LEVERAGING RESEARCH & EDUCATION NETWORK CONNECTIVITY

To the cloud via Internet2 & KeystoneREN

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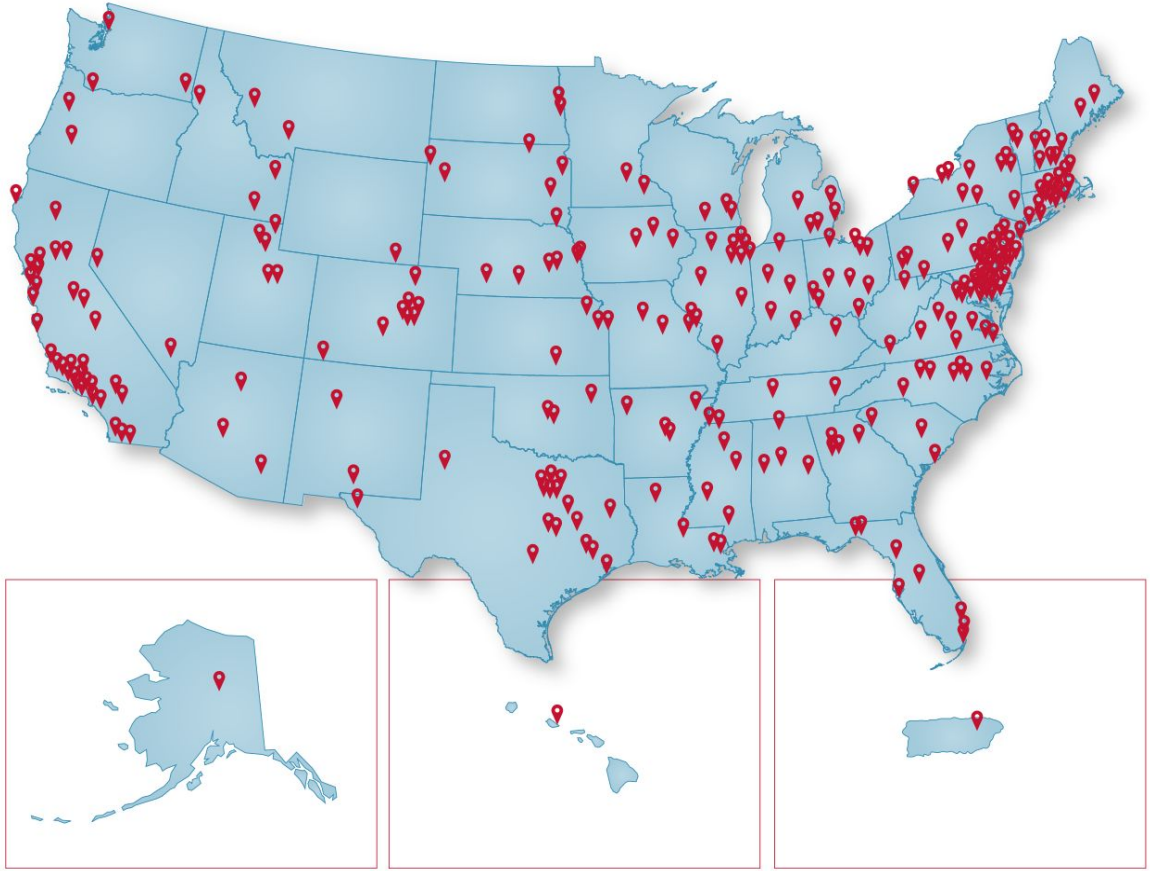
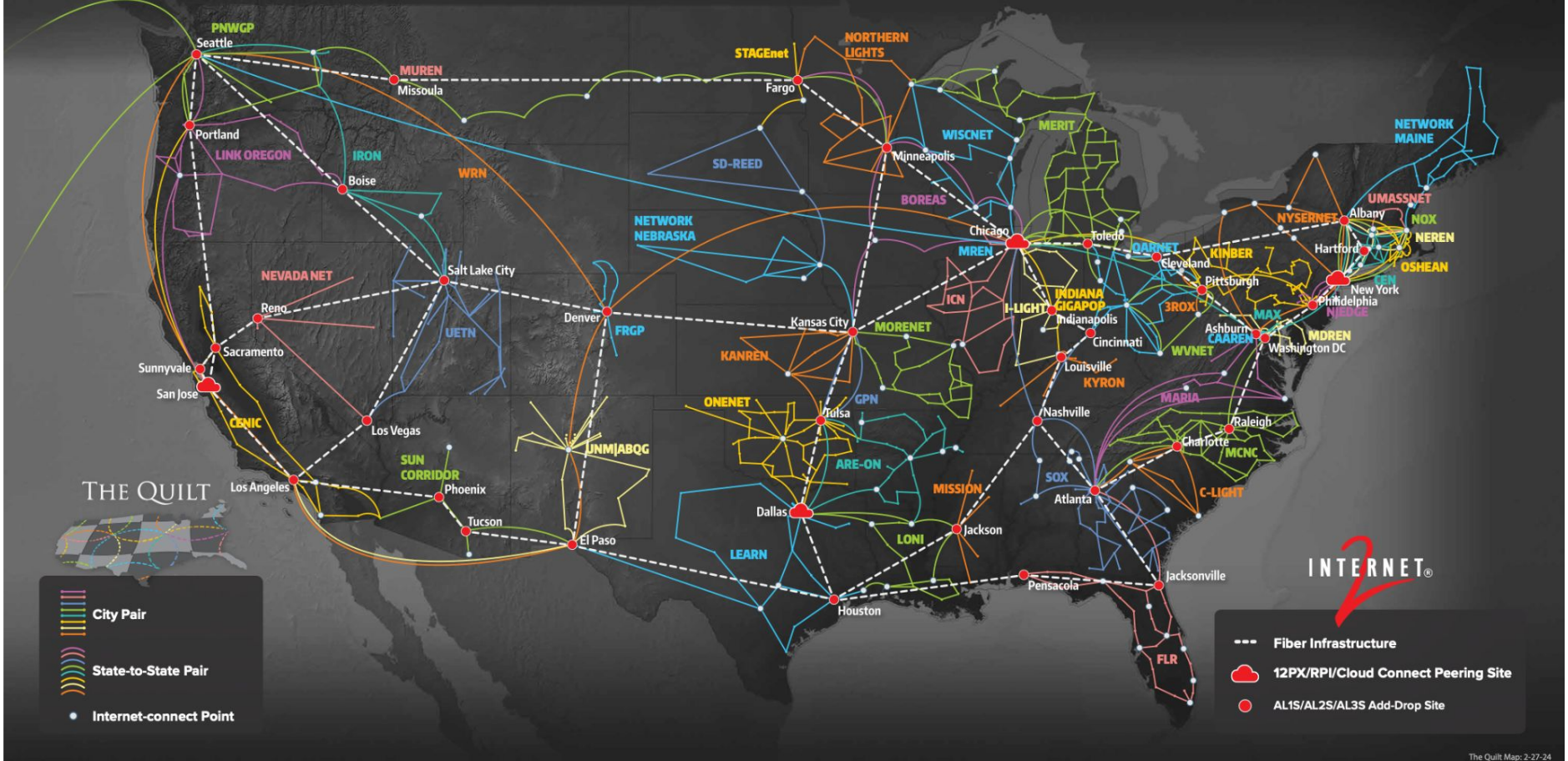
Internet2 Members & Community

- 347 Higher Education Members
- 27 Affiliate Members
- 34 Federal Affiliate Members
- 46 R&E Network Members
- 63 Industry Members
- 100+ Countries & Connections
- 80,000+ Community Anchor Institutions



Internet2 & Regional Research & Education Networks (REN) in the United States



Services

LAYER 1 SERVICE

Point-to-point 10, 100 & 400G links and flexible grid spectrum to support private network needs.

LAYER 2 SERVICE

Effective and efficient wide area 100 gigabit Ethernet technology.

LAYER 3 SERVICE

For IP network and peer exchange needs.

PEER EXCHANGE

Provides institutions with access to commercial peers across the national footprint.

RAPID PRIVATE INTERCONNECT

Allows Internet2 connectors to present themselves for private peering at selected national peering locations.

R&E

Provides institutions with access to each other across the national footprint.

CLOUD CONNECT

Uses regional's infrastructure in conjunction with the Internet2 Network to reach cloud resources.

GLOBAL DDoS PROTECTION

Our cloud-based, volumetric DDoS mitigation service was procured on behalf of the community.

