

## **RNP Update**

### **SAACC Meeting April 21-22, 2020**

Eduardo Grizendi & Michael Stanton  
RNP, Brazil

# Agenda

- Objective
- RNP activities
- RNP Backbone 100G 2022 & Partners
- Routes in progress
- New geographical patterns of international traffic
- Collaboration with USA: projects funded by NSF
- International R&E links by 2021
- Conclusion

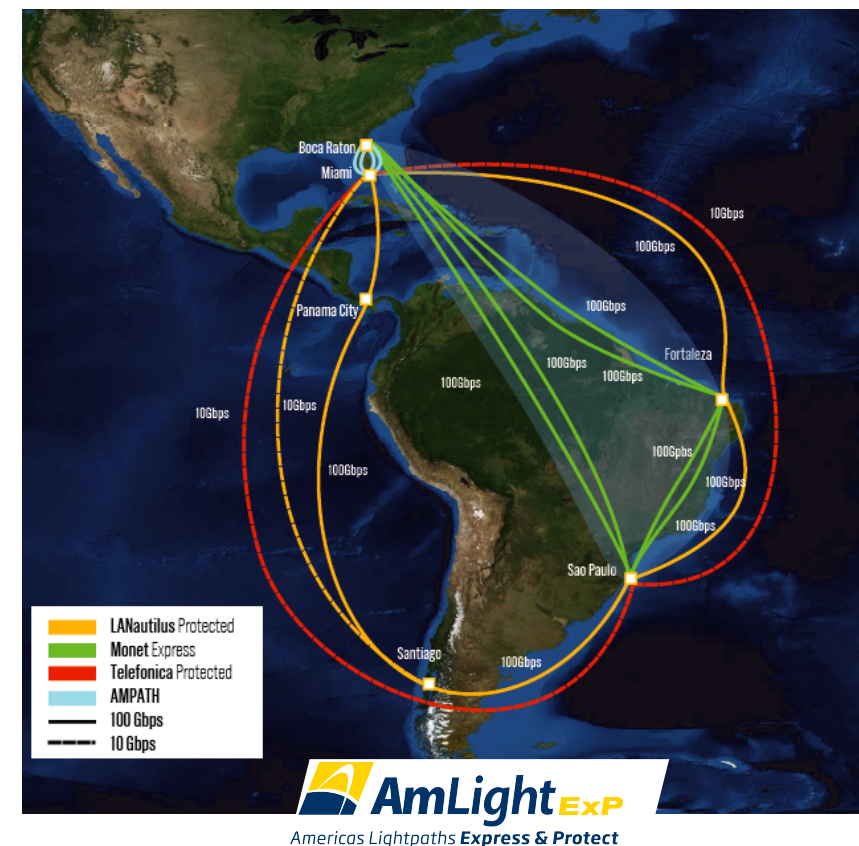
## Objective

RSVP AMLIGHT SAACC Face-to-Face / Virtual Meeting  
February 22<sup>nd</sup>, 2020

***....provide an Update on RNP's activities in support of data movement between the observatories in Chile and the R&E communities in Brazil, the U.S., Europe and other destinations of interest."***

## RNP activities in support of AmLight-ExP Network Infrastructure today

- **Express Ring**: Boca Raton – Fortaleza – São Paulo (green lines)
  - Joint Engineering Team FIU - RNP
  - 6 x 100G links: 4 managed by RNP, supported by FIU & ANSP
- **100G Protect Ring**: Miami-Fortaleza, Fortaleza-Sao Paulo, Sao Paulo-Santiago, Santiago-Panama, and Panama-Miami (solid orange lines)
  - Joint Engineering Team FIU-RNP-RedCLARA
  - 5 x 100G links: managed by FIU, support by RNP, ANSP & RedCLARA
- 10G ring from Miami-Sao Paulo-Miami for protection (red dashed lines)



# RNP Backbone 100G 2022 & Partners

## Northeast:

**CHESF** (agreed in 09/2016)

## Southeast & Midwest:

**Furnas** (agreed in 11/2017)

## South & Midwest :

**Furnas**

**Eletrosul** (agreed in 01/2018)

Regional ISPs (swap)

