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Outline

- Introduction
- AtlanticWave Services
- Topology
- Research Users and Activities

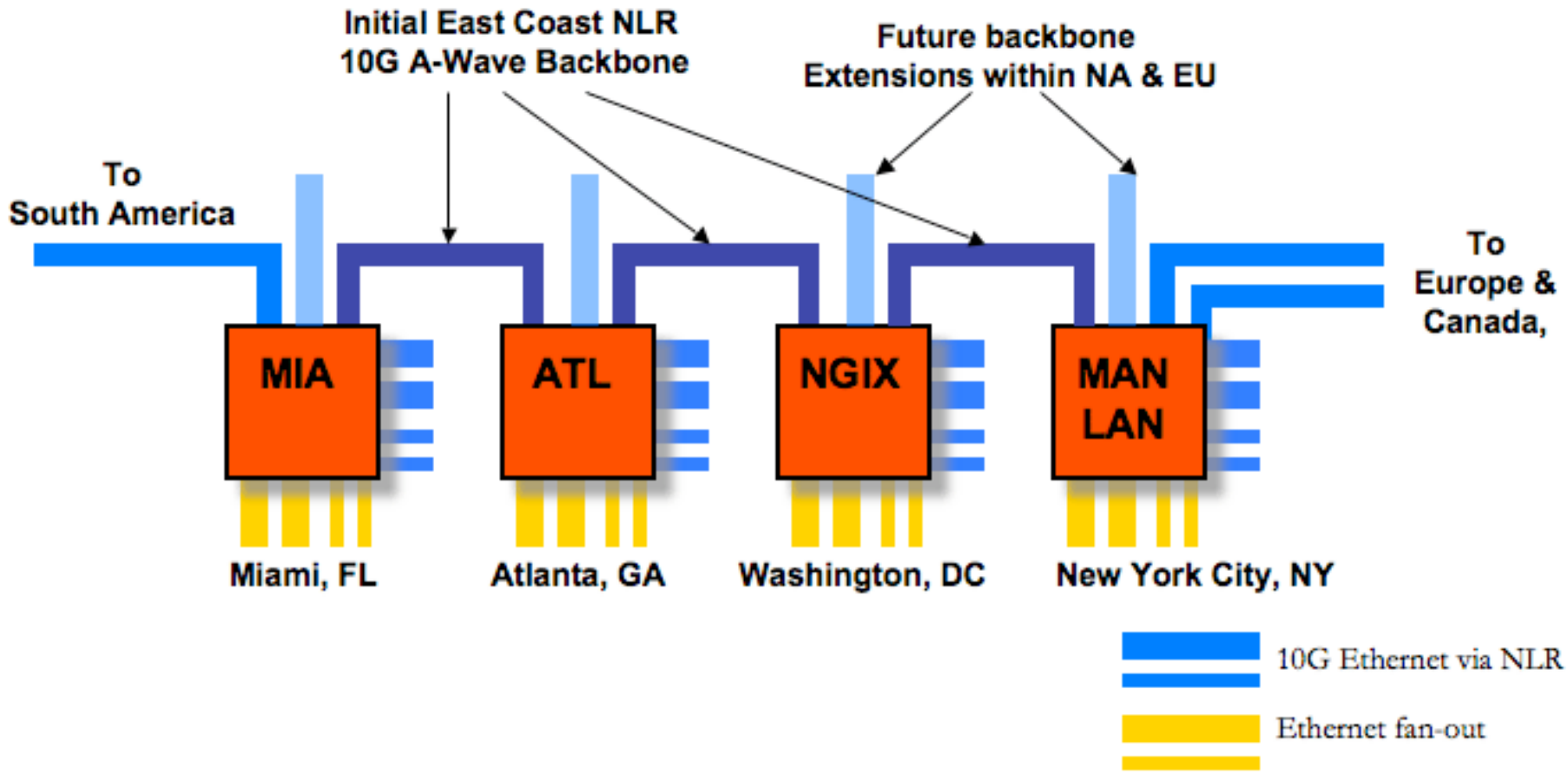
AtlanticWave Concept

- Facilitate international peering along the Atlantic rim of North and South America
- Support communities that need network resources for research between North and South America, and other countries and continents
- Enhance capabilities of NSF IRNC links

