Probleemoplossing voor Firepower Threat Defense IGMP en Multicast Basics

Inhoud

Inleiding

Dit document beschrijft de basisbeginselen van multicast en hoe Firepower Threat Defence (FTD) het Internet Group Management Protocol (IGMP) implementeert.

Voorwaarden

Vereisten

Basiskennis over IP-routing.

Gebruikte componenten

De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk live is, moet u zorgen dat u de potentiële impact van elke opdracht begrijpt.

De inhoud van dit artikel is ook van toepassing op de software voor adaptieve security applicatie (ASA).

De informatie in dit document is gebaseerd op de volgende software- en hardware-versies:

- Cisco Firepower 4125 Threat Defence versie 7.1.0.

- Firepower Management Center (FMC) versie 7.1.0.
- ASA versie 9.19.1.

Achtergrondinformatie

Definities

- Unicast = van één host naar een andere host (één-op-één).
- Uitzending = van één host naar ALLE mogelijke hosts (one-to-all).
- **Multicast = van een host van een groep hosts naar een groep hosts (één-naar-veel of veel-naar-veel).**
- Anycast = van een host naar de dichtstbijzijnde host van een groep (een-op-een-veel).

Grondbeginselen

- Multicast RFC 988 werd in 1986 geschreven door Steve Deering.
- IPv4-multicast gebruikt het bereik 224.0.0.0/4 (eerste 4-bits 110) - 224.0.0.0 - 239.255.255.255.
- Voor IPv4 is het L2 MAC-adres afgeleid van L3 multicast IP: 01005e (24 bits) + 25th bit altijd 0 + 23 lagere bits van het multicast IPv4-adres.
- IPv6-multicast maakt gebruik van het bereik FF00::/8 en is flexibeler dan IPv4-multicast omdat hiermee Rendezvous Point (RP) IP kan worden ingesloten.
- Voor IPv6 is het L2 MAC-adres afgeleid van de L3 multicast: 3333 + 32 lagere bits van het multicast IPv6-adres.
- Multicastvoordelen: Efficiëntie door een lagere belasting op de bron. Prestaties, omdat het verkeer duplicatie of overstroming voorkomt.
- Multicastnadelen: onbetrouwbaar transport (op UDP gebaseerd), geen congestievermijding, levering na afloop van de sequentie.
- Multicast wordt niet ondersteund op het openbare internet omdat daarvoor alle apparaten op het pad nodig zijn. Meestal gebruikt wanneer alle apparaten onder een gemeenschappelijke administratieve autoriteit vallen.
- Typische Multicast-toepassingen: interne videostroom, videoconferentie.

Multicast versus gerepliceerde Unicast

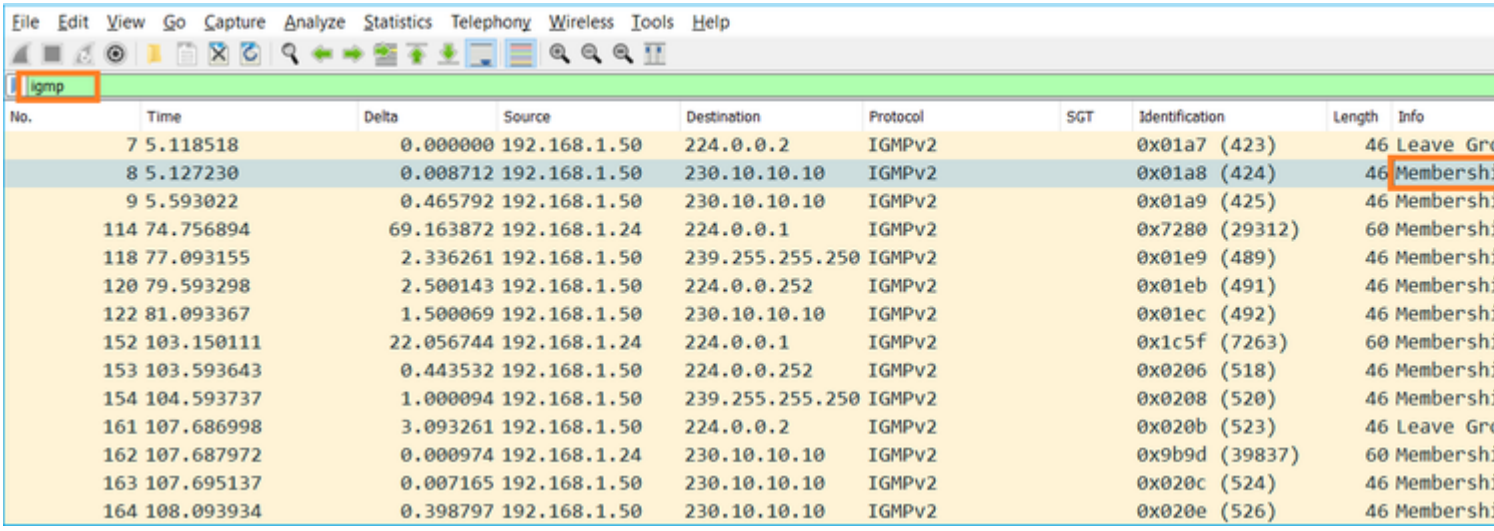
In replicated Unicast maakt de bron meerdere kopieën van hetzelfde unicastpakket (replicaâ€™s) en stuurt deze naar meerdere doelhosts. Multicast verplaatst de last van de bronhost naar het netwerk, terwijl in replicated Unicast al het werk wordt gedaan op de bronhost.

Configureren

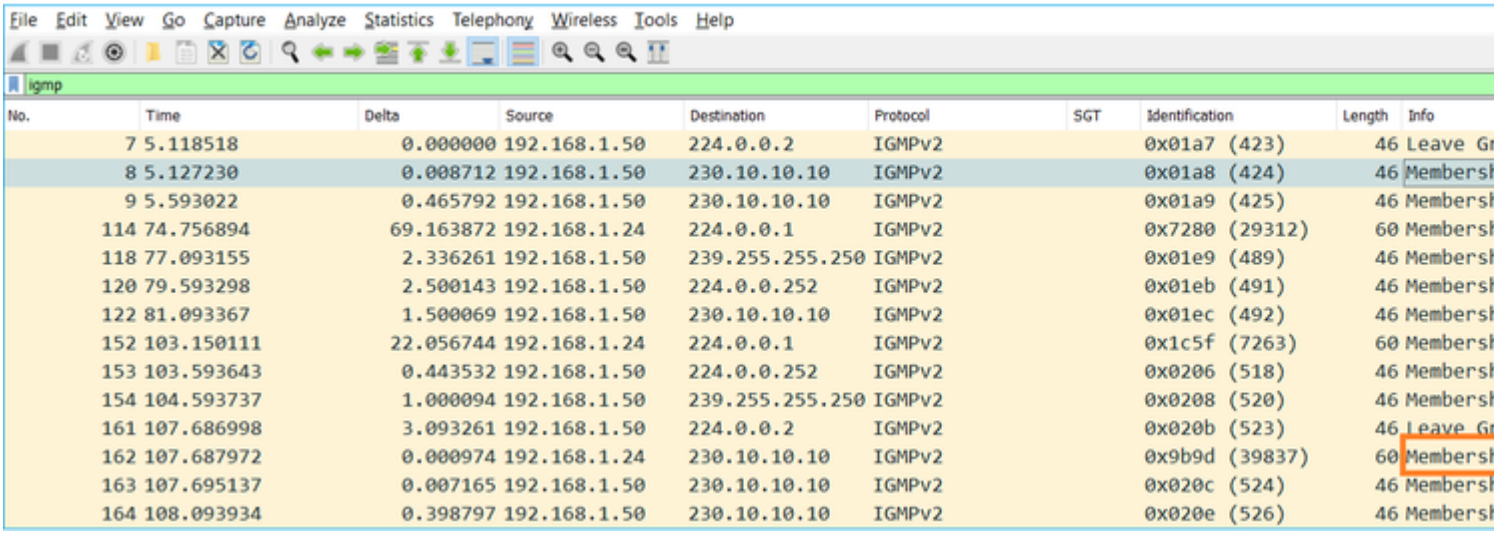
IGMP-grondbeginselen

- IGMP is de 'taal' die wordt gesproken tussen de multicast-ontvangers en het lokale L3-apparaat (meestal een router).
- IGMP is een Layer 3-protocol (zoals ICMP) en gebruikt **IP-protocol nummer 2.**
- Er zijn momenteel 3 IGMP-versies. De standaard IGMP versie op de firewall is versie 2. **Op dit moment worden alleen versie 1 en 2 ondersteund.**
- Tussen IGMPv1 en IGMPv2 zijn de belangrijkste verschillen:
    - IGMPv1 heeft geen bericht van de Groep van het Verlof.
    - IGMPv1 heeft geen Group-Specific Query (gebruikt door de firewall wanneer een host een multicast groep verlaat).
    - IGMPv1 heeft geen snellere verkiezingsprocedure.

- **IGMPv3 wordt momenteel niet ondersteund** op ASA/FTD, maar als referentie is het belangrijke verschil tussen IGMPv2 en IGMPv3 de opname van een Group-and-Source-Specific Query in IGMPv3 die wordt gebruikt in Source-Specific Multicast (SSM).
- IGMPv1/IGMPv2/IGMPv3-vragen = **224.0.0.1**
  IGMPv2-verlof = **224.0.0.2**
  IGMPv3-lidmaatschapsrapport = **224.0.0.2**
- Als een host wil toetreden kan een **ongevraagd IGMP Membership Report** bericht verzenden:



- Vanuit het firewallstandpunt zijn er **2 typen IGMP-vragen: Algemene vragen** en **groepsspecifieke vragen**
- Wanneer de firewall een bericht van de IGMP-verlofgroep ontvangt, moet het controleren of er andere leden van die groep op het subnetje staan. Om die reden stuurt de firewall een **Group-Specific Query:**



- Op subnetten met meerdere routers/firewalls wordt een **query** (een apparaat dat alle IGMP-vragen verstuurt) geselecteerd:

<#root>

```
firepower#
```

```
show igmp interface INSIDE
```

```
INSIDE is up, line protocol is up
  Internet address is 192.168.1.97/24
  IGMP is enabled on interface
  Current IGMP version is 2
  IGMP query interval is 125 seconds
  IGMP querier timeout is 60 seconds
  IGMP max query response time is 10 seconds
  Last member query response interval is 1 seconds
  Inbound IGMP access group is:
  IGMP limit is 500, currently active joins: 2
  Cumulative IGMP activity: 21 joins, 20 leaves
```

IGMP querying router is 192.168.1.97 (this system)

```
<-- IGMP querier
```

- Op FTD, gelijkend op een klassieke ASA, kunt u **debug igmp** toelaten om IGMP-gerelateerde berichten te zien:

<#root>

```
firepower#
```

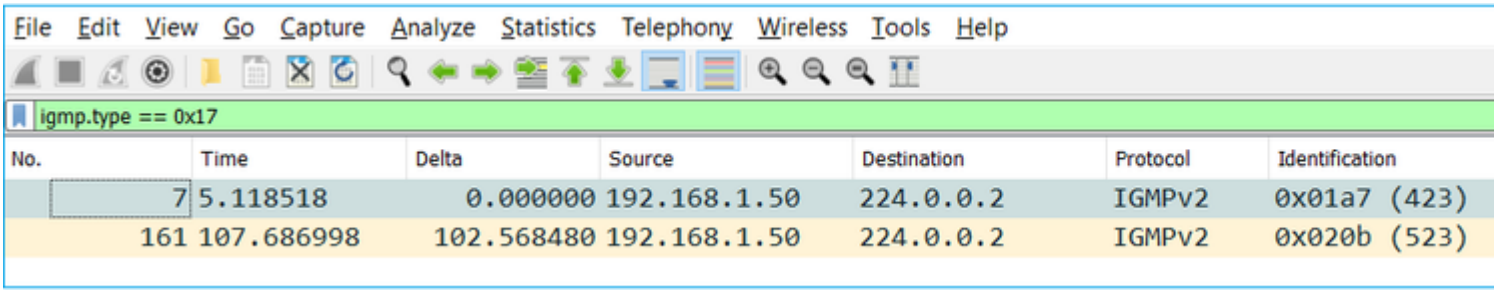
debug igmp

```
IGMP debugging is on
IGMP: Received v2 Query on DMZ from 192.168.6.1
```

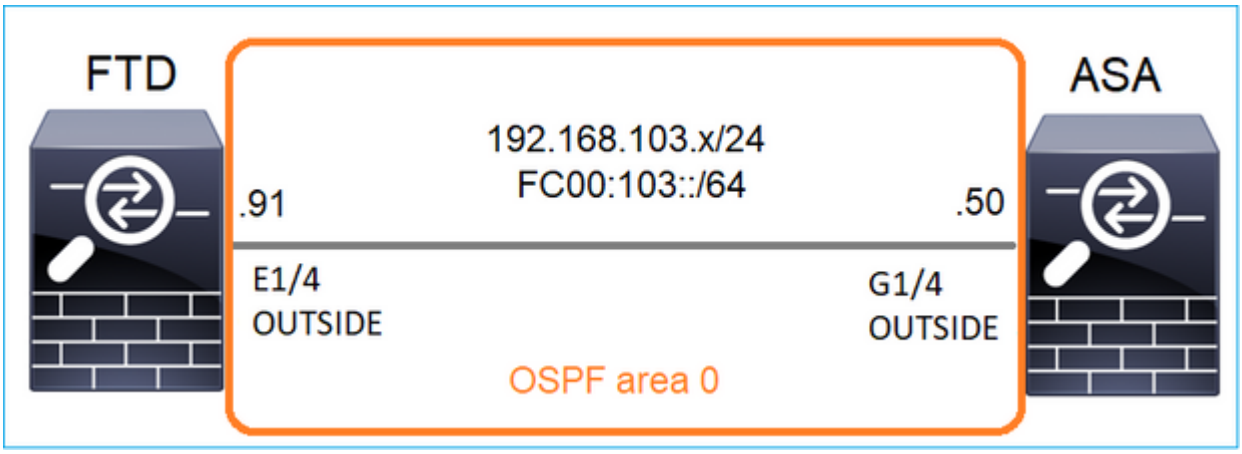
IGMP: Received v2 Report on INSIDE from 192.168.1.50 for 239.255.255.250

```
<-- Received an IGMP packet
IGMP: group_db: add new group 239.255.255.250 on INSIDE
IGMP: MRIB updated (*,239.255.255.250) : Success
IGMP: Switching to EXCLUDE mode for 239.255.255.250 on INSIDE
IGMP: Updating EXCLUDE group timer for 239.255.255.250
IGMP: Received v2 Report on INSIDE from 192.168.1.50 for 230.10.10.10
IGMP: group_db: add new group 230.10.10.10 on INSIDE
IGMP: MRIB updated (*,230.10.10.10) : Success
IGMP: Switching to EXCLUDE mode for 230.10.10.10 on INSIDE
IGMP: Updating EXCLUDE group timer for 230.10.10.10
IGMP: Send v2 general Query on INSIDE
IGMP: Received v2 Query on INSIDE from 192.168.1.97
IGMP: Send v2 general Query on OUTSIDE
IGMP: Received v2 Query on OUTSIDE from 192.168.103.91
IGMP: Received v2 Report on INSIDE from 192.168.1.50 for 239.255.255.250
IGMP: Updating EXCLUDE group timer for 239.255.255.250
IGMP: Received v2 Report on INSIDE from 192.168.1.50 for 230.10.10.10
IGMP: Updating EXCLUDE group timer for 230.10.10.10
```

- Een host verlaat normaal een multicast groep met een **Leave Group** bericht (IGMPv2).



