Aldo Paraboni Q/V Band Payload
Technology Demonstration Payload

The Aldo Paraboni Q/V Band Payload explores new frequencies for future telecom applications. In parallel, Ka- and Q-band beacon transmitters will measure how Earth’s atmosphere affects communications in these bands.

Exploring new frontiers

The frequencies in which broadband satellite communications operate are becoming crowded, and industry is now looking at technologies capable of utilising higher frequencies. These are represented by the Q-band for downlink (around 40 GHz) and V-band for uplink (around 50GHz). TDP 5 is named after the Italian scientist Aldo Paraboni, who dedicated his life to researching the higher frequency bands.

Italian national space agency ASI commissioned the payload (under ESA’s ARTES programme) with Italian companies Thales Alenia Space and Space Engineering to explore these possibilities by developing technology that could adapt to poor atmospheric conditions while minimising the effect it has on performance in clear skies.

These frequencies are now becoming real commercial possibilities, as technological advancements have eradicated the previous need for oversized transponders to accommodate for the fading that occurs due to Earth’s atmosphere. The wide bandwidth provided by these frequencies can result in lower service fees, higher-capacity systems and improved satellite positioning.

Two independent systems in harmony

TDP 5 is designed to perform two experiments while in GEO: Communication and Propagation. Its communication experiment tests methods of adapting the beam to atmospheric conditions and its propagation functions monitor the influence of weather and provide figures for the upgrade from current Ka-band to Q/V-band. It is the first time the advanced satellite standard DVB-S2 will be tested in Q/V-band, which must happen in real conditions. These experiments will provide the knowledge for future advancements in the necessary infrastructure.
Composition

COMEX Subsystem: Communication experiment

- In Q/V-band
- V-band uplink (48 GHz), Q-band downlink (38 GHz)
- 2 transponders with cross-strapping capability
- 3 beams (2 simultaneously active)
- No redundancy

SCIEX Subsystem: Propagation experiment

- In Q-Band and Ka-Band
- 2 beacons (19.7 GHz – 39.4 GHz)
- Fully redundant configuration

ASI, Space Engineering and Thales Alenia Space

Italian industry’s heritage with high frequency ranges in space services hails from the 1970s, when it pioneered the use of Ka-band in commercial applications. ASI continues to support further development in this area. ASI assigned the Space Engineering Group with the TDP 5 ground segment responsibilities, as well as the antenna and passive units design. Thales Alenia Space was responsible for the payload design and development of the active units and antenna assembly.

Facts and figures

Nominal lifetime 3 years, possible 2 year extension
Total weight 37.7kg
Max power consumption 274W
Max thermal dissipation 245W
Launch 25 July 2013, on Alphasat
Control Centres
- Tito, Italy
- Spino d’Adda, Italy
- Graz, Austria
- London, UK (Inmarsat)
Co- contractors
- Thales Alenia Space, Italy
- Space Engineering, Italy

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