Fermilab U.S. DEPARTMENT OF ENERGY | Office of Science

2x2 Network and Computing Status

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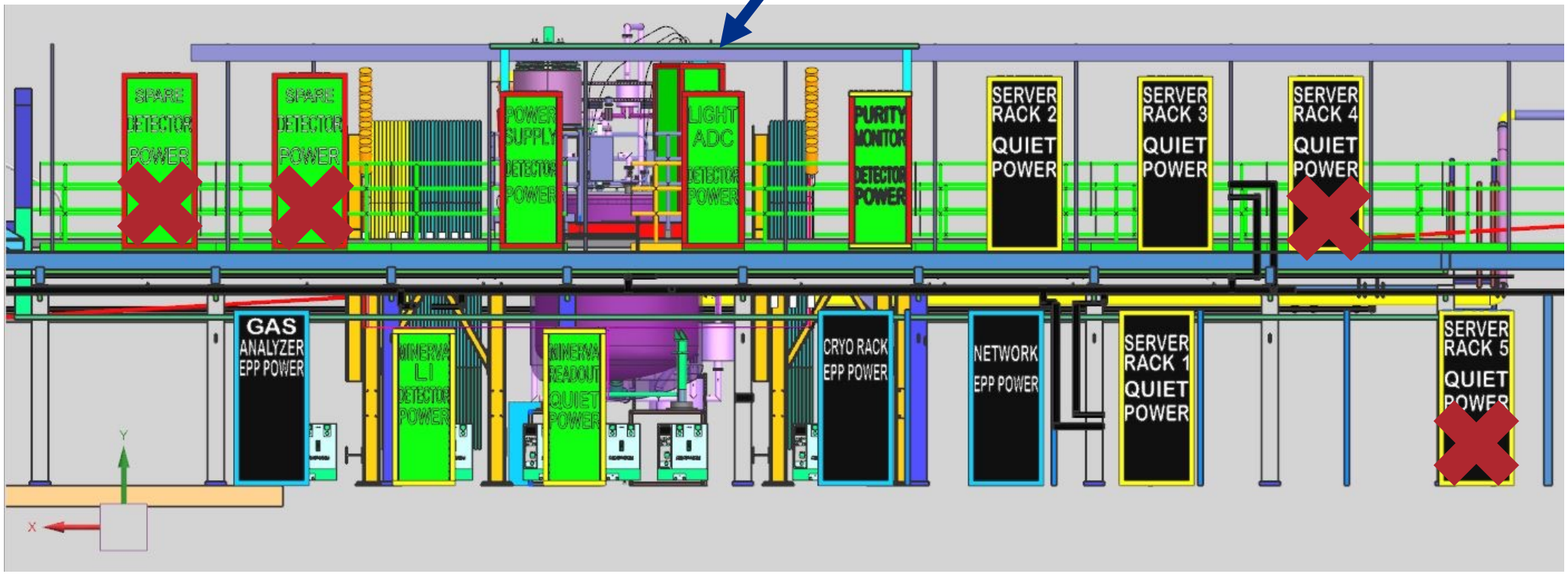
2x2 Rack Locations – Final???

← Beam Direction

2x2 Rack Locations

Platform rack hidden behind light adc rack in this view.

