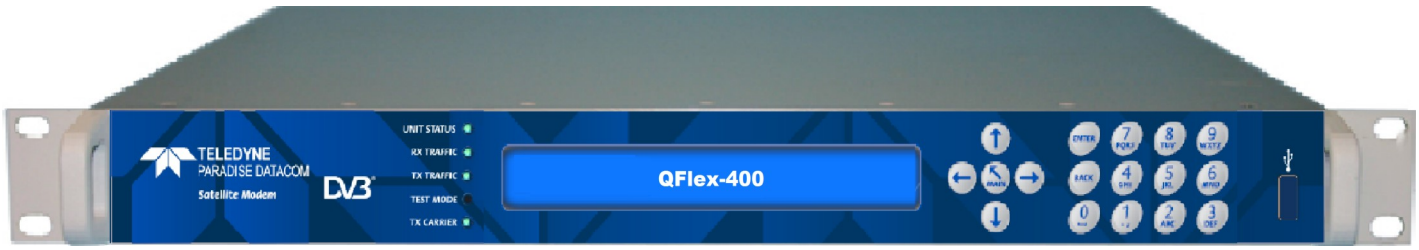
TELEDYNE
PARADISE DATACOM
Everywhereyoulook™

QFlex-400™ P2MP
Remote Satellite Modem
For Q-NET™ Point-to-multipoint Systems



OVERVIEW

We've created the **QFlex-400™ P2MP** modem by pre-configuring our **QFlex-400™** to provide only the features required for use as a remote modem in a **Q-NET™** point-to-multipoint IP system. This makes it easy to purchase exactly what you need.

The modem is fitted with the standard **QFlex-400™** software and so can also operate point-to-point.
Additional features for point-to-point operation, as per the **QFlex-400™** datasheet, can be purchased if required.

Advanced Bandwidth-Efficient Features

The **QFlex-400™ P2MP** modem supports the most powerful bandwidth-saving technology available.

There is a choice of **DVB-S2X** or **FastLink™** low-latency LDPC for both the outbound and inbound carriers. **DVB-S2X**, is 20% to 60% more bandwidth efficient than its predecessor, DVB-S2.

Bandwidth-saving IP features include VCM, ACM and TCP acceleration. Data for the remote modem can be filtered from the shared outbound using VLAN ID, stream ID, IP address, DSCP, etc.

FEATURES

- Dual IF/L-band operation
- Rx data rates to 345Mbps; Tx to 100Mbps
- Point-to-point & point-to-multipoint operation
- **XStream IP™** advanced IP optimization suite, including TCP Acceleration, dynamic routing, traffic shaping & ACM
- Choice of DVB-S2X or **FastLink™** LDPC outbound/inbounds
- Optimized spectral roll-offs, including 5%
- Customer traffic separation using VLANs
- **LinkGuard™** signal-under-carrier interference detection
- Built-in spectrum & constellation monitors
- DVB Carrier ID (DVB-CID compliant)
- **Q-NET™ Navigator** network control app included as standard
- Software Defined Network support: vendor-independent network device control using standard commands (supports OpenFlow)

Markets and Applications

- IP trunking/backhaul & cellular backhaul
- Corporate/enterprise networking
- Government universal service obligation networks
- Broadcast (Ultra HDTV/HEVC/SDTV)
- Maritime, oil & gas communications

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Main Specifications

Frequency	**L-band:** 950 to 2450MHz (resolution 1Hz) **IF:** 50 to 180MHz (resolution 100Hz) N-type connectors for Tx & Rx
Traffic Interface	**4-port Gigabit Ethernet switch** (RJ45 connectors; used for IP traffic and M&C)
Impedance	50Ω
Return Loss	**L-band:** >15dB; **IF:** >18dB
Redundancy	1:1

