

5 Year Network Modernization Plan

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What am I talking about

- 5 Year Project to enhance networking capabilities at Argonne National Laboratory
- Overview of the issues
- Pictures of the issues
- Why we got the money
- Make the plan
- Implement the plan



Who Am I?

- Christopher Poetzel
 - Network/Security Engineer
 - CCNA, CCNA Security
- University of Wisconsin-Madison (Go Badgers)
 - BS Computer Science 2001
- Father of 1 (1.5 year old boy)
- Teacher of Many
 - Adjunct Professor at College of Dupage, Glen Ellyn IL
 - Cisco Certifications
- Technology is great but ultimately doesn't compare to Mother Nature
 - Enchanted Rock State Park, Jan 12
 - Outside of Austin, TX



Argonne National Laboratory - Department of Energy Lemont, IL

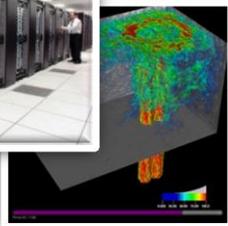
Laboratory Environment



- Founded 1946
- 25 Miles Southwest of Chicago
- 1,700 acres
- ~150 buildings
 - Average age 20+ years
- Diverse population:
 - 2500 employees
 - 10,000+ visitors annually
 - Off-site computer users
 - Foreign national employees, users, and collaborators
- Diverse funding:
 - Not every computer is a DOE computer.
 - IT is funded in many ways.



Emphasis on the Synergies of Multi-Program Science, Engineering & Applications



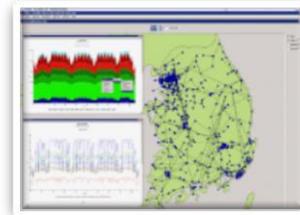
Computational Science



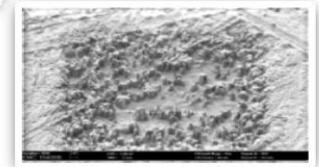
Accelerator Research



Fundamental Physics



Infrastructure Analysis



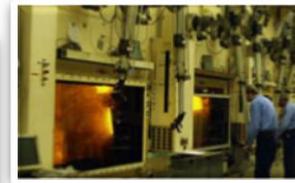
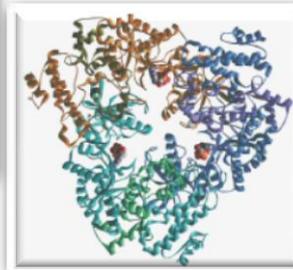
Materials Characterization



