Newtec

MCX7000
MULTI-CARRIER SATELLITE GATEWAY
(R2.1)

Description

Building upon the MDM6100 Broadcast Satellite Modem software suite, the enhanced hardware platform of the MCX7000 extends the modem capabilities beyond single carrier support and this in full compliance with all satellite DVB standards up to DVB-S2X. In a multi-modulator configuration, four 133 Mbaud carriers can be generated. In a multi-demod configuration, three 133 Mbaud carriers can be demodulated. As a modem, two carrier demodulation can be combined with the modulation of a 133 Mbaud carrier. Each and every transport stream embedded in one of the received carriers can be output on one of the six (optional) ASI or dual Ethernet ports. The same data interfaces can be used as input ports for the modulator. Transmodulation of a received stream is also an option.

Its remote in-band management and software upgradeability makes it the receiver equipment of choice for remote unattended towers and headends. Subsequent releases of this future-proof DVB-S2X platform guarantee, by simple software upgrade, even increased functionality and higher density.

Delivering the highest uptime for vital links

Uptime and reliability are essential in the design of the multi-carrier gateway, taking a vital role in the satellite network. Input source redundancy and the shortest redundancy switch-over times, operating both in 1+1 and N+1 topologies, are setting the standard in our industry.

Advanced capabilities are built in such as a MPEG Transport Stream analyser, support of SMPTE 2022 FEC at the GbE inputs (for distributed IP headends), and native support of Carrier ID according to the DVB standard as well as in the transport stream NIT Table. Re-ordering and gap filling of missing packets in transport streams is done with the Seamless input stream switching option. Special care was taken to cope with jittery transport stream over IP inputs. The 6 ASI ports are programmable as inputs or outputs allowing for monitoring as well as operational ASI ports. To protect the satellite transmission, the AES option can be activated. AES allows to encrypt/decrypt with a high security level the content of all DVB-S2(X) streams. On Transport Stream level, BISS scrambling/descrambling is optional.

Get the best performance and lower your costs

The MCX7000 Multi-Carrier Satellite Gateway performs among the best, offering unmatched bandwidth efficiency optimization options, thereby lowering overall Total Cost of Ownership. The fully automated operation of Newtec´s field-proven Equalink® 3 predistortion technology is now available for any satellite transmission application providing up to 15% bandwidth gain in DVB-S2(X) 8PSK mode in single carrier per transponder constellations.

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

Maximum symbol rates up to 133 Mbaud and modulations up to 256APSK (DVB-S2X standard) combined with VCM (Variable Coding and Modulation) allow for maximum throughput in large contribution links.

Up to 8 transport streams are supported in both directions over the redundant GbE ports. On top of this, another 6 transport streams can be routed in either direction over the optional 6 ASI ports. The streams received from up to 3 satellite carriers can be sent to any of the ASI or GbE ports.

The Newtec MCX7000 is a new dense DVB-S2X multi-carrier satellite gateway, resulting in OPEX and CAPEX savings. Its field of use covers all Broadcast applications, from DTH and primary distribution to towers and head-ends to contribution and exchange networks. Its 133 Mbaud capability extends its use to HTS spot-beam transponders.

The MCX7000 Multi-Carrier Satellite Gateway can be easily monitored and controlled via a comprehensive front panel menu, advanced web GUI as well as via SNMP protocol. This enables easy integration into any industry-standard EMS/NMS system. Its bidirectional remote in-band management and software upgradeability makes it the receiver equipment of choice for remote unattended towers and headends.

Evolve towards tomorrow's technology

Built upon flexible and latest generation programmable technology, the MCX7000 Multi-Carrier Satellite Gateway 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.
Migration of standard distribution links towards the new DVB-S2X standard can be as simple as inserting an MCX7000 Multi-Carrier Satellite Gateway in the headends while keeping the installed base of IRDs.

Featured modulator technologies such as Equalink 3 linear and non-linear predistortion and Clean Channel Technology bring best-in-class output spectrum, enhancing the satellite link margin and throughput to its optimum. The non-linear post compensation in the receivers brings extra link margin when in uplink limited multi-carrier per transponder constellation.