Modulator Specification

Operating Modes	**DVB-S2** (EN 302 307-1) & **DVB-S2X** (EN 302 307-2)
	FastLink™ Low-latency LDPC
Data Rate (1bps resolution)	**DVB-S2/S2X:** 50kbps to 50Mbps
	FastLink™: 18kbps to 100Mbps
Symbol Rate (1sps resolution)	**DVB-S2/S2X:** 100ksps to 50Msps
	FastLink™: 18ksps to 40Msps
Output Power (0.1dB resolution)	**L-band:** +5 to –40dBm (950 to 1950MHz) 0 to –40dBm (1950 to 2150MHz) 0 to –30dBm (2150 to 2450MHz) **IF:** 0 to –25dBm (0.1dB steps) (0.1dB steps)
Output Power Stability/Accuracy	**Stability:** ±1.0dB, 0ºC to 50ºC **Accuracy:** ±0.375dBm
Transmit Spectral Roll-off	**DVB-S2/S2X/FastLink™:** 5%, 10%, 15%, 20%, 25%, 35%
Phase Accuracy	±2º maximum
Amplitude Accuracy	±0.2dB maximum
Carrier Suppression	-30dBc minimum
Output Phase Noise	As EN 302 307, IESS-308 & IESS-316
Harmonics & Spurious	Better than –60dBc/ 4kHz in-band (at 0dBm to –30dBm output)
Transmit On/Off Ratio	-65dBc 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

Operating Modes	**DVB-S2** (EN 302 307-1) & **DVB-S2X** (EN 302 307-2)
	FastLink™ Low-latency LDPC
Data Rate (1bps resolution)	**DVB-S2/S2X:** 50kbps to 345Mbps
	FastLink™: 18kbps to 100Mbps
Symbol Rate (1sps resolution)	**DVB-S2/S2X:** 100ksps to 70Msps
	FastLink™: 18ksps to 40Msps
Input Range (dBm)	**L-band minimum:** -140 + 10 log (symbol rate) **IF minimum:** -130 + 10 log (symbol rate) **IF/L-band maximum:** -68 + 10 log (symbol rate)
Maximum Composite	+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	**DVB-S2/S2X/FastLink™:** 5%, 10%, 15%, 20%, 25%, 35%
LNB 10MHz Reference	Via IFL cable; 10MHz ± 0.01 ppm; 2dBm ± 1dBm
LNB Voltage	Selectable 13V, 15V, 18V, 20V or 24V DC to LNB via IFL cable; maximum 0.75A

ClearLinQ™ Adaptive Tx Predistorter

Corrects for linear & non-linear distortion in the RF chain (i.e. amplifier and transponder). Maximises amplifier linear output power; minimises required back-off. Up to 2dB performance gain

DVB-S2X Rx Adaptive Equaliser

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

Utilities Card (fitted as standard)

Add-on card with:
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
FSK signalling

Network Control

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

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

Test Facilities and Alarm Outputs

Built-in Test Tools	As part of built-in web server: Rx constellation monitor; Rx spectrum analyser; LinkGuard™ Signal-Under-Carrier interference detection; time graphs for key performance indicators (IP throughput, Eb/No, etc.)
BER Tester	Bit error rate tester. Available in **FastLink™** mode; 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

DVB Carrier ID Option (ETSI TS 103 129)

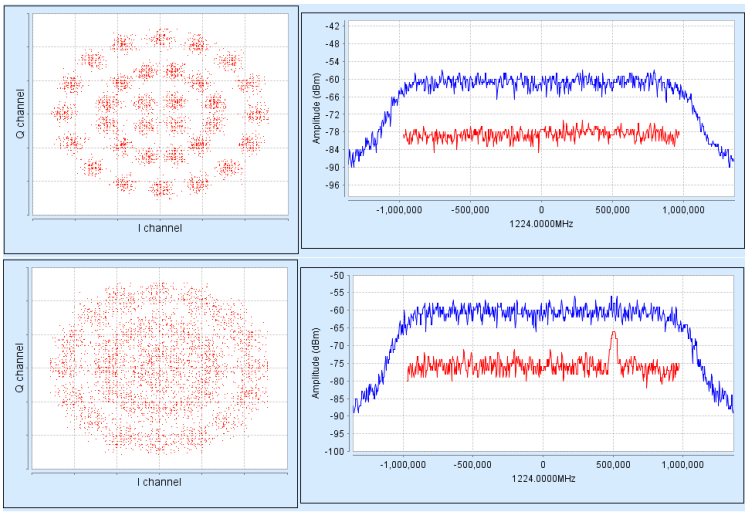
Supports the identification of interfering carriers. Allows identification of individual modem carriers by superimposing a low-power CID waveform onto the carrier with negligible degradation. **Supported for all carriers.** The CID waveform contains a unique Carrier ID and other identity information. A carrier monitoring system is required to decode CID waveforms

