Thuraya m2m

User Guide

Thuraya FT2225
Satellite M2M Terminal

ViaSat

Thuraya m2m

Powered By ViaSat

Declaration of Conformity

ViaSat, Inc., of 6155 El Camino Real, Carlsbad, CA, 92009, USA, declares under our sole responsibility that the product ViaSat FT2225 Terminal to which this declaration relates, is in conformity with the following standards and/or other normative documents:

ETSI EN 301 444 , ETSI EN 300 328, ETSI EN 301 489-1, ETSI EN 301 489-17, ETSI EN 301 489-20, IEC 60950-1, IEC 60950-22, Council Recommendation 1999/519/EC.

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

ViaSat, Inc. declares that this Satellite Modem is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. To ensure regulatory and safety compliance, use only the provided power and interface cables.

The technical documentation relevant to the above equipment will be held at:
ViaSat, Inc., 6155 El Camino Real, Carlsbad, CA, 92009, USA

EU ROHS (RESTRICTION OF HAZARDOUS SUBSTANCES) DIRECTIVE
FT2225 units marked RoHS meet the European Union (EU) directive 2002/95/EC on Restriction of Hazardous Substances.

EU REACH (REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS) DIRECTIVE
FT2225 units marked REACH meet the European Union (EU) directive 1907/2006/EC on Restriction of Chemicals.

EU WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT) DIRECTIVES
FT2225 units marked with WEEE meet the European Union (EU) directive 2002/96/EC on waste electrical and electronic equipment. WEEE mandates recycling of electrical and electronic equipment throughout the EU.

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

For addition information, contact Thuraya at: www.thuraya.com

Warnings, Cautions, and Notes

Safety precautions or important information found in this document will normally be presented just prior to the point where the hazard is likely to be encountered. Symbols used to identify the information are defined as follows:

Warning   This symbol indicates a procedure or practice that, if not correctly followed, could result in injury, death, or long term health hazard.

Caution   This symbol indicates a procedure or practices that, if not correctly followed, could result in equipment damage, destruction, or make the equipment not operate properly.

Caution   This symbol indicates that electrostatic discharge (ESD) precautions must be observed or the equipment may be damaged.

Note   This symbol indicates information that is important to observe.

General Safety Precautions

General safety precautions are as follows:

Warning   **There are no user-serviceable parts inside any of the equipment in your system. There are no lethal voltages inside the equipment. It should only be opened by a technician trained and certified to service ViaSat products.**

Warning   **This device emits radio frequency energy when in the transmit mode. In order to comply with FCC RF Exposure limits, the unit must be installed in a way such to ensure that the minimum separation distance of 1 ft is maintained between the antenna and nearby persons.**

About This Manual

This manual contains information about the M2M FT2225 Terminal including installation procedures, webpage operations, and troubleshooting procedures.

Obtaining Additional Publications and Information

Additional publications and information including user guides, white papers, application notes, release notes, software updates, training schedules, and other technical information may be found on the Thuraya web site, located at this URL: **http://www.thuraya.com/products/m2m**

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1   Introduction

1.1 Introduction to the M2M FT2225 Terminal

The High Performance FT2225 Terminal is a compact, rugged fixed L-band satellite terminal designed to provide dependable, instant IP-based machine-to-machine (M2M) communications via ViaSat's L-band Managed Service (VMS) over the Thuraya Satellite system. The FT2225 two-way networking capability enables both real-time monitoring and real-time control for a wide range of M2M applications as:

Figure 1: FT2225 Terminal

Field devices can instantly be assessed and adjusted remotely; such as gas valves, smart grid sensors, water pumps, and reservoir level indicators, and data and voice communications. AES-256 data link layer encryption is employed to ensure the integrity of your data is not compromised.

The terminal includes embedded, beyond-line-of-sight connectivity, enabling direct communications between remote locations and with control nodes. With an IP-based network architecture and multiple wired and wireless interfaces, the FT2225 terminal easily integrates with your existing M2M system to support any real-time remote monitoring and control application.

Rugged IP66 dust and powerful water jet resistant enclosure ensure reliable communications in the toughest environments.

The guidelines below provide an overview of the terminal's capabilities and basic operation. For detailed configurations, please contact your FT2225 retailer, or the Thuraya customer support hotline listed at the back of this manual.

1.2 Features of FT2225

Key Features of FT2225 includes:
- IP-based networking
- LHCP & RHCP operation
- Wired Ethernet and WiFi interfaces
- Easy antenna pointing via an app on your smartphone or tablet
- Built-in DHCP/NAT router
- Full-duplex connectivity
- Low-latency for instant message transfer and real-time monitoring with no delays
- Embedded commercial GPS + GLONASS
- Netted Voice
- IP66
- 10-32 V DC Input
- Built-in Web MMI
- AES-256 Encryption

1.3 FT2225 Standard Equipment and Optional Accessories

1.3.1 Standard Equipment

The FT2225 features the following standard accessories.
- FT2225 Terminal
- Connector mating kit
- 2x .250-20 UNC-2A screws

1.3.2 Optional Accessories

AC power cords (IEC320/C13)
- 1060200 US 6ft
- 1077791 Europe 2m
- 017197-0000 UK 2.44m
- 1187795 Australia/NZ 6.5 ft

POE Injector
- 1228500 Power in AC 100-240V, IEC320/C14 Power out 24W@ 24VDC

Power/ Ethernet Cables
- 1228501 3Meter
- 1228502 10Meter
- 1228503 30Meter

FT2225 Mount Kit
- 1228505 Power Mount Kit

1.4   Key Specifications

The key specifications for FT2225 are summarized below:

Category	Specification
Size (LxWxH in.):	7.23" x 5.13" x 1.63"
Weight	< 2.64lbs
Power Consumption	18W max
Antenna Receive G/T	Up to -21.0 dB/K at Zenith
Antenna Transmit EIRP	Up to +4 dBW at Zenith, configurable in 0.1 dB steps
Frequency Range	Extended L-band RX: 1518.0-1559.0 MHz TX: 1626.5-1675.0 MHz
Modulation	RX: BPSK, QPSK, 8-PSK and 16-APSK TX: CRMA
Waterproof/Dustproof	Transceiver: IP 66
Humidity	up to 95% condensing at 45°C, per IEC 60068-2-30
Temperature - Operating	-40°C to +71°C
Temperature - Storage	-40°C to + 85°C
Solar Radiation	1120 W/m2; per IEC-60068-2-5
Vibration (Operational)	Random vibration of 1.05g rms at vibration spectrum: 5 to 20WW Hz: 0.02g2/Hz 20 to 150 Hz: -3dB/octave
Vibration (Survival)	Transportation vibe per IEC 60068-2-64, Freq: 5-200Hz, ASD: 1.0m2/s3
Shock (Operational)	IEC 60068-2-64, 50m/s2, 11 ms
Shock (Survival)	Transportation shock per IEC 60068-2-29, A = 180m/s2, t = 6mS
Approval	CE, FCC, IC

2   Getting Started

2.1 Unpacking

The FT2225 is shipped in packaging materials that are uniquely designed for the product. The following packing list describes the contents of a typical FT2225 shipment:

1. FT2225 Terminal
2. Cable assembly, Pigtail, 10 meters (VPN 1212846)
3. Hardware Kit (2x .250-20 UNC-2A screws)

Upon unpacking of the box, inventory the contents and inspect for sign of damages during shipping. Contact your retailer in case of missing contents or noticeable defects.

