EdgeCon
ANNUAL CONFERENCE 2020

Edge Network Update

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Principal Network Architect

Agenda

- NJEdge
- IRR/Ddos
- Optical Network
    - Core Locations
    - Access Locations
- Packet Network
- Research/I2 Network
- Gaming/Esports Initiative

Jersey Net Gurus

NetGurus is a group of campus Network&Telecom Engineers/Architects that meet to contribute and learn from each other for the betterment of the broader education and research community. Participants discuss networking topics in a round table format to encourage open discussion and knowledge sharing. Typically, they meet before or after a conference to discuss items of interest. Many times, topics are suggested ahead of time to encourage participation. To allow for orderly discussion and to maximize individual participation, meetings are limited to 30 attendees on a first come, first serve basis. Also, please limit participants to the Network&Telecom Engineers a max of two (2) per institution. If you are interested in attending please let me know.

What is Edge?

- Network Operator
- Transport Provider
- A Utility

MANRS

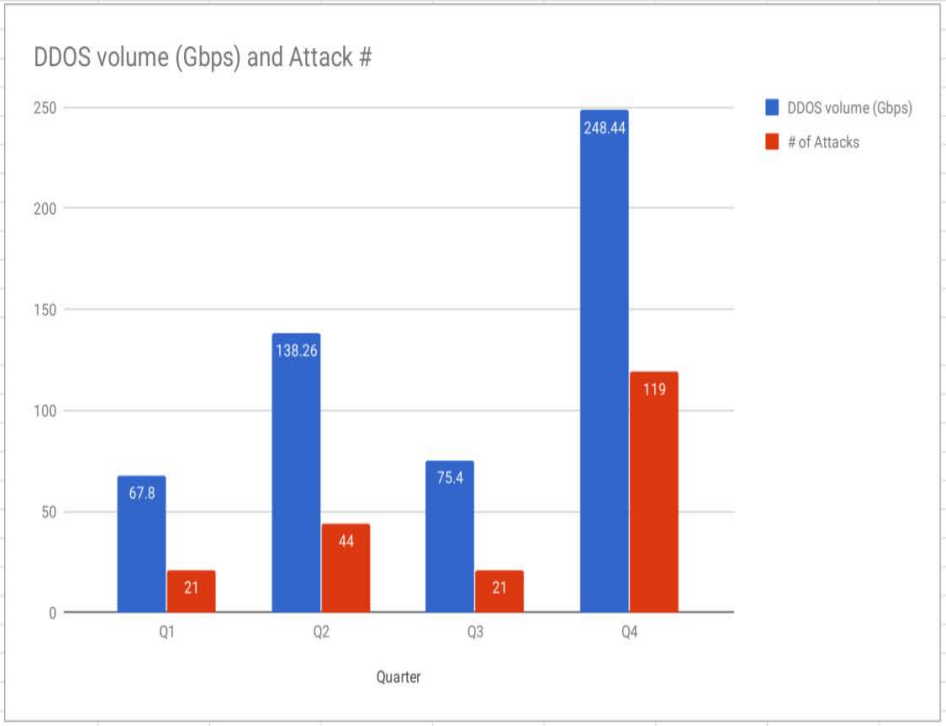
- Mutually Agreed Norms for Routing Security
- https://www.routingmanifesto.org/
- Prevent propagation of incorrect routing information
- Prevent traffic with spoofed source IP addresses
- Facilitate global operational communication and coordination between network operators
- Facilitate validation of routing information on a global scale (RKPI?)

What Is An Internet Routing Registry (IRR)

- An IRR is a Public registry (database) of network routing information
- Many registry options (RADB, ARIN, RIPE, AltDB, LEVEL3, ...)
- Often an IRR will mirror the other IRRs to create a more complete database
- Registry objects are specified using the Routing Policy Specification
- Language (RPSL, RFC2622)
- Registries can be used to document a network's prefixes, ASNs, groups of prefixes, groups of ASN, routing policy, and peers

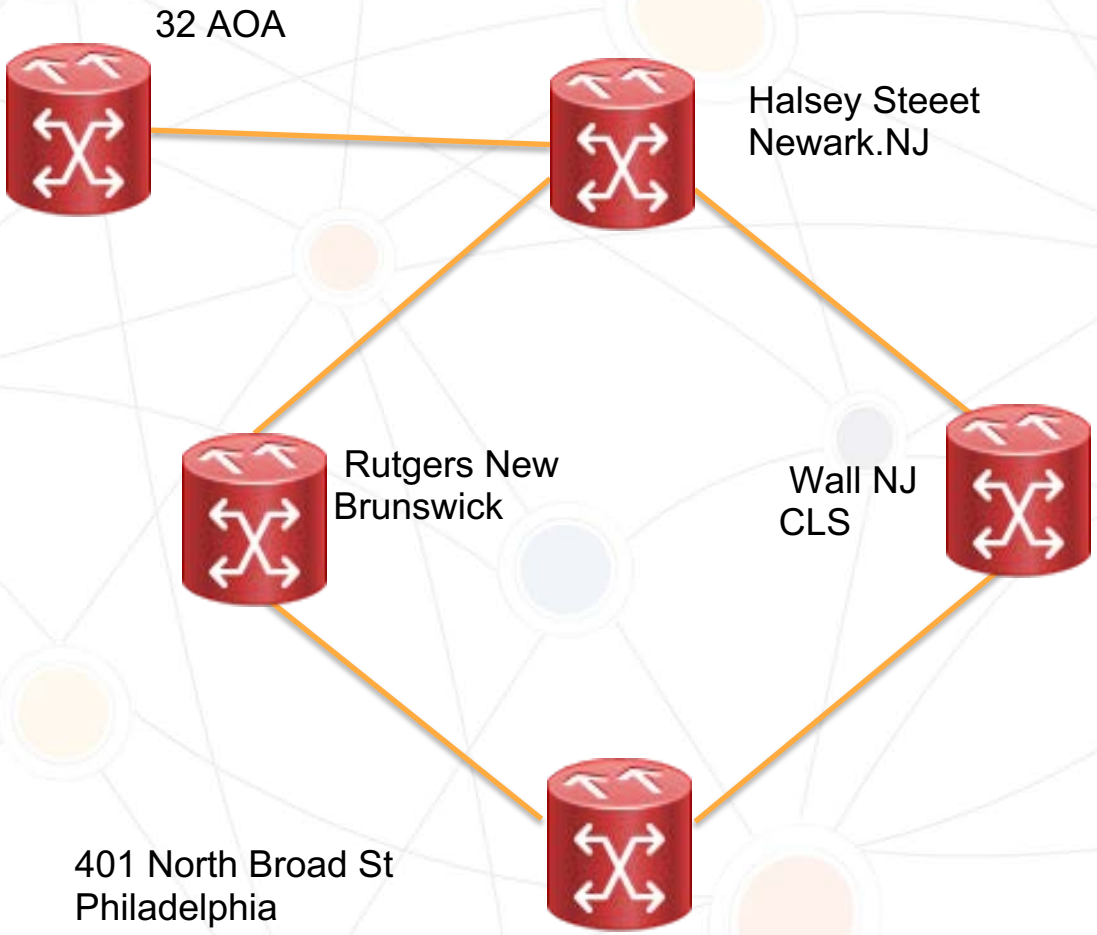
Ddos Jan2019-December2019

2019-2020 DDoS Data			
Quarter	**Hours of mitigation (h.mm)**	**DDOS volume (Gbps)**	**# of Attacks**
Q1	6.32	67.8	21
Q2	9.47	138.26	44
Q3	7.06	75.4	21
Q4	22.44	248.44	119
Totals	46.11	529.89	205
Highest value	3.04	33.47	
Three biggest DDoS attacks	33.47 Gbps	27.95 Gbps	27.94 Gbps

