

# IS-IS 网络类型和帧中继接口

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## 简介

在中间系统对中间系统(IS-IS)协议，有两种网络类型：点到点和广播。不同于开放最短路径优先(OSPF)协议，IS-IS没有其他网络类型类似非广播和点对多点。对于每种网络类型，不同种IS-IS hello (IIH)数据包被交换设立邻接。在点对点网络，点对点IIH交换;并且在广播网络(例如LAN)，1级或2级LAN IIH交换。运行IS-IS的帧中继网络可以配置属于到这些网络类型之一，根据是可行的在路由器之间通过网云连接的种类(充分地网状连接，部分地网状连接或者星型网)。本文在这种情况下提供网络类型配置不匹配的示例，并且显示如何诊断和解决问题。

## 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：

- 配置帧中继
- 配置集成IS-IS

### 使用的组件

本文档不限于特定的软件和硬件版本。

在本文显示的输出根据这些软件和硬件版本：

- Cisco 2500 系列路由器
- Cisco IOS 软件版本 12.2(27)

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](#)。

## 正确配置示例

IS-IS相似地对待多点serial interfaces和sub-interface对待广播接口，但是对待点对点接口，好象附加对点对点网络。例如，在此部分的网络示例拓扑里，三充分地网状连接的路由器之间的广域网多点连接对待正如LAN连接。和在LAN，1级或2级LAN IIS交换在他们之间，并且指定中间系统(DIS)选择。

在此拓扑示例方面，所有三路由器连接对在点到多点接口或sub-interface的帧中继网云。主接口默认情况下(类似在路由器的在路由器G)的Serial1 E和Serial0多点。路由器H和F有点对点连接通过点对点接口，并且他们使用点对点IIS。

这些是在此拓扑示例方面使用的路由器配置：

- [路由器 E](#)
- [路由器 G](#)
- [路由器 H](#)
- [路由器 F](#)

### 路由器 E

```
clns routing
!
interface Serial11 ip address 10.10.10.1 255.255.255.0 ip
router isis encapsulation frame-relay clns router isis
frame-relay map clns 123 broadcast frame-relay map clns
121 broadcast frame-relay map ip 10.10.10.3 121
broadcast frame-relay map ip 10.10.10.4 123 broadcast
frame-relay lmi-type ansi ! router isis net
49.0001.1111.1111.1111.00 is-type level-1
```

### 路由器 G

```
clns routing
!
interface Serial10 ip address 10.10.10.3 255.255.255.0 ip
router isis encapsulation frame-relay clns router isis
frame-relay map clns 112 broadcast frame-relay map clns
113 broadcast frame-relay map ip 10.10.10.1 112
broadcast frame-relay map ip 10.10.10.4 113 broadcast
frame-relay lmi-type ansi ! router isis net
49.0001.3333.3333.3333.00 is-type level-1
```

### 路由器 H

```
clns routing
!
interface Serial0
no ip address
no ip directed-broadcast
no ip mroute-cache
encapsulation frame-relay
frame-relay lmi-type ansi
!
interface Serial0.1 multipoint ip address 10.10.10.4
255.255.255.0 no ip directed-broadcast ip router isis
clns router isis frame-relay map clns 132 broadcast
```

```

frame-relay map clns 131 broadcast frame-relay map ip
10.10.10.1 132 broadcast frame-relay map ip 10.10.10.3
131 broadcast ! interface Serial0.2 point-to-point ip
address 10.20.20.4 255.255.255.0 no ip directed-
broadcast ip router isis clns router isis frame-relay
interface-dlci 130 ! router isis net
49.0001.4444.4444.4444.00 is-type level-1

```

## 路由器 F

```

clns routing
!
interface Serial2
no ip address
no ip directed-broadcast
encapsulation frame-relay
frame-relay lmi-type ansi
!
interface Serial2.1 point-to-point ip address 10.20.20.2
255.255.255.0 no ip directed-broadcast ip router isis
clns router isis frame-relay interface-dlci 103 ! router
isis net 49.0001.2222.2222.2222.00 is-type level-1