Catalysis Science



User Facilities



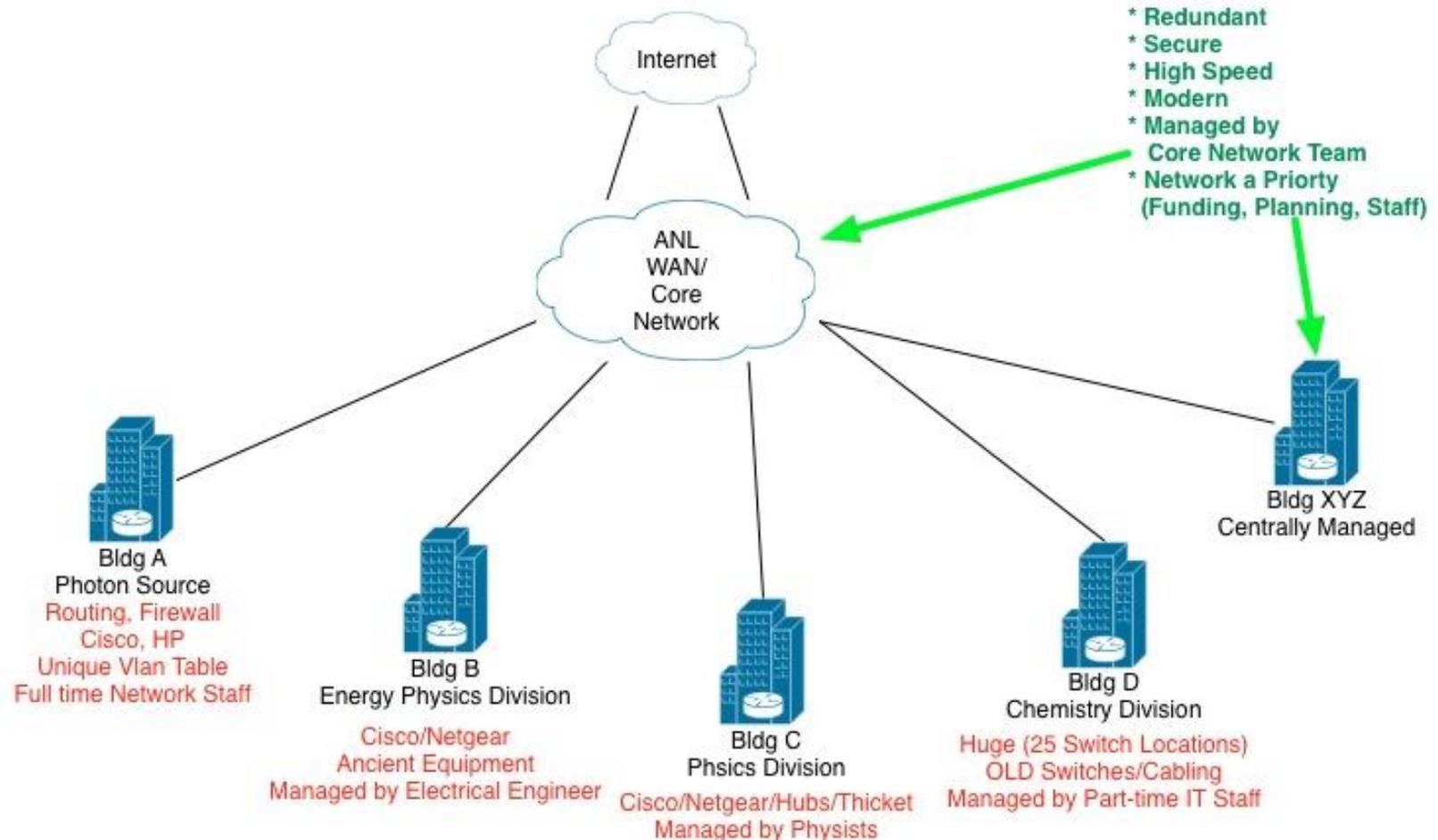
Nuclear Fuel Cycle



Transportation Science



How things have developed over the past 20 years



**Variety of Equipment, Age, Staff, Mangement, Funding, Technologies =
Variety of Problems**



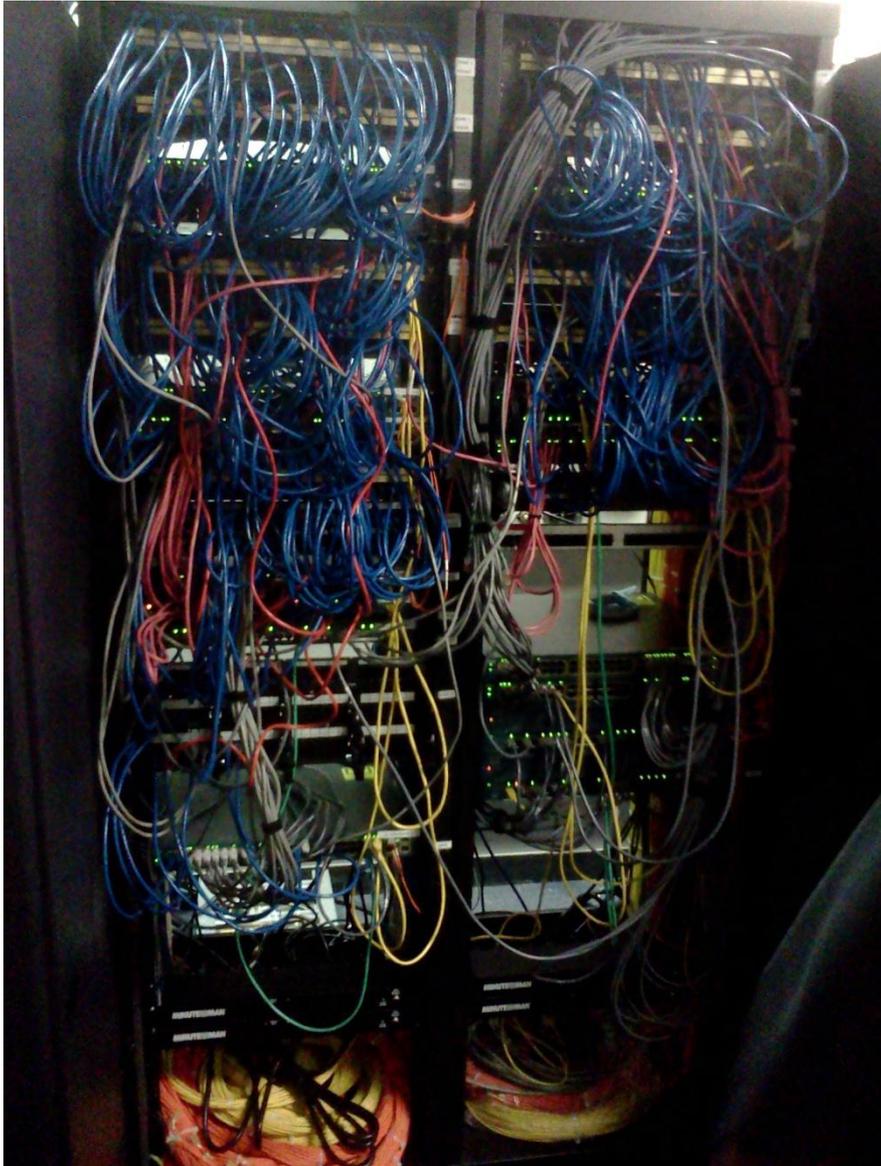
The Issues

- Sharing of infrastructure
- End-of-Life Equipment: no more upgrades, no support
- No standards
 - Equipment, Configurations, Capabilities, Monitoring
- Interoperability issues

- Aging Building infrastructure
 - Power
 - Cabling
 - Fiber
 - Racks/Cabinets (if the exist)
 - HVAC

