EL470
IP Satellite Modem
Elevation Product Family

Description

The EL470 is a state-of-the-art satellite modem designed for the transmission and reception of IP streams over satellite at rates of up to 133 Mbit/s in full compliance with the DVB standards. The EL470 modem connects directly to terrestrial IP network infrastructures via a single auto-switching Gigabit Ethernet interface

The EL470 comes with several hardware and software options and can be used in Point-to-Point links as well as in Point-to-Multi Point networks. It is compatible with a wide range of encapsulation protocols, among which data piping, MPE, ULE and Newtec's XPE (Extended Performance Encapsulation). The EL470 is capable of receiving DVB-S2 Multi-stream and VCM signals and can optionally transmit in Multi-stream or in VCM mode.
For maximum bandwidth efficiency an ease of operation, the EL470 has an embedded point-to-point FlexACM controller option that allows to automatically and dynamically adapt its uplink modulation parameters in function of the link condition. The FlexACM client option provides the modulator/modem on the other side of the satellite link with feedback on the conditions of the received signal. When two modems both equipped with the FlexACM controller and client options are connected to each other, they negotiate automatically and dynamically their configuration parameters in both directions.

At the output of the modulator, the signal is available on an L-band interface. IF-band as well as DC power supply and reference frequency are available as configuration options, providing a compact and cost effective solution.

The EL470 has a dual L-band input (950-2150 MHz). The active input is selected by the user and can provide DC power and frequency band selection signals compatible with most professional and commercial LNBs. Optionally, one L-band input can be replaced by an IF (50-180 MHz) input.

The integrated Noise & Distortion Estimator (NoDE) tool provides an accurate reading of the satellite link margin even in presence of non-linear distortion and allows the user to find the optimum input back-off setting very easily for 16APSK or 32APSK operation, whether or not non-linear predistortion is applied .

Key features

- DVB-S2 and DVB-DSNG/S compliant
- QPSK, 8PSK, 16APSK and 32APSK
- XPE, ULE, MPE, data piping encapsulation
- Data rates up to 133 Mbit/s in each direction
- Adaptive equaliser (demodulator input)
- L-band monitoring output
- Programmable amplitude slope equalizer (L-band output)

- Noise & Distortion Estimator (NoDE) tool
- Multi-stream, VCM and ACM reception
- Optional embedded point-to-point ACM controller and ACM client (FlexACM)
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Featured-based pricing and software upgradability

Main advantages

- Lower operational costs thanks to highest bandwidth efficiency
- Highest bandwidth efficiency through the most efficient IP encapsulation protocols.
- Integrated hardware and software offering for end-to-end solution
- High compactness
- High versatility and flexibility

Applications

- Corporate networks
- Backhauling for cellular networks
- IP trunking backbone

Related products

EL170 IP satellite modulator
EL178 High speed IP satellite modulator
EL478 High speed IP satellite modem
EL940 IP satellite receiver
EL970 IP satellite demodulator
EL978 High speed IP satellite demodulator

EL8xx Protocol Enhancement Proxy IP appliances

AZ7x0 Frequency converters

AZ200 Universal Switching System

Related Documents
White paper Equalink ™

Input/output interface

- Auto switching 10/100/1000 Base-T Ethernet interface
- Maximum rate: 133 Mbit/s in each direction, or 200 Mbit/s Tx+Rx or 67,000 packets per second Tx + Rx
- Layer 2 bridge mode: Ethernet frames over satellite
- Layer 3 bridge or router mode: IP packets over satellite
- Supported encapsulation modes:
  - Data piping
  - Ultra Lightweight Encapsulation (ULE)
  - Multi Protocol Encapsulation (MPE):
  - Extended Performance Encapsulation (XPE) -Newtec's highly efficient IP encapsulation protocol for the encapsulation of IP frames in DVB-S2 base band frames
- Filtering and routing capabilities (uplink):
  - Up to 32 VLANs filters
  - Up to 255 MAC filters
  - Up to 255 IP routes/air-MAC addresses
  - Up to 32 PIDs
    Up to 16 DVB-S2 Streams (with Multi-stream option)
- Data filtering (downlink):
  - up to 32 streams in DVB-S2 Multi-stream
  - up to 32 configurable PID filters
  - one air MAC address filter per PID or stream
- Proxy ARP support
- Embedded point-to-point ACM controller (optional)
- ACM client (optional)

