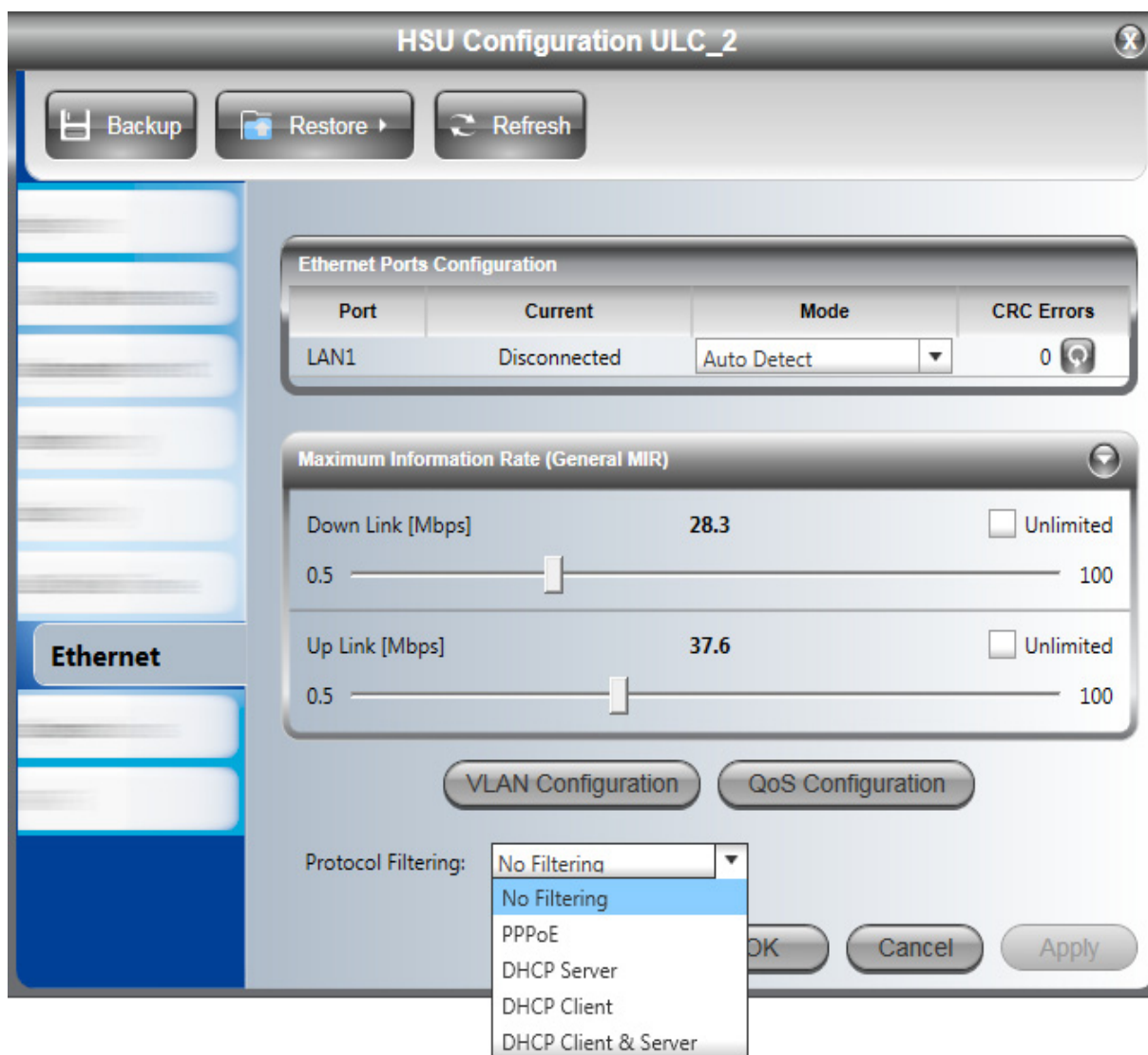
- You may change the SNMP community strings only for the HSU from here.
- You cannot change the Link password from an HSU.
- 802.1x options are not configured here.

4.5.7 Date & Time

Identical with the HBS tab - see [Date & Time](#) on page 4-43.

4.5.8 Ethernet

Ethernet configuration for an HSU follows the same general pattern as the corresponding tab for the HBS (see [Ethernet](#) on page 4-45) but with important differences.

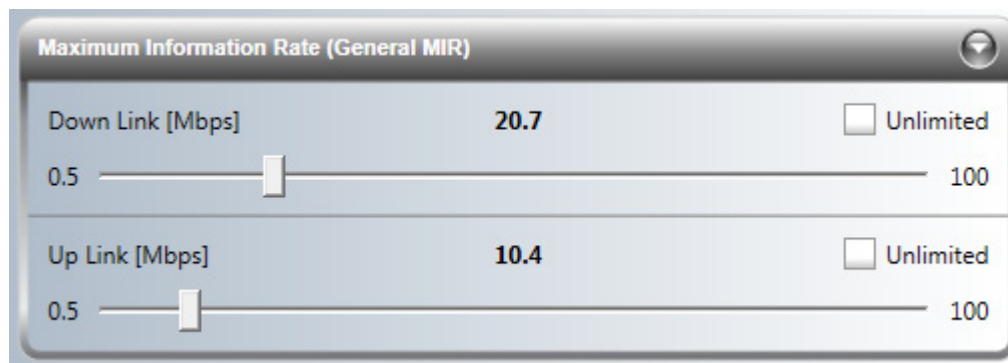


Ethernet Ports Configuration

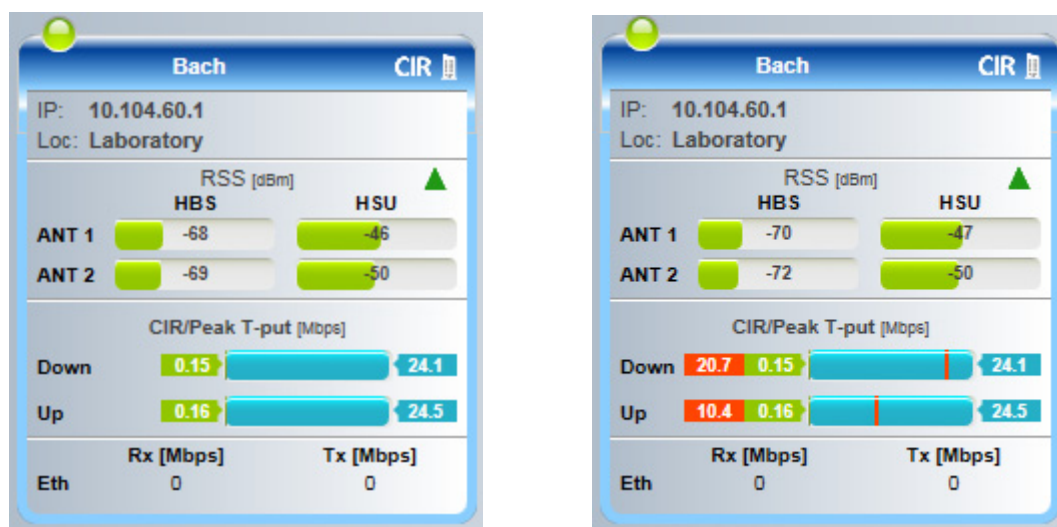
This item is same for all HSUs and the HBS (see [Ethernet Ports Configuration](#) on page 4-46).

Maximum Information Rate

The Maximum Information Rate (MIR) was initially set during HSU Registration (see [Registering a fixed HSU for service](#) on page 3-21). You may change it here. If you change it, the HSU card display changes. Here is an example:



The card changes as follows:



Before change

After change

Figure 4-31: HSU card display when changing MIR

Notice after the change, red bars appear. These show the maximum MIR you just set, for both the Down Link and Up Link directions. The vertical red lines in the after figure indicate the upper limit on the blue throughput bars.

Had you set the MIR to be more than the maximum (in this case 24.1 and 24.5) or “unlimited”, the red bars and red vertical lines would not have appeared.

VLAN Configuration

For Traffic VLAN configuration, see [Chapter 9](#).

QoS Configuration

QoS configuration is described in [Chapter 10](#).

Protocol Filtering

This option (relevant for the SU **PRO/AIR** EMB and SU **PRO/AIR** INT only) allows you to prevent non-PPPoE or DHCP traffic that is being sent from the customer equipment to the HSU from being forwarded to the HBS.

There are 5 options in the Protocol Filtering pull-down menu:

No Filtering: Do not block any non-PPPoE (Point-to-Point over Ethernet) or DHCP traffic that comes from customer equipment connected to the subscriber unit.

PPPoE: PPPoE only - prevents non-PPPoE packets coming from customer equipment connected to the subscriber unit from being forwarded to the HBS.

The “No Filtering” or “PPPoE” option must be chosen if you are planning to use the DHCP Relay Agent (Option 82) (see [Advanced](#) on page 4-47).

DHCP Server: Prevent DHCP Server responses from customer equipment from being forwarded to the HBS. DHCP Client responses can be forwarded.

DHCP Client: Prevent DHCP Client requests from customer equipment from being forwarded to the HBS. DHCP Server responses can be forwarded.

DHCP Client & Server:

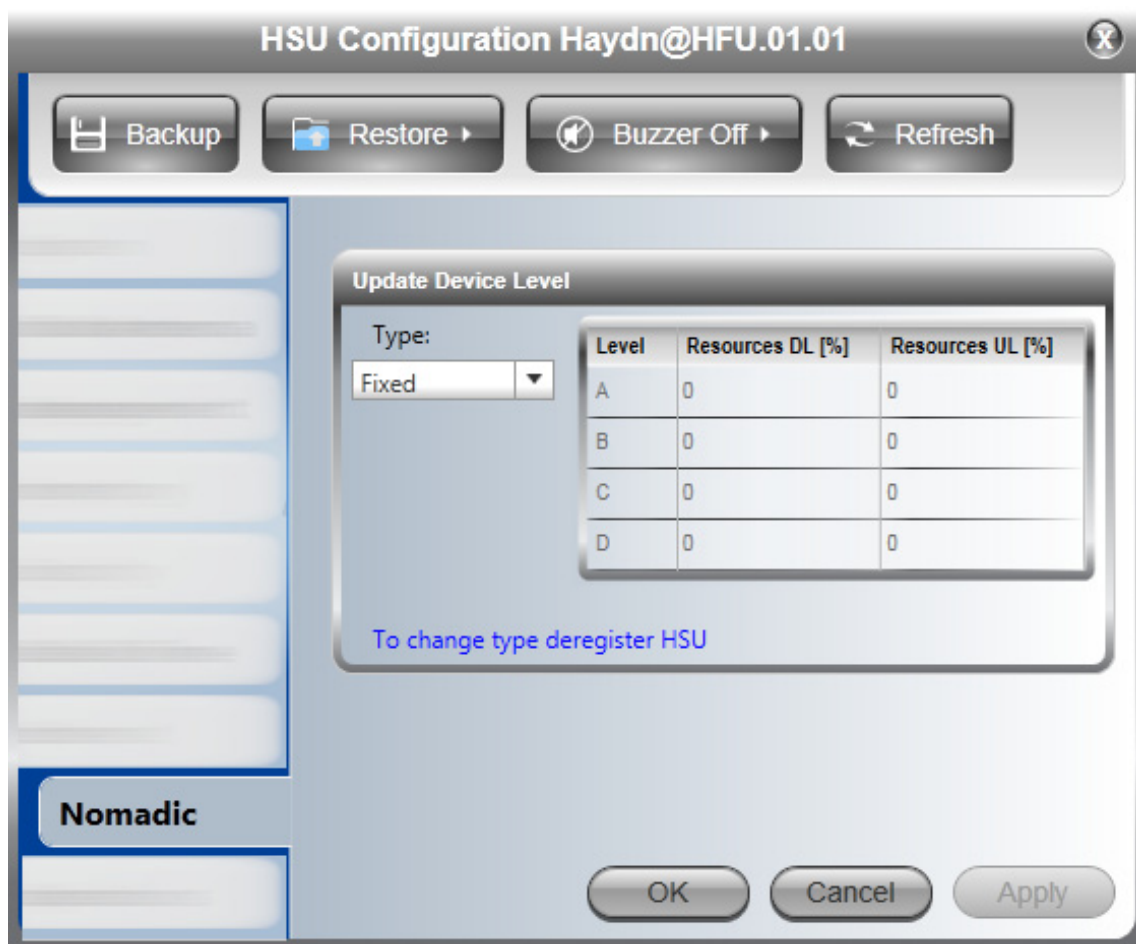
Prevent DHCP Client and DHCP Server requests from customer equipment from being forwarded to the HBS.



Protocol Filtering and 802.1x Authentication cannot be configured simultaneously (see [802.1x Authentication](#) on page 4-37).

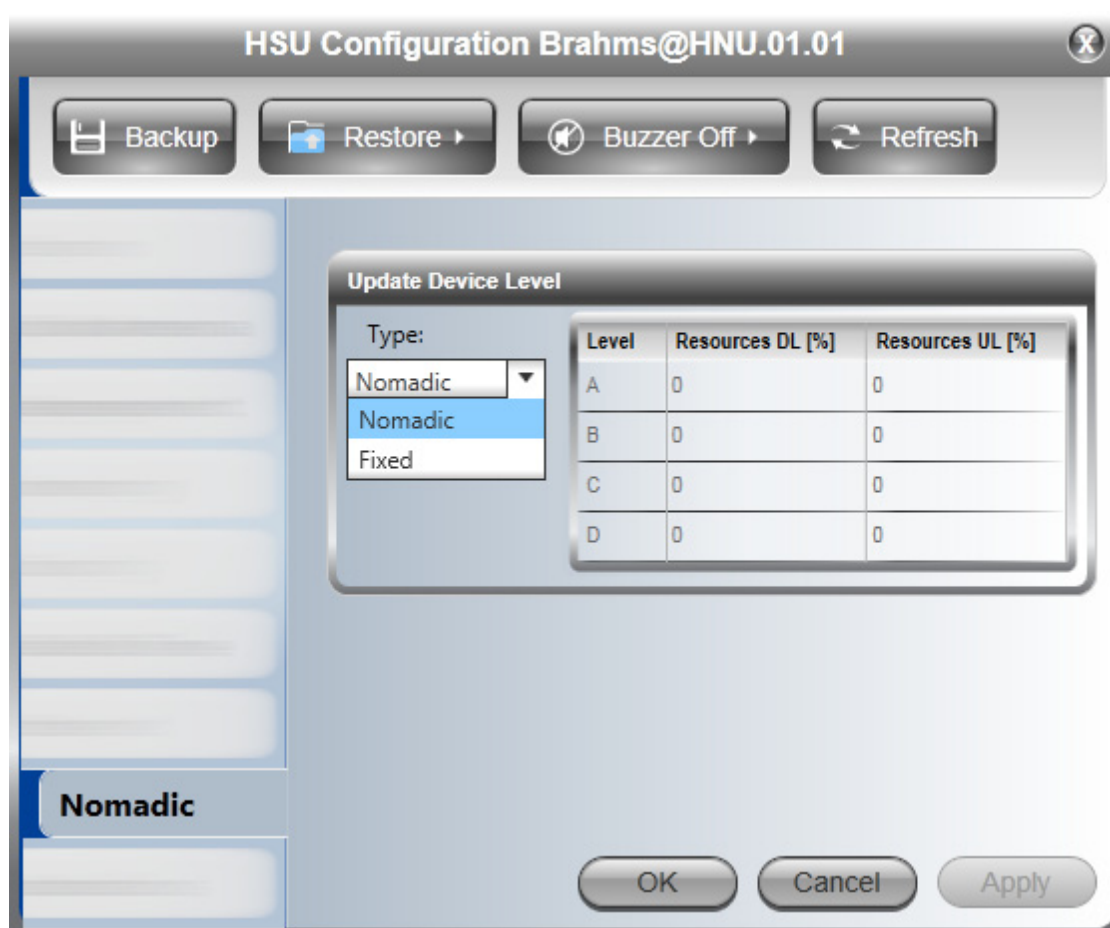
4.5.9 Nomadic

This is different from that of the HBS:



To change a fixed HSU to a nomadic HSU, the HSU must be deregistered (right-click on the HSU card, and choose **Deregister**).

For a nomadic HSU, you may change its operating level or even revert it to a fixed HSU:

**Note**

If you are working in the UNI regulatory environment, there are more options which must be configured directly from the HSU (see [Working in the UNI environment and with 3.xGHz](#) on page 6-6).

4.5.10 Operations

Identical with the HBS tab - see [Operations](#) on page 4-62.

4.5.11 WiFi

This is only relevant for the SU **PRO/AIR** EMB or SU **PRO/AIR** INT.

The screenshot shows the 'HSU Configuration ULC_2' window. At the top are 'Backup', 'Restore', and 'Refresh' buttons. The left sidebar has a 'WiFi' tab selected. The main area contains the following settings:

- Access Point Mode:** On (dropdown menu)
- SSID:** R-P15000I000X00657
- Status:** Off (red text)
- Connected Clients:** A table showing 5 clients with MAC addresses and RSSI values.
- Radio Configuration:**
 - Channel:** 6 (dropdown menu)
 - Tx Power:** 15 (dropdown menu)
- Network Configuration:**
 - Security:** Wpa2
 - Password:** [masked with asterisks]
 - Confirm Password:** [masked with asterisks]
 - IP Address:** 192.168.1.1

At the bottom, there is a blue message: 'Please turn off the WiFi access point before exiting the Manager'. Below this are 'OK', 'Cancel', and 'Apply' buttons.

MAC Address	RSSI [dBm]
00:00:00:00:00:00	0 [dBm]
00:00:00:00:00:00	0 [dBm]
00:00:00:00:00:00	0 [dBm]
00:00:00:00:00:00	0 [dBm]
00:00:00:00:00:00	0 [dBm]

Access Point Mode: Enable or disable the WiFi for the device.

The SSID status, and On status of the WiFi unit is displayed.

Connected Clients: This area shows up to 5 clients that are connected to this unit, including their MAC addresses and signal strength (RSSI).



The SSID of the WiFi is R- [serial number of unit]

You can set the following WiFi parameters:

- WiFi channel
- WiFi Tx power
- WiFi password

- WiFi IP address (partial)

4.6 Replacing an HSU

A defective HSU may be replaced by another HSU belonging to the sector provided that the replacement is not registered. Here is a typical scenario:

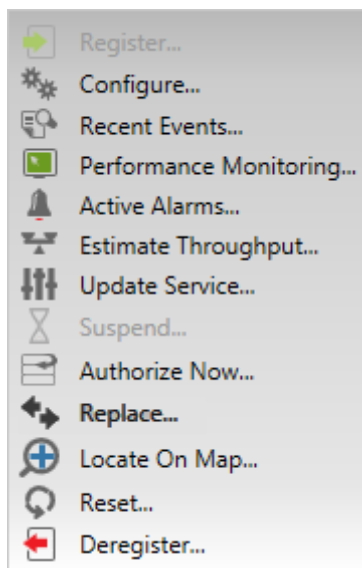


Figure 4-32: Unit 10.104.50.1 down; unit 10.104.50.3 available, not registered

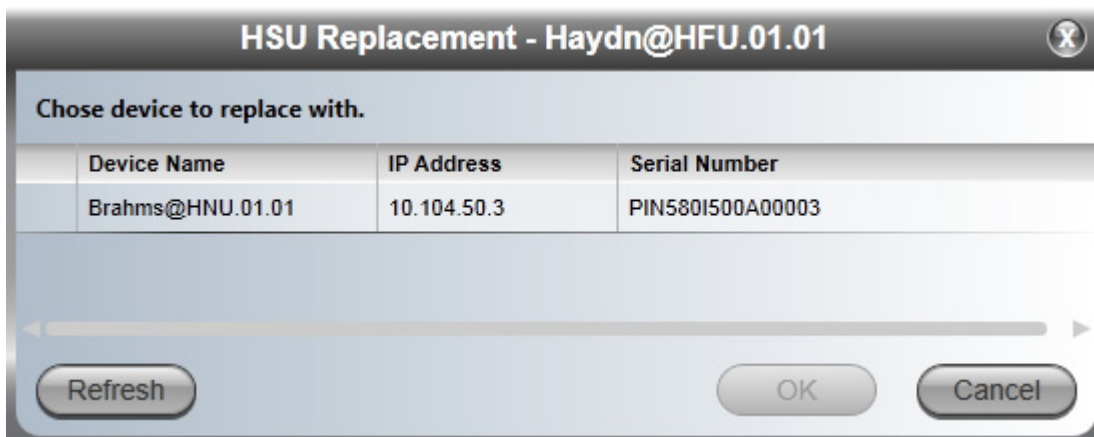
Since the replacement procedure is a rather delicate process, we will step through it with a detailed example.

➤ To replace a defective HSU:

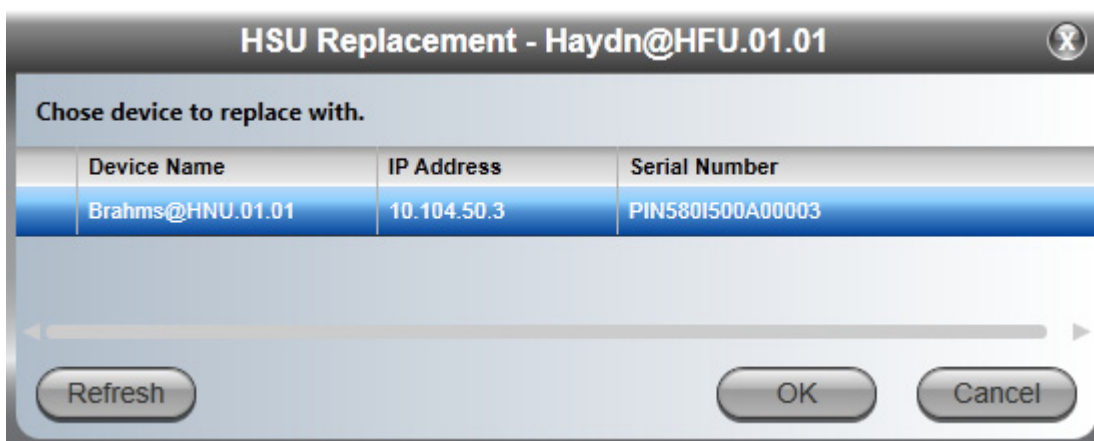
1. Right click the defective unit for its context menu:



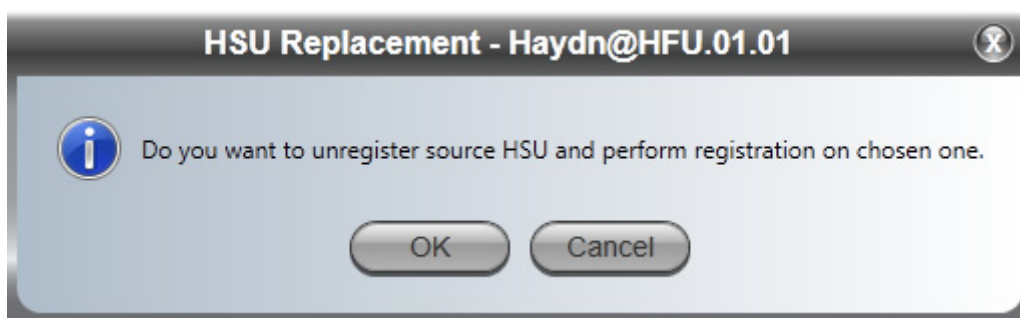
2. Click **Replace**. You are offered a list of HSUs available as replacements. In our example there is one: 10.104.50.3



3. Select the required unit by clicking on it.



4. Click **OK**. You are asked to confirm before proceeding:



5. Click **OK** again. You receive further confirmation:



Here is the final outcome:




Notice that 10.104.50.3 has replaced 10.104.50.1, inheriting most of its settings.



Note

The IP address of the replacement unit is not changed. To ensure that all 10.104.50.1 traffic actually gets to the new unit (in our example), you should also change its IP address to that of the original unit, 10.104.50.1.

4.7 Updating HSU Services

Choosing **Update Services** from an HSU context menu or clicking  from the HSU button bar opens the Registration window. You may use this to switch the HSU between Spatial Multiplexing, Diversity and Auto mode. You may also change the HSU resource type (CIR vs. BE).

4.8 Suspending an HSU

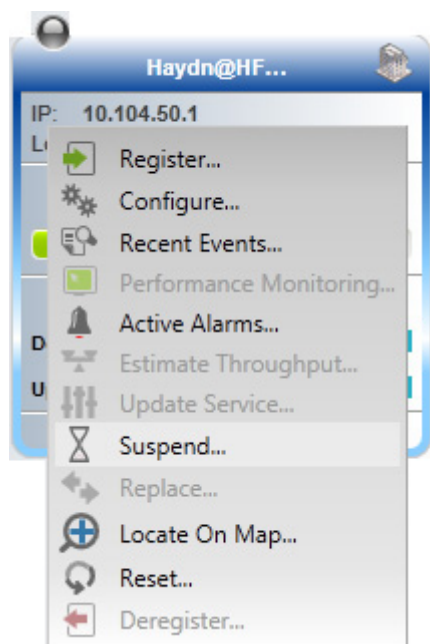
You may break the link (cause a sync loss) to an un-registered HSU for a fixed amount of time.



Note

If **RADIUS** is enabled, make sure you set the *RegisterAvailability* parameter to 0 in the Users file on the RADIUS server.

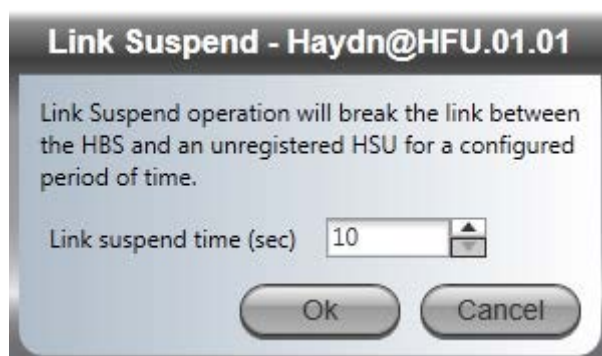
Here is the scenario:



HSU 10.104.50.1 is not registered.


➤ **To suspend an un-registered HSU:**

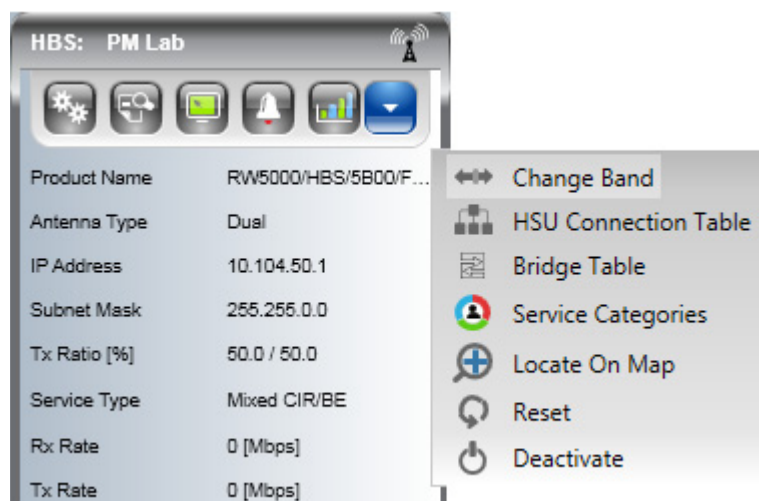
1. Click **Suspend** in its context menu. You are requested to enter a suspend duration.



2. Choose a suspend time and click **OK**. During the suspend duration, the HSU will be deleted from the HBS Main Window HSU panel. The HSU returns to the main display with resumption of sync.

4.9 Changing the Sector Band

Changing the Band in use is always carried out at the sector level (not per installed ODU). To change the Sector Band you must be logged on to the HBS as Installer. Click the right hand button,  on the Base Station button bar and choose **Change Band**.



➤ **To change the Sector Band:**

1. Click **Change Band**. A list of available Bands is displayed. The specific list depends on your regulatory environment.

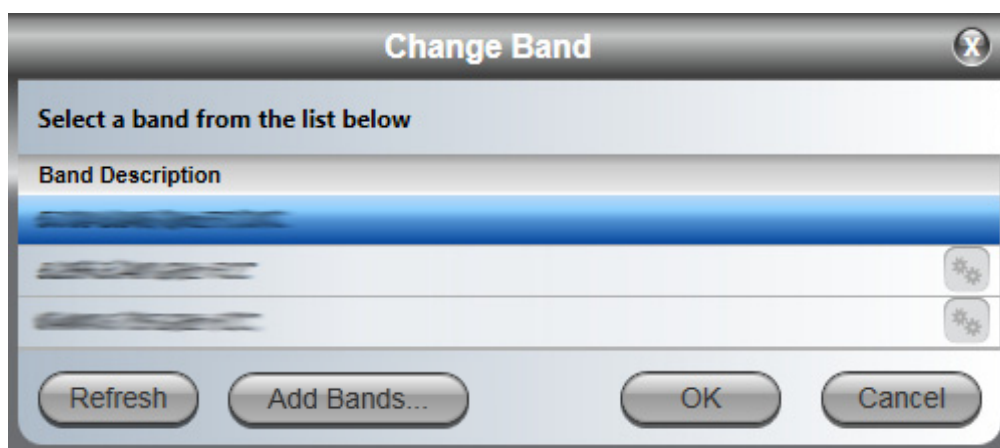
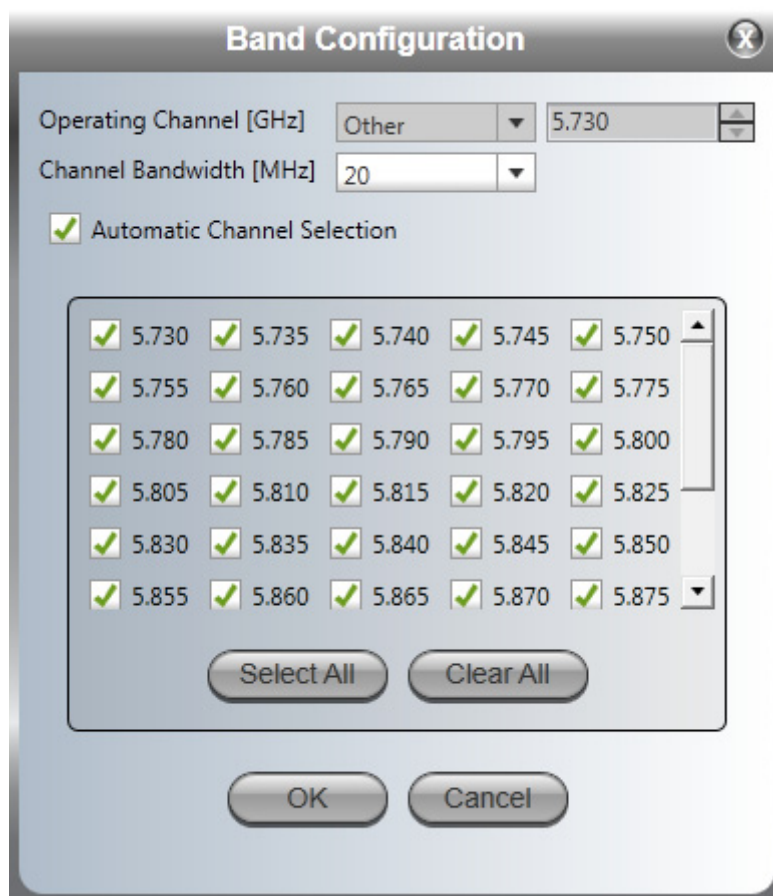
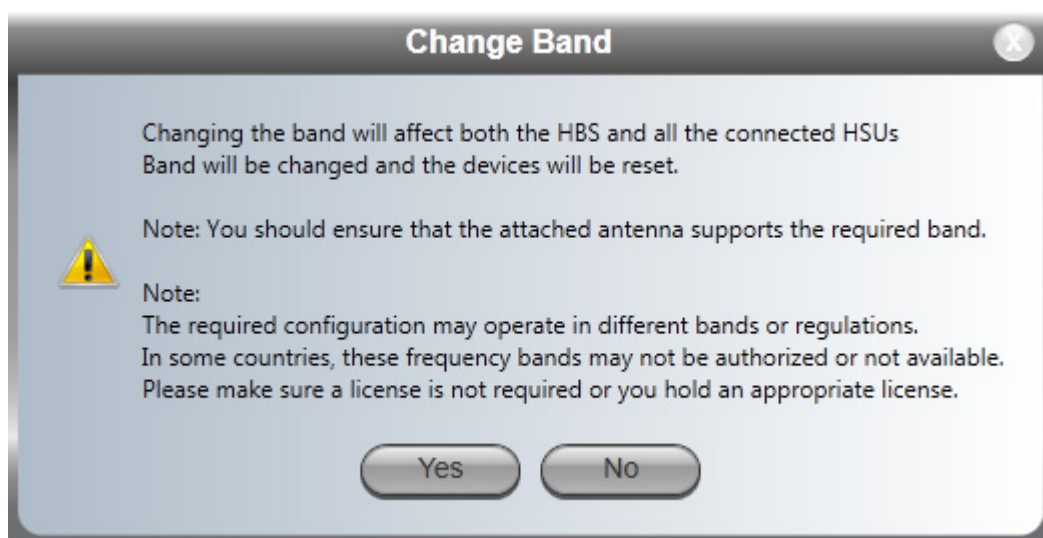


Figure 4-33: Change or Add Bands

2. Select the required Band and click **OK**.
3. Click the right button (⚙️). The following window opens:



4. Here you may choose the working channel bandwidth and channel selection as in the activation process. Click **OK** to accept your choice. You are returned to the display in [Figure 4-33](#).
5. Click **OK** again. The following cautionary message is displayed:



6. Click **Yes** to continue. After a short delay, you are offered a final confirmation:



7. Click **OK**. A sector re-sync follows.

Having set the channel bandwidth and operating channels earlier, there is no need for deactivation and reactivation.

You may also add new Bands by clicking the **Add Bands** button. There are several provisos to this:

- Additional Bands must be available for your hardware
- Such additional Bands must be available within the framework of your local regulations



To obtain and install additional bands:

1. Make a list of ODU serial numbers for all HBSs and all HSUs to receive additional bands. The list should be a simple text file, one serial number per line. (The serial numbers are located on the stickers on the ODUs.)
2. As Installer, open the window of [Figure 4-33](#) above, and click **Add Bands**. An instruction panel similar to the following is displayed:

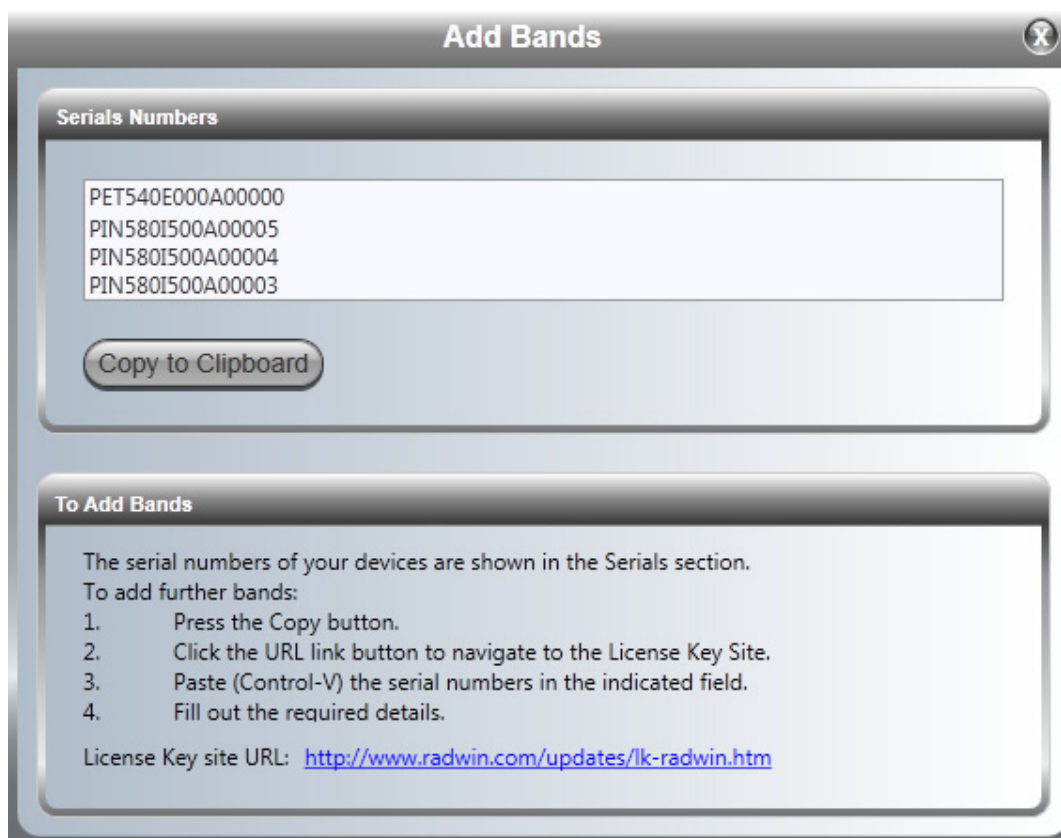


Figure 4-34: Add Bands Instructions Panel

The serial numbers displayed relate to the ODUs in the sector. Click **Copy to Clipboard**.

3. This step applies only if you have additional un-installed units:
Before proceeding to step 2 in Figure 4-34, open your own list in a plain text editor. If the displayed serial numbers are in the list, select your list and copy it all to the clipboard. Otherwise append the clipboard contents to your list. Select the whole list and save it to the clipboard.
4. Now carry out steps 2 to 4 in Figure 4-34. Step 2 will take you to a Web page, which contains a form similar to this:

This generator can be used for expanding the available bands of an ODU to additional bands supported by the ODU hardware. Different products have different expansion bands available, please consult the Release Notes document or our Professional Services for more information. Note: The regulatory rulings of certain regions prohibit adding certain bands. Where this is applicable, the License Generator will prevent adding these prohibited bands. Fill out the form below to generate your License Key. After submitting the form you will receive an email with the new License Key. License Key generation is per serial number, you may enter several serial numbers. Required fields are marked with *. The Reference field is for your own records. The License Key is supported from releases 2.4.50 and 1.9.12. To use it you should login as Installer.

Personal details

End-User Full Name:*	<input type="text"/>	Company:*	<input type="text"/>
Address:*	<input type="text"/>	Phone:*	<input type="text"/>
End-User Email Address:*	<input type="text"/>	Confirm Email:*	<input type="text"/>
Reference:	<input type="text"/>	Enter Code (9193):*	<input type="text"/>

Link details

Required Band:*	<input type="text" value="2.3 GHz Universal"/>	Serial Numbers:*	<input type="text"/>
Installation Country:*	<input type="text" value="Please Select..."/>		

Get Key

5. Fill out the requested details. Remember to terminate the dialog by clicking the **Get Key** button.
6. The results of your request will be displayed with further instructions.

No.	Serial	Status
1	PET540E000A00000	Serial Found
2	PIN580I500A00005	Serial Found
3	PIN580I500A00004	Serial Found
4	PIN580I500A00003	Serial Found

Close

You will receive an automated email during the next few minutes. If it does not arrive, please check that it was not caught by your junk/spam filter.

A few minutes later, you should receive an email, containing in its body, a list of license keys.



You may see error messages in the Status Column such as **Band not supported** or **Serial not found**. Supported bands typically reflect your local regulations. Check missing serial numbers with RADWIN Customer Service.

7. Copy and Paste the license keys into a plain text file and save it to a safe known place.
8. Open the **Configure | Operations** tab (Figure 4-26). Check the License File button and navigate to the file you saved in the last step.
9. Click **Activate**. The next time you enter the Change Bands tab, the new bands will be available.

4.10 Configuring AES 256 Encryption Support

AES 256 support is per HSU but enabled from a passive antenna HBS.



The JET HBS and the SU **PRO/AIR** EMB or SU **PRO/AIR** INT subscriber units do not support AES 256.

To enable AES 256 Encryption support for a sector:

1. Ensure that the HBS is hardware ready for AES 256: From the HBS **Configuration** button, open the **Inventory** page and check that the hardware version is 9 or higher. Open a text file and copy/paste the serial number of the HBS to it.

- Determine which HSUs require AES 256 support. From the **Inventory** page for each HSU, check that the hardware version is 9 or higher. Copy/paste the serial number of the HSU to the text list, one serial number per line. Alternatively, use the capture button in list mode at the HBS to copy paste a list of HSUs.

Index	Name	IP Address	State	Location	RSS HBS [dBm]	RSS HSU [dBm]	Tput HBS
1	Haydn@HFU.01..01	10.104.50.1	Active - Registered	HFU.01..01	-68	-69	5.8
2	Handel@HFU.01.04	10.104.50.4	Active - Registered	HFU.01.04	-68	-67	7
3	Mozart@HFU.01.02	10.104.50.2	Active - Registered	HFU.01.02	-66	-70	6.2
4	Brahms@HFU.01.03	10.104.50.3	Active - Registered	HFU.01.03	-68	-69	5.4

- Save the text file and send it to your equipment supplier with your license purchase order.
- You will receive by return email a text attachment showing serial number and license key. Save the file to a known safe location.
- At the HBS, open the **Configuration | Operations** tab (Figure 4-26). Check the **License Activation** page, then the **License File** button and navigate to the file you saved in the last step.
- Click **Activate**. You can confirm activation by opening the **Security** tab. The AES 256 check box is available (Figure 4-8). Check it to commence AES 256 Encryption.

You can confirm AES 256 support per ODU by looking at the Encryption icon at the bottom right hand corner of the main window as shown in the following tables:

Table 4-2: AES Indicators for an HBS






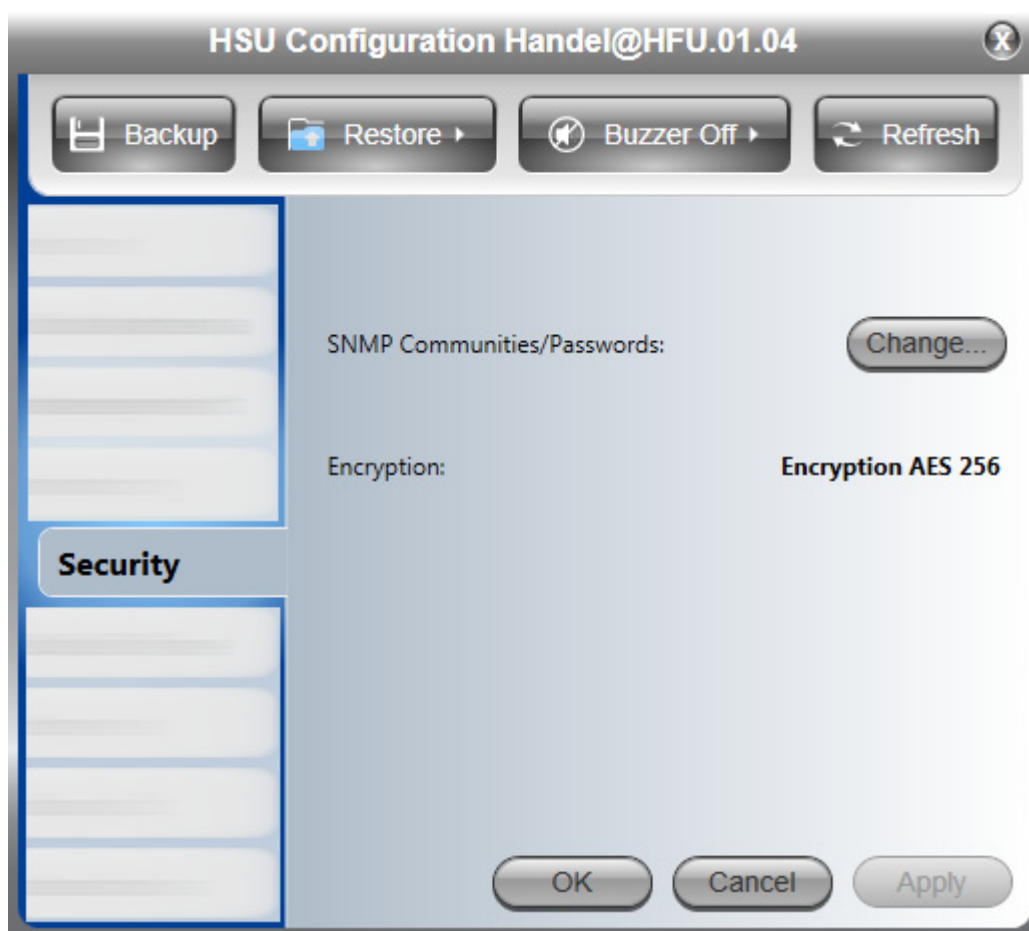
AES Level Supported	HBS Encryption Icon
128	 Encryption AES 128
256	 Encryption AES 128 & 256

Table 4-3: AES Indicators for an HSU

AES Level Supported	Licensed for AES 256	HSU Encryption Icon
128	N/A	 Encryption AES 128
256	No	 Encryption AES 128
	Yes	 Encryption AES 256

In addition, the Security tab on any HSU Configuration widow (from the HBS or direct logon) will indicate when appropriate, that AES 256 is enabled:



AES 256 support for licensed HSUs is immediate and global - either all licensed HSUs are AES 256 enabled or none.

4.11 Configuration with Telnet

A Telnet terminal can be used to configure and monitor the RADWIN 5000.



Telnet cannot be used for SU **PRO/AIR** EMB, SU **PRO/AIR** INT, or RADWIN JET DUO radios.

To start a Telnet session on the ODU, use **telnet <ODU_IP>**.

For example:

```
telnet 10.104.50.200
```

You will be asked for a user name and password.

The Telnet log on user name is the password that you used to enter the RADWIN Manager (for example, the default: **admin**). The Telnet password is the corresponding Community string (default: **netman**).

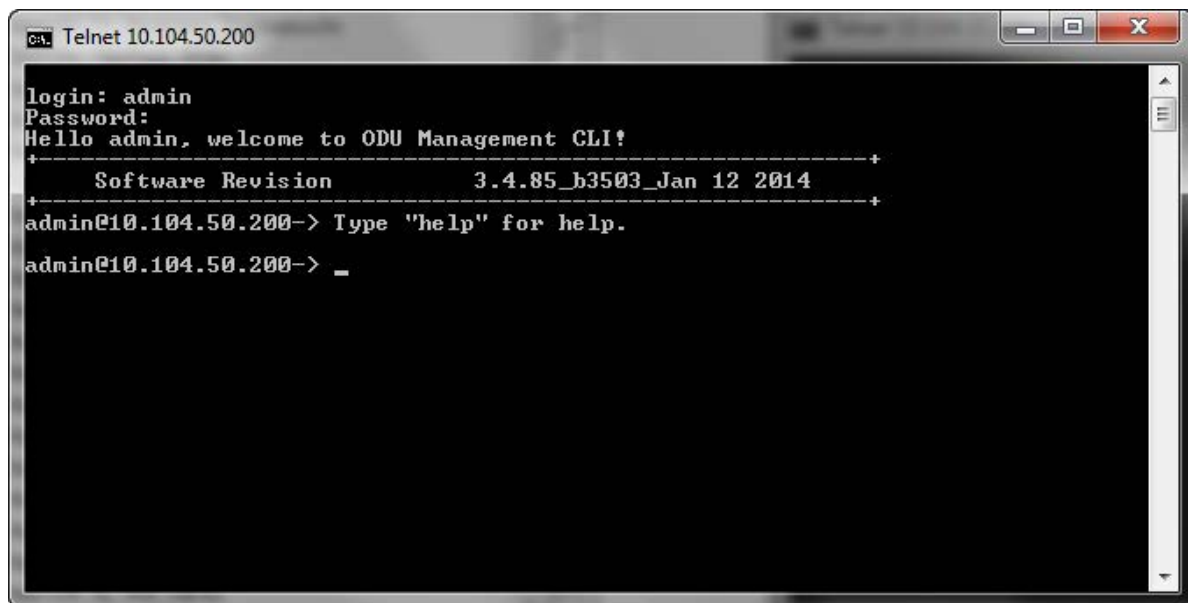


Figure 4-35: Telnet session: Logging on

A Read-Only Community string allows you to use **display** commands only whereas a Read-Write Community string allows you to use **display** commands and execute **set** commands.

Supported Telnet commands are shown in [Table 4-4](#) to [Table 4-6](#).

Table 4-4: Telnet - Display Commands

Command	Explanation
display inventory	Displays ODU product name, Name, Location, hardware and software revisions, uptime, MAC address.
display management	Displays IP, subnet, Gateway, Traps table
display link	Displays all static details about the HSU
display ethernet	Displays Port table (State, Status and action)
display ethernet_errors	Displays Cable statistics
display ntp	Displays Time, Server and Offset
display PM <interface:AIR,LAN1> <interval:current,day,month>	Shows the performance monitor tables for each interface according to user defined monitoring intervals
display bands	Displays available bands

Table 4-5: Telnet - Set Immediate Commands

Command	Explanation
set ip <ipaddr> <subnetMask> <gateway>	Set the ODU IP address, subnet mask and gateway. The user must reset the ODU after the command completion
set trap <index:1-10> <ipaddr> <port:0-65535>	Set a specific trap from the traps table (e.g. set trap 3 192.168..101 162)
set readpw <oldpasswd> <passwd>	Set the read access password (Read Community)
set writepw <oldpasswd> <passwd>	Set the read-write access password (Read-Write Community)
set trappw <oldpasswd> <passwd>	Set the trap Community string
set tpc<power:Value between minimal Tx power, and maximal Tx power>	Set the ODU Tx Power. If a wrong value is entered, both min and max values shall be displayed in the error reply
set name <new name>	Set the name of the link
set location <new location>	Set the name of the location
set contact <new contact>	Set the name of the site manager
set ethernet <port:LAN1> <mode:AUTO,10H,10F,100H,100F,DISABLE>	Set the mode and speed of the Ethernet port
reboot	Resets the ODU. The user is warned that the command will reset the ODU. A new Telnet session to the ODU may be opened after the reset is complete.
help	Displays the available commands
set buzzer <mode:0=OFF,1=AUTO,2=ON>	HSU only: Set the buzzer mode

Table 4-6: Telnet - Set Commands requiring Reset

Command	Explanation
set secId <SectorID>	Set new sector ID - Reset required.

Chapter 6: Direct HSU Configuration with the RADWIN Manager

6.1 Scope of this Chapter

This chapter describes how to configure an HSU unit.

6.2 Overview

- Direct management of an HSU may be carried out by a LAN connection to a managing computer (on-site) or over-the-air (from the HBS site).
- When using the RADWIN Manager, there are several differences for a directly managed HSU compared to the method of [Chapter 4, Managing the Sector with the RADWIN Manager](#) depending on whether the HSU is registered to a HBS, unregistered or not a member of any sector.

Log on to the HSU either directly or over-the-air as shown in [Chapter 2, RADWIN Manager Overview](#). For a registered HSU, you will see a display like this:

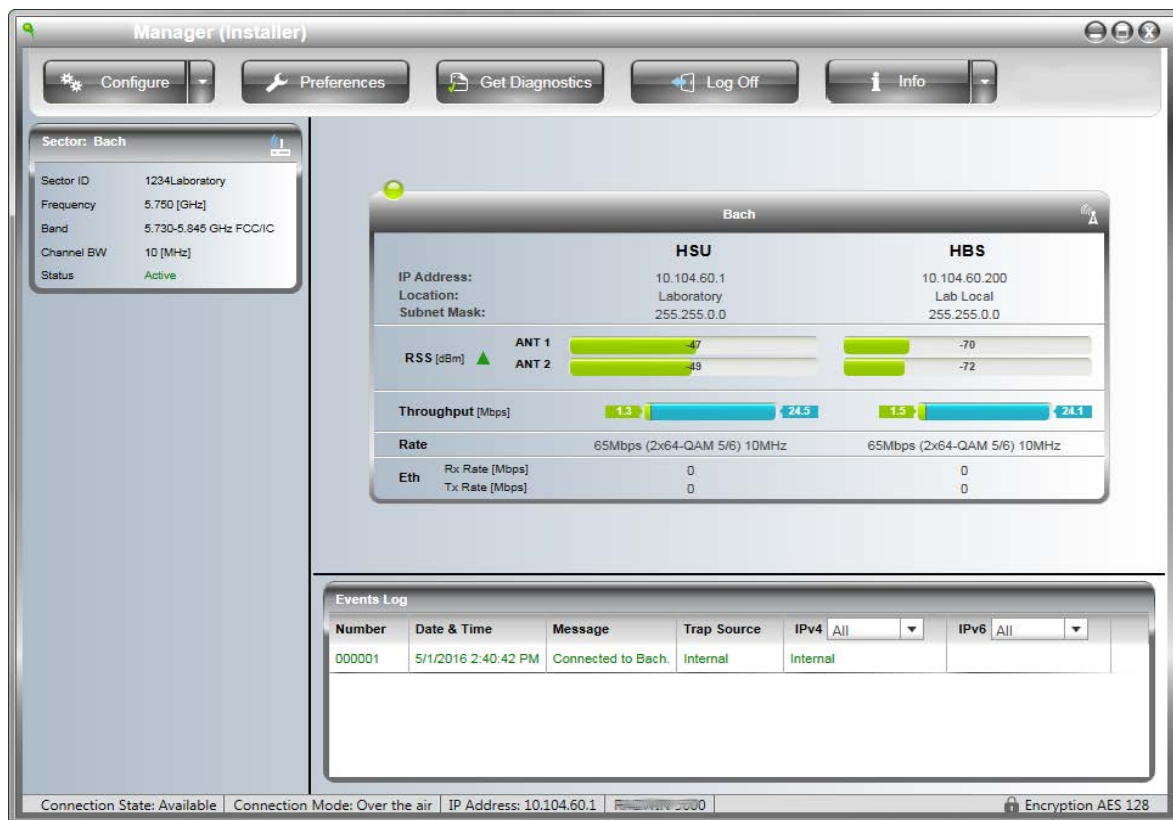


Figure 6-1: Direct or over the air connection to a registered HSU

If you enabled RSS Extended View (see [Enable RSS Extended View](#)), the center part of the display looks like this:

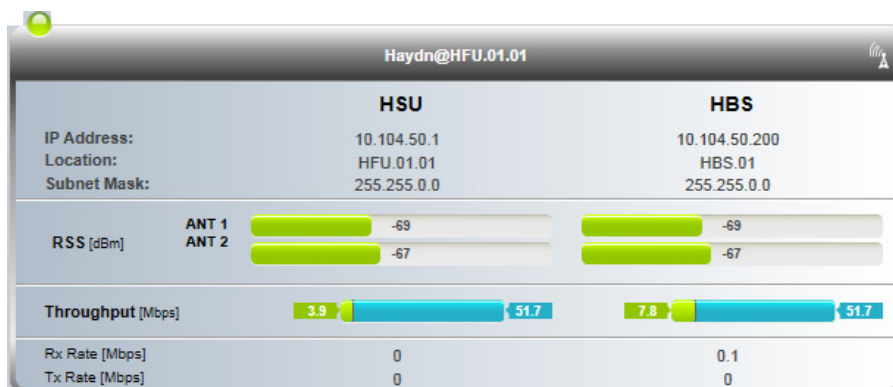


Figure 6-2: Registered HSU - extended view

For an unregistered HSU, the throughput (T-put) fields and the Sector ID field will be empty. If the HBS is deactivated, or the HSU is stand-alone you will see a display like this:

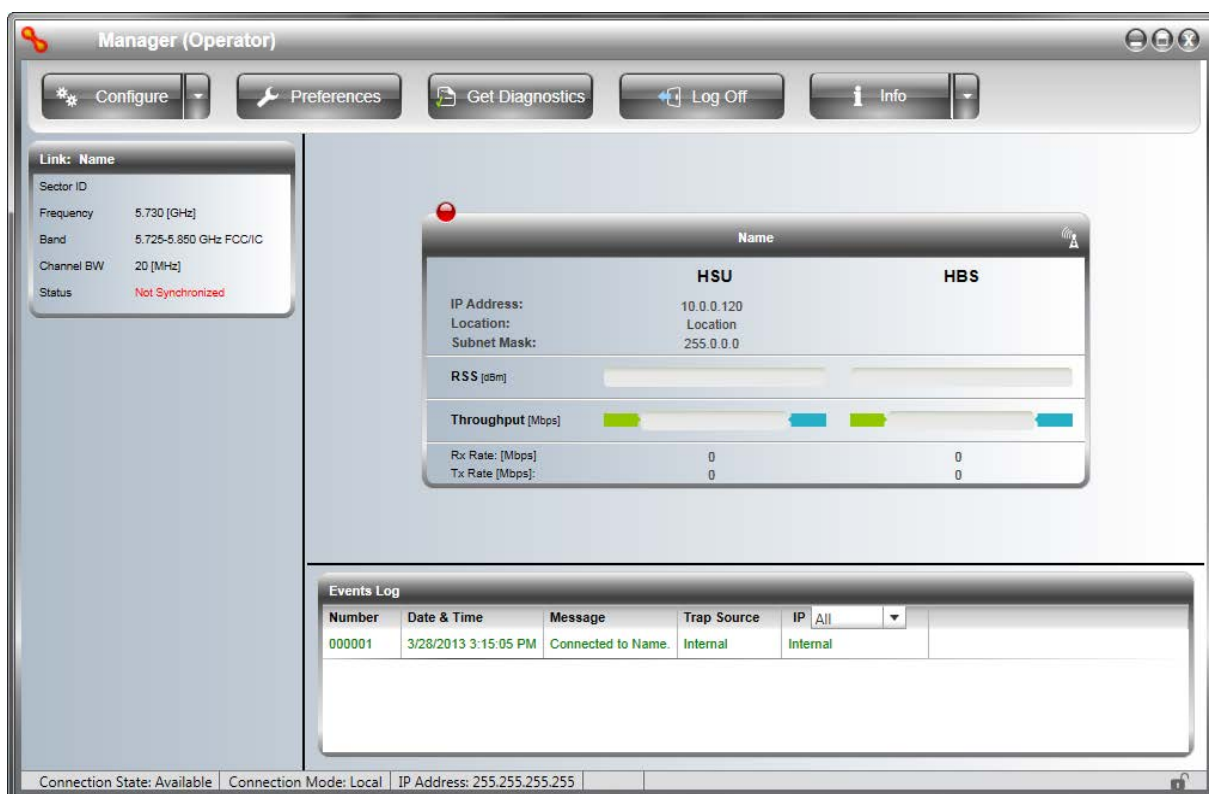


Figure 6-3: Direct connection to a stand-alone HSU out of the box

In what follows, we configure a registered HSU unless specifically specified otherwise.

