



# Hughes 9400 Series User Guide

P/N 3004128

Revision 1

inmarsat

HUGHES®

# SAFETY INFORMATION

For your safety and protection, read this entire user manual before you attempt to use the Broadband Global Area Network (BGAN) Land Mobile Satellite Terminal. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

## WARNING SYMBOLS USED IN THIS MANUAL

### 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

### 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 one meter or more from the front of the Satellite Terminal antenna.

## GENERAL

Handle your Satellite Terminal with care. The outdoor unit is weather resistant per IEC 60529 IP56; however, do not submerge either unit. Avoid exposing your Satellite Terminal to extreme hot or cold temperatures outside the range -25ºC to +55ºC.

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 USIM/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.

## 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 20cm from the Wi-Fi antenna and your pacemaker:
- 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. Ensure the Below Deck Equipment is properly grounded to the vehicle chassis.

# CONTENTS

# INTRODUCTION

## ABOUT THIS PRODUCT

The Hughes Network Systems 9400 Series Broadband Satellite Terminals are your gateway to global communication. The 9400 Series terminals have a common IDU that is branded as the Hughes 9450 IDU and it supports both the Class 10 (C10) and Class 11 (C11) antenna.

The 9400 Series terminals allow you to simultaneously send and receive IP packet and circuit-switched data via Ethernet (Power over Ethernet) ports and the Integrated Services Digital Network (ISDN) interfaces over the Inmarsat BGAN satellite network.

These units offer you the following features and benefits:

- Fully autonomous tracking antenna acquires and tracks the BGAN satellite signal while on the move
- Easy antenna installation (magnetic mount) on vehicle roof
- Includes RF cable and power cable for vehicular installation
- Up to 492 Kbps data (transmit and receive) and 256 Kbps streaming IP data rate (C10 only)[1]. However, below 45 degree look angle to the satellite the max streaming rate is 128kbps.[1].
- 4 X RJ-45 Power over Ethernet ports
- ISDN voice (3.1KHz audio) (above 20 degree look angle to the satellite)
- ISDN data (64Kbps) (above 20 degree look angle to the satellite)
- 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
- WLAN, FCC and CE certified
- Subscriber Identification Module (SIM) card security

The unit is easy to install and connects in minutes. It is built for use in vehicular environments.

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

| Term | Definition |
|---|---|
| IDU | Indoor Unit |
| ODU | Outdoor Unit/antenna |
| Terminal | Satellite Terminal |
| TE | Terminal Equipment (your computer) |
| UT | User Terminal/satellite terminal |

[1] Best efforts performance under moving conditions depending on obstruction of satellite signal. Signal outages of more than 60 seconds will cause circuit switched calls to be dropped and packet switched sessions being interrupted. May require user intervention to reactivate connections for longer outage durations.

## 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 9400 Series Land Mobile User Terminals.

Please refer to the Hughes 9201 User Guide for general information on how to access the BGAN network and how to use the Inmarsat LaunchPad Software. The 9201 User Guide can be downloaded from the Hughes website at www.bgan.hughes.com

## Package Contents

When you unpack the Land Mobile Terminal Kit package, you will find the following:

- BGAN Land Mobile Tracking Antenna Kit
- Hughes 9450 BGAN Satellite Modem Kit (Common to C10 and C11)

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 network. Note: The SIM card may also have four (4) MSISDN numbers associated with it for various ISDN services:

4K Voice

3.1KHz Audio/Fax

64K UDI data

56K RDI data

## Minimum System Requirements for Laptop/PC

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

- Internet Browser: Microsoft Internet Explorer, Mozilla or Safari. Java must be active and running version 1.6 or newer (available from www.java.com).
- PC Support for at least one of these interfaces: Ethernet, or WLAN (802.11b or b/g).
- 100 MB of free hard disk space if using LaunchPad.

# GETTING STARTED

## INTRODUCTION TO 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 voice and broadband services.

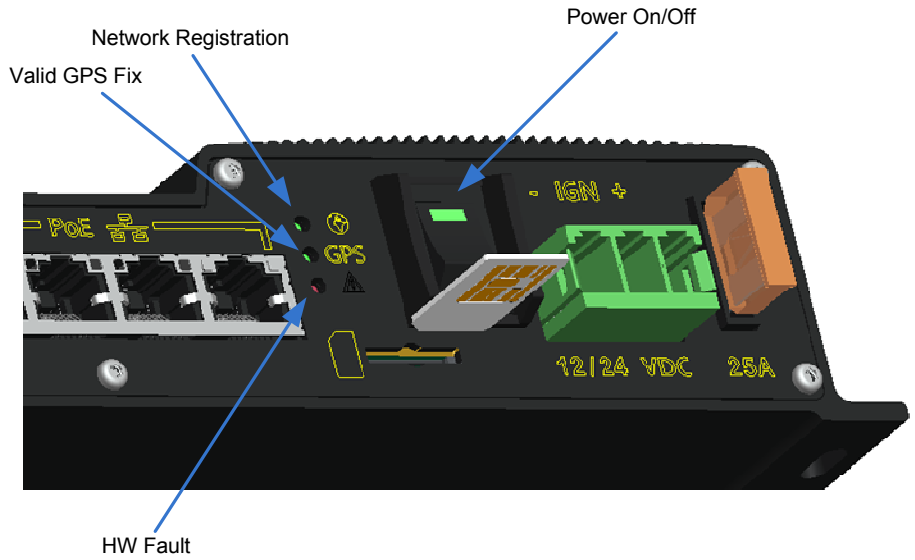
## INSTALLING YOUR TERMINAL

Install the Hughes 9400 Series terminals according to the Installation Guide P/N 3004129 supplied with the terminal. Please refer to the Installation Guide for grounding instructions.

## TERMINAL LED FUNCTIONALITY

The 9450 IDU has 4 LEDs with the following functions:

**Power:** Green when IDU is powered on. Off when IDU is powered off. This LED is integrated in the On/Off switch.
**Network Registration**: Green when registered and attached with Inmarsat BGAN network, Off otherwise.
**GPS**: Green when valid GPS fix acquired since last power-cycle, off otherwise.
**H/W Fault**: Red if HW fault detected, e.g.: IB fault, no communication to antenna or no GPS. Off otherwise.



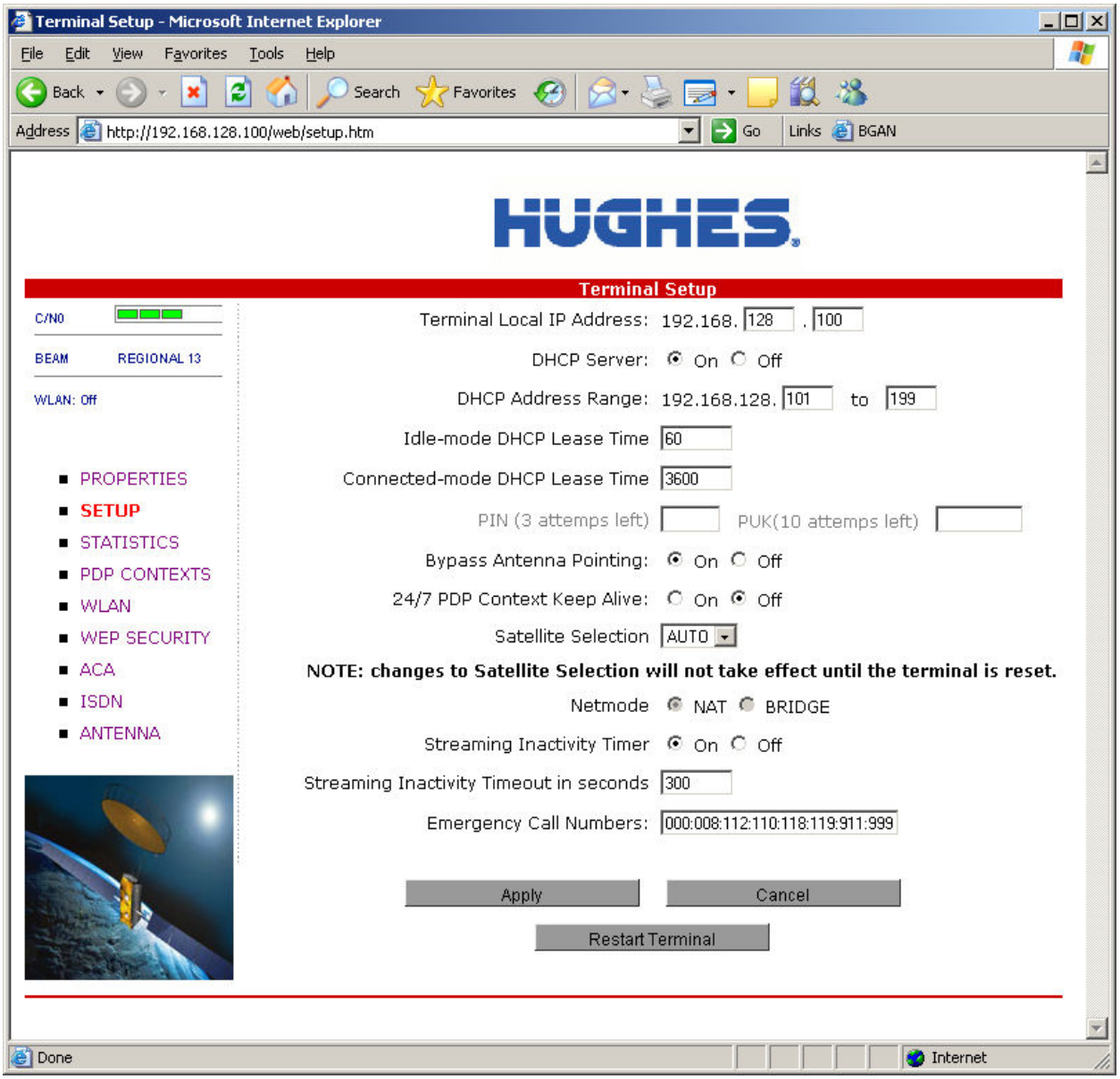

The 9450 IDU has a 4X RJ-45 connectors with 2 LEDs for each connector with the following functions:

**Green/Red bicolor:** Green indicates Link active, Red indicates power over Ethernet PD device is connected and being powered by IDU. When both LEDs are active, it will appear Orange in color.
**Yellow**: Traffic indicator

## AUTO START CONFIGURATION

Since the Hughes 9400 Series terminals are equipped with a tracking antenna, the default configurations for the Hughes 9400 Series Land Mobile Terminals are as follows:

- The Hughes 9400 Series is configured to bypass antenna pointing as default and will automatically register with the network: The terminal will automatically attempt to register with the network once the tracking antenna has acquired the satellite signal and obtained a GPS fix.
- The 9450 IDU has a power switch and an ignition sense line. For the unit to turn on, the power switch must be in the ON position and 12V or 24V applied to the ignition sense line.



| | |
|---|---|
| ☑ **Note** | These default configurations are accessible through LaunchPad or the web MMI and It is recommended to keep these settings for convenient operation of the Hughes 9400 Series Land Mobile Terminals. |

## POWER UP AND CONNECTION TO THE INTERNET

After power is applied, the Hughes 9450 IDU and Hughes Tracking Antenna will begin their start-up sequence. The tracking antenna will begin its search for the BGAN satellite and the antenna motors may be heard during this time. Note that the tracking antenna must have line of sight to the BGAN satellite. Once the antenna has locked onto the BGAN satellite, it will continue to make minor adjustments to acquire optimum signal strength. The antenna may be heard 'twitching' during this time. Eventually the antenna will sit at an optimum position while the vehicle is stationary.

Once the vehicle starts moving, the Hughes Tracking Antenna will automatically track the satellite signal and keep the antenna pointed towards the satellite. During short outages (e.g. while driving under a bridge, etc.) the antenna will remain in the same position and will pick up the satellite signal immediately. For longer outages the antenna may need to repeat the search pattern to reacquire the satellite signal.

| | |
|---|---|
| ☑ **Note** | Circuit switched and packet switched connections will typically recover from signal outages of less than 60 seconds. User intervention ***will*** be required to reactivate circuit switched connections for outages longer than 60 seconds and ***may*** be required for packet switched connections depending upon the actual length of outage. Packet switched connections like FTP are more robust than circuit switched connections in the network. |

## CONNECTING THE TERMINAL TO THE COMPUTER

You can connect your computer to the 9450 IDU with one or more of the following interfaces

- Ethernet
- Integrated Services Digital Network (ISDN)

| | |
|---|---|
| ☑ **Note** | **There is no need to check the active interface.** All interfaces can be used simultaneously to accommodate multiple users. |

| | |
|---|---|
| ☑ **Note** | During initial setup, the terminal can only be configured using either a USB or an Ethernet connection. Once the terminal has been configured, four of the five interfaces (Ethernet, WLAN and ISDN) can be used for data transfer depending on the service required.<br>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 BGAN 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 one of the four Ethernet ports on the 9450 IDU. These four Ethernet ports support Power-over-Ethernet (PoE).

