MDM6100
Broadcast Satellite Modem (R2.11)

ST Engineering

Description

The MDM6100 Broadcast Satellite Modem is the next generation DVB compliant modem specifically designed for broadcast applications. The modem supports the DVB-S2 and DVB-S2X, next to the legacy DVB-S and DVB-DSNG standards, as well as S2 Extensions in order to achieve barrier-breaking efficiency. The unit can act as a single Transport Stream modulator, demodulator or modem.

As a modulator, it is best suited for broadcast direct-to-home, primary distribution to headends and contribution of television and radio content. As a modem or demodulator, it is typically installed in head-ends or at both sides of a contribution link. The MDM6100 can be used in conjunction with set-top boxes, professional Integrated Receiver Decoders (IRDs) or professional satellite demodulators.

Delivering the highest uptime for vital links

Uptime and reliability are essential in the design of the modem, which plays a vital role in the satellite network. Input source redundancy on ASI or on the GbE ports supporting any IP network configuration and the shortest redundancy switch-over times of modems, operating both in 1+1 and N+1 topologies, are setting the standard in our industry.

Advanced capabilities are built in, such as an MPEG Transport Stream analyser, support of SMPTE 2022 FEC at the GbE inputs (for distributed IP headends) and outputs, and native support of Carrier ID, according to the new DVB standard, as well as in the transport stream NIT Table.

BROADCAST MODEMS

DIALOG

iDIRECT

Markets

Broadcast

This next generation broadcast satellite modem is not just a modem. It's a platform that takes a vital role in your networks, performs the best on the market and helps you evolve your business through ongoing market and technology innovations.

Special care was taken to cope with jittery transport stream over IP inputs. Two input ASI and two output ASI ports can be used as monitoring or operational (redundant) interfaces. The presence of ECM/EMM messages, essential to paid services in DTH constellations, can be monitored and triggers your management system in case of interruptions.

Get the best performance and lower your costs

The broadcast satellite modem performs among the best, offering unmatched bandwidth efficiency optimization options, thereby lowering overall Total Cost of Ownership. The fully automated operation of field-proven Equalink® 3 pre-distortion technology, with its seamless calibration, is now available for any satellite transmission application providing up to 10% bandwidth gains in single carrier per transponder constellations.

Clean Channel Technology®, in combination with DVB-S2X or S2 Extensions, improves satellite efficiency by up to 15%, thereby enabling much smaller carrier spacing.

Maximum symbol rates up to 72 Mbaud and modulations up to 256APSK (DVB-S2X standard) combined with VCM (Variable Coding and Modulation) allow for maximum throughput in large contribution links.

The powerful MPE encapsulator/decapsulator gives access to dual stream communication where live video is combined with file transfer, a service channel or video streaming.

At the output of the broadcast satellite modem, the signal is available in IF or extended L-band (950 MHz - 2150 MHz), providing a compact and cost effective solution. A built-in Ku-band or C-band upconverter is optional. A switchable 10 MHz reference signal and optional 24 Vdc or 48 Vdc for an outdoor BUC is multiplexed on the L-band interface. The demodulator input is dual L-band or 70/140 MHz and single L-band.

The broadcast satellite modem can be easily monitored and controlled via a comprehensive front panel menu, advanced web GUI, as well as via SNMP protocol or RESTful API. This enables easy integration into any industry-standard EMS/NMS system.

Evolve towards tomorrow's technology

Built upon flexible and latest generation programmable technology, the MDM6100 Broadcast Satellite Modem is a future-proof building block that lets any satellite network evolve to the next level of capabilities. A scalable, pay-as-you-grow, licensing and software upgrade mechanism facilitates the launch of new services, or last minute network design changes, without rebuilding the entire network infrastructure. Migration from ASI to GbE and IF to L-band is facilitated by simple in-field installation of license keys.

Migrating standard distribution links towards the new DVB-S2X standard or S2 Extensions is as simple as inserting an MDM6100 modem in the headends, while keeping the installed base of IRDs.

The brand new DVB-CID carrier identifier is already available as a software option on the MDM6100 and DSNG profiles, as defined by WBU-ISOG, and can be easily selected. These profiles define the basic parameters for the most common use cases including the new DVB-S2X standard.

