

ユニキャストVRF間ルート漏出のないVRF間マルチキャストの設定

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概要

このドキュメントでは、Virtual Routing and Forwarding(VRF)ソースのソースから着信し、ユニキャストのVRF間ルート漏出を行わずにVRFレシーバのユーザに向かうマルチキャストストリームを転送する方法について説明します。

前提条件

要件

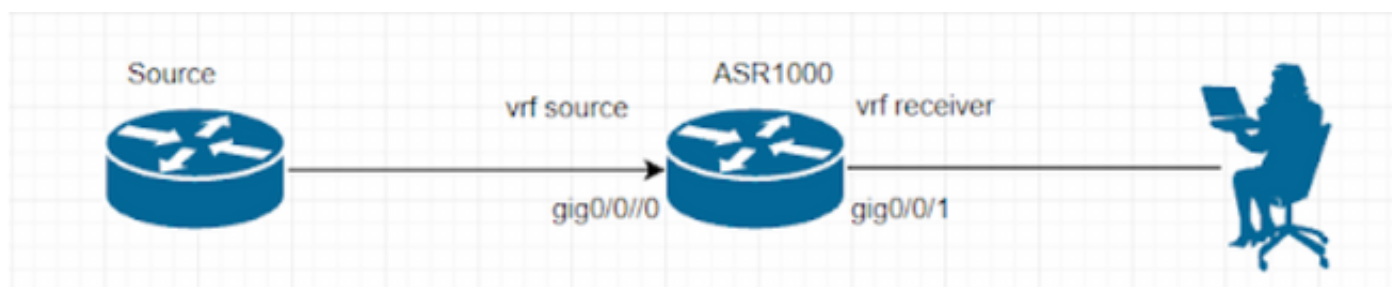
PIM機能とASMに関する知識があることが推奨されます。

使用するコンポーネント

このドキュメントの情報は、ASR1000に基づくものです。

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されました。このドキュメントで使用するすべてのデバイスは、初期（デフォルト）設定の状態から起動しています。本稼働中のネットワークでは、各コマンドによって起こる可能性がある影響を十分確認してください。

ネットワーク図



設定

送信元でUDPマルチキャストストリームを生成します。

```
Source#
```

```
ip sla 1
```

```
udp-echo 239.1.1.1 2000 source-ip 10.1.1.1
```

```
ip sla schedule 1 life forever start-time now
```

レシーバはIGMPで設定され、IGMPメンバーシップレポートを送信します。

ASR1000ルータがVRF間マルチキャストトラフィック転送を実行しています。VRFの「ソース」のLoopback 1は、両方のVRFのRPです。

```
ASR1000#
```

```
ip vrf source
```

```
rd 1:1
```

```
!
```

```
ip vrf receiver
```

```
rd 2:2
```

```
!
```

```
ip multicast-routing vrf source distributed
```

```
ip multicast-routing vrf receiver distributed
```

```
ip pim vrf source rp-address 1.1.1.1
```

```
ip pim vrf receiver rp-address 1.1.1.1
```

```
interface Loopback1
```

```
ip vrf forwarding source
```

```
ip address 1.1.1.1 255.255.255.255
```

```
ip pim sparse-mode
```

```
interface GigabitEthernet0/0/0
```

```
ip vrf forwarding source
```

```
ip address 10.1.1.2 255.255.255.0
```

```
ip pim sparse-mode
```

```
interface GigabitEthernet0/0/1
ip vrf forwarding receiver
ip address 20.1.1.2 255.255.255.0
ip pim sparse-mode
```

(S、G)エントリは、現時点ではvrf「receive」で形成されていません。

```
ASR1002-1#show ip mroute vrf source
```

```
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, E - Extranet,
```

```
X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
```

```
U - URD, I - Received Source Specific Host Report,
```

```
Z - Multicast Tunnel, z - MDT-data group sender,
```

```
Y - Joined MDT-data group, y - Sending to MDT-data group,
```

```
G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
```

```
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
```

```
Q - Received BGP S-A Route, q - Sent BGP S-A Route,
```

```
V - RD & Vector, v - Vector, p - PIM Joins on route,
```

```
x - VxLAN group, c - PFP-SA cache created entry,
```

```
* - determined by Assert
```

```
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
```

```
Timers: Uptime/Expires
```

```
Interface state: Interface, Next-Hop or VCD, State/Mode
```

```
(*, 239.1.1.1), 00:05:01/stopped, RP 1.1.1.1, flags: SPF
```

```
Incoming interface: Null, RPF nbr 0.0.0.0
```

```
Outgoing interface list: Null
```

```
(10.1.1.1, 239.1.1.1), 00:05:01/00:02:26, flags: PFT
```

```
Incoming interface: GigabitEthernet0/0/0, RPF nbr 0.0.0.0
```

```
Outgoing interface list: Null
```

```
(*, 224.0.1.40), 00:07:03/00:02:59, RP 1.1.1.1, flags: SJCL
```

```
Incoming interface: Null, RPF nbr 0.0.0.0
```