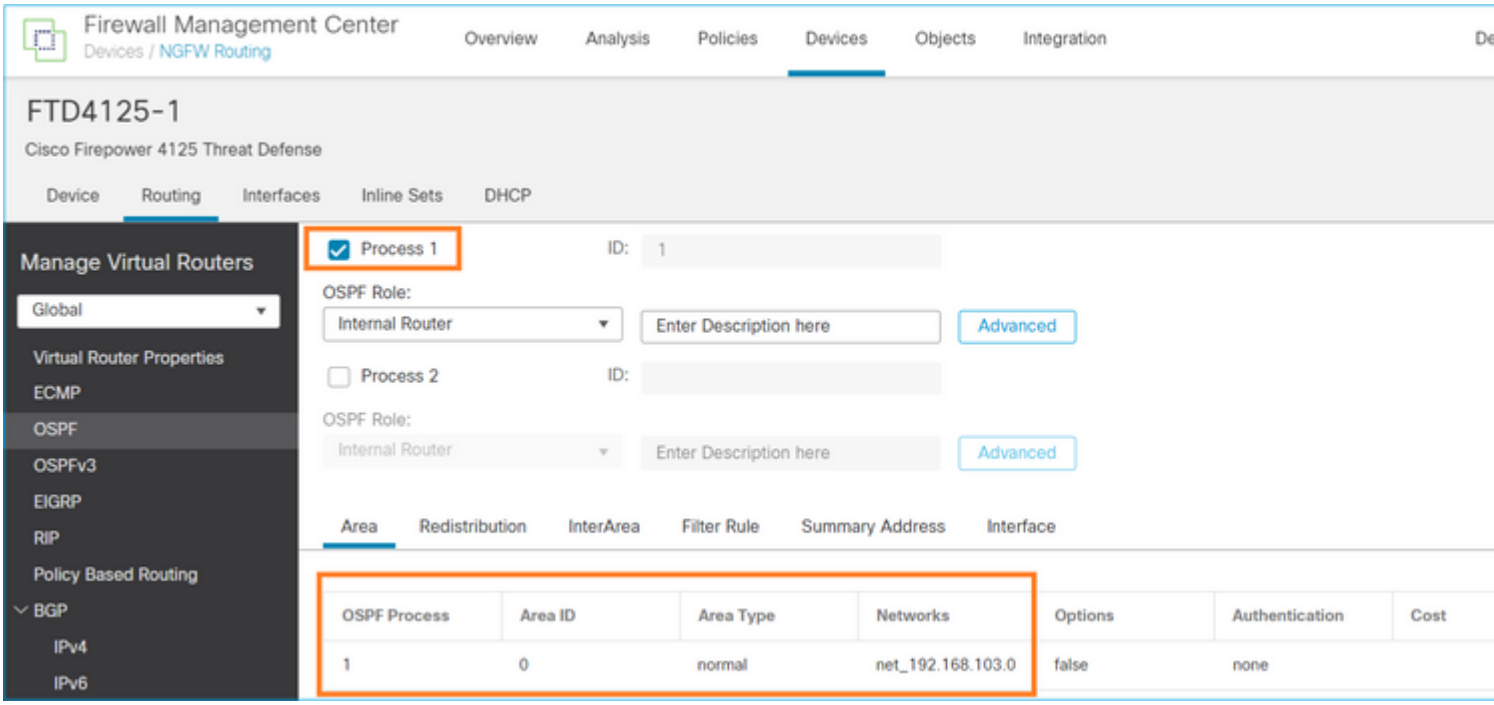
Taak 1 - Control-Plane Multicast-verkeer

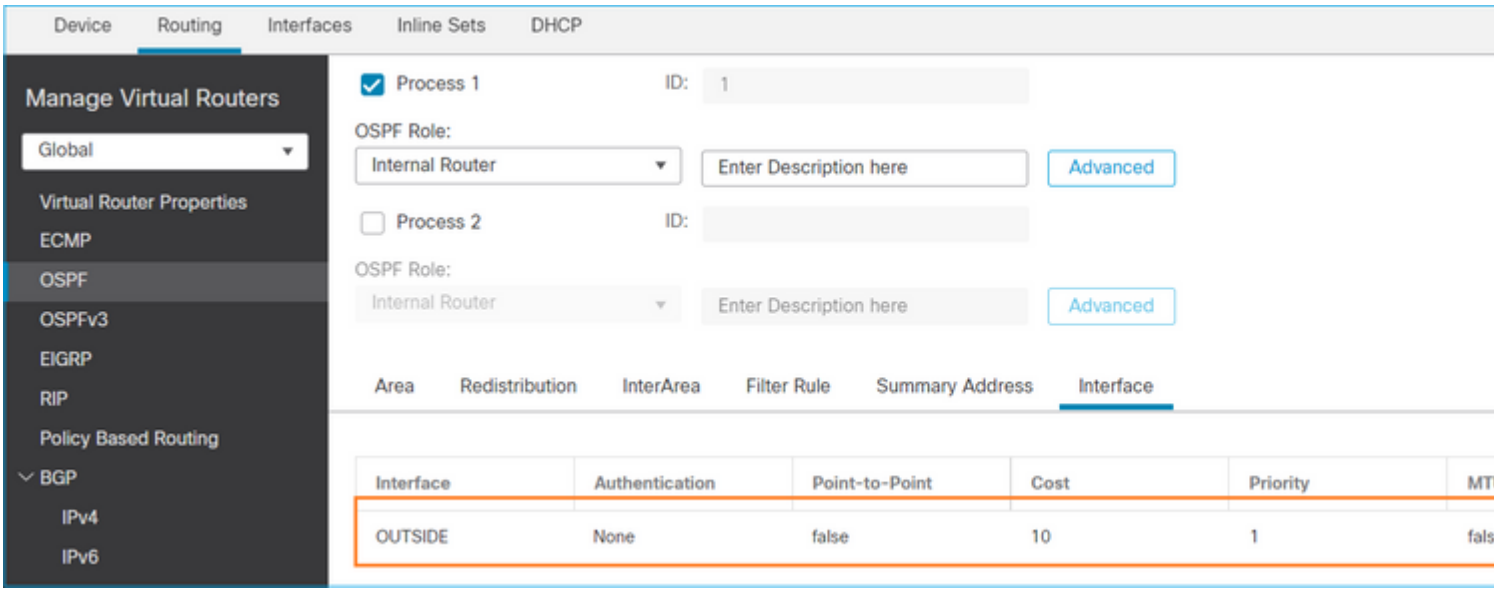


Configureer een OSPFv2 en OSPFv3 tussen de FTD en de ASA. Controleer hoe de 2 apparaten L2 en L3 Multicast verkeer behandelen dat door OSPF wordt geproduceerd.

Oplossing

OSPFv2-configuratie





Op dezelfde manier voor OSPFv3

Configuratie op FTD CLI:

<#root>

```
router ospf 1

 network 192.168.103.0 255.255.255.0 area 0

 log-adj-changes
!

ipv6 router ospf 1

 no graceful-restart helper
 log-adjacency-changes
!
interface Ethernet1/4
nameif OUTSIDE
security-level 0
ip address 192.168.103.91 255.255.255.0
ipv6 address fc00:103::91/64
ospf authentication null

ipv6 ospf 1 area 0
```

De configuratie maakt deze vermeldingen in de FTD Accelerated Security Path (ASP)-vergunningstabellen zodat toegang tot multicast-verkeer niet wordt geblokkeerd:

<#root>

```
firepower#

show asp table classify domain permit

...
in id=0x14f922db85f0, priority=13,

domain=permit, deny=false
```

```
<-- permit the packets
        hits=1, user_data=0x0, cs_id=0x0, reverse, flags=0x0, protocol=89
        src ip/id=0.0.0.0, mask=0.0.0.0, port=0, tag=any


dst ip/id=224.0.0.5, mask=255.255.255.255,

 port=0, tag=any, dscp=0x0, nsg_id=none     <-- OSPF for IPv4


input_ifc=OUTSIDE

(vrfid:0), output_ifc=identity(vrfid:0)     <-- ingress interface
in id=0x14f922db9350, priority=13,

domain=permit, deny=false

<-- permit the packets
        hits=0, user_data=0x0, cs_id=0x0, reverse, flags=0x0, protocol=89
        src ip/id=0.0.0.0, mask=0.0.0.0, port=0, tag=any


 dst ip/id=224.0.0.6, mask=255.255.255.255

, port=0, tag=any, dscp=0x0, nsg_id=none     <-- OSPF for IPv4


input_ifc=OUTSIDE

(vrfid:0), output_ifc=identity(vrfid:0)     <-- ingress interface
```

Voor IPv6:

<#root>

```
...
in id=0x14f923fb16f0, priority=13,

domain=permit, deny=false

 <-- permit the packets
        hits=1, user_data=0x0, cs_id=0x0, reverse, flags=0x0, protocol=89
        src ip/id=::/0, port=0, tag=any


dst ip/id=ff02::5/128

, port=0, tag=any, , nsg_id=none     <-- OSPF for IPv6


input_ifc=OUTSIDE

(vrfid:0), output_ifc=identity(vrfid:0)  <-- ingress interface
in id=0x14f66e9d4780, priority=13,

domain=permit, deny=false

<-- permit the packets
        hits=0, user_data=0x0, cs_id=0x0, reverse, flags=0x0, protocol=89
        src ip/id=::/0, port=0, tag=any


dst ip/id=ff02::6/128
```

```
, port=0, tag=any, , nsg_id=none     <-- OSPF for IPv6
```

```
input_ifc=OUTSIDE
```

```
(vrfid:0), output_ifc=identity(vrfid:0)  <-- ingress interface
...
```

De nabijheid van OSPFv2 en OSPFv3 zijn UP:

<#root>

```
firepower#
```

```
show ospf neighbor
```

```
Neighbor ID Pri State Dead Time Address Interface
192.168.103.50 1
```

```
FULL/BDR
```

```
 0:00:35 192.168.103.50 OUTSIDE   <-- OSPF neighbor is up
```

```
firepower#
```

```
show ipv6 ospf neighbor
```

```
Neighbor ID Pri State Dead Time Interface ID Interface
192.168.103.50 1
```

```
FULL/BDR
```

```
 0:00:34 3267035482 OUTSIDE       <-- OSPF neighbor is up
```

Dit zijn de multicast OSPF-sessies die in het vak worden afgesloten:

<#root>

```
firepower#
```

```
show conn all | include OSPF
```

```
OSPF OUTSIDE fe80::2be:75ff:fef6:1d8e NP Identity Ifc ff02::5, idle 0:00:09, bytes 5924, flags
OSPF OUTSIDE 192.168.103.50 NP Identity Ifc 224.0.0.5, idle 0:00:03, bytes 8904, flags
OSPF OUTSIDE ff02::5 NP Identity Ifc fe80::f6db:e6ff:fe33:442e, idle 0:00:01, bytes 6304, flags
OSPF OUTSIDE 224.0.0.5 NP Identity Ifc 192.168.103.91, idle 0:00:00, bytes 25220, flags
```

Schakel als test Opname voor IPv4 in en wis de verbindingen met het apparaat:

<#root>

```
firepower#
```

```
capture CAP interface OUTSIDE trace

firepower#

clear conn all

12 connection(s) deleted.
firepower#

clear capture CAP

firepower# !
```

> **Waarschuwing**: dit veroorzaakt een storing! Dit voorbeeld is alleen voor demonstratiedoeleinden te zien!

De opgenomen OSPF-pakketten:

<#root>

```
firepower# show capture CAP | include proto-89

1: 12:25:33.142189 192.168.103.50 > 224.0.0.5 ip-proto-89, length 60
2: 12:25:33.702691 192.168.103.91 > 224.0.0.5 ip-proto-89, length 60
7: 12:25:36.317000 192.168.206.100 > 224.0.0.5 ip-proto-89, length 56
8: 12:25:36.952587 fe80::2be:75ff:fef6:1d8e > ff02::5 ip-proto-89 40 [flowlabel 0xe] [hlim 1]
12: 12:25:41.282608 fe80::f6db:e6ff:fe33:442e > ff02::5 ip-proto-89 40 [flowlabel 0xe] [hlim 1]
```

Hier is hoe het OSPFv2 multicast pakket door de firewall wordt behandeld:

<#root>

```
firepower#

show capture CAP packet-number 1 trace

115 packets captured


1: 12:25:33.142189 192.168.103.50 > 224.0.0.5 ip-proto-89, length 60

<-- The first packet of the flow
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 6344 ns
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 6344 ns
Config:
```

```
Implicit Rule
Additional Information:
MAC Access list

Phase: 3
Type: ROUTE-LOOKUP
Subtype: No ECMP load balancing
Result: ALLOW
Elapsed time: 10736 ns
Config:
Additional Information:
Destination is locally connected. No ECMP load balancing.
Found next-hop 192.168.103.50 using egress ifc OUTSIDE(vrfid:0)

Phase: 4
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 5205 ns
Config:
Implicit Rule
Additional Information:

Phase: 5
Type: NAT
Subtype: per-session
Result: ALLOW
Elapsed time: 5205 ns
Config:
Additional Information:

Phase: 6
Type: IP-OPTIONS
Subtype:
Result: ALLOW
Elapsed time: 5205 ns
Config:
Additional Information:

Phase: 7
Type: CLUSTER-REDIRECT
Subtype: cluster-redirect
Result: ALLOW
Elapsed time: 29280 ns
Config:
Additional Information:

Phase: 8
Type: MULTICAST
Subtype:
Result: ALLOW
Elapsed time: 976 ns
Config:
Additional Information:


Phase: 9


Type: OSPF

<-- The OSPF process
```

Subtype: ospf

Result: ALLOW

Elapsed time: 488 ns

Config:

Additional Information:

Phase: 10
Type: FLOW-CREATION
Subtype:
Result: ALLOW
Elapsed time: 13176 ns
Config:
Additional Information:
New flow created with id 620, packet dispatched to next module

Result:
input-interface: OUTSIDE(vrfid:0)
input-status: up
input-line-status: up
output-interface: OUTSIDE(vrfid:0)
output-status: up
output-line-status: up
Action: allow
Time Taken: 82959 ns

Dit is hoe het OSPFv3 multicast pakket door de firewall wordt behandeld:

<#root>

firepower#

show capture CAP packet-number 8 trace

274 packets captured

8: 12:25:36.952587 fe80::2be:75ff:fef6:1d8e > ff02::5 ip-proto-89 40 [flowlabel 0xe] [hlim 1]

<-- The first packet of the flow
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 7564 ns
Config:
Additional Information:

MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 7564 ns
Config:
Implicit Rule
Additional Information:
MAC Access list

Phase: 3
Type: ROUTE-LOOKUP
Subtype: No ECMP load balancing
Result: ALLOW
Elapsed time: 8296 ns
Config:
Additional Information:
Destination is locally connected. No ECMP load balancing.
Found next-hop ff02::5 using egress ifc identity(vrfid:0)

Phase: 4
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 8784 ns
Config:
Implicit Rule
Additional Information:

Phase: 5
Type: NAT
Subtype: per-session
Result: ALLOW
Elapsed time: 8784 ns
Config:
Additional Information:

Phase: 6
Type: CLUSTER-REDIRECT
Subtype: cluster-redirect
Result: ALLOW
Elapsed time: 27816 ns
Config:
Additional Information:

Phase: 7

Type: OSPF

<-- The OSPF process

Subtype: ospf

Result: ALLOW

Elapsed time: 976 ns

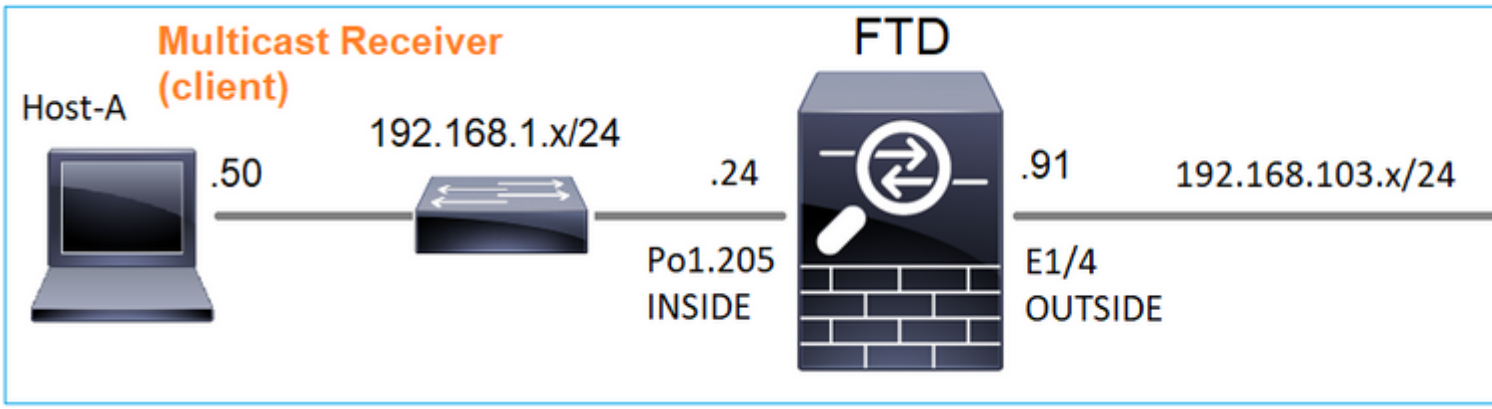
Config:

Additional Information:

```
Phase: 8
Type: FLOW-CREATION
Subtype:
Result: ALLOW
Elapsed time: 13664 ns
Config:
Additional Information:
New flow created with id 624, packet dispatched to next module

Result:
input-interface: OUTSIDE(vrfid:0)
input-status: up
input-line-status: up
output-interface: NP Identity Ifc
Action: allow
Time Taken: 83448 ns
```

