



UNIVERSITEIT VAN AMSTERDAM

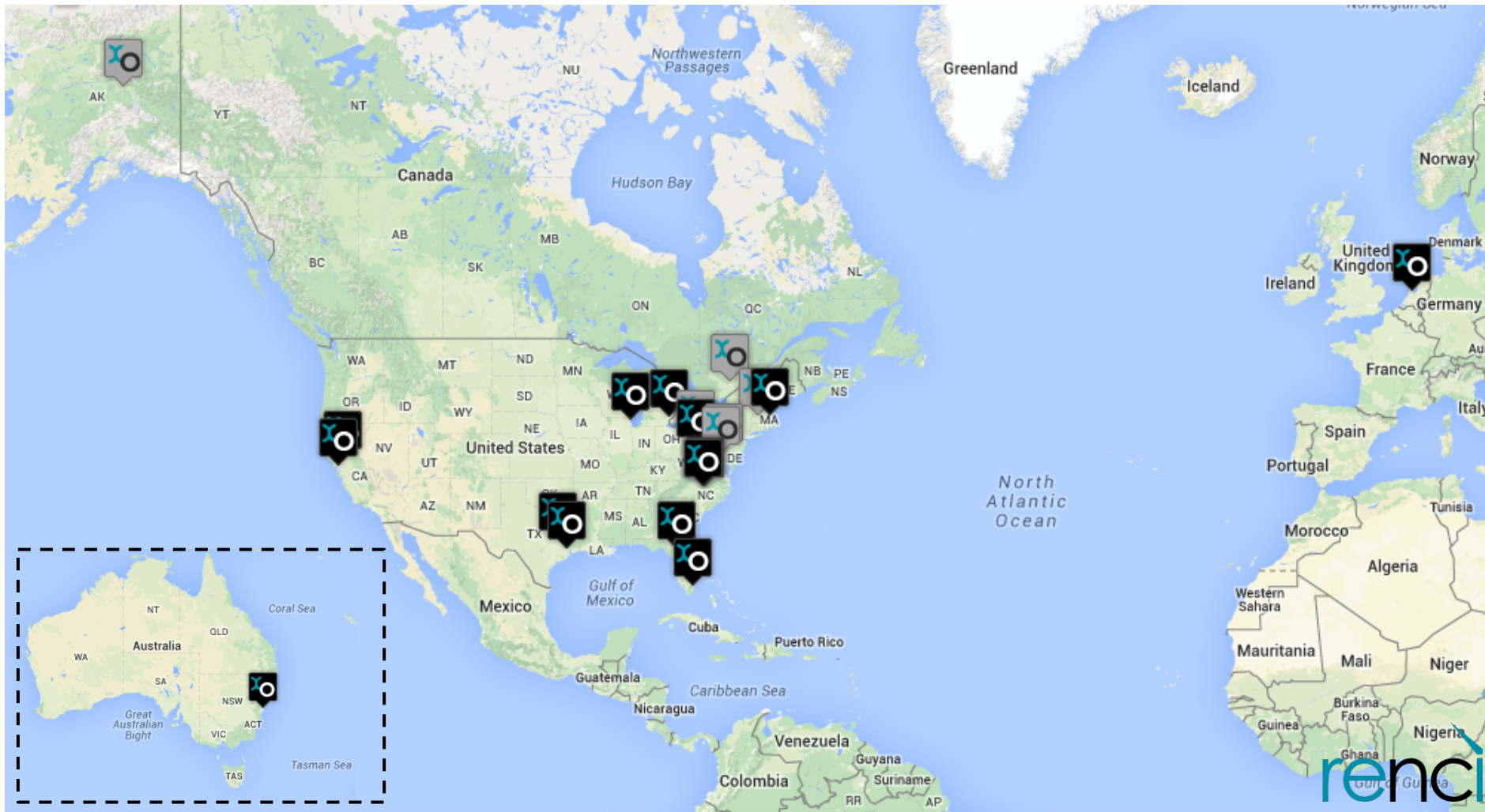
Multi-Domain High-bandwidth SDN