### CONNECTING BY WLAN

If you have not previously used the IDU's WLAN interface, it has to be enabled from the internal web MMI or LaunchPad with your computer connected to the IDU using either the Ethernet interface.

As you are configuring the WLAN, you can enable the Wireless Encryption Protocol (WEP), MAC address filtering and no broadcast SSID features for added security.

Once the WLAN is turned ON and configured, any device with a WLAN interface can detect the IDU's WLAN SSID, and connect to it automatically.

**Note:** If WEP is enabled, you must provide other WLAN users with the proper WEP key in order for them to connect to the IDU.

### CONNECTING BY ISDN

Connect an ISDN cable to your computer's or phone's ISDN port, and insert the other end of the connector into the Terminal's ISDN port.

To dial, prefix the international number with 00 and terminate with #. For example, to dial a number in the USA, enter: 0018005551234#

To receive incoming calls you must configure your ISDN device with the MSN (Multiple Subscriber Number) of the service it supports. See the ISDN section for information on configuration of MSNs. To configure the MSN in your ISDN device, refer to the user guide of your ISDN device.

### CONNECTING BY RJ-11

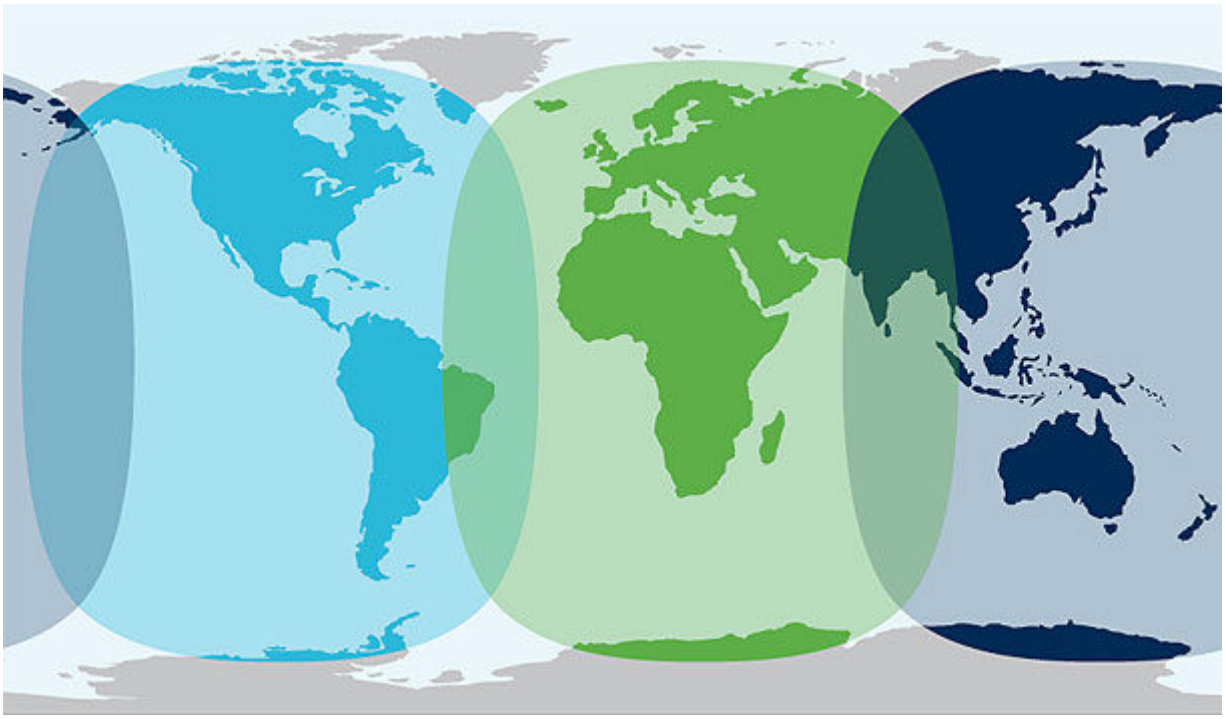
You can connect an analog phone or fax machine to the RJ-11 ports:

- The FAX port is configured for 3.1k service for fax
- The TEL port is configured for speech service for voice calls

To dial, prefix the international number with 00 and terminate with #. For example, to dial a number in the USA, enter: 0018005551234#

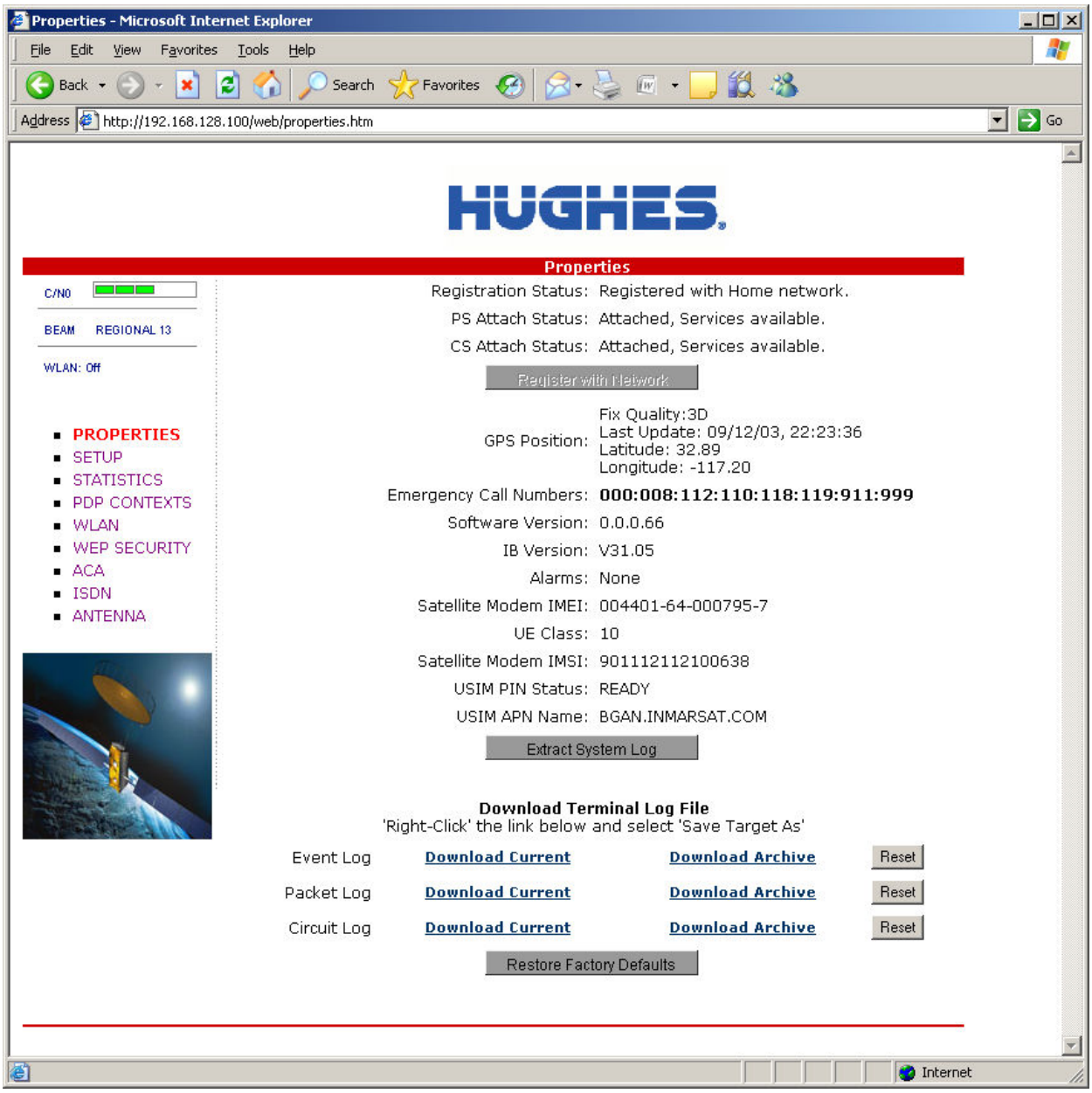
## COVERAGE MAP

The Inmarsat BGAN service is operated with 3 satellites as shown below. The Hughes 9400 Series terminals will perform best in areas where the elevation angle is 20 degrees or higher. Lower elevation angles increase the probability of signal outages caused by trees, buildings and hilly terrain and may severely impact the usability on the move.



## ACCESSING THE UT WEB MMI

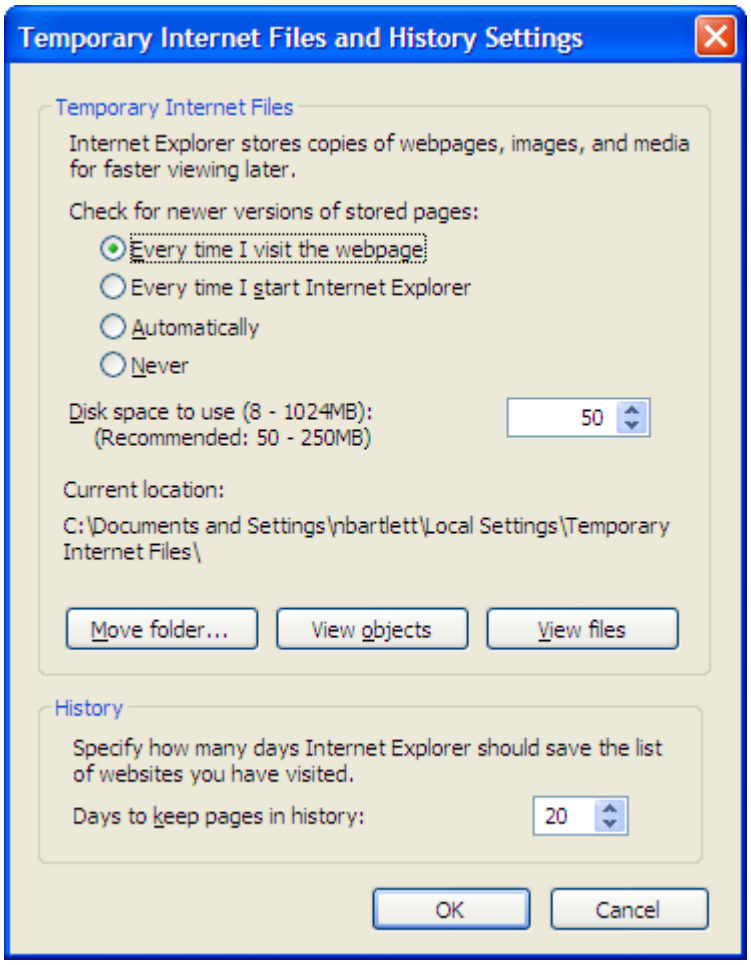
The Hughes UT includes its own internal Web MMI. To access the UT Web MMI, open your favorite Web Browser and type in the internal IP address of the UT e.g. http://192.168.128.100. The web MMI opens up to the "Properties" page as shown below:



To ensure the web pages update correctly with dynamic changes, set your browser to check for newer versions of stored pages on every visit to the page.

In Internet Explorer, this is configured in **Tools/Internet Options/Browsing History/Settings**.

In the Temporary Internet Files section select the "Every time I visit the webpage" option.



