# User Guide

# Thuraya IP+
# Satellite Modem

Revision C
3500799-0001

# SAFETY INFORMATION

For your safety and protection, read this entire user guide before you attempt to use the Thuraya IP+ satellite modem. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

## ▶▶ Warning Symbols Used in this Guide

This section introduces the various types of warnings used in this document to alert you to possible safety hazards.

**WARNING**

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

**WARNING**

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

**DANGER**

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

# ▶▶▌ WARNINGS FOR THURAYA IP+

**Do not stand in front of the antenna**

This device emits RF energy when in the transmit mode. To avoid injury, do not place head or other body parts in front of the satellite antenna when the system is operational. Maintain a distance of one meter away from the front of the antenna.

**Properly ground the antenna**

Failure to properly ground the optional external antenna may result in severe personal injury or death. Do not attempt to ground the optional external antenna unless you have the skills to do so in accordance with local electrical codes.

**Do not operate during electrical storms**

Operation of Thuraya IP+ during electrical storms may result in severe personal injury or death. Disconnect Thuraya IP+ from the computer and store the unit indoors if lightning is anticipated in the area of operation.

**General**

Handle your Thuraya IP+ with care. The enclosure is weather- resistant per IEC 60529 IP55. However, do not submerge the unit or expose it to severe rainstorms. Avoid exposing your Thuraya IP+ to extreme hot or cold temperatures. The operating temperature range of Thuraya IP+ is -25º C to +55º C.

Avoid placing your Thuraya IP+ close to cigarettes, open flames, or any source of heat.

Changes or modifications to Thuraya IP+ not expressly approved by Hughes Network Systems could void your authority to operate this equipment.

Use a soft damp cloth only to clean your Thuraya IP+.

To avoid impaired modem performance, please ensure your terminal's antenna is not damaged or covered with foreign material like paint or labelling.

When inserting the SIM, do not bend the SIM 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 Thuraya IP+ 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 Thuraya IP+ while at a petrol filling station. Do not use near fuel or chemicals.

### Qualified service

Do not attempt to disassemble your Thuraya IP+. Thuraya IP+ does not contain consumer-serviceable components. Only qualified service personnel may install or repair equipment.

### Batteries and accessories

Use approved batteries (Hughes P/N 3500496 or P/N 3500800) and accessories only. Use of non-approved accessories may result in loss of performance, damage to Thuraya IP+, fire, electric shock or injury.

AC Mains power adapter (Hughes P/N 3500411) is for indoor use only. It has an indoor operating temperature range of -25° C to +55° C and provides an output voltage of 19 VDC.

The storage capability of the battery decreases when operated below 0° C.  If the battery is charged at too high a temperature, this will be indicated on the LCD display. See Page 50 for Battery Safety, Charging and Disposal information.

### Battery

To ensure safety, ensure that the battery is properly installed and latched at all times during operation. To install the battery, hook the battery tab in the rectangular opening in the battery compartment. Firmly press the battery onto the latch on the other side. The seal around the battery should snugly fit between the battery and the enclosure with no pinch points visible. A good seal is necessary to maintain the IP55 rating.

### Connecting devices

Never connect incompatible products. When connecting Thuraya IP+ to any other device, read the device's user guide 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 modem should seek the advice of their cardiologist. As a pacemaker user we suggest you follow these guidelines:

- Maintain a distance of 15 cm between Thuraya IP+ and your pacemaker;
- Maintain a distance of 1 meter away from the front of Thuraya IP+'s antenna;
- 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 Thuraya IP+ immediately!

**Hearing aids**

Most new models of hearing aids are immune to radio frequency interference from satellite modems 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 satellite modem. Should interference be experienced, maintain additional separation between you and Thuraya IP+.

# INFORMATION TO USER

This device conforms to current EU standards and directives. Please refer to the declaration of compliance on page 51.

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.

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

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

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

## Manufacturer Contact:

Hughes Network Systems
1171 Exploration Lane
Germantown, MD 20876
USA
+1 (301) 428-5500
www.hughes.com

# INTRODUCTION

Your Thuraya IP+ is a satellite modem that provides portable, high-speed data communications via satellite. Using "Always On" technology, you can remain connected to the Internet while only sending or receiving the data that you need at speeds of up to 444 kbps, just as if you were sitting at your office desk. Thuraya IP+ works with your computer using an Ethernet or Wi-Fi connection much like commercially available wireless routers. Note that the Wi-Fi Access Point in the Thuraya IP+ uses a separate subnet and DHCP server than the wired Ethernet port. An internal router allows IP traffic to flow seamlessly between the two subnets and out over the satellite link.

While Thuraya IP+ operates very similarly to other data modems that you may be familiar with, there are a few important operating differences to note. Please read this user guide carefully to understand all the aspects of operating your Thuraya IP+.

# FIRST TIME SETUP

This section guides you through the process of setting up and configuring your Thuraya IP+ for the first time. The steps presented should be followed in the order given. When you are finished, your computer and modem will both be set up and ready to use.

## ►►| Unpacking

Unpack the modem and accessory box items.

> Thuraya IP+ satellite modem
> AC mains power adapter (100–240 V AC)
> AC mains power cables (UK, EU, US, and AUS)
> Rechargeable lithium ion battery pack
> Ethernet cable (do not use cross-over cable)
> User guide (this document)

Your service provider will supply a Subscriber Identification Module (SIM).

# ▶▶ Software Installation and Configuration

Your PC must support an Ethernet or Wireless LAN interface to operate with the Thuraya IP+.

> ➡ **Note:** You must verify that the proxy server settings in your browser are disabled. For Microsoft Internet Explorer, select Tools / Internet Options / Connections / LAN Settings and uncheck the box labelled "Use a proxy server for your LAN". For Firefox, go to Advanced Preferences and select "Direct connection to the Internet". When complete, please close your browser.
>
> DO NOT FORGET THAT YOU MAY NEED TO RECHECK THIS BOX ON RETURN TO YOUR OTHER INTERNET CONNECTION.

# ▶▶ Setting up the Modem

There are five basic steps to getting your modem up and running:

    Step 1: SIM insertion
    Step 2: Power connection and battery charging
    Step 3: Obtain initial GPS fix using the Thuraya IP+
    Step 4: Data connections
    Step 5: Pointing to the satellite

### STEP 1:  SIM INSERTION

1. Unpack the modem and accessories. Your service provider will have provided you with a SIM card.

2. Insert SIM provided by your service provider into the SIM holder inside the battery compartment as shown.

3. Now install the battery by hooking the battery tab in the rectangular opening in the battery compartment and firmly pressing the battery onto the latch on the other side. The seal around the battery should snugly fit between the battery and the enclosure with no pinch points visible. A good seal is necessary to maintain the IP55 rating of the terminal.

### STEP 2:  POWER CONNECTION AND BATTERY CHARGING

1.  The Thuraya IP+ will charge the battery automatically when the power is connected.

2.  Plug in the power cable and charge the battery for at least 3 hours.

### STEP 3:  OBTAIN INITIAL GPS USING THE THURAYA IP+

1.  Put the Thuraya IP+ outside on a flat surface with a clear view of the sky away from building, trees, and other obstructions.

2.  Power up satellite modem by pressing the power button.

3.  Once powered up, Thuraya IP+ will automatically attempt to locate itself using Global Positioning System (GPS). This may take up to 5 minutes. The small GPS satellite icons on the display (shaded area in the picture below) show how many GPS satellites are in view at any given time. You need all three satellite icons to be on solidly to obtain a GPS fix. If any are missing or flashing then the GPS signal is being blocked.
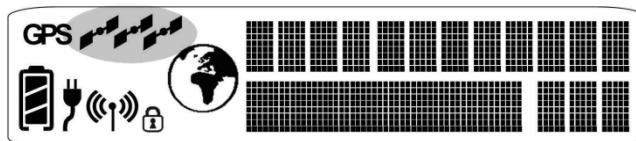


When the **GPS** icon stops flashing then Thuraya IP+ has successfully updated its GPS position.

### STEP 4:  DATA CONNECTIONS

**Connect the** Thuraya IP+ to your PC using Ethernet. It is also possible to connect using the wireless LAN facility, but use the wired connection for the first time setup.

### ETHERNET

Connect the Ethernet cable to your laptop's network interface and insert the other end of the connector into the Thuraya IP+.

> **Note**:  Any Ethernet cable can be used to connect the laptop and modem as long as it is less than 100 meters in length.

## STEP 5: POINTING TO THE SATELLITE

1. Thuraya IP+ is controlled through a Web browser interface (wMMI). To activate the wMMI, open the browser on your laptop. Enter **Error! Hyperlink reference not valid.** in the browser URL address field.



**URL address field**

> Note: You may want to store this as a browser bookmark.

2. If you have PIN security enabled on your SIM, you will be prompted to enter your PIN before proceeding.

> Note: You must have a valid GPS location for the compass direction and antenna angle to be displayed. If the GPS is not valid, go back to step 3 to obtain a GPS fix.

**Compass Direction**          **Antenna Angle**



| Satellite Location: | Region 1: | Direction is SW (204°) | Elevation is 58° |
| | Region 3: | Direction is SE (114°) | Elevation is 33° |

3. Look at the wMMI home page display and note the compass bearings and elevations for both Thuraya IP+ satellites in the "satellite location" section. The recommended satellite for your location will be highlighted in green. With the Thuraya IP+ terminal upside down, use the integrated compass to determine the direction of the recommended satellite. You must be able to obtain a clear view of the satellite in the sky for the Thuraya IP+ to connect to the network. If the recommended satellite is obstructed from your location, consider using the alternate satellite instead. If neither satellite is accessible from your location, you will need to move to a location that has visibility to at least one of the satellites.
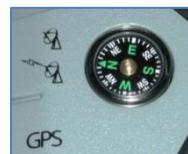
4. Once you have determined the best satellite to use, move the antenna stand to the correct elevation angle using the integrated protractor on the hinge. Recall that the elevation angle is indicated on the wMMI home page. With the

elevation angle correctly set, place the Thuraya IP+ on a flat surface with the antenna facing in the direction of the satellite as determined in step 3.

5. You can optimize the receive signal strength by observing the signal strength display on the Thuraya IP+ while <u>slowly</u> rotating the Thuraya IP+ a few degrees clockwise and counter clockwise. Find the direction that maximizes the signal strength. Likewise, <u>slowly</u> raise and lower the antenna a few degrees and find the elevation that maximizes the signal strength. This step fine-tunes the pointing of the antenna in the direction of the Thuraya IP+ satellite.
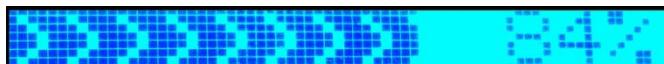


**Receive Signal Strength on the Thuraya IP+ Display**

6. Once the Thuraya IP+ obtains sufficient signal strength from the satellite, it will automatically connect and establish an IP data session. Check this on the home page by confirming that the "Network Status" line shows "Connected".