## North & Midwest

**Taesa** (agreed in 05/2019)

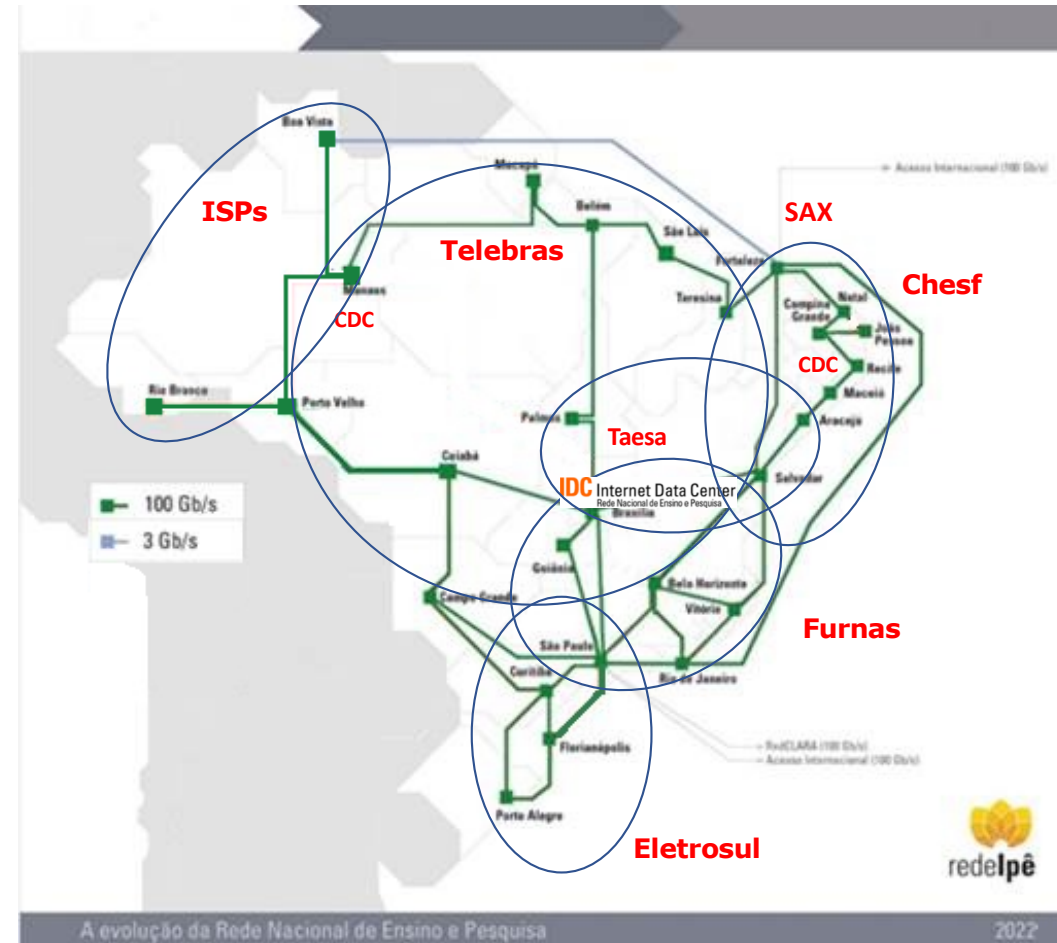
Telebras (agreed in 02/2019)

Regional ISPs (swap)

## SAX - Global Exchange Point in Fortaleza

Angola Cables DC (agreed 08/2018)

Power Companies ("Electrics")



