HUGHES
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Hughes 9502

User Guide

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Understanding safety alert messages

Safety alert messages call attention to potential safety hazards and tell you how to avoid them. These messages are identified by the signal words DANGER, WARNING, CAUTION, or NOTICE, as illustrated below. To avoid possible property damage, personal injury, or in some cases possible death, read and comply with all safety alert messages.

Messages d'alerte de sécurité attirent l'attention sur les dangers potentiels et de vous dire comment les éviter. Ces messages sont identifiés par un signal mots DANGER, AVERTISSEMENT, ATTENTION, ou avis, comme illustré ci-dessous. Pour éviter des dommages matériels, des blessures ou la mort dans certains cas possible de lire et de respecter tous les messages d'alerte de sécurité.

Messages concerning personal injury / *Messages concernant des blessures corporelles*

The signal words DANGER, WARNING, and CAUTION indicate hazards that could result in personal injury or in some cases death, as explained below. Each of these signal words indicates the severity of the potential hazard.

Le signal de DANGER mots, AVERTISSEMENT et ATTENTION indiquer les dangers qui pourraient entraîner des blessures ou, dans certains cas la mort, comme expliqué ci-dessous. Chacun de ces mots du signal indique la gravité du danger potentiel.

DANGER indicates a potentially hazardous situation which, if not avoided, *will* result in death or serious injury.

DANGER indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in serious injury.

AVERTISSEMENT indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures graves.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

ATTENTION indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.

Messages concerning property damage / *Messages concernant des dommages matériels*

A NOTICE concerns property damage only.

NOTICE

NOTICE is used for advisory messages concerning possible property damage, product damage or malfunction, data loss, or other unwanted results—but *not* personal injury.

AVIS est utilisée pour les messages concernant les dommages matériels, des dommages au produit ou de dysfonctionnement, de perte de données ou d'autres résultats indésirables, mais des blessures non personnelle.

Safety symbols

The generic safety alert symbol

calls attention to a potential personal injury hazard. It appears next to the DANGER, WARNING, and CAUTION signal words as part of the signal word label. Other symbols may appear next to DANGER, WARNING, or CAUTION to indicate a specific type of hazard (for example, fire or electric shock). If other hazard symbols are used in this document they are identified in this section.

Le symbole générique d'alerte suivant

attire l'attention sur un danger potentiel de risque de blessures. Il apparaît à côté des mots DANGER, AVERTISSEMENT et ATTENTION dans le cadre de l'affichage d'alerte. D'autres symboles peuvent apparaître à côté de DANGER, AVERTISSEMENT ou ATTENTION pour indiquer un type spécifique de danger (par exemple, un incendie ou un choc électrique). Si d'autres symboles de danger sont utilisés dans ce document, ils sont décrits dans cette section.

Additional symbols / *Symboles supplémentaires*

Warning Potential Radio Frequency (RF) hazard. Where you see this alert symbol and WARNING heading, strictly follow the warning instructions to avoid injury to eyes or other personal injury.

Avertissement *Danger possible de Fréquence Radio (RF). A la vue de ce symbole d'alerte et du terme AVERTISSEMENT, suivez rigoureusement les instructions d'avertissement afin d'éviter une blessure aux yeux ou toute autre blessure.*

Warning Where you see this alert symbol and WARNING heading, strictly follow the warning instructions to avoid personal injury.

Avertissement *A la vue de ce symbole d'alerte et du terme AVERTISSEMENT, suivez rigoureusement les instructions d'avertissement pour éviter toute blessure.*

Danger Electric shock hazard: Where you see this alert symbol and DANGER heading, strictly follow the warning instructions to avoid electric shock injury or death.

Danger *Risque de choc électrique: A la vue de ce symbole d'alerte et du terme DANGER, suivez rigoureusement les instructions d'avertissement pour éviter tout choc électrique ou blessure mortelle.*

Warnings for satellite terminal / *Avertissements pour le terminal satellite*

Do not stand in front of the ODU (Antenna) This device emits radio frequency energy. To avoid injury, do not place head or other body parts in front of the satellite ODU when system is operational. Maintain a distance of 1 m or more from the front of the Satellite Terminal ODU.

Ne pas se tenir en face de l'ODU (antenne) *Cet appareil émet une énergie de fréquence radio. Pour éviter toute blessure, ne placez pas la tête ou toute autre partie du corps en face de l'ODU satellite lorsque le système est opérationnel. Maintenez une distance de 1 m ou plus par rapport à l'ODU du terminal satellite.*

General Handle your Satellite Terminal with care. Avoid exposing your Satellite Terminal to extreme hot or cold temperatures outside the range -40ºC to +75ºC.

Avoid placing the Terminal close to cigarettes, open flames or any source of heat.

Changes or modifications to the Terminal not expressly approved by Hughes Network Systems will void the Warranty and could void your authority to operate this equipment.

Only use a soft damp cloth to clean the Terminal.

To avoid impaired Terminal performance, please ensure the unit's ODU is not damaged or covered with foreign material like paint or labeling.

When inserting the SIM, do not bend it or damage the contacts in any way. When connecting the interface cables, do not use excessive force.

Général *Manipulez votre terminal satellite avec soin. Évitez d'exposer votre terminal satellite à des températures extrêmement chaudes ou froides en dehors de la plage -40 º C à 75 º C.*

Évitez de placer le terminal à proximité de la cigarette, de flammes nues ou de toute source de chaleur.

Les changements ou modifications apportées au Terminal et non expressément approuvées par Hughes Network Systems annulent la garantie et peuvent annuler votre droit à utiliser cet équipement.

Utilisez uniquement un chiffon doux humide pour nettoyer le terminal.

Pour éviter toute dégradation des performances du terminal, veuillez vous assurer que l'ODU de l'unité n'est pas endommagée ou recouverte d'un corps étranger, comme de la peinture ou de l'étiquetage.

Lorsque vous insérez la carte SIM, ne pas la plier ni endommager les contacts en aucune manière. Ne pas forcer lors de la connexion des câbles d'interface.

In the vicinity of blasting work and in explosive environments Never use the Satellite Terminal where blasting work is in progress. Observe all restrictions and follow any regulations or rules. Areas with a potentially explosive environment are often, but not always, clearly marked.

A proximité de travaux de dynamitage et d'environnements explosifs *N'utilisez jamais le terminal satellite près de travaux de dynamitage en cours. Respectez toutes les restrictions et suivez toutes les instructions ou la règlementation. Les zones présentant une atmosphère potentiellement explosive sont généralement, mais pas toujours, clairement signalées.*

Qualified Service Do not attempt to disassemble your Satellite Terminal. The unit does not contain consumer-serviceable components. Only qualified service personnel may install or repair equipment.

Service Qualifié *N'essayez pas de démonter votre terminal satellite. L'unité ne contient pas de composants réparables par le consommateur. Seul le personnel qualifié peut installer ou réparer le matériel.*

Accessories Use Hughes approved accessories only. Use of non-approved accessories may result in loss of performance, damage to the Satellite Terminal, fire, electric shock or injury.

Accessoires *Utilisez uniquement des accessoires approuvés par Hughes. L'utilisation d'accessoires non approuvés peut entraîner une dégradation de performance, un endommagement du terminal satellite, un incendie, une électrocution ou des blessures.*

Connecting Devices Never connect incompatible devices to the Satellite Terminal. When connecting the Satellite Terminal to any other device, read the device's User Manual for detailed safety instructions.

Connexion de périphériques *Ne jamais connecter des périphériques incompatibles au terminal satellite. Lors du raccordement du terminal satellite à un autre appareil, lire le manuel utilisateur du périphérique pour les instructions détaillées de sécurité.*

Pacemakers The various brands and models of cardiac pacemakers available exhibit a wide range of immunity levels to radio signals. Therefore, people who wear a cardiac pacemaker and who want to use a Satellite Terminal should seek the advice of their cardiologist. If, as a pacemaker user, you are still concerned about interaction with the Satellite Terminal, we suggest you follow these guidelines:

- Maintain a distance of one meter from the front and sides of the ODU and your pacemaker;
- Refer to your pacemaker product literature for information on your particular device.

If you have any reason to suspect that interference is taking place, turn off your Satellite Terminal immediately.

Stimulateurs Cardiaques *Les différentes marques et modèles de stimulateurs cardiaques disponibles présentent un large éventail de niveaux d'immunité aux signaux radio. Par conséquent, les personnes qui portent un stimulateur cardiaque et qui veulent utiliser un terminal satellite doivent demander l'avis de leur cardiologue. Si, en tant qu'utilisateur de stimulateur cardiaque, vous êtes toujours soucieux d'une éventuelle interaction avec le terminal satellite, nous vous suggérons de suivre ces directives:*

- *Maintenez un mètre de distance entre votre stimulateur cardiaque et l'avant ou les côtés de l'ODU;*
- *Reportez-vous à la documentation de votre stimulateur cardiaque pour toute information spécifique à celui-ci.*

Si vous avez un doute que des interférences se produisent, éteignez votre terminal satellite immédiatement.

Hearing Aids Most new models of hearing aids are immune to radio frequency interference from Satellite Terminals that are more than 2 meters away. Many types of older hearing aids may be susceptible to interference, making it very difficult to use them near a Terminal. Should interference be experienced, maintain additional separation between you and the Satellite Terminal.

Appareils Auditifs *La plupart des nouveaux appareils auditifs sont insensibles aux interférences dues aux fréquences radio des terminaux satellites situés à plus de 2 m . De nombreux modèles plus anciens peuvent être sensibles aux interférences, ce qui les rend très difficiles à utiliser à*

proximité d'un terminal. En cas d'interférences détectées, veuillez maintenir une distance supplémentaire entre vous et le terminal.

Electrical Storms installation of the Satellite Terminal during electrical storms may result in severe personal injury or death.

Orages Electriques *L'installation d'un terminal satellite pendant un orage électrique peut entrainer des blessures graves ou mortelles.*

Protective Earth Grounding is recommended by Hughes for both the IDU and the ODU equipment. Please consult professional local advice for these requirements.

Une mise à la terre de protection *est recommandée par Hughes à la fois pour l'IDU et le matériel ODU. Veuillez consulter un conseil professionnel local pour ces spécifications.*

Chapter 1

Product description

Contents of the Hughes 9502 kit

The Hughes 9502 Kit (P/N 3500509-0001) is a two piece design that comes with an Indoor Unit (IDU), an Outdoor Unit (ODU) and a 10 meter RF cable that has an N type connection at both ends and an N to TNC adapter inside the cable bag for connection to the IDU.

Figure 1: IDU P/N 3500563-0001

Figure 2: RF cable with N to TNC adapter P/N 3500634-0001

Figure 3: ODU P/N 3500564-0001

Optional mounting accessories

The IDU can be mounted using the IDU strap (P/N 3500617-0001) if desired. Strap will require 4 each mounting bolts either M3.5 or 6/32” (not included).

Figure 4: IDU mounting strap

The ODU can be mounted using the Basic Fixed Mount Kit (P/N 3004066-0002) or by using the azimuth elevation bracket (P/N 1022994-0022) and an existing 1.5” diameter pole.

Figure 5: Azimuth/Elevation bracket

Main features of the 9502

The main features of the Hughes 9502 terminal are listed below:

- Use of Internet Protocol (IP) via the BGAN satellite network
- Remote Management
  - Web UI interface
  - SMS Control
  - AT Command Control
  - Log file upload
  - Terminal configuration
  - Remote firmware upgrade
- Power Savings and Sleep Mode
- IP Watchdog
- Install Mode
- XL-band ready
- NAT, NAPT, Relay and PPPoE Modes
- Auto Power ON when power is applied

- Automatic PDP Context Activation (Static or DHCP)
- Dedicated M2M web UI
- Security
  - Ethernet MAC Filtering
  - Administration Password
  - SMS Control password
  - White List for SMS control
  - AT Command password lock
  - SIM Personalization
    - Phone-to-SIM
    - DP SIM Lock
    - SP SIM Lock

Interfaces

The Hughes 9502 has the following interfaces:

- Ethernet connection (RJ45)
- USB 1.1 connection (USB Type-B) for PC to configure terminal (requires installation of Hughes USB driver. See www.bgan.hughes.com)
- TNC type RF connector on IDU and N-type RF connector on the ODU
- Integrated GPS receiver and L-band ODU
- RS232 serial interface (DB9 male, DTE) to external NMEA 0183 based GNSS device (e.g., GLONASS receiver). This port **cannot** be used for serial data.
- 3 LED status display and a single function button
- 3.5 mm stereo audio jack for audio tone or voltage level to assist in ODU pointing
- USIM card slot behind SIM door

Figure 6: Front side view of IDU

Figure 7: Back side view of IDU

Terminal specifications

Table 1: Terminal specifications

Technical Specifications	
Satellite TX Frequency	@ 1626.5 – 1675MHz
Satellite RX Frequency	@ 1518 – 1559 MHz
GPS Frequency	@ 1574.42 – 1576.42 MHz
9502 Indoor Unit Weight:	1.12 Kg
9502 Indoor Unit Dimensions:	150 mm x 200 mm x 45 mm
9502 External Antenna Weight:	1.85 Kg (exclude mount and cable)
9502 External Antenna Dimensions:	385 mm x 385 mm x 33 mm
Operating Temperature	-40°C to +75°C
Storage Temperature	-55°C to +75°C
Humidity	95% RH at +40°C
9502 External Antenna Wind loading	Survival wind loading (with optional mount) up to 100 mph
9502 Indoor Unit Water and Dust	IP-40 Compliant
9502 External Antenna Water and Dust	IP-65 Compliant
Nominal Input Voltage and Max Current	+12VDC / +24VDC 1.5A / 0.75A
Minimum/Maximum input voltage	+10.8VDC / +26.4VDC
Data Connectivity:	RJ45 connector (Ethernet 10BaseT)
	USB –Type B (USB 1.1 for configuration PC)
Other Features:	
	Single external BGAN Satellite and GPS antenna connection
	GPS module inside Indoor Unit
	3 status LEDs
	Antenna pointing audio tone and voltage level indicator through audio jack
	SIM/USIM Slot (behind SIM door)

Information for maintenance

In the event that a Hughes 9502 terminal develops a problem, please follow the instructions below.

For users:

Please contact the company that you purchased the Hughes 9502 terminal from so that they can request an RMA from Hughes for your terminal.

For distribution providers:

Should a Hughes 9502 terminal need to be returned for repair, an RMA will be required.

- To request an RMA access the Customer Care Portal at https://customergateway.hns.com
- Alternatively, an RMA may be requested via Email to MRC@hns.com
- Ship the unit to the Hughes repair center at the following address; *be sure to include the RMA number on the address label.*

  Hughes Network Systems

  Attn: RMA # XXXXXXXXX

  Material Return Center

  16060 Industrial Drive

  Gaithersburg, MD 20877

  USA

Date of manufacture

If it is necessary to determine the date of manufacture of a unit, e-mail Hughes at MobileSatelliteSupport@Hughes.com and provide the IMEI from the unit label.

Manufacturer contact

For other general queries, contact Hughes at:

11717 Exploration Lane, Germantown, MD 20876, USA

+1 (301) 428-5500

www.hughes.com

Chapter 2

Configuration via Web UI

The UT is typically configured via the Web User Interface (UI). Browsers that are currently supported are IE, Edge, Firefox, and Safari. Release 5.9.6.1 adds full support for the Chrome browser.

Web UI layout

The Web User Interface (UI) can be accessed from a MAC or PC browser by entering 192.168.128.100 as the URL (unless you change the IP address of the UT.)

Table 2 shows the 9502 Web UI layout:

Table 2: 9502 Web UI layout

Home	Connections	Settings	M2M	Security	SMS
Home	Manage Contexts Automatic Contexts Manage APNs	General IP Address / DHCP Ethernet ATC Setup Features	M2M Setup	Security	Send/Receive SMS Saved Drafts Sent Messages

Home tab

The home page includes the following fields:

Terminal Information

- Model, IMEI, Software Version

SIM Information

- IMSI, SIM APN, Terminal phone number

Troubleshooting

Terminal Log Files: This allows you to extract and save any of the following log files for troubleshooting purposes:

- System Log
- Event Log
- Packet Log

These files can be FTPed out of the UT and used for debugging. To download the logs right-click on the “Download Current” link and select “Save Target As”. This uses FTP to retrieve the files from the UT which can be blocked by some security software such as McAfee. If you encounter problems, check your PC security settings.

