TELEDYNE
PARADISE DATACOM
A Teledyne Technologies Company

DVB S2X

Q-MultiFlex™

'Hub-in-a-Box' IP Modulator / Multi-demodulator

OVERVIEW

The **Q-MultiFlex™** offers a cost-effective solution for point-to-multipoint IP satellite systems. The **Q-MultiFlex™** supports a highly-efficient **DVB-S2X** shared outbound along with up to 16 **FastLink™** low-latency LDPC returns. ***It is unique in the industry in allowing a rack of hub equipment, including all standard test and network equipment, to be replaced at a fraction of the price by a single box.***

All network modems (and other equipment) can be monitored and controlled via **Q-Net™ Navigator** (included as standard).

The optional **Q-Net™ Bandwidth Manager** supports multi-satellite carrier planning, analytics and report generation.

Advanced Bandwidth-Efficient Features

The **Q-MultiFlex™** supports the most powerful bandwidth-saving technology available.

DVB-S2X improves spectral efficiency by between 20% and 60% compared to DVB-S2 and includes spectral roll-offs as low as 5%.

Adaptive Coding and Modulation (ACM), one of many onboard bandwidth-saving IP features, converts any unused link margin into additional throughput.

FEATURES

- Star, mesh & hybrid point-to-multipoint IP
- Modulator & up to 16 demodulators
- Scalable to any network size
- Supports low-cost **Q-Lite™** & **Q-Flex™** remote modems
- Dual IF/L-band operation
- DVB-S2X shared outbound
- **FastLink™** low-latency LDPC returns
- Data rates to 200Mbps outbound & inbound
- **XStream IP™** advanced IP optimization suite including TCP acceleration, header & payload compression, traffic shaping, encryption & ACM
- Optimized spectral roll-offs, down to 5%
- **LinkGuard™** signal-under-carrier interference detection
- Built-in spectrum and constellation monitors
- DVB Carrier ID. Fully compliant with DVB-CID standard
- **Q-NET™ Navigator** network M&C app
- Optional **Q-Net™** Bandwidth Manager

Markets and Applications

- IP trunking and backhaul
- Corporate networking
- Cellular backhaul
- Disaster recovery
- Maritime, oil & gas communications
- Broadcast

Teledyne Paradise Datacom
328 Innovation Blvd., Suite 100
State College, PA 16803 USA
Tel: 1 (814) 238-3450
Fax: 1 (814) 238-3829

www.paradisedata.com

Teledyne Paradise Datacom Ltd.
2&3 The Matchyns, London Road, Rivenhall End
Witham, Essex, CM8 3HA United Kingdom
Tel: +44(0) 1376 515636
Fax: +44(0) 1376 533764

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Common Specifications

Frequency	**IF:** 50 to 90MHz & 100 to 180MHz (resolution 100Hz) (BNC connector) **L-band:** 950 to 2150MHz (resolution 100Hz) (N-type connector)
Traffic Interface	**Standard:** Single Ethernet Gigabit RJ45 **Options:** **4-port Gigabit Ethernet switch** (extends base modem Ethernet traffic port with another 3 Ethernet ports, creating 4-port switch) **Optical Gigabit Ethernet** (Small Form-Factor pluggable module supporting all common optical standards)
Network Topologies	Supports star, mesh and hybrid networks
Impedance	**IF:** 50Ω/75Ω; **L-band:** 50Ω
Return Loss	**IF:** >18dB; **L-band:** >15dB
Redundancy	1:1 or up to 1:16 redundancy

Demodulator Specification

A demodulator add-on card supports 8 demodulators. One demodulator card is fitted as standard and a second can be optionally fitted, supporting up to 16 demodulators. Demodulators are enabled in software in blocks of 4.

The second card can optionally be fitted with none of the demodulators enabled, thereby keeping the initial purchase price low but allowing for convenient expansion in the future.

