IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2) Near-Earth and Interplanetary Communications (7)

Author: Mr. Eric Reinthal

Planetary Transportation Systems GmbH (PTS), Germany, Eric.Reinthal@pts.space

Mr. Andrei-Costin Zisu

Planetary Transportation Systems GmbH (PTS), Germany, andrei.zisu@pts.space Mr. Christian Feichtinger

Planetary Transportation Systems GmbH (PTS), Austria, Christian.Feichtinger@pts.space Mr. Karsten Becker

Planetary Transportation Systems GmbH (PTS), Germany, karsten.becker@pts.space

ADVANCED INTERPLANETARY COMMUNICATION ARCHITECTURE

Abstract

Demands for interplanetary communication services are rapidly increasing in complexity, while connections remain constrained by long signal propagation delays and highly asymmetric links. In this paper we present a customer-centric communication system architecture for a lunar surface exploration mission. The network is focused on providing real-time end-to-end data services for payload operators, including reliable bidirectional data transfer and high-throughput streaming services. A novel architecture enables communication for network nodes on ground, nodes attached to a lunar lander, nodes deployed in orbit throughout the journey to the Moon and mobile nodes deployed on the lunar surface. To accommodate for all requirements, it leverages multiple communication technologies. Besides traditional radio links and Ethernet connections for spacecraft-local communication, it makes use of a Long-Term Evolution (LTE) network on the lunar surface as a world's first. Web-based ground interfaces provide access to the delay-tolerant networking architecture spanning from the ground to the space segment. This enables connections to the target node in space through automatic end-to-end routing. The presented approach resembles a highly effective communication network for an unlimited number of nodes in space, which easily adapts to changing customer requirements and specific mission constraints.