



BGAN Patrol

Hughes 9203

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 concerning personal injury

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.



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



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



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

Messages concerning property damage



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

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.

Additional symbols



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.



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



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.

Warnings for Satellite Terminal



Keep a safe distance from the satellite antenna This device emits radio frequency energy from the external satellite antenna. To avoid injury, do not place head or other body parts close to the satellite antenna when system is operational. Maintain a distance of 20 cm or more from the satellite antenna. The omnidirectional antenna radiates energy in all azimuth directions. Keep the antenna in a vertical position and higher than the user and bystanders.



Keep a safe distance from the integrated Wi-Fi antenna

This device emits radio frequency energy from the integrated Wi-Fi antenna. To avoid injury, do not place head or other body parts close to the antenna when system is operational. The Wi-Fi antenna radiates energy through the grey plastic radome of the terminal unit. When installing the unit for mobile use set it up such that the grey radome is pointing away from the user or other surface it is mounted to. It should only be covered by protective non-metallic material such as the liner of a carrying bag.

Maintain a distance of at least 20 cm from the front of the terminal unit (grey plastic radome) and at least 2.5 cm from the back of the terminal unit.



General Handle your Satellite Terminal with care. The unit is weather resistant per IEC 60529; however, do not submerge the unit. Avoid exposing your Satellite Terminal to extreme hot or cold temperatures outside the range -25°C to +60°C.

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 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.



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. Do not use the Terminal while at a petrol filling station. Do not use near fuel or chemicals.



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.



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.



Battery Use only a battery approved by Hughes. Risk of explosion if battery is replaced by an incorrect type. Recycle or dispose of used batteries in accordance with local regulations.



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.



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 main antenna front and sides 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.



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.



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

Introduction

Overview

The Hughes 9203 Land Portable Terminal provides reliable satellite connectivity over the Inmarsat BGAN satellite network.

- The Hughes 9203 comes in a small, portable package with an external omni-directional antenna mounted on a pole. It allows the user to communicate over the Inmarsat BGAN network while on the move.
- You can send and receive IP packets via Ethernet and WLAN interfaces.



The terminal includes the following features and benefits:

- Small, compact IP terminal with the following user interfaces:
 - Wi-Fi access point (b/g/n) built-in
 - RJ-45 Ethernet port
- SMS Remote Control, with over-air software upgrades
- Fully compatible with Remote Terminal Manager (RTM)
- Multi-user capability for sharing a single unit
- Selectable Quality-of-Service (QoS)
- Full IP compatibility for email, file transfer (FTP), browsing, VPN, etc.
- Cost-effective “always-on” access – charges only for data sent and received
- UMTS IP-based services
- FCC, CE and UKCA certified
- Subscriber Identification Module (SIM) card security

In this document, the following names and abbreviations are used to identify the Satellite Terminal and your computer.

Term	Definition
Terminal	Satellite Terminal
TE	Terminal Equipment (your computer)
UT	User Terminal/satellite terminal

About this User Guide

This user guide contains the most up-to-date information available on this product, on the date it was generated. It is focused on the specific information needed to operate the Hughes 9203 Land Portable Terminal.

9203 Package Contents

When you unpack the Hughes 9203 Land Portable Terminal Kit package, you will find the following:

- Hughes 9203 terminal unit
- Omni-directional antenna
- Antenna cable
- Mounting pole
- AC/DC power adapter
- US, EU and UK power cords
- Lithium Ion battery
- Quick Start Guide



Do not tear the plastic cover where the 9203 terminal is housed. Lift the entire package insert up and unfold the side flaps to remove the terminal. This packaging can be re-used for shipping to other customers if needed.



Your Service Provider will supply you with a Subscriber Identification Module (SIM) and its PIN, and Satellite Terminal configuration instructions – you will need these to access the satellite network.

Note: make sure the SIM card is provisioned for multiple PDP contexts to take advantage of the multiple users and remote management. The SIM card may also have an MSISDN number associated with it for the short message service (SMS).

Minimum System Requirements for Laptop/PC

These are the minimum computer system requirements for successful interface with the Satellite Terminal:

- Internet Browser: Edge, Firefox, Safari, Chrome.
- PC Support for Ethernet or WLAN (802.11b or b/g/n).

Getting Started

This guide is the simplest and quickest way to connect to the BGAN network. If you are a first time user, you will be guided through the procedure for powering up your terminal, obtaining a GPS fix, connecting your computer to the terminal and registering with the BGAN network. You are then ready to start using broadband services.

Information for Maintenance

In the event that a Hughes terminal develops a problem, please contact the company that you purchased the terminal from so that they can request an RMA from Hughes for your terminal.

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

Using the Terminal

Setup

Remove the battery and install the USIM card supplied by your Service Provider in the battery compartment. The SIM card icon on the casting shows the proper way to install the SIM card.



Installing the USIM

Install the battery in the terminal unit and then fully charge the battery using the supplied AC/DC converter.



Assemble the antenna pole. Sections must be assembled in the correct order with the flexible gooseneck section at the top. Mount the antenna at the top of the pole. Be careful not to cross-thread the connections and avoid using excessive force when tightening the antenna to the pole

Make sure the terminal unit is powered off. Use the RF cable to connect the antenna and the terminal unit.



**DO NOT USE EXCESSIVE FORCE WHEN
CONNECTING THE RF CABLE TO THE MODEM**

**Max torque: 2.5 Nm (22 in-lb)
(No more than 1/8 turn past finger tight)**

NOTICE

- Position the satellite antenna to point away from a person or other surfaces it is mounted to. Maintain 20 cm or more between a person's body and the satellite antenna. The antenna shall be installed on a pole such that it is positioned above the head of the person carrying the device.
- W-Fi antenna: Maintain a separation of 20 cm or more from the front of the terminal unit (grey plastic radome) and 2.5 cm from the back of the terminal unit (black metal housing)
- Stow the terminal unit in an outside pocket of the backpack. It should only be covered by protective non-metallic material such as the liner of a carrying bag.



LCD Quick Start

Press the power button for at least two (2) seconds in order to Power On the terminal. The LCD will display “Hughes 9203” for about 30 seconds while the terminal is booting up.

You must first obtain a GPS fix and then position the terminal’s antenna in an area with clear line of sight to the Inmarsat satellite before setting up a data connection with the network.



In the UT Front Panel picture above, the descriptive text above the panel refers to if the user performs a long (> 2 sec) press; and text below the panel refers to a short (< 2 sec) press. Short-pressing the Accept button enters the Menu System.

After power up the Hughes 9203 will automatically attempt to acquire the Inmarsat BGAN satellite signal and register with the network.

Once the unit has registered and is Circuit-Switched (CS) and Packet-Switched (PS) attached (“Ready” on the LCD), you can create a data connection from the menu by first pressing the **Accept** button to enter the menu system, then by scrolling through the various selections and by pressing the **Accept** button when the LCD says “Connection”. Scroll through the various QoS’s and select the appropriate one for your application by again pressing the **Accept** button.

Web UI Quick Start

Alternatively, you can connect a computer and use the terminal’s internal web server. From your terminal equipment (e.g., PC), enter 192.168.128.100 as the URL to access the Home Page (see *Using the Web UI* for more details).

The Terminal Status Page gives you all the information you need to acquire the satellite signal and register with the network.

Note: Since the Hughes 9203 has an omni-directional antenna there is no antenna pointing required. Just make sure the antenna has good line of sight to the Inmarsat satellite. However, the user can enable the antenna pointing feature on the WebUI if desired. In that scenario, once you have a GPS fix and are pointed to the satellite as best you can, click on the **Register with Network** button to start the registration process.



Once you are registered and CS and PS Attached, you can then select the Quality of Service (QoS) for your data connection by choosing either the **Standard** or **Streaming** connection.

NOTICE

The streaming data rate assigned to the terminal is shown with the initial “reference” bandwidth. After a few seconds, or once the device starts to send data the link rate will be updated. The Web UI will dynamically show the available bandwidth.

HUGHES 9203 Terminal Status

STATUS

Connection

- Registered
- PS Attached
- CS Attached

Beam: NARROW 84 AVER
Signal Strength: 58.2

GPS

3D GPS Fix

Location: 32.89570° N
117.20212° W
Last Fix: 19-Oct-2022
20:55 UTC

Mobile Terminal

WLAN On (WPA2)
Battery Only

Battery: Present (62%)

Current Connection

STANDARD

Charged per Megabyte

Connect

STREAMING

Charged per Minute

12K Stream

Connect

Connecting APN: hgen.immortal.com

Details

Device	Service	APN	Global IP

Visible Satellites

Satellite Name	Compass Direction	Antenna Angle
I-4 AVER	147.3°	46.5°

Connecting the terminal to the computer

You can connect your computer to the UT with one or more of the following interfaces

- Ethernet
- WLAN

Your computer must be configured to support your chosen connection method. Refer to the documentation supplied with your computer for details.

Connecting by Ethernet

To connect the Hughes UT terminal to a device using Ethernet:

- Connect an Ethernet cable to your device's Ethernet port, and insert the other end of the connector into the Ethernet port on the UT.

Connecting by WLAN

If you have not previously used the UT's WLAN interface, it has to be enabled from the UT's front-panel keypad, or you can connect via Ethernet and use the internal Web UI.

During initial setup, you can turn on Wi-Fi by long pressing

(> 2 seconds) the  button. Once the  icon shows solid on the LCD, you can continue to configure the terminal or setup a data session using your wirelessly-connected device.

From the Web UI WLAN pages:

- WLAN Power: The default is off, which disables the WLAN feature.
- SSID (network name): The default is "Hughes 9203 nnnnnn-n" (includes last digits of terminal's serial number), but you can change it to whatever you want.
- Channel Number: This controls the radio channel number (1 through 11) used by the access point. To meet FCC regulations, channels 12 to 14 are not supported.

