

# Lab 5: Interdomain ASM: Filtering and MSDP

## Answers

- Create filters to restrict PIM joins for administratively scoped addresses (239.0.0.0/8) inbound and outbound on external interfaces.

### Border-B

```
interface FastEthernet0/0
  ip multicast boundary multicast-boundary
ip access-list standard multicast-boundary
  deny 224.0.1.39
  deny 224.0.1.40
  deny 239.0.0.0 0.255.255.255
  permit any
```

### Border-A

```
protocols {
  pim {
    import pim-joins;
  }
}
policy-options {
  policy-statement pim-joins {
    term reject-joins {
      from {
        interface fe-0/0/0.0;
        route-filter 239.0.0.0/8 orlonger;
      }
      then reject;
    }
    term accept-all {
      then accept;
    }
  }
}
```

- Create MSDP SA filters to drop MSDP Source Active messages inbound for administratively scoped group addresses and RFC 1918 source addresses.

### Core-C (RP)

```
ip access-list extended msdp-list-in
  remark - scoped groups
  deny ip any 239.0.0.0 0.255.255.255
  remark - private (RFC 1918) addresses
  deny ip 10.0.0.0 0.255.255.255 any
  deny ip 172.16.0.0 0.15.255.255 any
  deny ip 192.168.0.0 0.0.255.255 any
  remark - loopback
  deny ip 127.0.0.0 0.255.255.255 any
  remark - SSM-range
  deny ip 232.0.0.0 0.255.255.255 any
  permit ip any any
```

- Create filters to prevent sending MSDP Source Active messages for admin scoped group addresses and RFC 1918 source addresses.

#### Core-C (RP)

```
ip access-list extended msdp-list-out
  remark - scoped groups
  deny ip any 239.0.0.0 0.255.255.255
  remark - private (RFC 1918) addresses
  deny ip 10.0.0.0 0.255.255.255 any
  deny ip 172.16.0.0 0.15.255.255 any
  deny ip 192.168.0.0 0.0.255.255 any
  remark - loopback
  deny ip 127.0.0.0 0.255.255.255 any
  remark - SSM-range
  deny ip 232.0.0.0 0.255.255.255 any
  permit ip any any
```

- Create filters to control MSDP Source Active messages to originate.

```
ip access-list extended acl-originate-sa
  permit ip 199.109.204.0 0.0.0.255 any
  deny ip any any
```

- Configure MSDP peering with your two external multicast peer Rendezvous Points, using the RP loopback addresses.

#### Core-C (RP)

```
ip msdp peer 199.109.201.6 connect-source Loopback1 remote-as 65501
ip msdp peer 199.109.203.6 connect-source Loopback1 remote-as 65503
```

- Apply Access Control Lists for MSDP SAs sent, received, and originated.

#### Core-C (RP)

```
ip msdp sa-filter in 199.109.201.10 list msdp-list-out
ip msdp sa-filter out 199.109.201.10 list msdp-list-out
ip msdp sa-filter in 199.109.203.6 list msdp-list-out
ip msdp sa-filter out 199.109.203.6 list msdp-list-out
ip msdp redistribute list acl-originate-sa
```

- Verify MSDP sessions are up and running.

#### Core-C (RP)

```
P4B#show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/   Reset SA      Peer Name
                  State           Downtime Count Count
199.109.201.10    65501 Up        00:46:08  0      2      ?
199.109.203.6    65503 Up        00:22:52  0      6      ?
P4B#
```

- Start ASM stream (webcam) on Host-Q.

```
vic <group>/<port>
Settings -> Device... -> (webcam); Transmit
```

Click on thumbnail to enlarge.

**- Publish channel info (Group, Port) on whiteboard.**

**- Verify that the DR for Host-Q (Customer-D) has (S,G) state for Host-Q's source stream, and that Register messages are being sent to the RP.**

```
P4E#show ip mroute 236.4.4.4
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry,
       X - Proxy Join Timer Running, A - Advertised via MSDP, U - URD,
       I - Received Source Specific Host Report
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 236.4.4.4), 00:37:06/00:02:59, RP 199.109.204.6, flags: SJCF
Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.37
Outgoing interface list:
  FastEthernet0/1, Forward/Sparse, 00:37:06/00:02:53

(199.109.201.162, 236.4.4.4), 00:07:33/00:02:57, flags: CJT
Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.37
Outgoing interface list:
  FastEthernet0/1, Forward/Sparse, 00:07:33/00:02:53

P4E#
```

