

# Q-Lite™ Encryption

Encrypted, Comms-On-The-Move  
Satellite Modem Card



A Portable Member  
of the Paradise Modem Family

## Overview

The **Q-Lite™ Encryption** is a compact, single-board satellite modem suitable for integration into custom enclosures for portable communications and comms-on-the-move, supporting AES 256 Encryption as standard.

The **Q-LiteE** modem card has been designed for simple mechanical integration into OEM products, being small in size and with very low power consumption, the Modem is suitable for integration into custom enclosures for portable communications and comms-on-the-move.

The unit is compatible with our QFlex-400 Encryption rack mount satellite Modem and our standard **QMultiFlex-400 Encryption** capable Hub and **QFlex-400 Encryption** series satellite Modems.

The **Q-LiteE** 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.

Monitoring and control of the modem is via Ethernet, with an option to fit a keypad and LCD display for local control. The **Q-LiteE** can also be provided in a half-width and ruggedised 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.

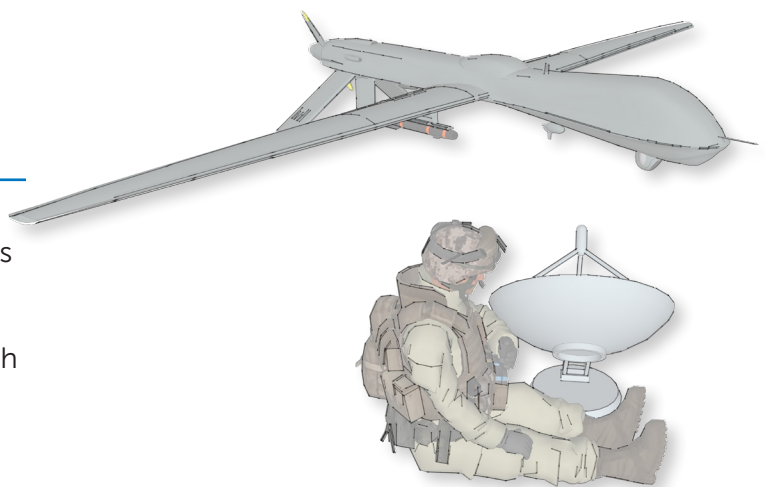
Bandwidth-saving IP features include ACM, acceleration and header and payload compression.

## Markets and Applications

- Comms-on-the-move including vehicles, aircraft and UAVs
- Portable communication systems
- Compact, low-power VSAT terminals
- Man-packs
- Broadcast news gathering
- Disaster recovery

## Features

- Small form factor (255mm x 184mm)
- Extended L-band operation to 2,450MHz
- Data rates to 345Mbps
- **AES 256 Encryption as standard**
- Paired Carrier+™ enhanced carrier overlay
- Satellite beacon receiver mode as standard
- Optimized spectral roll-offs, including 5%
- **XStream IPT™** advanced IP optimization suite including TCP Acceleration, header & payload compression, traffic shaping & ACM
- DVB-S2/S2X, **FastLink™** LDPC & TPC
- 24 Volt input power supply
- 25 to 33 Watt power consumption
- Optional keypad/LCD display & fans
- Optional L-band services (10MHz output, LNB power, external BUC PSU)
- **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



## Why Q-Lite?

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

### STATE OF THE ART

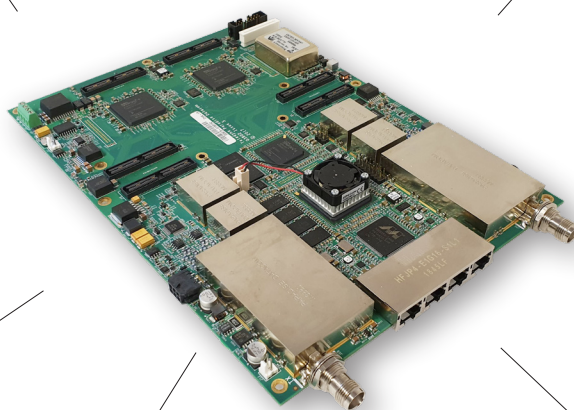
- DVB-S2X up to 64APSK provides the highest bandwidth efficiency
- FastLink Low latency LDPC provides advanced optimisation modes for latency sensitive applications.

