



# ArgonCube2x2 Networking and Computing Planning

Geoff Savage

ArgonCube2x2 Electronics and Readout Integration

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# Getting Started

- Planning for computing and networking part of electronics integration
  - Follow the planning process defined by Linda B.
  - Develop rack builds that identify number of network connections and power requirements
  - Also need an estimate of data rates
- Computing
  - Fermilab Linux system administrators provide support
  - Assist with computer purchases
  - Purchase computers from a local company (KOI Computers)
    - Ensure hardware support personnel has Minos underground training
    - Extend warranty to 5 years
- Networking
  - Fermilab networking group provides support
  - We outline our needs and they develop a plan
  - Integrate with other needs in Minos underground area
  - Experiment pays for hardware and yearly support
  - Fermilab installs and manages

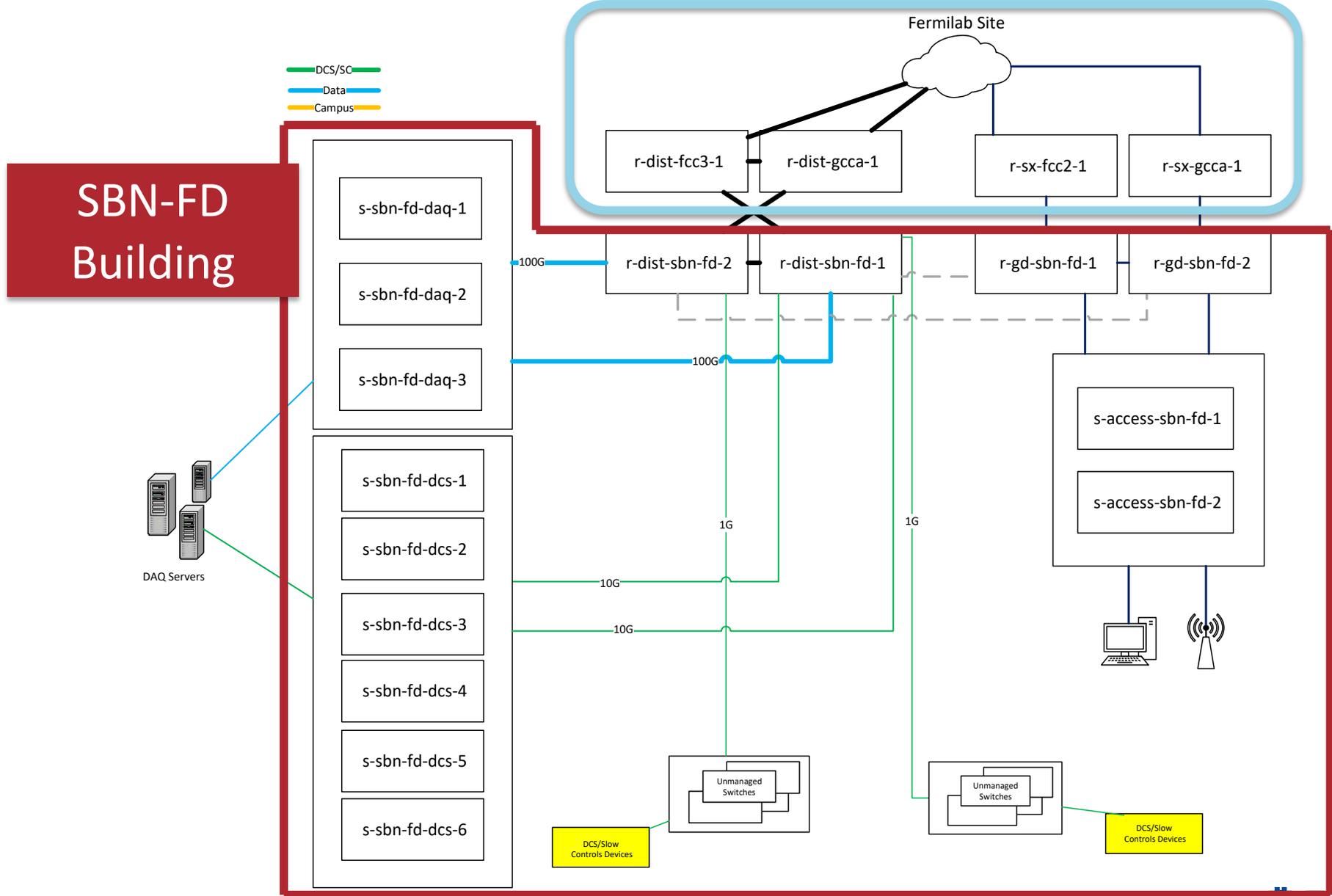
# Considerations

- Experiment vs Test Stand
- How much down time is acceptable when running?
  - Determines level of redundancy
- Reuse of old computers (Minerva computers are 4U)
- Data rates? 1Gb, 10Gb, 40Gb, 100Gb network links
- Computers do best in a computing rack, not a relay rack
- Computer security
  - Private networks for unkerberized network devices
  - Gateway computers for OS security updates
- Electrical isolation
  - Network switch for computers on building ground
  - A different network switch for electronics on detector ground
  - All network switches have fiber uplinks
- Flexibility and expansion
- Minimize equipment purchases and connections
  - Network switches and computers