6.2.1 Configuration Menu Buttons



The **Backup** and **Restore** buttons do the same as they do for the HBS. They provide for backup and restore of the HSU software.



Note

A backup (full or configuration) may be restored to another HSU provided that the product IDs, revision levels and capacity of the source and target HSUs are identical. They are shown in the HSU Inventory window.

The **Buzzer** button may set or mute the buzzer¹.

1. There is no buzzer on the SU **PRO/AIR** EMB or SU **PRO/AIR** INT



Recall that the buzzer tone is primarily used for HSU antenna alignment.

The **Refresh** button restores the current window to its previous state abandoning any changes you made, provided that you did not click **Apply** or **OK**.

The configuration tabs here are the same as those of the HSU configuration tabs when accessed from the HBS, but with only the differences mentioned below.

6.2.2 Air Interface

You can see here that the Channel Bandwidth shows Auto(20/40). That indicates that Dynamic Bandwidth selection is activated.

For a registered HSU this window is for information only.



Figure 6-4: HSU Config. - Air Interface for Registered fixed HSU

For an unregistered or unsynchronized fixed HSU, the Sector ID field will be blank or the last Sector ID used and editable and the Channel Bandwidth field will be set to default and active:

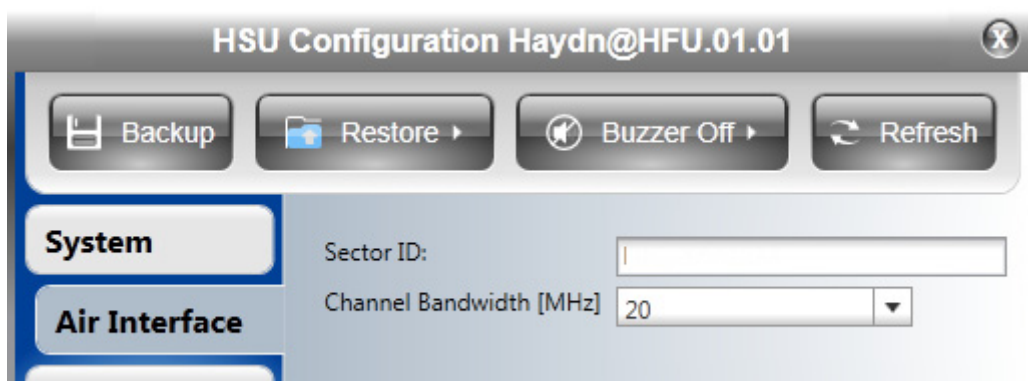


Figure 6-5: HSU Config. - Air Interface for stand-alone fixed HSU

Configure here the Network ID for HSUs in a sector with Secured Network ID (see [page 4-8](#))

For a nomadic HSU the Air Interface display shows only the Network ID:

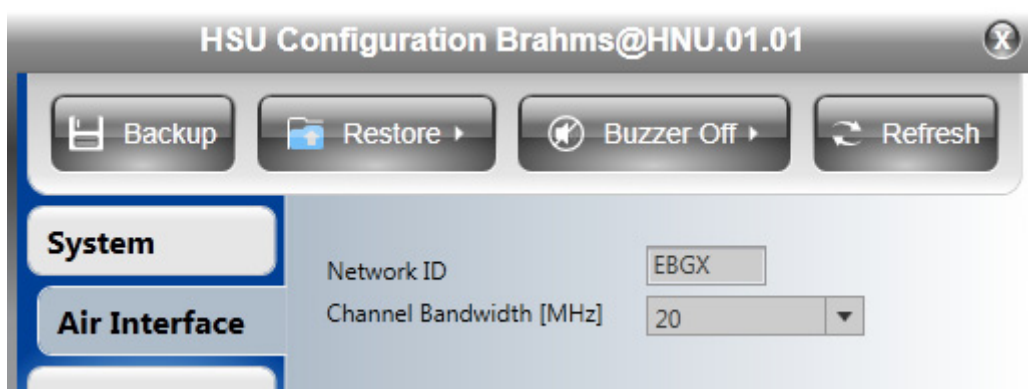


Figure 6-6: HSU Config. - Air Interface, registered nomadic HSU

For an unregistered or unsynchronized nomadic HSU, you may edit both of these fields:

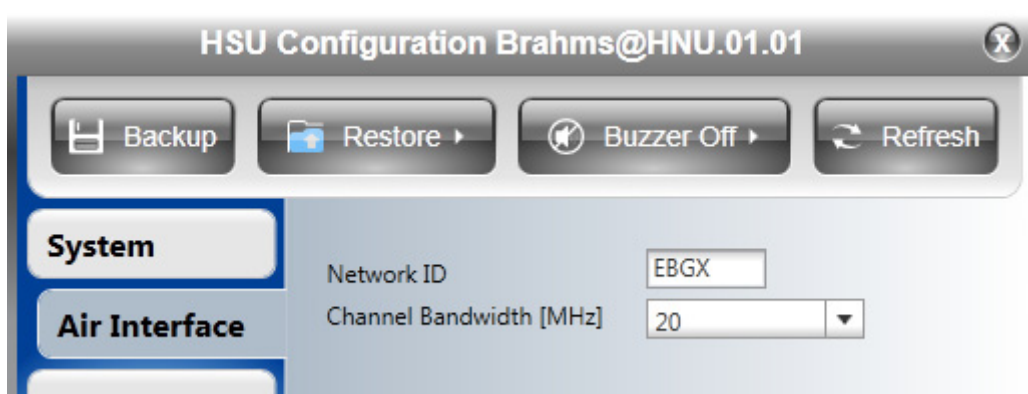


Figure 6-7: HSU Config. - Air Interface, stand-alone nomadic HSU or HMU

Use this feature to switch a nomadic HSU to a different network.

Where has my HSU gone?

Suppose that you installed two collocated HBSs with contiguous sectors. It is possible that an HSU located close to the common sector boundary may “discover” the wrong HBS. To remedy this, and force the HSU to register with the correct HBS, do the following:

1. Make sure the HSU is unregistered.
2. Log in directly to the HSU, and navigate to its Air Interface window:

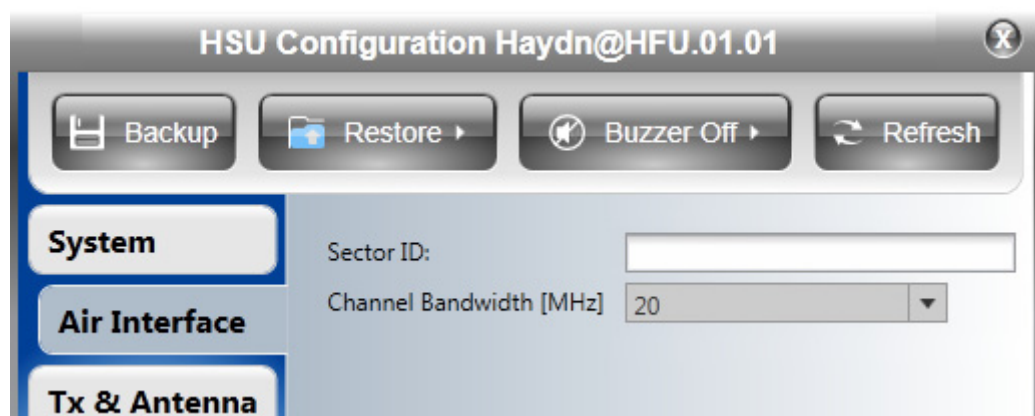


Figure 6-8: HSU Config. - Air Interface Unregistered HSU

3. Enter the Sector ID of the required HBS and click **OK**. The HSU should then “discover” the required HBS.

An additional way to prevent HSUs from discovering the wrong HBS is to configure the HBS using the **Secured Sync Type** option (See page 4-8 for instructions on how to do this).

This option requires all HSUs in the sector to have the same Network ID as the HBS. The Network ID is the first 4 digits of the Sector ID (see page 6-4).

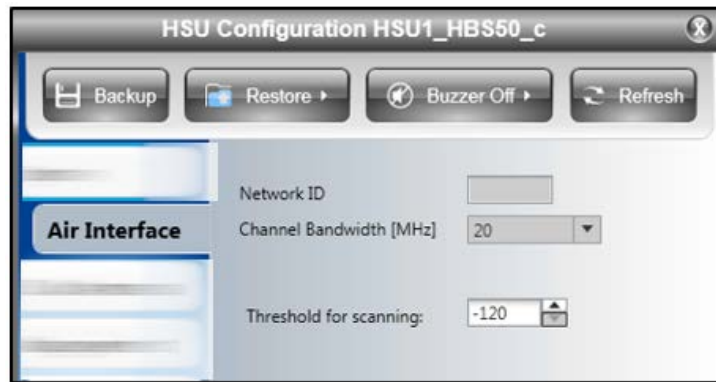


If the Secured Sync Type is Secured Network ID, and the wrong Network ID was entered in the HSU, the unit will be locked out of the sector for 10 minutes. Correct the Network ID, and at the end of this 10 minute period, the HSU will synchronize with the HBS.

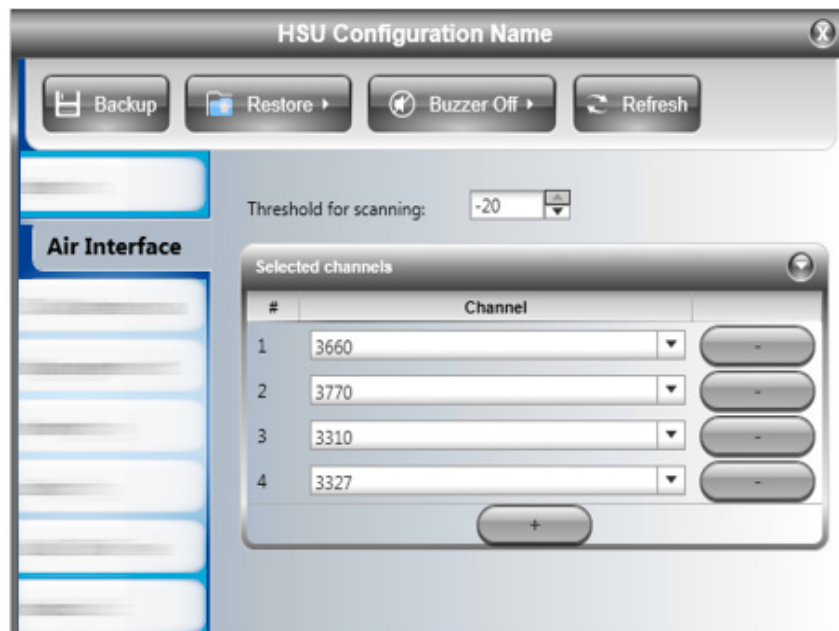
Working in the UNI environment and with 3.xGHz

If you are working in the UNI regulatory environment, you have a few more options:

For 5.x GHz and 3.x GHz units: When a nomadic unit is searching for a base station, you can select a threshold for scanning. Every 1MHz is checked. This threshold value is used as a jumping off point for a nomadic unit to scan for a base station. When the HSU detects a base station with a higher RSS value than the threshold, it locks on to it. Base stations with values lower than this are placed in a list, and the best one is chosen. Select this from **Air Interface**.



For 3.x GHz units only: Since every 250kHz is checked, the scan for the best unit can take quite some time. To reduce this time, you can choose a channel from which to start the scan. Select the channel from **Air Interface**. This is called “3.x High Resolution”.



6.2.3 Security



You may only change the SNMP community strings over a direct or over-the-air connection. You can change the Link Password for an un-synchronized HSU. Otherwise the functionality is the same as in [page 4-69](#).

Chapter 7: Monitoring and Diagnostics

7.1 Scope of This Chapter

This chapter describes how to work with the various monitoring and diagnostics tools available in the RADWIN Manager, including events, performance monitoring, traps and alarms.

7.2 Retrieving Link Information (Get Diagnostics)

The Get Diagnostics feature collects and writes link and Manager information from selected sites into a text file. The file information can be used for diagnostics and should be sent to RADWIN Customer Service to expedite assistance.



A supplementary diagnostics retrieval feature is available for the SU **PRO/AIR** EMB and SU **PRO/AIR** INT. See [Diagnostics](#) on [page 13-24](#).

The following table lists link and system information that can be monitored.

Table 7-1: Get Diagnostics Data and Description

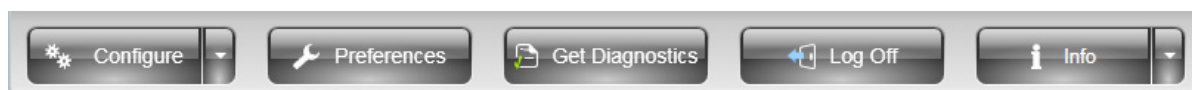
Data	Description
System Data	General information about the system
Events Log	<ul style="list-style-type: none">List of system events including those from other sites if this site is defined as the trap destinationLast 256 events from all sites
Sector Information	Information about the HBS and HSU settings

Table 7-1: Get Diagnostics Data and Description (Continued)

Data	Description
Site Configuration	Data about the site parameters
Monitor	Detailed event data record
HSU Connection Table	This is the Connection Table from Figure 4-27
Active Alarms	Active Alarms are raised for any event affecting availability or quality of service
Performance Monitor	Network performance data over defined time periods - - every 15 minutes for 30 days
Spectrum Analysis	For HBS, selected HSUs and general interference statistics for the sector
Service Categories	A list of service categories configured in the sector (available for HBS only).

➤ **To get diagnostics:**

1. Click **Get Diagnostics** from the RADWIN Manager main window:



One of the two following dialog boxes will appear, depending if you are accessing an HBS or HSU:

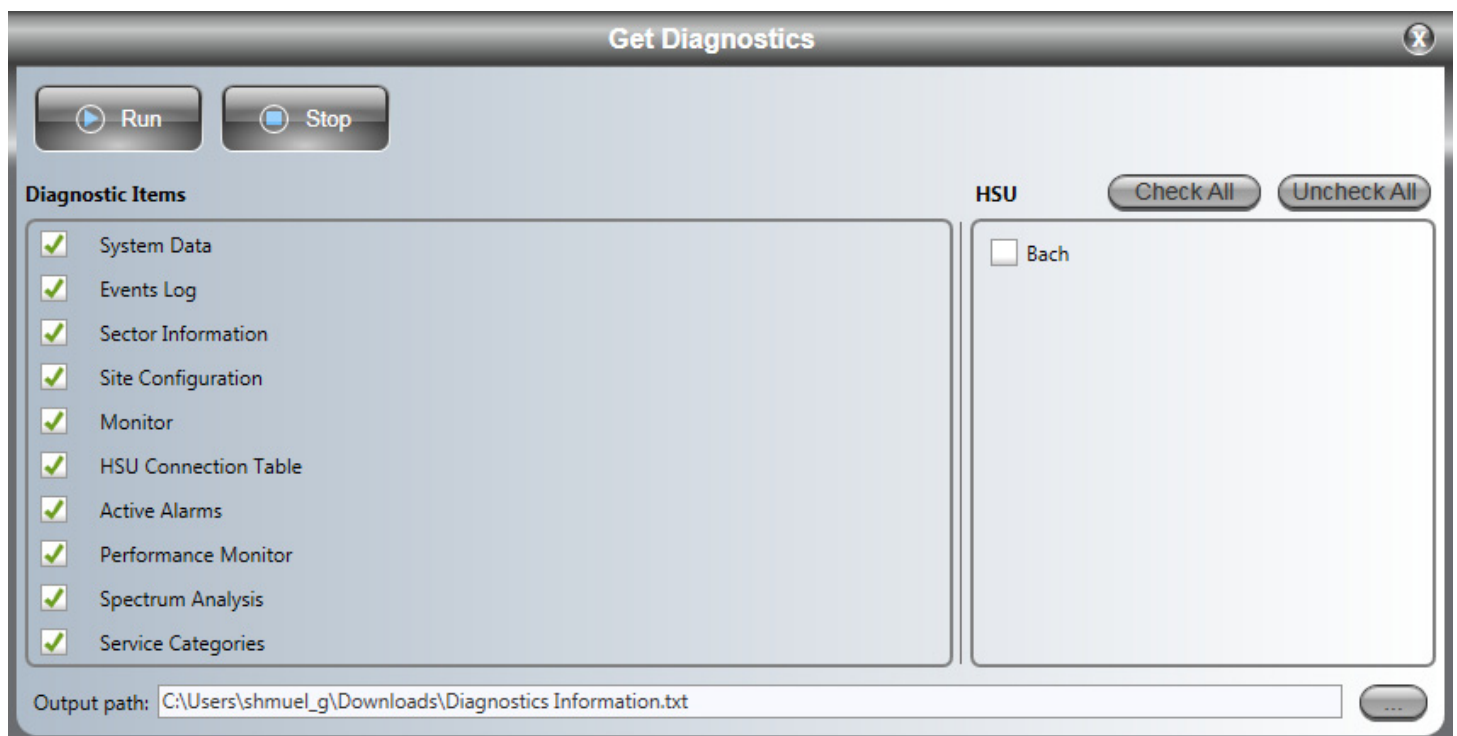


Figure 7-1: Get Diagnostics Dialog Box - HBS

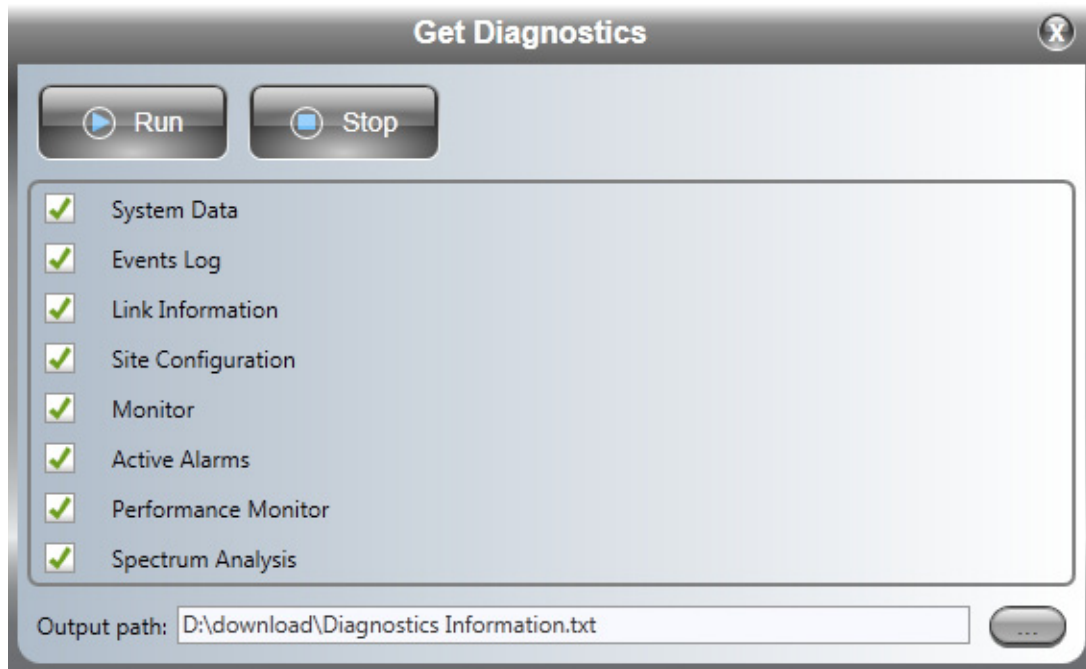


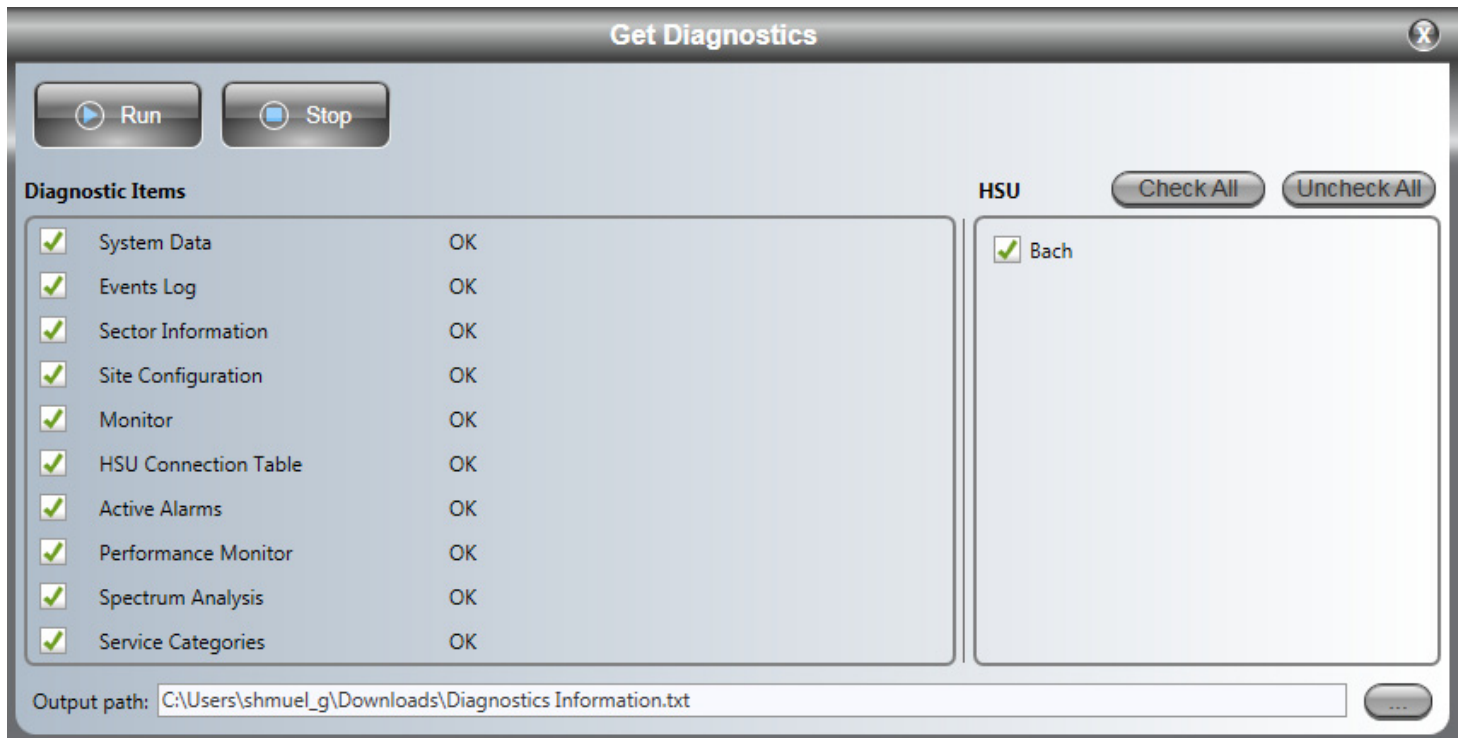
Figure 7-2: Get Diagnostics Dialog Box - HSU

2. Select or deselect the data options. If the file is to be sent to RADWIN Customer Service leave all options checked.
3. HBS only: Choose HSUs to be included.
4. Click the file browser button next to the **Output Path** field to specify the file name and folder in which you want to save the file and then click **Run** to save the information.



If you chose an HBS, you will get diagnostics for the whole sector. If you chose an HSU, you will only get diagnostics for that HSU.

On completion, the status of the checked items is confirmed:



The content of the Diagnostics report is an aggregate of all the more specific reports discussed below. It is primarily intended for use by RADWIN Customer Service.



The Spectrum Analysis output is available directly from the Spectrum View utility as a CSV file (see [Chapter 12](#)). The format in the Diagnostics report is intended for use by RADWIN Customer Service.

The Spectrum Analysis section of the Diagnostics report is based on the last available spectrum analysis (if any). If you are submitting a support request involving interference issues, or if you are specifically asked by Customer Service to submit a Diagnostics report containing a recent spectrum analysis, you should carry out the analysis in accordance with the instructions in [Chapter 12](#) prior to using the Get Diagnostics facility.

7.3 Link Compatibility

Compatibility between the HBS and an HSU is primarily determined by the software level of each element. Advisory messages are typically displayed as follows:

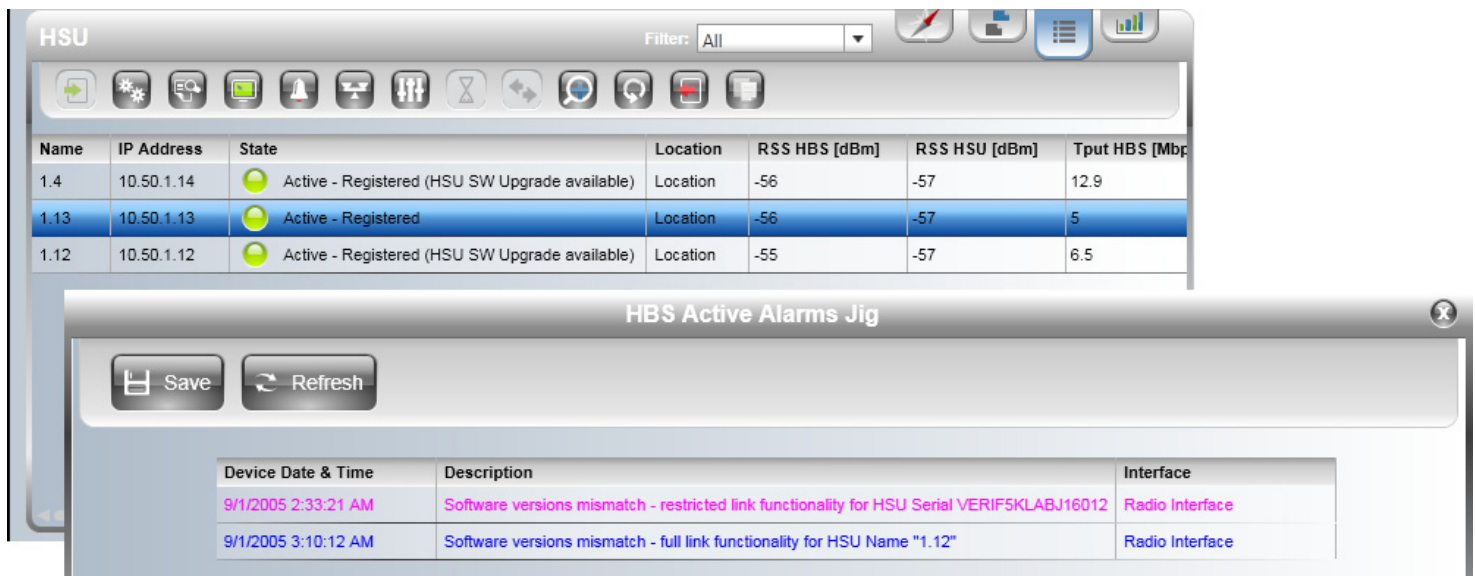


Figure 7-3: Typical incompatibility messages for HSUs on HBS display

On the HBS window, these messages can only be seen in HSU list mode, and in the HBS Active Alarms log.

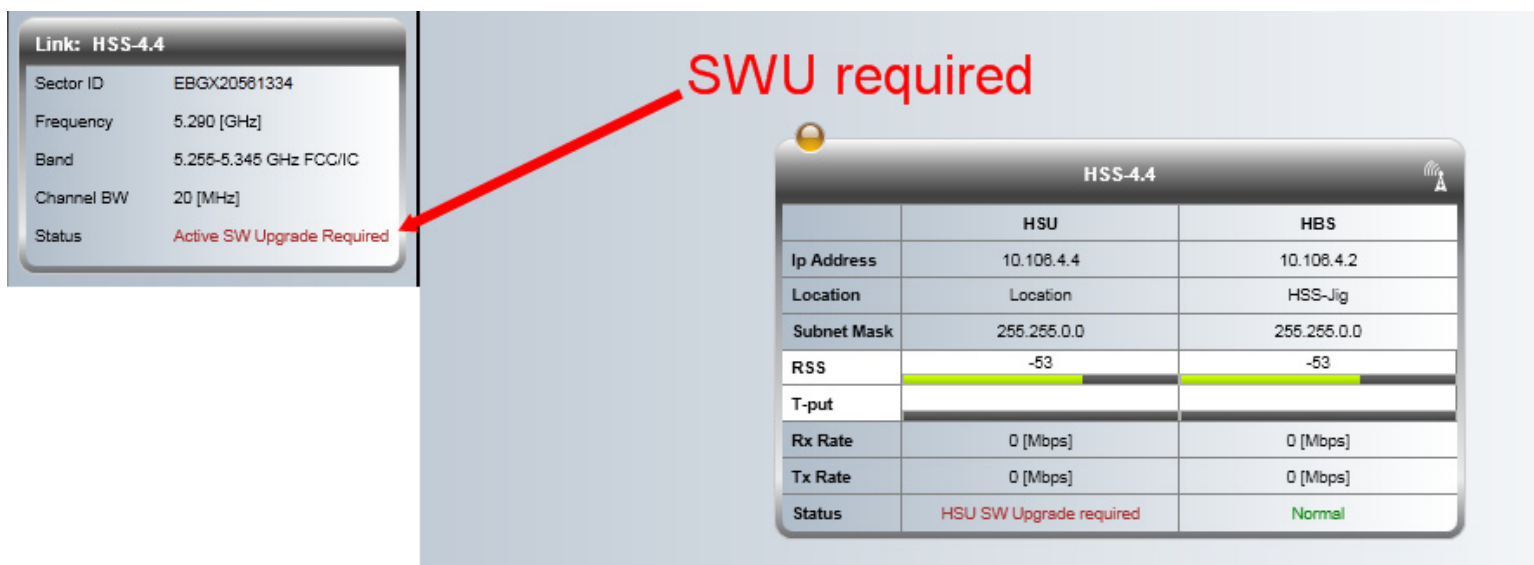


Figure 7-4: This HSU requires a software upgrade

On the HSU window, these messages appear as shown in Figure 7-4.

The messages are as follows:

7.3.1 Software Upgrade available

This is an advisory message. If the upgrade is not carried out, then corrections in the upgrade will not be available. This message may appear for an active HBS or any HSU in the sector, registered or not.

7.3.2 Software Upgrade recommended

This is also an advisory message. It typically occurs with a new HBS or new HSUs added to a sector.

If the upgrade is not carried out, then the HBS or HSU (s) will operate with limited or degraded functionality. This message may appear for an active HBS or any HSU in the sector, registered or not.

7.3.3 Software Upgrade required

This message will be displayed if a product band ID mismatch is detected.

Thus for a HBS, it cannot occur unless one or more HSUs are registered. Affected HSUs will always show it as depicted above in [Figure 7-4](#) above.

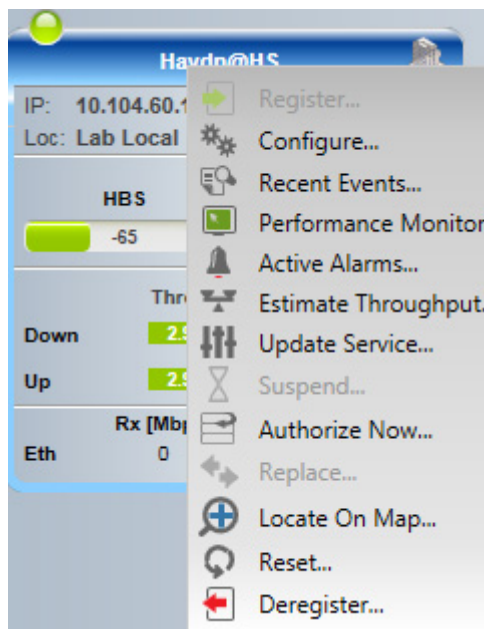
For such HSUs, traffic is disabled and the only services available are **Change Band** and **Software Upgrade**.

7.4 Throughput Checking

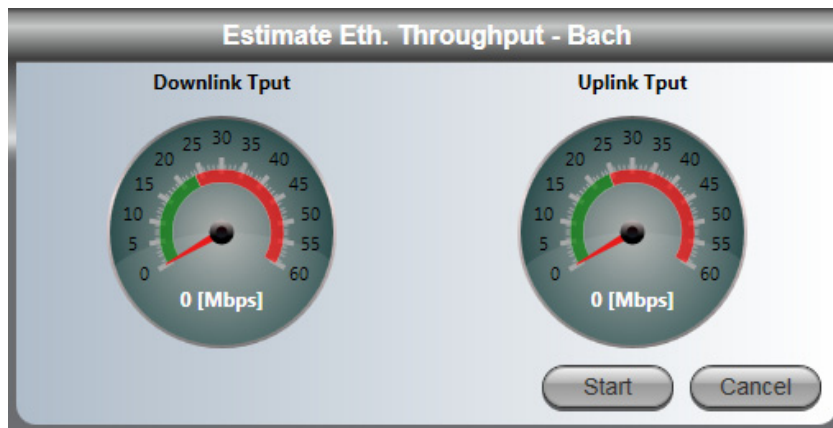
In this mode, RADWIN 5000 estimates Ethernet throughput per link.

➤ To use Throughput Checking:

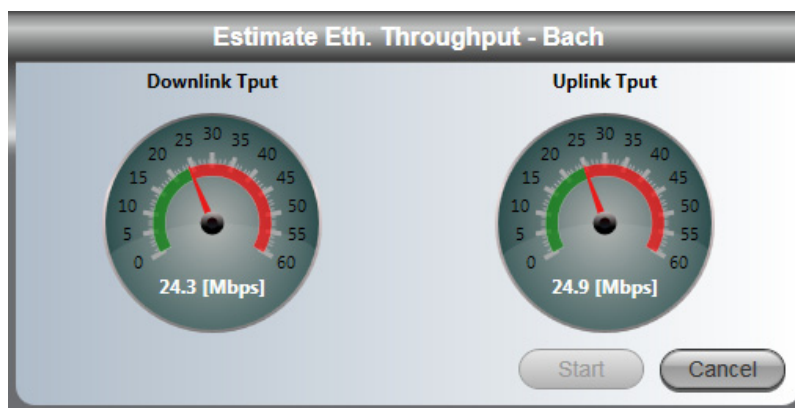
1. Right-click on the HSU for which you want to check throughput and choose **Estimate Throughput**:



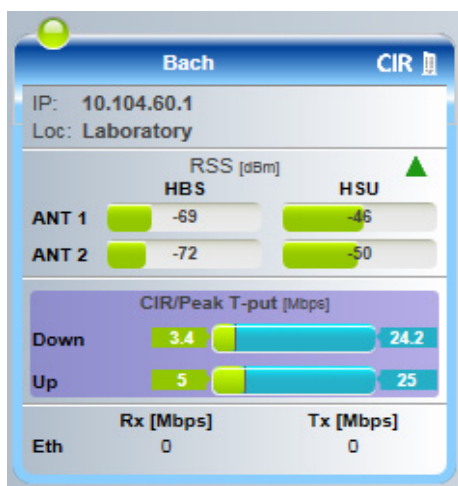
2. The throughput dial window appears. When you are ready to commence the throughput check, click **Start**.



The throughput dials show the changing throughput. The throughput is continually tested so long as the throughput dial window is kept open:



In addition, the Ethernet Services area of HSU card changes appearance and the estimated throughput is displayed:



To stop the throughput test, click **Cancel** in the throughput dial window. The display returns to normal.

7.5 Recent Events

The Recent Events log records system failures, loss of synchronization, loss of signal, compatibility problems and other fault conditions and events.



The foregoing event types include events from all links for which this managing computer has been defined as the traps address. Only events from RADWIN equipment will be shown.

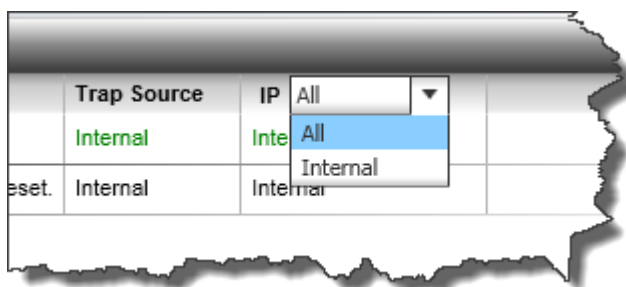
Alarms (traps) are displayed in the Events Log in the lower panel of the main window. The Events Log may be saved as a text file.

The Events Log includes the following fields:

- » Sequential number (ID)
- » Date and time stamp
- » Message
- » Trap source
- » IP address of the ODU that initiated alarm.

Events Log				
Number	Date & Time	Message	Trap Source	IP All ▼
000001	1/8/2013 1:09:29 PM	Connected to Bach@HBS.01.	Internal	Internal

You may filter the events shown by choosing All or Internal.



A full report may be seen by clicking **Recent Events**:

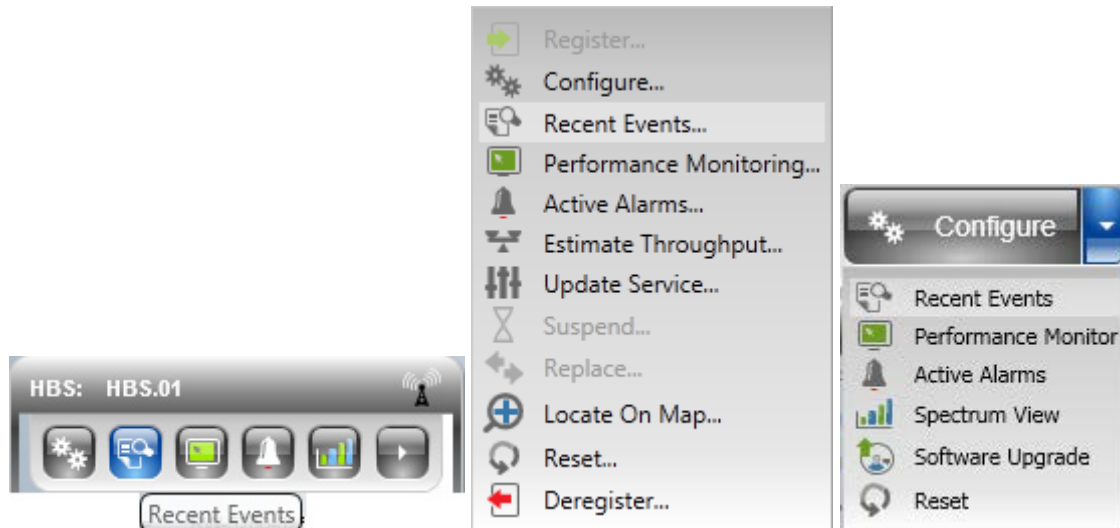


Figure 7-5: Recent Events: Left to right: HBS, HSU from HBS, HSU direct

In each case the report has the same format:

Number	Device Date & Time	Description	Interface
1	01/09/2005 00:00:00	Management port status changed to disconnected	Management Port on Odu
2	01/09/2005 00:00:00	The time was set to: THU SEP 01 00:00:00 2005	
3	01/09/2005 00:00:00	HBS ready	
4	01/09/2005 00:00:00	HBS Name inactive	Radio interface
5	01/09/2005 00:00:00	HSS operating state was changed to: Independent Unit	
6	01/09/2005 00:00:00	HSS multiple sync pulse sources were detected	
7	01/09/2005 00:00:00	HSS additional sync pulse was detected	
8	01/09/2005 00:00:00	HSS client status - Not Synchronized. The reason is: Pulse not detected	

Here is a more readable enlargement of the table area:

Number	Device Date & Time	Description	Interface
1	01/09/2005 00:00:00	Management port status changed to disconnected	Management Port on Odu
2	01/09/2005 00:00:00	The time was set to: THU SEP 01 00:00:00 2005	
3	01/09/2005 00:00:00	HBS ready	
4	01/09/2005 00:00:00	HBS Name inactive	Radio Interface
5	01/09/2005 00:00:00	HSS operating state was changed to: Independent Unit	
6	01/09/2005 00:00:00	HSS multiple sync pulse sources were detected	
7	01/09/2005 00:00:00	HSS additional sync pulse was detected	
8	01/09/2005 00:00:00	HSS client status - Not Synchronized. The reason is: Pulse not detected	

The left button may be used to save the report to a file.

7.6 Performance Monitoring

RADWIN 5000 Performance Monitoring constantly monitors traffic over the radio link and collects statistics data for the air interface and Ethernet ports. It does so continuously, even when the RADWIN Manager is not connected.

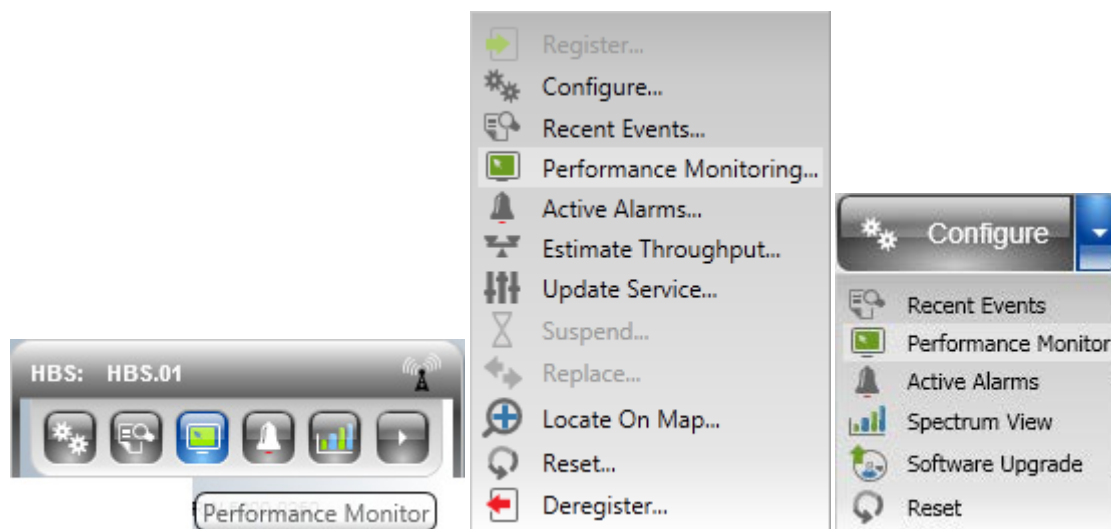


Figure 7-6: Performance Monitoring: L. to R. - HBS, HSU from HBS, HSU

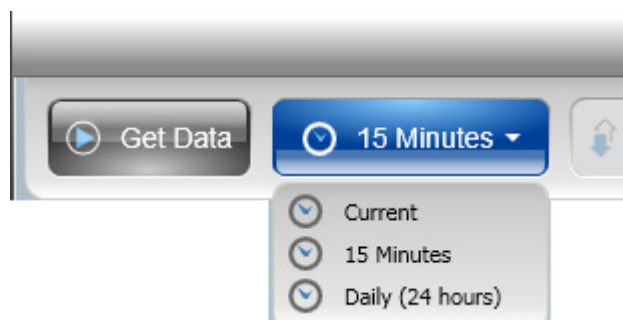
The on-screen and generated reports have the same general formats, but there are differences in what is reported.

7.6.1 HBS

The HBS Performance Monitoring window offers the following button menu:



Choose the data period required with the **15 Minutes** button.



- **Current** gives you the latest entry.
- **15 Minutes** provides data in a scroll down list in 15 minute intervals
- **Daily (24 hours)** shows results for the last 30 days at midnight.

The Threshold button enables you to set the upper traffic threshold for reporting. Traffic conditions above the threshold indicate congestion and probably lost frames.



Figure 7-7: Setting the upper traffic threshold

To get data for display, click **Get Data**. The process may take a few seconds.

Here is an extract Performance Monitoring report based on 15 minutes recording:

Integrity	Date & Time	UAS	ES	SES	BBE	Rx MBytes	Tx MBytes	Above Traffic Thresh (100.0 Mbps)	Active Seconds
✓	5/15/2012 10:30:00 AM	0	0	0	0	0	1	0	900
✓	5/15/2012 10:15:00 AM	0	0	0	0	0	1	0	900
✓	5/15/2012 10:00:00 AM	0	0	0	0	0	1	0	900
✓	5/15/2012 9:45:00 AM	0	0	0	0	0	1	0	900
✓	5/15/2012 9:30:00 AM	0	0	0	0	0	1	0	900
✓	5/15/2012 9:15:00 AM	0	0	0	0	0	0	0	900
✓	5/15/2012 9:00:00 AM	0	0	0	0	0	0	0	900
✓	5/15/2012 8:45:00 AM	0	0	0	0	0	0	0	900
✓	5/15/2012 8:30:00 AM	0	0	0	0	0	0	0	900

Figure 7-8: HBS - Performance Monitoring report - Valid data

The meaning of the column headings is shown in the following table:

Table 7-2: HBS Performance Monitoring Fields

Column Heading	Abbreviation Meaning	Description
Integrity	Valid data flag	Green tick for current and valid; Red cross for invalidated data (See example below). Note that the Performance Monitoring data is not valid if not all the values were stored (e.g., due to clock changes within the interval or power up reset)
Date & Time	Time stamp	Data are recorded every 15 minutes; the last 30 days of recordings are maintained. Roll-over is at midnight.
UAS	Unavailable Seconds	Seconds in which the interface was out of service.
ES	Errored seconds	The number of seconds in which there was at least one error block.
SES	Severe Errored Seconds	The number of seconds in which the service quality was low as determined by the BBER threshold.

Table 7-2: HBS Performance Monitoring Fields (Continued)

Column Heading	Abbreviation Meaning	Description
BBE	Background Block Error	The number of errored blocks in an interval.
Rx MBytes	Received Mbytes	The number of Megabytes received at the specified port within the interval
Tx MBytes	Transmitted Mbytes	The number of Megabytes transmitted at the specified port within the interval.
Above Traffic Thresh	Threshold set in Figure 7-7	Seconds count when actual traffic exceeded the threshold
Active Seconds		The number of seconds that the configured Ethernet service is active

Data becomes invalidated following a reset. In the example below, the HBS was reset shortly after 11:00. All data prior to that time becomes invalidated. The only valid item is the first recording after re-sync.

Integrity	Date & Time	UAS	ES	SES	BBE	Rx MBytes	Tx MBytes	Above Traffic Thresh (100.0 Mbps)	Active Seconds
✓	5/14/2012 6:00:00 PM	0	0	0	0	2	3	0	900
✓	5/14/2012 5:45:00 PM	0	0	0	0	1	3	0	900
✓	5/14/2012 5:30:00 PM	0	0	0	0	0	2	0	900
✓	5/14/2012 5:15:00 PM	0	0	0	0	1	1	0	900
✓	5/14/2012 5:00:00 PM	6	0	0	0	0	2	0	894
✗	5/14/2012 4:45:00 PM	0	0	0	0	0	0	0	0
✗	5/14/2012 4:30:00 PM	0	0	0	0	0	0	0	0
✗	5/14/2012 4:15:00 PM	0	0	0	0	0	0	0	0
✗	5/14/2012 4:00:00 PM	0	0	0	0	0	0	0	0

Figure 7-9: HBS - Performance Monitoring report - Showing invalid data

Use the **Save** button to store the current data to file and the **Clear** button to delete currently stored performance data.

7.6.2 HSU

The Performance Monitoring window for the HSU is slightly different depending on whether you access it from the HBS or directly:

From the HBS



You may chose between an uplink or downlink report. The remaining buttons have the same functionality as they do for the HBS. (There is no significance in monitoring period button label, **Daily**. The options are as for the HBS.)

Direct or Over the Air



Here, only a downlink report is available. Otherwise the buttons have the same functionality as they do for the HBS.

Here is an extract from a 15 minute report. We have broken it into three pieces so that it is legible:

Date & Time	UAS	ES	SES	BBE	Min RSL (dBm)	Max RSL (dBm)	RSL Thresh 1 (-88 dBm)	RSL Th
20/06/2011 13:15:00	0	0	0	0	-58	-57	0	0
20/06/2011 13:00:00	0	0	0	0	-58	-58	0	0
20/06/2011 12:45:00	0	0	0	0	-58	-58	0	0
20/06/2011 12:30:00	0	0	0	0	-58	-58	0	0
20/06/2011 12:15:00	0	0	0	0	-58	-58	0	0
20/06/2011 12:00:00	0	0	0	0	-58	-58	0	0
20/06/2011 11:45:00	0	0	0	0	-58	-58	0	0
20/06/2011 11:30:00	0	0	0	0	-58	-58	0	0
20/06/2011 11:15:00	6	0	0	0	-58	-54	1	1
20/06/2011 11:00:00	0	0	0	0	0	0	0	0
20/06/2011 10:45:00	0	0	0	0	0	0	0	0

Figure 7-10: HSU - Performance Monitoring - Valid and invalid data (1 of 3)

RSL Thresh 2 (-88 dBm)	Min TSL (dBm)	Max TSL (dBm)	TSL Thresh (25 dBm)	BBER Thre
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
0	5	5	0	0
1	5	5	0	0

Figure 7-11: HSU - Performance Monitoring - Valid and invalid data (2 of 3)

(25 dBm)	BBER Thresh (1.0 %)	Rx MBytes	Tx MBytes	Below Capacity Thresh (0.0 Mbps)	Above Traffic Thresh (100.0 Mbps)
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Figure 7-12: HSU - Performance Monitoring - Valid and invalid data (3 of 3)

The HSU report contains many more fields than the HBS. Here is their meaning::

Table 7-3: HSU Performance Monitoring Fields

Column Heading	Abbreviation Meaning	Description
Integrity	Valid data flag	Green tick for current and valid; Red cross for invalidated data (See example below). Note that the Performance Monitoring data is not valid if not all the values were stored (e.g., due to clock changes within the interval or power up reset)
Date & Time	Time stamp	Data are recorded every 15 minutes; the last 30 days of recordings are maintained. Roll-over is at midnight
UAS	Unavailable Seconds	Seconds in which the interface was out of service
ES	Errored seconds	The number of seconds in which there was at least one error block.
SES	Severe Errored Seconds	The number of seconds in which the service quality was low as determined by the BBER threshold
BBE	Background Block Error	The number of errored blocks in an interval
Min RSL (dBm)		The minimum of the receive signal level (measured in dBm)
Max RSL (dBm)		The maximum of the receive signal level (measured in dBm)
RSL Thresh 1 (-88dBm)		The number of seconds in which the Receive Signal Level (RSL) was below the specified threshold.
RSL Thresh 2 (-88dBm)		The number of seconds in which the RSL was below the specified threshold.
Min TSL (dBm)		The minimum of the transmit signal level (measured in dBm)

Table 7-3: HSU Performance Monitoring Fields (Continued)

Column Heading	Abbreviation Meaning	Description
Max TSL (dBm)		The maximum of the transmit signal level (measured in dBm)
TSL Thresh (25 dBm)		The number of seconds in which the Transmit Signal Level (TSL) was above the specified threshold
BBER Thresh (1.0%)		The number of seconds in which the Background Block Error Ratio (BBER) exceeded the specified threshold
Rx MBytes	Received Mbytes	The number of Megabytes received at the specified port within the interval
Tx MBytes	Transmitted Mbytes	The number of Megabytes transmitted at the specified port within the interval.
Below Capacity Thresh	(0.0 Mbps)	Seconds count when throughput fell below the threshold set in Figure 7-7
Above Traffic Thresh	Threshold set in Figure 7-7	Seconds count when actual traffic exceeded the threshold

As for the HBS, use the **Save** button to store the current data to file and the **Clear** button to delete currently stored performance data.

7.6.3 More on the Thresholds

RSL Thresholds

Two RSL Thresholds can be defined. They are used as an indicator of problems in the radio channel. You can check the RSS from the Link Budget Calculator results during installation. Values of -5dB and -8dB from the current RSS are typical.

TSL Threshold

A counter is maintained, of the number of second intervals during which Tx power exceeds this threshold.

BBER Threshold

The Background Block Error Ratio is measured as a percentage. The threshold can be set from 0.1% up to 50%.

An 8% threshold is recommended. If there are no problems during the interval, then for that threshold, the recommended BBER value should be 0. Since the system provides a lossless Ethernet service, there is throughput degradation in case of interference. The degradation is proportional to the BBER.

Ethernet Thresholds - Capacity

This is used as a basis for checking adherence to a Service Level Agreement. It is the number of seconds count that the link capacity falls below the threshold.

Ethernet Thresholds - Traffic

The number of seconds count that received traffic exceeded this threshold. It can be used to measure traffic peaks.

7.7 RADWIN Manager Traps

The RADWIN Manager application issues traps to indicate various events, displayed in the Events Log.

Table 7-4: RADWIN Manager Trap Messages


Trap Message	Severity	Remarks
Cannot bind to trap service port. Port 162 already in use by ProcessName (pid: ProcessId)	Warning	RADWIN Manager will not catch any traps from the ODU, some other application has grabbed this port.
Device unreachable!	Error	Check connectivity to ODU
Connected to <site_name>	Information	
<site_name> Site will be reset.	Information	
Restore Factory Default Settings in process on Site <site_name>	Information	
Factory Settings: The process was not finished due to connection issues.	Warning	Factory setting failed due to connectivity problem to ODU
Reset: The process was not finished due to connection issues.	Warning	Factory setting failed due to connectivity problem to target - ODU will not be reset
Cannot Write to Monitor file. There is not enough space on the disk.	Warning	Free some space on disk on the managing computer and retry
Windows Error: <error_ID>. Cannot Write to Monitor file.	Warning	Operating System error on the managing computer
Identical IP addresses at <local_site_name> and <remote_site_name>	Warning	Set up a different IP to each site
The Product is not identified at the <local_site_name> site.	Warning	RADWIN Manager is incompatible with the ODU software version
The Product is not identified at the <remote_site_name> site.	Warning	
The Product is not identified at both sites.	Warning	
Product Not Identified!	Warning	

Table 7-4: RADWIN Manager Trap Messages (Continued)

Trap Message	Severity	Remarks
The Manager identified a newer ODU release at the <remote_site_name> site.	Warning	ODU release is newer than RADWIN Manager release. Wizards are not available. RADWIN Manager will be used just for monitoring. Upgrade the RADWIN Manager. (You will get this message as a pop up)
The Manager identified a newer ODU release at the <local_site_name> site.	Warning	
Newer Version identified at the <local_site_name> site.	Warning	ODU release is newer than RADWIN Manager release. Wizards are not available. RADWIN Manager will be used just for monitoring. Upgrade the RADWIN Manager.
Newer Version identified at the <remote_site_name> site.	Warning	
Newer Version Identified!	Warning	

7.8 Active Alarms

Active Alarms are raised for any event affecting availability or quality of service.

