

疑難排解開放最短路徑優先路由資料庫相關問題

目錄

[簡介](#)

[必要條件](#)

[需求](#)

[採用元件](#)

[慣例](#)

[背景資訊](#)

[原因1：網路型別不匹配](#)

[解決方案](#)

[原因2：雙串列鏈路設定中的地址分配錯誤](#)

[解決方案](#)

[原因3：錯誤的主網或子網中包含點對點鏈路的一端](#)

[原因4：一側未編號，另一側已編號](#)

[解決方案](#)

[原因5：全網狀幀中繼環境中的PVC斷開](#)

[原因6：通過外部路由已知的轉發地址](#)

[原因7：路由被分發清單阻止](#)

[解決方案](#)

[相關資訊](#)

簡介

本文說明當資料庫中的路由不在路由資訊庫 (RIB) 或路由表中時，如何修復 OSPF 問題。

必要條件

需求

本文檔的讀者必須瞭解以下主題：

- 開放最短路徑優先(OSPF)協定的基本知識
- Cisco IOS®中的OSPF配置基礎知識

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- Cisco IOS軟體版本12及更新版本
- 所有思科路由器平台都支援此功能

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。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

慣例

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

背景資訊

本文描述開放最短路徑優先(OSPF)的一個常見問題，即資料庫中的路由不會出現在路由資訊庫(RIB)或路由表中。在大多數情況下，OSPF會發現資料庫中的差異，因此不會在路由表中安裝路由。通常，當發生此問題時，您會在資料庫的鏈路狀態通告(LSA)上看到Adv Router is not-reachable消息（這意味著通告LSA的路由器無法通過OSPF到達）。以下是範例：

```
<#root>
```

```
Router#
```

```
show ip ospf database router 172.16.32.2
```

```
Adv Router is not-reachable
```

```
LS age: 418
```

```
Options: (No TOS-capability, DC)
```

```
LS Type: Router Links
```

```
Link State ID: 172.16.32.2
```

```
Advertising Router: 172.16.32.2
```

```
LS Seq Number: 80000002
```

```
Checksum: 0xFA63
```

```
Length: 60
```

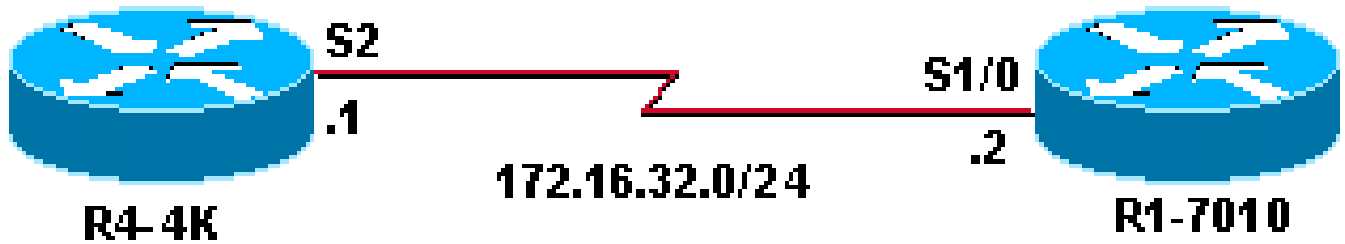
```
Number of Links: 3
```

造成此問題的原因有多種，其中大多數的原因都是配置錯誤或拓撲斷開。更正配置後，OSPF資料庫差異消失，路由顯示在路由表中。本文檔解釋了可能導致資料庫中存在差異的一些更常見原因。

本文檔中用於驗證OSPF行為的一些命令包括show ip ospf interface、show ip ospf database router、show ip ospf neighbor和show ip ospf database external。如果您的Cisco裝置輸出了這些命令中的任意一個，則可以使用[Cisco CLI Analyzer](#)顯示潛在的問題和解決方法。

原因1：網路型別不匹配

下一個網路圖用作示例：



R4-4K	R1-7010
<pre><#root> interface Loopback0 ip address 172.16.33.1 255.255.255.255 ! interface Serial2 ip address 172.16.32.1 255.255.255.0 ip ospf network broadcast ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>	<pre>interface Loopback0 ip address 172.16.30.1 255.255.255.255 ! interface Serial1/0 ip address 172.16.32.2 255.255.255.0 clockrate 64000 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>

<#root>

R4-4K(4)#

show ip ospf interface serial 2

Serial2 is up, line protocol is up
 Internet Address 172.16.32.1/24, Area 0
 Process ID 20, Router ID 172.16.33.1,

Network Type BROADCAST

, Cost: 64
 Transmit Delay is 1 sec, State DR, Priority 1
 Designated Router (ID) 172.16.33.1, Interface address 172.16.32.1
 Backup Designated router (ID) 172.16.32.2, Interface address 172.16.32.2
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:08
 Neighbor Count is 1, Adjacent neighbor count is 1
 Adjacent with neighbor 172.16.32.2 (Backup Designated Router)
 Suppress hello for 0 neighbor(s)

R1-7010(5)#

show ip ospf interface serial 1/0

Serial1/0 is up, line protocol is up
 Internet Address 172.16.32.2/24, Area 0
 Process ID 20, Router ID 172.16.32.2,

```
Network Type POINT_TO_POINT
```

```
, Cost: 64  
Transmit Delay is 1 sec, State POINT_TO_POINT,  
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5  
Hello due in 00:00:02  
Neighbor Count is 1, Adjacent neighbor count is 1  
Adjacent with neighbor 172.16.33.1  
Suppress hello for 0 neighbor(s)
```

