# Secure Peer-to-Peer Networks for Scientific Information Sharing

**This technique combines advantages of social networks with peer-to-peer file sharing.**

*Goddard Space Flight Center, Greenbelt, Maryland*

The most common means of remote scientific collaboration today includes the trio of e-mail for electronic communication, FTP for file sharing, and personalized Web sites for dissemination of papers and research results. With the growth of broadband Internet, there has been a desire to share large files (movies, files, scientific data files) over the Internet. E-mail has limits on the size of files that can be attached and transmitted. FTP is often used to share large files, but this requires the user to set up an FTP site for which it is hard to set group privileges, it is not straightforward for everyone, and the content is not searchable.

Peer-to-peer technology (P2P), which has been overwhelmingly successful in popular content distribution, is the basis for development of a scientific collaboratory called Scientific Peer Network (SciPerNet). This technology combines social networking with P2P file sharing. SciPerNet will be a standalone application, written in Java and Swing, thus insuring portability to a number of different platforms. Some of the features include user authentication, search capability, seamless integration with a data center, the ability to create groups and social networks, and on-line chat.

In contrast to P2P networks such as Gnutella, Bit Torrent, and others, SciPerNet incorporates three design elements that are critical to application of P2P for scientific purposes:

- User authentication,
- Data integrity validation,
- Reliable searching

SciPerNet also provides a complementary solution to virtual observatories by enabling distributed collaboration and sharing of downloaded and/or processed data among scientists. This will, in turn, increase scientific returns from NASA missions. As such, SciPerNet can serve a two-fold purpose for NASA: a cost-savings software as well as a productivity tool for scientists working with data from NASA missions.

*This work was done by Homa Karimabadi of SciberQuest, Inc. for Goddard Space Flight Center. For further information, contact the Goddard Innovative Partnerships Office at (301) 286-5810. GSC-15396-1*

# Multiplexer/Demultiplexer Loading Tool (MDMLT)

**This is a readily modifiable tool designed for any facility requiring the loading of computers.**

*Lyndon B. Johnson Space Center, Houston, Texas*

The purpose of the MDMLT is to improve the reliability and speed of loading multiplexers/demultiplexers (MDMs) in the Software Development and Integration Laboratory (SDIL) by automating the configuration management (CM) of the loads in the MDMs, automating the loading procedure, and providing the capability to load multiple or all MDMs concurrently. This loading may be accomplished in parallel, or single MDMs (remote). The MDMLT is a Web-based tool that is capable of loading the entire International Space Station (ISS) MDM configuration in parallel. It is able to load Flight Equivalent Units (FEUs), enhanced, standard, and prototype MDMs as well as both EEPROM (Electrically Erasable Programmable Read-Only Memory) and SSMMU (Solid State Mass Memory Unit) (MASS Memory). This software has extensive configuration management to track loading history, and the performance improvement means of loading the entire ISS MDM configuration of 49 MDMs in approximately 30 minutes, as opposed to 36 hours, which is what it took previously utilizing the flight method of S-Band uplink. The laptop version recently added to the MDMLT suite allows remote lab loading with the CM of information entered into a common database when it is reconnected to the network. This allows the program to reconfigure the test rigs quickly between shifts, allowing the lab to support a variety of onboard configurations during a single day, based on upcoming or current missions.

The MDMLT Computer Software Configuration Item (CSCI) supports a Web-based command and control interface to the user. An interface to the SDIL File Transfer Protocol (FTP) server is supported to import Integrated Flight Loads (IFLs) and Internal Product Release Notes (IPRNs) into the database. An interface to the Monitor and Control System (MCS) is supported to control the power state, and to enable or disable the debug port of the MDMs to be loaded. Two direct interfaces to the MDM are supported: a serial interface (debug port) to receive MDM memory dump data and the calculated checksum, and the Small Computer System Interface (SCSI) to transfer load files to MDMs with hard disks. File transfer from the MDM Loading Tool to EEPROM within the MDM is performed via the MIL-STD-1553 bus, making use of the Real-Time Input/Output Processors (RTIOP) when using the rig-based MDMLT, and via a bus box when using the laptop MDMLT. The bus box is a cost-effective alternative to PC-1553 cards for the laptop.

It is noted that this system can be modified and adapted to any avionic laboratory for spacecraft computer loading, ship avionics, or aircraft avionics where multiple configurations and strong configuration management of software/firmware loads are required.

*This work was done by Lenox Allen Brewer of Johnson Space Center; Elizabeth Hale and Robert Martella of Cimarron; and Ryan Gyorfi of The Boeing Co. Further information is contained in a TSP (see page 1).* ***MSC-24480-1***