EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Data Management Systems (4)

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THE SENTINEL-1 PAYLOAD DATA GROUND SEGMENT DESIGN – SCALABILITY AND
FLEXIBILITY FOR A GROWING MISSION

Abstract

The Sentinel-1 Payload Data Ground Segment (S1 PDGS) in its current configuration includes 3 Core Ground Stations, 2 Processing and Archiving centres, 1 Management Centre and 1 Quality Control Centre distributed across Europe. The S1 PDGS is charged in particular with mission planning operations for instrument sensing and satellite downlink, the systematic and timely production and distribution of Sentinel-1 data products up to level-2, the long-term data archiving, the products calibration and validation and the instrument performance monitoring activities.

From the outset, the Sentinel-1 PDGS has been designed to cater for the main mission's reconfiguration and resizing exercises from the initial operations during the Sentinel-1A satellite commissioning, to the Sentinel-1A routine operations with extended processing scenarios, the launch and commissioning of the Sentinel-1B satellite unit and the integration of the EDRS service in the Sentinel-1 operations.

The PDGS design provides flexibility with respect to the number of active core stations and processing and archiving centres and the allocation of storage, production and dissemination activity across the same type of centres. Key flexibility features include the capability to load balance functionality across a configurable number of elements for many functions, dynamically reconfigurable rule-based production and

dissemination control, configurable production cluster size and topology. Also, a high level of virtualisation ensures maximal flexibility during hardware re-configurations.

Over the first 2 years of operations, the PDGS has seen the seamlessly integration of a core station and a processing and archiving centre in the regular operations, the phase-in of additional hardware in line with the initial mission ramp-up plan, an increased production capacity beyond the scope of the initial systematic production scenario, the relocation of one complete centre to a new location and a significant hardware upgrade with system layout update for load balancing. All changes have been performed without interruptions to the delivered operational services by rerouting of system activity between centres.

This presentation focuses on the Sentinel-1 PDGS system production and data flow design with emphasis on the scalability and configurability features. Up-to-date production performance figures from the first 2 years of operations are presented. Based on the figures and the operational experience it is shown that certain software and hardware features and architectural patterns were instrumental in ensuring the flexibility that was needed, both to scale up for growth and to re-configure for transparent transition phases.