
cisco Live!
TURN
IT
UP
#CiscoLive

The bridge to possible

SP Cloud Native Data Center Infrastructure

From the Edge to the Cloud

Sonu Kumar Khandelwal, Technical Marketing Engineer
Héctor Fernández Capel, Technical Solutions Architect

BRKSPG-2036

Agenda

- Introduction
- Data Center Taxonomy
- Intelligent Transport
- Hand-off
- End-to-End Automation
- Details of ACI SR/MPLS handoff implementation with NSO

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Introduction

Bandwidth Optimization				Latency	Proximity	Edge connectivity and multi-cloud	
Content delivery (downstream)	Data reduction (upstream)	Mass customization	Localization	Ultra-low latency/ jitter reduction	Local reliability and survivability	Connectivity	Multi-cloud
Video, software downloads/updates	Surveillance, connected mobility, IoT, edge analytics	Live event coverage, in-band advertising, AR/VR	Peer-to-peer communication	Virtual and augmented reality	Industrial automation	Private backbone, global E2E SLA	End-to-end security, multi-cloud onramp

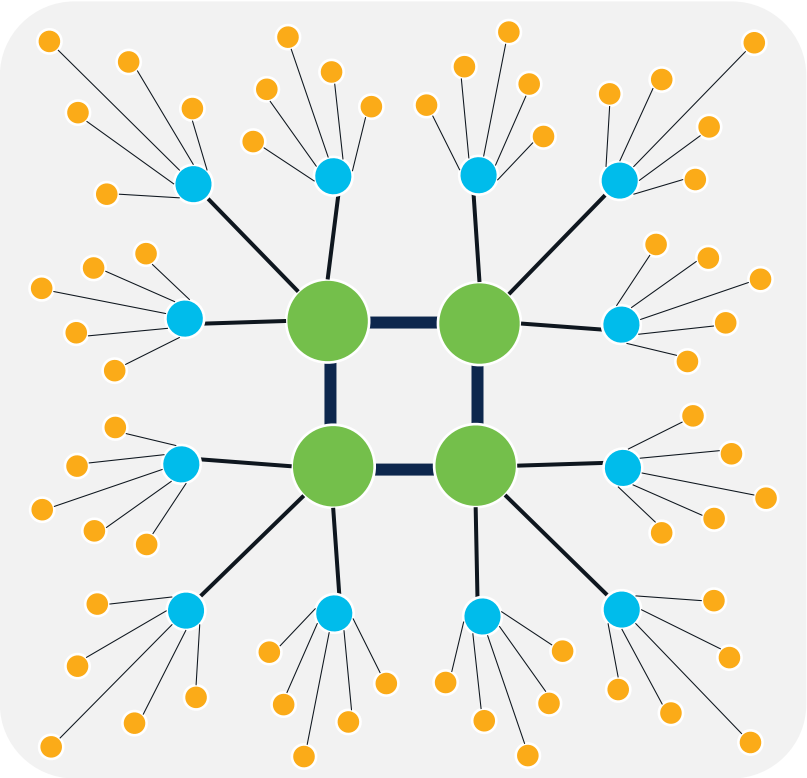
Enabled by the network edge

Augmented with a “middle-mile”

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Taxonomy

Taxonomy



CENTRAL DC	EDGE DC	FAR EDGE
Few **High Capacity** **Internet/Cloud** **CPF** • IMS • Policy • OTT Caches	**10s** **Medium Capacity** **Cloud** **UPF** **MEC hosting** **Edge CDN** **Cloud Gaming**	**100s/1000s** **Low capacity** **Constraints** **Fan-out** **Geo reach** **vCU/vDU, etc.** **150us from radio head**

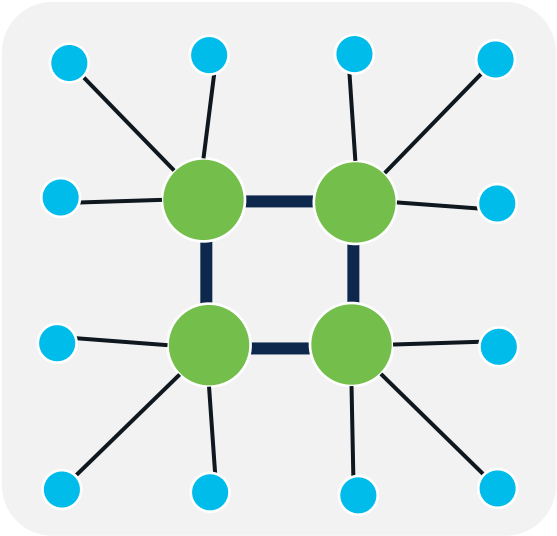
Distributed and Common Carrier-Grade Telco Cloud

Software Defined Programmable Infrastructure

End-to-end Closed-Loop Automation

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Central and Edge DCs

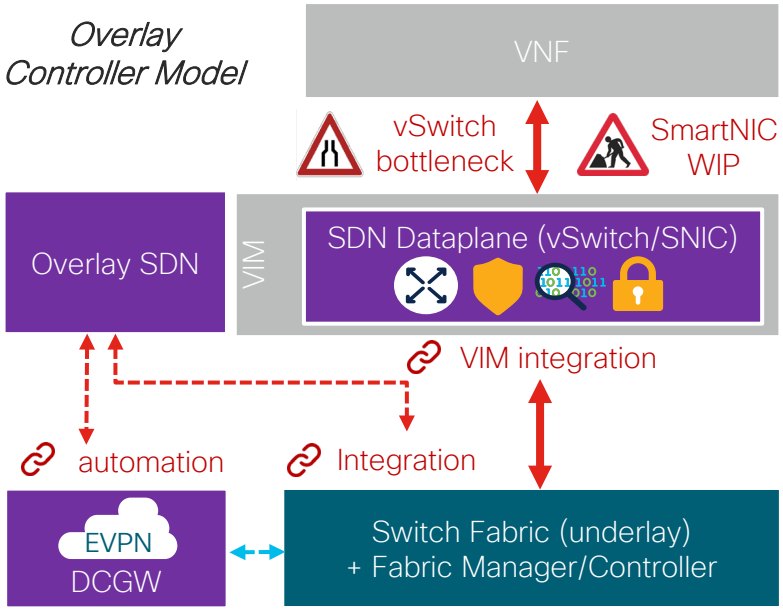


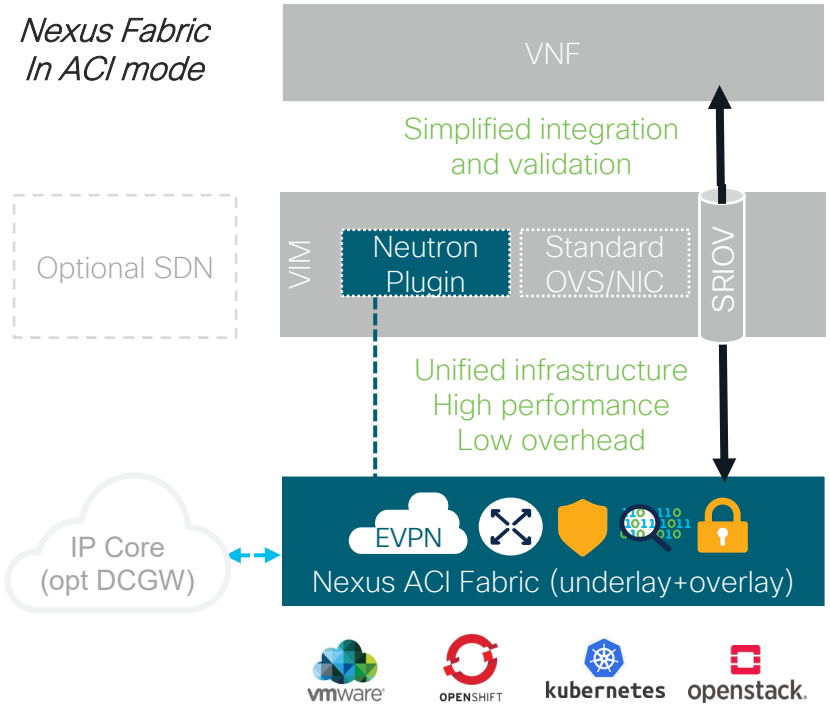
- Intelligent SDN Fabric
- Fully Automated
- Automated DCI
- Secure
- Cloud
- IaaS/CaaS
- Telco-ready
- Visibility