Demodulators	**Standard:** 4 **Options:** 8, 12 or 16 (total)
Operating Bandwidth	All inbound carriers must be within a bandwidth of 72MHz
Operating Mode	FastLink™ Low-latency LDPC decoder operated in Closed Network mode
Data Rate	**Each inbound:** 18kbps to 100Mbps **Total for all inbounds combined:** Up to 200Mbps 1bps resolution
Symbol Rate	**Each inbound:** 18ksps to 40Msps **Total for all inbounds combined:** Up to 70Msps 1sps resolution
Input Range	**IF minimum:** -115 + 10 log (symbol rate) **L-band minimum:** -130 + 10 log (symbol rate) **IF/L-band maximum:** -80 + 10 log (symbol rate)
Maximum Composite	+10dBm
Wanted-to-Composite	**IF:** -94 + 10 log (symbol rate) **L-band:** -102 + 10 log (symbol rate)
Frequency Sweep Width	±1kHz to ±250kHz (1kHz steps)
Acquisition Time	Dependent on data rate and sweep width
Clock Tracking Range	±100ppm minimum
Receive Spectral Roll-off	5%, 10%, 15%, 20%, 25%, 35%
LNB 10MHz Reference	Via IFL cable; 10MHz ± 0.01 ppm; 0dBm ± 3dB
LNB Voltage	Selectable 13V, 15V, 18V or 24V DC to LNB via IFL cable; maximum 0.5A

Modulator Specification

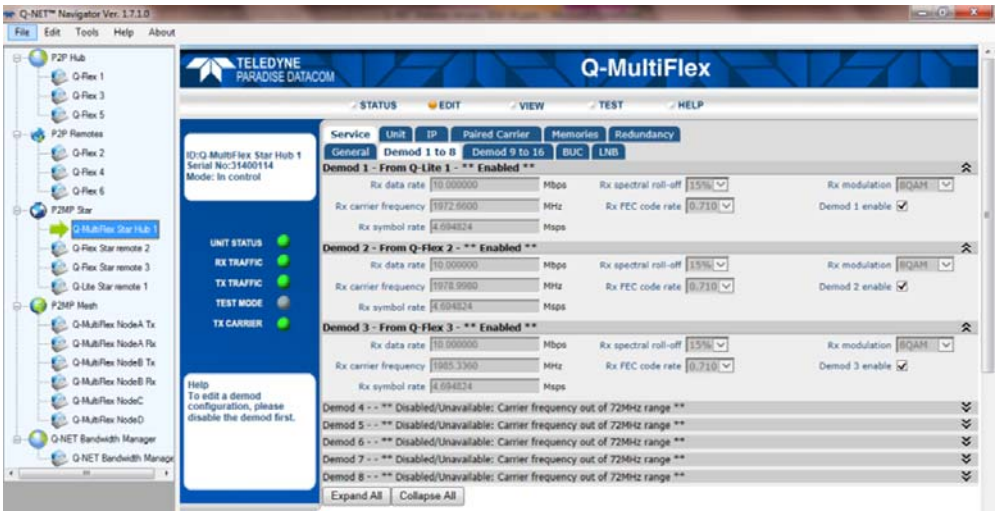
Operating Modes	**DVB-S2X** (EN 302 307-2)
	DVB-S2 (EN 302 307-1)
	FastLink™ Low-latency LDPC
Data Rate (1bps resolution)	**DVB-S2X:** 100kbps to 200Mbps
	DVB-S2: 100kbps to 200Mbps
	FastLink™: 18kbps to 100Mbps
Symbol Rate (1sps resolution)	**DVB-S2X:** 100ksps to 50Msps
	DVB-S2: 100ksps to 50Msps
	FastLink™: 18ksps to 40Msps
Output Power (0.1dB resolution)	**IF:** 0 to –25dBm **L-band:** 0 to –40dBm
Output Power Stability/Accuracy	**Stability:** ±1.0dB, 0ºC to 50ºC **Accuracy:** ±0.375dBm
Transmit Filter Roll-off	**DVB-S2/S2X:** 5%, 10%, 15%, 20%, 25%, 35% **FastLink™:** 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, 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; 3dBm ± 3dB
FSK Control	Allows monitor & control of a compatible L-band BUC from the modem via the Tx IFL cable

