INTERNET2

18 NOV 2011
2011 CUDI FALL MEETING

Internet2 Activities Update

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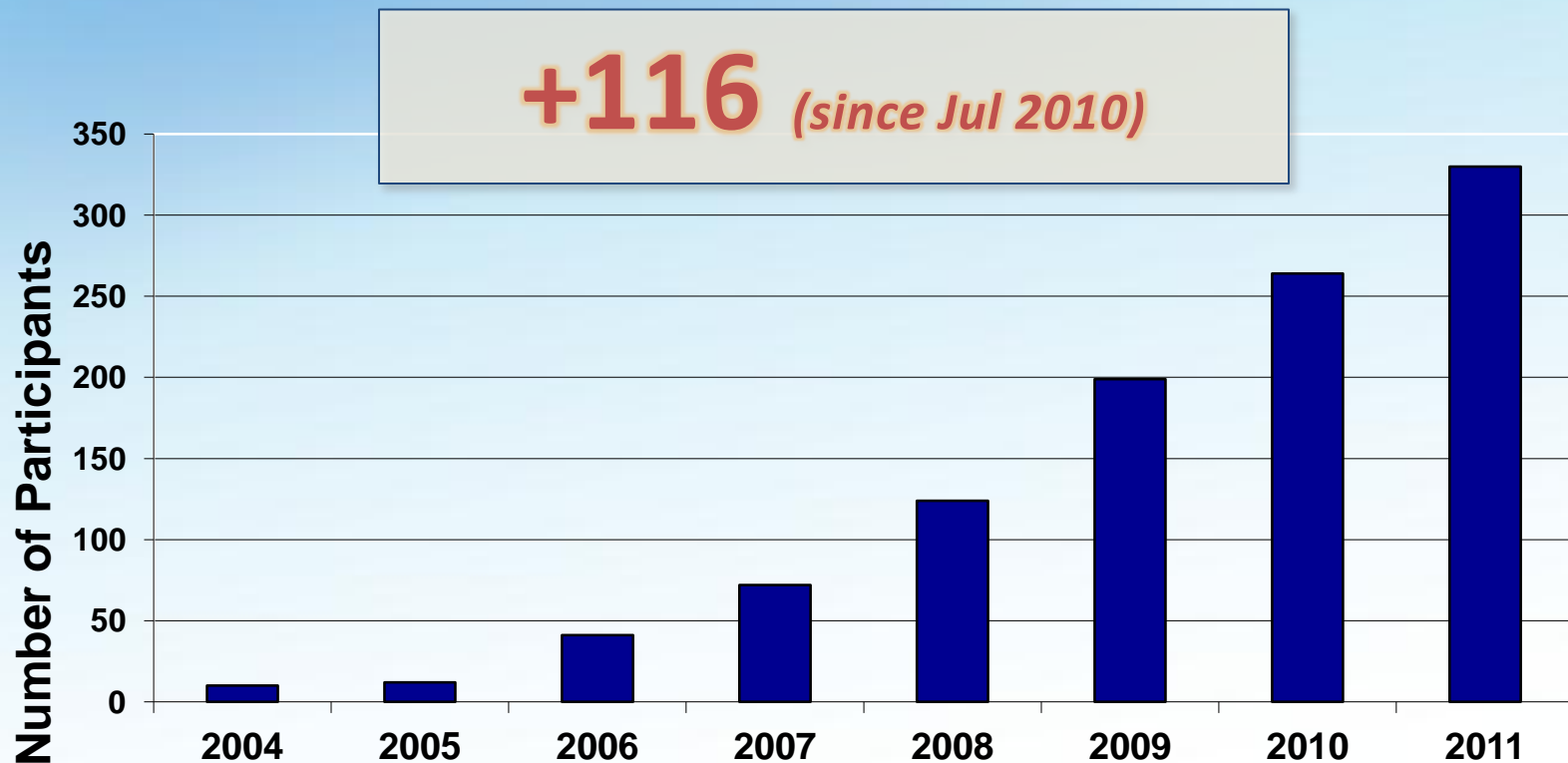# Update on Internet2 Internal Changes

- New CEO – H. David Lambert – 2nd CEO in our history
- New CTO – Steve Wolff
- New Strategic Goals

