



## Specifications

### Compression & Encryption

**Header Compression:** MPE, UDP/IP, and RTP/UDP/IP

**TRANSEC:** AES-256 encryption

### IP Routing

**Terrestrial-Side Routing:** RIP V2, OSPF, BGP, MPLS Edge (Requires IP Router or L3 switch option)

**Satellite-Side Routing (in FLS):** Dynamically linked to NMS set-up of each VSAT, VNO, & VSN

**Multicast IP:** Multicast IP forwarding & IGMP at VSAT

**VSN/VLANs:** Virtual Satellite Networks (RCS2), each with independent IP address spaces, using 802.1Q VLANs in Hub, also supporting MPLS Network Integration

### Shaping/QoS & Acceleration

**Traffic Shaping:** Shaping with rate limiting per VSAT and per VSAT Group; Granularity of 1 kbps

**QoS:** 4 different QoS Classes, 7 queues; multi-field IP packet classification rules in headers at Layers 2, 3, & 4 on Forward and Return

**TCP Acceleration:** Up to 10 Mbps per connection; up to 25,000 accelerated bi-directional TCP sessions per Network Accelerator module

**Cisco Integration Option:** QoS, TCP Acceleration & IP QoS Metrics enabled through integration with Cisco

### Time & Frequency References

**Time Protocols:** TP (RFC 868)/ NTP (RFC 1305)

**Frequency Stability:** 10<sup>-9</sup> or better if slaved to GPS

**NCR Stability:** Better than 37ns with respect to UTC

### Compliance

**CE**

**DVB-RCS2:** ETSI EN 301 545-2

**DVB-RCS:** ETSI EN 301 790

**DVB-S2:** ETSI EN 302 307

### TDM Forward Links

**Symbol Rates (S2):** 1-100 Msps, increments of 100 sps

**Outer/Inner FEC (S2/S2X):** BCH/LDPC MODCODs (S2X):

**FEC Ratio – Normal Frame**

- QPSK 1/4 - 9/10, 14 ratios
- 8PSK 3/5 - 9/10, 9 ratios
- 16APSK 26/45 – 9/10, 14 ratios
- 32APSK 32/45 – 9/10, 8 ratios
- 64APSK 11/15 – 5/6, 4 ratios

**FEC Ratio – Short Frames**

- QPSK 11/15 - 8/9, 16 ratios
- 8PSK 7/15 - 9/10, 8 ratios
- 16APSK 7/15 – 8/9, 9 ratios
- 32APSK 2/3 – 8/9, 6 ratios

**ACM (S2/S2X):** Full-range or custom list, plus min & max MODCOD configurable by VSAT

**FEC Frames (S2/S2X):** Normal (64 Kbit) and Short (16 Kbit)

**Roll-off Factor (S2/S2X):** 5%, 10%, 15%, 20%, 25%, or 35%

**Automatic UPC (S2/S2X):** Built-in to FLS (requires beacon receiver)

**IP Encapsulation (S2/S2X):** GSE

### Return Links; TDMA and SCPC

**Symbol Rates (RCS2):** 125 Ksps to 8 Msps FEC  
**Type (RCS2):** 16-State Turbo Code MODCODs (RCS2):

- BPSK: 1/3, 1/2
- QPSK: 1/3, 1/2, 2/3, 3/4, 5/6
- 8PSK: 2/3, 3/4, 5/6
- 16QAM: 3/4, 5/6

**ACM (RCS2):** Full-range with min & max MODCOD configurable by VSAT

**Carrier Spacing (RCS2):**

Down to 1.12x symbol rate

**TDMA Carriers per RLS (RCS2):**

1-24 within 40 MHz

**IP Encapsulation (RCS2):** RLE per standard

**SCPC (RCS2):** Dedicated carrier for Tx

**Option for legacy DVB-RCS:**

Selectable per RLS unit

### SatLink® NMS & NCC: Highlights

**Database:** Oracle™ with back-up, restore, & roll-back

**VNOs (Virtual Network Operators):** Access controls for each staff member of a VNO, no extra HW required

**VSAT Groups:** 24 VSAT Groups per TDMA Carrier Group

**Capacity Requests:** Rate, Volume, & Combined Mode VSAT Provisioning: Web-based, fast and simple

**MF-TDMA Resource Control:** Assignment policies per QoS class by VSAT and VSAT Group; ACS assigns feasible symbol rate

**MF-TDMA Frame Structure:** May be tailored per carrier

**Topologies:** Star

**OSS/BSS Integration with SatLink® NMS:** North-bound software integration interface provided via REST API

## SatLink® Hub Family

### Product Overview

The SatLink® Hub with Multi-Beam, Multi-Band & Multi-Satellite Support is a member of a family of SatLink® products and systems from NSSLGlobal AS enabling scalable, high-availability DVB-S2 / S2X & DVB-RCS2 networks including: VSATs, Hubs, and Hub components, with value-added options for advanced data, voice, and video networking via satellite.

