SwiftBroadband
Administrator Manual

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DOCUMENT CHANGE HISTORY

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4.4	10 April 2017	16/021	Added Authentication fields for selected modem to bond. Added POTS Physical interface in Table 3-1 for Product SDU 7320/7330.
4.5	11 May 2018	17/148	Updated Bond configuration Figure 7.9. Added Bonding Settings detail help reference in section 7.6.2.
4.6	30 June 2021	21/068	Section 7.6.2 Bond timeout explained. Section 14.1 Added AT commands availability table for Telnet and RAW connection to SDU. Section 7.2.4 Stated limitation on Single User NAT free mode. Updated Figure 7.1 to the latest SDU GUI representation of the Packet Switching configuration. Section 13.2.1 added: Primary PPPoE PDP Context already existed. Correct Satcom to SATCOM. Rotary mode option.

4.7	24 Nov 22	22/203	Deleted "USIM's are not user-replaceable" in section 3.2.1.3 and added the following line: To replace the factory fitted USIM in the configuration module refer to document OP-125. To obtain a copy of this document please contact Cobham at CAC.CapeTown.CustomerSupport@cobham.com.

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TABLE OF CONTENTS

LIST OF FIGURES

PAGE

LIST OF TABLES

PAGE

ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	*Definition*
3GPP	3rd Generation Partnership Project
AES	Aeronautical Earth Station
AM	Acknowledged Mode
AMER	Americas
APAC	Australasia and Pacific
ARINC	Aeronautical Radio Inc.
AT	Attention (used to start a command line in an emulated terminal)
BGAN	Broadband Global Area Network
BITE	Built-In Test Equipment
CIDR	Classless Inter-Domain Routing notation
CM	Configuration Module
CS	Circuit-Switched
DP	Distribution Partner
DHCP	Dynamic Host Configuration Protocol
DLNA	Diplexer/Low Noise Amplifier
DNS	Domain Name Server
EMEA	Europe, Middle East and Africa
FTP	File Transfer Protocol
GES	Ground Earth Station
GGSN	Gateway GPRS Support Node
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
HGA	High Gain Antenna
HLD	High power/ Low noise amplifier and Diplexer
HPA	High Power Amplifier
HTTP	Hyper-Text Transfer Protocol
IAI2	Inmarsat Air Interface 2
ICD	Interface and Control Document
IGA	Intermediate Gain Antenna

Acronym or Abbreviation	*Definition*
IMEI	International Mobile Equipment Identifier
IMEISV	International Mobile Equipment Identifier - Software Version
IMSI	International Mobile Subscriber Identifier
IP	Internet Protocol
IRS	Inertial Reference System
ISDN	Integrated Services Digital Network
ITU	International Telecommunications Union
LAN	Local Area Network
LLLN	Local Level, Local North
MCU	Modular Concept Unit
MIB	Management Information Data Base
MSISDN	Mobile Station International PSTN/ISDN Number.
MSN	Multiple Subscriber Number
NAT	Network Address Translation
PAP	Password Authentication Protocol
PC	Personal Computer
PDP	Packet Data Protocol
PoE	Power-over-Ethernet
POTS	Plain Old Telephone Service
PPP	Point to Point Protocol
PPPoE	Point-to-Point Protocol over Ethernet
PS	Packet-Switched
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RAN	Radio Access Network
RDI	Restricted Digital Information
RF	Radio Frequency
RTP	Real time protocol
RX	Receive
SAS	Satellite Access Station
SATCOM	Satellite Communication
SBB	SwiftBroadband

Acronym or Abbreviation	*Definition*
SDU	Satellite Data Unit
SGSN	Serving GPRS Support Node
SIP	Session Initiation Protocol
SNMP	Simple Network Management Protocol
SP	Service Provider
SRU	SATCOM Reference Unit
STE	Secure Terminal Equipment
STU	Secure Telephone Unit
SVN	Software Version Number
TA	Terminal Adapter
TE	Terminal Equipment
TCP	Transmission Control Protocol
TM	Transparent Mode
TX	Transmit
UDI	Unrestricted Digital Interface
UDP	User Datagram Protocol
UM	Unacknowledged Mode
UMTS	Universal Mobile Telecommunications System
USIM	Universal Subscriber Identity Module
VPN	Virtual Private Network
VoIP	Voice over IP
WAN	Wide Area Network

1. INTRODUCTION

This document is intended to assist IT System Administrators to configure and customise an installed Cobham SwiftBroadband (SBB) Aeronautical Earth Station (AES). The document covers single, dual and four-modem SATCOM Systems.

The SATCOM System is controlled via an integrated web-based interface ("SATCOM Console") and incorporates a NAT router interface for convenient user access from within the aircraft cabin. System Administrators should therefore have Internet Protocol (IP) networking experience, as well as a basic familiarity with the Inmarsat SBB services and network.

1.1 User Documents

Figure 1-1 indicates the relationship of this document to the other documents needed to install, configure and use the SATCOM System.

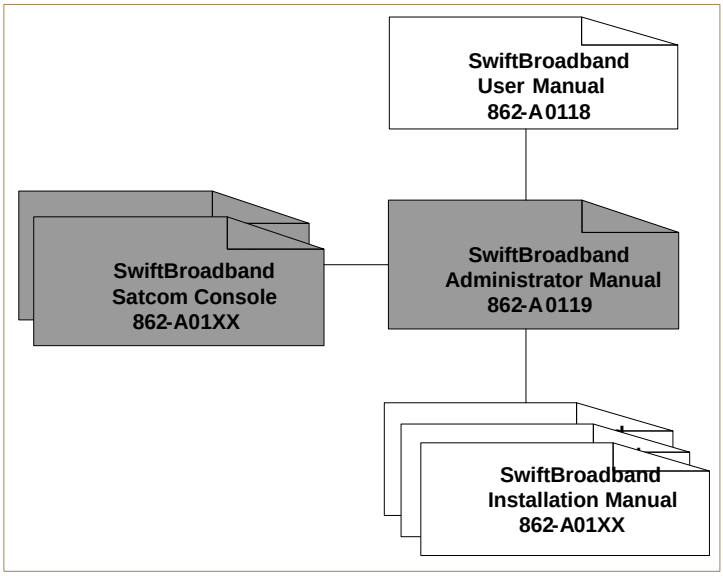

Figure 1-1: User Documents

- The **SwiftBroadband User Manual** (see [2]) contains procedural detail needed to enable end users to connect to terrestrial networks via the Inmarsat network.

- The **SwiftBroadband Administrator Manual** (this document) contains procedural detail used by Administrators to configure and customise the system. Further details can be found in the SATCOM Console on-line help screens.

- The **SwiftBroadband SATCOM Console Screenshots** document (see [7], [14]) contains detailed screenshots of the SATCOM Console. This document therefore provides an off-line view of the SATCOM Console web pages. By scrolling down, a detailed off-line visual SATCOM Console tour corresponding to the actual configuration sequence can be viewed. For training purposes a printable version (in PDF) format is provided together with the off-line presentation material. This document may not correspond to the SDU software version loaded by the client.

- The **SwiftBroadband Installation Manual** (see [1], [11] and [13]) contains technical detail required by engineers to install and maintain the SATCOM System.

This document is applicable after the SATCOM System installation has been successfully completed.

1.2 Conventions used in this document

All references to SATCOM Console screens contained in this document will be in *Italics*. A bracketed section at the beginning of every section will indicate the SATCOM Console screen(s) being referenced.

[Installation - LAN Settings] at the beginning of section 6.1 refers to the LAN Settings page, which is accessed from Installation page of the SATCOM Console.

All SATCOM Console pages as well as navigational properties can be viewed in the 862-A0121, SwiftBroadband SATCOM Console Screenshots ([7] and [14]).

Functionality that does not exist for a particular SATCOM System variant will be greyed out in the corresponding SATCOM Console screens. For example, all ISDN functionality will be greyed out for the SDU-7310 and SDU-7315 product variants.

2. DOCUMENT REFERENCES

[1] 862-A0101_IM, SwiftBroadband Installation Manual

[2] 862-A0118_UM, SwiftBroadband User Manual

[3] ARINC Characteristic 781-3 - Mark 3 Aviation Satellite Communication Systems, Aircraft Installation Provisions, Supplement 3, 9 Feb 2009

[4] ARINC Characteristic 741P1-10 - Aviation Satellite Communication System Part 1, Aircraft Installation Provisions, Supplement 10, 24 Dec 2003

[5] Inmarsat UT-TE Interface Specification for the Control of the BGAN Terminal, V2.3, 25 Sep 2007

[6] BGAN and IP Data Connections, V1, 8 May 2006 (available at http://www.inmarsat.com)

[7] 862-A0121, SwiftBroadband SATCOM Console Screenshots

[8] ARINC Specification 600-13 - Air Transport Avionics Equipment Interfaces, Supplement 13, 30 Mar 2001

[9] Inmarsat Streaming enhancements for SwiftBroadband v1.2, 09 July 2009

[10] 870-A0506_ICD, SwiftBroadband SDU Monitoring and Control ICD

[11] 862-A0138_IM, SB200 SwiftBroadband Installation Manual

[12] New SwiftBroadband class for smaller aircraft, "http://www.inmarsat.com/service/swiftbroadband-200/". URL accessed on 17/09/2014

[13] 862-A0139_IM, SDU-7315 SwiftBroadband Installation Manual.

[14] 862-A0140, SDU-7310 and SDU-7315 SwiftBroadband SATCOM Console Screenshots.

[15] ARINC Characteristic 781-5 - Mark 3 Aviation Satellite Communication Systems, Aircraft Installation Provisions, Attachment 5, 15 June 2012

[16] TT-3700 Inmarsat Broadband Global Area Network User Terminal (UT) BGAN Tracking TT 99-131484-A Interface Control Document (ICD)

[17] 862-A0153_IM, Bond Server Application Installation Manual

3. SWIFTBROADBAND SYSTEM DESCRIPTION

3.1 SwiftBroadband Overview

The Inmarsat BGAN system is a satellite-based packet radio network, offering both Packet Switched (PS) and Circuit Switched (CS) services to mobile terminals. The service available to aeronautical users is called SwiftBroadband (SBB), and this term will be used throughout this document. Examples of PS services are user client PC connections to the Internet, while examples of CS services are Public-Switched Telephony Network (PSTN) voice calls and Integrated Services Digital Network (ISDN) connections.

The SBB system provides near-global coverage (between +/-76 degrees latitude) from three satellites in geostationary orbit. The following URL: "http://www.inmarsat.com/service-collection/swiftbroadband/" (last access on 9/10/2014) can be used to view class dependant coverage maps. The satellites are 4th generation Inmarsat satellites, nominally located above the equator at longitudes 25 degrees East ("EMEA" satellite), 143.5 degrees East ("APAC" satellite) and 98 degrees West ("AMER" satellite). Each satellite provides a large number of overlapping narrow beams on the earth for users to access the network, similar in operation to any terrestrial cellular network.

The part of the earth's surface covered by each satellite is termed its "footprint". Within this footprint, a terminal should first be able to receive the satellite global beam in order to acquire various elements of system data. Within the area covered by the global beam, there are a number of smaller regional beams, each covering only a part of the footprint. The regional beam map and frequencies are received from the global beam broadcast. Network registration and call announcements are performed in the regional beam covering the SATCOM System's geographical location. The terminal stays "camped" in this beam whilst in idle mode. User services are provided in smaller narrow beams again, called narrow beams, which are typically a few hundred kilometres in size. The terminal switches to this beam only while user services (PS or CS) are active.

The SBB system uses 3GPP communication protocols, with an adaptation for operation over satellites, and as such it offers the same range of services as a modern mobile phone network. This includes mobility management and in-call service hand-offs between narrow beams as the user moves within the satellite footprint. Services will be lost whenever a user moves between different satellite regions, but the SATCOM Terminal will automatically re-register with the network subject to being within coverage of the new satellite.

In each narrow beam, the network provides one or more radio bearers over which the signalling and data are transferred. Bearers may be shared by a number of users, depending on their demand for bandwidth and available network capacity. Each modem card in the SATCOM System is tuned to one forward link (satellite to user) and one return link (user to satellite) bearer at any given time. Bearers are allocated by the network on a highly dynamic basis. Each modem in a multi-modem system may be connected to the same or different bearers, at the discretion of the network. In this regard a multi-modem terminal is treated by the network in exactly the same way as multi independent single-modem terminals. The network will typically try to satisfy the bandwidth demands of each modem of each terminal by allocating new bearers when required.

The terrestrial connection point of the SBB system is called the Satellite Access Station (SAS). The SAS connects the satellite system with terrestrial networks like the global Internet and international PSTN. The same common infrastructure is accessible via every satellite region, and it is not possible to select a specific SAS in the SBB system. Addressing for data traffic uses global IPv4 addressing, while PSTN calls are routed using standard international country codes in line with ITU-T E.164. All outgoing calls made from an SBB terminal must include international dialling prefixes. The SBB system has the international dialling code +870 for incoming calls.

SBB terminals of different classes are available. Class 6 has the highest antenna performance specified (High Gain Antenna or HGA) and would deliver the highest data throughput. Class 7 uses an Intermediate Gain Antenna (IGA) and has a reduced performance expectation. Class 15 uses a Low Gain Antenna.

Additional classes may be announced in future. The terminal discloses its class when it registers on the network.

3.1.1 More about Class 15 (SB200)

Class 15 is only available above an elevation angle of 20 degrees. The Class 15 service offers one modem providing one Voice call (CS service) together with PS services. The Class 15 PS services limit the Background PDP Contexts to a maximum of 200kbps and streaming PDP Contexts to a maximum of 16kbps.
For a more detailed description visit the Inmarsat website URL listed in [12].

3.2 AES Components

The Aircraft Earth Station (AES) is the airborne component of the SBB system, and consists of:

- Satellite Data Unit (SDU) including a Configuration Module (CM)
- High Power Amplifier (HPA)
- Diplexer/Low Noise Amplifier (DLNA)
- Antenna (High Gain (HGA) or Intermediate Gain (IGA) or LGA Gain Antenna (LGA))
- Aircraft navigational data interface
- Discrete inputs from aircraft
- User terminal equipment e.g. user client PCs, POTS telephone, ISDN TA/TE, SIP phones

For single-modem installations the HPA and DLNA may be replaced by a single unit called an HLD (High power/Low noise amplifier and Diplexer).

The SDU is the master unit of the AES, providing radio transceiver and control functionality. Two variants of SDU are available, with the same functionality but different enclosure sizes: the SDU-7320 and the SDU-7330. The SDU controls the AES and allows user equipment to communicate over the satellite network to the SAS.

One CM must be used. The CM contains all identification, configuration and installation-specific data needed for AES operation.

The HPA and DLNA form the radio frequency (RF) interface between the SDU and the antenna. For multi-modem operation the HPA-7400 or HPA-7450 and DLNA must be used, whereas the HLD-7260 may be used for single-modem operation. In the HLD-7260, the functions of the HPA and DLNA are combined into one compact unit.

The HPA amplifies the transmit RF signal generated by the SDU and feeds the signal through the DLNA to the antenna. The DLNA separates the receive and transmit signals and also amplifies the received signal before feeding it to the SDU.

The antenna must have a line-of-sight view of the satellite for the AES to connect to the SBB network; it will normally be installed on top of the fuselage or in the tail of the aircraft. Both HGA and IGA antennas have signal directivity, meaning that they have a 'beam' that focuses on a part of the sky. The antenna beam must point towards the selected satellite before the AES can connect to the SBB network.

To point the antenna beam towards a satellite the AES needs to know its location, the aircraft's attitude (heading, roll, and pitch) and the antenna installation angles on the aircraft.

The LGA antennas are omni-directional and therefore do not have signal directivity. Therefore the AES does not need to know its heading, roll, pitch and antenna installation angles.

All user equipment can be connected directly to the SDU.

3.2.1 SDU-73XX Satellite Data Units

The SDU-7320 is a one- or two-modem SDU packaged in a 2 MCU ARINC 600 enclosure (see [8]) and the SDU-7330 is a one-, two- or four-modem SDU packaged in a 3 MCU ARINC 600 enclosure. The SDU-7320 and SDU-7330 can operate in SBB Class 6 or Class 7 mode. The SDU-7320 and SDU-7330 offer identical user interfaces.

The SDU-7315 (flange mount SDU) is a flange mount SDU operating in SBB Class 6 or Class 7. The SDU-7310 is also a flange mount SDU and operates as a Class 15 (SB200 Class X) terminal. The SDU- 7315 is packaged as a one- or two-modem system. The SDU-7310 is packaged as a one-modem system.

The maximum possible data traffic throughput is proportional to the number of modems present (configured) in the SDU for SDU-7320, SDU-7330 and SDU-7315. For the SDU-7310 the Inmarsat network Class 15 service restrictions (detailed in section 3.1.1) apply. The number of modems installed inside the SDU is indicated by a dash number appended to the SDU part number, i.e. -001 signifies a single modem, -002 a two modem and -004 a four modem SDU.

The SDU provides the radio transceiver and control functionality of the AES. The control function of the SDU includes:

- Management and steering of antenna based on navigational data input via ARINC 429, SRU interfaces and optional use of an internal GPS receiver
- Management of HPA/DLNA or HLD
- Management of configuration data stored in the CM
- Logging and storage of AES status and events
- Management and loading of software upgrades in all the units of the AES
- User traffic management

The following communication interfaces, all terminating in the SDU, are available:

Table 3-1: Physical Interfaces:

Product	Number of interfaces/ports	Description
SDU 7320/7330	2	ISDN S/T Bus (Euro or NT1 protocols) for up to a total of 5 powered or 8 self-powered ISDN Terminals.
	1	100BaseT Ethernet port used for installation and maintenance (referred to as the Maintenance Port). The maintenance port is an Ethernet RJ-45 socket located behind a hatch on the SDU front panel (see Figure 3-3).
	4	4 x 10BaseT Ethernet ports (10 Mbps twisted pair) with Group-1 Power over Ethernet (PoE), limited to a total power of 16W.
	1	Front panel reset button.
	4	Two-wire phone interfaces (POTS), maximum 2 phones per port and up to a total of 8 phones connected to the SDU.
	1	Outputs for remote status LED panel with reset switch.
	1	Input for Tx-Mute (Radio Silence) switch.
	1	RS232 port for remote monitoring and control of the AES, as described in Section 13.
SDU 7310/7315	2	10BaseT Ethernet ports (10 Mbps twisted pair) with Group-1 Power over Ethernet (PoE), limited to a total power of 16W.
	2	Two-wire phone interfaces (POTS), maximum 2 phones per port and up to a total of 4 phones connected to the SDU.
	1	RS232 port for remote monitoring and control of the AES, as described in Section 13.
	1	Inputs for remote panel reset switch.
	1	Input for Tx-Mute (Radio Silence) switch.

Figure 3-1: SDU-7320 and SDU-7330 Satellite Data Units

Figure 3-2: SDU-7310 and SDU-7315

3.2.1.1 SDU-7320/30 Status LEDs and Front Panel Functions

The SDU front panel is shown in Figure 3-3. Reference should be made to 862-A0101_IM, SwiftBroadband Installation Manual ([1]) for the operation of all status LEDs and front-panel functions.

