EVLA Monitor and Control

Transition Software

Development Plan

Version 1.0.0

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/users/bsahr/EVLA/architecture_design/MandC_design/MandC_Transition_SW.doc

Revision History

Revision	Date	Author(s)	Description of Changes
1.0.0	March 25, 2005	Bill Sahr	Original Version

The material in this document on Phases 0 – III of the EVLA Monitor and Control transition software takes an earlier document as its starting point. The earlier document is "DRAFT VLA/EVLA Transition Observing System Development and Re-engineering Plan", Tom Morgan, 03 September 2004. A copy of that document is available on the Computing Working Documents web page:

http://www.aoc.nrao.edu/evla/techdocs/computer/workdocs/index.shtml

It is document # 37.

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1 Hardware Milestones and Target Dates

D30x ICD (ver E) ready for software	Apr 14, 2005
D30x ver E formatter tested	May 05, 2005
D30x ver E MIB software ready	May 20, 2005
M301 hardware ready for software	May 27, 2005
M301 ready to install on antennas	Jun 08, 2005
Antenna 14, ready to participate in scientific observations*	Jun 23, 2005
Antenna 16 ready to participate in scientific observations	Jul 01, 2005
Antenna 13 ready to participate in scientific observations	Jul 08, 2005
Antenna 18 ready	Aug 22, 2005
Antenna 20 ready	Nov 16, 2005
And thereafter, new EVLA antennas will enter the array at a rate of one every 10 to 12 weeks.	

* “Ready to participate in scientific observations” implies 4 IFs and computer-controlled band selection, be it L304 style switching or M301 controlled switching.

New VLA Correlator Controller ready for operational use	(end of) Q2 2005
WIDAR PDR (after place-and-route of Station and Baseline boards)	mid-July 2005
WIDAR, Gbit Ethernet tests	Jun-Jul, 2005
WIDAR, Delay module, hardware available for tests	Aug 31, 2005
WIDAR, Station boards, hardware available for tests	Aug 31, 2005
WIDAR, Baseline boards, hardware available for tests	Aug 31, 2005
WIDAR, Host Computers for prototype testing in-house	Aug 31, 2005
WIDAR, PC/104+ boards needed for testing in-house	Aug 31, 2005
WIDAR, Correlator Backend (CBE), install & test at DRAO	Jun 30, 2005
Southwest Consortium (SWC) Long Wavelength Demonstrator Array (LWDA-1) installation	Q4 2005
LWDA-1, single station operation & verification	Q1 2006
LWDA-1, single baseline testing with 1 VLA antenna, software correlator	Q2 2006
LWDA-1, multiple baseline testing, VLA correlator	Q2 2006
LWDA-1, participation in VLA observing	Q3 2006
WIDAR Prototype Correlator on-the-sky testing at the VLA site	Aug-Sep 2006
WIDAR Correlator CDR	Nov 2006

WIDAR Production Correlator, Limited Boards installation and testing at VLA site	Q1 2008
WIDAR Production Correlator, Limited Software installation	Q1 2008
WIDAR Production Correlator, on-the-sky testing of the Limited installation	Q1 2008
WIDAR Production Correlator, Start of Shared-Risk Observing	Q2 2008
WIDAR Production Correlator, Full installation & testing at VLA site	Q2 – Q4 2008
WIDAR Correlator, commissioning	Q4 2008 – Q2 2009
VLA Correlator retired (earliest possible date?)	Q2 2009
All VLA antennas converted to EVLA electronics (but not all EVLA receivers installed)	Q4 2010
EVLA receiver installation complete	Q2 2012

2 Planning Assumptions & Constraints

1. EVLA antennas will be used with the VLA Correlator.
2. VLA antennas will not be used with the WIDAR Correlator.
3. The current goal for retirement of the Modcomps is Dec 31, 2005.
4. If the Modcomps cannot be retired before the start of on-the-sky testing of the WIDAR prototype (Aug 2006), then they will not be retired until on-the-sky testing of the WIDAR prototype has been completed (Sep 2006).
5. Three EVLA antennas must be made available for on-the-sky testing of the WIDAR prototype.
6. On-the-sky testing of the WIDAR prototype including monitor and control of the prototype and archiving of prototype output (or output from the associated prototype correlator backend) will be handled by the EVLA Monitor and Control system.
7. Archiving of output from the VLA Correlator will always be in the current VLA archive format.
8. There will be sufficiently many EVLA antennas to support shared-risk observing. Given the current schedule for the production of EVLA antennas and taking the start of shared-risk observing as the start of Q2 2008, 15 – 16 EVLA antennas should be available.
9. There will be sufficiently many EVLA antennas to support scientific use of the WIDAR correlator once commissioning has been completed. Given current schedules and taking the completion of WIDAR commissioning as the start of Q2 2009, 20 – 21 EVLA antennas should be available.

