ALMA AOS/OSF-SCO Communication Infrastructure and Chajnantor CONNECTIVITY via it

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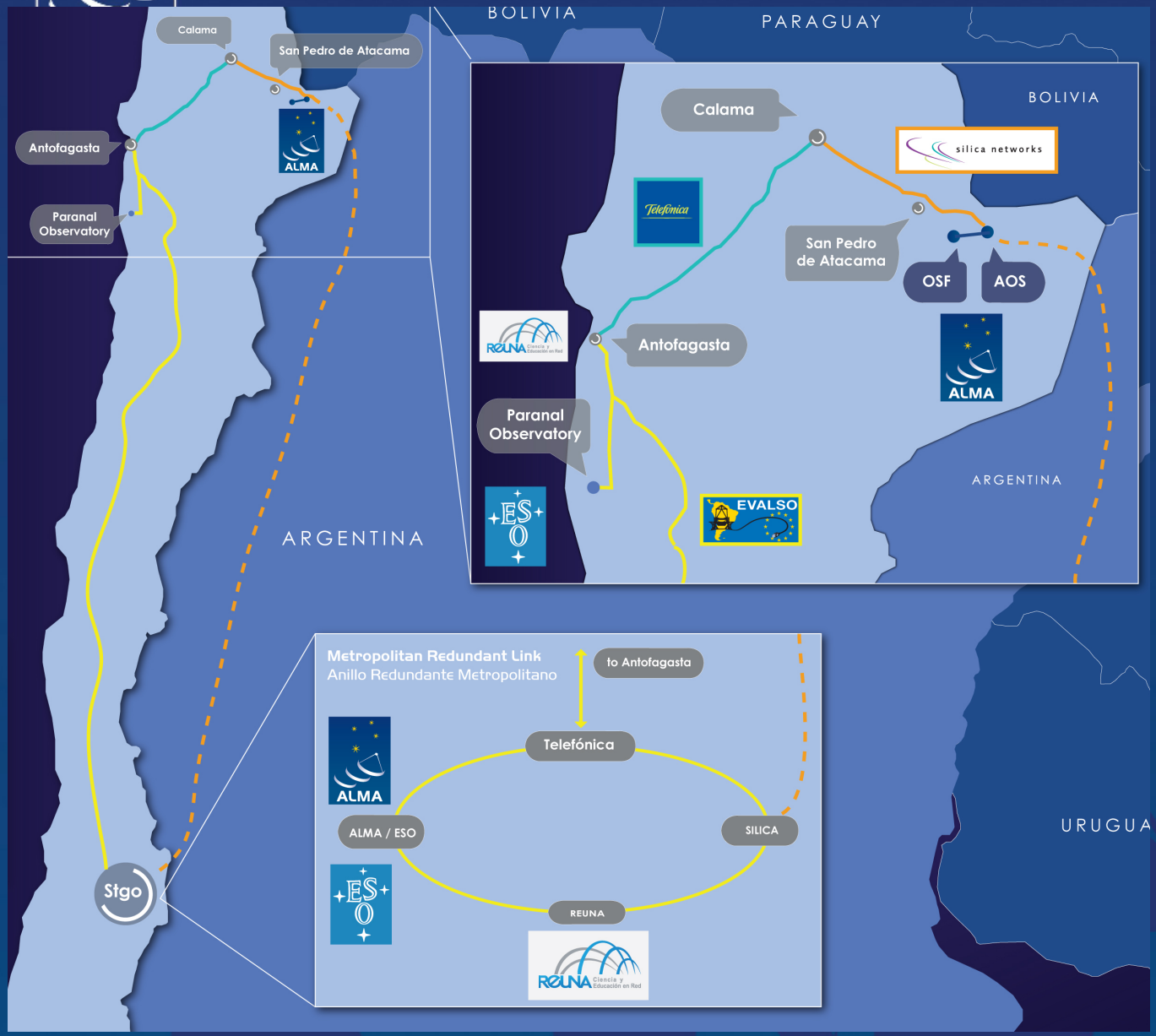
Architecture of the communication system



