South American International Connections

RNP - Brazilian NREN

Alex Soares de Moura
alex@rnp.br

RNP

Ministério da **Cultura**

Ministério da **Saúde**

Ministério da **Educação**

Ministério da **Ciência, Tecnologia e Inovação**

GOVERNO FEDERAL BRASIL PAÍS RICO É PAÍS SEM POBREZA

GLIF Americas (GLIF-A) Community Meeting

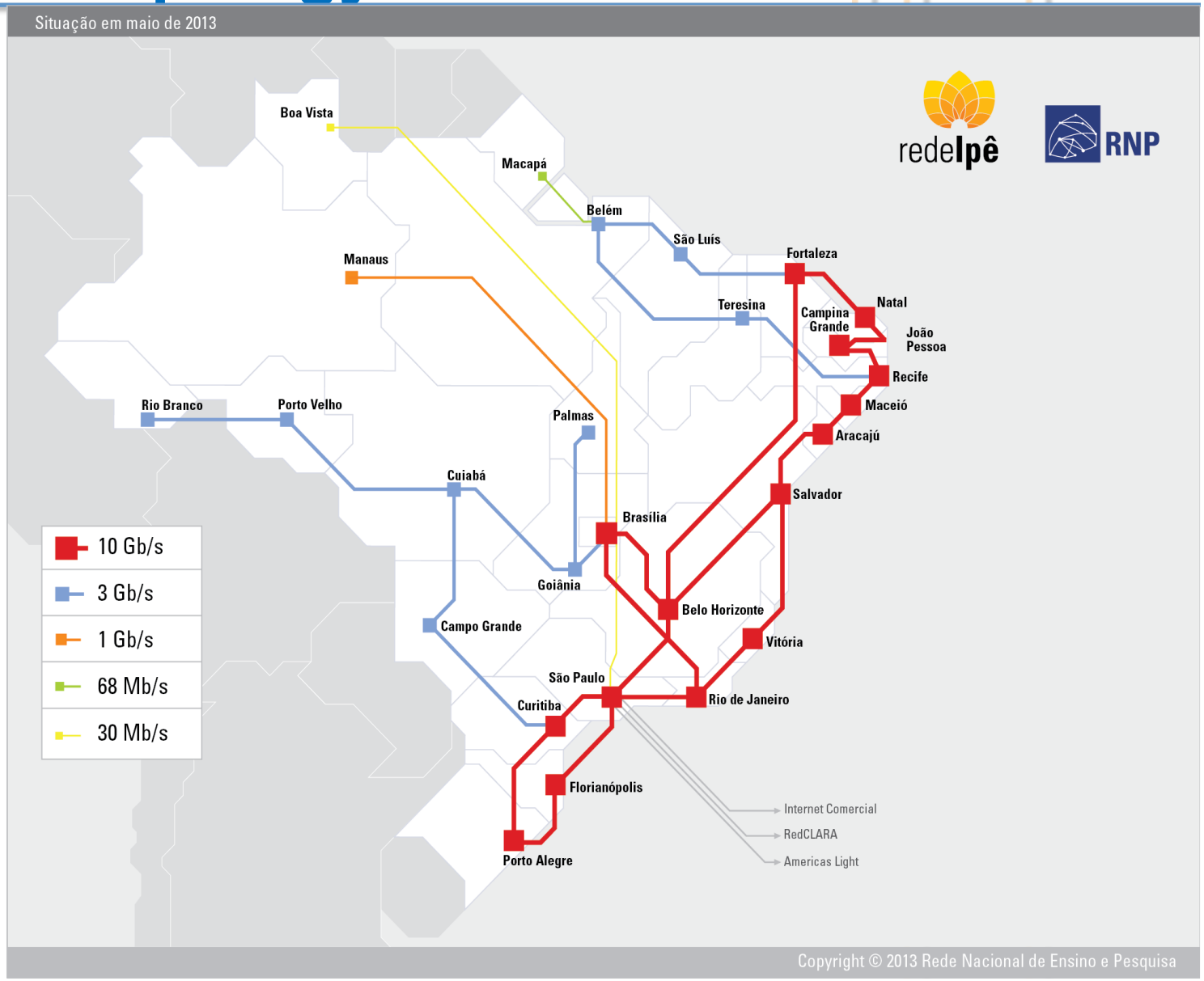
Wednesday, October 2, 2013 (1:30 – 4:30 pm)

Parallel and Distributed Computing Centre
School Of Computer Engineering,
Nanyang Technological University
Block N4, N4-B2A-02, Nanyang Avenue
Singapore 639798

