rednesp

Research and Education Network of São Paulo

AmLight SA3CC Meeting
April 30 - May 1, 2024

Agenda: 7 current rednesp efforts

Prof. Dr. Ney Lemke
(State University of Sao Paulo - UNESP)
ney.lemke@unesp.br

from ANSP to rednesp

A Academic Network at Sao Paulo)

rednesp (www.rednesp.br/en)

(research and education network of Sao Paulo)
USP, UNESP, UNICAMP committee

USP (University of Sao Paulo)
UNESP (São Paulo State University)
UNICAMP (State University of Campinas)

academic committee

(astronomy and physics teams)
FAPESP Scientific Board

First Effort: Financial Investment

- **Funded by FAPESP** (The Sao Paulo Research Foundation) http://fapesp.br/en
  - **USD 5 M by year** in last 16 years

  for providing Atlantic and Pacific links (orange lines)

  in the AmLight cooperation and rednesp

  connections.
- Investment in HR (Kytos+ Infrastructure+Administrative)

  New contract in 2023.

Second Effort: technical collaboration

management of international connections

AmLight ExP
Americas Lightpaths Express & Protect

rednesp

RNP

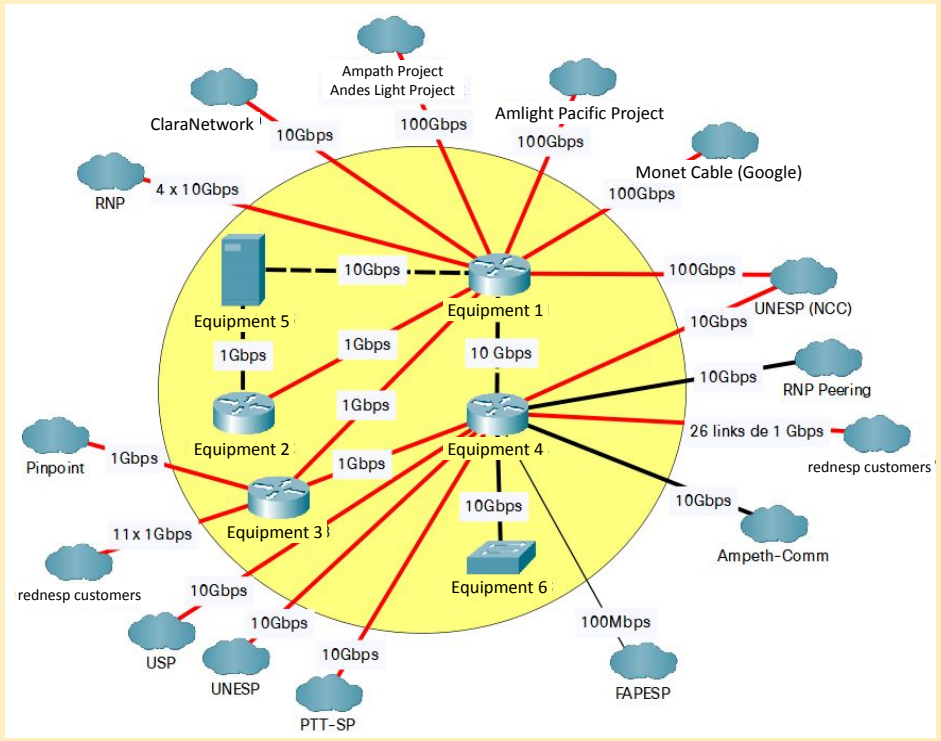
Resilient Links (2 x 100 Gbps)
Funded by FAPESP-rednesp and provided by Lauren