如前面的輸出所示，路由器R4-4K配置為廣播，路由器R1-7010配置為點對點。這種網路型別不相符會導致廣告路由器無法連線。

```
<#root>
```

```
R4-4K(4)#
```

```
show ip ospf database router 172.16.32.2
```

```
Adv Router is not-reachable
```

```
LS age: 418  
Options: (No TOS-capability, DC)  
LS Type: Router Links  
Link State ID: 172.16.32.2
```

```
Advertising Router
```

```
: 172.16.32.2  
LS Seq Number: 80000002  
Checksum: 0xFA63  
Length: 60  
Number of Links: 3
```

```
Link connected to: another Router (point-to-point)
```

```
(Link ID) Neighboring Router ID: 172.16.33.1  
(Link Data) Router Interface address: 172.16.32.2  
Number of TOS metrics: 0  
TOS 0 Metrics: 64
```

```
Link connected to: a Stub Network  
(Link ID) Network/subnet number: 172.16.32.0  
(Link Data) Network Mask: 255.255.255.0  
Number of TOS metrics: 0  
TOS 0 Metrics: 64
```

```
R1-7010(5)#
```

```
show ip ospf database router 172.16.33.1
```

```
Adv Router is not-reachable
```

```
LS age: 357
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 172.16.33.1

Advertising Router: 172.16.33.1

LS Seq Number: 8000000A
Checksum: 0xD4AA
Length: 48
Number of Links: 2
```

```
Link connected to: a Transit Network
```

```
(Link ID) Designated Router address: 172.16.32.1
(Link Data) Router Interface address: 172.16.32.1
Number of TOS metrics: 0
TOS 0 Metrics: 64
```

您可以看到，對於子網172.16.32.0/24，路由器R1-7010生成一條點對點鏈路，路由器R4-4K生成一條傳輸鏈路。這會導致鏈路狀態資料庫中存在不一致，這意味著路由表中未安裝任何路由。

```
<#root>
```

```
R1-7010(5)#
```

```
show ip route
```

```
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.16.32.0/24 is directly connected, Serial1/0
C       172.16.30.1/32 is directly connected, Loopback0
```

解決方案

要解決此問題，請將兩台路由器配置為同一網路型別。您可以將路由器R1-7010的網路型別更改為廣播，或者將路由器R4-4K串列介面更改為點對點。



註：如果出現一端是多點介面而另一端是子介面的情況，請將網路型別更改為兩端廣播。

在本示例中，我們刪除了R4-4K上的network-type broadcast語句，因為兩端都是點對點高級資料鏈路控制(HDLC)封裝的介面。

```
<#root>
```

```
R4-4K(4)#
```

```
configure terminal
```

```
R4-4K(4)(config)#
```

```
interface serial 2
```

```

R4-4K(4)(config-if)#
no ip ospf network broadcast
R4-4K(4)(config-if)#
end

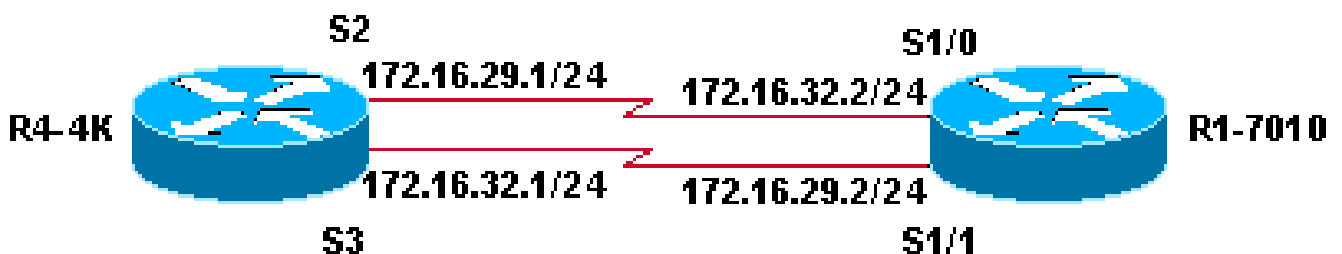
R4-4K(4)#
show ip ospf interface serial 2

Serial2 is up, line protocol is up
Internet Address 172.16.32.1/24, Area 0
Process ID 20, Router ID 172.16.33.1,
Network Type POINT_TO_POINT
, Cost: 64
Transmit Delay is 1 sec, State POINT_TO_POINT,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:04
Neighbor Count is 1, Adjacent neighbor count is 1
Adjacent with neighbor 172.16.32.2
Suppress hello for 0 neighbor(s)

```

原因2：雙串列鏈路設定中的地址分配錯誤

請考慮以下網路圖作為範例：



R4-4K	R1-7010
<pre> interface loopback 0 ip address 172.16.35.1 255.255.255.255 ! interface Serial2 ip address 172.16.29.1 255.255.255.0 ! interface Serial3 ip address 172.16.32.1 255.255.255.0 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0 </pre>	<pre> interface loopback 0 ip address 172.16.30.1 255.255.255.255 ! interface Serial1/0 ip address 172.16.32.2 255.255.255.0 clockrate 64000 ! interface Serial1/1 ip address 172.16.29.2 255.255.255.0 clockrate 38400 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0 </pre>

--	--

您可以看到，IP地址在以前的配置中發生翻轉，導致OSPF資料庫中存在差異。但是，這些路由器仍然在Cisco IOS版本12.1之前形成鄰居，因為在點對點鏈路上，OSPF路由器不會驗證相鄰路由器是否位於同一子網中。