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New members welcomed +32

Higher Ed +5	Affiliate +9	Industry +14	R&E Networks +4
California State University, Fullerton	American Council on Education	Blue Jeans Network	ABQG (Albuquerque GigaPop)
Colorado School of Mines	California Telehealth Network	Box	C-Light
Gallaudet University	Centers for Disease Control & Prevention	Complete Genomics, Inc.	Maryland Research and Education Network (MDREN)
Oglala Lakota College	Colorado Telehealth Network	Dell	West Virginia Network
University of the District of Columbia	Jasig	ESPN, Inc.	
	North Carolina TeleHealth Network (NCTN)	EVOgh, Inc.	
	Open Health Systems Laboratory	F5Networks	
	Open Health Tools, Inc.	NEC Corp of America	
	The Quilt	SHI	
		tw telecom-Public Sector	
		VMware	
		Wainhouse Research	
		WEPA, Inc.	
		Zayo Networks	

(since Jul 2010)

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New InCommon Participants welcomed

+116 *(since Jul 2010)*

Chart: Number of Participants by year

- 2004: ~10
- 2005: ~12
- 2006: ~42
- 2007: ~72
- 2008: ~125
- 2009: ~200
- 2010: ~265
- 2011: ~330

Y-axis: Number of Participants (0, 50, 100, 150, 200, 250, 300, 350)

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Strategic focus areas: *Moving ahead*

- Advanced network and network services leadership

- Internet2 NET+: services "above the network"

- U.S. UCAN
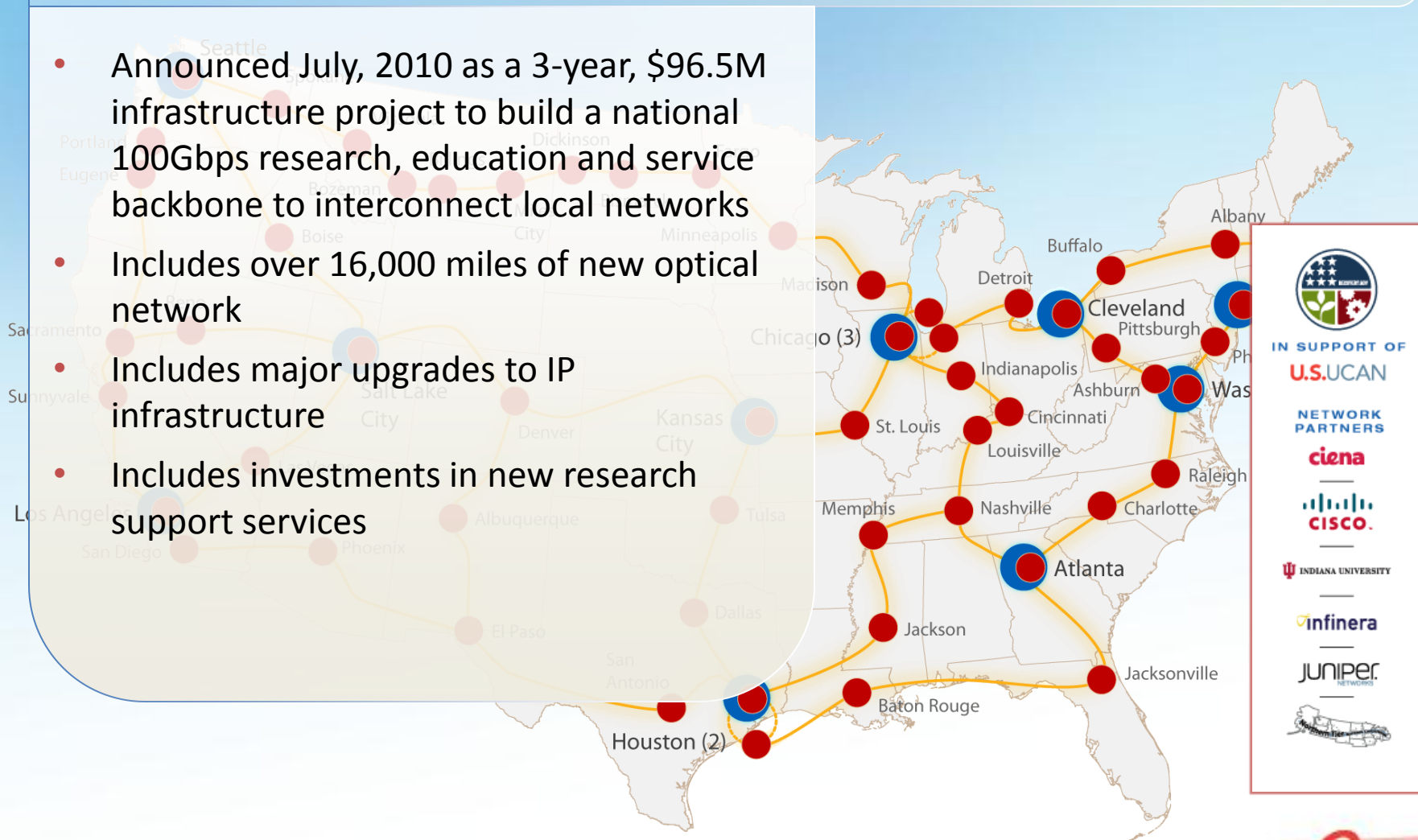
- National/Regional collaboration

