17th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Interactive Presentations - 17th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (IP)

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DESIGN AND DEVELOPMENT OF A PLANETARY COMMUNICATIONS GATEWAY INFRASTRUCTURE FOR SAFE, RELIANT AND STANDALONE DEEP SPACE MISSIONS AND OPERATIONS.

Abstract

Deep Space -and other heavenly bodies- permanent human settlements will require support of a local communication system to ensure that astronauts, systems and machines are performing as expected and can act accordingly in case of a local emergency. With existing technology, software and hardware developments as well as the creation of a local planetary intranet, key players and decision makers will have the proper tools, data and information to enable fast and reliant communication to all personnel involved in the mission. This communication will be in real time with local support and Earth mission control back up to keep with the objectives and operation of the mission. Based on the above, the development of a Planetary Communications Gateway (PCG) will be crucial. The proposed general architecture for the PCG is composed of a multicast information delivery system as well as multiple local cloud computing servers and routing systems, allowing the implementation of an advanced communication *in-situ* wide area network. This network will provide for each outpost simple voice and data communication for each member of the mission; as well as, sensitive information transmitted via a multicast delivery system such as relevant news and key data from mission control. Also, with state-of-the-art set top boxes it is possible to send over-the-top on-demand videos which will allow for personal, job specific instructions and training that can be send from Earth or the local decision maker. In addition, the use of Internet of Things-based sensors in key and equipment will provide on-site real time data to consider for activities, experiments, inventory and outpost resupply. An important outcome from the implementation of a PCG will be the delivery of a standalone and independent infrastructure that, in case of an emergency, quick response protocols and actions can be taken in short time, just as Earth-based communications and disaster management protocols. A key consideration taken for the development of the PCG proposal, is the existence of a working space infrastructure (communication or small satellites constellations in orbit) that will provide the point-to-point/multipoint links for all the outposts operation. This required space infrastructure mentioned before will be addressed in a further and complementary proposal.