## PROPERTIES PAGE

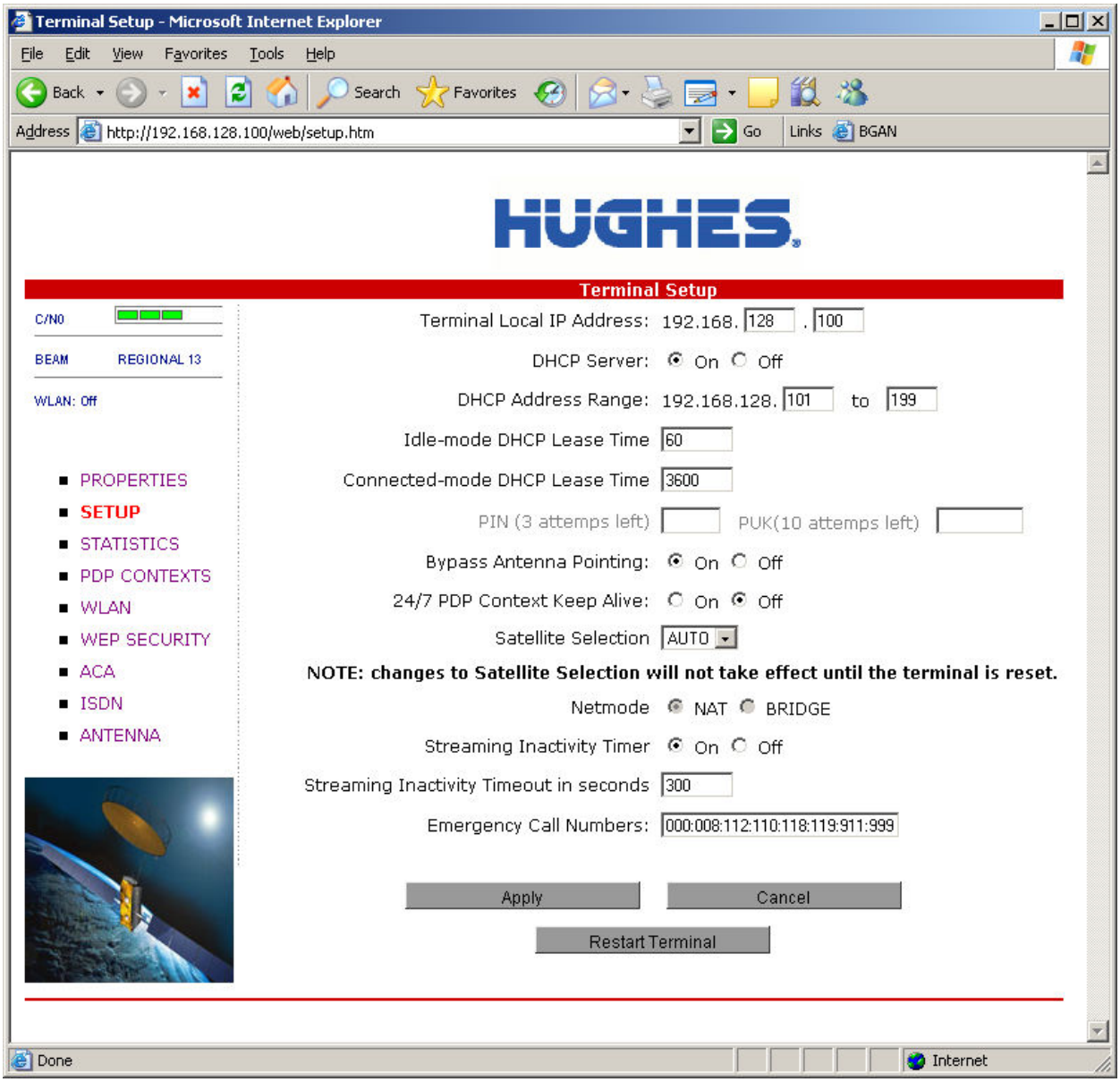
The Properties page shows the current status of the UT. A description of each item on the page follows:

In the Top left-hand corner of the screen there are Satellite Signal Strength and Beam ID indications. These items are updated automatically when the status of that item changes.

1. **Registration Status**: This field indicates whether you are Registered with the Network. Click on the "Register with Network" button. **Note:** For the 9400 Series, bypass antenna pointing is turned on as default so it will automatically register with the Network each time.
2. **PS Attach Status**: This field indicates whether you are PS (Packet Switch) attached with the Network. You will still need to setup a PDP context in order to send PS data.
3. **CS Attach Status**: This indicates whether you are CS (Circuit Switch) attached with the Network. Once you are CS Attached and Registered with the network, you are able to make CS calls.
4. **GPS Position:** 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.
5. **Emergency Call Numbers:** This field displays the Emergency call numbers that can be used with the UT.
6. **Software Version:** This displays the current version of software that is running on the UT. Core module.
7. **Alarms:** Any alarms, such as SIM not installed or no antenna connected are displayed.
8. **Satellite Modem IMEI:** This displays the IMEI number of the UT.
9. **UE Class:** this indicates the UT Class, such as class 10 for high gain land mobile
10. **Satellite Modem IMSI**: This displays the IMSI number of the USIM card in the UT. If is 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 PIN must be entered.
11. **USIM PIN Status**: This field indicates whether the USIM is ready or the PIN has to be entered. If the PIN needs to be entered, go to the SETUP page.
12. **USIM APN Name:** This displays the default APN that has been provisioned on the USIM card. Note that some USIM cards may have multiple APN's provisioned on them.
13. **Extract System Log:** Clicking this button allows the User to automatically extract a UT system log and save the file to a location on the TE for debugging purposes. This file can be e-mailed to Hughes directly for fault analysis if the User experiences any problems.
14. **Download Terminal Log File;** this allows you to extract and save different log files.
15. **Restore factory Defaults:** Clicking this button will restore the UT back to factory defaults and delete any of the User parameters that have been set-up in the UT. Hughes highly recommends that the User exhaust all possible debug procedures before using this feature.

## SETUP PAGE

The Setup page allows the User to configure various parameters of the UT. A description of each item on the page follows:




1. **Terminal Local IP Address**: This allows the User to change the local IP address of the terminal from the default 192.168.128.100 IP address. Only the last two 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 PDP Context page and ACA page will also be changed automatically. **Note:** Updates to this field will not take effect until the UT is rebooted.
2. **DHCP Server**: allows the DHCP server in the UT to be turned on or off
3. **DHCP Address Range:** This allows the User to set the range of DHCP addresses that are given out by the UT to any connected TE.
4. **Idle-mode DHCP Lease Time:** 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 a problem with some models of Cisco routers that will not accept a short DHCP lease time. **Note:** 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 PDP context.

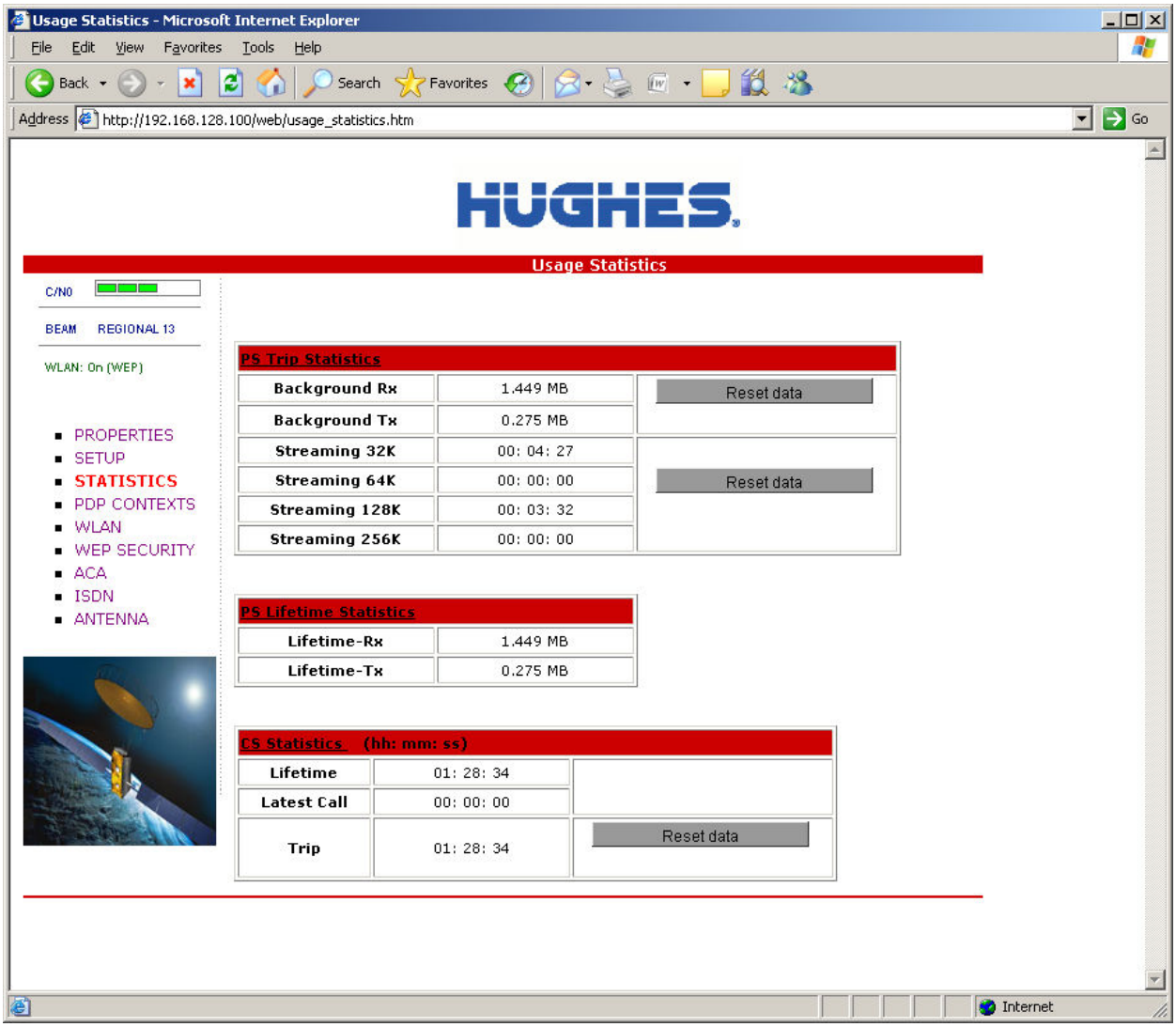
5. **Connected-mode DHCP Lease Time:** The Connected-mode DHCP Lease Time refers to the DHCP lease time when the UT is connected to the network. Most Users will have no need to change this parameter.
6. **PIN and PUK**: The PIN and PUK fields indicate whether the PIN or PUK needs to be entered to unlock the terminal. When grayed out they indicate the PIN is not required or is already satisfied.
7. **Bypass Antenna Pointing:** This parameter allows the User to bypass antenna pointing and have the UT go straight into Registering with the Network. This is turned "on" as default for the 9400 Series.
8. **24/7 PDP Keep Alive:** This is setting is for keeping a PDP context alive indefinitely. **Note:** This parameter should not be checked unless you have a need to keep the PDP context alive for critical information. This is not a good use of satellite resources.
9. **Satellite Selection:** This parameter is used within a satellite overlap region and allows the user to override the default satellite (selected based upon elevation angle/GPS location) and select a different satellite. **Note:** This change does not take effect until the UT is reset. When set to AUTO the UT will select the satellite based on the unit's GPS position. When set to a specific satellite it will attempt to use that satellite only. Be careful to select the correct satellite for your position.
10. **Net mode**: This option is grayed out and is set to NAT mode.
11. **Streaming Inactivity Timer:** This allows the user to turn on a timer for inactivity for a Streaming QoS that has been setup. The timer is in seconds and will tear down a streaming context after **X** seconds of inactivity.
12. **Emergency Call Numbers:** Allows the User to add the emergency call number that is applicable in the part of the world where the terminal is being used, if it is not already defined.
13. **Apply, Cancel, and Restart Terminal buttons**: These buttons are self explanatory.

## STATISTICS

This web page provides an estimate of the amount of Packet Switched data sent and received, along with time spent on a CS call. The data is broken up into two types:

**Trip:** The trip counter is similar to the trip counter on your vehicle. It can be zeroed out at anytime by the user and it will track the statistics until the User resets it.