To get started, additional following items are required:

Note: Contact your terminal integration partner for specific mounting equipment

1. Mount (Platform Dependent)
2. Grounding cable (Platform Dependent)
3. Phillips Screwdriver
4. Compass/inclinometer

2.2 Selecting Mounting Location

Warning

Terminal antenna should be kept at least 1 foot from direct exposure to humans

The FT2225 Terminal is designed for fixed outdoor installation. The terminal can be mounted on a pole or flat surface using one of the Installation kits (optional accessories).

Mounting location should be selected to provide the terminal with a clear line of sight to the operational satellite. Figure 2 illustrates improper placement of the terminal. The terminal is placed in front of a tall building, resulting in an obstructed view of the satellite. Figure 3 shows proper placement of the terminal. The terminal is placed away from the taller building and has a clear, unobstructed view of the satellite.

Terminal should be placed as far away from other transmit antennae as possible.

A minimum of 2 ft from GNSS antennae is recommended.

Figure 2: Poor Terminal Location - Line of Sight Blocked by Obstruction

Figure 3: Good Terminal Location - Line of Sight Clear

To avoid refection at low satellite look up angles (less than 10 degrees), elevate terminal from ground level.

2.3 Installation

The terminal is 7.23" long by 5.13" wide (excluding connector) and 1.63" high. The terminal is designed to be hard-mounted to fixed platforms. Two .250-20 UNC-2A size mounting hole locations are located on the underside of the terminal as shown in Figure 4. Optimal mounting method depends on chosen location. Examples of mounting methods are illustrated in *Appendix C: Pole Mount and Appendix D: Roof Mount Example.*

Caution: Any blockage of the radome and antenna may reduce performance of the Terminal.
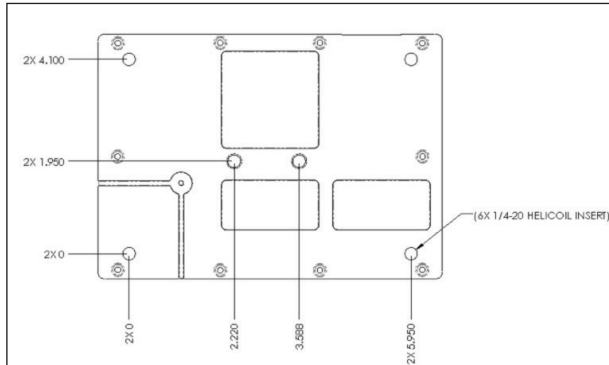
Figure 4: Terminal Mounting Hole Locations

Caution: Inspect cables for possible damage prior to installation

The terminal should be installed with the connector facing down or sideways, but not up. An example of installation with connector facing down is shown in Figure 5.

Caution: Do not over tighten

Figure 5: Terminal Mounting Example

Caution: Do not apply pressure to the cable/ connector during the installation.

A minimum of 4.00 inches of clearance from the connector side of the terminal is suggested for cable access and strain relief.

Caution: Do not force the connector pins to mate since this may damage the pins.

Reattach the connector to the terminal receptacle carefully. Align the plug tab with the receptacle tab as shown in Figure 6 and gently push the connector until it stops. Rotate the locking collar on the connector gently until it is properly engaged as shown in Figure 7. AVOID USING A WRENCH OR PLIERS TO TIGHTEN OR LOOSEN THE CONNECTOR. Using a tool other than your hand may result in over-torqueing or damaging the internal seals.

Figure 6: Key Slot

Figure 7: Cable Connector and Locking Collar

2.3.1 Cable and Connector Management

To protect the terminal's connector interface, follow the guidelines below:

- Install adhesive-lined shrink tubing as required around the cable ends to improve cable harness performance and maximize wear life.

- Install a metal cable tie holder with an outdoor rated epoxy/adhesive for best holder retention.

- Secure the cable with metal tie holders and black UV-rated cable ties at intervals along the cable assembly to minimize cable and connector strain as shown in Figure 8.

- Leave enough slack at the terminal connector end to reduce tension when installing or removing the connector.

- Route the remaining cable assembly neatly for a professional installation appearance.

Figure 8: Cable Management

After mounting the terminal to a support and reattaching the connector to the terminal, it is ready for power on.

2.4 Powering up

The FT2225 terminal is designed to automatically start up when DC power is applied. An ON/OFF power switch does not exist on the terminal.

At the completion of its power-up sequence, the terminal will automatically search for GNSS and VMS satellite signals.

2.5 Obtaining a GNSS Fix

The VMS network does not require the terminal location to access the network. However, terminal location enables optimal customer service.

At the completion of its power-up sequence, the terminal will automatically search for GNSS and VMS satellite signals. The default position reporting uses GPS satellites and terminal will automatically attempts to get a new GPS fix every time it is powered on. Obtaining a fix may take between a few seconds and 5 minutes.

2.6 Antenna Pointing

In order to obtain the best possible signal, it is important that the terminal is pointed correctly towards a VMS satellite. Incorrect pointing may result in poor signal quality, and in some cases prevent terminal from being able to operate on VMS network.

2.6.1   Pointing Using Commercial Satellite Finder Apps

Appendix F: VMS Pointing Procedure contains a list of popular antenna pointing apps. Use Coverage map provided in *Appendix E: Satellite Coverage Map* to determine appropriate VMS satellite.

Follow direction in *Appendix F: VMS Pointing Procedure* to point the terminal.

2.6.2   Pointing Using Web Server

Select **Antenna Pointing** under the **Administration** tab. The RSSI meter reports a value that is proportional to receiver signal strength. Turn and tilt the antenna to fine tune pointing using the signal strength indicators. The number of bars that are green indicates the strength of the received signal. Try to maximize the number of bars to the extent possible.).

2.6.3   Pointing Using VMSFinder

VMSFinder is an antenna pointing application, developed specifically for VMS. In order to use VMSFinder with your smart phone, you will first need to download and install VMSFinder from TBD. Please ensure that DC power is disconnected from the FT2225.

