Design Trades for Mission/DSN Antenna Supportability Using TIGRAS

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Preferred Type: Oral Presentation

Abstract:

With an increasing number of missions to be supported by NASA's Deep Space Network (DSN), it becomes a challenge for space flight projects to forecast their DSN supportability and integrate it into their mission and spacecraft design. As a result, such mission/DSN antenna supportability analysis is not explicitly considered early in the mission design life cycle. Current flight project efforts typically try to anticipate conflicts with other missions by focusing on geometric calculations (e.g., viewperiods). This may result in an inaccurate expectation of DSN supportability. The consequences of this may imply a re-design of the mission or spacecraft, a reduced data return during actual mission operations, or increased cost.

A tool has been developed to forecast DSN antenna supportability based on ground resource requirements over time and viewperiods from all projects. This tool is called TIGRAS. The tool was originally developed for DSN analysts to study antenna loads. We have now developed a prototype that extends the tool to allow projects to support early mission and spacecraft design.

In this presentation, we will describe the capability and usage of TIGRAS. A hypothetical "mission" called Jupiter Moon Explore (JME) is created for illustration purposes only for this presentation. We will discuss how DSN supportability can affect mission and spacecraft design and how JME can use TIGRAS in an early design phase to get better DSN coverage in future operation.