Hughes 9502 Fixed Satellite Terminal with Integrated Antenna

User Guide

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Contents

Understanding safety alert messages 5
Messages concerning personal injury / Messages concernant des blessures corporelles 5
Messages concerning property damage / Messages concernant des dommages matériels 6
Safety symbols 7
Chapter 1 Product Description 13
Contents of the Hughes 9502 One-piece Terminal 13
Optional Mounting Accessories 13
Main features of the 9502 one-piece terminal 14
Interfaces 15
Terminal Specifications 18
Chapter 2 Configuration via Web UI 19
Web UI Layout 19
Home Tab 19
Terminal Information 19
SIM Information 19
Troubleshooting 20
Status Bar 21
Connections Tab 22
Manage Contexts Page 22
Automatic Contexts 23
Manage APNs Page 25
Settings Tab 26
IP Address/DHCP Settings 26
Ethernet Port Page 27
ATC Page 28
Feature Management Page 28
M2M Page 29
Ping Configuration: 30
Security Passwords 31
Enhanced Security Settings Page 32
SMS Pages 34
Chapter 3 Operational Features 35
LEDs 35
Function Button 35
Network Mode 36

NAT Mode 36
Relay Mode 36
Remote Control 36
Remote Upgrade and File Transfer 37
Security 38
Wake on LAN (Any Packet) 38
Serial Pin Power Control 39
ATC 39
Watchdog 40
GNSS 40
Chapter 4 Installation Instructions 41
Inspecting the parts 41
Optional installation items: 41
Determining where to install the terminal 41
Terminal installation using the basic fix mount kit; (P/N 3004066-0002) 43
Mounting the azimuth elevation bracket 44
Mounting the azimuth elevation bracket onto the pole 45
Connecting power leads to the Hughes 9502 45
Powering up the Hughes 9502 49
Pointing the Antenna 50
LED Flow Chart 52
Adjusting the azimuth and elevation of the antenna 54
Exit Pointing Mode 55
Chapter 5 Lightning Protection and Safety 57
Lightning and Grounding Precautions / La foudre et la terre Précautions 57
Disclaimer / Avertissement 59
Chapter 6 AT Unsolicited Response Codes 60
Chapter 7 Troubleshooting 62
Chapter 8 Declaration of Conformity 63
FCC Compliance / Conformité FCC 64
IC Compliance / Conformité IC 64
EU RoHS (Restriction of Hazardous Substances) Directive 65
EU WEEE (Waste Electrical and Electronic Equipment) Directives 65

Figures

FIGURE 1-1 – 9502 ONE-PIECE TERMINAL P/N 3500753-0021 13
FIGURE 1-2 - BASIC FIXED MOUNT INSTALLATION 14
FIGURE 1-3 - AZIMUTH/ELEVATION BRACKET 14
FIGURE 1-4 – BOTTOM SIDE VIEW 16
FIGURE 1-5 – BACK SIDE VIEW 16
FIGURE 1-6 - BOTTOM SIDE VIEW WITH END CAP OFF 17
FIGURE 1-7 - TOP SIDE VIEW WITH END CAP OFF 17
FIGURE 2-1 - HOME PAGE 20
FIGURE 2-2 – MANAGE CONTEXTS 22
FIGURE 2-3 – AUTOMATIC CONTEXTS 23
FIGURE 2-4 – DHCP AUTOMATIC CONTEXTS 24
FIGURE 2-5 – MANAGE APNS 25
FIGURE 2-6 – IP ADDRESS/DHCP SETTINGS 26
FIGURE 2-7 – ETHERNET SETTINGS 27
FIGURE 2-8 – ATC PAGE 28
FIGURE 2-9 – FEATURE MANAGEMENT PAGE 28
FIGURE 2-10 – M2M SETUP 29
FIGURE 2-11 – SECURITY PASSWORDS 31
FIGURE 2-12 – ENHANCED SECURITY PAGE LINK 32
FIGURE 2-13 – ENHANCED SECURITY SETTINGS PAGE 32
FIGURE 2-14 – LOGIN PAGE 33
FIGURE 2-15 – SMS SEND/RECEIVE 34
FIGURE 4-1 – HOME PAGE SHOWING POINTING INFORMATION 42
FIGURE 4-2 – BASE BRACKET AND BUBBLE LEVEL 43
FIGURE 4-3 – POLE ASSEMBLY 44
FIGURE 4-4 – AZIMUTH ELEVATION BRACKET 44
FIGURE 4-5 – POLE COLLAR 45
FIGURE 4-6 – BOTTOM VIEW CAP OFF 46
FIGURE 4-7 – EXPLODED VIEW OF POWER CONNECTOR 46
FIGURE 4-8 - FUNCTION BUTTON 49
FIGURE 4-9 – SIGNAL STRENGTH ON HOME PAGE 51
FIGURE 4-10 – LED FLOW CHART 52
FIGURE 4-11 - ADJUSTING ELEVATION 54
FIGURE 4-12 - ADJUSTING AZIMUTH 55
FIGURE 5-1 – 9502 PROTECTIVE EARTH GROUNDING 58

Tables

TABLE 1 – TERMINAL SPECIFICATIONS 18
TABLE 2 – WEB UI LAYOUT 19
TABLE 3 – STATUS BAR 21
TABLE 4 – GPS STATUS 21
TABLE 5 – REMOTE CONTROL SMS MESSAGE COMMANDS 37
TABLE 6 - AT UNSOLICITED RESPONSE CODES 61

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

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

NOTICE

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

Ne pas se tenir en face de l'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'antenne satellite lorsque le système est opérationnel. Maintenez une distance de 1 m ou plus par rapport à l'antenne 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 antenna 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'antenne 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 antenna 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'antenne;**
- **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 the 9502. Please consult professional local advice for these requirements.

Une mise à la terre de protection est recommandée par Hughes pour le terminal satellite. Veuillez consulter un conseil professionnel local pour ces spécifications.

Chapter 1 Product Description

Contents of the Hughes 9502 One-piece Terminal

The Hughes 9502 One-piece Terminal (P/N 3500753-0021) is a one- piece design that is ready to mount outdoors in the harshest environments and in unmanned and remote locations.

Figure 1-1 – 9502 One-piece Terminal P/N 3500753-0021

Optional Mounting Accessories

The unit 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 1-2 - Basic Fixed Mount Installation

Figure 1-3 - Azimuth/Elevation Bracket

Main features of the 9502 one-piece terminal

The main features of the Hughes 9502 One-piece 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
- Relay Mode
- 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**)

- Integrated GPS receiver and L-band antenna
- 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 antenna pointing
- USIM card slot

Figure 1-4 – Bottom side view

Figure 1-5 – Back side view

Figure 1-6 - Bottom side view with end cap off

Figure 1-7 - Top side view with end cap off

Terminal Specifications

Satellite Transmit Frequency	1626.5–1660.5 MHz
Satellite Receive Frequency	1525–1559 MHz
GPS Frequency	1574.42–1576.42 MHz
Weight	3.8Kg
Dimensions	275 mm x 275 mm x 84 mm
Operating Temperature	-40° C to +75° C
Storage Temperature	-55° C to +75° C
Humidity	95% RH at +40° C
Wind Loading	Survival wind loading (with optional mount) up to 100 mph
Water and Dust	IP-66 Compliant
Input Voltage	+12 Vdc/+24 Vdc nominal
Firmware Upgrades	Over the air or local

Table 1 – Terminal Specifications

Chapter 2 Configuration via Web UI

The UT is typically configured via the Web User Interface (UI). Browsers that are currently supported are IE7 & 8, Mozilla, and Safari only.

