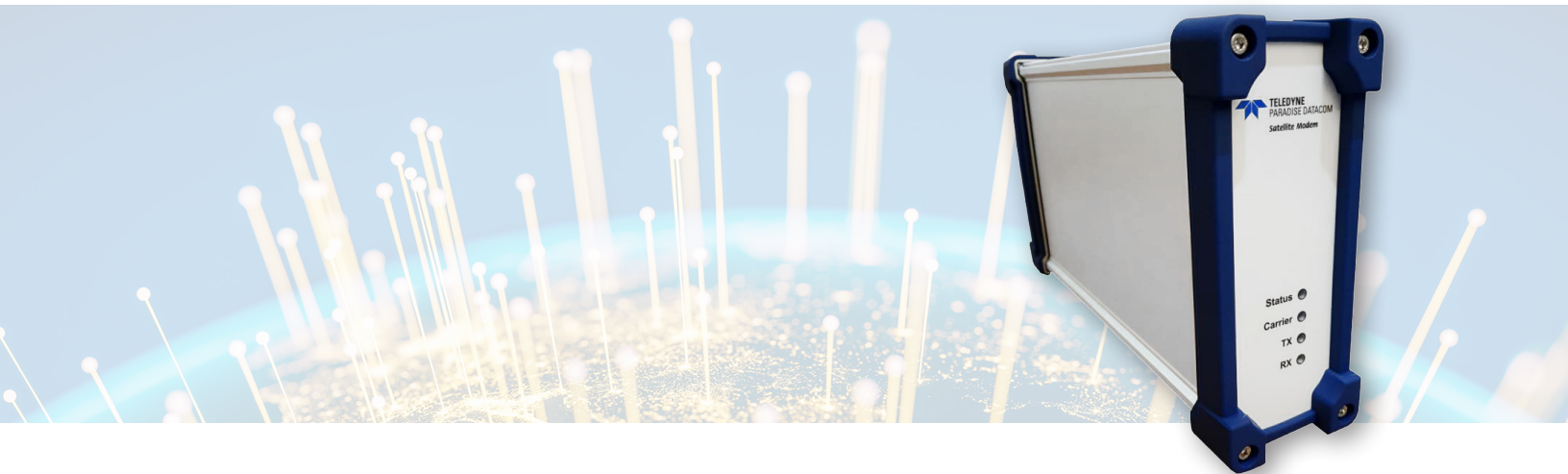


# Q-Lite™ Rugged Satellite Modem



IP65 Weatherproof  
Modem for Outdoor Use

## Overview

The compact **Q-Lite™** Rugged is an IP65 weatherproof outdoor satellite modem that is ideal for portable communications and comms-on-the-move. Incorporating our industrial temperature grade **Q-Lite™** modem card, it is suitable for all types of IP services including broad-cast video, trunking, backhaul and internet.

The **Q-Lite™** Rugged is fully compatible with our **Q-Flex™** and **Q-MultiFlex™** modems (for point-to-point and point-to-multipoint respective-ly).

The **Q-Lite** Rugged modem supports Paradise Datacom's low latency Fastlink LDPC for latency sensitive applications and DVB-S2 / DVB-S2X, the most powerful and robust modulation and coding available for the space segment, supporting modulations from QPSK to 64APSK and data rates to 345Mbps. The Modem has an extended L-band frequency range, better RF performance, higher processing capability therefore allowing for future upgrades. Multiple serial interfaces are available or the unit may be used for L2 Bridging or L3 routing of IP traffic. In addition, the unit may be used in the highly efficient Trunking mode, where maximum performance is achieved in terms of bit rate and packets per second, with zero jitter.

It is ideal as a versatile point-to-point network modem or a remote modem in a point-to-multipoint network.

The Q-Lite can also be provided in a half-width and full-width chassis.

## Advanced Bandwidth-Efficient Features

Paired Carrier+™ is our enhanced carrier overlap technology that allows transmit and receive carriers to occupy the same space segment.

DVB-S2X, is between 20% and 60% more bandwidth efficient than its predecessor, DVB-S2.

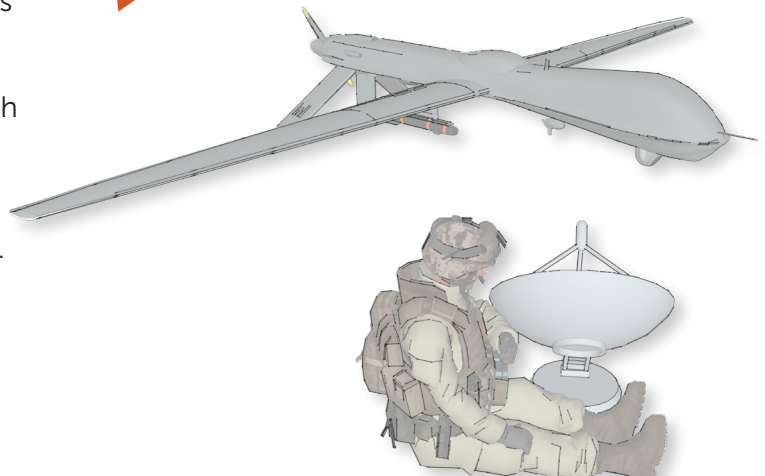
Bandwidth-saving IP features include ACM, acceleration and header and payload compression.

## Markets and Applications

- Portable/mobile communication systems
- Compact, low-power VSAT terminals
- Man-packs
- IP trunking & IP/cellular backhaul
- Corporate & government networks
- Maritime, oil & gas communications
- Broadcast (H.264/H.265, HD, Ultra HD, etc.)