3 Basic Objectives

3.1 EVLA Monitor and Control Transition

The plan for the transition from the VLA Control System to the EVLA Control System has been divided into four phases, with a major objective assigned to each phase. The high level summary of the phases and their objectives is:

- Phase 0, Q1 2005
  - Support for EVLA antenna Hardware Development
- Phase I, Q2 2005
  - Use of EVLA antennas in VLA Observing
- Phase II, Q3 2005
  - Migration of functionality from the VLA Monitor and Control System to the EVLA Monitor and Control System
- Phase III, Q4 2005
  - Rollover to EVLA Monitor and Control System. Retire the VLA Monitor and Control System.

Planning for the transition is constrained by the requirement that the VLA continue to operate as a scientific instrument during the transition. A possible qualification on this constraint is that it may be possible to declare one or two periods of reduced operations, perhaps of 2 to 3 months duration each. Given the lead time needed to notify the scientific community, it is unlikely that reduced observing will occur before Q1 or Q2 2006.

Components of the hybrid array

- EVLA antennas
- VLA antennas
- VLA Correlator
- WIDAR Prototype Correlator
- WIDAR Pre-Production (Limited) Correlator
- WIDAR Production Correlator

As hardware development proceeds, VLA antennas, the VLA Correlator, EVLA antennas, and some version of the WIDAR Correlator will all be present, at the same time, in the hybrid array.

4 Phase 0, EVLA M&C Transition, Q1 2005

4.1 Objective: Support for EVLA Antenna Hardware Development

The goal of this objective is to provide the software needed to support the development of the production versions of the hardware designs for the EVLA antenna subsystems.

4.1.1 Timeline: Support for EVLA Antenna Hardware Development

Q1 2005

As of late March 2005 the software for Phase 0 is basically complete. Some integration testing remains to be done, training for the VLA operators is scheduled to begin at the end of March, and written instructions need to be more fully developed.

Development of the production versions of the hardware for the EVLA antenna subsystems is currently scheduled to continue at least into the end of Q2 2005. Work to characterize the behavior of entire subsystems and EVLA antenna electronics as a whole will continue throughout all of 2005.

4.1.2 Task breakdown: Support for EVLA Hardware Development

Note that these tasks should not be understood as serial in time, but rather as ongoing parallel efforts. Bench testing of newly developed modules and design respins continues even while attempts to characterize a single antenna and the testing of multiple antennas proceeds. The tasks associated with each type of testing is, for the most part, a list of the software capabilities needed to begin that type of testing and to proceed with it in an effective manner.

1. Bench tests
    a. Basic MIB software to allow monitor and control of modules
    b. Labview interface to MIB-controlled modules
    c. Capture and archiving of module data, ad hoc system
2. Standalone testing of a single EVLA antenna
    a. Testing to be done by expert users
    b. Device browser
        i. Able to obtain monitor data from MIB-connected devices
        ii. Able to set control points (send commands) to MIB-connected devices
    c. At least a partial implementation of a control script language
    d. Observation Executor, test antenna version, capable of:
        i. Presenting a command line interface (CLI)
        ii. Running simple control scripts
        iii. Commanding modules in an EVLA antenna
        iv. Extension to new EVLA antenna modules and redesigned EVLA antenna modules

