



The bridge to possible

# Q-in-VNI over VxLAN Fabric Deployment

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CISCO *Live!*

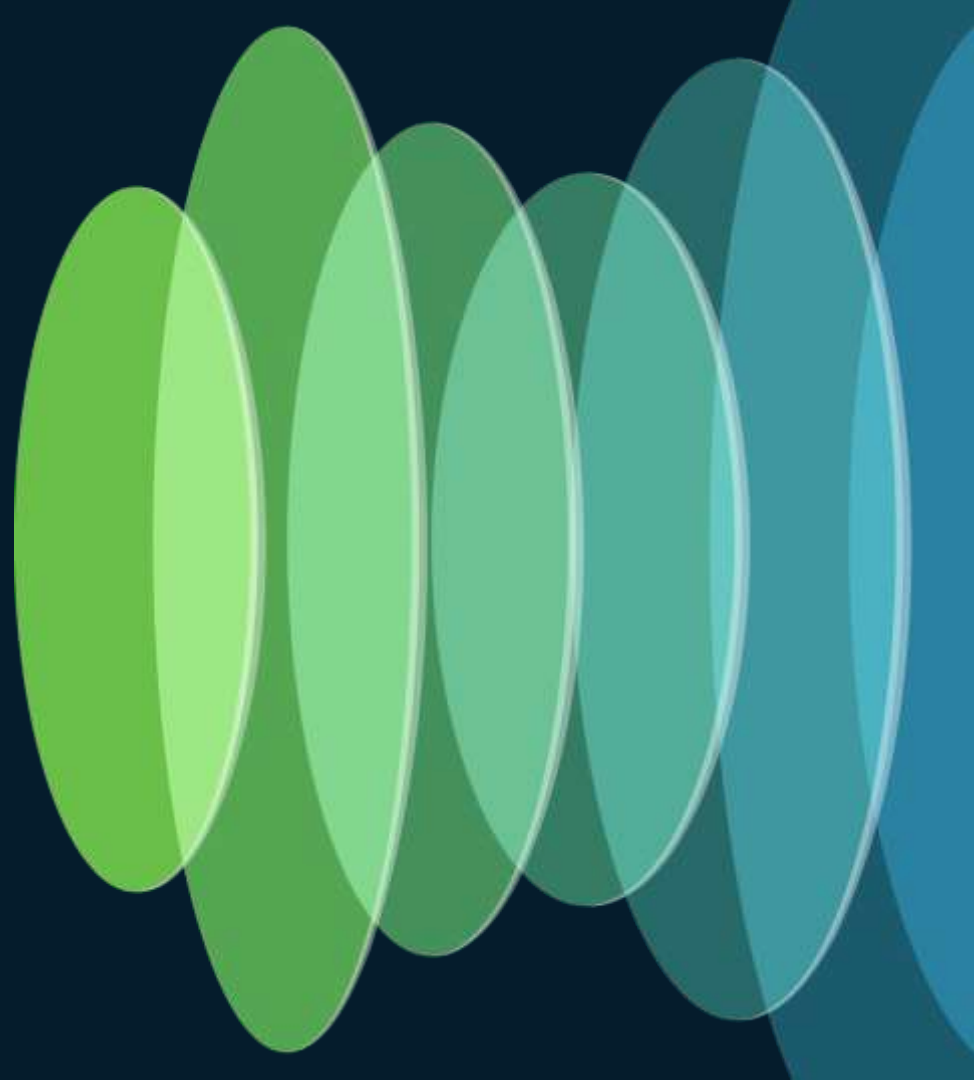
#CiscoLive



# Agenda

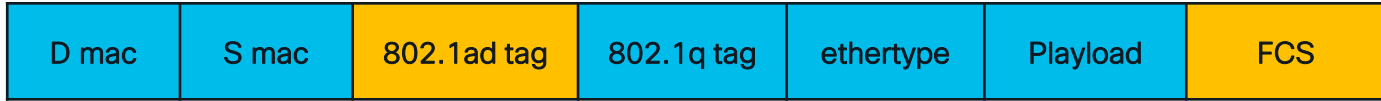
- Overview
- Q-in-VNI Features
- Summary
- References