```

发出**show clns neighbors**、**show isis database**和**show isis database**详细信息on命令其中任一mesh的路由器，观察IS-IS配置的作用在多点WAN连接的。这是从**show clns neighbors**命令的输出在所有路由器：

```

Router_E# show clns neighbors System Id Interface SNPA State Holdtime Type Protocol Router_G Se1
DLCI 121 Up 29 L1 IS-IS Router_H Se1 DLCI 123 Up 7 L1 IS-IS Router_G# show clns neighbors System
Id Interface SNPA State Holdtime Type Protocol Router_E Se0 DLCI 112 Up 27 L1 IS-IS Router_H Se0
DLCI 113 Up 7 L1 IS-IS Router_H# show clns neighbors System Id Interface SNPA State Holdtime
Type Protocol Router_E Se0.1 DLCI 132 Up 23 L1 IS-IS Router_F Se0.2 DLCI 130 Up 25 L1 IS-IS
Router_G Se0.1 DLCI 131 Up 28 L1 IS-IS Router_F# show clns neighbors System Id Interface SNPA
State Holdtime Type Protocol Router_H Se2.1 DLCI 103 Up 24 L1 IS-IS

```

从**show isis database**的输出根据psuedonode的链路状态包(LSP) ID显示路由器H是DIS，：

```

Router_E# show isis database IS-IS Level-1 Link State Database LSPID LSP Seq Num LSP Checksum
LSP Holdtime ATT/P/OL Router_E.00-00 * 0x00000EA6 0xA415 54 10/0/0 Router_F.00-00 0x00000DD7
0xD76E 46 0/0/0 Router_G.00-00 0x00000DE7 0x780B 40 0/0/0 Router_H.00-00 0x00000DF0 0x4346 37
0/0/0 Router_H.01-00 0x00000DD5 0xFD1F 46 0/0/0 Router_G# show isis database IS-IS Level-1 Link
State Database LSPID LSP Seq Num LSP Checksum LSP Holdtime ATT/P/OL Router_E.00-00 0x00000E8F
0xD2FD 46 10/0/0 Router_F.00-00 0x00000DC0 0x0657 45 0/0/0 Router_G.00-00 * 0x00000DD0 0xA6F3 41
0/0/0 Router_H.00-00 0x00000DDA 0x6F30 42 0/0/0 Router_H.01-00 0x00000DBE 0x2C08 50 0/0/0
Router_H# show isis database IS-IS Level-1 Link State Database LSPID LSP Seq Num LSP Checksum
LSP Holdtime ATT/P/OL Router_E.00-00 0x000001EC 0x1D12 44 10/0/0 Router_F.00-00 0x00000124
0x63A2 54 0/0/0 Router_G.00-00 0x00000130 0x0C3B 33 0/0/0 Router_H.00-00 * 0x0000012F 0xEA6C 42
0/0/0 Router_H.01-00 * 0x00000123 0xBA21 43 0/0/0

```

您能也检查LSP的详细信息由DIS生成的psuedonode的。在此输出中，伪节点LSP Router\_H.01-00代表完全网格广域网，显示所有路由器附加对mesh (如伪节点LSP在LAN执行)：

```

Router_E# show isis database detail Router_H.01-00 IS-IS Level-1 LSP Router_H.01-00 LSPID LSP
Seq Num LSP Checksum LSP Holdtime ATT/P/OL Router_H.01-00 0x00000DD6 0xFB20 42 0/0/0 Metric: 0
IS Router_H.00 Metric: 0 IS Router_E.00 Metric: 0 IS Router_G.00 Router_G# show isis database
detail Router_H.01-00 IS-IS Level-1 LSP Router_H.01-00 LSPID LSP Seq Num LSP Checksum LSP
Holdtime ATT/P/OL Router_H.01-00 0x00000DBE 0x2C08 35 0/0/0 Metric: 0 IS Router_H.00 Metric: 0
IS Router_E.00 Metric: 0 IS Router_G.00 Router_H# show isis database detail Router_H.01-00 IS-IS
Level-1 LSP Router_H.01-00 LSPID LSP Seq Num LSP Checksum LSP Holdtime ATT/P/OL Router_H.01-00 *
0x00000126 0xB424 55 0/0/0 Metric: 0 IS Router_H.00 Metric: 0 IS Router_G.00 Metric: 0 IS
Router_E.00