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 Web UI layout:

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

Table 2 – Web UI Layout

Home Tab

The home page includes the following fields:

Terminal Information

- Model
- IMEI
- Software Version

SIM Information

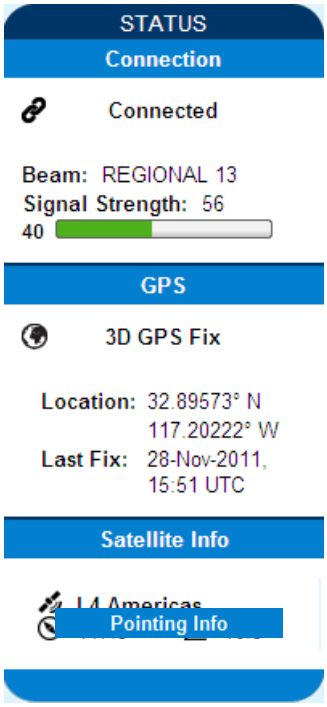
- IMSI
- SIM APN
- Terminal phone number

Troubleshooting

- System Log
- Event Log
- Packet Log

These files can be FTP'd out of the UT and used for debugging. To download the logs right-click on the "Download Current" link and select "Save Target As".

Figure 2-1 - Home Page



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 – Status Bar below.

Display	Comments	Corresponding LED display
Initializing	Initial start up (~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)

Table 3 – Status Bar

The signal strength bar shows the quality of the received signal. The same scale is used for all beam types and so during pointing only the left part of the bar is used. The signal strength in the Global Beam should be 46 to 52dB when it is pointed correctly (the higher the better).

The signal strength increases in value as you transition to the Regional Beam and again when you get a PDP context and transition to the Narrow Beam.

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

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
Location	Shows Latitude and Longitude coordinates if allowed by network GPS Policy. Shows “Blocked” if the unit has a fix but the policy has not yet been received.
Last Fix	Shows date and UTC time of last GPS fix

Table 4 – GPS Status

The *Pointing Info* section shows the satellite that the UT should be pointed to and gives the Azimuth and elevation angles to the

satellite. When the UT is in an overlap region, the Pointing Info section will show both satellites and the user will have to pick the best one to point to.

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.

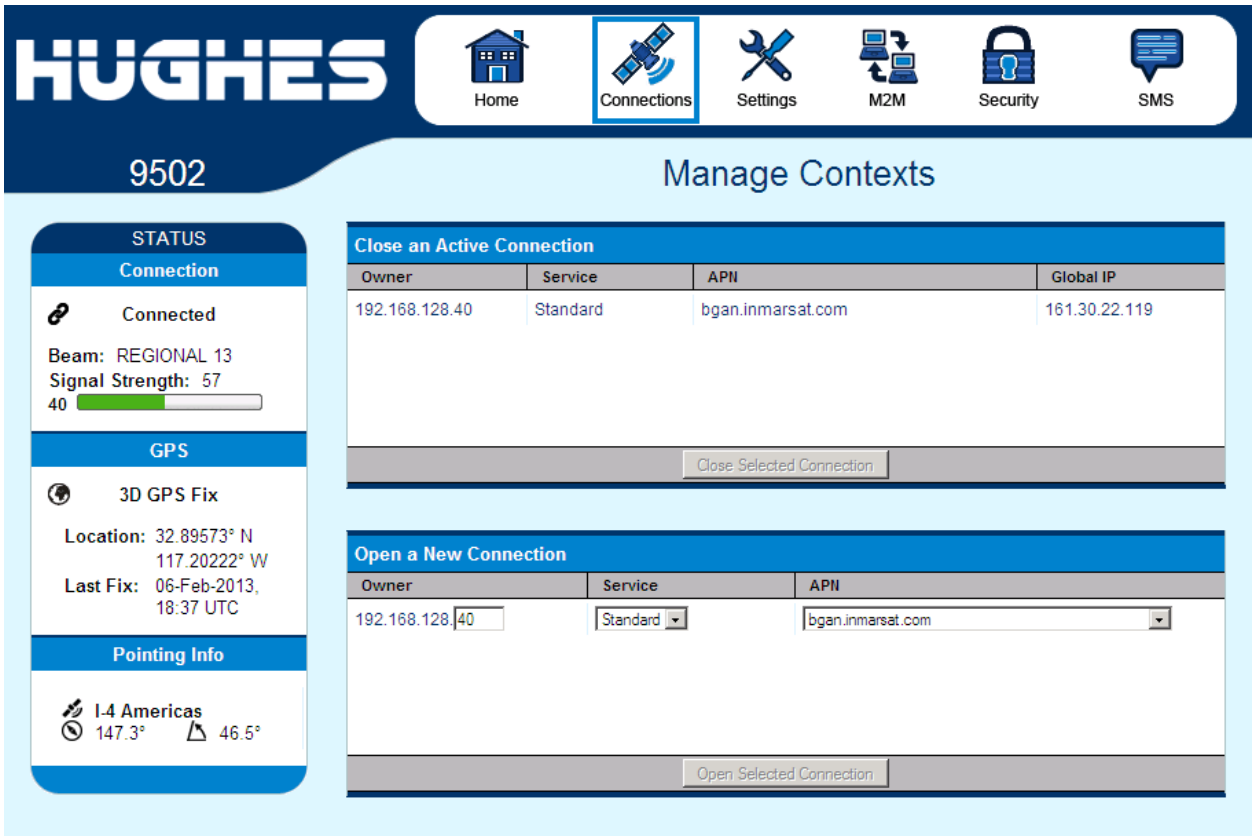


Figure 2-2 – Manage Contexts

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.)

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".

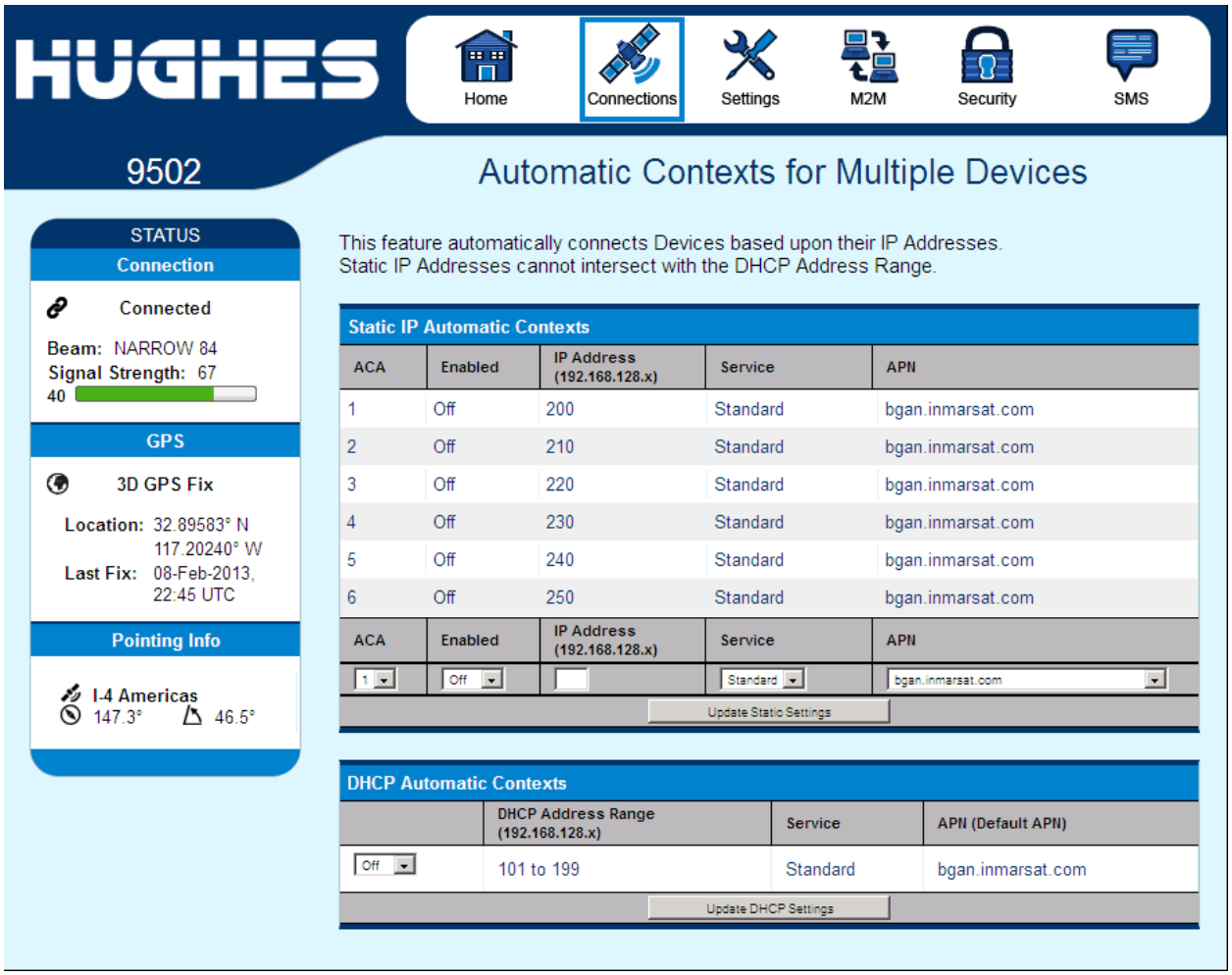


Figure 2-3 – Automatic Contexts

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.

