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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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
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.
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.
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
Peering Services at AMPATH

A connection at AMPATH provides connectors with the capability to peer with a wide variety of networks via Layer 3 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 (OOLE), 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
Google
Verisign
Akamai
Microsoft
LimeLight Networks
Ipsat
Packet Clearing House (PCH)
Peer1 Networks
Terremark NOTA Peering
GNAP5
Sunrise Telecom (TDC Switzerland)

Free.fr (France Telecom)
DALNet
Host.net
Cache Networks
ComSat
Prolexic
NeuStar
PowerMedium
WV Fiber
BitGravity
OCCAI
AMPATH INTERNATIONAL EXCHANGE POINT

- Foundry FastIron 400
  - Layer2 Ethernet Fabric
- Cisco 7609
  - Layer2/Layer3 Switch
- Cisco ONS 15454 MSPP
  - SDH/Optical Fabric
- Foundry NetIron XMR-8000
  - Layer2 Ethernet Fabric

- CNTI/Venezuela
- UVI/St. Croix
- STRI/Panama
- Internet2
- Cisco Research Wave
- AtlanticWave (NLR/ESNet/CANARIE)
- ANSP
- RNP

- Florida Int. Univ.
- New World Symphony
- Northwestern Univ.
- Univ. Puerto Rico
- redCLARA (NOTA)
- redCLARA / ANSP / RNP
- Univ. West Indies
- AURA/Gemini (Chile)

- 10 GigE
- STM-16
- GigE
- OC-12
- OC-3
- DS-3
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 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](http://www.glif.is)
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
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

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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

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  - Florida International University
  - Latin American Research and Education community
  - The many national and international collaborators
Thank You!

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- Caribbean SIG Membership Info:
  - caribinterest@internet2.edu
  - 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