

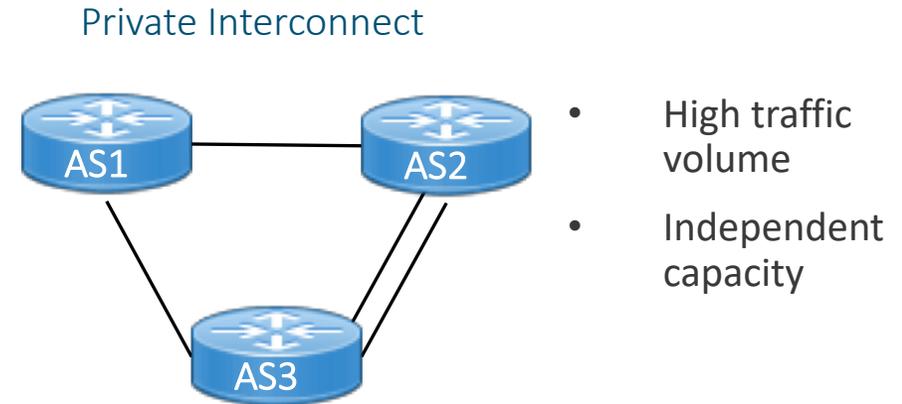
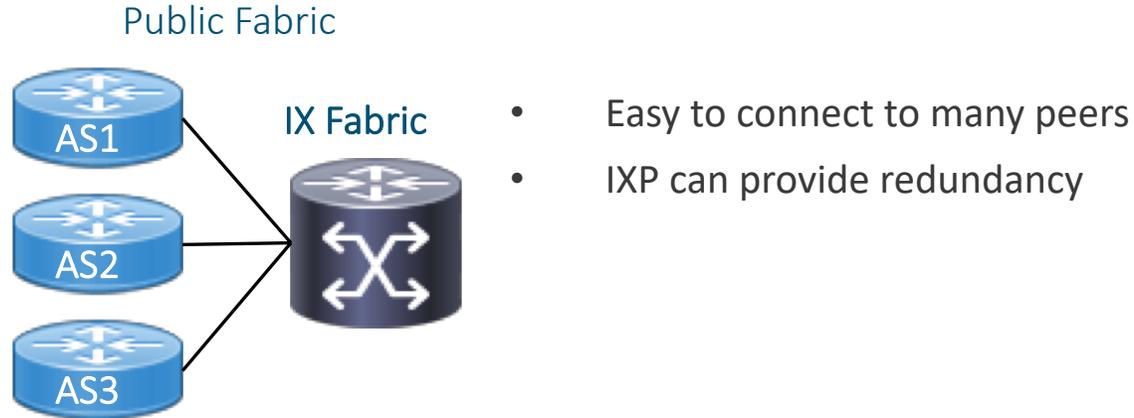


# Path to EVPN and 400G

Peering functions and HW

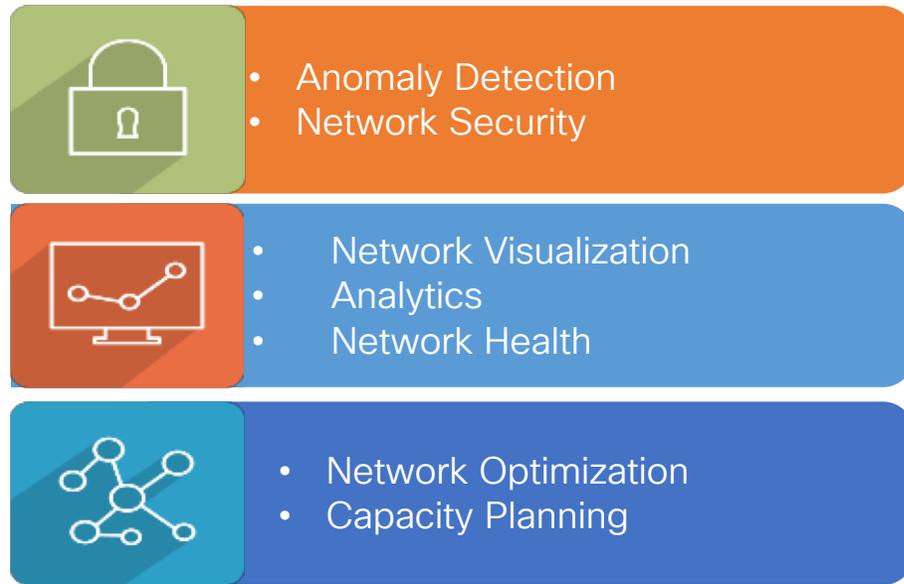
Tom Cof  
SP networking Sales Specialist

# Peering Interconnection Types



- Public or private fabrics interconnect many providers worldwide
  - Still important for regional, B2B, cloud interconnect
- Highest percentage of traffic **volume** carried over PNI
- Largest SP and content providers trending to more PNI

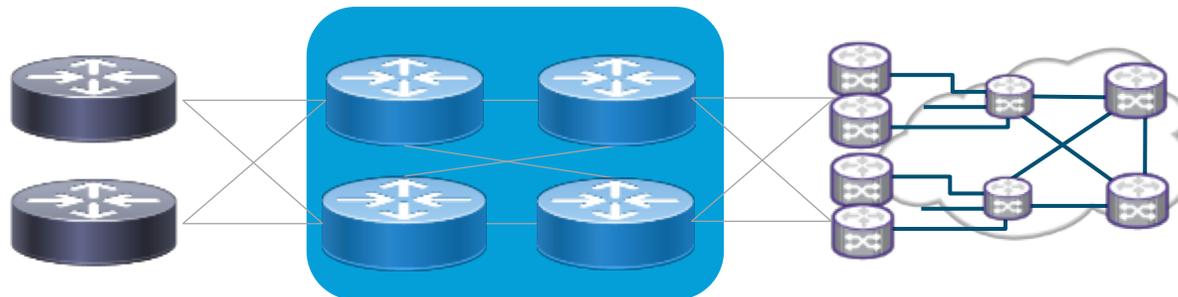
# Peering Data Provides Network Insights for Planning, Policy and Control



Alternatively: What's going on with my network?

