

GSFC Technology Development Center Report

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Abstract

This report summarizes the activities of the GSFC Technology Development Center (TDC) for 2009 and forecasts planned activities for 2010. The GSFC TDC develops station software including the Field System, scheduling software (SKED), hardware including tools for station timing and meteorology, scheduling algorithms, and operational procedures. It 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 and Ed Himwich, both employed by NVI, Inc. The remainder of this report covers the status of the main areas supported by the TDC.

2. Field System

The GSFC TDC is responsible for development, maintenance, and documentation of the Field System (FS) software package. The FS provides equipment control at VLBI stations. It interprets the .snp schedule and .prc procedure files (both as prepared by DRUDG from the .skd schedule). The FS controls the antenna, data acquisition hardware, and related ancillary equipment needed for making VLBI measurements. All major VLBI data acquisition backends are supported. The FS is customizable to allow it to control station specific equipment. It is used at all the IVS network stations (i.e., more than 30) and also at many stations that do VLBI only for astronomical observations. The only major VLBI facilities not using it are the VLBA and VERA.

There were no new releases of the FS during this period. However, there was a release of a new FS Linux kernel distribution (FSL8). This was a cooperative effort between E. Himwich and J. Quick (HartRAO). The associated documentation was updated as well.

In the next year, several other improvements are expected, including:

- Support for DBBC and DBE racks
- Support for Mark 5C recorders
- Development of an antenna interface for Patriot 12-m antennas
- Use of *idl2rpc* for remote operation
- A complete update to the documentation and conversion to a more modern format that will be easier to use
- Conversion of the FORTRAN source to use the *gfortran* compiler; this will enable use of the source level debugger, *gdb*, for development and field debugging
- *Chekr* support for Mark 5A and 5B systems

- Use of the Mark IV Decoder for phase-cal extraction in the field
- FS Linux 9 (based on Debian *squeeze*) distribution
- Support for periodic firing of the noise diode during observations
- Distribution of the new *gnplt*.

3. SKED and DRUDG

The GSFC TDC is responsible for the development, maintenance, and documentation of SKED and DRUDG. These two programs are very closely related, and they 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. Catalogs are used to define the equipment, stations, sources, and observing modes which are selected when writing a schedule with SKED.

Changes to SKED and DRUDG are driven by changes in equipment and by feedback from the users. The following summarizes some of the important changes to these programs in 2009.

3.1. SKED

The following changes were made to SKED:

- The station limit was increased from 32 to 64, and this was made a parameter so that this can be easily updated. This was driven by the requirement to schedule IYA2009, which originally had 35 stations.
- The scheduling algorithm was tweaked. This typically results in 5-10% more observations, but fewer scans. There are fewer scans involving sub-nets, and more involving larger sub-nets.
- Schedulers can use either the IAU name or the common name when referring to a source. Previously if the schedule file contained a common name for a source, users would have to use it. *Sked* would not recognize the IAU name.
- A new option was added to the *flux* command. *Flux check* will return a list of sources that are missing fluxes. Previously users had to use *flux list* and visually check for sources with missing flux models.
- Recognition of new disk types: K5, Mark 5B, and Mark 5C
- Minor bug fixes and formatting changes.

Plans for the next year include: (1) updating documentation, (2) making VEX format native, and (3) supporting *CLEAN* components for source flux models.

3.2. DRUDG

The only changes made to DRUDG were two bug fixes. Both of these surfaced under unusual circumstances and have not affected the normally scheduled IVS stations.

Plans for the next year include: (1) a documentation update and (2) support for new rack types.

3.3. Station Visits

During this year there was one formal site visit. It was made to Ny-Ålesund. E. Himwich, R. Strand (NVI, Inc.), and B. Corey (MIT Haystack Observatory) visited the site to perform training, station evaluation, and computer upgrades. A detailed report of this activity, with recommendations for further work, was produced and sent to the station.