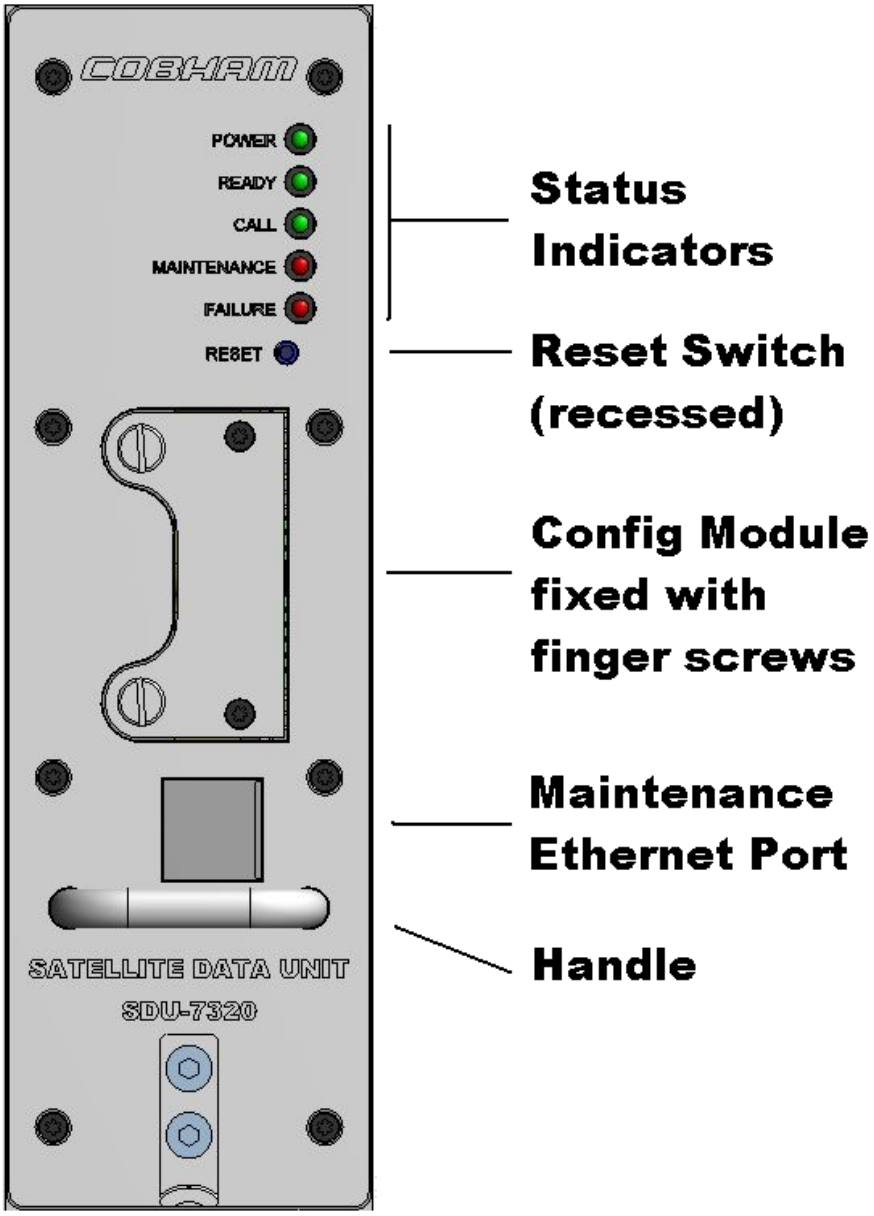

Figure 3-3: SDU-7320 Front Panel

3.2.1.2 SDU-7310/15 Front Panel

Reference should be made to [13] or [11], depending on your specific purchase, for the location and operation of front-panel functions.

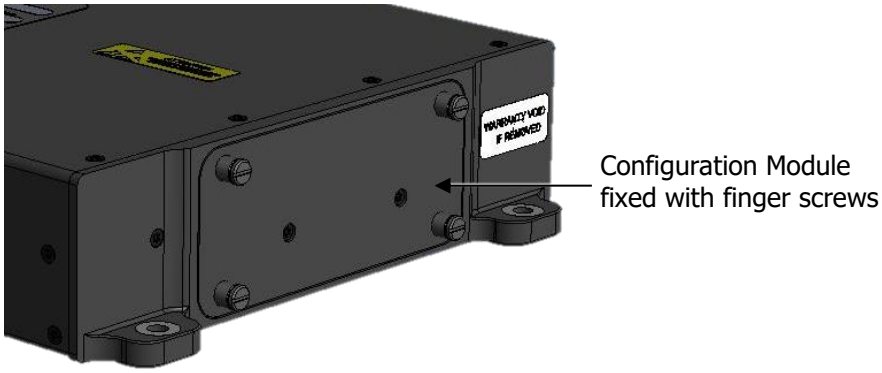

Figure 3-4: SDU-7310/15 Front Panel

3.2.1.3 Configuration Module

The CM contains installation-specific data and settings as well as identification and access codes for connecting to the satellite network. Identification, access codes and phone numbers of the AES are stored on USIMs inside the CM. The CM is factory fitted with one USIM per SDU modem. To replace the factory fitted USIM in the configuration module refer to document OP-125. To obtain a copy of this document please contact Cobham at CAC.CapeTown.CustomerSupport@cobham.com. In order to operate the SATCOM System over the Inmarsat SBB network, the USIM(s) within the unit must be registered and active (for billing purposes) on the Inmarsat system. The once-off operation to activate and provision the USIM(s) for the appropriate services before operational use of the SATCOM System is described in section 12.

Figure 3-5: Configuration Module[1] and Tray

The CM may be installed in one of two ways; it can either be inserted into the SDU front-panel, or it can be fixed to the airframe and wired to the SDU rear connector[2]. A CM wired to the rear connector has the advantage of remaining in the aircraft when an SDU is replaced. Only one CM should be installed. In case of duplication, however, a CM wired to the rear connector will take priority over a CM inserted in the front panel.

IMPORTANT: If the SDU is replaced, the CM should remain on the aircraft. This ensures that the identification and installation parameters and telephone numbers of the AES remain unchanged and that the system will not require re-commissioning or reconfiguration.

[1] Only the SDU-7320/30 CM shown in Figure 3-5.
[2] Rear CM connector only available on the SDU-7320/30.

4. QUICK START GUIDE

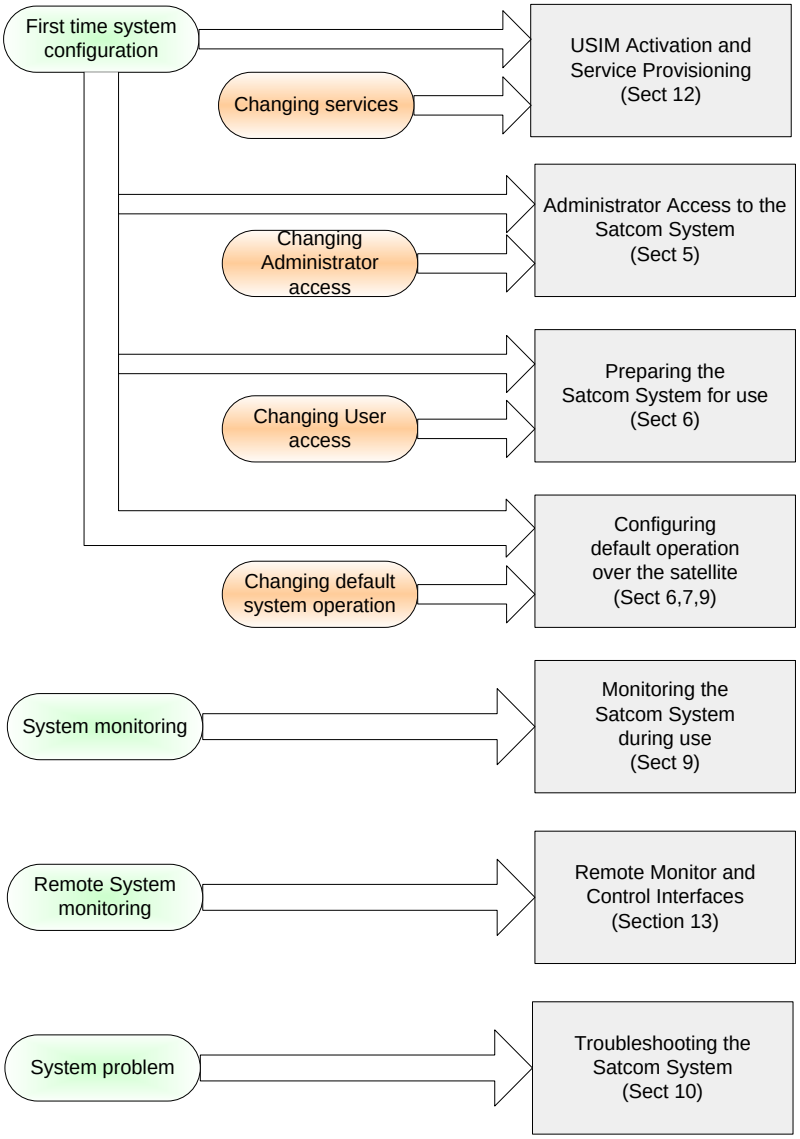

Figure 4-1: Quick Start Guide

5. ADMINISTRATOR ACCESS TO THE SATCOM SYSTEM

5.1 Administrator Access Overview

5.1.1 SATCOM Console

The SATCOM Console is the web interface through which the SATCOM System is configured and monitored by the Administrator. The SATCOM Console can be accessed using a standard web browser via Ethernet on either the Maintenance Port or any of the user ports. If a wireless Local Area Network (LAN) is connected and configured correctly, the SATCOM Console is also accessible via a wireless access point.

Although possible, users would not typically need to log into the SATCOM Console in order to use the services offered by the SATCOM System.

5.1.2 SATCOM Console URL

The factory settings for the SATCOM Console URLs are given in Table 5-1.

Table 5-1: Factory Default SATCOM Console URLs

Ethernet Port	SATCOM Console URL (IP Address)	Details
Maintenance Port (SDU-7320/30 only)	10.0.1.100/16[3]	No DHCP or Internet access is available via this port. Specify the connecting device's LAN adapter IP address statically in the same subnet e.g. 10.0.1.2/16. The Maintenance Port IP address is not configurable
User Ports	172.18.0.250/24	DHCP Enabled. If the Installer has modified the LAN settings, the user port may not be accessible at this default address. The subnet may have been reconfigured or the DHCP may be disabled. The LAN settings will then need to be determined/modified by following the procedures in section 6.2

5.1.3 Login authentication levels

Table 5-2: Default Authentication Passwords

SATCOM Console Authentication Levels	Factory Username	Factory Password
Administrator	"admin"	"password"
User	No user name required	No password required

Administrator login allows access to modify SATCOM System connectivity and default operation over the satellite. Access to installation-specific parameters is restricted as shown in section 5.1.4.

NOTE: All of the operations described in this document, except for restoring factory default settings, can be performed at Administrator level, and use of this is assumed throughout.

[3] CIDR Notation used

5.1.4 Access levels and available pages

Table 5-3 shows the SATCOM Console pages available at the various login authentication levels.

Table 5-3: SATCOM Console Access Levels and Available Pages

SATCOM Console Pages	Authentication Levels		
	User	Administrator	Maintenance
Connection Monitor	✓	✓	✓
Installation - Antenna Orientation			✓
Installation - RF Losses(Settings)			✓
Installation - SRU Settings			✓
Installation - ARINC Sources			✓
Installation - ARINC Labels			✓
Installation - ARINC Label Monitor			✓
Installation – Antenna Type			✓
Installation - Antenna Steering			✓
Installation – Discrete inputs			✓
Installation – Fan Settings			✓
Installation - LAN Settings		✓	✓
Installation – User Serial Port Settings		✓	✓
Installation - User Data		✓	✓
Installation – Upload Configuration			✓
Installation – Download Configuration			✓
Installation - Reboot SDU		✓	✓
Installation – Show All		✓	✓
Circuit Switching – POTS & ISDN Configuration		✓	✓
Circuit Switching – SIP Configuration		✓	✓
Circuit Switching – SIP Routing		✓	✓
Circuit Switching – Show All		✓	✓
System - System Status		✓	✓
System - System Information		✓	✓
System - Diagnostics		✓	✓
System - Config Override			✓
System - Change Password		✓	
System - Restore Defaults			✓
System - Maintenance Port		NA	NA
System - SDU Monitor and Control			✓
Packet Switching - Configuration		✓	✓
Packet Switching - Context Monitoring		✓	✓
Packet Switching - Advanced Settings		✓	✓
Position Reporting		✓	✓
Bonding		✓	✓
Logging - SATCOM System			✓
Logging - Modem 1			✓
Logging - Modem 2			✓
Logging - Modem 3			✓
Logging - Modem 4			✓
Logging - Config Module			✓
Logging - Packet Switching		✓	✓
Logging - Streaming Connections		✓	✓
Logging - Call Logs		✓	✓

5.2 Login

[Connection Monitor]
Once switched on, the SATCOM System will be accessible via the SATCOM Console after approximately 60 seconds.

Open any standard web browser and connect to the SATCOM Console using the URL appropriate to the PC connection as described Section 5.1.2

In the top right corner, click the Login link to display the login box as shown in Figure 5-1.

Figure 5-1: Login Box

Complete both fields and click the Login button. The user name and password fields are case sensitive.

The Administrator level access does not allow more than one connection at a time. Context-sensitive help is available at any time by clicking the *Show Help* link. A sixty second timeout is applied after a user has disconnected from the SATCOM Console without logging out. On expiry the administrator must repeat the login process.

If login is successful, the page will refresh and display links to the various SATCOM Console pages as shown in Figure 5-2.

Figure 5-2: Pages Available to the Administrator

Each of these pages has a number of sub-pages accessed by clicking the links that appear in the left pane once the main page was opened.

If any difficulty is experienced in connecting to the SATCOM Console, please refer to Section 10 for troubleshooting assistance.

5.3 Changing the Administrator password

[System – Change Password]

For added security, the Administrator can change the password required to log into the Administrator account. This can only be done once the Administrator has successfully logged in using the default or known password. The old password is also required to confirm the action of changing the password as shown in Figure 5-3. Click the Change Admin Password button to confirm.

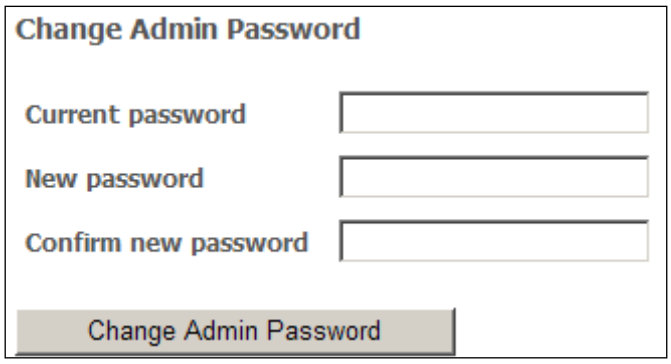

Figure 5-3: Changing the Administrator Password

NOTE: For improved security it is strongly recommended that the administrator password is changed from the default value. The new password is case sensitive and must be between 5 and 12 characters long.

A confirmation message will be displayed as shown in Figure 5-4.

Figure 5-4: Password Changed Successfully

5.4 Resetting the Administrator password to default

The Administrator password can be reset to its default value using the Maintenance Access Level account. The procedure is described in the relevant Installation Manual (see [1], [11] or [13] depending on the specific purchased product).

5.5 Entering system data

[Installation – User Data]

The data template (shown in Table 5-4) should be completed on the Installation page available via the SATCOM Console.

Table 5-4: Installation System Data

Parameter	Possible Values
Aircraft Type	Text string
Aircraft Registration / Tail Number	Text string
Navigation System	Text string
DLNA Type	Text string
Service Provider	Text string

The data is held in non-volatile memory, and need only be entered once, prior to first use. The data is printed in all diagnostic files obtained from the system.

The Aircraft Registration or Tail Number is also used to create the filename for all saved files and diagnostic logs e.g. yyyy-mm-dd hh-mm <tail_number> <file_name>.txt

NOTE: The allowable text characters can be found in the help *Installation – User Data* screen

6. PREPARING THE SATCOM SYSTEM FOR ETHERNET ACCESS

6.1 User Access Overview

6.1.1 Access modes

Users may access the SATCOM System via the user Ethernet ports in one of three modes (see 862-A0118_UM, SwiftBroadband User Manual ([2]) for further detail):

- Normal DHCP-based office LAN service, termed the "Shared Internet Connection" or "Router" access mode

- PPPoE-based broadband connection service, termed "PPPoE" access mode, resembling residential broadband Internet access via an Ethernet-connected modem.

Both access methods can be used simultaneously. The LAN settings for each are changed in the LAN Settings section on the Installation page available via the SATCOM Console.

- Single User NAT-free mode provides NAT-free access for one user device connected to any one of the SATCOM System Ethernet user ports. Your PC network adaptor must be configured to enable DHCP. Only one user at any particular time can connect to the Internet using this method of access. In Single User NAT-free mode, a second PC may be used to view the SDU Console provided it is configured with a static IP address. The static IP address must be x.x.x.y where x.x.x are the most significant 3 octets of the Inmarsat Network-assigned IP address and y (host address) must be 250 (which represents the SDU Console) or the host address (least signficant octet) assigned to the first (Single User NAT-free PC) by the SDU.

It is assumed that the cabin installation allows direct Ethernet connection to the SATCOM System. If intermediate switches, routers and/or servers are used, please consult the relevant documentation for these devices.

In the case of an external router, the external router can be configured to use PPPoE access (router WAN-side) to the SDU or simply function on the SDU LAN as another connected device.

6.1.2 User network IP address pools

This paragraph deals with the configuration of the airborne user network behind the SATCOM System. The concept of static and dynamic addressing in this section exclusively refers to the IP addressing options offered to the users connected to the SATCOM System. The concept of static and dynamic IP addressing from a service provisioning perspective is further discussed in section 12.1.1.

The User Network Configuration parameters (see 6.2.4) control the operation of dynamic IP addressing provided by the SATCOM System, including the base address of the IP address pools, subnet mask and default gateway address for user access. The IP address ranges, derived from the base IP address, are shown in Table 6-1.

Table 6-1 IP Address Pools

Service	Address Range (showing the last two octets)
Static IP Pool	xxx[4].45 to xxx.61
DHCP Pool	xxx.62 to xxx.240

NOTE: The SATCOM System supports IPv4, but not IPv6.

[4] xxx denotes the second octet from the right in the Base IP Address configured in Figure 6-1 (which is 0 in the example).

6.2 Configuring User Access

[Installation - LAN Settings]

Figure 6-1: User Network Configuration

On completing the required changes, press the Apply LAN Settings button.

6.2.1 Enable/disable DHCP

The Dynamic Host Configuration Protocol (DHCP) server on the SATCOM System user ports may be enabled or disabled as shown in Figure 6-1.

When enabled (default), the DHCP server will allocate IP addresses as described in section 6.1.2 to all user client PCs performing a router access. Primary and secondary DNS server addresses are allocated dynamically by the SBB network whenever a PS connection is activated, and these do not need to be manually configured.

When DHCP is disabled, IP addresses belonging to the DHCP pool may be included in the Static IP pool (to be used for static addressing if required). However it is recommended that the static IP address range as defined in Table 6-1 is used wherever possible. In order to use static IP addresses in user client PCs, ensure that IP addresses from the SATCOM System static IP pool are configured in the PC. This avoids IP conflicts if DHCP functionality is enabled. If the user PC is configured with an IP address from the SATCOM System static pool, a default gateway and a DNS server address must also be manually configured on the PC-side.

Disabling the DHCP server does not disable the PPPoE Server for PCs using PPPoE access.

NOTE: A public DNS sever pair for use on the Internet, is 4.2.2.1 and 4.2.2.2.

6.2.2 Enable/disable PPPoE

When enabled, a user PC can be configured to access the SATCOM System using a Broadband modem application instance.

6.2.3 Enable/disable Power-over-Ethernet

Power-over-Ethernet (PoE) on all four user ports may be enabled/disabled as shown in Figure 6-1. It is disabled by default.

When a PoE device is connected to the system, the device's power requirements are determined by the SDU. If the PoE supply has enough available power to supply the new device, it will be switched on. All previously connected devices will however remain operational. One or more of these devices can be disconnected to make more power available to the new device.