**Congratulations! Your Thuraya IP+ is successfully connected. You should now be able to send and receive data from your laptop to the Internet.**

> **Note**: If you are unable to successfully connect to the Internet, ensure that nothing but open sky is between the Thuraya IP+ and the satellite. If the view is blocked by trees, mountains, buildings, metalized glass, or similar objects then you must relocate the Thuraya IP+. Additional assistance can be found in the troubleshooting section towards the end of the Thuraya IP+ **User Guide.**

**Do not stand in front of the antenna**

Thuraya IP+ emits RF energy when in the transmit mode. To avoid injury, do not place head or other body parts in front of the antenna when the system is operational.

# QUICK REFERENCE

This section serves as a reference guide, identifying the key operational aspects of using the Thuraya IP+ system and the **Controls and Indicators** on Thuraya IP+ and their functions.

## ▶▶▶ Global Positioning System Operation

The Thuraya IP+ contains an integrated GPS receiver that is used to provide location information. GPS location information is required for system access, and the reception of a new GPS location is attempted automatically every time Thuraya IP+ is powered-on.

For optimum GPS signal reception, make sure Thuraya IP+ is positioned in a roughly horizontal placement.  Since GPS receivers must "see" a large part of the sky without obstructions from buildings, mountains, or trees, it may be necessary to take your Thuraya IP+ out to a clear space to obtain a new GPS location. It may be possible to obtain a new GPS location in a less favourable circumstance, but the time to completion may be longer.

Once updated, Thuraya IP+ remembers your location so the unit can be relocated to a more convenient working area, such as inside a building by a window facing toward the satellite.

Once you have established a session on Thuraya IP+ you will not need another GPS location while you remain connected in the "Always On" condition. This is convenient if you intend to operate from one location for an extended period of time since there is no need to move Thuraya IP+ to refresh the GPS receiver. Also, your stored GPS location remains good for a period of time even if you power-down and move a short distance between sessions. When you believe this is the case, simply skip the GPS location step and complete the Thuraya IP+ satellite pointing operation prior to going directly onto the network. Be sure to carefully point your unit every time it is moved.

### STORED GPS LOCATION

The most recent GPS location is stored in Thuraya IP+ even when powered-down. Upon power-up, the Thuraya IP+ will attempt to update this GPS location since the Thuraya system will only allow access if your GPS location is not too old. If Thuraya IP+ has a valid GPS location then the GPS icon on the display will go from flashing to solid. Likewise, the wMMI will indicate if the currently available GPS location is valid or invalid.

# ▶▶ Integrated Man Machine Interface (iMMI)

The Thuraya IP+ has an iMMI, which allows you to control the operational features of the terminal without the need of a PC or a browser. The iMMI includes buttons labelled with defining icons, an LCD, and an audible pointing aid integrated into the Thuraya IP+ itself.

The figure below shows the layout of the Thuraya IP+ iMMI.



## CONTROL BUTTONS

The following table gives you a summary of the four Thuraya IP+ buttons.

| Button | Action | Result |
|--------|--------|--------|
| Power button | Short press | Backlight on, cancel any menu operation, return to status menu |
|  | Long Press | Turn unit on or off |
| Connect button | Short press | Toggle audio pointing state (sound on/off) |
|  | Long press | • Toggle connection state (connect/disconnect)<br>• Exit pointing mode |
| Menu button | Short press | Scroll to next menu item |
|  | Long press | Start GPS receiver manually |
| Modify button | Short press | Scroll to next option of displayed menu item when in menu |
|  | Long press | Toggle Wi-Fi on/off (when not in menu display) |

## Status/Menu Display

The upper level of the LCD displays **status messages** and **menu items**. Status messages are summarized in the table below.

| Display | Description |
|---------|-------------|
| Powering off | Displayed while Thuraya IP+ is powering down |
| Fault {code} | A hardware fault exists, preventing operation (see troubleshooting section for code explanations) |
| Too hot | A temporary thermal shutdown is about to occur |
| Battery hot | A temporary thermal shutdown is about to occur due to battery heating |
| No SIM | No SIM is detected in Thuraya IP+ |
| Locked | A security code is needed (entered via wMMI) |
| PIN | A SIM pin code is needed (entered via wMMI) |
| Pointing | In pointing mode |
| GPS old | GPS is older than the system time period allows |
| Disconnected | The terminal has no IP connection to the network, preventing data transfer |
| Acquiring | The terminal is attempting to connect to the network |
| TX{rate}/RX{rate} | Transmit and receive streaming rates in kilobits per second |
| Standard | Best efforts Quality of Service (QoS) in both directions |

## Navigation of the iMMI

You navigate among the options available in the iMMI by utilizing the **Menu** and **Modify** buttons. With the unit in its "normal" state displaying status indicators, you press the **Menu** button to view and modify **QoS** settings and **LCD** display parameters. Pressing the **Modify** button within a menu option allows you to change the current setting.

The status display is the default display; after 30 seconds of inactivity, the display always reverts to the status display. Pressing the **Menu** button takes you through a circular list of menu items and then back to the status display. The two major menu options are the following:

**Change Rate**:  Modify the QoS settings for transmit and receive.
**LCD Contrast**:  Modify the contrast on your LCD.

## DATA RATE SELECTION

- With the unit in the default status display, press the **Menu** button. The **Change Rate** menu option is then displayed.
- Press the **Modify** button. You are then brought to the first value in the series of QoS settings.

| Change Rate Menu | Comment |
|---|---|
| Standard | Selects Background QoS for both the transmit and receive directions |
| TX: 384 kbps | Selects 384 kbps TX streaming QoS |
| TX: 16 kbps | Selects 16 kbps TX streaming QoS |
| TX: 32 kbps | Selects 32 kbps TX streaming QoS |
| TX: 64 kbps | Selects 64 kbps TX streaming QoS |
| TX: 128 kbps | Selects 128 kbps TX streaming QoS |
| TX: 256 kbps | Selects 256 kbps TX streaming QoS |
| RX: 384 kbps | Selects 384 kbps RX streaming QoS |
| RX: 16 kbps | Selects 16 kbps RX streaming QoS |
| RX: 32 kbps | Selects 32 kbps RX streaming QoS |
| RX: 64 kbps | Selects 64 kbps RX streaming QoS |
| RX: 128 kbps | Selects 128 kbps RX streaming QoS |
| RX: 256 kbps | Selects 256 kbps RX streaming QoS |

- Press the **Modify** button to scroll down the standard and TX QoS values until you see the setting you want. When you scroll to each setting, the displayed QoS value blinks, indicating that this selection is pending. Press the **Modify** button to move to the next setting without changing the pre-existing value.
- When the list of values is exhausted, press the **Modify** button to lead you back to the first value. You can cancel the selection and transition back to the status display via a short press of the power button.

- When you have found the value you want, press the **Menu** button. This action selects the new rate. Once you select the rate, you are transitioned to the RX set of values unless you selected "Standard" in which case you will exit rate selection.
- Navigation through and selection of the RX values is the same as for the TX values. Use the **Modify** button to scroll through the list in a circular manner, with cancellation achieved via the short press of the power button. Pressing the **Menu** button selects and stores the new RX rate, and you will then exit rate selection.
- When you select a new QoS, the old PDP context is deactivated and a new PDP context is activated with the new rate selection. If the rate selection did not change as a result of the selection, then no PDP context change occurs.

### RECEIVE SIGNAL STRENGTH DISPLAY

The lower row of the LCD is dedicated to RSSI (signal strength) information. This is used to monitor incoming signal strength from the Thuraya satellite and permit pointing or repointing to occur at any time during operation. The display provides both a graphical and digital indication of the signal strength.

The digital RSSI indication consists of a value between 0 and 99. The graphical RSSI indication is a 50-element bar graph of the RSSI.
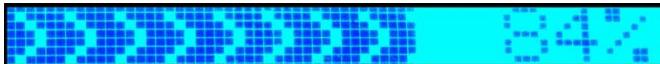


The RSSI display updates rapidly for at least 5 minutes after a satellite signal has been acquired or reacquired. After that acquisition, the RSSI display may be updated less rapidly to conserve power if the modem is running on battery. **Hint:** If the rate is reduced to save power, the rapid RSSI update mode can be re-enabled for 5 minutes if you short press the **Modify** button while the status display is present.

## Audible Pointing Indicator

An audible pointing indicator provides an audible representation of the signal strength during antenna pointing. When on, the indicator emits pointing tones that increase in tempo as the pitch increases. If the satellite is not found, one tone is followed by a pause. The indicator always defaults to off when the unit powers on. Use a short press of the **Connect** button to toggle the audio pointing indicator on and off.

## 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.

### 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 Thuraya IP+.

- The icon **flashes** when the stored GPS information is **older than the GPS validity period.**
- The icon is **on steady** when the stored GPS information is **within the GPS validity period**.

### Satellite Icons

The satellite icons, located next to the GPS icon, indicate the **status of the GPS receiver** in the Thuraya IP+ 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 solidly to acquire a new GPS location.

### Wireless LAN Icon

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

- **Off** if **Wireless LAN** operation is **turned off**.
- **On** 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 **state of IP connection** over the satellite.

- **Off** if **no PDP context** exists (no data traffic possible).
- **On** if a **PDP context exists** (ready for data traffic).

# ▶▶▶ Web Man Machine Interface (wMMI) Screens

The Thuraya IP+ can be accessed through a standard Web browser interface. To accomplish this, the connected computer must have one of the following supported browsers installed:

- Internet Explorer
- Firefox
- Chrome
- Macintosh Safari

To access the Thuraya IP+, connect your computer via Ethernet or WLAN, run a supported browser and enter http://192.168.128.100 into the browser's address field. You may wish to add this address to the browser's bookmark list so the address will be easier to find in the future. When active, the browser interface will allow you to access the wMMI.

Each of the main Web pages contains important status information in the upper left hand corner. The bar graph next to the 🛰 icon represents receive signal strength. The bar graph next to the 🔋 icon provides an indication of the battery's level and charging state. The icon area below these indicators mirrors the icons described in the iMMI section above. During a streaming session this area also maintains a timer to record how long the session has lasted.