The Active Alarms button,  is available for the HBS and the HSUs. Here is an example:

HSU Active Alarms Haydn@HFU.01.01		
<div> <div>Save</div> <div>Refresh</div> </div>		
Device Date & Time	Description	Interface
9/1/2005 12:00:00 AM	Management port status changed to disconnected	Management Port on Odu

Here is the table part in more detail:

Device Date & Time	Description	Interface
9/1/2005 12:00:00 AM	Management port status changed to disconnected	Management Port on Odu

Current Active Alarms may be saved to a file. The list displayed will not be updated unless you click **Refresh**.

7.8.1 Customer Service

Customer support for this product can be obtained from the local VAR, Integrator or distributor from whom it was purchased.

Chapter 8: Backup, Restore, and Upgrade

8.1 Scope of This Chapter

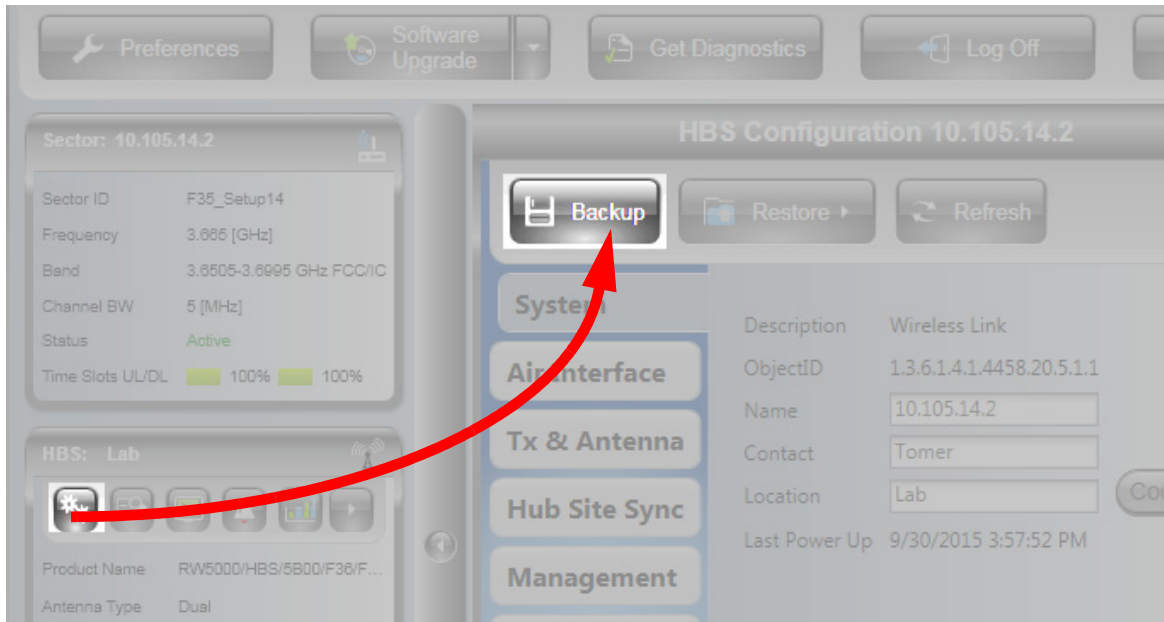
This chapter shows you how to back up and restore the software as well as the sector configuration as defined in the HBS in addition to upgrading the software.



The default file transfer protocol for backups, restore and upgrades is FTP. However, if your system has extensive FTP firewalls or FTP blocks, and you are working with SU **PRO/AIR** EMB and/or SU **PRO/AIR** INT with an HBS JET unit, you can use HTTP to transfer the files needed. See [File Transferring](#) on page 2-35 for more details.

8.2 System Backup

1. In the RADWIN Manager, from the HBS, open the **Configuration** window, then click the **Backup** button:



2. A Windows dialog will open prompting you to save the backup file. Save the backup file in a convenient location.
 - This backup file has a name constructed from the IP address of the HBS and the present date.
 - The file includes **all** system and software information, and is used to carry out both a Configuration Restore, and a Full Restore.

8.3 Bulk Software Backup

You can back up the sector software (only) using the HBS main button menu.



The Bulk Backup tab opens the following window of the Software Upgrade Utility:

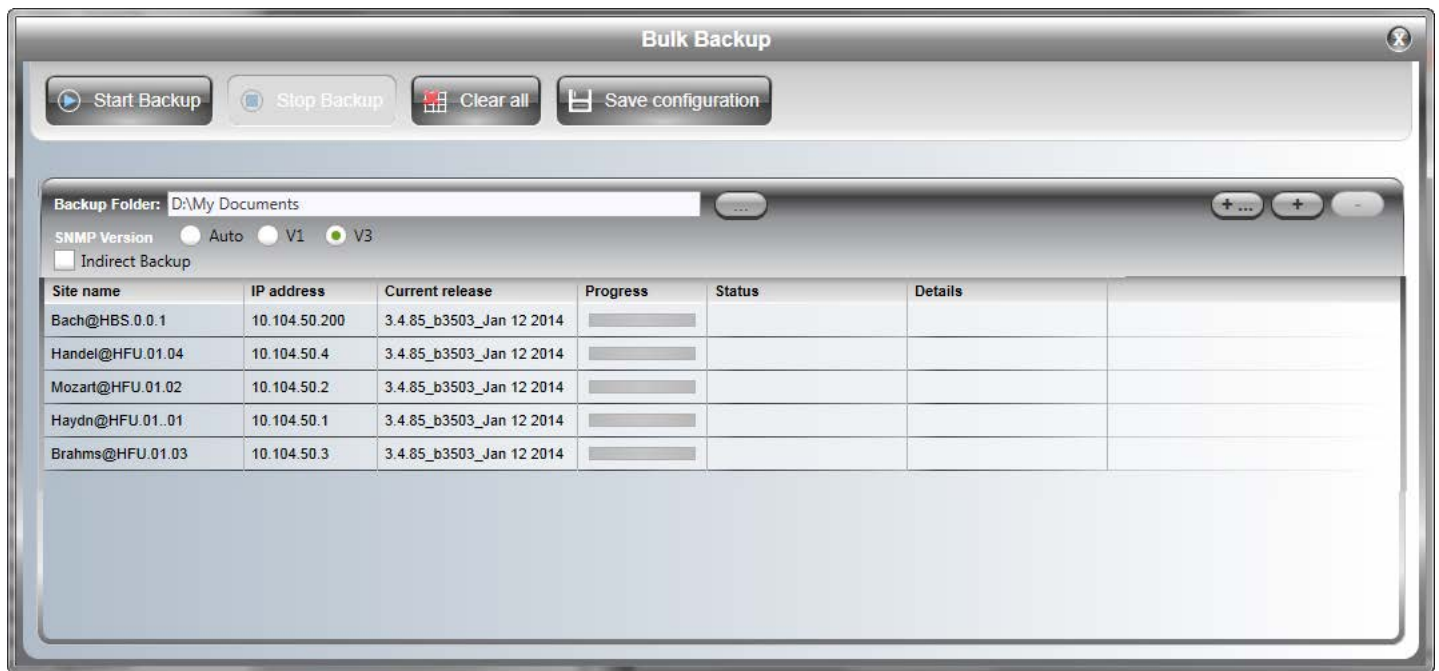


Figure 8-1: Bulk Backup setup window

The method of selection, addition or removal of items follows the same pattern as in SWU selection, [Figure 8-2](#).

Indirect Backup - enables you to backup subscriber units without having to define their IP addresses (available for the JET base station and SU **PRO/AIR** EMB and SU **PRO/AIR** INT subscriber units only).

Save configuration produces a text file in the format for upgrading an installed sector, as in the example on [page 8-8](#).

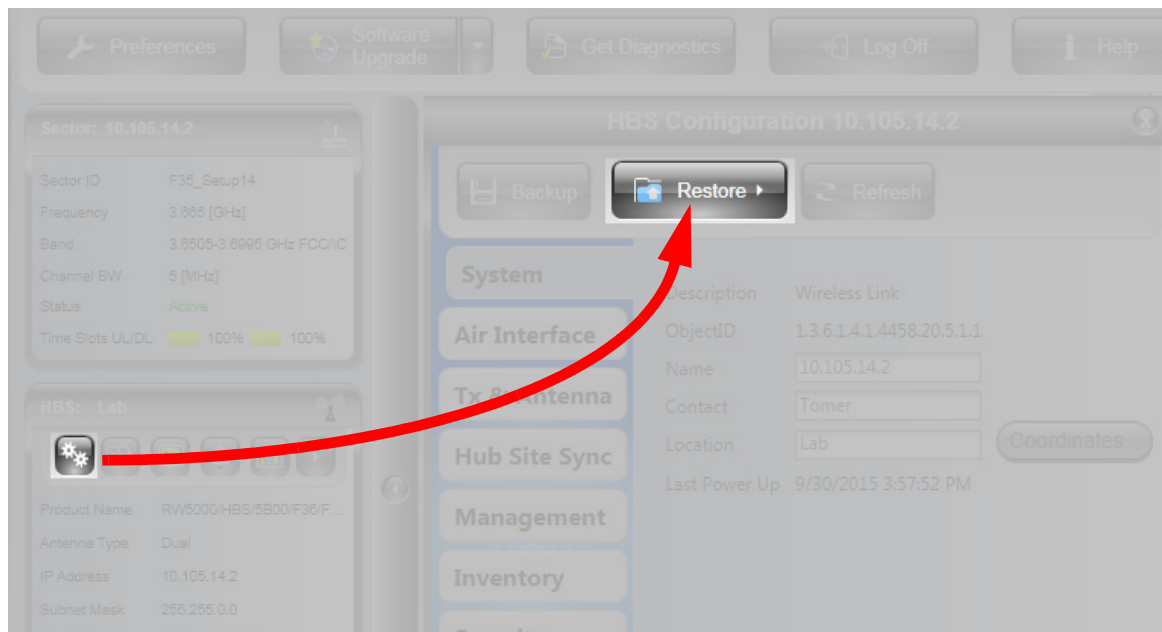
8.4 Configuration Restore

A configuration restore includes only certain configuration parameters (as shown in [Step 6](#) below). It does not restore the system software.

- HBS: A configuration restore can be carried out on either the same HBS unit, or a different HBS unit, even if the hardware version is different.
- HSU: A configuration restore can be carried out on either the same HSU unit, or a different HSU unit, but the hardware version must be the same.
- HBS and HSU: If you change one unit for a different unit whose part number and hardware version are the same, you can only do a [Full Restore](#) on the unit; you cannot do a [Configuration Restore](#) only.

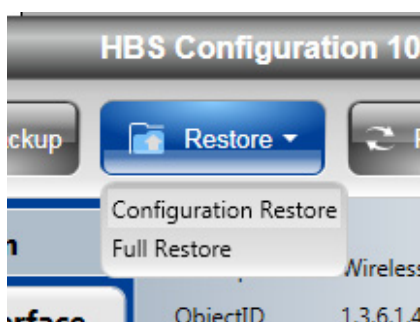
3. Make sure the HBS/HSU is deactivated before starting a Configuration Restore.

- Open the RADWIN Manager, and from the HBS/HSU, open the **Configuration** window, then click the **Restore** button:



Do NOT activate the unit at this point.

- From the two options that appear, click **Configuration Restore**:



- Choose the file you saved in Step 1. of [System Backup](#), and click **Open**. A warning message might appear stating that the current configuration settings may be lost. If this is acceptable, click **Yes**.

Categories restored are as follows:

- System Configuration (see [4.2.2 System](#))
- Trap Destination (see [4.2.6 Management](#)) (for SNMPv1 only)
- Protocol (see [4.2.6 Management](#))
- Date & Time (see [4.2.9 Date & Time](#))
- QoS Configuration (see [4.2.10 Ethernet](#))

- HSU Connection Table (see [4.3 HSU Connection Table](#))
- HSU Registration (restores the list of HSUs, and registers them)
- Service Categories (see [4.2.13 RADIUS](#))



Categories not listed (such as VLAN definition, Hub Site Synchronization, Antenna configuration, etc.) must be re-configured manually.

-
7. Once the system configuration has been restored, a message will appear informing you that the restoration was completed successfully, and that you must reset the site.
 8. Restore other configuration items that require manual restoration. .



If you mistakenly activated the HBS/HSU at Step [3](#), de-activate it by choosing **Configuration -> Operations -> Restore Defaults**, and continue with the rest of the steps.

Do not de-activate it by using the Deactivate option.

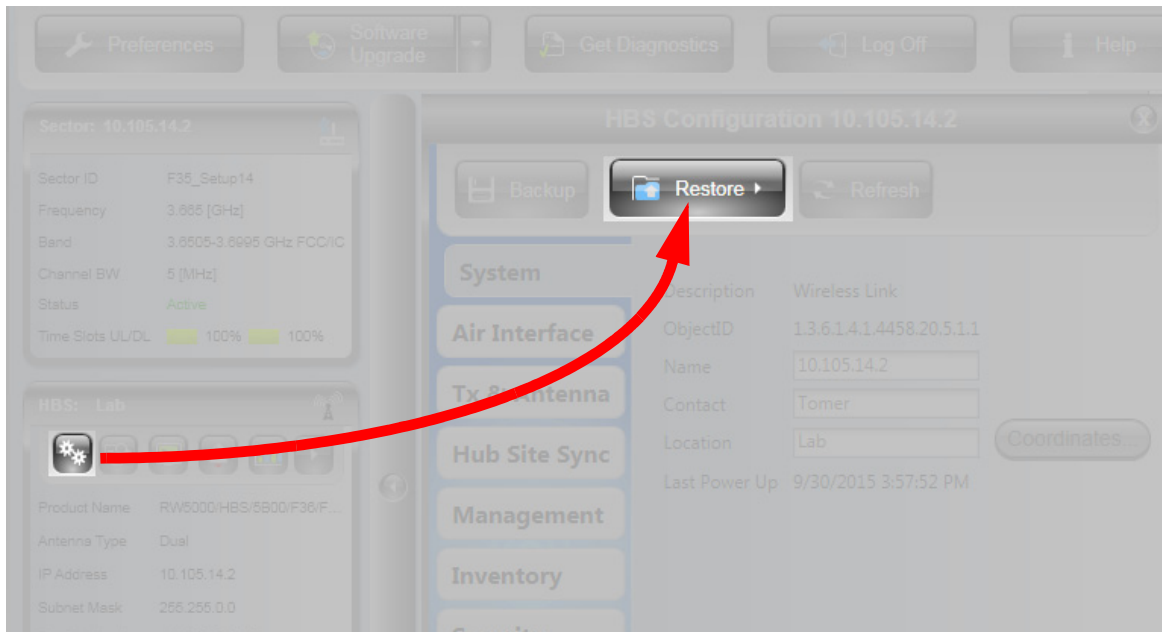
8.5 Full Restore

A Full Restore includes all configuration parameters (as shown in Step [6](#). above), in addition to system software.

A Full Restore can be carried out on either the same HBS/HSU unit from which a backup was carried out, or on a different HBS/HSU unit. If doing a Full Restore on a different HBS unit, the hardware version must be the same as that of the backup HBS unit (to see the hardware version, choose **Configuration -> Inventory**. For more details, see [Inventory](#) on page [4-30](#)).

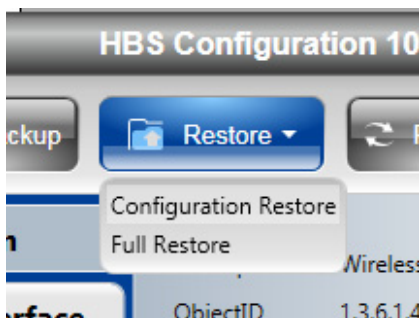
1. Make sure the HBS/HSU is deactivated before starting a Configuration Restore.

2. Open the RADWIN Manager, and from the HBS/HSU, open the **Configuration** window, then click the **Restore** button:



Do NOT activate the unit at this point.

3. From the two options that appear, click **Full Restore**:



4. Choose the file you saved in Step 1. of [System Backup](#), and click **Open**. A warning screen will appear indicating for which version the system will perform the restore. Click **Yes** to continue. The system will carry out a Full Restore.

In addition to the system software, a Full Restore includes all items listed in the Configuration Restore (as shown in Step 6. of [Configuration Restore](#), above), but like Configuration Restore, does not include items not listed there.

5. Restore other configuration items that require manual restoration.

8.6 To Upgrade from a non-JET based HBS to a JET based HBS

1. Carry out a System Backup as explained above (see [System Backup](#) on page 8-2)
2. Switch the hardware from the non-JET based HBS to a JET based HBS.
3. Install the relevant software on the JET based HBS.
4. Carry out a Configuration Restore on the JET based HBS as explained above (see [Configuration Restore](#) on page 8-3).

8.7 Upgrading an Installed Sector

➤ To upgrade software for a link:

1. In the RADWIN Manager, click the **Software Upgrade** button. The Software Upgrade Utility opens:

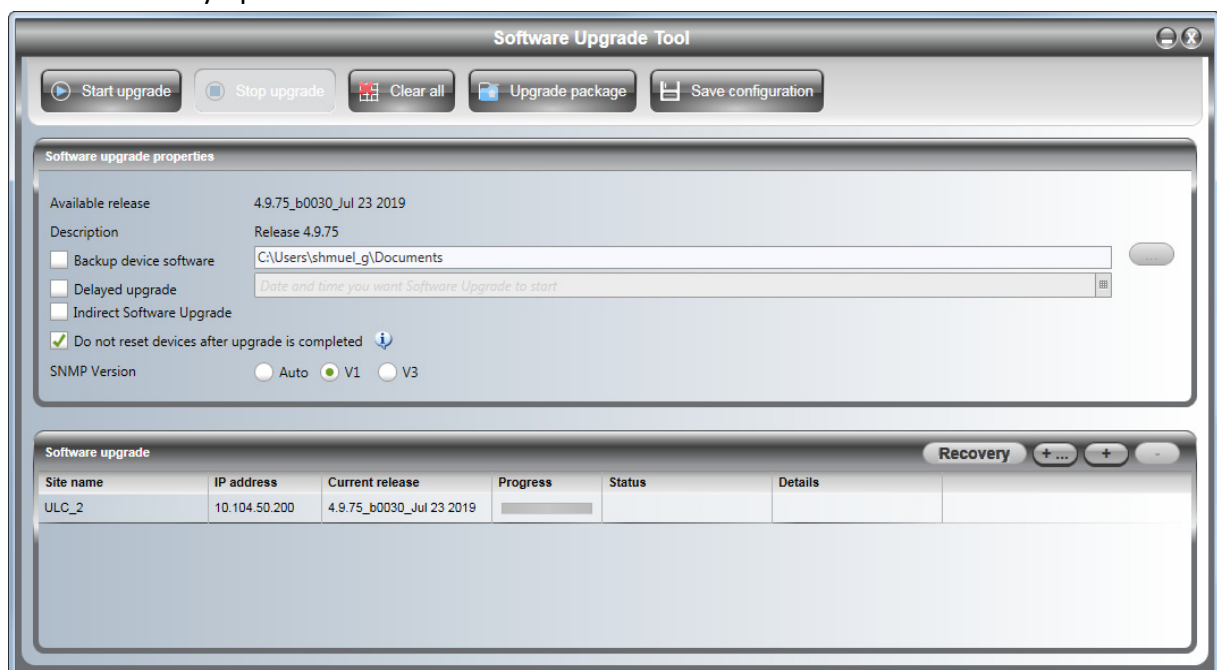



Figure 8-2: Software Upgrade Utility - Main window

The default sites shown in the Software Upgrade list panel belong to the currently installed sector. The list may be empty if you are running the RADWIN Manager “offline”.

2. To back up your existing system, check **Backup device software** check-box. Then click the  button for a standard file dialog. The default location is the My Documents directory on the managing computer or the last backup directory you used.



The backup here is the same as that on [page 4-1](#), and serves the same purpose. It provides a fallback if the upgrade proves problematic. Further information about the backup utility is provided on [page 8-2](#).

- In addition to the previous step, you may opt to perform a delayed upgrade. Check the **Delayed Upgrade** box, and enter the date and time for the delayed upgrade. A Calendar dialog box opens:



- Indirect Software Upgrade** - allows you to upgrade the subscriber units without having to define their IP addresses. Note that this does not work if the sector uses IPv6, or you have chosen to use HTTP as the file transfer protocol (available for the JET base station and SU **PRO/AIR** EMB or SU **PRO/AIR** INT subscriber units only).
- Choose the SNMP version of the units: V1, V3 or Auto.
- The Software upgrade list title bar has three buttons on the right hand side.



Figure 8-3: Add / Remove site buttons

The **left button** opens up a Windows file dialog to locate a list of locations to update. The list has the following format:

<IP address>,<Read-Only community>,<Read-Write community>

For example:

10.104.50.200,netman

10.104.50.4,netman

10.104.50.2,netman

10.104.50.1,netman

10.104.50.3,netman

The list should include HBSs and HSUs able to accept the same upgrade. This is unlikely to be a problem unless you are using equipment prior to the 3.3.00 release

of RADWIN 5000. Non-upgradable items will result in an error message. Contact Customer Service about upgrading them.

The **center button** allows you to add a single site:



The image shows a dialog box titled "Add Device". It contains four input fields: "IP Address", "Read-Write Community", "User Name:", and "Password:". Below these fields are two buttons: "OK" and "Cancel".

Figure 8-4: Adding a single site for upgrade

Enter the IP address of the site, the Read-Write Community (Default: **netman**), user-name, password, and then click **OK**. The site will appear in the Software Upgrade list box.

Items from the list can be cleared by selecting them and then using the **right button**.


The right button in Figure 8-4, may be used to remove one or more selected sites.

7. Having created an update list, click **Upgrade Package** to chose the relevant files. The default files are located in the **SWU** subdirectory in the RADWIN Manager installation area. You may see one or more of the following SWU files:

Table 8-1: SWU Files by product

Product	File name
RADWIN 5000	SWU_5k.swu
RADWIN GSU	SWU_gs.swu
SU PRO/AIR EMB	SWUL_5k.swul
SU PRO/AIR INT	SWUL_5k.swul

For RADWIN 5000, choose **SWU_5k.swu**, but this will not include the SU **PRO/AIR** EMB or SU **PRO/AIR** INT radios. To upgrade the SU **PRO/AIR** EMB or SU **PRO/AIR** INT radio, choose SWUL_5k.swul

8. **Do not reset** this option instructs the RADWIN Manager to not reset the units after the upgrade is done. Note that even if you select this option, if you are upgrading the SU **PRO/AIR** EMB or SU **PRO/AIR** INT or a JET, the unit will be reset in any case.
9. **Recovery:** If a unit has failed an upgrade, you can attempt an upgrade to a new software version, but with the factory default settings (except IP address). To upgrade in this manner, click the **Recovery** button () and follow the instructions on screen. After recovery, you might lose the connection to the unit.

10. Click **Start Upgrade** to commence the process. For an immediate upgrade you will be able to observe the upgrade progress from the green progress bars:

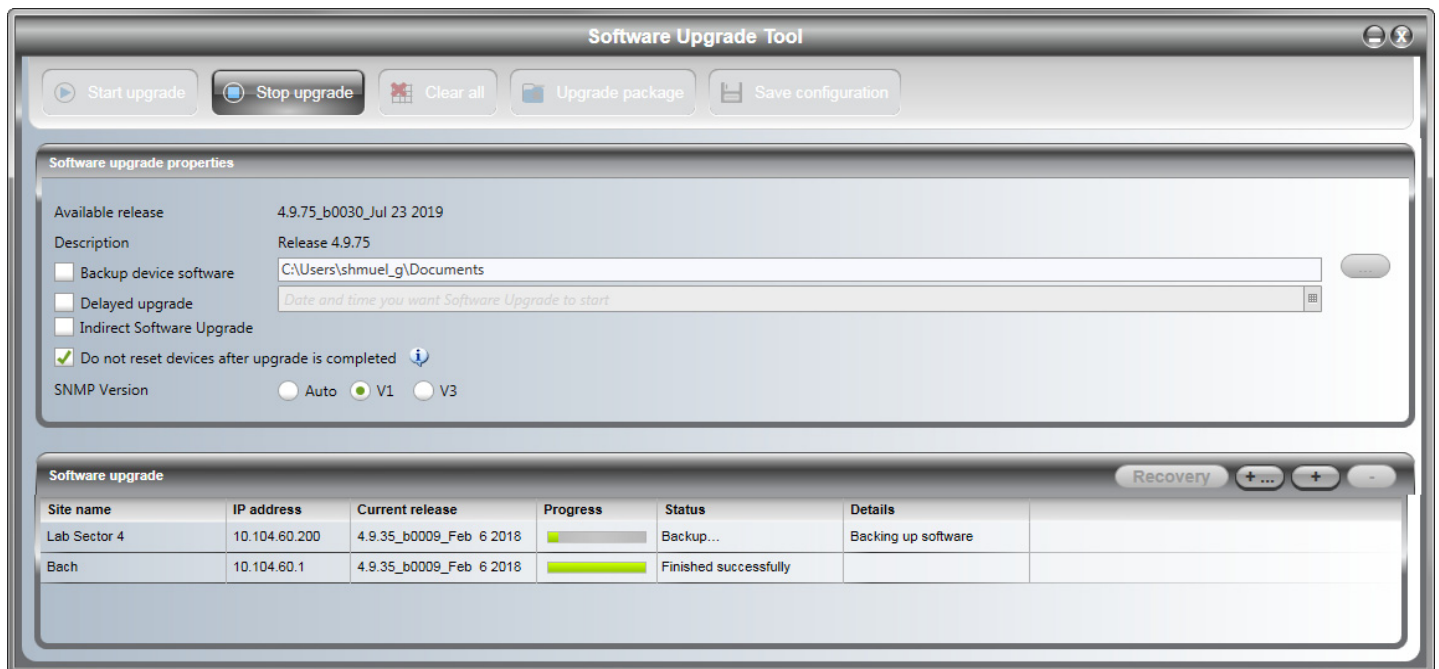


Figure 8-5: Software upgrade in progress - Note the stop button

Software upgrade					
Site name	IP address	Current release	Progress	Status	Detail
Bach@HBS.01	10.104.50.200	3.4.50_b3459_Mar 3 2013	<div></div>	Reset done	
HFU.01.01	10.104.50.1	3.4.50_b3459_Mar 3 2013	<div></div>	Reset done	
HNU.01.01	10.104.50.3	3.4.50_b3459_Mar 3 2013	<div></div>	Reset done	
HFU.01.02	10.104.50.2	3.4.50_b3459_Mar 3 2013	<div></div>	Reset done	

Figure 8-6: Software upgrade completed successfully

11. Use the title bar exit button to dismiss the Software upgrade window..



If any sites fail to update, a warning notice will be displayed. If one or more sites of a sector update fails, you should correct the problem and update the failed sites as soon as possible. If you do not, following the next reset of the updated sites, you could experience a link software mismatch which may affect service.

Chapter 9: VLAN Functionality

9.1 Scope of this Chapter

This chapter describes how the components of a RADWIN 5000 sector deal with tagging and untagging VLANs.

9.2 VLAN Tagging - Overview

9.2.1 VLAN Terminology

Both the technical literature and the RADWIN Manager use the terms VLAN ID and VID interchangeably to denote a VLAN identification number.

9.2.2 VLAN Background Information on the Web

The standards defining VLAN Tagging are IEEE_802.1Q and extensions.

For general background about VLAN see http://en.wikipedia.org/wiki/Virtual_LAN.

Background information about **Double Tagging** also known as **QinQ** may be found here: <http://en.wikipedia.org/wiki/802.1QinQ>.

9.3 Requirements

It is assumed that you are familiar with VLAN usage and terminology.

9.4 VLAN Tagging

VLAN tagging enables multiple bridged networks to transparently share the same physical network link without leakage of information between networks:

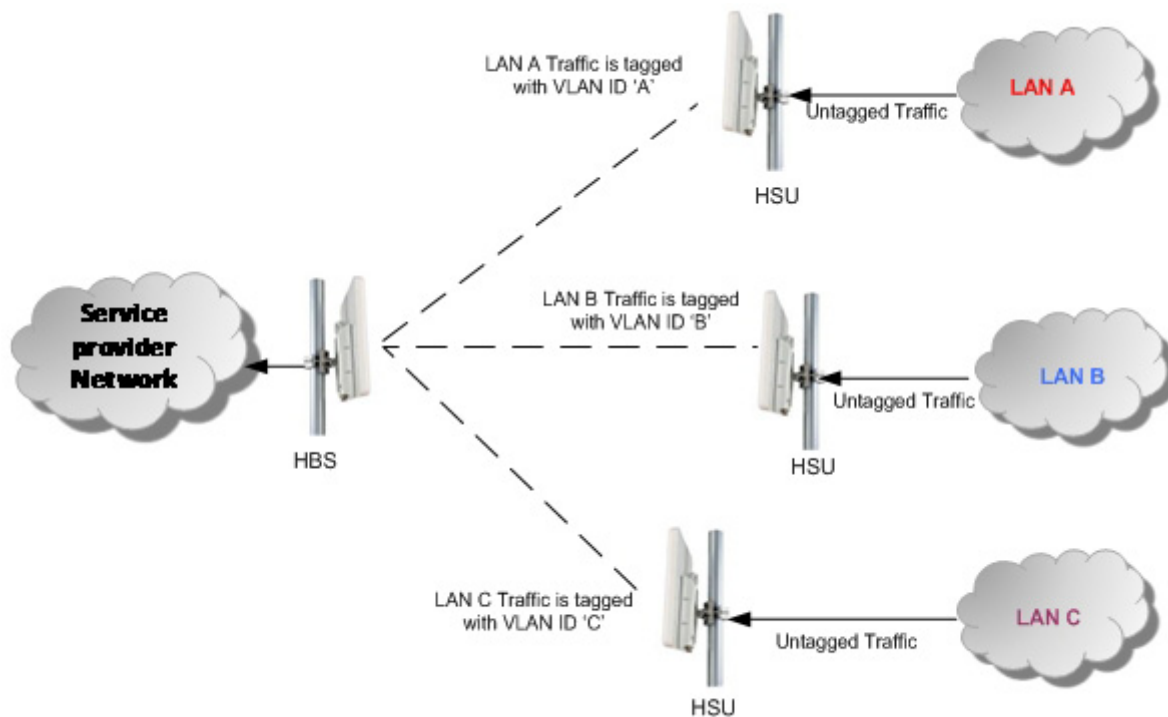


Figure 9-1: VLAN scenarios handled by RADWIN 5000 HBS

IEEE 802.1Q is used as the encapsulation protocol to implement this mechanism over Ethernet networks.

9.4.1 QinQ (Double Tagging) for Service Providers

QinQ is useful for Service Providers, allowing them to use VLANs internally in their “transport network” while mixing Ethernet traffic from clients that are already VLAN-tagged.

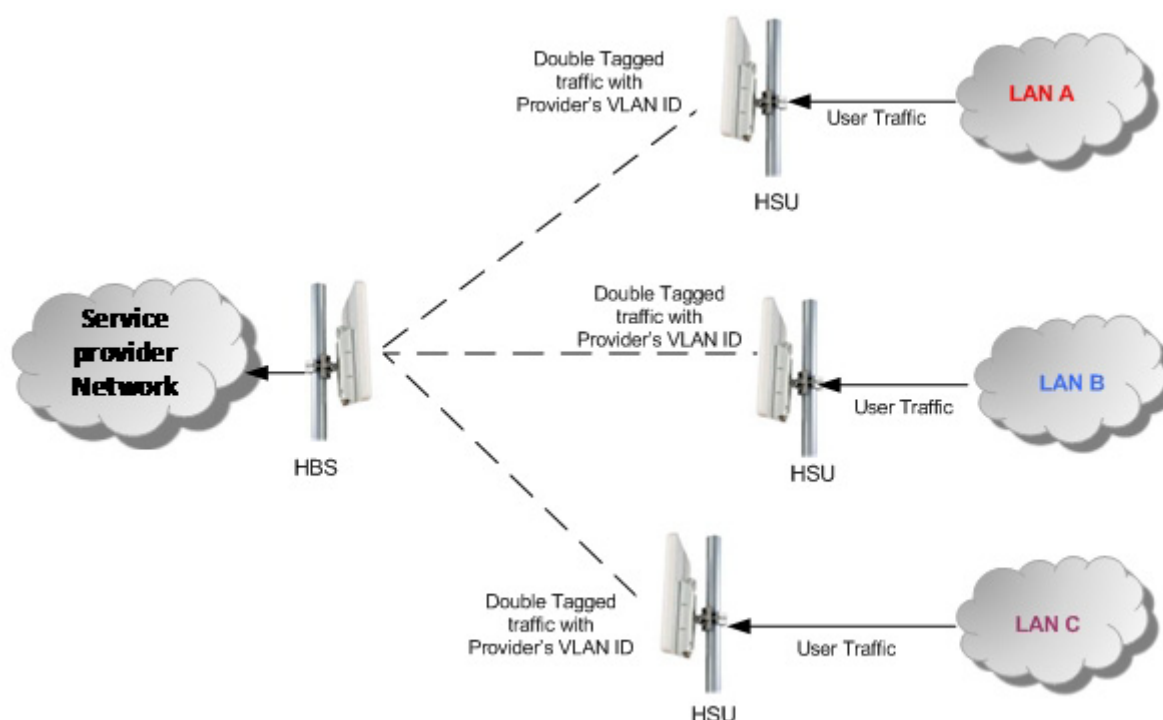


Figure 9-2: Separating client data streams using double tagging

The outer tag (representing the Provider VLAN) comes first, followed by the inner tag. In QinQ the EtherType = 0x9100. VLAN tags may be stacked three or more deep.

When using this type of “Provider Tagging” you should keep the following in mind:

- Under Provider Tagging, the system double-tags egress frames towards the Provider’s network. The system adds a tag with a VLAN ID and EtherType = 0x9100 to all frames, as configured by the service provider (Provider VLAN ID).
- The system always adds to each frame, tags with VLAN ID and EtherType = 0x9100. Therefore,
 - For a frame without a tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will have one tag
 - For a frame with a VLAN tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will be double-tagged

For a frame with a VLAN tag and a provider tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will be triple-tagged and so on.

At the egress side, the HSU removes the QinQ tag with EtherType = 0x9100 no matter what the value of its VLAN ID.

9.4.2 VLAN Untagging

VLAN Untagging means the removal of a VLAN or a Provider tag.

9.4.3 Port Functionality



In a RADWIN 5000 sector, all VLAN activity is configured and supported from the HSUs.

To this end, VLAN functionality is supported at the MNG port of the HSU.

The HSU MNG port can be configured to handle Ethernet frames at the **ingress direction** (where frames enter the HSU) and at the **egress direction** (where frames exit the HSU).

Ingress Direction

Table 9-1: Port settings - Ingress direction

Transparent	The port 'does nothing' with regard to VLANs - inbound frames are left untouched.
Tag	<p>Frames entering the HSU port without VLAN or QinQ tagging are tagged with VLAN ID and Priority^a, which are preconfigured by the user. Frames which are already tagged at ingress are not modified and pass through.</p> 
Provider tag	<p>Frames entering the HSU port are tagged with provider's VLAN ID and Priority which are preconfigured by the user. Frames which are already tagged with Provider tagging at the ingress are not modified and passed through.</p> 

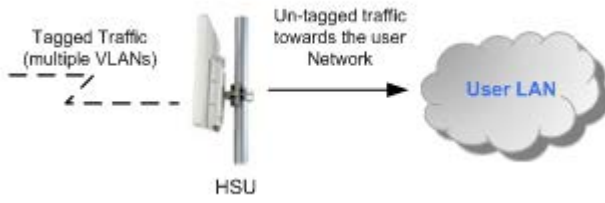
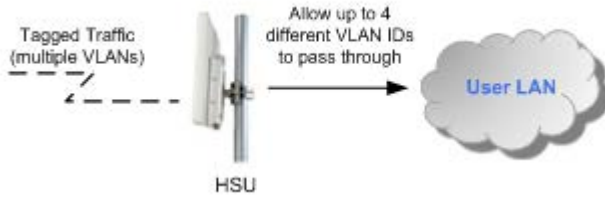
a. Priority Code Point (PCP) which refers to the IEEE 802.1p priority. It indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc).

Egress Direction

Table 9-2: Port settings - Egress direction

Transparent	The port 'does nothing' with regard to VLANs - outbound frames are left untouched.
--------------------	--

Table 9-2: Port settings - Egress direction (Continued)

Untag all	<p>Port configured to untag user VLAN tags for all frames.</p> 
Filter	

9.5 VLAN Configuration Using the RADWIN Manager



Caution

If you are **not** a VLAN expert, please be aware that incorrect VLAN configuration may cause havoc on your network. The facilities described below are offered as a service to enable you to get best value from your RADWIN 5000 links and are provided “as is”. Under no circumstances does RADWIN accept responsibility for network system or financial damages arising from incorrect use of these VLAN facilities.

9.5.1 Management Traffic and Ethernet Service Separation

You can define a VLAN ID for management traffic separation. You should configure the system to prevent conflicts as detailed below.

When configured for the default operational mode, a “Provider port” will handle ingress traffic as follows:

- Filters frames that are not tagged with the Provider VLAN ID
- Removes the Provider double tag

Therefore, if a port is configured for management traffic separation by VLAN and as ‘Provider port’, then the received management frames must be double tagged as follows:

- The outer tag has to be the Provider’s tag (so the frame is not filtered)
- The internal tag has to be management VLAN ID

To avoid mix-ups, best practice is to:

- Separate the management and data ports
- Define only a data port with Provider function

9.5.2 Managing the HBS over the Air from an HSU

If traffic VLAN tagging is in force for the HSU ingress direction and management VLAN is in use at the HBS, then the VLAN ID at the HSU ingress direction must be the same as the VLAN ID for management at the HBS.

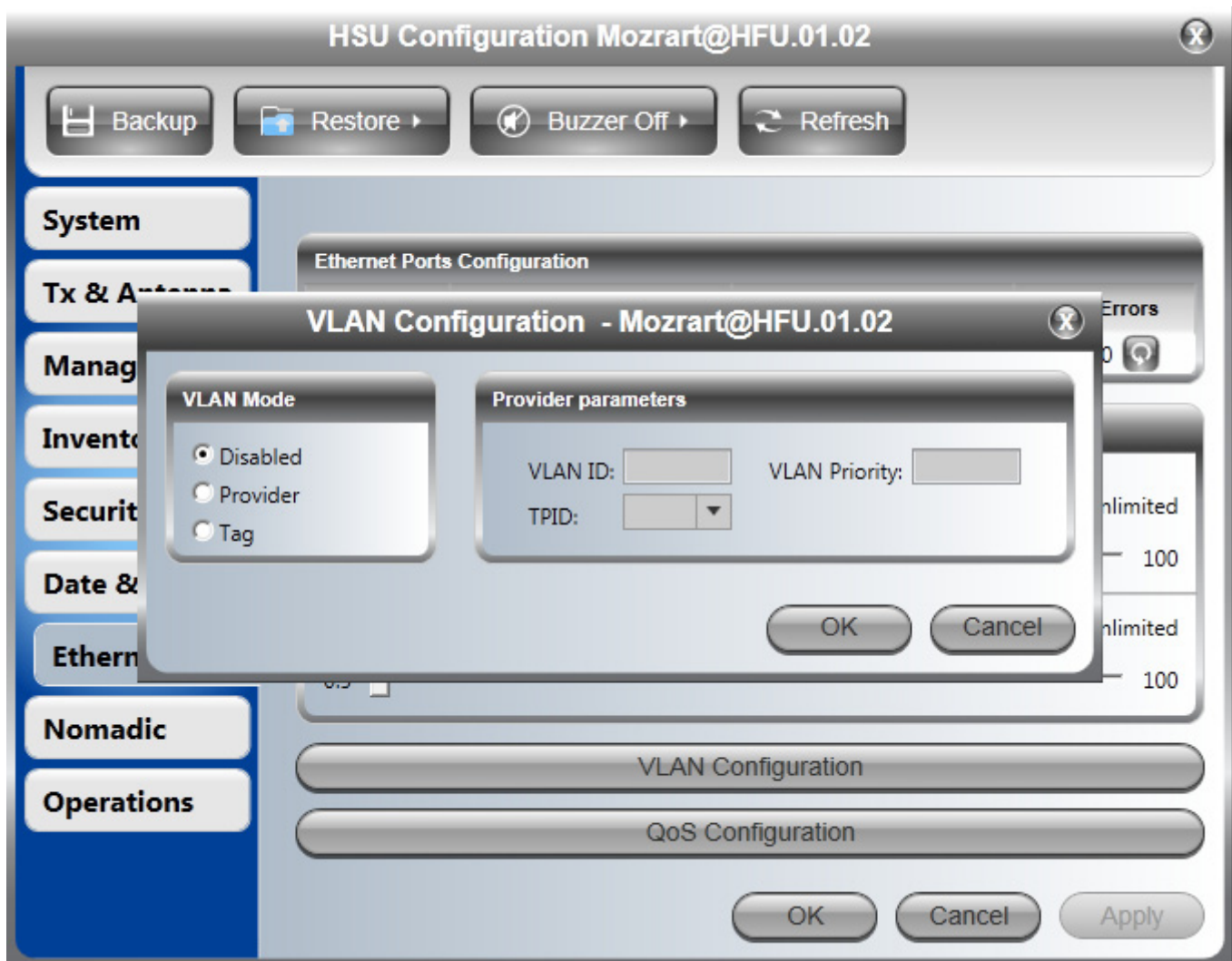
9.5.3 Configuration of VLAN Tagging for Ethernet Service

VLAN configuration is carried out per HSU. It is up to you to ensure consistency between the HSUs.

HSU VLAN tagging can only be configured from one of the HSU views from the HBS. You can not log on to an HSU directly and do it from the HSU main window. The reason is that the HBS maintains the HSU tagging information in its internal per HSU configuration record.

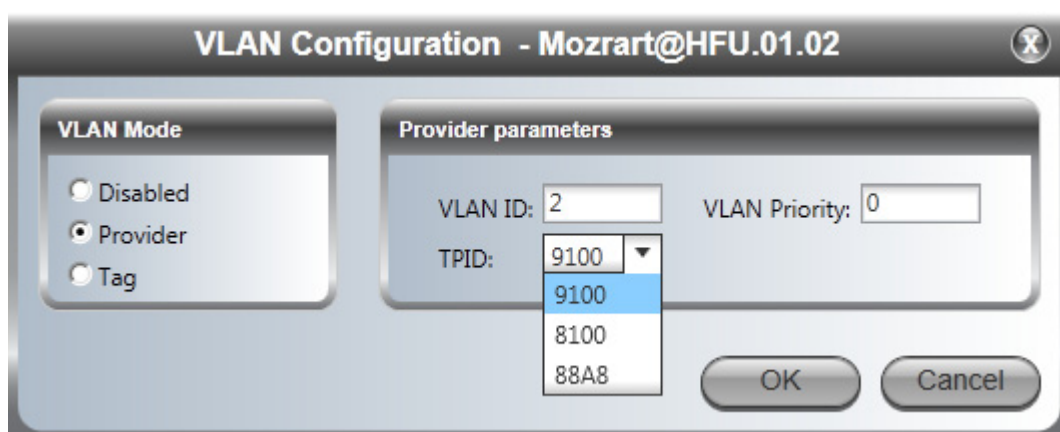
To set up an HSU for VLAN tagging:

1. Right click an HSU on the HBS window, and then click **Configure | Ethernet | VLAN Configuration**. The VLAN Configuration window is displayed:



In **Disabled** mode, Ethernet frames pass transparently over the radio links.

2. For Provider tagging, click the Provider Radio button:



In **Provider** mode, Ethernet frames are tagged with the provider's VLAN ID before they enter into the provider's network/backbone.

3. Enter a Provider VLAN ID and Priority. The VLAN ID must be in the range 2 to 4094. The VLAN Priority must be in the range 0 to 7. You may also change the TPID from the default as shown.



This facility is provided to enable connection through legacy switches requiring it. Otherwise, there is no need to change the TPID.

4. Click **OK** to accept.
5. For user VLAN tagging, click the Tag Radio button:

In **Tag** mode Ethernet frames are tagged or untagged to distinguish between different networks.

6. For completely transparent passage of tagged frames, there is nothing further to do. The following table shows the possible settings for each combination of Ingress and Egress modes:

7. Click **OK**.

Table 9-3: Further VLAN Configuration options and results by Tag mode

Ingress	Egress			
	Transparent	Untag All	Untag Filtered	Filter
Transparent	Frames are not modified and are forwarded transparently	All frames with VLAN tag are untagged	Allow VLAN IDs: Allow up to 4 VLANs to be passed through. Untag VLAN IDs: Untag the VLAN tag of the selected VLAN IDs.	Allow up to 4 VLANs to be passed through.
Tag: Enter a VID (1-4094) and Priority (0-7)	Frames are not modified and are forwarded transparently	All frames with VLAN tag are untagged	Allow up to 4 VLANs to be passed through	Allow up to 4 VLANs to be passed through

Chapter 10: Quality of Service

10.1 Scope of This Chapter

This chapter describes how to configure QoS parameters for a RADWIN 5000 sector.

10.2 Prerequisites

To use the facility you must be familiar with the use of VLAN (802.1p) or Diffserv.

10.3 QoS - Overview

QoS is a technique for prioritization of network traffic packets during congestion.

RADWIN 5000 sectors support two classification criteria, VLAN based or Diffserv based. You may choose which of them to use.

Table 10-1: Default priorities and allocation by VLAN ID and Diffserv

Quality queue	Priority	
	Diffserv	VLAN
Real time	48-63	6-7
Near real time (responsive applications)	32-47	4-5
Controlled load	16-31	2-3
Best effort	0-15	0-1

Based upon the classification criterion chosen, received packets will be mapped into one of four quality groups: Real time, Near real time, Controlled load and Best effort. You may partition the total link capacity across the four Quality queues. The default weights as percentages are shown in [Table 10-1](#).

You can also define part of the link capacity as carrying Voice-over-IP traffic. This is similar to defining part of it as Real time, and is explained in [Enabling a Voice-over-IP \(VoIP\) Queue](#) on [page 10-5](#).

10.4 Setting up QoS

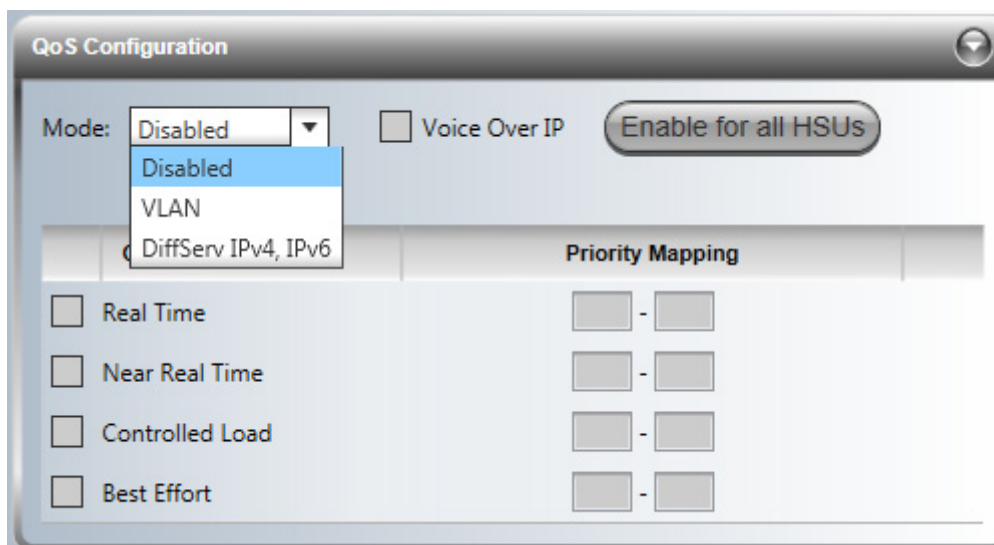
QoS for RADWIN 5000 is set up in two phases:

- Map the priority levels to the queues for the sector (Real Time or VoIP, Near Real Time, Controlled Load, and Best Effort).
- For each HSU, set the queue weights and queue Maximum Information Rate (MIR).

After you have finished setting up QoS for the sector, if you add an HSU to the sector, you must repeat the QoS configuration steps for them to take effect on the new HSU.

10.4.1 Mapping QoS Priority Levels to Queues (from the HBS)

1. From the HBS manager, choose **Configuration -> Ethernet** tab, then click **QoS Configuration**. QoS is disabled by default.
2. Choose either the VLAN (802.1p) and or Diffserv method (see [10.5](#) for VoIP).



3. For the method you selected, type the Priority Mapping for each queue. This determines the mapping (or translation) of the priority mapping of the traffic to what is used by the RADWIN 5000. Default settings for Diffserv and VLAN are as shown in the next two figures:

QoS Configuration

Mode: **DiffServ IPv4, IPv6** ☐ Voice Over IP **Enable for all HSUs**

To enable QoS, this option must also be enabled for each HSU separately.

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time	48 - 63
<input checked="" type="checkbox"/> Near Real Time	32 - 47
<input checked="" type="checkbox"/> Controlled Load	16 - 31
<input checked="" type="checkbox"/> Best Effort	0 - 15

QoS Configuration

Mode: **VLAN** ☐ Voice Over IP **Enable for all HSUs**

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time	6 - 7
<input checked="" type="checkbox"/> Near Real Time	4 - 5
<input checked="" type="checkbox"/> Controlled Load	2 - 3
<input checked="" type="checkbox"/> Best Effort	0 - 1

4. If you un-check a queue, this queue will be ignored for the sector. It will not prevent the HSU from configuring traffic labeled with this priority level as “live”; it will merely ignore its priority level, as if the traffic was not assigned with any priority level whatsoever. Note that you cannot un-check the Best Effort queue.

10.4.2 Setting up an HSU for QoS

1. Right click an HSU in the HBS manager HSU window (HSU must be registered), and choose **Configure**.
2. Open the **Ethernet** tab and click QoS Configuration. The following window is displayed:

Mode: **Enabled** ☐ Voice Over IP

Uplink **Downlink**

Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/> Real Time	<input type="checkbox"/> 15	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Near Real Time	<input type="checkbox"/> 20	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Controlled Load	<input type="checkbox"/> 25	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Best Effort	<input type="checkbox"/> 40	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	

OK Cancel

3. Ensure that the Mode field is Enabled. If you already configured the HBS (sector) for Diffserv or VLAN, then it will be enabled by default (see 10.5 for VoIP).
4. If you had disabled a queue in Step 4 above, a green checkmark will not be shown next to its name, and you will not be able to configure that queue.
5. Set the Weight percentage for each queue. This determines what percentage of the throughput will be dedicated for the indicated queue.

If you exceed 100% total weight, you will receive an error message.

Mode: **Enabled** ☐ Voice Over IP

Uplink **Downlink**

Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/> Real Time	<input type="checkbox"/> 15	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Near Real Time	<input type="checkbox"/> 20	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Controlled Load	<input type="checkbox"/> 25	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	
<input checked="" type="checkbox"/> Best Effort	<input type="checkbox"/> 45	0.5 — 100 <input checked="" type="checkbox"/> Unlimited 5 — 500 <input checked="" type="checkbox"/> Disabled	

Total queue weights can't exceed 100.

OK Cancel

You must correct this before leaving the window other than by cancellation.

If you are under-booked, for example by setting a queue to zero, the unused weight will be distributed to the remaining queues. The effect of doing this will only become apparent under congestion. In particular, a queue set to zero weight will become

nearly blocked under congestion with packets passing through on a best effort basis.

6. **Strict:** If you place a checkmark next to Strict, **all traffic** of the specific queue will be passed through. The Weight percentage will become disabled. Placing a checkmark here can only be done in order: First Real Time, then finally Best Effort. That is, you cannot place a checkmark in Near Real Time without one in Real Time as well.
7. **Maximum Information Rate:** Although the Weight percentage affects how much relative traffic will be allowed through, you can set here the absolute maximum to allow through. Place a checkmark to make this valued unlimited.
8. **Configurable TTL** (time to leave): A packet not transmitted within the TTL period in a congested link is dropped.
9. When you complete your entries, click **Downlink** to configure the downlink stream.
10. When you complete the Downlink entries, click **OK** to save them and continue.

10.5 Enabling a Voice-over-IP (VoIP) Queue

Note the following:

- You can enable a VoIP queue from either the HBS or the HSU¹. If enabled from the HSU, it is done for that HSU only, and its HBS. If done from the HBS, it can be done sector-wide.
- The VoIP feature as implemented here assumes that your end-user has a gateway or other network device that defines the traffic to be VoIP with the correct QoS defined (VLAN or DiffServ, in accordance with your configuration done here). The definition must be done at both ends of the data stream.
- Enabling a VoIP queue may decrease the sector's peak throughput in some scenarios. Therefore, make sure that you absolutely need to enable a VoIP queue before doing so.
- After you have finished setting up VoIP for the sector, if you add an HSU to the sector, you must repeat the VoIP configuration steps for them to take effect on the new HSU.

1. Not available for the SU **PRO/AIR** EMB, SU **PRO/AIR** INT, or small form-factor HBS units.

10.5.1 Enabling VoIP from an HBS

1. From the HBS manager, choose **Configuration -> Ethernet** tab, then click **QoS Configuration**.

QoS Configuration

Mode: VLAN ☐ Voice Over IP Enable for all HSUs

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time	6 - 7
<input checked="" type="checkbox"/> Near Real Time	4 - 5
<input checked="" type="checkbox"/> Controlled Load	2 - 3
<input checked="" type="checkbox"/> Best Effort	0 - 1

2. Click **Voice Over IP**. The Real Time queue will change to Voice over IP and its checkbox will be come grayed. This means that VoIP traffic is treated in a similar fashion to Real Time traffic. VoIP works whether you are using VLAN or DiffServ.

QoS Configuration

Mode: VLAN ☒ Voice Over IP Enable for all HSUs

Queue	Priority Mapping
<input type="checkbox"/> Voice over IP	6 - 7
<input checked="" type="checkbox"/> Near Real Time	4 - 5
<input checked="" type="checkbox"/> Controlled Load	2 - 3
<input checked="" type="checkbox"/> Best Effort	0 - 1

3. You can apply VoIP to all of the HSUs in the sector by clicking on **Enable for all HSUs**. You will be asked to confirm your choice.
 - If you do not choose this, you must go to each Hsu for which you want to enable a VoIP queue, and enable it there.
4. Click **Apply**, or **OK**.



Note

Make sure the “Mode” selected is the proper one, is consistent through you configuration, and that your end-user has equipment that also defines its VoIP traffic with the Mode you defined here.

10.5.2 Enabling VoIP from an HSU

You can enable (or disable) VoIP per each HSU.