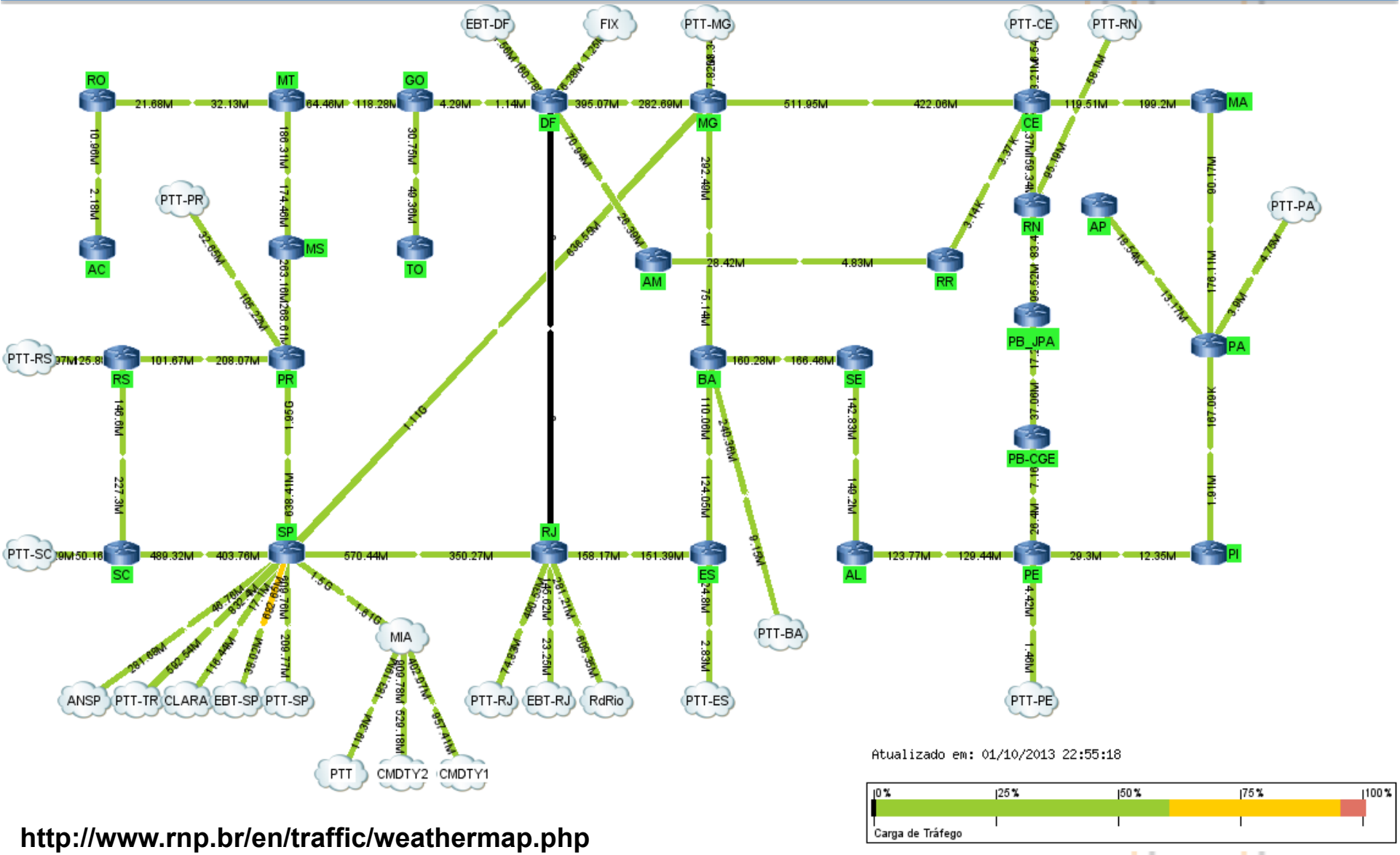
About RNP

- RNP is responsible to offer nationwide advanced internetworking services for the academic sector
- Conectivty (Brazilian model)
  - National backbone with PoPs in each state
  - Metro networks in 27 capitals and some big cities
  - Access to hundreds of campi (many outside capitals)
- Advanced Services
  - Similar to those offered by R&E networks in Europe and North America
- Projects
  - Telemedicine, Training, Cloud computing
- R&D
  - Advanced services development
  - Experimentation networks, i.e. Future Internet and SDN
  - Support for communities, i.e. High Energy Physics, Astronomy and Culture