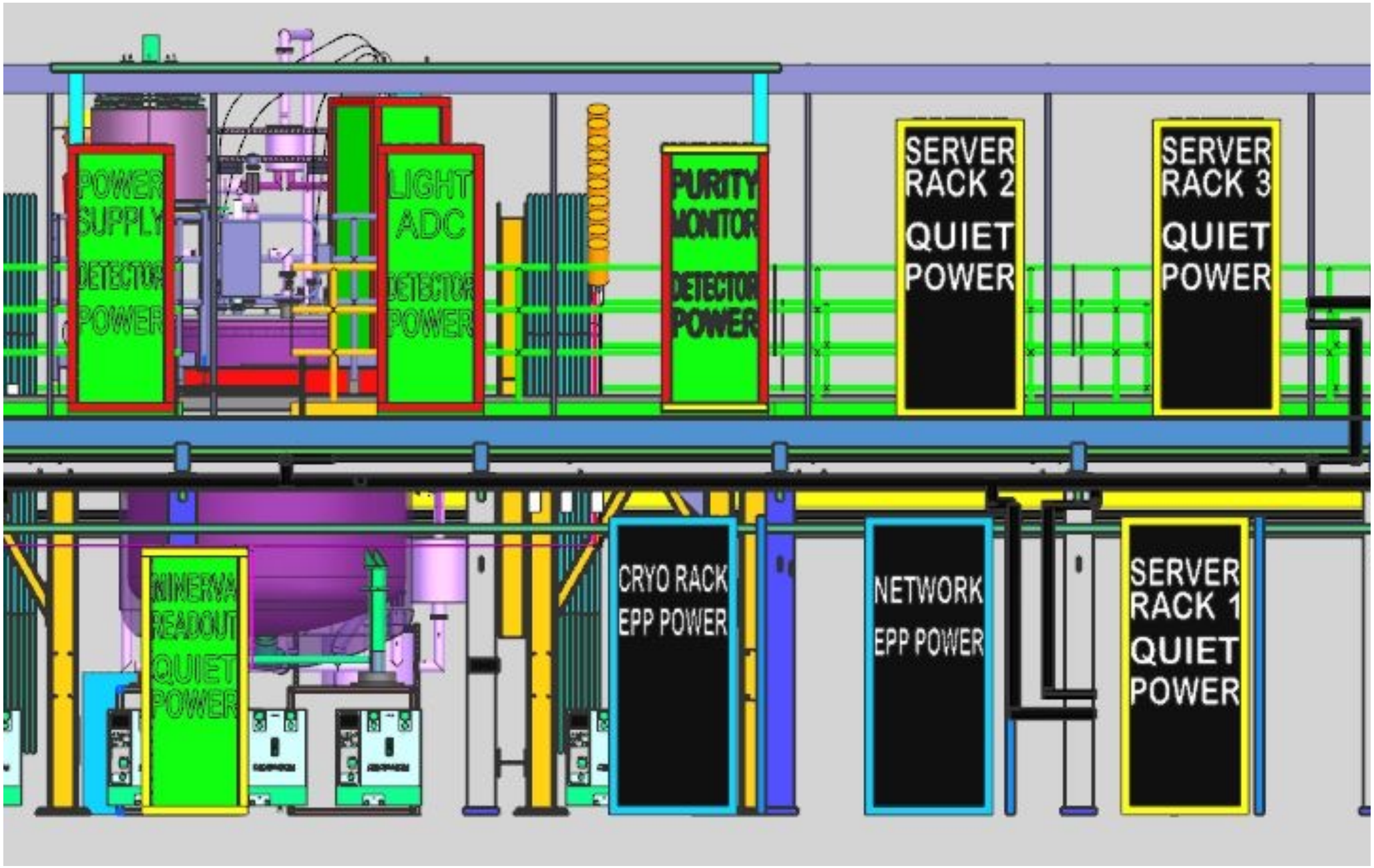


← Beam Direction

Not all racks in the image are scheduled to be installed for the initial phase of 2x2.

Rack List

- Electronics
  - Purity Monitor
  - Light ADC
  - Power Supply
  - HV Filter and Light VGA (on platform)
- Server Racks
  - Server 1,2,3 for 14 Linux servers
    - Server 1 rack – 48-port 1 Gb copper switch for all Linux servers
    - Server 2+3 racks have no network switches
  - Server 4+5 racks are for expansion if needed
    - Electrical outlets will be installed but not used right away
- Network rack
  - Main switch (router) – 48 port SFP+
- Cryo rack
- Minerva
  - Light Injection (LI)
  - Readout



