Backend System Requirements

System Requirements Specification
EVLA Correlator Backend
Project Document A25251N0000
Revision 2.0
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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