When extracting files, clear the browser cache on the computer between each download or the browser may use a cached copy rather than downloading the latest version of the file. It is also best to save the file to a unique name including a time stamp.

Release 5.9.6.1 adds support for downloading files with the Chrome browser. It also adds a timestamp to the file name to avoid the caching problem mentioned above.

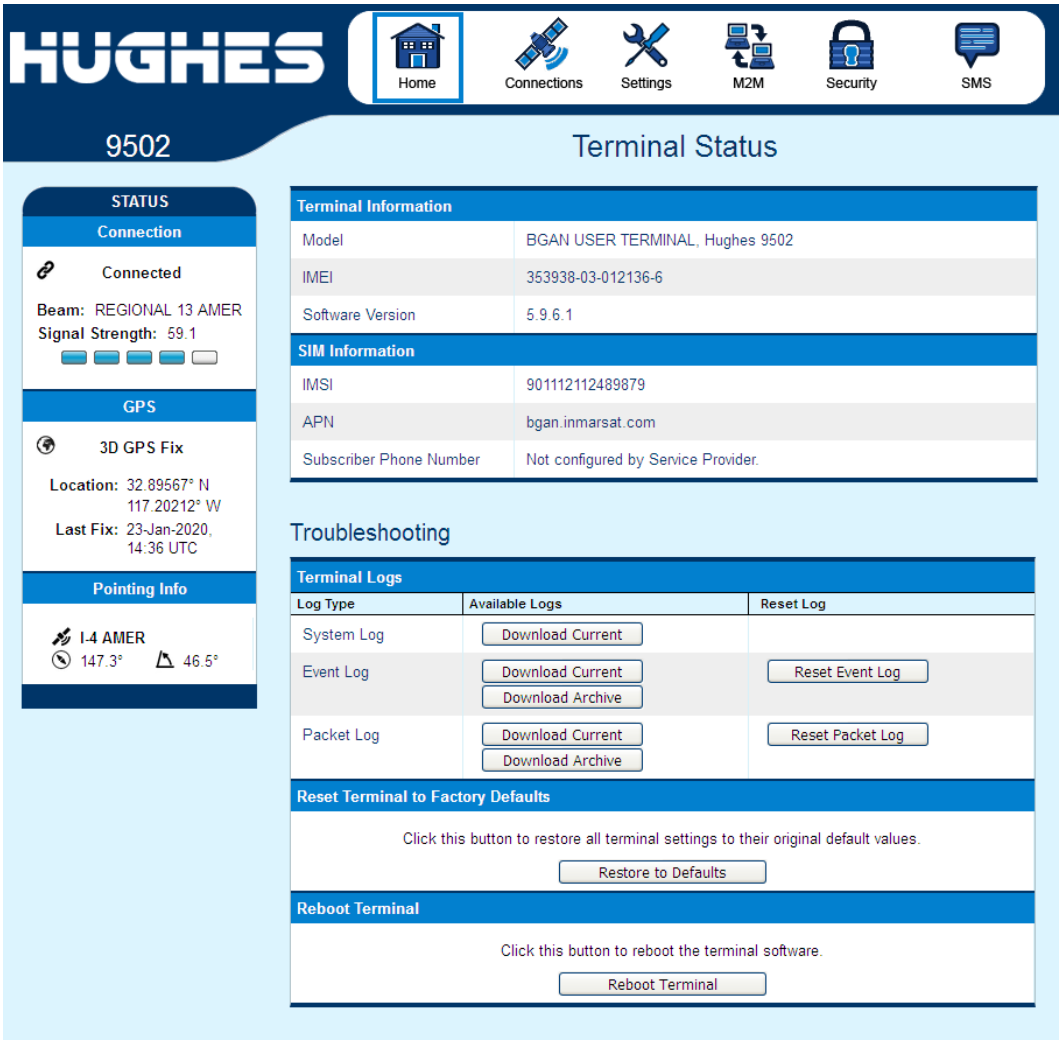


Figure 8: Home Page

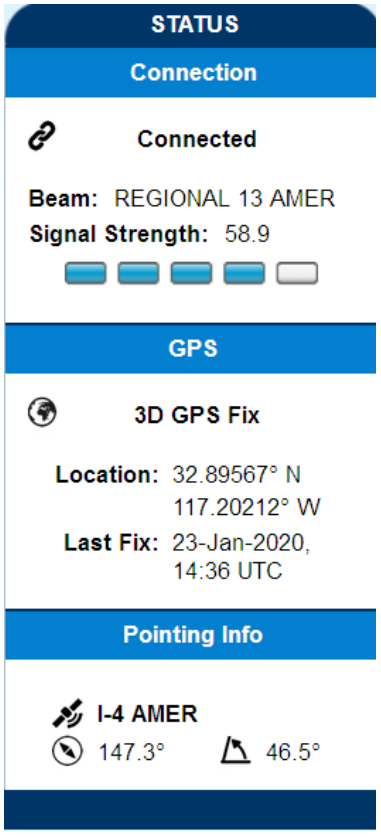
Reset Terminal to Factory Defaults: Clicking the "Restore to Defaults" button will restore the UT back to the factory default settings and delete any of the user parameters that have been set-up in the UT, including any custom APN settings.

In Release 5.9.6.1 and above you can also **Reset to Factory Defaults** if the small blue button next to the SIM card holder is depressed while powering off. Press and hold the blue button and then press and hold the function button for three seconds until the LEDs flash. Then release both buttons. Note this function is blocked if enhanced security is active.

Reboot Terminal: Clicking this button reboots the terminal so that configuration changes can be saved into the configuration file, or it can be clicked when just a simple reboot of the terminal is required.

Status bar

The status bar is included on the home page and other pages that do not have a navigation bar. It includes a field with the elevation angle and compass direction towards the visible satellite(s).



The status text in the *Connection* section is as shown in Table 3 below.

Table 3: Status bar

Display	Comments	Corresponding LED display
Initializing	Initial startup (~15-20 secs)	Various
Pointing	UT in pointing mode	All three LEDs flash 1Hz
Registering	Attempting to register - pointing mode exited or bypassed	PWR on, GPS on or flashing, NET off
Registered	Registered and attached, no context	PWR on, GPS on and NET flashing
Connected	PDP context active	All three on (or off after 1 minute timeout)

The signal strength bar shows the quality of the received signal. It also lists the current satellite beam type, beam number and the current satellite. The signal strength increases in value as the UT transitions to the Regional Beam and again when it gets a PDP context and transitions to the Narrow Beam.

Typical signal levels for the 9502:

Global beam, during pointing: 50 – 55 dB

Regional beam, during registration or idle: 57 – 61 dB

Narrow beam, on a data channel: 65 – 70 dB

The *GPS* status area shows the status of the GPS fix and results are shown in the following table:

Table 4: GPS status

Display	Comments
Acquiring	Trying to acquire a GPS fix
Stored	UT is using a Stored GPS fix
2D GPS Fix	The UT has acquired a 2D GPS fix and can continue Registration with the network
3D GPS Fix	The UT has acquired a 3D Fix
GNSS Fix	The UT got a fix from a GNSS device connected to the serial port.
Location	Shows Latitude and Longitude coordinates if allowed by network GPS Policy. Shows "**Waiting**" if the unit has a fix but the policy has not yet been received from the network.
Last Fix	Shows date and UTC time of last GPS fix

The *Pointing Info* section shows the satellite that the UT should be pointed to and the Azimuth and elevation angles to the satellite. When the UT is in an overlap region, all visible satellites are shown and the user can pick the best one.

In release 5.9.5.0 and above, a pointing control button was added to the Home page that duplicates the function button on the UT. During the “wait for input” state at startup this button is active for 15 seconds. If pressed the UT will enter pointing mode and remain until the button is pressed again. This feature is useful for repointing one piece 9502s without opening the enclosure.

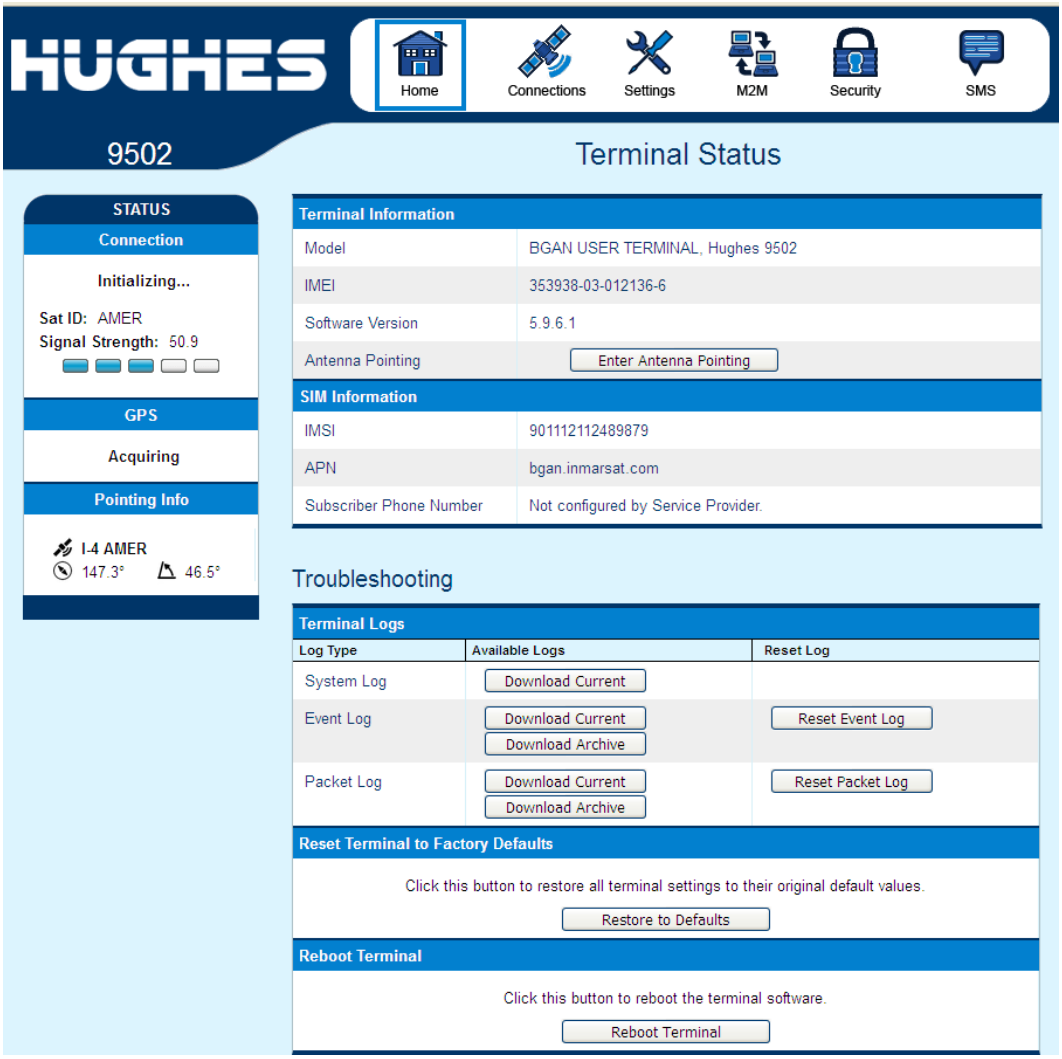


Figure 9: Enter pointing

Connections tab

Manage contexts page

The Manage Contexts page under the Connections tab displays the status of any active contexts and allows contexts to be controlled. Typically this page will not be used and you configure context activation via the always on option on the M2M page, or the ACA page.

Note: In NAPT mode the PDP context will NAPT data for all devices on the LAN. The owner IP address is shown as “shared”.

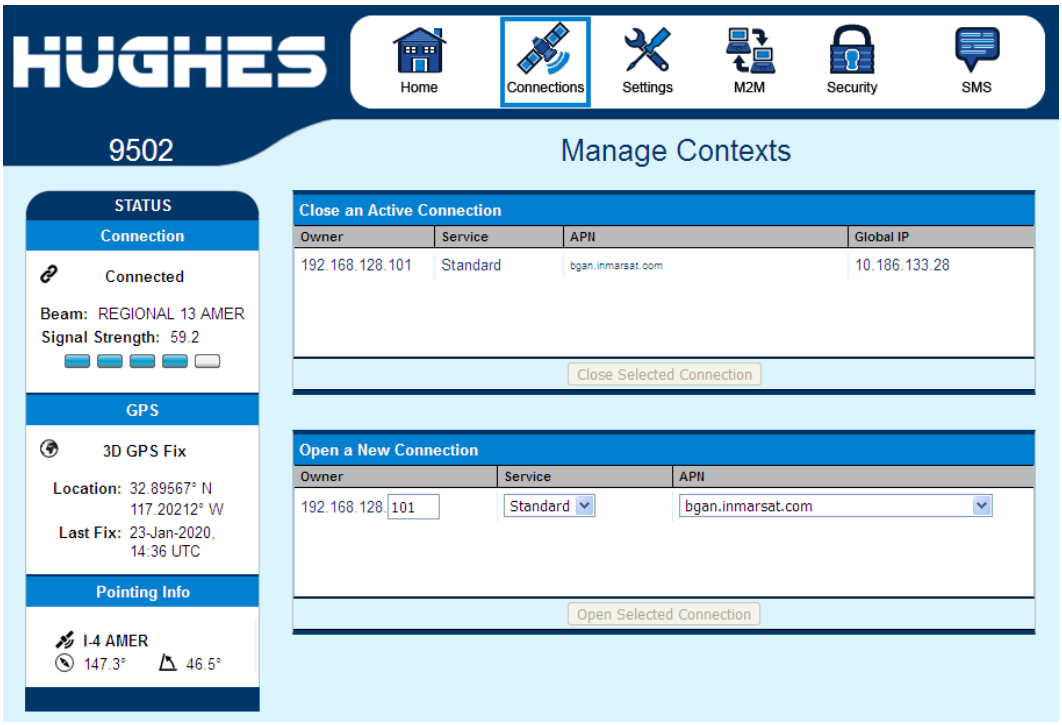


Figure 10: Manage contexts

Automatic contexts

This web page allows you to use Automatic Context Activation (ACA) for multiple devices. (The M2M page Always on context can be used if you only require a single context). The ACA page is not available in NAPT or PPPoE modes.

Static IP Automatic Contexts: You can define static ACA entries for specific addresses. If an entry is set to "On", the UT will set up a context for this address at startup, regardless of whether it sees it. If set to "Data", the UT will activate the context when it sees data from the device destined to the space link.

If the context is deactivated by the network, e.g. due to inactivity, the UT will reactivate it.

To turn on ACA for a particular static address, select "On" or "Data" from the drop down list and enter an address.

When you are finished, click on **Update Static Settings** and you should see a message saying "Operation Successful".

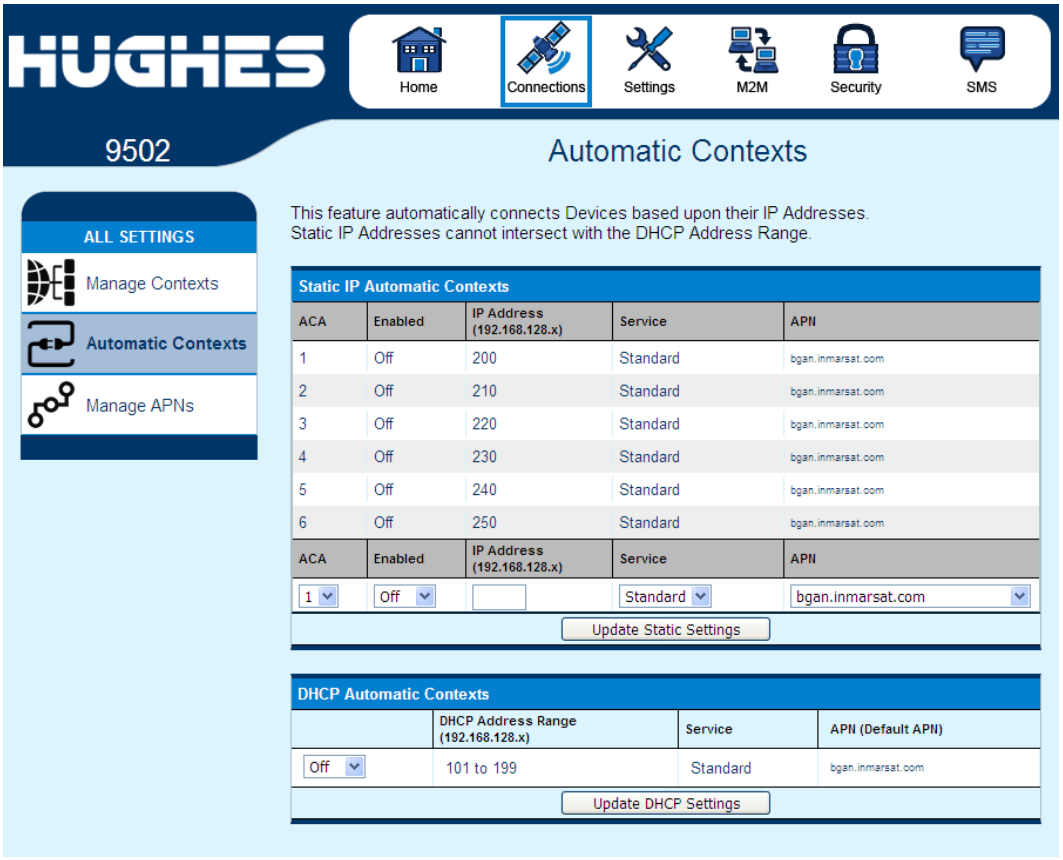


Figure 11: Automatic contexts

DHCP Automatic Contexts: This option allows you to set up the UT for dynamic ACA. This means that any device connected to the UT via **DHCP** will automatically receive a standard context.