## HOME SCREEN
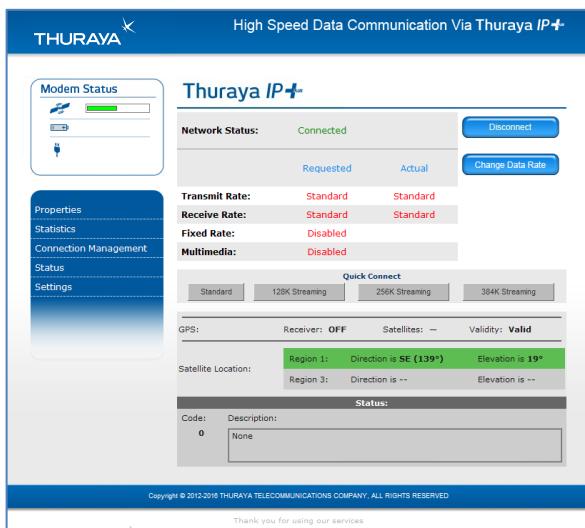


The **Home Screen** provides you with key summary status information about Thuraya IP+ and is also a gateway into Thuraya IP+ management.

Network status:  Provides the status of the network connection.

Transmit rate:  Provides the requested and actual transmit channel data rate. The actual allocated data rate may vary from the one requested due to subscription or system capacity restrictions.

Receive rate:  Provides the requested and actual receive channel data rate. The actual allocated data rate may vary from the one requested due to subscription or system capacity restrictions.

Fixed rate:  Provides the status of the fixed rate control. Enable fixed rate when using a streaming connection that must match the requested data rate. If the rate is unavailable, the connection is denied.

Multimedia:  Provides the status of the multimedia control. Enable multimedia when using streaming applications like Voice over Internet Protocol (VoIP) or live video playback.

Connect/disconnect:  This button toggles the network connection state on or off. When disconnected no data can be sent or received.

Change data rate:  This button allows you to change the connection parameters for the current session.

Quick connect:  These buttons access pre-stored connection profiles.

GPS:  The display includes the GPS receiver state (On/Off), GPS satellites visible, GPS validity, compass direction, and antenna angle. To obtain a

GPS fix, make sure there are at least three visible satellites reported. Once a GPS position is obtained, the Thuraya IP+ will provide the compass direction and degrees of elevation to the satellite. This information is used in the pointing operation described earlier.

## PROPERTIES SCREEN
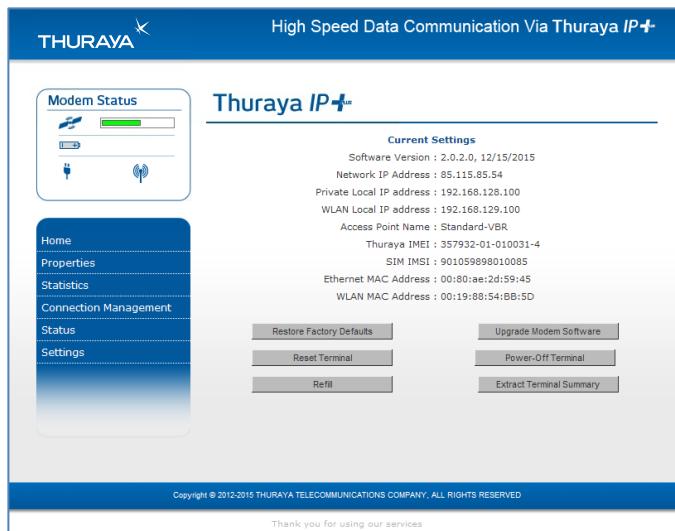


The **Properties Screen** displays a summary of current communications parameter settings. You can also use this screen to do the following:

**Restore factory defaults**:  When you click this button, the **restore message confirmation screen** informs you that the terminal is about to reset to factory defaults. Restoring the factory defaults returns the Thuraya IP+ settings to their original, just out-of-the-box state. This does not change the security code or SIM parameters. Please exercise caution when proceeding. If you invoke **Restore Factory Defaults,** you will need to re-enter any configuration information supplied by your service provider.

**Reset terminal**:  Reboots the terminal software.

**Refill**:  Connects to the prepaid SIM Web site.

**Upgrade modem software**:  Connects to the upgrader Web site.

**Power-off terminal**:  Powers down the terminal.

**Extract terminal summary log**:  Fetched diagnostic data from the terminal, which can be saved on the connected computer.

**Current settings**:  Provides the current communications parameters.

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- Software version currently executing
- Public network IP address
- Private local IP address (Ethernet subnet and wMMI address)
- WLAN local IP address (WLAN subnet)
- Access Point Name (APN) for the satellite connection
- Modem International Mobile Equipment Identity (IMEI)
- SIM International Mobile Subscriber Identity ( IMSI)
- Ethernet and WLAN Media Access Control (MAC) addresses

## STATISTICS SCREEN
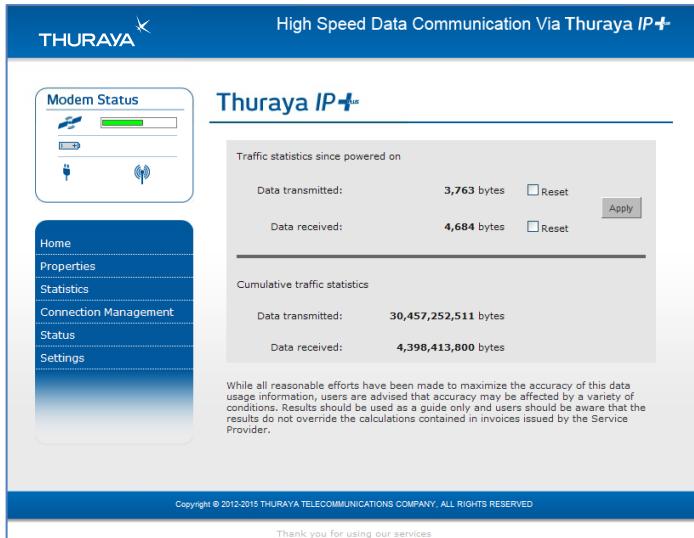


The **Statistics Screen** provides you with an estimate of your data usage. Data usage figures are obtained by counting the bytes in the IP packets received by and sent from the Thuraya IP+ terminal. You can view both "since power on" (per session) and "cumulative" (lifetime) data usage counts. To reset the data counters of a session, simply select the **Reset** button for either transmit or receive and click the **Apply** button.

> **Note**: The data usage figures provided on the screen are estimates only. This feature is not tied into the actual billing system. Hughes assumes no liability if differences are found between data usage figures and your actual bill.

## CONNECTION MANAGEMENT SCREEN
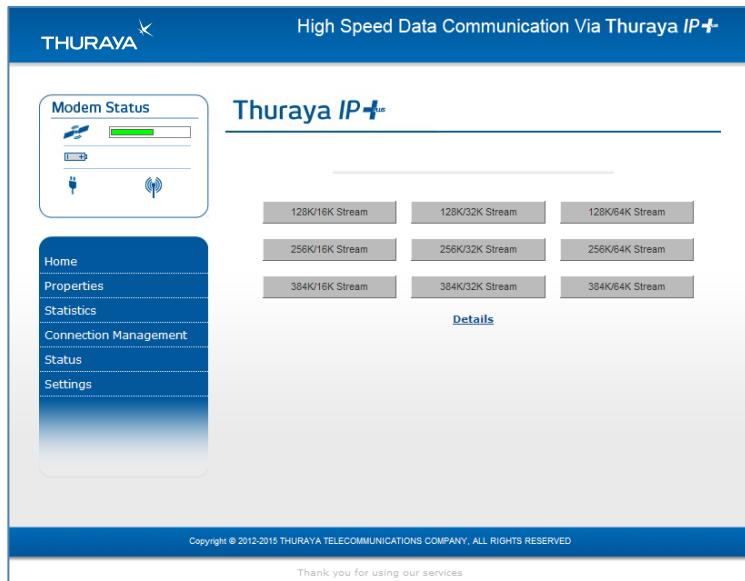


Accessible from the main menu, the **Connection Management** screen allows you to select from nine QoS quick connect buttons. Each button can be customized using the **Details** link on the **Connection Management** screen. The customization parameters for each button are as follows:

Transmit rate and receive connection rate:  Allows you to select the transmit and receive rates from the list of bandwidth values.

Multimedia control:  Allows you to enable or disable Automatic Repeat-reQuest (ARQ) over the satellite. Typically, ARQ–an error control protocol for data transmission–is best disabled for voice or video traffic.

Fixed rate control:  Allows you to enable or disable fixed rate service over the satellite. You can force the connection to match the requested QoS. If **disabled**, the best streaming rate possible–up to and including the selected rate–will be allowed. If **enabled**, the terminal will not set up a connection unless the requested rate is available from the network.

**Remember** to click **Apply** to save any changes or they will be lost.

## STATUS SCREEN
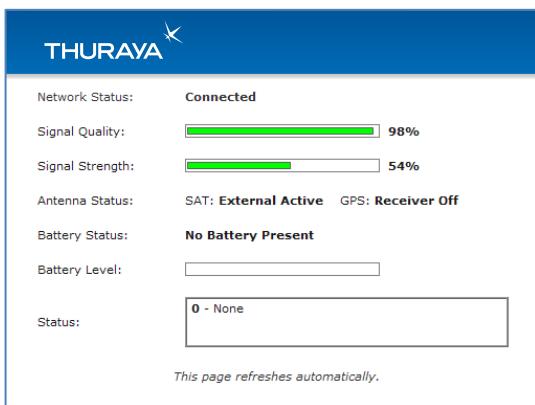


The **Status** screen, displayed in a separate window, provides you with a constantly updated flow of dynamic information and a concise summary of the Thuraya IP+ status.

When the **Status** screen is open, its information is updated every minute. *Note that while on battery power, your operating time will be reduced*.

Network status:  Provides the status of the network connection.

Signal quality:  This bar graph displays satellite signal quality.

Signal strength:  Use this display to monitor incoming signal strength from the satellite and permit pointing or repointing to occur at any time during operation.

> **Note:  Signal quality vs. signal strength**. The signal quality status is a different measure of the received satellite signal than the signal strength status. Seeing differences between these two levels is normal and not an indication of a problem with your Thuraya IP+.

Antenna type:  Use this display to determine which satellite and GPS antenna is in use. The standalone terminal will use its internal antenna. Optional external antennas, active, passive, and GPS, can be hooked up to the Thuraya IP+ for convenience and higher performance. See your service provider regarding these accessories.

Battery status:  On battery, charging or charged.

Battery level:  This bar graph provides an indication of remaining battery capacity.