SPECIFICATIONS

Key Features

- Configurations:
  - 4 x DVB-S2X carrier modulator
  - 3 x DVB-S2X carrier modulator with optional ASI interfaces
  - Modem with one or two modulators with optional ASI interfaces
  - 3 x DVB-S2X carrier demodulator
  - Modem with one or two demodulators with optional ASI interfaces
- Minimum symbol rate: 256 kbaud
- Maximum symbol rate: 133 Mbaud
- Data rates up to 425 Mbit/s
- IF (70/140) and L-Band (950-2150) high power outputs
- Demodulators with dual L-band 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 in single stream mode
  - Redundancy with main TS over ASI and back-up TS over IP input
  - Redundant optional ASI interfaces for up to 3 TS input streams
  - Stream and Source redundancy on TS over IP inputs
  - Optional Seamless Switching acc. SMPTE 2022-7 on TS over IP inputs
  - Carrier-based redundancy in 1+1 configurations
  - Built-in TS Analyser with PCR jitter measurements
  - Accurate link margin monitoring through the use of the Noise & Distortion Estimator (NoDE) tool
  - RFI reduction using DVB RF Carrier ID (DVB-CID) and NIT table CID
  - Automatic TS rate adaptation
  - L-band monitoring output
  - Market leading RF purity and performance
  - Programmable amplitude slope equalizer
  - 8 x PRBS generators and 3 x PRBS detectors for link performance tests
  - 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
  - QPSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK and 256 APSK
  - Clean Channel Technology provides up to 15% bandwidth efficiency gains on top of the DVB-S2 standard
  - Optional 2% roll-off on modulator side for highest efficiency
  - Optional Equalink 3 pre-distortion provides up to 15% bandwidth gain in DVB-S2(X) 8PSK mode, higher QoS and geographic coverage
  - Multistream CCM or VCM mode with ISSY
  - Selection of DSNG profiles acc. WBU-ISOG including the new DVB-S2X standard
  - Secure front panel, SNMP, HTTP and CLI interfaces
- Future-proof design combining video and IP multiservice capabilities, supports transport of today´s and tomorrow´s services
  - Multistream reception and transmission (8 streams in both directions for modem configurations – 16 streams in modulator or demodulator only configurations)
  - Up to 8 Transport Streams mux/demux on GbE (TSoverIP) and 6 on optional ASI interfaces
  - Transport Stream over IP outputs optimized for minimal Packet Inter-Arrival-Time
- 4 x built-in encapsulators for opportunistic data insertion up to 70 Mbps, interoperable with IRD's that support Multi Protocol Encapsulation (MPE)
- 4 x MPE decapsulators up to 70 Mbps
- Supports SFN Networks using transparent TS pass-through
- Optional AES encryption/decryption per ISI stream and per carrier
- Optional BISS scrambler and descrambler
- Demodulator supports the 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
- Remote in-band management
- Remote over-the-air software upgrade

Use Cases and Applications

Multi-modulator equipment for OPEX and CAPEX reduction in **back-up or dense DTH HUB stations.**
The support of DVB-S2X and its upgradeability to the transmission of bonded carriers makes the MCX7000 the preferred solution for transmission of future UHDTV bundles.

Efficient distribution to towers and headends resulting in OPEX and CAPEX savings is a major application for the MCX7000. It brings higher efficiency, limited need for rack space and with its transmodulation capability allows for upgrade of existing stations to the DVB-S2X standard while preserving the installed base of IRDs. This allows for decoupling modulation and video encoding technology roadmaps and investments.

Another use case is the **reception of multiple contribution links** in a single HUB device, bringing down CAPEX.

Broadcast contribution modem on standard and HTS spot-beam transponders.

In **closed video distribution** networks, **AES encryption** of the baseband frames results in extra security on physical layer level.

Optional part within a Newtec Dialog® mulitservice broadcast solution.

Related Products

M6100	Broadcast Satellite Modulator
MDM6100	Broadcast Satellite Modem
FRC07x0	Frequency converters portfolio
USS0212	1+1 Modulator Redundancy Switch
USS0201	Universal Switching System

Related Bandwidth Efficiency Technologies

Clean Channel Technology
Equalink 3
DVB-S2X

Newtec

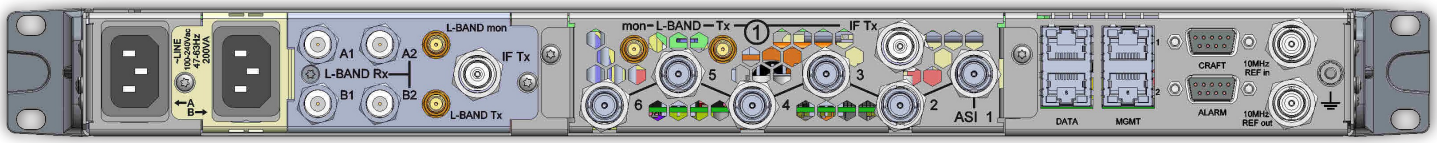

Figure: Dual modulator modem with ASI and GbE interfaces and dual power supply

Data Interfaces

ASI INTERFACE (OPTIONAL)