RNP Backbone: 2013 Geographic Topology



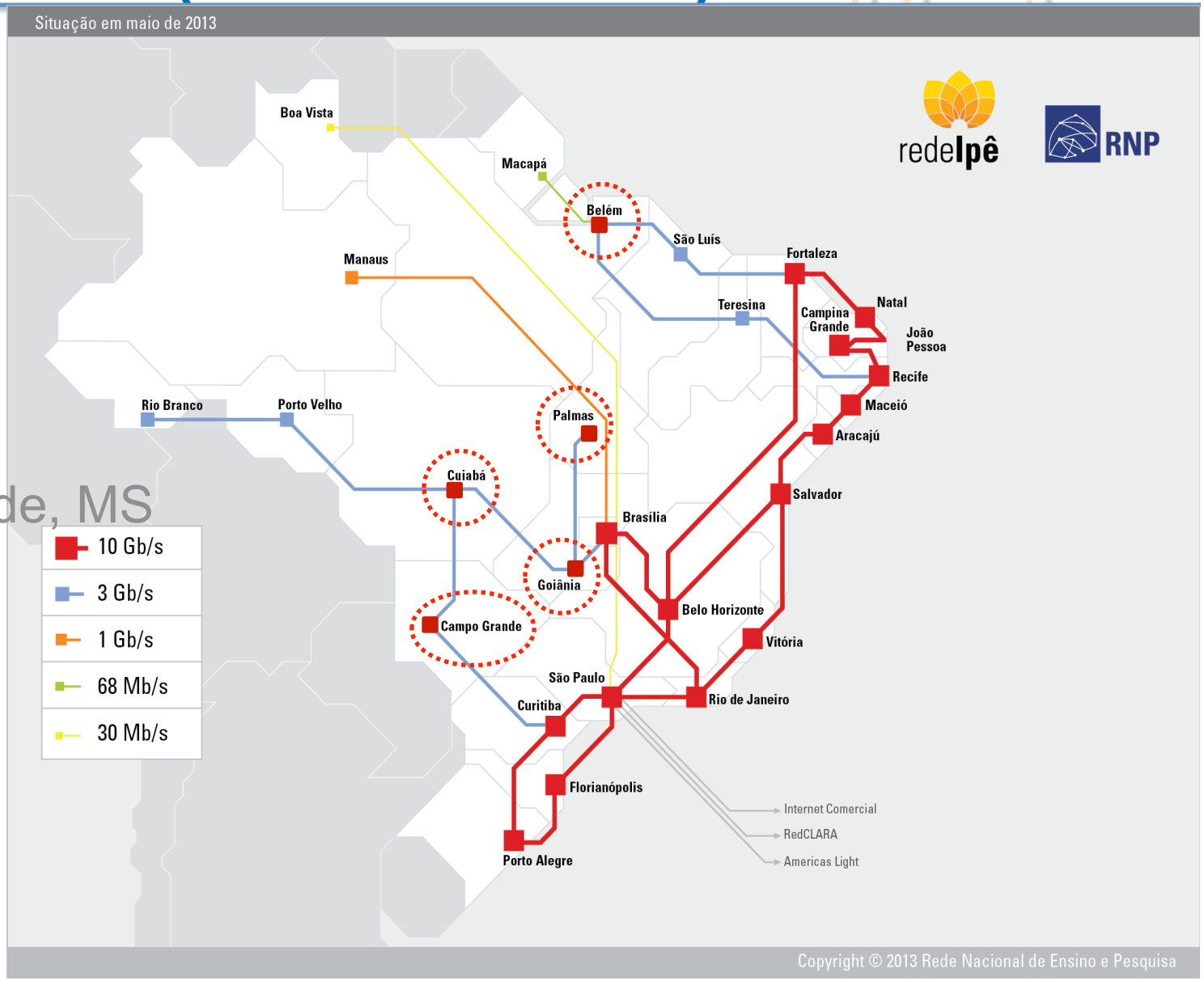
RNP Backbone: 2013
Logical Topology



http://www.rnp.br/en/traffic/weathermap.php

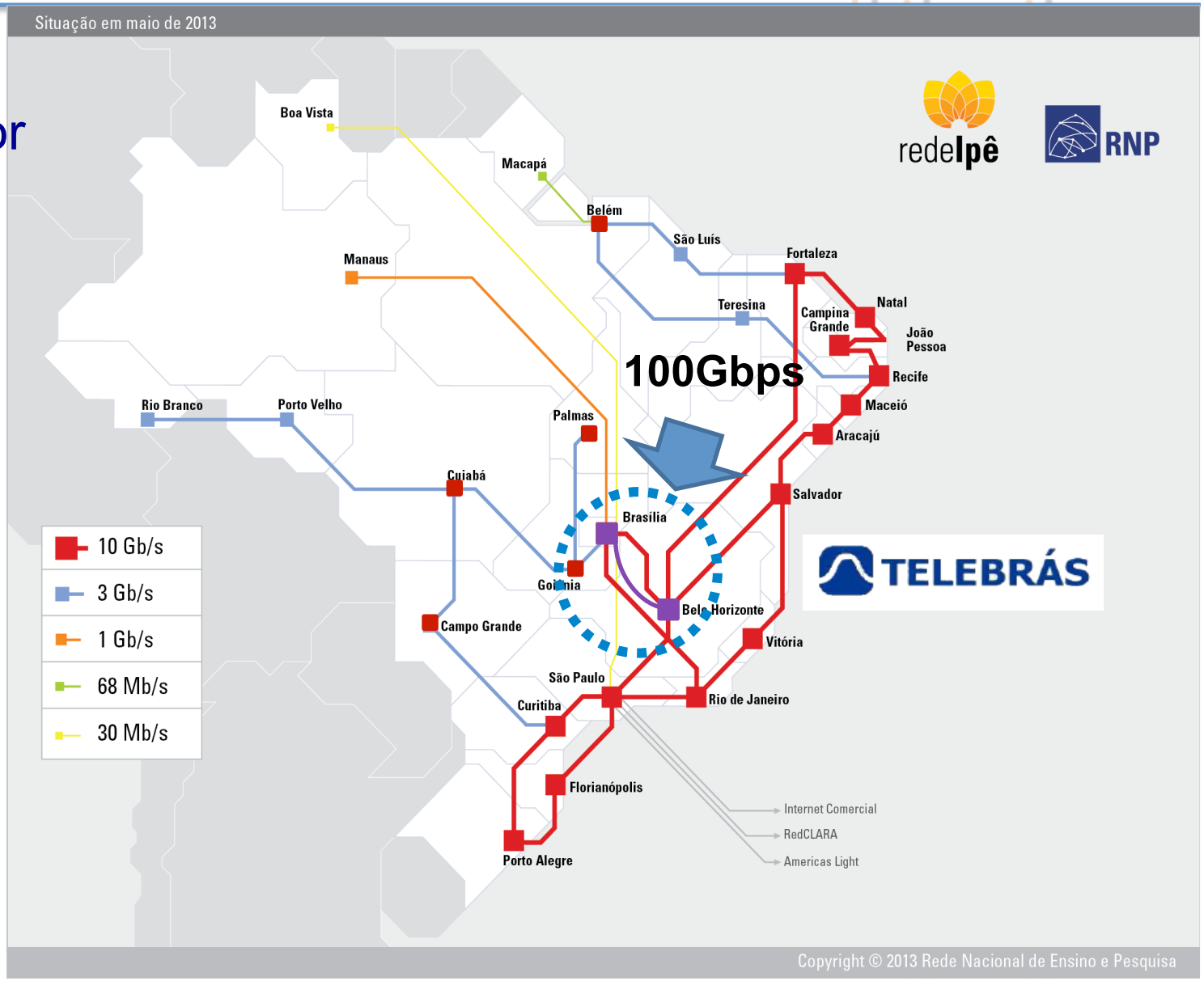
RNP Backbone Updates 2013-2014
New 10G PoPs (from 3G to 10G)