<#root>

R4-4K(4)#

show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.32.2	1	FULL/ -	00:00:37	172.16.32.2	Serial2
172.16.32.2	1	FULL/ -	00:00:31	172.16.29.2	Serial3

從上面的輸出中，您可以看到Serial2用於形成IP地址為172.16.32.2的鄰居，該鄰居不在同一個子網中。雖然形成了鄰居，但路由表中未安裝任何路由：

<#root>

R1-7010(5)#

show ip route

```
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.16.32.0/24 is directly connected, Serial1/0
C       172.16.29.0/24 is directly connected, Serial1/1
C       172.16.30.1/32 is directly connected, Loopback0
```

解決方案

要解決此問題，請正確分配IP地址或交換串列電纜。我們已更正以下IP地址：

R4-4K	R1-7010
<pre>interface loopback 0 ip address 172.16.35.1 255.255.255.255 ! interface Serial2 ip address 172.16.32.1 255.255.255.0 ! interface Serial3 ip address 172.16.29.1 255.255.255.0 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>	<pre>interface loopback 0 ip address 172.16.30.1 255.255.255.255 ! interface Serial1/0 ip address 172.16.32.2 255.255.255.0 clockrate 64000 ! interface Serial1/1 ip address 172.16.29.2 255.255.255.0 clockrate 38400 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>

--	--

<#root>

R4-4K(4)#

show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.32.2	1	FULL/ -	00:00:36	172.16.32.2	Serial2
172.16.32.2	1	FULL/ -	00:00:39	172.16.29.2	Serial3

現在它顯示了Serial 2介面的正確鄰居地址。路由表也包含這些路由：

<#root>

R1-7010(5)#

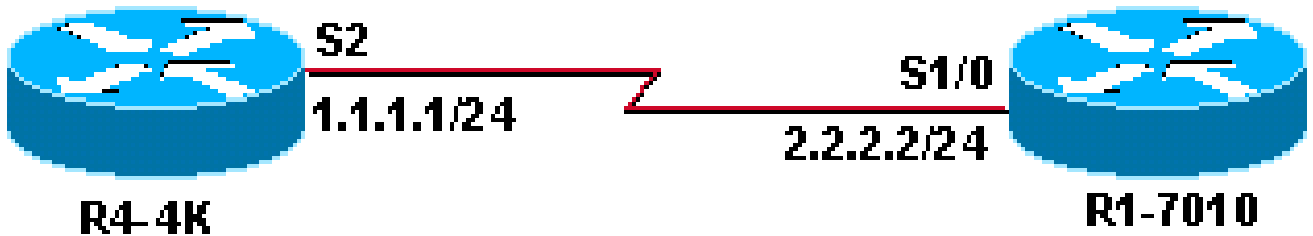
show ip route

```
172.16.0.0/16 is variably subnetted, 4 subnets, 2 masks
C       172.16.32.0/24 is directly connected, Serial1/0
O       172.16.35.1/32 [110/65] via 172.16.32.1, 00:03:12, Serial1/0

[110/65] via 172.16.29.1, 00:03:12, Serial1/1
C       172.16.29.0/24 is directly connected, Serial1/1
C       172.16.30.1/32 is directly connected, Loopback0
```

原因3：錯誤的主網或子網中包含點對點鏈路的一端

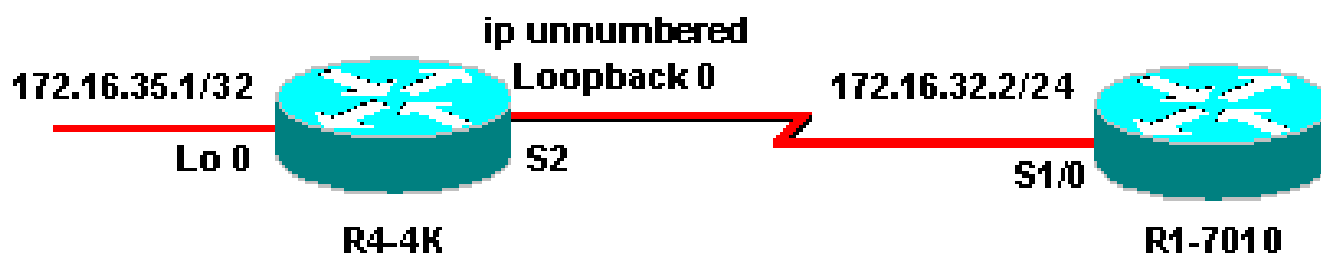
請考慮以下網路圖作為範例：



這種情況產生的行為與雙串列鏈路設定中的[錯誤地址分配完全相同](#)。要解決此問題，請在兩台路由器上分配同一子網中的IP地址。

原因4：一側未編號，另一側已編號

請考慮下一個網路圖作為範例：



R4-4K	R1-7010
<pre><#root> interface Loopback0 ip address 172.16.35.1 255.255.255.255 ! interface Serial2 ip unnumbered Loopback0 router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>	<pre>interface Loopback0 ip address 172.16.30.1 255.255.255.255 ! interface Serial1/0 ip address 172.16.32.2 255.255.255.0 clockrate 64000 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>

```
<#root>
```

```
R4-4K(4)#
```

```
show interface serial 2
```

```
Serial2 is up, line protocol is up
  Hardware is cxBus Serial
```

```
Interface is unnumbered.  Using address of Loopback0
```

```
(172.16.35.1)
```

```
R1-7010(5)#
```

```
show interface serial 1/0
```

```
Serial1/0 is up, line protocol is up
  Hardware is cxBus Serial
```

```
Internet address is 172.16.32.2/24
```

