

EVLA

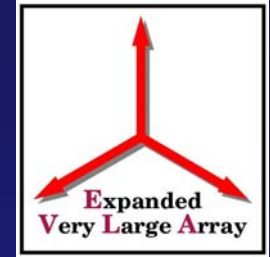
Advisory Committee Meeting

System Status

Jim Jackson, Hardware Systems Engineer



System Status Overview

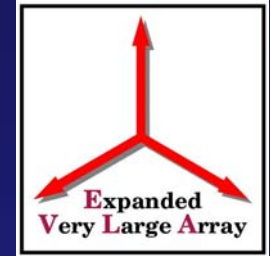


- December 2004 Advisory Committee report
- Antenna status
 - Antenna 13, 14, 16, 18, 24 and 26
- Electronics status
 - Currently in or ready for production
 - Nearing production
 - On-going issues
- Front-end status
 - On-going issues
- Other system highlights



System Status

Responses to 12/04 Adv Comm.

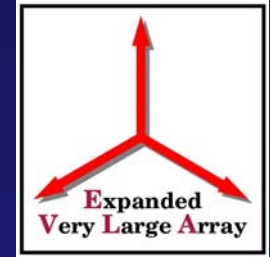


- Solar Headroom
 - No change from last year – passed System, LO/IF and Front-End CDRs
 - Design is result of consultation w/ NRAO solar astronomer Tim Bastian
 - Could be target for descoping
- Polarization
 - EVLA polarization performance is good – Rick Perley will discuss
 - Mixed polarization performance is transition issue
 - Committee recommended not diverting effort for this
 - Circular vs. Linear – would make VLA > EVLA transition extremely difficult
- Data Transmission System (DTS) status
 - New formatter and 8-bit digitizer complete
 - DTS is working well and is in production
 - 3-Bit digitizer options under development
 - DTS module built to accommodate 3-bit digitizer assembly



System Status

Responses to 12/04 Adv Comm.

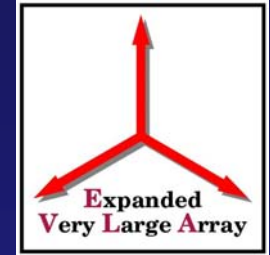


- Provide capability for redundant LO systems in test racks
 - Completed and in use
- Test LNA's with EVLA feeds before production purchase
 - Feed design shouldn't affect amplifier performance
 - Preliminary testing shows there is no problem
- L-Band Orthomode Transducer (OMT)
 - RF performance excellent
 - Issues with noise and cooling
 - Issues with manufacturability



System Status

Antennas

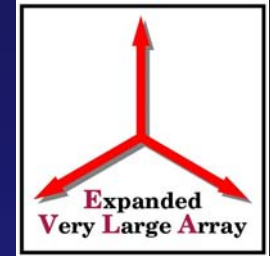


- Antennas 13, 14 and 16
 - Turned over to operations for initial scientific use
 - L,C,X,K and Q bands available with 4 IF's
 - 4/P bands available on antenna 14
 - Temporary band switching arrangement
 - No Automatic Level Control (ALC) – will add soon
 - Antennas 13 has production LO hardware
 - Antennas 14 and 16 have prototype LO hardware
 - Software compatible, retrofit Mid CY 2007
 - Tests and evaluation on-going
 - Scientists being encouraged to use antennas in observations



System Status

Antennas

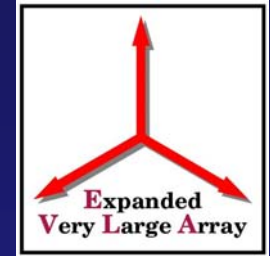


- Antenna 18
 - Operating since Mid-March w/ 2 IF's at X-band
 - Fringes obtained within minutes of first power-up
 - X band now available w/ 4 IF's
 - 4,P,L,C and K bands available mid May
 - Mostly production hardware
 - Temporary test bed for updated hardware
 - New L302 10.8-14.8 GHz synthesizer firmware
 - M301 converter interface for band switching
 - T301 with updated RF Board
 - T304 baseband converter with ALC
 - Caused minor delay in outfitting
 - Turn over to operations likely in early June