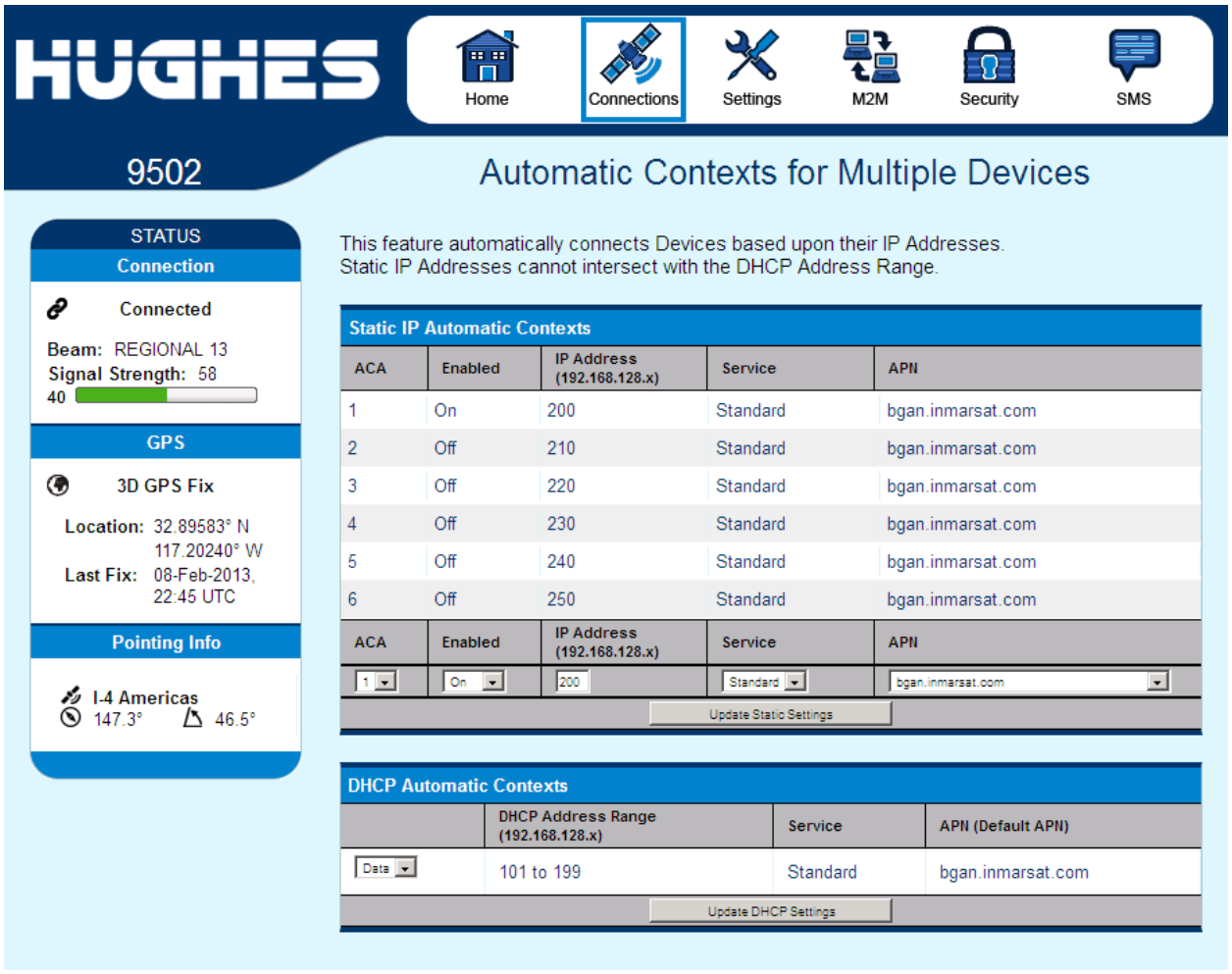


Figure 2-4 – DHCP Automatic Contexts

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 Connections** 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.

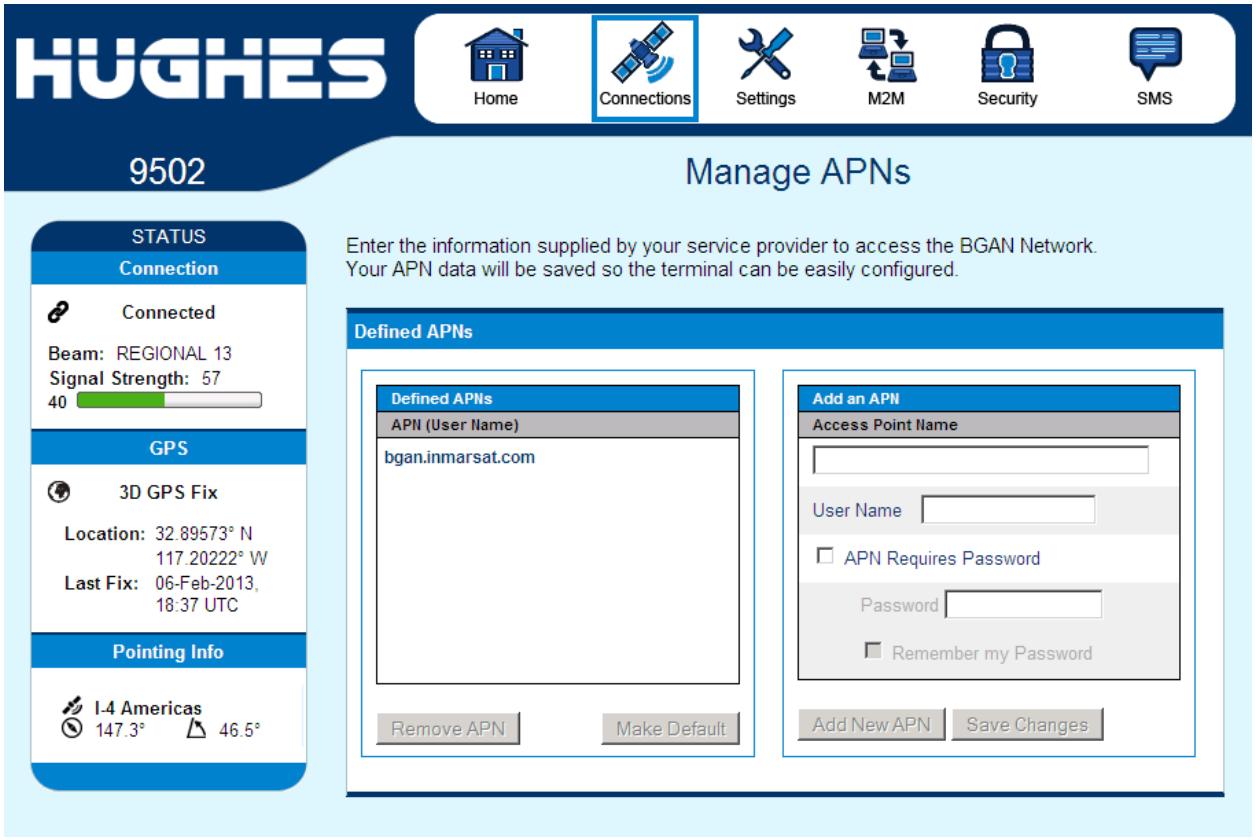


Figure 2-5 – Manage APNs

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 parenthesis. This APN will now be available to use from any APN drop down menu.