- Optical layer provider: Oi
- Upgrades in PoPs:
  - Cuiabá, MT
  - Campo Grande, MS
  - Goiânia, GO
  - Palmas, TO
  - Belém, PA



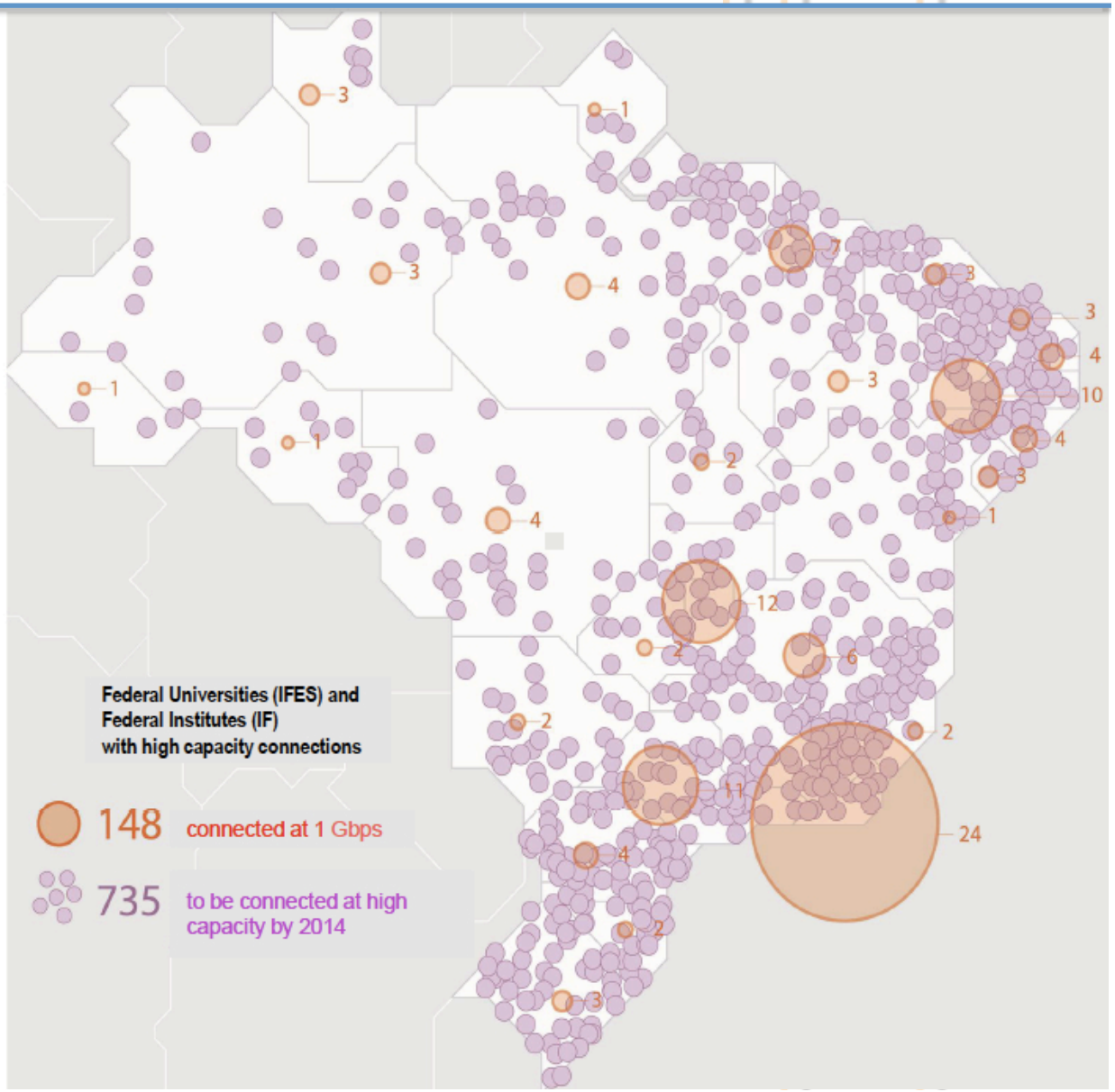
RNP Backbone Updates 2013-2014
New 100G Circuit: Brasilia and Belo Horizonte