# Overview

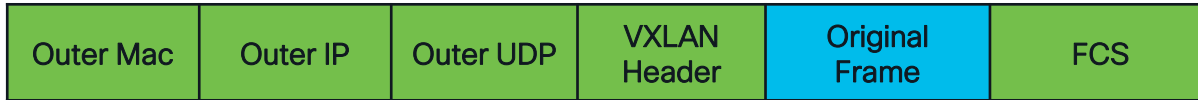


# Overview

Q-in-Q  
tagged  
frame



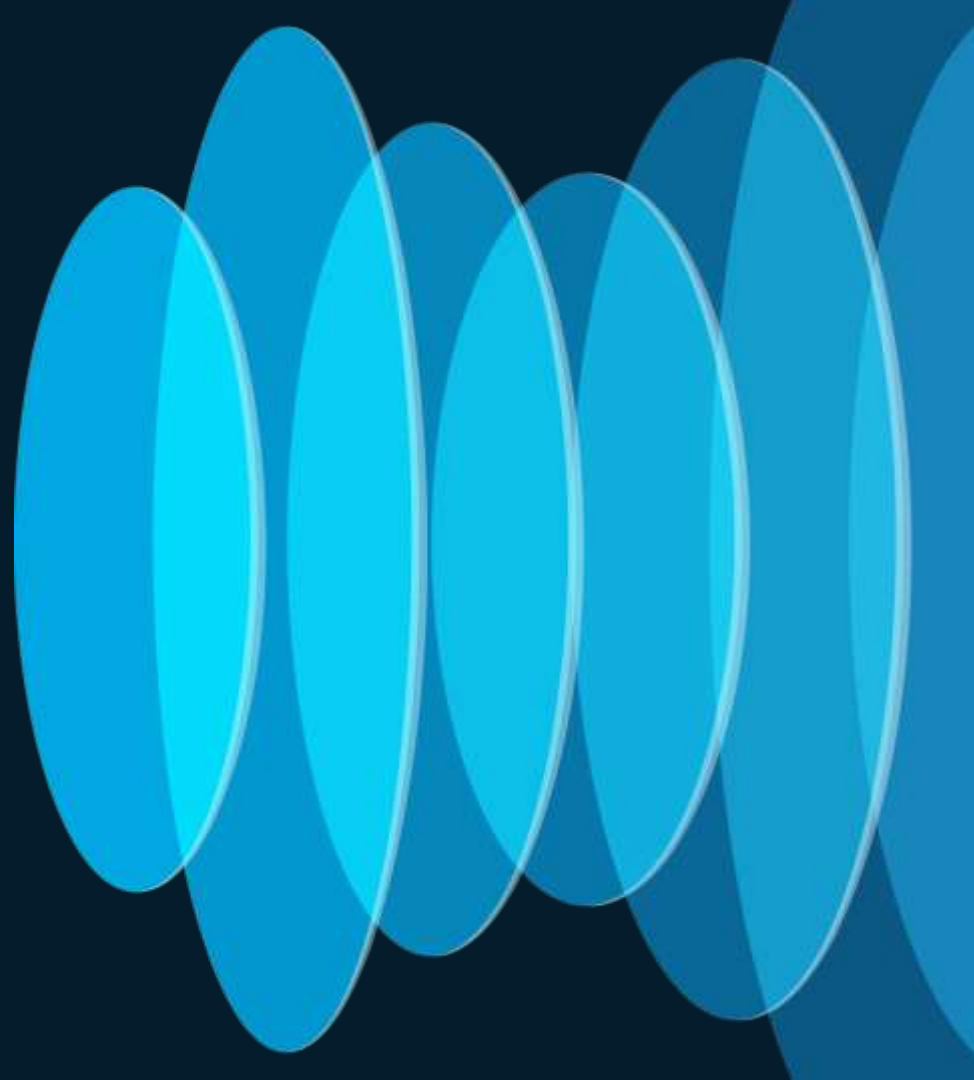
VXLAN  
encap  
frame



Q-in-VNI  
tagged  
frame



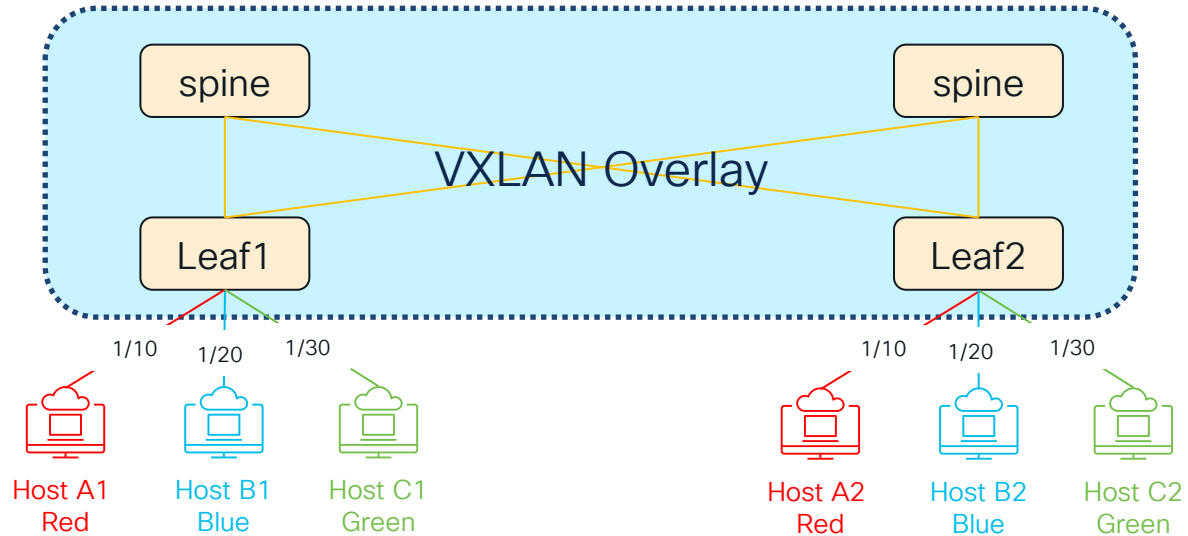
# Q-in-VNI Concepts



# Q-in-VNI Features

- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- VLAN mapping
- QinQ-QinVNI Multi tag
- QinVNI with Layer 2 Protocol Tunneling
- Cross-connect

# Q-in-VNI with VxLAN EVPN

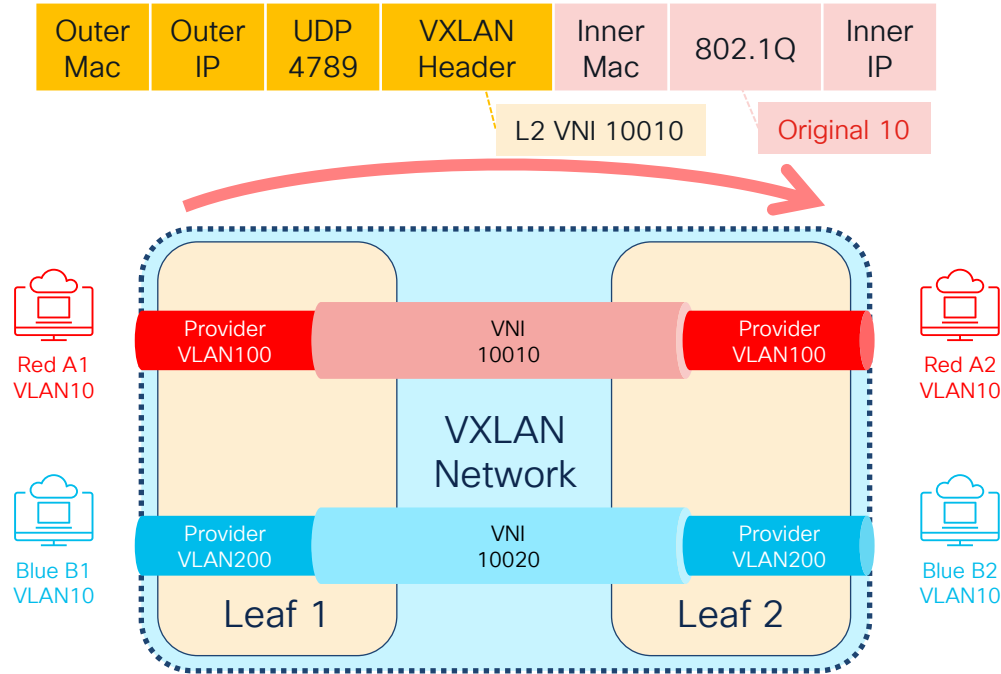


# Q-in-VNI Features

- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- VLAN mapping
- QinQ-QinVNI Multi tag
- QinVNI with Layer 2 Protocol Tunneling
- Cross-connect



# Q-in-VNI



## PE Interface

```
Switch(config)# interface Ethernet1/10
switch(config-if)# description Q-in-VNI for Cu-Red
switch(config-if)# switchport mode dot1q-tunnel
switch(config-if)# switchport access vlan 100
```

## Switch Level

```
switch(config) vlan 100
switch(config-vlan) vn-segment 10010
switch(config) system dot1q-tunnel transit
```



# Q-in-VNI

## Troubleshooting

```
#show consistency-checker vxlan qinvni
```

```
system dot1q tunnel transit not enabled on this box
```

```
qinvni_interfaces: ['Eth1/10']
```

```
qinvni_vlans: [100]
```

```
RWXVifTable programming verified for provider_type
```

```
RWSrcPortTable programming verified for keep_inner_qtag
```

