

Open Access and Dissemination of Scientific Information in Central America and the Caribbean **FIU-CIARA/AMPATH** **Presentation**

Session 10; High-speed Research and Education
Networks (RENS) for the Region
Montego Bay, Jamaica May 14, 2010
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Florida International University



AMPATH™
INTERNATIONAL EXCHANGE POINT IN MIAMI



Agenda

- Florida International University Center for Internet Augmented Research and Assessment (CIARA)
- AMPATH International Exchange Point in Miami
- Internet2 and Other U.S. & Global Research & Education Networks Connection Reaches Who, What and Where?
- Caribbean R&E Networks Special Interest Group
- Questions & Conclusion



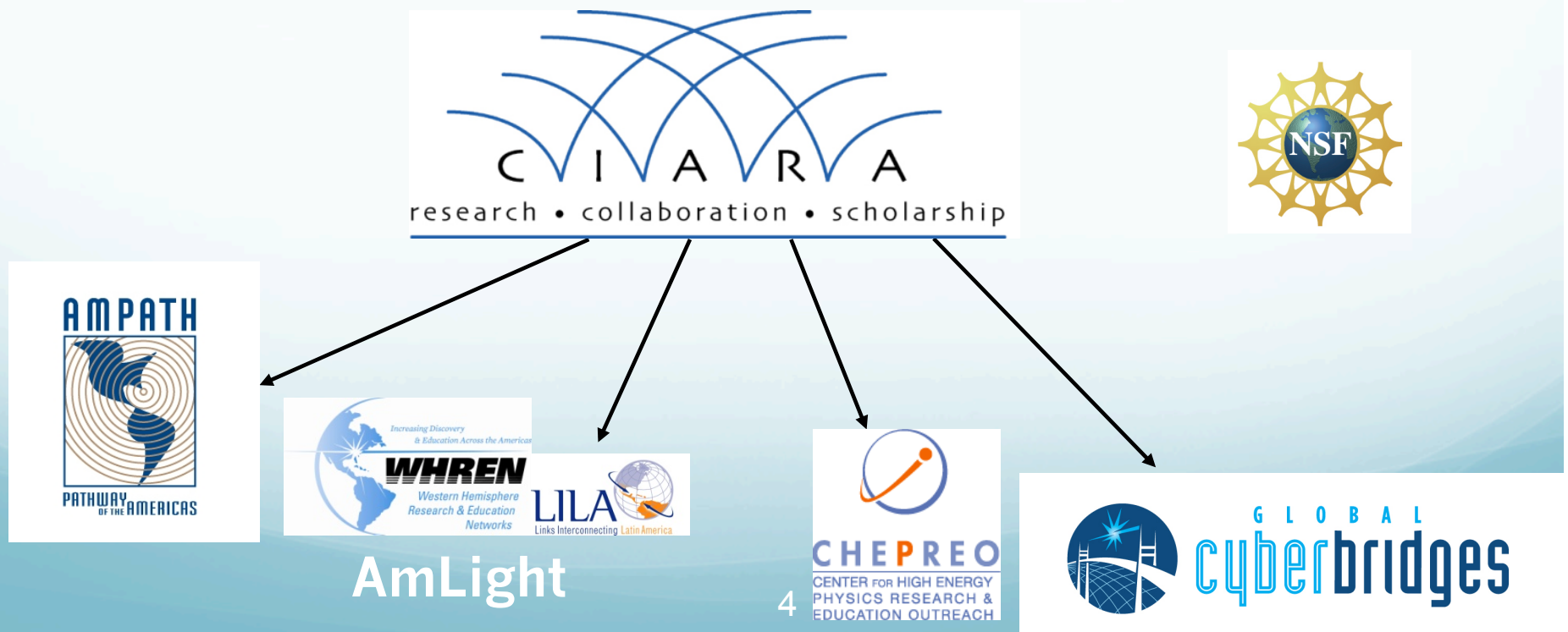
FLORIDA
INTERNATIONAL
UNIVERSITY

- FIU is one of the 15 largest universities, based on enrollment, and the largest Hispanic Serving Minority Institutions in the continental U.S.
- 40,000 + students
- 2,900 + full-time faculty
- 150,000 + alumni
- Top-tier Research University (Carnegie Foundation)
- **Vision:** A leading student-centered urban public research university that is locally and globally engaged.
- **Mission:** As an anchor public institution in South Florida, FIU is committed to providing quality learning, state-of-the-art research and creative activity, and problem-solving engagement.



