EVLA Software

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Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array

NRAO

Requirements and Goals

- Maximize scientific throughput of the instrument

- At a minimum be able to do what we can do with the VLA

- As easy to use as possible, by both experts and novices

- Commonality among NRAO instruments where possible

Block Diagram
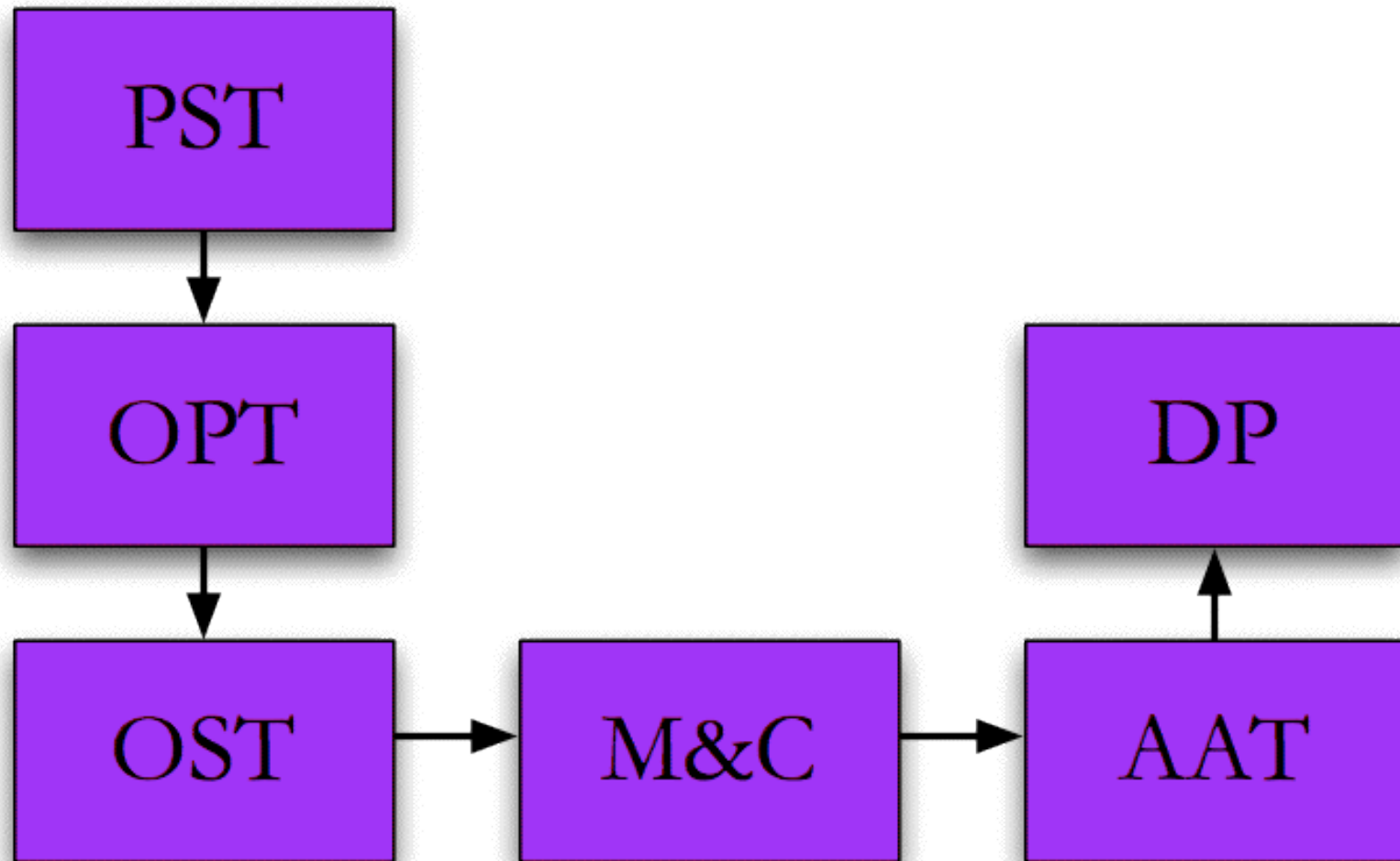
Monitor and Control (M&C)

The M&C software includes that which is necessary to run the instrument in real time:

- Antenna M&C (MIBs, mostly)

- Correlator M&C (CMIBs, GUIs, CPCC, MCCC/CM/DMH, CBE, etc.)

- Executor

- TelCal (real-time calibrations)

- Metadata Capture and Format (MCAF)

- Alert system

- Device Browser

- Operator's Interface

- Archive loading controller and SDM cataloger

- Monitor database storage, retrieval, plotting

M&C Status

- Antenna M&C is in place and fully functional

- Correlator M&C is mostly in place (CMIBs, GUIs, CPCC, CBE, CM) - enough to support WIDAR for Shared Risk Observing

- Executor is in place and mostly fully functional (some WIDAR support remains to be implemented or tested, as well as 3-bit sampler support)

- TelCal is in place for reference pointing; extensions needed for focus, delay, etc.