1. Right click an HSU in the HBS manager HSU window (HSU must be registered), and choose **Configure**.
2. Open the **Ethernet** tab and click QoS Configuration. The following window is displayed:

QoS Configuration - Bach

Mode: **Enabled** ☐ Voice Over IP

Uplink **Downlink**

	Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/>	Real Time	<input type="checkbox"/> 15	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Near Real Time	<input type="checkbox"/> 20	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Controlled Load	<input type="checkbox"/> 25	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Best Effort	<input type="checkbox"/> 40	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled

OK Cancel

5. Click **Voice Over IP** (un-click it if you want to disable VoIP for this unit). The Real Time queue will change to Voice over IP and its checkbox will be come grayed. This means that VoIP traffic is treated in a similar fashion to Real Time traffic. VoIP works whether you are using VLAN or DiffServ, but you must be consistent with this QoS mode throughout the data stream.

QoS Configuration - Bach

Mode: **Enabled** ☒ Voice Over IP

Uplink **Downlink**

	Queue	Strict / Weight [%]	Maximum Information Rate [Mbps]	Configurable TTL [ms]
<input checked="" type="checkbox"/>	Voice over IP	<input checked="" type="checkbox"/> 0	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Near Real Time	<input type="checkbox"/> 20	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Controlled Load	<input type="checkbox"/> 25	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled
<input checked="" type="checkbox"/>	Best Effort	<input type="checkbox"/> 40	0.5 100 <input checked="" type="checkbox"/> Unlimited	5 500 <input checked="" type="checkbox"/> Disabled

OK Cancel

6. Click **OK**. VoIP will become enabled for both the Uplink and Downlink directions.

Chapter 11: License-Dependent Upgrades

11.1 Scope of This Chapter

This chapter shows how to acquire and use a license to apply license-dependent upgrades on the HSU or HBS.

11.2 Overview

- » Certain features may be upgradable, with the proper license. See your RADWIN representative for an updated list.
- » To apply an upgrade, you use a license key that is unique for the feature and the specific item of equipment.

11.3 Receiving a License key

Receive a license key as follows:

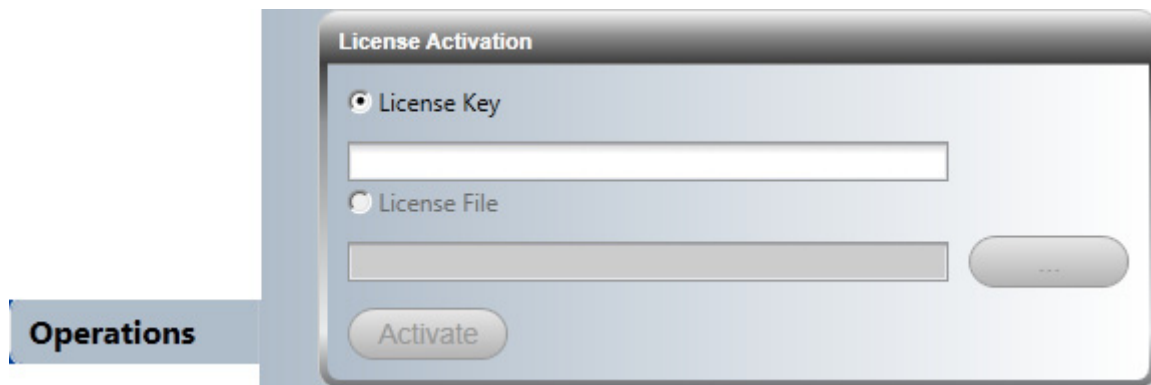
1. **Catalogue number:** Contact your RADWIN representative, and get a catalogue number of the upgrade you want. Purchase as many of these upgrades as you deem necessary.
2. **PAKs:** You will receive a list of Product Activation Keys (PAK) for each upgrade instance. A PAK number can be used on any compatible RADWIN product; they are not specific to any one given item of equipment.
3. **Activate PAKs:** Associate each PAK to a specific item of equipment: Access the License Key Application website: <http://tools.radwin.com/updates/licensekey/lk-radwin.htm>, and follow the instructions there to activate each PAK for the specific item of equipment you need to upgrade.
4. **Get License Keys:** The License Key Application will then give you a list of license keys. These numbers *are* unique for the specific upgrade and specific item of equipment. We recommend saving this list as a text file in a convenient location.

11.4 Applying a License Key

11.4.1 Individual HSU Upgrade

This can be done by direct connection to an HSU or via the HBS.

1. Using the license key you received for each HSU in turn, open the Configuration | Operations window.
2. Copy/paste the license key to the License Key field. The Activate button will become enabled.
3. Click **Activate**.



4. You will receive a confirmatory message if the activation succeeded or an error message if not.

11.4.2 Bulk (Sector) HSU Upgrade

- If you are upgrading all HSUs in a sector, use the text file you saved when you received your license keys.
1. Open the **Configuration | Operations** window for the HBS itself (rather than each HSU separately).
 2. Use the **License File** option to navigate to your text file. The Activate button will become enabled.
 3. Click **Activate**.
 4. You will receive a confirmatory message if the activation succeeded or an error message if not.

11.5 Completing the Upgrade

To make the upgrade effective, each upgraded HSU must be reset.

11.6 Persistency of the Upgrade

The upgrade is persistent across an HSU reset. If however, you restore an upgraded HSU to factory defaults, you will need to apply the upgrade to it again.

Chapter 12: Spectrum View

12.1 Scope of This Chapter

This chapter shows how to use the Spectrum View utility. This utility is part of the RADWIN Manager application.

12.2 What is Spectrum View

The RADWIN Manager Spectrum View utility is an RF survey tool designed to support the sector installation prior to full sector service activation. The tool is primarily a professional tool for the technician.

The tool provides comprehensive and clear spectral measurement information enabling easier, faster and better quality installations.

You can view real-time spectrum information, save the spectral information and view retrieved spectral information from historic spectrum scans.

Separate information is generated for the HBS and HSUs - all by selection. A general sector level Highest Interference view is also provided.

RADWIN's spectrum measurement and estimation algorithms are designed to show accurate information accommodating variations in frequency, temperature and interference power and at the same time overcoming anomalies that tend to occur in high interference environments.

Results are intended for use by RADWIN Customer Service to assist with diagnosing interference related problems.

We assume the reader knows about RF Spectrum Analysis so detailed theoretical explanations are not needed.

12.3 Two Ways to Run Spectrum View

From the HBS: Spectrum View may be run from the HBS in which case you have a choice of analyzing all sites in the sector in one run, or making a selection.

From an HSU: Spectrum View may also be run on a managing computer directly connected to an HSU (although not from an SU **PRO/AIR** EMB or SU **PRO/AIR** INT). In such a case the results will be quite different if the HSU is part of a sector (registered or not) or if it is completely stand-alone.

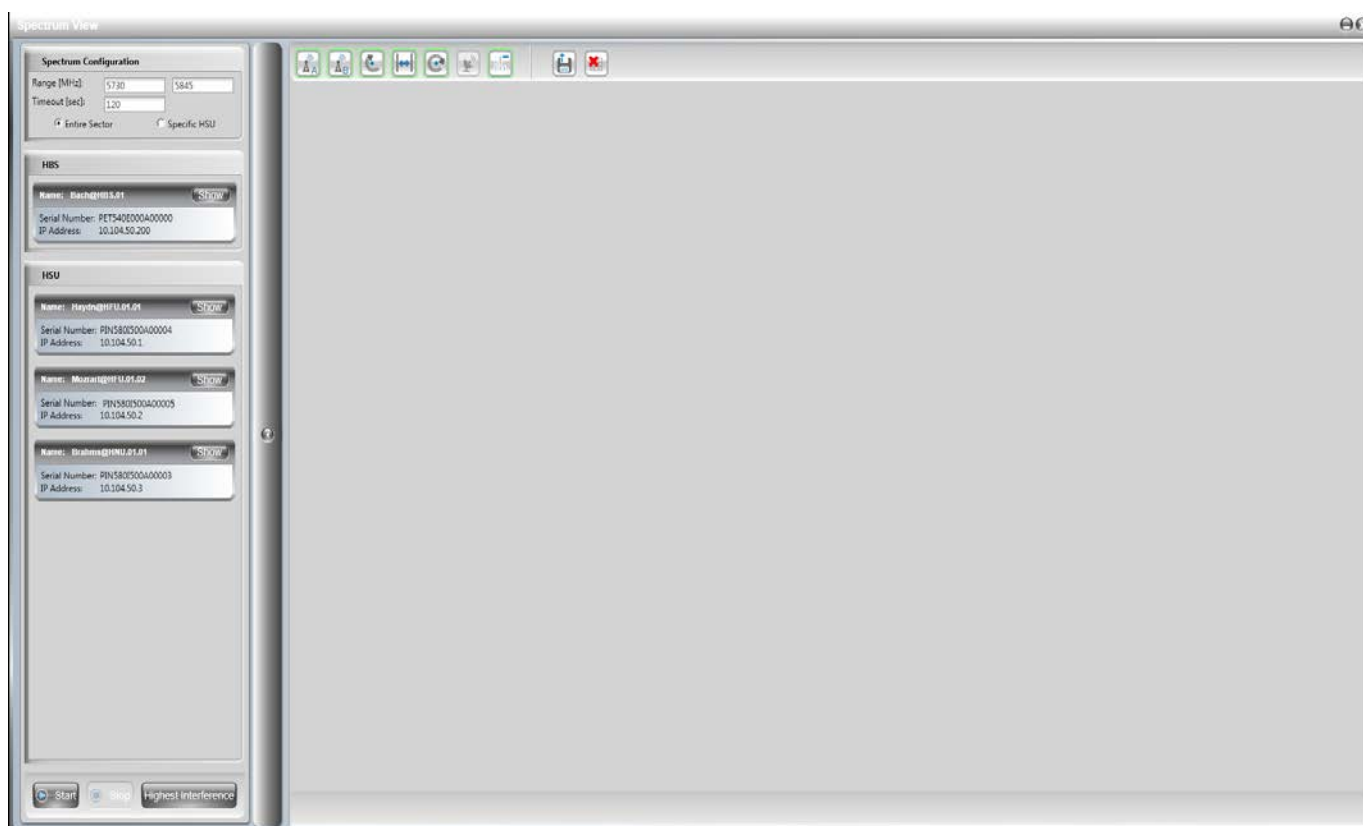
12.4 Where is the Spectrum View Data stored

Spectrum View data is always stored in the ODU originating the analysis. The HBS maintains the last Spectrum View analysis data for all members of the sector. If you run Spectrum View from a directly connected HSU, it stores its own data, which may be quite different from the analysis obtained for the same HSU from the HBS.

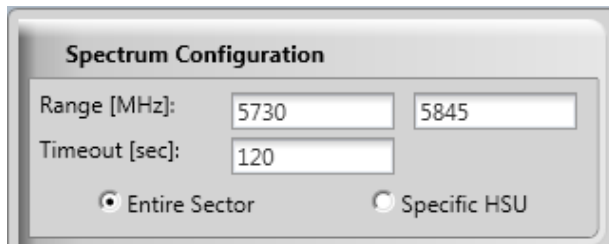
12.5 Spectrum View Main Window: HBS

In this section we review the main window management controls.

Click the **Spectrum View** button . The Spectrum View main window opens in full screen mode:



Use the top left panel to set the Spectrum View configuration parameters and choose an analysis type - **Entire Sector** or **Specific HSU**.




Spectrum Configuration

Range [MHz]:

Timeout [sec]:

☒ Entire Sector ☐ Specific HSU

The settings are “sticky” for the HBS and will be reused. The analysis range is limited from 4900 to 6050 MHz with a maximum difference of 500MHz. Erroneous entries will be shown

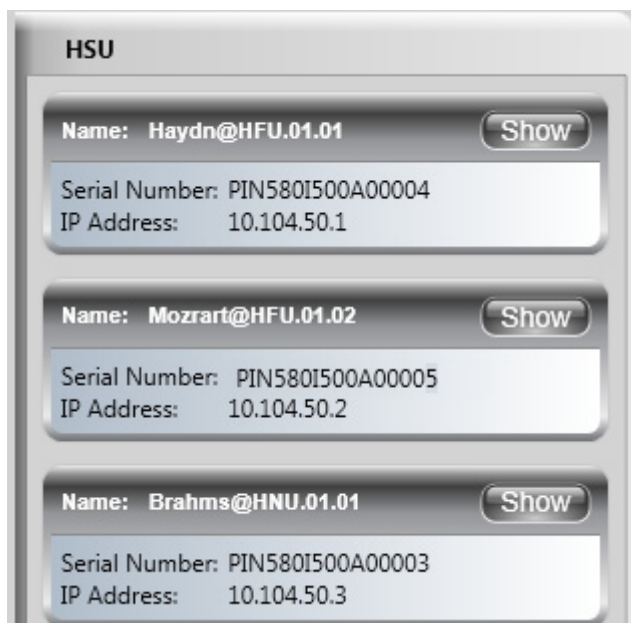
with a red border like this: 

The timeout is the maximum analysis time per site. Use the bottom button bar to start an analysis, to stop a running analysis or run a Highest Interference profile for the sector:




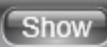
If you choose to run the analysis for specific HSUs, The left hand HSU panel will change:




HSU

Name: Haydn@HFU.01.01 

Serial Number: PIN580I500A00004
IP Address: 10.104.50.1

Name: Mozart@HFU.01.02 

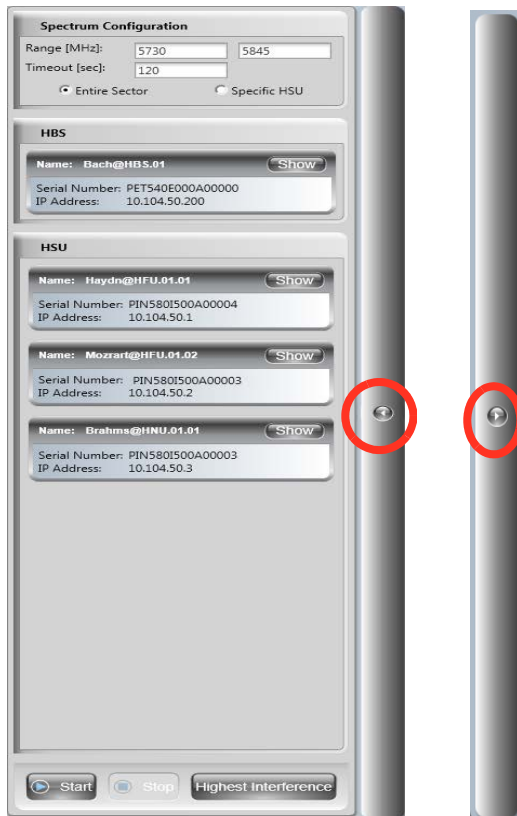
Serial Number: PIN580I500A00005
IP Address: 10.104.50.2

Name: Brahms@HNU.01.01 

Serial Number: PIN580I500A00003
IP Address: 10.104.50.3

Check the required HSUs and then **Start**.

Since a large sector will clutter up the right hand display area, you may selectively Show, minimize or remove a sector member. Another way of freeing up more space for analysis displays is to hide the left hand panel using the circled arrow:



If for example you click **Show** on the HBS, the following view will open in the right panel:

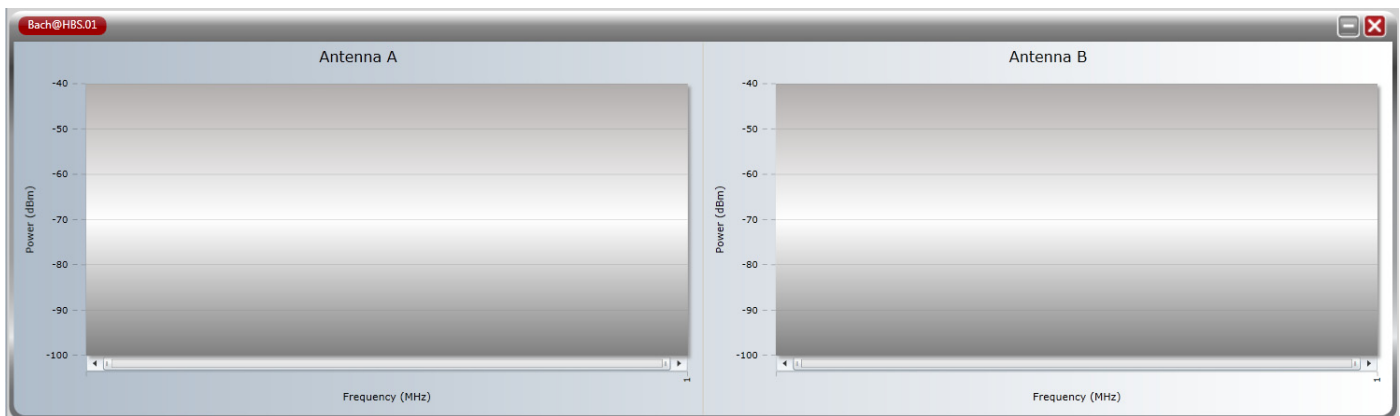


Figure 12-1: Spectrum View data panel for the HBS, ready for data

The standard X button closes the window completely (but does not loose data). The - button collapses the view to look like this:



The two side arrows (circled) are used to reorder a stack of such view on the display area:



The remaining controls on the Spectrum View main window relate to Spectrum View data manipulation. We will cover them in the next section using a live analysis.

12.6 Spectrum View Display Function Buttons

Spectrum View data manipulation functions are provide on the top button bar:



Table 12-1: Spectrum View Analysis Display Buttons functionality










Button	Purpose
	Show/Hide Antenna A
	Show/Hide Antenna B
	Show/Hide average
	Show/Hide current channel (HSUs only)
	Show/Hide maximum
	Not in use
	Show/Hide point values

Table 12-1: Spectrum View Analysis Display Buttons functionality (Continued)

Button	Purpose
	Save the analysis to a CSV file
	Clear all sector member analyses from the display (They can be shown again)

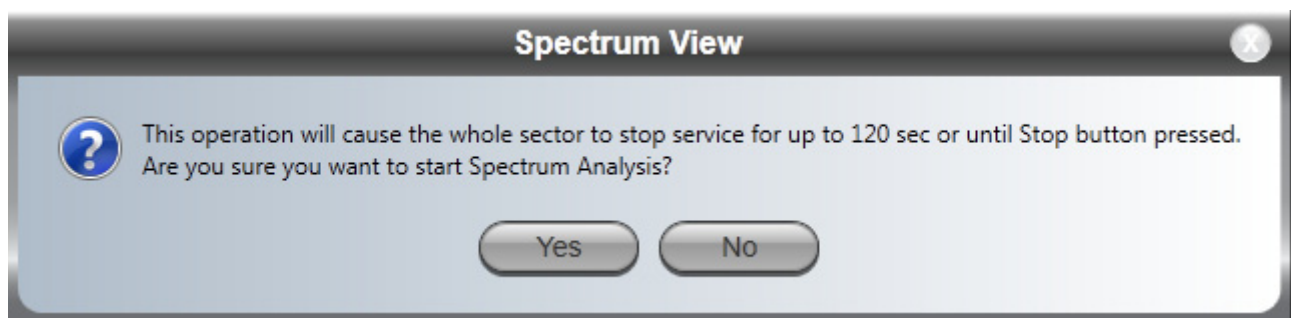


Note

Each button function applies to all of the sector members at once.

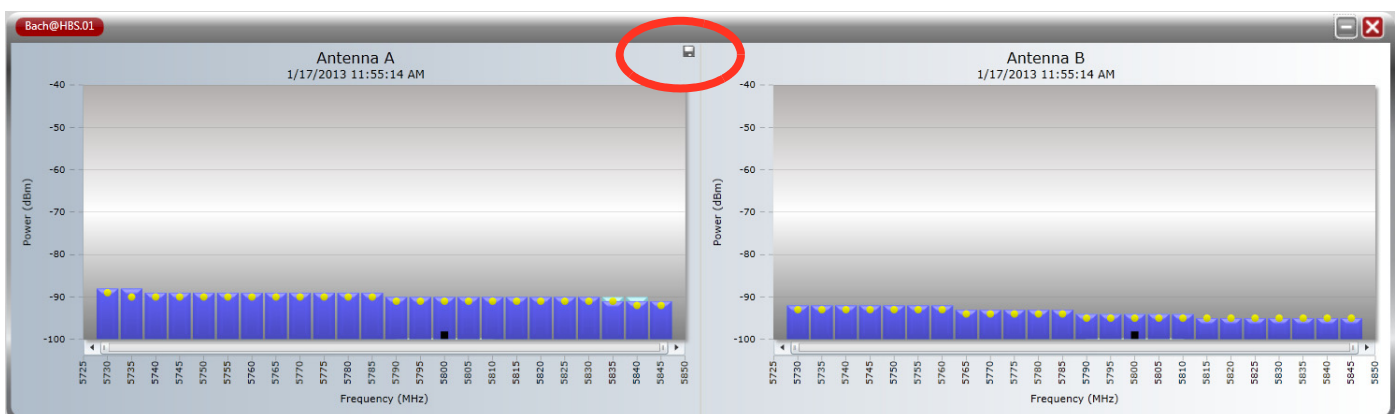
12.7 Running Spectrum View from the HBS

Choose **Entire sector** and click **Start**. You are offered the following cautionary message:



If it is acceptable to drop the service click **Yes**. The processing may appear to have stopped - but it is not complete until all of the **Show** buttons for selected HSUs are enabled.

Here is the result for the HBS:



The keys to the color coding is permanently displayed at the bottom of the main window:










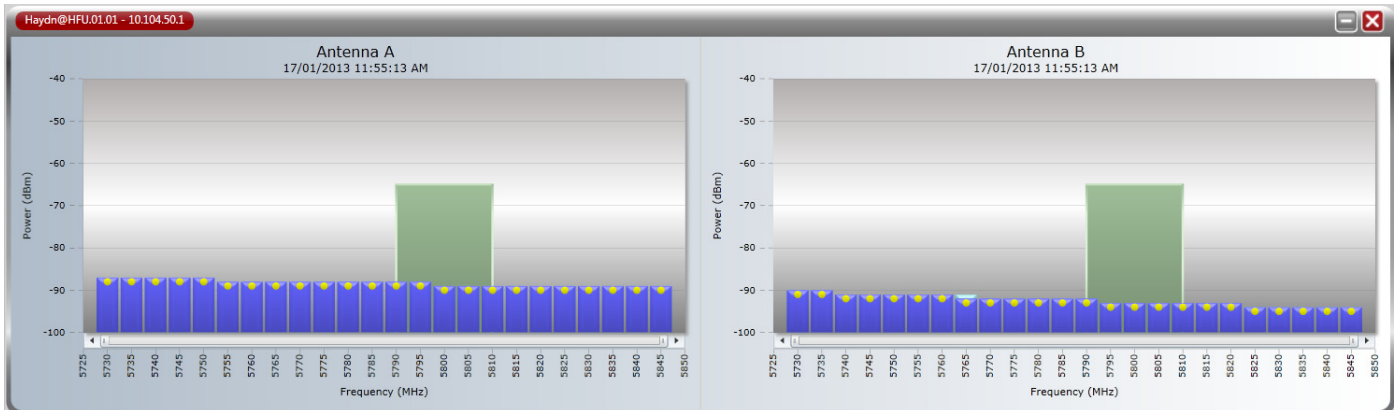
 Scanned
  Selected/ACS
  Not Scanned
  Current Channel
  Average
  Max
  Available (Radars Free)
  Radars Detected
  HBS signal

Figure 12-2: Spectrum View Analysis color codes

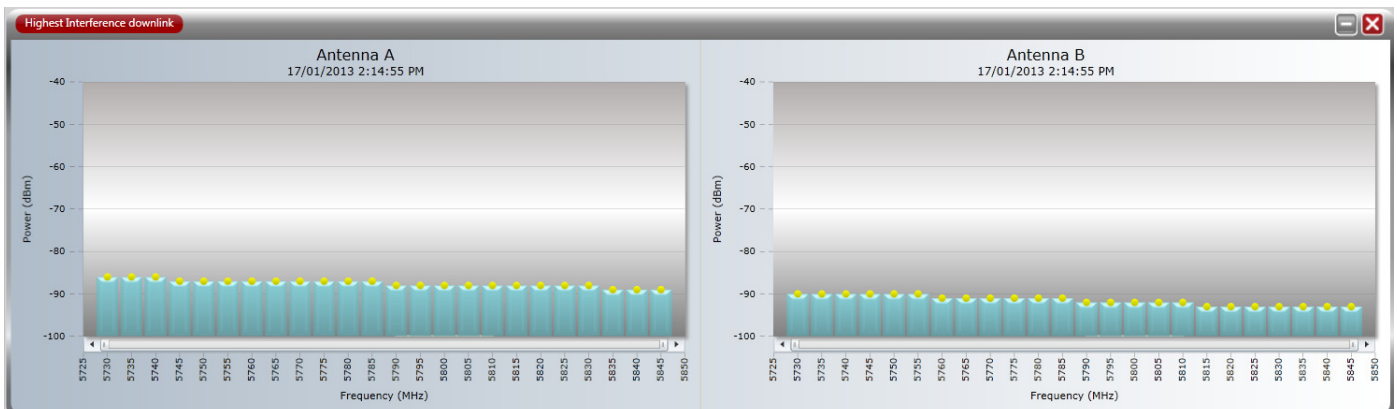
The green band reflects the current HBS operating frequency. Notice also the small fly-over diskette icon (circled) to the upper left of either graph. Clicking it opens a Windows File-Save dialog allowing you to save the graph to disk as a jpg file.

Here is the analysis for one of the HSUs. It is a bit different:



The light green rectangle in the background of both antenna displays reflects actual channel (20 MHz wide here) being used by the HSU. The title bar also contains the HSUs IP address.

There is a further display of interest: Highest Interference for all HSUs in the sector:



See [Figure 12-2](#) for the color coding.

12.8 Running Spectrum View from a HSU

There is no difference in principle between running a Spectrum View analysis for a HSU and running it for a HBS. There is a major difference between running Spectrum View on an active HSU (registered or not) or in total isolation from the sector. Here is what happens in total isolation:

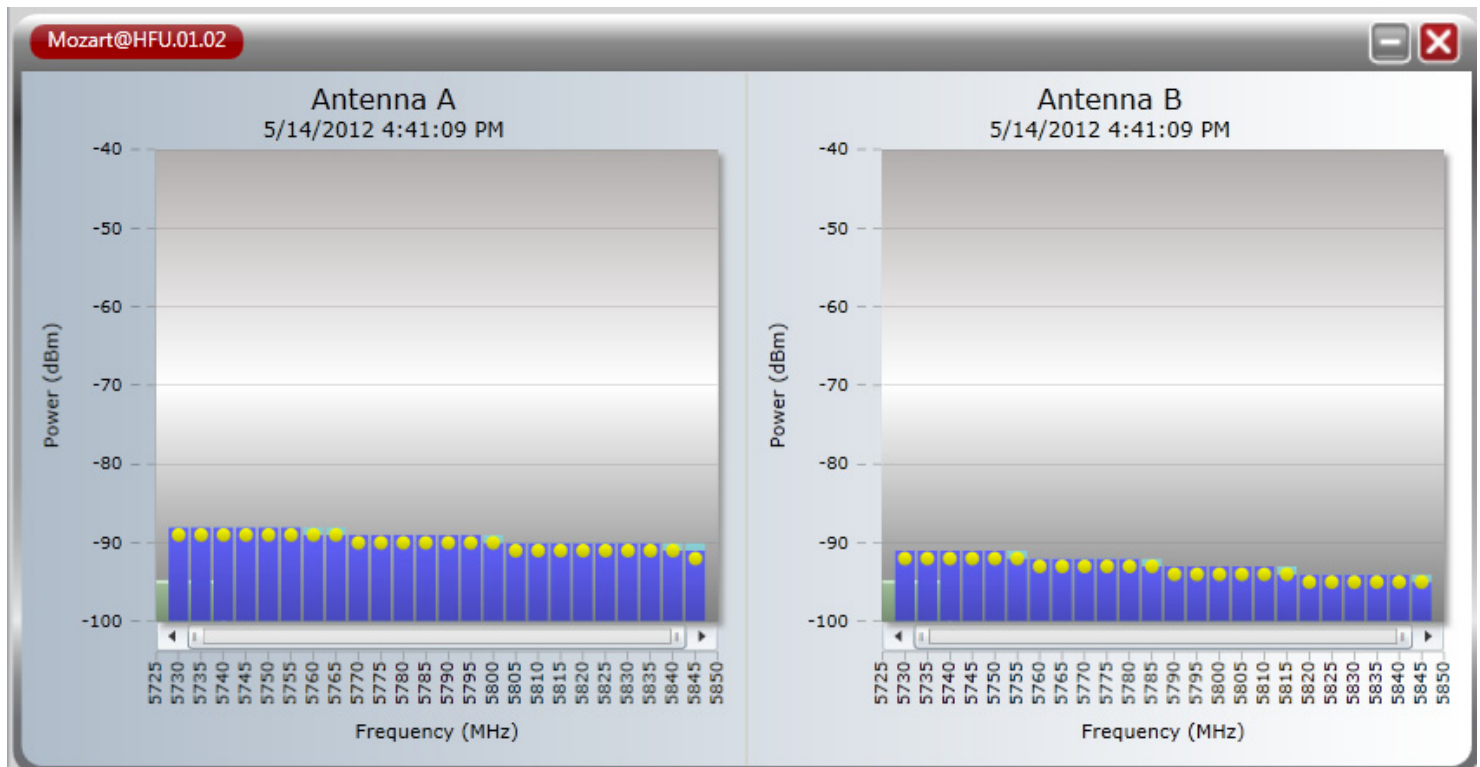


Figure 12-3: HSU spectrum analysis in complete isolation from the sector

Now we return the HSU to the sector:

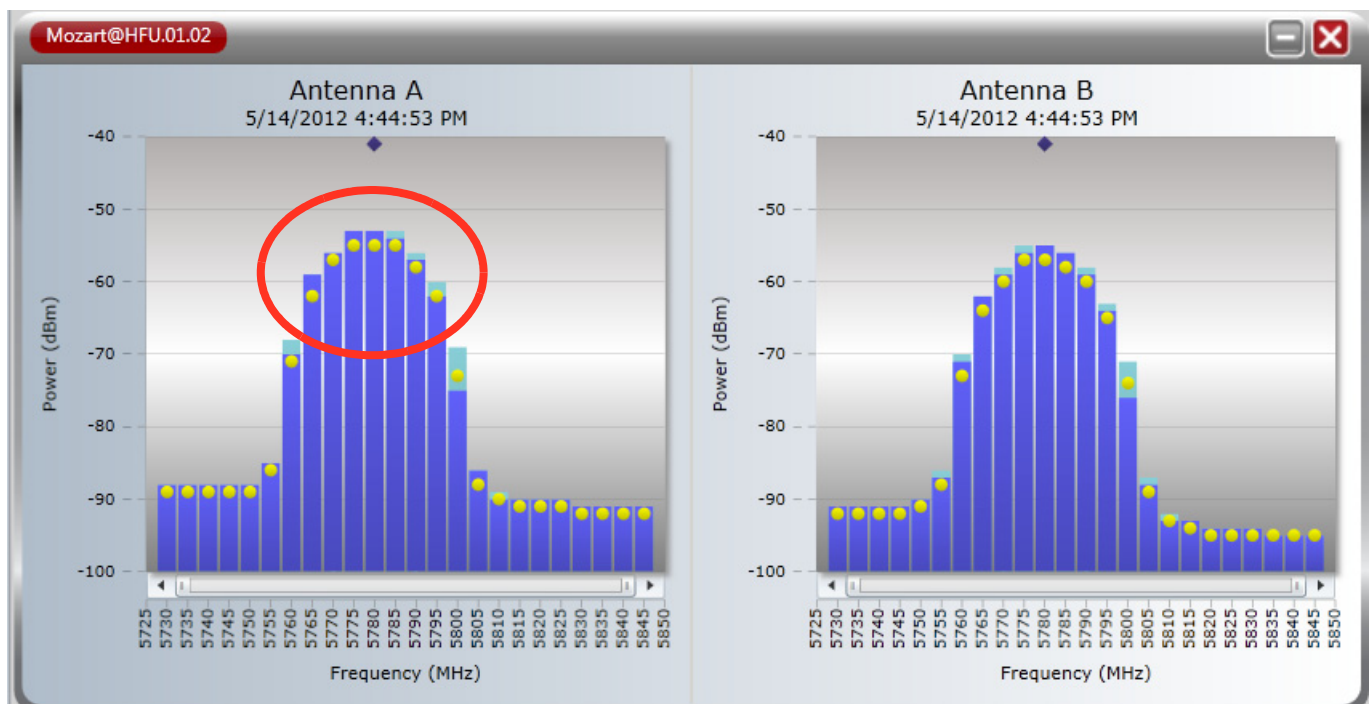
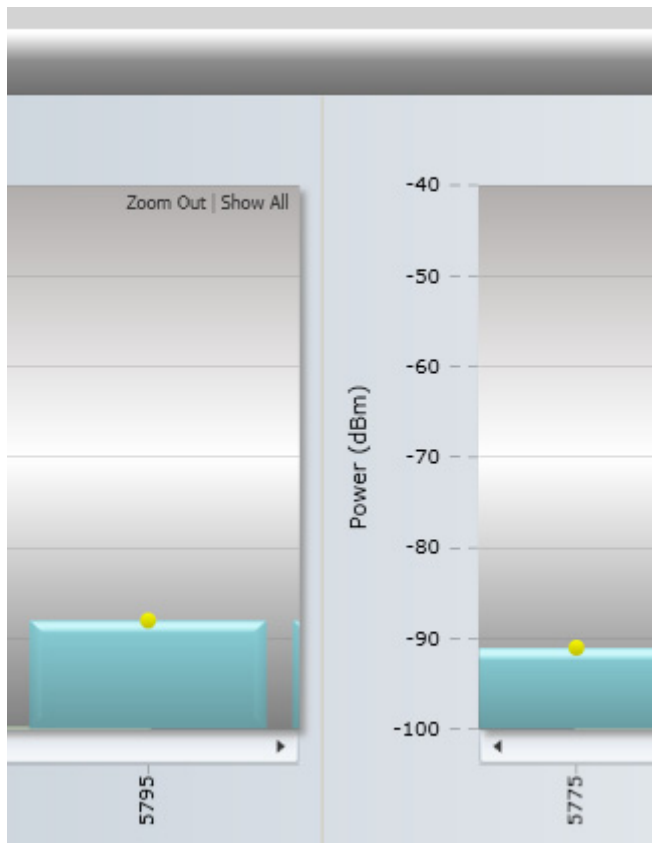


Figure 12-4: HSU spectrum analysis within the sector

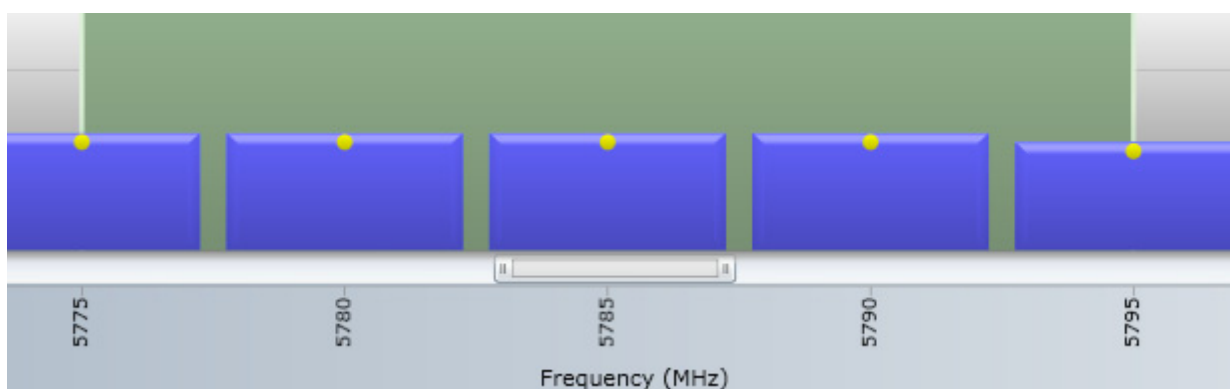
The hump in Figure 12-4 reflects the duty cycle signal from the HBS centered on the current channel (circled).

12.9 Zooming in and out

You may zoom in on a range of interest and enlarge it. Use the mouse to swipe the range from left to right or reverse and then click. The swiped range is zoomed in. You may repeat this several times. The zoom applies to all charts for all element in the analysis. An indicator is provided at the top right of each chart:



Zoom Out returns you to the previous zoom state; **Show all** reverts you to the original display. In a zoomed state, a horizontal scroll bar enables you to view other areas of the displayed frequency range.



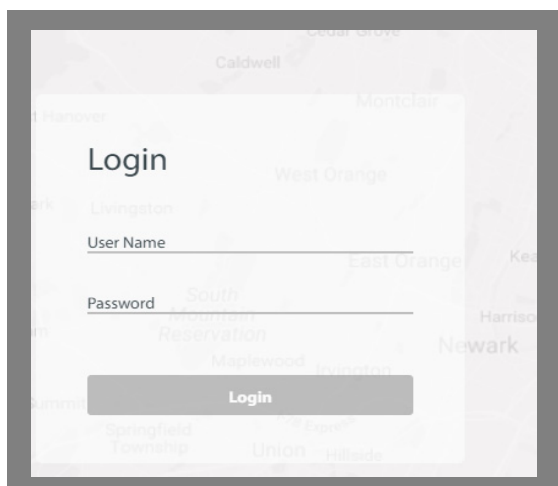
Chapter 13: Web Interface for SU *PRO/AIR* units

13.1 Scope of this Chapter

This chapter describes how to configure SU *PRO/AIR* units via its web interface. Although many features are available via its web interface, for configuration capability, use the RADWIN Manager.

13.2 Login

Access the web interface by connecting to the unit, either directly via RJ45 cable, or via the internet. We recommend using a PC or laptop. Do not use a smartphone. Enter the unit's IP address in a web browser (default value: 10.0.0.120). A welcome message will appear.

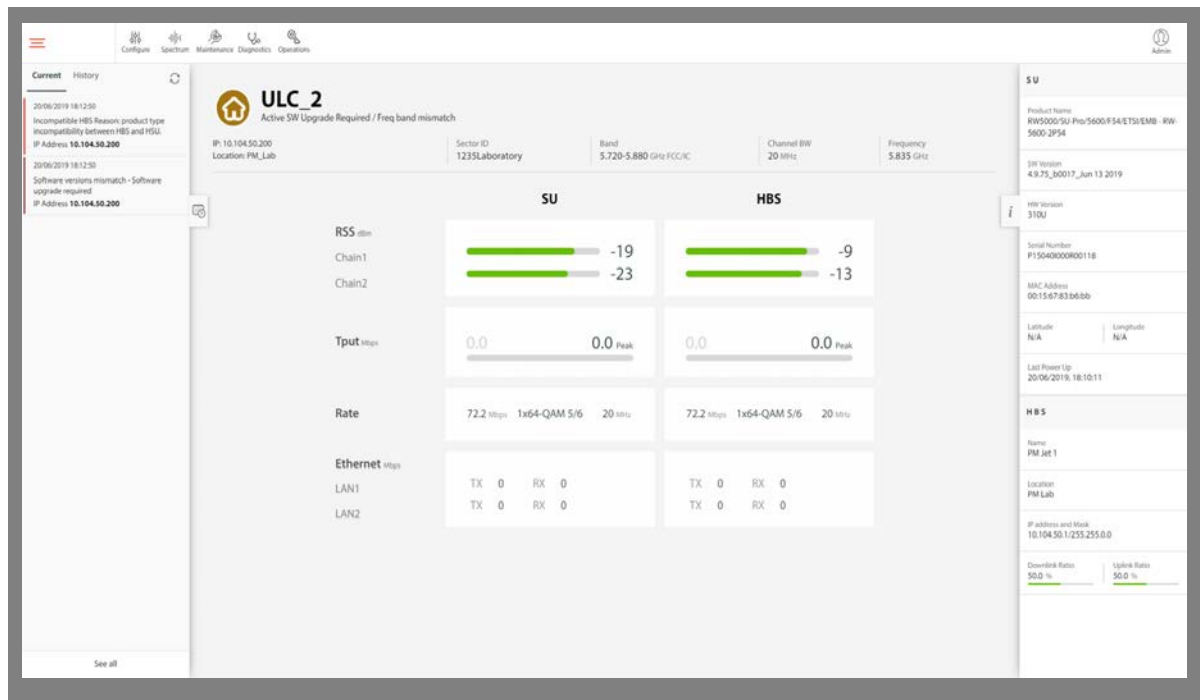


Enter the user name and password, then click **Login**

User name: **admin**

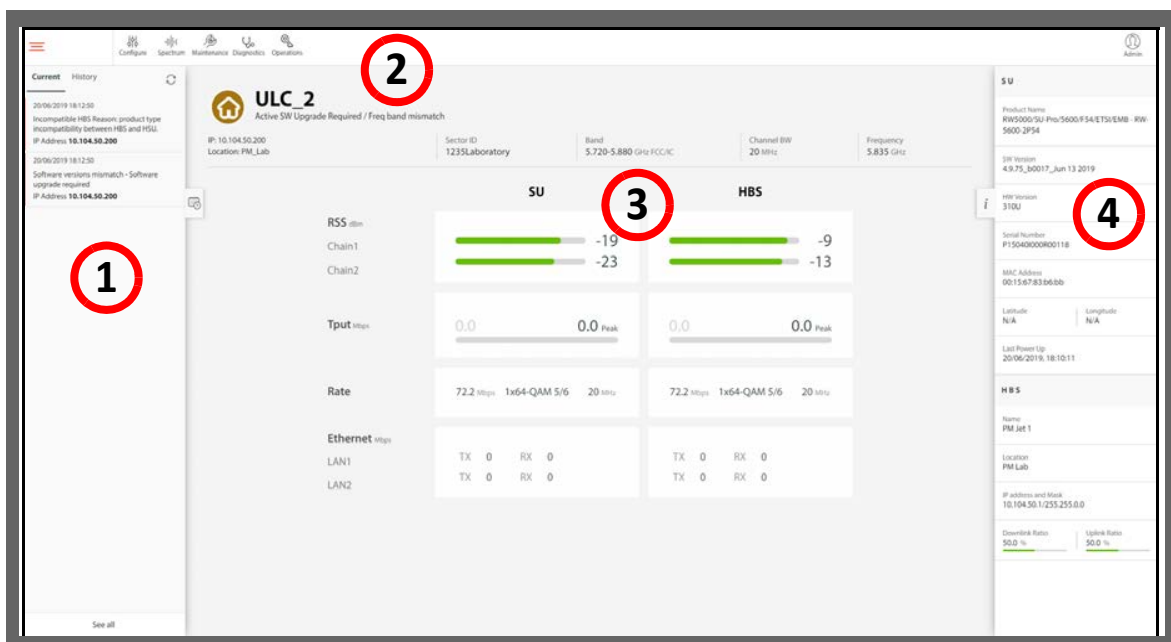
Password: **netwireless**

The main window will appear.

Figure 13-1: SU *PRO/AIR* Main/Overview Window

13.3 Web UI Overview

The Web UI shows the SU *PRO/AIR* unit and its base station to which it belongs.



Click on the section of the Web UI of which you want more information:

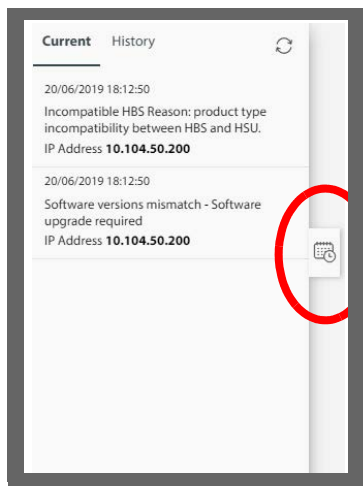
1	<i>History</i>	2	<i>Main icons</i>
3	<i>Radio List</i>	4	<i>Info Panel</i>

13.3.1 History

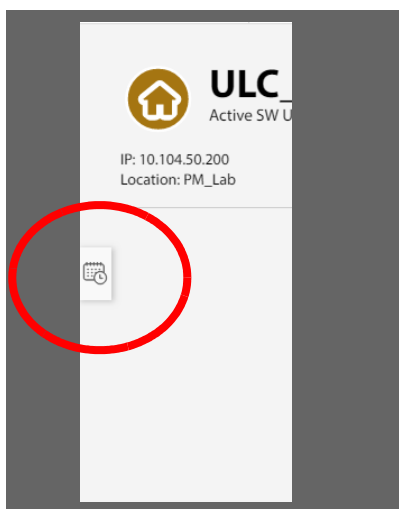
Here you can see the history of events.

Click on the **Current** tab to limit the list to recent events (from the last several hours), or on the **History** tab to see a comprehensive list of events.

- To minimize the History list, click on the minimize symbol:



- To restore the History list, click on the minimize symbol again:









13.3.2 Main icons

Along the top edge of the Web UI, there are icons that allow you to carry out certain tasks for the radio units.

The applicable icons become enabled when you select the radio unit relevant for the task.



	Configure	Set various parameters for the selected unit, including, but not limited to: <ul style="list-style-type: none"> • IP address, • frequency and bandwidth, • transmission power, • passwords, • NTP settings, and more
	Spectrum	The Spectrum view utility provides spectral measurements, and is be useful in assisting with diagnosing interference related problems prior to full sector activation. It is operated per carrier.
	Maintenance	Back up, upgrade or restore the software in the selected unit or units.
	Diagnostics	Shows radio signal strength (refer to this when carrying out antenna alignment), allows a ping and trace, a speed test, creates diagnostics files, operates an ethernet loopback on an iPerf3 server, and sniffing of TCP/IP packets.
	Operations	Resets, restores to factory default configuration, allows license-dependent upgrades, and can activate the unit.
	User Profile Icon	Click this icon to log out of the unit.

Configure



These are the configuration categories:

System	Air Interface	Tx & Antenna
Management	Inventory	Security
Nomadic	Date & Time	Ethernet
WiFi		

System

General

These items are convenience fields: **Description**, **Object ID**, **Name**, **Contact**, **Location**, and **Last Power Up**. **Name** and **Location** are typically entered during registration. If you make any changes, click **Save** to have them take effect.

System

General

Coordinates

Description
Wireless Link

Object ID
1.3.6.1.4.1.4458.20.5.1.1

Name
DUO_PM

Contact
Person

Location
PM_Lab

Last Power Up
12/11/2018, 14:21:05

Cancel Save

Coordinates

The coordinates (latitude and longitude) use either decimal degrees or degrees, minutes, and seconds. If you make any changes, click **Save** to have them take effect.

System

Coordinates

☒ Decimal Degrees Latitude (-89 to +89)
0.00000

☐ Degrees Minutes Seconds Longitude (-180 to +180)
0.00000

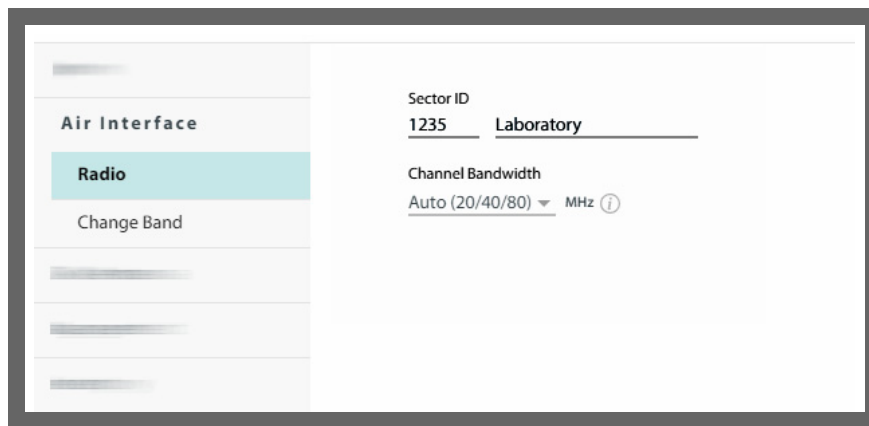
Latitude: Degrees / Minutes / Seconds
0 0 0.00 N S

Longitude: Degrees / Minutes / Seconds
0 0 0.00 E W

Cancel Save

Air Interface

You can change the Sector ID, channel bandwidth and frequency band. The Sector ID is important as it **must** be the same as that of the base station.

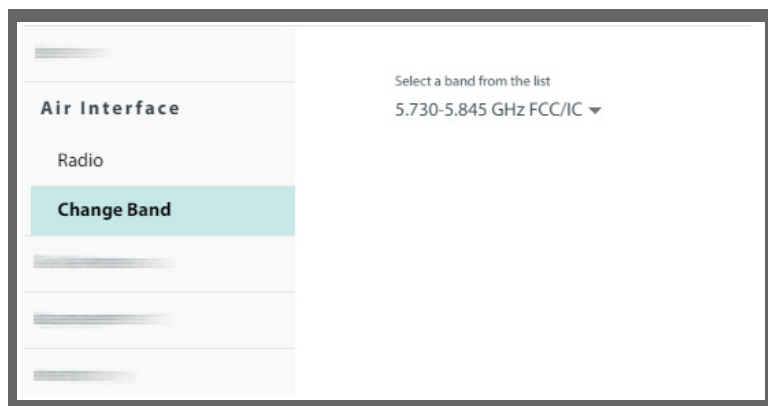


The screenshot shows the 'Radio' configuration page. On the left, a sidebar contains 'Air Interface' and 'Radio' (highlighted in teal). Below 'Radio' is a 'Change Band' button. The main content area displays 'Sector ID' with a value of '1235' and a label 'Laboratory'. Below that, 'Channel Bandwidth' is set to 'Auto (20/40/80)' with a dropdown arrow and an information icon.

Radio

Sector ID: Set the Sector ID here. This must be the same as the HBS to which the HSU is to connect.

Channel Bandwidth: Shows the channel bandwidth.



The screenshot shows the 'Change Band' page. The sidebar has 'Air Interface' and 'Radio', with 'Change Band' highlighted in teal. The main content area displays a dropdown menu with the text 'Select a band from the list' and the selected band '5.730-5.845 GHz FCC/IC'.

Change Band

You can change the frequency band here. Only frequency bands allowed by your regulatory environment will appear.

If you make any changes, click **Save** to have them take effect.

Tx & Antenna

Changes made here may affect link quality, and in the case of antenna type, cause a re-sync.

Tx & Antenna

Antenna Connection Type:
☒ External ☐ Integrated

Antenna Type: Dual ▼

Antenna Gain: 16.0 dBm ⓘ

Beamwidth (0 to 360): ⓘ

Azimuth (0 to 359): ⓘ

Tx Power (Per radio): 18 dBm

Tx Power (System): 21 dBm

Required Tx Power (Per radio): 24 dBm

Cable Loss: 0.0 dBm ⓘ

Max EIRP: 43 dBm

EIRP: 37 dBm

Cancel Save

If you make any changes, click **Save** to have them take effect.

Management

This category enables you to change the IP address, subnet mask and default gateway of the selected device, configure the management VLAN, set trap destinations, change the management protocol and its authentication mode, set the IP address of a Syslog server, and add or remove user definitions.

Network

You may configure a link for IPv4, IPv6, or both. Using both IP versions is useful in conjunction with applications that do not fully support IPv6.

1. Choose what type of IP address to enter (IPv4, IPv6, or both)

IP Version:
IPv4 ▼

IPv4

IP Address: 10.104.60.230

Subnet Mask: 255.255.255.0

Default Gateway: 10.104.60.201

IPv6

IP Address: ::b

Subnet Prefix Length: 64

Default Gateway: ::a

Cancel Save

Here, we choose both, and enter the IPv6 addresses:

IP Version
IPv4 + IPv6 ▼

IPv4	IPv6
IP Address 10.104.60.230	IP Address 205:104:60:230
Subnet Mask 255.255.255.0	Subnet Prefix Length 64
Default Gateway 10.104.60.201	Default Gateway 205:104:60:201

Cancel Save

2. Enter the appropriate IP address or addresses, including the Subnet Mask and Default Gateway (for IPv4), and/or the Subnet Prefix Length and Default Gateway (for IPv6).
3. Click **Save**.
4. If you changed any values, you will see a message warning you that a device reset will be done. To confirm, click **OK**.

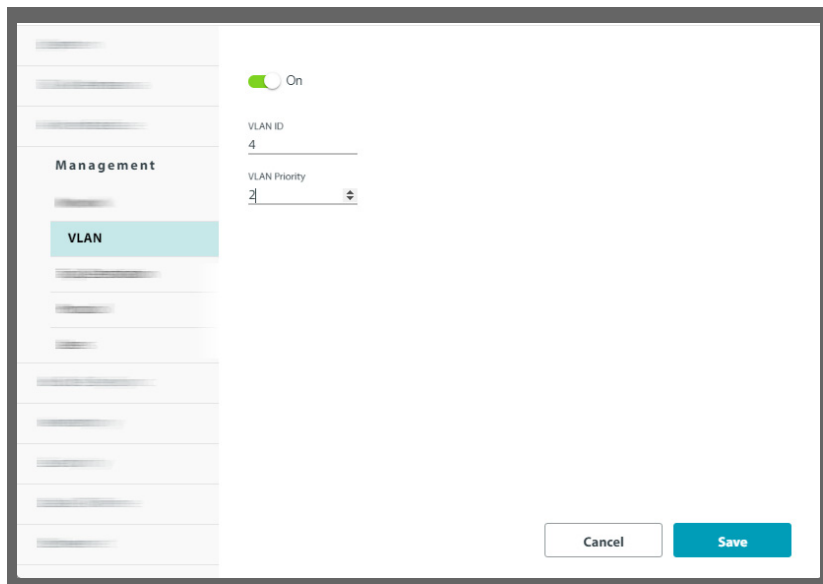
VLAN

Configure the management VLAN here.

The management VLAN enables separation of user traffic from management traffic whenever such separation is required. It is recommended that each member of a sector be configured with different VLAN IDs for management traffic. (This reduces your chances of accidentally locking yourself out of the sector.)



VLAN IDs are used by RADWIN products in three separate contexts: Management VLAN, Traffic VLAN and Ethernet Ring. It is recommended that you use different VLAN IDs for each context.



➤ To enable VLAN for management:

1. Check **ON** in the VLAN window.
2. Enter a VLAN ID. Its value should be between 2 and 4094.

After entering the VLAN ID, only packets with the specified VLAN ID are processed for management purposes. This includes all the protocols supported by the radio (ICMP, SNMP, Telnet and NTP). Using VLAN for management traffic affects all types of management connections (local, network and over the air).

3. Enter a Priority number between 0 and 7.

The VLAN priority is used for the traffic sent from the radio to the managing computer.

4. Change the VLAN ID and Priority of the managing computer NIC to be the same as those of steps 2 and 3 respectively.
5. Click **Save**.

➤ Lost or forgotten VLAN ID or IP Address

If the VLAN ID or IP address of the unit is forgotten, you can carry out the steps shown below to restore the values.

- Set the NIC of the managing computer to a static IP address, using an appropriate Subnet value. Record this subnet value (for eg. 192.168.3.100)
- Open a command line interface, and type

```
ARP -s xxx.yyy.zzz.www 00-15-67-8D-5F-FF
```

Where **xxx.yyy.zzz.www** is an IP address appropriate for the NIC's subnet value.

00-15-67-8D-5F-FF is a unique RADWIN MAC address, and must be entered as-is.

Note that as soon as you enter this command, you have 3 minutes to change whatever needs to be changed on the unit, so do the next few steps quickly:

- Enter the command:

```
ping xxx.yyy.zzz.www
```

You will see several timeout messages. Wait until you see about 3 or 4 of them.

