



# ZODIAC Data Systems – HEIM Airborne & Ground Data Acquisition

MASTERING THE ELEMENTS

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# MDR – Modular Data Recorder



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# MDR – Application Fields

Classic FTI –  
Development Testing



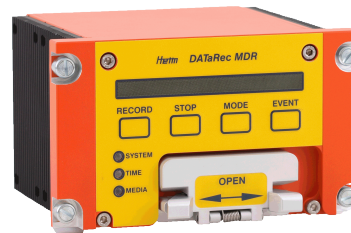
Serial FTI – Quality Testing



Trouble shooting –  
Service Testing



Monitoring



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# MDR - Benefits

- Compact sized system
- Rugged and reliable
- Low power consumption
- Excellent EMI behavior

**Seamless Integration**



- Modular design
- Scalable
- Broad range of signal interface modules
- Modules easy to swap by the user

**Easy to configure**



- MDR2 is a price-optimized FTI recorder
- Based on state of the art technology
- The natural D-Series migration path

**An excellent & safe investment**





# MDR – System Description



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# MDR Chassis

## ■ Mainframe performance

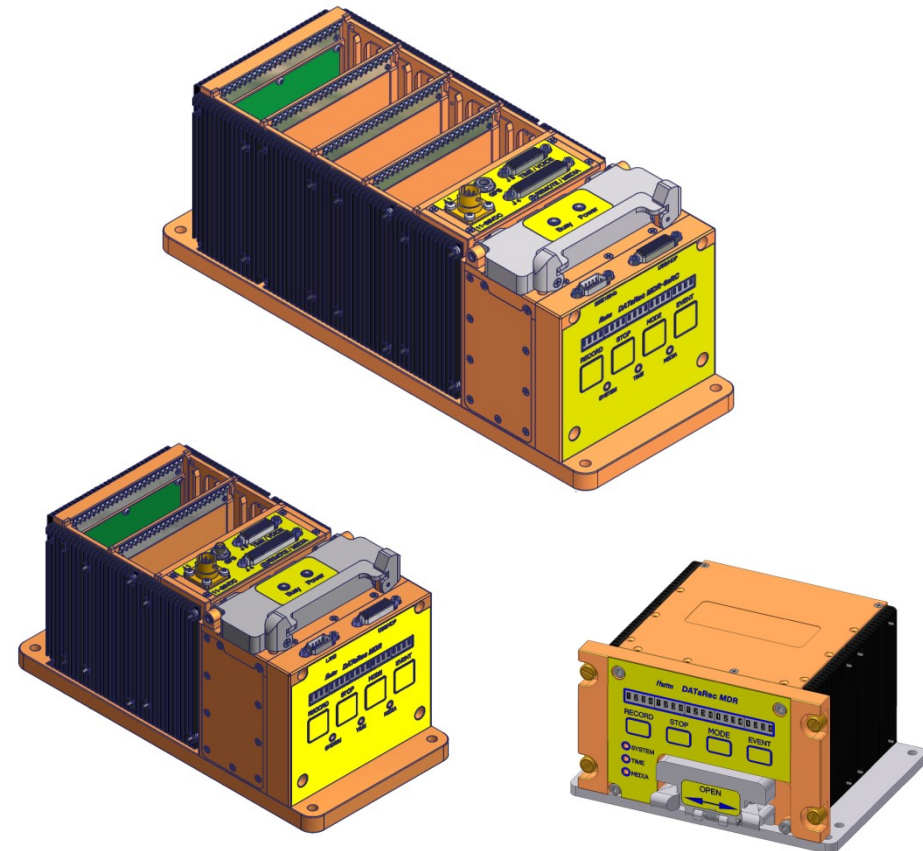
- ✓ 2, 4 or 8 interface slots
- ✓ 2 channels voice
- ✓ Time code inputs/outputs: IRIG A, B, G, PTP, NTP and GPS
- ✓ Recording on SSD or Compact Flash
- ✓ Discretes for remote control and monitoring
- ✓ UDP broadcasting
- ✓ 240 to 800 MBit/s versions