Booth #3315

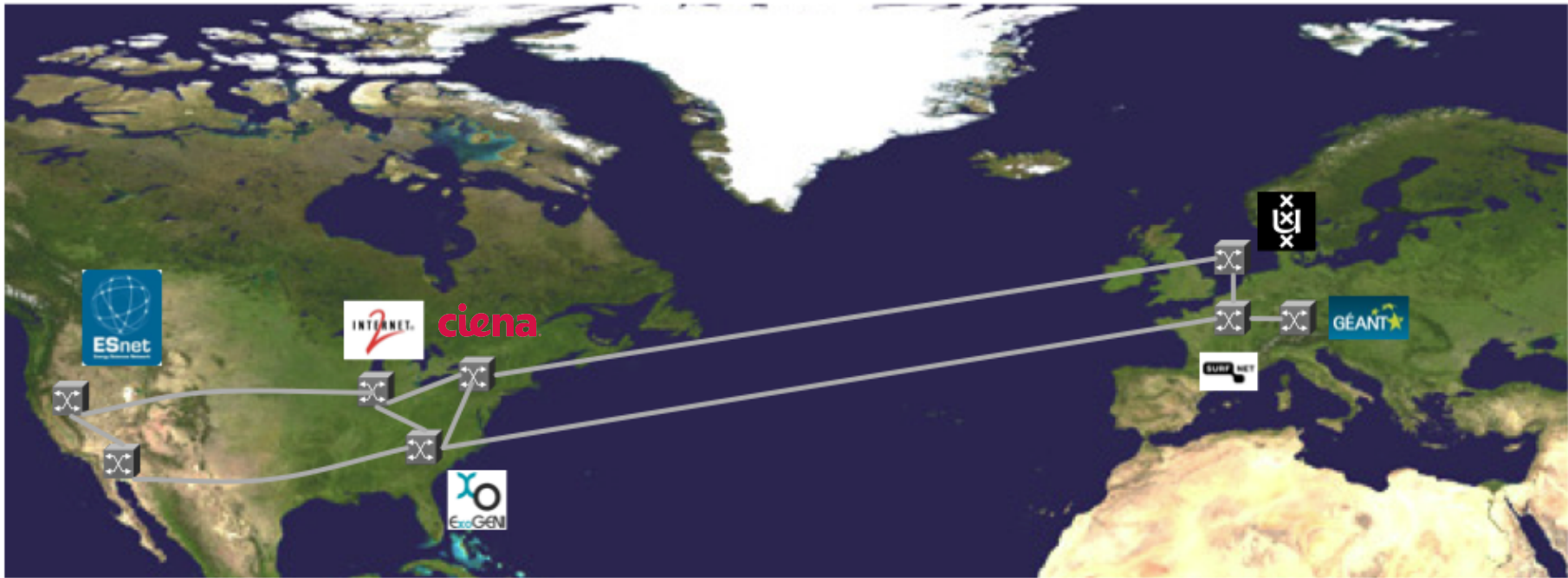
Ralph Koning, Marc Lyonnais, Cees de Laat, Rodney Wilson