If the total combined power output on all four user ports is greater than 16 W, the PoE will be turned off.

6.2.4 Configuring IP address ranges

The required IP address ranges may be configured User Network Configuration in the *[Installation - LAN Settings]* page.

The first three octets of the base address are configurable. The third octet of the IP Subnet Mask is configurable.

The first three octet fields of the Gateway Address are not directly editable by the user, but they will take on the same values as the Base IP address. The last octet is configurable but must be higher than 241 and must not contain 255 (also see Figure 6-1).

The factory settings for dynamic IP addressing are given in Table 6-2.

Table 6-2: Factory Default Dynamic IP Addressing Settings

Address Type	Address
Base IP address	172.18.0.0
Subnet Mask	255.255.255.0
Gateway Address	172.18.0.250

7. PACKET-SWITCHED (PS) CONNECTIONS

7.1 PS Data Connection Overview

A Packet-Switched (PS) connection allows data to be transferred between the local area network and the Internet via the satellite. Up to 11 different PS data connections to the Internet may simultaneously be made per modem via the Inmarsat network. This is in addition to a single CS connection per modem.

The Inmarsat network provides two classes of service for each PS data connection or "Packet Data Protocol (PDP) context":

- Background class or "Standard IP"
- Streaming class or "Streaming IP"

The two PDP context types are distinguished by different Quality of Service (QoS) characteristics. The key distinctions between Background and Streaming class services are summarised in Table 7-1.

Table 7-1: Data Connection Features

Feature	Background Class	Streaming Class
Bandwidth	Contended	Guaranteed QoS
Data transfer reliability	Automatic retransmissions	No automatic retransmissions (by default)
Charging (subject to particular service provider agreement)	Per Mbyte of data transferred	Per minute of connection

The following sections provide a summary of the various features of PDP contexts. Further background information can be found in [6], although it should be noted that the BGAN LaunchPad software referenced therein is applicable to Land Enterprise BGAN terminals only.

7.1.1 Background class connections

A Background class connection uses bandwidth that is contended for amongst multiple satellite terminals (airborne, maritime or land-based) occupying the same narrow beam and bearer. The maximum data rate depends on a number of factors, including the terminal class, the number of users actively passing traffic on the same bearer, the prevailing radio propagation conditions, and the resources available in the network at any given time. The maximum data rate allocated over a single bearer is approximately 432 kbps under best case propagation conditions, shared amongst all users on the bearer at a given time. The network attempts to satisfy all demands from users for bandwidth by creating additional bearers in the narrow beam as needed and while resources allow.

Data is transferred over a background class connection in Acknowledged Mode (AM), with the system automatically resending any data that was previously received in error. As such, this mode of connection is most suitable for TCP-based applications which require end-to-end reliability e.g. WWW browsing, file transfer, E-mail, VPN.

Data transferred over Background PDP contexts are charged on a per Mbyte basis, therefore it may be desirable to disable automatic updates for user applications running on connected PCs (e.g. MS Windows, virus checkers etc.). It should also be noted that point to point tunnelling internet links like VPNs maintain a continuous "keep alive" dialogue whilst connected, regardless of user activity.

7.1.2 Streaming class connections

A Streaming class connection has a guaranteed and consistent data rate dedicated to the user. When configuring a Streaming class connection, the Maximum Bitrate Upload/Download and the Guaranteed Bitrate Upload/Download must be specified (see [2]). The network will attempt to reserve the Maximum Bitrate Upload/Download requested. If this is not available, the network will revert to the Guaranteed Bitrate Upload/Download, and signal this "negotiated" rate back to the SATCOM System. If this is also not available, the creation of the context will be rejected. The maximum Streaming class bandwidth available to a single modem SBB terminal is 256kbps, provided the associated USIM is provisioned accordingly.

By default, data transfer over the satellite link is not reliable for Streaming class connections. As such, this sort of connection is most suitable for UDP-based applications which do not require end-to-end reliability e.g. VoIP, Video Streaming. TCP-based applications will still run over such a connection, but error recovery for any dropped packets will take place at the end-to-end TCP level, which is less efficient than for Background class connections. To obtain a Streaming class connection with native data transfer reliability, a Transfer Delay value above 1 s should be specified. (See sections 7.2.7 and 7.4)

As charging for a Streaming PDP context is per minute connected, regardless of user activity, care should be taken to deactivate Streaming PDP contexts when not in use.

Streaming PDP contexts are available at rates from 8kbps to 64 kbps in steps of 1 kbps; and from 64kbps 8kbps to 128kbps in steps of 8kbps (see [9]).

NOTE: The network may bill streaming connections in coarser steps (e.g. 8kbps). For example, a 9kbps connection may be billed as a 16 kbps connection.

In addition a 256 kbps X-Stream streaming service is available on the Inmarsat network. This service differs from the other streaming class services in that a full bearer is allocated, and data rates well in excess of 256 kb/s are possible under good modem conditions. Each USIM must be specifically provisioned by the service provider to access the X-Stream service.

7.1.3 Primary and Secondary PDP Contexts

A PDP context may be a "primary context", in which case an IP address is assigned, or a "secondary context", in which case the PDP context is associated with (and dependent on) a separate Primary PDP Context. The limit of 11 simultaneous PDP contexts applies to the aggregate combination of all active primary and all Secondary PDP Contexts per modem. (Note that more PDP contexts can be defined in the SATCOM System, but only 11 can be active at any one time.)

A Primary PDP Context must be set up before any associated secondary contexts. Its connection or network access point to the Internet is specified by an Access Point Name (APN). The APN is provided beforehand by the service provider, as outlined in USIM Activation and Service provisioning. The APN must then be used whenever the Primary PDP Context is set up.

NOTE: The end-to-end QoS for applications over an SBB terminal will be affected not only by the satellite link, but by the QoS of the service provider's connection to the Internet that is employed by the particular APN.

Secondary PDP Contexts are used if differentiated QoS characteristics are desired for different traffic types on the same (Primary PDP Context) connection to the Internet. Although they share the APN and IP address of the Primary PDP Context to which they've been associated, each Secondary PDP Context may be specified to have a different QoS. In these cases, a Traffic Flow Template (TFT) must be specified for each Secondary PDP Context.

For download traffic (traffic received via the SATCOM System from the Internet), a CGTFT must be specified. For upload traffic (traffic sent via the SATCOM System to the Internet), a _ITFT must be specified.

Traffic not explicitly filtered (tied) by TFTs are sent over the Primary PDP Context by default. The different traffic types are typically filtered by protocol number, although filtering by IP address and TCP/UDP port numbers is also possible.

PDP contexts are set up either automatically (in the case of the shared connection) or through the use of the PPPoE interface, as described in the following sections.

7.1.4 User access modes

7.1.4.1 Shared Connections

The available bandwidth is shared between the users connected to the Shared Internet Connection. The Shared Internet Connection may be activated automatically on system start-up, or only when a user chooses to manually activate it via the *[Connection Monitor]* page (see section 7.2.2). Automatic activation based on user traffic is not supported in order to avoid inadvertent charges, for example due to automatic updates on the user PCs. Neither the creation of Secondary PDP Contexts, nor access to the second modem in a multi-modem system, is available via this access mode.

Shared Internet Connection:
On behalf of all users employing the Shared Internet Connection (router access mode), the SATCOM System activates a single, Primary PDP Context on a pre-configured modem.

Bonded Shared Internet Connection:
SATCOM System activates multiple Primary PDP Contexts, one on each pre-configured modem.

7.1.4.2 PPPoE based Connections

The advantage of using PPPoE is that the application residing on the user device (the entity initiating the connection via the SATCOM System) has complete control over the selection of the QoS associated with the connection. Additionally, various different applications on a particular device may selectively use different connections. (This is achieved through the TFT filtering method used with secondary contexts.) See the SwiftBroadband User Manual [2] for further details.

A Primary PDP Context is activated for every user successfully connecting via the **PPPoE** access mode. Together with the Primary PDP Context, the user may choose to additionally activate Secondary PDP Contexts. Access to any modem in a multi-modem system is possible by specifying particular service strings [3] or AT commands [2][3][5] in the broadband connection setup.

7.2 PS Connection Configuration

The naming of subheadings in this section corresponds to the Packet Switching Configuration parameters in Figure 6-1.

[Packet Switching – Configuration]

Packet Switching Configuration

Parameter	Current Value	New Value
Auto Activate Shared Internet Connection at Start-up	Disabled	Disabled: ◉ Enabled: ○
Connection Control for Shared Internet Connection	Enabled	Disabled: ◉ Enabled: ○
Bonded Shared Internet Connection	Disabled	Disabled: ◉ Enabled: ○
Single User NAT-Free Mode	Disabled	Disabled: ◉ Enabled: ○
Non ARINC 781 PPPoE Context Identifiers	Disabled	Disabled: ◉ Enabled: ○
ARINC 781 SBB service name tag removal	Disabled	Disabled: ◉ Enabled: ○
Position Reporting Enabled	Disabled	Disabled: ◉ Enabled: ○
Rotary Wing Compensation	Disabled	Disabled: ◉ Enabled: ○

Figure 7-1: Packet Switching Configuration

7.2.1 Auto activate Shared Internet Connection at start-up

The SATCOM System may be configured to automatically connect the Shared Internet Connection immediately after start-up and successful system registration. This feature can be enabled/disabled as shown in Figure 7-1.

When Auto Activate Shared Internet Connection at Start-up is enabled (default), the SATCOM System will automatically create the configured PDP Context (or PDP Contexts) after the satellite was acquired.

When Auto Activate Shared Internet Connection at Start-up is disabled, users will need to manually start/stop the Shared Internet Connection as per section 7.2.2.

On completing the required changes, press the Apply Packet Switching Configuration button.

7.2.2 Connection control for Shared Internet Connection

Instead of automatically creating a PDP context at start-up, this may be done manually by the user. This feature can be enabled or disabled using Connection Control for Shared Internet Connection checkbox shown in Figure 7-1.

On completing the required changes, press the Apply Packet Switching Configuration button.

When Connection Control for Shared Internet Connection is enabled (default), users can manually start/stop the Shared Internet Connection using the Shared Internet Connection control feature on the *[Connection Monitor]* page (shown in Figure 7-2). If both Auto Activate and Connection Control are disabled, the Shared Internet Connection button controls will be greyed out. In that case, only PPPoE connections are under user control.

A Bonded Shared Internet Connection (see section 7.2.3) will default the Connection control for Shared Internet Connection to 'enabled' and grey out the Connection control for Shared Internet Connection option.

7.2.3 Bonded Shared Internet Connection

Bonded Shared Internet Connection can be used for Video broadcast traffic (UDP). It is not advisable to use Bonded Shared Internet Connections for multi-use Web browsing and file transfer (FTP) applications.

Enabling the Bonded Shared Internet Connection will provide the user with higher available data rates by combining, or bonding multiple modems in the connection. A bonded connection can only be configured for a multi-modem SATCOM System. A bonded Shared Internet Connection requires an active Bond Server - typically installed at the customer or Distribution Partner premises PoP (Presence of Peer) equipment. For Bond Server installation details see the document referenced in [17]. Additional SATCOM System-side configuration is required to configure bonding related (SATCOM System-side as well as Bond Server-side) parameters - see section 7.6.2.

A Bond consists of two or more Streaming PDP Contexts, established over a configurable number of modems (one PDP Context on each modem), that are bonded together to provide higher available data rates for users connected to the Internet via the Shared Internet Connection.

When Bonded Shared Internet Connection is enabled, the Shared Internet Connection Settings shown in section 7.4 are applicable. If disabled, the Shared Internet Connection Settings shown in section 7.4 are applicable.

The SATCOM System must be rebooted for the changes to take effect.

7.2.3.1 Non-bonded Shared Internet Connection Control

The *[Connection Monitor]* page Shared Internet Connection control is shown in Figure 7-2. A list of Status parameter message list can be seen on the SATCOM Console *[Connection Monitor->Help]* page.

Figure 7-2: Shared Internet Connection Start/Stop

NOTE: The *Shared Internet Connection* control starts or stops the Shared Internet Connection for all users using the shared connection.

7.2.3.2 Bonded Shared Internet Connection Control

The *[Connection Monitor]* page Shared Internet Connection control is shown in Figure 7-3. The Bond Result parameter message list can be seen on the SATCOM Console *[Connection Monitor->Help]* page. A summary of such statuses is provided in section 9.2.

Figure 7-3: Bonded Connection Control

7.2.4 Single user NAT-free mode at start-up

By enabling Single User NAT-free mode at start-up, the third access method as detailed in 6.1.1 is invoked. The SATCOM System requires a restart for the mode to become active. During the restart, the Shared Internet Connection Settings on the *[Packet Switching]* page (as described in section 7.2.7) are applied to the Single User NAT-free connection.

For Single User NAT-free mode, DHCP must be enabled (see Figure 6-1).

If the Connection Control for Shared Internet Connection parameter (see Figure 7-5) was previously disabled, the single connected user will receive a dedicated IP address after the restart. If the Connection Control for Shared Internet Connection parameter was enabled, the connection may be initiated by pressing the "Start" button on the Connection Monitor page after the start-up.

This mode of operation de-activates the Shared Internet Connection. Ensure that only one client device/PC is connected to the SATCOM System LAN.

After the connection was established (user PC received a dedicated IP), the SATCOM Console will not be available to the connected client machine at the same address as before the restart. The subnet of the new NAT-free IP address assigned to the client machine must be used to access the SATCOM Console. The host part of the IP address will be "250", the same as the factory default for the SATCOM System Gateway address.

As an example: After the restart the client machine receives an IP address of "161.30.180.21". To access the SATCOM Console from the client machine use the three most significant octets of the assigned IP address "161.30.180" together with "250" for the host part. Thus, typing 161.30.180.250 in the browser address bar will provide access to the SATCOM Console.

The SATCOM Console also remains accessible through the SATCOM System maintenance Ethernet port at the IP address of 10.0.1.100 on the as shown in section 10.4.1.

The Single User NAT-free mode at start-up is disabled and greyed out when the Bonded Shared Internet Connection (see section 7.2.3) is enabled. The two modes are not compatible.

7.2.5 Non ARINC-781 PPPoE Connection Identifiers

When the *disabled* checkbox is checked, the ARINC 781 Attachment 5 [15] command functionality is made available. This simplifies the management of contexts when creating/modifying PDP Contexts.

Virtual context identifiers (CIDs) are assigned by the SATCOM System for PDP Contexts. Every Primary PDP Context will be identified by CID=1 when using the ARINC 781 control line. The user therefore does not need to keep track of CIDs across multiple existing PDP Contexts in order to create or modify PDP Contexts.

When additional Contexts are created using the ARINC 781 control line (see 13.2), the first step is to 'bind' the TELNET session to an existing Primary PDP Context IP address. This is achieved by issuing the following Inmarsat AT-command extension from within an active TELNET session:

_IPDPS=<IP address of existing Primary PDP Context>

The bound PDP Context automatically receives a virtual CID of 1. Cyclic numbering (CIDs of 2,3,4 etc) can then be applied to Secondary Contexts that are added to the bound Primary PDP Context.

For example, an existing Primary Context may be displayed as having an actual CID=4 on the *[Connection Monitor – Show Detailed Data Connection Information]* page. The CID=4 implies that other PDP Contexts already exist that may (or may not) be Primary PDP Contexts or Secondary PDP Contexts. To create a Secondary PDP Context on the Primary PDP Context, the user makes use of the virtual CID=1 for the Primary and can use CID=2 for the first Secondary Context, CID=3 for the second Secondary PDP Context and any

subsequent created Secondary PDP Contexts can be assigned CIDs of 4,5,6 by the user. Refer to the **example** given in section 13.2.1.

To modify any other existing PDP contexts (as in the above), the TELNET session must be bound to the associated Primary Context's IP address (see 13.2.1).

If the *enabled* checkbox is checked, the ARINC 781 Attachment 5 control line functionality is disabled. The user has to make use of PPPoE service string option (see [2]) or the methods in section 13.3. In such cases the user must keep track of the CIDs by selecting CID=4 for the Primary Context, CID=5 for the first Secondary, CID=6 for the second Secondary etc.

7.2.6 ARINC-781 'SBB' service name Tag removal

During the PPPoE discovery phase the first message sent from the PPPoE client on the user's PC to the SDU is the PPPoE Active Discovery Information (PADI) message.

The SDU responds with a PPPoE Active Discovery Offer (PADO) message containing a string "SBB". The string is to ensure compliance with ARINC-781 specification (specifically) Attachment 5.

When the "enabled" checkbox is selected, the PADO will not contain the SBB string. This may be required for certain PPPoE clients to successfully connect to the SDU.

7.2.7 Position Reporting

The Position Reporting setting enables/disables the reporting of the aircraft position and other parameters to a Tracking Internet Gateway located in the Internet. The report is sent to the Tracking Internet Gateway via the SATCOM System Shared Internet Connection. Position Reporting requires an active Tracking Internet Gateway (an IP-addressable networking node) located elsewhere in the Internet to receive and decode the tracking messages.

When Position Reporting is enabled, additional SATCOM System-side configuration is required – see section 7.6.1.

7.3 Shared Internet Connection Settings

This section only applies to a non-Bonded Shared Internet Connection.

7.3.1 Default modem for Shared Internet Connection

For multi-modem SATCOM Systems, the default modem to be used for the Shared Internet Connection can be configured. This setting, shown in Figure 7-1, is applicable to both of the Auto Activation and Manual Connection Control of the Shared Internet Connection.

7.3.2 QoS settings for Shared Internet Connection

The Shared Internet Connection PDP context type can be configured to be a Background (default) or Streaming class connection (see Figure 7-1). For a Streaming class connection, it is also possible to configure the data rate.

The factory settings shown in Table 7-2 will be applied for the Shared Internet Connection whenever a PDP context is created.

Table 7-2: Default Shared Internet Connection Settings

Parameter	Possible Values	Factory Setting
APN	Text string	bgan.inmarsat.com
Connection Class	Background/ Streaming	Background
Maximum Bitrate Upload/Download (kbps)	8 – 128; (see 7.1.2)[5]	0
Guaranteed Bitrate Upload/Download (kbps)	8 – 128 (see 7.1.2)[5]	0
Transfer Delay (ms)	0-4000	0

A value greater than 64 will be rounded up to the next higher multiple of 8.

On completing the required changes, press the Apply Shared Internet Connection Settings button.

For security and billing purposes, some data service types (for example Streaming Connections) or IP address types provided by the Service Provider need to be authenticated. The actual connection authentication is handled by the terrestrial network. The SATCOM System supports PAP authentication.

For this purpose the *Username* and *Password* fields are used to supply the user's user name and password to the Service Provider. Together with the user name and password the *Authentication for Connection* checkbox should be set to *Enabled*.

For services not requiring authentication, any user name and password present in these fields may result in the network rejecting a PDP context from being created. It is therefore strongly advised to provide this information via PPPoE connections for those services where authentication is required, and to leave the default fields on the SATCOM Console blank.

Typical services offered by the Service Providers requiring authentication include the following:

- static IP address provisioning (as per section 12)).
- streaming class connection activation requests.
- value added service requests (services offered by the Service Provider, for example office VPN etc.).

[5] A value greater than 64 will be rounded up to the next higher multiple of 8. Class 15 terminals are limited to 16kbps by the BGAN network.

For a Streaming class connection, charging will be per minute for the duration of the connection, regardless of whether any user data is passed over the network. To avoid unexpected costs, this mode of operation should be used with care.

NOTE: The USIM provisioned Static IP address should not be confused with user static IP addresses which may be configured on user PCs connected to the SATCOM Terminal (section 12.1.1).

On completing the required changes, press the Apply Packet Switching Configuration button.

7.4 Bonded Shared Internet Connection Settings

7.4.1 Connection Settings

The APN, and Transfer Delay parameters have the same meaning and value ranges than shown in Table 7-2.

