

# EL170

## IP Satellite Modulator

### Elevation Product Family

ELEVATION

#### Description

The EL170 is a state-of-the-art satellite modulator designed for IP applications over satellite in full compliance with the DVB standards. As a real IP product, this modulator performs IP processing functions such as packet filtering, routing and encapsulation. Depending on the applications and the activated features, the EL170 can be used in conjunction with consumer satellite IP receiving devices, professional IP receivers such as the EL940, or professional satellite IP demodulators such as the EL970.

The EL170 offers a dual auto-switching Gigabit Ethernet interface and integrates seamlessly with terrestrial IP networks and equipment. The incoming IP packets can be filtered using e.g. VLAN or MAC addresses, transmitted transparently (data piping mode) or routed to several receiving points and destination addresses. Several routing and addressing mechanisms can be used and even combined:

- Routing to the MAC address of the IP receivers, using Multi-Protocol (MPE) or Ultra Light (ULE) encapsulation, or with the more efficient Extended Performance (XPE) or Generic Stream (GSE) Encapsulation.
- Addressing using several PIDs (MPE or ULE only)
- Addressing using several stream identifiers (with the DVB-S2 Multistream mode)

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.

For maximum bandwidth efficiency, the EL170 can also be used in Adaptive Coding and Modulation (ACM) mode, modifying the modulation parameters dynamically in function of the link conditions. The optional Base-Band Frame input option allows the EL170 to work with the external EL860 Bandwidth Manager. The modulator incorporates the renowned FlexACM® technology which fully optimizes the satellite link at optimal availability.

When activated, the unique linear and non-linear predistortion option Equalink™ provides an additional link margin improvement of up to 2dB, truly unleashing the full efficiency of higher modulation schemes such as 16 and 32 APSK.

Combining new innovative features and advanced data encapsulations protocols with DVB-S2 technology, the EL170 ensures the highest bandwidth efficiency available on the market.

Clean Channel Technology™ is available on the EL170 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, ULE, MPE, data piping, encapsulation
- Data rates up to 133 Mbit/s
- L-band monitoring output

- Programmable amplitude slope equalizer
- DVB-S2 Multistream
- Switchable BUC power supply on L-band output
- Optional Extended L-band
- Optional VCM and ACM operation (FlexACM®)
- 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 and lowest IP encapsulation overhead
- Integrated hardware and software offering for end-to-end solution
- Easy integration with terrestrial IP networks and routers
- High versatility and flexibility
- Secure and encrypted satellite transmissions

#### Applications

- IP trunking and backbone
- Corporate networks
- Primary distribution of IPTV
- IP Backhauling
- Government and Defence networks

#### Related products

EL178 High speed IP satellite modulator  
EL470 IP satellite modem  
EL478 High speed IP satellite modem  
EL940 IP satellite receiver  
EL970 IP satellite demodulator  
EL978 High speed IP satellite demodulator  
EL501 Elevation IP Hub  
EL860: Bandwidth Manager

AZ7x0 Frequency converters  
AZ200/AZ202 Universal Switching System  
AZ210 1+1 Modulator Redundancy Switch

#### Related Documents

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



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# Specifications – EL170 (R9)



## Input interface

- Auto switching 10/100/1000 Base-T Ethernet interface
- Maximum rate: 133 Mbit/s or 67,000 packets per second
- 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:
  - Up to 32 VLAN filters
  - Up to 255 MAC filters
  - Up to 255 IP routes/air-MAC addresses
  - Up to 255 PIDs
  - Up to 16 DVB-S2 Streams
- Proxy ARP support
- Base Band Frame input (optional)
- AES 64 bit encryption

## Modulation

### 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
- VCM support (optional)
- Embedded point-to-point FlexACM controller (optional)

### Baud rate range

- DVB-S2
  - QPSK/8PSK 0,05 – 45 Mbaud
  - 16APSK/32APSK 0,05 – 33 Mbaud
  - (for higher baud rates see EL178)
- DVB-S/DSNG
  - QPSK/8PSK/16QAM 0.05-45 Mbaud

### Frame length

- DVB-S/DSNG 188 bytes
- DVB-S2 Short Frames 16200 bits
- DVB-S2 Normal Frames 64800 bits

### Roll-off factor

- 20 % - 25 % - 35 %

### Clean Channel Technology™

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

## Output interfaces

### 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
- Level -30/+5 dBm (± 3 dB)
- Frequency 50 - 180 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ -10 dBm level and > 256 kbaud

### L-band+IF (optional)

- L-band: -30/+0 dBm (+/-3dB) output level
- IF: fixed 70 or 140 MHz frequency  
-34/+1 dBm (+/- 3 dB) output level

### 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 / AA-06: 1080 MHz
- spurious: better than -65 dBc/4 kHz @ -10 dBm level and > 256 kbaud

### BUC power and reference frequency (optional)

- max. current 3 A
- voltage 24V, 48V
- frequency 10MHz
- stability ±5x10<sup>-8</sup> 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

## Internal Reference frequency

### High Stability (optional)

- Stability ±5x10<sup>-8</sup> over 0°C to 70°C
- Ageing: ± 15 ppb/day  
± 300 ppb/year

### Very High Stability (optional)

- Stability ±2x10<sup>-9</sup> over 0°C to 65°C
- Ageing: ± 0.5 ppb/day  
± 500 ppb/10 year

## 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

EL170 IP SATELLITE MODULATOR		Order n°
<b>Default Configuration</b>		
DVB-S/DVB-DSNG-DVB-S2 IP modulator with GbE interface, data piping, MPE, ULE, GSE and XPE encapsulator, CCM, Multistream, SNMP Modulation & Baud rate: QPSK-8PSK, 5Mbaud Output interface: L-band (950 -1750 MHz)		EL170
<b>Configuration options</b>		
Category	Max. 1 option per category	
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
	Extended L-band (950 - 2150 MHz)	AA-18
Modulation & Baud rate	IF+ L-band	AA-06
	QPSK-8PSK 5Mbaud	Default
	QPSK-8PSK 15Mbaud *	AB-06
	QPSK-8PSK 33Mbaud *	AB-07
	QPSK-8PSK 45Mbaud *	AB-08
	QPSK- 8PSK-16APSK/QAM 5Mbaud *	AB-09
	QPSK- 8PSK-16APSK/QAM 15Mbaud *	AB-10
	QPSK- 8PSK-16APSK/QAM 33Mbaud *	AB-11
	Q/8PSK-16APSK/QAM-32APSK 5Mbaud*	AB-13
	Q/8PSK-16APSK/QAM-32APSK 15Mbaud*	AB-14
Q/8PSK -16APSK/QAM-32APSK 33Mbaud *	AB-15	
All Modcods, BBFinput (for use with EL860)*	AR-01	
<b>Additional options</b>		
Category	Max. 1 option per category	
10MHz reference In/Out	High stability: 1ppm	GR-01
	Very high stability : 0.01 ppm	GR-02
Encryption	AES 64 bit encryption	AG-01
	Clean Channel Technology for 5 Mbaud*	AI-01
	Clean Channel Technology for 15 Mbaud*	AI-02
	Clean Channel Technology for 33 Mbaud*	AI-03
Predistortion	Clean Channel Technology for 45 Mbaud*	AI-04
	Equalink *	AC-01
VCM/ACM	VCM*	AN-01
<b>Services</b>		
Category		
Assistance	Care Pack Basic	GA-06
	Care Pack Extended	GA-07

(\*) upgradeable via license key  
Other configurations and options such as RF output interfaces, are available on request,  
Contact your sales representative for details (sales@newtec.eu).

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