



EVLA Monitor & Control Transition System Software Overview



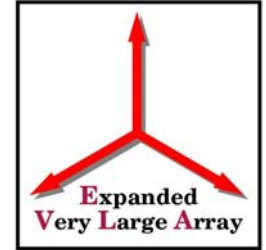
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- Presentation roughly follows the EVLA M&C Software Design document:
 - Scope of the M&C System
 - EVLA M&C Components
 - Transition System & Final System
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 - Carryover from Transition System to Final System
 - Current State of the Transition System
 - Architecture & Dataflow
 - Selected Components



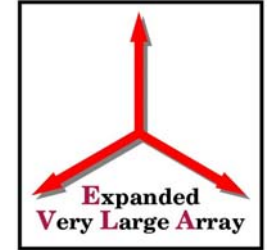
Definitions



-
- The EVLA M & C Transition System Software is the software designed and implemented for the purpose of operating the hybrid array.
 - The hybrid array is the VLA up to that point where it no longer contains either unconverted VLA antennas or the VLA correlator.



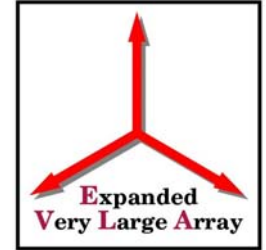
Scope of the M&C System



Microsoft
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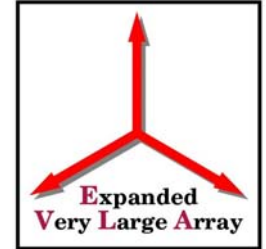
Scope of the M&C System



- The Real-Time Domain
 - Observation Executor
 - Antenna Monitor & Control (AMCS)
 - Correlator Monitor & Control (CMCS)
- Plus the following from the Online Domain
 - DCAF (Data Capture & Format)
 - Telcal (Telescope Calibration)
 - User Interfaces



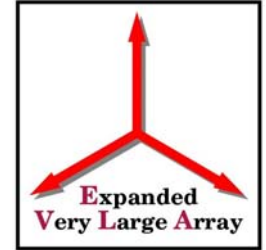
EVLA M&C Components



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PowerPoint Presentation



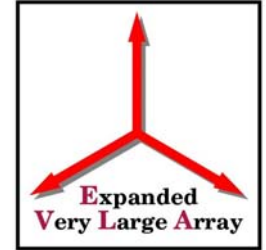
A Transition System and A Final System



- In broad terms, there will be two major versions of the EVLA Monitor & Control System – a Transition System and a Final System
- The Transition System bridges the gap between the old Modcomp-based VLA Control System and the final version of the EVLA Monitor & Control System, while maintaining operational capabilities
- The Transition System will be responsible for controlling a wide variety of old and new hardware – EVLA Antennas, VLA Antennas, the VLA Correlator, and the prototype WIDAR correlator
- The Transition System will incrementally shift its software architecture toward the desired architecture of the final system



Lifespan of the Transition System



- First light on an EVLA antenna – 27Oct 2003
- First fringes (EVLA ant 13 with an unmodified VLA antenna) – 24 Mar2004
- WIDAR correlator scheduled to be operational – Q1 2010
- VLA correlator retired – a policy decision
- VLA antennas no longer used – also a policy decision. The last VLA antenna is scheduled to be converted to EVLA electronics in Q3 2010
- Last EVLA receiver installed – Q2 2012