## Features

- IP65 weatherproofing for outdoor use
- Data rates to 345Mbps
- Four IP65 Ethernet ports
- Optimized spectral roll-offs, including 5%
- **XStream IP™** advanced IP optimization suite including TCP Acceleration, header & payload compression, traffic shaping & ACM
- DVB-S2/S2X, **FastLink™** LDPC & TPC
- VLAN/MPLS/Layer 2/Layer 3 support
- -20 °C to +55 °C operation
- AC, 12V & 24V DC input power supply options
- Optional L-band services (10MHz output, LNB power, 24V to external BUC)
- **LinkGuard™** signal-under-carrier interference detection
- Built-in spectrum & constellation monitors
- DVB Carrier ID. Fully compliant with DVB- CID standard
- **Q-NET™ Navigator** network control application included as standard
- Compatible with **Q-Flex™** and **Q-MultiFlex™**
- Standard and custom mounting options
- Available in WGS-certified model



## Why Q-Lite?

Our Flagship Software Defined Modem is Paradise Datacom's most innovative and flexible Satellite Modem to date

### STATE OF THE ART

- DVB-S2X up to 64APSK provides the highest bandwidth efficiency
- FastLink Low latency LDPC provides advanced optimisation modes for latency sensitive applications.

### SECURE

- SCPC is both secure, and with Paradise Modems, easy to provision
- For enhanced security, AES-256 encryption is optionally built in
- AAA Radius support and access control lists.

### COMPATIBLE

- Reuse your existing code
- Functional replacement for Q-Flex and older series Modems.
- No need for extensive retraining of Maintenance staff.
- Supports legacy interfaces and FEC schemes
- Supports IF and L-band in one unit.



### CONVENIENT

- Outdoor Power Supply Unit or Battery Power (charger available)
- Built in Spectrum Analyser and Constellation monitor

### PRACTICAL

- IP65 Weatherproofing for outdoor use
- Intuitive web browser and Q-NET compatible
- Built in test tools, no need for expensive test equipment

### EFFICIENT

- Paired Carrier+ saving up to 50% Bandwidth
- 5% spectral roll off saving 15% bandwidth over the standard 20%
- Advanced optimisation features, including TCP acceleration, Header and Payload compression.

## WELL EQUIPPED

### Transmitter

#### Fast:

- Up to 345Mbps / 70Msps
- Output power: IF 0 to -25dBm; Standard L-Band +5 to -40dBm

### Interface Ports

#### Convenient:

- For IP traffic and legacy interfaces
- Allowing seamless migration from serial to IP
- 4 GB Ethernet ports, Layer 2 Bridge, Layer 3 router.

### RF Stages

#### Future Proof:

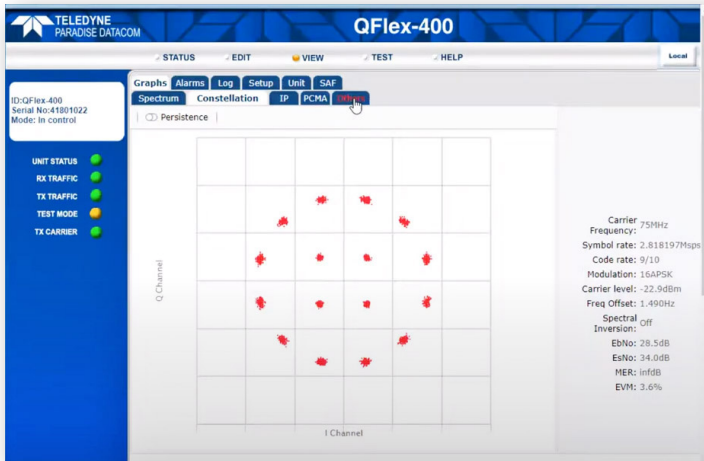
- Transmit and Receive speeds field upgradeable, only pay for the capacity you need now
- Extended L-Band coverage from 950 to 2,450 MHz
- Wideband IF 50 - 180MHz

### Receiver

#### Fast:

- Up to 345Mbps/ 70Msps

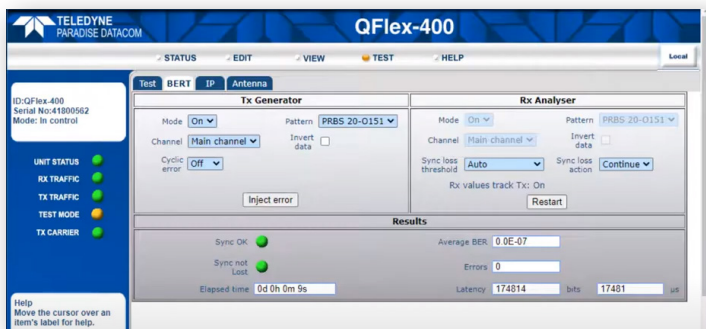
## Powerful Onboard Test Equipment



**Constellation view:** The Rx Constellation Monitor can be used to check for correct modem operation including checking for signal distortion and phase noise. The persistence mode is useful for showing any long-term effects due to phase noise and interference.



