用集中控制控制政策和App路由策略配置多个传输和流量工程

Contents

Introduction

本文描述如何配置集中控制控制政策和app路由策略达到在站点之间的流量工程。也许考虑作为特定的用例一个特定设计指南。

Prerequisites

Requirements

There are no specific requirements for this document.

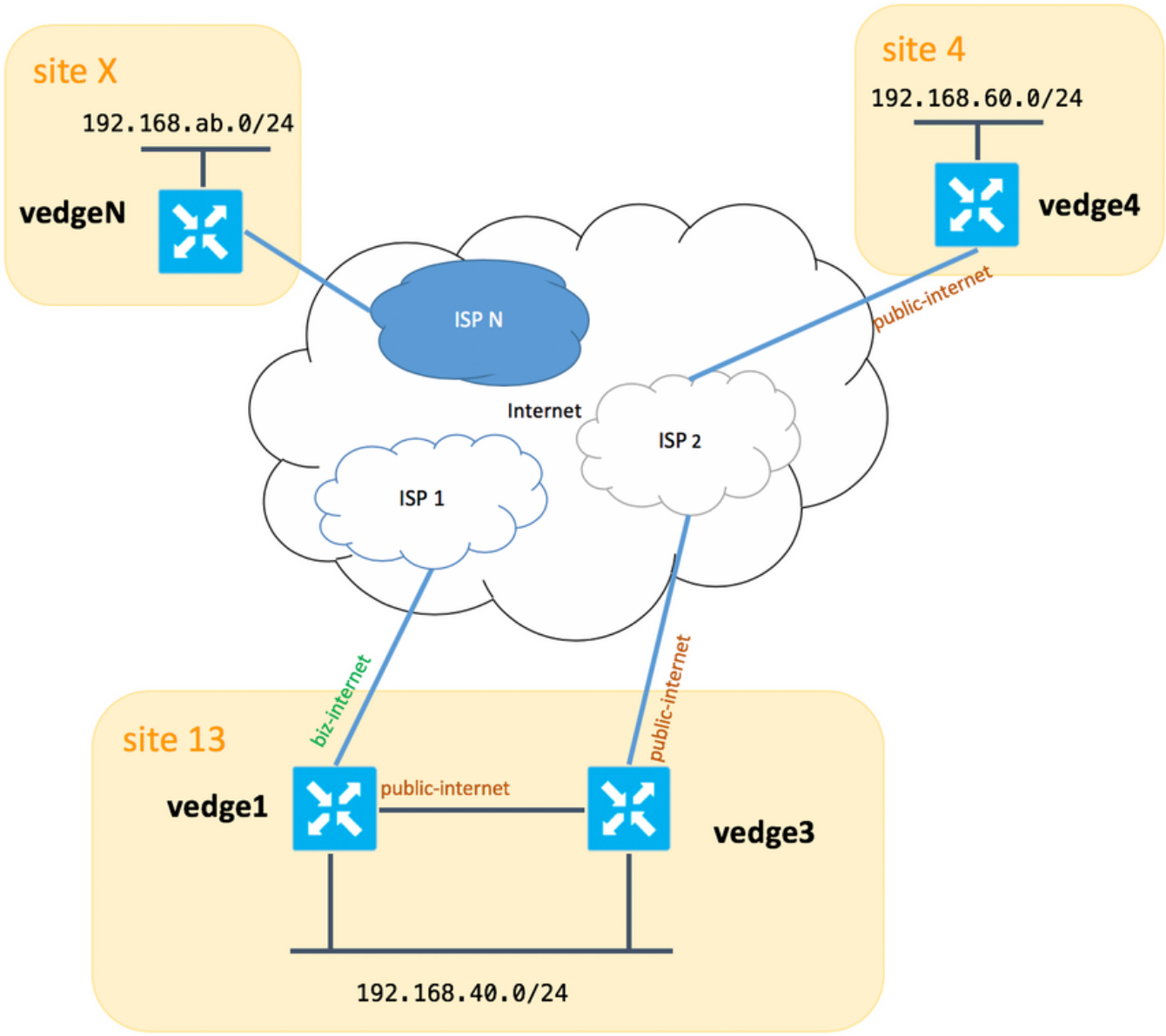
Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment.All of the devices used in this document started with a cleared (default) configuration.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。