1. A dark fiber pair between AOS and CALAMA (about 150km): this comes from a newly built fiber cable.

2. A dedicated LAMBDA between CALAMA and the REUNA Point of Presence (PoP) in ANTOFAGASTA (about 200 km).

3. A dedicated sub-LAMBDA between the REUNA PoP in ANTOFAGASTA and the SCO at the Vitacura Campus in Santiago: this is indeed configured on the existing EVALSO backbone.

4. A dark fiber pair between AOS and the town of SAN PEDRO (20XX).

5. A dedicated LAMBDA between AOS and Santiago via Argentina (20XX).

(Nearly) OPERATIONAL

Due to administrative hiccups, (still) used in “test mode”, but at full functionality.

Design specs fully confirmed:

- Delay (PING) between OSF and SCO around 25msec (same for both links).
- Transfer rates up to 1Gbps on each of the two channels

A DAY IN THE LINKS LIFE

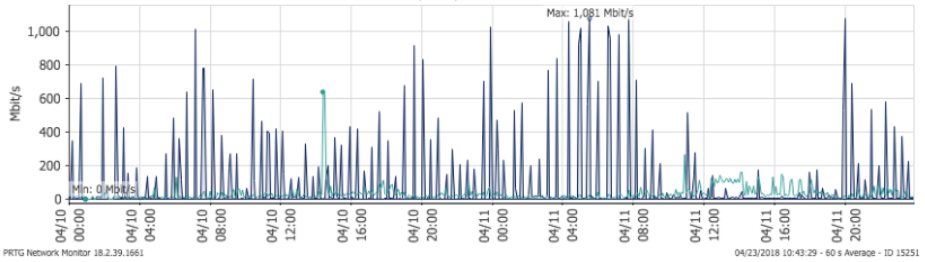
Since Feb2018, ALMA uses the two channels in balanced mode, i.e., they are not specialized any longer for scientific data and remaining data. Also the upgrade of the core routers at AOS allows now to use the full capability of the links (the communication peaks at the maximum nominal value more often).

PRTG NETWORK MONITOR

Report for **(Ethernet1/20) Link REUNA1 to N-CR-211.aos Traffic**

Report Time Span:	04/10/2018 00:00:00 - 04/11/2018 23:59:00					
Sensor Type:	SNMP Traffic 64bit (30 s Interval)					
Probe, Group, Device:	Cluster Probe > Rack 18 (CORE) > N-CR-101.sco					
Cluster Node:	PRTG SCO					
Uptime Stats:	Up:	100 %	[1d23h59m46s]	Down:	0 %	[0s]
Request Stats:	Good:	100 %	[5757]	Failed:	0 %	[0]
Average (Traffic In):	34 Mbit/s					
Total (Traffic In):	719,854,371 KByte					

Sensor: (Ethernet1/20) Link REUNA1 to N-CR-211.aos Traffic
Rack 18 (CORE) / N-CR-101.sco



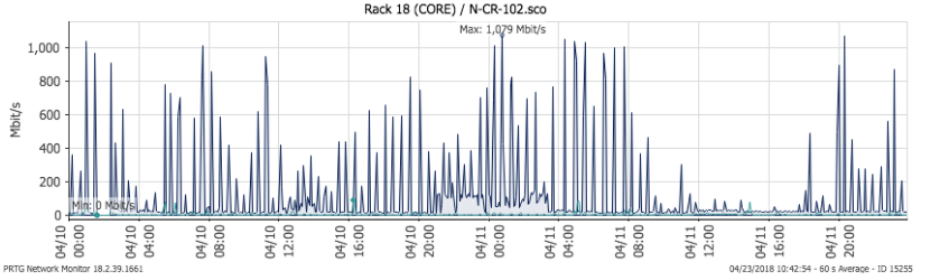
PRTG Network Monitor 18.2.39.1661 — 04/23/2018 10:43:29 - 60 s Average - ID 15251

