RNP update

SAACC Engineering meeting
Florida International University, Miami
January 10th & 11th, 2017

Eduardo Grizendi, Engineering & Operations

eduardo.grizendi@rnp.br

Michael Stanton, Research & Development

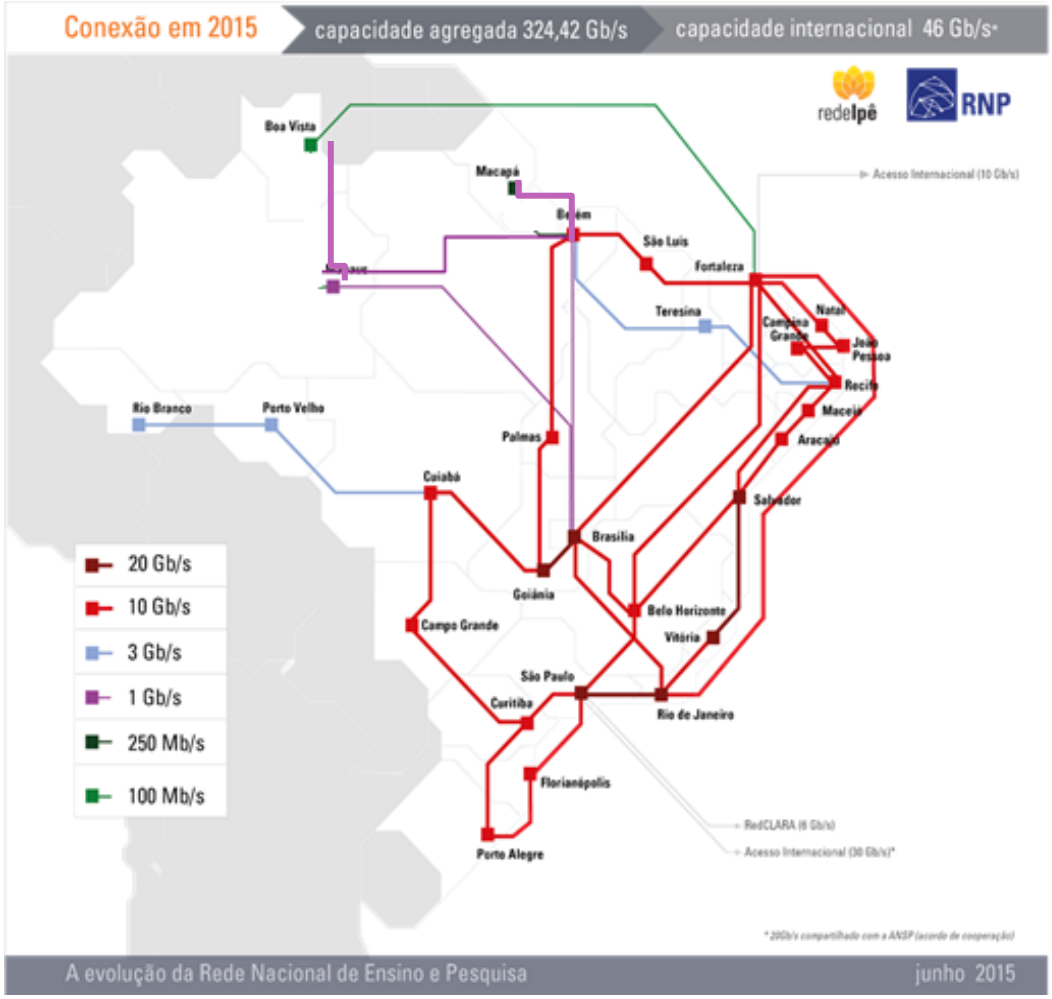
michael@rnp.br

Agenda

- RNP National Backbone & International connections - status & limitations
- Metro and other access networks
- Backbone 100 G
- LSST Project and RNP