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); 24V and 48V DC options
Compliances	FCC, CE and RoHS compliant
Safety Standards	EN62368-1:2014,Edition 2
Emissions & Immunity	**Emissions:** EN55022:2010 Class B **Immunity:** EN55024:2010
Operating Temperature	**Standard:** 0 to 50ºC (storage: -20ºC to 70ºC)
Humidity	95% relative humidity, non-condensing

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

LINKGUARD™



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Ethernet: Standard Features

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

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.

*The **XStream IP™ Option** for the **QFlex-400™** remote modem is required when communicating with a **Q-MultiFlex™** that is fitted with the **XStream IP™ Tier 3 (Tx and Rx) Option** (see **Q-MultiFlex™** datasheet).*

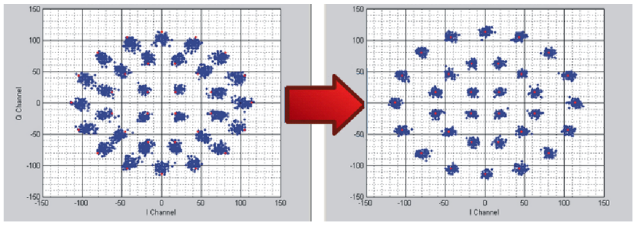
Traffic Shaping	Provides guaranteed throughput for priority traffic; supports Committed and Burst Information Rates. Stream classification by VLAN ID, IP address, IEEE 802.1p priority, Diffserv DSCP, PID & MPLS EXP
Header Compression	Robust Header Compression (RFC 3095). Reduces Ethernet/IP/UDP/TCP/RTP 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)
Payload Compression	Uses Deflate algorithm (RFC 1951) to compress TCP & UDP packets; typical payload compression of 50%
Dynamic Routing	RIP V1, V2; OSPF V2, V3; BGP V4
TCP Acceleration	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
AES-256 Encryption	*Supported on **QFlex-400-E™ P2MP** model only. The QFlex-400-E™ P2MP is identical to the standard QFlex-400™ P2MP in every other respect*

Ethernet: XStream IP™ DVB-S2X

Features that are provided as standard as part of DVB-S2 & DVB-S2X are: ACM, VCM and IP-over-DVB Decapsulation.

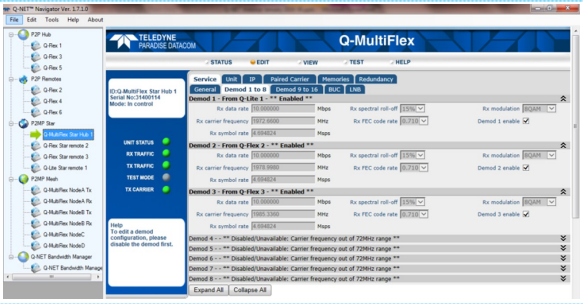
*These features correspond to the **XStream IP™ Tier 1 (Tx)** and **XStream IP™ Tier 2 (Tx)** options on the **Q-MultiFlex™** (see **Q-MultiFlex™** datasheet).*

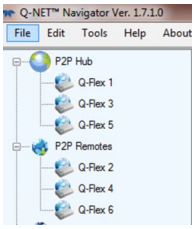
ACM	Allows the modem to receive dynamically varying modcods, maximising throughput at all times by converting unused link margin into additional throughput; 100% link availability
VCM	Supports the demodulation of any one of up to 16 IP streams transmitted (using independent modcods) by the **Q-MultiFlex™**. Typically a stream with its own unique modcod represents a VLAN
IP-over-DVB Decapsulation	Supports the reception of IP packets with/without Ethernet frames over DVB-S2/S2X; decapsulates using Paradise XStream Encapsulation (PXE)