Single stream mode

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

Multistream mode

- 6 BNC(F) - 75 Ohm (coax) connectors individually configurable as input or output or as 3 redundant TS inputs with auto switching
- 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)
- Seamless TS input switching SMPTE 2022-7 (optional) in the 300kbps-90Mbps bit rate range
- 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 SCRAMBLER (OPTIONAL)

- Support for BISS-0, BISS-1 and BISS-E
- On 4 TS (SPTS or MPTS) in modulator configurations
- On 2 TS (SPTS or MPTS) in modem configurations
- Up to 50 Mbps per TS
- Up to 130 Mbps on one TS per MCX7000

BISS DESCAMBLER (OPTIONAL)

- Support for BISS-0, BISS-1 and BISS-E
- On 3 TS (SPTS or MPTS) in demodulator configurations
- On 2 TS (SPTS or MPTS) in modem configurations
- Up to 130 Mbps

AES ENCRYPTION (OPTIONAL)

- AES encryption of Baseband frames
- 64-bit or 128-bit mode
- One AES encryption per carrier
- Single key or one key per ISI stream
- Up to 1 x 140 Mbps or 4 x 32 Mbps or 6 x 23 Mbps/ carrier

AES DECRYPTION (OPTIONAL)

- AES decryption of Baseband frames
- 64-bit or 128-bit mode
- One AES decryptor per carrier
- Global key or one key per ISI stream
- Up to 1 x 140 Mbps or 4 x 32 Mbps or 6 x 23 Mbps/ carrier

IP Encapsulation

- Optional 4 MPE Encapsulators
- Max aggregate 70 Mbit/s

IP Decapsulation

- 4 MPE Decapsulators
- Max aggregate 70 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
- 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 modulator and demodulators)

SYMBOL RATE RANGE

Modulator

- DVB-S2, DVB-S2X 256 kbaud - 133 Mbaud
- DVB-S & DSNG 1 - 45 Mbaud

Demodulator

- DVB-S2, DVB-S2X 256 kbaud - 133 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
  Normal Frames 64800 bits

CLEAN CHANNEL TECHNOLOGY

- Roll-off option (on modulator) : 2%
- Roll-off : 5% -10% -15% -20% - 25% - 35%
- Optimum carrier spacing
- Advanced filter technology

EQUALINK 3

- Linear and non-linear predistortion for all MODCODs
- Maximum rate 72 Mbaud

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

L-BAND (CONFIGURATION OPTION) (QTY: 0-4)

- Connector SMA(F), 50 Ohm
- Frequency 950 - 2150 MHz (10 Hz steps)
- Level -35/+7 dBm (+/- 2dB)
- 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 (CONFIGURATION OPTION) (QTY: 0-4)

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

L-BAND MONITORING (QTY: 0-4)

- 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 INPUT

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

10 MHZ REFERENCE OUTPUT (OPTIONAL)

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

Demodulation Interfaces

DUAL L-BAND INPUT (QTY: 0-3)

- 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

LNB POWER AND CONTROL
(ON 1 L-BAND INPUT/DEMOD)

- Max. current 350 mA
- 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)

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/10year

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

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,
  260 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

