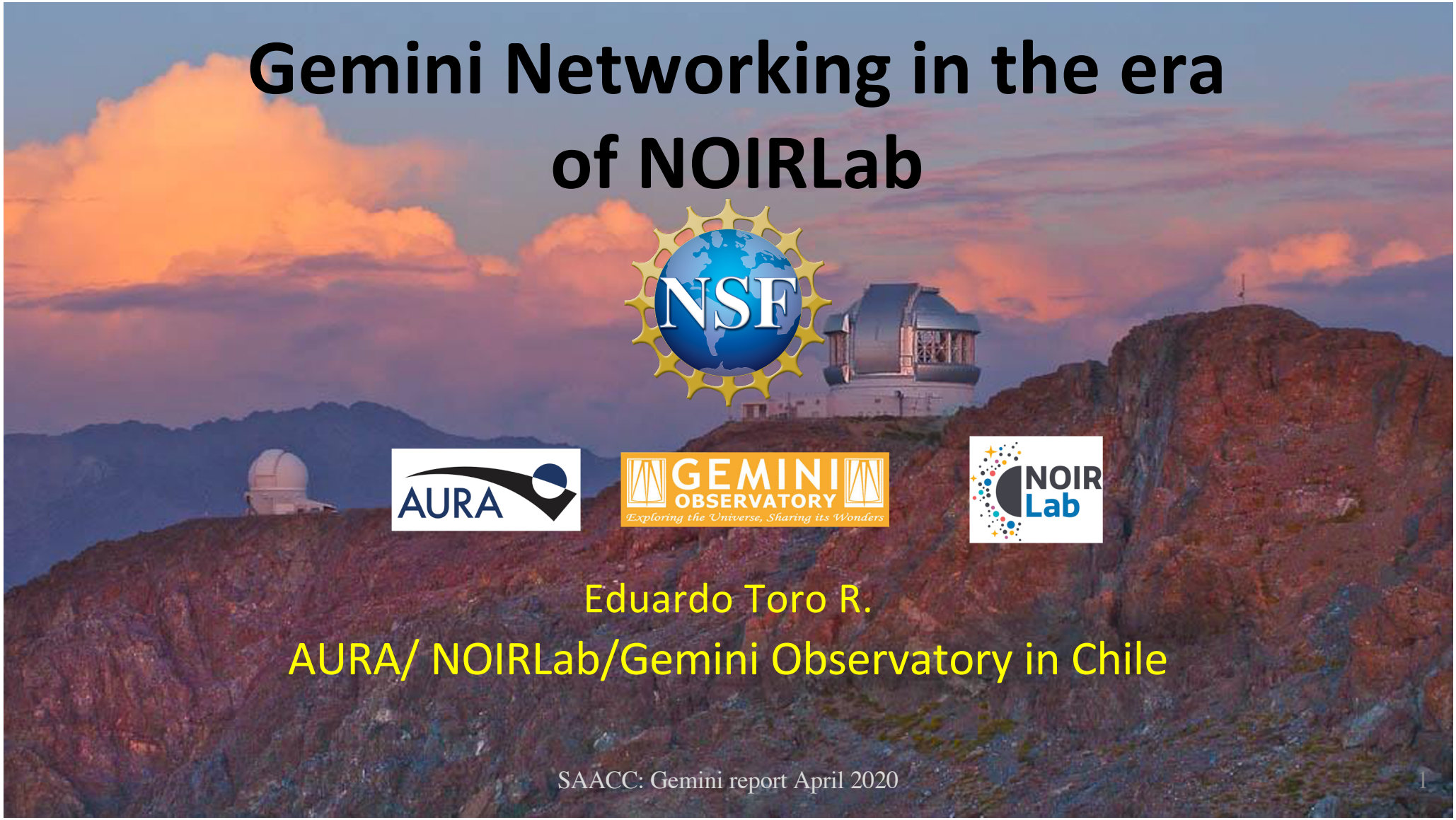
Gemini Networking in the era of NOIRLab



Eduardo Toro R.