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. 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, 410mm deep excluding front panel handles and rear panel connectors and fans
Weight	3.5kg
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	EN60950-1:2006
Emissions & Immunity	**Emissions:** EN55022:2010 Class B **Immunity:** EN55024:2010
Operating Temperature	**Standard:** 0 to 50ºC (storage: -40ºC to 70ºC) **Extended:** 0 to 55ºC when fitted with **Ruggedisation** option
Humidity	95% relative humidity, non-condensing



Q-NET™ Navigator *supports the M&C of all Paradise modems (old and new) and third-party network devices 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.* **Q-NET™ Navigator** *is included as standard, free of charge.*

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Ethernet: Standard Features

Bridging and Static Routing	**Trunking mode:** Hardware Layer 2 bridge supporting 200Mbps bi-directional traffic at up to 500,000 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 access/trunking
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
IEEE 1588 V2 Precision Time Protocol (PTP)	PTP hardware implementation with nanosecond-resolution timestamping provides sub-microsecond accurate clock synchronisation; modem implements a PTP boundary clock, operating in both master & slave modes
Web Server	Modem web server M&C interface (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
Packet Generator/ Analyser	Generates & analyses TCP & UDP packet streams, allowing modem-to-modem IP testing without any PCs
Ethernet MTU Size	**Standard:** 10k bytes **Optical Ethernet:** 16k bytes

XStream IP™ Tier 1 (Tx only)

XStream IP™ is an IP optimization suite designed for maximum reliability and bandwidth efficiency. The following features are provided as a standard part of the Modulator Option. ***Note that GSE is a separate option***

Traffic Shaping	Provides guaranteed throughput for priority traffic; supports Committed and Burst Information Rates. Stream classification uses one or more of: VLAN ID, IP address, IEEE 802.1p priority & Diffserv DSCP
IP-over-DVB Encapsulation	Supports the transmission of IP packets with/without Ethernet frames over DVB-S2/DVB-S2X; encapsulates & decapsulates using our highly-efficient Paradise XStream Encapsulation (PXE)
GSE Encapsulation	Highly efficient encapsulation of IP packets or Ethernet frames; compatible with EN 302 307-2 standard, for use with DVB-S2 & DVB-S2X

XStream IP™ Tier 2 (Tx only) Option

The Tier 2 option extends the transmit capabilities provided by the **XStream IP™ Tier 1** *option.*

DVB-S2/S2X ACM	Dynamically varies modcod with varying link conditions in order to maximise throughput for each remote site at all times by converting unused link margin into additional throughput; 100% link availability
DVB-S2/S2X VCM	Supports the transmission of up to 16 IP streams. Each stream has its own associated modcod for optimal per-site throughput

XStream IP™ Tier 3 (Tx and Rx) Option

The following features apply to both transmit and receive and can be used independently of **XStream IP™ Tier 1** *and* **XStream IP™ Tier 2** *options. The Tier 3 option supports all demodulators for a single price.*

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%
TCP Acceleration	Typical throughput level of 90% of link capacity. Supports 10,000 concurrent accelerated TCP connections (plus at least 40,000 unaccelerated TCP connections) up to 100Mbps
AES-256 Encryption	Provides bi-directional encryption. Remotes can share a common encryption key or each can use a unique key, ensuring different customer data is kept secure. *Supported on* ***Q-MultiFlexE™*** *model only. The Q-MultiFlexE™ is identical to the standard Q-MultiFlex™ in every other respect*