### SECURE

- SCPC is both secure, and with Paradise Modems, easy to provision
- For enhanced security, AES-256 encryption is built in as standard
- 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

- Optional BUC power Supply reduces need for external equipment
- Built in Spectrum Analyser and Constellation monitor

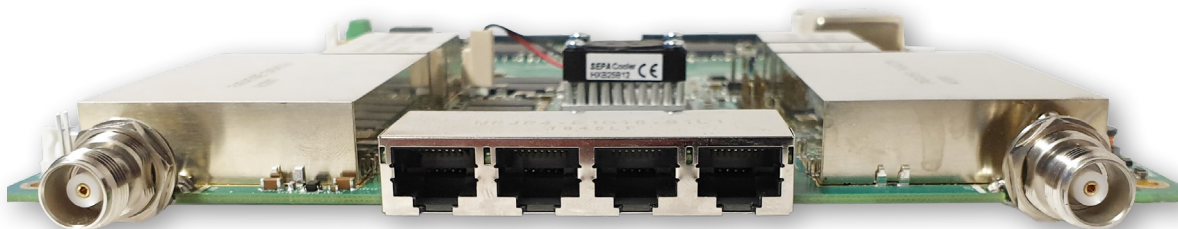
### PRACTICAL

- Small size, lightweight and low power consumption
- Optional keypad/LCD & fans
- 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:

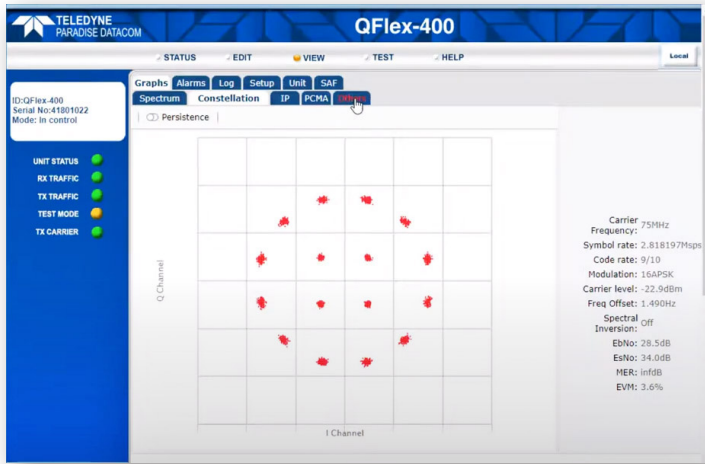
- Transmit and Receive speeds field upgradeable, only pay for the capacity you need now
- Extended L-Band coverage from 950 to 2,450 MHz
- Wideband IF 50 - 180MHz

### Receiver

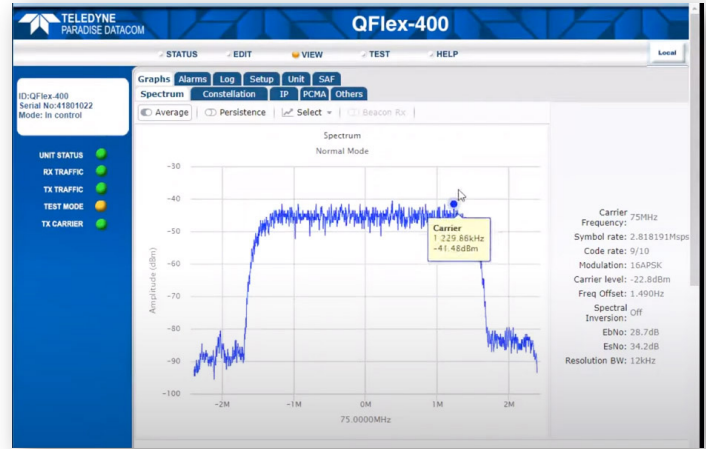
#### Fast:

- 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.



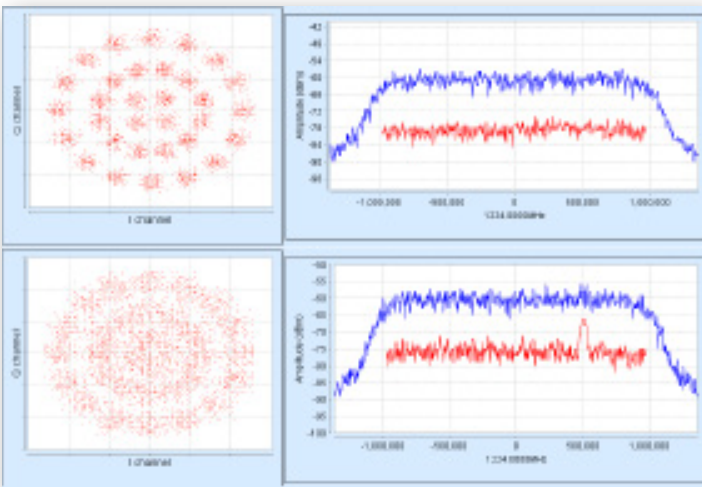
**Spectral view:** The Rx Spectrum Monitor is a powerful real-time spectrum analyser within the modem that is used to view the received signal spectrum. The monitor can not only display the wanted carrier but a Super Wide view allows checking for adjacent interfering carriers.