Cloud Connectivity Methods

1. **Public Internet:** Using the Internet as transport to the cloud is one of the quickest ways to connect from on-premises to the cloud. Connectivity is secured with an overlay technology like IPsec VPN or SD-WAN service and can be turned up within minutes. ***The supporting service that Internet2 offers is I2 Peer Exchange (I2PX).***

2. **Cloud Exchange:** Cloud partners offer software-defined interconnection platforms that allow organizations to quickly establish private connections to multiple cloud providers. These services are often referred to as Hosted or Partner services by the cloud service providers. ***The comparable service that Internet2 offers is I2 Cloud Connect (I2CC).***

3. **Direct Interconnect:** Private, direct connection between your on-premises network and the cloud provider's network. This type of connectivity typically requires your network presence at a Colocation facility or IP transport service to reach the cloud provider. ***The comparable service that Internet2 offers is I2 Rapid Private Interconnect (I2RPI).***

Building Blocks of Cloud Connectivity

I2PX

1. INTERNET2 PEER EXCHANGE

Use of the community's existing **3.6Tbps** of peering capabilities to the major cloud providers for advanced access to cloud SaaS services (e.g. Zoom or Office 365)

I2CC

2. INTERNET2 CLOUD CONNECT

Enabling the Internet2 and regional infrastructure to offer shared "**direct-connect**" private Layer 2 and Layer 3 access to Microsoft, Amazon, Oracle and Google cloud platforms **up to 5Gbps** at no additional fee *(Cloud provider fees apply)*

I2RPI

3. INTERNET2 RAPID PRIVATE INTERCONNECT

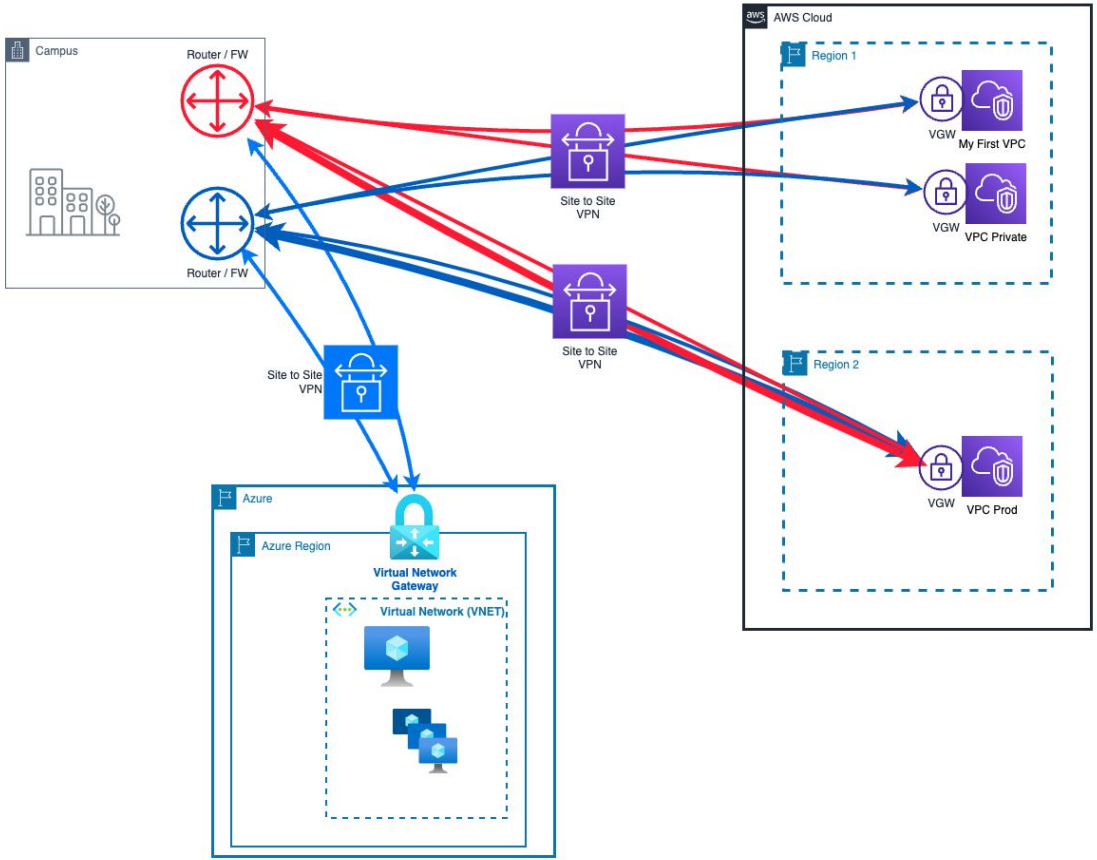
Private 10G and 100G interconnections at major peering points at low annual rates. Leverages current investment in local and national infrastructure to reach cloud providers, for dedicated access or improved resiliency. May be used to connect to any provider located at the peering point

aws

Google Cloud

ORACLE FAST CONNECT

VPN Tunnels


Campus
Router / FW
Router / FW
Site to Site VPN
Site to Site VPN
Site to Site VPN
AWS Cloud
Region 1
VGW
My First VPC
VGW
VPC Private
Region 2
VGW
VPC Prod
Azure
Azure Region
Virtual Network Gateway
Virtual Network (VNET)

Internet2 Peering Exchange (I2PX)

I2PX PNI Capacity by Peer/POP (Gb/s)

peer	ASHB	NEWY2	NEWY32	EQCH	DALL3	DENV	LOSA2	SANJ	SEAT	Total
Akamai	100	100		100	100		100	100	100	700
Amazon Peering	240	40		400	20				100	800
Apple	100	100		100	100		100	100	100	700
Backblaze								200		200
Charter Communications	20			10	10					40
China Telecom	10									10
Cloudflare	100	100		100	100		100	100		600
Comcast	100	100		100	30		100	100	100	630
Cox Communications					10					10
CrashPlan	20								20	40
DropBox	120	10		20						150
Edgio - EdgeCast	120	100		40	20		20			300
Edgio - Limelight	200	20		210						430
Facebook Inc	200	20		200	40		200			660
Fastly	200	100		200	120		100	20		740
Google	200	200		100	40		200	20	20	780
Kajeet	10									10
Kentik	10									10
Microsoft Peering	200	200		200	200		200	200	200	1400
Netflix Inc.	20	20		40	10		20			110
Oracle	200			20	200		200			620
Rackspace				10						10
ServiceNow								10		10
Time Warner Cable	30	10		20	10		100			170
Twitch				100						100
Wasabi	100						100			200
Zayo	100	110			10					220
Zoom Video Communications			10			10				20
Total	2400	1230	10	1970	1020	10	1540	850	640	9670

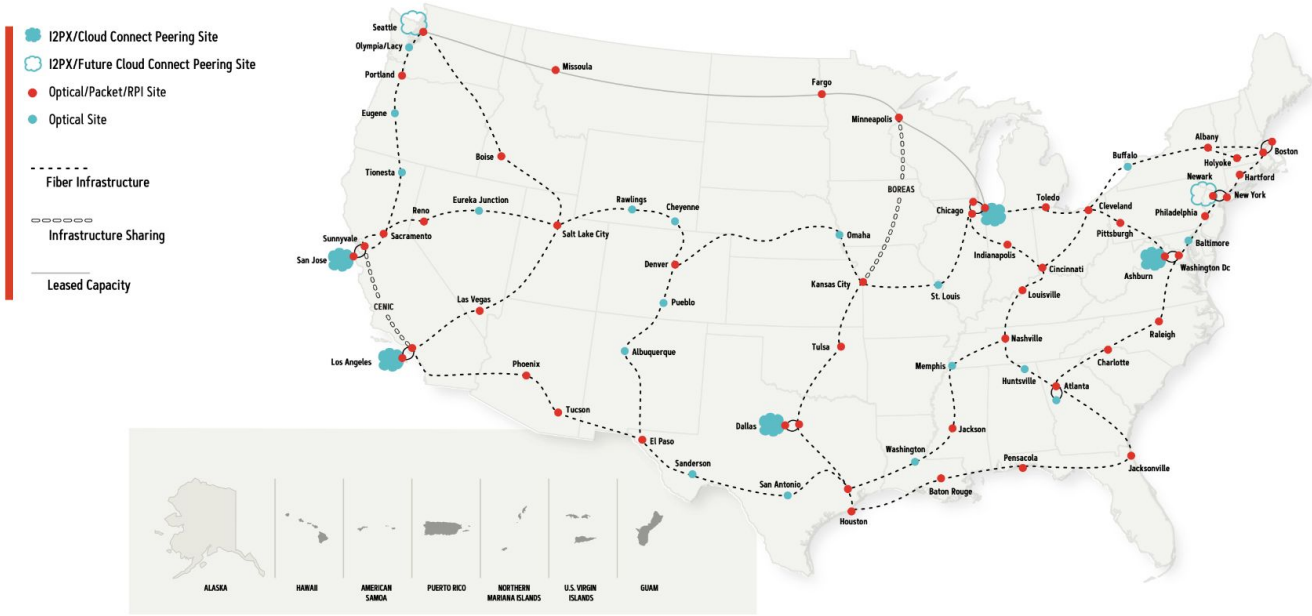
I2PX Public Exchange Capacity (Gb/s)

provider	ASHB	NEWY2	NEWY32	EQCH	DALL3	LOSA2	SANJ	SEAT	Total
Equinix	100			100	100	100	110		510
NYIIX		100							100
CoreSite						100			100
DE-CIX			100						100
Seattle Internet Exchange								100	100
Total	100	100	100	100	100	200	110	100	910