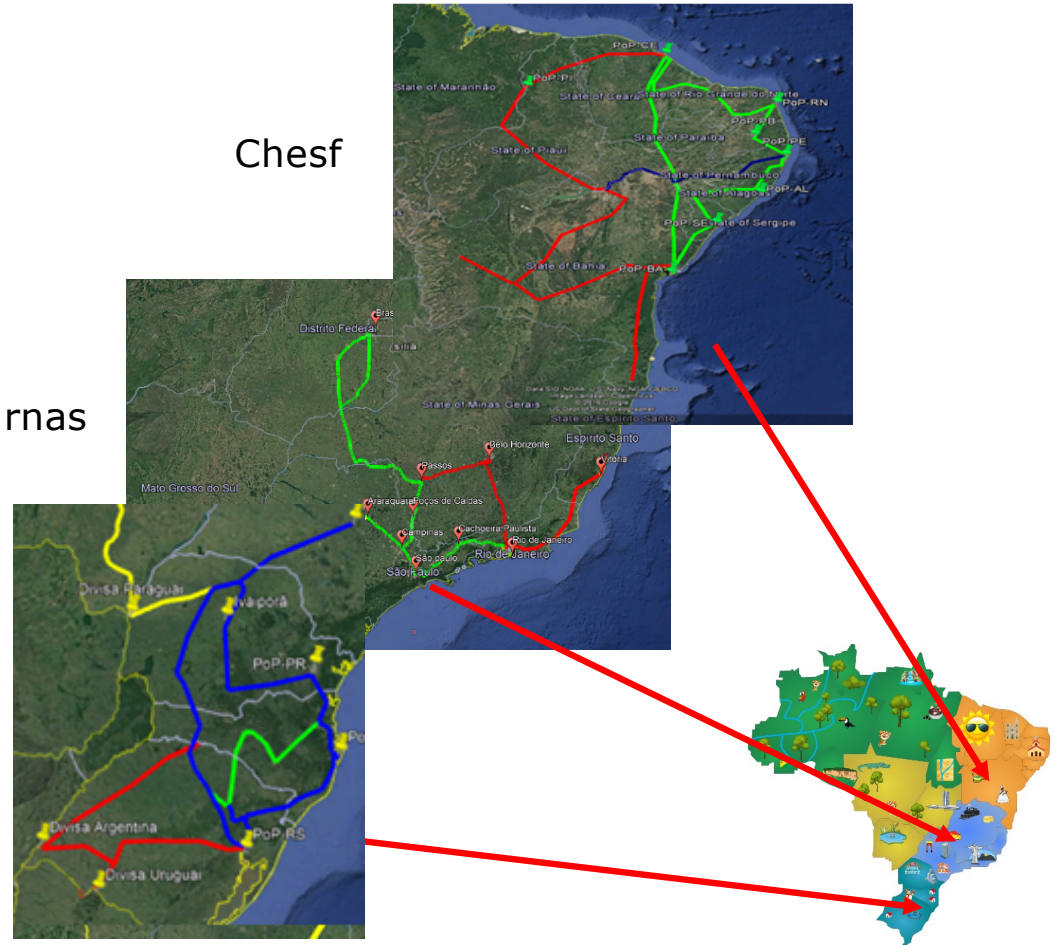
## Agreements with Electrical Power Companies - OPGW infrastructure

- Agreement for 20 years, Right of Use (RoU) of 1 dark fiber pair
- No IRU direct payment
- RNP provides
  - 40x 50GHz optical channels,
  - Equipment support and maintenance w/ vendor
- Each partner has RoU of 20 channels
  - Initially 2 X 100G: 1 X 100G each
- All routes provided by Power Company

Chesf

Furnas

Eletrosul





## Routes in Northeast Brazil - Chesf infrastructure

- **Phase I : green**
  - Ready, since 3Q2019
- **Phase II : red**
  - In progress: 1Q2021
- **Fortaleza – Salvador, part of Fortaleza – São Paulo route**



