TELEDYNE PARADISE DATACOM
Everywhere**you**look™

DVB S2X

Q-FlexV™
Dual IF/L-Band Broadcast Satellite Modulator/Modem

OVERVIEW

The **Q-FlexV™** broadcast satellite modulator/modem replaces our award-winning Vision Series broadcast modems. The **Q-FlexV™** is ideal for Ultra HDTV, DTH, DSNG, ISP backhaul, fiber restoration and video contribution and distribution services. It supports IP and ASI interfaces, and the **DVB-S2X** and DVB-S/DSNG standards.

The **Q-FlexV™** is a *flexible software-defined modem* that does what you want, now and in the future. The **Q-FlexV™** modem's *flexible hardware platform* makes it ideal for handling high-rate video and IP traffic.

Advanced Bandwidth-Efficient Features

The **Q-FlexV™** 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+™, our recently enhanced carrier overlap technology, overlays transmit and receive carriers reducing the required satellite bandwidth by 50%.

ClearLinQ™ adaptive transmit pre-distortion compensates for linear and non-linear distortion in the communications channel. **DVB-S2X ACM** converts any unused link margin into additional throughput and provides 100% link availability.

FEATURES

▶ Dual IF/L-band operation
▶ Data rates to 200Mbps
▶ DVB-S2/S2X & DVB-S/DSNG
▶ IP & ASI terrestrial interfaces
▶ Constant Coding & Modulation (CCM), Variable Coding & Modulation (VCM) & Adaptive Coding & Modulation (ACM)
▶ Optimized spectral roll-offs down to 5%
▶ **ClearLinQ™** Tx adaptive pre-distorter
▶ **Paired Carrier+™** enhanced carrier overlay
▶ **XStream IP™** advanced IP optimization suite, including TCP Acceleration, header & payload compression, dynamic routing, traffic shaping, jitter reduction, encryption & ACM
▶ DVB Carrier ID (to DVB-CID standard)
▶ Built-in spectrum & constellation monitors
▶ **LinkGuard™** signal-under-carrier interference detection
▶ **Q-NET™ Navigator** network control app

Markets and Applications

▶ Satellite news gathering
▶ Video contribution/distribution
▶ Ultra HDTV/HEVC/SDTV
▶ DTH
▶ ISP backhaul
▶ Fiber restoration
▶ Video conferencing & distance learning

Q-FlexV™
Dual IF/L-Band Broadcast Modulator/Modem

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Main Specifications

Frequency	**IF:** 50 to 90MHz & 100 to 180MHz (resolution 100Hz) (BNC connector) **L-band:** 950 to 2150MHz (resolution 100Hz) (N-type connector)
Data Rate	**DVB-S2/S2X:** 50kbps to 200Mbps **DVB-S/DSNG:** 100kbps to 50Mbps 1bps resolution
Symbol Rate	**DVB-S2/S2X:** 100ksps to 50Msps **DVB-S/DSNG:** 100ksps to 40Msps
Operating Modes	**DVB-S2/S2X** (EN 302 307-1 & EN 302 307-2) **DVB-S/DSNG** (EN 300 421 & EN 301 210)
Impedance	**IF:** auto 50Ω/75Ω **L-band:** 50Ω
Return Loss	**IF:** >18dB **L-band:** >15dB
Redundancy	1:1 through 1:16 redundancy

Traffic Interfaces

Standard:
  Gigabit Ethernet (single RJ45) for IP traffic (plus additional RJ45 for M&C)
Options:
  Optical Gigabit Ethernet/OC-3 (Small Form-Factor pluggable module supporting all common optical standards)
  Quad ASI (75Ω BNC female): complies with DVB document A010 Rev.1, May 1997, Section 4.4 (supports byte & packet burst modes)

Modulator

Output Power	**IF:** 0 to –25dBm (0.1dB steps) **L-band:** 0 to –40dBm (0.1dB steps)
Output Power Stability/Accuracy	**Stability:** ±1.0dB, 0ºC to 50ºC **Accuracy:** ±0.375dBm
Transmit Filter Roll-off	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, EN 300 421, IESS-308 & EN 301 210
Harmonics & Spurious	Better than –60dBc/ 4kHz in-band (at 0dBm to –30dBm output)
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 ± 1dBm
FSK Control	Allows monitor & control of a compatible L-band BUC from the modem via the Tx IFL cable
Noise Floor	<-120dBc/Hz

