

## 6 SPACE INTERNETWORKING SERVICES AREA

### 6.4 CISLUNAR SPACE INTERNETWORKING WORKING GROUP

<b>Title of Group</b>	<b>6.4 Cislunar Space Internetworking Working Group</b>
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#### 6.4.1 RATIONALE

The discovery of water ice at the Moon's poles and evidence of a history of water on Mars has prompted increased interest in executing an expanded program of human and robotic exploration missions to the Moon and Mars. A unified data communications architecture and protocol suite is needed to support these new missions, with Lunar infrastructure being forward-compatible to Mars; this will increase opportunities for cross-support and reduce costs.

#### 6.4.2 GOALS

The Cislunar Space Internetworking WG is chartered to perform the following work by 1 April 2007:

- 1) Create a top-level architecture and operations concept (CCSDS Green Book) for communicating effectively over the whole range of cislunar distances. The architecture will address the projected needs of new lunar exploration programs and their mapping into (and interoperation with) similar capabilities that will be needed on and around Mars;
- 2) Review current and emerging CCSDS standards and recommend any updates required to keep them current and to support cislunar communication (Pink Sheets);
- 3) Examine the spectrum of new Internet development activities that are proceeding within Internet standardization groups, such as the Internet Engineering Task Force (IETF), and identify where they may be applicable to the operations concept developed above. Candidate activities include:
  - a) The Stream Control Transmission Protocol (SCTP);
  - b) The Datagram Congestion Control Protocol (DCCP);
  - c) Voice Over IP (VOIP);

- d) Disruption Tolerant Networking (DTN);
  - e) LEMONADE enhancements to Internet email to support diverse service environments;
  - f) Internet over Digital Broadcast Video Networks.
- 4) Recommend standards for cislunar communications (CCSDS Red/Orange Books as appropriate) with the proviso that these standards should, whenever possible, be extensible to larger communications distances such as Earth-Mars.

### 6.4.3 SCHEDULE AND DELIVERABLES

<b>Date</b>	<b>Milestone</b>
15 November 2004	Draft Green Book describing cislunar communications architecture, operations concept, and protocol suite requirements. This Green Book considers both cislunar and Mars in-situ communications environments.  Survey document describing candidate protocols.
1 April 2005	Draft2 Green Book.  Draft review of existing CCSDS Standards with proposed plan for updating them.

<b>Date</b>	<b>Milestone</b>
1 November 2005	<p>Draft3 Green Book.</p> <p>Report on first round of proposed updates to existing CCSDS protocols. Includes pink sheets or recommendation on reaffirmation without changes for SCPS-NP, SCPS-SP, SCPS-TP, and SCPS-FP. These will require agency review.</p> <p>Down-selection from protocol survey list to core set for further investigation/performance analysis.</p> <p>Begin extensive analysis of candidate protocols. The first step will be to identify existing test reports / testbeds related to or implementing the protocols.</p>
1 April 2006	<p>Finalized Green Book describing operations concept and protocol requirements.</p> <p>Report on protocol analysis / prototyping efforts.</p>
30 November 2006	<p>Draft 1, Red/Orange Book(s) for recommended protocols. Includes any additional recommendations for updating CCSDS protocols.</p> <p><i>Already identified is the need for at least one Red/Orange book on implementation details of the Green Book Architecture.</i></p>
1 April 2007	<p>Red/Orange Book(s) Issue 1 for recommended protocols. Includes newly adopted/developed protocols and updates to CCSDS protocols. These books will be ready for agency review.</p>