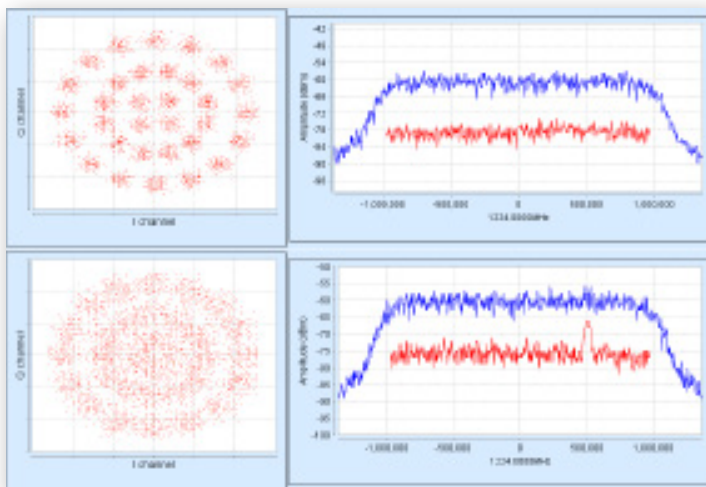
**Spectral view:** The Rx Spectrum Monitor is a powerful real-time spectrum analyser within the modem that is used to view the received signal spectrum. The monitor can not only display the wanted carrier but a Super Wide view allows checking for adjacent interfering carriers.



**Inbuilt Bit Error Rate Test Set (BERT):** The internal PRBS BER Tester allows pseudo-random bit patterns to be injected into the main traffic or overhead channel and the BER results to be monitored. Use of the ESC and AUX channels allows continuous real time traffic performance monitoring whilst the modem carries traffic. As well as average BER, number of bit errors and sync status, latency can also be measured.

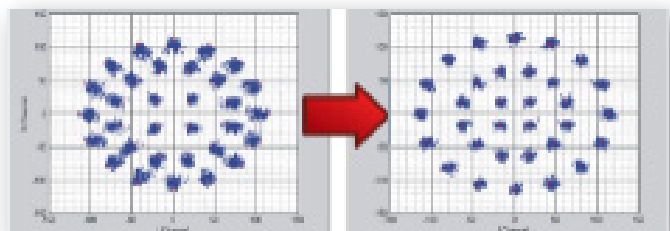
## LinkGuard™ Interference Detection

Built-in Spectrum Analyser showing LinkGuard™ Signal-Under-Carrier interference detection without/with interferer present.



## ClearLinQ™

'Before and after' constellations showing ClearLinQ™ Adaptive Tx Pre-distorter compensating for severe non-linear signal distortion to a 32APSK carrier.



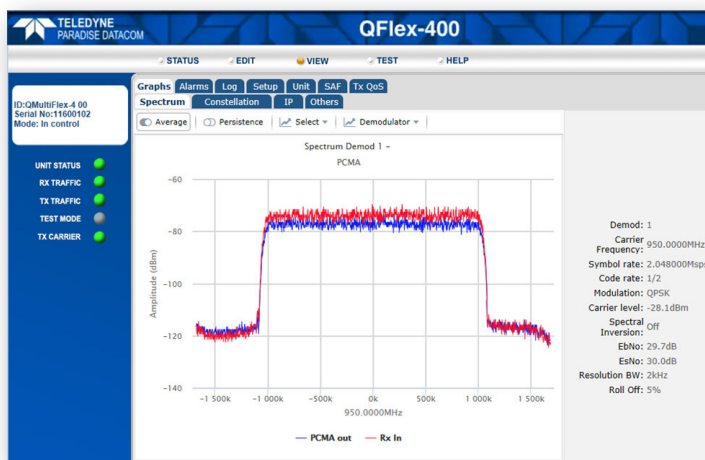
## Advanced Bandwidth-Efficient Features

The Q-Lite™ modem supports the most powerful bandwidth-saving technology available.

DVB-S2X, is between 20% and 60% more bandwidth efficient than its predecessor, DVB-S2.

Paired Carrier+™ is our enhanced carrier overlap technology that allows transmit and receive carriers to occupy the same space segment.

XStream IPTM bandwidth-saving IP features include ACM, TCP acceleration and header and payload compression.



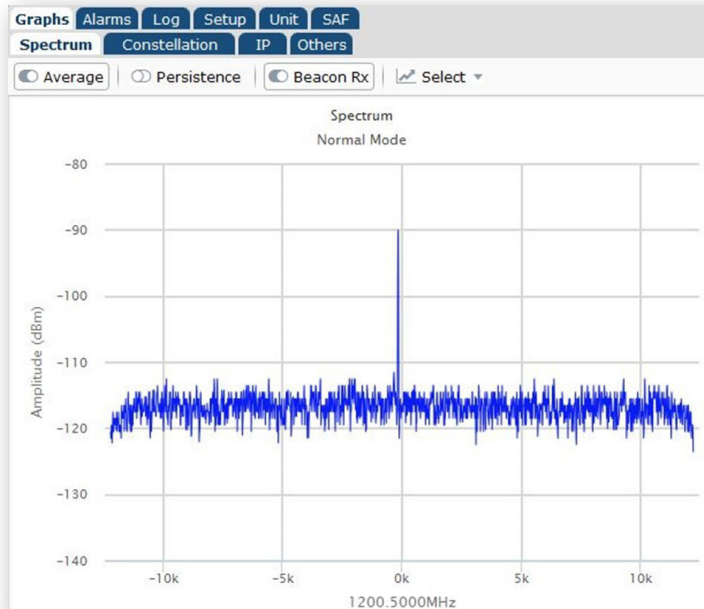
## Included Network Management

Q-NET Navigator supports monitor and control of all Paradise modems from a single application. Includes easy-to-use navigation, support for multiple operator roles / access levels, continuous status / alarm polling and full access to all modem features. The web based Q-NET Navigator is included as standard, free of charge.