As you are configuring the WLAN, you should enable the Wireless LAN Encryption (WPA or WPA2) and possibly MAC Address Filtering features for added security.



WLAN Security

Use the drop-down menu to select the type of encryption that you want: WPA or WPA2.

- WPA and WPA2 Protection Status:
 - Enter the Passphrase that you want to use and click on “Hide Keys” if you do not want to show the Passphrase.
- MAC Filtering: For added security, check the box to “Enable” MAC Filtering. You can define up to 10 MAC addresses for devices that are allowed to connect to your WLAN.

To determine the MAC address of a PC, go to a DOS prompt and type **ipconfig/all**.

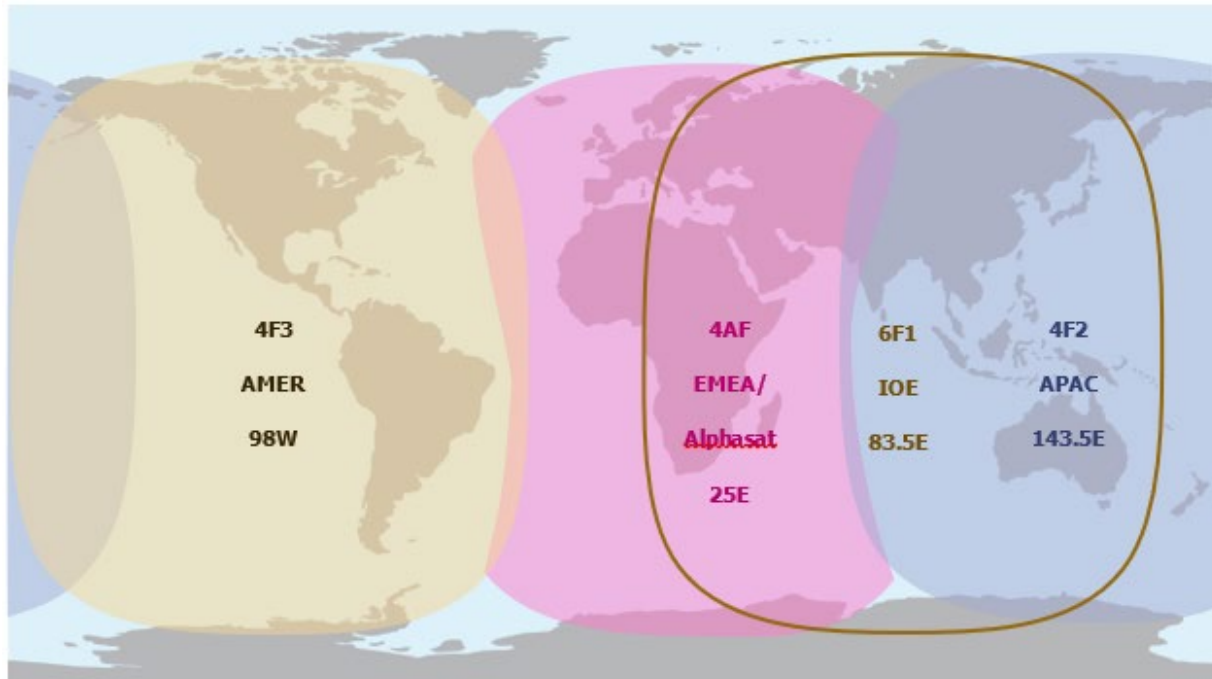
For Mac OS X, under the Apple Menu go to **System Preferences -> Network** and **Show Airport**. The Airport Id is the MAC address. Alternatively, go to **About this Mac -> More Info -> Network**, and select **Airport**.

NOTICE

When WLAN is enabled, unauthorized users may be able to access your BGAN service. If encryption is enabled, you must provide other WLAN users with the proper encryption key or passphrase in order for them to connect to the terminal. You can go to the **Manage Connections** Page on the Web UI to see the identities of computers (by IP address) are actually using the BGAN service.

Coverage Map

The Inmarsat BGAN service is operated with 4 satellites as shown below. The terminal will perform best in areas where the elevation (or “look”) angle is 30 degrees above horizontal or higher. Operation at lower elevation angles may not be possible.



Line of Sight to an Inmarsat Satellite

The omnidirectional antenna does not need to be pointed in the direction of the satellite. Keep the antenna vertical and make sure there is a line of sight to an Inmarsat satellite.

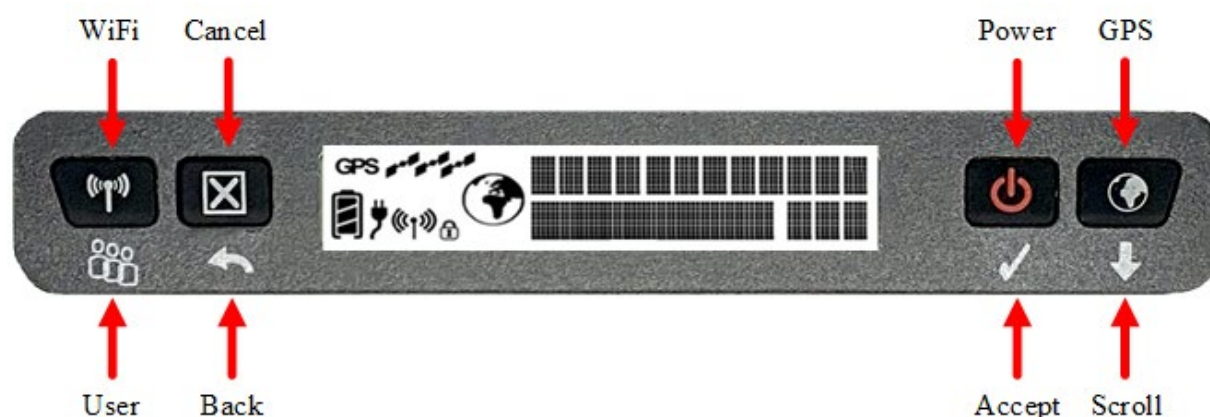


Using the LCD and Keypad

LCD Display and Keypad

The terminal has an LCD display that provides status information about the terminal. It has a four-button keypad that allows you to control the operational features of the terminal without the need of a PC or a web browser.

The figure below shows the layout of the LCD and keypad.



UT Front Panel (descriptive text above panel refers to if user performs a long (> 2 sec) press; text below panel refers to a short (< 2 sec) press). Short pressing the Accept button enters the Menu System.

Terminal Buttons

The UT provides four buttons for the user. Each button has two primary functions, one invoked with a short press and the other invoked with a long press. The top icon associated with a button is the long press function. The bottom icon associated with a button is the short press function.

Button Name	Short Press	Long Press
User / WiFi	Selects the user to display	Turns WiFi on/off
Back / Cancel	Up one level in menu	Exit pointing; Cancel to top menu
Accept / Power	Enters menu and confirms selection	Power on/off
Scroll / GPS	Scrolls through a menu or screen message	Activate a geolocation update (GPS)

A “**short press**” is any keypress less than two seconds.

A “**long press**” is any keypress that is two seconds or greater.

An “**extra long press**” of more than five seconds of the power button will cause a hardware-enforced power down.

Any button press starts or restarts the (configurable) backlight time period, even if it has no function in the current context.

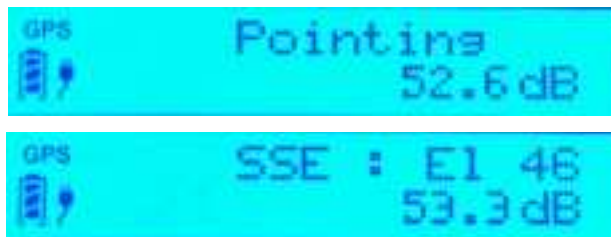
You can **reset to factory defaults** if the “Cancel” (X) button is depressed while powering off. Press and hold the “Cancel” button and then press and hold the power button until “Powering Off” is displayed, then release both buttons.

LCD Status Display

Pointing mode display

By default, the antenna pointing mode is bypassed for the Hughes 9203 because its antenna has an omni-directional radiation pattern. If desired, the user can disable the antenna pointing bypass. In this configuration the LCD shows the pointing display after power up. The upper line alternates between “Pointing” and the compass bearing and elevation angle of the closest satellite. In the picture below, the satellite bearing is South-South East (SSE) and the elevation angle to the satellite is 46 degrees.

The lower line displays the received signal strength, expressed as a number in dB. In pointing mode typical values are 43 to 47. The higher dB value that you can get, the better.



Note: The Hughes 9203 does not have an audible pointing indicator.

Exit Pointing and Registering with the network

Once you have positioned the antenna to receive a suitable satellite signal, exit pointing by a long press of the **Back/Cancel** button. This will cause the unit to attempt to register with the BGAN network.

Idle mode display

Once the unit exits pointing, it will automatically attempt to register with the network. During this operation it displays “Registering” on the upper line of the LCD.



Once it registers and is ready for PDP contexts, it displays “Ready” on the upper line.

Once it is ready for SMS, it displays the globe icon (see below).

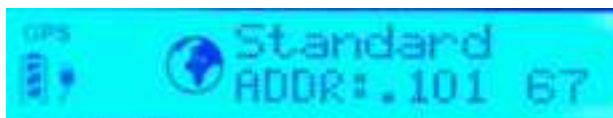
If user equipment is connected (via Ethernet and/or Wireless LAN), the lower line will display “ADDR:” plus the last octet of the IP address of the currently selected user terminal (the currently selected terminal’s data connection rate is shown on the upper line, if connected). If multiple devices are attached, you can “walk through” the others by consecutively pressing the **User** button – this means you can set-up/tear-down individual PDP contexts for each connected device directly from the front panel (no need to use the Web UI).

The signal strength is shown as a number in the right corner of the lower line; typical values in idle mode are 52 to 56.