The Modems to Bond checkboxes enables selection of the individual modems required for the bond. The modems that are not selected to be part of the bond, can still be used to pass traffic in PPPoE mode[6].

The Connection Class (QoS) is used to select the Streaming Context type to be used for the Bond QoS. The selected QoS will be applied to all the PDP Contexts established for the Bond.

The Use Authentication Credentials checkbox enables the authentication credential fields on a per modem/USIM basis. These fields are used if authentication is required for certain provisioned services (for example static IP addresses, or XSTREAM). When checked, the Username and Password field stings are sent to the network (during PDP Context creation) when the bond is started. When unchecked, the connections will be un-authenticated.

The Persist under degraded network conditions parameter allows the bonded Shared Internet Connection to activate despite PDP Context establishment failures occurring on one or more modems. If disabled, the Bonded Shared Internet Connection will succeed only if all PDP Contexts' activation succeed over the respective modems selected for the Bond. When enabled, an active bond will remain active under modem failures but when disabled, an active bond will be terminated under modem failure conditions.

[6] Additionally, any modem selected for the Bond, can also be accessed in PPPoE mode, but the available bandwidth will be shared with the bonded data traffic.

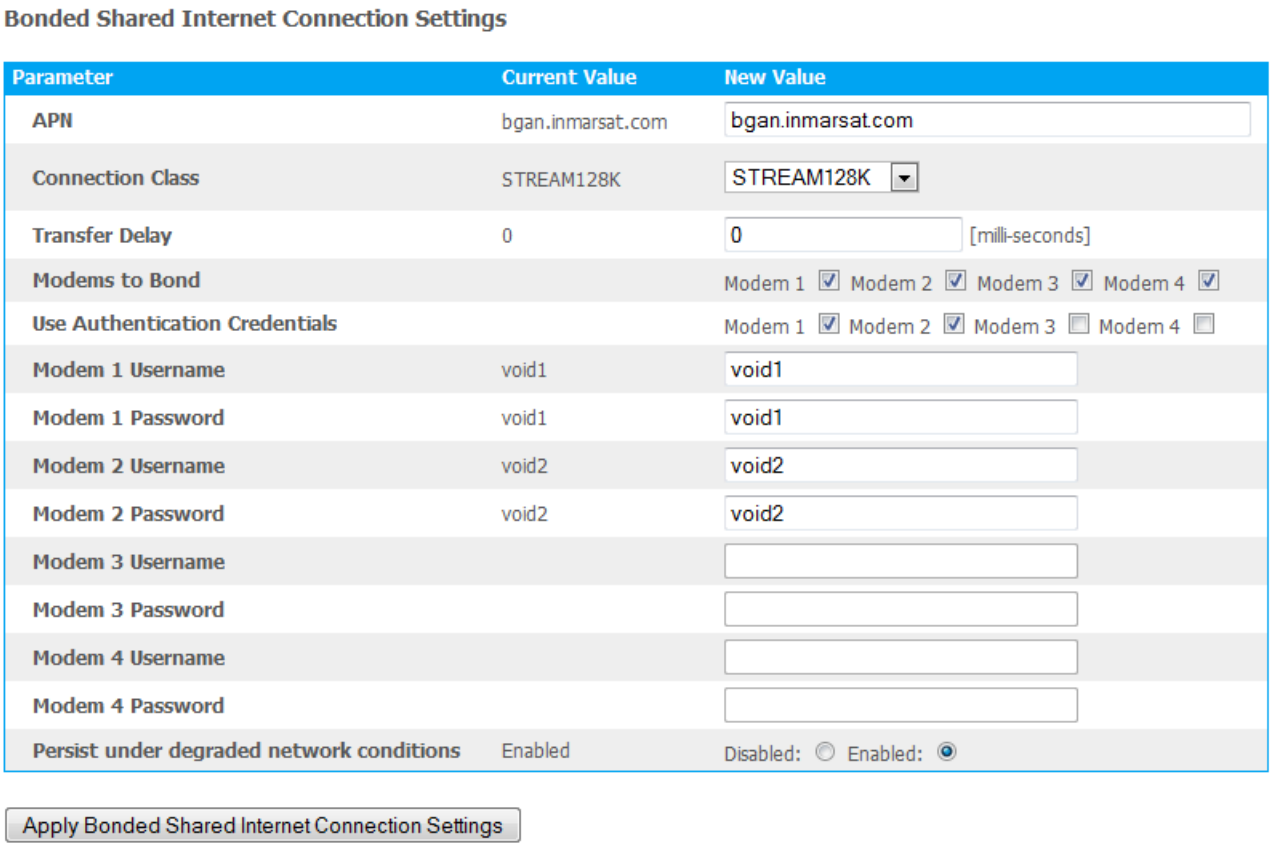

Figure 7-4: Bonded Shared Internet Connection Settings

On completing the required changes, press the Apply Bonded Shared Internet Connection Settings button.

Table 7-3: Default Bonded Shared Internet Connection Settings

Parameter	Possible Values	Factory Setting
APN	Text string	bgan.inmarsat.com
Connection Class	[7]Background, 64k,128K, XSTREAM	0
Transfer Delay (ms)	0-4000	0
Modems to Bond	Modem 1,2,3,4	All checkboxes cleared
Persist under degraded network conditions	Yes/No	Yes

[7] Background Contexts can be selected but are ONLY used for integration purposes to avoid costs associated with Streaming Contexts.

7.5 Default PPPoE Settings

The default PPPoE settings (configured in the SATCOM Console) are applied at the time of a PPPoE connection initiation from a user PC if the Service Name field (as it appears in the PPPoE modem instance on the PC) is empty.

If the Service Name field is not empty, the Service Name field content and not the default PPPoE settings will be applied during connection establishment provided the PPPoE Service Name String Override settings (see section 7.5.3) are disabled.

7.5.1 Default modem for PPPoE access

For multi-modem SATCOM Systems, the default modem to be used for default PPPoE-initiated PDP contexts can be selected. This may be configured as shown in Figure 7-5, with a default of modem 1.

Any PPPoE connection created on the same modem as an existing Shared Internet Connection will share the available bandwidth with the Shared Internet Connection. It is recommended wherever possible to balance the modem usage (in a multi-modem system) to optimise bandwidth availability to all users.

The default PPPoE connection can be configured to be a Background (default) or Streaming class connection. For a Streaming class connection, it is also possible to configure the bit rate to be requested from the network. To avoid unexpected costs, Streaming class connections should be used with care.

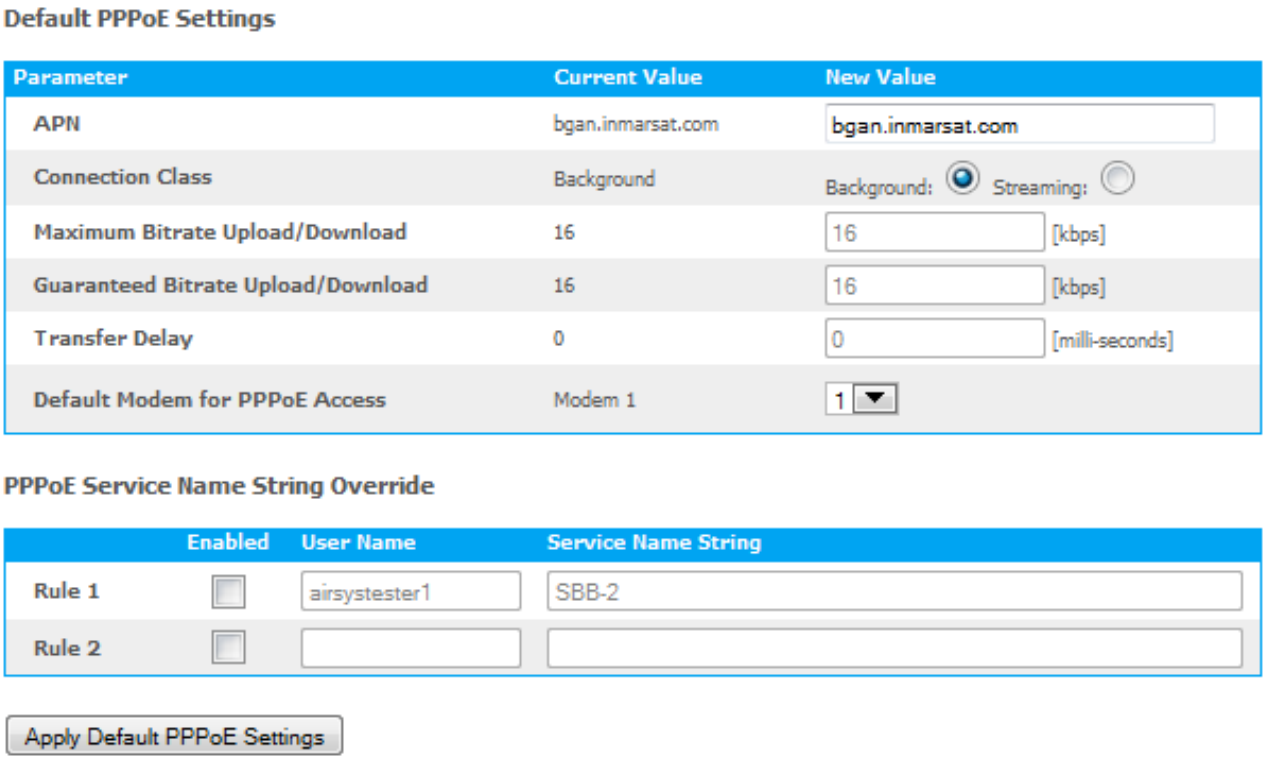

Figure 7-5: Default PPPoE Settings

The default settings in Table 7-4 will be applied whenever a PPPoE connection is initiated from a user PC or broadband router with an empty service name. If a valid service name or appropriate AT commands are provided then all the default settings are over-ridden.

On completing the required changes, press the Apply Default PPPoE Settings button.

Table 7-4: Default Modem Access Settings

Parameter	Possible Values	Factory Setting
APN	Text string	bgan.inmarsat.com
Connection Class	Background/ Streaming	Background
Maximum Bitrate Upload/Download (kbps)	8 – 128 (see 7.1.2)[8]	0
Guaranteed Bitrate Upload/Download (kbps)	8 – 128 (see 7.1.2)[8]	0
Transfer Delay (ms)	0-4000	0

7.5.2 Authentication for PPPoE connections

When authentication is required for the connection type requested with PPPoE, the user name and password must be entered in the PPPoE client.

7.5.3 Service Name String Override configuration

A facility exists to supply the BGAN network with Service Name String even if the PPPoE client machine, connected to the SDU, does not support the Service Name field. The configuration supplied will be applied during subsequent client connections. In such cases custom rules can be configured in the SATCOM Console to provide a Service Name String to the BGAN network. These rules must be pre-configured in the SATCOM Console by the administrator. They consist of the following:

- The user name assigned to the user by the service provider, for a particular connection (see the User name field in Figure 7-6).
- The Service Name String field's content contained in the rule is applied during connection setup time to customize the connection in terms of modem used, class of service, and other service parameters.

With 'Enabled' checked, the Service Name String, supplied in the SATCOM Console (as in Figure 7-6), will override any Service Name String supplied by the user PPPoE client application.

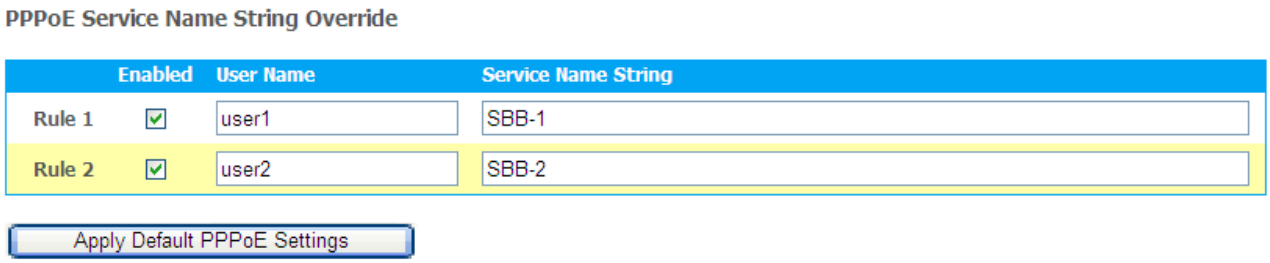

Figure 7-6: Service Name String Override

See section 6.3.2.1 of the document referenced in [2] for the Service Name Field input.

[8] A value greater than 64 will be rounded up to the next higher multiple of 8. Class 15 terminals are limited to 16kbps by the BGAN network.

7.6 Advanced PS configuration Settings

[Packet Switching – Advanced Settings]

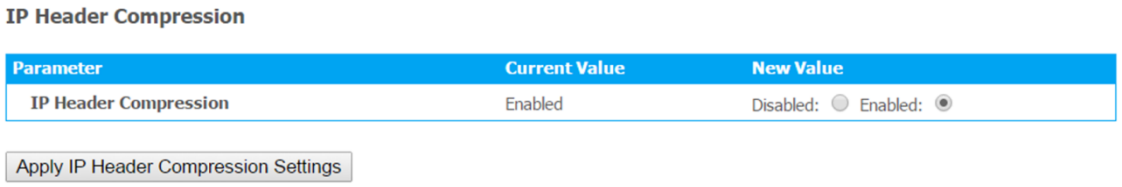

Figure 7-7: Header Compression configuration

7.6.1 Position Reporting

The SATCOM System position and Terminal Identification number can periodically be sent to a Tracking Internet Gateway (Position Reporting peer). Authentication and encryption can be configured for the reports. The Tracking Internet Gateway is an IP addressable networked node, located in the Internet, which executes a software application used to receive position reports from the SATCOM System. Guidance in terms of the protocol, required port numbers and message details for such a user application can be found in the Interface Control Document referenced in [16].

Position Reporting is configured, as shown in Figure 7-8, in the *[Packet Switched -> Advanced -> Position Reporting]* page. Further detail on the parameters not explicitly covered in this section, can be found be found in the document referenced in [16] as well as the *[Packet Switched -> Advanced -> Position Reporting->Help]* pages.

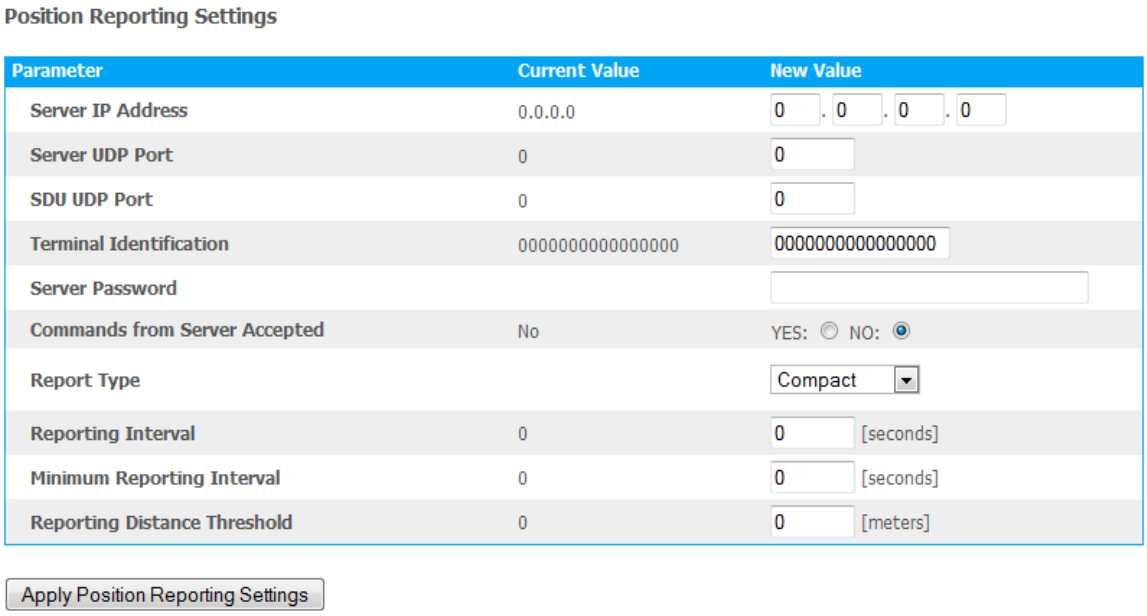

Figure 7-8: Position Reporting Configuration Settings

The Server Password field is a pre-shared string (of between 1 and 32 characters) which is used to encrypt the reports sent by the SATCOM System. The same string is used to decrypt the report on the Tracking Internet Gateway. An empty field disables encryption.

By enabling the Commands from Server Accepted parameter (by selecting 'YES'), the following parameters can be controlled from the Tracking Gateway-side:

- Report Type
- Reporting Interval
- Minimum Reporting Interval
- Reporting Distance Threshold

The use of any of the Reporting Interval, Minimum Reporting Interval and Reporting Distance Threshold settings is disabled by setting the respective value to zero. The Reporting Interval and Reporting Distance Threshold settings can be used simultaneously. The Minimum Reporting Interval is only used in conjunction with the Reporting Distance threshold (Reporting Interval must be set to zero). It is used to limit the rate of position reports. When the distance threshold is set too short or the aircraft is flying fast.

See the *[Position Reporting] ->[Help]* for an explanation of the other parameters. Three different report Types can be sent, each with a different number of parameters.

- Compact (lat, long)
- Extended (lat, long, speed, course, altitude)
- Extended 3D (time, posX, posY, posZ, speedX, speedY, speedZ

See the document referenced in [16] for details of the parameters sent in each report.

7.6.2 Bonding

The Bonding configuration, as shown in Figure 7-9, is performed on the *[Packet Switched -> Advanced -> Bonding]* page. Further details for Bonding Settings can be found in the SATCOM Console *[Packet Switched -> Bonding -> Help]* page.

Health messages will be received periodically (every 10 seconds) from the Bond Server after the bonded connection establishes.

The "Bond Active Timeout" is the time the SDU client should wait for a health message before deciding that the link is broken and tearing down the Bonded connection. A value of at least 60 seconds is advised.

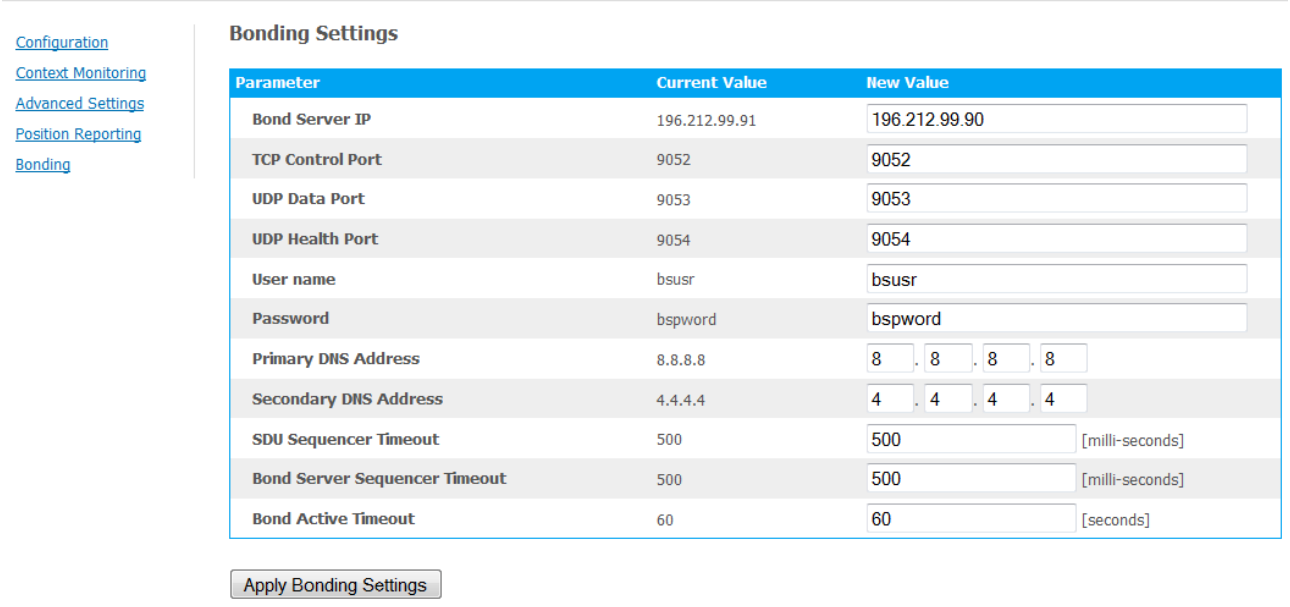

Figure 7-9: Bonding peer (end-point) configuration

7.6.3 Header compression

Header compression is a process whereby redundant data in TCP, UDP and IP protocol headers in user PS traffic is compressed before packets are exchanged over the satellite link with the SAS, and then decompressed before onward transmission over the IP network. This process reduces bandwidth and achieves better response times. However, under conditions of abnormal packet error rates, the time for occasional header resynchronisations can potentially outweigh the benefits. This functionality is disabled by default.

