etherstack
wireless innovation

SFFR-6

Small Form Factor Tactical Repeater and Base Station

USER MANUAL

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Important Safety Information/Consignes de sécurité importantes

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Class B

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada RSS 119

This device complies with RSS-119 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme CNR-119 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Human Exposure to Radio Waves

The equipment contains a transmitter which is designed to generate radio frequency (RF) energy. The RF energy can be radiated by an external antenna when attached by the end user to the antenna port. The antenna port has a 50 ohm characteristic impedance and must be operated with an antenna also with a 50 ohm impedance.

The system is designed to be operated so as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antenna can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines that are designed to reduce the overall exposure of the user or operator.

Compliance to FCC and Industry Canada Guidelines for Human Exposure to Radio Waves

The equipment has been evaluated for RF exposure for humans in reference to methods and limits as per FCC 47 CFR 1.310 and IC RSS-102 Issue 5. To maintain compliance with both standards, for the general public (Uncontrolled Environment), below Table 1 lists the minimum separation distance for the antennas from bystanders for each radio transmitter with reference to the approved maximum antenna gain for each radio transmitter.

L'équipement a été évalué pour l'exposition aux radiofréquences pour les humains en référence aux méthodes et limites selon FCC 47 CFR 1.310 et IC CNR-102 5e édition. Pour maintenir la conformité aux deux normes, pour le grand publique (Environnement non contrôlé), le tableau (Table 1) ci-dessous énumérés la distance de séparation minimale des antennes des passants pour chaque émetteur radio, en référence au gain d'antenne maximal approuvé pour chaque émetteur radio..

FCC ID	IC	Max Antenna Gain (dBi)	Minimum Separation Distance
2ADAKSFFR6V2	9487A-SFFR6V2	5.15	96.9 inches (246 cm)
2ADAKSFFR6UL2	9487A-SFFR6UL2	7.15	110.3 inches (280 cm)
2ADAKSFFR6UH2	9487A-SFFR6UH2	7.15	107.1 inches (272 cm)

Table 1

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Approved Transmit Antennas

The radio transmitter FCC ID: 2ADAKSFFR6V2/IC: 9487A-SFFR6V2 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below (Table 2), with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le émetteur radio FCC ID: 2ADAKSFFR6V2*/IC: 9487A-SFFR6V2* a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous *(Table 2)* et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna Type	Gain (dBi)	Impedance
1/4 wave omnidirectional	2.15	50 Ω
1/2 wave dipole omnidirectional	2.15	50 Ω
1/2 wave omnidirectional	4.15	50 Ω
5/8 wave omnidirectional	5.15	50 Ω

Table 2 Approved Antennas FCC ID: 2ADAKSFFR6V2/IC: 9487A-SFFR6V2

The radio transmitter FCC ID: 2ADAKSFFR6UL2/IC: 9487A-SFFR6UL2 and the radio transmitter FCC ID: 2ADAKSFFR6UH2/IC: 9487A-SFFR6UH2 have been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below (Table 2), with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

L'émetteur radio FCC ID: 2ADAKSFFR6UL2/IC: 9487A-SFFR6UL2 et l'émetteur radio FCC ID: 2ADAKSFFR6UL2/IC: 9487A-SFFR6UL2 ont été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous (Table 2) et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna Type	Gain (dBi)	Impedance
1/4 wave omnidirectional	2.15	50 Ω
1/2 wave dipole omnidirectional	2.15	50 Ω
1/2 wave omnidirectional	4.15	50 Ω
5/8 wave omnidirectional	5.15	50 Ω
1/2 wave collinear omnidirectional	5.65	50 Ω
5/8 wave collinear omnidirectional	7.15	50 Ω

Table 3 Approved Antennas FCC ID: 2ADAKSFFR6UL2/IC: 9487A-SFFR6UL2 and FCC ID: 2ADAKSFFR6UH2/IC: 9487A-SFFR6UH2

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1 Introduction

1.1 Overview

The SFFR-6, also known as the GoBox, is a small form factor, highly portable, self-powered, APCO P25 standalone repeater and base station capable of delivering Analog and P25 conventional networked and standalone functionality.

The GoBox weighs in at just over 9.0Kgs, and can deliver up to 28W of RF output power from its 2 hot swappable Lithium Ion rechargeable batteries.

When connected to external AC or DC power source, the GoBox is able to operate continuously while simultaneously acting as a battery recharger.

Unlike any other portable P25 tactical repeater on the market, the GoBox is also a fully featured networkable base station that can extend existing fixed station network infrastructure coverage. The GoBox can deliver a full suite of P25 network services and functionality including support for all P25 call types, supplementary and data services such as AVL and OTAR when connected to a core network.

GoBoxes can also be networked together when connected to Etherstack's RFSS Network Controller via its on-board Ethernet interface. The GoBox can connect to an IP backhaul using Cat5/Cat6 or can connect to an external 3G/4G cellular, Wi-Fi or Satellite based IP uplink via the Ethernet interface.

Multiple Go Boxes can also be used to provide P25 digital to digital cross-band operation (e.g. VHF and UHF cross-banding), or P25 digital and Analog interoperability (e.g. UHF P25 & VHF analog) when used with Etherstack's RFSS Network Controller.

To further simplify operation and enable fast deployment and setup, multiple operational configurations can be pre-programmed and permanently saved into the GoBox for quick selection and activation via the GoBox control dial.

In addition, a default configuration profile can be keyed to a specific duplexer such that on insertion of a duplexer, an associated default profile can be selected. This feature totally eliminates the need for any configuration in the field and truly speaks to why we love to call this product … the Go Box !

1.2 Document Conventions

Within the document you will see two text highlights as shown below.

This is a hint or useful tip box

This is a key highlight or important information box

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1.3 Features

Protocols

P25 Conventional (Repeat Only)	Standard
P25 Conventional Network	Option
Analog	Option
Analog Network	Option
Mixed Mode	Option
Mixed Mode Network	Option

Operational Modes

Repeater (Standalone)	Standard
Base Station (Networked)	Option
• DFSI	Option
• ISSI/CSSI	Option

Network Options

Ethernet 100Mbs	Standard
3G IP Bridge	Option
4G IP Bridge	Option
Wi-Fi IP Bridge	Option
Satellite IP Bridge	Option
OpenVPN	Option

Duplexer Modules

Quick Change Duplexer Module	Standard
1 Duplexer Module	Standard
2 or more Duplexer Modules	Option

Power Options

AC Power	Standard
DC Power	Standard
2 x Lithium Ion Batteries	Standard
Hot Swappable Batteries	Standard
Inbuilt battery charger with overcharge protection	Standard
External battery charger	Option
Additional Lithium Ion Batteries	Option
Redundant Power Supplies	Standard

Connectors

AC Power	Standard
DC Power	Standard
Control Module Ethernet (RJ45)	Standard
Interface Module Ethernet (RJ45)	Standard
RF Transmit/Receive (N type)	Standard
Accessory Connector	Standard

User Interface

Power Button	Standard

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Function Buttons	Standard
Rotary Dial / Button	Standard

Status Indicators

Power On	Standard
Receive Signal Detected	Standard
Transmit Enabled	Standard
AC Power Detected	Standard
DC Power Detected	Standard
Battery 1 Detected	Standard
Battery 1 Power Level	Standard
Battery 1 Charging Status	Standard
Battery 2 Detected	Standard
Battery 2 Power Level	Standard
Battery 2 Charging Status	Standard
Active Profile	Standard
Network Connection Status	Standard
Network Controller Status	Standard
LCD Backlight	Standard

Software Features

Profile Management	Standard
Profile Ordering	Standard
Accidental Profile Change Protection	Standard
Remote Profile Change	Standard
Auto Profile Filtering via Duplexer Group Tag on GoBox Interface	Standard
Auto Profile Selection for Duplexer Group Tag	Standard
Duplexer Viewer	Standard
Auto LCD Backlight Enable	Standard
Configurable LCD Backlight Level	Standard
Tamper Protection and PIN Access	Option
AES 256 Software Encryption	Option
AES 256 Hardware Encryption (FIPS 140-2)	Option

Administration

Web Based Configuration Tool	Standard
Access Control	Standard
Configuration Backup	Standard
Configuration Restore	Standard
Firmware Update	Standard

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1.4 Technical Specifications

General

Dimensions	259 mm (D) x 216 mm (W) x 198 mm (H) (10.2 in (D) x 8.5 in (W) x 7.8 in (H))
Weight[1]	9.0 kgs (19.8 lbs)
External Casing	Aluminium Alloy
Certifications	FCC Parts 90, 80, 74, 22 IC RSS-119 AS/NZS 4295

Input Power

AC	100 – 250 VAC
DC	10.8 - 15.6 VDC / 10Amps
Batteries	2 x Lithium Ion 11.25V 8850mAh

RF Specifications	VHF	UHF	
Supported Frequency Ranges	136-174 MHz	380-470 MHz	440-520 MHz
FCC ID	2ADAKSFFR6V2	2ADAKSFFR6UL2	2ADAKSFFR6UH2
IC	9487A-SFFR6V2	9487A-SFFR6UL2	9487A-SFFR6UH2
Channel Spacing	12.5 kHz		
Channel Step Size	2.5 / 3.125 kHz		
Modulation	C4FM / FM		
Duplexer	Internal notch type single antenna 4.5MHz Minimum Split	Internal notch type single antenna 5Mhz Minimum Split	

Transmitter

Output Power	28W[2] (Max)
Conducted Spurious Emissions	<-20 dBm
Modulation Fidelity	<1%
Frequency Accuracy	+/- 1.0 ppm
Adjacent Channel Power Ratio	67 db (C4FM), 60dB (FM)

Receiver

Reference Sensitivity	-116 dBm
Selectivity	60 db
Intermodulation Rejection	75 dB
Conducted Spurious Emissions	-57 dBm

[1] Includes duplexer and two batteries
[2] Maximum power at antenna port with duplexer bypassed. Use with duplexers will reduce the output power.

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2 Getting Started

2.1 Package Contents

1

Go Box

The GoBox will be in the carry mode with its lid closed and both locking clamps engaged.

The GoBox will be pre-fitted with a GoBox control module, GoBox radio modules, GoBox duplexer (in the band/frequency requested at time of order), 28W power amplifier and dual hot swappable battery module.

2

AC Power Cable

The AC power cable will have a standard AC power plug for your country of operation (requested at time of order) on one end and will have an IP67 rated coupling socket for connection to the GoBox on the other.

3

DC Power Cable

The DC power cable will be pre stripped for connection to standard telecommunications grade power supplies on one end and will have an IP67 rated coupling socket for connection to the GoBox on the other.

4

2 x Lithium Ion Rechargeable Batteries

Each battery will require a full charge prior to first use.

It is recommended that any additional batteries be sourced through an authorised reseller.

5

Lithium Ion Battery Recharger (Optional Accessory)

An external battery charger is available as an option.

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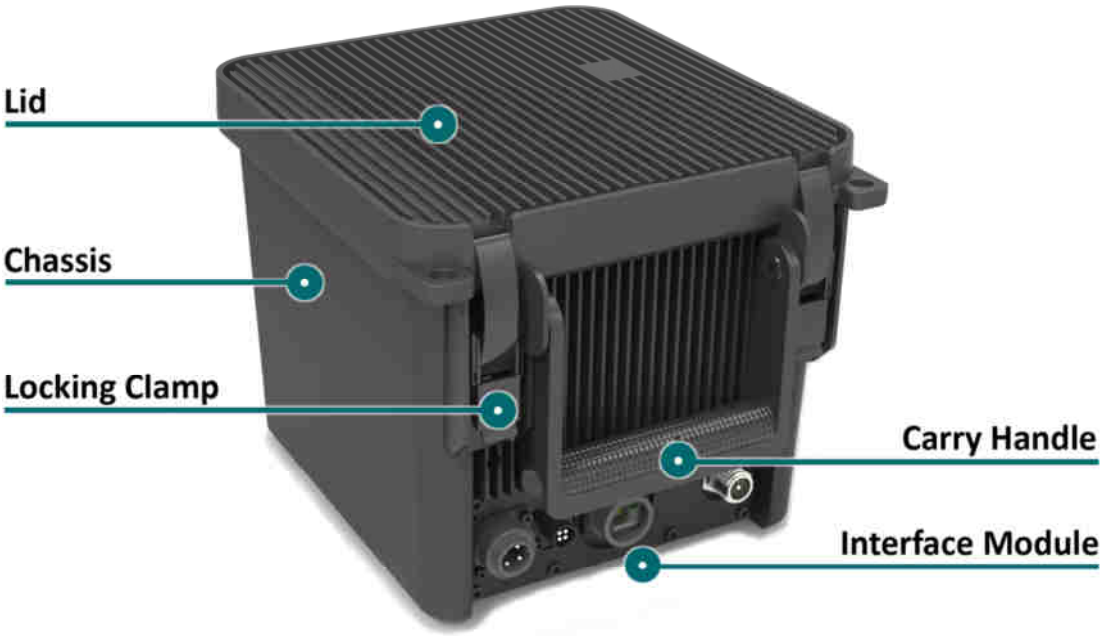
2.2 Overview



2.2.1 Locking Clamps

The GoBox has two locking clamps on either side of the carry handle to lock the lid firmly against the chassis.

To disengage the locking clamps, place your finger behind the clamps and pull away and up towards the lid. Lift the curved section of the locking clamp up and out of the channel in the top of the lid and repeat for the other clamp to release the GoBox lid.

Both locking clamps must be fully engaged to ensure a correct seal.

2.2.2 Lid

The GoBox lid has been designed to provide a seal to prevent dust and water from entering the GoBox when the locking clamps are fully engaged.

Once the GoBox has been programmed, the lid only needs to be opened to turn the GoBox on when powered under batteries. The lid does not need to be closed during operation however it is recommended to be closed during field use.

The lid gasket located around the lid perimeter of the chassis must be kept clean and free of any debris. It should be inspected before field operation and cleaned or replaced if damaged, otherwise water or dust could penetrate and damage GoBox electronics.

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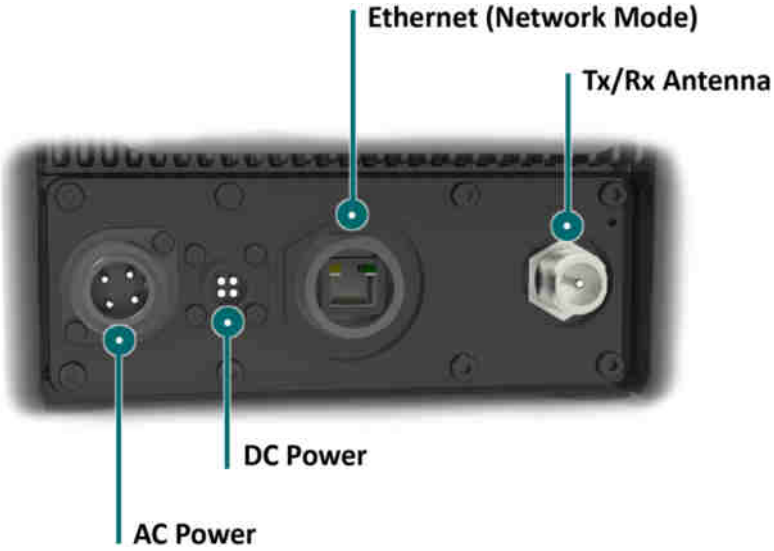
2.2.3 External Interfaces



The External Interfaces will vary based on the options purchased when your GoBox was ordered.

The interface module presents both AC and DC connectors, combined transmit and receive antenna connector or separate transmit and receive antenna connectors and/or an Ethernet port for use in Network mode.

2.2.3.1 AC Power Connector

The AC Power Connector interfaces to the AC Power Cable. The GoBox supports 100 – 250 VAC.

2.2.3.2 DC Power Connector

The DC Power Connector interfaces to the DC Power Cable. The GoBox supports 10.8 - 15.6 VDC.

2.2.3.3 Ethernet Connector

The Ethernet port is used to access the GoBox's internal programming menu and/or to connect multiple GoBoxes via Etherstack's optional RNC switch.

Attach a standard Ethernet cable to this port with the other end connected directly to a laptop/PC or to other network equipment. See Section 3.2 below for details on how to program you GoBox.

> **!** Do not attach an Ethernet cable to both Ethernet ports on the GoBox at the same time to a switch/router as it may cause some network switches/routers to fail.

2.2.3.4 Tx/Rx Antenna Connector

The Tx/Rx Antenna Connector is of an N-Type connector and is to be connected to 3rd party antennas. For details of approved transmit antenna types, refer to the section **Approved Transmit Antennas**.

> **!** To achieve optimum performance, antennas should be setup according to antenna manufacture specifications, including tuning of antennas, and appropriate mounting over ground planes.