SatLink® Hubs provide the high-performance modems, IP gateway, and management and control functions for all SatLink® VSAT networks. The Hub design employs SatLink®'s Open Hub Architecture using a common set of modules for scalability, efficiency, throughput and re-configuration. They implement a TDM/TDMA network in compliance with DVB-S2X & DVB-RCS2 standards, offering Transec AES256, IPv6, Bandwidth-on-Demand, ACM, and Quality of Service(QoS) on all carriers. SatLink® also supports SCPC mode for added flexibility. All SatLink® networks are fully managed by the SatLink® NMS.

A full range of SatLink® Hub configurations are available from small portable Hubs to carrier-class high-availability Hubs with 99.999% uptime. Hubs configured with redundancy in key modules can be upgraded with minimal or no disruption to traffic flows.

NSSLGlobal AS pioneered the DVB-RCS & DVB-RCS2 protocols working in partnership with the European Space Agency, utilising them on satellite networks to deliver superior performance for telecom service providers, ISPs, NATO and governments, enterprises and partners across the globe additionally offering turnkey integration, installation, and 24/7/365 global technical support. All backed up by the NSSLGlobal Group.

### Features & Benefits

#### Bandwidth Efficiency at Many Levels

The efficiency of DVB-S2X return links is matched with DVB-RCS2 return links offering ACM per burst, Adaptive Carrier Selection (ACS), return carrier spacing down to 1.12x, multiple layers of header compression, and the most efficient IP encapsulation, with TDMA management that assures no wasted bandwidth.

#### Comprehensive IP Networking Features

SatLink® Hubs integrate feature rich IP routing & TCP & HTTP acceleration with VPN tunnelling, VLANs, & Virtual Satellite Networks (VSN) for multiple IP address spaces.

#### Traffic Engineering, VNOs, & VSAT Groups

SatLink®'s traffic engineering enables cost-effective hub sharing by controlling bandwidth consumption and QoS policies of Virtual Network Operators (VNOs) for each of their VSAT Groups, without assigning hardware or dedicated carriers to particular VNOs.

#### Software-Defined RLS & FLS Platform

The RLS use SatLink®'s own software-defined modem platform optimised for processing IP packets and the DVB waveforms, using SatLink® firmware & software running on FPGAs & CPUs. They deliver many cost reductions and operational benefits, including high-efficiency MODCODs, large TDMA carrier groups, fast-feedback ACM integrated with IP QoS, and custom configurations of carrier groups for maximum efficiency in burst-mode operation and space & power savings.

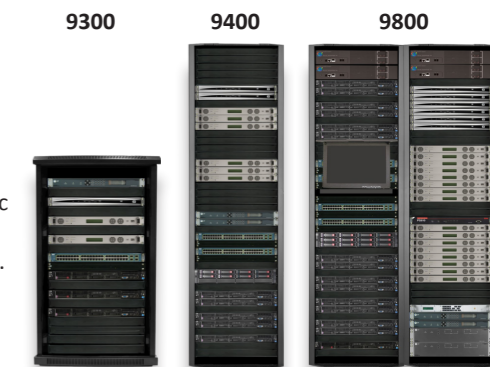
#### Advanced Traffic Shaping with QoS

Advanced traffic shaping on Forward and Return Links with four QoS classes meet the strict requirements for jitter and/or delay sensitive VoIP, video conferencing, video streaming, and time critical data applications.

#### Return SCPC Mode for Added Flexibility

An optional SCPC Mode enables the simplicity and spectrum efficiency as required for large high-capacity, dedicated trunks for an adaptable, complete solution.

## DVB-RCS2® DVB-S2X®



#### ACM, ACS, & Rain Fade Mitigation

With Adaptive Coding and Modulation (ACM) applied on both Forward and Return Links and Adaptive Carrier Selection (ACS) on all TDMA carriers, the impact of rain fades is greatly mitigated, even in Ka band.

#### High-Availability for Maximum Uptime

Module redundancy using 1:1 or N:1 with fast failover. Geographic redundancy with multiple RF systems. SW updates on-the-fly. Uptimes can exceed 99.999%.

#### Comprehensive NMS & NCC Software

The database-driven SatLink® Network Management System (NMS) and the SatLink® Network Control Centre (NCC) software optimise network performance using close-loop control and simplify the configuration and provisioning of Hub modules, VSATs, VSAT Groups, carriers, VSNs, and VNOs. Support for multiple beams, across multiple satellites on multiple bands (C, Ku, Ka, EHF), including cross-strapped transponders, adds versatility and scalability.

