Americas Lightpaths:
Building an enhanced measurement and reporting capability using Coral Reef

SAACC
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James Grace
Florida International University

AmLight: Americas LightPaths

- AmLight is an NSF IRNC Production Network (ProNet) award for USA-Latin America science & engineering research and education, OCI-0963053
- AmLight aims to enhance science research and education in the Americas
  - Interconnecting key points of aggregation
  - Providing operation of production infrastructure
  - Engaging U.S. and western hemisphere science and engineering research and education communities
  - Creating an open instrument for collaboration
  - Maximizing benefits of all investors

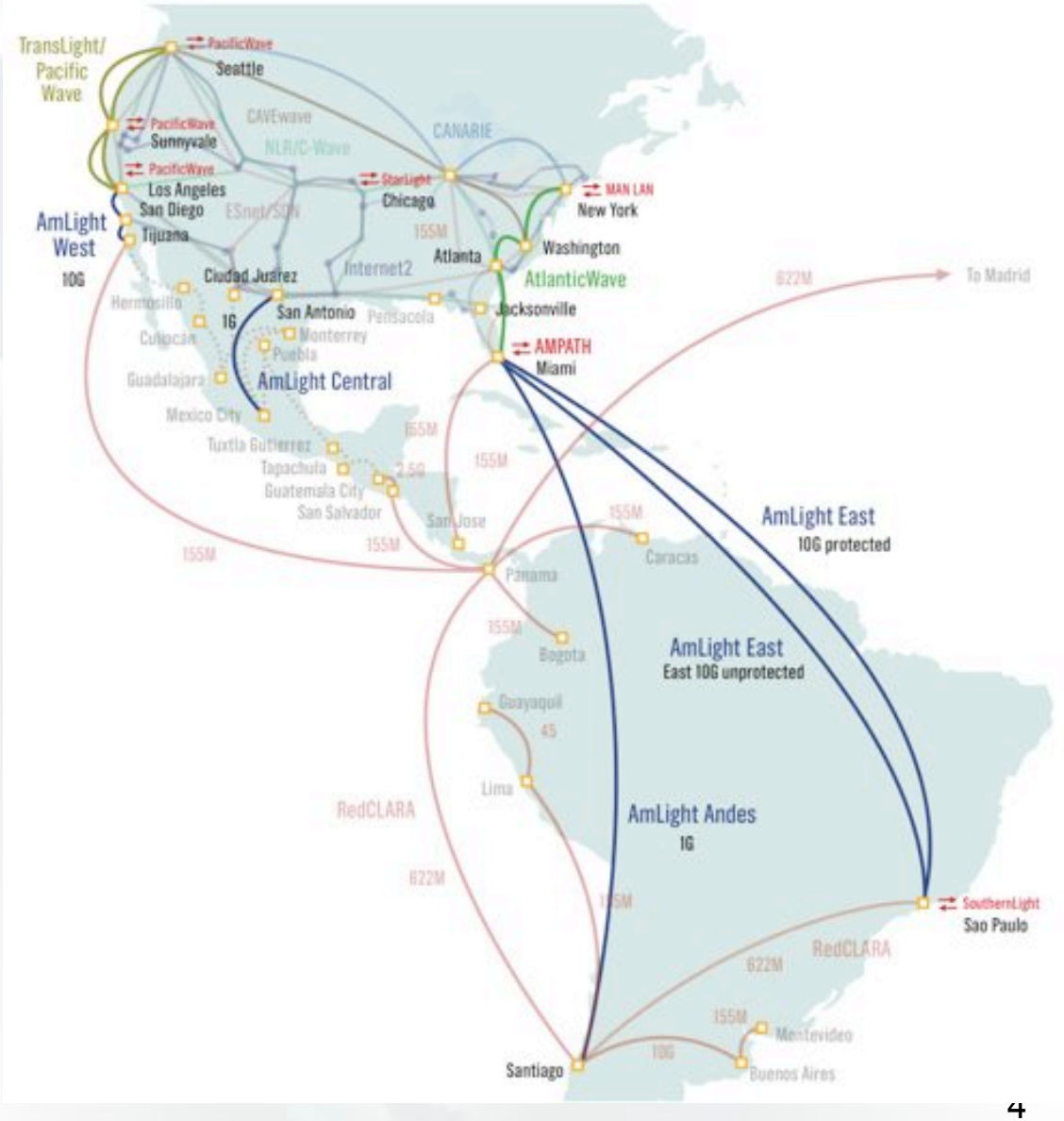
http://www.amlight.net/

AmLight: International Collaboration of NRENs, GOLEs and RONs

- Florida International University (AMPATH @ FIU)
- Corporation for Education Network Initiatives in California (CENIC)
- Lonestar Education and Research Network (LEARN)
- Academic Network of Sao Paulo (ANSP-FAPESP)
- Association of Universities for Research in Astronomy (AU
- Cooperación Latino Americana de Redes Avanzadas (CLARA)
- Corporación Universitaria para el Desarrollo de Internet (CUDI)
- Red Universitaria Nacional (REUNA)
- Rede Nacional de Ensino e Pesquisa (RNP)
- Florida LambdaRail
- Internet2
- Southeastern Universities Research Association (SURA)
- AtlanticWave Exchange Points
- National LambdaRail

