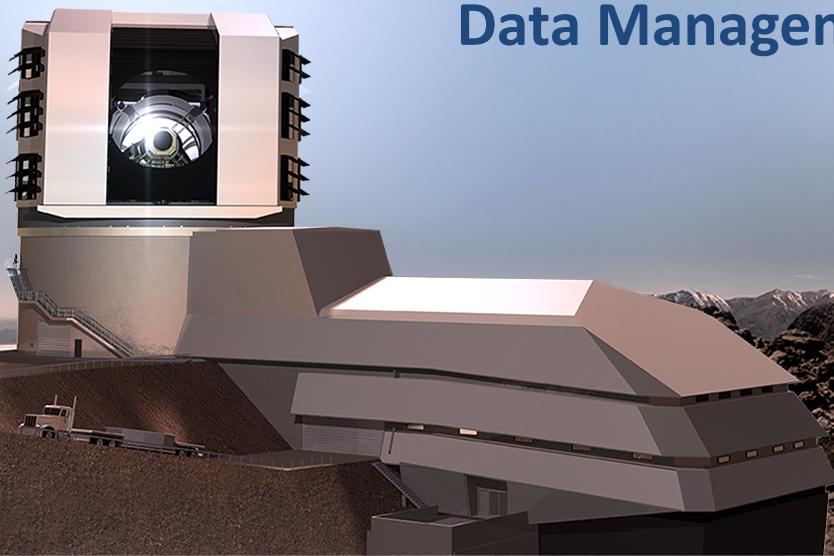


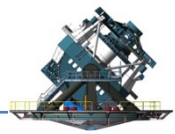


# LSST Networks and Base Center

Jeffrey Kantor  
Sr. Manager

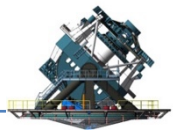
Data Management Leadership Team Meeting  
May 22, 2018