先前的輸出顯示，R4-4K Serial 2介面未編號為Loopback0（使用Loopback0 172.16.35.1的地址），而R1-7010的Serial 1/0介面為編號介面。

```
<#root>
```

```
R4-4K(4)#
```

```
show ip ospf interface serial 2
```

```
Serial2 is up, line protocol is up  
Internet Address
```

```
0.0.0.0/24
```

```
, Area 0  
Process ID 20, Router ID 172.16.35.1,
```

```
Network Type
```

```
POINT_TO_POINT, Cost: 64  
Transmit Delay is 1 sec, State POINT_TO_POINT,  
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5  
Hello due in 00:00:02  
Neighbor Count is 1, Adjacent neighbor count is 1  
Adjacent with neighbor 172.16.32.2  
Suppress hello for 0 neighbor(s)
```

```
R1-7010(5)#
```

```
show ip ospf interface serial 1/0
```

```
Serial1/0 is up, line protocol is up  
Internet Address 172.16.32.2/24, Area 0  
Process ID 20, Router ID 172.16.32.2,
```

```
Network Type
```

```
POINT_TO_POINT, Cost: 64  
Transmit Delay is 1 sec, State POINT_TO_POINT,  
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5  
Hello due in 00:00:02  
Neighbor Count is 1, Adjacent neighbor count is 1  
Adjacent with neighbor 172.16.33.1  
Suppress hello for 0 neighbor(s)
```

正如前面所看到的，這兩種情況中的network-type都是點對點的。問題是一端未編號，而另一端未編號，這樣會在資料庫中產生差異，如下所示。

```
<#root>
```

```
R4-4K(4)#
```

```
show ip ospf database router 172.16.30.1
```

```
OSPF Router with ID (172.16.35.1) (Process ID 20)  
Router Link States (Area 0)  
LS age: 202  
Options: (No TOS-capability, DC)  
LS Type: Router Links  
Link State ID: 172.16.30.1  
Advertising Router: 172.16.30.1  
LS Seq Number: 80000002  
Checksum: 0xC899  
Length: 60
```

```
Number of Links: 3
Link connected to: another Router (point-to-point)
(Link ID) Neighboring Router ID: 172.16.35.1
(Link Data) Router Interface address: 172.16.32.2
Number of TOS metrics: 0
TOS 0 Metrics: 64
Link connected to: a Stub Network
(Link ID) Network/subnet number: 172.16.32.0
(Link Data) Network Mask: 255.255.255.0
Number of TOS metrics: 0
TOS 0 Metrics: 64
Link connected to: a Stub Network
(Link ID) Network/subnet number: 172.16.30.1
(Link Data) Network Mask: 255.255.255.255
Number of TOS metrics: 0
TOS 0 Metrics: 1
```

```
R1-7010(5)#
```

```
show ip ospf database router 172.16.35.1
```

```
OSPF Router with ID (172.16.30.1) (Process ID 20)
Router Link States (Area 0)
Adv Router is not-reachable
LS age: 396
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 172.16.35.1
Advertising Router: 172.16.35.1
LS Seq Number: 80000003
Checksum: 0xBEA1
Length: 48
Number of Links: 2
Link connected to: another Router (point-to-point)
(Link ID) Neighboring Router ID: 172.16.30.1
```

```
(Link Data) Router Interface address: 0.0.0.3
```

!--- In case of an unnumbered link we use MIB-II IfIndex value which usually starts with 0.

```
Number of TOS metrics: 0
TOS 0 Metrics: 64
Link connected to: a Stub Network
(Link ID) Network/subnet number: 172.16.35.1
(Link Data) Network Mask: 255.255.255.255
Number of TOS metrics: 0
TOS 0 Metrics: 1
```

```
R1-7010(5)#
```

您可以看到，R1-7010使用包含其介面地址的Link Data欄位為此點對點鏈路生成LSA，而R4-4K使用包含MIB-II IfIndex值的Link Data欄位為同一鏈路生成LSA([RFC 2328](#))。這會導致鏈路狀態資料庫中存在不一致，這意味著路由表中未安裝任何路由。

```
<#root>
```

```
R1-7010(5)#
```

```
show ip route
```

```
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks  
C       172.16.32.0/24 is directly connected, Serial1/0  
C       172.16.30.1/32 is directly connected, Loopback0
```

解決方案

要解決此問題，請將兩台路由器的串列介面配置為已編號或未編號。在本例中，我們對路由器R4-4K的串列2介面進行了編號。

```
<#root>
```

```
R4-4K(4)#
```

```
configure terminal
```

```
R4-4K(4)(config)#
```

```
interface serial 2
```

```
R4-4K(4)(config-if)#
```

```
no ip unnumbered loopback 0
```

```
R4-4K(4)(config-if)#
```

```
ip address 172.16.32.1 255.255.255.0
```

```
R4-4K(4))#
```

```
show ip ospf interface serial 2
```

```
Serial2 is up, line protocol is up  
Internet Address 172.16.32.1/24, Area 0  
Process ID 20, Router ID 172.16.33.1,
```

```
Network Type
```

```
POINT_TO_POINT, Cost: 64  
Transmit Delay is 1 sec, State POINT_TO_POINT,  
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5  
Hello due in 00:00:02  
Neighbor Count is 1, Adjacent neighbor count is 1  
Adjacent with neighbor 172.16.32.2  
Suppress hello for 0 neighbor(s)
```