> **!** Refer to the safety guidelines in the section **Human Exposure to Radio Waves.**

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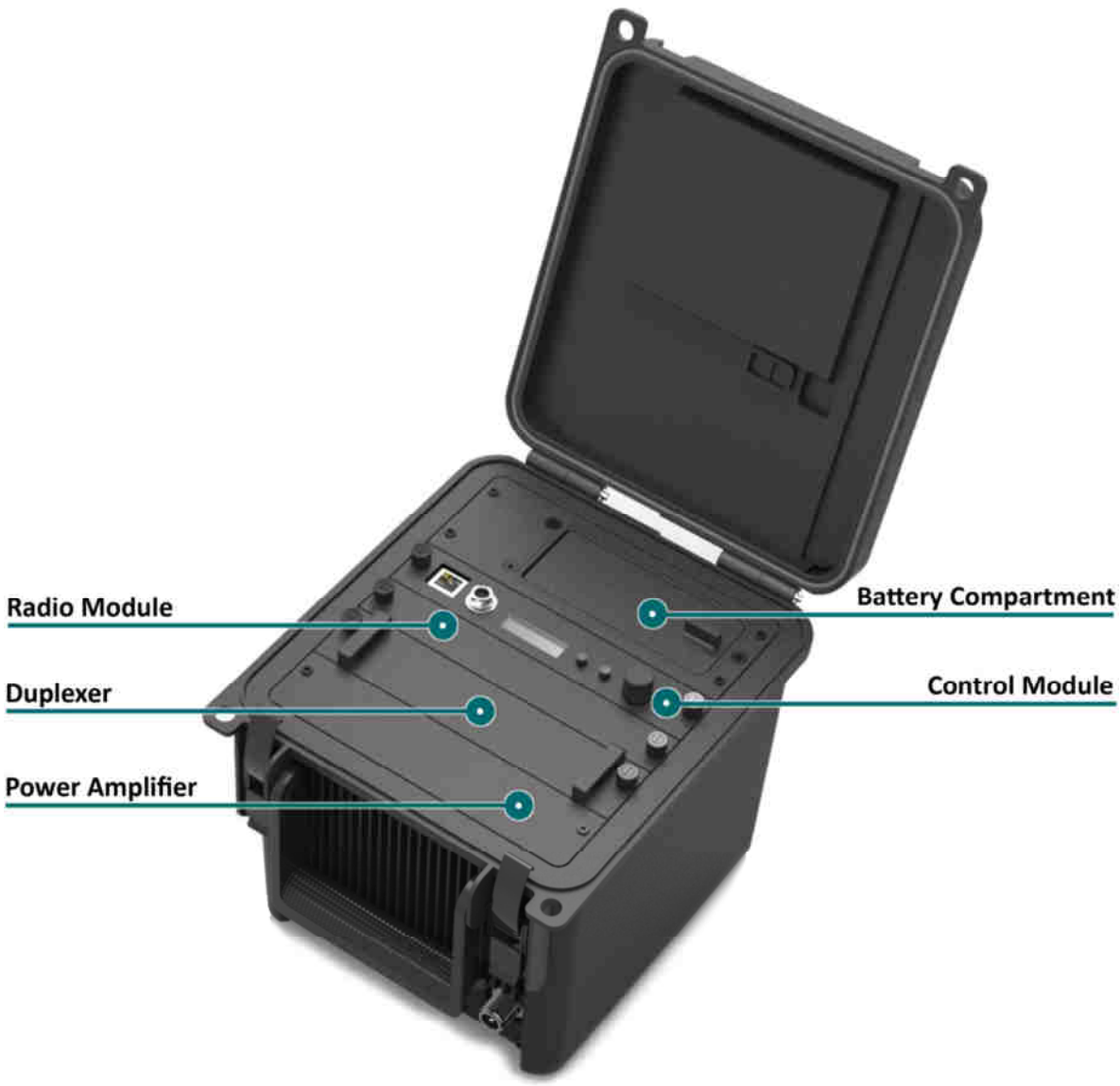
2.2.4 Internal Modules



2.2.5 Battery Compartment

The battery compartment supports two lithium ion batteries and while only one battery is required to operate the GoBox it is recommended to install two batteries to maximise run time when no AC or DC power is connected.

To open the battery compartment, turn the locking dial on the battery compartment 90 degrees counter clockwise and pull up to access the battery compartment. To lock the battery compartment, lower the battery compartment lid and turn the dial 90 degrees clockwise.

Each battery supplied will have a small nylon tag attached to the battery so it can be easily removed when installed in the GoBox Battery Compartment.

Each battery also has a battery charge status indicator that can be activated by pressing the small button located on the corner of the battery.

The battery compartment has also been designed to allow battery hot swapping to quickly replace an exhausted battery source without the need to turn the GoBox off.

The battery compartment has also been designed to recharge batteries when an external power source is applied. Battery charge and charging state is explained under the control module section below.

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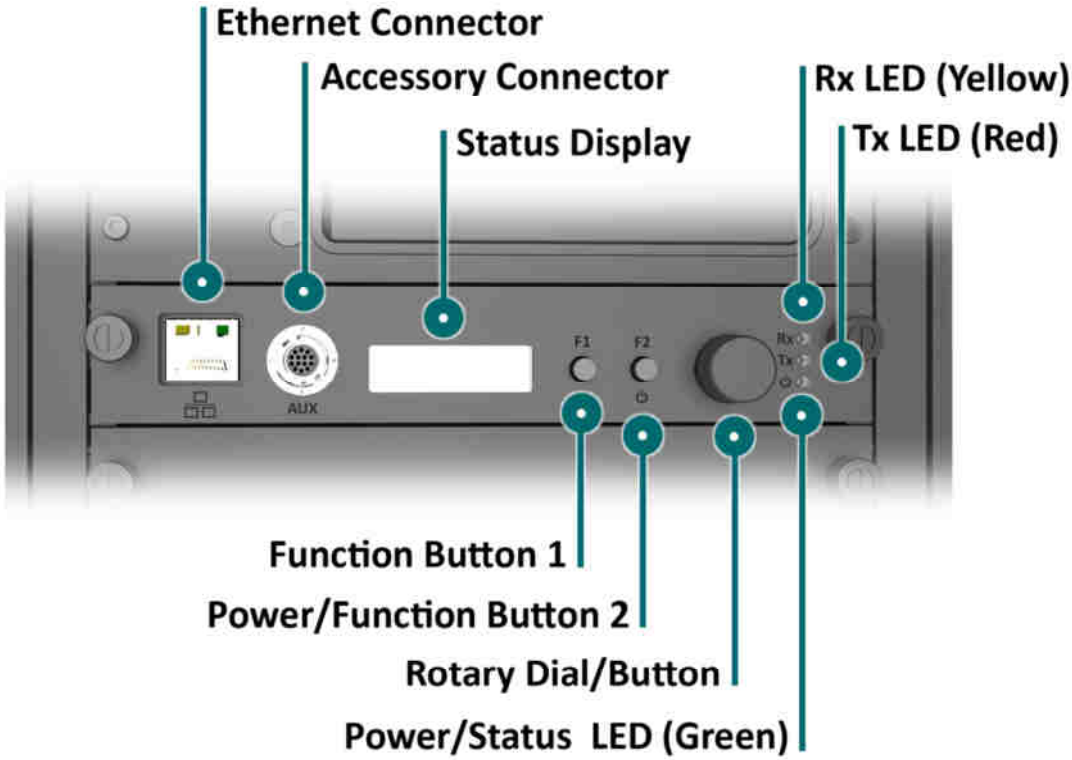
2.2.6 Control Module



2.2.6.1 Ethernet Connector

The Ethernet port is used to access the GoBox's internal programming menu and/or to connect multiple GoBoxes via Etherstack's optional RNC switch.

Attach a standard Ethernet cable to this port with the other end connected directly to a laptop/PC or to other network equipment. See Section 3.2 below for details on how to program you GoBox.

> **!** Do not attach an Ethernet cable to both Ethernet ports on the GoBox at the same time to a switch/router as it may cause some network switches/routers to fail.

2.2.6.2 Accessory Connector

The accessory connector is used to connect a local speaker microphone or short range wireless speaker microphone or headset for operation with the GoBox.

For further information on available accessories please contact your authorised distributor.

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2.2.6.3 Status Display

The status display shows the currently selected operational profile or other status messages, the power level of each battery, the status of the on-board battery charger and external power source mode if AC and/or DC power is connected.

The status display's backlight turns on for several seconds whenever a button or rotary dial is rotated/pressed, so the display can be more easily viewed if external lighting conditions are poor.

> The backlight is on a timeout to ensure it is not left on and otherwise drain the batteries unnecessarily.

> The backlight can be turned off before the timeout period by pressing any of the buttons or the front panel.

> The intensity of the backlight can be modified to maintain covertness during night use.

2.2.6.4 Function Button 1

Pressing and holding down Function Button 1 turns off the display and LEDs. This normally occurs when the lid is closed and is designed to save power.

2.2.6.5 Power/Function Button 2

Pressing and holding down Function Button 2 for several seconds will toggle the power status of the GoBox.

> The power button must be held down for several seconds to avoid accidental power on/off scenarios.

2.2.6.6 Rotary Dial/Button

The rotary dial is used to quickly select different operational profiles.

On pressing the rotary dial, the status window backlight will automatically illuminate until the button is pressed again or the backlight times out. You can turn the dial to select any of the available and pre-configured profiles when the rotary dial is pressed.

Once a profile has been found, releasing the rotary dial push button will commence a reconfiguration of the GoBox. During this time the power/status LED will flash green, indicating a reconfiguration is in progress. When the power/status LED turns steady green, the GoBox is ready for operation.

> To avoid accidental profile changes, the rotary dial must be pressed during rotation.

2.2.6.7 Rx LED

On receiving a carrier on the frequency the GoBox is programmed for, the yellow Rx LED will illuminate. Depending on the operational profile, the received signal has to meet additional conditions before it is repeated.

2.2.6.8 Tx LED

The red Tx LED will illuminate to indicate that the GoBox is transmitting. This can be a locally received and repeated signal, or when a networked profile is active, a signal forwarded from another GoBox or remote source such as a console or a subscriber located near a fixed base station site.

2.2.6.9 Power/Status LED

On power-up, the GoBox will perform a series of self-tests to ensure all elements are operational. During this time the power/status LED will flash green to indicate that power is on but the GoBox is not yet operational. Once the LED turns a steady green, the GoBox is ready for use.

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The GoBox when first unpacked will not have any operational profiles to execute. Until the GoBox has been configured, the power/status LED will continue to flash, indicating it is in the programming state.

2.2.7 Radio Module

The radio module houses two high performance radio transmitters and receivers. These modules are specific to either the VHF or UHF bands and will be pre fitted based on the band of the GoBox ordered.

The GoBox radio modules have been designed to run at high temperatures in order to support the power output and high duty cycles typical of a heavy use repeater/base station. Care must be taken if the GoBox has been running for several hours supporting a large volume of calls. The front panel of the radio module can exceed 50°C.

2.2.8 Duplexer

The GoBox will be fitted with a duplexer when the single antenna interface is fitted. The duplexer module will be tuned to the centre frequencies requested at the time of order to maximise RF performance.

Additional duplexers in the same band can be ordered and swapped within minutes. Additionally the GoBox can auto sense the installed duplexer and select the correct operational profile without any user interaction.

The duplexer may become hot during operation, particularly at high output power or high duty cycles. Care must be taken if the GoBox has been running for several hours supporting a large volume of calls. The front panel of the duplexer module can exceed 50°C.

The duplexer is not hot swappable. You must ensure the GoBox is powered down, batteries removed and all external power sources disconnected before removing the duplexer module.

To change the duplexer, ensure the GoBox is turned off and all power sources removed. Remove the duplexer, by turning the locking screws counter clockwise until the duplexer module can be lift up and out of the GoBox.

When installing a duplexer, take care to ensure that the duplexer is fully inserted. To avoid damaging the module, the GoBox or the locking screws, do not apply excessive downward force. Alternate between pushing the module in and turning the locking screws clockwise.

If the GoBox is fitted with separate Rx and Tx antenna connectors (option), a bypass module will be fitted in place of the duplexer module.

2.2.9 Power Amplifier

The GoBox will be fitted with a power amplifier specific to the band selected.

Power amplifiers are not recommended to be swapped and used in GoBoxes operating in another band as performance may be impacted.

The GoBox power amplifier has been designed to run at high temperatures in order to support the power output and high duty cycles typical of a heavy use repeater/base station. Care must be taken if the GoBox has been running for several hours supporting a large volume of calls. The chassis areas located near the handle can get hot. This includes the heat sink and the top of the case near the front edge.

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3 Configuration

3.1 Before you begin

3.1.1 About GoBox Configuration

The GoBox stores its configuration in a file that can be downloaded via the programming interface for the purposes of backup and centralized management.

For users that maintain several GoBoxes, the configuration data can be shared and it is recommended that a single configuration be used to simplify GoBox administration.

If your GoBox is ever damaged or you purchase additional units, your configuration backup can be easily used to program a new GoBox within minutes using the **Restore** feature.

3.1.2 About Operational Profiles

To use your GoBox you need to program at least one operational profile which can then be assigned to a duplexer for auto selection on power-up.

Up to 100 operational profiles can be pre-loaded into the GoBox. Each operational profile contains all information necessary to configure the GoBox.

Profiles can then be selected and activated by pressing and turning the rotary dial on the GoBox control interface to select and activate that profile.

Make sure you press and hold the rotary dial down when turning to select a new profile.

Operational profiles form part of the configuration file and as such can be backed up and restored over the network allowing easy transfer of profiles from one GoBox to another.

To setup multiple GoBoxes, we recommend using the following process on a single GoBox:

1. Assign a duplexer tag to each duplexer. Where multiple duplexers share the same frequency, you can assign the same tag
2. Add operational profiles
3. Set the start-up profile for each duplexer
4. Backup the configuration
5. Restore the configuration to other GoBoxes as required.

3.1.3 About Duplexer Group Tags

A duplexer tag can be programmed into a duplexer and then associated to an operational profile to essentially link the operational profile with the duplexer.

The GoBox will only display operational profiles whose duplexer group tag field has been set to the same tag group as what is programmed in the duplexer.

If an operational profile uses the **All** tag, the profile will always be visible in the GoBox control panel via the rotary dial despite what duplexer is fitted, however the profiles frequency may not be supported by the currently installed duplexer so care must be taken.

Additionally, an operational profile can be assigned as the start-up profile for when the GoBox powers on with a newly installed duplexer. This feature allows duplexers to be easily moved around GoBoxes in the same band and provided the configuration files are identical, the GoBox will automatically select the correct operational profile without requiring any user intervention.

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3.1.4 What you need to program and test your GoBox

3.1.4.1 Laptop or PC with an Ethernet Interface

The GoBox does not require any external programming application to be installed on your laptop/PC and does not require a special programming cable.

A laptop or PC with a web browser and standard Ethernet cable is all that will be required to configure the GoBox. Once configured the laptop is no longer required for GoBox operation.

3.1.4.2 Mobile/Portable Radios

Mobile and/or portable radios will be required to be programmed for the duplexer frequencies and other supported operational parameters such as NACs configured in the GoBox.

> A simple way to test GoBox operation is to PTT on a correctly programmed mobile/portable radio. If correctly programmed, the GoBox Rx and Tx LEDs will illuminate.

3.2 Connecting to your GoBox configuration interface

Once your GoBox has been connected via an Ethernet cable using the Ethernet port on the control module to your laptop/PC or network you will be able to:

- View battery presence and charging status
- View details of the installed duplexer
- Read and write a tag to the duplexer
- Create, edit and delete operational profiles
- Backup and restore a GoBox configuration

Ensure the GoBox is connected, powered on and connected via Ethernet to your PC/laptop either directly or via a network. Open your web browser and type the following http://172.16.10.1/

3.2.1 Direct Connection

If the PC/laptop and GoBox are connected directly, i.e. without a network between them, the PC should be configured as follows:

- IP Address: Any valid IP address in the range 172.16.0.1 thru 172.16.255.254, except 172.16.10.1
- Subnet Mask: 255.255.0.0

> The user is responsible for selecting an IP address which does not conflict with other networked equipment, if any such equipment shares the network segment with the GoBox and PC/laptop.

3.2.2 Connection via a Network

If the PC/laptop is connected to the GoBox via a network, i.e. the PC does not have an address in the 172.16.x.x subnet:

- The network to which the GoBox is directly attached should be configured as above.
- Additionally, the GoBox expects a gateway capable of routing IP traffic to the PC/laptop at the address 172.16.1.254.

> Some corporate IT policies may prevent accessing this subnet from your laptop/PC either directly or across your network. Please contact your local IT support team if you have trouble accessing the GoBox configuration interface.

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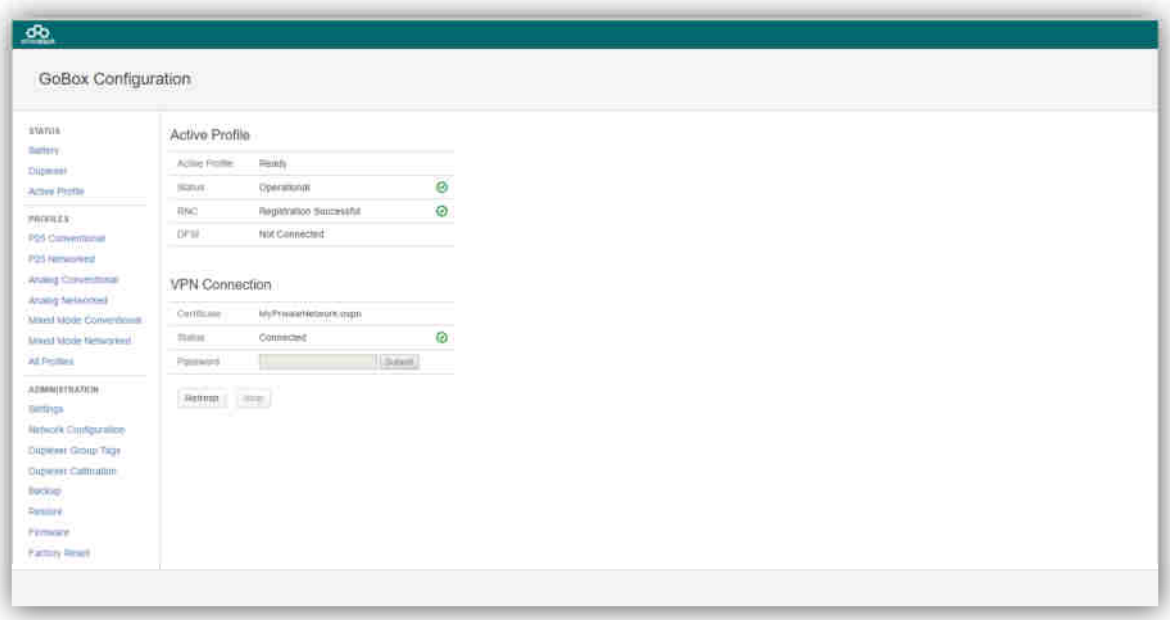

The configuration page above will display showing a navigation pane on the left and a content pane on the right.

> **!** If you see this page you have successfully connected to the GoBox configuration page. If you cannot see this page contact your IT support department to check your IP configuration.