Monet Link (2x 100 Gbps)
Provided by AmLight cooperation

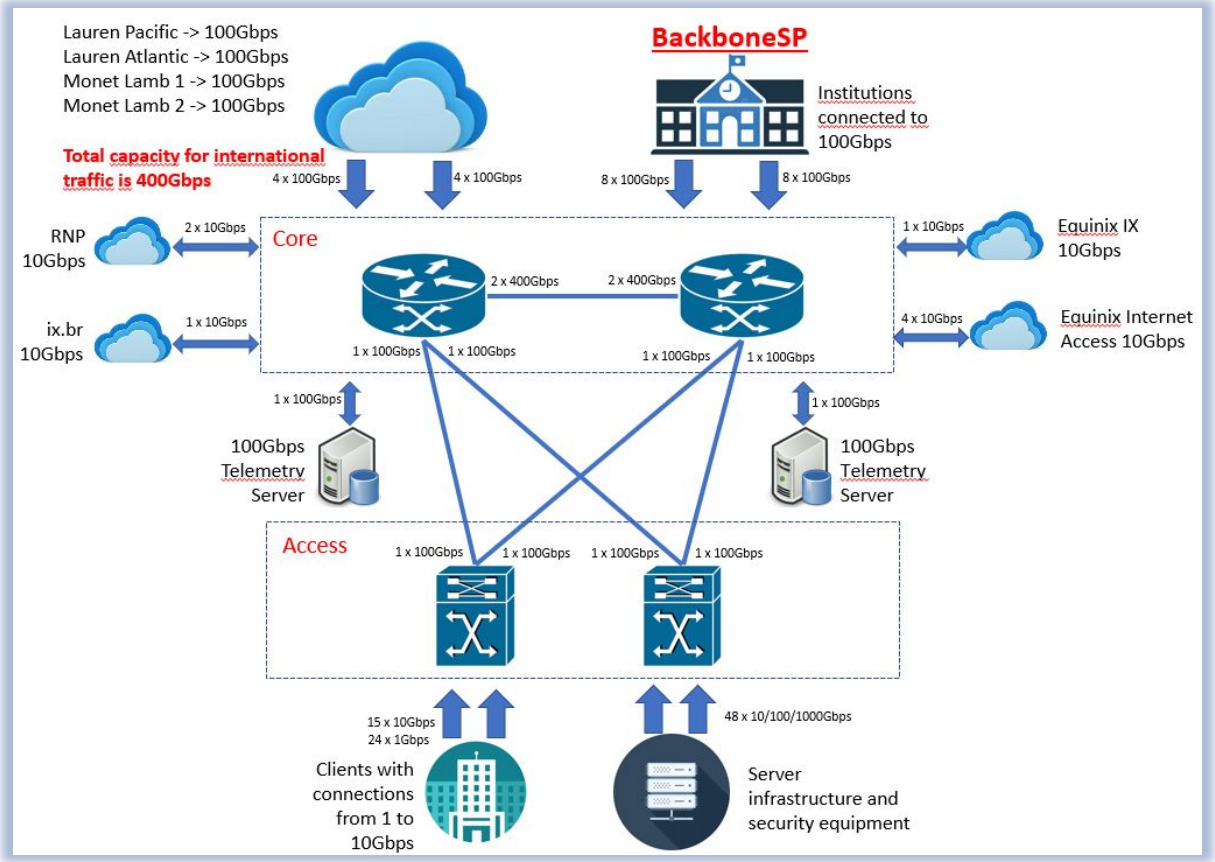
Ella link (Bella Programme)
Provided by European effort and RNP management in Brazil

Third Effort: Infrastructure evolution

Old infrastructure –100Gbps



New infrastructure - 400Gbps



Obsolete and discontinued equipment
- limited capacity
- no possibility of upgrade
- no possibility of growth

State-of-the-art Juniper equipment
- capacity of up to 14.4Tbps per slot
- PTX10004 has 4 slots totaling 57.6Tbps