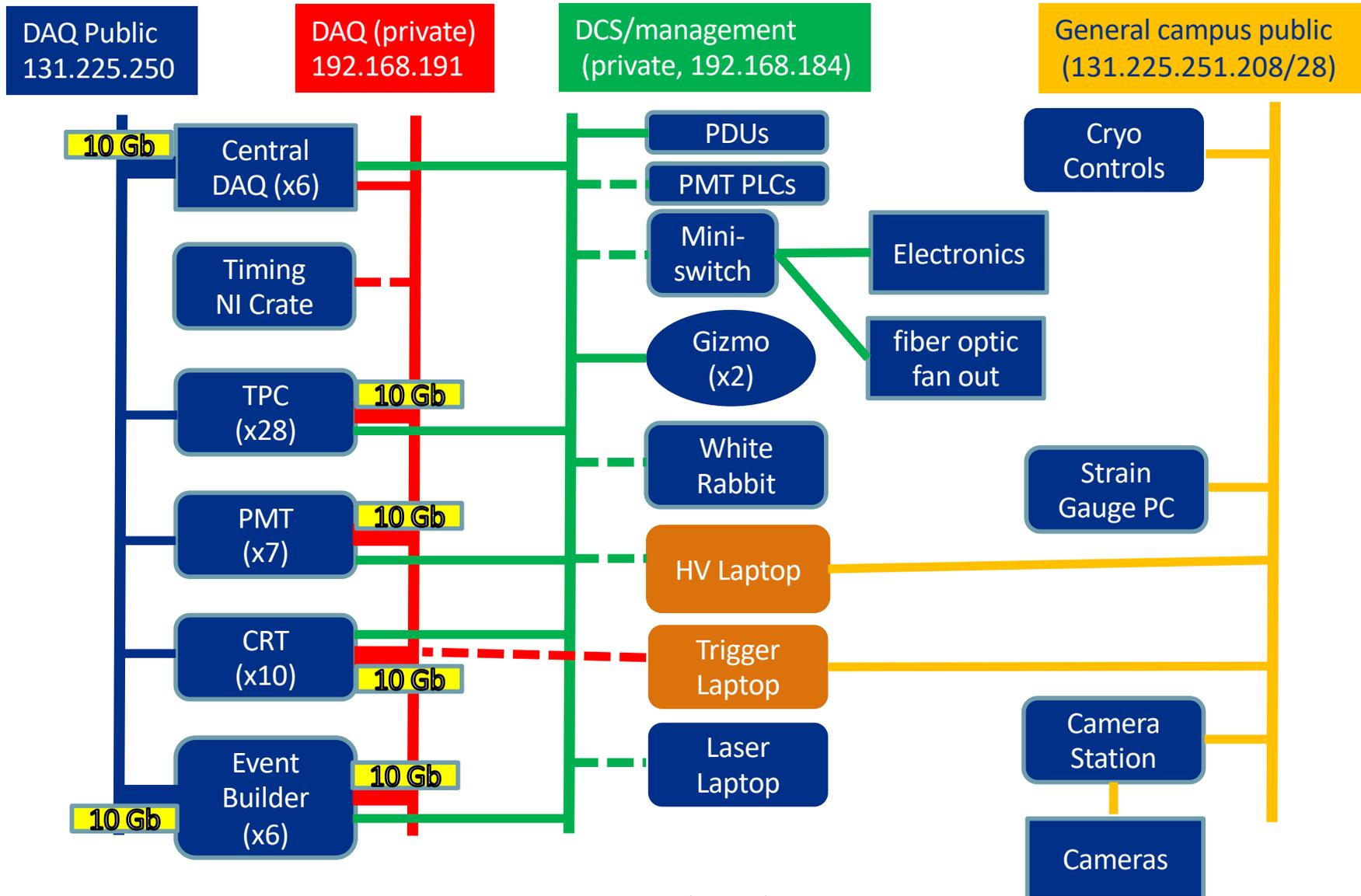
# Computers

- Core servers
  - gateway
    - Updated ~60 days
    - DAQ computers can be upgraded on the experiment schedule
  - file server
  - database
- DAQ (artDAQ)
  - Event builder (needs data disks)
  - Board reader
- Raid 10 disk arrays - usable disk size is  $\frac{1}{2}$ 
  - Fermilab services for file servers and database (Test beam does this)
  - Combine functionality
- Number of network interface cards and usb ports in each computer

# ICARUS Network Architecture



# ICARUS Online Computing



Each vertical bar is a subnet (vlan).

# SBN – ICARUS and SBND

- Gateways (x2) = \$2.25k/each
- File server (x2), db server (x2) = \$5k/each
- Event builder (x6) = \$11.3k/each
- Board readers (x35, x11) = \$2.5k/each
- Router with 48 SFP - \$16k
- Switch with 48 copper 10 Gb - \$10k
- Switch with 48 copper 1 Gb - \$3k

# Summary

- This is the first of many conversations on these topics.
- Open tickets with Fermilab sys admins and networking
- Collect requirements
  - Rack builds
  - Data rates
- No artDAQ installation has been attempted without significant support from the artDAQ team, they should also be included in these discussions