Demodulator

Input Range (dBm)	**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 (dBm)	**IF:** -94 + 10 log (symbol rate) **L-band:** -102 + 10 log (symbol rate)
Frequency Sweep Width	±1kHz to ±255kHz (1kHz steps)
Acquisition Time	Dependent on FEC, data rate and sweep width
Receive Filter Roll-off	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). Applicable to all FECs and modulations. Maximises amplifier linear output power; minimises required back-off. Up to 2dB performance gain
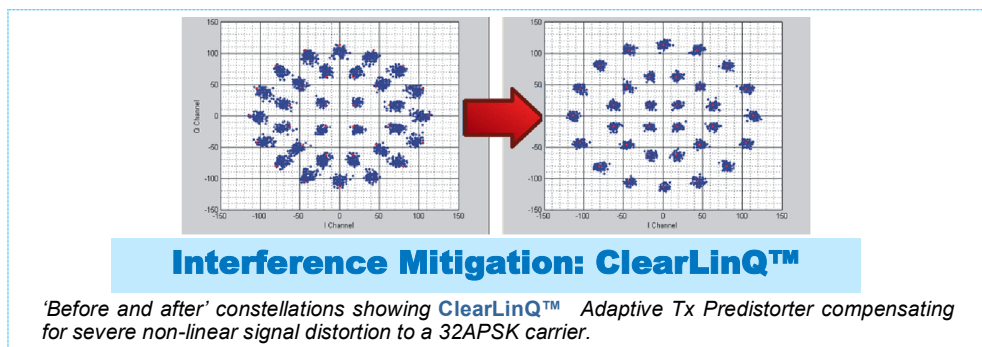
DVB-S2X Rx Adaptive Equaliser

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

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

Paired Carrier+™ Option

Paired Carrier+™ (25kHz to 54MHz occupied bandwidth)	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
Paired Carrier+™ data rate options	256kbps, 512kbps, 1024kbps, 2.5Mbps, 5Mbps, 10Mbps, 15Mbps, 20Mbps, 25Mbps, 30Mbps, 40Mbps, 50Mbps, 60Mbps, 80Mbps, 100Mbps and 200Mbps traffic rate
Carrier Asymmetry	**Power:** -10dB to +10dB **Symbol rate:** Up to 10:1
Eb/No Degradation	Typically less than 0.1dB
Delay Range	0 to 330ms
Mobile Operation	Uses GPS data to continually recalculate position relative to satellite, allowing uninterrupted operation in mobile environments anywhere in satellite footprint

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; beacon receiver function that provides automatic detection of satellite beacon transmissions; time graphs for key performance indicators (IP throughput, Eb/No, etc.)
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, 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: -20ºC to 70ºC) **Extended:** 0 to 55ºC when fitted with **Ruggedisation** option
Humidity	95% relative humidity, non-condensing

Interference Mitigation: ClearLinQ™

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

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Ethernet: Standard Features

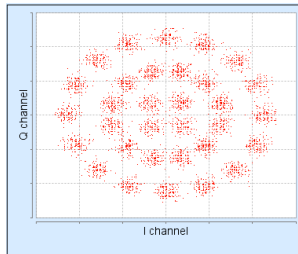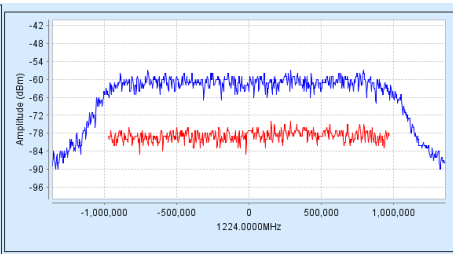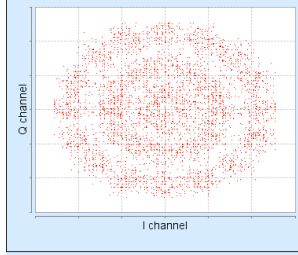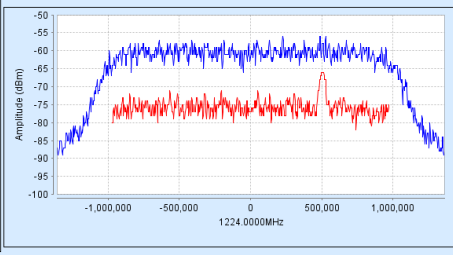|	
Bridging and Static Routing	**Trunking mode:** Hardware Layer 2 switch supporting 200Mbps bi-directional traffic at up to 200,000 packets per second; zero jitter **Layer 2 bridge & Layer 3 router:** Software processing capability of up to 150,000 packets per second
IPv4/IPv6	Dual IPv4/IPv6 TCP/IP 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	**Standard:** 10k bytes **Optical Ethernet:** 16k 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

