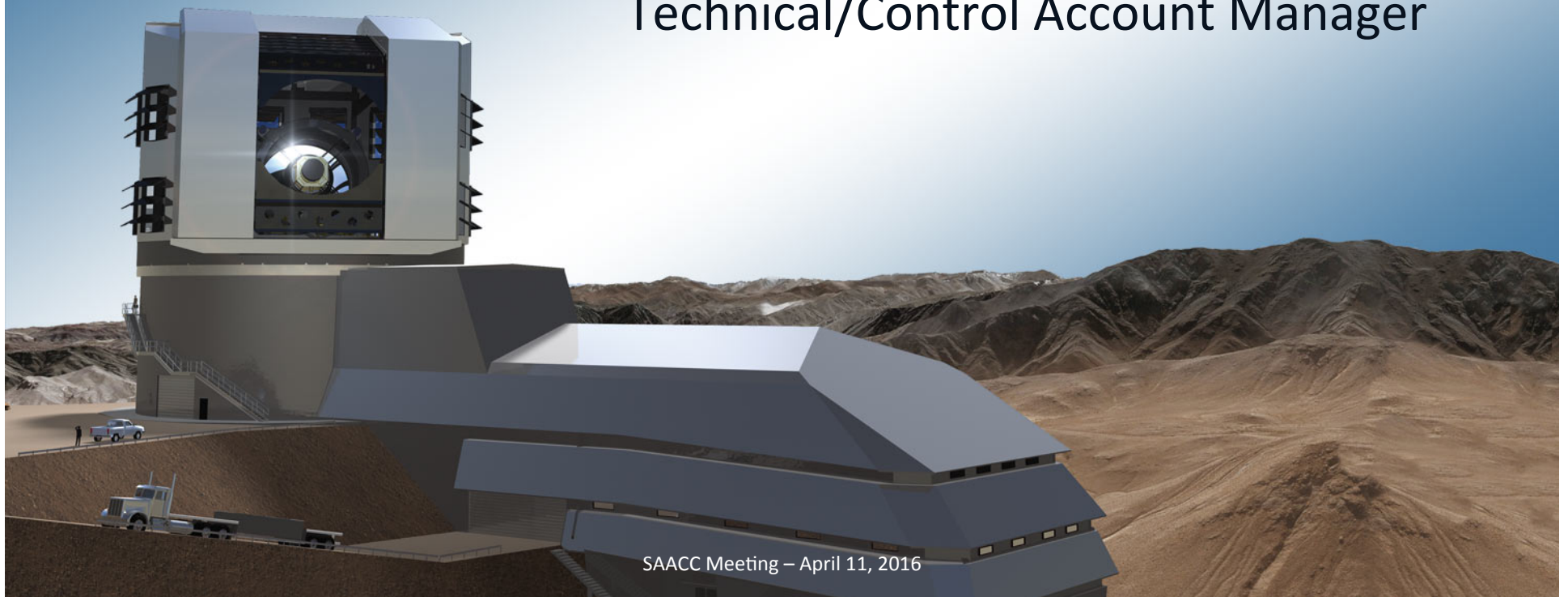




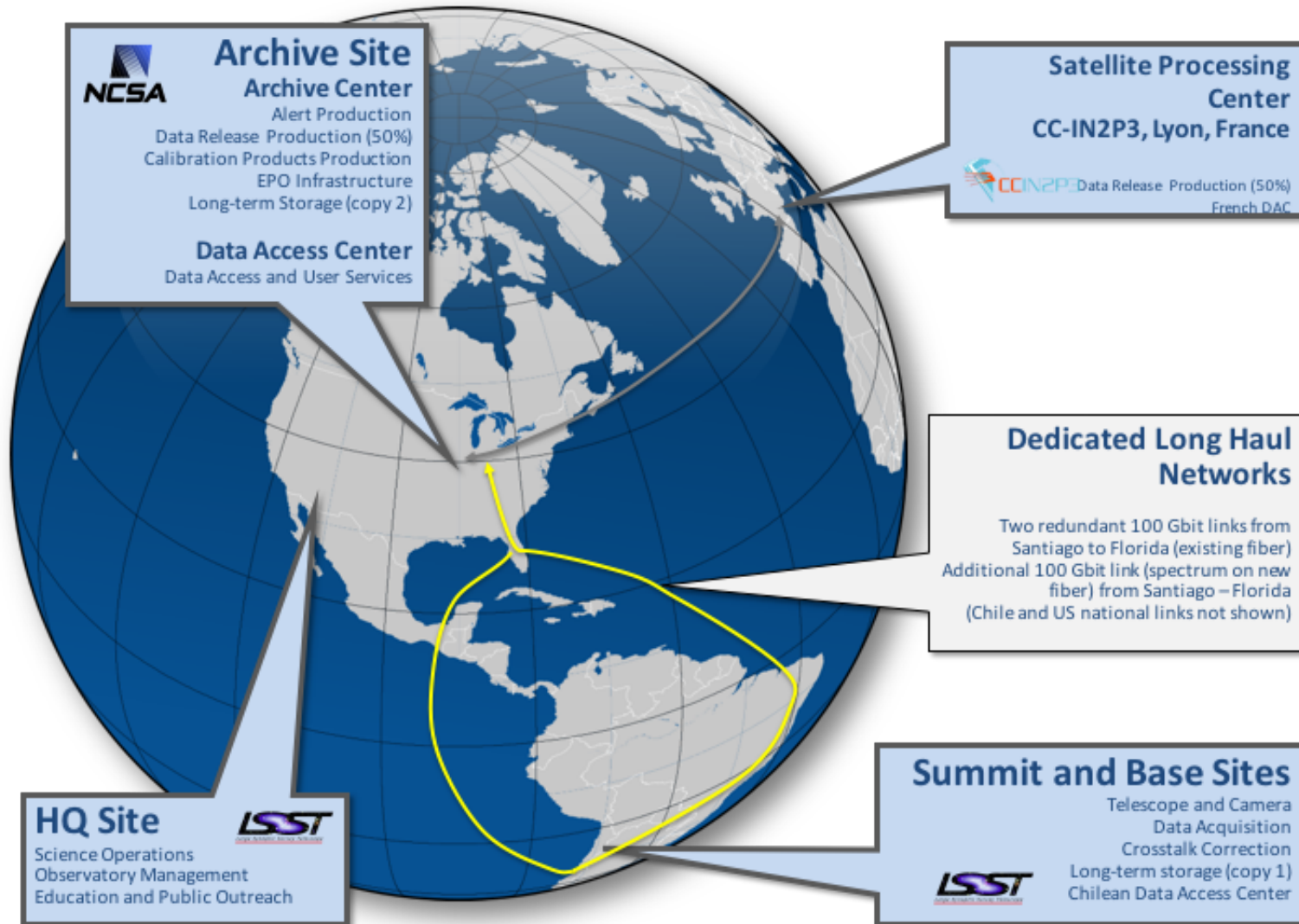
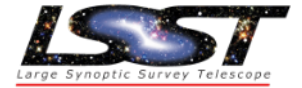
LSST Long Haul Networks

Jeff Kantor

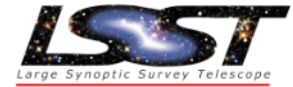
International Communications and Base Site
Technical/Control Account Manager



LSST International Networks



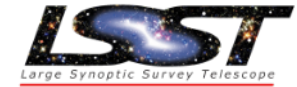
FY15 – FY19 Chilean LSST Network Fiber Contracts



