INTRODUCTION
Comtech EF Data’s SLM-7650 satellite modem is designed to comply with the strict requirements of the Defense Satellite Communications System (DSCS) defined in MIL-STD-188-165. The SLM-7650 also operates with most major commercial satellite systems in the world including Intelsat, Eutelsat, SES Americom, Panamsat, Skynets, Newskies, and others.

The modem is capable of high-level modulation techniques such as 8-phase shift keying (8-PSK) and 16-Quaternary Amplitude Modulation (16-QAM).

Advanced forward error correction (FEC) techniques are implemented. Viterbi, Trellis, Concatenated Reed-Solomon, and Turbo Product Code are available. Turbo coding significantly reduces the inherent decoding delay of Reed-Solomon while providing improved performance over Viterbi or trellis coding.

FEATURES
- MIL-STD-188-165 compliant
- BPSK, OQPSK, QPSK, 8-PSK, 16-QAM
- FEC rates 1/1, 1/2, 3/4, 7/8, 2/3, 5/6, and others
- 9.6 kbps to 20.0 Mbps (code rate dependent)
- Flash upgrade capability
- IDR/IBS Framing only
- Open network overhead terminations (optional circuit card)
- Drop and Insert (D&I) (optional circuit card)
- Closed network overhead capability for:
  - Automatic Uplink Power Control (AUPC)
  - Asynchronous Channel Unit
  - Reed-Solomon Codec
  - Turbo Product Codec (optional circuit card)
- Asymmetrical loop timing
- Clock recovery for input data without an associated transmit clock

APPLICATIONS
The SLM-7650 is the ideal equipment solution when implementing Tri-Band terminals that require both commercial and government communication access.

The modem complies with IESS-310 for 8-PSK over INTELSAT and EUTELSAT satellite networks.

COMPATIBILITY
The SLM-7650 is interoperable with the OM-73, SLM-3650, MD-1352(P)/U (BEM-7650), SLM-8650, and MD-945. The INTELSAT and EUTELSAT open network capabilities provide interoperability with earth stations worldwide.

DATA AND CLOCK
The modem is configured to derive timing from either the data, clock, or a 1, 5, 10 or 20 MHz station clock. The interface type is MIL-STD-188-114 and accepts balanced differential pairs for data and clock. The data and clock also meet the requirements for EIA-422.

OPEN NETWORK FRAMING
The modem provides overhead framing that is compatible with Intelsat specifications IESS-308, IESS-309, and IESS–310, for open network operation. D&I and access to the ESC overhead signals are available with an optional interface card.

ASYNC/AUPC (SLM-7650-02)
An engineering service channel for station-to-station communications or remote control is available by activating the overhead channel. Asynchronous communications at various protocols and baud rates may be configured for either EIA-232 or EIA-485 communications. Seven percent of the data rate is added as overhead for this application.

Automatic Uplink Power Control (AUPC) is available to maintains a desired Eb/No at the demodulator despite link fades due to excessive rain or other power level variations.

REED-SOLOMON CONCATENATED CODING
Uncorrectable burst errors will occur as the threshold BER is approached. The Reed-Solomon FEC can be used to further correct the burst errors resulting in greatly improving the satellite link performance. This allows for either extra link margin or the use of smaller antennas.

TURBO CODING
Turbo coding improves the viability of satellite communication circuits that were previously troublesome due to poor fade margins or excessively low look angles. The SLM-7650 Turbo coding is compatible with Intelsat IESS-315 and Comtech EF Data’s CDM-600.
### SLM-7650 Satellite Modem

#### SYSTEM
- **Operating Frequency Range**: 50 to 90, 100 to 180 MHz, in 1 Hz steps
- **Modulation Types**: BPSK, QPSK, Offset QPSK, 8-PSK, 16-QAM
- **Digital Data Rate**: 9.6 kbps to 20.0 Mbps, in 1 bps steps
- **Symbol Rate**: 9.6 Ks/s to 10 Ms/s
- **External Reference**: 1, 5, 10, or 20 MHz, selectable
- **Internal Reference Stability**: \( \pm 2 \times 10^{-7} \)
- **Scrambling**: V.35 scrambler variations to meet MIL-STD-188-165 and IESS-308, -309, -310.
- **IDR/IBS Framing Compatibility**: Support for IDR and IBS framing. Allows basic IDR/IBS open network operation.
- **Built-in Test (BIT)**: Fault and status reporting, BER performance monitoring, IF loopback, programmable test modes, Tx/Rx 2047 pattern provides and estimated BER.
- **Summary Faults**: Reported via 15-pin sub, FORM C relay contacts for Tx, Rx, Common equipment faults, and Tx and Rx Alarms.

#### MODULATION
- **Output Power**: +5 to -30 dBm, adjustable in 0.1 dB steps
- **Output Return Loss**: 17 dB
- **Output Impedance**: 50 \( \Omega \)
- **Spurious**:
  - 0 to 500 MHz: -5 to -30 dBm
  - -55 dBc
  - 0 to 500 MHz: +5 to -20 dBm
  - -50 dBc >64 kbps
  - 0 to 500 MHz: +5 to -20 dBm
  - -45 dBc <64 kbps
- **Tx Clock Source**:
  - INT, Tx Terrestrial, and Data Source Sync
- **Output Connector**: TNC

#### DEMODULATION
- **Input Power**:
  - Desired Carrier: -15 to -55 dBm
  - Maximum Composite: 0 dBm or +40 dBc
- **Input Impedance**: 50 \( \Omega \)
- **Input Connector**: TNC
- **Carrier Acquisition Range**: \( \pm 35 \text{ kHz} \), selectable
- **Input Return Loss**: 17 dB minimum
- **Buffer Clock**:
  - INT, EXTERNAL, Tx Terrestrial, Rx Satellite
- **Elastic Buffer**: 32 to 1,048,576 bits, selectable

#### CODING OPTIONS
- **Uncoded**: 1/1
- **Viterbi**: \( K = 7 \)
- **Viterbi and Reed-Solomon**: Concatenated
- **Trellis**: Per IESS-310
- **Trellis and Reed-Solomon**: Concatenated
- **TURBO**: Turbo Product Code (TPC)

#### OPEN NETWORK OPTION
- **IDR + Card**: TURBO
- **Hardware**:
  - 37 Pin (F) D connector, EIA-449
  - 25 Pin (F) D connector, EIA-530

#### AVAILABLE OPTIONS

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<th>BER</th>
<th>reed-Solomon</th>
<th>Turbo</th>
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### BER PERFORMANCE

**E_b/N_0, Performance Viterbi Decoder, QPSK**

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### ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS
- **Prime Power**: 90 to 264 VAC, 47 to 63 Hz, (DC optional)
- **Mounting**: 1 RU
- **Size**: 19” W x 19” D x 1.71” H (1 RU)
- **Weight**: < 15 lbs. (6.8 kg)
- **Temperature, Operating**: 0 to 50°C (32 to 122°F)
- **Temperature, Storage**: -40 to +70°C (-40 to 158°F)
- **Humidity**: 0 to 95%, non-condensing

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