**Paired Carrier+:** used to reduce the occupied satellite bandwidth by up to 50% by overlaying the transmit and receive carriers in the same space segment. Adaptive self-interference cancellation is used to remove the unit's transmitted signal from the composite received signal, leaving just the desired signal.

## Beacon Receiver Function

Q-Lite™ detects satellite beacon transmissions down to very low signal levels. This helps with automatic antenna pointing and removes the need for a separate beacon receiver.

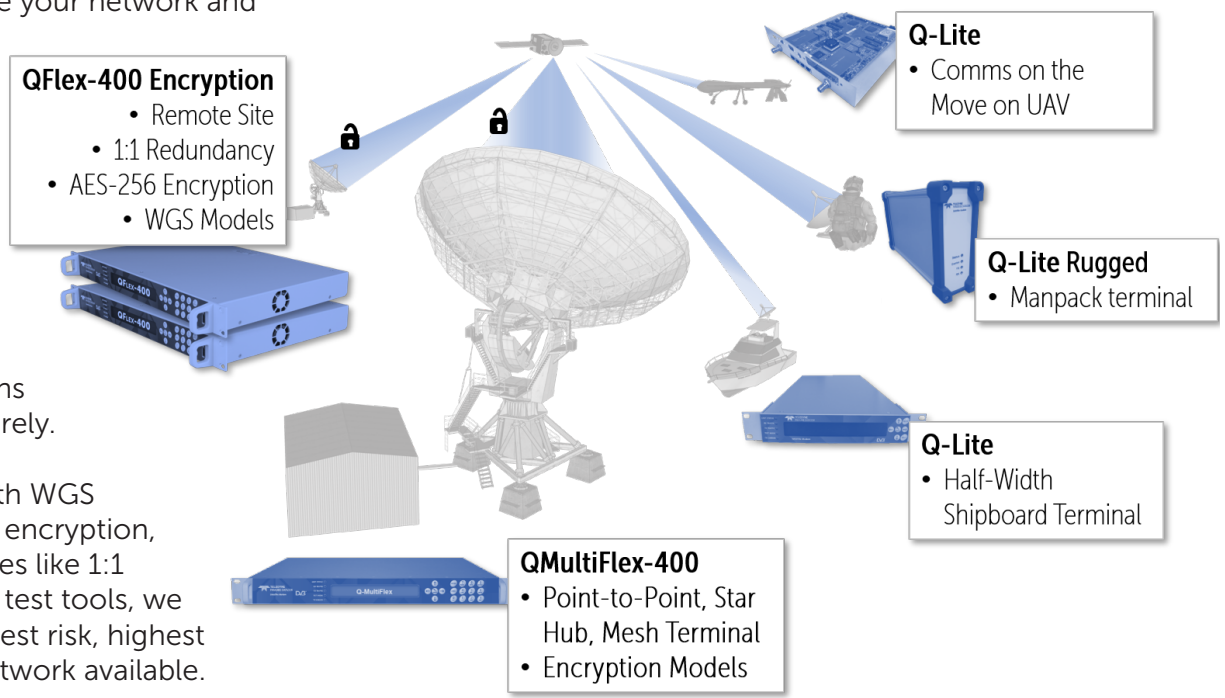


## The Q-Net Family

Q-Net is a fabric that allows each of the Q-Series modems to seamlessly inter-operate giving you the ability to upgrade your network and re-use assets at will.

The different models have been thoughtfully designed to cover a wide variety of network situations flexibly and securely.

From models with WGS certification and encryption, to built-in features like 1:1 redundancy and test tools, we give you the lowest risk, highest return secure network available.



## The Paradise Family of Secure SCPC Modems

Paradise SCPC Modems		Point-to-Point	Point-to-MultiPoint, Star, Mesh, Hybrid		Form Factor	Features of Note
			Hub or Remote Site	Remote Site		
Standard	QFlex-400	✓			1U 19" Rack	PCMA+ enhanced carrier overlay available
	QMultiFlex-400	✓	✓			Optional Embedded Hub Cancellor
	QFlex-400 P2MP			✓		Configured remote
	QubeFlex	✓				Small Sat/LEO - Support for CCSDS
Small Form Factor	Q-Lite Rugged	✓			Card	IP65 weatherproof outdoor satellite modem
	Q-Lite Half Width	✓				Mountable as two side by side within 1U rack space
	Q-Lite Card	✓				For OEM integration.
	AXIOM-X (New)	✓				Our smallest modem.

All modem models except QubeFlex are also available as **encrypted models**, capable of TCP/IP packet payload encryption using symmetric AES with 256-bit keys. Note that these models are export controlled.

The QFlex-400, Q-Lite, Q-Lite Half Width and Q-Lite Rugged models are also available as **WGS-certified** models.