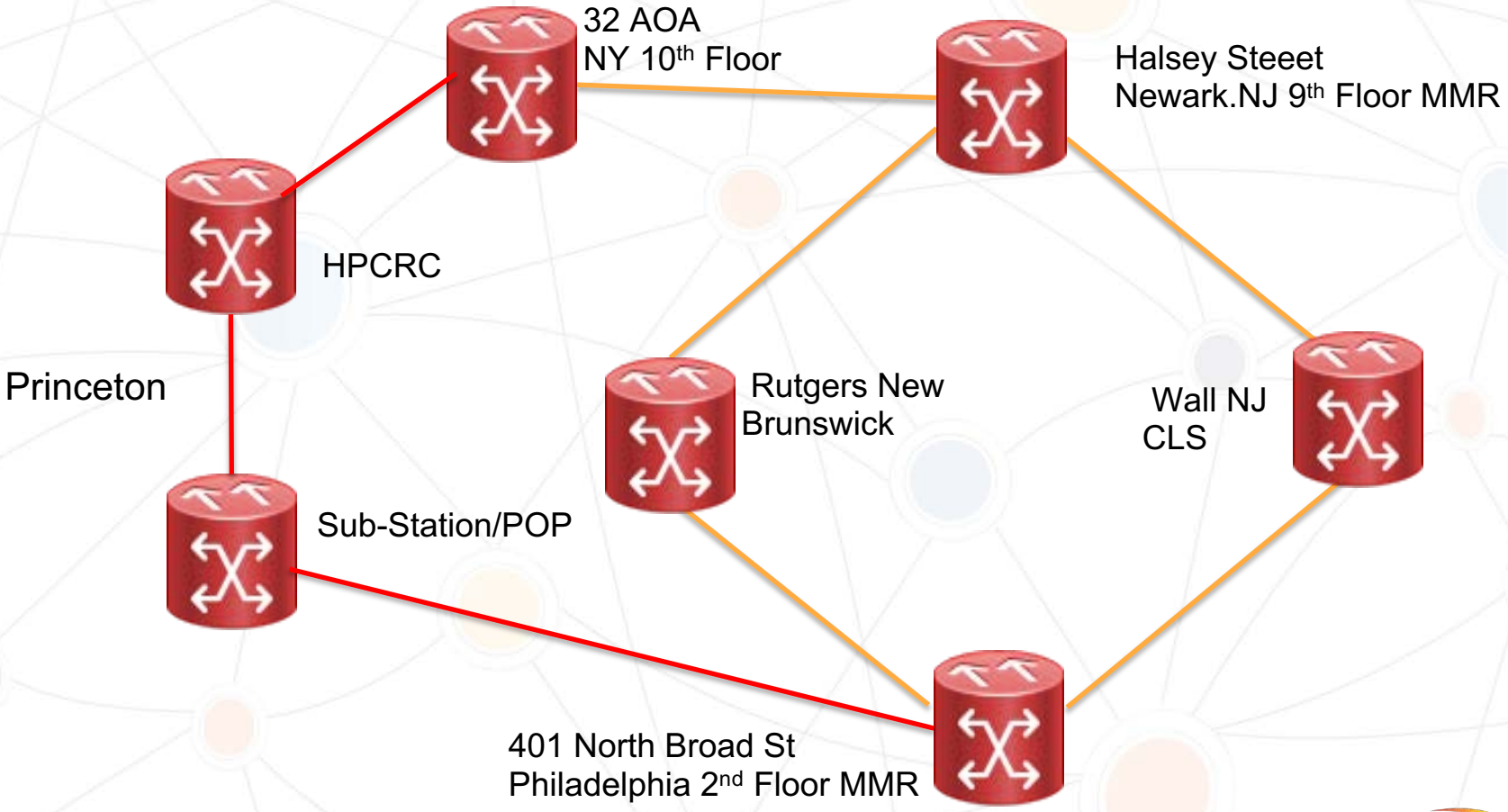


Optical Line Transport Network

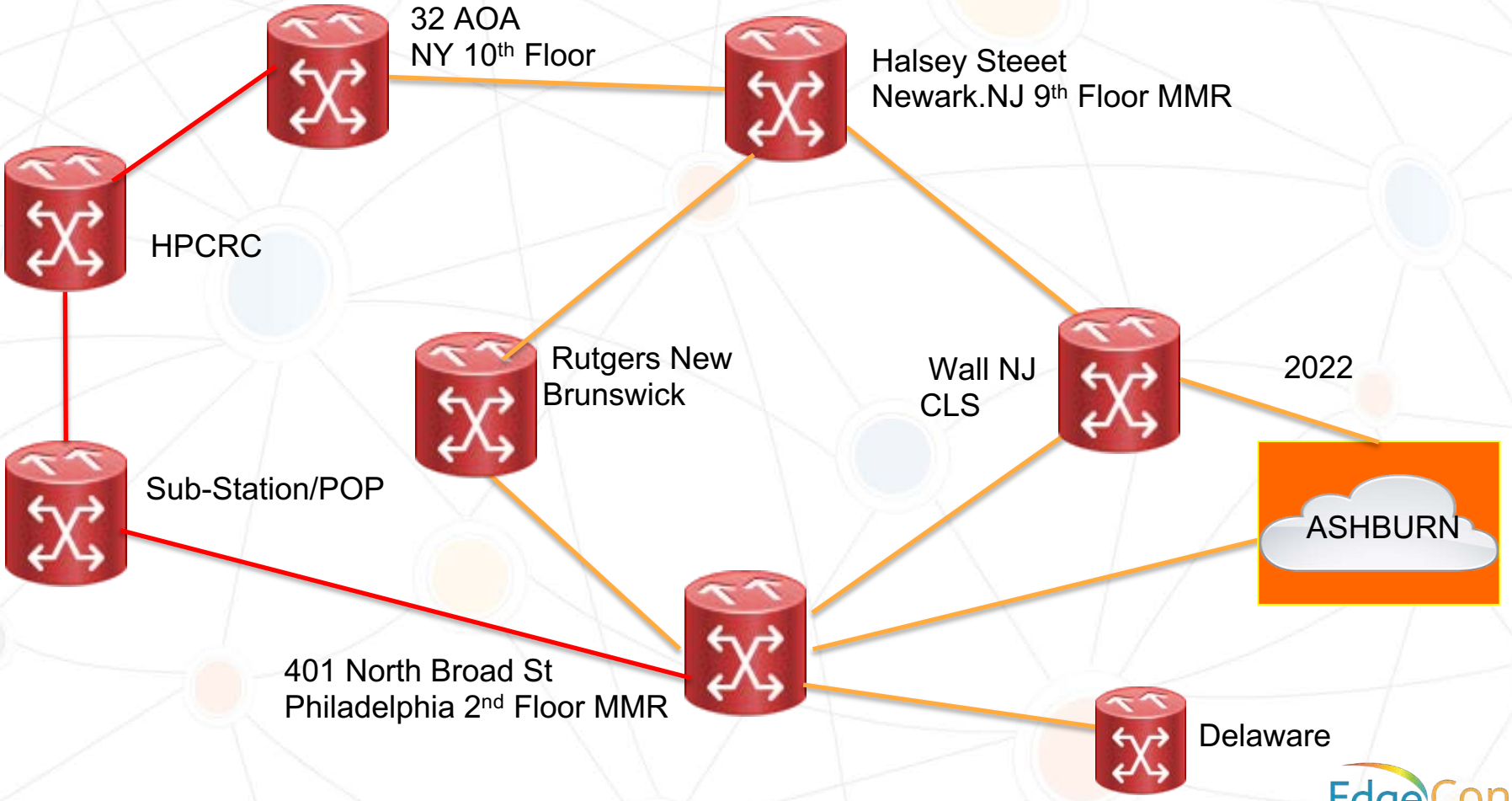
Edge Optical Network Nodes January 2020



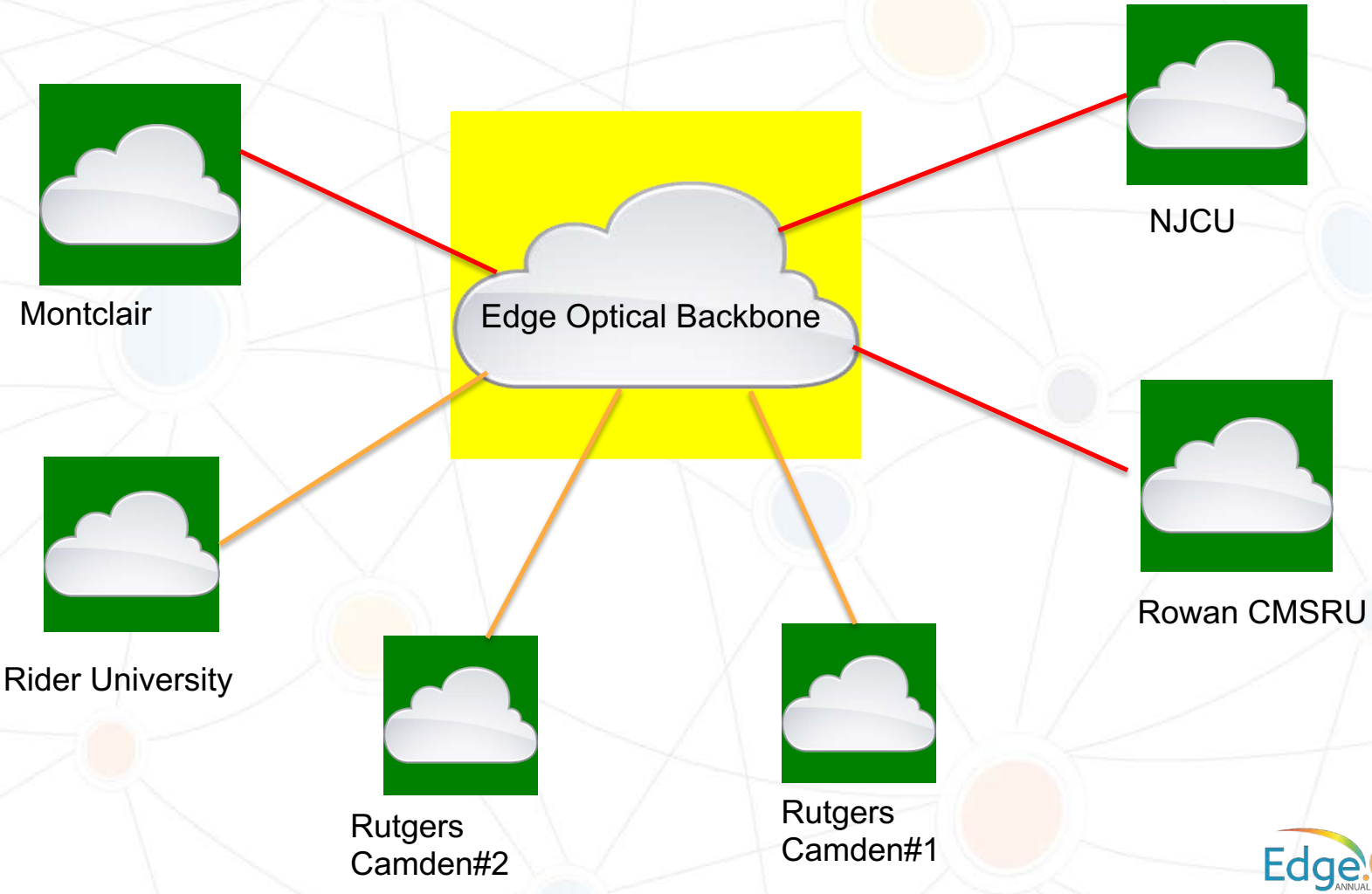
Edge Optical Network Nodes May 2020



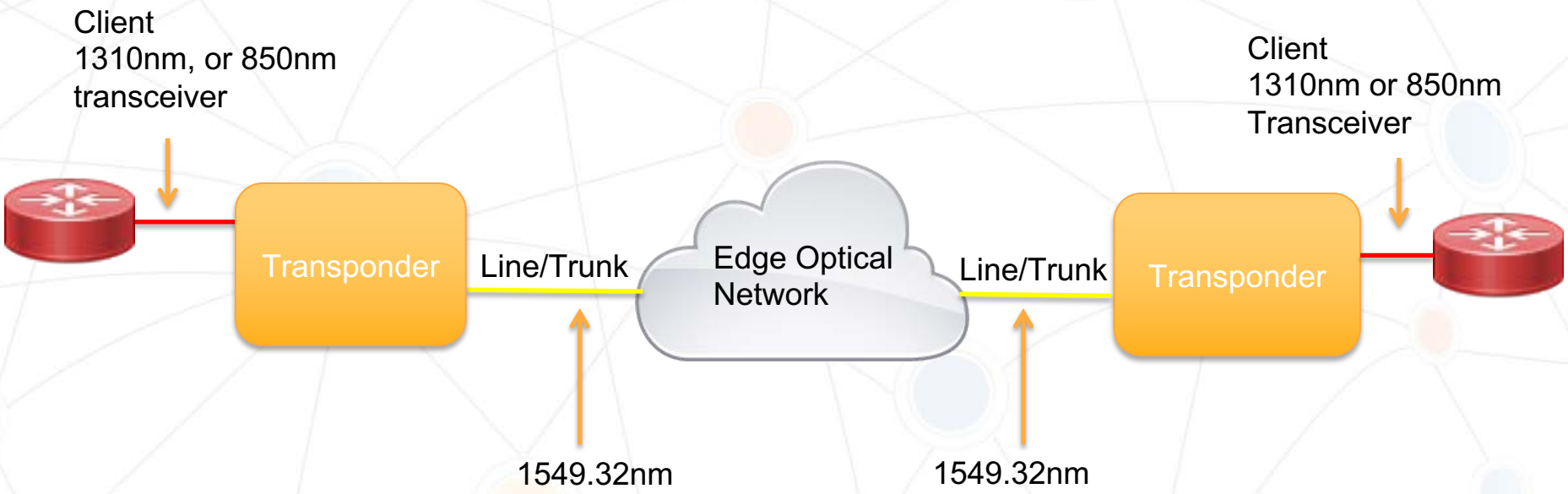
Edge Optical Expansion FY2021



Optical Access Locations



Whats a Transponder?



Optical Transponders

- **Transponder Systems**
- **Cisco 100g Line Card**
- **Cisco NCS1004**
- **Ekinops 10/100/200/400G**
- **Cienna WaveServer AI -200/400g**
- **Support for OTN Framing**

