

# QFlex-400™ Encryption

Encrypted, Dual IF/L-Band Satellite Modem



A Foundational Member  
of the Paradise Modem Family

## Overview

Our Flagship **QFlex-400 Encryption** software defined Satellite Modem is our highest data rate Modem to date. The unit supports data rates to 345Mbps and has AES 256 Encryption capability as standard, along with an extended L-band frequency range, better RF performance, improved carrier cancellation with paired carrier+, higher processing capability allowing for future upgrades and yet, is smaller and lighter than it's predecessors and has the lowest power consumption to date.

Ideal as a versatile point-to-point network modem or a remote modem in a point-to-multipoint network, the **QFlex-400 Encryption** modem is fully compatible with our Q-NET™ satellite network solution and **Q-Lite™ Encryption** satellite modems. It is also a drop-in replacement for the **Q-Flex™ Encryption** satellite modem.



## The Q-Net Family

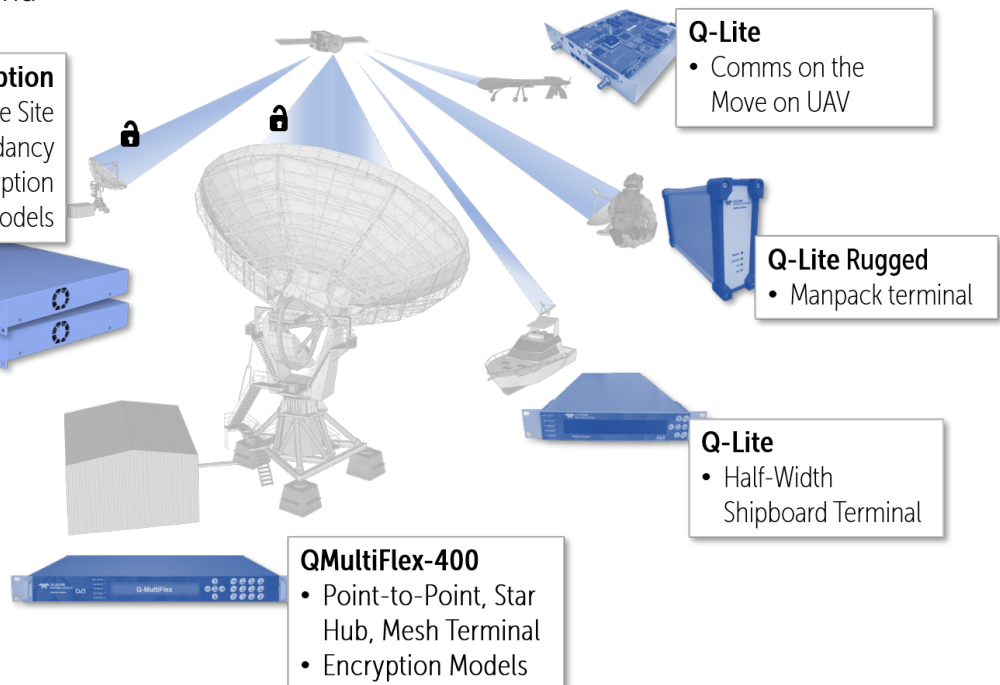
**Q-Net** is a fabric that allows each of the Q-Series modems to seamlessly interoperate giving you the ability to upgrade your network and re-use assets at will.

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.

### QFlex-400 Encryption

- Remote Site
- 1:1 Redundancy
- AES-256 Encryption
- WGS Models



## Markets and Applications

- IP trunking & IP/cellular backhaul
- Fiber backup restoral services
- Corporate & government networks
- Maritime, oil & gas communications
- Broadcast (H.264/H.265, HD, Ultra HD, etc.)
- Universal service obligation networks
- Disaster recovery
- Hub modem for Q-Lite Encryption VSAT terminals

## Features

- Dual IF/L-band; data rates to 345Mbps
- **Encrypts all IP traffic using AES 256 Encryption as standard**
- Low power consumption, typically 30W
- XStream IPTM advanced IP optimization suite, including TCP Acceleration, header & payload compression, dynamic routing, traffic shaping, jitter reduction & ACM
- DVB-S2/S2X & FastLink™ LDPC
- Optimized spectral roll-offs, including 5%
- Paired Carrier+™ enhanced carrier overlay
- LinkGuard™ signal-under-carrier interference detection
- Built-in spectrum & constellation monitors
- DVB Carrier ID (to DVB-CID standard)
- **TRANSEC (SAF option; limit <25Mbps) provides additional protection for communication channels**
- Q-NET™ Navigator network control app
- Interoperates fully with Q-Flex™ Encryption & Q-Lite™ Encryption
- Software Defined Network support: vendor-independent network device control using standard commands (supports OpenFlow)

### Q-Lite

- Comms on the Move on UAV

### Q-Lite Rugged

- Manpack terminal

### Q-Lite

- Half-Width Shipboard Terminal

### QMultiFlex-400

- Point-to-Point, Star Hub, Mesh Terminal
- Encryption Models

## Why QFlex-400?

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 standard](#)
- [Optional TRANSEC processing](#)
- AAA Radius support and access control lists.