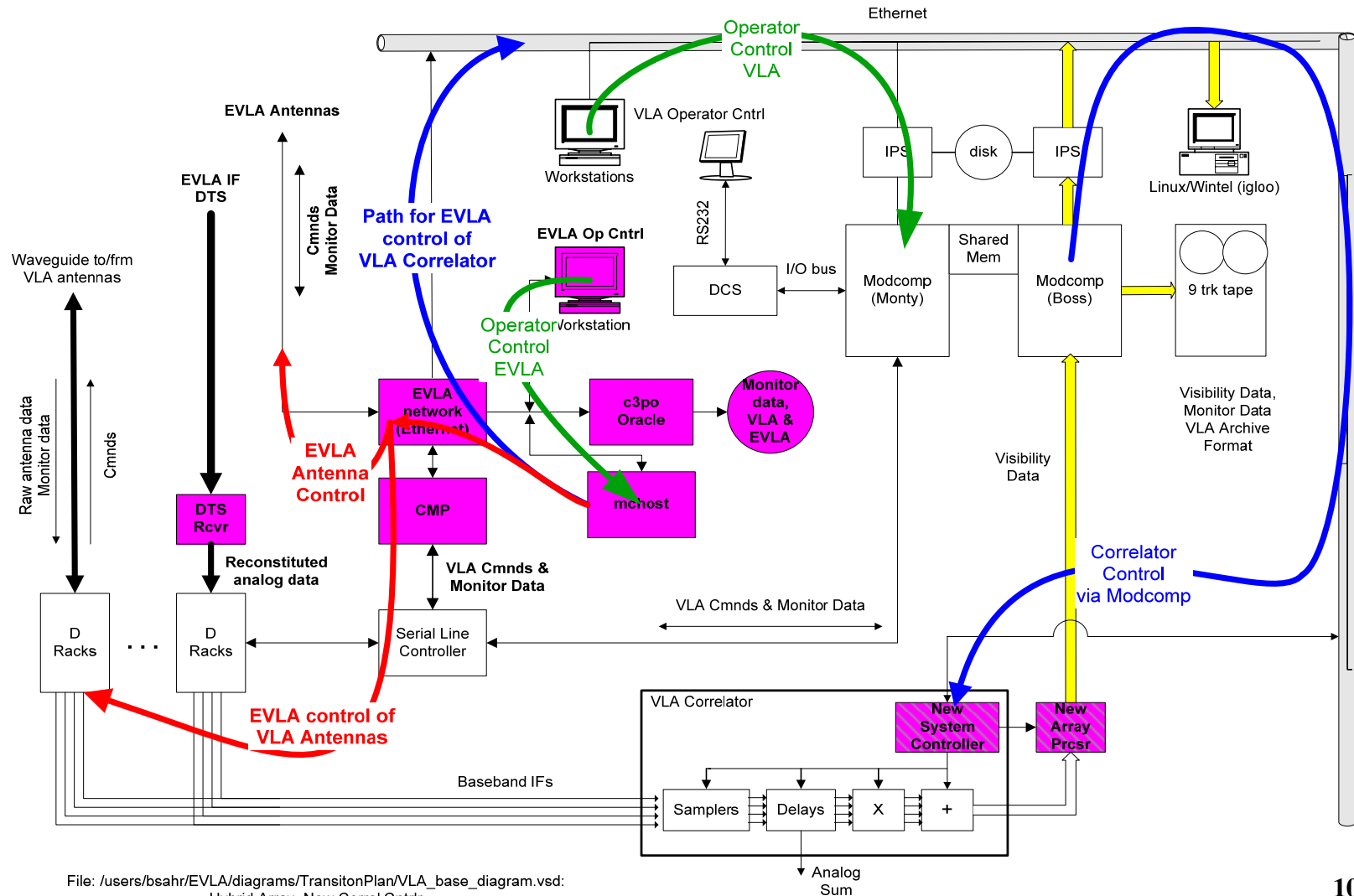
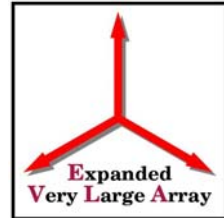
Carryover of Components Transition System to Final System



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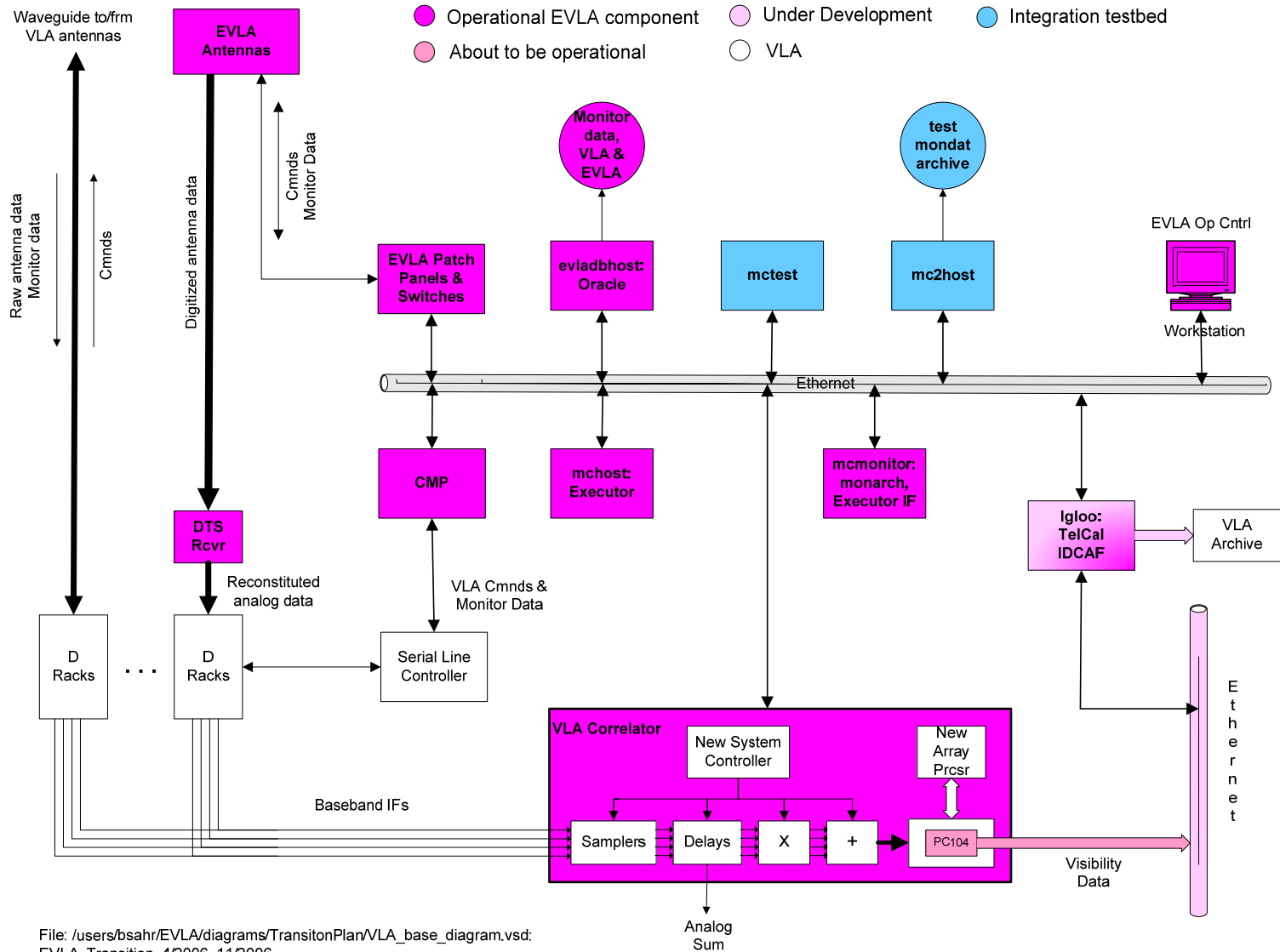
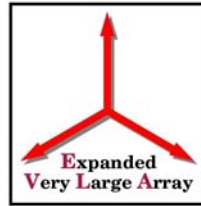