Investment of USD 500 thousand

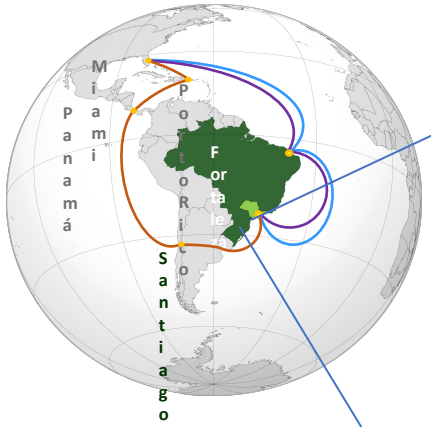
Third Effort: Infrastructure evolution

New cage - Equinix

front view

background view

Fourth Effort: Backbone-SP



Integrating 8 academic institutions at 100Gbps in the State of Sao Paulo

Fourth Effort: Backbone-SP

Integrating academic institutions by Backbone-SP

The Brazilian Synchrotron Laboratory

Brazilian Army Research Group

National Institute for Space Research

- High availability connectivity infrastructure using 100Gbps for supporting teaching and research in the State of São Paulo
- Backbone for state and international connection using high speed
- Protocol-transparent point-to-point links
- Alternative for interconnection of research centers in the State of São Paulo
- Backbone for integration of HPC servers

