

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 dual 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: data piping, MPE, ULE, GSE (Generic Stream Encapsulation) and Newtec's XPE (Extended Performance Encapsulation).

The EL470 is capable of receiving DVB-S2 Multistream and VCM signals and can optionally transmit in VCM mode. For maximum bandwidth efficiency, the EL470 can also be used in Adaptive Coding and Modulation (ACM) mode, modifying the modulation parameters dynamically in function of the link conditions. The modem incorporates the renowned FlexACM® technology which fully optimizes the satellite link at optimal availability.

At the output of the modulator, the signal is available on an L-band interface. Extended L-band, IF-band as well as BUC 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. 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 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 .

Clean Channel Technology™ is available on the EL470 IP modulator as an option. Clean Channel Technology™ further improves satellite efficiency by up to 15% compared to the current DVB-S2 standard. Newtec's customers will be able to immediately benefit from Clean Channel Technology, as it is available as a software field upgrade for existing Newtec equipment.

Key features

- DVB-S2 and DVB-DSNG/S compliant
- QPSK, 8PSK, 16APSK and 32APSK
- XPE, GSE, MPE, ULE 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
- DVB-S2 Multistream
- Optional extended L-band
- 2 Mbaud for low rate applications
- Optional VCM and ACM operation
- Optional embedded point-to-point ACM controller and ACM client (FlexACM®)

- Switchable BUC power supply on L-band output
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Optional AES encryption
- Optional Clean Channel Technology™

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
- Secure and encrypted satellite transmissions
- High versatility and flexibility
- Fit for operations over Inclined Orbit Satellites

Applications

- Corporate networks
- IP Backhauling
- IP Trunking and Backbone
- Government and Defence networks

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

AZ2xx Universal Switching System

Related Documents

White paper Equalink™
 White paper optimization of satellite capacity
 Care Pack Brochure
 Reference cases
 Application notes



SHAPING THE FUTURE OF SATELLITE COMMUNICATIONS

Specifications – EL470(R9)



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 encapsulation protocol for the encapsulation of Ethernet/IP frames in DVB-S2 Base-Band frames
 - Generic Stream Encapsulation (GSE)
- Filtering and routing capabilities (uplink):
 - Up to 32 VLAN filters
 - Up to 255 MAC filters
 - Up to 255 IP routes/air-MAC addresses
 - Up to 256 PIDs
 - Up to 16 DVB-S2 Streams
- Data filtering (downlink):
 - up to 32 streams in DVB-S2 Multistream
 - up to 32 configurable PID filters
 - one air MAC address filter per PID or stream
- Proxy ARP support
- Base Band Frame Input/Output (Optional)
- AES 64 bit encryption

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, 8/9
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
- Support DVB-S2 VCM mode
- Embedded point-to-point FlexACM controller (optional)
- FlexACM client (optional)

Baud rate range

- DVB-S2
QPSK/8PSK 0,256 – 45 Mbaud
16APSK/32APSK 0,256 – 33 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

Roll-off factor

- 20% - 25% - 35%

Clean Channel Technology™

- * Roll-Off: 5%-10%-15%-20%-25%-35%
- * Optimum carrier spacing
- * Advanced filter technology

Modulator interface

L-band output (default):

- Connector SMA (F), 50 ohms
- Return loss > 14 dB
- Level -35/+5 dBm (+/- 2dB)
- Frequency 950 - 1750 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ +5 dBm level and > 256 kbaud

Extended L-band output (optional)

- Connector SMA (F), 50 ohms
- Return loss > 14 dB
- Level -35/+5 dBm (+/- 2dB)
- Frequency 950 - 2150 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ +5 dBm level and > 256 kbaud

IF-band (optional):

- Connector BNC (F) - 75 ohms (intermateable with 50 ohms)
- Return loss 50 ohms: > 14 dB
75 ohms: > 20 dB
-30/+5 dBm (± 3 dB)
- Level
- Frequency 50 - 180 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ -10 dBm level and > 256 kbaud

L-band monitoring output (default):

- Connector SMA (F), 50 ohms
- Return loss > 7 dB
- Level -45 dBm
- Frequency default: identical to L-band output.
with options AA-02: 1080 MHz

BUC power and reference frequency (optional)

- max. current 3 A
- voltage 24V, 48V
- frequency 10MHz
- stability ±5x10-8 over 0°C to 65°C