AmLight Current Status

- AmLight East:
  - Sao Paulo-Miami:
    - 20G: 10G protected, 10G unprotected
- AmLight West:
  - Tijuana-Los Angeles
    - 10G connection to CENIC and Pacific Wave
    - 10G extended to CICESE in Ensenada
- AmLight Andes:
  - Santiago-Miami:
    - 1G protected
- AmLight Central:
  - Mex. City-San Antonio:
    - 1G connection to LEARN network



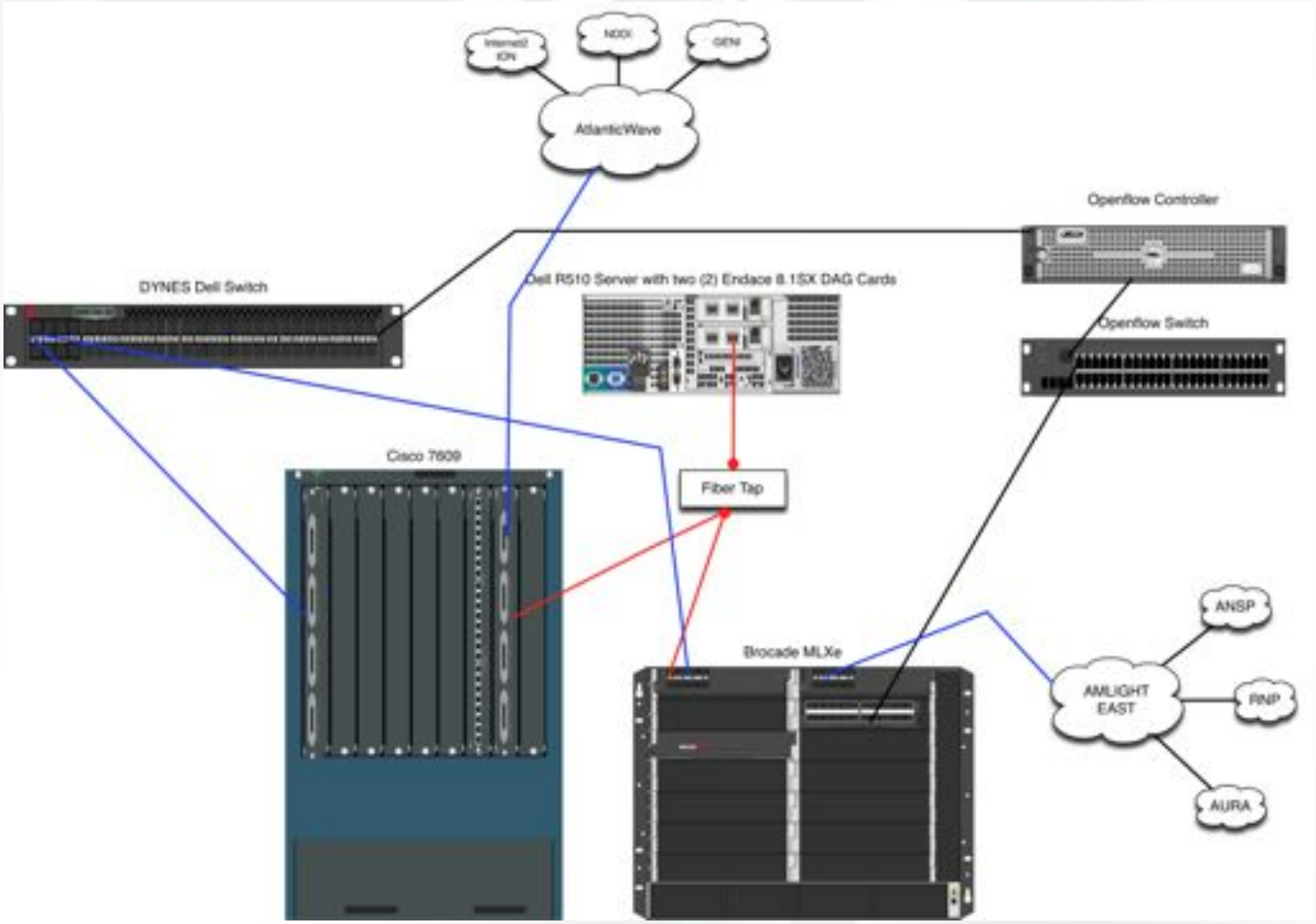
AmLight Measurement and Reporting Goals

- The IRNC program solicitation classified Hybrid Network Services as production
  - *"Dynamic circuit networking in combination with shared IP services must be support, NSF 09-564"*
- Measurement and reporting tools must support hybrid network services
- Goals: Operate a production-level measurement and reporting system for hybrid network services
  - Methodology: Collaborate with CAIDA to deploy the Coral Reef passive monitor in a production environment to support dynamic circuits and Openflow