To perform pointing procedure, perform the following actions:

1. Start Sat Aligner app
2. Make sure that location services is enable on your smart phone (VMSFinder uses GPS position to select proper satellite)
3. Lay the phone flat on top of the FT2225 radome
4. Turn and tilt the FT2225 and the phone together until the circle representing the satellite moves to the center crosshairs and turn green
5. Secure the unit in place
6. The FT225 is now ready for use

2.7 Connecting Your FT2225 to Other Equipment

2.8 Interfaces

The FT2225 Terminal offers the following wired interfaces via a multi-pin circular connector as shown in Figure 9.
- DC Power
- LAN

The FT2225 Terminal offers the following wireless interfaces:
- WLAN

PIN9   PIN1
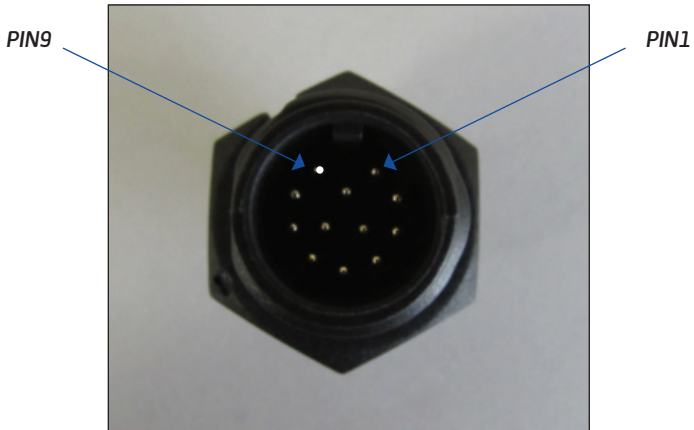
Figure 9: View of FT2225 Terminal Receptacle

Table 1: FT2225 Terminal Connector Pinout

MANUFACTURER	Receptacle Part Number	Mating Connector Part Number
CHOGORI	22012515-02	22012211-01

PIN NUMBER	SIGNAL NAME	DESCRIPTION
1	RX-	ETHERNET RECEIVE (-)
2	RX+	ETHERNET RECEIVE (+)
3	TX-	ETHERNET TRANSMIT (-)
4	TX+	ETHERNET TRANSMIT (+)
5	NC	NO CONNECT
6	VIN RTN	VDC RETURN
7	VIN RTN	VDC RETURN
8	VIN	+10VDC to +32VDC
9	VIN	+10VDC to +32VDC
10	Reserved	Reserved
11	Reserved	Reserved
12	Reserved	Reserved

2.8.1   Wired Interface

2.8.1.1 DC Power Interface

The FT2225 Terminal is designed to use +10 to +32 Volt Direct Current (VDC) electrical power systems. Optimal power supply efficiency is when input supply voltage is closer to the lower end of the range. Thuraya recommends using a 12V power supply when possible.

The nominal power consumption during receive is approximately 7 Watts (W). During transmission bursts or terminal boot up, the power draw can be up to 18W with a 4.5A surge for 5 milliseconds. Thuraya recommends a power supply with a minimum power rating of 25W to provide adequate power margin as well as to support the initial turn-on current surge of 4.5A.

The terminal protects against continuous inputs of -32.0 VDC to +32.0 VDC. Applying an input voltage outside this range may permanently damage the terminal and cause it to become non-operational.

The terminal offers a bonding point by using .190-32 UNF 2B threaded, blind hole. This bonding point allows the use of a threaded fastener to connect the terminal to platform potential.

The FT2225 will automatically start up when DC power is applied. There is no ON/OFF power switch.

2.8.1.2 Ethernet Interface

The Ethernet interface is defined by IEEE 802.3 for operation in 10Base-T and 100Base-TX modes with the exception of the connector type. Cabling for Ethernet connectivity must meet ANSI/TIA/EIA-568-A specifications for Category 5 or Category 5e cables. It is recommended that the wired Ethernet interface is used for permanent installation. Contact your terminal retailer for power/Ethernet cable or build your own cable assembly as shown in section 6.

2.8.2   Wireless Interface

2.8.2.1 WLAN Interface

To connect your WLAN-enable device to the FT2225, perform the followings:
1. Make sure that WLAN feature on your device is turned on
2. Place the device close to the FT2225
3. On your device, search for available WLAN networks.
4. The default SSID will be **vmt_<FTI>** where <FTI> should be replaced with the fixed terminal identifier unique to your terminal. Check the label on the terminal enclosure to obtain the FTI.
5. Select the SSID of your terminal network when it appears on the list.
6. The default password is **terminal**.

3   Connecting to the FT2225 Terminal

The FT2225 Terminal will attempt to log in automatically to an available satellite network as soon as it is powered on. Features of the terminal can be controlled using the web interface. The user interface is presented as a web page that is accessible from the terminal. This interface is used for determining terminal operational status, satellite link status and other terminal information. This interface allows the user to perform control actions on the terminal for certain activities such as reboot, managing IP addresses/ports, and controlling default transmit power-up states.

3.1   Web Server Connection

3.1.1   Address/Port Number

The web server address will be the same as the terminal IP Address. By default, the terminal IP Address is 192.168.1.1. The terminal IP Address is defined as the Destination IP Address for incoming datagrams to the terminal. This address is configurable through the maintenance web page. The web server port number is set to the standard port 80.

To connect to the terminal, enable DHCP settings on your PC, and enter the terminal IP address in your web browser.

If you do not wish to use the default DHCP server configuration, you will need to ensure that your PC's static IP address is on the same network as the terminal.

3.1.2   Protocol

The web server will use the HTTP protocol for connection with the platform interface devices.
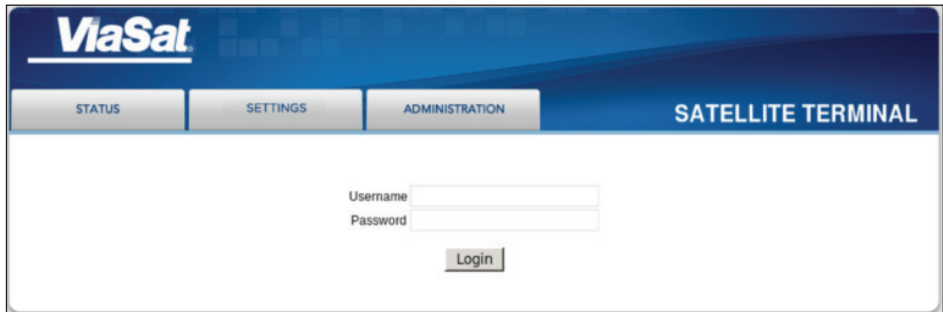
3.1.3   Web Browsers Supported

The FT2225 Terminal may be accessed by using the latest released version of the Google Chrome browser.