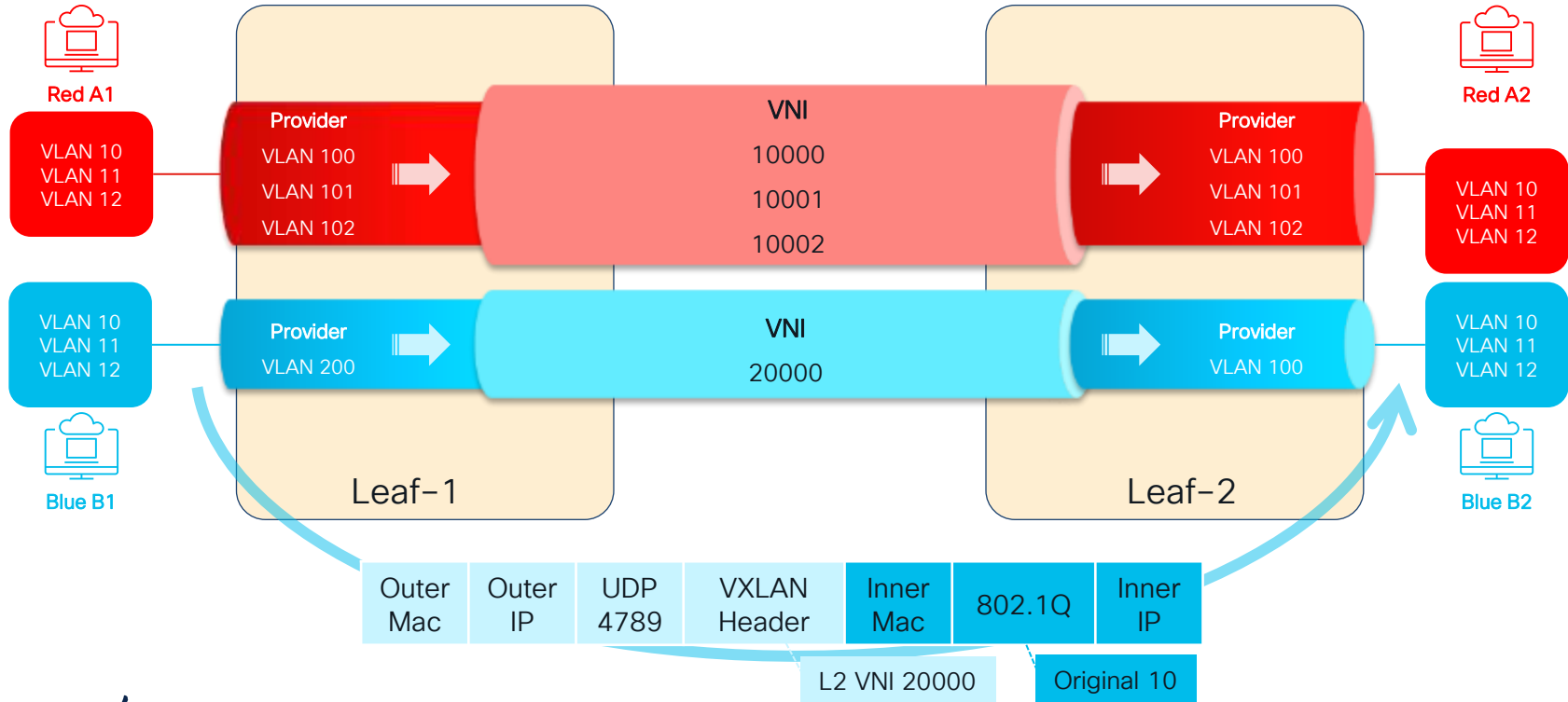
```
RWBdStateTable programming verified for provider_bd
```

```
QinVni cc verified successfully
```

# Q-in-VNI Features

- Q-in-VNI
- **Selective Q-in-VNI with multiple provider VLANs**
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# Selective Q-in-VNI with multiple provider VLANs



# Selective Q-in-VNI with multiple provider VLANs

## PE Interface

```
switch(config)# interface Ethernet1/10
switch(config-if)# description Selective QinVNI multiple Pvlans C-red
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping 10 dot1q-tunnel 100
switch(config-if)# switchport vlan mapping 11 dot1q-tunnel 101
switch(config-if)# switchport vlan mapping 12 dot1q-tunnel 102
```

```
switch(config)# interface Ethernet1/20
switch(config-if)# description Selective QinVNI multiple Pvlans C-Blue
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping 10-12 dot1q-tunnel 200
```

## Switch Level

```
switch(config) vlan 100
switch(config-vlan) vn-segment 10000
switch(config) vlan 101
switch(config-vlan) vn-segment 10001
switch(config) vlan 102
switch(config-vlan) vn-segment 10002
..
switch(config) vlan 200
switch(config-vlan) vn-segment 20000
```

# Selective Q-in-VNI with multiple provider VLANs

## PE Interface

```
switch(config)# interface Ethernet1/10
switch(config-if)# description Selective QinVNI multiple Pvlans C-red
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping 10 dot1q-tunnel 100
switch(config-if)# switchport vlan mapping 11 dot1q-tunnel 101
switch(config-if)# switchport vlan mapping 12 dot1q-tunnel 102
switch(config-if)# switchport vlan mapping 15-20 dot1q-tunnel 150

switch(config)# interface Ethernet1/20
switch(config-if)# description Selective QinVNI multiple Pvlans C-Blue
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping 10-12 dot1q-tunnel 200
```

## Switch Level

```
switch(config) vlan 100
switch(config-vlan) vn-segment 10000
switch(config) vlan 101
switch(config-vlan) vn-segment 10001
switch(config) vlan 102
switch(config-vlan) vn-segment 10002
..
switch(config) vlan 150
switch(config-vlan) vn-segment 10050
switch(config) vlan 200
switch(config-vlan) vn-segment 20000
```

# Selective Q-in-VNI with multiple provider VLANs

## Troubleshooting

**#show consistency-checker vxlan selective-qinvni**

Runs the selective Qinvni consistency checker on all the selective Qinvni configured ports on the box. This CC checks the port properties and the ingress vlan translate entries.