Chesf

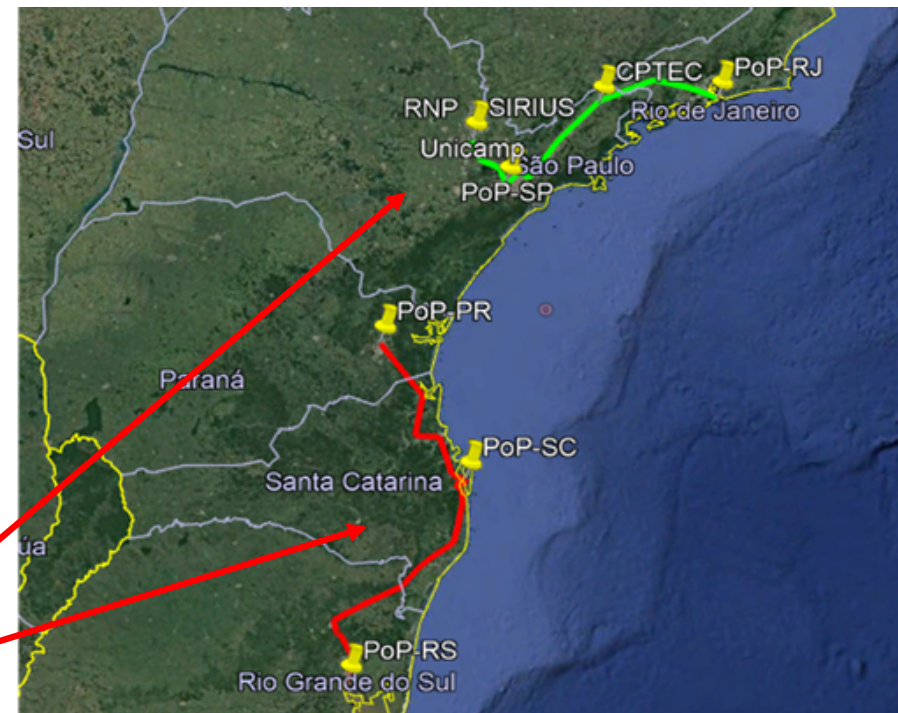


## Routes in Southeast & South - Furnas & Eletrosul infrastructures

- **Phase I - Furnas (Southeast): 1Q2021**
  - Rio de Janeiro – São Paulo (green)
  - Final of Fortaleza – São Paulo route
- **Phase I - Eletrosul (South): 4Q2020**
  - Curitiba – Florianópolis – Porto Alegre (red)
  - Part of São Paulo – Porto Alegre
- **Missing piece: São Paulo - Curitiba**



Furnas & Eletrosul



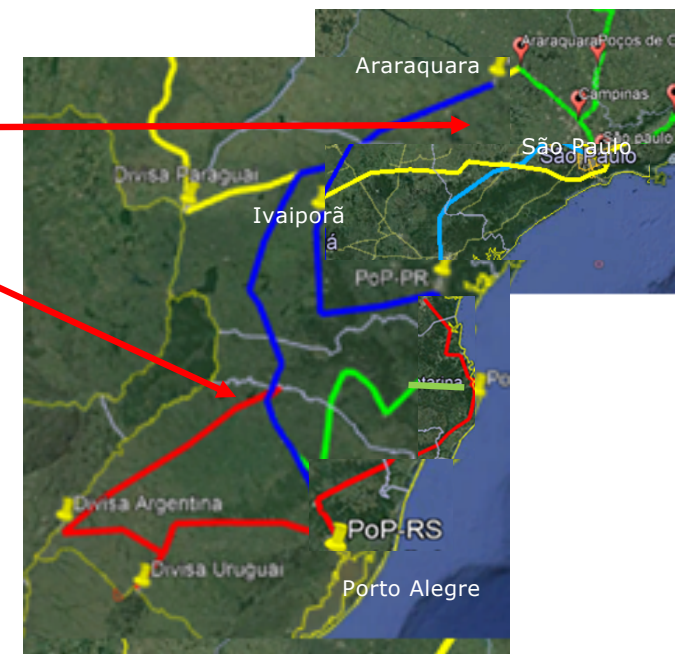


## Alternative routes of dark fiber which may still be lit in South

- RNP Right of Use for 20 years
- Alternative routes
  - São Paulo - Araraquara (green) + Araraquara - Porto Alegre (blue)
  - São Paulo - Ivaiporã (yellow) + Ivaiporã - Porto Alegre (blue)



Furnas & Eletrosul



## **RNP bidding process for swapping optical routes**

- **Swap of optical channels with ISPs**
- **Bidding process already published: “opened”**
  - Closing on May 31<sup>st</sup>, 2020
- **RNP offers channels on routes in Northeast, Midwest and Southeast regions**
- **RNP proposes that ISPs offer channels on routes of interest to RNP, in North and South regions, especially**
  - São Paulo - Porto Alegre
  - São Paulo - Buenos Aires (direct route)