Current RNP Backbone – Limitations

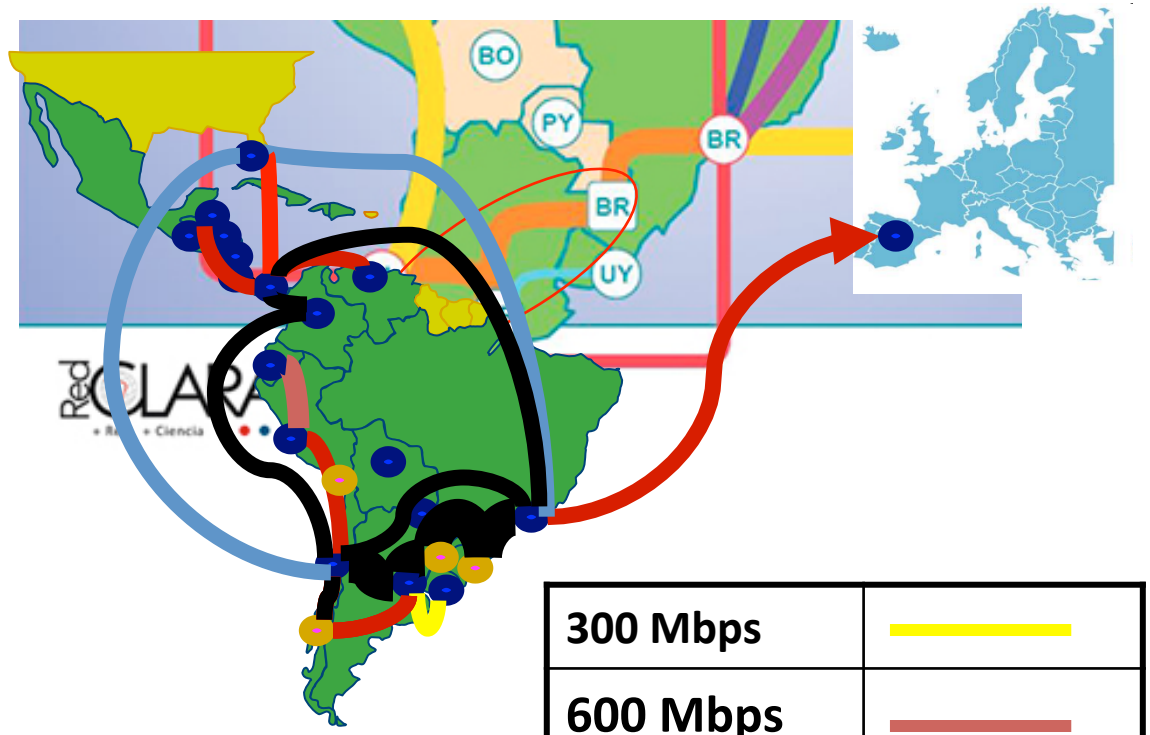
- Use of 1, 3 and 10 G circuits of Telecom Companies
- Not scalable
  - Upgrade for 100 G practically impossible with current companies.



Current International Links

BR - AL (together with RedCLARA)

- Brazil - Argentina
  - Partners: RNP, RedCLARA & Innova-red (Argentina)
  - Level3 dark fiber, n × 10 G, 15 years
  - In operation since 2012
- Other connections to Latin America, USA and Europe

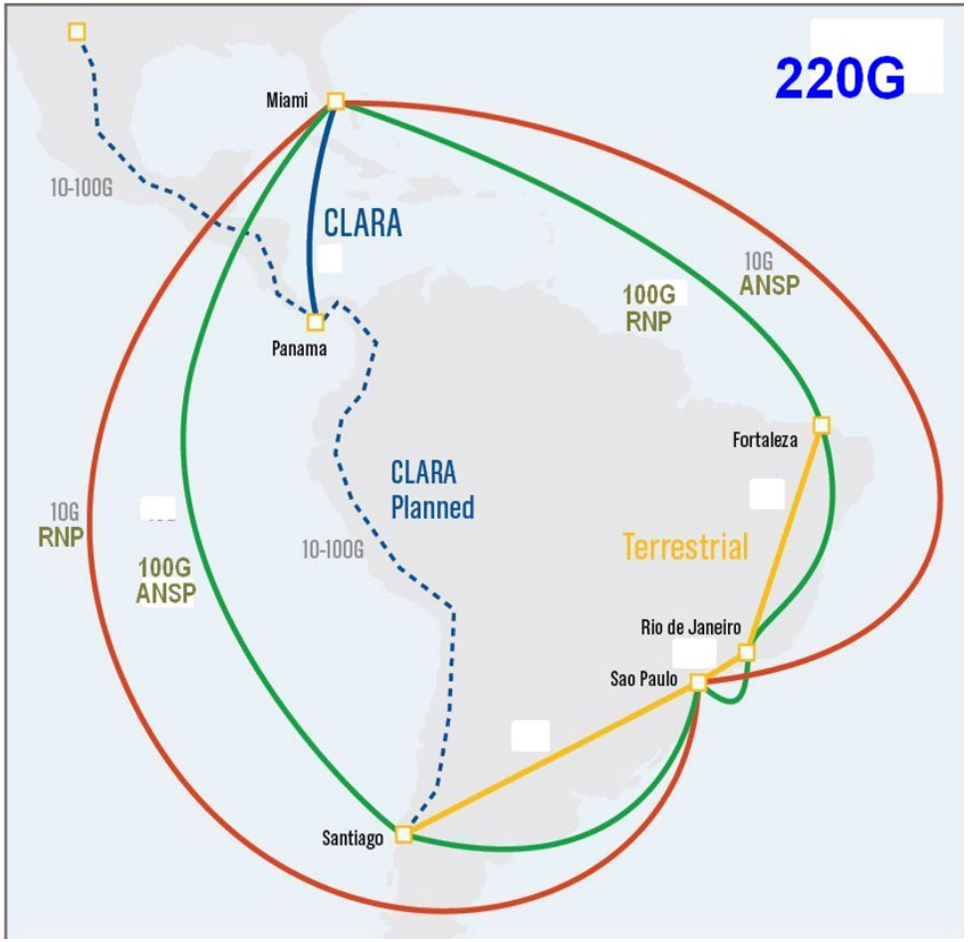


300 Mbps	
600 Mbps	
≧1 Gbps	
≧ 10 Gbps	

Current International Links

BR – EUA w/ AMLIGHT:

- Alliance w/ FIU & ANSP (São Paulo Academic Network)
- 110 G + 110 G by Atlantic and Pacific Oceans
- Interconnection points:
  - São Paulo and Fortaleza (BR), Santiago (CL)
- Redundancy: 4 physically diverse submarine cable routes
  - (100 + 10) G + (100 + 10) G = 110 G + 110 G = 220 G

