**EL978**  
**High Speed IP Satellite Demodulator**  
**Elevation Product Family**  

**Description**  
The EL978 is a state-of-the-art satellite demodulator optimized for the reception of high speed IP applications over satellite in full compliance with the DVB-S2 standard. In order to achieve speeds up to 160 Mbit/s, only the fastest and most bandwidth-efficient encapsulation and modulation parameters are supported.

The EL978 can be used in high speed Point-to-Point backbone links or in star IP trunking configurations, in conjunction with the high speed satellite IP modulator EL178 at the uplink side.

The EL978 offers an auto-switching Gigabit Ethernet interface and integrates seamlessly with terrestrial IP networks and equipment. The data received from the satellite must be encapsulated with Newtec’s XPE (Extended Performance Encapsulation) protocol, a highly efficient system to transmit IP data in DVB-S2.

For maximum bandwidth efficiency, the optional FlexACM client allows the EL978 to provide feedback on the link condition to an FlexACM controller located at the uplink site, so that the modulation parameters can be adapted automatically and dynamically.

The EL978 supports the DVB-S2 Multistream mode, allowing the IP traffic to be divided in several streams, each stream being transmitted with its own identifier. When the Variable Coding and Modulation (VCM) mode is activated, each stream can be transmitted with its own set of modulation parameters, further optimizing the transmission efficiency when different streams are intended to different types of receiving sites.

The EL978 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 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 compliant  
- QPSK, 8PSK, 16APSK and 32APSK  
- Data rates up to 160 Mbit/s  
- XPE encapsulation  
- Multistream and VCM support  
- Adaptive equaliser  
- Optional ACM client (FlexACM)  
- Noise & Distortion Estimator (NoDE) tool  
- Optional 10 MHz reference input/output

**Main advantages**  
- Enables high speed IP links over satellite  
- Lower operational costs thanks to highest bandwidth efficiency  
- Easy integration with terrestrial IP networks and routers  
- High versatility and flexibility

**Applications**  
- Backbone / Leased line in the sky  
- IP trunking for ISPs  
- Backhauling for WiMax

**Related products**  
- EL170 IP satellite modulator  
- EL178 High speed IP satellite modulator  
- EL470 IP satellite modem  
- EL478 High speed IP satellite modem  
- EL940 IP satellite receiver  
- EL970 IP satellite demodulator  
- EL8xx Protocol Enhancement Proxy appliances  
- EL860 ACM Controller, Shaper and Encapsulator (CSE)  
- AZ7x0 Frequency converters  
- AZ290 1+1 Demodulator Redundancy Switch  
- AZ200 Universal Switching System

**Related Documents**  
- White paper optimization of satellite capacity  
- Care Pack Brochure  
- Reference cases
Input interface

**Dual L-band input (default)**
- Connector: 2 x F-type (F), 75 ohms
- Return loss: > 7 dB
- Level: -65/-25dBm
- Frequency: 950 - 2150 MHz
- Adjacent signal: < (Co+7) dBm/Hz
  where 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
  where 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)
- 10 MHz reference

**Demodulation**

**Supported modulation schemes and FEC**
- DVB-S2:
  - Outer/Inner FEC: BCH/ LDPC
  - MODCODS:
    - QPSK: 1/2, 3/5, 2/3, 3/4, 2/5, 4/7, 5/6, 6/9, 9/10
    - 8PSK: 3/5, 2/3, 4/5, 2/3, 4/7, 5/6, 6/9, 9/10
    - 16APSK: 2/3, 3/4, 4/5, 5/6, 6/9, 9/10
    - 32APSK: 3/4, 4/5, 5/6, 6/9, 9/10
  - CCM, VCM and Multistream support
  - FlexACM client (optional)

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

**Frame length**
- DVB-S2 Normal Frames: 64 800 bit

<table>
<thead>
<tr>
<th>Roll-off factor</th>
<th>Normal Frames</th>
<th>Normal Frames</th>
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**Output interface**
- Auto switching 10/100/1000 Base-T Ethernet interface
- Maximum rate: 160 Mbit/s or 78,000 packets per second
- 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
- Data filtering:
  - up to 32 streams in DVB-S2 Multi-stream
  - one air MAC address filter per stream

**Internal Reference frequency**

**High Stability (optional)**
- Stability: ±5x10^-8 over 0°C to 70°C
- Ageing: ± 15 ppb/day
  ± 300 ppb/year

**Very High Stability (optional)**
- Stability: ±2x10^-9 over 0°C to 65°C
- Ageing: ± 0.5 ppb/day
  ± 500 ppb/year

**Generic**

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

**LNB reference frequency output (optional, only available with L-band)**
- Frequency: 10 MHz
- Stability: ±5x10^-8 over 0°C to 65°C
- Warm up time: 5 min (+/-100ppb)
- Ageing: ± 15 ppb/day
  ± 300 ppb/year

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

**Normal Frames**

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<thead>
<tr>
<th>Modulation</th>
<th>Code Rate</th>
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<tr>
<td>1/2</td>
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<td>3/5</td>
<td>2/3</td>
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<td>2/3</td>
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<td>6/9</td>
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<tr>
<td>6/9</td>
<td>9/10</td>
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**DVB-S2 performances at PER 1E-5**

<table>
<thead>
<tr>
<th>Modulation</th>
<th>Code Rate</th>
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<tbody>
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<td>QPSK</td>
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**Ordering information**

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<tr>
<th>EL978 HIGH SPEED IP SATELLITE DEMODULATOR</th>
<th>Order n°</th>
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<tbody>
<tr>
<td>DVB-S2 IP demodulator with GbE interface, QPSK, 8PSK, 16APSK 45Mbaud, 32APSK 33 Mbaud, XPE Multistream decapsulator, VCM, SNMP</td>
<td>EL978</td>
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**Configuration options**

<table>
<thead>
<tr>
<th>Category</th>
<th>Max. 1 option per category</th>
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<tbody>
<tr>
<td>Input Interface</td>
<td>L-band</td>
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<tr>
<td></td>
<td>L-band + 10MHz</td>
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<tr>
<td></td>
<td>IF + L-band</td>
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<tr>
<td></td>
<td>IF + L-band + 10MHz</td>
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</table>

**Additional options**

<table>
<thead>
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<th>Category</th>
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<tr>
<td>10MHz reference In/Out</td>
<td>High stability: 1ppm</td>
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<tr>
<td></td>
<td>Very high stability: 0.01 ppm</td>
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<tr>
<td>ACM</td>
<td>FlexACM client *</td>
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**Services**

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<tr>
<td>Assistance</td>
<td>Care Pack Basic</td>
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<td></td>
<td>Care Pack Extended</td>
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