Settings Tab

The settings tab has the following configuration pages:

IP Address/DHCP Settings

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

- Terminal Local IP address
- DHCP Server enable
- DHCP Address Range
- Lease Time when Idle
- Lease Time when Connected
- Network Mode field: NAT or Relay (see Network Mode section.)

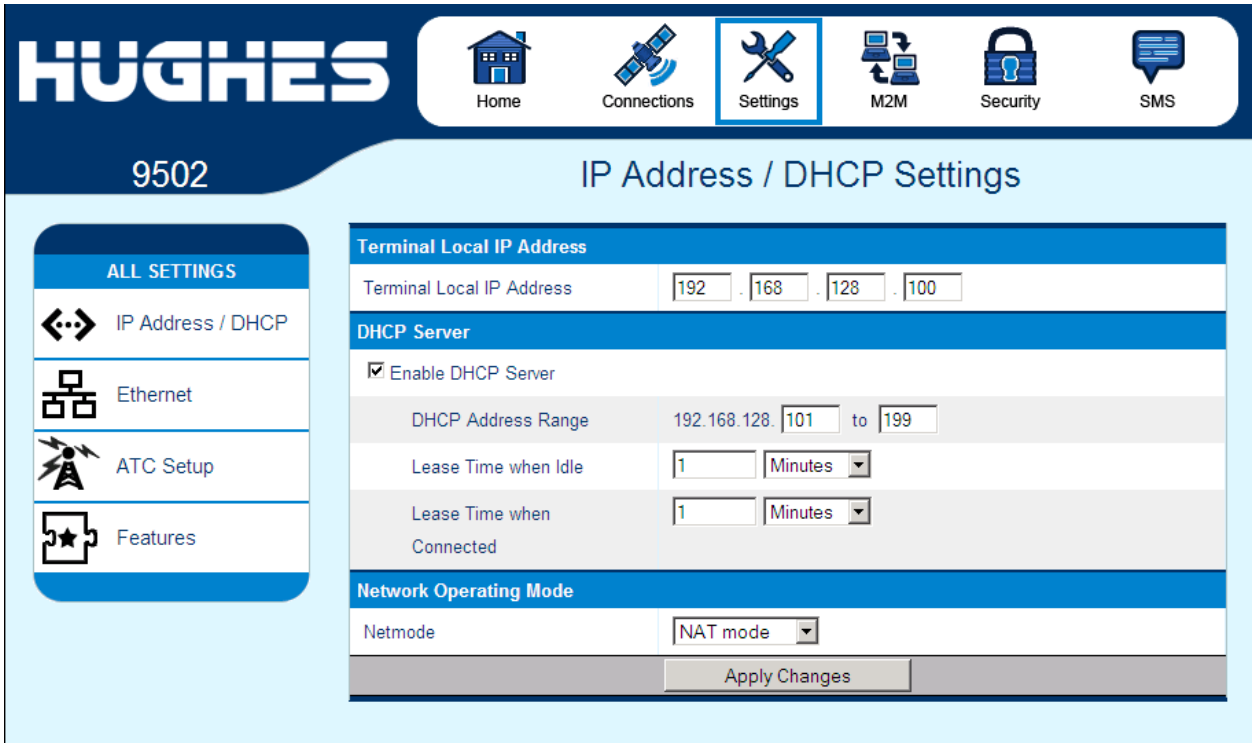


Figure 2-6 – IP Address/DHCP Settings

Ethernet Port Page

The Ethernet Port settings page includes:

- Wake On LAN (see Wake on LAN (Any Packet section)):
  - 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.

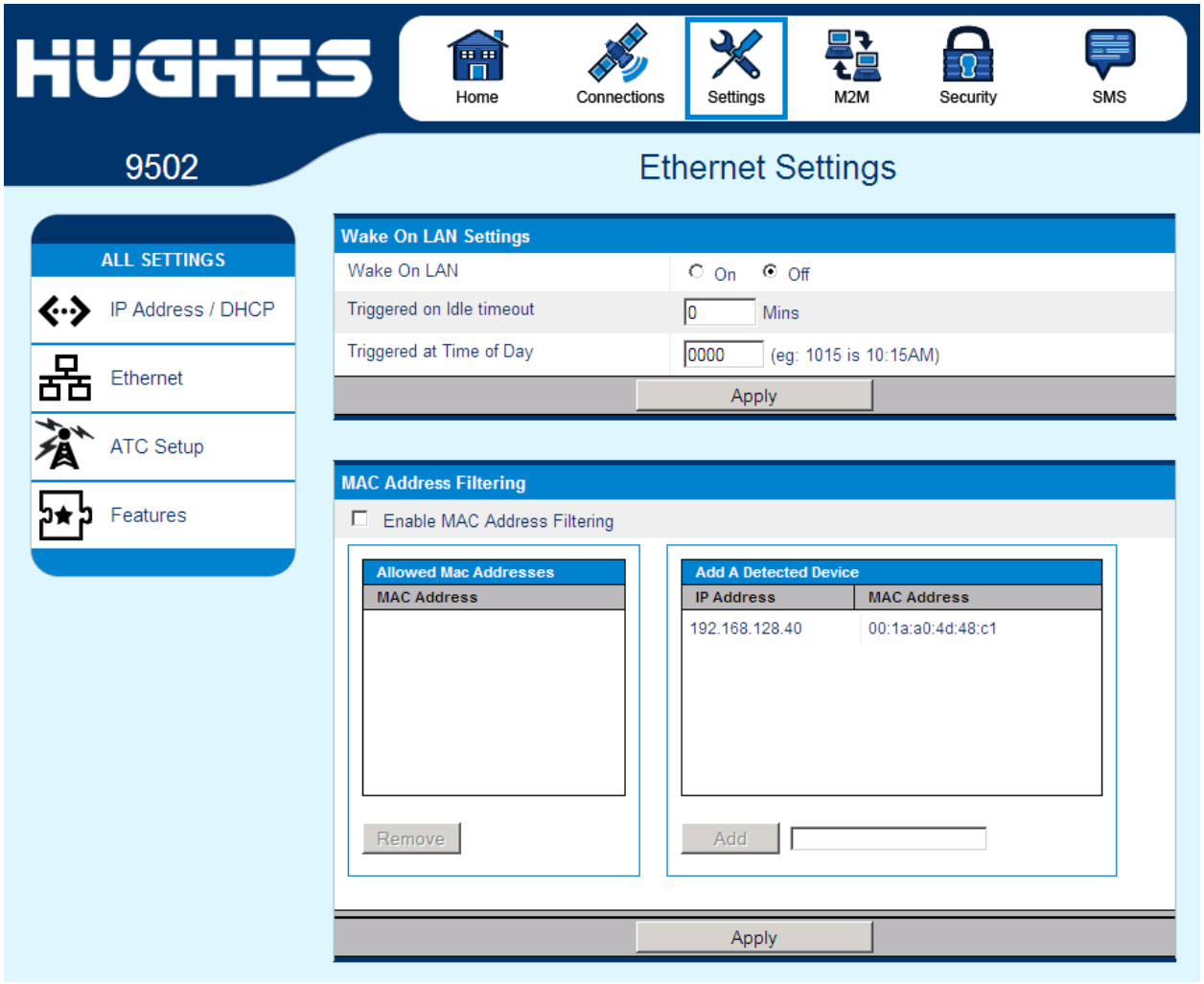


Figure 2-7 – Ethernet Settings

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.

