

GSFC Technology Development Center Report

Ed Himwich, John Gipson

Abstract

This report summarizes the activities of the GSFC Technology Development Center (TDC) for 2012 and forecasts planned activities for 2013. The GSFC TDC develops station software including the Field System (FS), 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, Ed Himwich, and Rich Strand, all 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 almost all the IVS Network Stations (more than 35) 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, several development projects were underway:

- Patriot 12-m Interface. Development of the interface for Patriot Antenna Control Unit (ACU) continued. Several improvements were made including wind-stow automatic recovery and systematic error reporting with classification of errors and documentation on how to respond to them.
- DBBC Support. FS support for the DDC personality of the DBBC was developed and tested. It will be released in early 2013. This will support DBBC use for recording with Mark 5B recorders and is compatible with “legacy” VLBI observing.
- Miscellaneous. Many small improvements and bug fixes were made for the new release expected in early 2013. These included a new, faster version of *gnplt* for antenna gain calibration and a work-around for the “day 49” kernel “feature”/bug.

2.1. Plans for Next Year

Several other improvements are expected in future releases, including:

- Support for RDBE racks
- Support for DBBC PFB personality
- Support for Mark 5C and Mark 6 recorders
- 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 and maintain
- Conversion of the FORTRAN source to use the *gfortran* compiler, which will enable use of the source level debugger, *gdb*, for development and field debugging
- *Chekr* support for Mark 5A and Mark 5B systems
- FS Linux 9 (based on Debian *wheezy*, skipping *squeeze*) distribution
- Support for periodic firing of the noise diode during observations.

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 2012.

3.1. SKED Changes

- Release of completely re-written SKED documentation in May 2012. The documentation includes examples of all commands. The last time the documentation was updated was in 1996.
- Added “source cull” command to remove sources that are only observed a few times in a session.
- Added support for Mark 5B in VEX files.
- Added list of catalogs used to the schedule file. This will help in debugging.

3.2. DRUDG Changes

- Better support of Mark 5B.

- Limited support of DBBCs
- Treatment of VEX as a default file type. Users no longer have to include ‘.vex’ in the filename.

3.3. Plans for Next Year

Plans for next year include:

- In 2012 we began work on making VEX the native format for SKED. We plan to finish this project in 2013.
- We also plan to expand support for RDBEs and DBBCs. This will involve changes to SKED, DRUDG, and the catalogs.
- If time permits we will convert SKED to compile using a freely available compiler such as *gfortran*.