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Low-Cost Uplink Concepts for Small S/C
ABSTRACT

In order to minimize the cost of developing sequences of commands for small, low cost missions, the right set of uplink tools must be developed for a minimum cost. The development costs can be greatly reduced if tools (and tool kits) with a multi-mission capability which are easy to adapt for the individual mission are utilized. This paper will describe the various steps in a generic uplink process that can be used with a variety of ground system architectures. For each step, the multi-mission S/W tools that can be used will be described along with the mission adaptation requirements associated with the various architectures. In addition, various features and rules of thumb of uplink systems that reduce costs will be described.

The multi-mission uplink tools include:

Science Opportunity Analysis Tool	Used to automatically analyze the S/C trajectory to locate opportunities for remote sensing and/or fields & particle observations.
Instrument Pointing Design Tool	Used to design/view the remote sensing instrument activities.
Activity Planning Tool	Used to develop time ordered list of activities to be performed by the S/C.
Timeline Generation Tool	Used to draw hardcopy timelines of the activity plan.
Command Sequence Generation Tool	Used to generate the S/C command sequence necessary to implement the activity plan generated by the planning tool.
Command Sequence Translation Tool	Used to translate the S/C command sequence into a S/C memory load.
Sequence Review Tool	Used to streamline and partially automate the manual review of the sequence.
Command Transmission Tool	Used to transmit the commands & memory loads to the S/C.

Various tools of these types already exist or are under development and are readily adaptable to a variety of distributed (e.g. remote science) architectures. The work described in this abstract was performed by the Jet Propulsion Laboratory, California Institute of Technology, under contract to the National Aeronautics and Space Administration.