**#show consistency-checker vxlan selective-qinvni**

system dot1q tunnel transit not enabled on this box

Box level hardware programming checks : PASS

Performing port specific checks for intf Eth1/10

Port specific selective QinVNI checks for interface Eth1/10 : PASS

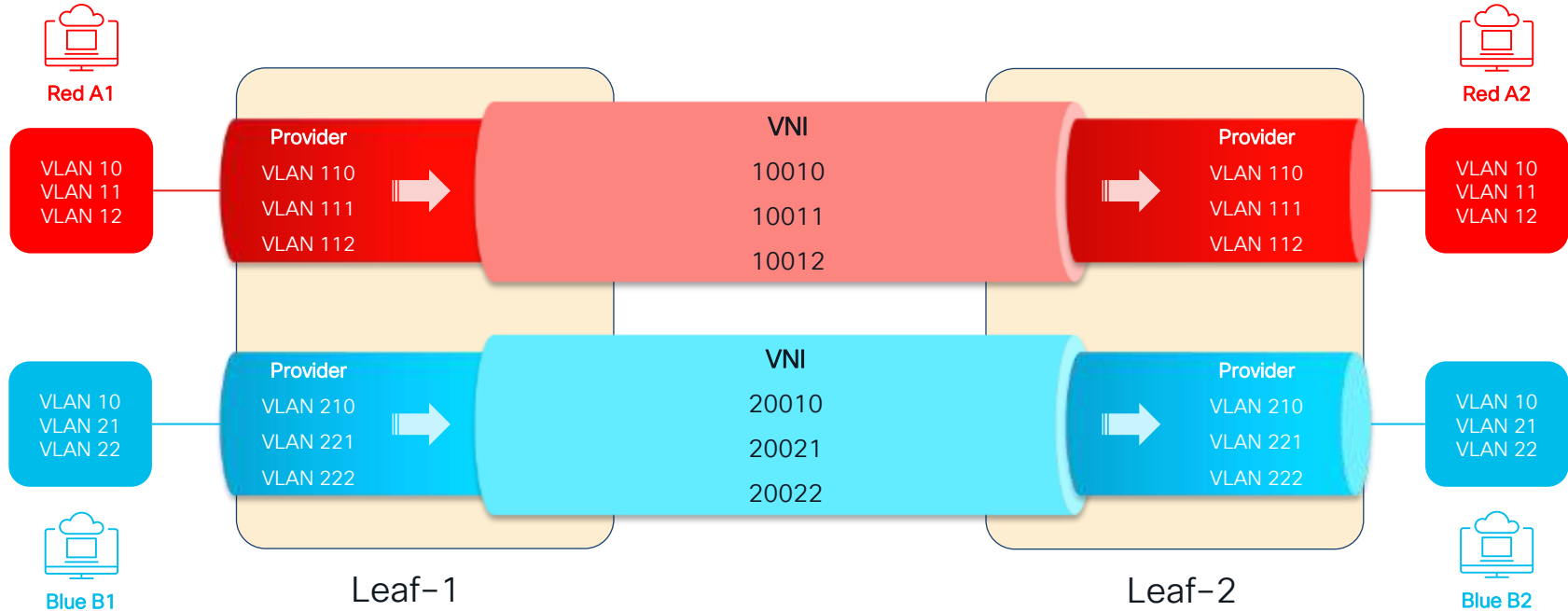
Vxlan Selective QinVNI Overall status : PASS



# Q-in-VNI Features

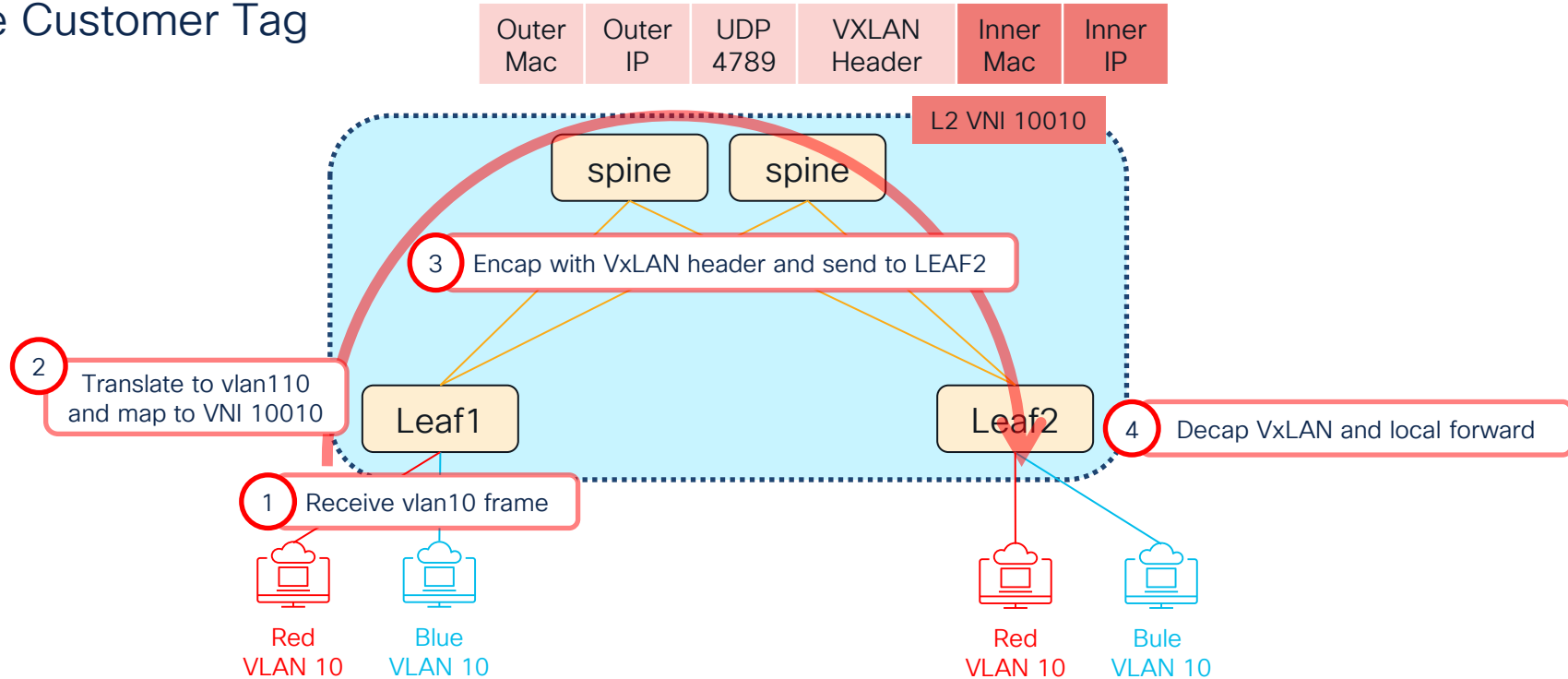
- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- **VLAN mapping**
- QinQ-QinVNI Multi tag
- QinVNI with Layer 2 Protocol Tunneling
- Cross-connect