- Global reach and leadership

- Research community development and engagement

- Industry partnership development and engagement

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Update: Internet2 BTOP upgrade project

- Announced July, 2010 as a 3-year, $96.5M infrastructure project to build a national 100Gbps research, education and service backbone to interconnect local networks

- Includes over 16,000 miles of new optical network

- Includes major upgrades to IP infrastructure

- Includes investments in new research support services

IN SUPPORT OF
U.S.UCAN

NETWORK PARTNERS

ciena

CISCO.

INDIANA UNIVERSITY

infinera

JUNIPER NETWORKS

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BTOP upgrade ahead of schedule

- October 4th, 2011: ESnet and Internet2 jointly announce the first coast-to-coast 100G optical network with provisioned waves in North America

- October 4th, 2011: First Chicago to Washington to New York 100G network active

- More than 52% of Internet2's BTOP project is complete at 42% through the project timeframe

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U.S. UCAN – Unified Community Anchor Network

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What will the new network enable for Higher Education?

- **Transport and analysis of the mountains of data** required by climate, clean energy, particle physics, genomics and other research

- **Unprecedented access** to raw networking resources, expediting development and advancing the state of the Internet

- **A new level of collaboration** for distributed research teams

- **New connectivity and applications** for government, research and education, and industry

- **An increase in scientific productivity** and shortened time to discovery for innovations we need to address current and future societal challenges

- **A view into the future Internet** with enhanced capabilities for real time visibility into network operations including its power consumption

Network Development and Deployment Initiative (NDDI)

