

OSPF不是那麼末梢區域第7類到第5類鏈路狀態通告轉換

目錄

- [簡介](#)
- [必要條件](#)
- [需求](#)
- [採用元件](#)
- [慣例](#)
- [設定](#)
- [網路圖表](#)
- [組態](#)
- [驗證](#)
- [檢查OSPF資料庫](#)
- [疑難排解](#)
- [相關資訊](#)

簡介

本文說明開放最短路徑優先(OSPF)如何將第7類非純末梢區域(NSSA)鏈路狀態通告(LSA)轉換為第5類LSA。

必要條件

需求

本文件沒有特定需求。

採用元件

本文件所述內容不限於特定軟體和硬體版本。

慣例

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

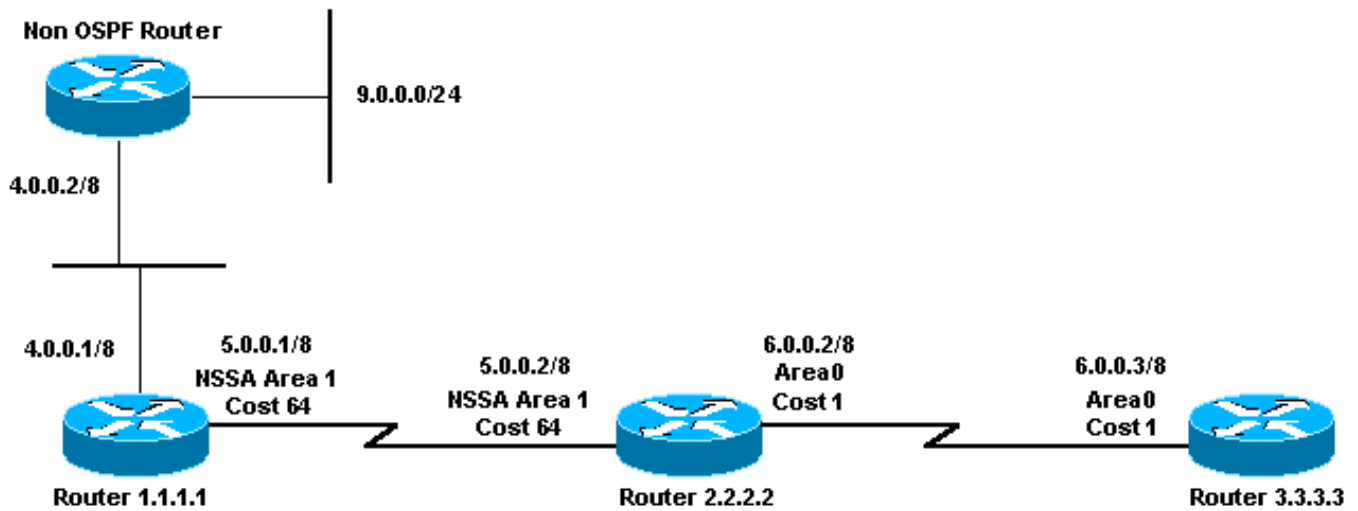
設定

本節提供用於設定本文件中所述功能的資訊。

注意：要查詢有關本文檔中使用的命令的其他資訊，請使用[命令查詢工具](#)([僅限註冊客戶](#))。

網路圖表

本檔案會使用下圖中所示的網路設定。



組態

本文檔使用此處顯示的配置。

- [路由器1.1.1.1](#)
- [路由器2.2.2.2](#)
- [路由器3.3.3.3](#)

路由器1.1.1.1

Current configuration:

```
hostname r1.1.1.1

interface Loopback0
 ip address 1.1.1.1 255.0.0.0

interface Serial2/1/0
 ip address 5.0.0.1 255.0.0.0

interface Ethernet2/0/0
 ip address 4.0.0.1 255.0.0.0

router ospf 4
 redistribute static metric 5 metric-type 1
 network 5.0.0.0 0.255.255.255 area 1
 network 4.0.0.0 0.255.255.255 area 1
 area 1 nssa

ip route 9.0.0.0 255.0.0.0 4.0.0.2

end
```

