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简介

本文目的将展示EVN (容易虚拟网络)的配置使用名为模式的EIGRP (增强型内部网关路由协议)。 它是补充对于容易虚拟网络配置文件，展示使用OSPF (首先开放最短路径)，以及其他高级主题类似VNET中继列表和路由复制。 EVN VNET比MPLS (多协议标签交换) VPN (虚拟专用网络)或VRF轻供操作员使用有一个更加容易的选项(虚拟路由和转发)部署的多个VRF。 EVN VNET使用被克隆的配置的概念路由协议和VNET中继接口从操作员删除负担和保存某些重复性任务。 排除故障EIGRP，路由或CEF (Cisco快速转发)是在范围本文外面，并且，除非要注意能遵从正常故障排除程序。

先决条件

要求

思科建议您有EIGRP基础知识。

此功能是avaialble在少量版本在IOS版本15.2以后。要验证，如果支持名为与EVN VNET的模式的EIGRP，请检查**show ip eigrp插件**输出。 如果容易虚拟网络版本1.00.00或以上是存在，则您的版本支持此功能。

```
R1#show eigrp plugins
EIGRP feature plugins:::
eigrp-release : 21.00.00 : Portable EIGRP Release
: 1.00.10 : Source Component Release(rel21)
parser : 2.02.00 : EIGRP Parser Support
igrp2 : 2.00.00 : Reliable Transport/Dual Database
bfd : 2.00.00 : BFD Platform Support
mtr : 1.00.01 : Multi-Topology Routing(MTR)
eigrp-pfr : 1.00.01 : Performance Routing Support
 EVN/vNets : 1.00.00 : Easy Virtual Network (EVN/vNets)
ipv4-af : 2.01.01 : Routing Protocol Support
ipv4-sf : 1.02.00 : Service Distribution Support
vNets-parse : 1.00.00 : EIGRP vNets Parse Support
```

```
ipv6-af : 2.01.01 : Routing Protocol Support
ipv6-sf : 2.01.00 : Service Distribution Support
snmp-agent : 2.00.00 : SNMP/SNMPv2 Agent Support
```