Taak 2 - Basis multicast configureren

Topologie



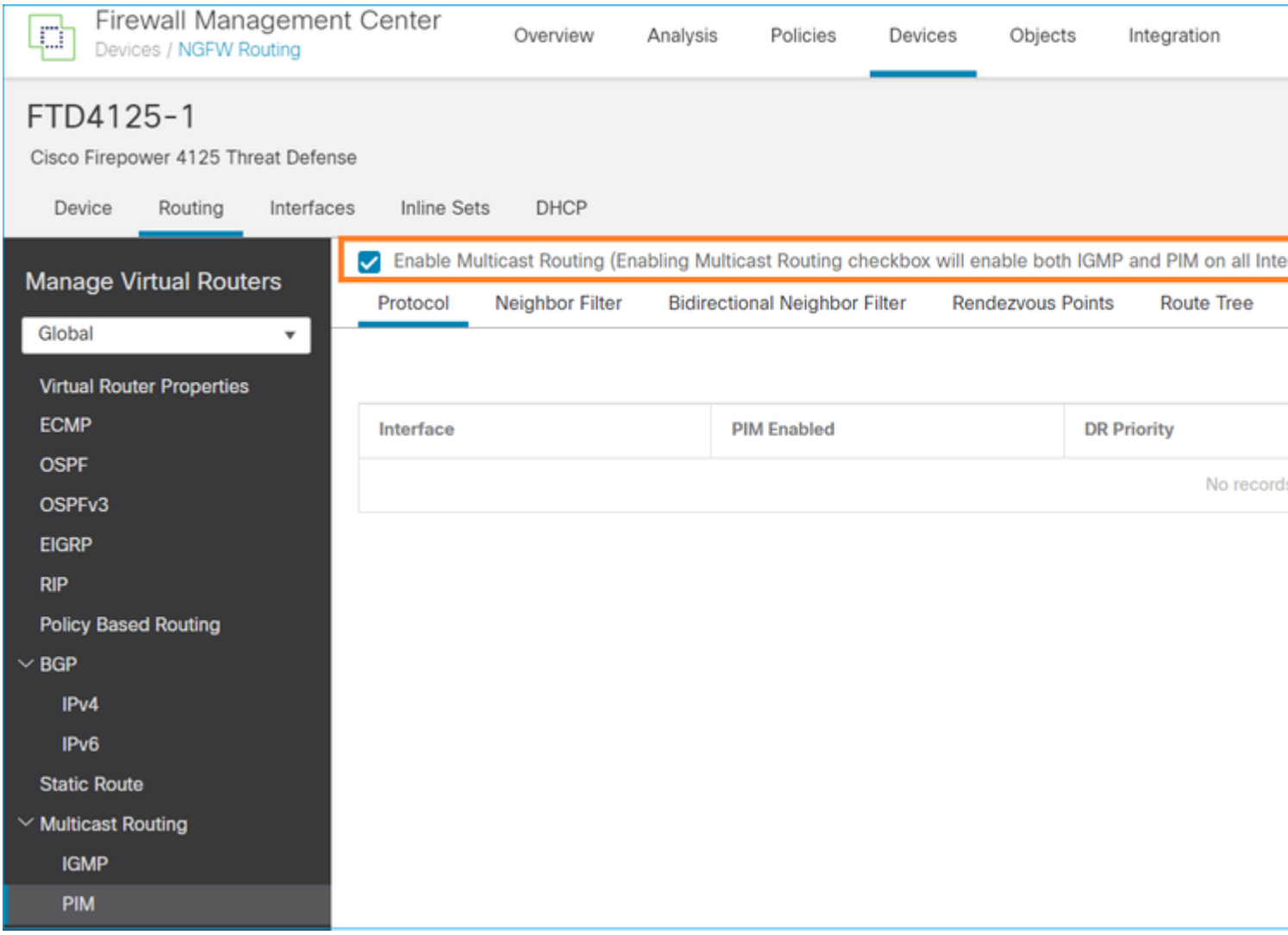
Vereiste

Configureer de firewall zodat multicast verkeer van de server naar de multicast client op IP 230.10.10.10 wordt gestreamd

Oplossing

Vanuit het firewallstandpunt is de minimumconfiguratie om multicast routing wereldwijd mogelijk te maken. Dit schakelt op de achtergrond IGMP en PIM op alle firewall interfaces in.

FMC UI:



Op de firewall CLI is dit de gedrukte configuratie:

<#root>

```
firepower#
```

`show run multicast-routing`

`multicast-routing`

```
<-- Multicast routing is enabled
```

IGMP-verificatie

<#root>

```
firepower#
```

`show igmp interface`

```
diagnostic is up, line protocol is up
  Internet address is 0.0.0.0/0
  IGMP is disabled on interface
```

INSIDE is up, line protocol is up

<-- The interface is UP
  Internet address is 192.168.1.24/24

  IGMP is enabled on interface

<-- IGMP is enabled on the interface

  Current IGMP version is 2

<-- IGMP version
  IGMP query interval is 125 seconds
  IGMP querier timeout is 255 seconds
  IGMP max query response time is 10 seconds
  Last member query response interval is 1 seconds
  Inbound IGMP access group is:
  IGMP limit is 500, currently active joins: 1
  Cumulative IGMP activity: 4 joins, 3 leaves
  IGMP querying router is 192.168.1.24 (this system)

OUTSIDE is up, line protocol is up

<-- The interface is UP
  Internet address is 192.168.103.91/24

  IGMP is enabled on interface

<-- IGMP is enabled on the interface

  Current IGMP version is 2

<-- IGMP version
  IGMP query interval is 125 seconds
  IGMP querier timeout is 255 seconds
  IGMP max query response time is 10 seconds
  Last member query response interval is 1 seconds
  Inbound IGMP access group is:
  IGMP limit is 500, currently active joins: 1
  Cumulative IGMP activity: 1 joins, 0 leaves
  IGMP querying router is 192.168.103.91 (this system)

<#root>

firepower#

show igmp group

IGMP Connected Group Membership
Group Address Interface Uptime Expires Last Reporter
239.255.255.250 INSIDE 00:09:05 00:03:19 192.168.1.50
239.255.255.250 OUTSIDE 00:06:01 00:02:33 192.168.103.60

<#root>

firepower#

show igmp traffic

IGMP Traffic Counters
Elapsed time since counters cleared: 03:40:48 Received Sent

```
                            Received     Sent
Valid IGMP Packets          21           207
Queries                     0            207
Reports                     15           0       <-- IGMP Reports received and sent
Leaves                      6            0
Mtrace packets              0            0
DVMRP packets               0            0
PIM packets                 0            0

Errors:
Malformed Packets           0
Martian source              0
Bad Checksums               0
```

PIM-verificatie

<#root>

```
firepower#
```

`show pim interface`

```
Address          Interface          PIM  Nbr   Hello  DR         DR
                                       Count Intvl  Prior

0.0.0.0          diagnostic         off  0     30     1          not elected
192.168.1.24     INSIDE             on   0     30     1          this system
192.168.103.91   OUTSIDE            on   0     30     1          this system
```

MFIB-verificatie

<#root>

```
firepower#
```

`show mfib`

```
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             AR - Activity Required, K - Keepalive
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts: Total/RPF failed/Other drops
Interface Flags: A - Accept, F - Forward, NS - Negate Signalling
             IC - Internal Copy, NP - Not platform switched
             SP - Signal Present
Interface Counts: FS Pkt Count/PS Pkt Count

(*,224.0.1.39) Flags: S K
```

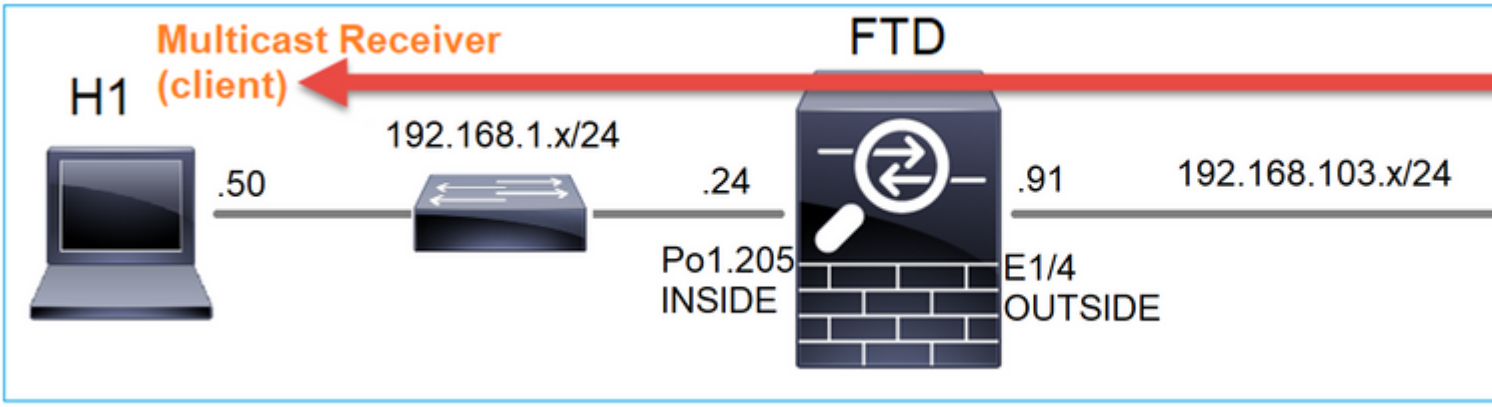
`Forwarding: 0/0/0/0`

```
, Other: 0/0/0   <-- The Forwarding counters are: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per secon
```

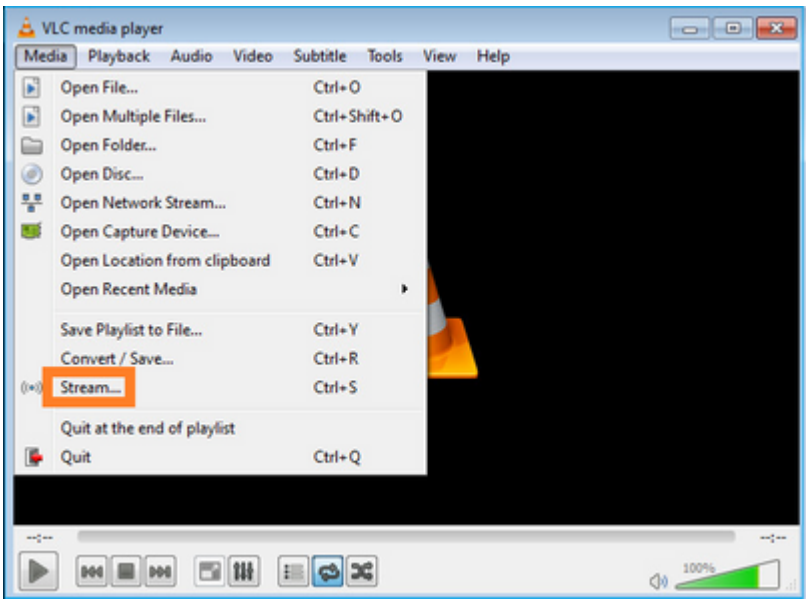
```
(*,224.0.1.40) Flags: S K
   Forwarding: 0/0/0/0,

Other: 8/8/0

   <-- The Other counters are: Total/RPF failed/Other drops
(*,232.0.0.0/8) Flags: K
   Forwarding: 0/0/0/0, Other: 0/0/0
```

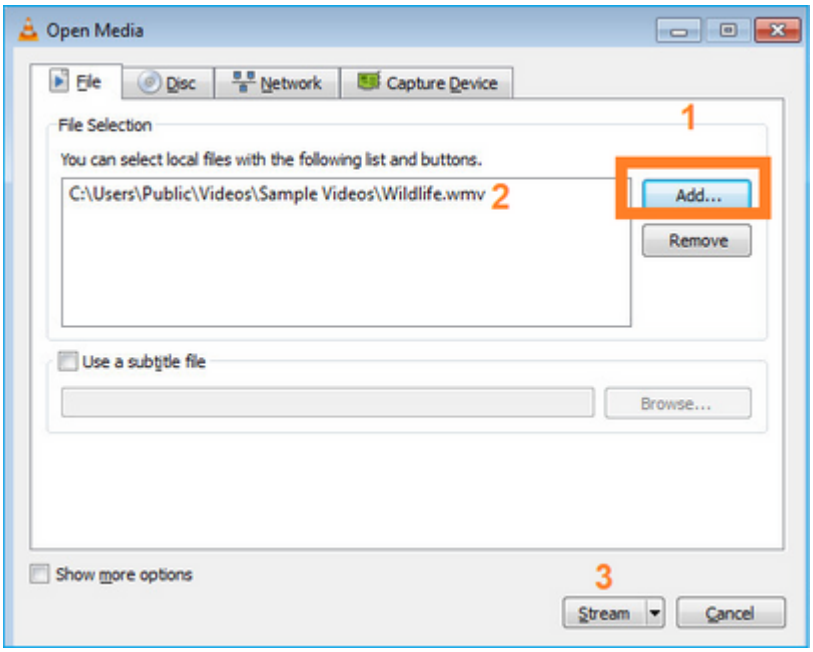
Multicastverkeer via de firewall

In dit geval wordt de VLC media player applicatie gebruikt als multicast server en client om multicast verkeer te testen:



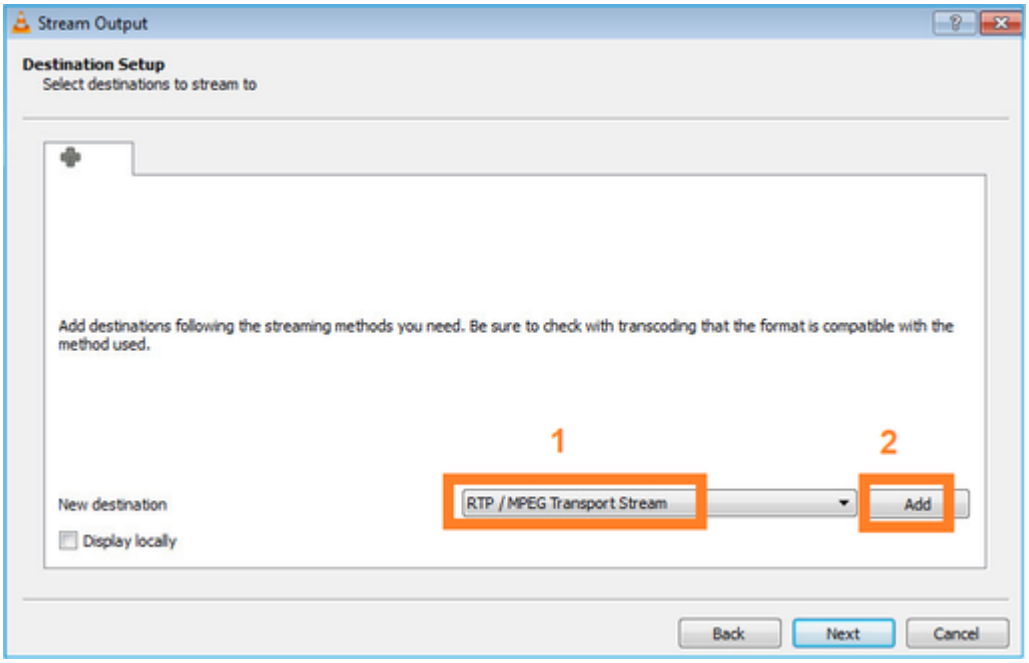
VLC-multicast serverconfiguratie:



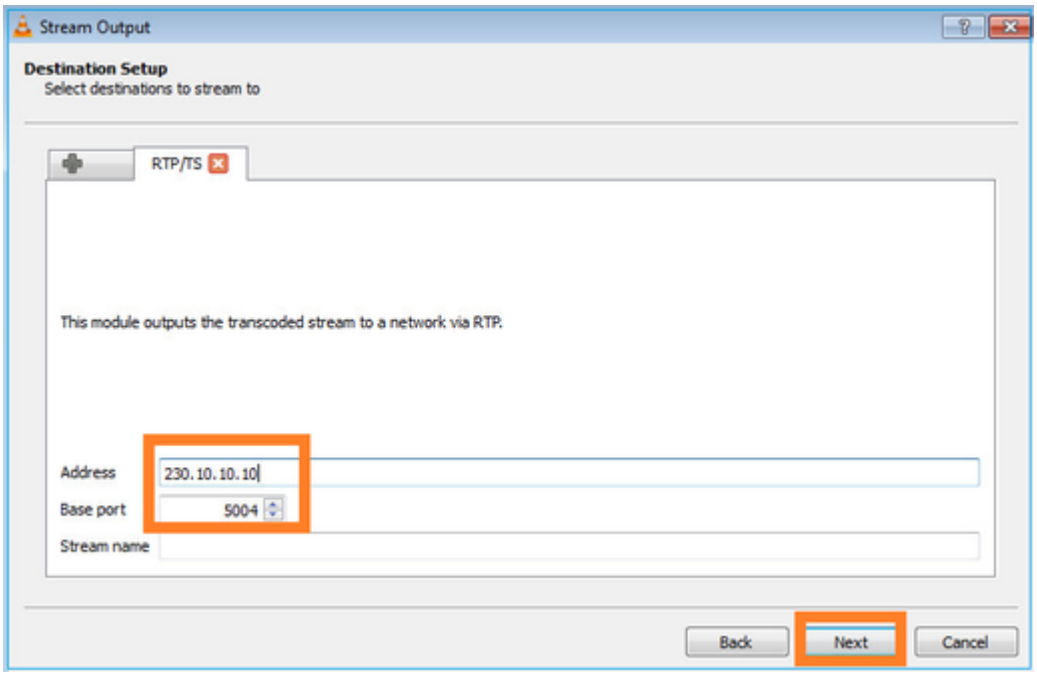


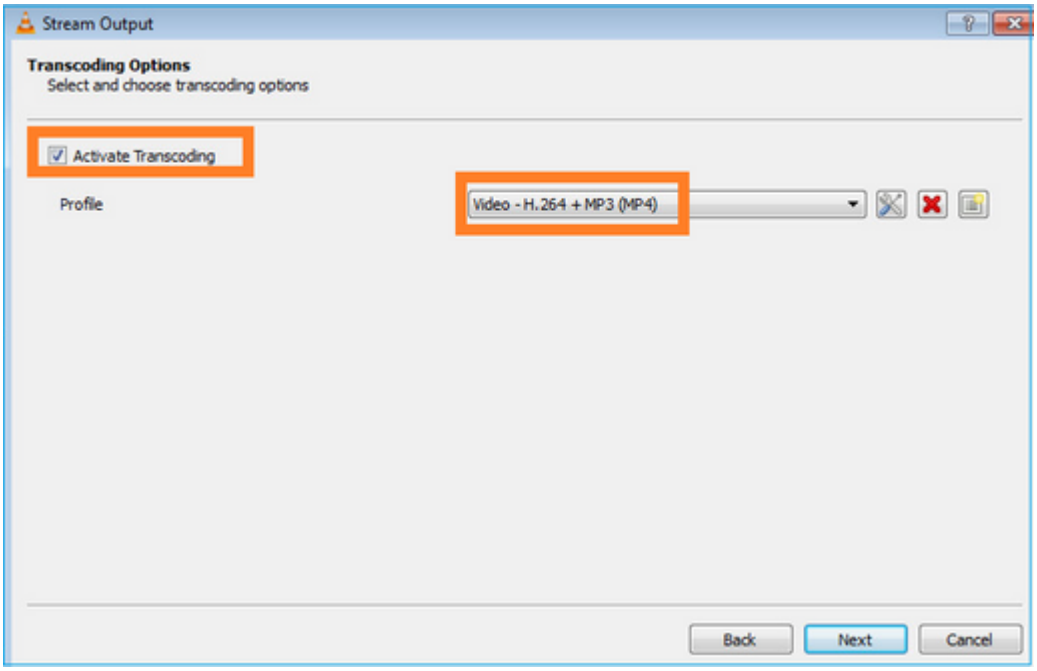
Selecteer op het volgende scherm gewoon **Volgende.**

Selecteer het formaat:



Specificeer multicast IP en poort:



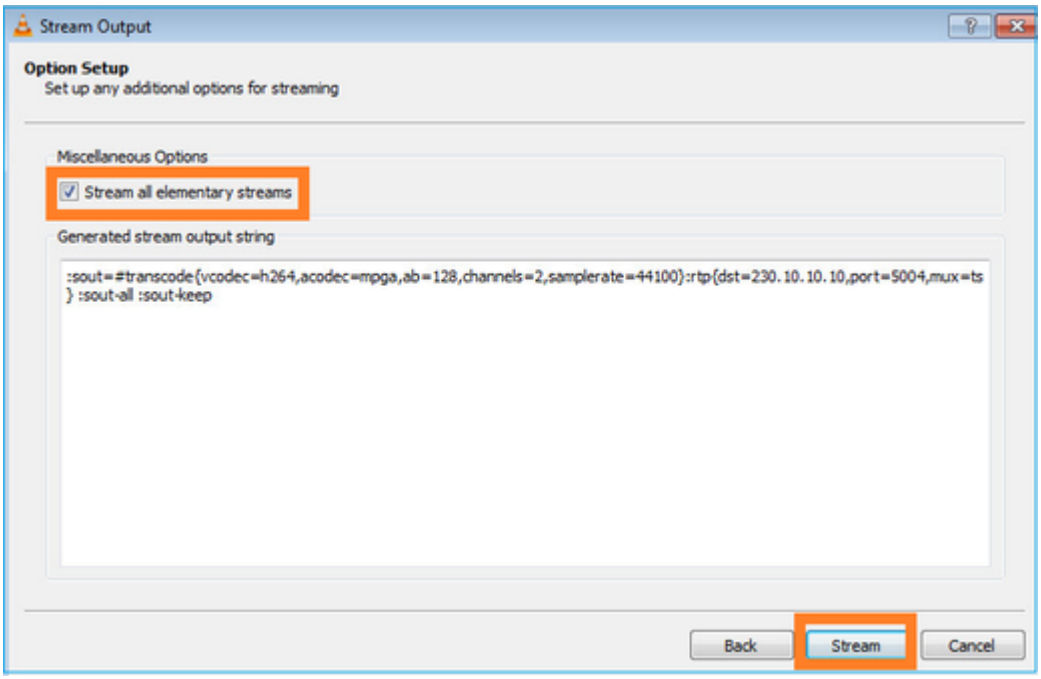


LINA inschakelen voor opname op de FTD-firewall:

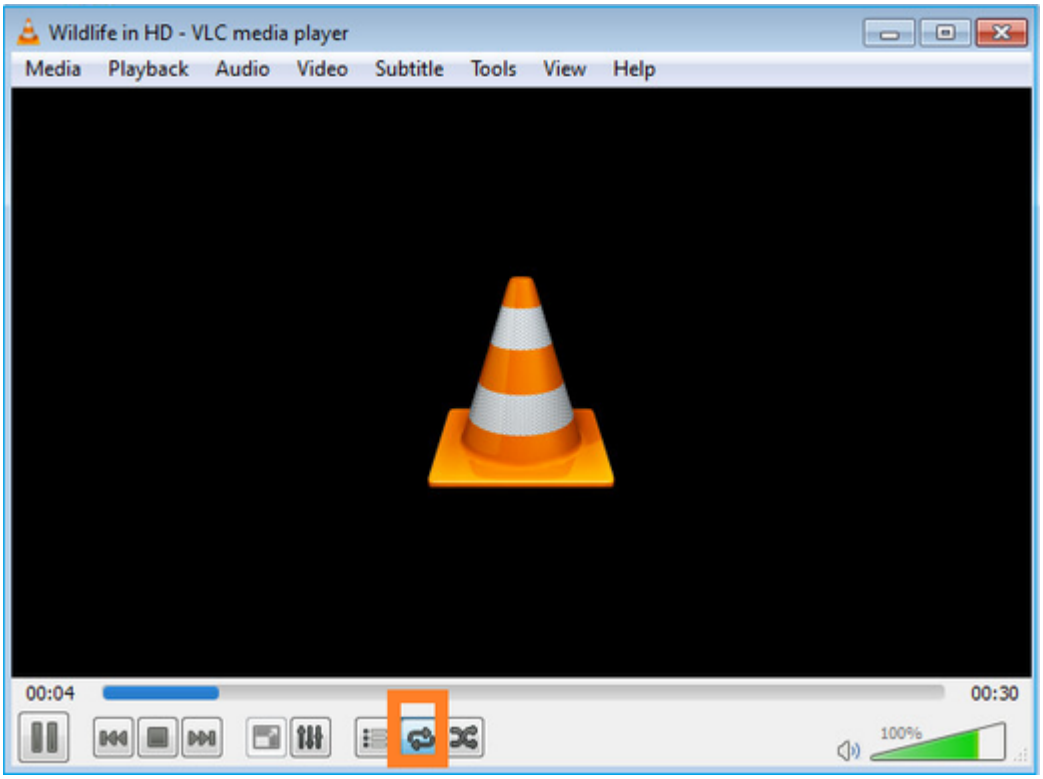
<#root>

```
firepower#
capture INSIDE interface INSIDE match ip host 192.168.103.60 host 230.10.10.10
firepower#
capture OUTSIDE interface OUTSIDE trace match ip host 192.168.103.60 host 230.10.10.10
```

Selecteer de knop **Stream** voor het apparaat om de multicast-stroom te starten:



Schakel de optie â€˜loopâ€™ in, zodat de stream continu wordt verstuurd:



Verificatie (niet-operationeel scenario)

Dit scenario is een demonstratie van een niet-operationeel scenario. Het doel is het gedrag van de firewall te demonstreren.

Het firewallapparaat krijgt de multicast stroom, maar door:sturen het niet:

<#root>

```
firepower#
```

```
show capture


capture INSIDE type raw-data interface INSIDE

[Capturing - 0 bytes]

<-- No packets sent or received
match ip host 192.168.103.60 host 230.10.10.10
capture OUTSIDE type raw-data trace interface OUTSIDE

[Buffer Full - 524030 bytes]

<-- The buffer is full
match ip host 192.168.103.60 host 230.10.10.10
```

Firewall LINA ASP drops tonen:

<#root>

```
firepower#

clear asp drop

firepower#

show asp drop


Frame drop:

Punt rate limit exceeded (punt-rate-limit)                          232

<-- The multicast packets were dropped
  Flow is denied by configured rule (acl-drop)                        2
  FP L2 rule drop (l2_acl)                                            2

Last clearing: 18:38:42 UTC Oct 12 2018 by enable_15

Flow drop:

Last clearing: 08:45:41 UTC May 17 2022 by enable_15
```

Om een pakket te overtrekken is het nodig het eerste pakket van de multicast stroom op te nemen. Om deze reden de huidige stromen te zuiveren:

<#root>

```
firepower#

clear capture OUTSIDE


firepower#

clear conn all addr 230.10.10.10

2 connection(s) deleted.
```

```
firepower#
show capture OUTSIDE

379 packets captured

1: 08:49:04.537875 192.168.103.60.54100 > 230.10.10.10.5005: udp 64
2: 08:49:04.537936 192.168.103.60.54099 > 230.10.10.10.5004: udp 1328
3: 08:49:04.538027 192.168.103.60.54099 > 230.10.10.10.5004: udp 1328
4: 08:49:04.538058 192.168.103.60.54099 > 230.10.10.10.5004: udp 1328
5: 08:49:04.538058 192.168.103.60.54099 > 230.10.10.10.5004: udp 1328
6: 08:49:04.538073 192.168.103.60.54099 > 230.10.10.10.5004: udp 1328
...
```

De â€˜detailâ€™ optie onthult het multicast MAC-adres:

```
<#root>
firepower#
show capture OUTSIDE detail

379 packets captured

1: 08:49:04.537875 0050.569d.344a
0100.5e0a.0a0a
 0x0800 Length: 106
192.168.103.60.54100 > 230.10.10.10.5005: [udp sum ok] udp 64 (ttl 100, id 19759)
2: 08:49:04.537936 0050.569d.344a
0100.5e0a.0a0a
 0x0800 Length: 1370
192.168.103.60.54099 > 230.10.10.10.5004: [udp sum ok] udp 1328 (ttl 100, id 19760)
3: 08:49:04.538027 0050.569d.344a 0100.5e0a.0a0a 0x0800 Length: 1370
192.168.103.60.54099 > 230.10.10.10.5004: [udp sum ok] udp 1328 (ttl 100, id 19761)
...
```

Het spoor van een echt pakket toont aan dat het pakket wordt toegestaan, maar dit is niet wat werkelijk gebeurt:

```
<#root>
firepower#
show capture OUTSIDE packet-number 1 trace

379 packets captured

1: 08:49:04.537875 192.168.103.60.54100 > 230.10.10.10.5005: udp 64
```

```
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 11712 ns
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 11712 ns
Config:
Implicit Rule
Additional Information:
MAC Access list

Phase: 3
Type: ROUTE-LOOKUP
Subtype: No ECMP load balancing
Result: ALLOW
Elapsed time: 7808 ns
Config:
Additional Information:
Destination is locally connected. No ECMP load balancing.
Found next-hop 192.168.103.60 using egress ifc OUTSIDE(vrfid:0)

Phase: 4
Type: ACCESS-LIST
Subtype: log
Result: ALLOW
Elapsed time: 5246 ns
Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced permit ip any any rule-id 268434432
access-list CSM_FW_ACL_ remark rule-id 268434432: ACCESS POLICY: mzafeiro_empty - Default
access-list CSM_FW_ACL_ remark rule-id 268434432: L4 RULE: DEFAULT ACTION RULE
Additional Information:
This packet will be sent to snort for additional processing where a verdict will be reached

Phase: 5
Type: CONN-SETTINGS
Subtype:
Result: ALLOW
Elapsed time: 5246 ns
Config:
class-map class-default
match any
policy-map global_policy
class class-default
set connection advanced-options UM_STATIC_TCP_MAP
service-policy global_policy global
Additional Information:

Phase: 6
Type: NAT
Subtype: per-session
Result: ALLOW
Elapsed time: 5246 ns
Config:
```

```
Additional Information:

Phase: 7
Type: IP-OPTIONS
Subtype:
Result: ALLOW
Elapsed time: 5246 ns
Config:
Additional Information:

Phase: 8
Type: CLUSTER-REDIRECT
Subtype: cluster-redirect
Result: ALLOW
Elapsed time: 31232 ns
Config:
Additional Information:

Phase: 9
```

Type: MULTICAST

```
<-- multicast process
Subtype:
Result: ALLOW
Elapsed time: 976 ns
Config:
Additional Information:

Phase: 10
```

Type: FLOW-CREATION

```
<-- the packet belongs to a new flow
Subtype:
Result: ALLOW
Elapsed time: 20496 ns
Config:
Additional Information:
New flow created with id 3705, packet dispatched to next module

Result:
input-interface: OUTSIDE(vrfid:0)
input-status: up
input-line-status: up
output-interface: OUTSIDE(vrfid:0)
output-status: up
output-line-status: up
```

Action: allow

```
<-- The packet is allowed
Time Taken: 104920 ns
```

Gebaseerd op de route en mfib tellers, worden de pakketten gelaten vallen omdat de Uitgaande Lijst van de Interface (OIL) leeg is:

<#root>

```
firepower#
```

show mroute

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
C - Connected, L - Local, I - Received Source Specific Host Report,
P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
J - Join SPT
Timers: Uptime/Expires
Interface state: Interface, State
```

(192.168.103.60, 230.10.10.10), 00:01:33/00:01:56, flags: SPF

Incoming interface: OUTSIDE

```
RPF nbr: 192.168.103.60
```

Outgoing interface list: Null

```
<-- The OIL is empty!