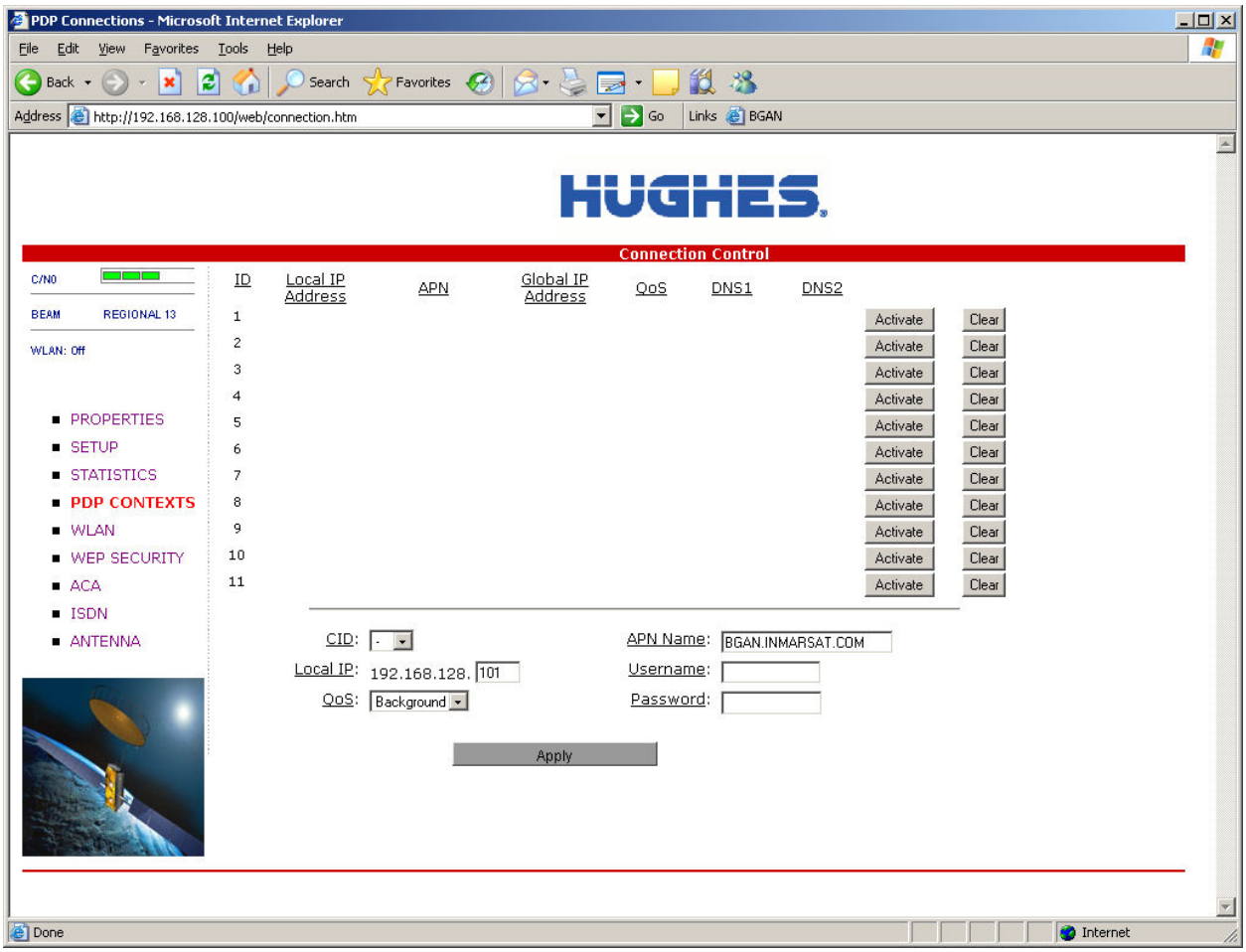
**Lifetime:** The Lifetime counter is similar to the odometer on your vehicle. It shows the statistics of the terminal since the software version that added this feature was loaded onto the UT. The User **cannot** reset these counters.




**Note:** 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 maybe inaccurate.

## PDP CONTEXTS

The PDP Context page allows the User to setup and configure PDP contexts for any TE that is connected to the UT. To activate a PDP Context, go to the bottom of the page. You will see the CID, Local IP Address, APN, Requested QoS, Username and Password fields.



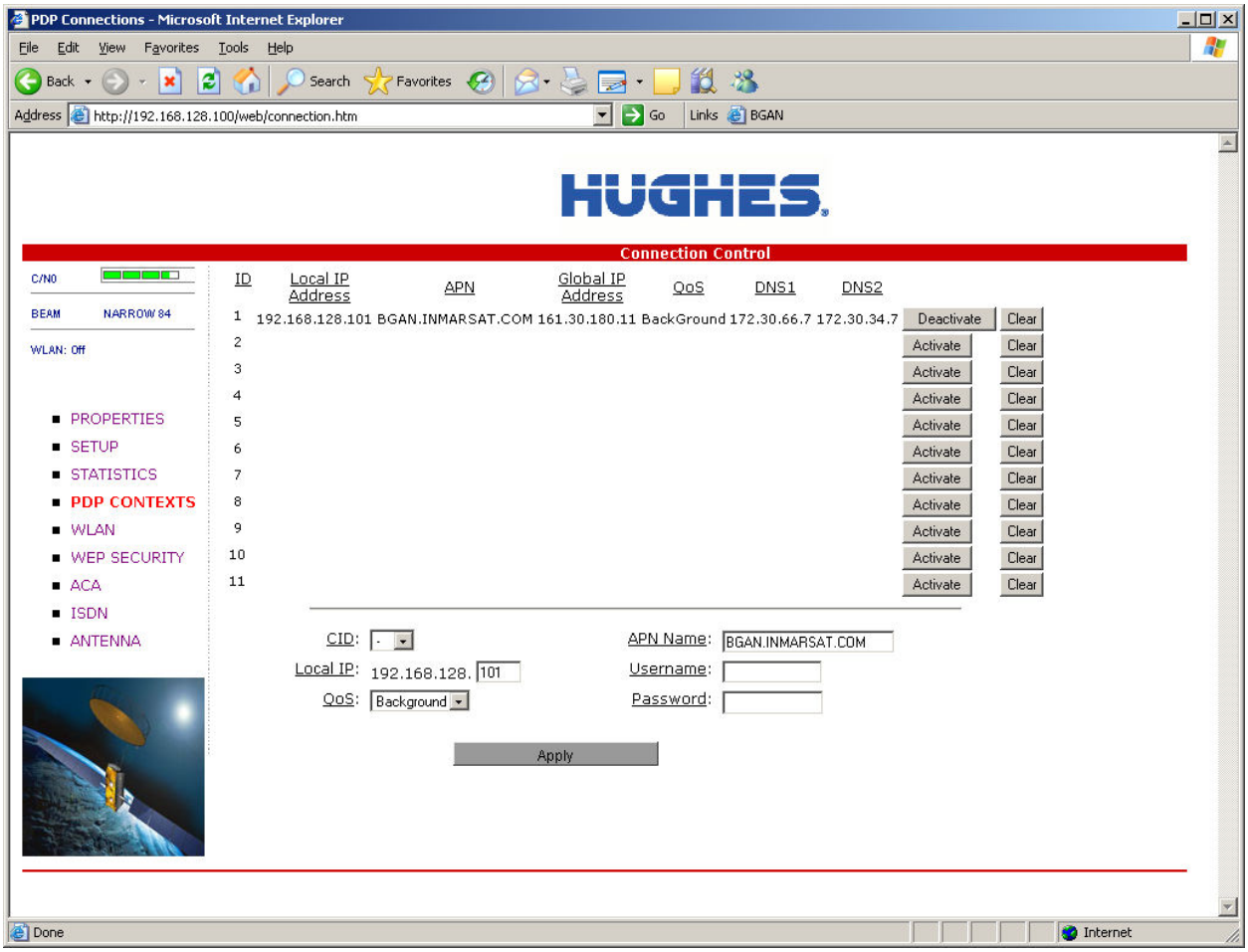

1. **CID:** The CID of each context is automatic by default. If for some reason the User wants to assign a particular context to a specific CID, use the drop down arrow and select the wanted CID number. Most users will **not** need to change this field from the automatic default setting.
2. **Local IP Address:** This is the local IP address of the TE that you want to setup a PDP context for. Note that the first three octets of the IP address will reflect any changes made in the setup screen to the UT local IP address. **NOTE:** The field will default to the IP address of your TE. You can change the IP address if you wish to configure a PDP context for another device.
3. **APN name:** This field is configurable, but it will always show the default APN that has been provisioned on the USIM. If you have a USIM that has been provisioned with multiple APN's, you can type in any of these secondary APN names as part of the PDP context setup.
4. **Requested QoS:** The drop down list shows all of the different QoS types: background, streaming 32K, streaming 64K, streaming 128K, and streaming 256K. Select the appropriate QoS required for the PDP context that you are setting up. Note: Maximum QoS rate for C10 is 256K at elevation angles > 45 degrees; maximum QoS rate for C11 is 128K.

5. **Username (UN)/Password (PW):** Some Service Providers require a Username and Password to be used when setting up a PDP context. This is often required when using Static Global IP addresses assigned by the Service provider.

**Activating a PDP Context**:

To activate a PDP context, perform the following instructions:

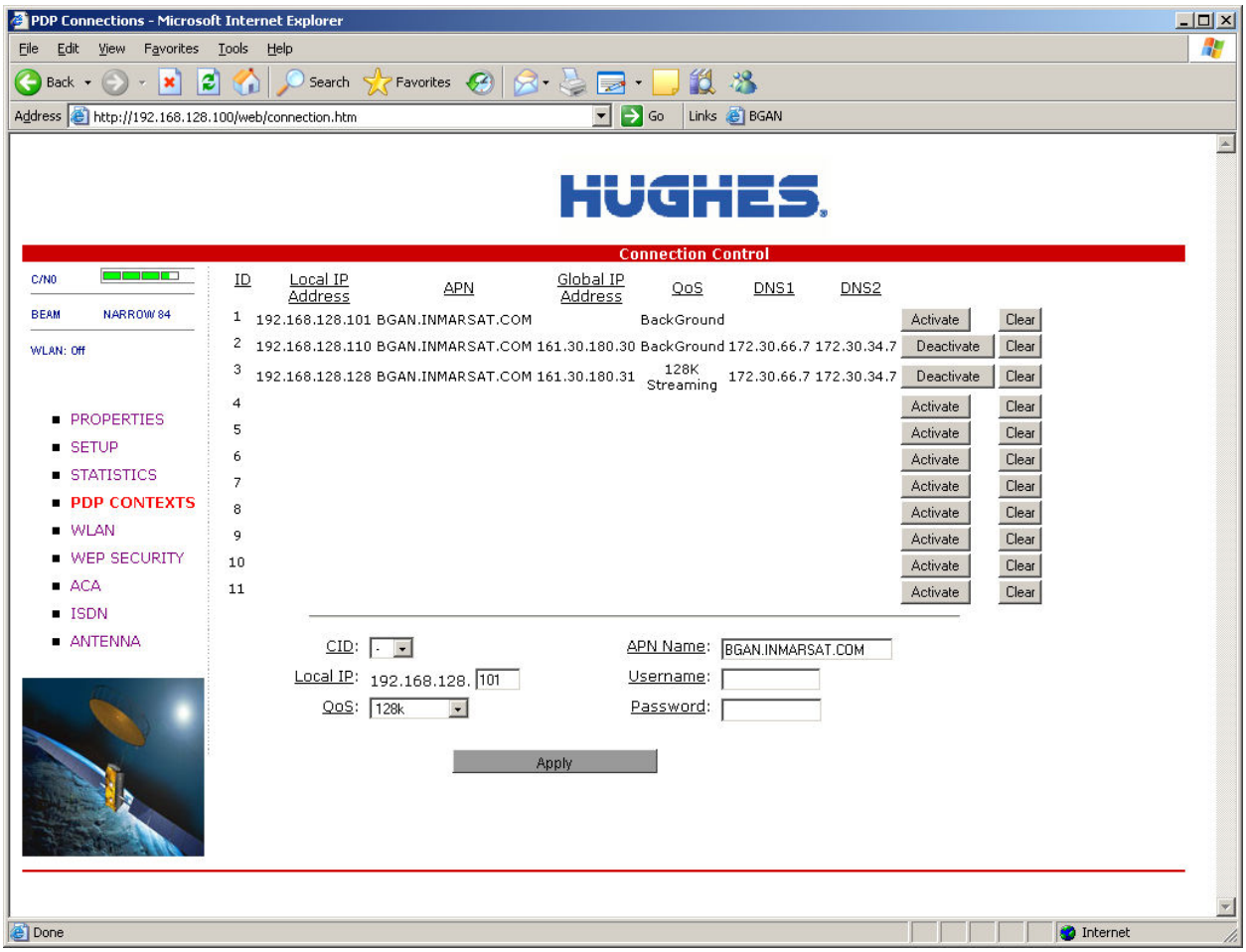
- Do not modify the CID field unless you need to setup a specific ID for one of your devices. Leaving it blank will allow the software to automatically choose the next CID that is available.
- Leave the IP address field unchanged unless you need to setup a connection for another TE.
- The APN is read from the USIM card and is usually not changed unless you have more than one APN provisioned on the USIM card.
- Next, select the QoS that is needed by selecting it from the drop down list.
- If your Service Provider requires a UN and PW, enter it in the Username and Password boxes, then click on "Apply".
- The new connection will show up in the table above (See screen shot below for example).




