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system with sufficient dynamic range to handle the expected signal levels of a variety of missions over the required tens-of-kilometers distance. The DSN currently uses FO systems for remoting at receiver Intermediate Frequencies. Remoting directly at the DSN-received microwave frequencies could provide further advantages. George describes a new FO system, for this application, that relies on high-efficiency microwave optical modulators, high-power semiconductor lasers, and high-power microwave photodetectors. Also discussed, is an upcoming demonstration of direct microwave transmission over an FO link, directly from the low-noise amplifiers in the Goldstone R/D 34-m antenna pedestal room to the control room. This capability will enable further migration of equipment presently in the antenna area of the DSSs to the SPC.

In the DSN Science contribution for this issue, Michael Klein reports the long-term effects on the microwave emission from Jupiter's inner magnetosphere following the fragment impacts of Comet Shoemaker-Levy 9, in July 1994. Klein describes the sudden increase and the slow decline in Jupiter's radio emission, as detected by the NASA/JPL Jupiter Patrol observations at 2295 MHz. The observational data are being used to test computer models that will explain the nature of the intense radiation belt that surrounds the planet and extends beyond the inner moons, Io and Europa.

JUPITER CONTINUED FROM PAGE 8

energize the radiating electrons, and (b) the generation of low-frequency waves known as "whistlers" that alter the spiral motion of the relativistic electrons so they reach higher magnetic latitudes where the magnetic field is stronger.

Sophisticated computer programs are being developed to model the details of the radio astronomy observations. As they use these models, scientists hope to sort out the physical processes at work in Jupiter's magnetosphere and, perhaps, apply the "lessons learned" to advance knowledge of the magnetosphere here on earth. The models may also be used to evaluate and design spacecraft radiation protection for future missions that may spend long periods of time in Jupiter's inner magnetosphere. One such possible mission would send a spacecraft to orbit Europa and land a robotic probe on the ice-crusted surface.

References

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3. dePater, I., and Jaffe, W. J. "Very Large Array Observations of Jupiter's Nonthermal Radiation," *Astrophysical Journal Supplement Series*, 54, (1984): 405–419.

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Commercial-off-the-Shelf (COTS) Products

Each year, at trade shows, we find that more and more manufacturers offer CCSDS-conformant products, chipsets, plug-in cards, and workstations to support the many new projects that adopt CCSDS, simply because they are the only modern standards engineered for the space environment.

Further information about the CCSDS, including free downloadable copies of all released CCSDS Recommendations, may be found on the worldwide web through the CCSDS home page at

http://www.ccsds.org/ccsds/

As part of the international CCSDS approval process, JPL advises NASA how to vote. Using a team of "standards representatives," a technical review is conducted by each affected technical division and program office. Then, the JPL standards approval board is convened to ensure that a proper technical review is conducted and that differences between divisions are resolved in arriving at a consensus Laboratory position. Except in unusual cases, when a CCSDS Recommendation is endorsed for NASA approval by the board, it is also approved as a local JPL standard.

The JPL Information Systems Standards Program is managed and funded primarily through the TMOD Plans and Commitments Office and is not related to the Laboratory's Engineering Standards Office, which administers standards outside of the Information Systems area.

Conclusion

It is our sincere hope that these information systems standards will be viewed by designers, not as another levied constraint that they have to deal with, but rather as a window of opportunity; an open door, that allows advanced new capabilities to be exploited at lower cost for the future, through COTS suppliers and economy of scale.

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TMOD Technology	
"TMOD Technology Office Reorganization"	L. Deutsch
"ARTSN: An Automated Real Time S/C Nav Sys"	L. Cangahuala
"Raster Scan for Calibration of DSN Antennas"	D. Rochblatt and P. Richter
"Improvement in the Water Vapor Emission Model from GPS/WVR Comparisons"	R. Linfield
Science	
"Space VLBI Co-observing with the DSN"	V. Altunin and T. Kuiper

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