

在幀中繼上的NBMA和廣播模式下運行OSPF的問題

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簡介

本技術說明解釋了在全網狀幀中繼環境中，出現在鏈路狀態資料庫中、而不是路由表中的OSPF路由問題。有關更多方案，請參閱[為什麼某些OSPF路由位於資料庫中，而不是路由表？](#)

必要條件

需求

本文檔的讀者應瞭解以下主題：

- OSPF
- 框架轉送

採用元件

本文件所述內容不限於特定軟體和硬體版本。但是本檔案中的組態會使用以下軟體和硬體版本進行測試和更新：

- Cisco 2500系列路由器
- Cisco IOS[®]版本12.2(24a)

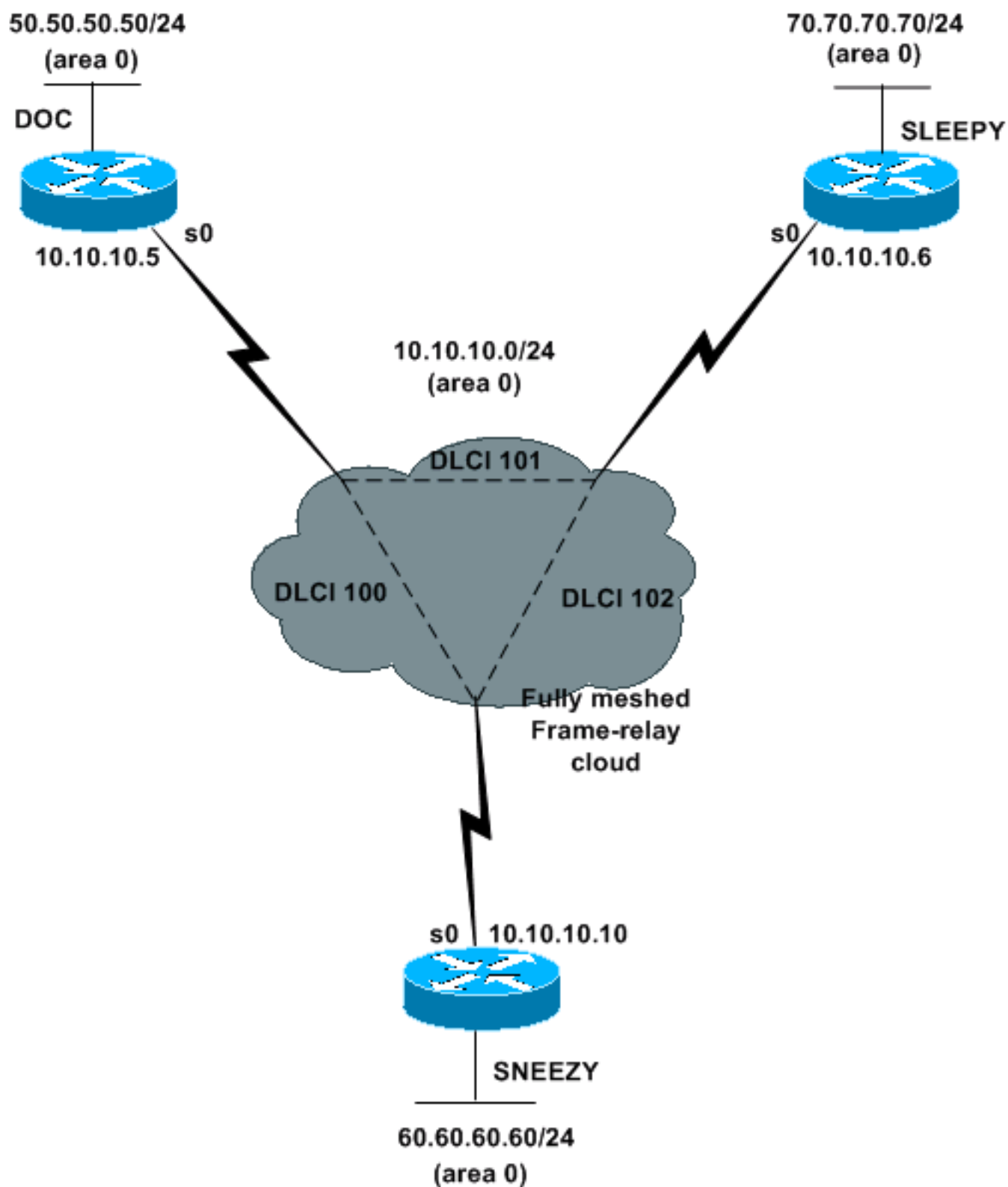
本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