To activate this feature, select "On" or "Data" from the drop down list under **DHCP Automatic Contexts** section. The APN will be the default APN configured on the **Manage APNs** page.

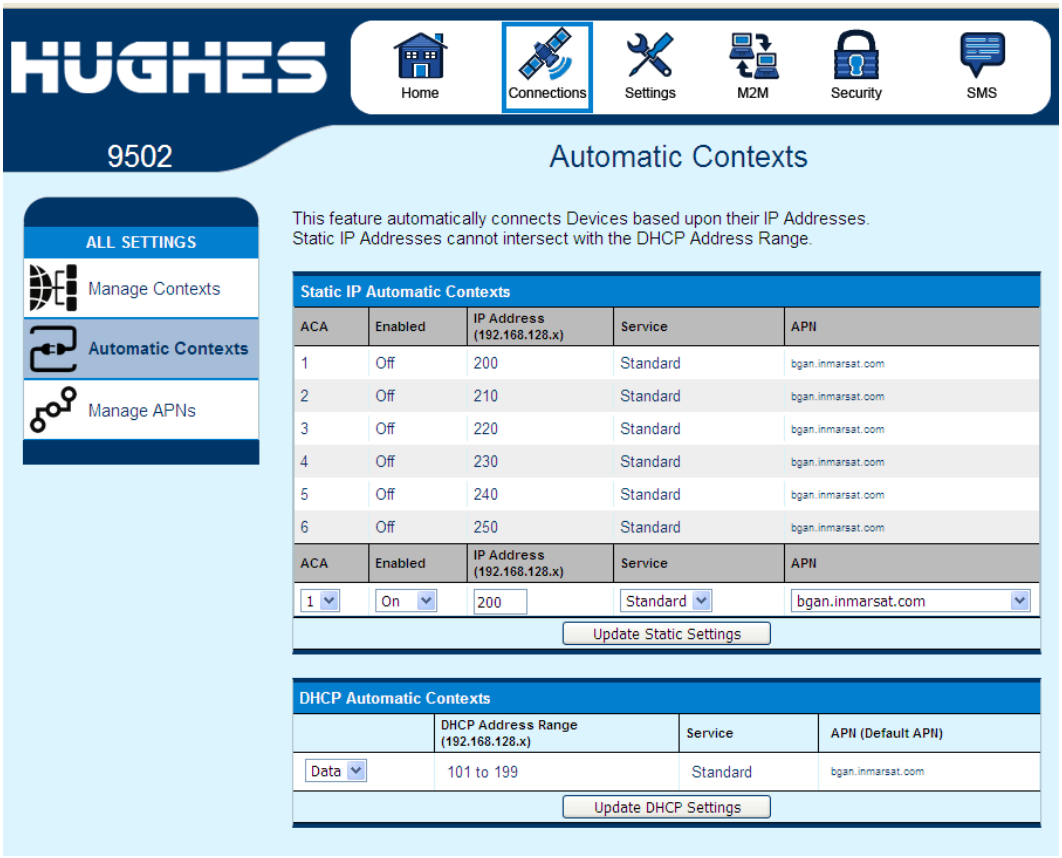


Figure 12: Automatic contexts

Once you hit "Apply" you will get a pop-up message saying that the ACA settings were updated successfully and to take effect you will have to reboot the terminal.

Once you reboot the terminal, check that the settings took effect.

To see if the context has been setup properly, click on the **Connections** tab>**Manage Contexts** Page and this will show you all contexts that have been setup (active or inactive).

Manage APNs page

The Manage APNs page under the Connections tab allows the user to view the available APNs and define new ones, e.g. if the correct APN is not configured in the SIM.

To make an APN the default, select it in the Defined APNs list and press "Make Default". The selected APN will be moved to the top of the list and shown in bold font. If an Always on Context is already defined, you must manually update the configuration on the M2M page to change to the new APN.

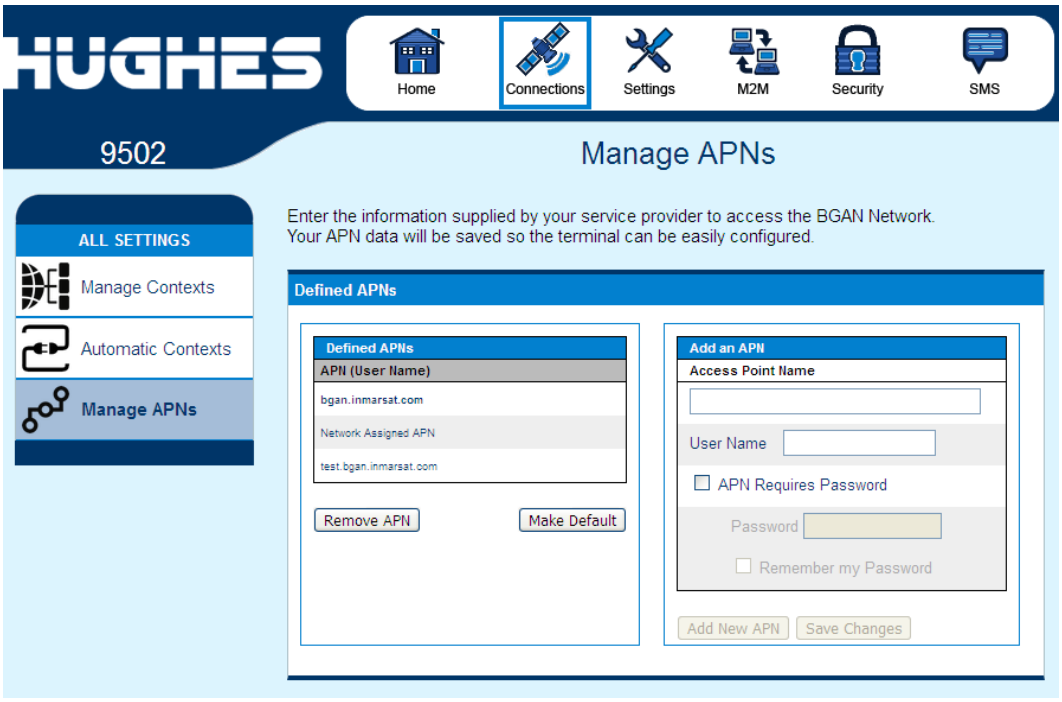


Figure 13: Manage APNs

Add an APN field – Use this field to add an additional APN that you want to use, or to edit an existing APN. For adding a new APN, type in the new APN and username (if required) then select **Add New APN**. If the APN requires a password, select the "APN Requires Password" box. If you want to save the password so you don't have to re-type it each time you configure a PDP context for that APN, check the "Remember my Password" box and then click the **Add New APN** button. (The username is always saved if entered.) The new APN name will show up in the **Defined APNs** field with the username in parentheses. This APN will now be available to use from any APN drop down menu.

Settings tab

The settings tab has the following configuration pages:

General setup

Release 5.9.5.0 on includes a General Setup page with the following fields:

- Connection: this field controls the satellites the UT will try to connect to. With the default “Automatic” selection it will search for all satellites.
- If an individual satellite is selected the UT will only search for and use the selected satellite. This is useful in areas where the antenna can see two satellites at the same time, e.g. EMEA and MEAS from Europe and West Africa – see Figure 39 on page 58. During site switches, the satellite signal is turned off briefly and the UT may try to register on the other satellite it can see. The signal will be weaker and will degrade service, so it is advisable to configure the UT to only use a single satellite. The visible satellites are shown on the status bar of the Home page.
- Streaming Inactivity Timer. In 9502B (BGAN Services) mode, a streaming inactivity timer field is also displayed. By enabling this parameter, the user can turn on a timer for inactivity on streaming contexts. The timer is in either seconds or minutes and will tear down a streaming context after X seconds or minutes of inactivity.

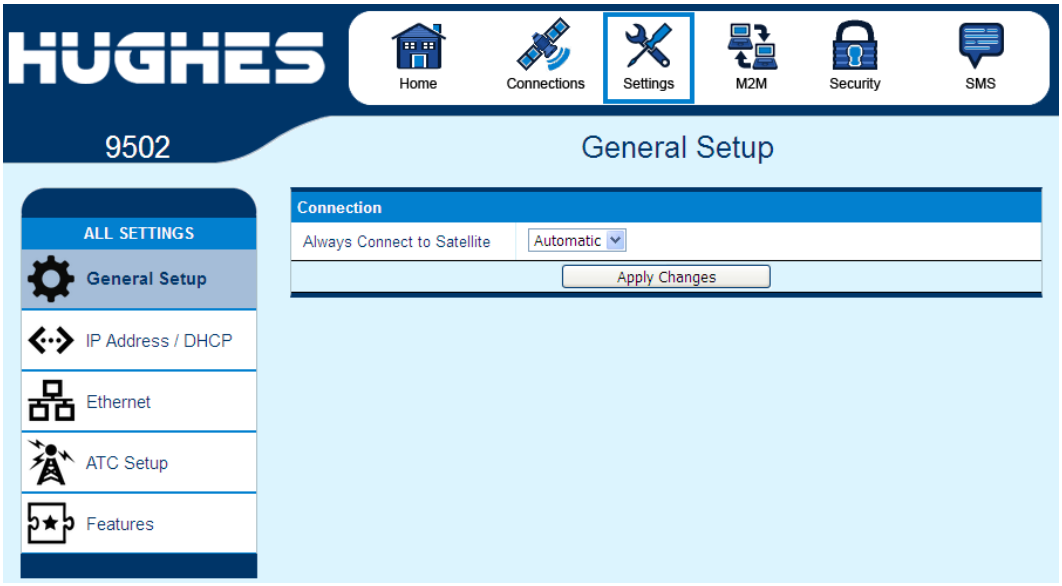


Figure 14: General Setup

IP Address/DHCP Settings

The IP settings page under the Settings tab includes the following fields:

- Terminal Local IP address
  - — Allows you to change the UT's IP address
  - — In PPPoE mode with the Inmarsat NSD you typically set the UT IP address to 192.168.0.1. If two BGAN terminals are connected to the NSD, set the IP address of the second UT to 192.168.0.129.
- Subnet Mask Range (release 5.9.5.3 and higher)
  - — Only used in PPPoE mode. If two BGAN terminals are connected to the NSD, set to 255.255.255.128
- Default route IP address (release 5.9.5.3 and higher)
  - — Only used in PPPoE mode. Use with the NSD when the TE local subnet is different from the UT subnet.
- DHCP Server enable
- DHCP Address Range
- Lease Time when Idle
- Lease Time when Connected
  - — If operating with a Vodafone MachineLink, recommend setting to a large value such as 1440 minutes, or use Static addressing.
- Network Mode field: NAT, NAPT, Relay or PPPoE mode (see Network mode on page 41.)
- Relay Connected Mode Subnet Mask (release 5.9.5.3 and higher)
  - — Defaults to 255.255.0.0. Can be used to configure a different subnet mask in Relay mode. Only applied when the Relay mode PDP context is active.

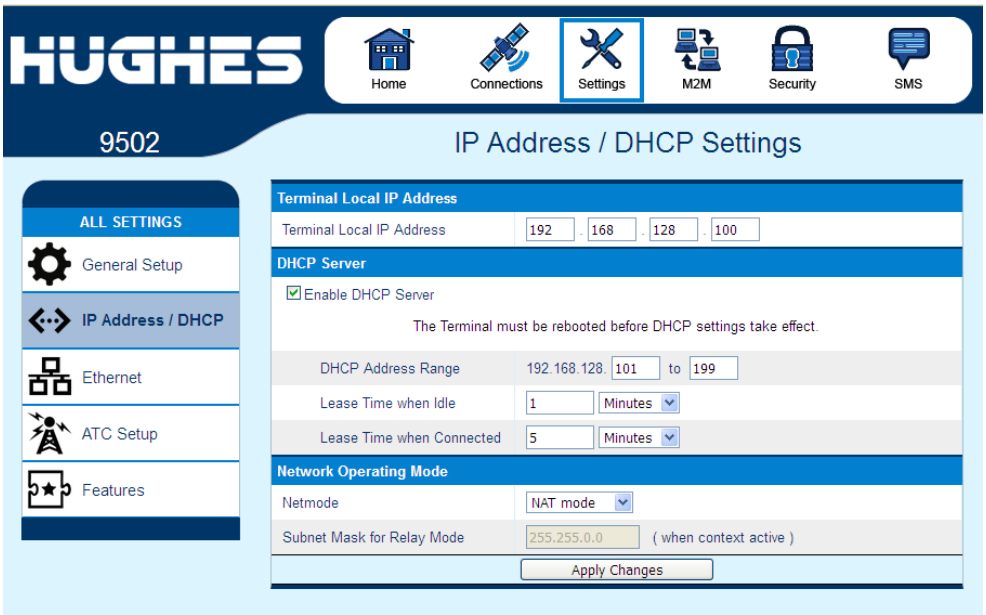


Figure 15: IP address/DHCP settings

Ethernet Port page

The Ethernet Port settings page includes:

- Wake On LAN (see Wake on LAN (any packet) on page 44):
  - Wake On LAN – On/Off radio button
  - Wake On LAN idle timer – in minutes
  - Wake On LAN time of day – 24 hour clock
- MAC Address filtering:
  - Ethernet MAC Address filtering enable tick box
  - Table of allowed Ethernet MAC addresses.
- Ethernet Operation: Duplex Mode
  - In Default mode, the UT uses Half Duplex, except in Netmode PPPoE when it automatically uses Full Duplex for operation with the Inmarsat NSD.
  - Full or Half Duplex option can be used in the unusual case that the default setting is not correct for your application.

    Note that the UT does not support duplex negotiation and so Full Duplex can only be used in the rare case that the TE device is also configured for Full Duplex, no negotiation.