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3.3 Managing Operational Profiles

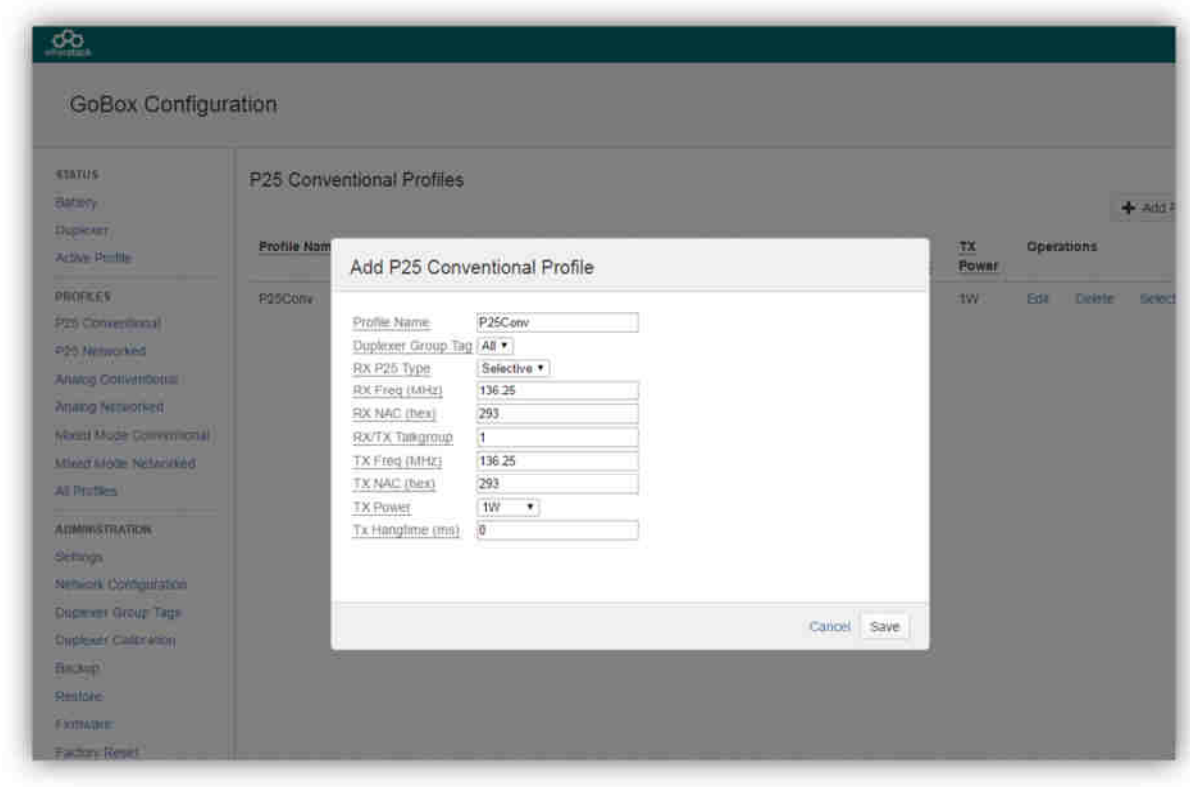
GoBox profiles are managed under the **Profiles** heading in the navigation pane. The types of profiles which can be configured depend on the installed options.

> If the user enters an invalid value in any form field, the GoBox will reject the profile, and the reason will be displayed on the form in red.

> Hovering over any form field name that has a dotted underline will display a popup tip to assist completing the form.

3.3.1 Adding a P25 Conventional Repeating Profile

3.3.1.1 Standalone Mode



To create a new P25 Conventional Standalone Repeat Profile, click the **P25 Conventional** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The following fields will be required to be completed.

- Profile Name
- Duplexer Group Tag
- Rx P25 Type
- Rx Frequency
- Rx NAC (if the Rx P25 Type is Normal or Selective)
- Rx/Tx Talkgroup (if the Rx P25 Type is Selective)
- Tx Frequency
- Tx NAC (if the Rx P25 Type is Normal or Selective)
- Tx Power
- Tx Hang Time

The fields are described in detail below in section 3.3.4.

Once the form has been completed, press the **Save** button to save the profile or **Cancel** to abort the operation.

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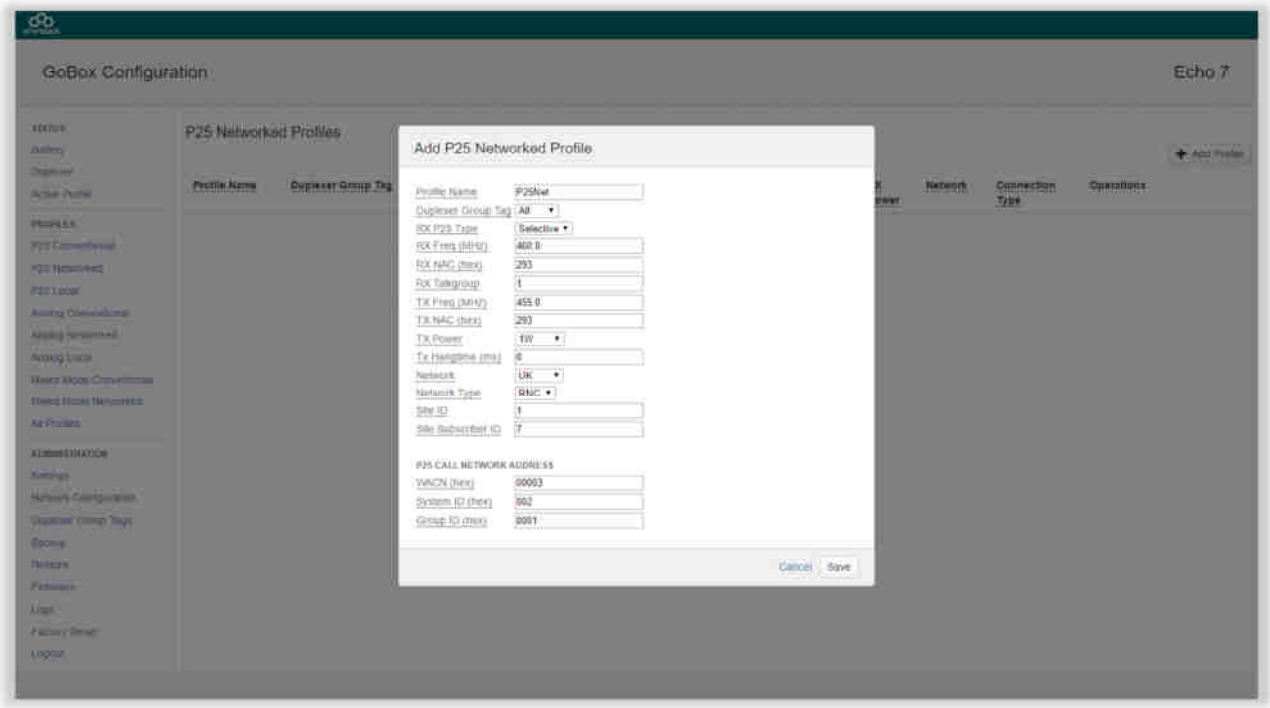
Once **Save** is pressed and all fields contain valid values, the profile is written to the GoBox.

3.3.1.2 Networked Mode



To create a new P25 Conventional Networked Repeat Profile, click the **P25 Networked** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The following fields will be required to be completed.

- Profile Name
- Duplexer Group Tag
- Rx P25 Type
- Rx Frequency
- Rx NAC (if Rx P25 Type is Normal or Selective)
- Rx/Tx Talkgroup (if Rx P25 Type is Selective)
- Tx Frequency
- Tx NAC
- Tx Power
- Tx Hang Time
- Network (reference to a Network configuration, see section 4.5.6)
- Network Type

For RNC Network Type the following fields are required:

- Site ID
- Site Subscriber ID
- Network Group Address (WACN ID, System ID, Group ID)

For DFSI Network Type the following fields are required:

- DFSI Control Port
- DFSI Voice Port

The fields are described in detail below in section 3.3.4.

Once the form has been completed, press the **Save** button to save the profile or **Cancel** to abort the operation.

Once **Save** is pressed and all fields contain valid values, the profile is written to the GoBox.

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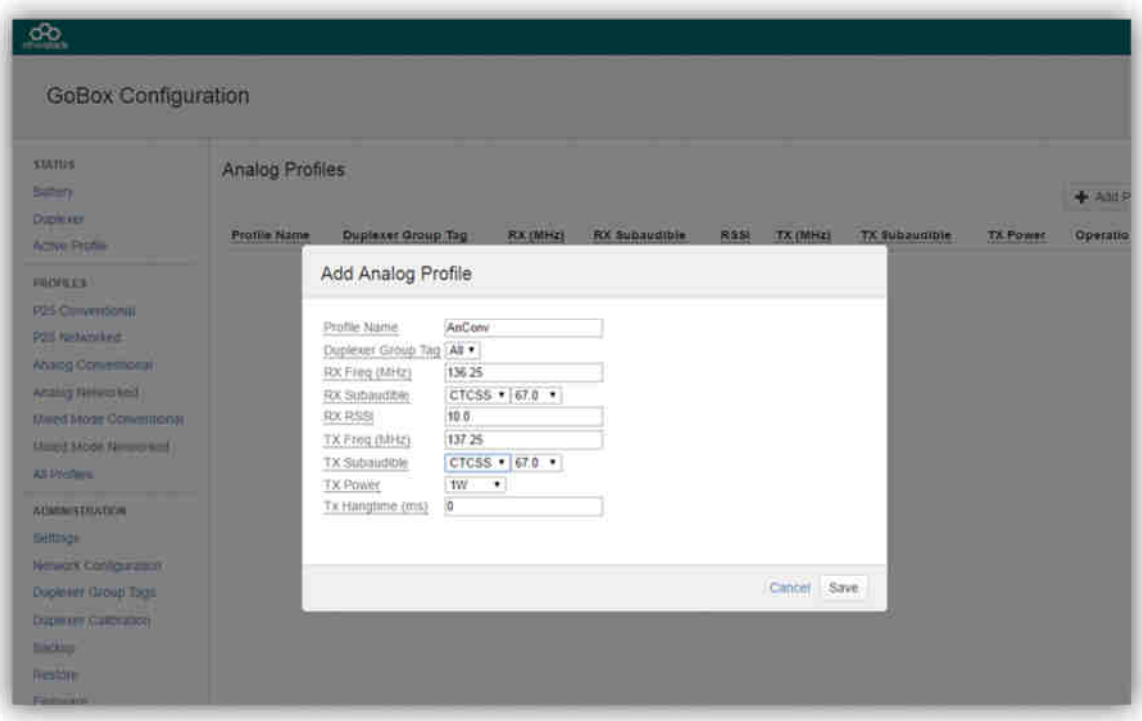
Once a P25 Networked profile is selected, the IP address of the GoBox Web Interface will change to the new IP address. To re-connect to the GoBox Web Interface at http://172.16.10.1 turn the rotary dial on the control interface until "Standby" is displayed in the Status Window.

3.3.2 Adding an Analog Conventional Repeating Profile

3.3.2.1 Standalone Mode



To create a new Analog Conventional Profile, click the **Analog Conventional** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The following fields will be required to be completed.

- Profile Name
- Duplexer Group Tag
- Rx Frequency
- Rx Subaudible
- Rx RSSI
- Tx Frequency
- Tx Subaudible
- Tx Power
- Tx Hang Time

The fields are described in detail below in section 3.3.4.

Once the form has been completed, press the **Save** button to save the profile or **Cancel** to abort the operation.

Once **Save** is pressed and all fields contain valid values, the profile is written to the GoBox.

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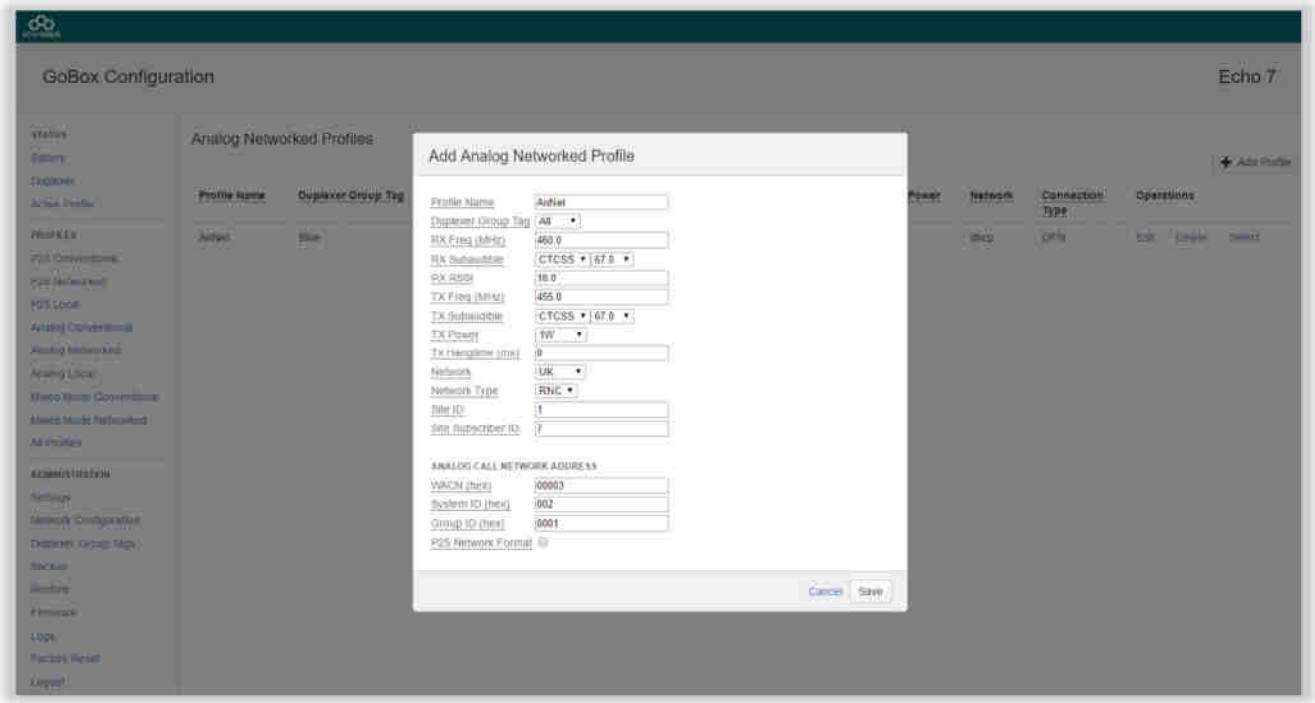
3.3.2.2 Networked Mode



To create a new Analog Networked Profile, click the **Analog Networked** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The following fields will be required to be completed.

- Profile Name
- Duplexer Group Tag
- Rx Frequency
- Rx Subaudible
- Rx RSSI
- Tx Frequency
- Tx Subaudible
- Tx Power
- Tx Hang Time
- Network (reference to a Network setup, see section 4.5.6)
- Network Type

For RNC Network Type the following fields are required:

- Site ID
- Site Subscriber ID
- Network Group Address (WACN ID, System ID, Group ID)
- P25 Network Format

For DFSI Network Type the following fields are required:

- DFSI Control Port
- DFSI Voice Port

The fields are described in detail below in section 3.3.4.

Once the form has been completed, press the **Save** button to save the profile or **Cancel** to abort the operation.

Once **Save** is pressed and all fields contain valid values, the profile is written to the GoBox.

Once an Analog Networked profile is selected, the IP address of the GoBox Web Interface will change to the new IP address. To re-connect to the GoBox Web Interface at http://172.16.10.1 turn the rotary dial on the control interface until “Standby” is displayed in the Status Window.

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3.3.3 Adding a Mixed Mode Conventional Repeating Profile

3.3.3.1 Standalone Mixed Mode

To create a new Mixed Mode Standalone Profile, click the **Mixed Mode Conventional** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The fields required are a combination of both P25 and Analog profiles, enabling both voice formats to be repeated depending upon the transmitting subscriber unit.

3.3.3.2 Network Mixed Mode

To create a new Mixed Mode Networked Profile, click the **Mixed Mode Networked** menu item in the navigation pane and click on **+ Add Profile** button on the content pane.

The fields required are a combination of both P25 and Analog profiles, enabling both voice formats to be repeated locally and via the network connection.

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3.3.4 Profile Field Descriptions

3.3.4.1 Common Profile Fields

Field	Description
Profile Name	Create a unique profile name that will appear in the status window of the GoBox control interface. This name is what your operational profile will be called. The Profile Name is limited to 8 characters and may only include letters, numbers or a hyphen '-'. The names “Standby” and “None” cannot be used.
Duplexer Group Tag	If duplexer group tags have been created, you can select a duplexer group to associate this profile with. Selecting a specific duplexer tag means this profile will only be available on the GoBox control interface if the corresponding duplexer is installed. If duplexer group tags have not been created, you can select **All** and then edit the profile once duplexer group tags have been created. Selecting **All** means this profile option will always be available to select on the GoBox control interface regardless of what duplexer is installed. Once an operational profile is associated with a duplexer group tag, it may also be chosen as the start-up profile for a newly installed duplexer.
Rx Frequency	This should be set to the desired centre receive frequency. The installed duplexer must be calibrated to this frequency to ensure optimal RF performance.
Tx Frequency	This should be set to the desired centre transmit frequency. The installed duplexer must be calibrated to this frequency to ensure optimal RF performance.
Tx Power	The transmit power in Watts to use for this operational profile.

3.3.4.2 P25 Profile Fields

Field	Description	
Rx P25 Type	The Rx P25 Type field indicates the level of filtering the GoBox will apply to a received signal before repeating the signal.	
	Monitor	All detected P25 signals will be repeated with the same NAC as was received.
	Normal	Only P25 signals with the specified Rx NAC code will be repeated/forwarded.
	Selective	Only P25 signals with the specified Rx NAC code and Talkgroup Id will be repeated/forwarded.
Rx NAC Tx NAC	The NAC is a feature similar to CTCSS or DCS for analog radios. Repeaters can be programmed to only repeat P25 signalling when receiving the correct NAC. NACs are programmed as a three-hexadecimal-digit code that is transmitted along with the digital signal being transmitted. Three of the possible NACs have special functions	
	0x293 ($293)	the default NAC
	0xf7e ($F7E)	a repeater set for this NAC will repeat P25 signalling on any decoded signal received
	0xf7f ($F7F)	a repeater set for this NAC will allow all incoming decoded signals and the repeater transmitter will retransmit the received NAC
Talkgroup	The GoBox may be configured to only repeat P25 signals matching a certain Talkgroup Id. Allowed values are 1 to 65535 inclusive.	
Tx Hang Time	The GoBox may be configured with an additional duration that is included at the end of every voice transmission. In P25 this transmission consists of additional terminator data units that enable subscribers to check that their uplink reached the repeater and was rebroadcast successfully. Allowed values are 0 (no hang time) to 30000 milliseconds.	

3.3.4.3 Analog Profile Fields

Field	Description	
Rx Subaudible Tx Subaudible	The Rx subaudible field sets the subaudible tone signalling which a received signal must contain in order to be repeated. The Tx subaudible field sets the tone signalling for the transmitted signal.	
	None	All detected analog signals, subject to the Rx RSSI, will be repeated. Transmitted signals carry no tone signalling.
	CTCSS	Use CTCSS tone signalling. Select the tone frequency from the option field.

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Field	Description	
	CDCSS	Use DCS digital subaudible signalling. Two options fields are available: the first allows selecting inverted DCS, the second selects the code. All codes are shown in octal notation.
Rx RSSI	Minimum receive signal strength, measured in approximate equivalent SINAD dB units.	
Tx Hang Time	The GoBox may be configured with an additional duration that is included at the end of every voice transmission. In Analog this transmission consists of additional carrier, with no subaudible content, that enables subscribers to check that their uplink reached the repeater and was rebroadcast successfully. Allowed values are 0 (no hang time) to 30000 milliseconds.	