配置

为演示和以后被描述的对问题的更好的了解的目的，请考虑在此镜像显示的拓扑。



请注意，那一般在**vedge1之间的**和**vedge3**您应该有第二条链路/子接口事务**互联网**TLOC扩展名的，但是这里为了未配置简单缘故的。

这是vEdges/vSmart的对应的系统设置(vedge2表示其他站点)：

主机名-	**站点id**	**系统IP**
vedge1	13 个	192.168.30.4
vedge3	13 个	192.168.30.6
vedge4	4	192.168.30.7
vedgex	X	192.168.30.5
vsmart1	1	192.168.30.3

您能找到传输旁边配置供参考。

vedge1 ：

```
vedge1# show running-config vpn 0
vpn 0
 interface ge0/0
  description "ISP_1"
```

```
  ip address 192.168.109.4/24
  nat
   respond-to-ping
  !
  tunnel-interface
   encapsulation ipsec
   color biz-internet
   no allow-service bgp
   allow-service dhcp
   allow-service dns
   allow-service icmp
   allow-service sshd
   no allow-service netconf
   no allow-service ntp
   no allow-service ospf
   allow-service stun
  !
  no shutdown
 !
 interface ge0/3
  description "TLOC-extension via vedge3 to ISP_2"
  ip address 192.168.80.4/24
  tunnel-interface
   encapsulation ipsec
   color public-internet
   no allow-service bgp
   allow-service dhcp
   allow-service dns
   allow-service icmp
   no allow-service sshd
   no allow-service netconf
   no allow-service ntp
   no allow-service ospf
   allow-service stun
  !
  no shutdown
 !
 !
 ip route 0.0.0.0/0 192.168.80.6
 ip route 0.0.0.0/0 192.168.109.10
!
```

vedge3 ：

```
vpn 0
 interface ge0/0
  description "ISP_2"
  ip address 192.168.110.6/24
  nat
   respond-to-ping
  !
  tunnel-interface
   encapsulation ipsec
   color public-internet
   carrier carrier3
   no allow-service bgp
   allow-service dhcp
   allow-service dns
   allow-service icmp
   no allow-service sshd
   no allow-service netconf
   no allow-service ntp
   no allow-service ospf
```

```
   no allow-service stun
  !
  no shutdown
 !
 interface ge0/3
  ip address 192.168.80.6/24
  tloc-extension ge0/0
  no shutdown
 !
 ip route 0.0.0.0/0 192.168.110.10
```

vedge4 ：

```
vpn 0
 interface ge0/1
  ip address 192.168.103.7/24
  tunnel-interface
   encapsulation ipsec
   color public-internet
   no allow-service bgp
   allow-service dhcp
   allow-service dns
   allow-service icmp
   no allow-service sshd
   no allow-service netconf
   no allow-service ntp
   allow-service ospf
   no allow-service stun
  !
  no shutdown
 !
 ip route 0.0.0.0/0 192.168.103.10
!
```

问题

用户要达到这些目标：

网络服务应该更喜欢提供**ISP 2**沟通在**站点13**和**站点4之间**由于一些理由。例如，它相当是一个一般的案件和方案，当在ISP内的连接/连接质量在其自己的客户端之间是非常好时，但是往互联网连通性的其余质量不满足公司的SLA由于一些麻烦或应该一般来说避免在ISP上行链路的拥塞和并且此ISP (在我们的情况的**ISP 2**)。

如果公共**互联网**出故障，仍然站点**站点13**应该更喜欢公共**互联网**上行链路连接到站点**站点4**，但是，维护冗余，并且应该能到达**站点4**。

站点**站点4**应该仍然维护与直接其他站点的最佳效果连接(因此您不能使用**限制**关键字这里在**vedge4**达到该目标)。

站点**站点13**应该以事务**互联网**colorto伸手可及的距离使用更好质量链路其他站点(表示由拓扑图的**站点x**)。

另一个原因也许开销/定价问题，当在ISP内的数据流免费时，但是更加消耗大，当退出服务商网络(自控系统)的数据流。

没有体验与SD-WAN方法并且习惯**经典**路由可能开始配置静态路由强制数据流从**vedge1**到**vedge4**公共接口地址通过**vedge1**和**vedge3之间的TLOC**扩展名接口的一些用户，但是它不会产生期