- Enter the command:

```
ARP -d xxx.yyy.zzz.www
```

- Open a web browser, and enter **xxx.yyy.zzz.www**

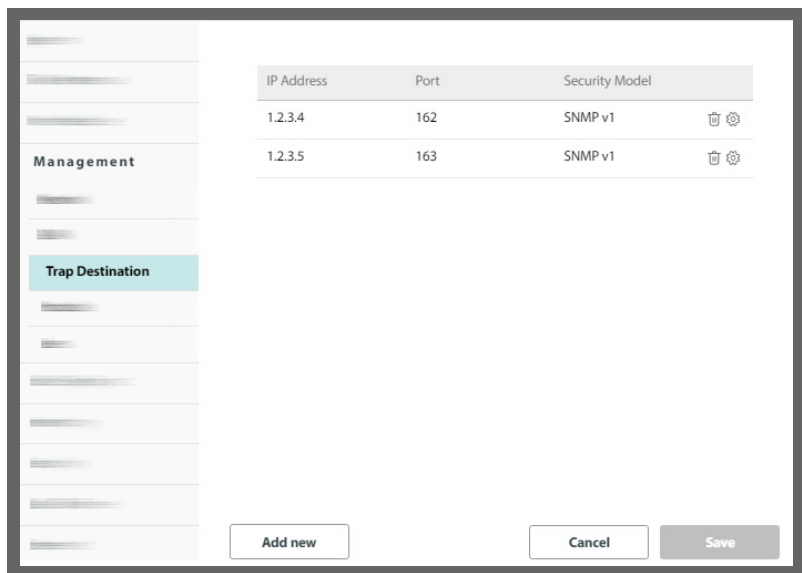
You will see the welcome message of the unit

- Enter the user name and password, click **Login**.
- From the main window, follow instructions as shown in this document to either change the IP address, or record the IP address. Do the same with the VLAN ID, if relevant.

Note that during this 3 minute window, there is no VLAN.

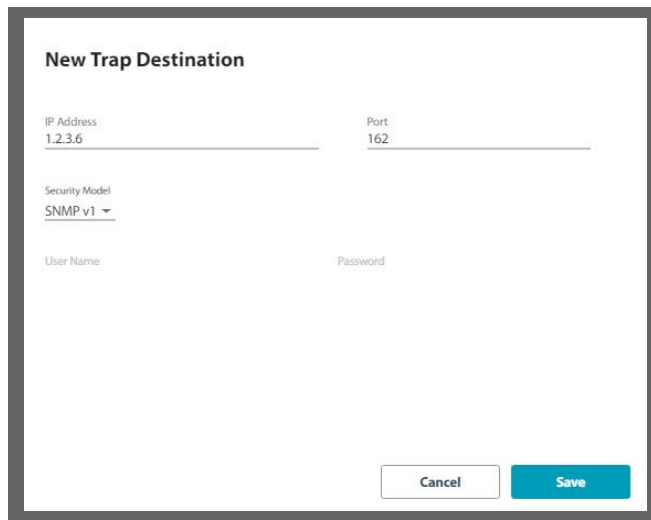
Trap Destinations

All traps are saved at each location you define.



To set a new trap destination:

1. Click **Add new**
2. In the window that appears, enter the Trap Destination IP Address, Port, and Security Model (SNMP v1 or v3). If choosing SNMP v3, enter the User Name and Password. The IP address can be the same as the managing computer. The events log will be stored at the address(es) chosen.



New Trap Destination

IP Address: 1.2.3.6 Port: 162

Security Model: SNMP v1 ▼

User Name: Password:

Cancel Save

3. Once you are finished, click **Save** to have your changes take effect.

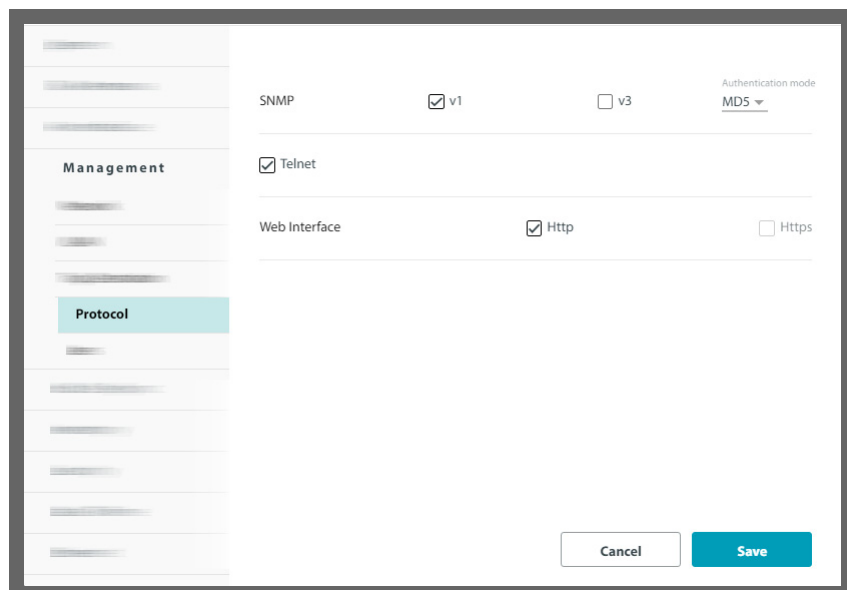


To change (edit or delete) a trap destination:

1. To delete a trap destination, click the trash icon (🗑️) on the same line as the IP address.
2. To edit a destination, click the configuration icon (⚙️) on the same line as the IP address.
3. In the window that appears, change the parameters you wish to change (Trap Destination IP Address, Port, and/or Security Model). If choosing SNMP v3, enter the User Name and Password. The IP address can be the same as the managing computer. The events log will be stored at the address(es) chosen.
4. Once you are finished, click **Save** to have your changes take effect.

Protocols

You can set the management protocol as well as the authentication mode.



SNMP ☒ v1 ☐ v3 Authentication mode: MD5 ▼

☒ Telnet

Web Interface ☒ Http ☐ Https

Cancel Save

SNMP

SNMP support is permanently enabled. You may choose between SNMPv1, SNMPv3 or both. You can leave the default authentication mode for SNMPv3 as MD5 (message digest algorithm), or change it to SHA1 (secure hash algorithm).

If you change these values here, you will be required to use them when you log in to the unit via the RADWIN Manager.

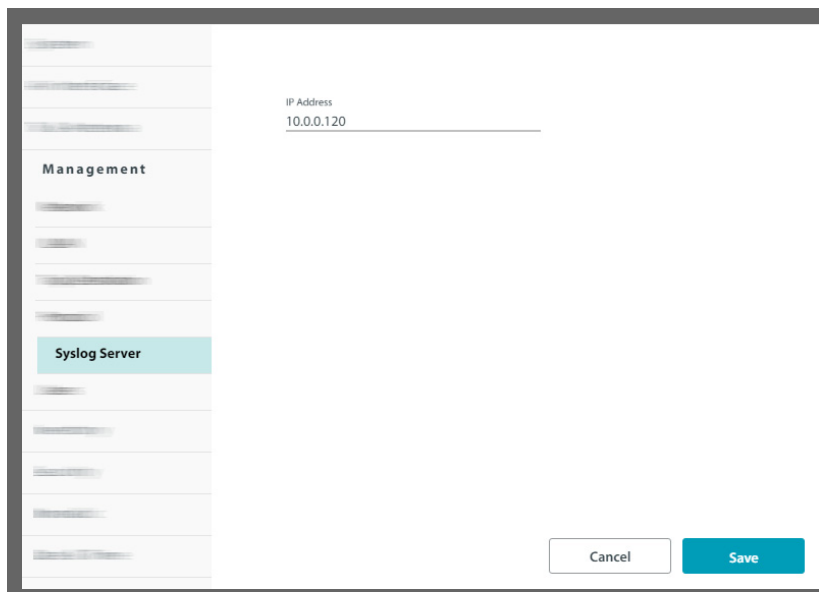
Web Interface

- The unit can be configured for HTTP, HTTPS, or both. To do this, place a checkmark in the box next to the protocol you want from the **Web Interface** line.
- The next time you log on to the unit's Web Interface, use the protocol you chose here.
- An admin user must be logged in with HTTPS to make changes in users.
- If you have selected HTTPS and log in with HTTP, then the unit will automatically use the secured model (HTTPS).
- If you choose Enabled under **Strict HTTPS**, then the next time you log in, you must do it via **https://IP Address**.

Once you are finished, click **Save** to have any changes take effect.

Syslog Server

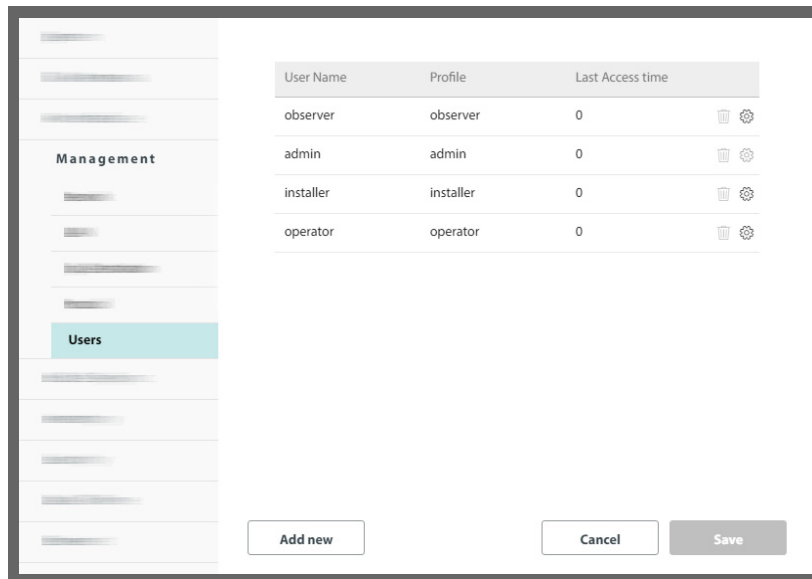
This field shows the IP address of a Syslog server to which the specific radio unit sends Syslog messages. This is configured per individual unit.



- Enter the IP Address of the Syslog server, and click **Save**. It could be the IP address of the managing computer. The Syslog events will be stored at the address chosen.

Users

Here an admin user can define users, and assign to them a pre-defined category. The admin user must be logged in using HTTPS. Once you define a user, that person can use the name and password to log in.



Possible user profiles are as follows:

User Profile	Function	Default Password
Observer	Monitoring	netobserver
Operator	Installation, configuration	netpublic
Installer	Operator plus set-band	netinstaller
Admin	Installer plus define users (in other words, Everything)	netwireless

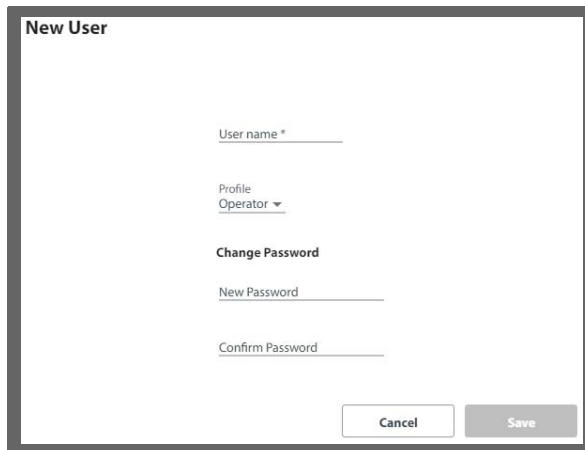


Caution

To add or edit a user, you must be logged in via secure HTTP. Do this by making sure that HTTPS is selected (from a selected unit, click the Configure icon, then from Management -> Protocol, select the HTTPS box. Then log in using the same IP address as before, but add https:// before its address.

New user:

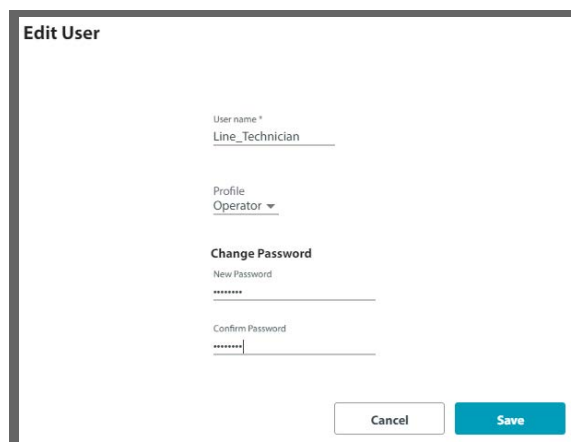
Click **Add new**, and the New User window will open.

A screenshot of the 'New User' form in a web interface. The form is titled 'New User' in the top left corner. It contains four input fields: 'User name *' (required), 'Profile' (a dropdown menu currently showing 'Operator'), 'Change Password' section with 'New Password' and 'Confirm Password' fields. At the bottom right, there are two buttons: 'Cancel' and 'Save'.

1. Enter a convenient name for the new user
2. Choose the profile for this user. The profile determines what the user can and cannot do.
3. Set the password for this user, and confirm it.
4. Click **Save** to have your changes take effect.
5. You will see the new user in the Users list.

Edit user:

Click the configuration icon (⚙️), and the Edit User window will open.

A screenshot of the 'Edit User' form in a web interface. The form is titled 'Edit User' in the top left corner. It contains four input fields: 'User name *' (required, currently showing 'Line_Technician'), 'Profile' (a dropdown menu currently showing 'Operator'), 'Change Password' section with 'New Password' and 'Confirm Password' fields (both masked with asterisks). At the bottom right, there are two buttons: 'Cancel' and 'Save'.

1. Change the name, if needed
2. Change the profile, if needed. This determines what the user can and cannot do.
3. Set the password for this user, and confirm it. This must be done no matter what action you take here.
4. Click **Save** to have your changes take effect.
5. You will see the edited user in the Users list.

Remove user:

You cannot remove the pre-defined users

1. Click on the trash icon (🗑️) to remove the user.

2. The user will be removed from the Users list.

Inventory

This shows the identification information for the selected unit: Product version, hardware version and software version, MAC address, serial number, aggregate capacity, the present temperature inside the unit, and the unit's power consumption.

Note you cannot see the IP address here. Go to **Configure -> Management -> Network** to see the IP address of the selected unit.

The screenshot shows the 'Inventory' section with the 'General' tab selected. The left sidebar contains a list of units. The main content area displays the following information:

Field	Value
Product	[Redacted]
HW Version	UNDEFINED
SW Version	4.9.34_b0030_Dec 17 2018
MAC Address	00:15:67:00:00:40
Serial Number	UNDEFINED0000000
Aggregate Capacity	260 Mbps
Temperature	48 °C
Power Consumption	17182 mW

Security

The Security dialog enables you to change the SNMP Community strings.

You can also create an encrypted SNMP Community string value file, set and change the Security Mode, and the present User Password.

The screenshot shows the 'Security' section with the 'SNMP Communities' tab selected. The left sidebar contains a list of units. The main content area displays the following information:

Current Read-Write Community: [Redacted] [Forgot Community?](#)

☐ Read-Write Community

New: [Redacted] Confirm: [Redacted]

☐ Read-Only Community

New: [Redacted] Confirm: [Redacted]

☐ Trap Community SNMPv1 only

New: [Redacted] Confirm: [Redacted]

☐ Show Characters

SNMP Communities

Each radio unit communicates with the managing computer using the SNMPv1 or SNMPv3 protocol. The SNMPv1 protocol defines three types of communities:

- Read-Only for retrieving information from the radio unit
- Read-Write to configure and control the radio unit
- Trap used by the radio unit to issue traps

The read-write Community strings and read-only Community strings have a minimum of five alphanumeric characters. Changing the trap Community is optional.

Editing SNMPv1 Community Strings

When editing these strings, both read-write and read-only communities must be defined.

➤ To change a Community string:

1. Type the current read-write Community in the **Current Read-Write Community** field (default is **netman**).
2. Click the check box next to the community whose string you wish to change.
3. Type the new Community string and re-type to confirm. A community string must contain at least five and no more than 32 characters excluding SPACE, TAB, and any of ">#@|*?;.,"
4. Click **Save** to have your changes take effect.

Security Mode

This is an enhanced version of the usual secured method of working, which offers extra protection against unauthorized access of the system.

It is performed on a unit-by-unit basis, and is independent of sector structure or hierarchy¹.

Implement this mode as follows:

1. Change the SNMP management interface to SNMPv3:

Select **Configuration -> Management -> Protocol** (see [Protocols](#) on page 13-11)

- a. Choose the SNMPv3 radio button. Choose SNMPv3 only, not "V1 and V3"
- b. You can use either the MD5 or SHA1 authentication mode
- c. Click **Save**. You will be asked to log in again. Make sure you have the proper SNMPv3 user name and password.

2. Select **Configuration -> Security -> Security Mode**

1. If configuring one unit for SNMPv3 and Enhanced Security, its counterpart must also be configured for SNMPv3, but need not be configured with Enhanced Security.

The screenshot shows a web interface with a sidebar on the left containing a 'Security' menu. The 'Security Mode' option is highlighted in blue. The main content area displays a dialog box titled 'Authentication to allow this change'. It includes a 'User Name' input field, a 'Password' input field, and an 'Authentication' button. At the bottom of the dialog are 'Cancel' and 'Save' buttons.

3. Enter the SNMPv3 user name and password, and click **Authentication**.

4. Click **Save**.

User Password

➤ To change the user password of the present user:

1. Select **Security -> User Password**. The User Password dialog box opens.

The screenshot shows the same web interface as before, but the 'User Password' option in the sidebar is highlighted in blue. The main content area displays a dialog box titled 'User Password'. It includes three input fields: 'Current User Password', 'New User Password', and 'Confirm User Password'. At the bottom of the dialog are 'Cancel' and 'Save' buttons.

2. Enter the current password.

3. Enter the new password.

4. Confirm the new password.

5. Click **Save**.

Nomadic

Each nomadic HSU is allocated to one of four HBS levels labelled A, B, C and D. Some operating parameters for each level (such as VLAN, MIR, QoS, resources, fixed rate, Spatial Multiplexing/Diversity antenna mode) can be different for each level allowing for broad prioritization of service between different types of nomadic units. This requires that each nomadic HSU be assigned a level to join a sector.

A nomadic HSU may only send and receive service traffic while stationary. A nomadic HSU detects that it is time to seek another HBS upon sync loss. Upon entering and stopping in a new sector, it may take several seconds to establish sync with the sector HBS.

Changing any of VLAN, MIR, QoS, fixed rate, Spatial Multiplexing/Diversity antenna mode for one configured HSU at a given level, changes all other HSUs at that level. If you add a new HSU to a sector (by direct connection) at a given level, at sync time, it will acquire the existing parameters for that level.

1. To configure a nomadic HSU, first configure it as described in the other sections here, then do the following from the **Configure -> Nomadic** tab:
2. Select the **Nomadic** radio button
3. From the **Device Level** pull-down menu, select the level of the unit (A,B,C,or D)
4. Click **Save**.
5. A message will appear warning you that if the selected type is not defined in the base station, the HSU will not be able to synchronize.

Once you are ready, click **OK**. The process will take several seconds, after which the HSU will be reset.

Notes for units working in he UNI or ETSI (ie, non-FCC) regulatory environment:

For 5.x GHz and 3.x GHz units: You can select a threshold for scanning. Every 1MHz is checked. This threshold value is used as a jumping off point for a nomadic unit to scan for a base station. Any base station that has an RSS value higher is immediately locked on to. Base stations with values lower than this are placed in a list, and the best one is chosen.

For 3.x GHz units only: Since every 250kHz is checked, the scan for the best unit can take quite some time. To reduce this time, you can choose a channel from which to start the scan.

Date & Time

Here you can set the date and time of the selected unit, whether manually, based on local time or on an NTP Server.

The radio unit maintains a date and time. The date and time should be synchronized with any Network Time Protocol (NTP) version 3 compatible server.

During power-up the radio attempts to configure the initial date and time using an NTP Server. If the server IP address is not configured or is not reachable, a default time is set.

When configuring the NTP Server IP address, you should also configure the offset from the Universal Coordinated Time (UTC). If there is no server available, you can either set the date

and time, or you can set it to use the date and time from the managing computer. Note that manual setting is not recommended since it will be overridden by a reset, power up, or synchronization with an NTP Server.



The NTP uses UDP port 123. If a fire wall is configured between the radio and the NTP Server this port must be opened. It can take up to 8 minutes for the NTP to synchronize the radio date and time.

➤ To set the date and time:

1. Determine the IP address of the NTP server to be used.
2. Test it for connectivity using the command (Windows XP and 7), for example:
w32tm /stripchart /computer:216.218.192.202

3. If entering an IP address for the NTP Server, enter the new address.
4. Set your site Offset value in minutes ahead or behind GMT¹.
5. To manually set the date and time, click the calendar icon and choose the new date, then click the spinner next to Time to choose the time.
6. To set the time based on the time of the managing computer, click **Use Computer Time**.
7. Click **Save** to have your changes take effect.

Ethernet

In this category, you can configure the input ports on the unit.

LAN Ports

- The input port (called here “LAN1”) is configurable for line speed (10/100/1000BaseT) and duplex mode (half or full duplex).

¹ Greenwich Mean Time

- An Auto Detect feature is provided, whereby the line speed and duplex mode are detected automatically using auto-negotiation. Use manual configuration when attached external equipment does not support auto-negotiation. The default setting is Auto Detect.
- CRC Errors shows how many Cyclic Redundancy Check errors occurred since the last rest.

LAN1

Current	Mode	CRC Errors	Main Data Path
1Gbps/Full Duplex	Auto (100 Mbps)	0	<input checked="" type="checkbox"/>

SFP

Current	Mode	CRC Errors	Main Data Path
Not Connected		0	<input type="checkbox"/>

Cancel Save

WiFi

WiFi

SSID	Status
Access Point Mode: Auto	Security
IP Address	TX Power

Connected Clients

#	MAC Address	RSSI[dBm]
1		
2		
3		
4		
5		

Cancel Save

The SSID status, Security method, and On status of the WiFi unit are displayed.

Access Point Mode: Turn On or Off the WiFi for the device. Auto allows the system to determine if WiFi needs to be used.

You can set the following WiFi parameters:

- WiFi password

- WiFi IP address
- WiFi channel
- WiFi Tx power

Connected Clients: This area shows up to 5 clients that are connected to this unit, including their MAC addresses and signal strength (RSSI).



The SSID of the WiFi is **R- [serial number of unit]**

Click **Save** to have your changes take effect.

Spectrum

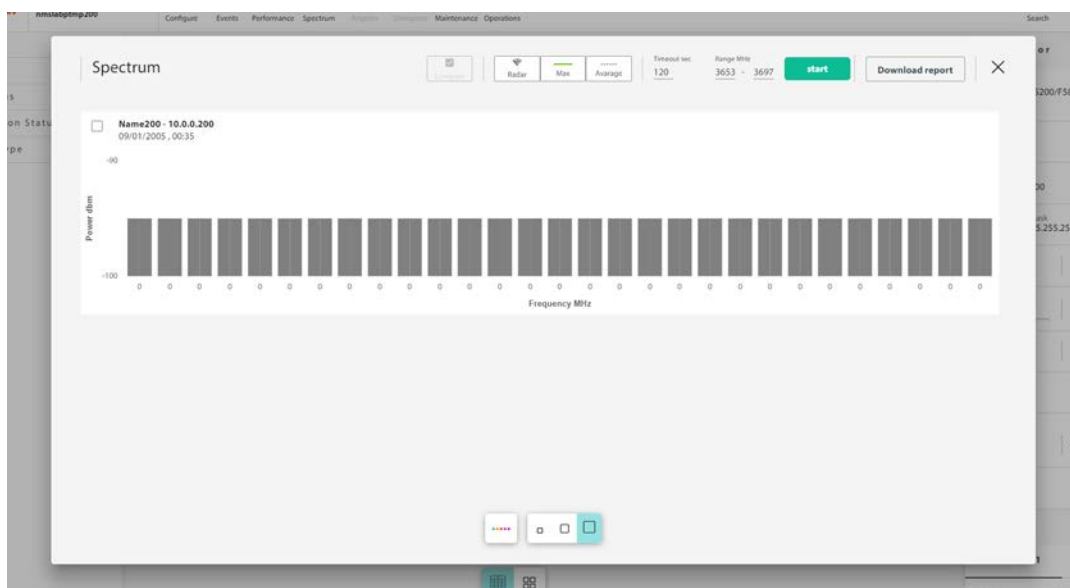


The Spectrum View utility is an RF survey tool that provides spectral measurement information, power vs. frequency. You can view real-time spectrum information, save results, and view historic spectrum scans. The data is stored in the radio unit itself.

The results of the Spectrum View utility are intended for use by RADWIN Customer Service to assist with diagnosing interference related problems.

We assume the reader knows about RF Spectrum Analysis so detailed theoretical explanations are not needed.

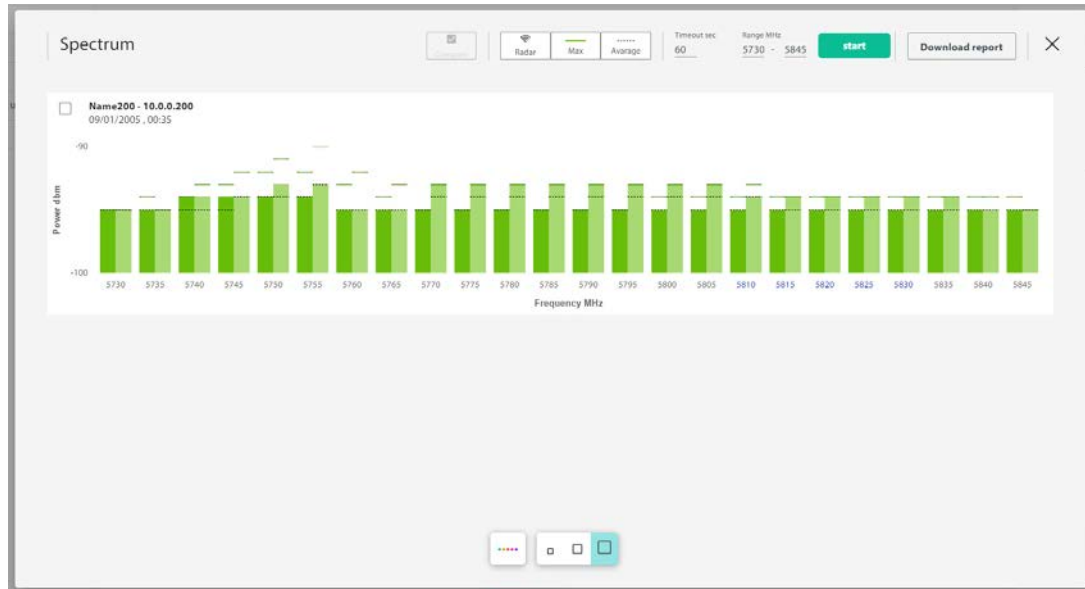
6. Click on the Spectrum View icon . The Spectrum View window will appear.




A blank Spectrum View result display will appear, where all the bars are grey.

The name of the unit appears, together with its IP address, date and time.

7. To start a scan first choose its **Timeout sec** time (top of window), which is the maximum analysis time per scan.
8. Select the frequency range (**Range MHz**, top of window). You can only select allowed frequencies.
9. Once you are ready, click **Start** to start the scan and see the results on screen. You will be warned that this is traffic-affecting. If this is acceptable, then click **Yes**.



- Green bars relate to those frequencies you chose when you activated the HBS. Dark green is Antenna A, and light green is Antenna B.
- If there are frequencies that you did not choose when you activated the HBS, their bars appear blue.
- The frequencies the unit is working at has text that appear blue.
- Green lines show the maximum power found for the indicated frequency range.
- Dotted lines show the average power found for the indicated frequency range.
- If a Radar was detected, its indicated by the brown icon, if not, that is indicated by the gray icon.

The key on the bottom of the window reviews these indications ()

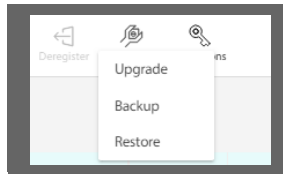
10. If you want to save the report, click **Download Report**, and select a location where to save the report file.

Maintenance



This allows you to upgrade, backup or restore the target software.

Choose the action you want from the pull-down menu.



Upgrade

1. Click **Choose Upgrade File**, and locate the SWUL_5k.swul file.
2. The name, size and status of the file will be shown.
3. Once you are sure that this is the correct file to use, select it, and click **Open**. The file will be uploaded to the unit, and validated. A description of the file will be displayed.
4. Once you are sure that this is the correct file, click **Install**. The upgrade procedure will commence, and when completed, an indication will be shown.

Backup

We recommend carrying out a backup before carrying out a software upgrade.

1. Click **Download**
2. The system will commence the backup procedure. Once it is finished, the name of the file and the date the backup was done will be shown in this window. Click **Done**.
3. The backup file will be located in the downloads location of the managing computer, with the extension *.backupl
4. You can retrieve this backup file by clicking on **Restore** and browsing to the file location.

Restore

If you wish to restore a previous configuration of the unit that you had already backed up, use this option.

1. Click **Choose Restore File**, and locate the desired *.backupl file
2. The name, size and status of the file will be shown
3. Once you are sure that this is the correct file to use, select it, and click **Open**. A description of the file will be displayed.
4. Once you are sure that this is the correct file, click **Upload**. The restore procedure will commence, and when completed, an indication will be shown.
5. Upon completion of the restore procedure, the unit will reset and then will operate according to the restored version.

Diagnostics

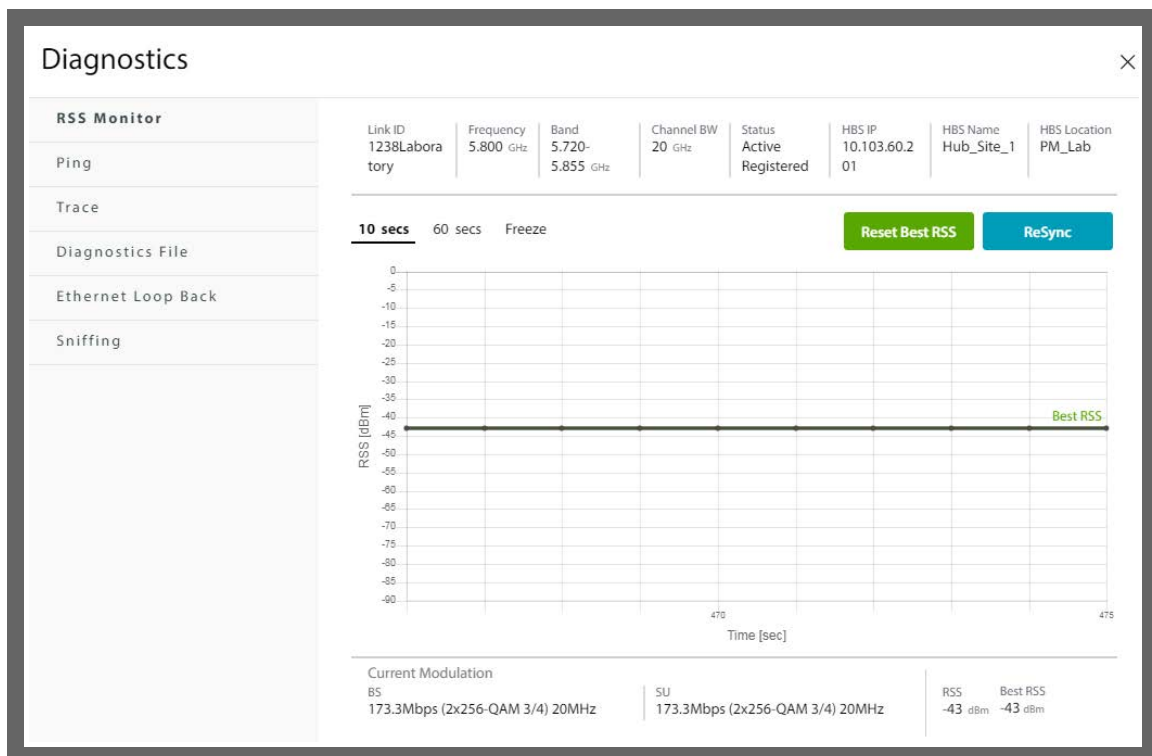


This category provides various tools: Radio Signal Strength display, a ping and trace capability, diagnostic files (to be used by RADWIN professional services), ethernet loop back, and radio unit sniffing.

Click this icon to open the **Diagnostics** window.

RSS Monitor

- This shows the Radio Signal Strength of the selected item in real time.
- You can set the re-fresh rate at 10 secs or 60 secs, or you can freeze the display at any point in time.
- The display shows both the present RSS and the best RSS achieved to the present point in time.
- Click Reset Best RSS to reset the best RSS counter, click ReSync to re-synchronize the radio unit.
- Use this display when carrying out antenna alignment.



Ping

This is a standard ping function, that also allows you to set the number of packets and the packet size sent in the ping action.

1. Enter the target IP address in the **Target IP** window.
2. Enter the number of packets to be sent in the ping action in the **Packets** window, and the packet size to be sent in the **Packet Size** window.

3. When you are ready, click **PING**. The button will display **Processing**. Do not interrupt the process.
4. After a few moments, or longer, depending on the size of the values you entered above, the ping results will be shown.

The ping action is a one-time action, and does not repeat indefinitely.

Trace

This is a trace route tool.

1. Enter the IP address of the target to which you want to carry out the trace.
2. When you are ready, click **Trace**. The button will display **Processing**. Do not interrupt the process.
3. The results will be shown on-screen.

Diagnostics File

This creates a diagnostic file, to be used by RADWIN professional services and support personnel to expedite assistance.

1. Select the items for which you want information. If an item is not selected, the diagnostic file will not contain information for that item. If not items are selected, the Diagnostics icon will become disabled.
2. Click **Generate Diagnostics File**. The diagnostics process will begin, and a button will appear with the option to stop the diagnostics action.
 - After a few seconds or minutes, a JSON file will be created, stored in the default downloads section of the managing computer.
 - The format of this file name is: **diagnostics-DATE TIME.json** .
3. Send this file to RADWIN professional services.

Ethernet Loop Back

- The Ethernet loopback command runs an iPerf3 server on the selected radio device. Ethernet loopback supports both TCP and UDP traffic (port 5001)
 - This radio device must be connected to the managing computer directly or via the network - it cannot be run over the air on a remote radio.
1. Run an iPerf3 client on your managing computer.
 2. Once this is ready, click **Start**. The loopback will commence and will continue to operate until you stop it by clicking **Stop**.
 3. While the loopback is operating, you can use your iPerf3 application on your managing computer to check performance.

Sniffing

- The Sniffing command captures and downloads TCP/IP packets on the line between the managing computer and the selected radio device.
- This radio device must be connected to the managing computer directly or via the network - it cannot be run over the air on a remote radio.

- You can select sniffing using full mode, or capture only the headers.
- Click **Start** to start the sniffing process. It will continue until you click **Stop**, or until the file reaches its maximum size (5MB).
- The process can be run in the background.
- Once you stop the process, click **Download** to download the *.pcap file.
- This *.pcap file is downloaded to the default download section of the managing computer. You can use an application such as WinShark to read this file.

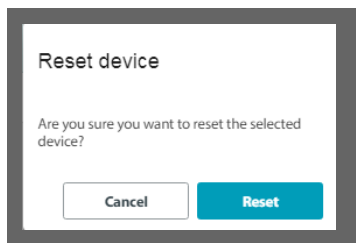
Operations



This icon allows you to perform a reset, restore the factory default settings, or to perform a license-dependent upgrade on the selected device.

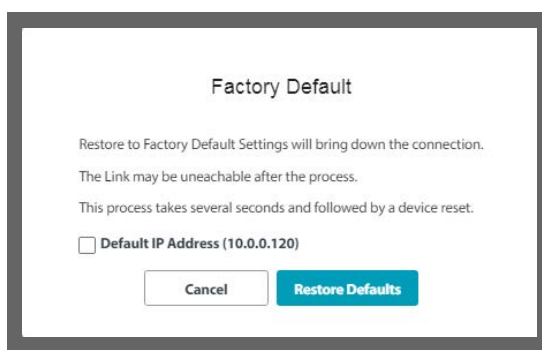
Reset

When you choose Reset, you are asked to confirm. Reset is traffic-affecting. If you are sure, click **Reset**.



Factory Default

When you choose Factory Default, you are asked to confirm. Since Factory Default involves a reset, it is traffic-affecting. You have an option to restore the default IP address (10.0.0.120), by clicking the box next to Default IP address. If you do not click this box, the device will retain its previous IP address. Once you are sure, click **Restore Defaults**, otherwise, click **Cancel**.

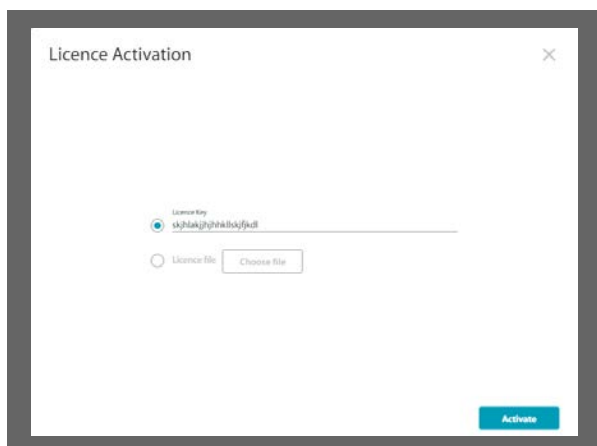


Licenses

To carry out a license-dependent upgrade, you must first acquire a license key. Do this as follows:

1. **Catalogue number:** Contact your RADWIN representative, and get a catalogue number of the upgrade you want. Purchase as many of these upgrades as you deem necessary.

2. **PAKs:** You will receive a list of Product Activation Keys (PAK) for each upgrade instance. A PAK number can be used on any compatible RADWIN product; they are not specific to any one given item of equipment.
3. **Activate PAKs:** Associate each PAK to a specific item of equipment: Access the License Key Application website: <http://tools.radwin.com/updates/licensekey/lk-radwin.htm>, and follow the instructions there to activate each PAK for the specific item of equipment you need to upgrade.
4. **Get License Keys:** The License Key Application will then give you a list of license keys. These numbers *are* unique for the specific upgrade and specific item of equipment. We recommend saving this list as a text file in a convenient location.
5. Select the device for which you want to apply a license-dependent upgrade.
6. Choose Operations -> License. The License Activation window will open.



7. Enter the license code in the field, or click **License file**, then **Choose file** to where you have saved the license file.
8. Once you are ready, click **Activate**.
9. The unit will be reset, after which it will be upgraded using the new license.

User Profile Icon



Admin, Observer, Operator, Installer

The name of the user profile will appear on the icon. Click this icon to log out of the HBS.

13.3.3 Radio List

The mid section of the user interface shows the status of the connected unit, together with its base station.

The information for the subscriber unit will be displayed along the top edge of the window.

- IP address
- Location
- Sector ID

- Frequency Band
- Channel BW
- Frequency of operation
- RSS for each stream (RSS1 and RSS2), on both the HBS side and the HSU side
- Throughput for the uplink and downlink
- Tx/Rx ratio



You can use this display of the RSS in real time as an aid during antenna alignment.

13.3.4 Info Panel

The right pane of the user interface functions as an information panel, giving a brief overview of the sector, showing the following:

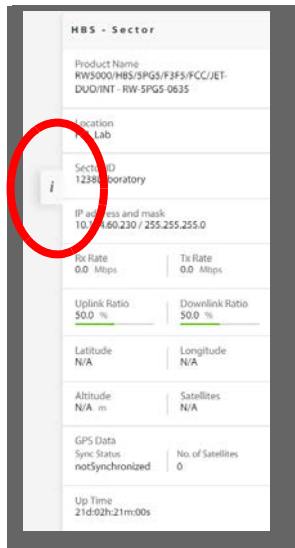
HSU (above)

- Product name
- Software version of target (SW Version)
- Hardware version (HW Version)
- Serial Number
- MAC Address
- The unit's latitude and longitude
- The unit's up time since last reset

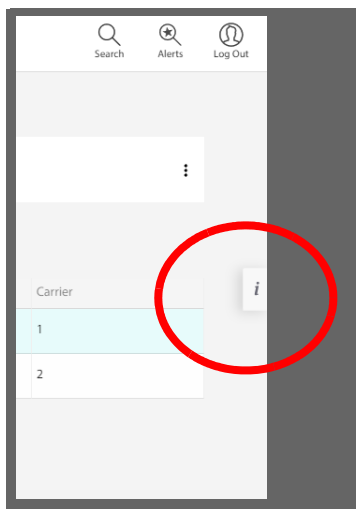
HBS (below)

- Product name
- Location
- IP address and mask
- Downlink ration and Uplink ratio

To minimize the info panel, click on the minimize symbol:



- To restore the info panel, click on the minimize symbol again:



Chapter 14: Managing a RADWIN JET DUO Sector

14.1 Scope of this Document

This document deals with managing the sector when working with a RADWIN JET DUO base station which has Release 4.9.34 and above. It covers DUO HBS configuration and HSU Configuration from the DUO HBS.

- The RADWIN JET DUO has two carrier frequencies in one unit: 5.x GHz, and 3.x GHz. Although they operate independently (they can be activated and de-activated independently, for example), since they are from the same unit, the sector name for both are the same, and if the HBS is reset, the action affects both carriers.
- In contrast to previous products, the RADWIN JET DUO is managed completely via its Web Interface, which is based in the unit itself. Configuration changes are also saved in the unit itself, and not in the accessing computer.



Caution

When working with a DUO base station (Release 4.9.34 and above), use its web interface only. It is not possible to use the RADWIN Manager.

However, when working with a LFF, SFF, JET base station, or DUO base station (Release 4.9.31 and below), or upgrading the DUO base station from 4.9.31 to 4.9.34, use the RADWIN Manager as the management application.

14.2 Login

Access the web interface by connecting to the unit, either directly via RJ45 cable, or via the internet. We recommend using a PC or laptop. Do not use a smartphone. Enter the unit's IP address in a web browser (default value: 10.0.0.120). A welcome message will appear.

Login

User Name _____

Password _____

Login

Enter the user name and password, then click **Login**

User name: **admin**

Password: **netwireless**

The main window will appear.

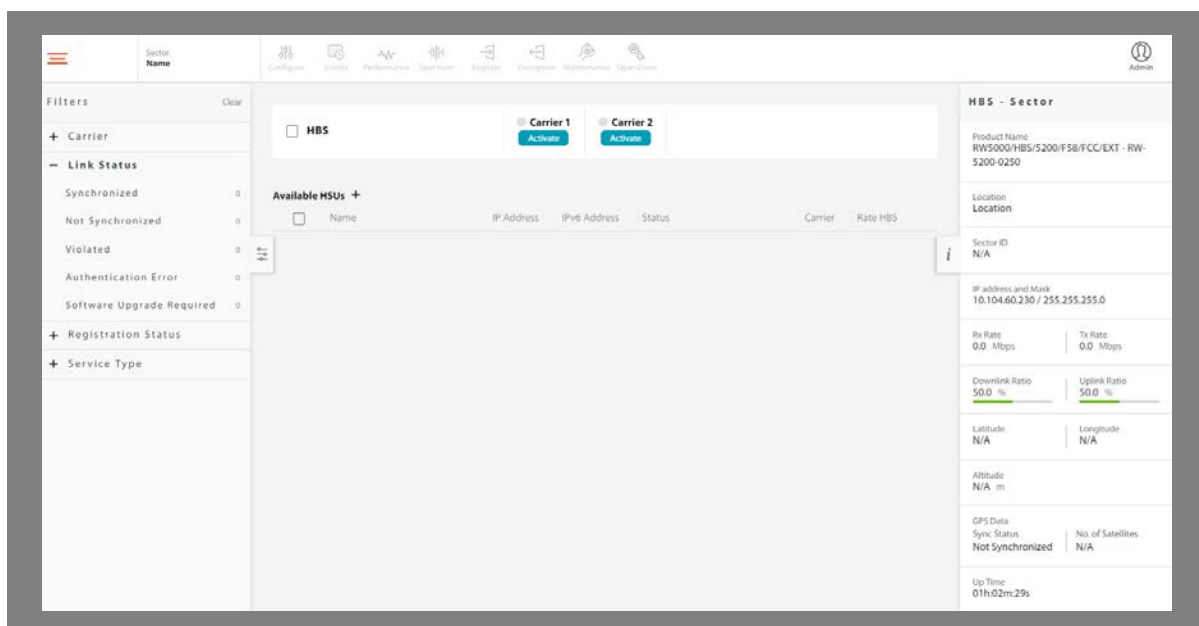


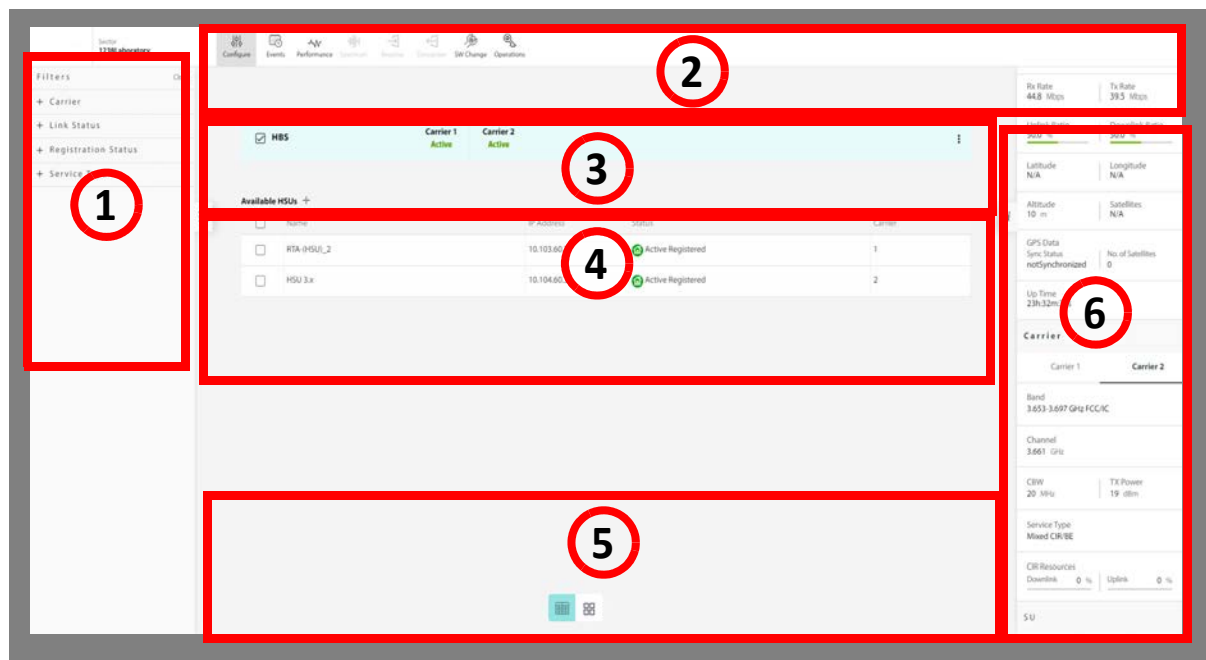
Figure 14-1: RADWIN JET DUO Main/Overview Window

For an explanation of the Web User Interface, see [Web UI Overview](#)

For instructions on first-time use of a DUO base station, see [First-Time Use](#)

14.3 Web UI Overview

The Web UI shows the DUO base station and any subscriber units it has detected.



You can see both carrier sectors at the same time, with all subscriber units.

You can filter what you see, and display the subscriber units in various manners.

Click on the section of the Web UI of which you want more information:




1	<i>Filters</i>	2	<i>Main icons</i>
3	<i>HBS List</i>	4	<i>HSU List</i>
5	<i>Sector Display views</i>	6	<i>Right Pane</i>

14.3.1 Filters

Here you can use certain criteria to filter what is displayed:

- **Carrier:** Select Carrier 1 or Carrier 2 to show only devices using the selected carrier. To show all devices using all carriers, select the Carrier title.
- **Link Status:** Select the status of the HSUs you want displayed. Possible HSU statuses are:

Icon	HSU status Description	
	Active Registered	Registered, in sync
	Active Unregistered	Unregistered
	Not Synchronized	Registered, no sync

Icon	HSU status Description	
	Active Violated	Belongs to another sector
	Active SW Upgrade Required / Freq band mismatch	Software Upgrade required
	Active Authentication Error	Authentication error

To show all devices using all statuses, select the Link Status title.

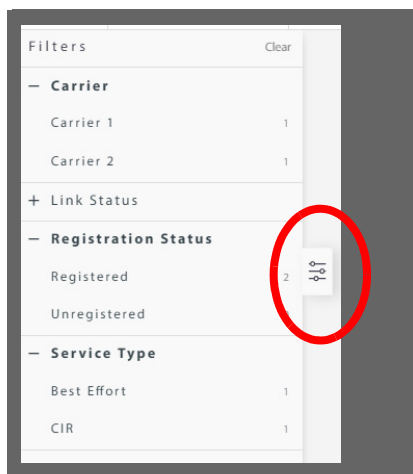
- **Registration Status:** Select Registered or Unregistered to show only devices in the indicated state.

To show all devices whether registered or not, select the Registration Status title.

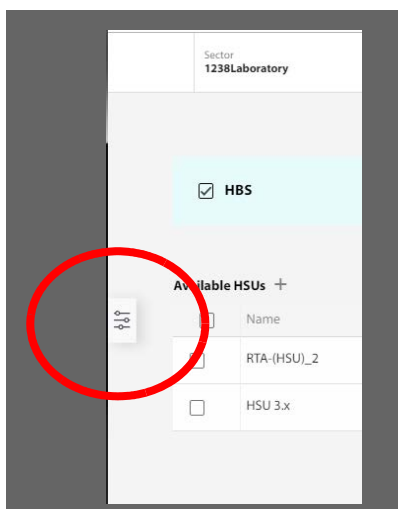
- **Service Type:** Select Best Effort or CIR to show only devices with the indicated service type.

To show all devices no matter what the service type, select the Service Type title.

- To minimize the Filters list, click on the minimize symbol:



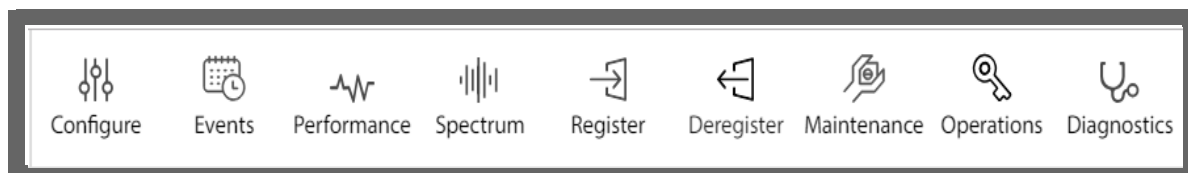
- To restore the Filters list, click on the minimize symbol again:



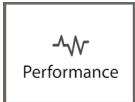









14.3.2 Main icons

Along the top edge of the Web UI, there are icons that allow you to carry out certain tasks for the radio units.

The applicable icons become enabled when you select the radio unit relevant for the task. For example, if you select an un-registered HSU, the Register icon will become enabled, but the Deregister icon will not.



	Configure	Set various parameters for the selected unit, including, but not limited to: <ul style="list-style-type: none"> • IP address, • frequency and bandwidth, • transmission power, • passwords, • NTP settings, • VLAN • QoS, and more
	Events	Shows system failures, loss of synchronization, loss of signal, compatibility problems and other fault conditions and events for the selected unit or units. You can also search and filter the events by severity, source, and time.
	Performance	The Performance Monitoring feature constantly monitors traffic and collects statistics data, whether or not the Web UI is open. Use this to see performance monitoring for the selected unit or units.
	Spectrum	The Spectrum view utility provides spectral measurements, and is be useful in assisting with diagnosing interference related problems prior to full sector activation. It is operated per carrier.
	Register	Registers an HSU
	Deregister	De-registers an HSU

 Maintenance	Maintenance	Back up, upgrade or restore the software in the selected unit or units.
 Operations	Operations	Resets, restores to factory default configuration, and allows license-dependent upgrades on the selected unit or units.
 Diagnostics	Diagnostics	Creates diagnostics files, for use by RADWIN professional services and support personnel to expedite assistance.
 Admin	User Profile Icon	Click this icon to log out of the HBS.

Configure



These are the configuration categories:

System	Service (HSU only)	Tx & Antenna
Air Interface (HBS only)	Management	Hub Site Sync (HBS only)
Inventory	Security	Date & Time
Ethernet (HBS only)	General (HBS only)	WiFi (HSU only)

Most are relevant for both HBSes and HSUs, but some are applicable for only one of them, and are indicated. If a category is not relevant for the unit you have selected, it will not appear in the GUI.

In addition, some specific items are different between HBSes and HSUs, and these are indicated in the descriptions as well.

System

General

These items are convenience fields: **Description**, **Object ID**, **Name**, **Contact**, **Location**, and **Last Power Up**. **Name** and **Location** are typically entered during HBS activation. If you make any changes, click **Save** to have them take effect.

System

General

Coordinates

Description
Wireless Link

Object ID
1.3.6.1.4.1.4458.20.5.1.1

Name
DUO_PM

Contact
Person

Location
PM_Lab

Last Power Up
12/11/2018, 14:21:05

Cancel Save

Coordinates

These can be changed for an HSU only, and can be changed only if the device does not have a GPS.

The coordinates (latitude and longitude) use either decimal degrees or degrees, minutes, and seconds. If you make any changes, click **Save** to have them take effect.

System

Coordinates

☒ Decimal Degrees Latitude (-89 to +89)
0.00000

☐ Degrees Minutes Seconds Longitude (-180 to +180)
0.00000

Latitude: Degrees / Minutes / Seconds
0 0 0.00 N S

Longitude: Degrees / Minutes / Seconds
0 0 0.00 E W

Cancel Save

Tx & Antenna

For an HBS, you can make changes for each carrier independently of each other. Changes made here may affect link quality and in the case of antenna type, cause a re-sync for the selected carrier.

Changing the antenna type for an HSU will cause a re-sync to that site only.

If you make any changes, click **Save** to have them take effect.

HBS:

Carrier 1 Carrier 2

Tx & Antenna

Antenna Connection Type:
☒ External ☐ Integrated ⓘ

Antenna Type: Dual ▾ Antenna Gain: 15.0 ⓘ Beamwidth (0 to 360): 90 ° Azimuth (0 to 359): 0 °

Tx Power (Per radio): 18 dBm Tx Power (System): 21 dBm Required Tx Power (Per radio): 25 dBm

Cable Loss: 0.0 ⓘ Max EIRP: 43 dBm EIRP: 36 dBm

Cancel Save

HSU:

Tx & Antenna

Antenna Connection Type:
☒ External ☐ Integrated ⓘ

Antenna Type: Dual ▾ Antenna Gain: 16.0 ⓘ Beamwidth (0 to 360): ⓘ Azimuth (0 to 359): ⓘ

Tx Power (Per radio): 18 dBm Tx Power (System): 21 dBm Required Tx Power (Per radio): 24 dBm

Cable Loss: 0.0 ⓘ Max EIRP: 43 dBm EIRP: 37 dBm

Cancel Save

Air Interface (HBS only)

Parameters here can be set for each carrier independently of each other.



If you change a band in one carrier, both carriers will be reset.

Radio

Sector ID: Set the Sector ID here. The value will “percolate” to all registered HSUs. It will of course, be “picked up” by newly installed and registered HSUs. The same Sector ID is used for both carriers.

Operating Channel: You can change the operating channel (only to those channels for which there is hardware support) if Automatic Channel Selection is not enabled. For the new channel to take effect you must deactivate, then reactivate the HBS.

Channel Bandwidth: You can choose the channel bandwidth even if Automatic Channel Selection is enabled. The changes will be sector-wide, and affect which RSS Threshold power levels are available.

Automatic Channel Selection: Allows you to choose the channel automatically. We recommend you do this only at configuration time.

The screenshot shows the 'Radio' configuration window for 'Carrier 1'. On the left is a sidebar with 'Air interface' and 'Radio' selected. The main area has 'Sector ID' set to 1238 and 'Laboratory' as the label. Below, 'Channel Bandwidth' is set to 20 MHz and 'Operating Channel' is 5.805 GHz. A section for 'Automatic Channel Selection' is checked, with 'Select All' and 'Clear All' links. A 4x4 grid of checkboxes shows available channels from 5.740 to 5.835 GHz, all of which are checked. 'Cancel' and 'Save' buttons are at the bottom right.