Outgoing interface list:

Loopback1, Forward/Sparse, 00:07:01/00:02:59

```
ASR1002-X-1#sh ip mroute vrf receiver
```

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, E - Extranet,

X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,

U - URD, I - Received Source Specific Host Report,

Z - Multicast Tunnel, z - MDT-data group sender,

Y - Joined MDT-data group, y - Sending to MDT-data group,

G - Received BGP C-Mroute, g - Sent BGP C-Mroute,

N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,

Q - Received BGP S-A Route, q - Sent BGP S-A Route,

V - RD & Vector, v - Vector, p - PIM Joins on route,

x - VxLAN group, c - PFP-SA cache created entry,

* - determined by Assert, # - iif-starg configured on rpf intf,

e - encap-helper tunnel flag

Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join

Timers: Uptime/Expires

Interface state: Interface, Next-Hop or VCD, State/Mode

```
(*, 239.1.1.1), 00:03:23/00:02:44, RP 1.1.1.1, flags: SJC
```

Incoming interface: Null, RPF nbr 0.0.0.0

Outgoing interface list:

GigabitEthernet0/0/1, Forward/Sparse, 00:03:23/00:02:44

これを修正するには、RPFチェックに合格するようにVRFを選択する必要があります。

```
ip access-list standard 1
```

```
permit 239.1.1.1 log
```

```
exit
```

```
ip multicast vrf receiver rpf select vrf source group-list 1
```

確認

ここでは、設定が正常に機能しているかどうかを確認します。

前述の手順を実行すると、受信側でマルチキャストフィードを確認できます。

```
Receiver#show flow monitor test cache format table
```

Cache type: Normal (Platform cache)

Cache size: 200000

Current entries: 1

High Watermark: 3

Flows added: 50

Flows aged: 49

- Inactive timeout (15 secs) 49

IPV4 SRC ADDR IPV4 DST ADDR TRNS SRC PORT TRNS DST PORT INTF INPUT FLOW SAMPLER ID IP TOS IP
PROT ip src as ip dst as ipv4 next hop addr ipv4 src mask ipv4 dst mask tcp flags intf output
bytes pkts time first time last

=====
=====

10.1.1.1 239.1.1.1 57314 1967 Gi0/0/3 0 0x00 17 0 0 0.0.0.0 /0 /0 0x00 Null 80 1 11:09:08.082
11:09:08.082

受信側でのパケットキャプチャ。

```
> Frame 1: 94 bytes on wire (752 bits), 94 bytes captured (752 bits)
> Ethernet II, Src: Cisco_93:70:01 (00:a6:ca:93:70:01), Dst: IPv4mcast_01:01:01 (01:00:5e:01:01:01)
v Internet Protocol Version 4, Src: 10.1.1.1, Dst: 239.1.1.1
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 80
    Identification: 0x0000 (0)
  > Flags: 0x00
    Fragment Offset: 0
    Time to Live: 254
    Protocol: UDP (17)
    Header Checksum: 0xc198 [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 10.1.1.1
    Destination Address: 239.1.1.1
  > User Datagram Protocol, Src Port: 54527, Dst Port: 1967
  > Data (52 bytes)
```

(S、G)エントリはVRFレシーバで形成されます。

```
ASR1002-1#show ip mroute vrf receiver 239.1.1.1
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, E - Extranet, X - Proxy Join Timer Running,
A - Candidate for MSDP Advertisement, U - URD, I - Received Source Specific Host Report,
Z - Multicast Tunnel, z - MDT-data group sender, Y - Joined MDT-data group,
y - Sending to MDT-data group, G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,
Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector,
p - PIM Joins on route, x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert Outgoing interface flags: H - Hardware switched,
A - Assert winner, p - PIM Join
Timers: Uptime/Expires
Interface state:
Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 00:21:36/stopped, RP 1.1.1.1, flags: SJC
Incoming interface: Loopback1, RPF nbr 1.1.1.1, using vrf source
Outgoing interface list:
GigabitEthernet0/0/1, Forward/Sparse, 00:21:36/00:02:43

(10.1.1.1, 239.1.1.1), 00:03:55/stopped, flags: T
```

Incoming interface: GigabitEthernet0/0/0, RPF nbr 0.0.0.0, using vrf source

Outgoing interface list:

