ROSS

Roaming Oceanic Satellite Server
Installation and Users Guide

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

Part Number MN/13070 Revision 4

PREFACE

Customer Support

Contact the Comtech EF Data Customer Support Department for:

- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached at:

Comtech EF Data
Attention: Customer Support Department
2114 West 7th Street
Tempe, Arizona 85281 USA

480.333.2200 (Main Comtech EF Data Number)
480.333.4357 (Customer Support Desk)
480.333.2161 FAX

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- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.

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- **Send e-mail** to the Customer Support Department at **service@comtechefdata.com**.

For information regarding this product's warranty policy, refer to the Warranty Policy, p. 5.

About this Manual

This manual describes the installation and operation for the Comtech EF Data Roaming Oceanic Satellite Server (ROSS). This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the ROSS.

Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual are appreciated. To submit comments, please contact the Comtech EF Data Technical Publications department:

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Conventions and References

Related Documents

The following documents are referenced in this manual:

- CDM-570
- SLM-5650A

Cautions and Warnings

IMPORTANT ***or*** **NOTE** ***indicates a statement associated with the task being performed or information critical for proper equipment function.***

CAUTION ***indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.*** **CAUTION** ***may also be used to indicate other unsafe practices or risks of property damage.***

WARNING ***indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.***

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For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

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The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Software Versions

Software Application version: 1.3.0.921
Software Part Number: SW13069C.app
Software ROSS Configuration Editor version: 1.3.0.921

Document Revision History

Revision	Description of Change	EffectiveDate
1	Software Release 1.0.0.562 First Publication Release	11-5-2007
2	Software Release 1.1.0.730 Moved vendor specific ACU reference to appendices, documented Orbit ACU configuration, added section LCD front panel interface.	08-30-2008
3	Software Release 1.2.0.812 Documented ROSS 1.2 features, service bound and multiband LNB support.	11-30-2009
4	Software Release 1.3.0.921 SLM-5650A Support, and ROAM Protocol Emplemented	10-25-2010

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1.1 Introduction

Comtech EF Data has developed Satellite On The Move (SOTM) technology that provides a global coverage method of satellite hopping dynamically to maintain communications and extend the advantages of switched Single Channel Per Carrier (dSCPC) within a Vipersat network. This method allows a mobile remote satellite station on-board a roaming oceanic vessel to transition between satellite or hub coverage connections with minimal service interruption. The key components to this technology are hub and remote satellite modems, a stabilized mobile antenna system for tracking GEO satellites, a central management system maintaining the alliance of the remote satellite network communication links, and a mobility controller with multiple location codes of satellite service areas.

The Vipersat Roaming Oceanic Satellite Server (ROSS) fills the role of the satellite mobility controller. In conjunction with an Antenna Control Unit (ACU), the ROSS performs satellite antenna re-point and information gathering. When a transition requirement is identified, the ROSS will push new pointing information to the ACU and provide the new transmission parameters to the CDM-IP modem that are required for service area handoff.

1.2 Overview

The ROSS is one of the key components in the Comtech EF Data mobile satellite solution system that provides the capability to automatically transfer remote sites from one satellite connection to another as the mobile vessel moves between multiple satellite coverage areas. In addition, the ROSS provides alternate configuration files for the modem that can be mapped to specific regions of a satellite’s coverage area or ground station equipment. This allows communication link parameters, such as data rate and modulation, to be optimized for the satellite reception in that region.

A typical interconnect diagram for the ROSS as deployed aboard ship in a mobile remote satellite application is shown in figure 1. Please note that the example in figure 1 uses a generic device name antenna control unit (ACU). All references to antenna controller unit (ACU) are refer to vendor neutral ACU. See appendices for supported ACU types.

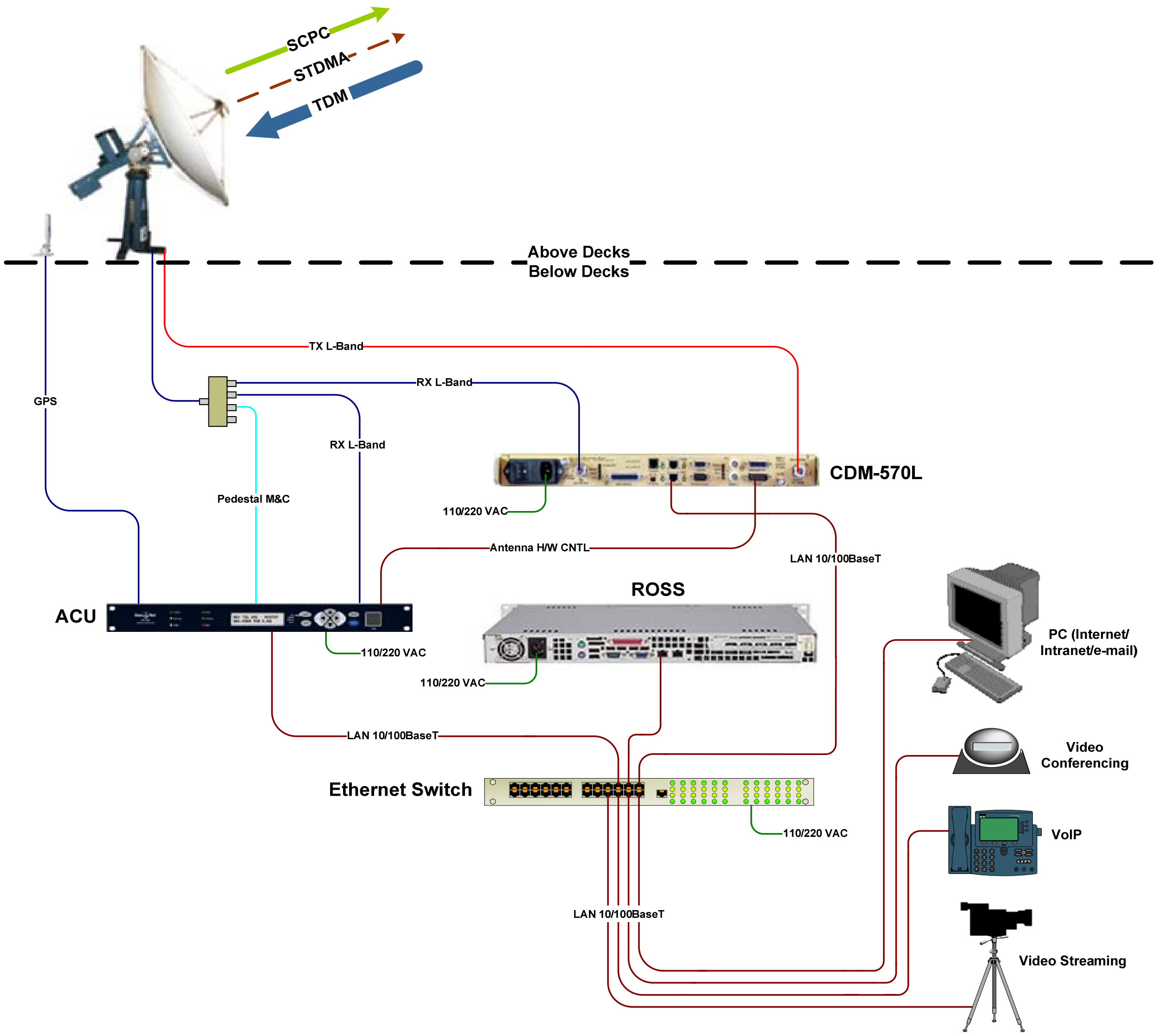


Figure 1: Typical Interconnect Diagram

1.3 ROSS Control Function

The ROSS hosts a set of configuration, database, and map files that are used for controlling satellite communications for the local remote terminal. This data provides the required reference points for managing satellite handoff operations and for enabling/disabling the remote modem transmitter. Shoreline boundaries provide a demarcation point for muting the modem transmitter to prevent potential interference with fixed terrestrial or satellite systems.

1.4 Configuration Files

There are two system configuration files used by ROSS:

ROSS Configuration Files – A factory default configuration file and an active configuration file holds the parameter values of the ROSS unit, which include parameters such as unit IP address, ACU address, Modem address, VMS Multicast address and Network Identifier. The default configure file only sets the factory unit IP address (192.168.254.3/24) leaving all other parameters un-initialized, zero. Upon initial configuration the active configuration file is generated and used during normal operations. If the restore factory defaults is executed the active file is removed and regenerated with default configuration.

Note the password is stored directly to the system account utility (default "Comtech") and is only configurable through the console Telnet/Serial interface. If the password is lost or unknown, the password can be restored through the local serial console interface which does not require a login user name or password. Also factory resetting will restore the password to default.

1.5 Database Files

There are four database files used by the ROSS:

Service Areas (SA) File – This is the primary database that provides critical information about each satellite with which the local remote will communicate, such as the satellite orbital position, TX polarization, frequency, bandwidth and identifiable description. These set of parameters are sent to the ACU upon detected handoff points. The service area is directly associated to service boundary and modem configuration files, which in combination construct the communication area.

Shoreline Database File – This file contains the coordinates that comprise the shoreline map. The SOTM system ensures that satellite transmission is strictly coordinated within a configurable shoreline threshold expressed in Kilometers. When it is necessary to override the global shoreline threshold, an override value can be specified in a Coordinated Area.

Coordinated Areas Map (CAM) File – This global database file defines those areas that call for special transmission requirements. These areas serve as overrides, either negative or positive, for enabling/disabling the modem transmit function. See section describing the Ross Configuration Editor for more information on editing coordinated areas.

Service Boundary (SB) File – This file defines the geometry of a service coverage area within the satellite footprint for the remote. Typically, multiple service boundary files are stored on the ROSS, each corresponding to either a specific satellite or central hub with a common satellite coverage area. Handoffs occur between service areas when the boundary of the current service area is crossed.

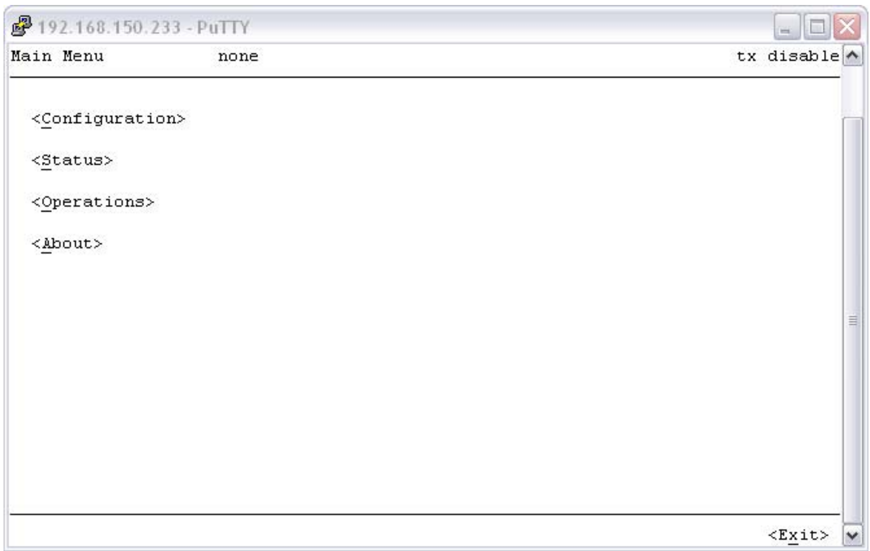
Modem Configuration File – This file contains all configuration parameters for the CDM-570/570L & SLM-5650A base modem and IP Network Processor card. Typically, multiple modem configuration files are stored on the ROSS, each corresponding to only one service area location.

1.6 Features

The ROSS integrates storage capacity, location processing control with flexible interfaces in a small hardware unit that is co-located with the mobile remote satellite station equipment (below decks) with connections to the Comtech Vipersat modem (e.g., CDM-570L or SLM-5650A) and the ACU.

1.7 ROSS Client Interface

The ROSS client interface is accessed using either remotely (Telnet) or locally using Serial connections. The RS-232 serial connection is always running the ROSS client application and requires no login account. This is the maintenance and operations console interface.



1.8 Storage Capacity

The ROSS offers generous non-volatile storage capacity that typically is not available in the satellite modems. This capacity is used to store the large satellite foot print maps (approximately 1500), shoreline contour vector maps, exclusion areas, RF data, multiple modem configurations, and other administrative information.

1.9 Processing Power

The ROSS provides its own CPU and software to implement the satellite roaming features, constantly monitoring vessel position data, satellite signal, and management status in order to determine if a satellite handoff is required. The ROSS CPU relieves the satellite modem from having to perform the complex handoff task, thus eliminating any performance impact on the modem.

1.10 Flexible Interface Platform

The ROSS offers a flexible hardware platform with standard interfaces, such as 10/100/1000BaseT, RS-232, and USB. These interfaces facilitate integration with multiple vendor equipment, such as antenna controllers, for mobility services.

1.11 Event Log

The ROSS provides a system event log. The event log is a circular file capable of storing up to 511 events that may occur in the normal course of operation. Each event is identified with an event type/category and time stamp, which is viewable and retrievable through the client or ROSS Configuration Editor application. This file can be downloaded either locally or over the air at any desirable intervals. The client user interface also provides a clear button to delete all events refreshing the log file to known state.

1.12 Tracking Log

The ROSS provides a tracking log file to comply with FCC part 25.221(c), as the ROSS unit must keep a log of vessel position and transmission parameters. The Tracking log is also a circular file capable of storing up to 32766 entries or 455 days before overwrites take place. Each entry is timed at 20 minute interval taking a timed/date snapshot of the vessels current location, frequency, transmit status, data rates and modulations… It is expected that network administrator will bulk download the tracking log file on scheduled intervals as not to lose any recorded history. The ROSS Configuration Editor application provides a user interface to download the reformatted tracking log as a coma delimited text file. Additionally a small simple command line utility is available to automatically schedule file downloads assuming the vessel is in communications with the central management hub facility.

1.13 ROSS Specifications

The ROSS is a network appliance server designed for rack mounting as a headless device (no monitor, keyboard, or mouse). Utilizing a flash drive rather than a hard drive provides inherent reliability. The following provides a list of system specifications that makeup the ROSS hardware unit.

Server Components:

- CPU – Intel Celeron, 2.6 GHz, 1x 100mm blower fan
- Operating System – Linux 2.6.16.2 (Light Weight Kernel)
- RAM – 512 MB
- Flash Drive – 1 GB Disk-On-Module (DOM)

Front Chassis View

Front Panel:

Buttons

- Power On/Off button
- System Reset button

LED Indicator Lamps:

- Power LED
- Hard drive activity LED
- 2x Network activity LEDs
- System Overheat LED

LCD Keypad Interface:

- 16x2 illuminated LCD display
- Four navigation keys (up, down, left, right)
- Cancel Key
- Select/Enter Key

Rear Chassis View

Rear Panel Ports:

- 2x Network Interface – Ethernet 10/100/1000 BaseT, NIC 1, left port only used
- 1x RS-232 – Local Console, User Interface
- 2x USB – Re-Imaging or Upgrades

Operating Environment (ROSS System):

- Operating Temperature, 32° to 104°F, (0 to 40°C)
- Non-Operating Temperature, -40° to 158°F, (-40 to +70°C)
- Operating Humidity Range, 8 to 90% non-condensing

Power Supply:

- AC Voltage, 100 – 240V, 60 - 50Hz, 5Amp

Dimensions:

- 1U Rack Mount
- Height 1.7” (43mm), Width 16.8” (427mm), Depth 14.0” (356mm)
- Gross Weight 14lbs (6.4kg)

2 Installation Overview

This section provides the steps necessary to install the ROSS unit as part of the remote terminal equipment in a Vipersat SOTM network. Any additional noncompliant third party equipment is not described in this document for clarity.

2.1 Installation Requirements

The document assumes that the ACU and all its supporting equipment have been installed and configured.

Hardware:
- ROSS Unit
- CDM-570L or SLM-5650A Satellite Modem & Router
- Installed ACU (including all below & above deck equipment)

Software:
- ROSS Configuration Editor, v1.3.0.921
- SetIP LAN Configuration Utility, v1.0
- VLoad 3.5.39 or later
- Putty v0.60
- ACU configuration application (depends on ACU vendor)

Documentation:
- ROSS User Guide, MN/13070, r4
- CDM-570/570L Installation and Operation Manual, MN/22125
- SLM-5650A User Guide, MN-0000035
- ACU Installation and Operation Manual, see vendor's for part numbers

2.2 Unpacking and Inspection

Inspect the shipping container for any evidence of damage. If any damage is found, notify the carrier in case a claim may have to be filed. This will only be necessary should the contents also be found to be damaged.

Unpack the equipment from the container. Retain all shipping materials for future use, such as for reshipment or RMA service. Visually inspect the equipment for any possible damage incurred during shipment.

Check the equipment against the packing list to ensure that the shipment is complete. Should any items be found to be either missing or damaged, contact customer support to report and record before proceeding forward.

2.3 Installing the ROSS Unit

The ROSS is below-deck electronic equipment designed to mount flush in a standard 19-inch equipment rack. Ensure that there is adequate clearance for ventilation, particularly on the top of the unit. In rack systems where there is high heat dissipation, forced air-cooling must be provided by top or bottom mounted fans or blowers. Under no circumstance should the highest internal rack temperature be allowed to exceed 34ºC (95ºF).

Using a medium Phillips screwdriver, mount the ROSS in the designated rack space with four rack screws. Always hand-tighten or use a low torque power driver to secure the front panel to the rack rails. *Note this is commercial grade manufactured equipment and it is recommended that input AC power conditioning (online UPS) is provided**.***

2.4 ROSS, Modem, and ACU Connectivity

As shown in figure 1, the ROSS unit, MODEM (CDM-570L is shown in this example), and ACU require several connections for data and signals. **The installation and configuration of the ACU hardware is beyond the scope of this document. Refer to the ACU vendor's documentation for more detailed information regarding ACU installation.**

2.4.1 Ethernet LAN Connections

ROSS and the MODEM (CDM-570L shown in figure 1) communicate via IP over Ethernet LAN. This is illustrated in figure 1, where the ROSS and MODEM are connected to an Ethernet switch. The ACU must supports IP over Ethernet and ROSS supports IP for selected ACU, the ACU should also be connected to the LAN. Any host equipment, such as PCs, IP phones, should also be connected to the LAN.

2.4.2 Modem to ACU/Antenna

The Tx input and Rx output IF signals from the modem need to be wired to above-deck antenna equipment such as LNB and BUC. In some cases, the Tx and Rx IF lines require connection to the ACU sub-panel interface. The ACU installation manual should be referenced for specific vendor information.

2.4.3 Modem Tx Mute and Rx Lock Signal

A majority of commercial ACUs use the Rx Carrier Lock as part of the closed feedback system in the satellite acquisition mechanism. In other words, the ACU will aim its antenna until the modem locks onto its configured carrier. It is also extremely important to correctly connect the modem Transmit carrier muting signal from the modem to the ACU. This hardware control line provides the overriding control to mute the transmit carrier over any other software logic. Tx and Rx controls are shown in Figure 1 and identified "Antenna HW CNTL". Consult the CDM modem manual and ACU installation instructions provided by the ACU vendor for detailed instructions.

2.5 Quick Start Configuration Checklist

In order to provision and configure ROSS, the check list is provided. The checklist assumes that all the ACU hardware and wiring has been properly installed and configured.

Step	Description
1	Build Service Area Information
2	Orbital Position, Tx Frequency Tx Polarization Bandwidth
3	Create Service Bounds (polygonal areas). A geo-mapping application may be used to layout the polygon and its coordinate points saved to a KML (Keyhole Markup Language) file.
4	Create Coordinated Areas (polygonal areas). Coordinated Areas are optional.
5	Configure the CDM-570L or SLM-5650A modems for satellite service connectivity. Once connectivity is established, take a snapshot of the modem configuration file (.txt) using VLOAD. This .txt file will later be imported into each Service Area entry. Create a .txt file for every satellite the modem will be switched to.
6	Follow the instructions section 6.1. Open a new ROSS configuration file and create the Service Areas with the information previously collected.
7	Save the configuration file. This will be uploaded to ROSS.
8	Upload configuration file using ROSS default IP address.
9	Using Putty to access console interface or front panel LCD keypad, configure the appropriate IP address, subnet, and gateway for the ROSS unit. Test ROSS IP connectivity by pinging it from another host on the LAN, or logging into the ROSS client interface.
10	If not done yet, use the RCE to upload the configuration file containing the Service Areas. Verify that the Services Area was uploaded successfully by browsing the Service Areas from the client interface or keypad interface.
11	Configure the ACU type and configuration fields.
12	Test ACU status by inspect the ACU poll status from Operations menu.
13	Verify ACU connectivity by examining the vessel position returned by ACU
14	Configure the IP address of the CDM-570L modem that ROSS is controlling.
15	Verify Modem connectivity by examining the modem poll status in operations menu.
16	Configure Default Shoreline value in Operations menu.
17	Test Manual Satellite Handoffs by using Manual Handoff command from ROSS client interface or front panel LCD interface.
18	Save the current ROSS configuration into the Active flash memory.
19	Reset ROSS and verify correct functionality.

2.6 ROSS System Overview

The ROSS server operates as a mediation device between the Comtech Satellite Modems and Antenna Control Units (ACU) subsystem. Its primary role is to poll Global Positioning Satellite coordinates (GPS) information from the ACU, determine the current location and push the appropriate command/configuration files updating communication parameters. The ROSS unit communicates to the modem and ACU on a network LAN interface connection using proprietary IP protocols. Each unit's IP address is programmed into ROSS starting a poll process which gathers location, status and current configurations. As each units respond to the queried messages the ROSS compares the received information to set database files making decisions to mute carrier, change service area or continue to operate without interruption within the current service area.

Service Areas are fundamental to the overall operation of ROSS as they contain control information which is associated to three separate database/configuration files. Each service area is configured with ACU set controls and linked to a Modem Parameter file, which are Service Bound together through geographical operational fencing. The third element is the Coordination Area Maps which are shared by all service areas. The overall fencing (binding) is geographical longitude/latitude coordinates combined to create a closed polygon forming an operational area or handoff boundary.

Through the polling of GPS coordinates from the ACU, ROSS processes hundreds of checks per minute against the Service Area, Shoreline database, and Coordinated Areas. If anyone or all represent a HIT, the ROSS initiates the proper action.

The ROSS server has four states that are processed during the course of initialization and operation:

- Startup – Loading configuration and acquiring modem, ACU communications
- Normal – Normal operation mode assumes VMS connectivity in a service area
- Handoff – Detected transition to next service area
- Parked – No service area coverage configured

Startup
Startup is the first state the ROSS enters when the unit is powered or rebooted. During the startup phase, the unit boots up the base OS, after system initialization the ROSS server is automatically started by a watchdog script. This script is called from the OS and continually monitors the ROSS running process. If the watchdog script fails process check, the ROSS process will be kick started within 10 seconds. Boot time for ROSS server is approximately ~5 seconds, as a complete cold start of the unit is ~25 seconds.

As the ROSS application is started the process loads configuration files, initializes internal modules, and establishes communication with the modem and ACU. ROSS stays in this mode until all devices are put into a known state by checking current location. If the current location matches set service ID in the modem, no change is made dropping into normal operations.

If the check returns a difference and new service area is available the ROSS will initiate a handoff sending configuration files to modem and ACU for processing of the next operational location.

Note both modem and ACU must have valid status polls or ROSS will not initiate any service area configurations.

Normal

This state is the “all systems are go” operating mode where connectivity to the hub is expected because the vessel location matches a service area in the service boundary. Satellite Location Identification Protocol (SLIP) messages and other management data is exchanged with hub VMS, such as ROSS registration commands, modem status, and command messages. Tracking Log entries are recorded in normal mode, and all other modes.

The transmission can be inhibited in Normal mode by:

a. ACU block signal is sent to the modem due to hazardous threshold (blockage limits).
b. Coordinated Area designates as no transmit zone
c. Vessel is inside a uncoordinated baseline (200km or set value, 0 = none, shoreline hit)
d. Carrier Inhibit, loss of hub carrier transmission, (receive data lock)
e. Modem or ACU no poll response timeout failure (~15sec) – TEK message initiated
f. Additionally the modem will mute transmit in the absences of TEK messages

Satellite Handoff Process
If the handoff state detects a transition point (new service area), the handoff function initiates the following processes:

1. Disable Transmit – TEK message disabling modulator output power
2. Retrieve the new Service Area information
3. Pushes a new Modem Configuration Parameter file into modem
4. Send the command to ACU to point antenna to new satellite (Orbital Position, Frequency & Bandwidth)
5. The modem will actively update all new parameters issuing a firm reset (quick update)
6. Enable Transmit – TEK message enabling modulator output power
7. Enter Normal operating state waiting for modem to receive transmit grant message from the hub

Note during this process the ROSS may send a TEK message enabling carrier before the antenna has completed its tracking. In this state the ROSS relies on the hardwired transmit mute control line from the antenna controller to the modem.

3.1 ROSS Messages & Data

3.1.1 Transmit Enable Keep-alive (TEK) Message

This TEK message is implemented as a watchdog process in the modem and is monitored for transmit control change or absence status. If the modem detects the (absence) loss of 3 messages (~15sec), the modem will fail poll reception timing out disabling modulator transmit. The ROSS continuously sends TEK messages on 5 second intervals to the modem to reset the transmit enable watchdog countdown timer. If the watchdog is not reset with a TEK message within the specified interval, the modem will mute its transmitter until a TEK is received again.

3.1.2 ACU Commands

ACU commands typically use a proprietary message format. These commands are sent to the ACU to reposition the antenna to new coordinates. ROSS sends Orbital Position, Frequency and bandwidth to antenna control commanding it to resume tracking to new satellite location. The ACU processes the orbital position into Azimuth and Elevation units calculated through the current GPS coordinates. The frequency and bandwidth focuses the signal track algorithms on a specific carrier typically the new service areas hub TDM carrier allowing the antenna signal processor to peak on identified carrier. The modem demodulator lock signal is offered up to the ACU through hardwire or soft-decision for final peak signal track and confirmation of satellite.

3.1.3 Modem Configuration File

This is a standard modem parameter file that is currently used by all Vipersat enabled Comtech modems, such as the CDM-570L or SLM-5650A. It is a proprietary formatted text file. This file contains configuration parameters that allow the modem to establish communications with a specific satellite. In other words, each modem configuration file is created for a specific satellite and hub ground station and contains all possible parameters values for the base modem and IP router interface card. The Service Area database associates this modem configuration file with a specific satellite and hub network. The file transfer uses the Comtech proprietary Streamload protocol for ROSS to push a new configuration updates. Upon complete reception the modem stores and processes the new changes issuing a firm reset to initialize the new changes. The new updates are accomplished without a reboot minimizing the transitioning time.