    e. Hand-written control scripts
    f. Capture and archiving of data from the antenna, prototype monitor data database system
3. Testing of multiple EVLA antennas, with one another and with VLA antennas
    a. Testing to be done by expert users
    b. Device browser, as per item 2
    c. Fuller development of test antenna Observation Executor
        i. Still CLI driven
        ii. Sufficient functionality to achieve fringes with VLA antennas
    d. Hand-written control scripts
    e. Further refinement of monitor data database
4. Routine support of testing of EVLA antennas
    a. Ability to control an EVLA antenna using a VLA Observe file or an EVLA control script
    b. GUI for test antenna Observation Executor
    c. Array operator execution of Observe files and control scripts via the Observation Executor GUI
    d. Bulk of devices and subsystems configured automatically via software. Manual device configuration via device browser only minimally necessary.
    e. Device browser, as per item 2
    f. Test antenna Observation Executor capabilities:
        i. Support for many of the capabilities specifiable via VLA Observe files
        ii. Job submission and first level subarray specification via a GUI
        iii. Automated conversion of observe files to control scripts
    g. Engineers and technicians able to configure antenna via Observation Executor GUI in support of testing
    h. Feedback to operators on EVLA antenna status (may still be fairly primitive)
    i. Feedback to operators on status of control script execution (may still be fairly primitive)
    j. Training for array operators
    Status: Scheduled to begin March 31, 2005
    k. Written instructions available (meaningful help screens count as written instructions)
    Status: In progress, not yet complete
    l. Routinely usable monitor data database
5. Preparation for Phase I
    a. Decide on architecture/structure of production version of Observation Executor
6. Other
    a. Revisit/review/revise EVLA M&C Software Development Plan
    b. Begin EVLA M&C Design document to capture work done during Phase 0, and to help plan work to be done in subsequent phases.

5 Phase I, EVLA M&C Transition, Q2 2005

5.1 Objective: Use of EVLA Antennas in VLA Observing

The primary objective of Phase I is to complete the software needed to enable the use of EVLA antennas in VLA scientific observations, while laying some of the groundwork needed to prepare for retirement of the Modcomps and the VLA Control system.

5.1.1 Relevant Milestones & Target Dates: Use of EVLA Antennas in VLA Observing

D30x ICD (ver E) ready for software	Apr 14, 2005
D30x ver E formatter tested	May 05, 2005
D30x ver E MIB software ready	May 20, 2005
M301 hardware ready for software	May 27, 2005
M301 ready to install on antennas	Jun 08, 2005
Antenna 14, ready to participate in scientific observations	Jun 23, 2005
Antenna 16 ready to participate in scientific observations	Jul 01, 2005
Antenna 13 ready to participate in scientific observations	Jul 08, 2005
Antenna 18 ready	Aug 22, 2005
Hardware verification, first fringes, antenna 14	?
Operations, Antenna Checkout, antenna 14	?
Scientific Commissioning, antenna 14	?

That an antenna is equipped with the needed electronics does not mean that the antenna is ready to participate in scientific observations. The hardware must be verified (engineering quality assurance), fringes obtained, basic operational antenna checkout procedures performed, and scientific commissioning must take place before the antenna can participate in scientific observations.

The assumption is that the first antenna, 14, to be ready to participate in scientific observations will also be the first antenna subjected to formal hardware verification, operational checkout, and scientific commissioning.

5.1.2 Timeline: Use of EVLA Antennas in VLA Observing

Q2 2005

Phase I software will be developed during Q2 2005. The core software must be ready for use by the time the first antenna is equipped with 4 IFs and either L304 or M301 style band switching. The current date for these hardware milestones is Jun 23, 2005. However, there is some optimism that it may be possible to better this date. Accordingly, the ECD will adopt the following dates:

- For the software needed to actually operate an EVLA antenna: mid-May 2005
- Support of hardware verification: end of May 2005. Actually, the software needed to support hardware verification is already complete. All that may be needed are some control scripts

- Support for antenna Checkout by Operations: end of June 2005
- Support for Scientific Commissioning: It is unclear if any software above and beyond that needed to operate an EVLA antenna as a part of the VLA is needed to support Scientific Commissioning.

5.1.3 Task Breakdown: Use of EVLA Antennas in VLA Observing

1. Observation Executor, test antenna version
    a. The main focus for the test antenna version of the Observation Executor for Phase I is the control of EVLA antennas
    b. Scan synchronization mechanism between the VLA Control System and the EVLA Control System
    Status (as of 3/21/05): Done
    c. Support for more of the capabilities specifiable via a VLA Observe file, including:
        i. Reference pointing (requires access to pointing offsets)
        ii. Phased array operation (requires access to phasing information)
    Overall Status (as of 3/21/05): See Bryan Butler's email of 26 Jan 2005 08:53:56, Subject: Re: status of phase I of transition plan. Most of the functionality needed for regular observing is supported. Reference pointing scans are supported, but application of pointing offsets to EVLA antennas is not yet possible. Phased array operation not yet supported.
    d. Integral obs2script (automatic conversion of (J)Observe files to control scripts)
    Status (as of 3/21/05): Mostly done, but additional testing and some extension required
    e. All devices and subsystems configured by Executor. Device browser not needed to configure EVLA devices for an observation.
        i. Deformatter board software
        Status (as of 3/21/05): Deformatter boards now present a MIB-like interface. A few tweaks and a bit of additional testing are needed.
    f. Improved feedback to operators on status of script execution
    g. Add DeviceListener thread to monitor antenna subsystems (see Barry Clark's posting to evla-sw-discuss of 1/5/2002, entitled "Design of the current EVLA real-time system)
    h. Update scan parameters supported (equivalent to a skip n 0)
    Status: Discussion of how to implement now ongoing
    i. Script stop supported
    Status: Code in place, but not yet tested
    j. Scan skip & scan extend supported, or equivalent functionality
        i. Skips and extends are difficult to implement. They do not map in a natural fashion to the structure of the Executor.
    k. Begin work needed to support configuration and control of VLA antennas