Peering Intelligence

BMP    Netflow    MDT



Peers, CDN, Content Hosts

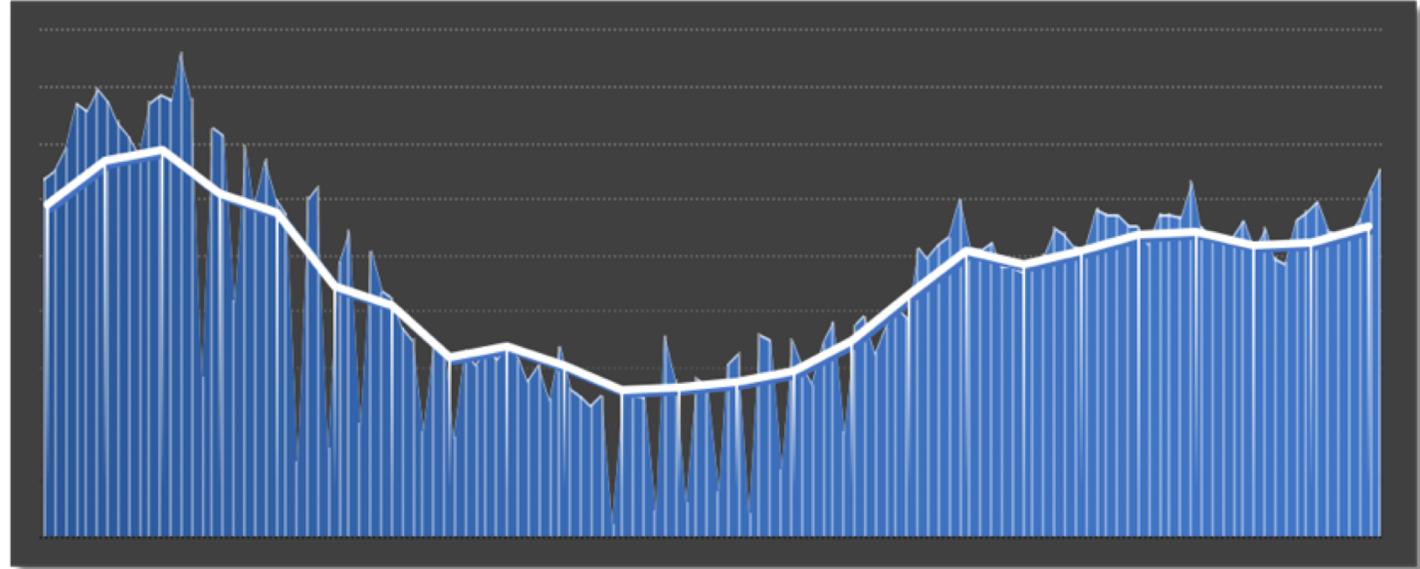
Peering Fabric

Core Network

# Model-Driven Telemetry for Peering

## Higher Resolution Metric Data

- Quickly detect anomalies when coupled with thresholds or machine learning
- Increased visibility into traffic patterns
- Expose hidden oscillations
- See instant impact of network changes or maintenance events



## Network and Device Health Monitoring

- Monitoring queuing resources, can be important across peering or fabric where ingress/egress interfaces are the same speed. Similar in concept to datacenter microburst detection
- Monitor hardware FIB capacity and RIB memory

# BGP Monitoring Protocol

Support in NX-OS, IOS-XR,  
and IOS-XE



BMP Message Type	Data
Route Monitoring	Per-peer NLRI and ongoing NLRI updates
Statistics Report	14 periodic stats values, EG: denied prefixes, RIB counts
Peer Down Notification	Peer down, includes local/remote notification msg
Peer Up Notification	Peer in Established state, includes open msg
Initiation Message	sysName, sysDescr, additional info
Termination Message	Termination reason, additional info
Route Mirroring	Exact copy of BGP message and context

# Netflow / IPFIX

- Has been around for many years
- Cisco Netflow v9 latest Netflow version
- IPFIX – IETF standard flow export
  
- Peering BGP data must be associated with flow information to be the most meaningful ***bgp attribute-download in XR***
  
- Modern traffic rates require sampling. **1:4000 is sufficient for accurate traffic modeling**
  
- Application-level visibility is becoming more difficult with encrypted traffic increasing, but peering data is only reliant on SRC/DST IP and still valid

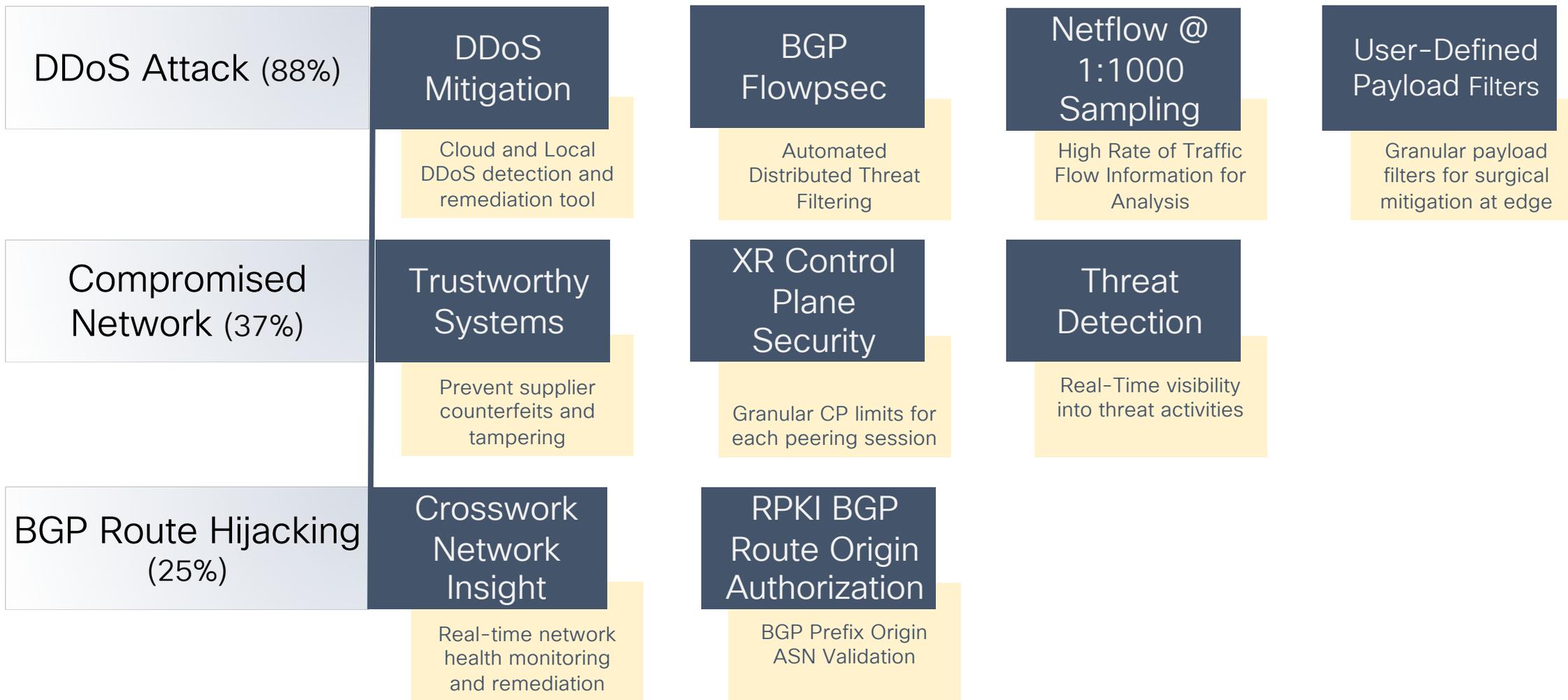
## Capacity planning use cases

- “Who should I peer with?”
- “Where should I peer with X,Y,Z?”
  