PRTG NETWORK MONITOR

Report for **(Ethernet1/20) Link REUNA2 to N-CR-212.aos Traffic**

Report Time Span:	04/10/2018 00:00:00 - 04/11/2018 23:59:00					
Sensor Type:	SNMP Traffic 64bit (30 s Interval)					
Probe, Group, Device:	Cluster Probe > Rack 18 (CORE) > N-CR-102.sco					
Cluster Node:	PRTG SCO					
Uptime Stats:	Up:	100 %	[1d23h59m38s]	Down:	0 %	[0s]
Request Stats:	Good:	100 %	[5757]	Failed:	0 %	[0]
Average (Traffic In):	63 Mbit/s					
Total (Traffic In):	1,317,726,538 KByte					

Sensor: (Ethernet1/20) Link REUNA2 to N-CR-212.aos Traffic
Rack 18 (CORE) / N-CR-102.sco



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OPERATIONAL REPORTS

- Provided by REUNA since September 2015.
- Report on system performance, single downtime events, both planned and unplanned.
- Provides statistics on availability

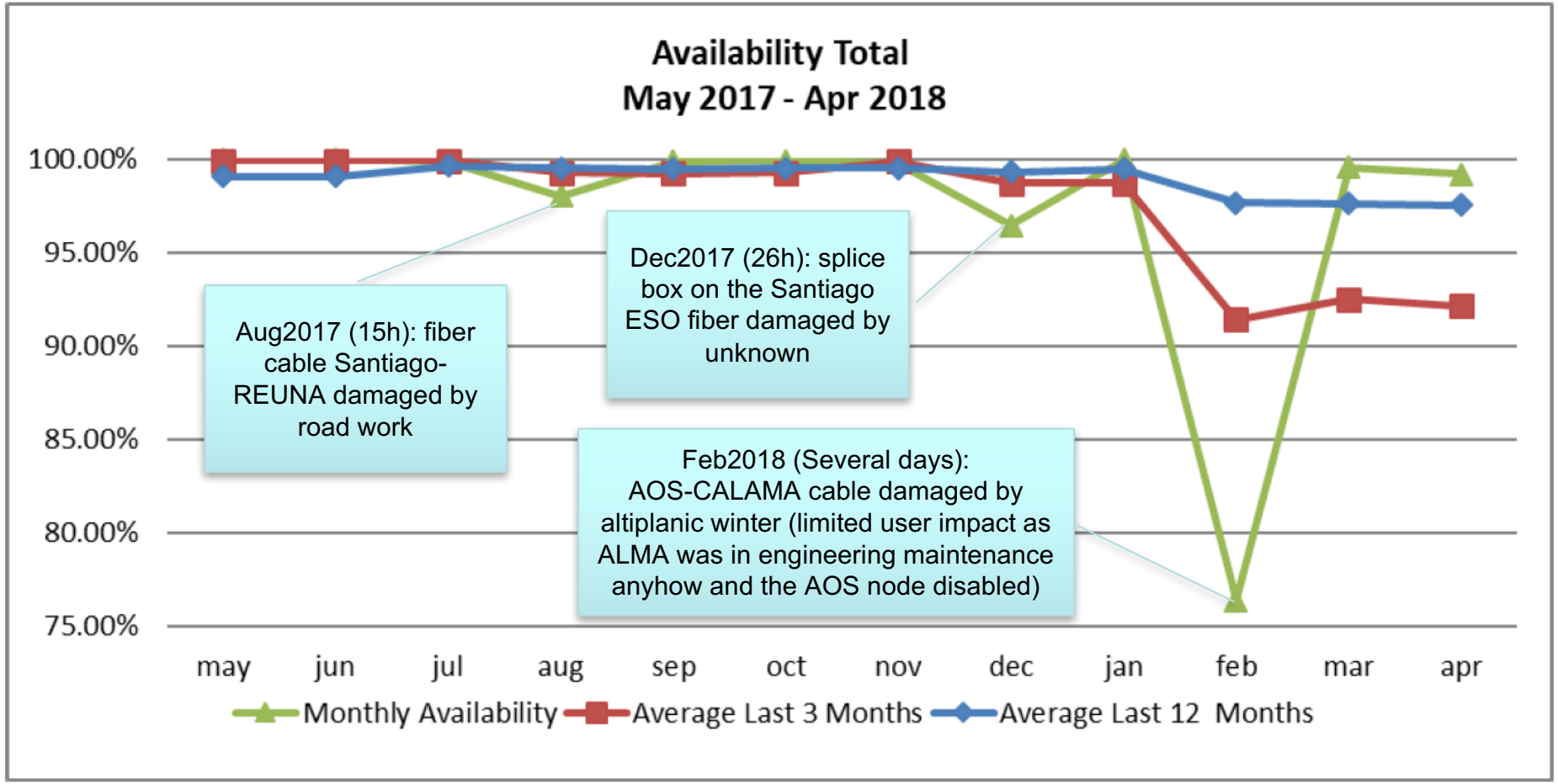
Periods:

