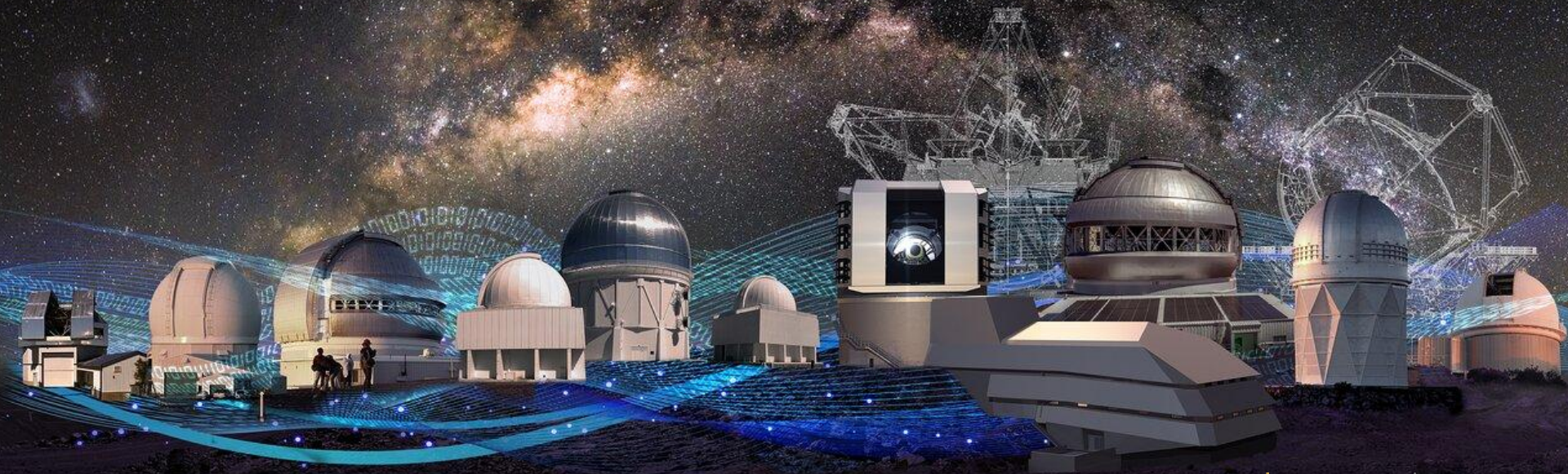# NOIRLab - ITOps

Christopher Morrison, Mauricio Rojas, Eduardo Toro
SA3CC Meeting 2022

Agenda

- NOIRLab General Overview

- NOIRLab IT Operations (ITOps)

- Backbone Networks Activities

- Program Integration

- Network Upgrade Project

NOIRLab General Overview

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

- MSO (Mid-Scale Observatories)
- CSDC (Community Science and Data Center)
- GEMINI Observatory
- KPNO (Kitt Peak National Observatory)
- Vera C. Rubin Observatory (Construction)

Tenant Services

NOIRLab provides several services, such as summit-base connectivity, and access to research and commodity internet, to several Tenants through special agreements.

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

* Source: https://noirlab.edu/

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NOIRLab IT Operations (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.

Astronomy IT Operations

Delivers and supports enterprise computing services dedicated to supporting science.

Business IT Operations

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

The Team

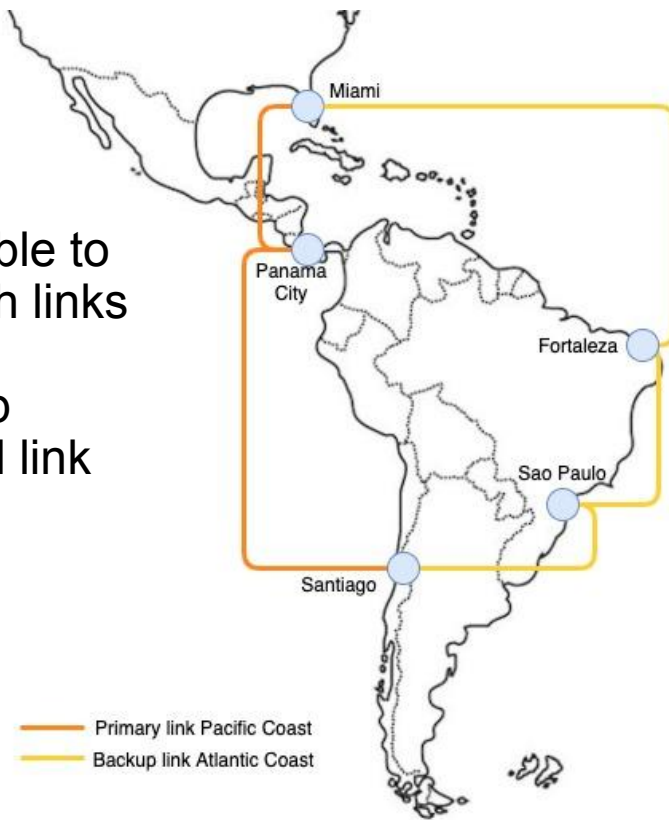24 staff distributed across all NOIRLab sites in Chile, Hawaii and Tucson