- “Should I build local peering or add caching to optimize my network?”
  
- “Should I change my network topology?”

# Cisco Peering Fabric - Security

## Leading SP Concerns\*

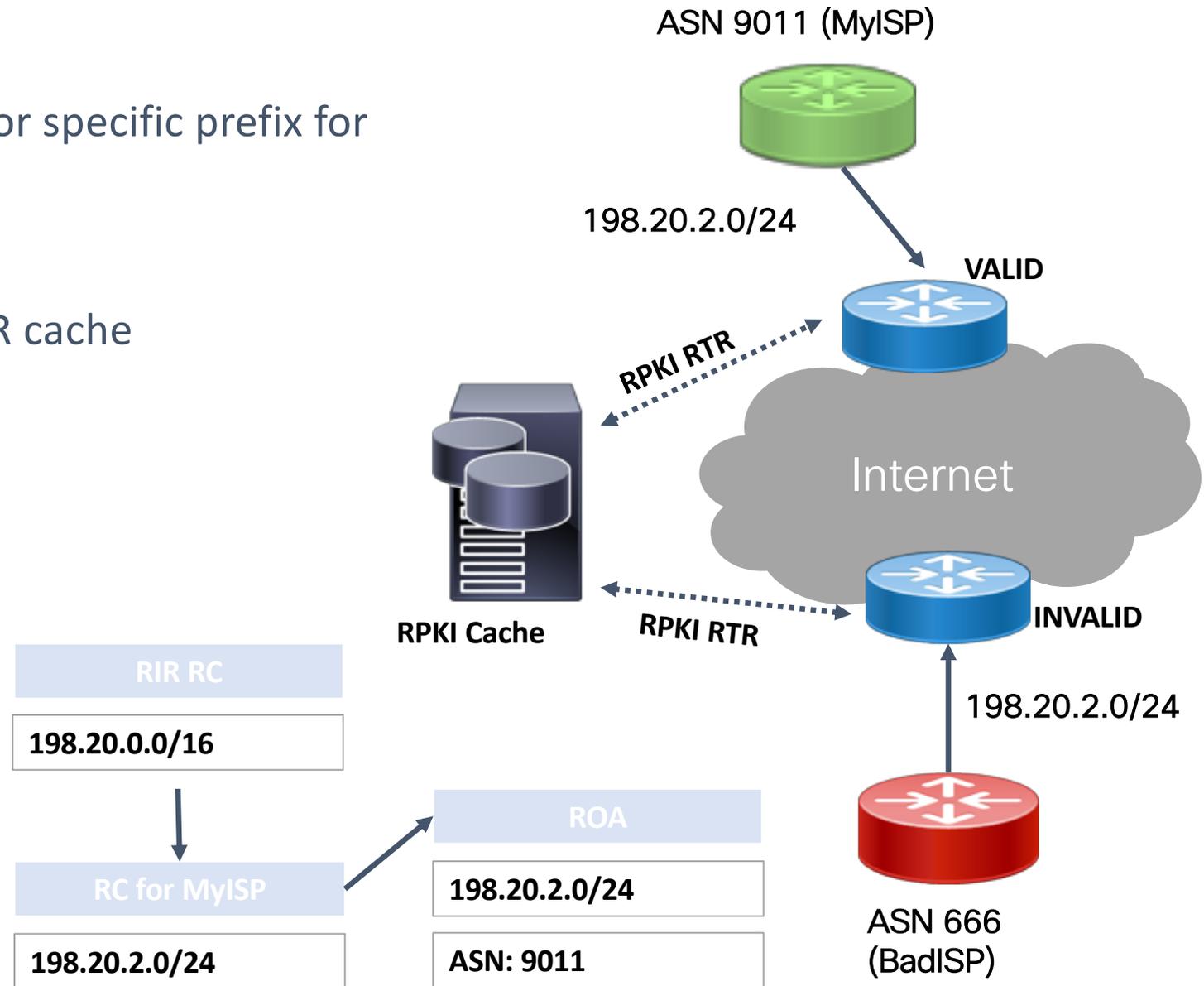
## Cisco Peering Solutions



\* Arbor 2018 Worldwide Infrastructure Security Report - SP Survey

# RPKI and Route Origin Validation (RFC 6483)

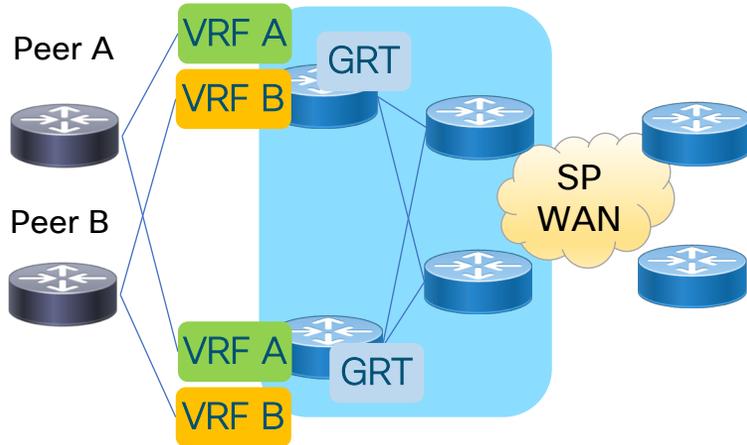
- Resource Public Key Infrastructure
- Route Origin Authorization is issued for specific prefix for originating provider
- Validates origin ASN to stop hijacking
- Validate against open source RPKI RTR cache
- Becoming more popular



