SR-TE Per-Flow (Class) ODN and Automated Steering (PCE Delegated)

Table 1: Feature History

Feature Name	Release	Description
SR-TE Per-Flow (Class) ODN and Automated Steering (PCE Delegated)	Cisco IOS XE Amsterdam 17.3.1	This feature lets you steer traffic with SR-TE PFP based on the QoS markings on the packets. The traffic is then switched onto the appropriate path based on the forward classes of the packet. This feature is supported on the Cisco RSP2 and RSP3 modules.

The SR-TE Per-flow policy (PFP) ODN with auto steering (Per flow ODN/AS) is a mechanism that allows the steering of traffic on an SR policy based on the attributes of the packets. SR-TE Per-flow policy (PFP) ODN with auto steering (Per flow ODN/AS) is a mechanism that allows the steering of traffic on an SR policy based on the attributes of the oacket. Packets are classified using Cisco's Modular QoS CLI (MQC) framework and then marked using internal tags known as forward classes (FCs). A Per-Flow Policy (PFP) is then used to route the marked packets based on the mappings between an FC and its corresponding path. This means that the traffic is steered based on its QoS markings and switched onto the appropriate path based on the FC of the packet.

A PFP is identified by <color, endpoint>. It is configured with a per-flow forwarding class table with up to eight entries, with each entry indexed by an FC and points to a Per Destination Policy (PDP) or native RIB path.

Restrictions for SR-TE Per-Flow (Class) ODN and Automated Steering (PCE Delegated)

For RSP2:

- 250 PFP+PDP (Combination) is supported.

- Dynamic change in the Quality of Service policy is not supported.

- PIC core over SR-TE tunnel PIC edge is not supported.

- VPLS over SR-TE is not supported.

- IPV6 is not supported.

- 10k VPNV4 prefix limit is supported.

- Effective Cisco IOS XE Bengaluru 17.5.1, ECMP over SR-TE is supported on RSP3.

- Total number of labels supported is 5 (3+2).

- Configure the set forward class to 0 to take default path for non-forward class.

- L3VPN Inter AS Option B for SR PFP is supported.

- Bgp vpnv4 label allocation mode should be on per VRF mode.

- BGP Labeled Unicast (BGP-LU) (RFC 3107) is not supported for SR ODN PFP Auto Steering.

- L2VPN over PFP tunnels is not supported.

- IPv6 services over PFP tunnel is not supported.

- Performance-Measurement over PFP is not supported.

- MPLS Ping or trace-route over PFP is not supported.

- Auto-route announce over PFP or PDP is not supported.

- PIC is not supported over PFP.

- IPv4 over MPLS and MPLS over VPN services are not supported with three and four transport labels.

- SR PFP is *not* supported with EVPN.

For RSP3:

- HW load balancing does not work with SR PFP template. HW load balancing works based on pre-selection only.

- SR PM will turn into SW timestamping mode if SRTE PFP feature is enabled through template.

- The following Quality of Service must be disabled in this option

  - Short Pipe

  - Vlan Cos Marking

- Timestamping will work at PD SW.

- A download error message is displayed for all unsupported OCE chains.

- PIC core over SR-TE tunnel PIC edge is not supported.

- VPLS over SR-TE is not supported.

- Effective Cisco IOS XE Bengaluru 17.5.1, ECMP over SR-TE is supported on RSP3.

- IPv4 over MPLS and MPLS over VPN services are not supported with three and four transport labels.

- Segment routing in Active or Active Quality of Service template is not supported.

- Short–pipe mode not supported.

- IPV6 is not supported.

- Policy statistics are not supported for 3/4 label SR policy.

- 250 PFP policies and 250 PDP policies are supported.

- The SR PFP and SR five-label push template are mandatory for PFP to work. When using the SR five-label push template, the following features are not supported:

  - OAM down MEP

  - Ethernet loopback

  - RSPAN

- The enable_egr_l3vpn_cm – L3VPN conditional marking is an optional template for PFP.