Current State of the Transition System



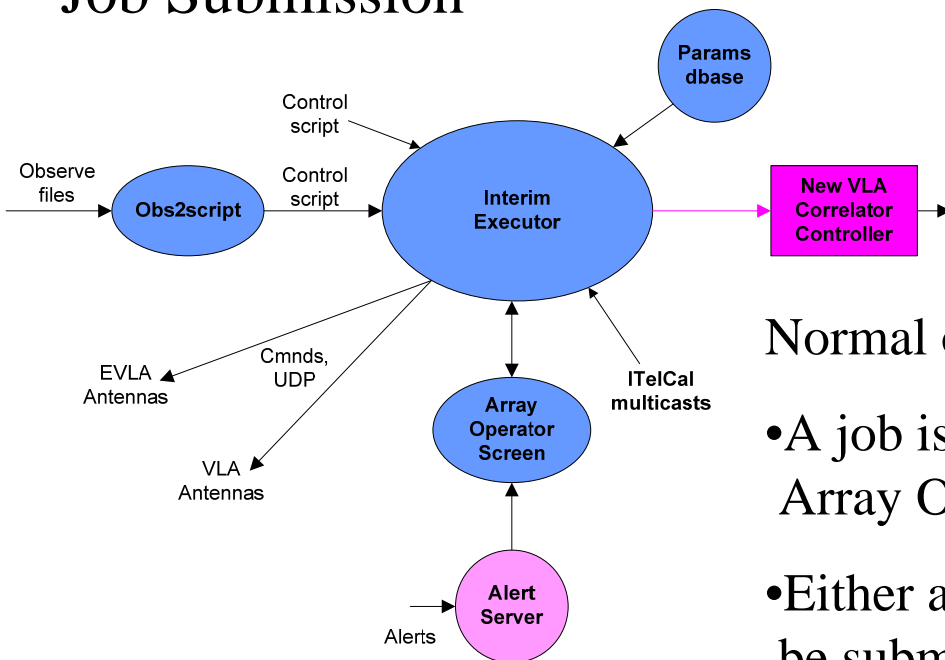
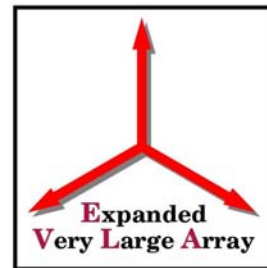


Next Step for the Transition System - Modcomps Retired



File: /users/bsahr/EVLA/diagrams/TransitionPlan/VLA_base_diagram.vsd:
EVLA, Transition 4/2006, 11/2006