Center for Internet Augmented Research and Assessment (CIARA)

CIARA was created in 2003 as a State of Florida Type II Research Center at FIU. CIARA services institutional collaborators in the U.S. and internationally as a bridge linking researchers and educators with the infrastructure and knowledge they need to perform their work.





AMPATH™
INTERNATIONAL EXCHANGE POINT IN MIAMI

Operated by the Center for Internet Augmented Research and Assessment at FIU Miami, FL U.S.A

Julio Ibarra, AMPATH Principal Investigator / CIARA AVP
of Technology Augmented Research
Heidi Alvarez, Director CIARA
Chip Cox, AMPATH Chief Operating Officer



AMPATH International Exchange Point

- Connectors are U.S. and international research and education networks
- Located at the NAP of the Americas in Miami
- <http://www.ampath.net> for more information



The International Exchange Point for Research and Education Networking In Miami

Peering Services at AMPATH

A connection at AMPATH provides connectors with the capability to peer with a wide variety of networks via Layer3 services with support for IPv4 and IPv6 unicast and multicast. Through the AMPATH peering fabric, connectors may establish peering connections with networks connected at the exchange point. AMPATH extends its peering fabric through the AtlanticWave—a distributed peering and exchange infrastructure along the Atlantic rim.

The following networks are accessible either directly connected or via layer 2 at the AMPATH international exchange point:

- Internet2
- Florida Lambda Rail (FLR)
- National Lambda Rail (NLR)
- Energy Sciences Network (ESNet)
- redCLARA
- CANARIE network
- Level3- Tier 1 Commodity
- AT&T- Tier 1 Commodity
- Sprint- Tier 1 Commodity
- Verizon Business- Tier 1 Commodity
- NAP of the Americas Peering Net
- Cogent- Commodity



AMPATH implements best practices for international exchange points. AMPATH is participant of the Global Lambda Integrated Facility (GLIF) Open Lightpath Exchange (GOLE), <http://www.glif.is/resources/>.

Connecting to AMPATH:

To inquire about connecting your network to AMPATH, please contact us at info@ampath.net, or call: +1-305-348-4105. Please request to speak to the Chief of AMPATH Operations.

AMPATH Network Peers

- | | |
|-----------------------------------|--------------------------|
| Yahoo | Free.fr (France Telecom) |
| Google | DALNet |
| Verisign | Host.net |
| Akamai | Cache Networks |
| Microsoft | ComSat |
| LimeLight Networks | Prolexic |
| Impsat | NeuStar |
| Packet Clearing House (PCH) | PowerMedium |
| Peer1 Networks | WV Fiber |
| Terremark NOTA Peering | BitGravity |
| GNAPS | OCCAID |
| Sunrise Telecom (TDC Switzerland) | |



NSF Award N°. OCI-0537464
Fellowship Opportunity for Science
and Computer Engineering
Graduate Students



