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# **LHC OPN – INTERNET2 UPDATE**

# Agenda

- Welcome
- Internet2 Strategic Focus Areas
- Network Specific Activities of Interest to the LHC Community

# The challenges we face



# Seven focus areas

Advanced network and  
network services leadership

Services at scale:  
Services “above the network”

U.S. UCAN

Global reach and leadership

Research community development  
and engagement

Industry partnership development  
and engagement

National/Regional collaboration





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# Advanced Network Services & Leadership

Advanced production IP network for R&E IP services and peering services

Substantial wave capacity for future

Tighter coordination with Global partners

Development & Deployment of large scale environment for network research

Development of a new persistent Open Exchange with persistent & dynamic VLANs

Tighter integration of performance programs with the network portfolio

Operational Support for Research



# Research Community Development & Engagement

Research Facilitation Program

Observatory and Operational Data

Operational Support for Research

Production wave capacity for a fee

Research wave capacity through RAC

Coordination with global partners

Support for Virtual Organizations

Development of a new persistent Open Exchange with persistent & dynamic VLANs

Development & Deployment at-scale environment for network research

NSF/GENI funded OpenFlow testbed



# Global Reach and Leadership

## Global NREN Coordination & Growth

Service & operational coordination with global partners where US research & education is present

Research & Development coordination with key global partners

Advocacy for a more cohesive view of trans-oceanic capacity

Support for Virtual Organizations across global boundaries

Extension of International transit policy beyond layer 3 to layer 2 and OpenFlow

Global 40/100G Ring Investigation

Global Telepresence / Data Center Project







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# **BTOP INFRASTRUCTURE SUPPORT FOR INTERNET2 STRATEGIC PRIORITIES**

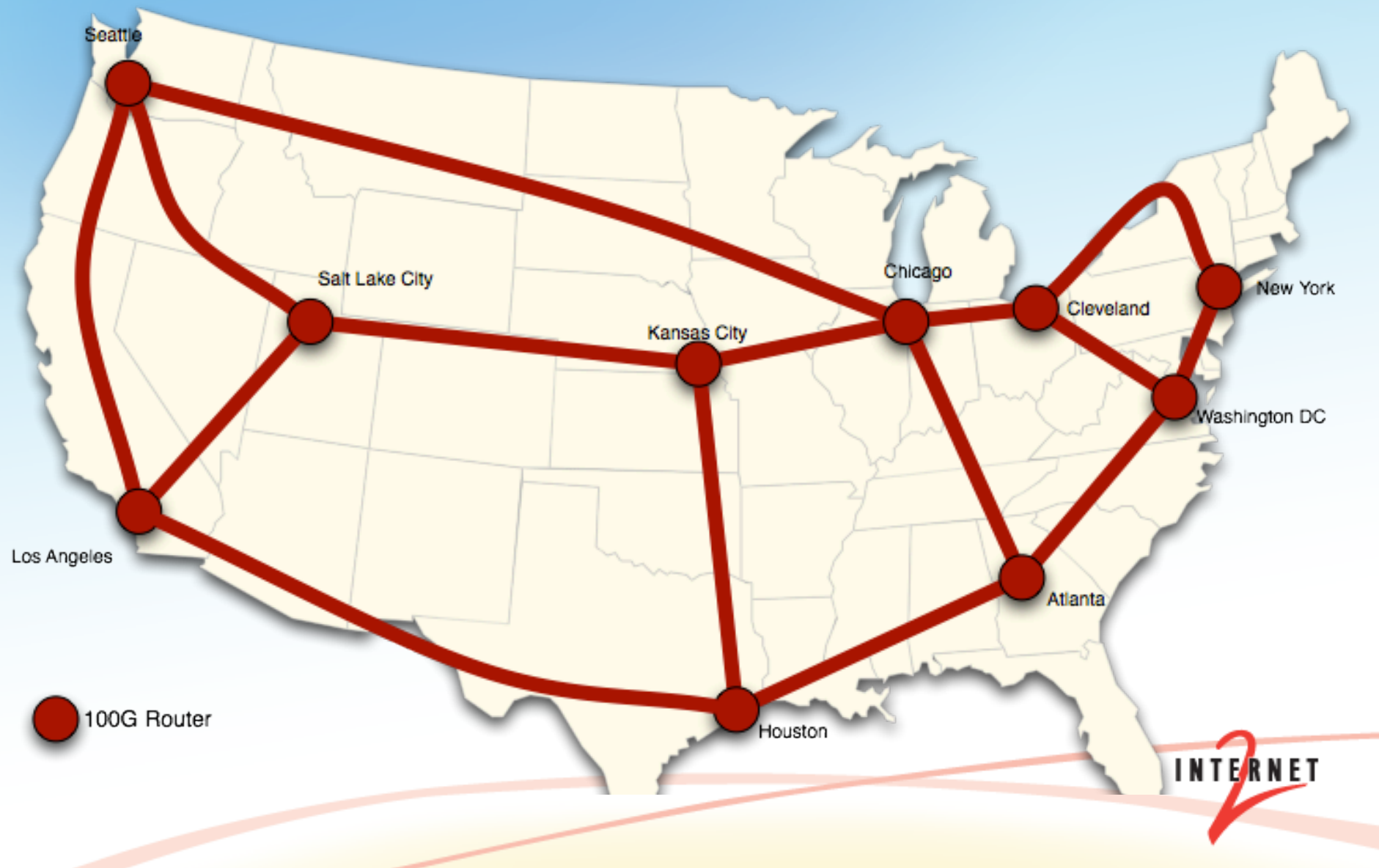
# New Internet2 8.8 Tbps Optical Network