i. Barry Clark has begun work on a loifsetup construct for VLA antennas
ii. Methods for communicating with VLA antennas (see also the CMP)

l. Begin work needed to support configuration and update of VLA correlator (new VLA Correlator Controller required for testing)

2. Observation Executor, target version
   a. Requirements
      i. Note: For testing, the target version of the Executor may need to support scan synchronization with the VLA Control System
   b. Detailed Design, including
      i. Specification of interfaces to
         1. Antenna Monitor and Control (AMCS)
         2. Correlator Monitor and Control (CMCS)
         3. Observation Scheduler
         4. Interim Antsol/Telcal if needed
         5. EVLA Telcal
         6. EVLA DCAF
   c. Determination of degree of reuse/refactoring of test antenna Observation Executor code
3. Flagging for EVLA antennas
   a. Development of flags in EVLA Control System from MIB-generated alerts. (Implies flagging for EVLA antennas.)
   b. Transfer of flagging information to VLA Control System
   c. Merger of EVLA flagging with VLA flagging in the VLA Control System
   d. VLA Archive records annotated with EVLA and VLA flagging information by the VLA Control System (the Modcomps)

   Status (as of 3/21/05): Tests have demonstrated that the full path from an alert generated in a MIB to annotation of VLA Archive records written by the VLA Control System is functional. MIB alerts need additional work. The development of flags at a level higher than the MIBs needs work. More testing is needed.
4. Interim Antsol/Telcal (antenna gains, pointing offsets, phasing information, focus, delays)
   a. EVLA access to pointing offsets and phasing information is required in this phase of software development.
   b. Begin work on focus determinations and the determination of delays by the EVLA Control System
      i. For EVLA antennas
5. EVLA Telcal
   a. If the means by which the EVLA Control System gains access to pointing offsets, phasing information, focus determinations, and delays is not a framework for a full, production-quality EVLA Telcal, then
      i. Develop a detailed design, task breakdowns and schedule for the development of an EVLA Telcal that includes
         1. Complex antenna gains

2. Pointing offset determination
3. Development of phasing information
4. Focus Determination
5. Delays

ii. Document the design, task breakdown, and schedule
iii. Begin development

6. VLA Data Capture and Format (VLA DCAF)
    a. VLA archive records still created (formatted) by the VLA Control System (Boss, DUMP)
    b. VLA archive records still written by the VLA Control System (Boss)
    c. Develop a detailed design for migration of VLA DCAF (old DUMP) functionality from the VLA Control System, including task breakdowns and a schedule with milestones
    d. Document the design, task breakdown, and schedule
    e. Begin development
7. VLA Archive
    a. Review the current VLA archive format for decisions and changes that must be made in order to write VLA format archive records in a Modcomp independent format.
        i. Develop a task breakdown for the changes to be made
        ii. Set milestones and schedule
        iii. Begin development
        iv. Document the decisions, task breakdown, and schedule

    Status (as of 3/21/05): Ken Sowinski has written and distributed an email (posted to evla-sw-discuss on 18 Feb 2005 08:43:22, Subject: the transition era VLA/eVLA archive record) that discusses the changes required in the VLA archive format to create a Modcomp independent version that can be written by the EVLA Monitor and Control System.
    b. Coordinate with other groups (AIPS, AIPS++ (?), others?) on changes in post-processing software needed to support changes in VLA archive format records
8. Operator tools
    a. Written instructions and help screens
        i. Written cookbook style instructions needed for common tasks
        ii. Continue development of help screens
    b. Job submission
        i. GUI interface to test antenna Observation Executor
        Status: Functional. Further development expected.
    c. Ability to monitor observation progress and status
        i. Specification of what is needed
            1. Status of control script execution for EVLA antennas
            2. Data quality displays that include EVLA antennas
            Status: The F and D10 displays are based on output from the VLA Correlator, and therefore provide feedback on EVLA as well as VLA antennas.
    d. Ability to monitor antenna status, EVLA antennas

i. EVLA hosted Checker function for EVLA antennas
Status (as of 3/21/05): Two Checker screens have been demonstrated. One captures current alert-on messages. The other is a history screen that provides a log of alert-on messages for which a matching alert-off message has been found. Work may be needed on prioritization or other indicators of severity, color-coding, etc.