Connection mode display

When a PDP context is active, the type of connection is displayed on the upper line: “Standard”, “Stream 32k”, etc.



The lower line displays the “ADDR:” information and the current signal level as described above.

While in an active PDP context, typical signal level values are 58 to 64. However, if no data is sent or received for 90 seconds, the unit may return to the regional beam and the signal strength will drop to the idle mode range. However, the PDP context will remain active.

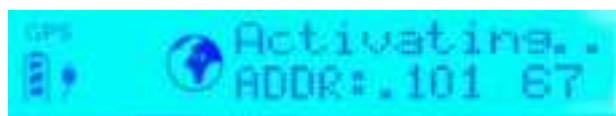
Status messages

The upper line of the LCD is used for status messages and menu items. Status messages are listed below.

Display	Description
HUGHES 9203 Initializing	On screen during power up
Powering Off	Displayed while the UT is powering down
Too Hot	Unit is too hot; if not corrected, a temporary thermal shutdown may occur
Battery Hot	Battery is too hot; reduce temperature or turn off unit to avoid damage to the battery
SIM Error	SIM communication error
No SIM	No SIM is detected in the UT
SIM Blocked	The SIM is blocked due to too many SIM PIN attempts. Enter the PUK via the Web UI to clear
Enter PIN	A SIM PIN code is needed (this can be entered via the front panel buttons)
<#> tries left	# of SIM PIN attempts left before the SIM is blocked
Fault {code/text}	A hardware fault exists preventing normal operation. Scrollable text is displayed. Use the right button to view the scrollable text.
{quick text}	Special messages displayed for ~15 seconds or until the next button press, see Table 3 for the list of possible messages.
Pointing	In pointing mode, this message alternates with satellite bearing and elevation on a 3 second cycle
Registering	Displayed during the registration process
Getting GPS	The terminal is in the process of acquiring a fresh GPS location
GPS Old	GPS is too old, obtain a fresh GPS location
Ready	Registration was successful, and the unit is PS attached
Standard	Standard (best effort) PDP context is active
Stream {rate}K	Streaming PDP context is active. Current streaming rate is listed: for example: {rate} = 32, 64
Conn Fail: {code/text}	A problem occurred during context activation. Scrollable text is displayed. Use the right (scroll) button to view the scrollable text. Press the left (user) button to clear the message (see the Troubleshooting section for more information). This can be caused by service subscription problems, using the wrong APN or invalid APN username/password. Check the APN and username/password on the Web UI. Failing that, contact your Service Provider to check the subscription.
Getting GPS	This message is shown alternating with other display/message to indicated that a GPS fix is being acquired. For example, after the user requested a geolocation updated by long pressing the world button.

Table 1: Status Messages

Examples:



Menu Navigation

From the status display, a short press of the **Accept** button takes the display to menu mode and displays the first of a circular list of menu items. The menu structure is shown in Table 2 below.

Use the **Scroll** button to scroll between options and the **Accept** button to select options. A short press of the **Back** button takes the user up one level in the menu and a long press exits the menu system and returns to the status display.

The status display is the default display, so after 30 seconds of inactivity while in the menu system, the unit automatically reverts to the status display.

Pressing the **Accept** button in the menu takes the display to the sub-menu for that option, or, at the lowest level, it selects the menu option, if applicable. When entering a submenu containing a list of parameter values/choices, such as connection types, the currently set choice is displayed.

Alternative parameters values can then be accessed by pressing the **Scroll** button; these flash until selected, and then remain on and steady to confirm they have been selected.

Note that configuration and status information shown in the menu context refers to the currently selected user TE. The user can change the selected user TE while in the menu system via the **User** button. This changes the displayed menu item as needed to reflect the newly-selected TE.

Level 1	Level 2	Level 3	Level 4	Comment
Connection	Standard			Starts display with the current setting.
	32 Kbps			
	64 Kbps			
	Disconnect			
Information	SMS	# New Msgs or No New Msgs		New message count
	GPS	{Latitude} or Blocked		13.32861° N format
		{Longitude} or Blocked		23.45833° E format
	IP Status	Global IP or Disconnected	{IP Address}	Shows Global IP address for the selected TE
		APN	{APN string}	Displays info about the UT
		Local Gateway Address	{192.168.128.100}	
	Terminal	Version	{Software version}	
		IMEI	{IMEI}	
		IMSI	{IMSI}	
Configure	Pointing	Enabled		Starts display with the current setting
		Bypass		
	Backlight	30 seconds		Controls backlight setting. Starts display with the current setting.
		120 seconds		
		On		
		Off		
	WiFi	Enabled		Starts display with the current setting
		Disabled		
	LCD	Level 1/5		Adjusts LCD contrast immediately to displayed level. Starts with current level. Accept button confirms.
		Level 2/5		
		Level 3/5		
		Level 4/5		
		Level 5/5		
Send Text	Emergency			Sends predefined SMS with GPS fix lat/long. Displays "Sending SMS" and "SMS Sent" when complete. You must configure the default destination for these messages from the SMS Settings web page.
	Need Help			
	All OK			
	Need Pickup			
	Running Late			

Table 2: LCD Menu Structure

Display Icons

Battery Icon



The battery icon displays the estimated life of the battery while under battery power. The battery icon also displays the charging state while under external power.

Three segments: 75% to full

Two segments: 50% to 74%

One segment: 25% to 49%

Zero segments: 10% to 24%

Zero segments, flashing: 0% to 9%

If the icon is off, no battery has been detected.

Power Icon



The power icon displays the state of the **external power input**.

On if external power is connected.

Off if external power is disconnected.

GPS Icon



The GPS icon indicates the state of the GPS information in the terminal.

The icon **flashes** while a fresh GPS fix is obtained after power up and when the user requests a geolocation update by pressing the GPS button.

The GPS icon **stops flashing** when the terminal has a new fix.

Satellite Icons



The satellite icons, located next to the GPS icon, indicate the **status of the GPS receiver** in the terminal and the **number of visible satellites**.

The icons are **off** when the **GPS receiver is off**.

The icons are **active** when the **GPS receiver is on**, either flashing or steady state. The number of icons in steady state indicates the number of GPS satellites in view. You will need all three on solid to acquire a new GPS fix. Note that once an adequate GPS fix is obtained, both the GPS receiver and all of

the satellite icons are turned off, but the GPS icon remains on solidly.

Wireless LAN Icon



The wireless LAN icon displays the state of the WLAN feature.

No icon on LCD if **Wireless LAN** operation is **turned off**.

Visible wireless LAN icon on LCD if **Wireless LAN** is **on**.

Wireless LAN Lock Icon



The lock icon displays the **state of encryption** for the WLAN feature. **It is displayed only if the Wireless LAN is on and WLAN encryption is turned on.**

Globe ICON



The globe icon displays the circuit-switched attach status of the terminal.

No icon on LCD if **not CS attached** to the network: no SMS exchange is possible.

Visible globe icon on LCD if **CS attached**: ready for SMS.

SIM PIN entry

If the SIM PIN is enabled, the PIN must be entered before the UT can be used. This can be entered via the Web UI or the front-panel keypad.

The upper row of the LCD displays “Enter PIN” while the lower row is used for PIN entry.

The cursor flashes under the current digit location.

A short press of the **Scroll** button cycles the current digit 0 – 9.

A short press of the **Accept** button advances to the next digit. When the 4th digit is entered, pressing **Accept** enters the PIN.

A short press of the **Back** button moves the cursor back to the previous digit.

When PIN entry is complete, the UT confirms the correct PIN has been entered. If it is correct, it proceeds with the normal display. If it is incorrect, it displays “<#> tries left” on the

display, where “#” is the number of attempts remaining prior to the SIM being blocked.

Multiple Users

Multiple TEs can be connected to the UT, e.g., via the wireless LAN interface or if an external hub or switch is used. To use the menu and keypad to control connections for all the TEs, short press (< 2 seconds) the **User** button and the display will cycle through the IP addresses of the connected TEs.

To activate a context for a particular TE, press the **User** button until the correct IP address is displayed, and then press the **Accept** button to enter the menu and control the PDP context.

Information Messages

The following table shows possible error and status messages with explanations and suggested actions. Most of these messages will self-clear after 15 seconds or can be cleared immediately by pressing any button on the front panel.

When setting up contexts from the menu, these messages are possible:	
MustDeact1st	There is already a context up for this TE, deactivate it before setting up a new one
Deact;TryAgn	UT is in the process of deactivating a context, try setting up the context a short time later
NotPSAttachd	UT is currently not PS attached, context setup is not possible
No TE Found	There is no TE currently connected/identified by the UT as available for data traffic
Activating	The UT is now attempting to establish the requested context; this message appears until the context is setup or an error is detected
When taking down contexts from the menu, these messages are possible:	
Deactivating	The context is being deactivated; this message appears until the context is deactivated or an error is detected
NoCntxtActiv	The TE for which context deactivation is being requested doesn't have a context setup at this time
When sending SMS messages from the menu, these are possible:	
NotCSAttachd	The UT is currently not CS attached, so it cannot send an SMS message at this time
Sending SMS	The UT is sending the requested SMS message
SMS Sent	The UT has sent the requested SMS message
SMS Failed	The UT failed to send the requested SMS message

If in pointing mode, this message is possible on the LCD:	
Insert SIM	There was no SIM detected; pointing can still continue, but once complete, "No SIM" will appear permanently and only emergency calls can be made (this message remains on for about 1 minute, then self-clears)
At any time during operation, this message is possible on the LCD:	
Battery Low	The battery is extremely low. Plug in the DC cord to avoid automatic power off when the battery level becomes critical. This message persists until the condition has been corrected or a button is pressed.

Table 3: Quick-Text Status Message Descriptions

Using the Web UI

Accessing the Web UI

The UT includes its own internal Web User Interface (“Web UI”). To access the Web UI, open your favorite Web Browser and type in the internal IP address of the UT, e.g., **http://192.168.128.100**. The Web UI opens up to the **Home** or **Terminal Status** Page as shown below.