AtlanticWave Project

- AtlanticWave has established a 10GigE wave along the Atlantic rim, from NYC to Sao Paulo
- AtlanticWave connects the key exchange points on the U.S. East Coast:
  - International Exchange Points MANLAN in NYC and AMPATH in Miami
  - MAX gigapop and NGIX-East in Washington, DC
  - SoX gigapop in Atlanta
- AtlanticWave is an integral component of the NSF IRNC WHREN-LILA proposal to create an open distributed exchange and transport service along the Atlantic rim
- AtlanticWave partners include SURA, FIU-AMPATH, IEEAF, FLR, MAX, SLR/SoX, Internet2/MANLAN

AtlanticWave Architecture



Ethernet-based Services

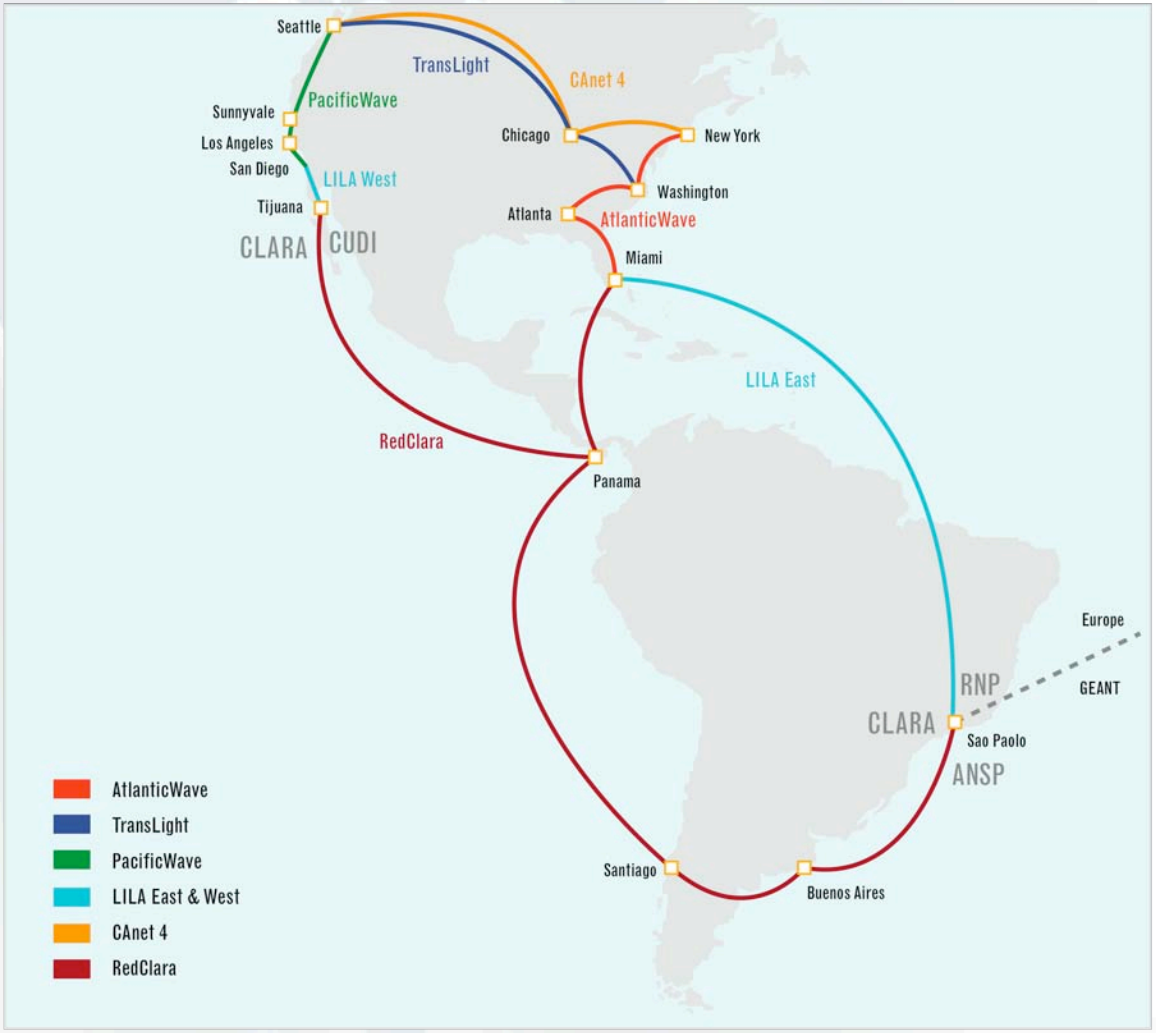
- A-Wave provides Layer 3 distributed exchange capabilities
- Ethernet based capability:
  - Best effort packet transit between peering networks
  - Linear topology
    - A-Wave has a single unprotected NLR wave
  - 1 GE, 10GE LAN, 10GE WAN client access
  - Jumbo frame support
- Available from each of the AtlanticWave exchange points