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GLIF maps are available from [www.glif.is](http://www.glif.is)

# Southern transatlantic cables since 2000

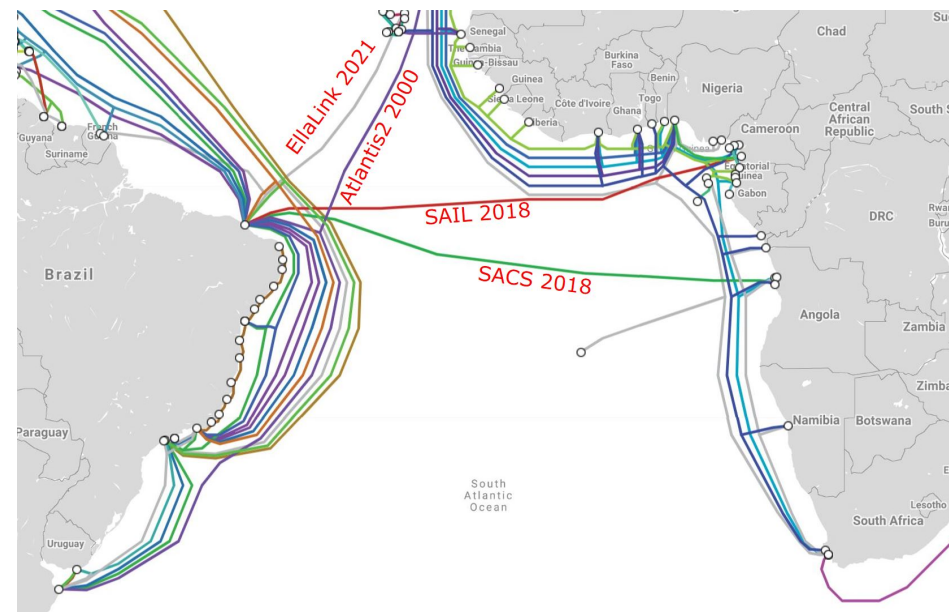
There are currently 2 active modern cable systems across the South Atlantic, both “ready for service” (RFS) in 2018: SACS and SAIL, from Fortaleza to Angola and to Cameroon, respectively

These should be joined by 2021 by EllaLink, which will connect Fortaleza and São Paulo to Sines in Portugal.

The capacity of the Atlantis2 cable, RFS in 2000, is totally inadequate for the Internet Age.

Source:  
<https://submarine-cable-map-2019.telegeography.com/>

RFS	Cable	Connecting Fortaleza to	Capacity
2000	Atlantis2	West Africa, Europe	40M
2018	SACS	Sanguano, Angola	n x 100G
2018	SAIL	Kribi, Cameroon	n x 100G
2021	EllaLink	Sines, Portugal	n x 100G



- The NSF is funding the construction of the **Vera Rubin Observatory** (formerly LSST) in La Serena, Chile.
- RNP has agreed to provide **connectivity between São Paulo and Santiago (Chile)** for Rubin Observatory use. In return RNP and ANSP gain access until 2032 to **several 37,5 GHz “slots” on the Monet cable** between Florida and São Paulo.
- This connectivity is accessible in São Paulo and Fortaleza, where RNP is building a **Global R&E Betwork Exchange Point (GXP)**

