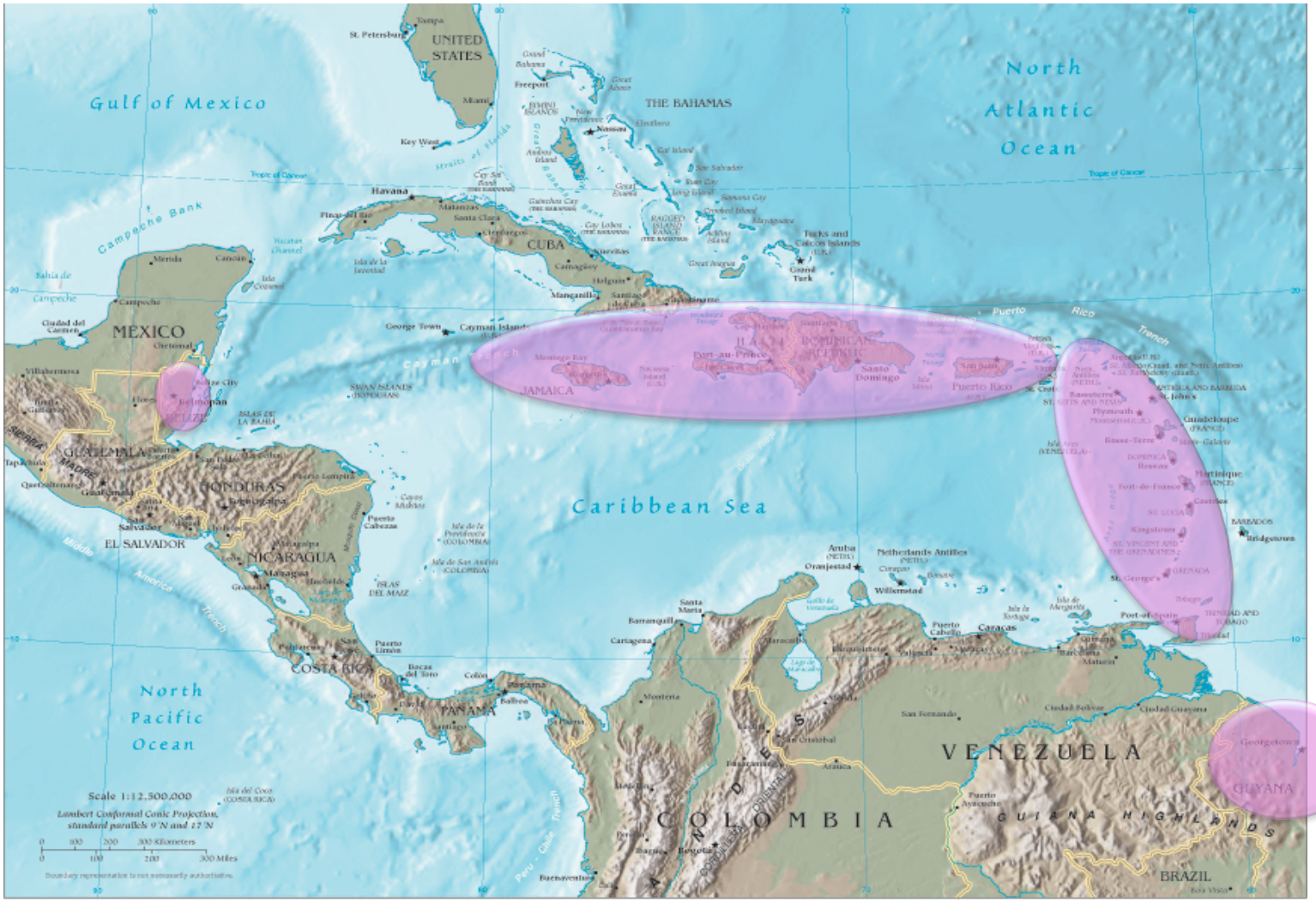
R&E NETWORKING in the CARIBBEAN

13 July 2010 JET Meeting

