

使用路由服务器配置Nexus EVPN-VXLAN多站点

目录

[简介](#)

[先决条件](#)

[要求](#)

[使用的组件](#)

[背景信息](#)

[配置](#)

[网络图](#)

[站点1枝叶1配置](#)

[站点1枝叶2配置](#)

[验证](#)

[故障排除](#)

[相关信息](#)

简介

本文档介绍如何在具有路由服务器集成的Cisco Nexus 9000交换机上配置和验证EVPN/VXLAN多站点环境。

先决条件

要求

Cisco 建议您了解以下主题：

- 多协议标签交换(MPLS)第3层VPN
- 多协议边界网关协议(MP-BGP)
- 以太网VPN/虚拟可扩展局域网(EVPN/VXLAN)

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco Nexus 9000系列交换机（实验室环境中使用的特定型号）
- 提供的示例中配置的软件和硬件版本

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

背景信息

数据中心是一个资源池，其中包含计算能力、存储和必要的应用，以支持任何业务环境。

正确规划数据中心基础设施设计至关重要。本文档介绍医院网络等关键要求，以及如何满足或超过这些要求。

现代IT基础设施和数据中心部署需要高可用性(HA)、以更快的速度扩展的能力以及始终保持的高性能。

下面是一些在DC设计/架构领域探讨的关键要求：

- 端口密度通过交换矩阵扩展器(FEX)得以改善。
- 通过硬件虚拟化(UCS)提高了计算容量。
- 接入层上行链路带宽通过端口通道提高。
- 机箱级冗余通过vPC得以改进。
- 软件定义网络(SDN)交换矩阵通过以应用为中心的基础设施(ACI)进行了改进 — 在交换矩阵中自动进行底层和重叠。
- 通过数据中心网络管理器(DCNM)可改进新服务的快速部署和支持。
- 通过暗光纤或波长服务提高了长距离应用的带宽要求。

地理冗余和扩展是扩展数据中心环境的重要属性。多站点VXLAN/EVPN有助于提供更好的数据中心互联(DCI)解决方案。

外部连接包括数据中心与网络其余部分的连接：到Internet、WAN或园区。为外部连接提供的所有选项都是多租户感知的，并侧重于到外部网络域的第3层(L3)传输。

EVPN是下一代一体化VPN解决方案。它不仅能完成许多其他的VPN技术，而且性能更佳。功能包括：

- 与传统网络集成。
- 选择性通告/扩展：仅扩展第2层(L2) — 使用第2类路由的特定VLAN/子网。仅使用第5类路由扩展L3 — 特定的L3域。
- 自动发现具有类型4路由的冗余组。
- 混叠、大量提取地址、水平分割(SH)多归属(MH)指示和1类路由。
- 使用类型3路由自动发现组播隧道终端和组播(MCAST)隧道类型。

其他优势：

- 在数据中心和云之间平衡工作负载。
- 对中断做出主动响应 — 降低即将到来的灾难（如飓风和洪水）的风险。
- 数据中心维护和迁移 — 计划在一段时间内发生的事件，并与传统网络集成。
- 备份和灾难恢复即服务(aaS)。