注意：15.1SY不支持名为与EVN VNETs的模式的EIGRP。 在此版本中您必须使用在可用的文档已经被展示的经典模式EIGRP配置。

全局VNET在VNET中继的任何已命名VNET sub-interface只当前支持BFD (双向转发检测)，并且不会作用。

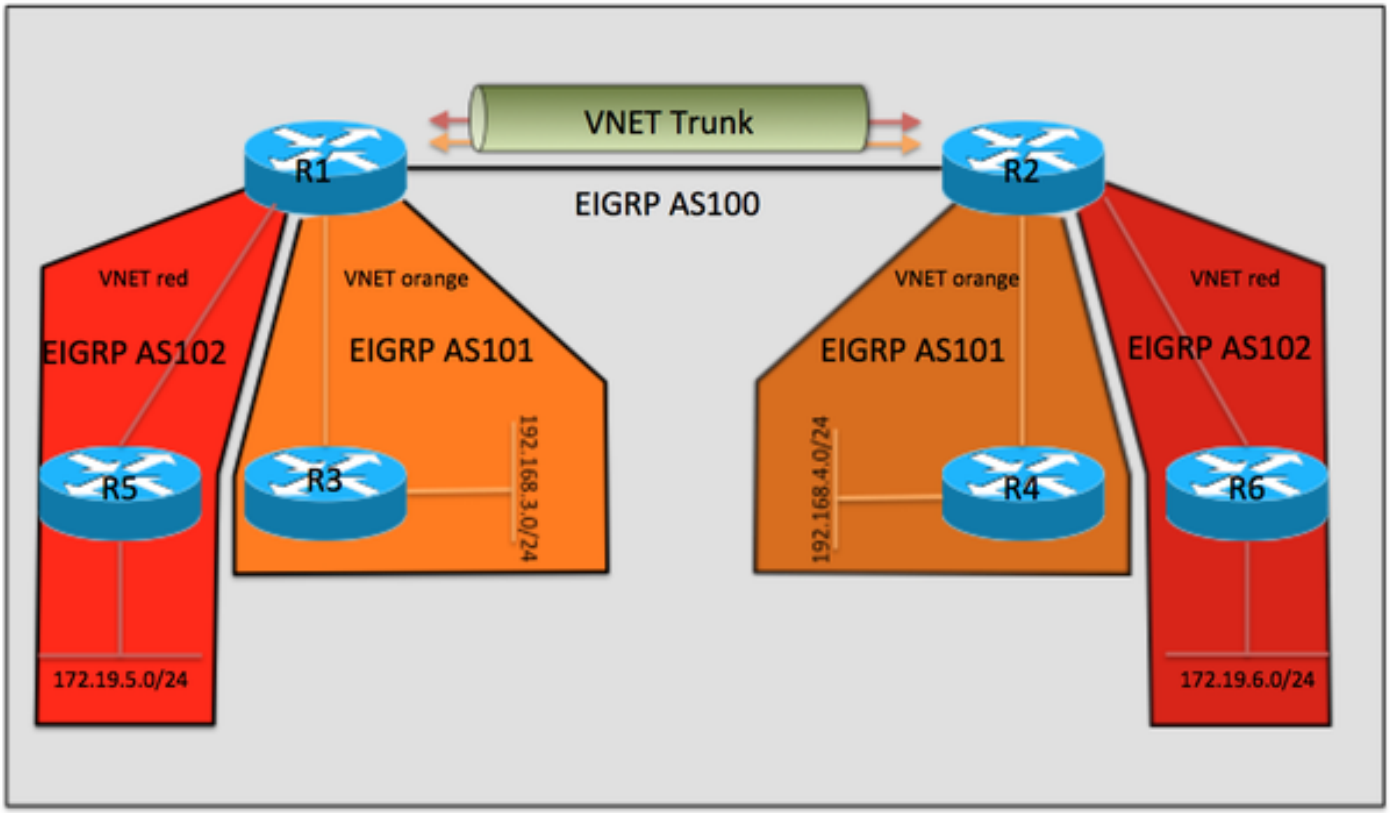
没有建议使用AF接口默认，当曾经EIGRP时命名了与EVN VNETs的模式由于可能的无法预测的继承。

使用的组件

本文档中的信息从在一个特定实验室环境运行Cisco IOS版本15.6(1)S2的设备创建。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

配置

网络图



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配置

R3、R4、R5和R6是全部的配置类似的，并且离开在本文外面。他们配置形成有R1或R2的一EIGRP邻居，并且他们不知道EVN VNET使用在R1和R2之间。

从R1的相关配置

```
vrf definition orange
 vnet tag 101
 !
 address-family ipv4
 exit-address-family
!
vrf definition red
 vnet tag 102
 !
 address-family ipv4
 exit-address-family
!
interface Ethernet0/0
vnet trunk
ip address 10.12.12.1 255.255.255.0
!
interface Ethernet1/0
vrf forwarding orange
 ip address 192.168.13.1 255.255.255.0
!
interface Ethernet2/0
vrf forwarding red
 ip address 192.168.15.1 255.255.255.0
!
!
router eigrp named
!
 address-family ipv4 unicast autonomous-system 100
!
af-interface Ethernet0/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
 network 10.0.0.0
exit-address-family
!
 address-family ipv4 unicast vrf orange autonomous-system 101
!
af-interface Ethernet1/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
network 10.0.0.0
 network 192.168.13.0
exit-address-family
!
 address-family ipv4 unicast vrf red autonomous-system 102
!
topology base
exit-af-topology
network 10.0.0.0
 network 192.168.15.0
exit-address-family
```