For more information on Header compression refer to IETF RFC 2507.

If enabled, header compression capability is signalled to the network during registration, and applies to every PDP context that is created. It is at the network's discretion whether to employ it or not.

Header compression can be enabled or disabled as shown in Figure 7-7.

On completing the required changes, press the Apply Advanced Network Settings button. The SATCOM System must be rebooted for the changes to take effect.

Header compression is separate from any type of application data compression. TCP performance enhancements such as TCP accelerators may additionally be applied to application data streams on the user's PC.

7.6.4 Port Forwarding

Data destined towards hosts connected to the SATCOM System LAN (user devices connected to the SATCOM System Shared Internet Connection) first undergo NAT when passing through the SATCOM System internal router. NAT is performed by the SATCOM System's internal router on incoming and outgoing IP packets. The router rewrites the source address of an inbound packet, destined towards a connected host, to that of the router. Similarly an outbound IP packet will appear to a host located in the Internet to have the SATCOM terminal router address as its source address.

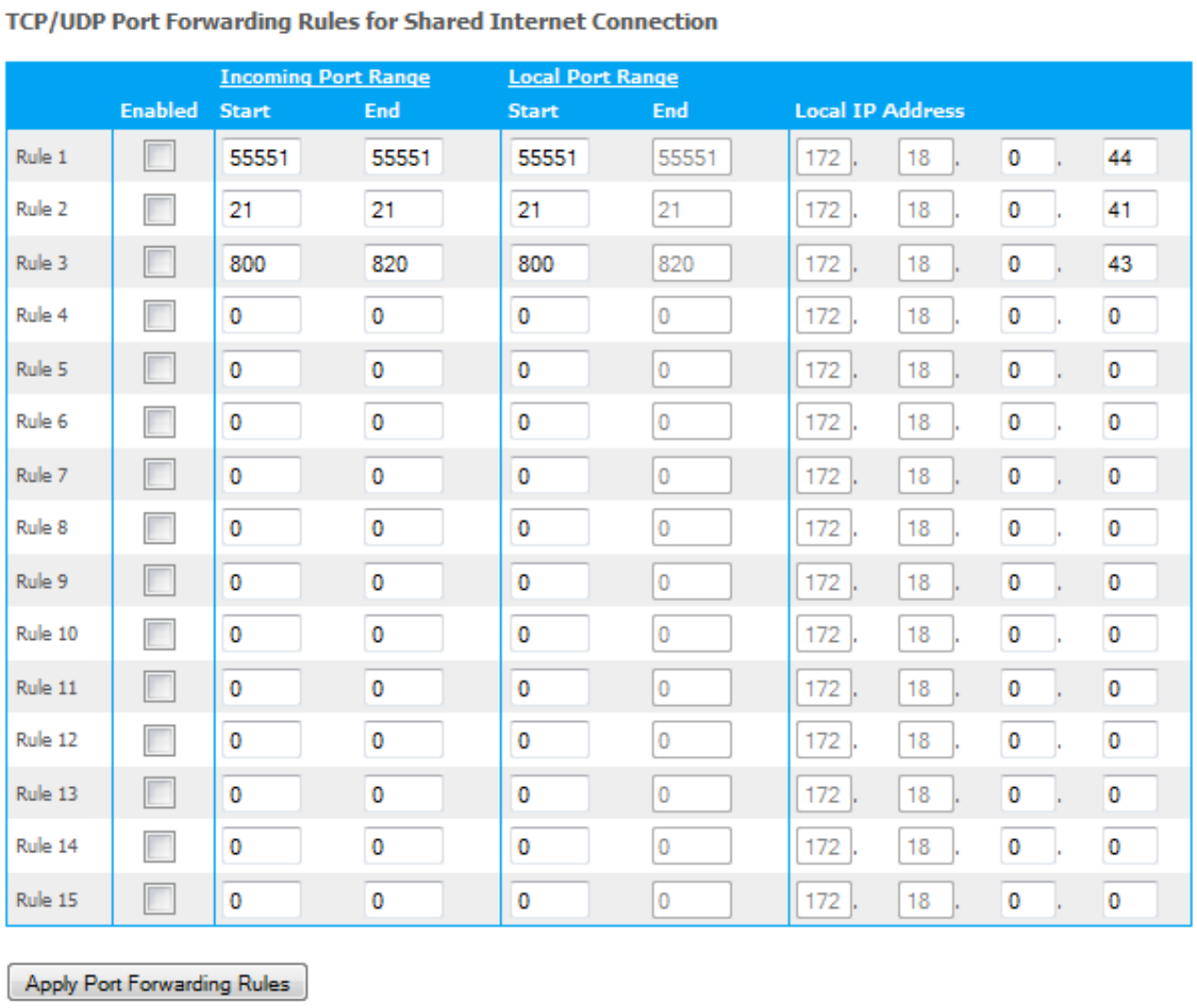

Figure 7-10: Port Forwarding rule configuration

To enable inbound (from the Internet to the SATCOM System) connections, port forwarding rules must be configured. These rules map incoming IP packet destination ports (or ranges of ports) to a specific host device connected to the SATCOM System Shared Internet connection via an IP Address. Provided an IP packet is received on the port number for which a rule exists, the SATCOM System's built-in router then automatically forwards the packet to the configured host IP address contained in the rule (see Figure 7-10).

The IP address used in the port forwarding rule would therefore be the IP address assigned to the user PC during a Shared Internet Connection, in other words the IP address assigned to the user PC from the DHCP pool or static pool (see Table 6-1). If more than one port needs to be forwarded for a particular IP address, the IP address must be repeated in subsequent forwarding rules.

7.6.4.1 Port Translation

Incoming connections can additionally be port-translated by configuring different port numbers for Incoming vs. Local ports in the Port Forward rules.

Incoming packet data connections, on well-known[9] Incoming port numbers, when assigned new Local port numbers (typically in the Ephemeral range, tied to a connected host's IP Address) in the port forwarding rule - will succeed to a SATCOM System LAN-connected device. The only requirement is that a rule must be configured which has the respective ports required for the translation as well as the actual IP Address of the connected device.

7.6.5 Rotor Mode

'Rotary Wing Compensation' can be enabled which reduces packet loss caused by satellite signal blocking due to conductive rotor blades. This feature should only be enabled for rotary wing aircraft.

[9] IANA pre-assigned ports, as per RFC 1700.

8. CIRCUIT-SWITCHED (CS) CONNECTIONS

Functionality that does not exist for a particular SATCOM System variant will be greyed out in the corresponding SATCOM Console screens. All examples and SATCOM Console screenshots shown in this section are based on the SDU-7320 and SDU-7320.

8.1 CS connection overview

Circuit-switched (CS) connections provide voice and data services commonly associated with telephone lines. One CS connection can be established per modem at any time, simultaneously with PS services.

Four CS service types are available over the network:

- Voice (4kbps compressed voice). This is the service most commonly used for voice calls.
- 3.1 kHz Audio service, for premium quality voice, or to send and receive Group 3 Fax
- Data 64 kb/s UDI
- Data 56 kb/s RDI

Four unique international telephone numbers, known as MISDNs, are allocated to each USIM when the USIM is registered with the service provider for CS services. Each of these MSISDNs is associated with one of the four CS service types. When a call is made from a land-based telephone (or ISDN terminal) to the aircraft, the service type is selected by dialling the appropriate MSISDN.

The user ports and service characteristics offered by the SDU variants are given in Table 8-1 and Table 8-2.

Table 8-1: Characteristics of SDU7330/20 CS interface ports

	POTS (2-Wire Telephone)	**ISDN**	**SIP (Ethernet User Ports)**
Maximum number of devices per port (subject to power constraints)	2	8	16[10] (subject to power constraints listed in Table 3-1 when PoE devices are used)
Services supported	• 4 kbps Voice • 3.1 kHz Audio	• 4 kbps Compressed Voice • 3.1 kHz Audio • Data 64 kb/s UDI • Data 56 kb/s RDI	• 4 kbps Compressed Voice • 3.1 kHz Audio

Table 8-2: Characteristics of SDU7310/15 CS interface ports

	POTS (2-Wire Telephone)	**SIP (Ethernet User Ports)**
Maximum number of devices per port	2 (subject to power constraints)	16 (subject to power constraints listed in Table 3-1 when PoE devices are used)
Services supported	• 4 kbps Compressed Voice • 3.1 kHz Audio[11]	• 4 kbps Compressed Voice • 3.1 kHz Audio[11]

A Voice connection uses significantly less bandwidth than a 3.1 kHz Audio connection, while still providing good voice quality. It is therefore normally charged at a lower rate. It is normally the preferred connection for a voice call. It does not pass modem signals, therefore a fax or modem call requires a 3.1 kHz Audio

[10]Ethernet port build-out can be achieved by installing an external Ethernet switch device. Without an external Ethernet switch, the SIP devices are limited to the number of native Ethernet ports wired out of the SATCOM System.

[11] SDU-7315 only.

connection. The 64 kb/s UDI and 56 kb/s RDI Data connections are suitable for a variety of ISDN data services between the aircraft and a terrestrial ISDN terminal.

CS calls can also be made from installed SIP phones. SIP phone connections to the SATCOM System are limited to one unique MAC/IP address per phone. For example if two SIP softphones, located on one terminal device (user's PC) are used, two LAN adaptors are required. Once connected to the SATCOM System, each LAN adaptor receives a unique IP address, enabling both SIP softphone applications to simultaneously register and place calls through the SATCOM System.

8.2 CS Configuration and Extension Numbering Plan

8.2.1 Pots and ISDN

Multiple (up to eight) ISDN terminals can be connected to each ISDN port (within power consumption constraints).

Telephones and ISDN terminals are allocated extension numbers according to a fixed numbering plan as shown in Table 8-3.

Table 8-3: Extension numbering plan

Terminal	Extension number (MSN)
POTS INTERFACES	
• POTS 1	2000
• POTS 2	2001
• POTS 3	2002
• POTS 4	2003
ISDN Interface 1	
• ISDN 1	2010
• ISDN 2	2011
• ISDN 3	2012
• ISDN 4	2013
• ISDN 5	2014
• ISDN 6	2015
• ISDN 7	2016
• ISDN 8	2017
ISDN Interface 1	
• ISDN 1	2020
• ISDN 2	2021
• ISDN 3	2022
• ISDN 4	2023
• ISDN 5	2024
• ISDN 6	2025
• ISDN 7	2026
• ISDN 8	2027

Multiple telephones connected to the same port have the same extension number.
To distinguish between the ISDN terminals, an MSN must be programmed into each terminal. (See the manufacturer's instructions of the particular device for instructions.) More than one MSN can be programmed into each ISDN device, of which one is the Active MSN. Each terminal's extension number must be programmed as its Active MSN.

Calls made from the terminal are associated with its Active MSN.

An ISDN terminal can be programmed with additional MSNs. The terminal will accept calls made to any of its MSNs. The use of the additional MSNs by the SATCOM System is explained in the next section.

NOTE: If no MSNs are programmed into an ISDN terminal, it will still be possible to make outgoing telephone calls over the Voice service, but incoming calls will not be possible.

In addition to the MSNs corresponding to extension numbers of ISDN terminals (Table 8.2), a special set of Service MSNs are defined, corresponding to the set of CS services provided through each modem. The Service MSNs are listed in Table 8-4. The use of the Service MSNs is explained in section 8.2.2.

Table 8-4: Service MSNs

Service	Service MSN
USIM 1	
• Voice	2060
• 3.1 kHz Audio	2061
• Data 64 kb/s UDI	2062
• Data 56 kb/s RDI	2063
USIM 2	
• Voice	2070
• 3.1 kHz Audio	2071
• Data 64 kb/s UDI	2072
• Data 56 kb/s RDI	2073
USIM 3	
• Voice	2080
• 3.1 kHz Audio	2081
• Data 64 kb/s UDI	2082
• Data 56 kb/s RDI	2083
USIM 4	
• Voice	2090
• 3.1 kHz Audio	2091
• Data 64 kb/s UDI	2092
• Data 56 kb/s RDI	2093

8.2.2 SIP

The SATCOM System has a built-in SIP server. BGAN and internal calls can be made by SIP phone clients connected and registered to the SATCOM System.

SIP clients that can connect to the SATCOM System SIP server are the following: Aircraft Installed SIP handsets, SIP applications installed on mobile phones, including communicators, SIP applications installed on the user's PC, smart phones etc. Connectivity to the SATCOM System is achieved using Wi-Fi (provided that an external Wi-Fi access point has been installed in the aircraft LAN) or Ethernet cable connected between the SIP enabled device and the SATCOM System Ethernet user ports.

To access the SATCOM System SIP server, the Administrator must enable the Shared Internet Connection.

Devices connected to the SDU via the PPPoE access mode cannot access the internal SIP server. Access to SIP servers provided by the Inmarsat DP are however still possible when the user is connected via PPPoE.

8.2.2.1 SATCOM System SIP Configuration

8.2.2.1.1 Network IP addressing for SIP

For SIP to make use of dynamic IP addressing, DHCP must be enabled in the *[Installation - LAN Settings]* page (see section 6.2.1).

If SIP phones are required to have static IP addressing, the static IP address pool range (also detailed in section 6.2.1, together with the netmask and default gateway required) must be used. For the static addressing option DCHP does not have to be disabled.

8.2.2.1.2 CS SIP configuration

[Circuit Switching – SIP Configuration]
Provision is made in the SATCOM Console to configure for a maximum of sixteen SIP phones. A maximum of sixteen SIP extensions can be configured, allowing a total of sixteen SIP phone applications to be simultaneously registered on the SATCOM System.

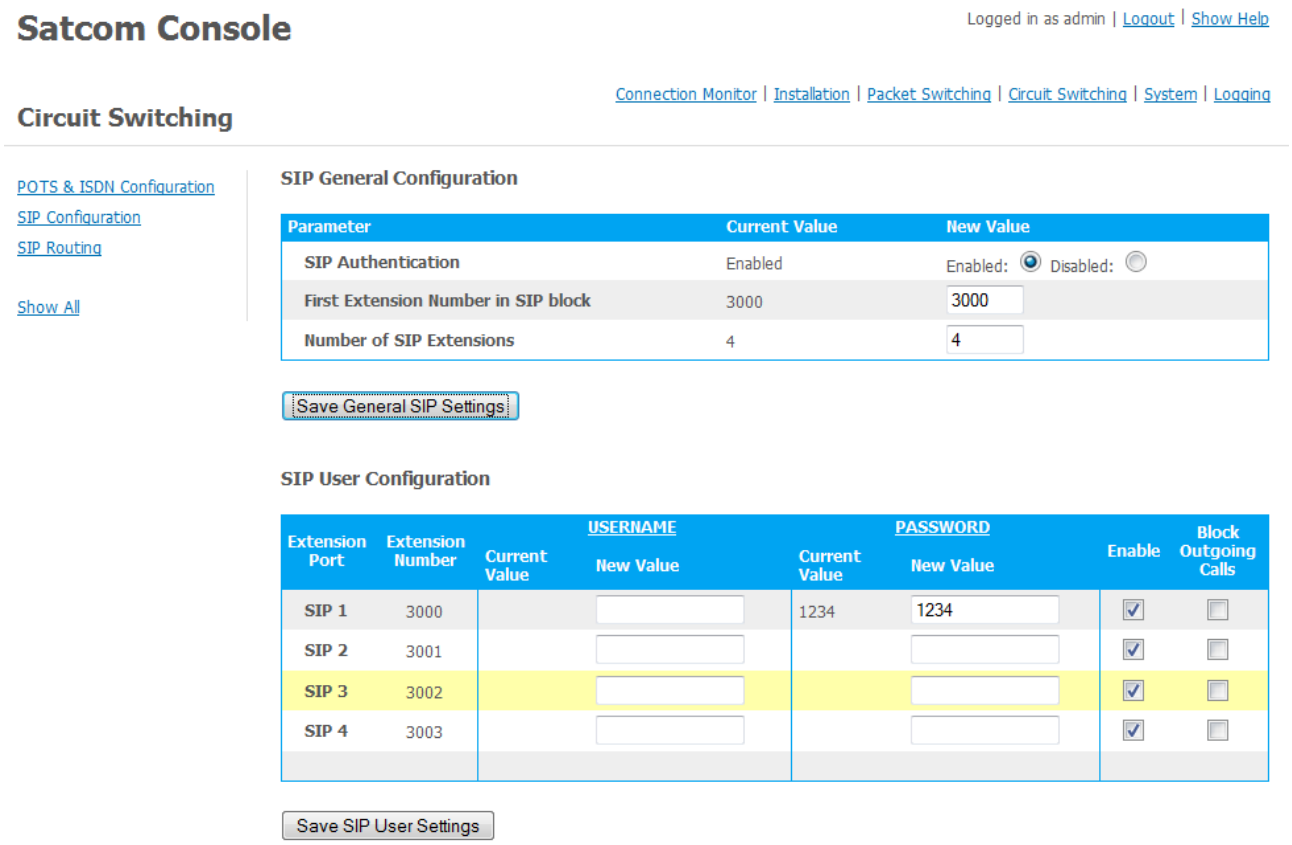

Figure 8-1: SIP Numbering Plan Configuration

8.2.2.1.3 SIP phone registration confirmation

The Administrator can see which SIP handsets successfully registered to the SATCOM System by viewing the *[System – Diagnostics]* Diagnostics log file.

8.2.2.1.4 SIP configuration (with authentication)

By enabling the SIP Authentication checkbox (see Figure 8-1), registering SIP handsets will be authenticated by the SATCOM System SIP server. The following settings (as a minimum) are required to match between the SIP configuration in the SATCOM Console and the SIP phone-side configuration:

Table 8-5: SIP configuration parameters (authenticated registration)

SATCOM Console	SIP phone-side settings	Description
Extension Number *[Circuit Switching - SIP Configuration]*	SIP username/identity/number	This is the number to dial in order to reach this SIP phone from another handset/phone connected to the SATCOM System.
USERNAME *[Circuit Switching - SIP Configuration]*	Authentication username	Credential used by the SATCOM System during Digest Authentication. A typical value would be the same as the Extension Number.
PASSWORD *[Circuit Switching - SIP Configuration]*	Password	Used to authenticate the SIP handset during handset registration.
SATCOM System LAN Gateway Address *[Installation – LAN Settings]*	SIP proxy/registrar	The SATCOM System Gateway Address configured as part of the LAN settings. *[IP address Installation – LAN Settings]*

Example: SIP phone configuration[12]:
To configure a SIP phone for "SIP 4" with Extension Number "3000" shown in Figure 8-1, the following parameters are required to be set:

SIP number : "3000"
Password : "1234"
Authentication username[13] : "3000"
SIP proxy/registrar : "172.18.0.250" (assuming that the system has the default factory LAN settings).