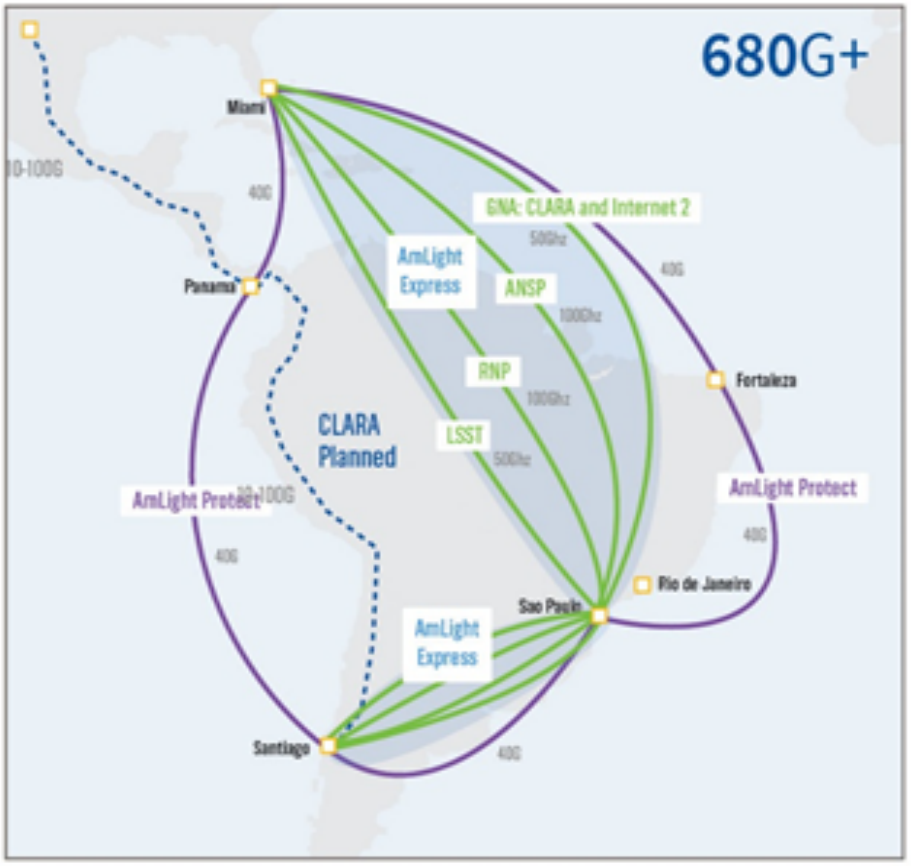


New submarine cables & RNP

- Use of Monet Cable in LSST Project
- Use of Ellalink in BELLA Project
- Use of SACS and Monet in AARCLight Project

