MEOS™ PPH

Packet Processing hub - PPH
Data consolidation & access point for satellite constellations and ground station networks

MEOS™ PPH (Packet Processing hub) is a high-performance data hub for multi-source ground systems. It provides the customer an access point to consolidated, time-ordered and unique data for entire satellite and ground systems. Typical applications are satellite constellation systems and networks of ground stations serving single- or multi-satellite missions.

The PPH receives multiple incoming data streams. VCDUs from a network of ground stations are consolidated into the most complete data sets possible filling gaps and removing data overlaps, then processing VCDUs to satellite instrument Application Packets (APs). Partial APs are regenerated, duplicate data is removed, and the resulting data is distributed to multiple data users for further processing.

The PPH is ideal for implementing site diversity in Ka-Band and optical downlink GS networks.

Processing includes generation of APs, removal of duplicate APs, and regeneration of incomplete APs upon reception of new data that fills gaps in previous data sets.

The MEOS™ PPH consists of a number of generic Processing Nodes. Each node performs data reception, processing and distribution. The PPH has an integrated Monitoring & Control system that integrates all elements into a complete and seamless system.

All processing nodes are autonomous, with identical capabilities, sharing a common processing database and data storage. The common storage provides all information needed for any and all nodes to perform the same operations.

Input data can be relayed transparently to multiple other destinations prior to processing. This allows multiple PPHs to be used in a bigger network (as well as other system types). The primary PPH will relay the input data to other PPH's, enabling seamless fail-over between multiple PPHs.

The PPH offers built-in redundancy. If a node fails, the remaining nodes will automatically replace the failed node by taking over its duties, ensuring seamless failover. The failed node can be physically replaced by a spare node without interrupting nominal operations.

Running in a data driven operational mode, the PPH accepts incoming data streams at any time without scheduling or external control. It operates as a fully self-contained unit and hence requires minimal attention or maintenance, saving substantial operational costs.

The PPH supports a number of standard data protocols, making it compatible with most COTS ground equipment.

The MEOS™ Capture HRDFEP is an ideal ground receiver / modem for pushing downlinked data to the PPH in data driven operations. Together, these two MEOS™ products also offer filtering of data transfers from ground stations to reduce the costs of transferring redundant data. This is provided by applying a unique, intelligent and very robust MEOS™ protocol.

FEATURES

- Fully data driven
- Up to four concurrent input data streams at 400 Mbps
- Handles single & multiple copies of overlapping data sets
- Customer specific data delivery configurations
- Reception, processing and distribution reporting
- Forwards input data to other units via transparent Relay streams
- CCSDS protocol: SLE RAF / RCF
- 24/7 operations - extremely high availability
- Automatic failover
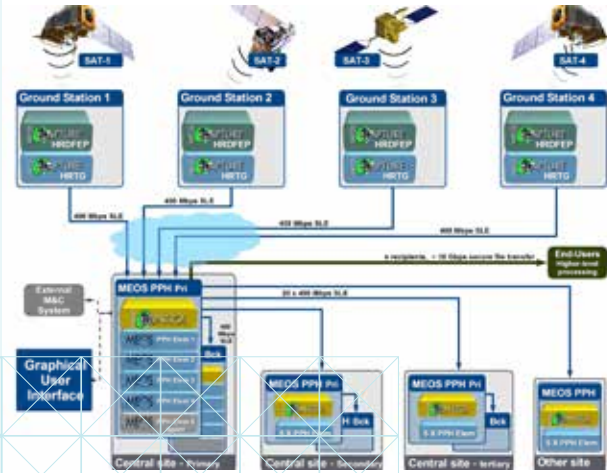
TECHNICAL SPECIFICATIONS

MEOS™ PPH

Capacities and scaling shown below refer to a system delivered on an HPE Synergy 12000 hardware platform. The PPH can be up- or downscaled to other capacities and can also be delivered on a VM platform.

DATA INPUT
- Data format: VCDUs and EVCDUs
- Maximum number of concurrent VCDU input streams:
  - four (one stream per PPH Node,
  - four concurrent streams in total per PPH)
- Data protocol: SLE RAF, SLE RCF and MDIS
- Max data rate per input stream: 400 Mbps

RELAYED OUTPUTS
- Data format: VCDUs and EVCDUs
- Maximum number of concurrent VCDU relay output streams: 20 (up to five streams per PPH Node, up to four nodes transmitting concurrently)
- Data protocol: SLE RAF, SLE RCF and MDIS
- Max data rate per output stream: 300 Mbps

DATA PROCESSING
- VCDU Normalization: Complement incoming VCDU data with already received data to generate data sets as complete as possible, by:
  - Time ordering of data
  - Gap filling
  - Filtering of duplicate data
- EAP generation:
  - Data format: APs and EAPs
  - Time segmented AP/EAP files

DATA DISTRIBUTION
- Data format: APs and EAPs
- Distribution to up to 15 destinations
- Concurrent distribution to all destinations
- Individual configuration per destination (e.g. maximum file size)
- Filtering of duplicate data
- Data protocol: FTP, SFTP, FTPS

DATA STORAGE
- Data format: APs and EAPs Internal NAS, 45 TB capacity (flexible)

REDUNDANCY
- One extra processing node, for a total of
- five identical Nodes, all operating in parallel
- Automatic failover ensured by the 4+1 Node architecture
- Fully data driven operation

MONITORING & CONTROL
- PPH system GUI
- Processing Node GUI

REPORTING
- Extensive reports on data acquisition, processing and distribution

CCSDS SPACE LINK EXTENSION (SLE)
- CCSDS data transfer protocol
- Runs on top of TCP/IP
- RAF – Return All Frames (All VCIDs)
- RCF – Return Channel Frames (selected VCIDs: 0-63)
- Timely Online (PIB and UIB)
- Complete Online (PIB and UIB)
- Offline (UIB only)
- User Initiated Bind (UIB)
- Provider Initiated Bind (PIB)
- Authentication
  - Secure Hash Function (SHA-256) as recommended by CCSDS
- Status messages
- Private annotations

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