# Forward Error Correction

*Table 1: Feature History*

| Feature Name | Release Information | Description |
|---|---|---|
| Forward Error Correction | Cisco IOS XE SD-WAN Release 16.11.x | Feature introduced. FEC is a mechanism to recover lost packets on a link by sending extra "parity" packets for every group of 4 packets. |
| IPv6 support for Forward Error Correction | Cisco IOS XE Catalyst SD-WAN Release 17.15.1a | IPv6 support for Forward Error Correction is added. |

Forward Error Correction (FEC) is a mechanism to recover lost packets on a link by sending extra "parity" packets for every group of 4 packets. As long as the receiver receives a subset of packets in the group (at-least N-1) and the parity packet, up to a single lost packet in the group can be recovered. FEC is supported on Cisco IOS XE Catalyst SD-WAN devices.

**Note** We recommend Cisco IOS XE Release 17.6.3 as the minimum release when using FEC.

**Supported Traffic**

Cisco IOS XE Catalyst SD-WAN Devices support forward error correction for the following traffic types:

From Cisco IOS XE Catalyst SD-WAN Release 16.12.1b:

IPv4 traffic over IPv4 tunnel

From Cisco IOS XE Catalyst SD-WAN Release 17.15.1a:

- IPv4 traffic over IPv6 tunnel
- IPv6 traffic over IPv4 tunnel
- IPv6 traffic over IPv6 tunnel

# Supported Devices for Forward Error Correction

The forward error correction is supported on all the Cisco IOS XE Catalyst SD-WAN devices.

# Configure Forward Error Correction for a Policy

**Procedure**

**Step 1**   From the Cisco SD-WAN Manager menu, choose **Configuration** > **Policies**.

**Step 2**   Click **Centralized Policy** and then click **Add Policy**.

**Step 3**   Click **Next**.

**Step 4**   Click **Next** again and then click **Configure Traffic Rules**.

**Step 5**   Click **Traffic Data**, and from the **Add Policy** drop-down list, choose **Create New**.

**Step 6**   Click **Sequence Type**.

**Step 7**   From the **Add Data Policy** pop-up menu, choose **QoS**.

**Step 8**   Click **Sequence Rule**.

**Step 9**   In the **Applications/Application Family List**, choose one or more applications or lists.

**Step 10**   Click **Accept**.

**Step 11**   Click **Actions** and click **Loss Correction**.

**Step 12**   In the **Actions** area, choose one of the following:

  • **FEC Adaptive**: Only send FEC information when the loss detected by the system exceeds the packet loss threshold.

  • **FEC Always**: Always send FEC information with every transmission.

  • **Packet Duplication** check box: Duplicates packets through secondary links to reduce packet loss if one link goes down.

**Step 13**   Click **Save Match and Actions**.

**Step 14**   Click **Save Data Policy**.

**Step 15**   Click **Next** and take these actions to create a centralized policy:

  a)   Enter a **Name** and a **Description**.
  b)   Select **Traffic Data Policy**.
  c)   Choose VPNs and a site list for the policy.
  d)   Save the policy.

# Monitor Forward Error Correction Tunnel Information

**Procedure**

**Step 1**    From the Cisco SD-WAN Manager menu, choose **Monitor** > **Devices**.

Cisco vManage Release 20.6.x and earlier: From the Cisco SD-WAN Manager menu, choose **Monitor** > **Network**.

**Step 2**    Choose a device group.

**Step 3**    In the left panel, click **Tunnel**, which displays under WAN.

The WAN tunnel information includes the following:

- A graph that shows the total tunnel loss for the selected tunnels.

- A table that provides the following information for each tunnel endpoint:

    - Name of the tunnel endpoint

    - Communications protocol that the endpoint uses

    - State of the endpoint

    - Jitter, in ms, on the endpoint

    - Packet loss percentage for the endpoint

    - Latency, in ms, on the endpoint

    - Total bytes transmitted from the endpoint

    - Total bytes received by the endpoint

    - Application usage link

# Monitor Forward Error Correction Status Using the CLI

Use the **show sdwan tunnel statistics fec** command to verify the FEC status on a Cisco IOS XE Catalyst SD-WAN device:

```
Device# show sdwan tunnel statistics fec
tunnel stats ipsec 192.0.2.1 203.0.113.1 12346 12366
fec-rx-data-pkts    0
fec-rx-parity-pkts  0
fec-tx-data-pkts    0
fec-tx-parity-pkts  0
fec-reconstruct-pkts 0
fec-capable         true
fec-dynamic         false
tunnel stats ipsec 192.0.2.1 203.0.113.1 12346 12346
fec-rx-data-pkts    122314
```

```
fec-rx-parity-pkts   30578
fec-tx-data-pkts     125868
fec-tx-parity-pkts   31467
fec-reconstruct-pkts 3
fec-capable          true
fec-dynamic          false
```

The following table describes the FEC counters related to the output shown in the **show sdwan tunnel statistics fec** command:

| Name of Counter | Description |
| --- | --- |
| **fec-rx-data-pkts** | Displays the number of data packets received by the device. |
| **fec-rx-parity-pkts** | Displays the number of parity packets received by the device. |
| **fec-tx-data-pkts** | Displays the number of data packets sent by the device. |
| **fec-tx-parity-pkts** | Displays the number of parity packets sent by the device. |
| **fec-reconstruct-pkts** | Displays the number of received packets reconstructed by the device. |