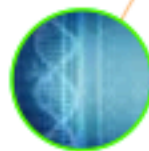
# BTOP Infrastructure Includes

- Next Generation Network Infrastructure
  - New single-owner 20-30 Year Dark Fiber IRU on expanded footprint
  - Over **8.8 Tbs** of Wave Capacity
  - Plus upgrades to Northern Tier and integration with the national fabric
- Enhanced Services
  - 100G IP/MPLS Backbone
  - Delivery of robust 10, 40 and 100G waves
    - Fees are set *extremely* competitively based on our new cost basis
  - New persistent Layer 2 Services (NDDI/OS3E)
  - Increased connectivity to Commercial Exchange Points
  - Regional interconnects
  - Tight integration with middleware, cloud services, global reach
- Specific Research Opportunity
  - Move to native 40G, 100G waves – important for research support
  - Partnership with Department of Energy / ESnet network testbed
  - Sliceable network development environment for network research
  - New Operational Support for Research

# 100G IP Backbone – Beginning Fall 2011

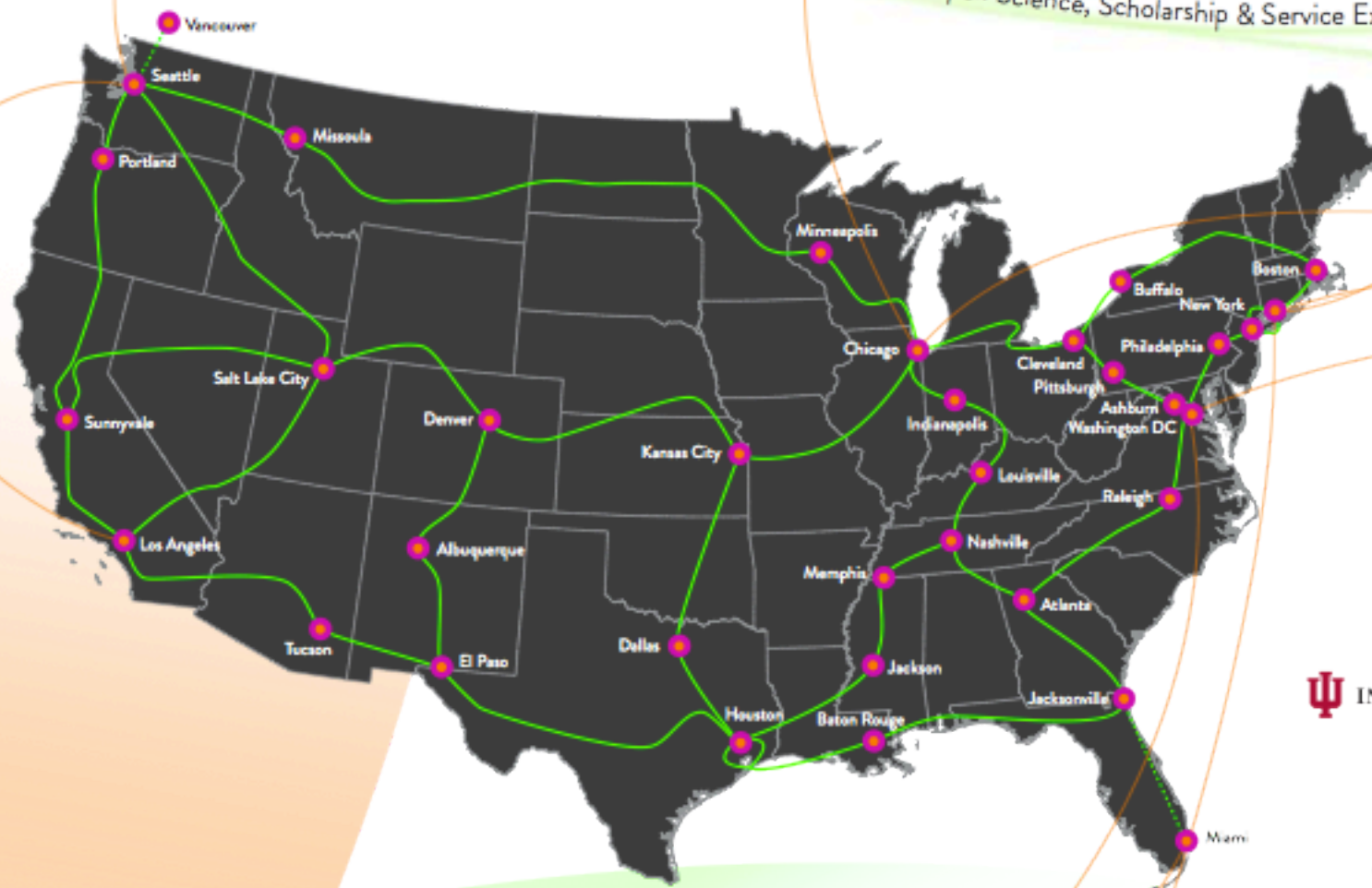






# OS<sup>3</sup>E

The Open Science, Scholarship & Service Exchange



INTERNET<sup>®</sup>

INDIANA UNIVERSITY

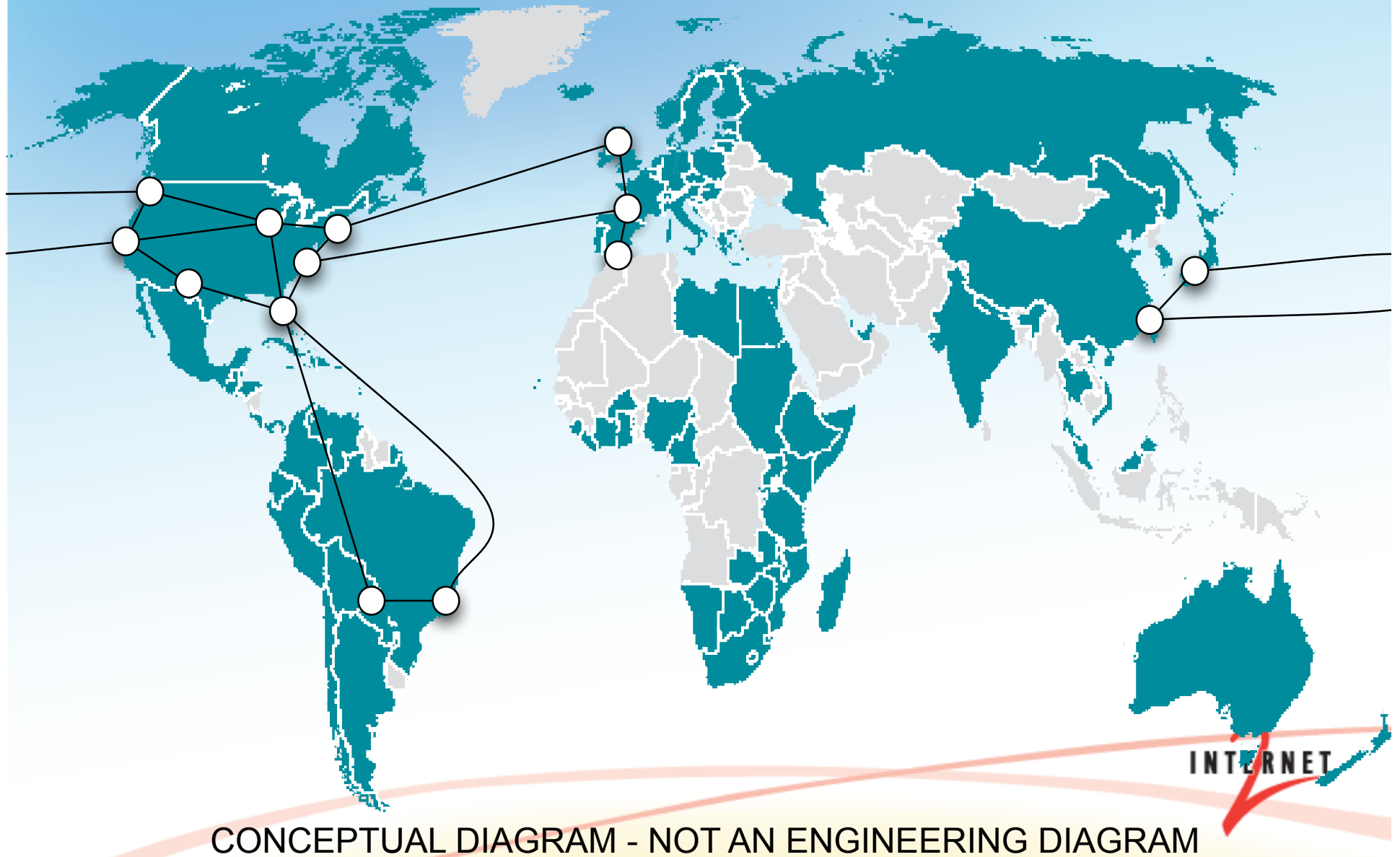
STANFORD  
UNIVERSITY

# Open Science, Scholarship and Services Exchange:

- In addition to Internet2's "traditional" R&E services, develop a next generation service delivery platform for research and science to:
  - Deliver production layer 2 services that enable new research paradigms at larger scale and with more capacity
  - Enable a global scale sliceable network to support network research
  - Start at 2x10 Gbps, Possibly 1x40 Gbps
- Build it using disruptive technologies and with global reach
  - Re-enable open-source development at the network layer
  - Enable disruptive network economics throughout the ecosystem
  - Build as a major partnership between Indiana University, Stanford and Internet2 as the principle investors and other partners



# Global Reach – Extending Open Science Exchange Capabilities to Europe & Asia





**INTERNET**

**DISCUSSION**



# NDDI AND OS<sup>3</sup>E