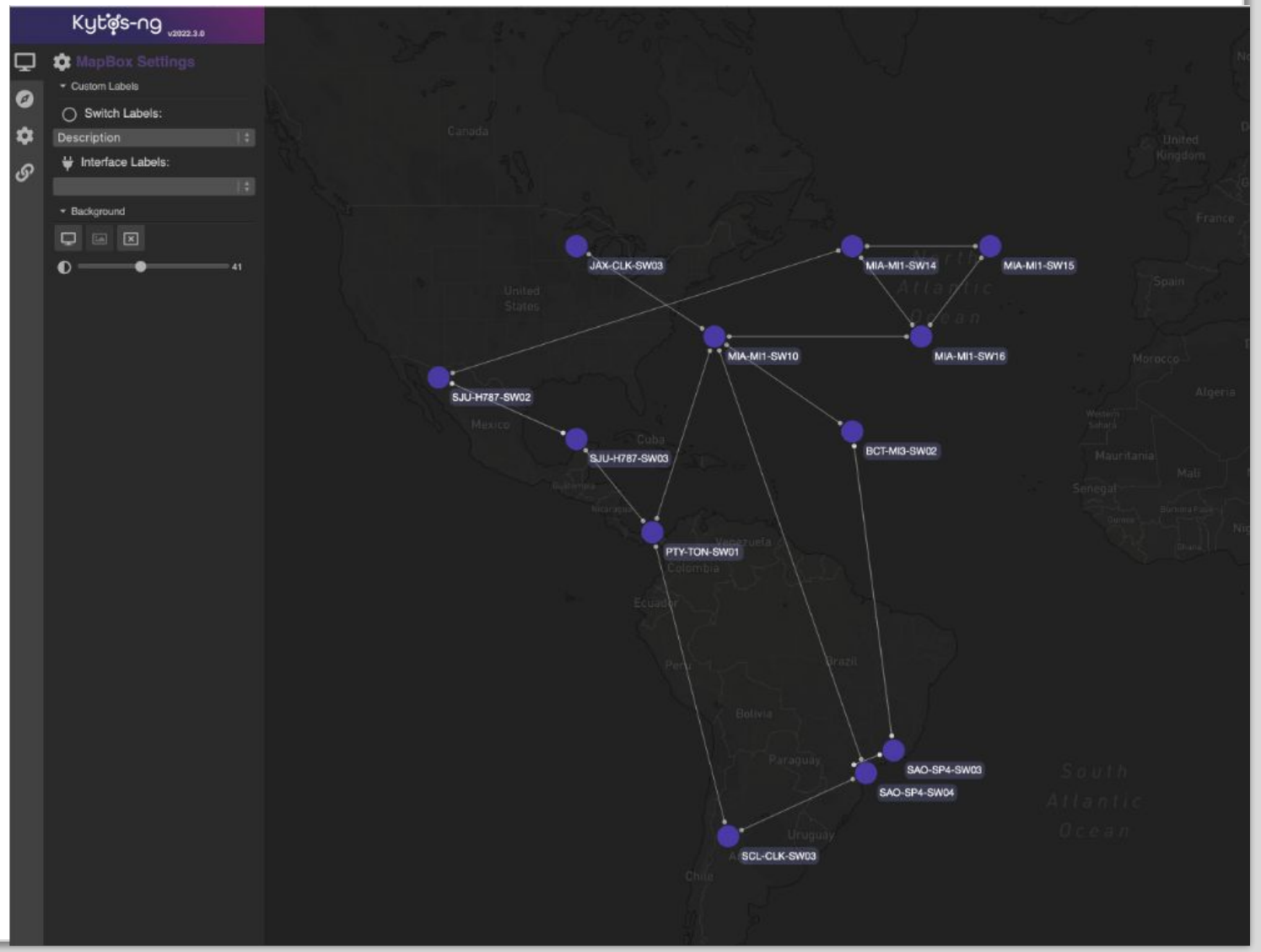
Fifth Effort: Kyt s-ng

- SDN platform
  - SDN Controller
    - orchestration of SDN switches of the Pacific/Atlantic ring connecting São Paulo/BR to Florida/US
  - Multi-component architecture
  - Framework to develop Network Applications (NApps)
    - E-Line (Point-to-Point Ethernet virtual circuits)
    - LLDP network topology discovery
    - Pathfinder for computing constrained best paths
    - Bidirectional Forwarding Detection (BFD)
    - INT In-band network telemetry
  - Controlled by REST APIs or Web UI
- Open source code available at Github repository

  [https://github.com/kytos-ng]
  - Source-code and release notes are publicly available