- Telebrás partnership for optical layer



RNP Clients Distribution 2012-2014

- Federal Universities and Federal Institutes with high capacity connections
- 148 institutions connected at 1Gbps
- 735 institutions to be connected at high capacity by 2014



RNP Current Situation

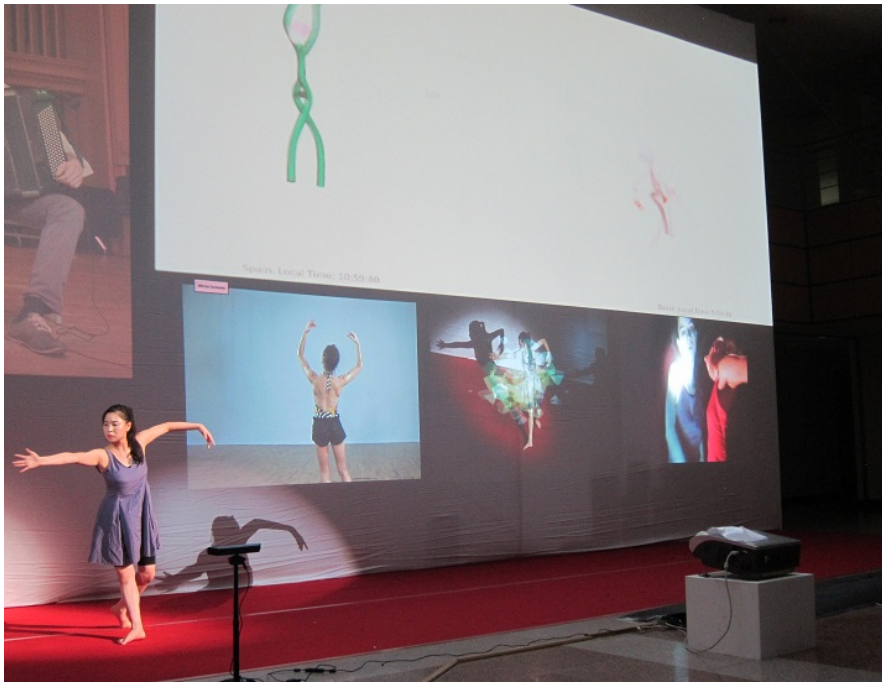
- RNP has 3 major parts to its international communications configuration
  - Direct connection to USA (S. Paulo – Miami) for international collaboration and commodity access
    - Part of AmLight consortium (RNP 10G, FAPESP 10G, jointly operated)
  - Connection to Europe via RedCLARA (Sao Paulo ↔ Madrid) for international collaboration
    - Current capacity of 2.5G
  - Cross-border connections to Mercosur neighbours Argentina, Uruguay and Paraguay
    - AR: terrestrial optical fiber cable between Porto Alegre and Buenos Aires, shared with RedCLARA
    - Uruguay (UY): planned optical connection
    - Paraguay (PY): installation in progress (100M)