Backbone Network activities

- Chile to USA links

- La Serena to Santiago

- Cerro Pachon <> La Serena

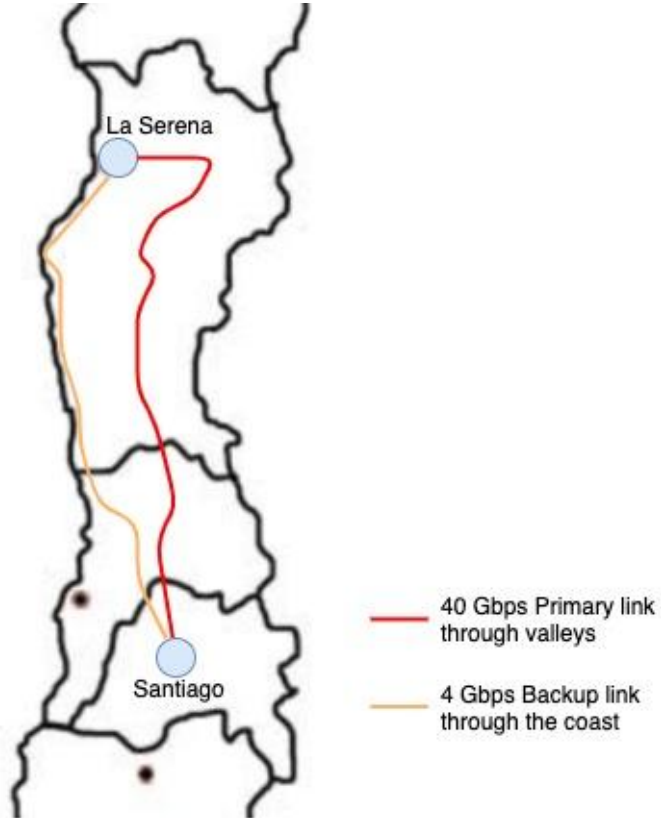- DWDM improvements

- LCO improvements

Chile to USA

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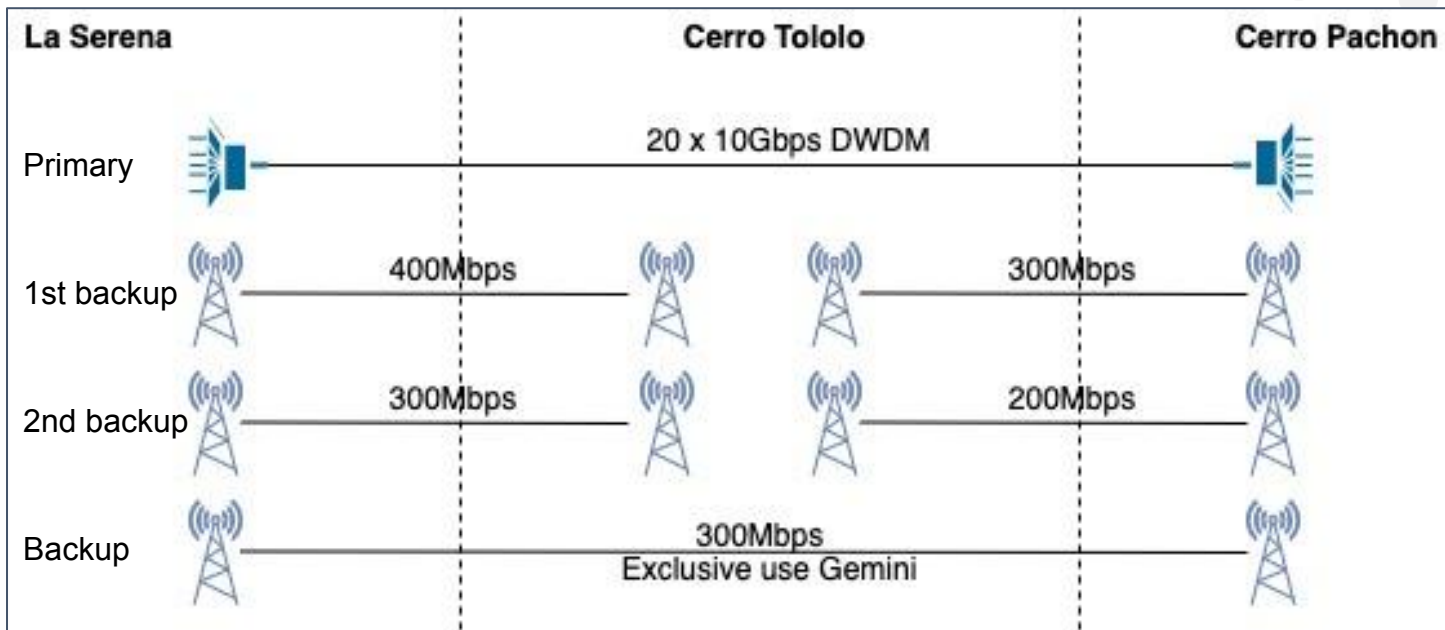
- REUNA backup 10Gbps shared link