ii. Operator Screens
1. Framework for general approach
2. Specification of screens to be developed
3. Prototypes for some significant subset of the screens
a. Ability to monitor and control MIB-connected antenna devices (EVLA antennas)

e. Specification and documentation of the general approach to interfaces for non MIB-connected processes
i. Executor, Checker, Flagger, others?
ii. At least prototype GUIs for these processes

Status (as of 3/21/05): A general approach to these interfaces has been developed. It is web-based. GUIs for the Executor, Checker, and Flagger have been demonstrated. Documentation of the approach has been written, but is now somewhat obsolete and needs to be updated. The documentation has not yet been made publicly available. Much more field-testing of this approach to the interfaces is needed to be certain of its viability.

9. Device Browser
a. Ability to access all attributes of all monitor and control points for MIB-connected devices (I.e., EVLA antennas)
b. Ability to set all writeable attributes of MIB-connected devices (I.e., EVLA antennas)
c. Annotation of plot scales
d. Ability to sample monitor points at high sample rates and save data to local computer

10. Monitor data database
a. Monitor data accessible using fully qualified, fully descriptive device names that accurately reference the data source
b. Ability to search for & list multiple monitor points with one query
c. Ability to search and plot multiple monitor points with one query (?)

11. MIB software
a. Module software as hardware becomes available
i. T304/T305
ii. L302 mods
iii. D30x
iv. M301
v. F320
vi. F317
b. Get *.*.* disallowed as a MIB command

i. Implementation
ii. Update documentation (Service Port ICD)

c. Addition of alert status in response to get commands for monitor point values
   i. Implementation
      Status (as of 3/21/05): Implemented in release 0.20 of the MIB framework software (3/2005). Currently undergoing testing.
   ii. Update documentation (Service Port ICD)

d. Addition of alert status to data port multicasts of monitor point values
   i. Implementation
      Status (as of 3/21/05): Implemented in release 0.20 of the MIB framework software (3/2005). Currently undergoing testing.
   ii. Update documentation (Data Port ICD)

e. "In Use" flag
   i. Initial implementation
   ii. Update documentation (Framework Software)

f. Upgrade to latest version of Nucleus OS
   i. Fix TCP_Retransmit bug
   ii. Make transition to latest version of Nucleus OS
   iii. Update old images for MIBs already in the field

g. Decision on upgrade to latest version of toolset
   i. Begin exploring a GNU-based toolchain ?

12. Control and Monitor Processor (CMP)
    a. VLA monitor data available in EVLA format
    b. VLA monitor data to EVLA monitor data archive
    c. Implementation of a command path to VLA antennas
       i. Low-level implementation within the CMP
       ii. Public interface to command path for use by external processes (such as the Observation Executor)
13. New VLA Correlator Controller
    a. Fully operational by the end of Q2 2005, controlled by Modcomp hosted software
14. Software support for Hardware Quality Assurance
    a. GUI interface to test antenna Observation Executor
       Status (as of 3/21/05): GUI is functional. Further development expected.
    b. Appropriate test scripts available
       Status: Done
    c. User training
       Status: Done
15. Software support for Antenna Checkout/Acceptance, Startup After Maintenance Day, Other Tests (See "VLA Antenna Checkout for Operations, EVLA Notes/Questions", by Pat Van Buskirk, 1/12/2005, and an email from Ken Sowinski, 15 Jan 2005 16:42:15, Subject: Transition Software list)
    a. Items needed while VLA Control System (Modcomps) are still present
       i. Verify network connectivity to antenna