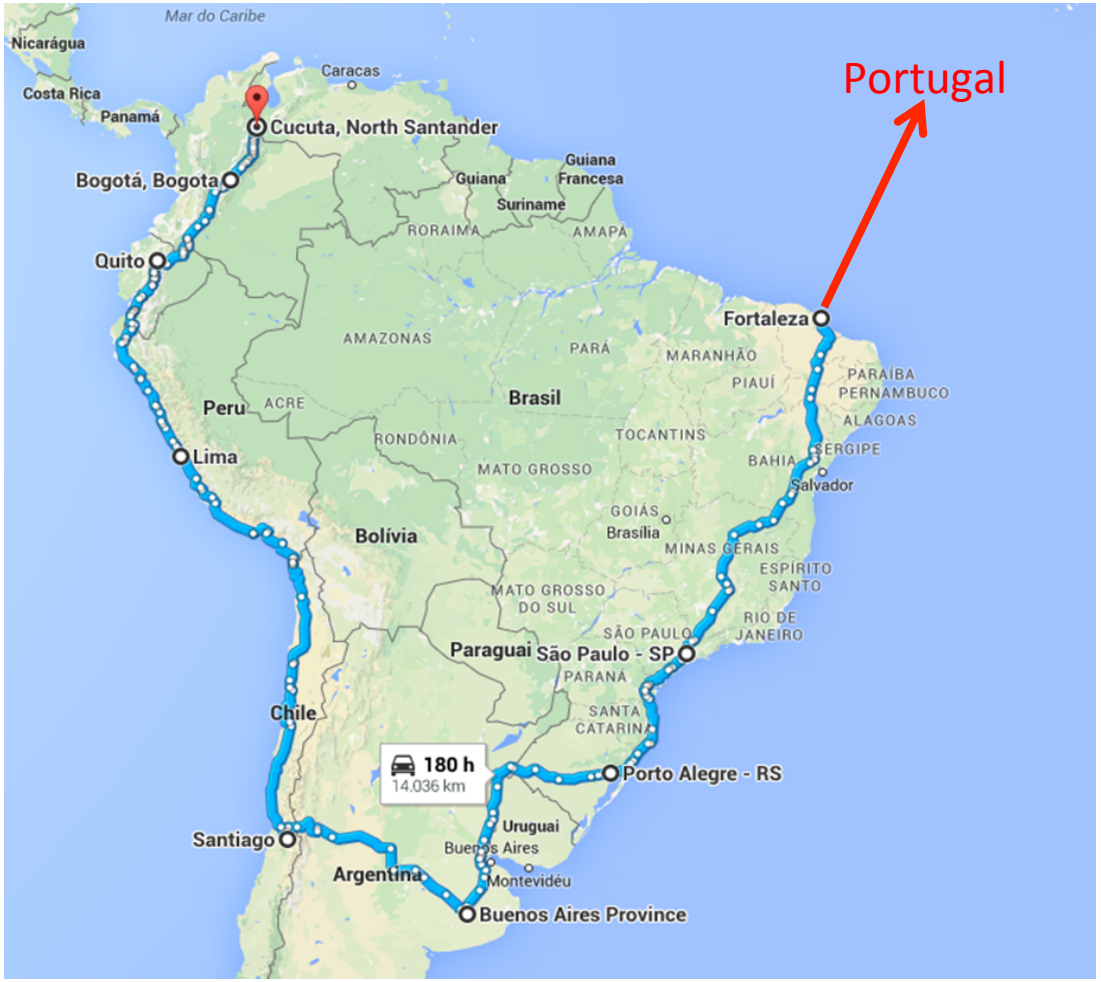
Brazil – EUA (2017) – LSST Project

- **LSST - Large Synoptic Survey Telescope**
- **Use of Monet Cable**
  - MoA signed in 2015
  - Partners: LIneA, LNA, LSST, ANSP, RNP & FIU
  - Use of optical spectrum (GHz)
- **680G+ includes LSST, GNA**



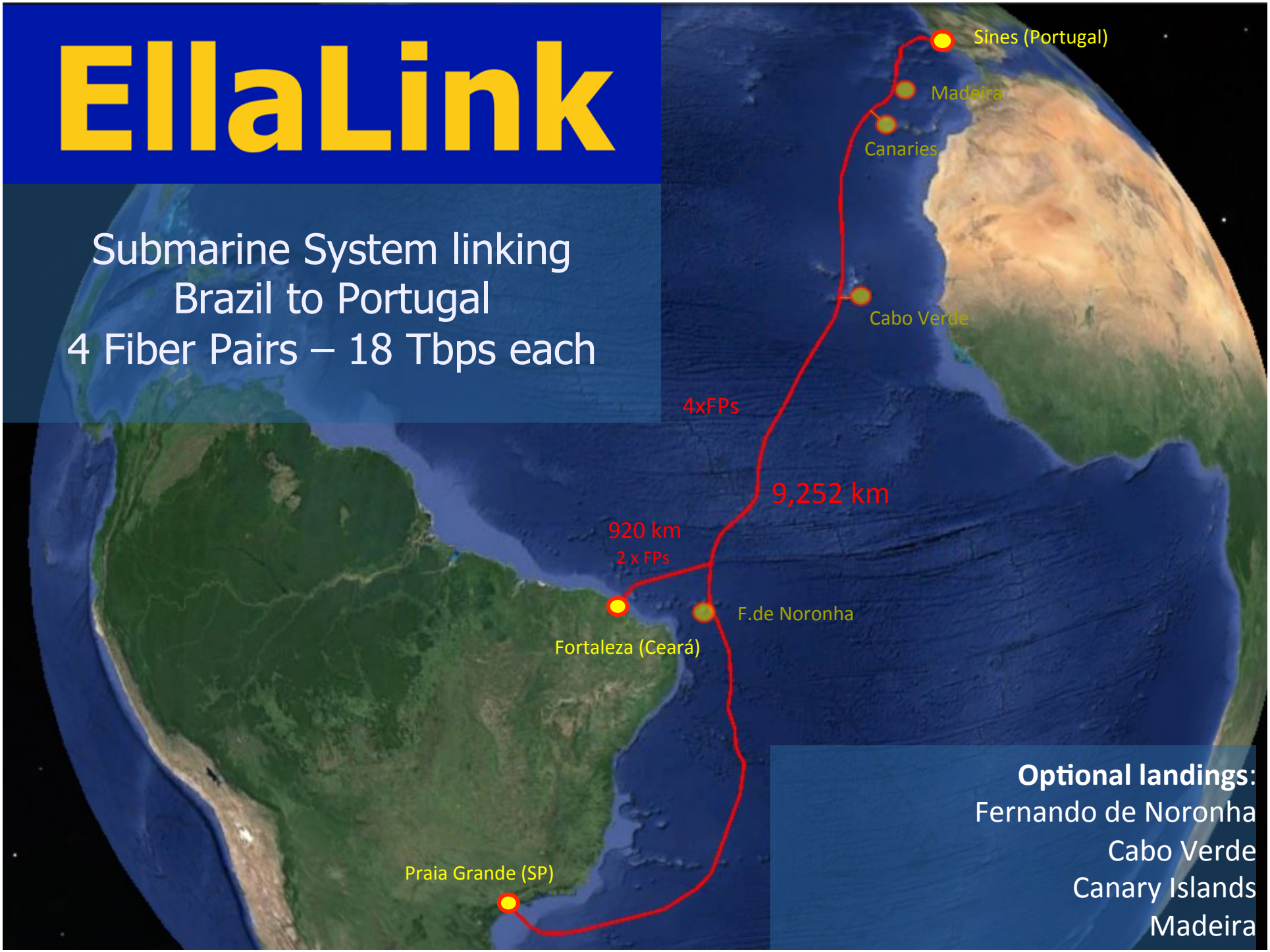
Brazil - Europe (2019) - BELLA Project

- **BELLA Project**
  - BELLA - Building Europe Link to Latin America
- **Use of Ellalink Cable**
  - Partners: RedCLARA & LA-NRENs, Géant & EU-NRENs
- **BELLA-S (submarine part)**
  - Acquisition of 1500 GHz for the cable lifetime
  - 2 lit 100G waves initially
  - RFS in 1st semester of 2019
- **BELLA-T (terrestrial part)**
  - Building scalable infrastructure to be shared by RedClara and S. American NRENs