Primary link Pacific Coast
Backup link Atlantic Coast

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La Serena to Santiago

40 Gbps Primary link through valleys

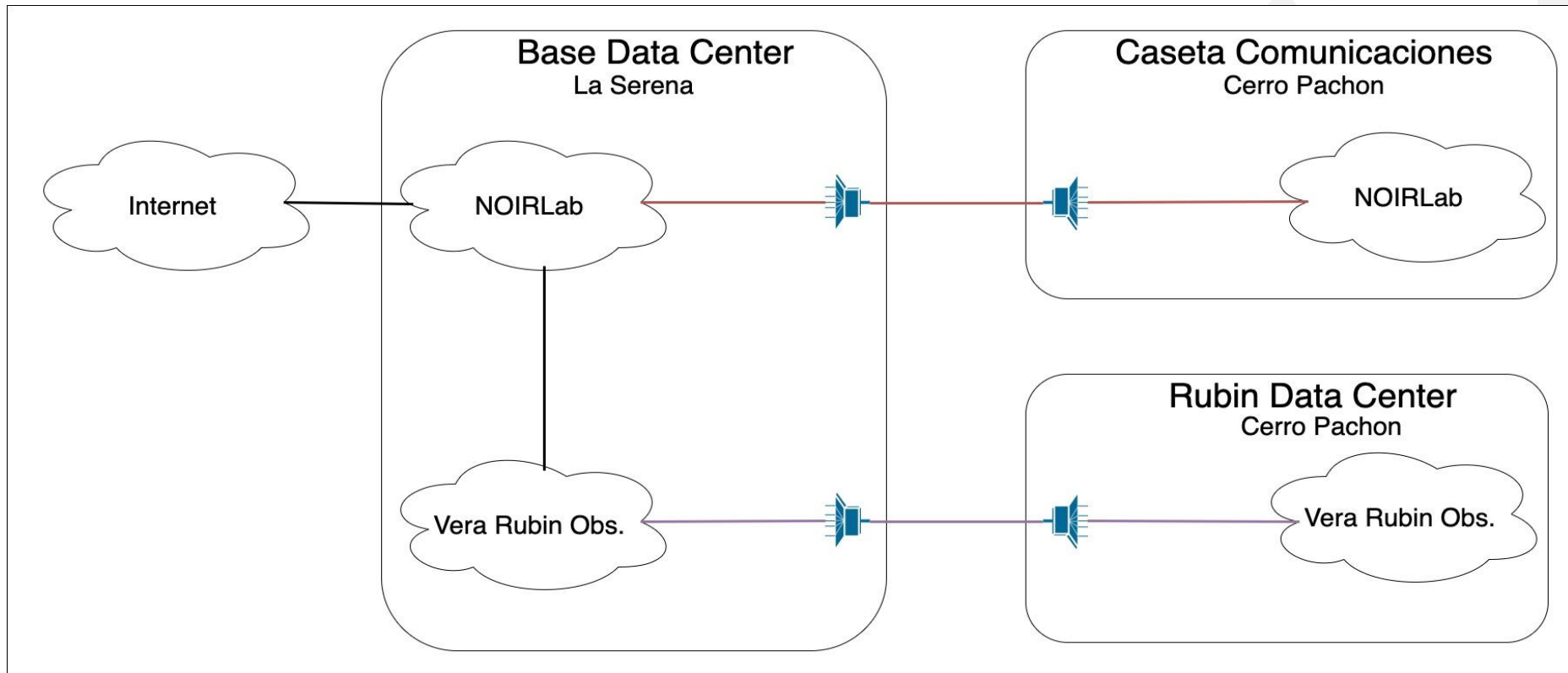4 Gbps Backup link through the coast
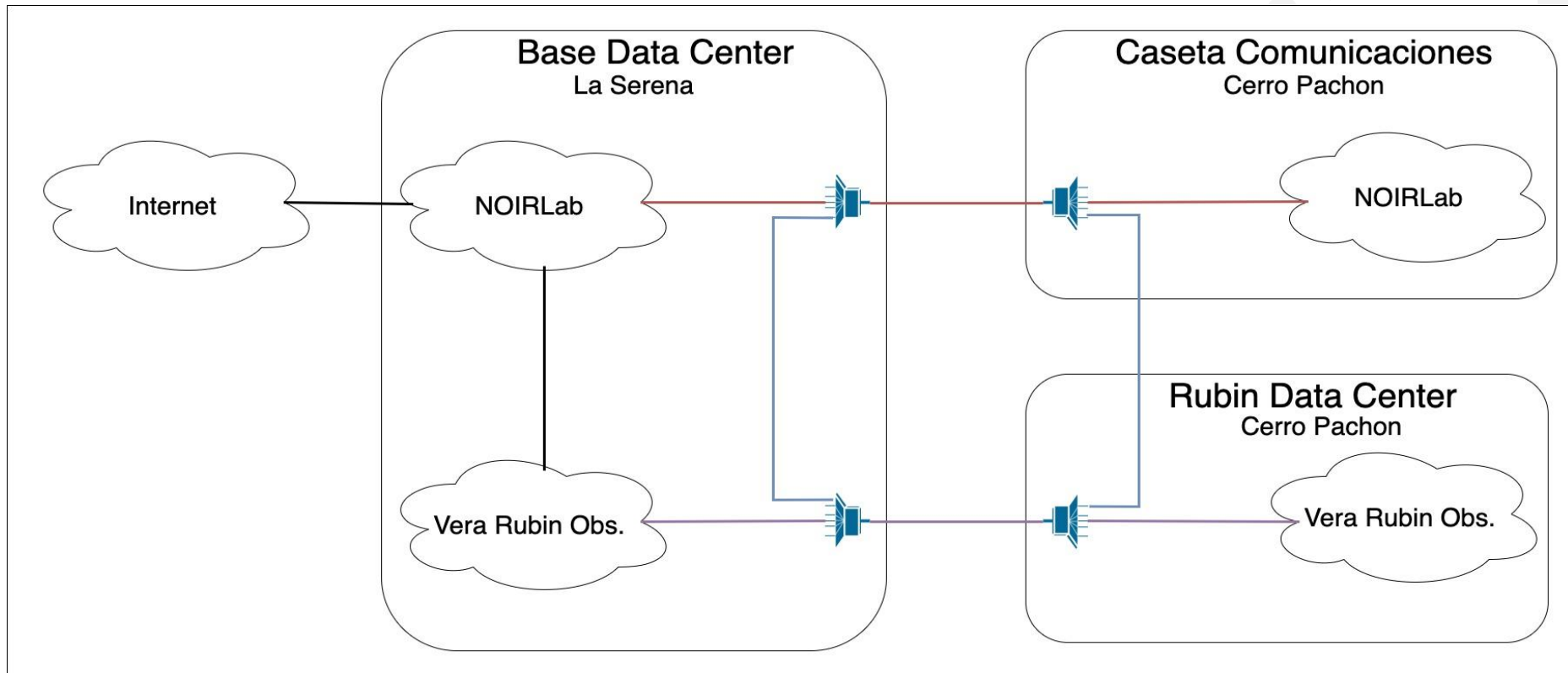
Cerro Pachón to La Serena
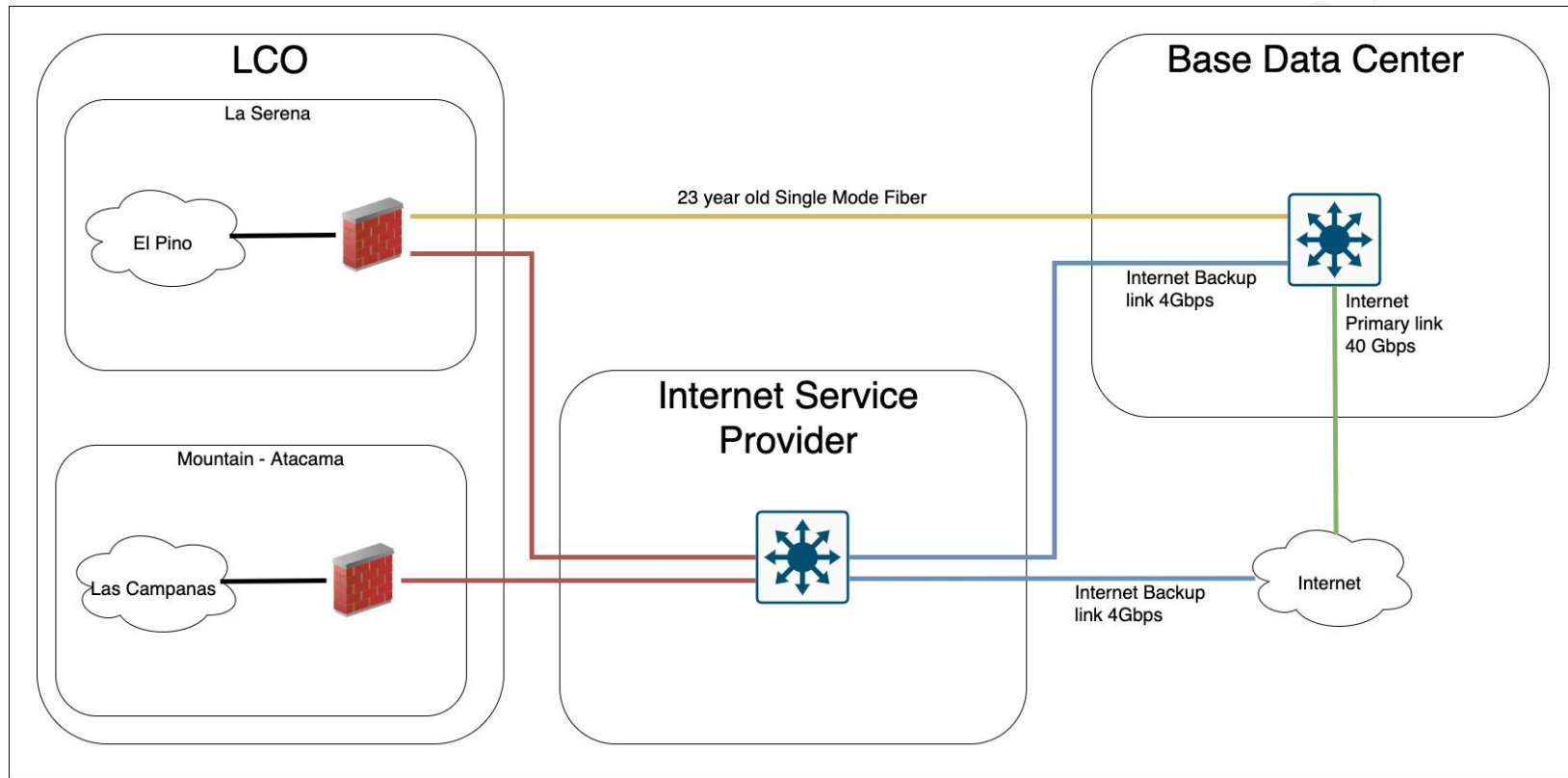
DWDM Improvements

