

Data Transport & Routing Workpackage

MWA/LFD Kickoff Meeting

Roger Cappallo

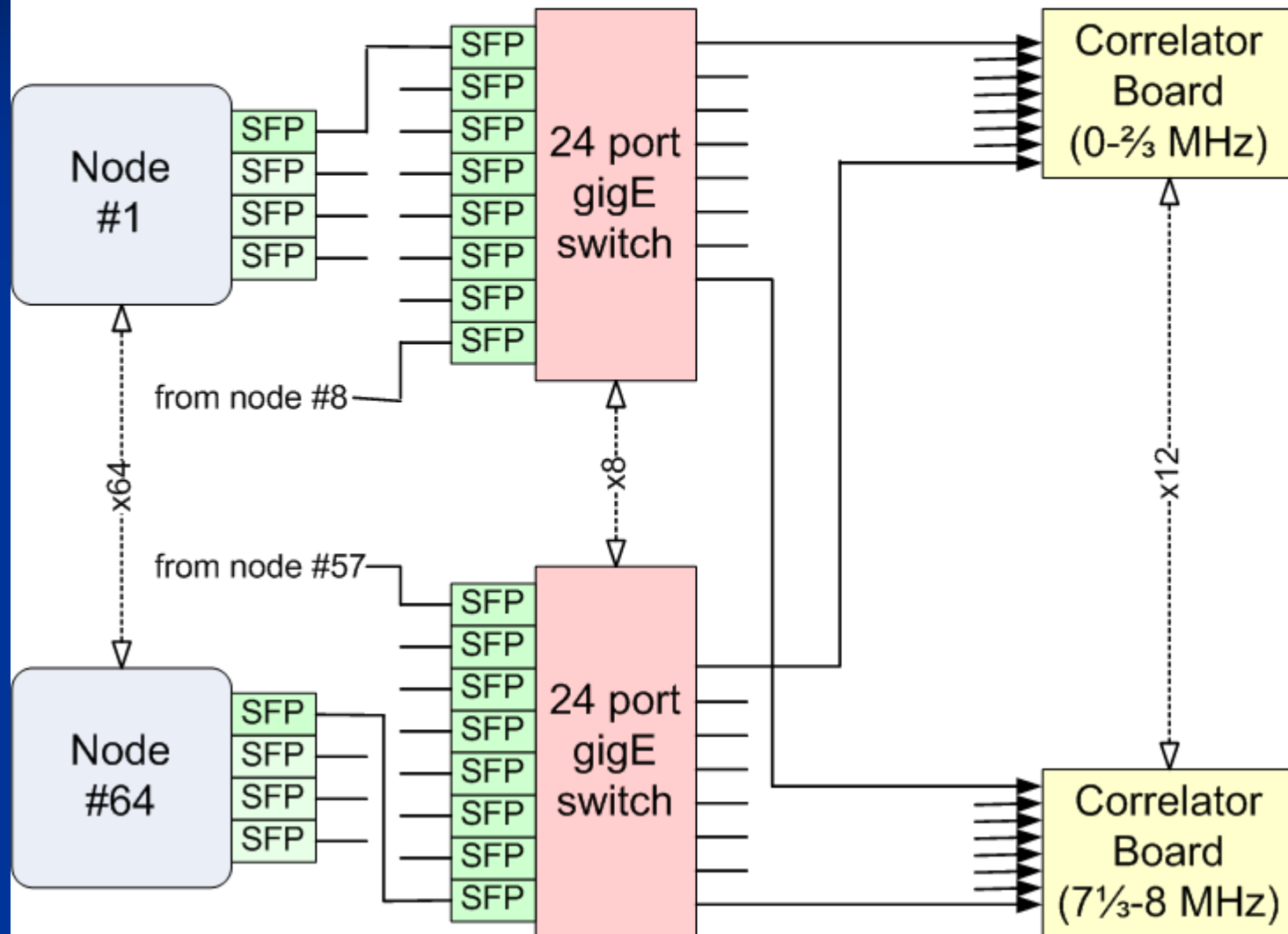
2006.6.5

DTR Layer Functionality

- Prepare, re-order, address, and transmit node packets to appropriate correlator slice
- Transport packets over ≤ 10 km of fiber
- Aggregate, re-route, and deliver packets to correlator boards
- Distribute M&C commands and responses to/from nodes and processing center equipment

Transport Layer & Routing Network

8 MHz slice



Relevant Science Specifications

- 32 MHz processed (& therefore transported) bandwidth

Data Packetization & Reordering

- Within digital receiver packets start out as 4K frequencies, for each antenna for each time: *taf* order
- At the correlator products are formed and summed over ~ 512 samples for each antenna pair independently for each frequency channel: *fat* order
- cube rotation could be distributed, but probably will be done in the digital receiver
- packets are less than 1500 or 9000 bytes (jumbo), and need to have tcp/ip framing which includes MAC address of target correlator board

Current State of Design

- Choice of gigabit Ethernet
- Architectural description of packet break-down and re-ordering upon transmission
- Identification of candidate commercial switches and transceivers that are affordable & *appear* to meet specs

Significant Issues

- Technology: is gigE still the best choice at time of purchase, or has 10 gigE become affordable (switch & transceiver cost)?
- Network performance – how heavily loaded can links be without catastrophic traffic jams?
- Will multiple layers of switching cause a propensity for catastrophic jams?
- Choice of fiber given the array topology
- Can M&C data be asynchronously interspersed with the 256 Gb/s flow from the nodes without adversely affecting performance?

Needed Skills for Workpackage

- Systems engineering – to make choices about how and where to partition the data stream
- Network engineering – to make performance tests, choices of hardware and fiber
- Software engineering – to code a meaningful scale test of the array data flow

Interface areas

- At the nodes: physical interface probably at the SFP socket, but there is an architectural gray area in the packet preparation, reordering, and addressing (specified by DTRL, but implemented by the Digital Receiver WP)
- At the correlator: again a physical interface at the gigE (copper) socket, but close coordination with the correlator team is needed
- M&C: to manage & monitor data flow

Dependencies on other subsystems

- Fiber choices depend on infrastructure (e.g. trenching)
- Transceiver choices depend on array layout, central facility location
 - SX: < 550 m, multimode fiber, \$100-200
 - LX: < 10 km, single mode, \$200-300
 - ZX: < 70 km, single mode, \$500