**Background Context activated for 192.168.128.101**

Once the context has been setup, whether it is successful or not, the context field will always be populated until you click on the "Clear" box. This allows you to retry/reactive the existing context parameters (See CID #1 below).

You can tell if a context is active by looking to see if the Global IP Address and DNS fields are populated. If they are populated, the context is active.




**CID #1 Inactive; CID #2 & 3 active**

### Activating Multiple PDP Contexts

To activate multiple PDP contexts for additional TE devices, follow the same procedures above. Each time you activate a context for a particular local IP address, it will show up in the table as shown in the screenshot above.

### Deactivating PDP Contexts

To deactivate a PDP context press the deactivate or clear button. The deactivate button will leave the definition of the context so it can be reactivated with the activate button. The clear button will both deactivate and delete the context.

## ACA

This web page allows you to use Automatic Context Activation (ACA) in **two** different ways; using static IP addresses in the TE device you can establish an automatic PDP context with any QoS that is offered by the network (upper half of the web page)or using DHCP from the UT, you can establish an automatic background PDP context for any TE that connects to the UT (lower part of the web page).

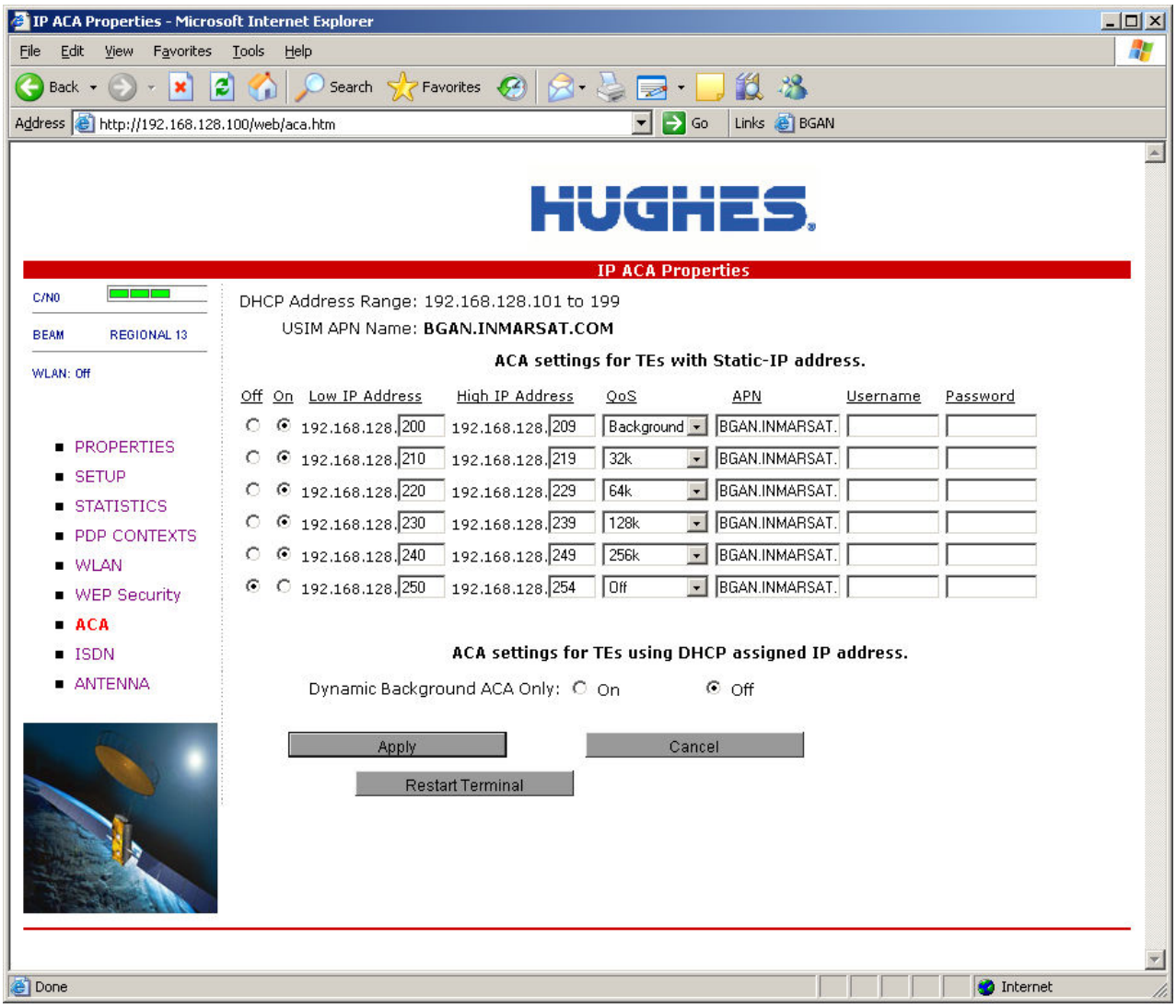
**ACA settings for TEs with Static IP address**:

You can setup your own range of static IP addresses for setting up an automatic PDP context with any of the QoS's offered by the network.

To turn on a particular range of addresses, select the "On" radio button and choose a range of addresses, low and high to use (e.g. 192.168.128.200 to 192.168.128.205) or leave the defaults.

Next select the desired QoS for that range of IP addresses (e.g. 32K streaming). The APN listed is the default APN read from the USIM card (bgan.inmarsat.com). If your USIM is provisioned for more than one APN, then you can type a secondary APN in this field.

If your Service Provider requires a username and password, enter them in the next two fields.

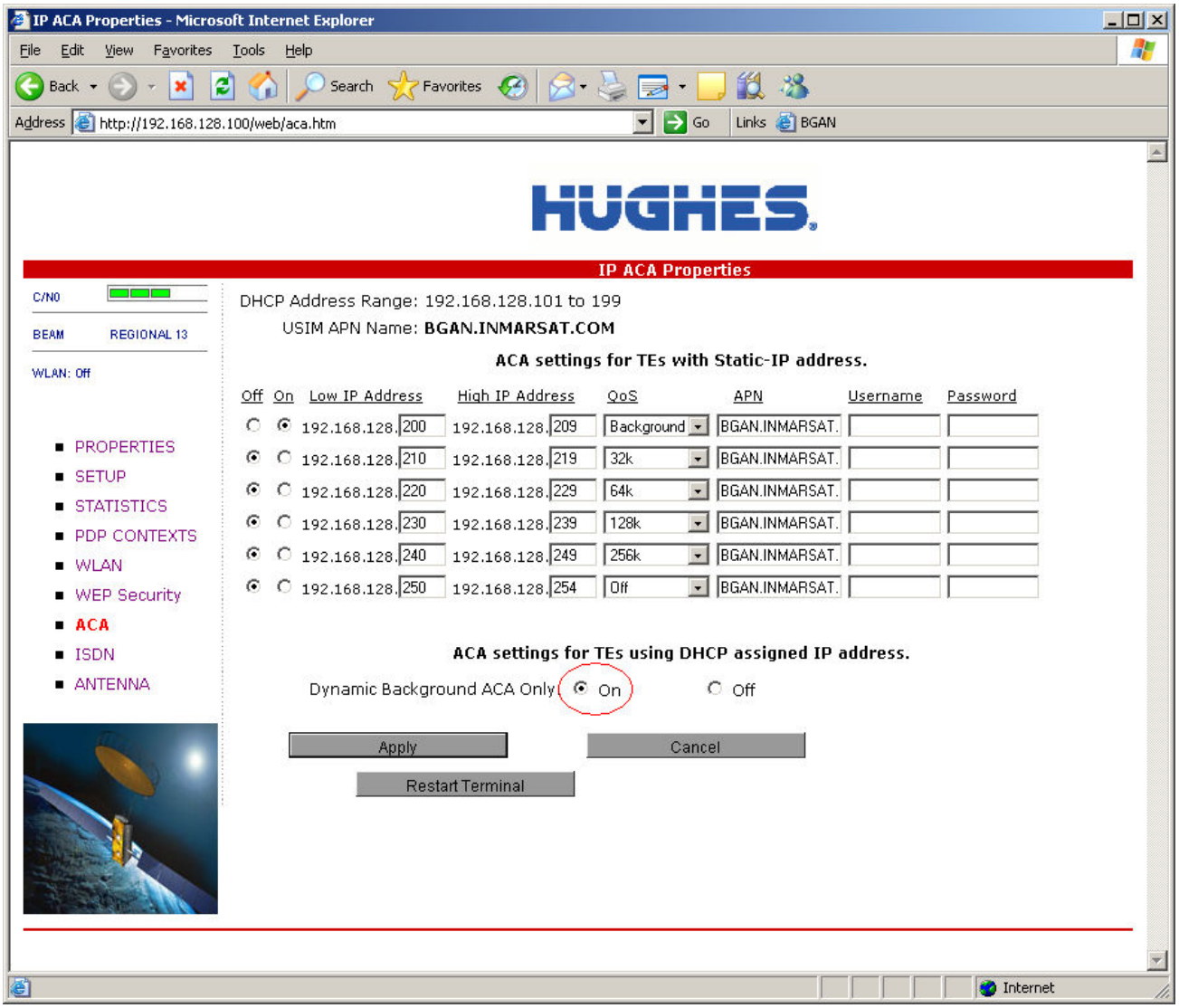


If you want to setup additional ranges of addresses, please follow the same instructions as above. **Note:** You cannot overlap the IP address ranges. If you do, an error will pop-up telling you that you have an overlap region. Check all of the ranges for overlaps and try again.

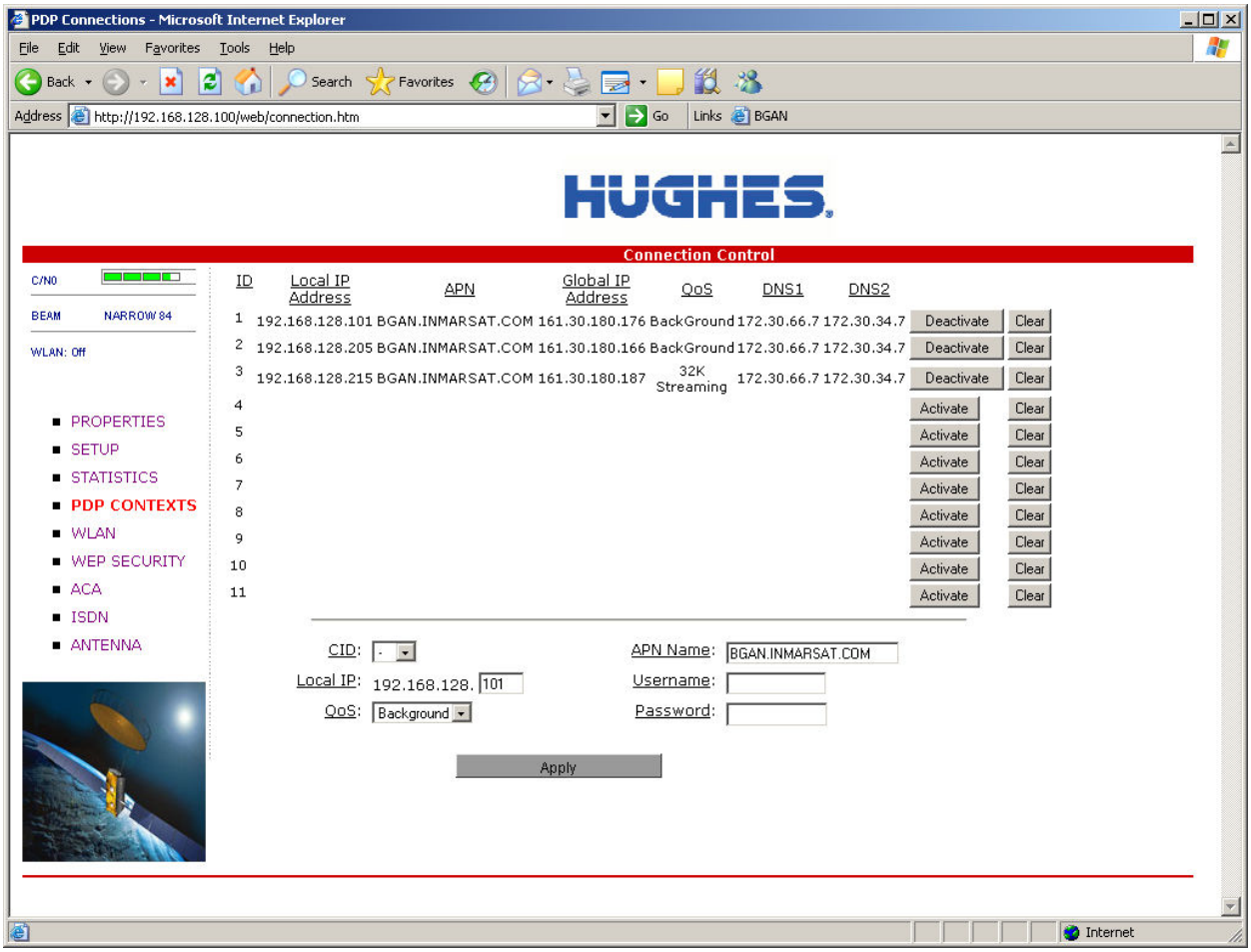
When you are finished, click on "Apply" and you should see a message saying "Operation Successful".