DWDM Improvements

LCO Improvements

Program Integration

- Gemini & MSO Integration

- ITOps Improvements 2021

- NOIRLab Network Upgrade Project

Gemini & MSO Integration
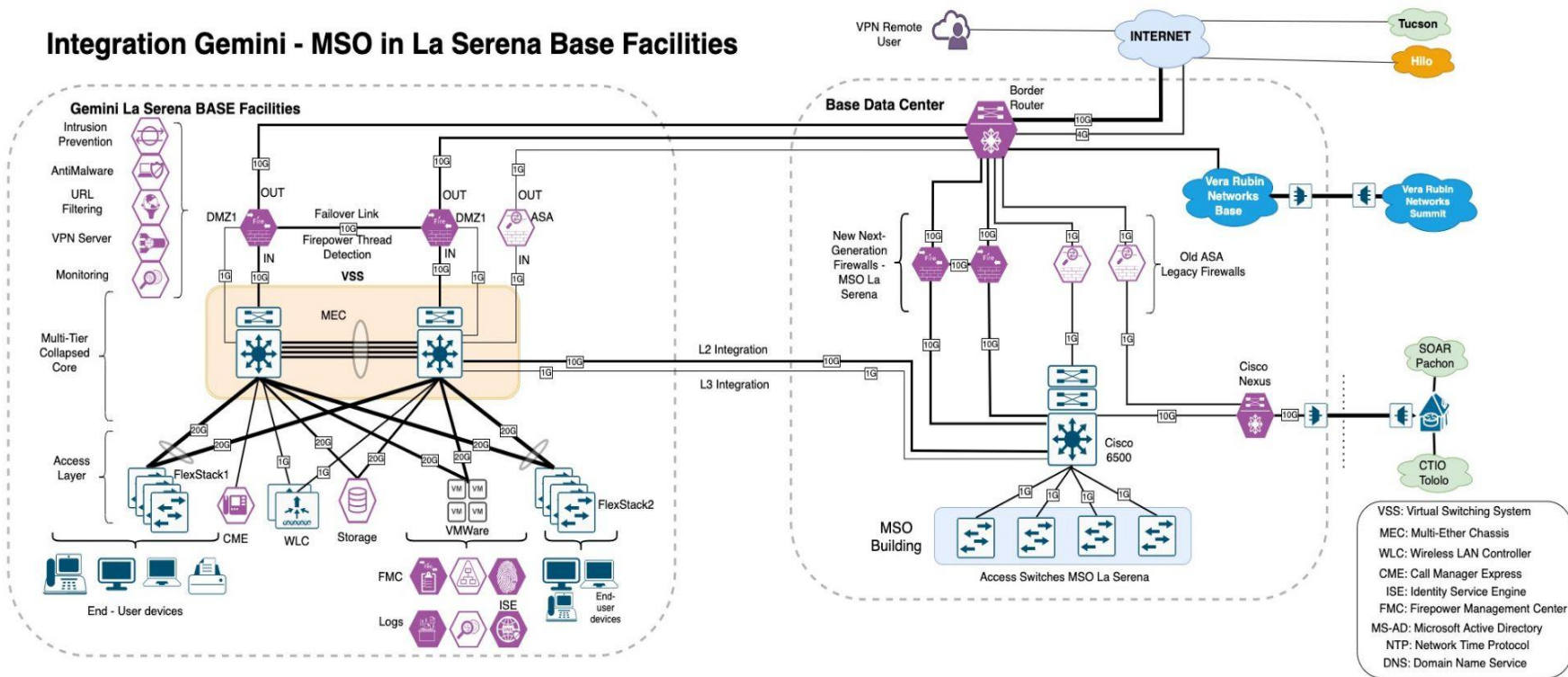
Activities During 2021

- In Layer 2 & L3: Sharing estrategic VLANs and routes between both Programs

- Developing the "NOIRLab Network Upgrade Project"
    - Wired : Defining new Core/Spine and Access/Leaf Topology
    - WiFi : Defining new equipment to integrate both NOIRLab Programs

- Firewall Upgrade : Completed NGFW migration on CTIO
    - SSL VPN : To provide encrypted connection to Authentication Servers

- VoIP: Modifying Dial-Peers to communicate between both VoIP Systems

Gemini & MSO Integration

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ITOps Improvements 2021

Next Generation Firewalls

- Increased number of Tunnel Profiles to Provide access to Remote users (GS, CTIO, GN)

- ResearchSOC Initiative (https://researchsoc.iu.edu/)

- CTIO Traffic Control moved to NGFW in SBF, legacy ASA Firewall VPN Server

- Implementation IPS, URL Filtering, Pre-Filtering

Software Upgrade on NX-OS Backbone devices

- NX-OS Upgrade on all Nexus devices that provide the connectivity to NOIRLab Backbone
  - AURA /NOIRLab Border Router
  - Head Border devices between SBF, Pachon Summit and Tololo Summit

Network Services & Collaborative Tools

- Authentication & Authorization :

  - Improvement ISE Nodes deployment, Licensing, Many new Policy Set Statements

- Centralized Service Desk (CSD)

- Unified productivity suite deployed to all NOIRLab Staff

Collaboration and Integration with Vera C. Rubin Observatory

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NOIRLab Network Upgrade Project

NOIRLab Networking Upgrade Project

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

Based on standard technologies the options available (Design phase) are :

- Traditional Multi-Tier design
  - Core - Distribution - Access Topologies
  - Stacking Topologies
- Fabric L2 Leaf-Spine (Using Multi-Link Aggregation - MLAG)

