Bridging Communities in the Americas

Chinese-American Networking Symposium

Toward Next Generation Advanced Networks

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FLORIDA INTERNATIONAL UNIVERSITY

Outline

- Community development in the Americas (2001-04)

- Bandwidth Phenomenon

- Community building projects in Latin America

- New Connections and Directions

- AtlanticWave

- Pan-American Advanced Studies Institute

Communities in the Americas (2001-04)

- Canada: Development of CA*net4 and the start of Customer Empowered Networks and optical research networks

- U.S.: National transit over I2's Abilene network; International connections by the NSF HPIIS program for EuroLink, STARTAP-Starlight, Naukanet-GLORIAD and TransPAC; FedNets peering at NGIXs

- Latin America: International connections via AMPATH to NRENs and academic networks of Argentina, Brazil, Chile, Venezuela and Panama; Mexico connects through CENIC and UTEP

- International peering in Chicago, NYC, Seattle, LA, Miami

- US Federal and international labs reachable through AMPATH-StarLight link

- Enabling infrastructure for instrument remote control and sustainable inter-regional collaborations (eg., astronomy)

Bandwidth Supply-Demand Mismatch

- Over supply of buried optical fibers and unlit capacity have driven bandwidth providers into bankruptcy and made their assets available for pennies on the dollar

- Research and Education networking communities exploited the opportunity

- The formation of National Lambda Rail, FiberCo, and the creation of fiber-based network infrastructures owned and managed by non-profit consortia of universities, regional aggregators and state research networks

- In Latin America, the implementation of RedCLARA and fiber-based optical projects in Brazil and Chile

Grand Challenge Research:CHEPREO

- An interregional grid-enabled Center for High-Energy Physics Research and Educational Outreach (CHEPREO)

- Fosters an integrated program of research, network infrastructure development, and education and outreach

  - Collaboration with FIU, Caltech, University of Florida, Florida State University, the State University of Rio de Janeiro, University of Sao Paulo

  - Augments bandwidth capacity to Brazil

- Joint funding by U.S. NSF (MPS-0312038) and State Sao Paulo Research Foundation (FAPESP)
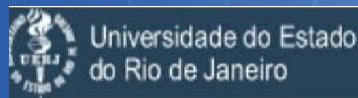
CLARA

- Cooperation of Latin American research networks
- @LIS Alliance of the Internet Society funded program, providing 10 Million Euros for interconnecting R&D communities of Latin America and Europe
- Creates a regional backbone in Latin America
- Direct connectivity to Europe from Sao Paulo, Brazil
- Intraregional connectivity between connected countries in Latin America
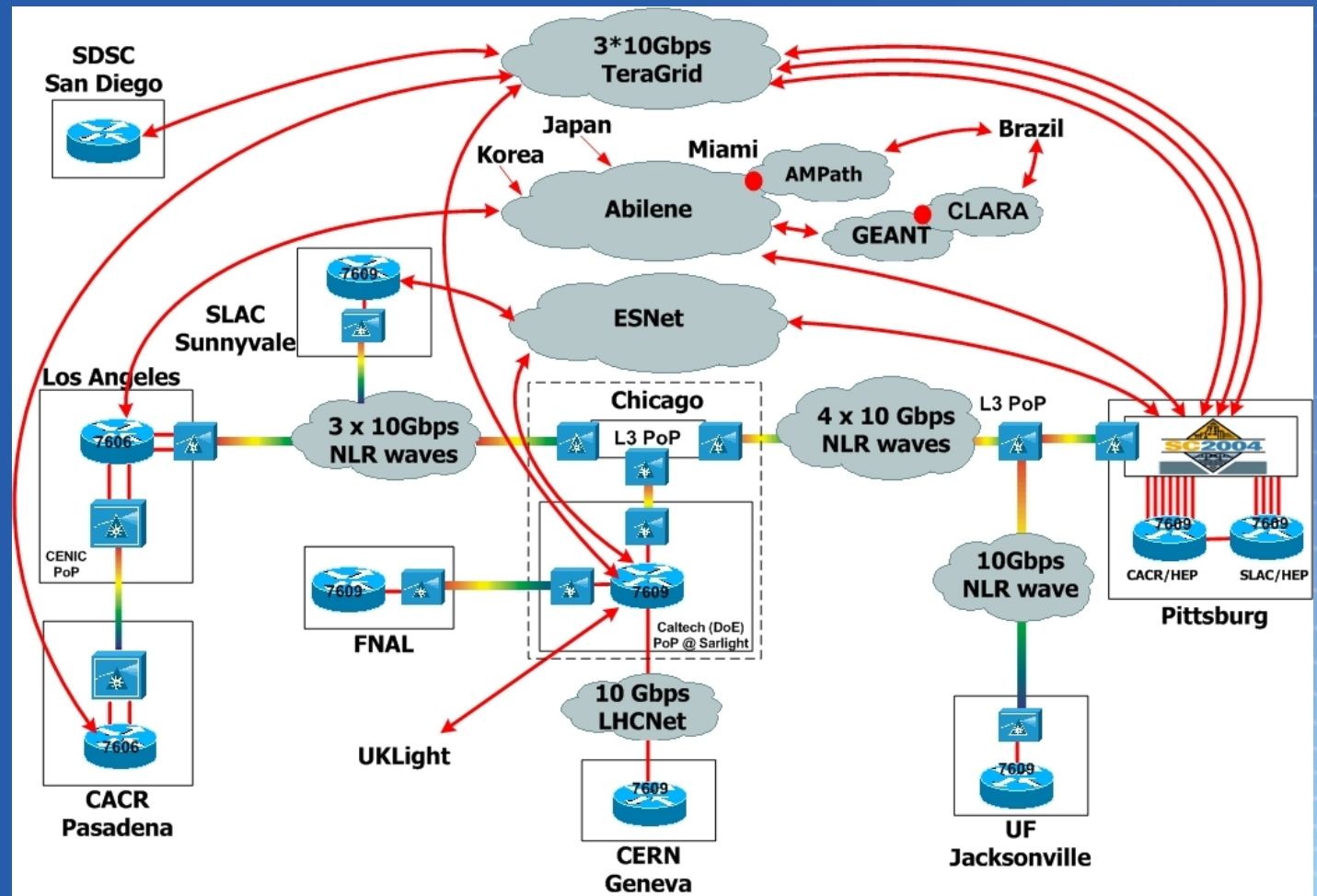
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New Connections and Directions - Q4 2004

