

NOIRLab - ITOps

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SAACC Meeting 2021





Agenda

- **NOIRLab General Overview**
- **ITOps**
- **Backbone Networks**
- **MSO & Gemini South Integration**
- **Main Activities During 2020**
- **Future Activities**





NOIRLab General View

Mission:

Enable breakthrough discoveries in astrophysics developing and operating state-of-the-art ground-based observatories and providing data products and services for a diverse and inclusive community*

NOIRLab Programs

- CTIO (Cerro Tololo Interamerican Observatory)
- CSDC (Community Science and Data Center)
- GEMINI
- KPNO (Kitt Peak National Observatory)
- Rubin Observatory

AURA operates these facilities and NSF's NOIRLab under a cooperative agreement with NSF

* Source: <https://noirlab.edu/>



Discovering Our Universe Together



NOIRLab ITOps

Overview

ITOps infrastructure and operations support standardizes system deployment and management as well as IT support requirements reaching all levels of NOIRLab. This includes Astronomy IT Operations, Business IT Operations, NOIRLab business and service areas.

Business IT Operations

Delivers and supports integrated IT services across all NOIRLab sites. Provides the IT services necessary to run the business of a modern, globally distributed organization.

Astronomy IT Operations

Delivers and supports enterprise computing services dedicated to supporting science.

The Team

23 staff distributed across all NOIRLab sites in Chile, Hawaii and Tucson



Discovering Our Universe Together



Tenants

Larger

- Gemini (south)
- MSO Blanco-SOAR
- Rubin Observatory (construction)
- Las Campanas
- NRAO (Santiago)

Smaller

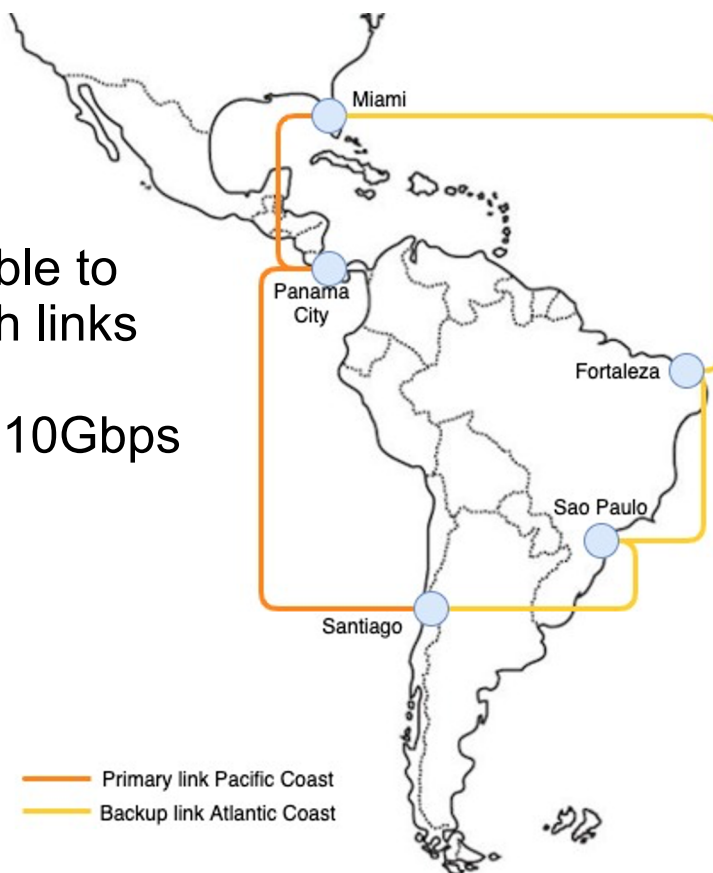
- Smart group
- Prompt
- Gong
- Alo
- LCOGT
- Wham