- **Green:**  Normal indication of battery level
- **Red:**  Almost fully discharged

- **Amber:** Charging under external power

Status: The current system status code (see page 36).

## SETTINGS SCREENS

From the main menu you can select **Settings** to navigate among all the various settings functions from the menu on the left side of the screen:

- Network Settings
- Security Management Settings
- Login Settings
- WLAN Settings
- Advanced Settings

## NETWORK SETTINGS SCREEN
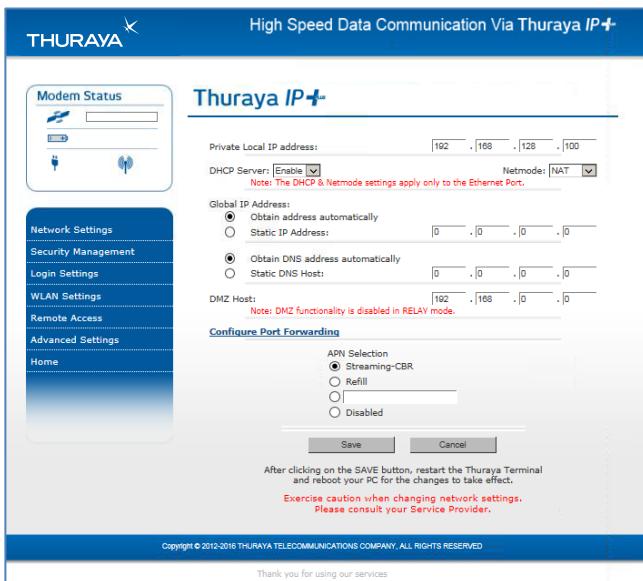


After executing the necessary first time setup steps to configure Thuraya IP+, you may want to select the **Network Settings** screen to check your network configuration. This screen provides you with control over key network access parameters. Here you find the appropriate Domain Name Service (DNS) and the Access Point Name (APN) information configured by your service provider. You are also given the ability to make changes.

> **Note**: Generally your service provider has already performed this configuration step for you. Whenever you modify the addresses on the **Network Settings** screen, you must press **Save** and exit the wMMI, reboot your computer, and power the Thuraya IP+ off and then back on so that the new settings can take effect.

Private local IP address: This setting allows you to change the lower two octets of the terminal's local gateway address. Changing this address will change the address of the wMMI and the base address for the Ethernet DHCP server. This subnet must remain unique from the WLAN subnet address being used.

DHCP server: The DHCP server for Ethernet can be enabled or disabled as needed. If disabled, a local static IP addressing scheme must be used by connected Ethernet devices. This setting has no impact on the WLAN operation, which uses a dedicated DHCP server.

Netmode: This command allows for NAT or relay mode to be selected. The Network Address Translation (NAT) mode allows multiple devices to be connected via the Ethernet and WLAN ports. This is the default operating mode. Relay mode is used for special situations where a single local device needs to be assigned the same address as the global IP address assigned to the user terminal. The connected device is assigned a LAN address initially, but with a very short DHCP lease time. When the global IP address is assigned to the Thuraya IP+ it is flowed through to the connected device via a DHCP address reassignment. All WAN traffic flows through to the single connected device with no port or address translation. Relay mode is only available on the Ethernet port and DHCP must be enabled at the same time.

Global IP address:

Obtain address automatically: If this button is **selected**, Thuraya IP+ uses an IP address automatically assigned by the network during the period when the modem connects to the network.

Static IP address: If this button is **selected**, the modem uses the IP address you enter in the associated IP address field. You should check this box and enter an IP address only if directed to do so by your service provider.

DNS:

Obtain DNS address automatically: If this button is **selected**, the Thuraya IP+ uses a primary host DNS automatically assigned by the network during the period when the modem connects to the network.

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Static DNS host:  If this button is **selected**, the modem uses the DNS address you enter in the DNS address field. You should check this box and enter an IP address only if directed to do so by your service provider.

DMZ host:  If you wish to route incoming network originated IP traffic to a specific connected device, enter that device's IP address in this parameter. Be careful to establish a suitable firewall on this device to protect against malicious attacks from the Internet.

Configure Port Forwarding: This link opens the Port Forwarding configuration page.  See below for details.

APN selection:  If use of multiple Internet service providers is required, you can modify the current **APN** value. You should modify these fields only if directed to do so by your service provider. The choices are the following: Streaming-CBR, Refill, <BLANK> (enter the desired name), and Disabled.

SAVE/CANCEL:  If you want the values you have entered to be processed, click the **SAVE** button, **exit** the wMMI, and **reboot** your computer. You will also need to turn Thuraya IP+ off and then on again so that the new settings can take effect. If you want the values you have entered to be ignored, click the **CANCEL** button and the network settings remain as they were with no reboot required.

## PORT FORWARDING CONFIGURATION



Port Forwarding is a technique that allows specific global ports to be connected to specific local device(s). This feature allows incoming IP

traffic to be routed to a specific device's IP address, based upon the global port number on which the traffic was received.

If **Enabled**, you will be able to associate specific TCP/UDP ports with specific IP addresses and local port numbers. All incoming IP traffic (TCP, UDP or Both) with a configured port number will be routed to the corresponding local IP address. You may also map global port numbers to different local port numbers. Outbound IP traffic is not impacted by the Port Forwarding functionality.

> **Note**:  It is important to ensure that each IP address identified in the Port Forwarding table exists and pertains to the correct device for this traffic. If the target IP address does not belong to any device that is currently connected to the terminal, then routing of that traffic will fail. Generally static IP addresses are used on the LAN devices involved with Port Forwarding to ensure that traffic is routed correctly. To avoid IP address conflicts with DHCP, static IP addresses are best assigned outside of the DHCP range but within the subnet.  For a terminal in its default state, the DHCP address pool extends from 192.168.128.101 to 192.168.128.150.  The first such value for a static IP address is 192.168.128.151.

Port Forwarding configuration fields:

- **Port Forwarding** control – Global Enable/Disable
- **Enable** – Enable or disable a port mapping, default: disable
- **Global Port** – The incoming destination port number to be forwarded.  It can be any number from 1 to 65535.  The default is 0.
- **Protocol** – A drop down list of TCP, UDP and TCP&UDP, default: TCP&UDP
- **Local IP Address** – The IP address of the destination device on the LAN, default: all zeroes
- **Local Port** – The mapped destination port number for the forwarded IP packets.  It can be any number from 1 to 65535. The default is 0.

The Port Forwarding configuration page is controlled by the Admin lock. All user entered information shall be retained in the table unless the terminal is reset to factory defaults.

> **Note**:  A terminal restart is not required for the Port Forwarding changes to take effect; however, a new PDP context is required for changes to take effect. Pressing the Save button on the Port Forwarding page automatically causes a new PDP context to be established.  Port Forwarding is not compatible with Relay Mode and therefore is disabled automatically when Relay Mode is enabled.

The Port Forwarding page is accessed via the Network Settings page.

## SECURITY MANAGEMENT SCREEN
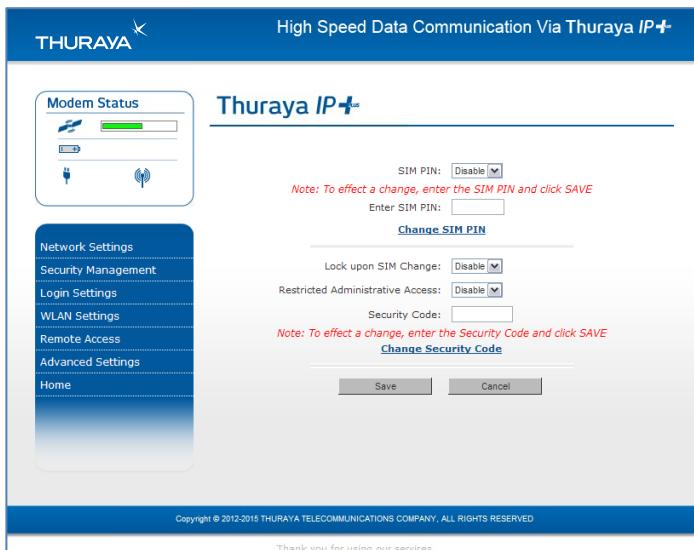


The **Security Management Screen** allows you to impose a tighter level of security on your Thuraya IP+.

SIM PIN disable/enable:  If **Enabled**, a prompt requests you to enter the SIM PIN each time you power up the modem. This helps prevent unauthorised use of your SIM. **Disable** this feature to skip the PIN entry process. To change the setting, click the desired one, enter the current SIM PIN (required), and click the **Save** button.

> **Note**:  If the SIM PIN code is incorrectly entered three times, the SIM will be locked until the Pin Unlock Key (PUK) number is entered. Consult your service provider if you do not have your PUK number.

<u>Change SIM PIN</u>:  If the SIM PIN is **enabled** and you would like to change the existing PIN, click this link. You will be required to enter the old PIN, the new PIN, and the new PIN again for confirmation.

<u>Lock upon SIM change</u>:  When this setting is **enabled**, you must enter a security code when the terminal powers up with a new SIM.

<u>Restricted administrative access</u>:  When restricted administrative access is **enabled**, protected Web pages can only be accessed after you enter a username and password. The username is the fixed string "admin" and the password is the security code.

<u>Change security code</u>:  The security code is 12345 when shipped from the factory. To change an existing security code, click this link. You will be required to enter the old code, the new code, and the new code again for confirmation.

> **Note**:  If you forget the security code you will need to consult with your service provider.

## LOGIN SETTINGS SCREEN
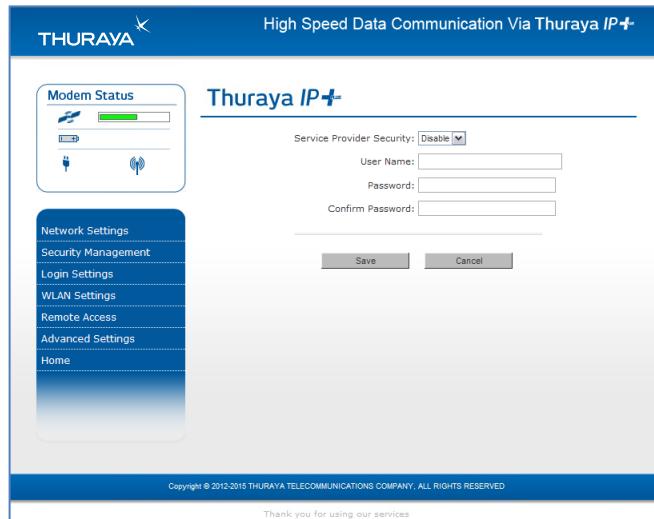


Utilize the **Login** screen only if you have been given the necessary information from your service provider.

