FS RTD Subproject Plan

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1 Introduction

This document outlines the RTD FS subgroup plan for the rest of the project duration.

2 Prioritized Tasks

Future FS enhancements are described in subsequent subsections. They are being presented in the priority order agreed in EVN TOG meeting in Dwingeloo in October 1999.

2.1 FS Linux Technical Support

Providing FS Linux technical support for EVN user community and NASA/GSFC FS group has been proved to be unavoidably important of the FS task. It seems to require a minimum of 50–60 man-hours per each quarter year and thus it represents roughly 50% of the manpower allocated for this project.

2.2 Miscellaneous Hardware Control

This category of FS enhancements strives to allow adding more automated control of hardware directly from the FS and observation schedules. New hardware solutions must be found which can be applied uniformly at every EVN observatory and which can be included in FS software with minimal amount of station-specific programming work.

A major obstacle here is to both find suitable—preferably commercially-available, and economical—devices which can be accepted by the EVN community. A common software implementation cannot take into account endless variations of station equipment. New controllable items must also be made available in scheduling software and in the chain of VEX→drudg→SNAP→station.prc.

2.2.1 FS-controllable phase calibration signal on-off switch

The purpose of this phase-cal switch is to ensure that the phase calibration comb signal is either off or on at the desired power level, as required by the schedule. It needs both the necessary hardware to control the phase-cal unit and software additions in the FS to control the hardware.

Suitable commercial RS232/RS485-based remote control modules have been found but they still remain to be accepted by the EVN community. The basic software scenario of sending ASCII-based control messages over a serial port in FS PC and receiving acknowledgement responses is clear and not overly difficult to implement (approximately 35–70 man-hours after the decision is clear what kind(s) of modules it has to support).

Building and integrating hardware at each station remains the big question mark of this task. If a "generic" complete hardware solution is developed inside the FS subgroup it may end up being "too expensive" and it probably will not be adopted anywhere in the EVN. On the other hand, if only the control modules are made available to the observatories and they must acquire switches/attenuators, cabling, connectors, and power supplies on their own, it is likely that it takes a long, long time before every observatory has realized such a system—and most probably every observatory will then manage to create slight incompatibilities which make the software exponentially more difficult and less robust.

2.2.2 Mk3/Mk4 IF input switch matrix

Enquiries about a suitable commercial MkIII/MkIV IF input switch matrix were not successful: both 'sales@pickeringswitch.com' and 'sales@uswi.com' declined to answer to my request for quotation. This has been put on hold, especially when the expected price range of such a device is in the \$10k–\$100k range.

2.3 Consistent Tsys Measurements

Implementing consistent Tsys measurements in the FS across EVN stations in cooperation with John Conway and Jean-Marie Desmurs, resulting in machine-readable ANTAB-style calibration information, as required by NRAO Socorro correlator.

2.4 Onsource/Offsource Flagging

A scheme has been developed in which the FS can periodically poll the local, station-dependent antenna interface program ("`antcn`") for onsource/offsource status and log changes in it into the standard FS log file. There are several precautions which need to be made here:

1. The local "`antcn`" implementation must be robust enough so that it can tolerate frequent polls (10–20–30s) for onsource status. It is quite intolerable for the local "`antcn`" to crash even occasionally.
2. The local "`antcn`" must be able to convey the changes in real antenna status reasonably quickly so that good data is not flagged "offsource" and vice versa. Alternatively, it must be able to convey the UTC timestamp when the antenna changed its "slewing/tracking" status to FS "`antcn`"— in this case the actual antenna timestamps can be logged instead of the timestamps of communication.

It would also be possible to post-process a timestamped "antenna log" from the local antenna subsystem and merge that information at post-session time. However, this would require a local (although in principle simple, say, Perl-based) script to read in the local antenna log format. (Of course a local antenna log file is a prerequisite, too.)

The software changes in the FS would required roughly 35–70 man-hours to implement but, as described in the above, it remains relatively unclear how many stations have "good enough" "`antcn`" programs which would make the results really useful so that they could be post-processed into a flagging file for AIPS. Also, the route from session post-processing at stations via an undetermined way to end users, that is, PIs reducing correlated data, needs to be established.

2.5 FS Linux 4

As new PC hardware emerges and as new releases of the Linux operating system become available and stable, it is inevitable that FS Linux must be upgraded to use a new version of Linux. Old hardware (such as display adapters) which were supported by the older version cannot be bought anymore, thus new FS PCs cannot be acquired unless the operating system is upgraded. Last time this required about 70–110 man-hours, with only the minimal installation documentation.

2.6 FS Linux Install and Support Documentation

The "full" FS "Computer Reference Manual" and its addendum currently refer to FS Linux 1 and need extensive updating to match the current FS Linux 3 and the future version 4. This was voted in the October 1999 Dwingeloo TOG meeting to be placed on the bottom of the priority list.

3 Timeline and Milestones

As described in the above, FS Linux technical support represents a 50% load over the allocated project manpower. If other commitments don't drain manpower from this subproject, one quarter would roughly mean getting either "miscellaneous hardware control" or "onsource/offsource" flagging implemented at the FS end. "FS Linux 4" represents roughly two quarters, but its nature dictates that it must be implemented in a shorted period, that is, man-hours from other quarters must be "moved" to make "FS Linux 4" happen. "Uniform and continuous Tsys" is the most difficult to "size" beforehand, as its basic impact on the FS source code would probably be minimal but it would require writing and testing SNAP-based procedures and Perl-based log post-processing software in an iterative way.

My anticipation of the milestones is thus the following:

1. 1Q2000 can make the FS end of "miscellaneous hardware control" happen. Whether the stations will have any new hardware to control remains open.
2. 2Q2000 (and 3Q2000 "drained" towards 2Q2000) can make FS Linux 4 a reality. This will be necessitated by new PC hardware and it is unlikely that it can be avoided.

3. 4Q2000 can be devoted to either "uniform and continuous Tsys" or "on-source/offsource flagging". The latter would need changes in only the FS source code and it would expose the (probable) deficiencies in station "`antcn`"s, thus accelerating their development. On the other hand, Tsys is a much-requested feature which would help PIs a lot when calibrating VLBI data, so most probably it must be preferred.

4. 1Q2001 and 2Q2001 will be naturally used for what remains, documentation and/or what was left from item 3.