## ■ Service and Set-up

- ✓ Serial RS232 / RS422
- ✓ Ethernet
- ✓ USB

## ■ Standards

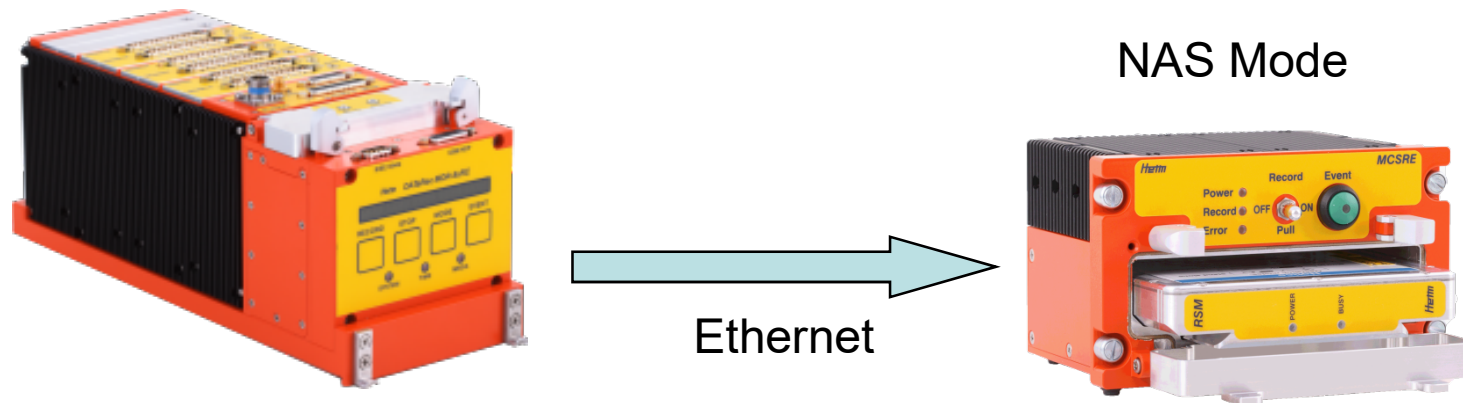
- ✓ Recording on SSD or Compact Flash
- ✓ External media via eSATA and Ethernet
- ✓ IRIG-106 Ch10 data format



# MCSRe – Control & Storage Unit

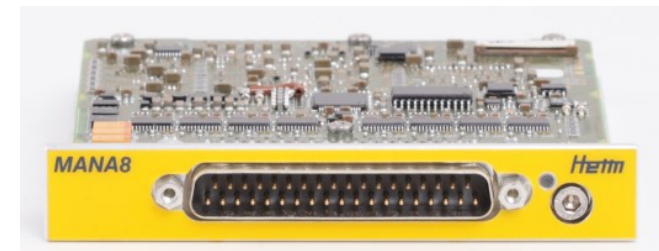
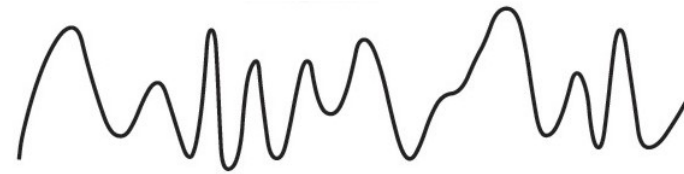
## ■ Mode of Operation

- MCSRe is cockpit mounted
- MDR and MCSRe connected via Ethernet for START/STOP/EVENT/STATUS
- MDR writes the data onto the MCSRe via Ethernet link
- Benefit: MDR is installed in remote location of the aircraft. Pilot has full control over the recording and medium with cockpit mounted MCSRe



# MDR Components - Modules

Analog Interfaces	
<b>MANA8</b>	8 x Analog, DC-40kHz, ac, dc, ICP, 10 V
<b>MANA8A</b>	8 x Analog, DC-40kHz, ac, dc, ICP, 50V
<b>MANA12</b>	12 x Analog, DC-20kHz, ac, dc, ICP
<b>MANA16 AC</b>	16 x Analog, DC-20kHz, ac
<b>MANA16 DC</b>	16 x Analog, DC-20kHz, dc
<b>MANA16 IEPE</b>	16 x Analog, DC-20kHz, ICP

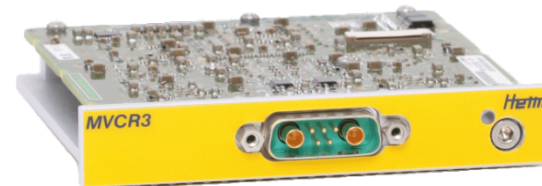
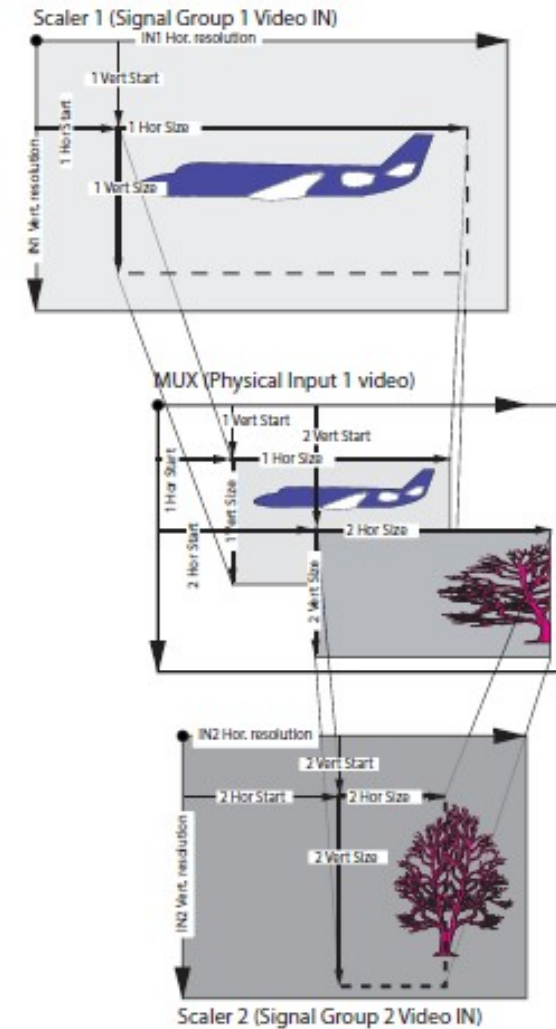