**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.

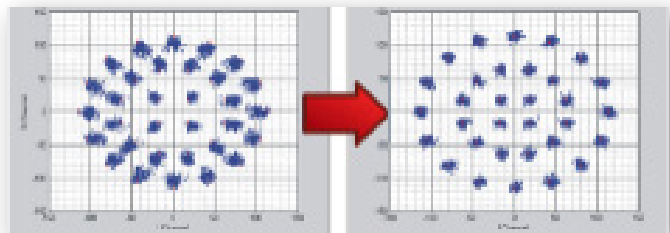
## LinkGuard™ Interference Detection

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-LiteE™ 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 IPT™ bandwidth-saving IP features include ACM, TCP acceleration and header and payload compression.

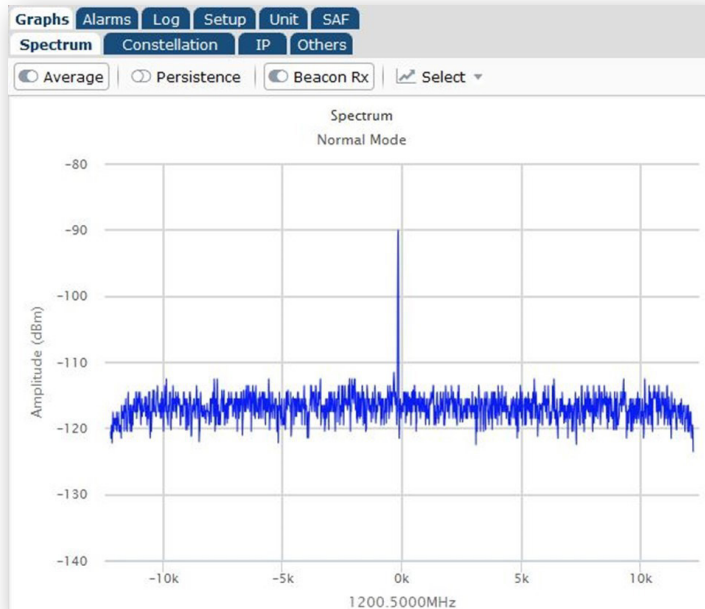
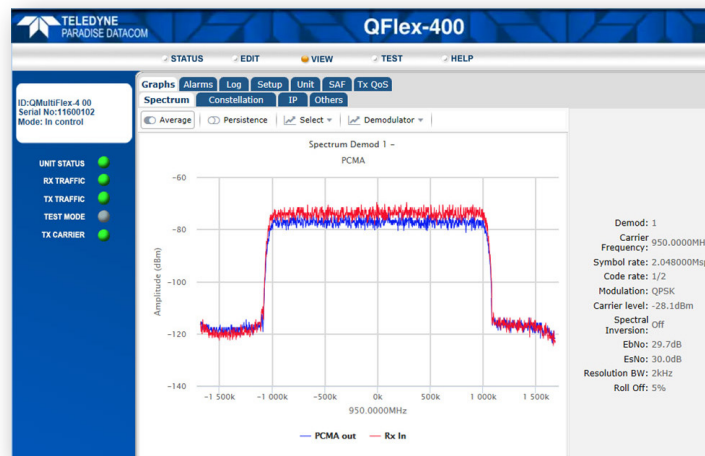
**Paired Carrier+:** used to reduce the occupied satellite bandwidth by up to 50% by overlaying the transmit and receive carriers in the same space segment. Adaptive self-interference cancellation is used to remove the unit's transmitted signal from the composite received signal, leaving just the desired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

## Beacon Receiver Function

Q-LiteE™ 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.

