

Overview of Implementing SpaceWire in Satellites from Thales Alenia Space

Session: SpaceWire missions and applications

Short Paper

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ABSTRACT

Thales Alenia Space is implementing SpaceWire technology in most future space projects for observation missions. Three kinds of space applications are based on SpaceWire architectures for payload data handling, with low earth orbit observation satellites, planetary exploration carriers and geostationary observation satellites.

All various missions are briefly described and compared for SpaceWire implementation, showing how the SpaceWire use and perimeter is increasing from interfaces standardization, through interfaces optimization by merging of mission and configuration command/control data up to allowing to exceed limits of today architectures.

In the frame of the Global Monitoring for Environment and Security programme (GMES), the Sentinel-3 satellites is a European polar orbit satellite system for the provision of operational marine and land services, based on optical and microwave Earth observation payload. The payload data handling architecture is based on SpaceWire links with a Payload Data Handling Unit providing an overall throughput of about 1072Mbps with a 360Gbits EOL storage capacity. Other low earth observation satellites are based on similar architectures with payload data handling over SpaceWire links.

The ExoMars Programme will demonstrate key flight and technologies in support of the European ambitions for future exploration missions. ExoMars 2016 mission shall accomplish the technological objective with Entry, Descent and Landing (EDL) of a payload on the surface of Mars and the scientific objective to investigate Martian atmospheric trace gases and their sources. The ExoMars spacecraft will carry a 600kg EDL Demonstrator and go into orbit around Mars to perform a science mission of 2 years followed by a Mars proximity communications mission of about 3 years. The science instruments on-board will remotely sense the Martian atmosphere and surface with 5 instruments. A SpaceWire network is candidate to acquire and multiplex data from these various instruments.

The MTG system will provide Europe's National Meteorological Services and, by extension, the International Users and Science Community, with an advanced operational satellite system, providing improved imaging and new infrared sounding capabilities for both meteorological and climate applications. The MTG space segment is based on 2 geostationary satellites carrying complementary payloads, built around a fast SpaceWire network for an unified mission and configuration data management, merging science and RF data, with more than 300Mbps continuous downlink for the following missions :

- Flexible Combined Imager mission allowing to scan either the full earth disc in 16 channels every 10 minutes
- InfraRed Sounding mission covering the full disc, providing hyper-spectral sounding information in two bands
- Lightning Imagery mission, detecting continuously over almost the full Earth disc, the lightning discharges
- Ultraviolet, Visible & Near-infrared sounding mission, covering Europe.
- Search and Rescue Relay Service providing distress alert and location
- Data Collection System mission for collection and transmission of observations and data from surface, buoy, ship, balloon or airborne