3.2 Login

The web server will present a login screen for the user to access all activities shown below. Without the proper user login, no terminal functionality or status is available from the web page. The terminal will be responsive to all login requests during all modes of operation.

Contact your terminal retailer or integrator for login credentials for your FT2225 Terminal.
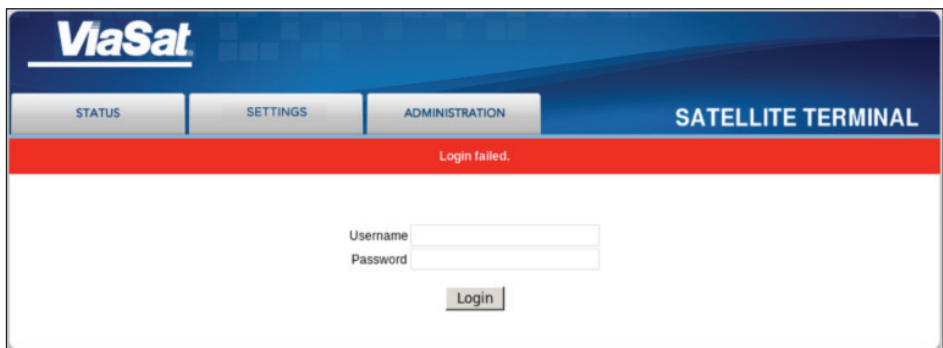
Figure 10: Login Screen

The default Username/Password is **admin/admin**. After a successful login, the user will be directed to the System Status page in Section 3.3.

After an unsuccessful login, the following web page with error banner is presented.

Figure 11: Failed Login

3.3 Status Tab

The status bar is included at the top of each page. It displays the current status of the connection to the network and the latest GPS information.
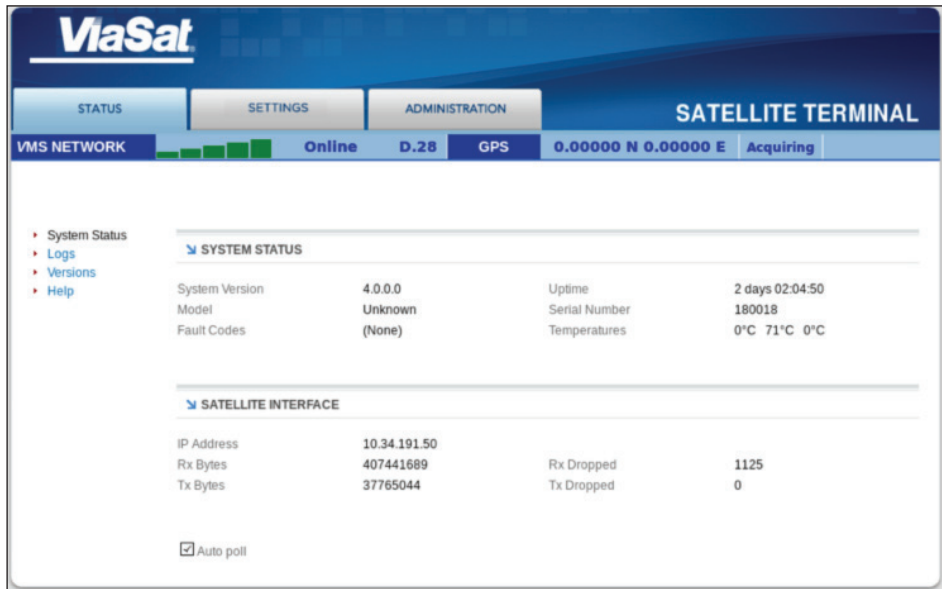
Figure 12: Status Tab

Network

Note: Signal strength will vary based on factors such as terminal location, current data rate, and service plan.

The received signal strength bars indicate the current received signal strength. The number of bars that are green indicates the strength of the received signal for the modulation scheme being used on the current received forward link.

The status field shows the current state of the terminal on the network. Possible statuses are shown below:

Table 2: Network Status

Searching	Terminal is searching for the forward link
Acquired	Terminal has acquired a forward link
Registering	Terminal is registering with the network
Online	Terminal logged in to the network and ready for use
Online	Terminal logged off the network
Re-Registering	Terminal requesting to re-login

GNSS

The GNSS fields show the current location. The location will only be valid when the terminal has acquired enough GPS/GLONASS satellites for a valid fix.

3.3.1 System Status

System status displays general information about the current system.

⚠️ *Caution*

If you are experiencing issues with your FT2225 Terminal or observing fault codes after reboot attempts, contact customer support.

The *Tx* Bytes and *Rx* Bytes fields display the number of bytes sent and received over the satellite. The *Tx Dropped* field displays the number of outgoing packets intended to be sent over the satellite link but were dropped due to queue limitations, encryption failure or other transmit errors. The *Rx Dropped* field displays the number of incoming packets that were dropped due to space limitations, decryption failure, data integrity check failure or other reception errors.

The *Temperature* field displays current temperature in Celsius within the terminal.

Table 3: System Status Fault Codes

Description	Fault Code	Action
General fault	0x01 - 0x53	Reboot the terminal
Overtemp fault	0x61 - 0x63	Place terminal in environment less than +70°C and power off until terminal cools down.
Undertemp fault	0x69 -0x6B	Place terminal in environment greater than -40°C until terminal warms up.
Power fault	0x70 or other	Reboot the terminal

3.3.2 Logs

The Logs page allows the user to view or display system log files. All log files with the exception of the NV Log are volatile and are not maintained through reboots. The NV (Non-Volatile) Log contains high priority information that is saved through reboots.
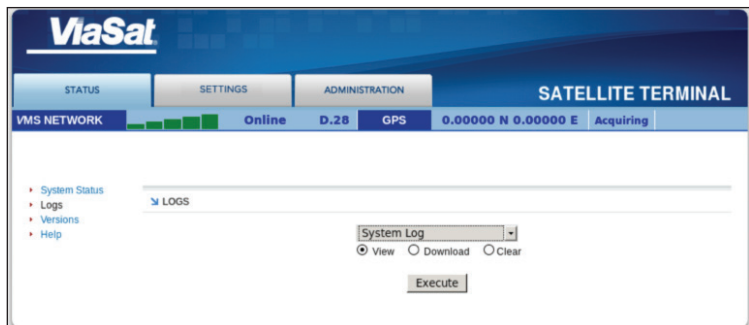
Figure 13: Logs Pane

System Log

The System Log displays information about the operating system environment, including drivers and devices.

Control Message Manager

The Control Message Manager processes network control messages and maintains the terminal login state.

Web Administration

This log file contains information about actions performed using the Web Administration interface.

AT Server

The AT Server logs interactions between the internal AT command server and external AT clients.

