# ISSU MPLS Clients

**First Published: April 16, 2004**
**Last Updated: November 14, 2008**

MPLS applications can be upgraded using the In Service Software Upgrade (ISSU) process and the enhanced Fast Software Upgrade (eFSU) process. Thus, MPLS applications are considered ISSU's MPLS clients. The ISSU process allows Cisco IOS software *at the router level* to be updated or otherwise modified while packet forwarding continues. *At the line-card level*, the eFSU process minimizes line-card downtime during such upgrades to between 30 and 90 seconds, by loading the new line-card image before the ISSU switchover occurs from the active to the standby Route Processor (RP).

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for ISSU MPLS Clients" section on page 17.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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# Prerequisites for ISSU MPLS Clients

Before you perform an upgrade, you need to verify that the clients you are concerned about are compatible with the intended switchover. Use the commands listed in the "Verifying the ISSU Process for an MPLS Client" section on page 5 to determine compatibility.

The success performance of some clients in the upgraded network will depend upon their compatibility with other clients as described in Table 1.

***Table 1 MPLS Client Interdependencies***

| This client . . . | ...can only work when this client is shown to be compatible |
|---|---|
| MPLS VPN | LSD Label Manager High Availability |
| LDP | LSD Label Manager High Availability |
| VRF ("Table ID") | LSD Label Manager High Availability |
| LSD Label Manager High Availability | Base clients: Checkpointing and Redundancy Facility |
| MFI Pull | XDR |
| MFI Push | XDR |
| LSPV Push within OAM | XDR |
| TE | Base clients:<br>• Checkpointing and Redundancy Facility<br>• MPLS TE High Availability |

# Restrictions for ISSU MPLS Clients

Because line cards in the Cisco series 7600 routers do not support Minimum Disruption Restart (MDR), they reset when eFSU is performed. That causes IGP adjacencies to flap (adjacent routes are advertised as unavailable and then available again in quick sequence), bringing down the MPLS traffic engineering (TE) tunnels. Therefore, after an eFSU operation, it may take as long as two minutes for TE tunnels to be resignaled and reestablished.

For this reason, we recommend that before you begin eFSU you first disable Resource Reservation Protocol Graceful Restart (RSVP GR) full mode. If this mode is not disabled, RSVP can inadvertently delay the reestablishment of TE tunnels while it waits for the recovery of the preexisting TE tunnel state.

To see how long each line card will be placed out of service during the eFSU process, use the **show issu outage slot all** command as described in the "Determining Impending Line-Card Outage Periods During an ISSU" section on page 4.

# Information About ISSU MPLS Clients

Before examining ISSU coordination of MPLS clients, you should understand the following concepts:


- ISSU-Capable Protocols and Applications: Clients, page 3
- ISSU-Capable MPLS Feature Sets, page 4


This section provides information about upgrading MPLS-related applications through ISSU and eFSU. Those MPLS applications are considered ISSU's MPLS "clients."

For information on the entire ISSU and eFSU procedure, please see the document, *Cisco IOS In Service Software Upgrade and Enhanced Fast Software Upgrade Process*.

For information specific to eFSU on the Cisco 7600 series router, please refer to the "ISSU and eFSU on Cisco 7600 Series Routers" chapter in the *Cisco 7600 Series Router Cisco IOS Software Configuration Guide,* Release 12.2SR.

## ISSU-Capable Protocols and Applications: Clients

Protocols and applications that can be upgraded through the ISSU process are considered clients of ISSU. These include at least the following:

- Address Resolution Protocol (ARP)
- Asynchronous Transfer Mode (ATM)
- Cisco Express Forwarding
- Dynamic Host Configuration Protocol (DHCP)
- EtherChannel—port aggregration protocol (PagP) and Link Aggregration Control Protocol (LACP)
- Frame Relay (FR)
- Gateway Load Balancing Protocol (GLBP)
- High-Level Data Link Control (HDLC)
- Hot Standby Router Protocol (HSRP)
- IEEE 802.1x and 802.3af
- Internet Group Management Protocol (IGMP) snooping
- IP host
- Intermediate System-to-Intermediate System (IS-IS)
- Multiprotocol Label Switching (MPLS)
- PPP and Multilink PPP
- Port security
- Quality of service (QoS)
- Remote File System (RFS) versioning
- Simple Network Management Protocol (SNMP)
- Spanning Tree Protocol (STP)