Critical parameter categories include:

- RF properties such Tx and Rx home state frequencies, FEC rate, modulation, data rates, and baseline transmit power.
- STDMA burst map configuration
- Route table configured for specific network topology if required
- QoS rules for setting unique priorities and bandwidth

Modem Parameters Excluded by ROSS:

- IP Address – Modem IP communication address remains static
- Network Node ID – Defines unique flow ID assigned by controlling VMS

Modem Parameters Replaced by ROSS:

- Satellite ID – derived by ROSS per service area

Exclusions and Replacements are necessary in providing seamless association between user unknown values and possible unwanted overwrites. All the configurations for the modem are stored in a single directory and are associated to its service area by sequential numbered file naming convention.

3.2 Service Area Description

The Service Area (SA) is a container including all of the critical elements necessary to calculate coordinated areas, determine operational or non-operational areas pushing updates and controls to associated transmission equipment. The perimeter control within the SA is the Service Bounds (SB) which is a multipoint polygon fence setting the satellite transmission beam area borders. There are also Coordinated Area Maps (CAM) that if required can set transmit carrier zones whereby the vessels transmit carrier is controlled to either enable or disable within these boundaries. ROSS can store hundreds of these Service Areas that define the operating parameters for each satellite and/or ground based equipment that the vessel requires for normal operation within any given geographical location.

Each unique SA is created or maintained locally/remotely using the ROSS Configuration Editor (RCE). The editor consolidates database elements into a single structure which is downloaded or uploaded to the ROSS. The ROSS incorporates a file manger that labels each file element through logical renaming appending each file with a sequential number grouping them all into a SA. Example SA, the ACU command information sets the base reference with modem configuration file(s), SB(s) which are then grouped together with a unique number. The SA number is irrelevant to the user as it is assigned at the time of reception during uploads to ROSS. The number assignment is only relevant to ROSS as container grouped database information.

The SA example figure 2 depicts the structure of two separate SA binding list elements together into a distinct area. This grouping is shown with only one SB per SA and two shared CAM's, however multiple SB's can be linked into a single SA. Configuring SA's is described in much more detail in the Configuration section of this manual.

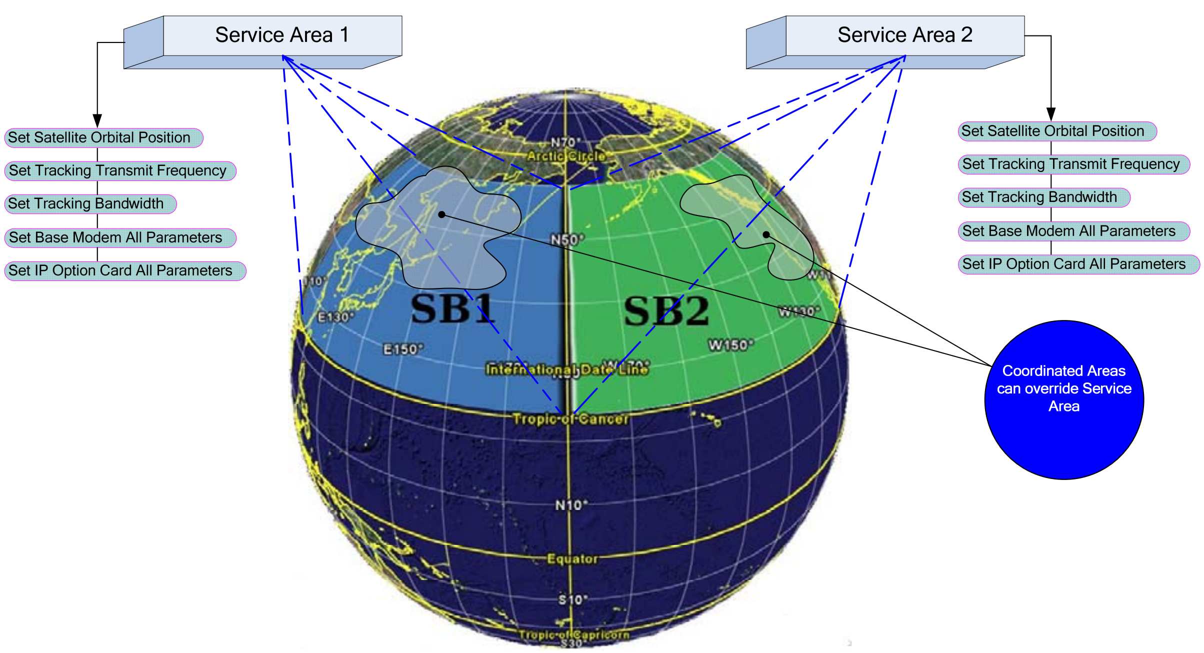


Figure 2: Service Area Example

3.3 Modem Interaction with ROSS

The Vessel equipment must bond together blending a mix of independent processes forming a partnership of exchanged information and controls. This unique partnership builds a cohesive system even though all run independent process. Each component has startup, normal and idle modes of operation but still mesh together in timed acknowledged sequences.

The follow functional lists only describe the two Comtech units omitting the antenna control system for lack of function detail. Each list is a step-by-step description on the basic processes and how they interact forming the system functionality. This section describes what different type of sequencing happens between cold and hot initializations.

3.3.1 Modem Initialization

The modem plays a key role in the communications chain as it must perform quickly through the active transformation of pushed configurations file from ROSS. The modem has two different modes of processing configurations files, one at boot time the other at run time. Each process deferrers in sequence based on the initialization execution point.

Previously described the ROSS unit also has two types of execution points requiring long and short initializations, however during the operational mode the ROSS unit pushes configuration files to the modem which must be timed correctly for proper execution. During cold boot (applied input power) all system components will typically complete initialization at different times presenting a possible problem if the mediator (ROSS) pushed information too soon. ROSS must wait for valid responses before sending controls or configurations prematurely resulting in lost information. This validation before send eliminates repetitive processing streamlining the initialization sequence.

Modem Cold Boot:

1. The Comtech modem stores two boot images, one is for the base modem processes and the other is the IP Interface module (router). On power up both are loaded simultaneously with base modem monitoring the boot state of the IP interface. The IP Interface module boots the OS reading the FLASH parameter configuration file while the base modem reads its last state values from NVRAM.
2. The Base modem first loads last state (stored) parameters which could have TX enabled, however the transmit enable is held muted through a hardware control line from the IP interface module until it completes its boot check before releasing. This prevents premature transmission until the IP Interface has booted and finished rendering configured states.
3. Once the IP Interface has finished booting it reads a stored parameter file from FLASH sending two base modem configuration index scripts, Modem Group Configuration (MGC) and Outdoor Group Configuration (OGC). These two loads contain the complete IDU/ODU configuration sets.
4. Next the IP Interface loads Home State (subset of transmission values) parameters from FLASH releasing the hardware mute signal.

5. Last the modem looks for demodulator lock following TEK enable and grant to burst transmit from hub STDMA controller.
6. During the modem boot cycle ROSS is in the background trying to query the modem for last set Satellite ID (service area). Once ROSS receives a valid response containing the SAT_ID_NUMBER, a compare is applied to current location determining if a configuration update is required.
7. If polled SAT_ID_NUMBER matches current location no change is necessary. If different a new configuration file is push updating all communications parameters.
8. The TEK message now commences setting the transmit flag to enable mode.
9. The modem is now at home state waiting for TEK enable and hub grant to transmit message.
10. During this time ROSS will send commands to the ACU updating the new pointing location.
11. Special power controls can be applied to assure connectivity to the hub station during the burst entry cycle. *See STDMA Power Hunt.*
12. After TX enable and burst grant the remote modem sends a request for registration to the managing VMS. It must receive acknowledgment before transitioning through IP routing table changes and dynamic switching to dSCPC mode. During this process all customer data traffic is blocked and only allowing management traffic to pass. This prevents possible customer switching requests from being lost during registration processing.

Note during the modem query the ROSS server is also polling the ACU for location status. If the ACU has failed to respond during this initial sequence, ROSS will enter Parked mode waiting for valid responses before changing states. Also during this process the antennas tracking maybe inhibiting transmit until signal lock is established.

3.3.2 Modem Hot Initialization

All the same valid polling rules apply during hot initialization processing and are assumed to be valid in the next sequencing.

1. During normal mode the modem operates under standard Vipersat control with only one difference, the ROSS governs the transmit state. All standard dynamic switching, power controls and communication recoveries apply.
2. If the vessel transitions into a new SA the ROSS server process the handoff sequence as describe previously. However the modem is now in an operational state with all current set value enabled.
3. As the ROSS unit processes handoff mode it pushes the new configuration file to the modem via a UDP Steamload protocol.
4. The modem receives the file and checks the integrity before copying to FLASH and processing.
5. The processing of the parameter file is accomplished on the fly inhibiting transmit before execution. As the file parameters are processed through the internal menu engine each value is modified/copied over. Once complete the Streamload process performs a firm boot (execution time is in the ms) initializing all new values.

6. The modem is now at home state waiting for TEK enable and hub grant to transmit message.
7. Special power controls can be applied to assure connectivity to the hub station during the burst entry cycle. *See STDMA Power Hunt.*
8. After TX enable and hub grant to transmit the modem sends a request for registration to the managing VMS. It must receive acknowledgment before transitioning through IP routing table changes and dynamic switching to dSCPC mode. During this process all customer data traffic is blocked and only allowing management traffic to pass. This prevents possible customer switching requests from being dropped during registration processing.

   Note during the modem query the ROSS server is also polling the ACU for location and status. If the ACU has failed to respond during this initial sequence, ROSS will enter Parked mode waiting for valid responses before changing states. Also during this process the ACU maybe inhibiting transmit until signal lock is established.

3.3.3 Transmit Power Controls

STDMA Power Hunt

Summary
The STDMA default power value is a possible problem as remotes with incorrect or impaired transmissions cannot close their return links during service area entry mode. By adding a power hunt algorithm with limits will provide burst link closure reliability.

The STDMA Power Hunt (SPH) function has a maximum power limit of up to 9dB in 3dB increments greater than initial default, base value. This modulator power value cycles during burst transmission increasing or decreasing power until it receives a reply from its managing STDMA controller. This is accomplished through burst map acquisition acknowledgement flag. Throughout the process the remote will remain at base or modified set power value until commanded otherwise or manual operator intervention. Once in SCPC mode and DPC enabled, the value is over written by DPC and servos to targeted set Eb/No value. Any revert from SCPC to STDMA will reuse last set DPC value as power delta offset over default set-point. Reboot or forced revert will cause the unit to clear all temporary set power values.

Implementation
The hub and remote units both provide a role in SPH which allows the remote modulator to increase its base configuration (Home State) power setting to a maximum of 9dB from initial set-point if link reception is incorrect or impaired. The hub STDMA burst map contains a flag which is used separately by each remote in the group. This flag indicates if either their burst ACK message was missed or received at the hub. When the hub STDMA controller receives a valid burst ACK from the remote it sets the flag for the corresponding remote in the next burst map indicating completed transmission.

There are two counters initialized in the remote, one that reads missed ACK’s and the other is received ACK’s.

During burst map reception the remote reads the ACK flag and either increments or resets missed ACK counter. The missed counter is initialized and invoked when the first or next message received has the flag set to zero ‘0’. It then starts a 10 missed count before incrementing the power value by 3dB step. The second counter is received ACK’s which has a flag set to ‘1’and the count must receive 5 consecutive good ACK’s before resetting missed ACK counter.

Once reset the power hunt stops and the value is retained and put into a variable called DPC Delta.

There are three separate stored power components, Baseline Power, DPC Delta, and SOTM Offset. *Note SOTM Offset is a reserved variable for future use.*

Baseline Power is either Home State default power value which is applied at initialization, CLI force home state or VMS force reverts or the last value received from VMS. The baseline power value is based on link budget calculations which may be subject to error in SOTM environments.

DPC Delta is a shared value between SPH and DPC. SPH applies its offsets during STDMA mode only, while DPC adjustments are made in SCPC only due to environmental conditions, unknown budget calculations (ocean coverage errors) and also traveling through power variances within a satellite beam. These two power offsets share this variable with only one exception DPC can overwrite the SPH value.

Operational Conditions

- When enabling SPH it is only available in STDMA. Switching to SCPC disables this function allowing DPC to modify independently. However, the SPH value remains stored in DPC delta variable unless over written.
- Once set the delta value remains effective throughout switching states, SCPC or STDMA unless overwritten by DPC.
- The current SPH gets stored in the DPC delta variable for use in SCPC mode and STDMA during reverts (Home State). It is cleared during a force revert, either from VMS or CLI.
- There are two counters, missed ACK and other is received ACK’s.
- SPH power is an incremental 3dB step value (added or subtracted) up to 9dB after 10 cycles (burst maps) of missed ACK’s.
- The missed ACK counter is cleared after receipt of 5 consecutive received ACK’s.

Boot & Initialization: (burst transmission succeed)

1. The default Home State power value is applied to the base modem modulator on boot-up.
2. After transmission grant, remote bursts to corresponding STDMA controller with ACK + Registration request message.
3. If hub reception is NOT impaired and transmission acquisition is completed the burst controller sets the missed ACK flag to ‘1’ indicating to corresponding remote good burst.
4. No power adjustment is required. “SPH value remains at zero value”
5. VMS responds to registration request sending registration configuration to remote.

Boot & Initialization: (burst transmission failure)

1. The default Home State power value is applied to the base modem modulator on boot-up.
2. After transmission grant, remote bursts to corresponding STDMA controller with ACK + Registration request message.
3. If hub reception was impaired and transmission acquisition failed the burst controller sets the missed ACK flag to '0' indicating to corresponding remote failed burst acquisition.
4. Power adjustment is required.
5. Remote missed ACK counter is initialized waiting next burst map and flag set value.
6. If count reaches 10 (burst maps) missed ACK's the default power is increased by 3dB.
7. If next burst map indicates received ACK, the missed ACK counter holds count until 5 consecutive receive counts.
8. After 5 consecutive receive counts the missed counter is reset and the power value is stored in DPC Delta variable.
9. VMS responds to registration request sending registration configuration.
10. Remote may now switch to SCPC mode.

Note all stated power process assumes receive transmission from the hub TDM is good.

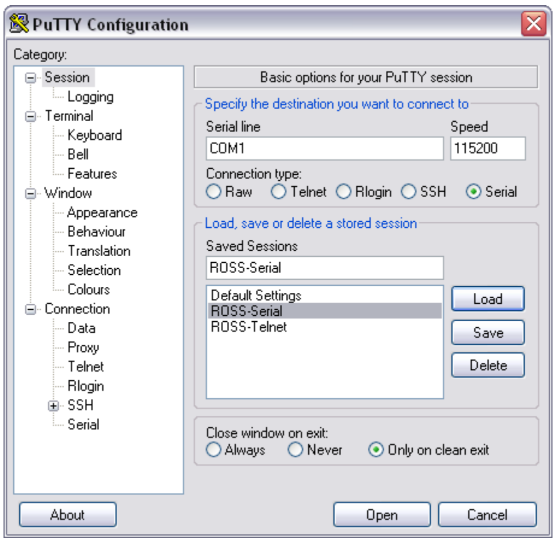
4.1 ROSS Client Interface

The ROSS client interface is accessed using either Telnet or Serial connections through an open source application, Putty. The RS-232 serial connection is always running the ROSS client application and requires no login account. This serial interface is used for local maintenance configuration management such as resetting login passwords or unit IP address.

The ROSS client interface is accessed by Putty, an open source Windows application. Putty is a Win32 Telnet client configurable for either serial or LAN IP communications.

4.2 Connecting To ROSS via Serial Interface

This connection is the initial interface that provides open account access requiring no login password to establish communications to the main menu system. Through this interface allows the installer or operator to setup the basic communications parameters, e.g. unit IP address, subnet mask and gateway address. It's also the backdoor interface if in the event the login password was forgotten or resetting of the network IP address is required.



Upon initial configuration (out of box) all parameters are set to factory values initializing only minimal settings for basic boot operations. It's only necessary at this point to set a subset of communication parameters as the full configuration is handled by a separate Comtech application "ROSS Configuration Editor".

1. Connect a RS-232, DB9-F-F crossover cable between PC and ROSS serial interface connections.

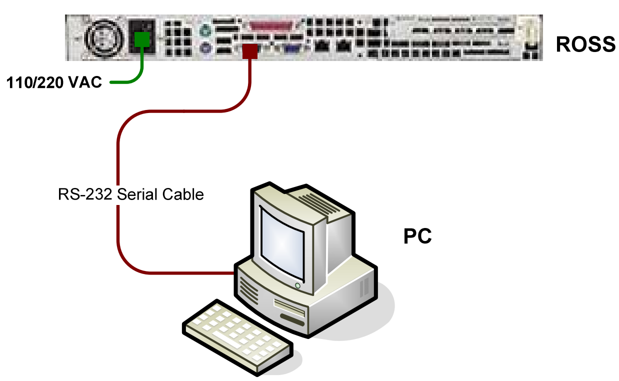


Figure 3: Serial connection to access ROSS client interface

2. Apply input AC power to ROSS and push the front panel power button to boot ROSS. Boot up requires approximately 25 seconds.
3. On the PC launch the Putty application clicking on the desktop ICON or from sourced directory location.

4. Configure communications for serial, COM1 or available port# and port speed of 115200.
5. Click Open button to establish communications.
6. It will be necessary to refresh the window display text, select **F12** on the PC keyboard.

4.3 Connecting to ROSS via LAN (Telnet) Connection

This connection interface is used for local LAN or remote control over the satellite communications link. It operates using the same Putty application with a different setup configuration. It is possible to establish local communications without initially configuring the network interface IP address in the event that a serial cable is not available.

Each ROSS unit uses a factory default IP address and mask: “192.168.254.3/24”. When configuring ROSS with its default IP address, any host IP address must be configured to be within the 192.168.254.0 subnet.

Note it extremely important to ensure that the correct IP address is assigned. An incorrect address may cause the ROSS unit to be unreachable from a remote host.

1. Connect the CAT5 cables as shown below, note if an Ethernet switch is not available use a crossover LAN cable between ROSS and PC.

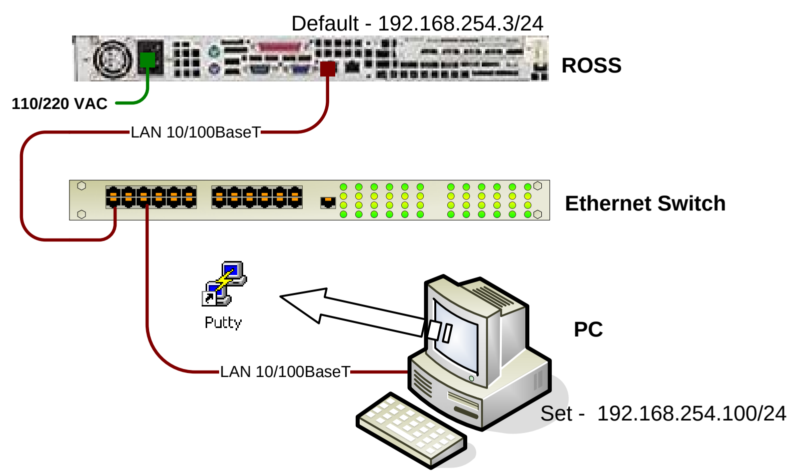
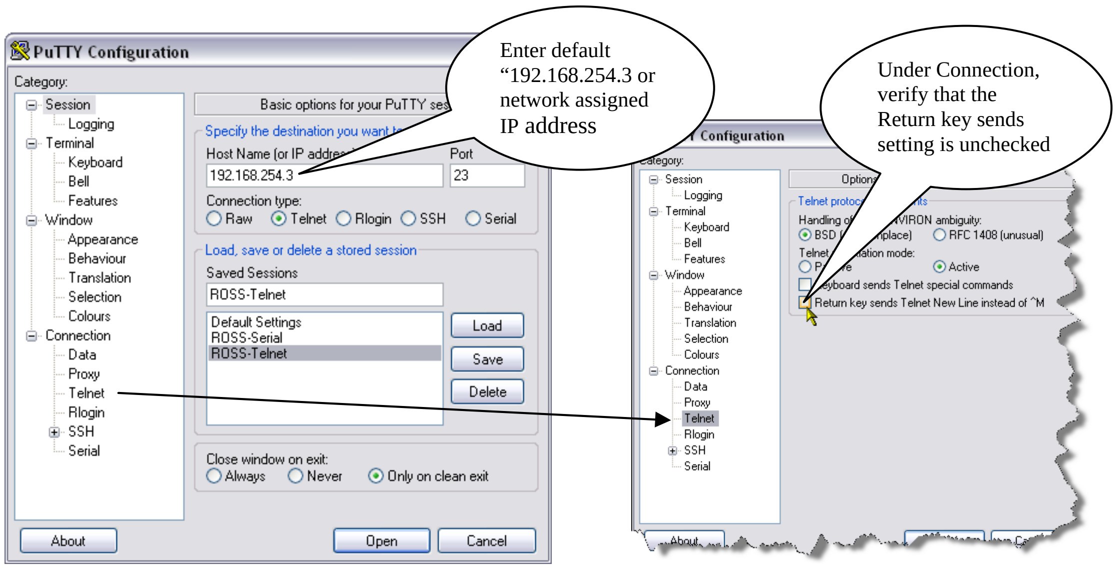


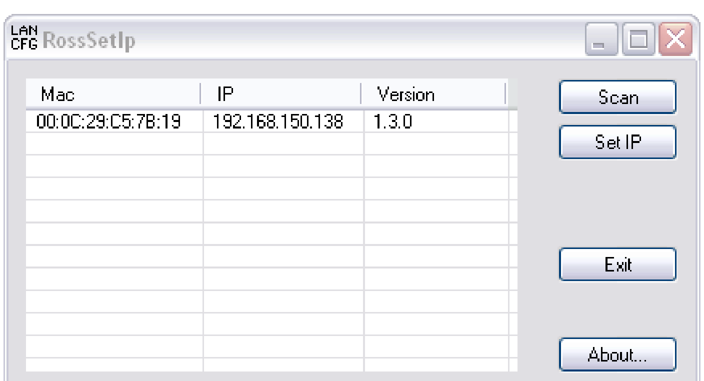
Figure 4: Ethernet LAN connection to ROSS client interface

2. Apply input AC power to ROSS and push the front panel power button to boot ROSS. Boot up requires approximately 35 seconds.
3. Next on the PC configure network communication to operate within ROSS IP subnet address range. See your Windows operators guide for settings of network properties.
4. On the PC launch the Putty application clicking on the desktop ICON or from sourced directory location.
   Configure the Putty settings to match the ROSS default IP address or networked configured.



5. Click Open button to establish communications, at the login prompt enter "admin" and default password as "Comtech" or set password.

There is a second method to configure the IP address of each ROSS unit, which is by a Comtech utility (LAN CFG – SetIP) that provides a unique Ethernet messaging exchange. This small Windows application broadcasts a proprietary packet which all ROSS unit's listen for and respond with MAC, IP and version information. *See Appendix E for more information.*



4.4 Main Menu

After using one of the connection methods the top main menu will display configuration, Status, Operations and About selections. Each selection has submenus which provide additional configuration settings or system information. The menu using Putty allows left mouse button selection or keyboard character shortcuts with keypad arrow manipulation. All settings require positive acknowledgements before they are stored into nonvolatile memory. The shortcut keys are represented by an underlined character on each displayed menu.

This section is a step-by-step procedure configuring all the necessary communication parameters for ROSS to gain access control to system components e.g. network, modem and ACU. These settings are typically configured once during installation deployment and remain static unless network configuration change.

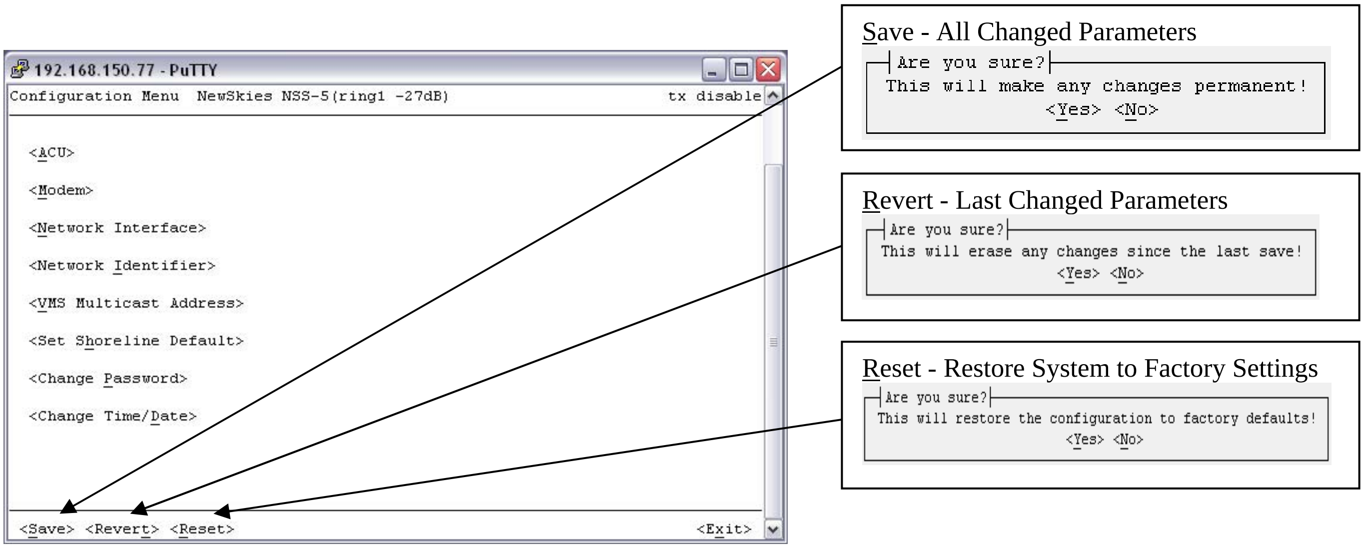
4.5 Configuration Menu

Select Configuration to access the configuration menu. The configuration menu has specific communication parameters that ROSS will use to query and control. The base menu bar sets storage parameter controls as illustrated below:

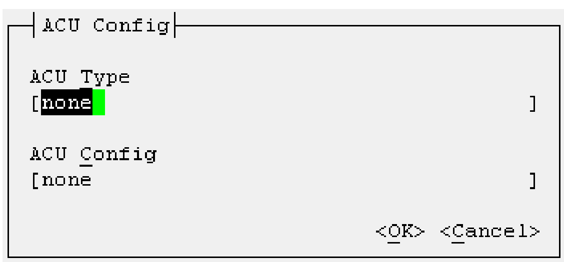
4.6 ACU Configuration

Every ACU vendor has their own proprietary communication protocols that provide for external devices to gain access to monitor and control settings. Selecting ACU Type allows the operator to enter the appropriate model or manufacture indicating to the ROSS which device driver to initialize during boot-up. The ACU models supported by ROSS are listed in Appendices at end of this document. The ACU Configuration dialog allows the operator to sets the ACU type and configuration options.

See the Appendices for ACU specific configuration parameters.