## Main Specifications

Frequency	950 to 2,450MHz (resolution 100Hz) TNC connectors for Tx & Rx
Data Rates	<b>Standard:</b> 2,048kbps <b>Options:</b> 5, 10, 25, 60, 100, 200 & 345Mbps
Data Rate Limits	<b>DVB-S2/S2X:</b> 55kbps to 345Mbps <b>FastLink™ LDPC:</b> 18kbps to 100Mbps <b>TPC:</b> 2.4kbps to 60Mbps <b>DVB-S/DSNG:</b> 100kbps to 50Mbps (1bps resolution)
Symbol Rate Limits	<b>DVB-S2/S2X:</b> 150ksps to 70Msps <b>FastLink™ LDPC:</b> 18ksps to 40Msps <b>TPC:</b> 2.4ksps to 40Msps <b>DVB-S/DSNG:</b> 100ksps to 40Msps
Operating Modes	<b>DVB-S2/S2X</b> (EN 302 307-1 & EN 302 307-2) <b>Closed Network</b> (+ ESC) (IESS-315) <b>DVB-S/DSNG</b> (EN 300 421 & EN 301 210)
Impedance	50Ω
Return Loss	950MHz to 2GHz >16dB 2GHz to 2.45GHz >12dB
Traffic Interfaces	Four Gigabit Ethernet ports (RJ45 connectors; used for IP traffic and M&C)




## Test Facilities & Alarm Outputs

Built-in Test Tools	As part of built-in web server: Rx constellation monitor; Rx spectrum analyser; <b>LinkGuard™</b> Signal-Under-Carrier interference detection; beacon receiver function that provides automatic detection of satellite beacon transmissions; time graphs for key performance indicators (IP throughput, Eb/No, etc.)
BER Tester	Bit error rate tester operates over main traffic or ESC channel, allowing BER monitoring while on traffic. Not available in DVB-S2/S2X modes. Supports various test patterns compatible with common BER testers
Other Test Modes	Transmit CW Transmit alternate 1-0 pattern Simulated satellite delay for TCP/IP packets

## Mechanical/Environmental

Size	440mm x 214mm x 90mm
Weight	2.5kg (excluding external power unit)
Power Supply	<b>Options:</b> Outdoor PSU (mains to 24V DC) 24V ± 5%. Recommended ± 0.5V 12V DC input option (Modem consumes ~30 Watts)
Compliance	FCC, CE and RoHS compliant
Safety Standards	EN 62368-1:2014
Emissions & Immunity	Emissions: EN 55032:2015 Class A Immunity: EN 55032:2017
Operating Temperature	-20°C to +55°C
Storage Temperature	-20°C to +70°C (limits must not be exceeded)
Weather-proofing	Sealed enclosure rated for IP65
Shock & Vibration	Certification to relevant part of MIL-810G currently in progress
Design & Production Facility Certification	Both the design and production facilities are ISO9001 certified; the production facility is additionally AS9100 certified (giving parts traceability)

## Features

<b>ClearLinQ™ Adaptive Tx Predistorter</b> 	Corrects for linear & non-linear distortion in the RF chain (i.e. amplifier and transponder). Applicable to all FECs and modulations. Maximises amplifier linear output power; minimises required back-off. Up to 2dB performance gain
<b>DVB-S2/S2X Rx Adaptive Equaliser</b>	Corrects for slope on the carrier and group delay (typically found at transponder edges, causing inter-symbol interference). The 9-tap Rx equaliser is provided as standard; automatically switched on above 10Msps
<b>DVB Carrier ID Option (ETSI TS 103 129)</b> 	Supports the identification of interfering carriers. Allows identification of individual modem carriers by superimposing a low-power CID waveform onto the carrier with negligible degradation. <b>Supported for all carriers.</b> The CID waveform contains a unique Carrier ID and other identity information. A carrier monitoring system is required to decode CID waveforms
<b>Traffic Interfaces</b> 	<b>Standard: 4-port Gigabit Ethernet switch</b> (RJ45 connectors; used for IP traffic and M&C) <b>Options</b> (maximum of one additional interface may be selected): <ul style="list-style-type: none"> <li><b>EIA-530</b> (RS422, X.21, V.35 and RS232 on 25-pin D-type female)</li> <li><b>Quad ASI</b> (75Ω BNC female)</li> </ul> <i>Please contact us regarding support for other interfaces</i>

 Optional Functionality

## Modulator

<b>Output Power</b> (0.1dB steps)	+5 to -40dBm (950 to 1,950MHz) 0 to -40dBm (1,950 to 2,150MHz) 0 to -30dBm (2,150 to 2,450MHz)
<b>Output Power Stability/Accuracy</b>	Stability: $\pm 1.0$ dB, 0°C to 50°C Accuracy: $\pm 0.375$ dBm
<b>Transmit Filter Roll-off</b>	5%, 10%, 15%, 20%, 25%, 35%
<b>Phase Accuracy</b>	$\pm 2^\circ$ maximum
<b>Amplitude Accuracy</b>	$\pm 0.2$ dB maximum
<b>Carrier Suppression</b>	-30dBc minimum
<b>Output Phase Noise</b>	As EN 302 307, EN 300 421, IESS-308 & EN 301 210; minimum 16dB better than IESS-308/309
<b>Harmonics &amp; Spurious</b>	Better than -55dBc/ 4kHz in-band (at 0dBm to -30dBm output)
<b>Transmit On/Off Ratio</b>	-65dB minimum
<b>BUC</b>	External 24V DC input can also be used to power a BUC via IFL cable
<b>BUC 10MHz Reference</b>	Via IFL cable; 10MHz $\pm 0.01$ ppm; 2dBm $\pm 2$ dBm