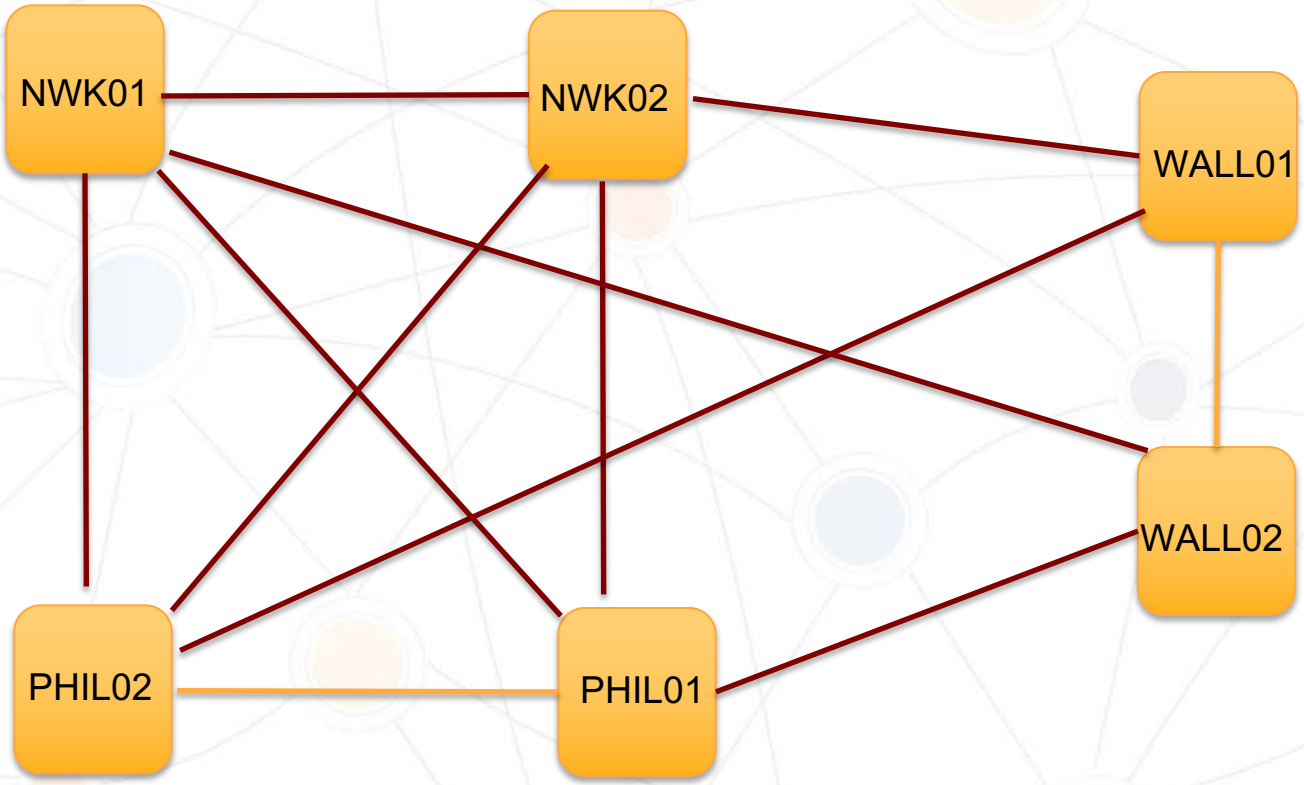
Optical Network Management

Packet Network

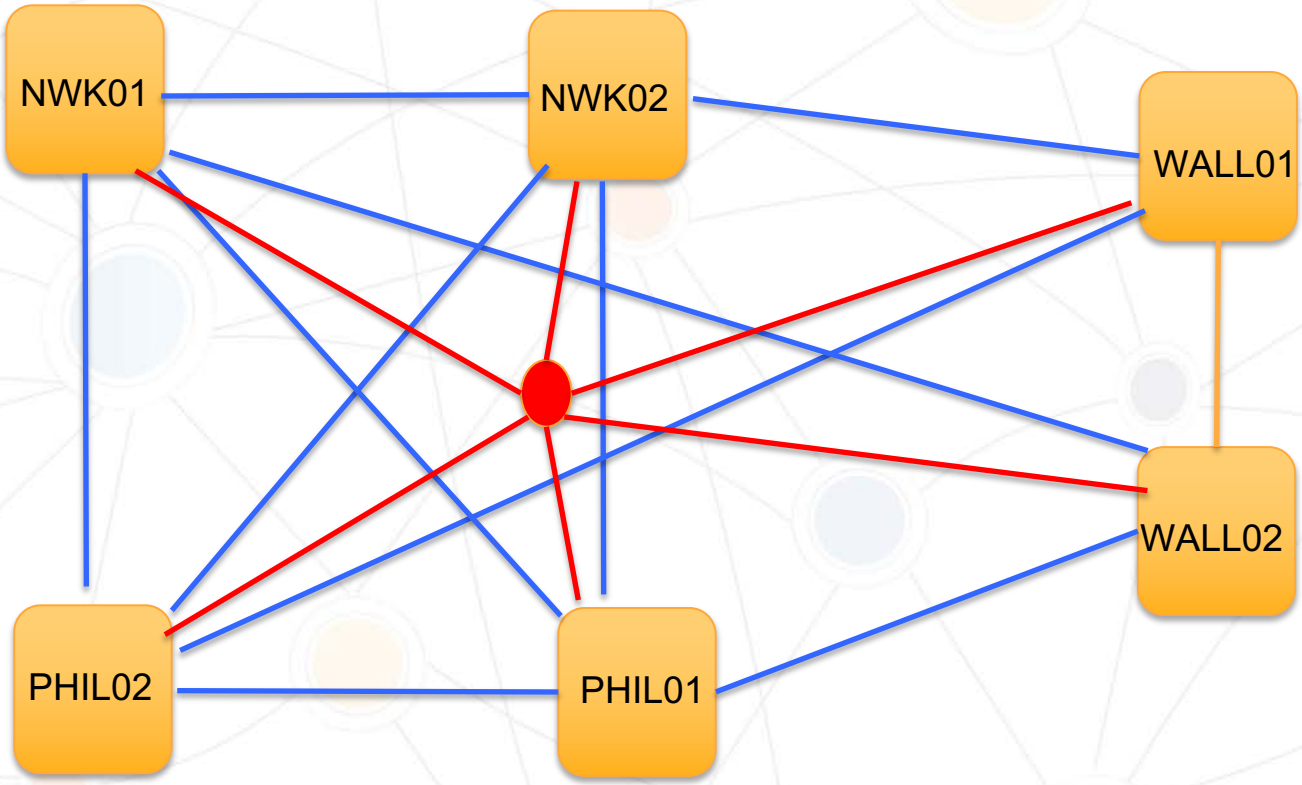
Edge Operates two ASN's

- BGP ASN 21976 Commodity Internet
- BGP ASN 62532 R&E Network
- RFC 7607,5398 6996,7300
- BCP 38
- BGP TTL Security
- TCP/AO