# ISSU-Capable MPLS Feature Sets

Within the MPLS technology, ISSU supports the following feature sets as clients:

- Label Distribution Protocol (LDP)
- MPLS Virtual Private Network (MPLS VPN)
- VPN routing and forwarding (VRF), also called the "Table ID" client
- Label Switching Database Label Manager for high availability, usually called "LSD Label Manager for HA"
- MPLS Forwarding Infrastructure Pull, called "MFI Pull"
- MPLS Forwarding Infrastructure Push, called "MFI Push"

Beginning with Cisco IOS Release 12.2(33)SRB1, the following MPLS features are also supported as ISSU clients:

- Label Switched Path Verification Push within Operation, Administration, and Management (OAM), called "LSPV Push"
- TE

# How to Verify that an MPLS Client Can Support an In Service Software Upgrade

This section contains the following procedures:

- Determining Impending Line-Card Outage Periods During an ISSU, page 4 (required)
- Verifying the ISSU Process for an MPLS Client, page 5 (required)

# Determining Impending Line-Card Outage Periods During an ISSU

Perform this task to determining impending line-card outage periods during an ISSU.

During an ISSU, the router preloads line-card software onto line cards that support enhanced Fast Service Upgrade (eFSU). Then, when the switchover occurs between active and standby processors, the line cards that support eFSU are restarted with the new, preloaded software, which helps to minimize outage time during the upgrade. Line cards that do not support eFSU undergo a hard reset at switchover, and the software image is loaded after the line card is restarted.

**Note** For the complete task sequence that accomplishes ISSU and eFSU, please see the document entitled, *Cisco IOS In Service Software Upgrade and Enhanced Fast Software Upgrade Process*.

## Prerequisites

Ensure that you have successfully loaded new Cisco IOS software onto the standby processor as described in *Cisco IOS In Service Software Upgrade and Enhanced Fast Software Upgrade Process*.

### SUMMARY STEPS

1. **enable**
2. **show issu outage slot all**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **show issu outage slot** *all*<br><br>**Example:**<br>`Router# show issu outage slot all` | Determines the maximum length of time each line card could be down when use of the **issu runversion** command will trigger eFSU. |

## Examples

The following is sample output from the **show issu outage** command:

```
Router# show issu outage slot all

Slot # Card Type                                MDR Mode          Max Outage Time
------ ---------------------------------------  ------------      ---------------
     1 CEF720 24 port 1000mb SFP                WARM_RELOAD        300 secs
     2 1-subslot SPA Interface Processor-600    WARM_RELOAD        300 secs
     3 4-subslot SPA Interface Processor-400    WARM_RELOAD        300 secs
     4 2+4 port GE-WAN                          RELOAD             360 secs
```

The column “Max Outage Time” shows the longest downtime that should be expected for each of the four listed line card types:

**Note** When there is no eFSU to be performed, and only ISSU will result from the use of the **issu runversion** command, the MDR Mode column in this display shows “NSF_RELOAD” for each line card, to indicate that the line card will not be restarted during the upgrade and therefore will not experience any downtime.

If you happen to enter the **show issu outage** command outside of the ISSU command sequence, the MDR Mode column in this display shows “INVALID”.

# Verifying the ISSU Process for an MPLS Client

Perform this task to verify that a particular MPLS client can be upgraded successfully during a particular ISSU session. The commands in this task also can be used to display other details about the ISSU MPLS clients, and should be entered in the order described.