- Kasi
- Asas-sn
- Evryscope
- mEarth
- t80



Chile to USA

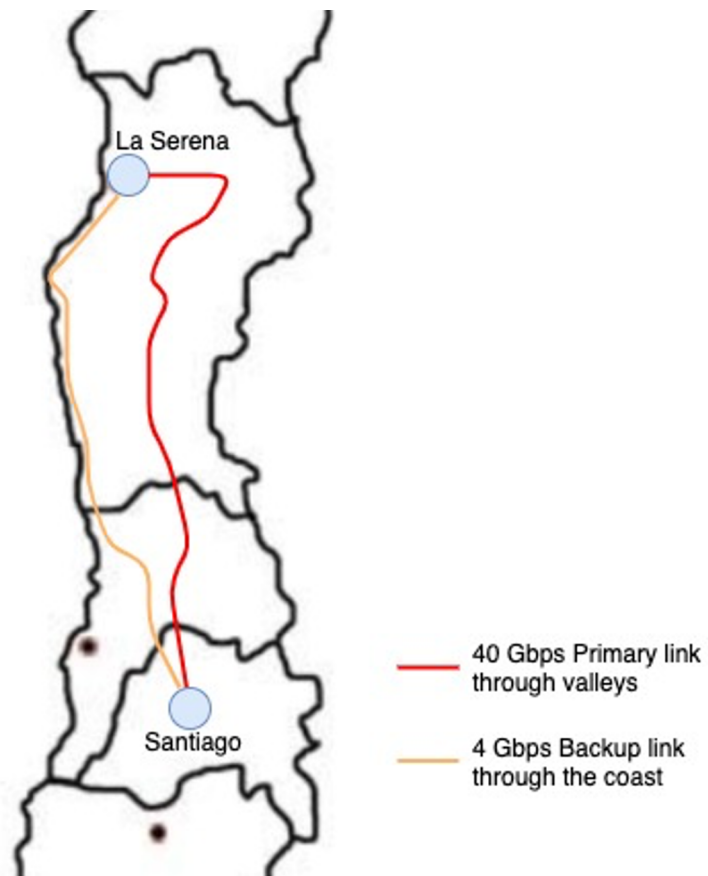
- 10Gbps burstable to 40Gbps on both links
- Reuna backup 10Gbps shared link