# MDR Components - Modules

Video Interfaces	
<b>MVCR1A</b>	2x video, SDTV, RGB, voice
<b>MVCR2</b>	1x videos, DVI-D, scaler, voice, loopback
<b>MVCR3</b>	2x videos, SD-SDI, HD/3G-SDI, voice
<b>MVCR4</b>	1x video, analog, scaler, voice, loopback
<b>MVCR5</b>	2x videos, DVI-D, voice
<b>MVCR6</b>	2x videos, SDI with PiP function, scaler, voice
<b>MVCRE</b>	8x IP videos, RTSP or RTP protocols

**H.264**  
**MPEG-4/AVC**

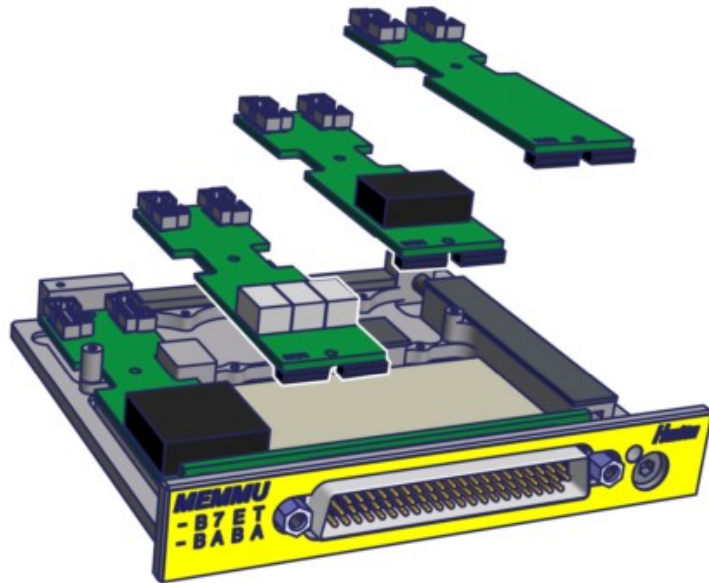


# MDR Components - Modules

Digital Interfaces	
<b>MMRG8A</b>	8x 30Mbit/s PCM CH10
<b>METH2A</b>	2x Ethernet, 600 Mbit/s total, parsing
<b>MARR16</b>	16x ARINC 429
<b>MUSM16</b>	16x Serial RS 422/485/232
<b>MUAR6TA</b>	6x MIL-1553 – Filtering
<b>MCAN4</b>	4x CAN Bus
<b>MSTG2</b>	2x STANAG 3910
<b>MDSC32</b>	32x Discrete, 100 kHz sampling
<b>MAMU</b>	8 x ARINC429, 2 x PCM, 2 x MIL-1553



# Hybrid Modules – Modularity <sup>3</sup>



## ■ Design target:

- Flexible & easy packaging of bus interfaces for adapting to individual customer requirements
- Four signal interfaces per module