<u>Service provider security</u>:  If this is **enabled**, you can enter a **Username** and **Password** for authentication between Thuraya IP+ and your service provider. Your service provider will let you know if this step is required and give you the necessary information.

Username, password, confirm password:  You must enter the password twice to ensure accuracy.

## WLAN CONFIGURATION SCREEN
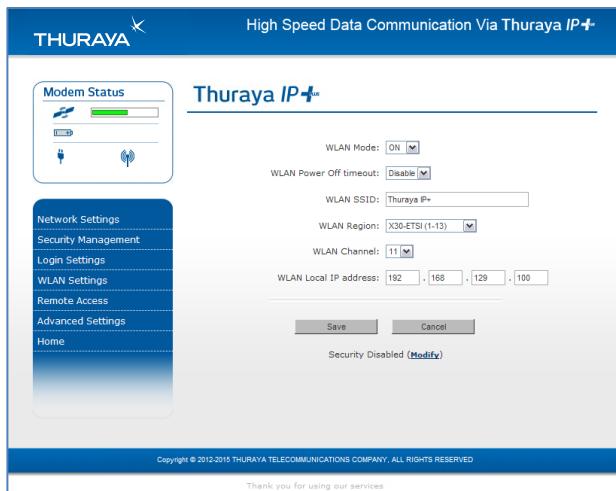


The **WLAN Configuration Screen** allows you to configure the integrated WLAN Access Point (AP), which can support up to eight simultaneous clients using 802.11b/g/n. The WLAN AP operates on its own subnet and utilizes its own DHCP server. The wMMI remains at 192.168.128.100 (default) whether accessed via WLAN or Ethernet.

WLAN power:  Select ON or OFF to turn the feature on or off.

WLAN power-off timeout:  If **disabled**, there is no timeout. If this parameter is **enabled**, the WLAN will remain powered-up for the selected timeout value after the terminal powers on. If no WLAN activity is detected during the timeout, the WLAN card will power down.

WLAN SSID:  The WLAN network ID (SSID) can be entered as desired.

WLAN region:  Select the WLAN region from a drop-down list (X10, X20, X30, X31, X32, X40, and X41). If you try to activate a channel not supported in the selected region, the request shall be rejected with an error message.

WLAN channel:  Select the WLAN channel from a drop-down list.

WLAN local IP address:  The WLAN network uses the default subnet of 192.168.129.xxx with DHCP addresses starting at 192.168.129.100. The two least significant octets can be changed to different values; however, the WLAN subnet must remain distinct from that used by Ethernet.

## WLAN Security Screen
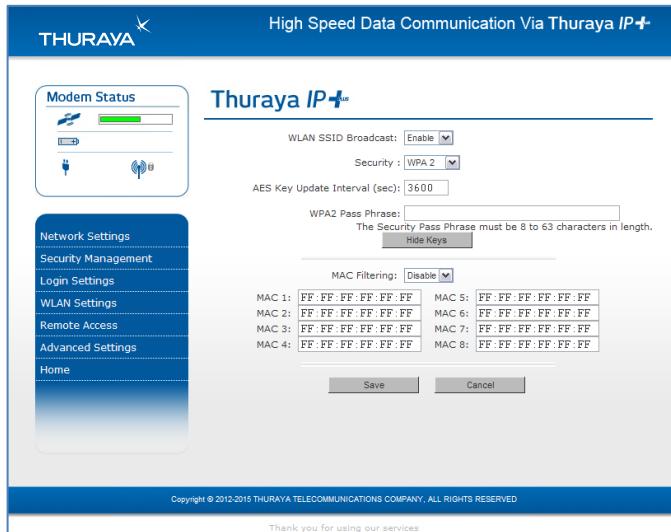


The **WLAN Security** screen allows you to configure WLAN security parameters, including enabling/disabling security, hiding the SSID, and setting Media Access Control (MAC) filters.

Access this screen by clicking the **WLAN Security Settings** link towards the bottom of the **WLAN Configuration** screen.

WLAN SSID broadcast:  **Enable** or **Disable** SSID broadcast.

Security:  **Disable** or chose an available security method: Wired Equivalent Privacy (NOTE: WEP64 & WEP128 is not available on newer IP+ terminals), WPA or WPA2.

WEP key to Use:  Under WEP64, select the **active key**–Key1 through Key 4–from a pull-down menu. For WEP128 only key 1 is available.

WLAN key fields, Key 1 through Key 4:  In WEP64 mode, enter a 10-character (0-9, A-F) **key value** in each of four text boxes.  In 128-bit WEP mode, enter a 26-character (0-9, A-F) **key value** in the Key1 text box.

Generate:  Instead of manually entering a key value, you may press the **Generate** button to automatically generate a key value.

TKIP/AES key update interval:  Under WPA and WPA2 this timeout determines how often the working key is changed.

WPA/WPA2 pass phrase:  Under WPA and WPA2 enter a secret pass phrase that will become the master key for WLAN access.

Hide keys:  Click this button to hide the keys from this display.

MAC filtering:  **Enable** or **disable** MAC filtering. If filtering is **enabled**, you can enter up to eight MAC addresses. Only these addresses will be permitted to access the terminal via the WLAN.

## ADVANCED SETTINGS SCREEN
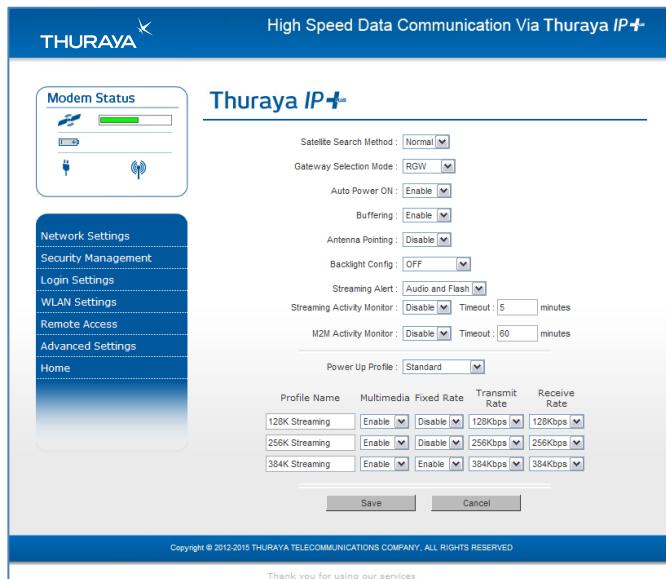


The **Advanced Settings Screen** allows you to modify several key operating parameters in the unit.

Satellite search method:  **Normal** is the default method to use unless your service provider specifies the full method. The **full** method takes longer and utilizes more resources since it will search all possible frequencies for Thuraya IP+ service. This full search can take up to 20 minutes.

Auto power ON:  When **enabled**, the terminal will automatically power up when external DC is applied.

Buffering: When buffering is enabled the Thuraya IP+ can store more data to handle bursts of IP traffic from connected devices. When buffering is disabled, only the minimum of traffic is stored to reduce latency. Disable buffering for low latency traffic, such as voice or video.

Antenna pointing: This drop-down menu determines whether the pointing display comes up each time Thuraya IP+ is powered-up or restarts. The factory default for this setting is **Disabled** to bypass the pointing state upon power-up. However, antenna pointing can be **enabled** to provide pointing information prior to going online.

<u>LCD backlight configuration</u>:  LCD backlighting can be **On (15 seconds)**, **Off**, or **Auto** (off after 15 seconds of inactivity unless external DC present).

<u>Streaming Alert</u>:  When enabled and a Streaming connection is active, the Thuraya IP+ warns the user if the connection becomes inactive.  An active connection has both transmit and receive traffic.  When the **audio** streaming alert is enabled and the session is inactive, the terminal beeps every 30 seconds.  Pressing an iMMI button cancels the alert. When the **visual** streaming alert is enabled and the session is inactive, the terminal flashes the LCD backlight every 10 seconds, unless the backlight is set to off.  With the Streaming Alert control a user can enable either or both of the audio and visual indicators.

On the web MMI, a streaming timer is displayed within the modem status box that appears on the upper left-hand corner of each web page (see example at right). This indicates how long a streaming session has been active.
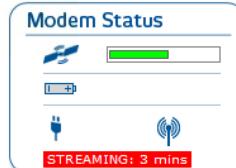


<u>Streaming Activity Monitor</u>: When enabled, the Thuraya IP+ monitors user traffic during streaming sessions.  If the timeout period expires with no user traffic, the streaming session is cancelled and a standard on-demand session is requested.  The minimum **Timeout** value is 5 minutes. This setting has no effect during non-streaming sessions.

<u>M2M configuration</u>:  When enabled, the Thuraya IP+ monitors transmit and receive traffic. If traffic is not seen on either direction for the timeout duration then the terminal will automatically reboot to ensure it stays online. The feature will also try to re-establish a PDP context if it is disconnected for any reason. This mechanism is useful to ensure continuous operation from unattended sites.

<u>M2M monitor</u>: This is the timeout setting for the M2M feature.

<u>Power-up profile</u>:  You can select the power-up profile from a drop-down list, including standard and three customizable streaming profiles. Each streaming profile can be customized by **name**, **multimedia** mode, **fixed rate** mode, **transmit rate**, and **receive rate**.

Select the **Save** button to implement your modifications.

## Pointing Screen
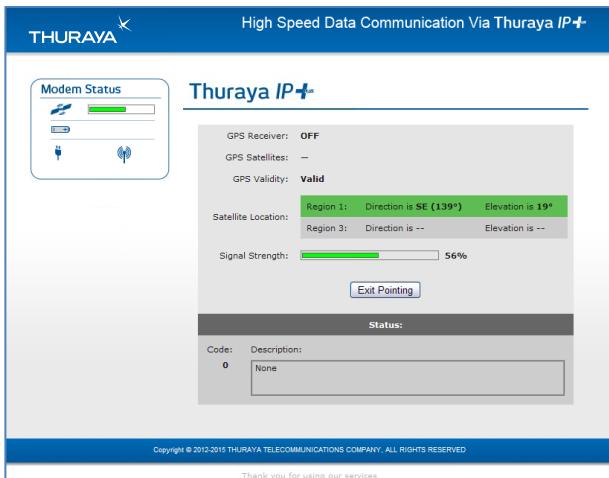


The **Antenna Pointing** screen step can be enabled using the **Antenna Pointing** option on advanced settings screen described above. When this option is **enabled**, the Thuraya IP+ will stop in a pointing mode prior to accessing the network after powering up. This can be useful when optimal pointing is important, such as with fixed installations using an external antenna.