## SUMMARY STEPS

1. **enable**
2. **show issu clients**
3. **show issu sessions** *clientID*
4. **show issu negotiated version** *sessionID*
5. **show issu negotiated capability** *sessionID*
6. **show issu message types** *clientID*

## DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **show issu clients**<br><br>**Example:**<br>`Router# show issu clients` | Lists network applications and protocols currently supported by ISSU.<br>You can use this command to discover the client ID that you will need to enter in Steps 3 and 6. |
| **Step 3** | **show issu sessions** *clientID*<br><br>**Example:**<br>`Router# show issu sessions 2002` | Tells whether a particular client is compatible with the intended upgrade.<br>You can use this command to discover the session ID that you will need to enter in Steps 4 and 5. |
| **Step 4** | **show issu negotiated version** *sessionID*<br><br>**Example:**<br>`Router# show issu negotiated version 33` | Displays details of the session's negotiated message version. |
| **Step 5** | **show issu negotiated capability** *sessionID*<br><br>**Example:**<br>`Router# show issu negotiated capability 33` | Displays results of a negotiation about the client application's capabilities. |
| **Step 6** | **show issu message types** *clientID*<br><br>**Example:**<br>`Router# show issu message types 2002` | Displays the message formats ("types") and versions supported by the specified client. |

# Configuration Examples for ISSU MPLS Clients

This section presents the following examples:



To examine any ISSU client, you must specify its unique client ID when entering the **show issu sessions** command. If you do not already know that client ID, enter the **show issu clients** command in user EXEC or privileged EXEC mode. Each ISSU client on the network will then be listed, with its client ID and client name on the same line, as shown in the following example:

```
Router# show issu clients

Client_ID = 2,  Client_Name = ISSU Proto client,  Entity_Count = 1
Client_ID = 3,  Client_Name = ISSU RF,  Entity_Count = 1
Client_ID = 4,  Client_Name = ISSU CF client,  Entity_Count = 1
Client_ID = 5,  Client_Name = ISSU Network RF client,  Entity_Count = 1
Client_ID = 7,  Client_Name = ISSU CONFIG SYNC,  Entity_Count = 1
Client_ID = 8,  Client_Name = ISSU ifIndex sync,  Entity_Count = 1
Client_ID = 9,  Client_Name = ISSU IPC client,  Entity_Count = 1
Client_ID = 10,  Client_Name = ISSU IPC Server client,  Entity_Count = 1
Client_ID = 11,  Client_Name = ISSU Red Mode Client,  Entity_Count = 1
Client_ID = 12,  Client_Name = ISSU EHSA services client,  Entity_Count = 1
Client_ID = 100,  Client_Name = ISSU rfs client,  Entity_Count = 1
Client_ID = 110,  Client_Name = ISSU ifs client,  Entity_Count = 1
Client_ID = 1001,  Client_Name = OC3POS-6,  Entity_Count = 4
Client_ID = 1002,  Client_Name = C10K ATM,  Entity_Count = 1
Client_ID = 1003,  Client_Name = C10K CHSTM1,  Entity_Count = 1
Client_ID = 1004,  Client_Name = C10K CT3,  Entity_Count = 1
Client_ID = 1005,  Client_Name = C10K GE,  Entity_Count = 1
Client_ID = 1006,  Client_Name = C10K ET,  Entity_Count = 1
Client_ID = 1007,  Client_Name = C10K CHE1T1,  Entity_Count = 1
Client_ID = 1009,  Client_Name = C10K MFE,  Entity_Count = 1
Client_ID = 1010,  Client_Name = C10K APS,  Entity_Count = 1
Client_ID = 1013,  Client_Name = C10K CARD OIR,  Entity_Count = 1
Client_ID = 2002,  Client_Name = CEF Push ISSU client,  Entity_Count = 1
Client_ID = 2003,  Client_Name = ISSU XDR client,  Entity_Count = 1
Client_ID = 2004,  Client_Name = ISSU SNMP client,  Entity_Count = 1
Client_ID = 2005,  Client_Name = ISSU HDLC Client,  Entity_Count = 1
Client_ID = 2006,  Client_Name = ISSU QoS client,  Entity_Count = 1
Client_ID = 2007,  Client_Name = ISSU LSD Label Mgr HA Client,  Entity_Count = 1
Client_ID = 2008,  Client_Name = ISSU Tableid Client,  Entity_Count = 1
Client_ID = 2009,  Client_Name = ISSU MPLS VPN Client,  Entity_Count = 1
Client_ID = 2010,  Client_Name = ARP HA,  Entity_Count = 1
Client_ID = 2011,  Client_Name = ISSU LDP Client,  Entity_Count = 1
Client_ID = 2012,  Client_Name = ISSU HSRP Client,  Entity_Count = 1
Client_ID = 2013,  Client_Name = ISSU ATM Client,  Entity_Count = 1
Client_ID = 2014,  Client_Name = ISSU FR Client,  Entity_Count = 1
Client_ID = 2015,  Client_Name = ISSU REDSSOC client,  Entity_Count = 1
Client_ID = 2019,  Client_Name = ISSU TCP client,  Entity_Count = 1
Client_ID = 2020,  Client_Name = ISSU BGP client,  Entity_Count = 1
```

```
Client_ID = 2021,  Client_Name = XDR Int Priority ISSU client,  Entity_Count = 1
Client_ID = 2022,  Client_Name = XDR Proc Priority ISSU client,  Entity_Count = 1
Client_ID = 2023,  Client_Name = FIB HWIDB ISSU client,  Entity_Count = 1
Client_ID = 2024,  Client_Name = FIB IDB ISSU client,  Entity_Count = 1
Client_ID = 2025,  Client_Name = FIB HW subblock ISSU client,  Entity_Count = 1
Client_ID = 2026,  Client_Name = FIB SW subblock ISSU client,  Entity_Count = 1
Client_ID = 2027,  Client_Name = Adjacency ISSU client,  Entity_Count = 1
Client_ID = 2028,  Client_Name = FIB IPV4 ISSU client,  Entity_Count = 1
Client_ID = 2030,  Client_Name = MFI Pull ISSU client,  Entity_Count = 1
Client_ID = 2031,  Client_Name = MFI Push ISSU client,  Entity_Count = 1
Client_ID = 2051,  Client_Name = ISSU CCM Client,  Entity_Count = 1
Client_ID = 2052,  Client_Name = ISSU PPP SIP CCM Client,  Entity_Count = 1
Client_ID = 2053,  Client_Name = ISSU MPLS TE Client,  Entity_Count = 1
Client_ID = 2054,  Client_Name = ISSU process client,  Entity_Count = 1
Client_ID = 2089,  Client_Name = MPLS LSPV Push client,  Entity_Count = 1
.
.
.
.
Base Clients:
 Client_Name = ISSU Proto client
 Client_Name = ISSU RF
 Client_Name = ISSU CF client
 Client_Name = ISSU Network RF client
 Client_Name = ISSU CONFIG SYNC
 Client_Name = ISSU ifIndex sync
 Client_Name = ISSU IPC client
 Client_Name = ISSU IPC Server client
 Client_Name = ISSU Red Mode Client
 Client_Name = ISSU EHSA services client
 Client_Name = ISSU rfs client
Client_Name = ISSU ifs client
 Client_Name = ISSU EM client
 Client_Name = ISSU Platform Medialayer Client
 Client_Name = ISSU FM Client
 Client_Name = ISSU TCAM Manager Client
 Client_Name = ISSU L2 Cmn Client
 Client_Name = ISSU L3 Manager HA Client
 Client_Name = ISSU L3 Manager Client
 Client_Name = ISSU CFIB BASE Client
 Client_Name = ISSU PF CONFIG SYNC Client
 Client_Name = ISSU MLS CEF Client
 Client_Name = ISSU Cat6k Logger Client
```