### COMPATIBLE

- Reuse your existing code
- Drop in replacement for the Q-Flex and Q-Lite 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

- 1U rack mount chassis
- Simple front panel control with backlit LCD
- 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:

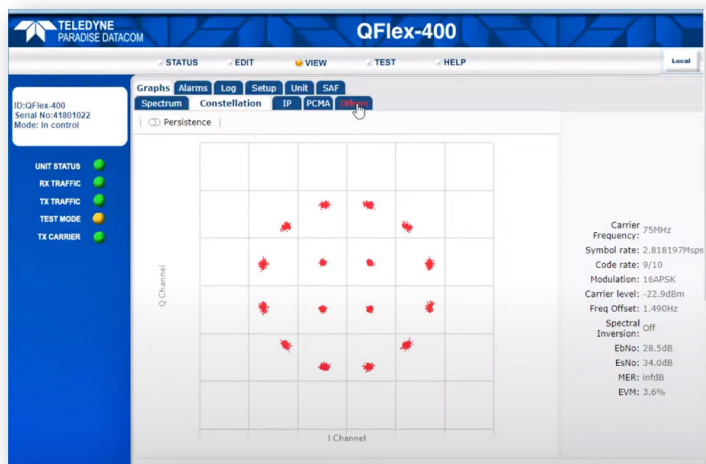
- Transmit and Receive speeds field upgradeable, only pay for the capacity you need now
- Extended L-Band coverage from 950 to 2,450 MHz
- Wideband IF 50 - 180MHz

### 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.



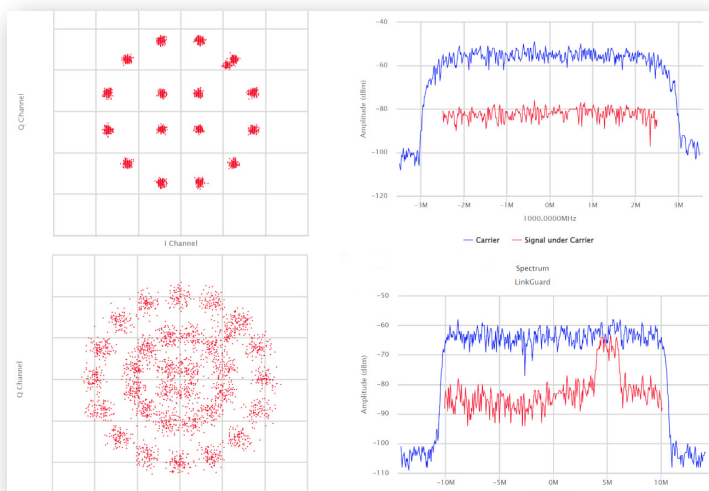
**Spectral view:** The Rx Spectrum Monitor is a powerful real-time spectrum analyser within the modem that is used to view the received signal spectrum. The monitor can not only display the wanted carrier but a Super Wide view allows checking for adjacent interfering carriers.