The pointing screen has a signal strength bar graph and numeric value to assist in accurate antenna pointing. The green bar identifies the signal strength measured during antenna pointing and will help you optimize the pointing direction. Note that obtaining the highest signal strength possible will ensure that you have an optimum connection to the network.

GPS receiver:  On/Off

GPS satellites:  The number of satellites visible to the unit

GPS validity:  Invalid, stored, or valid. See the Global Positioning System Operation section for more details on GPS.

Point antenna to these settings:  Compass direction and antenna angle to help orient Thuraya IP+ toward the satellite. Once this rough pointing is accomplished, use the signal strength meter described below to optimize the pointing direction.

Signal strength:  This segmented bar moves to the right as the signal received from the satellite gets stronger. The numeric display to the right of the bar is simply a digital representation of the bar. Use this display when fine-tuning Thuraya IP+'s orientation to the satellite. Signal strength

is only a relative measure of the satellite signal strength and may vary from location to location.

Exit pointing:  Select this button to leave the screen after optimum signal strength has been achieved. This action will take you to the home screen on the wMMI.

Status:  Status codes (see page 36 for a list).

## REMOTE ACCESS SCREEN
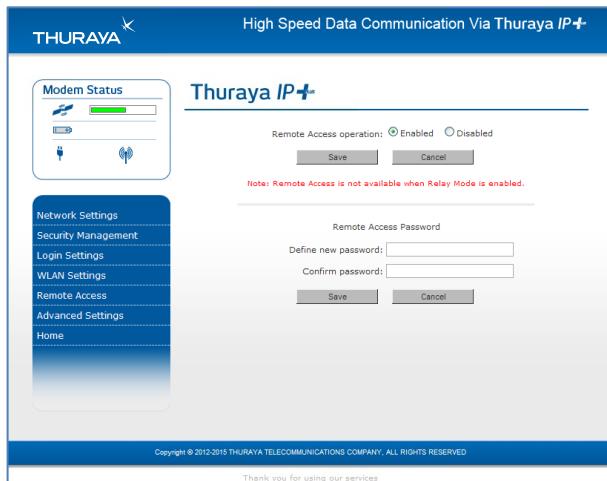


The **Remote Access** screen enables wMMI access from the satellite network side of the terminal. To use the feature, select the **Enabled** option, type in a password and select **Save**. Obtain the network IP address from the **Properties** screen and use that in the browser on the remote PC as follows: http://85.115.79.53:45380 (85.115.79.53 is an example; your terminal address will be different and can change with each PDP session). In general the IP address to use is http://aaa.bbb.ccc.ddd:45380, where aaa.bbb.ccc.ddd is the terminal's public IP address and the HTTP access port is 45380. You will be prompted to enter Remote Access password to log in. For security reasons you should use the **Logout** button on the wMMI when you have finished the session.

- Only one **remote access** session is supported at any one time
- The Thuraya IP+ must have an active PDP context
- The remote access password can be changed by entering a new string using the **remote access** screen password entry above
- The **remote access** feature is disabled by default

- If you forget the **remote access** password simply enter a new one to overwrite the old one.

> **Note**:  Remote Access uses satellite data that will be billed to the account on the user terminal. Also, Remote Access data shares the channel with any other traffic being sent and received by the Thuraya IP+.

# ▶▶ UPGRADING THURAYA IP+

Should a Thuraya IP+ Modem software upgrade become available, you can complete the upgrade process yourself. The software can be downloaded directly from the Internet using any available access method, including Thuraya IP+.

## UPGRADING SOFTWARE

In order to upgrade software **you must first connect to the Internet** and follow the steps listed below:

1. Connect your PC/Notebook to the Internet using Thuraya IP+ (satellite service), wired LAN, or dial-up connection.
2. Go to [www.thuraya.com](www.thuraya.com) or use the Upgrade link on the **Properties** page if connected to the Thuraya IP+.
3. Go to the Web site area for Thuraya IP+ updates.
4. To download, select the latest upgrade package. The browser proceeds to retrieve the package.
5. Once the package is downloaded, you are prompted to execute the package. Select **Yes** and the upgrader application will self-extract onto the PC's hard drive.
6. Once the package is installed, it puts a shortcut on the desktop and prompts you to **upgrade now**. Make sure the Thuraya IP+ is now connected to the PC via Ethernet and is powered up. Select the upgrade option on the PC, and the program will allow you to upgrade the terminal.
7. The upgrader will query the current software version of the terminal. You should choose whether you want to upgrade to the newer version of software.
8. If you choose to upgrade the terminal, the process automatically downloads the new release of software and forces a terminal reboot.
9. When the terminal returns from reboot, you can verify that the download was successful via the **Properties** page in the wMMI or by confirming the new release on the upgrader.
10. Once loaded onto a PC, the upgrade program can be used to upgrade any number of Thuraya IP+ terminals. Just connect them one at a time and execute the upgrade program.

# TROUBLESHOOTING

Some general hardware and software problems you may encounter in the installation and operation of Thuraya IP+ along with the possible source of these problems and how to correct them. System fault codes and descriptions reported to you by Thuraya IP+ on the wMMI screens, along with their possible causes and solutions. If unable to correct a problem please contact the Thuraya IP+ dealer you purchased the unit from.

## ▶▶ General Troubleshooting

| Problem | Possible Cause | Action |
|---------|----------------|--------|
| Thuraya IP+ will not switch on, or will not stay on when under battery power. | Battery needs recharging. | Charge the battery. Check battery light or wMMI screen for battery charging indication. |
| | The battery is not inserted properly. | Remove and reinsert the battery. Make sure the battery is latched. |
| | The battery contacts are dirty or damaged. | Check the battery connector contacts. Clean them if necessary. If you find any damage, replace battery. |
| | The modem was reset while under battery power. | When the modem is reset while under battery power (no AC mains connected), you must turn it back on manually. This is a normal operation for the modem. |
| SIM card error. | SIM card or SIM card contacts may be damaged. | Visually inspect the SIM card and SIM card contacts and return SIM card to your service provider if it is damaged. |
| | SIM card may not be present. | Remove the battery and verify that the SIM card is present. |
| | SIM card may be inserted incorrectly. | Remove the SIM card and make sure that it is inserted according to the instructions in the user guide. |
| | SIM card contacts may be dirty. | Clean the SIM card contacts with a dry cloth. |
| The wMMI does not work from browser. | The browser may not be correctly configured. | For Firefox, go to Advanced Preferences and select "Direct connection to the Internet." |

| Problem | Possible Cause | Action |
|---------|----------------|--------|
| | | For Microsoft Internet Explorer, select Tools / Internet Options / Connections / LAN Settings and uncheck the box labelled "Use a proxy server for your LAN." <br> You may need to recheck this box upon returning to your other Internet connection. |
| Primary LAN connection to the modem does not function. | The interface cable is not plugged in correctly. | Remove and reinsert the interface cable from both the PC and the modem. |
| | The PC Windows network settings may not be configured correctly. | Make sure the Windows network settings in the PC are set to choose IP settings automatically (DHCP). Then reboot the PC. |
| | The PC can only have one active LAN connection. When connected to the PC, the modem must be the only active LAN connection. | Disconnect all other LAN connections. Make sure the modem is the only active LAN connection. <br> Windows limits the number of network bindings to six. If you have more than six, you must remove one in order for the PC to communicate with the modem. |
| The compass does not appear to work correctly. | The compass is not level or is near metal. | Hold the Thuraya IP+ upside down and level, away from metallic objects. |
| The security code appears to be invalid. | The code may have been changed. | After 10 failed attempts to enter the security code, you must switch the modem off and on again to have access to another 10 retries. If you forgot the security code, contact your service provider. |
| The SIM PIN code appears to be invalid. | The code may have been changed. | If the SIM PIN is blocked, contact your service provider to obtain the PUK code. Enter the PUK when prompted. |
| Thuraya IP+ cannot locate itself using GPS. | No signal or weak signal. | Make sure no obstruction is blocking the GPS antenna and that the modem has a clear view of at least 3/4 of the sky. Make sure that you do |

| Problem | Possible Cause | Action |
|---------|----------------|--------|
| | | not place your hand or another object over the main antenna radome. |
| | Determining GPS position can take up to 5 minutes. | Wait for 5 minutes. Switch the modem off and on again. |
| | The modem is configured to use an external GPS antenna. | The antenna switch is automatic, if you have connected a GPS antenna make sure it can see the full sky |
| The signal strength meter on the pointing screen does not change when moving the antenna. | Java not enabled on the browser. | Enable Java applications on the browser. |
| | Rough pointing not completed correctly. | Follow the instructions in the user guide to correctly complete rough pointing. |
| Thuraya IP+ cannot find the satellite. | No signal or weak signal. | Make sure no obstruction is blocking the satellite signal. Make sure that the Modem has a clear view of the sky in the direction of the satellite. Be aware that metalized window glass may reduce or entirely block the signal. Check that the antenna is pointed using the correct compass direction and antenna angle from the wMMI Pointing screen. |
| Thuraya IP+ cannot access the Internet after successful pointing. | You did not exit antenna pointing mode. | Click the 'Exit Pointing' button from the Pointing page or press the **Connect** button on the face of the terminal. |
| | The antenna may not be pointed properly. | Turn Thuraya IP+ off and then back on again, and attempt antenna pointing again to improve the signal strength. You may need to reposition Thuraya IP+, verifying that there are no obstructions blocking the satellite signal and that the modem has a clear view of the sky in the direction of the satellite. |
| | The modem network settings may not be | Refer to the network settings supplied by your service provider. If the DNS host settings are |

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| Problem | Possible Cause | Action |
|---------|----------------|--------|
|  | correctly configured. | changed, the PC must be rebooted. |
|  | The browser may not be correctly configured. | For Firefox, go to Advanced Preferences and select "Direct connection to the Internet." For Microsoft Internet Explorer, select Tools / Internet Options / Connections / LAN Settings and uncheck the box labelled 'Use a proxy server for your LAN.' You may need to recheck box upon returning to your other Internet connection. |
| No network access or poor network performance. | Interference from other satellite mobile terminals. | If you are near another satellite mobile terminal, switch the other satellite mobile terminal off or move as far away as possible to avoid interference. |
| The battery will not charge. | The battery is defective. | Replace the battery. After several years of average use, a gradual decline may be expected. |
|  | The battery contacts are dirty or damaged. | Check the battery connector contacts. Clean them if necessary. If the battery is damaged, replace it. |
| Satellite modem stops sending data even with good network connection and sufficiently charged battery. | Modem/battery is overheated. | If the LCD display indicates an over temperature condition let the Thuraya IP+ cool down before attempting to resume operation. |
| The signal quality meter on the wMMI changes from time to time. | Normal behavior. | There are several types of channels used by the modem, each with different signal strengths. Because the signal quality meter measures the channel currently in use, there may be slight differences in what the meter shows as channels are changed from one type to another. |