— Primary link Pacific Coast
— Backup link Atlantic Coast

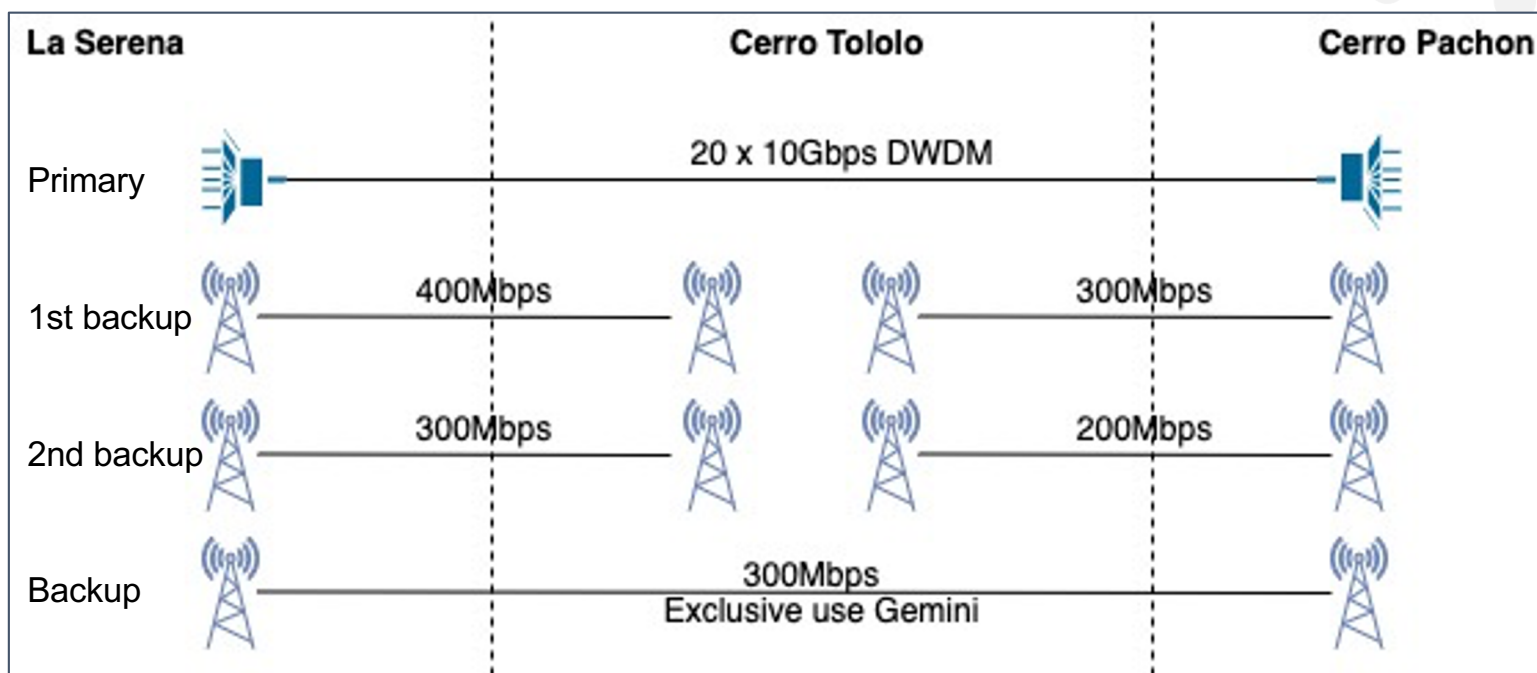


La Serena to Santiago





Cerro Pachón to La Serena





Gemini Observatory



“ One Observatory, Two Telescopes ”

Gemini Telescopes

- Gemini North
 - Mauna Kea Mountain, Hawaii
- Gemini South
 - Cerro Pachón, Chile