Job Submission



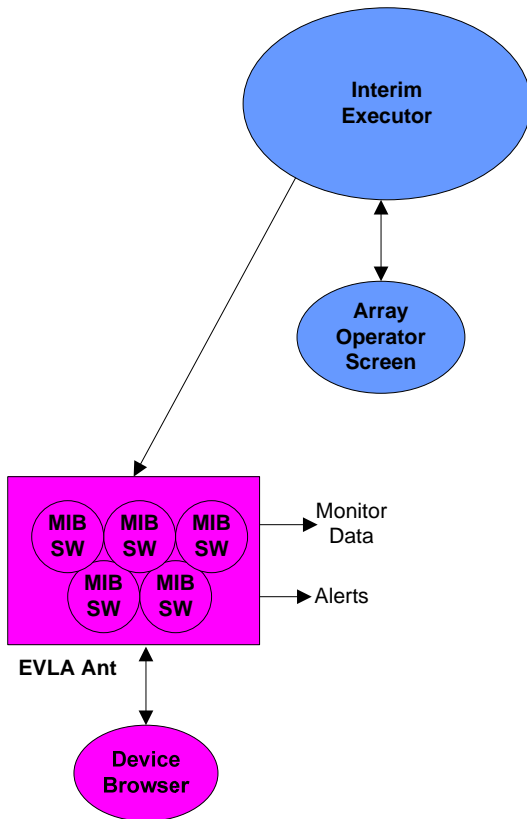
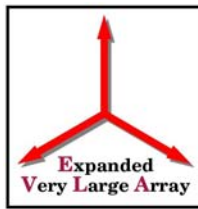
Normal operations

- A job is submitted via the SCRIPTS pane of the Array Operator Screen
- Either a VLA Observe file or a control script can be submitted

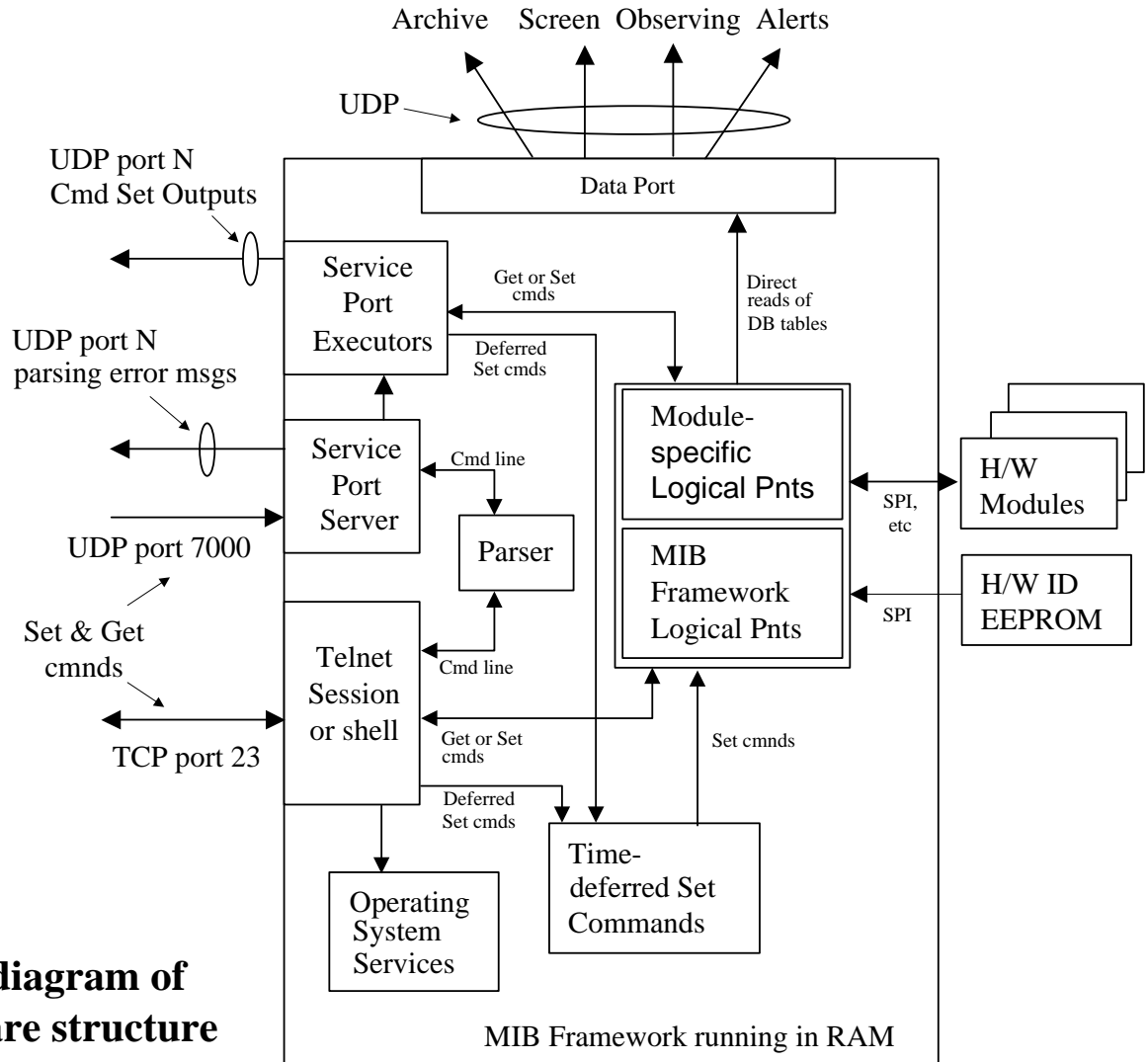
- Observe files are automatically routed through obs2script & converted to control scripts
- Needed observing parameters are obtained from the Parameters database
- The Interim Observation Executor directly configures
 - EVLA antennas
 - VLA Antennas (soon)
 - The VLA correlator via the new correlator controller (soon)