Networked Profile Fields

Field	Description
Network	This option references a Network configuration that has already been created in the Administration -> Network Configurations section. Details of the IP Address, Subnet Mask, Default Gateway and VPN options are all part of the Network configuration that can be re-used by multiple network profiles. This prevents the need to enter common networking parameters multiple times. See section 4.5.6 for details on how to create network configuration that can be selected by one or more network profiles.
Network Type	This option is used to select the type of network connection. It must be one of RNC or DFSI. A RNC connection can be used to establish multi-site GoBox functionality or other ISSI interconnections. A DFSI is used to connect to a DFSI Host, usually a console user.
P25 Network Format	This option is only available for Analog Network profiles and is used to select the type of network traffic used for Analog voice. If checked, Analog voice from the air interface will be encoded into P25 IMBE on the network. Likewise P25 voice from the network will be decoded into Analog on the air interface. This option enables the GoBox to bridge Analog subscriber units with P25 network users.

RNC Networked Profile Fields

Field	Description
Site ID	The Site ID indicates the identity of the P25 site and is inserted into over-the-air traffic. The Site ID must be unique within an RFSS when the GoBox is used in Network mode. The Site ID is limited to values between 0 and 255 (decimal).
Site Subscriber ID	The site subscriber ID is used to register and affiliate with the RNC to allow multisite conventional repeating. The value should be unique and homed to an RFSS.
WACN ID	P25 Wide Area Communications Network ID. Allowed values are hexadecimal (00000 to FFFFF)
System ID	P25 System ID. Allowed values are hexadecimal (000 to FFF)
Group ID	P25 Network Talkgroup ID. Allowed values are hexadecimal (0000 to FFFF)

DFSI Networked Profile Fields

Field	Description
DFSI Control Port	The local UDP port to listen for incoming DFSI Host control messaging. The default value for DFSI is port 7000
DFSI Voice Port	The local UDP port to use for voice communication with the DFSI Host

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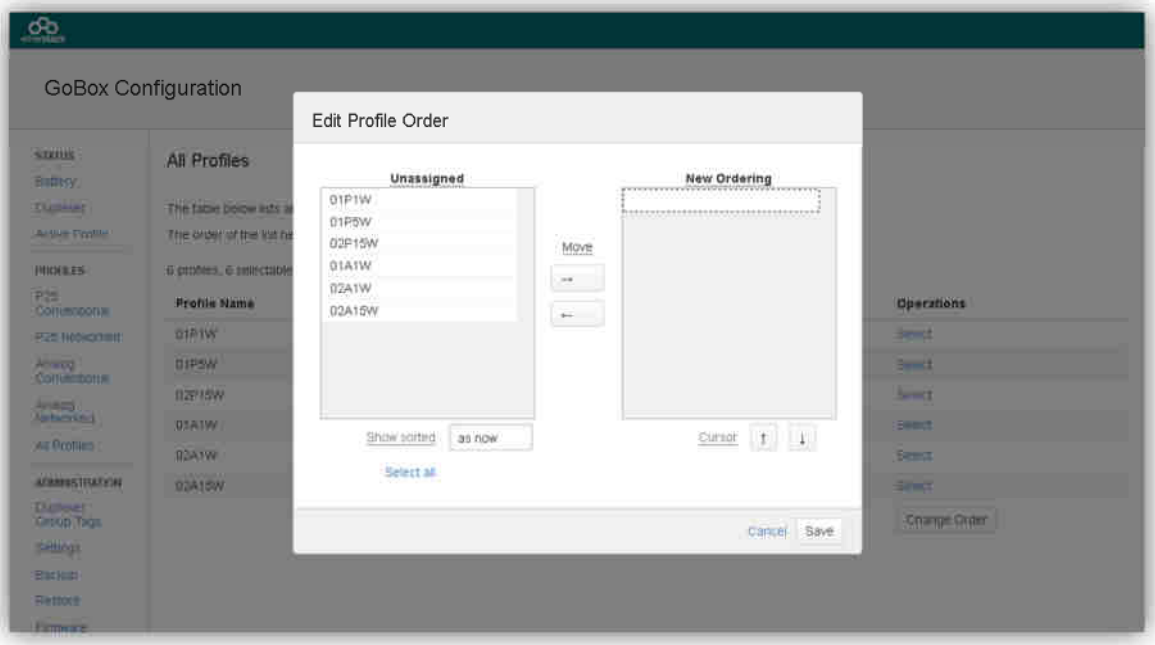
3.3.5 Setting the Operational Profile Order



If you have created a large number of profiles, it may be useful to set the order in which they appear on the GoBox control interface.

To change the display order, select the page **All Profiles** from the **Profiles** section of the navigation pane, and click **Change Order**.

The stored profiles are initially all shown in the left column, and can be sorted there either in the current order or alphabetically by name. Move them to the right column in the desired order, using the following operations:

1. Select one or more profiles by clicking and sweeping up and down within either column.
2. Select all profiles in the left column by clicking on **Select All**.
3. Move selected profiles from the left to the right column by clicking the right-arrow button. The profiles will be inserted in the new ordering at the cursor (the row with the dashed border).
4. Move the cursor up and down in the right column by clicking on the up-arrow or down-arrow buttons.
5. Move selected profiles from the right column back to the left column by clicking the left-arrow button. The profiles will be shown according to the selected sorting criterion.
6. Once all profiles are in the right column in the desired order, click **Save**. Alternatively click Cancel to return to the profile list without changing the order.

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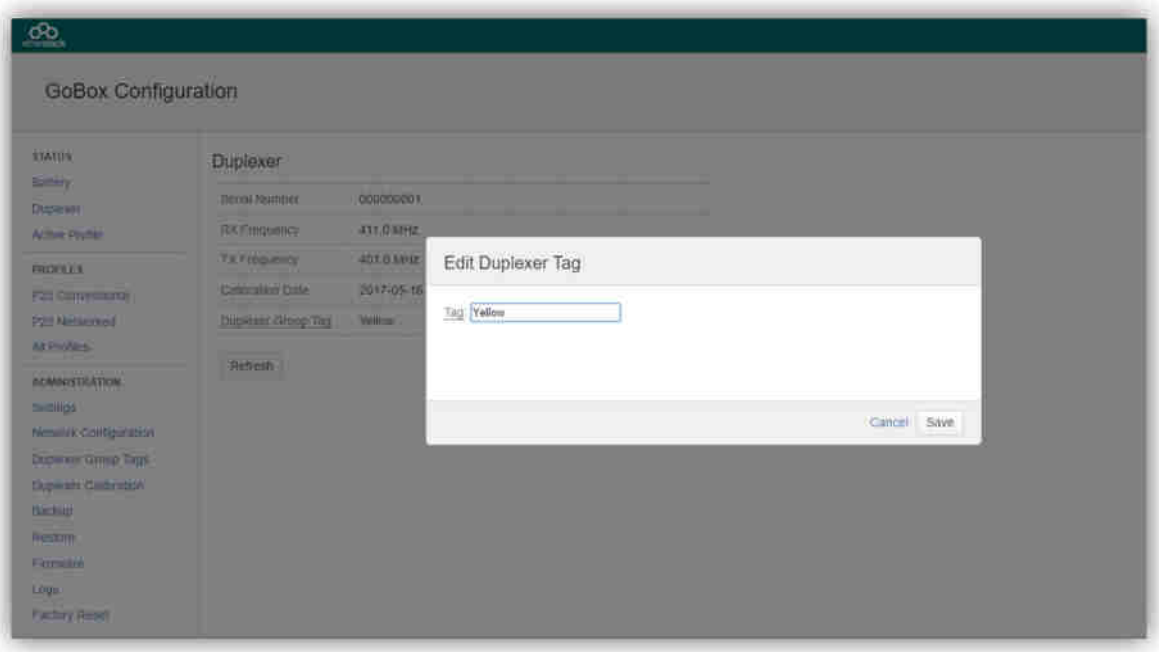
3.4 Managing Duplexers

3.4.1 Writing a Duplexer Group Tag

Before the GoBox will recognise a duplexer and allow operational profiles to be associated with it, you must write a duplexer group tag to the duplexer's internal memory. To do this use the following steps:

Click on the **Duplexer** menu item on the navigation pane and press the **Edit** button on the content pane to show the **Edit Duplexer** form.



The following fields will be required to be completed.

Field	Description
Tag	A unique name for this duplexer group. Allowed characters are A-Z, a-z, 0-9 and '-'. Up to 8 characters can be entered. The tag "All" is reserved and cannot be used.

Once the form has been completed, press the **Save** button to write to the duplexer or **Cancel** to abort the operation.

> **!** Writing to the duplexer will take several seconds. If the page does not update automatically after a short time, it may be necessary to click the **Refresh** button to verify the tag has been written.

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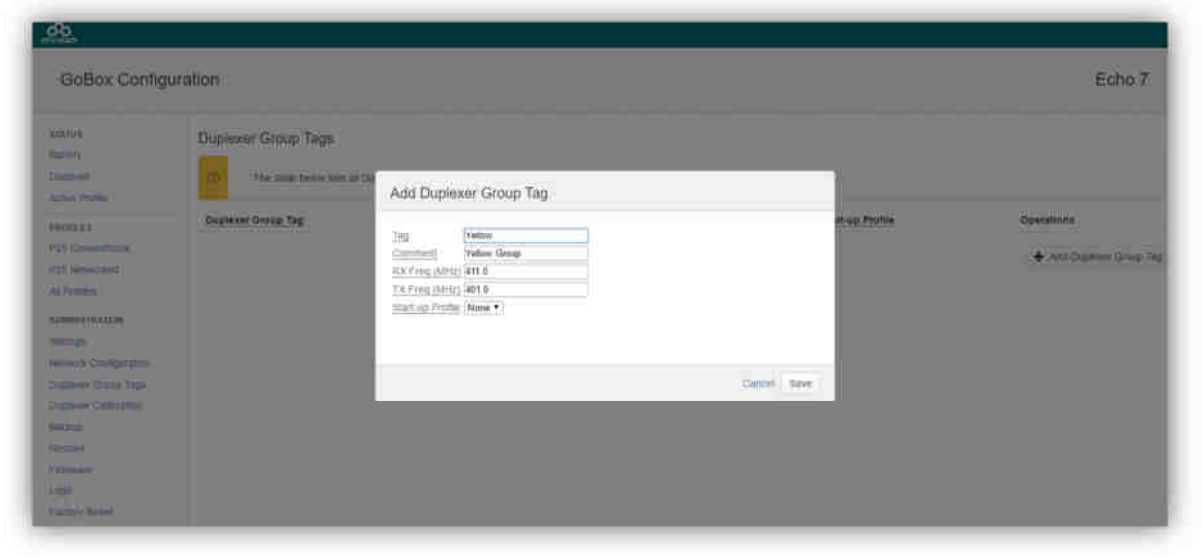
3.4.2 Setting the start-up profile for a Duplexer

To define different start-up profiles for different duplexers use the following steps:

> At least one operational profile is required.

Click on the **Duplexer Group Tags** menu item on the navigation pane and press the **+ Add Duplexer Group Tag** button on the content pane to show the **Add Duplexer Group Tag** form.



The following fields will be required to be completed.

Field	Description
Duplexer Group Tag	A unique name for this duplexer group. Allowed characters are A-Z, a-z, 0-9 and '-'. Up to 8 characters can be entered. The name “All” cannot be used.
Comment (Optional)	An optional comment describing this duplexer group tag.
Rx Freq	The receive frequency of the duplexer group
Tx Freq	The transmit frequency of the duplexer group
Start-up Profile	The operational profile to be selected when the GoBox powers on

> The last active profile (before the GoBox was shut down) takes precedence over the Start-up Profile. However, if this profile is not compatible with the currently installed duplexer, the Start-up profile will be used..

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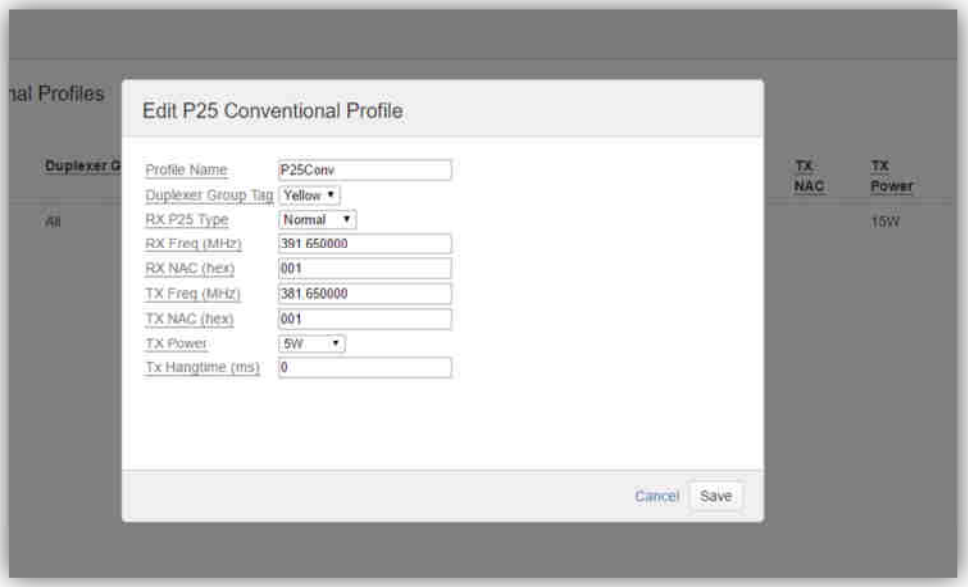
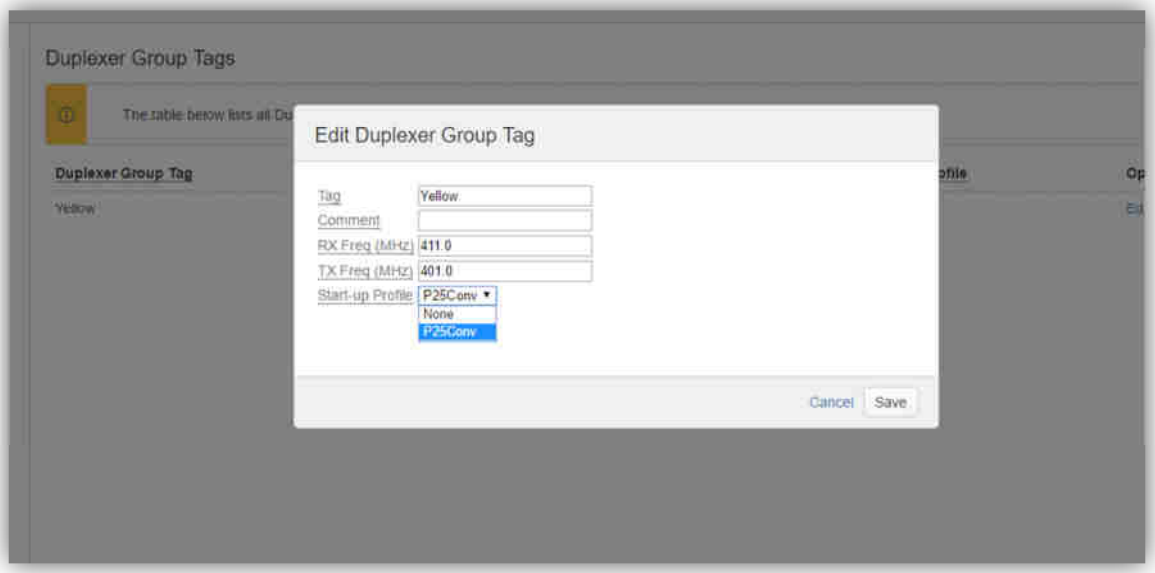
Create or edit each operational profile, and link it to a specific duplexer by setting the **Duplexer Group Tag** field.



Back in the **Duplexer Group Tag** menu item, select a start-up profile for each duplexer.



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4 Using the GoBox

4.1 Turning your GoBox On

The GoBox will automatically turn on when AC or DC power is first applied or a battery is inserted with sufficient charge.

If a power source has already been connected and the GoBox was previously turned off via the GoBox Power Button, pressing and holding down the Power button will turn the GoBox on.

> The power button must be held down for several seconds to turn the GoBox on and off. This is a feature to avoid accidental power-on/off.

During the GoBox's power-on self-test, the status window backlight and all control panel LEDs will turn on briefly to indicate these subsystems are fully operational.

During the GoBox's power-on self-test, the Power LED will flash to indicate that power is supplied but the GoBox is not ready for use. During this time, the status window shows a progress bar to provide an approximate indication of the remaining time.

After approximately 30 seconds, the Power LED will turn solid indicating that the GoBox is ready for use if a suitable operational profile can be found otherwise the Power LED will continue to flash and the word Standby displayed in the GoBox status window.

> If the GoBox cannot find a profile matching the installed duplexer during start-up, it displays "Standby" in the status window. You will need to attach a laptop/PC to the GoBox and follow the steps in section 3.4 to address the issue.

If operational profiles have been programmed into the GoBox, and a valid operational profile found, this operational profile will be selected and the GoBox will be ready for operation, indicated by a solid green power/status LED.

4.2 Selecting an Operational Profile

4.2.1 Front Panel

Once the GoBox has been programmed with operational profiles, you can change the operating profile by pressing the rotary dial and turning to select the required profile. Releasing the button activates the currently displayed profile.

During profile changes, the GoBox will perform a soft reset, indicated by a flashing Power LED. When the Power LED returns to a solid state the operational profile will have been loaded and the GoBox is ready for use.

If the selected profile is networked, status indicators on the bottom row of the display will indicate the network status. A blinking "WWW" or "VPN" icon indicates that the GoBox is awaiting network connectivity for clear and encrypted connections, respectively. Once connected, the status icon will turn solid and an adjacent "RNC" icon will start blinking. When the GoBox successfully registers with the RNC, the "RNC" icon will turn solid and the GoBox shall be fully network operational.

> The GoBox will always power up using the last active profile if it is compatible with the installed duplexer. Otherwise, it will use the duplexer's default profile, if configured.

4.2.2 Web Configuration Interface

To activate an operational profile remotely, navigate to the **All Profiles** page or to one of the pages showing details of one type of profile, such as the **P25 Conventional** page, find the row with the profile you want to activate, and click on the **Select** action in that row.