路由器2.2.2.2

```
Current configuration:

hostname r2.2.2.2

interface Loopback0
 ip address 2.2.2.2 255.0.0.0

interface Serial0/1/0
 ip address 5.0.0.2 255.0.0.0

interface ATM1/0.20
 ip address 6.0.0.2 255.0.0.0

router ospf 2
 network 5.0.0.0 0.255.255.255 area 1
 network 6.0.0.0 0.255.255.255 area 0
 area 1 nssa

end
```

路由器3.3.3.3

```
Current configuration:

hostname r3.3.3.3

interface Loopback0
 ip address 3.3.3.3 255.0.0.0

interface ATM2/0.20 point-to-point
 ip address 6.0.0.3 255.0.0.0

router ospf 2
 network 6.0.0.0 0.255.255.255 area 0

end
```

驗證

本節提供的資訊可用於確認您的組態是否正常運作。

[輸出直譯器工具](#)(僅供註冊客戶使用)支援某些show命令，此工具可讓您檢視show命令輸出的分析。

- [show ip ospf database](#) — 顯示LSA清單並將其鍵入鏈路狀態資料庫。此清單僅顯示LSA報頭中的資訊。
- [show ip ospf database nssa-external](#) — 僅顯示有關NSSA外部LSA的資訊。
- [show ip ospf database external](#) — 僅顯示關於外部LSA的資訊。
- [show ip ospf database \[router\] \[link-state-id\]](#) — 顯示資料庫中路由器的所有LSA的清單。LSA由每台路由器生成，這些基本LSA列出所有路由器的鏈路或介面，以及鏈路的狀態和傳出成本。它們只被淹沒在它們的源頭地區。
- [show ip ospf database summary <link-state id>](#) — 顯示區域邊界路由器(ABR)摘要鏈路。
- [show ip route](#) — 顯示路由表的當前狀態。

檢查OSPF資料庫

要檢視給定此網路環境的OSPF資料庫外觀，請使用show ip ospf database命令。

```
r2.2.2.2#show ip ospf database
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Router Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
2.2.2.2	2.2.2.2	1235	0x8000001D	0xD9FF	2
3.3.3.3	3.3.3.3	1100	0x8000000B	0x9455	2

```
Summary Net Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum
4.0.0.0	2.2.2.2	1979	0x80000002	0xFDE7
5.0.0.0	2.2.2.2	1483	0x80000004	0x8864

```
Router Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
1.1.1.1	1.1.1.1	319	0x8000000C	0xAFA8	3
2.2.2.2	2.2.2.2	220	0x8000002F	0xD478	2

```
Summary Net Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum
6.0.0.0	2.2.2.2	1483	0x8000001C	0x7894

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

Link ID	ADV Router	Age	Seq#	Checksum	Tag
9.0.0.0	1.1.1.1	334	0x80000005	0xD738	0

```
Type-5 AS External Link States
```

Link ID	ADV Router	Age	Seq#	Checksum	Tag
9.0.0.0	2.2.2.2	1725	0x80000004	0x50C6	0

要將外部路由通告到NSSA，自治系統邊界路由器(ASBR)會建立nssa外部LSA (型別7)。

```
r2.2.2.2#show ip ospf database nssa-external 9.0.0.0
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

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

```
Routing Bit Set on this LSA
```

```
LS age: 381
```

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

```
!--- This can be translated into a type 5 LSA by !--- an ABR. LS Type: AS External Link Link State ID: 9.0.0.0 (External Network Number ) !--- The ASBR (Router 1.1.1.1) advertises !--- 9.0.0.0/8. Advertising Router: 1.1.1.1 !--- Router ID of the ASBR. LS Seq Number: 80000005 Checksum: 0xD738 Length: 36 Network Mask: /8 Metric Type: 1 (Comparable directly to link state metric) TOS: 0 Metric: 5 Forward Address: 4.0.0.1 !--- Forwarding address is incorrectly specified !--- as an interface on the ASBR.
```

ABR將第7類LSA轉換為第5類LSA，並將第5類LSA傳播到正常區域。