- Month: Apr 2018, 30 days, 720 hours
- Trimester: Feb 2018 to Apr 2018
- Year: May 2017 to Apr 2018, 365 days, 8760 hours

Availability	Monthly			Yearly		
	Uptime [hours]	Downtime [hours]	Availability [%]	Uptime [hours]	Downtime [hours]	Availability [%]
Planned	720	0	100%	8751,42	8,58	99,90%
Unplaned	714,1	5,9	99,18%	8555,44	204,56	97,66%
Total	714,1	5,9	99,18%	8546,9	213,14	97,57%

AVAILABILITY LAST 12 MONTHS

REUNA
Ciencia y Educación en Red



Chajnantor Key Enablers

- The presence of a fiber cable in the Chajnantor area that connects to Calama and the Chilean communication backbone

- The availability of the policy for “Non-ALMA projects and experiments approval in the ALMA concession”

- The intention to create a REUNA Point of Presence at AOS

→ open to the possibility of fiber-based class communication for Astronomical Facilities in Chajnantor .

REUNA PoP@ALMA-AOS

ALMA is working closely with REUNA for the creation of a Point of Presence (PoP) at the ALMA AOS Technical Building, so that REUNA could be able to provide general communication services once a project has connectivity to the ALMA Technical Building.

As part of this effort, an end-to-end simulation has been done in collaboration with the Simons Observatory that demonstrated the feasibility of the concept (see previous presentation).

Building on this, ALMA will start progressing in the formalization of an agreement with REUNA.

Alternatively, a non-ALMA project can choose to connect with other provider.

