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

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# HIGH PERFORMANCES DATA HANDLING AND TRANSMISSION SYSTEMS: THE COSMO-SKYMED SECONDA GENERAZIONE SOLUTION.

**Abstract**

The Payload Data Handling and Transmission (PDHT) is a subsystem operating on board Earth Observation satellites to provide handling and transmission to Ground of the observation data acquired by high resolution radar instruments, typically Synthetic Aperture Radar (SAR). The really challenging needs, according to the requirements stated by ASI and I-MoD, of the COSMO-SkyMed Seconda Generazione (CSG) mission, requires very high performances in terms of SAR acquisition data rates and data volumes per orbit, leading to a Payload Data Handling and Transmission architecture design completely new with respect to the present flight proven solution. On the first generation of COSMO-SkyMed (CSK) satellites the SAR payload produces one data flow with a maximum rate of 600Mbps; on CSG the SAR is designed to simultaneously operate in dual polarization with an higher resolution, providing to the PDHT two input data flows with an overall input data rate almost quadruple of the CSK one. Therefore, a significant improvement of the state of art PDHT storage capability and downlink performances are resulted necessary. The competitive mission needs together with the availability of good technology maturity level and the consequent compatibility with the programme time schedule have driven the trade-off phase allowing the identification of a new and high performance technological and architectural PDHT solution. In particular, two different configurations have been evaluated from the performances and the development time and costs point of views and, according to a "best fitting" approach, a specific architecture has been proposed as a baseline solution for CSG. The baseline PDHT solution has been identified taking also into account the performance and functional growth foreseen in the frame of other TAS-I programs currently under development. In particular, the PDHT is designed with a faster data acquisition

interface and with a new modulation and coding scheme, the 4D-TCM 8PSK with Reed Solomon and interleaving, to enhance spectral efficiency and to allow increasing the downlink capabilities (higher than 500Mbps). Details on the PDHT baseline architecture for high performance real time data handling and transmission in the frame of COSMO-SkyMed Seconda Generazione mission will be provided highlighting the main features in terms of architectural and technological aspects.