Specifications

Key Features

•Single Transport Stream modem with optional data stream via MPE encapsulation/decapsulation

- Baud rate range: 256 kbaud – 72 Mbaud
- Data rates up to 216 Mbit/s
- IF (70/140) and L-Band (950-2150) high power outputs
- Optional integrated RF upconverter (Ku-band or C-band)
- Demodulator with dual L-Band or selectable IF-or L-band (option) input
- Highest system reliability and service uptime through robust design and industry-leading redundancy solutions
  - Exceptional jitter recovery on TS over IP inputs with SMPTE 2022 FEC
  - Redundant optional ASI or GbE interfaces with support of redundant IP network configurations
  - User configurable alarm table for device redundancy switching
  - Input TS redundancy switch based upon null packet stuffing exceeding a set limit
  - Built-in TS Analyser with
    - TR101 290 priority 1 and 2 error monitoring
    - PID table with rate and PCR jitter measurements
    - Continuity Count error monitoring per PID
  - Receiver Non-Linear Post Compensation (NLPC 2.0) for a better link margin in case of multiple carriers per transponder, reduces intermodulation interference
  - Accurate link margin monitoring through the use of NoDE (Noise & Distortion Estimator) tool
  - RFI reduction using optional DVB RF Carrier ID (DVB-CID) and NIT table CID (default)
  - Input rate recovery based upon PCR timestamps
  - Automatic TS rate adaptation
  - L-band monitoring output
  - Market-leading RF purity and performance
  - Programmable amplitude slope equalizer
  - PRBS generator for link performance tests
  - Output level adjust for cable loss compensation
  - Optional high stability internal clock reference
  - Optional dual AC power supply
- Low Total Cost of Ownership as a result of very high bandwidth efficiency technology options, and ease of monitoring and control
  - DVB-S2X, DVB-S2, DVB-DSNG and DVB-S compliant
  - S2 Extensions
  - QPSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK and 256 APSK
  - Clean Channel Technology provides up to 15% bandwidth efficiency gain on top of the DVB-S2 standard
  - Optional automated Equalink 3 predistortion provides up to 10% bandwidth gains, higher QoS and geographic coverage
  - Selection of DSNG profiles acc. WBU-ISOG including the new DVB-S2X standard
  - Secure front panel, SNMP, HTTP and CLI interfaces
  - Optional PID Activity Monitoring for ECM/EMM message interruption triggering external management system
- Optional built-in support for opportunistic data insertion up to 20 Mbps, interoperable with IRDs which support Multi Protocol Encapsulation (MPE)
- MPE decapsulator up to 20 Mbps
- Supports SFN Networks using transparent TS pass-through
- Optional BISS content protection
- Demodulator supports the automated Equalink 3 calibration protocol
- External reference input
- Optional 10 MHz reference output
- Easy integration with industry-leading management systems (EMS/NMS/OSS)
- Feature-based pricing and software upgrades
- Pay-as-you-grow flexible licensing scheme

Applications

- Broadcast Direct-to-Home (DTH)
- Broadcast primary distribution
- Broadcast fixed contribution
- Upgrade of distribution networks towards S2 Extensions or DVB-S2X
- Transmodulation of DVB-S/S2 to DVB-S2, DVB-S2X or S2 Extensions

Related Products

M6100	Broadcast Satellite Modulator
FRC07x0	Frequency converters portfolio
USS0212	1+1 Modulator Redundancy Switch
USS0202	Universal Switching System

Related Bandwidth Efficiency Technologies

Clean Channel Technology

Fully Automated Equalink 3

S2 Extensions and DVB-S2X

Support Services for your Professional Equipment

Care Pack Basic and Care Pack Enhanced are the service and support packages protecting your equipment over a three year period

Data Interfaces

ASI INTERFACE (OPTIONAL)

Single stream mode

- 2 selectable ASI inputs on BNC (F) – 75 Ohm (coax)
- 2 x ASI output (loop through) on BNC (F) – 75 Ohm (coax)
- 188 or 204 byte mode
- Rate adapter
- MPTS or SPTS according to ISO/IEC 13818