## ▶▶| Status Codes

| Number and Description | Cause | Solution |
|---|---|---|
| 1 SIM card is not installed. Power-down, install SIM card properly, and try again. | Absence or incorrect installation of the SIM card. | SIM card may not be present. Remove the battery and verify that the SIM card is present. |
| | | SIM card may be inserted incorrectly. Remove SIM card and make sure it is inserted according to the instructions in the User Guide. |
| | | SIM card may be damaged. Visually inspect the SIM card and return it to your service provider if damaged. |
| | | SIM card contacts may be dirty. Clean the SIM card contacts with a dry cloth. |
| | | If problem continues, replace SIM card with a known good SIM card. If problem persists, return the unit to your service provider for service. |
| 2 SIM card read/write error. Power-down and try again. | Failure to read from or write to the SIM card. | Power down Thuraya IP+ and try again. |
| | | SIM card may be damaged. Visually inspect the SIM card and return it to your service provider if damaged. |
| | | SIM card contacts may be dirty. Clean the SIM card contacts with a dry cloth. |
| | | If the problem continues, replace SIM card with a known good SIM card. If the problem persists, return the unit to your service provider for service. |
| 3 SIM card access has been blocked. Please contact your service provider. | Failure to access the SIM card due to too many failed | This occurs after three failed attempts to enter the PIN. The SIM card is locked. Enter the PUK to unlock the SIM card. |

| Number and Description | Cause | Solution |
|---|---|---|
| | attempts with an invalid PIN. | |
| 4 SIM card has been improperly changed during an active session. Power-down and try again. | You replaced a SIM card with another after the modem was turned on. | The SIM card must be replaced when the unit is turned off. Make sure the unit is turned off before replacing the SIM. |
| 5 SIM card is not responding. Power-down and try again. | Hardware failure to access the SIM card. | Power-down Thuraya IP+ and try again.

SIM card may be damaged. Visually inspect the SIM card and return it to your service provider if damaged.

SIM card contacts may be dirty. Clean the SIM card contacts with a dry cloth.

If problem continues, replace SIM card with a known good SIM card. If the problem persists, return the unit to your service provider for service. |
| 6 A required data field is missing from the SIM card. Please contact your service provider. | Absence of a required data field on the SIM card. | SIM card was incorrectly programmed and is missing one or more required fields. The SIM card must be replaced by another from your service provider. |
| 7 You are not allowed to connect to the network. Please contact your service provider. | Network connection failure because the user is not allowed to connect to the network. | Your authorization has been removed by your service provider (SIM card IMSI is not authorised). Contact your service provider to regain service. |
| 8 Your Thuraya terminal is not allowed to connect to the network. Please contact your service provider. | Network connection failure because the modem is not allowed to | The modem authorization has been removed by your service provider (modem IMEI is not authorized). Contact your service provider to regain authorized service. |

| Number and Description | Cause | Solution |
|---|---|---|
| | connect to the network. | |
| 9 You have no subscription; service is not allowed. Ensure you are using a valid Thuraya SIM. Please contact SP if problem persists. | Network connection failure because you are not identified as a subscriber to the service. | Contact your service provider to receive authorized service. Your service provider should check the subscription entries in the home location registry. |
| 10 The network detached the Thuraya terminal. Verify your settings (APN, IP, etc.) and retry. | Network connection broken with an unknown cause. | Power down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 11 Network connection failure; invalid parameters used for network attach procedure. Please contact your service provider. | Network connection failure due to use of invalid parameters. | Contact your service provider. |
| 12 Network connection failure; LLC or SNDCP failure.  Power-down and try again. | Network connection failure caused by LLC or SNDCP failure. | Power down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 13 Network connection failure; unknown PDP type.  Please contact your service provider. | Network connection failure. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 14 Network connection failure; user authorization failed. Please contact your service provider. | Network connection failure because the user is not authorized for service. | Contact your service provider to regain authorized service. Your service provider should check the subscription entries in the home location registry. |
| 15 Network connection failure; service option | Network connection | Contact your service provider to regain authorized service. |

| Number and Description | Cause | Solution |
|---|---|---|
| not supported. Please contact the service provider. | failure because the service option is not supported. | The service provider should check the subscription entries in the home location registry. |
| 16 Network connection failure; service option not subscribed. Verify your settings (APN, IP, etc.) and retry. Please contact SP if problem persists. | Network connection failure because user was not subscribed to the service option. | Contact your service provider to regain authorized service. The service provider should check the subscription entries in the home location registry. |
| 17 Network connection failure; N-SAPI has already been used. Power-down and try again. | Network connection failure because network assigned an N-SAPI that is already being used. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 18 Network connection failure; regular PDP deactivation by network. Power-down and retry. | The connection was deactivated by the network. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 19 Network connection failure; SM network failure. Power-down and try again. | Connection failure due to the network Session Manager (SM). | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 20 Network connection failure; too many failures to activate PDP context. Power-down and try again. | Too many failed attempts (4) to connect to the network. | This failure may occur because of a weak signal due to obstructions or geographic position (such as extreme latitude or longitude). Contact your service provider to verify coverage for your location. |
| 21 Network connection failure; Network assigned an invalid IP address. Power-down and try again. | Assignment of an invalid IP address by the network during connection. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. The service provider should verify that you have the correct network settings. |

| Number and Description | Cause | Solution |
|---|---|---|
| 22 Network connection failure; no response from network. Power- down and try again. | Network connection failure due to lack of a response from the network. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 23 Network connection failure; protocol error received from network. Power-down and try again. | Network connection failure due to a protocol error. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 24 Network connection failure; GPRS stack could not attach to MUX interface. Power-down and try again. | Internal software error. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 25 Network connection failure; GPRS stack could not detach from MUX interface. Power-down and try again. | Internal software error. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 26 SIM card error; IMSI field is longer than 8 bytes and is invalid. Please contact your service provider. | SIM card may have been programmed incorrectly. | SIM card was incorrectly programmed. The SIM card must be replaced by another from your service provider. |
| 27 GPRS software internal failure; GPRS stack message subscription failure. Please contact your service provider. | Internal software error. | Power-down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 28 Your PC has been disconnected from the Thuraya terminal. Please ensure the interface cable is plugged in securely. | The connection between terminal equipment and mobile terminal has been removed, or | Remove and reinsert the interface cable from both the PC and the Thuraya IP+. When done reboot the Thuraya IP+. |

| Number and Description | Cause | Solution |
|---|---|---|
| | the interface cable between terminal equipment and mobile terminal is not plugged in properly. | |
| 29 Your requested QoS parameters could not be met by the network.  Please try again later. | Current network resources cannot support the QoS requested. | Try a different QoS setting, or try again later. |
| 30 Your requested QoS parameters are not valid.  Please modify them and try again. | Network rejected Quality of Service parameters. | Try a different QOS setting. If the problem continues, contact your service provider. |
| 41 Your PC is opening large number of TCP connections. The Thuraya terminal is running out of resources. | Applications on your PC are generating excessive Internet connections. | Check your PC for applications that may open large numbers of connections and disable these applications. If the problem continues, contact your service provider. |
| 42 Excessive TCP requests from user devices have depleted NAT resources. Condition will eventually clear itself. To clear immediately, restart terminal. | Excessive TCP connections by the PC have consumed all available connection resources in the terminal. | Clean up PC applications that are creating excessive TCP connections.  Power-down Thuraya IP+ and try again. It should eventually clear itself, but if the problem continues, contact your service provider. |
| 101 You were detached by the network.  The Thuraya terminal is attempting to reattach. | Connection broken by the network. | The issue may clear itself shortly. If not, power down Thuraya IP+ and try again. If the problem continues, contact your service provider. |
| 102 No network connection; user | User initiated network disconnect. | User can reconnect using the wMMI or iMMI connection controls. |

| Number and Description | Cause | Solution |
|---|---|---|
| initiated detach from network. | | |
| 103 Network connection failure; PLMN is not allowed. Reacquiring connection... | Network connection failure due to PLMN not allowed. | If the problem continues, contact your service provider. |
| 104 Network connection failure; LA is not allowed. Reacquiring connection. | Network connection failure because Thuraya IP+ is in a Location Area (LA) where service is not allowed. | If the problem continues in other areas where service is allowed, contact your service provider. |
| 105 Network connection failure; Roaming is not allowed. Reacquiring connection. | You are using a SIM card from a carrier that does not have a roaming agreement with your service provider. | If the problem continues with an authorized SIM card, contact your service provider. |
| 106 Network connection failure; Thuraya terminal implicitly detached by the network. Reacquiring connection. | Connection was implicitly detached by the network. | If the problem continues, contact your service provider. |
| 107 Network service is not available; network resources not available. Reacquiring connection. | Network service not available due to lack of network resources. | If the problem continues, contact your service provider. |
| 108 Network service is not available. Reacquiring connection. | Network service not available. | If the problem continues, contact your Service Provider. |