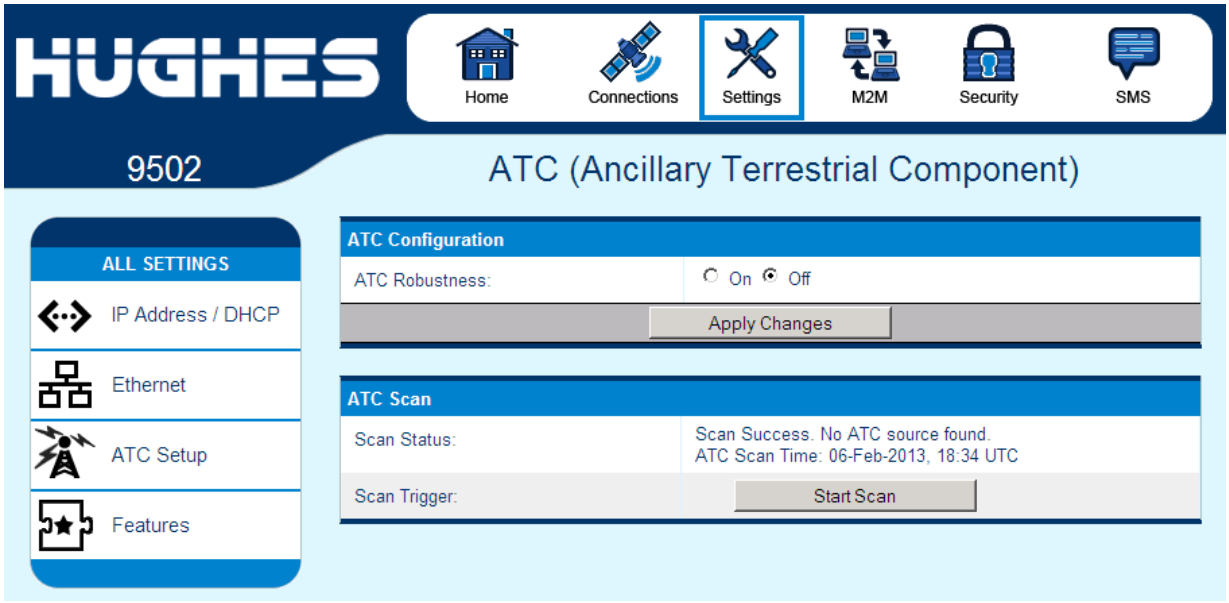


Figure 2-8 – ATC Page

Feature Management Page

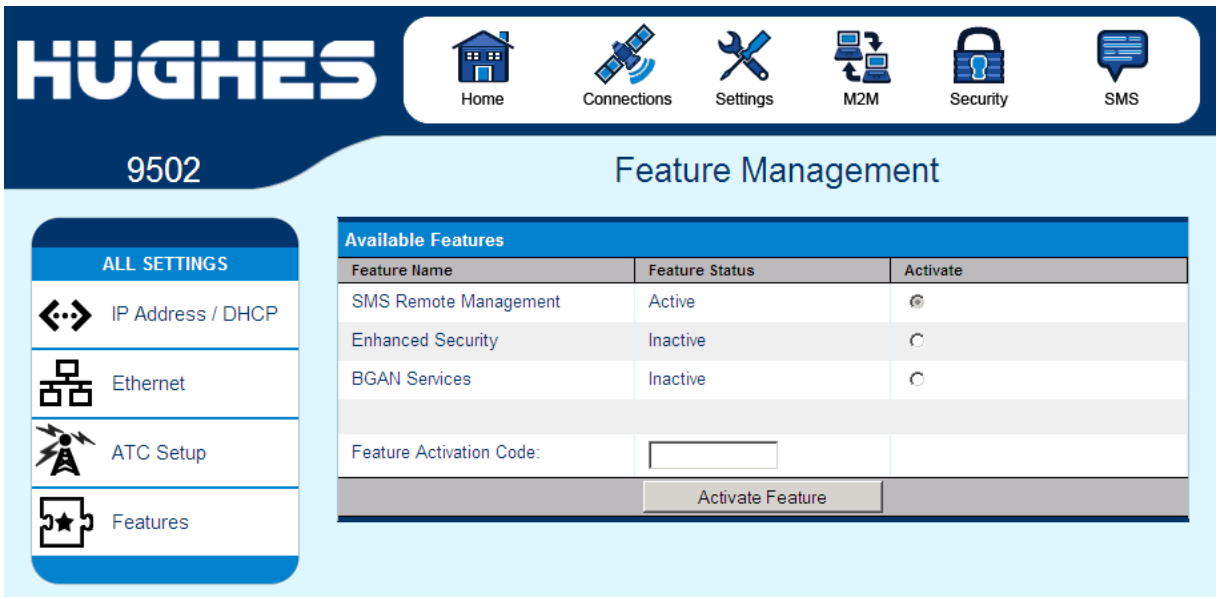


Figure 2-9 – Feature Management Page

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. 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).

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

M2M Page

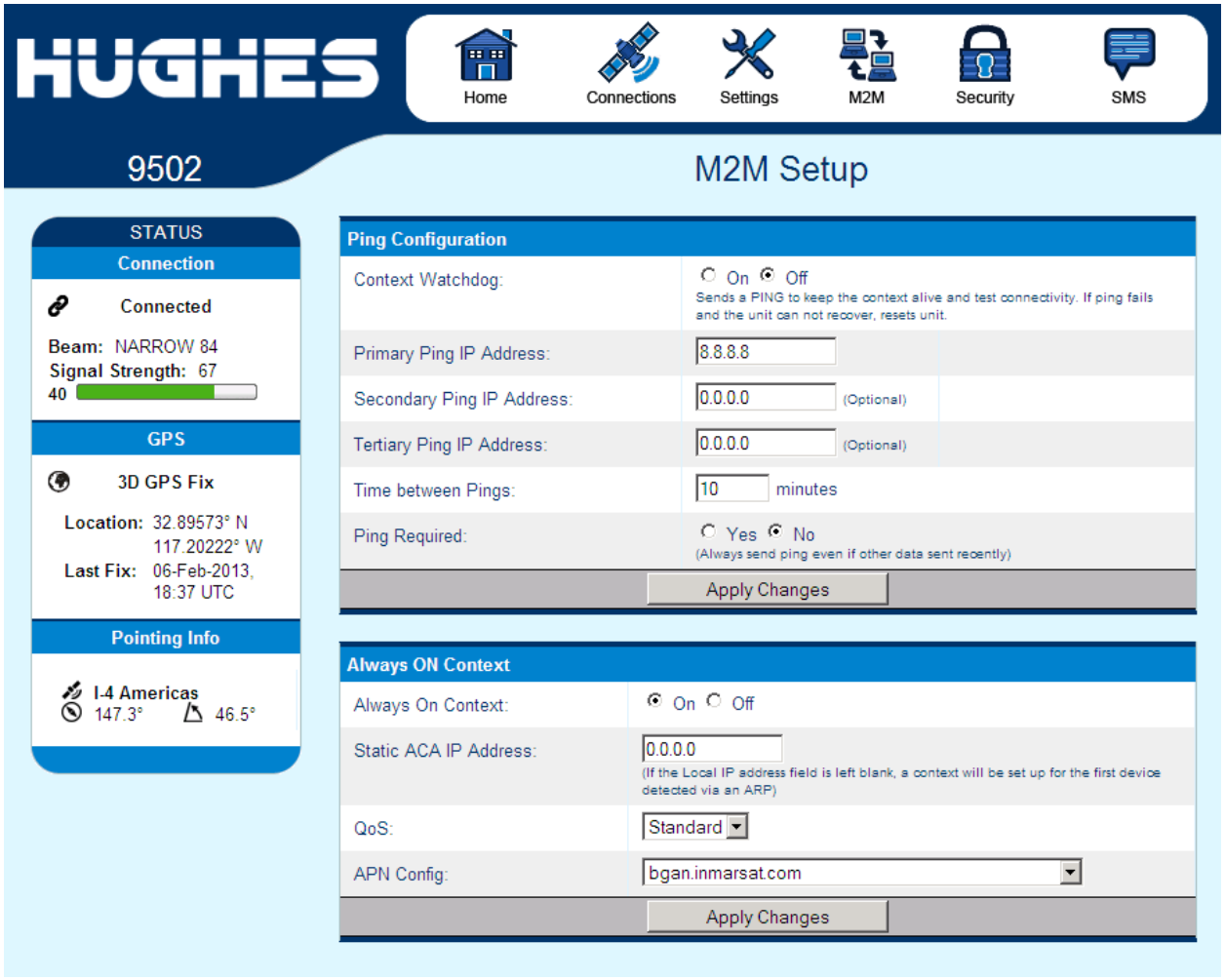


Figure 2-10 – M2M Setup

The M2M page includes the following configurable parameters:

Ping Configuration:

- Context Watchdog - On/Off
- Primary Ping Address
- Secondary Ping Address
- Tertiary Ping Address
- Time between Pings
- Ping required - Yes/No. If set to "No", then the system will not try to ping on timer expiration if data was transmitted within the watchdog period.