从R2的相关配置

```
vrf definition orange
 vnet tag 101
```

```
 !
 address-family ipv4
 exit-address-family
!
vrf definition red
 vnet tag 102
 !
 address-family ipv4
 exit-address-family
!
interface Ethernet0/0
 vnet trunk
ip address 10.12.12.2 255.255.255.0
!
interface Ethernet1/0
 vrf forwarding orange
 ip address 192.168.24.2 255.255.255.0
!
interface Ethernet2/0
 vrf forwarding red
 ip address 192.168.26.2 255.255.255.0
!
!
router eigrp named
 !
 address-family ipv4 unicast autonomous-system 100
!
af-interface Ethernet0/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
 network 10.0.0.0
exit-address-family
!
 address-family ipv4 unicast vrf orange autonomous-system 101
!
af-interface Ethernet1/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
network 10.0.0.0
 network 192.168.24.0
exit-address-family
!
 address-family ipv4 unicast vrf red autonomous-system 102
!
topology base
exit-af-topology
network 10.0.0.0
 network 192.168.26.0
exit-address-family
```

验证

其中一个容易虚拟网络的好处是配置的简单。 这通过自动配置每VNET标记的VNET中继达到。 EVN与VRF轻比较，每sub-interface将需要手工配置。 Ethernet0/0是连接R1和R2的VNET中继，并且VNET sub-interface自动地创建为了每个VNET能符合EVN的流量分离要求通过添附有dot1q VNET标记的帧。这些sub-interface不是可视在show running-configuration中输出，然而他们能看到

在显示派生设置。

```
R1#show derived-config | sec Ethernet0/0
interface Ethernet0/0
 vnet trunk
ip address 10.12.12.1 255.255.255.0
no ip redirects
no ip proxy-arp
interface Ethernet0/0.101
 description Subinterface for VNET orange
 encapsulation dot1Q 101
 vrf forwarding orange
 ip address 10.12.12.1 255.255.255.0
 no ip proxy-arp
interface Ethernet0/0.102
 description Subinterface for VNET red
 encapsulation dot1Q 102
 vrf forwarding red
 ip address 10.12.12.1 255.255.255.0
 no ip proxy-arp
```

