

IEEE Aerospace & Electronics Systems Magazine

Call for Papers

“Recent Trends in Interplanetary Communications Systems”

The information content of scientific data coming from remote planets explorations is very high and it is still not fully exploited by the scientific and public communities. A large distribution of such data to scientists not directly involved in a space mission project is a relevant objective worthy of interest. This evolution requires an increase in returned data volumes and higher data rates, envisaging the need of complex Interplanetary communications architectures and technologies.

Furthermore, future human missions to Mars and Moon will require a reliable and interactive communication infrastructure able to connect astronauts, landers, rovers and orbiters with Earth facilities.

Several issues have to be taken into account while defining and realizing an interplanetary network. Some of the most important concerns are: *a)* large propagation delays and path losses; *b)* scarce resources; *c)* limited quantity of energy; *d)* discontinuity of the links.

These requirements added to constraints on cost, size, mass and energy consumption of space communication equipments make the enhancement and optimization processes highly recommendable.

Radio Frequency (RF) and optical communications technologies represents two complementary approaches to establish point to point communications links at very long distance. The research in the design and optimization of these technologies is open and wide.

Besides new RF and optical communications technologies, the exploitation of novel networking solutions plays a crucial role. In more detail, concerning the networking architecture, the Delay Tolerant Network (DTN) architecture is an important tool, which basically consists in the Bundle Protocol layer implemented under the application layer and running directly over transport, network or data link layers.

We solicit papers covering a variety of topics that include, but are not limited to the following subjects:

- Architecture design and specific mission analysis;
- Satellite constellations and infrastructures for space missions;
- Innovative protocol stacks and paradigms for interplanetary networks;
- DTN protocols in space missions;
- RF and optical communication technologies;
- Physical and MAC layer schemes and advanced modulation/coding techniques;
- Interplanetary and DTN routing protocols;
- Congestion control at different protocol layers;
- Flexible and reliable Transport layer (Enhanced TCP, LTP, SCPS-TP, TP-Planet, etc.) over medium, long and Interplanetary distances;
- Innovative space mission applications including space life sciences, space telemedicine, instrument connectivity and monitoring;



- Interplanetary network security;
- Efficient network and power management techniques;
- Advanced video, image and signal processing for deep space systems;
- Advanced simulations and emulations to assess the performance of interplanetary networks.

Interplanetary communications systems involve several scientific/engineering communities ranging from space science and systems to communications technologies and networks, and all of them are solicited to submit articles.

Papers should be tutorial in nature and focus on issues and findings that will influence the development of communication services and applications for the selected area. Papers should allow readers to gain basic understanding and insight into the evolution of Interplanetary Communications Systems. Detailed mathematical equations and proofs are not desirable.

Submission information

Authors should follow the IEEE Aerospace and Electronic Systems Magazine formatting and paper submission guidelines available on: <http://sysaes.msubmit.net>. Please, specifically identify submitted contributions as part of this special issue.

Schedule

Prospective authors are requested to submit original papers electronically via the website (<http://sysaes.msubmit.net>) by March 15, 2010. Tentative publication date: last quarter of 2010.

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