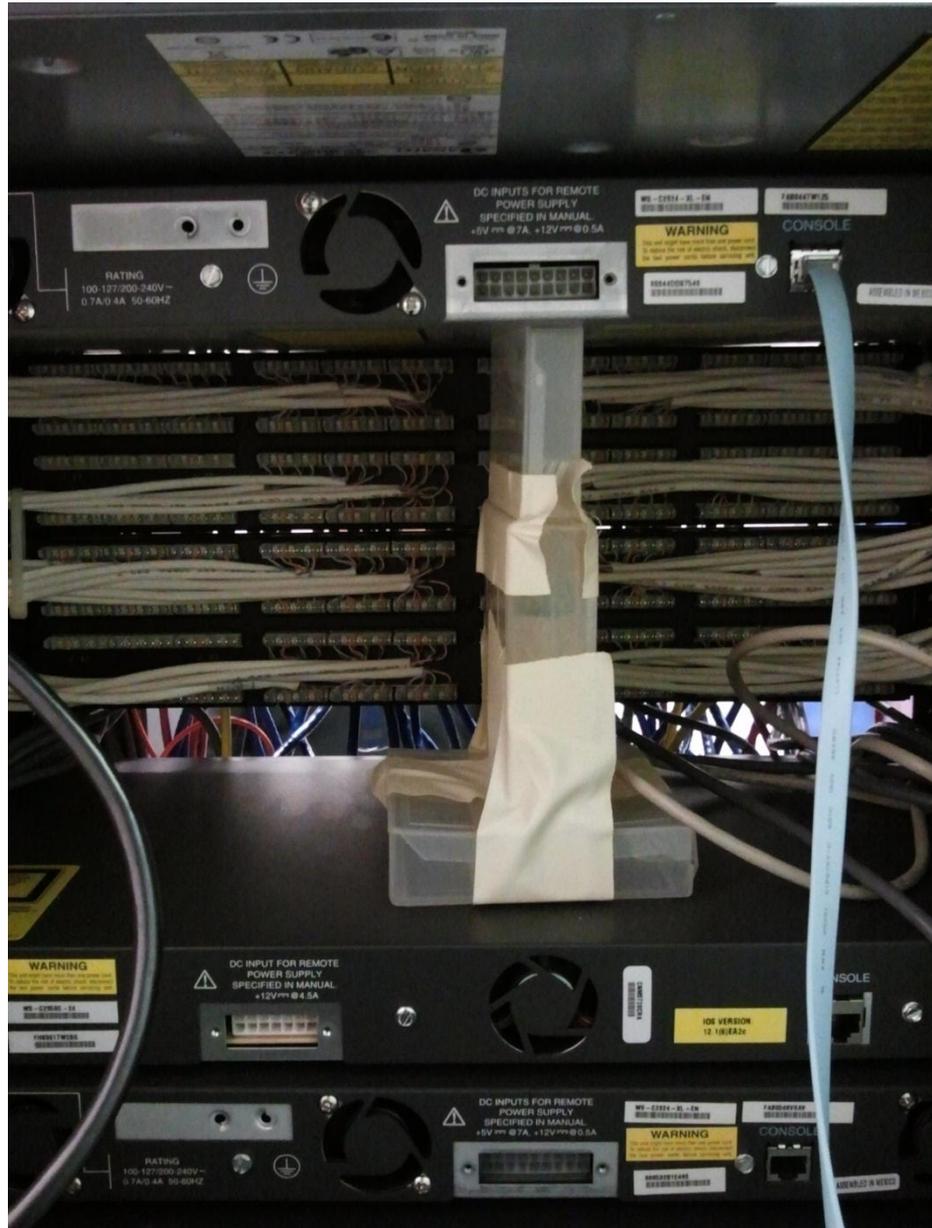


When left alone over the years

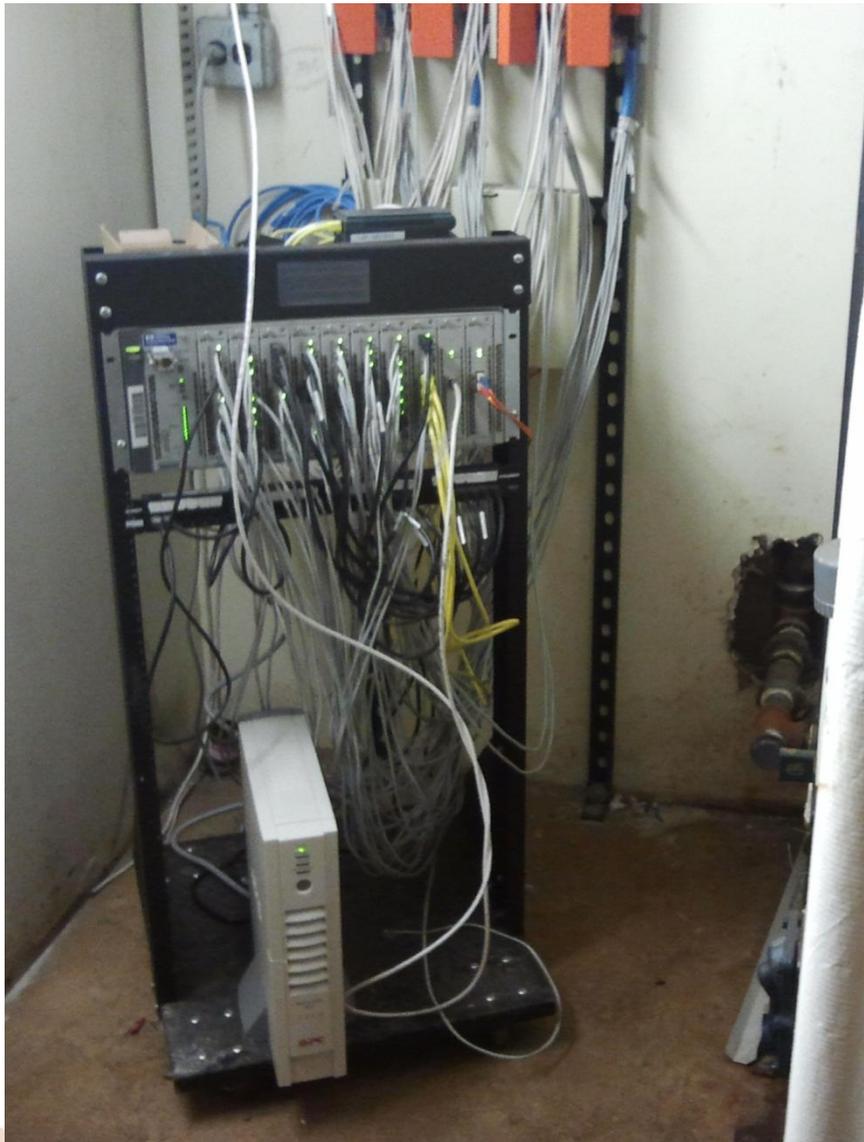


- 18 Switches
 - 75% are End-of-Life
 - Various models, speed, OS versions, configurations
 - Oldest switch was manufactured in 1995
- ~275 active connections
 - Very little labeling of cables/switchports