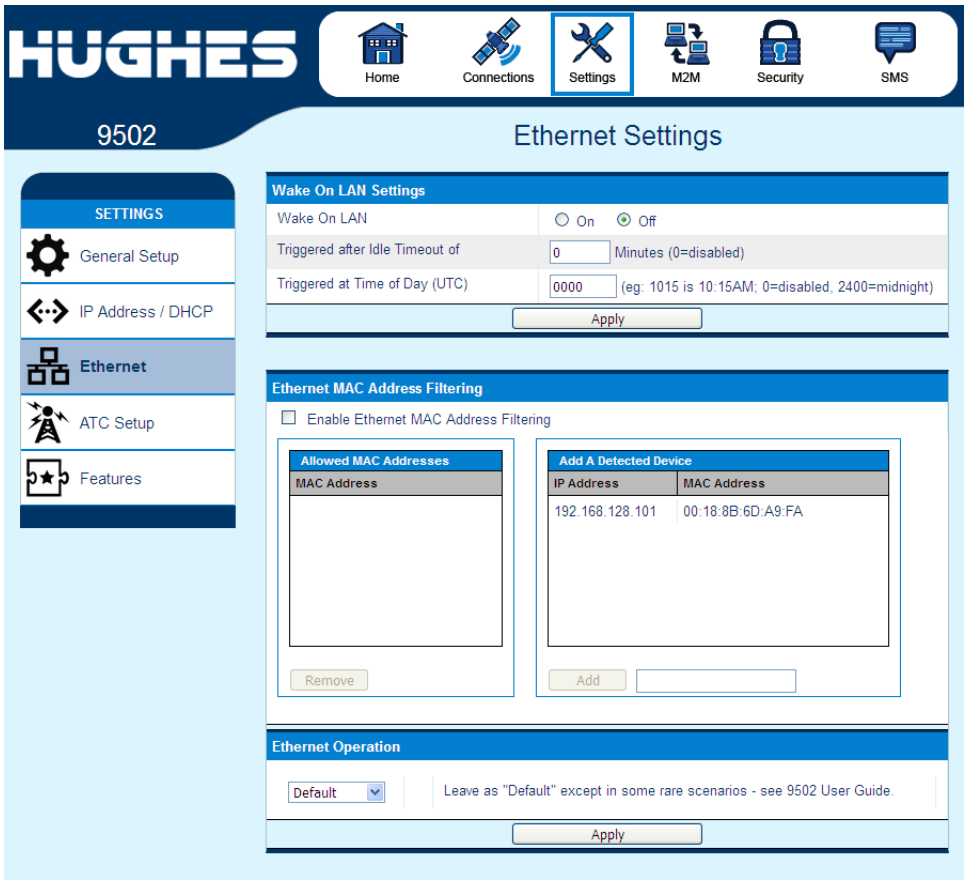


Figure 16: Ethernet Settings

Port Forwarding page

The Port Forwarding page is only available in NAPT mode and includes:

- DMZ – if enabled, all packets received from the space link that are not routed to other addresses will be forwarded to the DMZ host address.
- Port Forwarding Rules. These fields allow you to configure rules defining how packets of particular protocols are routed, e.g. TCP port 80 for HTTP. Port Forwarding rules are applied before the DMZ rule.

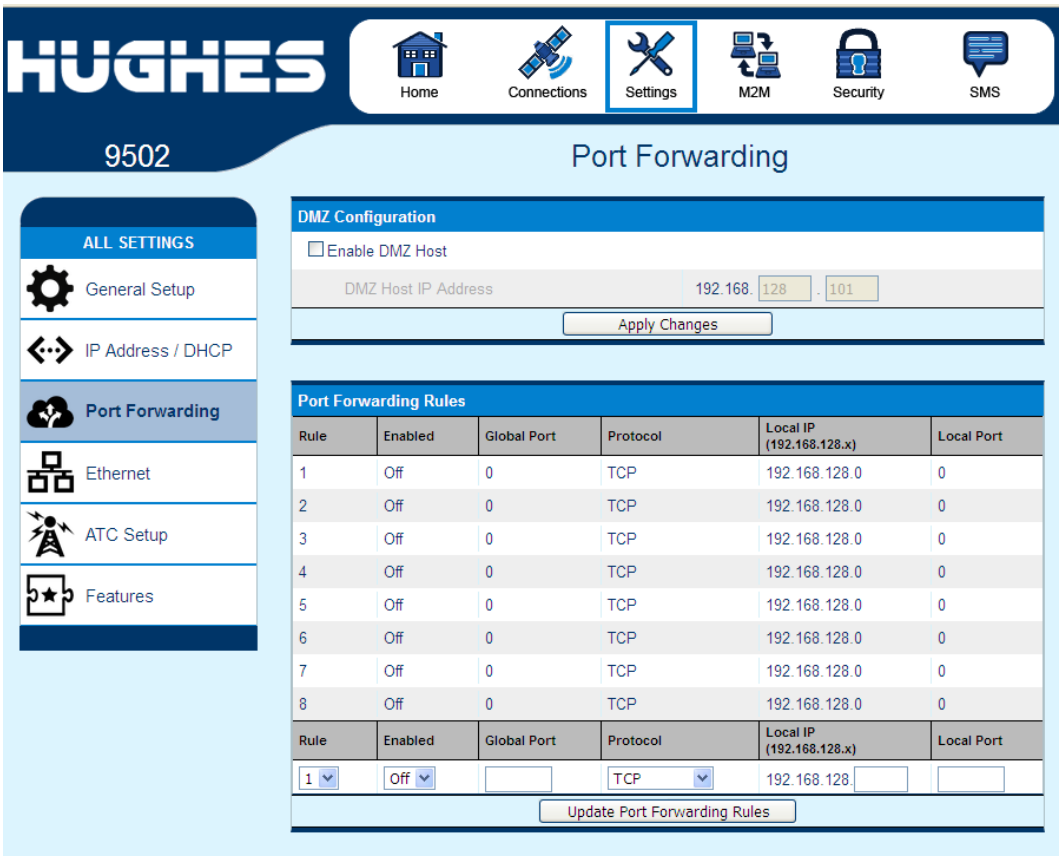


Figure 17: Port Forwarding settings

ATC page

The ATC page includes:

- ATC robustness On/Off radio button
- ATC scan button
- ATC scan status bar. This indicates the results of the last scan.

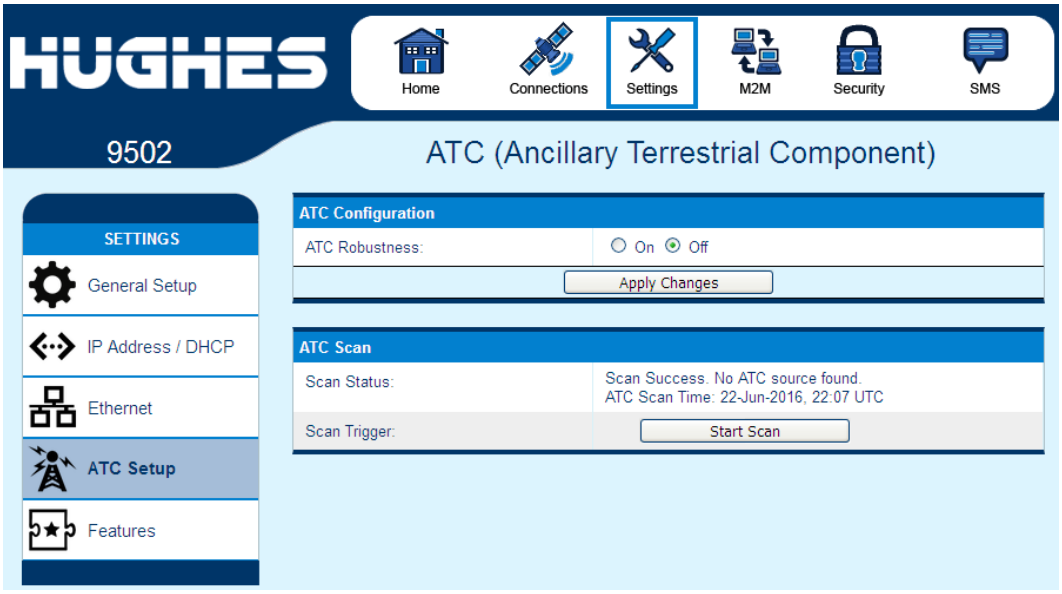


Figure 18: ATC page

Feature Management page

You can enable special features from this page:

SMS Remote Management allows the unit to receive and act on special remote control SMS messages. This feature is on by default.

Enhanced Security allows you to lock the UT so that it can only be accessed locally after entering a password. Refer to the Enhanced Security Settings page below (page 37). When this feature is active, the remote SMS password will be stored encrypted. When the feature is enabled a link to the Enhanced Security page appears on the Security Passwords page (see below—page 36).

BGAN Services allows the unit to be converted to a unit that uses a BGAN SIM rather than an M2M SIM.

With release 5.9.5.1 and above, the UT will automatically switch between M2M and BGAN Services based on the type of SIM card. The Feature code is no longer required.

In release 5.9.6.1 and above, Enhanced Security can be enabled and disabled without a feature code. Simply select the required option and press “Act/Deact Feature”.

Figure 19: Feature management page

M2M page

Figure 20: M2M Setup

The M2M page includes the following configurable parameters:

Ping configuration:

- Context Watchdog - On/Off. The watchdog can be used to periodically verify the UT network connectivity and take recovery action if a problem is detected.
- Primary Ping Address – enter an address pingable by the UT over the spacelink.
- Secondary Ping Address. If you don't have a secondary address, you can configure the primary address in this field to give the UT more attempts to reach the server.
- Tertiary Ping Address
- Time between Pings. If the connected device sends or receives data on a periodic basis, set this time to be longer than the periodicity of the data.
- Ping required - Yes/No. If set to "No", the system will not try to ping on timer expiration if data was transmitted within the watchdog period. This is the recommended setting. If set to "Yes", the system will always ping when the "Time between Pings" expires, which will cause extra data to be sent on the link.

Always on context:

- Always on context - On/Off (default is On)
- Always on static IP address. If the TE has a known static IP address or never ARPs, enter this address. Alternatively, leave the IP address blank (0.0.0.0) and the UT will set up a context for the first device it detects through ARP during startup.
- APN drop down box. This includes the APNs configured on the Manage APNs page and (in release 5.9.5.2 and above) the “Use a network assigned APN” option. This option allows the network to assign the APN rather than the user configuring it at the UT. It should only be used if this option is appropriately configured at the network side.

Security Passwords

The security passwords page includes the following functions:

- Personalization Key to lock the UT to a particular USIM (SIM to Phone lock). This is Off by default.
- Administration password – Off by default. Default password is ***admin***
- SMS Remote Control – Off by default except in releases 5.9.4.3 through 5.9.5.3 where it is On by default.
- SMS Remote Password – default was ***remote*** but in 5.9.6.1 and above the default is blank and a password must be entered when enabling SMS Remote Control.
- Sender White-list – is a list of numbers that the terminal will allow a remote SMS message to come from. When entering the number use the + symbol in front of the country code e.g., +870 or just start with the country code e.g., 870. Do not use 00 in front of the country code.

Figure 21: Security Passwords

If the Enhanced Security feature is enabled, a link to the Enhanced Security page will be displayed as shown below.

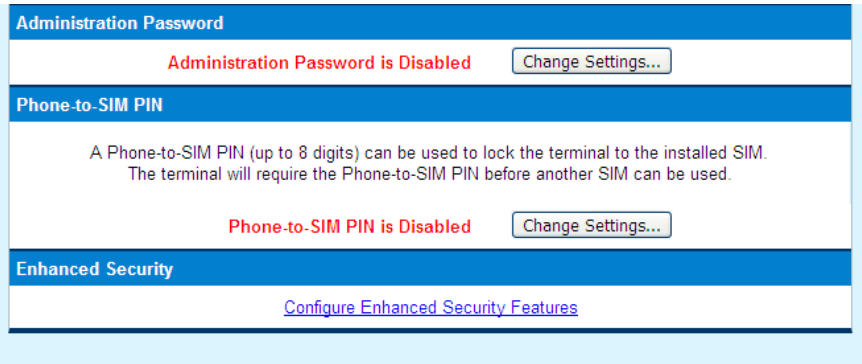


Figure 22: Enhanced Security Page Link

Enhanced Security Settings page

The Enhanced Security Page is used to configure local security for the unit.

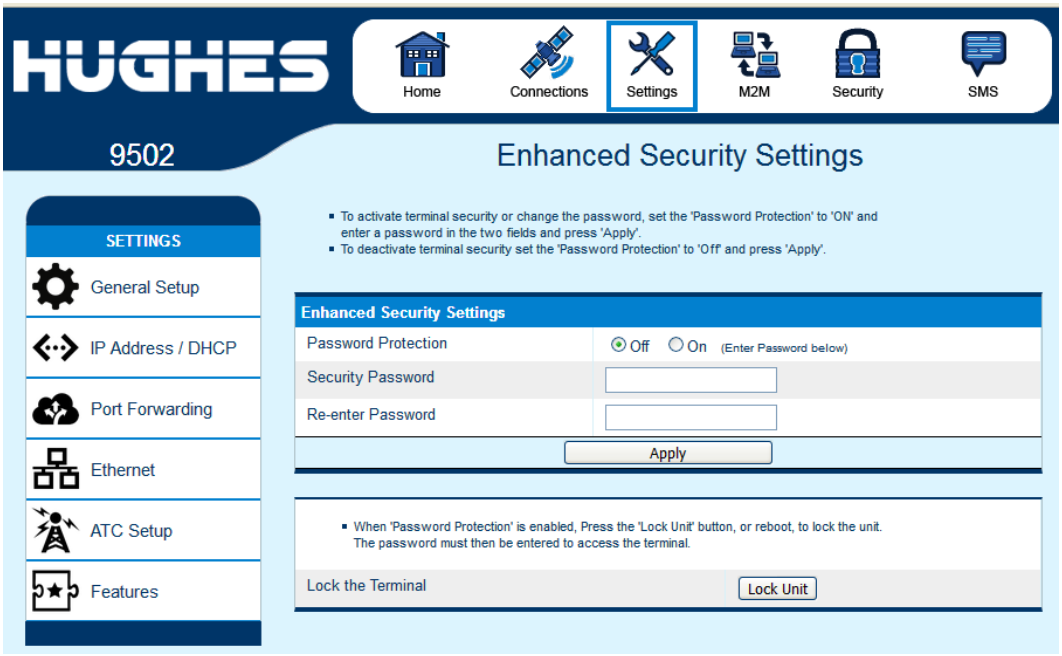


Figure 23: Enhanced Security Settings page

For added security you can lock the UT so that it cannot be accessed locally. This is controlled by a security password configured from the Enhanced Security Settings page accessible from the Security Passwords page.

When the password is active, each time the UT starts up, the password must be entered before the user interface can be accessed. All local IP ports are blocked, e.g. so AT commands, and the upgrader cannot be used. User data can be sent if a PDP context is up.

To activate the security feature, select “Password Protection” On, enter the same password string in both fields and press “Apply”. If the two password fields match, the password is saved and security is enabled.

The UT will be locked when it restarts, or to immediately lock it, press “Lock Unit”

Make a note of the password as it cannot be viewed and once the UT is locked it cannot be accessed.

To deactivate the security feature, select “Password Protection” Off and press “Apply”.

If the Web UI is accessed when the UT is locked, the browser is redirected to the Login page and the password must be entered. If the wrong password is entered three times in a row, password entry is locked out and the UT must be restarted before the password will be accepted.

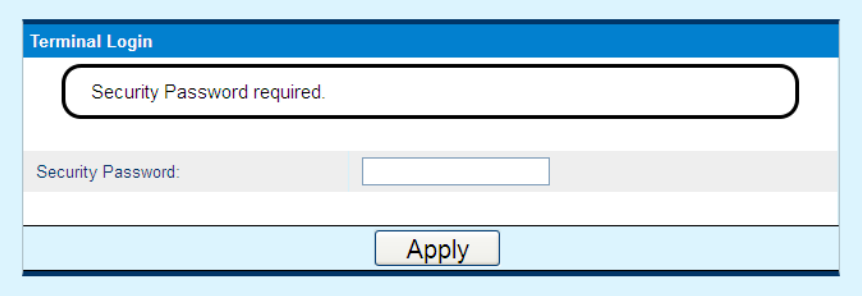


Figure 24: Login Page

SMS pages

The SMS pages are used to send SMS messages from the terminal to another BGAN device or another phone number. When sending an SMS message, use the **+** symbol in front of the country code of the number you want to send the SMS to e.g., +16199778619.