```
r2.2.2.2#show ip ospf database external 9.0.0.0
```

OSPF Router with ID (2.2.2.2) (Process ID 2)

Type-5 AS External Link States

LS age: 1782

Options: (No TOS-capability, DC)

LS Type: AS External Link

Link State ID: 9.0.0.0 (External Network Number)

!--- Router 2.2.2.2 advertises 9.0.0.0/8. Advertising Router: 2.2.2.2 !--- When the conversion is complete, the advertising !--- router ID becomes the ABR router ID !--- because the ABR originates this type 5 LSA. LS Seq Number: 80000004 Checksum: 0x50C6 Length: 36 Network Mask: /8 Metric Type: 1 (Comparable directly to link state metric) TOS: 0 Metric: 5 Forward Address: 4.0.0.1 External Route Tag: 0 r2.2.2.2#**show ip ospf database router 1.1.1.1**

OSPF Router with ID (2.2.2.2) (Process ID 2)

Router Link States (Area 1)

Routing Bit Set on this LSA

LS age: 426

Options: (No TOS-capability, DC)

LS Type: Router Links

Link State ID: 1.1.1.1

!--- For router links, Link State ID is always the same !--- as the advertising router (next line). Advertising Router: 1.1.1.1 LS Seq Number: 8000000C Checksum: 0xAFA8 Length: 60 AS Boundary Router !--- Bit E in the router LSA indicates that this router !--- originates from external LSAs. Number of Links: 3 !--- There are three links in area 1. Link connected to: a Stub Network !--- This represents the Ethernet segment 4.0.0.0/8. (Link ID) Network/subnet number: 4.0.0.0 (Link Data) Network Mask: 255.0.0.0 Number of TOS metrics: 0 TOS 0 Metrics: 10 !--- The OSPF cost of the Ethernet segment. Link connected to: another Router (point-to-point) !--- Shows that Router 1.1.1.1 is a neighbor with !--- Router 2.2.2.2. (Link ID) Neighboring Router ID: 2.2.2.2 (Link Data) Router Interface address: 5.0.0.1 !--- The interface address that connects to Router !--- 2.2.2.2 is 5.0.0.1. Number of TOS metrics: 0 TOS 0 Metrics: 64 !--- The OSPF cost of the link that connects !--- the two routers. Link connected to: a Stub Network !--- This represents the serial link 5.0.0.0/8. (Link ID) Network/subnet number: 5.0.0.0 (Link Data) Network Mask: 255.0.0.0 Number of TOS metrics: 0 TOS 0 Metrics: 64 !--- The OSPF cost of the serial link.

從這裡的**bold**輸出可以看到，儘管Router 2.2.2.2的組態中沒有任何**redistribute**陳述式，但它仍是ASBR，因為它將第7類LSA轉換為第5類LSA。

r2.2.2.2#**show ip ospf database router 2.2.2.2**

OSPF Router with ID (2.2.2.2) (Process ID 2)

Router Link States (Area 0)

LS age: 1361

Options: (No TOS-capability, DC)

LS Type: Router Links

Link State ID: 2.2.2.2

Advertising Router: 2.2.2.2

LS Seq Number: 8000001D

Checksum: 0xD9FF

Length: 48

Area Border Router

*!--- Bit B is set in the router LSA to indicate !--- that this router is an ABR. **AS Boundary Router***
!--- Bit E in the router LSA indicates that this router !--- originates from external LSAs. Number of Links: 2 *!--- There are two links in area 0.* Link connected to: another Router (point-to-point) (Link ID) Neighboring Router ID: 3.3.3.3 (Link Data) Router Interface address: 6.0.0.2 Number of TOS metrics: 0 TOS 0 Metrics: 1 Link connected to: a Stub Network (Link ID) Network/subnet number: 6.0.0.0 (Link Data) Network Mask: 255.0.0.0 Number of TOS metrics: 0 TOS

```
0 Metrics: 1 Router Link States (Area 1) LS age: 346 Options: (No TOS-capability, DC) LS Type:
Router Links Link State ID: 2.2.2.2 Advertising Router: 2.2.2.2 LS Seq Number: 8000002F
Checksum: 0xD478 Length: 48 Area Border Router AS Boundary Router Number of Links: 2 Link
connected to: another Router (point-to-point) (Link ID) Neighboring Router ID: 1.1.1.1 (Link
Data) Router Interface address: 5.0.0.2 Number of TOS metrics: 0 TOS 0 Metrics: 64 Link
connected to: a Stub Network (Link ID) Network/subnet number: 5.0.0.0 (Link Data) Network Mask:
255.0.0.0 Number of TOS metrics: 0 TOS 0 Metrics: 64 r2.2.2.2#show ip ospf database router
3.3.3.3
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Router Link States (Area 0)
```