http://www.internet2.edu/nddi

- Coast-to-coast SDN-based layer-2 service
- Ready for discussion: use cases and expansion of the network
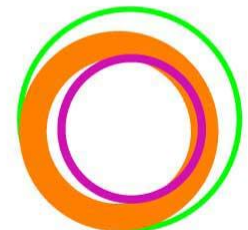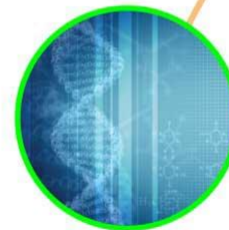- iNDDI – A framework for international coordination announced
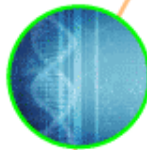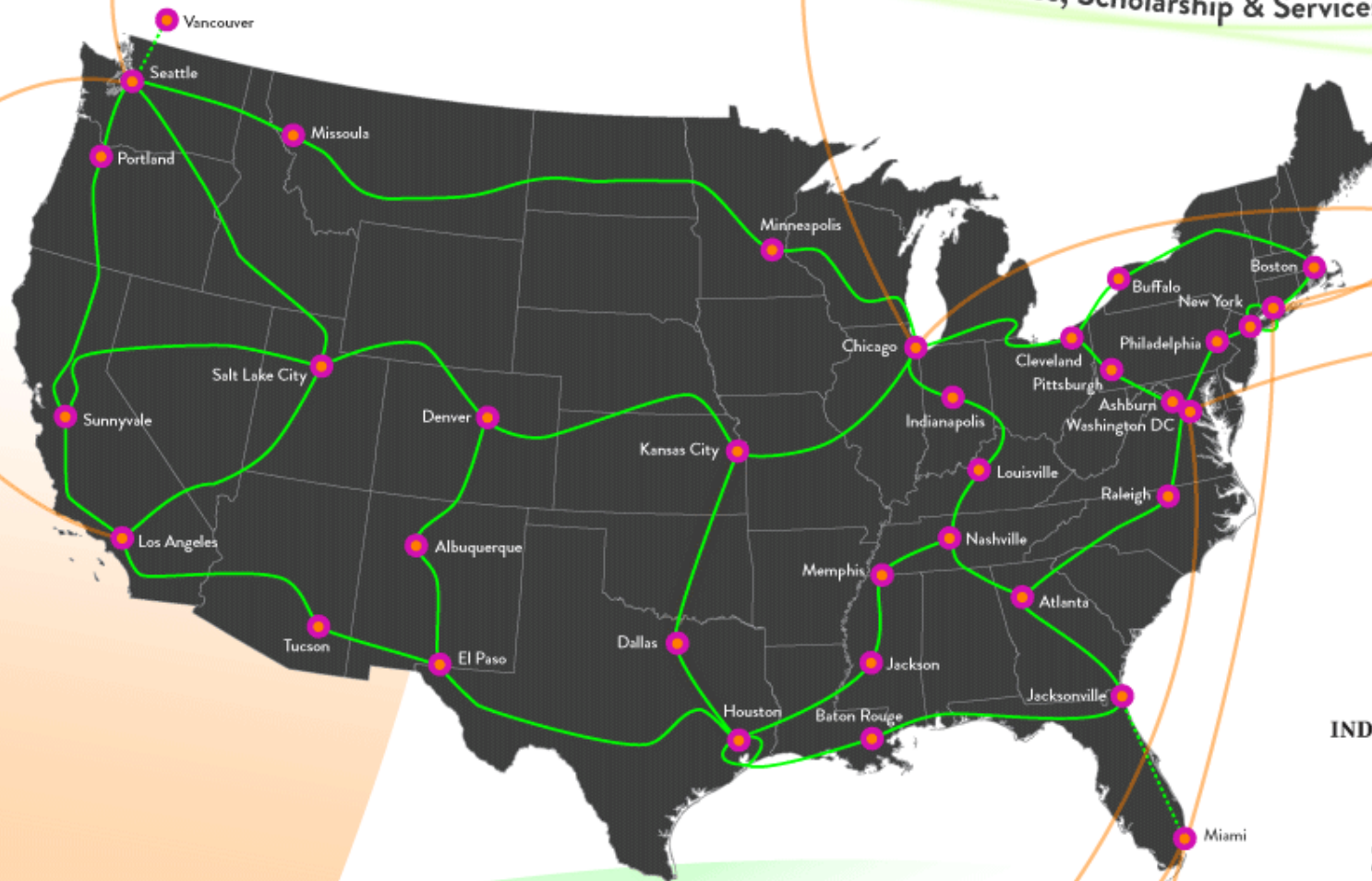

Courtesy of CERN

Courtesy of LBNL

OS³E

The Open Science, Scholarship & Services Exchange

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IU INDIANA UNIVERSITY

STANFORD UNIVERSITY

BEYOND THE NETWORK:

Informal survey results

Cloud applications & services of interest

- Scalable compute and storage resources (on-demand services)
- File storage services
- Research computing (HPC)
- Public facing web services
- Archiving
- SaaS (email, ERP, credit-card processing, LMS, niche applications)
- Virtual computing labs
- Virtual desktop services
- Platform computing resources
- Identity management
- Library systems

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Initial portfolio

- **InCommon Federation**

  Federated Authentication, Assurance Program, Certificate Service

- **Middleware**

  MACE, Shibboleth®, Grouper™, Comanage

- **Internet2 Commons**

  Virtual meeting rooms, desktop collaboration, telepresence, other

- **Cloud Services**

  - Storage Services

  - "Community Cloud" (Pilot)

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Why Internet2 NET+ Services?

- Define a new generation of value-added services from Internet2

- Provide a single point of contracting and provisioning for the Internet2 community

- Leverage our members' buying power for better pricing and terms

- Leverage the Internet2 network and other services such as InCommon

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Partnerships with service providers

First partnerships recently announced at the
Fall 2011 Internet2 Member Meeting, Raleigh, NC