← Beam Direction

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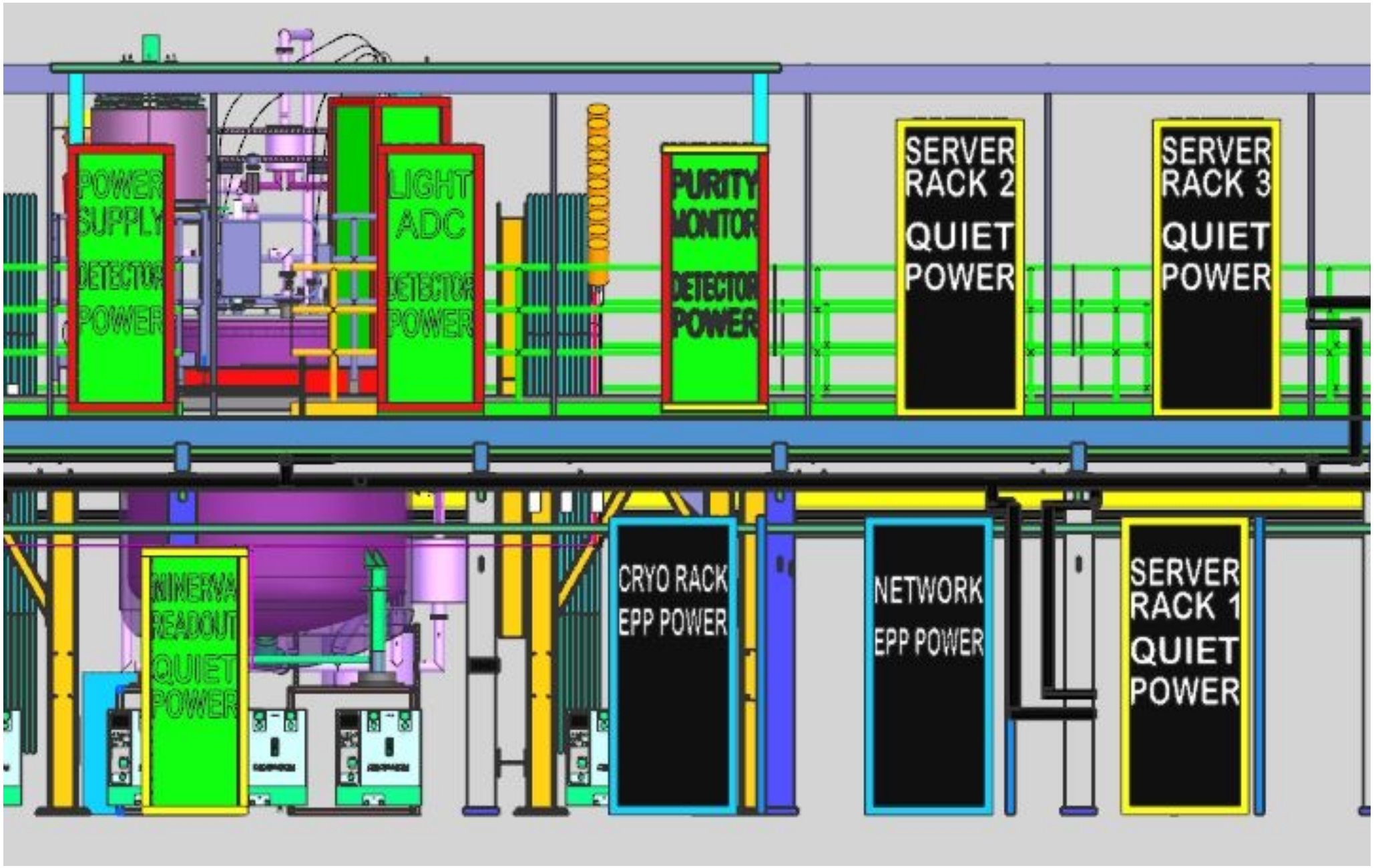

