OSPF中具有重疊子網的外部LSA

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簡介

開放最短路徑優先(OSPF)協定將其鏈路狀態通告(LSA)儲存在OSPF資料庫中。本文檔介紹Cisco IOS®軟體如何處理重疊的OSPF外部（型別5）LSA。

您應該熟悉OSPF LSA，因為它們在Cisco路由器上的Cisco IOS軟體中使用。有關IP定址的基本知識也很有幫助。

> **附註**：輸出直譯器工具(僅供已註冊客戶使用)支援某些**show**命令。使用輸出直譯器工具來檢視**show**命令輸出的分析。

外部LSA的輸出

OSPF外部LSA包含從其他路由進程匯入到OSPF的資訊。以下是OSPF外部LSA的輸出示例。

```
R1#sh ip ospf database external 192.168.1.0

            OSPF Router with ID (10.0.12.1) (Process ID 1)

        Type-5 AS External Link States

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 924
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
Link State ID: 192.168.1.0 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000003
Checksum: 0x29D4
Length: 36
Network Mask: /24
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
```

```
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0
```

在本示例中，OSPF使用鏈路狀態ID（與外部網路號相同）來區分不同的外部LSA。

範例 1：具有相同外部網路編號的兩個不同路由

使用不同的路由協定匯入到OSPF的不同掩碼時，可以使用相同的網路號。也就是說，兩個不同的路由可以具有相同的網路編號但具有不同的掩碼。

```
R1#sh ip route ospf
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override
The gateway of last resort is not set.

     10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
O         10.1.23.0/24 [110/20] via 10.1.12.2, 00:24:06, Ethernet0/0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
O E2      192.168.1.0/24 [110/1] via 10.1.12.2, 00:20:57, Ethernet0/0
O E2      192.168.1.0/25 [110/1] via 10.1.12.2, 00:00:11, Ethernet0/0
```

在本示例中，OSPF必須在其資料庫中安裝兩個LSA。為此，OSPF會將下一個接收的LSA安裝為其廣播號碼，而不是其網路號碼。

```
R1#sh ip ospf database external

            OSPF Router with ID (10.0.12.1) (Process ID 1)

        Type-5 AS External Link States

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 53
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.0 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000003
Checksum: 0x29D4
Length: 36
 Network Mask: /24
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 428
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.127 (External Network Number )  <----Broadcast Number
of 192.168.1.0/25
```

```
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x35CA
Length: 36
 Network Mask: /25
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0
```

示例2:LSA已撤銷

在本示例中，LSA 192.168.1.0/24被撤銷。一旦此LSA丟失，其他LSA(192.168.1.0/25)不會與其網路號一起安裝，而是與廣播號一起安裝。

```
R1#sh ip ospf database external

            OSPF Router with ID (10.0.12.1) (Process ID 1)

        Type-5 AS External Link States

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 1066
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.127 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x35CA
Length: 36
 Network Mask: /25
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0
```

示例3：收到新的LSA

在本範例中，收到新的LSA(192.168.1.0/26)。

```
R1#sh ip ospf database external

            OSPF Router with ID (10.0.12.1) (Process ID 1)

        Type-5 AS External Link States

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 51
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.0 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x2DD2
Length: 36
```

```
 Network Mask: /24
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 7
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.63 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x39C6
Length: 36
 Network Mask: /26
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 1198
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.127 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x35CA
Length: 36
 Network Mask: /25
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0
```

示例4:LSA已撤銷且收到新的LSA

在本示例中，LSA 192.168.1.0/24被撤消，並收到新的LSA(192.168.1.0/26)。新的LSA取代撤銷的LSA，OSPF可以使用其網路號安裝新的LSA。

```
R1#sh ip ospf database external

           OSPF Router with ID (10.0.12.1) (Process ID 1)

       Type-5 AS External Link States

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 2
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.0 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000003
Checksum: 0xAD8F
Length: 36
 Network Mask: /26
```

```
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0

Routing Bit Set on this LSA in topology Base with MTID 0
LS age: 1362
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
 Link State ID: 192.168.1.127 (External Network Number )
Advertising Router: 10.1.23.2
LS Seq Number: 80000001
Checksum: 0x35CA
Length: 36
 Network Mask: /25
 Metric Type: 2 (Larger than any link state path)
 MTID: 0
 Metric: 1
 Forward Address: 10.1.23.3
 External Route Tag: 0
```

Cisco IOS軟體嘗試安裝LSA作為其網路號。例如，如果網路號已安裝了不同的掩碼，則可能無法執行此操作。在這種情況下，Cisco IOS軟體會將新收到的LSA安裝為其廣播號碼，而不是其網路號碼。