Home Page



The Home “tab”/page shows the current terminal status and allows you to setup your initial data connection.

On the left side of the page is the Status bar. These items are updated automatically when the status of any item changes.

1. **Connection:** This field indicates whether you are registered with the network. It also shows the PS and CS status, beam type, satellite acquired and receive signal strength.
 - a. **Packet-Switched (PS) Attach Status:** This field indicates whether you are PS attached with the network. Once PS attached, in most cases you will still need to setup a PDP context to send PS data.
 - b. **Circuit-Switched (CS) Attach Status:** This indicates whether you are CS attached with the network. Once you are CS Attached and Registered with the network, you can send and receive SMS messages.
2. **GPS:** This field displays the current GPS position status. If you have received a GPS fix and the network GPS policy has been received (and it allows the GPS position to be shown to the user), it will display the Latitude, Longitude, Fix Quality, and the Last time the GPS position was updated. Time displayed is UTC time. If the location is shown as “Waiting” it means the unit has a fix but cannot yet display it because it is waiting for the GPS display policy from the network.
3. **BGAN terminal:** This field indicates the WLAN and battery/charging status.

The sample Home page above shows what appears while the UT is in antenna pointing mode. Once antenna pointing is complete, and you have successfully registered with the satellite network, the middle of the page updates. In the middle of the page you will find the following items (refer to screenshot below):

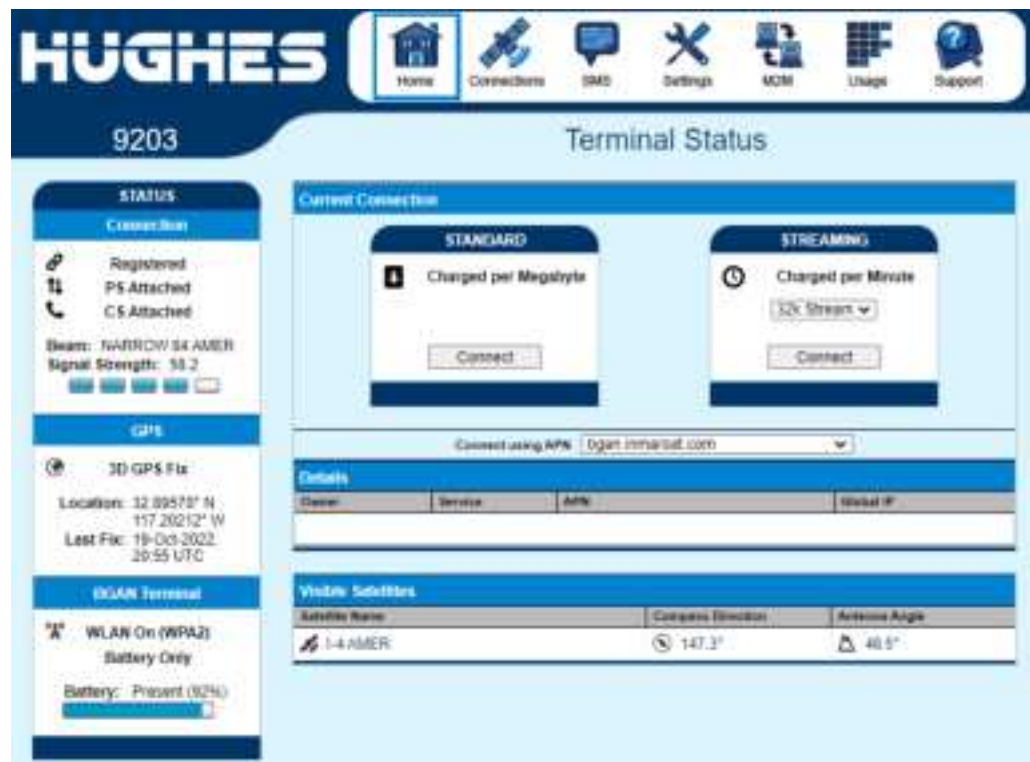
Current Connection field allows you to activate data connections for your TE. You can activate a Standard connection or a Streaming connection. For streaming connections use the drop-down box to select the data rate for the stream.

Connect using APN field allows you to control the APN used for the connection.

Details show the status of the connection for this TE.

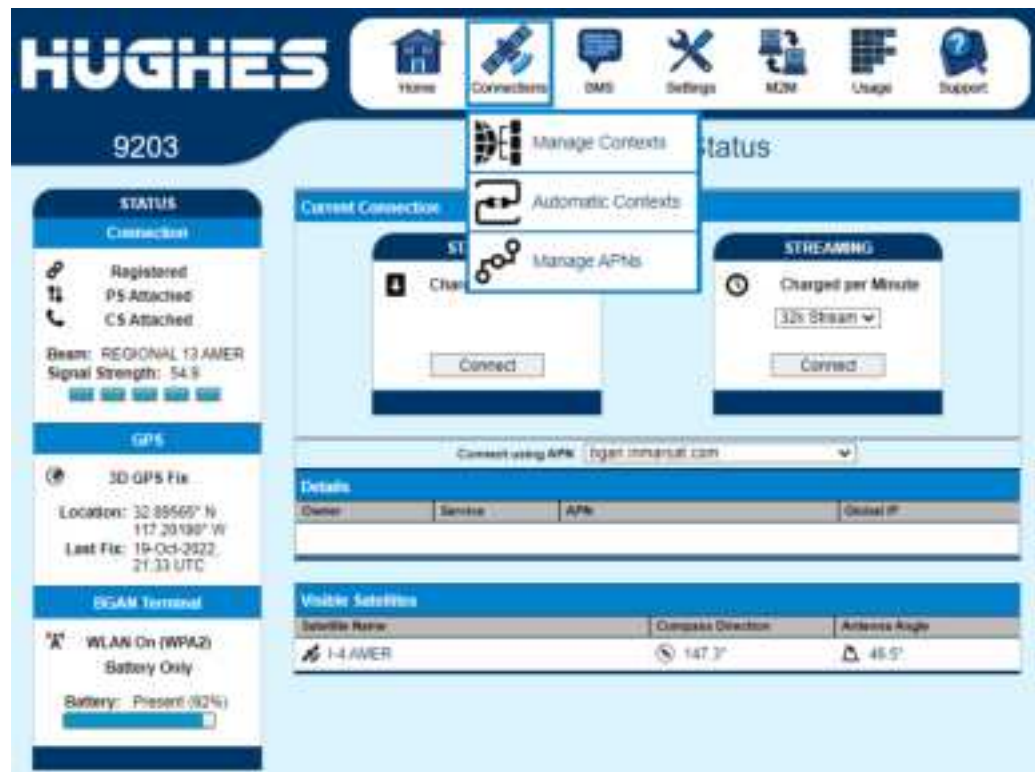
Visible Satellites shows the satellites visible from your current location and the pointing information.

The following figure shows how the UI looks before you activate a Standard or Streaming connection. After the connection is setup, use the **Disconnect** button to deactivate your connection.



Connections

Along the top of all Web UI pages are “tabs”/icons representing the categories of available sub-pages. The **Connections** icon has three main configuration areas (sub-pages) to select from: **Manage Contexts**, **Automatic Contexts**, and **Manage APNs**. The following section reviews each of these pages.



Manage Contexts



The **Manage Contexts** Page under the **Connections** icon allows the user to setup and configure PDP contexts (data connections) for *any* TE that is connected to the UT. It also shows you all current Active Connections.

Open a New Connection field - To open a new connection, select the desired row and enter the required data:

Owner – Your current IP address is shown by default (e.g., .101), but you can change it to control connections for any other device connected to the terminal. The page automatically displays entries for all **detected** devices and these entries can be selected to activate connections for those devices.

Service - Select the service that you want by clicking on the down arrow. The drop-down list shows all the different QoS types: Standard, Streaming 32K, Streaming 64K. Select the appropriate service required.

APN - The APN is read from the SIM card, but if you have other APNs defined (refer to the **Manage APNs** Page), you can use the down arrow to select a different APN.

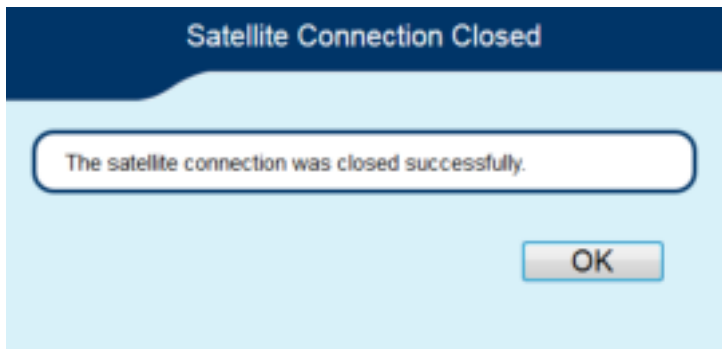
Username/Password: Some Service Providers require a username and password to be used when setting up a connection.

This is often required when using Static Global IP addresses assigned by the Service Provider. If this information is required, a “pop-up” dialog will appear once you select the APN. These fields may also be entered when defining a new APN or when you select a different APN.

Once everything is defined correctly, click on the **Open Selected Connection** button. If the requested PDP context is successfully established, the new context information will appear in the **Close an Active Connection** field above.

Close an Active Connection field - In the upper field, all active connections are shown and you can select and close any of these connections unless an Administration Password has been enabled. See the **Security** Section for more information about the administration password.

Close an Active Connection			
Owner	Service	APN	Global IP
192.168.128.101	HDR 64	lgan.inmarsat.com	10.185.134.2
Close Selected Connection			



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 mode.