← Beam Direction

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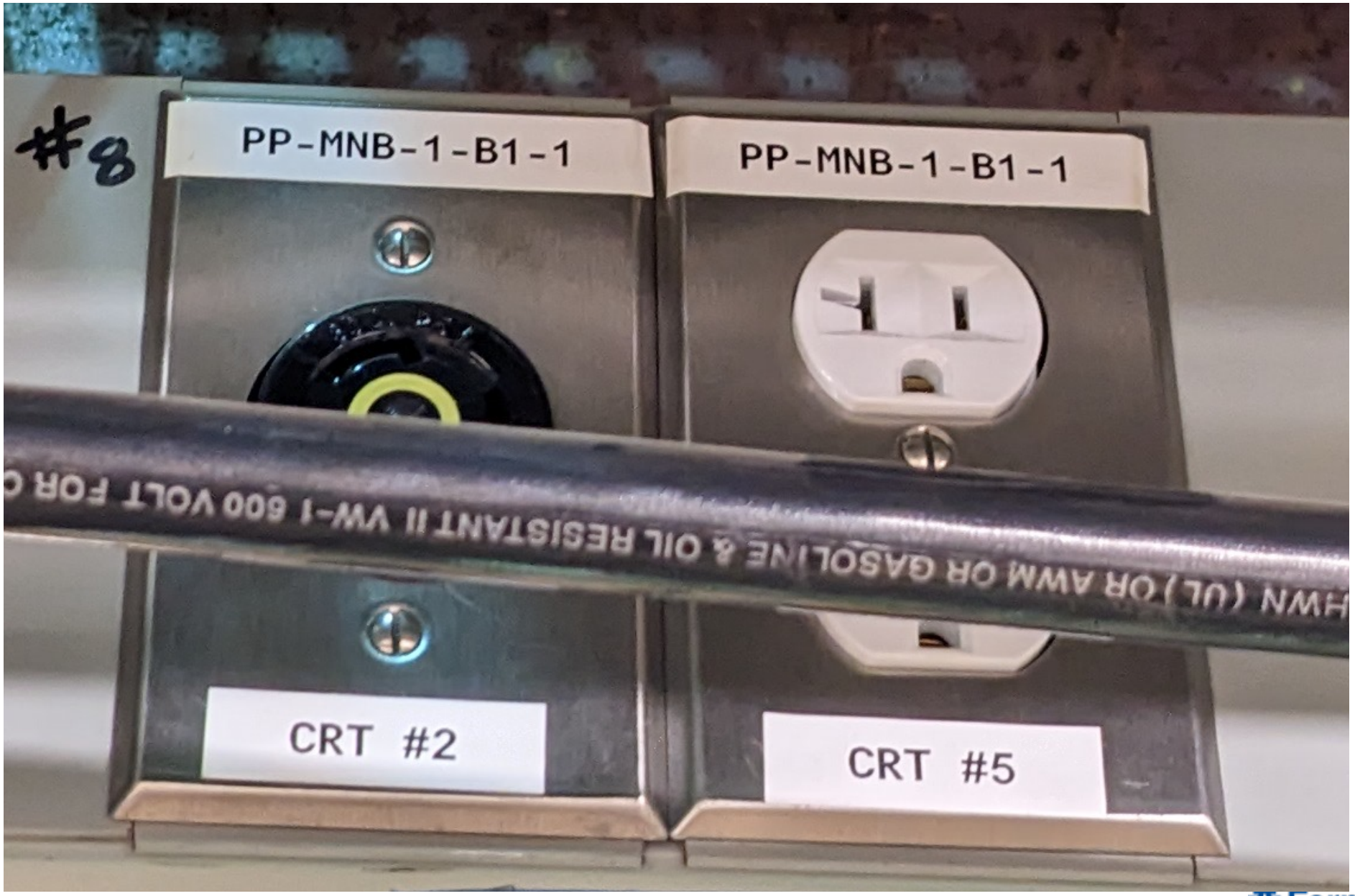
Upper Wire Way Outlets