EllaLink

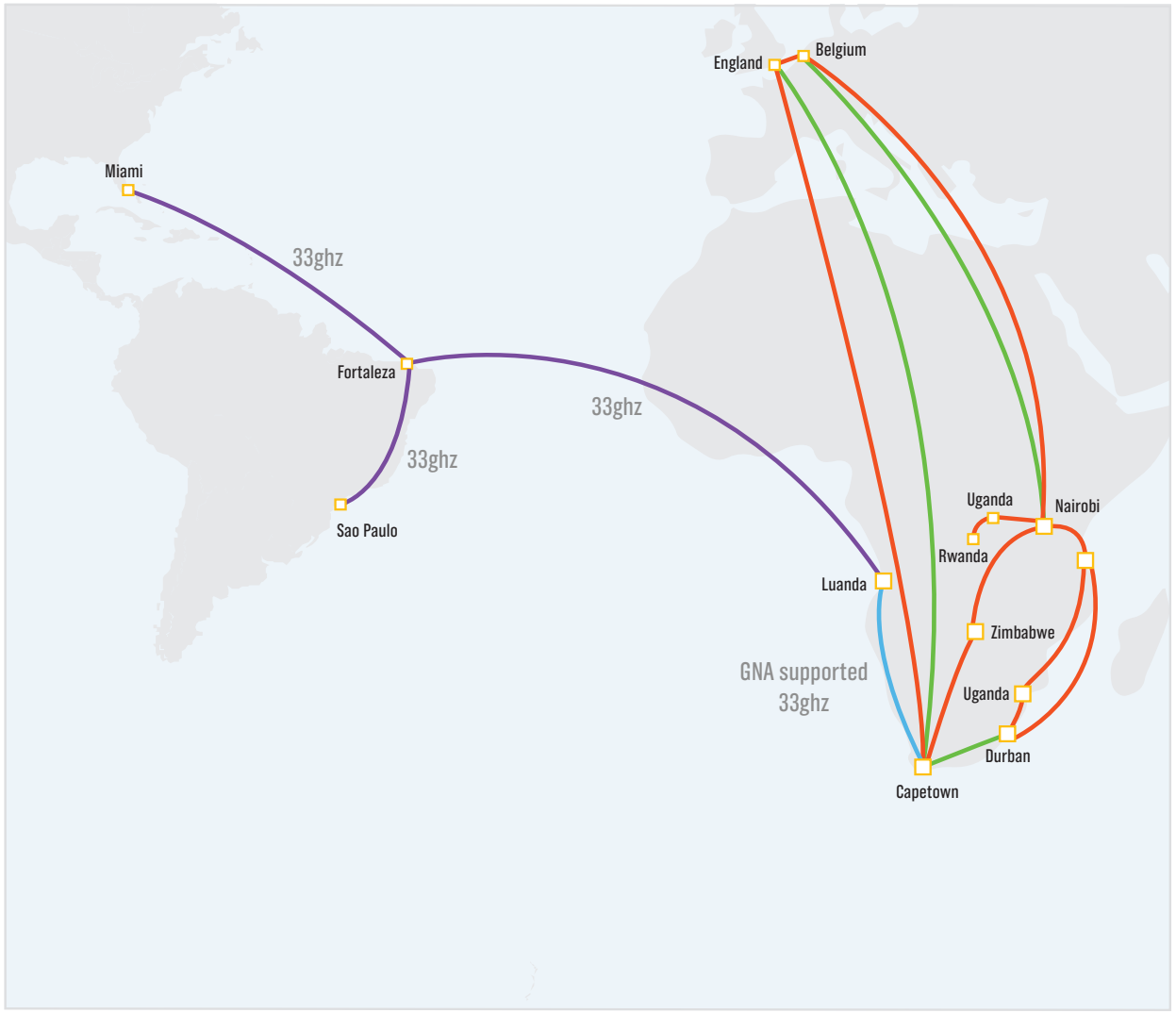
Submarine System linking
Brazil to Portugal
4 Fiber Pairs – 18 Tbps each