ii. Round Trip Phase. Ability to verify that the antenna is synchronized to the 10 sec tick.
iii. Ability to verify:
    1. Control of feed heaters (initially by the F320 module, ultimately by the M302 utility module). Feed heaters to be available sometime in March 2005.
    2. Data Sets. Proper operation of backend filters (dataset 5)
    3. Focus/Rotation. Successful setup at all bands.
    4. LO. Scripts needed for checkout of L301 & L302 settings at all bands
    5. Cryo. F317 & F320. Verify that cryo temp < 20K, vacuum < 1u. Use device browser, perhaps with a special screen?
    6. Front End (F317 & F320) default settings for all bands.
iv. 600 MHZ round trip phase. EVLA is optical. What needs to be checked and how will we do it?
v. Delays. Verify delays found for all IFs at all bands. No change with Modcomps and VLA Correlator, but Phase I is the right time to begin thinking about what we will do when the Modcomps are retired.
vi. Pointing1. Set first tilt terms & A7. Requires an interface to the parameters database. No other changes until WIDAR correlator.
vii. Focus, recommissioned antennas only. Verify focus found for all bands. New design and software needed.
viii. L Band, recommissioned antennas only. Check crossed-hand polarizations. Available via D10 display or data analysis via AIPS. Should be changed to check all receivers.
ix. Baselines, install after valid baseline run/analysis. Requires an interface to the parameters database.
x. Pointing2, install updated coefficients after valid pointing run/analysis. Requires an interface to the parameters database.
xi. Tipping. New software needed for EVLA antennas.
xii. Systest. Needs requirements and definition. Total Power and Synch Detector voltages must be monitored.

16. Software needed to support Scientific Commissioning
    a. It is not clear that any software beyond that already needed to integrate EVLA antennas into VLA observing will be needed.
17. Other
    a. Update and revise EVLA M&C Software Development Plan
    b. Update and revise EVLA M&C Design document

6 Phase II, EVLA M&C Transition, Q3 2005

6.1 Objective: Migration of functionality from VLA Control System to EVLA Control System

The primary objective of Phase II is to substantially complete the migration of functionality from the VLA Control System to the EVLA Control System in preparation for retirement of the VLA Control System and the Modcomp computers. During this phase of software development the EVLA Monitor and Control System needs to acquire the ability to

- Control VLA antennas as well as EVLA antennas
- Control the VLA Correlator

and

- The target version of the Observation Executor must achieve a level of functionality nearly equal to the current state of the test antenna version of the Observation Executor

6.1.1 Relevant Milestones & Target Dates: Migration of functionality from VLA Control System to EVLA Control System

New VLA Correlator Controller ready for operational use (end of) Q2 2005

6.1.2 Timeline: Migration of functionality from VLA Control System to EVLA Control System

Q3 2005

Control of VLA antennas by the EVLA Monitor and Control System should be an early goal for Phase II. By the end of this phase, the EVLA Monitor and Control System must be beyond the proof-of-concept stage for control of the VLA correlator by the EVLA Monitor and Control System, and the target version of the Observation Executor must be in a well-developed state.

6.1.3 Task Breakdown: Migration of functionality from VLA Control System to EVLA Control System

1. Observation Executor, test antenna version
    a. Support for most of the capabilities present in VLA Observe files
    b. Ability to configure, monitor, and control VLA antennas
        i. To the same degree as is possible for EVLA antennas
        ii. Integration of VLA system parameter database with the EVLA system parameter database
    c. At least a first implementation of the ability to configure & update the VLA Correlator via new correlator controller
2. Observation Executor, target version
    c. 1st prototype implementation - basic structure, limited functionality
    a. Iterative development and field testing of successive prototypes with increasing degrees of functionality

    b. Implementation of most of the functionality supported by the test antenna version of the Executor
3. Flagging
    a. Able to develop flags for both EVLA and VLA antennas
    b. Transmission of flagging information for EVLA and VLA antennas from EVLA Control System to current site of VLA DCAF
4. Interim Antsol/Telcal (antenna gains, pointing offsets, phasing information, focus, delays)
    a. Continue work on focus determinations and the determination of delays by the EVLA Control System
        i. For EVLA antennas
        ii. For VLA antennas
5. EVLA Telcal (antenna gains, pointing offsets, phasing, focus, delays)
    a. First implementation of a production quality EVLA Telcal. At this point full functionality is not expected.
        i. Parallel testing against Interim Antsol/Telcal
6. VLA Data Capture and Format (VLA DCAF)
    a. VLA DCAF functionality migrated from the VLA Control System
        i. EVLA Control System becomes source of information for VLA format archive record headers
        ii. VLA archive records formatted by EVLA Control System or by an intermediary that is independent of the VLA Control System
        iii. VLA archive records written by EVLA Control System or by an intermediary that is independent of the VLA Control System
7. VLA Archive
    a. VLA archive records written in Modcomp independent format
    b. Test for compatibility with post-processing software
8. Operator Tools
    a. Job Submission
        i. Should have been substantially completed in Phase I. Refinements in Phase II
    b. Ability to monitor observation progress and status
        i. Screen(s) giving status of control script execution implemented
        ii. Data quality displays implemented
            1. EVLA equivalents of the F and D10 displays
    c. EVLA hosted Checker functionality for EVLA and VLA antennas
    d. Screens to monitor and control
        i. EVLA antenna subsystems
        ii. VLA antenna subsystems
        iii. VLA correlator
        iv. Weather station
    e. More fully developed interfaces to non-MIB connected processes (Checker, Flagger, others)
9. Device Browser
    a. TBD
10. Monitor data database

