TCP-verbindingen worden niet ingesteld bij verkeer na symmetrische paden

Inhoud

Inleiding

Dit document beschrijft probleem dat zich voordoet wanneer asymmetrische paden worden gebruikt voor doorsturen in SD-WAN fabric.

Probleem

Secure Shell (SSH)-verbindingen kunnen niet worden ingesteld op host2 (hostname - edgeclien2) vanaf host1 (hostname - edgeclien1), maar tegelijkertijd werkt SSH in omgekeerde richting.

```
[root@edgeclient2 user]# ssh user@192.168.40.21
user@192.168.40.21's password:
Last login: Sun Feb 10 13:26:32 2019 from 192.168.60.20
[user@edgeclient1 ~]$
```

```
[root@edgeclient1 user]# ssh user@192.168.60.20
<nothing happens after that>
```

of

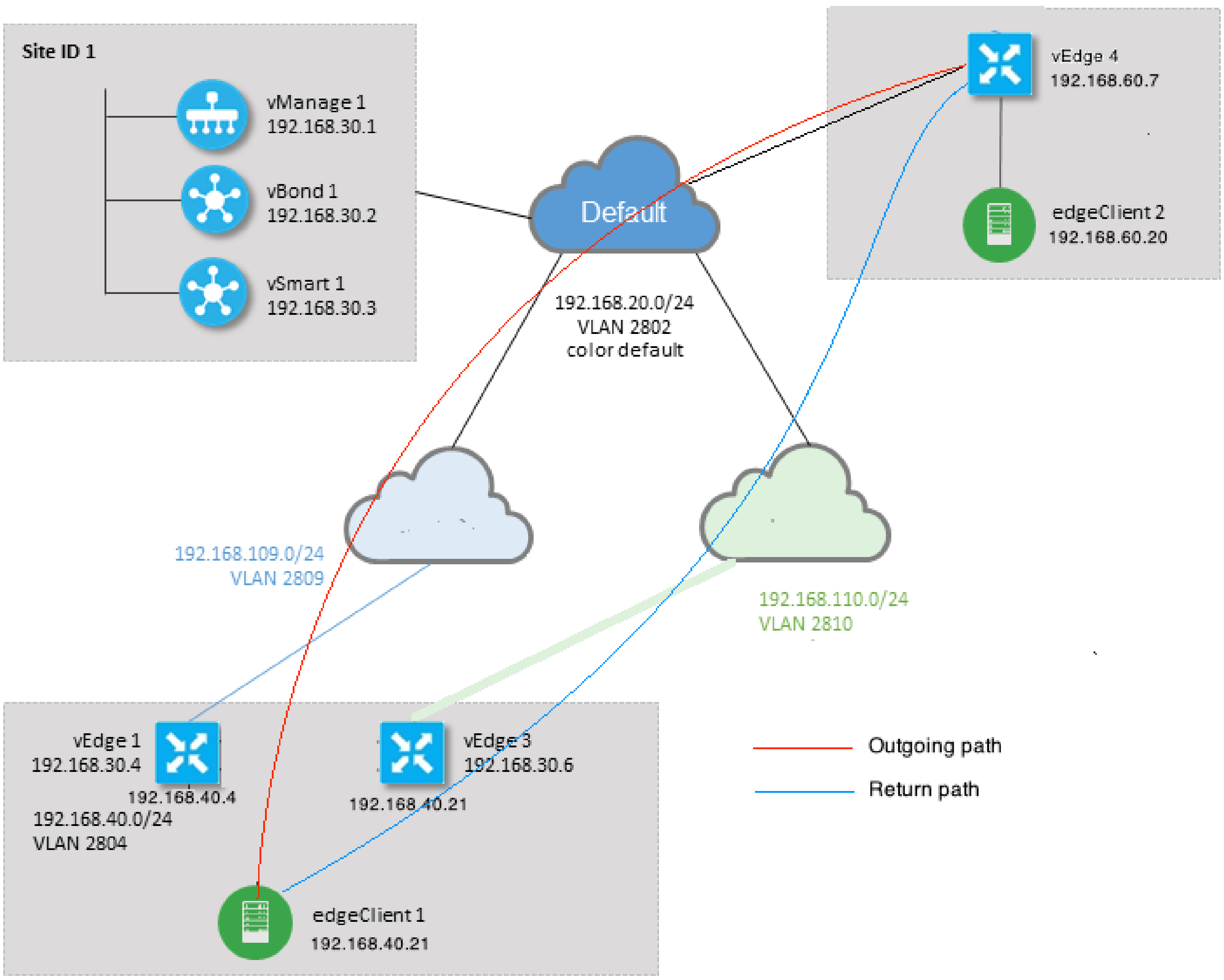
```
[user@edgeclient1 ~]$ ssh user@192.168.60.20
ssh_exchange_identification: Connection closed by remote host
```

Zowel Edelclient1 als Egeclient2 SSH-datums en klanten hebben goede configuraties en verbindingen weten te realiseren vanaf het lokale LAN-segment met succes:

```
vedge4# request execute vpn 40 ssh user@192.168.60.20
user@192.168.60.20's password:
Last login: Sun Feb 10 13:28:23 2019 from 192.168.60.7
[user@edgeclient2 ~]$
```

Alle andere TCP-toepassingen (Transmission Control Protocol) hebben soortgelijke problemen.