# VLAN mapping with one Customer Tag



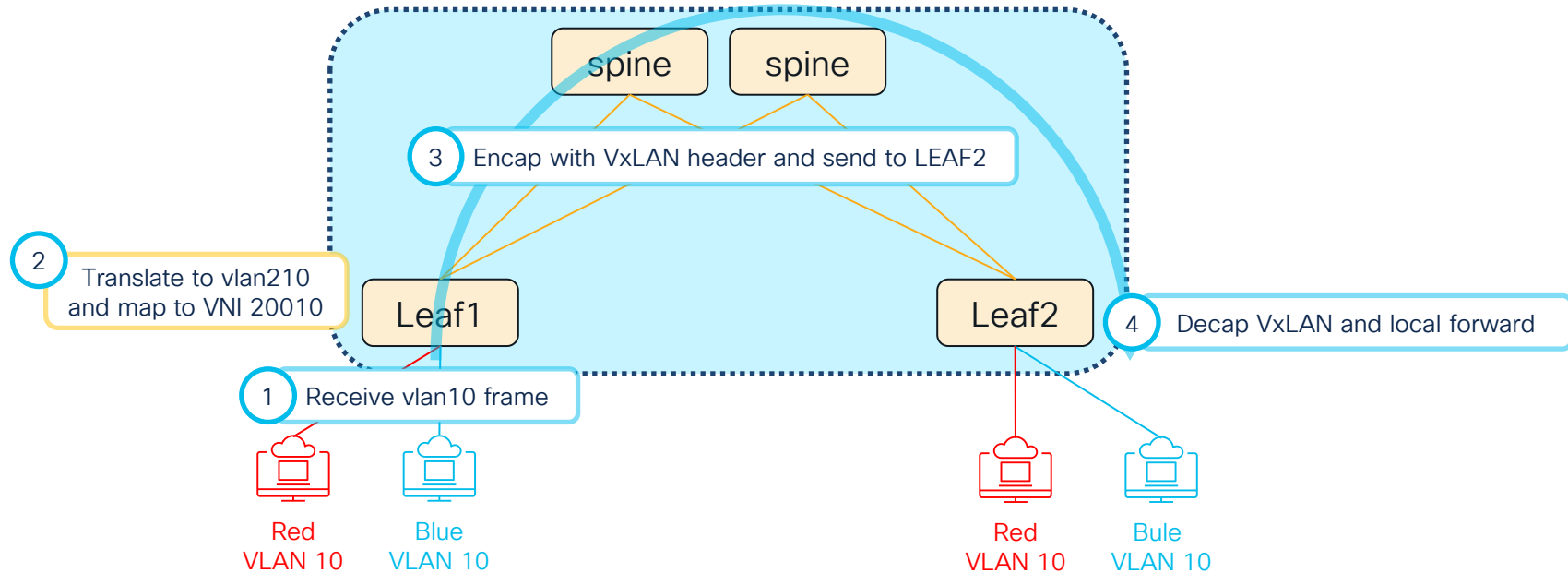
# VLAN mapping

## One Customer Tag



# VLAN mapping

## One Customer Tag



# VLAN mapping

## One Customer Tag

### PE Interface

```
switch(config)# interface Ethernet1/10
switch(config-if)# description Port Vlan Mapping Red
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping enable
switch(config-if)# switchport vlan mapping 10 110
switch(config-if)# switchport vlan mapping 11 111
switch(config-if)# switchport vlan mapping 12 112

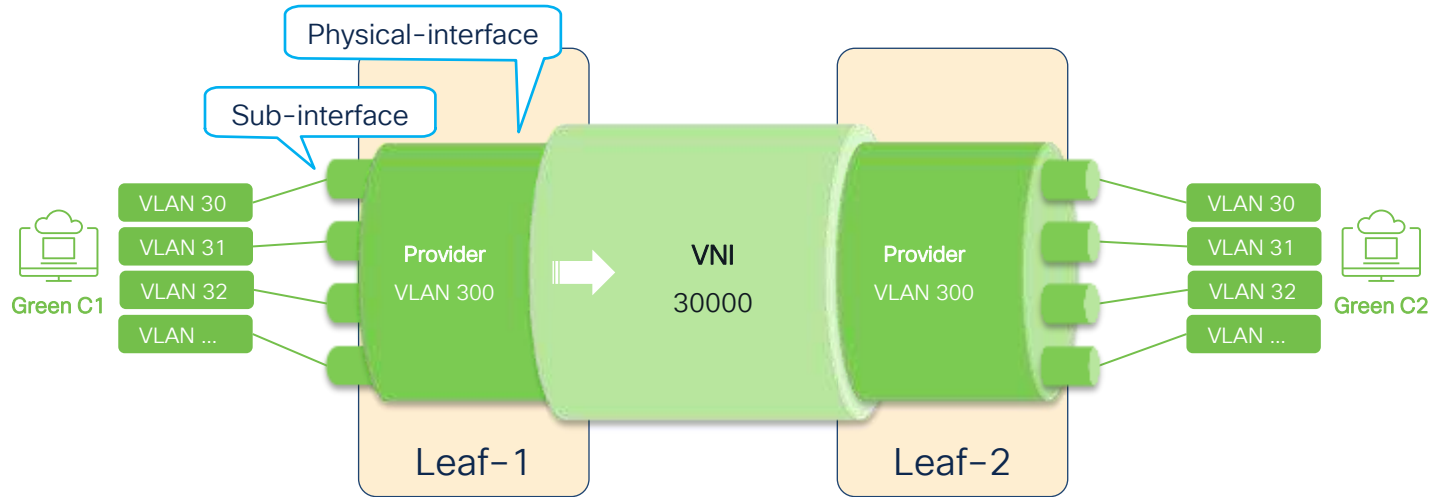
switch(config)# interface Ethernet1/20
switch(config-if)# description Port Vlan Mapping Blue
...
```

### Switch Level

```
switch(config) vlan 110
switch(config-vlan) vn-segment 10010
switch(config) vlan 111
switch(config-vlan) vn-segment 10011
switch(config) vlan 112
switch(config-vlan) vn-segment 10012
..
switch(config) vlan 210
switch(config-vlan) vn-segment 20010
switch(config) vlan 221
switch(config-vlan) vn-segment 20021
switch(config) vlan 222
switch(config-vlan) vn-segment 20022
```

# VLAN mapping

\*Port Multi-VLAN Mapping



# VLAN mapping

## Two Customer Tags

### PE Interface

```
switch(config)# interface Ethernet1/30
switch(config-if)# description Port Vlan Mapping Green
switch(config-if)# switchport mode trunk
switch(config-if)# switchport vlan mapping enable
switch(config-if)# switchport vlan mapping 30 300
```