Local Breakouts

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

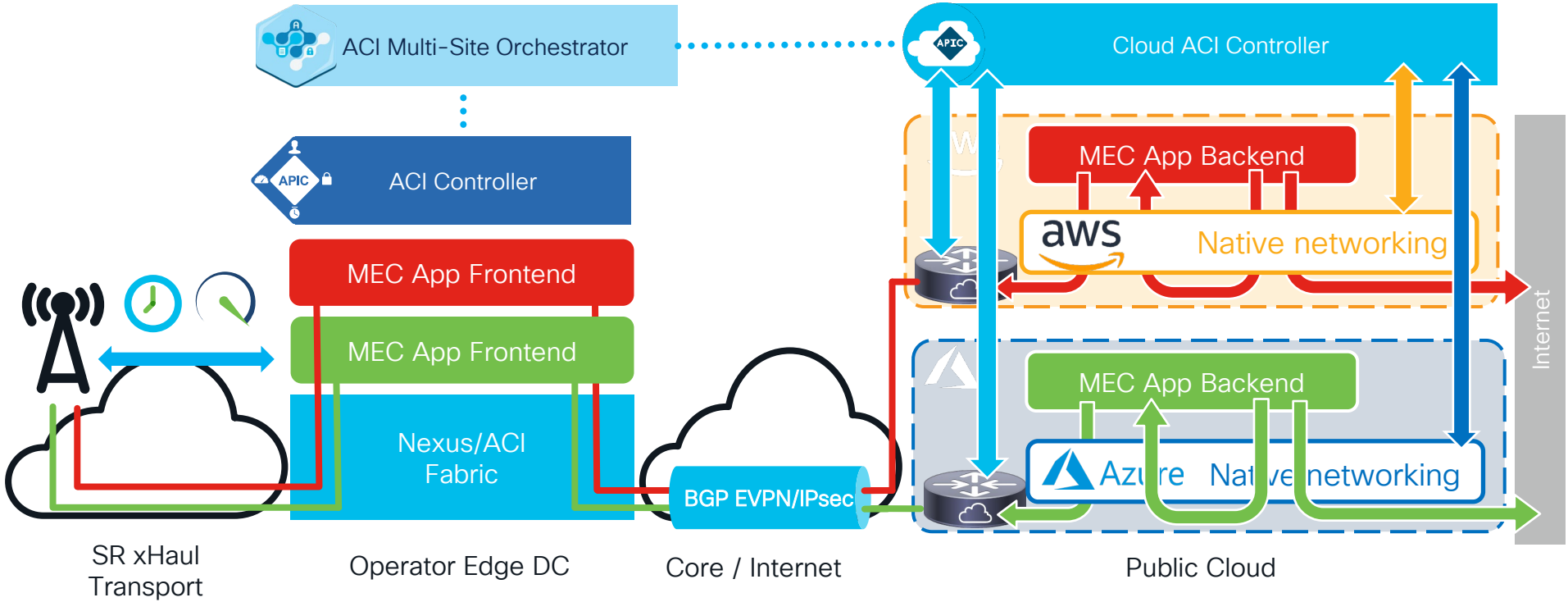
Drastic SDN simplification for IT & Telco-DC





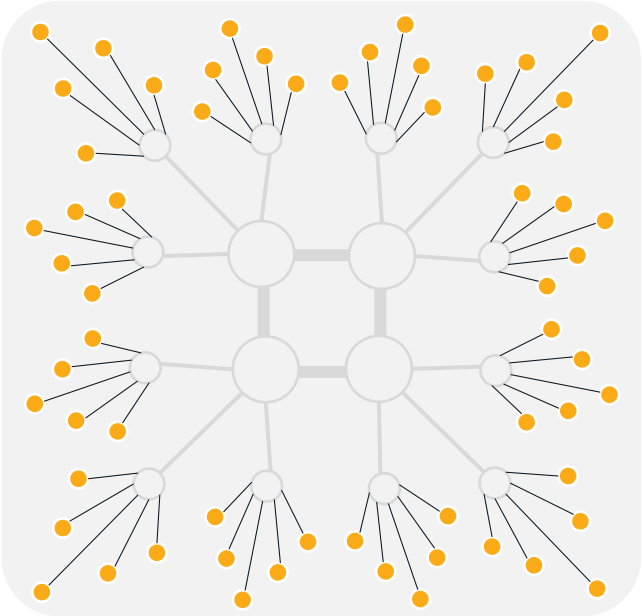
© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Hybrid Cloud MEC use case



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Far Edge



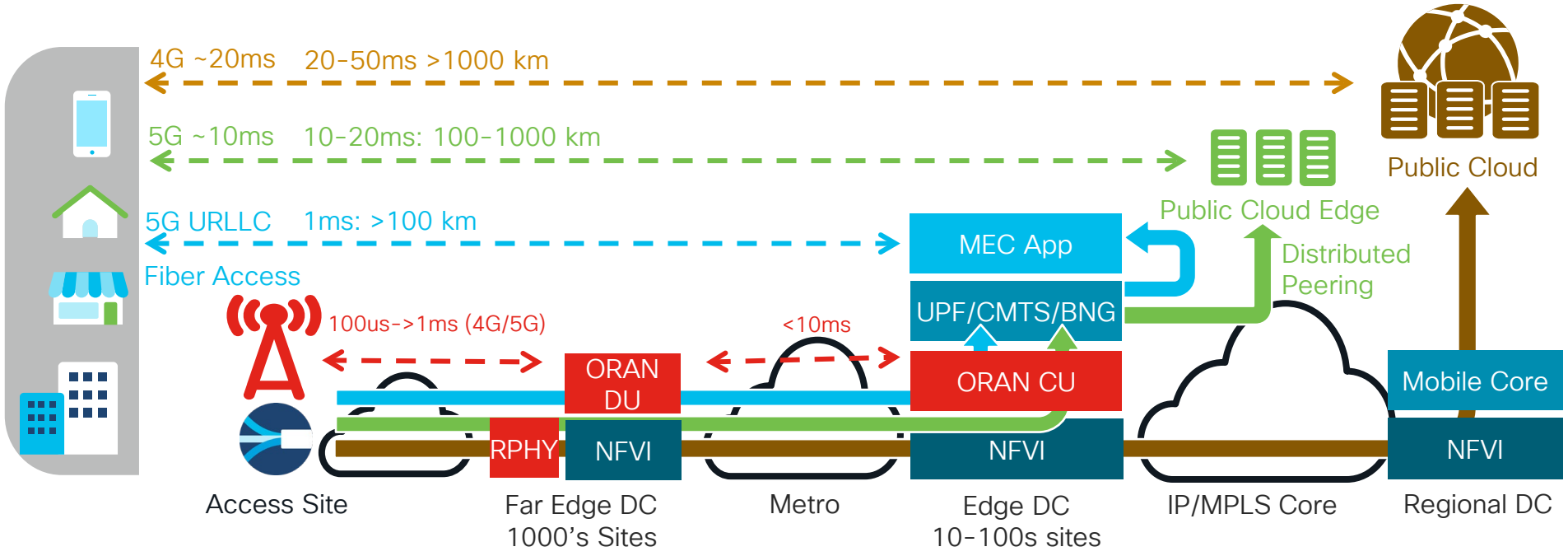
- Physical constraints
- Timing
- Centralized control
- Visibility

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Intelligent Transport

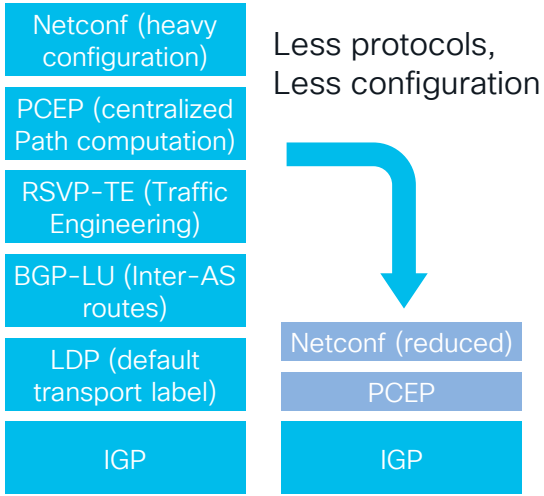
cisco Live!