Hybrid Networking on AmLight

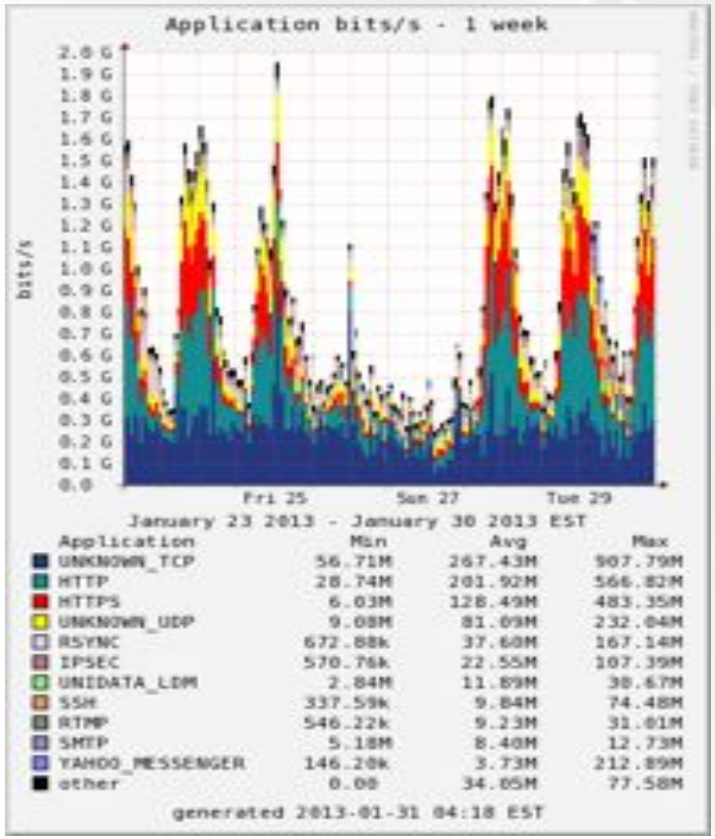
- Deployed the DYNES Inter-Domain Controller (IDC) supporting the On-Demand Secure Circuits and Advance Reservation System (OSCARS)
- Deployed OpenFlow switches to interconnect SDN deployments in Latin America with U.S. deployments (GENI, Internet2, Esnet, etc.)

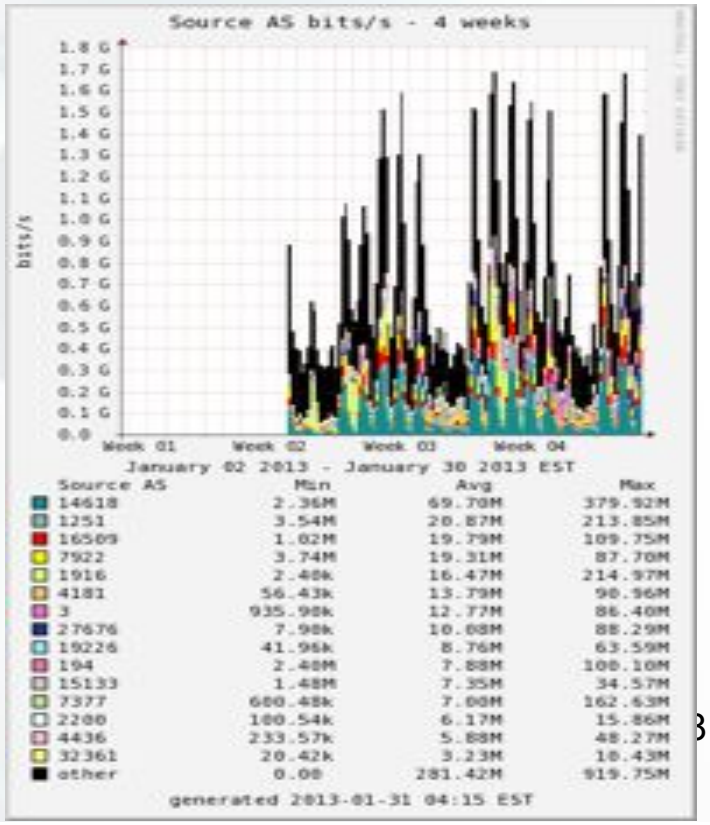
Coral Reef Implementation



Reports

- Currently reporting Bits/s, Packets/s, Tuples/s for Applications, Protocol, and AS-Source.





Next Steps

- Reports on a per VLAN level, instead of only the port
- Measuring dynamically provisioned VLANs
- Measuring and Reporting on OpenFlow circuits

Performance(Latency) Measurement

- Many advanced experiments require a low-variance latency to keep timing calculations correct.
- AMPATH has implemented perfSonar to schedule performance tests.

Performance(Latency) Measurement

Performance(Latency) Measurement

- Initial Findings
  - Average RTT: ~106.5ms
  - Most significant jumps in RTT are caused by optical “reroutes” on the international SDH circuit.
- Next Steps
  - Confidence Interval Alerts
    - Email alerts when Latency rises +/- 2 standard deviations from mean.

The End
Thank You