望的结果，并且能创建混乱，由于：

管理层面数据流(即ping， traceroute工具信息包)跟随期望小路。

同时， SD-WAN数据层面建立隧道(IPsec或gre传输隧道)忽略路由表信息和根据TLOCs**颜色的**表连接**。**

因为静态路由没有智力，如果公共**互联网**TLOC下降在**vedge3** (对ISP 2),then **vedge1的**上行链路不会注意此和连接对**vedge4**发生故障，竟管**vedge1**仍然有可用的事务**互联网**。

因此应该避免此方法和不可用。

解决方案

1. 使用集中控制控制政策设置一个首选为vSmart控制器的公共**互联网**TLOC，当宣布对应的OMP路由对**vedge4时。**它帮助归档从**站点4to站点13的**所需的数据流路径。

2. 要达到在反向的所需的数据流路径从**站点13**到**站点4**您不能使用集中控制控制政策，因为**vedge4**只有可用一个的TLOC，因此您不能设置首选到任何东西，但是您能使用app路由策略取得出口流量的此结果从**站点13**。

这是集中控制控制政策如何可能看起来象在vSmart控制器更喜欢公共**互联网**TLOC到达**站点13** ：

```
policy
 control-policy S4_S13_via_PUB
  sequence 10
   match tloc
    color   public-internet
    site-id 13
   !
   action accept
    set
     preference 333
    !
   !
  !
  default-action accept
 !
!
```

并且这是app更喜欢公共**互联网**上行链路的路由策略示例作为出口流量的出口点从**站点13**对**站点4** ：

```
policy
 app-route-policy S13_S4_via_PUB
  vpn-list CORP_VPNs
   sequence 10
    match
     destination-data-prefix-list SITE4_PREFIX
    !
    action
     count                      COUNT_PKT
     sla-class SLA_CL1 preferred-color public-internet
    !
   !
```

```
  !
 !
policy
 lists
  site-list S13
   site-id 13
  !
  site-list S40
   site-id 4
  !
  data-prefix-list SITE4_PREFIX
   ip-prefix 192.168.60.0/24
  !
  vpn-list CORP_VPNs
   vpn 40
  !
 !
 sla-class SLA_CL1
  loss    1
  latency 100
  jitter  100
 !
```

在vSmart控制器应该适当地运用策略：

```
apply-policy
 site-list S13
  app-route-policy S13_S4_via_PUB
 !
 site-list S4
  control-policy S4_S13_via_PUB out
 !
!
```

也请切记APP路由策略在仅vSmart不被配置作为一个本地化的策略，并且应该适用。

Verify

请注意app路由策略不会被运用于vEdge本地产生的数据流，因此验证是否根据推荐生成从对应的站点的LAN分段的若干数据流的所需的路径被操纵的通信流。一个高级测试方案事例您能使用iperf生成主机之间的数据流在**站点13**和**站点4的**LAN分段然后检查接口统计数据。例如，在我的情况，没有除系统生成以外的数据流并且您能看到专业流量总量穿过了ge0/3往TLOC扩展名的接口在**vedge3**：

```
vedge1# show interface statistics

PPPOE  PPPOE  DOT1X  DOT1X
                  AF    RX                    RX      RX     TX                    TX      TX
RX     RX      TX     TX      TX     RX     TX     RX
VPN  INTERFACE    TYPE  PACKETS  RX OCTETS   ERRORS  DROPS  PACKETS  TX OCTETS   ERRORS  DROPS
PPS    Kbps    PPS    Kbps    PKTS   PKTS   PKTS   PKTS
-------------------------------------------------------------------------------------------
-----------------------------------------------------------
0    ge0/0        ipv4  1832     394791      0       167    1934     894680      0       0
26     49      40     229     -       -      0      0
0    ge0/2        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
```

```
0    ge0/3        ipv4  3053034  4131607715  0       27     2486248  3239661783  0       0
51933  563383  41588  432832  -       -      0      0
0    ge0/4        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
```

