

## Description

The MDM6000 Satellite IP Modem is a versatile next generation modem optimized for a wide range of applications such as cellular backhauling, IP trunking and fiber restoration. The MDM6000 modem is typically installed at both ends of a point-to-point satellite link or at the remote sites of a star network. The unit can work as a modulator, demodulator or modem depending on the network configuration and integrates seamlessly with terrestrial networks and equipment. The modem is in full compliance with the DVB-S2 and DVB-S2X standards and still supports the Newtec S2 Extensions, achieving the highest possible efficiency at maximum service availability.

## Efficiency at the Core

The Newtec MDM6000 Satellite Modem combines a number of innovative elements to improve current market available efficiencies, thereby lowering the overall Total Cost of Ownership.

New modulation and Forward Error Correction (FEC) codes up to 256APSK 3/4 in the DVB-S2X standard in combination with innovative technologies such as 72 MBaud, Clean Channel Technology®, Automatic Uplink Power Control (AUPC), FlexACM®, QoS and Equalink® 3 are embedded in the modem and bring the satellite link to full efficiency. By increasing the amount of data that can be transferred per transponder the MDM6000 modem effectively increases business opportunities for service providers.

Depending on the application, the Newtec MDM6000 Satellite Modem can be used in conjunction with the Newtec HUB6000 Satellite Hub. The performance can be increased even more by adding Newtec's bandwidth cancellation and/or network optimization technologies, such as acceleration, compression, shaping and bandwidth management.

## Optimal Availability

Newtec's auto-adaptive technology FlexACM is incorporated in the MDM6000 modem and deals with fading conditions (rain, dust, interference) and inclined orbit satellites with varying throughput. Thanks to FlexACM these fading conditions will no longer interrupt the transmission between the hub and remote sites nor result in loss of data. The maximum possible throughput can be achieved at all

times. Additionally, the Automatic Uplink Power Control mechanism ensures maximum use of the link budget at all times.

## Flexibility and Scalability Matching Market's Business Models

The MDM6000 Satellite Modem provides a scalable and flexible platform which allows customers to grow depending on their application and investment plan. The platform can start as a modulator or demodulator unit and grow into a modem with different functionalities by simple license upgrades.

All modulation modes and maximum symbol rate are always available, the capability of the modem is determined by its IP throughput license with rates as low as 1 Mbps up to 425 Mbps in very granular steps. This makes the MDM6000 suitable for either low, medium or high speed links.

At the output of the MDM6000 Satellite Modem, the signal is available in IF or extended L-band (950 MHz-2150 MHz). 24V/48V DC BUC Power and 10 MHz reference can be multiplexed on the L-band modulator output via software settings. At the receive site the modem has a dual L-band input or optional IF+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 providing a compact and cost effective solution.

The MDM6000 Satellite Modem can be easily monitored and controlled via a comprehensive front panel menu, advanced web GUI and via SNMP protocol. This enables easy integration into any industry-standard EMS/NMS system.

The Newtec MDM6000 Satellite Modem is a versatile modem which allows service providers and government operations to increase the amount of services or the customer base within the same bandwidth. At the same time it introduces ways to reduce OPEX costs and increase the profitability of their business at maximum efficiency and optimum availability.

