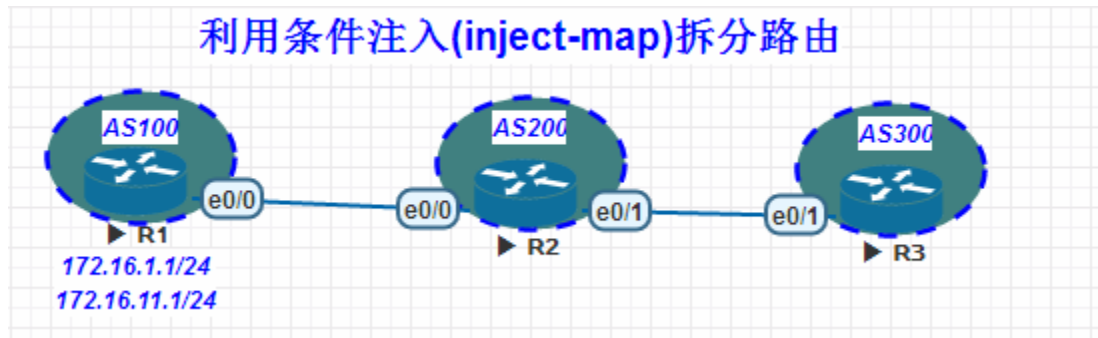


利用条件注入(inject-map)做路由拆分

一、拓扑



要求:

- 1.R1、R2、R3 配置 EBGP 邻居, R1 上配置环回口地址 172.16.1.1/24 和 172.16.11.1/24。
- 2.R1 通告路由 172.16.1.0/24 和 172.16.11.0/24, 并且做 BGP 路由手工汇总 172.16.0.0/16。
- 3.R2 收到汇总路由 172.16.0.0/16 后, 在其上面做条件注入, 使其携带明细路由 172.16.1.1/24。
- 4.观察 R3 收到的 BGP 路由。

二、配置

- 1.基本 IP 地址和 EBGP 配置 (省略)。
- 2.R1 上通告路由

```
R1(config)#router bgp 100
R1(config-router)#network 172.16.1.0 mask 255.255.255.0
R1(config-router)#network 172.16.11.0 mask 255.255.255.0
```

查看 R1、R2、R3 上的 BGP 路由

```
R1#show ip bgp
BGP table version is 3, local router ID is 172.16.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop        Metric LocPrf weight Path
  *> 172.16.1.0/24   0.0.0.0         0         32768 i
  *> 172.16.11.0/24  0.0.0.0         0         32768 i
```

```
R2#show ip bgp
BGP table version is 3, local router ID is 23.1.1.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop        Metric LocPrf weight Path
  *> 172.16.1.0/24   12.1.1.1        0         0 100 i
  *> 172.16.11.0/24 12.1.1.1        0         0 100 i
```

```
R3#show ip bgp
BGP table version is 3, local router ID is 23.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop        Metric LocPrf weight Path
  *> 172.16.1.0/24   23.1.1.2        0         0 200 100 i
  *> 172.16.11.0/24 23.1.1.2        0         0 200 100 i
```

- 3.R1 上配置 BGP 手工汇总路由 172.16.0.0/16

```
R1(config)#router bgp 100
R1(config-router)#$address 172.16.0.0 255.255.0.0 summary-only as-set
R1(config-router)#
```

再查看 R1、R2、R3 的 BGP 路由

```
R1#show ip bgp
BGP table version is 6, local router ID is 172.16.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
*> 172.16.0.0       0.0.0.0           0         100 32768 i
s> 172.16.1.0/24    0.0.0.0           0         32768 i
s> 172.16.11.0/24   0.0.0.0           0         32768 i
```

```
R2#show ip bgp
BGP table version is 6, local router ID is 23.1.1.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
*> 172.16.0.0       12.1.1.1          0         0 100 i
```

```
R3#show ip bgp
BGP table version is 6, local router ID is 23.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
*> 172.16.0.0       23.1.1.2          0         0 200 100 i
```

4.R2 上配置条件注入，进行路由拆分，使 R2 获得明细路由 172.16.1.1/24

```
R2(config)#ip prefix-list 1 permit 172.16.0.0/16
R2(config)#ip prefix-list 2 permit 12.1.1.1/32
R2(config)#ip prefix-list 3 permit 172.16.1.0/24
R2(config)#
R2(config)#route-map 1
R2(config-route-map)#match ip address prefix-list 1
R2(config-route-map)#match ip route-source prefix-list 2
R2(config-route-map)#exit
R2(config)#
R2(config)#route-map 2
R2(config-route-map)#match ip address prefix-list 3
R2(config-route-map)#exit
R2(config-route-map)#exit
```

```
R2(config)#router bgp 200
R2(config-router)#bgp inject-map 2 ?
    exist-map Routemap which specifies exist condition
R2(config-router)#bgp inject-map 2 exist-map 1
R2(config-router)#end
```