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

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. On/Off radio button
- SMS Remote Password – default is ***remote*** (case sensitive)
- 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 2-11 – Security Passwords

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

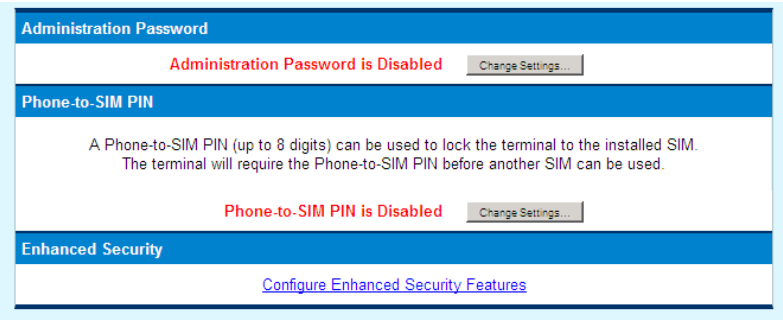


Figure 2-12 – Enhanced Security Page Link

Enhanced Security Settings Page

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

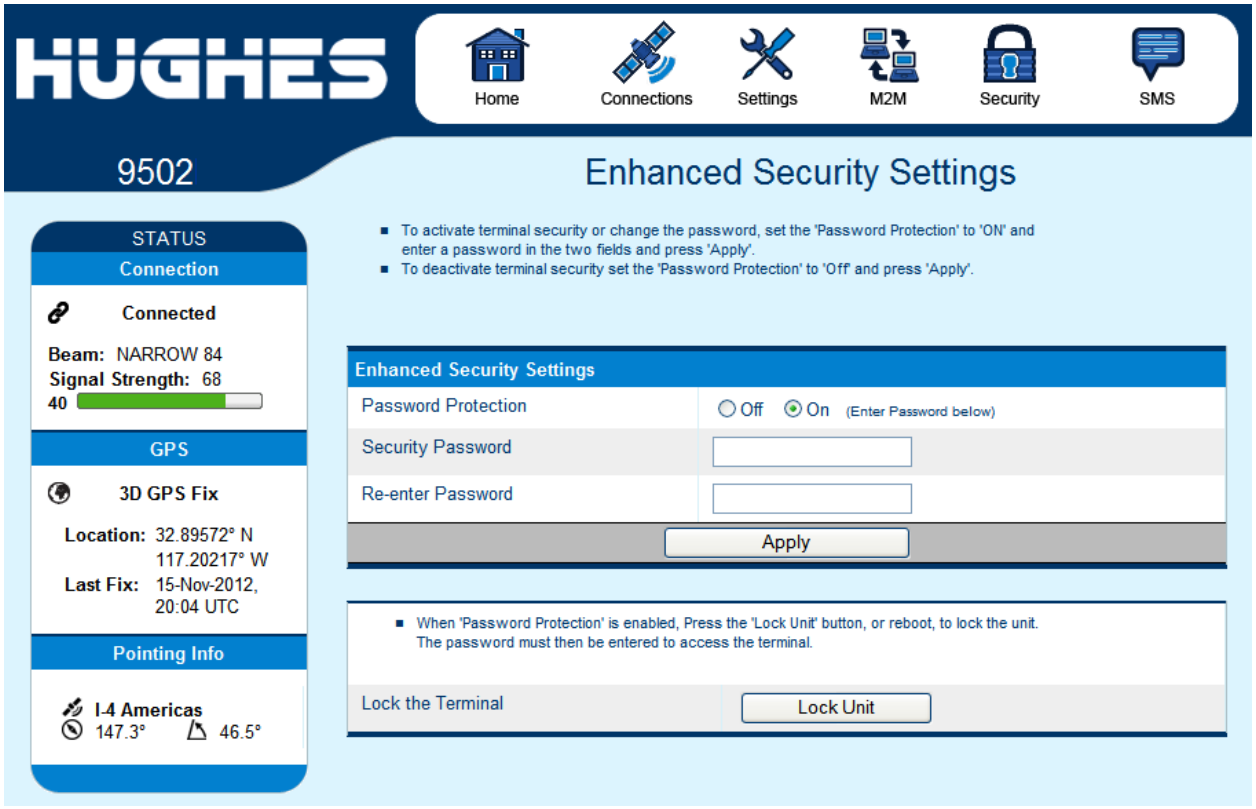


Figure 2-13 – Enhanced Security Settings Page

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.

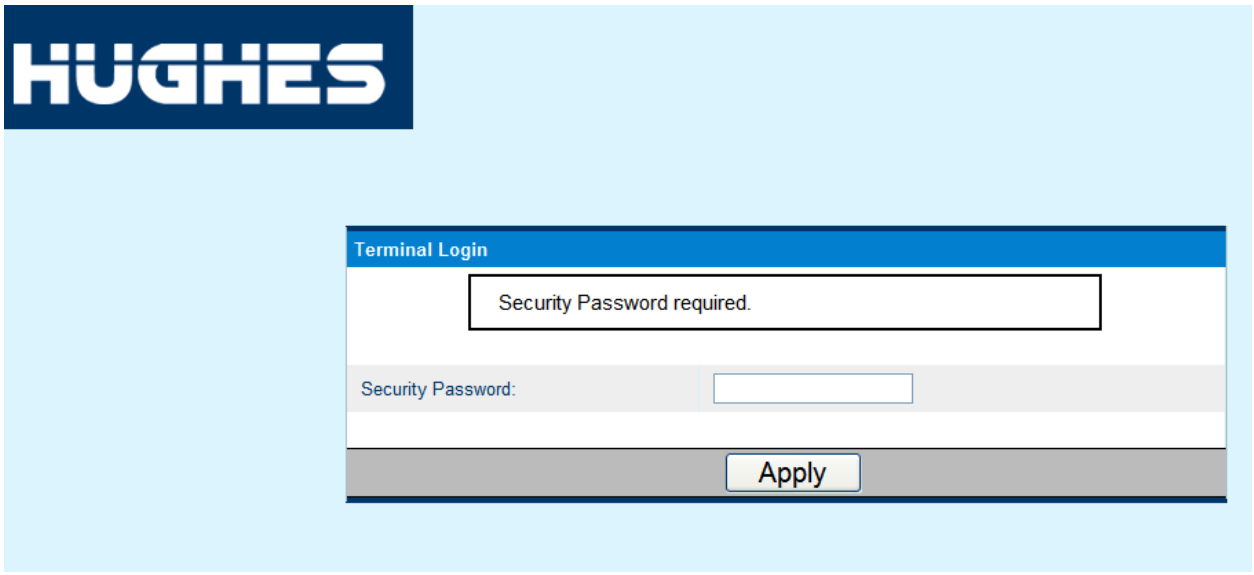


Figure 2-14 – Login Page

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.

