

瞭解OSPF中轉發地址的選擇

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簡介

本檔案將說明在OSPF（開放最短路徑優先）網域中，ASBR（自治系統邊界路由器）為外部LSA（連結狀態通告）選擇轉送位址所使用的概念。

必要條件

需求

本文檔的讀者應瞭解以下主題：

- 基本IP路由。
- OSPF路由協定概念和術語。

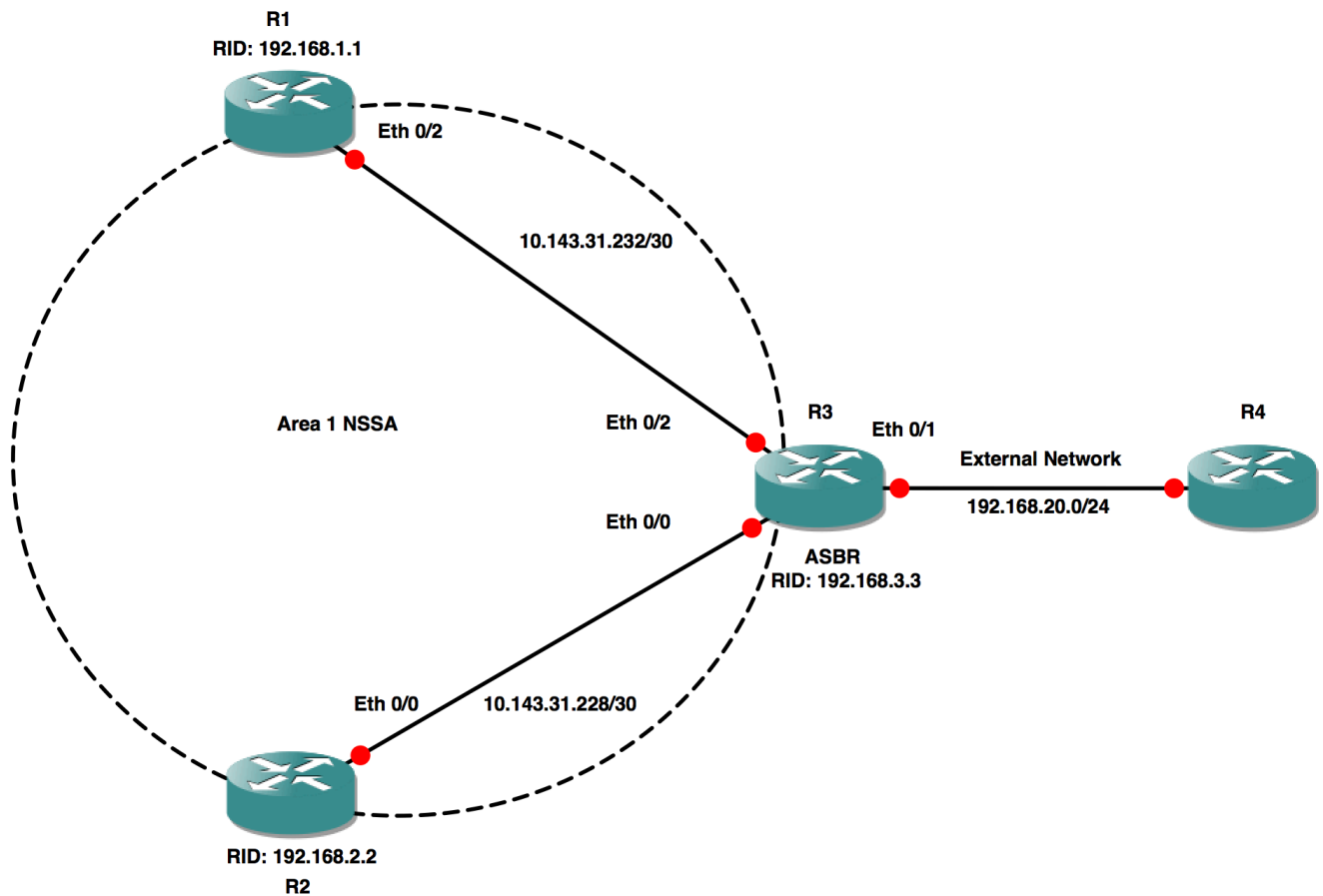
採用元件

本文件所述內容不限於特定軟體和硬體版本。

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

驗證

以下影象將用作文檔其餘部分的示例拓撲。



R3正在使用路由對映將網路192.168.20.0/24重分發到OSPF NSSA (非純末梢區域)。您可以使用任何將路由重分發到OSPF域的方法。

R3的相關配置：

```
router ospf 1
router-id 192.168.3.3
area 1 nssa
redistribute connected metric-type 1 subnets route-map CONN
network 10.143.31.0 0.0.0.255 area 1
```

```
route-map CONN, permit, sequence 10
Match clauses:
interface Ethernet0/1
Set clauses:
Policy routing matches: 0 packets, 0 bytes
```

```
interface Ethernet0/1
ip address 192.168.20.1 255.255.255.0
```