Infrastructure-as-a-Service

Storage-as-a-Service

Internet2-Box partnership

Addressing the storage challenge

- Enable users to securely share, store and collaborate content

- Protect information and privacy

- Provide unlimited storage, mobile device access and support

- Offer IT an easy-to-use administrative interface

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University PoC participants and early adopters
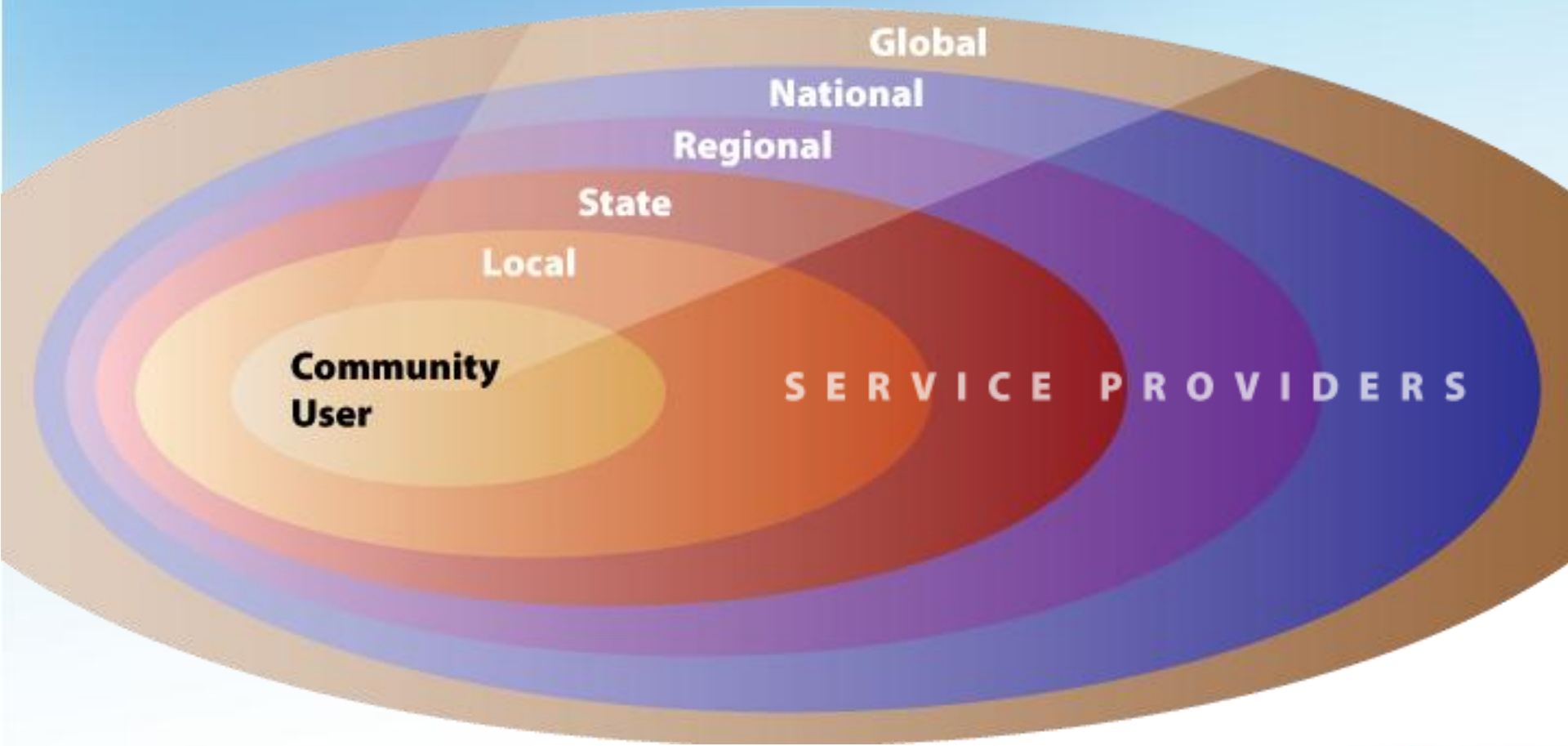

Among others…

Emerging opportunities

Currently engaged with a number of potential partners and service providers relative to a range of offerings

- AT&T
- Amazon
- Bluejeans
- Dell

- DuraSpace
- Evogh
- NC State (VCL)
- Solutions Design Group

Among others…

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An ecosystem built on partnerships

Globalization is changing Internet2 member missions and strategies—from higher education to industry

- National institutions now in global competition by default

- Large-scale, distributed science depends on global infrastructure and global data assets

- Science, research, education, service no longer bound by geographic or political boundaries