Interference Mitigation: ClearLinQ™

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





Network Control: Q-NET™ Navigator

Q-NET™ Navigator *supports the control of all network modems and third-party network devices from a single application. Includes easy-to-use navigation, multiple operator roles/access levels (including Virtual Network Operator support), continuous status/alarm polling and automatic synchronisation of all network configuration changes.* **Q-NET™ Navigator** *is included as standard, free of charge.*

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Forward Error Correction

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

DVB-S2 Performance
QEF (PER 10-7)
Normal frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 1/4	0.490243	1.1 (-2.0)
QPSK 1/3	0.656448	0.7 (-1.1)
QPSK 2/5	0.789412	0.7 (-0.3)
QPSK 1/2	0.988858	1.1 (1.1)
QPSK 3/5	1.188304	1.7 (2.4)
QPSK 2/3	1.322253	2.0 (3.2)
QPSK 3/4	1.487473	2.4 (4.1)
QPSK 4/5	1.587196	2.6 (4.6)
QPSK 5/6	1.654663	3.0 (5.2)
QPSK 8/9	1.766451	3.7 (6.2)
QPSK 9/10	1.788612	3.9 (6.4)
8PSK 3/5	1.779991	3.5 (6.0)
8PSK 2/3	1.980636	4.0 (7.0)
8PSK 3/4	2.228124	4.6 (8.1)
8PSK 5/6	2.478562	5.6 (9.5)
8PSK 8/9	2.646012	6.6 (10.8)
8PSK 9/10	2.679207	6.9 (11.2)
16APSK 2/3	2.637201	5.2 (9.4)
16APSK 3/4	2.966728	5.8 (10.5)
16APSK 4/5	3.165623	6.2 (11.2)
16APSK 5/6	3.300184	6.6 (11.8)
16APSK 8/9	3.523143	7.5 (13.0)
16APSK 9/10	3.567342	7.8 (13.3)
32APSK 3/4	3.703295	7.3 (13.0)
32APSK 4/5	3.951571	7.8 (13.8)
32APSK 5/6	4.119540	8.4 (14.5)
32APSK 8/9	4.397854	9.4 (15.8)
32APSK 9/10	4.453027	9.6 (16.1)

DVB-S2X Performance
QEF (PER 10-7)
Normal frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 13/45	0.567805	0.5 (-2.0)
QPSK 9/20	0.889135	0.9 (0.4)
QPSK 11/20	1.088581	1.1 (1.5)
8APSK-L 5/9	1.647211	3.1 (5.3)
8APSK-L 26/45	1.713601	3.2 (5.5)
8PSK 23/36	1.896173	3.6 (6.4)
8PSK 25/36	2.062148	4.1 (7.2)
8PSK 13/18	2.145136	4.3 (7.6)
16APSK-L 1/2	1.972253	3.4 (6.3)
16APSK-L 8/15	2.104850	3.5 (6.7)
16APSK-L 5/9	2.193247	3.6 (7.0)
16APSK-L 3/5	2.370043	3.9 (7.6)
16APSK-L 2/3	2.635236	4.4 (8.6)
16APSK 26/45	2.281645	4.2 (7.8)
16APSK 3/5	2.370043	4.4 (8.1)
16APSK 28/45	2.458441	4.2 (8.1)
16APSK 23/36	2.524739	4.6 (8.6)
16APSK 25/36	2.745734	5.2 (9.6)
16APSK 13/18	2.856231	5.4 (10.0)
16APSK 7/9	3.077225	6.0 (10.9)
16APSK 77/90	3.386618	7.0 (12.3)
32APSK-L 2/3	3.289502	6.5 (11.7)
32APSK 32/45	3.510192	6.5 (12.0)
32APSK 11/15	3.620536	6.7 (12.3)
32APSK 7/9	3.841226	7.5 (13.3)
64APSK-L 32/45	4.206428	8.4 (14.6)
64APSK 11/15	4.338659	8.9 (15.3)
64APSK 7/9	4.603122	9.3 (15.9)
64APSK 4/5	4.735354	9.5 (16.3)
64APSK 5/6	4.933701	10.3 (17.2)