配置

网络图

作者要填充的占位符内容

站点1枝叶1配置

这是站点1枝叶1的配置。每个命令启用关键功能并配置EVPN-VXLAN多站点操作所需的接口、VRF、VLAN和路由协议。

```
feature nxapi
cfs ipv4 distribute
nv overlay evpn
feature ospf
feature bgp
feature pim
feature fabric forwarding
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
fabric forwarding anycast-gateway-mac 0000.1111.2222
ip pim rp-address 10.102.0.2 group-list 224.0.0.0/4
ip pim ssm range 232.0.0.0/8
ip igmp snooping vxlan
vlan 1,100,200,300-350,2001
vlan 100
vn-segment 4000100
vlan 200
vn-segment 4000200
vlan 301
vn-segment 4000301
vlan 302
vn-segment 4000302
vlan 303
vn-segment 4000303
vlan 350
name L3-VNI
vn-segment 4000999
vlan 2001
vn-segment 4000502
vrf context L3VNI4000999
vni 4000999
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vrf context vrf_1
vni 4000501
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vrf context vrf_2
vni 4000502
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vpc domain 100
peer-switch
peer-keepalive destination 10.197.214.54 source 10.197.214.53
```

```
virtual peer-link destination 10.102.1.9 source 10.102.1.8 dscp 56
delay restore 150
peer-gateway
ip arp synchronize
interface Vlan100
no shutdown
mtu 9216
vrf member vrf_2
no ip redirects
ip address 192.168.100.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan200
no shutdown
mtu 9216
vrf member vrf_2
no ip redirects
ip address 192.168.200.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan301
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.11.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan302
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.12.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan303
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.13.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan2001
no shutdown
mtu 9000
vrf member vrf_2
no ip redirects
ip forward
ipv6 address use-link-local-only
no ipv6 redirects
interface port-channel10
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200,300-350,2001
spanning-tree port type network
vpc peer-link
interface port-channel100
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200
```

```
mtu 9216
vpc 100
interface nve1
no shutdown
host-reachability protocol bgp
advertise virtual-rmac
source-interface loopback1
member vni 4000100
suppress-arp
mcast-group 231.0.0.1
member vni 4000200
suppress-arp
mcast-group 231.0.0.2
member vni 4000502
associate-vrf
interface Ethernet1/1
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200
mtu 9216
channel-group 100
no shutdown
interface Ethernet1/2
mtu 9216
port-type fabric
medium p2p
ip address 192.168.17.12/24
ip ospf network point-to-point
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
no shutdown
interface loopback0
ip address 10.102.0.5/32
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
interface loopback1
ip address 10.102.1.8/32
ip address 10.201.201.201/32 secondary
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
router ospf 100
router-id 10.102.0.5
router bgp 100
router-id 10.102.0.5
log-neighbor-changes
address-family l2vpn evpn
advertise-pip
neighbor 10.102.0.2
remote-as 100
update-source loopback0
address-family ipv4 unicast
address-family ipv6 unicast
send-community
send-community extended
address-family l2vpn evpn
send-community
send-community extended
neighbor 10.102.0.3
remote-as 100
update-source loopback0
address-family ipv4 unicast
address-family ipv6 unicast
```

```
send-community
send-community extended
address-family l2vpn evpn
send-community
send-community extended
evpn
vni 4000100 12
rd auto
route-target import auto
route-target export auto
vni 4000200 12
rd auto
route-target import auto
route-target export auto
vni 4000301 12
rd auto
route-target import auto
route-target export auto
vni 4000302 12
rd auto
route-target import auto
route-target export auto
vni 4000303 12
rd auto
route-target import auto
route-target export auto
```

站点1枝叶2配置

```
feature nxapi
feature sftp-server
cfs ipv4 distribute
nv overlay evpn
feature ospf
feature bgp
feature pim
feature fabric forwarding
feature interface-vlan
feature vn-segment-vlan-based
feature lacp
feature vpc
feature nv overlay
fabric forwarding anycast-gateway-mac 0000.1111.2222
ip pim rp-address 10.102.0.2 group-list 224.0.0.0/4
ip pim ssm range 232.0.0.0/8
vlan 1,100,200,300-350,2001
vlan 100
vn-segment 4000100
vlan 200
vn-segment 4000200
vlan 301
vn-segment 4000301
vlan 302
vn-segment 4000302
vlan 303
vn-segment 4000303
vlan 350
```

```
name L3-VNI
vn-segment 4000999
vlan 2001
vn-segment 4000502
vrf context L3VNI4000999
vni 4000999
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vrf context vrf_1
vni 4000501
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vrf context vrf_2
vni 4000502
rd auto
address-family ipv4 unicast
route-target both auto
route-target both auto evpn
vpc domain 100
peer-switch
peer-keepalive destination 10.197.214.53 source 10.197.214.54
virtual peer-link destination 10.102.1.8 source 10.102.1.9 dscp 56
delay restore 150
peer-gateway
ip arp synchronize
interface Vlan100
no shutdown
mtu 9216
vrf member vrf_2
no ip redirects
ip address 192.168.100.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan200
no shutdown
mtu 9216
vrf member vrf_2
no ip redirects
ip address 192.168.200.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan301
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.11.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan302
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.12.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan303
```

```
no shutdown
mtu 9216
vrf member vrf_1
no ip redirects
ip address 172.16.13.254/24
no ipv6 redirects
fabric forwarding mode anycast-gateway
interface Vlan2001
no shutdown
mtu 9000
vrf member vrf_2
no ip redirects
ip forward
ipv6 address use-link-local-only
no ipv6 redirects
interface port-channel10
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200,300-350,2001
spanning-tree port type network
vpc peer-link
interface port-channel100
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200
mtu 9216
vpc 100
interface nve1
no shutdown
host-reachability protocol bgp
advertise virtual-rmac
source-interface loopback1
member vni 4000100
suppress-arp
mcast-group 231.0.0.1
member vni 4000200
suppress-arp
mcast-group 231.0.0.2
member vni 4000502
associate-vrf
interface Ethernet1/1
switchport
switchport mode trunk
switchport trunk allowed vlan 100,200
mtu 9216
channel-group 100
no shutdown
interface Ethernet1/2
mtu 9216
port-type fabric
medium p2p
ip address 192.168.18.12/24
ip ospf network point-to-point
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
no shutdown
interface loopback0
ip address 10.102.0.8/32
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
interface loopback1
ip address 10.102.1.9/32
```

```

ip address 10.201.201.201/32 secondary
ip router ospf 100 area 0.0.0.0
ip pim sparse-mode
icam monitor scale
router ospf 100
router-id 10.102.0.8
router bgp 100
router-id 10.102.0.8
log-neighbor-changes
address-family l2vpn evpn
advertise-pip
neighbor 10.102.0.2
remote-as 100
update-source loopback0
address-family ipv4 unicast
address-family ipv6 unicast
send-community
send-community extended
address-family l2vpn evpn
send-community
send-community extended
neighbor 10.102.0.3
remote-as 100
update-source loopback0
address-family ipv4 unicast
address-family ipv6 unicast
send-community
send-community extended
address-family l2vpn evpn
send-community
send-community extended
evpn
vni 4000100 12
rd auto
route-target import auto
route-target export auto
vni 4000200 12
rd auto
route-target import auto
route-target export auto
vni 4000301 12
rd auto
route-target import auto
route-target export auto
vni 4000302 12
rd auto
route-target import auto
route-target export auto
vni 4000303 12
rd auto
route-target import auto
route-target export auto