Hardware Configuration EVLA Antennas - MIBs

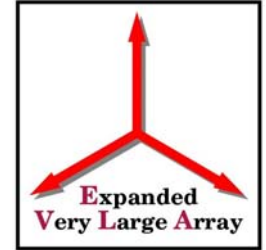


**Simplified diagram of
MIB software structure**





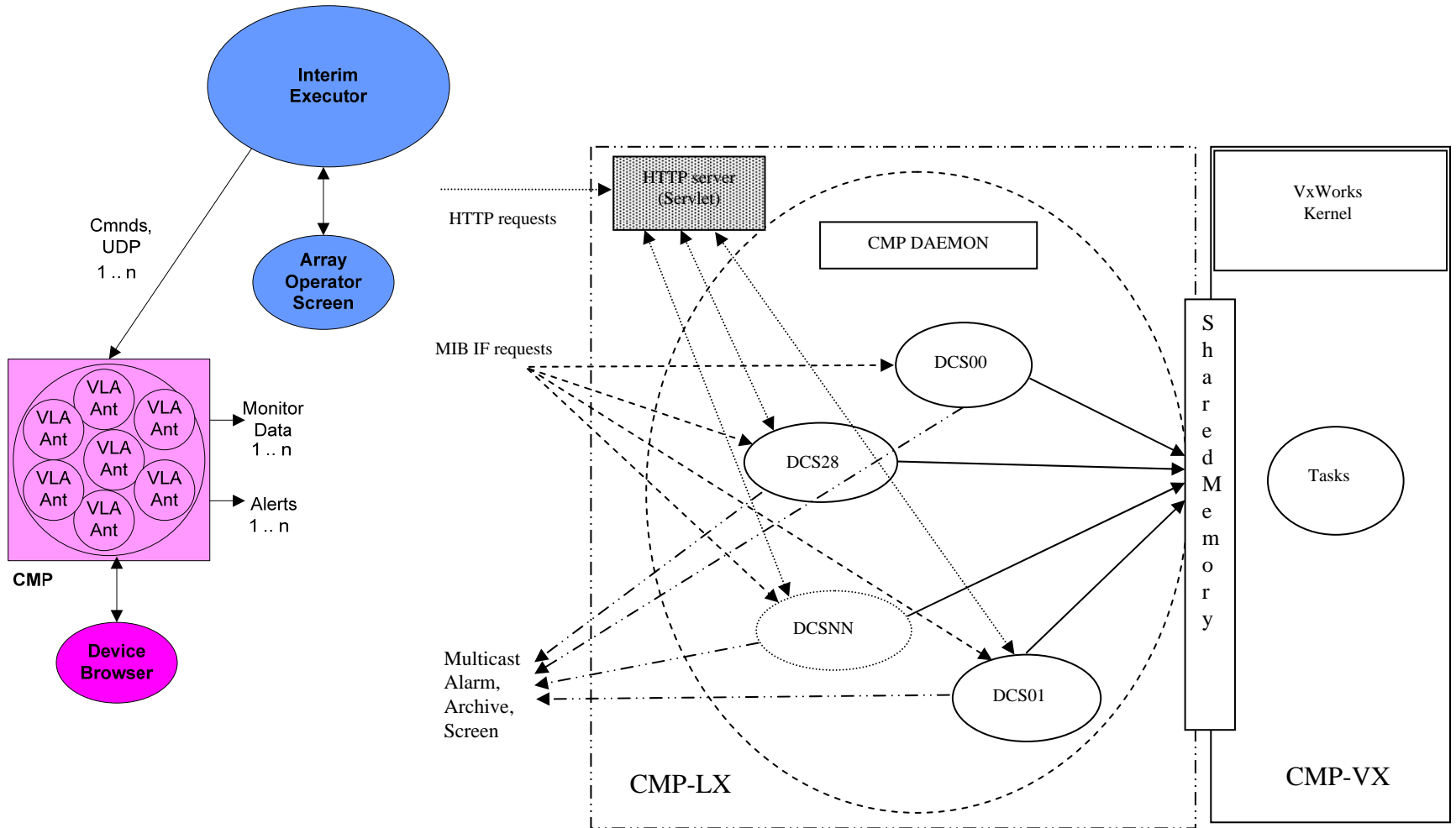
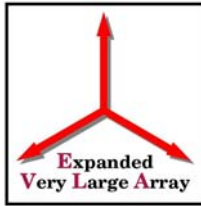
MIB Hardware & Software