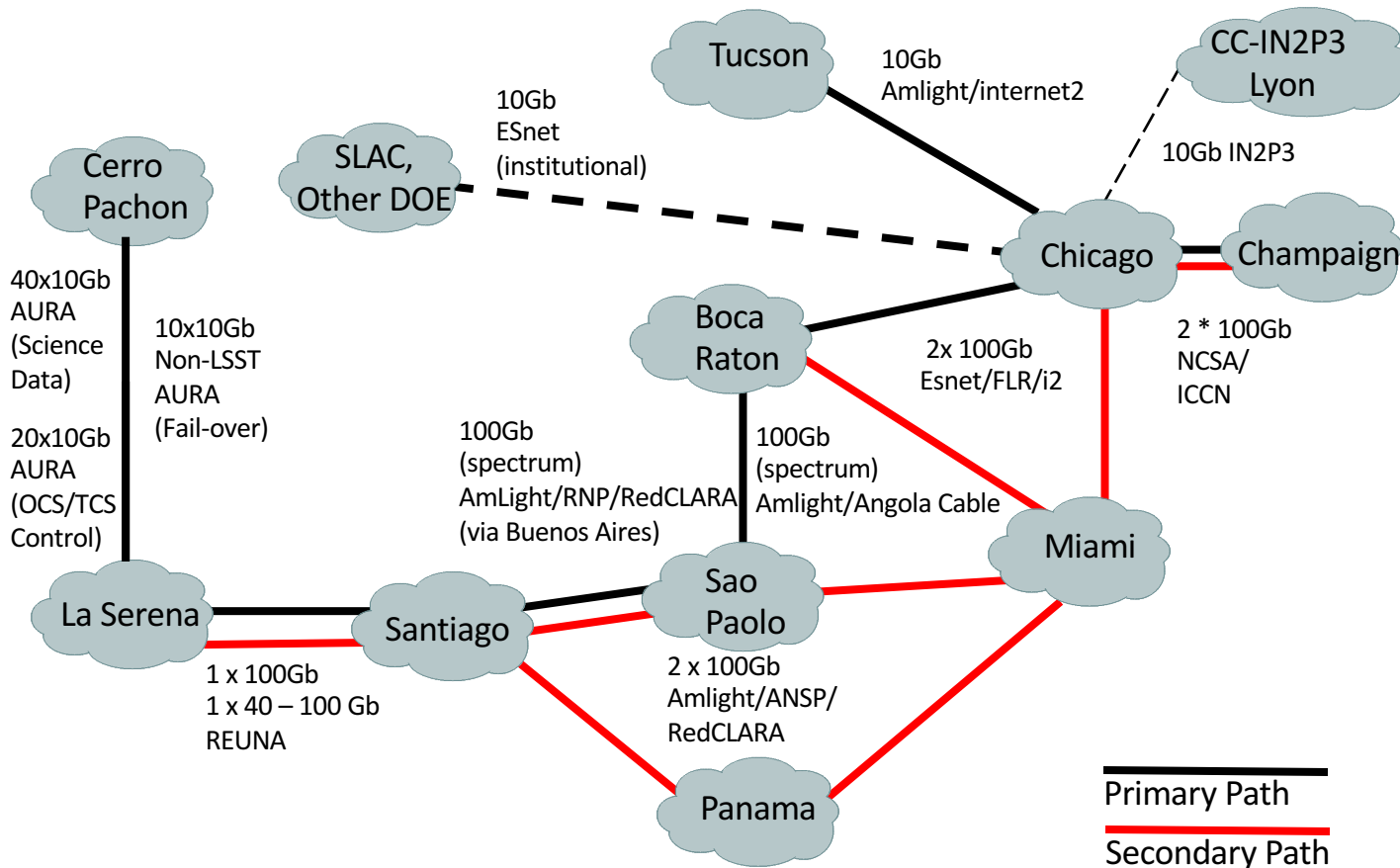


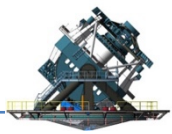
# Networks and Path Diversity between Sites and Centers





# LSST Long Haul Network Links (Baseline)

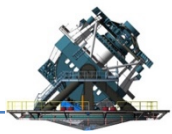




## Recent Accomplishments



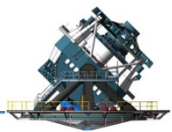
- Accepted fibers
  - Summit – AURA Gatehouse
  - AURA Gatehouse – La Serena
  - La Serena - Santiago
- Installed Dense Wave Division Multiplex (DWDM) equipment on Cerro Pachon, in La Serena, and in Santiago
- Conducted First Optic Light Demonstration
- Activated 100 Gbps Ring Santiago – Miami
- Installed temporary network and phone service on summit



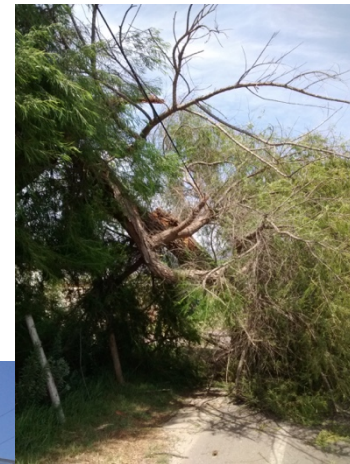
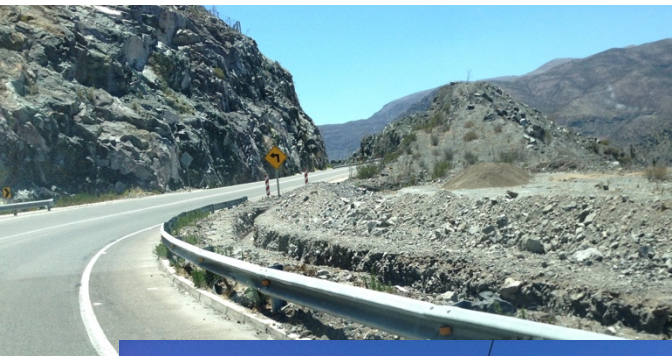
## Work in Progress

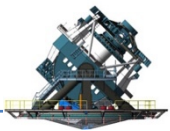


- Installation of Cisco ACI-based Summit Network
- DWDM procurement for 100 Gbps Spectrum/activate link
- Design of Base Data Center in La Serena
- Agreement with Esnet to provide 2 x 100 Gbps links Atlanta – Chicago
- Maintenance agreement for fiber on AURA property