L6-20-R Outlet
not 30A

Outlets Over Network Rack



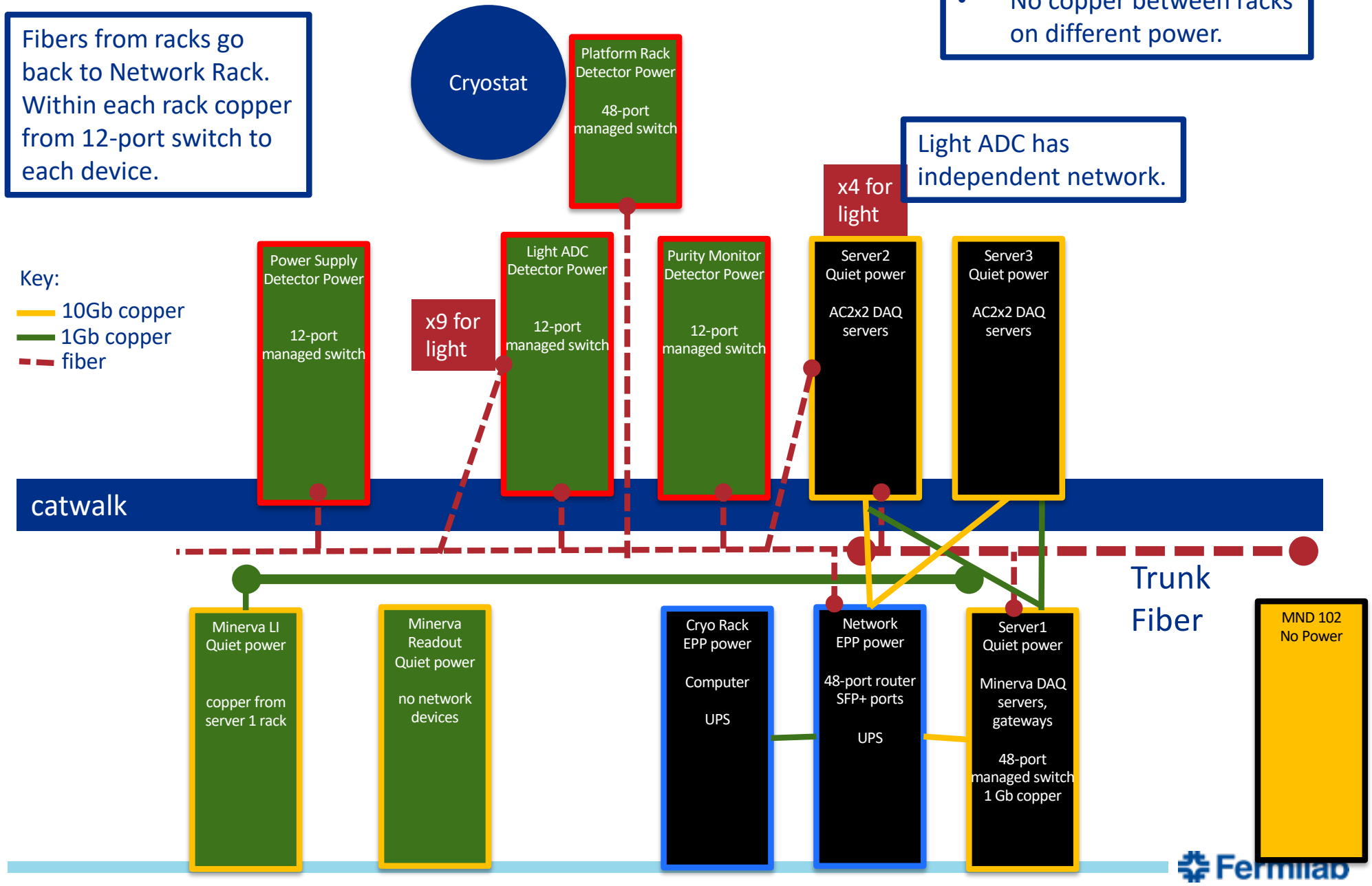
Overview

- Minerva readout is working (Server 1 rack)
  - Two gateway servers
  - Two DAQ servers – connect to Minerva VME readout crate
  - 24-port network switch installed in server 1 rack (borrowed)
  - Network fuse panels in Minerva LI rack are on the network
- 2x2 Networking
  - Switches are here
    - Ordered 17-Oct-2022
    - PO 693151
  - Most cabling is in hand
    - RITM1635011 - Cabling for 2x2 demonstrator network installation in Minos underground
    - What we are missing has been ordered by Networking
