

The Galileo Spacecraft:

A Telecommunications Legacy for Future Space Flight

Dr. Leslie J. Deutsch

Chief Systems Architect
Telecommunications and Mission Operations
Jet Propulsion Laboratory
California Institute of Technology

Abstract

The Galileo mission to Jupiter has implemented a wide range of telecommunication improvements in response to the loss of its high gain antenna. Among the communications enhancements that have been made are the use of advanced compression techniques, packetized telemetry, new error correcting codes and algorithms, more efficient modulation, variable transmission data rates, routine ground antenna arraying (even between continents,) extremely sensitive ground receivers, and non-real-time automated data reconstruction. These together have resulted in a 20 dB (100 fold) increase in information being returned from the spacecraft at Jupiter, allowing the mission to meet the vast majority of its science objectives using small, hemispherical antennas and an S-Band system. In fact, Galileo is currently the most advanced deep space craft in the world in terms of communications technology. While necessity dictated the use of these new techniques for Galileo, now that they have been proven in flight, they are available for use on future deep space missions. This telecommunications legacy of Galileo will aid in our ability to conduct a meaningful exploration of the solar system, and beyond, at a reasonable cost.