Troubleshoot

首先，请保证对应的BFD会话建立(请勿使用**限制**任何地方关键字) ：

```
vedge1# show interface statistics

PPPOE  PPPOE  DOT1X  DOT1X
                  AF    RX                    RX      RX     TX                    TX      TX
RX     RX      TX     TX      TX     RX     TX     RX
VPN  INTERFACE    TYPE  PACKETS  RX OCTETS   ERRORS  DROPS  PACKETS  TX OCTETS   ERRORS  DROPS
PPS    Kbps    PPS    Kbps    PKTS   PKTS   PKTS   PKTS
-------------------------------------------------------------------------------------------------
-----------------------------------------------------------
0    ge0/0        ipv4  1832     394791      0       167    1934     894680      0       0
26     49      40     229     -       -      0      0
0    ge0/2        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
0    ge0/3        ipv4  3053034  4131607715  0       27     2486248  3239661783  0       0
51933  563383  41588  432832  -       -      0      0
0    ge0/4        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0

vedge1# show interface statistics

PPPOE  PPPOE  DOT1X  DOT1X
                  AF    RX                    RX      RX     TX                    TX      TX
RX     RX      TX     TX      TX     RX     TX     RX
VPN  INTERFACE    TYPE  PACKETS  RX OCTETS   ERRORS  DROPS  PACKETS  TX OCTETS   ERRORS  DROPS
PPS    Kbps    PPS    Kbps    PKTS   PKTS   PKTS   PKTS
-------------------------------------------------------------------------------------------------
-----------------------------------------------------------
0    ge0/0        ipv4  1832     394791      0       167    1934     894680      0       0
26     49      40     229     -       -      0      0
0    ge0/2        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
0    ge0/3        ipv4  3053034  4131607715  0       27     2486248  3239661783  0       0
51933  563383  41588  432832  -       -      0      0
0    ge0/4        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0

vedge1# show interface statistics

PPPOE  PPPOE  DOT1X  DOT1X
                  AF    RX                    RX      RX     TX                    TX      TX
RX     RX      TX     TX      TX     RX     TX     RX
VPN  INTERFACE    TYPE  PACKETS  RX OCTETS   ERRORS  DROPS  PACKETS  TX OCTETS   ERRORS  DROPS
PPS    Kbps    PPS    Kbps    PKTS   PKTS   PKTS   PKTS
-------------------------------------------------------------------------------------------------
-----------------------------------------------------------
0    ge0/0        ipv4  1832     394791      0       167    1934     894680      0       0
26     49      40     229     -       -      0      0
0    ge0/2        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
```

```
0    ge0/3        ipv4  3053034  4131607715  0       27     2486248  3239661783  0       0
51933  563383  41588  432832  -       -      0      0
0    ge0/4        ipv4  0        0           0       0      0        0           0       0
0      0       0      0       -       -      0      0
```

如果不能取得与流量工程的期望的结果，则请检查适当地运用了策略：

1. 在vedge4您应该检查对于于站点起源的前缀13适当的TLOC选择了：

```
vedge4# show omp routes 192.168.40.0/24 detail

---------------------------------------------------
omp route entries for vpn 40 route 192.168.40.0/24
---------------------------------------------------
            RECEIVED FROM:
peer            192.168.30.3
path-id         72
label           1002
status          R
loss-reason     tloc-preference
lost-to-peer    192.168.30.3
lost-to-path-id 74
    Attributes:
     originator       192.168.30.4
     type             installed
     tloc             192.168.30.4, biz-internet, ipsec
     ultimate-tloc    not set
     domain-id        not set
     overlay-id        1
     site-id          13
     preference       not set
     tag              not set
     origin-proto     connected
     origin-metric    0
     as-path          not set
     unknown-attr-len not set
            RECEIVED FROM:
peer            192.168.30.3
path-id         73
label           1002
status          C,I,R
loss-reason     not set
lost-to-peer    not set
lost-to-path-id not set
    Attributes:
     originator       192.168.30.4
     type             installed
     tloc             192.168.30.4, public-internet, ipsec
     ultimate-tloc    not set
     domain-id        not set
     overlay-id        1
     site-id          13
     preference       not set
     tag              not set
     origin-proto     connected
     origin-metric    0
     as-path          not set
     unknown-attr-len not set
            RECEIVED FROM:
peer            192.168.30.3
path-id         74
label           1002
status          C,I,R
```

```
loss-reason     not set
lost-to-peer    not set
lost-to-path-id not set
    Attributes:
     originator       192.168.30.6
     type             installed
     tloc             192.168.30.6, public-internet, ipsec
     ultimate-tloc    not set
     domain-id        not set
     overlay-id        1
     site-id          13
     preference       not set
     tag              not set
     origin-proto     connected
     origin-metric    0
     as-path          not set
     unknown-attr-len not set
```