# SPECIFICATIONS

## Key Features

- Very granular rate licensing scheme with rates from 1 Mbps up to 425 Mbps bidirectional
- Suitable for low, medium and high speed applications, baudrates up to 72 MBaud to handle all common transponder sizes
- Clean Channel Technology for additional bandwidth efficiency gains by allowing optimal carrier spacing
- DVB-S2 and optional DVB-S2X (QPSK upto 256APSK) for standard compliant optimal use of bandwidth
- Newtec S2 Extensions (up to 64APSK) for optimal closed network operation
- Optional Equalink 3 for optimal use of semi-saturated transponders
- Reduce impact of RF Interferences (RFI) by enabling the optional DVB RF Carrier ID (DVB-CID)
- All MODCODs and baudrates default enabled for flexible and optimal operation of the network
- Automatic Uplink Power Control for combating uplink fading
- Optional FlexACM for adaptive environments like variable interferences from rain and dust or for inclined orbit operation
- Standard GSE encapsulation for minimal overhead
- Support for MPE, ULE and XPE for working with legacy equipment
- Adaptive traffic shaping and bandwidth management allowing maximal SLA adherence even in case of ACM
- Advanced Quality of Service (QoS) for better customer experience
- Easy integration with terrestrial data networks
- Easy operation through secure front panel, SNMP, HTTP and CLI interfaces
- Modified OpenAMIP support to interwork with stabilized antennas from different vendors

## Support Services for your Professional Equipment

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

## Architecture

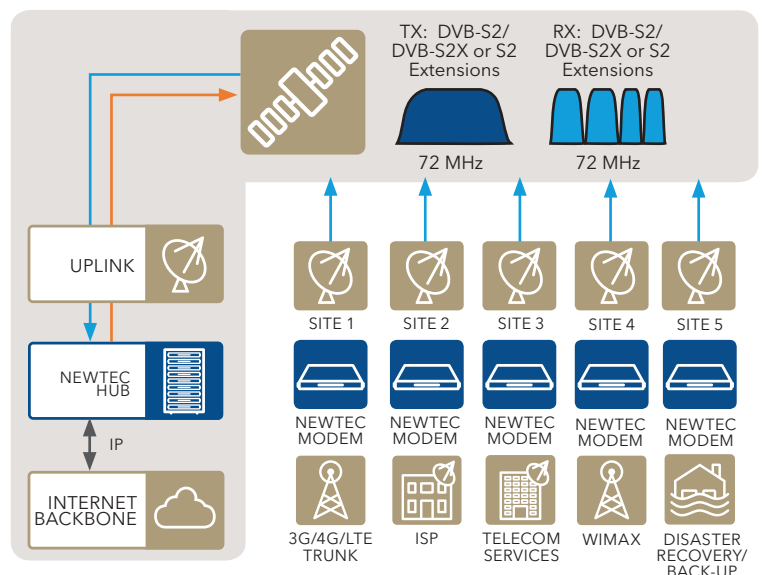
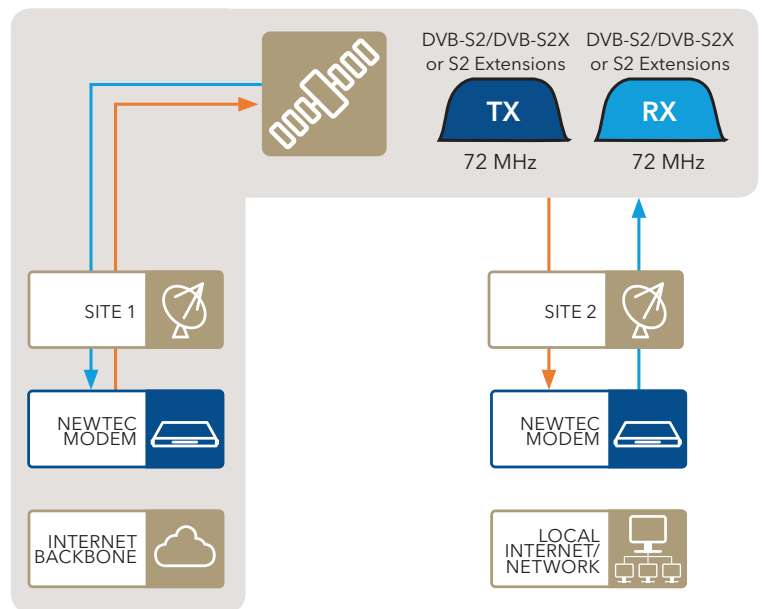
The MDM6000 Satellite Modem can be used at both ends of a point-to-point network or at the remote site of a star network. Depending on the configuration, the unit can be used as a modulator, demodulator or modem.