Home
 Connections
 SMS
 Settings
 MCM
 Usage
 Support

9203

Automatic Contexts

ALL SETTINGS

Manage Contexts
 Automatic Contexts
 Manage APIs

This feature automatically connects Devices based upon their IP Addresses. Static IP Address Ranges cannot interact with the DHCP Address Range

Static IP Automatic Contexts				
ACA	Enabled	IP Range (192.168.128.x)	Service	API
1	ON	200 to 209	Standard	hughesmanual.com
2	ON	210 to 219	Standard	hughesmanual.com
3	ON	220 to 229	Standard	hughesmanual.com
4	ON	230 to 239	Standard	hughesmanual.com
5	ON	240 to 249	Standard	hughesmanual.com
6	ON	250 to 254	Standard	hughesmanual.com

1

OFF

Standard

hughesmanual.com

Update Static Settings

DHCP Automatic Contexts

	DHCP Address Range (192.168.128.x)	Service	API (Default API)
OFF	101 to 199	Standard	hughesmanual.com

Update DHCP Settings

This web page allows you to use Automatic Context Activation (ACA) in **two** different ways:

- One way is to use a Static IP address in the TE device so you can establish an automatic PDP context with any QoS that is offered by the network (upper half of the web page).
- The second way is to use DHCP IP addresses so you can establish an automatic standard PDP context for any TE that connects via DHCP to the UT (lower part of the web page).
- There are also two ways to set the ACA whether you choose Static or DHCP. You can choose whether the context should be activated as soon as the UT detects the device (“ON”), or if the context should only be activated when the TE attempts to send data to the satellite link (“Data”):
 - “Always ON”: Select ON in the drop-down menu if you want the context to be On all the time.

- “Data”: Select Data if you only want the context to be activated when the TE attempts to send data to the satellite link

NOTICE

When using “Data” ACA, if the context is ever deactivated, it will be reactivated when more data is sent.

The “On” option will always reactivate the context if it is deactivated, even if data is not sent by the TE.

Static IP Automatic Contexts: You can configure your own range of Static IP addresses and QoS’s to use with a static automatic context.

To turn on a particular range of static addresses, select “On” or “Data” from the drop-down list and choose a range of addresses, low and high, to use (e.g., 192.168.128.200 to 192.168.128.202) or you can leave the defaults (192.168.128.200 to 192.168.128.209).

If the ACA hi and low IP addresses are the same and the ACA is set to “ON”, then the UT will activate the PDP context at startup without waiting for any IP packet from the local device. This allows contexts to be set up for devices that do not ARP. Also, you can use an IP address in the DHCP range so you can control the APN plus username/password that is used for a particular Local IP address. This is useful when using Global Static IP addresses that are to be assigned to particular local devices.

Next, select the desired QoS for that range of IP addresses (e.g., **Standard**). The APN listed is the default APN read from the SIM card (bgan.inmarsat.com). If your SIM is provisioned for more than one APN, then you can select a secondary APN from the drop-down list (also refer to the **Manage APNs** Page).

If you want to setup additional ranges of addresses, please follow the same instructions as above.

NOTICE

You cannot overlap the IP address ranges. If you do, an error message will pop-up telling you that you have an overlap conflict. Check all the ranges for overlaps and try again.

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

DHCP Automatic Contexts: This option allows you to set up the UT for dynamic *standard* ACA. This means that any device

connected to the UT via **DHCP**, whether wired or wirelessly, will automatically receive a standard context. **Note: Streaming contexts are not supported with DHCP ACA.** For Streaming contexts, you must use Static ACA, described above.

To activate this feature, select “On” or “Data” from the drop-down list under the **DHCP Automatic Contexts** section. The DHCP address range is configured on the **IP Address/DHCP Settings** Page. The APN will be the default APN configured on the **Manage APNs** Page.

DHCP Automatic Contexts			
	DHCP Address Range (192.168.126.x)	Service	APN (Default APN)
Data ▾	101 to 199	Standard	lgan.verizon.com
Update DHCP Settings			

Once you hit “Update Static Settings” you will get a pop-up message saying that the ACA settings were updated successfully and for the changes 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

Some SIM cards are provisioned with multiple APNs, so you can use this page to pre-configure those additional APNs if needed. Once an APN is defined, you can select it from drop-down lists on other pages without having to put in the username and password every time.

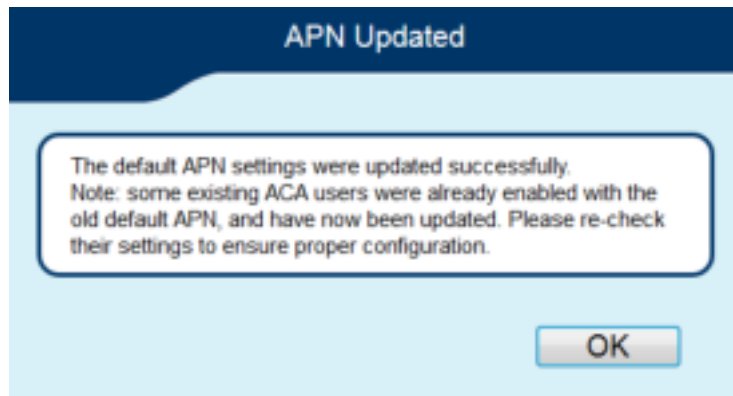
Add an APN field – Use this field to add an additional APN that you want to use, or to edit an existing APN. For adding a new APN, type in the new APN and username (if required) then select **Add New APN**. If the APN requires a password, select the “APN Requires Password” box. If you want to save the 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.

User Name /Password: Some Service Providers require a username and/or password to be used when setting up a

connection. This is often required when using Static Global IP addresses assigned by the Service Provider.

If you wish to edit an existing APN, first select the APN to edit under the **Defined APNs** section on the left. The information for that APN will then appear in the **Add an APN** field to the right, and you can then edit it. Click the **Save Changes** button to save your changes.

Make Default. If you wish to change the default APN, select an entry in the list of Defined APNs and then click **Make Default**. This APN will now be the default APN on the other context control pages. **Note:** The pop-up message below warns you that APN's have been updated and changed and to re-check your settings.



SMS

You can manage SMS text messages from the **SMS Pages**. You must have a valid Service Center number configured in order to send SMS messages – see the **SMS Settings** Page.

Send/Receive

The **Send/Receive** Page allows you to view your Inbox messages and compose a new message. If there are more than 10 messages, you can view the older ones by changing the page number. You can also reply to received messages or forward them to another number.



You may need to periodically delete messages to prevent the SIM from filling up, which will prevent the receipt of new messages. Select a single message by checking the box next to it and pressing the **Delete Checked** button. To delete multiple messages, just select the check box next to each message.

After composing a message, you can save it to drafts rather than sending it, by pressing the **Save** button.

Saved Drafts

The **Saved Drafts** Page allows you to view previously saved messages. After editing a message, you can resave (Save) or send the message (Send). You can also compose a message from this page.

The screenshot displays the Hughes 9203 web interface for managing SMS messages. The top navigation bar includes links for Home, Connections, SMS (selected), Settings, MDM, Usage, and Support. The main header shows the phone number 9203 and the title 'Saved Drafts'. On the left, a sidebar titled 'SMS MAILBOXES' contains links to Send/Receive, Saved Drafts (highlighted), Sent Messages, and SMS Settings. The main content area is divided into two sections: 'Saved Drafts' and 'Compose Message'. The 'Saved Drafts' section has a table with columns 'To' and 'Message Text'. The 'Compose Message' section has a 'To' field and a 'Message Text' field. At the bottom, there is a status bar showing 'Page 1' and 'Characters Remaining: 160'.

Saved Drafts	
To	Message Text

Compose Message

To

Page 1 Characters Remaining: 160

Sent Messages

The **Sent Messages** Page allows you to view previously sent messages. Again, you may need to periodically delete messages to prevent the SIM from filling up. You can also compose a new message from this page.



SMS Settings

On the **SMS Settings** Page you can configure the default settings for messages.

NOTICE

You must have a valid Service Center number configured to send SMS messages. The default Service Center number is +870772001799.

The screenshot shows the HUGHES SMS Settings web interface. At the top, there is a navigation bar with icons for Home, Connectors, SMS, Settings, MCM, Usage, and Support. Below the navigation bar, the page title "SMS Settings" is displayed. On the left side, there is a sidebar menu with options: Send/Receive, Saved Drafts, Sent Messages, and SMS Settings. The main content area contains several sections: "Service Centre" with a text input field for "Current Service Centre" containing "+870772001799"; "Default Message Options" with a "Validity" dropdown set to "1 day", checkboxes for "Request status report" and "Add signature", a "Signature" text input field, and a "Signature Characters Remaining" counter showing "21"; "Remote SMS Feature" with a checkbox for "Remote SMS Control" and a "Remote SMS Password" text input field; and "Predefined SMS Messages" with a "Default SMS destination" text input field containing "+8234567890". An "Apply" button is located at the bottom right of the form.

In the **Remote SMS Feature** section, you can enable the unit to receive and act on special “remote control” SMS messages. Contact your Service Provider for more information on this feature.

You can configure the password that must be contained in remote control SMS messages. Be sure to make a note of the password if you change it from the default.

Note: If you activate this feature and do not change the password, it is possible that other people may be able to send control messages to your unit.

Remote control messages will be deleted after they are received and will not be stored in the SIM.

The **Default SMS destination** is the SMS address that is used when sending any of the pre-defined text messages from the keypad (see Menu Navigation on page 21).

Settings Page

General Setup

This page allows the user to configure various parameters of the UT. A description of each item follows:

Terminal Startup – by default, “Bypass Antenna Pointing” is not selected, but if the terminal is permanently mounted, you can select this option to bypass antenna pointing on subsequent power-ups. For permanent installs you can also configure the unit to “Always power on when mains is connected” to avoid having to use the power button.

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.