GigabitEthernet0/0/1, Forward/Sparse, 00:03:55/00:02:43

ASR1002-1#show ip mroute vrf source 239.1.1.1

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, E - Extranet,

X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,

U - URD, I - Received Source Specific Host Report,

Z - Multicast Tunnel, z - MDT-data group sender,

Y - Joined MDT-data group, y - Sending to MDT-data group,

G - Received BGP C-Mroute, g - Sent BGP C-Mroute,

N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed,

Q - Received BGP S-A Route, q - Sent BGP S-A Route,

V - RD & Vector, v - Vector, p - PIM Joins on route,

x - VxLAN group, c - PFP-SA cache created entry,

* - determined by Assert

Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join

Timers: Uptime/Expires

Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.1.1.1), 00:22:36/stopped, RP 1.1.1.1, flags: SJCFFE

Incoming interface: Null, RPF nbr 0.0.0.0

Outgoing interface list: Null

Extranet receivers in vrf receiver:

(*, 239.1.1.1), 00:21:54/stopped, RP 1.1.1.1, OIF count: 1, flags: SJC

(10.1.1.1, 239.1.1.1), 00:04:14/00:02:55, flags: FTE

Incoming interface: GigabitEthernet0/0/0, RPF nbr 0.0.0.0

Outgoing interface list: Null

Extranet receivers in vrf receiver:

(10.1.1.1, 239.1.1.1), 00:04:14/stopped, OIF count: 1, flags: T

ASR1002-1#show ip mfib vrf receiver 239.1.1.1

Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,

ET - Data Rate Exceeds Threshold, K - Keepalive

DDE - Data Driven Event, HW - Hardware Installed

ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB

MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary

MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client.

I/O Item Flags: IC - Internal Copy, NP - Not platform switched,

NS - Negate Signalling, SP - Signal Present,

A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,

MA - MFIB Accept, A2 - Accept backup,

RA2 - MRIB Accept backup, MA2 - MFIB Accept backup

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

Other counts: Total/RPF failed/Other drops

I/O Item Counts: HW Pkt Count/FS Pkt Count/PS Pkt Count Egress Rate in pps

VRF receiver

(*,239.1.1.1) Flags: C HW

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

HW Forwarding: 0/0/0/0, Other: 1/1/0

GigabitEthernet0/0/1 Flags: NS

(10.1.1.1,239.1.1.1) Flags: HW

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

HW Forwarding: 15/0/94/0, Other: 0/0/0

GigabitEthernet0/0/1 Flags: NS

また、VRFレシーバRIBには、RPおよび送信元IPのユニキャストエントリはありません。

```
ASR1002-1#show ip route vrf receiver 1.1.1.1
Routing Table: receiver % Network not in table
```

```
ASR1002-1#show ip route vrf receiver 10.1.1.1
Routing Table: receiver % Network not in table
```

したがって、RPFは失敗と表示されますが、マルチキャストトラフィックは転送されます。

```
ASR1002-1#show ip rpf vrf receiver 1.1.1.1
failed, no route exists
ASR1002-1#show ip rpf vrf receiver 10.1.1.1
failed, no route exists
```

これを実現する別の方法は次のとおりです。

```
ip mroute vrf receiver 10.1.1.0 255.255.255.0 fallback-lookup vrf source
```

```
ip mroute vrf receiver 1.1.1.1 255.255.255.255 fallback-lookup vrf source
```

これにより、RPFチェックが成功します。

```
ASR1002-1#show ip rpf vrf receiver 1.1.1.1
RPF information for ? (1.1.1.1)
RPF interface: Loopback1
RPF neighbor: ? (1.1.1.1) - directly connected
RPF route/mask: 1.1.1.1/32
RPF type: multicast (connected)
Doing distance-preferred lookups across tables
Using Extranet RPF Rule: Static Fallback Lookup, RPF VRF: source
RPF topology: ipv4 multicast base
```

```
ASR1002-1#show ip rpf vrf receiver 10.1.1.1
RPF information for ? (10.1.1.1)
RPF interface: GigabitEthernet0/0/0
RPF neighbor: ? (10.1.1.1) - directly connected
RPF route/mask: 10.1.1.0/24
RPF type: multicast (connected)
Doing distance-preferred lookups across tables
Using Extranet RPF Rule: Static Fallback Lookup, RPF VRF: source
RPF topology: ipv4 multicast base
```

ただし、RPF **select** コマンドまたは **fallback lookup** コマンドを使用すると、いずれもその目的を果たすことができます。

トラブルシューティング

現在、この設定に関する特定のトラブルシューティング情報はありません。