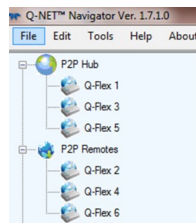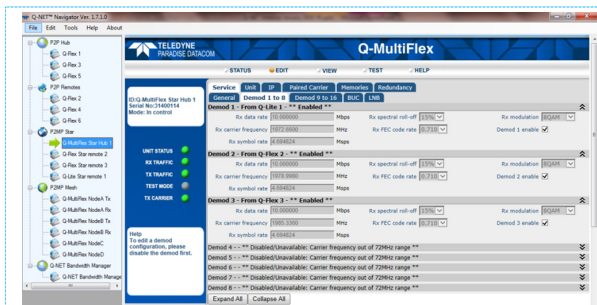|	
Traffic Shaping	Provides guaranteed throughput for priority traffic; supports Committed and Burst Information Rates. Stream classification by VLAN ID, IP address, IEEE 802.1p priority, Diffserv DSCP, PID & MPLS EXP
Header Compression	Robust Header Compression (RFC 3095). Reduces Ethernet/IP/UDP/TCP/RTP 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 Q-FlexVE™ model only. The Q-FlexVE™ is identical to the standard Q-FlexV™ in every other respect*

Ethernet: XStream IP™ DVB-S2X

Provided as standard as part of DVB-S2/S2X

ACM	Dynamically varies modcod with varying link conditions, maximises throughput at all times by converting unused link margin into additional throughput; 100% link availability
VCM	Supports transmission/reception of two ASI streams or, one ASI stream with one IP stream, each with its own modcod for optimal throughput
IP-over-DVB Encapsulation	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
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

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

LINKGUARD™

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

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.

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
DVB-S/DSNG	**DVB-S:** QPSK 1/2, 2/3, 3/4, 5/6, 7/8 **DVB-DSNG:** 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8 (ETSI EN 300421/ 301210 compliant)

DVB-S/DSNG Performance
Eb/No (dB) at QEF

	Rate 1/2	Rate 2/3	Rate 3/4	Rate 5/6	Rate 7/8	Rate 8/9
QPSK	3.9	4.6	4.0	4.6	5.3	
8PSK		6.9		8.9		9.4
16QAM			9.0		10.7	

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)

Adaptive Coding and Modulation

Adaptive Coding and Modulation (ACM) uses feedback from the receiver to the transmitter to respond to changes in channel conditions to optimise throughput. By varying the error correction to match atmospheric conditions, link margin is converted into additional bandwidth.

The symbol rate and power to satellite are kept constant, changing the transmitted terrestrial data rate up or down in relation to the current Es/No value. Changes in modcod are transparent at the receiver.

ACM works in DVB-S2 and DVB-S2X modes. Deployments of ACM have reported throughput increases of up to 100%.

DVB-S2X

The **Q-FlexV™** supports a full implementation of DVB-S2 and **_DVB-S2X_**.