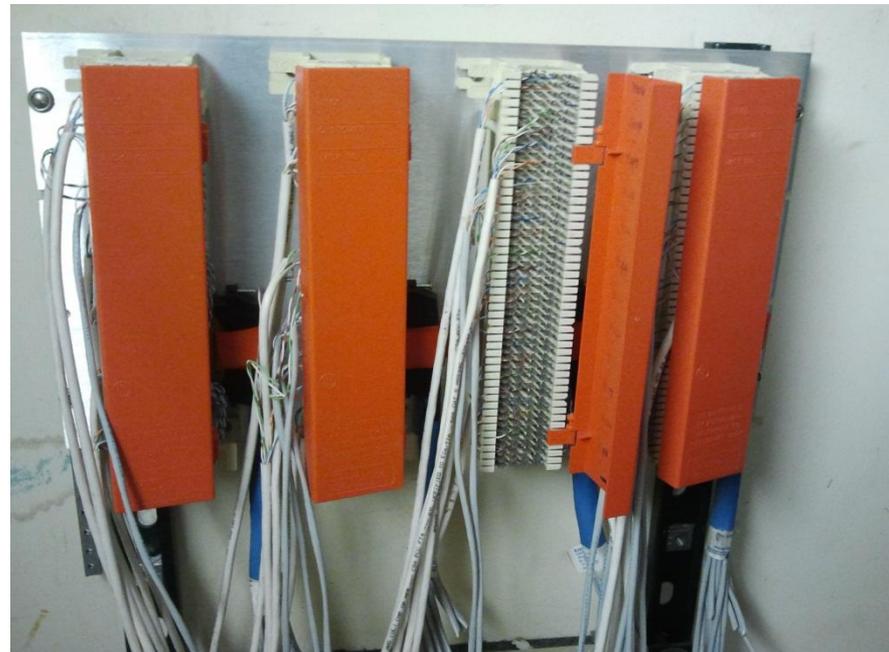




Leaky Boiler, Questionable Cabling

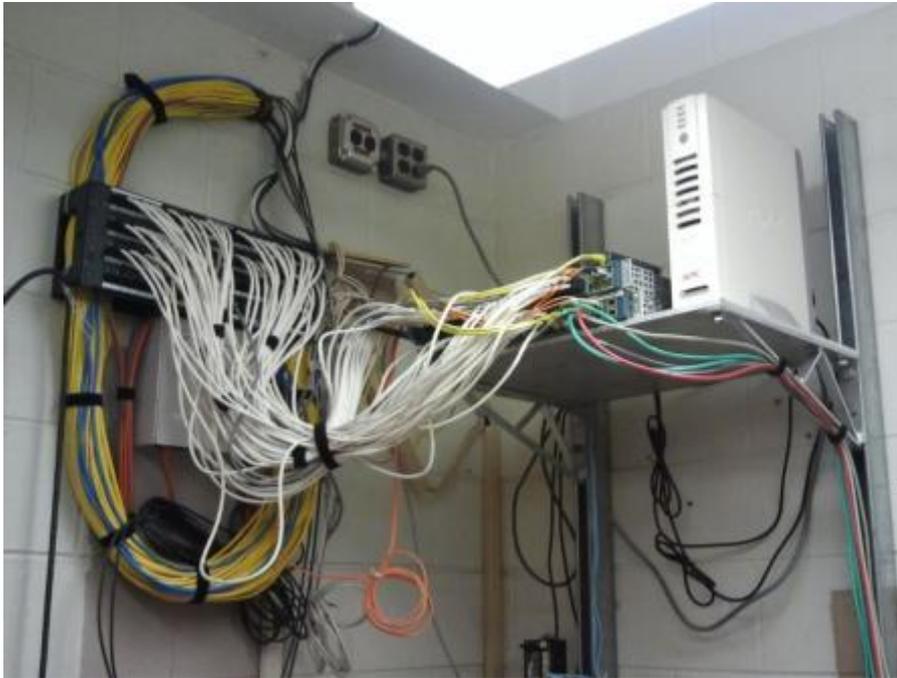


- Routinely has standing water in room
- Cat 5 cabling
 - Split pairs
 - 1 cable goes to 2 jacks
 - CAN NOT support Gigabit or POE



- No Door, cabinet to full
- Active Thicket Cables

- Safe??



Drivers (Current & Future) or Why we need money to fix this

- Labwide Wireless (from a/b/g to N)
- Labwide “Network Based” PA systems
- Labwide SCADA systems
 - Door Control Systems
 - Building Automation Systems
 - Water Monitoring
 - Electricity Monitoring
- 2014: Labwide VOIP Deployment
- Labwide “Network Based” Fire Alarm System
- Lots of \$\$ has gone towards these systems
 - Need to spend the \$\$ to support the underlying network glue
- 5 Year - \$7.5 million commitment from the Laboratory