End to end slicing for Edge Computing



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Simplicity always prevails



Simplified Network Operation

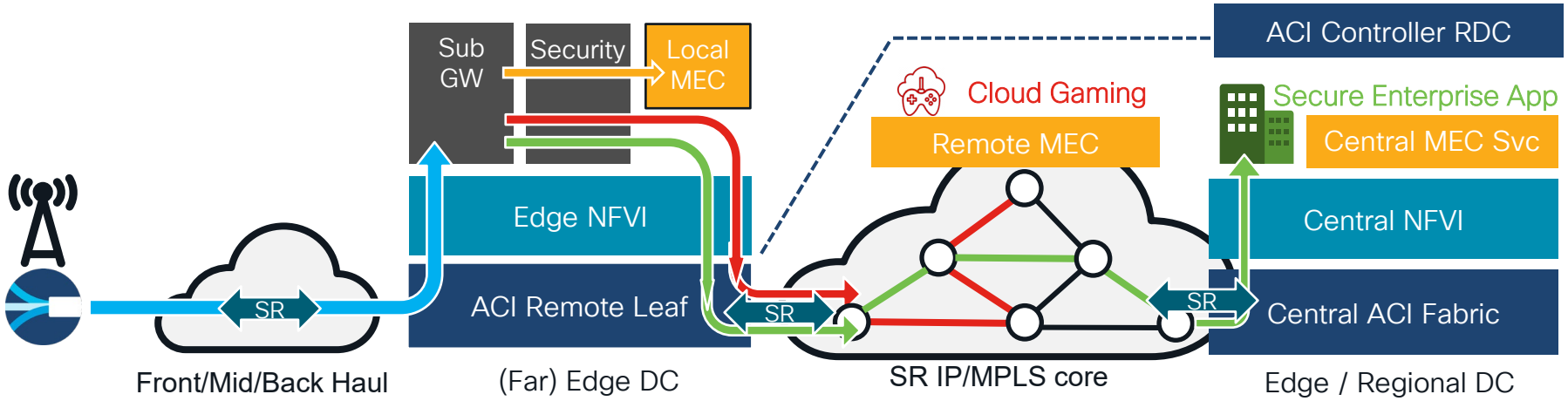
- Simplified automation & orchestration
- Efficient troubleshooting
- Robust routing code
- Stateless TE -> scale

One common architecture to address all current capabilities

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

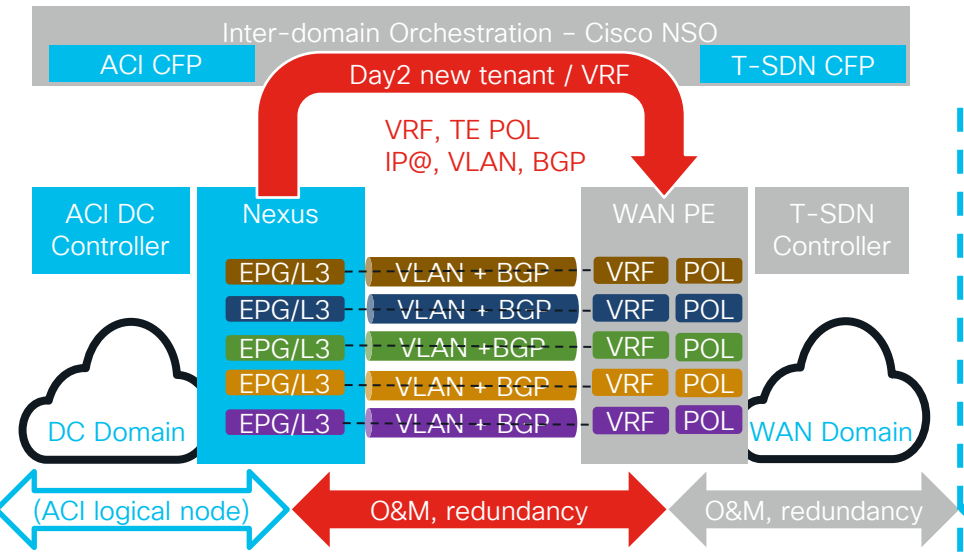
Hand-off

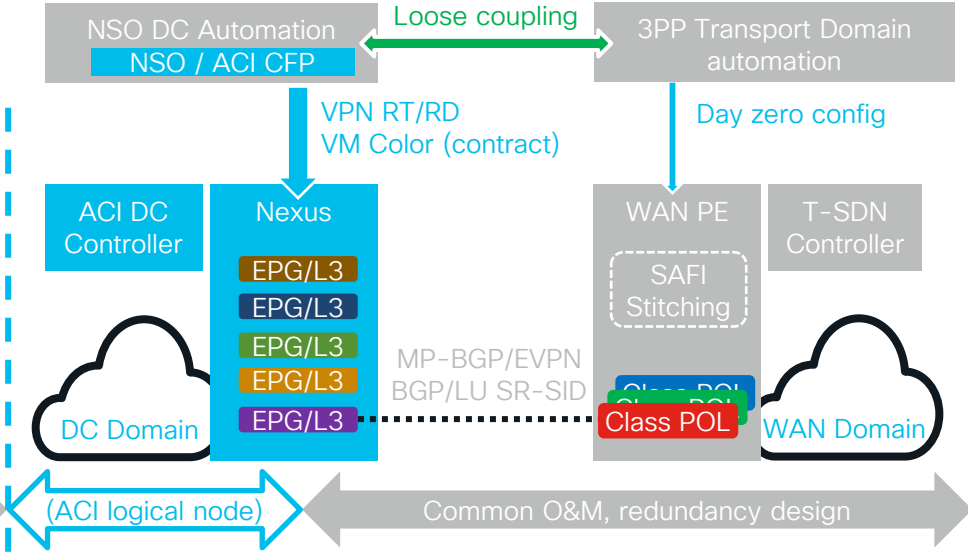
Network slicing: E2E orchestration & SR-TE



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

DC/Transport hand-off & ODN benefits





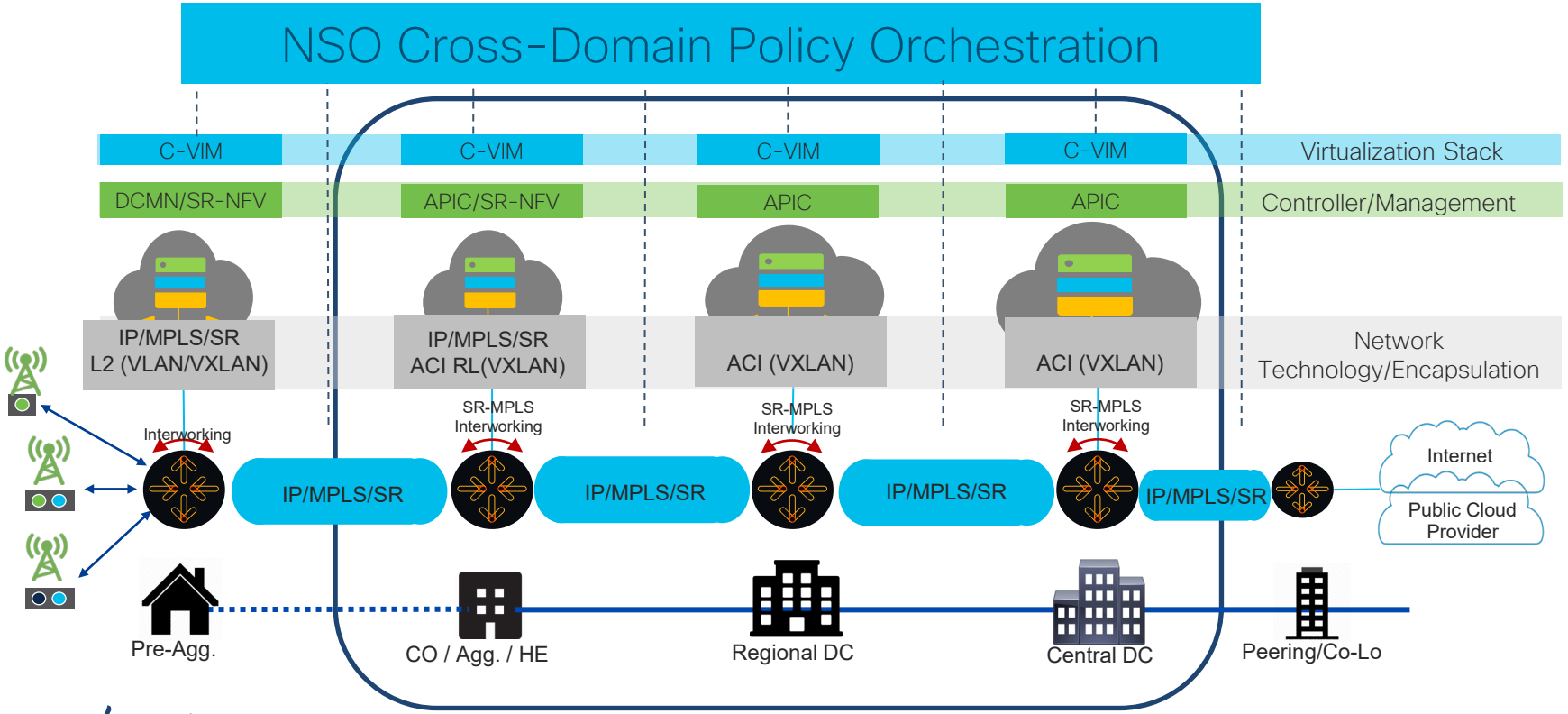
- "A la" Inter-AS option A
  - Heavy configuration of the PE
  - Scalability limits (i.e. BGP sessions)
- Need to synchronize destination specific policies
- Can be done with cross domain automation, dedicated DCGW (NSO, ACI / TSDN CFP)