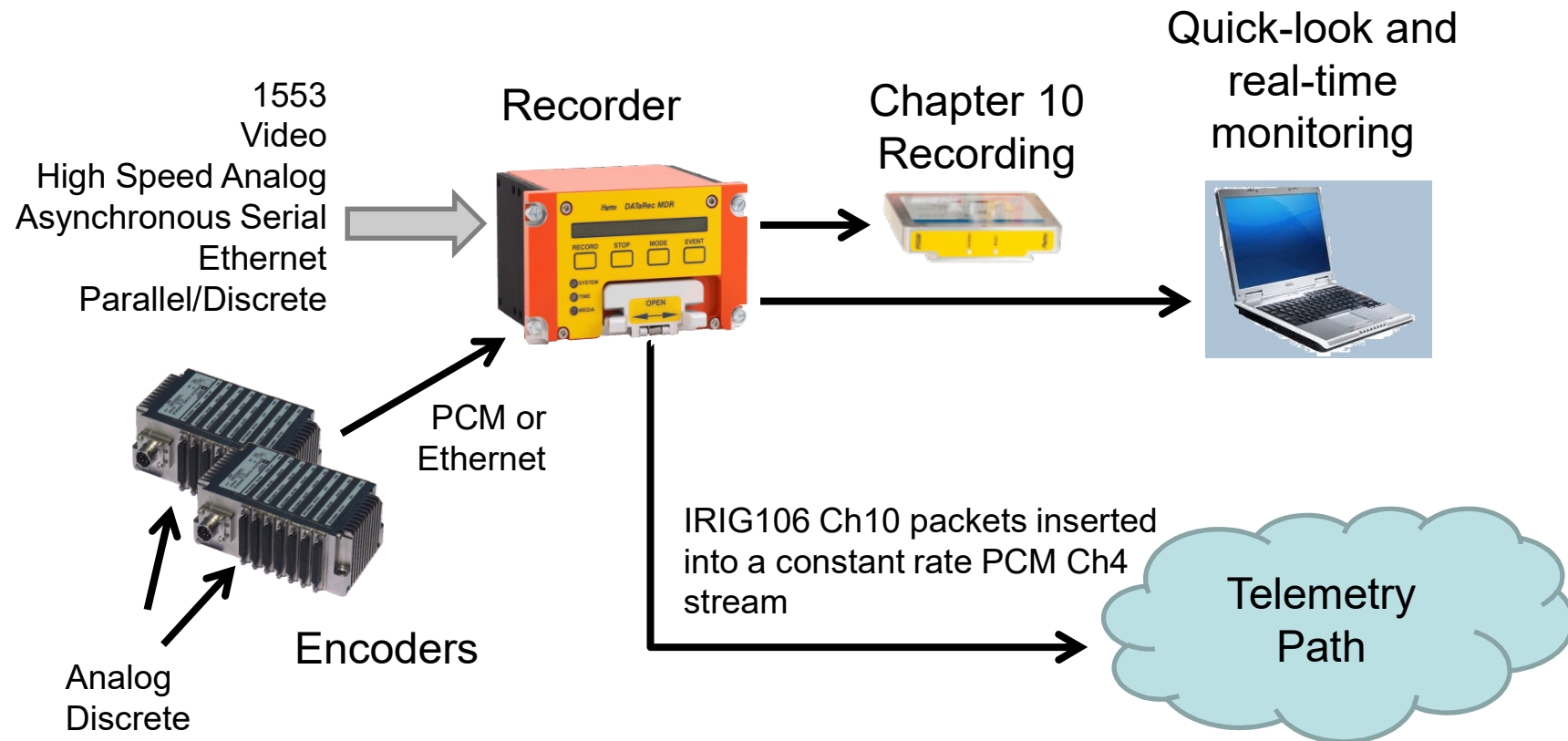
## ■ Modularity <sup>3</sup>:

- Choice of input type: Ethernet, PCM, MIL-1553, ARINC429, asynchronous serial, discrete, etc...
- Choice of electrical characteristics: input impedance, coupling
- Choice of advanced features: filtering, frame synchronisation

## ■ Configuration example:

- 3 inputs PCM inputs with loopback, 2 MIL -1553 with filter function, 1 input Ethernet with parsing option