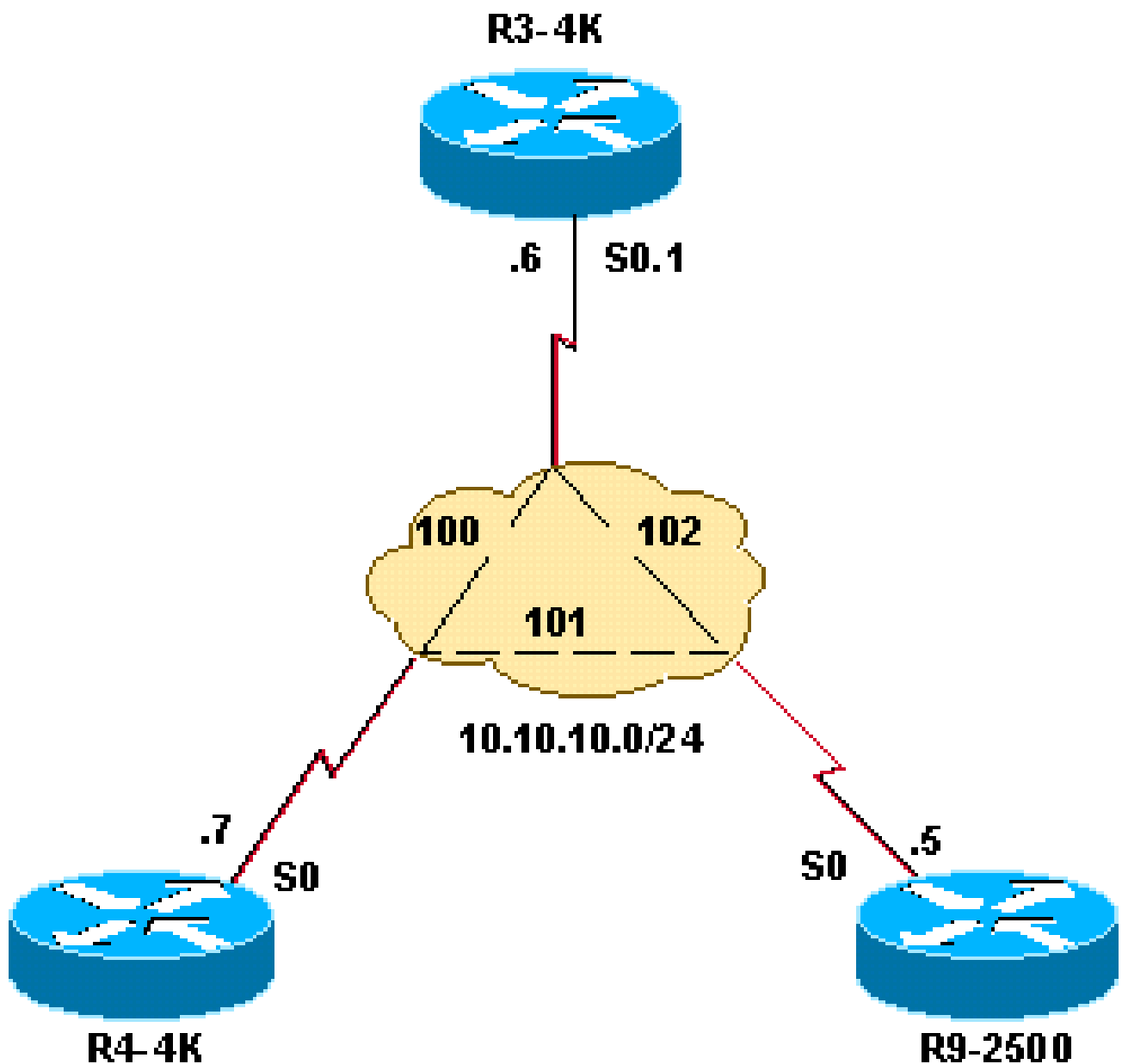
```
R1-7010(5)#
```

```
show ip route
```

```
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks  
C       172.16.32.0/24 is directly connected, Serial1/0  
O       172.16.33.1/32 [110/65] via 172.16.32.1, 00:03:08, Serial1/0  
C       172.16.30.1/32 is directly connected, Loopback0
```

原因5：全網狀幀中繼環境中的PVC斷開

請考慮以下網路圖作為範例：



R9-2500

```
interface Loopback0
ip address 10.50.50.50 255.255.255.255
!
interface Serial0
ip address 10.10.10.5 255.255.255.0
encapsulation frame-relay
ip ospf network broadcast
frame-relay map ip 10.10.10.6 102 broadcast
```

```
frame-relay map ip 10.10.10.7 101 broadcast
!  
router ospf 10  
network 10.10.10.0 0.0.0.255 area 0  
network 10.50.50.0 0.0.0.255 area 0
```

R4-4K

```
interface Loopback0  
ip address 10.70.70.70 255.255.255.255  
!  
interface Serial0  
ip address 10.10.10.7 255.255.255.0  
encapsulation frame-relay  
ip ospf network broadcast  
frame-relay map ip 10.10.10.5 101 broadcast  
frame-relay map ip 10.10.10.6 100 broadcast  
!  
router ospf 10  
network 10.10.10.0 0.0.0.255 area 0  
network 10.70.70.0 0.0.0.255 area 0
```