### Switch Level

```
switch(config) vlan 300
switch(config-vlan) vn-segment 30000
```

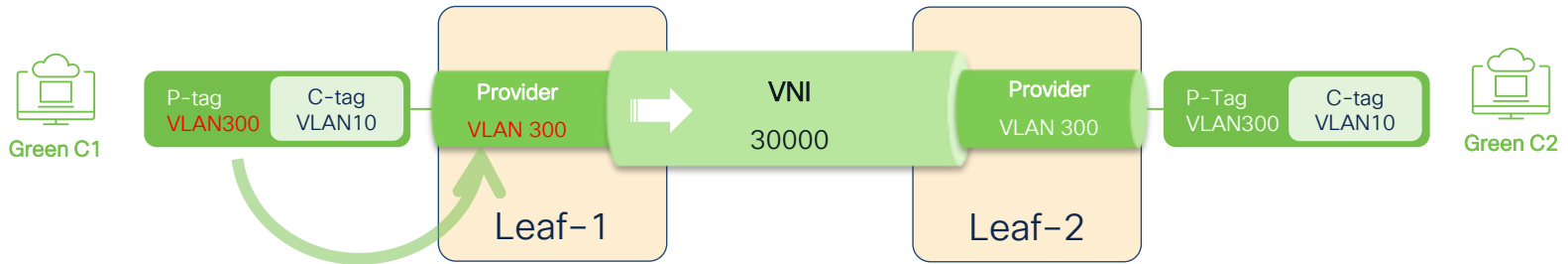
# Q-in-VNI Features

- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- VLAN mapping
- QinQ-QinVNI Multi tag
- QinVNI with Layer 2 Protocol Tunneling
- Cross-connect



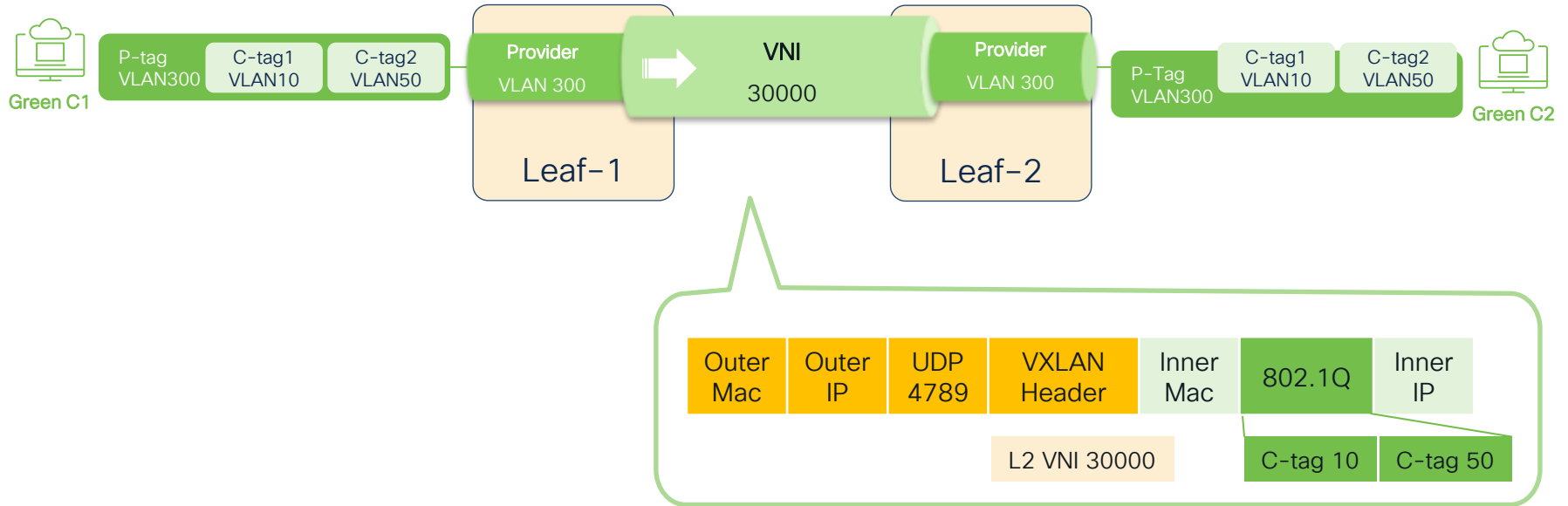
# QinQ-QinVNI Multi tag

## One Customer Tag



# QinQ-QinVNI Multi tag

## Two Customer Tags



# QinQ-QinVNI Multi tag

## PE Interface

```
switch(config)# interface Ethernet1/30
switch(config-if)# description QinQ-QinVNI
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk allow-multi-tag
switch(config-if)# switchport trunk allowed vlan 300
```

## Switch Level

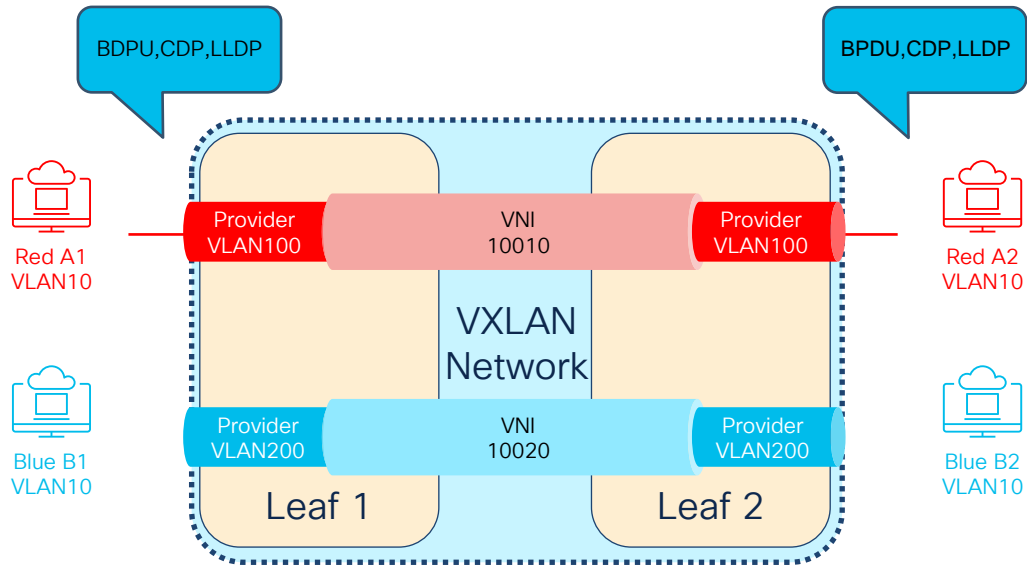
```
switch(config) vlan 300
switch(config-vlan) vn-segment 30000
```

# Q-in-VNI Features

- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- VLAN mapping
- QinQ-QinVNI Multi tag
- **QinVNI with Layer 2 Protocol Tunneling**
- Cross-connect

# QinVNI with Layer 2 Protocol Tunneling

## L2TP



### PE Interface

```
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk allow-multi-tag
switch(config-if)# switchport trunk allowed vlan 100
switch(config-if)# l2protocol tunnel vxlan vlan 100
switch(config-if)# system dot1q-tunnel transit vlan 100
```