AtlanticWave Services

- International Peering Service
  - R&E networks connected at one or more A-Wave exchange points can use A-Wave for primary or backup peering purposes
  - A-Wave users can initiate and establish peering agreements between themselves
  - At least one of the networks of the peering relationship must be an international network that is connected to one of the exchange points
- Special Projects
  - Short-term network transport for projects conducting experiments or research
  - Use is temporary and, if necessary, scheduled
  - Special projects must be designed to be non-disruptive with bandwidth needed by the primary peering activities

AtlanticWave Topology

- 10GigE wave from NYC to JAX over NLR
- 10GigE wave from JAX to MIA over FLR
- Layer2 peering fabric extended to Sao Paulo and Chicago
- Access to 2 IRNC links at layer2
  - Facilitated by MAX at McLean and CaveWave from McLean to StarLight



http://www.atlanticwave.net/

How to connect to AtlanticWave?

- Networks must first connect to one of the 4 AtlanticWave exchange points
  - Contact information for each of the XPs is available at atlanticwave.net
- To peer with another AtlanticWave user, complete the International Peering Service form
- Temporary use for projects or experiments, can send an email to info@atlanticwave.net, describing requirements, estimated bandwidth, start date and duration

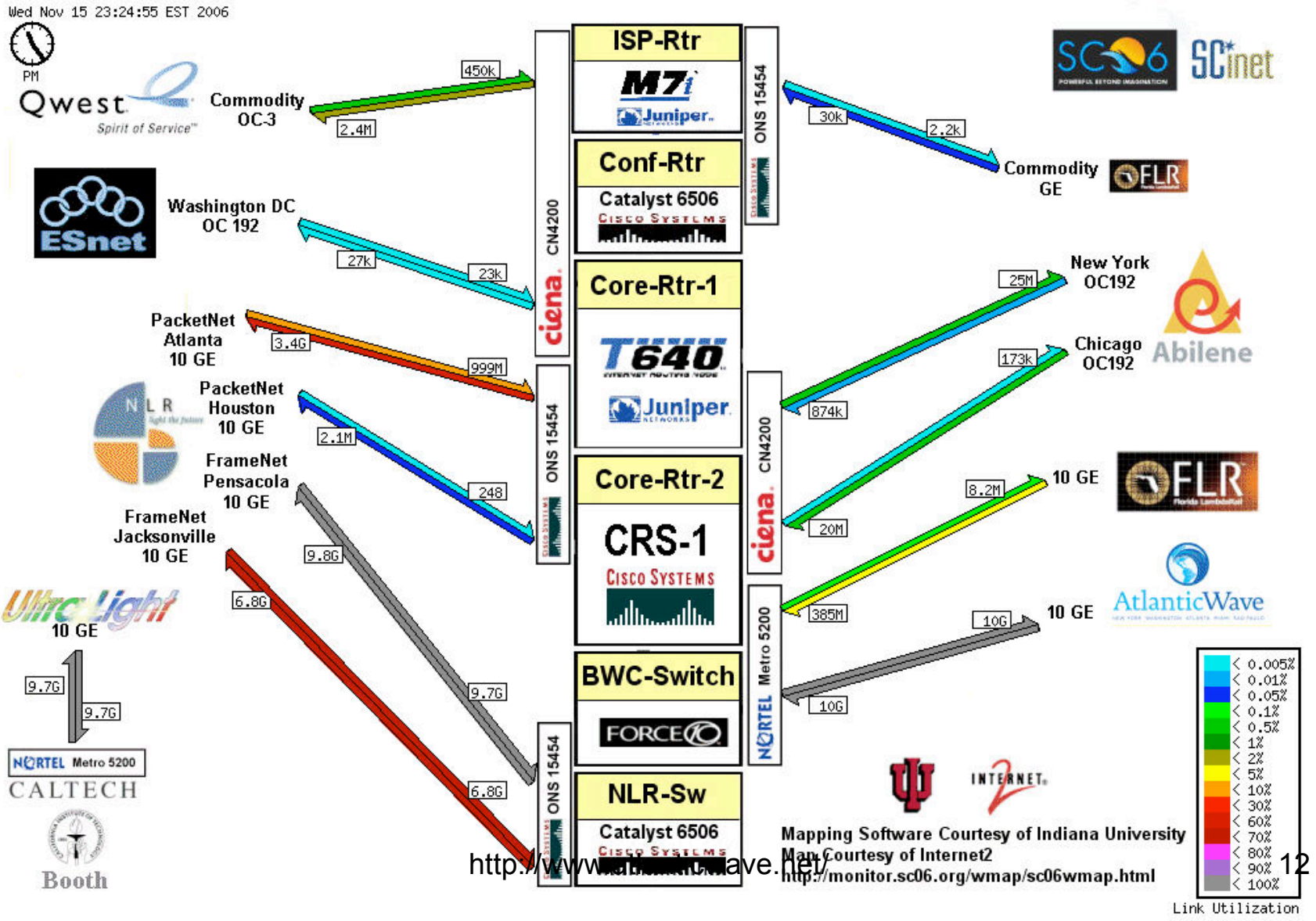
Research Activities

- U.S.-Latin America production research
- High-Energy Physics
  - SC06 Bandwidth Challenge
  - Tier2-Tier1 flows between Brazil-U.S. and Brazil-CERN
- Astronomy
  - Arecibo participating in e-VLBI events and experiments

U.S.-Latin America production research

- AtlanticWave International Peering Service support production research
  - RNP – Internet2
  - RedCLARA – Internet2
  - RedCLARA – NLR
  - RedCLARA – Esnet (V4)
  - RedCLARA – Esnet (V6)

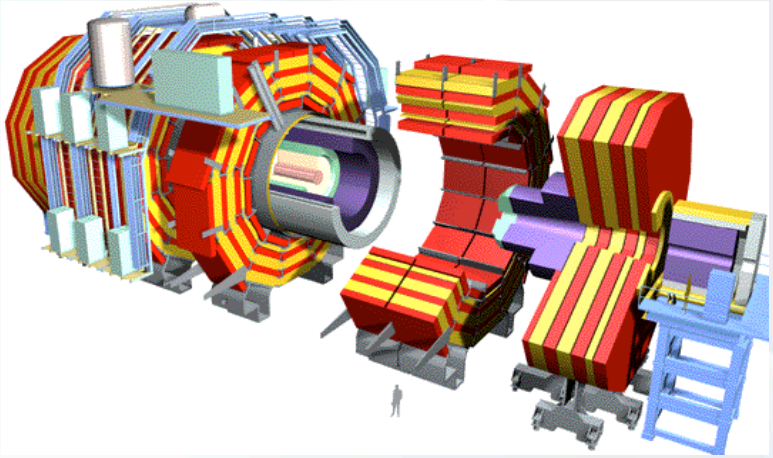
SC06 Bandwidth Challenge: Fast Data Transport