GPS

The GPS provides information regarding the internal GPS receiver and client.

NV Log

The NV logs high-priority terminal information that is maintained through reboots.

3.3.3 Versions

This field displays the version number of each terminal software component.

3.4 Settings Tab

The settings tab lists terminal settings that can be modified by the user. A description of each setting is listed below.

⚠️ *Caution Modifying the IP Address and Subnet Masks can result in loss of connectivity to the terminal. See Section 4 for more information on network configuration settings and examples.*

3.4.1   Network IF

The Network IF pane allows the user to set both the wired and wireless IP/subnet mask for the terminal.

Figure 14: Network IF Pane

Configure the Ethernet interface IP Address and Subnet Mask. These fields must be in dot notation (a.b.c.d) and contain a valid IP address.

3.4.2 DHCP Server

When the DHCP Server is enabled, there are two options for DHCP server configuration, dynamic and static.

Dynamic Assignments

The DHCP server can be configured with a pool of IP addresses that it will lease to clients.

The Pool Start and Pool End fields are set to the start and end IP addresses. The Netmask field is set to the subnet mask that a client should use. Each of these fields must be a valid IP address or subnet mask in dot notation. The lease time is the time in minutes that a lease given to a client will be valid.
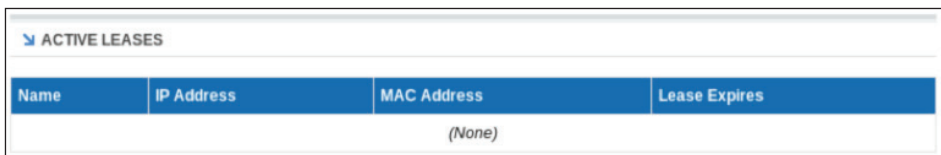
Static Assignments

The DHCP server can also be configured to provide a static IP address to a particular network device. The network device is determined by its hardware MAC address. Each time the DHCP server gets a request from a device that matches the MAC address the assigned IP address will be given to the device.

The Name field is the hostname of the network device that will be assigned a static IP address. This name must not contain any white space and should consist of alphanumeric characters, hyphens or underscores. The MAC Address field is set to the MAC address of the network device. This field must be specified as follows: xx:xx:xx:xx:xx:xx, where xx is a two-digit hexadecimal number. The IP Address field specifies the IP address to be assigned to the network device with the corresponding MAC address. The IP address is specified in dot notation (a.b.c.d).

Active Leases Table

Any currently active DHCP assignm ents are shown in the Active Leases and Static IP Assignments tables.

Name	IP Address	MAC Address	Lease Expires
(None)			

Figure 15: DHCP Server - Active Leases

Ethernet DHCP Dynamic Address Pool

The IP address allocation and lease time for the wired Ethernet dynamically-assigned DHCP address pool is configured in this table.

⬎ ETHERNET DHCP DYNAMIC ADDRESS POOL				
Pool Start	**Pool End**	**Netmask**	**Lease Minutes**	
192.168.1.100	192.168.1.200	255.255.255.0	1440	Save

Figure 16: DHCP Server – Wired Ethernet DHCP Dynamic Address Pool

WIFI DHCP Dynamic Address Pool

The IP address allocation and lease time for the WLAN dynamically-assigned DHCP address pool is configured in this table.

⬎ WIFI DHCP DYNAMIC ADDRESS POOL				
Pool Start	**Pool End**	**Netmask**	**Lease Minutes**	
				Save

Figure 17: DHCP Server – WLAN DHCP Dynamic Address Pool

Static IP Assignments

The IP address to MAC pairing for static IP assignments is contained in this table.

⬎ STATIC IP ASSIGNMENTS			
Name	**IP Address**	**MAC Address**	
		(None)	

Figure 18: DHCP Server – Static IP Assignments Table

Static Routes

Static routes are configured and listed in these tables if desired.

⬎ STATIC ROUTES			
Destination	**Netmask (CIDR)**	**Gateway**	
	/		Add

⬎ STATIC ROUTE TABLE			
Destination	**Netmask (CIDR)**	**Gateway**	

Figure 19: DHCP Server – Static Routes Tables

3.4.3 Port Forwarding

The FT2225 terminal provides a network address translator (NAT) that creates a private network for devices attached to the terminal. Devices behind the terminal NAT are invisible to any hosts outside the terminal NAT.

The only way to access a device behind the terminal is either:
• Have the device behind the terminal initiate the connection
• Create a port forwarding assignment to the device in the terminal

Port forwarding allows incoming UDP or TCP packets destined for a specific port to be forwarded to a network device behind the terminal NAT. The incoming packet will be forwarded to the destination port and IP address defined by the port forwarding rule. Using port forwarding assigns the port being forwarded to a single host IP address and excludes this port from being used by any other host.

Port Forward Assignments
Any currently active port forwarding assignments will be shown in the Port Forwarding Assignments table.

To add a port forwarding configuration, enter the following information into the Port Forwarding table:

1. **Name** – Set to the logical name of the service being forwarded. This name must not contain any white space and should consist of alphanumeric characters, hyphens or underscores.

2. **Incoming Port** – Set to the port number of the service to be forwarded, such as 21 for FTP.

3. **Protocol** – Select between UDP/TCP/Both.

4. **Server IP** – Set to the IP address, in dot notation, of the host that the packets will be forwarded to.

5. **Server Port** – Set to the port number on the Server IP that the packets will be sent to. This port can be the same as the Incoming Port, but does not need to be.

6. When complete, click **Add** and the assignment will show up in the Port Forwarding Assignments table.

Figure 20: Port Forwarding Pane

3.4.4 WIFI IF

The WIFI IF pane is used to configure your wireless access point interface for the WLAN.

To configure the access point settings set the following:

1. **SSID** – This is also known as your network name. Provide a unique SSID for the network. The name must not exceed 32 keyboard characters.

2. **Network Password** – The terminal uses WPA2 encryption. Use this field to set the network password for the WLAN.

3. **Channel** – Choose the operating channel for your WLAN.

4. Click **Save**.
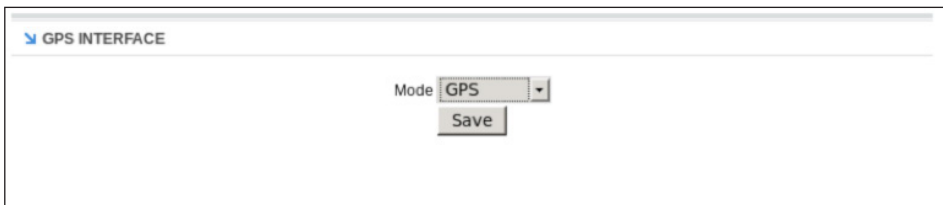
Figure 21: WIFI IF Pane

3.4.5 GPS/GLONASS IF

The GPS/GLONASS IF pane is used to select the operating mode for the GPS/GLONASS location services.