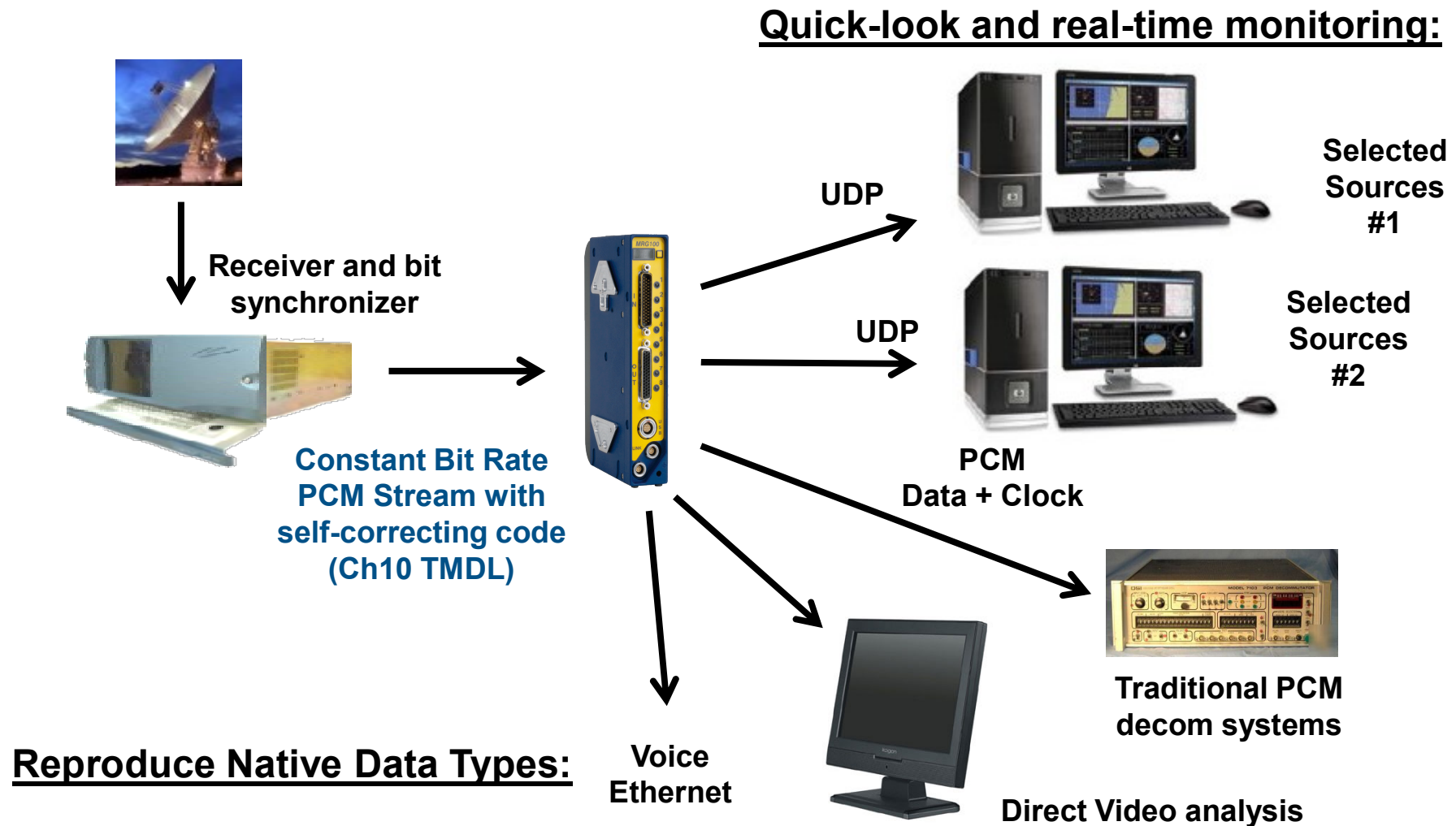
# Chapter 10 Telemetry Concept



**Duplicate interfaces not required !**



# Ground Side: Downlink Diagram



# Storage Media

## Data format Ext2



CF Card 4GB – 64GB

Temperature

Speed

interfaces

Declassific.

-25° - + 71°

160 Mbit/s

Card reader

No



RSM-CF (Container f. CF)