8.2.2.1.5 SIP configuration (without authentication)

By unchecking the SIP Authentication checkbox (see Figure 8-1), registering SIP handsets will not be authenticated by the SATCOM System SIP server during registration. Therefore the PASSWORD configured in extension "SIP 1" in Figure 8-1 will be ignored. The "*Password*" and "*Authentication username*" parameters are also ignored and may be left blank on phone-side configuration.

Example: SIP phone configuration:

SIP number: "3000"
Password: leave blank (value ignored)
Authentication username: leave blank (value ignored)
SIP proxy/registrar: "172.18.0.250"

8.2.2.1.6 SIP LAN connection, NAT and IP addressing options

SIP phones may be connected to the SATCOM System in the following network topologies:

- Directly/or via an external Ethernet switch to a SATCOM System Ethernet user port. Static or dynamic IP addressing is possible. If dynamic IP addressing is preferred, ensure that the phone-side and SATCOM System-side DHCP is enabled.
- To a router which, in turn on its WAN side, is connected to the SATCOM System Ethernet user port. The phone-side LAN configuration is then dependent on the IP addressing configured for the router LAN-side.

[12] Often a diverse set of configurable parameters exist and also differs significantly between various different SIP handset types. The values listed represent the minimum set of parameters required by the SATCOM System. Please contact the SIP phone manufacturer if doubt exists about other SIP configuration parameters offered for the particular SIP phone.
[13] SIP handsets/application dependent.

The SATCOM System does not offer the following functionality:

- STUN (Simple Traversal of UDP through NATs)
- ICE (Interactive Connectivity Establishment)

8.2.2.1.7 DTMF settings for SIP devices

SIP phones typically have two ways of supporting DTMF.

- DTMF via SIP INFO
- DTMF in-band

Configure the SIP phone to use the "DTMF in-band" option. DTMF via SIP INFO messages is not supported by the SATCOM System.

8.2.2.1.8 SIP Keep-alive mechanism

A SIP phone must be configured to utilize the SIP REGISTER message that is sent out to the SATCOM Console SIP Registrar/Proxy in order to remain registered. This parameter is typically the default on most SIP clients, but may be configurable in some cases.

8.2.2.1.9 RTP settings for SIP devices

The G.711 codec must be selected.

8.3 POTS/ISDN Incoming Call Routing

[Installation – Circuit Switching]

Routing of incoming calls is configured by the checkboxes mapping the bearer service of each USIM to each physical interface.

To route an incoming call of a particular service type to a selected POTS phone, check the checkbox corresponding to the service type and the POTS port.

To route an incoming call of a particular service type to a selected ISDN terminal:

- Check the checkbox corresponding to the service type and the ISDN Interface and
- Program the Service MSN corresponding to the service type into the ISDN terminal. (The Service MSN must not be programmed as the Active MSN. The same service MSN may be programmed into multiple terminals.)

Click the *Save Incoming Call Routing* button at the bottom of the screen once the desired mapping has been configured.

Incoming calls can be routed to multiple phones and ISDN terminals using SATCOM Console. These will all ring when the call comes in, but the call will be connected only to the first phone or terminal to go off-hook.

8.3.1.1 Incoming call routing example

In the configuration shown in Figure 8-2, an incoming voice call will cause all four POTS extensions to ring. If the call is associated with USIM 1, it will also cause all ISDN terminals MSN 2060 to ring. If the call is associated with USIM 2, it will cause all ISDN terminals with MSN 2070 to ring. Note that the configuration page does not indicate how many ISDN terminals are installed. If only one is installed, and has MSNs 2060 and 2070 programmed in, it (as well as all POTS phones) will ring for any incoming voice calls.

Numbering Plan: Incoming Call Routing

Extension Port	Extension Number	INCOMING SERVICE USIM 1				INCOMING SERVICE USIM 2			
		Voice	3.1kHz Audio	Data 64kbps	Data 56kbps	Voice	3.1kHz Audio	Data 64kbps	Data 56kbps
POTS 1	2000	☑	☐			☑	☐		
POTS 2	2001	☑	☐			☑	☐		
POTS 3	2002	☑	☐			☑	☐		
POTS 4	2003	☑	☐			☑	☐		
ISDN Interfaces									
Service MSN		2060	2061	2062	2063	2070	2071	2072	2073
ISDN Interface 1		☑	☑	☑	☐	☑	☑	☑	☐
ISDN Interface 2		☑	☑	☑	☐	☑	☑	☑	☐

Save Incoming Call Routing

Figure 8-2: Incoming Call Routing Configuration

8.4 POTS/ISDN Outgoing Call Routing

[Installation – CS Numbering Plan]

Outgoing call routing is configured on the *[Installation – CS Numbering Plan]* page of the SATCOM Console (Figure 8-3).

To select the CS service used by a telephone for outgoing calls, check the appropriate check box corresponding with the service and the extension number.

To select the CS service used by an ISDN terminal for outgoing calls:

- Check the appropriate check box corresponding with the service and the extension number. Check the Auto Selection checkbox for an ISDN terminal, if the service used should be determined by the Bearer Capability configured in the terminal. (See the terminal manufacturer's instructions.)
- Ensure that the appropriate extension number is programmed into the ISDN terminal as the active MSN.

For each telephone or ISDN terminal, select the default USIM to be used. Check the USIM Lock checkbox if only the default USIM may be used. This applies when the default USIM is already used for a call or when not available.

Block outgoing calls from any extension using the appropriate checkbox as required.

Click the 'Save Outgoing Call Routing' Button at the bottom of the screen once the required mapping has been configured.

Numbering Plan: Default Outgoing Call Routing

Extension Port	Extension Number	OUTGOING SERVICE					Default USIM	USIM Lock	Block Outgoing Calls
		Voice	3.1KHz Audio	Data 64Kbps	Data 56Kbps	Auto Selection			
POTS 1	2000	◉	○				1	☐	☐
POTS 2	2001	◉	○				1	☐	☐
POTS 3	2002	◉	○				1	☐	☐
POTS 4	2003	◉	○				1	☐	☐
ISDN Interface 1									
ISDN 1	2010	○	○	○	○	◉	1	☐	☐
ISDN 2	2011	○	○	○	○	◉	1	☐	☐
ISDN 3	2012	○	○	○	○	◉	1	☐	☐
ISDN 4	2013	○	○	○	○	◉	1	☐	☐
ISDN 5	2014	○	○	○	○	◉	1	☐	☐
ISDN 6	2015	○	○	○	○	◉	1	☐	☐
ISDN 7	2016	○	○	○	○	◉	1	☐	☐
ISDN 8	2017	○	○	○	○	◉	1	☐	☐
ISDN Interface 2									
ISDN 1	2020	○	○	○	○	◉	1	☐	☐
ISDN 2	2021	○	○	○	○	◉	2	☐	☐
ISDN 3	2022	○	○	○	○	◉	1	☐	☐
ISDN 4	2023	○	○	○	○	◉	1	☐	☐
ISDN 5	2024	○	○	○	○	◉	1	☐	☐
ISDN 6	2025	○	○	○	○	◉	1	☐	☐
ISDN 7	2026	○	○	○	○	◉	1	☐	☐
ISDN 8	2027	○	○	○	○	◉	1	☐	☐

Save Outgoing Call Routing

Figure 8-3: CS Call Routing for outgoing calls

8.5 SIP Outgoing Call Routing

[Circuit Switching - SIP Routing]

To select the CS service used by a telephone for outgoing calls, check the appropriate check box corresponding with the service and the extension number (See Figure 8-4).

Check the USIM Lock checkbox if only the default USIM may be used. This applies when the default USIM is already used for a call or when not available.

Block outgoing calls from any extension using the appropriate checkbox as required.

Click the 'Save Outgoing Call Routing' Button at the bottom of the screen once the required mapping has been configured.

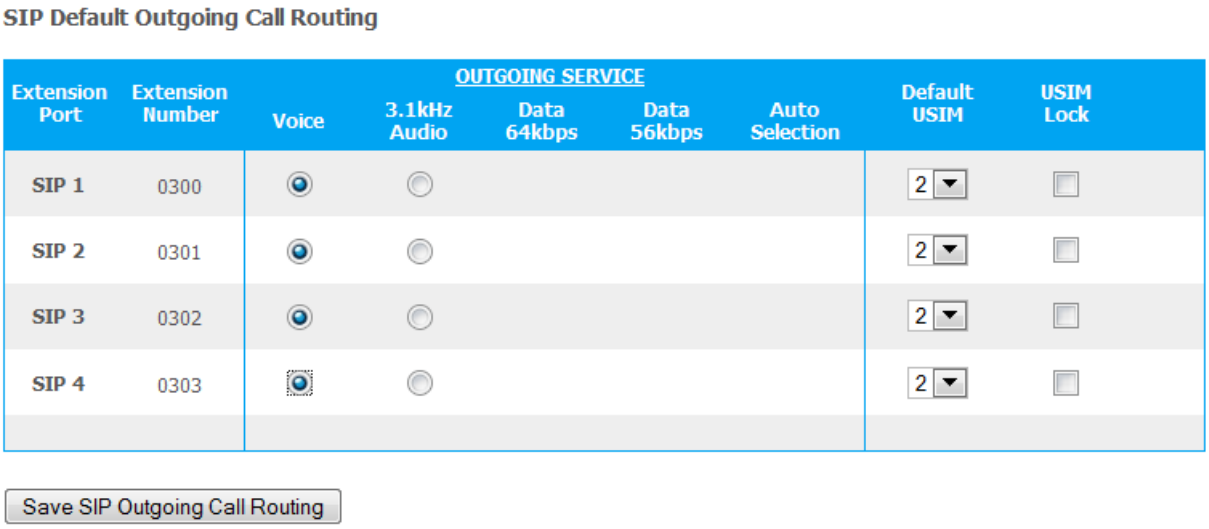

Figure 8-4: SIP Outgoing Call Routing

8.6 SIP Incoming Call Routing

[Circuit Switching - SIP Routing]

In the configuration shown in Figure 8-5, an incoming 3.1kHz Audio call associated with USIM 1, will cause all four SIP extensions as well as all the ISDN handsets with MSN 2061 to ring, provided all four SIP extensions have registered SIP clients attached. An incoming Voice call, associated with USIM 2, will cause all SIP, POTS and ISDN (Figure 8-2) extensions to ring.

Click the *Save Incoming Call Routing* button at the bottom of the screen once the desired mapping has been configured.

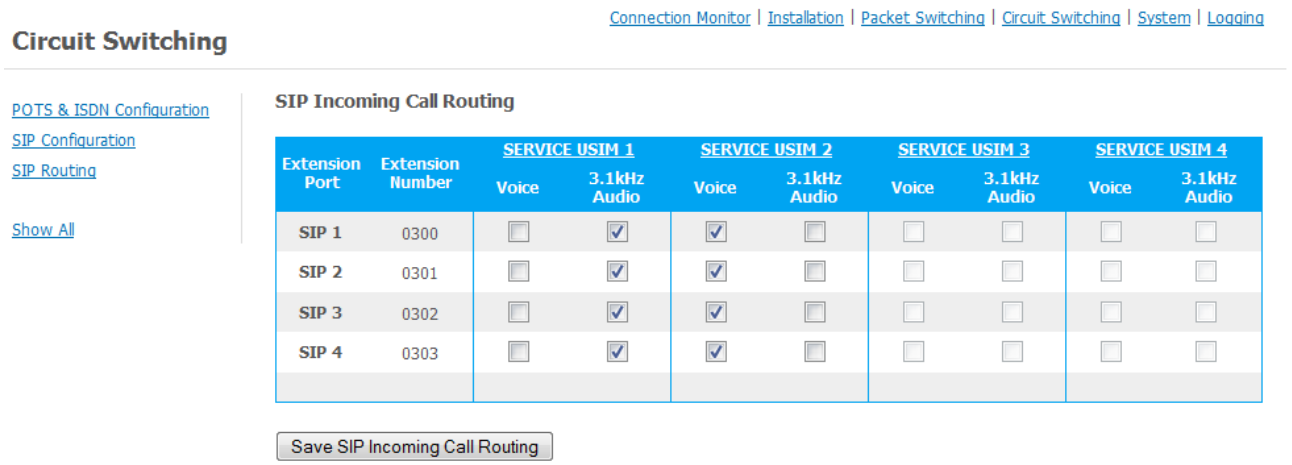

Figure 8-5: SIP incoming call routing

9. SYSTEM MONITORING USING THE SATCOM CONSOLE

9.1 System Status

[System - System Status]

The status information in Table 9-1 is provided on the *[System - System Status] page.* The example below is for a two-modem system.

Table 9-1: System Status Information

System Component Status	Description/State [Units]
System Status	• Initialising • Waiting For Peripherals • Calibrating • Waiting for Steering • Acquiring • Ready • System Error • Modem Error • RF Amplifier Error • Antenna Error • Config Module Error • Calibration Failed • Radio Silence
Modem Status	• Not Present • Initializing • USIM Not Available • Heating • Wait for Navigation Data • Wait for Acquisition • Acquiring • Ready • Modem Error • Software Download
HPA	• No HPA Detected • HPA Detected • HPA Detected – Busy Heating : Temp xx • Invalid HPA Detected
HPA Status	• Initializing • Idle • Active • Alarm • Software Download
System Mute Status	• Active • Inactive
Discrete Tx-Mute Status	• Active • Inactive
Control Interface Tx-Mute Status	• Active • Inactive

Antenna	• No Antenna Detected • IGA-5001 Detected • IGA-5006 Detected • HGA-6000 Detected • HGA-6500 Detected • HGA-7000 Detected • HGA-7001 Detected • HGA-8000 Detected • Passive Antenna (Fixed Gain) • Unknown Antenna Detected
• Internal GPS	• Locked • Not Locked
Configuration Module	• Front Panel CM Detected • External CM Detected • External and Front Panel CM Detected (Using External) • None Detected
Modem Frequencies	**[Units]**
Modem 1 Rx Frequency	[Hz]
Modem 1 Tx Frequency	[Hz]
Modem 2 Rx Frequency	[Hz]
Modem 2 Tx Frequency	[Hz]
Antenna Steering Status	**Description/State [Units]**
Status	• Initialising • Waiting for steering & Doppler data • Waiting for satellite position • Pointing • Error • Disabled • Unknown
Time Input Data	• Invalid • Valid
Steering Input Data	• Invalid • Valid
Doppler Input Data	• Invalid • Valid
Antenna	• Not Present • Present
Antenna Steering Details	**Description/State [Units]**
Azimuth in Antenna Frame	[degrees]
Elevation in Antenna Frame	[degrees]
Azimuth in Aircraft Frame	[degrees]
Elevation in Aircraft Frame	[degrees]
Azimuth in LLLN frame	[degrees]
Elevation in LLLN frame	[degrees]
Time, source	Current date and time [yyyy-mm-dd hh:mm:ss] Source • GPS • ARINC • Simulated • Onboard Real Time Clock • Unknown
Roll	[degrees] <Source>
Pitch	[degrees] <Source>
Roll Rate	[degrees/seconds] <Source>
Pitch Rate	[degrees/seconds] <Source>
Heading	[degrees] <type> <Source>

Magnetic Declination	[degrees]
Heading Rate	[degrees/seconds] <Source>
Latitude	[degrees] <Source>
Longitude	[degrees] <Source>
Altitude Above Sea Level	[meters] <Source>
Height Above Ellipsoid	[meters] <Source>
Satellite Longitude	[degrees]
Ground Speed	[meters/seconds] <Source>
Track Angle	[degrees] <Source>
Vertical Velocity	[meters/seconds] <Source>
Antenna Detection Details	**Description**
Modem Antenna	• none • IGA-5001 • IGA-5006 • HGA-6000 • HGA-6500 • HGA-7000 • HGA-7001 • HGA-8000 • Unknown type
ARINC Antenna	• IGA-5001 • IGA-5006 • HGA-6000 • HGA-6500 • HGA-7000 • HGA-8000 • Unknown type • Not present
Antenna Gain	[dB]
Time Advance	[milli-seconds]
Antenna Class	• 6 • 7 • 15
Install Angles	• Configured • Not Configured
Antenna Pitch Alignment	[degrees]
Antenna Roll Alignment	[degrees]
Antenna Yaw Alignment	[degrees]
GPS Details	**Description/State [Units]**
GPS Satellites Tracked	Number <Source>
GPS Satellites Visible	Number <Source>
HDOP	Number <Source of GPS> Number • 1(Ideal) • 1-2 (Excellent) • 2-5 (Good) • 5-10 (Moderate) • 10-20 (Fair) • >20 (Poor) Source • Internal GPS • External GPS

PDOP	Number <Source of GPS> Number • 1(Ideal) • 1-2 (Excellent) • 2-5 (Good) • 5-10 (Moderate) • 10-20 (Fair) • >20 (Poor) Source • Internal GPS • External GPS
Self-Steering Antenna Data	**Description/State [Units]**
Antenna Data Status	• Waiting for antenna data • Inactive • Valid • Waiting for GPS data • Calibrating – capturing data • Calibrating – calculating
Measured Field (plate axes)	[nT]
Compensated Measured Field (body axes)	(Forward,Down,Right)[nT] <Source>
Compensated Measured Field (LLLN)	[nT] <Source>
Compensated Measured Field Magnitude (LLLN)	[nT] <Source>
Compensated Measured Field Components (LLLN)	Horizontal [nT], Vertical [nT], <Source>
Compensated Measured Field Orientation (LLLN)	Azimuth[degrees], Elevation [degrees], <Source>
IGRF Field (LLLN)	(x-axis, y-axis, z-axis) [nT]
IGRF Field Magnitude (LLLN)	[nT]
IGRF Field Components (LLLN)	Horizontal [nT], Vertical [nT]
IGRF Field Orientation (LLLN)	Azimuth [degrees], Elevation [degrees]
Antenna Pitch Inclinometer	[degrees], <Source Status>
Self-Steering Antenna Calibration Status	**Description/State [Units]**
Calibration Status	• Calibration Required • Calibrating • Calibrated • Calibration Required - antenna install angles changed.
HPA Details	
Mute Status	• Muted • Not Muted
SDU Monitoring of HPA Power	**Description**
Power Monitor	• Enabled • Disabled
Power Monitor State	• Sufficient HPA Power for [1-4] channels • Best effort for 1 channels
Number of channels Transmitting	[1-4]

9.2 Monitor Connection Status

[Connection Monitor]

The information shown in Table 9-2 can be monitored for each modem in the Connection Monitor page.

Table 9-2: Connection Monitor Information

Component	Description/State [Units]
Modem Information	
Status	• Not Present • Initialising • USIM Not available • Wait For Navigation Data • Wait For Acquisition • Acquiring • Ready • Blocked • Heating • Software Download • Modem Error
Receiver Signal Quality	Typical receiver signal quality: ▪ 50 dBHz (Global Beam) ▪ 55-65 dBHz (Regional Beam) ▪ 65-75 dBHz (Narrow Beam)
Satellite Beam	ID of current satellite beam ▪ Not available ▪ Global – Beam ID ▪ Regional - Beam ID ▪ Narrow – Beam ID
Call Information	
Active Call Connections	Direction and Type of CS call ▪ Incoming/Outgoing Voice ▪ Incoming/Outgoing 3.1kHz Audio ▪ Incoming/Outgoing 64Kbps UDI ▪ Incoming/Outgoing 56Kbps RDI Call state ▪ No Call ▪ Starting ▪ Ringing ▪ Connected ▪ Disconnecting
Call Duration	Duration in every call state [hh:mm:ss]
Data Connection Information	
Active Data Connections	Number of active PDP contexts
Data Connection Duration	[hh:mm:ss]
Upload Speed	[kbps]
Download Speed	[kbps]
Bytes Sent	[kB]/[MB]
Bytes Received	[kB]/[MB]

9.3 Monitor PDP Context

Detail PDP Context information is available by clicking on the *Show Detailed Data Connection Information* link on the [*Connection Monitor]* page. Alternatively for the Administrator or Installer the same information is also available on the *[Packet Switching – Context Monitoring]* page.