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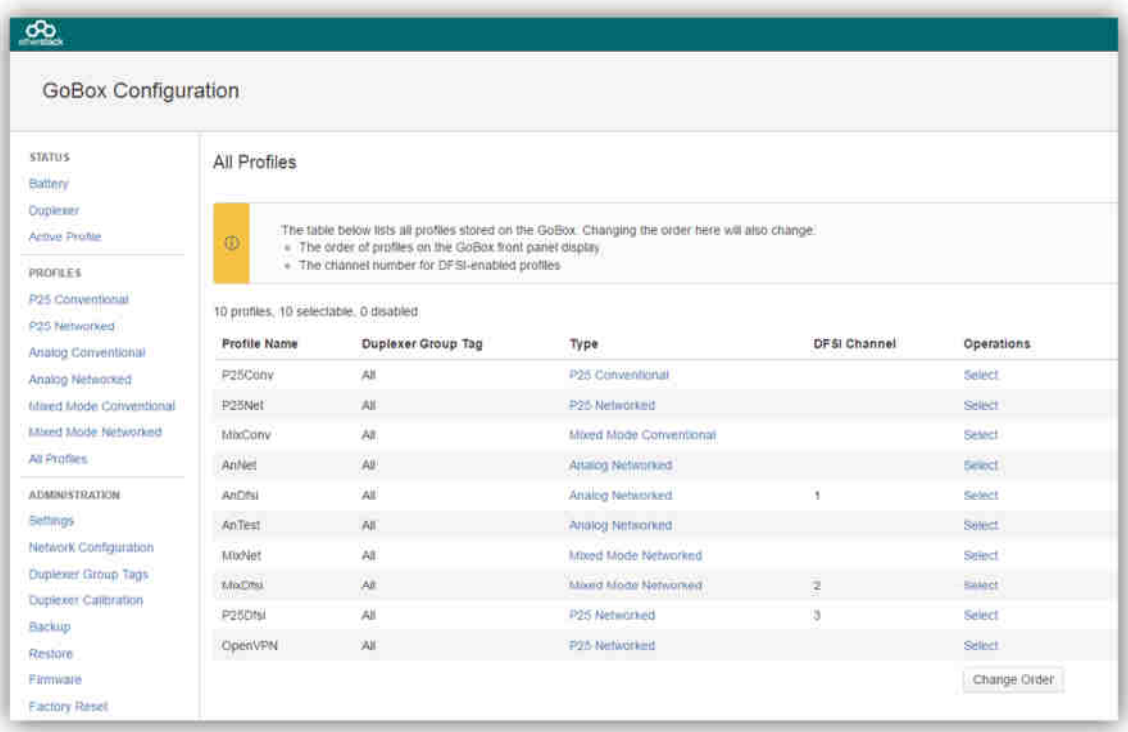
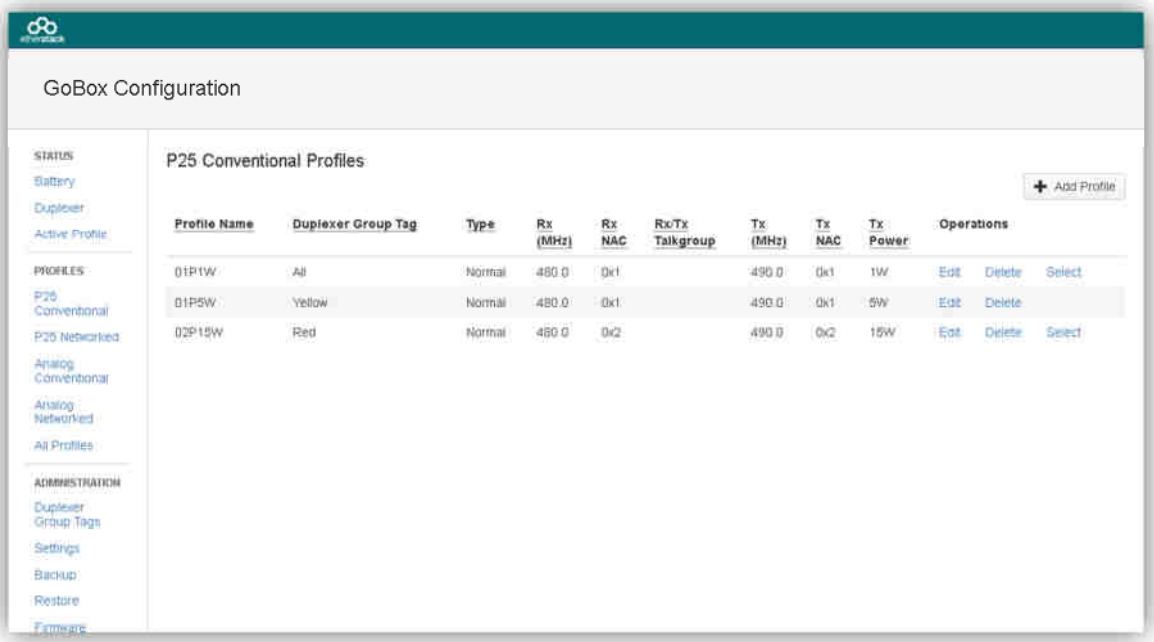
The profiles which can be selected this way are the same as on the GoBox front panel. I.e. only profiles which have a duplexer group tag of **All** or match the installed duplexer have a **Select** action.





4.3 Stopping Repeater Operation

The GoBox can be returned to a standby state whereby it does not repeat according to any operational profile, but can be programmed using the web interface.

4.3.1 Front Panel

Press the rotary dial, turn it while holding the dial down until “Standby” appears in the display, and release the dial.

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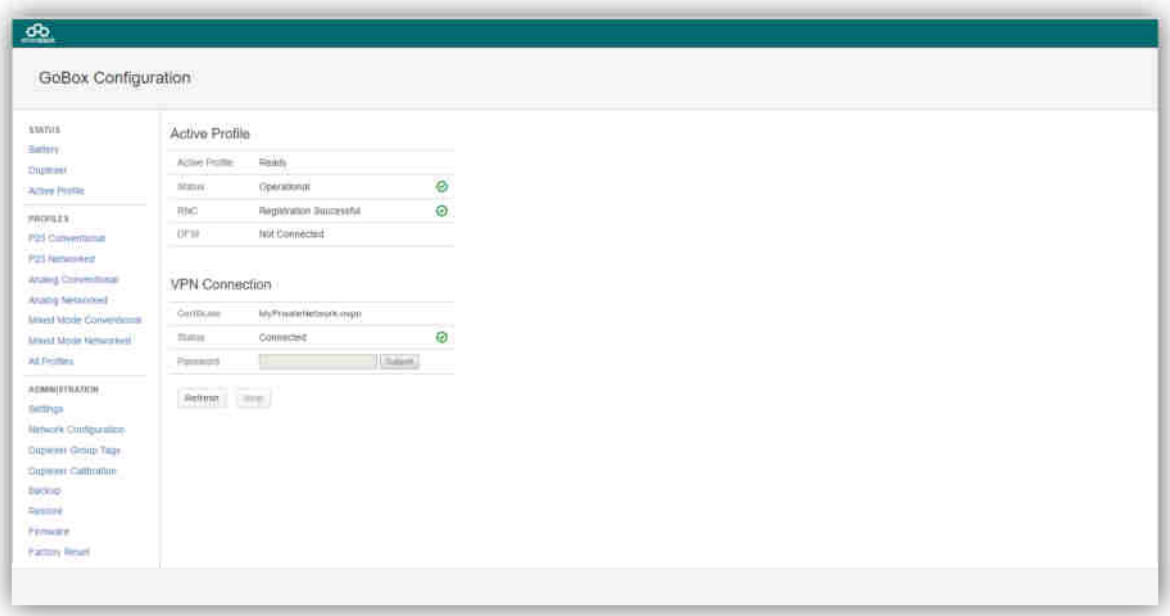
The GoBox will continue to display “Standby” and the power/status LED will blink green, until an operational profile is selected.

4.3.2 Web Interface

Select **Active Profile** under the heading **Status** of the navigation pane, and click on the **Stop** button.



4.4 Checking GoBox Status

The GoBox displays several indicators in the status window such as power source, battery state and active operational profile and if a laptop/PC is connected additional status information can be viewed.

4.4.1 Status Window

4.4.1.1 Checking Battery Status

Two rectangles will appear in the top right hand corner of the status window to indicate if any of the batteries are detected in the battery compartment.

A solid rectangle indicates a battery is inserted and is fully charged. A partially filled rectangle indicates the remaining battery charge. When a battery has no charge remaining it will be represented as an empty rectangle.

The GoBox has a built in battery charger. When AC or DC power is available, any batteries detected in the GoBox will be charged. This will be indicated by a scrolling battery charge image.

> **!** An external battery charger is also available.

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4.4.1.2 Checking External Power Source

The letters AC and/or DC will appear in the bottom right hand corner of the status window to indicate if any external power source is detected.

> **!** Both power sources can be connected at the same time.

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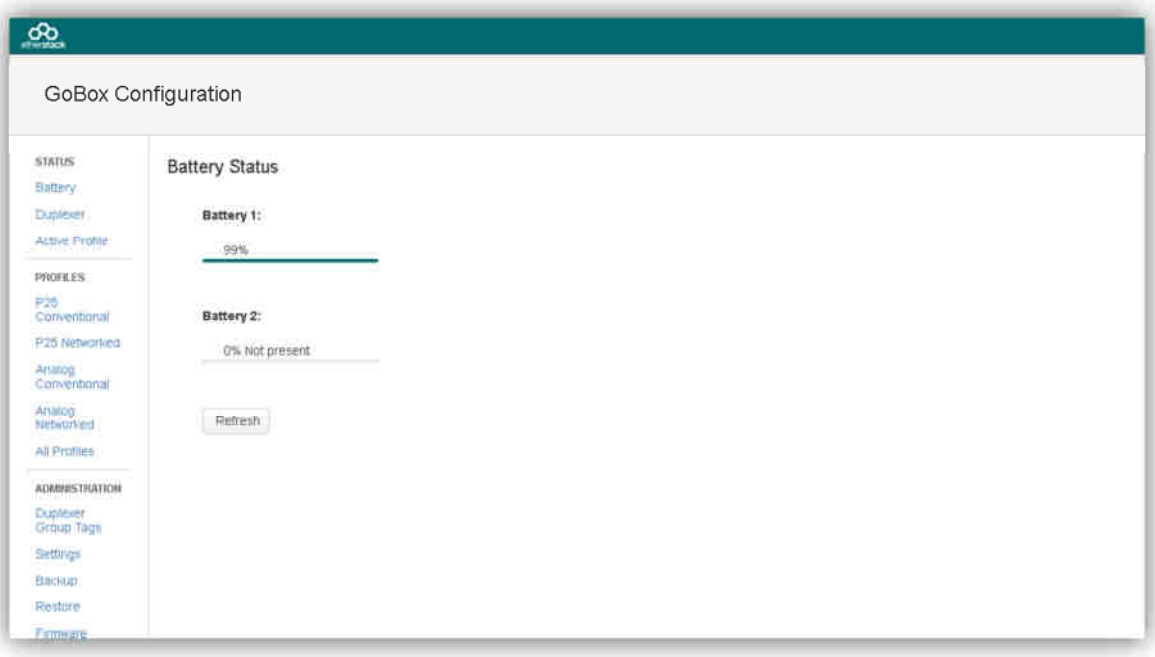
4.4.1.3 Checking the current operational profile

The GoBox will display the current operational mode in the status window after power up.

If the GoBox displays “Standby” in the status window, the GoBox is in programming mode and awaiting a connection from a laptop or PC otherwise the GoBox will display the current operational profile.

4.4.2 Web configuration interface

4.4.2.1 Checking Battery Status



To access this page, click on the **Battery** menu item on the navigation pane.

The battery status page will show if a battery is installed, each batteries current charge percentage and if the internal GoBox battery charger is active.

> To update the page with the latest information press the **Refresh** button.

> The battery charger will only operate when an AC or DC power source is applied and will automatically turn off to protect the battery once full charge has been reached.

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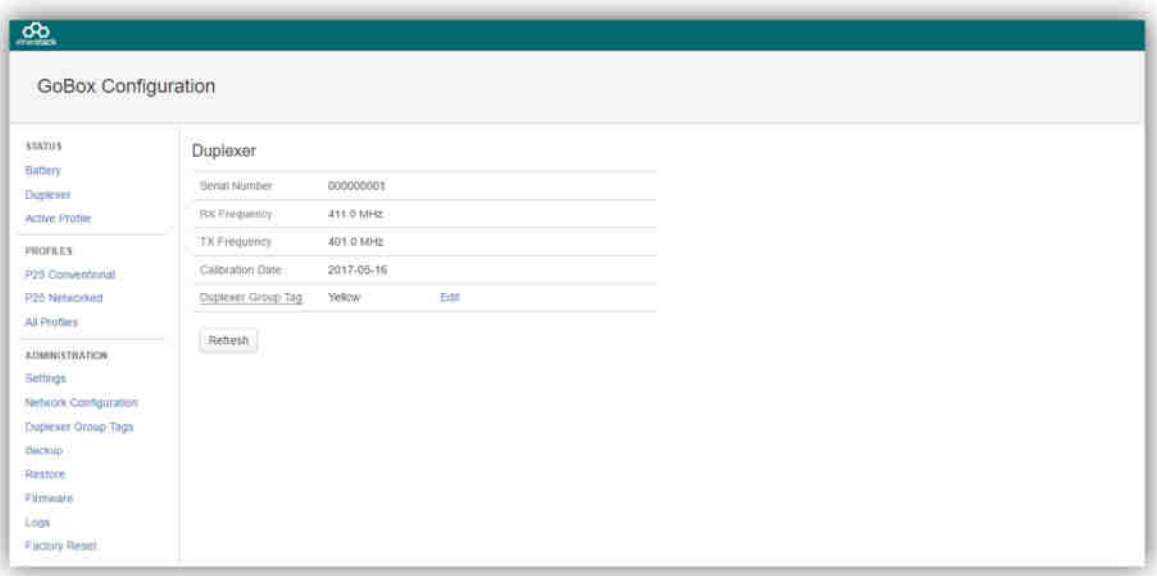
4.4.2.2 Checking Duplexer Status

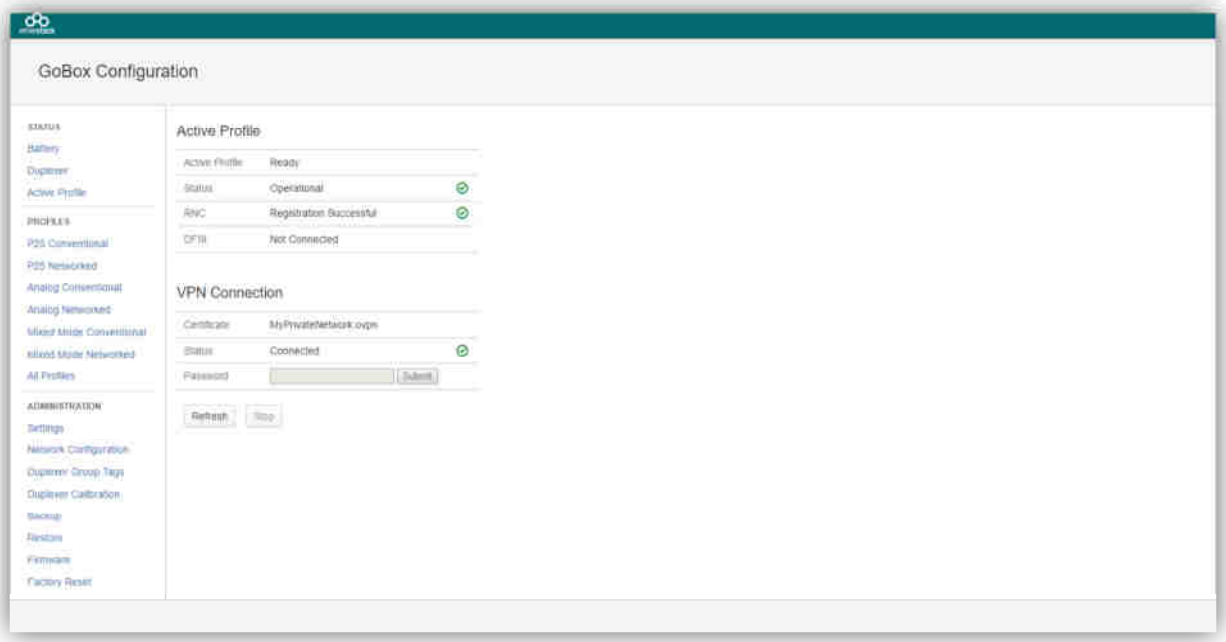


To access this page, click on the **Duplexer** menu item on the navigation pane.

The duplexer status page will show the duplexer serial number, receive centre frequency, transmit centre frequency, date last calibrated and the duplexer group tag used to link a duplexer to a start-up operational profile.

> To update the page with the latest information, press the **Refresh** button.

4.4.3 Checking Active Profile



To access this page, click on the **Active Profile** menu item on the navigation pane.

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The active profile status page will show:

- Active Profile: The active profile name. This will match what is shown on the GoBox status window.
- Status:
  - **Loading** whilst the profile is being loaded
  - **Operational** once the profile is ready

For network profiles additional status information is available depending upon the type of connection:

- RNC: Displays whether or not the GoBox has successfully connected to the RNC.
  - **Not Connected** if the GoBox is not connected to the RNC
  - **Registering** if the GoBox is attempting to connect to the RNC
  - **Registration Failed** if the GoBox can communicate with the RNC but cannot register
  - **Affiliation Failed** if the GoBox can communicate with the RNC but cannot affiliate to the network group
  - **Registered** if connected and registered with RNC successfully
- DFSI: Displays whether or not a DFSI Host has successfully established a connection to the GoBox.
  - **Not Connected** if no DFSI Host has connected
  - **Connected** if successfully connected to a DFSI Host, along with the DFSI Host IP Address and Host UDP Port.

When the GoBox is used with a VPN to establish a secure connection to a network, additional status information is available,

- Certificate: displays the file name of the VPN client certificate used by the current profile
- Status: displays current VPN status which is one of
  - **Disconnected** if no VPN can be established
  - **Connecting** whilst in the process of trying to connect to the VPN server
  - **Connected** once a successful connected has been established
  - **Need Password** if the VPN profile requires a password but has not been entered yet
  - **Invalid Password** if the VPN profile requires a password but the provided password returned an error
- Password: allows the input of VPN password information. If the VPN profile does not require a password this field is greyed out.

!

To update the page with the latest information press the **Refresh** button.

When a profile is active, clicking **Stop** will deactivate it.