# Peering Security

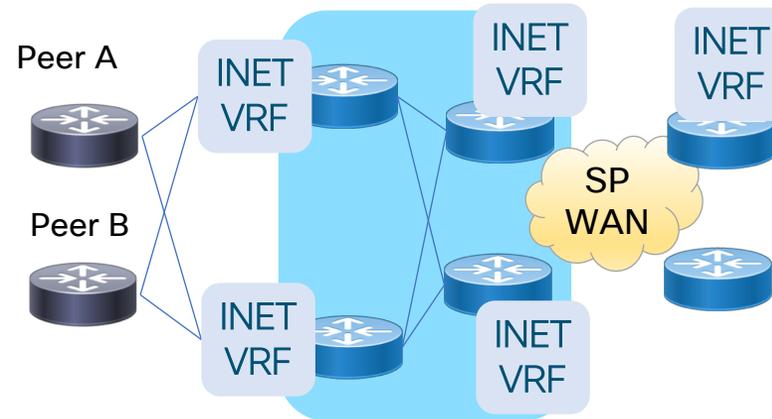
## Peer and Internet VRF isolation models

### VRFs for Peer Isolation



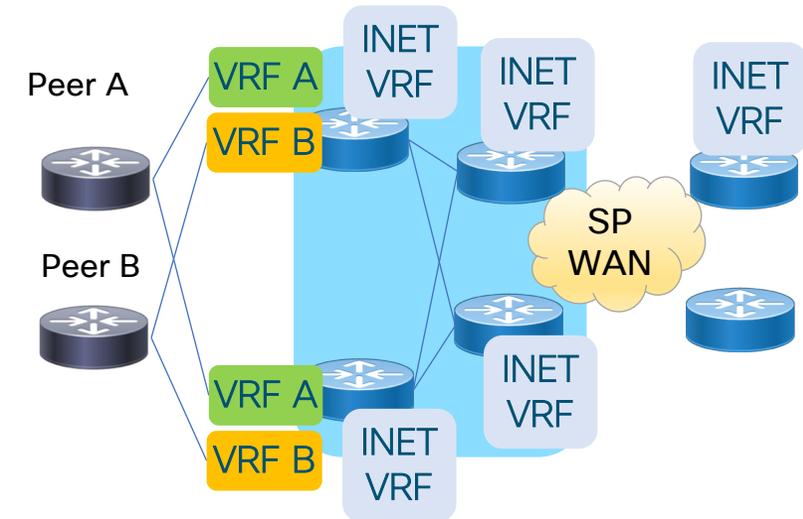
PFL node performs import/export between Peer VRF and GRT

### Internet in a VRF without Peer Isolation



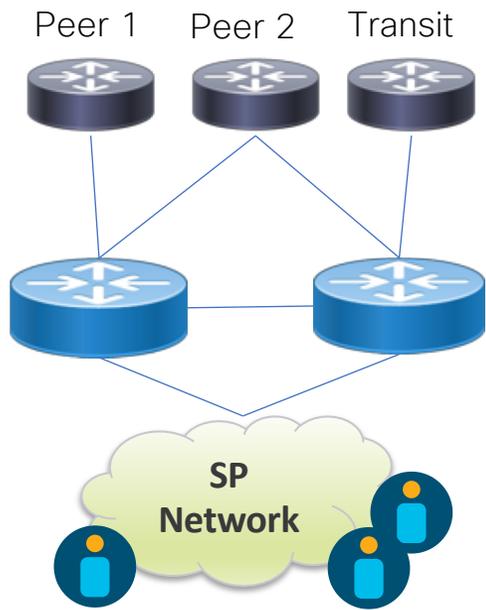
All public facing Internet endpoints are in INET VRF

### Internet in a VRF with Peer Isolation

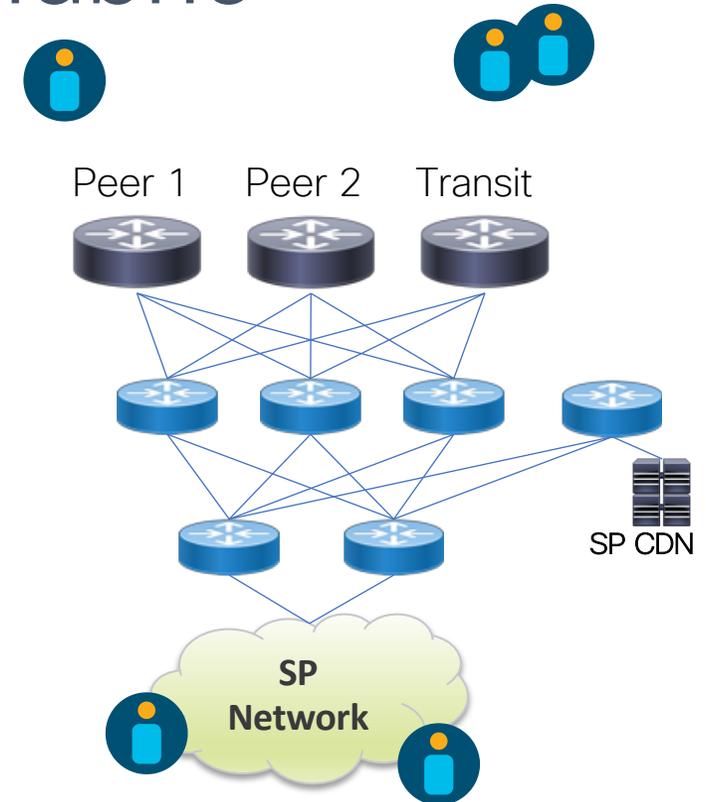
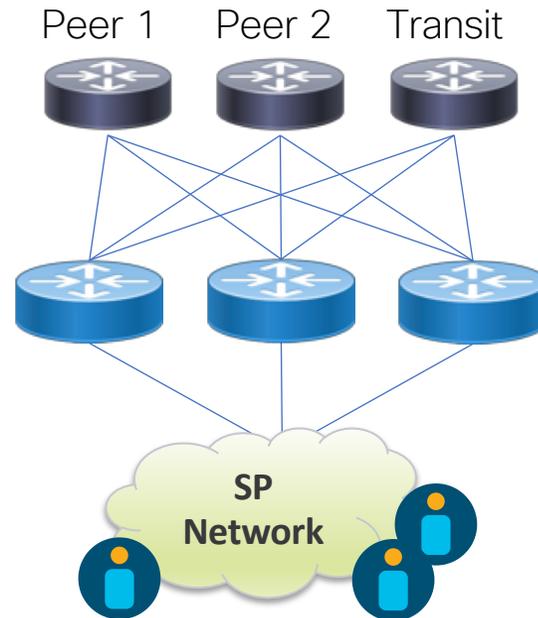
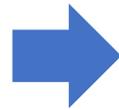