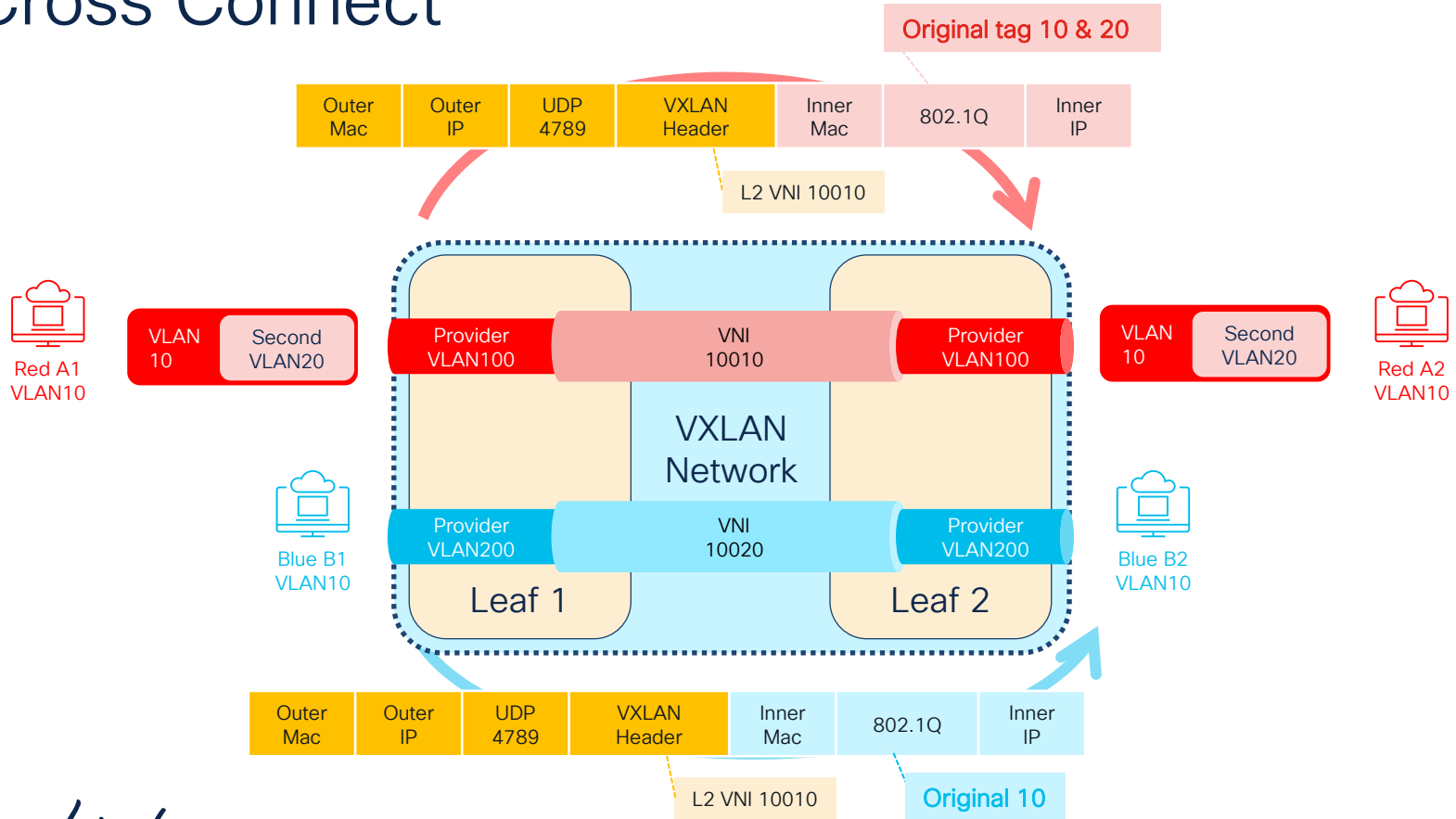
### Switch Level

```
switch(config) vlan 100
switch(config-vlan) vn-segment 10010
```

# Q-in-VNI Features

- Q-in-VNI
- Selective Q-in-VNI with multiple provider VLANs
- VLAN mapping
- QinQ-QinVNI Multi tag
- QinVNI with Layer 2 Protocol Tunneling
- **Cross-connect**

# Cross Connect



# Cross Connect

## PE Interface

```
Switch(config)# interface Ethernet1/10
switch(config-if)# description Q-in-VNI for Cu-Red
switch(config-if)# switchport mode dot1q-tunnel
switch(config-if)# switchport access vlan 100
```