- Greater Scaling (single BGP session)
- Simplified provisioning (simplified VRF configuration – option B style)
- Could replace DCGW function
- Color routes / packets independent from VRF / endpoint specific configuration
- SR MPLS bookending, single AS option

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

End-to-end Automation

End-to-end Automation



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

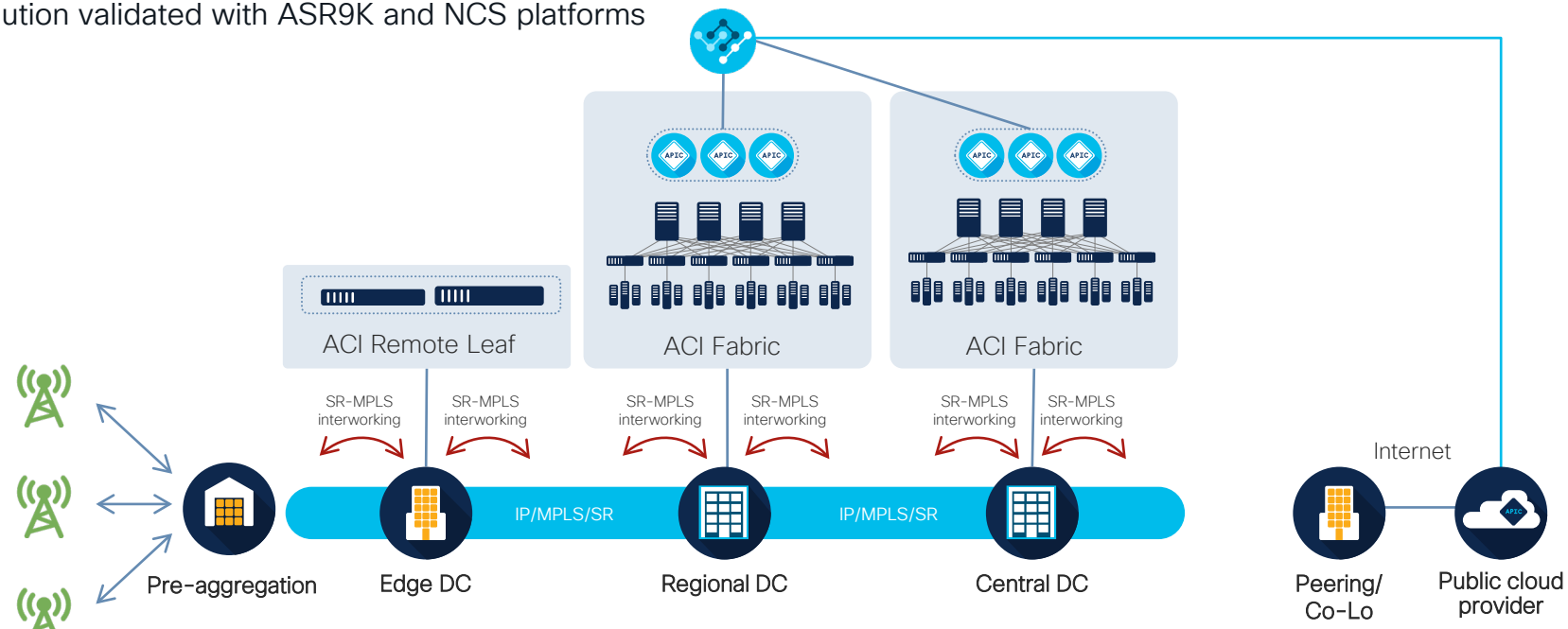
Details of ACI SR/MPLS handoff implementation with NSO

cisco Live!

ACI 5.0(1)
May, 2020

ACI to SR/MPLS handoff

- Unified Segment routing (SR/MPLS) based transport network
- Building consistent end to end policy across DC and SP transport networks
- Solution validated with ASR9K and NCS platforms