The screenshot shows the Hughes 9203 General Setup web interface. The top navigation bar includes the Hughes logo, a home icon, and icons for Home, Connections, SMS, Settings (highlighted), MCM, Usage, and Support. The main title is "9203 General Setup". On the left is a sidebar with "ALL SETTINGS" and a list of settings: General Setup (selected), IP Address / DHCP, Port Forwarding, Wireless LAN, WLAN Security, Security, and Location Services. The main content area is divided into sections: "Terminal Startup" with checkboxes for "Bypass the Antenna Pointing mode when the terminal is powered up" (checked) and "Always power on the terminal when it is connected to mains" (unchecked); "Connection" with a dropdown menu set to "Automatic"; "Streaming" with a checkbox for "Enable Streaming Inactivity Timer" (unchecked) and a "Streaming Timeout" field set to "5" minutes; and "AT/CDLTE Configuration" with a dropdown menu set to "Off". An "Apply Changes" button is at the bottom right.

Streaming – By enabling this parameter, the user can turn on a timer for inactivity on streaming connections. The timer is in either seconds or minutes and will tear down a streaming context after X seconds or minutes of inactivity.

ATC/LTE Robustness – Turning on the robustness can improve receive performance in the presence of an interferer such as an ATC or LTE base station. However, use the default **Off** setting in the typical case where interference is not detected or expected. Options:

On – robustness always on, for operation in areas that are always subject to interference,

On for this trip – robustness on, but will switch back to **Off** at the next power cycle or restart.

Off – default option for normal operation with robustness off.

NOTICE

Operation of the Hughes 9203 may be impaired when it is located within a 900 m radius of an ATC/LTE base station.

IP Address/DHCP Settings

Terminal Local IP Address: This section allows the user to change the Local IP address of the terminal from the default 192.168.128.100 IP address. All four octets are available to change. Once the Local IP address is changed on this page and applied, the IP address ranges for the DHCP server, the Manage Context Page, and the ACA Page will also be changed automatically.

The screenshot displays the Hughes 9203 web interface for IP Address / DHCP Settings. The top navigation bar includes icons for Home, Connections, SMS, Settings (highlighted), M2M, Usage, and Support. The left sidebar lists settings categories: General Setup, IP Address / DHCP (selected), Wireless LAN, WLAN Security, Security, and Location Services. The main content area is titled 'IP Address / DHCP Settings' and contains the following sections:

- Terminal Local IP Address:** A row of four input fields showing the current IP address: 192, 168, 128, and 100.
- DHCP Server:**
 - ☒ Enable DHCP Server
 - The Terminal must be restarted before DHCP settings take effect.
 - DHCP Address Range: 192.168.128.101 to 199
 - Lease Time when Idle: 1 Minutes
 - Lease Time when Connected: 5 Minutes
- Network Operating Mode:**
 - Network Mode: NAT mode
 - Apply Changes button

NOTICE

Updates to the IP address will **not** take effect until the UT is **rebooted**.

DHCP Server: allows the DHCP server in the UT to be turned on or off by checking the “Enable” box.

DHCP Address Range: This allows the user to set the range of DHCP addresses that are given out by the UT to connected TEs.

Lease Time when Idle: The Idle-mode DHCP Lease Time refers to the DHCP lease time when the UT is not connected to the network. This parameter allows the user to change the default time (60 seconds) that the DHCP lease to the TE is good for. This parameter was introduced because of problems with some devices that will not accept a short DHCP lease time.

NOTICE

The longer the Idle-mode DHCP lease time, the longer it will take the network/UT to update the TE with the correct DNS servers for web browsing after establishing a data context.

Lease Time when Connected: The Connected-mode DHCP Lease Time refers to the DHCP lease time when the UT is connected to the network. Most users will have no need to change this parameter.

Network Operating Mode: The Netmode field indicates the mode of operation of the terminal. In *NAT* mode, the UT will translate between the Local and Global IP addresses. In *Relay* mode, the UT will supply the Global IP address to the TE once a PDP Context is established. *Relay* mode is single user/single PDP Context mode, and only supports a single connected TE. In *NAPT* mode, multiple devices connected via WLAN or a hub/switch share a single PDP context.

Note: Updates to this field will not take effect until the UT is restarted.

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 a single user mode, as it 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 the connections 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 DHCP lease time to 60 seconds in idle and connected mode.

NOTICE

Relay mode only supports a single user TE.

NAPT Mode

In **NAPT mode**, 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, an Always On Context is activated. The **ACA** Page is removed. A **Port Forwarding** Page is added under **Settings**, and it can be used to configure the DMZ and Port Forwarding parameters.

Port Forwarding Page

The Port Forwarding Page is only available in NAPT mode. It includes:

- **DMZ** – if enabled, all packets received from the spacelink 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.

HUGHES 9203 Port Forwarding

ALL SETTINGS

- General Setup
- IP Address / DHCP
- Port Forwarding**
- Wireless LAN
- WLAN Security
- Security
- Location Services

DMZ Configuration

☐ Enable DMZ Host

DMZ Host IP Address: 192.168.128.1

Apply Changes

Port Forwarding Rules

Rule	Enabled	Global Port	Protocol	Local IP (192.168.128.x)	Local Port
1	OFF	0	TCP	192.168.128.0	0
2	OFF	0	TCP	192.168.128.0	0
3	OFF	0	TCP	192.168.128.0	0
4	OFF	0	TCP	192.168.128.0	0
5	OFF	0	TCP	192.168.128.0	0
6	OFF	0	TCP	192.168.128.0	0
7	OFF	0	TCP	192.168.128.0	0
8	OFF	0	TCP	192.168.128.0	0

Rule: 1 Enabled: OFF Global Port: Protocol: TCP Local IP (192.168.128.x): 192.168.128.0 Local Port: 0

Update Port Forwarding Rules

Wireless LAN

The Wireless LAN Settings Page allows the user to enable, disable, and configure the Wireless LAN functionality of the terminal.

The screenshot shows the 'Wireless LAN Settings' page for a Hughes 9203 terminal. The interface has a blue header with the 'HUGHES' logo and navigation icons for Home, Connections, SMS, Settings (highlighted), MDM, Usage, and Support. Below the header, the terminal model '9203' is displayed. A left sidebar contains navigation links: 'ALL SETTINGS', 'General Setup', 'IP Address / DHCP', 'Wireless LAN' (selected), 'WLAN Security', 'Security', and 'Location Services'. The main content area is titled 'Wireless LAN Settings' and includes sections for 'Enable Wireless LAN' (with an unchecked checkbox for 'Enable Wireless LAN Interface'), 'Network Name Settings' (with fields for 'Network Name (SSID)' set to 'Hughes 9203 400055-5' and 'Broadcast SSID' with a checked 'Broadcast the Network Name' option), and 'Region and Channel' (with 'Network Region' set to 'X10-PCC (1-11)' and 'Network Channel' set to '11'). An 'Apply Changes' button is at the bottom of the settings section. A red warning box at the bottom states: 'Security is currently disabled on your wireless network. Click here to modify the security settings.'

The Wireless LAN Security is controlled on a separate web page (**WLAN Security**).

Note: If you have not previously used the terminal's WLAN interface, it has to first be enabled from this page using a computer connected to the terminal using an Ethernet connection (or use the terminal buttons – see page 16). Once WLAN is enabled and configured, TEs can connect to the terminal wirelessly.

Fields on this page include:

Enable Wireless LAN Interface: Turns the Wireless LAN interface on/off. The default is off (unchecked).

Network Name (SSID): The default is “Hughes 9203 nnnnnn-n” (includes last digits of terminal's serial number), but you can change it to whatever you want.

Network Region: There is only one region for all countries.

Network Channel: This controls the radio channel number (1 through 11) used by the access point. To meet FCC regulations, channels 12 to 14 are not supported.

If performance issues occur over the WLAN interface, changing the Channel may help.

Wireless LAN Security

The screenshot shows the 'WLAN Security Settings' page for a Hughes 9203 device. The interface has a blue header with the 'HUGHES' logo and navigation icons for Home, Connectors, SMS, Settings (highlighted), MCM, Usage, and Support. Below the header, the device ID '9203' is displayed. A left sidebar contains a menu with 'ALL SETTINGS' and icons for General Setup, IP Address / DHCP, Wireless LAN, WLAN Security (selected), Security, and Location Services. The main content area is titled 'WLAN Security Settings' and includes a 'General WLAN Security Settings' section with a dropdown menu set to 'WPA2 Protection' and a checkbox for 'Enable Wireless LAN MAC Address Filtering'. Below this is a 'WPA2' section with a 'WPA2 Passphrase' field and a 'Hide Keys' button. An 'Apply' button is located below the passphrase field. The bottom section, 'MAC Address Filtering', contains two panels: 'Allowed MAC Addresses' with a list box and an 'Add' button, and 'Add A Detected Device' with fields for 'IP Address' and 'MAC Address' and an 'Add' button.

This page allows the user to configure WPA or WPA2 Security for use when the terminal is communicating wirelessly to TEs. Additionally, you can enable MAC Address Filtering so that only the MAC addresses that you select can connect to the terminal. A maximum of ten (10) addresses can be filtered.

For the field, **Secure the Wireless Network using**, select from the down arrow, **No protection**, **WPA** or **WPA2**.

For WPA and WPA2, define an 8 to 63 character passphrase.

MAC Address Filtering

Check the box to *Enable MAC Address Filtering*

If any TE is already connected to the terminal wirelessly, the MAC address of that TE will be detected and show up in the **Add a Detected Device** field.

To add the detected MAC address, click on the address to highlight it and then click **Add**. It will now show up in the **Allowed MAC Address** field.

To add a MAC Address manually, fill in the box next to the **Add** button with the desired MAC Address, then click **Add**.

Security

You can configure three separate security settings on this page:

SIM PIN – this is a four-digit field that can be Enabled and configured by the user to secure the terminal against unwanted use. Once enabled, the terminal will require the SIM PIN at startup.

