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A High-Performance Mass Memory Unit for Next Generation Satellite Systems

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DSI Aerospace GmbH is an SME located in Bremen, Germany which provides following electronic equipment:

Platform & Instruments Computers

Payload Data Handling Units (incl. MMBs)

Data Processing Units

Test Systems (EGSE)

Engineering Services

Aerospace Electronics since 1997

Targeted Requirements

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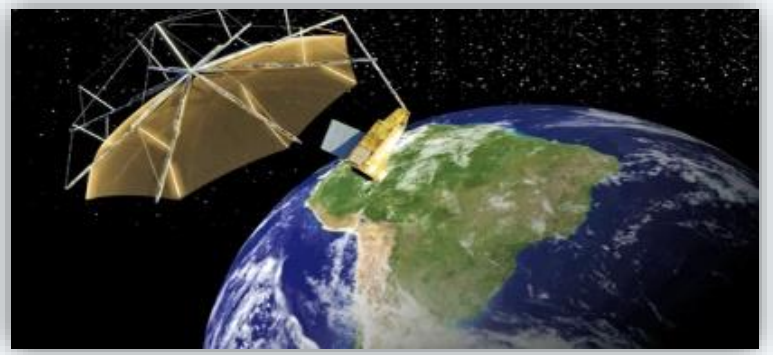

Potential missions and studies

- Requirement review
- Several upcoming missions are taken into account
  - Earth observation: Hyperspectal & SAR missions (Sentinel NG, national radar mission, national optical mission)
  - Quantum cryptography

Key Requirements and Parameter

- Data rates (aggregate) up to 20 Gbps (combined)
- Storage capacity up to 48 Tbit (BOL)
- Reasonable SWaP

MMU Current Baseline for Copernicus Satellites

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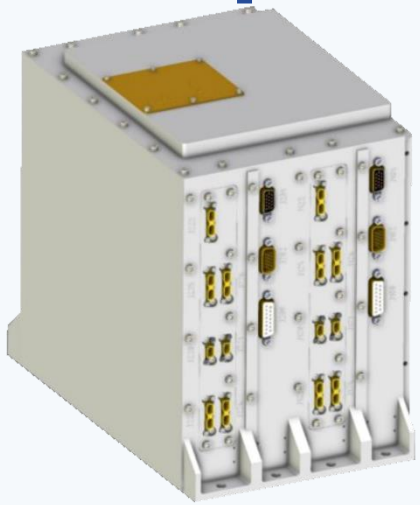
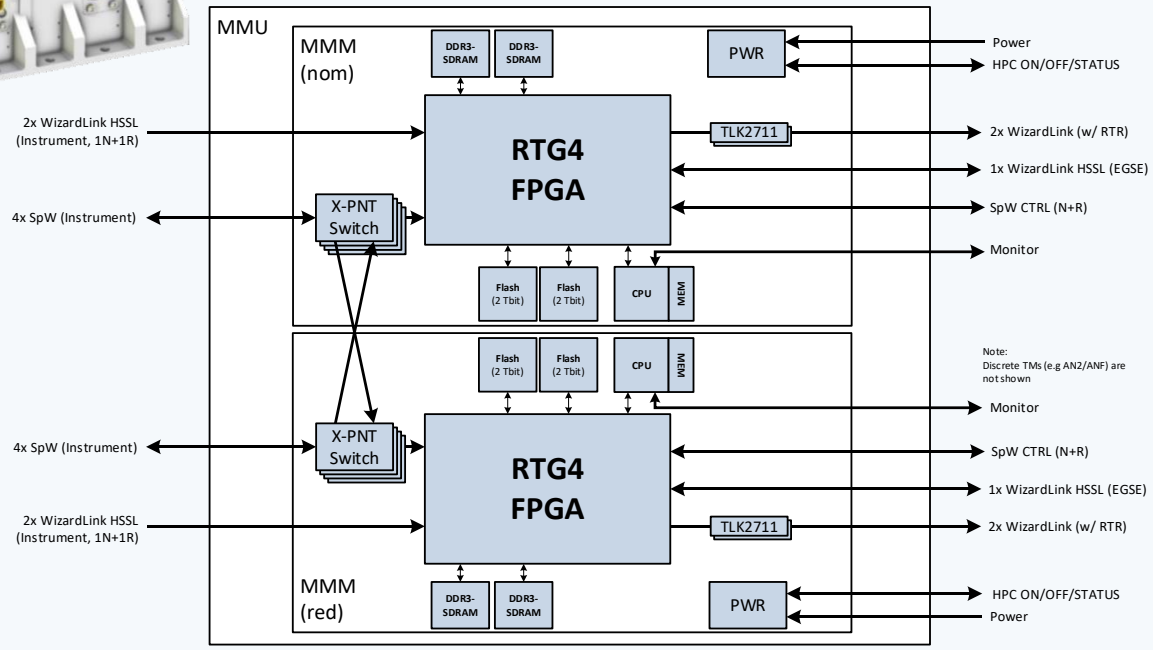
An RTG4 Based MMU