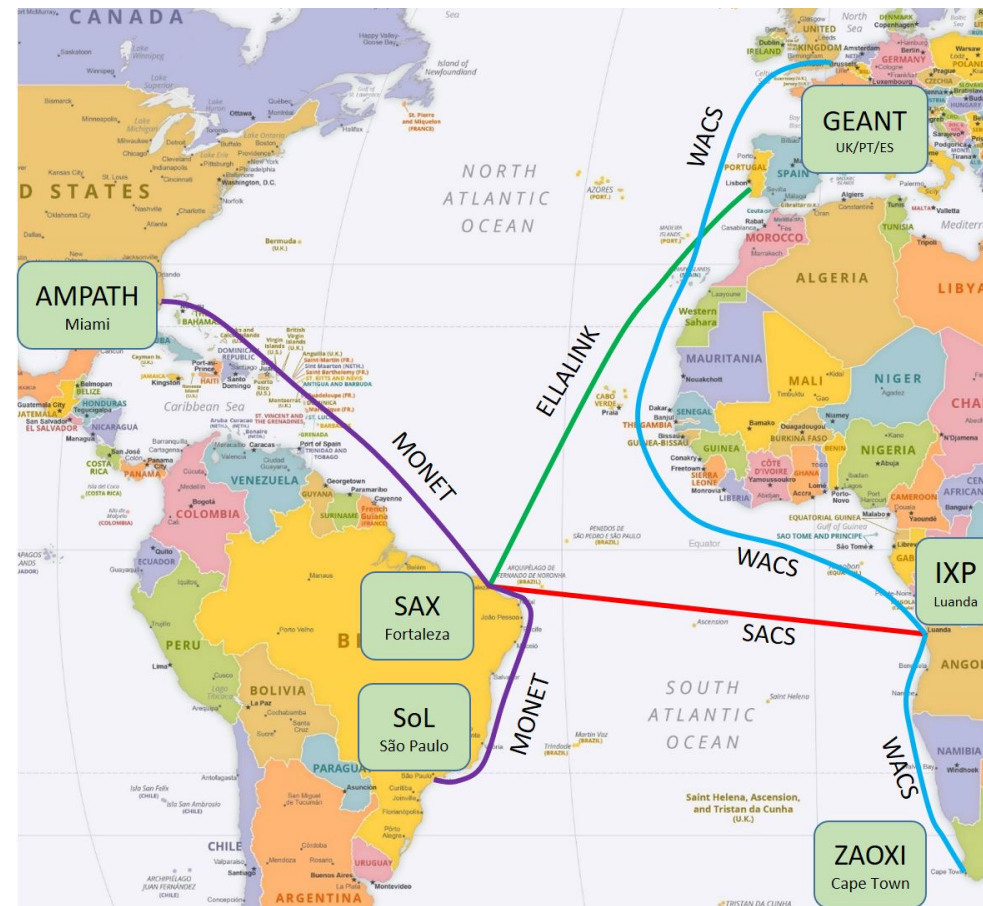
### NSF infrastructure projects at FIU:

- **Amlight Express and Protect**, to connect to Brazil and Chile, providing redundant connectivity to S. America
- **Aarclight**, to link to Africa using the SACS cable between Fortaleza, Brazil, and Sanguano, Angola.
- Aarclight has made feasible **interconnecting SACS and WACS**, the principal Sanren-Tenet connection between South Africa and Europe.
- **This makes possible entirely new routes:**
  - US-Brazil-Africa
  - South America-Africa-Europe



