RPI, I2CC, DDoS, I2IC Network Numbers Entering 2024

Legend:
- I2PX/RPI/Cloud Connect Peering Site
- I2PX/RPI Peering Site
- AL1S/AL2S/AL3S Add-Drop Site
- AL1S Add-Drop Site
- AL1S Regeneration Site
- Fiber Infrastructure
- Infrastructure Sharing
- Leased Capacity

2024 Stats

- **I2 Cloud Connect**
  - **539** Connections

- **I2 RPI**
  - **42** 10G Interfaces
  - **2** 100G Interfaces

- **I2 DDOS**
  - **14** Subscribers
  - **95** Tenants

- **I2 Insight Console (Since 11/23)**
  - **217** Layer 2 Connections Created or Updated
  - **90** Layer 3 Connections Created or Updated
  - **48,000** Looking Glass Queries Executed

- **Routing Integrity**
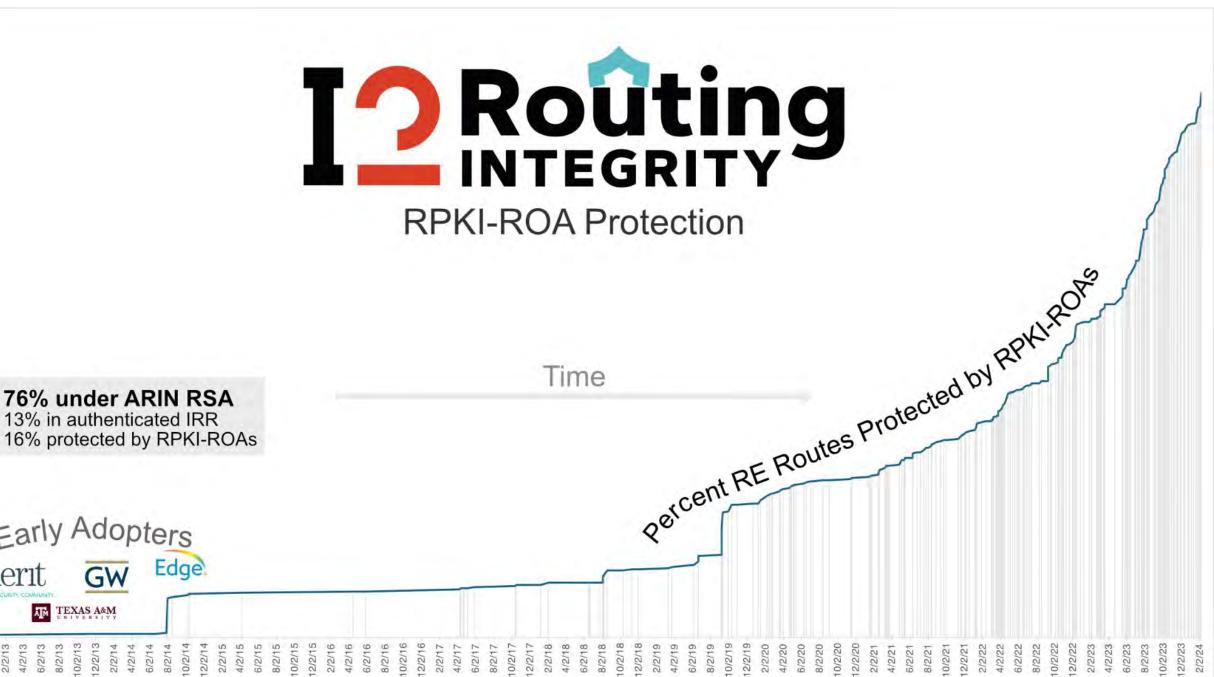 - LRSA executed by **~300** R&E institutions

Sessions Involving Great Folks from Network Services

Network Automation and Security:
- Tuesday: A Discussion of Routing Integrity for the Internet2 Community | 11:20 – 11:40 a.m.
  - Steve Wallace
- Tuesday: Network Security SIG | 12:00 – 1:00 p.m.
  - Adair Thaxton
- Wednesday: DDoS Mitigation SIG | 12:00 – 1:00 p.m.
- Wednesday: NTAC Network Automation SIG | 12:00 – 1:00 p.m.
  - Shannon Byrnes

Consortiums and Collaborative Initiatives:
- Tuesday: Introducing MetrANOVA: Consortium for Advancing Network Observation and Analysis | 11:20 – 12:00 p.m.
- Tuesday: Global Net Advancement (GNA-G) Meeting | 12:00 – 1:00 p.m.