慣例

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

背景理論

以下示例使用全網狀幀中繼環境。網路圖和配置如下所示：



文檔

```
interface Ethernet0
ip address 50.50.50.50 255.255.255.0
```

```
interface Serial0
  encapsulation frame-relay
  !--- Enables Frame Relay encapsulation on the interface.
interface Serial0.1 multipoint !--- The subinterface is
configured as a multipoint link. ip address 10.10.10.5
255.255.255.0 ip ospf network broadcast !--- This
command is used to define the network type as broadcast.
!--- The network type is defined on nonbroadcast
networks to !--- avoid configuring the neighbors
explicitly. frame-relay map ip 10.10.10.6 101 broadcast
frame-relay map ip 10.10.10.10 100 broadcast !--- To
define the mapping between a destination protocol
address !--- and the data-link connection identifier
(DLCI) used to !--- connect to the destination address.
!--- The broadcast keyword is used to forward broadcasts
to !--- this address when broadcast/multicast is !---
disabled because of non-broadcast medium. router ospf 1
network 0.0.0.0 255.255.255.255 area 0
```

咽倦

```
interface Ethernet0
  ip address 70.70.70.70 255.255.255.0

interface Serial0
  encapsulation frame-relay
  !--- Enables Frame Relay encapsulation on the interface.
interface Serial0.1 multipoint !--- The subinterface is
configured as a multipoint link. ip address 10.10.10.6
255.255.255.0 ip ospf network broadcast !--- This
command is used to define the network type as broadcast.
!--- The network type is defined on nonbroadcast
networks to !--- avoid configuring the neighbors
explicitly. frame-relay map ip 10.10.10.5 101 broadcast
frame-relay map ip 10.10.10.10 102 broadcast !--- To
define the mapping between a destination protocol
address !--- and the DLCI used to connect to the
destination address. !--- The broadcast keyword is used
to forward broadcasts to !--- this address when
broadcast/multicast is !--- disabled because of non-
broadcast medium. router ospf 1 network 0.0.0.0
255.255.255.255 area 0
```

噴嚏

```
interface Ethernet0
  ip address 60.60.60.60 255.255.255.0

interface Serial0
  encapsulation frame-relay
  !--- Enables Frame Relay encapsulation on the interface.
interface Serial0.1 multipoint !--- The subinterface is
configured as a multipoint link. ip address 10.10.10.10
255.255.255.0 ip ospf network broadcast !--- This
command is used to define the network type as broadcast.
!--- The network type is defined on nonbroadcast
networks to !--- avoid configuring the neighbors
explicitly. frame-relay map ip 10.10.10.5 100 broadcast
frame-relay map ip 10.10.10.6 102 broadcast !--- To
define the mapping between a destination protocol
address !--- and the DLCI used to connect to the
destination address. !--- The broadcast keyword is used
```

```
to forward broadcasts to !--- this address when
broadcast/multicast is !--- disabled because of non-
broadcast medium. router ospf 1 network 0.0.0.0
255.255.255.255 area 0
```

問題

最初，所有路由器的鄰居表中都有所有路由。發生一個事件，導致Doc和Sleepy從各自的鄰居表中相互刪除。從本節中給出的鄰居表中，我們可以看到Doc鄰居表沒有條目70.70.70.70，而Sleepy鄰居表沒有條目50.50.50.50。

文檔鄰居表

```
doc#
show ip ospf neighbor

Neighbor ID Pri State          Dead Time Address
Interface
60.60.60.60 1    FULL/DR      00:00:33 10.10.10.10
Serial0.1
```

睏倦鄰居表

```
sleepy# show ip ospf neighbor

Neighbor ID Pri State          Dead Time Address
Interface
60.60.60.60 1    FULL/BDR     00:00:32 10.10.10.10
Serial0.1
```

Sneezy鄰居表

```
sneezy# show ip ospf neighbor

Neighbor ID Pri State          Dead Time Address
Interface
50.50.50.50 1    FULL/DROTHER 00:00:36 10.10.10.5
Serial0.1
70.70.70.70 1    FULL/DR      00:00:31 10.10.10.6
Serial0.1
```

此外，Doc會丟失其路由表中的所有OSPF路由，Sleepy和Sneezy在其路由表中不再有50.50.50.0（Doc的LAN子網）。

文檔路由表

```
doc#
show ip route

Gateway of last resort is not set
10.0.0.0 255.255.255.0 is subnetted, 1 subnets
C       10.10.10.0 is directly connected, Serial0.1
50.0.0.0 255.255.255.0 is subnetted, 1 subnets
C       50.50.50.0 is directly connected, Ethernet0
```

休眠路由表

```
sleepy# show ip route

Gateway of last resort is not set
10.0.0.0/ 24 is subnetted, 1 subnets
```



```
LS Type: Network Links
Link State ID: 10.10.10.6 (address of Designated
Router)
Advertising Router: 70.70.70.70

Network Mask: 255.255.255.0
Attached Router: 70.70.70.70
Attached Router: 60.60.60.60
```