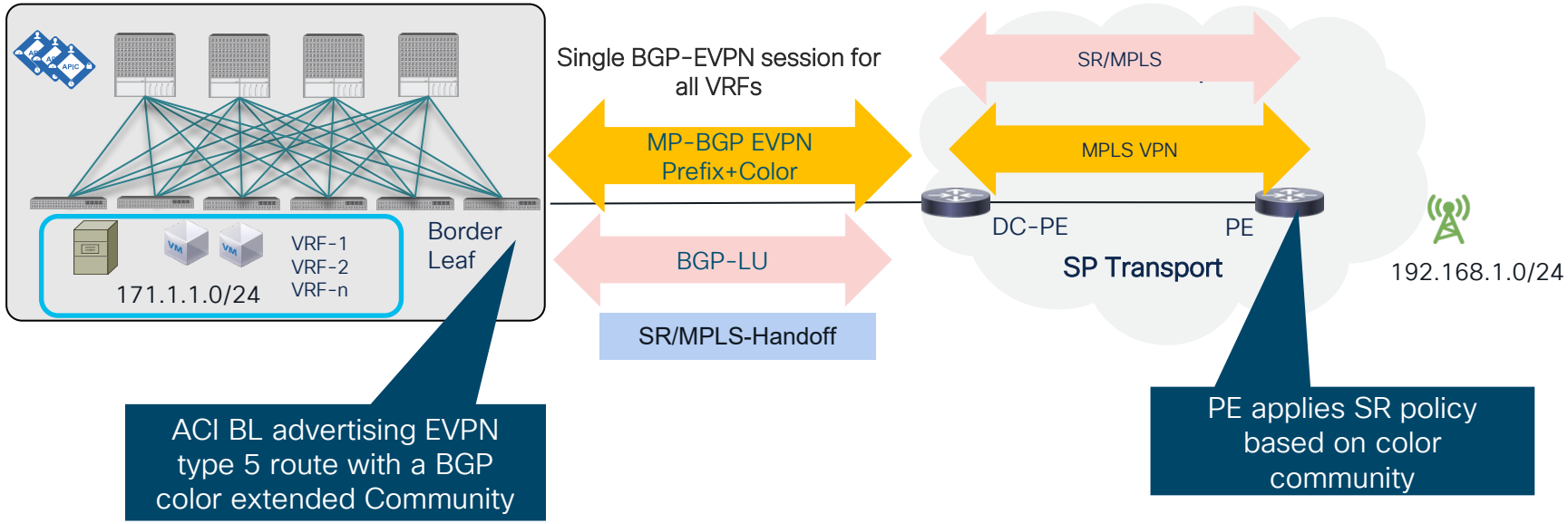


© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Use-Cases

SR policy in transport using color community

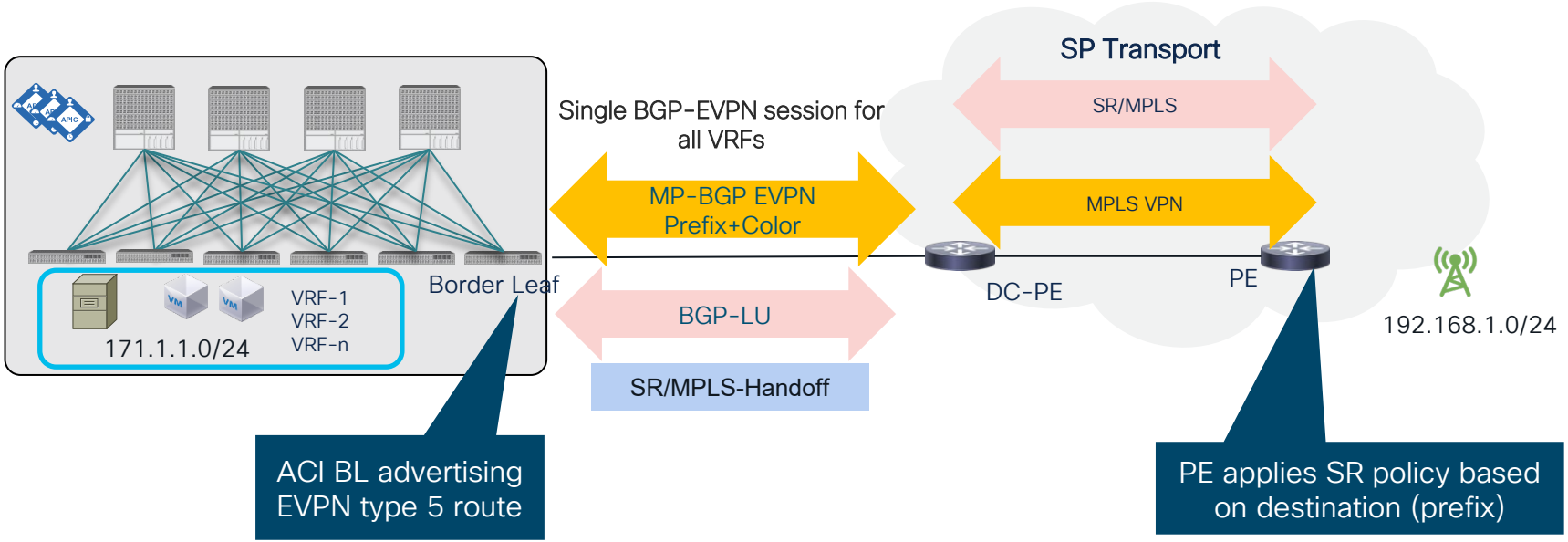
- Advertise color community for a prefix from ACI BL, and use it on PE to define a SR policy in transport



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

SR policy in transport using destination prefix

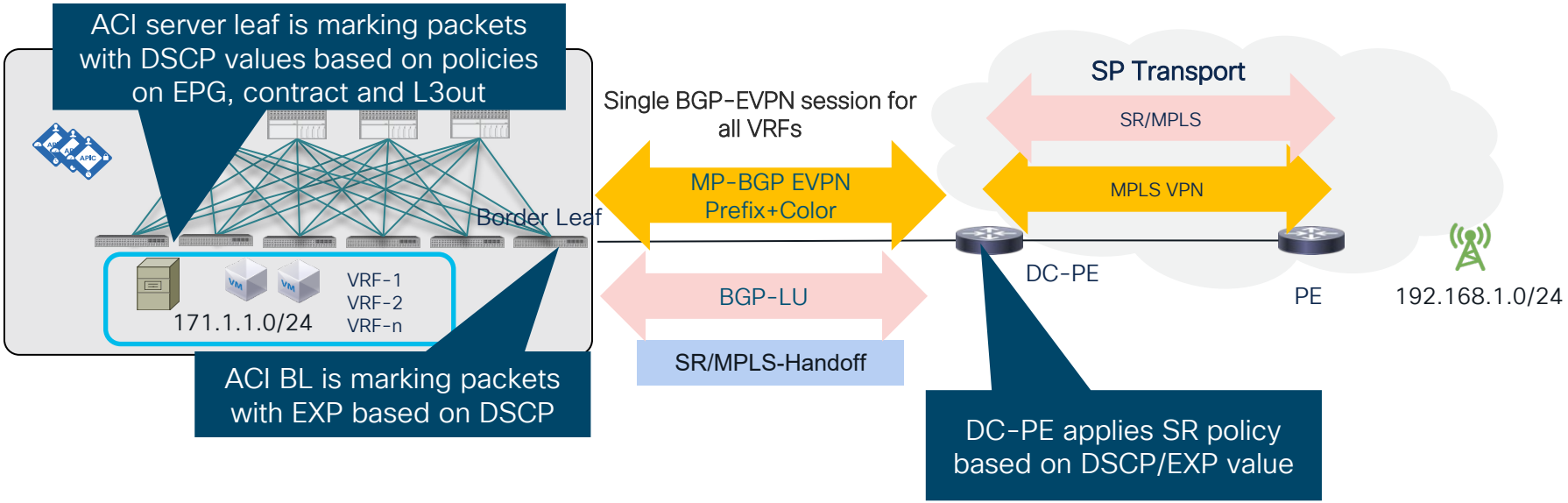
- Advertise EVPN type 5 prefix from ACI BL, and map it on PE to define a SR path in transport
- Recommendation to use color community to reduce configuration on PE. Destination prefix-based SR policy can be used when color community is not supported.



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Per-Flow automated Steering in transport

- ACI BL can mark packets going to transport network with DSCP/EXP values
- DC-PE to define SR policy in transport based on DSCP/EXP values from ACI BL