Internet2 Nationwide Network: A secure, stable and trusted network for R&E

Network Infrastructure Topology | September 2025

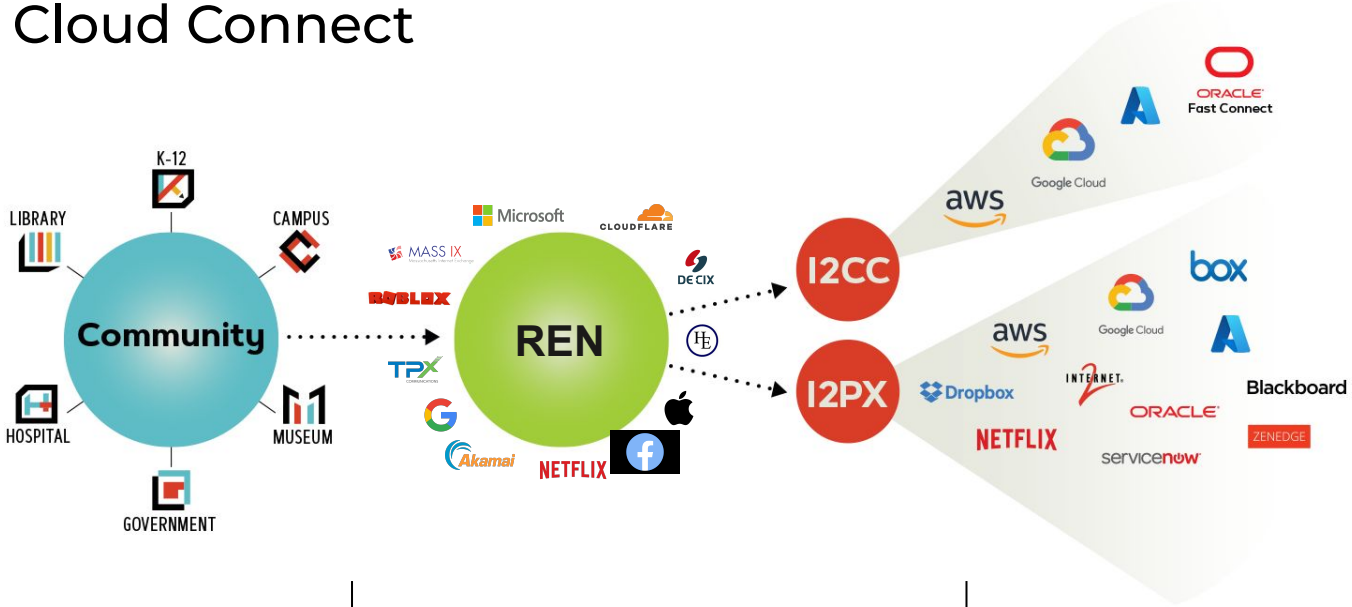
This map represents all 50 states and five major territories of the U.S. The Internet2 network infrastructure extends across the contiguous U.S. and, through a global fabric of research and education networks and exchange points, interconnects with locations in Alaska, Hawaii, Guam, Puerto Rico, and 100+ countries worldwide.



Leveraging R&E Networks for Direct Cloud Connections

Internet2 Cloud Connect

I2CC



REN members can connect at Layer 2 or Layer 3

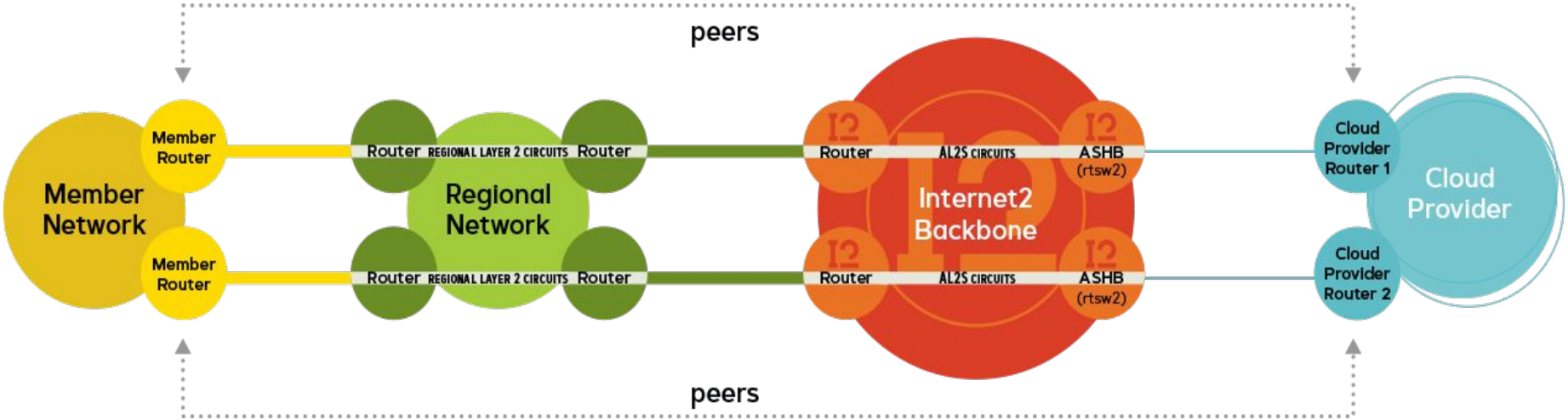
REN members can use Cloud Connect with up to 5Gbps connections to Amazon Direct Connect, Google Cloud Partner Interconnect, Microsoft Azure Express Route or Oracle FastConnect services