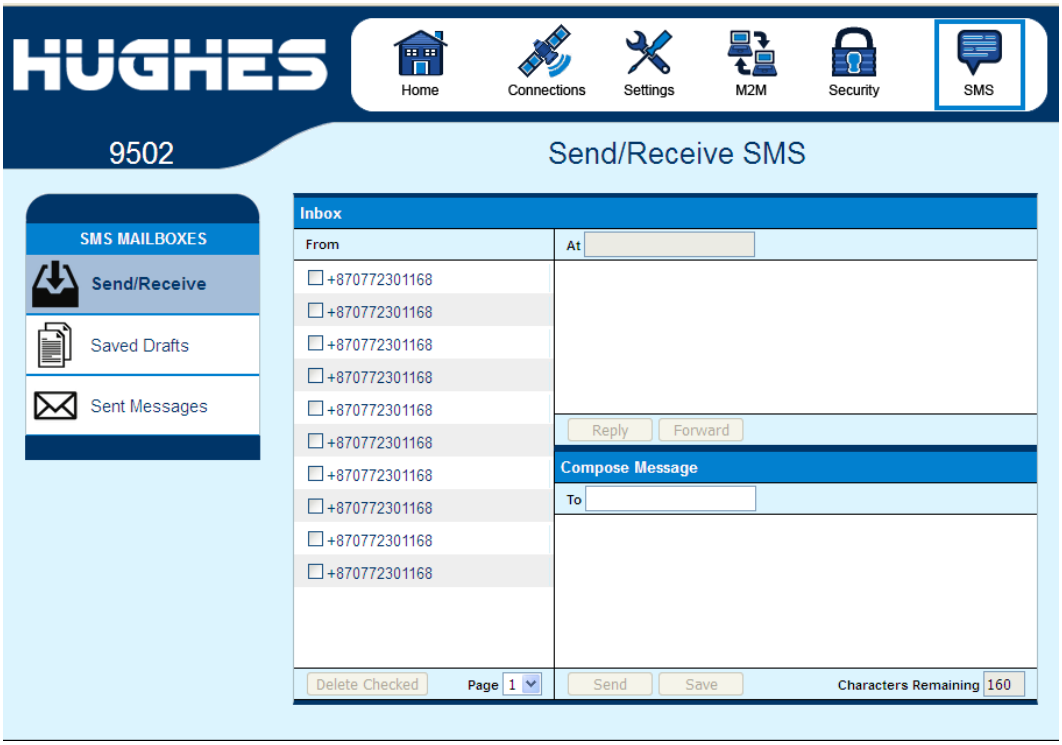


Figure 25: SMS send/receive

Chapter 3

Operational features

LEDs

The 9502 has three green LEDs:

- Power LED: “PWR”
  - Turn unit on - LED turns on
- “GPS” LED
  - Flashes while acquiring fix
  - Turns solid when unit has a 2D or 3D fix
- Network LED: “NET”
  - Flashes when registered
  - Turns solid when unit establishes a PDP context

All three LEDs flash in install mode and short flash if there is a fault detected that prevents normal operation, e.g. no SIM installed, or incorrect SIM installed.

Function button

The M2M unit includes one user button called the “function” button.

- Short press (< 2 second):
  - During startup while power LED flashing, a short press enters install mode (see Pg 55.)
  - In install mode, short press exits install mode
  - If LEDs off, short press turns them on
- Medium press (2 to 5 seconds – the user should press and hold for about 3 seconds):
  - Shut down and reboot
- Long press (> 5 seconds):
  - Hardware power cycle

Network mode

By default the 9502 is configured for NAT mode in the Network Mode field on the IP Address/DHCP settings page.

NAT mode

In **NAT mode** once a PDP context is active, the UT will translate between the local and global IP addresses. This is a basic NAT that only performs IP address translation. It does not use port translation.

NAPT mode

In **NAPT mode** (5.9.4.4 and above) multiple devices connected via a hub or switch share a single PDP context. The port translating NAT modifies both IP addresses and port numbers so multiple devices can share the single global IP address assigned to the PDP context.

In NAPT mode only a single context is supported. By default the Always On Context is activated on the M2M page. The ACA page is removed. A Port Forwarding page is added under Settings and can be used to configure the DMZ and Port Forwarding rules.

Relay mode

In **Relay mode** the UT will supply the global IP address to the TE when the context is established. Relay mode is single user and only supports a single connected TE.

In Relay mode DHCP is required to provide the global IP address to the TE. When the context is activated, the DHCP server in the UT will NACK the next DHCP lease renewal from the TE and assign the global IP address assigned by the network. The local IP connection will be torn down and reestablished as the IP address changes. Similarly, when the context is deactivated the DHCP server will NACK the lease renewal and then reassign the original private IP address.

The Web UI will lose and reestablish its connection to the terminal as the IP address is changed.

To make the IP address change happen quickly a short DHCP lease should be used. The terminal defaults the lease time to 60 seconds in idle and connected mode.

NOTICE

Relay mode only supports a ***single*** user TE. If you need to connect a laptop via the USB port for configuration and monitoring purposes, you must set the laptop up with a local static IP address within the same subnet as the terminal e.g., 192.168.128.200. This prevents the USB port from getting the single DHCP address when in Relay mode once you reboot the terminal.

PPPoE mode

In **PPPoE mode** (release 5.9.5.3 and above) the UT uses PPP over Ethernet to communicate with the TEs. PPP sessions are mapped to PDP contexts. PPPoE mode is primarily designed to operate as a backup path for the Inmarsat Network Service Device (NSD). Refer to the Inmarsat NSD documentation for details.

The NSD requires the UT to be configured for 10BaseT Full Duplex. When PPPoE mode is selected, the UT will automatically set the Ethernet port to Full Duplex. If PPPoE is used with another device not hard configured for full duplex, manually select Half Duplex on the Ethernet Settings page.

With the NSD you typically set the UT IP address to 192.168.0.1 on the IP settings page. If two BGAN terminals are connected to the NSD, set the subnet mask to

255.255.255.128 on both UTs and set the IP address of the second UT to 192.168.0.129.

If the TEs use a subnet other than the directly connected interface range, configure a default route on the IP Settings page so that the WebUI can be accessed. The default route will be in the subnet associated with the TE Ethernet interface.

If you need to reconfigure a UT out of PPPoE mode back to NAT mode, it may be easiest to first Reset Factory Defaults from the Home page.

Remote control

The 9502 can be controlled remotely via SMS and locally via AT commands. The AT interface can be used for local control of the terminal as long as AT commands can be sent by the terminal equipment (TE) connected. The AT command listing supported by the 9502 can be downloaded from the Hughes website at www.bgan.hughes.com .

The 9502 includes a remote control by SMS feature that supports the special SMS messages listed in Table 5. Remote control SMS is supported by default in the 9502 and does not have to be activated by a feature code. The syntax of the messages is covered in the "Hughes 9502 SMS Remote Control Feature User Guide."

Table 5: Remote Control SMS Message Commands

Command	Action
ACTIVATE	Activate PDP context
DEACTIVATE	Deactivate PDP context
CLEAR	Clear SMS messages in the UT SIM
GETINFO	Get info from the UT. This returns an SMS with the information.
RESTART	Restart the UT
WATCHDOG	Change the configuration of the watchdog parameters
ATCO	Execute the AT command encapsulated in the SMS. This can be used for the following remote control functions: Download Firmware Start Firmware upgrade Get file Send file, e.g. log files. Activate Remote Web access Perform ATC scan and/or set ATC robustness. Configure the default APN (release 5.9.4.3 on) Configure the satellite to use (release 5.9.5.0 on)

All remote control messages and responses must fit into a single 160 character SMS.

The SMS handler automatically deletes any message that fills the last SMS slot in the USIM to ensure there is always room to receive control SMS messages. Control messages are received into the SIM then read out and deleted so as not to fill up the SIM card.

Remote upgrade and file transfer

The 9502 includes an FTP client. The operator can send SMS messages or AT commands to command the 9502 to send or retrieve files from an FTP server in the network or Internet. This allows the 9502 to be upgraded, reconfigured and also allows log files to be sent back to the server. The FTP server can be in the Inmarsat network, e.g. accessible via a free APN for upgrades; or can be outside the Inmarsat network, e.g. accessible via a normal APN for debugging and configuration changes.

The remote upgrade process uses download firmware and firmware upgrade commands (see “Hughes 9502 SMS Remote Control Feature User Guide”).

Security

The Web UI includes an admin feature that can be activated from the security page to prevent unauthorized access to the Web UI. Additionally the AT command port is locked by default and the command: `AT_ICLCK=”AD”,0,”<admin password>”` must be used to unlock it before AT commands can be used. Both mechanisms use the same password but the AT commands port and each Web UI session use a separate lock and must be individually unlocked.

Support for SMS Remote control is configured from the SMS settings page. Each Remote Control SMS must include the correct password. Remote control SMS containing AT commands will be processed regardless of the Admin setting (they require the feature to be active and the correct SMS password.)

USIM personalization (or “Phone to SIM lock”) can be used to lock the UT to a particular SIM.

MAC address filtering on the Ethernet port page allows the user to define the MAC address of TEs authorized to communicate via the Ethernet port.

Note: The USB port is not included in the MAC filtering and can be used if the proper USB driver is installed on the TE.

Wake on LAN (any packet)

The UT includes a special low power mode called Wake on LAN (any packet). From the Web UI you can configure the UT to power down into this mode after a configurable idle timer or time of day.

Wake on LAN operation is configured from the Ethernet Settings page (Figure 16 on page 30) under the Settings tab. It includes a configurable idle timer to control when the UT shuts down into the Wake on LAN mode. The UT declares the link idle if no packets are received on the Ethernet port within the idle time.

Additionally, the UT can be configured to power down at a configurable time of day. Enter UTC time as 0001 to 2400. Set to 0 to deactivate the time of day feature. Note that the UT waits 5 minutes after startup before it checks the time of day to see if it has to power off.

When the UT powers down into this mode it will disconnect from the BGAN network and monitor the local Ethernet port and power up again if it sees any

Ethernet packet (ARP, DHCP, data packet, etc.). In this mode the power consumption is less than 10mW when powered from a 12V source. The UT generates Ethernet sync pulses so the TE believes the link is still active.

When an Ethernet packet is detected the UT will power up normally, register and bring up a PDP context (if configured for ACA.) It takes about 1 minute for the UT to be fully connected to the Inmarsat network.

For this mode to be useful the TE must only send Ethernet packets when it has data to send over the air. Thus, for example, the TE should be configured with a static IP address to avoid periodic DHCP exchanges waking up the UT.

Serial pin power control

The UT can be switched off by applying a voltage to pin 9 of the DB9 serial port.

If you apply voltage to Pin 9 of the serial port with pin 5 as Ground, the UT will power down. It will power up when you remove the voltage.

The voltage can be 2.5V to 50V. 12V is the recommended level.

ATC

The UT includes an extended L-band scanning mode to detect Auxiliary Terrestrial Component (ATC) or other sources of external interference. The terminal can be commanded into scanning mode by the Web UI, AT command or SMS command. During the scan the terminal will be offline to the BGAN network and will automatically reboot to return to normal operation.

In scanning mode the terminal measures the received signal strength across the 41MHz of L-band spectrum (1518 to 1559MHz). Once the scan is complete the UT restarts and communicates the results of the scan.

If an interference signature is detected, an attenuator is switched into the receiver path to attempt to make the UT more resilient to ATC interference.

The attenuator setting can be controlled from the Web UI, AT command or remote SMS.

Watchdog

The M2M terminal includes a watchdog mechanism that can be used to periodically verify the UT network connectivity and take action if a problem is detected.

Configuration Parameters are shown in the M2M page on page 34.

GNSS

The Hughes 9502 terminal supports a **Global Navigation Satellite System** (GNSS) feature. During start up, if the UT detects a GNSS device connected to the GNSS serial port, it will attempt to obtain a position fix from the GNSS device via NMEA messages.

The serial port is a DB9 male, configured as a DTE and supports autobaud between the valid NMEA rates of 4800bps and 38.4kbps.

Table 6: DB9 pinout

Pin	Function
1	Not connected
2	Rx data - input to the 9502
3	Tx data – output from the 9502
4	Not connected
5	Ground
6	Not connected
7	Not connected
8	Not connected
9	Power control: apply +12VDC to power off the unit

The GNSS device must provide a fix via the RMC or GGA NMEA messages. Typically a straight through DB9 serial cable can be used with the correct plug for the GNSS device.

Chapter 4

Installation instructions

Inspecting the parts

Make sure you have all parts listed in the shipment box before beginning the installation; you should have the following parts:

1. Hughes 9502 IDU
2. Flat panel ODU
3. 10m RF coaxial cable terminating in N(M) connections at both ends
4. An N to TNC adapter is included in the cable bag.

Optional installation items

1. Basic Fix Mount Kit (P/N 3004066-0002)
2. Azimuth elevation bracket (P/N 1022994-0022)
3. IDU Strap (P/N 3500617-0001)

Determining where to install the ODU

In order for your terminal to work correctly, the antenna or ODU must be installed in a location that provides a clear, unobstructed, line of sight to the satellite. Any objects such as building structures or trees may degrade the quality of the satellite signal. To determine where to install the ODU, you need to determine that you have both a clear unobstructed line of sight to the satellite and that your fixed mount is aimed in the approximate direction to the satellite.

To determine the direction from your location to the satellite follow the steps below:

1. Determine the latitude and longitude of the site and enter them into the Location Spreadsheet that is available on the Hughes BGAN support page: www.bgan.hughes.com**.** This will give you the compass direction and the elevation angle to point the ODU. Alternatively, it can be done by powering up the UT, allowing it to get a GPS fix and then checking the pointing information on the Web UI Home page.
2. Unbox the Hughes 9502 and remove the ODU and cable assembly.
3. Determine the location of both the IDU and ODU before starting to make sure that the IDU and ODU can be installed within the 10M cable length.
4. Install the ODU with the installation hardware that you have chosen by following the instructions below.

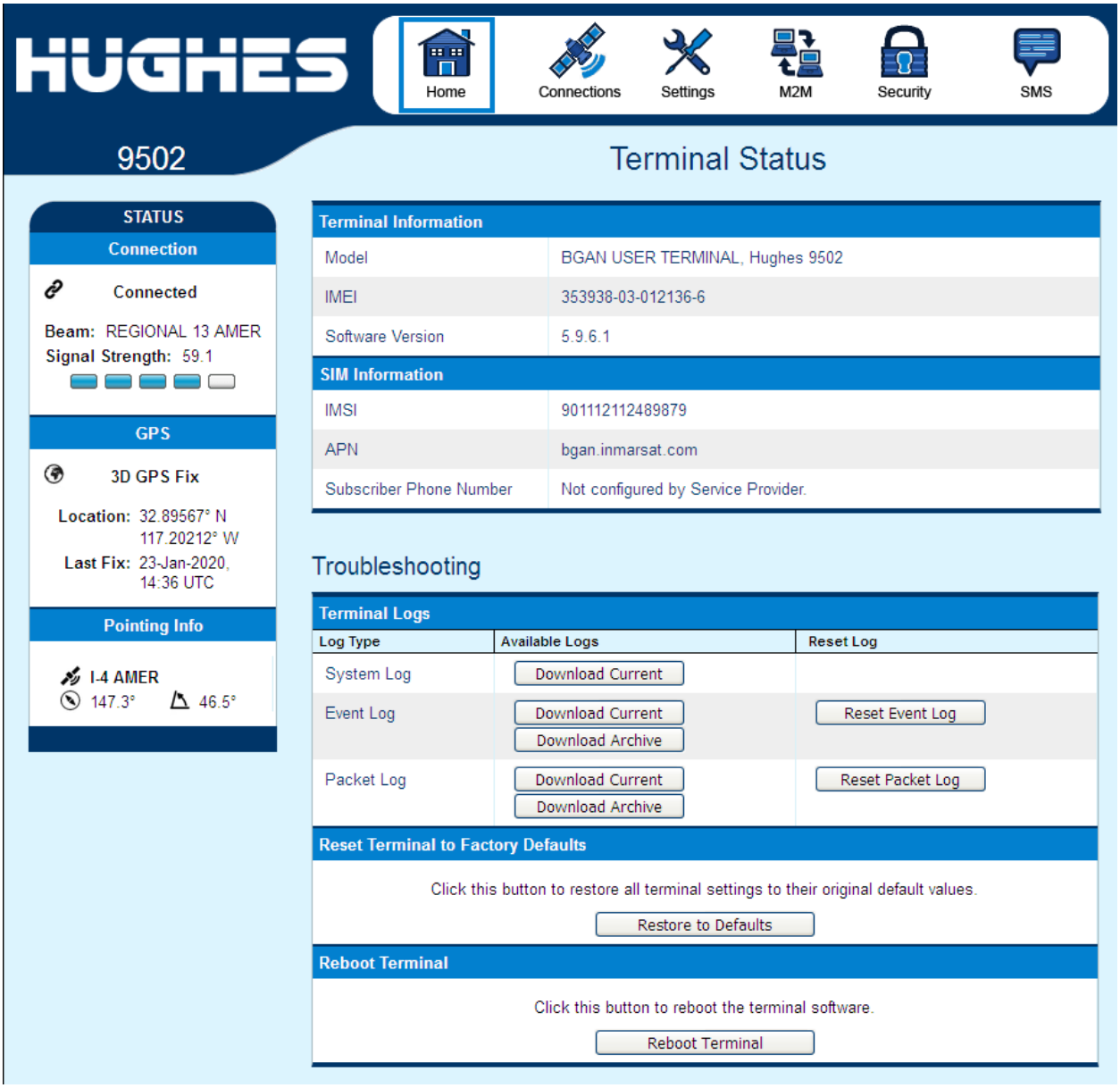


Figure 26: Home page showing pointing information

ODU installation using the basic fix mount kit (P/N 3004066-0002)

⚠ CAUTION

You may install the fixed mount on any structurally sound surface; either on a horizontal, or vertical, or a sloped surface such as a roof or wall.

