

在帧中继的NBMA和广播模式中运行OSPF的问题

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简介

此技术说明解释OSPF路由问题出现在链路状态数据库，但是不在全网状帧中继环境的路由表里的。关于更多方案，请参阅[为什么是一些OSPF路由在数据库，但是不是路由表里？](#)

先决条件

要求

本文档的读者应掌握以下这些主题的相关知识：

- OSPF
- 帧中继

使用的组件

本文档不限于特定的软件和硬件版本。然而，在本文的配置利用这些软件和硬件版本测试并且更新：

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

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

背景理论

下面的示例使用一个全网状帧中继环境。网络图和配置如下所示：

文档

```
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
```

Sleepy

```
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
```

Sneezy

```
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
```

问题

最初，所有路由器有所有路由在他们的邻居表里。事件发生那造成文档和Sleepy从他们的各自的邻居表互相下降。从在此部分给的邻居表，我们能看到文档邻居表没有条目70.70.70.70，并且困了邻居表没有条目50.50.50.50。

文档邻居表

```
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
```

困了邻居表

```
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邻居表

```
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
```

另外，文档丢失从其路由表的所有OSPF路由，并且Sleepy和Sneezy不再请有50.50.50.0 (Doc的LAN子网)在他们的路由表里。

文档路由表

```
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
```

困了路由表

```
sleepy# show ip route Gateway of last resort is not set
10.0.0.0/ 24 is subnetted, 1 subnets C 10.10.10.0 is
directly connected, Serial0.1 60.0.0.0/ 24 is subnetted,
1 subnets O 60.60.60.0 [110/ 11175] via 10.10.10.10, 00:
07: 25, Serial0.1 70.0.0.0/ 24 is subnetted, 1 subnets C
70.70.70.0 is directly connected, Ethernet0
```

Sneezy路由表

```
sneezy# show ip route Gateway of last resort is not set
10.0.0.0/ 24 is subnetted, 1 subnets C 10.10.10.0 is
directly connected, Serial0.1 60.0.0.0/ 24 is subnetted,
1 subnets C 60.60.60.0 is directly connected, Ethernet0
70.0.0.0/ 24 is subnetted, 1 subnets O 70.70.70.0 [110/
11175] via 10.10.10.6, 00: 07: 53, Serial0.1
```

虽然文档在其路由表里没有任何OSPF路由，我们能从有一个完整OSPF数据库的输出看到在那之下

文档数据库

```
doc# show ip ospf database OSPF Router with ID
(50.50.50.50) (Process ID 1) Router Link States (Area 0)
Link ID ADV Router Age Seq# Checksum Link count
50.50.50.50 50.50.50.50 169 0x80000030 0x3599 2
60.60.60.60 60.60.60.60 1754 0x8000002F 0xD26D 2
70.70.70.70 70.70.70.70 1681 0x8000002D 0xFDD9 2 Net
Link States (Area 0) Link ID ADV Router Age Seq#
Checksum 10.10.10.6 70.70.70.70 569 0x8000002B 0x8246
```

网络连接状态是描述所有路由器附加对网络指定路由器(DR)生成的链路状态。在下面的输出中，我们看到DR不列出文档路由器ID (50.50.50.50)作为连接的路由器，中断广播模型。所以文档不通过帧中继网络安装任何OSPF获知的路由。

网络链路-状态

```
doc# show ip ospf database network 10.10.10.6 Net Link
States (Area 0) 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
```

另一个方式查看此是文档宣称Sneezy作为DR并且盼望Sneezy生成网络连接状态。然而，因为Sneezy不是DR，它不生成网络连接状态，在其路由表里反过来不允许文档安装任何路由。

文档邻居表

```
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

根据数据库，帧中继网云的DR困了。然而，Sleepy看不到文档作为OSPF邻居。如在此示例中看到，ping从Sleepy到文档发生故障：

```
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)
```

从输出[show frame-relay map](#)命令在Sleepy，我们能去文档的DLCI是非激活的。那解释Sleepy为什么不能ping文档，并且他们为什么互相看不到作为邻居。这是触发事件的事件：

```
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
```

由于在文档和Sleepy之间的PVC是残破的，并且对指定路由器(DR)的Doc的链路是残破的，文档宣称从的所有LSA不是DR)的Sneezy (作为不可达的。如果帧中继网云充分地网状连接，在帧中继的广播模型正常运转。如果任何永久虚电路(PVC)是残破的，它能制造在OSPF数据库的问题，从如下所示的[show ip ospf database router](#)命令输出是明显的—哪些显示ADV消息。

文档邻居表

```
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
```

解决方案

当您配置OSPF运行一个支持广播的或非广播，多路访问网络时，所有设备一定能直接地用(在最低)指定路由器连通。广播和NBMA型号依靠充分地网状连接的帧中继网云。如果永久虚拟电路(PVC)断开，网云充分地不再网状连接，并且OSPF未正确地起作用。

在帧中继环境，如果Layer2是不稳定的，正如在我们的示例，我们不推荐OSPF广播网络类型。请使用点对多点的OSPF。

相关信息

- [OSPF 故障排除](#)
- [OSPF 设计指南](#)
- [Cisco - 了解 OSPF 邻居问题](#)
- [基于非广播型链路的 OSPF 的初始配置](#)
- [帧中继子接口上的 OSPF 初始配置](#)
- [IP 路由支持页](#)
- [OSPF 支持页](#)
- [技术支持和文档 - Cisco Systems](#)