An International Grid Enabled Center for High Energy Physics Research & Educational Outreach at FIU

CHEPREO
CENTER FOR HIGH ENERGY PHYSICS RESEARCH & EDUCATION OUTREACH

http://www.chepreo.org



An integrated program of research, network infrastructure development, and education and outreach at one of the largest minority schools in the US

- Supports Brazil's and South America's access to Tier2s and Tier1s in the U.S. and to CERN
- Collaboration with Florida State University (FSU), the University of Florida (UF), the California Institute of Technology (Caltech)
- Leverages IRNC WHREN-LILA infrastructure to support data-intensive science from High-Energy Physics and Astronomy communities
- Collaborations with Open Science Grid, GridUNESP, Kyatera, UltraLight and others to enable data intensive science in the western hemisphere

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U.S.-Brazil CMS Collaborations

- AtlanticWave facilitates access to NSF IRNC links
  - U.S.-Latin America (WHREN-LILA)
  - U.S.-Europe (TransLight/StarLight)
- Access to IRNC links by Brazil's Tier2s lessens the burden on U.S. Tier1
  - IRNC links are facilitating a division of labor to augment U.S. Tier1 and Tier2 capabilities by including Brazil's Tier2 facilities, providing both human and machine resources
- Project is underway to establish two 1GigE vlans connecting Brazil's Tier2s to CERN using WHREN-LILA, AtlanticWave, CaveWave and TransLight/StarLight

Astronomy

- Gemini and NOAO will be leveraging LILA link from Sao Paulo
- Collaborating with CLARA and AURA to establish shared network infrastructure from Santiago to Sao Paulo that will then interconnect with LILA
- Transports over 19,760,000,000 bytes/ day of data to 3 widely separated storage/ archive sites on 2 continents

Cerro Pachón
Chile 9,000 ft

ALMA, Atacama
Desert Chile

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Gemini, NOAO, CTIO, SOAR International Collaboration

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Radio Astronomy, e-VLBI

- E-VLBI community interested in the use of AtlanticWave now for Arecibo. Access to antennas TIGO (Chile) and ROEN (Brazil) in the future.
- Demonstration being planned for TERENA8, similar to demonstration that was done at APAN in August 2007
  - Goal is to include Arecibo and TIGO in the demonstration

Questions?

Thank You!

- WHREN-LILA, AMPATH infrastructure, CHEPREO, Global CyberBridges, science application support, education, outreach and community building efforts are made possible by funding and support from:
  - National Science Foundation (NSF) awards OCI-0441095, MPS-0312038, OISE-0549456, OCI-0537464, OCI 0636031, IIS 0646144, OISE 0715489, OCI 0734173, OISE 0742675
  - Florida International University
  - Latin American Research and Education community
  - The many national and international collaborators who support our efforts