- RedCLARA backbone nodes in Sao Paulo, Buenos Aires, Santiago, Panama and Tijuana

- Chile, Brazil connected and peering with GEANT; Mexico, then Argentina by end of 2004

- US-Brazil interregional link increased to 622Mbps (CHEPREO)

- Sustains access to US Federal labs for Brazil, Argentina and AMPATH members

- AMPATH links to Argentina expire Jan. 2005; Venezuela and Panama 2007

- AMPATH providing 3 circuits to assist CLARA in build out to other LA countries
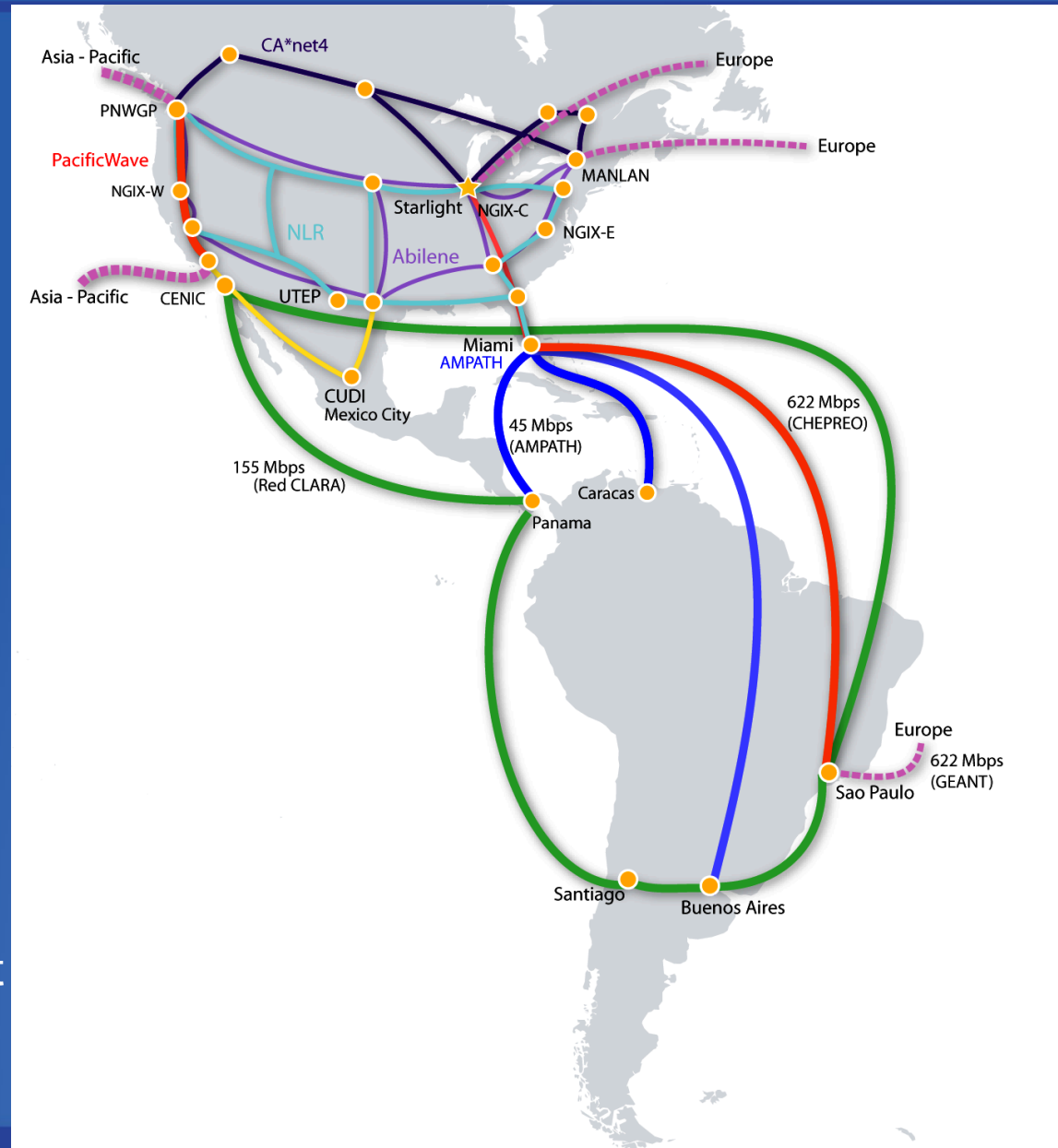
SuperComputing 2004

- International collaboration led by Caltech, with partners from the UK, Brazil and Korea

- Brazil transmits an aggregate of over 2Gbps helping exceed the goal of 100Gbps

- Demonstrated exceptional collaboration between teams from HEP and R&E network organizations
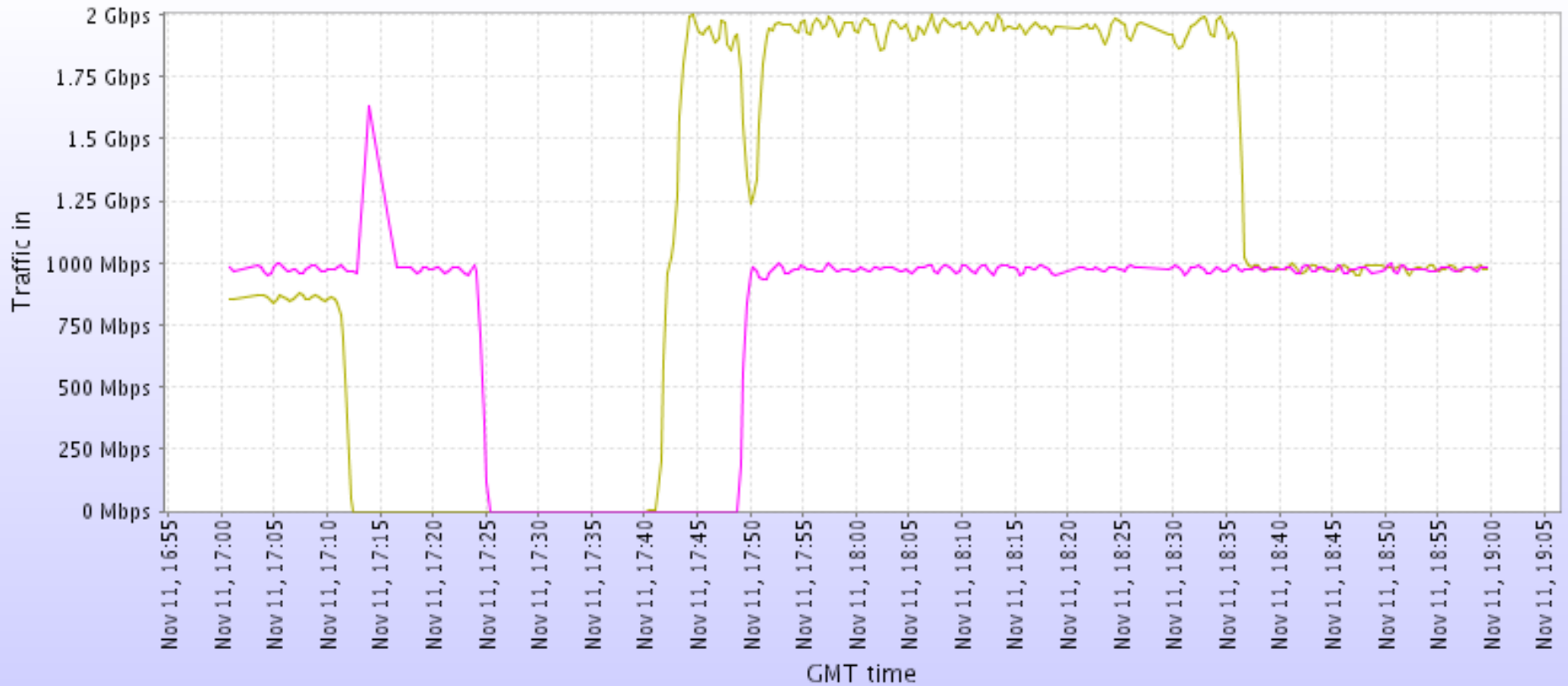