AURA/ NOIRLab/Gemini Observatory in Chile

The Gemini Observatory Mission

"To advance our knowledge of the Universe by providing the International Gemini community with forefront access to the entire sky"

Gemini Observatory

“ One Observatory, Two Telescopes”

Gemini Telescopes

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

Gemini Partners

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

Gemini Observatory Data Centers

Gemini North

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

Gemini South

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

Key Use Cases:

- #1 = Base Facility Operations: High QoS
- #2 = Summit Base Data Transfer: High Bandwidth
- #3 = High Availability: Multiple Paths
- #4 = Cross-site Coordination, Hilo - La Serena: Low Latency
  - La Serena - Tucson
- #5 = Cloud Data Archiving: High Reliability

Gemini Network Use

- Remote Observing
  - Base Facility Operations

Gemini South staff Javier Fuentes and Joy Chavez conduct remote observations from the control room in La Serena, Chile.

- Instrumentation
  - Each Telescope is equipped with four instruments fed by advanced AO Systems:
    - GMOS
    - GSAOI
    - GPI
    - FLAMINGOS-2
    - GEMS
    - GCAL
    - **GHOST**
    - **SCORPIO**
  - Visiting Instruments
    - DSSI
    - Phoenix
    - IGRINS
    - ZORRO

Summit Base Data Transfer

Primary Channel

- Current :
  - SM Fiber DWDM, 40 Gb/s : Port-Channel 4x10Gb/s

Backup link

- Gemini/Telconor Link : 300 Mb/s (2 Microwave radios)

Multiple Paths: HA

Data Center Redundancy:

- Next-Generation FTD
- Core Switches
- Flexstack Technology
- Authentication Servers Virtualized (ISE)
- VmWare nodes
- Storage servers
- Backup Service
- Power and Cooling

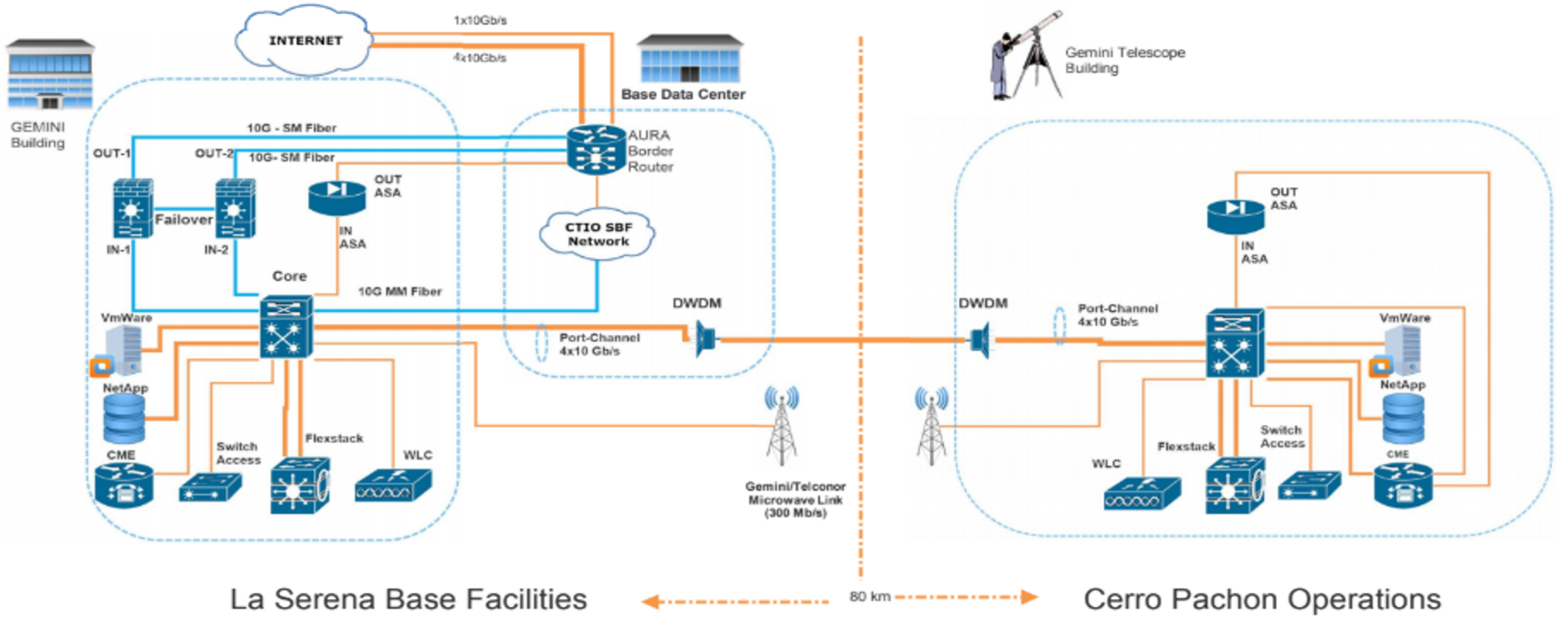
Fiber Optic :