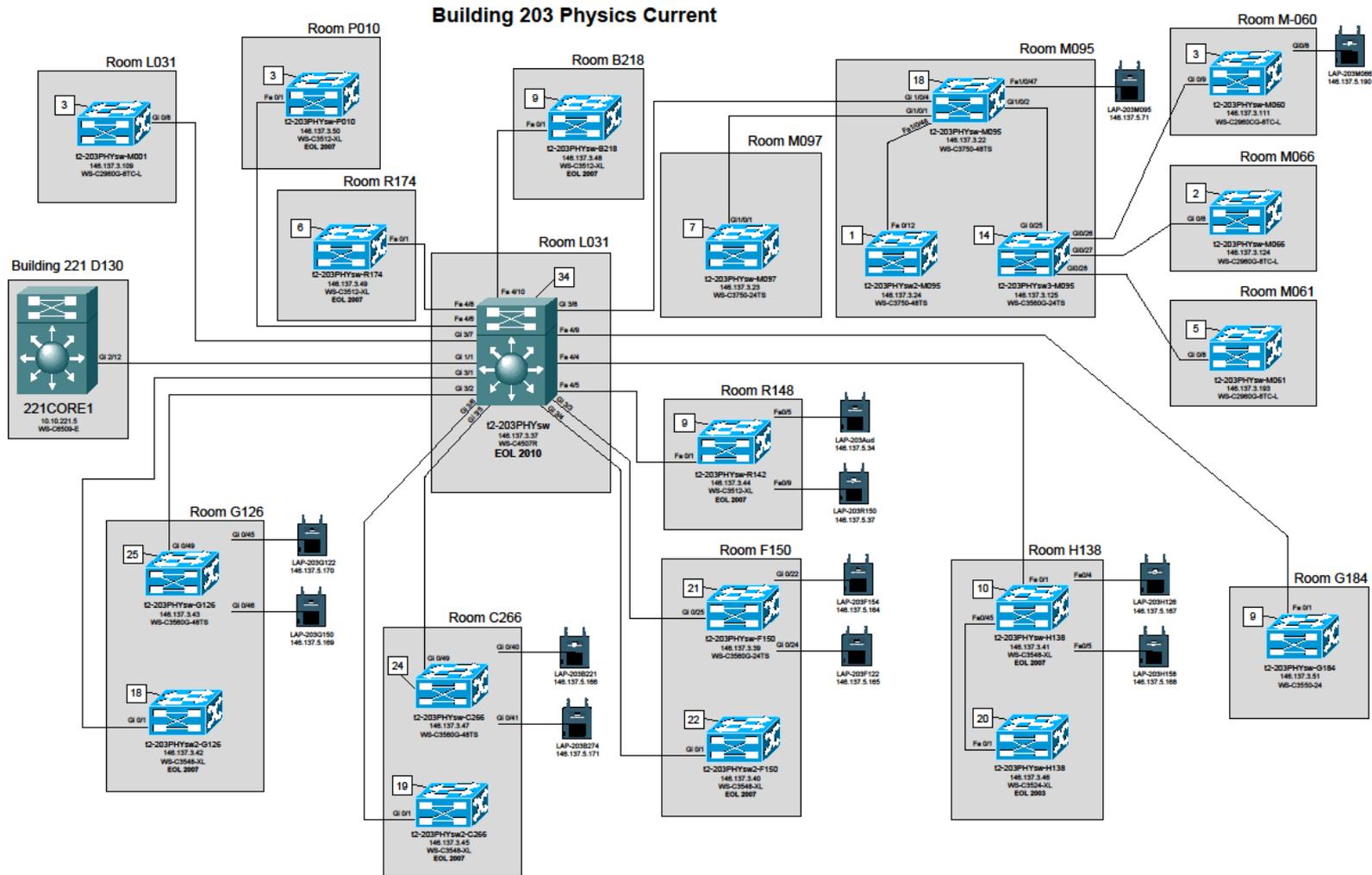


Make the plan

- Figure out just how bad things are
 - Gather information from our heads
 - Call Divisional Network Personal
 - Building Walkthroughs
 - Drawings/Documentation
 - Thank goodness for students
- Determine which buildings to upgrade when
 - Based on variety of factors
- Schedule/Plan
 - Power Work
 - Fiber Work
 - Copper Work
- Order supplies
 - Switches/Routers, UPS, UPS batteries, Cabinets, Fiber Shelves, Patch Cables, Cable Management, etc

