



# MEOS™ Capture HRTG v3

## High Rate Test Generator

**The MEOS Capture HRTG is a high performance test generator for the most demanding professional users. 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 as ECL synchronous clock and data, and a 720 MHz modulated IF signal.*

### Performance

#### Outputs

- Serial ECL clock/data
- (x)PSK modulated signal on 720 MHz carrier

#### High data rates

- Supporting data rates from 500 kbps to 1 Gbps (ref. Table 1 on page 3 for performance figures)

#### Coding of data

- Reed-Solomon, differential and convolutional

#### Multiple data formats

- Frame formats
- PN sequences
- Data bit stream (files)

### Reliability

*Reduce your operations cost by automated "lightsout" operations*

- Fully automated operations, allowing schedules to be preloaded in advance. Once a schedule has been received, the MEOS Capture HRTG will work autonomously according to the schedule.
- Very stable Linux system, supporting 24/7 operations without operator intervention

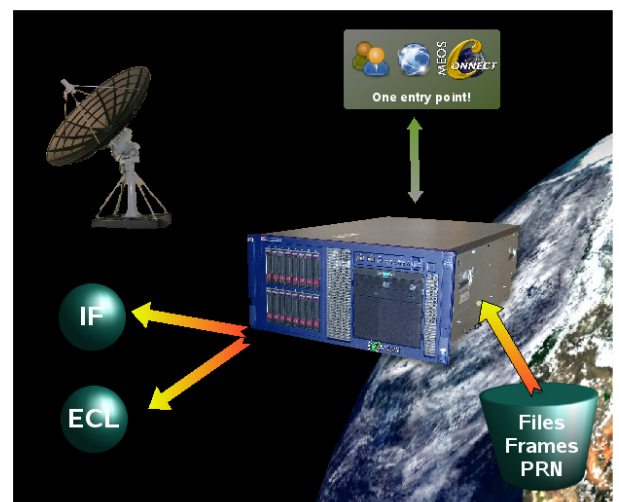
### Key features & benefits

- Encoding of output data
- Output of files, frames or PRN patterns
- PSK modulator
- Two output types; serial clock/data and modulated IF signal
- Programmable IF carrier sweep, signal level and noise generator
- 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
- Manual or automated operations

### Flexibility & modularity

*Keep your original system, just add functionality if needed*

- One extra set of output channels (digital and analog) may be added
- Data storage on removable media may be added



MEOS Capture HRTG

## Data type options

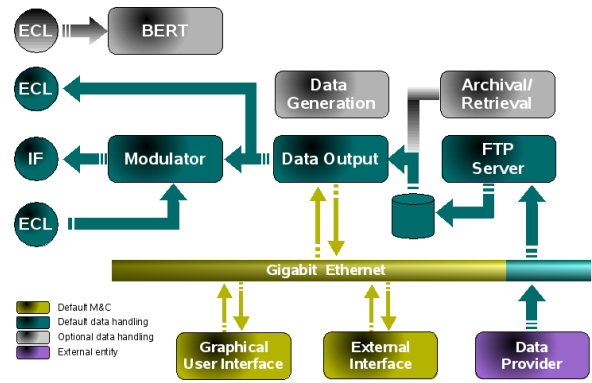
- PN sequences for BER performance test
- Real data files stored locally, all formats
- Pre-generated data files stored locally
- Realtime generated frame formats – standard CCSDS frames or other (specify on order)
- Coding (ref. page 3 for coding options)
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## Graphical User Interface

