

## Chapter 18

# Summary of CCC and TCC Configuration Statements

This chapter provides a reference for each circuit cross-connect (CCC) configuration statement. The statements are organized alphabetically.

## connections

```

Syntax connections {
    interface-switch connection-name {
        interface interface-name.unit-number;
        interface interface-name.unit-number;
    }
    lsp-switch connection-name {
        transmit-lsp label-switched-path;
        receive-lsp label-switched-path;
    }
    p2mp-receive-switch {
        output-interface interface-name.unit-number;
        receive-p2mp-lsp receiving-point-to-multipoint-lsp;
    }
    p2mp-transmit-switch {
        input-interface input-interface-name.unit-number;
        transmit-p2mp-lsp transmitting-point-to-multipoint-lsp;
    }
    remote-interface-switch connection-name {
        interface interface-name.unit-number;
        transmit-lsp label-switched-path;
        receive-lsp label-switched-path;
    }
}

```

**Hierarchy Level** [edit logical-routers *logical-router-name* protocols],  
[edit protocols]

**Description** Define the connection between two circuits in a CCC connection.

**Options** The statements are explained separately.

**Usage Guidelines** See “CCC and TCC Overview” on page 355 and the *JUNOS Network Interfaces and Class of Service Configuration Guide*.

**Required Privilege Level** routing—To view this statement in the configuration.  
routing-control—To add this statement to the configuration.

## encapsulation

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See the following sections:

encapsulation (Logical Interface) on page 387

encapsulation (Physical Interface) on page 389

### ***encapsulation (Logical Interface)***

<b>Syntax</b>	encapsulation (atm-ccc-cell-relay   atm-ccc-vc-mux   atm-tcc-vc-mux   atm-cisco-nlpid   atm-mlppp-llc   atm-nlpid   atm-ppp-llc   atm-ppp-vc-mux   atm-snap   atm-tcc-snap   atm-vc-mux   ether-over-atm-llc   ether-vpls-over-atm-llc   frame-relay-ccc   frame-relay-tcc   gre-fragmentation   multilink-frame-relay-end-to-end   multilink-ppp   vlan-ccc   vlan-ccc   vlan-vpls);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ], [edit logical-routers <i>logical-router-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]
<b>Description</b>	Logical link-layer encapsulation type.
<b>Options</b>	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>atm-ccc-vc-mux—Use ATM VC multiplex encapsulation on circuit cross-connect (CCC) circuits. When you use this encapsulation type, you can configure the family ccc only.</p> <p>atm-cisco-nlpid—Use Cisco ATM NLPID encapsulation. When you use this encapsulation type, you can configure the family inet only.</p> <p>atm-mlppp-llc—For ATM2 IQ interfaces only, use Multilink PPP over ATM adaptation layer 5 (AAL5) logical link control (LLC). For this encapsulation type, your router must be equipped with a Link Services PIC.</p> <p>atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the family inet only.</p> <p>atm-ppp-llc—For ATM2 IQ interfaces only, use PPP over ATM adaptation layer 5 (AAL5) logical link control (LLC) encapsulation.</p> <p>atm-ppp-vc-mux—For ATM2 IQ interfaces only, use PPP over ATM adaptation layer 5 (AAL5) multiplex encapsulation.</p> <p>atm-snap—Use ATM SNAP encapsulation.</p> <p>atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.</p> <p>atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on translational cross-connect (TCC) circuits. When you use this encapsulation type, you can configure the family tcc only.</p> <p>atm-vc-mux—Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the family inet only.</p>

`ether-over-atm-llc`—For interfaces that carry IPv4 traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

`ether-vpls-over-atm-llc`—For ATM intelligent queuing interfaces only, use the Ethernet VPLS over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the FCS field removed.

`frame-relay-ccc`—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the family `ccc` only.

`frame-relay-tcc`—Use Frame Relay encapsulation on TCC circuits for connecting unlike media. When you use this encapsulation type, you can configure the family `tcc` only.

`gre-fragmentation`—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the don't fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's MTU value, the packet is fragmented before encapsulation.

`multilink-frame-relay-end-to-end`—Use Multilink Frame Relay (MLFR) FRF.15 encapsulation. This encapsulation is used only on multilink and link services interfaces and their constituent T1 or E1 interfaces.

`multilink-ppp`—Use Multilink Point-to-Point Protocol (MLPPP) encapsulation. This encapsulation is used only on multilink and link services interfaces and their constituent T1 or E1 interfaces.

`vlan-ccc`—Use Ethernet virtual local area network (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the family `ccc` only.

`vlan-tcc`—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the family `tcc` only.

`vlan-vpls`—Use Ethernet VLAN encapsulation on virtual private LAN service (VPLS) circuits.