- Must build strong bridges between international partners and collaborators
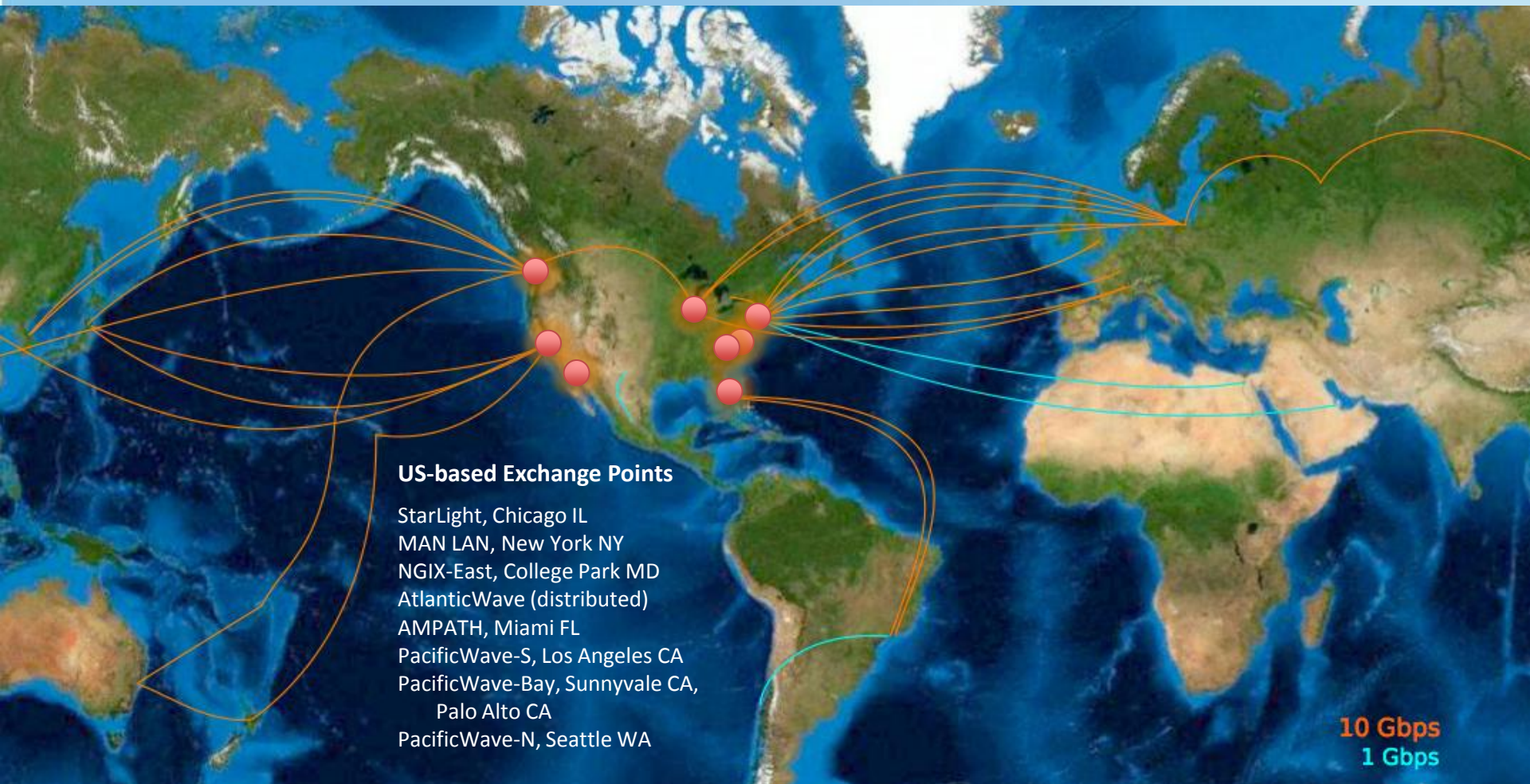
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Update: Global Leadership

- Ensure access to globally distributed science facilities (LHC, ITER, Gemini)

- Support Internet2 members deploying campuses overseas

- Foster aggressive international dialogue

- Facilitate development of coherent, global network capabilities, architectures that support growing collaborations

- Strengthen and support existing global partnerships and projects

- Expand support for development of national R&E networks in countries important to members

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International reach

US-based Exchange Points

StarLight, Chicago IL
MAN LAN, New York NY
NGIX-East, College Park MD
AtlanticWave (distributed)
AMPATH, Miami FL
PacificWave-S, Los Angeles CA
PacificWave-Bay, Sunnyvale CA,
    Palo Alto CA
PacificWave-N, Seattle WA