## 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.

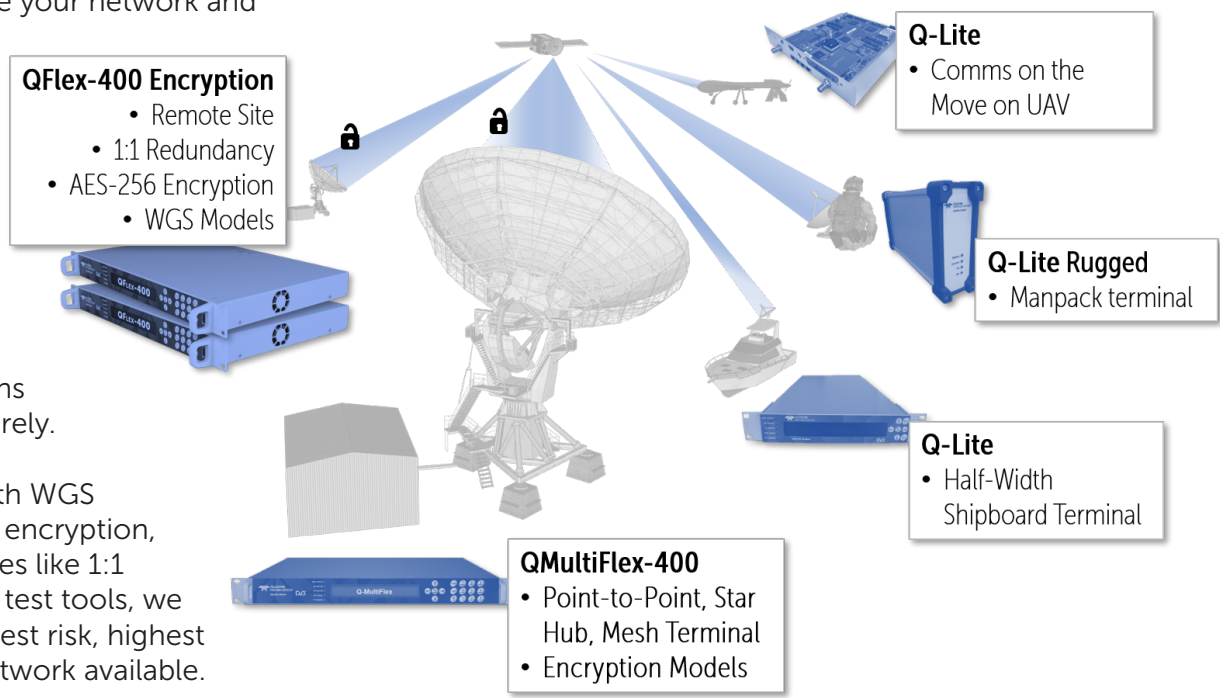


## The Q-Net Family

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)	✓		Card	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

Topology	Point to Point or Star Modem within a Point to Multipoint Network
Frequency	<b>L-band:</b> 950 to 2,450MHz (resolution 1Hz) <b>IF:</b> 50 to 90, 100 to 180MHz (resolution 1Hz) 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 (1bps resolution) <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	<b>L-Band:</b> 950MHz to 2GHz >16dB 2GHz to 2.45GHz >12dB <b>IF:</b> > 18dB
Redundancy	1:1 through 1:16 redundancy (requires Utilities Card)

## 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
Alarm Relays	4 independent Form C relays for unit, Tx, Rx and deferred alarms (requires Utilities Card)

## Mechanical/Environmental

Size	255mm x 184mm
Weight	397g (see below)
Power Supply	24 V DC input (not provided) Consumes 25 to 33W
Tolerance	24 V +/- 5% max. Paradise Recommends: +/- 0.5V
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 & Storage Temperature	Component temperature: -40°C to 85°C (Applies to Q-Lite and mezzanine cards. The front panel and all interface cards operate from 0 to 50°C only.)
Humidity	95% relative humidity, non-condensing
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)

## Option Card Weights

Base unit	397g
Base unit with a single expansion card	493g

### Where a single expansion card supports the following functionality:

- DVB-S2/X
- FastLink Low Latency LDPC;
- Paired Carrier;
- DVB-S2/X and FastLink Low Latency LDPC;
- FastLink Low Latency LDPC and Paired Carrier.

### Base unit with two expansion cards

576g

### Where the two expansion cards support the following functionalities:

- DVB-S2/X and Paired Carrier.

### P3732 Antenna pointing card

add 21g

### P3720 EIA530 card

add 69g

### P3719 Utilities card

add 114g

### P3710 ASI card

add 114g

All weights include the necessary fixing kits.