同样地，您能看到EIGRP配置自动地也创建：

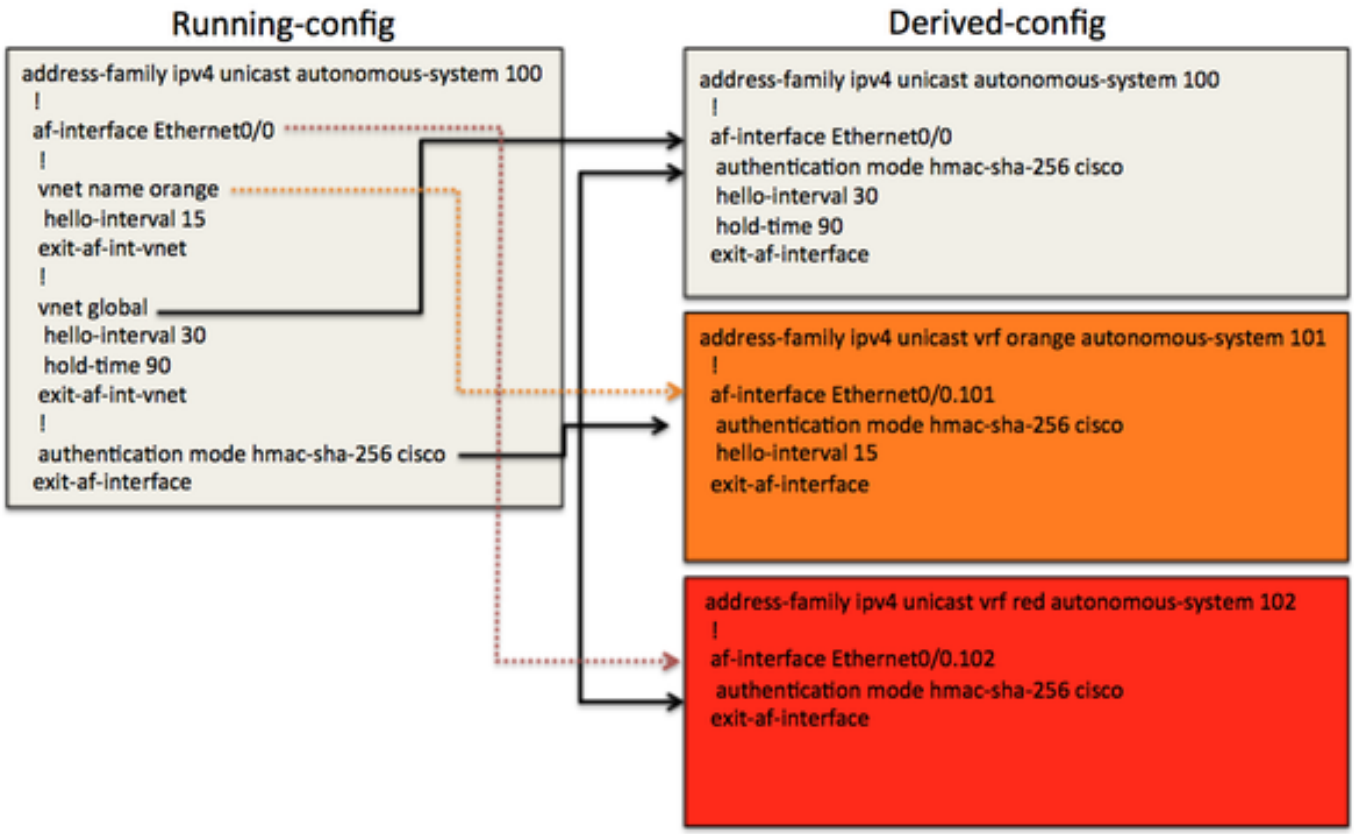
```
R1#show derived-config | sec router eigrp
router eigrp named
!
address-family ipv4 unicast autonomous-system 100
!
af-interface Ethernet0/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
network 10.0.0.0
exit-address-family
!
 address-family ipv4 unicast vrf orange autonomous-system 101
!
 af-interface Ethernet0/0.101
 authentication mode hmac-sha-256 cisco
 exit-af-interface
!
af-interface Ethernet1/0
authentication mode hmac-sha-256 cisco
exit-af-interface
!
topology base
exit-af-topology
network 10.0.0.0
network 192.168.13.0
exit-address-family
!
 address-family ipv4 unicast vrf red autonomous-system 102
!
af-interface Ethernet0/0.102
 authentication mode hmac-sha-256 cisco
 exit-af-interface
!
topology base
exit-af-topology
network 10.0.0.0
network 192.168.15.0
exit-address-family
```

```
R1#
```

在以上输出的一有趣的观察是VNET sub-interface的AF接口继承从在全局VRF自治系统100的AF接口ethernet0/0。 跟随的部分较详细的说明此：

Inheritence同EIGRP已命名模式

下面图将用于帮助形象化继承规则，当曾经EIGRP时命名了与EVN VNETs的模式。



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在以上示例中有VNET中继AF接口ethernet0/0， VNET sub-interface将接收他们的派生的配置。某非默认值的配置例如Hello间隔、hold-time和验证是完成展示继承。 您也将注意VNET从属方式在全局EIGRP进程的AF接口下。 这是方式控制哪些配置选项被克隆对每个VNET的动态地已创建AF接口在其EIGRP VRF配置内。

例如Eth0/0的派生的设置在全球路由表里从全局vnet被继承(Hello间隔30， hold-time 90)。Eth0/0的认证模式hmac-sha-256直接地在此AF接口配置在running-config，并且派生的设置输出显示Eth0/0继承了命令。 因为认证模式在VNET中继AF接口配置，由所有VNET接口继承。

对于VRF橙色， VNET橙色配置与Hello间隔15在running-config。在您能为在自治系统101的VRF橙色看到的派生的设置， Hello间隔15从在AF接口eth0/0下的VNET从属方式被采取了，在全局进程。 hold-time未从使用默认值的AF接口eth0/0被修改和被克隆了。