RNP International Connectivity

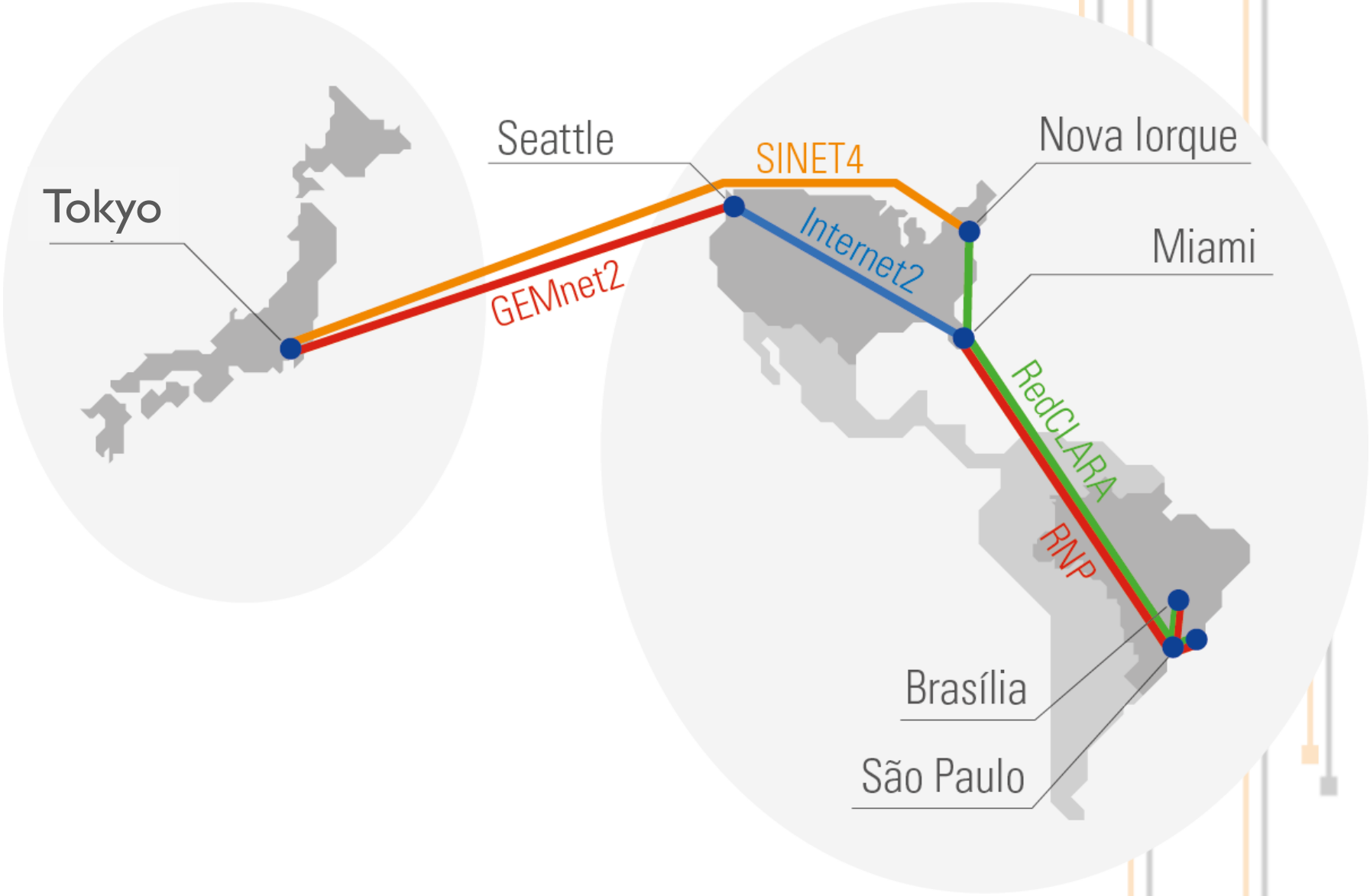
- Bandwidth split between commodity and R&E collaborations
  - Collaboration: use global R&E networks (GEANT, Internet2, ESnet, regional networks etc.) through own circuits to US and RedCLARA's
  - Commodity: transit and peering use commercial
- Own circuits: shared with ANSP (Academic Network of Sao Paulo)
  - Upgraded from 20 Gbps to 40Gbps in 2013
- To RedCLARA (Regional Latin America Network)
  - Partial financing from EC 2003-2012
  - External interconnections with GÉANT and US networks

RNP International R&D Collaborations

- Telematic Performances w/ Korea
- Super-Hi Vision (SHV) 8K Transmissions w/ Japan



Super-Hi Vision Video Streaming Demo Path (8K resolution)



AMLIGHT

1. ANSP
• 2x 10G Sao Paulo ↔ Miami
- (west) via Santiago (SAC)
- (east) direct (SAM)

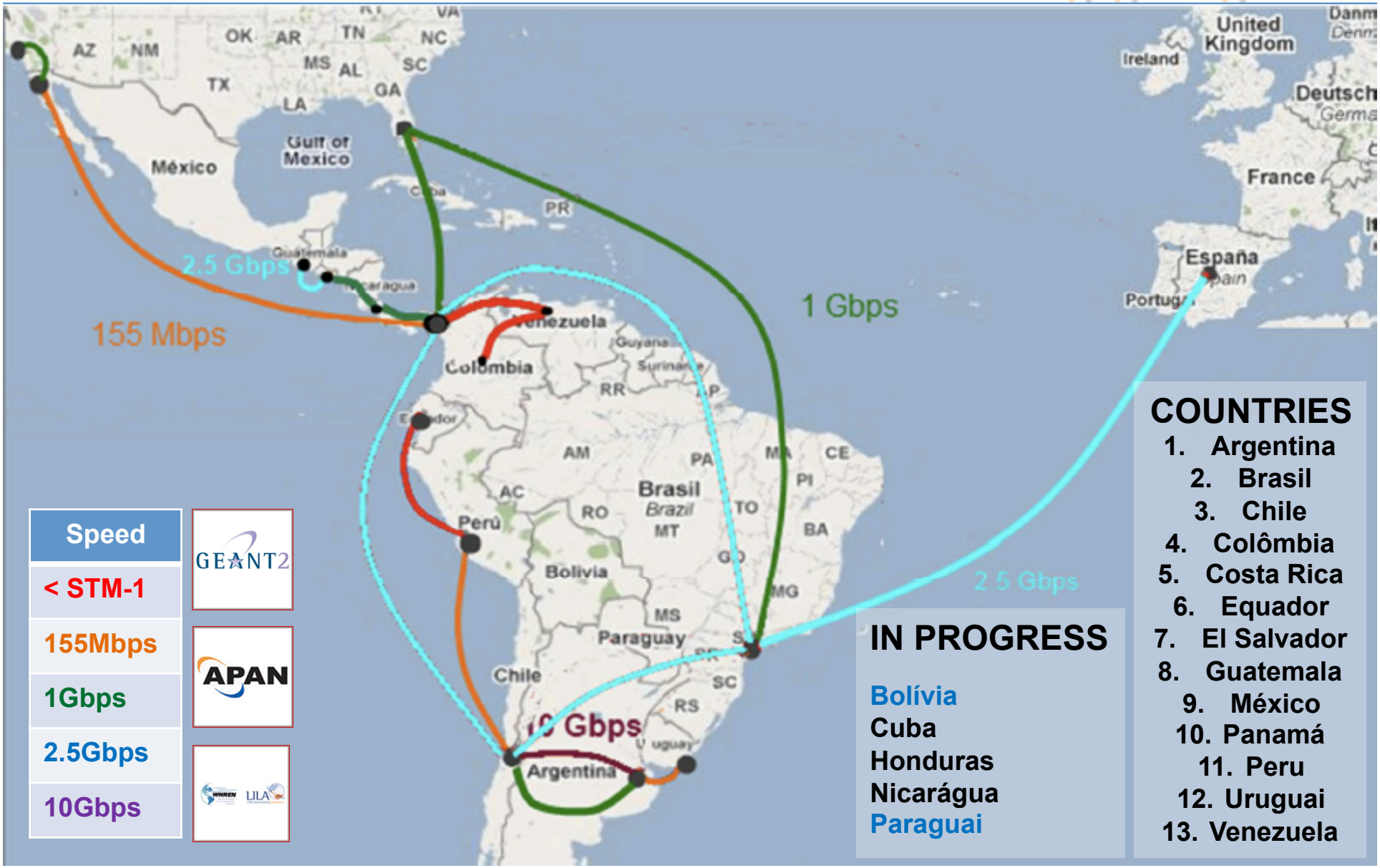
2. **RNP**
• 2x 10G circuits, Sao Paulo ↔ Miami
- (west) direto (SAM)
- (east) via Rio de Janeiro and Fortaleza (SAC)
(+ terrestrial redundant circuits)