- N + R, Cold Redundancy
- 4 Gbps maximum aggregate datarate
- 4 Tbit EOL Capacity
- SpaceWire Routing Capability
- ~7 kg
- 273×170×237 mm³



Data Interfaces (exemplary):

- 2x WizardLink Input (SerDes Receiver)
- 4x SpaceWire Input (int. x-strap)
- 2x WizardLink Output (1 active)
- N+R SpaceWire or 1553B C&C
- 128 Gbit NAND-Flash devices (RAW)



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The «MMU-NXT»

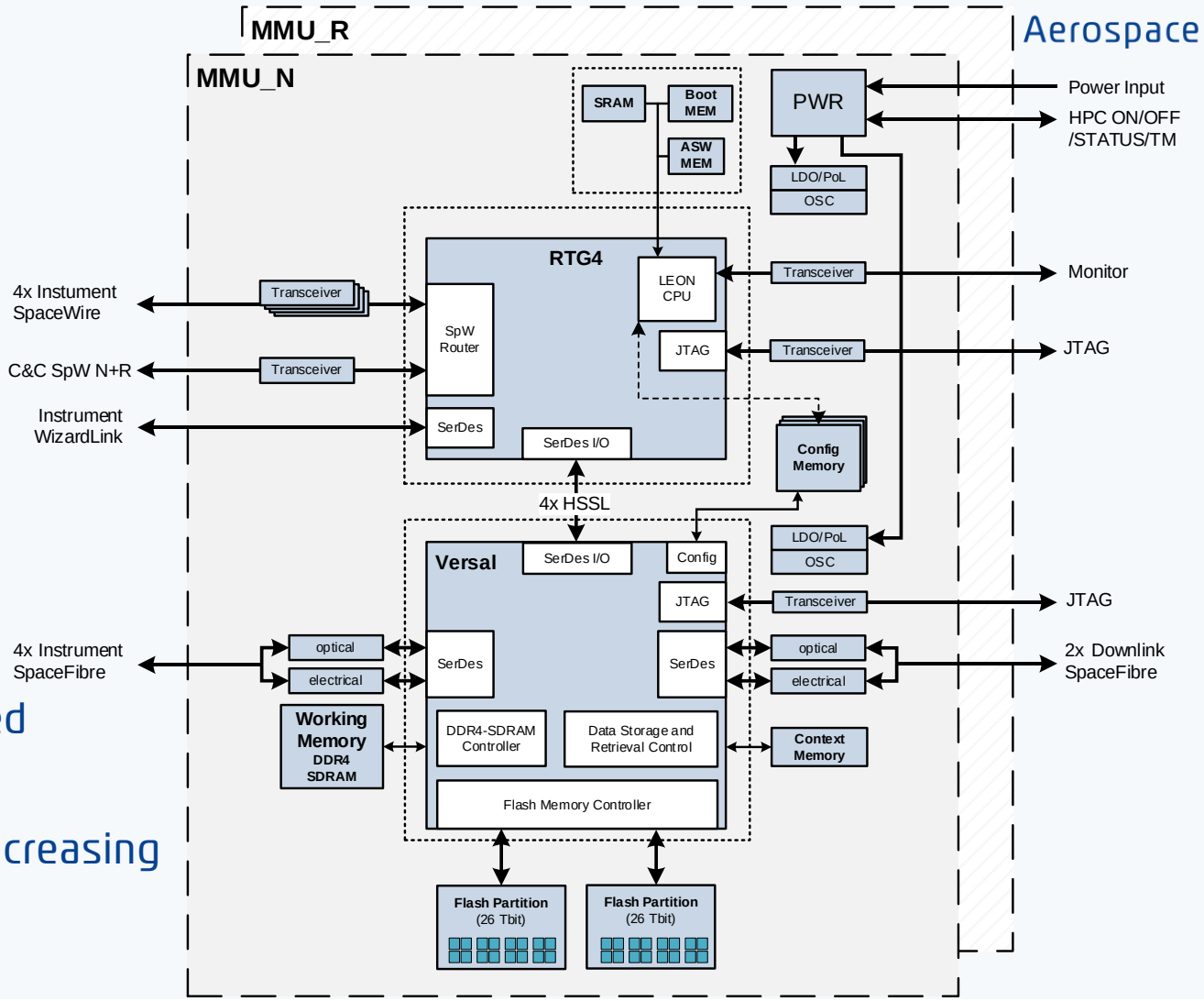
RTG4 & Versal based MMU

- N + R, Cold Redundancy
- 20 Gbps maximum aggregate datarate
- 48 Tbit EOL Capacity (Sync FLASH)
- SpaceWire Routing Capability

Data Interfaces (exemplary):

- 4x SpaceFibre Input
- 4x SpaceWire Input
- 2x SpaceFibre Output
- N+R SpaceWire or 1553B C&C
- Optical Interfaces are included for high-speed interfaces

Higher performance (5x) without significantly increasing the SWaP from current RTG4 based systems