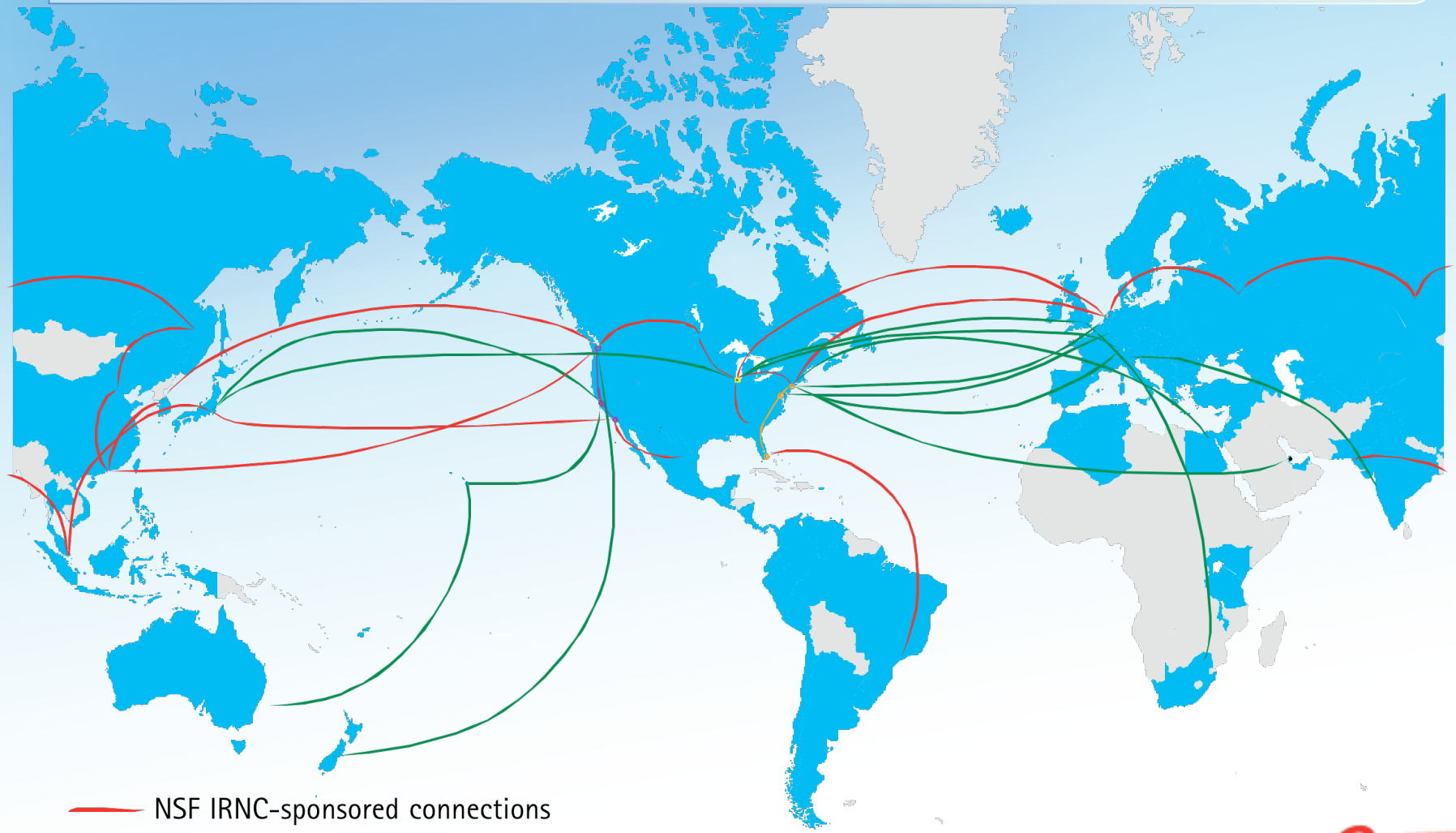
Jocelyn Gerich, Internet2
Ernie Rubi, AMPATH/Florida International University