ETH INTERFACE

- Auto switching 10/100/1000 Base-T Ethernet interface
- Transport stream over IP interface (UDP/RTP), unicast or multicast
- Forward Error Correction SMPTE 2022-1 and -2
- 188 or 204 byte mode
- Rate adapter
- MPTS or SPTS according to ISO/IEC 13818

Content Encryption and Protection

BISS ENCRYPTION (OPTIONAL)

- Support for BISS-0, BISS-1 and BISS-E
- On one single TS (SPTS or MPTS)

IP Encapsulation

- Optional MPE Encapsulation of IP packets in 1 Transport Stream
- Max 20 Mbit/s

IP Decapsulation

- MPE Decapsulation of IP packets received in 1 Transport Stream
- Max 20 Mbit/s

Modulation and Demodulation

SUPPORTED MODULATION SCHEMES AND FEC

- DVB-S
  Outer/Inner FEC: Reed Solomon / Viterbi
  MODCODs
  QPSK: 1/2, 2/3, 3/4, 5/6, 7/8
- DVB-DSNG
  Outer/Inner FEC: Reed Solomon / Viterbi
  MODCODs
  8PSK: 2/3, 5/6, 8/9
  16QAM 3/4, 7/8
- DVB-S2 (acc. ETSI EN 302 307 v1.2.1 for DVB-S2)
  Outer/Inner FEC: BCH/LDPC
  52 MODCODs (short & normal frames)
  QPSK: from 1/4 to 9/10
  8PSK: from 3/5 to 9/10
  16APSK: from 2/3 to 9/10
  32APSK: from 3/4 to 9/10
- S2 Extensions
  Outer/Inner FEC: BCH/LDPC
  54 MODCODs
  QPSK: from 45/180 to 144/180
  8PSK: from 80/180 to 150/180
  16APSK: from 80/180 to 162/180
  32APSK: from 100/180 to 162/180
  64APSK: from 90/180 to 162/180
  29 Linear MODCODs:
  8PSK-L: from 80/180 to 120/180
  16APSK-L: from 80/180 to 162/180
  64APSK-L: from 90/180 to 162/180
- DVB-S2X standard
  Outer/Inner FEC: BCH/LDPC
  53 MODCODs (normal frames)
  QPSK: from 1/4 to 9/10
  8PSK: from 3/5 to 9/10
  16APSK: from 26/45 to 9/10
  32APSK: from 32/45 to 9/10
  64APSK: from 11/15 to 5/6
  128APSK: 3/4; 7/9
  256APSK: 32/45; 3/4
  13 Linear MODCODs (normal frames)
  8APSK-L: 5/9; 26/45
  16APSK-L: from 1/2 to 2/3
  32APSK-L: 2/3
  64APSK-L: 32/45
  256APSK-L: 29/45 to 11/15
  41 MODCODs (short frames)
  QPSK: from 11/45 to 8/9
  8PSK: from 7/15 to 8/9
  16APSK: from 7/15 to 8/9
  32APSK: from 2/3 to 8/9
- Support of DVB-S2 VCM mode (on demodulator and modulator)

BAUD RATE RANGE

Modulator

- DVB-S2, DVB-S2X & S2 Extensions 256 kbaud - 72 Mbaud
- DVB-S & DVB-DSNG 1 - 45 Mbaud

Demodulator

- DVB-S2, DVB-S2X & S2 Extensions 256 kbaud - 72 Mbaud
- DVB-S & DVB-DSNG 1 - 45 Mbaud

FRAME LENGTH

- DVB-S & DVB-DSNG 188 bytes
- DVB-S2 & DVB-S2X
  Short Frames 16200 bits
- DVB-S2, DVB-S2X & S2 Extensions Normal Frames 64800 bits

CLEAN CHANNEL TECHNOLOGY

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

EQUALINK 3

- Predistortion for all MODCODs
- Calibration without service interruption

RECEIVER POST COMPENSATION NLPC 2.0

- For extra link margin in a multicarrier uplink limited constellation

CARRIER INTERFERENCE REDUCTION

- DVB RF Carrier ID (DVB-CID)
  - Spread Spectrum Modulator (BPSK)
  - Supports User Data
  - Compliant to ETSI 103 129 v1.1.1 (2013-05)
- Carrier ID NIT Table