Requires studying vendor capabilities
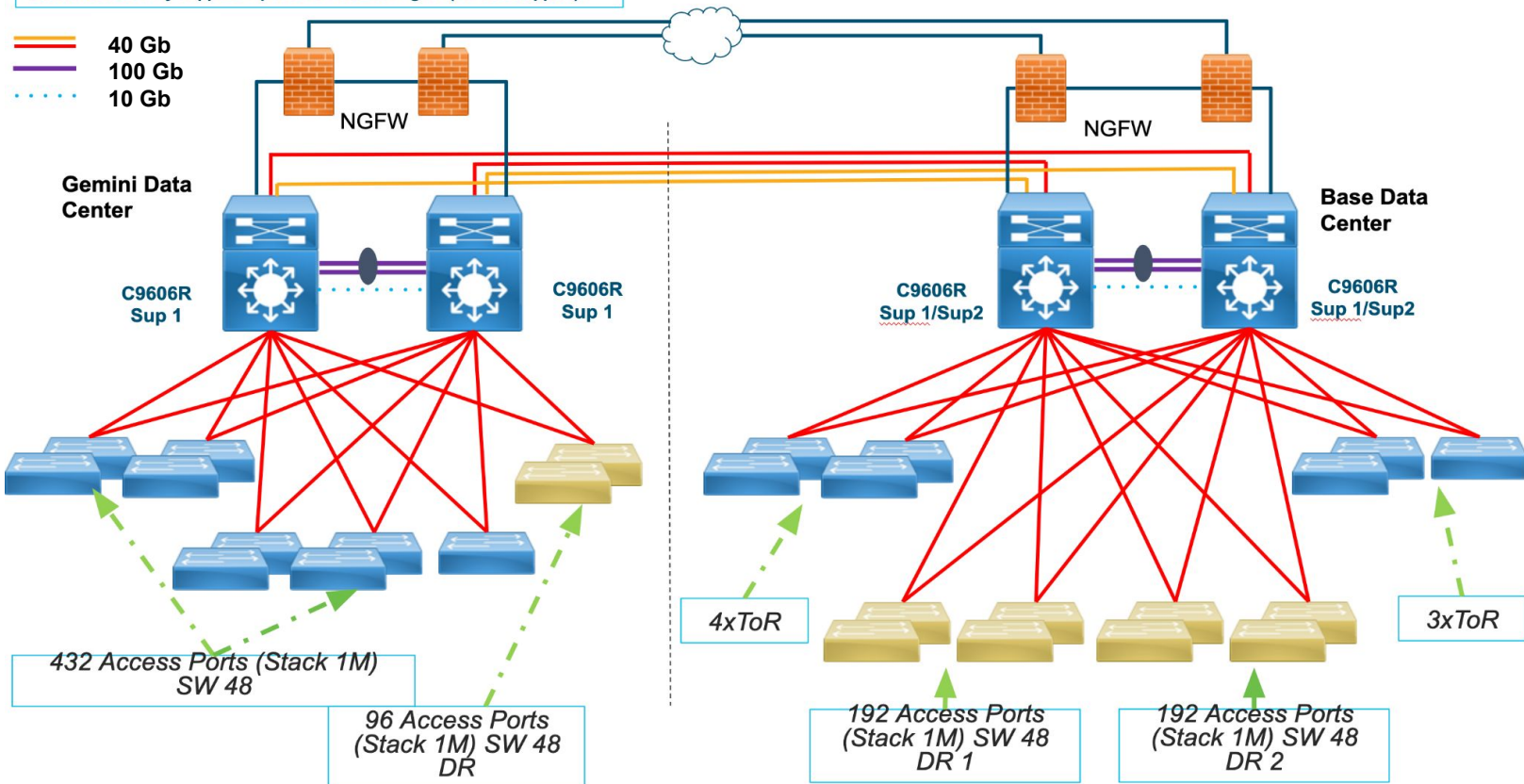
- Such as: Cisco - Arista - Aruba