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Thank You
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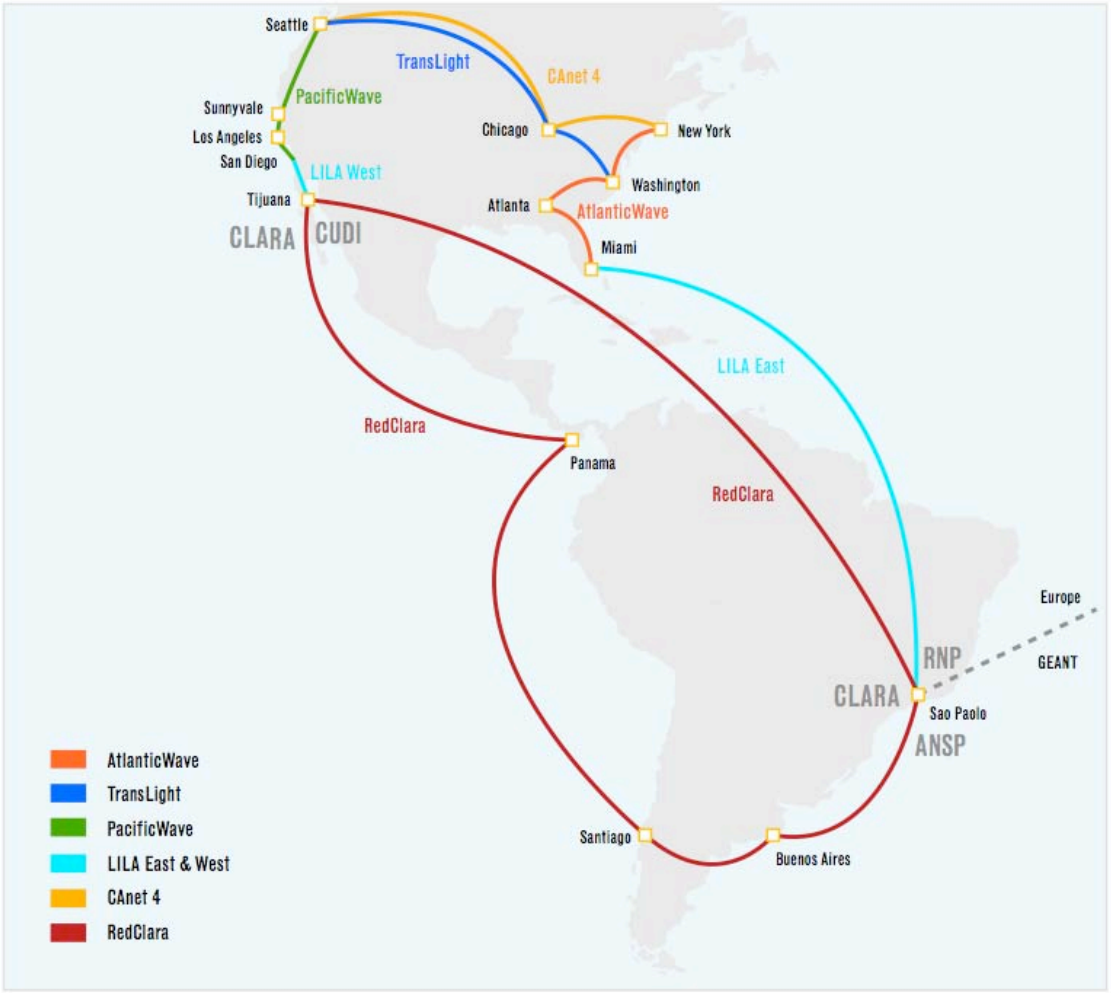
More Slides Follow

Next Steps

- SC06 was a successful proof of concept that connected US exchange points
- AtlanticWave established
- Demonstrations using exchange points were successful and proved to be useful



Next Steps

- Facilitating access to NSF IRNC links
- Evolving infrastructure to support GLIF-GOLE standard
- Developing a US or North American exchange point infrastructure?
- Collaborating to address issues involving
  - Connectivity?
  - Interoperation? Operationalizing end-to-end across all US XPs?
  - Practice/Standards?
  - Policy?

Collaborating Organizations

- Collaborating Organizations
  - SURA
  - FIU-AMPATH
  - University of Maryland - NGIX-E
  - Southern Crossroads (SoX)
  - Internet2 - MANLAN
- Founding Affiliates
  - IEEAF and FLR

Structure

- Governance Committee
  - Responsible for the overall strategy, finances, operations, and external relations of the Collaboration
  - Voting committee, comprised of one representative designated by each Collaborating Organization
- Engineering Committee
  - Responsible for developing recommendations to the Governance Committee for technical design and operational practices
  - MAX leads the EC by chairing the EC and coordinating with the GC
  - Non-voting committee, comprised of one or more engineers from each exchange point

International Peering Service Users

- Supporting production R&E network services