ATPC

Automatic HSU Transmit Power Control enables the HBS to optimize the transmit power of all HSUs in the sector for the selected carrier. This is done by configuring the desired RSS (radio signal strength) threshold level. The HBS then tunes the transmission power of the HSUs to give this RSS value.

- **Mode:** Select **Disabled**, **Static**, or **Dynamic** from the pull-down menu.
 - **Disabled:** Disables the ATPC option
 - **Static:** Instructs the HBS to find an optimal transmit RSS value for the HSUs. The HBS then locks on to this power value and does not change it until this configuration option is changed.
 - **Dynamic:** Instructs the HBS to find an optimal transmit RSS value for the HSUs. The HBS will change this power value from time to time when needed.
- **RSS Threshold:** The desired RSS level which the HBS refers to in order to tune the transmission power of the HSUs. The best power level depends on the radio plan, but is also influenced by your choice of Channel Bandwidth.

Carrier 1 Carrier 2

Air interface

Radio

ATPC

CIR/BE Resource

Advanced

Change band

Mode
Static

Rss threshold

Cancel Save

CIR/BE Resource

If the sector you are working with has a combination of CIR and Best Effort HSUs, this option allows you to set what percentage of the sector resources are allocated to CIR units and what percentage are allocated to BE units.

Click the **Use recommended settings** radio button to set the CIR/Best Effort to 80%-20%.

Carrier 1 Carrier 2

Air interface

Radio

ATPC

CIR/BE Resource

Advanced

Change band

Use recommended settings

Customize CIR/BE resource allocation

CIR 50 80% 100

BE 0 20% 50

Best effort only

Cancel Save

If you wish to **customize** the settings, do the following:

- If you have only BE units, check the Best Effort only box. This is like setting CIR/Best Effort Ratio to 0.0%/100.0%. If you have at least one CIR unit, this box is disabled.

Carrier 1 Carrier 2

☐ Use recommended settings

☒ Customize CIR/BE resource allocation

CIR 0% 100% 50

BE 100% 0 50

☒ Best effort only

Cancel Save

- If you have only CIR units, move the slider to the far right, and get 100% for CIR. This is the most efficient use of resources for a sector with only CIR units.

You can set this before any fixed HSUs are registered, and if you choose 100% of one kind or another, you will be limited when registering the HSUs to that resource type.

When you register a specific HSU, you choose what percentage of the specific resource type (CIR or BE) to allocate to this HSU (see [Register Subscriber Units](#) on page 14-69).

Carrier 1 Carrier 2

☐ Use recommended settings

☒ Customize CIR/BE resource allocation

CIR 90% 100% 50

BE 10% 0 50

☐ Best effort only

Cancel Save

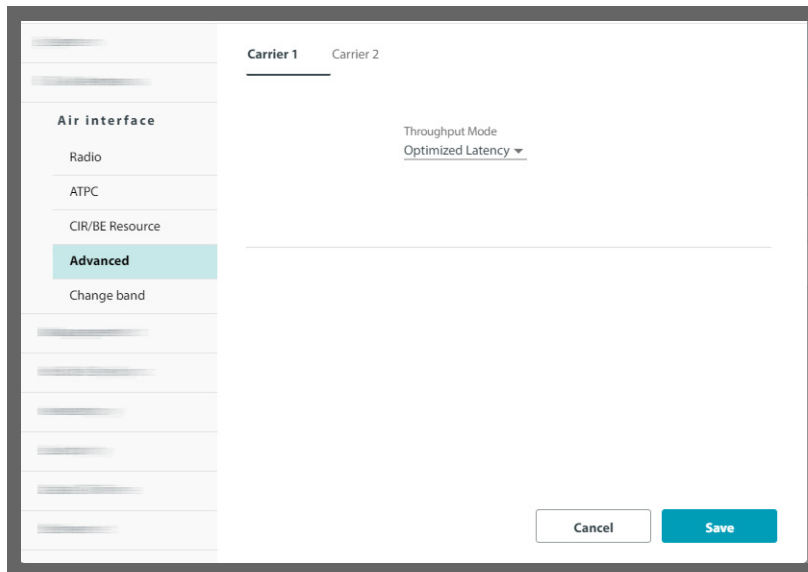
Click **Save** to have your changes take effect.

Advanced

This option allows you to configure the **Throughput Mode**: This determines how the Adaptive Modulation mechanism works.

- **Maximum Throughput** (default) should be chosen if throughput is more important than higher delay
(If configuring a sector for FCC UCBP, see [Appendix B, Operating Under the FCC Unrestricted Contention Based Protocol](#) for further instructions).

- **Optimized Latency** minimizes delay at the expense of lower throughput.



Click **Save** to have your changes take effect.

Change band

Changing the band in use is always carried out at the sector level, each carrier by itself.

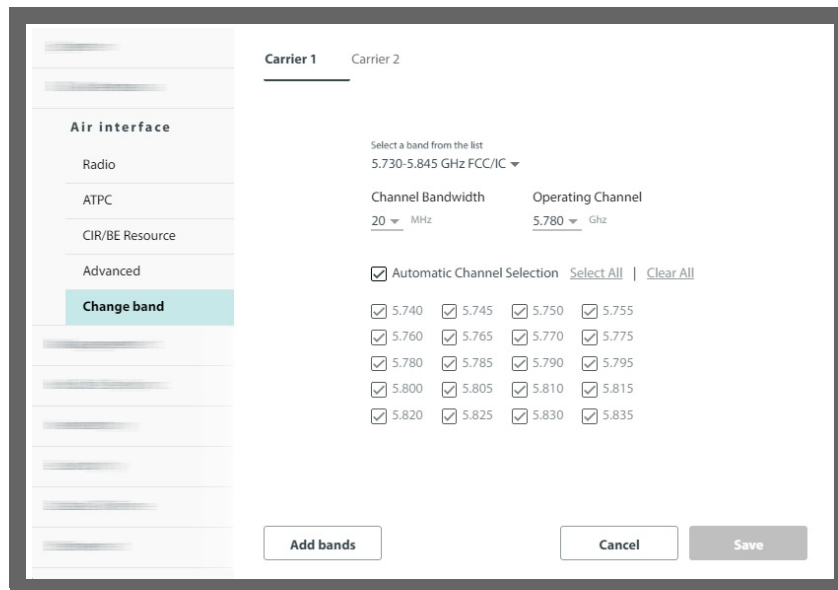
1. Make sure you are logged in to the DUO as Installer.
2. From the **Select a band from the list** pull-down menu, select the new band. The specific list depends on your regulatory environment.
3. Choose the working channel bandwidth and operating channel.
4. Click **Save**. A message will appear cautioning you that all the devices will be reset. Note that this applies to both carriers even if you are only changing the band for one of the carriers.



Caution

When changing a frequency band for one carrier, both carriers will be reset.

5. Click **Yes** to continue.
6. Click **OK**. A sector re-sync follows.



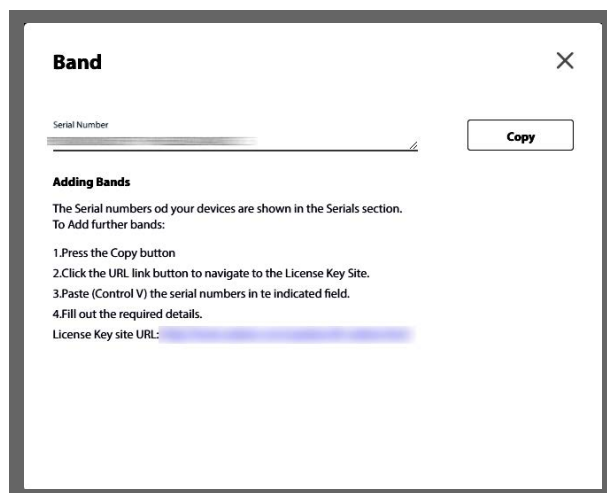
You may also add new Bands by clicking the **Add Bands** button. There are several provisos to this:

- Additional Bands must be available for your hardware
- Such additional Bands must be available within the framework of your local regulations



To obtain and install additional bands:

1. Make a list of ODU serial numbers for all HBSs and all HSUs to receive additional bands. The list should be a simple text file, one serial number per line. (The serial numbers are located on the stickers on the ODUs.)
2. Click **Add Bands**. An instruction panel is displayed



The serial numbers displayed relate to the radios in the sector. Click **Copy** to copy the numbers to the clipboard.

3. This step applies only if you have additional un-installed units:

Before proceeding to Step 2 in the instruction panel, make your own list of serial numbers of units you have in a plain text editor. If the serial numbers are in the list,

select your list and copy it all to the clipboard. Otherwise append the clipboard contents to your list. Select the whole list and save it to the clipboard.

- Now carry out steps 2 to 4 in the instruction panel. Step 2 will take you to a Web page.

This generator can be used for expanding the available bands of an ODU to additional bands supported by the ODU hardware. Different products have different expansion bands available, please consult the Release Notes document or our Professional Services for more information. Note: The regulatory rulings of certain regions prohibit adding certain bands. Where this is applicable, the License Generator will prevent adding these prohibited bands. Fill out the form below to generate your License Key. After submitting the form you will receive an email with the new License Key. License Key generation is per serial number, you may enter several serial numbers. Required fields are marked with *. The Reference field is for your own records. The License Key is supported from releases 2.4.50 and 1.9.12. To use it you should login as Installer.

Personal details

End-User Full Name:*	<input type="text"/>	Company:*	<input type="text"/>
Address:*	<input type="text"/>	Phone:*	<input type="text"/>
End-User Email Address:*	<input type="text"/>	Confirm Email:*	<input type="text"/>
Reference:	<input type="text"/>	Enter Code (9193):*	<input type="text"/>

Link details

Required Band:*	<input type="text" value="2.3 GHz Universal"/>	Serial Numbers:*	<input type="text"/>
Installation Country:*	<input type="text" value="Please Select..."/>		

Get Key

- Fill out the requested details in the Web page. Click **Get Key** to terminate the dialog box.
- The results of your request will be displayed with further instructions.

No.	Serial	Status
1	PET540E000A00000	Serial Found
2	PIN580I500A00005	Serial Found
3	PIN580I500A00004	Serial Found
4	PIN580I500A00003	Serial Found

Close

You will receive an automated email during the next few minutes. If it does not arrive, please check that it was not caught by your junk/spam filter.

A few minutes later, you should receive an email, containing in its body, a list of license keys.



You may see error messages in the Status Column such as **Band not supported** or **Serial not found**. Supported bands typically reflect your local regulations. Check missing serial numbers with RADWIN Customer Service.

7. Copy and Paste the license keys into a plain text file and save it to a safe known place.
8. Open the **Operations -> Licenses** window (see [Licenses](#) on page 14-54). Check the **License File** button and navigate to the file you saved in the last step.
9. Click **Activate**. The next time you enter the Change Bands tab, the new bands will be available.

Management

This category enables you to change the IP address, subnet, mask and gateway of the selected device, configure the management VLAN, set trap destinations, change the management protocol and its authentication mode, and add or remove user definitions.

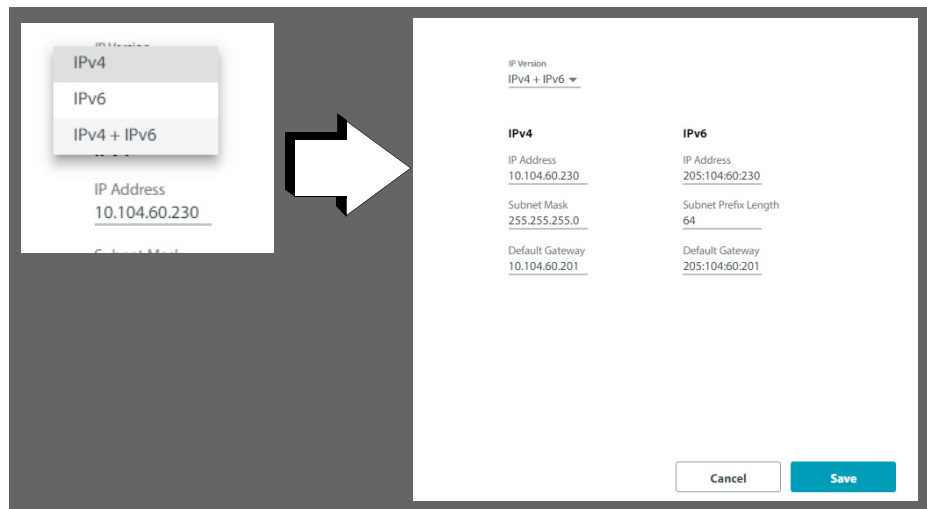
Network

You may configure a link for IPv4, IPv6, or both. Using both IP versions is useful in conjunction with applications that do not fully support IPv6.

1. Choose what type of IP address to enter (IPv4, IPv6, or both)

The screenshot shows a configuration window with a sidebar on the left containing 'Management' and 'Network' (highlighted). The main area is divided into two columns: 'IPv4' and 'IPv6'. Under 'IPv4', there are fields for 'IP Address' (10.104.60.230), 'Subnet Mask' (255.255.255.0), and 'Default Gateway' (10.104.60.201). Under 'IPv6', there are fields for 'IP Address' (::b), 'Subnet Prefix Length' (64), and 'Default Gateway' (::a). At the bottom right, there are 'Cancel' and 'Save' buttons.

Here, we choose both, and enter the IPv6 addresses:



2. Enter the appropriate IP address or addresses, including the Subnet Mask and Default Gateway (for IPv4), and/or the Subnet Prefix Length and Default Gateway (for IPv6).
3. Click **Save**.
4. If you changed any values, you will see a message warning you that a device reset will be done. To confirm, click **OK**.

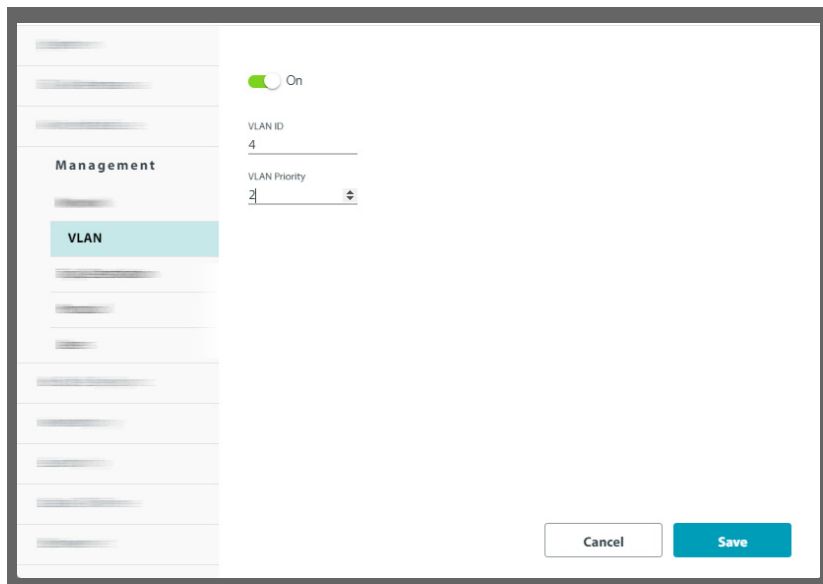
VLAN

Configure the management VLAN here. To configure a VLAN for traffic, see [VLAN](#) on page 14-38.

The management VLAN enables separation of user traffic from management traffic whenever such separation is required. It is recommended that each member of a sector be configured with different VLAN IDs for management traffic. (This reduces your chances of accidentally locking yourself out of the sector.)



VLAN IDs are used by RADWIN products in three separate contexts: Management VLAN, Traffic VLAN and Ethernet Ring. It is recommended that you use different VLAN IDs for each context.



➤ **To enable VLAN for management:**

1. Check **ON** in the VLAN window.
2. Enter a VLAN ID. Its value should be between 2 and 4094.

After entering the VLAN ID, only packets with the specified VLAN ID are processed for management purposes by the HBS/HSU. This includes all the protocols supported by the radio (ICMP, SNMP, Telnet and NTP). Using VLAN for management traffic affects all types of management connections (local, network and over the air).

3. Enter a Priority number between 0 and 7.

The VLAN priority is used for the traffic sent from the radio to the managing computer.

4. Change the VLAN ID and Priority of the managing computer NIC to be the same as those of steps 2 and 3 respectively.
5. Click **Save**.

➤ **Lost or forgotten VLAN ID or IP Address**

If the VLAN ID or IP address of the DUO unit is forgotten, you can carry out the steps shown below to restore the values.

- Set the NIC of the managing computer to a static IP address, using an appropriate Subnet value. Record this subnet value (for eg. 192.168.3.100)
- Open a command line interface, and type

```
ARP -s xxx.yyy.zzz.www 00-15-67-8D-5F-FF
```

Where **xxx.yyy.zzz.www** is an IP address appropriate for the NIC's subnet value.

00-15-67-8D-5F-FF is a unique RADWIN MAC address, and must be entered as-is.

Note that as soon as you enter this command, you have 3 minutes to change whatever needs to be changed on the unit, so do the next few steps quickly:

- Enter the command:

```
ping xxx.yyy.zzz.www
```

You will see several timeout messages. Wait until you see about 3 or 4 of them.

- Enter the command:

```
ARP -d xxx.yyy.zzz.www
```

- Open a web browser, and enter **xxx.yyy.zzz.www**

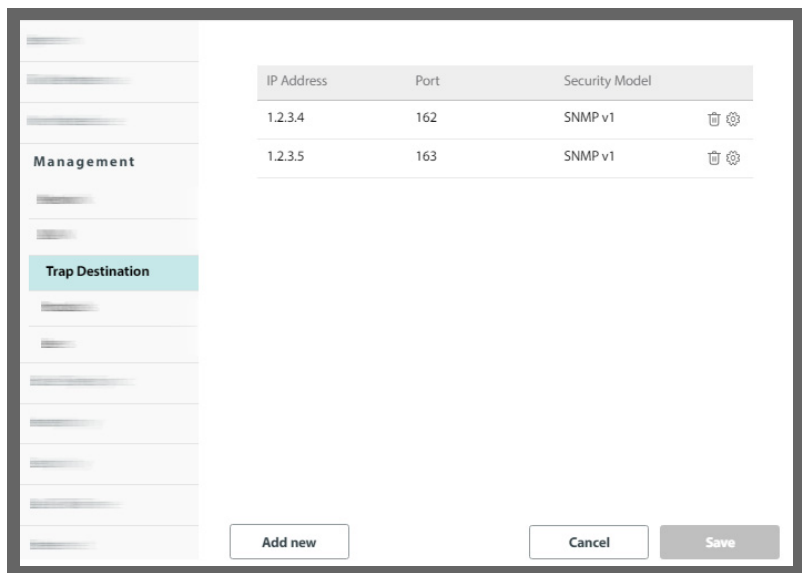
You will see the welcome message of the RADWIN JET DUO

- Enter the user name and password, click **Login**.
- From the main window, follow instructions as shown in this document to either change the IP address, or record the IP address. Do the same with the VLAN ID, if relevant.

Note that during this 3 minute window, there is no VLAN.

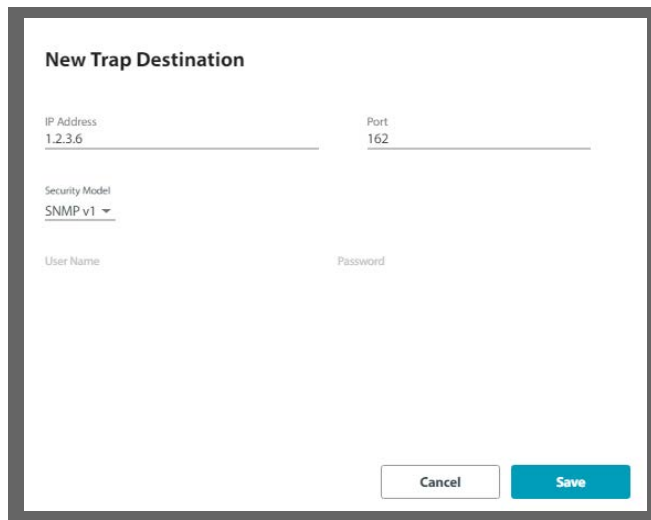
Trap Destinations

All traps are saved at each location you define.



To set a new trap destination:

1. Click **Add new**
2. In the window that appears, enter the Trap Destination IP Address, Port, and Security Model (SNMP v1 or v3). If choosing SNMP v3, enter the User Name and Password. The IP address can be the same as the managing computer. The events log will be stored at the address(es) chosen.



New Trap Destination

IP Address: 1.2.3.6 Port: 162

Security Model: SNMP v1 ▼

User Name: Password:

Cancel Save

3. Once you are finished, click **Save** to have your changes take effect.

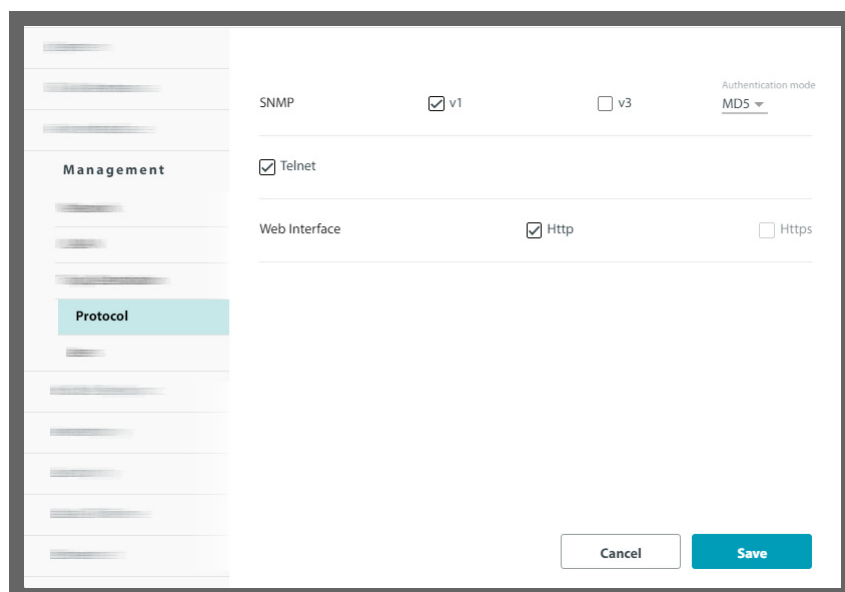


To change (edit or delete) a trap destination:

1. To delete a trap destination, click the trash icon (🗑️) on the same line as the IP address.
2. To edit a destination, click the configuration icon (⚙️) on the same line as the IP address.
3. In the window that appears, change the parameters you wish to change (Trap Destination IP Address, Port, and/or Security Model). If choosing SNMP v3, enter the User Name and Password. The IP address can be the same as the managing computer. The events log will be stored at the address(es) chosen.
4. Once you are finished, click **Save** to have your changes take effect.

Protocols

You can set the management protocol as well as the authentication mode.



SNMP ☒ v1 ☐ v3 Authentication mode: MD5 ▼

☒ Telnet

Web Interface ☒ Http ☐ Https

Cancel Save

SNMP

SNMP support is permanently enabled. You may choose between SNMPv1, SNMPv3 or both.

You can leave the default authentication mode for SNMPv3 as MD5 (message digest algorithm), or change it to SHA1 (secure hash algorithm).

Telnet

Telnet can be enabled only for units that have this feature (LFF, SFF, and JET).

For a sector managed as part of a network, direct access to a HBS/HSU using Telnet is considered to be a security breach. Telnet access may be enabled or disabled by clicking the Protocol tab and enabling/disabling Telnet access using the Telnet check-box.

Web Interface

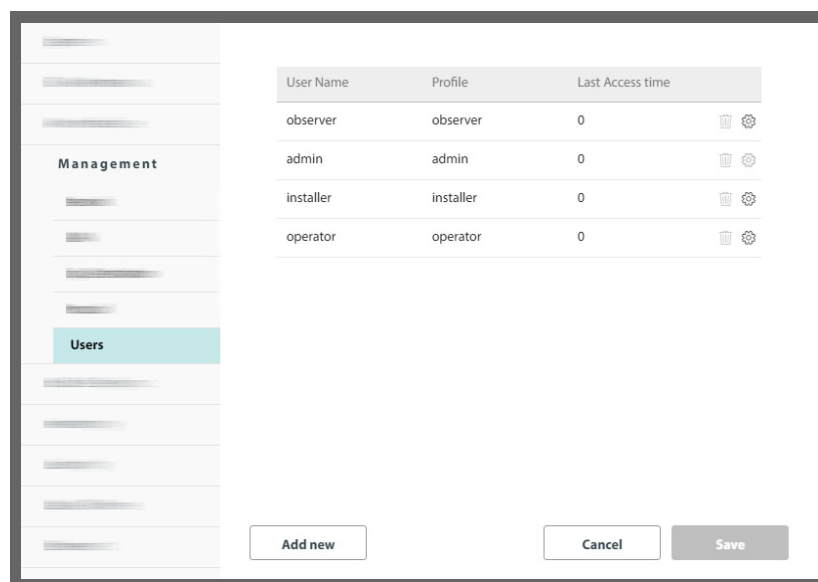
Only relevant for the RADWIN JET DUO, SU **PRO/AIR** EMB or SU **PRO/AIR** INT.

- The unit can be configured for HTTP, HTTPS, or both. To do this, place a checkmark in the box next to the protocol you want from the **Web Interface** line.
- The next time you log on to the unit's Web Interface, use the protocol you chose here.
- An admin user must be logged in with HTTPS to make changes in users.

Once you are finished, click **Save** to have any changes take effect.

Users

Here an admin user can define users, and assign to them a pre-defined category. The admin user must be logged in using HTTPS. Once you define a user, that person can use the name and password to log in.



Possible user profiles are as follows:

User Profile	Function	Default Password
Observer	Monitoring	netobserver
Operator	Installation, configuration	netpublic

User Profile	Function	Default Password
Installer	Operator plus set-band	netinstaller
Admin	Installer plus define users (in other words, Everything)	netwireless



To add or edit a user, you must be logged in via secure HTTP. Do this by making sure that HTTPS is selected (from a selected HBS, click the Configure icon, then from Management -> Protocols, select the HTTPS box. Then log in using the same IP address as before, but add https:// before its address.

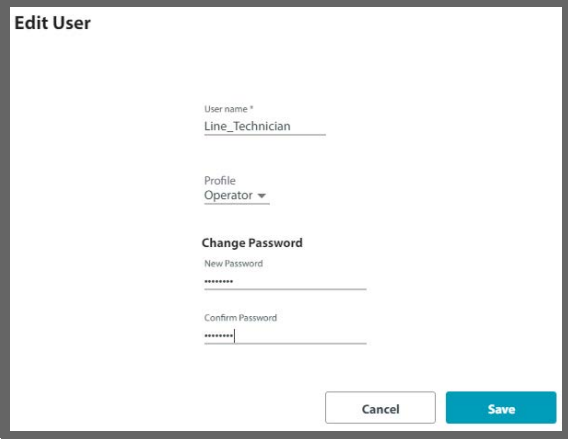
New user:

Click **Add new**, and the New User window will open.

1. Enter a convenient name for the new user
2. Choose the profile for this user. The profile determines what the user can and cannot do.
3. Set the password for this user, and confirm it.
4. Click **Save** to have your changes take effect.
5. You will see the new user in the Users list.

Edit user:

Click the configuration icon (⚙️), and the Edit User window will open.



1. Change the name, if needed
2. Change the profile, if needed. This determines what the user can and cannot do.
3. Set the password for this user, and confirm it. This must be done no matter what action you take here.
4. Click **Save** to have your changes take effect.
5. You will see the edited user in the Users list.

Remove user:

You cannot remove the pre-defined users

1. Click on the trash icon () to remove the user.
2. The user will be removed from the Users list.

Hub Site Sync (HBS only)

If there are co-located radio units with your HBS, they can interfere with each other. The Hub Site Synchronization (HSS) feature was created to prevent this.

To enable Hub Site Synchronization, click **On**.

See the *Hub Site Synchronization Application Note* for more details.

Inventory

This shows the identification information for the selected unit: Product version, hardware version and software version, MAC address, serial number, aggregate capacity, the present temperature inside the unit, and the unit's power consumption.

Note you cannot see the IP address here. Go to **Configure -> Management -> Network** to see the IP address of the selected unit.

Security

The Security dialog enables you to change the SNMP Community strings.

If the selected unit is an HBS, you can also create an encrypted SNMP Community string value file, set and change the Link Password, and the present User Password.

SNMP Communities

Each radio unit communicates with the managing computer using the SNMPv1 or SNMPv3 protocol. The SNMPv1 protocol defines three types of communities:

- Read-Only for retrieving information from the radio unit
- Read-Write to configure and control the radio unit
- Trap used by the radio unit to issue traps

The read-write Community strings and read-only Community strings have a minimum of five alphanumeric characters. Changing the trap Community is optional.

Editing SNMPv1 Community Strings

When editing these strings, both read-write and read-only communities must be defined.

➤ To change a Community string:

1. Type the current read-write Community in the **Current Read-Write Community** field (default is **netman**).
2. Click the check box next to the community whose string you wish to change.
3. Type the new Community string and re-type to confirm. A community string must contain at least five and no more than 32 characters excluding SPACE, TAB, and any of ">#@|*?;.,"
4. Click **Save** to have your changes take effect.

Link Password

The Link Password enables enhanced security for the link. It is not the same as the user password.

This item is available as follows:

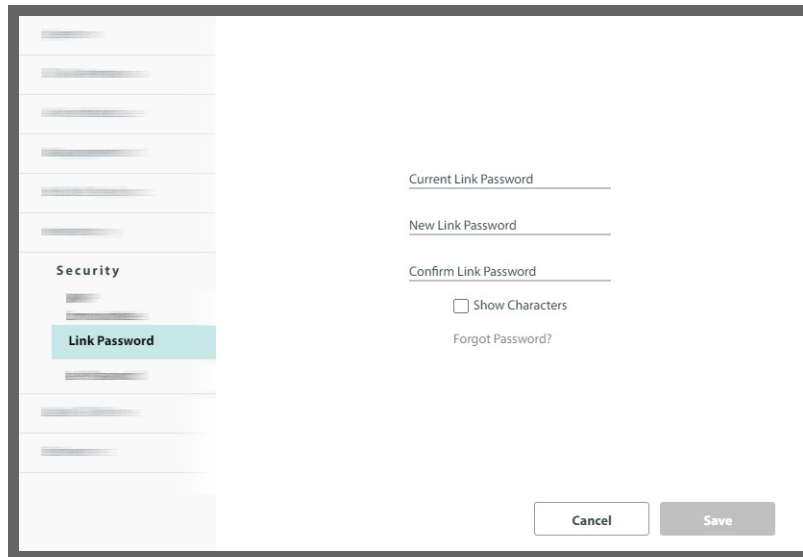
- At an isolated HBS (No active HSUs)
- At an isolated HSU

- Never for an active HSU

The default password is **wireless-p2mp**.

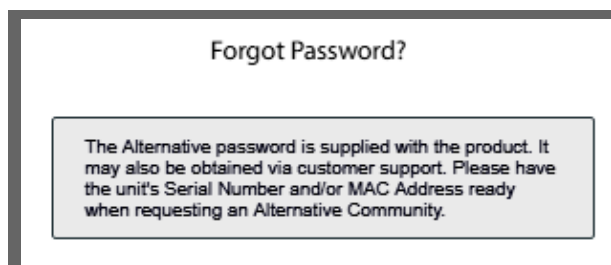
➤ **To change the link password:**

1. Select **Security -> Link Password**. The Link Password dialog box opens.

The screenshot shows the 'Link Password' dialog box. On the left is a sidebar with a 'Security' menu item and a 'Link Password' sub-item highlighted in blue. The main area contains three input fields: 'Current Link Password', 'New Link Password', and 'Confirm Link Password'. Below these fields is a checkbox labeled 'Show Characters' and a link labeled 'Forgot Password?'. At the bottom right are 'Cancel' and 'Save' buttons.

2. Enter the current link password (The default link password for a new unit is **wireless-p2mp**).

If you have forgotten the Link Password, click **Forgot Password?**. The following tool tip is displayed:



Follow the instructions in the tool tip to use the Alternative Link Password, and click **OK** to finish. Continue with the next step.

3. Enter a new password.
4. Retype the new password in the Confirm field.
5. Click **Save**.
6. Click **Yes** when asked if you want to change the link password.
7. Click **OK** at the *Password changed* success message.

User Password (HBS only)

➤ **To change the user password of the present user:**

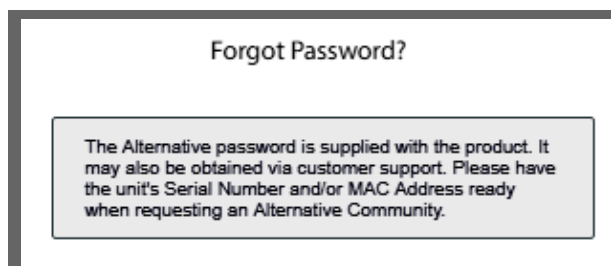
1. Select **Security -> User Password**. The User Password dialog box opens.



- A link password must contain at least eight but no more than 16 characters excluding SPACE, TAB, and any of ">#@|*?;,"
- Restoring Factory Defaults returns the Link Password to *wireless-p2mp*.

2. Enter the current password.

If you have forgotten the password, click **Forgot Password?** The following tool tip is displayed:



Follow the instructions in the tool tip to use the Alternative Link Password, and click **OK** to finish. Continue with the next step.

3. Enter a new password.
4. Retype the new password in the Confirm field.
5. Click **Save**.
6. Click **Yes** when asked if you want to change the password.
7. Click **OK** at the *Password changed* success message.



- A user password must contain at least eight but no more than 16 characters excluding SPACE, TAB, and any of ">#@|*?;,"

Date & Time

Here you can set the date and time of the selected unit, whether manually, based on local time or on an NTP Server.

The radio unit maintains a date and time. The date and time should be synchronized with any Network Time Protocol (NTP) version 3 compatible server.

During power-up the radio attempts to configure the initial date and time using an NTP Server. If the server IP address is not configured or is not reachable, a default time is set.

When configuring the NTP Server IP address, you should also configure the offset from the Universal Coordinated Time (UTC). If there is no server available, you can either set the date and time, or you can set it to use the date and time from the managing computer. Note that manual setting is not recommended since it will be overridden by a reset, power up, or synchronization with an NTP Server.



The NTP uses UDP port 123. If a fire wall is configured between the radio and the NTP Server this port must be opened. It can take up to 8 minutes for the NTP to synchronize the radio date and time.

➤ To set the date and time:

1. Determine the IP address of the NTP server to be used.
2. Test it for connectivity using the command (Windows XP and 7), for example:
`w32tm /stripchart /computer:216.218.192.202`

3. If entering an IP address for the NTP Server, enter the new address.
4. Set your site Offset value in minutes ahead or behind GMT¹.

1. Greenwich Mean Time

5. To manually set the date and time, click the calendar icon and choose the new date, then click the spinner next to Time to choose the time.
6. To set the time based on the time of the managing computer, click Use Computer Time.
7. Click **Save** to have your changes take effect.

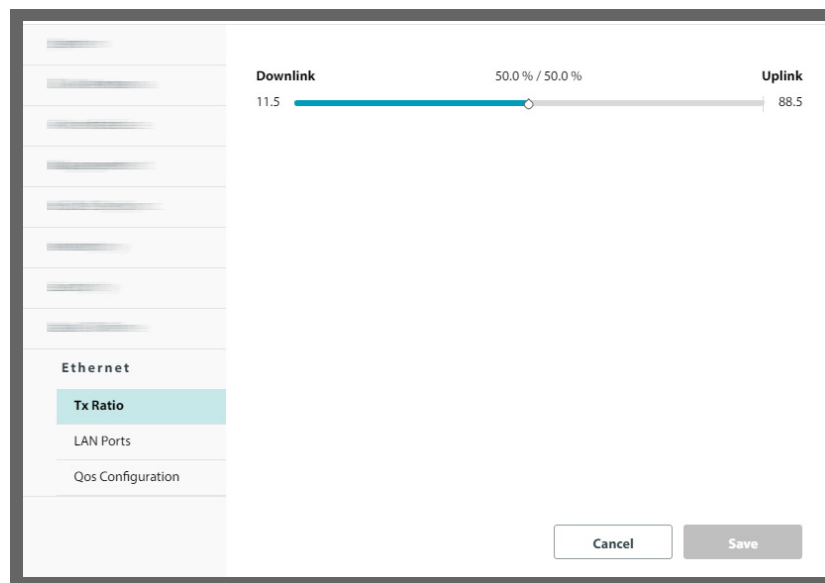
Ethernet (HBS only)

In this category, you can configure the ratio between the uplink and downlink (Tx Ratio), the input ports on the unit, and the QoS (quality of service).

Tx Ratio

The **Tx Ratio** (Transmission Ratio, Asymmetric Allocation) shows the allocation of throughput between downlink and uplink traffic at the HBS. The Transmission Ratio is not only sector-wide: If you use Hub Site Synchronization to collocate several HBSs (to cover adjacent sectors), they must all use the same Transmission Ratio.

1. Move the slider to the right or left to determine the Tx Ratio.
2. Click **Save** to have your changes take effect.



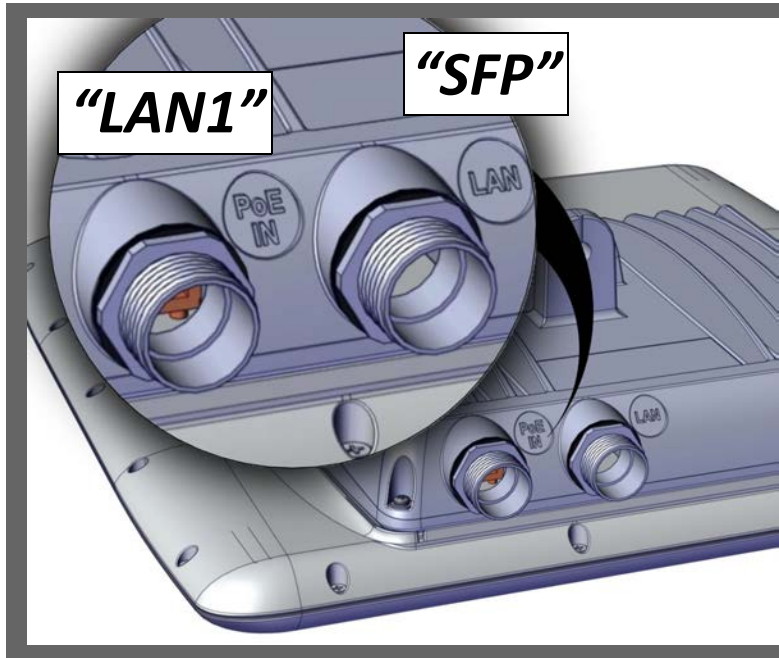
The allowable range is from 50/50 % to 88/11 %. Setting values beyond this range will cause unpredictable results. You must ensure that the range remains within allowable values. There is no fail-safe.

The effective available range for symmetric allocation is determined by channel bandwidth as shown as well as link distance. In this context, “link” is any collocated RADWIN HBS, not necessarily a RADWIN JET DUO.

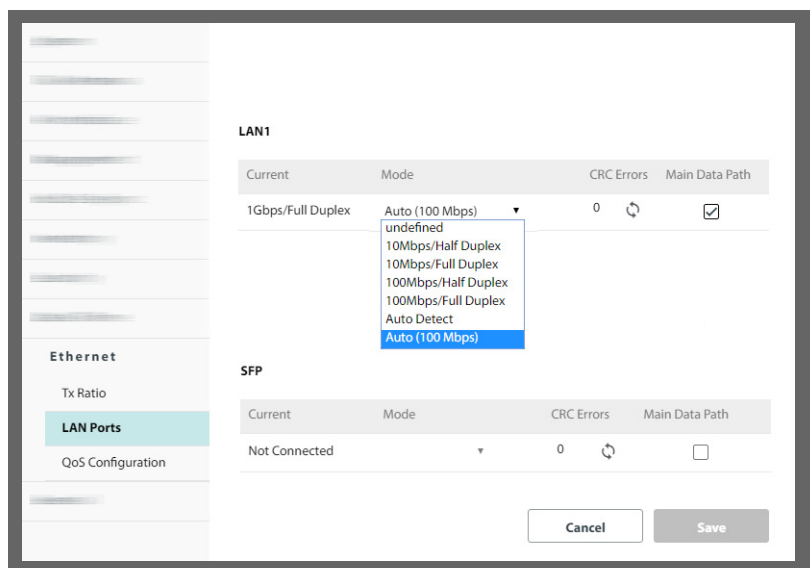
LAN Ports

There are two ports, called LAN1 and SFP:

- LAN1 refers to the port on the radio unit labeled “PoE IN” and can carry data as well as power.
- SFP refers to the port on the radio unit labeled “LAN” and functions as an SFP port which can carry data only.



- The LAN1 input port is configurable for line speed (10/100/1000BaseT) and duplex mode (half or full duplex).
- Line speed 1000BaseT is only available if the HBS is connected to a GbE PoE device.
- An Auto Detect feature is provided, whereby the line speed and duplex mode are detected automatically using auto-negotiation. Use manual configuration when attached external equipment does not support auto-negotiation. The default setting is Auto Detect.
- The SFP input port can only be set as Auto Detect or Disable.
- CRC Errors shows how many Cyclic Redundancy Check errors occurred since the last rest.



Although you can use the LAN (ie, “SFP”) port for traffic and/or management, you still must connect voltage to the PoE IN port (“LAN1”).

QoS Configuration (HBS side)

QoS (Quality of Service) is a technique for prioritization of network traffic packets during congestion.

RADWIN 5000 sectors support two classification criteria: VLAN based or Diffserv based. You may choose which of them to use. To work with them properly you must be familiar with the use of VLAN (802.1p) or Diffserv.

This section describes how to configure QoS for the HBS for the whole sector. However, to fully configure QoS properly, you must also configure it for each HSU in turn. To configure QoS for a single HSU, see [QoS Configuration \(HSU side\)](#) on page 14-36.

Based upon the classification criterion chosen, received packets will be mapped into one of four quality groups: Real time, Near real time, Controlled load or Best effort. You may partition the total link capacity across the four Quality queues. The default weights as percentages are shown in the table below:

Quality queue	Priority	
	Diffserv	VLAN
Real time	48-63	6-7
Near real time (responsive applications)	32-47	4-5
Controlled load	16-31	2-3
Best effort	0-15	0-1

You can also define part of the link capacity as carrying Voice-over-IP traffic. This is similar to defining part of it as Real time (see [Enabling a VoIP Queue \(HBS side\)](#) on page 14-32).

1. From the Mode pull-down menu, Choose either the VLAN or Diffserv method.
2. For the method you selected, type the Priority Mapping for each queue. This determines the mapping (or translation) of the priority mapping of the traffic to what is used by the RADWIN JET DUO. Default settings for Diffserv and VLAN are as shown in the next two figures:

The screenshot shows the 'QoS Configuration' window with the 'Mode' set to 'VLAN'. The 'Queue' table is as follows:

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time Voice Over IP	6 - 7
<input checked="" type="checkbox"/> Near Real Time	4 - 5
<input checked="" type="checkbox"/> Controlled Load	2 - 3
<input checked="" type="checkbox"/> Best Effort	0 - 1

Below the table, there is a checkbox for 'Enable Voice Over IP for all HSUs' which is checked. Two informational messages are present: 'To enable QOS, this must also be enabled for each HSU seperately' and 'To enable VoIP, this must also be enabled for each HSU seperately'. The 'Cancel' and 'Save' buttons are at the bottom right.

The screenshot shows the 'QoS Configuration' window with the 'Mode' set to 'DiffServ IPv4, IPv6'. The 'Queue' table is as follows:

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time Voice Over IP	48 - 63
<input checked="" type="checkbox"/> Near Real Time	32 - 47
<input checked="" type="checkbox"/> Controlled Load	16 - 31
<input checked="" type="checkbox"/> Best Effort	0 - 15

Below the table, there is a checkbox for 'Enable Voice Over IP for all HSUs' which is checked. Two informational messages are present: 'To enable QOS, this must also be enabled for each HSU seperately' and 'To enable VoIP, this must also be enabled for each HSU seperately'. The 'Cancel' and 'Save' buttons are at the bottom right.

3. If you un-check a queue, this queue will be ignored for the sector. It will not prevent the HSU from configuring traffic labeled with this priority level as “live”; it will merely ignore its priority level, as if the traffic was not assigned with any priority level whatsoever. You cannot un-check the Best Effort queue.

Note the following:

- You can enable QoS from either the HBS or the HSU. If enabled from the HSU, it is done for that HSU only, and its HBS. If done from the HBS, it is done sector-wide.
- If QoS is enabled from the HBS, it is applied to all HSUs presently connected to the sector. For HSUs connected to the sector after QoS was defined, do one of the following:
 - Enable QoS on those individual HSUs (this is the intention of the note “To enable QoS, this must also be enabled for each HSU separately”), or
 - Re-enable it for the whole sector from the HBS.
- To configure QoS from the HSU side, see [QoS Configuration \(HSU side\)](#) on page 14-36.

Enabling a VoIP Queue (HBS side)

Note the following:

- You can enable a VoIP queue from either the HBS or the HSU¹. If enabled from the HSU, it is done for that HSU only, and its HBS. If done from the HBS, it can be done sector-wide. To enable a VoIP queue from the HBS, select **Enable Voice Over IP for all HSUs**.
- If a VoIP queue is enabled from the HBS, it is applied to all HSUs presently connected to the sector. For HSUs connected to the sector after the VoIP queue was defined, do one of the following:
 - Enable VoIP on those individual HSUs (this is the intention of the note “To enable VoIP, this must also be enabled for each HSU separately”), or
 - Re-enable it for the whole sector from the HBS.
- To configure VoIP from the HSU side, see [Enabling a VoIP Queue \(HSU side\)](#) on page 14-37.
- The VoIP feature as implemented here assumes that your end-user has a gateway or other network device that defines the traffic to be VoIP with the correct QoS defined (VLAN or DiffServ, in accordance with your configuration done here). The definition must be done at both ends of the data stream.
- Enabling a VoIP queue may decrease the sector’s peak throughput in some scenarios. Therefore, make sure that you absolutely need to enable a VoIP queue before doing so.
 1. Click **Voice Over IP**. The Real Time queue will become disabled. This means that VoIP traffic is treated in a similar fashion to Real Time traffic. VoIP works whether you are using VLAN or DiffServ.
 2. Optionally, apply VoIP to all of the HSUs in the sector by clicking on **Enable Voice Over IP for all HSUs**.
 - If you do not choose this, you must go to each HSU for which you want to enable a VoIP queue, and enable it there.
 3. Click **Save** to have your changes take effect.



Make sure the “Mode” selected is the proper one, is consistent throughout your configuration, and that your end-user has equipment that also defines its VoIP traffic with the Mode you defined here.

1. Not available for the SU **PRO/AIR** EMB, SU **PRO/AIR** INT, or small form-factor HBS units.

Queue	Priority Mapping
<input checked="" type="checkbox"/> Real Time	6 - 7
<input checked="" type="checkbox"/> Near Real Time	4 - 5
<input checked="" type="checkbox"/> Controlled Load	2 - 3
<input checked="" type="checkbox"/> Best Effort	0 - 1

☐ Enable Voice Over IP for all HSUs

General (HBS only)

In this category, you can configure the Aging Time, and enable/disable Backwards Compatibility Discovery and Broadcast Flooding Protection.

Aging Time
300 seconds

☒ Backwards Compatibility Discovery ⓘ

☒ Broadcast flooding protection

Aging Time

The HBS works in Bridge Mode. In Bridge mode, it performs both learning and aging, forwarding only relevant packets over the sector. The aging time of the HBS is by default 300 seconds, although you can change this value here.

Backwards Compatibility Discovery

This allows HSUs with firmware older than Release 4.6 (those without the percentage-based DBA mechanism) to discover HBSs with Release 4.6 or above. To work properly, the firmware of the HSU must be upgraded to firmware that is compatible with that of the HBS.

Broadcast Flooding Protection

Broadcast Flooding Protection provides a measure of protection by limiting broadcast packets. This feature works in the downlink direction only.

You may wish to disable this feature if your application is based on broadcast packets.

Service (HSU only)

This category has four sub-categories:

Resources - set the resource type (CIR or BE)

Mir (Maximum Information Rate)

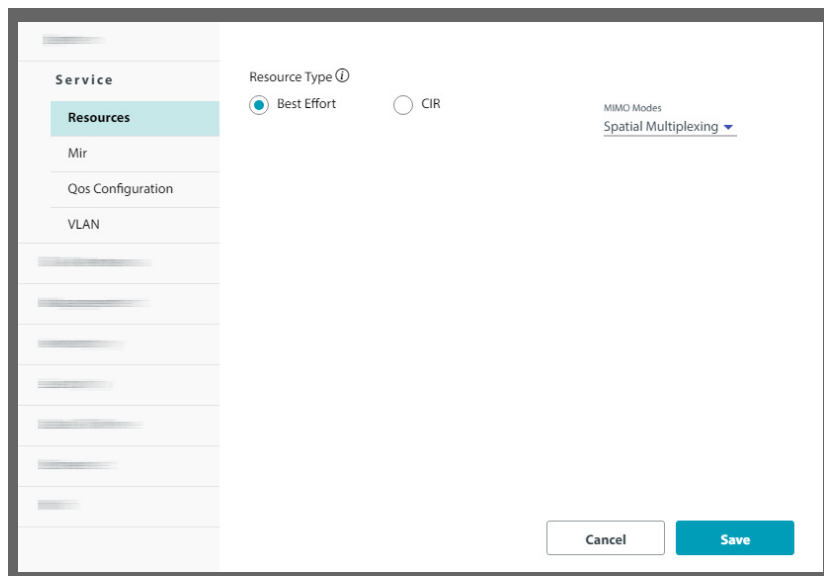
QoS Configuration (HSU side)

VLAN

Resources

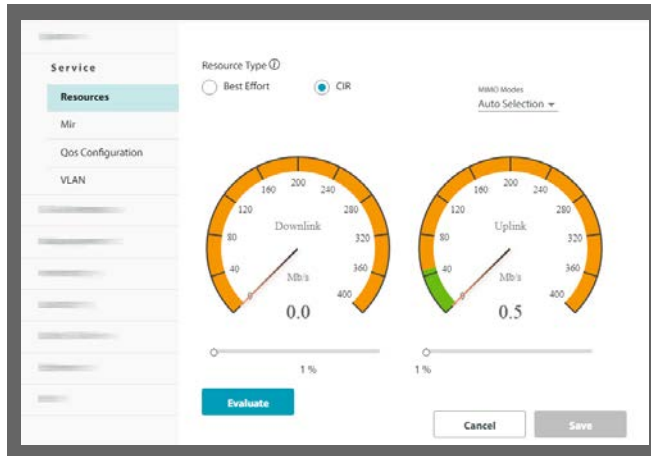
Even after an HSU is registered, you can change these settings here: Resource type and MIMO mode.

- Select the **Resource Type** for the selected HSU. This can be CIR (Committed Information Rate), or BE (Best Effort):
 - **BE** (Best Effort) grants the HSU resources as they become available in the sector.
 - **CIR** (Committed Information Rate) grants the HSU with a certain guaranteed percentage of resources already allocated to CIR traffic in the sector. That percentage is set in the MIR window.
- Select a **MIMO Mode** for the selected HSU:
 - **Spatial Multiplexing** (default) splits the data into two streams on transmission and recombines it on reception providing maximum throughput. This provides a higher throughput.
 - **Diversity** transmits the same data on both streams. This mode helps to ensure more reliable data transmission in a noisy environment, although throughput will be lower.
 - **Auto Selection** instructs the system to choose whichever mode is most efficient.



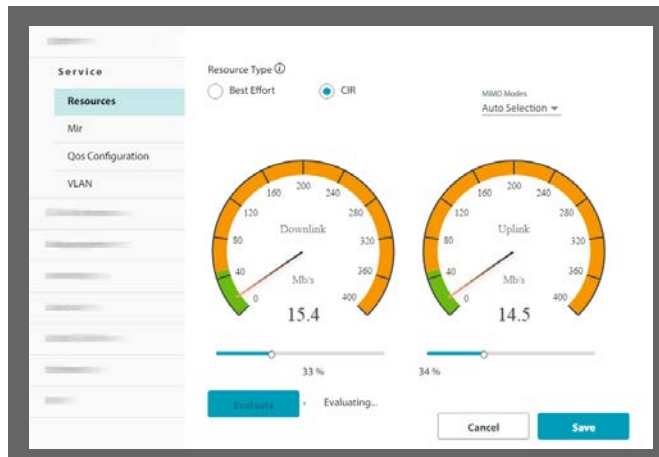
- Click **Save** to have your changes take effect.

If you chose the CIR resource type, CIR evaluate window will appear.



- Click the **Evaluate** button.

Service evaluation takes a few seconds during which an “Evaluating ...” message is displayed.



After the initial evaluation, dynamic monitoring of the sector is maintained. This allows you to add HSUs in the sector, and the available resources are adjusted automatically.

- Use the sliders to choose the percentage of resources (uplink and downlink) already allocated to CIR traffic in the sector to be allocated to the selected HSU.
- Click **Save** to have your changes take effect.

Mir (Maximum Information Rate)

Although this is set during registration, you can change it here.

Use the sliders to set here the maximum throughput rate you want for the specific HSU in each direction: down link, and up link. You can choose a value, or click the Unlimited checkbox.

Service

Resources

Mir

Qos Configuration

VLAN

Downlink 53.8 Mbps ☐ Unlimited

0.5 250

Uplink 94.8 Mbps ☐ Unlimited

0.5 250

Cancel Save

Click **Save** to have your changes take effect.

QoS Configuration (HSU side)

This section describes how to configure QoS for an individual HSU. To see how to configure QoS for the whole sector, that is, from the HBS, see [QoS Configuration \(HBS side\)](#) on page 14-30.

Service

Resources

Mir

Qos Configuration

VLAN

Mode: Enabled ☐ Configure same as... (choose HSU)

Queue	Strict / Weight %	Maximum Information Rate Mbps
Real Time	↑ <input type="text"/> 15	0.5 <input type="checkbox"/> Unlimited
Active Voice over IP	↓ <input type="text"/> 15	0.5 <input type="checkbox"/> Unlimited
Near Real Time	↑ <input type="text"/> 20	0.5 <input type="checkbox"/> Unlimited
Active	↓ <input type="text"/> 20	0.5 <input type="checkbox"/> Unlimited
Controlled Load	↑ <input type="text"/> 22	0.5 <input type="checkbox"/> Unlimited
Active	↓ <input type="text"/> 14	0.5 <input type="checkbox"/> Unlimited
Best Effort	↑ <input type="text"/> 40	0.5 <input type="checkbox"/> Unlimited
Active	↓ <input type="text"/> 40	0.5 <input type="checkbox"/> Unlimited
Total uplink	97 %	
Total downlink	89 %	

Cancel Save

1. Enable the **Mode** field. ([Enabling a VoiP Queue \(HSU side\)](#) for VoIP).
2. Set the **weight percentage** for each queue by moving the spinners up or down.

Light blue for uplink, pink for downlink. 20 20

The weight percentage determines what percentage of the throughput will be dedicated for the indicated queue.

The total weight is shown in the lower part of the window. If you exceed 100% total weight, you will receive an error message.

If you are under-booked, for example by setting a queue to zero, the unused weight will be distributed to the remaining queues. The effect of doing this will only become apparent under congestion. In particular, a queue set to zero weight will become nearly blocked under congestion with packets passing through on a best effort basis.

3. **Strict:** If you place a checkmark in the Strict box, **all traffic** of the specific queue will be passed through. The Weight percentage will become disabled. Placing a checkmark here can only be done in order: First Real Time, then finally Best Effort. That is, you cannot place a checkmark in Near Real Time without one in Real Time as well. Like the weight percentage, uplink and downlink are configured separately.
4. **Maximum Information Rate:** Although the weight percentage affects how much relative traffic will be allowed through, you can set here the absolute maximum to allow through. Place a checkmark to make this valued unlimited.
5. **Configure same as** : This allows you to copy the VoIP configuration of a different HSU. From this pull-down menu, choose the HSU whose configuration you want to copy. The settings will appear.