DSM 128GB – 512GB

-5° - + 55°

360 Mbit/s

eSATA

No



RSM 32 GB – 256GB

-40° - + 71°

240 Mbit/s

eSATA

Yes



RRM – 600 GB or 1.2 TB

-40° - + 71° \*

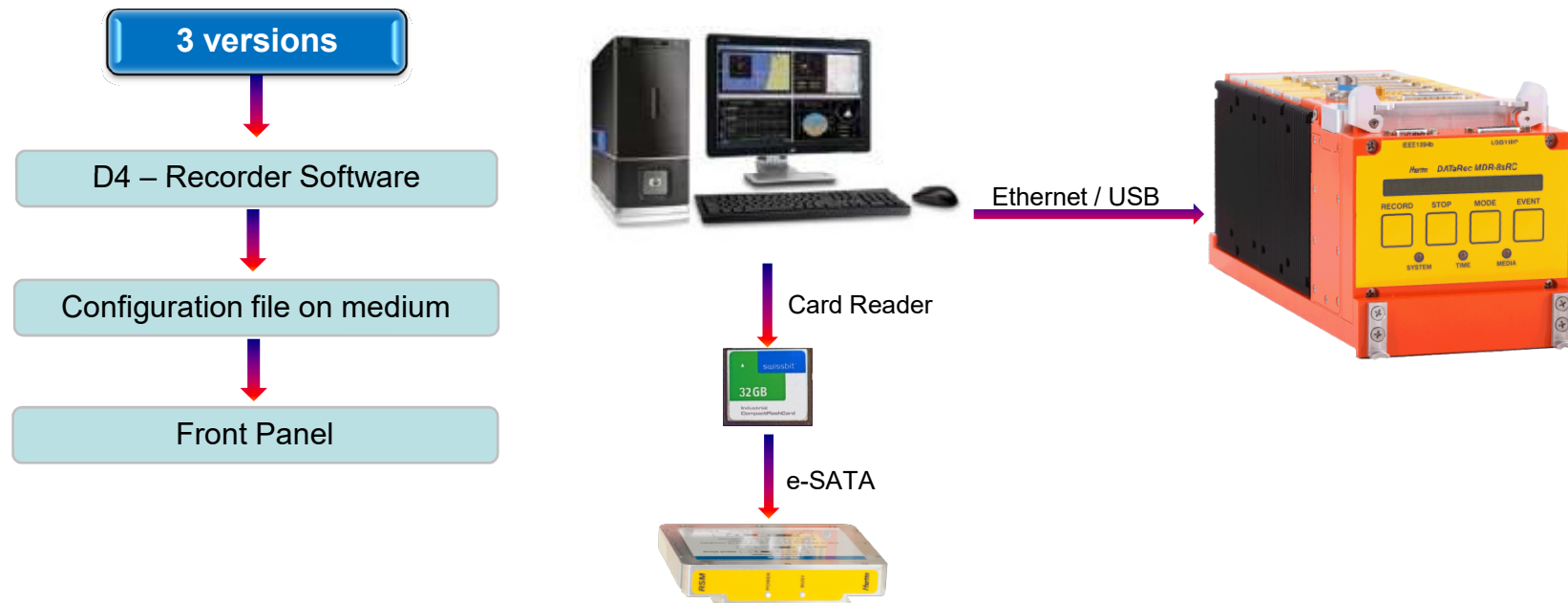
800 Mbit/s

eSATA

No

\* Needs pre heating phase

# Configuration possibilities





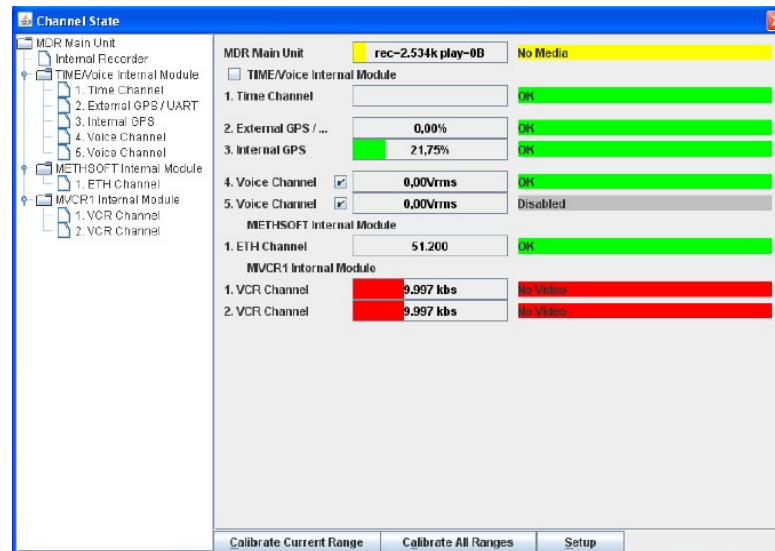
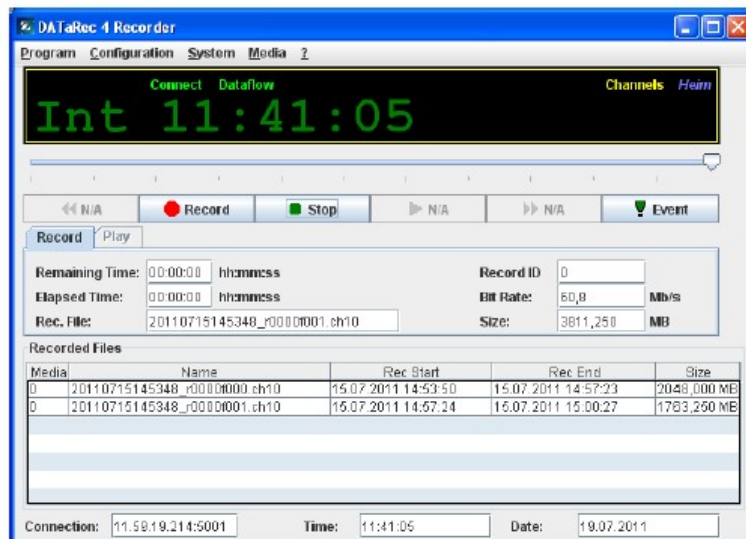
# Software Suite

- Set-up
- UDP Broadcast, UDP Replay File Server
- Video Viewer
- Conversion software
- Post-Processing software



# Monitoring & Control over Ethernet

- Chapter 10 .Health, .Critical
- Binary commands
- D4Recorder
- SNMP (AA300)



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# UDP Server

- Live UDP broadcast to several destinations
- UDP File Replay to several destinations
- Allows real time and time shifted streaming
- Allows nominal speed streaming for debriefing

The screenshot shows the 'UDP File Server' configuration window. It has a title bar with a close button. Inside, there's a section for 'UDP File Server' with 'Start' (selected) and 'Stop' radio buttons, and 'Apply' and 'Cancel' buttons. Below are several checkboxes: 'Insert TMATS packets periodically' (checked), 'Define Start Time' (checked), 'Define Stop Time' (checked), and 'Repeated Loop' (unchecked). Text fields include 'TMATS Interval (s): 10', 'Maximum UDP Size: 1024', 'Date: 23.02.2012', 'Time: 01:00:53', 'Date: 23.02.2012', and 'Time: 01:01:42'. There's a 'Speed Mode' dropdown set to 'Multiplier', a 'Speed' field set to '1', and a 'Frontend Data' checkbox (unchecked). The 'File Name' dropdown shows '20120223010051\_r0001f000.ch10'. The 'Count of IP Addresses' field is '1'. At the bottom, a table lists destination information.