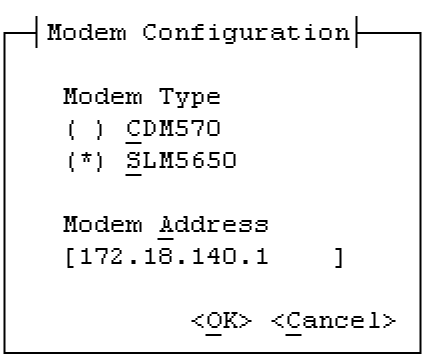
1. Enter ACU type string. This is specific to each ACU vendor. See appendices for more information.
2. Enter the ACU Config using the format for the specific ACU vendor.



3. Select Ok to enter changes, Cancel will disregard entries

4.7 Modem Configuration

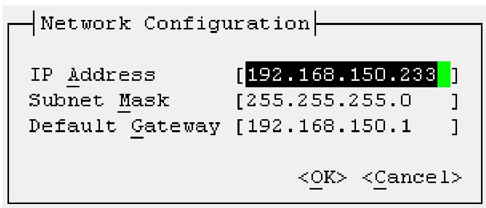
This sets the IP address that ROSS will use to communicate with the locally attached Comtech modem. The modem IP address information is obtainable from the front panel of the modem, see specific users guide for menu operation. After selecting Ok the ROSS will initialize polling with inquires of modem SOTM mode, enabled/disabled and set SAT ID number.



4.8 Network Configuration

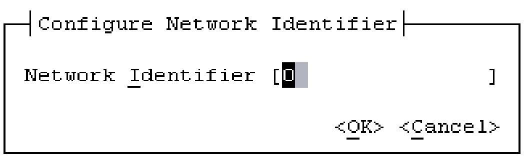
The network configuration is the ROSS system LAN interface properties setting the IP address, subnet mask and local default gateway. After applying the network protocol stack will reinitialize with the new IP settings without rebooting.

During the address change the top menu will display “A timeout occurred processing your request!” This is normal as services have temporarily stopped during address reset.



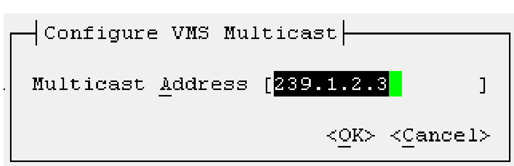
4.9 Network ID

The Network ID that is assigned to the unit defines which network within the managing VMS that the ROSS information will belong. All ROSS units used in a specified network will have the same network ID. This parameter is used by the VMS to identify units common to a network and allows the VMS to manage multiple networks, each with its own unique network ID number. This value is configurable from 1 -255 and is assigned by the network operator. Zero equals no network assignment.



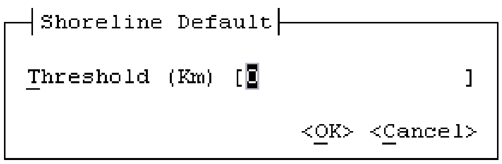
4.10 VMS Multicast Address

This sets the listening address of the active managing VMS. The VMS sends announcement messages to specified address to update active managing VMS where redundancy applies.



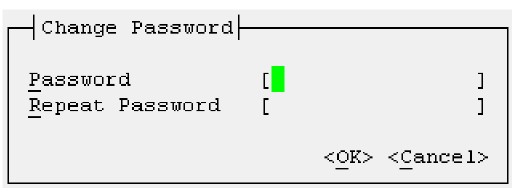
4.11 Shoreline Default (Threshold)

This sets the global shoreline threshold value. The FCC for the US shoreline is required to cease transmission at 200.0 kilometers from shore. If a vessel's distance to the nearest shoreline is less than or equal to the threshold, and NOT inside an enabled coordinated area, ROSS will mute the satellite modem's transmitter. The shoreline threshold can be disabled by setting to 0. The shoreline value is a decimal value representing kilometers. Coordinated Area Mapping can be used in place or in conjunction to control transmit. See Coordination Area Configuration for more information.



4.12 Change Console Password

Enter the new console password with a minimum of 6 to a maximum of 22 characters. There must be at minimum either one upper or lower character, all other character sets are acceptable.



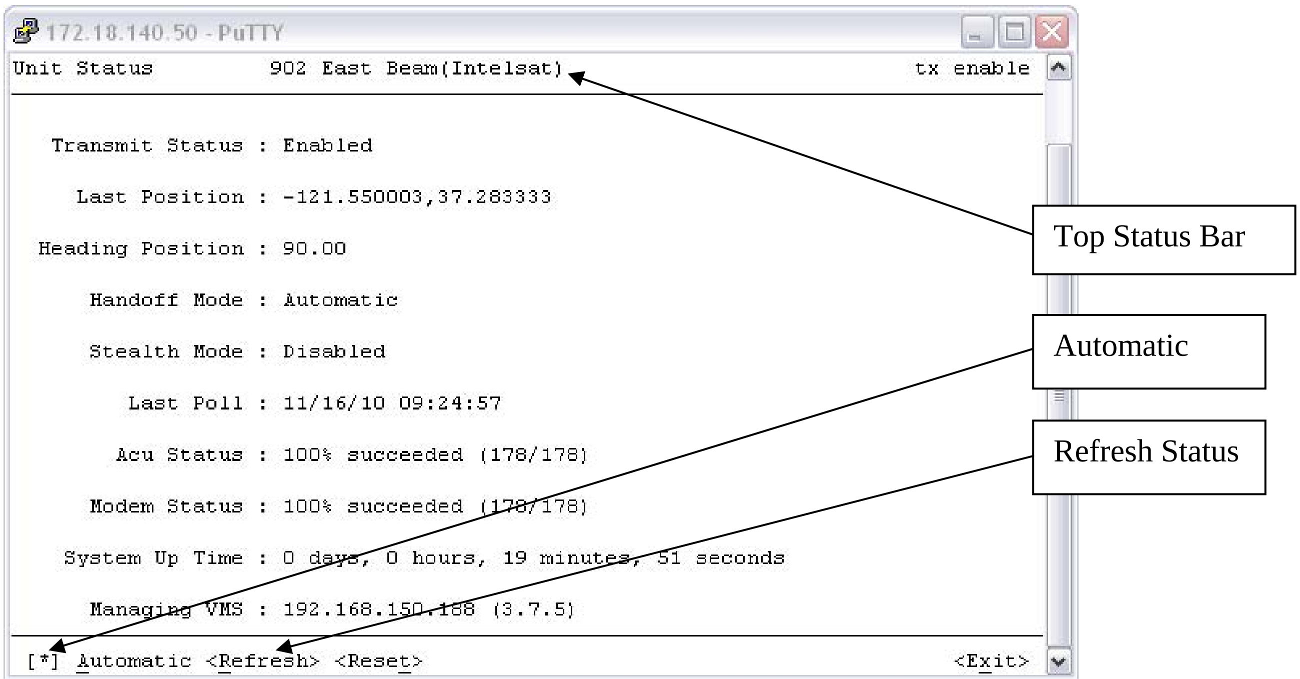
Note the password is stored directly to the system account utility (default "Comtech") and is only configurable through the Telnet/console interface. If the password is lost or unknown, the password is only configurable through the serial interface which does not require a login account. Factory resetting will restore password back to default.

4.13 General Setup: Date & Time

Setting the date & time is the users local time reference. All logged events use GMT as the vessel will travel through different time zones. Enter the date & time as shown below.

4.14 Unit Status Page

The status page shows the communication state of the modem, ACU, last reported position, transmit condition and ROSS unit up time. All displayed value requires manual Refresh to query the latest information or you can select Automatic where the values are updated every 5 seconds. The top status bar is automatically updated with the current service area/service bound and modem transmit statue. There is also a Reset that will clear the ACU and Modem Status resetting to zero state, starting both polls at 1/1.



4.15 Transmit Status

On the top menu bar right side indicates ‘enable’ or ‘disable’ of the set value in the TEK message sent to the modem. The enable indication may not be the true state of modulator transmission because of external controls, e.g. ACU hardware control signal or modem internal logic that can override ROSS. This value ‘enabled’ represents that ROSS is in a valid service area and communication poll status of modem an ACU are successful. If disabled the modulator transmit carrier is muted regardless of any other controls.

4.16 Last Position

This position retrieved from the most recent ACU poll. This value is expressed in longitude and latitude in decimal degrees. If the reported position is within a coordinated area, the coordinated area ID will be displayed adjacent to the coordinates. ROSS polls the ACU for position on a 5 second interval. This value is updated by the Refresh command.

4.17 Heading Position

This position retrieved from the most recent ACU poll. This value is expressed in decimal degrees. ROSS polls the ACU for position on a five 5 second interval.

4.18 Handoff Mode

The ROSS Handoff Mode is defaulted to automatic mode (satellite handoff is triggered by vessel position within Service Areas) on startup. If Force Manual Mode is invoked, Automatic Handoff mode is disabled. Automatic Handoff mode can also be enabled or disabled. When Automatic Handoff mode is disabled, the modem will continue to transmit except if it enters a coordinated area with a transmit flag set to disabled. On power up Automatic Mode is always enabled.

4.19 Stealth Mode

If enabled, ROSS will omit any location information in the Satellite Location Identification Protocol (SLIP) message. Some modes of operation require location of vessels to remain unidentified from network operators. This mode can be enabled or disabled from the Operations menu in the ROSS client console.

4.20 Last Poll

This indicates the last poll time at which the ROSS queried the modem and ACU for status display updates, approximately every 5 seconds.

4.21 ACU Status

The ACU status is the number of failed or successful poll attempts from start of ROSS server or from last Reset. A percentage is calculated from the count differences between failed or succeeded attempts. If failed attempts are equal 100%, check communications between ROSS and ACU. *Note if status is indicating failed the modulator transmission is muted.*

4.22 Modem Status

The modem status is the number of failed or successful poll attempts from start of ROSS server or from last Reset. A percentage is calculated from the count differences between failed or succeeded attempts. If failed attempts are equal 100%, check communications between ROSS and modem. *Note if status is indicating failed the modulator transmission is muted.*

4.23 System Up Time

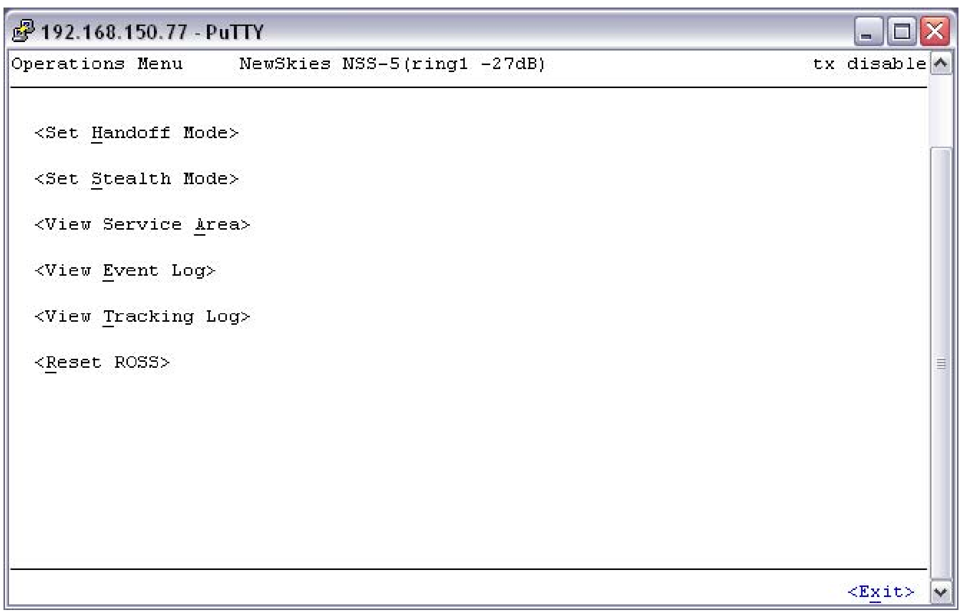
This shows the operating time of the ROSS server since last boot time.

4.24 Managing VMS

The active managing VMS sends an address announcement multicast message on timed intervals containing its source IP address. This address is used by all listening units that match the multicast address within the specified network. After reception of the active managing VMS announcement multicast message, the then ROSS process the information and sets the VMS destination IP address wherein to send unsolicited information. This address may change if there is server alteration either through redundancy switchovers or administration of new IP address network plan.

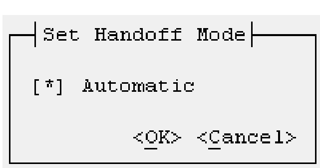
4.25 Operations Menu

The operations menu is used for performing common functions while the ROSS unit is operational. These operations include maintenance tasks such as viewing event logs, or enable/disable specific options that affect handoff, and most importantly, invoking a manual handoff



4.25.1 Set Handoff Mode

This parameter is typically used for vessel commissioning allowing the installer to test basic operations between service areas if possible. Additionally if the network operator or on-board attendant determines that automation must be terminated during installation/test mode or vessel in nonoperational state.

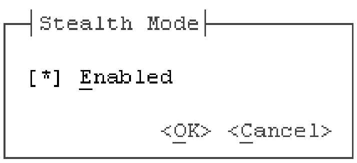


The View Service Area explained in the next section allows manual handoff selection and if invoked will disable this automatic feature. After exercising manual handoffs from the service area menu, this handoff mode control will require setting back to automatic if forced to manual mode.

The handoff mode is set to automatic at boot-up to insure that at worst case if an operator was performing maintenance procedures and forgot to return the setting back to normal condition, the local attendant could restore automation by simply power cycling unit.

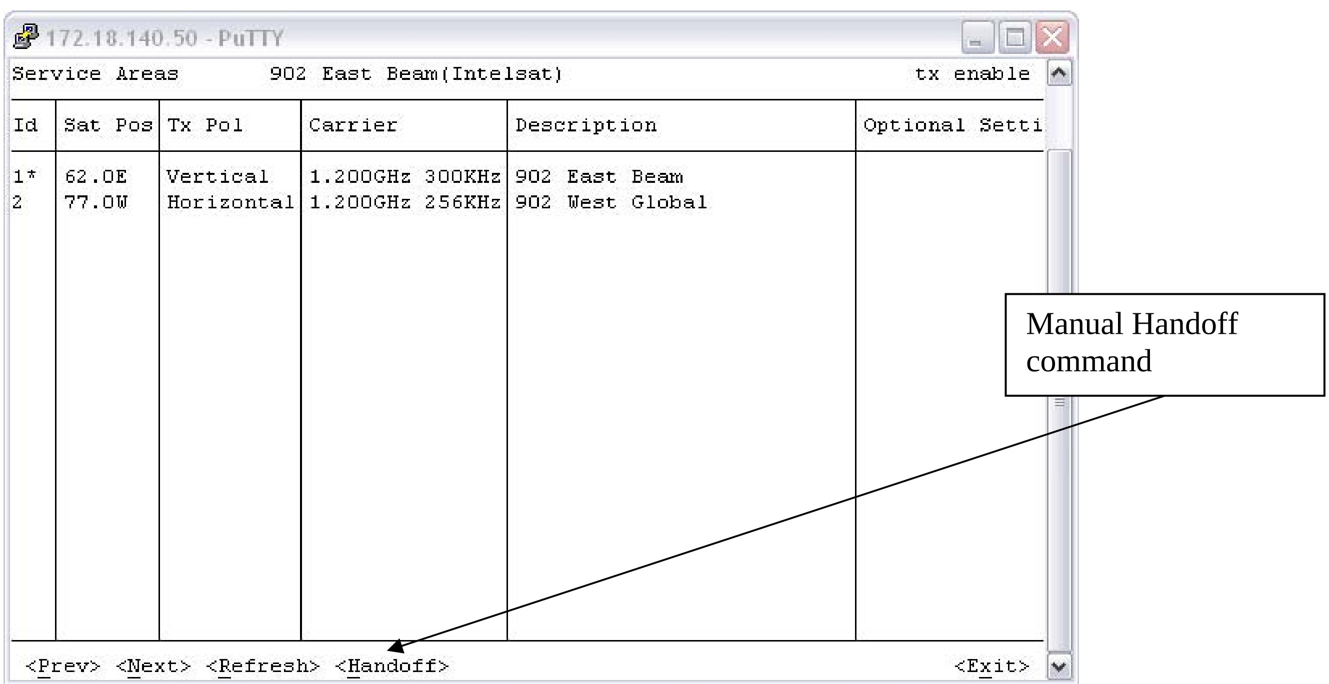
4.25.2 Stealth Mode

When Stealth mode is enabled, the vessel position is omitted from the periodic status message (SUM/SLIP) sent to the managing VMS. The vessel position is still recorded in the ROSS's internal tracking log. Stealth mode is disabled by default.



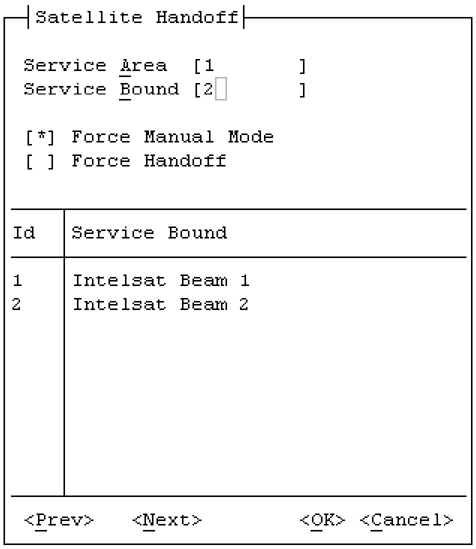
4.25.3 Service Area

This menu provides a list of configured service areas that were configured using the ROSS Configuration Editor. Each listed SA is assigned an ID displaying satellite orbital set position, Transmit polarity and targeted carrier formation. The complete definition and configuration of service areas are described in section 5.0, ROSS Configuration Editor.



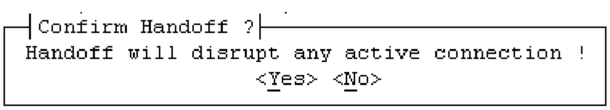
4.25.4 Manual Handoff From Service Area

The Service Area handoff command is useful when it becomes necessary to test or force the modem to a different satellite. To Force a Handoff of a selected service area, click on Handoff from the bottom of the menu and enter desired Id from the list of service areas.

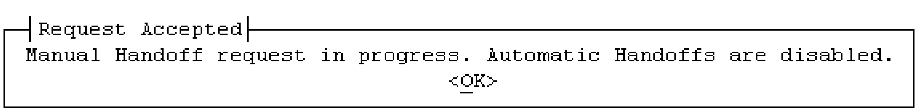


After entering the desired service area Id number from the list, a second list of all the Service Bounds contained in the SA is displayed. Enter the Service Bound Id number from the displayed list. Next select Force Manual Mode if the SA Id is outside the currently detected. Or exclude Force Manual Mode and select Force Handoff if the SA Id is within the currently detected.

Click <OK> to start the Manual Handoff operation.



A confirmation dialog is displayed to request Yes or No before proceeding. If the operation is confirmed the dialog below is shown to the operator indicating that the automatic handoffs are disabled.

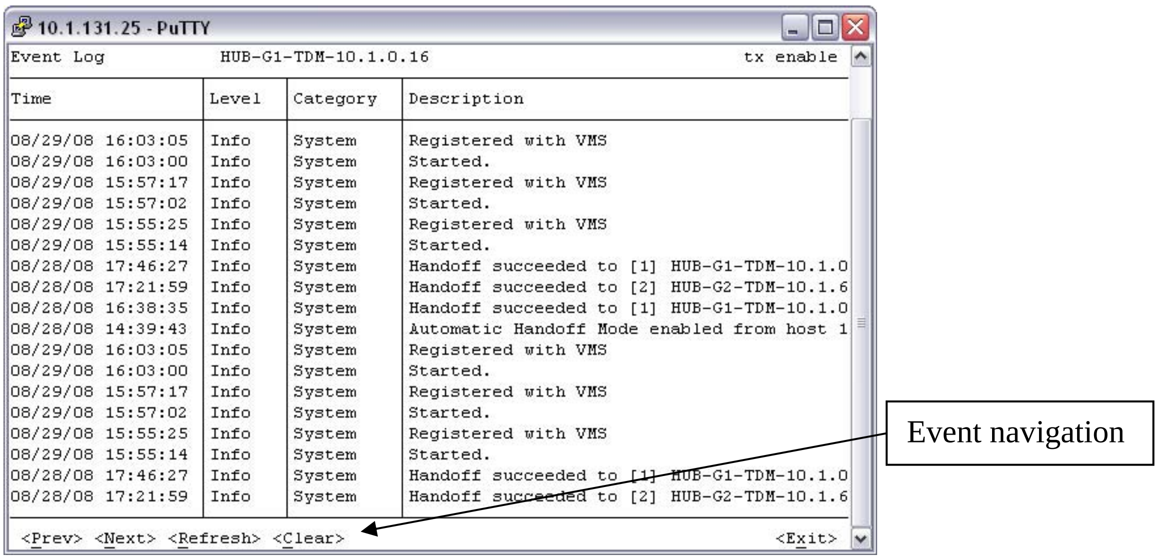


After making a selection ROSS will override current location pushing selected SA configurations to the modem and ACU. Once completed, the manually requested SA description will be displayed at the top on the menu indicating selection completion. You can at anytime during this process select a different SA for execution without adverse effects.

Force Manual Mode disables Automatic Handoff Mode. To restore Automatic Handoff mode, where ROSS performs a handoff based on vessel position and service area, use the Handoff Mode command described in section 4.25.1.

4.25.5 Event Log

Upon boot the system records internal processes and events that are useful when troubleshooting failure conditions and improper operations. The even view is a scrollable window sorting oldest to latest events.



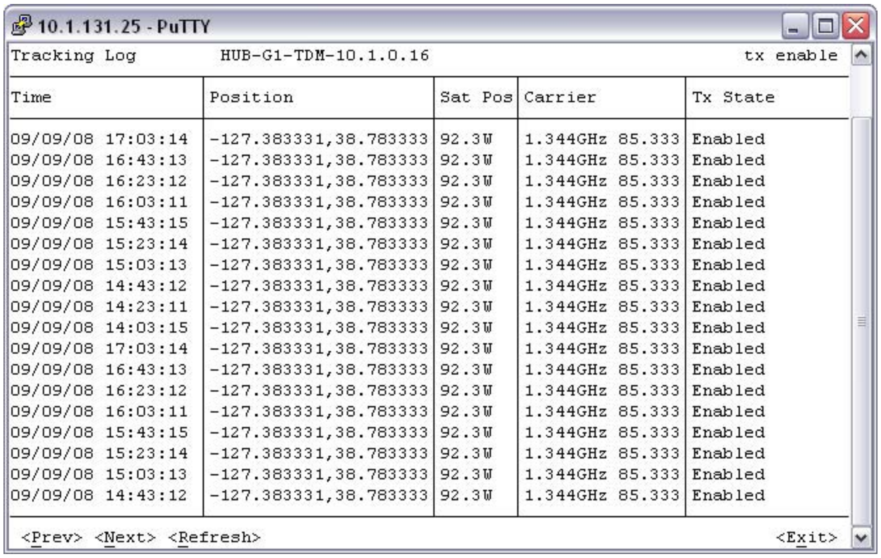
There four menu controls at the bottom of the window frame that provide navigation through the list of stored event. By selecting Next or Prev the list will block scroll between events. The Refresh will update list and the Clear selection will delete all events emptying the file completely.

Each event is identified with an event type/category and time stamp and recorded with a brief description. The total list is a circular file capable of storing up to 511 events that may occur in the normal course of operation. After reaching the max list count the oldest event will be replace with the next newest event.

If stored history of system events is required for local or remote backups, the file can be downloaded either locally or over the air at any desirable intervals using the supplied utility "GetLog.exe", which is run from a command-line prompt with the capability of setting up windows scheduled interval downloads. *For more information on GetLog application see section 6 Get Log Files.*

4.25.6 Tracking Log

The Tracking log is also a circular file capable of storing up to 32766 entries or 455 days before overwrites take place. Each entry is timed at 20 minute interval taking a timed/date snapshot of the vessels current location, frequency, transmit status, data rates and modulations. It is expected that the network administrator will bulk download the tracking log file on regular intervals so as not to lose any tracking data.


10.1.131.25 - PuTTY

Tracking Log HUB-G1-TDM-10.1.0.16 tx enable

Time	Position	Sat Pos	Carrier	Tx State
09/09/08 17:03:14	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:43:13	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:23:12	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:03:11	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:43:15	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:23:14	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:03:13	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 14:43:12	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 14:23:11	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 14:03:15	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 17:03:14	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:43:13	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:23:12	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 16:03:11	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:43:15	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:23:14	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 15:03:13	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled
09/09/08 14:43:12	-127.383331,38.783333	92.3W	1.344GHz 85.333	Enabled

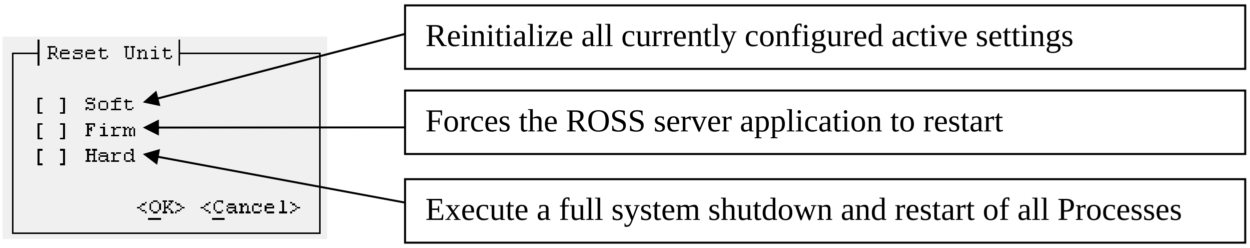
<Prev> <Next> <Refresh> <Exit>

If stored history of tracking information is required for local or remote backups, the file can be downloaded either locally or over the air from the ROSS editor or at any desirable intervals using the supplied utility “GetLog.exe”, which is run from a command-line prompt with the capability of setting up windows scheduled interval downloads.

For more information on GetLog application see section 6 Get Log Files.

4.25.7 Reset Unit

The event that the operator determines that reset of ROSS application is require there are three separate reset functions available.



4.26 ROSS Front Panel Interface (Keypad/LCD)

The ROSS units have a front panel interface consisting of a six-function keypad and 16x2 character LCD display. The Front Panel interface allows for local maintenance of the ROSS unit. Any configuration and operation function provided in the console interface (sec 4.1) is available from the front panel interface.

This keypad interface is based on a structured menu system where the keypad is used for menu navigation, data entry, and command execution. The “Select” button (green check) is used to select items on the menu display. The “Cancel” button (red X) will cancel any operation or move to the upper menu level.

