Ethernet interfaces. Furthermore, there will also be general-purpose, multi-gigabit interfaces. In addition, the system will have dozens of transceivers that can support LVDS (low-voltage differential signaling), RS-422, or SpaceWire. The SpaceCube Mini includes an I/O card that can be customized to meet the needs of each mission. This version of the SpaceCube will be designed so that multiple Minis can be networked together using SpaceWire, Ethernet, or even a custom protocol.

Scalability can be provided by networking multiple SpaceCube Minis together. Rigid-Flex technology is being targeted for the construction of the SpaceCube Mini, which will make the extremely compact and low-weight design feasible. The SpaceCube Mini is designed to fit in the compact CubeSat form factor, thus allowing deployment in a new class of missions that the previous SpaceCube versions were not suited for. At the time of this reporting, engineering units should be available in the summer 2012.

This work was done by Michael Lin, David Petrick, Alessandro Geist, and Thomas Flatley of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16223-1

Dichroic Filter for Separating W-Band and Ka-Band

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The proposed Aerosol/Cloud/Ecosystems (ACEs) mission development would advance cloud profiling radar from that used in CloudSat by adding a 35-GHz (Ka-band) channel to the 94-GHz (W-band) channel used in CloudSat. In order to illuminate a single antenna, and use CloudSat-like quasi-optical transmission lines, a spatial diplexer is needed to add the Ka-band channel.

A dichroic filter separates Ka-band from W-band by employing advances in electrical discharge machining (EDM) and mode-matching analysis techniques developed and validated for designing dichroics for the Deep Space Network (DSN), to develop a preliminary design that both met the requirements of frequency separation and mechanical strength.

First, a mechanical prototype was built using an approximately 102-micron-diameter EDM process, and tolerances of the hole dimensions, wall thickness, radius, and dichroic filter thickness measured. The prototype validated the manufacturing needed to design a dichroic filter for a higher-frequency usage than previously used in the DSN. The initial design was based on a Ka-band design, but thicker walls are required for mechanical rigidity than one obtains by simply scaling the Ka-band dichroic filter. The resulting trade of hole dimensions for mechanical rigidity (wall thickness) required electrical redesign of the hole dimensions. Updates to existing codes in the linear solver decreased the analysis time using mode-matching, enabling the electrical design to be realized quickly.

This work is applicable to missions and instruments that seek to extend W-band cloud profiling measurements to other frequencies. By demonstrating a dichroic filter that passes W-band, but reflects a lower frequency, this opens up the development of instruments that both compare to and enhance CloudSat.

This work was done by Larry W. Epp, Stephen L. Durden, Vahraz Jamnejad, Ezra M. Long, John B. Sosnowski, Raymond J. Higuera, and Jacqueline C. Chen of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-48174