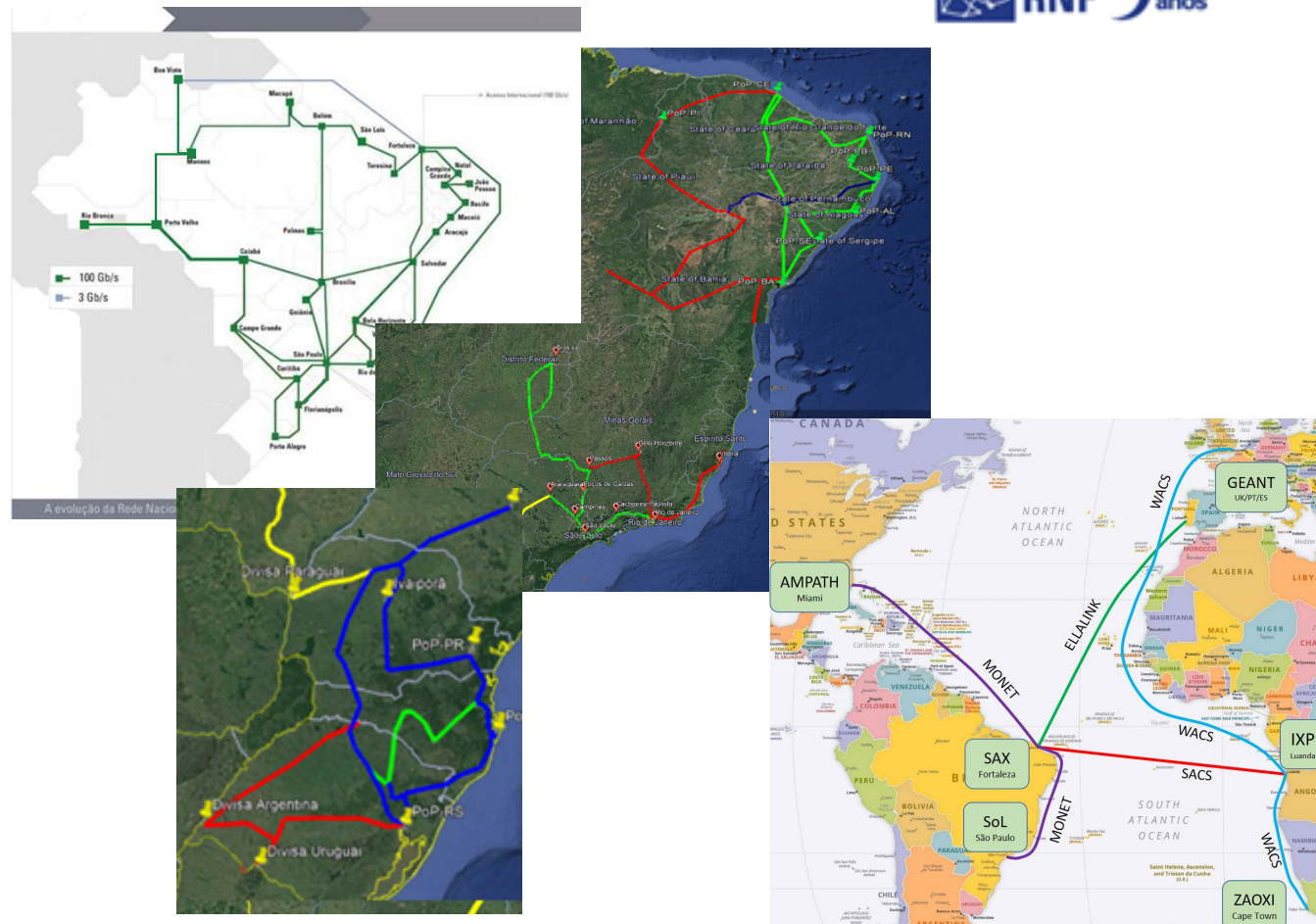
## International R&E links by 2021

- Brazil already operates the **SouthernLight (SoL) GLIF GOLE/GXP** in São Paulo, interconnecting the N-S cables from the US used by R&E networks (Monet, SAC), the Brazilian R&E networks (ANSP, RNP) and RedClara
- To cater for this new international connectivity, **RNP has provided the new GXP in Fortaleza, called SAX** - South America eXchange, interconnecting the Monet and SACS cables
- In December 2019, using SACS and WACS cables, **connectivity was extended from SAX to the South African NREN (TENET/SANREN)**.
- This is the **first trans South Atlantic link for R&E networks**, substantially shortening distances, and thus latency, between Africa and the Americas, especially South America.
- One benefit: **Increased redundancy with new South Atlantic routes** (see recent WACS cable outage, backed up by SACS+Monet)
- Starting in 2021, **SAX will also host EllaLink**, part of the BELLA project to link S America and Europe from 2021.



## Conclusions

- RNP 100G Backbone 2022 “is on its way”
- Fortaleza – São Paulo and São Paulo – Porto Alegre routes still need to define these links
  - Salvador – Rio de Janeiro
  - São Paulo – Curitiba
- Alternative routes of dark fiber to be lit
- RNP bidding process for swapping optical channels
- Important new international routes within South America and to Europe and Africa



**Thank you!**

Eduardo Grizendi & Michael Stanton

[eduardo.grizendi@rnp.br](mailto:eduardo.grizendi@rnp.br)

[michael.stanton@rnp.br](mailto:michael.stanton@rnp.br)