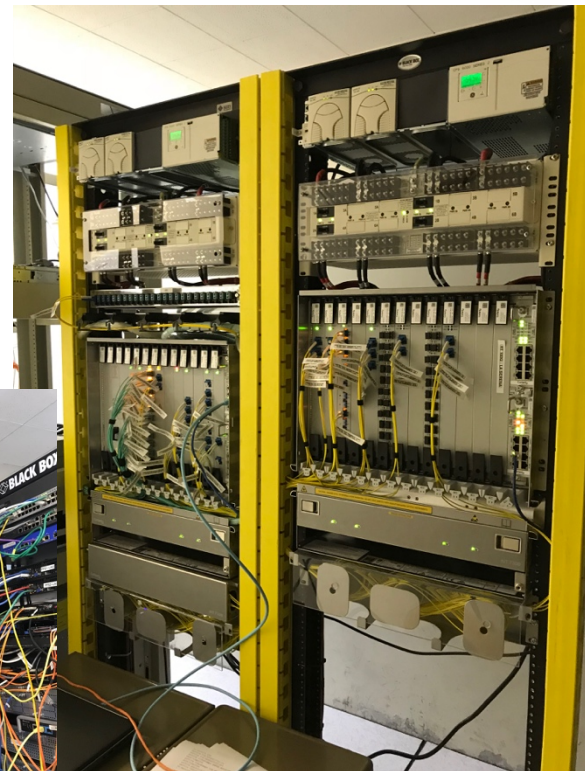


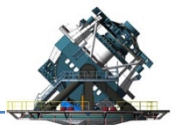
# Accepted Fiber Optics





# Installed DWDM Equipment

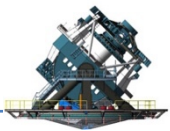




# Summit Computer Room





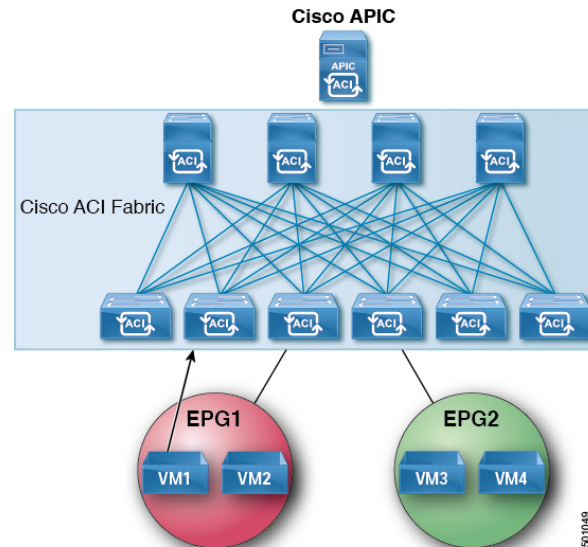


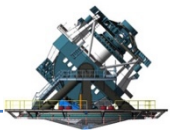
## What's Cisco ACI?

- State-of-the-art software define network (SDN) solution.
- Centralizes management (controller).
- Automates the underlying network.

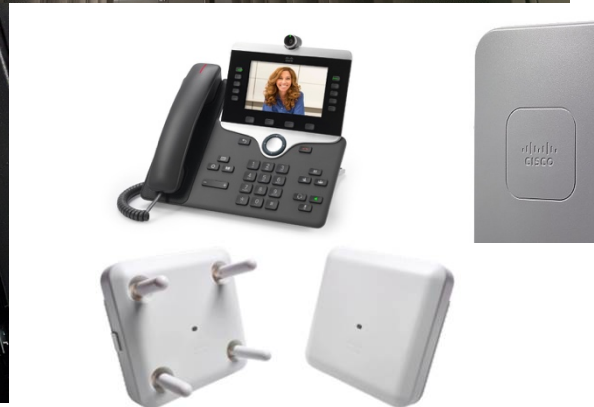
## Why Cisco ACI?

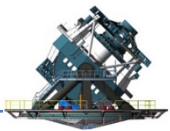
- Penalty-free 100G L2 adjacency.
- Embedded security.
- Increased visibility and support for Container (Docker) and Virtual Machine (Vmware) networking.
- Sorts-out DDS middleware challenges:
  - ✓ Routes multicast between different networks and different physical switches without additional multicast routers.