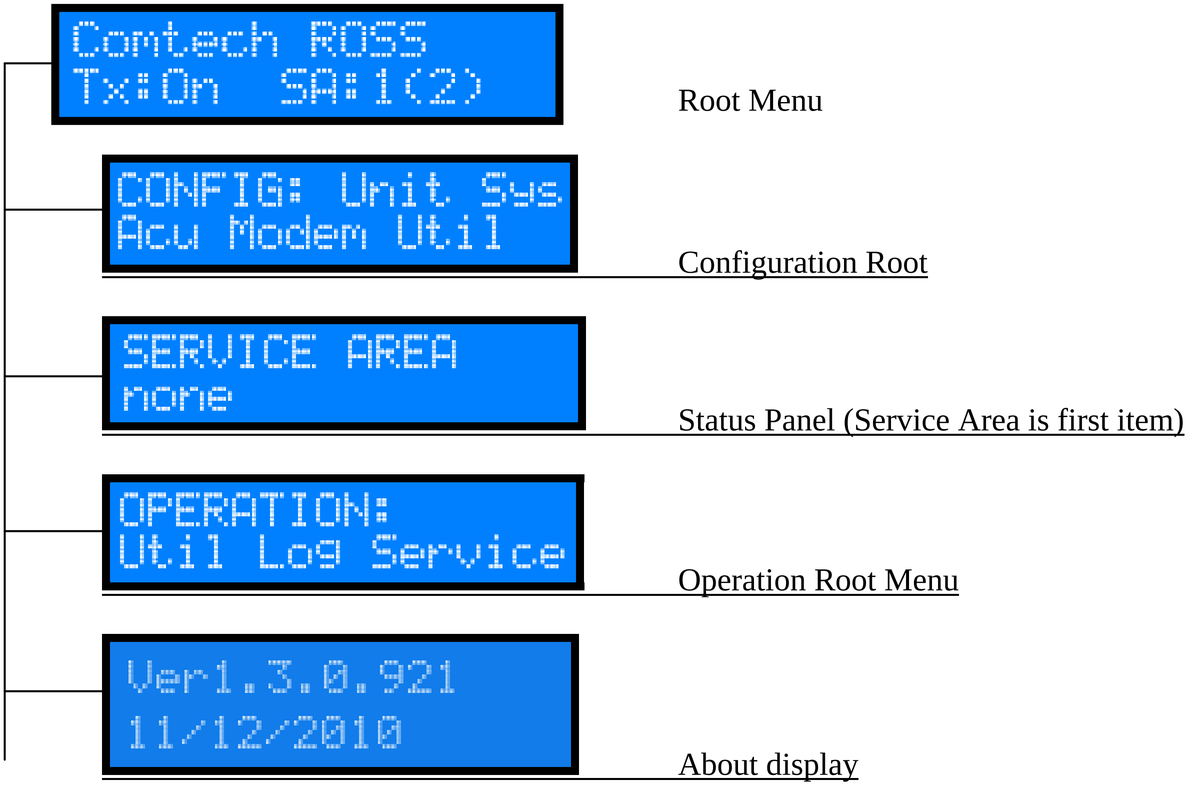
Navigation from one menu item to another is accomplished by using the arrows keys to move the cursor (flashing block) to the desired item. Pressing the “Select” button will execute the command or menu item identified by the cursor position.

Figure 5: LCD screen and keypad layout showing splash screen

This initial splash screen displays the transmit status and the current service area id and service bound id (in parentheses) being used.

The Keypad interface uses a multi-level menu tree to expose the commands and functions. The root level menus and their sub-menus are shown below. The menu structure closely matches the menu in the ROSS console interface described in Section 4.1.

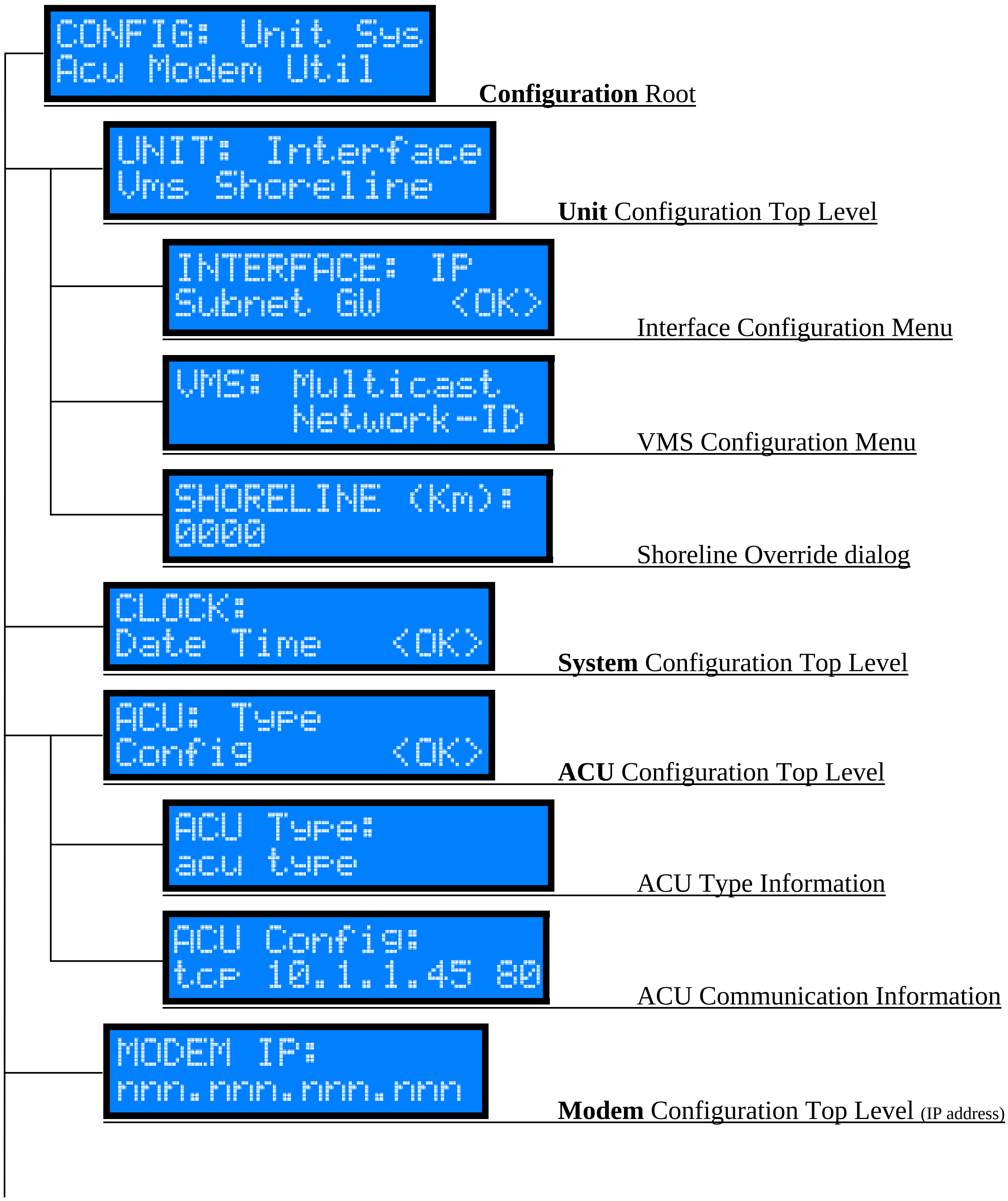
At root level, there are four sub-menus.

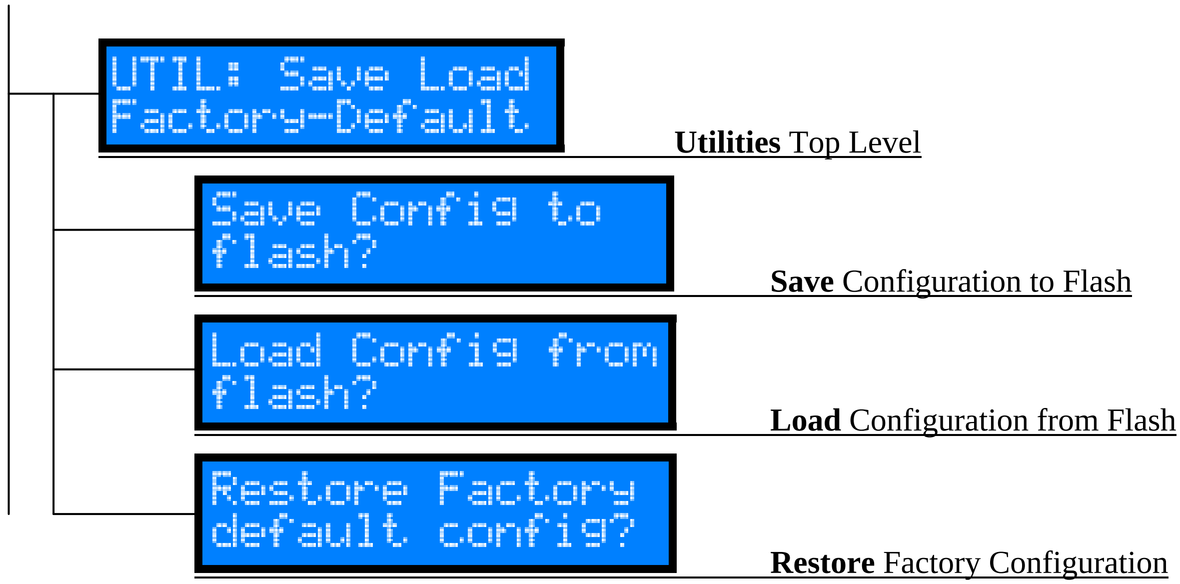


Menus: `Config, Status, Operation, About`
Each sub-menu may display commands or more sub-menus to show more categories.

4.27 Configuration Menu

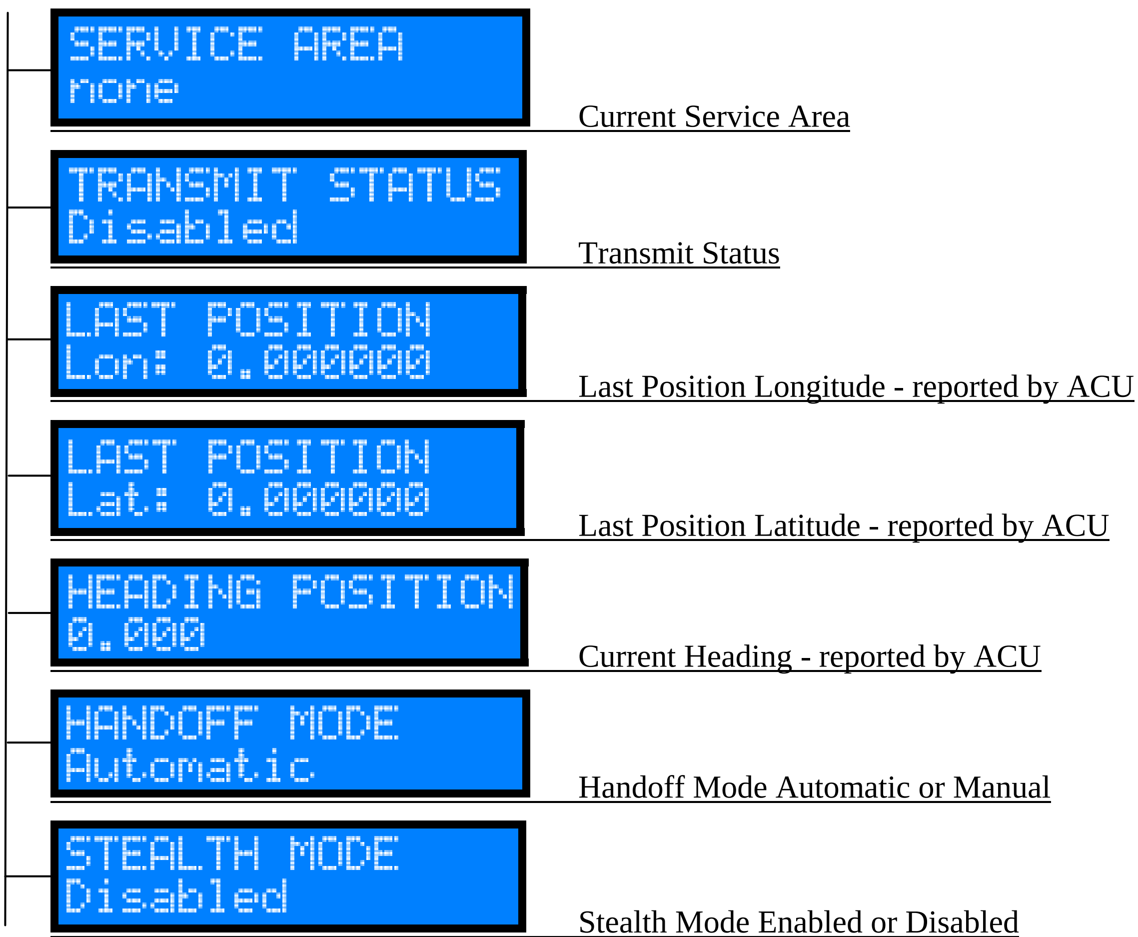
The Configuration menu has five sub menus as shown below:

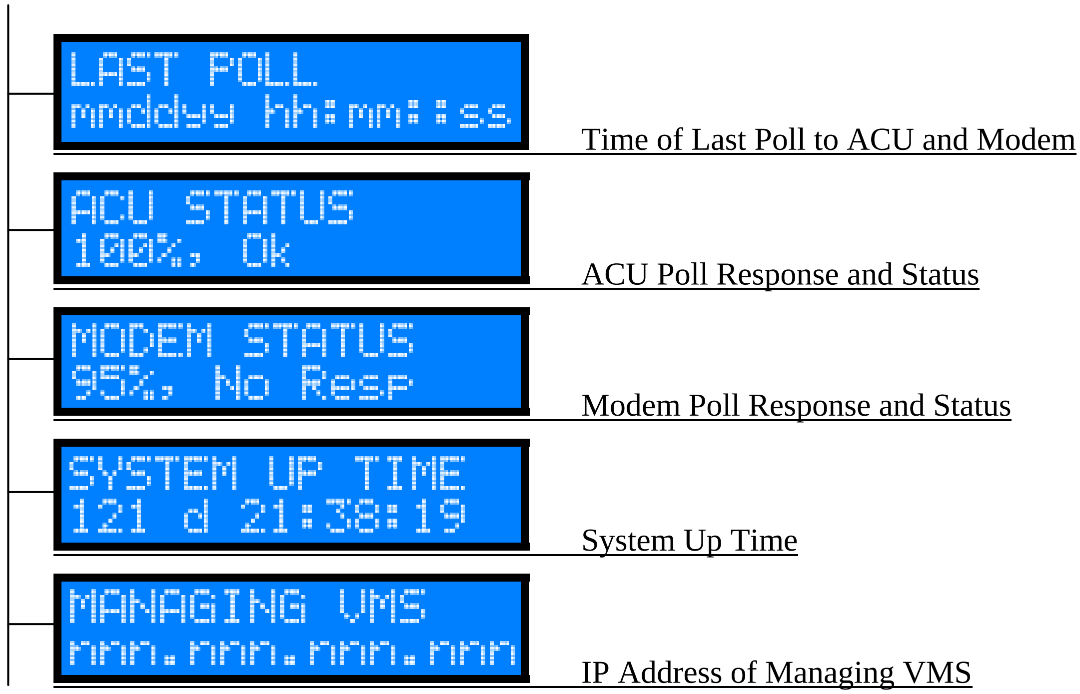




4.28 Status Menu

The Status menu item is a command that allows the operator to scroll through twelve (12) separate status items. The "Left" and "Right" navigation keys scroll to next and previous status item views.



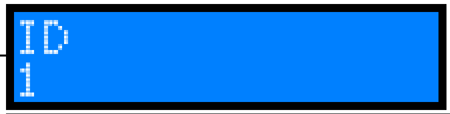


4.29 Operation Menu

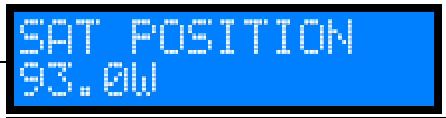
The Operation menu item exposes commands to change Handoff Mode, Stealth Mode, Reset unit, browse event & tracking logs, and view the current Service Area entries. It also allows the user to perform a manual handoff to a specific service area.

Selecting "Service" command allows the user to browse the Service Areas described in section 4.4.3. The "Left" and "Right" keys display the previous or next column in the current row entry, while the "Up" and "Down" keys display the previous or next Service Area entry.

Each Service Area entry has the following data items. Select the "Enter" key will invoke a manual Handoff Command. If successful, Automatic Handoff mode is disabled.



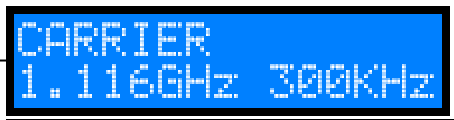
Service Area ID



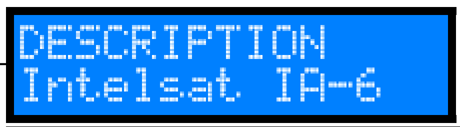
Satellite Position value sent to ACU

Polarization Value:

Depending on the ACU type, this value can also specify Rx Polarization



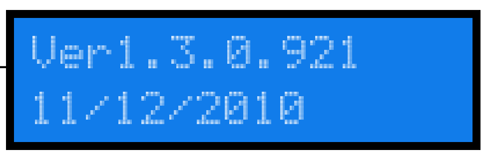
Carrier information sent to ACU for acquisition



Service Area description or label text

4.29.1 About Menu (command)

The About menu command displays information about the current ROSS software version and build date. The version shows the software levels major, minor, maintenance and build level.



5 ROSS Configuration Editor

To complete the configuration of ROSS it is required to generate a unique service area (SA) with all its associated files. The ROSS Configuration Editor will help gathers different elements and consolidates them into a single structure which is uploaded to the ROSS file manger. The ROSS Configuration Editor also provides the capability for file uploads and downloads either through local LAN or over the air interface.

ROSS is ready to accept roaming database files after completing the basic communication configurations in Section 4 “Communications Configuration”. The screen capture below illustrates as if two SA were generated and possibly uploaded. This section will step through the basics of creating a complete SA files for first time upload. It will also touch on editing an existing file structure for ongoing maintenance.

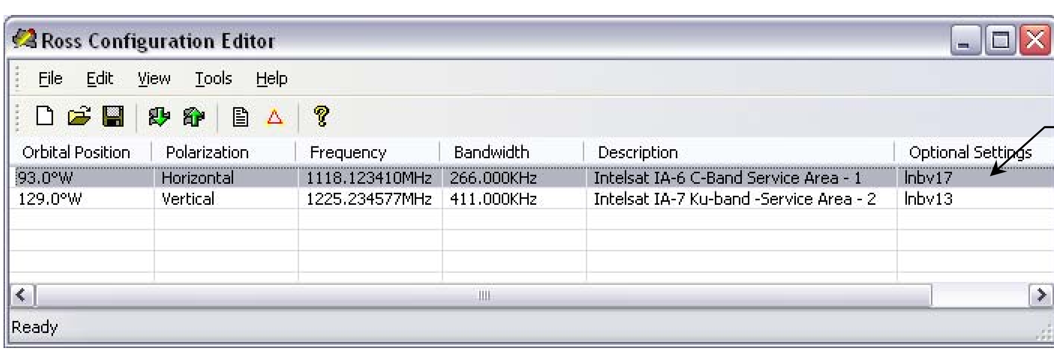
The ROSS Configuration Editor (RCE) is Windows application that is launched directly as a standalone program requiring no system installation. It can be run from anywhere within your network assuming the PC executing the program has IP connectivity to the editing ROSS unit(s). The RCE is executed by double clicking on the program ICON shown below.

The RCE uses a proprietary IP protocol to transfer the configuration data in optimized manner. The UI provides pull down menus as well as tool bar icons for configuration operations.

5.1 Creating Service Areas

There are two basic steps to begin building a SA, one is to first launch the RCE application and second set the IP address that corresponds to the configurable ROSS unit.

1. Start-up the RCE application by opening the RossCfgEdit.exe application.
2. From the Edit menu select proprieties and enter the IP address of the ROSS unit for editing.



Click desired row for editing or upload

Each Service Area is associated with a number of required files that when combined create an overall operational SA. After creation of a SA it is processed (edited, uploaded) by highlighting (click select) the row as shown.

All created SA groups are uploaded and also stored locally for retrieval further editing. When saving the newly or edited file, assign a logical name for easy association to editing ROSS unit.

5.2 ROSS Configuration Items

There are four important data items that the RCE can edit. These items are necessary for ROSS to operate:

1. **Service Area(s)**, consist of a collection Service Bounds which are geographic areas that define the operating zone. Service Areas (SAs) can contain one or more Service Bounds that operate under a specific satellite beam.
2. **Service Bound(s)**, as previously stated each Service Area can contain one or many service bounds (SB). If ROSS detects that a vessel has moved into a SB that is in another SA, ROSS initiates a satellite handoff operation into a different configuration, e.g. hub, satellite, TDM carrier or all combinations. SB are polygonal areas defined by latitude/longitude coordinates which cover satellite and/or hub transmissions that are overlaid bridging the communication hops between service connections. Starting with VMS 3.7.x and ROSS 1.2.0.x, Service Bounds can also provided Advanced Switching modulation table to optimize spectral efficiency on a per Service Bound basis.
3. **Modem Configuration** sets all the parameters in the modem and is associated to a SA transforming the communications to match entry points of hub, satellite, TDM, STDMA controller and/or all.
4. **Coordinated Area(s)**, like the Service Bound, a coordinated area is collection of geographic zones defined by coordinates. Unlike the SB, the coordinated areas are used to indicate special use cases such (1) inhibiting a transmission within an SB, or (2) overriding shoreline transmission exclusion. Section 6.1.10 provides more details on using Coordinated Areas.

   Note the ACU parameters are the assignment of antenna pointing information for that SA and are the base starting point of configurations.

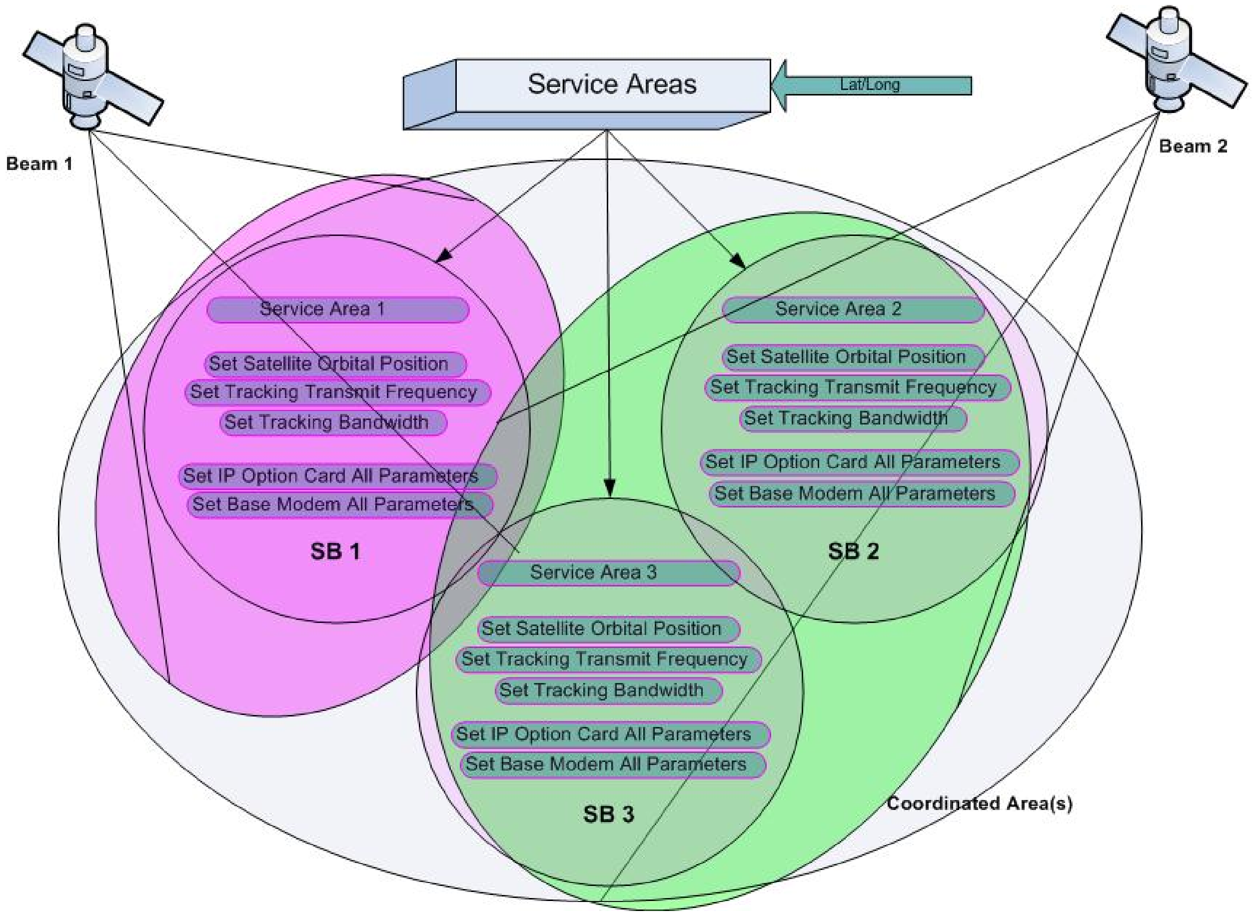


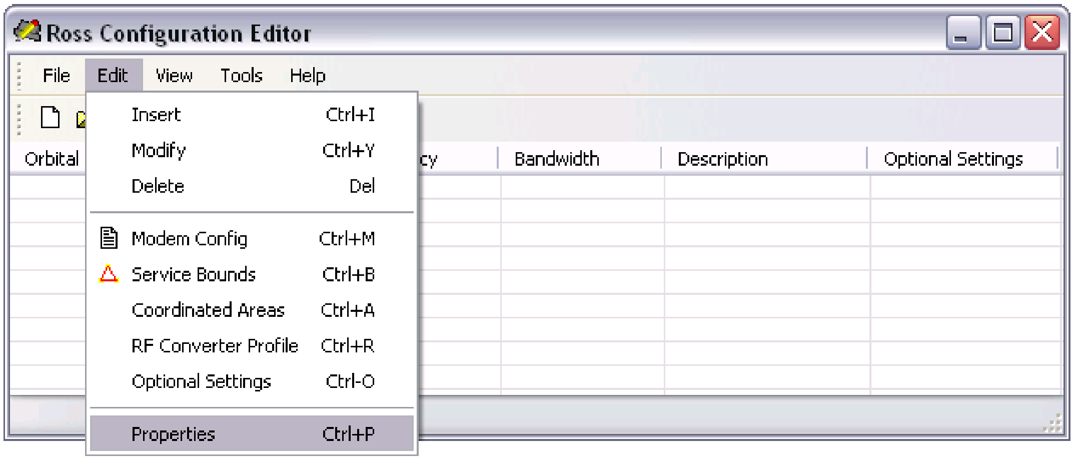
Figure 6: Service Bounds example

The service area drawing figure 6 depicts three separate service bounds. SB-1 is configured with one satellite, while SB-2, 3 are configured under one satellite which may operate from different hubs or TDM's from the same hub. This is only one example out of many combinations.