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UNIVERSITY

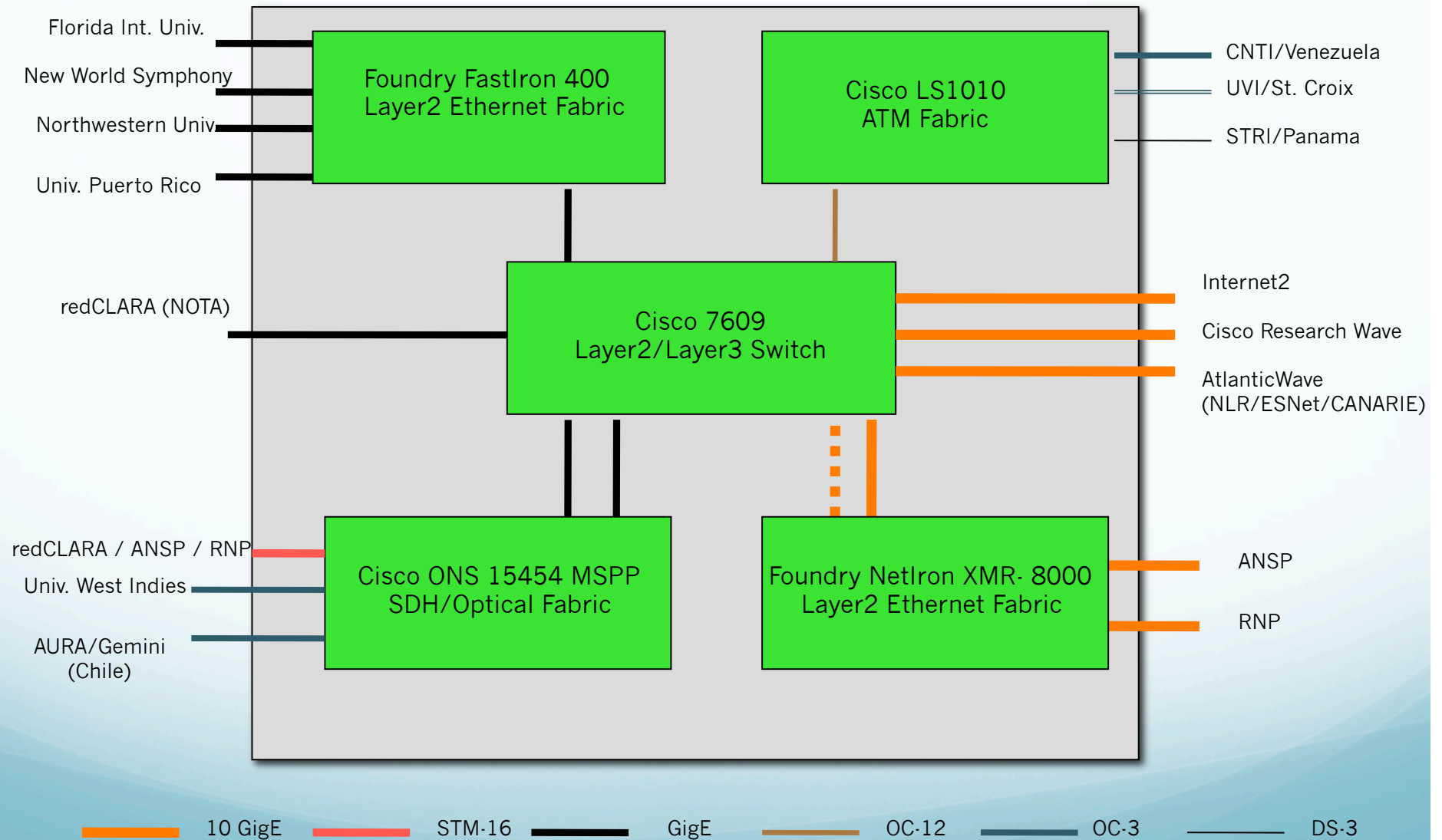


Center for Internet
Augmented Research & Assessment

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AMPATH INTERNATIONAL EXCHANGE POINT



Americas LightPaths (AmLight)



- AmLight aims to enhance research and education in the Americas through the operation of production infrastructure in support of U.S. and western hemisphere science and engineering research and education communities
- AmLight consortium partners: FIU-AMPATH, CENIC, LEARN, AURA, CLARA, FAPESP, RNP, CUDI, REUNA, PacificWave, AtlanticWave



AmLight Links

- AmLight East:
 - Miami- Sao Paulo; 2x10G; NSF, FAPESP and RNP co-funding
- AmLight West:
 - Tijuana-Los Angeles; 2x1G; NSF funding
- AmLight Andes:
 - Sao Paulo-Santiago; 1G; NSF, AURA, ANSP, and CLARA co-funding
- AmLight Central:
 - El Paso-Ciudad Juarez; 1G; NSF, LEARN co-funding