I2 Routing INTEGRITY
RPKI-ROA Protection

76% under ARIN RSA
13% in authenticated IRR
16% protected by RPKI-ROAs

Early Adopters

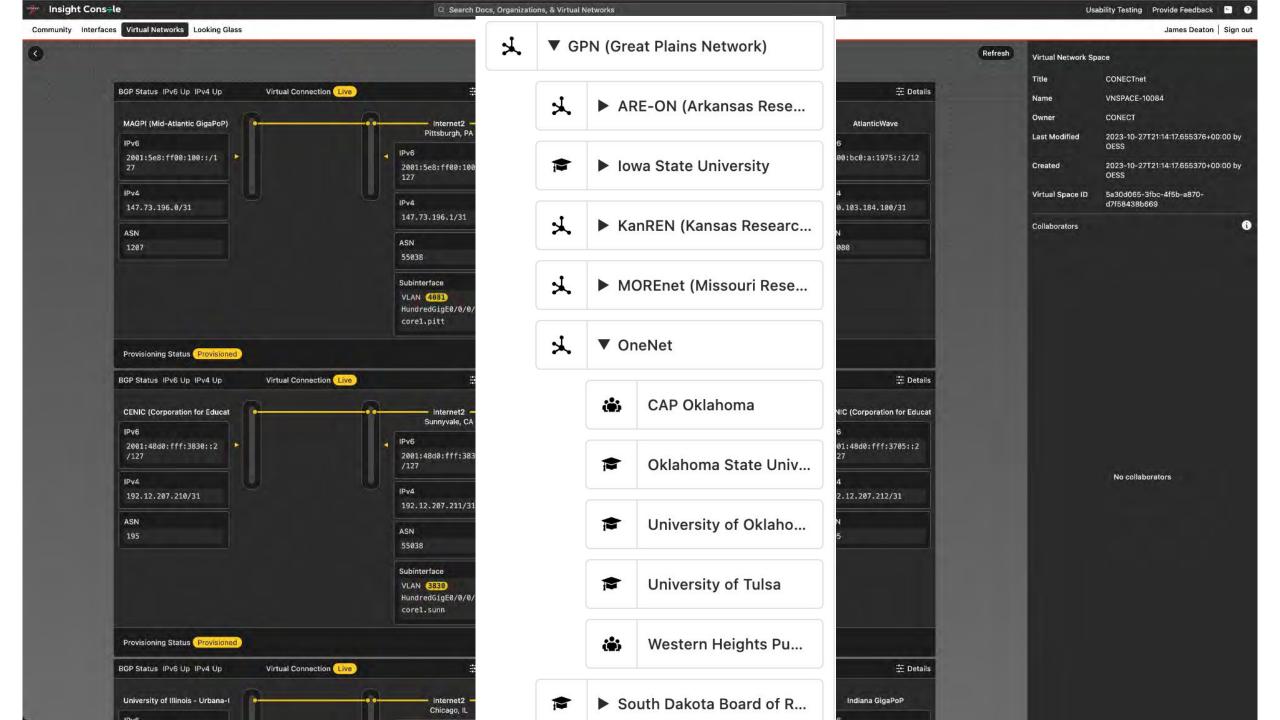Percent RE Routes Protected by RPKI-ROAs

Time

Sessions Involving Great Folks from Network Services

Special Interest Groups and Meetings:
- Tuesday: Connector/Network Member BoF (Invitation Only) | 5:30 – 7:00 p.m.

Innovative Architectures and Development:
- Tuesday: Insight Console: Update on current status and work in progress | 10:45 – 11:15 a.m.
  - Mike Simpson
- Wednesday: Collaborating and Testing Innovative Architectures within the R&E Community | 8:30 – 9:30 a.m.
  - Matt Mullins
  - JoAnne Bender
  - Jeff Bartig
- Thursday: Building a NetDevOps Team | 8:30 - 9:30 a.m.