(*, 239.255.255.250), 00:01:50/never, RP 0.0.0.0, flags: SCJ
Incoming interface: Null
RPF nbr: 0.0.0.0
Immediate Outgoing interface list:
INSIDE, Forward, 00:01:50/never
```

De MFIB-tellers tonen RPF-storingen, wat in dit geval niet het geval is:

<#root>

```
firepower#
```

show mfib 230.10.10.10

```
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             AR - Activity Required, K - Keepalive
firepower# show mfib 230.10.10.10
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
AR - Activity Required, K - Keepalive
```

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second

```
<-- Multicast forwarding counters
```

Other counts: Total/RPF failed

```
/Other drops            <-- Multicast drop counters
Interface Flags: A - Accept, F - Forward, NS - Negate Signalling
             IC - Internal Copy, NP - Not platform switched
             SP - Signal Present
Interface Counts: FS Pkt Count/PS Pkt Count

(192.168.103.60,230.10.10.10) Flags: K
```

Forwarding: 0/0/0/0

,

Other: 650/650

/0   <-- Allowed and dropped multicast packets

Vergelijkbare RPF-fouten in de output 'toon mfib count':

<#root>

firepower#

show mfib count

IP Multicast Statistics
8 routes, 4 groups, 0.25 average sources per group
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second
Other counts:

Total/RPF failed

/Other drops(OIF-null, rate-limit etc)
Group: 224.0.1.39
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
Group: 224.0.1.40
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0

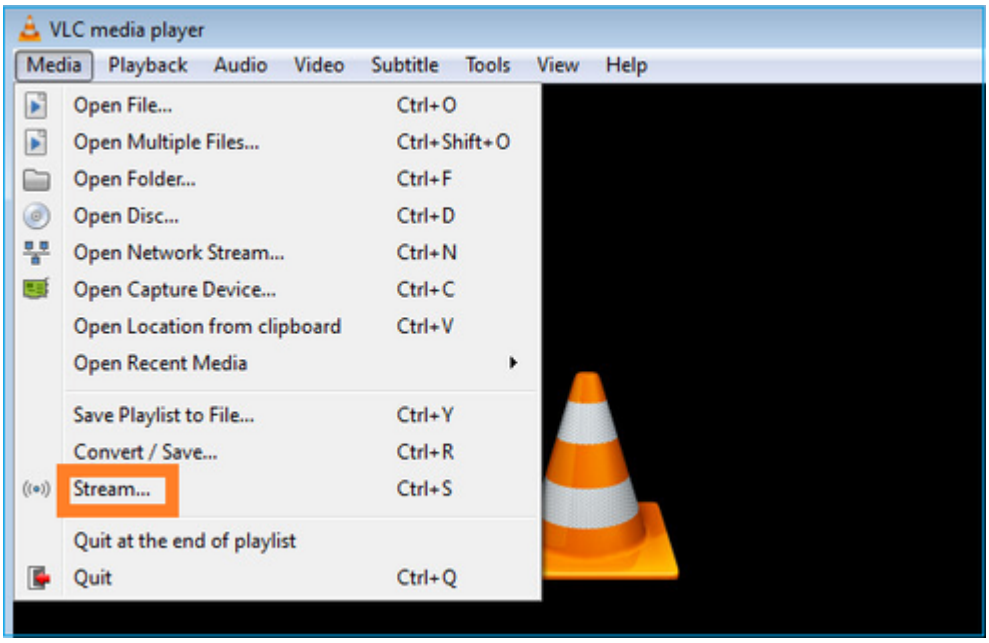
Group: 230.10.10.10

  Source: 192.168.103.60,
    Forwarding: 0/0/0/0,

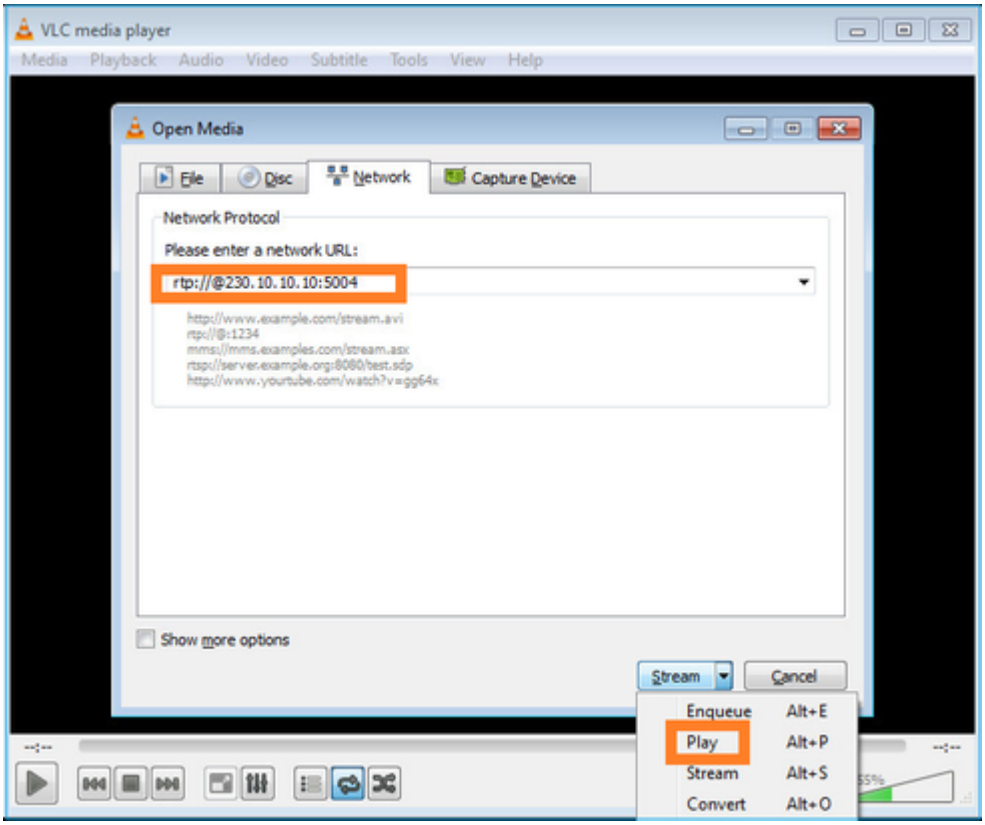
Other: 1115/1115

/0   <-- Allowed and dropped multicast packets
  Tot. shown: Source count: 1, pkt count: 0
Group: 232.0.0.0/8
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
Group: 239.255.255.250
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0

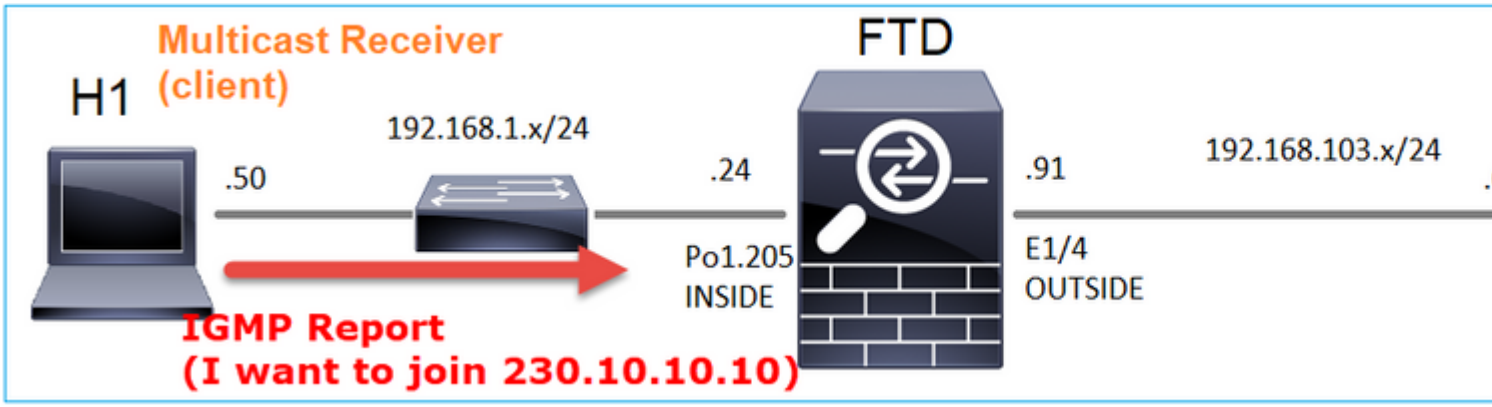
Configureer de VLC multicast-ontvanger:



Specificeer de multicast IP-bron en selecteer **Afspelen:**



In het backend, zodra u **Spel** selecteert**,** kondigt de gastheer zijn bereidheid aan om zich bij de specifieke multicast groep aan te sluiten en verzendt een bericht van het **IGMP- Rapport**:



Als u een debug inschakelt, kunt u de IGMP-rapportberichten zien:

<#root>

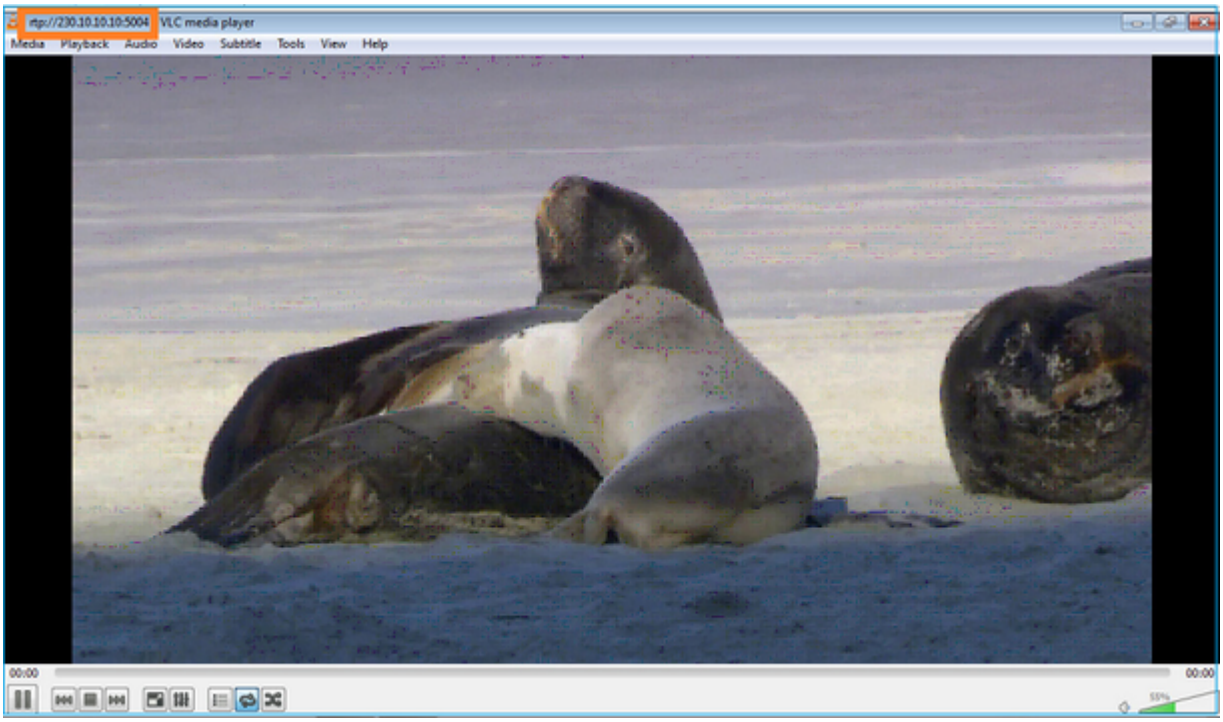
```
firepower#
```

debug igmp group 230.10.10.10

IGMP: Received v2 Report on INSIDE from 192.168.1.50 for 230.10.10.10

```
<-- IGMPv2 Report received
IGMP: group_db: add new group 230.10.10.10 on INSIDE
IGMP: MRIB updated (*,230.10.10.10) : Success
IGMP: Switching to EXCLUDE mode for 230.10.10.10 on INSIDE
IGMP: Updating EXCLUDE group timer for 230.10.10.10
```

De stream start:



Verificatie (operationeel scenario)

<#root>

```
firepower#
```

show capture

```
capture INSIDE type raw-data interface INSIDE
```

[Buffer Full - 524156 bytes]

```
<-- Multicast packets on the egress interface
match ip host 192.168.103.60 host 230.10.10.10
capture OUTSIDE type raw-data trace interface OUTSIDE
```

[Buffer Full - 524030 bytes]

```
<-- Multicast packets on the ingress interface
match ip host 192.168.103.60 host 230.10.10.10
```

De routekaart van de firewall:

<#root>

```
firepower#
```

show mroute

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT
Timers: Uptime/Expires
Interface state: Interface, State

(*, 230.10.10.10), 00:00:34/never, RP 0.0.0.0, flags: SCJ
  Incoming interface: Null
  RPF nbr: 0.0.0.0
  Immediate Outgoing interface list:
    INSIDE, Forward, 00:00:34/never
```

(192.168.103.60, 230.10.10.10), 00:01:49/00:03:29, flags: SFJT

Incoming interface: OUTSIDE

RPF nbr: 192.168.103.60

Inherited Outgoing interface list:

INSIDE, Forward, 00:00:34/never

<-- The OIL shows an interface

<#root>

firepower#

show mfib 230.10.10.10

Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
AR - Activity Required, K - Keepalive

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second

Other counts: Total/RPF failed/Other drops
Interface Flags: A - Accept, F - Forward, NS - Negate Signalling
IC - Internal Copy, NP - Not platform switched
SP - Signal Present
Interface Counts: FS Pkt Count/PS Pkt Count

(*,230.10.10.10) Flags: C K
Forwarding: 0/0/0/0, Other: 0/0/0
INSIDE Flags: F NS
Pkts: 0/0

(192.168.103.60,230.10.10.10) Flags: K

Forwarding: 6373/0/1354/0,

Other: 548/548/0 <-- There are multicast packets forwarded

OUTSIDE Flags: A

INSIDE Flags: F NS

Pkts: 6373/6

mfib-tellers:

<#root>

firepower#

show mfib count

IP Multicast Statistics
10 routes, 5 groups, 0.40 average sources per group

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second

Other counts: Total/RPF failed/Other drops(OIF-null, rate-limit etc)
Group: 224.0.1.39

```
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
Group: 224.0.1.40
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
```

Group: 230.10.10.10

RP-tree:

Forwarding: 0/0/0/0, Other: 0/0/0

Source: 192.168.103.60,

Forwarding: 7763/0/1354/0,

```
Other: 548/548/0   <-- There are multicast packets forwarded
  Tot. shown: Source count: 1, pkt count: 0
Group: 232.0.0.0/8
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
Group: 239.255.255.250
  RP-tree:
    Forwarding: 0/0/0/0, Other: 0/0/0
  Source: 192.168.1.50,
    Forwarding: 7/0/500/0, Other: 0/0/0
  Tot. shown: Source count: 1, pkt count: 0
```

IGMP-controle

- IGMP-controle is een mechanisme dat op switches wordt gebruikt om multicast-overstromingen te voorkomen.
- De switch bewaakt IGMP-rapporten om te bepalen waar hosts (ontvangers) zich bevinden.
- De switch bewaakt IGMP-vragen om te bepalen waar zich routers/firewalls (afzenders) bevinden.
- IGMP-controle is standaard ingeschakeld op de meeste Cisco-switches. Controleer de bijbehorende switchinghandleidingen voor meer informatie. Hier is de voorbeelduitvoer van een L3 Catalyst switch:

<#root>

switch#

show ip igmp snooping statistics

```
  Current number of Statistics entries    : 15
  Configured Statistics database limit    : 32000
  Configured Statistics database threshold: 25600
  Configured Statistics database limit    : Not exceeded
  Configured Statistics database threshold: Not exceeded
```

```
Snooping statistics for Vlan204
#channels: 3
#hosts   : 5

Source/Group                    Interface       Reporter        Uptime   Last-Join Last-Leave
0.0.0.0/230.10.10.10            Vl204:Gi1/48    192.168.1.50    2d13h        -     2d12h
0.0.0.0/230.10.10.10            Vl204:Gi1/48    192.168.1.97    2d13h    2d12h         -
0.0.0.0/230.10.10.10            Vl204:Gi2/1     192.168.1.50    2d10h    02:20:05  02:20:00
0.0.0.0/239.255.255.250         Vl204:Gi2/1     192.168.1.50    2d11h    02:20:05  02:20:00
0.0.0.0/239.255.255.250         Vl204:Gi2/1     192.168.2.50    2d14h    2d13h         -
0.0.0.0/239.255.255.250         Vl204:Gi2/1     192.168.6.50    2d13h        -     2d13h
0.0.0.0/224.0.1.40              Vl204:Gi2/26    192.168.2.1     2d14h    00:00:39  2d13h

Snooping statistics for Vlan206
#channels: 4
#hosts   : 3

Source/Group                    Interface       Reporter        Uptime   Last-Join Last-Leave
0.0.0.0/230.10.10.10            Vl206:Gi1/48    192.168.6.91    00:30:15 2d13h     2d13h
0.0.0.0/239.10.10.10            Vl206:Gi1/48    192.168.6.91    2d14h    2d13h         -
0.0.0.0/239.255.255.250         Vl206:Gi2/1     192.168.6.50    2d12h    00:52:49  00:52:45
0.0.0.0/224.0.1.40              Vl206:Gi2/26    192.168.6.1     00:20:10 2d13h     2d13h
0.0.0.0/230.10.10.10            Vl206:Gi2/26    192.168.6.1     2d13h    2d13h         -
0.0.0.0/230.10.10.10            Vl206:Gi2/26    192.168.6.91    2d13h        -     2d13h
0.0.0.0/239.10.10.10            Vl206:Gi2/26    192.168.6.1     2d14h    2d14h         -
0.0.0.0/239.10.10.10            Vl206:Gi2/26    192.168.6.91    2d14h        -     2d14h
```

Taak 3 - IGMP-statische groep vs IGMP-groep

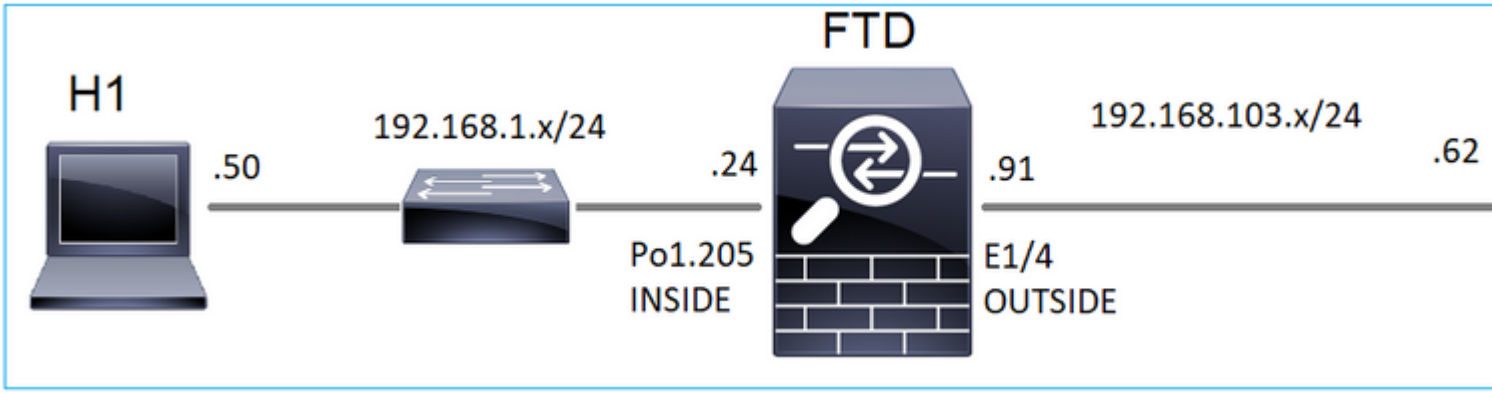
Overzicht

	Statische groep van IP-igmp	**IP-igmp samenvoegen-groep**
Van toepassing op FTD-interface?	Ja	Ja
Trekt de FTD een multicast stream aan?	Ja, een PIM Join wordt verzonden naar het stroomopwaartse apparaat. de bron of naar het Rendezvous Point (RP). Dit gebeurt alleen als de FTD met deze opdracht de PIM Designated Router (DR) op die interface is.	Ja, een PIM Join wordt verzonden naar het stroomopwaartse apparaat. de bron of naar het Rendezvous Point (RP). Dit gebeurt alleen als de FTD met deze opdracht de PIM Designated Router (DR) op die interface is.
Vooruit het FTD multicast-verkeer uit de interface?	Ja	Ja
Verbruikt de FTD en antwoordt deze op het multicast verkeer	Nee	Ja, de FTD straft de multicast stream naar de CPU, verbruikt deze en antwoordt op de bron.
CPU-impact	Minimaal omdat het pakket niet op CPU is afgestemd.	Kan invloed hebben op de FTD CPU omdat elk multicast pakket dat tot de groep

		behoort, wordt gepunteerd op de FTD CPU.