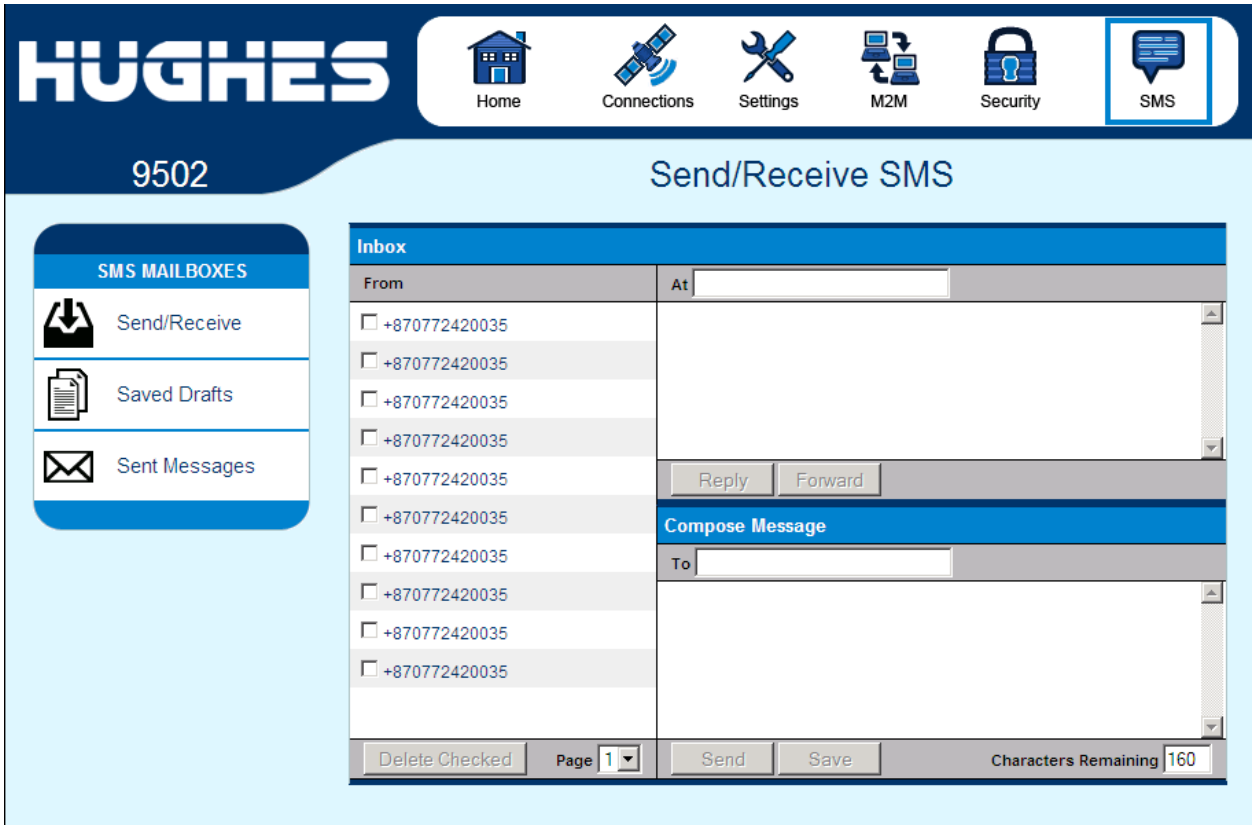


Figure 2-15 – SMS Send/Receive

Chapter 3 Operational Features

LEDs

The 9502 One-piece design 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 49.)
  - 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 One-piece 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.

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.

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 syntax of all AT commands is covered in the "Inmarsat BGAN UT-TE Interface Specification" and 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 Message Commands. 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."

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.

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.

Table 5 – Remote Control SMS Message Commands

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 2-7 – Ethernet Settings) 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.

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.

GNSS

The Hughes 9502 One-piece 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 4800bps and 38.4kbps. 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

NOTICE

When opening the box, please carefully read the instructions before removing the terminal. This is a specially designed box and if not handled correctly, the box cannot be reused for shipment.

Optional installation items:

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

Determining where to install the terminal

In order for your terminal to work correctly, the terminal 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 terminal, you will need to determine if 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: http://www.bgan.hughes.com. This will give you the compass direction and the elevation angle to point the terminal. 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 One-piece terminal.
3. Install the terminal with the installation hardware that you have chosen by following the instructions below.

Figure 4-1 – Home Page showing pointing information

Terminal 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 uses four bolts in a 6” x 3 ¾” (15.24cm x 9.525cm) rectangle (not included).

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 4-2 – Base Bracket and bubble level and Figure 4-3 – Pole Assembly):

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 terminal 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 4-2 – Base Bracket and bubble level

Figure 4-3 – Pole Assembly

Mounting the azimuth elevation bracket

Mount the azimuth elevation bracket to the back of the terminal using four washers/nuts included in the terminal kit (see Figure 4-4 – Azimuth elevation bracket).

Figure 4-4 – 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 4-5 – Pole Collar).
2. Leave the pole collar bolts loose to allow for azimuth adjustment during pointing.

Figure 4-5 – Pole Collar

Connecting power leads to the Hughes 9502

Once the terminal is properly installed/mounted, you can then remove the end cap with the two couplers and connect the power leads (positive + and negative -) from the power source to the 9502 power connector. The terminal is clearly marked for positive and negative lead. It is designed for a nominal 12Vdc and 24Vdc voltage and is protected from reverse polarity.

Figure 4-6 – Bottom View Cap off

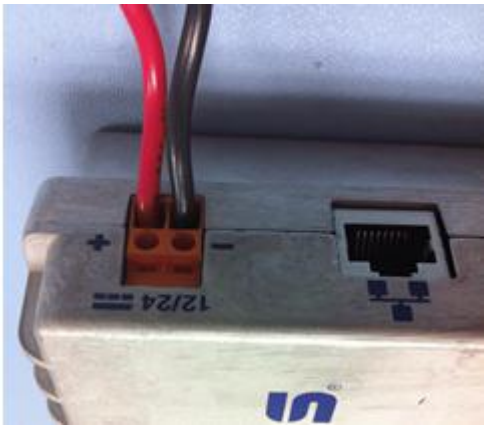


Figure 4-7 – Exploded view of Power connector

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.

NOTICE

Important Note:

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

Install Ethernet Cable and Power Wires through fittings

The Hughes 9502-1 has two standard bulkhead fittings. One fitting is for the power wires and the other fitting is for the Ethernet cable. The Figure below shows how to feed the Ethernet connector/cable through the fitting. Once the cable is passed through, you must then tighten the clamp nuts on the outside to ensure a positive seal on the cable.

1. Apply sealant (as required) to power wires and Ethernet cable
2. Slide cable/wires through fitting
3. Pull enough cable to mate to equipment
4. Tighten outer cinch nut to cable/wires

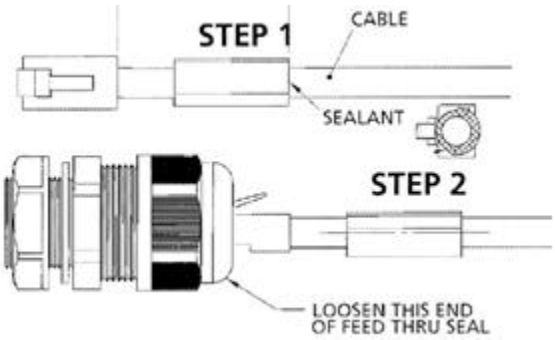


Figure 4-8 Installing Ethernet Cable through fitting

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

Figure 4-9 - Function Button

Pointing the Antenna

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 Web UI page.

In order to speed up getting the initial GPS fix, while you are in pointing mode you should lay the unit 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 unit 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. Touching the two exposed wires with voltmeter leads will give voltage readings from 2.5V to 3.2V as you are pointing. The higher the voltage the better the antenna is pointed. A voltage reading of approximately 2.9V equates to a good signal level of 50dB.

You can also monitor the signal strength by hooking up a laptop/PC to the USB port and monitor it from the Web UI (see Figure 4-10). Access the Web UI by opening a browser (Mozilla, Safari or IE7 or 8) and typing in the local IP address of the terminal 192.168.128.100