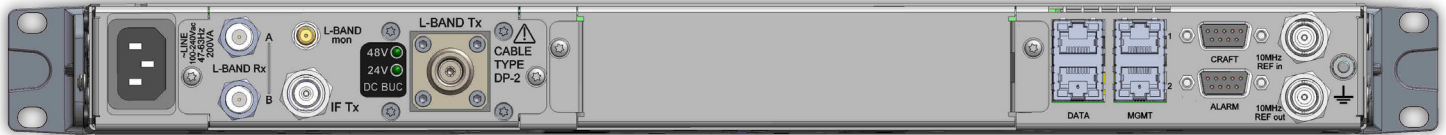
## Related Products

- HUB6000 Satellite Hub
- MDM6100 Broadcast Satellite Modem
- BWC0900 Bandwidth Canceller
- NOP183x PEP Gateways
- NOP184x PEP Servers
- USS02x2 Redundancy Switch
- FRC07x0 Frequency Converters Portfolio

## Related Bandwidth Efficiency Technologies

- Clean Channel Technology
- Equalink 3
- DVB-S2X and Newtec S2 Extensions
- FlexACM





## Input Interfaces

- Auto switching 10/100/1000 Base-T Ethernet interfaces
- GSE Encap/Decap performance  

<u>lmix (avg 340 byte)</u>	<u>1500 byte</u>
TX only: 300 Mbps	TX only: 425 Mbps
RX only: 360 Mbps	RX only: 425 Mbps
RX + TX: 523 Mbps	RX + TX: 850 Mbps
- Max PPS (46 byte)  

TX only: 120 kpps
RX only: 150 kpps
RX + TX: 220 kpps
- Maximum Data Rate  
425 Mbps simplex, 850 Mbps duplex
- Layer 2 bridge function: Ethernet over satellite (IPv6/VLAN/MPLS compatible)
- Layer 3 static router function: IPv4 packets over satellite
- Up to 100 routes
- Advanced QoS features  
Adaptive Traffic Shaping on bitrate or symbolrate according to PIR/CIR  
Flexible traffic classification on VLAN/MPLS/IPv4/IPv6
- GSE, MPE, XPE or ULE Encapsulation/  
Decapsulation of IP/Ethernet frames in DVB-S2, DVB-S2X and S2 Extensions
- Data filtering (downlink):  
Up to 64 receive filters

## Modulation and Demodulation

### SUPPORTED MODULATION SCHEMES AND FEC

- 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
- Newtec 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
- FlexACM controller (optional)

- FlexACM client embedded in MDM6000 modem (optional)
- Automatic Uplink Power Control

### BAUD RATE RANGE

- Modulator: 256 kBaud - 72 MBaud
- Class 1 Demodulator: 1 - 60 MBaud (depending on MODCOD)
- Class 2 Demodulator: 256 kBaud - 72 MBaud

### FRAME LENGTH

- Short frames of 16200 bits for DVB-S2 and DVB-S2X
- Normal frames of 64800 bits for DVB-S2, DVB-S2X and Newtec's S2 Extensions

### CLEAN CHANNEL TECHNOLOGY

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

### EQUALINK 3

- Linear pre-distortion
- Non-linear pre-distortion for all MODCODs

### CARRIER INTERFERENCE REDUCTION

- DVB RF Carrier ID (CID according ETSI TS 103 129 v1.1.1)
- Spread Spectrum Modulator (BPSK)
- Supports User Data
- Compliant to DVB Standard

## Modulation Interfaces

### L-BAND

- 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/4kHz @ +5 dBm output level and > 256 kBaud  
Non-signal related: < -80 dBc @ +5 dBm output

### IF-BAND

- Connector BNC (F) - 75 Ohm (intermateable with 50 Ohm)
- Frequency 50 - 180 MHz (10 Hz steps)
- Level -35/+10 dBm ( $\pm$  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