ORDERING INFO

Newtec MCX7000 Multi-Carrier Satellite Gateway (R2.1)		Ordering n°
Configuration Options Category		**MCX7000**
		Select 1 option
Hardware Platform	Chassis Type 05 (7000)	CH-05
		Select 1 option
Operating Software	MCX7000 Major Software R2*	MS-20
		Select 1 option
Mains Power Supply Unit	PSU Single AC 110/240V	PS-00
	PSU Dual Redundant AC 110/240V	PS-01
		Select 1 option
Data/Video Package	Video TS, Carrier-ID(NIT), TS Analyser*	VP-01
	Video TS, Demod only*	VP-02
		Select 1 option
Video Interface	GbE TSoIP, SMPTE-2022 DEC (req. VP-01/VP-02)*	VI-01
	GbE TSoIP + ASI(6) (req. VP-01/VP-02 and HS-05)	VI-02
	ASI (6 connectors) (req. VP-01/VP-02 and HS-05)	AS-02
		Select max. 1 option
Slot 1	Modulator Cl.2	HS-01
	Demodulator Cl.3	HS-02
		Select max. 1 option
Slot 2	Modulator Cl.2	HS-03
	Demodulator Cl.3	HS-04
		Select max. 1 option
Slot 3	ASI board	HS-05
	Modulator Cl.2	HS-06
	Demodulator Cl.3	HS-07
		Select max. 1 option
Modulator licenses	No modulator license	ML-00
	One modulator license	ML-01
	Two modulator license	ML-02
	Three modulator license	ML-03
	Four modulator license	ML-04
		Select max. 1 option
Demodulator board licenses	No demodulator board license	DL-00
	One demodulator board license	DL-01
	Two demodulator board licenses	DL-02
	Three demodulator board licenses	DL-03
		For a modem or modulator, select 1 option
Modulator Output Interface	L-band with switchable 10 MHz output*	OU-00
	IF (50-180 MHz)*	OU-01
	IF+ L-band with switchable 10 MHz out*	OU-02
		For a modem or modulator, select 1 option
Modulator Standard and Coding (includes multistream support) x = 0 to 3 (for 1 to 4 modulators)	DVB-S Q/8PSK*	SC-x1
	DVB-S/S2 QPSK*	SC-x2
	DVB-S/S2/S2X Q/8PSK*	SC-x3
	DVB-S/S2/S2X Q/8PSK 16QAM 16APSK*	SC-x4
	DVB-S/S2/S2X Q/8PSK 16QAM 16/32APSK*	SC-x5
	DVB-S/S2/S2X Q/8PSK 16QAM 16/32/64/128/256*	SC-x6
		For a modem or modulator, select 1 option
Modulator Maximum Symbol Rates x = 0 to 3 (for 1 to 4 modulators)	Modulation Symbol Rate 5 Mbaud*	SR-x1
	Modulation Symbol Rate 15 Mbaud*	SR-x2
	Modulation Symbol Rate 36 Mbaud*	SR-x3
	Modulation Symbol Rate 54 Mbaud*	SR-x4
	Modulation Symbol Rate 72 Mbaud*	SR-x5
	Modulation Symbol Rate 133 Mbaud*	SR-x6
		For a modem or demodulator, select 1 option
Demodulator Standard and Coding (includes multistream support)	DVB-S/S2/S2X Q/8PSK 16QAM 16/32APSK*	DC-01
	DVB-S/S2/S2X up to 256PSK*	DC-02
		For a modem or demodulator, select 1 option
Demodulator Maximum Symbol Rates	Demodulation Symbol Rate 72 Mbaud*	DR-01
	Demodulation Symbol Rate 133 Mbaud*	DR-02

Newtec MCX7000 Multi-Carrier Satellite Gateway (R2.1)		Ordering n°
Configuration Options Category		
		Select 1 option
Internal Reference Clock	Standard 10MHz	IR-00
	Very High Stability 10MHz	IR-02
Additional Options Category		
		Max. 1 option per category
Reference Clock Output	10 MHz Reference Output (BNC)	RO-01
		Max. 1 option per category
Pre-distortion	Equalink 3 * (1 license)	AE-01
	Equalink 3 * (2 licenses)	AE-02
	Equalink 3 * (3 licenses)	AE-03
	Equalink 3 * (4 licenses)	AE-04
		Max. 1 option per category
Roll-off factor	2% roll-off (modulator)	CC-02
		Max. 1 option per category
MPE Insertion	4 x MPE Data insertion in TS (req. VP-01)*	VM-01
		Max. 1 option per category
Scrambling	BISS (0-1-E) (Req. VP-01)*	CA-01
		Max. 1 option per category
Descrambling	BISS (0-1-E) descrambler (Req. VP-01/02)*	AC-01
		Max. 1 option per category
Encryption	AES 64 bit encryption*	ES-01
	AES 128 bit encryption*	ES-02
	2 x AES 64 bit encryption*	ES-03
	2 x AES 128 bit encryption*	ES-04
	3 x AES 64 bit encryption*	ES-05
	3 x AES 128 bit encryption*	ES-06
	4 x AES 64 bit encryption*	ES-07
	4 x AES 128 bit encryption*	ES-08
		Max. 1 option per category
Decryption	AES 64 bit decryption*	AD-01
	AES 128 bit decryption*	AD-02
	2 x AES 64 bit decryption*	AD-03
	2 x AES 128 bit decryption*	AD-04
	3 x AES 64 bit decryption*	AD-05
	3 x AES 128 bit decryption*	AD-06
		Max. 1 option per category
Redundancy switching	Seamless reconstruction (SMPTE 2022-7)	SM-01
		Max. 1 option per category
Support	Care Pack 3 Basic	GA-08
	Care Pack 3 Enhanced	GA-09

(*) Selectable via license key

Contact your sales representative for details (sales@newtec.eu).

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.

Newtec

SHAPING THE FUTURE OF SATELLITE COMMUNICATIONS

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