Refresh

Virtual Network Space

Title	CONECTnet
Name	VNSPACE-10084
Owner	CONECT
Last Modified	2023-10-27T21:14:17.655376+00:00 by OESS
Created	2023-10-27T21:14:17.655370+00:00 by OESS
Virtual Space ID	5a30d065-3fbc-4f5b-a870-d7f58438b669

Collaborators

No collaborators

▼ GPN (Great Plains Network)

▶ ARE-ON (Arkansas Rese…

▶ Iowa State University

▶ KanREN (Kansas Researc…

▶ MOREnet (Missouri Rese…

▼ OneNet

CAP Oklahoma

Oklahoma State Univ…

University of Oklaho…

University of Tulsa

Western Heights Pu…

▶ South Dakota Board of R…

BGP Status IPv6 Up IPv4 Up   Virtual Connection Live

MAGPI (Mid-Atlantic GigaPoP)   Internet2
                                                Pittsburgh, PA
IPv6
2001:5e8:ff00:100::/127

IPv4
147.73.196.0/31

ASN
1207

IPv6
2001:5e8:ff00:100::
127

IPv4
147.73.196.1/31

ASN
55038

Subinterface
VLAN 4081
HundredGigE0/0/0/
core1.pitt

Provisioning Status Provisioned

Details

AtlanticWave

00:bc0:a:1975::2/12

0.103.184.100/31

080

BGP Status IPv6 Up IPv4 Up   Virtual Connection Live

CENIC (Corporation for Educat   Internet2
                                                Sunnyvale, CA
IPv6
2001:48d0:fff:3830::2/127

IPv4
192.12.207.210/31

ASN
195

IPv6
2001:48d0:fff:383
/127

IPv4
192.12.207.211/31

ASN
55038

Subinterface
VLAN 3830
HundredGigE0/0/0/
core1.sunn

Provisioning Status Provisioned

Details

NIC (Corporation for Educat

01:48d0:fff:3705::2
27

.12.207.212/31

IC

BGP Status IPv6 Up IPv4 Up   Virtual Connection Live

University of Illinois - Urbana-(Internet2
                                                Chicago, IL

Indiana GigaPoP

Details

Peer	Gbps	Petabytes
Akamai-20940	284.7	9.7
Fastly-54113	113.2	4.3
Apple-714	115.6	3.5
Google-15169	117.6	3.5
Amazon-16509	80.5	2.6
ByteDance-396986	66.3	2.1
Microsoft-8075	59.3	1.4
Valve-32590	38.0	1.4
Cloudflare-13335	55.3	1.4
Meta-32934	43.3	1.3
Edgio-15133	24.5	0.9
Netflix-2906	17.6	0.8
Comcast-7922	24.9	0.8
Edgio-22822	19.6	0.7
Zayo-6461	16.0	0.5
Twitch-46489	13.6	0.5
i3D-49544	10.2	0.3
OVH-16276	8.7	0.2
Oracle-31898	5.5	0.2

Sessions Involving Great Folks from Research Engagement

Research Engagement:
- Tuesday: BoF: Evolving R&E Engagement From REN/NRENs | 12:00 - 1:00 p.m.
- Wednesday: How to Connect with Researchers and Why | 2:40 - 3:40 p.m.
- Thursday: The Campus Research Computing Consortium & RCD Nexus | 8:30 - 9:30 a.m.
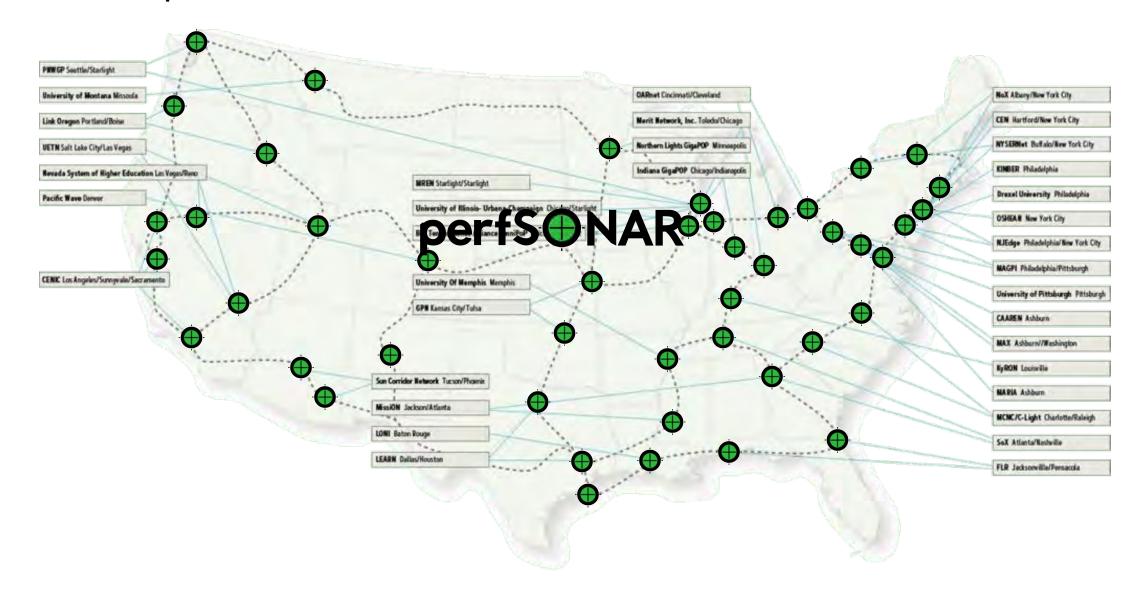
National Research Platform Contributions