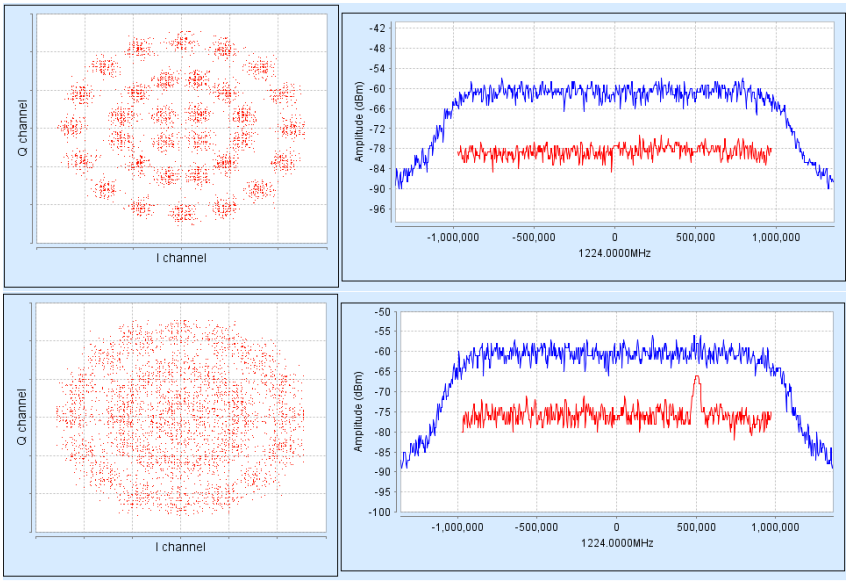
Test Facilities and Alarm Outputs

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	Demodulator-based bit error rate tester, allowing the link from each remote to be tested for data transparency. 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, deferred, Tx and aggregated Rx alarms

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
Q-NET™ Bandwidth Manager	Provides multi-satellite/transponder carrier planning and high-level system control, monitoring, recording and quality-of-service reporting
Modem Compatibility	Compatible with the use of Q-Flex™ and Q-Lite™ satellite modems



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

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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-S2X Advanced Modulation	**Normal Frame:** **128APSK** 3/4, 7/9 **256APSK** 32/45, 3/4 **256APSK-L** 29/45, 2/3, 31/45, 11/15
DVB-S2X Low-latency Mode *Paradise proprietary extension to DVB-S2X*	**Very Short Frame:** (Frame size of 5,400 bits, reducing latency to 33% of standard DVB-S2 Short frame) **QPSK** 1/5, 4/15, 1/3, 2/5, 7/15, 8/15, 3/5, 2/3, 11/15, 12/15 **8PSK** 11/15, 12/15 **16APSK** 12/15 **Ultra Short Frame:** (Frame size of 3,240 bits, reducing latency to 20% of standard DVB-S2 Short frame) **QPSK** 2/9, 1/3, 4/9, 5/9, 2/3, 7/9 **8PSK** 2/3, 7/9 **16APSK** 2/3, 7/9 **32APSK** 7/9 **64APSK** 7/9
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 10e-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 10e-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 10e-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 10e-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	Low BER Eb/No & Es/No	Balanced Eb/No & Es/No	Low Latency Eb/No & Es/No
BPSK	0.499	2.1 (-0.9)	2.9 (-0.1)	3.4 (0.4)
(O)QPSK	0.532	2.1 (2.4)	2.6 (2.9)	2.9 (3.2)
(O)QPSK	0.639	2.4 (3.5)	2.8 (3.8)	3.2 (4.3)
(O)QPSK	0.710	2.7 (4.2)	3.2 (4.7)	3.7 (5.2)
(O)QPSK	0.798	3.1 (5.1)	3.9 (6.0)	4.2 (6.2)
8PSK	0.639	5.4* (8.2)	5.9* (8.7)	6.3* (9.1)
8PSK	0.710	5.6* (8.9)	5.5 (8.8)	5.8 (9.1)
8PSK	0.778	5.6 (9.3)	6.1 (9.7)	6.4 (10.1)
8QAM	0.639	4.4 (7.2)	4.8 (7.6)	5.0 (7.8)
8QAM	0.710	5.0 (8.3)	5.3 (8.6)	5.5 (8.8)
8QAM	0.778	5.5 (9.2)	5.9 (9.6)	6.1 (9.8)
16APSK	0.726	7.6* (12.2)	7.5* (12.1)	7.5 (12.1)
16APSK	0.778	7.8* (12.7)	7.1 (12.0)	7.5 (12.4)
16APSK	0.828	7.4 (12.6)	8.1 (13.3)	8.4 (13.6)
16APSK	0.851	7.9 (13.2)	8.3 (13.6)	8.8 (14.1)
16QAM	0.726	7.2* (11.8)	6.6 (11.2)	6.8 (11.4)
16QAM	0.778	6.7 (11.6)	7.1 (12.0)	7.4 (12.3)
16QAM	0.828	7.2 (12.4)	7.7 (12.9)	8.0 (13.2)
16QAM	0.851	7.5 (12.8)	8.0 (13.3)	8.4 (13.7)
32APSK	0.778	9.8* (15.7)	9.6 (15.5)	10.0 (15.9)
32APSK	0.828	9.8 (16.0)	10.6 (16.8)	10.9 (17.1)
32APSK	0.886	10.8 (17.3)	11.4 (17.9)	11.9 (18.4)
32APSK	0.938	12.6 (19.3)	13.2 (19.9)	13.9 (20.6)