- Port-Channels

Microwave Link:

- Two Radios 150 Mb/s
  - Gemini/Telconor

High level Diagram Gemini South



Author	Date	Version
Eduardo Toro R	April 11th 2020	1.0
Title: High Level Gemini South Diagram		

Cross Site Coordination

VPN L2L between :

- SBF and HBF
- SBF and MKO
- CPO and HBF
- CPO and MKO
- SBF and TBF
- SBF and MSO-CTIO

La Serena <=> Hilo

- Latency ~226 ms

La Serena ⇔ Tucson

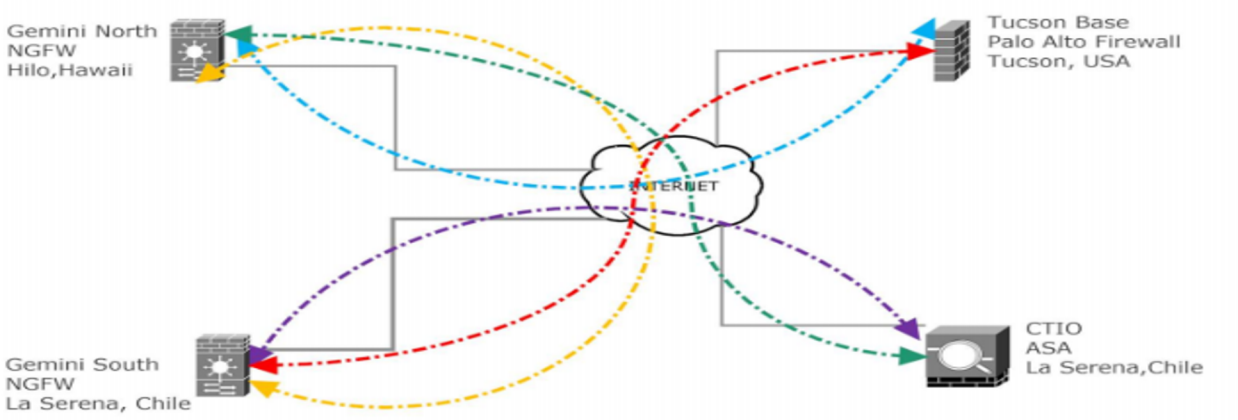
- Latency ~167 ms

Many Services in common:

- Mail and Google Apps
- ISE
- Active Directory
- DNS
- Zoom Conference Meetings

(HBF ⇔ Tucson ~64 ms)

VPN L2L Site Coordination



Site	Public IP
Gemini North	128.171.188.163
Tucson	140.252.104.20
Gemini South	139.229.33.7
CTIO-SBF	139.229.10.238

IPSec VPN L2L,GN-Tucson
IPSec VPN L2L,GN-GS
IPSec VPN L2L,GN-CTIO
IPSec VPN L2L,GS-Tucson
IPSec VPN L2L, GS-CTIO

Important upgrades 2019

- Upgrade to the Next Generation Firewalls
  - Migrating from old EoL equipment in 4 locations
  - Increased BW to the AURA Border router : DONE
  - Improvement using High availability: DONE
  - New features incorporated :
    - VPN L2L GS-GN : DONE
    - SSL VPN Anyconnect : 50 Licenses added
    - New IPS : DONE
    - AMP: In Progress
    - URL Filtering : In Progress

Cloud Data Archiving

- Fast and low cost Observatory data archive running on the cloud

- https://archive.gemini.edu/

GEMINI

- Important astronomical studies and discoveries summary on 2019:

Gemini Focus Link

(specially pages 27 - 47)

Gemini and NOIRLab

Gemini ITS is now part of one unity named the ITOps Department of NOIRLab. The new group is creating the sinergy and coordination with the whole IT´s group, to deliver efficient and effective IT throughout the organization.

- Knowledge transfer across Programs
- Increased support capacity
- Economies of scale
- Standardization of infrastructure
- https://nationalastro.org/

Gemini and NOIRLab

Current NOIRLab Projects:

- Centralized Authentication and Authorization Service Implementation
- Email,Calendar and Collaboration Project
- DNS NOIRLab Project
- VoIP System Alignment
- Centralized Video Conferencing

Thanks