LAST MILE

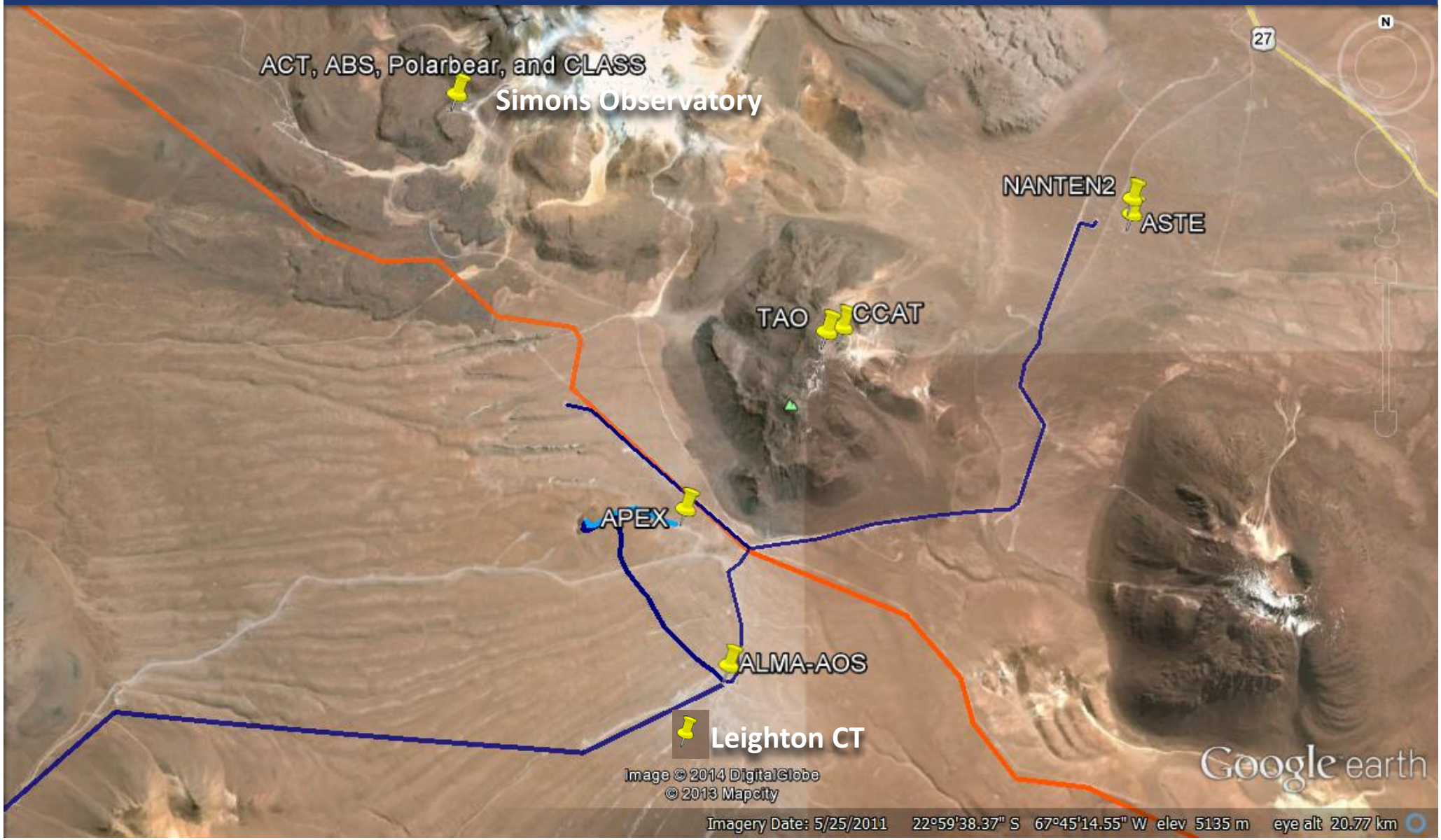
To be able to reach that REUNA PoP@ALMA-AOS a project may consider to ask access to some of the existing ALMA fibers already present in the plateau.

Therefore, a project may consider to apply for the “Non-ALMA projects and experiments approval in the ALMA concession” to verify the eligibility from the project to access ALMA resources.