Available to REN members today at no additional fee

Layer 2 Connection Option

Internet2 Cloud Connect

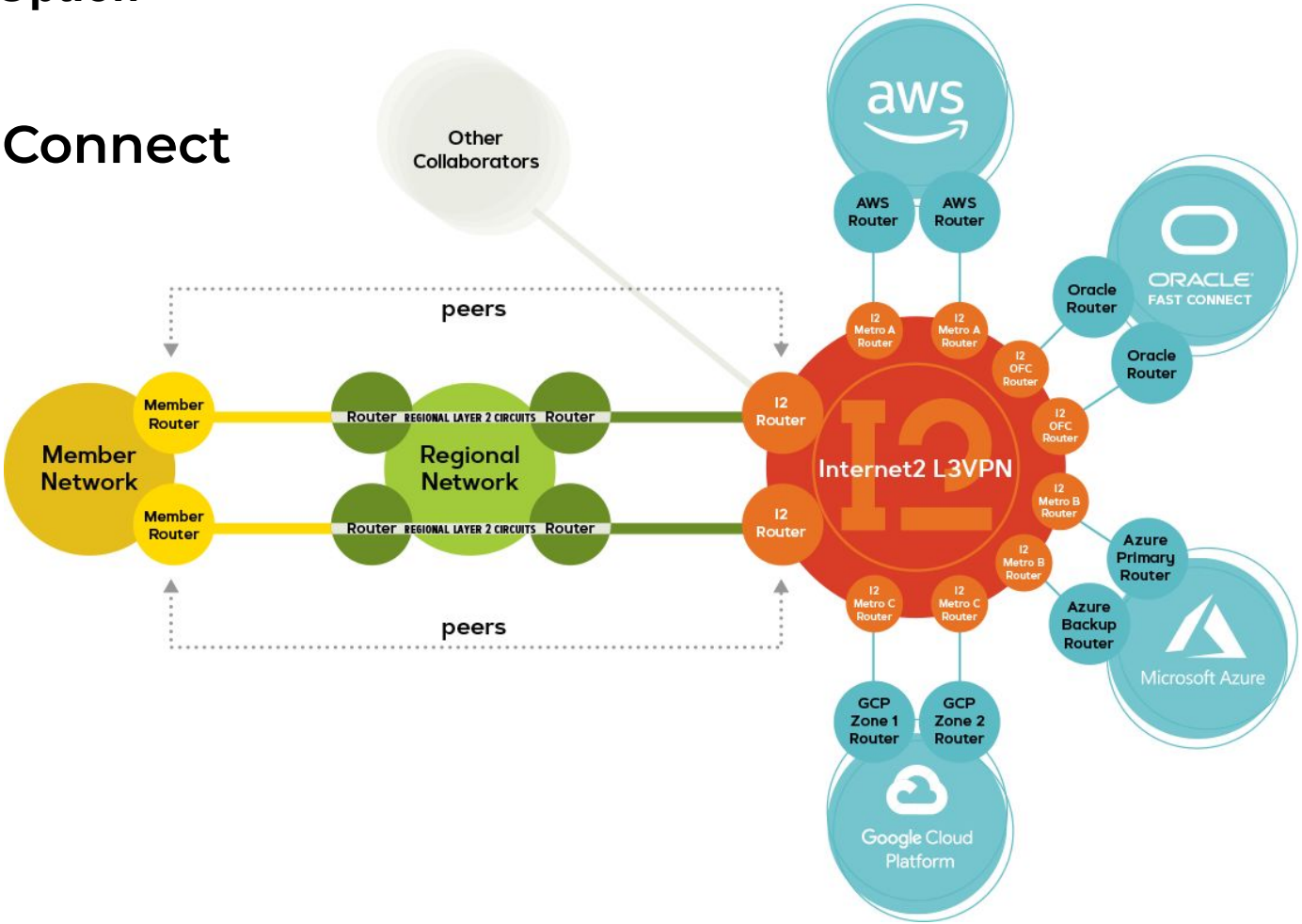
I2CC



Layer 3 Connection Option

Internet2 Cloud Connect

I2CC



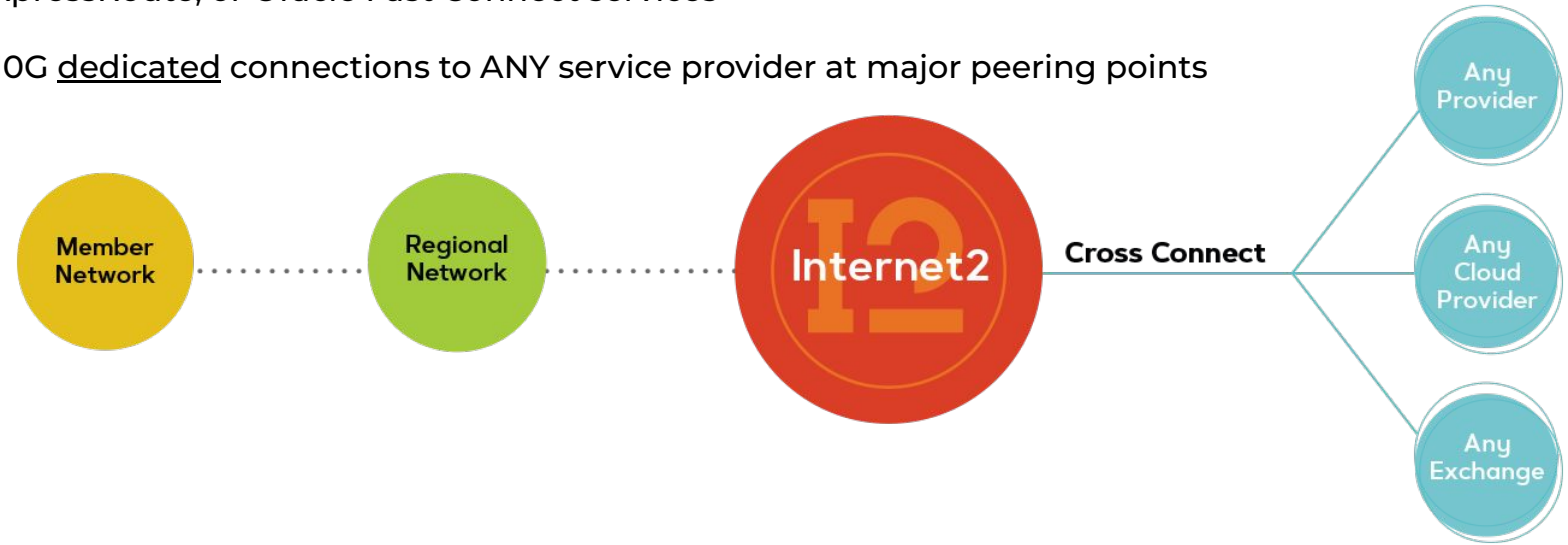
Flexible Connections to Any Provider

Internet2 Rapid Private Interconnect

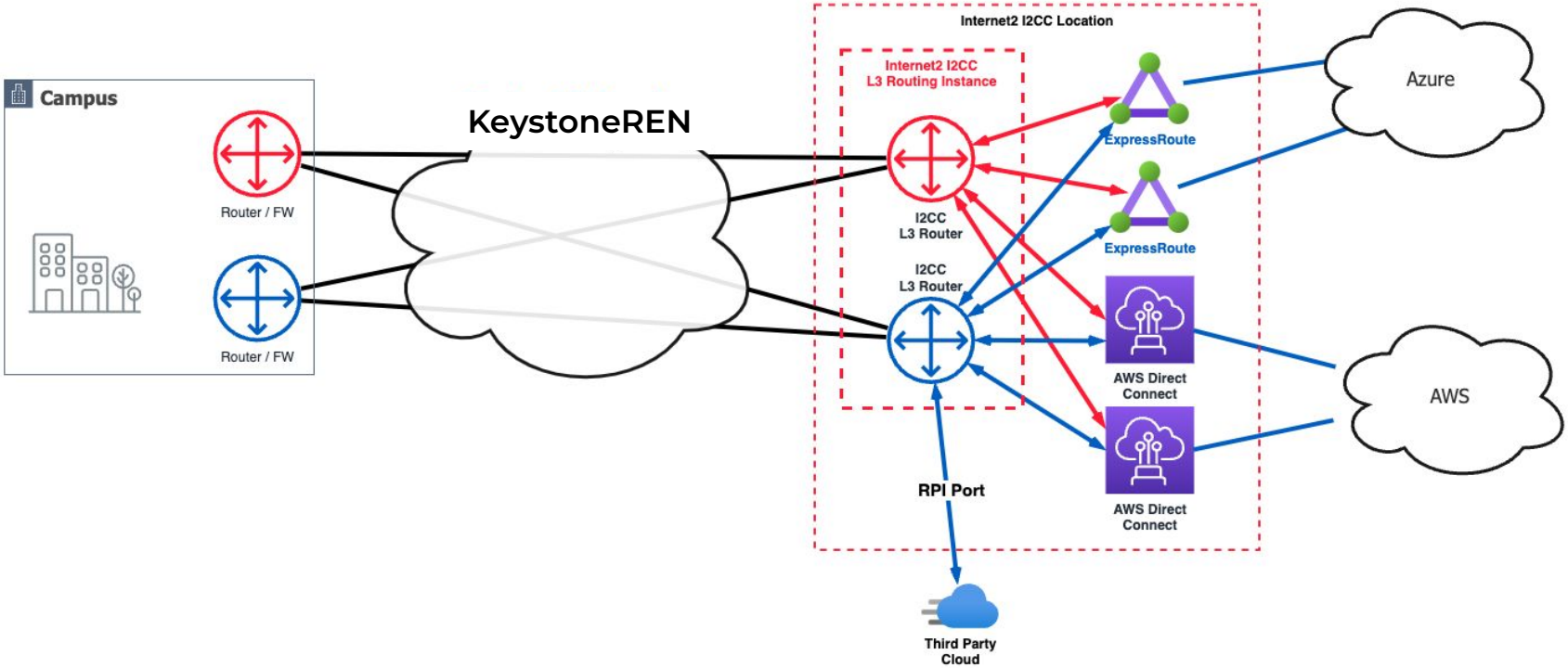
I2RPI

Available through Network Connectors for an additional fee

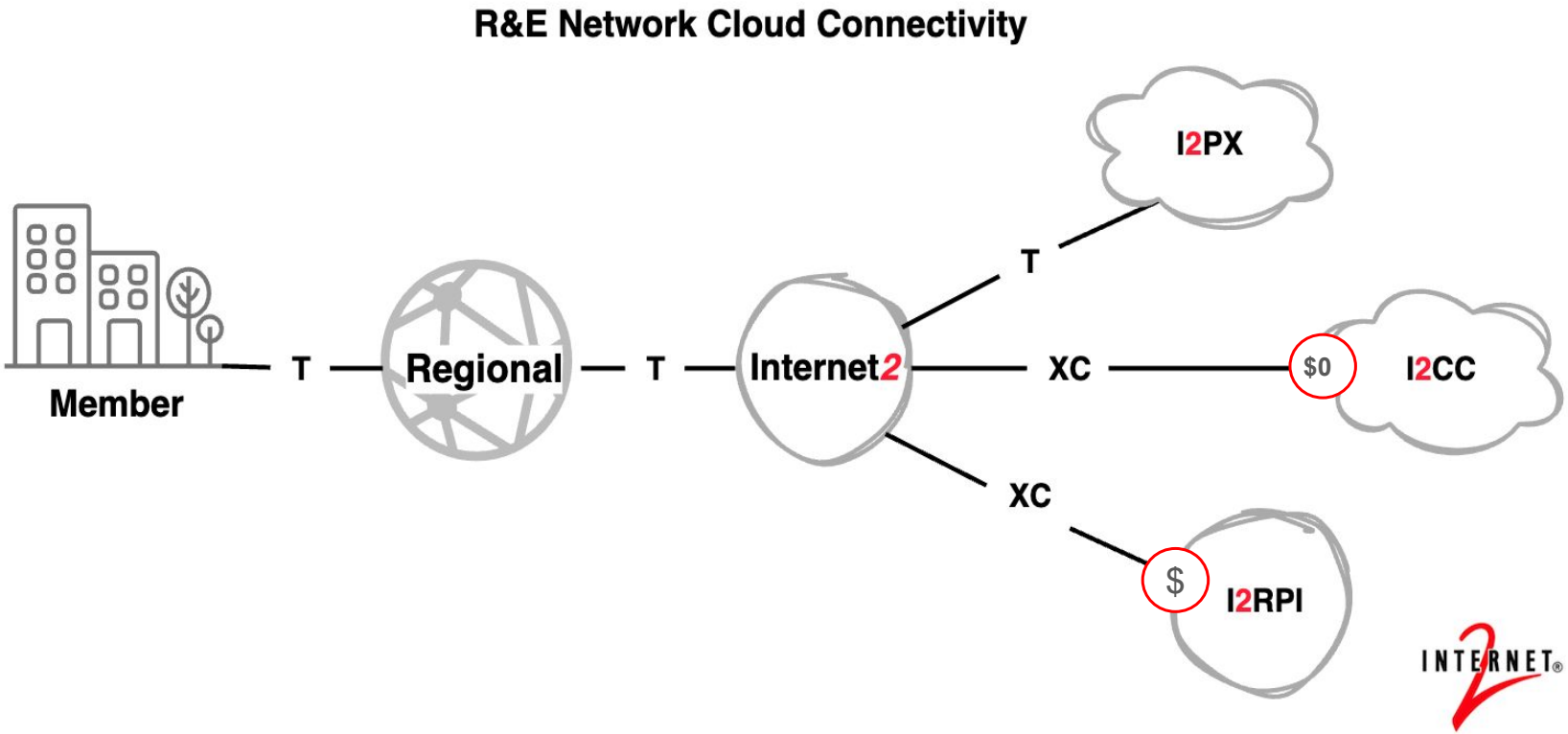
- Connect at Layer 2 or Layer 3
- Private 10G dedicated connections to Amazon Direct Connect, Google Cloud Interconnect, Microsoft Azure ExpressRoute, or Oracle Fast Connect services
- Private 10G dedicated connections to ANY service provider at major peering points