10 Gbps
1 Gbps

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INTERNATIONAL PARTNERSHIPS

AMERICAS
CANARIE (Canada)CEDIA
(Ecuador)
CNTI (Venezuela)
CR2Net (Costa Rica)
CUDI (Mexico)
INNOVA|RED (Argentina)
REUNA (Chile)
RNP [FAPESP] (Brazil)
SENACYT (Panama)

MULTI-NATIONAL
AAU (Africa)
APAN (Asia - Pacific)
CKLN (Caribbean)
CLARA (Latin America and Caribbean)
DANTE (Europe)
NORDUnet (Nordic Countries)
TERENA (Europe)
UbuntuNet Alliance (Africa)
University of the West Indies (Caribbean)

EUROPE
ARNES (Slovenia)
BELNET (Belgium)
CARNET (Croatia)
CESnet (Czech Republic)
DFN (Germany)
FCCN (Portugal)
GARR (Italy)
RENATER (France)
GRNET (Greece)
HEAnet (Ireland)
HUNGARNET (Hungary)
JISC, JANET (United Kingdom)
PSNC, PIONIER (Poland)
RedIRIS (Spain)
RESTENA (Luxemburg)
RIPN (Russia)
SANET (Slovakia)
SURF (Netherlands)
SWITCH (Switzerland)

ASIA and PACIFIC RIM
AARNet (Australia)
ANF (Korea)
CDAC, ERNET (India)
CERNET, CSTNET,
NSFCNET (China)
JAIRC (Japan)
JUCC (HongKong)
MYREN, MDeC (Malaysia)
NECTEC, UniNet
(Thailand)
NREN (Nepal)
PERN (Pakistan)
REANNZ (New Zealand)
SingAREN (Singapore)
TWAREN (Taiwan)
VinaREN (Vietnam)

MIDDLE EAST and GULF STATES
ANKABUT (UAE)
Israel-IUCC (Israel)
MCIT [EUN, ENSTINET] (Egypt)
Qatar Foundation (Qatar)
KACST (Saudi Arabia)

AFRICA
TENET (South Africa)
TERNET (Tanzania)
NUC (Nigeria)

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Current Networks Reachable

AFRICA
Algeria (ARN)
Egypt (EUN / ENSTINET)
Kenya (KENET)
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 (CR2Net)
Ecuador (CEDIA)
El Salvador (RAICES)
Guatemala (RAGIE)
Mexico (CUDI)
Panama (RedCyT)
Peru (RAAP)
Trinidad (UWI)
Uruguay (RAU2)
Venezuela (Reacciun2)

ASIA and PACIFIC
Australia (AARNet)
Bhutan (BdREN)
Cambodia (CamREN)
China (CERNET2, CSTNET, NSFCNET)
Hong Kong (HARNET)
India (ERNET)
Indonesia (ITB)
Japan (SINET3, WIDE, JGN2)
Korea (KOREN, KREONET2)
Laos (LERNET)
Malaysia (MYREN)
Nepal (NREN)
New Zealand (KAREN)
Pakistan (PERN)
Philippines (PREGINET)
Singapore (SingAREN)
Sri Lanka (LEARN)
Taiwan (TANet2, ASnet)
Thailand (UniNet, ThaiSARN3)
Vietnam (VinaREN)

CENTRAL and SOUTHWEST ASIA
Armenia (ASNET-AM)
Azerbaijan (AzRENA)
Georgia (GRENA)
Kyrgyz Republic (AKNET)
Tajikistan (TARENA)
Turkey (ULAKBIM)
Turkmenistan (TuRENA)

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 and GULF STATES
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

Aligning efforts with strategy:
Fostering international dialogue

- **Concept: University pairing**
- Growing stronger collaborators by sharing knowledge and experience
- Strengthening native skills over the long term
- Exchanging core capabilities and experiences, two-way visits and communications, leadership connections

Aligning efforts with strategy:
Supporting U.S. campuses overseas

- **Concept: Develop overseas campus network infrastructure models, including:**
- Consideration of infrastructure needs in early stages
- Access to high-speed, robust networks, critical to collaboration tools
- Ability to adapt to changing needs
- Novel IT staffing patterns: move from specialist to versatilist
- Evaluation of tools and technologies
- Addressing of cultural differences

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Local, Regional, National, Global Networking: Crucial value in challenging times

- During financial difficulties, information technology becomes *more* important, not less
- Drives down costs through economies of scale
- Fuels long-term strategic gains
- Opens possibilities for new, game-changing services

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