



L2CP Tunneling MEF

This chapter introduces you to L2 Control Protocols (L2CP) tunneling to help initiate control packets from a local customer-edge (CE) device to a remote CE device.

Table 1: Feature History Table

| Feature Name | Release Information | Feature Description |
|----------------|---------------------|---|
| L2CP Tunneling | Release 7.4.1 | <p>This feature is now supported on routers that have Cisco NC57 line cards installed and operates in native and compatibility modes.</p> <p>L2 Control Protocols (L2CP) tunneling helps initiate control packets from a local customer-edge (CE) device to a remote CE device.</p> |

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L2CP Tunneling

The router supports the following tunnel protocols:

- Link Layer Discovery Protocol (LLDP)
- Link Aggregation Control Protocol (LACP)
- Operation, Administration, Management (OAM)
- Ethernet Local Management Interface (ELMI)
- Cisco Discovery Protocol (CDP)

Some of the L2 transport interfaces are:

- VPWS L2 transport main
- VPWS L2 subinterface

- L2 transport main bridge port
- L2 subinterface bridge port
- VPWS L2 bundle main port
- VPWS L2 bundle subinterface
- L2 bundle main bridge port

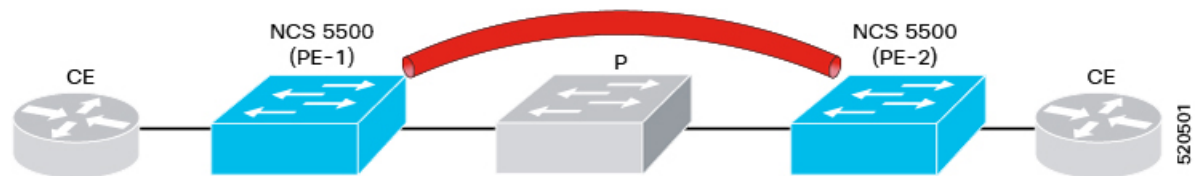
On a subinterface, when control packets such as LLDP and LACP are tunneled, the system tunnels the same control packets to the main interface.

The LACP packet for VPLS (also known as ELAN service) either gets peered or dropped.

The router tunnels Layer 2 packets between PEs.

The following figure depicts Layer 2 protocol tunneling.

Figure 1: L2CP Tunneling



L2CP packets are tunneled from NNI to NNI (depicted in red pipe). The Layer 2 traffic is sent through the Cisco NCS 5500 Series Routers, and these routers switch the traffic from end to end.

Restrictions

- VPLS service does not support LACP tunneling.
- VPWS and EVPN-VPWS services support LACP tunneling.

L2CP Protocol Support on Cisco NCS 5500 Series Router

The router supports Layer 2 peering functionalities on a per Ethernet Flow Point (EFP) basis. It supports maximum packet rate of 10 packets per second (per interface) for a protocol, and 100 packets per second for all protocols (on all interfaces).

You do not need to configure L2CP tunneling explicitly. L2CP packets are tunneled over Layer 2 tunnel by default.

The following table lists the options that are supported on the router and displays the supported defaults and configuration options for the router.

| Protocol | Packet Type | Action |
|----------|-------------|--------------------|
| CDP | Untagged | Peer |
| LACP | Untagged | Peer |
| LLDP | Untagged | Peer else Tunneled |

| Protocol | Packet Type | Action |
|----------|-------------|----------|
| STP | Untagged | Peer |
| VTP | Untagged | Peer |
| OAM | Untagged | Peer |
| BPDU | Untagged | Tunneled |
| UDLD | Untagged | Peer |
| CDP | Tagged | Tunneled |
| LACP | Tagged | Tunneled |
| LLDP | Tagged | Tunneled |
| STP | Tagged | Tunneled |
| VTP | Tagged | Tunneled |
| BPDU | Tagged | Tunneled |
| OAM | Tagged | Tunneled |
| ELMI | Tagged | Tunneled |
| UDLD | Tagged | Peer |