Multi-cloud


Campus
Router / FW
Router / FW
KeystoneREN
Internet2 I2CC Location
Internet2 I2CC
L3 Routing Instance
I2CC
L3 Router
I2CC
L3 Router
ExpressRoute
ExpressRoute
AWS Direct
Connect
AWS Direct
Connect
RPI Port
Third Party
Cloud
Azure
AWS

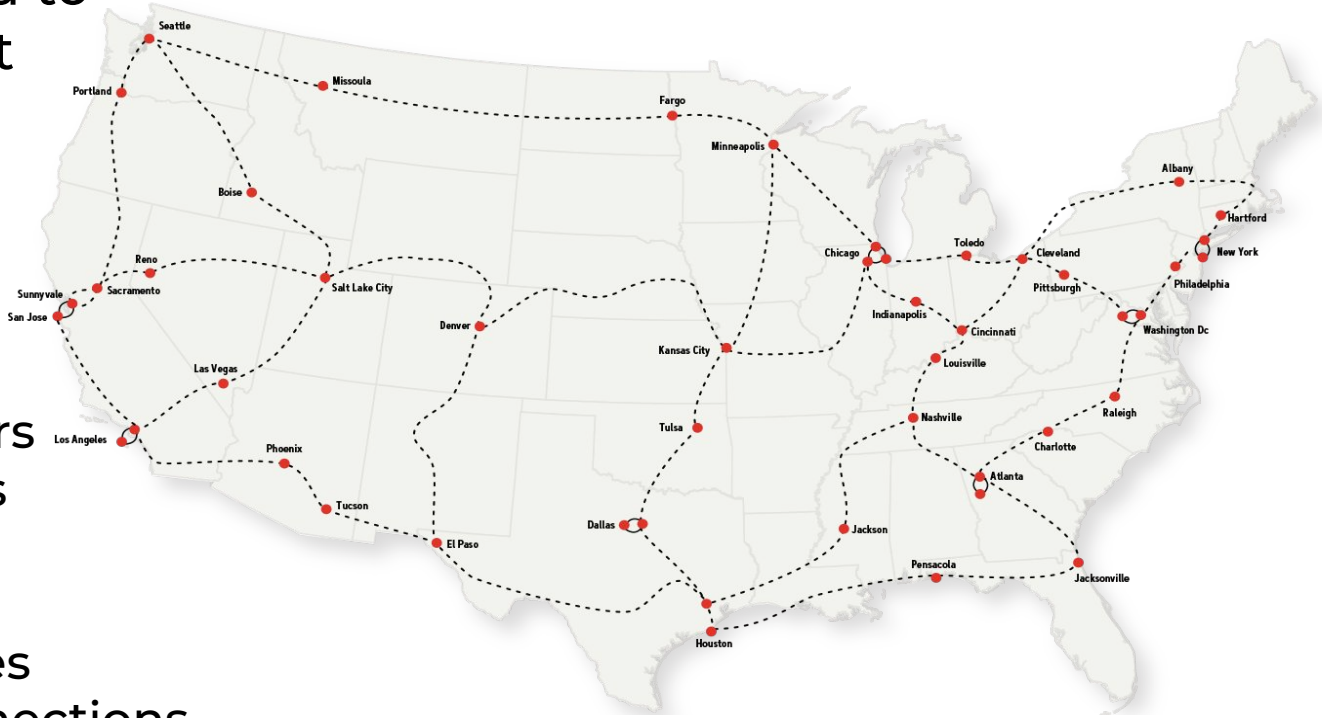
Cloud Connectivity Diagram



Nationwide Connectivity

Internet2 Rapid Private Interconnect

I2RPI can be used to provide private direct connectivity to any provider.

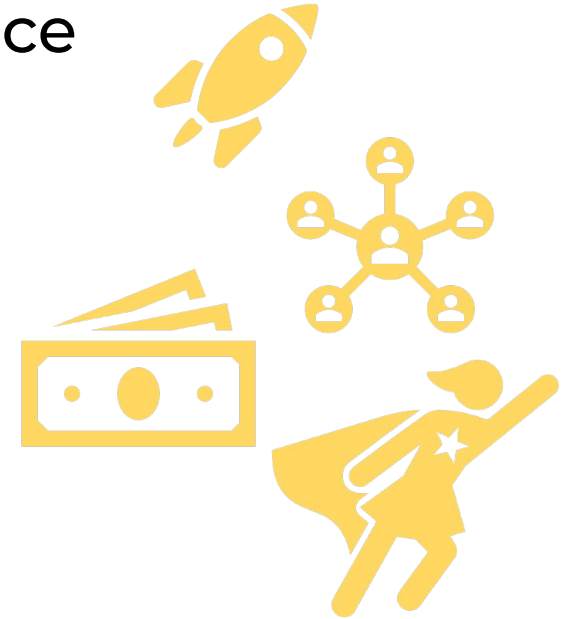


Use cases include:

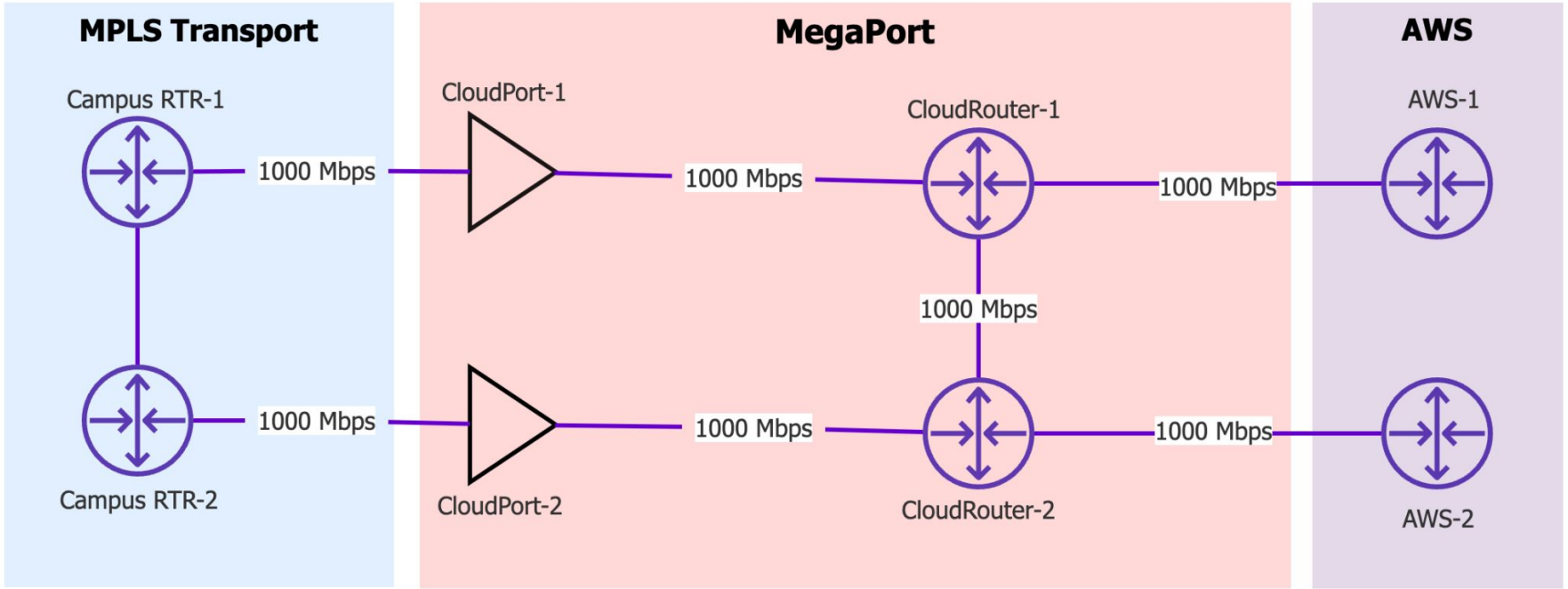
- SIP service providers
- Internet Exchanges
- ISP services
- Esports exchanges
- Other cloud services
- MACsec cloud connections

