

GSFC Technology Development Center Report

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Abstract

This report summarizes the activities of the GSFC Technology Development Center (TDC) for 2004, and forecasts planned activities for 2005. The GSFC TDC develops station software including the Field System, scheduling software (SKED), hardware including tools for station timing and meteorology, scheduling algorithms, operational procedures, and provides a pool of individuals to assist with station implementation, check-out, upgrades and training.

1. Technology Center Activities

The GSFC IVS Technology Development Center (TDC) develops hardware, software, algorithms and operational procedures. It provides manpower for station visits for training and upgrades. Other technology development areas at GSFC are covered by other IVS components such as the GSFC Analysis Center.

The current staff of the GSFC TDC consists of John Gipson, Ed Himwich and Raymond Gonzalez, employed by NVI, Inc, Chuck Kodak, employed by Honeywell, and William Wildes, employed by NASA/GSFC.

The remainder of this report covers the status of the main areas of development that are currently being pursued.

2. Field System

During this period some new features were released in FS version 9.7:

1. improved support for Mark5A recorders including features for realtime e-VLBI and ftp-VLBI
2. support for the S2 DAS (provided by M. Bérubé, NRCCanada)
3. support for NTP for the FS computer time
4. automatic recording of abnormal termination messages to aid debugging of problems encountered in the field
5. conversion of the *fsvue* user interface to a Client-Server model
6. inclusion of support for station specific detectors and stations with no noise diodes in the new *onoff* program
7. addition of numerous small bug fixes and improvements

In the next year, several other improvements are expected, among these are: (1) a complete update to the documentation and in a more modern format that will be easier to use; (2) conversion of the FORTRAN source to use the *g77* compiler, this will enable use of the source level debugger, *gdb* for development and field debugging; (3) use of *fsvue* or Real VNC for network operation; (4) *chekr* support for Mark5A systems; (5) use of the Mark IV decoder for phase-cal extraction in the field; and (6) support for periodic firing of the noise diode during observations.

3. DRUDG and SKED

The GSFC TDC is responsible for the development, maintenance, and document of SKED and DRUDG. These two programs are very closely related, and operate as a pair for the preparation of the detailed observing schedule for a VLBI session, and its proper execution in the field. In the normal data flow for geodetic schedules, first SKED is run at the Operation Centers to generate the .skd file that contains the full network observing schedule. Then stations use the .skd file as input to DRUDG for making the control files and procedures for their station. During 2004 many changes were made to both SKED and DRUDG.

3.1. SKED

SKED is the program used to generate geodetic VLBI schedules. Several major enhancements were made to SKED this year.

Astrometric Mode This new mode allows the user to specify a minimum and an optional maximum target for the number of observations for different sources. These numbers are expressed as a percentage of the total number of observations. This option is useful if there are some sources that you want to observe a minimum number of times.

Revamping of Major and Minor Options A major change in sked was to revamp the way that scans are selected, and the subsequent weighting of the scans to determine which scan to use. Major options are associated with which trial scans are generated. Previously some of these options were defined as “parameters”, and some were defined as “options”. These options were set and listed separately, depending on what they were. Their treatment is now unified. The Minor Options are associated with how a scan is weighted. There are several factors that determine how “desirable” a scan is, among them: length of the scan; number of stations involved; idle time; whether a particular source is involved; whether a particular station is involved; etc. The treatment of the various minor options was unified. The scheduler was also given the ability to weight the options differently. Previously an option was either on or off. You can now weight the different options individually.

Improved Cable Wrap Algorithm The cable wrap algorithm was improved in two respects. First, situations where the antenna moves close to 180 degrees are prohibited. The reason is because sked may choose a different direction than the antenna actually moves. This will lead to cable wrap problems. Second, observations close to a cable wrap boundary are prohibited. The reason is that depending on where the source is when the on-source command is executed, the antenna may choose to go the wrong way to get the correct position, again resulting in cable wrap problems. These changes have resulted in fewer losses due to cable wrap problems.

Source Monitoring Database One of the largest changes made to sked was the ability to query a mysql database which contains information about when sources have been observed, as well as the number of observations scheduled, correlated and observed. This ability is used in the source monitoring program (described under the GSFC Analysis Center Report) to choose sources that have not been observed recently.

3.2. DRUDG

The major changes made to DRUDG this year involved changes and improvements in Mark5A recording. These specifications continued to modify over the year, and DRUDG had to be modified accordingly. Support was added for e-VLBI. Two new SNAP commands were implemented: disk2file, which transfers a scan from the Mark5A rack to another disk, and in2net, which allows the transfer of a scan to a remote location via the internet.

A major enhancement of DRUDG is the ability to handle schedules which are Mark5 aware. Previously a schedule had to be written for tape, and then subsequently changed to use the Mark5A recorder. Currently only SCHED writes Mark5A aware schedules, although it is planned that SKED will be able to generate such schedules by the end of 2005.

3.3. Plans for 2005

The major updated planned for SKED is to make it possible to generate Mark5 schedules directly within SKED. The major update planned for DRUDG is improved S2 support.