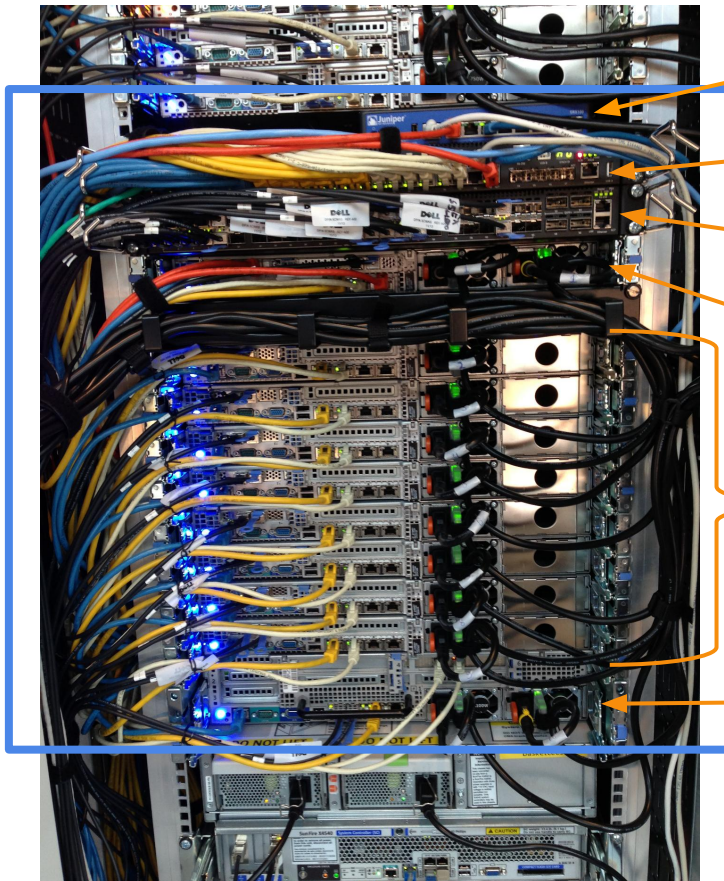
ExoGENI Deployment Worldwide



Connectivity and Collaborations



The ExoGENI Rack



VPN Gateway - Juniper SRX100

Management Switch - Dell Force10 S55

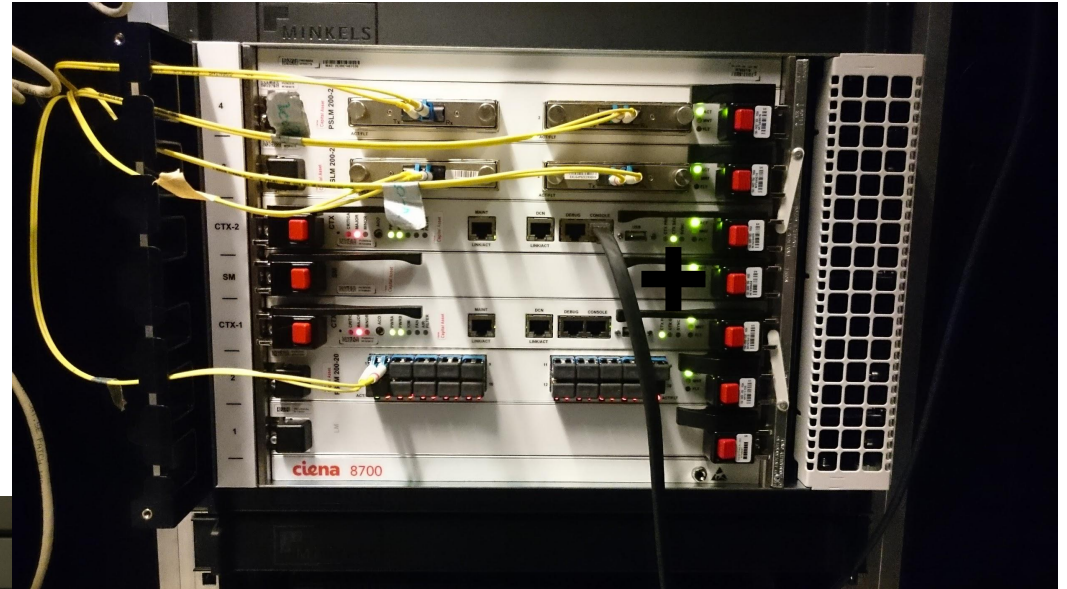
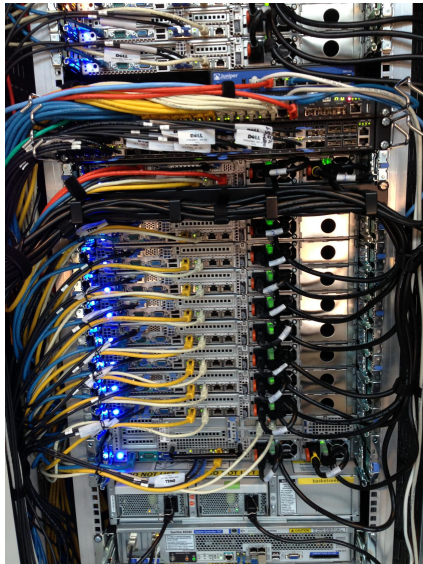
OpenFlow Switch - Dell Force10 S4810P