Gemini Partners

- United States
- Canada
- Chile
- Brazil
- Argentina
- Korea



Gemini Data Centers / Key uses cases

Gemini North

- Hilo Base Facility (HBF), Hilo
- Mauna Kea Operations (MKO), at 4200m

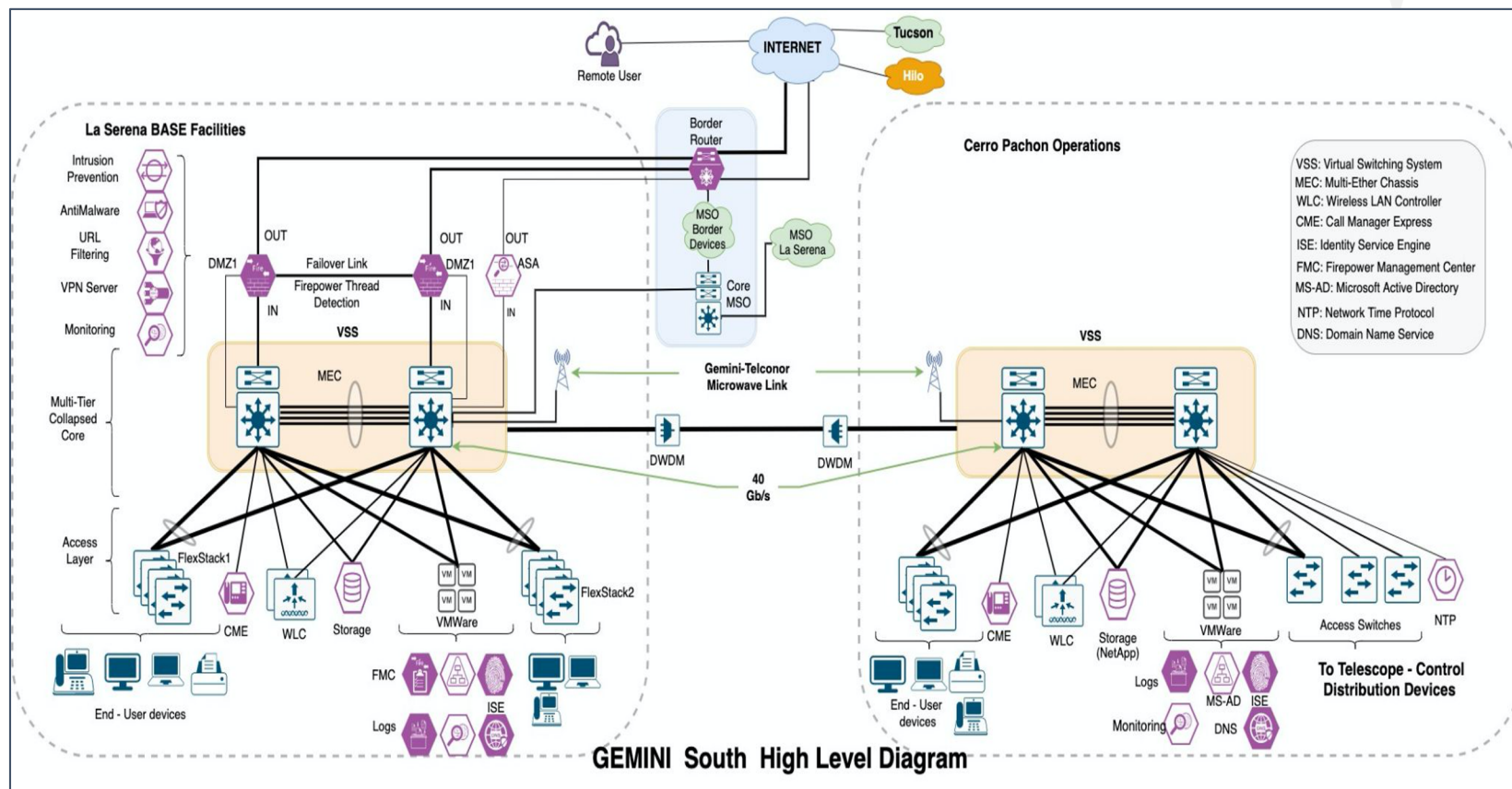
Gemini South

- La Serena Base Facility (SBF), La Serena
- Cerro Pachón Operation (CPO), at 2700m

- **Base Facility Operations:** Remote Observing - VPN access
- **Summit Base Data Transfer:** [High Bandwidth](#)
- **High Availability:** World-Class availability (>99%)
- **High Reliability:** Maximum MTBF (>10 years)
- **Cross-site Coordination:** Low Latency between : [Hilo - La Serena](#) & [La Serena - Tucson](#)
- **Cloud Data Archiving:** Upload/Download from AWS



Gemini South - High Level Diagram





Gemini South Improvements 2020

Next Generation Firewalls

- Increased number of Tunnel Profiles to Provide access to Remote users (GS and GN)
- Implementation of URL Filtering
 - Cisco URL License
 - ResearchSOC Initiative (<https://researchsoc.iu.edu/>)
- Traffic Control to Cerro Pachón Operations
 - Decommissioned old Cisco ASA on CPO

Network Services & Collaborative Tools

- Authentication & Authorization :
 - Improvement ISE Nodes deployment, Licensing, Many new Policy Set Statements
- Cloud Service Desk (CSD)
- Google Workspace deployed to All

Integration Gemini & MSO (CTIO)