  - Transceivers are available
  - Installation
    - Only have power for the Network and Server 1 racks
    - Requested installation of the router and 1 Gb switch sometime in the the first two weeks of June
    - Not sure of the status with the safety stand down and illness of group leader
- 2x2 Computing
  - Servers are on site
  - 2x2 DAQ (5) – 4 DAQ and 1 slow controls
  - Minerva DAQ (3) – One used for nearline
  - Operations (4) – new gateways and remote desktops
  - Already have two gateways installed in Server 1 rack

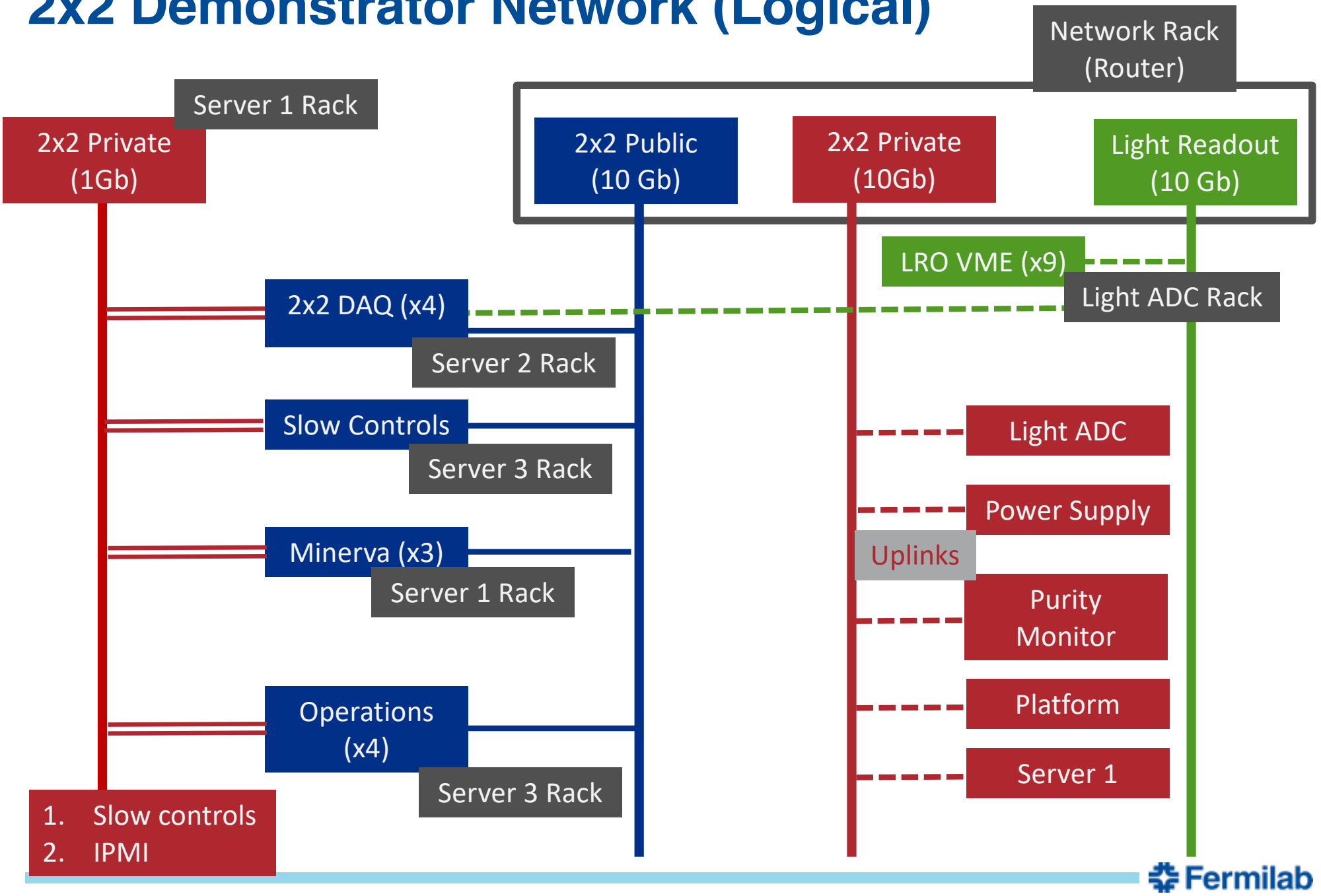
Cabling (not to scale)

