EL478
High Speed IP Satellite Modem
Elevation Product Family

ELEVATION

Description

The EL478 is a state-of-the-art satellite modem optimized for high speed IP applications over satellite in compliance with the DVB-S2 standard. As a real IP product, this modem performs IP processing functions such as packet filtering, routing and encapsulation. In order to achieve speeds up to 160 Mbit/s, only the fastest and most bandwidth-efficient encapsulation and modulation parameters are supported.

The EL478 offers a dual auto-switching Gigabit Ethernet interface to transmit and receive simultaneously IP packets (or Ethernet frames) over satellite. The modem integrates seamlessly with terrestrial IP networks and equipment. Incoming IP packets can be filtered using VLAN or MAC addresses, transmitted transparently (bridging)) or routed to several destination addresses using Newtec's Extended Performance (XPE) encapsulation.

The EL478 is capable of receiving DVB-S2 Multistream, VCM or ACM signals and can optionally transmit in VCM mode. For maximum bandwidth efficiency, the EL478 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.

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.

On the receive side, the EL478 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. An adaptive equalizer compensates linear distortion of the transmission channel and 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 EL478 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 compliant
- QPSK, 8PSK, 16APSK and 32APSK
- XPE encapsulation
- Data rates up to 160 Mbit/s
- L-band monitoring output
- Programmable amplitude slope equalizer
- Noise & Distortion Estimator (NoDE) tool
- Multistream, VCM and ACM reception
- Optional switchable BUC power supply on L-band output
- Optional Extended L-band

- Optional embedded point-to-point FlexACM controller and/or client (FlexACM®)
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Optional AES encryption
- Optional Clean Channel Technology™

Main advantages

- Enables high speed IP links over satellite
- Lower operational costs thanks to highest bandwidth efficiency
- 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

- Backbone / Leased line in the sky
- IP trunking for ISP's, WiMax
- Corporate networking
- Government and Defence networks

Related products

EL170 IP satellite modulator
EL178 High speed IP satellite modulator
EL470 IP satellite modem
EL940 IP satellite receiver
EL970 IP satellite demodulator
EL978 High speed IP satellite demodulator

EL8xx Protocol Enhacement Proxy IP appliances
EL860 Bandwidth Manager

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

Newtec

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Specifications – EL478 (R9)

Input/output interface

- Auto switching 10/100/1000 Base-T Ethernet interface
- Maximum rates: 160 Mbit/s in each direction, or 78,000 packets per second Tx + Rx
- Layer 2 bridge mode: Ethernet frames over satellite
- Layer 3 bridge or router mode: IP packets over satellite
- Encapsulation: Extended Performance Encapsulation (XPE) -Newtec's highly efficient encapsulation protocol for the encapsulation of Ethernet/IP frames in DVB-S2 Base-Band frames
- 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 16 DVB-S2 Streams
- Data filtering (downlink):
    - Up to 16 ISI/AirMAC filters
- Proxy ARP support
- AES 64 bit encryption

Modulation and demodulation

Supported modulation schemes and FEC
- DVB-S2:
    Outer/Inner FEC: BCH/ LDPC
    MODCODS:
    QPSK: 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
- Embedded point-to-point FlexACM controller (optional)
- Support of DVB-S2 VCM mode (demod)
- FlexACM client (optional)

Baud rate range
- DVB-S2
    QPSK/8PSK/16APSK   0,256 – 45 Mbaud
    32APSK   1 – 33 Mbaud

Frame length
- 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

Modulator 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 Ohm (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 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 interfaces

Dual L-band input (default)
- 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
- 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

Config	Normal Frames < 45 Mbaud Es/No		Config	Normal Frames < 45 Mbaud Es/No
QPSK- 1/2	1.4		16APSK- 2/3	9.6
QPSK- 3/5	2.8		16APSK- 3/4	10.5
QPSK- 2/3	3.6		16APSK- 4/5	11.5
QPSK- 3/4	4.3		16APSK- 5/6	12.1
QPSK- 4/5	5.1		16APSK- 8/9	13.3
QPSK- 5/6	5.5		16APSK- 9/10	13.6
QPSK- 8/9	6.6		32APSK-3/4	13.6
QPSK- 9/10	6.7		32APSK-4/5	14.5
8PSK- 3/5	6.3		32APSK-5/6	14.9
8PSK- 2/3	7.1		32APSK-8/9	16.1
8PSK- 3/4	8.4		32APSK-9/10	16.5
8PSK- 5/6	9.7			
8PSK- 8/9	11.1			
8PSK- 9/10	11.3			

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

EL478 HIGH SPEED IP SATELLITE MODEM			Order n°
Default Configuration			
DVB-S2 IP modem with GbE interface, QPSK, 8PSK, 16APSK 45Mbaud, 32APSK 33 Mbaud, XPE encapsulator, CCM, Multistream, L-Band (950-2150 MHz) demod input, SNMP Output interface Modulator: L-band (950 - 1750 MHz)			EL478
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 BUC		AA-13
	Extended L-band (950-2150 MHz)		AA-18
Demodulator Input Interfaces	dual L-band		Default
	IF + L-band (only with IF Mod Output)		AJ-03
Additional options Category	Max. 1 option per category		
10MHz reference In/Out	High stability : 1ppm		GR-01
	Very High stability : 0,01 ppm		GR-02
Encryption/ Decryption	AES 64 bit encryption/decryption		AD-01
Clean Channel Technology™	Clean Channel Technology for 5 Mbaud*		AI-01
	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
ACM (Rx)	FlexACM client*		AR-04
VCM/ACM(Tx)	VCM + Point-to-Point FlexACM controller*		AR-03
Services Category			
Assistance	Care Pack Basic		GA-06
	Care Pack Extended		GA-07

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