Taakvereiste

Bekijk de volgende topologie:



Schakel deze opnamen in op de firewall:

<#root>

```
firepower#
 capture CAPI interface OUTSIDE trace match icmp host 192.168.103.62 any
firepower#
 capture CAPO interface INSIDE match icmp host 192.168.103.62 any
```

1. Gebruik ICMP-ping vanuit de L3-switch om multicast verkeer naar IP 230.11.11.1 te verzenden en controleer hoe dit door de firewall wordt verwerkt.
2. Schakel de opdracht **statisch-groep igmp** in op de firewall INSIDE-interface en controleer hoe de multicast stream (IP 230.11.11.11) door de firewall wordt verwerkt.
3. Schakel de opdracht **statisch-groep igmp** in op de firewall INSIDE-interface en controleer hoe de multicast stream (IP 230.11.11.11) door de firewall wordt verwerkt.

Oplossing

De firewall heeft geen routes voor IP 230.11.11.11:

<#root>

```
firepower#
show mroute

Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, I - Received Source Specific Host Report,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT
Timers: Uptime/Expires
Interface state: Interface, State
```

```
(*, 239.255.255.250), 00:43:21/never, RP 0.0.0.0, flags: SCJ
  Incoming interface: Null
  RPF nbr: 0.0.0.0
  Immediate Outgoing interface list:
    OUTSIDE, Forward, 00:05:41/never
    INSIDE, Forward, 00:43:21/never
```

Een eenvoudige manier om multicast te testen is het ICMP-pinggereedschap te gebruiken. In dit geval, initieer pingelen van R2 aan het multicast IP adres 230.11.11.11:

<#root>

```
L3-Switch#
```

ping 230.11.11.11 re 100

```
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 230.11.11.11, timeout is 2 seconds:
.............................
```

Op de firewall wordt dynamisch een route gecreëerd en is de OIL leeg:

<#root>

```
firepower#
```

show mroute

```
Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
C - Connected, L - Local, I - Received Source Specific Host Report,
P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
J - Join SPT
Timers: Uptime/Expires
Interface state: Interface, State
```

(192.168.103.62, 230.11.11.11), 00:02:33/00:00:56, flags: SPF

```
<-- The mroute is added
```

** Incoming interface: OUTSIDE**

** RPF nbr: 192.168.103.62**

** Outgoing interface list: Null**

```
<-- The OIL is empty
```

De opname op de firewall toont:

<#root>

```
firepower# show capture

capture CAPI type raw-data trace interface OUTSIDE

[Capturing - 1040 bytes]

<-- There are ICMP packets captured on ingress interface
match icmp host 192.168.103.62 any
capture CAPO type raw-data interface INSIDE

[Capturing - 0 bytes]

<-- There are no ICMP packets on egress
match icmp host 192.168.103.62 any
```

De firewall maakt verbindingen voor elke ping, maar laat de pakketten stilzwijgend vallen:

<#root>

```
firepower#

show log | include 230.11.11.11


May 17 2022 11:05:47: %FTD-7-609001:

Built local-host identity:230.11.11.11

<-- A new connection is created
May 17 2022 11:05:47: %FTD-6-302020: Built inbound ICMP connection for faddr 192.168.1.99/6 gaddr 230.11
May 17 2022 11:05:47: %FTD-6-302020: Built inbound ICMP connection for faddr 192.168.103.62/6 gaddr 230.
May 17 2022 11:05:49: %FTD-6-302021: Teardown ICMP connection for faddr 192.168.1.99/6 gaddr 230.11.11.1
May 17 2022 11:05:49: %FTD-6-302021: Teardown ICMP connection for faddr 192.168.103.62/6 gaddr 230.11.11
May 17 2022 11:05:49: %FTD-7-609002:

Teardown local-host identity:230.11.11.11 duration 0:00:02

<-- The connection is closed
May 17 2022 11:05:51: %FTD-7-609001:

Built local-host identity:230.11.11.11

<

--

A new connection is created
May 17 2022 11:05:51: %FTD-6-302020: Built inbound ICMP connection for faddr 192.168.1.99/6 gaddr 230.11
May 17 2022 11:05:51: %FTD-6-302020: Built inbound ICMP connection for faddr 192.168.103.62/6 gaddr 230.
May 17 2022 11:05:53: %FTD-6-302021: Teardown ICMP connection for faddr 192.168.1.99/6 gaddr 230.11.11.1
May 17 2022 11:05:53: %FTD-6-302021: Teardown ICMP connection for faddr 192.168.103.62/6 gaddr 230.11.11
May 17 2022 11:05:53: %FTD-7-609002:

Teardown local-host identity:230.11.11.11 duration 0:00:02

<-- The connection is closed
```

Opmerking: de LINA ASP-drop-opname toont de gedropte pakketten niet

---

De belangrijkste indicatie van multicast pakketdruppels is:

<#root>

```
firepower#
```

show mfib

```
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
             AR - Activity Required, K - Keepalive
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
```

Other counts: Total/RPF failed/Other drops

```
Interface Flags: A - Accept, F - Forward, NS - Negate Signalling
             IC - Internal Copy, NP - Not platform switched
             SP - Signal Present
Interface Counts: FS Pkt Count/PS Pkt Count

(*,224.0.1.39) Flags: S K
  Forwarding: 0/0/0/0, Other: 0/0/0
(*,224.0.1.40) Flags: S K
  Forwarding: 0/0/0/0, Other: 0/0/0
```

(192.168.103.62,230.11.11.11)

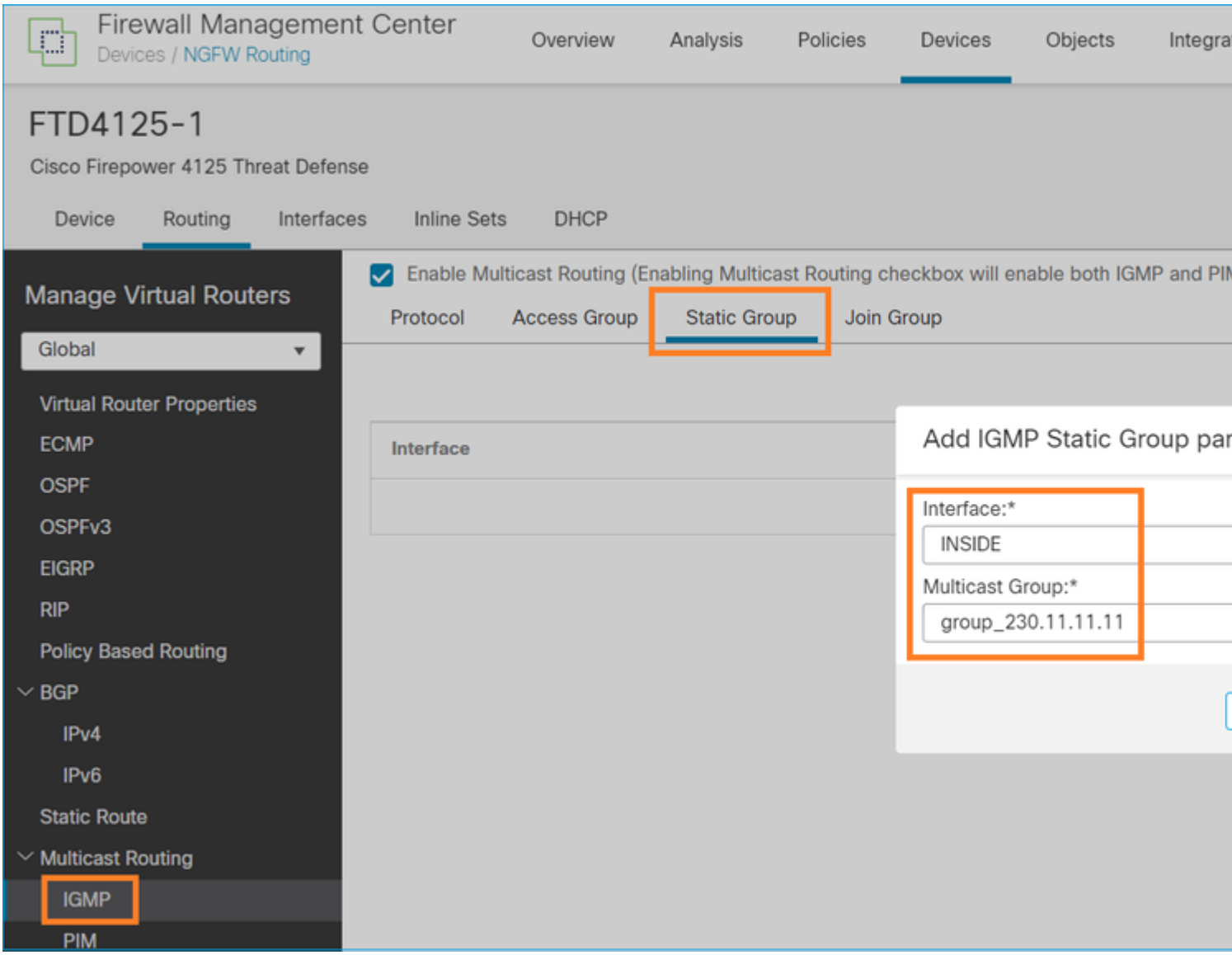
```
 Flags: K         <-- The multicast stream
  Forwarding: 0/0/0/0,
```

Other: 27/27/0

```
<-- The packets are dropped
```

IGMP statische groep

Configureer op FMC een statische IGMP-groep:



Dit wordt op de achtergrond ingezet:

<#root>

```
interface Port-channel1.205
 vlan 205
 nameif INSIDE
 cts manual
  propagate sgt preserve-untag
  policy static sgt disabled trusted
 security-level 0
 ip address 192.168.1.24 255.255.255.0

 igmp static-group 230.11.11.11

<-- IGMP static group is enabled on the interface
```

Pingelen mislukt, maar het ICMP-multicast verkeer wordt nu doorgestuurd door de firewall:

<#root>

```
L3-Switch#
ping 230.11.11.11 re 10000
Type escape sequence to abort.
Sending 10000, 100-byte ICMP Echos to 230.11.11.11, timeout is 2 seconds:
.........................
```

<#root>

```
firepower#
show capture

capture CAPI type raw-data trace interface OUTSIDE
[Capturing - 650 bytes]
<-- ICMP packets are captured on ingress interface
match icmp host 192.168.103.62 any
capture CAPO type raw-data interface INSIDE
[Capturing - 670 bytes]
<-- ICMP packets are captured on egress interface
match icmp host 192.168.103.62 any
```

<#root>

```
firepower#
show capture CAPI
8 packets captured
1: 11:31:32.470541 192.168.103.62 > 230.11.11.11 icmp: echo request
2: 11:31:34.470358 192.168.103.62 > 230.11.11.11 icmp: echo request
3: 11:31:36.470831 192.168.103.62 > 230.11.11.11 icmp: echo request
4: 11:31:38.470785 192.168.103.62 > 230.11.11.11 icmp: echo request
...
firepower#
show capture CAPO

11 packets captured
1: 11:31:32.470587 802.1Q vlan#205 P0 192.168.103.62 > 230.11.11.11 icmp: echo request
2: 11:31:34.470404 802.1Q vlan#205 P0 192.168.103.62 > 230.11.11.11 icmp: echo request
3: 11:31:36.470861 802.1Q vlan#205 P0 192.168.103.62 > 230.11.11.11 icmp: echo request
4: 11:31:38.470816 802.1Q vlan#205 P0 192.168.103.62 > 230.11.11.11 icmp: echo request
```

Opmerking: het overtrekken van het pakket toont een onjuiste uitvoer (toegangsinterface is hetzelfde als uitgang). Controleer voor meer informatie Cisco bug-id CSCvm89673.

<#root>

```
firepower#
```

show capture CAPI packet-number 1 trace

1: 11:39:33.553987 192.168.103.62 > 230.11.11.11 icmp: echo request

```
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 3172 ns
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 3172 ns
Config:
Implicit Rule
Additional Information:
MAC Access list

Phase: 3
Type: ROUTE-LOOKUP
Subtype: No ECMP load balancing
Result: ALLOW
Elapsed time: 9760 ns
Config:
Additional Information:
Destination is locally connected. No ECMP load balancing.
Found next-hop 192.168.103.62 using egress ifc OUTSIDE(vrfid:0)

Phase: 4
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 5368 ns
Config:
Implicit Rule
Additional Information:

Phase: 5
Type: CONN-SETTINGS
Subtype:
Result: ALLOW
Elapsed time: 5368 ns
Config:
class-map class-default
match any
policy-map global_policy
class class-default
set connection advanced-options UM_STATIC_TCP_MAP
service-policy global_policy global
Additional Information:

Phase: 6
Type: NAT
```

Subtype: per-session
Result: ALLOW
Elapsed time: 5368 ns
Config:
Additional Information:

Phase: 7
Type: IP-OPTIONS
Subtype:
Result: ALLOW
Elapsed time: 5368 ns
Config:
Additional Information:

Phase: 8
Type: CLUSTER-REDIRECT
Subtype: cluster-redirect
Result: ALLOW
Elapsed time: 31720 ns
Config:
Additional Information:

Phase: 9
Type: INSPECT
Subtype: np-inspect
Result: ALLOW
Elapsed time: 488 ns
Config:
class-map inspection_default
match default-inspection-traffic
policy-map global_policy
class inspection_default
inspect icmp
service-policy global_policy global
Additional Information:

Phase: 10
Type: INSPECT
Subtype: np-inspect
Result: ALLOW
Elapsed time: 2440 ns
Config:
Additional Information:

Phase: 11

Type: MULTICAST

<-- The packet is multicast

Subtype:

Result: ALLOW

Elapsed time: 976 ns

Config:

Additional Information:

Phase: 12

Type: FLOW-CREATION

<-- A new flow is created
Subtype:
Result: ALLOW
Elapsed time: 56120 ns
Config:
Additional Information:
New flow created with id 5690, packet dispatched to next module

Phase: 13
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 10248 ns
Config:
Additional Information:
MAC Access list

Result:

input-interface: OUTSIDE(vrfid:0)

input-status: up
input-line-status: up

output-interface: OUTSIDE(vrfid:0)

output-status: up
output-line-status: up

Action: allow

<-- The packet is allowed
Time Taken: 139568 ns

Tip: U kunt pingen met timeout 0 van de bronhost en u kunt de firewall mfib tellers controleren:

<#root>

L3-Switch#

ping 230.11.11.11 re 500 timeout 0

Type escape sequence to abort.
Sending 1000, 100-byte ICMP Echos to 230.11.11.11, timeout is 0 seconds:
.....
.....
.....
.....