PFL node performs import/export between Peer VRF and INET VRF

# Towards a more resilient peering fabric



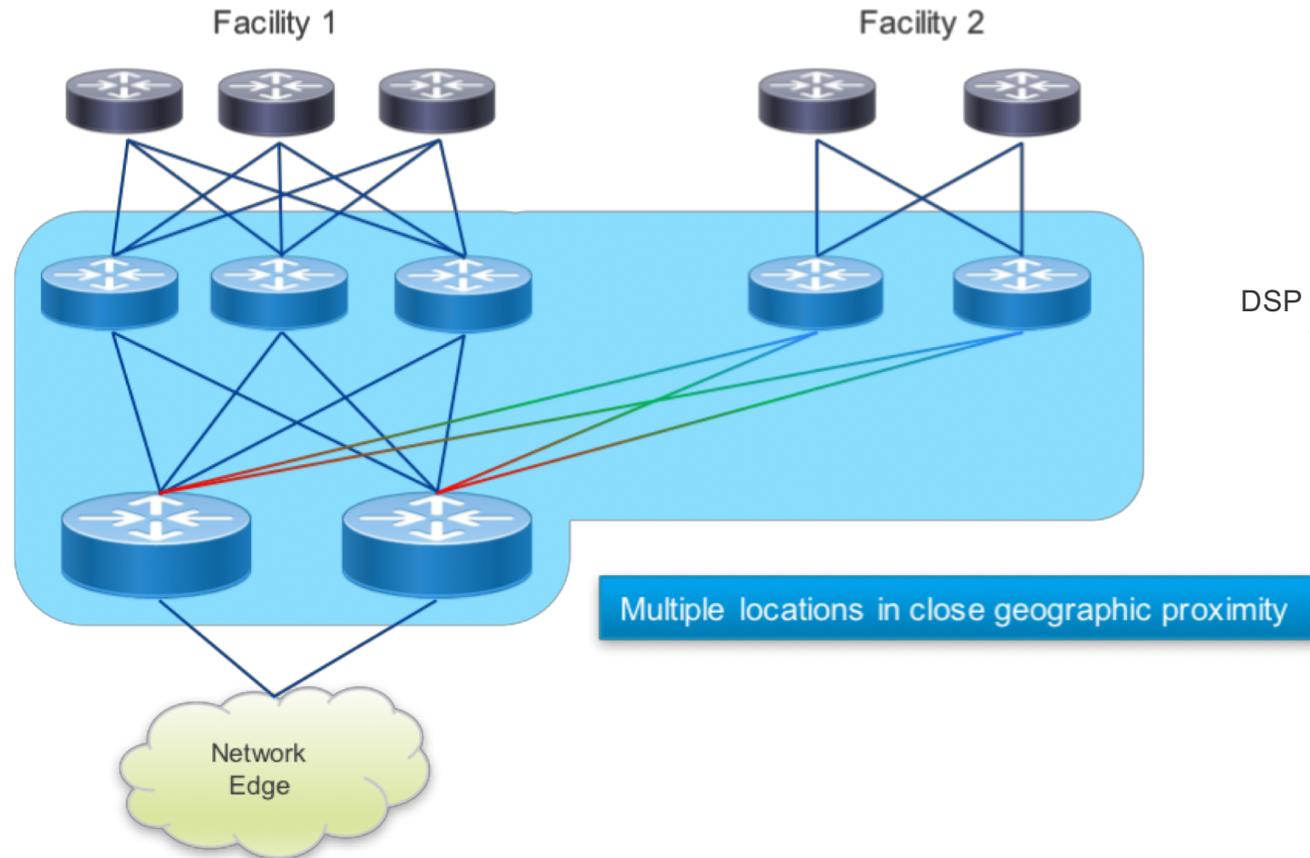
Traditional Peering



- Horizontal scaling adds resiliency
- Less reliance on long-haul backup for metro or DC Peering
- Reduced blast radius during maintenance or failure
- Simplified SR control-plane

- Greater resiliency and capacity scale
- Optimized feature sets at each layer
- Optimized fabric for both ingress and egress content delivery

