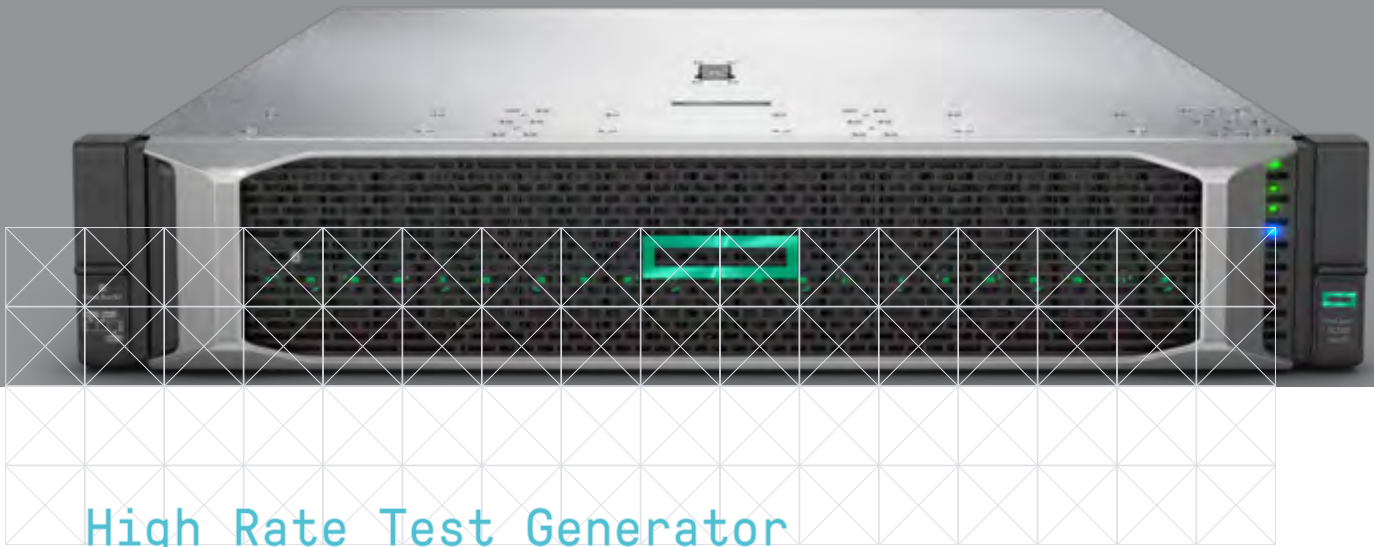


MEOS™ CAPTURE HRTG



KONGSBERG



The MEOS™ Capture HRTG is a high performance test transmitter for ground system testing and verification. It generates phase modulated and baseband data streams for testing of demodulators and other ground equipment. The MEOS™ Capture HRTG implements the same key properties as all MEOS™ Capture products: Performance, Reliability and Flexibility.

MEOS™ Capture HRTG outputs PN sequences, simulated data and real satellite data. It generates modulated IF signals with various modulations, carrier frequencies and power levels, as well as ECL / LVDS baseband signals.

PERFORMANCE

Outputs

- (x)PSK phase modulated signal on 720, 1200 or 2400 MHz carrier
- Serial baseband ECL / LVDS clock & data

High data rates

- Supporting symbol rates from 500 kSps to 500 Msps (ref. Table - Supported data rates)

Data encoding

- Trellis, convolutional, differential, Reed-Solomon

Multiple data formats

- CCSDS Transfer Frames
- PN sequences
- Data bit stream (files)

RELIABILITY

Reduce your operations cost by automated “lights-out” operations.

- Fully automated test scenarios with preloaded operational schedules. MEOS™ Capture HRTG operates autonomously according to the schedule.
- Very stable Linux system, supporting 24/7 operations without operator intervention

FLEXIBILITY & MODULARITY

Keep your original system, just add functionality.

- Single and dual channel versions
- Baseband ECL / LVDS interfaces are optional
- Software modules can be added to support additional functionality
- Data storage on removable media may be added

TECHNICAL SPECIFICATIONS

MEOS™ CAPTURE HRTG

Data type options

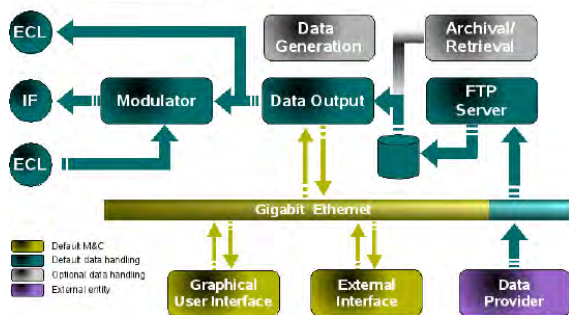
- PN sequences for BER performance test
- Synthetic Transfer Frames generated in real-time (CCSDS type or other, specify on order)
- Data files, all formats
- Pre-generated data files stored locally
- Data encoding (see page 3 for coding options)