```

为了文档简洁性和可读性，源内容中包含其他设备的完整配置，可以在此处引用。每个配置遵循与上述相同的详细结构，启用所需功能，定义VLAN、VNI、VRF、接口和路由协议，并根据每个设备的角色配置NVE、BGP EVPN和多站点边界网关参数。

验证

本节提供确认EVPN-VXLAN多站点配置是否正常运行的验证步骤和示例输出。

步骤 1：使用Ping检验端到端连接

```
Host2# ping 192.168.200.103
PING 192.168.200.103 (192.168.200.103): 56 data bytes
64 bytes from 192.168.200.103: icmp_seq=0 ttl=254 time=1.21 ms
64 bytes from 192.168.200.103: icmp_seq=1 ttl=254 time=0.627 ms
64 bytes from 192.168.200.103: icmp_seq=2 ttl=254 time=0.74 ms
64 bytes from 192.168.200.103: icmp_seq=3 ttl=254 time=0.737 ms
64 bytes from 192.168.200.103: icmp_seq=4 ttl=254 time=0.542 ms
--- 192.168.200.103 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.542/0.771/1.21 ms
```

步骤 2：通过其他Ping检验第2层和第3层连通性

```
Host2# ping 192.168.100.103
PING 192.168.100.103 (192.168.100.103): 56 data bytes
64 bytes from 192.168.100.103: icmp_seq=0 ttl=254 time=1.195 ms
64 bytes from 192.168.100.103: icmp_seq=1 ttl=254 time=0.613 ms
64 bytes from 192.168.100.103: icmp_seq=2 ttl=254 time=0.575 ms
64 bytes from 192.168.100.103: icmp_seq=3 ttl=254 time=0.522 ms
64 bytes from 192.168.100.103: icmp_seq=4 ttl=254 time=0.534 ms
--- 192.168.100.103 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.522/0.687/1.195 ms
```

```
Host2# ping 192.168.100.100
PING 192.168.100.100 (192.168.100.100): 56 data bytes
64 bytes from 192.168.100.100: icmp_seq=0 ttl=254 time=1.029 ms
64 bytes from 192.168.100.100: icmp_seq=1 ttl=254 time=0.561 ms
64 bytes from 192.168.100.100: icmp_seq=2 ttl=254 time=0.579 ms
64 bytes from 192.168.100.100: icmp_seq=3 ttl=254 time=0.511 ms
64 bytes from 192.168.100.100: icmp_seq=4 ttl=254 time=0.496 ms
--- 192.168.100.100 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.496/0.635/1.029 ms
```

```
HOST_3(config)# ping 192.168.100.100
PING 192.168.100.100 (192.168.100.100): 56 data bytes
64 bytes from 192.168.100.100: icmp_seq=0 ttl=254 time=1.319 ms
64 bytes from 192.168.100.100: icmp_seq=1 ttl=254 time=0.77 ms
64 bytes from 192.168.100.100: icmp_seq=2 ttl=254 time=0.505 ms
64 bytes from 192.168.100.100: icmp_seq=3 ttl=254 time=0.542 ms
```

```
64 bytes from 192.168.100.100: icmp_seq=4 ttl=254 time=0.486 ms
--- 192.168.100.100 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.486/0.724/1.319 ms
```