Enabling a VoIP Queue (HSU side)

Note the following:

- You can enable a VoIP queue from either the HBS or the HSU¹. If enabled from the HSU, it is done for that HSU only, and its HBS. If done from the HBS, it can be done sector-wide.
 - To configure VoIP from the HBS side, see [Enabling a VoIP Queue \(HBS side\)](#) on page 14-32.
 - The VoIP feature as implemented here assumes that your end-user has a gateway or other network device that defines the traffic to be VoIP with the correct QoS defined (VLAN or DiffServ, in accordance with your configuration done here). The definition must be done at both ends of the data stream.
 - Enabling a VoIP queue may decrease the unit's peak throughput in some scenarios. Therefore, make sure that you absolutely need to enable a VoIP queue before doing so.
1. Click **Voice over IP**. The Voice over IP indicator will turn green.

Resources	Queue	Strict / Weight %	Maximum Information Rate Mbps
Mir	Real Time	↑ <input checked="" type="checkbox"/> 0	0.5 <input type="checkbox"/> Unlimited
Qos Configuration	Active	↓ <input checked="" type="checkbox"/> 0	0.5 <input type="checkbox"/> Unlimited
VLAN	 Voice over IP		
Tx & Antenna	Near Real Time	↑ <input type="checkbox"/> 20	0.5 <input type="checkbox"/> Unlimited
	Active	↓ <input type="checkbox"/> 20	0.5 <input type="checkbox"/> Unlimited

The weight percentages of the Real Time queue will become zero in both the uplink and downlink directions. This means that VoIP traffic is treated in a similar fashion to Real Time traffic.

VoIP works whether you are using VLAN or DiffServ, but you must be consistent with this QoS mode throughout the data stream.

1. Not available for the SU **PRO/AIR** EMB, SU **PRO/AIR** INT, or small form-factor HBS units.

2. Click **Save** to have your changes take effect.

VLAN

Configure a VLAN for traffic here. To configure the management VLAN, see [VLAN](#) on page 14-16.

VLAN configuration is carried out per HSU. It is up to you to ensure consistency between the HSUs.

If VLAN is not enabled, ethernet frames pass transparently over the radio links.

VLAN Background Information

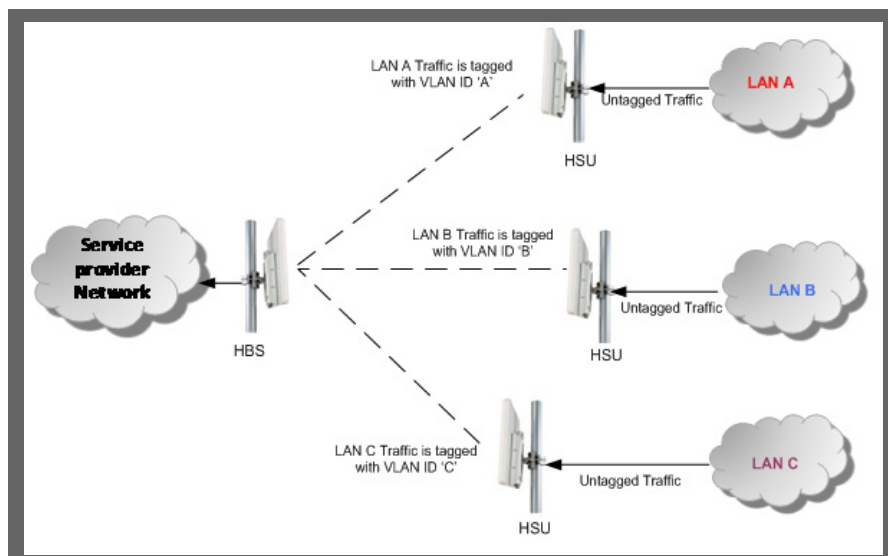
The standards defining VLAN Tagging are IEEE_802.1Q and extensions.

For general background about VLAN see http://en.wikipedia.org/wiki/Virtual_LAN.

Background information about **Double Tagging** also known as **QinQ** may be found here: <http://en.wikipedia.org/wiki/802.1QinQ>.

VLAN Tagging

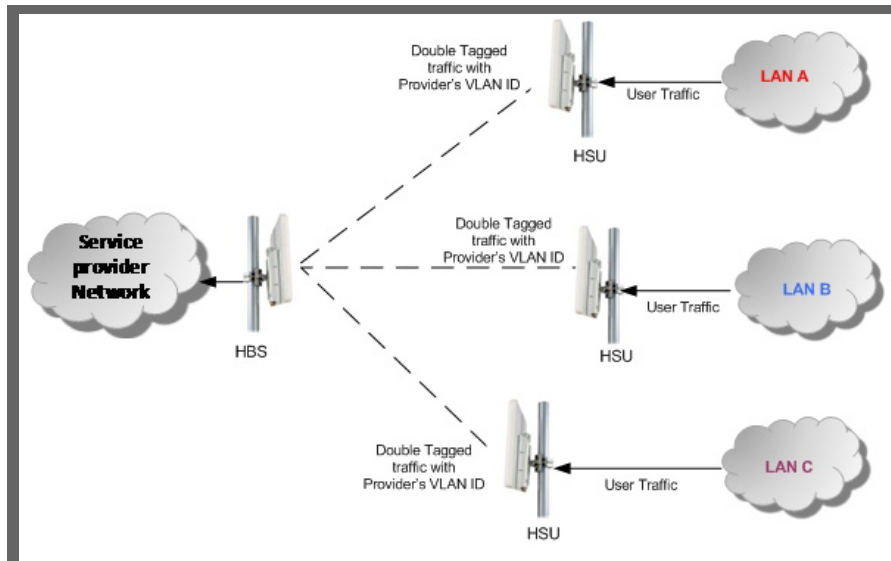
VLAN tagging enables multiple bridged networks to transparently share the same physical network link without leakage of information between networks.



IEEE 802.1Q is used as the encapsulation protocol to implement this mechanism over Ethernet networks.

QinQ (Double Tagging) for Service Providers

QinQ is useful for Service Providers, allowing them to use VLANs internally in their “transport network” while mixing Ethernet traffic from clients that are already VLAN-tagged.



The outer tag (representing the Provider VLAN) comes first, followed by the inner tag. In QinQ the EtherType = 0x9100. VLAN tags may be stacked three or more deep.

When using this type of “Provider Tagging” you should keep the following in mind:

- Under Provider Tagging, the system double-tags egress frames towards the Provider’s network. The system adds a tag with a VLAN ID and EtherType = 0x9100 to all frames, as configured by the service provider (Provider VLAN ID).
- The system always adds to each frame, tags with VLAN ID and EtherType = 0x9100. Therefore,
 - For a frame without a tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will have one tag
 - For a frame with a VLAN tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will be double-tagged

For a frame with a VLAN tag and a provider tag – the system will add a tag with VLAN ID and EtherType = 0x9100 so the frame will be triple-tagged and so on.



At the egress side, the HSU removes the QinQ tag with EtherType = 0x9100 no matter what the value of its VLAN ID.

Port Setting

In a RADWIN 5000 sector, all VLAN activity is configured and supported from the HSUs.

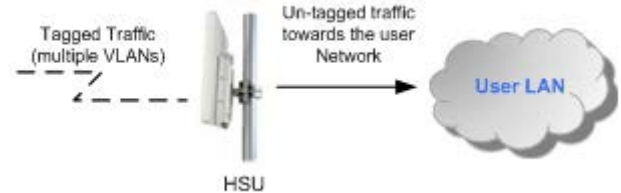
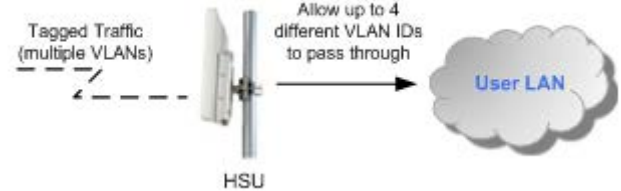
The HSU management port can be configured to handle Ethernet frames at the **ingress direction** (where frames enter the HSU) and at the **egress direction** (where frames exit the HSU).

Ingress Direction

Transparent	The port 'does nothing' with regard to VLANs - inbound frames are left untouched.
Tag	<p>Frames entering the HSU port without VLAN or QinQ tagging are tagged with VLAN ID and Priority^a, which are preconfigured by the user. Frames which are already tagged at ingress are not modified and pass through.</p> 
Provider tag	<p>Frames entering the HSU port are tagged with provider's VLAN ID and Priority which are preconfigured by the user. Frames which are already tagged with Provider tagging at the ingress are not modified and passed through.</p> 

a. Priority Code Point (PCP) which refers to the IEEE 802.1p priority. It indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc).

Egress Direction

Transparent	The port 'does nothing' with regard to VLANs - outbound frames are left untouched.
Untag all	<p>Port configured to untag user VLAN tags for all frames.</p> 
Filter	

Before proceeding, note the following:



If you are **not** a VLAN expert, please be aware that incorrect VLAN configuration may cause havoc on your network. The facilities described below are offered as a service to enable you to get best value from your RADWIN JET DUO links and are provided “as is”. Under no circumstances does RADWIN accept responsibility for network system or financial damages arising from incorrect use of these VLAN facilities.

Management Traffic and Ethernet Service Separation

You can define a VLAN ID for management traffic separation. You should configure the system to prevent conflicts:

When configured for the default operational mode, a “Provider port” will handle ingress traffic as follows:

- Filters frames that are not tagged with the Provider VLAN ID
- Removes the Provider double tag

Therefore, if a port is configured for management traffic separation by VLAN and as ‘Provider port’, then the received management frames must be double tagged as follows:

- The outer tag has to be the Provider’s tag (so the frame is not filtered)
- The internal tag has to be management VLAN ID

To avoid mix-ups, best practice is to:

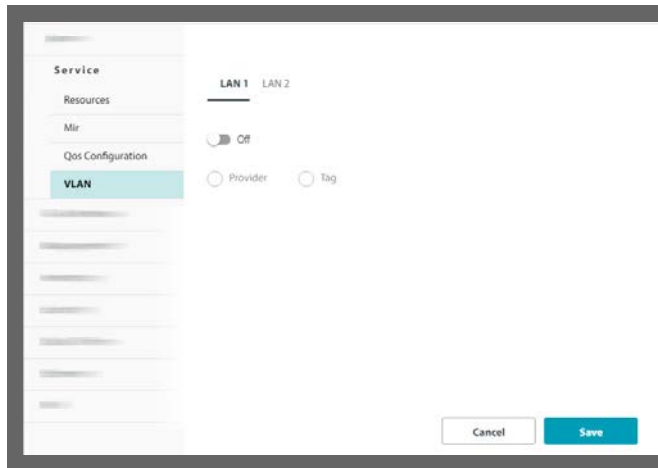
- Separate the management and data ports
- Define only a data port with Provider function



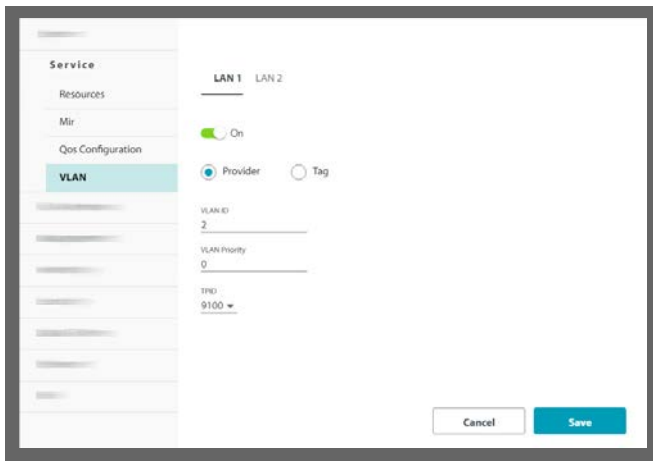
If traffic VLAN tagging is in force for the HSU ingress direction and management VLAN is in use at the HBS (see [VLAN](#) on page 14-16), then the VLAN ID at the HSU ingress direction must be the same as the VLAN ID for management at the HBS.

VLAN Configuration

1. Select the HSU to be configured, open the Configuration icon, click Service -> VLAN.



2. You can configure VLAN for LAN1 and for LAN2 separately.
3. Click **Off** to enable the VLAN window. It will turn to **On**.

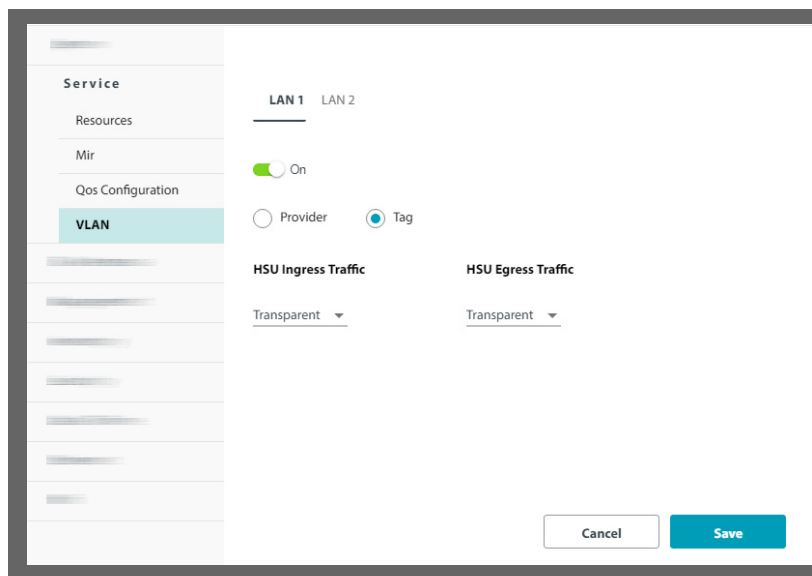


4. If you are using Provider tagging, click the Provider Radio button.
5. In **Provider** mode, Ethernet frames are tagged with the provider's VLAN ID before they enter into the provider's network/backbone.
6. Enter a Provider VLAN ID and Priority. The VLAN ID must be in the range 2 to 4094. The VLAN Priority must be in the range 0 to 7. You may also change the TPID from the default as shown.



This facility is provided to enable connection through legacy switches requiring it. Otherwise, there is no need to change the TPID.

7. Click **Save** to have your changes take effect.
8. If you are using VLAN tagging, click the **Tag** radio button.
9. In **Tag** mode Ethernet frames are tagged or untagged to distinguish between different networks.



10. For completely transparent passage of tagged frames, there is nothing further to do. Click **Save** to have your changes take effect.

11. However, if you wish to not have transparent passage of frames, the following table shows the possible settings for each combination of Ingress and Egress modes:

Ingress	Transparent	Frames are not modified and are forwarded transparently
	Tag	Enter a VLAN ID (1-4094) and Priority (0-7)

Egress	Transparent	Frames are not modified and are forwarded transparently
	Untag All	All frames with VLAN tag are untagged
	Filter	Allow up to 4 VLAN IDs to be passed through.
	Untag Filtered	Allow VLAN IDs: <ul style="list-style-type: none"> Allow up to 4 VLAN IDs to be passed through. Untag: <ul style="list-style-type: none"> Untag the VLAN tag of the selected VLAN IDs.

12. Click **Save** to have your changes take effect.

WiFi (HSU only)

This is only relevant for the SU **PRO/AIR** EMB or SU **PRO/AIR** INT.

The SSID status, Security method, and On status of the WiFi unit are displayed.

Access Point Mode: Turn On or Off the WiFi for the device. Auto allows the system to determine if WiFi needs to be used.

You can set the following WiFi parameters:

- WiFi password
- WiFi IP address
- WiFi channel
- WiFi Tx power

Connected Clients: This area shows up to 5 clients that are connected to this unit, including their MAC addresses and signal strength (RSSI).




The SSID of the WiFi is **R- [serial number of unit]**

Click **Save** to have your changes take effect.

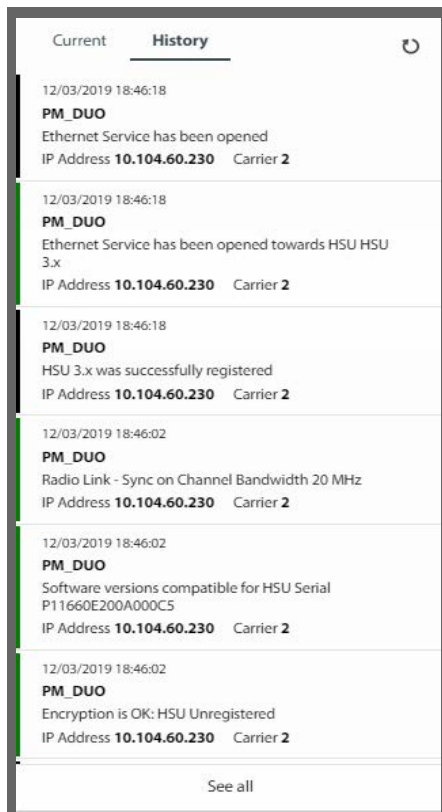
Events



1. To display the Events Log, first select the unit or units for which you want to display events. You can select any combination of units.

2. Click on the Events icon in the upper panel of the Web page ; The events are displayed in the partial Events Log. This is a small version of the complete Events Log, and shows a list of events according to the date and time they occurred, its source, a description of the event, IP address of the source, and on which Carrier the event was recorded.

- Click **Current** to see alarms since the last log in (these are cleared once the alarm condition is removed), click **History** to see all events recorded.



- Click **See all** to see the full Events Log.

Date & Time	Message	Source	IP v4	IP v6	Severity	Carrier	Interface
09/01/2005 , 00:23	Ethernet Service has been opened towards HSU Name192	Name190	10.0.0.190		normal		Radio Interface
09/01/2005 , 00:23	HSU Name192 synchronized	Name190	10.0.0.190		normal		Radio Interface
09/01/2005 , 00:23	Encryption is OK: HSU Name192	Name190	10.0.0.190		normal		Radio Interface
09/01/2005 , 00:23	Software versions compatible for HSU Name Name192	Name190	10.0.0.190		normal		Radio Interface
09/01/2005 , 00:21	HSU Name192 out of sync: The reason is: Spectrum analysis	Name190	10.0.0.190		critical		Radio Interface
09/01/2005 , 00:21	Ethernet Service has been closed towards HSU Name192	Name190	10.0.0.190		major		Radio Interface




The Events Log records system failures, loss of synchronization, loss of signal, compatibility problems and other fault conditions and events.

- The Events Log may be saved as an Excel or PDF file. Click **Download report** to do so.

The Events Log includes the following fields:

- » Date and time stamp
- » Message
- » Trap source (if the source is a radio unit, this is its name)
- » IP address of the unit that initiated alarm - IPv4 or IPv6. Use the pull-down menu here to filter the list according to the indicated criteria.

- » Severity of the trap (color-coded)

Critical	
Major	
Minor	
Warning	
Normal	
Info	

- » Carrier on which the trap was found (Carrier 1 or Carrier 2)
- » Interface of the trap

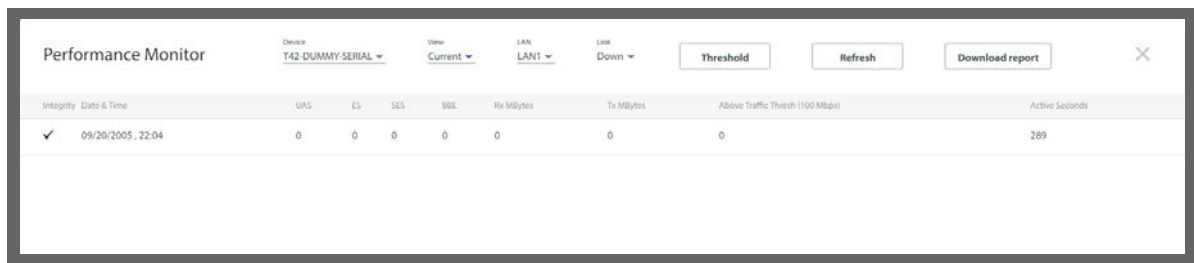
6. Click **Current** to see alarms since the last log in (these are cleared once the alarm condition is removed), click **History** to see all events recorded.

7. You can filter the list of messages by IP or trap source by entering the desired item in the field at the top center of the window, and clicking the spyglass icon.

Performance



The RADWIN JET DUO Performance Monitoring feature constantly monitors traffic over the radio link and collects statistics data for the air interface and Ethernet ports.



Integrity		Date & Time	UAS	ES	SES	BSE	Rx Mbytes	Tx Mbytes	Above Traffic Thresh (100 Mbps)	Active Seconds
✓		09/20/2005 . 22:04	0	0	0	0	0	0	0	289

When you click on this icon, the Performance Monitor window opens. It differs slightly if you are accessing an HBS or an HSU.

You have the following options:

Device Click this pull-down menu and select a radio to display its results

View This pull-down menu has the following options:

- Current - gives you the latest entry
- 15 Minutes - provides date in a scroll down list in 15 minute intervals
- Daily (24 hours) - shows result for the last 30 days at midnight

LAN This pull-down menu allows you to show results from LAN1 or LAN2 (see [LAN Ports](#) on page 14-28 for an explanation of the input ports)

Link This pull-down menu allows you to select between the downlink and the uplink directions

- Threshold** Click on this button to set the upper traffic threshold for reporting. The units used depends on the specific parameter. Traffic conditions above the threshold indicate congestion and probably lost frames.
- Refresh** Click on this button to refresh the view to include more recent data.
- Download report** Click on this button to save the report as an Excel file or PDF.

The meaning of the column headings is shown in the following table:

Column Heading	Description
Integrity	Valid data flag: Green tick for current and valid; Red cross for invalidated data. Note that the Performance Monitoring data is not valid if not all the values were stored (e.g., due to clock changes within the interval or power up reset)
Date & Time	Time stamp: Data are recorded every 15 minutes; the last 30 days of recordings are maintained. Roll-over is at midnight.
UAS	Unavailable Seconds: Seconds in which the interface was out of service.
ES	Errored seconds: The number of seconds in which there was at least one error block.
SES	Severe Errored Seconds: The number of seconds in which the service quality was low as determined by the BBER threshold.
BBE	Background Block Error: The number of errored blocks in an interval.
Rx MBytes	Received Mbytes: The number of Megabytes received at the specified port within the interval
Tx MBytes	Transmitted Mbytes: The number of Megabytes transmitted at the specified port within the interval.
Above Traffic Thresh	Threshold set in the previous step: Seconds count when actual traffic exceeded the threshold
Active Seconds	The number of seconds that the configured Ethernet service is active (available for HBS only)

If you have selected an HSU, you will see the following additional parameters:

Column Heading	Description
RSL Thresh 1 (-88dBm)	Receive Signal Level Threshold: The number of seconds in which the Receive Signal Level (RSL) was below the specified threshold.
RSL Thresh 2 (-88dBm)	Receive Signal Level Threshold: The number of seconds in which the RSL was below the specified threshold.

Column Heading	Description
Min TSL (dBm)	Minimum Transmit Signal Level: The minimum of the transmit signal level (measured in dBm)
Max TSL (dBm)	Maximum Transmit Signal Level: The maximum of the transmit signal level (measured in dBm)
TSL Thresh (25 dBm)	Transmit Signal Level Threshold: The number of seconds in which the Transmit Signal Level (TSL) was above the specified threshold
BBER Thresh (1.0%)	Background Block Error Ratio Threshold: The number of seconds in which the Background Block Error Ratio (BBER) exceeded the specified threshold
Rx MBytes	Received Mbytes: The number of Megabytes received at the specified port within the interval
Tx MBytes	Transmitted Mbytes: The number of Megabytes transmitted at the specified port within the interval.
Below Capacity Thresh	Seconds count when throughput fell below the threshold value set in
Above Traffic Thresh	Threshold set in the previous step: Seconds count when actual traffic exceeded the threshold

Spectrum




The Spectrum View utility is an RF survey tool that provides spectral measurement information, power vs. frequency. You can view real-time spectrum information, save results, and view historic spectrum scans. Separate information is generated for the HBS and HSUs - all by selection. The data is stored in the radio unit itself.

The results of the Spectrum View utility are intended for use by RADWIN Customer Service to assist with diagnosing interference related problems.

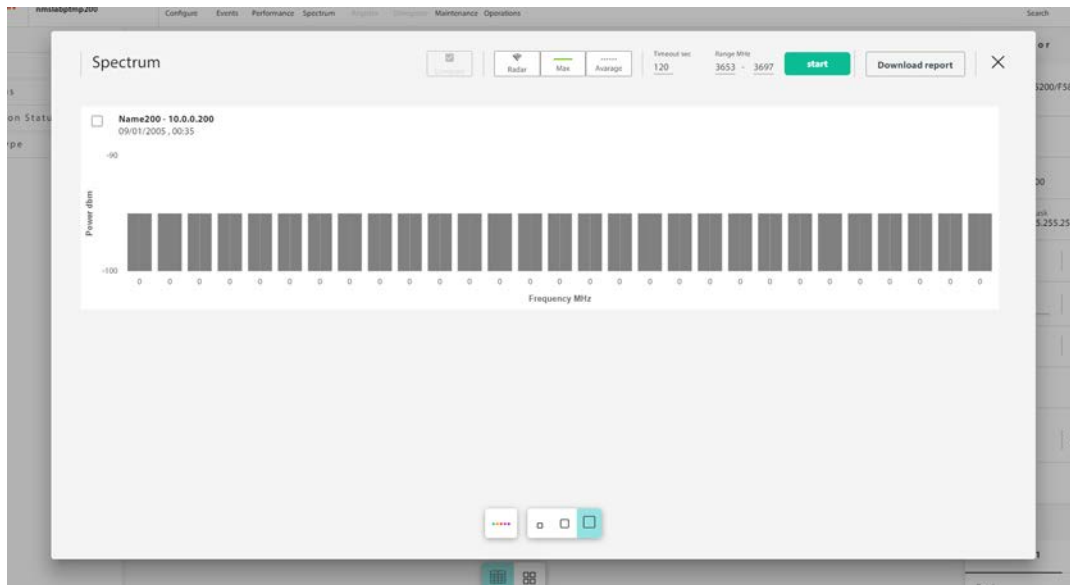
Spectrum View can be opened from the HBS, or from an HSU¹, or any combination thereof.

We assume the reader knows about RF Spectrum Analysis so detailed theoretical explanations are not needed.

1. Select the device or devices for which you want to see the Spectrum View. No more than 8 fixed HSUs can be selected.


2. Click on the Spectrum View icon , then choose the carrier for which you want to see the Spectrum View. You can only see it for one carrier at a time. The Spectrum View window will appear.

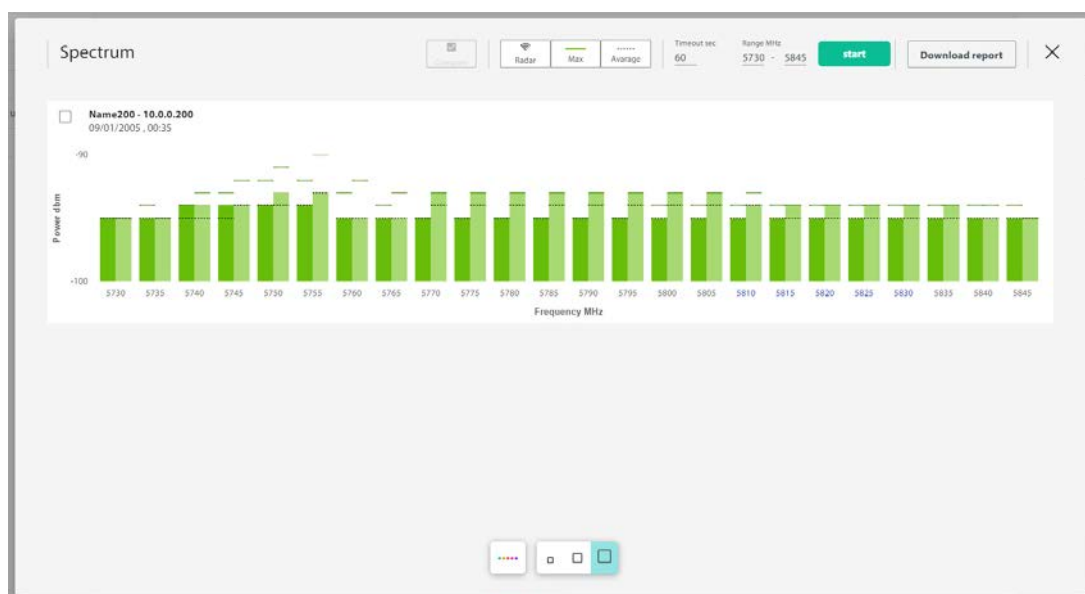
1. Although not from an SU PRO/AIR EMB OR SU PRO/AIR INT



A blank Spectrum View result display will appear, where all the bars are grey.

The name(s) of the selected unit(s) appear, together with their IP address(es), date and time.

3. The three box icons in the bottom of the window () allow you to adjust the size of the display so you can show results from more than one unit.
4. To start a scan first choose its **Timeout sec** time (top of window), which is the maximum analysis time per scan.
5. Select the frequency range (**Range MHz**, top of window). You can only select allowed frequencies.
6. Once you are ready, click **Start** to start the scan and see the results on screen. You will be warned that this is traffic-affecting. If this is acceptable, then click **Yes**.



Green bars relate to those frequencies you chose when you activated the HBS (see [Activate the DUO Base Station](#) on page 14-66). Dark green is Antenna A, and light green is Antenna B.

If there are frequencies that you did not choose when you activated the HBS, their bars appear blue.

The frequencies the unit is working at has text that appear blue.

Green lines show the maximum power found for the indicated frequency range.

Dotted lines show the average power found for the indicated frequency range.

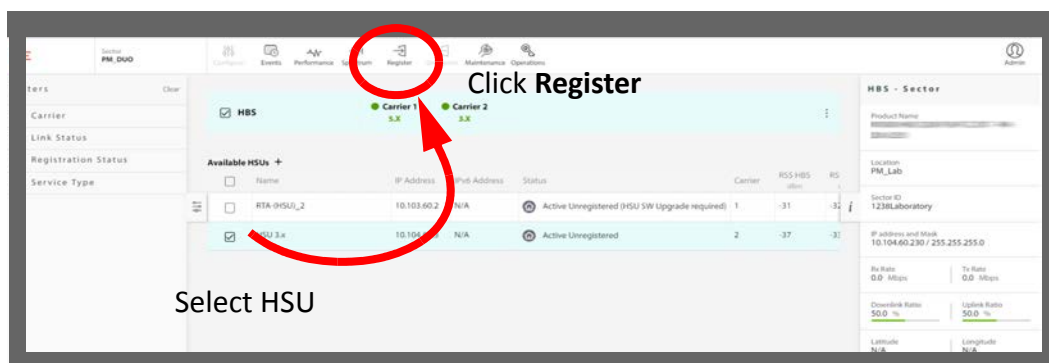
Radar shows/hides DFS information

Compare allows you to compare the results from selected units, side-by-side.

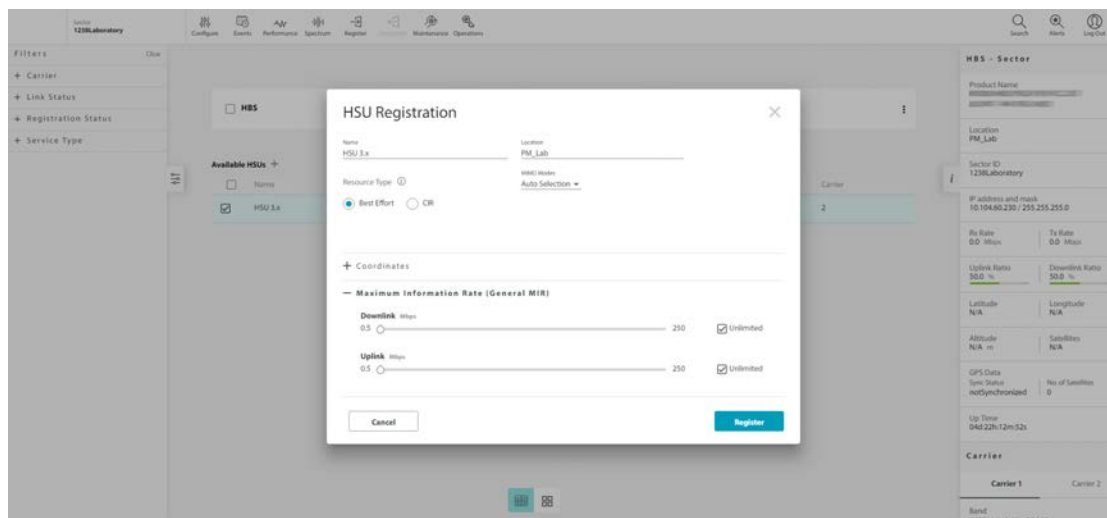
7. If you want to save the report, click **Download Report**, and select a location where to save the report file.



1. Select the HSU you want to register by placing a checkmark next to it:

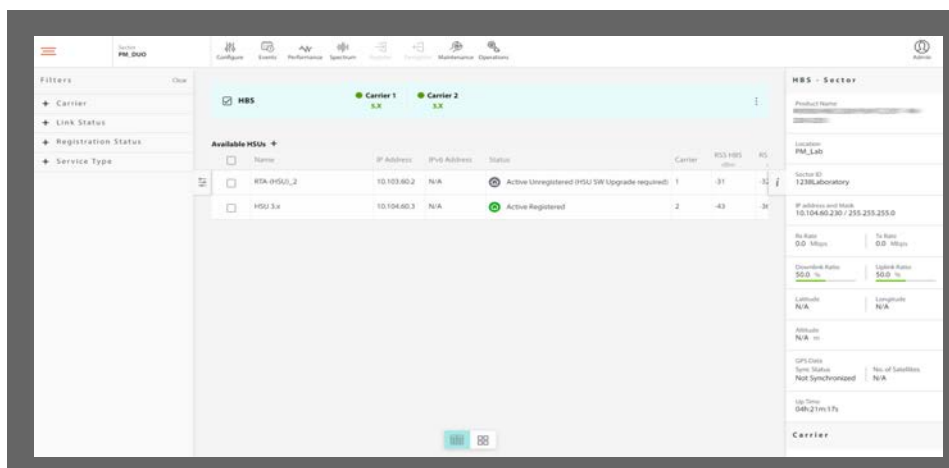


2. Click **Register**. The HSU Registration window will open.

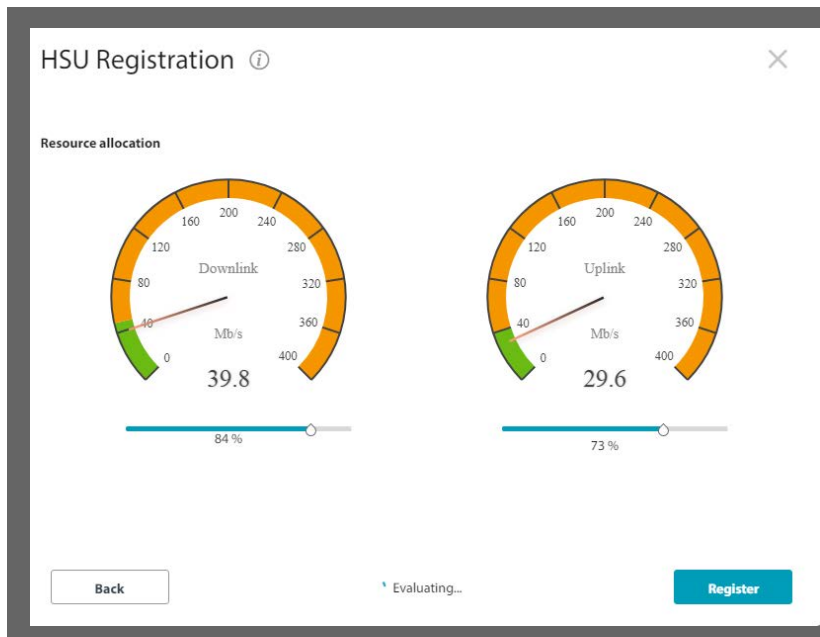


3. You may edit or add the site's **Name**, **Location** and **Coordinates**.

4. If you are registering an SU **AIR** EMB or SU **AIR** INT, the **Resource Type** can only be BE (Best Effort). Skip to Step 6.
5. Select the **Resource Type** for the HSU. This can be CIR (Committed Information Rate), or BE (Best Effort):
 - **BE** grants the HSU resources as they become available in the sector.
 - **CIR** grants the HSU with a certain guaranteed percentage of resources. You set this percentage in the General MIR window.
6. Check a **MIMO Mode** for this HSU:
 - **Spatial Multiplexing** (default) splits the data in to two streams on transmission and recombines it on reception providing maximum throughput. This provides a higher throughput.
 - **Diversity** transmits the same data on from both antennas and check for correctness on reception. This mode helps to ensure more reliable data transmission in a noisy environment, although throughput will be lower.
 - **Auto Selection** instructs the system to choose whichever mode is most efficient.
7. Optionally, you can choose the **Maximum Information Rate**. Use the sliders to set here the maximum throughput rate you want for the specific HSU in each direction: down link, and up link. You can choose a value, or click the Unlimited checkbox.
 - If you chose the BE resource type in Step 5. above, continue to Step 8.
 - If you chose the CIR resource type in Step 5. above, continue to Step 9.
8. If you chose the **BE** resource type in Step 5. above, or your unit is an SU **AIR** EMB or SU **AIR** INT, click the **Register** button. In a few moments, the HSU will be registered.



9. If you chose the CIR resource type in Step 5. above, choose the resource allocation. Use the sliders to choose the percentage of resources to be allocated to the HSU. This is the percentage of available resources in the sector. Obviously, you must make sure that the resource percentages of all the HSUs in the sector do not add up to more than 100%.



When a stable value is reached, the **Register** button will become enabled.

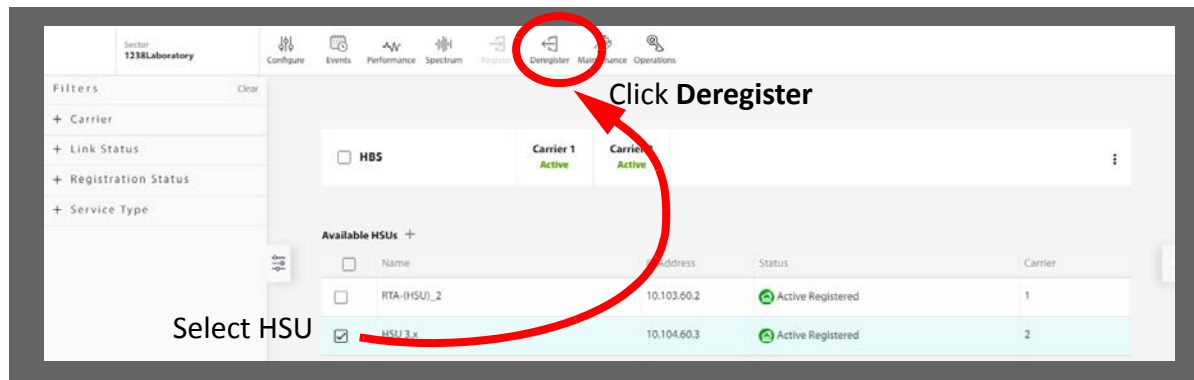
10. Click **Register**.

The main configuration window displays the "HSU" section. On the left, a sidebar shows filters for Carrier, Link Status, Registration Status, and Service Type. The main area shows a table of "Available HSUs" with columns for Name, IP Address, Status, and Carrier. Two HSUs are listed: "HSA-HSU_2" (IP: 10.103.60.2, Status: Active Registered, Carrier: 1) and "HSU 3x" (IP: 10.104.60.3, Status: Active Registered, Carrier: 2). On the right, a detailed view for "Carrier 1" and "Carrier 2" is shown, including parameters like Rx Rate, Tx Rate, Uplink Ratio, Downlink Ratio, Latitude, Longitude, Altitude, and GPS Data.

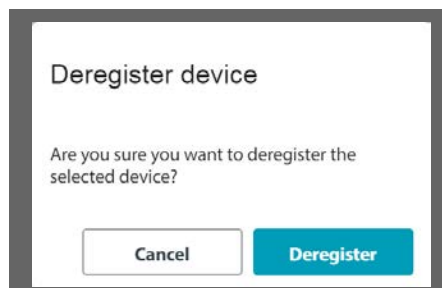
Deregister



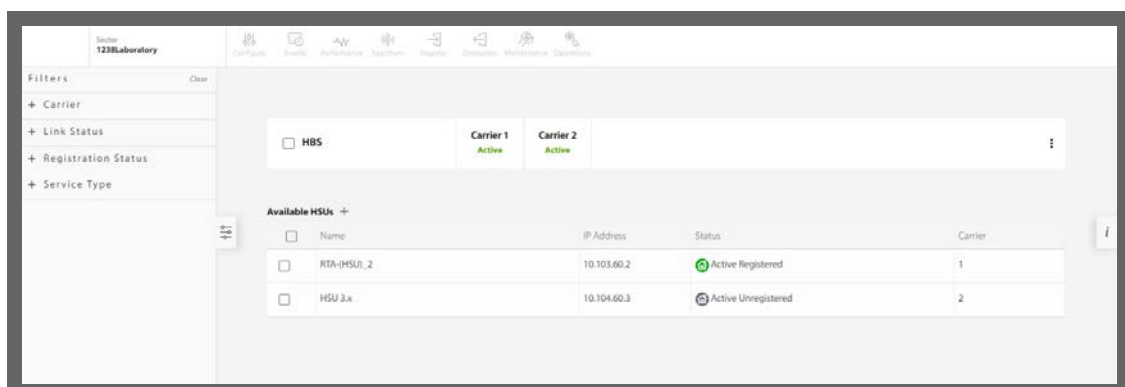
1. Select the HSU you want to de-register by placing a checkmark next to it.



2. Click **Deregister**. You will be asked to confirm that you want to deregister the radio.



3. If you are sure, click **Deregister**. The device will no longer be registered.

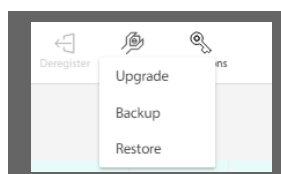


Maintenance



This allows you to upgrade, backup or restore the target software.

Choose the action you want from the pull-down menu.



- Any of these actions requires the NMSTools.exe application. This is the RADWIN Manager, which must be installed on your computer. When you choose any of these options, you will be asked if you want to open this application. Click **Open NMSTools.exe** to open the application.

Operations



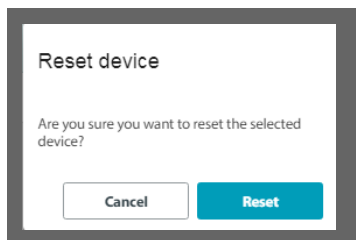
This icon allows you to perform a reset, restore the factory default settings, or to perform a license-dependent upgrade on the selected device.



If you reset an HBS, this affects traffic on both carriers.

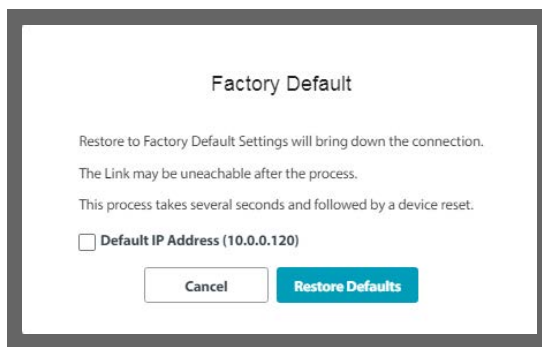
Reset

When you choose Reset, you are asked to confirm. Reset is traffic-affecting, and if it is done on an HBS, it stops the traffic throughout the sector. If you are sure, click **Reset**.



Factory Default

When you choose Factory Default, you are asked to confirm. Since Factory Default involves a reset, it is traffic-affecting, and if it is done on an HBS, it stops the traffic throughout the sector. You have an option to restore the default IP address (10.0.0.120), by clicking the box next to Default IP address. If you do not click this box, the device will retain its previous IP address. Once you are sure, click **Restore Defaults**, otherwise, click **Cancel**.

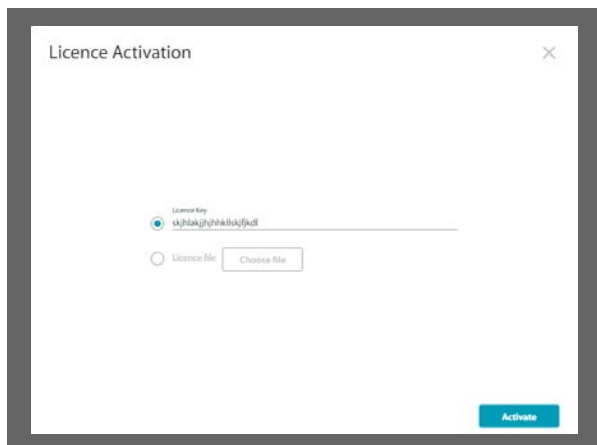


Licenses

To carry out a license-dependent upgrade, you must first acquire a license key. Do this as follows:

1. **Catalogue number:** Contact your RADWIN representative, and get a catalogue number of the upgrade you want. Purchase as many of these upgrades as you deem necessary.
2. **PAKs:** You will receive a list of Product Activation Keys (PAK) for each upgrade instance. A PAK number can be used on any compatible RADWIN product; they are not specific to any one given item of equipment.

3. **Activate PAKs:** Associate each PAK to a specific item of equipment: Access the License Key Application website: <http://tools.radwin.com/updates/licensekey/lk-radwin.htm>, and follow the instructions there to activate each PAK for the specific item of equipment you need to upgrade.
4. **Get License Keys:** The License Key Application will then give you a list of license keys. These numbers *are* unique for the specific upgrade and specific item of equipment. We recommend saving this list as a text file in a convenient location.
5. Select the device for which you want to apply a license-dependent upgrade.
6. Choose Operations -> License. The License Activation window will open.



7. Enter the license code in the field, or click **License file**, then **Choose file** to where you have saved the license file.
8. Once you are ready, click **Activate**.
9. The unit will be reset, after which it will be upgraded using the new license.

Diagnostics



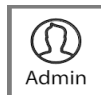
This creates diagnostic files, to be used by RADWIN professional services and support personnel to expedite assistance.

1. Select the items for which you want information (HBS and/or HSUs). If an item is not selected, the diagnostic files will not contain information for that item.
2. Click this icon to open the **Get Diagnostics** window.
3. You will be warned that this could take a few minutes, depending on how many devices have been selected. If this is acceptable, click **Get Diagnostics**.
 - The main window will darken, and the **Getting monitor diagnostics** message will appear.
 - After a few seconds or minutes, a comma-delimited (*.csv) file will be created, stored in the default downloads section of the managing computer. The **Getting monitor diagnostics** message will disappear.
 - The format of this file name is: **monitor-DATE TIME.csv** .

- The Diagnostics icon will then be shown with a percentage indicator below it, showing the status of the creation of the second diagnostics file: a JSON file. In addition, a small blue **diagnostics in progress** message will appear next to the Diagnostics icon.
- After a further few seconds or minutes, the JSON file will be created. This file is also stored in the default downloads section of the managing computer.
- The format of this file name is: **diagnostics-DATE TIME.json**, accurate to the second.

4. Send these files to RADWIN professional services.

User Profile Icon

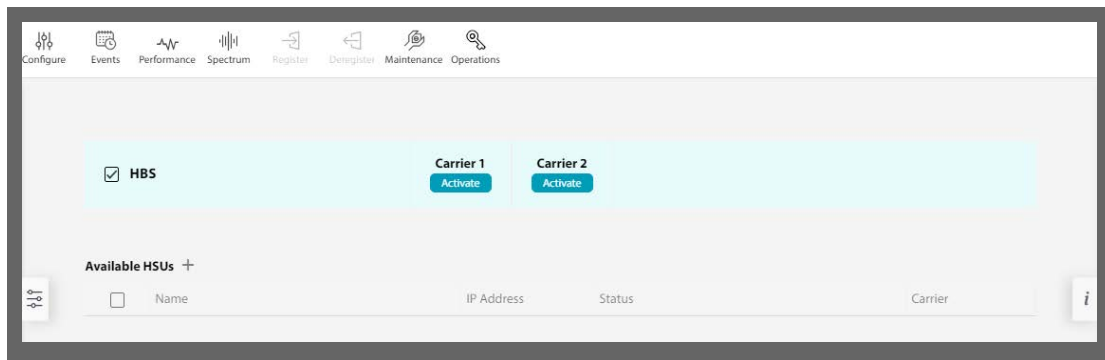


Admin, Observer, Operator, Installer

The name of the user profile will appear on the icon. Click this icon to log out of the HBS.

14.3.3 HBS List

Near the top of the user interface, the status of the connected HBS is shown, together with the activation status of each Carrier.



To activate a carrier, click **Activate**. For further instructions, see [Activate the DUO Base Station](#) on page 14-66.

Once a Carrier is activated, you can de-activate it.

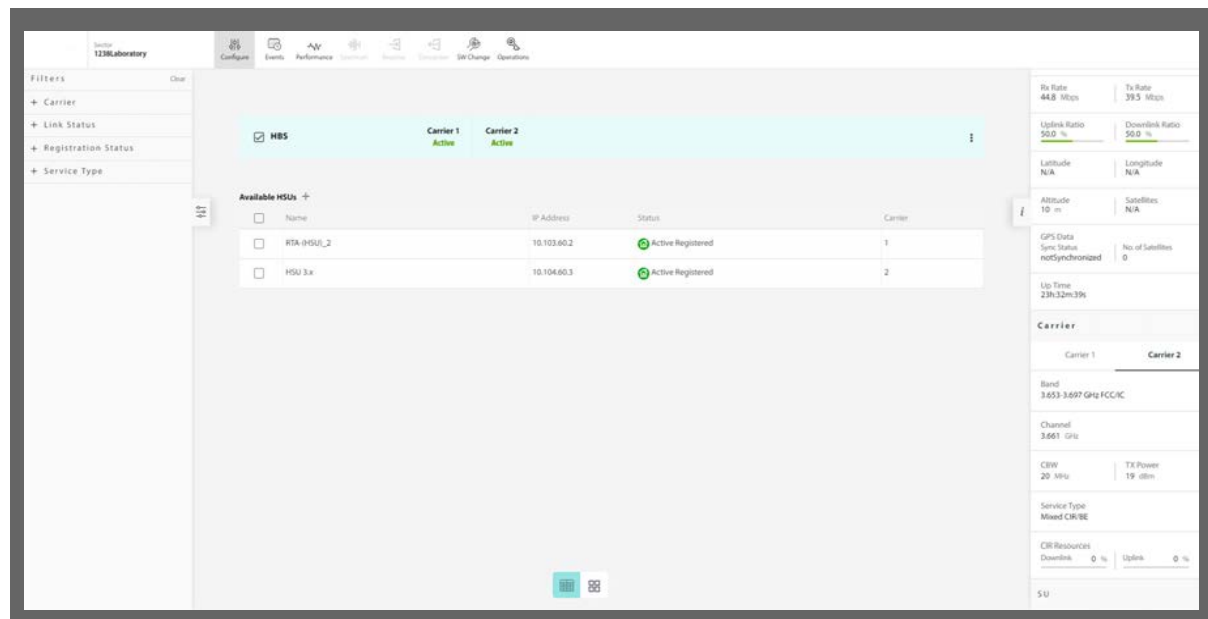
Click the vertical ellipsis next to the Right Pane, then choose which Carrier you want to de-activate.



14.3.4 HSU List

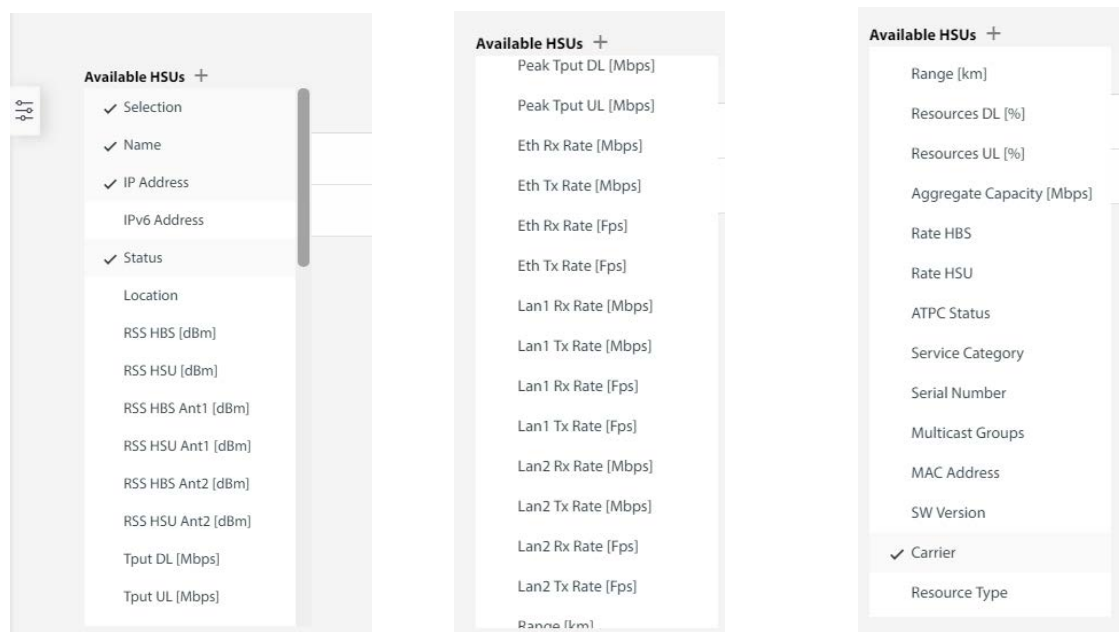
The central part of the user interface shows a list of the HSUs that the HBS has detected. The HBS can only detect HSUs if the carrier is activated (for instructions on activating a Carrier, see [Activate the DUO Base Station](#) on page 14-66).

The name and IP address of the HSUs (as configured) are listed, as well as their statuses and which carrier they are using (See [HSU status Description](#) on page 14-3 for the possible HSU statuses).



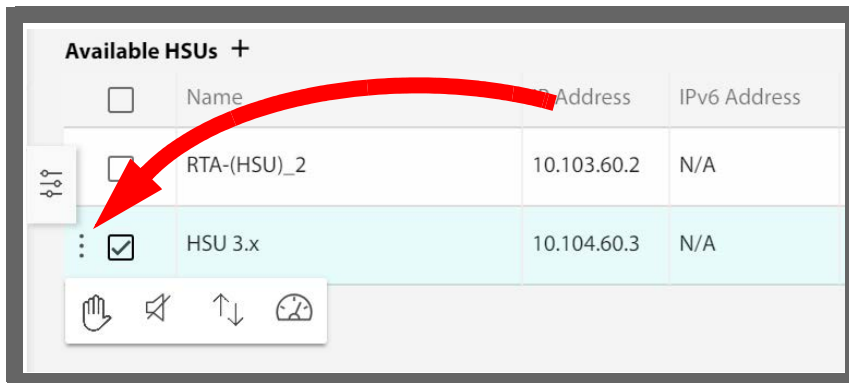
You can add other parameters as well by clicking the plus (+) sign next to the Available HSUs label, and selecting the desired parameters.

Additional HSU parameters, scrolling down on the list:



HSU Mini Menu

At the far left of the HSU line is a mini menu that provides various options. Click on the three dots at the end of the line to display this menu.