R3-4K

```
interface Loopback0  
ip address 10.60.60.60 255.255.255.255  
!  
interface Serial0  
no ip address  
encapsulation frame-relay  
!  
interface Serial0.1 multipoint  
ip address 10.10.10.6 255.255.255.0  
ip ospf network broadcast  
frame-relay map ip 10.10.10.5 102 broadcast  
frame-relay map ip 10.10.10.7 100 broadcast  
!  
router ospf 10  
network 10.10.10.0 0.0.0.255 area 0  
network 10.60.60.0 0.0.0.255 area 0
```

只要幀中繼網雲是全網狀的，幀中繼上的廣播模型就可以正常工作。如果任何永久虛擬電路(PVC)損壞，它可能會在OSPF資料庫中出現問題，從而產生Adv路由器無法訪問消息。

在本示例中，R9-2500和R4-4K之間的PVC斷開，通往指定路由器(DR)的R9-2500鏈路斷開。因此，R9-2500宣告來自R3-4K (不是DR) 的所有LSA不可達。您可以看到，R9-2500不會為連線到R3-4K的串列介面生成傳輸鏈路；而是生成末節鏈路，因為對於R9-2500而言，此鏈路上沒有DR。

```
<#root>
```

```
R9-2500(3)#
```

```
show ip ospf database router
```

```
        OSPF Router with ID (10.50.50.50) (Process ID 10)  
          Router Link States (Area 0)
```

```
LS age: 148  
Options: (No TOS-capability, DC)  
LS Type: Router Links  
Link State ID: 10.50.50.50  
Advertising Router: 10.50.50.50  
LS Seq Number: 8000000B  
Checksum: 0x55A  
Length: 48  
Number of Links: 2
```

```
Link connected to: a Stub Network  
(Link ID) Network/subnet number: 10.10.10.0  
(Link Data) Network Mask: 255.255.255.0  
Number of TOS metrics: 0  
TOS 0 Metrics: 64
```

```
Link connected to: a Stub Network  
(Link ID) Network/subnet number: 10.50.50.50  
(Link Data) Network Mask: 255.255.255.255  
Number of TOS metrics: 0  
TOS 0 Metrics: 1
```

```
Adv Router is not-reachable
```

```
LS age: 1081  
Options: (No TOS-capability, DC)  
LS Type: Router Links  
Link State ID: 10.60.60.60  
Advertising Router: 10.60.60.60  
LS Seq Number: 80000006  
Checksum: 0x4F72  
Length: 48  
Number of Links: 2
```

```
Link connected to: a Stub Network  
(Link ID) Network/subnet number: 10.60.60.60  
(Link Data) Network Mask: 255.255.255.255  
Number of TOS metrics: 0  
TOS 0 Metrics: 1
```

```
Link connected to: a Transit Network  
(Link ID) Designated Router address: 10.10.10.7  
(Link Data) Router Interface address: 10.10.10.6  
Number of TOS metrics: 0  
TOS 0 Metrics: 64
```

Adv Router is not-reachable

LS age: 306
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 10.70.70.70
Advertising Router: 10.70.70.70
LS Seq Number: 80000007
Checksum: 0xC185
Length: 48
Number of Links: 2

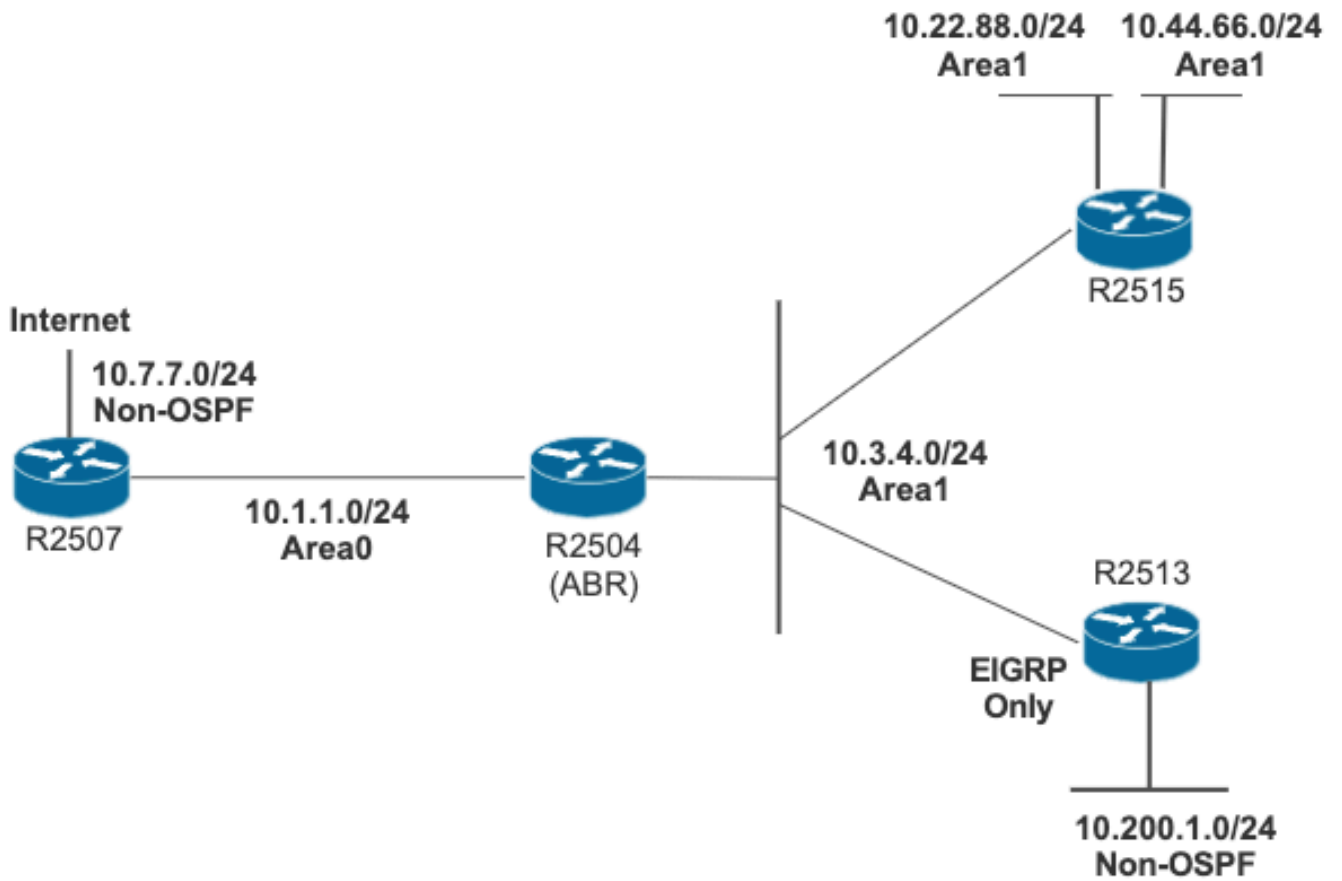
Link connected to: a Stub Network
(Link ID) Network/subnet number: 10.70.70.70
(Link Data) Network Mask: 255.255.255.255
Number of TOS metrics: 0
TOS 0 Metrics: 1