Phone to SIM PIN – use a code of up to 8 digits to lock the terminal to the current SIM card. The Phone to SIM PIN code will have to be entered if the SIM card is changed. The default password is 12345, but the feature is off by default.

Administration Password – this configuration allows the user to prevent terminal settings from being changed once the terminal is configured properly. This password will have to be entered before any settings can be changed. See screenshots below.



The Enter Administrator Password pop down screen appears the first time the user tries to edit a parameter if the Administrator password is enabled.

Enter Administrator Password

Please Enter the Administrator Password to apply Settings

PASSWORD

Cancel Submit

HUGHES Home Connectors SMS Settings **M2M** Usage Support

9203 M2M Setup

SETTINGS

- General Setup
- IP Address / DHCP
- Wireless LAN
- WLAN Security
- Security
- Location Services

Ping Configuration:

Context Watchdog: ☒ On ☐ Off
Send a PING to test the context alive and test connectivity. If ping fails and the watch-dog mechanism is enabled, restarts call.

Primary Ping IP Address: 8.8.8.8

Secondary Ping IP Address: 8.8.4.4 (Default)

Tertiary Ping IP Address: 8.0.0.8 (Default)

Time between Pings: 30 minutes

Ping Required: ☐ Yes ☒ No
(Please send ping even if data sent successful)

Apply Changes

Always On Context

Always On Context: ☒ On ☐ Off

Static ACK IP Address: 8.0.0.8
(If the static IP address has not all data, a session will be setup for the first device connected via static IP)

QoS: Standard

APN Config: hgan.immagine.com

Apply Changes

The M2M Page includes the following configurable parameters which can be useful when the terminal is used in a machine-to-machine or unmanned scenario:

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.

Always On Context:

The always on context can be used for machine to machine or unmanned scenarios to automatically set up a PDP context. It also defaults to On in NAPT mode.

- Always on context - On/Off (default is Off)
- 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.
- QoS drop-down box
- APN Config drop-down box

Usage Page

This web page provides an estimate of the amount of Packet-Switched data that was sent and received, along with time spent on streaming connections and CS calls. The data is broken up into two types:

Trip Usage Statistics: The trip counter is similar to the trip odometer on your vehicle. It can be zeroed out at any time by the user and it will track the statistics until the user resets it.

Lifetime Usage Statistics: The Lifetime counter is similar to the main odometer on your vehicle. It shows the statistics of the terminal since the software version that added this feature was loaded onto the UT. The user **cannot** reset these counters.



NOTICE

If the UT power is abruptly disconnected for some reason, the UT will not be able to save the statistics to flash and hence the statistics for the session (**Trip**) may be inaccurate.

Support Page

This web page allows you to display technical and support information about the terminal and retrieve logs.



Support and Information

Terminal Information

Model: displays the UT model number: 9203.

Class: indicates the UT Class.

IMEI: displays the IMEI (serial) number of the UT.

Software Version: This displays the current version of software that is running on the UT.

SIM Information

IMSI: This displays the IMSI number of the SIM card in the UT. If the IMSI is not displayed, it indicates that there is a problem reading the SIM card, e.g., because there is no SIM, it is installed incorrectly, or the correct SIM PIN must first be entered.

APN: This is the APN read from the SIM card.

Subscriber Phone Number: this field displays the MSISDN or phone number for the terminal's SMS service. The number is only displayed if the number was configured in the SIM by your Service Provider. Even if no number is shown, the service may still be active because this field is just for your information and is not required for the service to operate.

Terminal Support – contact information retrieved from the SIM card:

Website
Telephone
E-Mail

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
Circuit Log

These files can be e-mailed to Hughes directly for fault analysis if the user experiences any problems.

Downloading of the terminal log files 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.

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.

Note: You can also **Reset to Factory Defaults** by pressing the “Cancel” (X) button while powering off. Press and hold the

“Cancel” button and then press and hold the power button until “Powering Off” is displayed, then release both buttons.

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.

Smart Phone Web UI



The Web UI detects when it is being accessed by a smart phone and adjusts to optimize for the phone screen.

An icon bar at the bottom of the screen provides shortcuts to the other pages.

Icon bar	Function
	The bottom left icon shows the signal strength and when pressed, activates the status bar (see below).
	Shortcut to the Home Page
	Shortcut to the PDP Contexts Page
	Shortcut to the SMS Page
	The bottom right icon when pressed activates the menu to access all the other screens (see below).

Status Bar



Menu



Troubleshooting

Problem	Possible Cause	Possible Solution
Terminal will not turn on	Battery not connected properly Battery not charged	Check battery is correctly installed Connect AC/DC adapter to charge the battery
Cannot get SIM card to lock into position	SIM is not correctly oriented for insertion	Ensure the SIM is pressed firmly into the SIM slot Ensure the SIM is oriented as shown in the Setup section
The Web UI will not connect to the terminal	No interface connection between the terminal and computer Your computer is configured with a Static IP address in the wrong subnet. Default UT IP address is: 192.168.128.100 UT has unknown IP address and DHCP is turned off.	Ensure there is a WLAN or Ethernet connection between the terminal and computer, see page 12. Check the IP configuration settings on your computer. Enable DHCP or use a Static IP address in the same subnet as the UT Local IP address. Default UT IP address is 192.168.128.100 Power up the unit with the SIM card removed and it will turn on DHCP.
Terminal is connected to the BGAN network, but cannot obtain the requested Quality of Service	Network temporarily not available	Retry again. If problem persists, contact your Service Provider.
Terminal does not obtain a GPS fix	Terminal's location limits visibility of 3 or more GPS satellites.	Move the terminal to a location where there are fewer obstructions such as trees or tall buildings, so that there is a clear view of the sky.
None of the above solutions resolve the problem	Terminal may have a hardware or software fault and needs to be re-booted.	Remove power. Wait 30 seconds. Reconnect the DC power and turn on the terminal.
Cannot access or control the unit	Forgotten admin password. Invalid configuration.	Reset to factory defaults: Press and hold the "Cancel" (X) button and then press and hold the power button until "Powering Off" is displayed, then release both buttons.

PDP Context Activation Errors

CME error number	CME Error Text on LCD display or 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.

Technology Overview

GPS

The Global Positioning System (GPS) uses orbital satellites to determine the position of the Terminal anywhere on the globe.

Obtaining a GPS Fix

In normal operation, a GPS receiver, such as that built into the terminal, needs to be able to receive signals from at least four satellites so that it can then calculate a latitude, a longitude and an altitude – this position fix is referred to as a 3-dimensional or 3-D fix. If only three GPS satellites can be seen by the GPS receiver, then the last available altitude measurement is assumed, and the GPS receiver calculates a position fix based on latitude and longitude only. This simpler position fix is referred to as a 2-dimensional or 2-D fix and is quicker and easier to obtain than a 3-D fix but may be less accurate.

The GPS receiver may take between a few seconds and a few minutes to obtain a GPS fix, depending on how frequently the GPS receiver is being used. The frequency of use determines the how quickly the GPS Terminal can start.

- Hot start – if the GPS receiver is being used frequently, (that is, in the last two hours), it is regularly updated with data from the GPS satellites, and so only takes a few seconds to obtain a GPS fix after being switched on.
- Warm start – if a GPS receiver has not been used for more than two hours then it may take up to 45 seconds to obtain a GPS fix.
- Cold start – if the GPS receiver has not been used for some time or is 300 km or more from where it was last used, it can take a few minutes to obtain a valid position fix.

The time taken to obtain a valid GPS fix can also be affected by the visibility that the GPS receiver has of the GPS satellites. The GPS system is relatively tolerant of atmospheric conditions such as heavy cloud or rainfall. However, physical blockages, such as tall buildings or terrain can significantly degrade the ability of the GPS receiver to obtain a fix. For this reason, ensure that the GPS receiver has a clear view of as much open sky as possible.

GPS and BGAN Registration

BGAN uses the accurate position and timing information obtained from GPS to help ensure efficient registration of a BGAN Terminal with the BGAN network.

Numbering

Multi-Subscriber Numbering (MSN) - The BGAN SIM card has a master MS-ISDN number that is used for sending and receiving SMS messages.

The BGAN numbering system follows the same pattern as terrestrial telephone systems. If you are sending a message to another BGAN unit, use 00 + 870 number.

PDP Context

A Packet Data Protocol (PDP) Context defines connection aspects such as routing, Quality of Service (QoS), security and billing between a mobile user terminal, such as the BGAN Terminal, and a data network. PDP Contexts are essential to the General Packet Radio Service (GPRS) system, which is used by GSM and UMTS-based 3G networks worldwide for transmitting data.

For a user to be able to transfer data across a network, a PDP Context must be activated in the Terminal and associated Core Network. Once the terminal is registered and attached to the BGAN network, it can request a PDP context. The PDP context request specifies the desired Quality of Service (background or streaming) and the APN of the external network to which connectivity is requested. Assuming the request is valid and there are sufficient resources available, the network assigns the resources, including an IP address for the context.

A terminal may have multiple PDP Contexts, each with different QoS profiles, e.g., for different connected devices.