International Research & Education Network connections

- The NSF IRNC program provides network connections linking U.S. research networks with peer networks in other parts of the world to support science and engineering research and education applications
- Awards (2010):
 - TransPAC3 (U.S. - Japan and beyond)
 - GLORIAD (U.S. - China, Russia, Korea)
 - Translight/PacWave (U.S. - Australia)
 - ACE (U.S. - Europe)
 - AmLight (U.S. - Latin America)
- The GLIF map shows links and networks that offer their bandwidth capacity for use by international research communities for applications-driven and computer-system experiments
- <http://www.glif.is>



columbus

NETWORKS *Connecting the Americas.*

[+] ESPAÑOL



Global Cyber Bridges



- NSF CI-TEAM Implementation Project, OCI-0636031
- Improve the technology training for a new generation of scientists
- Collaborators:
 - Computer Network Information Center of the Chinese Academy of Sciences, Beijing
 - City University of Hong Kong, China
 - University of Sao Paulo's School of the Future, Brazil
 - FIU in Miami, USA
- AMPATH provides Global CyberBridges fellows and faculty with connectivity to R&E computational grid resources at institutions and laboratories around the world



LambdaVision 100-Megapixel display and SAGE (Scalable Adaptive Graphics Environment) software developed by the Electronic Visualization Laboratory at the University of Illinois at Chicago. Major funding provided by NSF.

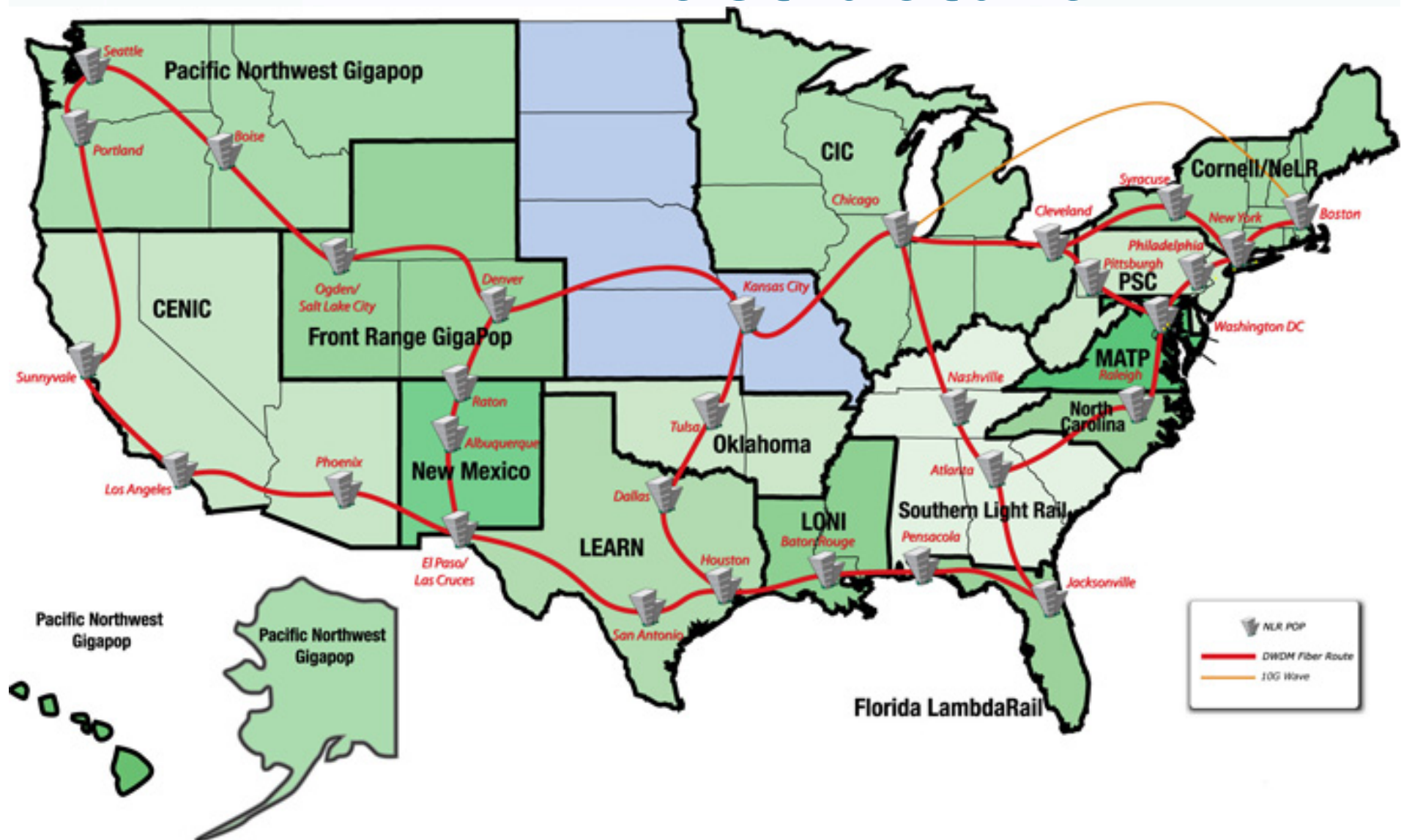
What are National Research and Education Networks (NRENs)?