The information shown in Table 9-3 can be seen for all PDP contexts in the Monitor PDP Context page.

Table 9-3: PDP Context Monitoring Information

Description	State [Units]
Modem	Modem Identifier (number)
State	• Inactive • Active Pending • Active
Tx kB	Bytes transmitted in [kB]
Rx kB	Bytes received in [kB]
Upload Speed kbps	[kbps]
Download Speed kbps	[kbps]
Duration	Duration of active PDP context in [hh:mm:ss]
Class	Connection Class negotiated with network • Background • Streaming
Guar. Bit Rate kbps	For streaming connections • Actual guaranteed rate (direction land to mobile) received from the network. For background connections • 0kbps
Max. Bit Rate kbps	For streaming connections • Actual maximum rate (direction land to mobile) received from the network. For background connections • 512kbps
Type	• Primary • Secondary
IP address	IP address received from network
APN	Access Point Name
PDP Context ID	PDP context ID

9.4 IMSI Information

[System - System Information]

The IMSI (see section 12) for each modem can be viewed in the System Information sub screen on the System page.

9.5 IMEISV Information

[System - System Information]

The IMEISV (see section 12) for each modem can be viewed in the System Information sub screen on the System page.

10. TROUBLESHOOTING THE SATCOM SYSTEM

10.1 Rebooting the SATCOM System

The SATCOM System can be rebooted via the SATCOM Console or by pressing the reset button on the front panel of the SATCOM System.

10.1.1 Soft Reboot

[Installation – Reboot SDU]

To reboot the SATCOM System via the SATCOM Console, navigate to the path as shown above and click the Reboot button.

The SATCOM System software will now reset. After approximately 30 s the Connection Monitor page will be restored.

10.1.2 Hard Reboot

To reboot the SATCOM System using the reset switch, either on the SATCOM System front panel or remotely wired, press and hold the switch for 5 s and release.

After approximately 30 s the SATCOM Console will return to the Connection Monitor page.

10.2 System Diagnostics File

[System – Diagnostics]

The diagnostics file contains information regarding system health, installation parameters, error and warning log files, and hardware status information.

To download a diagnostics file, navigate to the path as shown above and click on the **Download** link (Figure 10-1). The browser will then prompt the user to save the file.

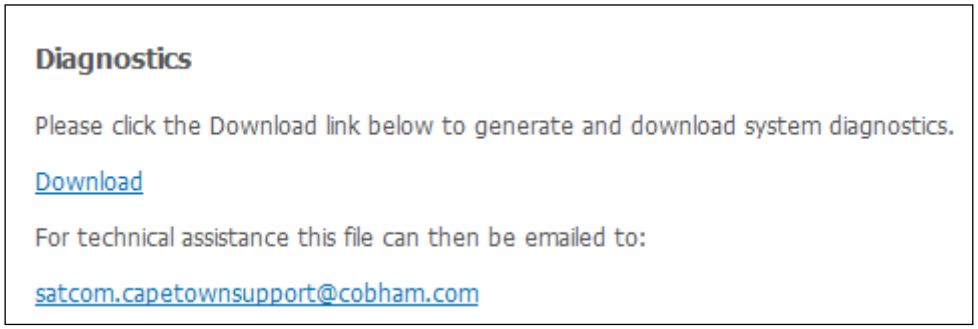

Figure 10-1: Download Diagnostics File

For technical assistance please contact your local SATCOM support personnel, or email the diagnostics file to:

SATCOM.capetownsupport@cobham.com

10.3 Maintenance Functions

10.3.1 LRU replacement

In the event of hardware failure, one of the Line Replaceable Units (LRUs) may have to be replaced. For further instructions on how to remove and replace an LRU, please refer to the SwiftBroadband Installation Manual ([1], [11] or [13] depending on the purchased product).

10.3.2 CM Replacement

The CM contains both the installation parameters necessary for system operation and the USIM(s) activated and provisioned by the provider of services as outlined in USIM Activation and Service provisioning.

If the CM is replaced, the installation parameters have to be reconfigured. The existing configuration may be saved in binary file format and uploaded once the new CM is in place (see [1]). The IMSIs from the new USIMs have to be activated and provisioned with the Service Provider before the SATCOM System can be used again.

10.4 Connection Problems

The examples shown in this section are based on the dedicated Maintenance Port of the SDU-7320 and SDU-7320. See 5.1.2 for the IP address used to connect to the SDU-7310 and SDU-7315 Maintenance facility via a SATCOM System user port.

10.4.1 Connecting to the SATCOM Console via the Maintenance Port

The IP address of the SDU maintenance port is 10.0.1.100. Any IP address from 10.0.1.1-254 (excluding 10.0.1.100) may therefore be used for the user PC.

The procedure to manually configure your PC network adapter to use a static IP address of say 10.0.1.10 is as follows.

NOTE: It is strongly recommended that the user enables the firewall on the user PC.

Click on the Start button, and then select Control Panel as shown in Figure 10-2.

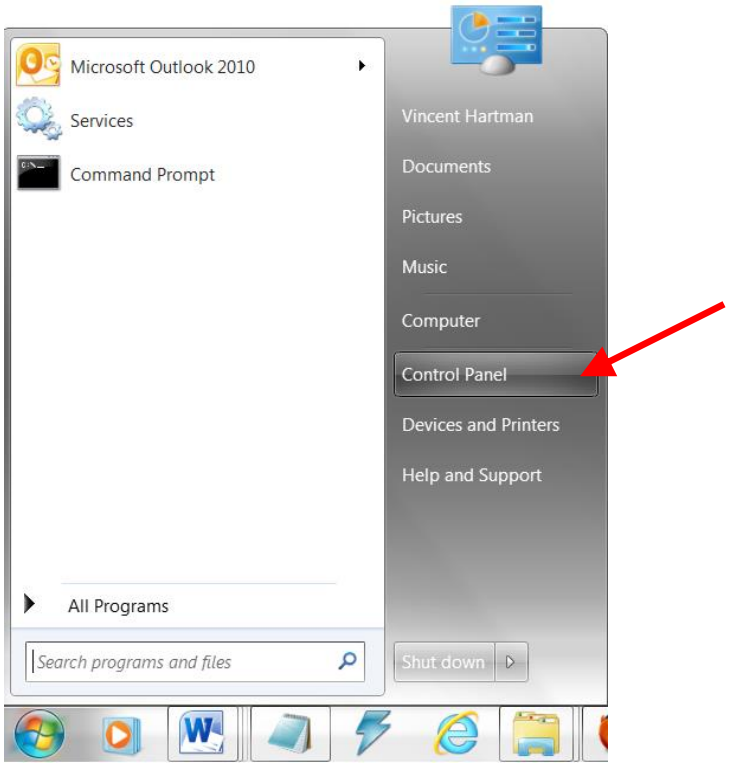

Figure 10-2: Windows Start Menu

The Control Panel window will open as shown in Figure 10-3.

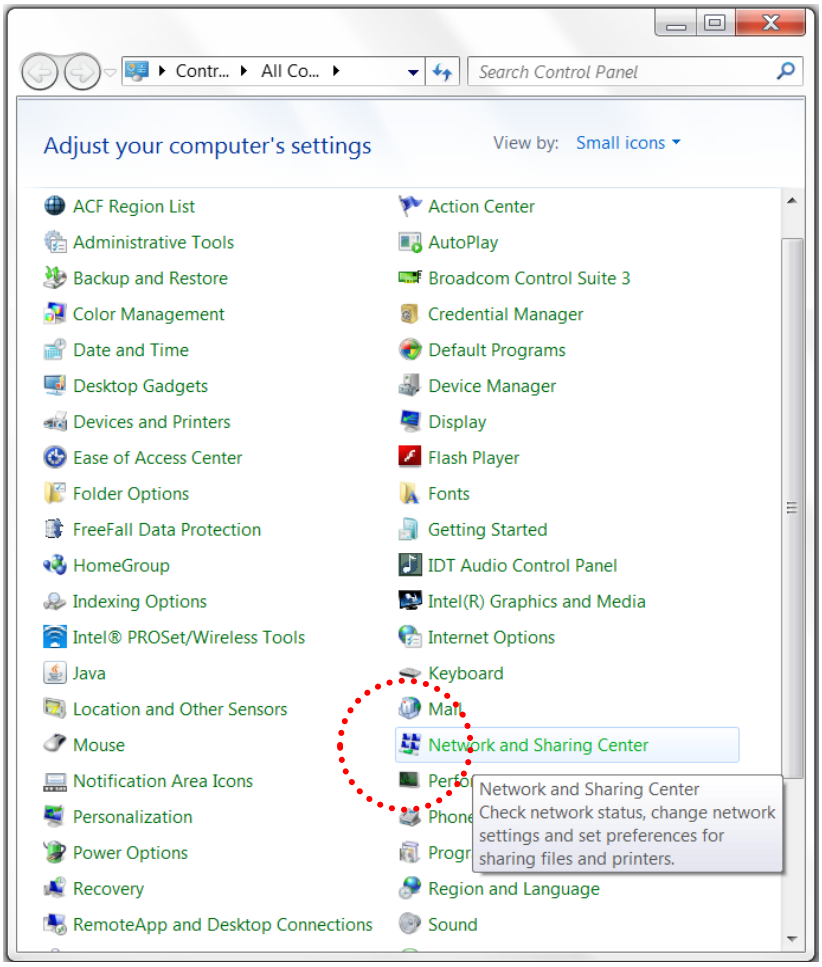

Figure 10-3: Windows Control Panel

Click on the Network Sharing Center. The following dialogue appears (see Figure 10-4):

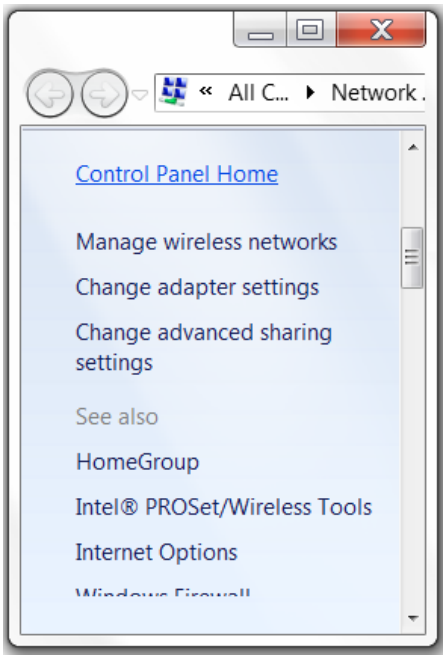

Figure 10-4: Network Sharing Center

Click on "Change Adaptor Settings" in the left pane. A window displaying the list of available network connections will be shown (see Figure 10-5).

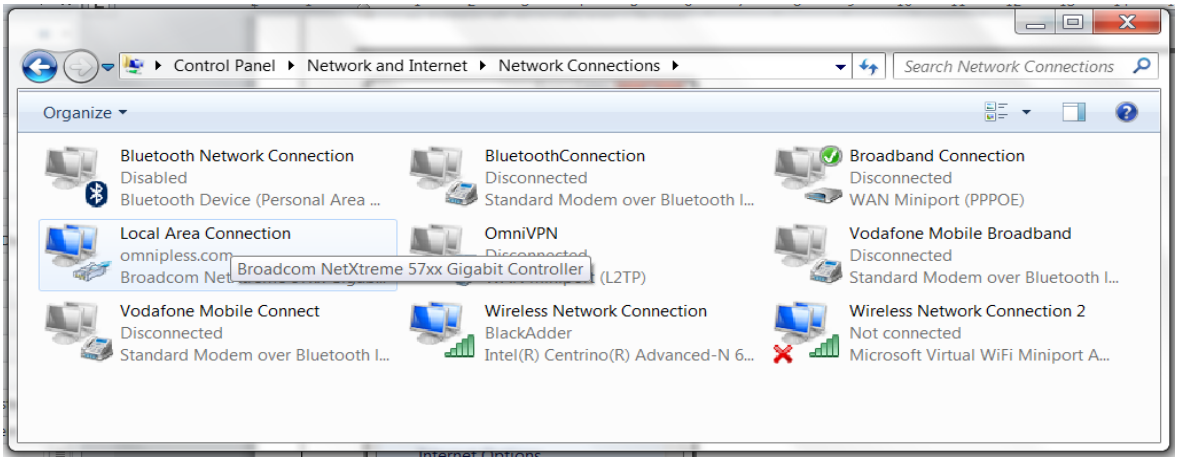

Figure 10-5: Network Connections

Right click on the "Local Area Connection" and select the "Properties" item in the list. The following dialogue appears (see Figure 10-6):

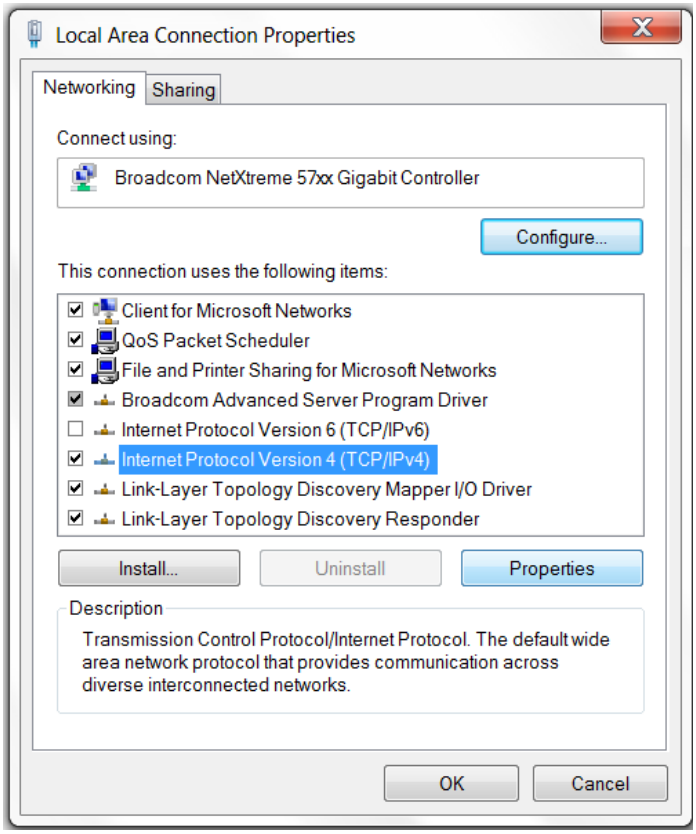

Figure 10-6: IP properties

Select Internet Protocol Version 4 (TCP/IPv4) and then click on the Properties button. Select Use the following IP Address, and enter an appropriate IP Address and subnet mask as shown in Figure 10-7.

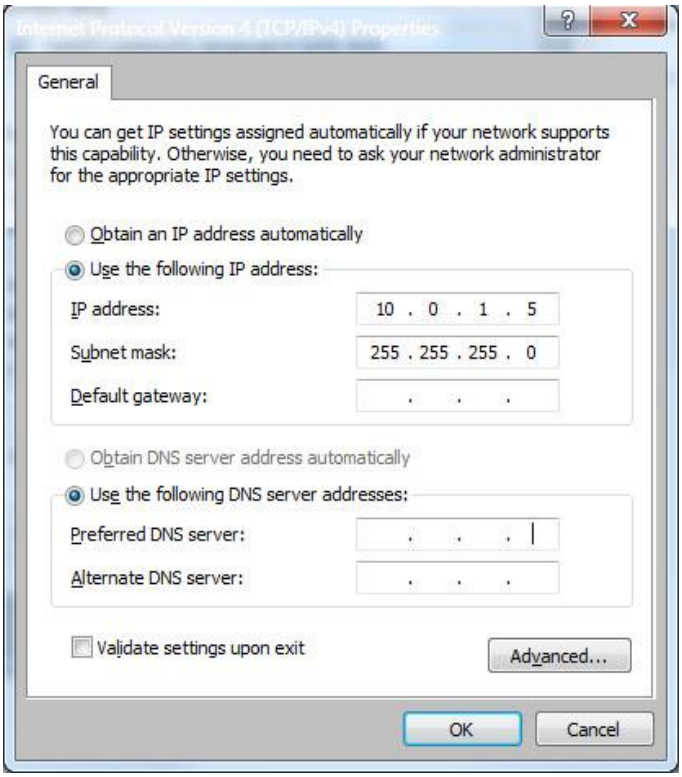

Figure 10-7: Static IP address

Click OK on the (TCP/IP) Properties window and close the Network Connection Properties Window.

Open any Internet browser such as Internet Explorer.

Ensure that the browser proxy settings are disabled.

In the address bar, type in the IP address of the SATCOM Console on the maintenance port as shown in Figure 10-8.

Figure 10-8: Troubleshooting - Windows 7 Entering the SATCOM Console URL

Press Enter. The SATCOM Console should now load.

11. INTELLECTUAL PROPERTY RIGHTS

The AMBE+2™ voice compression technology embodied in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. This voice compression technology is licensed solely for use, as is, within the Inmarsat satellite communications system. US Patent Nos. 6,199,037, 6,161,089, 5,826,222, 5,754,974, 5,701,390, 5,715,365, 5,630,011, 5,649,050, 5,247,579, 5,870,405, and 5,226,084.

12. USIM ACTIVATION AND SERVICE PROVISIONING

An agreement with an SBB Distribution Partner (DP) or Service Provider (SP) is required to activate and provision the USIM(s) for the required SBB services.

One USIM is required for each modem in a multi-modem SATCOM System. They each contain a unique identity, the International Mobile Subscriber Identifier (IMSI), which uniquely identifies a user's subscription for billing purposes.

The USIMs are enclosed in the Configuration Module (CM) and are not accessible by the user. A USIM failure mandates a CM replacement. See Section 10.3.2 for further details regarding CM replacement.

Each SBB terminal is uniquely identified by the International Mobile Equipment Identifier - Software Version (IMEISV). The first 14 digits of the IMEISV are the IMEI, while the last two digits are the Software Version Number (SVN). A multi-modem SATCOM System appears as two, or four independent terminals to the SBB network – therefore there will be two or four IMEISVs associated with a multi-modem system.

Customer-specific details and aircraft information will also be required to complete the DP/SP registration form.

NOTE: Some DPs/SPs may request that a separate activation form be completed for each USIM.

12.1.1 Selection of IP address types

Two types of IP addresses may be allocated by the Service Provider to be used by SBB customers. These are:

- Public
- Private

The Public IP Address is unique and, once allocated to a device, cannot be assigned to any other device on the Internet. The device can be directly accessed from anywhere in the Internet. NAT is not used by the Service Provider for IP traffic sent to such a device.

The Private address is not uniquely allocated to a specific device and is typically used internally within the intranets of organizations. To provide Internet access to a satellite terminal with a Private address, NAT is performed on data to and from the satellite terminal inside the Service Provider infrastructure.

A further distinction can be made by the way in which IP addresses are allocated:

- Dynamic IP addresses are allocated by the DP to a connecting device (satellite terminal or user PC connected to the satellite terminal) only for the duration of the connection. Once the device re-connects a different IP address would be assigned to the device.

- Static IP addresses are tied to a particular USIM. The same statically allocated IP address would therefore be allocated to the satellite terminal every time the device containing the statically provisioned USIM establishes a connection.

Combinations of public/private address allocated statically/dynamically are then exploited by the Service Providers to suit the particular data types that users intend to exchange over the Internet. Various IP address options are provided by the DP's and are structured in DP-specific packages, together with associated billing arrangements.

12.1.2 GPS discreet mode

A USIM with GPS discreet[14] mode enabled must be installed the CM to enable this mode.