Distributed Computing

- Participate in Open Science Data Federation (OSDF)
- Provides Distributed high-throughput computing (dHTC) in support of open science
- Internet2 operates 12 cache / compute nodes
- Filling key latency and location gaps

A Plethora of Public perfSONAR Points in PoPs

PNWGP Seattle/Starlight

University of Montana Missoula

Link Oregon Portland/Boise

UETN Salt Lake City/Las Vegas

Nevada System of Higher Education Las Vegas/Reno

Pacific Wave Denver

CENIC Los Angeles/Sunnyvale/Sacramento

OARnet Cincinnati/Cleveland

Merit Network, Inc. Toledo/Chicago

Northern Lights GigaPOP Minneapolis

Indiana GigaPOP Chicago/Indianapolis

MREN Starlight/Starlight

University of Illinois- Urbana-Champaign Chicago/Starlight

University Of Memphis Memphis

GPN Kansas City/Tulsa

Sun Corridor Network Tucson/Phoenix

MissION Jackson/Atlanta

LONI Baton Rouge

LEARN Dallas/Houston

NoX Albany/New York City

CEN Hartford/New York City

NYSERNet Buffalo/New York City

KINBER Philadelphia

Drexel University Philadelphia

OSHEAN New York City

NJEdge Philadelphia/New York City

MAGPI Philadelphia/Pittsburgh

University of Pittsburgh Pittsburgh

CAAREN Ashburn

MAX Ashburn//Washington

KyRON Louisville

MARIA Ashburn

MCNC/C-Light Charlotte/Raleigh

SoX Atlanta/Nashville

FLR Jacksonville/Pensacola

perfSONAR

Developing Areas of Community Engagement & Contribution

Internet2 NETWORK SERVICES

- Routed Services: Developing a program to better drive utilization of national and regional networks
    - MANRS and Routing Intentions (led by Steve Wallace)
    - "Peer Engineer" (led by Jeff Bartig and Hans Addleman) - BGP skill development, workshops
    - Network Technical Advisory Committee (NTAC) P&R - architecture evolution of the Internet2 Platform

  Looking for opportunities to bolster partnerships in the NRENs / R&E networks (example: NSRC, GEANT)

- Core Network: Starting to test potential packet hardware for evolution of the Internet2 core; starting to deploy discrete coherent optics (instead of classic transponders); starting to expand use of "alien waves" on the platform
    - Packet Exploration (led by Matt Mullins, leveraging community knowledge in NTAC)
    - Optical Exploration (led by JoAnne Bender, leveraging community knowledge in NTAC)

  Looking to bolster partnerships in NRENs / R&E network

- Programmatic Science:
    - Example: Strengthening involvement with Open Science Grid (led by Frank Wuerthwein, UCSD)
        Planning to deploy 3rd generation OSDF DTN nodes (10 in service on backbone)

- Workforce Development: Developing skills in engineering, software/devops, international, and network research
    - Example: Strengthening involvement with Women in IT Networking at SC (WINS), SCInet in general, and OFC
    - Example: Strong internal focus on Internet2's own workforce development

INTERNET2 2024
COMMUNITY EXCHANGE
CHICAGO

Highlight: Developing Areas of Community Engagement & Contribution
Internet2 NETWORK SERVICES