Link connected to: a Transit Network
(Link ID) Designated Router address: 10.10.10.7
(Link Data) Router Interface address: 10.10.10.7
Number of TOS metrics: 0
TOS 0 Metrics: 64

有關此問題的詳細資訊，請參閱[幀中繼上的NBMA和廣播模式中的OSPF問題](#)。

原因6：通過外部路由已知的轉發地址

請考慮以下網路圖作為範例：



R2507

```

interface GigabitEthernet0/0
 ip address 10.1.1.1 255.255.255.0
!
interface GigabitEthernet0/1
 ip address 10.7.7.1 255.255.255.0
!
router ospf 1
 network 10.1.1.1 0.0.0.0 area 0
 default-information originate metric 20
!
ip route 0.0.0.0 0.0.0.0 10.7.7.2

```

R2504

```
interface GigabitEthernet0/0
 ip address 10.1.1.2 255.255.255.0
!
interface GigabitEthernet0/1
 ip address 10.3.4.2 255.255.255.0
!
router ospf 1
 network 10.1.1.0 0.0.0.255 area 0
 network 10.0.0.0 0.255.255.255 area 1
 area 1 range 10.0.0.0 255.0.0.0
```

R2515

```
interface GigabitEthernet0/0
 ip address 10.3.4.3 255.255.255.0
!
interface GigabitEthernet0/2
 ip address 10.44.66.3 255.255.255.0
!
interface GigabitEthernet0/3
 ip address 10.22.88.3 255.255.255.0
!
router ospf 1
 redistribute eigrp 1 metric 20 subnets
 network 0.0.0.0 255.255.255.255 area 1
!
router eigrp 1
 network 10.3.4.0 0.0.0.255
```

R2513

```
interface GigabitEthernet0/0
 ip address 10.3.4.4 255.255.255.0
!
interface GigabitEthernet0/1
 ip address 10.200.1.4 255.255.255.0
!
router eigrp 1
 network 10.3.4.0 0.0.0.255
 network 10.200.1.0 0.0.0.255
```

<#root>

R2507#

```
show ip ospf database external 10.200.1.0
```

OSPF Router with ID (10.7.7.1) (Process ID 1)

Type-5 AS External Link States

```
LS age: 954
Options: (No TOS-capability, DC, Upward)
LS Type: AS External Link
Link State ID: 10.200.1.0 (External Network Number )
Advertising Router: 10.44.66.3
LS Seq Number: 80000007
Checksum: 0x46EF
Length: 36
Network Mask: /24
    Metric Type: 2 (Larger than any link state path)
    MTID: 0
    Metric: 20
    Forward Address:
```

10.3.4.4

External Route Tag: 0

R2507的資料庫中包含10.200.1.0/24，但它尚未將其安裝在路由表中，因為通過OSPF外部路由獲知10.3.4.4。

<#root>

R2507#

```
show ip route 10.3.4.4
```

Routing entry for

10.3.4.0/24

Known via "ospf 1", distance 110, metric 20,

type extern 2

, forward metric 70


Redistributing via ospf 1

Last update from 10.1.1.2 on GigabitEthernet0/0, 00:00:40 ago

Routing Descriptor Blocks:

* 10.1.1.2, from 10.44.66.3, 00:00:40 ago, via GigabitEthernet0/0

Route metric is 20, traffic share count is 1

 注意：在此案例中，通過外部路由獲知轉發地址的原因在於下一個警告。在修復「Cisco bug ID [CSCdp72526](#)」(僅限註冊客戶) 後，OSPF不會生成重疊外部網路的5類鏈路狀態通告 (LSA)；因此，R2507僅顯示10.0.0.0/8的區域間總結路由。然後，R2507會安裝帶有轉發地址的10.200.1.0/24，並且可以通過區域間路由10.0.0.0/8到達，因此符合RFC 2328。