The following table lists the supported options on the router and displays the supported defaults and configuration options for the Cisco NCS 5700 Series Line Cards.

| Protocol | Services and Action on Cisco NCS 5700 Series Line Cards | | | | | | | |
|------------|---|--------|---------|---------|---------|---------|---------|---------------------|
| | EPL1 | EPL2 | ELAN | E-Tree | EVPL1 | EVLAN | EVTREE | Enable on Interface |
| STP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Not supported |
| RSTP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Not supported |
| LACP /LAMP | Tunnel | Tunnel | Discard | Discard | Discard | Discard | Discard | Punt |
| LOAM | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Drop |
| E-LMI | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt |
| LLDP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt |
| PTP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt |

| Protocol | Services and Action on Cisco NCS 5700 Series Line Cards | | | | | | | |
|-------------|---|--------|--------|--------|---------------|---------------|---------------|---------------------|
| | EPL1 | EPL2 | ELAN | E-Tree | EVPL1 | EVLAN | EVTREE | Enable on Interface |
| ESMC /SynCE | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Not supported |
| CDP | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Punt |
| MACSEC | Tunnel | Tunnel | Tunnel | Tunnel | Not supported | Not supported | Not supported | Punt-not supported |
| UDLD | Drop | Drop | Drop | Drop | NA | NA | NA | Punt |



Note L2CP protocols over BVI is not supported.
L2CP protocol on Cisco NCS 5700 Series Line Cards is supported from Release 7.6.1.

MEF Compliant L2CP Tunneling Services

Table 2: Feature History Table

| Feature Name | Release | Description |
|---------------------------------------|---------------|--|
| MEF Compliant L2CP Tunneling Services | Release 7.6.1 | <p>MEF compliant Ethernet private line (EPL1) and Ethernet virtual private line (EVPL1) L2CP tunneling services enable a point-to-point Ethernet connection between a pair of dedicated User-Network Interfaces.</p> <p>These services provide:</p> <ul style="list-style-type: none"> • Efficient and secure connections between networks. • Packet-switched network connections to enable endpoints to reside in different machines. • Enabling of virtual private networks. • Privacy |

The Router supports the MEF compliant L2CP tunneling services of EPL1 and EVPL1 and their configurations.



Note This feature is applicable only to the Distributed Disaggregated Chassis (DDC).

The following table lists the MEF compliant L2CP tunneling services and their actions with protocol.

Table 3: MEF Compliant L2CP Tunneling Services

| Protocol | Services and Action | | |
|---------------------|-----------------------------|--|---------------------|
| | EPL1 (Local Xconnect, VPWS) | EVPL1 (Local Xconnect, VPWS with VLAN) | Enable on Interface |
| STP | Tunnel | Tunnel | Not supported |
| RSTP | Tunnel | Tunnel | Not supported |
| MSTP | Tunnel | Tunnel | Not supported |
| PVRST ^{*1} | Not supported | Not supported | Not supported |
| Pause | Not supported | Not supported | Not supported |
| LACP /LAMP | Tunnel | Discard | Punt |
| LOAM | Tunnel | NA | Punt |
| E-LMI | Tunnel | Tunnel | Punt |
| LLDP | Tunnel | Tunnel | Punt |
| PTP | Tunnel | Tunnel | Punt |
| ESMC/SynCE | Tunnel | NA | Punt |
| CDP | Tunnel | NA | Punt |
| MACSEC | Tunnel | Not supported | Not supported |
| UDLD | Discard | NA | Punt |

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PVRST is not MEF defined protocol. It is included for the completeness.

Configure MEF 2.0 Compliant L2CP Tunneling Services

Cisco IOS XR software Release 7.6.1 supports MEF 2.0 complaint L2CP tunneling services of EPL1 and EVPL1.