International Programs

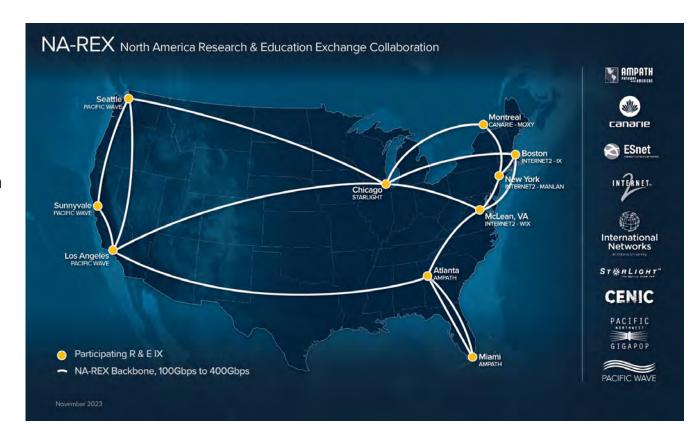- Partnerships and Collaboration are the Key to Success!

Highlight: Developing Areas of Community Engagement & Contribution
Internet2 NETWORK SERVICES

International Collaboration: NA-REX

- North American consortium of Exchange Point Operators, Connectivity Providers, Science Networks

- Improve coordination, establish common operating principles

- Leverage common toolsets, provisioning mechanisms

- Support dedicated links for experimental traffic, network research

- Initial links online:
  - Chicago and Seattle (dedicated)
  - Chicago and Los Angeles (shared)

- Links were successfully leveraged by Supercomputing NREs (Network Research Experiments)

- Currently planning for 2024:
  - Deployment of dashboard based on NetSage
  - Bring additional 400G links online
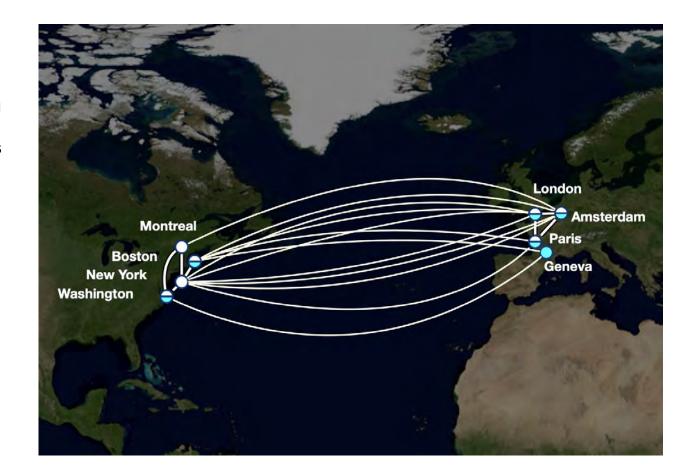 - Restore API functionality to I2 Exchange Points (Q2)

NA-REX North America Research & Education Exchange Collaboration

AMPATH — PATHWAY for the AMERICAS
canarie
ESnet — ENERGY SCIENCE NETWORK
INTERNET2
International Networks at Indiana University
STARLIGHT — The Optical STAR TAP
CENIC
PACIFIC NORTHWEST GIGAPOP
PACIFIC WAVE

- Participating R & E IX
- NA-REX Backbone, 100Gbps to 400Gbps

November 2023

Highlight: Developing Areas of Community Engagement & Contribution
Internet2 NETWORK SERVICES

International Collaboration: Architecture Development

- Confluence of Advanced North Atlantic (ANA) Engineering and Global Network Advancement Group (GNA-G) Advanced Engineering Working Group
  - ANA has 400G capacity coming online 2024,2025 and needs improved link management, analytics, and interoperability with DOE networks

- A system-engineering approach to support:
  - Global traffic management (example: primary and secondary paths)
  - Varied philosophies and business models of participants
  - Support Multiple Use Cases

- Likely will focus on ANA initially, but push larger best practices out to community through the GNA-G

- Additional GNA-G activity on "digital twin" testbeds and demo activities (led by Marijke Kaat and the team at the University of Amsterdam)

Developing Areas of Community Engagement & Contribution
Internet2 NETWORK SERVICES

A closing thought:

Collaboration is one of our key strengths as a community!

INTERNET2 2024
COMMUNITY EXCHANGE
CHICAGO

jdeaton@internet2.edu
cwilkinson@internet2.edu