- REUNA (#1): Santiago-La Serena fiber
 - 18 yr Irrevocable & Exclusive Use (IEU)
 - IEU of up to 10 wavelengths/channels on 1 pair
 - Will “light” one (1) 100Gbps channel
 - IEU of a diverse path backup link of >40Gbps
 - \$5,760,000 USD (signed; in progress)
- REUNA (#1A): La Serena-Gatehouse fiber
 - 18 yr IEU of 2 pairs
 - Baseline plan is to “light” 2 channels per pair, one nominally LSST specific and one nominally AURA Backbone and LSST backup
 - \$868,500 USD (to be amendment to Contract #1)
- Telefonica (#3): Gatehouse-Summits
 - Installation of 12 fiber pairs; wholly owned by AURA
 - Connecting Gatehouse to both Pachon and Tololo; ring topology an upgrade option, not implemented in current baseline
 - \$331,500 USD (under negotiation)



Chilean LSST Network Additional Contracts



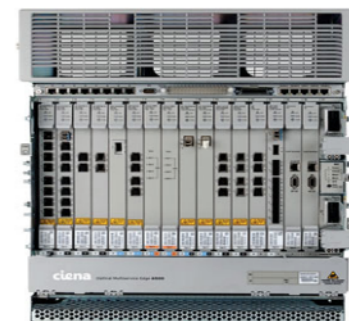
- Contract Negotiation Consultancy (FY15 – FY16)
 - Domain Expert Fernando Liello
 - Actively participating in all contract negotiations, including Telefonica fiber contracts (Santiago-La Serena, La Serena-Gatehouse, and Gatehouse-Summits) and Equipment purchase
 - \$240,000 USD (signed; in progress)
- Equipment Purchase (FY16)
 - DWDM equipment capable of lighting multiple wavelengths on fibers
 - Covers equipment for both Santiago-La Serena and La Serena-Summits fiber networks
 - Budgeted at \$1,400,000 USD
- Operations/Service Level Agreement (Operations Phase)
 - REUNA will provide full operations of Santiago-La Serena link for \$60,000 USD/yr
 - REUNA will manage maintenance and repair of La Serena-Summits link for \$25,000 USD/yr



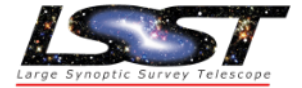
INFINERA



CIENA 6500



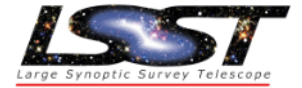
International Networks Agreements are Signed with FIU



- 100G Ethernet ring until 2032
 - Subcontractor to FIU includes LATIN AMERICAN NAUTILUS (Telecom Italia)
 - LSST contribution:\$9.6M
 - Total cost approximately \$42M
 - NSF further contribution \$4m
 - No further investor clause ensuring LSST 2018-2032 ring
-
- Combination of investors
 - LSST direct investment \$4.6M
 - Total system expense \$90M
 - Provides primary, exclusive LSST path Santiago-Boca Raton

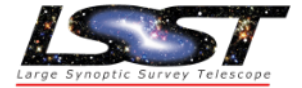


Last 6 months progress



- La Serena - Santiago Network
 - The contract was signed w/REUNA
 - The new primary backbone fiber was installed
 - The existing secondary fiber was prepared for use up to 4 Gbps
 - The 10 Gbps initial capability end equipment was ordered
- Mountain - Base Network
 - The Summits - AURA Gatehouse contract w/Telefonica and La Serena - AURA Gatehouse contract w/REUNA were signed
 - The La Serena - AURA Gatehouse fiber was installed
 - The Summits - AURA Gatehouse baseline fiber path on power line posts is being evaluated for reliability and maintainability. A portion or all of the fiber may be “armored” fiber, and may be installed underground, some posts may be replaced or added. There is up to 6 month delay in this segment, but over a year of float remains

Last 6 months progress



– International Network

- The contract was signed w/FIU Amlight
- The subcontract with Latin American Nautilus was signed to ensure protected capacity for LSST
- Interim equipment was procured to test Sao Paolo - Miami segments

– US National Network

- Preliminary discussions were conducted with ESNet to confirm that LSST will request ESNet support