**Usage Guidelines** See “Defining the Encapsulation for Layer 2 Switching Cross-Connects” on page 361, “Defining the CCC Encapsulation for LSP Tunnel Cross-Connects” on page 371, and “Defining the Encapsulation for the Layer 2 Switching TCCs” on page 377. For more information about how to configure interfaces, see the *JUNOS Network Interfaces and Class of Service Configuration Guide*.

**Required Privilege Level** `interface`—To view this statement in the configuration.  
`interface-control`—To add this statement to the configuration.

**encapsulation (Physical Interface)**

<b>Syntax</b>	encapsulation (atm-ccc-cell-relay   atm-pvc   cisco-hdlc   cisco-hdlc-ccc   cisco-hdlc-tcc   ethernet-ccc   ethernet-over-atm   ethernet-tcc   ethernet-vpls   extended-frame-relay-ccc   extended-frame-relay-tcc   extended-vlan-ccc   extended-vlan-tcc   extended-vlan-vpls   flexible-ethernet-services   flexible-frame-relay   frame-relay   frame-relay-ccc   frame-relay-tcc   frame-relay-port-ccc   multilink-frame-relay-uni-nni   ppp   ppp-ccc   ppp-tcc   vlan-ccc   vlan-vpls);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Description</b>	Physical link-layer encapsulation type.
<b>Options</b>	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>atm-pvc—Use ATM PVC encapsulation.</p> <p>cisco-hdlc—Use Cisco-compatible HDLC framing.</p> <p>cisco-hdlc-ccc—Use Cisco-compatible HDLC framing on CCC circuits.</p> <p>cisco-hdlc-tcc—Use Cisco-compatible HDLC framing on TCC circuits for connecting unlike media.</p> <p>ethernet-ccc—Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard TPID values.</p> <p>ethernet-over-atm—As defined in RFC 1483, this encapsulation type allows ATM interfaces to connect to devices that support only bridged-mode protocol data units (PDUs). The JUNOS software does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload and drops the rest. For packets destined the Ethernet LAN, a route lookup is done by use of the destination IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.</p> <p>ethernet-tcc—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. Ethernet TCC is not currently supported on Fast Ethernet 48-port PICs.</p> <p>ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values.</p> <p>extended-frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.</p> <p>extended-frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect unlike media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.</p> <p>extended-vlan-ccc—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and four-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values.</p>

`extended-vlan-tcc`—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. Extended Ethernet TCC is not currently supported on Fast Ethernet 48-port PICs.

`extended-vlan-vpls`—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901.

`flexible-ethernet-services`—For Gigabit Ethernet intelligent queuing interfaces only, use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. This encapsulation type allows you to configure any combination of routed, TCC, CCC, and VPLS encapsulations on a single physical port.

`flexible-frame-relay`—For intelligent queuing interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, or standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value in the range 1 through 1022.

`frame-relay`—Use Frame Relay encapsulation.

`frame-relay-ccc`—Use plain Frame Relay encapsulation or Frame Relay encapsulation on circuit cross-connect (CCC) circuits.

`frame-relay-tcc`—Use Frame Relay encapsulation on TCC circuits to connect unlike media.

`frame-relay-port-ccc`—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two CE routers without explicitly configuring each DLCI on the two PE routers with Frame Relay transport. When you use this encapsulation type, you can configure the family `ccc` only.

`multilink-frame-relay-uni-nni`—Use MLFR user-to-network (UNI) network-to-network (NNI) encapsulation. This encapsulation is used only on link services interfaces functioning as FRF.16 bundles and their constituent T1 or E1 interfaces.

`ppp`—Use serial PPP encapsulation.

`ppp-ccc`—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the family `ccc` only.

`ppp-tcc`—Use serial PPP encapsulation on TCC circuits for connecting unlike media. When you use this encapsulation type, you can configure the family `tcc` only.

`vlan-ccc`—Use Ethernet VLAN encapsulation on CCC circuits.

`vlan-vpls`—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only.

<b>Default</b>	PPP encapsulation.
<b>Usage Guidelines</b>	See “Defining the Encapsulation for Layer 2 Switching Cross-Connects” on page 361, “Defining the CCC Encapsulation for LSP Tunnel Cross-Connects” on page 371, and “Defining the Encapsulation for the Layer 2 Switching TCCs” on page 377. For more information about how to configure interfaces, see the <i>JUNOS Network Interfaces and Class of Service Configuration Guide</i> .
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