- Interconnect a country's higher education institutions
 - and often government research institutions, primary and secondary schools, libraries, hospitals, museums, other public institutions
- Provide a dedicated network
 - Separate from the commercial Internet
 - With dedicated connections to other countries' NRENs

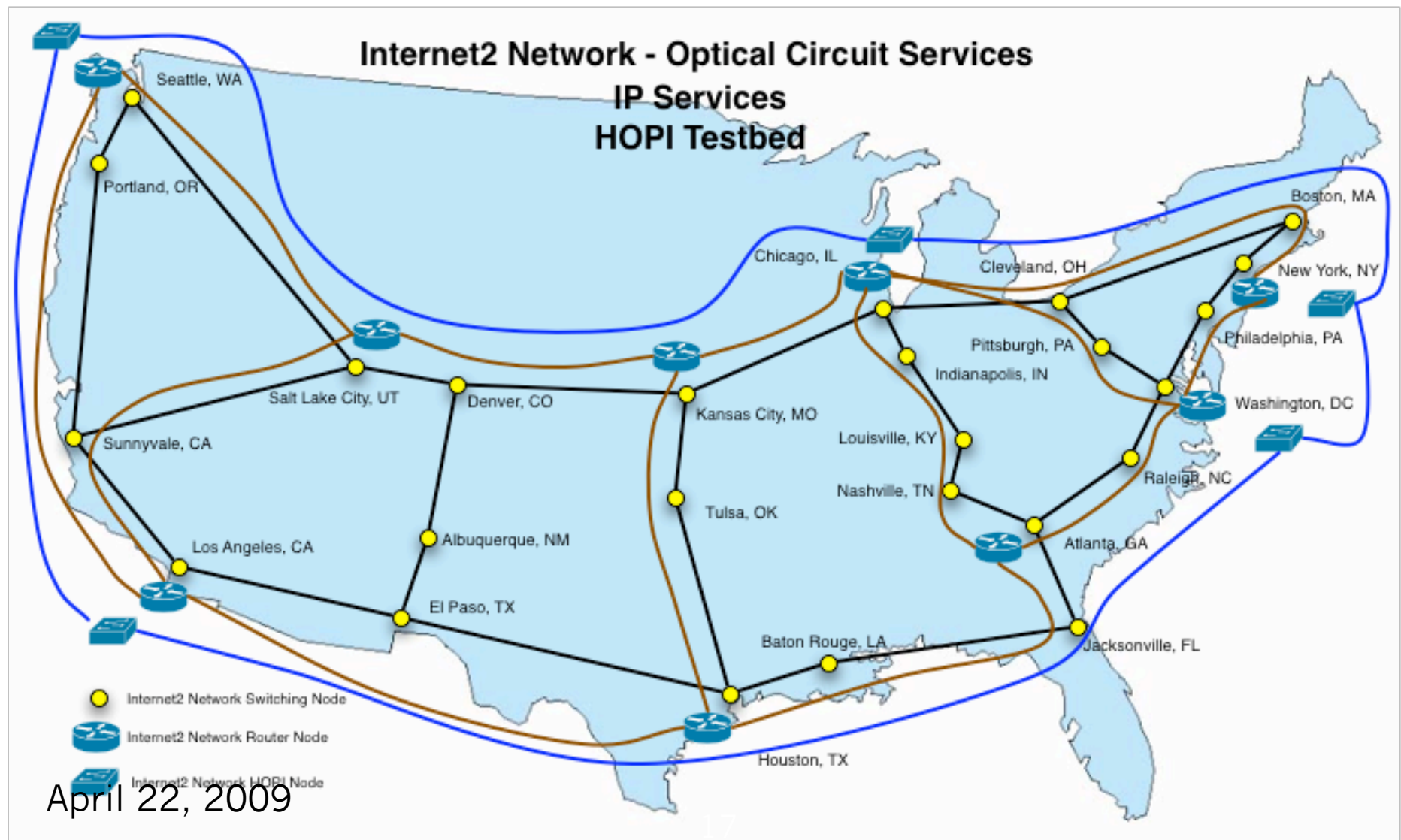
Why Use Research & Education Networks?