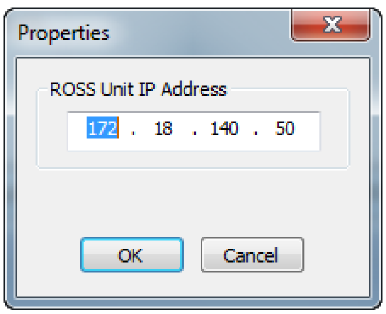
5.3 Edit Properties (IP Address)

The first step in configuring the SA files is to establish IP communication to the ROSS unit for editing, if this is not possible at this time, the configuration of service areas can be accomplished without having connectivity to the ROSS unit. It is possible to configure multiple ROSS databases without making connections. Setting the IP address is part of the configuration file set and when recalled (open) later will be used to direct upload files to the correct unit. It is important to logically name each database configuration with a unique name, as an example the ROSS IP address could be used as part of the file naming strategy.

1. Select Edit from the RCE menu, scroll down and pick properties (Ctrl+P), properties dialog window will popup requesting ROSS Unit IP Address.

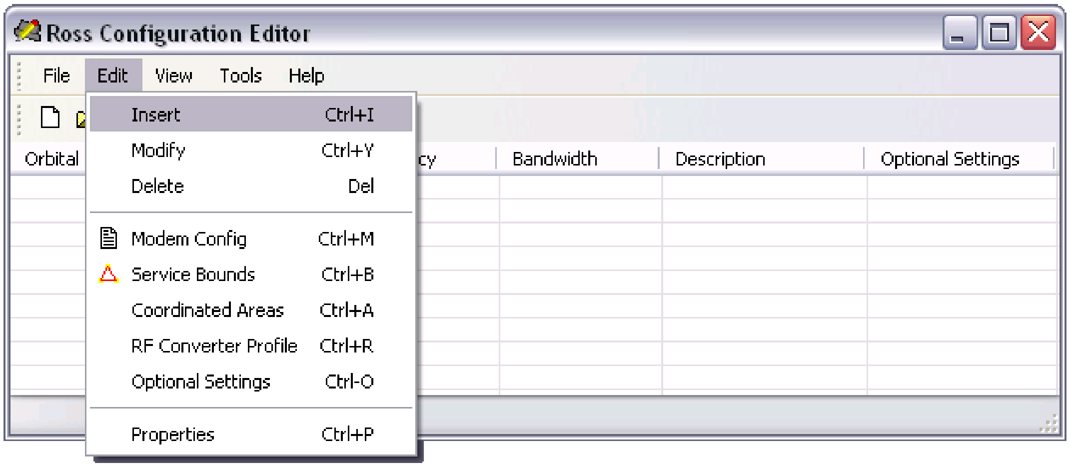


2. Enter the IP address and click OK.



5.4 Edit Insert (Service Area)

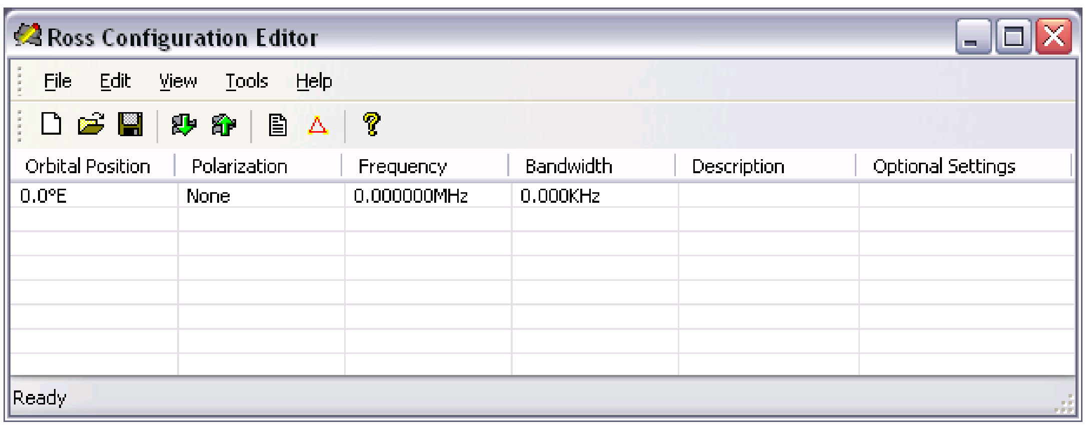
The first stage of creating a service area is inserting the antenna pointing information. This is the enumerated index for the SA, but you will notice that no SA number is visible at this time. All file numbering is handed by the RCE assigning a unique number as the database is created before upload.



Select Insert (Ctrl+I) from the dropdown Edit to insert a new SA.

5.5 Enter Antenna Pointing Information

To modify the default antenna values, select each cell for editing by double clicking into the cell. Each is cell is edited differently, some are text with extension values and others are dropdown list selections.



1. Orbital Position – Set the satellite orbital position, this is entered as a longitudinal position in degrees with a west (W) or east (E) suffix. Check with your service provider for information on your satellite position(s). See figure 7 below for an example of satellite orbital positions.

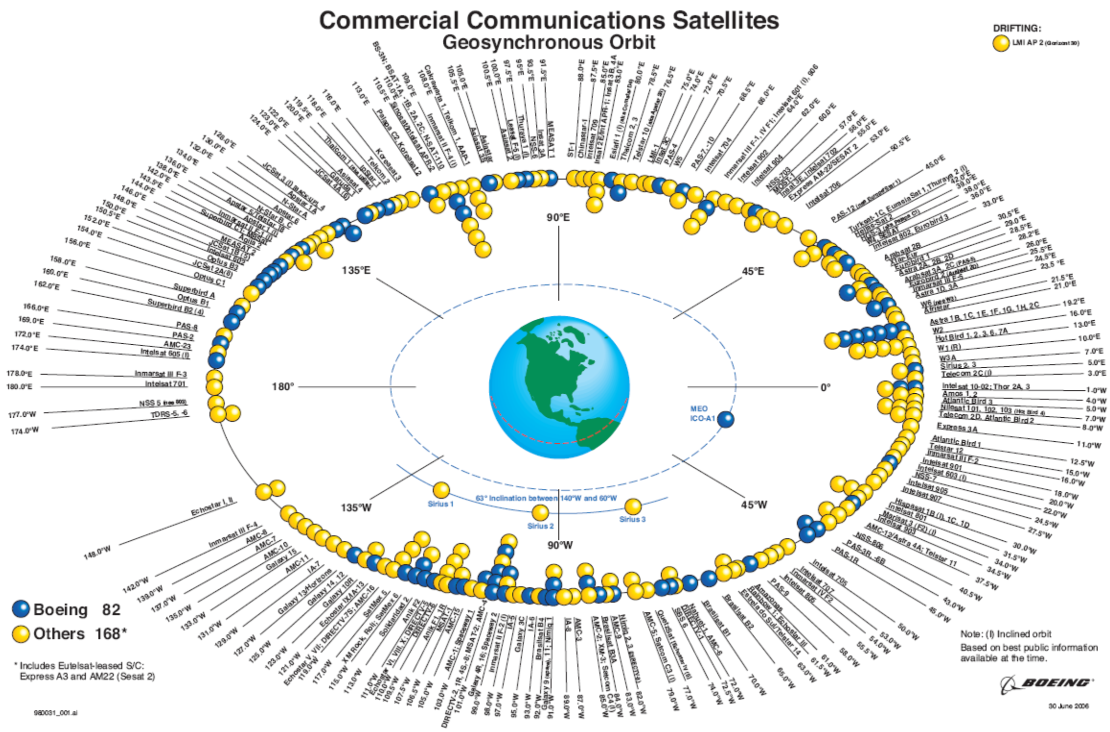


Figure 7: Orbital Position of Geosynchronous Satellites

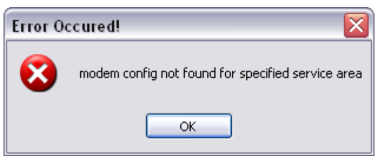
2. Polarization – Transmit polarization is set for ‘None’ typically C-Band Global beams or Vertical/Horizontal Ku-Band polarized feeds. This parameter is a dropdown list dialog. This value is governed by the antenna hardware configuration and is set to match the transmit transponder per service connection.
3. Frequency – The antenna controller requires a beacon carrier to track when transitioning from cold start or beam to beam. This frequency value which is set in MHz tunes the ACU’s receiver to a set center frequency to determine AGC thresholds and peak tracking. Typically this frequency should match the TDM carrier for this service area.
4. Bandwidth – The antenna controller requires a beacon carrier to track when transitioning from cold start or beam to beam. This bandwidth value which is set KHz tunes the ACU’s receiver to a set bandwidth to determine AGC thresholds. Typically this bandwidth should match the TDM carrier for this service area. It is used in conjunction with frequency setting.
5. Description - is only used as an assigned identification per service area configuration. This assigned value is displayed within the ROSS view of service area menu.
6. Optional Settings – This field contains optional parameters values that are linked to the ACU to provide additional RF controls. This is a text string that can change the behavior of specific ROSS subsystems (i.e. ACU). Optional settings are linked to a specific Service Area.

5.6 Import Modem Configuration File

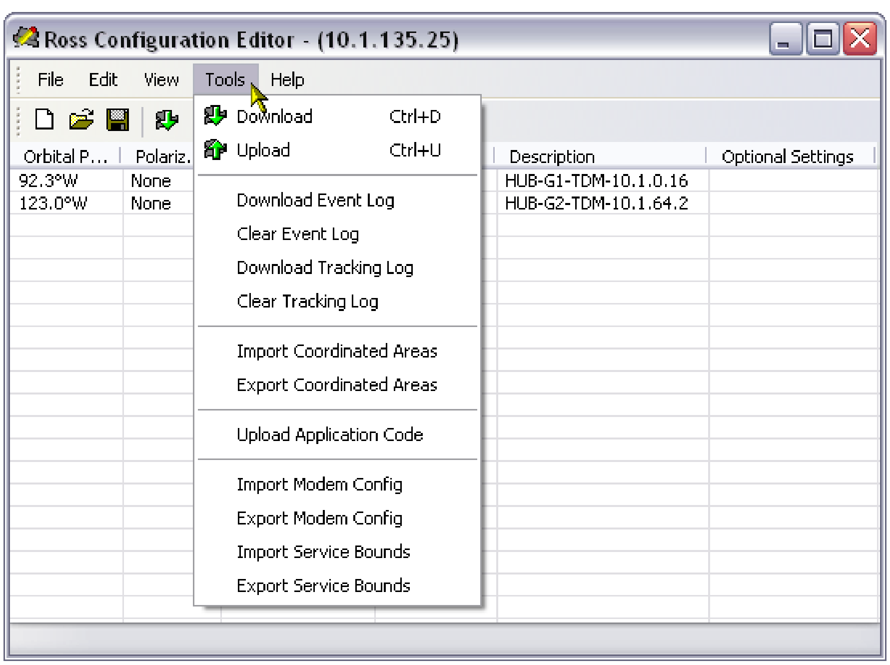
Before editing modem configuration it will be necessary to import a preconfigured modem parameter file to modify. To simplify the modem configurations it is advisable to create a generic modem file which contains the most common set parameters which can be used through the network and only requiring the necessary changes per site.

CAUTION ***See Vload Users Guide, Doc 22117, Rev1.0, SW Ver. 3.5.x for more information on how to get configuration files from modems.***

When editing the modem configuration for a selected SA and no modem parameter file loaded the following error message will appear.



1. Select the Import Modem Config from the dropdown Tools menu.
2. The windows explorer file menu will prompt the user to locate the directory and file location for selection. The default file type is (*.cfg), typically the modem parameter files are stored as .txt.
3. Select Files of Type to be “All file types (*.*) to locate the modem file. This will load the generic modem file to the selected SA.



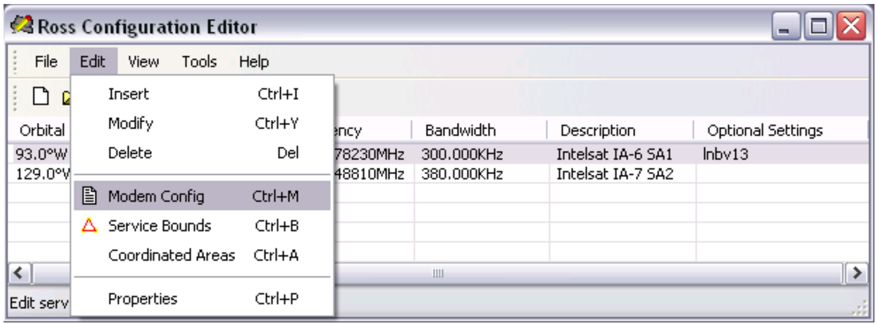
4. Repeat this process for subsequent SA’s.

5.7 Edit Modem Configuration File

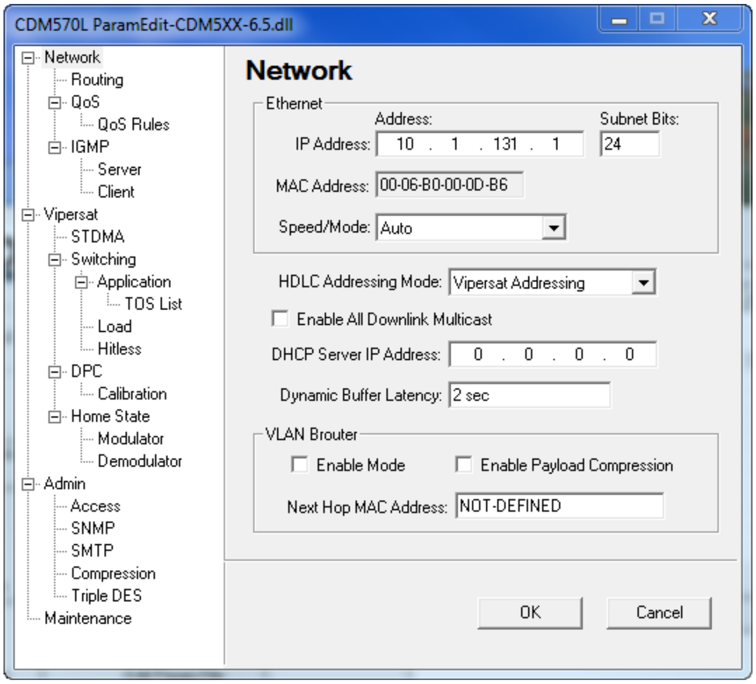
The SA sets the modem parameters by calling a preconfigured file and streaming it over the local LAN connection. This file is edited through a user interface that is provided by a shared library. The library file is loaded by the RCE to display all the configuration values that require setting for this SA.

The library must be named ParamEdit.dll and be visible in the RCE path. It is recommended that the ParamEdit.dll reside in the same working directory as the RCE executable. Contact Comtech EF Data technical support at supportcvni@comtechefdata.com to obtain the latest ParamEdit.dll library.

See Vipersat CDM-570/570L Users Guide, Doc 22125, Rev2, FW Ver.1.6.5 for proper operation.



After selecting the Modem Config (Ctrl+M) from the Edit dropdown menu the RCE will invoke the CDM editor popping the dialog display menu into view. Configure all the modem communication parameters that are appropriate for this SA.



Note the modem IP address is omitted during the Streamload process protecting against possible settings that could terminate communications between ROSS and network operator. If an operator copies a modem parameter file from one modem to another and forgot to change the IP address the communication would not fail after ROSS pushed this file for a new SA.

WARNING *If incorrect transmission parameters are configured, the result will be communications failure. Take care when determining set parameters!*

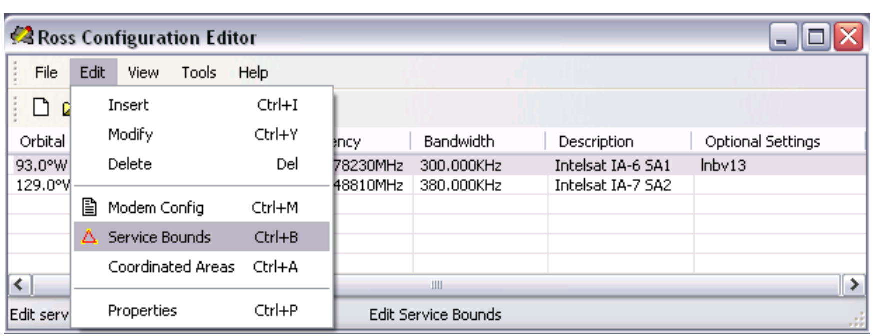
WARNING ***SLM-5650A*** *IP address is* *NOT* *omitted during Streamload process. If an operator copies a modem parameter file from one modem to another and forgot to change the IP address the communication would fail after ROSS pushed this file for a new SA. Take care when determining set parameters!*

After completing all necessary changes to modem parameters select OK to set file into selected SA database.

5.8 Edit Service Bounds

The service bounds set the geographical area for this satellite and/or hub connection. Defining the multiple point longitude/latitude polygon(s) that is associated to the modem configuration information allows the ROSS to push groups of files when crossing into or out of these boundaries. Example, the selected SA shown below has antenna pointing information and fixed configured modem parameters. Once the vessel crosses into this service area the ROSS will send antenna to new point and push new parameter set to the modem. Each unit will change configuration waiting on communications to be established.

The SB can be entered manually through location by location if you have already established each point on the polygon. A minimum of three points is required with each point defined as longitude and latitude.



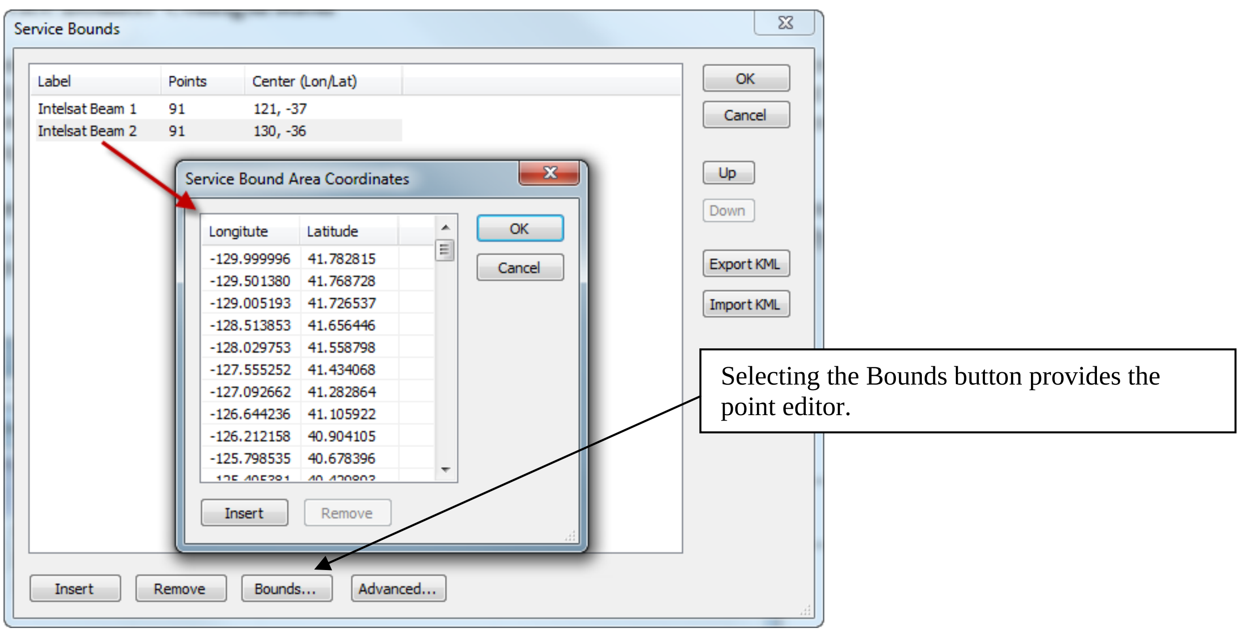
If the surrounding polygon points are unknown, there are other methods for generating the polygon either through global mapping applications such as Google™ Earth. In all cases each polygon should be within the Satellite’s footprint.

Service bounds can also support ***Advanced Switching Modulator Code Tables***. The Modulator Code tables specify the modulation rate that will be utilized for requested bit-rate. This feature allows Service Bounds to modify transmission parameters within the same beam providing stepped condition settings. These stepped transitions could correct or overcome environmental beam degradation areas and provide optional service level assignments (i.e. power, data rate, modulation, etc.). This flexible mechanism allows the operator to meet any customer requirements for specific operating conditions.

5.9 Service Bounds Configuration

ROSS SB editor is a text-based file that conforms to the following format, Label (ID of Service Bound), Points (the number of points within the polygon) and Center Lon/Lat (displays the center of the polygon). The Bounds button provide the entries of the polygon longitude, latitude as derived from your generate SB polygon data or as manually entered.

The Service Bounds window shown below illustrates two of a service bounds entry. Each entry is a set of longitude and latitude coordinates that represent points of a polygon over a geographic area. This polygon defines the *Service Bounds.*



A Service Bound polygon, as shown above, can be as simple as four points which define the operational area.

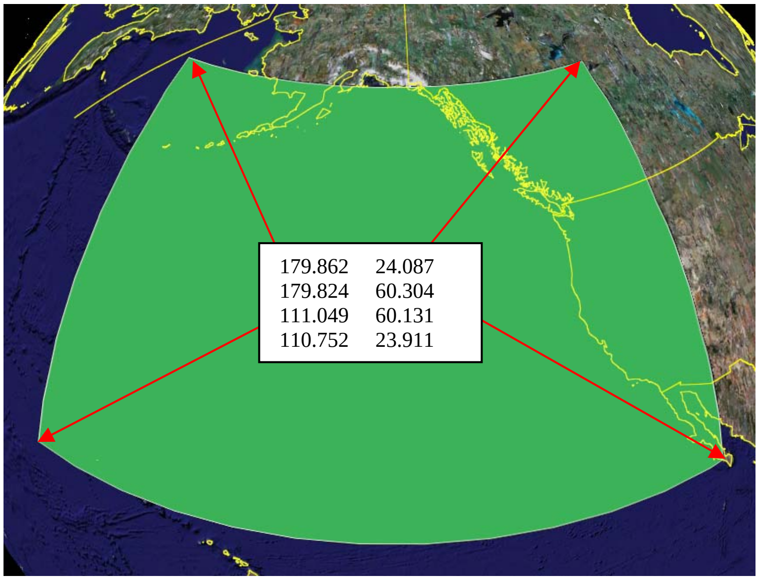


Figure 8: Example of creating a service bound polygon in Google Earth™

As shown in figure 8, Google Earth™ is very useful in laying out a service bounds polygon(s). The service bounds polygon(s) created in a Google Earth™ application can be imported directly into the Service Bounds editor using the "Import KML" command located under the File menu in the editor. This commands imports polygons from a KML file (keyhole markup language) generated by Google Earth™.

Service Bound Search Order

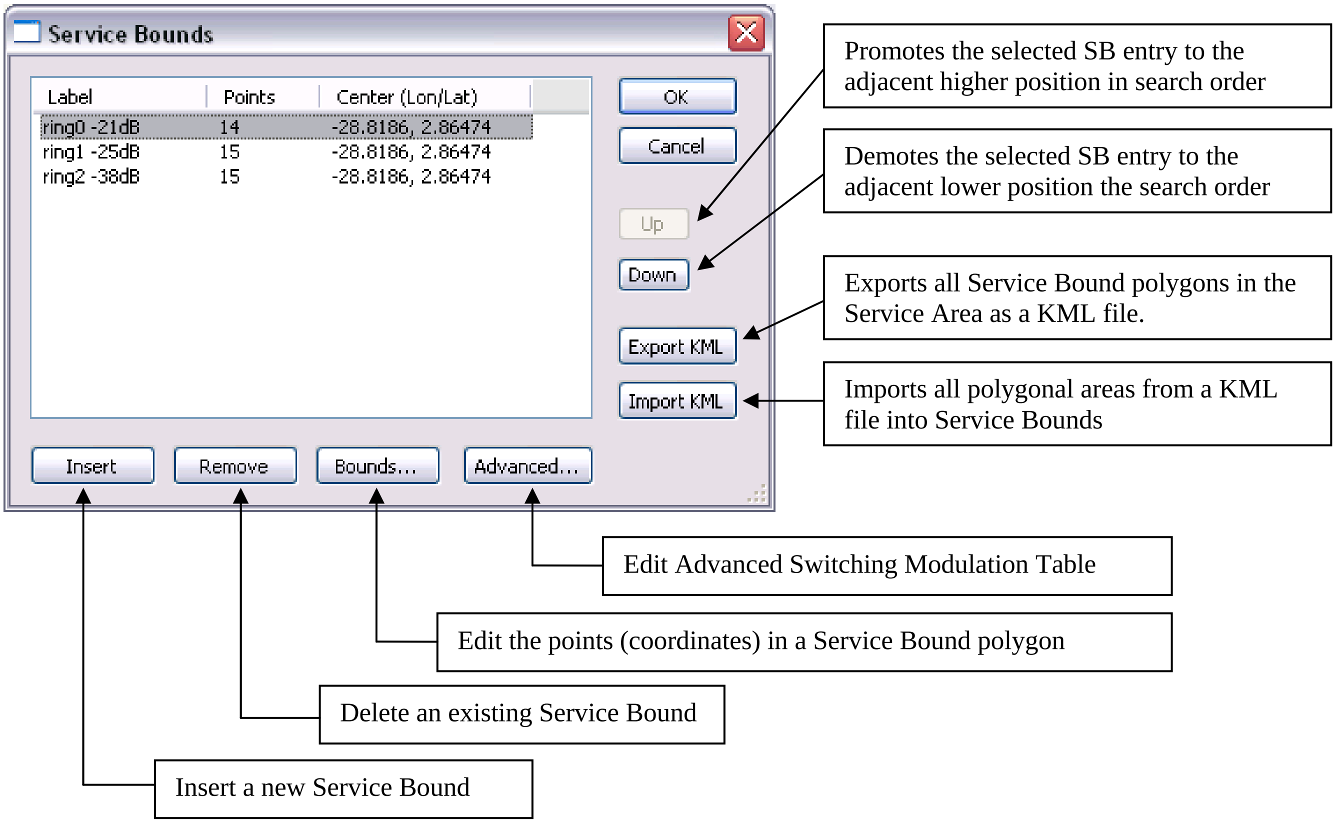
The order in which service bounds are searched to determine whether a handoff is necessary follows the declaration order of each Service Bound in the list.

5.10 Service Bounds Configuration

Service Bounds have the following enhancements:

- Id – assigned by ROSS editor to ensure unique references, displayed in ROSS console handoff dialog
- Label – user entered text to annotate the Service Bound
- Advanced Switching –modulation for specific bit rates used by VMS Advanced Switching. See VMS User Manual for detailed description of Advanced Switching.