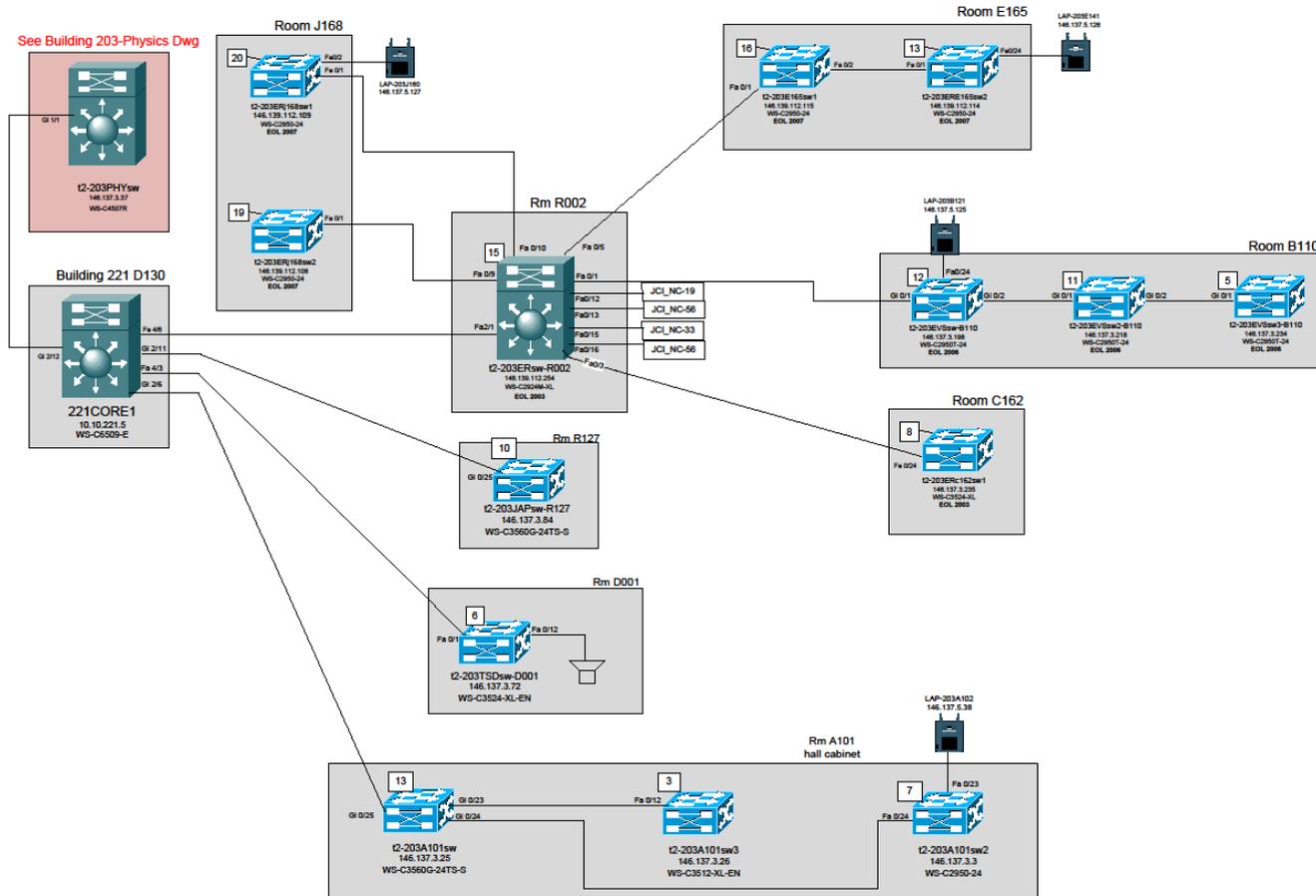


Building 203 - Physics



Building 203 - Environmental Systems

Building 203 EVS Current



Things to consider at 1 location

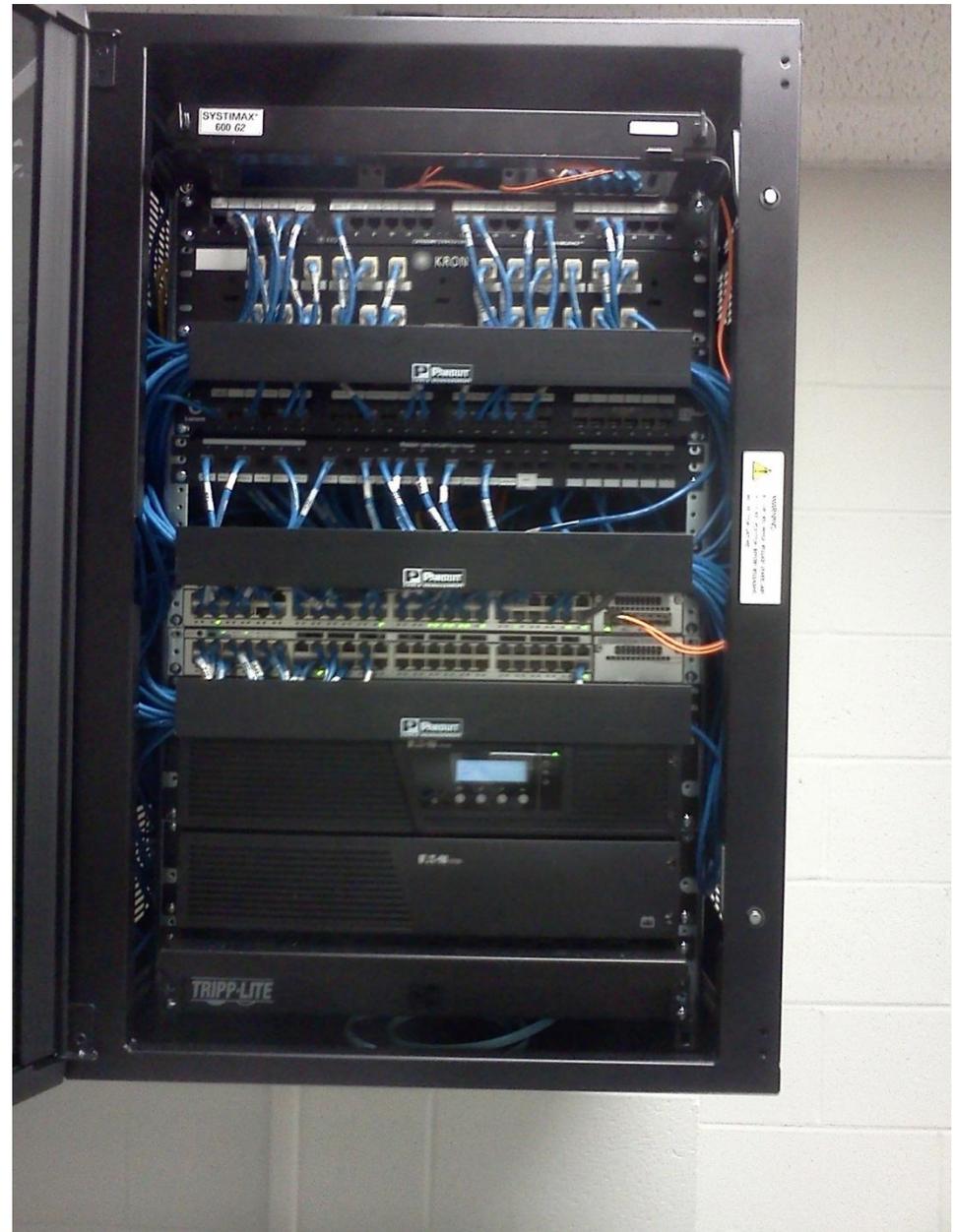
- Power
 - Commercial, Bldg UPS, Emergency
- Cabling
 - Copper, Fiber (redundancy)
- Physical Environment
 - Water, Heat, Cooling, Radiation
 - Weight Bearing of Wall
 - Cabinet Type/Size
 - Audible Sound of New Switch
- Port Count
 - Current vs Future Needs
- Rackmount UPS
 - Weight/size vs runtime
- Migrating Configuration of the Switch
- Hubs/Switches/Media Converters
- Approval for downtime ... NO I don't want to “just do it on the weekend”