- Pool demand, resources, expertise of the research and education community
- Optimize network infrastructure for particular needs of research, teaching, learning
 - Keep traffic local
 - Provide uncongested bandwidth
 - Provides services like multicast to support multi-way video-conferencing

NLR Infrastructure



Internet² Network



How are NRENs being used today?

- Astronomy
- Bio-sciences
- High Energy and Nuclear Physics
- Earth observation, environment
- Health Sciences
- Veterinary Medicine
- Surgery and clinical care
- Humanities
- Arts Performance
- Distributed computation
- Virtual laboratories
- Digital libraries
- Distributed learning
- Interactive digital video and audio
- Remote instrument access and manipulation
- Tele-immersion
- All of the above in combination

April 22, 2009



Current I² International Partners

Europe

ARNES (Slovenia)
BELNET (Belgium)
CARNET (Croatia)
CESnet (Czech Republic)
DANTE (Europe)
DFN-Verein (Germany)
FCCN (Portugal)
GARR (Italy)
GIP- RENATER (France)
GRNET (Greece)
HEAnet (Ireland)
HUNGARNET (Hungary)
NORDUnet (Nordic Countries)
PSNC/PIONER (Poland)
RedIRIS (Spain)
RESTENA (Luxembourg)
RIPN (Russia)
SANET (Slovakia)
Stichting SURF (Netherlands)
SWITCH (Switzerland)
TERENA (Europe)
JISC, UKERNA (United Kingdom)

Africa

MCIT [EUN/ENSTINET]
(Egypt)
TENET (South Africa)

Middle East

Khalifa University of Sci &
Technology(UAE)
Israel-IUCC (Israel)
Qatar Foundation (Qatar)

South Asia

ERNET/CDAC (India)
PERN (Pakistan)

Asia-Pacific

AAIREP (Australia)
APAN (Asia-Pacific)
ANF (Korea)
CERNET/CSTNET/
NSFCNET (China)
JAIRC (Japan)
JUCC (Hong Kong)
MYREN/MDeC (Malaysia)
NECTEC/UNINET (Thailand)
REANNZ (New Zealand)
SingAREN (Singapore)
NCHC/TANet (Taiwan)

Americas

CANARIE (Canada)
CEDIA (Ecuador)
CLARA (Latin
America & Caribbean)
CNTI (Venezuela)
CR2NET (Costa Rica)
CUDI (Mexico)
REUNA (Chile)
RETINA (Argentina)
RNP [FAPESP] (Brazil)
SENACYT (Panama)

Internet2 “Emerging NRENs” Interest Group

- Convenes Internet2 members and partners to focus on areas currently underserved by NRENs
- Awareness raising with key resource-providers
 - WorldBank, Inter American Development Bank, NSF, USAID, Dept of State
- Key workshops on sub Saharan Africa, South Asia

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About the Caribbean Research & Education Networking (CaribREN) Special Interest Group

- Mission: To advance the state of high-performance networking for research and education in the Caribbean.
- Membership is open to all institutions and individuals with an interest in supporting, contributing, or learning more about the mission of the CaribREN SIG.
- Current membership ranges from Caribbean interests, US and Latin American research & education networks, scientists, and educators.

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Questions? Comments!

- Connecting ?
- Teaching & Learning Resources ?
- Applications Communities ?
- Other ?

Credits

- 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
- Academic Network of Sao Paulo (award #2003/13708-0)
- Florida International University
- Latin American Research and Education community
- The many national and international collaborators

April 22, 2009

Thank You!

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 - http://international.internet2.edu/intl_connect/carib_sig.html
- Inquiries on who is reachable via Internet2?
 - <http://international.internet2.edu>
 - Joceyln Gerich jgerich@internet2.edu