http://ultralight.caltech.edu/sc2004/BandwidthRecord/
http://ampath.fiu.edu/sc2004.htm

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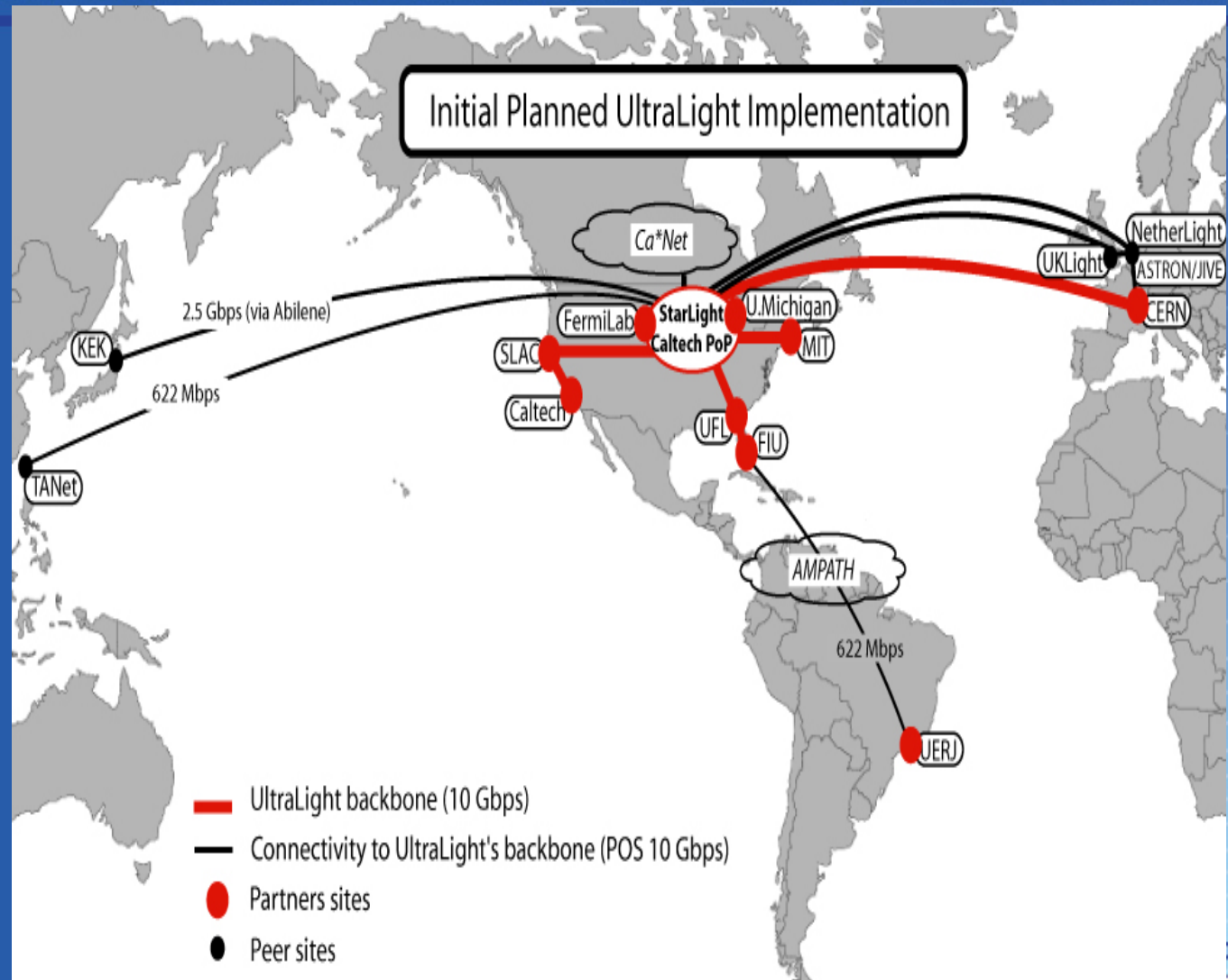PATHWAY of the AMERICAS