3. **RedCLARA**
• 1G circuit, Panama ↔ Miami (SAC)
• Terrestrial 10G circuit Santiago ↔ S Paulo
More redundancy due to use of undersea cables

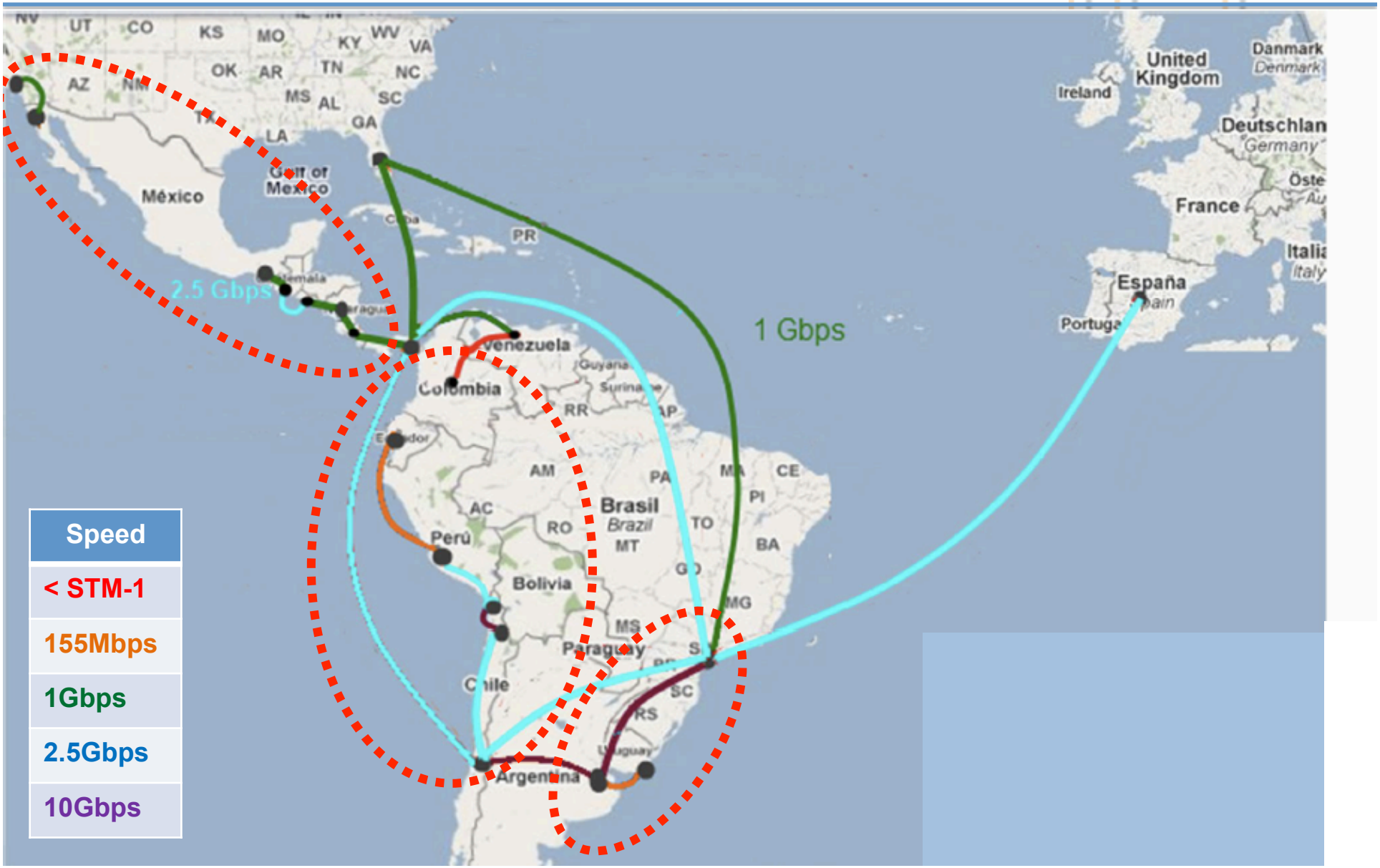
RedCLARA

- Since 2004 RedCLARA operates an interconnection network in the South American region with circuits to Europe and US in the same fashion as GÉANT.
- The majority RedCLARA's backbone core circuits are deployed using undersea cables
- Since 2008 the RedCLARA community also looks for terrestrial optical alternatives for connections between neighboring countries.