With this option installed, the L-band output connectors become N(F), 50 ohms

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
- Return loss > 7 dB (75 Ohm - F(F))
- Level -65/-25dBm
- Frequency 950 - 2150 MHz
- 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
- Return loss > 15 dB (75 ohms - BNC(F))
- Level -55 to -15 dBm
- Frequency 50 - 180 MHz
- 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

Confg	Short Frames		Normal Frames	
	< 15 Mbaud	< 45 Mbaud	Es/No	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

Confg	< 20 Mbaud		> 20 Mbaud	
	Eb/No	Eb/No	Eb/No	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	-	-
16QAM-7/8	10.1	11.1	-	-

Generic

Monitor and control interfaces

- Web based GUI
- Diagnostics report, alarm log
- RMCP over TCP-IP/UDP and RS232/RS485
- SNMP v2c

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°
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Default Configuration

DVB-S/DVB-DSNG-DVB-S2 IP modem with GbE interface, data piping, MPE, ULE, GSE and XPE encapsulation, Multistream CCM, L-band (950 - 2150 MHz) demod input, SNMP Output interface Modulator: L-band (950 - 1750 MHz) Modulation & Baud rate modulator: QPSK-8PSK 2Mbaud Modulation & Baud rate demodulator: QPSK-8PSK 5Mbaud	EL470
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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-12
	L-band + 10MHz + 48Vdc for BU	AA-13
Demodulator Input Interface	Extended L-band (950 - 2150 MHz)	AA-18
	dual L-band	Default
Modulation & Baud rate	QPSK-8PSK 2Mbaud	Default
	QPSK-8PSK 5Mbaud*	AB-05
	QPSK-8PSK 15Mbaud*	AB-06
	QPSK-8PSK 33Mbaud*	AB-07
	QPSK-8PSK 45Mbaud*	AB-08
	QPSK-8PSK-16APSK 2Mbaud*	AB-16
	QPSK-8PSK-16APSK 5Mbaud*	AB-09
	QPSK-8PSK-16APSK 15Mbaud*	AB-10
	QPSK-8PSK-16APSK 33Mbaud*	AB-11
	Q/8PSK-16APSK PtP FlexACM control 2Mbaud*	AB-22
	Q/8PSK-16APSK PtP FlexACM control 5Mbaud*	AB-23
	Q/8PSK-16APSK PtP FlexACM control 15Mbaud*	AB-24
	Q/8PSK-16APSK PtP FlexACM control 33Mbaud*	AB-25
	Q/8PSK-16/32APSK PtP FlexACM control 2Mbaud*	AB-12
	Q/8PSK-16/32APSK PtP FlexACM control 5Mbaud*	AB-19
	Q/8PSK-16/32APSK PtP FlexACM control 15Mbaud*	AB-20
	Q/8PSK-16/32APSK PtP FlexACM control 33Mbaud*	AB-21
Demodulation & Baud rate	All Modcods, BBInterface (for use with EL860)*	AR-01
	QPSK-8PSK 5Mbaud	Default
	QPSK-8PSK 33Mbaud*	AL-07
	QPSK-8PSK 45Mbaud*	AL-08
	QPSK-8PSK-16APSK 5Mbaud*	AL-09
	QPSK-8PSK-16APSK 33Mbaud*	AL-11
	QPSK-8PSK-16APSK 45Mbaud*	AL-12
	Q/8PSK-16APSK FlexACM Client 5Mbaud*	AL-13
	Q/8PSK-16APSK FlexACM Client 33Mbaud*	AL-14
	Q/8PSK-16/32APSK FlexACM Client 5Mbaud*	AL-18
Q/8PSK-16/32APSK FlexACM Client 33Mbaud*	AL-20	

Additional options

Category	Max. 1 option per category	
10MHz reference	High stability : 1ppm	GR-01
	In/Out	Very High stability : 0,01 ppm
Encryption/Decryption	AES 64 bit encryption/decryption	AD-01
	Clean Channel Technology™	Clean Channel Technology for 5 Mbaud*
Clean Channel Technology for 15 Mbaud*		AI-02
Clean Channel Technology for 33 Mbaud*		AI-03
Clean Channel Technology for 45 Mbaud*		AI-04
Predistortion	Equalink *	AC-01

Services

Category	Max. 1 option per category	
Assistance	Care Pack Basic	GA-06
	Care Pack Extended	GA-07

(* upgradeable via license key
Other configurations and options are available upon request.
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