Paradise _DVB-S2X_ provides:

- Additional modulations and FEC rates including 64APSK
- Low spectral roll-off factors of 5%, 10% and 15%
- Symbol rates of up to 50Msps

	Option	Description	Fully configurable - pay only for what you need!
Base Modem	✔	**Data rate to 100Mbps; with two Gigabit Ethernet RJ45s for M&C and traffic** respectively; includes all features described under Ethernet Standard Features **IF operation 50 to 90MHz & 100 to 180MHz** **L-band operation 950 to 2150MHz**; high-stability 10MHz reference; FSK **DVB-S2X CCM Tx:** 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 for both DVB-S2 and DVB-S2X **DVB-S2X CCM Rx:** 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 for both DVB-S2 and DVB-S2X **DVB-S/DSNG (to 50Mbps):** QPSK, 8PSK, 16QAM (includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs) **XStream IP™ DVB-S2X:** Consisting of: 　　**IP-over-DVB Encapsulation:** Encapsulation of IP packets and Ethernet frames over DVB-S2 using GSE, Paradise XStream Protocol (PXE), MPE or ULE 　　**ACM:** DVB-S2/S2X ACM 　　**VCM:** Allows either two ASI streams, or one ASI stream and one IP stream, to be multiplexed onto a single carrier; requires Quad ASI hardware option **ClearLinQ™ Adaptive Tx Predistorter:** Corrects for linear & non-linear distortion in the RF chain. Applicable to all FECs and all modulations **LinkGuard™:** Signal-under-carrier interference detection showing any interference underneath the received carrier **AUPC:** Automatic Uplink Power Control **Test facilities:** includes all features described under Test Facilities **AC mains input**
Tx-only		Discount for when only transmit functionality is required. Receive functions specified in the base modem will be disabled	
Rx-only		Discount for when only receive functionality is required. Transmit functions specified in the base modem will be disabled	
Data Rate Options		**200Mbps data rate:** Extends 100Mbps Tx/Rx operation to 200Mbps (*DVB-S2 & DVB-S2X only*)	
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) plus 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	

Configuration options continue on next page

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	Option	Description **Fully configurable - pay only for what you need!**
Paired Carrier+™ *Subject to prevailing modem data rate limits.* *Occupied bandwidth: minimum 25kHz; maximum 54MHz* 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 Sales for details*		**Paired Carrier+™ add-on card** (requires one or more options below)
		Paired Carrier+™ up to **256kbps** (requires Paired Carrier+™ add-on card)
		Extends Paired Carrier+™ up to **512kbps**
		Extends Paired Carrier+™ up to **1.024Mbps**
		Extends Paired Carrier+™ up to **2.5Mbps**
		Extends Paired Carrier+™ up to **5Mbps**
		Extends Paired Carrier+™ up to **10Mbps**
		Extends Paired Carrier+™ up to **15Mbps**
		Extends Paired Carrier+™ up to **20Mbps**
		Extends Paired Carrier+™ up to **25Mbps**
		Extends Paired Carrier+™ up to **30Mbps**
		Extends Paired Carrier+™ up to **40Mbps**
		Extends Paired Carrier+™ up to **50Mbps**
		Extends Paired Carrier+™ up to **60Mbps**
		Extends Paired Carrier+™ up to **80Mbps**
		Extends Paired Carrier+™ up to **100Mbps**
		Extends Paired Carrier+™ up to **200Mbps**
Terrestrial Interfaces		**Optical Gigabit Ethernet/OC-3:** Small Form-factor Pluggable module; supports single-mode & multi-mode fibre & all wavelengths; supports all standard fibre connector types such as SC & LC (subject to provision of suitable SFP transceiver module)
		Quad ASI: 4xBNC 75Ω sockets
Ruggedisation		Ruggedises the modem for harsh environments (fans with higher airflow, heatsinks on key components, etc.)
DVB-CID		**DVB Carrier ID:** Tx carrier identification per ETSI 103 129
DC Input		**24V DC: K3023** 24V DC primary power input (in place of 100 to 240V AC input)
		48V DC: K3018 48V DC primary power input (in place of 100 to 240V AC input)
BUC PSU		**AC In & 24V Out: P3543** AC input, 24V 200W DC to Tx BUC
		AC In & 48V Out: P3544 AC input, 48V 200W DC to Tx BUC
		48V In & 24V Out: P3545 Floating 48V DC input; +24V 200W DC to Tx BUC
		48V In & 48V Out: P3546 Floating 48V DC input; +48V 200W DC to Tx BUC
		+48V In & 48V Out: P3547 +48V DC input; +48V 200W DC to Tx BUC