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| Number and Description | Cause | Solution |
|---|---|---|
| 109 Network service is not available; packet data services not presently available in this network. | Network service not available. | If the problem continues, contact your service provider. |
| 110 Network service is not presently available; the Thuraya terminal is acquiring network. | Network service not available because cell access is barred. | If the problem continues, contact your service provider. |
| 111 Network service is not available; Limited network service. Reacquiring connection. | Network service not available due to limited service. | If the problem continues, contact your service provider. |
| 112 Network service is not available; invalid position. Update the GPS under open sky and ensure you are under the Thuraya coverage. | Network service not available because the GPS position is not valid. | Verify that the modem has an open view of the sky and can get a fresh GPS fix. If the problem continues, contact your service provider. |
| 113 Network service is not available; invalid position for the selected service provider. Reacquiring connection. | Network connection failure because the GPS position is not supported by service provider. | Verify that the modem has an open view of the sky and can get a fresh GPS fix. If the problem continues, contact your service provider. |
| 114 Network service is not available; invalid position for selected RAI. Reacquiring connection. | The GPS fix does not match the selected Routing Area Information (RAI). | Verify that the modem has an open view of the sky and can get a fresh GPS fix. If the problem continues, contact your service provider. |
| 115 Network service not available; unknown cause. | Network service not available; cause unknown. | If the problem continues, contact your service provider. |

| Number and Description | Cause | Solution |
|---|---|---|
| Reacquiring connection. | | |
| 116 Network connection failure; insufficient resources. Reacquiring connection. | Network connection failure due to insufficient resources. | If the problem continues, contact your service provider. Network may be down. |
| 117 Network connection failure; PDP rejected for unspecified reason. Reacquiring connection. | Network connection failure; unknown cause. | If the problem continues, contact your service provider. Network may be down. |
| 118 Network connection failure; service option temporarily out of order. Reacquiring connection. | Network connection failure because service option is temporarily out of order. | If the problem continues, contact your service provider. Network may be down. |
| 119 Network connection failure; PDP deactivated by network. Reacquiring connection. | Network connection failure. | If the problem continues, contact your service provider. Network may be down. |
| 120 No network connection; user initiated PDP deactivation. | The modem was powered down while connected to the network. | You will generally not see this code. In order for you to deactivate the PDP, you must power-down the terminal. If the problem continues, contact your service provider. |
| 121 Network connection failure; Missing or invalid APN. Please provide correct information and try again. | Network connection failure because the APN is missing or invalid. | Contact your service provider to get the correct network settings. |
| 122 Network connection failure; | Network connection | Verify that your service provider user ID and password are |

| Number and Description | Cause | Solution |
|---|---|---|
| Rejected by GGSN. Please re-enter user ID/password and try again. | failure due to rejection by the GGSN. | correctly set on the Login Settings screen. If they are correct and the problem continues, contact your SP. |
| 123 Network connection failure; subscribed QoS rejected by network. Please contact your service provider. | Network connection failure because the requested QoS was rejected by the network. | Modify the QoS settings and try again. If the problem continues, set all QoS settings to the default values and try again. If the problem continues with the default values, contact your service provider. |
| 124 Network connection failure; invalid transaction ID. Reacquiring connection. | Network connection failure due to invalid transaction ID. | If the problem continues, contact your service provider. |
| 125 Network connection failure; unknown session Manager error. Reacquiring connection. | Network connection failure due to unknown session manager error. | If the problem continues, contact your service provider. |
| 126 Network access temporarily unavailable; please wait; the Thuraya terminal should automatically reacquire a connection within 1-2 minutes. | Network connection failure because network access is temporarily blocked. | Network access is temporarily blocked. The network will send the modem a timer value, and the modem will attempt to connect again when the timer is complete.<br><br>If the problem continues, contact your service provider. |
| 127 Network access blocked; radio priority is less than threshold. Thuraya terminal waiting to be unblocked by the network... | Network access is blocked due to the user's priority. | You are blocked from network access due to your network priority.<br><br>If the problem continues, contact your service provider. |
| 128 Network blocked; GPS fix is too old. | Notification of a GPS fix during or | A new GPS fix was obtained during the connection process, |

| Number and Description | Cause | Solution |
|---|---|---|
| Please obtain new GPS fix in an open area away from obstructions. Please contact SP if problem persists. | after network connection procedure. | superseding the old fix. The modem should reconnect shortly.<br><br>If the problem continues and a new connection cannot be made, contact your service provider. |
| 129 Network access blocked; GPS location may be too old. Please obtain new GPS fix in an open area away from obstructions. Contact SP if problem persists. | GPS fix may be too old. | Verify that the modem has an open view of the sky and can get a fresh GPS fix.<br><br>If the problem continues, contact your service provider. |
| 130 Network access unavailable; GPS location needs updating. The Thuraya terminal will acquire a new GPS location and connection. Do not power-off! | GPS fix is too old. | The Thuraya IP+ terminal will acquire a new GPS location and connection. Do not power off the terminal. |
| 131 Battery temperature too high. | The battery is too hot. | Allow the terminal to cool down. |
| 132 Terminal temperature too high. | The terminal is too hot. | Allow the terminal to cool down. |
| 133 An external antenna is recommended to achieve the requested data rates. | Terminal may not reach desired data rates using internal antenna. | Connect an external antenna and try again, or change QoS request to use lower data rates. |

# GLOSSARY

**APN:** Access Point Name. APNs can be assigned to each external network interface to allow communications among multiple Internet Service Providers (ISPs). If use of multiple ISPs is required in your network, on Thuraya IP+ wMMI Network Settings screen you can enable APN and enter the value supplied by your service provider.

**DHCP:** Dynamic Host Configuration Protocol. DHCP is a communications protocol that lets network administrators manage centrally and automate the assignment of IP addresses in an organization's network. With use of the Internet Protocol, each machine that can connect to the Internet needs a unique IP address. You must make sure that the Windows network settings on your PC are set to allow the network to choose IP settings automatically.

**DNS:** Domain Name Service, a static, hierarchical name service for TCP/IP hosts. The network administrator configures the DNS with a list of host names and IP addresses, allowing users of workstations configured to query the DNS to specify remote systems by host names rather than IP addresses. On Thuraya IP+ wMMI Network Settings screen, a primary and possibly a secondary DNS address supplied by your service provider must be assigned.

**Ethernet**: Ethernet is a local area networking method used widely throughout the computer industry.

**GGSN**: Gateway GPRS Support Node.

**GPRS**: General Packet Radio System.

**GPS**: Global Positioning System. When the GPS receiver in Thuraya IP+ gets a bearing on a GPS satellite, the receiver computes and stores the modem's location on earth. That location is used in the pointing process to obtain your location relative to the Thuraya satellite.

**NAT**: Network Address Translation.

**Normal Operational Mode**: In this mode, Thuraya IP+ is connected to your network, allowing you to perform standard system activities such as Internet browsing. The other mode of modem operation is **Pointing Mode**.

**PDP**: Packet Data Protocol.

**Pointing Mode**: In this mode, using Thuraya IP+ Protractor and Compass, and referencing the Pointing screen for indications of signal strength, you manipulate the modem antenna to get the optimum Thuraya

satellite signal strength for your network connection. Pointing is required during modem setup or if the modem has been moved from its previous location. Once you have obtained the best antenna position, you can enter Normal Operational Mode and be ready to perform standard activities.

**Protractor**: An instrument that measures angles, Thuraya IP+ protractor provides the current angle of the antenna so that you can adjust it to the antenna angle specified on the Pointing screen.

**QoS**: Quality of Service.

**SIM**: Subscriber Identification Module. Your service provider issues you a SIM, containing your SIM Personal Identification Number (PIN) and other security-related information. You insert the SIM into Thuraya IP+ SIM holder as part of Modem hardware setup. If you configure the modem to enable SIM PIN security, each time you invoke the modem wMMI after turning on the modem, PIN authorization is required in order to use the system.

**SIM PIN:** A Subscriber Identification Module (SIM) Personal Identification Number (PIN) may be supplied by your service provider. If SIM PIN entry is enabled on Thuraya IP+ wMMI Security Management screen, a prompt requests you to enter the SIM PIN each time you run the wMMI. This helps prevent unauthorised use of your SIM.

**Static IP Address:** A static IP address is a number that is assigned to a computer by an ISP to be its permanent address on the Internet. Computers use IP addresses to locate and talk to each other on the Internet. If static IP addressing is enabled on Thuraya IP+ wMMI Network Settings screen, you must enter an IP address supplied by your service provider in the static public network IP address field that follows.

**Status Code:** A number which uniquely references an event or condition in a hardware or software system. In Thuraya IP+, if there is a fault detected, the status code and a description are displayed at the bottom of the modem wMMI home and status screens.

# SPECIFICATION

| Physical Characteristics | |
|---|---|
| Weight | 1.4 kg (terminal and battery) |
| Size | 216mm x 216mm x 45mm |
| **Packet Data Services** | |
| Streaming IP | 384 kbps |
| Standard IP | 444 kbps |
| **Environmental** | |
| Operating Temperature | Using external supply: -25° C to +55° C |
| | Using battery: 0° C to +50° C |
| Storage Temperature | Including battery: -20° C to +60° C |
| | Excluding battery: -25° C to +80° C |
| Operating Humidity | 95% RH at 40° C |
| Mechanical Vibration | 200-2000 Hz, 0.3 m²/s³ MIL-Spec 810B |
| Unpacked Drop | 0.5 m (cosmetic damage only) |
| Ingress Protection | IP55 Standard |
| **Compliance and Certifications** | |
| | CE, EMC 301 444, 301 489, IEC 60950 |
| **External Power** | |
| Main power supply adapter | 100-240 V AC at 50-60Hz |
| Output Voltage | 19 volt DC, 3.4 amps |
| **Battery** | |
| Battery Life | Up to 30 hours stand by time |
| | More than 1 hour of continuous transmission at the highest rate |
| Battery Type | Lithium-Ion |
| **Interfaces** | |
| Connectors | Ethernet (RJ-45) |
| User Interface | Web-based graphical user interface accessible via standard Web browser |
| External Antenna Connector | - GPS<br>- Thuraya Satellite (passive and active antennas) |
| WLAN Connectivity | IEEE 802.11 b/g/n standard with:<br>- WEP, WPA and WPA2 encryption<br>- SSID broadcasting control<br>- MAC address filtering<br>- DHCP |

# APPLICATION NOTE – BATTERY SAFETY

## SAFETY INFORMATION
a. Replace battery with 3500800-0007 or 3500800-0008 battery <u>only</u>. 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 using a Thuraya IP+.
   • The Thuraya IP+ charges with a constant-voltage over a temperature range: 0°C to +40°C.

## 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.

# EU DECLARATION OF COMPLIANCE

We,

**Hughes Network Systems**

of

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

hereby declare under our sole responsibility that the product

**Thuraya IP+ Broadband Satellite IP Modem**

is in conformity with the following standards and/or other normative documents.

All essential radio test suites have been carried out, and the product is in conformity with the essential requirements of Radio Equipment Directive (RED) 2014/53/EU.

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

EN 62311:2008

EN 60950-1:2006/A2:2013

IEC 60950-1:2005/AMD2:2013

IEC 60529:1989 + A1:1999 + A2:2013

*For article 3.1(b), Electromagnetic Compatibility:*

EN 301 489-1 V2.1.1 (2017-02)

EN 301 489-17 V3.2.0 (2017-03)

EN 301 489-20 V1.2.1 (2002-11)

*For article 3.2, Effective Use of the Spectrum Allocated:*

EN 300 328 V2.1.1 (2016-11)

EN 301 444 V2.1.2 (2016-11)

*RoHS-2 Directive 2011/65/EU*

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

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

Identification mark:

$C\,\epsilon$

The technical documentation relevant to the above equipment is held at:

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

**Graham Avis**

**Vice President**

**9-October-2017**

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