Graphical User Interface

- Programmable (XML definition) Java based GUI
- Stand alone or through a web browser

External M&C Interface

- TCP socket and XML based external interface
- Access authentication
- MEOS™ Connect ready
- Seamless integration in Ground Station networks
- Detailed system visibility and control from any location in the network



Options

- Archival & Retrieval: Archival and retrieval of data to/from removable media (requires additional HW).
- Additional IF channel: Add a second IF channel to increase system capabilities
- Software Data Generation tool

Modulator (HRM)

- Fully programmable wideband digital modulator for:
 - BPSK, xQPSK, 8PSK, 16QAM
 - SCCC*
 - DVB-S2**
- 1 or 2 modulator output channels
- 720, 1200, 2400 MHz carrier frequency (± 200 MHz tunable range in 1 kHz steps)
- Output impedance: 50 ohms
- VSWR: < 1.5
- Spurious signal attenuation > 60 dBc
- Programmable signal power: -5 dBm to -50 dBm
- Programmable signal power variation
- Modulation type:
 - BPSK, CBPSK, QPSK, OQPSK, 1/2 UQPSK, 1/4 UQPSK, 1/8 UQPSK, 8PSK, 16QAM, SCCC*, DVB-S2**
- Matched filters: RC, SRRC
- Programmable Doppler on Carrier: 4000 kHz
 - Max Carrier Doppler rate: 100 kHz/s
- Reference oscillator input 10 MHz
- System time: NTP time reference
- Data rates: See table below
- Female SMA connectors

Encoder (ENC)

- Differential encoding
 - PCM: NRZ-M, NRZ-S, NRZ-L
- Trellis encoding 4D-TCM according to CCSDS 401.0-B:
 - Rate: 8/12, 9/12, 10/12, 11/12
- Convolutional encoding: CCSDS compliant polynomial
 - Rate 1/2, 3/4, 2/3, 5/6, 7/8
- R-S (255, 239), R-S (255, 223)
 - Codeword interleaving: 1 to 16
 - Codeword length: 33 to 255
- LDPC 7/8
- LDPC DVB-S2**
- SCCC Turbo codes**

Fill Data Generator

- Filling gaps between test data segments
- Continuous output of fill data only
- CCSDS Transfer Frame format: Fill CADUs
- PN generator: 4 selectable standard polynomials

OPTIONAL MODULES

CCSDS SCCC Processing*

- Data formatting, encoding and modulation according to CCSDS 131.2-B-1

DVB-S2 Processing*

- Data formatting, encoding and modulation according to ETSI EN 302 307-1

Baseband Data Inputs

- Per channel: Two separate or merged (I+Q) synchronous clock/data inputs
- Data rates: Up to 1 Gbps per channel
- Configurable clock phase and data polarity
- Electrical standard: Differential ECL or LVDS
- Female SMA connectors

Baseband Data Outputs

- Playback of stored data (serial or parallel)
- Per channel: Two separate or merged (I+Q) synchronous clock/data outputs
- Configurable clock phase and data polarity
- Clock duty cycle: - 50% \pm 10%
- External clock input
- Electrical standard: Differential ECL or LVDS
- Female SMA connectors

Signal Impairments Module

- AWGN noise
- Frequency tilt
- I/Q amplitude imbalance
- I/Q phase imbalance
- I/Q timing error
- Phase noise
- Signal spectrum view (with impairments)

Test Data Generator Module

- Standard CCSDS Transfer Frame generation
- Standard CCSDS Space Packet generation
- Standard CCSDS CFDP PDU generation
- User defined data file source
- Programmable data error insertion
- Programmable sensing (observation) time manipulation

TECHNICAL SPECIFICATIONS

MEOS™ CAPTURE HRTG

TCP Input Module

- Test data is received as a TCP stream, as an alternative to reading data from a file on disk
 - Continuous stream
 - Segmented streams in burst mode
- Gigabit Ethernet (optional 10Gbit)

TCP Output Module

- Test data is transmitted as a TCP stream, as an alternative to the modulated IF and baseband interfaces
- Used to send data directly to a receiver (e.g. MEOS™ Capture HRDFEP) or to distribute test data to multiple units in an advanced test scenario
- Gigabit Ethernet (optional 10Gbit)

Scheduling Module

- Used for setting up multiple data output sessions
 - Predefined start times
 - Continuous mode: Predefined start and stop times
- Output interface options
 - Modulated IF
 - Baseband data outputs
 - TCP output stream

Data Distribution Module

- Distribution of data files through LAN / WAN
- Multiple protocols available
 - SLE (CCSDS Space Link Extension): RCF, RAF
 - FTPS, SFTP, MDIS

Special Features

- Web based status report per session

Automatic Storage Management

- Oldest data stored on disk will automatically be deleted when necessary
- User controlled locking of data

*CCSDS 131.2-B-1
** ETSI EN 302 307-1

Physical

Rack mountable chassis

- Height x Width x Depth: 21,8 CM X 48,26 CM X 73,22 CM
- Weight: appr. 40 kg

Power:

- 100-240 volts, 50-60 Hz
- Dual power supplies
- Consumption: 500 W

Temperature:

- Operating: 10°C to 35°C
(non-operating: -30°C to 60°C)

Relative humidity (non condensing):

- Operating: 10% to 90%
(non-operating: 5% to 95%)

Separate keyboard and monitor unit (optional)

Optional items can be made available upon request.