Optional landings:
Fernando de Noronha
Cabo Verde
Canary Islands
Madeira

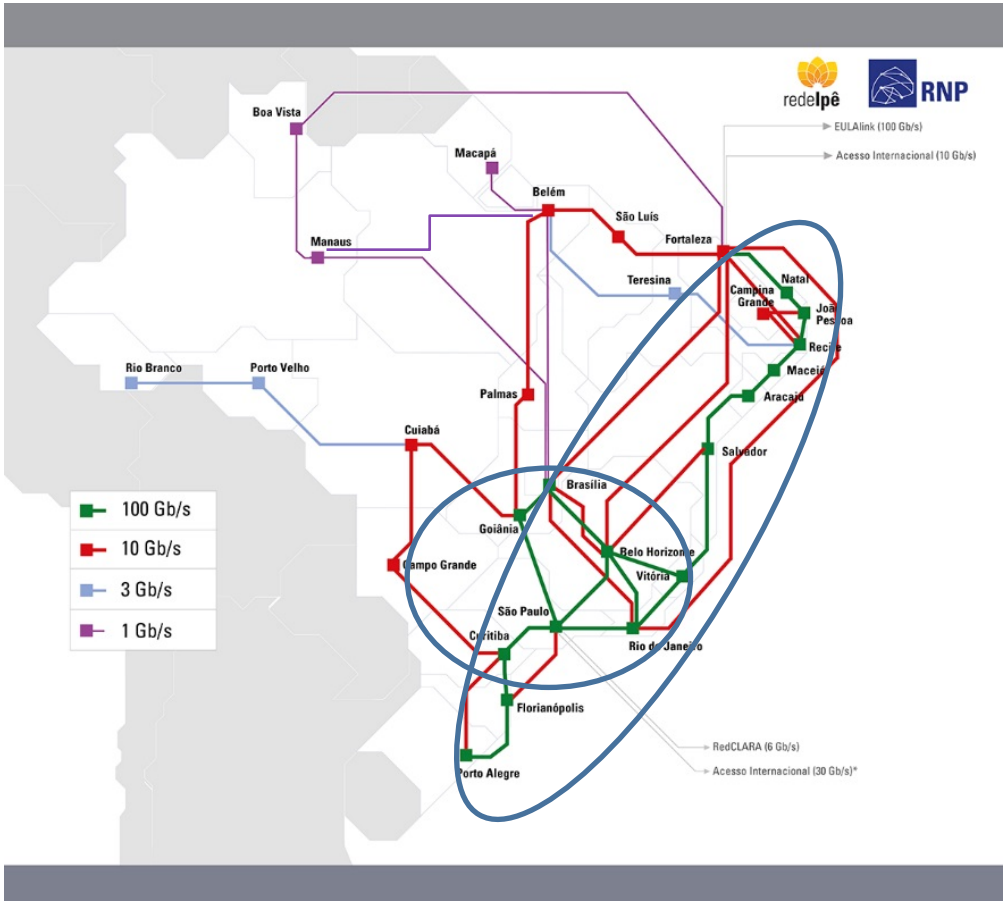
Brazil – Africa (2018)

- **Use of SACS**
  - Angola Cables
- **Optical channel of 33 Ghz (initially 100 G) for 10 years**
  - AARCLight Project
  - Partners FIU & Angola Cables