Why, How, And When To Use I2CC

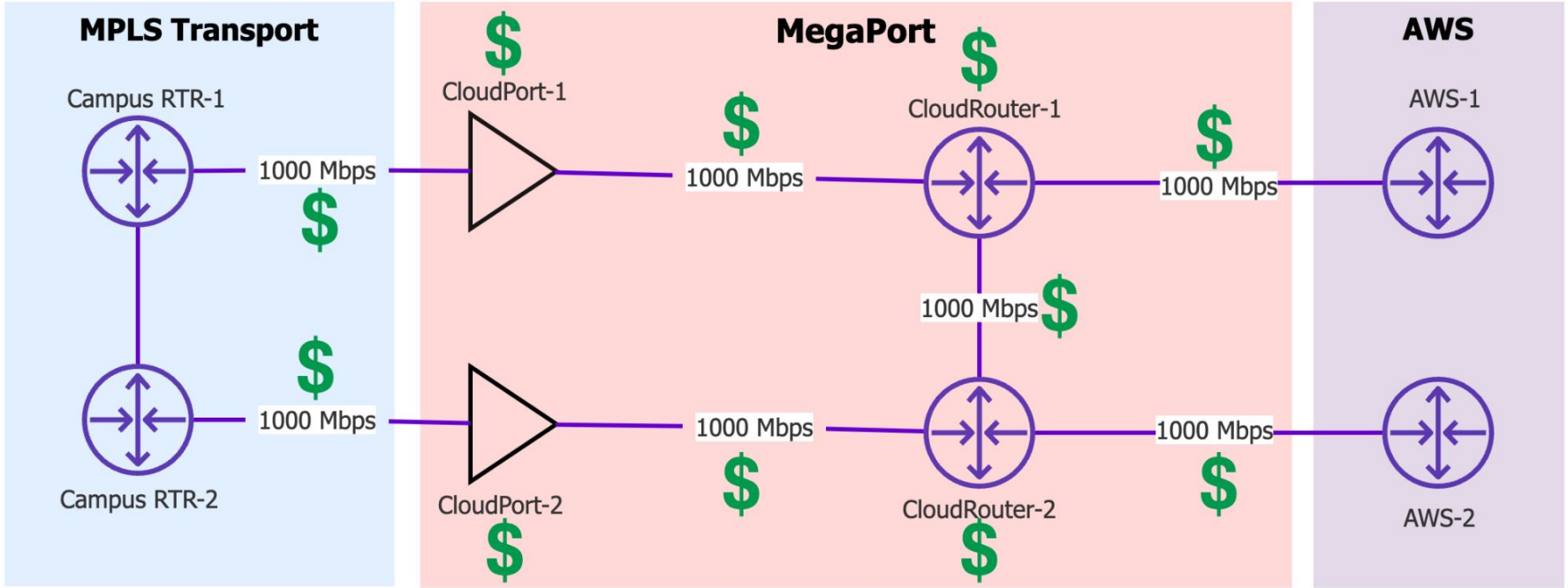
- Boost Network Performance
- Architect for Resiliency
- Simplify Connectivity
- Better Supportability
- Reduce Cost