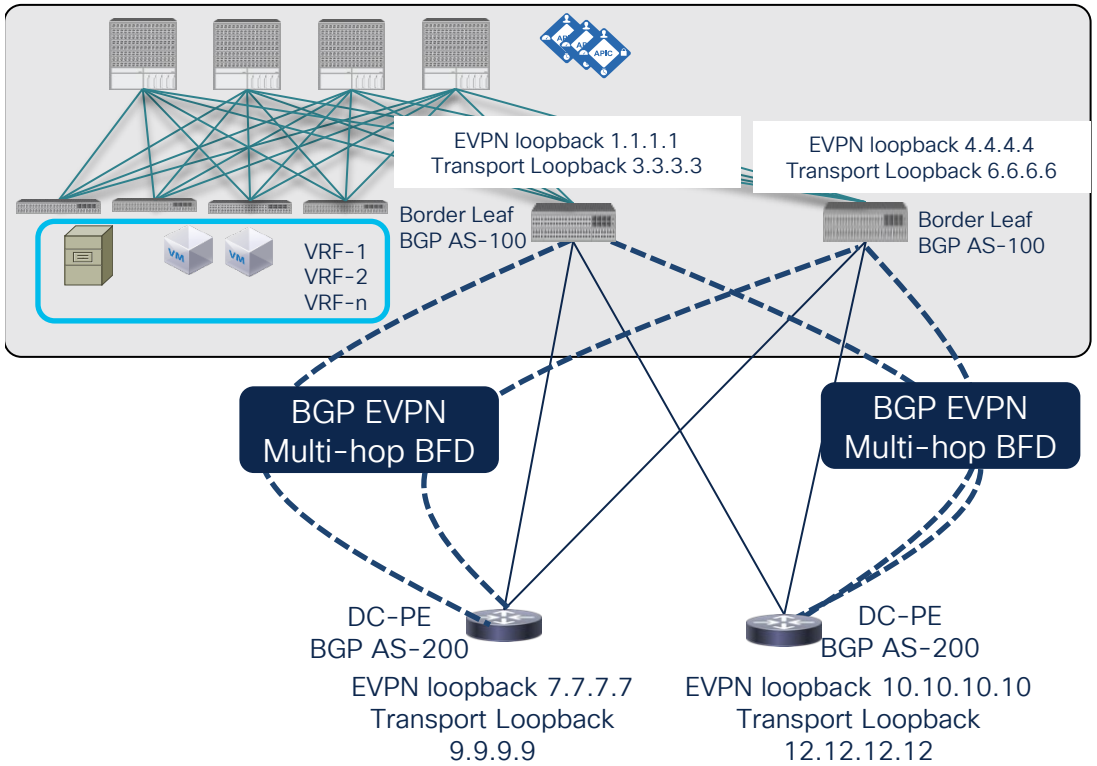


© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Control and Data Plane

BGP EVPN session between ACI BL and DC-PE

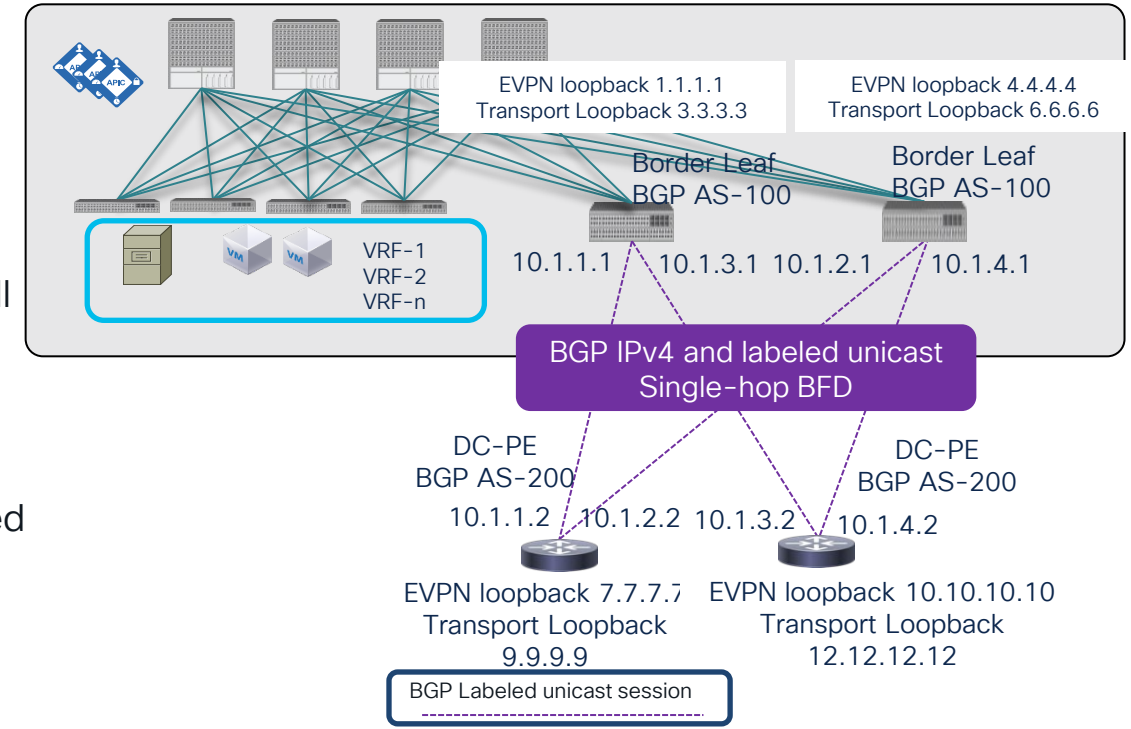
- BGP EVPN session advertises VPN prefixes, VPN label, and BGP communities including color community
- Multi-hop BFD EVPN session is required to detect the failure of BGP session faster and provide better convergence. Minimum supported BFD timer is 250msec, and minimum detect multiplier is 3.
- Loopbacks on BGP EVPN sessions
  - EVPN loopback for control plane session
  - Transport loopback for dataplane



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Underlay BGP sessions between ACI BL and next-hop router

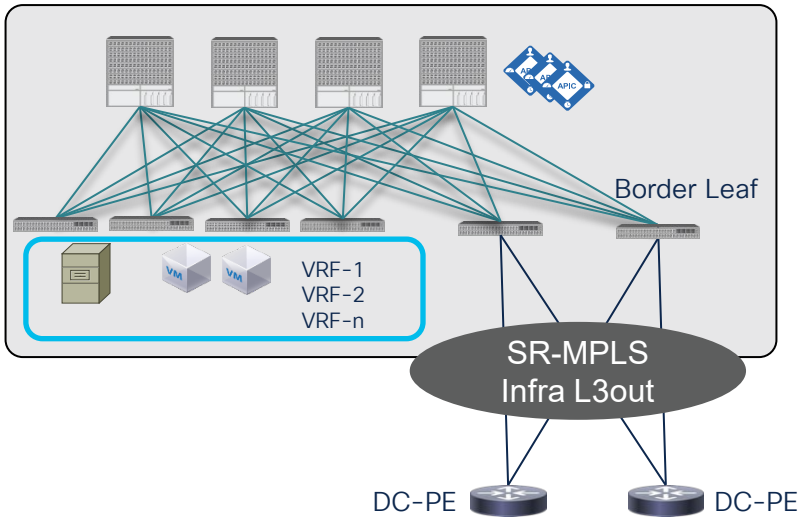
- Per interface eBGP IPv4 and labeled unicast address-family between ACI BL and directly connected router.
- BGP IPv4 address family automatically advertise EVPN loopbacks
- BGP labeled unicast address family will automatically advertise SR transport loopback with SR MPLS label
- Single hop BFD session is faster to detect soft failures. Minimum supported BFD timer is 50msec, and minimum detect multiplier is 3



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

ACI SR-MPLS Infra L3out

- SR-MPLS Infra L3out is configured in Infra Tenant on Border Leaf to setup underlay BGP Labeled unicast (BGP-LU) and overlay BGP-EVPN sessions
- Tenant VRFs are selectively attached to ACI Infra-L3out(s) to advertise Tenant prefixes to DC-PE routers and import MPLS VPN prefixes from DC-PE
- An Infra-L3out will be scoped to a POD or RL pair and not extended across PODs or RL pair
- A POD or Remote Leaf pair can have 1 or more Infra-L3out(s)
- All nodes in a single infra L3out will automatically build BGP EVPN session with DC-PE, and provide redundancy



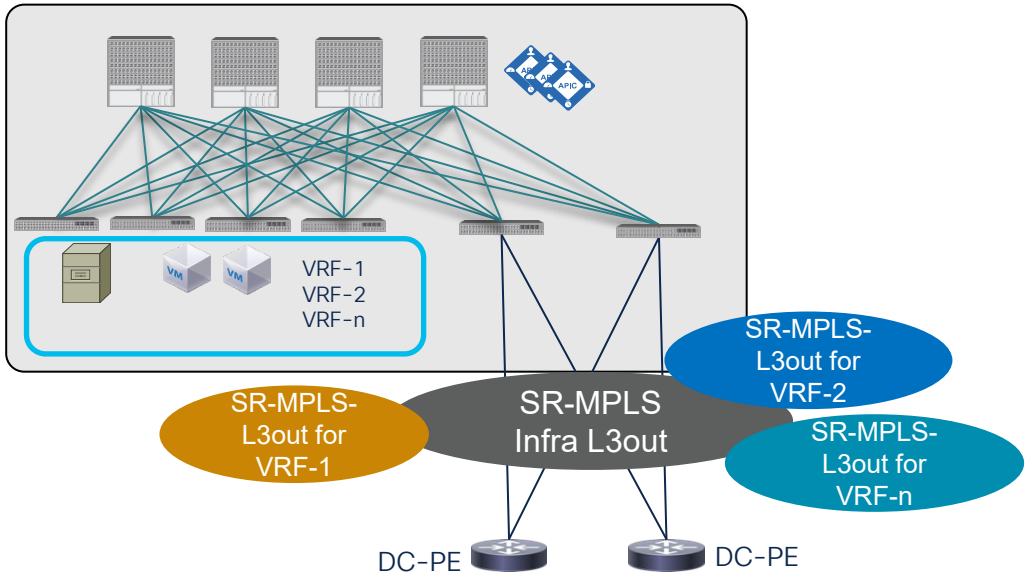
© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

ACI SR-MPLS VRF L3out

- Each VRF that needs to be extended towards SR MPLS transport needs to configured with SR-MPLS VRF L3out and be associated to SR-MPLS-Infra L3out

- Import and export route-map can be configured to
  - apply route-policies based on prefixes and/or communities
  - Advertise prefixes into SR network
  - filter prefixes from SR network