**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.

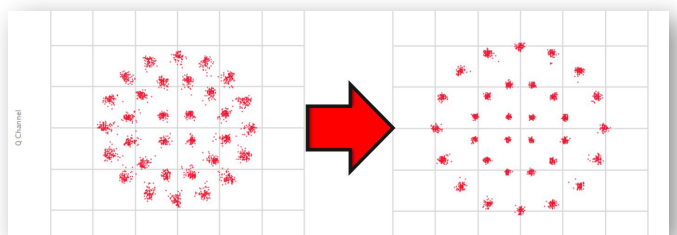
## LinkGuard™ Interference Detection

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






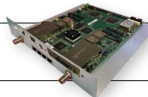




## ClearLinQ™

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



## The Paradise Family of Secure SCPC Modems

Paradise SCPC Modems		Point-to-Point	Mesh	Point-to-MultiPoint, Star, Hybrid		Features of Note
				Hub	Remote Site	
Standard	1U 19" Rack	QFlex-400	✓		✓	PCMA+ enhanced carrier overlay available
		QMultiFlex-400	✓	✓	✓	Optional Embedded Hub Cancellor
		QFlex-400 P2MP	✓		✓	Configured remote
		QubeFlex	✓			Small Sat/LEO - support for CCSDS
		AXIOM-N	✓		✓	IP-centric modem 
Small Form Factor	Rack Mount Half Width	Q-Lite Half Width	✓		✓	Mountable side-by-side in 1U rack space
		AXIOM-C	✓		✓	Compact IP-centric modem 
	Rugged	Q-Lite Rugged	✓		✓	IP65 weatherproof outdoor modem
		AXIOM-R	✓		✓	IP67 IP-centric modem 
	OEM Card	Q-Lite Card	✓		✓	For OEM integration
		AXIOM-X	✓		✓	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.

### Advanced Bandwidth-Efficient Features

The **QFlex-400™ Encryption** modem supports the most powerful bandwidth-saving technology available.

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

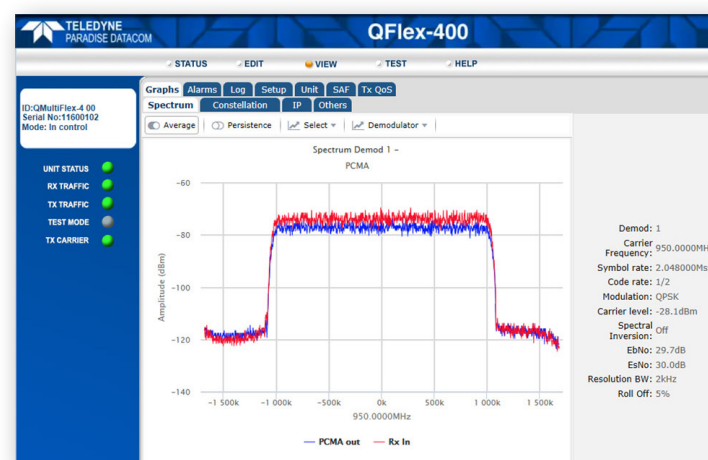
Paired Carrier+™ is our enhanced carrier overlap technology that allows transmit and receive carriers to occupy the same space segment.

XStream IP™ bandwidth-saving IP features include ACM, 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.

### 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.



## Main Specifications

Topology	Point-to-Point links or Remote Modem within a Point-to-Multipoint Star Network
Frequency	<b>L-band:</b> 950 to 2,450MHz (resolution 1Hz) <b>IF:</b> 50 to 180MHz (resolution 100Hz) N-type 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 (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
Operating Modes	<b>DVB-S2/S2X</b> (EN 302 307-1 & EN 302 307-2) <b>Closed Network</b> (+ ESC) (IESS-315) <b>IBS/IDR</b> (IESS-308/309/310/314) options
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

## Modulator

Output Power	<b>IF:</b> 0 to -25dBm (0.1dB steps) <b>L-band:</b> (0.1dB steps) +5 to -40dBm (950 to 1950MHz) 0 to -40dBm (1950 to 2150MHz) 0 to -30dBm (2150 to 2450MHz)
Output Power Stability/ Accuracy	Stability: ±1.0dB, 0°C to 50°C Accuracy: ±0.375dBm
Transmit Filter Roll-off	5%, 10%, 15%, 20%, 25%, 35%
Phase Accuracy	±2° maximum
Amplitude Accuracy	±0.2dB maximum
Carrier Suppression	-30dBc minimum
Output Phase Noise	As EN 302 307, EN 300 421, IESS-308 & EN 301 210; minimum 16dB better than IESS-308/309
Harmonics & Spurious	Better than -60dBc/ 4kHz in-band
Transmit On/ Off Ratio	-65dB minimum
BUC PSU Option	24V or 48V DC via IFL cable, 200W
BUC 10MHz Reference	Via IFL cable; 10MHz ± 0.01 ppm; 2dBm ± 2dBm
FSK Control	Allows monitor & control of a compatible L-band BUC from the modem via the Tx IFL cable

## Demodulator

Input Range (dBm)	IF minimum: -130 + 10 log (symbol rate) L-band minimum: -140 + 10 log (symbol rate) IF/L-band maximum: -68 + 10 log (symbol rate)
Maximum Input Power	+10dBm
Wanted-to-Composite	-102 + 10 log (symbol rate)
Frequency Sweep Width	±1kHz to ±255kHz (1kHz steps)
Acquisition Time	Dependent on FEC, data rate and sweep width
Receive Spectral Roll-off	5%, 10%, 15%, 20%, 25%, 35%
LNB 10MHz Reference	Via IFL cable; 10MHz ± 0.01ppm; 2dBm ± 2dBm
LNB Voltage	Programmable 13V, 15V, 18V, 20V or 24V DC to LNB via IFL cable; maximum 0.5A




