Correlator Backend Computing

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EVLA Computing
WIDAR Correlator

- 160 data pipes from the baseline boards
- Potential for > 1 gigabyte per second data rate per pipe
- Hardware performance is “fixed” upon delivery

Backend Computer Configuration

- Probably a loosely coupled cluster to handle data rates
- Use COTS computers to reduce costs
- Keep hardware upgrade path flexible to adapt to new technologies
Goals

• Decouple backend computing from the correlator hardware
• Design correlator data pipes with future COTS systems in mind and build for best data rates
• Provide ability to direct data pipes into arbitrary backend computing topology
• Design backend computing topology with near real time self healing capability
Correlator Hardware Decoupling

- Use industry standard protocols and media
  - Fast, Gigabit, and 10 Gigabit Ethernet, InfiniBand, SONET
  - Fiber Optics, Copper, ....
- Have ability to tailor protocol as back end computing scales with technology
  - Use Fast Ethernet until cost of Gigabit Ethernet hardware becomes affordable
  - Use parallel data pipes or single firehose to scale data rates.
  - “Wrap” data frames so data can be sent in packets (i.e. UDP packets)
- Allow for hardware design to be “set” now and allow backend computing hardware decisions to be deferred until later
Backend Computing Topology

• Use packet switching devices so arbitrary data flow connects can be made
• Have computer “hot spares” available for alternative parallel data processing and near real time swapping with failed systems
• Allow arbitrary paths for data dumping to short term storage (disks), long term storage (archive), or real time image pipelines (or all three).
• Upgrade hardware as new technology becomes available or data rate needs increase
• Allow for a small number of high speed computers or a large number of “throw-away” computers (or both)