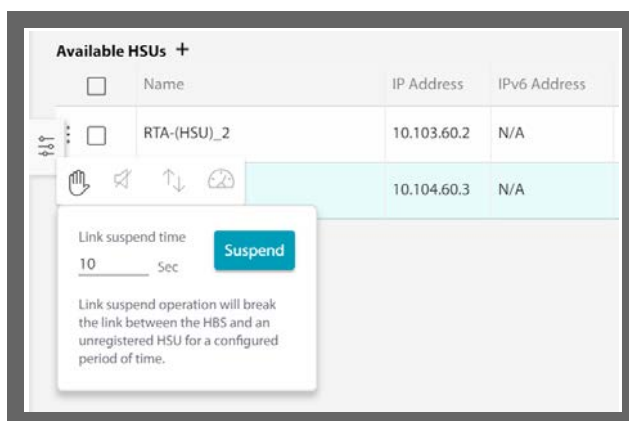
This menu allows you to carry out the actions below, but only if it is relevant for the selected unit:

- [Suspend](#) an HSU
- Control the HSU's [Buzzer](#)
- [Replace](#) a defective HSU with an operative HSU, and transfer all configurations
- Carry out a [Speed Test](#)

Suspend

Remove the selected subscriber unit from the list for a specified period of time that you determine. You can only suspend an un-registered subscriber unit.

1. Click on the HSU mini menu, then click on the Suspend icon:
2. From the window that appears, select the amount of time for which you want to suspend the HSU, then click **Suspend**.

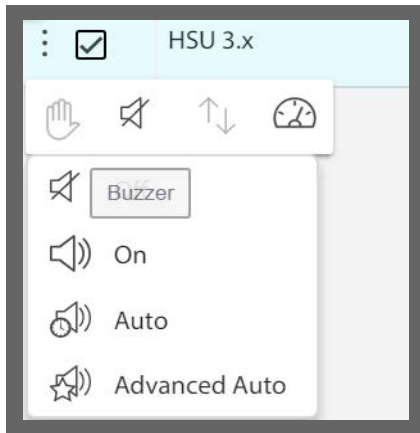


The suspended HSU will disappear from the HBS's list.

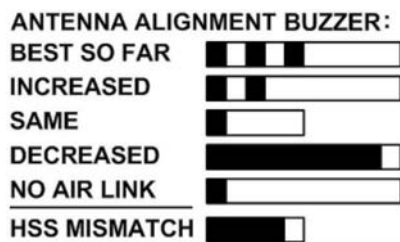
Buzzer

Click on the HSU mini menu, then click on the Buzzer icon:

The **Buzzer** button turns the buzzer On or Off (not relevant for the SU **PRO/AIR** EMB or SU **PRO/AIR** INT).



- The Auto position means that the Buzzer will beep as shown in the figure below during installation or upon sync loss. The main use of the buzzer tone is for HSU antenna alignment.
- The Advanced Auto position means that the buzzer will beep continuously at different rates upon sync loss, antenna mis-alignment and other events for up to two minutes following restoration of sync.



Replace

A defective HSU may be replaced by another HSU belonging to the sector provided that the replacement is not registered.


When doing so, the new HSU receives the configuration parameter values of the replaced HSU.

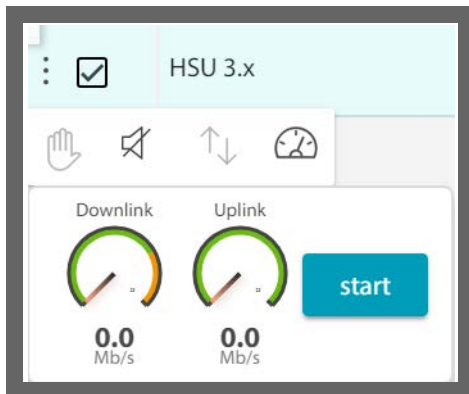
1. Click on the HSU mini menu, then click on the Replace icon:
2. You are offered a list of HSUs available as replacements.
3. Select the required unit by clicking on it.
4. You are asked to confirm before proceeding, do so.
5. Once the unit was replaced successfully, a confirmation message will appear. Note that all of the configuration parameters from the replaced unit will appear in the new unit.

Speed Test

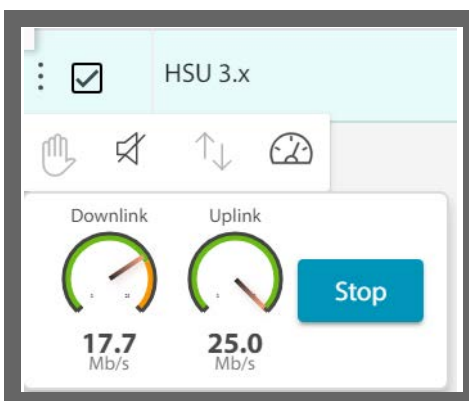
This graphically shows the real time throughput in the downlink and uplink direction of the selected HSU.

You can only carry out a speed test on a registered HSU.

1. Click on the HSU mini menu, then click on the Speed Test icon: 
2. Click **Start** to start the test.



The Downlink and Uplink dials will show the speed in each direction.



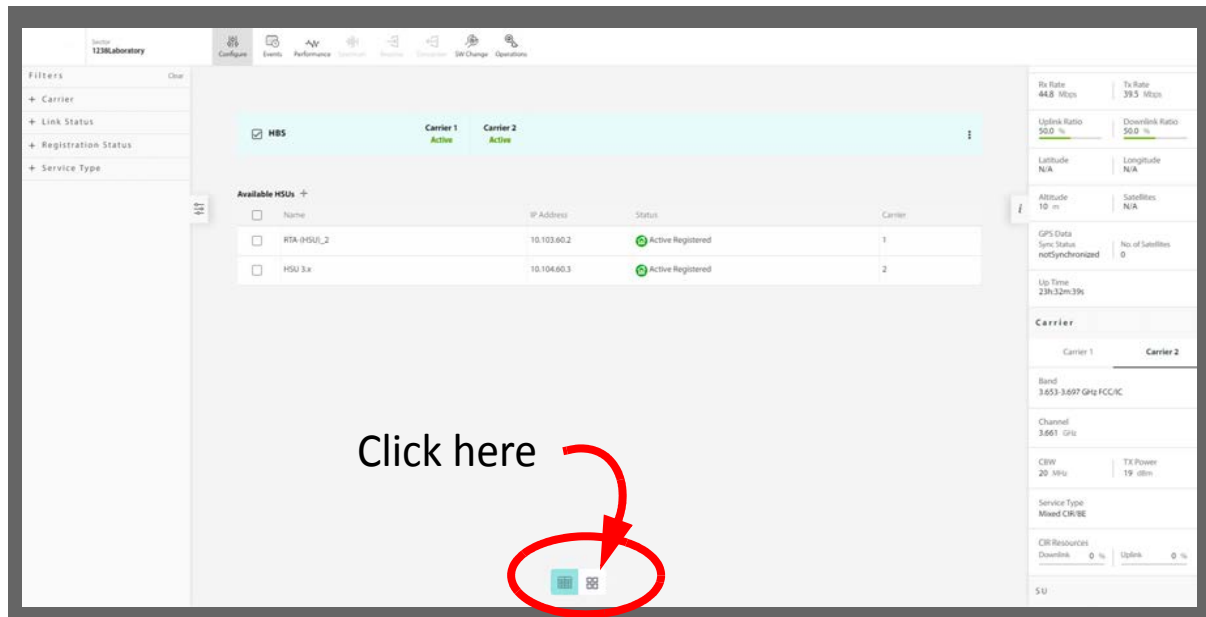
3. Click **Stop** to stop the test.

14.3.5 Sector Display views

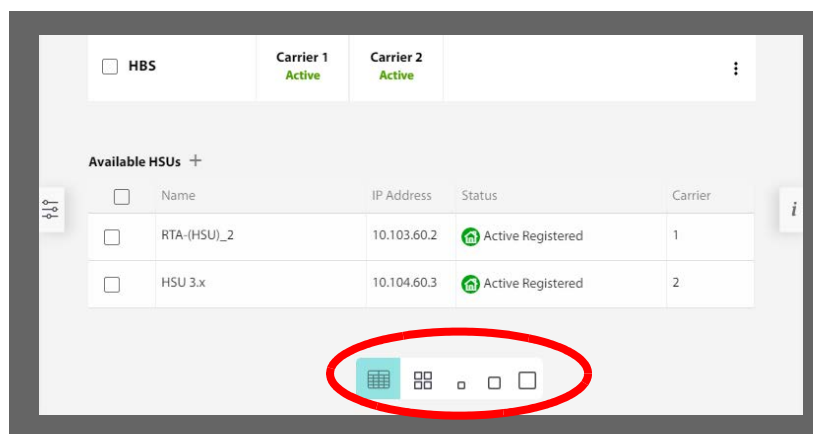
The default view of the sector (list of HSUs) is in a table format.

However, you can display information about the HSUs in a card-like format as well.

Click the four-square symbol on the bottom of the user interface.



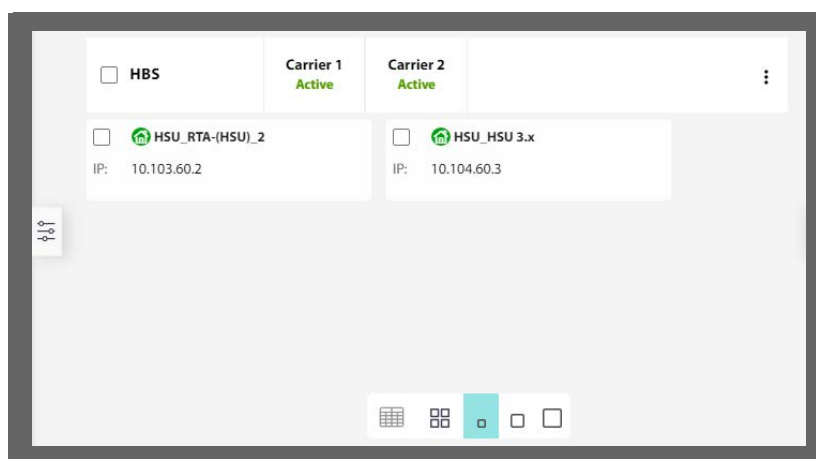
Various card size options will appear.



The size options are Small, Medium, and Large.

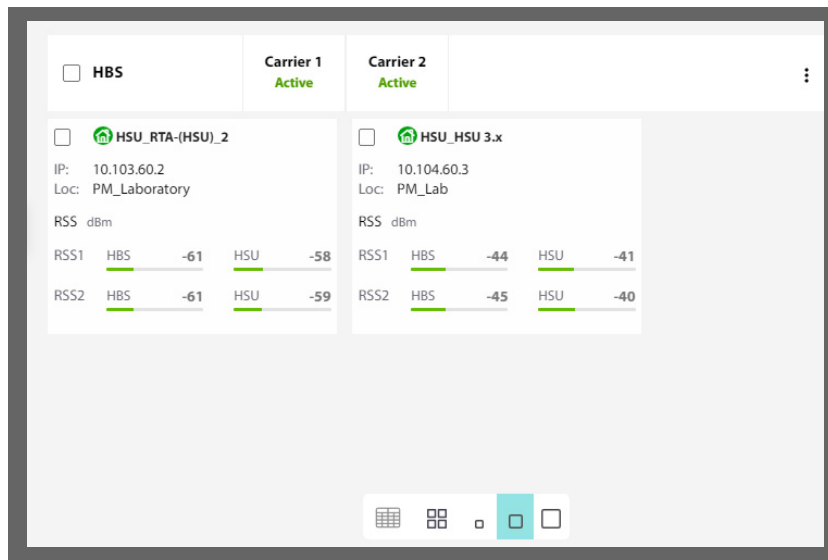
Click on the Small card option, and the information for the HSUs will be displayed in small cards with minimal information:

- Unit name, status
- IP address



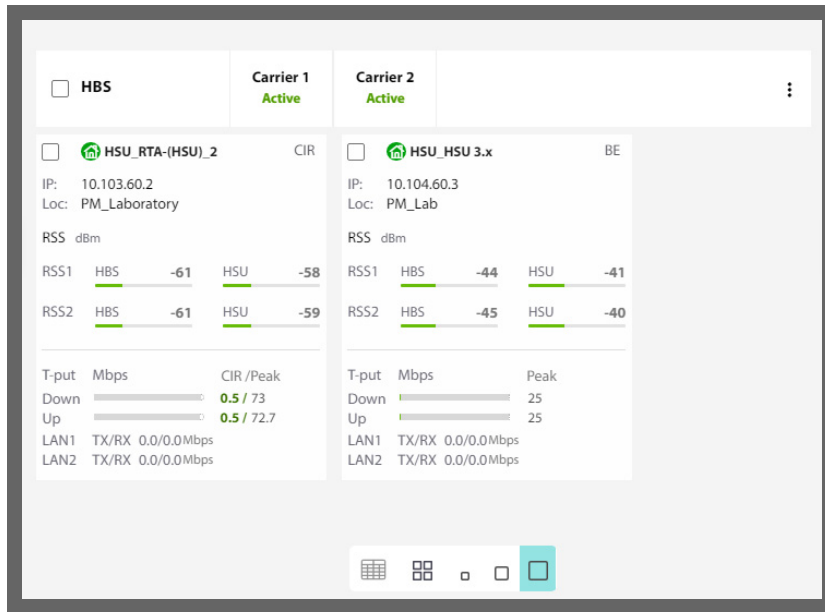
Click on the Medium card option, and the information for the HSUs will be displayed in medium-sized cards with more information:

- Unit name, status
- IP address
- Location
- RSS for each stream (RSS1 and RSS2), on both the HBS side and the HSU side.



Click on the Large card option, and the information for the HSUs will be displayed in large-sized cards with yet more information than the medium cards.

- Unit name, status
- Service category (CIR or BE)
- IP address
- Location
- RSS for each stream (RSS1 and RSS2), on both the HBS side and the HSU side
- Throughput for the uplink and downlink
- CIR and Peak value (as per configuration)
- Tx/Rx ratio for each line (LAN1 and LAN2)



14.3.6 Right Pane

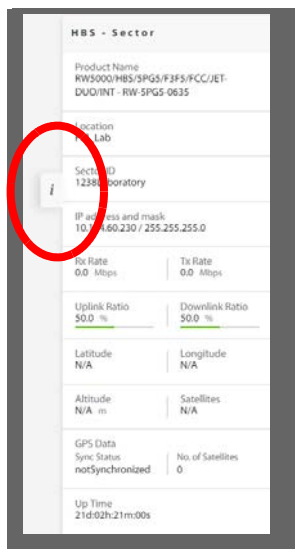
The right pane of the user interface gives a brief overview of the sector, showing the following:

- HBS product name
- Location, Sector ID, IP address and mask (as per configuration)
- The present Rx and Tx Rates
- The present Uplink and Downlink ratios
- The HBS's latitude, longitude, altitude (as per configuration) and if any satellites have been detected
- GPS data, including sync status and number of GPS satellites discovered, and
- The HBS's up time since last reset

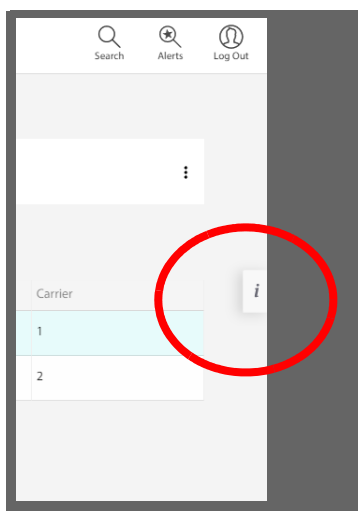
Scroll down, and you can see basic information about the link, which is displayed separately for each Carrier:

- Frequency Band
- Channel
- Channel Bandwidth
- Service Type being used in the sector (CIR, BE, or mixed)
- CIR Resources being used, if any

To minimize the Right Pane, click on the minimize symbol:



- To restore the Right Pane, click on the minimize symbol again:



14.4 First-Time Use

When working with a DUO base station for the first time, carry out these tasks:

Update DUO Connection Parameters - Change the IP address of the DUO base station, and any other connection parameters in accordance with your radio plan. Although this can be done later, we recommend doing this as soon as possible.

Activate the DUO Base Station - this must be done for each carrier.

Register Subscriber Units - this must be done for each subscriber unit in each carrier.

Update Subscriber Unit Connection Parameters - Change the IP address of each subscriber unit, and any other connection parameters in accordance with your radio plan. This can be done later, but we recommend doing this as soon as possible.

14.4.1 Update DUO Connection Parameters

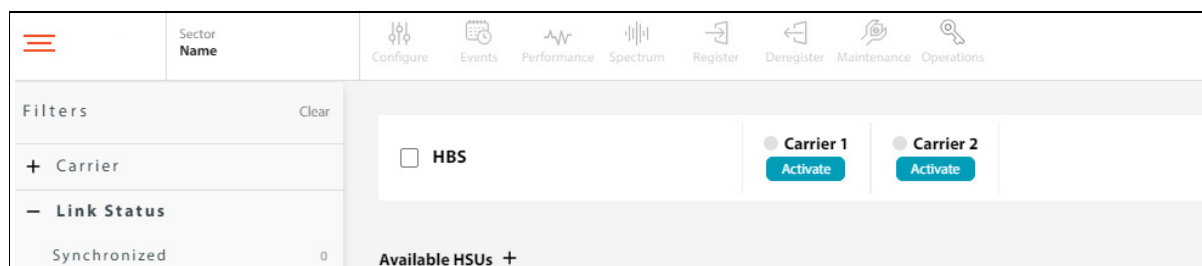
When first logging on to a new DUO base station, you must change its IP address in accordance with your radio plan.

Connect the radio to the network and voltage via its PoE port.

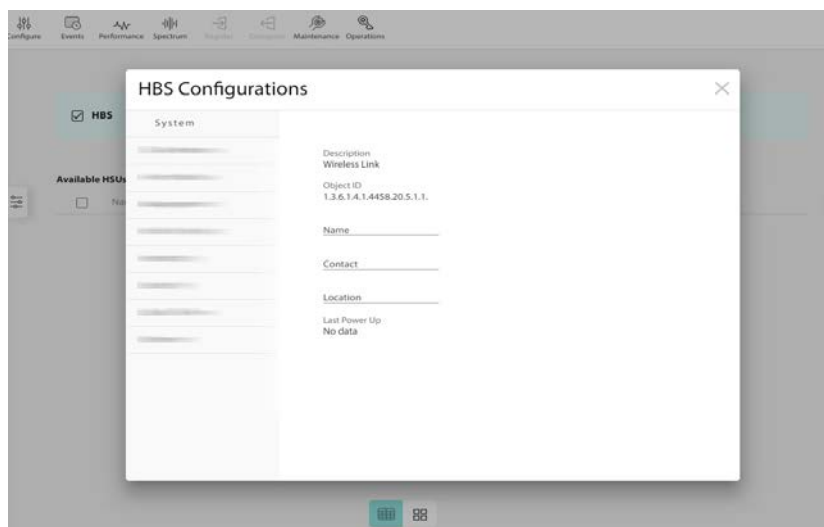
Enter its IP address in a web browser (default value: 10.0.0.120).

Enter username **admin** and password **netwireless**.

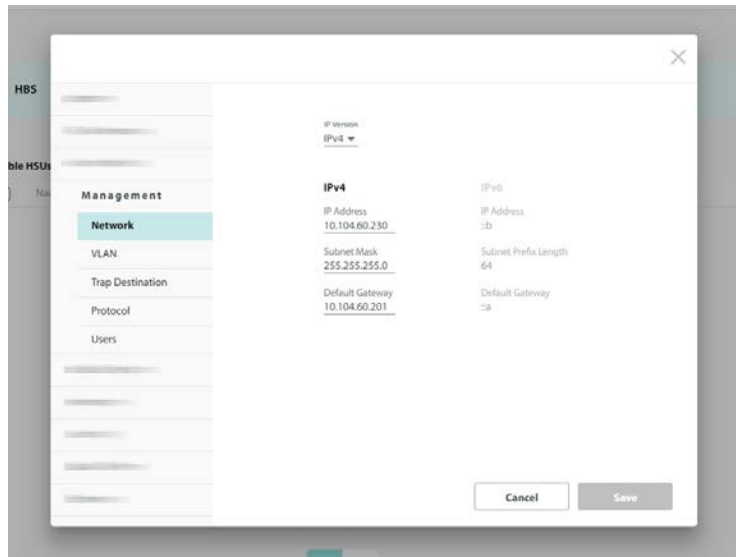
Select the DUO base station unit by placing a checkmark next to it, then click on **Configure**.



The **Configuration -> System** window will open.

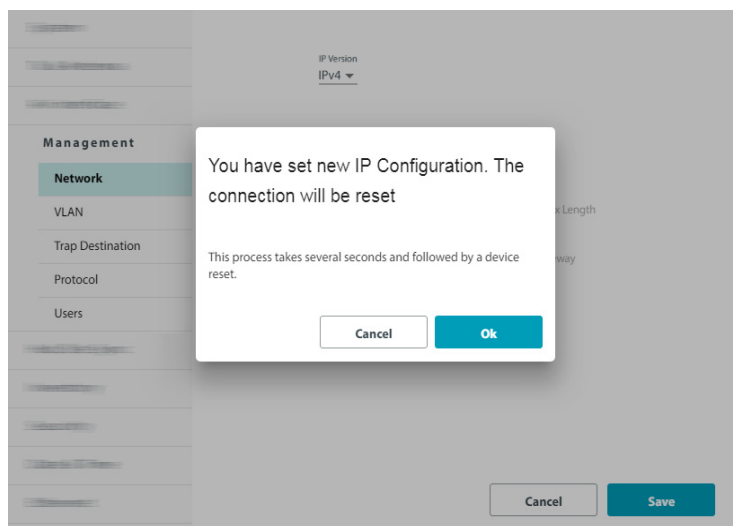


Select **Management -> Network**:



Enter the new IP address, Subnet Mask and Default Gateway in accordance with your radio plan, then click **Save**.

You will be warned that the device (HBS) will be reset. If all the values are correct, click **OK**.

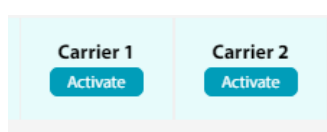


Once the HBS is reset, log in again, using the new IP address.

14.4.2 Activate the DUO Base Station

There are two carriers, and you must activate the DUO base station for each carrier used.

1. For the first carrier, click **Activate** under **Carrier 1**.



2. Enter the Sector ID, Sector Name and Location.

The Sector ID is used by all radio units connected to this HBS to identify which HBS to connect to.

The same Sector ID is used for both carriers.

The image shows two side-by-side screenshots of the 'Carrier 1 Activation' configuration window, specifically the 'General HBS Settings' tab. The left screenshot shows the 'Sector ID' field as a required field with a red error message. The right screenshot shows the 'Sector ID' field populated with '1238 Laboratory'. A red arrow points from the left screenshot to the right one, indicating the progression of the setup.

3. Click **Next**.

The image shows the 'Carrier 2 Activation' configuration window, specifically the 'Radio Settings' tab. It displays 'Channel Bandwidth' set to 20 MHz and 'Operating Channel' set to 3.661 GHz. Below these, there is a section for 'Automatic Channel Selection' which is checked. A list of frequencies is shown with checkboxes, and 'Automatic Channel Selection' is checked. The 'Back' and 'Next' buttons are visible at the bottom.

4. The operating channel and channel bandwidth will appear. We recommend you use the default values, but depending on the specific version of the product, these can be changed.
5. We also recommend you select Automatic Channel Selection, although you can select specific frequencies if your radio plan requires it. You must select at least two frequencies.
6. Click **Next**.

Carrier 2 Activation

1 System — 2 Radio — Antenna

Antenna Parameters

Antenna Connection Type:

Antenna Type: Dual ▾ Antenna Gain: 17.0 Beamwidth (0 to 360): 90.0 ° Azimuth (0 to 180): 0 °

Tx Power (Per radio): 22 dBm Tx Power (System): 25 dBm Required Tx Power (Per radio): 25 dBm

Cable Loss: 0 dB Max EIRP: 42 dBm EIRP: 42 dBm

7. Check the parameter values in this window, and change any that need to be changed.

Depending on the specific product in use, and especially the regulatory environment in which you are working, not all parameters can be changed.

8. Once you are sure the values are correct, click **Activate**.

A “working” graphic below the selected carrier will appear for a few moments.

☒ HBS ☐ Carrier 1 ☐ Carrier 2 **Scanning**

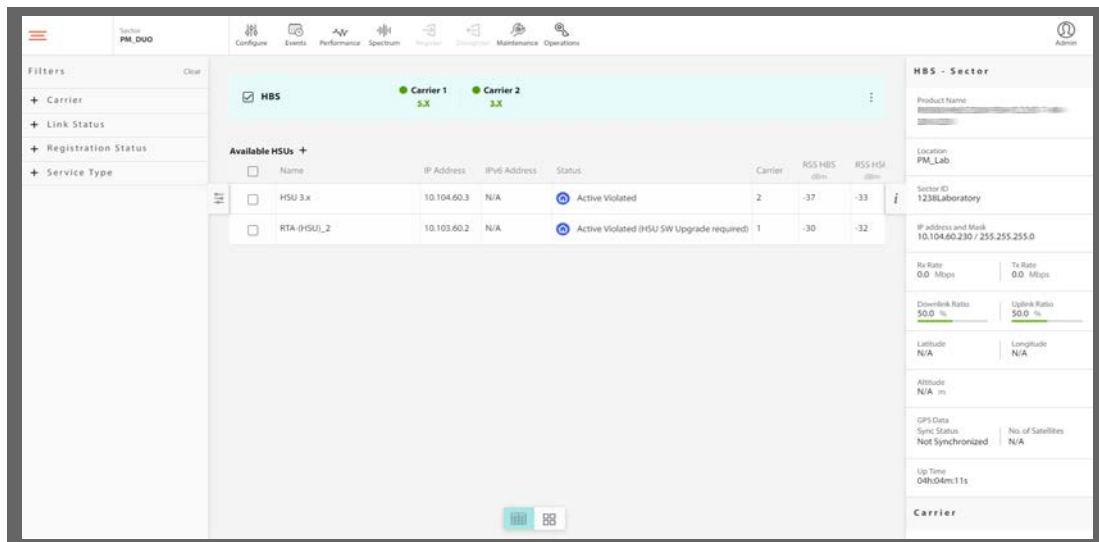
Available HSUs +

<input type="checkbox"/>	Name	IP Address	IPv6 Address	Status	Carrier	RSS HBS dBm	RSS HS dBm

Then the carrier you are working with will be shown with a green bullet next to it, and its frequency band in green below it, indicating that the carrier is Active.

☒ HBS ☐ Carrier 1 ☒ Carrier 2 **3.X**

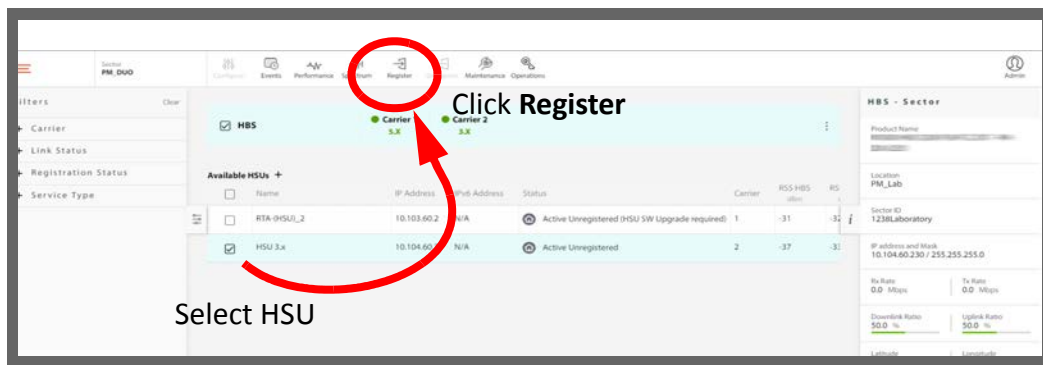
After you have repeated the above for the other carrier, the window will show that carrier as being active.



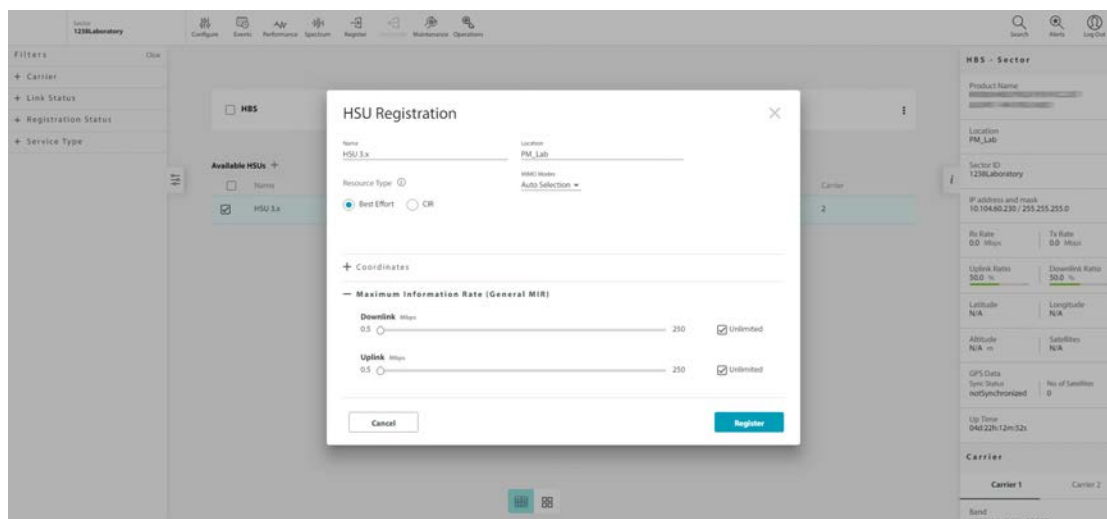
9. Both carrier frequencies will be shown as Active, and any HSUs that the HBS was able to contact are shown as well. However, for a first-time use, those HSUs will be shown as un-registered. To work with them, you must register each one.

14.4.3 Register Subscriber Units

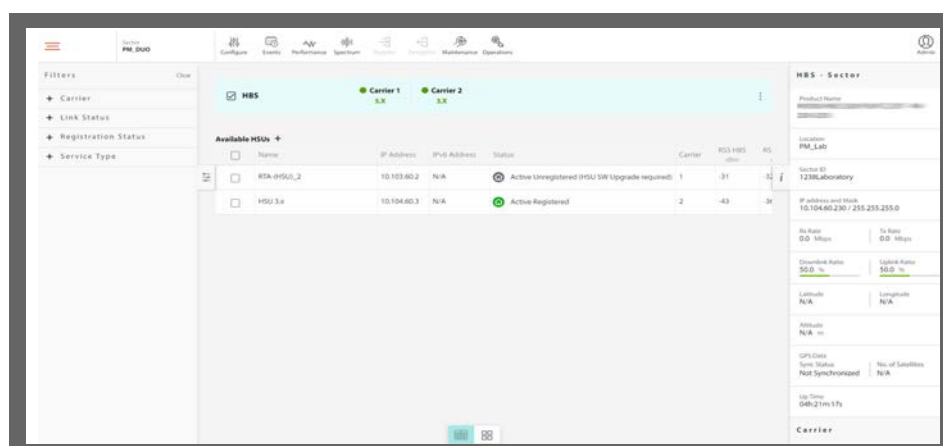
1. Select the HSU you want to register by placing a checkmark next to it.



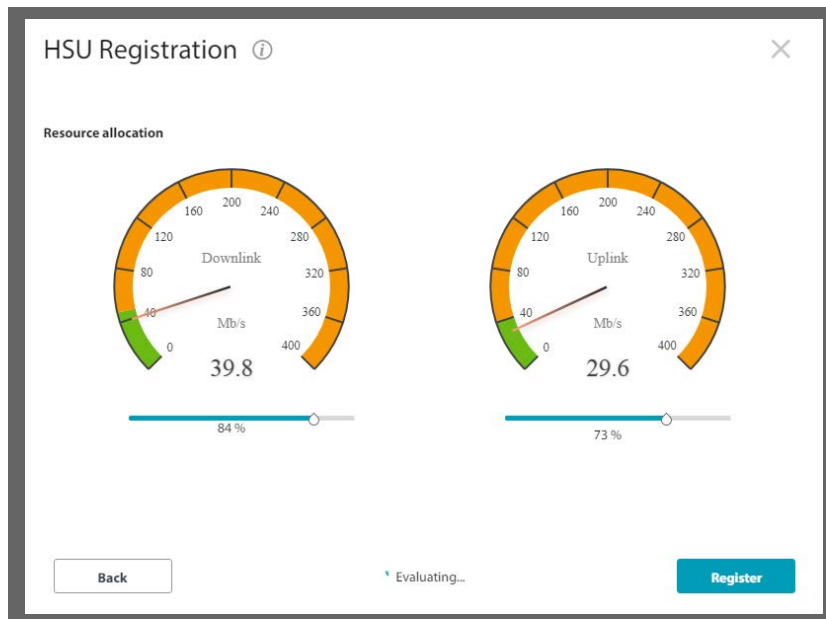
2. Click **Register**. You will see a window similar to the following:



3. You may edit or add the site's **Name**, **Location** and **Coordinates**.
4. If you are registering an SU **AIR** EMB or SU **AIR** INT, the **Resource Type** can only be BE (Best Effort). Skip to Step 6.
5. Select the **Resource Type** for the HSU. This can be CIR (Committed Information Rate), or BE (Best Effort):
 - **BE** grants the HSU resources as they become available in the sector.
 - **CIR** grants the HSU with a certain guaranteed percentage of resources. You set this percentage in the General MIR window.
6. Check a **MIMO Mode** for this HSU:
 - **Spatial Multiplexing** (default) splits the data in to two streams on transmission and recombines it on reception providing maximum throughput. This provides a higher throughput.
 - **Diversity** transmits the same data on from both antennas and check for correctness on reception. This mode helps to ensure more reliable data transmission in a noisy environment, although throughput will be lower.
 - **Auto Selection** instructs the system to choose whichever mode is most efficient.
7. Optionally, you can choose the **Maximum Information Rate**. Use the sliders to set here the maximum throughput rate you want for the specific HSU in each direction: down link, and up link. You can choose a value, or click the Unlimited checkbox.
- If you chose the BE resource type in Step 5. above, continue to Step 8.
- If you chose the CIR resource type in Step 5. above, continue to Step 9.
8. If you chose the **BE** resource type in Step 5. above, or your unit is an SU **AIR** EMB or SU **AIR** INT, click the **Register** button. In a few moments, the HSU will be registered.

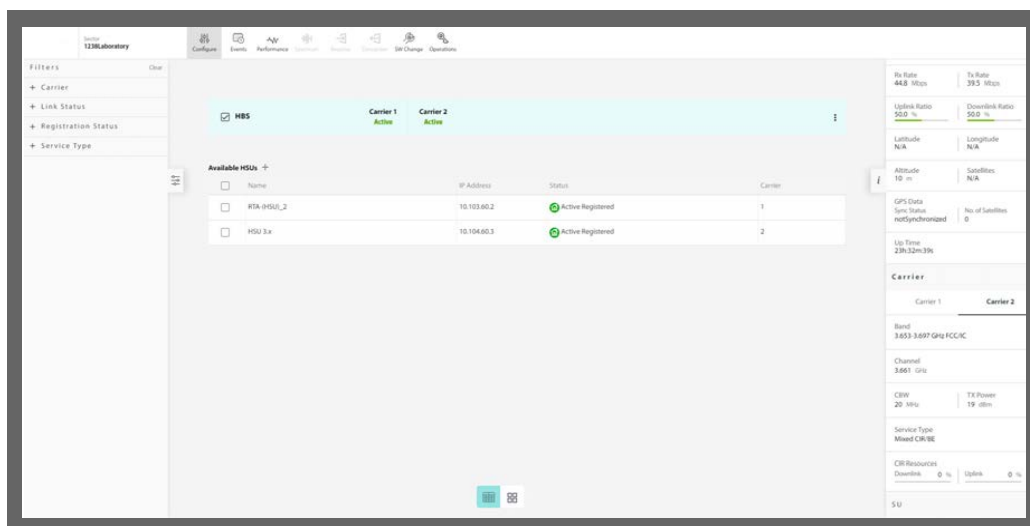


9. If you chose the CIR resource type in Step 5. above, choose the resource allocation. Use the sliders to choose the percentage of resources to be allocated to the HSU. This is the percentage of available resources in the sector. Obviously, you must make sure that the resource percentages of all the HSUs in the sector do not add up to more than 100%.



When a stable value is reached, the **Register** button will become enabled.

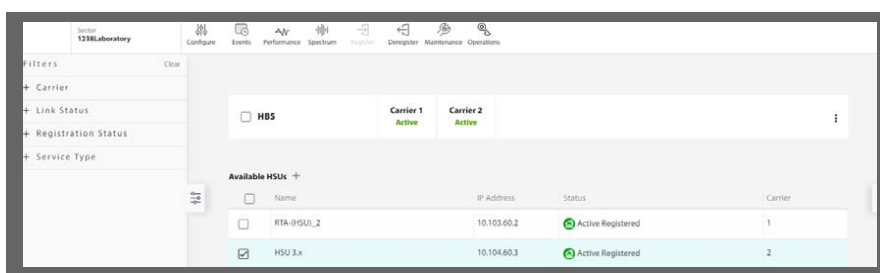
10. Click **Register**.



14.4.4 Update Subscriber Unit Connection Parameters

When first logging on to a new subscriber unit, you must change its IP address in accordance with your radio plan.

Select the subscriber unit by placing a checkmark next to it, then click on **Configure** [].



The **Configuration -> System** window will appear.

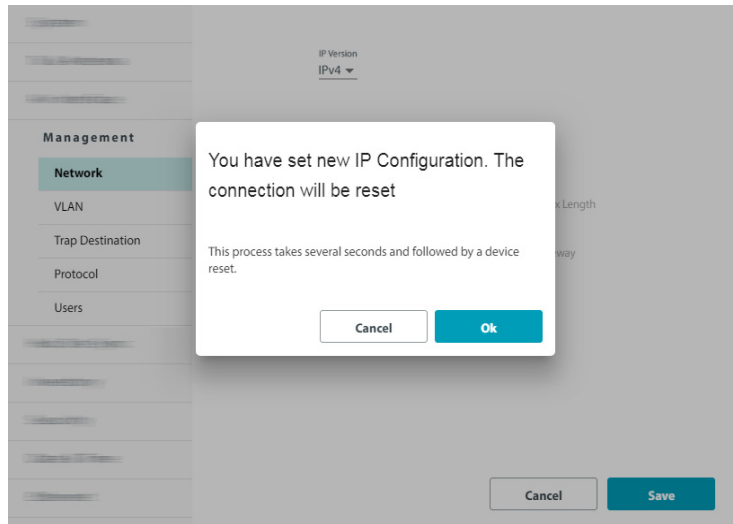
System	
Service	Description Wireless Link
Tx & Antenna	Object ID 1.3.6.1.4.1.4458.20.6.1.2.
Management	Name HSU 3.x
Inventory	Contact Shmuel
Security	Location PM_Lab
Date & Time	Last Power Up 19/11/2018, 12:47:53
Ethernet	
Wifi	

Select **Management -> Network**

Management	
Network	IP Version IPv4
Trap Destination	IP Address 10.104.60.230
Protocol	Subnet Mask 255.255.255.0
VLAN	Default Gateway 10.104.60.201
Users	Subnet Prefix Length 64

Enter the new IP address, Subnet Mask and Default Gateway in accordance with your radio plan, then click **Save**.

You will be warned that the unit will be reset. If all the values are correct, click **OK**.



Once the unit is reset, the base station should synchronize with it shortly.

Appendix A: Terminology

Table A-1: Terminology (Sheet 1 of 4)

Term	Description
Assured throughput	Actual number of timeslots allocated to a radio unit.
ACS	Automatic Channel Selection. Option that instructs the radio to choose which frequency to use. Enabling or disabling this option has various ramifications as shown in the documentation.
ATPC	Automatic Transmit Power Control
BE	Best Effort: A level of priority for traffic in which users receive dynamic resource allocation according to overall demand. They are not guaranteed resources. See also CIR .
BFD	Bidirectional Forwarding Detection. A network protocol used to detect faults between two forwarding engines connected by a link.
BS	Base Station: a radio that can transmit and receive to more than one point. See also HBS
CIR	Committed Information Rate: A level of priority for traffic in which users receive a guaranteed percentage of resources in addition to dynamic resources if available. See also BE .
CPE	Customer Premises Equipment
DBA	Dynamic Bandwidth Allocation: a method that allocates bandwidth between the various users of that same bandwidth in the network.
DBS	Dynamic Bandwidth Selection: When activating a base station, or when changing its bandwidth, if you choose the maximum value available for the bandwidth, the link may dynamically switch between the maximum value and values as low as 20MHz to ensure the best throughput.
DHCP	Dynamic Host Configuration Protocol: a protocol that automatically assigns IP addresses and other network configuration parameters.

Table A-1: Terminology (Sheet 2 of 4)

Term	Description
Diversity	A technique by which the reliability of a radio link is increased using multiple transmitting and receiving antennas, transmitting the same signal on all antennas.
Downlink	Data traffic from an HBS to an HSU, or Data traffic from an RT-A to an RT-B
DUO	Dual Band base station
EIRP	Equivalent (or Effective) Isotropically Radiated Power: The power that an antenna must emit to produce the peak power density in the direction of maximum antenna gain. In our cases, this is usually: System Tx Power + Antenna Gain - Cable Loss.
FAA	Federal Aviation Administration. A U.S. federal office that manages aviation regulations throughout the United States.
Fixed (HSU)	A “fixed” HSU remains in one location, as contrasted with a nomadic or mobile HSU, which does not remain in one location.
GHSS	GPS Hub Site Synchronization
GRE	Generic Routing Encapsulation. A communication protocol used to establish a direct, point-to-point connection between network nodes. GRE lets two peers share data they wouldn’t be able to share over the public network itself.
GRE Tunnel	A virtual point-to-point connection between two networks, using the GRE protocol to carry this out.
HBS	High capacity Base Station. Same as a BS
HMU	High capacity Mobility (subscriber) Unit. Similar to an HSU, but can be mobile.
HSC	Hub Sync Client: When using Hub Site Synchronization, one unit is a master (generates the sync pulses), and the other units are clients.
HSM	Hub Sync Master: When using Hub Site Synchronization, one unit is a master (generates the sync pulses), and the other units are clients.
HSU	High capacity Subscriber Unit. Same as an SU
IGMP	Internet Group Management Protocol
ISU	Integrated Synchronization Unit: a network device that provides a synchronization signal to underground HBSs.
ITHO	Intra-train handover mechanism
LFF	Large Form-Factor

Table A-1: Terminology (Sheet 3 of 4)

Term	Description
MD5	Message digest algorithm: an authentication type for SNMPv3 connections.
MIMO	Multiple In, Multiple Out. A technique by which the capacity of a radio link is increased using multiple transmitting and receiving antennas, transmitting a different signal on all antennas.
MIR	Maximum Information Rate
Mobile (HSU)	A “mobile” HSU can move from location to location and provide service while it moves or when it is stationary.
Nomadic (HSU)	A “nomadic” HSU move from location to location but can only provide service when it is stationary.
ODU	Outdoor Unit: a generic term for any radio, and can usually be exchanged for HBS or HSU.
On-board	Items or subject matter that relates to the environment on or inside the train itself. Also called “Train Side”
PPPoE	Point-to-Point Protocol over Ethernet
PtMP	Point to Multi-Point: link from an HBS to several HSUs
PtP	Point to Point
RADIUS	Remote Authentication Dial-In User Service
RSS	Radio Signal Strength
QoS	Quality of Service
SBM	Smart Bandwidth Management
Sector	A group of radios that consists of one HBS and several HSUs that communicate with the HBS.
SFF	Small Form-Factor
SHA1	Secure hash algorithm: an authentication type for SNMPv3 connections.
SLA	Service Level Agreement - the basic agreement between the service provider and its customer regarding certain aspects of the service provided. For example, what should be the data rate, throughput, jitter of the line, who should pay what fees, the mean time between failure (MTBF) of the equipment, and so forth,
SSM	Synchronization Status Message: Provides traceability of synchronization signals, and is used in the Synchronous Ethernet standard of communication.
SU	Subscriber Unit: a radio that can transmit and receive to one point. See also HSU

Table A-1: Terminology (Sheet 4 of 4)

Term	Description
Sync E or SyncE	Synchronous Ethernet: A standard of communication for ethernet that provides a synchronization signal to network elements that need such a signal.
TBS	Transportation Base Station. Similar to an HBS or BS, but used with high-speed transportation applications.
TDWR	Terminal Doppler Weather Radar: a type of radar station used in the U.S. and other countries for weather reporting. If a radio unit is installed close enough to one of these stations, the FCC requires that certain actions must be taken on the part of the customer. Regulations in other countries varies.
TMU	Transportation Mobile Unit. Similar to an SU
Track Side	Items or subject matter that relates to the environment not on or inside the train. It is not limited to precisely next to the track. Also called “wayside”
Train Side	Items or subject matter that relates to the environment on or inside the train itself. Also called “On-board”
TSN	Time Sensitive Network
Uplink	Data traffic from an HSU to an HBS, or Data traffic from an RT-B to an RT-A
VMU	Vehicular Mobile Unit
Wayside	Items or subject matter that relates to the environment not on or inside the train. It is not limited to precisely next to the track. Also called “Track Side”
WI	Web Interface: web-based application that provides simple configuration capabilities for the radio units.
WISPA	Wireless Internet Service Provider Association. An organization that manages registration of wireless devices that operate close to TDWR facilities run by the FAA.
VRRP	Virtual Router Redundancy Protocol - a networking protocol that provides for automatic assignment of available IP routers to participating hosts.

Appendix B: Operating Under the FCC Unrestricted Contention Based Protocol

B.1 Scope of this Chapter

This appendix explains how to set up a RADWIN 5000 sector operating under the FCC Unrestricted Contention Based Protocol (UCBP) in the 3.650-3.7GHz band.

The detailed technical operation of the protocol is beyond the scope of this manual.

B.2 Bringing up a Sector

The HBS for FCC UCBP is pre-configured for this regulation only.

Activation is the same as for other RADWIN 5000 products (see To activate an HBS: on [page 3-5](#)). Following activation, the HBS will find its HSUs in the same manner as described in [Chapter 3](#).

The only additional steps you must take are to set two extra parameters in the Configuration Air Interface tab:

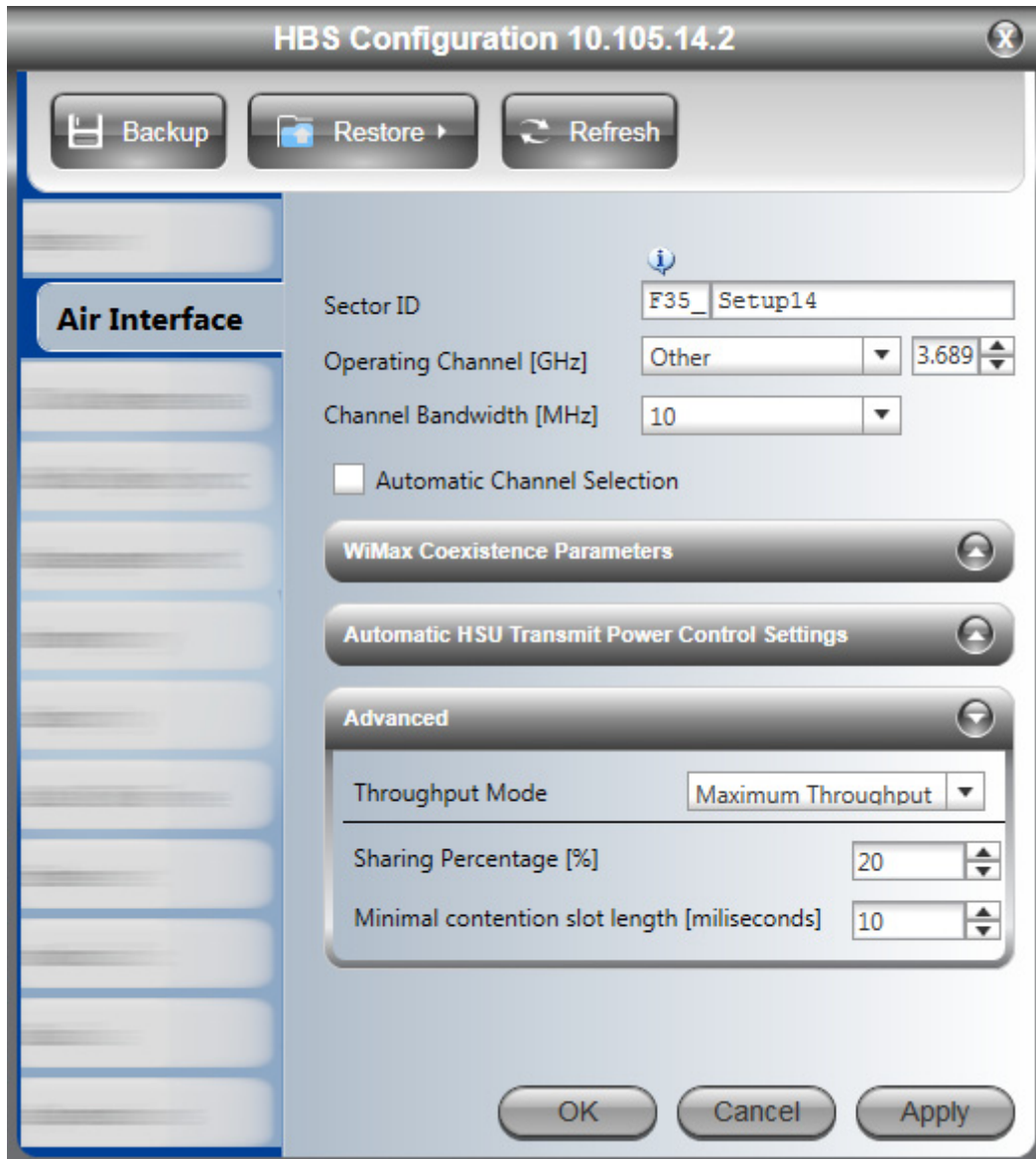


Figure B-1: Air Interface Tab for FCC UCBP

Throughput Mode: Leave this as Maximum Throughput

Sharing Percentage [%]: This value (between 15 - 75%, default 50%) is the maximum capacity the HBS is prepared to relinquish in favour of other transmitters on this band. (There may be several.)

Minimal Contention: This value (5 - 20ms, default 10ms) is the amount of time the HBS is prepared to wait to check again for channel availability - and if still not available, to transmit regardless.

The values as set in [Figure B-1](#) mean the following: The HBS will relinquish 20% of its capacity, but will transmit a burst after 10ms regardless.



B.3 HSU Operation

Since the HSUs take their cue from the HBS in respect of air interface parameters, nothing special is required in their configuration. Older model HSUs configured for the 3.650-3.7GHz band should work correctly - but you should check with RADWIN Customer Service before using them for UCBP.

Appendix C: Revision History

Table C-1: Revision History: RADWIN 5000 Configuration Guide

Cat.No.	Date	Description
DQ0193770/0.1 System Release 4.9	Feb, 2017	<ul style="list-style-type: none">Initial release
DQ0193770/0.2 System Release 4.9	Apr, 2017	<ul style="list-style-type: none">False Radar Mitigation removed
DQ0193770/0.3 System Release 4.9.15	Jun, 2017	<ul style="list-style-type: none">WiFi SSID for the SU PRO/AIR EMB added (“WIFI” on page 5-5)Minor changes in the graphic user interface of Configuration Restore (see Configuration Restore on page 8-3).Antenna Alignment added to the Web Interface of the SU PRO/AIR EMB.Enhanced Security feature added (see Security Mode on page 4-41)A VoIP queue can be defined in QOS (see Enabling a Voice-over-IP (VoIP) Queue on page 10-5 and see RADIUS on page 4-53)
DQ0193770/0.4 System Release 4.9.17	Sep, 2017	<ul style="list-style-type: none">Antenna alignment for an external, non-integrated antenna added to the Web Interface of the SU PRO/AIR EMB (see Radio on page 5-4).Description of using a smartphone for the Web Interface added (see HSU-P/A EMB and HSU-P/A INT Web Interface (via Smartphone) on page 5-10)Current modulation for both the SU and the Base Station is shown in the Web UI for the SU PRO/AIR EMB (see Antenna Alignment on page 5-9).

Table C-1: Revision History: RADWIN 5000 Configuration Guide

Cat.No.	Date	Description
DQ0193770/0.5 System Release 4.9.20	Nov, 2017	<ul style="list-style-type: none"> DHCP Relay Option: Updated with more features (see page 4-47) 802.1x option authentication added (see “802.1x Authentication” on page 4-37)
DQ0193770/0.6 System Release 4.9.30	Jan, 2018	<p>New product: RADWIN JET DUO:</p> <ul style="list-style-type: none"> Has two frequency bands (3.x and 5.x) (see Changing the Sector Band on page 4-78) Uses the second input port on the JET platform as an SFP port (see Ethernet Ports Configuration on page 4-46)
DQ0193770/0.7 System Release 4.9.34	Dec, 2018	<ul style="list-style-type: none"> RADWIN JET DUO graphic user interface
DQ0193770/0.7 System Release 4.9.35	Mar, 2018	<p>New product: RADWIN JET DUO:</p> <ul style="list-style-type: none"> Has two frequency bands (3.x and 5.x) (see Changing the Sector Band on page 4-78) Uses the second input port on the JET platform as an SFP port (see Ethernet Ports Configuration on page 4-46) <p>New features (not all features are available for all products, the differences are noted within the document):</p> <ul style="list-style-type: none"> SHA1 or MD5 authentication mode for SNMPv3 (see Protocol on page 4-23) It is possible to change the antenna modes between MIMO and Diversity directly from the Manager application (see Tx & Antenna on page 4-67) IGMP Snooping (see IGMP on page 4-52) Non-PPoE and DHCP filtering (see Sector Protocol Filtering on page 4-49 and see Protocol Filtering on page 4-71) 802.1x Authentication (see Security on page 4-30) Enable HTTPS for the SU PRO/AIR EMB (see Management on page 4-67) Subscriber units need no IP address for SW upgrade (see Bulk Software Backup on page 8-2 and see Upgrading an Installed Sector on page 8-7) RADIUS Accounting (see RADIUS on page 4-53)

Table C-1: Revision History: RADWIN 5000 Configuration Guide

Cat.No.	Date	Description
DQ0193770/0.8 System Release 4.9.60	Sep, 2018	<ul style="list-style-type: none"> • New product: the SU PRO/AIR INT: Same as the SU PRO/AIR EMB, but with increased sensitivity due to a larger, integrated antenna. • When working with the SU PRO/AIR EMB or SU PRO/AIR INT opposite a HBS JET unit, it is possible to use HTTP instead of FTP for file transfers, especially when performing a software upgrade (see File Transferring on page 2-35). • Link Quality Indication: sends a trap if the throughput of the link is below a certain threshold (user-configurable, see “Link Quality Indication:” on page 4-5). • Ability to send reports to a Syslog Server (see Syslog server IP address on page 4-12). • Ability to preserve Community String values in an external file for all units and instruct the RADWIN Manager to check this file when logging on (see Community Encryption on page 4-36) • Broadcast and Multicast flooding protection can be configured separately (see Advanced on page 4-47).
DQ0193770/0.9 System Release 4.9.34/60	Jan, 2019	<ul style="list-style-type: none"> • New product: RADWIN JET DUO base station, which can operate in the 3.x GHz band and 5.xGHz band simultaneously. It also features a new management application: a web interface based in the unit itself.
DQ0193770/1.0 System Release 4.9.70	Apr, 2019	<ul style="list-style-type: none"> • Secured synchronization using the Network ID • Bridge Table
DQ0193770/1.1 System Release 4.9.75	Aug, 2019	<ul style="list-style-type: none"> • New WebUI for SU PRO/AIR • User authentication RADIUS capability • Accounting RADIUS Server • High Resolution in 3.xGHz, UNI regs - ability to choose frequency to scan. • ODU Sniffer • iPerf loopback • Strict HTTPS • More robust software upgrade (“Recovery”)

RADWIN 5000

User Handbook

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