

# RNP Updates

AmLight SAACC Spring Meeting  
Santiago, Chile  
20<sup>th</sup> April, 2015

**Michael Stanton**

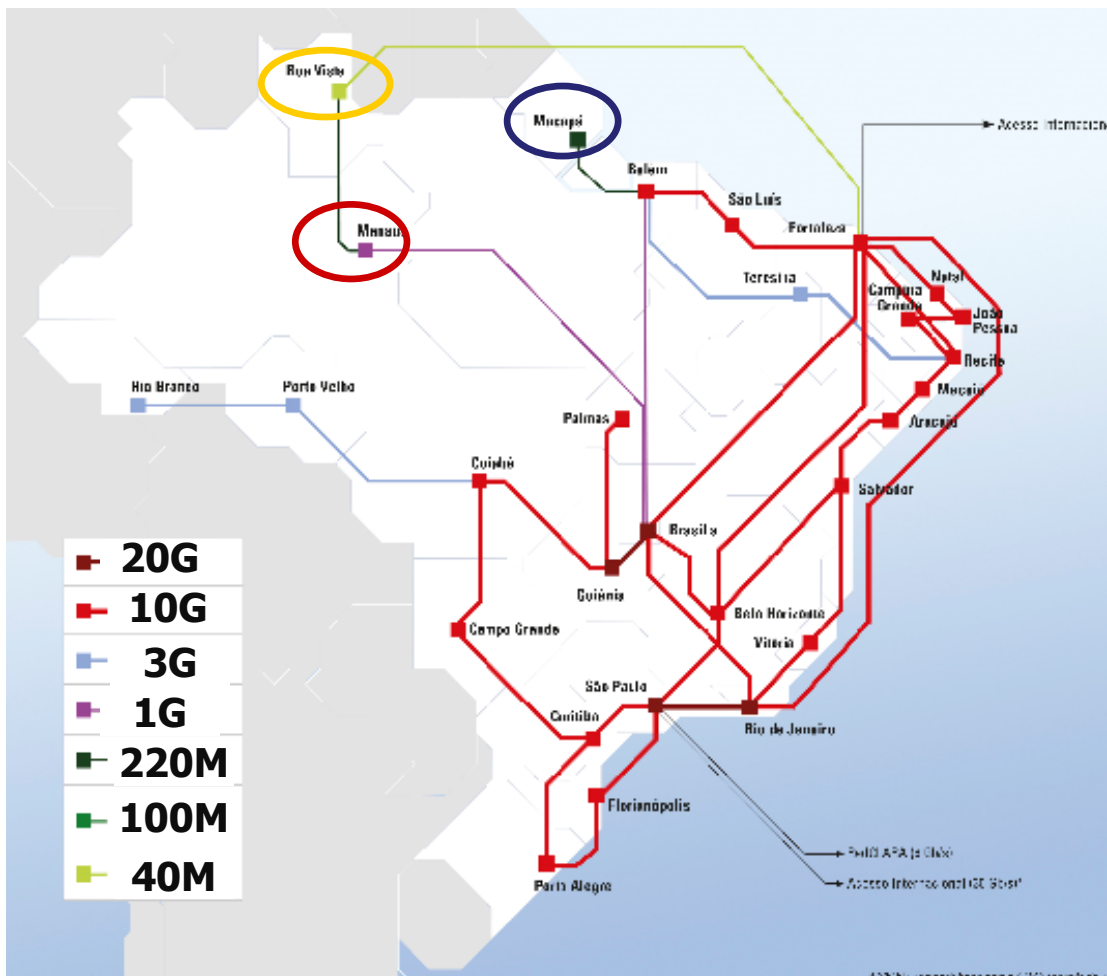
**RNP**

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- Backbone network extensions
- New fibre infrastructure in Amazonia
- Planned international submarine cables
- Metro and other access networks  
(now providing access to over 1000 campi)

