ISSU MPLS Clients

MPLS applications can be upgraded using the In Service Software Upgrade (ISSU) process. Thus, MPLS applications are considered ISSU's MPLS clients. The ISSU process allows Cisco IOS XE software to be updated or otherwise modified while packet forwarding continues.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and 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 table at the end of this module.

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

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, on page 4 to determine compatibility.

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

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: • Checkpointing and Redundancy Facility • MPLS TE High Availability

Information About ISSU MPLS Clients

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

This section provides information about upgrading MPLS-related applications through ISSU. Those MPLS applications are considered ISSU’s MPLS “clients.”

For more information on the ISSU procedure, see Cisco IOS XE In Service Software Upgrade Process document and see the Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide .

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)

Note For a complete list of ISSU- compliant protocols and applications that are supported for the Cisco ASR Series Routers for your release, see the Release Notes for Cisco ASR Series Aggregation Services Routers .

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”
- 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

Note For the complete task sequence that accomplishes ISSU see the Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide .

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.

Before you begin

Ensure that you have successfully loaded new Cisco IOS XE software onto the standby processor as described in the Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide.

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** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show issu clients** **Example:** `Router# show issu clients`	Lists network applications and protocols currently supported by ISSU. • 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* **Example:** `Router# show issu sessions 2002`	Displays detailed information about a particular ISSU client that includes whether a particular client is compatible with the intended upgrade.

	Command or Action	Purpose
		• 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*
	Example:
	`Router#`
	`show issu negotiated version 33`
		Displays details of the session's negotiated message version.

Step 5	**show issu negotiated capability** *sessionID*
	Example:
	`Router#`
	`show issu negotiated capability 33`
		Displays results of a negotiation about the client application's capabilities.

Step 6	**show issu message types** *clientID* **Example:** `Router# show issu message types 2002`	Displays the message formats ("types") and versions supported by the specified client.

Configuration Examples for ISSU MPLS Clients

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, 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
```

```
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

The following sections provide references related to the ISSU MPLS Clients feature.

Related Documents

Related Topic	Document Title
ISSU process	• Cisco IOS XE In Service Software Upgrade Process • Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide
High availability commands	*Cisco IOS High Availability Command Reference*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature	--

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. 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. 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

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Table 2: Feature Information for ISSU MPLS Clients

Feature Name	Releases	Feature Information
ISSU MPLS--LDP	Cisco IOS XE Release 2.1	This feature allows In Service Software Upgrade (ISSU) support for the Label Distribution Protocol (LDP) and Multiprotocol Label Switching (MPLS) Forwarding. MPLS applications can be upgraded using the In Service Software Upgrade (ISSU) process. Thus, MPLS applications are considered ISSU's MPLS clients. The ISSU process allows Cisco IOS XE software to be updated or otherwise modified while packet forwarding continues. In Cisco IOS XE Release 2.1, this feature was introduced on Cisco ASR 1000 Series Aggregation Services Routers.
		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.**
ISSU--MPLS VPN (Support for IPv4 VPNs)	Cisco IOS XE Release 2.1	This feature supports In Service Software Upgrade (ISSU) for Multiprotocol Label Switching (MPLS) Virtual Private networks (VPNs) for IPv4 address families only. In Cisco IOS XE Release 2.1, this feature was introduced on Cisco ASR 1000 Series Aggregation Services Routers. No commands were introduced or modified for this feature.
ISSU--MPLS TE	Cisco IOS XE Release 2.3	This feature allows upgrade or downgrade of compatible Cisco IOS XE software images on the back up Route Processor (RP) while the device is operational and passing traffic on Multiprotocol Label Switching (MPLS) traffic engineering (TE) tunnels. In Cisco IOS XE Release 2.3, this feature was introduced on Cisco ASR 1000 Series Aggregation Services Routers. No commands were introduced or modified for this feature.

Glossary

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.