Q-MultiFlex™: *The industry's first 'Hub in a Box'.*

Historically, networks required many different boxes including modulators, demods, IP optimisers, Ethernet switches, routers, packet encapsulators, BER testers, spectrum analysers, oscilloscopes, interference detectors and traffic analysers.

Now you can replace all of these with a single box! That's a lot of money you won't have to spend and that's leaving out the cost of spares, training and maintenance for all those individual boxes. And you can multiply the saving times over as you scale the network!

'Before' and 'After'

	Option	Description — Fully configurable - pay only for what you need!
Base Unit	✓	**Four demodulators with FastLink™ Low-latency LDPC Closed Network operation**: BPSK, (O)QPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK, 64QAM; maximum composite receive data rate of 100Mbps/40Msps; 5%, 10%, 15%, 20%, 25%, 35% spectral roll-off factors **Two Gigabit Ethernet RJ45s (for M&C and traffic)**; Ethernet bridge, static routing and all features described under Ethernet Standard Features **IF demodulator operation 50 to 90MHz & 100 to 180MHz** **L-band demodulator operation 950 to 2150MHz**; high-stability 10MHz reference (for BUC/LNB); FSK **Web browser monitoring tools:** Spectrum display, constellation monitor, TCP/IP throughput **Internal Bit Error Rate Tester (BERT):** For non-DVB-S2/DVB-S2X operation only
Modulator Options		**DVB-S2/S2X CCM Tx:** Modulator transmit function to 10Mbps; 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™ Tier 1 (Tx only)**, which comprises traffic shaping and IP-over-DVB encapsulation
		DVB-S2X Low-latency Mode (*proprietary extension to DVB-S2X):* **Very Short Frame:** Frame size of 5,400 bits, reducing latency to 33% of standard DVB-S2 Short frame; supports QPSK/8PSK/16APSK **Ultra Short Frame:** Frame size of 3,240 bits, reducing latency to 20% of standard DVB-S2 Short frame; supports QPSK/8PSK/16APSK/32APSK/64APSK *Requires **DVB-S2/S2X CCM Tx** option*
		DVB-S2X Advanced Modulation: 128APSK, 256APSK, 256APSK-L (*requires **DVB-S2/S2X CCM Tx** option*)
		***Low-cost* DVB-S2 CCM Tx:** *(Reduces cost by providing only DVB-S2 operation.)* Modulator transmit function to 10Mbps; DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Tx operation per EN 302 307-1. Includes 15%, 20%, 25% & 35% spectral roll-offs Includes **XStream IP™ Tier 1 (Tx only)**, which comprises traffic shaping and IP-over-DVB encapsulation
		FastLink™ Low-latency LDPC: Modulator transmit function to 10Mbps; includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs
Modulator Data Rate Options		**25Mbps data rate:** Extends 10Mbps operation to 25Mbps
		60Mbps data rate: Extends 25Mbps operation to 60Mbps
		100Mbps data rate: Extends 60Mbps operation to 100Mbps
		200Mbps data rate: Extends 100Mbps operation to 200Mbps (*DVB-S2 & DVB-S2X only; note **Low-cost DVB-S2** option is restricted to a maximum of 132Mbps/37.5Msps only*)
Demodulator Options		**8 demodulators:** extends base operation from 4 demodulators to 8 demodulators (*software option*)
		'16 Demodulator Hardware' option: adds second demodulator add-on card supporting demods number 9 to 16
		12 demodulators: extends operation from 8 demodulators to 12 demodulators (*requires **16 Demodulator H/W** option*)