# Brazil in 2014-15: 6<sup>th</sup> Phase

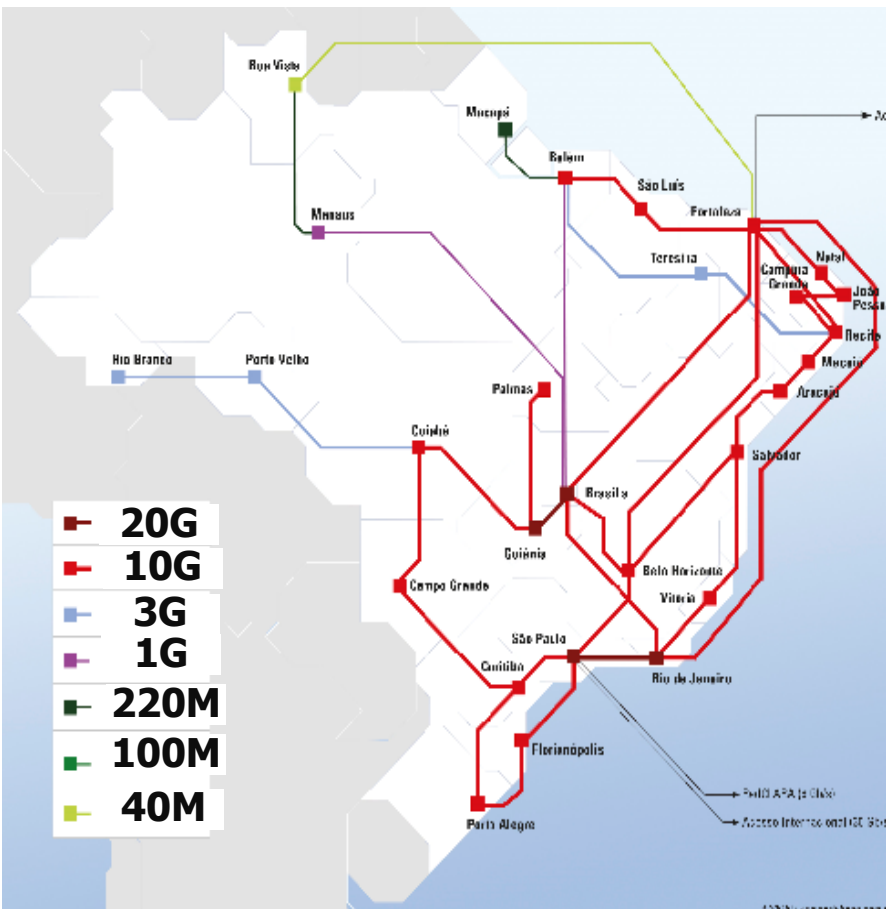
## “Ipê” 10G Core Network



- ➔ 10G Footprint extended to reach 21 of 26 state capitals)
- ➔ Brasilia – Manaus Link to 1G, via existing terrestrial link
- ➔ Completion of the optical fibre footprint: Manaus – Boa Vista (+ redundancy via submarine cable)
- ➔ New 2<sup>nd</sup> fibre across Amazon reaches the northern capitals **Macapá and Manaus**
- ➔ RNP expects to get multi-Gbps to these cities soon
- ➔ Metro R&E dark fibre nets in 26 of 27 state capitals in operation 19 at 2X10G; 2 at 10G+3G; only **Porto Velho** left to be built.
- ➔ Completion of long-awaited 10G 300km long metro network in Rio used by 60 campi, including **ON and LineA** sites

# Brazil "Ipê" Core Network

## Major Upgrades in 2014-15



- ❑ **3G to 10G Upgrade of Oi circuits:** from Fortaleza to São Luís and Belém and from Goiânia and Curitiba to Palmas, Cuiabá and Campo Grande
- ❑ **New 10 G Telebras link** between Fortaleza and Recife
- ❑ **New landing points in Rio de Janeiro and Fortaleza of the 10 G submarine link formerly connecting São Paulo to Miami via the Atlantic**
- ❑ **Incorporation of São Paulo – Rio de Janeiro and Rio de Janeiro – Fortaleza submarine links into the national backbone**
- ❑ **Ongoing upgrades to metro R&E nets** Including Phase 2: non-state capital R&E metro networks

# Aerial Amazon Crossing

at Jurupari (Pará): 2100m span between 300m towers



## TRAVESSIA RIO AMAZONAS

Dados Travessia Rio Amazonas  
Extensão - 8,56 Km  
Escavação - 1.506 m<sup>3</sup>  
Armaduras - 641 Ton  
Concreto - 7.556 m<sup>3</sup>  
Estacas Metálicas /Raiz - 27.600 MI  
Torres Autoportantes - 5.800 Ton  
Lançamento de Cabos - 214 Km