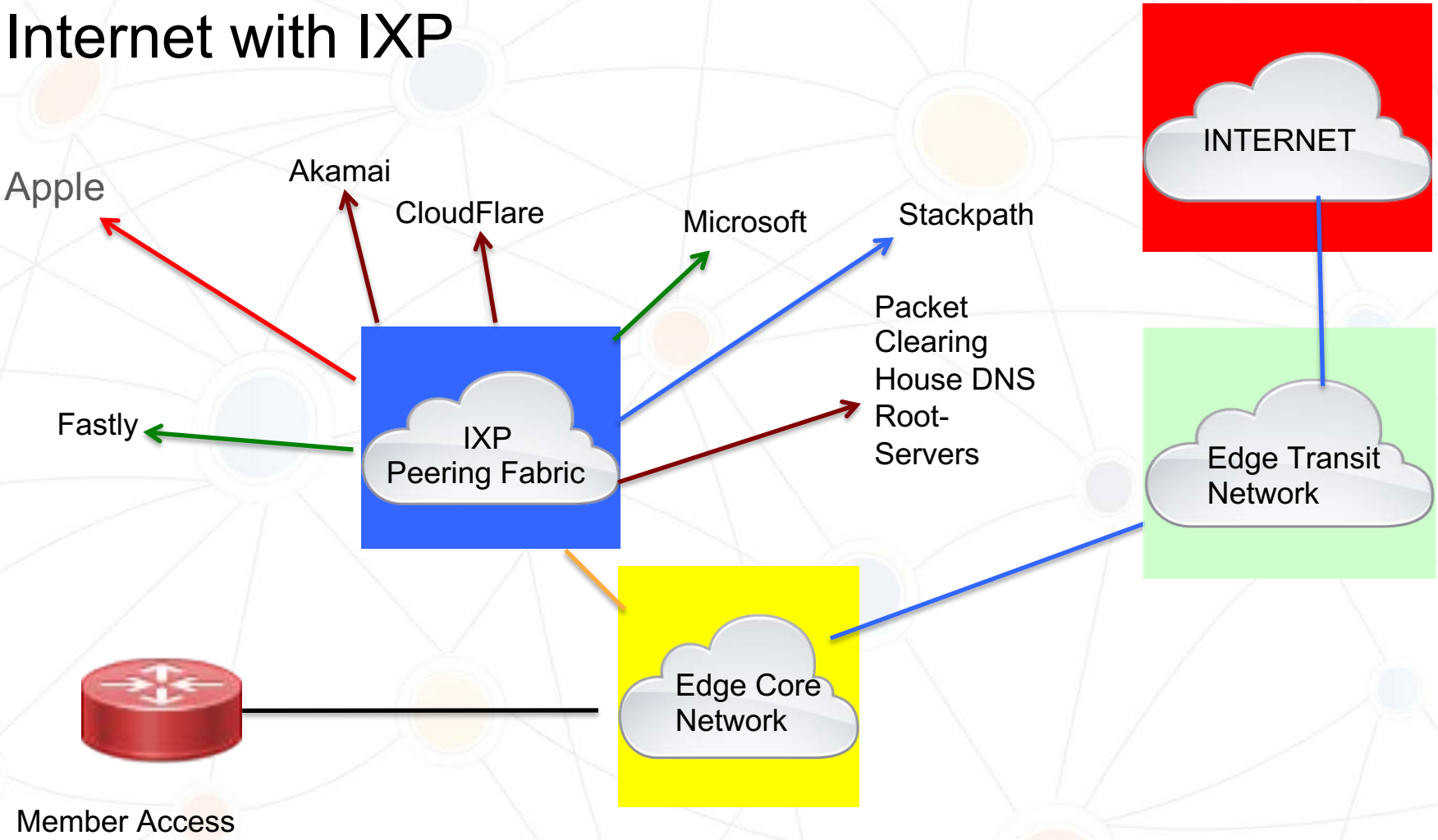
Edge Backbone 100G



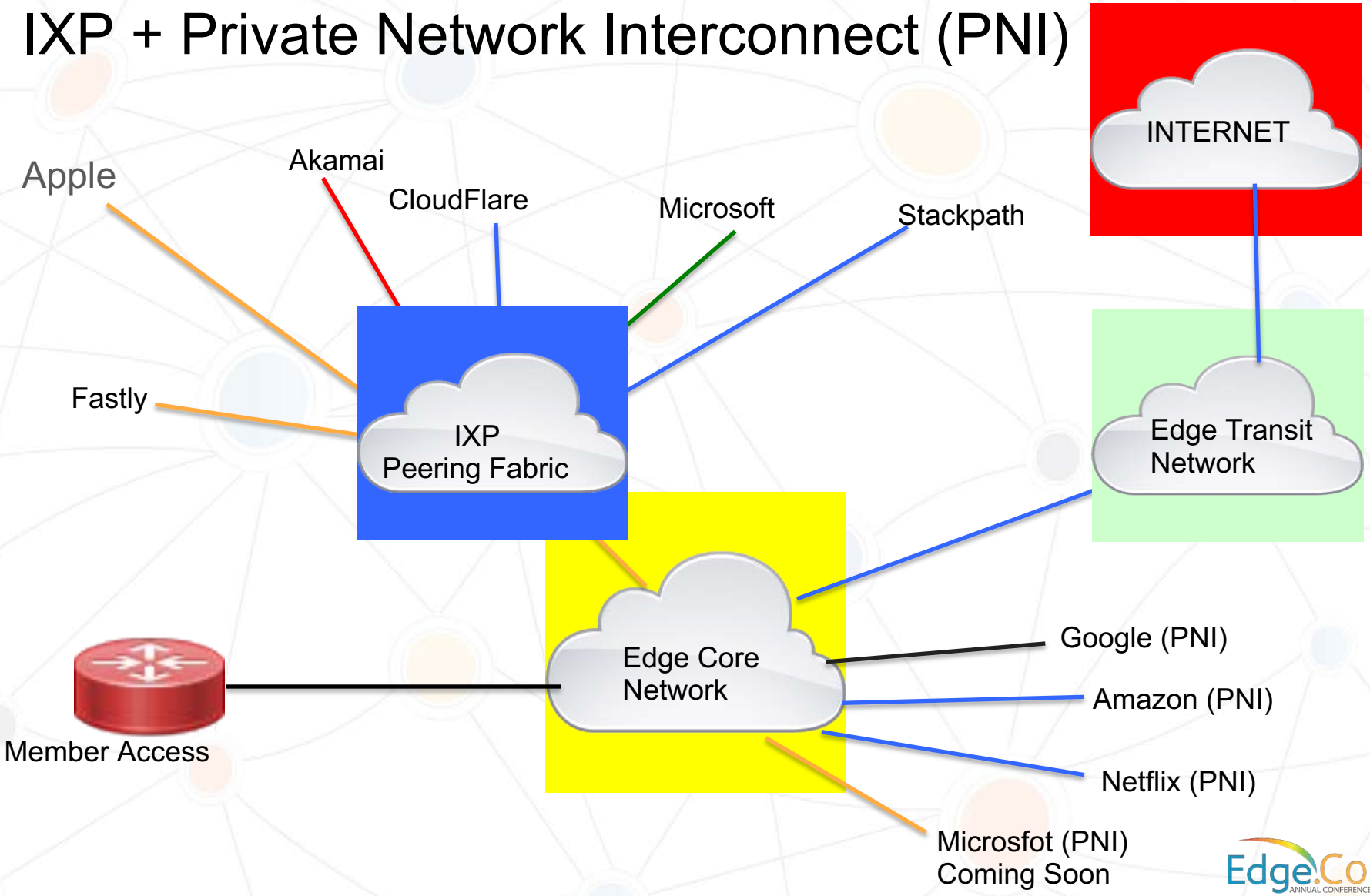
Edge Backbone 100G

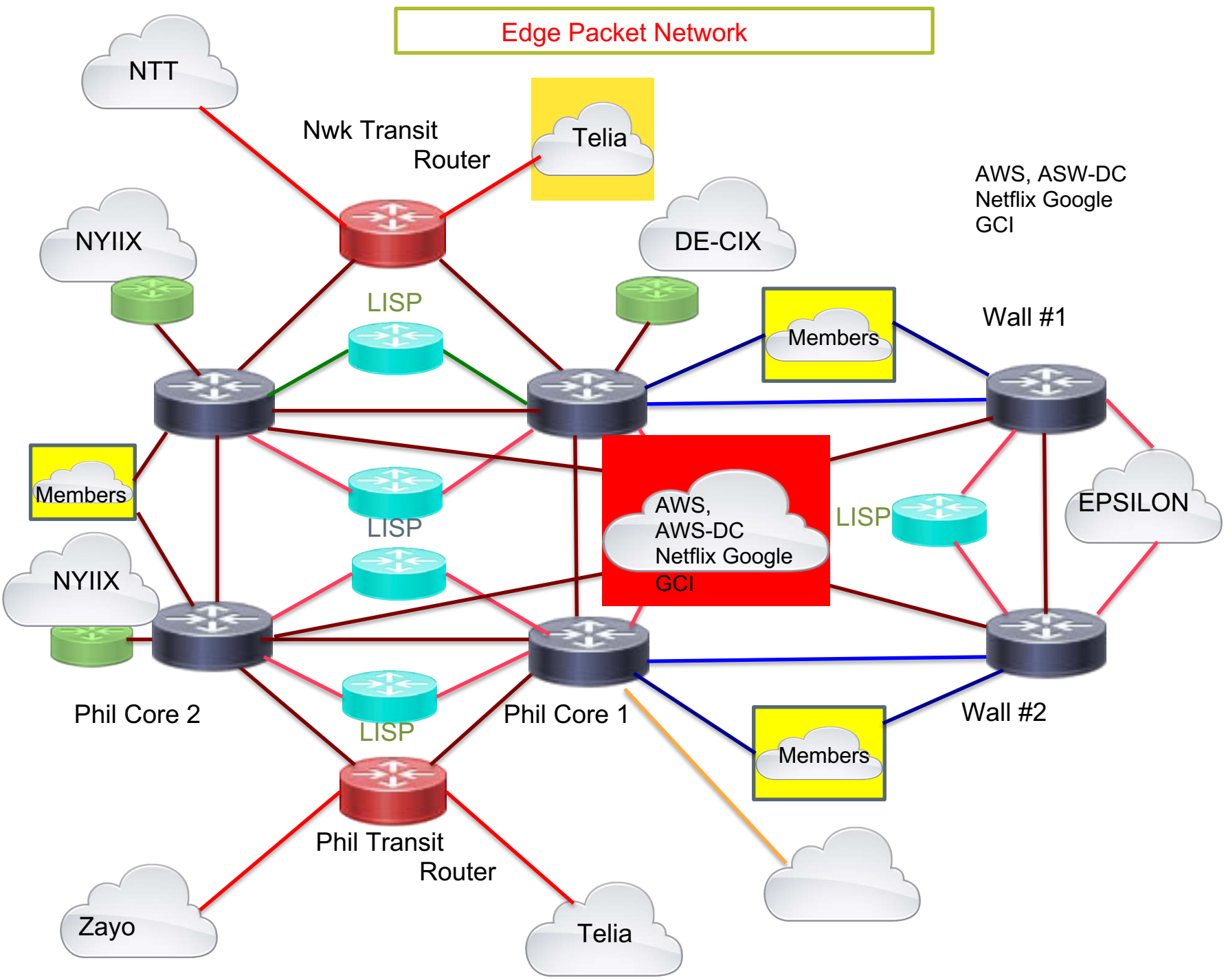


Internet with IXP



IXP + Private Network Interconnect (PNI)




Edge Packet Network
NTT
Nwk Transit Router
Telia
AWS, ASW-DC
Netflix Google
GCI
NYIIX
DE-CIX
LISP
Members
Wall #1
Members
LISP
AWS,
AWS-DC
Netflix Google
GCI
LISP
EPSILON
NYIIX
LISP
Phil Core 2
Phil Core 1
Wall #2
Members
Phil Transit Router
Zayo
Telia

Sites of Interest

- Status.njedge.net
- Speedtest.njedge.net
- Mdash.njedge.net/rtt
- Mdash.njedge.net

Edge Network RTT

The table below represents the various RTT times between the backbone network across different paths and t
major cloud, content and streaming providers. We only list a few direct peers.