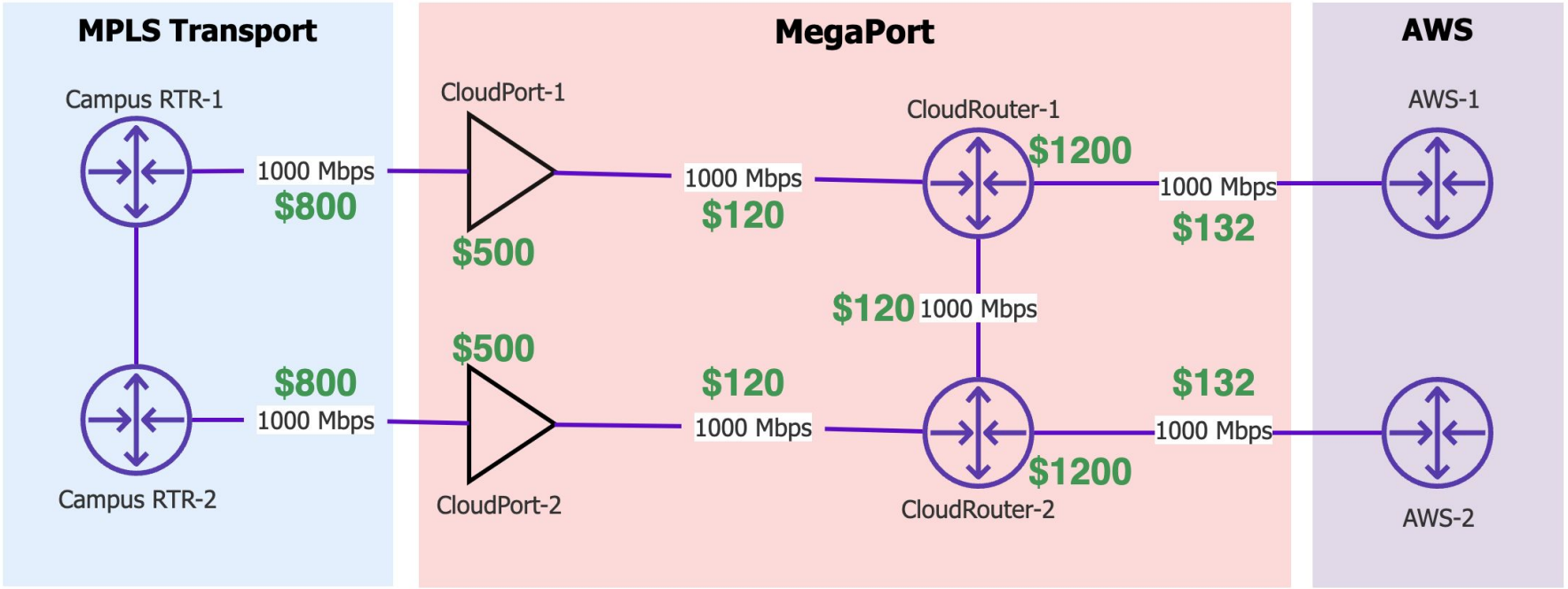
Let’s Talk Cost



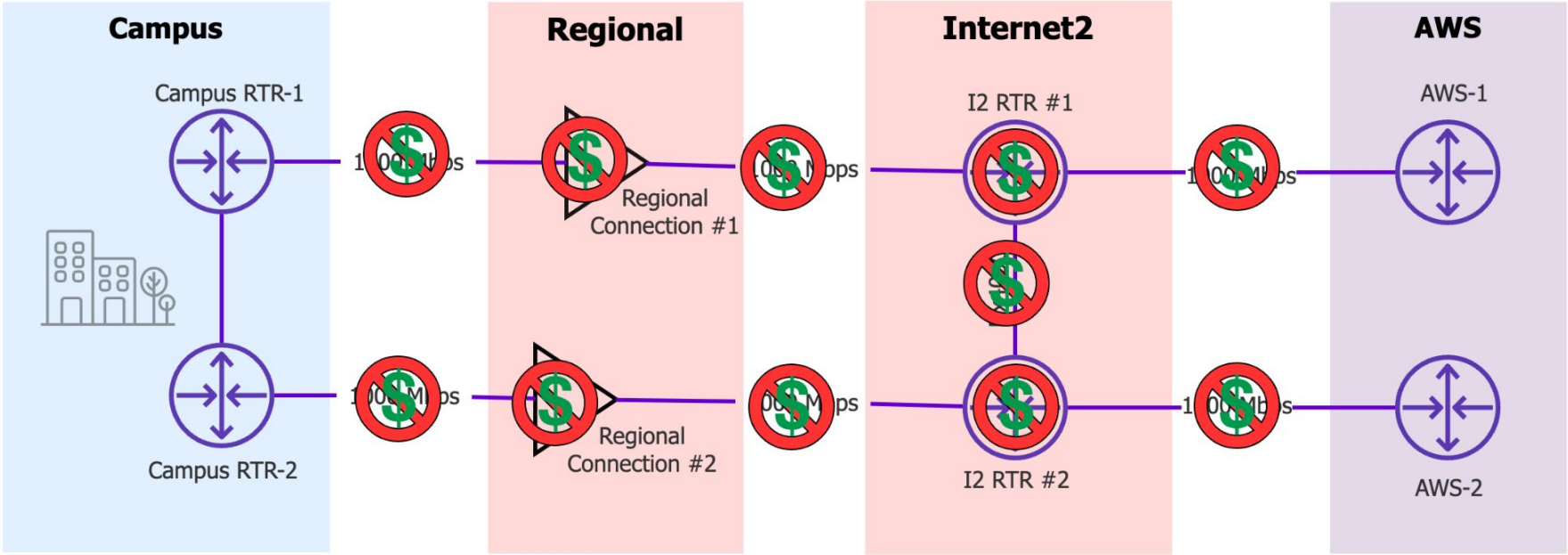
Real World Example



Monthly Expense Example



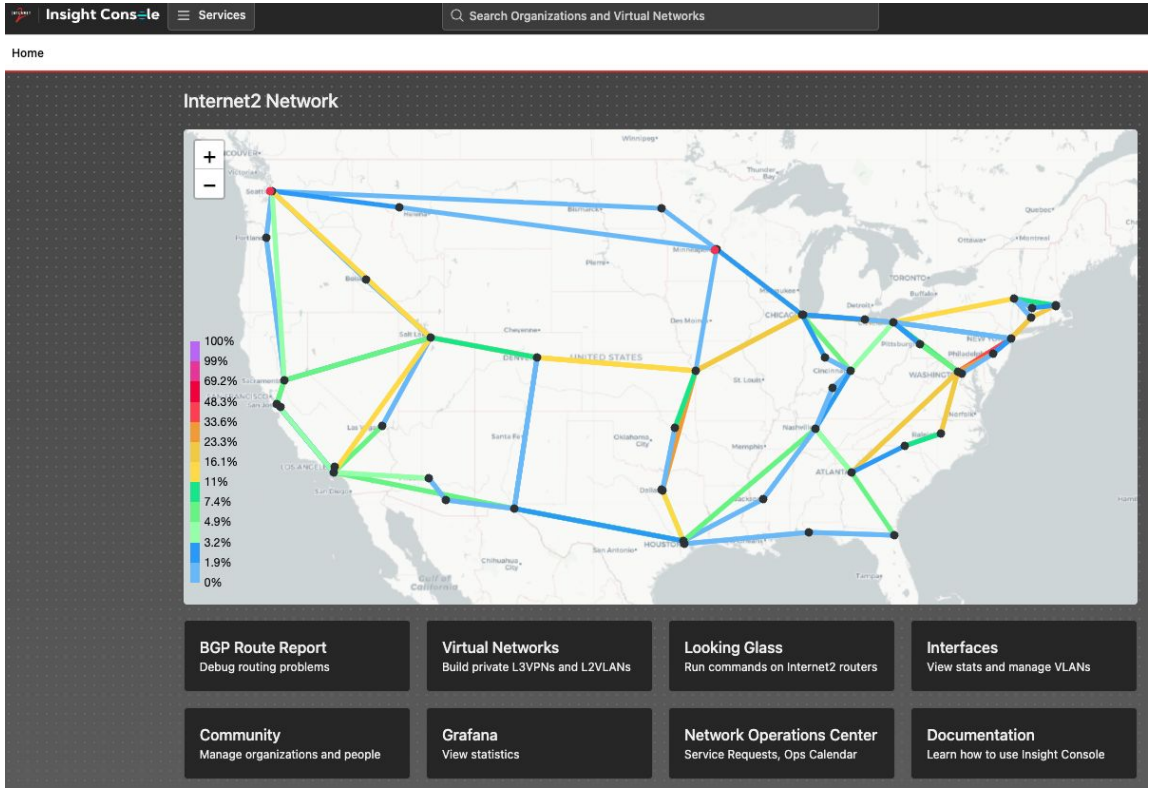
I2CC Monthly Savings



Total monthly saving: $5,624

Software Defined Network-as-a-Service

Internet2 Insight Console



https://console.internet2.edu

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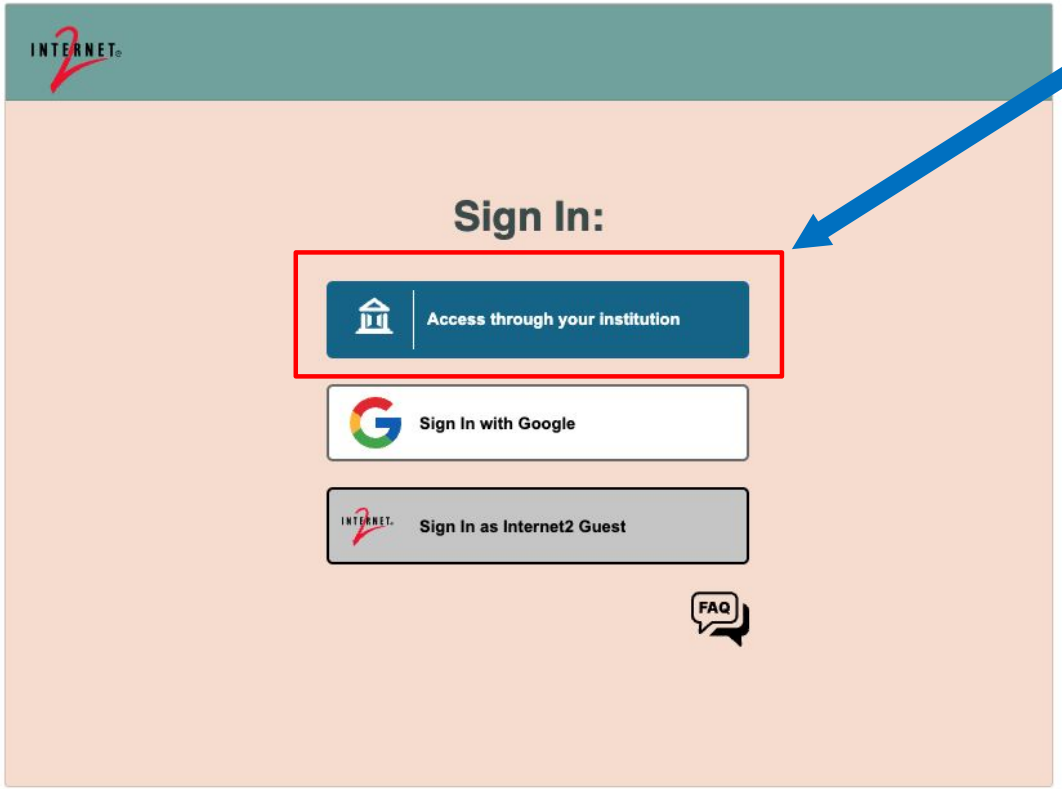
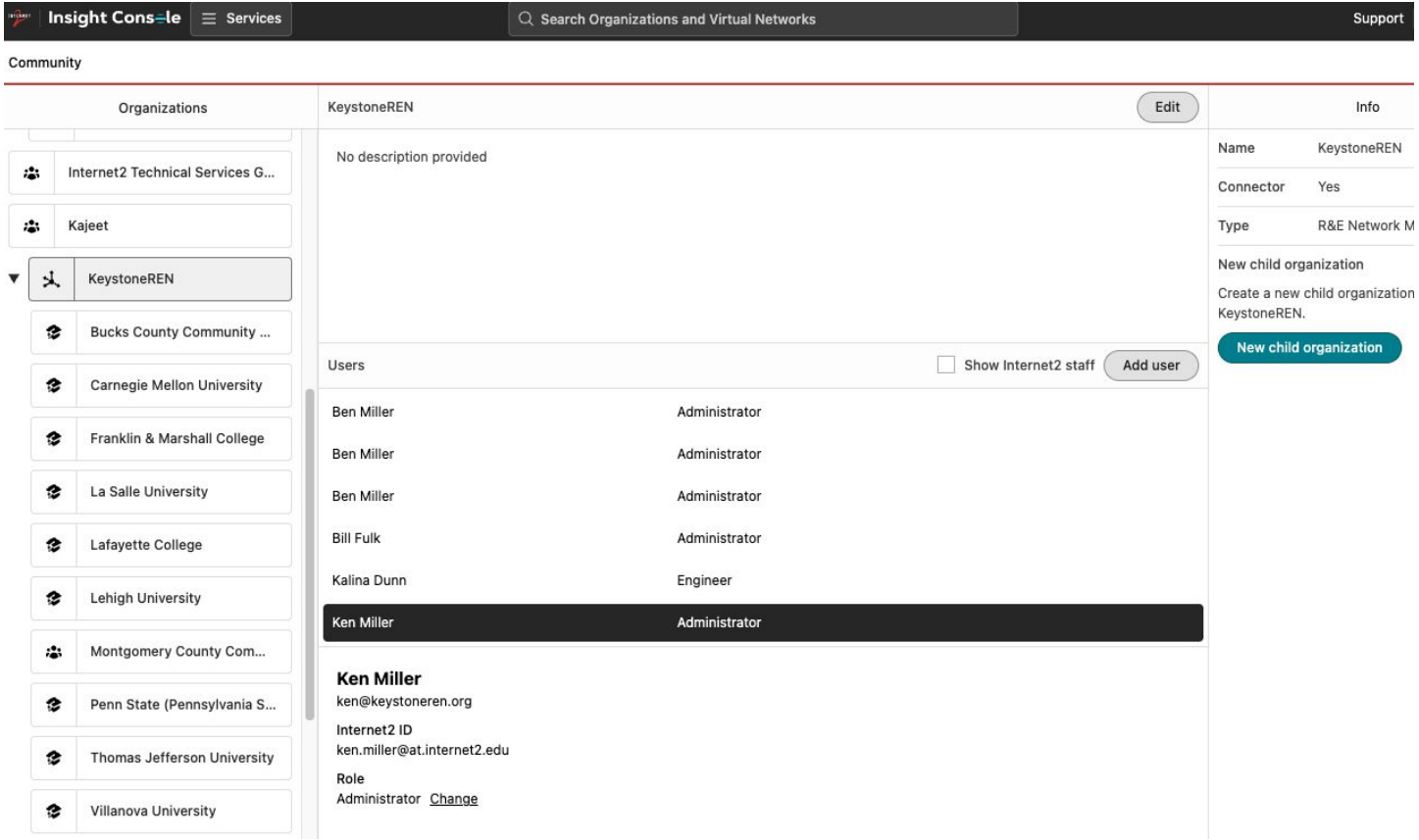