- EVLA antennas are presented as a collection of modules containing one or more devices, each module implementing the MIB interface
- MIB interface includes a command port, a data port, and a port used for interactive telnet sessions
- The final version of an EVLA antenna is expected to contain approximately 30 to 34 MIBs
- MIB hardware and software were subjected to a critical design review on 20Oct2004



Hardware Configuration VLA Antennas – the CMP



CMP Ports and Interfaces



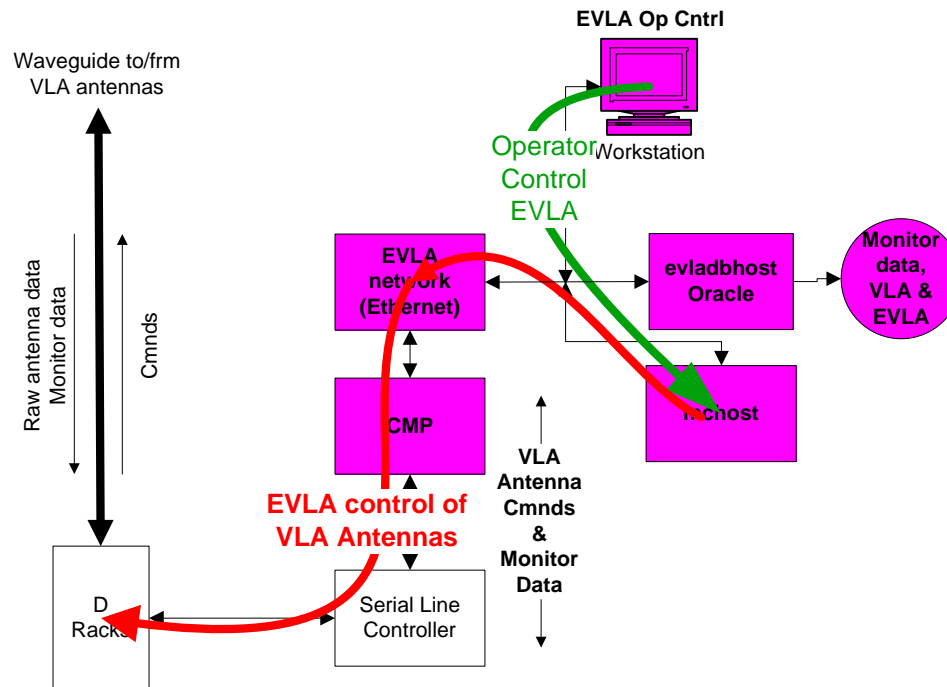
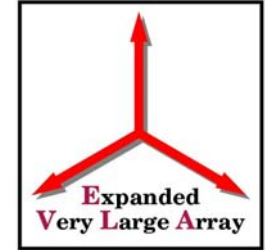
VLA Antennas – the CMP



- The CMP presents VLA antennas to the EVLA M & C System as virtual antennas implementing the MIB interface
- The VLA antenna MIB interface includes the same command, data, and telnet ports as the EVLA module MIB interface
- Uses the same basic “set <device> ...” & “get <device> ...” command format as is used for EVLA subsystems
- Interfaces to the VLA Serial Line Controller

