



*Americas Lightpaths Express & Protect*

AmLight Express and Protect (AmLight-ExP):  
Enabling Research and Education in the Americas



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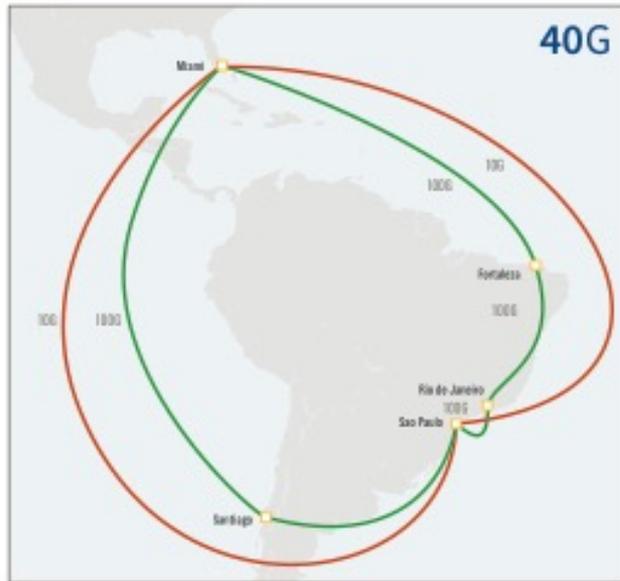
**Americas Research Platform (AmRP) meeting  
Global Research Platform workshop  
September 17, 2019**

# Outline

- AmLight Vision
- Current Status
- Science Driver: LSST
- AmLight-SACS
- Conclusion

# AmLight Express & Protect Vision

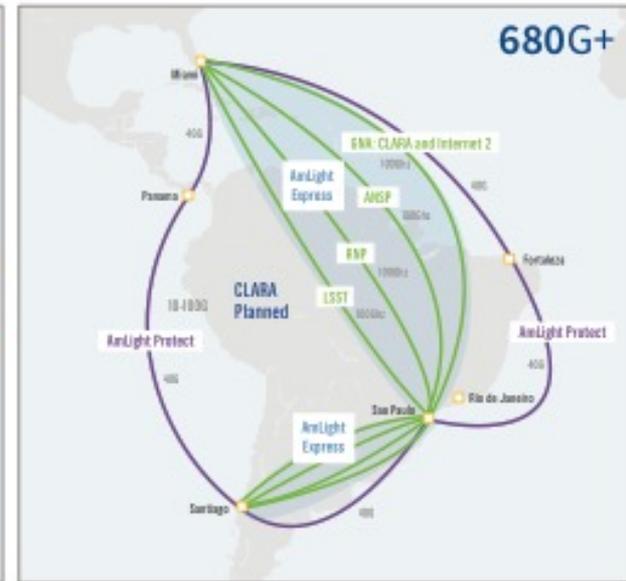
## Backbone: AMLIGHT



Current



2015-2017



2018-2031

- Community-operated network infrastructure
- Leased capacity on two submarine cable systems, evolving to a hybrid model that includes spectrum from Boca Raton to Sao Paulo
- Express (spectrum) capacity will provide up to 6 optical channels, which will be lit with 100G transponders today
- Protect (leased) capacity 100G ring will back up the Express capacity