Large Geographic Space With Small Island States



CKLN
Caribbean Knowledge and Learning Network

The International Reach of the Internet2 Network



Current Networks Reachable

AFRICA
Algeria (ARN)
Kenya (KENET)
Malawi (MAREN)
Morocco (MARWAN)
South Africa (TENET)
Tanzania (TERNET)
Tunisia (CCK)
Uganda (RENU)

AMERICAS
Argentina (INNOVA|RED)
Brazil (RNP2/ANSP)
Canada (CAnet 4)
Chile (REUNA)
Colombia (RENATA)
Costa Rica (RedCONARE)
Ecuador (CEDIA)
El Salvador (RAICES)
Guatemala (RAGIE)
Mexico (CUDI)
Panama (RedCyT)
Peru (RAAP)
Trinidad (Univ. of the West Indies)
Uruguay (RAU2)
Venezuela (Reacciun2)

ASIA and PACIFIC
Australia (AARNET)
China (CERNET, CSTNET, NSFCNET)
Fiji (USP-SUVA)
Hong Kong (HARNET)
India (ERNET)
Indonesia (ITB)
Japan (SINET, WIDE, JGN2)
Korea (KOREN, KREONET2)
Malaysia (MYREN)
New Zealand (KAREN)
Pakistan (PERN)
Philippines (PREGINET)
Singapore (SingAREN)
Taiwan (TANet2, ASnet)
Thailand (UniNet, ThaiSARN)
Vietnam (VinaREN)

CENTRAL & SOUTHWEST ASIA
Armenia (ASNET-AM)
Azerbaijan (AzRENA)
Georgia (GRENA)
Kazakhstan (KazRENA)
Kyrgyz Republic (KRENA)
Tajikistan (TARENA)
Turkey (ULAKBIM)
Turkmenistan (TuRENA)
Uzbekistan (UzSciNet)

EUROPE
Albania (ASA/INIMA)
Andorra (Univ. of Andorra)
Austria (ACOnet)
Belarus (BASNET, UNIBEL)
Belgium (BELNET)
Bosnia-Herzegovina (BIHARNET)
Bulgaria (ISTF)
Croatia (CARNet)
Cyprus (CyNET)
Czech Republic (CESnet)
Denmark (Forskningsnettet)
Estonia (EENet)
Finland (Funet)
France (RENATER)
Germany (X-WiN)
Greece (GRNET)
Hungary (NIIF/HUNGARNET)
Iceland (RHnet)
Ireland (HEAnet)
Italy (GARR)
Latvia (LATNET)
Lithuania (LITNET)
Luxembourg (RESTENA)
Macedonia (MARNet)
Malta (UofM/RicerkaNet)
Moldova (RENAM)
Montenegro (MREN)
Netherlands (SURFnet)

EUROPE cont'd
Norway (UNINETT)
Poland (PIONIER)
Portugal (FCCN)
Romania (RoEduNet)
Russian federation (RBnet, RUNNET)
Serbia (AMRES)
Slovakia (SANET)
Slovenia (ARNES)
Spain (redIRIS)
Sweden (SUNET)
Switzerland (SWITCH)
Ukraine (URAN)
United Kingdom (JANET)

MIDDLE EAST
Egypt (EUN/ENSTINET)
Israel (IUCC)
Jordan (JUNet)
Palestinian Territories (Birzeit Univ./Al-Quds Open Univ.)
Qatar (Qatar FN)
Syria (HIAST)
United Arab Emirates (ANKABUT)

MULTINATIONAL NETWORKS
APAN
GEANT2
NORDUnet
redCLARA
UbuntuNet

Regional Interest Group

- Objectives
  - Stimulate discussion
  - Encourage collaboration between organizations in the region
  - Facilitate development of infrastructure and NRENs in the Caribbean
- Led by Heidi Alvarez, Florida International University
  - Home Page - https://wiki.internet2.edu:443/confluence/x/3gY
  - Spring Member Meeting 2010 focused on Haiti and the role of technology in earthquake relief and recovery
  - Presentations from the meeting are posted here: https://wiki.internet2.edu:443/confluence/x/3xhG