- MCAF is in place, but extensions needed as new tables are added to SDM

- Alert system is in place and fully functional

- Device Browser is in place and fully functional

- Operator's Interface is in place and fully functional (though some additional screens will need to be added for WIDAR)

- Archive loading controller and SDM cataloger are in place, but not in final form

- Monitor database storage, retrieval, plotting exist and are fully functional (some WIDAR extensions are being implemented)

Scientific Support Software (SSS)

The SSS software includes that which scientists interact with, or which involves science-related issues (namely the OST):

- Proposal Submission Tool (PST)

- Observation Preparation Tool (OPT)

- Observation Scheduling Tool (OST)

- Archive Access Tool (AAT)

SSS Status

- PST is outsourced to OpenSky Software - in place for many years now. Needs addition of proposal review capabilities as well as continued modification for support of EVLA observing.

- OPT is in place and fully supports OSRO observing. Some RSRO is supported as well, but not all. Latest release has more complete WIDAR setup interface for "experts".

- OST is in place but in early stage, and not in regular use for observing.

- AAT is an extension of the old VLA archive search tool - in place for many years now. Infrastructure is in place and works well, but automation of some parts is still being added.

Development Plan
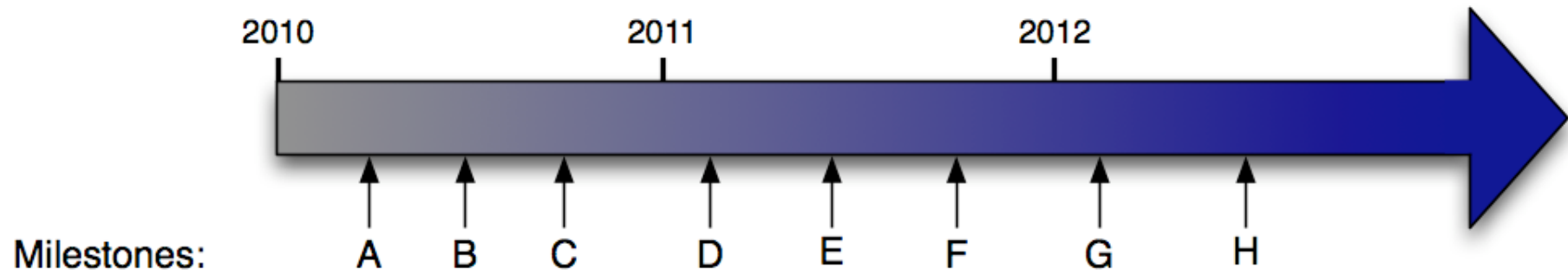
A - full OSRO support (256 MHz); begin support of RSRO capability (2 GHz)

B - trade subbands for channels

C - 64 subband pairs

D - recirculation

E - subband flexibility - independent tuning and different bandwidth and channel width

F - 8 GHz RSRO observing

G - special modes (phased array for VLBA; pulsars)

H - full observing support

Development Plan

- We must be flexible in this plan (especially on dates) given the need to balance ongoing EVLA construction, science observing, commissioning, and the development and testing of new capabilities (e.g., new correlator modes).

- We do this by continually assessing, on short timescales (days to weeks), what we are working on and adjusting priorities if necessary. A typical high-level priority list might currently look like:

  1. RSRO/ECSO observing

  2. 3-bit sampler support

  3. OSRO programs awaiting resolution of "blockers" (e.g., T_{sys} correction)

  4. Other observing support (moving bodies, for instance)

- We have two management meetings per week (Monday and Friday) at which we discuss the priority of the various elements, and then meetings of the M&C group (Wednesday) and SSS group (Tuesday) along with individual discussions to be sure that this priority order is followed.

Current Challenges

Given what I have already presented, it might seem that much of the software work is done. We are however facing a number of challenges; most currently involve system integration:

- The EVLA is a complex system, and integrating the different elements (hardware, firmware, and many separate software subsystems) is difficult; debugging changes or new features is time-consuming and often progress is "two steps forward, one step back." Delays in delivery of stable hardware and firmware exacerbate this problem.

- The need to balance regular science observing, commissioning observations, and testing new developments can be particularly difficult for software development. We are mitigating this through more rigorous tracking of changes in software that allow us to roll back more completely to previous versions.

- While the "core" of the software system is all in place, it needs extension in a number of areas, including special types of observations, and "ease of use" areas.

Conclusions

- M&C software is in good shape - further development is needed mostly in WIDAR-related software and involves system integration and extensions to take advantage of the power of the correlator; stable hardware and firmware will aid tremendously.

- SSS software is also in good shape - OST needs integration with regular observing, and other elements need significant enhancements, especially for "ease of use."

- Main current challenges are in system integration.