## Demodulator

<b>Input Range (dBm)</b>	<b>Minimum:</b> -140 + 10 log (symbol rate) <b>Maximum:</b> -68 + 10 log (symbol rate)
<b>Maximum Input Power</b>	+10dBm
<b>Wanted-to-Composite</b>	-102 + 10 log (symbol rate)
<b>Frequency Sweep Width</b>	$\pm 1$ kHz to $\pm 255$ kHz (1kHz steps)
<b>Acquisition Time</b>	Dependent on FEC, data rate and sweep width
<b>RX Spectral Roll-off</b>	5%, 10%, 15%, 20%, 25%, 35%
<b>LNB 10MHz Reference</b>	Via IFL cable; 10MHz $\pm 0.01$ ppm; 2dBm $\pm 2$ dBm
<b>LNB Voltage</b>	Programmable 13V, 15V, 18V, 20V or 24V DC to LNB via IFL cable; maximum 0.5A

## Ethernet: Standard Features

<b>Bridging and Static Routing</b>	<b>Trunking mode:</b> Hardware Layer 2 switch supporting 345Mbps bi-directional traffic at up to 200,000 packets per second; zero jitter <b>Layer 2 bridge &amp; Layer 3 router:</b> Software processing capability of up to 150,000 packets per second
<b>IPv4/IPv6</b>	Dual IPv4/IPv6 TCP/IP supporting IPv4/ IPv6 bridging and routing
<b>VLAN Support</b>	IEEE 802.1q VLAN support IEEE 802.1p packet prioritisation using strict priority or fair weighting queuing
<b>Software Defined Network Support</b>	OpenFlow and other WA-SDN protocols provide support for network virtualisation; see Q-NET Satellite Network Solution white paper for more details
<b>DHCP</b>	DHCP client for automatic allocation of M&C IP address; DHCP server allocates IP addresses to network devices
<b>NAT</b>	NAT firewall; allows all network devices to share a single IP address when viewed from other end of satellite link
<b>SNMP</b>	SNMP v1, v2c & v3
<b>Access Control Lists</b>	Separate IP and MAC address black/ white user access control lists
<b>Network Time Protocol (NTP)</b>	NTP client synchronises modem time & date to NTP server; provides millisecond accuracy
<b>Web Server</b>	Modem web server M&C interface (including built-in tools listed under Test Facilities)
<b>AAA RADIUS Secure User Login</b>	Authentication, Authorisation & Accounting. Greater access control & accountability. Replaces standard modem login with user's personal network login credentials
<b>IP Metrics</b>	Tx, Rx throughput (bps, pps) graphs; dropped, errored packet counts
<b>sFlow Performance Metrics</b>	sFlow is the industry standard for network monitoring, giving full modem performance visibility to sFlow compatible network management devices
<b>Active Queue Management (AQM)</b>	Implements CoDel (controlled delay) which overcomes buffer bloat by maintaining a constant delay through the modem for all IP packets
<b>MPEG over IP</b>	Supports the efficient transfer of SMPTE 2002-2 MPEG2 transport streams over satellite
<b>OpenAMIP Protocol Support</b>	Controls modem interaction with compliant antenna control units to support antenna deployment/pointing/tracking
<b>Virtual Routing &amp; Forwarding</b>	VRF supports multiple modem routing tables, allowing inter-VLAN routing
<b>Packet Generator/Analyser</b>	Generates & analyses TCP & UDP packet streams, allowing modem-to-modem IP testing without any PCs
<b>Ethernet MTU Size</b>	10k bytes



## Ethernet: XStream IPT™ DVB-S2X



Provided as standard as part of DVB-S2/S2X

<b>ACM</b>	Dynamically varies Modcod with varying link conditions, maximises throughput at all times by converting unused link margin into additional throughput; 100% link availability
<b>DVB-S2/X VCM mode</b>	Supports MultiStream mode where the outbound carrier consists of multiple Modcods. Up to 6 Modcod's are supported, which allows stations to be configured to receive any one of these Modcod's, depending on signal strength at the remote site.
<b>VCM</b>	Supports transmission/reception of two ASI streams or, one ASI stream with one IP stream, each with its own Modcod for optimal throughput
<b>IP-over-DVB Encapsulation</b>	Supports the transmission of IP packets with/without Ethernet frames over DVB-S2/S2X; encapsulates & decapsulates using GSE (see below), MPE (EN 301 192), ULE (RFC 4326) or Paradise XStream Encapsulation
<b>GSE Encapsulation</b>	Highly efficient encapsulation of IP packets or Ethernet frames; compatible with EN 302 307-2 standard, for use with DVB-S2 and DVB-S2X

## Ethernet: XStream IPT™ Option



XStream IPT™ is an integrated set of IP optimization and traffic management features designed for maximum reliability and bandwidth efficiency. The maximum throughput depends on features enabled & traffic format



<b>Traffic Shaping</b>	Provides guaranteed throughput for priority traffic; supports Committed and Burst Information Rates. Stream classification by VLAN ID, IP address, IEEE 802.1p priority, Diffserv DSCP, PID & MPLS EXP
<b>Header Compression</b>	Robust Header Compression (RFC 3095). Reduces Ethernet/IP/UDP/TCP/RTP header sizes typically by 90%. 1-way packet processing limit: 60,000 pps; 2-way limit: 45,000 pps. Includes Ethernet header compression (compresses 14-byte Ethernet frame to typically one byte)
<b>Payload Compression</b>	Uses Deflate algorithm (RFC 1951) to compress TCP & UDP packets; typical payload compression of 50%
<b>Dynamic Routing</b>	RIP V1, V2; OSPF V2, V3; BGP V4
<b>TCP Acceleration</b>	Typical throughput level of 90% of link capacity. Supports 4,400 concurrent accelerated TCP connections (plus at least 40,000 unaccelerated TCP connections) up to 100Mbps
<b>AES-256 Encryption</b>	Supported on Q-LiteE™ model only. The Q-LiteE™ is identical to the Q-Lite™ in every other respect