1. The pole has a 1.66” (4.2164cm) outer diameter (schedule 40 metal).
2. The pole mount is 2lbs/0.9Kg. The azimuth/elevation bracket is 1 lb/0.45Kg.
3. The wall mounting pattern has four bolts in a 6” x 3 ¾” (15.24cm x 9.525cm) rectangle (not included). The holes are 0.325” diameter. See Figure 27.

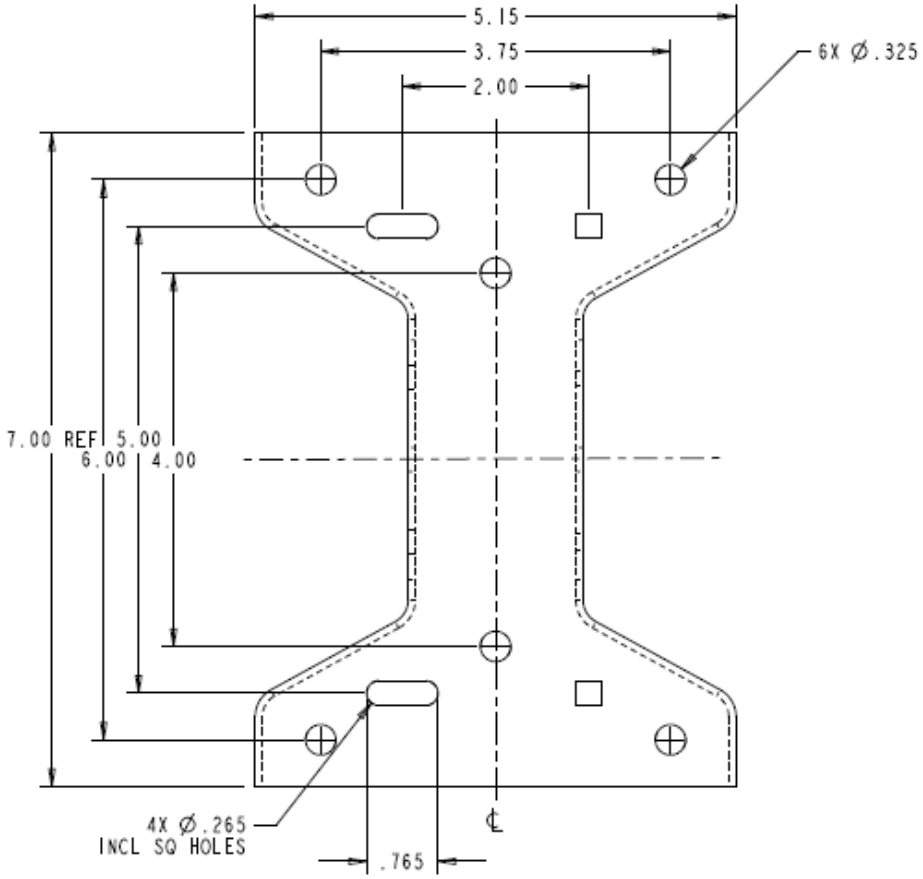


Figure 27: Base bracket hole pattern

The pole is shipped attached to the base bracket. Mount the base bracket of this assembly to the structure with the appropriate hardware (not included). Consult local building codes if needed. Once the base bracket is mounted, perform the following steps (refer to Figure 28 and Figure 29**)**

1. Insert the bubble level into the end of the pole (pipe) opposite the base bracket. The bubble level fits inside the pole.
2. Loosen the pole attachment fasteners at the base bracket so the pole can swivel.
3. Swivel the pole until the end of the pole where the ODU will be installed is vertical. Adjust the pipe position until the bubble is centered inside the circles on the top surface of the bubble level.
4. Tighten the pole attachment fasteners on the base bracket.

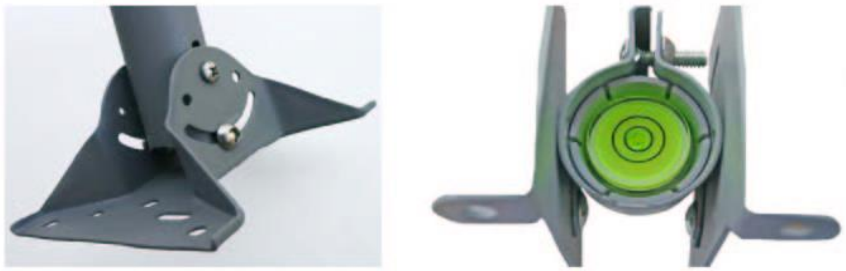


Figure 28: Base bracket and bubble level

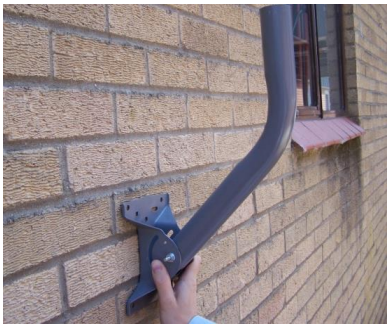


Figure 29: Pole assembly

Mounting the azimuth elevation bracket

Mount the azimuth elevation bracket to the back of the ODU using four washers/nuts (see Figure 30). The N-type RF connector should be on the left or right side of the azimuth elevation bracket if installed correctly.

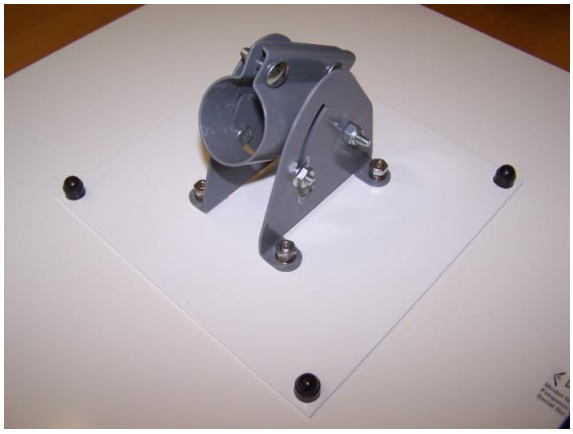


Figure 30: Azimuth elevation bracket

Mounting the azimuth elevation bracket onto the pole

1. Slide the pole collar of the azimuth elevation bracket over the end of the pole (see Figure 31).
2. Leave the pole collar bolts loose to allow for azimuth adjustment during pointing.

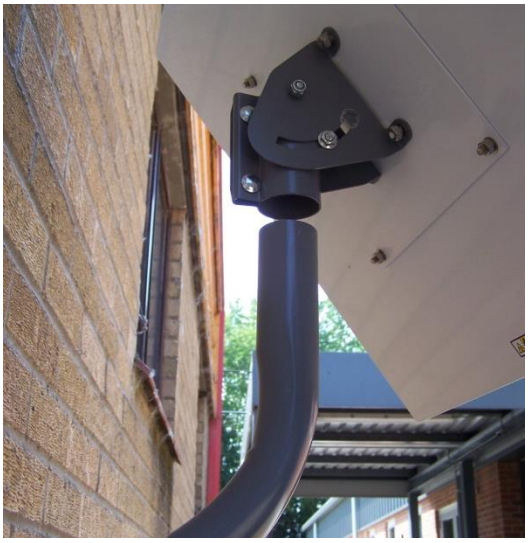


Figure 31: Pole collar

NOTICE

Important Notes:

- The RF cable assembly supplied (10m), forms an integral part of the ODU system and is made to a specific length in order to meet the system specifications. The cable must not be cut to a shorter length, nor must any cables be added to the cable run.

- It is essential that only the supplied cable is used. Third party cables may not be used; their use will invalidate the warranty of the ODU and may cause system malfunction.
- It is important not to stress the connection to the ODU during installation of the coaxial ODU cable.
- The minimum bend radius of the cable is 2" (50mm) however; it is recommended that a 4" (100mm) bend radius be used.
- Any modification to these rules must be approved by Hughes and Inmarsat prior to the installation.

Attaching RF cable to ODU

1. Attach the cable to the mounting pole via a zip strap to take the weight of the cable.
2. Mate the connector to the ODU firmly by hand but do not over tighten.
3. Weatherproof the connection using self-amalgamating tape (not provided) (see Figure 32).
4. Route the cable to the 9502 IDU avoiding any sharp bends, extremes in temperature, and compression of the cable.

Figure 32: Weather-proof connector

Attaching RF cable to the Hughes 9502 IDU

Locate the TNC connector on the back of the IDU and connect the cable from the ODU to the IDU (see Figure 33 using N to TNC adapter provided)

Figure 33: Connect cable to TNC connector on IDU

Installing the SIM Card

The SIM card is usually installed by the Service Provider but if you have to install or replace it, it is installed behind the SIM door as shown below. Push it in until it clicks, or to remove it, push it in and release.

NOTICE

Important Note:

- When installing or removing the SIM, do not touch the gold contacts. Touching the contacts can introduce dirt or grease that could cause SIM read errors.

Figure 34: Installing the SIM card

Connecting power leads to the Hughes 9502 IDU

Once the ODU is properly connected, you can then connect the power leads (positive + and negative -) from the power source to the 9502 IDU power connector. The IDU is clearly marked for positive and negative leads and the IDU is designed for a nominal 12Vdc and 24Vdc voltage and is protected from reverse polarity. The maximum current draw is 1.5A at 12V, 0.75A at 24V.

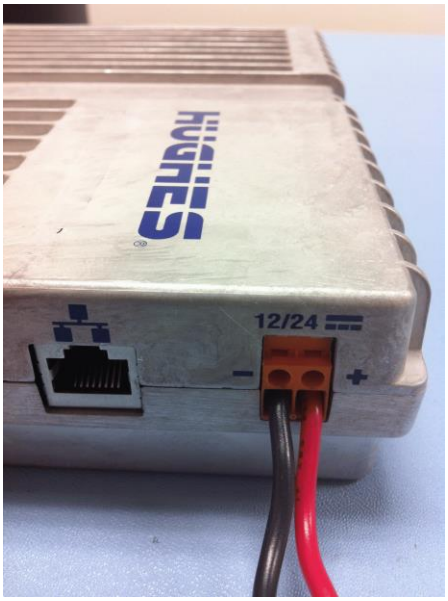


Figure 35: Power connector

Insert the positive lead into the positive terminal jack and tighten the screw. Then connect the negative lead into the negative terminal jack and tighten the screw (see Figure 35 on page 54).

NOTICE

Important Note:

- Ensure the power source is turned off before connecting the power leads to the 9502 IDU
- Ensure that the screws are tightened to where the power leads cannot fall out

Powering up the Hughes 9502

The 9502 will power up automatically when DC power is applied. It does not have a power button. By default it will bypass antenna (ODU) pointing and automatically register, attach and activate a PDP context.

Once you have applied DC power, the terminal goes through a power-on-self-test (POST) that takes approximately 15-20 seconds and then the power LED will start flashing for another 15 seconds. If you want to enter pointing mode, you will need to short press (<2 seconds) the function button within those 15 seconds. If you do not short press the Function button, the unit will start to register with the network and set up a PDP context.

CAUTION

If the unit bypasses ODU pointing and starts to register with the network, the ODU is now transmitting so please stay at least 1 m clear of the front of the ODU to avoid RF radiation.

Figure 36: Function Button

Coverage map

The Inmarsat BGAN service is operated via 4 satellites with global coverage shown below.

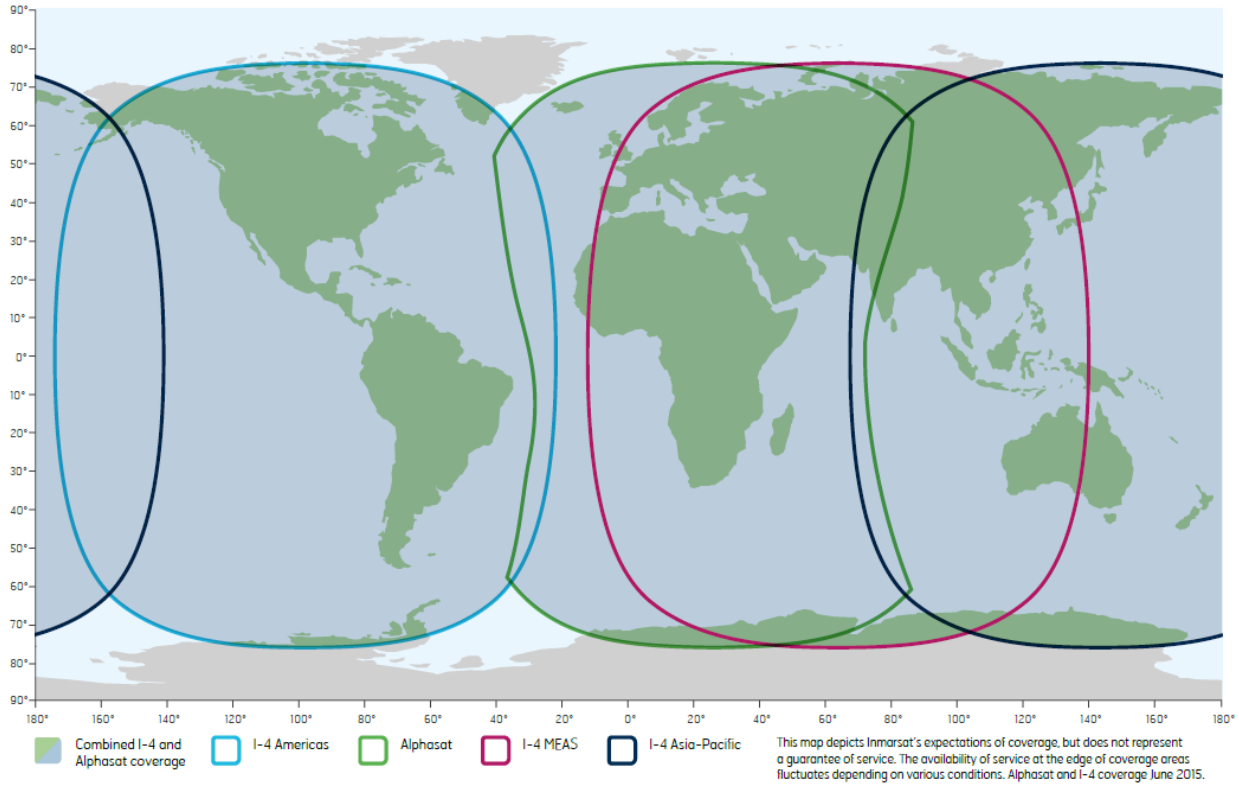


Figure 37: Inmarsat satellite coverage

Operation in the MEAS footprint

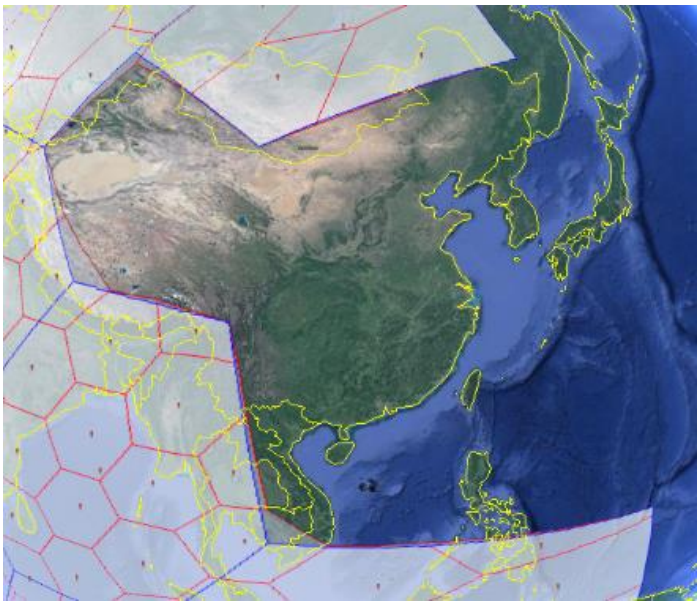


Figure 38: MEAS coverage cutout over China

NOTICE

I-4 MEAS has a cutout area in its coverage over China and nearby parts of Asia. In this area, I-4 Asia Pacific (APAC) must be used even if MEAS is closer.