# Summit Network Installation

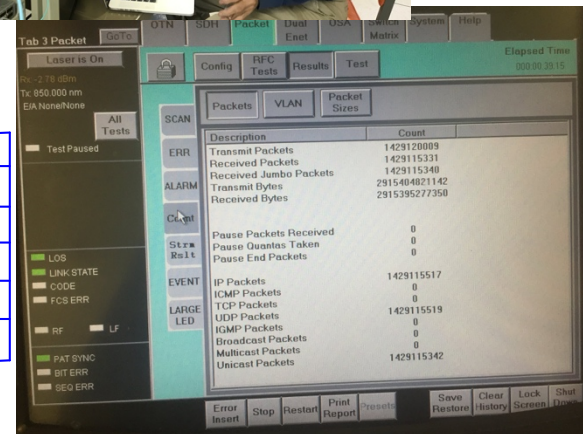
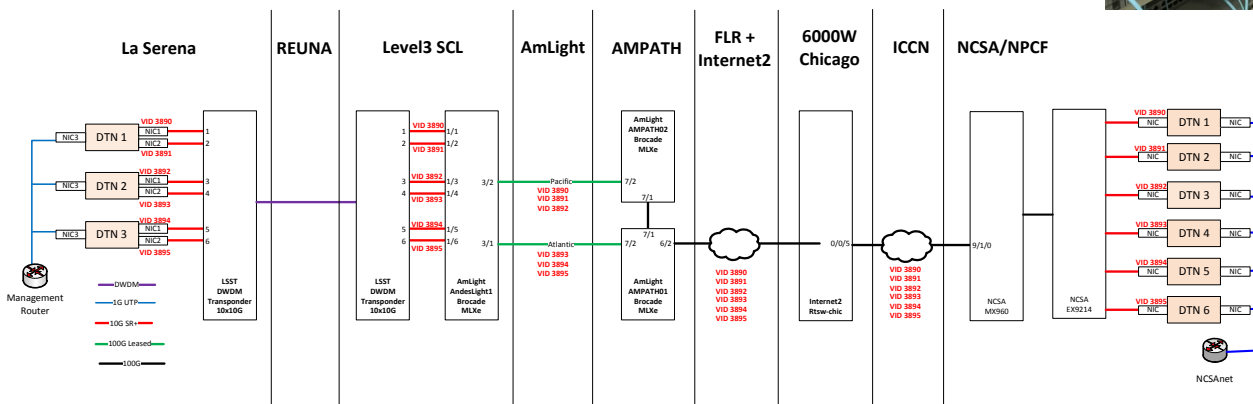


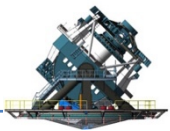


# First Optic Light Demonstration



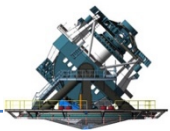
- The LSST Network Engineering Team (NET) completed the first successful transfer of digital data over LSST/AURA fiber optic networks from the Summit Site on Cerro Pachon, Chile to the Base Site in La Serena, Chile and on to the Archive Site at NCSA in Champaign. A set of 6 x 10 Gbps Network Interface cards on Data Transfer Nodes (DTN) configured with iPerf3 generated a sustained data rate of approximately 44 gigabits per second, over a period of 24 hours. This exceeded the test target of 40 gigabits per second.





## BASE FACILITY DATA CENTER





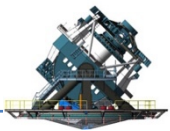
BASE FACILITY DATA CENTER  
LOSA Y ARMADURA MUROS DC