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

## External Interface

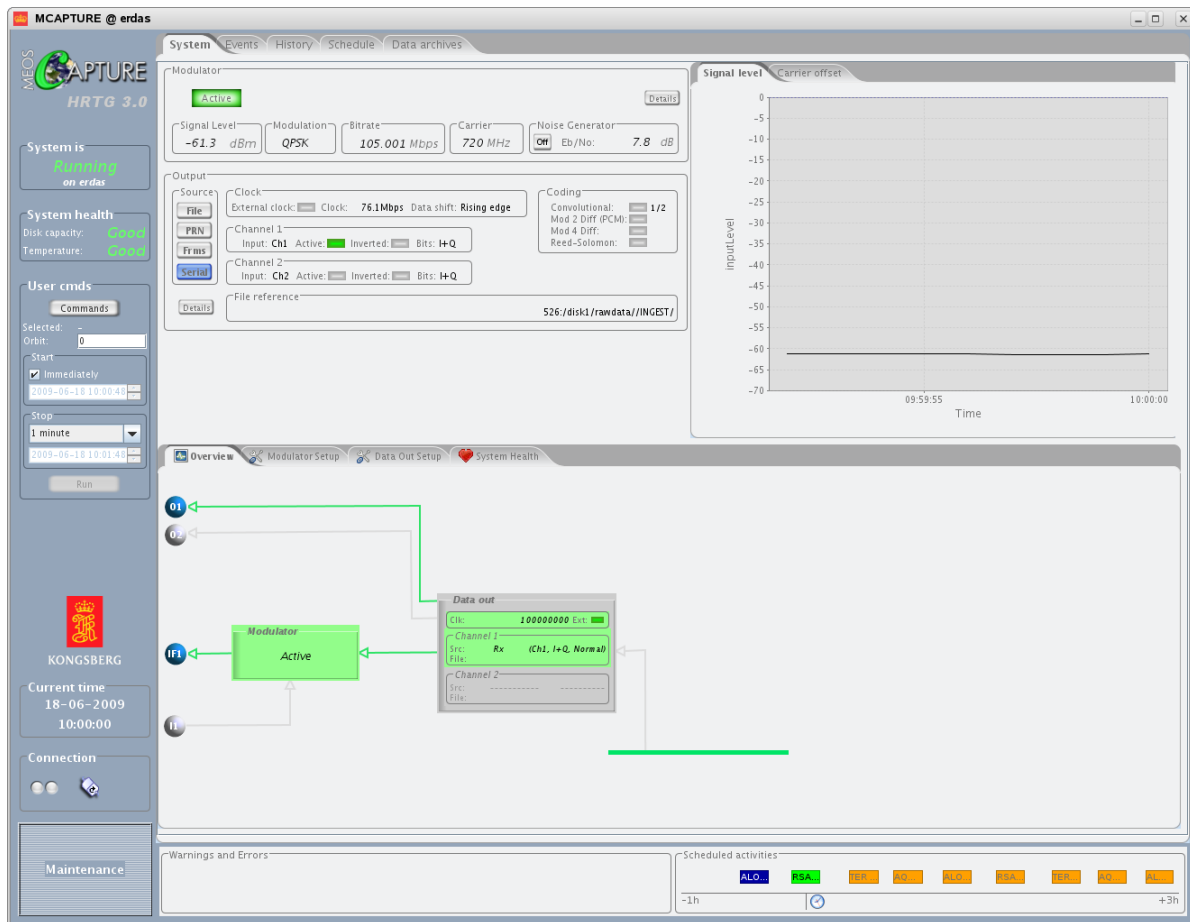
- TCP socket and XML based external interface
- Access authentication
- MEOS Connect ready
- Designed for seamless integration in Ground Station networks, with GUI and API providing detailed system visibility and control from any location in the network, with minimal bandwidth requirements.



## Options

- **Archival & Retrieval:** Archival and retrieval of data to/from removable media (requires additional HW).
- **Additional channel:** Increase system flexibility by adding one additional set of analog and digital channels
- **Data Generation:** Generate more types of data using software tools
- **BERT (Bit Error Rate Tester):** Test bit error rate
- **Coding:** see page 3

## Graphical User Interface



MEOS Capture HRTG user interface



**Outputs**

- PSK modulated data channel
  - 720 MHz carrier frequency (+/- 200 MHz tunable range, 1 kHz steps)
  - Signal level: -10 dBm to -50 dBm
  - Output signal:
    - 50 ohm
    - <1.5 VSWR
  - Data Rate: see table below
- Dual serial clock/data outputs – separate or merged data
  - Data polarity:
    - Normal/Inverted
  - External clock input
  - Electrical standard: Differential ECL (standard), RS-422, LVDS
  - Selectable clock inversion (0° or 180°)
- All female SMA connectors

**Modulator**

- Modulation: BPSK, QPSK, OQPSK, UQPSK (I/Q unbalance 3dB, 6dB, 9dB), 8PSK, 16QAM
- Matched filters:
  - Raised Cosine
  - Square Root Raised Cosine
- AWGN Noise Generator:
  - Eb/No: -10 dB to 30 dB, programmable
- Doppler emulation:
  - Rate range (frequency sweep): 1 kHz/s to 100 kHz/s
  - Max +/- 1.5 MHz from centre frequency
- PN data sequences of length:
  - 2<sup>9</sup>, 2<sup>10</sup>, 2<sup>11</sup>, 2<sup>15</sup>, 2<sup>23</sup>, 2<sup>31</sup>

**Coding**

- Modulo 4 Differential Coding (option)
- Modulo 2 Differential Coding (PCM):
  - NRZ-M, NRZ-S, NRZ-L
- Trellis Encoding 4D-TCM:
  - Rate: 8/12, 5/6 (10/12)
- Convolutional encoding:
  - Compliant with CCSDS 131.0-B-1
  - Rate 1/2, 2/3, 3/4, 5/6, 7/8
  - 7 bits constraint length
- Reed-Solomon:
  - (255, 223)
  - Optional: (10, 6), (255, 239)