The rtt results are collected from a perfsonar mesh and are refreshed every hour. The tests are performed from the perfsonar se
inside our backbone network.

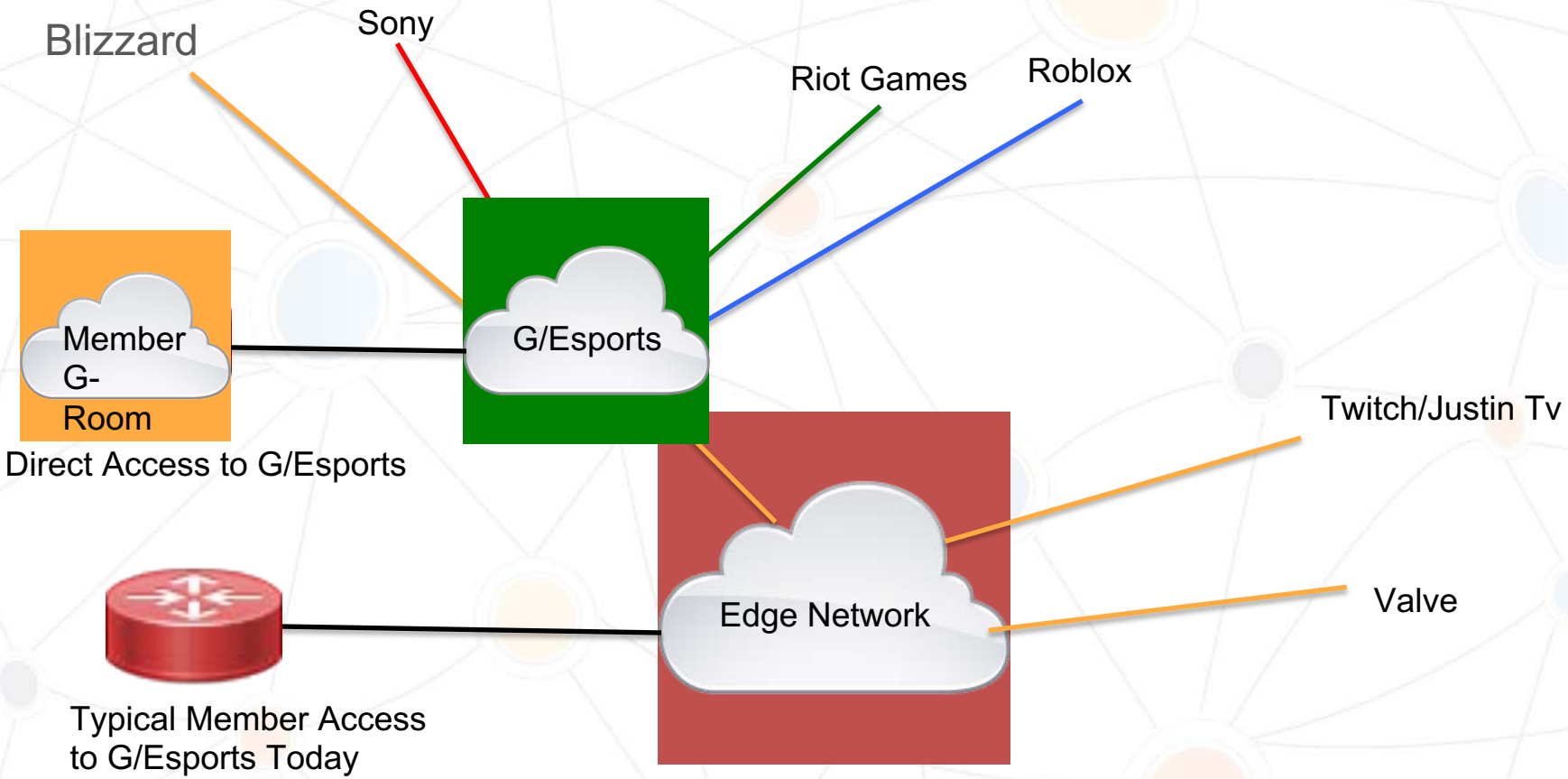
Search..

Source	Destination	Path	RTT	Updated
Newark	Netflix East Video Servers	Direct Peering	0.25ms	01/06/2020 11:59:20
Newark	Google CE East Region	Direct Peering	0.67ms	01/06/2020 11:52:23
Newark	Twitch TV	Direct Peering	0.8ms	01/06/2020 11:57:30
Wall	Philadelphia	B	1.72ms	01/06/2020 11:57:09
Wall	Philadelphia	A	1.77ms	01/06/2020 12:05:03
Wall	Newark	B	1.85ms	01/06/2020 11:52:42
Wall	Newark	A	1.8ms	01/06/2020 12:04:06
Newark	Philadelphia	A	1.94ms	01/06/2020 11:52:07
Philadelphia	Newark	B	1.98ms	01/06/2020 11:56:12
Philadelphia	NYC	A	3.23ms	01/06/2020 11:56:56
Newark	Azure Compute East Region	IX Peering	7.2ms	01/06/2020 11:53:40
Newark	AWS EC2 East Region	Direct Peering	Unavailable	Unavailable