VNET红色没有从AF接口Eth0/0的配置差别，因此继承默认计时器值以及认证模式。

这些配置选项允许灵活性操作员使用不同的参数每个VNET中继线子接口。例如，不同的计时器值、认证模式或者无源接口。 要汇总继承规则，所有VNETs将继承从VNET中继AF接口的配置。 在VNET从属方式的VNET特定配置将由VNET中继线子接口也继承，并且采取在参数的优先级从AF接口。

下面验证配置继承的某更多输出：

```
R1#show eigrp address-family ipv4 interface detail e0/0
EIGRP-IPv4 VR(named) Address-Family Interfaces for AS(100)
Xmit Queue PeerQ Mean Pacing Time Multicast Pending
Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes
Et0/0 1 0/0 0/0 6 0/2 50 0
Hello-interval is 30, Hold-time is 90
Split-horizon is enabled
Next xmit serial <none>
Packetized sent/expedited: 3/1
Hello's sent/expedited: 2959/3
Un/reliable mcasts: 0/4 Un/reliable ucasts: 5/5
Mcast exceptions: 0 CR packets: 0 ACKs suppressed: 0
Retransmissions sent: 3 Out-of-sequence rcvd: 1
Topology-ids on interface - 0
Authentication mode is HMAC-SHA-256, key-chain is not set
Topologies advertised on this interface: base
Topologies not advertised on this interface:

R1#show eigrp address-family ipv4 vrf orange interface detail e0/0.101
EIGRP-IPv4 VR(named) Address-Family Interfaces for AS(101)
VRF(orange)
Xmit Queue PeerQ Mean Pacing Time Multicast Pending
Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes
Et0/0.101 1 0/0 0/0 5 0/2 50 0
Hello-interval is 15, Hold-time is 15
Split-horizon is enabled
Next xmit serial <none>
Packetized sent/expedited: 4/1
Hello's sent/expedited: 2371/3
Un/reliable mcasts: 0/4 Un/reliable ucasts: 6/5
Mcast exceptions: 0 CR packets: 0 ACKs suppressed: 0
Retransmissions sent: 3 Out-of-sequence rcvd: 1
Topology-ids on interface - 0
 Authentication mode is HMAC-SHA-256, key-chain is not set
Topologies advertised on this interface: base
Topologies not advertised on this interface:

R1#show eigrp address-family ipv4 vrf red interface detail e0/0.102
EIGRP-IPv4 VR(named) Address-Family Interfaces for AS(102)
VRF(red)
Xmit Queue PeerQ Mean Pacing Time Multicast Pending
Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes
Et0/0.102 1 0/0 0/0 4 0/2 50 0
Hello-interval is 5, Hold-time is 15
Split-horizon is enabled
Next xmit serial <none>
Packetized sent/expedited: 6/1
Hello's sent/expedited: 2676/3
Un/reliable mcasts: 0/6 Un/reliable ucasts: 7/5
Mcast exceptions: 0 CR packets: 0 ACKs suppressed: 0
Retransmissions sent: 3 Out-of-sequence rcvd: 1
Topology-ids on interface - 0
Authentication mode is HMAC-SHA-256, key-chain is not set
Topologies advertised on this interface: base
Topologies not advertised on this interface:
```

路由复制同EIGRP名称模式

其中一个EVN的好处是能力复制在VNETs之间的路由。 例如在VRF红色的R4可能需要到达是

VRF橙色的一部分在192.168.13.0/24的一服务。 这可以达到使用下面配置。

```
R2#show run
vrf definition orange
vnet tag 101
!
address-family ipv4
exit-address-family
!
vrf definition red
vnet tag 102
!
address-family ipv4
route-replicate from vrf orange unicast eigrp 101 route-map filter
exit-address-family
!
<output removed>
!
ip prefix-list filter seq 5 permit 192.168.13.0/24
!
route-map filter permit 10
 match ip address prefix-list filter
!
```