a. TBD

11. MIB software
    a. Development of a toolchain (probably GNU-based) for the TC11IB processor that is not dependent upon the Windows operating system
        i. C/C++ compiler
        ii. Assembler
        iii. Linker/Locator
        iv. Debugger
        v. Image download
12. CMP
    a. Full implementation of EVLA style alerts for VLA antennas
13. New VLA Correlator Controller
    a. Configured and updated by test antenna Observation Executor
14. Software Support for Hardware Quality Assurance
    a. TBD, as needed
15. Software Support for Antenna Checkout/Acceptance, Startup After Maintenance Day, Other Tests (See "VLA Antenna Checkout for Operations, EVLA Notes/Questions", by Pat Van Buskirk, 1/12/2005, and an email from Ken Sowinski, 15 Jan 2005 16:42:15, Subject: Transition Software list)
    a. Items needed for EVLA antennas to participate in VLA scientific observing (Phase I), that may require further work
        i. Focus. New design and software needed.
        ii. Tipping. New software needed for EVLA antennas
    b. Items needed when Modcomps are retired
        i. Delays. Verify delays found for all IFs at all bands. New design and software required when Modcomps are retired.
        ii. L Band, recommissioned antennas only. Check crossed-hand polarizations. Available via D10 display or data analysis via AIPS. Should be changed to check all receivers. Will new design and software be required after Modcomps retired?
        iii. Baselines, install after valid baseline run/analysis. New design and software required when Modcomps are retired.
        iv. Pointing2, install updated coefficients after valid pointing run/analysis. Will new design and software be required after Modcomps retired?
        v. Modcal & Tsys. Require work when Modcomps are gone.
        vi. Systest. Needs requirements and definition. Total Power and Synch Detector voltages must be monitored.
    c. Items needed when VLA correlator retired
        i. Pointing1. Set first tilt terms & A7. New design and software required for WIDAR correlator.
        ii. Pointing 2, install updated coefficients after valid pointing run/analysis. New design and software required for WIDAR correlator.
        iii. P Band, check for fringes. New design and software required for WIDAR Correlator.

iv. Syscorrx – no changes until WIDAR, and then it only needs AIPS or whatever to know how to process correlator data
v. PN3db – as with Syscorrx
vi. RFI – will change with WIDAR
vii. P Band – changes with WIDAR. In what ways?
viii. 4 Band – as with P Band

16. Software needed to support Scientific Commissioning
    a. TBD, as needed
17. Other
    a. Review and revise EVLA M&C Software Development Plan
    b. Review, update, expand EVLA M&C Design document

7 Phase III, EVLA M&C Transition, Q4 2005

7.1 Objective: Rollover to EVLA Monitor & Control System. Retire VLA Control System.

The primary objective for this phase is to make the switchover to control of the hybrid array by the EVLA Monitor and Control System. The bulk of Phase III should be spent on the validation of the EVLA Control System elements developed during Phases I & II. Planning for the further development of the EVLA Monitor and Control System must begin during this phase.

7.1.1 Relevant Milestones & Target Dates: Rollover to EVLA Monitor & Control System. Retire VLA Control System.

Southwest Consortium (SWC) Long Wavelength Demonstrator Array (LWDA-1) installation	Q4 2005
LWDA-1, single station operation & verification	Q1 2006
LWDA-1, single baseline testing with 1 VLA antenna, software correlator	Q2 2006
LWDA-1, multiple baseline testing, VLA correlator	Q2 2006
WIDAR Prototype Correlator on-the-sky testing at the VLA site	Aug-Sep 2006

7.1.2 Timeline: Rollover to EVLA Monitor & Control System. Retire VLA Control System.

Q4 2005

If the schedule slips and the date for retirement of the VLA Control System and the Modcomp computers begins to slip toward the date for support of on-the-sky testing of WIDAR prototype (start of Q2 2006), then retirement of the Modcomps will be deferred until testing of the WIDAR prototype has been completed.