~3 years to cover all locations
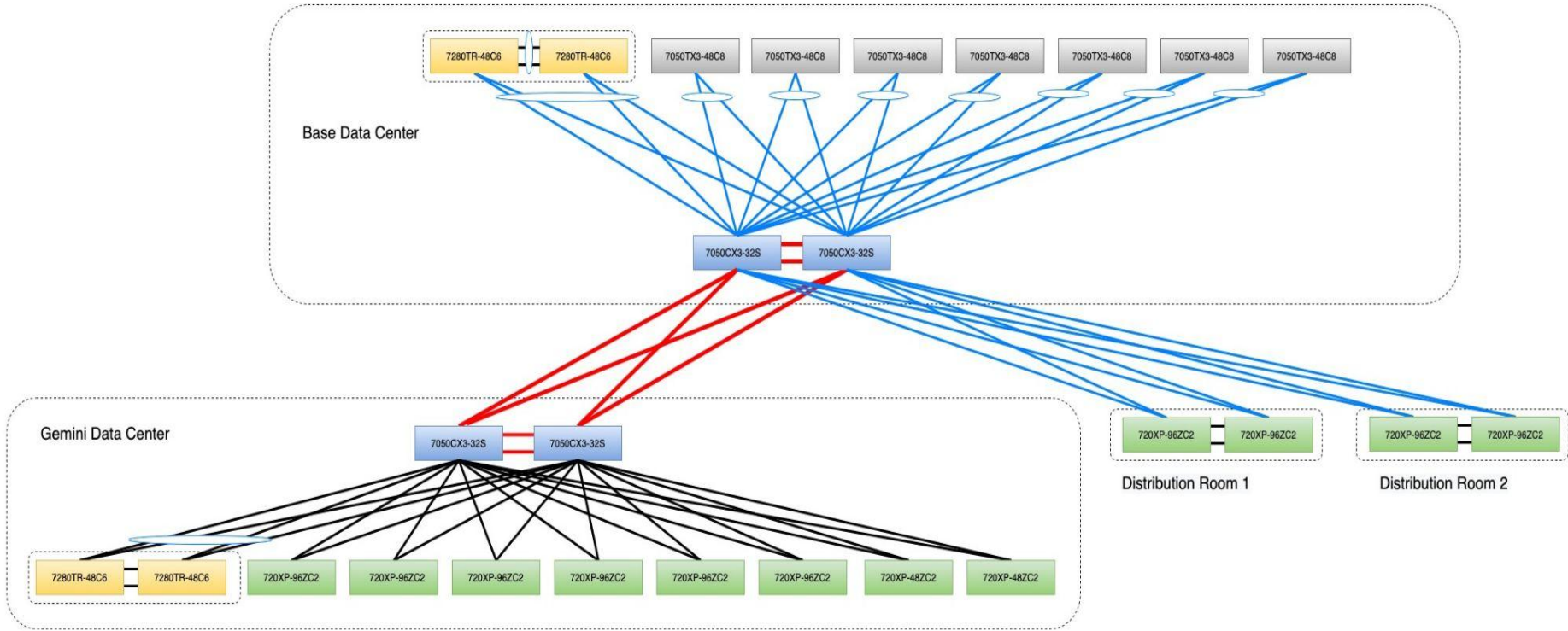
Will involve important NOIRLab stakeholders