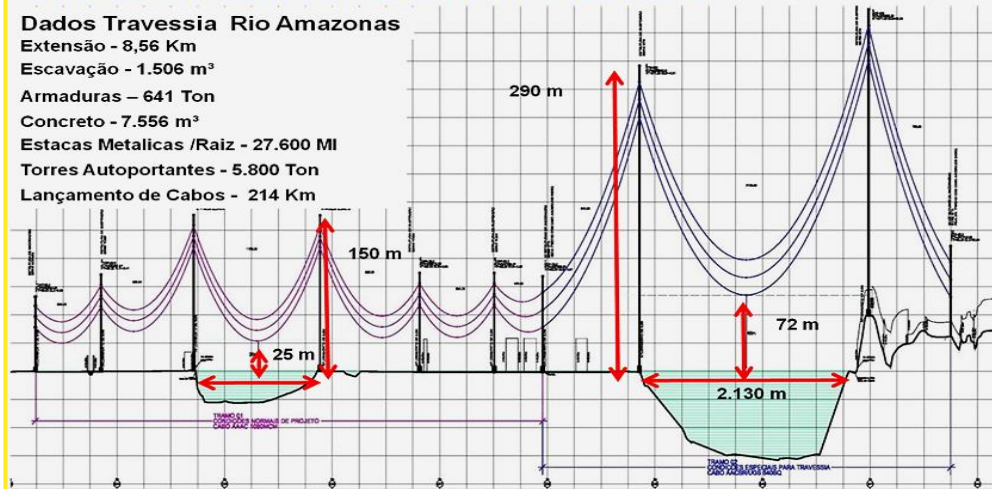


Figure N+3: Details of the Amazon crossing at Jurupari.

- ➔ New 2<sup>nd</sup> fibre across the Amazon reaches the northern capital cities **Macapa and Manaus**
- ➔ Brings competition to the 1<sup>st</sup> terrestrial link to Manaus
- ➔ RNP expects to get **multi-Gbps access to these cities soon**