# Verifying the ISSU Process for an MPLS LDP Client: Example

This example shows how to verify the ISSU process for an LDP client.

The first command shows you whether the LDP client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2011

------------------------------------------------------------------------
 Client_ID = 2011,  Entity_ID = 1 :

 *** Session_ID = 46,  Session_Name = LDP Session :

    Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid     Role       Result   GroupID  GroupID  Signature
     4       34   PRIMARY   COMPATIBLE    1        1         0
                          (no policy)
```

```
    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 46
         Nego_Session_Name = LDP Session
         Transport_Mtu = 3948
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 46

 Session_ID = 46 :
     Message_Type = 1,  Negotiated_Version = 2,  Message_MTU = 20
     Message_Type = 2,  Negotiated_Version = 2,  Message_MTU = 20
     Message_Type = 3,  Negotiated_Version = 2,  Message_MTU = 4
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 46

 Session_ID = 46 :
     Negotiated_Cap_Entry = 1
```

Finally, to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2011

------------------------------------------------------------------------
 Client_ID = 2011,  Entity_ID = 1 :
    Message_Type = 1,  Version_Range = 2 ~ 2
          Message_Ver = 2,    Message_Mtu = 20
    Message_Type = 2,  Version_Range = 2 ~ 2
          Message_Ver = 2,    Message_Mtu = 20
    Message_Type = 3,  Version_Range = 2 ~ 2
          Message_Ver = 2,    Message_Mtu = 4
```

# Verifying the ISSU Process for an MPLS VPN Client: Example

This example shows how to verify the ISSU process for an MPLS VPN client.