http://boson.cacr.caltech.edu:8888/

UltraLight

- UltraLight is a program to explore the integration of cutting-edge network technology with the grid computing and data infrastructure of HEP/Astronomy

- A critical aspect of UltraLight is its integration with two driving application domains in support of their national and international eScience collaborations: LHC-HEP and eVLBI-Astronomy

Initial Planned UltraLight Implementation

Ca*Net

2.5 Gbps (via Abilene)

622 Mbps

KEK

TANet

FermiLab

StarLight Caltech PoP

U.Michigan

MIT

SLAC

Caltech

UFL

FIU

NetherLight

UKLight

ASTRON/JIVE

CERN

AMPATH

622 Mbps

UERJ

UltraLight backbone (10 Gbps)
Connectivity to UltraLight's backbone (POS 10 Gbps)
Partners sites
Peer sites

NSF ITR funded proposal

U.S. Atlantic Coast Peering Collaboration: AtlanticWave

IEEAF (Internet Educational Equal Access Foundation), **SURA**, **FIU/AMPATH** and **Pacific Wave**, and in partnership with the Academic Network of Sao Paolo (ANSP), are combining efforts to create an advanced, extended peering facility on the U.S. East Coast

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U.S. Pacific Coast Peering Collaboration: P-Wave

The Model:

CENIC (Corporation for Education Network Initiatives in California) and **PNWGP** (Pacific Northwest Gigapop) have combined efforts to create an advanced, extended peering facility on the U.S. West Coast.

Traditional Peering Model

- Participants connect at a specific site to exchange routes and peer with others connected at that same site

- Growing the number of groups you peer with means physically connecting to multiple sites.

- MAX, SoX, AMPATH, and NYSERnet/MANLAN successfully operate such traditional peering facilities.

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Removing Geographic Barriers

- Concept: an extensible, geographically dispersed peering fabric -- with open, neutral exchange/peering points

- Result: you connect at any one location on the fabric and have the option to peer with any other participant, regardless of where they are connected

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SURA and AMPATH

- SURA and AMPATH committed to interconnecting the AMPATH International Exchange and NYC/MANLAN

- Important to include connectivity to MAX and its federal connections in DC area

- Leverage SURA investment in SoX, role of SoX/SLR as southeast exchange point

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AtlanticWave

•International and domestic distributed peering and exchange fabric along the Atlantic

•Interconnects the Atlantic with international peering exchanges in Chicago and the Pacific through CA*net4, the PacificWave (P-Wave) and beyond through TransLight

•Anticipated partners are SURA, AMPATH, FLR, SoX/SLR, MATP, MAX, NYSERnet, MANLAN and the ANSP; collaborators are P-Wave, Starlight, Canarie and NLR

