Enhancements to Data Models

This section provides an overview of the enhancements made to data models.

OAM for MPLS and SR-MPLS in mpls-ping and mpls-traceroute Data Models

Table 1: Feature History Table

Feature Name	Release Information	Description
YANG Data Models for MPLS OAM RPCs	Release 7.3.2	This feature introduces the `Cisco-IOS-XR-mpls-ping-act` and `Cisco-IOS-XR-mpls-traceroute-act` YANG data models to accommodate operations, administration and maintenance (OAM) RPCs for MPLS and SR-MPLS. You can access these Cisco IOS XR native data models from the Github repository.

The Cisco-IOS-XR-mpls-ping-act and Cisco-IOS-XR-mpls-traceroute-act YANG data models are introduced to provide the following options:

- Ping for MPLS:
  - MPLS IPv4 address
  - MPLS TE
  - FEC-129 Pseudowire
  - FEC-128 Pseudowire
  - Multisegment Pseudowire

- Ping for SR-MPLS:
  - SR policy name or BSID with LSP end-point
  - SR MPLS IPv4 address
  - SR Nil-FEC labels
  - SR Flexible Algorithm
- Traceroute for MPLS:
  - MPLS IPv4 address
  - MPLS TE
- Traceroute for SR-MPLS:
  - SR policy name or BSID with LSP end-point
  - SR MPLS IPv4 address
  - SR Nil-FEC labels
  - SR Flexible Algorithm

The following example shows the ping operation for an SR policy and LSP end-point:

```
<mpls-ping xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-ping-act">
  <sr-mpls>
  <policy>
    <name>srte_c_10_ep_10.10.10.1</name>
      <lsp-endpoint>10.10.10.4</lsp-endpoint>
  </policy>
  </sr-mpls>
  <request-options-parameters>
    <brief>true</brief>
  </request-options-parameters>
</mpls-ping>
```

Response:

```
<?xml version="1.0"?>
 <mpls-ping-response xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-ping-act">
  <request-options-parameters>
   <exp>0</exp>
   <fec>false</fec>
   <interval>0</interval>
   <ddmap>false</ddmap>
   <force-explicit-null>false</force-explicit-null>
   <packet-output>
    <interface-name>None</interface-name>
    <next-hop>0.0.0.0</next-hop>
   </packet-output>
   <pad>abcd</pad>
   <repeat>5</repeat>
   <reply>
    <dscp>255</dscp>
    <reply-mode>default</reply-mode>
    <pad-tlv>false</pad-tlv>
   </reply>
   <size>100</size>
```

```
   <source>0.0.0.0</source>
   <destination>127.0.0.1</destination>
   <sweep>
    <minimum>100</minimum>
    <maximum>100</maximum>
    <increment>1</increment>
   </sweep>
   <brief>true</brief>
   <timeout>2</timeout>
   <ttl>255</ttl>
  </request-options-parameters>
  <replies>
   <reply>
    <reply-index>1</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>2</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>3</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>4</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>5</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
  </replies>
 </mpls-ping-response>
```

The following example shows the ping operation for an SR policy BSID and LSP end-point:

```
<mpls-ping xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-ping-act">
<sr-mpls>
<policy>
    <bsid>1000</bsid>
    <lsp-endpoint>10.10.10.4</lsp-endpoint>
</policy>
</sr-mpls>
<request-options-parameters>
    <brief>true</brief>
</request-options-parameters>
</mpls-ping>
```

Response:

```
<?xml version="1.0"?>
 <mpls-ping-response xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-ping-act">
  <request-options-parameters>
   <exp>0</exp>
   <fec>false</fec>
   <interval>0</interval>
   <ddmap>false</ddmap>
   <force-explicit-null>false</force-explicit-null>
   <packet-output>
    <interface-name>None</interface-name>
    <next-hop>0.0.0.0</next-hop>
   </packet-output>
   <pad>abcd</pad>
   <repeat>5</repeat>
   <reply>
    <dscp>255</dscp>
    <reply-mode>default</reply-mode>
    <pad-tlv>false</pad-tlv>
   </reply>
   <size>100</size>
   <source>0.0.0.0</source>
   <destination>127.0.0.1</destination>
   <sweep>
    <minimum>100</minimum>
    <maximum>100</maximum>
    <increment>1</increment>
   </sweep>
   <brief>true</brief>
   <timeout>2</timeout>
   <ttl>255</ttl>
  </request-options-parameters>
  <replies>
   <reply>
    <reply-index>1</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>2</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>3</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>4</reply-index>
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
   <reply>
    <reply-index>5</reply-index>
```

```
    <return-code>3</return-code>
    <return-char>!</return-char>
    <reply-addr>14.14.14.3</reply-addr>
    <size>100</size>
   </reply>
  </replies>
 </mpls-ping-response>
```

The following example shows the traceroute operation for an SR policy and LSP end-point:

```
<mpls-traceroute xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-traceroute-act">
<sr-mpls>
<policy>
    <name>srte_c_10_ep_10.10.10.1</name>
    <lsp-endpoint>10.10.10.4</lsp-endpoint>
</policy>
</sr-mpls>
<request-options-parameters>
    <brief>true</brief>
</request-options-parameters>
</mpls-traceroute>
```

Response:

```
<?xml version="1.0"?>
 <mpls-traceroute-response xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-mpls-traceroute-act">

  <request-options-parameters>
   <exp>0</exp>
   <fec>false</fec>
   <ddmap>false</ddmap>
   <force-explicit-null>false</force-explicit-null>
   <packet-output>
    <interface-name>None</interface-name>
    <next-hop>0.0.0.0</next-hop>
   </packet-output>
   <reply>
    <dscp>255</dscp>
    <reply-mode>default</reply-mode>
   </reply>
   <source>0.0.0.0</source>
   <destination>127.0.0.1</destination>
   <brief>true</brief>
   <timeout>2</timeout>
   <ttl>30</ttl>
  </request-options-parameters>
  <paths>
   <path>
    <path-index>0</path-index>
    <hops>
    <hop>
        <hop-index>0</hop-index>
        <hop-origin-ip>11.11.11.1</hop-origin-ip>
        <hop-destination-ip>11.11.11.2</hop-destination-ip>
        <mtu>1500</mtu>
        <dsmap-label-stack>
            <dsmap-label>
                <label>16003</label>
            </dsmap-label>
        </dsmap-label-stack>
        <return-code>0</return-code>
        <return-char> </return-char>
    </hop>
```

```
  <hop>
      <hop-index>1</hop-index>
      <hop-origin-ip>11.11.11.2</hop-origin-ip>
      <hop-destination-ip>14.14.14.3</hop-destination-ip>
      <mtu>1500</mtu>
      <dsmap-label-stack>
          <dsmap-label>
              <label>3</label>
          </dsmap-label>
      </dsmap-label-stack>
      <return-code>8</return-code>
      <return-char>L</return-char>
  </hop>
  <hop>
      <hop-index>2</hop-index>
      <hop-origin-ip>14.14.14.3</hop-origin-ip>
      <hop-destination-ip></hop-destination-ip>
      <mtu>0</mtu>
      <dsmap-label-stack/>
      <return-code>3</return-code>
      <return-char>!</return-char>
  </hop>
  </hops>
 </path>
</paths>
</mpls-traceroute-response>
```