DVB-S2 Performance
QEF (PER 10-7)
Short frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 1/4	0.365324	2.2 (-2.2)
QPSK 1/3	0.629060	1.3 (-0.7)
QPSK 2/5	0.760928	1.1 (-0.1)
QPSK 1/2	0.848840	1.6 (0.9)
QPSK 3/5	1.156532	2.1 (2.7)
QPSK 2/3	1.288400	2.3 (3.4)
QPSK 3/4	1.420269	2.9 (4.4)
QPSK 4/5	1.508181	3.1 (4.9)
QPSK 5/6	1.596093	3.5 (5.5)
QPSK 8/9	1.727961	4.0 (6.4)
8PSK 3/5	1.725319	4.0 (6.4)
8PSK 2/3	1.922040	4.5 (7.3)
8PSK 3/4	2.118761	5.1 (8.4)
8PSK 5/6	2.381056	6.0 (9.8)
8PSK 8/9	2.577777	7.0 (11.1)
16APSK 2/3	2.548792	5.6 (9.7)
16APSK 3/4	2.809662	6.2 (10.7)
16APSK 4/5	2.983575	6.7 (11.4)
16APSK 5/6	3.157488	7.1 (12.1)
16APSK 8/9	3.418357	8.1 (13.4)
32APSK 3/4	3.493093	8.1 (13.5)
32APSK 4/5	3.709309	8.7 (14.4)
32APSK 5/6	3.925526	9.0 (14.9)
32APSK 8/9	4.249850	10.2 (16.5)

DVB-S2X Performance
QEF (PER 10-7)
Short frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 11/45	0.453236	1.4 (-2.0)
QPSK 4/15	0.497192	1.3 (-1.7)
QPSK 14/45	0.585104	1.1 (-1.2)
QPSK 7/15	0.892796	1.4 (0.9)
QPSK 8/15	1.024664	1.7 (1.8)
QPSK 32/45	1.376313	2.6 (4.0)
8PSK 7/15	1.331876	3.1 (4.3)
8PSK 8/15	1.528597	3.4 (5.2)
8PSK 26/45	1.659745	3.8 (6.0)
8PSK 32/45	2.053188	4.8 (7.9)
16APSK 7/15	1.766184	4.0 (6.5)
16APSK 8/15	2.027053	4.4 (7.5)
16APSK 26/45	2.200966	4.8 (8.2)
16APSK 3/5	2.287923	5.0 (8.6)
16APSK 32/45	2.722705	5.8 (10.2)
32APSK 2/3	3.168769	6.8 (11.8)
32APSK 32/45	3.384985	7.3 (12.6)

FastLink™ Performance at BER 5E-8
(Note: * denotes BER of 5E-12)