```
LS age: 1245
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 3.3.3.3
Advertising Router: 3.3.3.3
LS Seq Number: 8000000B
Checksum: 0x9455
Length: 48
Number of Links: 2
```

```
Link connected to: another Router (point-to-point)
(Link ID) Neighboring Router ID: 2.2.2.2
(Link Data) Router Interface address: 6.0.0.3
Number of TOS metrics: 0
TOS 0 Metrics: 1
```

```
Link connected to: a Stub Network
(Link ID) Network/subnet number: 6.0.0.0
(Link Data) Network Mask: 255.0.0.0
Number of TOS metrics: 0
TOS 0 Metrics: 1
```

要將路由從一個區域通告到另一個區域，ABR會建立彙總LSA（型別3）。

```
r2.2.2.2#show ip ospf database summary 4.0.0.0
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Summary Net Link States (Area 0)
```

```
LS age: 172
Options: (No TOS-capability, DC)
LS Type: Summary Links(Network)
Link State ID: 4.0.0.0 (summary Network Number)
!--- The ABR (Router 2.2.2.2) advertises !--- 4.0.0.0/8 into area 0. Advertising Router:
2.2.2.2 LS Seq Number: 80000003 Checksum: 0xFBE8 Length: 28 Network Mask: /8 TOS: 0 Metric: 74
r2.2.2.2#show ip ospf database summary 5.0.0.0
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Summary Net Link States (Area 0)
```

```
LS age: 1687
Options: (No TOS-capability, DC)
LS Type: Summary Links(Network)
Link State ID: 5.0.0.0 (summary Network Number)
!--- The ABR (Router 2.2.2.2) advertises !--- 5.0.0.0/8 into area 0. Advertising Router:
2.2.2.2 LS Seq Number: 80000004 Checksum: 0x8864 Length: 28 Network Mask: /8 TOS: 0 Metric: 64
r2.2.2.2#show ip ospf database summary 6.0.0.0
```

OSPF Router with ID (2.2.2.2) (Process ID 2)

Summary Net Link States (Area 1)

LS age: 1697

Options: (No TOS-capability, DC)

LS Type: Summary Links(Network)

Link State ID: 6.0.0.0 (summary Network Number)

!--- The ABR (Router 2.2.2.2) advertises !--- 6.0.0.0/8 into area 1. Advertising Router:

2.2.2.2 LS Seq Number: 8000001C Checksum: 0x7894 Length: 28 Network Mask: /8 TOS: 0 Metric: 1

在本例中，不需要ASBR彙總LSA，因為ABR建立外部LSA，並且可以在區域0內訪問ABR。通過檢視資料庫示例[OSPF如何將外部路由傳播到多個區域](#)，將此示例與NSSA是正常區域的場景進行比較。

此路由表輸出顯示9.0.0.0稱為每台路由器的OSPF路由的不同型別。

```
r1.1.1.1#show ip route 9.0.0.0
```

```
Routing entry for 9.0.0.0/8
```

```
Known via "static", distance 1, metric 0
```

```
Redistributing via ospf 4
```

```
Advertised by ospf 4 metric 5 metric-type 1
```

```
Routing Descriptor Blocks:
```

```
* 4.0.0.2
```

```
Route metric is 0, traffic share count is 1
```

```
r2.2.2.2#show ip route ospf
```

```
O 4.0.0.0/8 [110/74] via 5.0.0.1, 01:10:13, Serial0/1/0
```

```
O N1 9.0.0.0/8 [110/79] via 5.0.0.1, 01:07:20, Serial0/1/0
```

```
R3.3.3.3#show ip route ospf
```

```
O IA 4.0.0.0/8 [110/75] via 6.0.0.2, 02:11:14, ATM2/0.20
```

```
O IA 5.0.0.0/8 [110/65] via 6.0.0.2, 03:10:41, ATM2/0.20
```

```
O E1 9.0.0.0/8 [110/80] via 6.0.0.2, 02:08:11, ATM2/0.20
```

[疑難排解](#)

目前尚無適用於此組態的具體疑難排解資訊。

[相關資訊](#)

- [OSPF如何將外部路由傳播到多個區域](#)
- [OSPF資料庫說明指南](#)
- [OSPF技術支援](#)
- [IP 路由支援頁面](#)
- [技術支援與文件 - Cisco Systems](#)