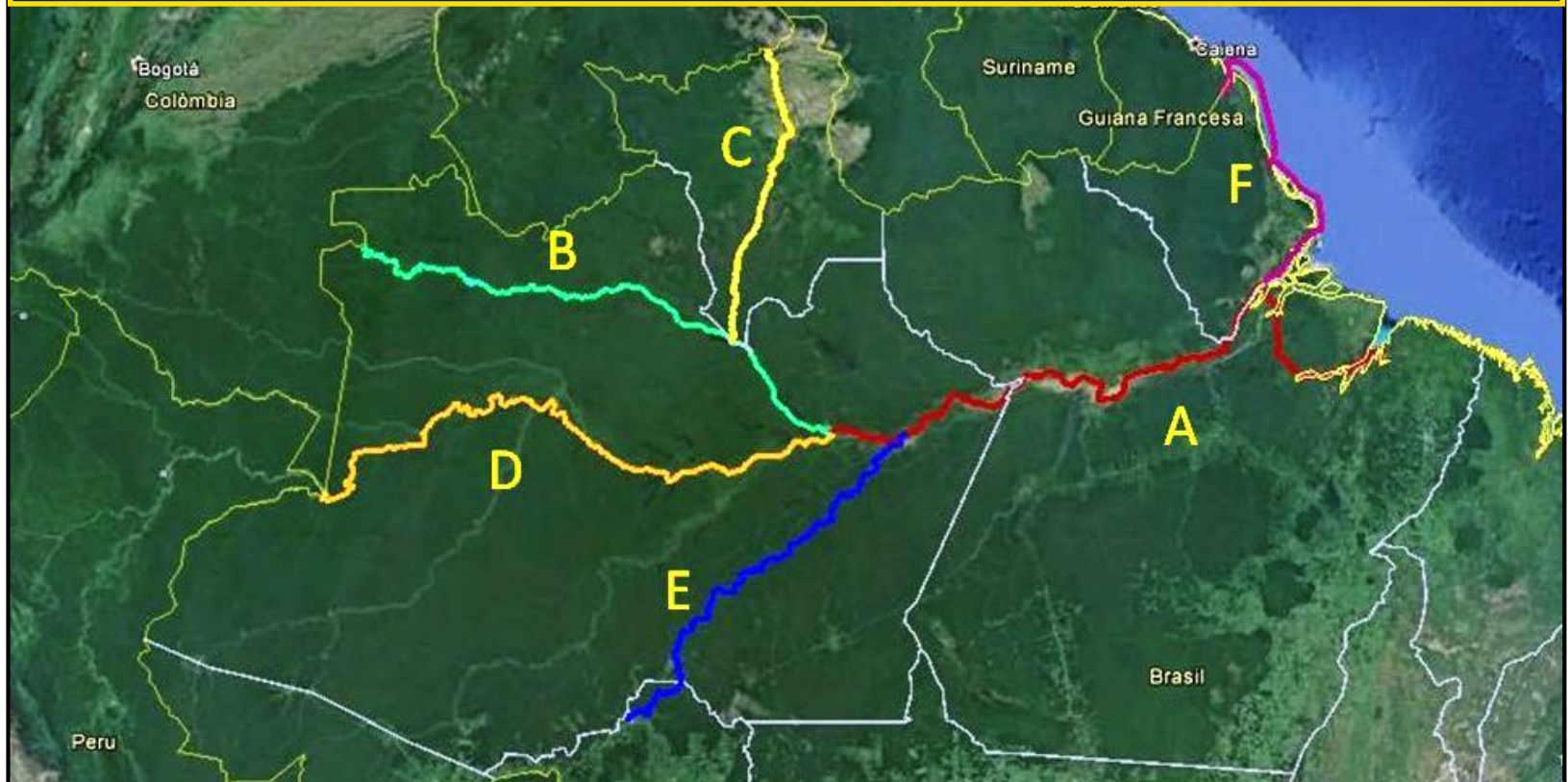
# Existing infrastructure in Amazonia

- Existing long-distance optical infrastructure in the Brazilian Amazon region
  - Belem-Manaus and Manaus–Boavista 2012
  - Macapá - Manaus 2013.
- Does not reach the majority of the riverside population
  - Access to large cities, hydroelectric plants, gas centres, ...)
  - Majority lives along the main rivers of the region



# RNP proposal for subfluvial cables along major rivers in the north

- ❑ **Complementing existing fibre infrastructure**
- ❑ **200km pilot along Route D feasible in 2015**



**Possible major routes for subfluvial fibre optic cables.**  
**Rivers: A: (lower) Amazon; B: Negro; C: Branco; D: Solimões (upper Amazon), E: Madeira; F: maritime route to French Guiana.**



# Pilot for subfluvial cable project

- **First stage**  
**Coari – Tefe (200 km)**  
**(Route D)**



## References:

- Grizendi, E. ; Stanton, M.A. “Use of subfluvial optical cable in a region without land-based infrastructure - a project to deploy optical cable in the Amazon region”. UbuntuNet-Connect 2013, Kigale, Rwanda.  
<http://www.ubuntunet.net/sites/ubuntunet.net/files/grizend.pdf>
- Siemens, A., “Cable Laying on the Amazon River”, Nature vol 54, 162-164 (18 June 1896). Also available at  
<http://www.atlantic-cable.com/Cables/1895ParaManaos/>



# New South Atlantic cables

## Monet (Miami), SACS (Luanda), eulaLink (Lisbon)

- ❑ **Monet Cable: Google + 3 Telcos in Brazil, Uruguay, and Angola**  
**Planned to be operational by 2017**
  - ❑ **LSST to purchase 300 GHz of spectrum on one fibre pair (Currently enough for 6 X 100G) proposed to be funded by NSF**
  - ❑ **2/3 of this is proposed to be used by RNP and ANSP in exchange for access networks in Brazil and neighbouring countries**

### South Atlantic Cable System (SACS) (by 2016)

- **Owned by Angola Cables**
- **Shorter Africa – US Route**
- **suited to link SKA to US (?)**

### eulaLink Cable (by 2017)

- **Telebras + IslaLink (Spain)**
- **Shorter S.America –EU route**
- **2 THz Spectrum for LA+EU RENS**