The first command shows you whether the VPN client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2009

------------------------------------------------------------------------
Client_ID = 2009,  Entity_ID = 1 :

*** Session_ID = 39,  Session_Name = MPLS VPN ISSU Session :

   Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
 UniqueID  Sid     Role       Result   GroupID  GroupID  Signature
    3       33    PASSIVE   COMPATIBLE    1        1         0
                           (no policy)

   Negotiation Session Info for This Message Session:
        Nego_Session_ID = 39
        Nego_Session_Name = MPLS VPN ISSU Session
        Transport_Mtu = 3980
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 39

Session_ID = 39 :
    Message_Type = 1,  Negotiated_Version = 1,  Message_MTU = 32
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 39

Session_ID = 39 :
       Negotiated_Cap_Entry = 1
```

Finally,= to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2009

------------------------------------------------------------------------
Client_ID = 2009,  Entity_ID = 1 :
   Message_Type = 1,  Version_Range = 1 ~ 1
         Message_Ver = 1,    Message_Mtu = 32
```

# Verifying the ISSU Process for an MPLS VRF ("Table ID") Client: Example

This example shows how to verify the ISSU process for an MPLS VRF ("Table ID") client.

The first command shows you whether the VRF client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2008

------------------------------------------------------------------------
 Client_ID = 2008,  Entity_ID = 1 :

 *** Session_ID = 19,  Session_Name = TABLEID ISSU CF :

    Peer   Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid    Role       Result   GroupID  GroupID  Signature
     4       13   PRIMARY   COMPATIBLE    1        1         0
                          (no policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 19
         Nego_Session_Name = TABLEID ISSU CF
         Transport_Mtu = 3948
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 19

 Session_ID = 19 :
     Message_Type = 1,  Negotiated_Version = 1,  Message_MTU = 44
     Message_Type = 2,  Negotiated_Version = 1,  Message_MTU = 4
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 19

Session_ID = 19 :
       Negotiated_Cap_Entry = 1
```

Finally, to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2008

------------------------------------------------------------------------
 Client_ID = 2008,  Entity_ID = 1 :
    Message_Type = 1,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 44
    Message_Type = 2,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 4
```

# Verifying the ISSU Process for an MPLS LSD Label Manager HA Client: Example

This example shows how to verify the ISSU process for an MPLS LSD Label Manager HA client.

The first command shows you whether the LSD client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2007

------------------------------------------------------------------------
 Client_ID = 2007,  Entity_ID = 1 :

 *** Session_ID = 40,  Session_Name = lsd_ha :

    Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid     Role       Result   GroupID  GroupID  Signature
     4       30   PRIMARY   COMPATIBLE    1        1         0
                             (policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 40
         Nego_Session_Name = lsd_ha
         Transport_Mtu = 3948
         Compat_Result: raw_result = COMPATIBLE,  policy_result = COMPATIBLE
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 40

Session_ID = 40 :
     Message_Type = 1,  Negotiated_Version = 2,  Message_MTU = 8
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 40

-------------------------------------------------
  Client_ID = 2007,  Entity_ID = 1,  Session_ID = 40 :
```

```
      Negotiated_Cap_Entry = 1
```

Finally, to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2007

------------------------------------------------------------------------
 Client_ID = 2007,  Entity_ID = 1 :
    Message_Type = 1,  Version_Range = 1 ~ 2
          Message_Ver = 1,    Message_Mtu = 12
          Message_Ver = 2,    Message_Mtu = 8
```

# Verifying the ISSU Process for an MPLS MFI Pull Client: Example

This example shows how to verify the ISSU process for an MPLS MFI Pull client.