## 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

## Mechanical/Environmental

Size	1U chassis, 285mm deep excluding front panel handles and rear panel connectors and fans
Weight	3kg
Power Supply	90 to 264VAC, 1A @100V, 0.5A @240V, 47 to 63Hz Fused IEC connector (live and neutral fused); 48V DC option
Compliance	FCC, CE and RoHS compliant
Safety Standards	EN62368-1:2014, Edition 2
Emissions & Immunity	Emissions: EN 55032:2015 Class A Immunity: EN 55032:2017
Temperature	Standard: 0 to 55°C; Storage: -20°C to 70°C
Humidity	95% relative humidity, non-condensing

## 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 10Mbps
<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. Supported for all carriers. 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:</b> Note: Only IP traffic is Encrypted <b>4-port Gigabit Ethernet switch</b> (RJ45 connectors; used for IP traffic and M&C) <b>Options:</b> <b>EIA-530</b> (RS422, X.21, V.35 and RS232 on 25-pin D-type female) <b>G.703</b> E1/T1, E2/T2, E3/T3 (balanced on RJ45; unbalanced 75Ω BNC female) <b>Quad E1 G.703</b> (balanced RJ45) <b>Quad ASI</b> (75Ω BNC female) <b>Serial LVDS</b> (25-pin D-type female) <b>HSSI</b> (50-pin HD SCSI-2 connector) <b>IDR</b> (to IESS 308; 50-way female D type connector)
<b>Utility Interfaces</b>	<b>9-way D type</b> for 1:1 and 1:N redundancy (compatible with Q-NET PDQS Redundancy Switch); <b>15-way D type</b> 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; <b>USB connector</b> for software upgrades, etc.; <b>Second fan</b> ; <b>FSK signalling</b>

## 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 licence
<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 Es/No ≤ 7dB. <0.2dB for 7dB < Es/No ≤ 11dB. <0.4dB for 11dB < Es/No ≤ 14dB. <0.5dB for 14dB < Es/No ≤ 16dB. <1.0dB for 16dB < Es/No ≤ 18dB. <1.5dB for 18dB < Es/No ≤ 20dB. <2.0dB for 20dB < Es/No ≤ 22dB.
<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
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<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™ 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

 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 nominally 150k packets per second. However, this is derated when internal optimisation features are enabled	<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 SD-WAN protocols provide support for network virtualisation; see Q-NET Satellite Network Solution whitepaper 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>	Standard: 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 key. Note: Encryption adds approximately 5% overhead to the configured datarate and derates the pps processing capability based on packet size.

## Ethernet: XStream IPT™ Option



<b>Description</b>	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

## Ethernet: XStream IPT™ DVB-S2X



<b>Note</b>	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>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 (PXE)
<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

## Network Control

<b>Description</b>	Web browser user interface support is provided as standard. SNMP and command line interfaces support the development of third-party user interfaces. In addition, the following network control application options are available
<b>Q-NET™ Navigator</b>	A simple interface to allow all Q-series modems in a network to be monitored and controlled from a single desktop application. Provided as standard, free of charge.