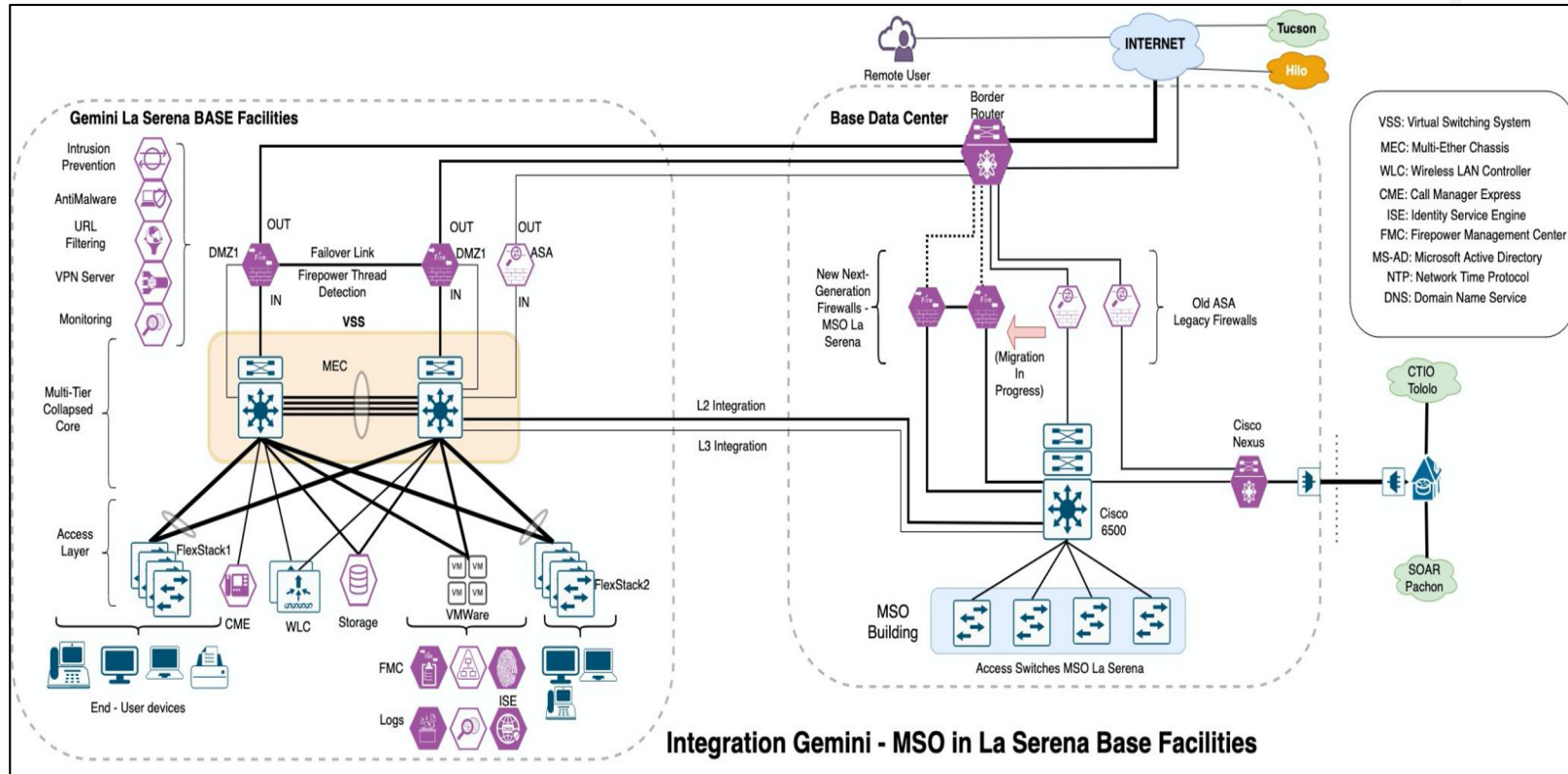
Integration Gemini - MSO

Activities During 2020

- In Layer 2: Sharing strategic VLANs between both Programs
- In Layer 3: Adding static routes to reach specific subnets in La Serena
- WiFi :
 - Extending SSID's from Gemini to MSO buildings
 - Extending SSID's from MSO to Gemini buildings
- VoIP: Modifying Dial-Peers to communicate between both VoIP Systems
- VPN S2S: To provide encrypted connection to Authentication Servers