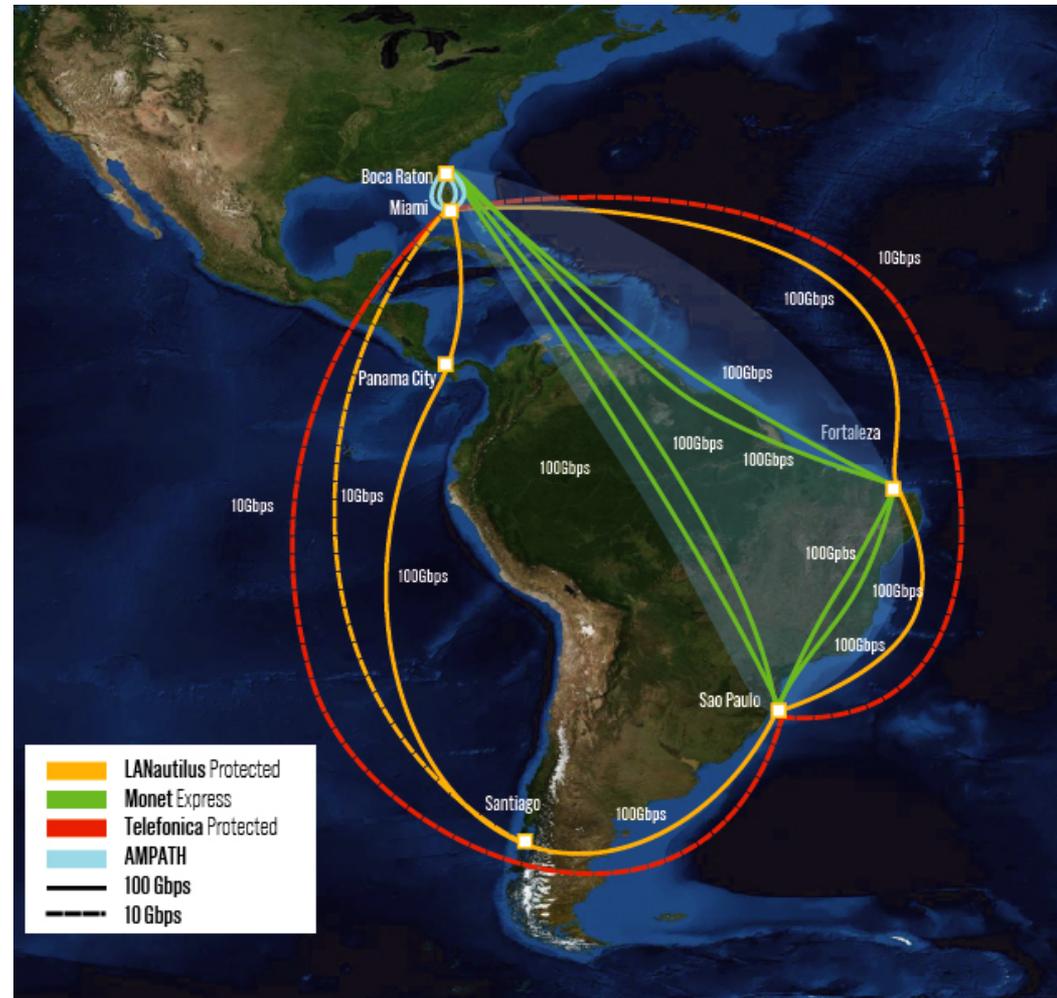
# Partners and Goals

- AmLight-Exp interconnects the U.S. to key aggregation points in South and Central America (Brazil, Chile, Panama)
- 5-year Cooperative Agreement with the U.S. National Science Foundation
- Cooperative and collaborative partnerships with ANSP, RNP, CLARA, REUNA, AURA, FLR, and Internet2
- Continue evolving a rational network infrastructure using both optical spectrum and leased capacity



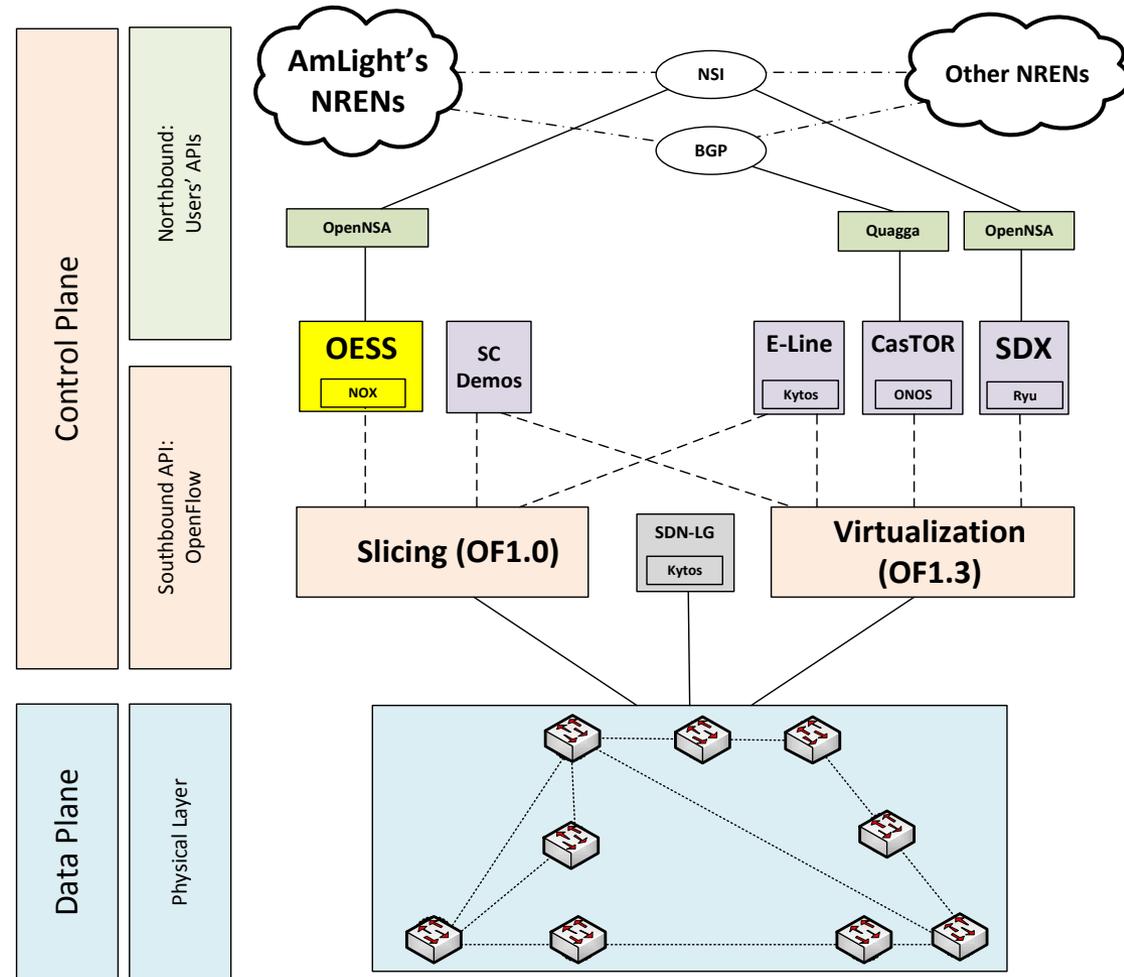
# AmLigh- ExP Network Infrastructure Today