System Status

Antennas

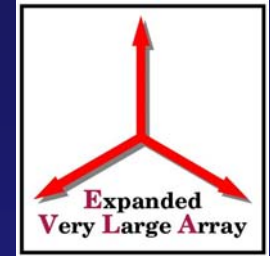


- Antenna 24
 - Outfitting electronics now
 - First fringes expected mid May
 - M302/M303 utility modules will be added
- Antenna 26
 - In barn for azimuth bearing change
 - VLA electronics stripped
 - EVLA refit to begin by 1 June



System Status

Electronics



Electronics currently in (or ready for) production

- D301-4 DTS Module – excluding 3-bit digitizer PCB
- D351 DTS De-formatter
- F320 Front End Transition Module
- L300 Synthesizer Reference Generator
- L301 12-20 GHz Synthesizer
- L304 LO Reference Receiver
- L305 / L350 Reference Generators
- L351 Offset Generator
- L354 LO Driver
- L355 Digital Timing Distributor
- M304 Module ID
- P301/302 DC/DC Power Supplies
- T302 LSC Converter
- T303 UX Converter
- T305 Baseband Converter - Digital
- -48 VDC Power System
- Front End Card Cage
- Main Shielded Equipment Racks

Represents:

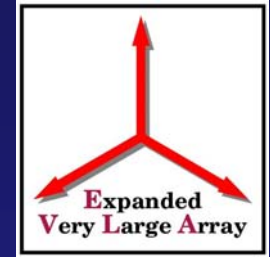
68% of Antenna Electronics

80% of Central Electronics



System Status

Electronics



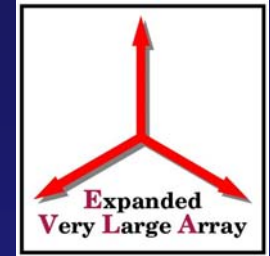
Modules in final design – ready for production by 1 July 2006

- F317 Front End Controller
- L353 LO Transmitter
 - Motherboard to integrate design
- M301 Converter Interface
- M302/M303 Utility Modules
- P350/P351 DC/DC power supply
 - PCB Mod to support N+1 redundancy
- Power Dist. Board for Central LO
- T301 4/P Converter
 - Corrects 1024 MHz Isolation Issue on RF PCB
 - Solar Attenuator PCB to be developed
 - module can be produced without this PCB
- In final testing
- PCB Revision
- In final testing
- In final testing
- PCB Revision
- New PCB Design
- PCB Revision



System Status

Electronics



Modules in final design – ready for production by 1 July 2006

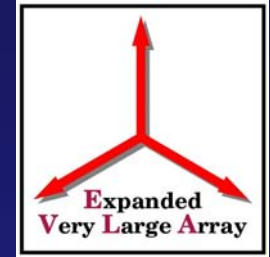
- T304 Baseband Converter
 - New Total Power Detectors
 - New Filter Arrangement
 - L302 10.8-14.8 GHz Synthesizer
 - New MIB / DDS FPGA firmware developed
 - Updated units being tested in Antenna 18
- In final testing
- In final testing

Represents: 27% of antenna electronics, 20% of central electronics



System Status

Electronics – On-going Issues



L352 LO Round Trip Phase Meter

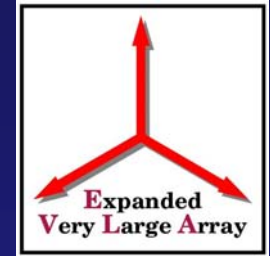
- Issues with thermal stability
- Issues with measurement repeatability
- Affects use of higher frequency bands
- New PCB's developed – integrated motherboard
- New design being tested in system

- Low risk
- High priority



System Status

Electronics – On-going Issues

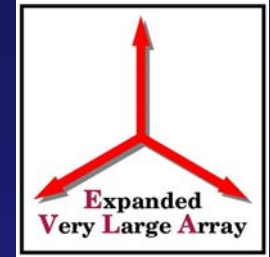


- 3-Bit digitizer for DTS
 - Two design options
 - Comparable cost
 - 3 bit / 4 Gbps device being designed for ALMA
 - IC and PCB's in development at University of Bordeaux, France
 - Some possible issues with design and performance for EVLA
 - 6 bit / 4 Gbps COTS device from Rockwell
 - IC now available
 - PCB in development at NRAO Socorro
 - Still supplies 3-bits to correlator
 - Additional bits provide flexibility and over-range indication
 - Challenging design – very high speed PCB's (4 GHz clock)
 - Can tolerate some delay
 - Considerable EVLA capability with 8-bit device
 - WIDAR Correlator checkout does not require 3-Bit Digitizer
- Moderate Technical Risk
- Moderate Priority