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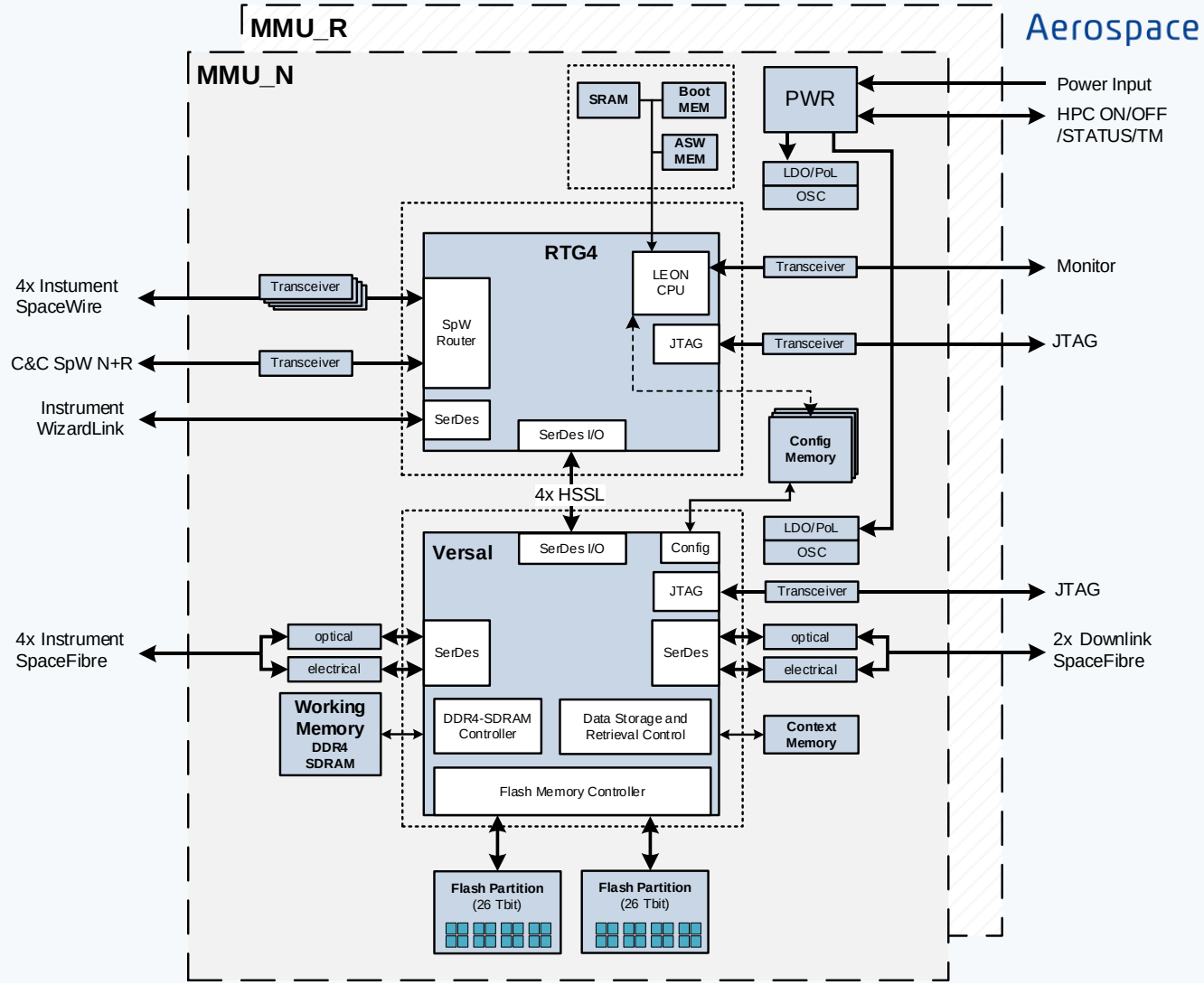
The «MMU-NXT»

RTG4

- Integrated soft-IP LEON CPU
- TM/TC Handling
- C&C and "low-speed" interfaces
- Monitoring of Versal device

Versal

- Control of NAND Flash arrays
- High-speed and optical interfaces
- Downlink TM encapsulation
- Possible future applications:
  - Data compression
  - SAR processing
  - Cloud detection



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3D NAND Flash Upscreening

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Need for modern Flash Devices in Space

- Evolvement of planar Flashes (capacity, performance) stopped
- Planar NAND 256 Gbit vs. 3D-NAND up to 8.0 (3.3 SLC) Tbit per device
- High-speed interfaces: eMMC/UFS (managed) or NV-DDR2/NV-DDR3 (raw)

Planning

- Requirements are taken from ECSS standards (e.g. ECSS-Q-ST-60C)
- Tests have to be adapted to the internal qualification already carried out by the manufacturer
- Selection of suitable COTS candidates:
  - Raw vs managed NAND Flash
  - Availability and Lifecycle of COTS devices
  - How to perform radiation tests with 3D NAND devices?

Campaign

- Evaluation
- Justification
- Lot Acceptance Test
- Screening

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Thank you for your attention!

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Meet us at booth 10

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