Topologische grafiek



diagnostiek

Deze toegangscontrolelijsten (ACL's) zijn geconfigureerd en toegepast in corresponderende richtingen op serviceszijinterfaces van vEdge1 en vEdge3:

```
policy
 access-list SSH_IN
  sequence 10
   match
    source-ip      192.168.40.21/32
    destination-ip 192.168.60.20/32
   !
   action accept
    count SSH_IN
   !
  !
  default-action accept
 !
 access-list SSH_OUT
  sequence 10
   match
```

```
    source-ip      192.168.60.20/32
    destination-ip 192.168.40.21/32
   !
   action accept
    count SSH_OUT
   !
  !
  default-action accept
 !
!
```

Omgekeerde ACL werd toegepast op vEdge4:

```
policy
 access-list SSH_IN
  sequence 10
   match
    source-ip      192.168.60.20/32
    destination-ip 192.168.40.21/32
   !
   action accept
    count SSH_IN
   !
  !
  default-action accept
 !
 access-list SSH_OUT
  sequence 10
   match
    source-ip      192.168.40.21/32
    destination-ip 192.168.60.20/32
   !
   action accept
    count SSH_OUT
   !
  !
  default-action accept
 !
!
```

Ook is app-zichtbaarheid ingeschakeld voor alle vEdge-routers en stromen tijdens de SSH-verbindingsfase:

```
vedge1# show app cflowd flows | tab ; show policy access-list-counters

                                                             TCP
TIME    EGRESS  INGRESS
                                   SRC    DEST        IP     CNTRL  ICMP                   TOTAL
TOTAL  MIN  MAX                            TO      INTF    INTF
VPN  SRC IP         DEST IP        PORT   PORT  DSCP  PROTO  BITS   OPCODE  NHOP IP        PKTS
BYTES  LEN  LEN  START TIME                EXPIRE  NAME    NAME
-------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------
40   192.168.40.21  192.168.60.20  47866  22    0     6      24     0       192.168.109.7  3
227    66   87   Sun Feb 17 14:13:25 2019  34      ge0/0   ge0/1


         COUNTER
NAME     NAME     PACKETS  BYTES
```

```
----------------------------------
SSH_IN   SSH_IN   3        227
SSH_OUT  SSH_OUT  2        140

vedge3# show app cflowd flows | tab ; show policy access-list-counters

                                                             TCP
TIME    EGRESS  INGRESS
                                   SRC   DEST         IP     CNTRL  ICMP                   TOTAL
TOTAL  MIN  MAX                            TO      INTF    INTF
VPN  SRC IP         DEST IP        PORT  PORT   DSCP  PROTO  BITS   OPCODE  NHOP IP        PKTS
BYTES  LEN  LEN  START TIME                EXPIRE  NAME    NAME
-------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------
40   192.168.60.20  192.168.40.21  22    47866  0     6      18     0       192.168.40.21  8
480    60   60   Sun Feb 17 14:14:08 2019  51      ge0/1   ge0/0


         COUNTER
NAME     NAME     PACKETS  BYTES
----------------------------------
SSH_IN   SSH_IN   0        0
SSH_OUT  SSH_OUT  7        420

vedge4# show app cflowd flows | tab ; show policy access-list-counters

                                                              TCP
TIME    EGRESS  INGRESS
                                   SRC    DEST         IP      CNTRL  ICMP
TOTAL  TOTAL  MIN  MAX                            TO      INTF    INTF
VPN  SRC IP         DEST IP        PORT   PORT   DSCP  PROTO  BITS   OPCODE  NHOP IP        PKTS
BYTES  LEN  LEN  START TIME                EXPIRE  NAME    NAME
-------------------------------------------------------------------------------------------------
------------------------------------------------------------------------
40   192.168.40.21  192.168.60.20  47866  22     0     6      2      0       192.168.60.20  4
240    60   60   Sun Feb 17 14:17:44 2019  37      ge0/2   ge0/0
40   192.168.60.20  192.168.40.21  22     47866  0     6      18     0       192.168.110.6  8
592    74   74   Sun Feb 17 14:17:44 2019  49      ge0/0   ge0/2


         COUNTER
NAME     NAME     PACKETS  BYTES
----------------------------------
SSH_IN   SSH_IN   8        592
SSH_OUT  SSH_OUT  4        240
```