现在192.168.13.0/24前缀在VRF红色，然而ping不工作，因为源地址不是路由复制到VNET橙色。

```
R2#show ip route vrf red

Routing Table: red
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
D 10.5.5.5/32 [90/1536640] via 10.12.12.1, 03:48:46, Ethernet0/0.102
D 10.6.6.6/32 [90/1024640] via 192.168.26.6, 03:48:37, Ethernet2/0
C 10.12.12.0/24 is directly connected, Ethernet0/0.102
L 10.12.12.2/32 is directly connected, Ethernet0/0.102
D + 192.168.13.0/24
[90/1536000] via 10.12.12.1 (orange), 03:48:46, Ethernet0/0.101
D 192.168.15.0/24 [90/1536000] via 10.12.12.1, 03:48:46, Ethernet0/0.102
192.168.26.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.26.0/24 is directly connected, Ethernet2/0
L 192.168.26.2/32 is directly connected, Ethernet2/0
R2#
R2#
R2#ping vrf red 192.168.13.1 source e2/0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.26.2
.....
Success rate is 0 percent (0/5)
```

在所有复制的路由以后从VRF红色到在R1的VRF橙色，使用相似的配置：

```
R2#show ip route vrf red

Routing Table: red
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
D 10.5.5.5/32 [90/1536640] via 10.12.12.1, 03:48:46, Ethernet0/0.102
D 10.6.6.6/32 [90/1024640] via 192.168.26.6, 03:48:37, Ethernet2/0
C 10.12.12.0/24 is directly connected, Ethernet0/0.102
L 10.12.12.2/32 is directly connected, Ethernet0/0.102
D + 192.168.13.0/24
[90/1536000] via 10.12.12.1 (orange), 03:48:46, Ethernet0/0.101
D 192.168.15.0/24 [90/1536000] via 10.12.12.1, 03:48:46, Ethernet0/0.102
192.168.26.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.26.0/24 is directly connected, Ethernet2/0
L 192.168.26.2/32 is directly connected, Ethernet2/0
R2#
R2#
R2#ping vrf red 192.168.13.1 source e2/0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.26.2
.....
Success rate is 0 percent (0/5)
```

注意：您能路由复制品连接的， BGP、EIGRP等等。 请参考更多示例的参考。

路由上下文

与EVN的另一个好的功能是路由上下文的概念。 这允许您执行在VRF红色内的命令，而不必包括'VRF红色'到每个CLI。 例如，同样ping如上所述使用路由上下文如下所示。

```
R2#routing-context vrf red
R2%red#ping 192.168.13.1 source e2/0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.26.2
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
R2%red#
```

增强版traceroute

输出traceroute命令也将显示VNET VRF名字，为排除故障是有用，特别是如果路由复制是包含的。

```
R6#traceroute 192.168.13.3
Type escape sequence to abort.
Tracing the route to 192.168.13.3
VRF info: (vrf in name/id, vrf out name/id)
```

```
1 192.168.26.2 (red,orange/101) 1 msec 0 msec 0 msec
2 10.12.12.1 (orange/101,orange) 2 msec 1 msec 1 msec
3 192.168.13.3 0 msec * 1 msec
```

从R2的同样trace

```
R2#trace vrf red 192.168.13.3 source 192.168.26.2
Type escape sequence to abort.
Tracing the route to 192.168.13.3
VRF info: (vrf in name/id, vrf out name/id)
1 10.12.12.1 (orange/101,orange) 1 msec 1 msec 0 msec
2 192.168.13.3 1 msec * 1 msec
```

在此输出中您能看到从R2， next-hop in VRF橙色直接地被采取到达192.168.13.0/24。

结论

与名为模式的EIGRP的EVN VNET配置为客户提供一个方式部署一个虚拟化网络环境，并且取消某些复杂性关联与传统MPLS VPN或者VRF轻。 了解继承规则是关键对成功部署此功能，并且保证网络操作按照计划。

参考

容易虚拟网络whitepaper

http://www.cisco.com/c/en/us/products/collateral/ios-nx-os-software/layer-3-vpns-l3vpn/whitepaper_c11-638769.html

配置指南

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/evn/configuration/xe-3s/evn-xe-3s-book/evn-overview.html