步骤 3：检验ARP表

```
device# show ip arp
Flags: * - Adjacencies learnt on non-active FHRP router
+ - Adjacencies synced via CFSOE
# - Adjacencies Throttled for Glean
CP - Added via L2RIB, Control plane Adjacencies
PS - Added via L2RIB, Peer Sync
RO - Re-Originated Peer Sync Entry
D - Static Adjacencies attached to down interface

IP ARP Table for context default
Total number of entries: 8
Flags
```

步骤 4：检验MAC地址表

```
device# show mac address-table
Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,
+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan

VLAN    MAC Address          Type    age    Secure  NTFY    Ports
-----+-----+-----+-----+-----+-----+-----
```

步骤 5：检验BGP EVPN路由

```
device# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 3291, Local Router ID is 10.102.0.5
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-inject
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2
Network Next Hop Metric LocPrf Weight Path
*>i[2]:[0]:[0]:[48]:[6c8b.d3fe.df3b]:[32]:[192.168.100.104]/27 210. 100. 100. 1 100 0 300 200 i
...
```

步骤 6：验证vPC状态

```

device# show vpc brief
Legend:(*) - local vPC is down, forwarding via vPC peer-link
vPC domain id      : 100
Peer status        : peer adjacency formed ok
vPC keep-alive status : peer is alive
Configuration consistency status : success
Per-vlan consistency status      : success
Type-2 consistency status       : success
vPC role            : secondary
Number of vPCs configured      : 1
Peer Gateway        : Enabled
Dual-active excluded VLANs     : -
Graceful Consistency Check     : Enabled
Auto-recovery status          : Disabled
Delay-restore status          : Timer is off.(timeout = 150s)
Delay-restore SVI status      : Timer is off.(timeout = 10s)
Delay-restore Orphan-port status: Timer is off.(timeout = 0s)
Operational Layer3 Peer-router : Disabled
Virtual-peerlink mode         : Enabled
vPC Peer-link status
id  Port    Status Active vlans
1   Po10    up      100,200,300-350,2001
vPC status
Id  Port    Status Consistency Reason  Active vlans
100 Po100    up      success    success    100,200

```

故障排除

本节提供对EVPN-VXLAN多站点配置进行故障排除的命令和方法。

步骤 1：检验ARP表

```

device# show ip arp
Flags: * - Adjacencies learnt on non-active FHRP router
+ - Adjacencies synced via CFSOE
# - Adjacencies Throttled for Glean
CP - Added via L2RIB, Control plane Adjacencies
PS - Added via L2RIB, Peer Sync
RO - Re-Originated Peer Sync Entry
D - Static Adjacencies attached to down interface

IP ARP Table for context default
Total number of entries: 8
Flags

```

步骤 2：检验MAC地址表

```

device# show mac address-table
Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,

```

+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan

VLAN	MAC Address	Type	age	Secure	NTFY	Ports
-----+-----+-----+-----+-----+-----+-----						

步骤 3：检验BGP EVPN

```
device# show bgp 12vpn evpn
```

步骤 4：验证vPC状态

```
device# show vpc brief
```

步骤 5：使用Cisco CLI分析器

思科 CLI 分析器（仅适用于注册客户）支持某些 show 命令。要查看对 show 命令输出的分析，请使用思科 CLI 分析器。

相关信息

- [思科技术支持和下载](#)

关于此翻译

思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

请注意：即使是最好的机器翻译，其准确度也不及专业翻译人员的水平。

Cisco Systems, Inc. 对于翻译的准确性不承担任何责任，并建议您总是参考英文原始文档（已提供链接）。