## Ordering: QFlex-400™ Encryption

Standard Features	Description
Base Modem	<input checked="" type="checkbox"/> 2.4kbps to 2.048Mbps Tx/Rx Closed Network (+ ESC) modem with 4-port Gigabit Ethernet switch for M&C and traffic. <a href="#">AES-256 Encryption</a> Front-panel keypad and display IF operation 50 to 180MHz. L-band operation 950 to 2450MHz; high-stability 10MHz reference TPC: BPSK, QPSK, OQPSK, 8PSK, 8QAM and 16QAM; to 60Mbps subject to prevailing modem data rate. All features described under Ethernet Standard Features. All features described under Test Facilities AUPC: Automatic Uplink Power Control AC mains input
Optional Features	
Tx Only	<input type="radio"/> Transmit functions only
Rx Only	<input type="radio"/> Receive functions only
Extend Tx Data Rate	<input type="radio"/> <b>5Mbps data rate:</b> Extends base operation to 5Mbps <input type="radio"/> <b>10Mbps data rate:</b> Extends 5Mbps operation to 10Mbps <input type="radio"/> <b>25Mbps data rate:</b> Extends 10Mbps operation to 25Mbps <input type="radio"/> <b>60Mbps data rate:</b> Extends 25Mbps operation to 60Mbps <input type="radio"/> <b>100Mbps data rate:</b> Extends 60Mbps operation to 100Mbps <input type="radio"/> <b>200Mbps data rate:</b> Extends 100Mbps operation to 200Mbps (DVB-S2 & DVB-S2X only) <input type="radio"/> <b>345Mbps data rate:</b> Extends 200Mbps operation to 345Mbps (DVB-S2 & DVB-S2X only)
<b>XStream IP™</b> Not available when <b>TRANSEC</b> option selected.	<input type="radio"/> <b>Xstream IP Bundle</b> , includes all of the features listed below: <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 <b>Header Compression:</b> IP/UDP/TCP/RTP packet header compression (RFC 3095) plus Ethernet header compression <b>Payload Compression:</b> TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951) <b>Dynamic Routing:</b> RIP, OSPF and BGP <b>TCP Acceleration:</b> Up to 4,400 concurrent accelerated TCP connections to 100Mbps subject to prevailing data rate
<b>DVB-S2X</b> To 345Mbps subject to prevailing modem data rate limits	<input type="radio"/> <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 Smartlink™ and XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB encapsulation <input type="radio"/> <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 Smartlink™ and XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB decapsulation
<b>FastLink™</b> Low-latency LDPC	<input type="radio"/> 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: QFlex-400™ Encryption 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>
<b>Terrestrial Interfaces</b> (Please choose up to two hardware options)  <b>Note:</b> Optional interfaces other than <b>TRANSEC</b> do not support Encryption	<input type="radio"/> <b>G.703:</b> Provides unbalanced G.703 on 2xBNC 75Ω sockets & balanced G.703 on RJ45; includes G.703 clock extension, which provides a high-stability reference clock over satellite (alternative to GPS); includes Drop & Insert; supports E1, T1, E2, T2, E3 & T3
	<input type="radio"/> <b>EIA-530:</b> D25 DCE supporting RS422/X.21/V.35/RS232
	<input type="radio"/> <b>Quad E1:</b> Balanced G.703 on 4xRJ45; all 4 ports support Drop & Insert and are enabled as standard; supports Closed Network (+ ESC) satellite framing (< 0.5% overhead); MultiMux enabled as standard: dynamically replaces one or two E1 ports with IP and/or EIA-530, allowing combinations such as: 2 E1s + up to 32Mbps IP + up to 8Mbps EIA-530, or 3 E1s + up to 32Mbps IP, or 3 E1s + up to 8Mbps EIA-530, or up to 8Mbps EIA-530 plus up to 32Mbps IP
	<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)
	<input type="radio"/> <b>Serial LVDS:</b> On 25-way D-type connector
	<input type="radio"/> <b>HSSI:</b> On HD50 50-way SCSI-2 connector
	<input type="radio"/> <b>IDR:</b> To IESS-308; 50-way female D-type connector; includes Advanced AUX (variable rate synchronous Aux channel; includes option to replace IDR audio channels with serial data); includes Audio option (for IBS carriers this allows 2 x audio in 64kbps or 2 x audio+64kbps data in 128kbps - requires IBS option)
	<input type="radio"/> <b>Optimised Spectral Roll-Off</b> Extends the standard 35%, 25% and 20% roll-off factors to include 5%, 10% and 15% roll-offs for TPC and legacy FEC's
<b>ClearLinQ™</b>	<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
<b>DVB-CID</b>	<input type="radio"/> <b>DVB Carrier ID:</b> Tx carrier identification per ETSI 103 129
<b>IBS</b>	<input type="radio"/> Satellite framing to IESS 309 with low-rate Intelsat ESC (to IESS 403) and high-rate IBS ESC
<b>Legacy FEC</b>	<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
<b>TRANSEC (Transmission Security)</b>	<input type="radio"/> <b>TRANSEC</b> provides an additional layer of protection for communication channels. It builds on, but is separate from, encryption of the payload and is a licenced software activated feature (SAF) limited to <25Mbps.
<b>DC Input</b>	<input type="radio"/> <b>48V DC:</b> K3025 48V DC primary power input (in place of 100 to 240V AC input)
<b>BUC PSU</b>	<input type="radio"/> <b>AC In &amp; 24V Out:</b> P3553 AC input, 24V 200W DC to Tx BUC
	<input type="radio"/> <b>AC In &amp; 48V Out:</b> P3554 AC input, 48V 200W DC to Tx BUC
	<input type="radio"/> <b>48V In &amp; 24V Out:</b> P3555 48V DC input; +24V 200W DC to Tx BUC
	<input type="radio"/> <b>48V In &amp; 48V Out:</b> P3556 48V DC input; +48V 200W DC to Tx BUC

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