**ACA settings for TEs using DHCP assigned IP address:** This option allows you to set up the UT for dynamic background ACA. This means that any device connected to the UT, will automatically receive a background PDP context.

To activate this feature, select the "On" radio button under ACA settings for TEs using DHCP assigned IP address and click on "Apply".

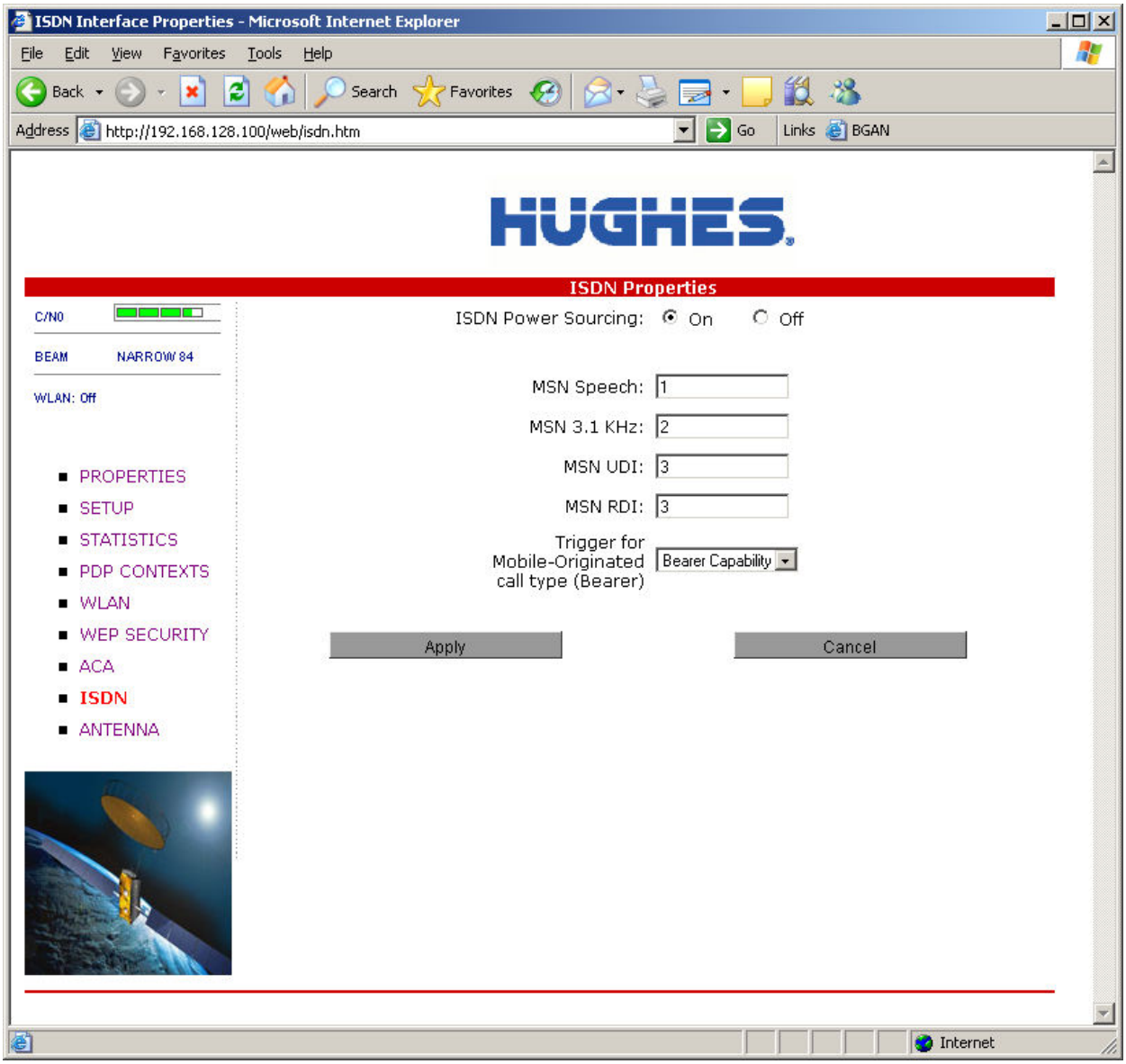


To see if the context has been setup properly, click on PDP Contexts page and this will show you all contexts that have been setup (active or inactive). See screen shot below.



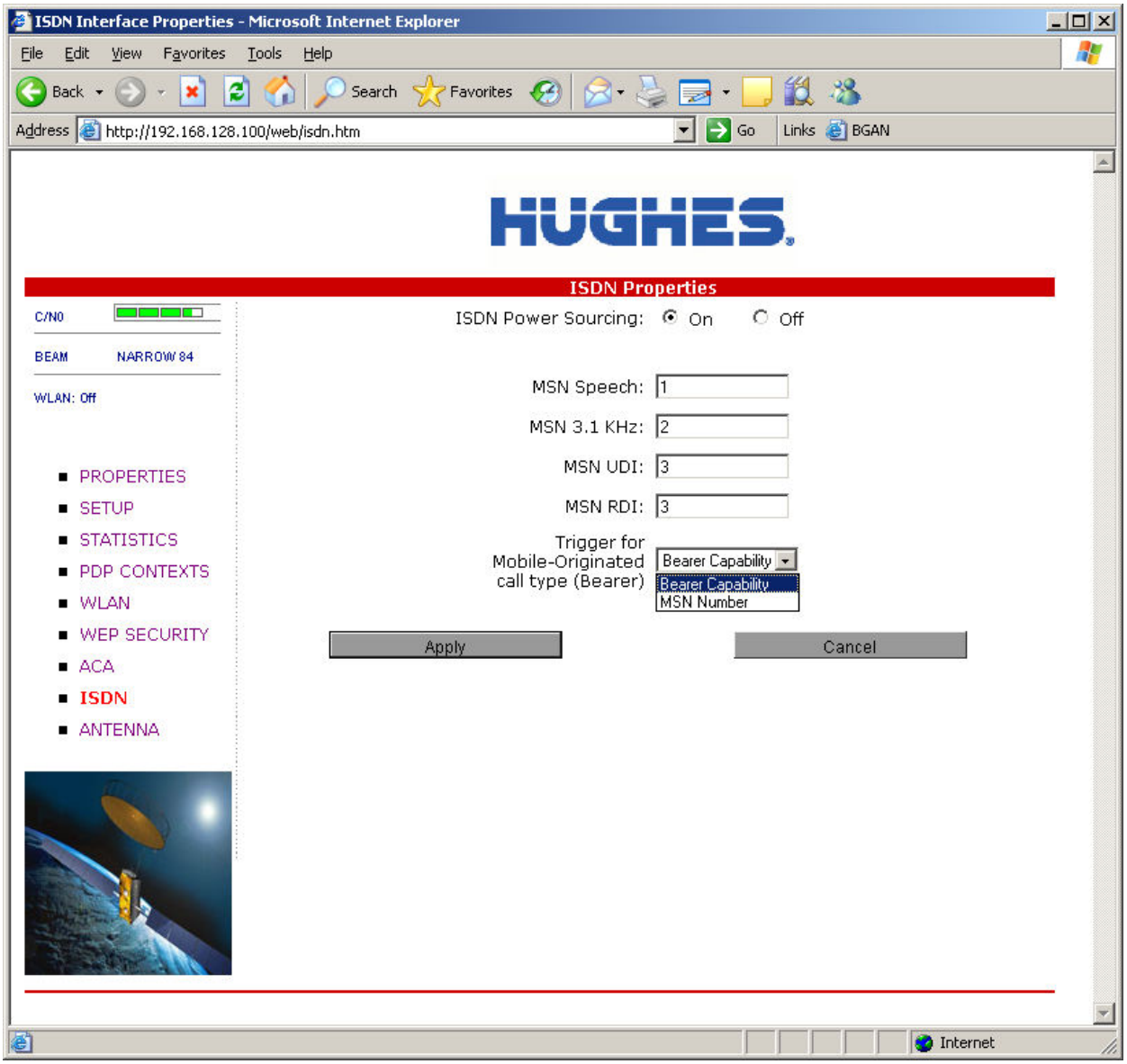
## ISDN

You can establish ISDN data communication by connecting your ISDN equipment directly to the BGAN Terminal's ISDN port with the supplied ISDN cable (which is the same as the Ethernet cable). This web page allows you to activate 40V power sourcing on the ISDN interface, and set MSN numbering options.




1. **ISDN Power Sourcing:** To turn on the ISDN power sourcing click on the "On" radio button. The ISDN device should receive 40V power immediately via the ISDN cable. This field should be on unless you never use ISDN or are using an ISDN device that has its own power source.
2. **MSN Speech:** By default, MSN 1 is entered into the MSN Speech number text box. To receive incoming calls, you must program the same MSN into your ISDN handset connected to the ISDN port.
3. **MSN 3.1 KHz audio:** By default, MSN 2 is entered into the MSN 3.1 KHz Audio number text box. To receive incoming calls, you must program the same MSN into your ISDN fax machine connected to the ISDN port.
4. **MSN UDI (Unrestricted Digital Information):** By default, MSN 3 is entered into the MSN UDI text box. UDI is a 64 Kbps service that is a European standard ISDN.

5. **MSN RDI (Restricted Digital Information):** By default, MSN 3 is entered into the MSN RDI text box. RDI is a 56 Kbps service found in the USA.
6. **Trigger for Mobile-Originated call type (Bearer):** This box controls the mechanism used by the terminal to select the bearer type for mobile originated calls. By default, "Bearer capability" is set as the trigger in this text box. There is also an option under the drop down arrow to set the trigger to use the MSN rather than the bearer. Most ISDN devices correctly signal the call type (speech, 3.1KHz audio, UDI, RDI) via the bearer capability. If there is a problem, this field can be changed to use the MSN number instead.




Once all changes have been made, click on "Apply".

**Note:** You can use different MSNs for any of the ISDN call types above, but your ISDN equipment must be programmed with the same MSN to accept incoming calls, and you must use different numbers for speech, audio and UDI/RDI calls.

## ANTENNA

This web page allows you to monitor the status of the antenna. **Note:** This page does not automatically update and must be refreshed to poll for the latest status.