在 R2、R3 上查看 BGP 路由

```
R2#show ip bgp
BGP table version is 7, local router ID is 23.1.1.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf weight Path
*> 172.16.0.0       12.1.1.1          0         0 100 i
*> 172.16.1.0/24    12.1.1.1          0         0 ?
```

```

R3#show ip bgp
BGP table version is 7, local router ID is 23.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
  *> 172.16.0.0      23.1.1.2          0 200 100 i
  *> 172.16.1.0/24   23.1.1.2          0 200 ?

```

```

R1#show ip bgp neighbors 12.1.1.2 advertised-routes
BGP table version is 6, local router ID is 172.16.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
  *> 172.16.0.0      0.0.0.0          100 32768 i

Total number of prefixes 1

```

```

R2#show ip bgp neighbors 23.1.1.3 advertised-routes
BGP table version is 7, local router ID is 23.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop          Metric LocPrf Weight Path
  *> 172.16.0.0/24   12.1.1.1          0 100 i
  *> 172.16.1.0/24   12.1.1.1          0 ?

Total number of prefixes 2

```

可以看到 R1 仅向 R2 通告了汇总路由，但是 R2 向 R3 通告了明细路由 172.16.1.0/24 和汇总路由 172.16.0.0/16，从而达到路由拆分的目的。现在给 R1 上的汇总路由添加 community 属性。

```

R1(config)#route-map 1
R1(config-route-map)#set community 100:16
R1(config-route-map)#exit
R1(config)#
R1(config)#
R1(config)#
R1(config)#router bgp 100
R1(config-router)#$ 255.255.0.0 as-set summary-only attribute-map 1
R1(config-router)#neighbor 12.1.1.2 send-community
R1(config-router)#exit
R1(config)#ip bgp-community new-format

```

可以看到，利用条件属性，我们在 R1 上给汇总路由 172.16.0.0/24 添加了 community 属性 100:16，再查看汇总路由属性。

```

R1#show ip bgp 172.16.0.0
BGP routing table entry for 172.16.0.0/16, version 14
Paths: (1 available, best #1, table default)
  Advertised to update-groups:
    3
  Refresh Epoch 1
  Local, (aggregated by 100 172.16.11.1)
    0.0.0.0 from 0.0.0.0 (172.16.11.1)
      Origin IGP, localpref 100, weight 32768, valid, aggregated, local, best
      Community: 100:16

```

可以看到 R1 已经成功给汇总路由添加了 community 值。再到 R2 上查看明细路由 172.16.1.0/24 的属性。

```

R2#show ip bgp 172.16.1.0
BGP routing table entry for 172.16.1.0/24, version 27
Paths: (1 available, best #1, table default)
  Advertised to update-groups:
    2
  Refresh Epoch 7
  Local, (aggregated by 100 172.16.11.1), (injected path from 172.16.0.0/16)
    12.1.1.1 from 12.1.1.1 (172.16.11.1)
      origin incomplete, localpref 100, valid, external, best

```

可以看到 R2 上通过条件注入生成的明细路由 172.16.1.0/24 没有携带 community 值，为了让明细路由也继承汇总路由 172.16.0.0/24 的 community 属性，可以进行操作如下

```

R2(config)#router bgp 200
R2(config-router)#bgp inject-map 2 exist-map 1 copy-attribute
R2(config-router)#exit
R2(config)#ip bgp-community new-format
R2(config)#end

```

```

R2#show ip bgp 172.16.1.0
BGP routing table entry for 172.16.1.0/24, version 28
Paths: (1 available, best #1, table default)
  Advertised to update-groups:
    2
  Refresh Epoch 7
  100, (aggregated by 100 172.16.11.1), (injected path from 172.16.0.0/16)
    12.1.1.1 from 12.1.1.1 (172.16.11.1)
      origin IGP, metric 0, localpref 100, valid, external, best
      Community: 100:16

```

可以看到明细路由已经继承了汇总路由的 community 属性。

```

R2#show ip bgp injected-path
BGP table version is 29, local router ID is 172.16.1.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop      Metric LocPrf weight Path
  *> 172.16.1.0/24  12.1.1.1          0         0 100 i

```

也可以直接查看条件注入的明细路由 172.16.1.0/24 的来源是 12.1.1.1。