Head Node - Dell R620

Compute Nodes - 8 x Dell R620

Storage Node - Dell R720









ExoGENI extended



ANA-200G

ANA-200G: 100G Production Ring across North Atlantic for R&E

Open Exchange Points & Links

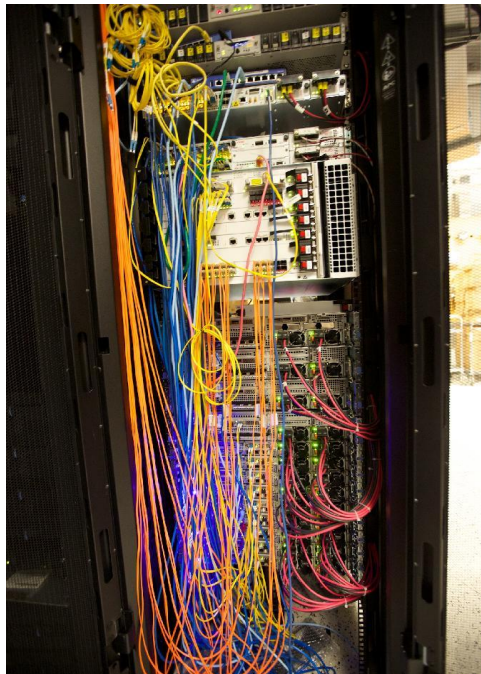
-  MAN LAN
-  WIX
-  NetherLight
-  GEANT Open London
-  Internet2
-  TGN-Atlantic South
-  NORDUnet/SURFnet
-  Hibernia Atlantic

ANA-100G Production Network: A 100 Gbit/s production quality ring across the North Atlantic for Research and Education. Collaborators: Internet2, NORDUnet, CANARIE and SURFnet.



Figure by Erik-Jan Bos (NORDUnet)

Ciena Environment for Network Innovation (CENI)



CENI Ottawa System Specifications

- ❑ 8700 4 Slot with 560G of L2 Capacity
 - ❑ 4x40G (2 PSLM-200-2)
 - ❑ 2x100G (1 PSLM-200-2)
 - ❑ 20x10GE (1 PSLM-200-20)
- ❑ 10 Dell Servers
 - ❑ 180 Physical Cores -> approx. 330 Virtual Core Machines
Running Linux RedHAT 6.0
 - ❑ Up to ~ 80 VMs (using 4 Cores each.)
 - ❑ 608 GB of Physical RAM -> approx. 1.2TB VRAM
 - ❑ 6 TB of HD-> more than 12TB Virtual Disk Capacity
- ❑ 100GE Upload Capacity, first of its kind for GENI
- ❑ 20GE in Management Ethernet ports (approx 48 ports) via 5142 and 5150)
- ❑ All DC powered (approx. 100A)
- ❑ 175 Public IP addresses on CANARIE Network



Live, from Ciena R&D
Ottawa Canada

Key Enablers

Key 2015 Objectives:

- Develop 8700 for EXO GENI applications.
 - Complete, international acceptance testing†
 - Set up Additional C-GENI rack in Baltimore
 - Key Events: GENI conf. Washington, Vectors, SC15, Austin
 - Explore role of reliable, secure Carrier Ethernet
 - Optical GENI to up GENI capacity
 - SDX Switch project w/ University of Amsterdam
- Vehicle to allow Ciena to participate in external cutting edge research on next generation virtualized cloud resources & networking
 - 8700 takes GENI beyond OpenFlow
 - Runs on Ciena's research on demand network between Hanover, Ottawa, Chicago & Europe
 - †Grad Students being trained on C-GENI
 - Ciena's high performance networking product

High bandwidth slices