# Connecting remote locations into peering fabric



DSP integrated with the CFP2



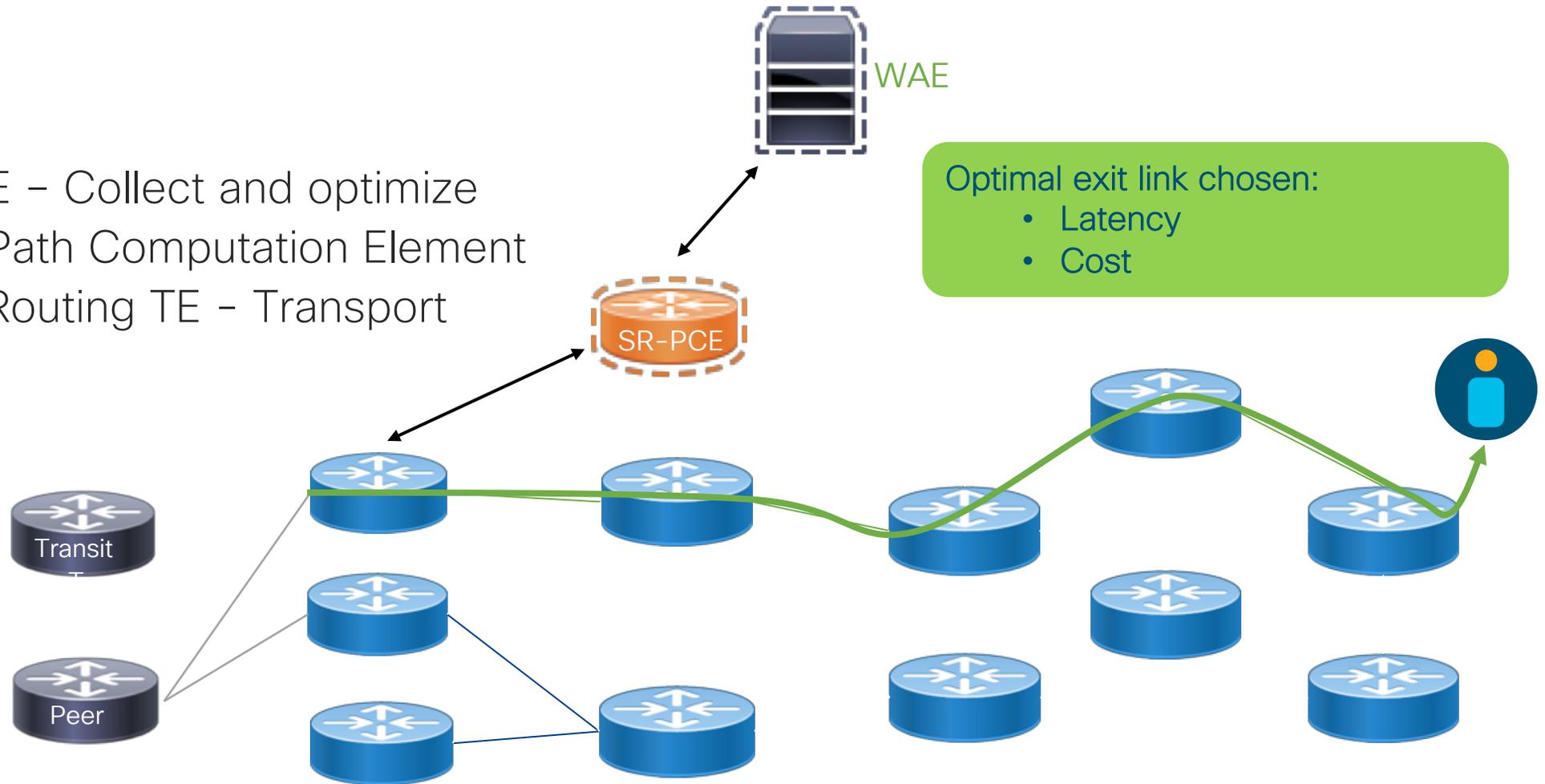
IPoDWDM with CFP2 DCO

# SR-TE SP Ingress Peering Traffic Optimization

**Problem:** Engineering optimal path across SP network for ingress traffic from peering location to SP end users

## Solution:

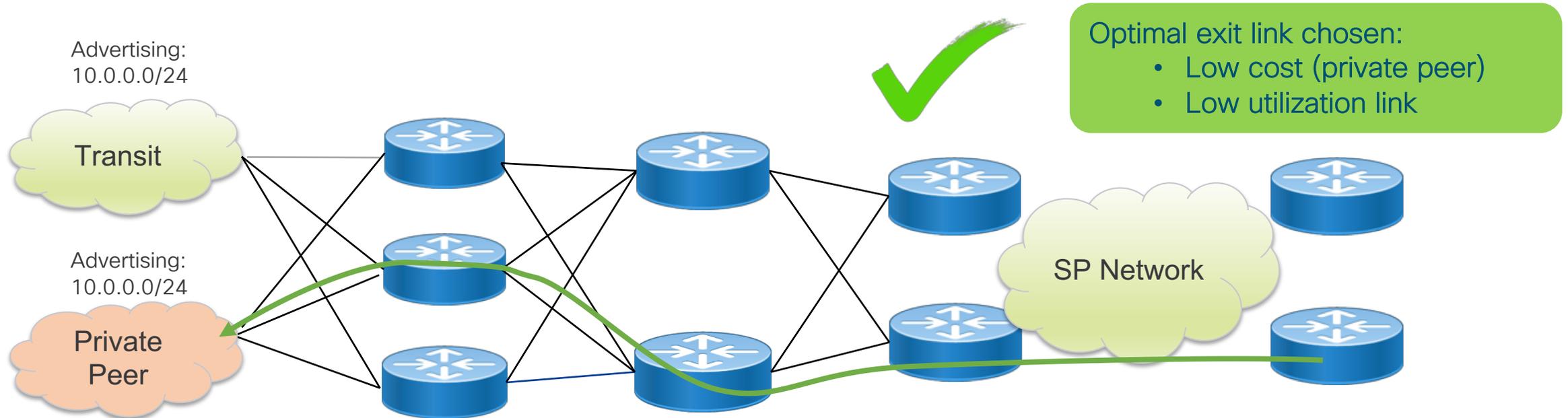
- Cisco WAE – Collect and optimize
- Cisco SR Path Computation Element
- Segment Routing TE – Transport



# SR-TE Egress Peer Engineering

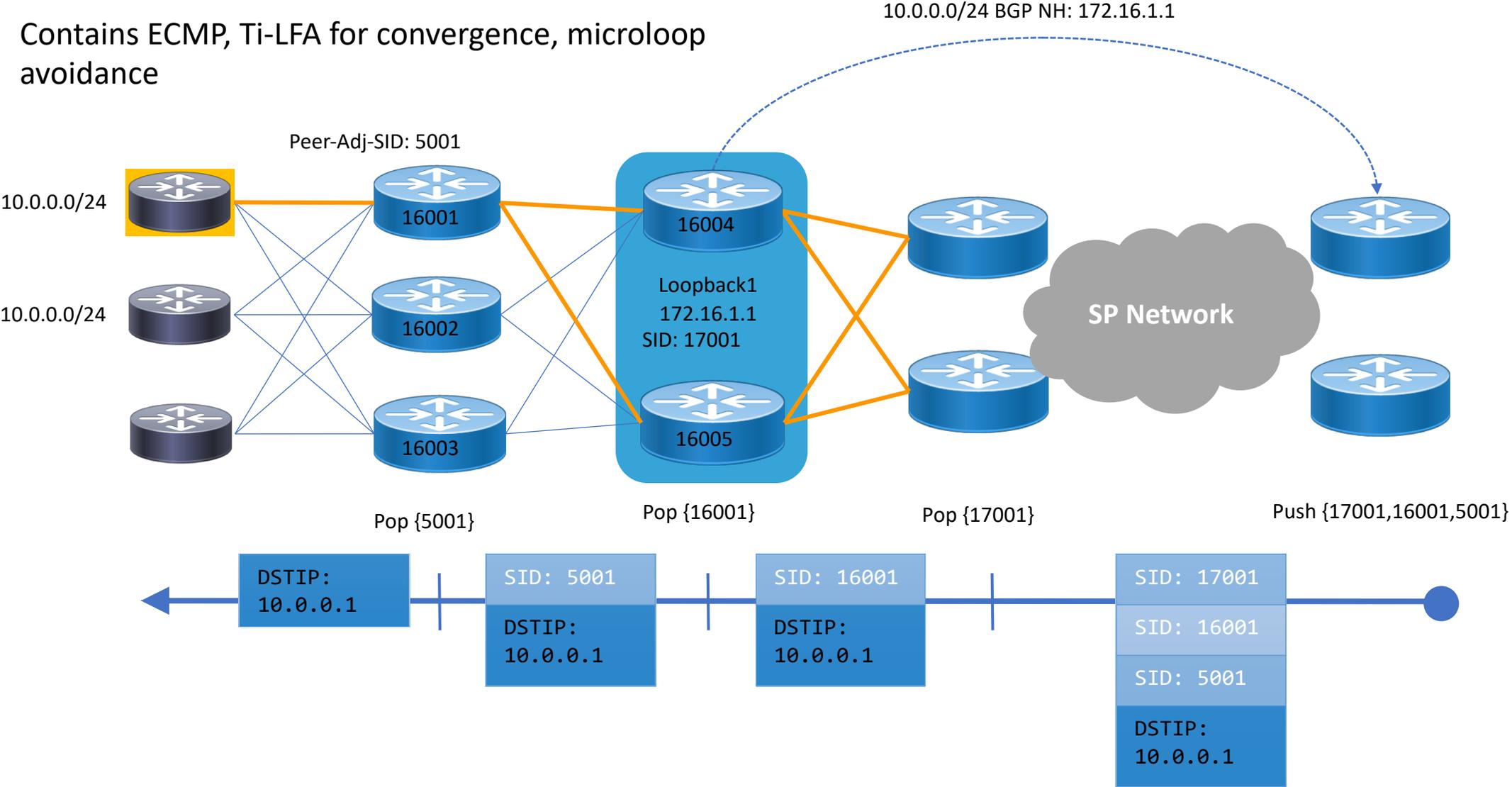
**Problem:** Engineering the best network exit path that is cost-efficient while providing good user experience metrics (latency, link utilization & traffic loss).