Modulation and demodulation

Supported modulation schemes and FEC
- DVB-S/DSNG: Outer/Inner FEC: Reed Solomon / Viterbi
  MODCODs: QPSK:1/2, 2/3,3/4, 5/6, 7/8; 8PSK: 2/3, 5/6; 16QAM: 3/4, 7/8
- DVB-S2: Outer/Inner FEC: BCH/ LDPC
  MODCODS: 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

Baud rate range
- DVB-S2
  - QPSK/8PSK   0,256 – 45 Mbaud
  - 16APSK/32APSK   0,256 – 30 Mbaud
- DVB-S/DSNG
  - QPSK/8PSK/16QAM   1 - 45 Mbaud

Frame length
- DVB-S2 Short Frames   16200 bits
- DVB-S2 Normal Frames   64800 bits
- DVB-S/DSNG   188 bytes
(Mixing of normal frames & short frames not possible in Multi-stream)

Roll-off factor
- 20 % - 25 % - 35 %

Modulator interface

L-band output (default):
- Connector   SMA (F), 50 ohms
- Level   -50/-7 dBm (+/- 2dB)
- Frequency   950 - 1750 MHz (50 Hz steps)
- Return loss   > 10 dB

IF-band (optional):

- Connector   BNC (F) - 75 ohms (intermateable with 50 ohms)
- Level   -30/+5 dBm (± 3 dB)
- Frequency   50 - 180 MHz (50 Hz steps)
- Return loss   50 ohms : > 14 dB
                 75 ohms : > 20 dB

L-band monitoring output (default):
- Connector   SMA (F), 50 ohms
- Level   -45 dBm
- Frequency   1080 MHz (fixed frequency)
- Return loss   > 7 dB

BUC power and reference frequency (optional)
- max. current   1,5 A
- voltage   24V
- frequency   10MHz
- stability   ±5x10-8 over 0°C to 65°C

Spurious performance
- better than - 65 dBc @ -10 dBm output level

10 MHz reference input / output (optional)
- Connector   BNC (F) – 50 ohms
- Input level   -3dbm up to 7dBm
- Output level   +7dBm

Demodulator interface

Dual L-band input
- Connector   2 x F-type (F), 75 Ohms
- Level   -65/-25dBm
- Frequency   950 - 2150 MHz
- Return loss   > 7 dB (75 Ohm – F(F))
- Adjacent signal < (Co+7) dBm/Hz with Co = signal level density

IF-band input (optional, replaces one L-band input)
- Connector   BNC (F) - 75 ohms
- Level   -55 to -15 dBm
- Frequency   50 - 180 MHz
- Return loss   > 15 dB (75 ohms – BNC(F))
- Adjacent signal < (Co+7) dBm/Hz with Co = signal level density

LNB power and control
- max. current   350 mA (on selected IFL input)
- voltage   11,5 -14 V (Vertical polarization) 16 -19 V (Horizontal polarization) & additional 22 kHz +/- 4KHz (band selection according to universal LNB for Astra satellites & DiSEqC command transmission)

DVB-S2 performances at PER 1E-5

Config	Short Frames < 15 Mbaud Es/No	Normal Frames < 45 Mbaud Es/No
QPSK- 1/3	-0.6	-0.7
QPSK- 2/5	0.4	0.2
QPSK- 1/2	1	1.4
QPSK- 3/5	3.1	2.8
QPSK- 2/3	3.8	3.6
QPSK- 3/4	4.5	4.3
QPSK- 4/5	5.1	5.1
QPSK- 5/6	5.8	5.5
QPSK- 8/9	6.7	6.6
QPSK- 9/10	-	6.7
8PSK- 3/5	6.5	6.3
8PSK- 2/3	7.4	7.1
8PSK- 3/4	8.6	8.4
8PSK- 5/6	10.2	9.7
8PSK- 8/9	11.4	11.1
8PSK- 9/10	-	11.3
16APSK- 2/3	9.9	9.6
16APSK- 3/4	10.9	10.5
16APSK- 4/5	11.6	11.5
16APSK- 5/6	12.4	12.1
16APSK- 8/9	13.6	13.3
16APSK- 9/10	-	13.6
32APSK-3/4	-	13.6
32APSK-4/5	-	14.5
32APSK-5/6	-	14.9
32APSK-8/9	-	16.1
32APSK-9/10	-	16.5