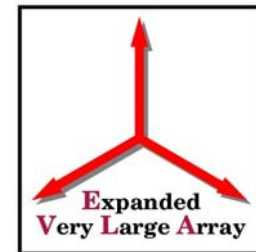


CMP as Deployed

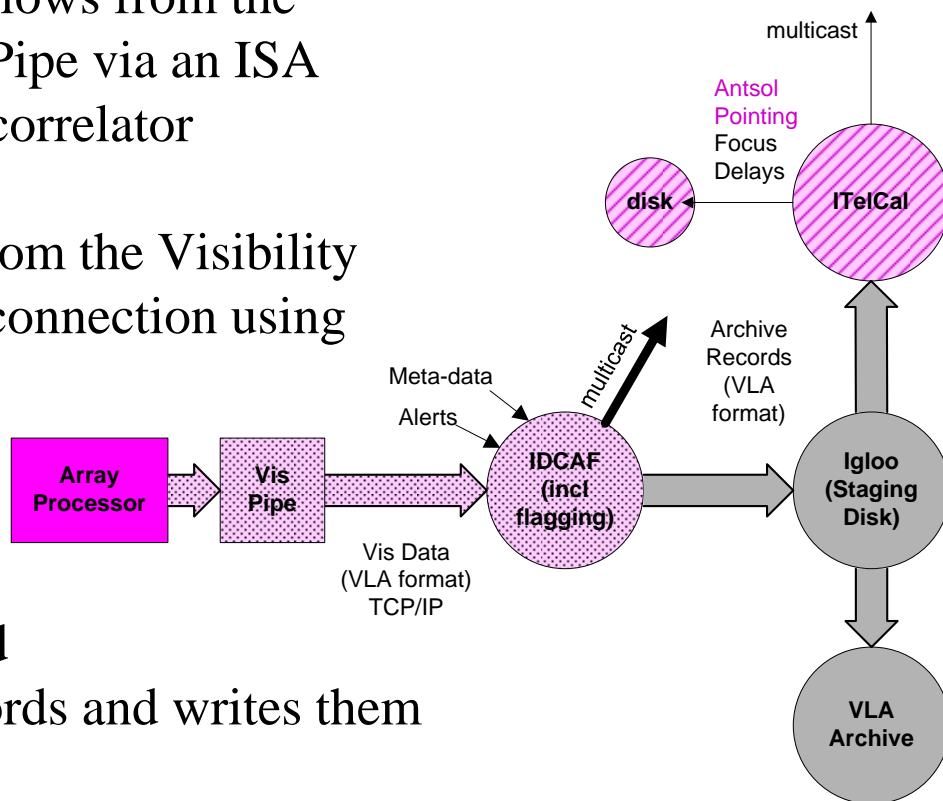




Visibility Data & Archive Records



- Properly formatted visibility data flows from the array processor into the Visibility Pipe via an ISA bus interface on a card in the new correlator controller
- The visibility data is transmitted from the Visibility Pipe to IDCAF over an Ethernet connection using TCP/IP
- IDCAF collects meta-data & alerts via multicast and forms VLA format archive records
- IDCAF flags the records as needed
- IDCAF multicasts the archive records and writes them to a staging disk
- ITelCal obtains the archive records from the staging disk





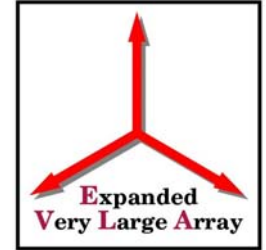
User Interfaces



- 01Nov2006 release of EVLA Operator software:
 - Array Operator Screen
 - Device Browser
 - Critical Functions Screen
 - Screenlets (Panels from the Array Operator Screen - Alerts, Antennas, Scripts, Weather)
 - Module Screens (ACU, FRM, F317, F320, L301, M302, M303)
 - Telcal screens (Calibrator Amplitude & Phase, Calibrator Complex Value, Pointing Record, Pointing Offset)



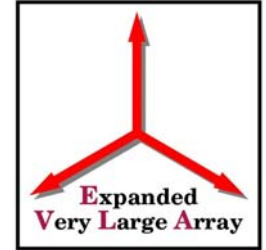
User Interface Releases



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- Stable builds web page:
<http://www.aoc.nrao.edu/asg-internal/jnlp/>
 - Accessible only from within an NRAO domain or via the NRAO VPN



Array Operator Screen



- Chief Operator Screen
 - Scripts pane, including job submission popups
 - Antennas pane: Az, El, Az Error, El Error, + Icons for Computer Control, DPM, On Source, E-Stop
 - Thumbwheel scrollable display of the Wye
 - Message console
 - Time
 - Weather
 - Alerts

Array Operators Screen

Operator Screen [build date: 11.01.2006]

File Edit View Screens Windows Help

SCRIPTS

Active

Queued

History

781E160A	781E160A-00...
xband_025	Xband
xband_024	Xband
xband_023	Xband

Job ID 781E160A
Submitted By evlaops@10.80.100.25
Script 781E160A-000.evla
Status User Requested Abort
Source 1331+305
RA 13:31:08.288
Dec 30:30:32.958
Next Source
Frontend 15GHz
Antennas ea13 ea14 ea16 ea18 ea...

ANTENNAS

ea13	380.37	92.81
ea14	321.37	92.81
ea16	262.37	88.57
ea18	380.37	92.81
ea23	261.64	92.81
ea24	262.37	92.81
ea25	380.37	92.81

Az

El

VLA

CONSOLE

```

23:00:46 Nov22::Executor->Job '781E160A' completed.
Systole halting.
RefPointingAgent halting.
RefPointingAgent shutting down.
Modcomp listener shutting down.
781E160A 54061 230044 Exit Array
    
```

TIME

Year.Day 2006.326
MJD 54061.984212
UTC 23:37:15
LAT 23:37:48
LST [60781] 20:34:02