•Establishes 10Gb wave from Miami to NYC over FLR and NLR with interconnects in Jacksonville, Atlanta and DC
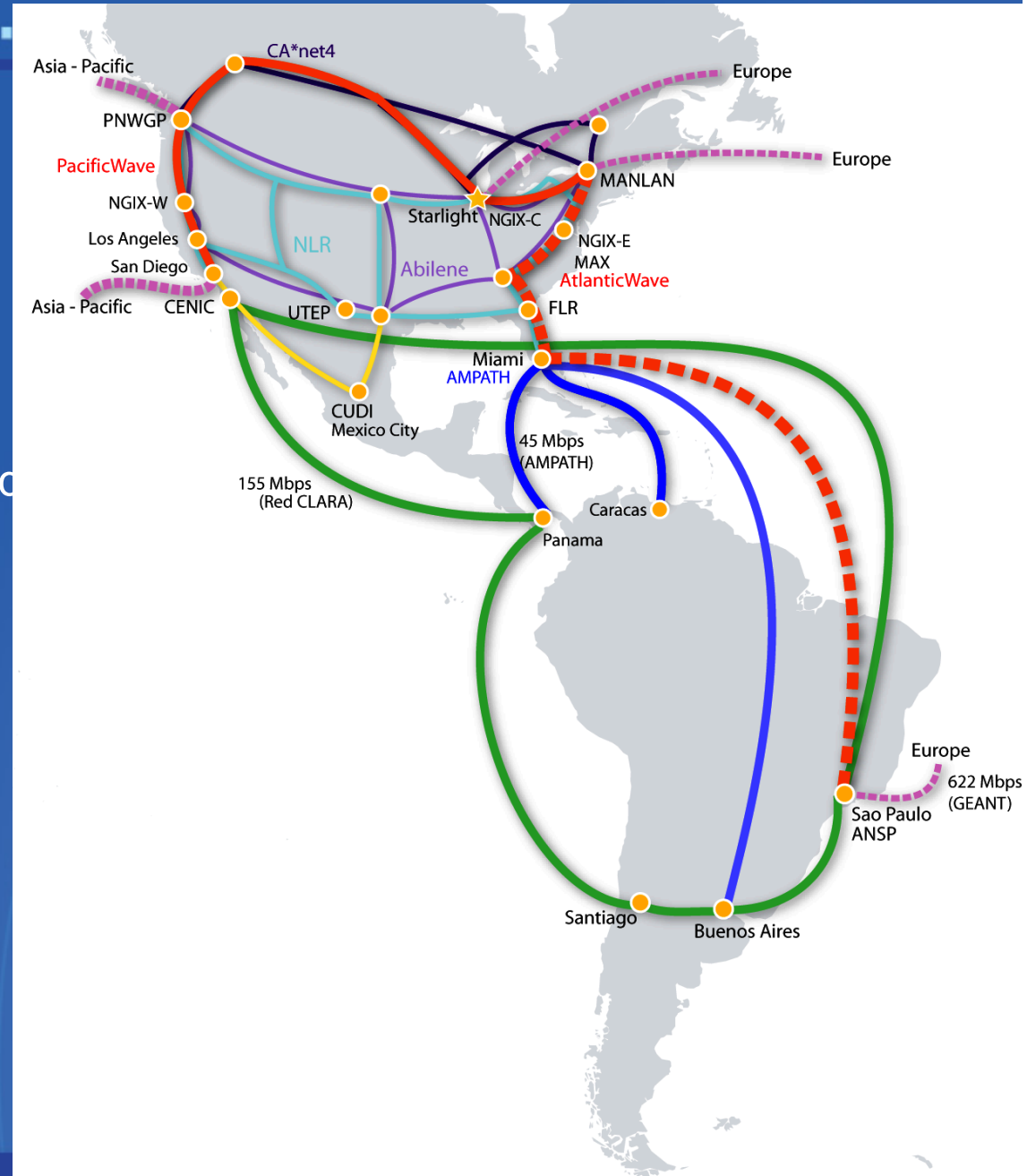
AtlanticWave Roadmap

- First governance meeting of stakeholders held at I2 Members meeting in Austin

- Recommended the formation of an engineering team to study architecture, required services, then make recommendations to the governance group

- Engineering team reviewing P-Wave architecture and best practices for implementation of distributed optical exchanges

- Estimated ready for service date Q2 2005

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Pan-American Advanced Studies Institute

• NSF sponsored program to offer a series of lectures at the advanced graduate and postgraduate level involving domain researchers, students and practitioners

• Aims to disseminate advanced scientific and engineering knowledge, stimulate collaborative learning and cooperation among the research communities of the Americas

Mendoza Argentina

• CIARA, along with collaborators from the U.S., Argentina and Brazil, is organizing a PASI to offer a series of lectures on the role of Grid Computing and Advanced Networking for High-Energy Physics and Astronomy

• Our PASI is planned for May 15-20, 2005 in Mendoza, Argentina

• Approximately 50 students from the Americas will learn of the major experiments, Grid and advanced networking technologies and how the growing interdependence between the science and the technologies are forming global collaborations

Thank You!

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- Cisco Systems
- Tandberg Telecom
- Terremark Worldwide

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Thank You

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