System Status

Electronics – On-going Issues

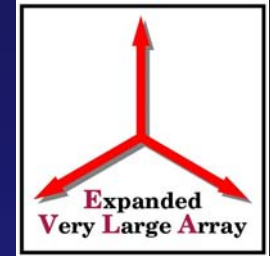


- Network timing – Low Risk / High Priority
 - Current scheme utilizing NTP timing not working well
 - Causing jumps in time as seen by MIB's in L302 synthesizer
 - Researching GPS time servers to connect to M&C network at VLA
 - Currently affecting test and scientific data



System Status

Front-Ends



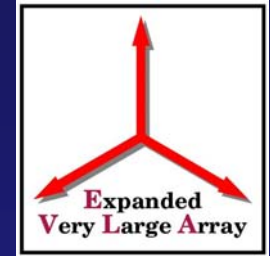
Front Ends

- 4 Band
 - Complete – Using existing VLA receiver
- P-Band
 - Mostly complete – Using existing VLA receiver
 - Modification required to stop LNA oscillations in S,C and X-Bands
- L-Band
 - Horn complete and in production
 - Prototype OMT and receiver in lab testing – issues as mentioned
 - Balanced amps from CDL in use on existing and prototype receivers
- S-Band
 - Half scale feed horn built and currently being tested
 - Receiver to be developed, CDL wideband amps now available
 - Wideband OMT awaiting L-Band results – S-Band will use scaled down version
- C-Band
 - Horn complete and in production
 - Interim receiver in production (final receiver minus wideband OMT)
 - OMT design complete - Awaiting L-Band results – C-Band will use scaled down version



System Status

Front-Ends



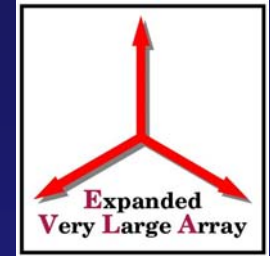
Front Ends

- X Band
 - Currently using existing VLA receiver
 - New X-Band will be last to be developed – funding permitting
- Ku-Band
 - New feed Horn to be developed
 - New Receiver to be developed – will be based on K-Band design
- K-Band
 - Using Existing VLA Feed and Receiver
 - Added block converter and modified LO/IF chain
 - In production
- Ka-Band
 - Horn in production
 - Receiver development underway
- Q-Band
 - Using Existing VLA feed and receiver
 - New MIMIC post amp and block converter



System Status

Front-Ends – On-going Issues

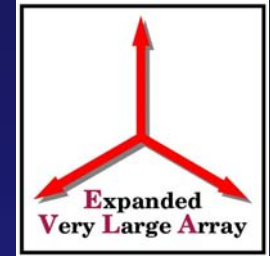


- L-Band Ortho-Mode Transducer – High Risk / High Priority
 - Reviewed in recent Front-Ends CDR
 - RF performance excellent
 - Progress slower than expected
 - Affects availability of wideband L-Band receiver
 - Also delays S-Band and C-Band – based on same design
 - Delaying Front-end group progress on Ku/Ka band receivers
 - Difficult to build, assemble and test
 - Size and weight – difficult to maneuver
 - Problems with cooling
 - May need to find new materials / fabrication techniques



System Status

Other System Highlights



- New shielded room for WIDAR correlator installed & RFI tested
 - Flooring, alarms and utilities being completed now
 - Will be ready well in advance of WIDAR correlator delivery
- Cryogenic compressors & Scott-T boxes in production
- Antenna HVAC systems purchased
- Feed cone assembly in production
- Azimuth fiber cable wrap in production
- All fiber optic cable in the ground
- Fiber optic termination room complete
- Control building fiber M&C networking in place



Questions?