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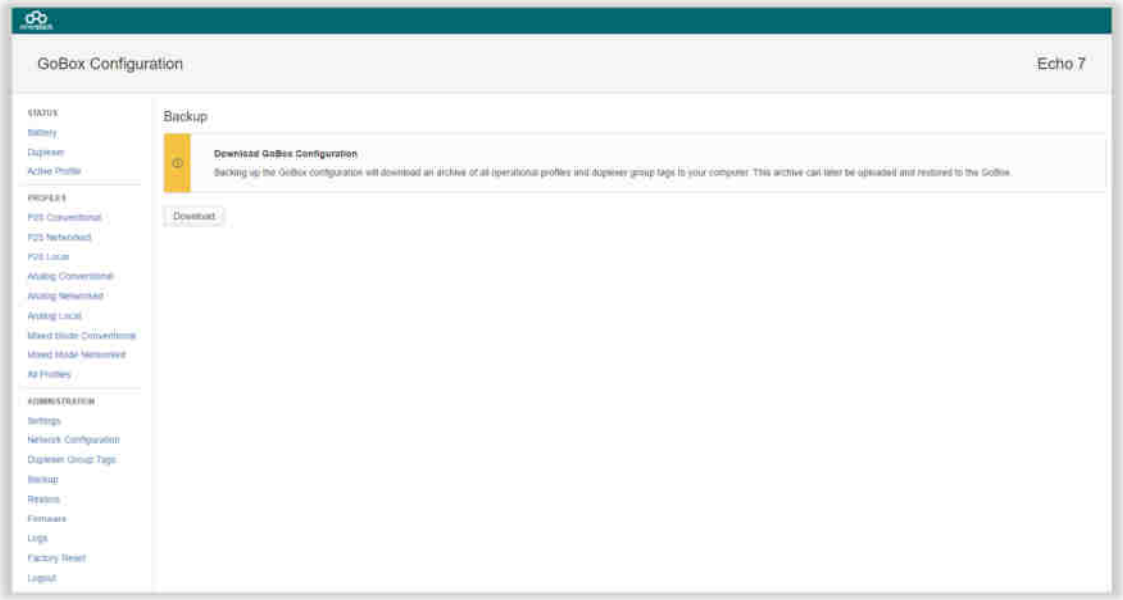
4.5 Administration

4.5.1 Backing up GoBox Configuration Data

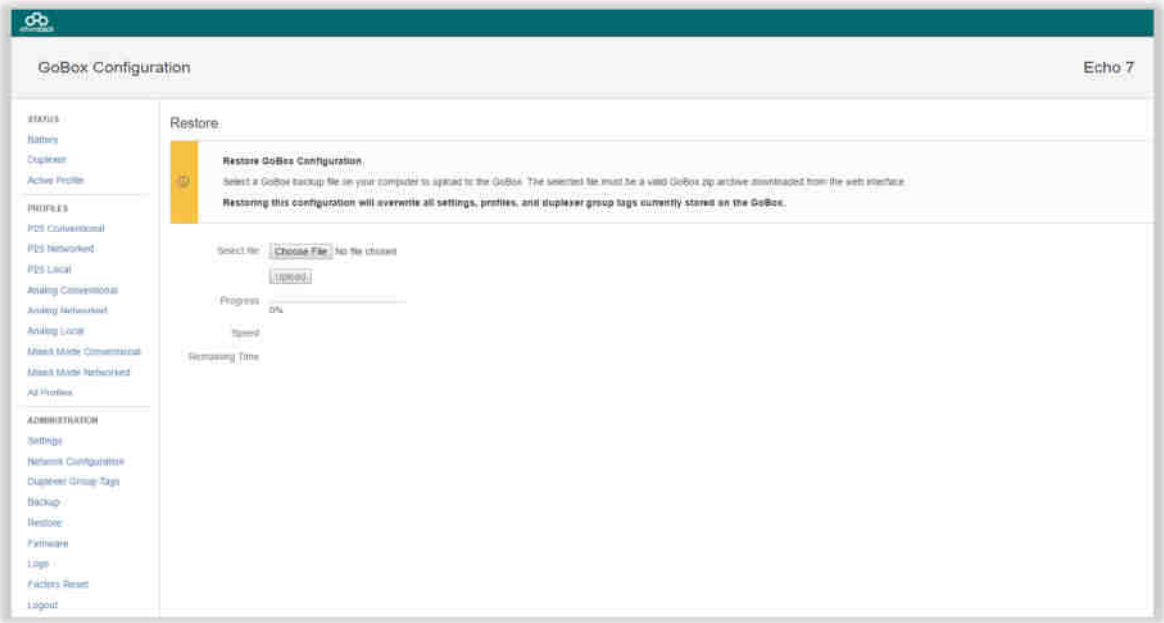


To back-up your GoBox configuration to your local computer, click the **Backup** menu item on the left hand navigation pane and click on the **Download GoBox Profiles** button in the content pane.

A specially constructed zip file containing all GoBox profiles will be downloaded to the Download folder of your local computer. This file should be archived and stored in a safe place.

This configuration file can be used to restore the configuration on any GoBox and/or program future GoBoxes.

4.5.2 Restoring GoBox Configuration Data from a Backup



To restore a GoBox configuration, click the **Restore** menu item on the left hand navigation pane and click on the **Restore** button in the content pane.

A file browser will then be displayed where you can select a previously backed up configuration file.

> This will overwrite all profiles and duplexer group tags currently stored on the GoBox.

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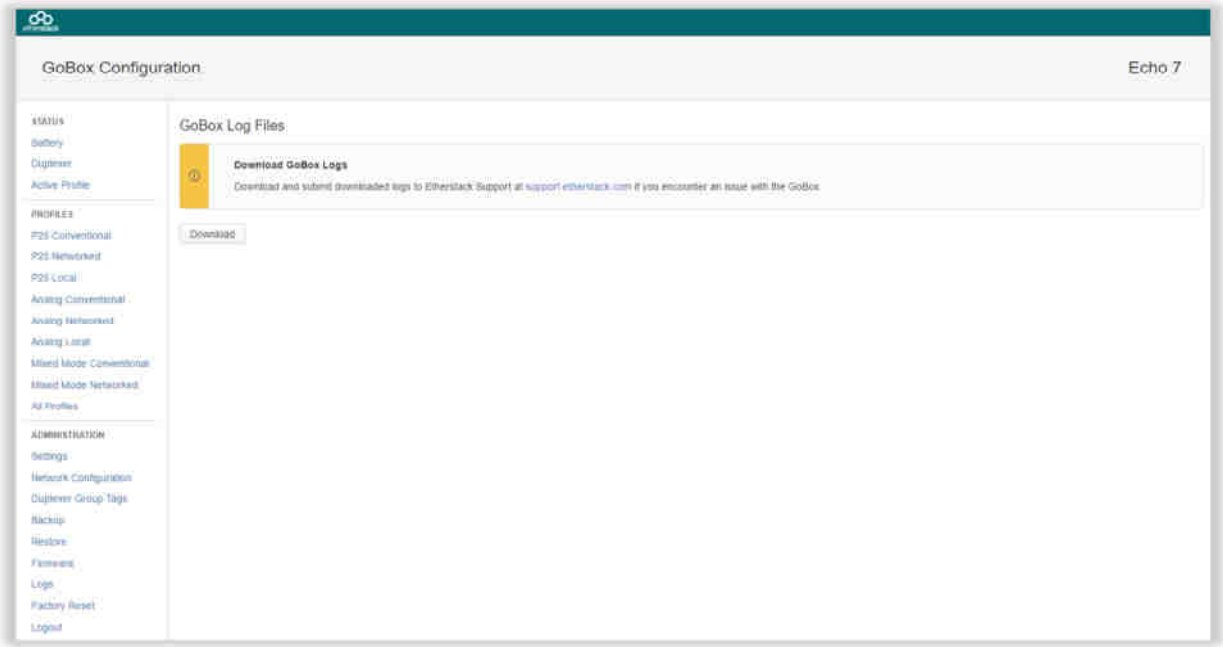
4.5.3 Downloading GoBox Log Files

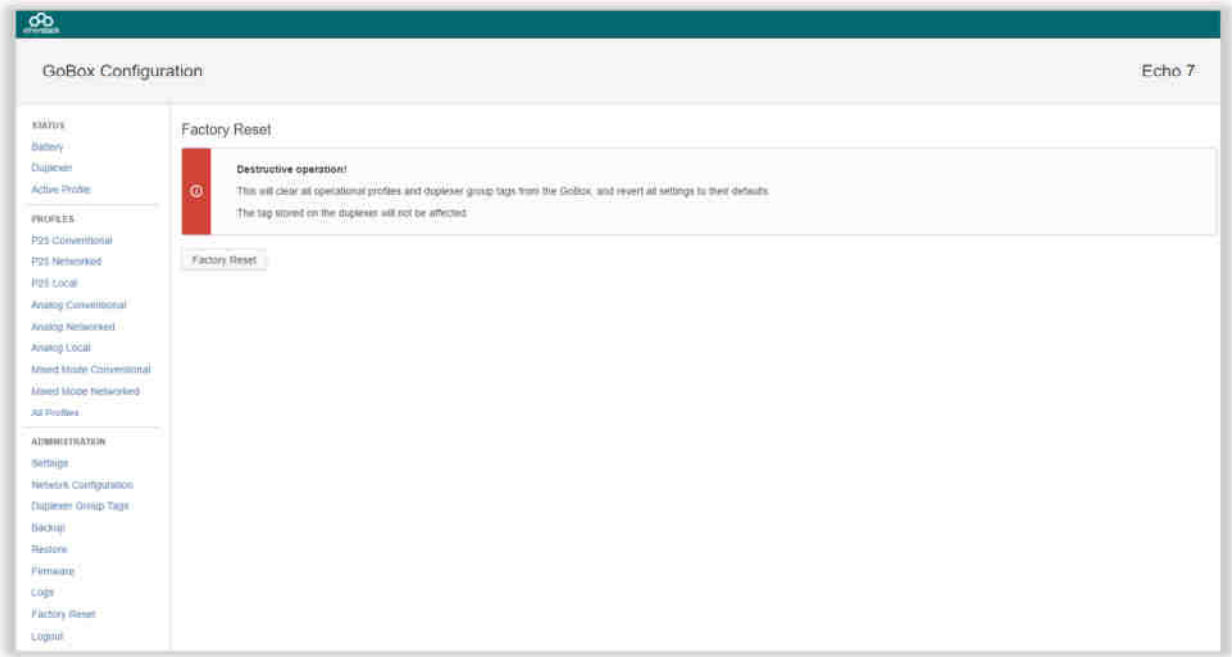


To download the GoBox log files to your local computer, click the **Logs** menu item on the left hand navigation pane and click on the **Download** button in the content pane.

A zip file containing all GoBox profiles will be downloaded to the Download folder of your local computer. When reporting an issue with the GoBox, support staff may request a copy of the log files to help diagnose the issue.

4.5.4 Clearing the GoBox Configuration from memory

To clear all GoBox profile and duplexer group tag information, and restore the brightness setting to its original state, click the **Factory Reset** menu item on the left hand navigation pane and click on the **Factory Reset** button in the content pane.



This will clear all profiles and duplexer group tags currently stored on the GoBox.

Duplexer tags stored on duplexers are not affected by a factory reset.

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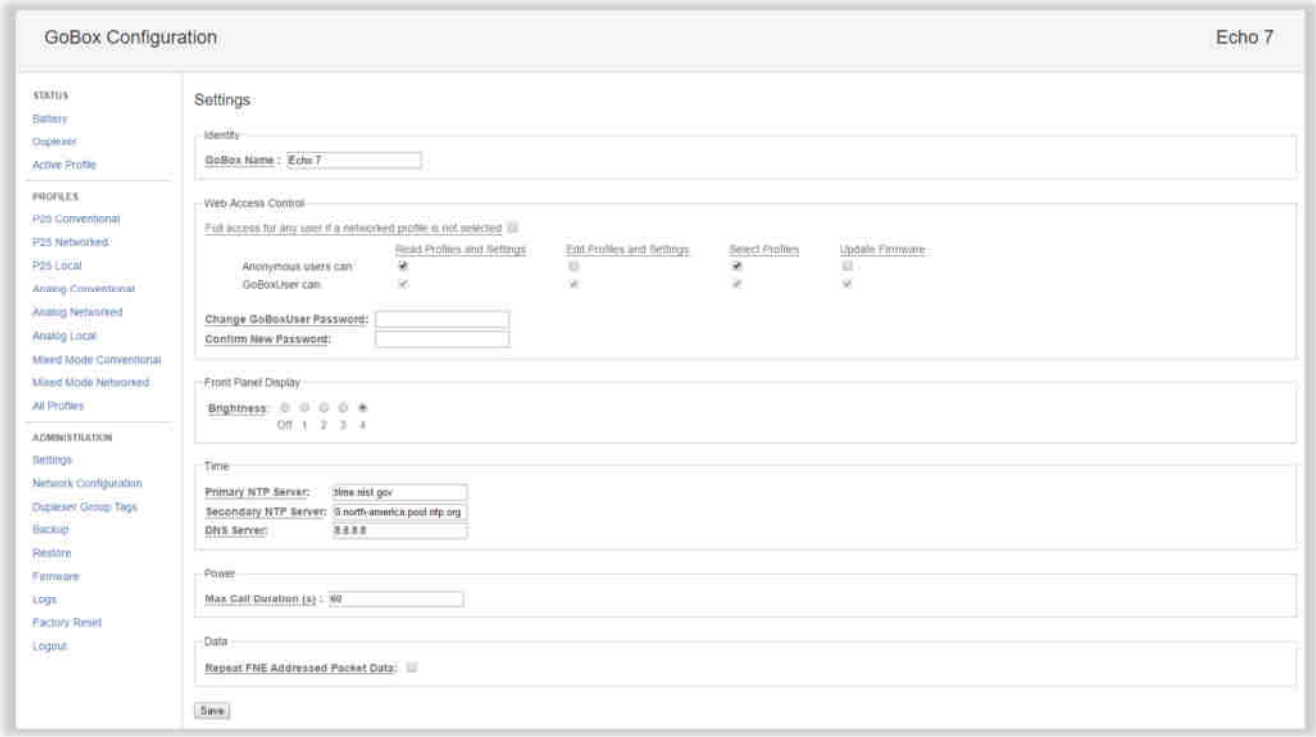
4.5.5 Settings

Changes made on the Settings page will apply globally to all GoBox operational profiles.



4.5.5.1 GoBox Name

The GoBox can be assigned a name to help identify it when accessed via the web interface. The name will appear in the top right corner of all pages visited on the web interface. The user may adopt any naming convention and uniqueness is not enforced.

4.5.5.2 Web Access Controls

An administrator (the GoBoxUser account) may restrict actions that can be performed via the web interface by users who have not logged in (anonymous users). These actions include viewing (or backing up) the GoBox configuration and log files, adding/editing profiles and settings, selecting the active profile, and updating the GoBox firmware. If the administrator is accidentally locked out of the web interface, please contact support.

4.5.5.3 Adjusting the LED and LCD Backlight Brightness

To change the brightness of the Rx/Tx and Status LEDs and LCD Backlight, select **Settings** from the navigation pane.

The brightness can be set in 5 levels, corresponding approximately to off, 3%, 10%, 30% and 100%. Select a brightness level and click Save.

The brightness will be set to the highest level after a power cycle or factory reset.

Updating and saving the brightness will take several seconds. If the page does not update automatically after a short time, it may be necessary to click the **Refresh** button.

The brightness of the network traffic LEDs on the control module cannot be changed.

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4.5.5.4 NTP and DNS Servers

When using the GoBox in VPN mode, the network time must align with the VPN server time. In order to ensure time accuracy, the GoBox requires one or more NTP servers which are designated Primary and Secondary. Enter the hostnames or IP addresses of reliable NTP servers in these fields, e.g. time.nist.gov.

A DNS server is also required to resolve the NTP server hostnames. The DNS server must be entered as an IP address, e.g. 8.8.8.8.

!

Updating and syncing network time may take a number of minutes after a profile using a network has been selected. During this time the VPN may report failure to connect.

4.5.5.5 Programmable Time-Out Timer

The GoBox can automatically shut down the transmit path after a maximum call duration. This prevents battery drain or an occupied transmit path when a subscriber unit is holding down the PTT button, either intentionally or accidentally.

Once this duration has been reached, the transmit path is returned to an idle state. There is no lock-out period and any subsequent transmission may use the transmit path, however if the local uplink remains busy then it may not allow other users to talk until the offending subscriber unit releases their PTT button.

Allowed values are 0 (no time-out) to 300 seconds.

!

The default value for this is 60 seconds, and unless modified, users should be aware that a long PTT transmission may end prematurely.

4.5.5.6 Repeat FNE-addressed Data

FNE-addressed (unit ID = 0) data packets are typically not repeated over-the-air by the GoBox. This behaviour may be changed by enabling this setting, which forces all inbound data packets to be repeated, no matter the destination address.