Connected Sites

- University of Puerto Rico
  - http://www.upr.clu.edu/
  - Member of Internet2 since 1998
  - Connected via AMPATH since 2001
  - GigE circuit
- University of the West Indies
  - Trinidad campus connected to Internet2 via AMPATH
  - STM-1 circuit
  - They are working to connect Barbados and Jamaica campuses as well
  - http://uwi.edu/

Connected Sites cont'd

- University of the Virgin Islands
  - Two campuses (St. Thomas & St. Croix) with approximately 2500 students
  - Heavy reliance on videoconferencing
  - Information & Technology Services is responsible for faculty technology training
  - STM-1 circuit connected via AMPATH
  - www.uvi.edu
- Caribbean Knowledge and Learning Network
  - http://ckln.org/
  - Supported by OAS, World Bank, European Union, and Canadian International Development Agency
  - Launched by Caricom and OECS in 2004

CARIBBEAN KNOWLEDGE AND LEARNING NETWORK PROJECT

What is CKLN?

An **Intergovernmental Agency** financed and owned by the governments of the CARICOM Community that implements development projects with assistance of grant funds.

IMPLEMENTING C@ribNET

- Phase 1 – Design of the network
- Phase 2 – Connectivity procurement
- Phase 3 – Hardware procurement
- Phase 4 – Deployment of the network

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Phase 1 – Design of the network (June, 2010)

- Definition of the topology and placement of the main nodes (backbone nodes); estimates of active equipment required, bandwidth and connectivity, etc.

Phase 2 – Connectivity procurement (September, 2010)

- The design phase will drive tenders to acquire the digital data transmission capacity between endpoints and the network and associated equipment required plus NOC services.
- The tender will establish the providers in the region for the main links of the backbone

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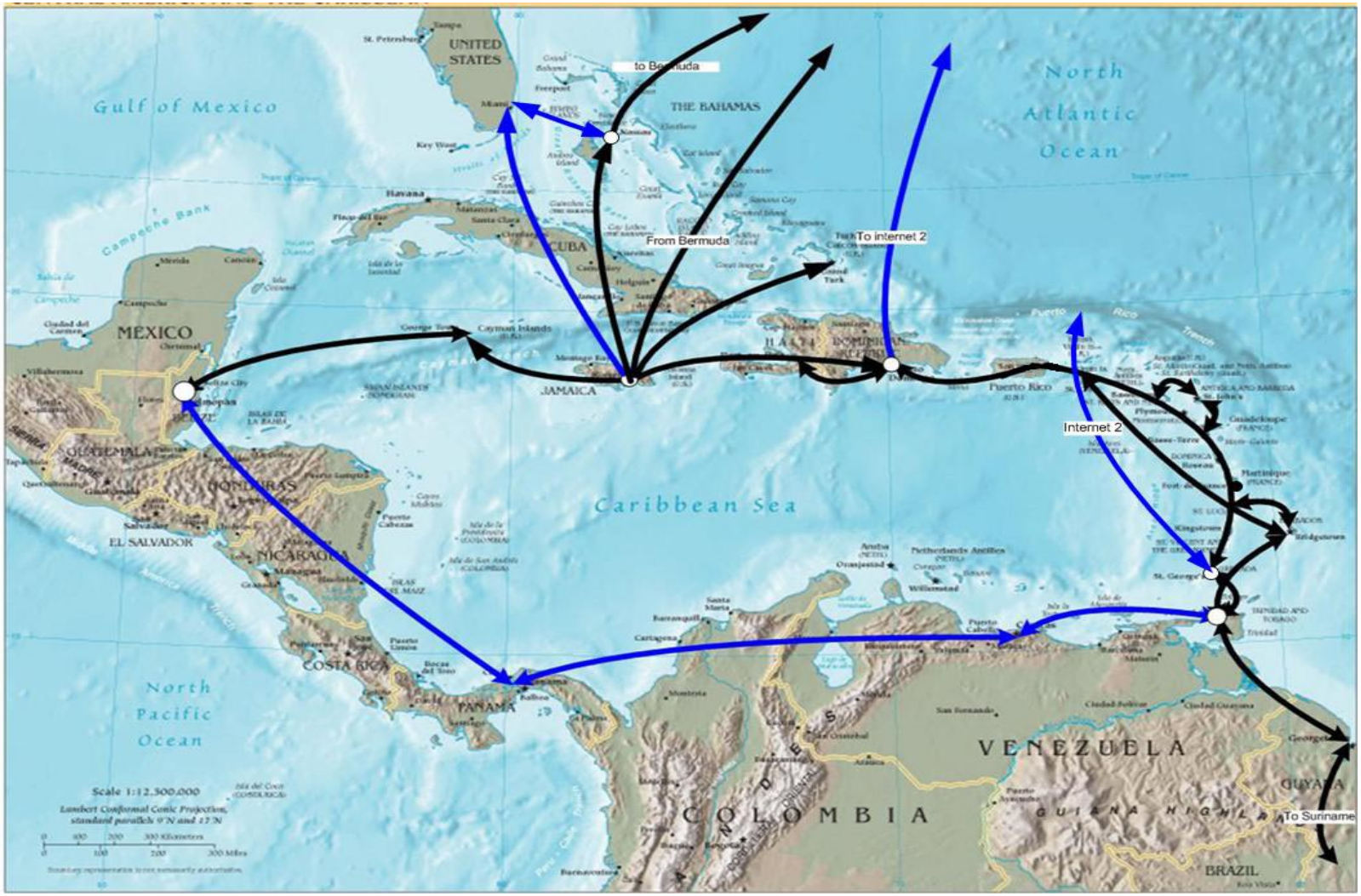
Phase 3 – Hardware procurement (December, 2010)