The first command shows you whether the MFI Pull client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2030

------------------------------------------------------------------------
Client_ID = 2030,  Entity_ID = 1 :

*** Session_ID = 131073,  Session_Name = MFI Pull    (6):

    Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid     Role       Result   GroupID  GroupID  Signature
    7       35  PRIMARY   COMPATIBLE 1        1         0
                            (no policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 131073
         Nego_Session_Name = MFI Pull               (6)
         Transport_Mtu = 4056
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 131073

    Session_ID = 131073:
     Message_Type = 1006,  Negotiated_Version = 1,  Message_MTU = 4
    Message_Type = 3003,  Negotiated_Version = 1,  Message_MTU = 12
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 131073

    Session_ID = 131073 :
      Negotiated_Cap_Entry = 1
```

Finally to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2030
```

```
------------------------------------------------------------------
    Client_ID = 2030,  Entity_ID = 1 :
    Message_Type = 1006,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 4
    Message_Type = 2004,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 12
```

# Verifying the ISSU Process for an MPLS MFI Push Client: Example

This example shows how to verify the ISSU process for an MPLS MFI Push client.

The first command shows you whether the MFI Push client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2031

------------------------------------------------------------------
Client_ID = 2031,  Entity_ID = 1 :

*** Session_ID = 196646,  Session_Name = MFI Push    (6):

    Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid    Role       Result   GroupID  GroupID  Signature
    7       36     PRIMARY   COMPATIBLE  1        1         0
                              (no policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 196646
         Nego_Session_Name = MFI Push               (6)
         Transport_Mtu = 4056
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 196646

Session_ID = 196646:
     Message_Type = 101,  Negotiated_Version = 1,  Message_MTU = 17
    Message_Type = 105,  Negotiated_Version = 1,  Message_MTU = 31
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 196646

Session_ID = 196646 :
      Negotiated_Cap_Entry = 1
```

Finally to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2031

------------------------------------------------------------------
    Client_ID = 2031,  Entity_ID = 1 :
    Message_Type = 5002,  Version_Range = 1 ~ 2
          Message_Ver = 1,    Message_Mtu = 10
    Message_Type = 5018,  Version_Range = 1 ~ 1
```

```
            Message_Ver = 1,    Message_Mtu = 39
```

# Verifying the ISSU Process for an MPLS LSPV Push Client: Example

This example shows how to verify the ISSU process for an MPLS LSVP Push client.

The first command shows you whether the LSPV Push client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2089

------------------------------------------------------------------------
 Client_ID = 2089,  Entity_ID = 1 :

 *** Session_ID = 45,  Session_Name = MPLS LSPV Push (6 ):

    Peer    Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid    Role       Result   GroupID  GroupID  Signature
     7       36    PRIMARY   COMPATIBLE    1        1         0
                           (no policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 45
         Nego_Session_Name = MPLS LSPV Push ( 6)
         Transport_Mtu = 1438
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 45

 Session_ID = 45:
    Message_Type = 0,  Negotiated_Version = 1,  Message_MTU = 74
    Message_Type = 1,  Negotiated_Version = 1,  Message_MTU = 120
    Message_Type = 2,  Negotiated_Version = 1,  Message_MTU = 120
    Message_Type = 3,  Negotiated_Version = 1,  Message_MTU = 5122
    Message_Type = 4,  Negotiated_Version = 1,  Message_MTU = 6
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 45

Session_ID = 45:
        Cap_Type = 0   Cap_Result = 1     No cap value assigned
```

Finally to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2089

------------------------------------------------------------------------
 Client_ID = 2089,  Entity_ID = 1 :
    Message_Type = 0,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 74
    Message_Type = 1,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 120
    Message_Type = 2,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 120
    Message_Type = 3,  Version_Range = 1 ~ 1
          Message_Ver = 1,    Message_Mtu = 5122
    Message_Type = 4,  Version_Range = 1 ~ 1
```

```
            Message_Ver = 1,    Message_Mtu = 6
```

# Verifying the ISSU Process for an MPLS TE Client: Example

This example shows how to verify the ISSU process for an MPLS TE client.