Select the pull-down for the desired mode and click **Save**.
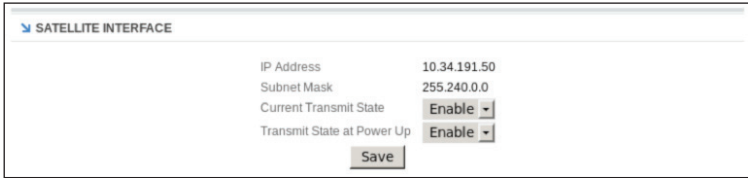
Figure 22: GPS/GLONASS IF Pane

3.4.6 Satellite IF

Configure the satellite interface transmit settings. These settings can be used to inhibit terminal transmissions, both in real-time and at boot up.

Figure 23: Satellite IF Pane

The IP Address and Subnet Mask fields contain the external (Satellite Interface) address configuration assigned to your terminal. These fields are assigned by your service provider.

Current Transmit State – Allows you to alter disable your terminals ability to transmit if desired. For normal operation, this should be set to **Enabled**. If disabled, your terminal will not be able to send data over the satellite interface.

Transmit State at Power Up – Allows you to alter the power up behavior so that the terminal will not transmit when powered up. For normal operation, this should be set to **Enabled**. If disabled, your terminal will not be able to send data over the satellite interface on power up.

3.5 Administration Tab

The Administration tab provides additional information and settings such as file uploads and user administration.

Antenna Pointing

This field applies to the FT2225 Terminal only. To achieve optimum satellite link performance and stability, the terminal should be pointed directly towards the satellite. Section 2.6 contains details on how to optimally point the terminal. This pane reports the current receive signal strength indication (RSSI) of the terminals satellite network link.

Crypto

Displays status of the encryption engine used to provide data security.

File Upload

The file upload function is used to upload terminal configuration files.

HW Diagnostics

Executes any or all of the terminal built-in tests. These diagnostics test the basic functionality of the hardware components of the terminal. They can aid in finding the cause of any hardware faults reported by the terminal. These tests should only be run when the terminal is offline.

Logout

Initiates log out from the current webpage session.

Net Diagnostics

Network diagnostics initiates pings to the destination IP address up to a maximum count of 10 times. The results of the pings will be displayed.

OSD Status

Over-the-Air Software Download (OSD) downloads new software into the terminal using the satellite link instead of a local file upload. This page displays the current status of any downloads in progress. OSD is a "trickle file download", using only any idle capacity in the satellite link sent in the background of transporting of user data.

Passwords

To changes the password of the current logged in user. Please contact customer care.

Reboot

Initiates reboot of the terminal.

4   IP Data Interface

The following section details the Network architecture, and provides instructions for setting up typical configurations on the Network to use as a reference.

4.1   IP Network Architecture

The IP network architecture and the IP address scheme that network devices communicating through the VMS hub, which is located in the Thuraya Primary Gateway in Sharjah, UAE with network devices behind terminals in the network must use is outlined below.

The following illustration shows an example network. An application server connects to the VMS hub through the Internet to communicate with two terminals, where each terminal has two clients behind it.
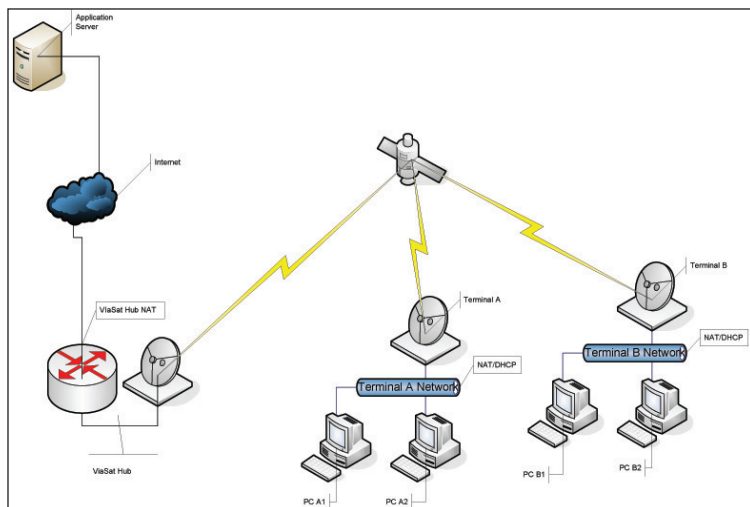
Figure 24: Network Architecture

The IP network architecture uses two NAT devices between an external device connecting via the Internet and network devices behind the terminal. One NAT exists at the gateway to the VMS hub and another at the terminal.

The terminal NAT provides security to the network behind the terminal by blocking access to devices within the terminal network from the Internet and devices connected to the VMS hub. Port forwarding in the terminal must be configured to allow access through the terminal NAT for applications to communicate with devices within the terminal network.

Any device within the terminal network must also be configured to use the terminal as its default gateway to the Internet and any devices connected to the VMS hub. This may be accomplished by using the DHCP server in the terminal or by configuring a default gateway manually on each device within the terminal network.

In order to connect a PC or other device over the Network through the terminal, you must properly configure your device and terminal. The instructions below are for a typical configuration to establish connectivity. Your terminal retailer or integrator may give you specific instructions to establish a custom network connection in lieu of the instructions below.

For a typical configuration, follow these steps:

1. Determine the applications that will be communicating with devices attached to the terminal via the terminal LAN/WLAN.

2. For each application determine the protocol used (UDP or TCP) and the port numbers that these applications will be using.

3. Set your device's IP settings to use DHCP.

4. Plug your device into the terminal Ethernet cable. The terminal will by default assign a unique IP address to your device

5. Login to the terminal webpage interface. See Section 3.2. Select the Settings tab

6. Select the Port Forwarding option

7. Enter the Port Forwarding information which includes:

    a. Application Port

    b. Protocol

    c. IP Address of the device these packets will be forwarded to

    d. Port number these packets will be forwarded to. This will typically be the same as the Application Port.

8. Press Add

9. Perform steps 7-8 for each application port that needs to be forwarded.

5   Troubleshooting, Maintenance & Technical Support

The FT2225 is designed to be very reliable, as well as rugged. The terminal performs automated self-tests and also provides for alarms, manual self-tests, and system resetting to further evaluate the cause for, and possibly correct, any unexpected functionality. A further list of problems that might arise, their possible causes, and potential remedies is provided in Section 5.1.

5.1 Troubleshooting Guide

Faults may be detected by visual observation or by built-in test (BIT). Problems uncovered during preventive maintenance, or while the terminal is in service, their possible cause, and recommended corrective action(s) are described in Table 4.