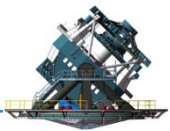
# BASE FACILITY DATA CENTER





# BASE FACILITY DATA CENTER

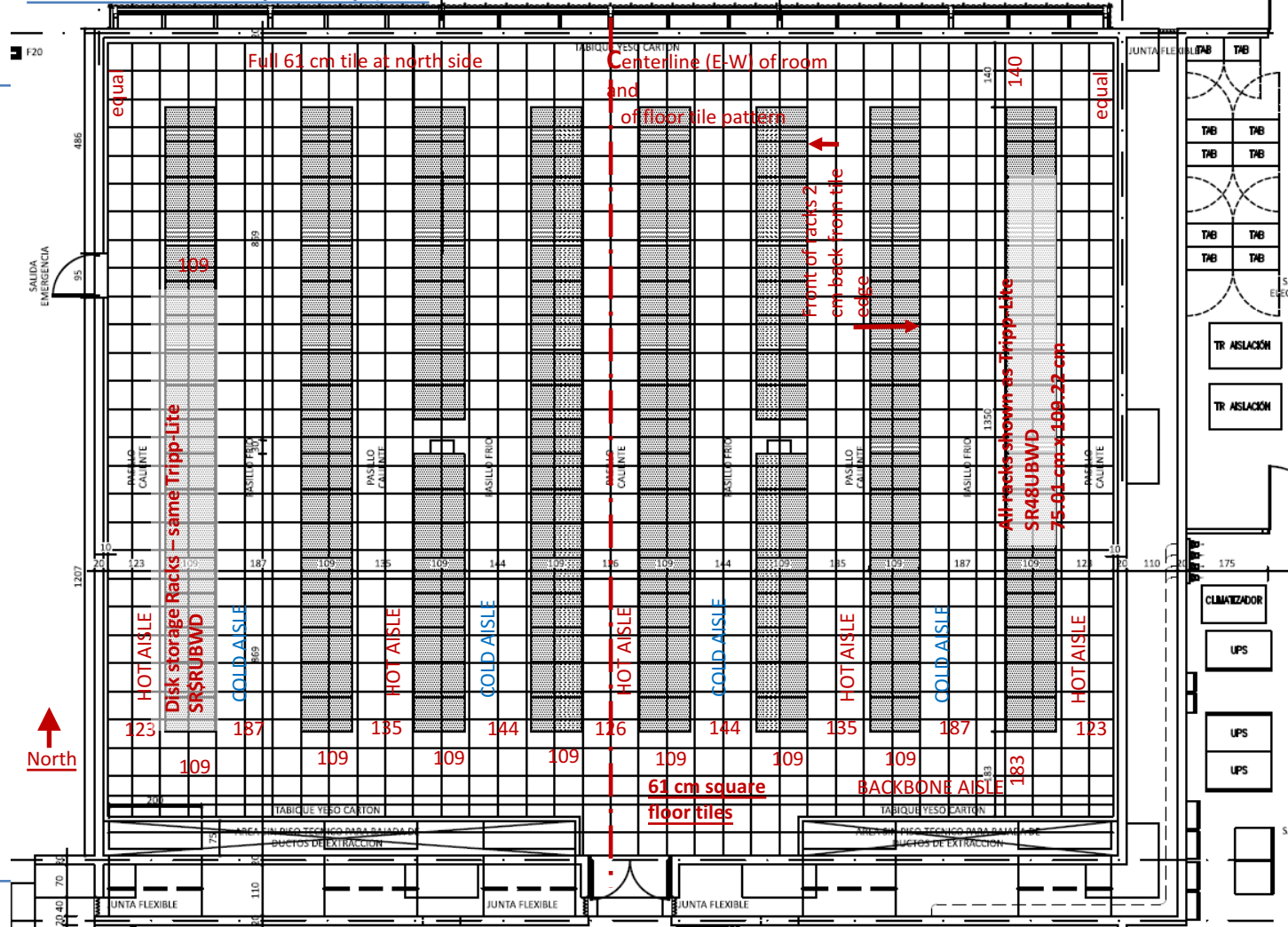
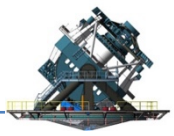