**ATB State:** This field indicates the detailed state of the antenna tracking board and indicates whether the antenna is tracking or searching for the satellite

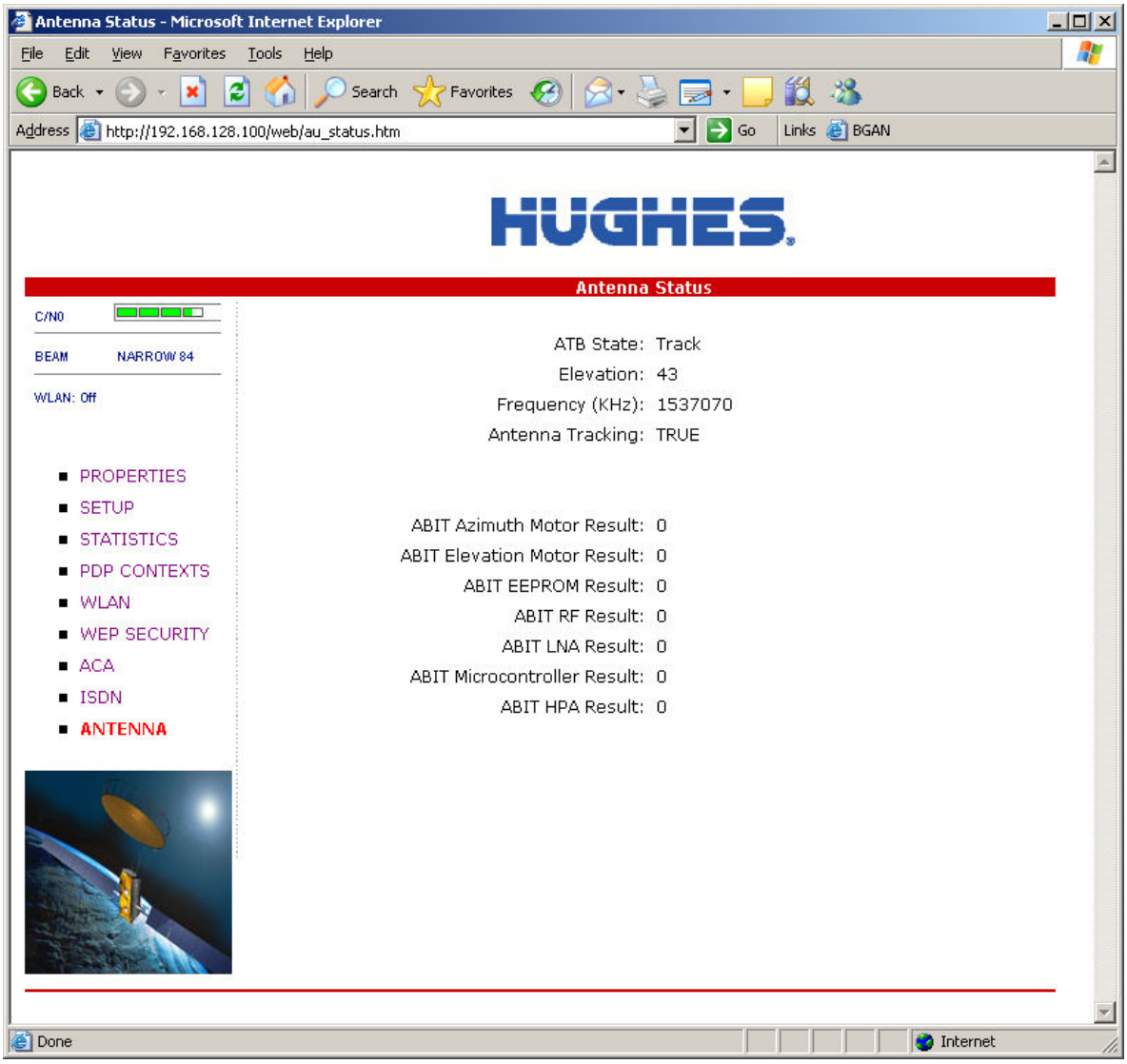
**Elevation:** the current elevation angle of the antenna

**Frequency (KHz):** the frequency of the global beam in kHz that the antenna will attempt to track. If the unit is experiencing problems, use the table below to verify the antenna is searching for the correct satellite for your location

**Antenna Tracking:** indicates (TRUE or FALSE) whether or not the antenna is currently tracking the satellite

**ABIT results**: these fields indicate if any errors are found in the antenna during startup self test:

- 0 indicates no error
- 255 indicates the test has not yet been run
- Any other value indicates a problem. If the same code is seen repeatedly, contact your service provider



Additional Information on the various antenna parameters (ATB states) are shown below:

| # | State name | State Description |
|---|---|---|
| 0 | INIT_ST | Initial state |
| 1 | IDLE_ST | Wait on a frequency from the TU |
| 2 | AZ_SEEK1_ST | Determine min/max signal levels in a full sky scan |
| 3 | AZ_SEEK2_ST | Find azimuth direction |
| 4 | AZ_SEEK_ELEVATION_ST | Determine min/max signal levels on a single elevation |
| 5 | TR_TUNE_EL_ST | Track and tune elevation state |
| 6 | TR_TUNE_PLL_ST | Track and tune PLL state |
| 7 | TRACK_ST | Track state |
| 8 | BLOCK_ST | Blocked state |
| 9 | FREEZE_ST | Antenna has stopped all motors |
| 10 | 0x0A) TEST_ST | Test state |

The field at the bottom of the page is true/false indicating whether the antenna is tracking (i.e. in states 5, 6 or 7).

The frequency is the frequency of the global beam. Possible values are the primary and secondary frequencies of the 3 satellites.

| Satellite ID | Satellite Longitude | Primary Freq kHz | Alternate Freq kHz |
|---|---|---|---|
| I4-F1 APAC | 143.5 E | 1537485 | 1540825 |
| I4-F2 EMEA | 25.0 E | 1537920 | 1541115 |
| I4-F3 AMER | 98.0 W | 1537070 | 1540730 |

## ACCESSING THE UT MOBILE WEB MMI

The UT includes special versions of the web pages formatted for mobile devices with small screens such as PDAs, Blackberries and iPhones. The UT queries the connecting device screen resolution to determine whether to load the normal or the mobile version of the web pages. The pages contain the same information and most operate the same way as the regular pages.

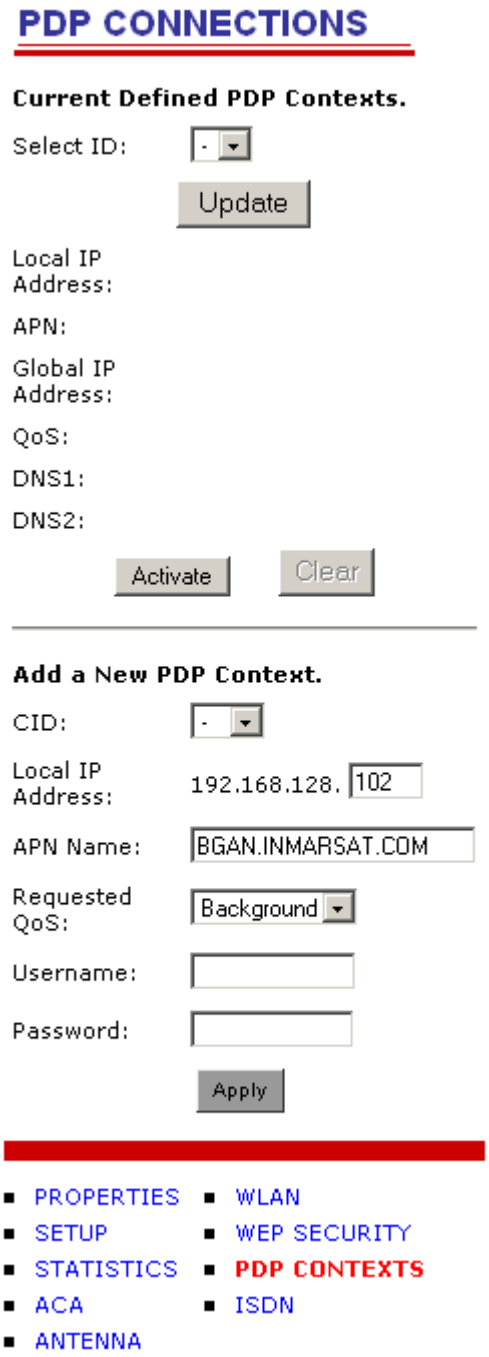
Note that mobile devices may not include Java and so the Java Applet with C/N0, etc is typically not displayed.

## Mobile Web - PDP Contexts

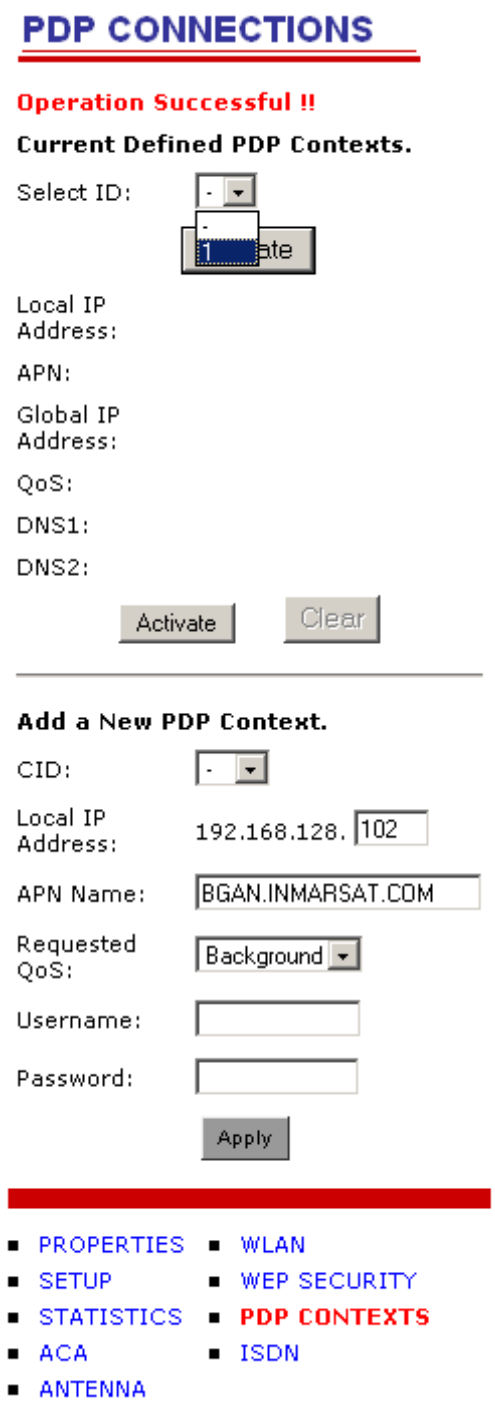
There is insufficient room to display all the PDP Contexts on one page in the mobile web version.

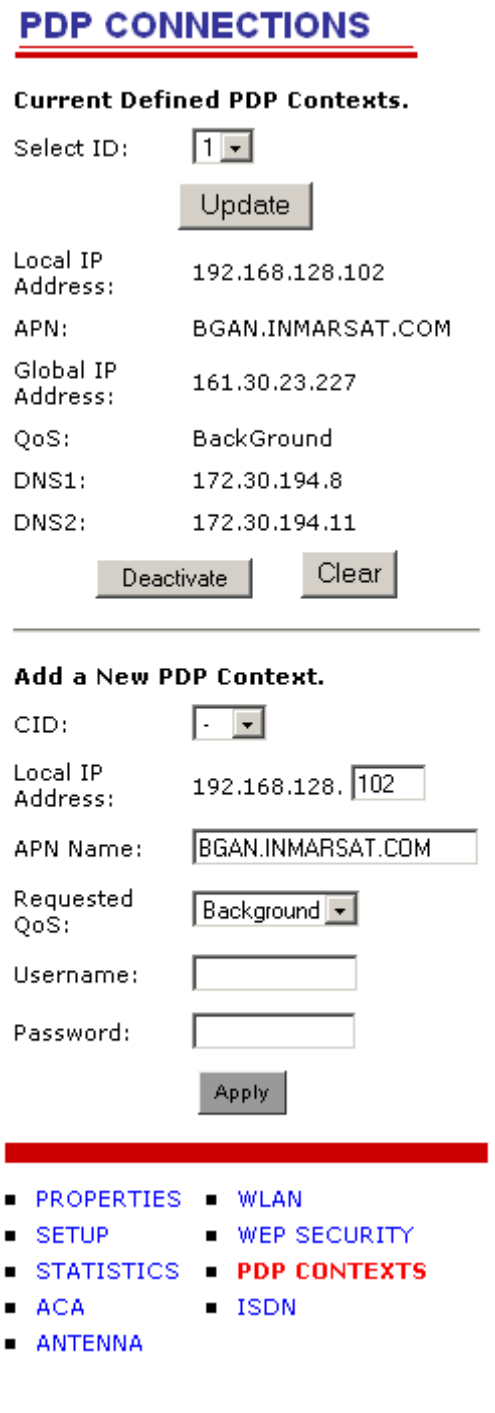
PDP contexts are created in the usual way from the "Add a New PDP Context" section of the screen.

The IP address of your device automatically appears in the Local IP Address field.