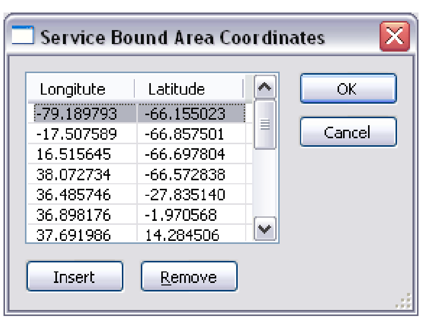
Service bounds are edited using a simple text editor where the entered text had to conform to a specific format. ROSS Editor uses a dedicated UI to edit the enhanced Service Bound(s). The new Service Bound editor is shown below.



As illustrated above, the dialog is displaying three Service Bounds for a selected Service Area. The three columns displayed are the label (description), number of points in the service bound polygon, and approximate center coordinates of the service bound geographic area.

Service Bound Search Order
The order in which service bounds are searched to determine whether a handoff is necessary is follows the declaration order of each Service Bound in list. Use "Up" or "Down" to change search order. Overlapping Service Bounds should be ordered from smaller areas first to larger areas last.

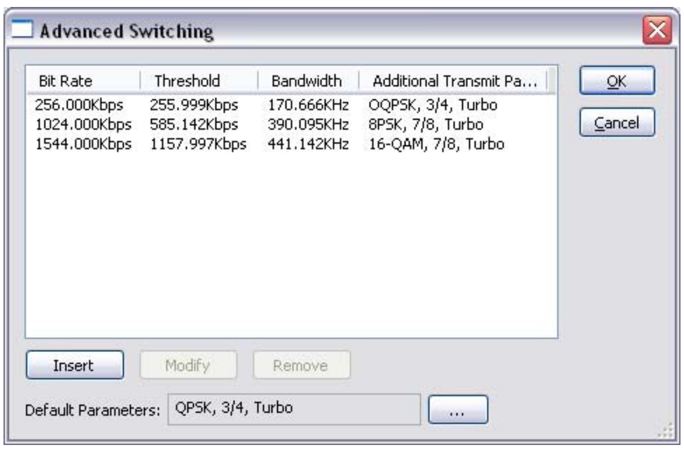
Each service bound entry can be modified by clicking the "Bounds" button that will open a new editor. The Service Bounds editor is show below. Points that comprise the polygonal service bound can be edited in place by selecting the value in the row.



5.11 Service Bound Advanced Switching

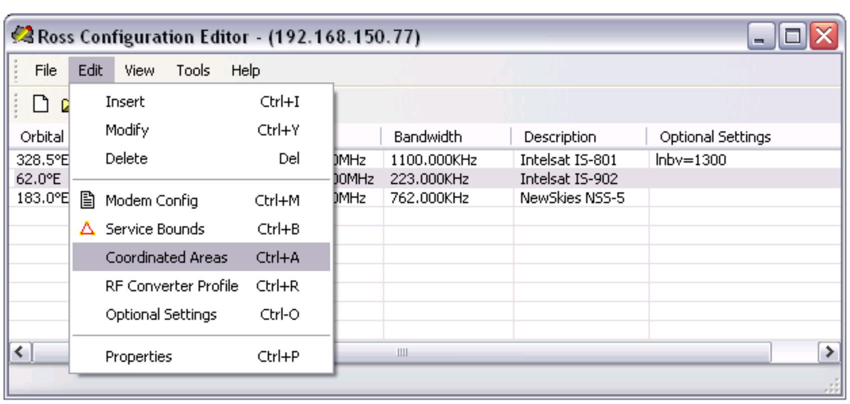
Advanced Switching (per Service Bound) allows each Service Bound to use a specific modulation type based on the requested bit rate. This results in optimized spectral efficiency and bandwidth utilization for the specific Service Bound. For example, a Service Area can have multiple Service Bounds. Each Service Bound will have different characteristics, such as EIRP or G/T, which affect the link budget, transmit power, and bit rate. The Service Bound that is in the center of the satellite beam may be able to support a more efficient modulation rate than the Service Bound that is on the fringe of coverage.

The Service Bound Advanced Switching works in conjunction with the Advanced Switching in VMS (see VMS 3.7.x User Guide for more information). When the vessel moves into a new Service Bound, the Advanced Switching modulation table (if not empty) is transmitted to VMS where it replaces the Advanced Switching configuration stored in VMS's database for the roaming modulator. The modem is reverted and switched back up using the new Advanced Switching configuration provided by the Service Bound configuration in ROSS.



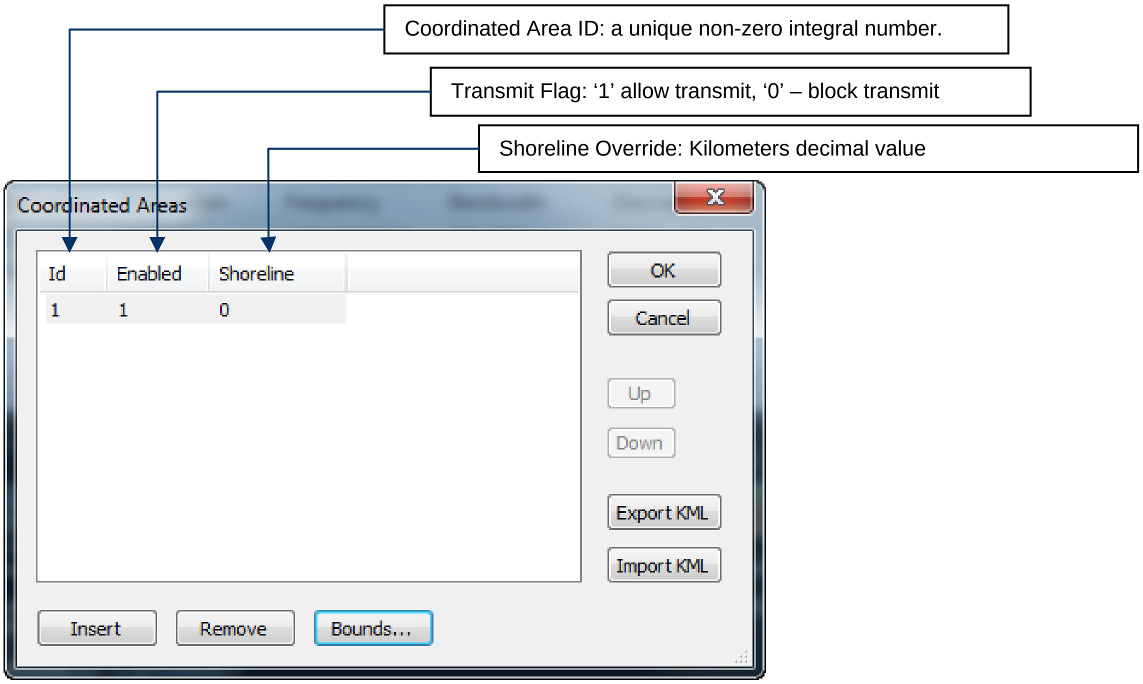
5.12 Edit Coordinated Areas

Editing coordinated areas is very similar to SB editing and all the same tools will work to create these control boundaries.



5.13 Coordinated Area Configuration

The Coordinated Area editor is used to enter coordinated area data that are shared in all regions. The format illustrated below is similar to SB editing. The CA entry has three flag sets, identifier, transmit enable/disable and shoreline override.



5.14 Importing Polygon Coordinates from KML Files

Like the previously mentioned service bounds, coordinated area polygon(s) created in the Google Earth application can be imported into the Coordinated Areas Editor using the "Import KML" command located under the File menu in the text editor. This command imports polygons from a KML file (keyhole markup language) generated by Google Earth.

Note that Google Earth generated polygons will close the polygon by ensuring that the first and last coordinate are identical. ROSS does not require closed polygon coordinates set. ROSS uses that the first and last point in the coordinated set to close the polygon. Therefore, the last coordinate can be removed if it is identical to the first coordinate.

5.15 Coordinated Area ID

When importing a polygon coordinates from a KML file into the coordinated areas editor, the coordinated area ID is randomly generated while the remaining values are defaulted to Transmit flag enabled (1) and shoreline override (0). It is highly recommended that the coordinated area ID value be changed to match the sequence, or format, of the existing IDs. **This ID will be displayed in the ROSS console Status page's Position field if the position is inside the matching coordinated area.** Coordinated area IDs can be any non-zero integral number.

For example, an ID can be the coordinated area's greatest, or smallest, longitude value expressed in hundredths of a degree. If the largest eastward longitude value in the coordinate set is -42.57 (equivalent to 42.57W = 317.43E) it can be used as an id value of 31743. This method of generating ID numbers would ensure uniqueness and give some meaning to the value.

5.16 Shoreline Override

Coordinated Areas support a shoreline override value. **If the shoreline override value is non-zero, then the Transmit Flag is not used to control modem transmitter if the vessel is inside the Coordinated Area**. The shoreline threshold detection controls the modem transmission while the vessel is inside a coordinated area.

5.17 Nested Coordinated Areas

Example Figure 9 shows nested coordinated areas, where the multiple coordinated areas have overlapping polygons. The default (global) shoreline value is 100Km as shown by the orange line. The large coordinated area, (id 31114) in green has a shoreline override set to 5.0 while the smaller *nested* coordinated area (id 31743) has it's transmit flag disabled with a shoreline override of 0.0. A vessel inside area, (31114), and not in area (31743), would be permitted to transmit until is crosses the 5Km shoreline threshold. If the vessel is inside area (31743), no transmission is allowed. Area (31743) is effectively a blocked transmission zone.

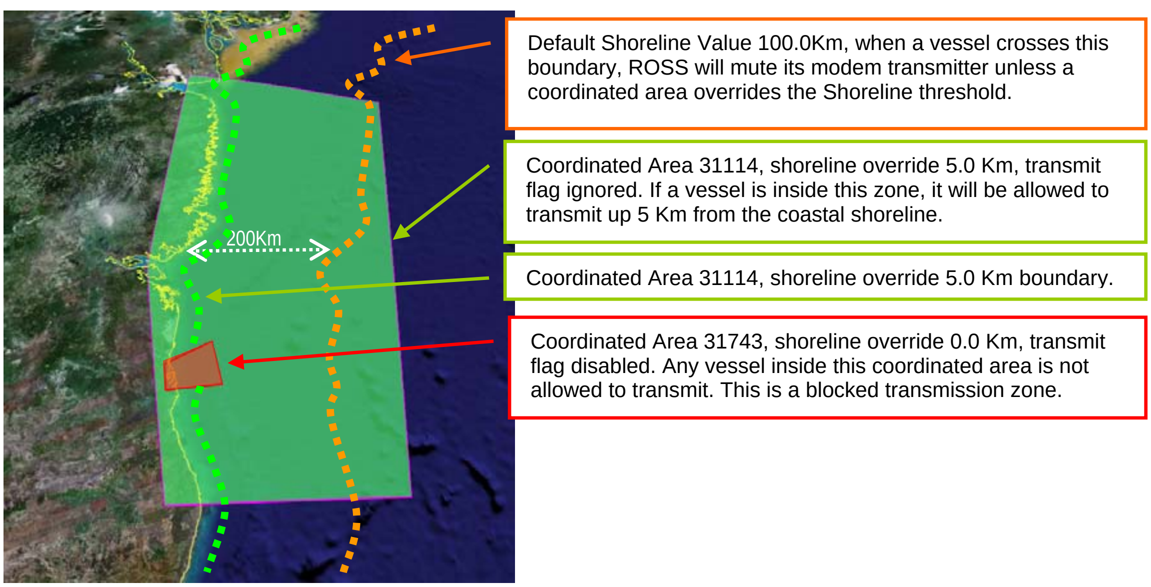


Figure 9: Example of Coordinated Areas

When creating coordinated areas that are nested, or overlap one another, **<u>the order of declaration is critical</u>**. ROSS performs a sequential search to check vessel position against the coordinated area polygons. The first coordinated polygon that contains the position is used to test transmission mode. The general guideline is to declare the inner most polygons ahead of the outer most polygons.

Figure 10 shows the Coordinated Area Editor with coordinated areas in the proper sequence, where the *contained* polygon is declared before the *containing* polygon. This order ensures that area 31743 is always tested before area 31114. If area 31114 were declared first, area 31743 will not be visible for position testing.

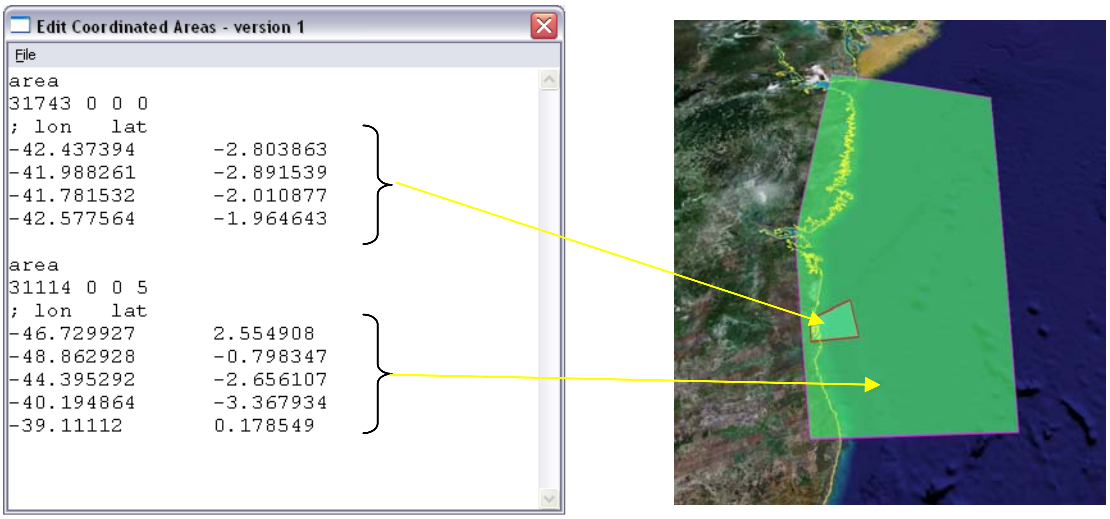
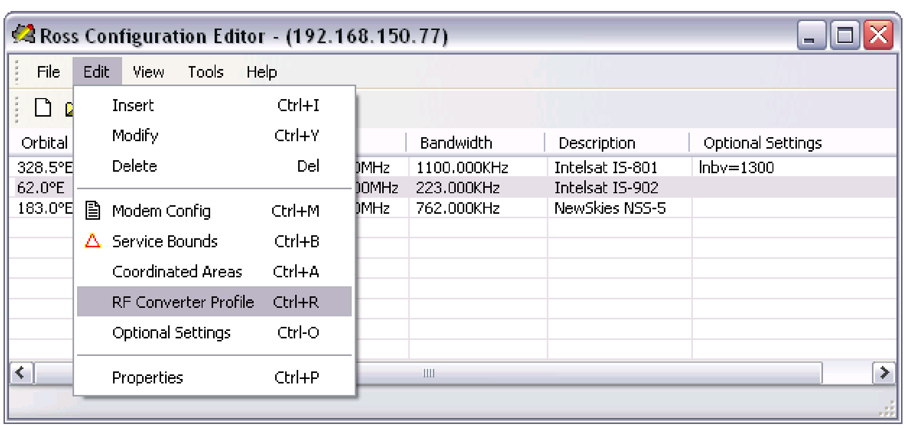


Figure 10: Coordinated Areas Order Declaration

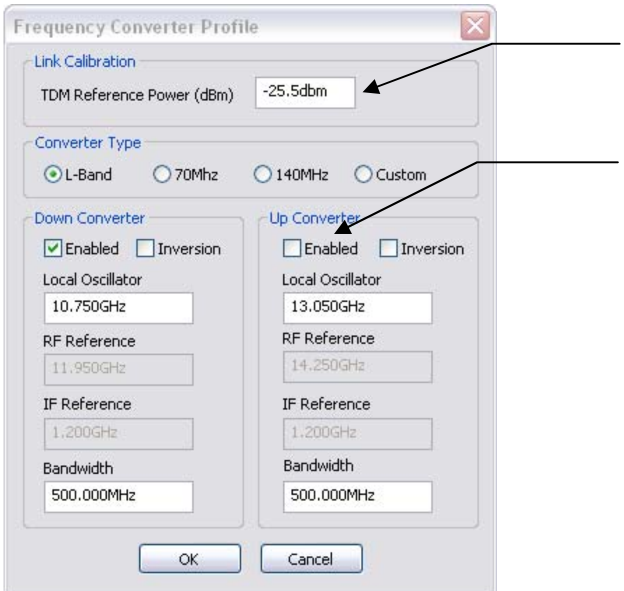
5.18 Edit RF Converter Profile



This feature is intended to be used primarily with ACUs that support multiband LNBs. By using the optional setting (see Optional Settings), the ACU can be configured to select a specific frequency band in the LNB down converter. The RF Converter Profile dynamically updates the down converter settings in VMS to match those of the actual LNB on the vessel. This ensures that VMS performs correct frequency calculations in the event that the antenna subsystem has switched multiple Local Oscillator bands, typically Ku-Band operations.

In the same manner, the up converter profile can also be altered to adjust frequency allocation restrictions. This is useful when the ROSS unit performs a handoff from one satellite operating in one band to another satellite operating in another band or even within the same satellite.

Normally this up converter section should remain unchecked as it does require extreme caution when adjusting transmitting parameters.



However, this may be useful if up conversion restrictions are required in specific service areas, e.g. vessels entering port and limited frequency band operations are enforced. If these conditional areas are required, the operator may configure custom up converter settings to force the system to limit the frequency range and center on very specific region of the pooled bandwidth.

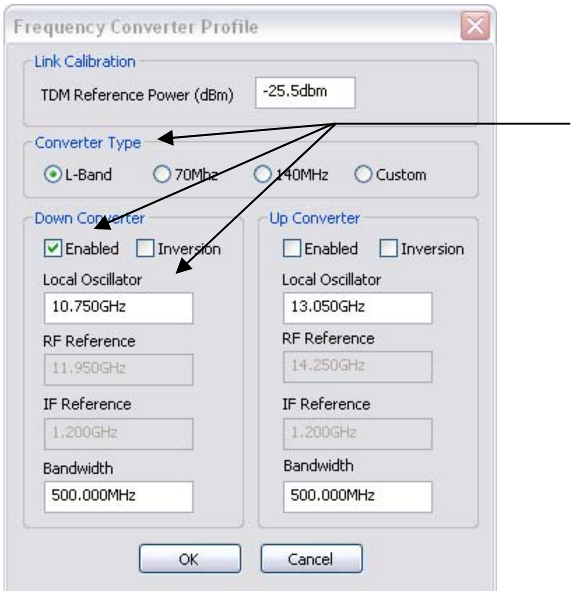
Enabling and modifying converter settings places stored values within the selected Service Area entry. As the service area is invoked, the Frequency Converter Profile is sent to VMS in the last stage of a satellite handoff during modem registration process (see section 3.3.2 step 8). The new configuration replaces the settings in VMS's database for the down converter or up converter assigned to the roaming remote modem. As previously stated, the updated converter configuration ensures that the frequency calculations performed by VMS are correct with respect to the actual satellite operating band.

5.18.1 Multiband LNB Support

Under multiband LNB operations it is important that this down converter Local Oscillator frequency value matches that of the antenna controller value set in Optional Setting, (see section, 6.1.18). If a different LO is selected (used) other than the base set in the VMS database for the site, it will be necessary to alter this value per service area to match.

To properly set the corresponding LO frequency value, the network administrator will be required to consult the antenna manufactures set voltage/tone tables to determine the correct LO frequency. After determining the LO frequency, apply this frequency value to the Local Oscillator field and enable the down converter as indicated below.

As previously mentioned the set values within the service area will be pushed to the VMS for updating of the remote down/up converter conversions.

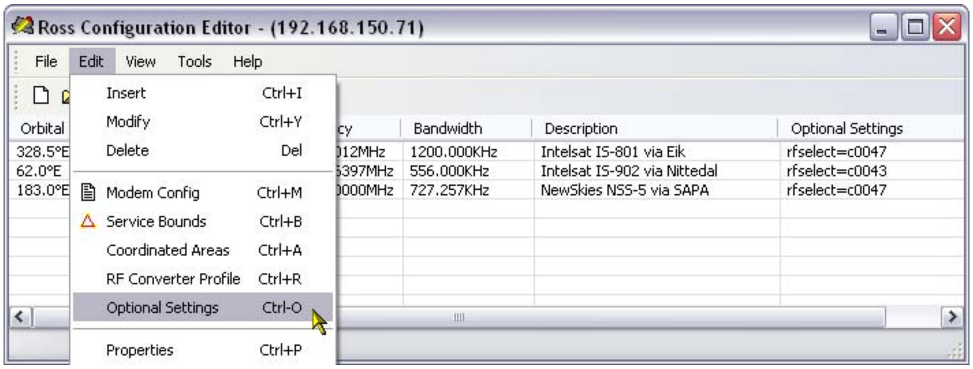


Down converter configuration for multiband LNB control. Converter Type must also match that of the shipboard equipment installed.

Refer to VMS Users Guide for additional information on configuring converter operations.

5.18.2 Edit Optional Settings

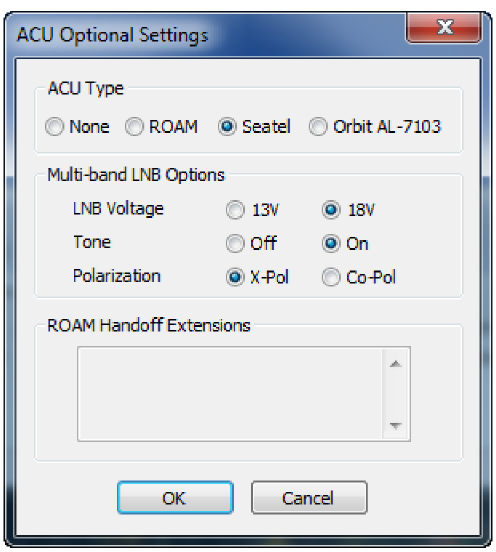
Global Satellite configurations differ in manufactured structure requiring receiving antenna subsystems to modify their RF characteristics on the fly. The following unique Optional Settings allow each SA to have a unique configuration for the receiving LNB to dynamically adapt to different frequency bands and transponder polarities.



These receiver options assist in creating specific ACU settings providing additional controls for global roaming between satellite configurations. The LNB band select is a combination of Voltage and Tone settings that correspond to switched Local Oscillator frequency band.

The polarization setting can also provide either cross-polarization (X-Pol) or concurrent polarization (Co-Pol) if the ACU supports this option.

After determining the correct settings to generate the proper configuration per satellite service area, make sure that the LO frequency value is updated in the RF Converter Profile previously described.

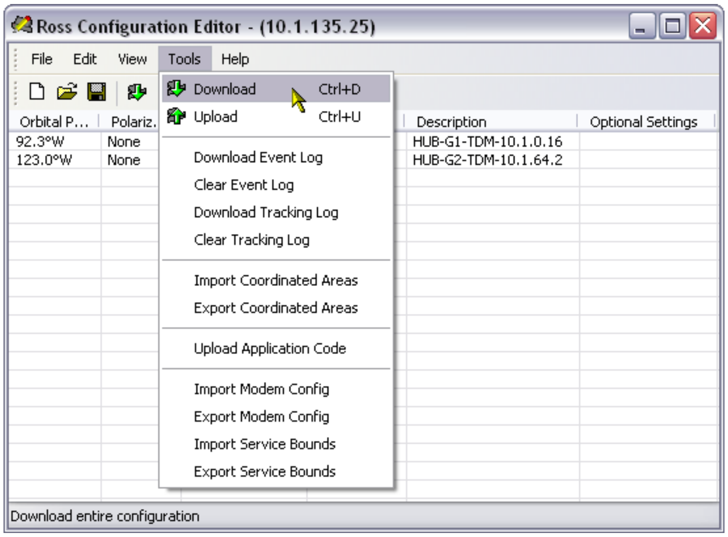


Consult the LNB and/or ACU vendor specific documentation for the settings needed to select a specific LNB band and polarization.

5.19 Tools Download

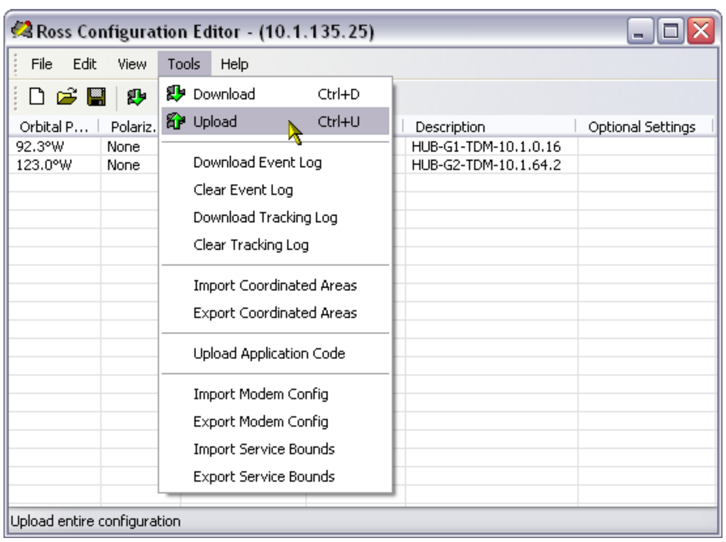
The tools menu provides the uploading and downloading of generated ROSS service areas. In addition the ROSS application is upgradable by locating the newer version and selecting upload to send either locally over LAN connection or the air interface. The RCE handles all the stored file information as part of the upload/download processing, transforming the binary information to and from human text format.

Download will connect to the properties set IP address pulling the previously configured ROSS service area information. This is useful for editing existing ROSS database information.



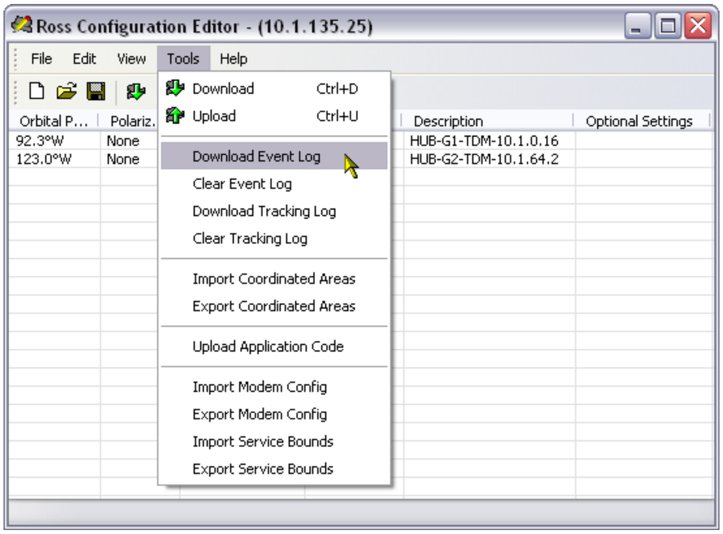
5.20 Tools Upload

The upload will push newly created or edited service area files to select ROSS IP Addresses. After creation or downloaded editing, select upload to send modified data information.