## Modulator

<b>Output Power</b> (0.1dB steps)	<b>IF:</b> 0 to -25dBm <b>L-Band:</b> <ul style="list-style-type: none"> <li>+5 to -40dBm (950 to 1,950MHz)</li> <li>0 to -40dBm (1,950 to 2,150MHz)</li> <li>0 to -30dBm (2,150 to 2,450MHz)</li> </ul>
<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 PSU Option</b>	24V or 48V DC via IFL cable, 200W
<b>BUC 10MHz Reference</b>	Via IFL cable; 10MHz $\pm 0.01$ ppm; 2dBm $\pm 2$ dB
<b>FSK Control</b>	Allows monitor & control of a compatible L-band BUC via the Tx IFL cable (requires Utilities Card)

## Demodulator

<b>Input Range (dBm)</b>	<b>IF minimum:</b> -130 + 10 log (symbol rate) <b>L-band minimum:</b> -140 + 10 log (symbol rate) <b>IF/L-band maximum:</b> -68 + 10 log (symbol rate)
<b>Maximum Input Power</b>	<b>L-Band:</b> +10dBm <b>IF:</b> 0dBm
<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>Receive Spectral Roll-off</b>	5%, 10%, 15%, 20%, 25%, 35%
<b>LNB 10MHz Reference</b>	Via IFL cable; 10MHz $\pm 0.01$ ppm; 2dBm $\pm 2$ dB
<b>Antenna Pointing Output</b>	Scalable 0 to 10V DC output signal of the wanted Rx power level, composite Rx signal level, demodulator AGC level or Eb/No level for antenna peaking/pointing (requires Utilities Card or Antenna Pointing Card)
<b>LNB Voltage</b>	Programmable 13V, 15V, 18V, 20V or 24V DC to LNB via IFL cable; maximum 0.5A

## 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



## 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>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>IPv4/IPv6</b>	Dual IPv4/IPv6 TCP/IP supporting IPv4/ IPv6 bridging and routing	<b>IP Metrics</b>	Tx, Rx throughput (bps, pps) graphs; dropped, errored packet counts
<b>VLAN Support</b>	IEEE 802.1q VLAN support IEEE 802.1p packet prioritisation using strict priority or fair weighting queuing	<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>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>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>DHCP</b>	DHCP client for automatic allocation of M&C IP address; DHCP server allocates IP addresses to network devices	<b>MPEG over IP</b>	Supports the efficient transfer of SMPTE 2002-2 MPEG2 transport streams over satellite
<b>NAT</b>	NAT firewall; allows all network devices to share a single IP address when viewed from other end of satellite link	<b>OpenAMIP Protocol Support</b>	Controls modem interaction with compliant antenna control units to support antenna deployment/pointing/tracking
<b>SNMP</b>	SNMP v1, v2c & v3	<b>Virtual Routing &amp; Forwarding</b>	VRF supports multiple modem routing tables, allowing inter-VLAN routing
<b>Access Control Lists</b>	Separate IP and MAC address black/ white user access control lists	<b>Packet Generator/Analyser</b>	Generates & analyses TCP & UDP packet streams, allowing modem-to-modem IP testing without any PCs
<b>Network Time Protocol (NTP)</b>	NTP client synchronises modem time & date to NTP server; provides millisecond accuracy	<b>Ethernet MTU Size</b>	10k bytes
<b>Web Server</b>	Modem web server M&C interface (including built-in tools listed under Test Facilities)	<b>AES-256 Encryption</b>	Encrypts all IP traffic using AES with 256-bit keys Note: Encryption adds approximately 5% overhead to the configured datarate and derates the pps processing capability based on packet size.

## 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>Cancellation ratio</b>	28dB typical
<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>Es/No degradation (symmetric carriers)</b>	<0.1dB for $E_s/N_0 \leq 7\text{dB}$ . <0.2dB for $7\text{dB} < E_s/N_0 \leq 11\text{dB}$ . <0.4dB for $11\text{dB} < E_s/N_0 \leq 14\text{dB}$ . <0.5dB for $14\text{dB} < E_s/N_0 \leq 16\text{dB}$ . <1.0dB for $16\text{dB} < E_s/N_0 \leq 18\text{dB}$ . <1.5dB for $18\text{dB} < E_s/N_0 \leq 20\text{dB}$ . <2.0dB for $20\text{dB} < E_s/N_0 \leq 22\text{dB}$ .
<b>Carrier Asymmetry</b>	<b>Symbol rate:</b> Up to 10:1	<b>Monitoring</b>	Delay, frequency offset, power offset, lock status, channel amplitude slope and group delay (consult sales)
<b>Max Sym Rate</b>	70MBaud (carrier roll-off 10% max)	<b>Mobile Operation</b>	Uses GPS data to continually recalculate position relative to satellite, allowing uninterrupted operation in mobile environments anywhere in satellite footprint
<b>Min Sym Rate</b>	25kBaud		
<b>Delay Range</b>	0 to 350ms		
<b>Cancellation Range</b>	-10 to +10dB local to remote carrier		