The Long Wavelength Demonstrator Array (LWDA-1) has the potential to be a complicating factor during Phase III of development of the EVLA Monitor and Control transition software.

There have been discussions of declaring a period of reduced observing (less scheduled observing time) as the EVLA Monitor and Control System for the hybrid array becomes operational. Q1 2006 or the following calendar quarter, Q2 2006, might be appropriate times for a period of reduced observing.

7.1.3 Task Breakdown: Rollover to EVLA Monitor & Control System. Retire VLA Control System.

1. Observation Executor, test antenna version
    a. Freeze development of new capabilities
2. Observation Executor, target version
    a. Continue and complete iterative development and field testing of successive prototypes with increasing degrees of functionality
    b. Implementation of all functionality supported by test antenna version of the Executor
    c. Support for all of the capabilities present in VLA Observe files
        i. Excluding those capabilities, if any, which, as a matter of policy, will not be supported
    d. Side by side testing with test antenna version of the Executor
    e. All new functionality to be implemented in production version of the Executor, including
        i. Configuration, control, and update of the VLA Correlator via the new VLA Correlator Controller
        ii. As necessary, adaptation of EVLA antenna control functionality to the LWDA-1
            1. This work is likely to continue into Q1 2006
    f. Rollover to use of target version of Executor
3. Flagging, EVLA and VLA antennas
    a. Testing
4. EVLA Telcal (antenna gains, pointing offsets, phasing, focus, delays)
    a. Full, production quality implementation of:
        i. Complex antenna gains
        ii. Pointing offset determinations
        iii. Phasing information
        iv. Focus determinations
        v. Delay determinations
    b. Design and initial implementation of additional requirements as per section 5.1 (Real-time Calibrator Analysis) of the EVLA e2e Science Software Requirements document
5. VLA Data Capture and Format (VLA DCAF)
    a. Testing
6. EVLA DCAF
    a. Begin development of the design
7. VLA Archive
    a. Testing

8. EVLA Archive
    a. Begin development of the design
9. Operator Tools
    a. Job Submission
        i. TBD
    b. Ability to monitor observation progress and status
        i. TBD
    c. If resources available, begin work on EVLA monitor and control of
        i. Atmospheric Phase Interferometer
        ii. Water Vapor Radiometers
        iii. Hardware and software development required
10. Device Browser
    a. TBD
11. Monitor data database
    a. TBD
12. MIB software
    a. TBD
13. CMP
    a. TBD
14. New VLA Correlator Controller
    a. TBD
15. Software Support for Hardware Quality Assurance
16. Software Support for Antenna Checkout/Acceptance, Startup After Maintenance Day, Other tests (See "VLA Antenna Checkout for Operations, EVLA Notes/Questions", by Pat Van Buskirk, 1/12/2005, and an email from Ken Sowinski, 15 Jan 2005 16:42:15, Subject: Transition Software list)
    c. Items needed when Modcomps are retired
        iii. Delays. Verify delays found for all IFs at all bands. New design and software required when Modcomps are retired.
        iv. L Band, recommissioned antennas only. Check crossed-hand polarizations. Available via D10 display or data analysis via AIPS. Should be changed to check all receivers. Will new design and software be required after Modcomps retired?
        v. Baselines, install after valid baseline run/analysis. New design and software required when Modcomps are retired.
        vi. Pointing2, install updated coefficients after valid pointing run/analysis. Will new design and software be required after Modcomps retired?
        vii. Modcal & Tsys. Require work when Modcomps are gone.
        viii. Systest. Needs requirements and definition. Total Power and Synch Detector voltages must be monitored.
    d. Items needed when VLA correlator retired
        i. Pointing1. Set first tilt terms & A7. New design and software required for WIDAR correlator.

ii. Pointing 2, install updated coefficients after valid pointing run/analysis. New design and software required for WIDAR correlator.
iii. P Band, check for fringes. New design and software required for WIDAR Correlator.
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17. Software needed to support Scientific Commissioning
    a. TBD
18. Other
    a. Review and revise EVLA M&C Software Development Plan
    b. Review, update, expand EVLA M&C Design document