**Physical**

- Rack mountable chassis
- Height x Width x Depth in cm: 21.92 x 44.45 x 67.31
- Weight: appr. 35 kg
- Power:
  - 90-132 volts / 180-264 volts, 47 – 63 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 95%
  - (non-operating: 5% to 95%)
- Separate keyboard and monitor unit (optional)

*Optional items can be made available upon request.*



Data type	Modulated data				Data/ Clock
	BPSK	xQPSK	8PSK	16QAM	
PN sequences	250 Mbps	500 Mbps	750 Mbps	1 Gbps	2x300 Mbps
Frame formats	250 Mbps	500 Mbps	600 Mbps	600 Mbps	2x300 Mbps
Files on disk	TBD	TBD	TBD	TBD	TBD
Ext clock/data input	250 Mbps	500 Mbps	500 Mbps	500 Mbps	NA

*Supported data rates (TBC)*



## Integrating your ground station network

### 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

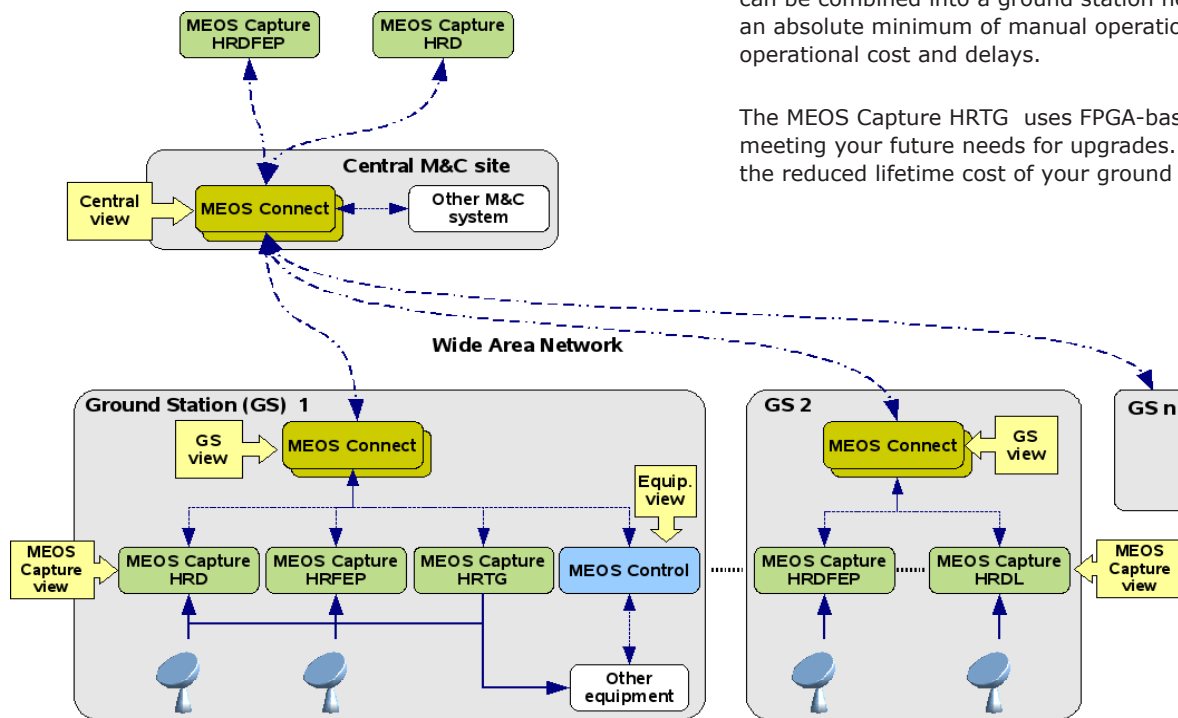
The MEOS Capture HRTG is designed for seamless integration in ground station networks. Its GUIs and remote monitoring and control capability provides detailed system visibility and control from any location in the network, with minimal bandwidth requirements. Network capacity utilization is optimized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

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 building 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.

The MEOS Capture HRTG uses FPGA-based hardware, meeting your future needs for upgrades. This contributes to the reduced lifetime cost of your ground station network.



### Related Products

- MEOS Capture HRFEP - High Rate Front End Processor
- MEOS Capture HRDFEP - High Rate Demodulator and Front End Processor
- MEOS Capture HRTG - High Rate Test Generator
- MEOS Capture HRR - High Rate Recorder
- MEOS Connect - Ground Station Networking / Systems-of-systems
- MEOS Control - Controlling external equipment from one system

### Delivery

MEOS Capture HRTG is delivered with SuSe Linux, and normally configured, tested and pre-qualified at Kongsberg Spacotec AS premises.

Alternative configurations may be available upon request.

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*Note!* Specifications are subject to change without notice.