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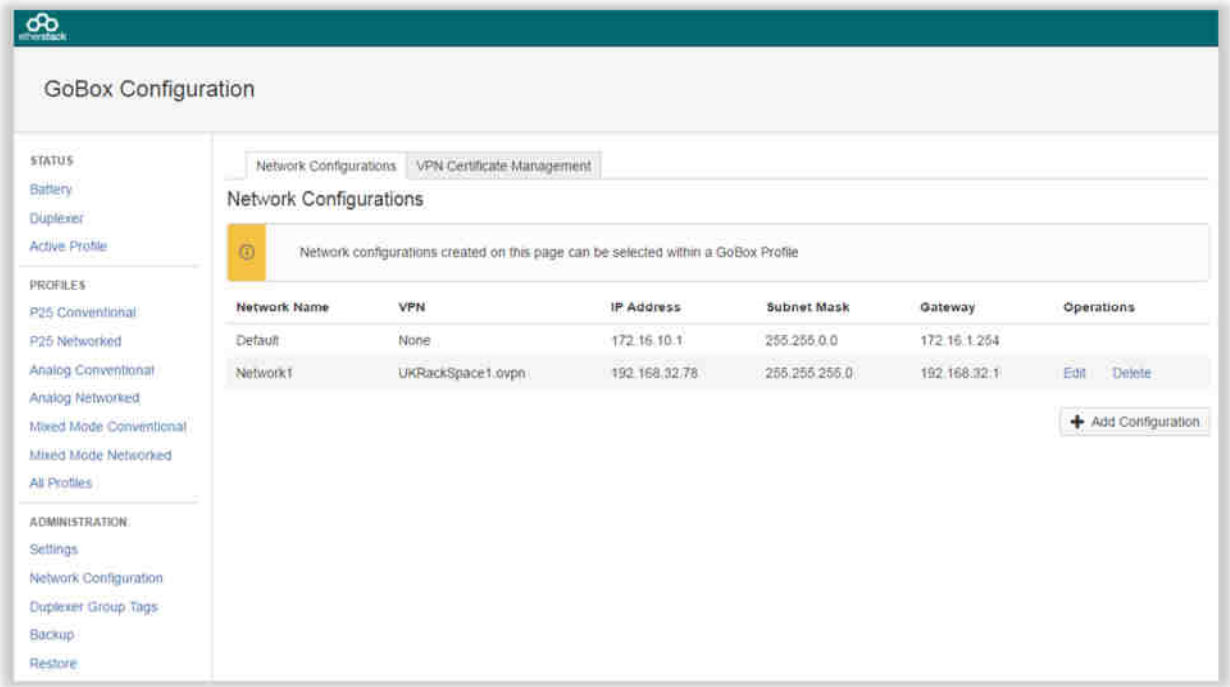
4.5.6 Network Configurations

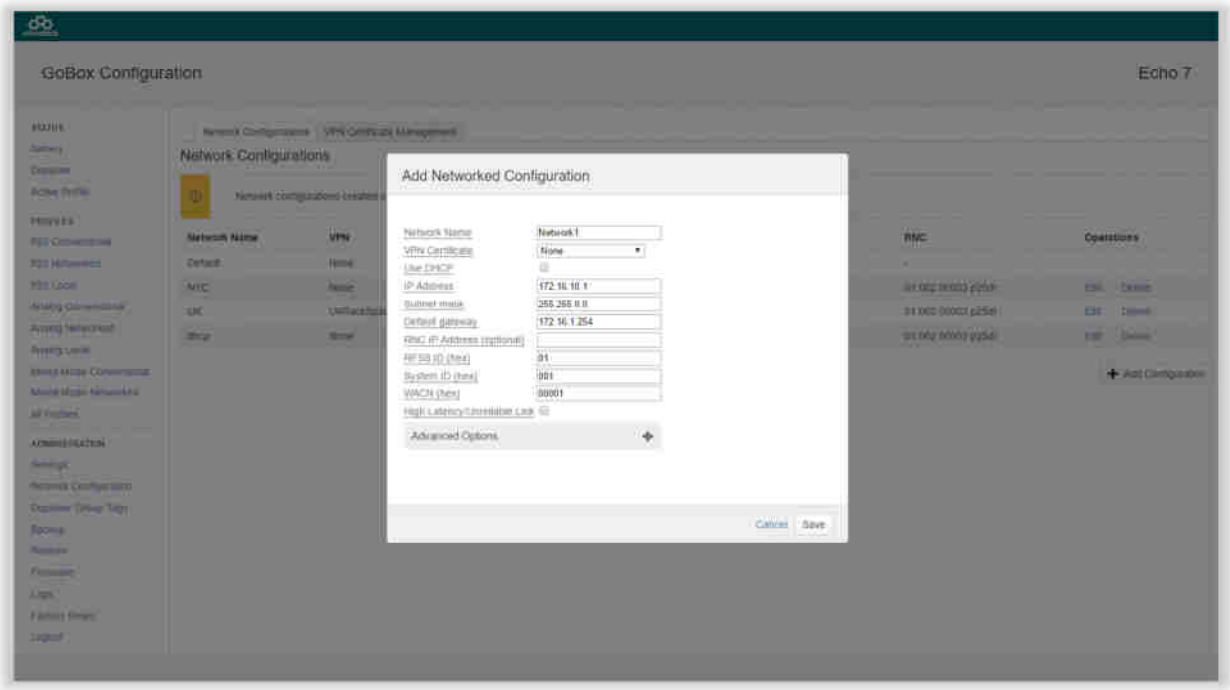
When an operational profile is using Network mode, it references a number of common settings that are defined by the **Network Configurations** Administrative page. This page provides settings including the IP Address, Subnet Mask and Default Gateway that can be combined into a network configuration. Additionally, VPN settings are included as part of the network setup to allow a number of similar profiles to re-use the same network details without requiring manual re-entry of these fields.

To view the Network Configurations, click the **Network Configurations** menu item on the left hand navigation pane which will display a list of current network configurations in the content panel.



There is always a Default network configuration which the Standby profile is associated with. This network configuration cannot be modified or deleted. This allows administrators the ability to always connect to the Standby profile with a direct Ethernet connection.

To add a new network configuration click the **Add Configuration** button.



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4.5.6.1 Network Configuration Fields

Field	Description
Network Name	Create a unique network name that will be referenced during creation of any networked profile. The Network Name is limited to 8 characters and may only include letters, numbers or a hyphen '-'.
VPN Certificate	A reference to a VPN configuration. Upload VPN certificates from the VPN certificate tab. If no VPN is to be used select None.
IP Address	IP Address the GoBox will use when this operational profile is used. The GoBox will reconfigure its network interface and IP address to this value when selected.
Subnet mask	The subnet mask the GoBox will use when this operational profile is selected.
Default gateway	The default gateway the GoBox will use when this operational profile is selected.
RNC IP Address	The static IP Address of the RNC that the GoBox will register with and will be used to perform multi-site repeating.
RFSS ID	P25 Radio Frequency Sub-System ID.
System ID	P25 System ID. Allowed values are hexadecimal (000 to FFF)
Group ID	P25 Network Talkgroup ID. Allowed values are hexadecimal (0000 to FFFF)
High Latency / Unreliable Link	When checked, the GoBox will perform PTT arbitration locally instead of needing a round-trip to the RNC to enforce the talking party. This field can be checked to reduce repeat delay if there is a backhaul link between the GoBox and RNC that is slow or disconnects often (e.g. satellite).

Several “Advanced Options” are also available by clicking on the “+” to expand the form:

Field	Description
Control Traffic DSCP	Differentiated Service Code Point for Control Traffic A classification parameter for network traffic between the GoBox and an RNC or DFSI host. It is used to provide QoS. The DSCP must be between 0 and 63.
Voice Traffic DSCP	Differentiated Service Code Point for Voice Traffic
RNC Poll Period	A SIP Options request will be sent to the RNC at the supplied interval to determine the connection status. On a metered network connection, this figure can be increased to reduce connection costs associated with this action. The poll period must be between 0 and 30 seconds.
Voice Frames Per RTP Packet	The number of voice frames within each RTP packet sent into the network. On a metered network connection, this figure can be increased to reduce connection costs. Valid values are 1, 2, or 3.
Keep Network Calls Alive	When checked, the GoBox will attempt to re-establish the RTP connection associated with a network group if it is torn down by RNC. On a metered network connection, disabling this can reduce connection costs if the P25 network regularly tears down the talk group. The recommended default is checked.

4.5.6.2 VPN Certificate Management

The GoBox supports using a VPN connection to establish a secure network tunnel between itself and a remote server via the use of OpenVPN. The GoBox is the VPN client and expects to establish the connection with a VPN server. To view and add new VPN connections, click on the **Network Configurations** administrator option and then click the **VPN Certificate Management** tab.

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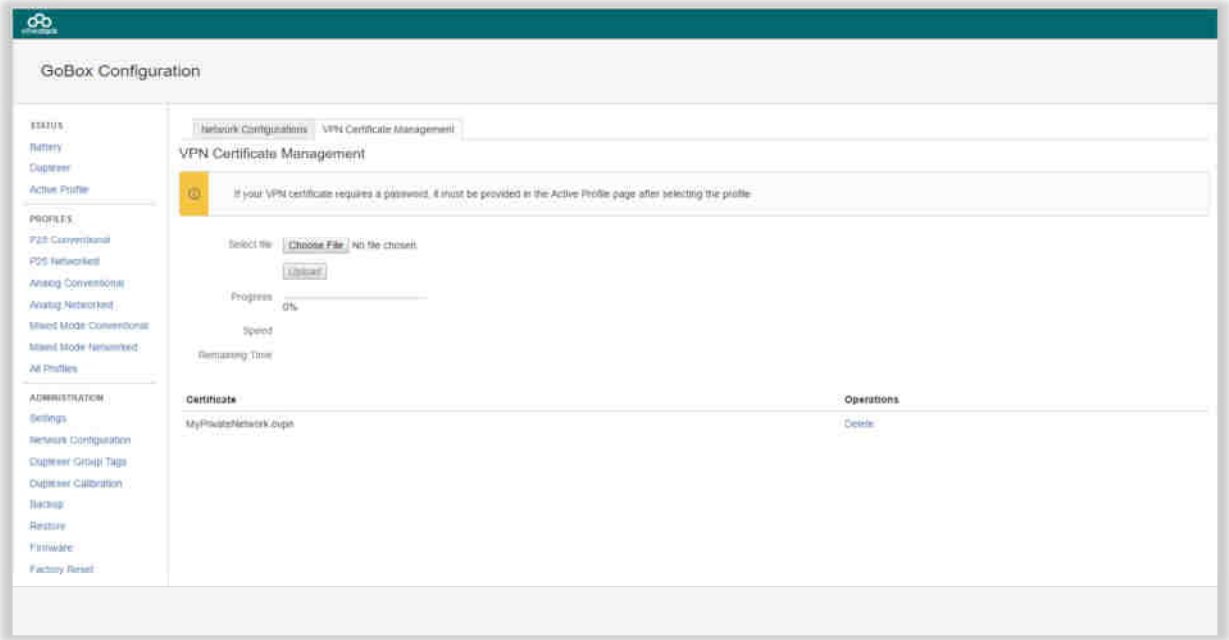

To add a new VPN certificate, click the **Choose File** button. Your VPN administrator should have provided you with a filename with the suffix **.ovpn** which is the format for OpenVPN client certificates and also contains other VPN settings specific to each client.

Once selected, click the **Upload** button to copy the file to the GoBox, the new certificate should appear in the certificate listings and can then be used by network configurations.

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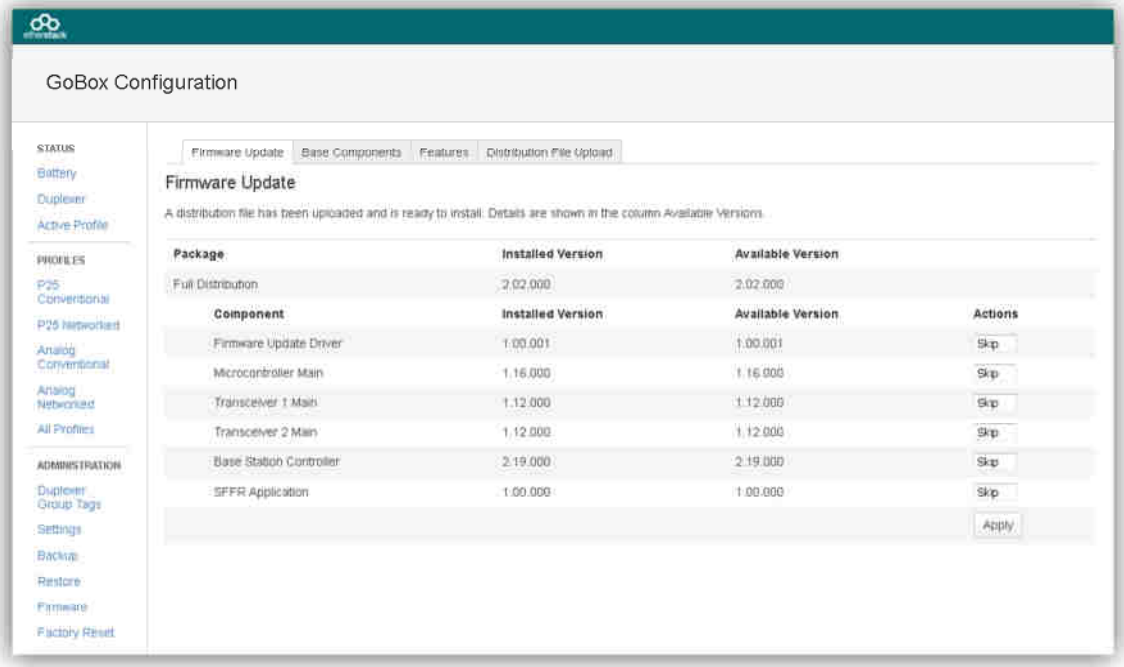
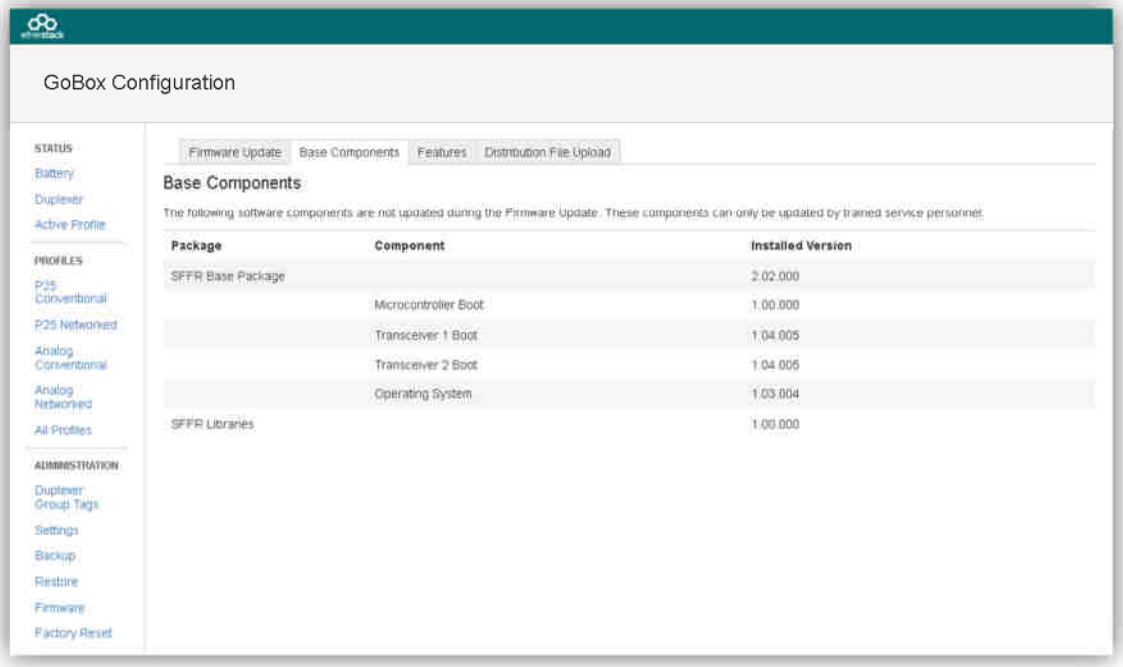
4.5.7 Firmware Versions

The GoBox consists of several hardware and firmware sub systems. Since the behaviour will vary slightly between versions, it will be necessary to provide details of the installed firmware versions with any problem reports or support queries.

To view the installed versions, select **Firmware** from the navigation pane. The **Firmware Update** tab lists the currently installed firmware versions under the **Installed Version** column.



The **Base Components** tab lists components which are not user upgradable but whose versions may be required by Support.



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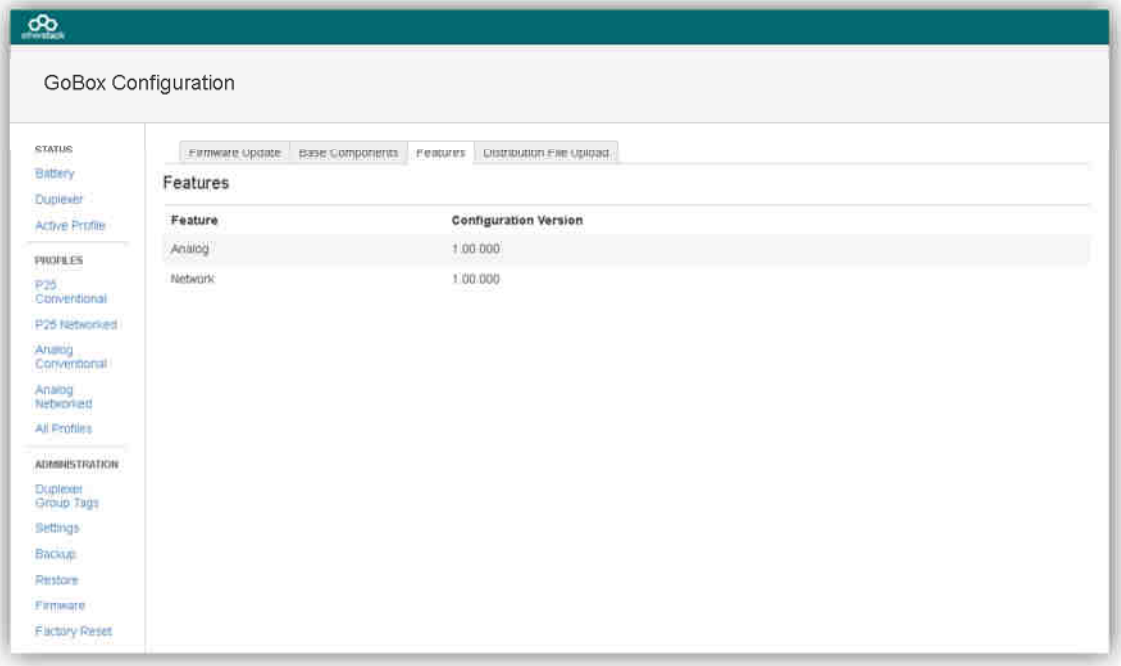
The **Features** tab lists the options licensed for this GoBox.



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4.5.8 Upgrading Firmware

The GoBox supports updating of the firmware components listed on the **Firmware Update** tab of the **Firmware** page. Upgrading the GoBox firmware consists of two steps, which can be done at different times:

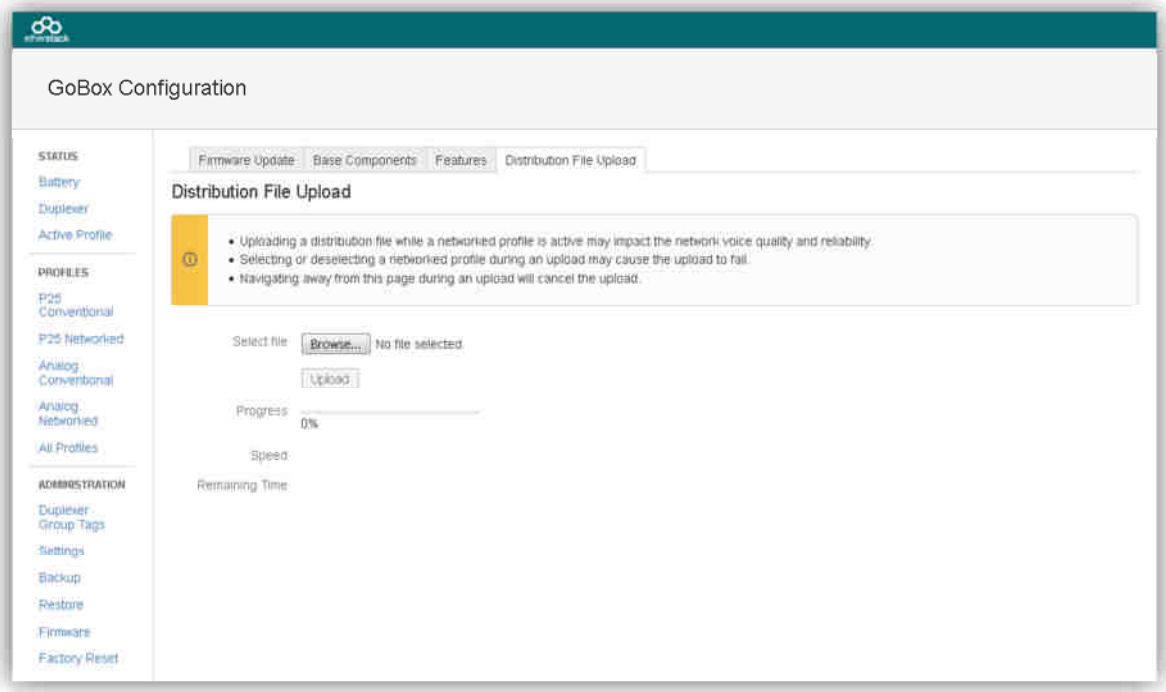
1. Uploading a firmware distribution file, which has previously been copied to the PC/laptop, to the GoBox.
2. Installing the firmware.