	Destination IP	Destination Port	Channel IDs
1:	11.59.17.3	2000	ALL

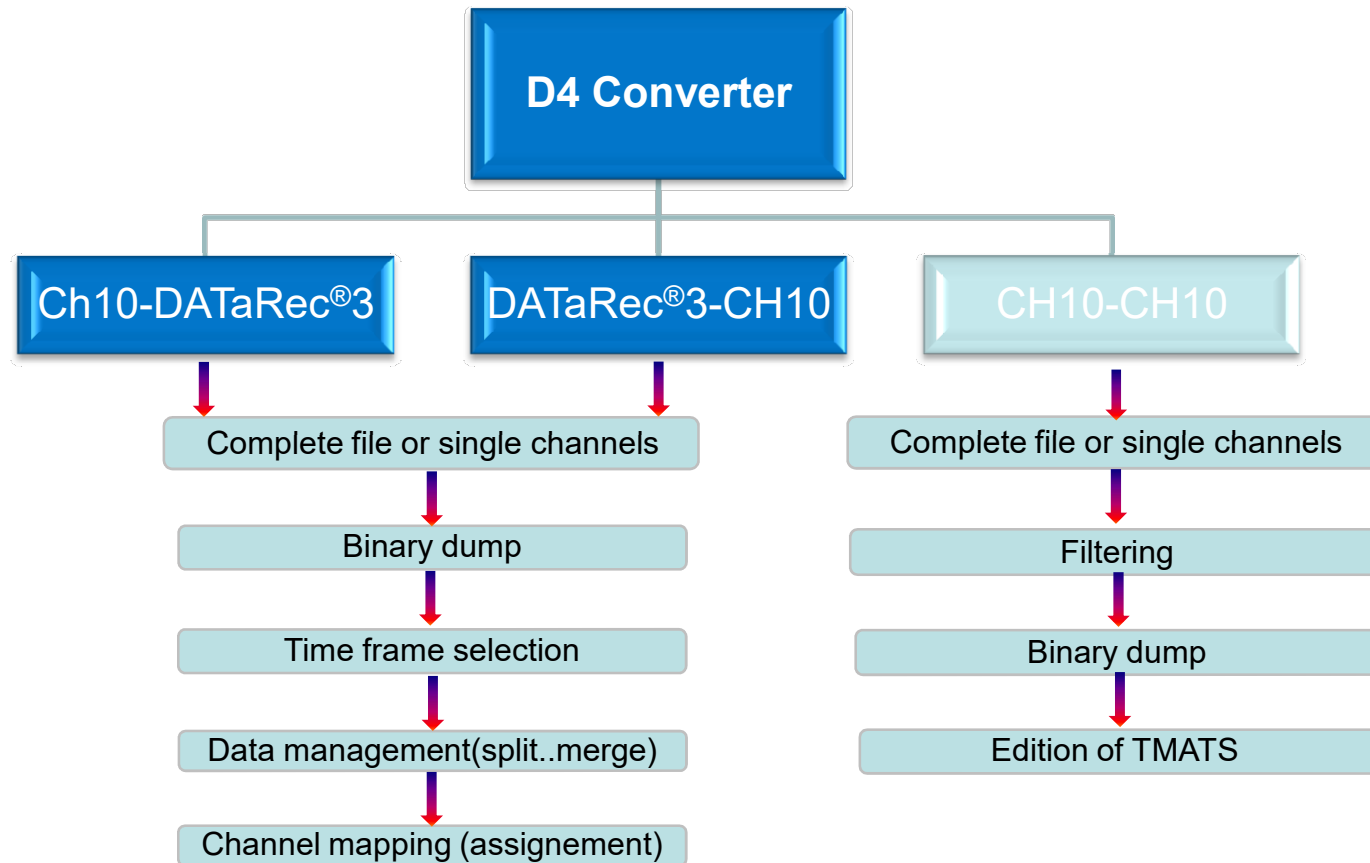
# Video Viewer

## ■ Mode of Operation

- Up to 4 videos simultaneous replay, real time or time shifted
- UDP or File video replay
- Direct replay from Chapter 10 file