Configure EPL1

Configuration Example

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# xconnect group 1
Router(config-l2vpn-xc)# p2p 1
Router(config-l2vpn-xc-p2p)# interface bundle-Ether 101
Router(config-l2vpn-xc-p2p)# interface bundle-Ether 102
Router(config-l2vpn-xc-p2p)# commit
```

Running Configuration

```
Router# show run l2vpn xconnect group 1
l2vpn
 xconnect group 1
  p2p 1
    interface Bundle-Ether101
    interface Bundle-Ether102
  !
!
!
```

Verification

```
Router# show l2vpn xconnect group 1
Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
        SB = Standby, SR = Standby Ready, (PP) = Partially Programmed,
        LU = Local Up, RU = Remote Up, CO = Connected, (SI) = Seamless Inactive
```

| XConnect Group | Name | ST | Segment 1 Description | ST | Segment 2 Description | ST |
|----------------|------|----|-----------------------|----|-----------------------|----|
| 1 | 1 | UP | BE101 | UP | BE102 | UP |

Configure EVPL1

Configuration Example

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# xconnect group 10
Router(config-l2vpn-xc)# p2p 10
Router(config-l2vpn-xc-p2p)# interface bundle-Ether 101.1
Router(config-l2vpn-xc-p2p)# interface bundle-Ether 102.1
Router(config-l2vpn-xc-p2p)# commit
```

Running Configuration

```
Router# show run l2vpn xconnect group 10
l2vpn
 xconnect group 10
  p2p 10
```

```

interface Bundle-Ether101.1
interface Bundle-Ether102.1
!
!
!

```

Verification

Router# **show l2vpn xconnect group 10**

Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
 SB = Standby, SR = Standby Ready, (PP) = Partially Programmed,
 LU = Local Up, RU = Remote Up, CO = Connected, (SI) = Seamless Inactive

| XConnect Group | Name | ST | Segment 1 Description | ST | Segment 2 Description | ST |
|----------------|------|----|-----------------------|----|-----------------------|----|
| 10 | 10 | UP | BE101.1 | UP | BE102.1 | UP |

Cisco NC57 Compatibility Mode: L2CP Tunneling

Table 4: Feature History Table

| Feature Name | Release Information | Feature Description |
|---|---------------------|---|
| Cisco NC57 Compatibility Mode: L2CP Tunneling | Release 7.5.1 | This feature is now supported on routers that have Cisco NC57 line cards installed and operate in compatibility mode. L2 Control Protocols (L2CP) tunneling helps initiate control packets from a local customer-edge (CE) device to a remote CE device. |

L2CP Support Matrix for Cisco NC57 Compatibility Mode

Table 5:

| Services | EDPL1 | EDPL2 | ELAN | E-Tree | EVPL1 | EVLAN | EVTREE | Enable on Interface | EPLAN/EVPLAN+ BVI data points |
|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------------|-------------------------------|
| STP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Not supported | Discard |
| RSTP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Not supported | Discard |
| MSTP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Not supported | Discard |
| PVRST | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Discard |

| Services | EDPL1 | EDPL2 | ELAN | E-Tree | EVPL1 | EVLAN | EVTREE | Enable on Interface | EPLAN/ EVPLAN+ BVI data points |
|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------------|--|
| Pause | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Not supported | Discard |
| LACP/ LAMP | Tunnel | Tunnel | Discard | Discard | Discard | Discard | Discard | Punt | Discard Only physical |
| LOAM | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Punt | Discard Only physical |
| E-LMI | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt | Discard Only physical E-LMI is not supported on subinterface. |
| LLDP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt | Discard |
| PTP | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Tunnel | Punt | Discard |
| ESMC/ SynCE | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Punt | Discard |
| CDP | Tunnel | Tunnel | Tunnel | Tunnel | NA | NA | NA | Punt | Discard |
| MACSEC | Tunnel | Tunnel | Tunnel | Tunnel | Not Supported | Not Supported | Not Supported | Not Supported | Discard |
| UDLD | Drop | Drop | Drop | Drop | NA | NA | NA | Punt | Discard |