- Access through your institution is the preferred method.
- If your institution uses InCommon you'll likely have the ability to sign in.
- You might need Internet2 to create or move your institution into the correct hierarchical tree structure.

https://console.internet2.edu

Internet2 Insight Console



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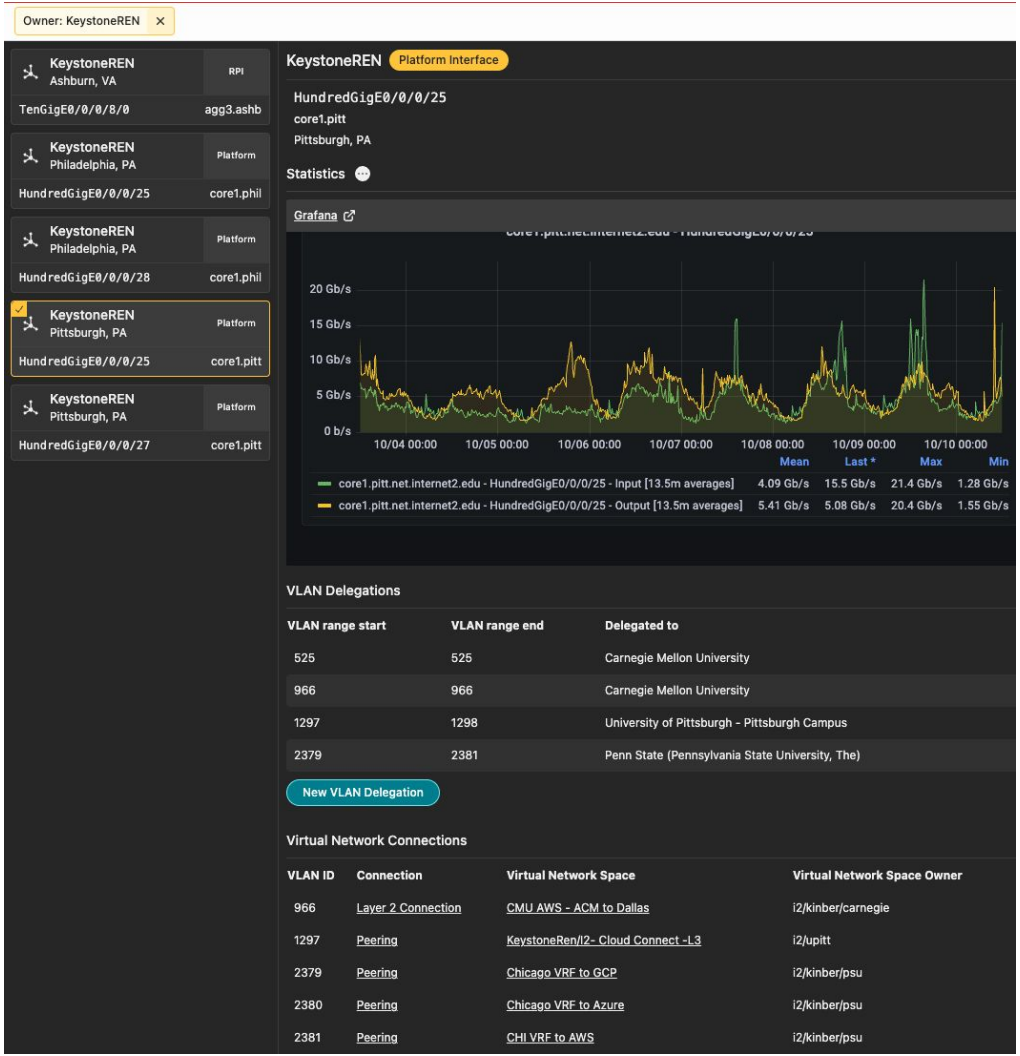

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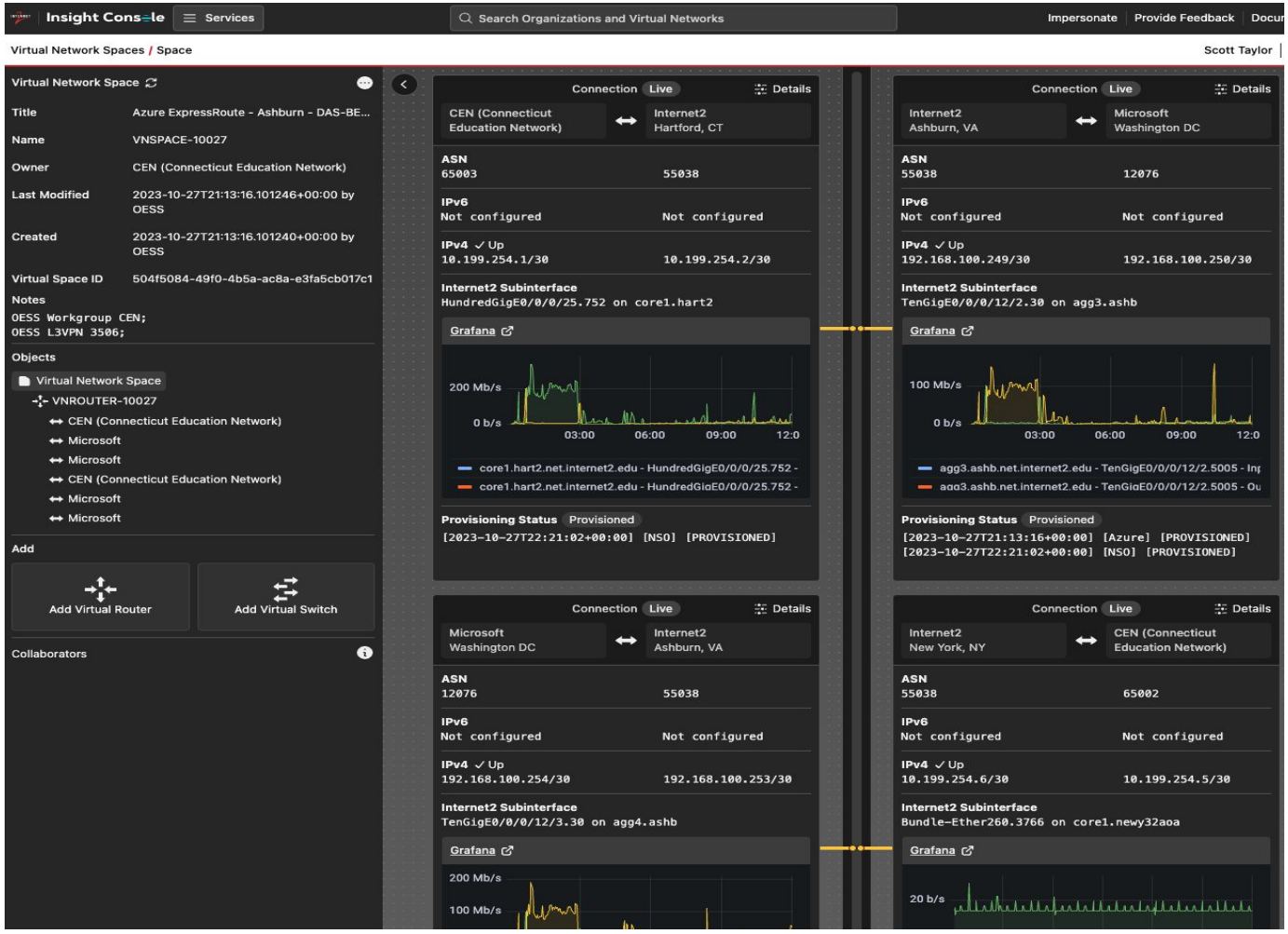


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THANK YOU !!
2025-10-16
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