	FEC Rate	Spectral Efficiency	Low BER Eb/No & Es/No	Balanced Eb/No & Es/No	Low Latency Eb/No & Es/No
BPSK	0.499	0.499	2.1 (-0.9)	2.9 (-0.1)	3.4 (0.4)
(O)QPSK	0.532	1.064	2.1 (2.4)	2.6 (2.9)	2.9 (3.2)
(O)QPSK	0.639	1.278	2.4 (3.5)	2.8 (3.8)	3.2 (4.3)
(O)QPSK	0.710	1.42	2.7 (4.2)	3.2 (4.7)	3.7 (5.2)
(O)QPSK	0.798	1.596	3.1 (5.1)	3.9 (6.0)	4.2 (6.2)
8PSK	0.639	1.917	5.4* (8.2)	5.9* (8.7)	6.3* (9.1)
8PSK	0.710	2.13	5.6* (8.9)	5.5 (8.8)	5.8 (9.1)
8PSK	0.778	2.334	5.6 (9.3)	6.1 (9.7)	6.4 (10.1)
8QAM	0.639	1.917	4.4 (7.2)	4.8 (7.6)	5.0 (7.8)
8QAM	0.710	2.13	5.0 (8.3)	5.3 (8.6)	5.5 (8.8)
8QAM	0.778	2.334	5.5 (9.2)	5.9 (9.6)	6.1 (9.8)
16APSK	0.726	2.904	7.6* (12.2)	7.5* (12.1)	7.5 (12.1)
16APSK	0.778	3.112	7.8* (12.7)	7.1 (12.0)	7.5 (12.4)
16APSK	0.828	3.312	7.4 (12.6)	8.1 (13.3)	8.4 (13.6)
16APSK	0.851	3.404	7.9 (13.2)	8.3 (13.6)	8.8 (14.1)
16QAM	0.726	2.904	7.2* (11.8)	6.6 (11.2)	6.8 (11.4)
16QAM	0.778	3.112	6.7 (11.6)	7.1 (12.0)	7.4 (12.3)
16QAM	0.828	3.312	7.2 (12.4)	7.7 (12.9)	8.0 (13.2)
16QAM	0.851	3.404	7.5 (12.8)	8.0 (13.3)	8.4 (13.7)
32APSK	0.778	3.89	9.8* (15.7)	9.6 (15.5)	10.0 (15.9)
32APSK	0.828	4.14	9.8 (16.0)	10.6 (16.8)	10.9 (17.1)
32APSK	0.886	4.43	10.8 (17.3)	11.4 (17.9)	11.9 (18.4)
32APSK	0.938	4.69	12.6 (19.3)	13.2 (19.9)	13.9 (20.6)

PER v BER

Note: A PER of 10-7 is equivalent to a BER of 6.6 x 10-11.

	Option	Description **Fully configurable - pay only for what you need!**
Base Modem	✓	**2.4kbps to 2.048Mbps Tx/Rx Closed Network (+ ESC) modem with 4-port Gigabit Ethernet switch for M&C and traffic** **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**
Modulator Options		**DVB-S2/S2X CCM Tx:** Modulator transmit function (2.048Mbps default data rate); 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 decapsulation
		FastLink™ Low-latency LDPC: Modulator transmit function (2.048Mbps default data rate); includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs
Modulator Data Rate Options		**5Mbps data rate:** Extends base operation to 5Mbps
		10Mbps data rate: Extends 5Mbps operation to 10Mbps
		25Mbps data rate: Extends 10Mbps operation to 25Mbps
		60Mbps data rate: Extends 25Mbps operation to 60Mbps
		100Mbps data rate: Extends 60Mbps operation to 100Mbps
Demodulator Options		**DVB-S2/S2X CCM Rx:** Demodulator operation to 345Mbps/70Msps (default); 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: Demodulator operation to 100Mbps/40Msps (default); includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs
XStream IP™		**Xstream IP Bundle,** includes all of the features listed below:
		Traffic Shaping: 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
		Header Compression: IP/UDP/TCP/RTP packet header compression (RFC 3095) + Ethernet header compression
		Payload Compression: TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951)
		Dynamic Routing: RIP, OSPF and BGP
		TCP Acceleration: Up to 4,400 concurrent accelerated TCP connections to 100Mbps subject to prevailing data rate
ClearLinQ™		**Adaptive Tx Predistorter:** Corrects for linear & non-linear distortion in the RF chain (amplifier & transponder)
DVB-CID		**DVB Carrier ID:** Tx carrier identification per ETSI 103 129
DC Input		**48V DC: K3025** 48V DC primary power input (in place of 100 to 240V AC input)
BUC PSU		**AC In & 24V Out: P3553** AC input, 24V 200W DC to Tx BUC
		AC In & 48V Out: P3554 AC input, 48V 200W DC to Tx BUC
		48V In & 24V Out: P3555 48V DC input; +24V 200W DC to Tx BUC
		48V In & 48V Out: P3556 48V DC input; +48V 200W DC to Tx BUC