Zoals je kunt zien aan deze uitgangen, zijn inkomende en uitgaande stromen asymmetrisch. edgeclient1 (192.168.40.21) probeert SSH-sessie met edgeclient2 (192.168.60.20) in te stellen en inkomend verkeer komt via vEdge1 en retourverkeer via vEdge3. Vanaf de ACL-tellers kunt u ook dat aantal inkomende en uitgaande pakketten zien op v Edge4 komt niet overeen met som in bijbehorende richtingen op vEdge1 en vEdge3. Tegelijkertijd is er geen pakketverlies bij het testen met **ping**:

```
[root@edgeclient1 user]# ping -f 192.168.60.20 -c 10000
PING 192.168.60.20 (192.168.60.20) 56(84) bytes of data.

--- 192.168.60.20 ping statistics ---
10000 packets transmitted, 10000 received, 0% packet loss, time 3076ms
rtt min/avg/max/mdev = 0.128/0.291/6.607/0.623 ms, ipg/ewma 0.307/0.170 ms
```

```
[root@edgeclient2 user]# ping -f 192.168.40.21 -c 10000
PING 192.168.40.21 (192.168.40.21) 56(84) bytes of data.

--- 192.168.40.21 ping statistics ---
10000 packets transmitted, 10000 received, 0% packet loss, time 3402ms
rtt min/avg/max/mdev = 0.212/0.318/2.766/0.136 ms, ipg/ewma 0.340/0.327 ms
```

Tevens wordt erop gewezen dat SSH in omgekeerde richting werkt en dat bestanden ook zonder problemen kunnen worden gekopieerd via scp/sftp.

Oplossing

Bij sommige formaties of gegevensbeleid van Deep Packet Inspection (DPI) werd aanvankelijk vermoed, maar geen van deze werd geactiveerd:

```
vedge3# show policy from-vsmart
% No entries found.

vedge1# show policy from-vsmart
% No entries found.
```

Maar uiteindelijk werd ontdekt dat TCP-optimalisatie was ingeschakeld:

```
vedge1# show app tcp-opt active-flows

                                                                          EGRESS  INGRESS
                                   SRC    DEST                            INTF    INTF     TX
RX                  UNOPT   PROXY
VPN  SRC IP         DEST IP        PORT   PORT  START TIME                NAME    NAME     BYTES
BYTES  TCP STATE    REASON  IDENTITY
------------------------------------------------------------------------------------------------
--------------------------------------------
40   192.168.40.21  192.168.60.20  47868  22    Sun Feb 17 14:18:13 2019  ge0_0   ge0_1    314
0      In-progress  -       Client-Proxy

vedge1# show app tcp-opt expired-flows

                                                  SRC    DEST
TX     RX                UNOPT   PROXY
TIMESTAMP      VPN  SRC IP         DEST IP        PORT   PORT   START TIME                END
TIME                  BYTES  BYTES  TCP STATE  REASON  IDENTITY      DELETE REASON
------------------------------------------------------------------------------------------------
----------------------------------------------------------------------------------
1549819969608  40   192.168.40.21  192.168.60.7   22     56612  Sun Feb 10 18:32:49 2019  Sun
Feb 10 18:36:03 2019  5649   4405   Optimized  -       Server-Proxy  CLOSED
1549820055487  40   192.168.40.21  192.168.60.7   22     56613  Sun Feb 10 18:34:15 2019  Sun
Feb 10 19:07:46 2019  5719   4669   Optimized  -       Server-Proxy  CLOSED
1550408210511  40   192.168.40.21  192.168.60.20  47862  22     Sun Feb 17 13:56:50 2019  Sun
Feb 17 13:56:58 2019  401    0      Optimized  -       Client-Proxy  STATE-TIMEOUT
1550408981634  40   192.168.40.21  192.168.60.20  47864  22     Sun Feb 17 14:09:41 2019  Sun
Feb 17 14:09:49 2019  401    0      Optimized  -       Client-Proxy  STATE-TIMEOUT
1550409205399  40   192.168.40.21  192.168.60.20  47866  22     Sun Feb 17 14:13:25 2019  Sun
Feb 17 14:13:33 2019  227    0      Optimized  -       Client-Proxy  STATE-TIMEOUT
1550409493042  40   192.168.40.21  192.168.60.20  47868  22     Sun Feb 17 14:18:13 2019  Sun
Feb 17 14:18:21 2019  401    0      Optimized  -       Client-Proxy  STATE-TIMEOUT
```