# Optical metro networks

Provide high-capacity access to campi

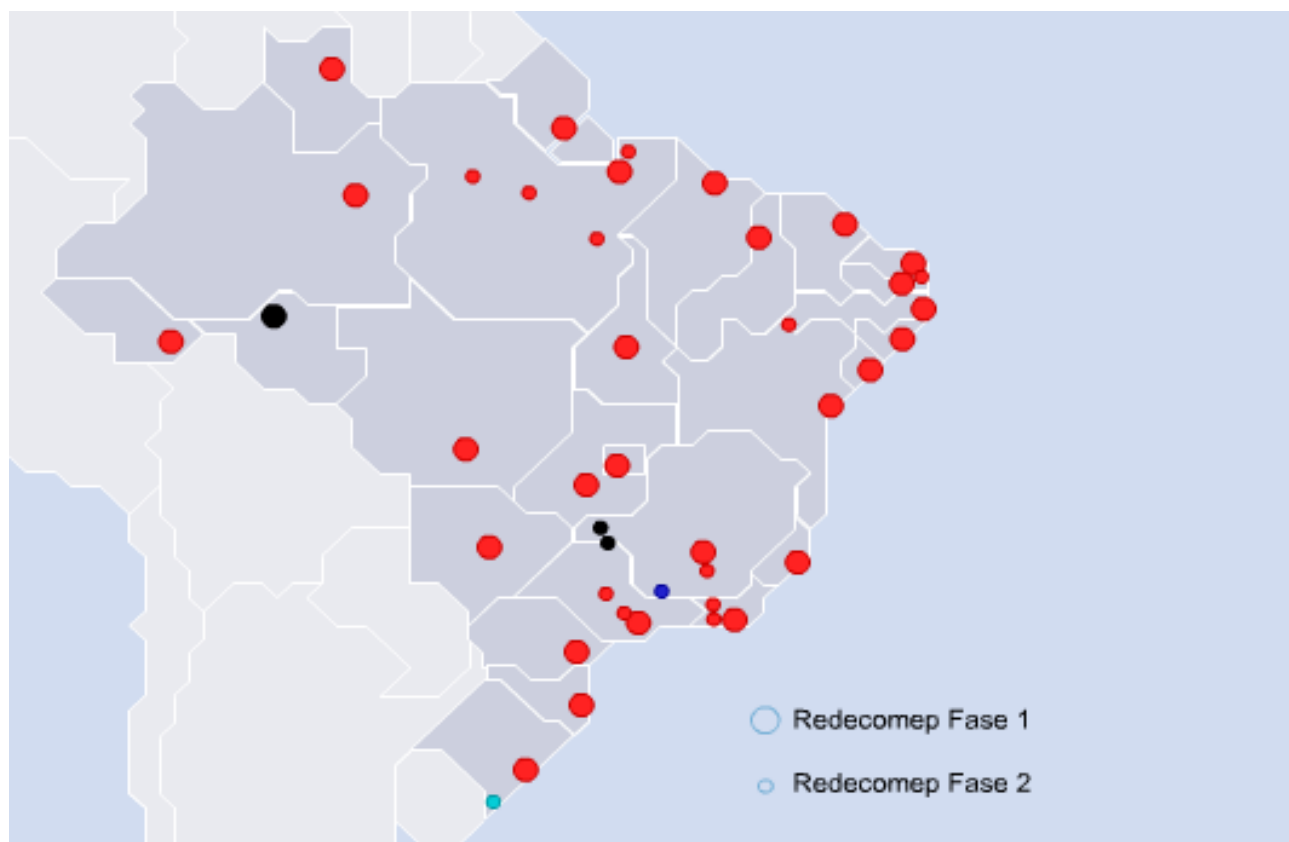
- (Usually owned) dark fibre infrastructure to connect campi at (currently) 1Gb/s or 10 Gb/s

Phase 1:

- capital cities

Phase 2:

- non-capital cities



September, 2014: more than 400 campi connected in 40 networks, with the inauguration of the 300km metro network in Rio de Janeiro (Redecomep-RJ)

