



Backend System Requirements

System Requirements Specification

EVLA Correlator Backend

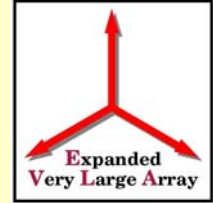
Project Document A25251N0000

Revision 2.0

May 10, 2002



Assumptions



- Correlator Handles Packetization of Lag Frames
- Lag Frames Will Not Necessarily Arrive in Lag Set Order
- Lag Frame Delivery a One-Time Shot
- Lag Set Length Always Power of 2
- Timely Delivery of Indirect Data
- e2e Capable of Handling Output Rates and Volumes



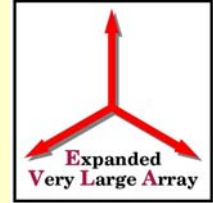
Constraints



-
- Critical Component in the Astronomical Data Path
 - Operations Performed Shall be Reversible
 - Performance Limits Set by Technology and Budget



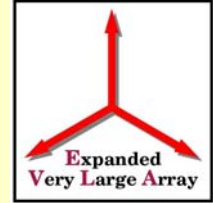
Input Data



-
- Lag Frames
 - State Counts
 - Data Valids
 - Meta-data
 - Observational Mode
 - Data Processing Parameters
 - Status Requests



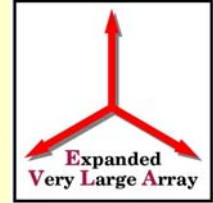
Output Data



-
- Formatted Observational Output
 - Status Reports
 - Error Reports
 - Warning Reports
 - Failure Reports
 - Recovery Reports



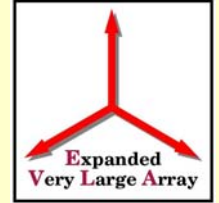
Correlator Interface



- Receive Lag Frame Data Packets
- All Backend Processors Have Paths to All Correlator Outputs
- Sufficient Bandwidth to Meet Performance Requirement
- All Frames For Same Baseline Routed to Same BE Processor



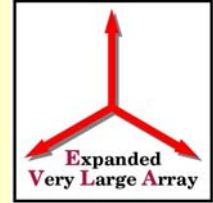
Monitor & Control Interface



-
- Receive Non-Lag Frame Data
 - Receive Status and Queries
 - Send Query Responses and Internally Generated Messages



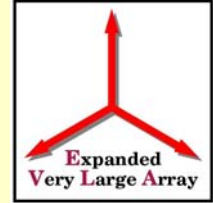
End-to-End Interface



- Transfer Formatted Data
- All Backend Processors Have a Path to the e2e System
- Sufficient Bandwidth to Meet Performance Requirement



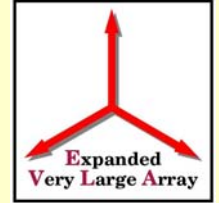
Data Processing



- Lag Set Assembly
- Normalization
- Coarse Quantization Correction
- Time Stamp Adjustment
- Interference Removal/Reduction
- Windowing
- Fourier Transform
- Integration
- Output Formatting



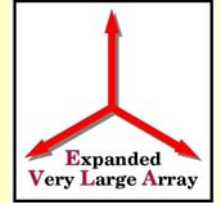
Internal Monitor and Control



- No User Interface of Its Own
- Respond to Outside Queries
- Selectable Internal Test Modes
- Self Monitoring
- Self Recovery
- Problem Reporting



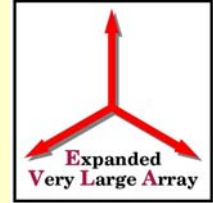
Performance



-
- Maximum Aggregate Input Rate of 1.6 Gbytes/sec
 - Maximum Aggregate Output Rate of 25 Mbytes/sec



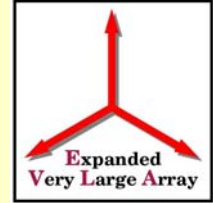
Reliability



-
- Detect and Recover From Processor Failures
 - Detect and Recover From Process Failures
 - Detect and Recover From Internal Network Failures
 - No Total System Reboots Between Maintenance Windows (Goal)



Scalability



- Total System Extensible to Higher Rates of Input, Output, and Data Processing
- Hardware Extensible in a Manner That is Transparent to Software and Vice Versa
- Upgrades Meet Seamlessly With Unchanged Components