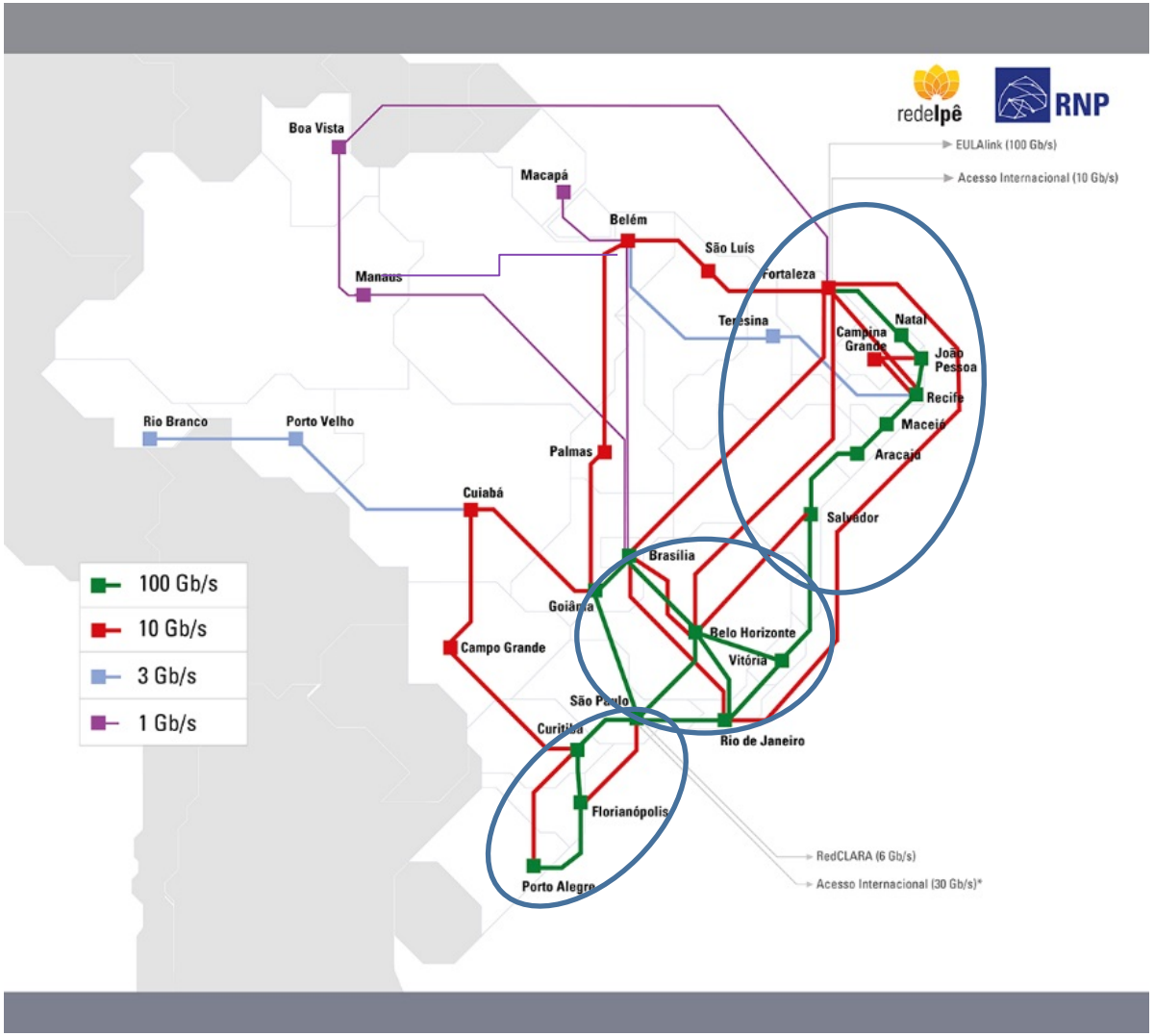
RNP National Backbone 2018

- **Fortaleza – Porto Alegre Route**
- **100 G Southeast Ring**



RNP National Backbone 2018

- **3 phases:**
  - Northeast region (NE)
  - Southeast region (SE)
  - Southern region (S)



Northeast – Alliance with CHESF

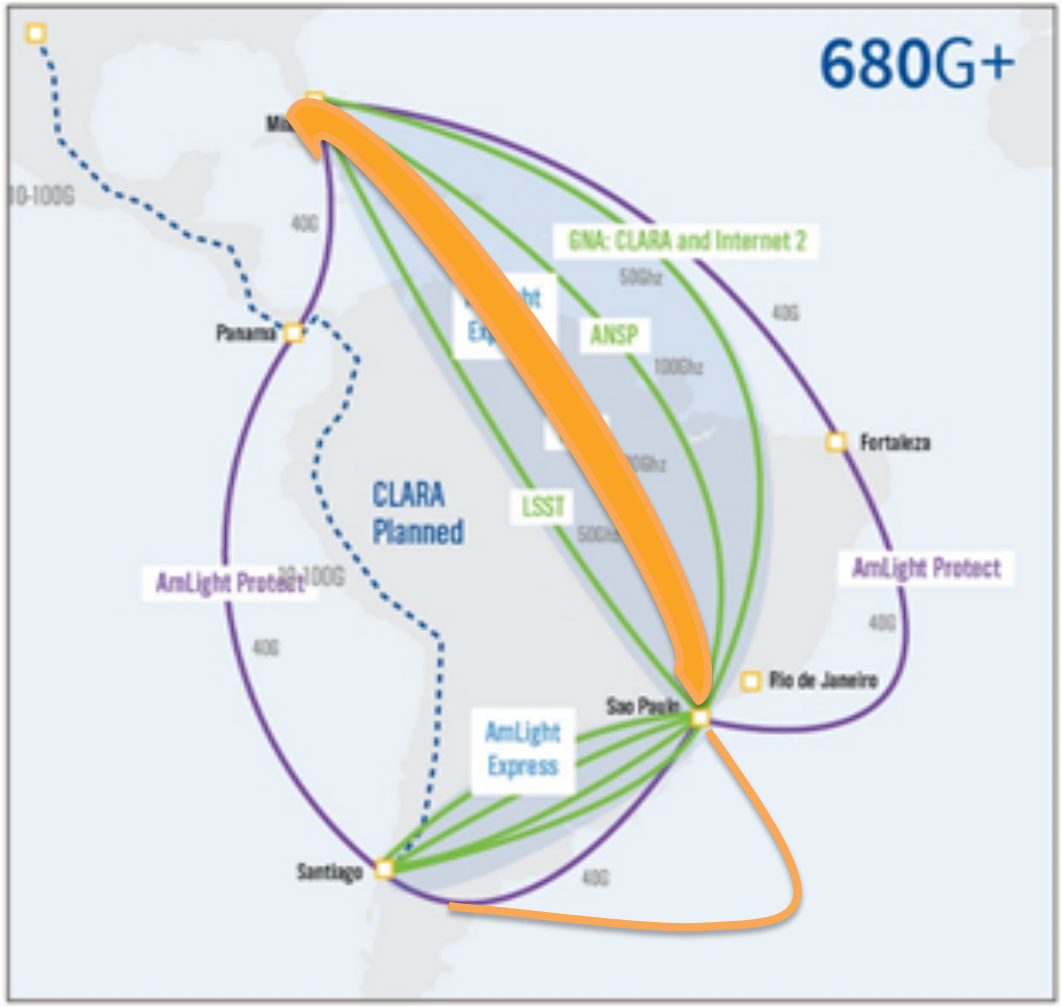
- **CHESF – Companhia Hidro Elétrica do São Francisco**
- **Right of Use of ½ the optical spectrum**
- **Initially using 3 × 100G waves**
- **Part of the Fortaleza - Porto Alegre route**
  - Fortaleza - Recife – Salvador – South of Bahia
- **Agreement signed on Sept 19, 2016**