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## SatLink® Hub Feature Comparison

|                        | 9300            | 9400               | 9800               |
|------------------------|-----------------|--------------------|--------------------|
| Forward Link           | DVB-S2X         | DVB-S2X            | DVB-S2X            |
| Return Link            | DVB-RCS2        | DVB-RCS2           | DVB-RCS2           |
| Forward Link ACM & QoS | ✓               | ✓                  | ✓                  |
| Return Link ACM & QoS  | ✓               | ✓                  | ✓                  |
| Max # of Beams         | 10              | 10                 | 10                 |
| # of VSATs             | 0-1000          | 0-1000             | 0-50000            |
| Redundancy             |                 | N:1 or 1:1         | N:1 or 1:1         |
| VNO                    | ✓               | ✓                  | ✓                  |
| VSN (RCS2)             | ✓               | ✓                  | ✓                  |
| Return SCPC Mode       | ✓               | ✓                  | ✓                  |
| TCP Acceleration       | ✓               | ✓                  | ✓                  |
| Accounting Support     | ✓               | ✓                  | ✓                  |
| TRANSEC (RCS2)         | ✓               | ✓                  | ✓                  |
| Forward Automatic UPC  | Optional        | Optional           | Optional           |
| Rack Space*            | Half-Rack (22U) | 1 to 2 Racks (42U) | 1 to 3 Racks (42U) |
| Easily Upgradable      | ✓ (to 9400)     | ✓ (to 9800)        |                    |

\*Recommended rack space with room to grow. For a SatLink® 9800 Hub expecting 8 or more beams, 3 racks (42 U each) are recommended.

### SatLink® 8575 FLTx



The SatLink® 8575 FLTx enables DVB-S2/DVB-S2X forward link TDM carriers at up to 100 Msps with ACM for up to 10,000 VSATs. It efficiently combines the functions of a DVB-S2X (or DVB-S2 / S2X) modulator with IP routing, IP encapsulation, and header compression at 75,000 IP packets per second.

ACM is implemented across all supported MOD- CODs with very low latency and integration with QoS policies per VSAT, at information rates up to 300 Mbps. Configurations with N:1 redundancy (N up to 5) are supported.

### SatLink® NetAcc

The SatLink® 6450 NetAcc is an integrated SatLink® hub component which delivers high-performing TCP acceleration while also implementing IP routing, QoS policy enforcement, and traffic shaping, as well as optional user accounting and fair use policy control.

The SatLink® 6450 supports up to 10,000 VSATs with 50,000 concurrent TCP sessions, up to 10 Mbps of TCP throughput in a single direction. Total IP throughput is rated at 300 Mbps on the supplied multi-core servers. Each NetAcc server supports multiple FLS/RLS. Configurations with N:1 redundancy (N up to 5) are supported.

### SatLink® 8560 RLS



The SatLink® 8560 RLS enables large DVB-RCS2 return link capacities by using up to 24 TDMA carriers, with each carrier in the range 125 kbps to 8 Msps, within a 40 MHz band using ACM per burst, at 1.12x carrier spacing. It is a combination of a DVB-RCS2 (or RCS) burst demodulator with IP packet re-assembly and header de-compression at up to 20,000 IP packets per second or 50Mbps.

The 8560 RLS handles up to 10,000 VSATs with two service classes each, or 5,000 VSATs with four service classes each. Configurations with N:1 redundancy (N up to 5) are supported. Multiple active RLS modules may be assigned to a single active FLS.

### SatLink® NMS & NCC

The SatLink Network Management System (NMS) provides an efficient platform for satellite network management, enabling remote activation, auto-commissioning, automatic beam handover, traffic analysis, and real-time custom reporting. Its intuitive interface supports seamless deployment of changes and compatibility with terminals of different software versions. SatLink NMS optimizes network performance with features like traffic shaping, TCP acceleration, and QoS management.

The NMS system supporting up to 50,000 remote terminals for centralized, scalable management. With tiered monitoring and an open API for easy integration, SatLink NMS enables flexible, customer-driven reporting, and support OSS/BSS integration to support centralized VSAT provisioning activities, including addition, deletion, update VSATs, subscriptions and reporting.

## SatLink® Open Hub Architecture

SatLink® Hub design uses the Open Hub Architecture with commercial off-the-shelf modules mounted in standard racks with high-capacity Gigabit Ethernet inter-connects. This enables scalability and re-configuration, while also allowing for integration of 3rd party products for value-added features. A full range of SatLink® Hub configurations are offered from small portable Hubs to carrier-class Hubs with 99.999% uptime. All configurations use a common set of modules.