Figure 4-10 – Signal Strength on Home Page

LED Flow Chart

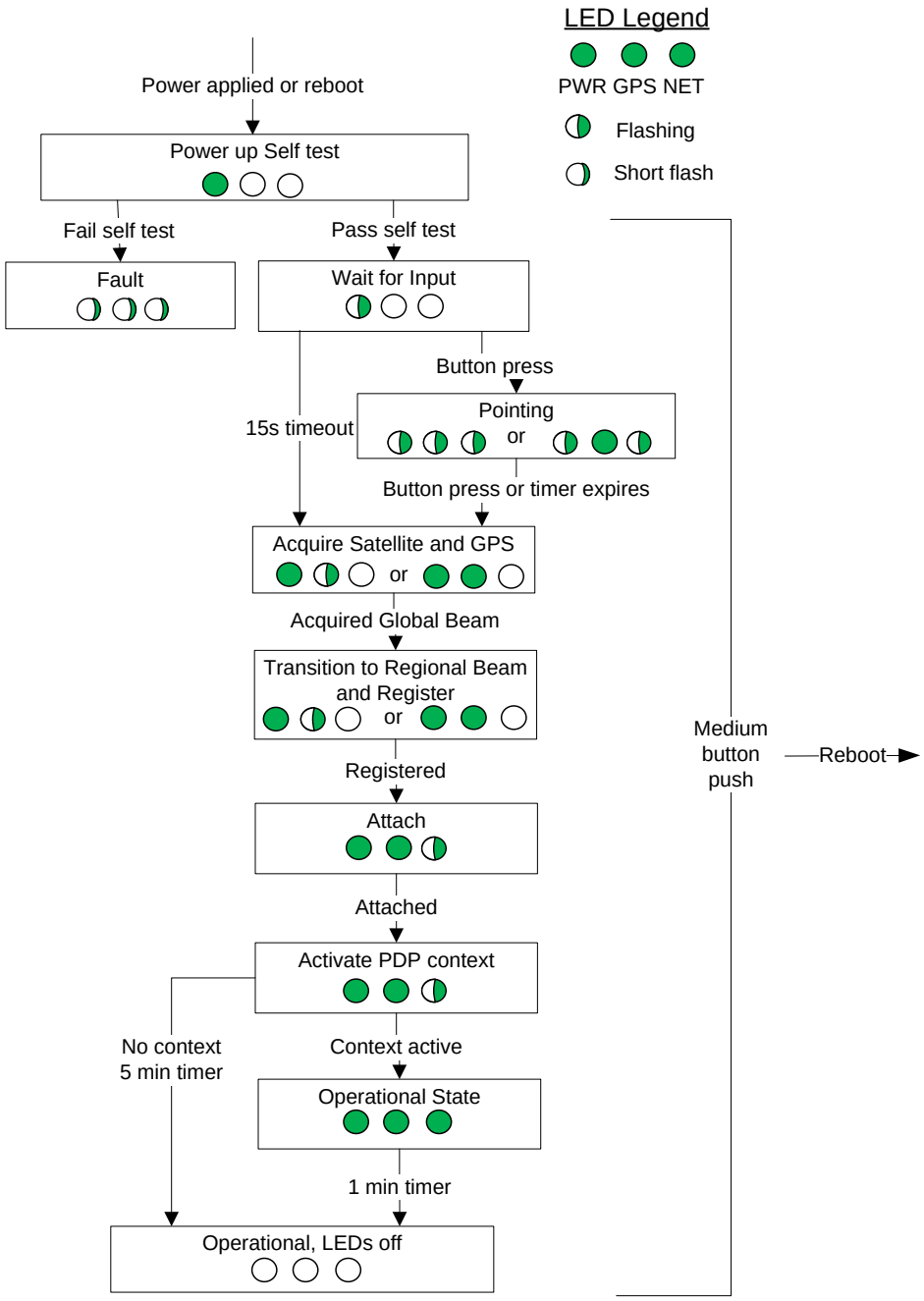


Figure 4-11 – LED Flow Chart

NOTICE

Important Notes:

- To aid in pointing the antenna, there is a 3.5mm stereo audio jack port on the 9502. 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 unit must have DC power applied for pointing.
- The GPS antenna is an integral part of the main antenna 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 antenna at least 1m for safety purposes.

Adjusting the azimuth and elevation of the antenna

To adjust elevation, refer to Figure 4-12 - Adjusting elevation

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 unit to obtain the desired elevation.

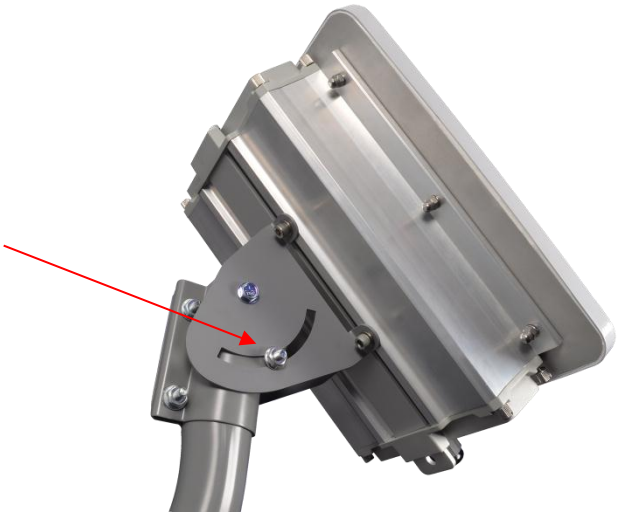


Figure 4-12 - Adjusting elevation

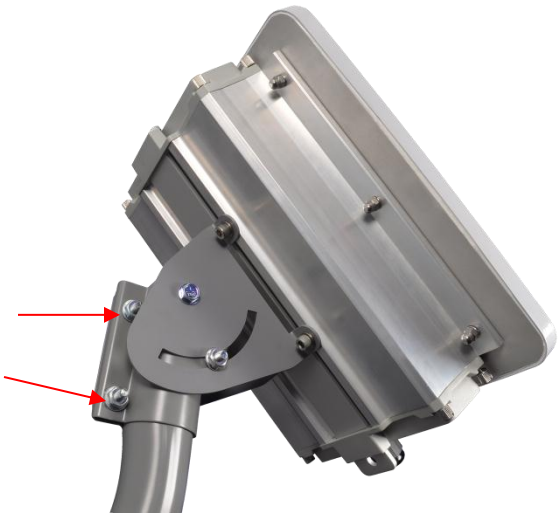


Figure 4-13 - Adjusting azimuth

4. Loosen the two bolts on the pole collar.
5. Move the unit 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 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 4-11 – LED Flow Chart).
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 4-11 – LED Flow Chart).

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).

NOTICE

5. Ensure both end caps have been re-installed and all four thumb screws on each end cap are securely fastened to ensure the IP-66 integrity of the unit once again.

Chapter 5 Lightning Protection and Safety

Lightning and Grounding Precautions / La foudre et la terre Précautions

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

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

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 One-piece 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 Hughes 9502 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 mount. Please consult professional local advice for protective earth grounding requirements.

Hughes recommande également qu'un câble de terre être connecté à la monture. Veuillez consulter un conseil professionnel local pour les spécificités concernant la mise à la terre de protection.

Figure 5-1 – 9502 Protective Earth Grounding

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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'unité 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 6 below shows the current set of response codes, grouped by function.

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'.
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
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.
_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.
_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.

Table 6 - AT Unsolicited Response Codes

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"

Chapter 8 Declaration of Conformity

We,

Hughes Network Systems

(manufacturer's name)

of

9605 Scranton Road, Suite 500, San Diego, CA 92121, USA

(address)

declare under our sole responsibility that the product

Hughes 9502 Satellite Terminal

(detailed description of product including name, type, model and supplementary information such as lot, batch or serial number, sources and number of items)

to which this declaration relates, is in conformity with the following standards and/or other normative documents.

For article 3.1(a), Health and Safety of the User:

EN 62311

IEC 60950-1 (2nd Edition)

For article 3.1(b), Electromagnetic Compatibility:

EN 301 489-1, EN 301 489-20

For article 3.2, Effective Use of the Spectrum Allocated:

EN 301 444

We hereby declare that all essential radio test suites have been carried out and that the above named product is in conformity to all the essential requirements of Directive 1999/5/EC.

Identification mark:	The equipment will also carry the Class 2 equipment identifier:
CE	ⓘ

The technical documentation relevant to the above equipment will be held at:

Hughes Network Systems, 9605 Scranton Road, Suite 500, San Diego, CA 92121, USA

(name and address of EU representative)

Bill Lindsay

(name)

Senior Engineering Program Director **21 March 2013**

(title)

(signature of authorized person) *(date)*

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 RoHS-2 (Restriction of Hazardous Substances) Directive

The European Union (EU) Directive 2011/65/EU restricts the use of certain hazardous substances in electrical and electronic equipment.

Unless otherwise noted, all products, assemblies, and sub-assemblies manufactured by Hughes and its sub-contractors are compliant with this directive.

EU WEEE (Waste Electrical and Electronic Equipment) Directives

The European Union (EU) Directive 2002/96/EC on waste electrical and electronic equipment mandate recycling of electrical and electronic equipment throughout the EU by August 13, 2005.

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**.