WEATHER

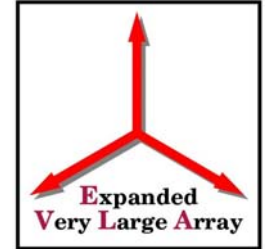
Wind Speed 0.40
Wind Direction 199.98
Temperature 16.53
Barometer 792.65
Dew Point -8.74
RMS Phase 2.52

ALERTS

23:16:10	ea18	acu	az...
23:16:08	ea14	acu	az...
23:15:54	ea26	acu	az...
23:15:53	ea13	acu	az...
23:15:53	Unknown	acu	az...
23:03:28	ea14	acu	el...
23:03:28	ea18	acu	el...
23:03:28	ea26	acu	el...
23:03:28	ea16	acu	el...
23:03:28	ea16	acu	az...
23:03:28	ea14	frm	rot...
23:03:28	ea14	frm	foc...
23:03:28	ea18	frm	rot...
23:03:28	ea13	acu	el...
23:03:28	ea18	frm	foc...
23:03:28	Unknown	frm	rot...
23:03:28	Unknown	frm	foc...
23:03:28	ea26	frm	rot...
23:03:28	ea26	frm	foc...
23:03:28	ea16	frm	rot...



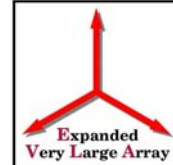
Device Browser



- Low level view of any device implementing the MIB interface
- Tree of all devices in a MIB (module)
- Selected device expands to show all monitor and command points
- Display of all properties and their values for selected monitor or command point
- Real-time plot of value of selected monitor point
- Real-time plots of multiple monitor points



Device Browser



Device Browser [build date: 11.01.2006]

File Edit View Screens Windows Help

Connect To ea24-*

DEVICES

- AZCur2
- AZCur1
- ELCur2
- ELCur1
- AZVel
- AZCur
- ELVel
- ELCur
- PhaseB
- PhaseA
- PhaseC
- AZPos**
- AZPosRaw
- ELPos
- ELPosRaw
- Mode
- ELPosLimitStat
- EIMtrStat
- AzMtrStat
- MoreStuff
- DigitalPos
- EIParityErr
- ComputerCtrl
- AzParityErr

Properties Plots

ea24-acu->ACU->AZPos

Property	Value
lo_alert	0
enrg_unit	degrees
s_period	0
o_period	300
alert	0
type	analog
msg	
conv_type	LINEAR
hi_alert_arm	0
close	0.000242

MONITOR POINT

ea24-acu acu.azpos 262,366 degrees

262.3662110

16:39:20 16:39:25 16:39:30 16:39:35 16:39:40



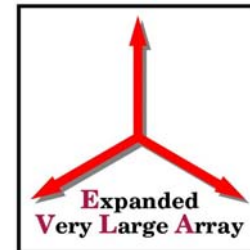
Critical Functions



-
- Will allow an E-Stop, ACU Reset, Critical Power Reset, Track (DPM), Stow, Park, or Standby command to be sent to any antenna, selected group of antennas, or to the entire array.
 - Depends upon the installation of the M302 module in an antenna



Critical Functions Screen



Critical Functions [build date: 11.01.2006]

File Edit View Screens Windows Help

Array Commands

Array E-Stop	Array ACU Reset	Array CP Reset
Array Stow	Array Park	Array Standby

Antenna Commands

ea13	ea14	ea16	ea18	ea23	ea24	ea26	va01	va02
va03	va04	va05	va06	va07	va08	va09	va10	va11
va12	va15	va19	va20	va21	va22	va25	va27	va28
E-Stop	ACU Reset	CP Reset	Track (DPM)	Stow	Park	Standby		



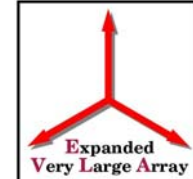
Module Screens



- ACU – antenna control unit
- FRM – focus & rotation module
- F317 – front end (rcvr) controller
- F320 – front end transition module
- L301 – 12-20 GHz synthesizer
- M302 – Utility module, includes critical functions
- M303 – Utility module



A module subsystem screen – the ACU Screen



ACU Screen [build date: 11.01.2006]

File Edit View Screens Windows Help

ACU: ea13

Azimuth

380.366943

Azimuth	380.36...	119.27...	-12.81...
Velocity	1.0000		
Current	0.2500	Motor #1	-0.2500
		Motor #2	0.0000

PARITY A		MOTOR A2	MOTOR A1
<< RCW	< RCW	LCW >	LCW >>

Elevation

92.813530

Elevati...	92.81...	11.03...	81.78...
Velocity	0.0000		
Current	0.0000	Motor ...	0.0000
		Motor ...	0.0000

MOTOR E1	MOTOR E2		PARITY E
<< LIMIT	< LIMIT	LIMIT >	LIMIT >>

DGTL POS **COMP CTL** MTR TEMP INPT BRK DC TEMP CIRC BRK FIELD STOW PIN E STOP MODE PAR