# BASE FACILITY DATA CENTER







North ↑

Full 61 cm tile at north side

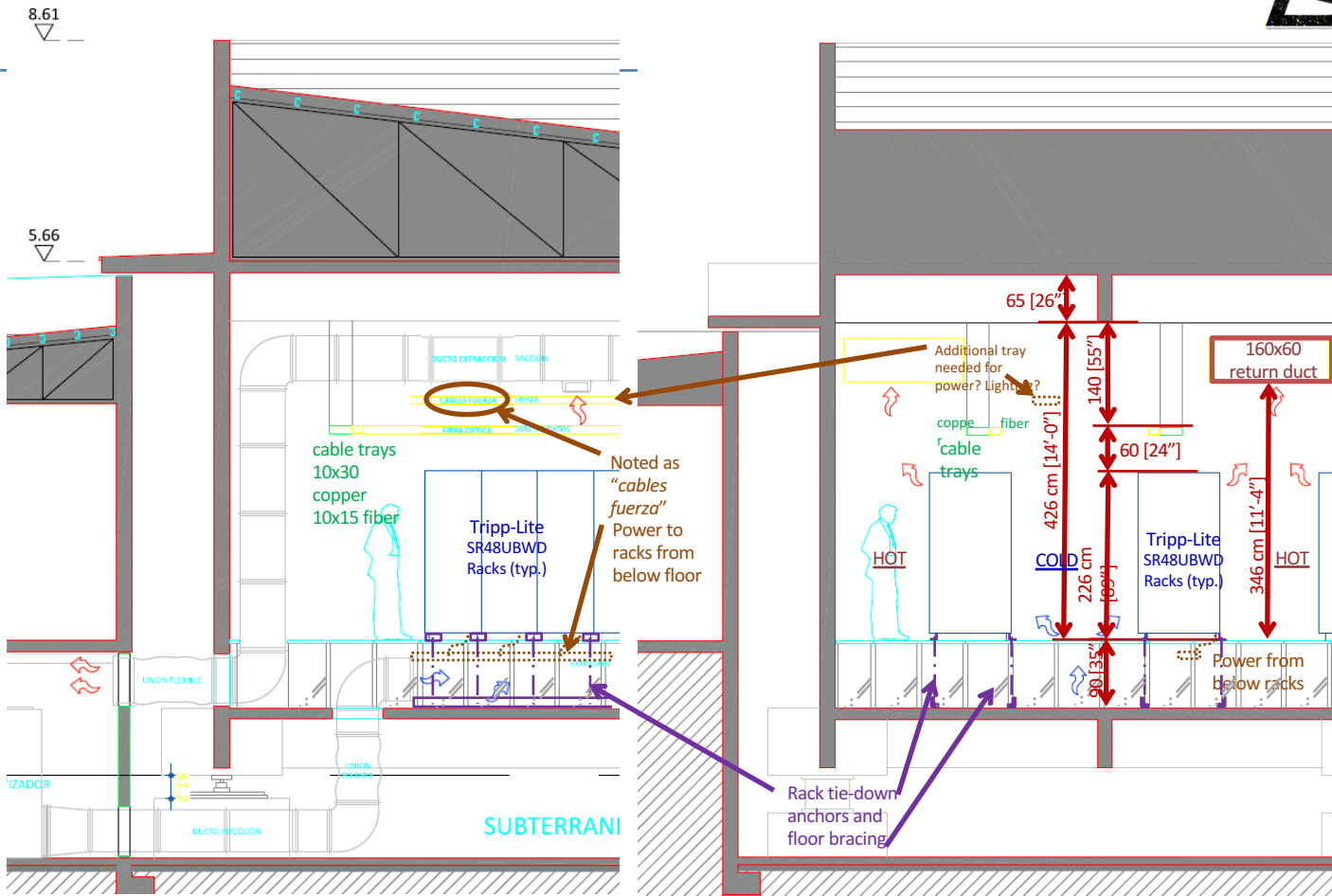
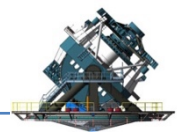
Centerline (E-W) of room and of floor tile pattern

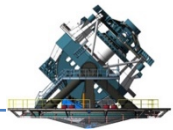
Front of racks 2 cm back from tile edges

All racks shown as Tripp-Lite SR48UBWD 75-01 cm x 109-22 cm

61 cm square floor tiles

BACKBONE AISLE





# Standard Tripp-Lite Rack Selected for Data Center



## Specifications

PHYSICAL	
Rack Height (U Spaces)	48
Maximum Device Depth (in.)	37
Maximum Device Depth (cm)	93.98
Minimum Device Depth (in.)	4
Minimum Device Depth (cm)	10.16
Shipping Dimensions (hwd / in.)	95 x 32 x 45
Shipping Dimensions (hwd / cm)	241.3 x 81.28 x 114.3
Shipping Weight (lbs.)	395
Shipping Weight (kg)	179
Unit Dimensions (hwd / in.)	89 x 29.53 x 43
Unit Dimensions (hwd / cm)	226.06 x 75.01 x 109.22
Unit Weight (lbs.)	343
Unit Weight (kg)	155.58
Color	Black
Weight Capacity - Stationary (lbs.)	3000
Weight Capacity - Rolling (lbs.)	2250
Weight Capacity - Stationary (kg)	1361

## 48U SmartRack Wide Standard-Depth Rack Enclosure Cabinet with doors & side panels

MODEL NUMBER: SR48UBWD



### Description

The SR48UBWD is a WIDE version of our standard 48U SmartRack. This enclosure is 750mm wide (30") compared to the standard 600mm wide (23.6"). This extra width allows for high density equipment installations. It allows cable management and PDU mounting off to the sides of the rack in order to keep these items out of the airflow for proper cooling.

