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 268, 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 LN Bs. 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

**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 Enhancement 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
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.
- 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, 3/4, 5/6, 6/8, 9/10; 8PSK: 3/4, 5/6, 6/8, 9/10; 16APSK: 3/4, 5/6, 6/8, 9/10; 32APSK: 3/4, 5/6, 6/8, 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**: 3/4, 4/5, 5/6, 8/9, 9/10.

**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 k baud.

**Extended L-band output (optional):**
- **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 k baud.

**IF-band (optional):**
- **Connector**: BNC (F) -75 Ohm (intermateable with 50 ohms).
- **Return loss**: > 14 dB.
- **Level**: 75 ohms.
- **Frequency**: -30/+5 dBm (+/- 3 dB).
- **Spurious**: better than -65 dBc/4 kHz @ -10 dBm level and > 256 k baud.

**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.

**IF-band monitoring output (optional):**
- **Connector**: BNC (F) – 400 ohms.
- **Return loss**: > 14 dB.
- **Level**: -35/+5 dBm.
- **Frequency**: default: identical to IF-band output.

**BUC power and reference frequency (optional):**
- **Max. current**: 3A.
- **Voltage**: 24V, 48V.
- **Frequency**: 10 MHz.
- **Stability**: ±5x10^-8 over 0°C to 65°C.

**Specifications - EL478(R9)**

This brochure is provided for information purposes only. The details contained in this document, including product and feature specifications, are subject to change without notice and shall not bind Newtec in any way.

---

**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.
- **Humidity**: 5% to 85% non-condensing.
- **CE label**

**Ordering information**

**EL478 HIGH SPEED IP SATELLITE MODULATOR**

<table>
<thead>
<tr>
<th>Order n°</th>
<th>Default Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-band (950-1750 MHz)</td>
<td>Default</td>
</tr>
<tr>
<td>IF (50-180 MHz)</td>
<td>AA-02</td>
</tr>
<tr>
<td>L-band + 10 MHz for BUC</td>
<td>AA-03</td>
</tr>
<tr>
<td>L-band + 10 MHz = 2400c for BUC</td>
<td>AA-12</td>
</tr>
<tr>
<td>L-band + 10 MHz = 4800c for BUC</td>
<td>AA-13</td>
</tr>
<tr>
<td>Extended L-band (950-2150 MHz)</td>
<td>AA-18</td>
</tr>
<tr>
<td>Demodulator/Output Interface</td>
<td>dual L-band (only with IF Mod Output)</td>
</tr>
</tbody>
</table>

**Modulator/Output Interface**

**Configuration options**
- **Category**: Max. 1 option per category.

**Additional options**
- **Category**: Max. 1 option per category.
- **10MHz reference In/Out**: High stability: ±1 ppm.
- **Encryption/Decryption**: AES 64 bit encryption/decryption.
- **Clean Channel Technology™**: Clean Channel Technology for 5 Mbaud®.
- **Predistortion Equaliser**: ALC-01.
- **VCM/ACM (Tx)**: FlexACM client®.
- **Services**: Care Pack Basic.
- **Care Pack Extended**.

(*) upgradeable via license key.

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