NOTICE

With the introduction of MEAS, there are now parts of the overlap areas of MEAS and EMEA, such as the yellow shaded area below, where the antenna might be able to see a second satellite.

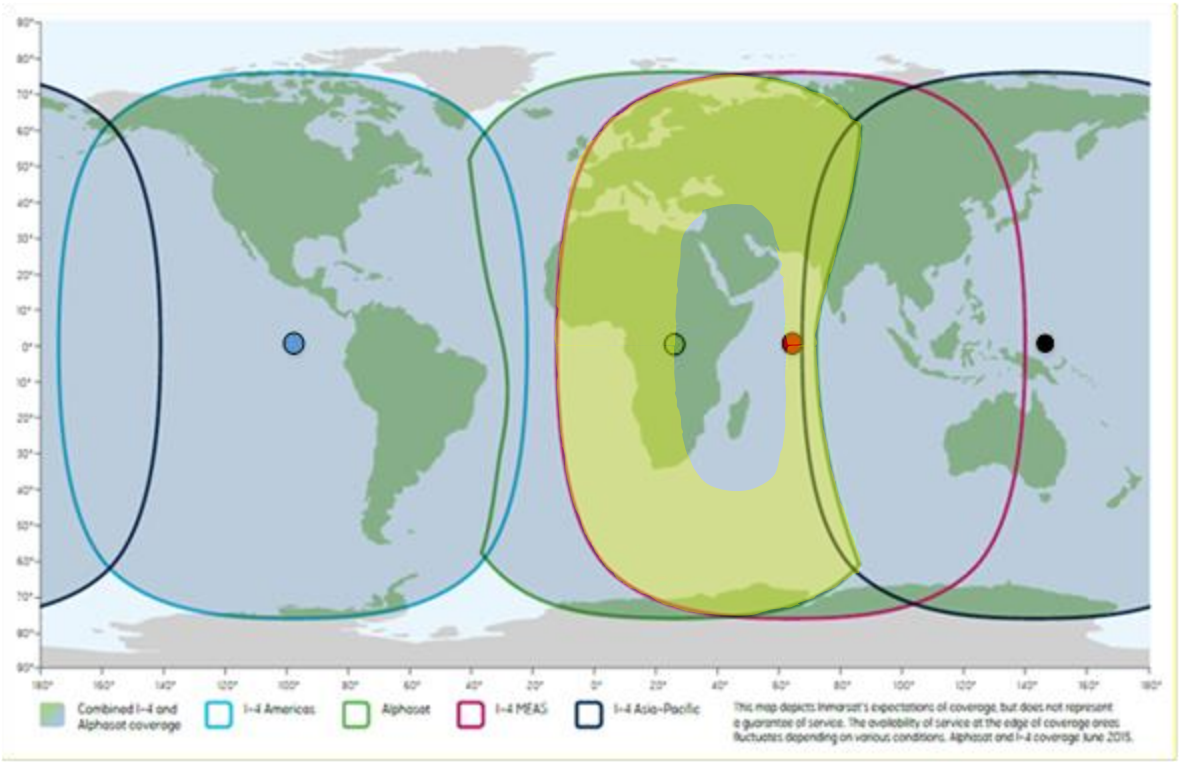


Figure 39: Area where the UT may see two satellites

During site switches, the satellite signal is turned off briefly and the UT may try to register on the other satellite it can see. The signal will be weaker and will degrade service so it is advisable to select operation on a single satellite.

The visible satellites are shown on the status bar of the Home page. To configure the UT to use a single satellite, use the General Setup on page 28 in release 5.9.5.0 and higher. Alternatively, use the _IHSET=”SAT_SELECT” remote control SMS to configure the satellite.

Operation in the Russian Federation

In the Territory and National Waters of the Russian Federation covered by the three Regional beams of I-4 MEAS shown below, end-users must select MEAS rather than Alphasat (EMEA) or I-4 Asia Pacific (APAC), even if one of these satellites is closer. In areas within the Russian Federation, but not covered by the I-4 MEAS satellite, use I-4 Asia Pacific (APAC).

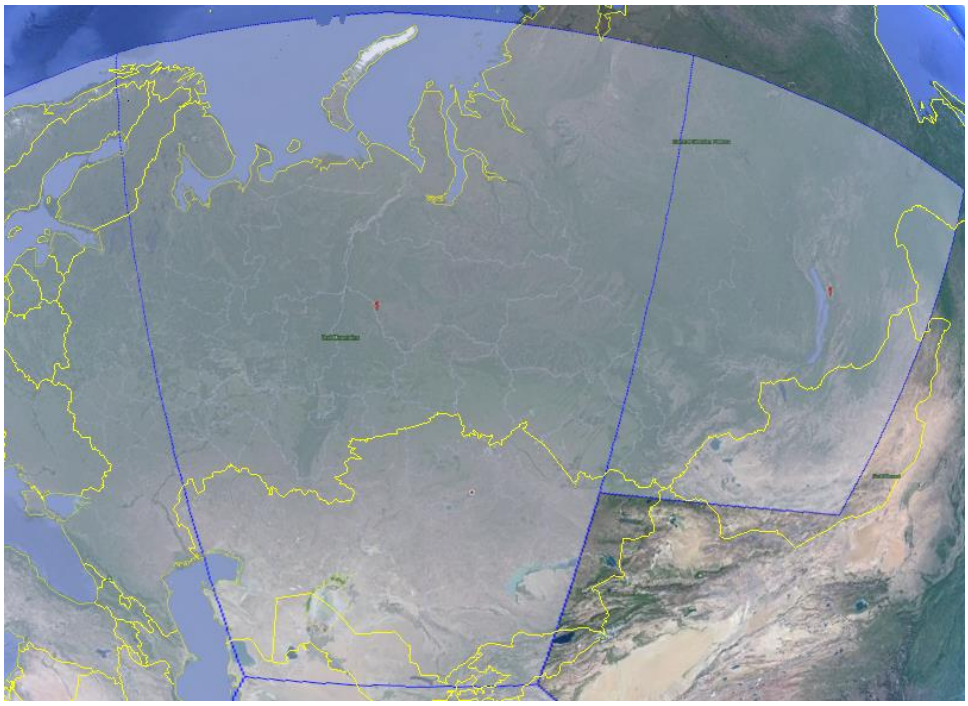


Figure 40: MEAS regional beams covering the Russian Federation

Pointing the ODU

Determine the azimuth and elevation for the look angle to the satellite in advance of the installation by using the approximate latitude and longitude of the site in a simple satellite pointing application or specially marked map. This is the preferred mode as it simplifies the install and may be critical data for choosing the site if there are multiple potential locations to mount the UT in wooded, mountainous or built-up areas.

Alternatively, you can get the azimuth and elevation angle by powering up the UT, allowing it to get a GPS fix and then checking the pointing information on the 9502 home webUI page.

In order to speed up getting the initial GPS fix, while you are in pointing mode you should lay the ODU flat with a clear view of the sky first so that it can see as many GPS satellites as quickly as possible. Once you get the initial GPS fix (GPS LED solid green), then you can point the ODU to the Inmarsat satellite.

If you short press the function button to enter pointing mode, all three LEDs start to blink, indicating that the terminal is in pointing mode.

To aid in pointing, you can use two different methods:

1. You can use the 3.5mm jack to connect stereo speakers or a headset in order to hear the tones for pointing. As the signal strength increases, the tone pitch will get higher and faster.
2. You can also use the 3.5mm jack to connect a 3.5mm stereo plug that has two bare wires exposed. Measure the DC voltage between the two exposed wires with a voltmeter while you are pointing. The range is 2.5V to 3.2V and the higher the voltage the better the antenna is pointed. A reading of 3.0V equates to a signal level of about 51dB, so try to get as close to 3.2V as possible.

You can also monitor the signal strength by hooking up a laptop/PC to the USB port and monitor it from the webUI (see Figure 41 on page 61). Access the webUI by opening a browser and typing in the local IP address of the terminal 192.168.128.100

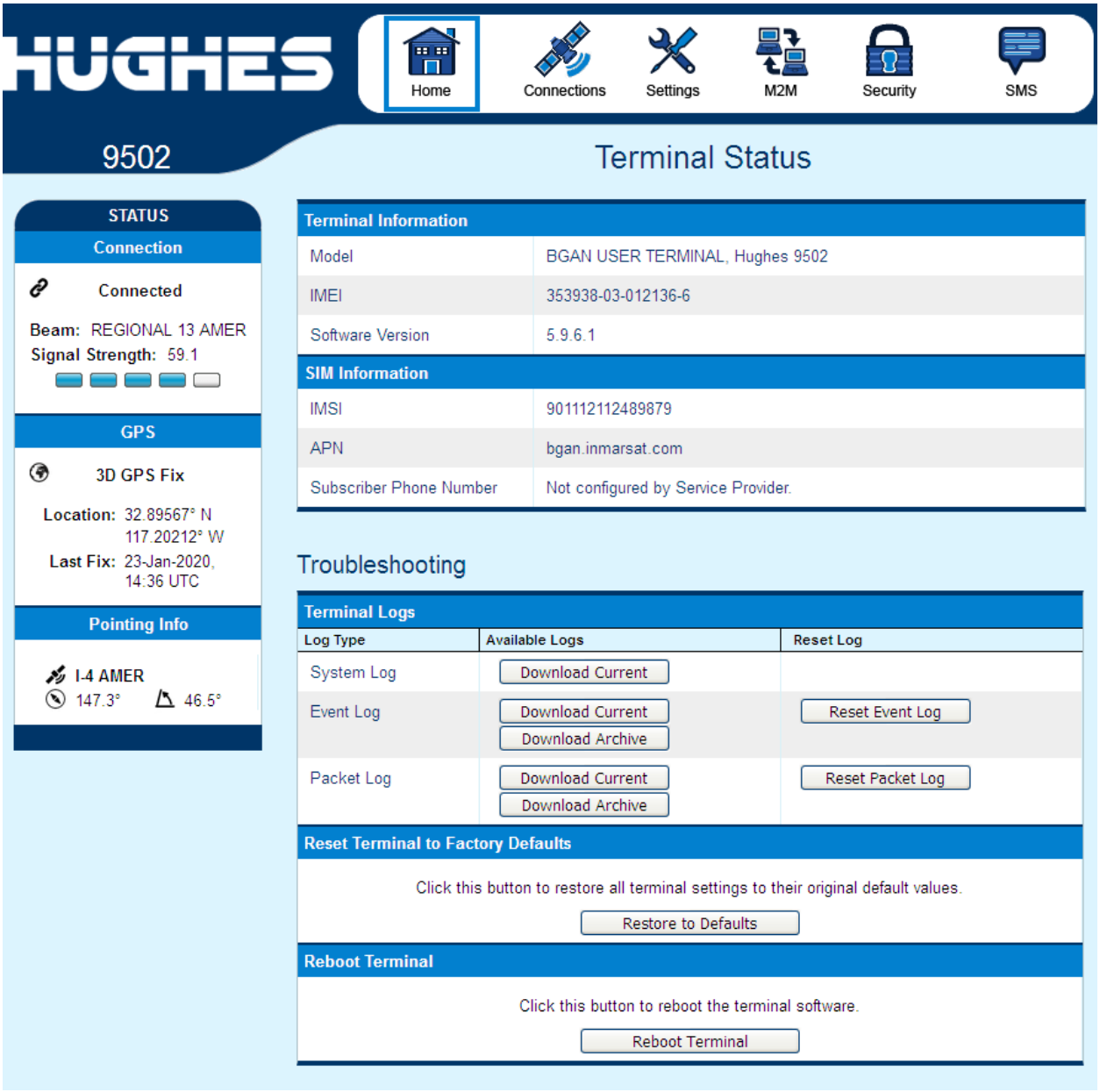


Figure 41: Signal strength on home page

LED flow chart

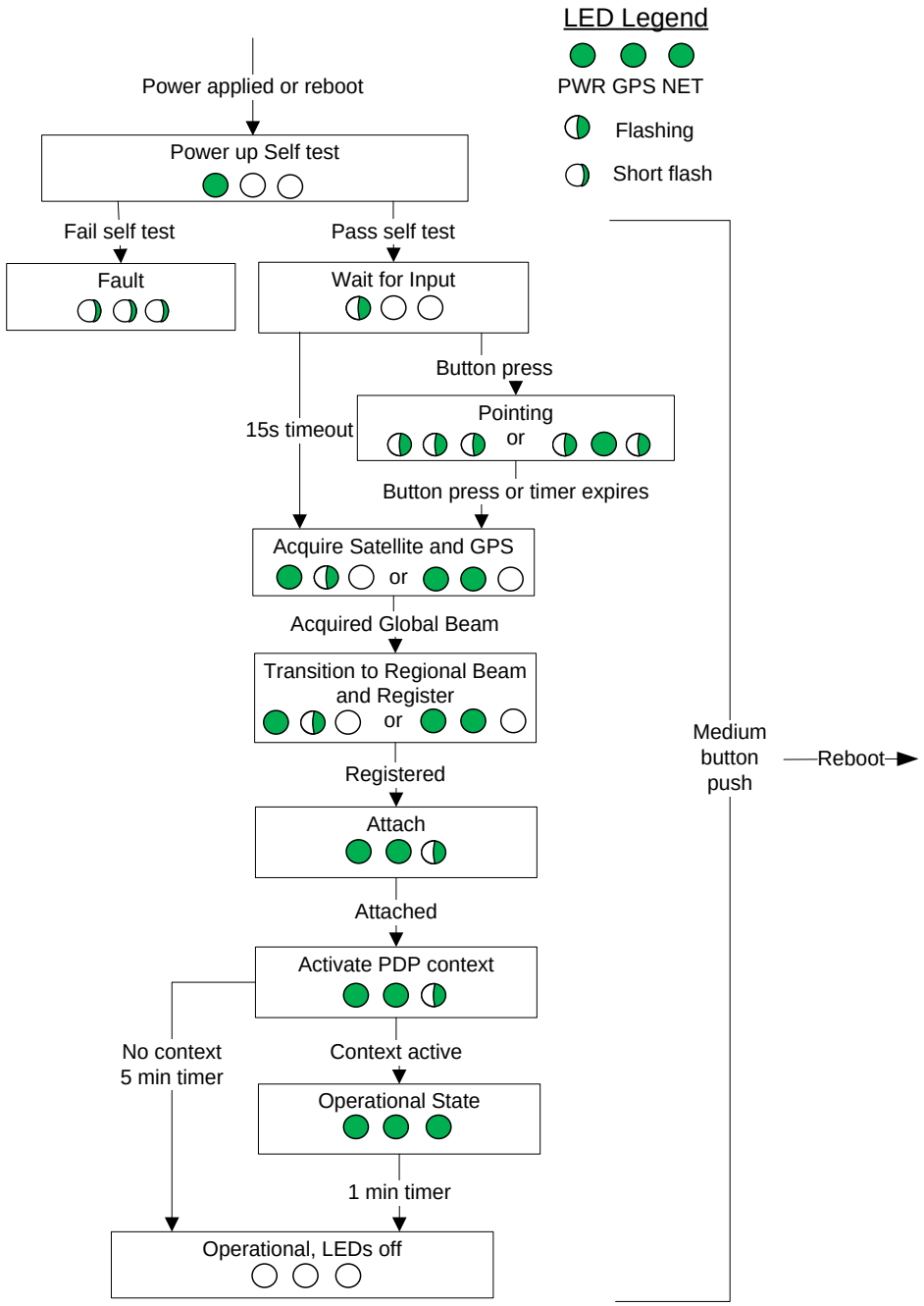


Figure 42: LED flow chart

NOTICE

Important Notes:

- To aid in pointing the ODU, there is a 3.5mm stereo audio jack port on the IDU. The user can insert a stereo headset to hear audio tones or use a voltmeter to measure the voltage which indicates the quality of the signal detected during install mode.
- The IDU must have DC power applied for pointing.
- The GPS antenna is an integral part of the ODU and a GPS fix can be obtained as part of the pointing process.

- Once you are out of pointing mode, you need to stay away from the front and sides of the ODU at least 1m for safety purposes.

Adjusting the azimuth and elevation of the ODU

To adjust elevation, refer to Figure 43

1. Loosen the two bolts in the curved slots on the azimuth elevation bracket.
2. Read the elevation angle from the elevation scale on the bracket, using the red edge on the pole collar as the angle indicator. View this edge through the curved slot on the azimuth elevation bracket.
3. Pivot the ODU to obtain the desired elevation.