DVB DSNG/S performances at BER 1E-7 after RS

Config	< 20 Mbaud Eb/No	> 20 Mbaud Eb/No
QPSK- 1/2	3.9	3.9
QPSK- 2/3	4.4	4.5
QPSK- 3/4	4.9	5.1
QPSK- 5/6	5.4	5.8
QPSK- 7/8	5.8	6.4
8PSK- 2/3	6.3	6.5
8PSK- 5/6	8.3	8.8
8PSK- 8/9	8.8	9.8
16QAM - 3/4	8.4	8.6
16 QAM- 7/8	10.1	11.1

Generic

Monitor and control interfaces
- Web server GUI (HTTP) via web browser
- Diagnostics report, alarm log (HTTP)
- RMCP over TCP-IP/UDP and RS232/RS485
- SNMP v.2c/MIB

Alarm interface
- Electrical dual contact closure alarm contacts
- Connector 9-pin sub-D (F)
- Logical interface and general device alarm

Physical

- 1RU, width: 19", depth 51 cm, 6 kg
- Power supply: 90-130 & 180-260 Vac, 105 VA, 47-63 Hz
- Temperature
  - Operational: 0°C to 40°C
  - Storage: -40 to +70°C
- Humidity: 5% to 85% non-condensing
- CE label

Ordering information

EL470 IP SATELLITE MODEM		Order n°
Default Configuration		
DVB-S/DVB-DSNG/DVB-S2 IP modem with GbE interface, data piping, MPE, ULE and XPE encapsulator, L-band (950 - 2150 MHz) demod input, SNMP Output interface Modulator: L-band (950 - 1750 MHz) Modulation & Baud rate modulator: QPSK-8PSK 5Mbaud Modulation & Baud rate demodulator: QPSK-8PSK 30Mbaud		EL470
Configuration options Category Max. 1 option per category		
Modulator Output Interface	L-band (950-1750 MHz)	Default
	IF (50-180 MHz)	AA-02
	L-band + 10MHz for BUC	AA-03
	L-band + 10MHz + 24Vdc for BUC	AA-04
Demodulator Input Interface	L-band	Default
	IF + L-band	AJ-03
Modulation & Baud rate	QSPK-8PSK 5Mbaud	Default
	QPSK-8PSK 15Mbaud *	AB-06
	QPSK-8PSK 30Mbaud *	AB-07
	QPSK-8PSK 45Mbaud *	AB-08
	QSPK- 8PSK-16APSK 5Mbaud *	AB-09
	QSPK- 8PSK-16APSK 15Mbaud *	AB-10
	QSPK- 8PSK-16APSK 30Mbaud *	AB-11
	Q/8PSK-16APSK-32APSK 5Mbaud*	AB-13
	Q/8PSK-16APSK-32APSK 15Mbaud*	AB-14
	Q/8PSK-16APSK -32 APSK 30Mbaud *	AB-15
Demodulation & Baud rate	QSPK-8PSK 30Mbaud	Default
	QSPK-8PSK 45Mbaud *	AL-08
	QSPK- 8PSK-16APSK 30Mbaud *	AL-11
	Q/8PSK-16APSK -32APSK 30Mbaud *	AL-15
Additional options Category Max. 1 option per category		
10MHz reference In/Out	Internal reference : 1ppm	GR-01
	Internal reference : 0,01 ppm	GR-02
Predistortion	Equalink *	AC-01
VCM	Multi-stream VCM (uplink)*	AN-01
ACM	FlexACM client *	AR-04
	Point-to-Point FlexACM controller & client*	AR-03

(*) upgradeable via license key
Other configurations and options are available upon request.
Contact your sales representative for details (sales@newtec.eu)