The first command shows you whether the TE client's old and new software versions are compatible, and therefore are able to make use of the ISSU opportunity:

```
Router# show issu sessions 2053

------------------------------------------------------------------------
 Client_ID = 2053,  Entity_ID = 1 :

 *** Session_ID = 84,  Session_Name = RSVP HA Session :

    Peer   Peer  Negotiate  Negotiated   Cap      Msg     Session
  UniqueID  Sid    Role       Result   GroupID  GroupID  Signature
    22       94   PRIMARY   COMPATIBLE    1        1         0
                           (no policy)

    Negotiation Session Info for This Message Session:
         Nego_Session_ID = 84
         Nego_Session_Name = RSVP HA Session
         Transport_Mtu = 1392
```

Now you can take the session ID displayed in the previous command's output and enter it into the next command, in order to see the negotiated message version:

```
Router# show issu negotiated version 84

Session_ID = 84 :
     Message_Type = 1,  Negotiated_Version = 2,  Message_MTU = 1024
```

Next you can enter the same session ID into the following command to display the capability negotiation result:

```
Router# show issu negotiated capability 84

Session_ID = 84 :
     Cap_Type = 0,     Cap_Result = 1     No cap value assigned
```

Finally to see which message types and versions are supported by this particular client, you enter the client ID into the following command:

```
Router# show issu message types 2053

------------------------------------------------------------------------
 Client_ID = 2053,  Entity_ID = 1 :
    Message_Type = 1,  Version_Range = 1 ~ 2
          Message_Ver = 1,    Message_Mtu = 1024
          Message_Ver = 2,    Message_Mtu = 1024
```

# Additional References

# Related Documents

| Related Topic | Document Title |
|---|---|
| ISSU and eFSU procedure | *Cisco IOS In Service Software Upgrade and Enhanced Fast Software Upgrade Process* |
| ISSU and eFSU on Cisco 7600 series routers | *Cisco 7600 Series Router Cisco IOS Software Configuration Guide* |

# Standards

| Standard | Title |
|---|---|
| None | — |

# MIBs

| MIB | MIBs Link |
|---|---|
| None | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br>http://www.cisco.com/go/mibs |

# RFCs

| RFC | Title |
|---|---|
| None | — |

# Technical Assistance

| Description | Link |
|---|---|
| The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.<br>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.<br>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password. | http://www.cisco.com/techsupport |

# Feature Information for ISSU MPLS Clients

Table 2 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

**Note** Table 2 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

*Table 2 Feature Information for ISSU MPLS Clients*

| Feature Name | Releases | Feature Information |
|---|---|---|
| ISSU MPLS Clients | 12.2(28)SB<br>12.2(33)<br>SRB-1 | MPLS applications can be upgrading using the In Service Software Upgrade (ISSU) process and the enhanced Fast Software Upgrade (eFSU) process. Thus, MPLS applications are considered ISSU's MPLS clients. The ISSU process allows Cisco IOS software *at the router level* to be updated or otherwise modified while packet forwarding continues. *At the line-card level*, the eFSU process minimizes line-card downtime during such upgrades to between 30 and 90 seconds, by loading the new line-card image before the ISSU switchover occurs from the active to the standby Route Processor (RP).<br>In 12.2(28)SB, the ISSU feature was introduced.<br>In 12.2(33)SRB-1, the LSPV Push and TE clients and the eFSU functionality were added.<br>The following commands were introduced or modified: **show issu clients, show issu entities, show issu message types, show issu negotiated, show issu outage, show issu sessions**. |

# Glossary

**eFSU**—enhanced Fast Software Upgrade.

**IS**—intermediate system.

**ISSU**—In Service Software Upgrade.

**LACP**—Link Aggregration Control Protocol.

**LDP**—Label Distribution Protocol.

**MFI**—Multiprotocol Label Switching Forwarding Infrastructure.

**MPLS**—Multiprotocol Label Switching.

**OAM**—Operation, Administration, and Management.

**PagP**—port aggregation Protocol.

**PPP**—Point to Point protocol.

**RP**—Route Processor.

**RSVP GR**—Resource Reservation Protocol graceful restart.

**TE**—traffic engineering.

**VPN**—Virtual Private Network.

**VRF**—virtual routing and forwarding.