9203 Technical Specifications

Satellite TX Frequency	1626.5 – 1660.5 MHz and 1668 – 1675 MHz ⁴
Satellite RX Frequency	1518 – 1559 MHz
GPS Frequency	1574.42 – 1576.42 MHz
Satellite EIRP (L-band Max Tx)	9 dBW
Continuous transmit	Up to 2 hours ¹
Continuous receive	Up to 4 hours ¹
Standby Time	Up to 36 hours ¹
Weight	Terminal: 1.4 kg
Dimensions	Antenna with cable and pole: 1.1 kg Terminal: 211 mm x 211 mm x 41 mm Antenna: 153 mm (height) x 94 mm (diameter)
Operating Temperature (with DC supply)	-25 °C to +55 °C ³
Battery Charging Temperature	0 °C to +40 °C
Storage Temperature (including battery)	-25 °C to +55 °C (0 °C to +20 °C is recommended for longer battery life)
Storage Temperature (excluding battery)	-25 °C to +70 °C
Humidity	95% RH at +40 °C
Water and Dust	IP 65 compliant
Non-operational Mechanical Vibration	MIL-STD 810G, Method 514.7, Loose Cargo, in transportation case
Input Voltage	19V === 3.4A ²
Data Connectivity	RJ45 port (Ethernet 100BaseT) 802.11b/g/n WLAN
Other Features	Integrated User Interface (iUI) via LCD panel Web User Interface (Web UI) SIM/USIM Slot (behind battery) AC/DC adapter Rechargeable Li-Ion battery Compass

Note:

1. Performance may be affected by a wide range of factors.
2. The Hughes 9203 satellite terminal operates on DC power which can be supplied by an AC or DC power source. To comply with safety requirements, the terminal must be powered only with an AC/DC adapter or DC power source supplied or approved by Hughes. See Section “Application Note – Battery” for more information.
3. Recommend using external battery or power source for continuous Tx above +40° C.
4. XL band 1668 – 1675 MHz operation available only within Alphasat I-4A F4 satellite coverage.

Regulatory Notices

Declaration of Conformity

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

FCC Compliance

- 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.
- To comply with FCC RF exposure requirements, this device must be operated with the following minimum separation distances from a person's body:
 - 20 cm or more from the satellite antenna. Antenna shall be installed on a pole such that it is positioned above the head of the person carrying the device.
 - W-Fi antenna: 20 cm or more from the front of the terminal unit (grey plastic radome) and 2.5 cm from the back of the terminal unit (black metal housing)Other operating configurations should be avoided.
- 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.

EU WEEE Directive



The European Union (EU) directive on waste electrical and electronic equipment (WEEE) 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 will be compliant with this directive and any subsequent revisions or amendments. This product carries the WEEE label below to demonstrate compliance.

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

Glossary

APN: An Access Point Name (APN) provides access to an external network. By default, the SIM Card in your terminal is configured with the APN of your Service Provider. If your SIM subscription includes other APNs, e.g., for special services or to access other networks, you can configure the additional APNs from the Web UI.

BGAN Satellite Terminal: Referenced throughout this document as the Satellite Terminal, “The Terminal,” or UT. This device implements and manages BGAN satellite communications between your computer and Service Provider’s network.

Quality of Service: Quality of Service (QoS) assigns a level of priority to certain types of data traffic, in particular high bandwidth applications such as video and multimedia. QoS attempts to maintain a guaranteed throughput level, and minimize error rates and end-to-end latency, by providing a higher level of service than “best effort” protocols.

DNS Server: The Domain Name System (DNS) is an Internet service that is required because the Internet does not recognize the text-based Web address or email address that you type into your Web browser or email application. All or part of a Web address or an email address is a domain name, and DNS translates this domain name into an IP address that is recognized by the Internet.

A DNS Server holds a database of domain names and IP addresses, so that when you enter a Web address or email address, you are directed to the correct IP address over the Internet.

Ethernet: Ethernet is a local area networking method used widely throughout the computer industry. It is one of the two communications interfaces supported by the Satellite Terminal.

Fault Code: A number which uniquely references an error in a hardware or software system. In the Satellite Terminal, if there is a fault detected, the fault code and a description are displayed in suitable windows/screens.

GPS: Global Positioning System. The GPS receiver in the Satellite Terminal receives signals from the constellation of GPS satellites. It uses these signals to determine the Terminal’s location on earth. That location is used during registration to gain access to the BGAN system.

IP Address: An Internet Protocol address, or IP address, is a number that uniquely identifies the computer accessible over a TCP/IP-based LAN or the Internet that is sending or receiving information. An IP address is a 32-bit numeric address written as four numbers, separated by periods and each number is between 0 and 255. For example, 207.115.79.4 is an IP address. In the BGAN system, IP addresses for the network and the TE can be Dynamic or Static.

Network Dynamic IP Address: A network Dynamic IP address is a temporary address that is assigned by your BGAN Service Provider when you connect to the BGAN network.

Network Static IP Address: If required, a Static IP address can be assigned by Service Providers to BGAN users when the SIM is provisioned. This Static IP address is used every time you connect to the BGAN network and is associated with a specific username and password.

DHCP Address: Local IP address that is assigned by the UT DHCP server to the TE once connected to the UT. This is a private IP address that is not routable within the Internet.

Terminal Local IP Address: IP address of the UT to access the Web UI. This address is configurable by the user. The default Local IP address of the terminal is 192.168.128.100.

Standard Connection: A standard connection is charged by volume of data sent. The bandwidth you are allocated depends on terminal type and network availability, but is always ‘best effort’, that is, you are allocated bandwidth depending on your requirements and the requirements of other users of the BGAN network, or BGAN Terminal. This connection class is suitable for most data types, other than multimedia.

Streaming: A streaming connection gives you a guaranteed data rate and is charged by the amount of time the connection is active. Streams are typically used for multimedia data, such as video.

TE (Terminal Equipment): Terminal equipment refers to the piece of equipment that is connected to the BGAN UT (e.g., laptop, video equipment, phone, etc.).

Traffic Flow Template: A Traffic Flow Template, also called an Application Template, is a series of data filters such as QoS (Quality of Service), PDP Context, and security settings that allow the Core Network to classify packets received from an external network into the correct PDP Context. When incoming data arrives at an access point in the Core Network, a packet classifier will make a PDP Context selection based on the Traffic Flow Template, and map the incoming data packets into the PDP

Context with the correct QoS attributes. The use of a Traffic Flow Template allows multiple PDP Contexts to be associated with the same PDP address.

UT (User Terminal): The user terminal is the BGAN modem device, i.e. the Hughes 9203.

SIM Card: Your BGAN Service Provider supplies you with a Universal Mobile Telecommunications System Subscriber SIM (SIM) Card.

The SIM card is similar to the SIM Card that is commonly used in a GSM phone. The card holds a microchip that stores information and encrypts data transmissions, making it extremely difficult to listen in. The SIM Card also stores data that identifies the caller to the BGAN Service Provider.

Virtual Private Network: A Virtual Private Network (VPN) enables remote offices or users to gain secure access to their organization's network over the public telecommunications network. This provides the benefits of remote access without the expense of dedicated leased or owned lines. VPNs work by using tunneling protocols, to encrypt data at the sending end, and decrypt the data at the receiving end. This "tunnel" cannot be accessed by data that is not properly encrypted.

Application Note – Battery

The UT battery is a high capacity lithium-ion battery pack. When using the 9203 terminal in extremely hot environments with a PDP context active, you may see a “Battery Too Hot” error message.

To avoid this error, you can connect an external power source. Some standard external power sources are listed below:

- AC/DC power adapter P/N 3500411-0008
- Hughes DC/DC power adapter P/N 3500099-0003
- Various military batteries e.g., BA-2590, BA-5590 or AN/PRC 148. Use the following cable accessories with 2.5mm ID x 5.5mm OD barrel connector:
 - Ext. Battery cable BA-5590, 12 V (9511201-0002)
 - Ext. Battery cable AN/PRC-152 (9511202-0002)

NOTICE

When using an external battery make sure to fully disconnect it when the terminal is powered off to avoid discharging the external battery.

Application Note – Battery Safety

Safety Information

- a. Replace battery with 3500800-0008 battery only (reorder as battery assembly number 3501192-0001). Use of another battery may present a risk of fire or explosion
- b. The battery used in this device may present a risk of fire or chemical burn if mistreated. Risk of Fire and Burns. Do Not Open, Crush, Heat Above (manufacturer's specified maximum temperature) or incinerate. Follow manufacturer's Instructions
- c. Do not dismantle, open or shred the battery
- d. Do not short-circuit the battery. Do not store batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by conductive materials
- e. Do not remove a battery from its original packaging until required for use
- f. Do not expose batteries to heat or fire. Avoid storage in direct sunlight
- g. Do not subject the batteries to mechanical shock
- h. In the event of a cell leaking, do not allow the liquid to come into contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice
- i. Store the batteries in a dry place at a temperature between 0°C and +40°C
- j. Secondary (rechargeable) batteries give their best performance when they are operated at room temperature (20°C +/- 5°C)

Charging

- a. Only charge batteries with a Hughes 9203 AC/DC power adapter.
- b. The Hughes 9203 charges with a constant-voltage, constant current battery charger circuit with the following parameters:
 1. Nominal charge voltages: 8.40 VDC
(Maximum charge voltage: 8.50 VDC)
 2. Nominal charge current: 3200 mA
(Maximum charge current: 3250 mA)
 3. Charge temperature range: 0°C to +40°C

Preventative Maintenance

Lithium-Ion batteries are best stored at approximately 40% of their rated capacity to prolong their life while not in use. Unfortunately, Lithium-Ion batteries also self-discharge slowly over time, so it is not possible to maintain that level of charge during period of extended storage. It is also the case that these batteries can be degraded if deep discharged, therefore some level of preventative maintenance is required when they are in long term storage.

The following action is recommended for extending the life of your Hughes Lithium-Ion battery:

1. It is best to store the battery outside of the terminal in a dry location with a temperature in the range of 0°C to +25°C.
2. Fully charge the battery when planning on months of storage.
4. Check the battery charge every six to 12 months thereafter, top up if necessary.
5. For longest battery life, the recommended storage temp is -20°C to + 20°C.
6. If shipping batteries by air, please refer to the IATA guidelines for shipment safety.

Disposal

- a. Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire
- b. When disposing of batteries, keep cells or batteries of different electrochemical systems separate from each other
- c. Recycle or dispose of this battery in accordance with local regulations. For assistance, refer to <http://www.epa.gov/recycle/how-do-i-recycle-common-recyclables>