RedCLARA Topology



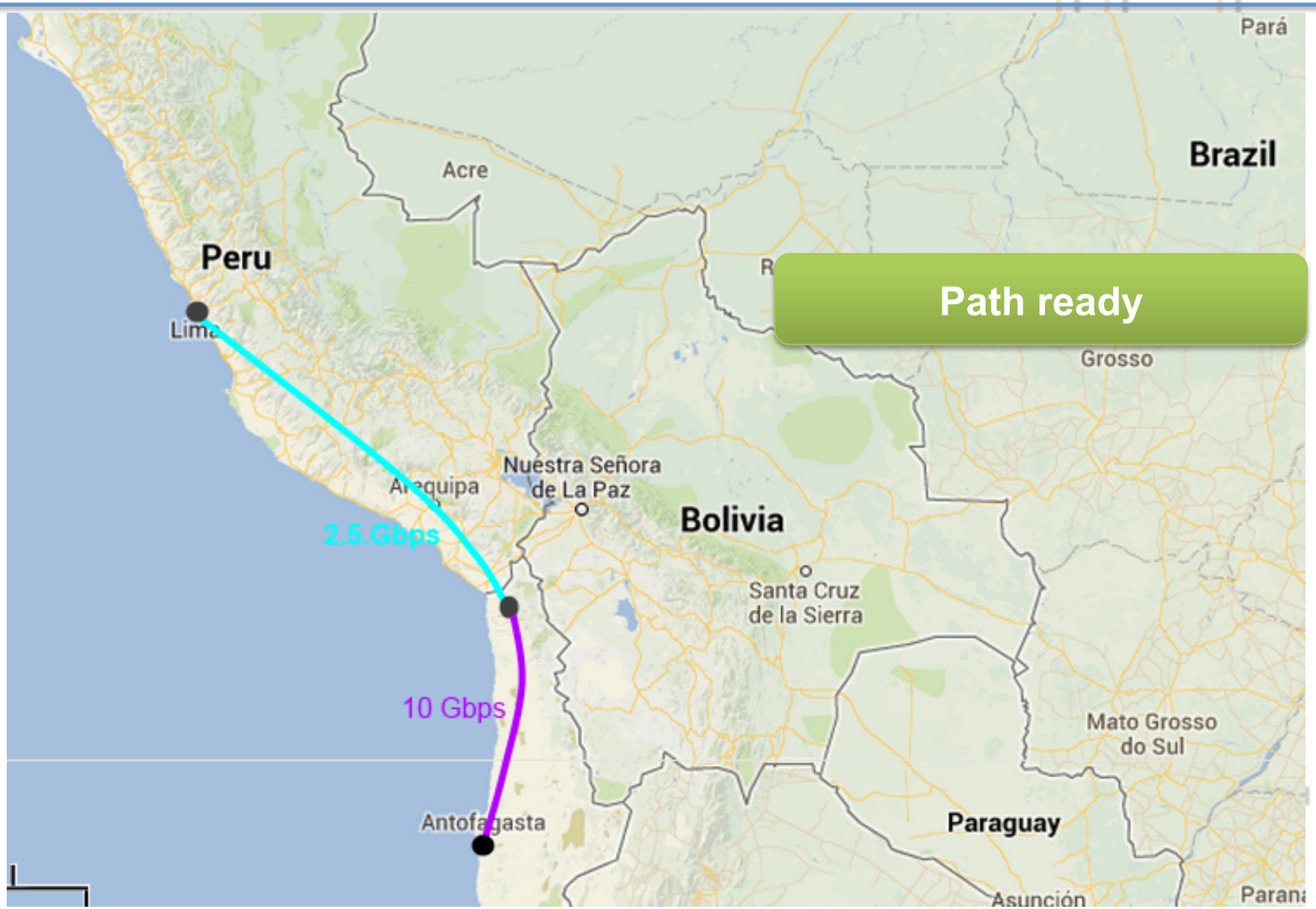
RedCLARA Topology Update



RedCLARA: Central America terrestrial fiber

RedCLARA: Buenos Aires ↔ Porto Alegre, RS

RedCLARA: Lima, PE ↔ Antofagasta, CL



RedCLARA: Roadmap 2013-2014

Thank You!

RNP – Rede Nacional de Ensino e Pesquisa
Brazil

Alex Soares de Moura
alex@rnp.br

RNP

Ministério da
Cultura

Ministério da
Saúde

Ministério da
Educação

Ministério da
Ciência, Tecnologia
e Inovação

GOVERNO FEDERAL
BRASIL
PAÍS RICO É PAÍS SEM POBREZA