## Switch Level

```
switch(config)# vlan 100
switch(config-vlan)# vn-segment 10010
switch(config)# xconnect
```



# Cross Connect

## Troubleshooting

**#show ngoam xconnect session all**

States: LD = Local interface down, RD = Remote interface Down

HB = Heartbeat lost, DB = Database/Routes not present

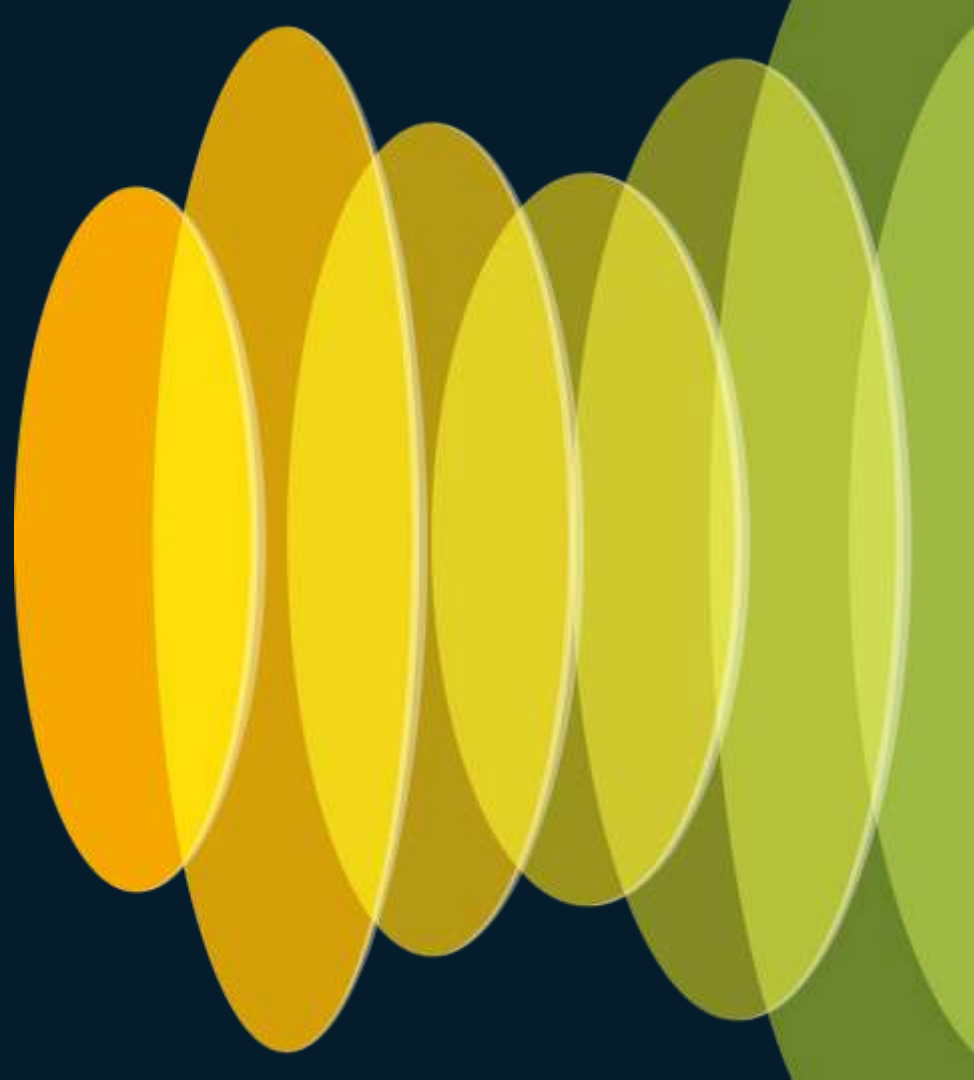
\* - Showing Vpc-peer interface info

Vlan	Peer-ip/vni	XC-State	Local-if/State	Rmt-if/State
=====				
10.13.0.2 / 10010		Active	Eth1/10 / UP	Eth1/10 / UP

**# show nve vni**

Interface	VNI	Multicast-group	State	Mode	Type [BD/VRF]	Flags
-----						
nve1	10010	UnicastBGP	Up	CP	L2 [100]	Xconn

# Summary

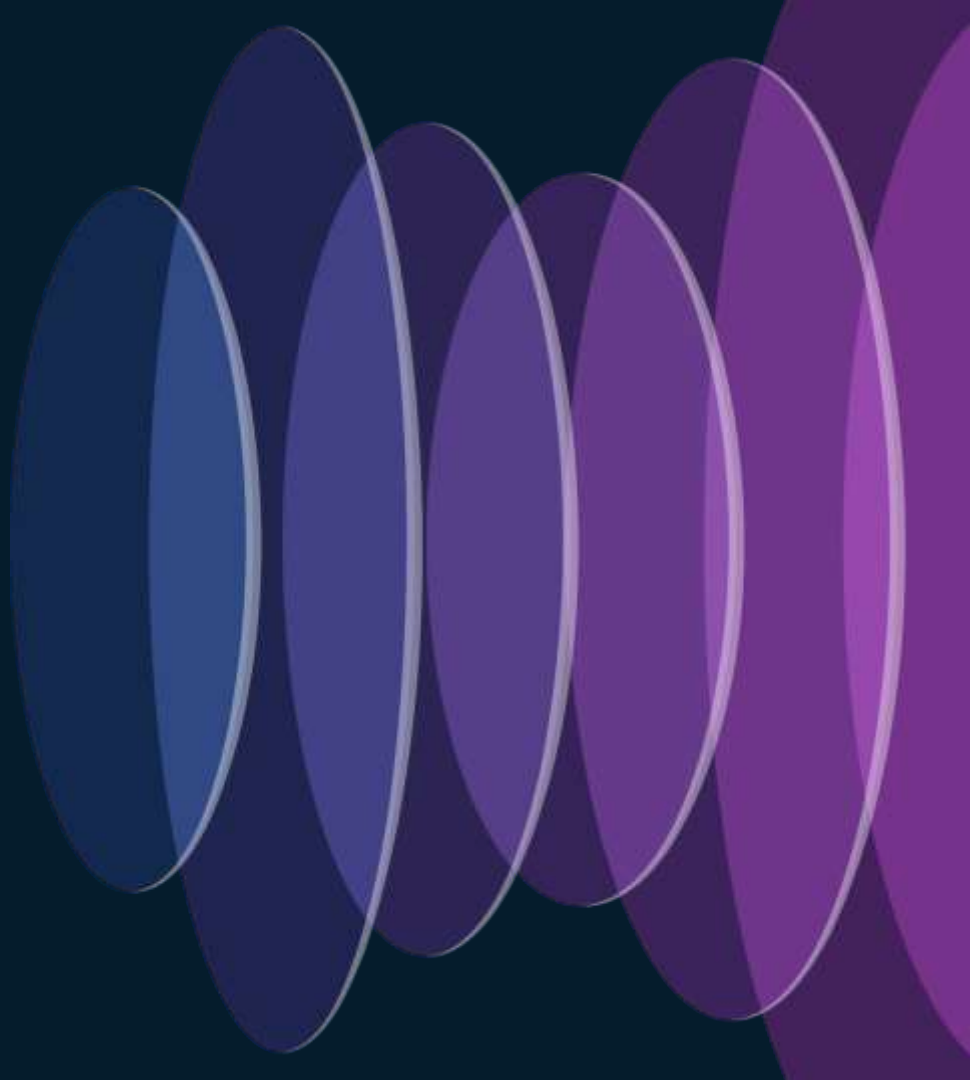


# Summary

	Customer Outer-tag	PE Port switch mode	Allow C-tag stacking	Multiple C-tag To Single VNI
Q-in-VNI	C-tag	dot1q tunnel	Y	N
Selective Q-in-VNI with multiple provider VLANs	C-tag	Trunk	N	Y
VLAN mapping	C-tag	Trunk	N	*N/Y
QinQ-QinVNI Multi tag	P-tag	Trunk	Y	N
Cross Connect	C-tag	dot1q tunnel	Y	N

\* C-tag = Customer vlan tag

# References



# References

- ✓ Cisco Configuration Guide for Q-in-VNI on NX-OS Release 10.3(x)

[https://www.cisco.com/c/en/us/td/docs/dcn/nx-os/nexus9000/103x/configuration/vxlan/cisco-nexus-9000-series-nx-os-vxlan-configuration-guide-release-103x/m\\_configuring\\_cross\\_connect\\_93x.html#task\\_abn\\_tj5\\_dhb](https://www.cisco.com/c/en/us/td/docs/dcn/nx-os/nexus9000/103x/configuration/vxlan/cisco-nexus-9000-series-nx-os-vxlan-configuration-guide-release-103x/m_configuring_cross_connect_93x.html#task_abn_tj5_dhb)

**Note:** All guidelines and limitations when using Q-in-VNI on various nexus platforms is listed in the above URL.

- ✓ White Paper: Q-in-VNI over VxLAN Fabric Deployment Guide

<https://www.cisco.com/c/en/us/td/docs/dcn/whitepapers/q-in-vni-over-vxlan-fabric-deployment-guide.html>



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# Thank you

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