OSPF

R1#sh ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.3.3	0	FULL/ -	00:00:38	10.143.31.234	Ethernet0/2

R2#sh ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
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```
192.168.3.3      0    FULL/ -          00:00:36    10.143.31.230    Ethernet0/0
```

```
R3#sh ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.1.1	0	FULL/ -	00:00:34	10.143.31.233	Ethernet0/2
192.168.2.2	0	FULL/ -	00:00:30	10.143.31.229	Ethernet0/0

如果檢視R1和R2上外部路由「192.168.20.0」的度量，您會發現在R1上看到度量為30，在R2上看到度量為40。即使它們以相同的方式連線到R3，兩者也存在差異。

```
R1#sh ip route 192.168.20.0
Routing entry for 192.168.20.0/24
  Known via "ospf 1", distance 110, metric 30, type NSSA extern 1
  Last update from 10.143.31.234 on Ethernet0/2, 00:00:31 ago
  Routing Descriptor Blocks:
  * 10.143.31.234, from 192.168.3.3, 00:00:31 ago, via Ethernet0/2
    Route metric is 30, traffic share count is 1
```

```
R2#sh ip route 192.168.20.0
Routing entry for 192.168.20.0/24
  Known via "ospf 1", distance 110, metric 40, type NSSA extern 1
  Last update from 10.143.31.230 on Ethernet0/0, 00:00:26 ago
  Routing Descriptor Blocks:
  * 10.143.31.230, from 192.168.3.3, 00:00:26 ago, via Ethernet0/0
    Route metric is 40, traffic share count is 1
```

R1和R2上此字首的LSA資訊：

```
R1#sh ip ospf database nssa-external

      OSPF Router with ID (192.168.1.1) (Process ID 1)

      Type-7 AS External Link States (Area 1)

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 334
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.20.0 (External Network Number )
Advertising Router: 192.168.3.3
LS Seq Number: 80000003
Checksum: 0xA0E3
Length: 36
Network Mask: /24
  Metric Type: 1 (Comparable directly to link state metric)
  MTID: 0
  Metric: 20
  Forward Address: 10.143.31.234
  External Route Tag: 0
```

```
R2#sh ip ospf database nssa-external

      OSPF Router with ID (192.168.2.2) (Process ID 1)

      Type-7 AS External Link States (Area 1)
```

```

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 352
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.20.0 (External Network Number )
Advertising Router: 192.168.3.3
LS Seq Number: 80000003
Checksum: 0xA0E3
Length: 36
Network Mask: /24
  Metric Type: 1 (Comparable directly to link state metric)
  MTID: 0
  Metric: 20
  Forward Address: 10.143.31.234
  External Route Tag: 0

```

您可以看到，第7類LSA的轉發地址在R1和R2上相同。此外，此轉發地址屬於R3和R1之間的介面。此轉發地址對於R1是直接連線的，但是對於R2，可以通過R3到達。這意味著對於R2，轉發地址是額外的一跳。

如果R3選擇R3和R2之間鏈路的IP地址作為轉發地址，則R1上會出現類似的情況。

使用以下規則在ASBR上選擇轉發地址：

1. 如果區域中配置了環回，則會選擇環回的IP地址作為轉發地址。
2. 如果不滿足第一個條件，則選擇OSPF介面清單上第一個介面的IP地址作為轉發地址。您可以使用「show ip ospf interface brief」命令檢視OSPF介面清單。頂部介面是連線到OSPF的最後一個介面。

```

R3#sh ip ospf interface brief
Interface      PID   Area          IP Address/Mask    Cost   State Nbrs F/C
Et0/2        1    1            10.143.31.234/30  10    P2P  1/1
Et0/0          1     1             10.143.31.230/30  10     P2P   1/1

```

Et0/2顯示在「show ip ospf interface brief」的頂部，這就是選擇其IP地址作為轉發地址的原因。

將Et0/0的配置更改為預設配置會使其從OSPF分離。再次新增配置會將其連線回OSPF。在此之後，Et0/0將列在「show ip ospf interface brief」輸出的頂部。

```

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
R3(config)#default interface e0/0
Interface Ethernet0/0 set to default configuration

*Aug  3 11:25:47.625: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.2 on Ethernet0/0 from FULL to
DOWN, Neighbor Down: Interface down or detached

R3(config)#interface Ethernet0/0
R3(config-if)# ip address 10.143.31.230 255.255.255.252
R3(config-if)# ip ospf network point-to-point
R3(config-if)#end

R3#*Aug  3 11:26:03.995: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.2 on Ethernet0/0 from LOADING
to FULL, Loading Done

```

```
R3#sh ip ospf interface brief
```

Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C
Et0/0	1	1	10.143.31.230/30	10	P2P	1/1	
Et0/2	1	1	10.143.31.234/30	10	P2P	1/1	