4.5.8.1 Uploading a Firmware Distribution File

In order to ensure a smooth file transfer, check that the following prerequisites can be met:

1. The GoBox and PC/laptop must be able to maintain a network connection for the duration of the upload. This may take several minutes if the network link is slow: For the typical size of 4.5MBytes of a firmware distribution file, and over a relatively slow link of 256kbit/s, the transfer could take 3-4 minutes.
2. If the GoBox is operating with a networked repeating profile, and the PC/laptop connects to the GoBox over the same link as the call traffic between the GoBox and the RNC, uploading a firmware distribution file may affect the voice quality. It is recommended to either not upload a firmware distribution file while operating a networked repeating profile, or connect the PC/laptop directly to the GoBox for the upload, not using the same network connector of the GoBox as for the link to the RNC.
3. Changing the operating profile of the GoBox during an upload, where either the new or old profile is networked, may interrupt the upload. This is due to the change of the GoBox' IP address.

Navigate to **Firmware** from the navigation pane, and select the tab **Distribution File Upload**.



Click on **Browse...** to select a file, then click on **Upload** to start transferring the file. The page will show some information about the progress of the upload. At the end of a successful upload, the browser will be redirected to the **Firmware Update** tab.

4.5.8.2 Installing Firmware Updates

Before beginning the firmware installation procedure, check that the following conditions are met:

1. The GoBox has sufficient power for the whole procedure, i.e. is either powered with a sufficiently charged battery or connected to an AC or DC power source. An estimate of the time required for installation is shown before the process starts. No installation process is expected to take more than about 10 minutes.
2. Repeater operation must be halted while firmware is being installed. Ensure that no radio communications rely on this GoBox for the needed time.
3. If the GoBox is operating with a networked profile, the GoBox will not automatically deselect this profile, because doing so may interrupt the network connection between the GoBox and PC/laptop. In this case, manually deselect the profile before commencing a firmware update, using the rotary dial on the GoBox or the **Status** -> **Active Profile** page of the remote interface.

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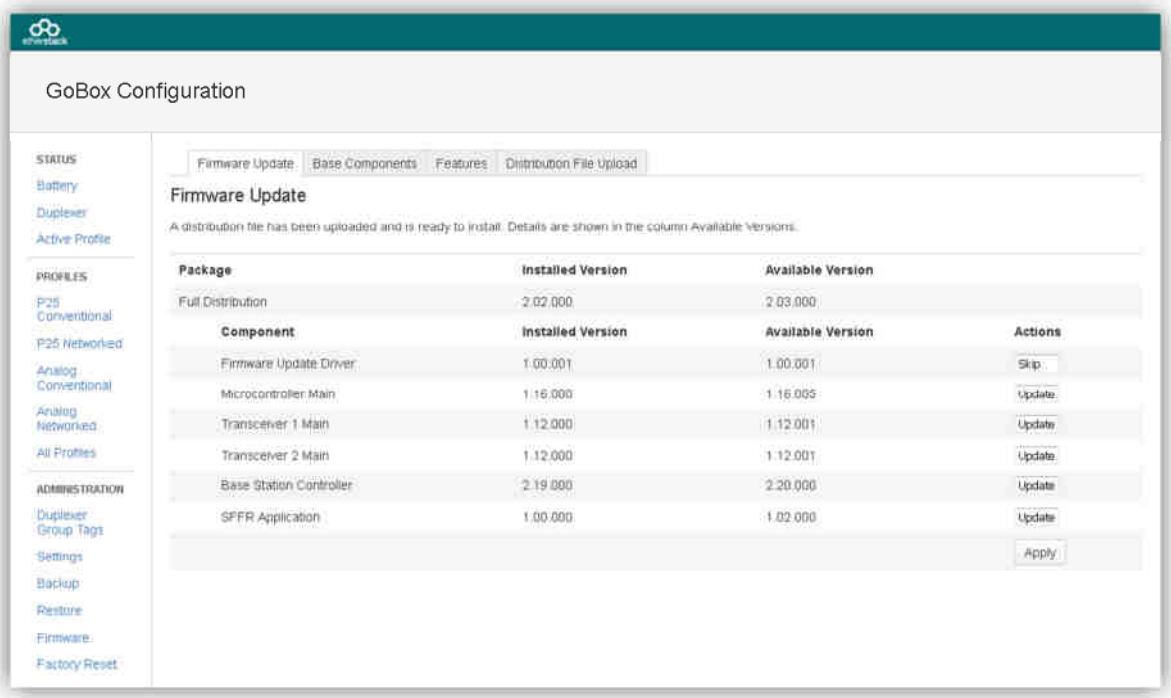
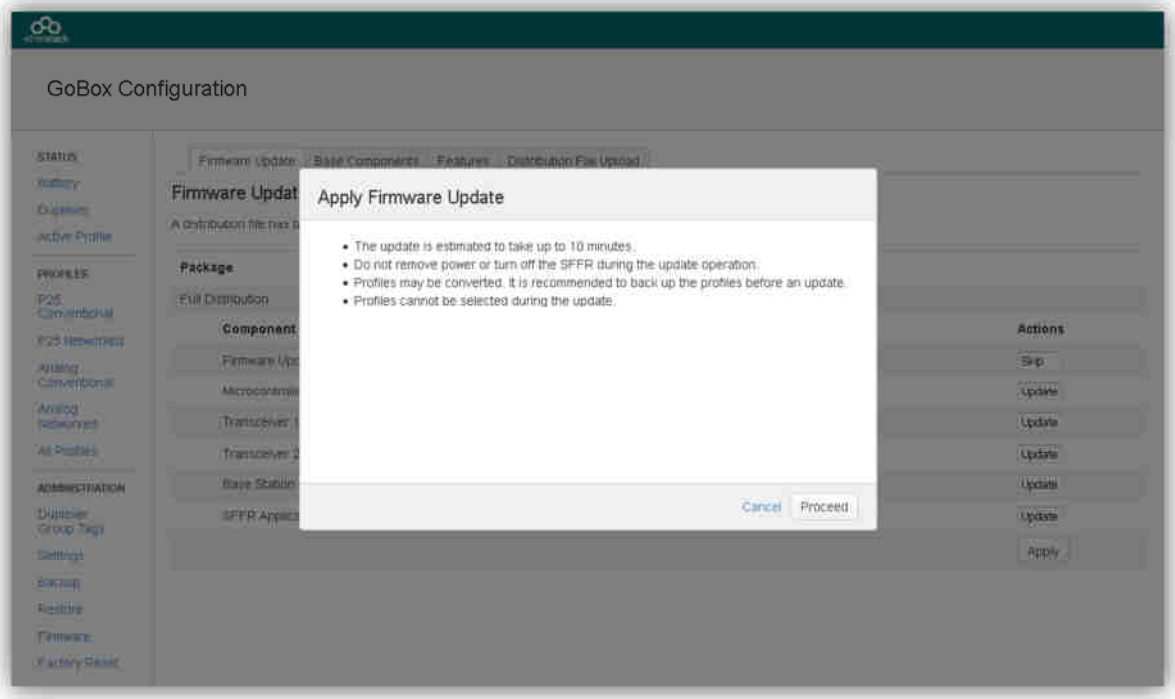
Once a firmware distribution file has been uploaded to the GoBox, its contents are listed alongside the installed component versions.



During a typical firmware update, all components are brought up to date with the versions contained in the uploaded distribution file. Components which already contain the same firmware version as the available one are skipped. Click on **Apply** to proceed.



An estimate of the time required for the update is calculated and shown at this time. To start the installation, click on **Proceed**, otherwise click on **Cancel**.

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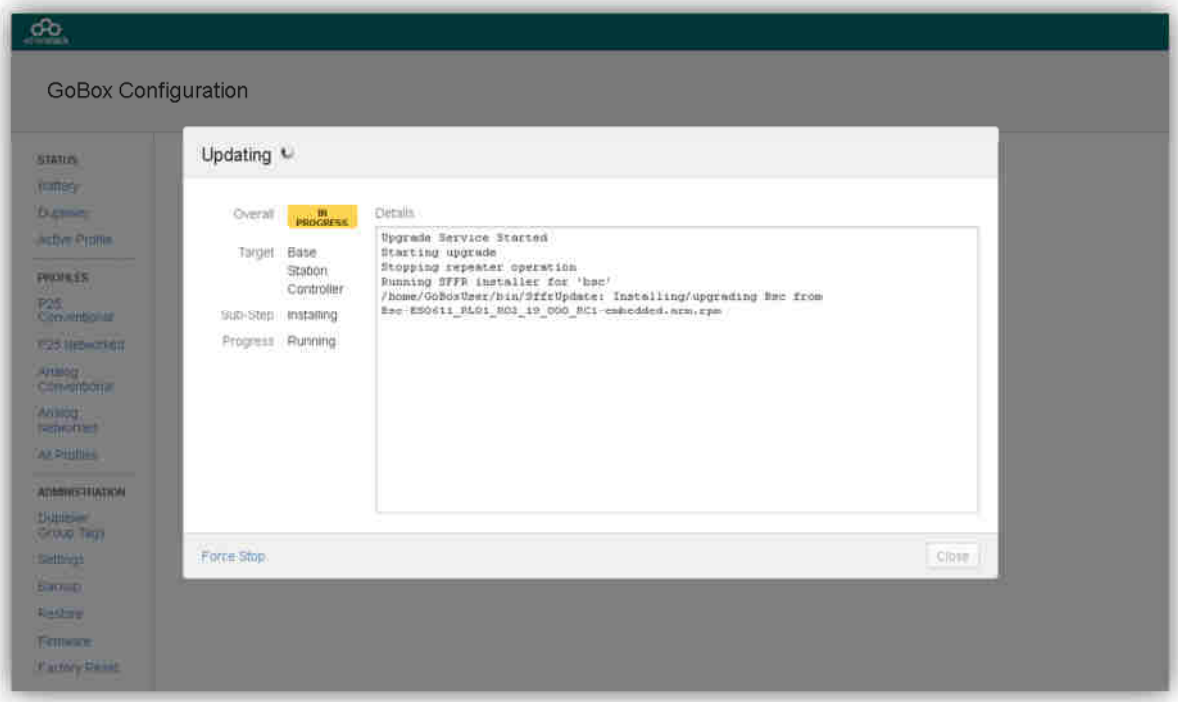
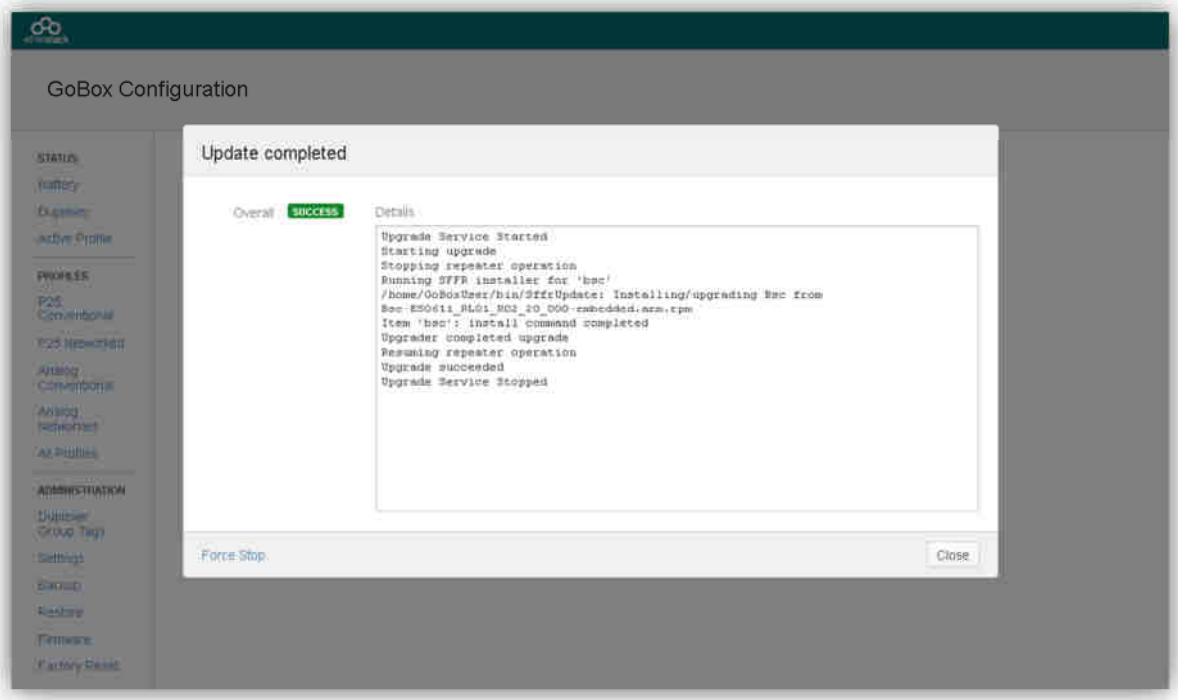


A progress screen is shown for the duration of the installation process, and is updated approximately once a second. If the web interface itself is being updated, progress screen updates may be suspended for up to 20 seconds.

> !
> If the progress page stops refreshing during an update, e.g. because the network connection was interrupted, or the user navigates away in the browser, the update will nevertheless continue.
> Open http://172.16.10.1/update/progress/ to resume viewing the status of the update.

During an update, the status display on the GoBox will generally show “Updating” and the power/status and Rx LEDs will flash. Certain upgrade steps may temporarily turn off the status display and LEDs entirely.



Once the installation process has completed, clicking on **Close** will return to the firmware overview page.

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5 Troubleshooting

5.1 Cannot connect to the GoBox web interface

Ensure a functioning Ethernet cable is connected to the GoBox from your PC/Laptop and check the Ethernet activity lights are on or flashing on the GoBox Ethernet connector.

Ensure that the GoBox LCD displays the "Standby" string. This ensures that the IP address configuration will be set to the default of 172.16.10.1. If the GoBox does not display "Standby", press and turn the rotary dial until the status window displays "Standby", then release the dial.
Verify there is network connectivity between your PC/laptop and the GoBox on the 172.16.10.1 subnet. (Request help from your System Administrator if required.)

5.2 Network Status icon displays REG ERR

The RNC was reachable, but the GoBox could not complete the registration procedure due to a configuration error on the GoBox or RNC. In this scenario, the GoBox will repeat calls locally, but will not receive from or send calls out onto the network. Check that the P25 network addresses on the RNC and GoBox match, and that the RNC contains an entry for the talk group configured on the GoBox. If a change was required on the RNC, the GoBox will periodically retry to register until it is successful. Otherwise, re-select the profile after the necessary changes are made on the GoBox.

5.3 Network Status icons displays PSWD

The selected profile is trying to connect to a VPN using a certificate that requires a decryption password. To enter the password, visit the “Active Profile” page on the GoBox web interface. Enter the password in the prompt within the “VPN Connection” panel and click “Submit”.

5.4 Network Status icon WWW does not turn solid

The GoBox is unable to reach the server hosting the RNC or VPN service. The following should be verified:

- the active profile’s Network Configuration is configured with the correct RNC IP address
- the network plan permits routing of packets between the GoBox and RNC
- the WAN connection is established (e.g. satellite modem)

5.5 Network Status icon VPN does not turn solid

On very high latency links, the VPN service may have trouble establishing a connection, even if there is general network connectivity. If the GoBox’s system time is out of sync, this may increase the time required to establish a connection. Allow several minutes for the GoBox to sync to the NTP server. If the GoBox still cannot connect to the VPN service, even after reselecting the active profile, submit the GoBox logs to support to help determine the cause of the issue.

5.6 Network Status icon RNC does not turn solid

The GoBox cannot connect to the RNC service. Verify that the RNC service is online and that the profile’s network configuration contains the correct RNC IP address.

5.7 Status window displays Err:Ctrl

Power-cycle the GoBox and if the problem persists turn the GoBox off and remove and reinsert the control module. If the error still is present when power is reapplied, contact support.

5.8 Status window displays Err:Rad1, Err:Rad2 or Err:Rad12

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Power-cycle the GoBox and if the problem persists turn the GoBox off and remove and reinsert the radio module. If the error still is present when power is reapplied, contact support.

5.9 There are no profiles to select on the GoBox control panel

You need to have at least one profile programmed in your GoBox and if a duplexer tag is configured, at least one of the profiles must have the same tag or the tag “All”, otherwise it will be hidden.

Check your operational profiles using the web interface and retry.

Profile selection is also disabled during firmware installation.

5.10 GoBox web interface displays “Template Syntax Error”

The GoBox profile and duplexer information may have become corrupted due to a power or network loss during configuration.

If this occurs, please either restore your operational profiles from a backup or perform a Factory Reset using the web interface.

5.11 The LEDs and the LCD backlight do not turn on

Using the **Settings** page of the web interface, check that the brightness has not been set to “Off”.

5.12 When turning on the GoBox, the LEDs flash rapidly for a second, and the LCD stays blank

This may occur after an interrupted firmware update attempt (e.g. the GoBox lost power during the installation.)

Wait 30 seconds after powering up, then connect a PC/laptop and attempt to open the web interface. If it is available, go to the **Firmware** page and try to repeat the last firmware installation. If the web interface is not accessible, contact an authorised dealer for support.

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6 Glossary

Term	Definition
APCO	Association of Public-Safety Communications Officials
AVL	Automatic Vehicle Location
DFSI	Digital Fixed Station Interface
ISSI	Inter Sub-System Interface
MMI	Man Machine Interface
NAC	Network Access Code
OTAR	Over the Air Rekeying
PTT	Push-To-Talk
P25	Project 25
RFSS	Radio Frequency Sub-System
RNC	RFSS Network Controller
SFFR	Small Form Factor Repeater
VPN	Virtual Private Network
WACN	Wide Area Communications Network

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