

INTER-CONTINENTAL, INTER-AGENCY ARRAYING - THE GALILEO EXPERIENCE

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Abstract

Since November 1, 1996, the Galileo orbital tour of Jupiter and its moons (Ganymede, Callisto, and Europa) is routinely supported by a massive array of large antennas: two 70-meters antennas in Goldstone (California) and Canberra (Australia), a 64-meters antenna at Parkes (Australia), and additional 1-2 34-meters antennas at Canberra. The scope of this array is unprecedented - it operates daily in a routine fashion, inter-continently, and employs antennas of several agencies, namely two complexes of JPL's Deep Space Network (DSN) and CSIRO's¹ Parkes facility. The success of this routine arraying operation is the basis for the DSN's new array of 34-meters antennas that is being implemented in Goldstone.

Arraying offers a flexible method to applying resources to a communications link. By varying the number of the antennas in the array, enough G/T^2 can be constructed to address a particular mission's downlink requirements. A specific use is for beacon-mode, or on-demand communications. Some (or all) the antennas in the array monitor many spacecraft for a low-rate request-for-downlink. When such a request is detected, the full array is deployed to provide the requested service.

In this paper we discuss the processes associated with making the operationally-complex arraying feasible - lessons learned from the Galileo support. Then we review how the architecture of arraying large numbers of smaller antennas results in a more efficient, and cost-effective, method of supporting deep-space missions.

¹ CSIRO - Commonwealth Scientific Industrial Research Organization

² G/T - Ratio of Antenna Gain to System Noise temperature

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The 48th International Astronautical Federation (IAF) Congress will be held in Turin, Italy, October 6-10, 1997. We anticipate a call for papers from NASA Headquarters. At this time, those authors planning to submit abstracts for approval consideration should forward their abstract, through their respective management channels, to the Associate Director's Office, 180-900, no later than Thursday, January 30, 1997. Also, those persons planning to participate in other capacities such as session chair should also submit their request to attend.