**- Verify that your RP has (S,G) state for Host-Q's source stream, and that it's originating MSDP Source Actives.**

```
P4B#show ip mroute 236.4.4.4
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
       C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry,
       X - Proxy Join Timer Running, A - Candidate MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report, Z - Multicast Tunnel
       Y - Joined MDT-data group, y - Sending to MDT-data group
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 236.4.4.4), 00:38:40/stopped, RP 199.109.204.6, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  FastEthernet0/1, Forward/Sparse, 00:38:40/00:03:26

(199.109.204.162, 236.4.4.4), 00:38:40/00:03:28, flags: TA
Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
Outgoing interface list:
  FastEthernet0/0, Forward/Sparse, 00:13:33/00:03:09
```

```

P4B#
P4B#show ip msdp summary
MSDP Peer Status Summary
Peer Address      AS      State      Uptime/   Reset SA      Peer Name
                  AS      State      Downtime Count Count
199.109.201.10    65501  Up         00:50:03 0        2        ?
199.109.203.6    65503  Up         00:26:47 0        6        ?
P4B#
P4B#show ip msdp peer 199.109.201.10 advertised-SAs

MSDP SA advertised to peer 199.109.201.10 (?) from mroute table

236.4.4.4          199.109.204.162 (?)

MSDP SA advertised to peer 199.109.201.10 (?) from SA cache

227.1.1.1          199.109.203.130 (?) RP: 199.109.203.6
227.1.1.1          199.109.203.162 (?) RP: 199.109.203.6
233.1.1.1          199.109.203.162 (?) RP: 199.109.203.6
[...]
```

```

P4B#show ip msdp peer 199.109.203.6 advertised-SAs

MSDP SA advertised to peer 199.109.203.6 (?) from mroute table

236.4.4.4          199.109.204.162 (?)

MSDP SA advertised to peer 199.109.203.6 (?) from SA cache

227.1.1.1          199.109.201.162 (?) RP: 199.109.201.10
P4B#

```

**- Start ASM receivers for each external source (three total).**

```
vic <group>/<port>
```

**- Verify that your RP has (\*,G) state for each external group, created as a result of the IGMP joins of the ASM receivers.**

```

P4B#show ip mroute 233.1.1.1
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry,
X - Proxy Join Timer Running, A - Candidate MSDP Advertisement,
U - URD, I - Received Source Specific Host Report, Z - Multicast Tunnel
Y - Joined MDT-data group, y - Sending to MDT-data group
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 233.1.1.1), 00:19:37/stopped, RP 199.109.204.6, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    FastEthernet0/1, Forward/Sparse, 00:19:37/00:02:45

(199.109.203.130, 233.1.1.1), 00:16:59/00:03:21, flags: MT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.17, Mbgp
  Outgoing interface list:
    FastEthernet0/1, Forward/Sparse, 00:16:59/00:02:45

```

```
(199.109.203.162, 233.1.1.1), 00:16:59/00:03:21, flags: MT
Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.17, Mbgp
Outgoing interface list:
FastEthernet0/1, Forward/Sparse, 00:16:59/00:02:45

(199.109.204.195, 233.1.1.1), 00:16:02/00:03:21, flags: TA
Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
Outgoing interface list:
FastEthernet0/0, Forward/Sparse, 00:16:02/00:02:47

(199.109.204.196, 233.1.1.1), 00:16:05/00:03:20, flags: TA
Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
Outgoing interface list:
FastEthernet0/0, Forward/Sparse, 00:16:04/00:02:45

(199.109.204.197, 233.1.1.1), 00:11:34/00:03:24, flags: TA
Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
Outgoing interface list:
FastEthernet0/0, Forward/Sparse, 00:11:34/00:02:45

(199.109.204.198, 233.1.1.1), 00:19:37/00:03:20, flags: TA
Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
Outgoing interface list:
FastEthernet0/0, Forward/Sparse, 00:17:02/00:02:45
```

P4B#

**- Verify that MSDP Source Active messages are received by your RP and cached for each external source.**

```
P4B#show ip msdp sa-cache
MSDP Source-Active Cache - 8 entries
(199.109.201.162, 227.1.1.1), RP 199.109.201.10, MBGP/AS 65501,
00:17:51/00:05:49, Peer 199.109.201.10
(199.109.203.130, 227.1.1.1), RP 199.109.203.6, MBGP/AS 65503,
00:13:50/00:05:43, Peer 199.109.203.6
(199.109.203.162, 227.1.1.1), RP 199.109.203.6, MBGP/AS 65503,
00:14:15/00:05:43, Peer 199.109.203.6
(199.109.203.130, 233.1.1.1), RP 199.109.203.6, MBGP/AS 65503,
00:18:02/00:05:43, Peer 199.109.203.6
(199.109.203.162, 233.1.1.1), RP 199.109.203.6, MBGP/AS 65503,
00:18:02/00:05:43, Peer 199.109.203.6
(199.109.201.162, 236.4.4.4), RP 199.109.201.10, MBGP/AS 65501,
00:13:39/00:05:49, Peer 199.109.201.10
(199.109.203.130, 236.4.4.4), RP 199.109.203.6, MBGP/AS 65503,
00:18:02/00:05:43, Peer 199.109.203.6
(199.109.203.162, 236.4.4.4), RP 199.109.203.6, MBGP/AS 65503,
00:18:02/00:05:43, Peer 199.109.203.6
```

