

OSPF中子网重叠的外部LSA

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简介

开放最短路径优先(OSPF)协议将其链路状态通告(LSA)存储在OSPF数据库中。本文档介绍Cisco IOS®^软件如何处理重叠的OSPF外部 (第5类) LSA。

您应该熟悉OSPF LSA，因为OSPF LSA在Cisco路由器的Cisco IOS软件中使用。IP编址的基本知识也很有帮助。

注意： [命令输出解释程序工具 \(仅限注册用户\) 支持某些 show 命令](#)。使用输出解释器工具来查看 show 命令输出的分析。

外部LSA的输出

OSPF外部LSA包含从其他路由进程导入到OSPF的信息。这是OSPF外部LSA的输出示例。

```
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
```

在本例中，OSPF使用链路状态ID（与外部网络号相同）来区分不同的外部LSA。

示例 1：具有相同外部网络号的两条不同路由

可以使用从不同路由协议导入到OSPF的不同掩码使用相同的网络号。也就是说，两个不同的路由可以具有相同的网络号，但掩码不同。

```
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
```

在本例中，OSPF必须在其数据库中安装两个LSA。为此，OSPF会将下一个收到的LSA安装为其广播号，而不是网络号。

```
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已撤消

在本例中，LSA 192.168.1.0/24被撤消。一旦此LSA丢失，其他LSA(192.168.1.0/25)将不安装其网络号，而安装广播号。

```
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已撤销并收到新LSA

在本例中，LSA 192.168.1.0/24被撤销，并且收到新的LSA(192.168.1.0/26)。新的LSA将取代撤销的LSA，OSPF可以使用其网络号安装新的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软件尝试将LSA安装为其网络号。例如，如果网络号已使用不同的掩码安装，则可能无法执行此操作。在这种情况下，Cisco IOS软件将新接收的LSA安装为其广播号，而不是网络号。