- Any other template cannot be enabled along with the OAM down MEP, Ethernet loopback, or RSPAN templates.

- LB paths under PDP or PFP tunnels are not supported.

Configuring SR ODN Per-Flow Policy (PFP) AUTO STEERING (PCE DELEGATED)

Consider the following topology:
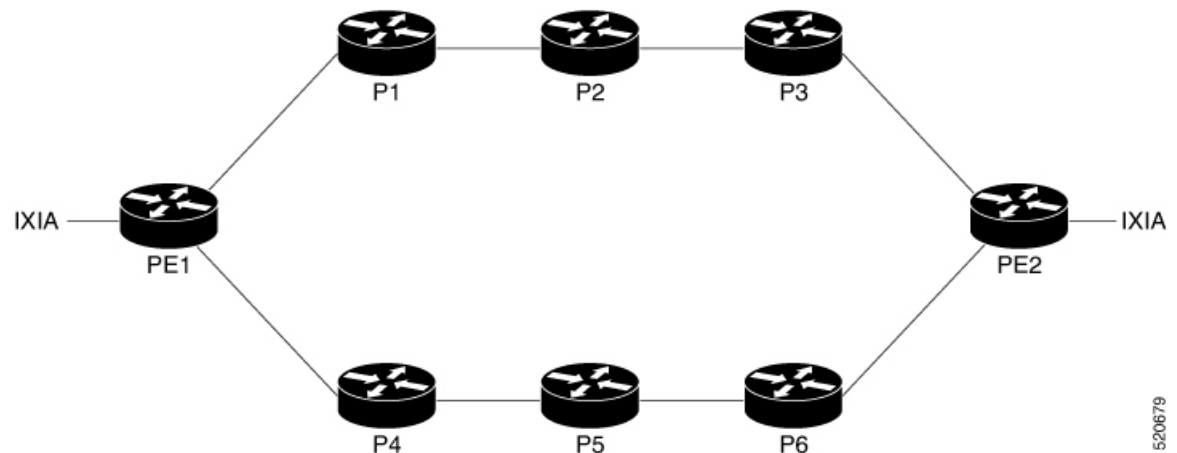
Perform the following steps to configure ODN for PFP:

1. Configure Quality of Service on PE1.

```
class-map DSCP
      match DSCP AF41
```

- Set forward class on the class map.

```
policy-map per-flow
 class DSCP
 set forward-class 1
```

- Attach the policy map on the corresponding interface.

```
interface TenGigabitEthernet0/1/0
 service-policy input per-flow
```

2. Configure SR-TE PFP on PE1.

   - Set forward class on PFP.

```
policy PER_FLOW
color 4500 end-point 5.5.5.5
candidate-paths
  preference 2
    per-flow
        forward-class 0 color 100
        forward-class 1 color 330
        forward-class 2 color 580
        forward-class 3 color 3010
        forward-class 4 color 2305
        forward-class 5 color 8363
        forward-class 6 color 9000
        forward-class 7 color 4294967295
```

   - Attach the segment list to PDP.

```
policy  perflow_pdp
color 100 end-point 5.5.5.5
candidate-paths
 preference 2
   explicit segment-list srte1 weight 10
   !
   constraints
     segments
       dataplane mpls
```

   - Set segment list to SR-TE.

```
segment-routing traffic-eng
  segment-list name srte1
      index 1 mpls label 16002
      index 2 mpls label 16005
```

3. Configure SR-TE PFP on PE2.

```
ip prefix-list pfp seq 5 permit 35.0.0.0/16 le 32
```

   - Attach route-map to PFP.

```
route-map pfp permit 10
 match ip address prefix-list pfp
 set extcommunity color 4500
```

   - Activate BGP routes.

```
router bgp 100
 !
```

```
address-family vpnv4
 neighbor 10.0.0.1 activate
 neighbor 10.0.0.1 send-community extended
 neighbor 10.0.0.1 route-map pfp out
```