## interface-switch

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<b>Syntax</b>	<pre>interface-switch <i>connection-name</i> {     interface <i>interface-name.unit-number</i>;     interface <i>interface-name.unit-number</i>; }</pre>
<b>Hierarchy Level</b>	[edit logical-routers <i>logical-router-name</i> protocols connections], [edit protocols connections]
<b>Description</b>	<p>Configure Layer 2 switching cross-connects. The cross-connect is bidirectional, so packets received on the first interface are transmitted out the second interface, and those received on the second interface are transmitted out the first.</p> <p>For Layer 2 switching cross-connects to work, you must also configure MPLS.</p>
<b>Options</b>	<p><i>connection-name</i>—Connection name.</p> <p>interface <i>interface-name.unit-number</i>—Interface name. Include the logical portion of the name, which corresponds to the logical unit number.</p>
<b>Usage Guidelines</b>	See “Defining the CCC Connection for Layer 2 Switching Cross-Connects” on page 366.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration

## lsp-switch

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<b>Syntax</b>	lsp-switch <i>connection-name</i> { transmit-lsp <i>label-switched-path</i> ; receive-lsp <i>label-switched-path</i> ; }
<b>Hierarchy Level</b>	[edit logical-routers <i>logical-router-name</i> protocols connections], [edit protocols connections]
<b>Description</b>	Configure Layer 2 switching cross-connects.
<b>Options</b>	<i>connection-name</i> —Connection name.  receive-lsp <i>label-switched-path</i> —Name of the LSP from the connection's source.  transmit-lsp <i>label-switched-path</i> —Name of the LSP to the connection's destination.
<b>Usage Guidelines</b>	See “CCC and TCC Overview” on page 355, “Configuring LSP Stitching Cross-Connects” on page 374, and “Defining the Connection for the Layer 2 Switching TCC” on page 381.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.

## p2mp-receive-switch

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<b>Syntax</b>	p2mp-receive-switch <i>point-to-multipoint-switch-name</i> { output-interface <i>interface-name.unit-number</i> ; receive-p2mp-lsp <i>receiving-point-to-multipoint-lsp</i> ; }
<b>Hierarchy Level</b>	[edit logical-routers <i>logical-router-name</i> protocols connections], [edit protocols connections]
<b>Description</b>	Configure the CCC switch for a point-to-multipoint LSP on the egress PE router.
<b>Options</b>	<i>point-to-multipoint-switch-name</i> —Point-to-multipoint CCC receive switch name.  output-interface <i>interface-name.unit-number</i> —Name of the egress interface for the point-to-multipoint LSP traffic.  receive-p2mp-lsp <i>receiving-point-to-multipoint-lsp</i> —Name of the point-to-multipoint LSP which is switched to the output interface.
<b>Usage Guidelines</b>	See “Configuring the Point-to-Multipoint LSP Switch on the Egress PE Router” on page 384.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.

## p2mp-transmit-switch

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<b>Syntax</b>	<pre>p2mp-transmit-switch <i>point-to-multipoint-transmit-switch-name</i> {     input-interface <i>input-interface-name.unit-number</i>;     transmit-p2mp-lsp <i>transmitting-point-to-multipoint-lsp</i>; }</pre>
<b>Hierarchy Level</b>	[edit logical-routers <i>logical-router-name</i> protocols connections], [edit protocols connections]
<b>Description</b>	Configure the CCC switch for the point-to-multipoint LSP on the ingress PE router.
<b>Options</b>	<p><i>point-to-multipoint-transmit-switch-name</i>—Point-to-multipoint CCC transmit switch name.</p> <p><i>input-interface input-interface-name.unit-number</i>—Specify the name of the interface carrying incoming traffic to be switched to the point-to-multipoint LSP.</p> <p><i>transmit-p2mp-lsp transmitting-point-to-multipoint-lsp</i>—Specify the name of the point-to-multipoint LSP carrying traffic to the CCC switch on the egress PE router.</p>
<b>Usage Guidelines</b>	See “Configuring the Point-to-Multipoint LSP Switch on the Ingress PE Router” on page 383.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>

## remote-interface-switch

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<b>Syntax</b>	<pre>remote-interface-switch <i>connection-name</i> {     interface <i>interface-name.unit-number</i>;     transmit-lsp <i>label-switched-path</i>;     receive-lsp <i>label-switched-path</i>; }</pre>
<b>Hierarchy Level</b>	[edit logical-routers <i>logical-router-name</i> protocols connections], [edit protocols connections]
<b>Description</b>	Configure MPLS LSP tunnel cross-connects.
<b>Options</b>	<p><i>connection-name</i>—Connection name.</p> <p><i>interface interface-name.unit-number</i>—Interface name. Include the logical portion of the name, which corresponds to the logical unit number.</p> <p><i>receive-lsp label-switched-path</i>—Name of the LSP from the connection's source.</p> <p><i>transmit-lsp label-switched-path</i>—Name of the LSP to the connection's destination.</p>
<b>Usage Guidelines</b>	See “CCC and TCC Overview” on page 355 and “Configuring MPLS LSP Tunnel Cross-Connects” on page 369.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>