LSST Project – RNP's viewpoint

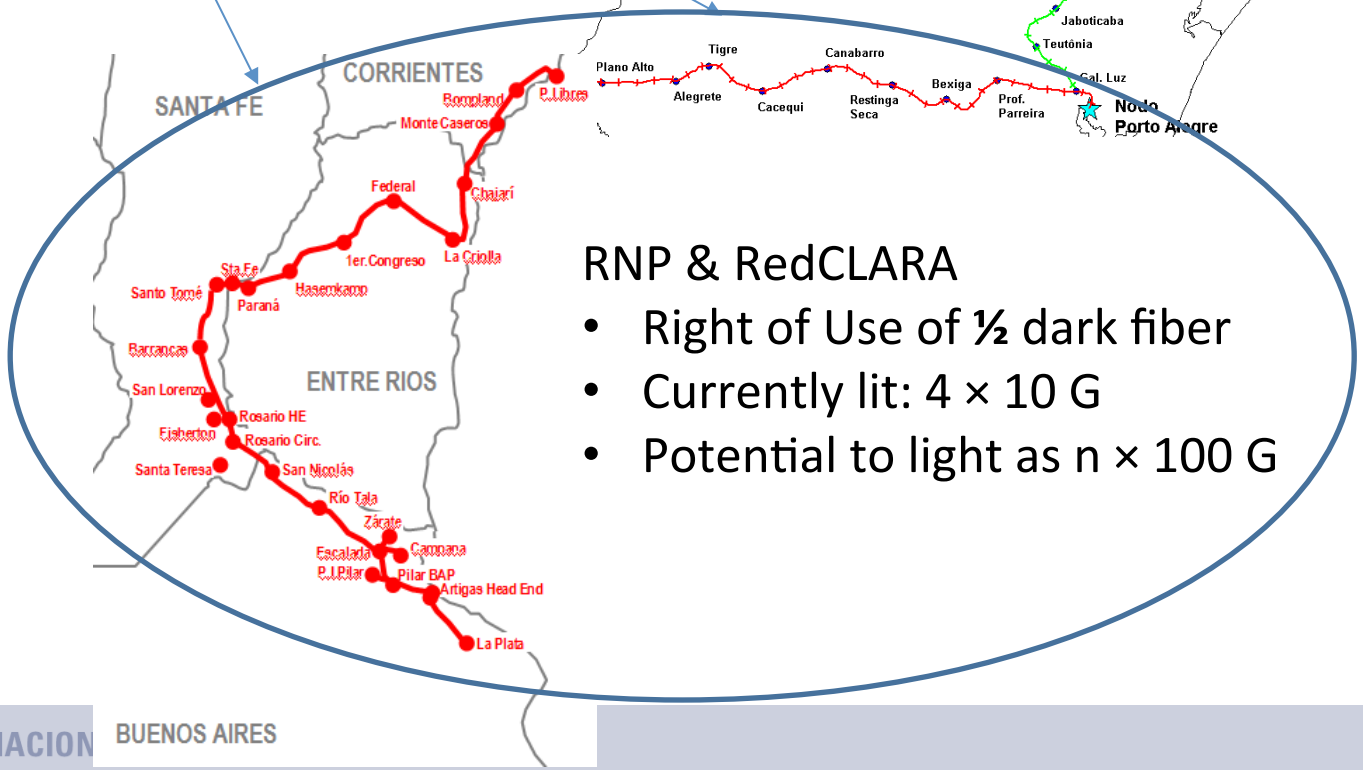
- **MoA signed in July - September 2015**
- **RNP is committed to provide connectivity between São Paulo and Santiago 2 x 100 G**
  - 100 G starting September 30, 2019
  - Additional 100 G of burst traffic
  - Agreement lasts until September 2032.
- **In exchange, RNP will be granted access to 100 GHz spectrum on the Monet cable, between Florida and São Paulo.**
  - 100 GHz: up to 3 channels with current 100 G technology (33 GHz)
  - Santos, SP, to Boca Raton, FL.
  - Available when the cable becomes operational
  - The 100 GHz operation will be the subject of a separate MoA
  - The Brazilian astronomy community will also gain right to participate actively in the LSST project

Boca Raton - São Paulo - Santiago

- **Boca Raton (FL) – Praia Grande (SP)**
  - Monet Cable
- **Praia Grande – São Paulo (SP)**
  - Terrestrial link
  - ½ the optical spectrum of dark Fiber
  - Negotiation In Progress
- **São Paulo – Santiago:**
  - Routes: São Paulo – Porto Alegre; Porto Alegre – Buenos Aires and Buenos Aires – Santiago
  - Possible use of the BELLA–T infrastructure.
  - Possible use of the Porto Alegre – Buenos Aires route



Porto Alegre – Buenos Aires route



RNP & RedCLARA

- Right of Use of ½ dark fiber
- Currently lit: 4 × 10 G
- Potential to light as n × 100 G

Obrigado!
Thank you!

Questions? Comments?

Eduardo Grizendi, eduardo.grizendi@rnp.br
Director of Eng &Op,
Michael Stanton, michael@rnp.br
Director of R&D,
RNP