# Integração metropolitana

Última atualização em abr/2012

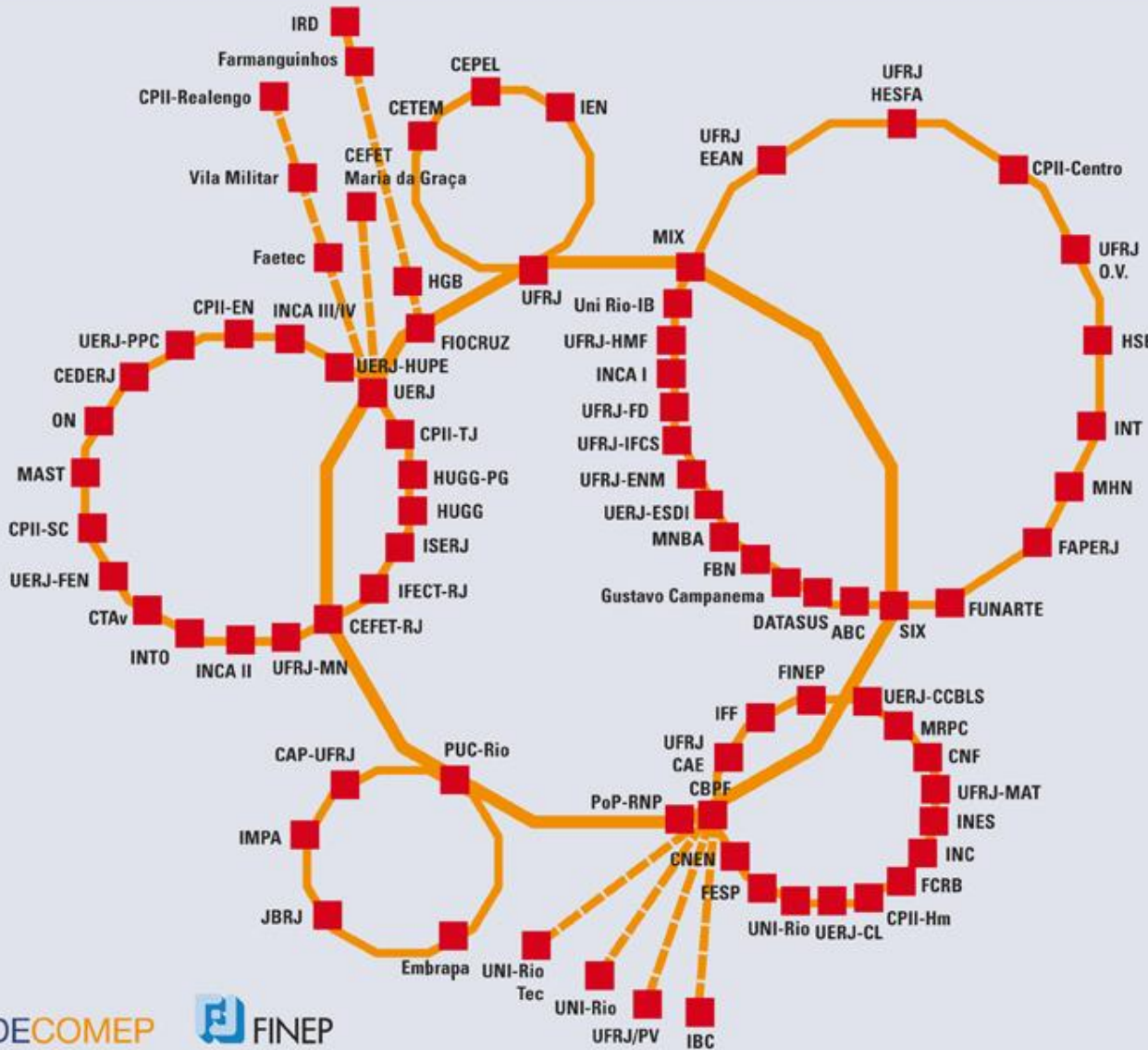
Ministério da  
Ciência, Tecnologia  
e Inovação



