MTU Mismatch Problem in IS−IS

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Introduction

Intermediate System−to−Intermediate System (IS−IS) hellos are padded to the full maximum transmission unit (MTU) size. The benefit of padding IS−IS Hellos (IIHs) to the full MTU is that it allows for early detection of errors due to transmission problems with large frames or due to mismatched MTUs on adjacent interfaces.

The padding of IIHs can be turned off (in Cisco IOS® Software Releases 12.0(5)T and 12.0(5)S) for all interfaces on a router with the **no hello padding** command in router configuration mode for the IS−IS routing process. The padding of IIHs can be selectively turned off for point−to−point or multipoint interfaces with the **no hello padding multi−point** or **no hello padding point−to−point** command in router configuration mode for the IS−IS routing process. Hello padding can also be turned off on an individual interface basis using the **no isis hello padding** interface configuration command.

A user would disable hello padding in order avoid wasting network bandwidth in case the MTU of both interfaces are the same or, in case of translational bridging. While hello padding is disabled, Cisco routers still send the first five IS−IS hellos padded to the full MTU size. This is to maintain the benefits of discovering MTU mismatches. Consecutive hellos are no longer padded.

This document demonstrates what happens when there is an MTU mismatch on the interfaces of two connected routers running IS−IS. The MTU on Router F has been changed from its default value of 1500 bytes to 2000 bytes with the **mtu 2000** interface configuration command. The serial interface has been "flapped." Therefore, for the new MTU value to take effect, you must disable Serial 0 with the **shutdown** command, and then enable it with the **no shutdown** command.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

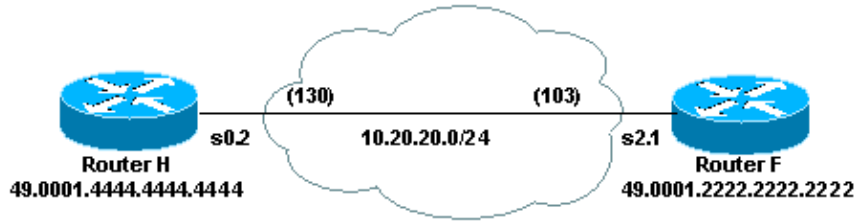
This document is not restricted to specific software and hardware versions.

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Problem

The network diagram and configurations used to describe this problem are shown here:



Router H	Router F
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 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	clns routing ! interface Serial2 **mtu 2000** 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

On both routers, you can see the state of the adjacency between Router F and Router H with the **show clns neighbors** command. In the output from Router F, note that the adjacency with Router H is in the INIT state. In the output from Router H, you can see that the adjacency with Router F is type IS, and the protocol is End System−to Intermediate System (ES−IS). This output indicates there is a problem with the Connectionless Network Service (CLNS) adjacency.

```
Router_H# show clns neighbors

System Id      SNPA            Interface   State  Holdtime  Type Protocol
```

```
Router_F       DLCI 130          Se0.2       Up     294       IS   ES-IS
Router_G       DLCI 131          Se0.1       Up     7         L1   IS-IS
Router_E       DLCI 132          Se0.1       Up     27        L1   IS-IS


Router_F# show clns neighbors

System Id      Interface   SNPA            State  Holdtime  Type Protocol
Router_H       Se2.1       DLCI 103        Init   26        L1   IS-IS
```

If you enable IS−IS adjacency−packet debugging with the **debug isis adj−packets** command, you can see that Router F both sends and receives serial IIHs on the Serial 2.1 subinterface.

```
Router_F# debug isis adj-packets
IS-IS Adjacency related packets debugging is on
ISIS-Adj: Sending serial IIH on Serial2.1
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00
ISIS-Adj: rcvd state DOWN, old state INIT, new state INIT
ISIS-Adj: Action = GOING UP, new type = L1
ISIS-Adj: Sending serial IIH on Serial2.1
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00
ISIS-Adj: rcvd state DOWN, old state INIT, new state INIT
ISIS-Adj: Action = GOING UP, new type = L1
ISIS-Adj: Sending serial IIH on Serial2.1
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1, cir id 00
ISIS-Adj: rcvd state DOWN, old state INIT, new state INIT
ISIS-Adj: Action = GOING UP, new type = L1
ISIS-Adj: Rec serial IIH from DLCI 103 (Serial2.1), cir type L1,cir id 00
ISIS-Adj: rcvd state DOWN, old state INIT, new state INIT
ISIS-Adj: Action = GOING UP, new type = L1
ISIS-Adj: Sending serial IIH on Serial2.1
```

This output shows that Router H does not receive IIHs on Serial 0.2 from Router F. Therefore, no IS−IS adjacency is formed. Instead, the adjacency is End System (ES).

```
Router_H# debug isis adj-packets
IS-IS Adjacency related packets debugging is on
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01

ISIS-Adj: Sending L1 IIH on Serial0.1
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
ISIS-Adj: Sending serial IIH on Serial0.2
ISIS-Adj: Rec L2 IIH from DLCI 132 (Serial0.1), cir type 3, cir id Router_H.01
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type 3, cir id Router_H.01
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
ISIS-Adj: Sending L1 IIH on Serial0.1
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
ISIS-Adj: Rec L2 IIH from DLCI 132 (Serial0.1), cir type 3, cir id Router_H.01
ISIS-Adj: Sending serial IIH on Serial0.2
ISIS-Adj: Rec L1 IIH from DLCI 132 (Serial0.1), cir type 3, cir id Router_H.01
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
ISIS-Adj: Rec L1 IIH from DLCI 131 (Serial0.1), cir type 1, cir id Router_H.01
```

The Cause of the Problem

Router H does not receive the hellos from Router F because IIHs are padded to the full MTU of the link, whereas ES hellos are not padded to full MTU size. This happens because Router F thinks the MTU is 2000, and it sends a 2000−byte hello, which is ignored by Router H.

Solution

The solution is to make sure that both sides of a link have the same MTU. One way to do this is to use the **mtu** command as shown here:

```
Router_F# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router_F(config)# interface serial 2
Router_F(config-if)# mtu 1500
Router_F(config-if)# shutdown
Router_F(config-if)# no shutdown
Router_F(config-if)# ^Z
Router_F#
```

Now Router H and Router F can become neighbors and route each other's traffic.

```
Router_H# show clns neighbors

System Id      SNPA               Interface   State  Holdtime  Type Protocol
Router_F       DLCI 130           Se0.2       Up     28        L1   IS-IS
Router_G       DLCI 131           Se0.1       Up     8         L1   IS-IS
Router_E       DLCI 132           Se0.1       Up     29        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
```

The CLNS adjacency problem due to MTU mismatch can also be solved using the **clns mtu** command as shown here:

```
Router_F#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router_F(config)#interface serial2
Router_F(config-if)#clns mtu 1500
Router_F(config-if)#^Z
Router_F#
```

Related Information

- **IP Routing Support Page**
- **IS−IS Support Page**
- **Technical Support − Cisco Systems**

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