Dynamic Scheduling of the e-EVN

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Abstract

1   Introduction

The ability to use the e-EVN as a dynamically scheduled instrument is a goal of EVN2015.

2   Requirements

The original schedule should be prepared and distributed as usual; the new processes only address subsequent the means by which this schedule can be modified. Additionally:

- Only `$SOURCE` and `$SCAN` blocks in vex file should be modified; all other station settings must remain unchanged

- Field System `proc` file must not be modified: it contains telescope settings that cannot be changed without manual intervention

- New schedule should be propagated to stations from JIVE

- New schedule should be processed and activated at stations under JIVE control

- A historically-accurate vex file for correlation at JIVE and to serve as a record of the experiment conducted.

3   Software

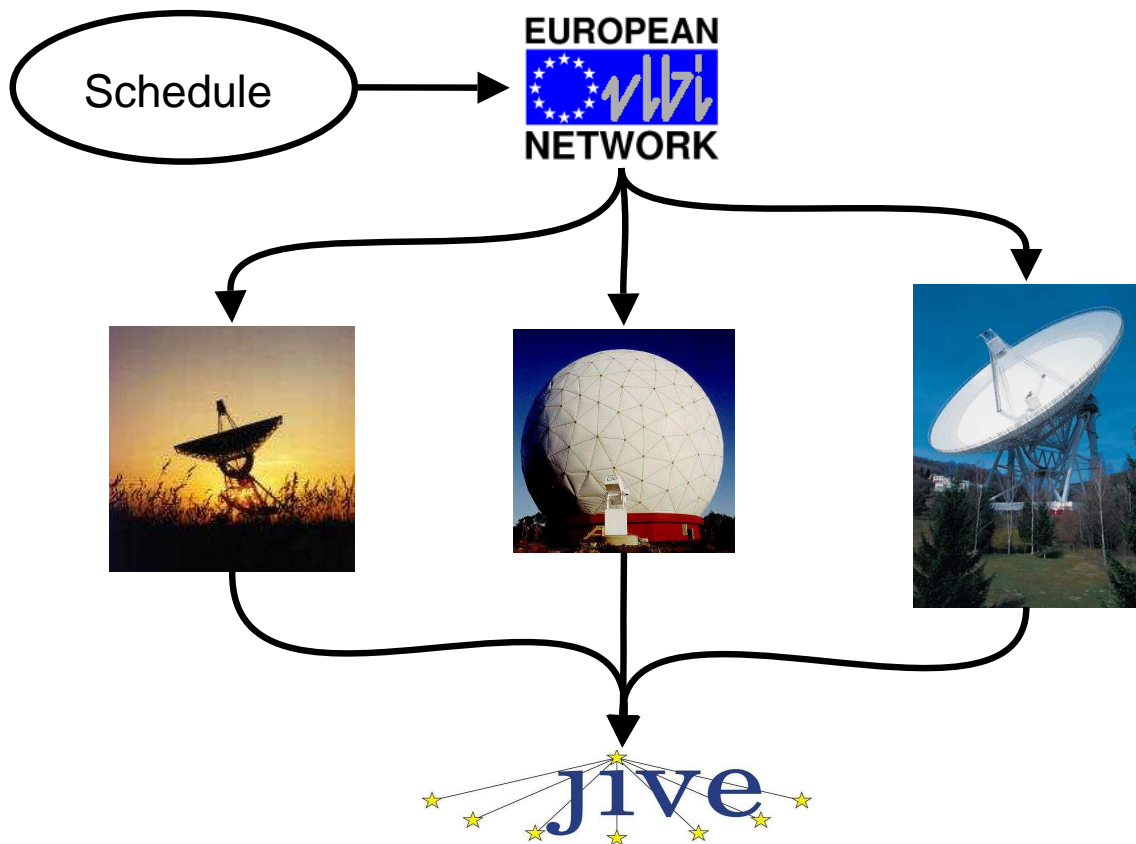The workflow involved in dynamic scheduling is summarized in Figure 3.