**Solution:** Segment Routing Egress Peer Engineering (EPE).

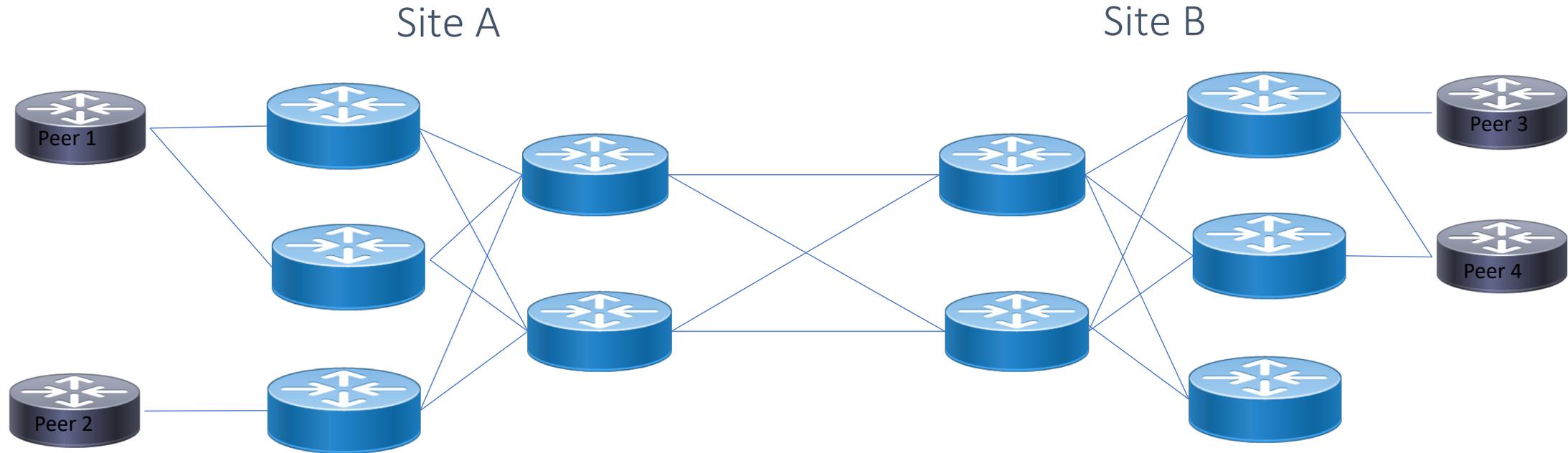


# SR-TE Egress Peer Engineering Dataplane

Contains ECMP, Ti-LFA for convergence, microloop avoidance

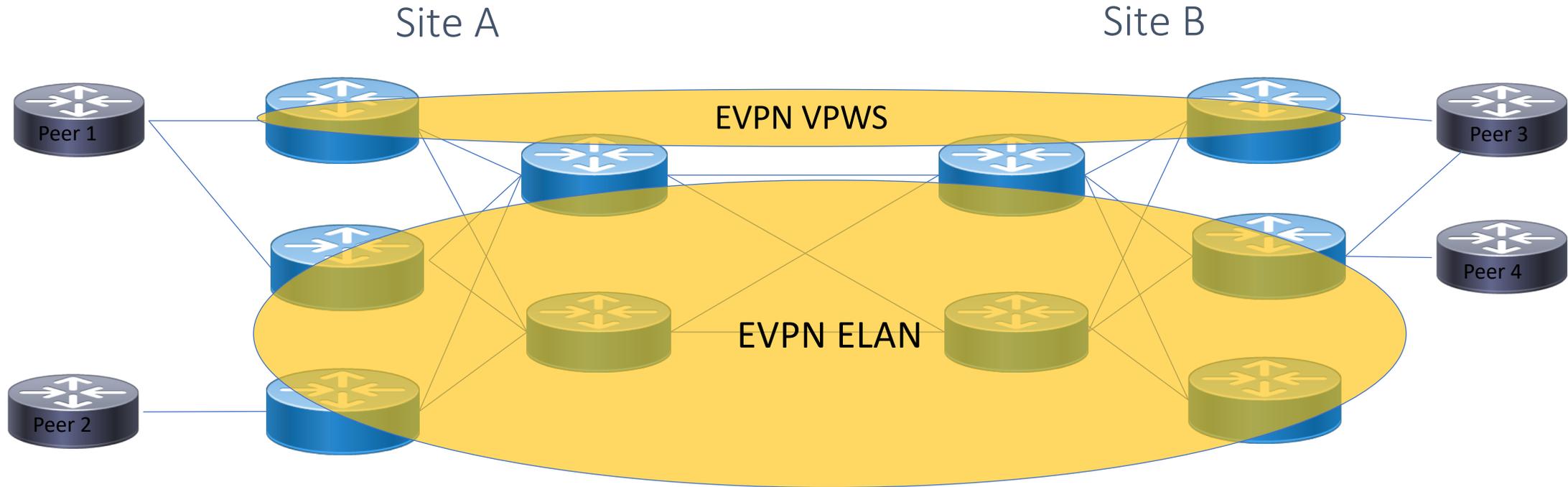


# Distributed IXP Fabric



- SR/EVPN based fabric for interconnecting peers
- Initial release supports L2 connectivity, port or VLAN based
- Utilize SR-TE if necessary, ODN for EVPN VPWS
- **Can also be utilized by SP to interconnect customers to cloud and external peering fabrics**