<#root>

firepower# clear mfib counters

firepower# !ping from the source host.

firepower#

show mfib 230.11.11.11

Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
AR - Activity Required, K - Keepalive

Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second

Other counts: Total/RPF failed/Other drops
Interface Flags: A - Accept, F - Forward, NS - Negate Signalling
IC - Internal Copy, NP - Not platform switched
SP - Signal Present
Interface Counts: FS Pkt Count/PS Pkt Count

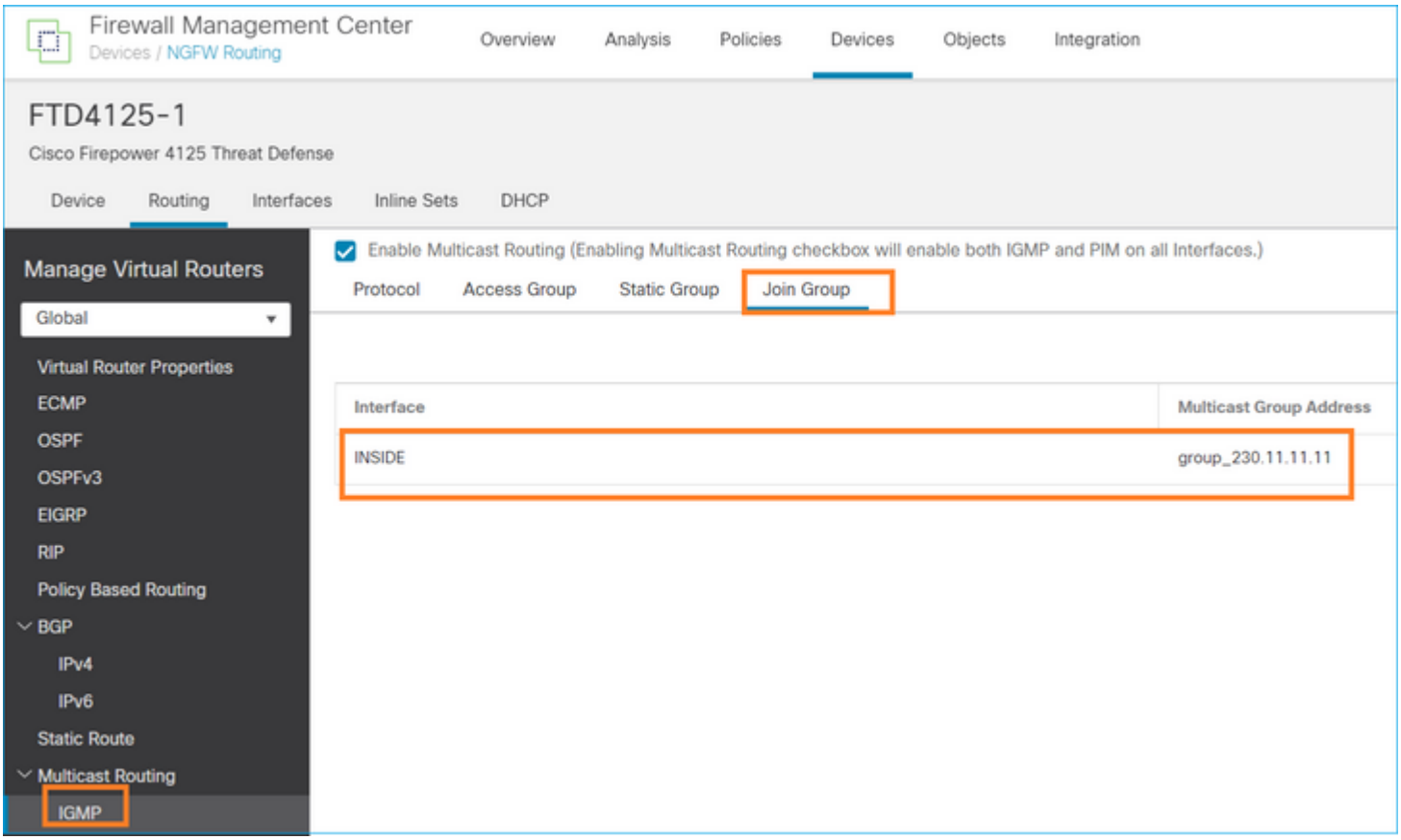
(*,230.11.11.11) Flags: C K
  Forwarding: 0/0/0/0, Other: 0/0/0
  INSIDE Flags: F NS
    Pkts: 0/0
(192.168.103.62,230.11.11.11) Flags: K

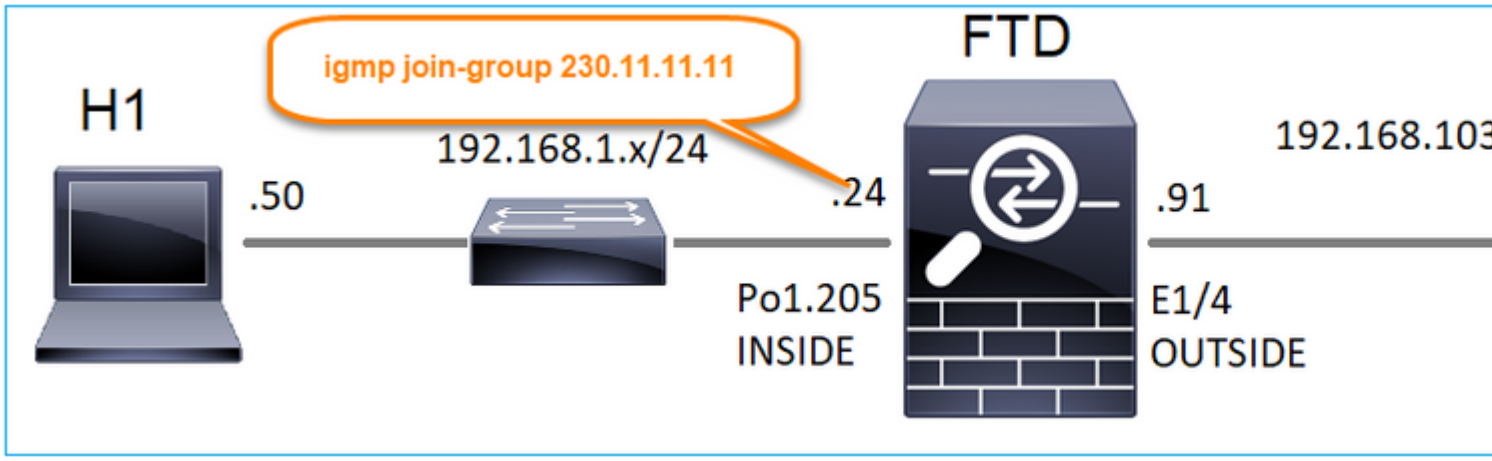
Forwarding: 500/0/100/0, Other: 0/0/0

<-- 500 multicast packets forwarded. The average size of each packet is 100 Bytes
  OUTSIDE Flags: A
  INSIDE Flags: F NS
    Pkts: 500/0

IGMP-groep

Op FMC-afstandsbediening kunt u de eerder ingestelde statische groepsconfiguratie configureren en een IGMP-groepsgroep configureren:





De geïmplementeerde configuratie:

<#root>

```
firepower#
```

`show run interface Port-channel1.205`

```
!
interface Port-channel1.205
vlan 205
nameif INSIDE
cts manual
propagate sgt preserve-untag
policy static sgt disabled trusted
security-level 0
```

```
ip address 192.168.1.24 255.255.255.0
```

```
igmp join-group 230.11.11.11
```

```
<-- The interface joined the multicast group
```

De IGMP-groep:

<#root>

```
firepower#
```

```
show igmp group
```

```
IGMP Connected Group Membership
Group Address Interface Uptime Expires Last Reporter
```

```
230.11.11.11 INSIDE 00:30:43 never 192.168.1.24
```

```
<-- The group is enabled on the interface
```

Probeer vanuit de bronhost de eerste ICMP-multicast test naar 230.11.11.11 IP:

<#root>

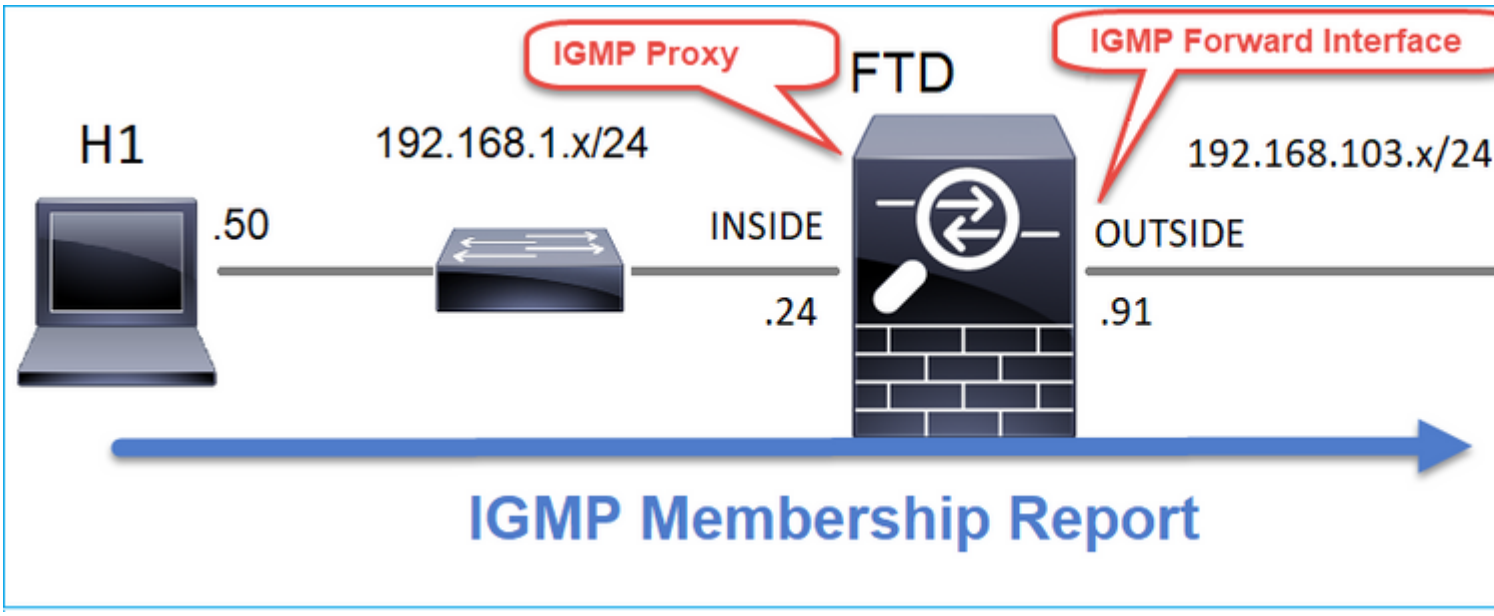
```
L3-Switch#
```

```
ping 230.11.11.11 repeat 10
```

```
Type escape sequence to abort.
Sending 10, 100-byte ICMP Echos to 230.11.11.11, timeout is 2 seconds:

Reply to request 0 from 192.168.1.24, 12 ms
Reply to request 1 from 192.168.1.24, 8 ms
Reply to request 2 from 192.168.1.24, 8 ms
Reply to request 3 from 192.168.1.24, 8 ms
Reply to request 4 from 192.168.1.24, 8 ms
Reply to request 5 from 192.168.1.24, 12 ms
Reply to request 6 from 192.168.1.24, 8 ms
Reply to request 7 from 192.168.1.24, 8 ms
Reply to request 8 from 192.168.1.24, 8 ms
Reply to request 9 from 192.168.1.24, 8 ms
```

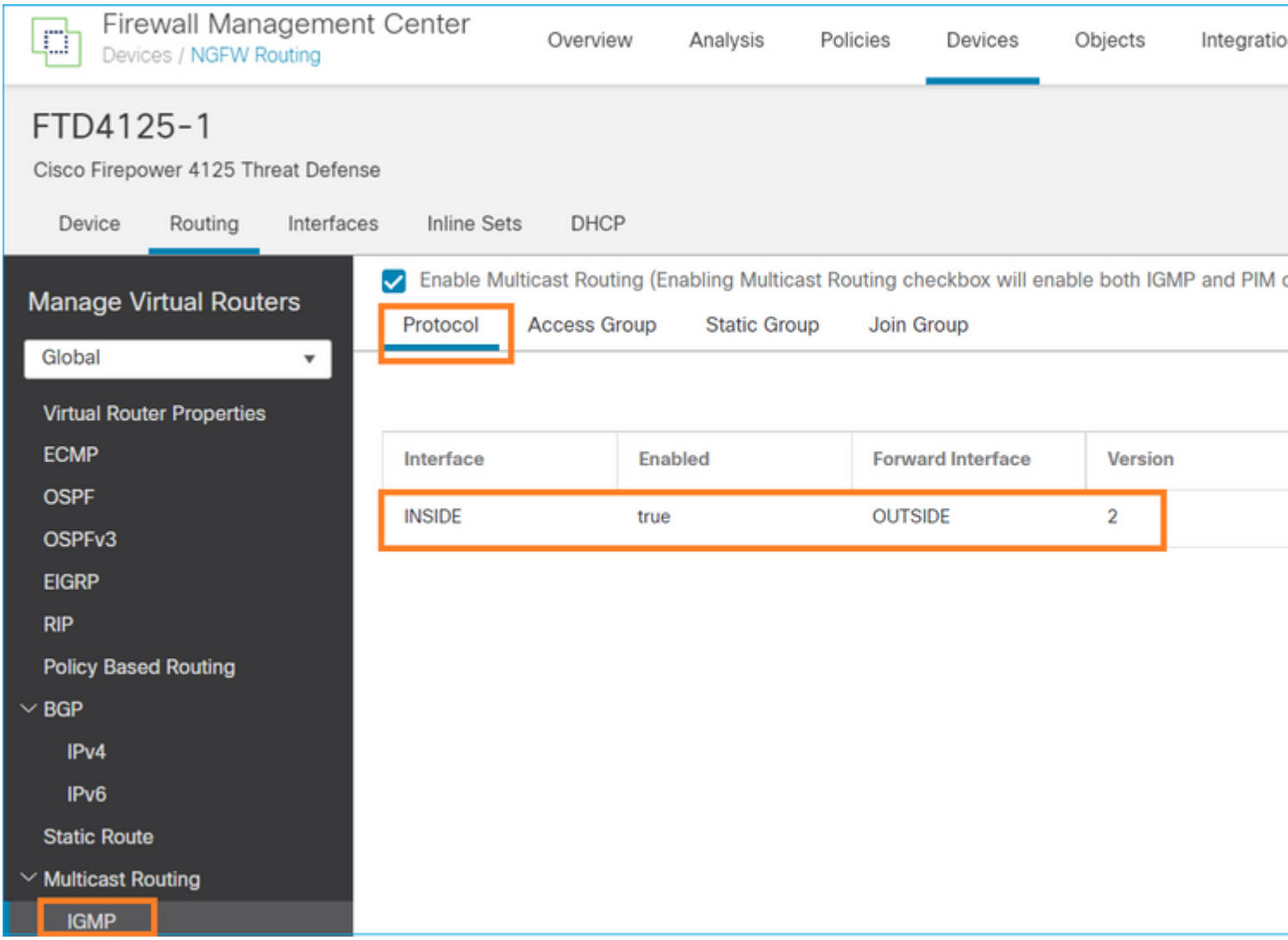
Opmerking: als u niet alle antwoorden ziet, controleert u CSCvm90069 met bug-id van Cisco.

Taak 4 - IGMP Stub Multicast-routing configureren



Configureer stub multicast routing op FTD zodat IGMP Membership Report-berichten die op de BINNENKANT-interface worden ontvangen, naar de BUITENinterface worden doorgestuurd.