Successes

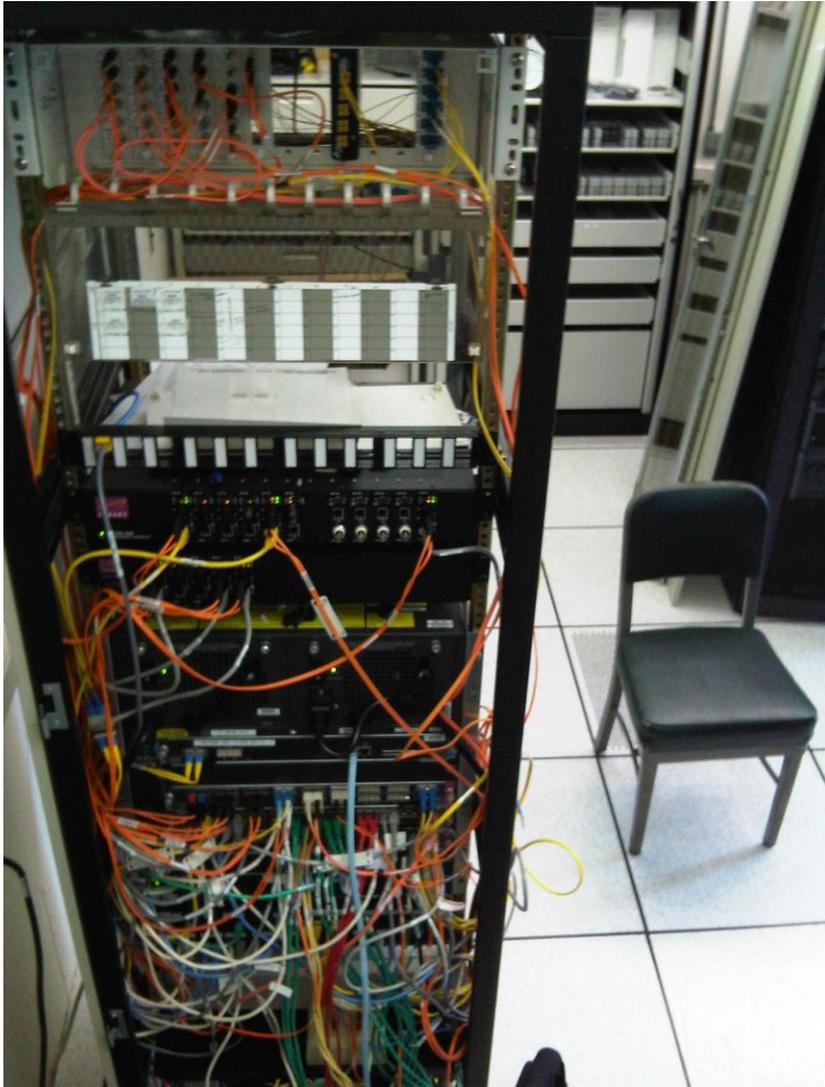
Small Wall Cabinet

- The Standard
 - Lockable Cabinet
 - Modern Gigabit/POE switches w/support contract
 - Fiber Shelf
 - Cable Management
 - Labels 😊
 - UPS
 - 2hr runtime
- Centrally managed and maintained

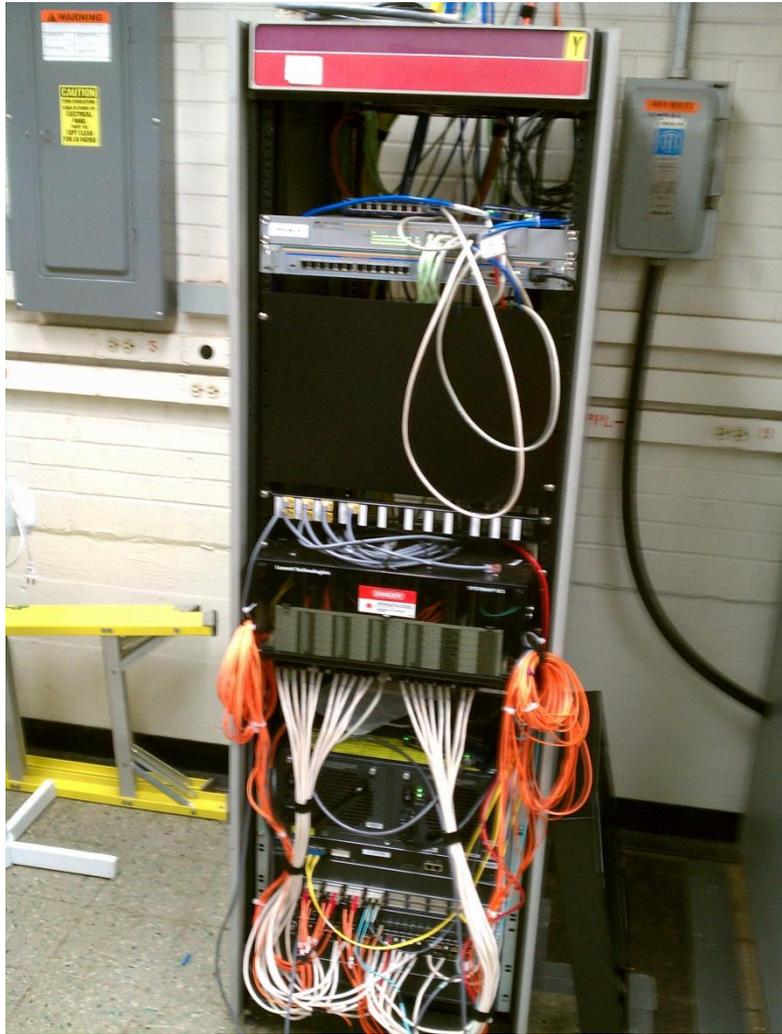




Large Building Distribution Switch: This -> That



Large Building Distribution Switch: This -> That (2)



Leftovers

1 of 3 Large piles growing



That is all

- Thanks for you time
- Questions????

- Cpoetzel at anl dot gov