此更改將導致轉發地址重新計算為Et0/0上配置的IP地址的地址。

```
R1#sh ip ospf database nssa-external
```

```
OSPF Router with ID (192.168.1.1) (Process ID 1)
```

```
Type-7 AS External Link States (Area 1)
```

```
Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 284
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.20.0 (External Network Number )
Advertising Router: 192.168.3.3
LS Seq Number: 80000004
Checksum: 0x6621
Length: 36
Network Mask: /24
Metric Type: 1 (Comparable directly to link state metric)
MTID: 0
Metric: 20
Forward Address: 10.143.31.230
External Route Tag: 0
```

```
R2#sh ip ospf database nssa-external
```

```
OSPF Router with ID (192.168.2.2) (Process ID 1)
```

```
Type-7 AS External Link States (Area 1)
```

```
Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 303
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.20.0 (External Network Number )
Advertising Router: 192.168.3.3
LS Seq Number: 80000004
Checksum: 0x6621
Length: 36
Network Mask: /24
Metric Type: 1 (Comparable directly to link state metric)
MTID: 0
Metric: 20
Forward Address: 10.143.31.230
External Route Tag: 0
```

現在，「show ip route」的輸出將顯示到達R1上外部路由的度量是40,R2上是30。這與前面的輸出相反。

```
R1#sh ip route 192.168.20.0
```

```
Routing entry for 192.168.20.0/24
```

```
Known via "ospf 1", distance 110, metric 40, type NSSA extern 1
Last update from 10.143.31.234 on Ethernet0/2, 00:06:14 ago
```

Routing Descriptor Blocks:

```
* 10.143.31.234, from 192.168.3.3, 00:06:14 ago, via Ethernet0/2
  Route metric is 40, traffic share count is 1
```

```
R2#sh ip route 192.168.20.0
```

```
Routing entry for 192.168.20.0/24
```

```
Known via "ospf 1", distance 110, metric 30, type NSSA extern 1
```

```
Last update from 10.143.31.230 on Ethernet0/0, 00:06:29 ago
```

```
Routing Descriptor Blocks:
```

```
* 10.143.31.230, from 192.168.3.3, 00:06:29 ago, via Ethernet0/0
  Route metric is 30, traffic share count is 1
```

這種更改可能是不可預測的，並且會導致網路收斂，因此建議使用環回IP地址作為轉發地址。

```
R3(config)#int lo0
```

```
R3(config-if)#ip address 192.168.3.3 255.255.255.255
```

```
R3(config-if)#router ospf 1
```

```
R3(config-router)#network 192.168.3.3 0.0.0.0 area 1
```

```
R3(config-router)#end
```

這也會導致R1和R2上的度量相等：

```
R1#sh ip ospf database nssa-external
```

```
OSPF Router with ID (192.168.1.1) (Process ID 1)
```

```
Type-7 AS External Link States (Area 1)
```

```
Routing Bit Set on this LSA in topology Base with MTID 0
```

```
LS age: 1
```

```
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
```

```
LS Type: AS External Link
```

```
Link State ID: 192.168.20.0 (External Network Number )
```

```
Advertising Router: 192.168.3.3
```

```
LS Seq Number: 80000005
```

```
Checksum: 0x872F
```

```
Length: 36
```

```
Network Mask: /24
```

```
  Metric Type: 1 (Comparable directly to link state metric)
```

```
  MTID: 0
```

```
  Metric: 20
```

```
  Forward Address: 192.168.3.3
```

```
  External Route Tag: 0
```

```
R1#sh ip route 192.168.20.0
```

```
Routing entry for 192.168.20.0/24
```

```
Known via "ospf 1", distance 110, metric 31, type NSSA extern 1
```

```
Last update from 10.143.31.234 on Ethernet0/2, 00:01:27 ago
```

```
Routing Descriptor Blocks:
```

```
* 10.143.31.234, from 192.168.3.3, 00:01:27 ago, via Ethernet0/2
  Route metric is 31, traffic share count is 1
```

```
R2#sh ip ospf database nssa-external
```

```
OSPF Router with ID (192.168.2.2) (Process ID 1)
```

```
Type-7 AS External Link States (Area 1)
```

```
Routing Bit Set on this LSA in topology Base with MTID 0
```

```
LS age: 6
Options: (No TOS-capability, Type 7/5 translation, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.20.0 (External Network Number )
Advertising Router: 192.168.3.3
LS Seq Number: 80000005
Checksum: 0x872F
Length: 36
Network Mask: /24
  Metric Type: 1 (Comparable directly to link state metric)
  MTID: 0
  Metric: 20
  Forward Address: 192.168.3.3
  External Route Tag: 0
```

```
R2#sh ip route 192.168.20.0
Routing entry for 192.168.20.0/24
  Known via "ospf 1", distance 110, metric 31, type NSSA extern 1
  Last update from 10.143.31.230 on Ethernet0/0, 00:01:57 ago
  Routing Descriptor Blocks:
  * 10.143.31.230, from 192.168.3.3, 00:01:57 ago, via Ethernet0/0
    Route metric is 31, traffic share count is 1
```

附註：有關外部LSA的非零轉發地址的詳細資訊，請參閱[OSPF轉發地址的常見路由問題](#)。