Data type / Interface	Modulated data output				Baseband Data / Clock output
	BPSK	xQPSK	8PSK	16QAM	
Fill data ¹	500 Mbps	1 Gbps	1,5 Gbps	2 Gbps	500 Mbps
Files on disk	500 Mbps	1 Gbps	1 Gbps	1 Gbps	500 Mbps
TCP Input ²	500 Mbps	1 Gbps	1 Gbps	1 Gbps	500 Mbps
Ext clock / data input ³	500 Mbps	500 Mbps	500 Mbps	500 Mbps	NA

Table - Supported data rates (TBC)

¹ PN sequences or CCSDS Transfer Frames, ² Option, ³ Option

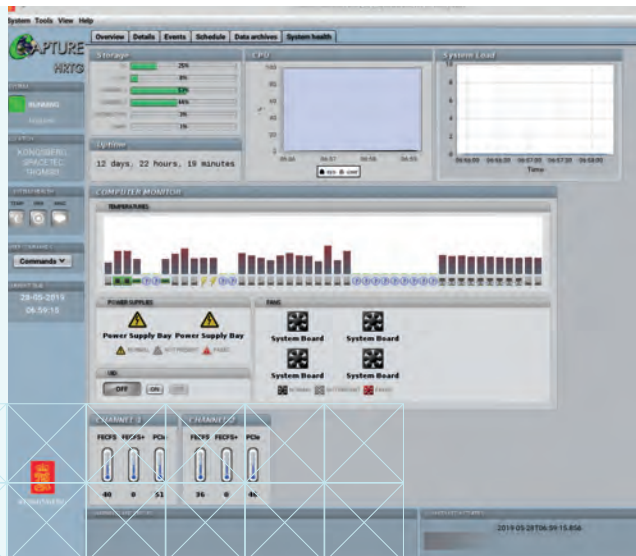
FEATURES

- RF modulator
 - Encoding of output data
 - Output of frames or PRN patterns
 - Data files or synthetically generated data
 - Modulated IF signal with programmable carrier frequency sweep, signal level, white noise level
 - State of the art FPGA based hardware
 - Extensive monitoring and control capabilities, locally and remotely.
- Instant status information on ongoing testing
 - Java based Graphical User Interface

Optional

- Test data generator module
- Signal impairments module
- Baseband clock/data, TCP output
- Other options, consult factory.

Manual or automated operations
MEOS™ HRTG GUI, System health view



APPLICATION NOTE

MEOS™ CAPTURE HRTG

THE CHALLENGE

A network of satellite ground stations typically consists of many sites. Each site may have one or more antennas and associated switching matrices and receivers. The stations may have individual technical solutions that may also undergo evolution during the operational life. Operations are typically under a combination of local and centralized control. Equipment diagnostic tools are available primarily at the station level. Generating and distributing status reports and statistics to support operational decisions, is typically a manual process.

Operational schedules are distributed from the central site to the stations. In some cases, manual work is required to run the stations according to these schedules. Manual work is also required at the central site to assemble reports, make statistics available and present this during operations briefings.

THE SOLUTION

The MEOS™ Capture HRTG is an efficient tool for testing individual demodulators and RF chains. Adding the optional module for signal impairments allows testing and verification of system robustness.

Adding optional modules for test data generation, LAN/WAN data distribution interfaces and advanced scheduling enables the customer to perform tests from unit level to ground system level, for single or multiple ground sites.

The MEOS™ Capture HRTG is designed for seamless integration in ground station networks. Its GUIs and remote monitoring and control capability provide detailed system visibility and control from any location in the network, with minimal bandwidth requirements. Network capacity utilization is optimized by automatic and adaptive bandwidth allocation and retransmission.

Specifications subject to change without any further notice.

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System status and data quality statistics are automatically generated and disseminated for central archiving and report compilation. The MEOS™ Capture HRTG and the MEOS™ Connect are the ideal elements for your ground station network.

BENEFITS

The MEOS™ Capture HRTG, MEOS™ Control and MEOS™ Connect can be combined into a ground station network requiring an absolute minimum of manual operations. This reduces operational cost and delays.

MEOS™ Capture HRTG is delivered with SuSe Linux, and normally configured, tested and pre-qualified at KSGS premises.

Alternative configurations may be available upon request.

