SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Space Communications and Navigation Systems (1)

Author: Mr. David Dunlop
National Space Society, United States

EVOLVING AN INTEROPERABLE COMMUNICATIONS ARCHITECTURE FROM INTERNATIONAL LUNAR MISSIONS IN DEVELOPMENT

Abstract

At least 31 lunar missions and significant payloads with planned deployment by 2025 are in funded development. Surprisingly, there has been rather meager public discussion and regarding the development of an international lunar communications architecture. An International Lunar Decade has been proposed which involves the further exploration and commercial and industrial development of the Moon approximately between 2020 and 2030 and the infrastructure needed. A Cislunar-Lunar Communications architecture is one component of that infrastructure recognized in A NASA White paper: "In view of the potential abundance of lunar spacecraft to be launched during the 2016-2025 timeframe and the fact that there exists no common communications architecture to guide these mission from several space agencies yet, a decadal space communications architecture may benefit future missions from several space agencies" (1) 1 This cislunar network potential has been discussed in the context of ISECG and at present there is no agreement on interoperability standards. 2 The European Space Agency is funding the "Lunar PathFinder" satellite to provide services by 2019-2020 for customers requiring communications links to the lunar surface. 3 KARI-NASA's Joint Study developed a lunar communications architecture(1) which supports NASA and KARI mission requirements that would be operational in the 2018-2021 timeframe including: the 2018 launched Korea Pathfinder Lunar Orbiter (KPLO), the KPLO mission operations system, Lunar CubeSat missions, and NASA's Resource Prospector.These joint capabilities would be interoperable to each other, and could obtain "cross support" by the network assets of the two agencies,(1) This model is proposed for expanded "international cooperation for implementing a DTN protocol, and has been done by NASA-ESA (2012) and NASA-JAXA (2013) 8 And NASA-KARI/Electronics and Telecommunications Research Institute (ETRI). (http://sourceforge.net/projects/ion-dtn/)". NASA is also planning for the deployment of an optical laser system in the early 2020's with manned cislunar missions. 4 The provision of communications relay orbiters cycling between the Earth and the Moon might provide a means to overcome the communications constraints at Earth Moon distances. 5 Affordable lunar orbital cubesat relay nodes might provide an additional commercial mechanism for an initial proposed lunar satellite constellation of 3 satellites. 6 A further multi-national and commercial study of how planned lunar missions might be leveraged for a communications network should be initiated. Note (1) The Lunar Space Communications Architecture from the KARI-NASA Joint Study AIAA 2016-2419 Space Ops. Conference 16-20 May 2016, Dajeon, Korea.