```

## 配置不匹配问题

此部分检查一问题由于配置不匹配。路由器F Serial2.1 sub-interface从点对点更改到多点，引入在路由器F和H之间的一问题。和在下输出中显示，路由器配置F更改，当路由器H仍然连接到路由器F通过点对点子接口时。

- [路由器H](#)
- [路由器F](#)

```
路由器H
-----
clns routing
!
interface Serial0
  no ip address
  no ip directed-broadcast
  no ip mroute-cache
  encapsulation frame-relay
  frame-relay lmi-type ansi
!
interface Serial0.1 multipoint
  ip address 10.10.10.4 255.255.255.0
  no ip directed-broadcast
  ip router isis
  clns router isis
  frame-relay map clns 132 broadcast
  frame-relay map clns 131 broadcast
  frame-relay map ip 10.10.10.1 132 broadcast
  frame-relay map ip 10.10.10.3 131 broadcast
!
interface Serial0.2 point-to-point ip address 10.20.20.4
255.255.255.0 no ip directed-broadcast ip router isis
clns router isis frame-relay interface-dlci 130 ! router
isis passive-interface Ethernet0 net
49.0001.4444.4444.4444.00 is-type level-1
```

```
路由器F
-----
clns routing
!
interface Serial2
  no ip address
  no ip directed-broadcast
  encapsulation frame-relay
  frame-relay lmi-type ansi
!
interface Serial2.1 multipoint ip address 10.20.20.2
255.255.255.0 no ip directed-broadcast ip router isis
clns router isis frame-relay interface-dlci 103 ! router
isis net 49.0001.2222.2222.2222.00 is-type level-1
```

现在，路由器H不再看到路由器F作为IS-IS邻居。

```
Router_H# show clns neighbors System Id Interface SNPA State Holdtime Type Protocol Router_E
Se0.1 DLCI 132 Up 23 L1 IS-IS Router_G Se0.1 DLCI 131 Up 22 L1 IS-IS
```

路由器F看到路由器H作为邻居;但是而不是L1的邻接类型is IS和协议是终端系统到中间系统(ES-IS)而不是IS-IS。这意味着路由器F有一邻接问题。

```
Router_F# show clns neighbors System Id Interface SNPA State Holdtime Type Protocol Router_H
Se2.1 DLCI 103 Up 272 IS ES-IS
```

## [问题原因](#)

问题围绕事实路由器F发送在其多点子接口的LAN IIH，并且路由器H发送在其点对点接口的序列IIH。当您激活在路由器H时的**debug isis adj packets**，您能看到发送在Serial0.2的序列IIH。然而，您看不到所有IIH来通过Serial0.2，虽然路由器F发送在Serial2.1的LAN IIH。

```
Router_H# debug isis adj-packets IS-IS Adjacency related packets debugging is on *Mar 2
01:11:10.065: ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type L1, cir id4444.01, length
1500 *Mar 2 01:11:11.421: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2
01:11:11.961: ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type L1, cir id4444.01, length
1500 *Mar 2 01:11:14.657: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2
01:11:15.205: ISIS-Adj: Sending serial IIH on Serial0.2, length 1499 *Mar 2 01:11:17.237: ISIS-
Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2 01:11:18.765: ISIS-Adj: Rec L1 IIH from
DLCI 131 (Serial0.1), cir type L1, cir id4444.01, length 1500 *Mar 2 01:11:20.181: ISIS-Adj:
Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2 01:11:21.861: ISIS-Adj: Rec L1 IIH from DLCI
132 (Serial0.1), cir type L1, cir id4444.01, length 1500 *Mar 2 01:11:22.717: ISIS-Adj: Sending
L1 LAN IIH on Serial0.1, length 1500 *Mar 2 01:11:24.073: ISIS-Adj: Sending serial IIH on
Serial0.2, length 1499 *Mar 2 01:11:25.845: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length
1500 *Mar 2 01:11:27.289: ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type L1, cir
id4444.01, length 1500 *Mar 2 01:11:28.637: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length
1500 *Mar 2 01:11:31.853: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2
01:11:31.865: ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type L1, cir id4444.01, length
1500 *Mar 2 01:11:33.181: ISIS-Adj: Sending serial IIH on Serial0.2, length 1499 *Mar 2
01:11:35.165: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length 1500
```