Packet Network Management

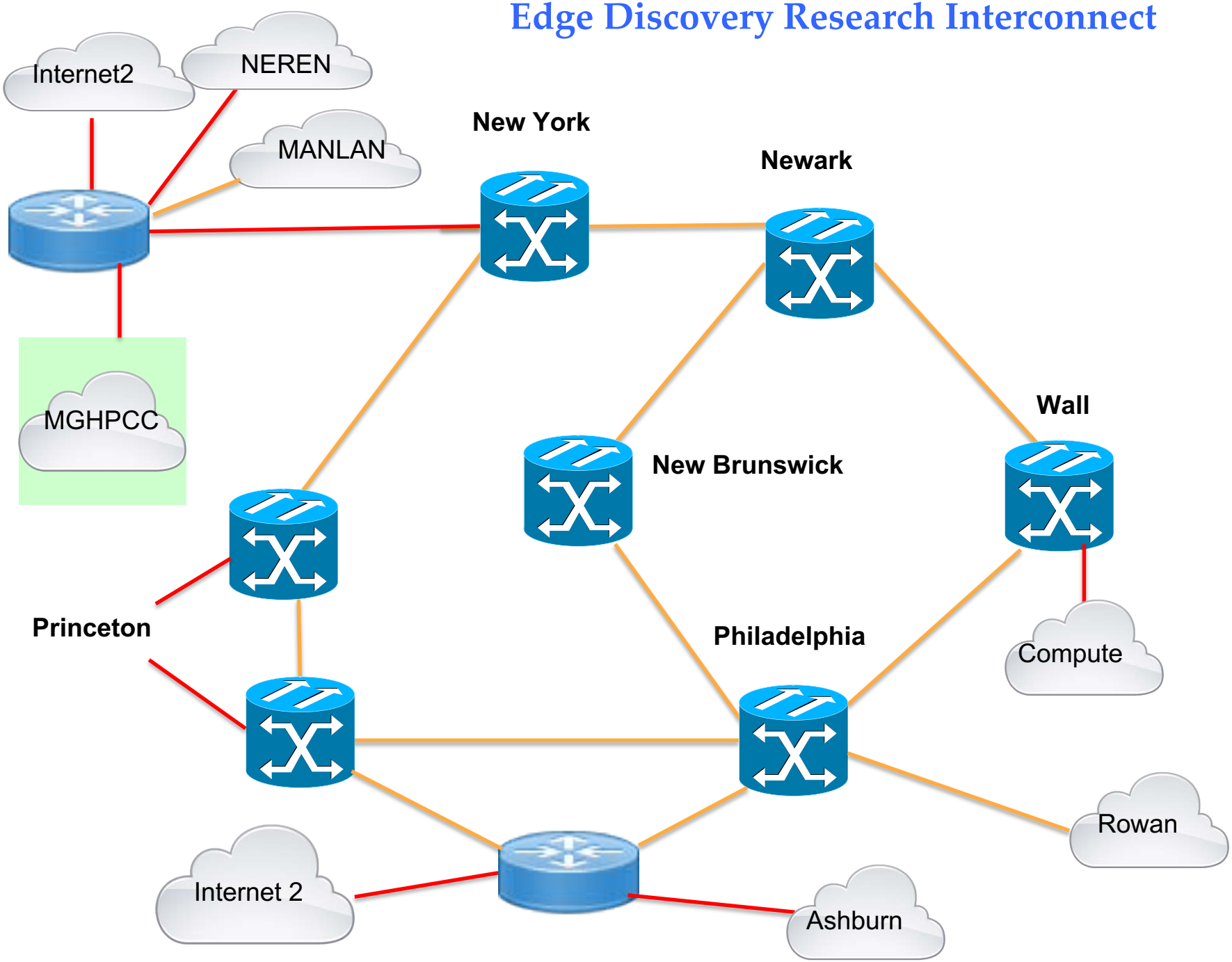
Gaming/Esports

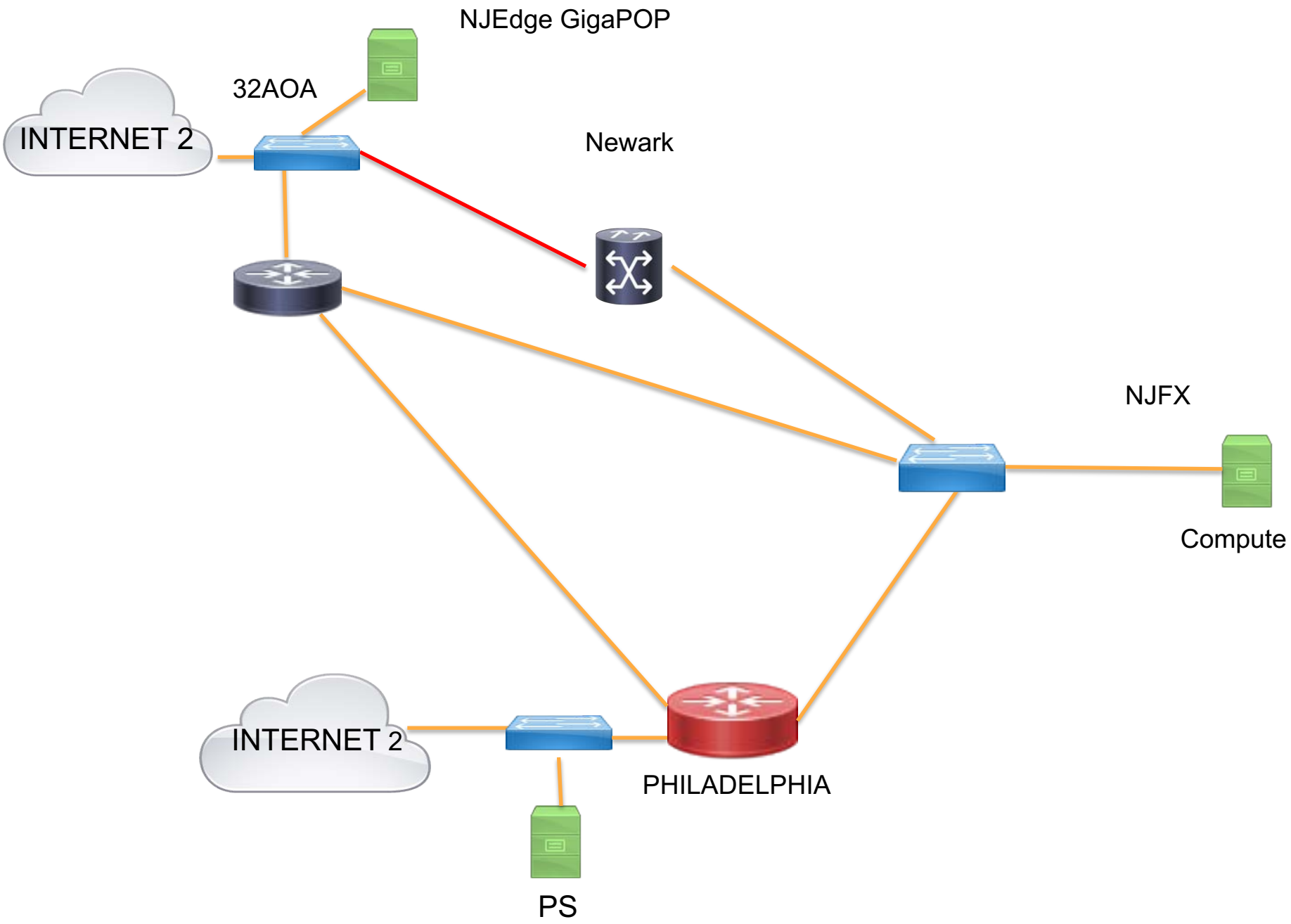
Edge Gaming Infrastructure



Edge Discovery

Edge Discovery Research Interconnect




NJEdge GigaPOP
32AOA
INTERNET 2
Newark
NJFX
Compute
INTERNET 2
PHILADELPHIA
PS