Rio de Janeiro  
Rede Metropolitana do Rio de Janeiro

Extensão de rede  
**303 Km**

Investimento estimado  
**RS 9.000.000,00**



Instituição coordenadora da implantação: RNP

PONTOS DE ATENDIMENTO 128

60 Acadêmicos

28 Prefeituras

2 Supervia

17 Metrô

8 MS + Rute

1 MSAúde

9 MinC

1 MMA

1 ABC

1 MD

INSTITUIÇÕES PARCEIRAS 6

Faperj

Governo do Estado do Rio de Janeiro

LAMSA

METRÔ

Prefeitura da Cidade do Rio de Janeiro

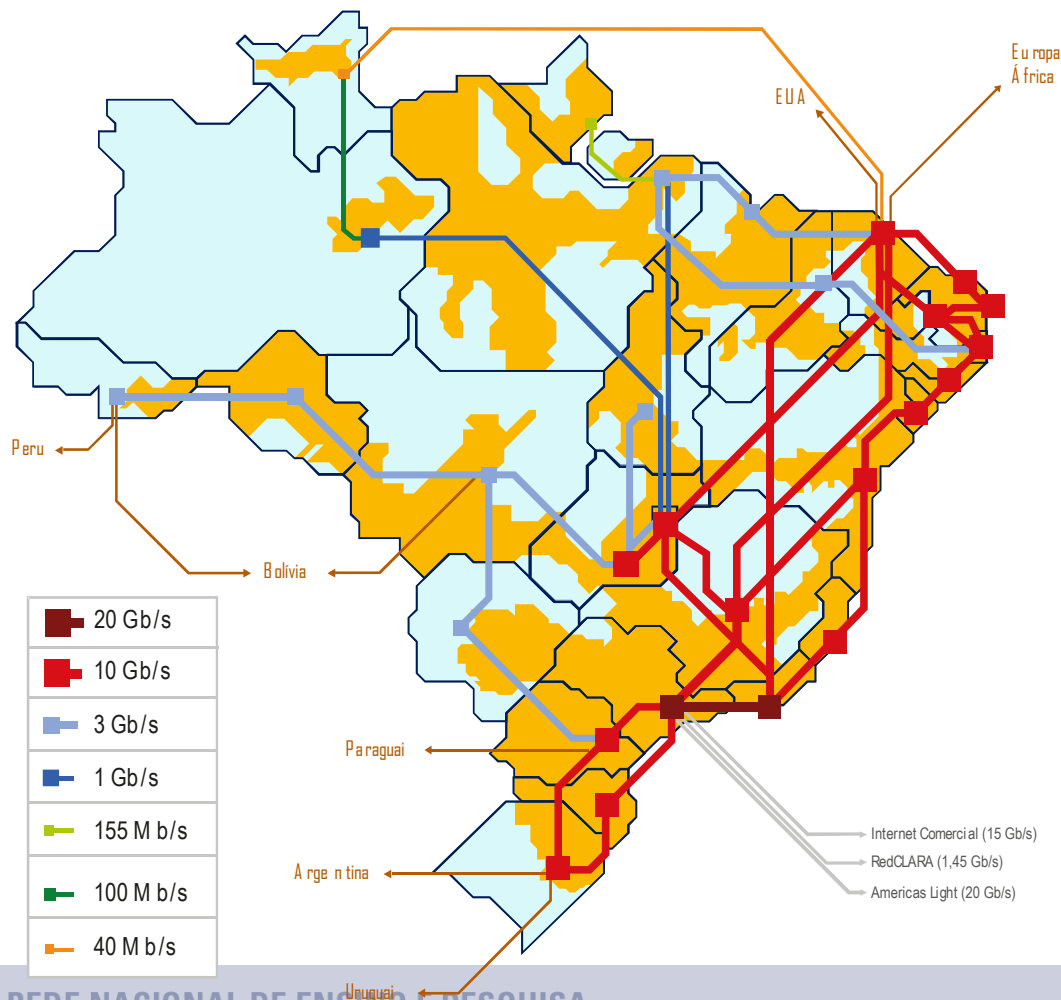
SUPERVIA

REDECOMEP FINEP

A EVOLUÇÃO DA REDE NACIONAL DE ENSINO E PESQUISA

# UPSTATE CONNECTIONS

Apart from the multigigabit backbone que connects points of presence in state capitals, RNP connects more than 600 upstate campi of federal universities and institutes at capacities between 100M and 1G.



Obrigado!  
Thank you!

Questions? Comments?

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