- The topology is anticipated to have two tiers:
  - core – nodes comprising the backbone
  - distribution – nodes for aggregation of institutions
- Every country/member will have a distribution node, and only the backbone selected countries will have core nodes

Phase 4 – Deployment of the network (Q1, 2011)

CKLN
Caribbean Knowledge and Learning Network

Proposed Caribbean Educational Knowledge and Research Network (C@ribNET)



CKLN
Caribbean Knowledge and Learning Network


USA
BAHAMAS
TURKS & CAICOS
MEXICO
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
JAMAICA
DOMINICAN REPUBLIC
PUERTO RICO
ST. MARTIN
ST. KITTS & NEVIS
ST. CROIX
GUADALOUPE
DOMINICA
MARTINIQUE
ST. LUCIA
ST. VINCENT
BARBADOS
GRENADA
CURAÇAO
VENEZUELA
COLOMBIA
ECUADOR
TRINIDAD & TOBAGO
JAMAICA NETWORK ("FLOW")
MONTEGO BAY
OCHO RIOS
NEGRIL
MANDEVILLE
BULL BAY
MORANT BAY
ARCOS
Terrestrial Fiber
Sub-Sea Carrier Partner
Branching Unit
Fibralink, Caribbean Crossings, ECLink
CFX Express Route

National Academy of Sciences

- Program on Digital Knowledge Resources and Infrastructure for Research and Education in Developing Countries
  - Organized under the InterAcademy Panel (IAP) on International Issues and managed by the U.S. National Academy of Sciences, in collaboration with other Science Academies and organizations
  - Initial geographic focus is on sub-Saharan Africa, Central America and the Caribbean
  - Program's objectives are implemented by two international Task Groups
    - Digital knowledge resources focus (content)
    - Digital knowledge infrastructure focus (information and communication technologies)
  - Term of the Program is 2008-2011, with the possibility of renewal
  - http://www.interacademies.net/CMS/Programmes/4704.aspx

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

PACIFIC WAVE

AtlanticWave
NEW YORK WASHINGTON ATLANTA MIAMI SAO PAULO

Reuna

RNP

cudi

AMPATH™
PATHWAY OF THE AMERICAS

cenic

LEARN
LONESTAR EDUCATION AND RESEARCH NETWORK

AURA

CLARA

FAPESP

AmLight Links

- AmLight East:
  - Miami- Sao Paulo; 2x10G
- AmLight West:
  - Tijuana-Los Angeles 2x1G
- AmLight Andes:
  - Sao Paulo-Santiago; 1G
- AmLight Central:
  - El Paso-Ciudad Juarez; 1G