5.21 Tools Download Event Log

The ROSS stores all system events log information on-board and either viewed through the client interface or is downloadable for local storage and off-line viewing. When download event log is selected the RCE will establish an IP connection to the ROSS unit coping and transforming the system event log file to text format. During the download process a Windows file manager will prompt the use to select a location for local disk storage.



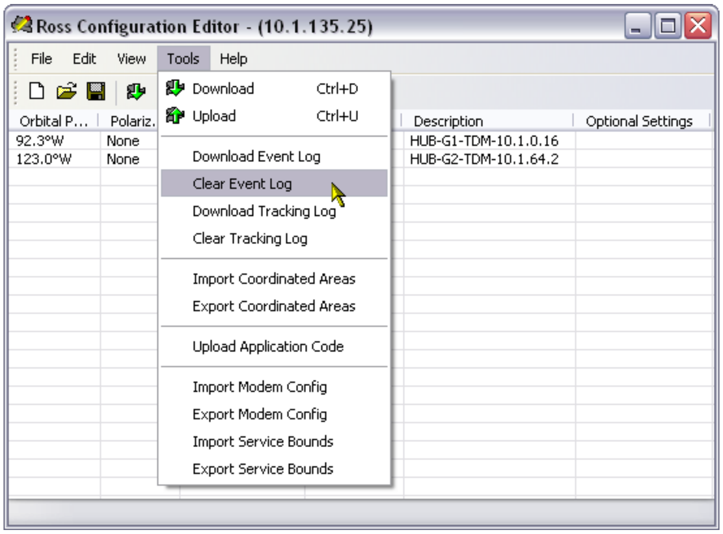
Example of download event file format:

Time/Date	Severity Level	Category	Description
9/6/2007 13:51	Info	System	Started.
9/6/2007 13:51	Major	ACU	invalid response 'Welcome to the simulated seatel ACU
9/6/2007 13:51	Info	ACU	ACU OK
9/6/2007 13:53	Major	ACU	Connection reset by peer (104)
9/6/2007 13:54	Major	ACU	Connection refused (111)
9/6/2007 14:01	Info	ACU	ACU OK
9/6/2007 14:34	Info	System	Satellite Handoff to [2] Intelsat IA-7 Ku-Band - Dummy
9/6/2007 14:44	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 14:47	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 14:53	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 14:55	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 15:05	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 15:32	Info	System	Satellite Handoff to [1] Intelsat IA-6 Ku-Band - Vipersat
9/6/2007 15:42	Major	Modem	A timeout occured processing your request!
9/6/2007 15:42	Info	Modem	Modem OK

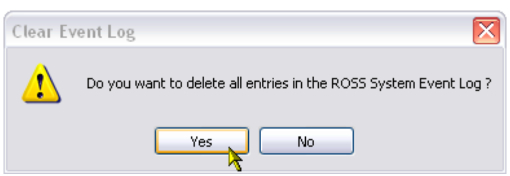
The saved text event log file is comma delimited for viewing and sorted content manipulation.

5.22 Tools Clear Event Log

The ROSS stores all system events logs locally in non-volatile memory. The log information is viewed from Telnet Command Line Interface and provides the control to clear the stored events. The ROSS editor also provides a tool to clear the stored events remotely. By selecting the Clear Event Log the editor will send a command to the addressed ROSS unit clearing all stored system events.

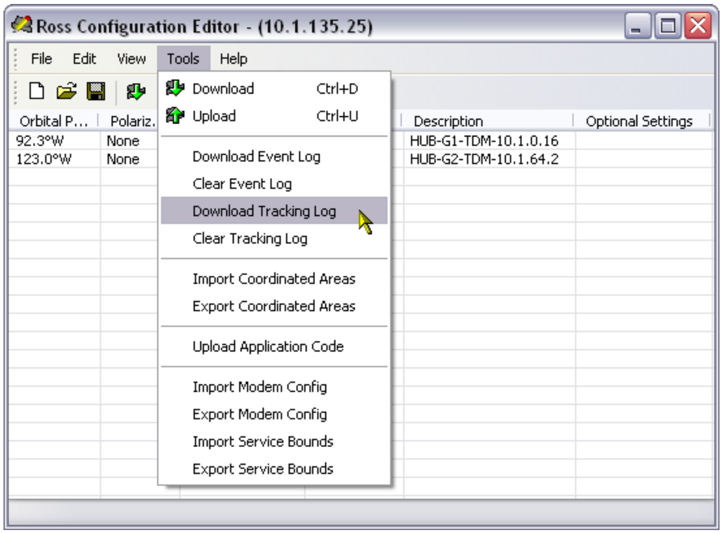


Warning, after selecting this command the events for the selected server will no longer be available for download. Make sure that you download events before clearing if necessary!



5.23 Tools Download Tracking Log

The ROSS stores all system tracking log information on-board and either viewed through the client interface or is downloadable for local storage and off-line viewing. When download tracking log is selected the RCE will establish an IP connection to the ROSS unit coping and transforming the system tracking log file to text format. During the download process a Windows file manager will prompt the use to select a location for local disk storage.



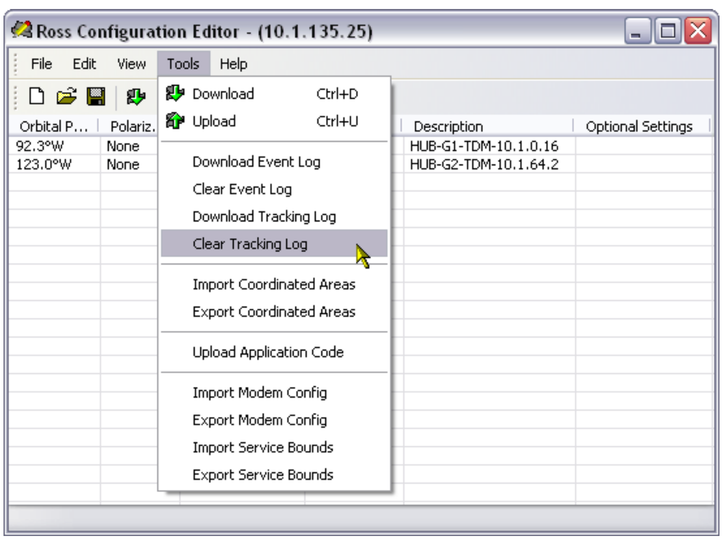
Example of download tracking file format:

Time/Date	Longitude	Latitude	Satellite Positior	Tx Enable	Tx Frequency	Tx Bandwidth	Tx Alarmed	Tx FEC Type	Tx FEC Rate	Tx Modulation	Tx Bit Rate	Tx Power	Tx Carrier	Rx Frequency	Rx Bandwidth
9/6/2007 13:51	-122.51666	37.38333	93.0W	true	1.395GHz	341.333KHz	ok	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz
9/6/2007 14:11	-122.51666	37.38333	93.0W	true	1.378GHz	341.333KHz	alarmed	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz
9/6/2007 14:31	-122.51666	37.38333	93.0W	true	1.378GHz	341.333KHz	alarmed	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz
9/6/2007 14:51	-122.51666	37.38333	93.0W	true	1.395GHz	341.333KHz	ok	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz
9/6/2007 15:11	-122.51666	37.38333	93.0W	true	1.395GHz	341.333KHz	alarmed	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz
9/6/2007 15:31	-122.51666	37.38333	93.0W	true	1.395GHz	341.333KHz	alarmed	Turbo	3/4	QPSK	512000	-240	enabled	1.390GHz	1365.333KHz

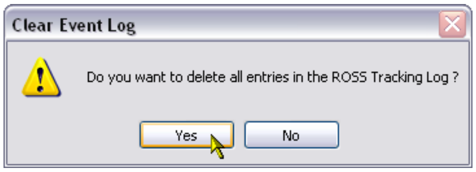
The saved text tracking log file is comma delimited for viewing and sorted content manipulation.

5.24 Clear Tracking Log

The ROSS stores all system tracking logs locally every 20 minutes in non-volatile memory. The log information is viewed from Telnet Command Line Interface and provides controls to only view the stored events. The ROSS editor provides a method to clear the stored tracking events remotely. By selecting the Clear Tracking Log the editor will send a command to the addressed ROSS unit clearing all stored tracking events.



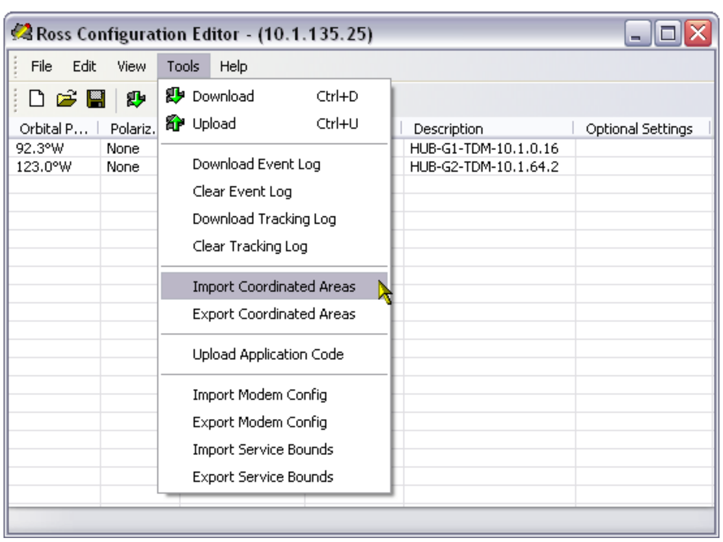
After selecting this command the tracking events for the selected server will no longer be available for download. Make sure that you download tracking events before clearing if necessary!



Before upgrading to ROSS version 1.3.0.921, download and store Tracking Log file before updating ROSS application. There was unavoidable restructuring of the tracking log database in order to enhance download performance. Loading this latest version of ROSS software will corrupt existing history file, resulting in lost information. Any new versions will not require this process.

5.25 Import & Export of Coordinated Area Maps

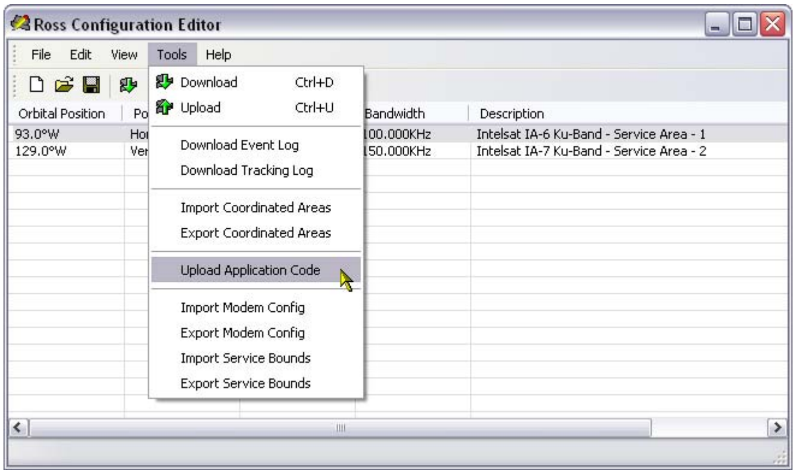
If it becomes necessary to generate hundreds of CAM's within a network in maybe useful to copy the same CAM information to all or a select few ROSS units as most will probably operate within the same region with the same configuration. The RCE provides the ability to import and export coordinated areas by selecting the SA from the list for import. With this ability it also possible to uniquely copy & paste only selected SA's within a group.



This same import/export commands are also available for service bounds and modem configuration files.

5.26 Uploading Application Code

Selecting the Upload Application Code from the Tools menu allows a new image of ROSS system firmware to be uploaded to a ROSS unit. This command will call the Windows file manager prompting the user to locate the image (SW13069D.app) from saved location. After selection the RCE with send the file over a TCP connection using the set RCE IP address.



After the application code (.app file) has been transferred it will be checked for integrity. If the integrity check passes, the ROSS will perform a soft reboot which loads and executes the new application code.

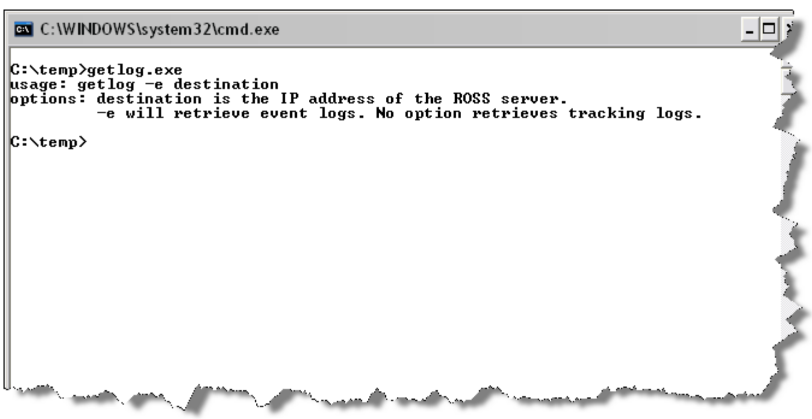
6 Retrieving Event and Tracking Logs

Description
GetLog is a windows console application that retrieves events stored in the ROSS event log and tracking log. GetLog can be run directly from the command line console or as a scheduled task using the windows task scheduler.

Installation
Copy the 'GetLog.exe' into a directory where the user has valid *write* and *execute* privileges. This application can be installed on a VMS Client PC. Only users with privileges should run this application.

Operation
GetLog can be executed in two modes: (1) console, (2) scheduled task. Before using GetLog in any mode, it is highly recommended that connection status to ROSS is verified active.

Command Options
The GetLog console application has the following command line options:



-e downloads the entire System Event Log file.
No option downloads the entire Tracking Log file.

For example, the following command retrieves all event logs. The output is saved as application generated log.txt file and written into the path from where GetLog was executed.

GetLog –e destination (where destination is the IP Address of desired ROSS unit)

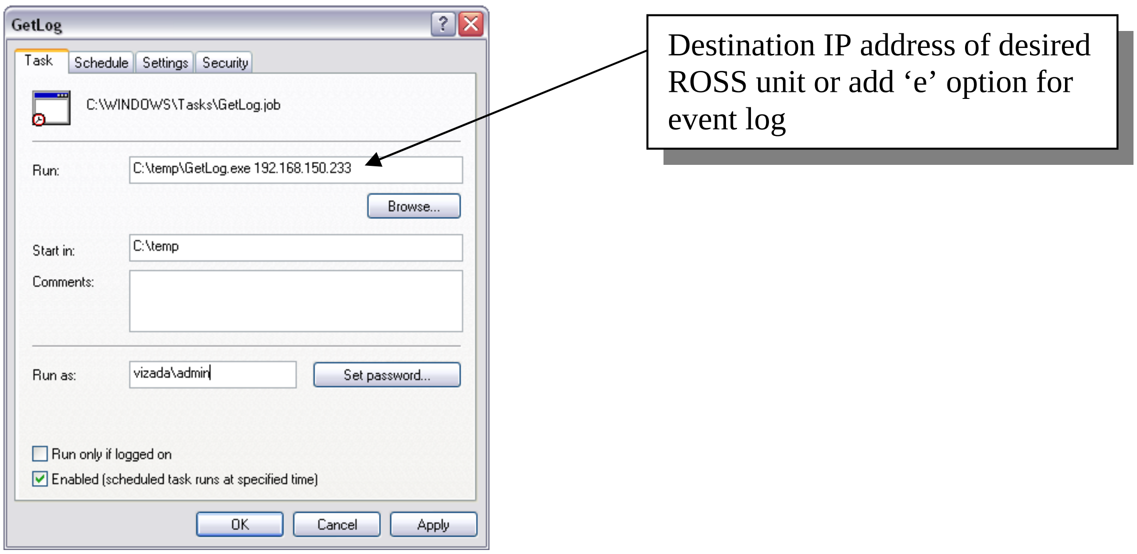
To retrieve tracking logs it is recommend that a separate copy of GetLog application is executed from a different directory as the output file name is generate with the same naming convention "log.txt".

GetLog "no options" destination

Note each time GetLog is executed it will overwrite the existing file, recommend renaming or setting up system date environment variables to preserve each downloaded copy. Batch files will help to schedule multiple lists of ROSS units.
Scheduled Task Mode

The ROSS log retrieval process can be automated by using the Windows Task Scheduler. The Windows Task Scheduler will execute GETLOG on a scheduled basis. To create a scheduled GetLog task, use the Scheduled Task Wizard. Follow the steps below:

a. Open the Windows Task Scheduler by clicking Start, click All Programs, point to Accessories, point to System Tools, and then click Scheduled Tasks.
b. Click on the Add Scheduled Task item. This will open the “Scheduled Task Wizard”
c. When prompted to select the “Windows program to run”, click on Browse, and select the GetLog.exe from its install directory.



b. Select a name for the task and scheduled period (Daily, Weekly, Monthly, etc…).
c. Set the start time, start date, and recurrence options.
d. Enter your user and name password to confirm the new task entry. This username and password should be a valid VMS user. g) In the last step, check the “Open advanced properties for this task ….” Option, then click Finish.
e. The last step is to add the GetLog command options to the task. In the Run text box, go to the end of the GetLog.exe and add the desired options. The GetLog application will be run as a scheduled task by the Windows Task Scheduler.

An alternative method to running a scheduled GetLog task is to create a batch file that calls GetLog with the desired options. A scheduled task is created to run this batch file. This simplifies the maintenance as only the batch file needs to be modified if they are any changes to GetLog options.

Other alternatives would be to create a small script that would run in the background calling a list of destination on scheduled bases.

Appendix A: Documents and Glossary

APPLICABLE DOCUMENTS

ii. 0806-SOTM Global Vessel Satellite Roaming – Rev3
iii. ROSS Functional Specifications – ROSS-FPSEC-J
iv. ROAM Protocol ICD_R1.5
v. VMS Users Guide, MN-22156_r6_VMS
vi. CDM-570/570L Installation Operational Manual, Doc MN/CDM570L.IOM, Rev5
vii. Vipersat CDM-570/570L Users Guide, Doc 22125, Rev2, FW Ver.1.5.4
viii. Vload Users Guide, Doc 22117, Rev1.0, SW Ver. 3.5.x
ix. Sea Tel Installation and Operation Manual, DAC-2202, Doc 122933-A
x. Orbit Marine Installation Operation , AL-71xx, Doc MAN26-1327

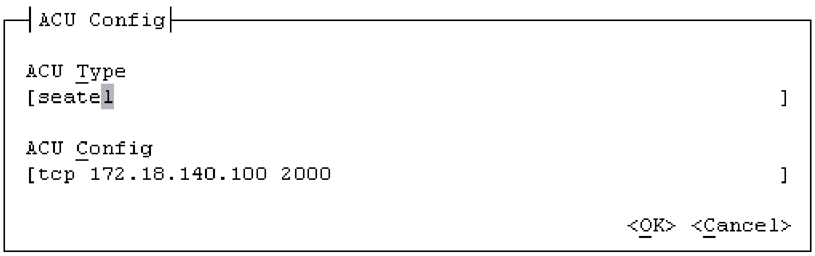
GLOSSARY

ACU – Antenna Control Unit
ASR – Automatic Switch Request
CAM – Coordinated Area Map
CDM – Comtech Data Modem
DPC – Dynamic Power Control
dSCPC – Dynamic Single Channel Per Carrier
ECM – Entry Channel Mode
ESV – Earth Station on-board Vessel
PCU – Pedestal Control Unit
RCE - ROSS Configure Editor
ROSS – Roaming Oceanic Satellite Server
SB – Service Boundary
SA – Service Area
SCPC – Single Channel Per Circuit
SLIP – Satellite Location Identification Protocol
SOTM – Satellite On The Move
STDMA – Selective Time Division Multiple Access
TEK – Transmit Enable Keep-alive
VMS – Vipersat Management System

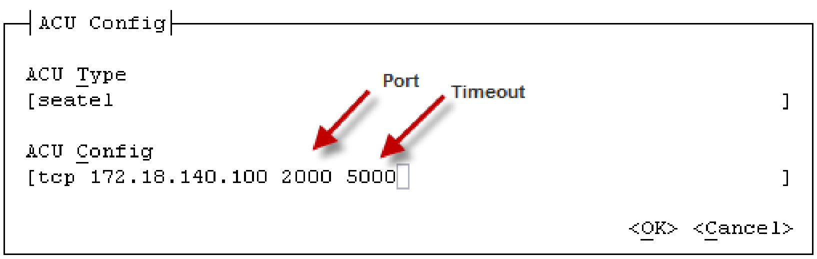
Appendix B: Sea Tel DAC-2202

ROSS ACU Configuration

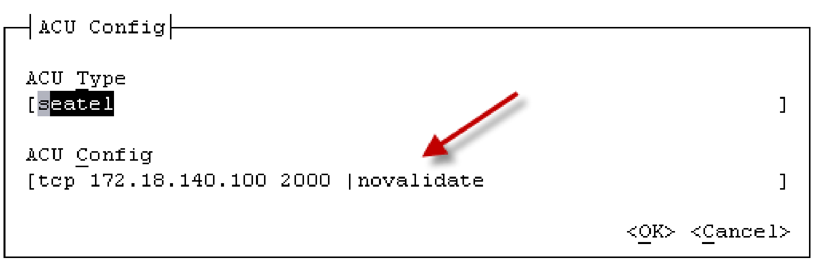
For the Sea Tel ACU, the configuration options are port type, IP address, and port number. At this time, the port type is “tcp” and the default port is 2000. For example, using the ACU Configuration value of “`tcp 192.168.150.45 2000`” configures ROSS to communicate with the Sea Tel ACU using a TCP connection to port 2000 (decimal) on an ACU at IP address 192.168.150.45.



Optionally, after the TCP connection port number a message timeout value and message validation is configurable. The timeout values are in milliseconds, e.g. 5000, 5 seconds. The internal default timeout is 2 seconds and if determined necessary because of bad (unresolved) LAN communications, this additional wait time may help. If problems like this persist, correct hardware issues.



Message validation is by default whereby all command message sent to the ACU are queried and compared. If any of the sent commands return as mismatched the ROSS process will attempt up to three retries, if all attempts fail ROSS will report a service handoff failure. If validations are failing because of known mismatch incompatibilities, this check can be disabled by appending the ACU Configuration with pipe (|) character followed by “novalidate”.



Comtech EF Data CDM-570L, Sea Tel DAC-2202, and ROSS Hardwire Interconnect Wiring:

The CDM570L is connected to the DAC 2202 ACU through the Terminal Mounting Strip (TMS) using the Comtech Modem Interface cable assembly 126877-B. The cable assembly is designed to work with older and newer versions of the TMS, however when using the newer version of the TMS the +12/24V pull-up connection is not required as there is a voltage pull-up jumper instead. When using the newer terminal PCBA with pull-up jumper, clip the +12/24V line from cable assembly. See Comtech Modem Interface Cable Assembly, Figure 12.

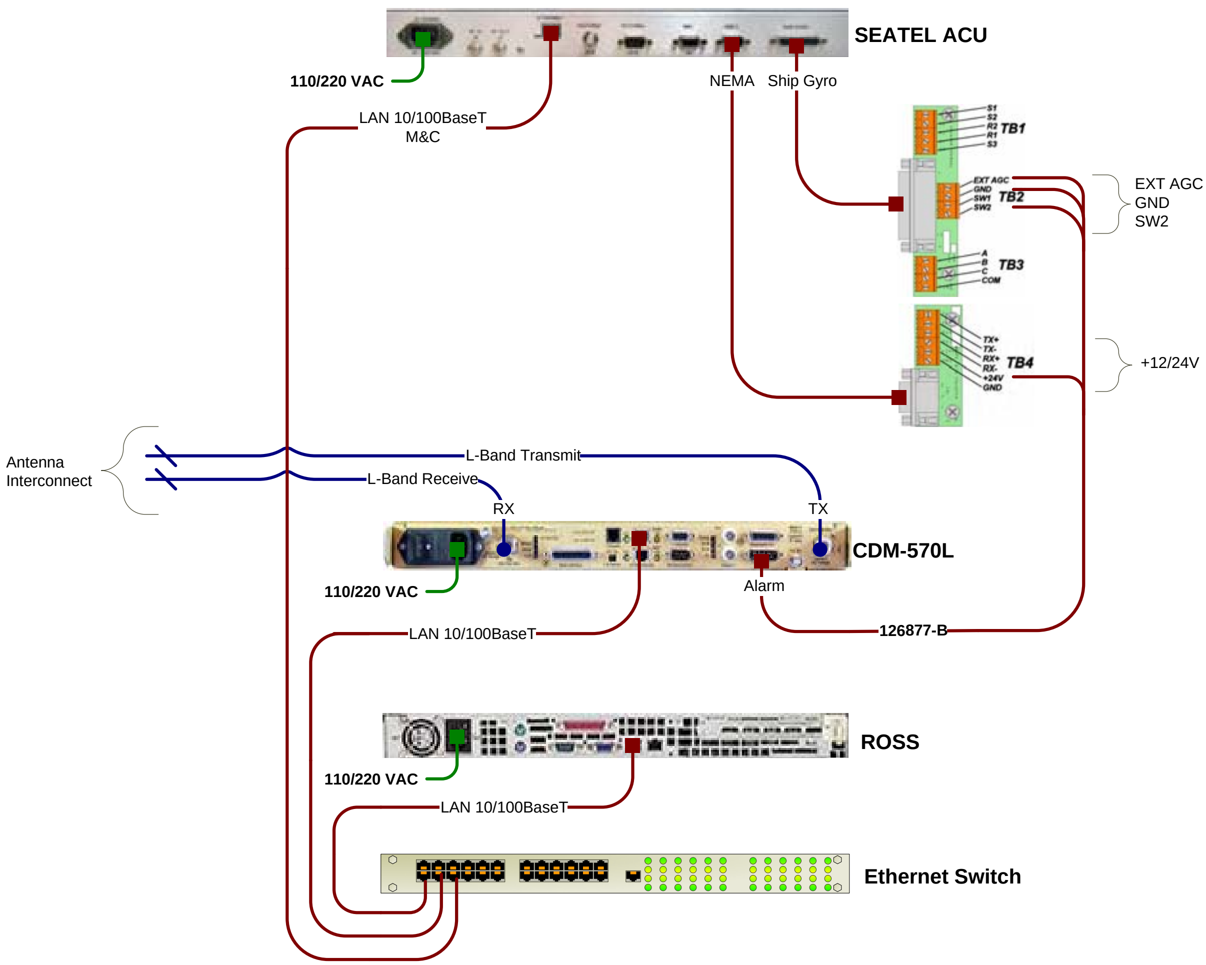


Figure 11, ROSS to Sea Tel DAC-2202 to CDM-570L Interconnect Diagram

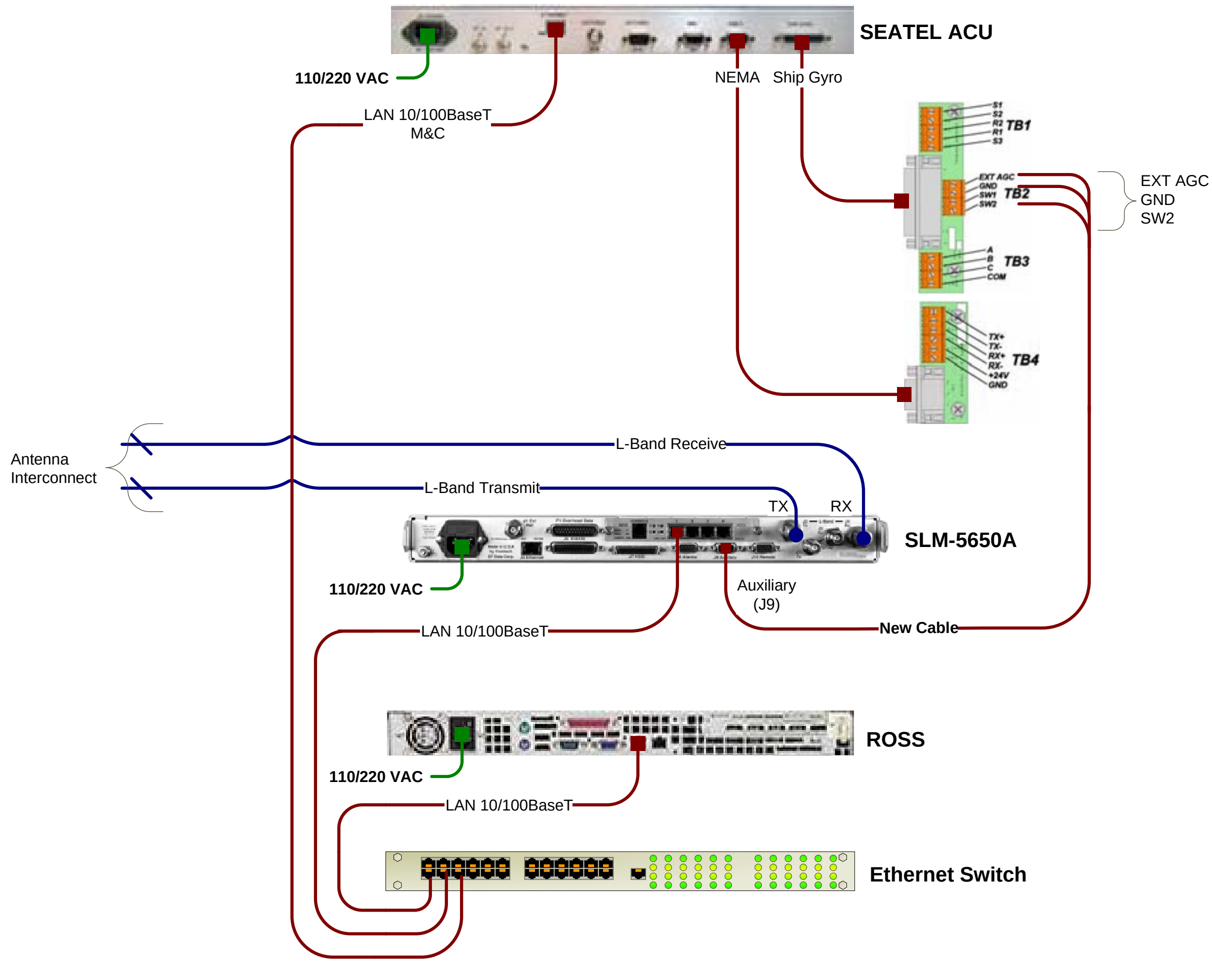


Figure 12, ROSS to Sea Tel DAC-2202 to SLM-5650A Interconnect Diagram

ROSS to ACU Hardware Controls Signals

The Sea Tel DAC-2202 supports blocked, pointing error and RF radiation hazard carrier muting signaling function on a 25 pin terminal mounting strip (TB2). Also modem lock input for positive satellite ID. (See Sea Tel document DAC-2202 ACU for more details).