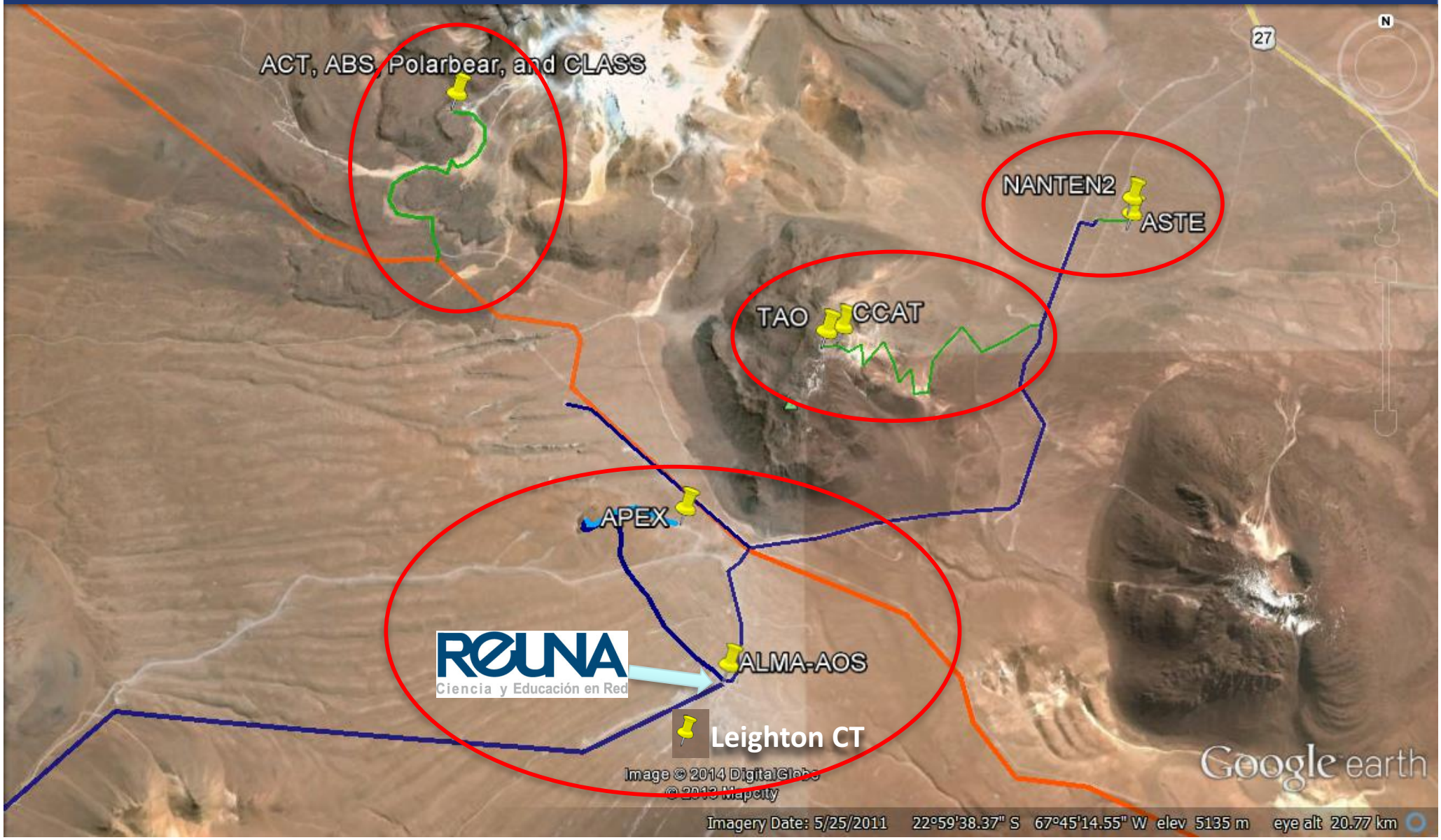
Once the collaboration has green light, technical implementation for the connectivity to PoP can be discussed.

Atacama Large Millimeter/submillimeter Array

Existing Fiber Cables as of 2017 Chajnantor



EXAMPLES of possible connections to existing cables



COMMUNICATION ACCESS

Type of services and conditions will have to be discussed directly between a given project and REUNA.

As of today, REUNA can provide connection by peering to the commercial INTERNET as well as to the Academic Networks in Latin America, North America, Europe, and East Asia.

REUNA is also partner of the BELLA project that aims to deliver a high speed link between LA and EU.

Atacama Large Millimeter/submillimeter Array

Thanks!

In search of our Cosmic Origins