修正提及的錯誤後，輸出如下所示：

<#root>

R2507#

```
show ip route 10.3.4.4
```

```
Routing entry for
```

```
10.0.0.0/8
```

```
Known via "ospf 1", distance 110, metric 2,
```

```
type inter area
```

```
Last update from 10.1.1.2 on GigabitEthernet0/0, 00:01:02 ago
```

```
Routing Descriptor Blocks:
```

```
* 10.1.1.2, from 10.3.4.2, 00:01:02 ago, via GigabitEthernet0/0  
Route metric is 2, traffic share count is 1
```

```
R2507#
```

```
show ip route
```

```
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  
a - application route  
+ - replicated route, % - next hop override, p - overrides from PfR
```

```
Gateway of last resort is 10.7.7.2 to network 0.0.0.0
```

```
S* 0.0.0.0/0 [1/0] via 10.7.7.2
```

```
10.0.0.0/8 is variably subnetted, 6 subnets, 3 masks
```

```
O IA 10.0.0.0/8 [110/2] via 10.1.1.2, 00:01:41, GigabitEthernet0/0
```

```
C 10.1.1.0/24 is directly connected, GigabitEthernet0/0
```

```
L 10.1.1.1/32 is directly connected, GigabitEthernet0/0
```

```
C 10.7.7.0/24 is directly connected, GigabitEthernet0/1
```

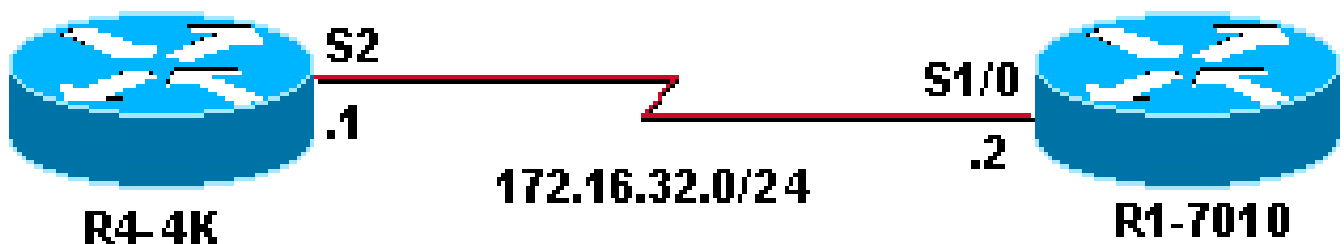
```
L 10.7.7.1/32 is directly connected, GigabitEthernet0/1
```

```
O E2 10.200.1.0/24 [110/20] via 10.1.1.2, 03:30:47, GigabitEthernet0/0
```

如果轉發地址也通過外部路由得知，OSPF不會將該路由安裝到路由表中。有關此問題的更多詳細資訊，請參閱[OSPF轉發地址的常見路由問題](#)。

原因7：路由被分發清單阻止

下一個網路圖用作示例：



R4-4K	R1-7010
<pre>interface Loopback0 ip address 172.16.33.1 255.255.255.255 ! interface Serial2 ip address 172.16.32.1 255.255.255.0 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0</pre>	<pre>interface Loopback0 ip address 172.16.30.1 255.255.255.255 ! interface Serial1/0 ip address 172.16.32.2 255.255.255.0 clockrate 64000 ! router ospf 20 network 172.16.0.0 0.0.255.255 area 0 distribute-list 1 in ! access-list 1 permit 172.16.32.0. 0.0.0.255</pre>

如前所述，R1-7010配置了distribute-list命令，它僅允許在路由表中安裝172.16.32.0/24地址範圍。在鏈路狀態協定中，您實際上無法使用distribute-list命令篩選LSA。LSA仍存在於資料庫中；但是LSA未安裝在路由表中。

<#root>

R1-7010(5)#

show ip ospf database router 172.16.33.1

```
LS age: 357
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 172.16.33.1
```

Advertising Router: 172.16.33.1

```
LS Seq Number: 8000000A
Checksum: 0xD4AA
Length: 48
Number of Links: 3
```

Link connected to: another Router (point-to-point)

(Link ID) Neighboring Router ID: 172.16.32.2

```
(Link Data) Router Interface address: 172.16.32.1
Number of TOS metrics: 0
TOS 0 Metrics: 64
```

R1-7010上的distribute-list配置命令過濾172.16.33.1/32網路並阻止將子網安裝到路由表中。

<#root>

R1-7010(5)#

show ip route

172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks

```
C      172.16.32.0/24 is directly connected, Serial1/0
C      172.16.30.1/32 is directly connected, Loopback0
```

解決方案

要解決此問題，請在訪問控制清單(ACL)中配置R1-7010並允許172.16.33.0/24，以便將此網路安裝到路由表中。

```
<#root>
```

```
R1-7010(5)#
```

```
configure terminal
```

```
R1-7010(5)(config)#
```

```
access-list 1 permit 172.16.33.0 0.0.0.255
```

```
R1-7010(5)(config)#
```

```
end
```

```
R1-7010(5)#
```

```
show ip access-list 1
```

```
Standard IP access list 1
```

```
    permit 172.16.32.0, wildcard bits 0.0.0.255
```

```
    permit 172.16.33.0, wildcard bits 0.0.0.255
```

```
R1-7010(5)#
```

```
show ip route
```

```
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
```

```
C      172.16.32.0/24 is directly connected, Serial1/0
```

```
O      172.16.33.1/32 [110/65] via 172.16.32.1, 00:00:08, Serial1/0
```

```
C      172.16.30.1/32 is directly connected, Loopback0
```

相關資訊

- [OSPF 支援頁面](#)
- [思科技術支援和下載](#)

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。