Gemini & MSO Integration





Future Activities and Initiatives

NOIRLab Networking Upgrade Project

- LAN Design in all Locations
 - (La Serena, Cerro Pachón, Cerro Tololo, Hilo, Mauna Kea, Tucson, Kitt Peak)
- WAN Design
- WiFi Upgrade

NOIRLab VoIP upgrade

- Evaluating Cloud-Based Solutions

Firewall Upgrade

- MSO Upgrade is still in Progress
- Design and Planning upgrades in many locations

Collaboration and Integration with Rubin Observatory



NOIRLab Network Upgrade Project

Based on standard technologies which could include :

- Traditional Multi-Tier design
 - Core - Distribution - Access Topologies
 - Stacking Topologies
- Fabric L2 Leaf-Spine (Using Multi-Link Aggregation - MLAG)
- Fabric L3 Leaf-Spine (Using VXLAN/BGP/EVPN Technologies)

Requires studying vendor capabilities

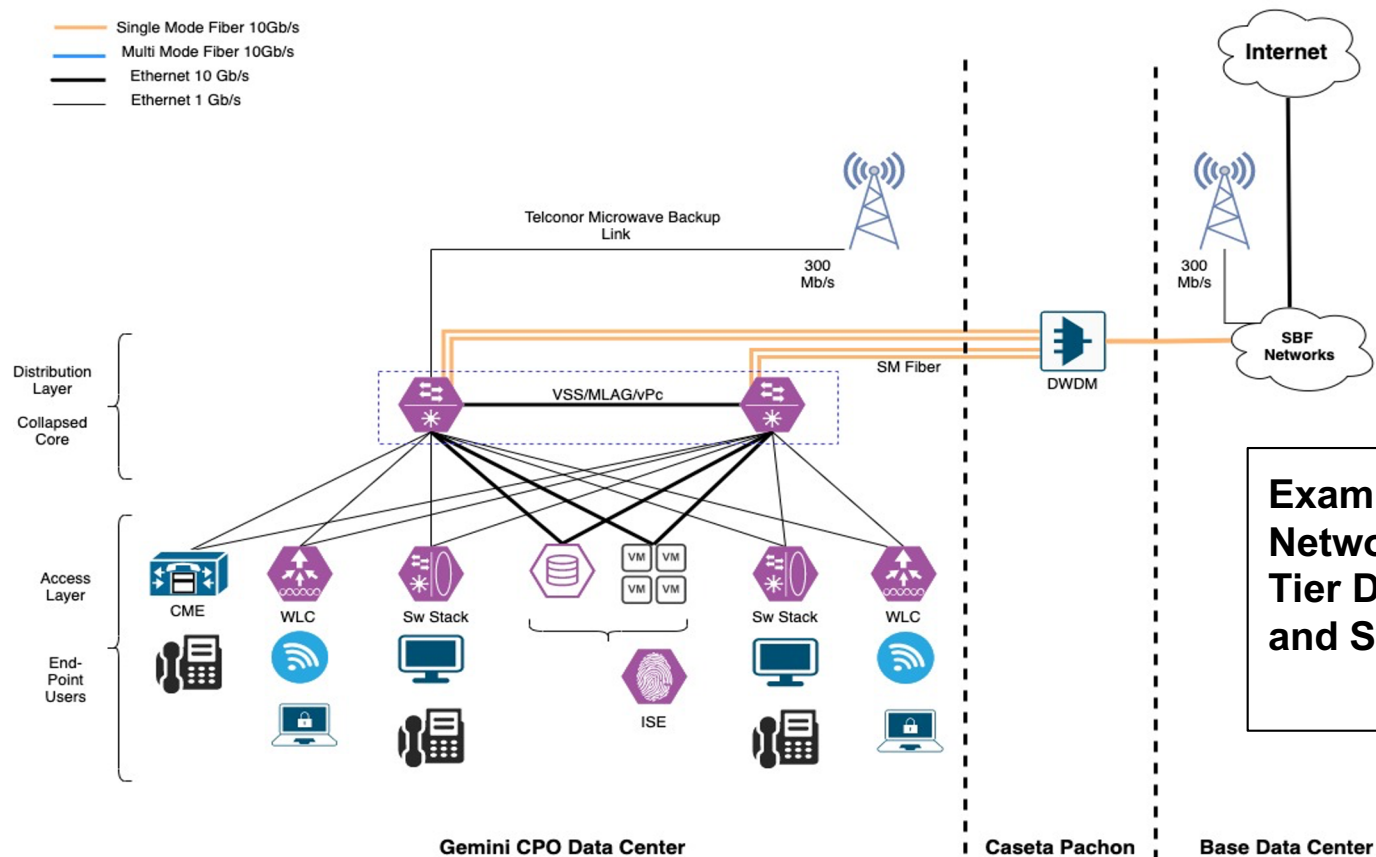
- Such as: Cisco - Juniper - Arista

~3 years to cover all locations

Will involve important NOIRLab stakeholders

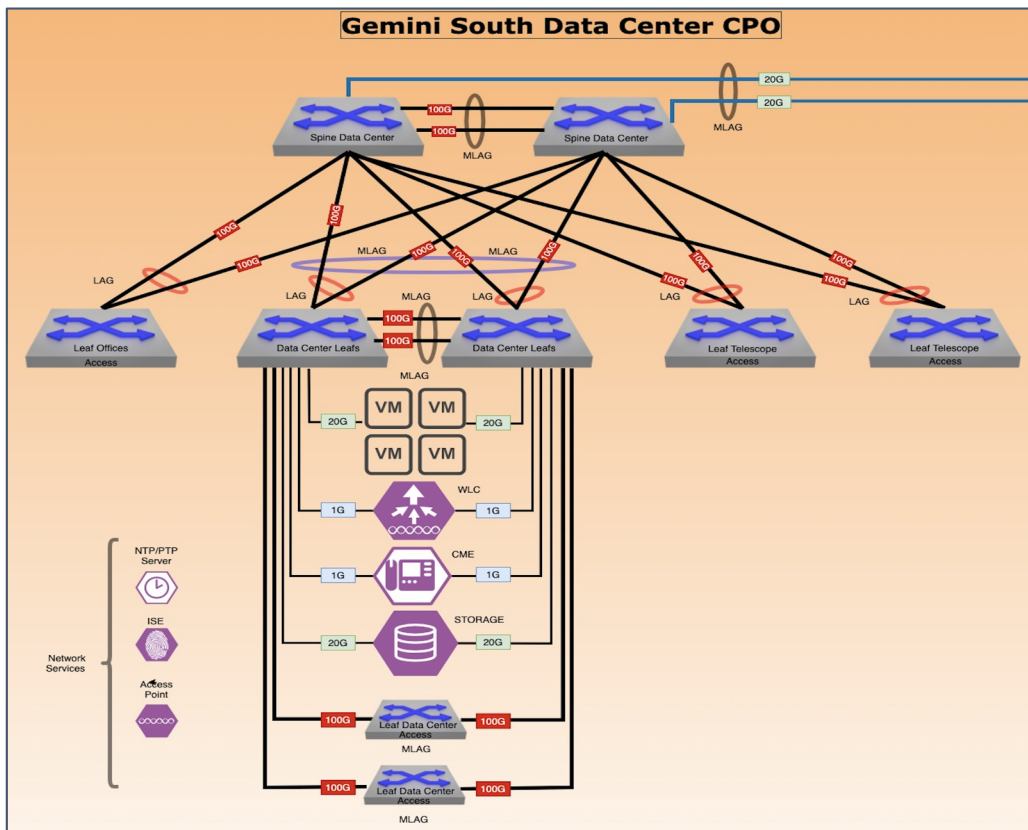


Preliminary LAN Design using Multi-Tier topology on CPO





Preliminary LAN Design using L2 Leaf Spine on CPO



Example 2: Draft of CPO Network Design using L2 Spine-Leaf with Multi-Link Aggregation

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