To comply with FCC CFR part 25.222(a6)(a7), cease carrier transmission through pointing error or blockage, this hardware level (TTL) interface is connected to the ROSS unit through hardwire connections. The ACU shorts pin SW2 to GND (on TB2-Terminal Mounting Strip) when antenna is outside the configured pointing limit of 0.5 degree from satellite peak or limit stop blockage occurred, thus muting modulator carrier output.

CDM-570 Satellite Signal Identifier Connection

The modem rear panel RX Traffic Alarm indicator connector pin 15 (RX-NC, Locked) is pulled low (grounded) by the modem when demodulator lock is detected, this is used as a positive ID to the antenna controller to stop tracking and peak on signal. When RX Traffic is faulted, (RX-NO, Unlocked) the signal to the ACU (EXT AGC, TB2) is pulled high indicating demodulator unlocked condition, within ~20 seconds the ACU will commence retargeting of the antenna.

SLM-5650A Satellite Signal Identifier Connection

The modem rear panel Auxiliary connector J9-HD-15F (Rx TTL Fault) is logic Low when not faulted indicating demodulator lock, this is used as a positive ID to the antenna controller to stop tracking and peak on signal. When RX is faulted, the signal to the ACU (EXT AGC, TB2) is pulled high indicating demodulator unlocked condition, within ~20 seconds the ACU will commence retargeting of the antenna.

- External AGC input must be 0 to 5 Volts DC analog signal, positive going voltage proportional to satellite signal input level and must be real-time in its response to antenna pointing.

- External Modem Lock from a satellite modem is used as a positive ID that the antenna is on the desired satellite. This input is NOT used for tracking purposes; it is only used for satellite identification to acquire the correct satellite during search. To enable the external modem input you must the ACU SYSTEM TYPE parameter to 79 and NID MUST be set to <u>0000</u> indicating no DVB NID used.

    - **Lock Logic** - The modem lock signal connects to EXT AGC and a ground reference from the modem connects to GND. The expected signal from the modem is 0VDC to +5VDC. Low voltage indicates modem lock, high voltage indicates modem unlock.

ACU SYSTEM TYPE:
This determines the system options according to the following table. Add together all the desired options to determine the proper entry. *These are typical settings and users should refer to your antenna manual.*

128	Reverse External Modem Lock input polarity (logic hi = lock)
64*	Enables LNB voltage output
32	Display Relative in the Azimuth entry display
16	Reverse blockage output logic (SW2 logic hi = blocked)
8*	Enable AFC in NBIF Mode
4*	Auto SAT load after SEARCH failure
2*	Enable External Modem Lock Input (logic low = lock)
1*	Auto SAT load on “hot” RESET and ACU Power-Up
79*	

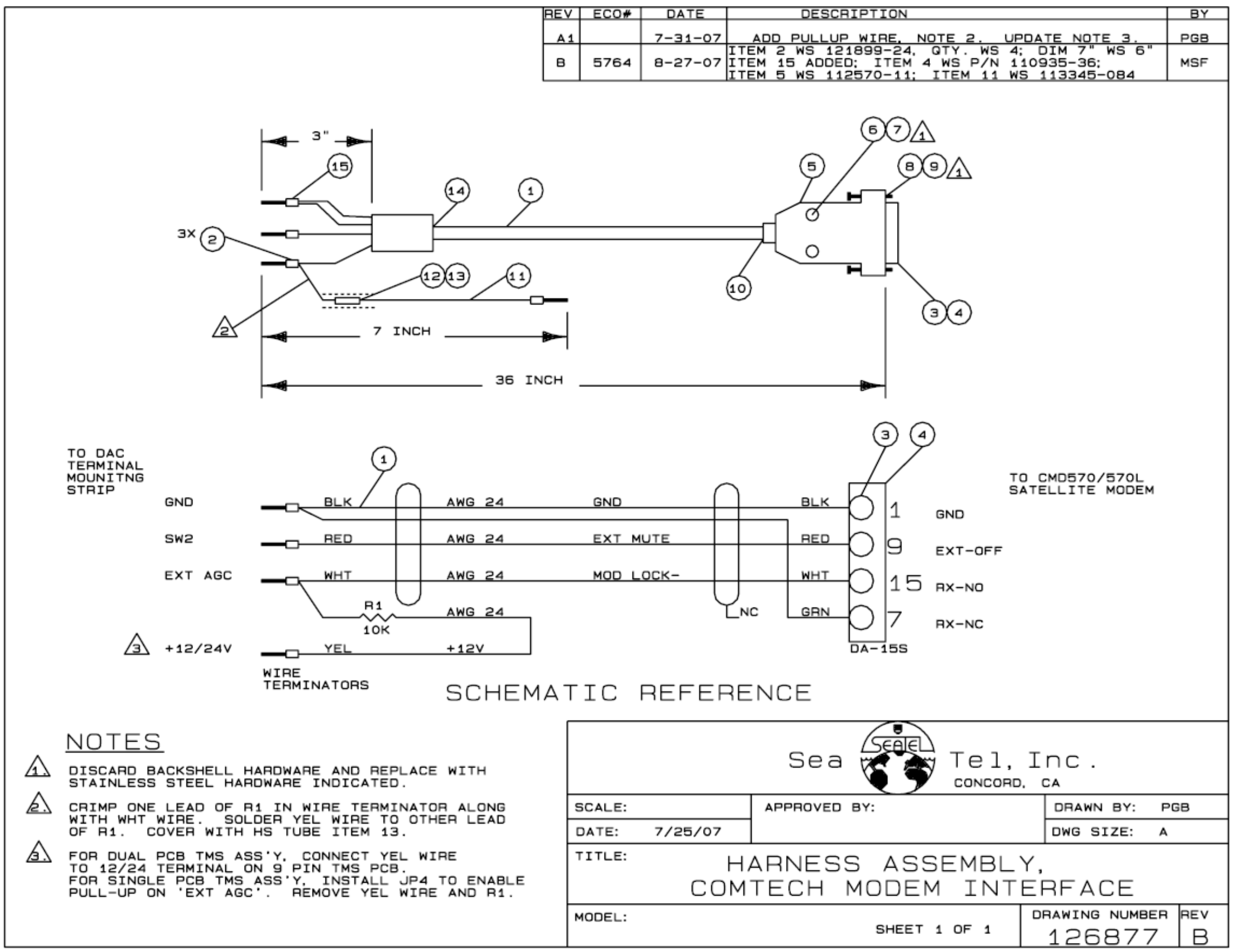


Figure 12, Comtech 570 Modem Interface Cable Assembly

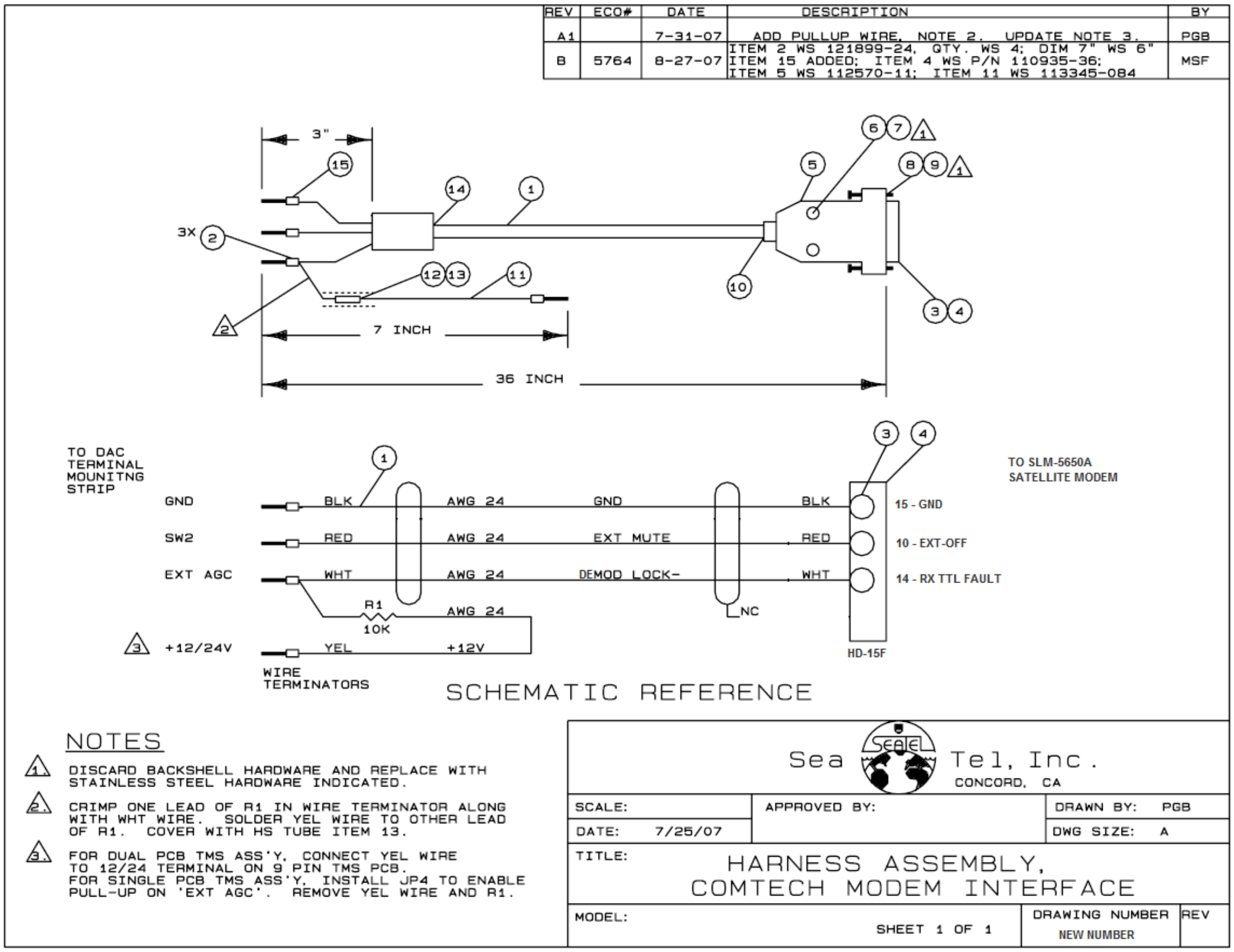
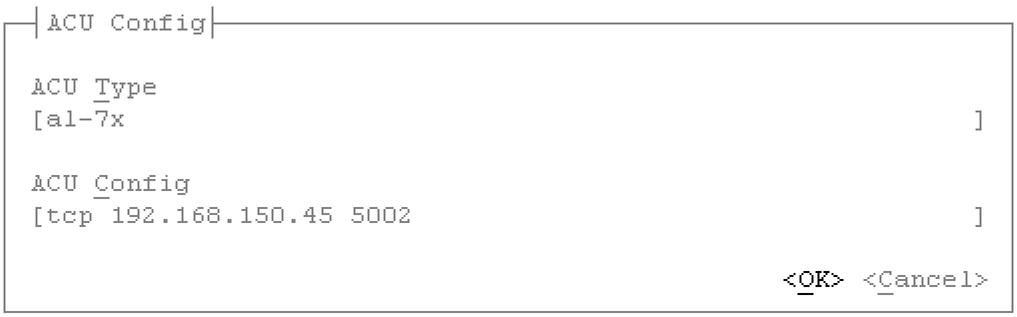


Figure 12, Comtech 5650A Modem Interface Cable Assembly

Appendix C: Orbit Technologies OrSat AL-7200 Controller

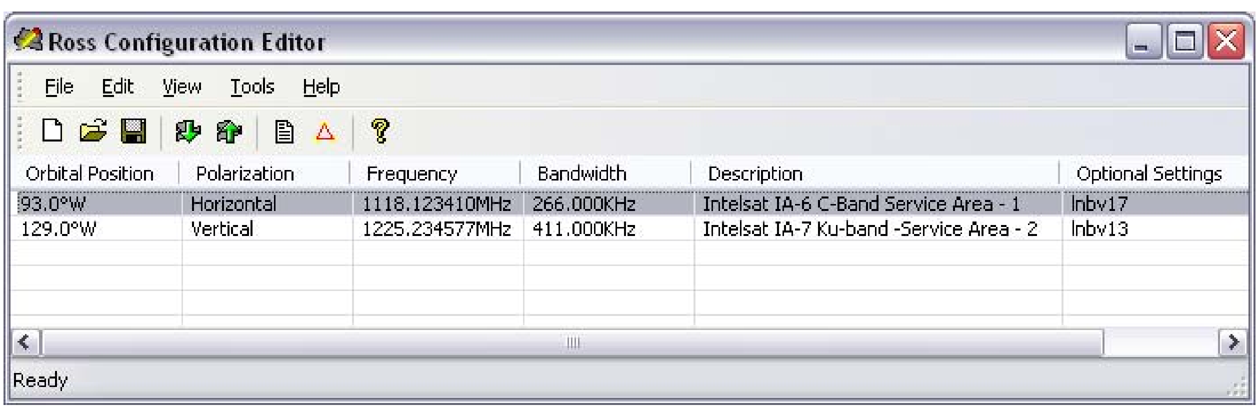
For the Orbit Technologies Group Orsat AL-7100 series controller, enter “al-7x” in the ACU Type field. The ACU Configuration field consists of the interface type, IP address, and port number. At this time, the port type is “tcp” and the default port is 5002. For example, using the ACU Configuration value of “`tcp 192.168.150.45 5002`” (no quotes) configures ROSS to communicate with the Orbit SBC using a TCP connection to port 5002 (decimal) on an SBC at IP address 192.168.150.45.

Note that the Orbit documentation uses that term “SBC” (single board computer) instead of ACU. The term “CCU” (central control unit) refers to the Orbit local console interface for the SBC.



Optionally, after the TCP connection port number a message timeout value can be set. The timeout values are in milliseconds, e.g. 5000, 5 seconds. The internal default timeout is 2 seconds and if determined necessary because of bad (unresolved) LAN communications, this additional wait time may help. If problems like this persist, correct hardware issues.

Service Area Parameters
When ROSS is used with the Orbit AL-71xx antenna system, the Service Area parameters Polarization, Frequency, and Bandwidth are interpreted as the **receiver settings**.



The Orbit controller also supports two “Optional Settings” parameters. The values “lnbv13” and “lnbv17” specify two voltage levels (13V & 17V respectively) that are sent to LNB during a satellite handoff. This parameter is typically used for dual-band LNB.

Comtech EF Data/Orbit Hardware Control Wiring:

The cable assembly in figure 13 below interconnects the hardware control lines between the Orbit OrSat AL-71xx. Consult the Orbit documentation for more detailed information about the installation and configuration of the Orbit antenna system.

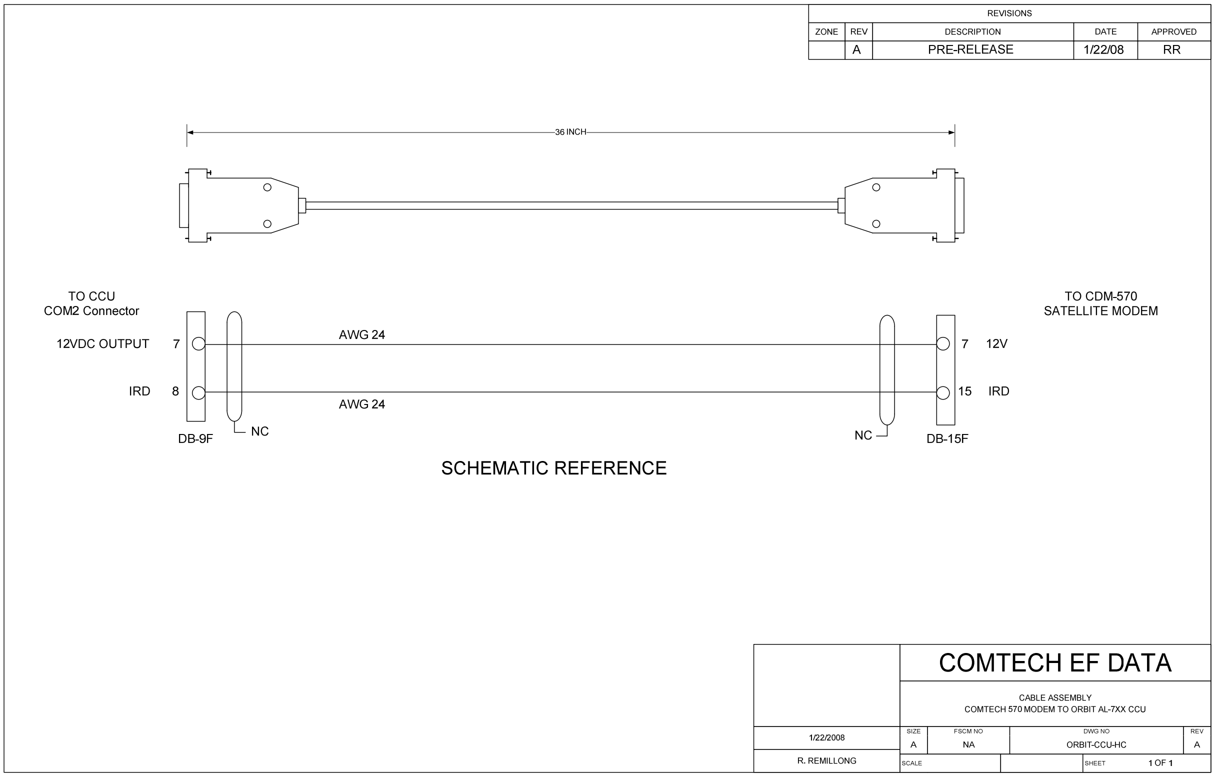


Figure 13, Modem to CCU Cable Connection

Appendix D: ROAM Protocol

The ROAM protocol is simple, efficient, and flexible open standard. The protocol messages are limited to a minimum control set required by ROSS to perform satellite handoffs and monitor status.

ROSS ACU Configuration

For the roam ACU type, the configuration options are port, IP address, and port number. The port type is “udp” and the default port is 49184. For example, using the ACU Configuration value of “udp `172.18.140.50 49184`” configures ROSS to communicate with any ACU equipped with the ROAM protocol.

```
┤ACU Config├──────────────────────────────────────────

ACU Type
[roam                                              ]

ACU Config
[udp 172.18.140.50 49184                           ]

                                     <OK> <Cancel>
```

CDM-570 Satellite Signal Identifier Connection

The modem rear panel RX Traffic Alarm indicator connector pin 15 (RX-NC, Locked) is pulled low (grounded) by the modem when demodulator lock is detected, this is used as a positive ID to the antenna controller to stop tracking and peak on signal. When RX Traffic is faulted, (RX-NO, Unlocked) the signal to the ACU is open and may require a logic pull-up to signal a high indicating demodulator unlocked condition.

SLM-5650A Satellite Signal Identifier Connection

The modem rear panel Auxiliary connector J9-HD-15F (Rx TTL Fault) is logic Low when not faulted indicating demodulator lock, this is used as a positive ID to the antenna controller to stop tracking and peak on signal. When RX is faulted, the signal to the ACU is open and may require a logic pull-up to signal a pulled high indicating demodulator unlocked condition.

Note interconnect wiring will vary depending on ACU equipment.

For more information on ROAM protocol refer to “ROAM Protocol ICD_R1.5” document.

Appendix E: LAN Configuration SetIP

LAN configuration utility (LAN CFG – SetIP) provides a unique Ethernet messaging exchange to remotely configure unknown or default ROSS IP addresses. This small Windows application broadcasts a proprietary packet which all ROSS unit's listen for and respond with MAC, IP and version information. This simplifies and eliminates need to modify the IP address of the PC especially if the ROSS units IP address is known.

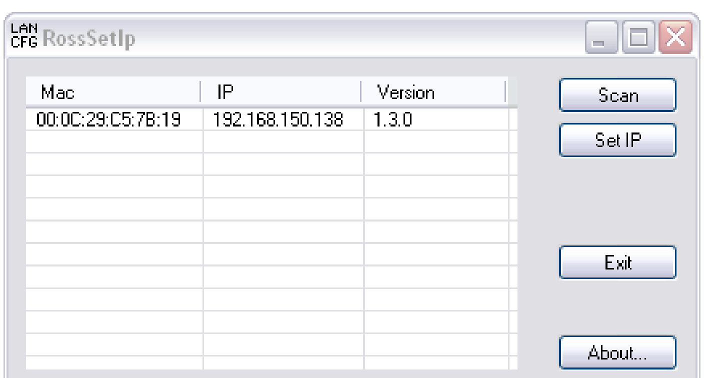
New Installations and Modifications

The SetIP application sends a broadcast message to any listening ROSS unit(s) on the same LAN segment. The message being a broadcast IP packet will not pass through LAN devices that block broadcasts, e.g. smart switches, routers, etc. Typically if the local LAN switch is configured to allow broadcasts to pass all ports this program will reach any connected ROSS unit.

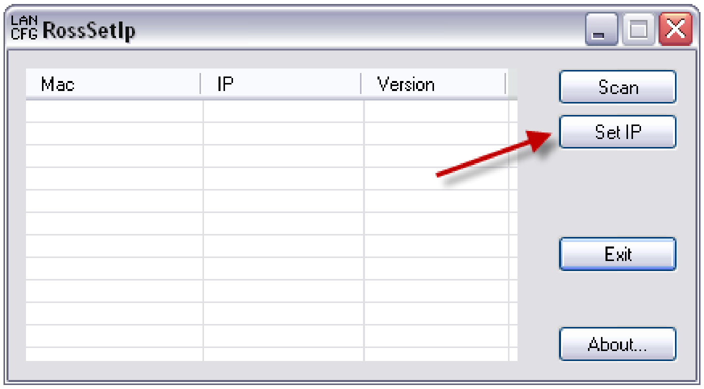
If the network devices present a problem, the PC running SetIP can be directly connected using a standard CAT5 cable.

The application is easy to use, by selecting the Scan button a single message is sent waiting for any active ROSS unit to respond.

Once a unit receives the message they respond back to the sender with the following information, MAC address of the device, current IP address and software version.

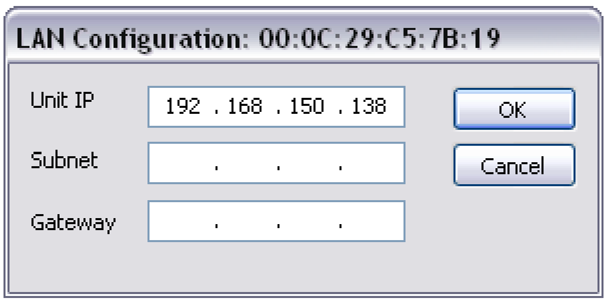


Select the desired unit from the list and click Set IP.



Configure the new IP address, Subnet mask and default gateway, click OK. The program will send the changes to the selected ROSS. The ROSS unit upon reception will update the address but not store the address to flash (persistent memory).

Note it will be necessary to connect to the unit and save to flash memory. Using Putty, telnet to the unit select "Save" under the configuration menu to make the new address persistent.



You can repeat this process for each of the units listed; however use caution when identifying which unit is which if more than one is listed.

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480 • 333 • 2161 FAX