Resources and Credits

- Internet2 International webpages
  - http://www.internet2.edu/international/
- Emerging NREN SIG Information
  - https://wiki.internet2.edu:443/confluence/x/fxI
- CKLN
  - http://ckln.org/
- CLARA
  - http://redclara.net/
- ALICE2
  - http://alice2.redclara.net/index.php/en/project
- Special thanks to Heidi Alvarez, Carlton Samuels and Florencio Utreras for their input

R&E NETWORKING IN THE CARIBBEAN

13 July 2010

For more information, please visit us at www.internet2.edu/international

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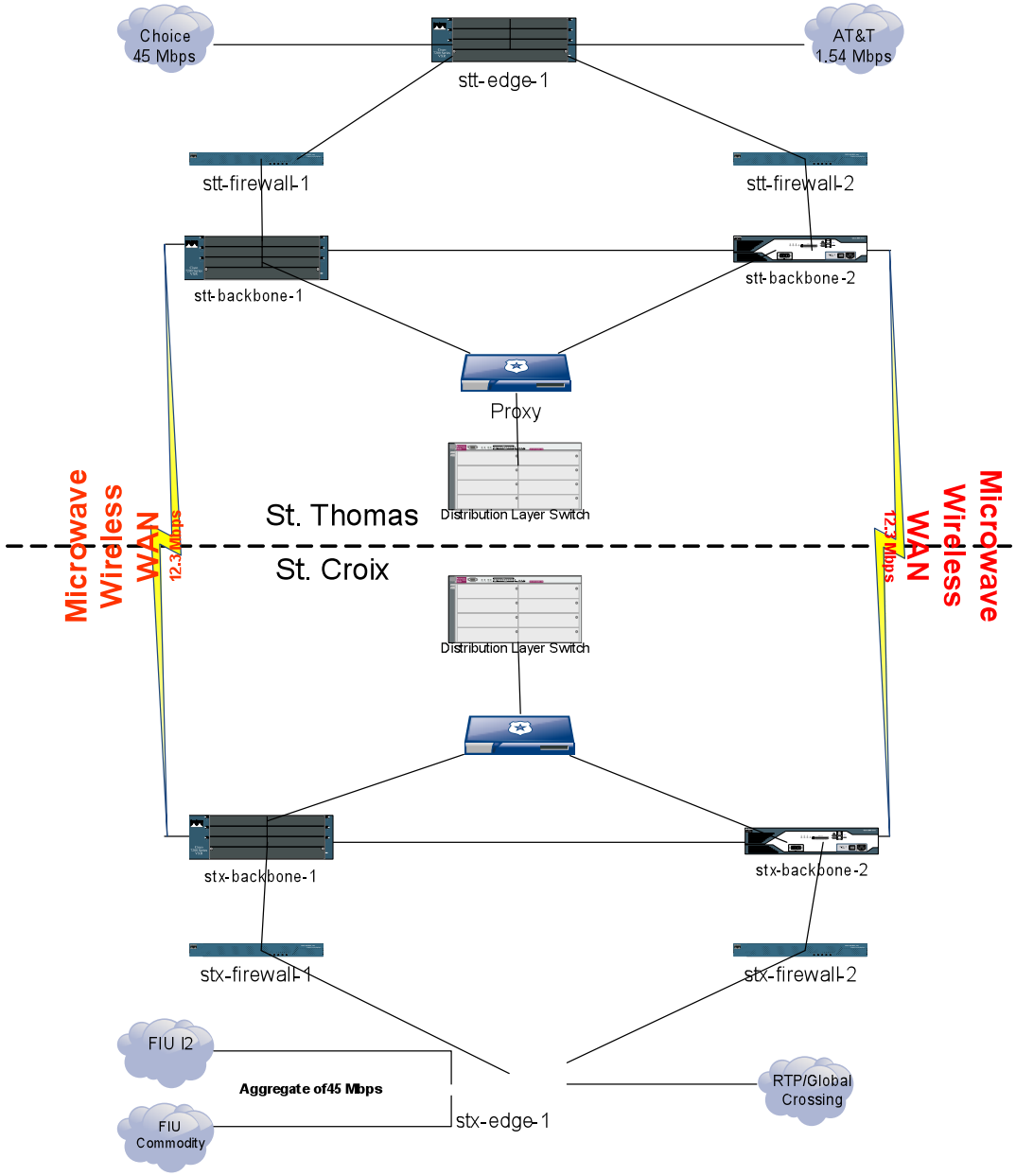
New UVI Backbone I2 Topology



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SPECIALIZING IN FUTURES

HISTORICALLY AMERICAN.
UNIQUELY CARIBBEAN.
GLOBALLY INTERACTIVE.