- **Express Ring:** Boca Raton, Fortaleza, Sao Paulo
  - 6 (green lines) x 100G links
    - 4 managed by RNP
    - 2 managed by FIU/ANSP/LSST
- **100G Protect Ring:** Miami-Fortaleza, Fortaleza-Sao Paulo, Sao Paulo-Santiago, Santiago-Panama, and Panama-Miami (solid orange)
- 10G ring from Miami-Sao Paulo-Miami for protection (red dashed)
- 10G Miami-Santiago for protection (orange dashed)
- 100G and 10G rings are diverse, operating on multiple submarine cables
- Total upstream capacity presently at **630Gbps!**



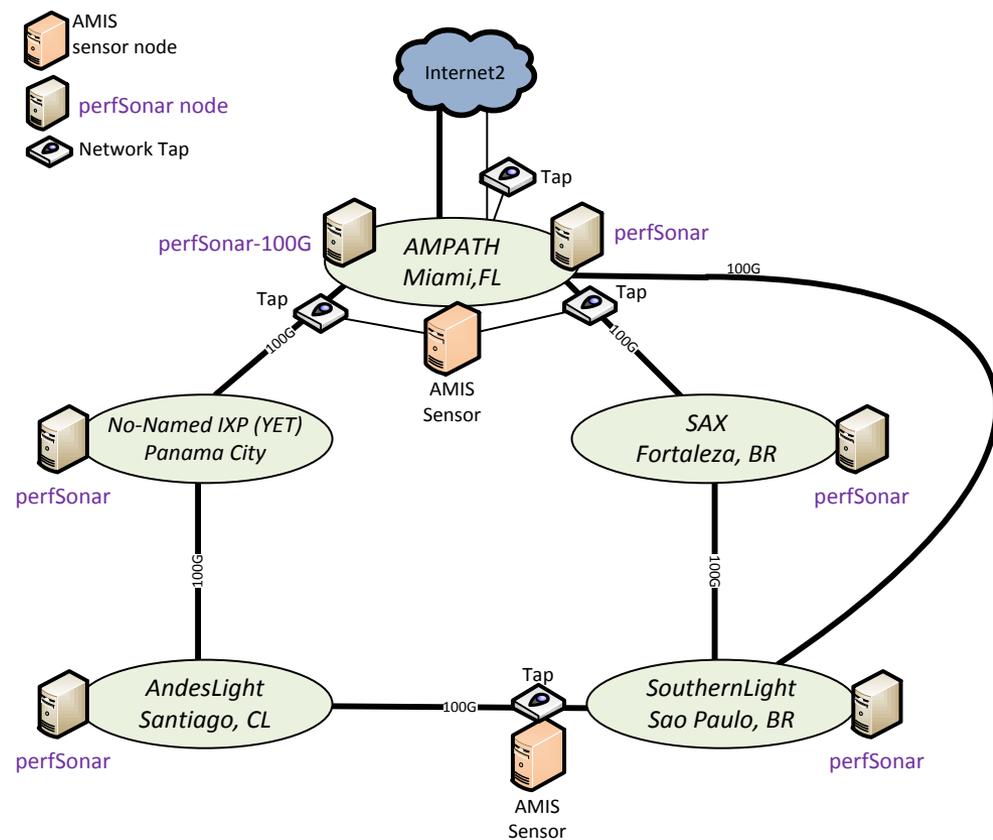
# Network virtualization and programmability

- Supporting SDN in production since 2014
- Researchers use slicing/virtualization to prototype network-aware applications
  - Can implement testbeds with real network devices
  - Can validate research in a production environment, and at scale
  - E.g., Existing testbed for bandwidth prioritization and reservation to support big-data and real-time applications (LSST use case)
- SDN Looking Glass for integration of both optical and packet domains for a complete network troubleshooting and visualization



# Monitoring and Measurement

- Each AmLight PoP has a 10G perfSonar node with two NICs (BWCTL and OWAMP)
- Two 100G network taps installed in Miami to support the IRNC AMIS project
- One 100G network tap installed between Sao Paulo and Santiago
- Maddash portal available





THANK YOU!