Daarnaast kan je het bericht van CONN_TEARDOWN zien in **debugs**.

```
vedge1# show log /var/log/tmplog/vdebug tail "-f"
local7.debug: Feb 17 13:56:50 vedge1 FTMD[662]: ftm_tcpopt_flow_add[268]: Created new tcpflow :-
vrid-3 192.168.40.21/47862 192.168.60.20/22
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_send_conn_tear_down[388]: Trying to
pack and send the following message to TCPD
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_send_conn_tear_down[408]: Sending
following CONN_TD msg
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_send_conn_tear_down[413]:
192.168.40.21:47862->192.168.60.20:22; vpn:40; syn_seq_num:4172167164; identity:0; cport_prime:0
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_msgq_tx[354]: Transfering size = 66
bytes data
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_send_conn_tear_down[416]: Successfully
sent conn_td msg to TCPD
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpopt_propagate_tear_down[1038]: Sent
CONN_TEARDOWN msg to tcpd for existing tcpflow :- vrid-3 192.168.40.21/47862 192.168.60.20/22 ;
identity:CLIENT_SIDE_PROXY . Send Successful !
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpopt_append_expired_err_flow_tbl[958]:
Appending flow vrid-3 192.168.40.21/47862 192.168.60.20/22  to the expired flow table at Sun Feb
17 13:56:58 2019
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpopt_append_expired_err_flow_tbl[980]:
Appending flow vrid-3 192.168.40.21/47862 192.168.60.20/22  to the error flow table at Sun Feb
17 13:56:58 2019
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpopt_flow_delete[293]: Removing tcpflow :-
vrid-3 192.168.40.21/47862 192.168.60.20/22
local7.debug: Feb 17 13:56:58 vedge1 TCPD[670]: handle_upstream_connect[538]: Error - BP NULL
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_msg_decode[254]: FTM-TCPD: Received
FTM_TCPD__PB_FTM_TCPD_MSG__E_MSG_TYPE__CONN_CLOSED msg
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_handle_conn_closed[139]: FTM-TCPD:
Received CONN_CLOSED for following C->S
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_handle_conn_closed[150]:
192.168.40.21:47862->192.168.60.20:22; vpn:40; syn_seq_num:4172167164; identity:0;
cport_prime:47862; bind_port:0
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_handle_conn_closed[184]: FTM-TCPD:
Could not find entry in FT for following flow
local7.debug: Feb 17 13:56:58 vedge1 FTMD[662]: ftm_tcpd_handle_conn_closed[185]: vrid-3
192.168.40.21/47862 192.168.60.20/22
```

En hier kunt u een voorbeeld zien wanneer TCP-optimalisatie goed werkt (het CONN_EST bericht kan worden gezien):

```
vedge3# show log /var/log/tmplog/vdebug tail "-f -n 0"
local7.debug: Feb 17 15:41:13 vedge3 FTMD[657]: ftm_tcpd_msg_decode[254]: FTM-TCPD: Received
FTM_TCPD__PB_FTM_TCPD_MSG__E_MSG_TYPE__CONN_CLOSED msg
local7.debug: Feb 17 15:41:13 vedge3 FTMD[657]: ftm_tcpd_handle_conn_closed[139]: FTM-TCPD:
Received CONN_CLOSED for following C->S
local7.debug: Feb 17 15:41:13 vedge3 FTMD[657]: ftm_tcpd_handle_conn_closed[150]:
192.168.40.21:47876->192.168.60.20:22; vpn:40; syn_seq_num:2779178897; identity:0;
cport_prime:47876; bind_port:0
local7.debug: Feb 17 15:41:15 vedge3 FTMD[657]: ftm_tcpd_msg_decode[258]: FTM-TCPD: Received
FTM_TCPD__PB_FTM_TCPD_MSG__E_MSG_TYPE__CONN_EST msg
local7.debug: Feb 17 15:41:15 vedge3 FTMD[657]: ftm_tcpd_handle_conn_est[202]: FTM-TCPD:
Received CONN_EST for following C->S
local7.debug: Feb 17 15:41:15 vedge3 FTMD[657]: ftm_tcpd_handle_conn_est[213]:
192.168.40.21:47878->192.168.60.20:22; vpn:40; syn_seq_num:2690847868; identity:0;
cport_prime:47878; bind_port:0
local7.debug: Feb 17 15:41:15 vedge3 FTMD[657]: ftm_tcpopt_flow_add[268]: Created new tcpflow :-
vrid-3 192.168.40.21/47878 192.168.60.20/22
```

Conclusie

Voor het optimaliseren van TCP moeten stromen symmetrisch zijn, zodat u dit probleem kunt oplossen of TCP-optimalisatie moet worden uitgeschakeld (**geen VPN 40 tcp-optimalisatie) of het gegevensbeleid moet worden gemaakt om TCP-stromen in beide richtingen te dwingen.** U kunt meer informatie hierover vinden in SD-WAN Design Guide sectie Traffic Symmetry for DPI, pagina 23.