New UVI Backbone I2 Topology

- Upgraded the Cisco 7206 routing equipment
- Added Cisco 2821 routers as a redundant path
- Implemented Border Gateway Protocol (BGP) to support multi-homing to multiple ISPs
- Upgraded Cisco system software to support BGP and configuration to support I2 routing
- Restructured backbone architecture to create uniformity on both Islands in preparation for multi-homing

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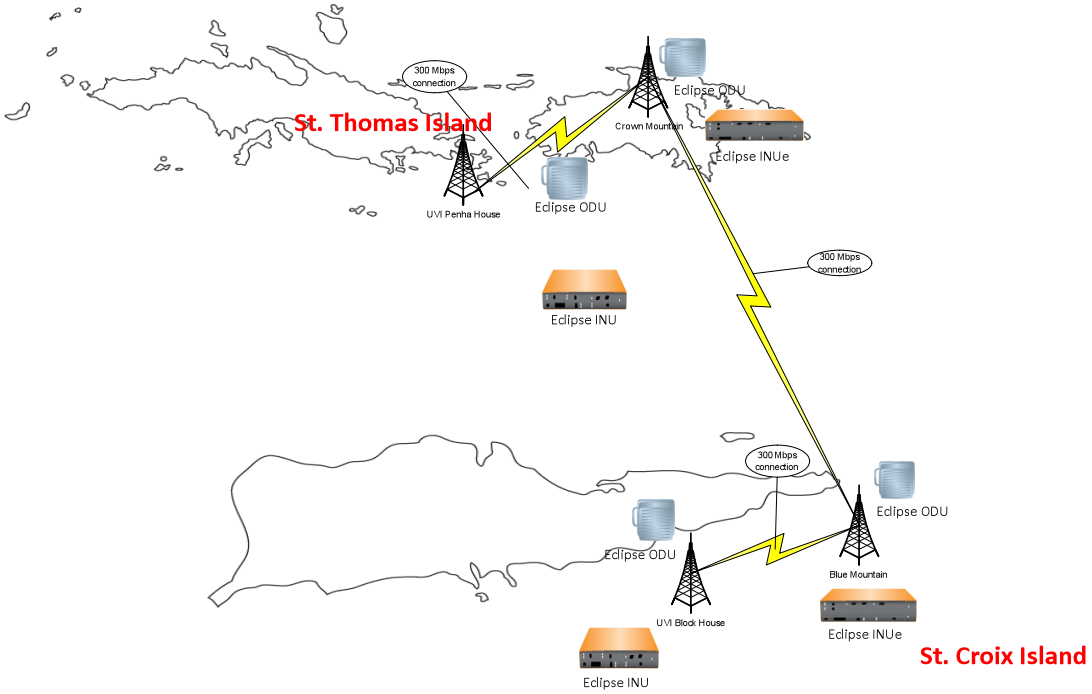
Microwave Wireless WAN 300 Mbps



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Microwave Wireless WAN 300 Mbps

- Installation in May 2010
- Increase WAN bandwidth from 12.3 Mbps to 300 Mbps to accommodate I2 traffic
- Carrier-grade Eclipse wireless backhaul solution from Aviat Networks, formally Harris Stratex
  - Highly scalable software design
  - Optimized wireless nodes that support multi-outdoor units (ODUs)
  - Efficient Terminal Options solutions for transport of OC3 data
  - Scalable Capacity Architecture that supports smooth network upgrades
  - High speed data transport and QoS features
  - Advance Network control through Java-based management tools