Table 4: Troubleshooting Guide		
Problem/Observation	**Possible Cause**	**Corrective Action**
Cannot access terminal web server	Terminal not Power on Incorrect IP address Cable is not plugged in correctly	Default IP address is 192.168.1.1 Verify that cable is connected to user device LAN port
Terminal not responding to web server interface	Software error	Power Cycle Terminal
Web Server shows no position fix	Terminal position is unknown, GNSS signal is weak	Provide terminal with unobstructed view of sky as much as possible. Try to point terminal straight upward to receive GPS fix, then repoint terminal toward L-band satellite
Web MMI status show terminal does not exit searching mode	Receive signal strength is too low View toward satellite is blocked	Repoint antenna (see Appendix F: VMS Pointing Procedure) Ensure that no object is in front of antenna
WiFi Connection cannot be established	Your device is too far from terminal	
Terminal cannot login or Terminal does not exit searching mode	No signal or weak signal Interference	Provide terminal with unobstructed view of sky as much as possible. Perform antenna pointing as necessary. Move terminal away from nearby satellite terminals
	No signal or weak signal	Provide terminal with unobstructed view of sky as much as possible. Perform antenna pointing as necessary

Faults may be visually observed as error codes on the Web MMI Status page as described in Table 5.

Table 5: Web MMI Fault Codes		
Fault Code	**Description**	**Recommended Action**
0x01 - 0x53	General fault	Reboot the terminal
0x61 - 0x63	Overtemp fault	Place terminal in environment less than +70°C and power off until terminal cools down.
0x69 -0x6B	Undertemp fault	Place terminal in environment greater than -40°C until terminal warms up.
0x70 or other	Power fault	Reboot the terminal

5.2 Preventive Maintenance

Preventative maintenance is the systematic, scheduled care and inspection of equipment to prevent equipment failure and to reduce downtime. The primary preventative maintenance for the FT2225 is to keep the equipment clean and dust free. Use a soft brush, moist sponge, and a clean cloth for this purpose. The radome should be visually inspected for any attached substances which could potentially obstruct functionality (e.g., mud on the radome).

In addition, to ensure proper functionality and full operating potential of FT2225 Terminal capabilities, the unit should be visually inspected for cracks, corrosion, and loose mating connector.

5.3 Warranty

ViaSat, Inc. does not provide a warranty to the end user for this product. Any such warranty from ViaSat, including the implied warranty of merchantability or fitness for a particular purpose, is hereby disclaimed. Your service provider may provide a warranty for this product. For warranty information and repairs, please contact your service provider.

5.4 Serviceable Parts

The FT2225 terminal contains no user serviceable parts

5.5 Customer Support

Customer Support	Customers can contact Thuraya with questions at: Thuraya Customer Care Center From Thuraya network: 100 From other networks: +88216 100 100 Fax: +971 6 8828444 Email: customer.care@thuraya.com
Product Orders	To order Terminals and accessories, contact sales@thuraya.com
World Wide Web	Customers can obtain Terminal information on Thuraya's web page at: http://www.thuraya.com/products/m2m
Mailing Address	Head OfficeDubai - UAE P.O. Box 283333

Appendix A: Acronyms

Category	Specification
AES	Advanced Encryption Standard
ANSI	American National Standards Institute
DHCP	Dynamic Host Configuration Protocol
EIA	Electronic Industries Alliance
EIRP	Effective Isotropic Radiated Power
Es/No	Energy Symbol/Noise
FIPS	Federal Information Processing Standard
FL	Forward Link
FTP	File Transfer Protocol
GB	Gigabyte
GLONASS	Global Navigational Satellite System
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
HTTP	Hypertext Transfer Protocol
HW	Hardware
IE	Internet Explorer
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
IP	Internet Protocol
IP66	Ingress Protection
LAN	Local Area Network
LHCP	Left-Hand Circular Polarization
LOS	Line of Sight
M2M	Machine-to-Machine
MAC	Media Access Control
Mbps	Megabits per second
MMI	Multi Media Interface
NAT	Network Address Translator
OSD	Over The Air Software Download
OTA	Over The Air
RHCP	Right-Hand Circular Polarization
RX	Receive
SCADA	Supervisory Control and Data acquisition
TCP	Transmission Control Protocol
TIA	Transmission Industry Association
TX	Transmit
UDP	User Datagram Protocol
URL	Uniform Resource Identifier
UV	Ultra Violet
VDC	Voltage Direct Current
VMS	ViaSat Managed Services
WAN	Wireless Area Network

Appendix B: Power/Ethernet Cable Assembly Instruction

This section provides guidelines for the Value Added Resellers or end-user to assemble the power/Ethernet cables. The solder cup connector kit ships with the terminal.

1.0 Required Tools

The following tools are required to assemble the power/Ethernet cable.

- Utility knife or similar
- 22-26 AWG wire stripper
- Diagonal cutters
- Long nose pliers
- Soldering iron and solder

2.0 Connector Information

The mating connector is a Chogori 12 pin connector and the part number is 22012211-01.

3.0 Cable Specification

The cable selection for this application is influence by three main principles: current capacity, outdoor application and shielding.

The operating input voltage range for the terminal is 9 to 32 VDC and draws 1.7 amperes. If the application requires an extended cable length, it is necessary to calculate the cable voltage drop to determine if the terminal is able to receive the minimum 9 volts for operation.

Exposure to outdoor elements can degrade the insulation of the cable and allow moisture to penetrate the conductor and subsequently degrade the copper conductor. It's highly recommended that the cable chosen shall be able to withstand UV rays.

Cable shielding is a critical design element over long distance. The cable selection can adversely be affected by EMI/RFI/ESI. Ideally, multi-shield (foil & braid) is recommended. This design has superior shielding characteristics from signal interferences.

4.0 Cable Assembly Steps

Use a utility knife to remove 12mm of the outer jacket of the cable and use diagonal cutters to remove any shielding as shown in Figure 25. Carefully remove 2-3mm of insulation from the wires using a wire stripper. Avoid nicking the center conductor as you strip the insulation from the wire.
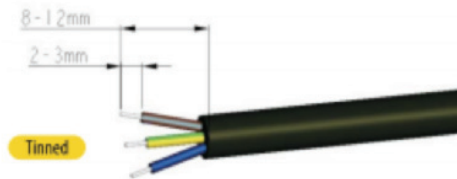
Figure 25: Cable Assembly Preparation

The bare ends on the stripped wire may require twisting to prevent fraying when the connector parts are slid over the cable. Slide the items over the cable in sequential order as shown in Figure 26. Observe that the seal ring and red gasket are present.

Figure 26: Connector Part Description

Apply a thin coat of solder for tinning on the bare wires and on the connector socket contacts in preparation of soldering the wires to the end connector contacts.

