GALILEO SCIENCE DATA SYSTEM; Theodore C. Clarke and James L. Anderson, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109

The Galileo spacecraft, scheduled for launch from the Space Shuttle in November, 1989, will send a probe into the atmosphere of Jupiter and, while orbiting the giant planet, will study the Galilean satellites, Jupiter's atmosphere and magnetosphere, and the interaction between Jupiter's magnetosphere and its satellites, for about two years. Enroute to Jupiter via a Venus-Earth-Earth gravity assist trajectory, Galileo has a variety of cruise science objectives including Venus, Earth and Moon, and one or more asteroid encounters.

The Galileo orbital mission includes at least ten orbits of the spacecraft about the planet Jupiter, with one targetted close encounter with one of the Galilean satellites on each orbit. There are also planned several, more distant, encounters with the Galilean satellites, referred to as non-targetted encounters by mission planners, because these encounters are fortuitous and are a natural fallout of the detailed development of the trajectory leading to the ten close encounters. The information gleaned from one orbital pass through the Jovian System by the Galileo spacecraft might reveal scientific information that could have an impact on the design of the science sequence during a subsequent targetted or non-targetted encounter with that satellite. It is imperative that data gathered from one encounter be distributed to the Galileo scientists spread around the globe as quickly as possible to allow them time to analyze the data and relay future observation requirements that might impact the planning for science sequences on subsequent orbits. In addition, the inter-disciplinary nature of the science that will be gathered during the Galileo mission requires prompt exchange of data between scientists often oceans and continents apart. The Galileo electronic links spanning the globe must operate with speed and reliability to ensure rapid communications and data exchange among the Galileo science community.

The interdisciplinary nature of planetary science in general, and Jovian system science in particular, has influenced the way in which scientists plan to exchange and archive their data. In the past, data system engineers for the various science experiments built their own data systems that suited their own peculiar experiences and subjective preferences regarding data formats, nomenclature, archive media, software languages, and distribution mechanisms. With the advent of the Interdisciplinary Scientist on Pioneer-Venus (1979), and subsequently on Galileo and other planetary exploration projects, data exchange and archive requirements have driven data system technology towards standardization of data formatting and nomenclature, and more efficient and faster electronic communications. This paper reports on the evolving Galileo Science Data System, which is taking advantage of these evolving technologies.

GALILEO SCIENCE DATA SYSTEM

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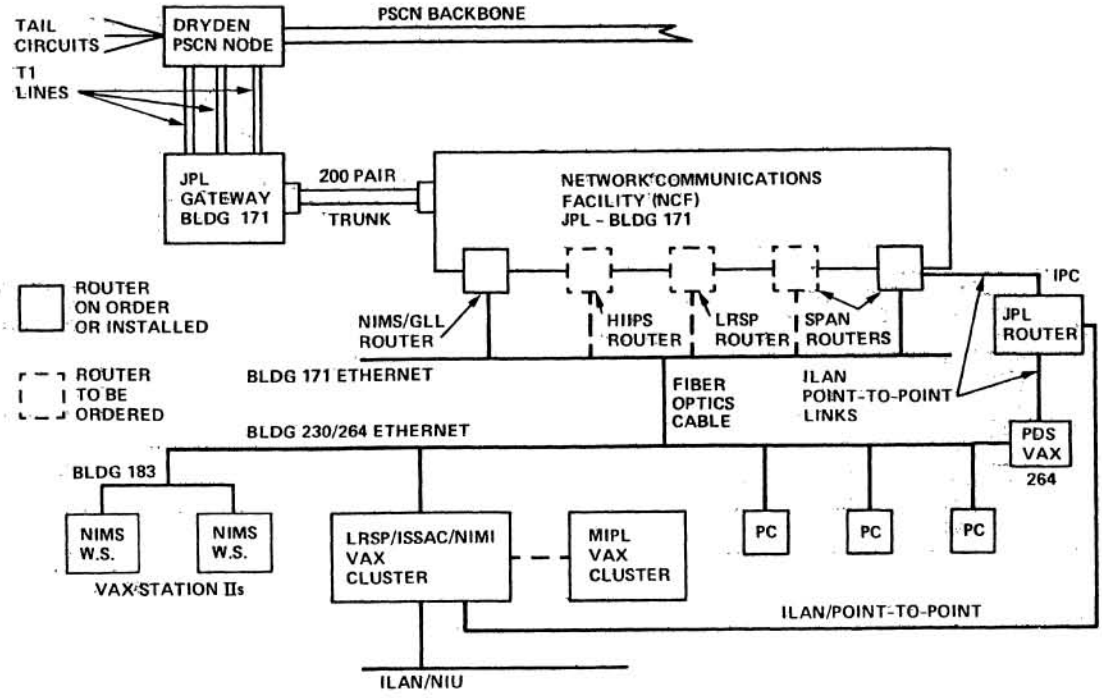
The purpose of the Galileo Science Data System (SDS) is to provide a science ground data system through which the science sequence command files uplinked to the spacecraft and resulting scientific data acquired during the Galileo planetary mission are managed, recorded, temporarily stored, distributed to the experiment investigators for immediate needs and archived for future use of planetary and general science users. Principal attributes of the evolving Galileo SDS include electronic data distribution and communications, two-way interactive electronic data processing, clustered computer processors, optical disk technology and development of data archives. Two levels of archiving are being planned. One is a temporary archive, referred to as the repository, which consists of distributed data storage media and locations for all data collected and generated during the flight mission. The other level of archive is the permanent archive associated with the Planetary Data System (PDS), assigned responsibility by NASA's National Space Science Data Center (NSSDC) for the archiving of planetary science data obtained during NASA-sponsored spacecraft exploration of the planets of our solar system.

Two mini-computer clusters, one for the low and medium rate science experiments, and one for the high rate science experiments, will provide two-way request driven electronic communications and data access between the principal investigators, co-investigators, team leaders and team members of the science teams. NASA-funded 9.6 and 56 kbps Program Support Communications Network (PSCN) communications links and modems connect the foreign, Hawaiian and domestic Science Investigator sites to the Galileo computer clusters.



Galileo Science Data System - JPL PSCN Connections