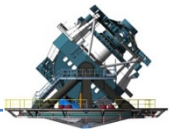
The SR48UBWD features a massive front-to rear-ventilation capacity that meets or exceeds server manufacturer requirements. Its integrated baying tabs make it easy to combine multiple enclosures in rows for data center applications. This enclosure is also compatible with hot-aisle/cold-aisle configurations.

The SR48UBWD houses 3000 lb of standard 19-inch rack equipment in 48U. Its front and rear pairs of vertical rails have square mounting holes that are adjustable in quarter-inch increments from 4 to 37 inches. Adjustment is quick and an easy-view depth index ensures consistent rail placement without requiring time-consuming measurements. Each rack space within the enclosure is numbered for ready reference.

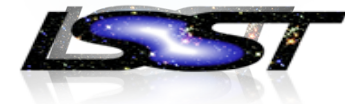
Two of the adjustable vertical mounting rails support toolless button-mount OU installation of up to four compatible PDUs and cable managers. This feature makes it easier to route cabling to rack equipment and reduces cord clutter.

With its locking, reversible, removable front and rear doors, and locking, removable side panels, the SR48UBWD provides ultimate equipment safety. The side panels are half size for ease of removal and reinstallation. The split rear door design allows the enclosure to be placed closer to a wall. The SR48UBWD meets all requirements toward PCI DSS compliance.

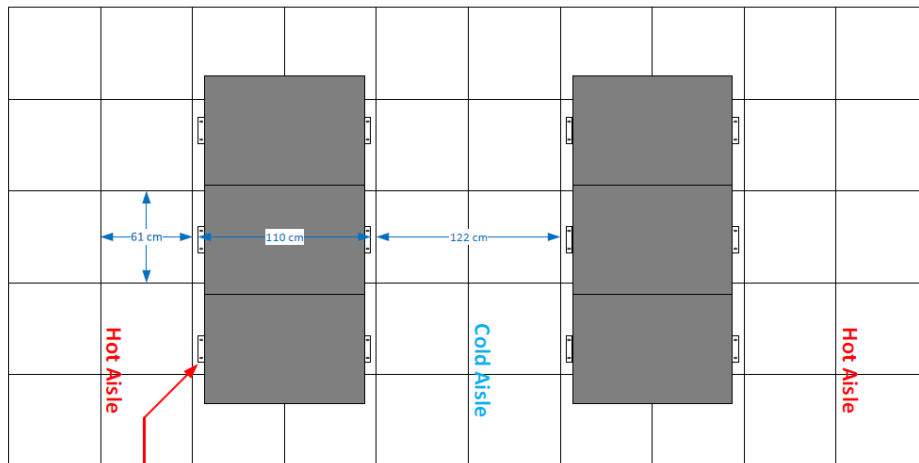
3 / 4



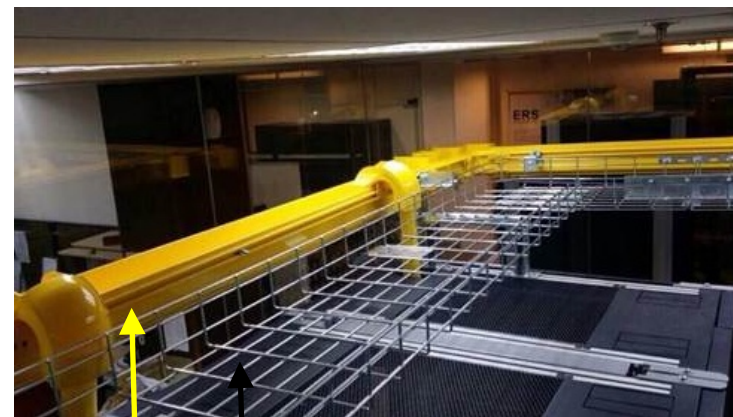
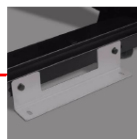
# Seismic Anchors and Fiber Trays



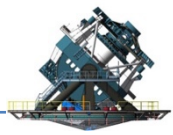
Top view



Stabilizing bracket



Types of trays for fiber and Copper-Data (per L. Corral May 3 email)



- Initial Summit Network
- Summit Computer Room server installations (Aux Tel, EFD, ECS, etc.)
- Base LAN Design Complete (also Cisco ACI)
- LSE-239 Base Data Center Requirements updated/rebaselined
- 100 Gbps test between Chile and NCSA
- Activation of Spectrum Link (Sao Paolo – Boca Raton)
- Completion of ESNet Agreement