另一種解釋是，Doc宣佈Sneezy為DR，並期望Sneezy生成網路鏈路狀態。但是，由於Sneezy不是DR，它不會生成網路鏈路狀態，這反過來又不允許Doc在其路由表中安裝任何路由。

文檔鄰居表

```
doc# show ip ospf neighbor

Neighbor ID      Pri   State             Dead Time
Address          Interface
60.60.60.60      1    FULL/DR           00:00:29
10.10.10.10     Serial0.1
```

原因

根據資料庫，幀中繼雲的DR為Sleepy。但是，Sleepy不將Doc視為OSPF鄰居。如本例所示，從Sleepy到Doc的ping失敗：

```
sleepy# ping 10.10.10.5
```

```
Type escape sequence to abort.
Sending 5, 100- byte ICMP Echos to 10.10.10.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/ 5)
```

從Sleepy中的**show frame-relay map**命令的輸出中，我們可以看到，發往Doc的DLCI處於非活動狀態。這就解釋了為什麼Sleepy無法ping通Doc，以及為什麼他們不能將彼此視為鄰居。這是觸發問題的事件：

```
sleepy# show frame-relay map
Serial0.1 (up): ip 10.10.10.5 dlci 101( 0x65,0x1850), static,
                broadcast,
                CISCO, status defined, inactive

Serial0.1 (up): ip 10.10.10.10 dlci 102( 0x66,0x1860), static,
                broadcast,
                CISCO, status defined, active
```

由於Doc和Sleepy之間的分路器(PVC)已斷開，並且Doc到指定路由器(DR)的鏈路已斷開，因此Doc會宣告來自Sneezy (不是DR)的所有LSA均無法訪問。如果幀中繼網雲完全網格化，則通過幀中繼的廣播模型可以正常工作。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，這一點從下面所示的**show ip ospf database router**命令輸出中明顯可見，該命令顯示Adv router is not-reachable消息。

文檔鄰居表

```
doc#
show ip ospf database router
```

OSPF Router with ID (50.50.50.50) (Process ID 1)

Router Link States (Area 0)

LS age: 57
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 50.50.50.50
Advertising Router: 50.50.50.50
LS Seq Number: 800000D4
Checksum: 0x355D
Length: 48
Number of Links: 2

Link connected to: a Transit Network
(Link ID) Designated Router address: 10.10.10.10
(Link Data) Router Interface address: 10.10.10.5
Number of TOS metrics: 0
TOS 0 Metrics: 64

Link connected to: a Stub Network
(Link ID) Network/subnet number: 50.50.50.0
(Link Data) Network Mask: 255.255.255.0
Number of TOS metrics: 0
TOS 0 Metrics: 10

Adv Router is not-reachable

LS age: 367
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 60.60.60.60
Advertising Router: 60.60.60.60
LS Seq Number: 800000C9
Checksum: 0xC865
Length: 48
Number of Links: 2

Link connected to: a Transit Network
(Link ID) Designated Router address: 10.10.10.6
(Link Data) Router Interface address: 10.10.10.10
Number of TOS metrics: 0
TOS 0 Metrics: 64

Link connected to: a Stub Network
(Link ID) Network/subnet number: 60.60.60.0
(Link Data) Network Mask: 255.255.255.0
Number of TOS metrics: 0
TOS 0 Metrics: 10

Adv Router is not-reachable

LS age: 53
Options: (No TOS-capability, DC)
LS Type: Router Links
Link State ID: 70.70.70.70
Advertising Router: 70.70.70.70
LS Seq Number: 800000CA
Checksum: 0xEDD4
Length: 48
Number of Links: 2

Link connected to: a Transit Network

```
(Link ID) Designated Router address: 10.10.10.6
(Link Data) Router Interface address: 10.10.10.6
Number of TOS metrics: 0
  TOS 0 Metrics: 64

Link connected to: a Stub Network
(Link ID) Network/subnet number: 70.70.70.0
(Link Data) Network Mask: 255.255.255.0
Number of TOS metrics: 0
  TOS 0 Metrics: 10
```

解決方案

當您將OSPF配置為在支援廣播或不支援廣播的多路訪問網路上運行時，所有裝置必須能夠直接與指定路由器通訊（至少能夠與指定路由器通訊）。廣播和NBMA模式依賴於幀中繼雲完全網格化。如果永久虛電路(PVC)關閉，雲將不再完全網狀，並且OSPF無法正常工作。

在幀中繼環境中，如果第2層不穩定（如本例所示），我們不建議使用OSPF廣播網路型別。改為使用OSPF點對多點。

相關資訊

- [排除OSPF故障](#)
- [OSPF 設計指南](#)
- [OSPF鄰居問題說明](#)
- [非廣播鏈路上的OSPF初始配置](#)
- [使用幀中繼子介面的OSPF初始配置](#)
- [IP 路由支援頁面](#)
- [OSPF支援頁](#)
- [技術支援與文件 - Cisco Systems](#)