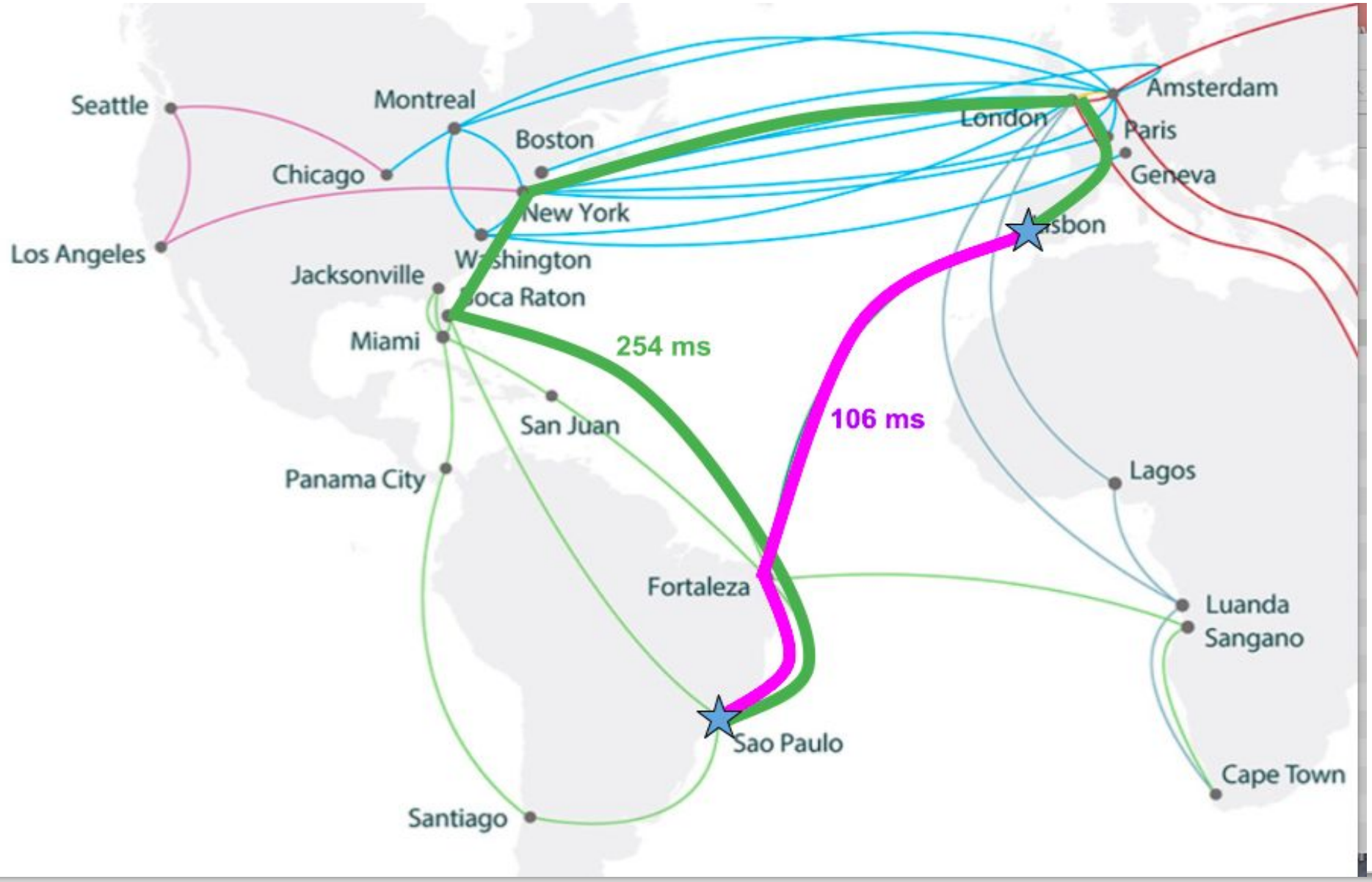
Fifth Effort: Kytos-ng next steps

- rednesp contribution for Kytos-ng 2023.2
  - Upgrade core component of Kytos-ng
  - Support development/evolution



Sixth Effort: SC 2023 experiment

Supercomputing 2023 (SC 2023)https://sc23.supercomputing.org



Seventh Effort: Adding projects

- **Observatory - Cherenkov Telescope Array (CTA)** **https://www.cta-observatory.org/**

Prof. Luiz Vitor de Souza Filho – PI FAPESP in the CTA cooperation grant

the main goal: linking the observatory from Chile to Europe for study the extreme environments of the universe through detection of the **highest known energy radiation** such as the explanation of dark matter , the possibility of breaking of Lorentz invariance and understanding how supermassive black holes operate.

- **Integrating High Performance Computing Centers in Sao Paulo**

the main goal: provide the Scientific and Technological Cooperation Agreement between FAPESP, MCTI and MCom (fapesp.br/8388) - USD 20 M.

rednesp-FAPESP teams and Partners

FAPESP

Prof. Dr. Marco Antonio Zago - President

Administrative-Technical Board (ATB)

- **Prof. Carlos Américo Pacheco** – Director of ATB
- **Prof. Márcio de Castro Silva Filho –** Scientific Director
- **Prof. Fernando Menezes de Almeida** – Administrative Director

rednesp university committee:

- **Prof. João Paulo Gois / UFABC**
- **Prof. Calebe de Paula Bianchini / Mackenzie**
- **Prof. Paulo Bandiera Paiva / UNIFESP**
- **Prof. Hermes Senger / UFSCar**
- **Profa. Cecilia de Azevedo Castro Cesar/ITA**
- **Prof. João Eduardo Ferreira/USP**
- **Prof. Ney Lemke / UNESP**
- **Prof.Ricardo Dahab / UNICAMP**

rednesp executive committee

- **Prof. João Eduardo Ferreira (USP) –** Coordenadinator
- **Prof. Ney Lemke (UNESP)**
- **Prof. Sandro Rigo (UNICAMP)**

rednesp technical team

- **Prof. Carlos Antônio Ruggiero**
- **Bruno Ferreira Baldim**
- **Paulo Sérgio Simionato**
- **Rogério Motitsuki**
- **Ana Maria Dias Cerqueira**

USP collaborators

- **Jorge Marcos de Almeida**
- **Geraldo Teodoro da Silva Junior**

Partners - Backbone SP

Partners

rednesp

Research and Education Network of São Paulo

AmLight SA3CC Meeting
April 30 - May 1, 2024

Thanks!

Prof. Dr. Ney Lemke
(State University of Sao Paulo - Unesp)
ney.lemke@unesp.br