## 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, 7/90 <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> <b>Low-Latency LDPC</b> 	<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: QPSK 1/2, 2/3, 3/4, 5/6, 7/8 DVB-DSNG: 8PSK 2/3, 5/6, 8/9; <b>16QAM</b> 3/4, 7/8 (ETSI EN 300421/ 301210 compliant)

## Utilities Card

<b>Option</b>	Add-on card size: 168mm x 104mm <ul style="list-style-type: none"> <li>9-way D type for 1:1 and 1:N redundancy (compatible with Q-NET PDQS Redundancy Sw)</li> <li>15-way D type for alarms (4 independent Form C relays for unit, Tx, Rx and deferred alarms), Tx Inhibit signal and scalable DC voltage output for antenna pointing USB connector for software upgrades, etc.</li> <li>Second fan for environments where extra cooling is required</li> <li>FSK signalling</li> </ul>
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## 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

<b>Q-NET™ Navigator</b>	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
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## Ethernet: XStream IP™ 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 IP™ Option

XStream IP™ 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

## Ordering: Q-Lite™ Encryption

Standard Features	Description
Base Modem	<input checked="" type="checkbox"/> <b>4.8kbps to 2.048Mbps Closed Network (+ ESC) modem with 4-port Ethernet 10/100/1000 BaseT switch for M&amp;C and traffic</b> <b>All features described under Ethernet Standard Features</b> <b>AES 256 Encryption</b> <b>L-band operation 950 to 2450MHz;</b> high-G 10MHz reference (with G sensitivity rating of 1 x10-9/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>  When connected to the output of an external BUC PSU (not provided), the Q-Lite™ can provide up to 200W to the BUC at 24V or 48V, as determined by the BUC PSU
<b>Optional Features</b>	
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
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™ Encryption Continued

<b>Paired Carrier+™</b> Subject to prevailing modem data rate limits. Occupied bandwidth: minimum 25kHz; maximum 72MHz	<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>
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	
<b>Terrestrial Interfaces</b> (Please choose up to one hardware options) Note: Optional interfaces do not support Encryption	<input type="radio"/> <b>EIA-530:</b> D25 DCE supporting RS422/X.21/V.35/RS232 <input type="radio"/> <b>Quad ASI:</b> 4xBNC 75Ω sockets; includes DVB-S/DSNG FEC (for use with ASI, or MPEG over IP, or general IP)
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
Utilities Card	<input type="radio"/> <b>Add-on card</b> size: 168mm x 104mm 9-way D type for 1:1 and 1:N redundancy (compatible with Q-NET PDQS Redundancy Switch) 15-way D type for alarms (4 independent Form C relays for unit, Tx, Rx and deferred alarms), Tx Inhibit signal and scalable DC voltage output for antenna pointing USB connector for software upgrades, etc. Second fan for environments where extra cooling is required FSK signalling
Antenna Pointing Card	<input type="radio"/> Smaller, lighter, lower power alternative to Utilities Card that provides <b>AGC output for antenna pointing</b> (along with Tx Inhibit and Rx Lock status) and serial RS232/RS485 M&C bus (alternative to Ethernet control). Scalable 0 to 10V DC output signal represents any of the following: Receive power level Receive composite signal level Demodulator AGC level Eb/No
ClearLinQ™	<input type="radio"/> <b>Adaptive Tx Predistorter:</b> Corrects for linear & non-linear distortion in the RF chain (amplifier & transponder). Applicable to all FECs and modulations
DVB-CID	<input type="radio"/> <b>DVB Carrier ID:</b> Tx carrier identification per ETSI 103 129
Keypad/LCD Display	<input type="radio"/> Paradise <b>standard front-panel membrane</b> (local user interface) consisting of: LEDs that provide basic modem status; 3-line LCD display; keypad. The Q-Lite™ software will automatically detect & support the membrane when it is fitted
Fan	<input type="radio"/> Paradise <b>standard modem fan:</b> 20mm; 12V; 2.5W; 12.0 CFM; 65,000 hour lifetime; connects to Q-Lite™ card; a second fan requires the Utilities card to be fitted
Advanced Temperature Testing	<input type="radio"/> -40 to +85°C temperature cycling, full test results & certificate provided on shipment.