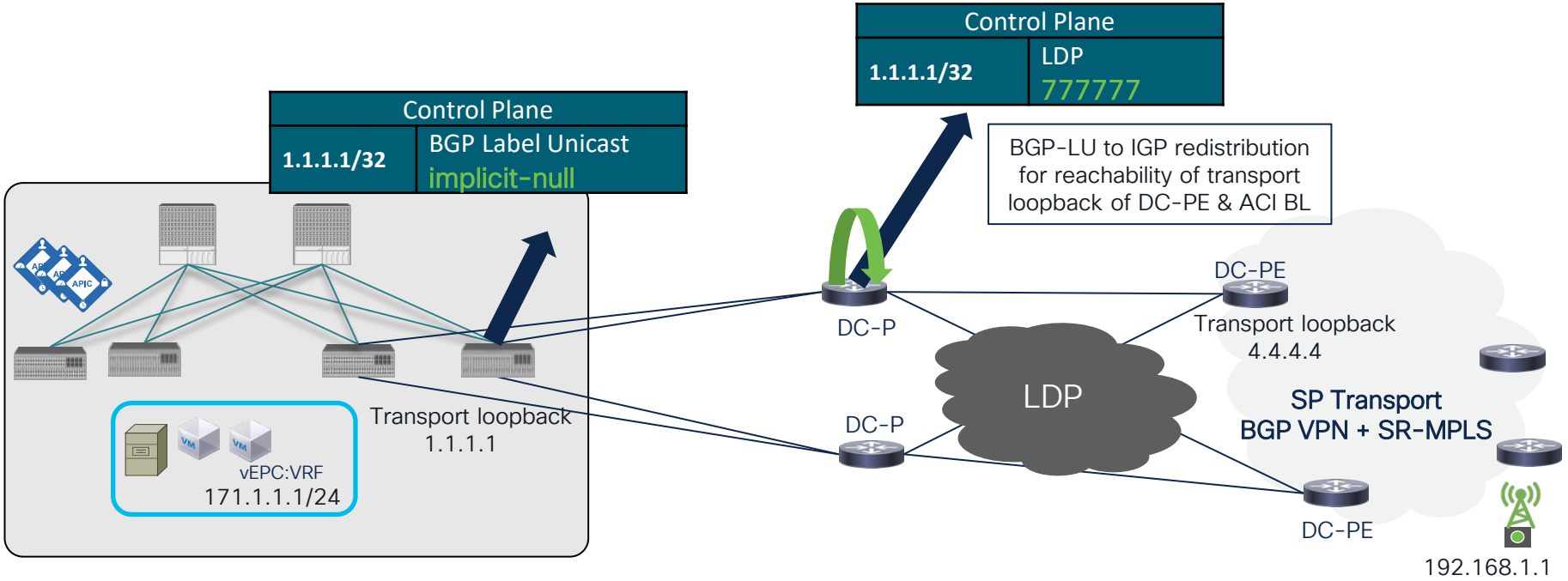
- External EPG with subnet needs to be configured on user L3out for
  - Security policies (contract)
  - PBR policies
  - Route leaking between VRFs



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

MPLS LDP Network ACI BL and DC-PE

- BGP labeled unicast address-family between DC-P and ACI BL is advertising MPLS label without label index
- MPLS LDP is configured between DC-P and DC-PE. MPLS LDP is not supported on ACI BL.



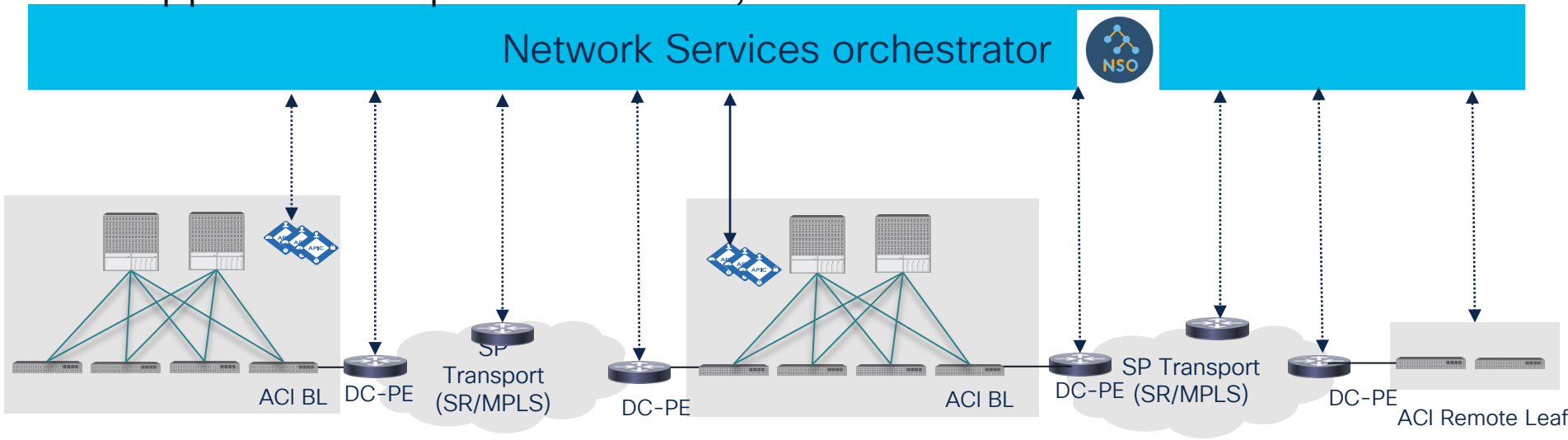
© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

NSO CFP

cisco Live!

Supported topologies for DC (ACI) CFP

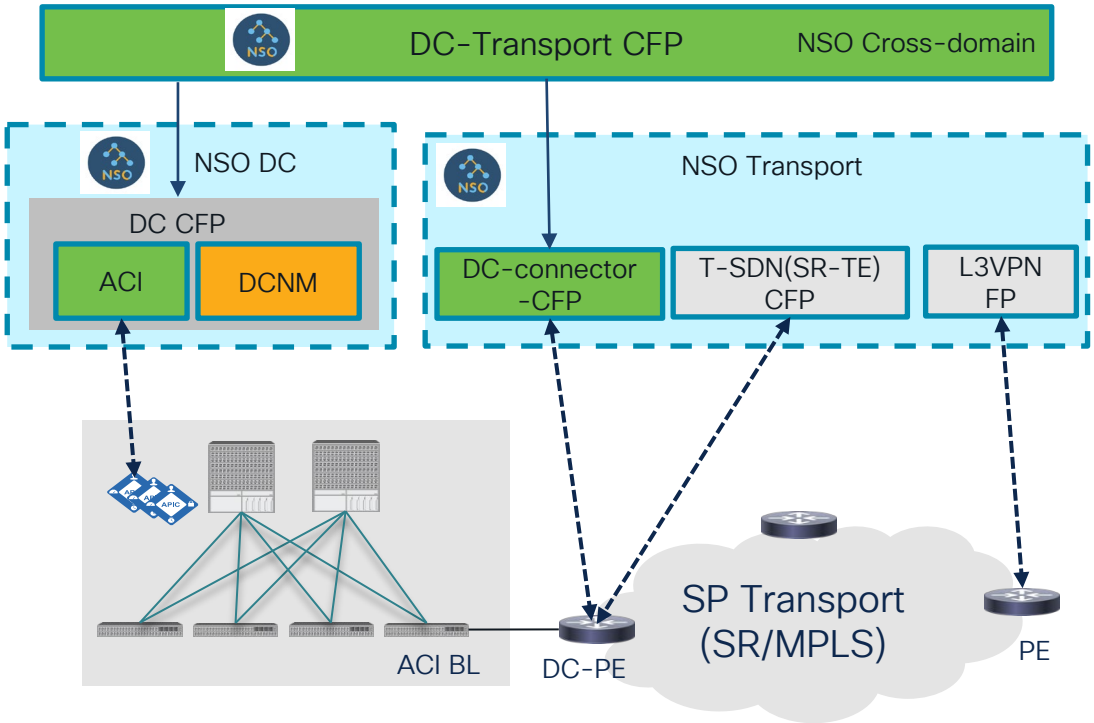
- Multi-Domain Orchestration across Transport and DC
- Telco DC provisioning, and DC handoff provisioning for both IP and SR handoff
- Support of multiple ACI Fabrics, Multi-Pod & RL