Fibers from racks go back to Network Rack. Within each rack copper from 12-port switch to each device.

Electrical Requirements:
- Fiber separates grounds.
- No copper between racks on different power.



2x2 Demonstrator Network (Logical)



Tasks

- Phase 1
  - Limited AC power – Network rack and Server 1 rack
  - In the short term install the router in the network rack and the 1Gb switch in the Server 1 rack
  - New Minerva DAQ servers in the Server 1 rack
- pORC for each rack
  - Partial Operational Readiness Clearance (for one rack)
  - Network
  - Server 1 (updated)
- I'm working with Linda on the rack protection and UPS for the network rack.
  - In the short term we can connect the network switches directly to the duplex outlets in the wire way to get the network equipment installation started.
- Develop a plan to install the new Minerva DAQ servers in the Server 1 rack while keeping the Minerva readout working.
  - New servers will have a different operating system.
  - Phased approach?

Linux Server Purchase Goals

- Support the software used at Bern for module testing
  - High disk write rates during testing light readout
- Modernize Minerva readout servers
- Computing for underground operations
- Eventually support DUNEDAQ but not immediately
- Some servers not included locally
  - Network file system servers
  - Database servers
  - Use NFS and DB from Fermilab central services

2x2 DAQ Server

- CPU = AMD, mid-range, single socket, 32 cores
- RAM = 128GB
- Mirrored system disks
- ~20TB Hardware RAID10
- Quad 10GB copper
- Dual 10GB SFP+ - for light readout
- Fully unlocked IPMI features
- 5 year warranty
- Dual power supplies
- Works with latest version of Fermi Linux
- Count = 5
  - 4 2x2 DAQ
  - 1 Bern slow controls
- Test all 4 modules at the same time

Minerva DAQ Server

- CPU = mid-range, single socket, 16 cores
- RAM = 64GB
- Mirrored system disks
- ~20TB Hardware RAID 10
- Quad 10GB copper
- PCI 32 bit 33 MHz for CAEN A2818 card (5V or 3.3V)
  - https://www.caen.it/products/a2818/
  - Mechanical – half size form factor, 106.65 mm x 167.65 mm (HxL)
- Serial port
- Fully unlocked IPMI features
- 5 year warranty
- Dual power supplies
- Works with latest version of Fermi Linux
- Count = 3
  - 1 DAQ
  - 1 Nearline
  - 1 DAQ/nearline spare

Operations Server

- CPU = AMD, mid-range, single socket, 16 cores
- RAM = 64 GB
- Mirrored system disks
- Quad 10GB copper
- Fully unlocked IPMI features
- 5 year warranty
- Dual power supplies
- Works with latest version of Fermi Linux
- Count = 4
  - 2 gateways
  - 2 operations and ignition

Space In HV Filter / Light VGA rack

- This rack is on the platform
- Distance from the platform surface to the top of the cryostat is ~13 inches (see picture in next slide)
- Front of the rack faces the cryostat to minimize cable distances
  - I don't remember which cables
- What is the distance from the cryostat to the front of the rack in a birds eye view?
- Looks like the space for a 48-port network switch in this rack falls below the level of the cryostat top and will not be accessible
  - 1U for switch
  - 1U for cable management
- Reviewed the situation with Jack and Tom last Friday at LArTF
- Can the rack be supported above the platform with a riser?
  - Stability
  - Interference with crane
  - Interference with ???

Distance from Platform to Cryostat Top = 13 inches