Figure 1: Batch eVLBI

3.1 Software at JIVE

The original schedule file (with `.skd` file extension) has the format of a vex file, but lacks some sections (notably the `$CLOCKS` block) which are filled in by the `log2vex` program, which uses GPS data from the stations to calibrate the clocks, when this data is available. The output of `log2vex` is a full vex file, suitable for use by the JIVE correlator. The clock information is not used at the stations, but when a full vex file is processed at stations the unneccessary sections are ignored. It therefore makes sense to create a new vex file, rather than just a schedule file, when the schedule is modified, since this can drive the correlator and be processed by Field System tools, and also serves as a permanent record of the experiment conducted which can be used by JIVE support scientists in post-processing operations.

The modified vex file is created by editing the original schedule file and merging it with the vex file produced by `log2vex`. The merging is done with the new `vexmerge` program, which creates a new vex file. The `vexmerge` program retains all blocks unchanged from the original vex file unchanged except the `$SCHED` block.
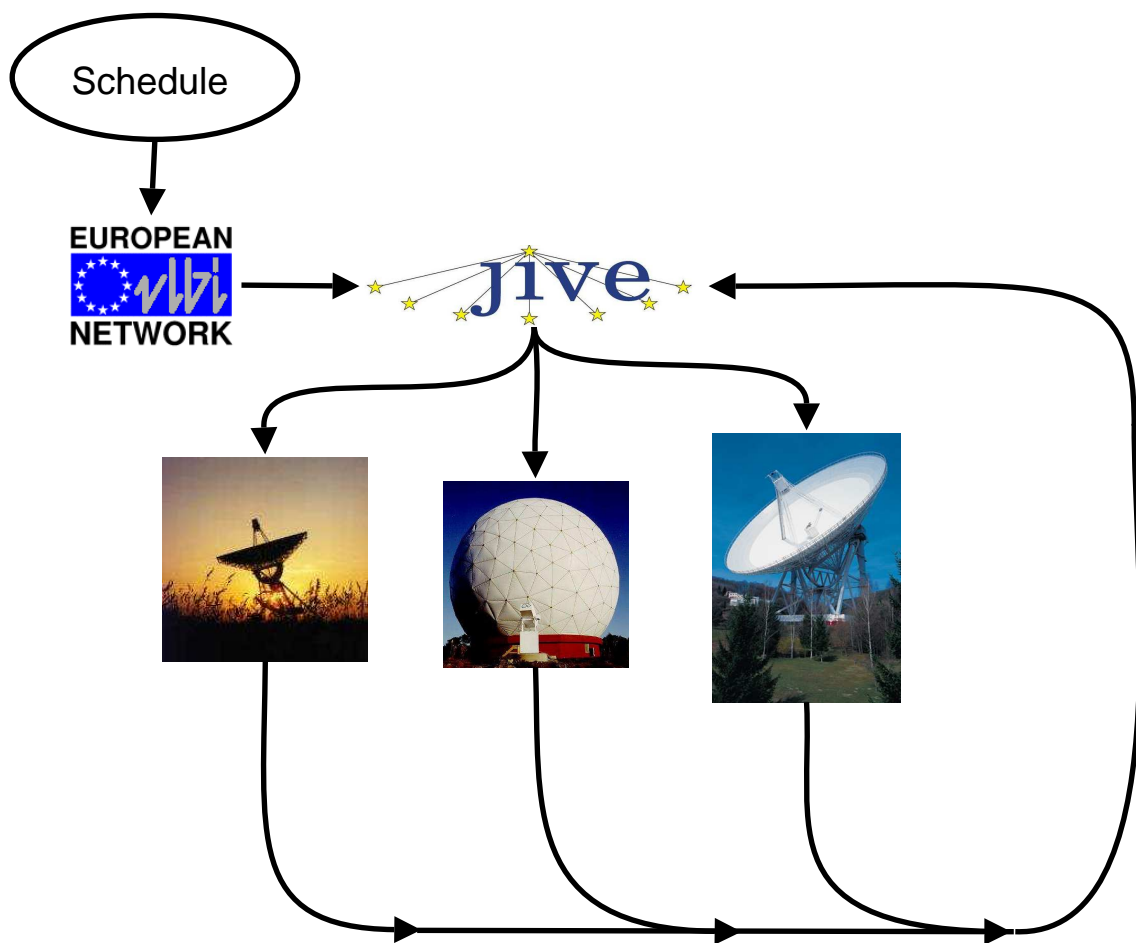
Figure 2: Dynamic eVLBI