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

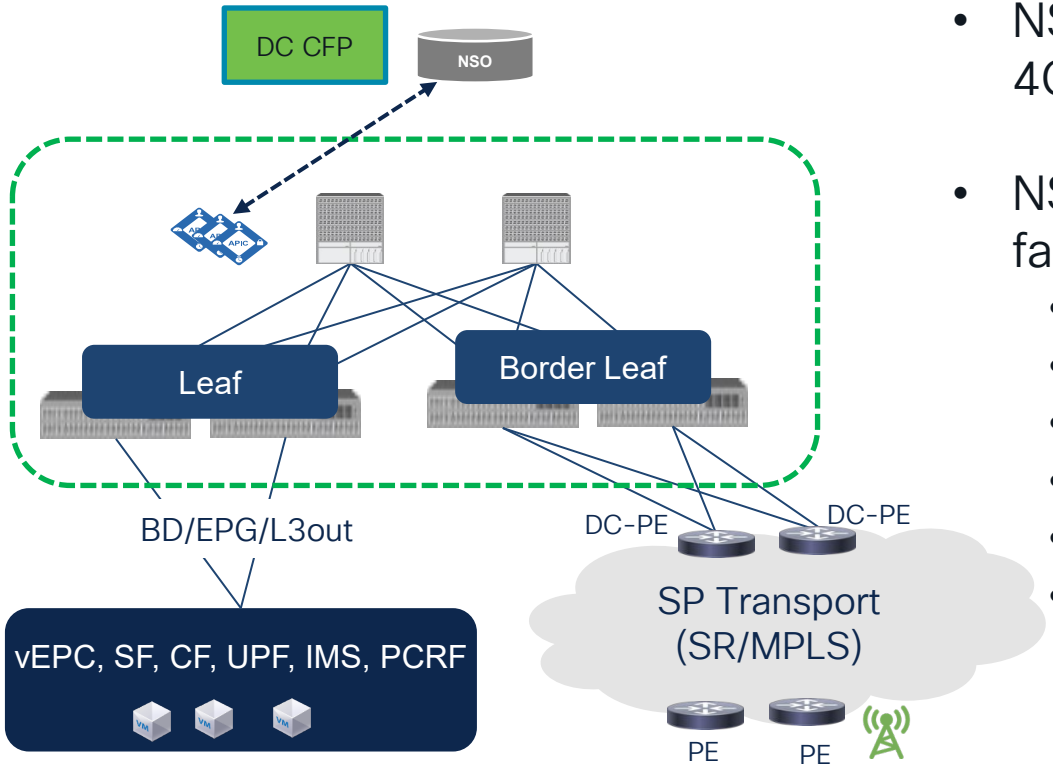
NSO Cross-domain core function Pack

- Cross-domain CFP to provision DC to transport handoff for both IP and SR handoff using DC CFP and DC-Transport-CFP
- Multi-NSO support
- Support of Multiple ACI Fabrics from single NSO



© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

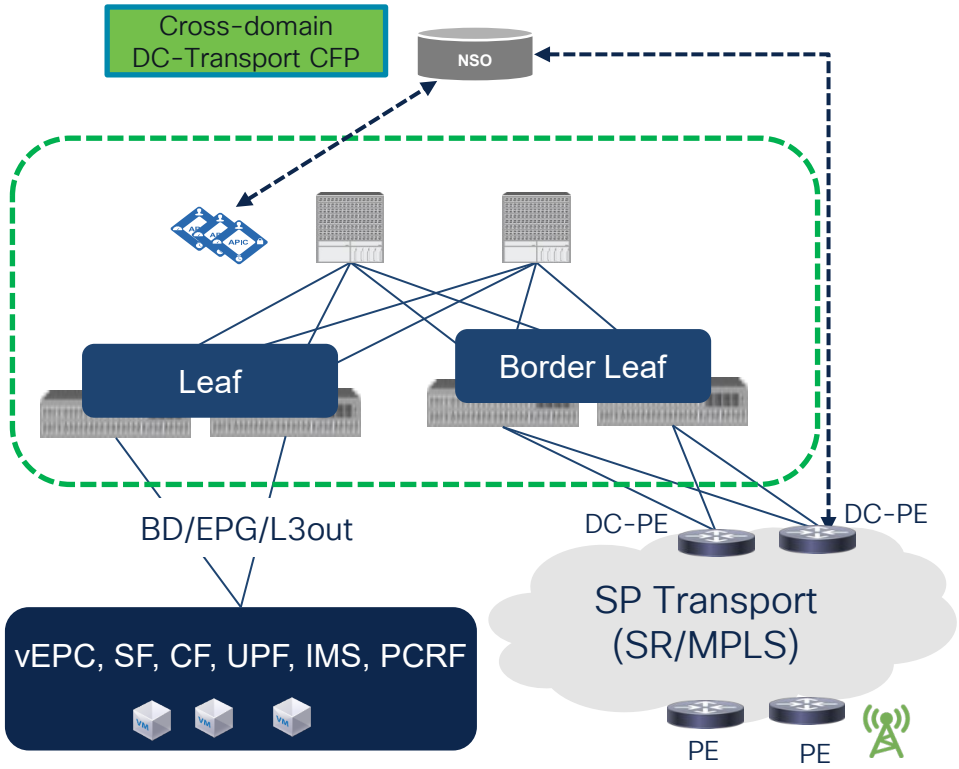
ACI CFP use-case
Telco cloud deployment



- NSO to push ACI policies to bring up 4G/5G services
- NSO will automate following in DC fabric
  - Interface, VLANs, policies
  - Tenant, EPG, BD, VRF, contracts
  - Routing (BGP, static route)
  - Route-maps
  - Service chaining (PBR)
  - QOS

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

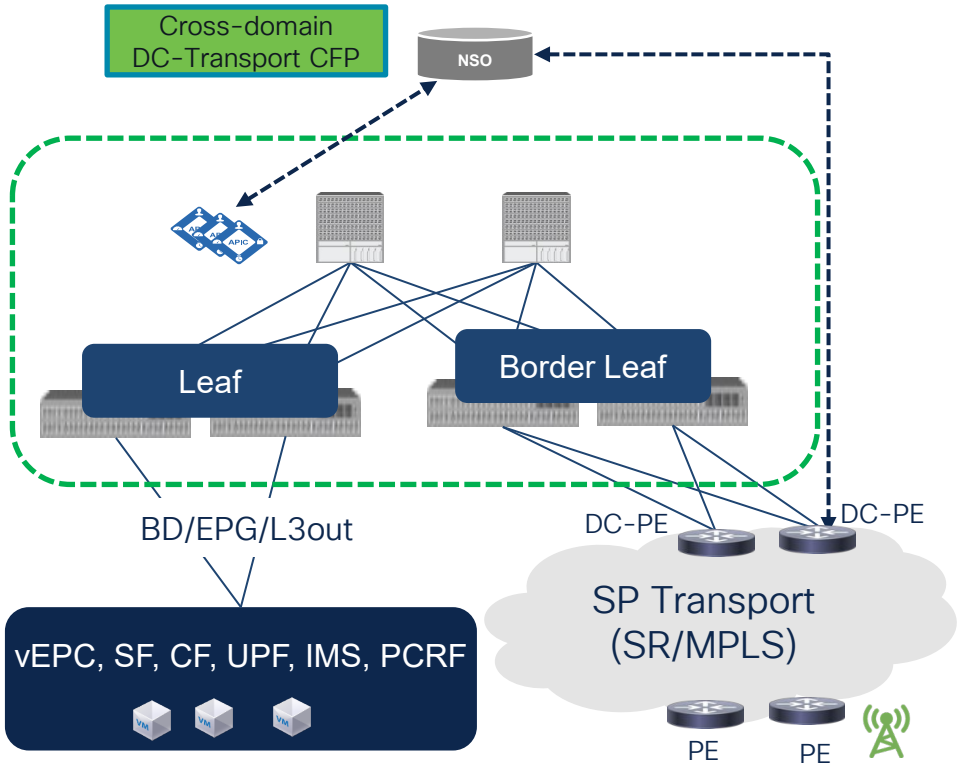
Cross-domain core function pack (IP handoff)



- NSO will automate following on ACI BL and DC-PE
  - VRF, RT, RD, VPN
  - Physical/logical interface
  - VLAN and IP address management for interfaces between DC-PE and ACI BL
  - Router-id auto-allocation
  - Routing (BGP, static route)
  - BFD
  - Routing policies
- Map prefixes, DSCP to SR policies on DC-PE

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

Cross-domain core function pack (SR handoff)



- NSO to automate following configuration on ACI BL and DC-PE
  - Configuration and management of VLAN and IP addresses for underlay BGP-LU, EVPN loopback, transport loopback, RD, RT, VLAN, SID, and Router-id
  - MPLS QOS policies
  - BGP EVPN and labeled unicast session
  - Single and Multi-hop BFD
  - Routing policies such as BGP color community
  - SR/MPLS QOS policies
- RT Translation from EVPN to L3VPN on DC-PE
- Map BGP color-community, prefixes, DSCP/EXP to SR policies on DC-PE

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

SR-MPLS hand-off

End-to-end policy across domains

Better scale

Simpler automation and operation

© 2021 Cisco and/or its affiliates. All rights reserved. Cisco Public

The bridge to possible

Thank you


cisco Live!
TURN
IT
UP
#CiscoLive