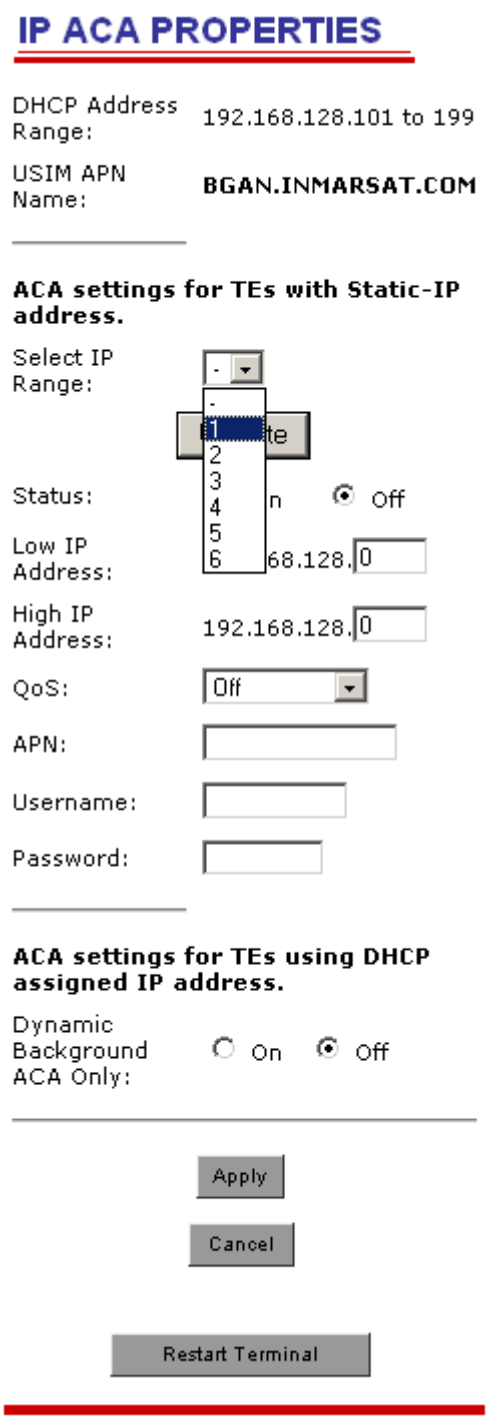
To display a defined context, select it from the "Select Id" field and then press update.



## MOBILE WEB – ACA PAGE

There is insufficient room to display all the ACA IP address ranges on the mobile version of the ACA page. To configure IP address ranges for different ACA QoS, select the required IP range and then press Update.



# TROUBLE SHOOTING

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| Terminal will not turn on | Power switch not on<br><br>No ignition sense | Check the power switch is in the ON position.<br>Check positive voltage is applied to the ignition sense pin of the power connector |
| Cannot insert USIM card holder into terminal | USIM is not correctly seated in the SIM slot<br>SIM incorrectly oriented | Ensure the USIM is pressed firmly into the SIM slot<br>Ensure the SIM is oriented as shown in the Install Guide |
| The BGAN LaunchPad or web MMI will not connect to the terminal | No interface connection between the terminal and computer<br><br>Your computer is configured with a static IP address in the wrong subnet. | Ensure there is a WLAN or Ethernet connection between the terminal and computer, see **User Guide**<br>Check the IP configuration settings on your computer. Enable DHCP or use a static IP address in the same subnet as the UT |
| Terminal will not accept incoming ISDN calls | The MSN programmed into the ISDN device does not match the MSN programmed into the terminal | Ensure the appropriate MSN is programmed into the ISDN device, see ISDN Section of **User Guide**<br>Ensure the appropriate MSN is programmed into the terminal, see ISDN Section of **User Guide** |

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| Terminal will not make outgoing ISDN calls | ISDN power sourcing is turned off<br><br>Terminal is not Registered with the Network. | Enable the ISDN power sourcing from the BGAN LaunchPad or ISDN web MMI page (unless the ISDN device has a separate power source).<br>Check the Properties page in web MMI to make sure the unit is CS attached. |
| Terminal is connected to the BGAN network, but cannot obtain the requested Quality of Service | Network temporarily not available<br><br>User tried to set up a 256 Kbps streaming connection. | Retry again. If problem persists, contact your service provider.<br>The Inmarsat Network only supports 256K for Class 10 >45 degree look angle and 128K connections for Class 11 UT's |
| Terminal does not obtain a GPS fix | Terminal's location limits visibility of 4 or more GPS satellites. | Move the vehicle / terminal to a location where there are few obstructions such as trees or tall buildings, so that as much as possible of the sky is visible. |
| ISDN device does not operate correctly | The ISDN device is trying to draw too much power from the satellite terminal's ISDN interface<br><br>The device you are connecting is not an ISDN device. It might be an Ethernet device that you are accidentally connecting to the ISDN port. | Only connect an ISDN device that draws less than 70mA of current at 40V (equivalent power 2.8W)<br><br>Make sure you connect only ISDN devices to the ISDN port |
| 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. |

## GPS

The Global Positioning System (GPS) uses 24 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 in to the Tracking Antenna, 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 is able to 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 will 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 as long as 15 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.

Following successful registration and providing the Terminal is left switched on and remains stationary, the GPS is no longer needed. Periodically, the BGAN Terminal contacts the BGAN network to inform the network that it is still switched on. In addition, the BGAN network periodically checks each Terminal for activity, and if the Terminal has not automatically contacted the BGAN network as described above, then the Terminal will be de-registered from the network.

# ISDN

The Satellite Terminal provides an ISDN (Integrated Services Digital Network) interface to connect devices for Circuit Switched voice and data services. It is a Basic Rate (also known as 2B+D) interface and uses the Euro ISDN protocol. Note that the Satellite Terminal can only provide service for one 64Kbps B-channel at a time.

### DIALING AND NUMBERING

#### DIALING

As the ISDN numbering system follows the same pattern as the normal telephone system, dialing is carried out in exactly the same manner as making a normal telephone call. The subscriber number is used with the same international and area codes as any other telephone network. Start the dialed number with 00 and terminate it with a #.

#### MULTI-SUBSCRIBER NUMBERING (MSN)

ISDN supports Multi-Subscriber Numbering (MSN). MSN is a facility whereby more than one telephone number can be allocated to an ISDN line. The BGAN Satellite Terminal assigns different MSNs for Voice, 3.1KHz Audio, UDI and RDI devices. Each incoming call will be directed to the appropriate MSN depending on the type of call. This allows proper routing of incoming calls to the correct ISDN device (e.g. ISDN phone, data card or Fax).

# 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.

In order 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. The procedure for this is as follows:

1. After registration with the network, the user activates a PDP Context using an application on the computer or Terminal, and requests sufficient radio resources (that is, power and bandwidth) to support the context activation procedure.

2. Once the resources are allocated, the Terminal sends the Activate PDP Context request to the Core Network. This request includes key information about the mobile user's PDP address (for example an IP address), PDP type (that is, static or dynamic address) the QoS requested for this context, the APN of the external network to which connectivity is requested, the user's identity (IMSI) and any necessary IP configuration parameters (for example, security settings).

3. On receiving the Activate PDP Context message, the Core Network checks the user's subscription record to establish whether the request is valid. If the request is valid, a virtual connection is established between the Terminal and the Core Network, and data transfer can then take place between the Terminal and the external data network, within the scope of the current PDP Context. The PDP Context is stored in both the Terminal and the Core Network.

A single Terminal may have multiple PDP Contexts each with different QoS profiles. The primary PDP Context is a PDP Context with default QoS profile attributes and is always activated first. All other PDP Contexts with the same PDP Address are secondary PDP Contexts. Secondary PDP Contexts share the same PDP Address and connect to the same APN but may have different QoS profiles.

# TECHNICAL SPECIFICATIONS

| | Terminal | Antenna |
|---|---|---|
| Weight C10 | 2.2 Kg | 5.5 Kg |
| Weight C11 | 2.2 Kg | 2.0 Kg |
| C 10 Dimensions | 46mm x 269mm x 234mm | Ø477 mm x 153 mm |
| C11 Dimensions | 46mm x 269mm x 234mm | Ø252mm x 119mm |
| Humidity | 95% RH at +40˚C | 95% RH at +40° C |
| Temperature | -25˚C to +55˚C operating<br>-25˚C to +80˚C storage | -25° C to +55° C operating<br>-25° C to +80° C survival |
| Water & Dust | | IP-56 standard |
| Wind | N/A | 125 mph (200 km/h)<br><br>Exception for Magnetic Mount:<br>100 mph (160 km/h) |
| ICE | N/A | 25 mm non-operational |
| Vehicle Motions | N/A | Turning Rate: 40°/s<br>Turning acceleration 50°/s$^2$ |
| Power (terminal plus antenna) | *Idle: 20 W<br>Max: 150 W (when transmitting) | |

*__Note:__ This does not include power delivered to any PoE devices connected

# DECLARATION OF CONFORMITY

Hughes Network Systems, LLC, of 9605 Scranton Road, San Diego, CA, 92121, USA, declares under our sole responsibility that the product Hughes 9400 Series Satellite IP Terminal to which this declaration relates, is in conformity with the following standards and/or other normative documents:

ETSI EN 301 444, ETSI EN 300 328, ETSI EN 301 489-1, ETSI EN 301 489-17, ETSI EN 301 489-20, EN 62311, EN 60950-1.

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 R&TTE Directive 1999/5/EC.

The conformity assessment procedure referred to in Article 10 and detailed in Annex [III] or [IV] of Directive 1999/5/EC has been followed with the involvement of the following Notified Body(ies):

Nemko AS, Gaustadalleen 30, P.O. Box 73, Blindern, N-0314 Oslo, Norway

Identification mark: **0470** (Notified Body number).

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

- Hughes Network Systems, LLC, 9605 Scranton Road, San Diego, CA, 92121, USA
- Signed by Nigel Bartlett (Senior Technical Director, September, 2009) and Bill Lindsay (Senior Program Manager, September, 2009)

| | |
|---|---|
| ☑ **Note** | The Ethernet cable used with the Hughes 9400 Series shall not be longer than 3 meters to comply with ETSI emissions requirements. |

## 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 a minimum separation distance of 20 cm or more from a person's body. 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 (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT) DIRECTIVES

The European Union (EU) directive on waste electrical and electronic equipment mandates 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 will be 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**.

# 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. You may want to configure further APN's if you have arranged with your Service Provider to use more than one SIM Card.

**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, so 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.

**Dynamic DNS Server**: If you are using dynamic IP addressing, Inmarsat recommends that you use a dynamic DNS server. A dynamic DNS server updates the IP address information in the DNS database each time your IP address changes. A dynamic DNS server also enables a computer using a dynamic IP address to use network applications that normally require a static IP address, for example FTP servers. This service requires subscription with a Dynamic DNS provider.

**Static DNS Server**: If you are using static IP addressing, Inmarsat recommends that you use a static DNS server. If you select this option, you must enter the IP address of the Primary DNS Server. This is supplied by your Internet Service Provider. Optionally, you can enter the IP address of a Secondary DNS Server, also supplied by your ISP. This is used in the event of failure of the Primary DNS Server.

**Error correction**: Error correction ensures that very little data is lost during transfer by asking for dropped packets to be resent. However, because it holds subsequent data whilst the packet is being resent, you may notice some jitter or delay in the received data. This is normal for most data types.

For real-time applications, such as Voice over IP (VoIP) or video, it is recommended that you remove error correction. Removing error correction minimizes delay and jitter..

**Ethernet:** Ethernet is a local area networking method used widely throughout the computer industry. It is one of the three 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 LaunchPad windows.

**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.

**Header Compression**: A header is the component of a data packet that precedes the data that you are sending. The header contains information such as source and destination address, error checking and other administrative details. In most data types this does not noticeably

affect the data transmission rates. However in multimedia applications such as voice and video, the header can significantly affect performance.

**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. If you do not need a permanent Static IP address, most Service Providers use a dynamic IP address. Some Service Providers provide a private Network IP address not routable within the Internet) and others provide a routable public IP address.

**Static IP Address**: A static IP address is assigned by Service Providers to BGAN Users when the USIM 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 MMI and talk to the UT via Telnet. This address is configurable by the User.

**Power-over-Ethernet (POE):** Device that allows one to transmit power to a security power through an Ethernet network cable.

**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 is charged by time. You are charged for the amount of time the connection is active. Streaming enables multimedia data, such as video, to be sent in a continuous data stream and converted into sound and pictures. The bandwidth required for a streaming connection is difficult to predict, and depends on factors such as length of connection and number of receivers.

**Symmetrical Rate**: The rate at which streaming data is transmitted, in kilobits per second (Kbps). This rate applies to transmitted (uplink) and received (downlink) data.

**Desired Symmetrical Rate**: From the drop-down list, choose the desired data rate for your Streaming connection. This can be 32 Kbps, 64 Kbps, 128 Kbps or 256 Kbps. This figure is guaranteed, unless the connection cannot meet this requirement because of bandwidth restrictions. In this case the rate defaults to the minimum symmetrical rate.

**Minimum Symmetrical Rate**: From the drop-down list, choose the minimum data rate that you are prepared to accept for your Streaming connection. This can be 32 Kbps, 64 Kbps, 128 Kbps or 256 Kbps. This rate must be lower than the Desired Symmetrical Rate. If the connection cannot meet this requirement, an error message displays.

**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 9400 Series.

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

The USIM 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 voice and data transmissions, making it extremely difficult to listen in on calls. The USIM 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.