Modulation Interfaces

- Connector N(F), 50 Ohm (optional SMA adapter)
- Frequency 950 - 2150 MHz (10 Hz steps)
- Level -35/+7 dBm (+/- 2 dB)
- Return loss > 14 dB
- Switchable 10 MHz Reference
- Spurious performance
  Better than - 65 dBc/4 kHz @ +5 dBm output level and > 256 kbaud
  Non-signal related: < - 80 dBc @ +5 dBm output

IF-BAND (CONFIGURATION OPTION)

- Connector BNC (F) - 75 Ohm (intermateable with 50 Ohm)
- Frequency 50 - 180 MHz (10 Hz steps)
- Level -35/+10 dBm (± 2 dB)
- Return loss 50 Ohm: > 14 dB
  75 Ohm: > 20 dB
- Spurious performance
  Better than - 65 dBc/4 kHz @ +5 dBm output level and > 256 kbaud
  Non-signal related:< - 80 dBc @ +5 dBm output

L-BAND MONITORING

- Connector SMA (F), 50 Ohm
- Frequency Same as L-Band output frequency or 1050 MHz in case of IF output option only
- Level -45 dBm
- Return loss > 10 dB

RF BAND (OPTIONAL)

- Connector SMA (F), 50 Ohm
- Return loss > 15 dB
- Frequencies 5.85 - 7.05 GHz
  13.75 - 14.5 GHz
- Level -25/+7 dBm (+/- 3 dB)

with secondary L-band input:

- Connector SMA (F), 50 Ohm
- Return loss >12 dB
- Range -35/-3 dBm
- Maximum input power for no damage +13 dBm

with L-band output:

- Connector SMA (F), 50 Ohm
- Return loss >12 dB
- Level -35/-3 dBm (+/- 3 dB)

10 MHZ REFERENCE INPUT

- Connector BNC (F), 50 Ohm
- Input level -3 dBm up to + 7 dBm
- Frequencies 1, 2, 5, 10, 20 MHz

10 MHZ REFERENCE OUTPUT (OPTIONAL)

- Connector BNC (F), 50 Ohm
- Output level +3 dBm (+/- 2 dB)

BUC POWER (OPTIONAL)

Max. current: 3.8A
Voltage: 24V, 48V (Software controlled)

Demodulation Interfaces

DUAL L-BAND INPUT (DEFAULT)

- Connector 2 x F-type (F), 75 Ohm
- Return loss > 7 dB (75 Ohm – F(F))
- Maximum total input power: - 10 dBm
- Maximum input signal power: (-30 + 10log(f))dBm where f=baud rate in Mbaud
- Minimum input signal power: (-80+Es/No(thr)+10log(f))dBm where f=baud rate in MBaud and Es/No(thr)= Es/No value in dB for QEF reception
- 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 Ohm
- Return loss > 15 dB
- Input power: add 10 dB to the L-band input spec above
- 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 +/- 4 KHz (band selection according to universal LNB for Astra satellites & DiSEqC command transmission)

Internal 10 MHz Reference Frequency

STANDARD STABILITY

- Stability: +/- 2000 ppb over 0 to 70°C
- Ageing: +/- 1000 ppb/year

VERY HIGH STABILITY (OPTIONAL)

- Stability: +/- 2 ppb over 0 to 65°C
- Ageing: +/- 500 ppb/10 year

Generic

MONITOR AND CONTROL INTERFACES

- Web server GUI (HTTP) via web browser
- M&C connectivity via separate Ethernet links
- Diagnostics report, alarm log (HTTP)
- SNMP v2c
- RESTful API

ALARM INTERFACE

- Electrical dual contact closure alarm contacts
- Connector 9-pin sub-D (F)
- Logical interface and general device alarm

Physical

- Height 1RU, width: 19", depth 51 cm, 5.8 kg
- Power supply:
  90-130 & 180-260 Vac, 125 VA, 47-63 Hz
- Temperature:
  Operational: 0°C to +50°C / +32°F to +122°F
  Storage: -40° to +70°C / -40°F to +158°F
- Humidity: 5% to 85% non-condensing
- CE label and UL