## Paired Carrier+™ Option



<b>Paired Carrier+™</b>	Transmit and receive carriers are overlaid in the same space segment. Echo cancellation techniques are used to cancel the unwanted transmit carrier, leaving the wanted receive carrier. Supports an occupied bandwidth between 25kHz and 70MHz depending on license
<b>Data Rate Options</b>	256kbps, 512kbps, 1024kbps, 2.5Mbps, 5Mbps, 10Mbps, 15Mbps, 20Mbps, 25Mbps, 30Mbps, 40Mbps, 50Mbps, 60Mbps, 80Mbps, 100Mbps, 200Mbps and 345Mbps traffic rate
<b>Carrier Asymmetry</b>	<b>Symbol rate:</b> Up to 10:1
<b>Max Sym Rate</b>	70MBaud (carrier roll-off 10% max)
<b>Min Sym Rate</b>	25kBaud
<b>Delay Range</b>	0 to 350ms
<b>Cancellation Range</b>	-10 to +10dB local to remote carrier
<b>Cancellation ratio</b>	28dB typical
<b>Es/No degradation (symmetric carriers)</b>	<0.1dB for $E_s/N_0 \leq 7$ dB. <0.2dB for $7$ dB < $E_s/N_0 \leq 11$ dB. <0.4dB for $11$ dB < $E_s/N_0 \leq 14$ dB. <0.5dB for $14$ dB < $E_s/N_0 \leq 16$ dB. <1.0dB for $16$ dB < $E_s/N_0 \leq 18$ dB. <1.5dB for $18$ dB < $E_s/N_0 \leq 20$ dB. <2.0dB for $20$ dB < $E_s/N_0 \leq 22$ dB.
<b>Monitoring</b>	Delay, frequency offset, power offset, lock status, channel amplitude slope and group delay (consult sales)
<b>Mobile Operation</b>	Uses GPS data to continually recalculate position relative to satellite, allowing uninterrupted operation in mobile environments anywhere in satellite footprint

## Forward Error Correction

<b>DVB-S2X</b> EN 302 307-2  Includes support for DVB-S2	<b>Normal Frame:</b> <b>QPSK</b> 13/45, 9/20, 11/20 <b>8PSK</b> 23/36, 25/36, 13/18 <b>8APSK-L</b> 5/9, 26/45 <b>16APSK</b> 26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 77/90 <b>16APSK-L</b> 5/9, 8/15, 1/2, 3/5, 2/3 <b>32APSK</b> 32/45, 11/15, 7/9 <b>32APSK-L</b> 2/3 <b>64APSK</b> 11/15, 7/9, 4/5, 5/6 <b>64APSK-L</b> 32/45
	<b>Short Frame:</b> <b>QPSK</b> 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 <b>8PSK</b> 7/15, 8/15, 26/45, 32/45 <b>16APSK</b> 7/15, 8/15, 26/45, 3/5, 32/45 <b>32APSK</b> 2/3, 32/45
<b>DVB-S2</b> EN 302 307-1	<b>QPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 <b>8PSK</b> 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 <b>16APSK</b> 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 <b>32APSK</b> 3/4, 4/5, 5/6, 8/9, 9/10
<b>FastLink™</b> Low-Latency LDPC 	<b>BPSK</b> 0.499 <b>(O)QPSK</b> 0.532, 0.639, 0.710, 0.798 <b>8PSK/8QAM</b> 0.639, 0.710, 0.778 <b>16APSK/16QAM</b> 0.726, 0.778, 0.828, 0.851 <b>32APSK</b> 0.778, 0.828, 0.886, 0.938 <b>64QAM</b> 0.828, 0.886, 0.938, 0.960
<b>TPC</b>	<b>BPSK</b> 5/16, 21/44, 3/4, 7/8 <b>(O)QPSK</b> 5/16, 21/44, 3/4, 7/8, 0.93 <b>8PSK</b> 3/4, 7/8, 0.93 <b>8QAM</b> 3/4, 7/8, 0.93 <b>16QAM</b> 3/4, 7/8, 0.93
<b>DVB-S/DSNG</b>	DVB-S: <b>QPSK</b> 1/2, 2/3, 3/4, 5/6, 7/8 DVB-DSNG: <b>8PSK</b> 2/3, 5/6, 8/9; <b>16QAM</b> 3/4, 7/8 (ETSI EN 300421/ 301210 compliant)

## Included Network Management

Web browser user interface support provided standard. SNMP & command line interfaces support development of third-party user interfaces. The following network control application options is available

### Q-NET™ Navigator

Allows all modems and third-party network devices to be fully controlled through a single application. It provides an easy-to-navigate site map, summary status reporting, etc. Provided as standard, free of charge



Rear of **Q-Lite Rugged** modem showing weatherproof connectors (4 x Ethernet, Tx, Rx and DC input). A mounting bracket allows the modem to be secured in place. Several mounting options are available and can be customised to suit individual requirements.



For additional thermal protection, the **Q-Lite Rugged** modem is fitted with heatsinks as standard.