# Distributed IXP Fabric – EVPN Services



- EVPN VPWS for P2P connectivity between peers
- EVPN ELAN for multi-lateral peering fabric

# Peering Fabric Hardware

Cisco NCS 5500 series

Any device supports all peering fabric functions

NCS-55A2-MOD (S/SE)



NCS-55A1-36H-SE



NCS-55A1-24H



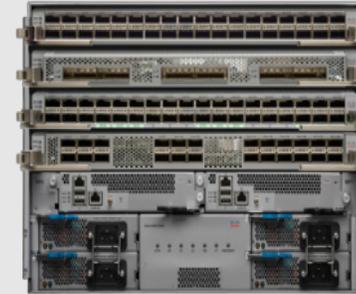
NC55-MOD-A-S-SE



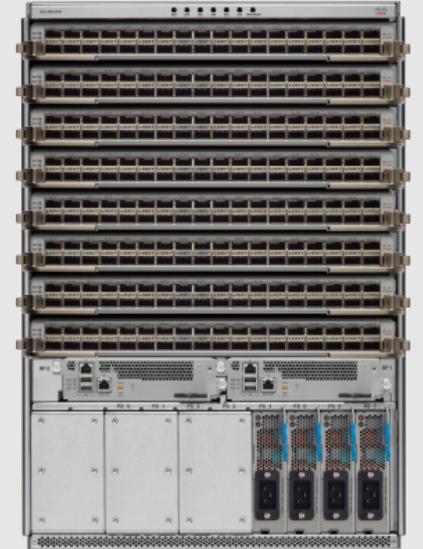
NCS-5501-SE



NCS-5504



NCS-5508

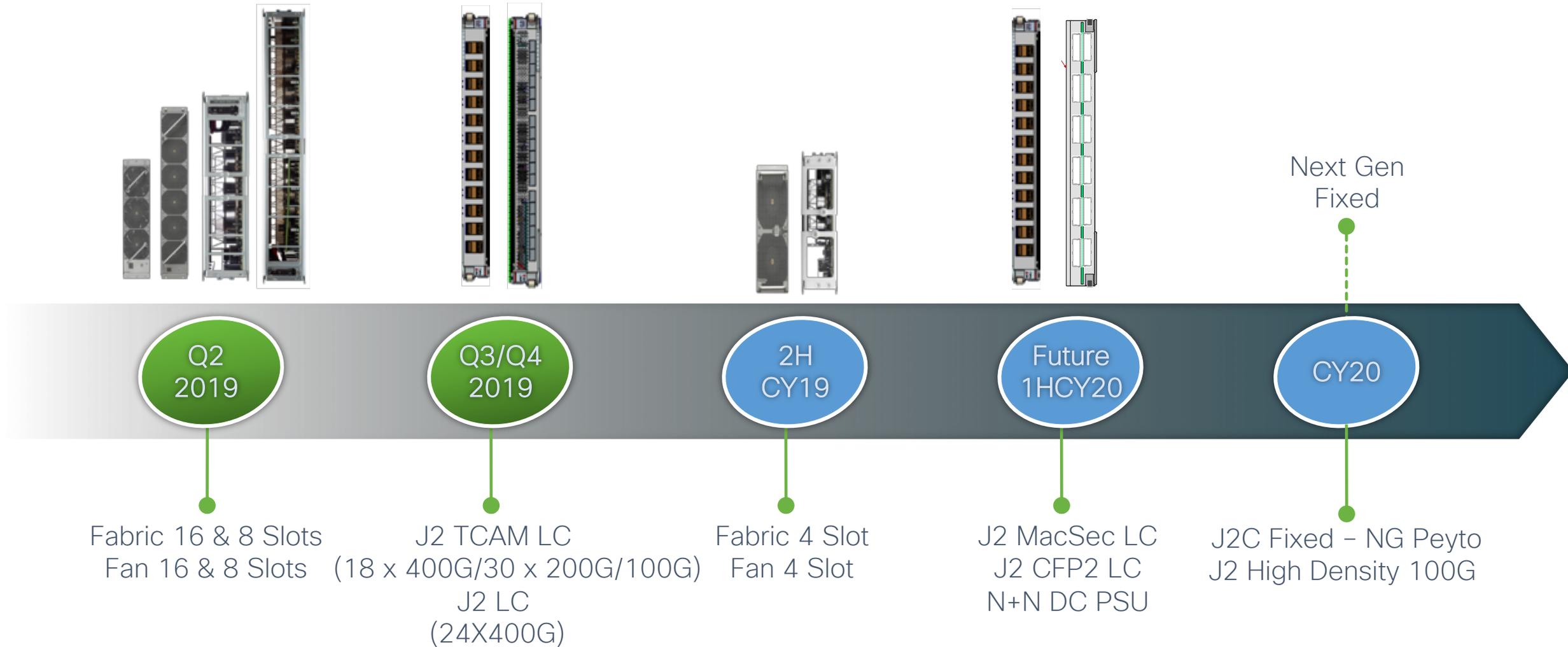


NC55-36X100G-A-SE



# NCS-5500 400G / Jericho 2 Programs

## High Level Timeline



Note: CY2019 and beyond program pending commit

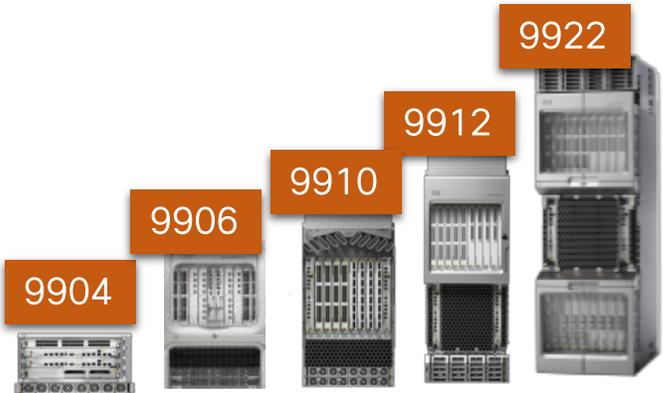
# LightSpeed for Hyper Scale!



4x Capacity increase

Powered by 64-bit XR

Lower TCO



32x100GE  
TR/CM

32x100GE  
SE/TR/CM

10x400GE  
SE/TR/CM

2.4T Combo  
SE/TR/CM

16x100GE  
TR/CM

2T Combo  
SE/TR/CM

8x100GE  
SE/TR/CM

eXR 6.5.15  
Sept. 28<sup>th</sup> 2018

Q1 CY'20

Q2 CY'20

2H CY'20

LS (Orderable)

(Not CC'ed yet)