Figure 27: Cable Assembly - Step 1

Assemble the gasket into the clamp ring. The gasket is directional and the flat surface should be installed on the housing side as shown in Figure 27.

Figure 28: Cable Assembly - Step 2

Assemble the clamp ring to the housing as shown in Figure 28.

Figure 29: Cable Assembly - Step 3

Slide the seal ring to the end of the clamp ring as shown in Figure 29.

Figure 30: Cable Assembly - Step 4

Assemble the seal nut and clamp ring as shown in Figure 30

Figure 31: Cable Assembly - Step 5

Appendix C: Pole Mount

The FT2225 can be mounted on any flat surface that is wide as the bottom outline as shown in Figure 4 and installed onto a pole using the pole mount adapter.

Instructions are included to install the terminal on any vertical position on a pole or on a horizontal support. The vertical pole or horizontal support must have sufficient height to achieve an unobstructed view to the satellite.

1.0 Required Tools

The following tools are required to assemble and attach the terminal to a pole.
- Crescent wrench
- Philips screwdriver
- Flat blade screwdriver
- Pliers

2.0 Required Materials

The following materials are required to assemble and attach the terminal to a pole.
- Pole mount adapter & kit
- Stainless steel hose clamps
- Hardware kit

3.0 Installation Steps

The following are the installation steps to assemble and attach the terminal to a pole.
1. Audit the antenna bracket hardware kit.
2. Remove the bracket parts from the hardware kit.
3. Pre-assemble the pieces to prepare for installation.
4. Attach the upper bracket assembly and terminal adapter to the mounting pole.
5. Attach the lower bracket assembly to the antenna support/mounting pole.
6. Attach the FT2225 terminal to the adapter plate and secure bolts/nuts.
7. Adjust terminal adapter plate in the direction of the satellite and ensure there is no obstructed view to the satellite.
8. Tightened the bolts and nuts at the joints.
9. Route and secure FT2225 cable assembly along the pole using metal tie mounts. Use self-tapping screws to secure the metal tie mounts to the pole.
10. Install the cable assembly to the metal tie mounts and secure using black cable ties. A cable service loop may be required at joints to allow re-pointing of the terminal.
11. Leave a cable service loop/slack at the FT2225 connector to ease connector termination. This will allow the installer to re-terminate the connector with ease.

Appendix D: Roof Mount Example

The FT2225 can be installed on any flat surface that is wide as the bottom outline as shown in Figure 4.
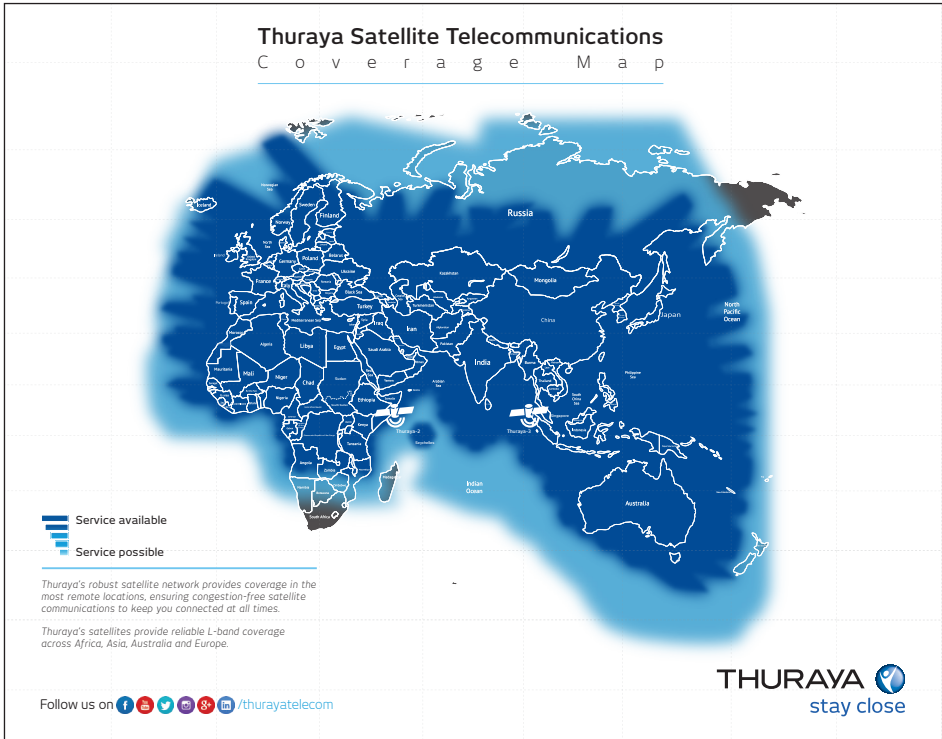
Appendix E: Satellite Coverage Map

Figure 32: Thuraya Satellite Coverage Map

Appendix F: VMS Pointing Procedure

CAUTION: Do not attempt to point the FT2225 to a satellite during a rain/thunder storm. Doing so can cause personnel casualty or damage the equipment.

A Satellite finder application for your smart phone is the easiest method to locate a geostationary satellite wherever you are. Listed below are recommended Satellite Pointing Programs for smartphones.

Iphone

Satellite Locator: **https://itunes.apple.com/us/app/satellitelocator/id540894938?mt=8**

DishPointer: **https://itunes.apple.com/us/app/dishpointer-ar-pro/id321914743?mt=8**

Android

Satellite Director: **https://play.google.com/store/apps/details?id=zekitez.com. satellitedirector&hl=en**

Satellite Pointer: **https://play.google.com/store/apps/details?id=com.tda. satpointer&hl=en**

Dish Pointer: **https://play.google.com/store/apps/details?id=com.dishpointer. dparpro&hl=en**

The FT2225 antenna peaking procedure is listed below and this is to ensure the terminal has an unobstructed LOS to the satellite.

1. Enable your Satellite Finder/Locater apps on our mobile phone and point to the sky.
2. Move your mobile phone up and down and left and right to get a satellite arc on a live video display. You will see satellites line up along the arc and see if there are any obstructed buildings/trees blocking the line of sight.
3. Place the FT2225 terminal/support in a spot where the Satellite Finder has an unobstructed LOS to the satellite to begin antenna peaking.
4. View Section 2.11 Status Page and observe the Es/No reading.
5. Very slowly optimize the FT2225 in azimuth from east to west direction and observe the Es/No reading. The Es/No should be at a maximum signal when peaked.
6. Repeat step 2 for elevation direction.
7. Once it's apparent that the signal does not increase in signal, make a mark on the antenna mount to indicate it's peaked in azimuth and elevation.
8. Tighten the azimuth and elevation bolts or clamp bolts.
9. You may want to repeat these steps to confirm the FT2225 is peaked

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