2. 在**vedge1**和**vedge3请**保证安装从vSmart的相应的策略，并且信息包被匹配并且计数：

```
vedge1# show policy from-vsmart
from-vsmart sla-class SLA_CL1
 loss    1
 latency 100
 jitter  100
from-vsmart app-route-policy S13_S4_via_PUB
 vpn-list CORP_VPNs
  sequence 10
   match
    destination-data-prefix-list SITE4_PREFIX
   action
    count                      COUNT_PKT
    backup-sla-preferred-color biz-internet
    sla-class       SLA_CL1
    no sla-class strict
    sla-class preferred-color public-internet
from-vsmart lists vpn-list CORP_VPNs
 vpn 40
from-vsmart lists data-prefix-list SITE4_PREFIX
 ip-prefix 192.168.60.0/24

vedge1# show policy app-route-policy-filter

                COUNTER
NAME      NAME  NAME     PACKETS   BYTES
-------------------------------------------------
S13_S4_via_PUB CORP_VPNs  COUNT_PKT     81126791  110610503611
```

除那以外您应该通过从**站点13的公共互联网**颜色看到更多发送的数据包(在我测试期间没有数据流通过事务**互联网**TLOC)：

```
vedge1# show app-route stats remote-system-ip 192.168.30.7
app-route statistics 192.168.80.4 192.168.103.7 ipsec 12386 12366
 remote-system-ip 192.168.30.7
 local-color      public-internet
 remote-color     public-internet
 mean-loss        0
 mean-latency     1
 mean-jitter      0
```

```
 sla-class-index  0,1

       TOTAL           AVERAGE  AVERAGE  TX DATA  RX DATA
INDEX  PACKETS  LOSS   LATENCY  JITTER   PKTS     PKTS
-------------------------------------------------------------
0      600      0      0        0        0        0
1      600      0      1        0        5061061  6731986
2      600      0      0        0        3187291  3619658
3      600      0      0        0        0        0
4      600      0      2        0        9230960  12707216
5      600      0      1        0        9950840  4541723

app-route statistics 192.168.109.4 192.168.103.7 ipsec 12346 12366
 remote-system-ip 192.168.30.7
 local-color      biz-internet
 remote-color     public-internet
 mean-loss        0
 mean-latency     0
 mean-jitter      0
 sla-class-index  0,1

       TOTAL           AVERAGE  AVERAGE  TX DATA  RX DATA
INDEX  PACKETS  LOSS   LATENCY  JITTER   PKTS     PKTS
-------------------------------------------------------------
0      600      0      0        0        0        0
1      600      0      1        0        0        0
2      600      0      0        0        0        0
3      600      0      0        0        0        0
4      600      0      2        0        0        0
5      600      0      0        0        0        0
```

Related Information

- https://sdwan-docs.cisco.com/Product_Documentation/Software_Features/Release_18.3/07Policy_Applications/01Application-Aware_Routing/01Configuring_Application-Aware_Routing
- https://sdwan-docs.cisco.com/Product_Documentation/Software_Features/Release_18.3/02System_and_Interfaces/06Configuring_Network_Interfaces
- https://sdwan-docs.cisco.com/Product_Documentation/Command_Reference/Configuration_Commands/color