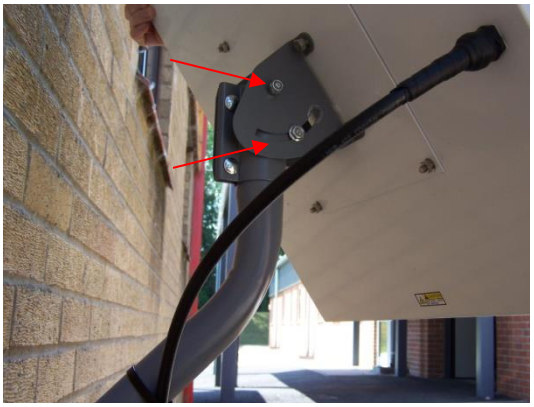


Figure 43: Adjusting elevation

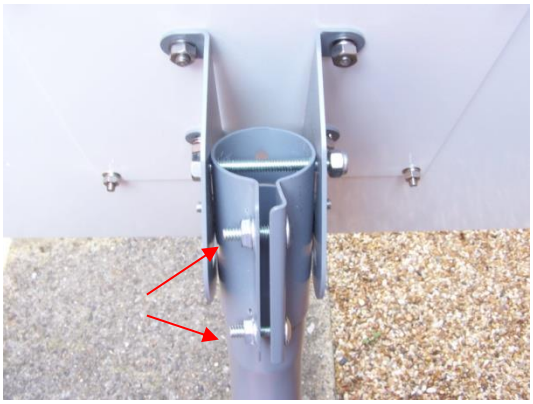


Figure 44: Adjusting azimuth

To adjust azimuth, refer to Figure 44

4. Loosen the two bolts on the pole collar.
5. Move the ODU to either side, in small increments, as necessary to get the optimum signal strength as shown on the voltmeter or by the fast high pitch sounds that you hear with the headphones.

When you have maximized the signal quality:

6. Tighten the two bolts in the curved slots on the azimuth elevation bracket to lock down the elevation adjustment.
7. Be careful not to change the ODU's orientation while tightening the bolts.
8. Tighten the two bolts on the pole collar to lock down the azimuth adjustment.
9. Make sure all other fasteners on both brackets are tight.

Exit pointing mode

1. Short press the function button (<2 seconds) to exit pointing mode. The terminal will initiate registration with the network.
2. Verify the unit registers, attaches, and establishes a PDP context by checking the status on the Web UI or when all three of the LEDs are solid green (Figure 42 on page 62).
3. Optionally, verify the unit will correctly recover from a power cycle by removing and reapplying power. Verify it registers, attaches, and establishes a PDP context by again checking the status on the Web UI or when all three of the LEDs are solid green (Figure 42 on page 62).
4. Verify end to end connectivity of the system, by sending a small amount of data from the device connected to the 9502 and verifying that the data was received by the other end (e.g., data center).

Chapter 5

Lightning protection and safety

Lightning and grounding precautions / *La foudre et la terre précautions*

A lightning strike on the ODU, mounting hardware or cable may cause death or serious injury and is likely to damage both the ODU and the IDU.

La foudre sur l'ODU, le matériel de montage ou les câbles peut causer des blessures graves ou mortelles et est susceptible d'endommager à la fois l'ODU et l'IDU.

It is therefore essential that the installer does not use an installation location, which is likely to experience a lightning strike, and make suitable grounding and lightning protection arrangements to minimize any possibility of injury or damage. Professional local advice should be sought with respect to these matters. Hughes accepts no liability for any injury or damage caused by lightning strikes.

Il est donc essentiel que l'installateur évite tout emplacement d'installation susceptible d'être frappé par la foudre, et de mettre en place un dispositif de mise à la terre et de protection contre la foudre adapté afin de minimiser tout risque de blessure ou de dommage. Un conseil professionnel local devrait être consulté à cet égard . Hughes n'accepte aucune responsabilité pour tout préjudice ou dommage causé par la foudre.

Hughes 9502 indoor unit (IDU) chassis shall be connected to earth ground. Connect the earth grounding wire with lug in between the ground screw and chassis. Tighten the ground screw after the wire lug is installed. The wire lug material shall be either tin-plated copper or tin-plated steel.

Le châssis de l'unité d'intérieur Hughes 9502 (IDU) doit être connecté à la terre. Connectez le câble de mise à la terre avec une cosse entre la vis de terre et le châssis. Serrez la vis de terre après que le câble avec cosse ait été installé. Le câble avec cosse doit être soit en cuivre zingué ou en acier étamé.

Hughes also recommends that a protective earth cable be connected to the ODU or ODU mount. Please consult professional local advice for protective earth grounding requirements.

Hughes recommande également qu'un câble de terre de protection soit connecté à l'ODU ou au montage de l'ODU . Veuillez consulter un conseil professionnel local pour les spécificités concernant la mise à la terre de protection.

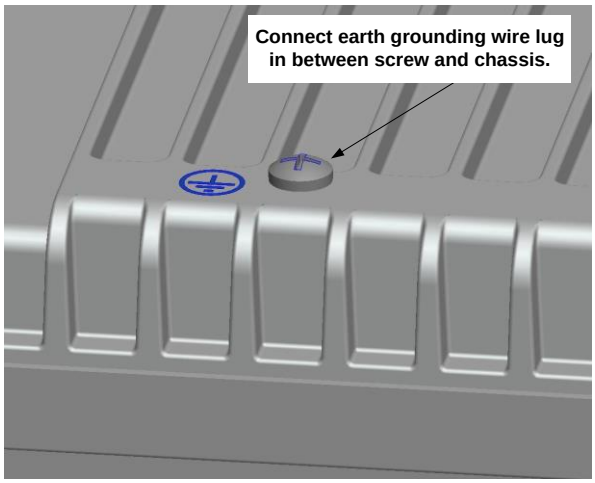


Figure 45: 9502 IDU protective earth grounding

Disclaimer / *Avertissement*

Whilst prepared in good faith, Hughes makes no warranty or representation as to the accuracy, completeness or fitness for purpose of this document or its contents and all warranties, whether express or implied are excluded. Hughes, to the maximum extent permitted by law, excludes any liability arising from the use of this document or its contents. Users' attention is brought to the fact that the local applicable laws and regulations as to the use of the remote ODU may apply and it is the user's responsibility to identify and comply with these.

Tout en étant rédigé de bonne foi, Hughes n'offre aucune garantie ou représentation quant à l'exactitude, l'exhaustivité ou l'adéquation quant à l'objectif de ce document ou son contenu, et toutes garanties, exprimées ou tacites sont exclues. Hughes, dans la mesure maximale permise par la loi, exclut toute responsabilité découlant de l'utilisation de ce document ou son contenu. L'attention des utilisateurs est attirée sur le fait que les lois et réglementations locales applicables à l'utilisation de l'ODU peuvent s'appliquer et il est de la responsabilité de l'utilisateur de les identifier et de s'y conformer.

Chapter 6

AT unsolicited response codes

The following codes and text may appear as unsolicited response codes on the AT interface to the UT or in an SMS response to an ATCO Remote SMS command. Each code appears in the following format:

```
<crlf><at_command>: <#>, <text><crlf>
```

Where:

`<crlf>` is the carriage-return/line-feed character sequence

`<at_command>` identifies the command which generated the response

`<#>` is the numeric response code

`<text>` is descriptive text about the response

Examples:

```
_IGETFW: 20, FTP hookup fail
_IUPDFW: 0, Complete
```

The message format is intended to be readable/usable by both automated processes and humans.

Table 7 below shows the current set of response codes, grouped by function.

Table 7: AT unsolicited response codes

Code	Text	Explanation
General		
0	Complete	Operation completed successfully
1	Unexpected software error	Software error
2	Local file open error	_IGETFW: could not open local file for download _IUPDFW: could not open control file for update parameters _IUPDCFG: could not compute checksum for new config file.
3	Directory not found	Could not find specified directory on UT file system.
4	File not found	Could not find named file (on local file system).
5	Error renaming file	_IUPDFW: Could not restore 'image.txt' after failed upgrade. _IUPDCFG: Could not rename new file to 'config.txt'.
6	Parameter error	Error found in a parameter, e.g. invalid value, string too long, etc.
Context Management		
10	No entry in context table	No free entry in context ID table (all 11 contexts in use)
11	Context parameter error	Internal software error
12	Local IP addr error	Internal software error
13	Context activation error	Context activation failed. Could be problem with PS attach, SIM subscription, APN, network or connectivity.
14	Context deactivation error	Context deactivation failed

Code	Text	Explanation
FTP Management		
20	FTP hookup fail	Connection to FTP server failed. Problem could be server unreachable or specified IP address or server name invalid, or connectivity failure.
21	FTP login fail	FTP username or password incorrect
22	FTP 'type' fail	Could not establish “binary” mode.
23	FTP 'cwd' fail	Could not change to working directory on FTP server.
24	FTP data connection fail	Could not establish an FTP data connection with the server.
25	FTP 'nlst' fail	Could not get list of files in current FTP server directory. Directory may be empty.
26	FTP xfer command fail	Could not initiate data transfer on an established connection. May be caused if filename not found.
27	FTP found no filename	Could not find a filename in the current server directory.
28	FTP local file read/write fail	Error while writing downloaded file to UT flash or reading upload file data.
29	FTP socket fail	Error while reading or writing FTP data socket.
30	FTP completion error	Error while closing the current FTP connection.
31	FTP xfer timed out	FTP client timed out waiting for socket ready (read or write), e.g. due to loss of connectivity during transfer.
_IGETFW		
40	File in use, cannot download	The file to be downloaded is the same (by name) as the image currently in use.
41	Starting immediate update…	Normal success. File downloaded successfully, now starting immediate update.
42	Complete	File listed in the response successfully downloaded to the UT
43	Downgrade disallowed	Downgrade to lower release blocked to protect hardware.
_IUPDFW		
50	New firmware file not found	Could not find filename specified in upgraded control file.
51	New firmware file corrupt	Firmware file failed checksum test.
52	New firmware file failure	The new firmware failed to run or failed to acquire the network and the unit fell back to the old release.
53	Upgrade admin file error	Problem with local file manipulation during upgrade process.
54	Upgrade status file error	Problem with local file manipulation during upgrade process
_IGETFILE		
60	Can't overwrite protected file	File specified in AT command was ‘config.txt’, ‘config.chk’, ‘config_bk.txt’, ‘config_bk.chk’
_IUPDCFG		
70	Can't use reserved file	Attempt to use one of protected config files as the new config.txt file.

Code	Text	Explanation
_IREMWEB		
80	Invalid IP address string	An IP address parameter string could not be interpreted as a legitimate IP address.
81	Global IP: <ip_addr>	REMWEB connection set up successfully. Indicates global IP address assigned to the UT's own PDP context, to which an HTTP connection may be made.

Chapter 7
Troubleshooting

Problem	Possible Cause	Possible Solution
Ethernet connectivity problems	The 9502 Ethernet chip is 10BaseT and some routers and other devices may have problems if set to 100BaseT or auto-negotiate	Configure the device for 10BaseT
Problems with remote control SMS when sending from cell phone	The Inmarsat network does not interconnect for SMS with all cellular carriers. Some only work in one direction.	Test SMS from cell phones to BGAN before deploying to verify interconnectivity. Alternatively, use another BGAN terminal to send and receive SMS.
Problems with remote control SMS	Most remote SMS problems are caused by configuration or syntax problems.	Verify the UT has remote SMS enabled. Verify you are using the correct password. If the white list is configured, verify you are initiating messages from a device with an allowed number. Check the syntax of the SMS against the SMS Remote Control Feature User Guide. Spaces are used as delimiters between parameters and must be used correctly. Some parameters require double quotes, e.g. APN such as “bgan.inmarsat.com”
Cannot access or control the unit	Forgotten admin password. Invalid configuration.	Reset to factory defaults: Press and hold the small blue button next to the SIM card while powering off the UT. Note this is only supported in Release 5.9.6.1 and above. Note this function is blocked if enhanced security is active.
No SIM error	No SIM installed. Faulty SIM card. Dirty SIM contacts.	Check the SIM card. Remove the card and clean it with a pencil eraser or soft cloth and ensure the contacts are free and clear of dirt, debris and grease before replacing.

PDP context activation errors

Table 8: PDP context activation errors

CME error number	CME Error Text on Web UI	Possible reason
14	invalid index	Problem in PDP context request
21	no network service	Could be poor signal or signal blockage, or network problem.
55	Implicitly detached (#10)	Check attach and registration status.
62	Network failure (#17)	Could be problem accessing the network; or could be invalid streaming rate or too many streams requested.
65	Congestion (#22)	Insufficient resources in the spot beam. Retry later.
67	Service option not supported (#32)	Invalid context parameters or subscription problem.
68	Requested service option not subscribed (#33)	Requested invalid APN or SIM subscription problem.
69	Service option temporarily out of order (#34)	Retry activating the context, then try rebooting the unit.
70	No PDP context activated (#40)	Retry activating the context, then try rebooting the unit.
72	PDP authentication failure	Could be invalid APN username or password
74	Semantically incorrect message (#95)	Could be problem in TFT definition or PDP context request.
75	Invalid mandatory information (#96)	Problem in PDP context request
76	Message type non-existent or not implemented (#97)	Problem in PDP context request
77	Message type not compatible with the protocol state (#98)	Problem in PDP context request
78	Information element non-existent or not implemented (#99)	Problem in PDP context request
79	Conditional IE error (#100)	Problem in PDP context request
80	Message not compatible with the protocol state (#101)	Problem in PDP context request
81	Protocol error, unspecified (#111)	Problem in PDP context request
92	Network access forbidden	Retry activating the context, then try rebooting the unit. Check the SIM card and SIM subscription.

Chapter 8

Regulatory notices

EU Declaration of Conformity

Refer to www.bgan.hughes.com for the EU Declaration of Conformity.

FCC compliance / *Conformité FCC*

This device conforms to the FCC rules. Any changes or modifications to Hughes Network Systems' equipment, not expressly approved by Hughes Network Systems, could void the user's authority to operate the equipment.

Cet appareil est conforme aux règles FCC. Toute modification apportée à l'équipement de Hughes Network Systems et non approuvé expressément par Hughes Network Systems, peut annuler l'autorisation de l'utilisateur à opérer cet équipement.

To comply with FCC RF exposure requirements, this device must be operated with a minimum separation distance of one meter from the front of the satellite terminal's antenna to a person's body. Other operating configurations should be avoided.

Afin d'être conforme aux exigences FCC concernant l'exposition RF, cet appareil doit être utilisé tout en maintenant une distance de séparation minimale d'un mètre entre la personne et le devant de l'antenne du terminal satellite. Toute autre configuration d'utilisation doit être évitée.

This device complies with Part 15 of the FCC 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.

Cet appareil est conforme à la Section 15 du règlement FCC. Son fonctionnement est sujet aux deux conditions suivantes ; (1) ce matériel ne peut pas provoquer d'interférences nuisibles, et (2) ce matériel doit pouvoir tolérer n'importe quelle interférence reçue, y compris les interférences qui peuvent provoquer un fonctionnement indésirable.

IC compliance / *Conformité IC*

This device conforms to Industry Canada's rules. Any changes to Hughes Network Systems' equipment, not expressly approved by Hughes Network Systems, could void the user's authority to operate the equipment.

Cet appareil est conforme aux règlements de l'Industrie Canada. Tout changement à l'équipement de Hughes Network Systems, sans le consentement exprès de Hughes Network Systems, peut résulter à l'annulation de l'autorité confiée à l'usager d'opérer cet équipement.

To comply with Industry Canada's RF exposure requirements, this device must be operated with a minimum separation distance of one meter from the satellite terminal's antenna to a person's body. Other operating configurations should be avoided.

Pour être conforme aux règlements d'Industrie Canada sur l'exposition aux rayonnements RF, cet appareil se doit opérer à une distance d'au moins un mètre entre l'antenne du terminal de transmission satellite et le corps d'une personne. Toute autre configuration d'opération devrait être évitée.

EU WEEE (Waste Electrical and Electronic Equipment) directives

The European Union (EU) Directive 2012/19/EU on waste electrical and electronic equipment mandates recycling of electrical and electronic equipment throughout the EU.

Unless otherwise noted, all products, assemblies, and sub-assemblies manufactured by Hughes and its sub-contractors are compliant with this directive and any subsequent revisions or amendments. This product carries the WEEE label below to demonstrate compliance.

For addition information, contact Hughes Network Systems at: www.hughes.com.