		16 demodulators: extends operation from 12 demodulators to 16 demodulators (*software option*)
Demodulator Data Rate Options (*Composite data rate for all demodulators*)		**25Mbps data rate:** Extends 10Mbps operation to 25Mbps
		60Mbps data rate: Extends 25Mbps operation to 60Mbps
		100Mbps data rate: Extends 60Mbps operation to 100Mbps
		200Mbps data rate: Extends 100Mbps operation to 200Mbps
XStream IP™ Options		**XStream IP™ Tier 1 (Tx only)**: provided as standard with the **Modulator Option**; includes: • **Traffic Shaping:** CIR/BIR/priority settings for IP streams classified by VLAN ID, IP address, IEEE 802.1p priority and Diffserv DSCP • **IP-over-DVB Encapsulation:** transmission of IP packets and Ethernet frames over DVB-S2/S2X using Paradise XStream Encapsulation (PXE)
		XStream IP™ Tier 2 (Tx only): requires **Modulator Option**; includes: • DVB-S2/S2X point-to-multipoint VCM (up to 16 streams in shared outbound, each controlled by its own modcod) • DVB-S2/S2X point-to-multipoint ACM (dynamic adjustment of all outbound modcods to maximize data rate)
		XStream IP™ Tier 3 (Tx & Rx): applies to Tx and Rx; does not require XStream IP™ Tier 1 or Tier 2 options; supports all enabled demodulators; includes: • **Header Compression:** IP/UDP/TCP/RTP packet header compression (RFC 3095) plus Ethernet header compression • **Payload Compression:** TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951) • **TCP Acceleration:** Supports up to 10,000 concurrent accelerated TCP connections at up to 100Mbps • ***AES-256 Encryption:** Please note that AES-256 Encryption (TCP/IP packet payload encryption using AES with 256-bit keys) is supported on the **Q-MultiFlexE™** model only. The Q-MultiFlexE™ is identical to the standard Q-MultiFlex™ in every other respect*
XStream IP™ DVB-S2 GSE Encapsulation		Highly efficient encapsulation of IP packets or Ethernet frames; compatible with EN 302 307-2 standard, for use with DVB-S2 and DVB-S2X

Configuration options continue on next page.
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	Option	Description Fully configurable - pay only for what you need!
Terrestrial Interfaces		**4-port Gigabit Ethernet Switch:** Extends base unit Ethernet traffic port with 3 Ethernet ports, creating 4-port switch
		Optical Gigabit Ethernet: Small Form-factor Pluggable module; supports single-mode & multi-mode fibre & all wave-lengths; supports all standard fibre connector types such as SC & LC (subject to provision of suitable mating socket for SFP cage)
Ruggedisation		Ruggedises the equipment for harsh environments (fans with higher airflow, heatsinks on key components, etc.)
DVB-CID		**DVB Carrier ID:** Tx carrier identification per ETSI 103 129
24V DC Input		**K3023** 24V DC primary power input (in place of 100 to 240V AC input)
48V DC Input		**K3018** 48V DC primary power input (in place of 100 to 240V AC input)
24V 200W BUC PSU		**P3543** AC input, 24V 200W DC to Tx BUC
48V 200W BUC PSU		**P3544** AC input, 48V 200W DC to Tx BUC
48V In & 24V BUC PSU		**P3545** Floating 48V DC input; +24V 200W DC to Tx BUC
48V In & 48V BUC PSU		**P3546** Floating 48V DC input; +48V 200W DC to Tx BUC
+48V In & 48V BUC PSU		**P3547** +48V DC input; +48V 200W DC to Tx BUC