Oplossing



De geïmplementeerde configuratie:

<#root>

```
firepower#
```

show run multicast-routing

multicast-routing

```
<-- Multicast routing is enabled
firepower#
```

show run interface Port-channel1.205

```
!
interface Port-channel1.205
 vlan 205
 nameif INSIDE
 cts manual
  propagate sgt preserve-untag
  policy static sgt disabled trusted
 security-level 0
 ip address 192.168.1.24 255.255.255.0
```

igmp forward interface OUTSIDE

```
<-- The interface does stub multicast routing
```

Verificatie

Opnamen op FTD inschakelen:

<#root>

```
firepower#
```

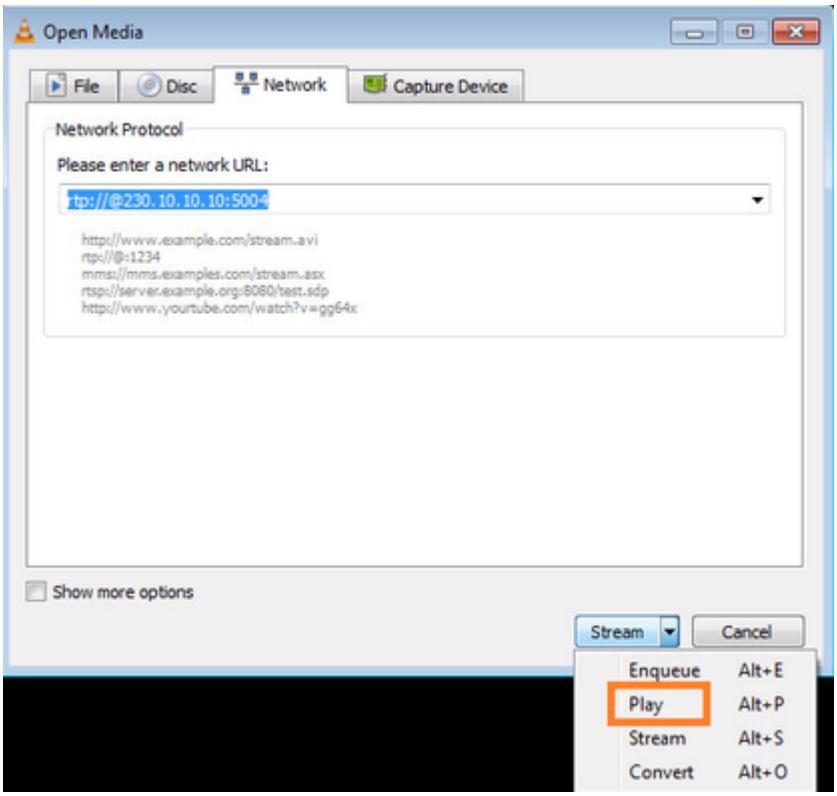
capture CAPI interface INSIDE trace match igmp any host 230.10.10.10

```
firepower#
```

capture CAPO interface OUTSIDE match igmp any host 230.10.10.10

Verificatie

Om een IGMP Membership Report af te dwingen, kunt u een applicatie als VLC gebruiken:



De FTD-proxyâ€™s van de IGMP-pakketten:

<#root>

```
firepower#
```

show capture

```
capture CAPI type raw-data trace interface INSIDE
```

[Capturing - 66 bytes]

```
<-- IGMP packets captured on ingress
match igmp any host 230.10.10.10
capture CAPO type raw-data interface OUTSIDE
```

[Capturing - 62 bytes]

```
<-- IGMP packets captured on egress
match igmp any host 230.10.10.10
```

De FTD wijzigt de IP-bron:

<#root>

```
firepower#
```

show capture CAPI

```
1 packet captured
```

```
   1: 12:21:12.820483 802.1Q vlan#205 P6
```

192.168.1.50

```
 > 230.10.10.10 ip-proto-2, length 8    <-- The source IP of the packet on ingress interface
1 packet shown
firepower#
```

show capture CAPO

```
1 packet captured

   1: 12:21:12.820743
```

192.168.103.91

```
 > 230.10.10.10 ip-proto-2, length 8  <-- The source IP of the packet on egress interface
1 packet shown
```

Als u het pakket in Wireshark controleert, kunt u zien dat het pakket volledig door de firewall wordt geregenereerd (de IP-identificatie verandert).

Er wordt een groepsvermelding aangemaakt op FTD:

<#root>

firepower#

show igmp group

```
IGMP Connected Group Membership
Group Address    Interface            Uptime    Expires   Last Reporter
```

230.10.10.10   INSIDE   00:15:22 00:03:28 192.168.1.50

```
<-- IGMP group is enabled on the ingress interface
239.255.255.250  INSIDE               00:15:27  00:03:29  192.168.1.50
```

De FTD-firewall maakt 2 besturingsplane verbindingen:

<#root>

firepower#

show conn all address 230.10.10.10

```
9 in use, 28 most used
Inspect Snort:
preserve-connection: 0 enabled, 0 in effect, 0 most enabled, 0 most in effect
```

IGMP INSIDE 192.168.1.50 NP Identity Ifc 230.10.10.10, idle 0:00:09, bytes 8, flags

```
<-- Connection terminated on the ingress interface
```

IGMP OUTSIDE 230.10.10.10 NP Identity Ifc 192.168.103.91, idle 0:00:09, bytes 8, flags

```
<-- Connection terminated on the egress interface
```

Soort eerste pakket:

<#root>

```
firepower#
```

show capture CAPI packet-number 1 trace

```
6 packets captured
```

1: 12:21:12.820483 802.1Q vlan#205 P6 192.168.1.50 > 230.10.10.10 ip-proto-2, length 8

```
<-- The first packet of the flow
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 5124 ns
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 5124 ns
Config:
Implicit Rule
Additional Information:
MAC Access list

Phase: 3
Type: ROUTE-LOOKUP
Subtype: No ECMP load balancing
Result: ALLOW
Elapsed time: 7808 ns
Config:
Additional Information:
Destination is locally connected. No ECMP load balancing.
Found next-hop 192.168.1.50 using egress ifc INSIDE(vrfid:0)

Phase: 4
Type: CLUSTER-DROP-ON-SLAVE
Subtype: cluster-drop-on-slave
Result: ALLOW
Elapsed time: 5368 ns
Config:
Additional Information:

Phase: 5
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Elapsed time: 5368 ns
Config:
```

Implicit Rule
Additional Information:

Phase: 6
Type: IP-OPTIONS
Subtype:
Result: ALLOW
Elapsed time: 5368 ns
Config:
Additional Information:

Phase: 7
Type: NAT
Subtype: per-session
Result: ALLOW
Elapsed time: 5368 ns
Config:
Additional Information:

Phase: 8
Type: CLUSTER-REDIRECT
Subtype: cluster-redirect
Result: ALLOW
Elapsed time: 40504 ns
Config:
Additional Information:

Phase: 9

Type: MULTICAST

<-- The packet is multicast

Subtype:

Result: ALLOW

Elapsed time: 976 ns

Config:

Additional Information:

Phase: 10

Type: FLOW-CREATION

<-- A new flow is created

Subtype:

Result: ALLOW

Elapsed time: 17568 ns

Config:

Additional Information:

New flow created with id 5945, packet dispatched to next module

Phase: 11

Type: FLOW-CREATION

<-- A second flow is created

Subtype:

Result: ALLOW

Elapsed time: 39528 ns

Config:

Additional Information:

New flow created with id 5946, packet dispatched to next module

Phase: 12
Type: NEXTHOP-LOOKUP-FROM-OUTPUT-ROUTE-LOOKUP
Subtype: Lookup Nexthop on interface
Result: ALLOW
Elapsed time: 6344 ns
Config:
Additional Information:
Found next-hop 230.10.10.10 using egress ifc OUTSIDE(vrfid:0)

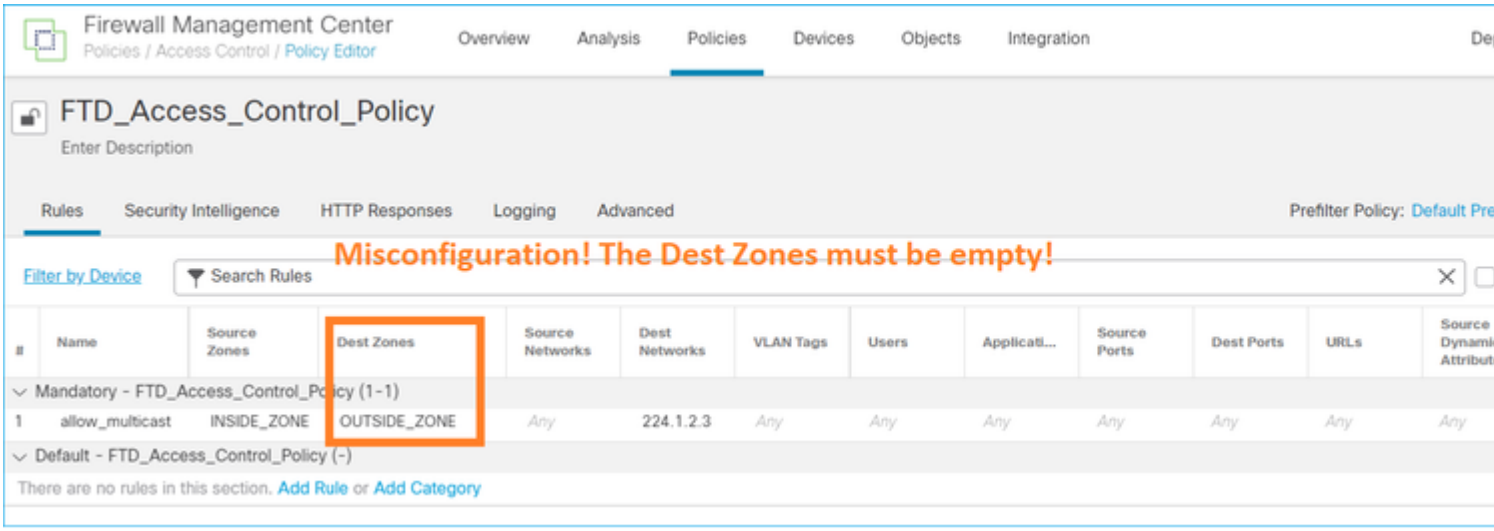
Phase: 13
Type: CAPTURE
Subtype:
Result: ALLOW
Elapsed time: 9760 ns

```
Config:
Additional Information:
MAC Access list

Result:
input-interface: INSIDE(vrfid:0)
input-status: up
input-line-status: up
output-interface: INSIDE(vrfid:0)
output-status: up
output-line-status: up
Action: allow
Time Taken: 154208 ns
```

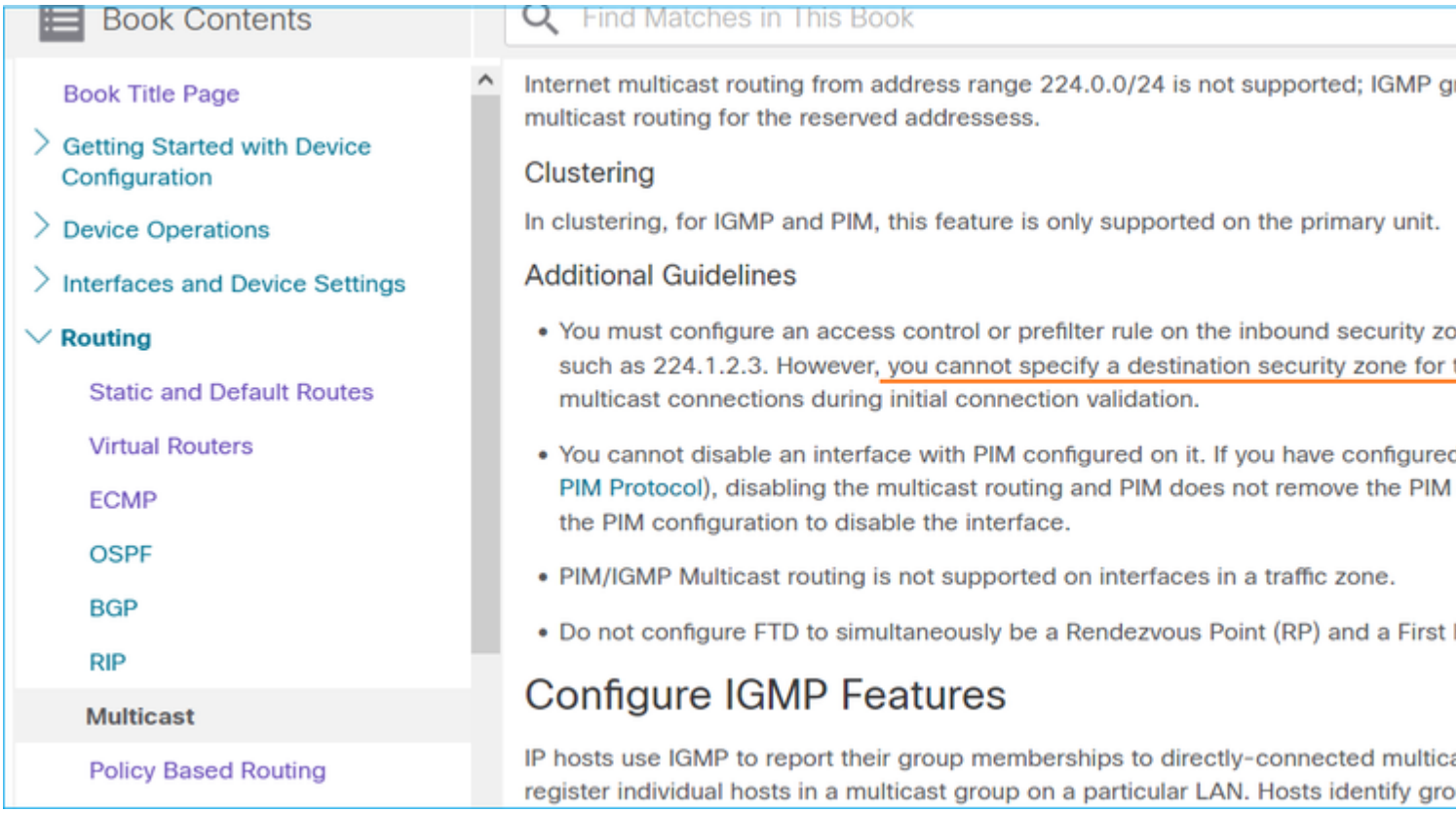
Bekende problemen

Filter multicast verkeer op doelzones

U kunt geen doelbeveiligingszone opgeven voor de regel Toegangsbeheer die overeenkomt met het multicastverkeer:



Dit wordt ook gedocumenteerd in de FMC-gebruikershandleiding:



IGMP-rapporten worden ontkend door de firewall wanneer de IGMP-interfacelimiet wordt overschreden

Standaard staat de firewall maximaal 500 actieve verbindingen (rapporten) toe op een interface. Als deze drempelwaarde wordt overschreden, negeert de firewall extra inkomende IGMP-rapporten van de multicast ontvangers.

Om de IGMP-limiet en actieve verbindingen te controleren, voert u de opdracht **show igmp interface *name***:

<#root>

```
asa#
```

```
show igmp interface inside
```

```
inside is up, line protocol is up
  Internet address is 10.10.10.1/24
  IGMP is enabled on interface
  Current IGMP version is 2
  IGMP query interval is 125 seconds
  IGMP querier timeout is 255 seconds
  IGMP max query response time is 10 seconds
  Last member query response interval is 1 seconds
  Inbound IGMP access group is:
```

```
  IGMP limit is 500, currently active joins: 500
```

```
  Cumulative IGMP activity: 0 joins, 0 leaves
  IGMP querying router is 10.10.10.1 (this system)
```

Het IGMP debug commando **debug igmp** toont deze uitvoer:

<#root>

```
asa#
```

debug igmp

```
Apr 20 2023 09:37:10: %ASA-7-711001: IGMP: Group 230.1.2.3 limit denied on inside
```

De softwareversies met de oplossing van Cisco bug ID CSCvw60976 staat gebruikers toe om tot 5000 groepen op een per-interfacebasis te vormen.

Firewall negeert IGMP-rapporten voor het 232.x.x/8-adresbereik

Het 232.x.x.x/8-adresbereik is bedoeld voor gebruik met Source Specific Multicast (SSM). De firewall ondersteunt geen PIM Source Specific Multicast (SSM)-functionaliteit en bijbehorende configuratie.

Het IGMP debug commando **debug igmp** toont deze uitvoer:

<#root>

```
asa#
```

debug igmp

```
Apr 20 2023 09:37:10: %ASA-7-711001: IGMP: Received v2 Report on inside from 10.10.10.11 for 232.179.89.
Apr 20 2023 09:37:10: %ASA-7-711001: IGMP: group_db: add new group 232.179.89.253 on inside
```

Apr 20 2023 09:37:10: %ASA-7-711001: IGMP: Exclude report on inside ignored for SSM group 232.179.89.253

Cisco bug-id CSCsr53916 houdt de verbetering bij om het SSM-bereik te ondersteunen.

Gerelateerde informatie

- Multicast-routing voor FirePOWER Threat Defense
- Probleemoplossing voor Firepower Threat Defence en ASA Multicast PIM

Over deze vertaling

Cisco heeft dit document vertaald via een combinatie van machine- en menselijke technologie om onze gebruikers wereldwijd ondersteuningscontent te bieden in hun eigen taal. Houd er rekening mee dat zelfs de beste machinevertaling niet net zo nauwkeurig is als die van een professionele vertaler. Cisco Systems, Inc. is niet aansprakelijk voor de nauwkeurigheid van deze vertalingen en raadt aan altijd het oorspronkelijke Engelstalige document (link) te raadplegen.