P4B#

**- Verify that your RP has (S,G) state for each MSDP Source Active received for each external group, and that the input and output interface lists follow the multicast reachability topology that you expect.**

```
P4B#show ip mroute 233.1.1.1
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry,
X - Proxy Join Timer Running, A - Candidate MSDP Advertisement,
```

```

U - URD, I - Received Source Specific Host Report, Z - Multicast Tunnel
Y - Joined MDT-data group, y - Sending to MDT-data group
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 233.1.1.1), 00:21:55/stopped, RP 199.109.204.6, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    FastEthernet0/1, Forward/Sparse, 00:21:55/00:03:25

(199.109.203.130, 233.1.1.1), 00:19:18/00:03:22, flags: MT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.17, Mbgp
  Outgoing interface list:
    FastEthernet0/1, Forward/Sparse, 00:19:18/00:03:25

(199.109.203.162, 233.1.1.1), 00:19:18/00:03:22, flags: MT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.17, Mbgp
  Outgoing interface list:
    FastEthernet0/1, Forward/Sparse, 00:19:18/00:03:25

(199.109.204.195, 233.1.1.1), 00:18:21/00:03:22, flags: TA
  Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:18:21/00:03:20

(199.109.204.196, 233.1.1.1), 00:18:23/00:03:21, flags: TA
  Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:18:23/00:03:19

(199.109.204.197, 233.1.1.1), 00:13:52/00:03:21, flags: TA
  Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:13:52/00:03:19

(199.109.204.198, 233.1.1.1), 00:21:55/00:02:41, flags: TA
  Incoming interface: FastEthernet0/1, RPF nbr 199.109.204.29
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:19:20/00:03:19

P4B#show ip rp
P4B#show ip rpf 199.109.203.162
RPF information for ? (199.109.203.162)
  RPF interface: FastEthernet0/0
  RPF neighbor: ? (199.109.204.17)
  RPF route/mask: 199.109.203.0/24
  RPF type: mbgp
  RPF recursion count: 0
  Doing distance-preferred lookups across tables
P4B#

```

**- Verify that the DR next to the receiver has (S,G) state for the external sources.**

```

P4D#show ip mroute 233.1.1.1
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group,
C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag,
T - SPT-bit set, J - Join SPT, M - MSDP created entry,
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report, s - SSM

```

```
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 233.1.1.1), 00:29:37/00:02:59, RP 199.109.204.6, flags: SJCF
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.33
  Outgoing interface list:
    FastEthernet1/0, Forward/Sparse, 00:29:36/00:02:59

(199.109.201.162, 233.1.1.1), 00:00:28/00:02:31, flags: CJT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.33
  Outgoing interface list:
    FastEthernet1/0, Forward/Sparse, 00:00:28/00:02:59

(199.109.203.130, 233.1.1.1), 00:02:33/00:00:26, flags: CJT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.33
  Outgoing interface list:
    FastEthernet1/0, Forward/Sparse, 00:02:33/00:02:59

(199.109.203.162, 233.1.1.1), 00:27:05/00:02:59, flags: CJT
  Incoming interface: FastEthernet0/0, RPF nbr 199.109.204.33
  Outgoing interface list:
    FastEthernet1/0, Forward/Sparse, 00:27:05/00:02:52

(199.109.204.195, 233.1.1.1), 00:26:09/00:02:01, flags: CFT
  Incoming interface: FastEthernet1/0, RPF nbr 0.0.0.0
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:26:09/00:02:37

(199.109.204.196, 233.1.1.1), 00:26:09/00:01:56, flags: CFT
  Incoming interface: FastEthernet1/0, RPF nbr 0.0.0.0
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:26:09/00:02:37

(199.109.204.197, 233.1.1.1), 00:21:39/00:01:30, flags: CFT
  Incoming interface: FastEthernet1/0, RPF nbr 0.0.0.0
  Outgoing interface list:
    FastEthernet0/0, Forward/Sparse, 00:21:39/00:02:37

P4D#
```

- **Verify (S,G) joins follow the expected multicast reachability info to pod border.**
- **Troubleshoot as necessary.**
- **Capture and decode packets to verify that data for each ASM channel is received.**
- **Stop ASM sources and receivers.**