Scans in the original vex file that began before the current time (or a time given as an optional command-line argument) are retained; those that begin after this time are replaced by those from the edited schedule file. Typically, the expected modification will be changing the source observed by a scan, althought the software also allows modes and start and/or end times to be altered.

3.2 Software at stations

No new software is installed on the stations' Field Systems. The programs used to process and initiate the new schedule – drudg and inject_snap – are standard parts of the Field System. Additionally, no log-in session is started at the Field Systems: all commands are run from JIVE using ssh in single-command mode.

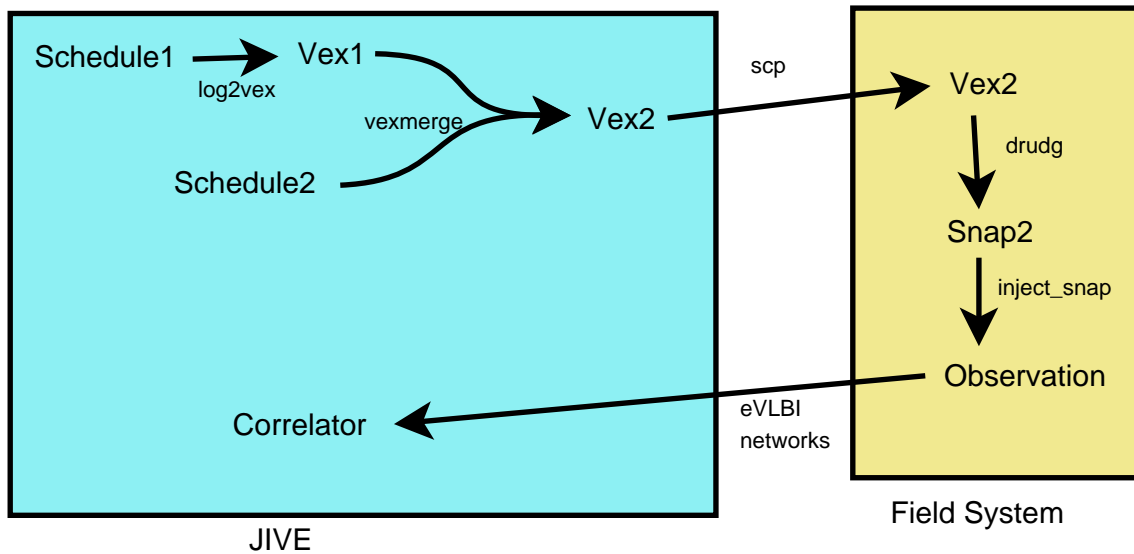drudg is used to produce a snap file, which contains the details of the requested

Figure 3: Dynamic scheduling workflow

operations over time. In standard Field System operation `drudg` is used interactively, and also generates a `proc` file, containing the details of the telescope settings to be used for the experiment. In the dynamic scheduling framework described here, `drudg` is run in batch mode, and no new `proc` file is produced, so that the `proc` file originally produced by telescope operators is used throughout the experiment.

4   A test run at two stations

A test was conducted during the eVLBI session on 28 August 2008, with the telescopes at Toruń and Westerbork (in single-dish mode). Fringes were successfully obtained between these stations after switching from the source DA193 to 4C39.25.

5   Prospects

Further tests, preferably with additional stations, will be necessary before this feature can be offered as a standard option for e-VLBI experiments. Station participation is actively being sought by JIVE; the only technical requirement is that JIVE obtains access to a station's Field System (in the form of a UNIX account).