[14] Discreet mode operation is only available on Class 6 and Class 7 systems.

A SATCOM System with a Discreet USIM does not transmit its geographical position (latitude and longitude) to the Inmarsat Network. Only the current spot beam ID is reported to the network.

The SATCOM Console *[System-System Information]* page may be used to verify that a GPS discreet mode USIM is used by the SATCOM System.

NOTE: A multi-modem system requires all USIMs to be enabled accordingly if GPS discreet mode is required on all modems.

12.2 Information Required

Typical information required during the activation and provisioning process is:

Customer Information

- Customer Name
- Contact Name (if different)
- Mail Address
- Telephone Number
- Fax Number
- E-mail Address

Billing Information

- Payment Method & Details
  - Cheque
  - Credit Card
  - ACH
  - Deposits/Wire

Aircraft Information

- Aircraft Type
- Aircraft Registration / Tail Number
- Aircraft Type and Model
- Country of Registration
- Registration Date

SwiftBroadband Information

- SATCOM Model
- IMEI or IMEISV for modem 1
- IMEI or IMEISV for modem 2 (if fitted)
- IMSI for USIM Card 1
- IMSI for USIM Card 2, (3 and 4 if fitted), required for multi-modem operation

- Streaming services to be enabled/disabled
- Maximum streaming rate (per PDP) - ensure that 128kbps is provisioned
- Public/Private, Static/Dynamic IP address(es) required or not
- CS services enabled/disabled

The IMSI(s) and IMEISV(s) are printed on the label on the side of the Configuration Module. They are also available via the SATCOM Console. See sections 9.3 and 9.5 for further details.

Streaming services are pay per minute and therefore subject to separate enabling/disabling.

Static IP address(es) are an additional service typically used wherever application servers are located on-board the aircraft. These will be IPv4 address(es) only. See sections 7.2.7 and 7.4 for further details.

12.3 Information Provided by the DP/SP

For PS services, the DP/SP will provide the details of specific SBB APN(s) required to connect to the Internet. A primary APN should be provided, and this text-string identifier is used when establishing PS services. The primary APN should be configured for default access as described in sections 7.2.7 and 7.4, and provided to all users employing PPPoE access.

If authentication is required for any specific DP/SP services (for example for use with static IP addresses) user name and password pair(s) will be provided for each. This information should be configured for default access as described in sections 7.2.7 and 7.4.

13. SATCOM SYSTEM MONITOR AND CONTROL INTERFACES

13.1 SATCOM System monitoring using SNMP

The SDU incorporates an SNMP server that returns objects requested from the ArincSwift-MIB, as described in ARINC-781 Attachment 5 [15]. Section 14.2 contains a list of the SNMP objects supported by the SATCOM System. Version information, status and statistics can be retrieved using any SNMP client application connected to the SATCOM System via any of the Ethernet user ports.

The SNMP client must connect to the SDU gateway IP Address: 172.18.0.250 (or the configured IP Address if configured differently – according to section 6.2.4)

The supported SNMP protocol version is SNMPv2. For client access to objects served from the SNMP server, MIB Definition files must be available to the SNMP client. These files are typically placed inside the client application directory structure. The following MIB Definition files are required:

- ArincSwift-MIB
- PPP-LCP-MIB
- RFC1213-MIB

The ArincSwift-MIB Definition (private) can be downloaded at the following URL "http://www.aviation-ia.com/aeec/SupportFiles/781-2/" (last accessed on 16/9/2014). The current supported MIB version is 1.0. The PPP-LCP-MIB (public) MIB can be found at the following URL "http://www.oidview.com/mibs/0/PPP-LCP-MIB.html" (last accessed on 16/9/2014). The RFC1213-MIB is a public MIB and distributed as part of SNMP packages like "net-snmp" and "NetPort/mibcomp".

For a complete description of the structure and objects contained in the ArincSwift MIB, please see ARINC-781 Attachment 5 [15].

13.1.1 Example of an SNMP request issued to the SATCOM System

The example (given in Figure 13-1) shows Link Information Table objects requested from the SATCOM System using a Linux based SNMP client. In the example the returned object contains the IP addresses of four Secondary PDP Contexts tied to the Primary Context with an IP address of 161.30.180.37.

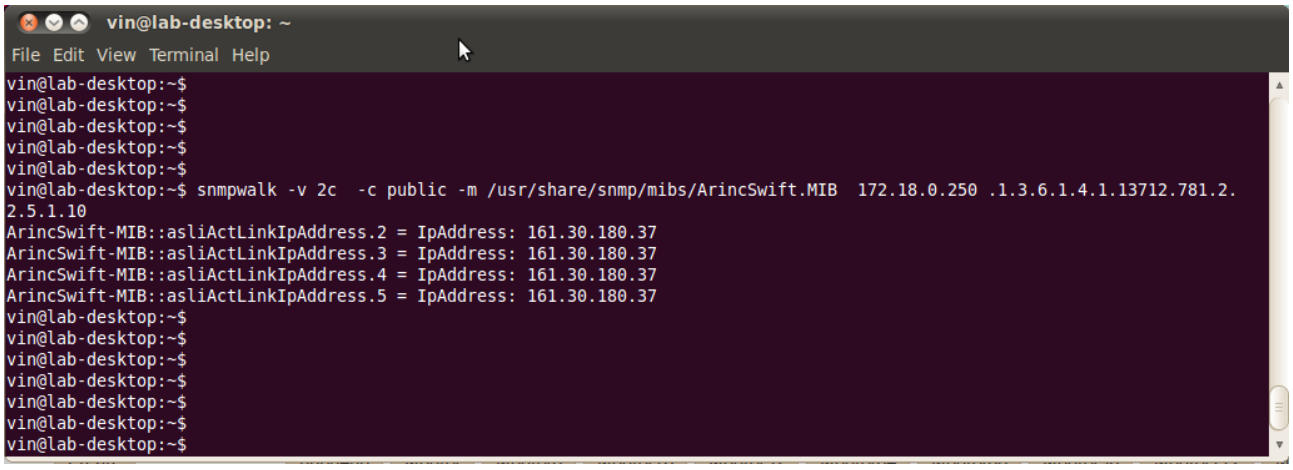

Figure 13-1: SNMP walk example using an Ubuntu client

13.2 ARINC-781 Control line via TELNET

The SDU can accept TCP connections over port 22222 for establishing, modifying and creating secondary contexts. After establishing a TELNET connection, AT-commands to and responses from the SATCOM System

can be send and received from within a TELNET session.

The SATCOM System restricts the use of TELNET sessions to a single session at any given time. If a second TELNET session is created, the first TELNET session will exit.

After the TELNET session is established, the first command must be the AT_IPDPS command. The AT_IPDPS command binds the session to an existing Primary PDP Context (previously established on the applicable modem). Once bound, further commands can be issued from the client application.

For multi-modem SATCOM Systems any modem can be accessed from the same TELNET session provided the user binds/re-binds to an existing Primary PDP Context on that modem.

Section 14.1 contains for the list of AT-commands supported by the SATCOM System.

To simplify the management of new PDP Contexts in terms of the Context Identifiers (CIDs) used, please see section 7.2.5.

13.2.1 Example of Control line usage

The following example (performed at the Ubuntu command line) demonstrates the telnet session. In the example a Primary PPPoE PDP Context already existed with an Inmarsat network assigned IP address of 161.30.180.3. The blue-font lines are commands entered by the user. The "# comment.." lines are for information only.

```
$> telnet 172.18.0.250 22222

Trying 172.18.0.250...
Connected to 172.18.0.250.
Escape character is '^]'.

# comment: TELNET session entered. Create a binding on an existing Network assigned IP address.

AT_IPDPS=161.30.180.3
OK

# comment: The binding is queried.

AT_IPDPS?
_IPDPS:47,161.30.180.3

# comment: The SATCOM System temperature is queried. 58 degrees C is returned.

AT_ITEMP
_ITEMP: 0,58.000000

# comment: Create a Secondary (background) PDP Context (CID=2)  on the existing Primary Context (CID=1).
AT+CGDSCONT=2,1
OK
```

13.3 Monitor and Control Interface

A Monitor and Control facility allows the SATCOM System to be managed remotely. It is targeted at specialized SATCOM System deployments performed by advanced users. It can be used where users do not have access to the SATCOM Console.

13.3.1 Interface Protocol

The 870-A0506_ICD, SwiftBroadband SDU Monitoring and Control ICD ([10]) defines the Serial and Ethernet interface protocol, to be implemented by the user of the Monitor and Control facility.

13.3.2 Configuration of SATCOM System

Two methods of access are available for the Monitor and Control facility. A control client device (for instance a user PC) that is acting as the controller may be connected to either the SATCOM System RS232 user serial port (for wiring details and port configuration see [1], [11], or [13] relevant to your purchased product) or any provided Ethernet port. Various status, configuration and control messages are defined which, once implemented in the client-side application, allows the connected client access to a variety of SATCOM System functions.

NOTE: Development of a monitor and control application utilising the defined messages is the responsibility of the user.

The Monitor and Control facility is enabled via the SATCOM Console (see Figure 13-2). This is done by selecting the type of access provided (RS232 or Ethernet) on the *[System-SDU Monitor and Control]* page.

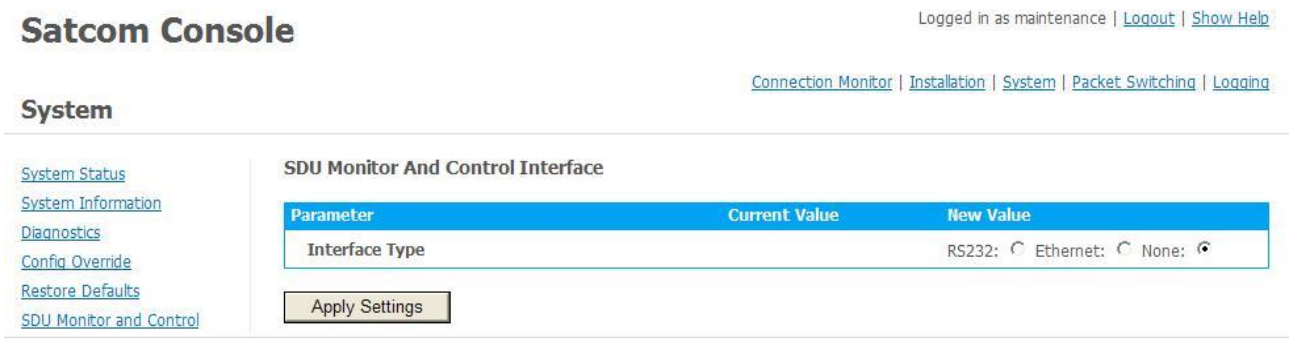

Figure 13-2: Enable/disable Monitoring and Control

13.3.2.1 Serial Port (RS232) access

To use serial access to monitor and control the SATCOM System configure the system as follows:

Select the RS232 checkbox located on the [*Installation-User Serial Port Settings]* page (see Figure 13-2). Click on *Apply Settings* for the change to take effect.

- Select the RS232 baud rate on the SATCOM S*ystem to match the baud rate of the cont*rolling application (PC-side).

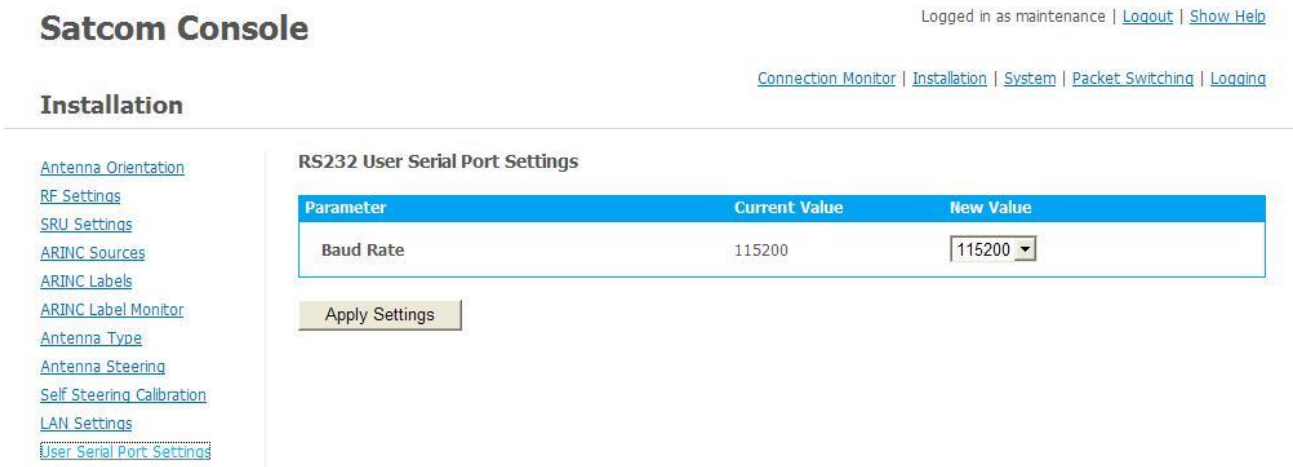

Figure 13-3: RS232 Baud rate configuration setting

Currently no flow control is provided by the SATCOM System.

The monitor and control protocol is proprietary (see [10]) and not ASCII based. Off-the-shelf terminal emulators (for example Windows HyperTerminal, Putty etc.) can therefore not be used.

13.3.2.2 Ethernet access

To use Ethernet access, select the *Ethernet* checkbox located on the [*Installation-User Serial Port Settings]* (see Figure 13-2) page. Click on *Apply Settings* for the change to take effect.

13.4 Debugging Client-side applications on the SATCOM System

Messages between the SATCOM System and Client Controller are recorded in the Packet Switching Log.

14. APPENDIX A

14.1 AT-commands supported by the SATCOM system

The following AT-commands are available via TELNET on port 22222 and on the RAW modem connection ports 9876/7/8/9

AT-command	Description	Commands Available Telnet on Port 22222	Commands Available RAW connection Port 9876,9877,9878,9879
+CGMI	Request Manufacturer Identification	Not available	√
+CGMM	Request Model Identification	√	√
+CGMR	Request Revision Identification	√	√
+CGSN	Request Product Serial Number Identification	Not available	√
+CSCS	Select TE Character Set	√	√
+CREG	Network registration	√	√
+COPS	PLMN Selection	√	√
+CLCK	Facility Lock	√	√
+CPWD	Change Password	√	√
+CMAR	Master Reset	√	√
+CGDCONT	Define PDP Context	√	√
+CGDSCONT	Define Secondary PDP Context	√	√
+CGTFT	Traffic Flow Template (applied by the GGSN)	√	√
+CGQREQ	Quality of Service Profile (Requested)	√	√
+CGQMIN	Quality of Service Profile (Minimum acceptable)	√	√
+CGEQREQ	3G Quality of Service Profile, Requested	√	√
+CGEQMIN	3G Quality of Service Profile, Minimum	√	√
+CGEQNEG	3G Quality of Service Profile,	√	√
+CGATT	PS Attach or Detach	√	√
+CGACT	PDP Context Activate or Deactivate	√	√
+CGCMOD	PDP Context Modify	√	√
+CGDATA	Enter data state	√	√
+CGPADDR	Show PDP Address	√	√
_ISIG	SatBeamInfo (GLOBAL, REGIONAL, NARROW or UNKNOWN)	Not available	√
_IPDPS	Binding Telnet session to PPPoE context	√	Not available
_ITFT	Traffic Flow Template (applied by the UT)	√	√

AT-command	Description	Commands Available Telnet on Port 22222	Commands Available RAW connection Port 9876,9877,9878,9879
_ITEMP	UT Temperature	Not available (always returns a constant)	√
_ITEMP_HPA	High Power Amplifier temperature	Not available	√

14.2 SNMP private MIB objects Supported by the SATCOM System

The following MIB structure and objects are supported by the SATCOM System. The MIB Entry Point is "arincSwift".

LVL 1	LVL2	LVL3	LVL4	Description
asVersion (1)	asvMajorVersion (1)			Major version of the arincSwift MIB definition.
	asvMinorVersion (2)			Minor version of the arincSwift MIB definition.
asLinks (2)	aslInfos (2)	asliSatState (1)		Satellite locked or not.
		asliSatID (2)		Satellite connected to, e.g. "EMEA".
		asliSatIDNum (3)		Unique numeric identifier for the connected satellite.
		asliActLinkEntryNumbers (4)		Number of entries in the table of established links.
		asliActLinkTable (5)	asliActLinkIndex (1)	Unique identifier for the current link entry and can be considered a handle for the session
			asliActLinkStatus (4)	Is the current link up or not. Because entries are only removed 30 seconds after going down, it is important to check this field while reading the active link table.
			asliActLinkChanNo (5)	Modem used on the SDU by the current link.
			asliActLinkContextID (6)	PDP context ID assigned to the current link. This is a virtual (logical) context ID specific to a user session. Refer to Section 4.2.2.1 for details.
			asliActLinkActualContextID (7)	The context ID used over the air. This ID is unique per modem card in the system while it is active. The association between a ContextID and the ActualContextID remains for the duration of the Primary PDP Context.

LVL 1	LVL2	LVL3	LVL4	Description
			asliActLinkConnectionID (8)	Information about the connection (e.g., initialization string of the current link in form of the used AT command). If the original string was longer than can fit in this field, it will be truncated.
			asliActLinkNegotiatedBW (9)	Currently negotiated bandwidth of the link in this table entry. Variable-rate connections (SBB:BACKGROUND, MPDS) are best-effort connections and do not have specifically negotiated, fixed, symmetric bandwidth.
			asliActLinkIpAddress (10)	IP-Address of the current link. If this link is a sub-link of another entry, which does not have an own IP address (e.g., a part of a bundle or a secondary context), this field contains the address of the primary context it is related to.
			asliActLinkTxTrafficVol (11)	Information about the total transmitted bytes over this link in kBytes.
			asliActLinkRxTrafficVo (12)l	Information about the total received bytes over this link in kBytes.
			asliActLinkSigQual (14)	Quality in dBHz*10 of the current link.
			asliActLinkMaxSigQual (15)	Expected Maximum/ideal values for Link Signal Quality.
			asliActLinkMainIndex (16)	If this link entry is part of bundle (e.g., a secondary context), this object refers to the main entry (e.g., the primary context) in this table to which this subentry is related.
			asliActLinkPhysInterfIndex (19)	Index number of the physical interface, where this link is related to. The value is a crosslink into the ifTable of the RFC1213-MIB by referring the according value ifIndex. For links not related to an IP interface (analog POTS, for example), this value is 0.
			asliActLinkStartTime (20)	Time at which the link was brought up.
			asliActLinkEndTime (21)	Time at which the link was brought down. If the link is still connected this field contains the same value as the start time.

LVL 1	LVL2	LVL3	LVL4	Description
			asliActLinkPPPoEID (22)	PPPoE Session ID which started the call. For links not started through PPPoE, this value is zero. For Secondary PDP's, this value is the one from the related Primary PDP.
			asliActLinkQueueTotalSize (23)	Queue size for the current air-to-ground modem used by this link.
			asliActLinkQueueFreeSize (24)	Indicates space available in the current air to ground modem queue.
		asliSatHandoverPending (8)		Set if the system believes it will need to do a handover soon
		asliSatNetworkName (9)		Indicates to which satellite network the SDU is connected. Value will always be "BGAN"
asSystem (3)	assInfos (2)	assiHealthStatus (1)		Health state of the whole system.
		assiHWPN (3)		The hardware part number of the SDU
		assiSerialNumber (4)		Serial number of the SDU
		assiShortName (6)		Short name (e.g. 'SDU-7330').
asUnits (4)	asSDU (2)	asuSduInfo (1)	asuSduInfoTable (2)	asuSduInfoHWPN (3)
				asuSduInfoSN (4)
				asuSduInfoSWVersion (7)