当您激活在路由器F时的同样调试，您能看到路由器F接收从路由器H的序列IIH在其Serial2.1接口，但是忽略Hello。路由器F尝试发送的LAN IIH丢弃与封装故障。

```
Router_F# debug isis adj-packets IS-IS Adjacency related packets debugging is on *Mar 2
01:19:15.113: ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00, length
1499 *Mar 2 01:19:15.117: ISIS-Adj: Point-to-point IIH received on multi-point interface:
ignored IIH *Mar 2 01:19:17.177: ISIS-Adj: Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar
2 01:19:20.305: ISIS-Adj: Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:22.813:
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00, length 1499 *Mar 2
01:19:22.817: ISIS-Adj: Point-to-point IIH received on multi-point interface: ignored IIH *Mar 2
01:19:23.229: ISIS-Adj: Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:26.157:
ISIS-Adj: Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:28.825: ISIS-Adj:
Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:30.833: ISIS-Adj: Rec serial IIH
from DLCI 103 (Serial2.1), cir type L1, cir id 00, length 1499 *Mar 2 01:19:30.837: ISIS-Adj:
Point-to-point IIH received on multi-point interface: ignored IIH *Mar 2 01:19:31.849: ISIS-Adj:
Encapsulation failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:34.929: ISIS-Adj: Encapsulation
failed for L1 LAN IIH on Serial2.1 *Mar 2 01:19:38.029: ISIS-Adj: Encapsulation failed for L1
LAN IIH on Serial2.1
```

这是什么的分析发生在路由器F和H之间，当链路类型不匹配时：

- LAN邻接使用握手，导致三可能的状态之一：DOWN，INIT或者向上。
- 有1级的IIH封装故障出站从在Serial2.1 sub-interface的路由器F，因为没有——在多点子接口下——[frame-relay map clns命令](#)转发IS-IS PDU。
- 路由器H不接收从路由器F的任何LAN IIH，因为路由器F有封装故障，当发送他们时。
- 路由器F看到来自路由器H的序列IIH，但是忽略Hello，因为接收在多点子接口的点到点Hello。路由器F检测有事未命中或错误在从路由器H的IIH，因此路由器F创建LAN邻接，但是考虑它通过ES-IS了解，而不是从与IS-IS的—L1类型邻接。

## 解决方案

解决方案将保证链路的两边点到点或多点。在这种情况下，请更改路由器F Serial2.1 sub-interface回到点对点，匹配在路由器H. Serial0.2接口配置的那。在更改，摆动接口后。