## Ordering: Q-Lite™ Rugged Satellite Modem

Standard Features	Description
Base Modem	<input checked="" type="checkbox"/> Q-Lite modem in sealed, weatherproof chassis rated to IP65 <b>2.4kbps to 2.048Mbps Closed Network (+ ESC) modem with 4-port Gigabit Ethernet ports for M&amp;C and traffic</b> <b>All features described under Ethernet Standard Features</b> <b>L-band operation 950 to 2,450MHz;</b> high-G 10MHz reference (with G sensitivity rating of 1 x10 <sup>-9</sup> /g) <b>TPC:</b> BPSK, QPSK, OQPSK, 8PSK, 8QAM and 16QAM; to 60Mbps subject to prevailing modem data rate <b>AUPC:</b> Automatic Uplink Power Control <b>All features described under Test Facilities</b>  <b>Note:</b> A power source is not included as standard (see over the page for options); a user-supplied 24V DC regulated input can also be used

### Optional Features

Tx Only	<input type="checkbox"/> Transmit functions only
Rx Only	<input type="checkbox"/> Receive functions only
Extend Tx Data Rate	<input type="checkbox"/> <b>5Mbps data rate:</b> Extends base operation to 5Mbps <input type="checkbox"/> <b>10Mbps data rate:</b> Extends 5Mbps operation to 10Mbps <input type="checkbox"/> <b>25Mbps data rate:</b> Extends 10Mbps operation to 25Mbps <input type="checkbox"/> <b>60Mbps data rate:</b> Extends 25Mbps operation to 60Mbps <input type="checkbox"/> <b>100Mbps data rate:</b> Extends 25Mbps operation to 100Mbps (FastLink, DVB-S2 & DVB-S2X only) <input type="checkbox"/> <b>200Mbps data rate:</b> Extends 100Mbps operation to 200Mbps (DVB-S2 & DVB-S2X only) <input type="checkbox"/> <b>345Mbps data rate:</b> Extends 200Mbps operation to 345Mbps (DVB-S2 & DVB-S2X only)
XStream IP™	<input type="checkbox"/> <b>XStream IP Bundle,</b> includes all of the features listed below (or select any combination of individual features): <input type="checkbox"/> <b>Traffic Shaping:</b> Supports CIR/BIR/priority settings for IP streams classified by VLAN ID, IP address, Diffserv class, IEEE 802.1p priority, MPLS EXP field & MPEG2 transport stream PID <input type="checkbox"/> <b>Header Compression:</b> IP/UDP/TCP/RTP packet header compression (RFC 3095) plus Ethernet header compression <input type="checkbox"/> <b>Payload Compression:</b> TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951) <input type="checkbox"/> <b>Dynamic Routing:</b> RIP, OSPF and BGP <input type="checkbox"/> <b>TCP Acceleration:</b> Up to 4,400 concurrent accelerated TCP connections to 100Mbps subject to prevailing data rate
DVB-S2X To 345Mbps subject to prevailing modem data rate limits	<input type="checkbox"/> <b>DVB-S2/S2X CCM Tx:</b> DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Tx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK & 64APSK Tx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB encapsulation <input type="checkbox"/> <b>DVB-S2/S2X CCM Rx:</b> Add-on card supporting DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Rx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK & 64APSK Rx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB decapsulation
ClearLinQ™	<input type="checkbox"/> <b>Adaptive Tx Predistorter:</b> Corrects for linear & non-linear distortion in the RF chain (amplifier & transponder). Applicable to all FECs and modulations
FastLink™ Low-latency LDPC	<input type="checkbox"/> Add-on card; includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; to 100Mbps subject to prevailing modem data rate limits; includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs as standard

## Ordering: Q-Lite™ Continued

<b>Paired Carrier+™</b> Subject to prevailing modem data rate limits. Occupied bandwidth: minimum 25kHz; maximum 72MHz  Paired Carrier+™ is also available as a low-cost 90 -day license for light users (the license counts down only when Paired Carrier+™ is being actively used) - please contact us for details	<input type="radio"/> <b>Paired Carrier+™ add-on card</b> (requires one or more options below) <input type="radio"/> Paired Carrier+™ up to <b>256kbps</b> (requires Paired Carrier+™ add-on card) <input type="radio"/> Extends Paired Carrier+™ up to <b>512kbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>1.024Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>2.5Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>5Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>10Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>15Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>20Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>25Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>30Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>40Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>50Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>60Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>80Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>100Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>200Mbps</b> <input type="radio"/> Extends Paired Carrier+™ up to <b>345Mbps</b>
Optimised Spectral Roll-Off	<input type="radio"/> Extends the standard 35%, 25% and 20% roll-off factors to include 5%, 10% and 15% roll-offs for TPC and legacy FEC's
DVB-CID	<input type="radio"/> <b>DVB Carrier ID:</b> Tx carrier identification per ETSI 103 129
IBS	<input type="radio"/> Satellite framing to IESS 309 with low-rate Intelsat ESC (to IESS 403) and high-rate IBS ESC
Legacy FEC	<input type="radio"/> <b>Sequential FEC</b> (limited to maximum of 2.048Mbps); TCM 8PSK 2/3 to IESS 310; Viterbi BPSK/QPSK/OQPSK FEC rates 1/2, 3/4 & 7/8; Intelsat Reed-Solomon outer codec
Outdoor PSU	<input type="radio"/> Weatherproof PSU that converts mains input to 24V DC for powering the modem
12V DC Battery	<input type="radio"/> 12V DC battery power source for powering the modem (comes with 12V to 24V DC to DC converter)
Battery Charger	<input type="radio"/> Battery charger for 12V DC battery

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