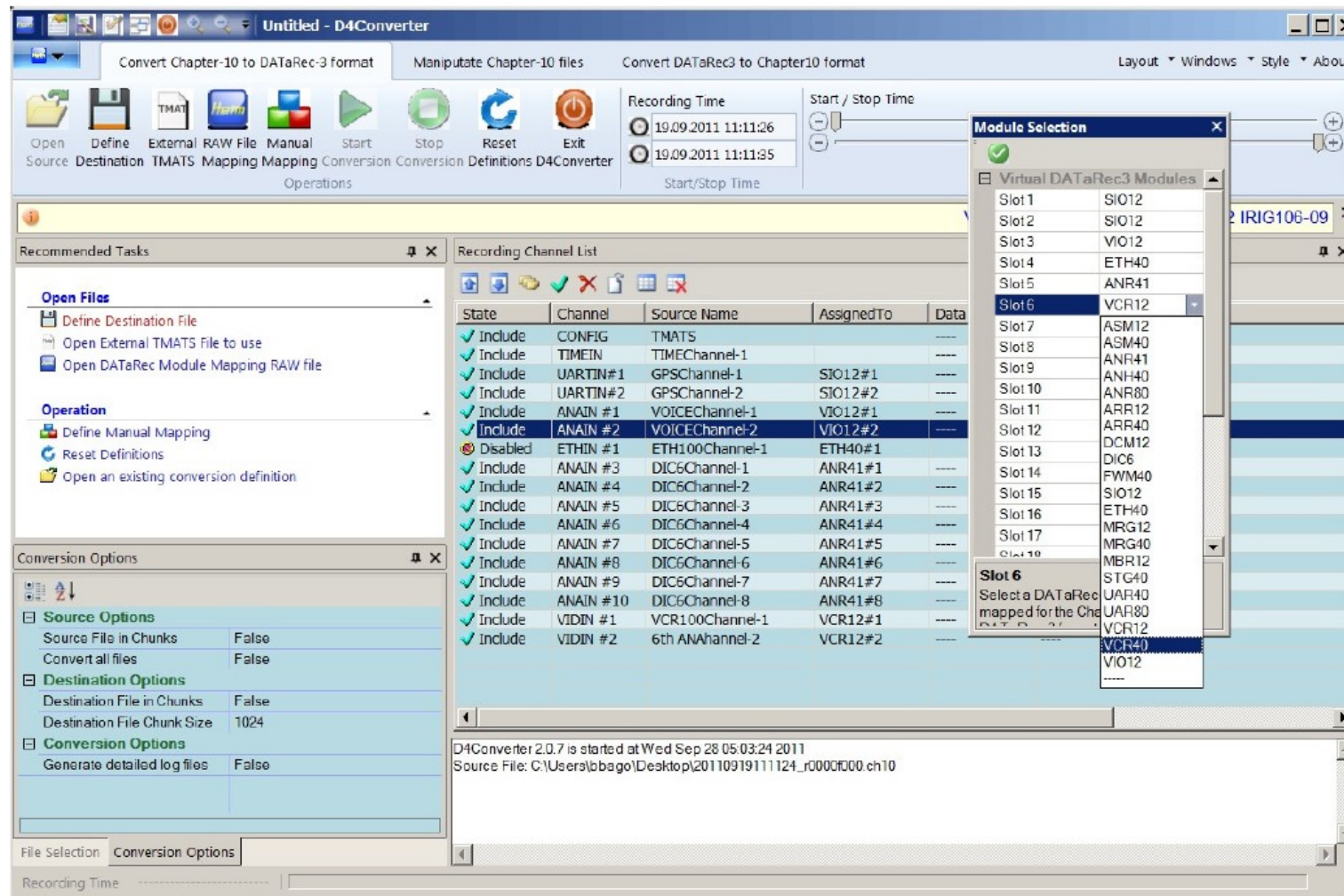


# Conversion software





# Conversion software

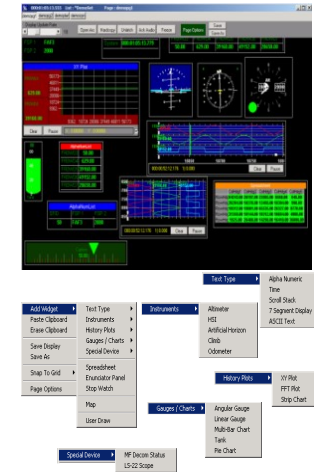


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# Processing software



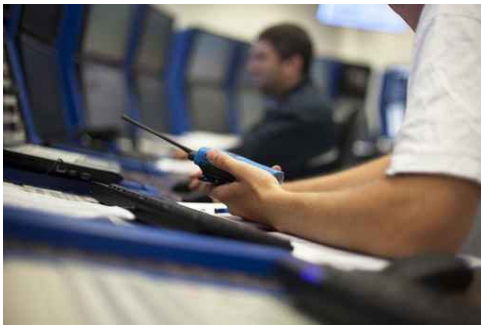
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# GMDR –Ground Modular Data Recorder and Reproducer



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# GMDR – Application Fields

Classic FTI – Replay of  
FTI Data



Telemetry Applications –  
Record and Replay of  
Telemetry data



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# GMDR6 – Compact 1 or 2 HU Systems



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# GMDR6 – Facts

- Fully compatible with the global leading ZDS MDR recorder series
- Supports a huge variety of data types (PCM, ETHERNET, ARINC 429, MIL 1553, CAN, analog, video, serial, discrete, ...)
- Wide range of video interfaces (DVI, SDI, PAL, NTSC, RTP)
- Replay modules for PCM, Ethernet, MIL 1553, Video, ARINC 429
- Intelligent data distribution (Ethernet streaming and multiple recording destination with filtering capabilities)
- One height unit for GMDR 6 and six module slots
- Two height units for GMDR 12 and twelve module slots

# GMDR – Development Road Map

## ☐ GMDR-6 availability:

- ☐ First prototype was shown at ITC in November '14.
- ☐ First deliveries planned for May '15

## ☐ GMDR-12 availability:

- ☐ First deliveries planned for September '15



# Thank You

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