下debug输出显示发生了什么，在您做变动后，并且在路由器F的Serial2接口拍动。现在路由器F能

发送，并且接收在其Serial2.1的序列IIH请建立接口。

```
Router_F# debug isis adj-packets *Mar 2 04:32:37.276: %LINK-5-CHANGED: Interface Serial2,
changed state to administratively down *Mar 2 04:32:38.316: %LINEPROTO-5-UPDOWN: Line protocol
on Interface Serial2, changed state to down *Mar 2 04:32:45.868: %LINK-3-UPDOWN: Interface
Serial2, changed state to up *Mar 2 04:32:46.868: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Serial2, changed state to up *Mar 2 04:33:05.896: ISIS-Adj: Sending serial IIH on
Serial2.1, length 1499 *Mar 2 04:33:13.312: ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1),
cir type L1, cir id 00, length 1499 *Mar 2 04:33:13.316: ISIS-Adj: rcvd state DOWN, old state
DOWN, new state INIT *Mar 2 04:33:13.316: ISIS-Adj: Action = GOING UP, new type = L1 *Mar 2
04:33:13.320: ISIS-Adj: New serial adjacency *Mar 2 04:33:13.324: ISIS-Adj: Sending serial IIH
on Serial2.1, length 1499 *Mar 2 04:33:14.196: ISIS-Adj: Rec serial IIH from DLCI 103
(Serial2.1), cir type L1, cir id 00, length 1499 *Mar 2 04:33:14.204: ISIS-Adj: rcvd state INIT,
old state INIT, new state UP *Mar 2 04:33:14.204: ISIS-Adj: Action = GOING UP, new type = L1
*Mar 2 04:33:14.208: ISIS-Adj: L1 adj count 1 *Mar 2 04:33:14.212: ISIS-Adj: Sending serial IIH
on Serial2.1, length 1499 *Mar 2 04:33:15.100: ISIS-Adj: Rec serial IIH from DLCI 103
(Serial2.1), cir type L1, cir id 00, length 1499 *Mar 2 04:33:15.100: ISIS-Adj: rcvd state UP,
old state UP, new state UP *Mar 2 04:33:15.104: ISIS-Adj: Action = ACCEPT *Mar 2 04:33:22.924:
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00, length 1499 *Mar 2
04:33:22.928: ISIS-Adj: rcvd state UP, old state UP, new state UP *Mar 2 04:33:22.932: ISIS-Adj:
Action = ACCEPT
```

从路由器H的角度，配置是回到正常：

```
Router_H# show clns neighbors System Id Interface SNPA State Holdtime Type Protocol Router_E
Se0.1 DLCI 132 Up 28 L1 IS-IS Router_F Se0.2 DLCI 130 Up 21 L1 IS-IS Router_G Se0.1 DLCI 131 Up
28 L1 IS-IS
```

debug isis adj packets命令输出也是回到正常：

```
Router_H# debug isis adj-packets *Mar 2 04:40:19.376: ISIS-Adj: Sending L1 LAN IIH on Serial0.1,
length 1500 *Mar 2 04:40:21.944: ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type L1,
cir id 4444.4444.01, length 1500 *Mar 2 04:40:22.020: ISIS-Adj: Sending L1 LAN IIH on Serial0.1,
length 1500 *Mar 2 04:40:22.428: ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type L1,
cir id 4444.4444.01, length 1500 *Mar 2 04:40:24.740: ISIS-Adj: Sending L1 LAN IIH on Serial0.1,
length 1500 *Mar 2 04:40:24.780: ISIS-Adj: Rec serial IIH from DLCI 130 (Serial0.2), cir type
L1, cir id 0ngth 1499 *Mar 2 04:40:24.784: ISIS-Adj: rcvd state UP, old state UP, new state UP
*Mar 2 04:40:24.784: ISIS-Adj: Action = ACCEPT *Mar 2 04:40:26.068: ISIS-Adj: Sending serial IIH
on Serial0.2, length 1499 *Mar 2 04:40:27.516: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length
1500 *Mar 2 04:40:30.432: ISIS-Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2
04:40:31.152: ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type L1, cir id 4444.4444.01,
length 1500 *Mar 2 04:40:31.540: ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type L1,
cir id 4444.4444.01, length 1500 *Mar 2 04:40:33.292: ISIS-Adj: Rec serial IIH from DLCI 130
(Serial0.2), cir type L1, cir id 0ngth 1499 *Mar 2 04:40:33.296: ISIS-Adj: rcvd state UP, old
state UP, new state UP *Mar 2 04:40:33.296: ISIS-Adj: Action = ACCEPT *Mar 2 04:40:33.664: ISIS-
Adj: Sending L1 LAN IIH on Serial0.1, length 1500 *Mar 2 04:40:34.420: ISIS-Adj: Sending serial
IIH on Serial0.2, length 1499 *Mar 2 04:40:36.328: ISIS-Adj: Sending L1 LAN IIH on Serial0.1,
length 1500
```

## [相关信息](#)

- [中间系统到中间系统协议](#)
- [了解 IS-IS 伪节点 LSP](#)
- [IS-IS 支持页](#)
- [技术支持和文档 - Cisco Systems](#)