### 10 MHZ REFERENCE OUTPUT (OPTIONAL)

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

### BUC POWER (OPTIONAL)

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

## Demodulation Interfaces

### DUAL L-BAND INPUT

- 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:  $(-30 + 10\log(f))$  dBm where f=baud rate in Mbaud
- Minimum input signal power:  $(-80+Es/No(thr)+10\log(f))$  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 (REPLACES ONE L-BAND INPUT)

- Connector BNC (F) - 75 Ohm
- Return loss > 15 dB
- Level See L-band input level spec above + 10dBm
- 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

- M&C connectivity via separate Ethernet links
- Web server GUI (HTTP) via web browser
- Diagnostics report, alarm log (HTTP)
- SNMP v2c
- Modified OpenAMIP protocol to control stabilized antenna from modem

### 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 or 36-76 VDC, 160 W
- 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

Newtec MDM6000 Satellite Modem Release 2.2		Ordering n°
Configuration Options Category		MDM6000
		Select 1 option
Hardware Platform	Chassis Version 03 (Modem)	CH-03
		Select 1 option
Operating Software	MDM6000 Major Software version R1*	MS-11
		Select 1 option
Efficiency Optimization Package	DVB-S2, CCT, AUPC*	OP-02
	S2 Ext, DVB-S2, CCT, AUPC*	OP-03
	DVB-S2, DVB-S2X and S2 Ext, CCT and AUPC	OP-04
		For a modem or demodulator, select 1 option
Demodulator Hardware	Class 1 (DVB-S2 only)*	DH-01
	Class 2 (Wideband DVB-S2 & DVB-S2X, S2 Extensions)	DH-02
		For a modem or demodulator, select 1 option
Demodulator Input Interface	Redundant L-band	IU-00
	Selectable IF or L-band **	IU-01
		For a modem or modulator, select 1 option
Modulator Output Interface	L-band with switchable 10 MHz output*	OU-00
	L-band + 10 MHz output + 24/48 V BUC**	OU-05
	IF (50-180 MHz)*	OU-01
	IF+ L-band with switchable 10 MHz out*	OU-02
	IF+L-band + 10 MHz output + 24/48 V BUC**	OU-06
		Select 1 option
Internal Reference Clock	Standard 10 MHz	IR-00
	Very High Stability 10 MHz	IR-02
		Select max 1 option
Reference Clock Output	10 MHz Reference Output (BNC)	RO-01
		Select 1 option
Mains Power Supply Unit	PSU Single AC 110/240 V	PS-00
	PSU Dual Redundant AC 110/240 V	PS-01
	PSU Single DC 48 V**	PS-10
	PSU Dual DC 48 V**	PS-11
		For a modem or modulator, select 1 option
Outbound Rates	Outbound Rate*	1 - 425 Mbit/s
		For a modem or demodulator, select 1 option
Inbound rates	Inbound Rate*	1 - 425 Mbit/s
<b>Additional Options Category</b>		
		Select max 1 option
Outbound ACM	TX FlexACM point-to-point *	1-425 Mbit/s
		Select max 1 option
Inbound ACM	RX FlexACM Client*	1-425 Mbit/s
		Select max 1 option
DVB Carrier Identifier	DVB RF carrier identifier*	ID-01
		Select max 1 option
BBF output	Transparent BBF over IP output	TB-01
		Select max 1 option
Pre-Distortion	Equalink 3*	AE-01
		Select max 1 option
Modulator Output Connector	L-Band output N to SMA output adapter	OU-10
<b>Services Category</b>		
		Select max 1 option
Support	Care Pack 3 Basic	GA-08
	Care Pack 3 Enhanced	GA-09

(\*) Selectable via license key  
 (\*\*) Option IU-01, PS-10 and PS-11 are mutually exclusive with options OU-05 and OU-06  
 Contact your sales representative for details (sales@newtec.eu).

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.