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Preliminary LAN Design using Multi-Tier topology in SBF

C9600X-SUP-2 only supports speeds of 10GE or higher (no 1GE support).

40 Gb
100 Gb
10 Gb

NGFW

NGFW

Gemini Data Center

Base Data Center

C9606R Sup 1

C9606R Sup 1

C9606R Sup 1/Sup2

C9606R Sup 1/Sup2

4xToR

3xToR

432 Access Ports (Stack 1M) SW 48

96 Access Ports (Stack 1M) SW 48 DR

192 Access Ports (Stack 1M) SW 48 DR 1

192 Access Ports (Stack 1M) SW 48 DR 2

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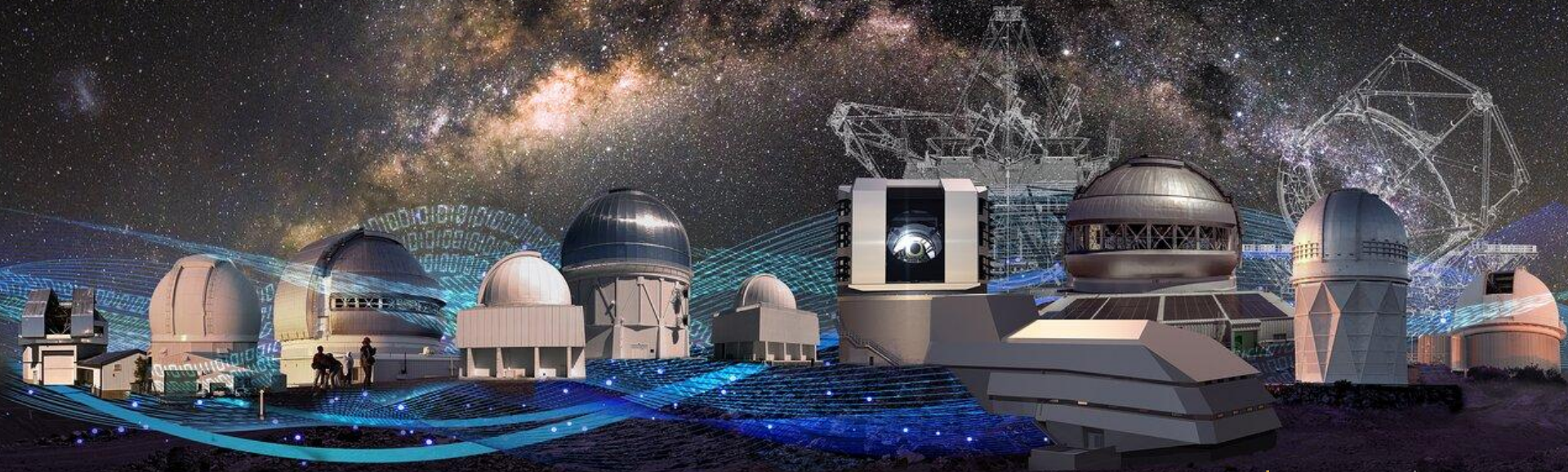# Preliminary LAN Design using L2LS (Arista Model)

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