

## **Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between a Virtual Chassis Access Switch and a Virtual Chassis Distribution Switch**

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EX-series switches allow you to combine one to eight Ethernet links into one logical interface for higher bandwidth and redundancy. The ports that are combined in this manner are referred to as a link aggregation group (LAG) or bundle. EX-series switches allow you to further enhance these links by configuring Link Aggregation Control Protocol (LACP).

This example describes how to overlay LACP on the LAG configurations that were created in Example: Configuring Aggregated Ethernet High-Speed Uplinks Between a Virtual Chassis Access Switch and a Virtual Chassis Distribution Switch:

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### **Requirements**

This example uses the following software and hardware components:

- JUNOS Release 9.0 or later for EX-series switches
- Two EX-series 4200-48P switches
- Two EX-series 4200-24F switches
- Four EX-series EX-UM-2XFP uplink modules

Before you configure LACP, be sure you have:

- Installed your EX-series switches.
- Set up the virtual chassis switches. See Example: Configuring a Virtual Chassis with a Master and Backup in a Single Wiring Closet.
- Configured the uplink ports on the switches as trunk ports. See Configuring Gigabit Ethernet Interfaces (CLI Procedure).
- Configured the LAGs. See Example: Configuring Aggregated Ethernet High-Speed Uplinks Between a Virtual Chassis Access Switch and a Virtual Chassis Distribution Switch

### **Overview and Topology**

This example assumes that you are already familiar with the Example: Configuring Aggregated Ethernet High-Speed Uplinks between Virtual Chassis Access Switch and Virtual Chassis Distribution Switch. The topology in this example is exactly the same

as the topology in that other example. This example shows how to use LACP to enhance the LAG functionality.

LACP exchanges are made between *actors* (the transmitting link) and *partners* (the receiving link). The LACP *mode* can be either active or passive.



**NOTE:** If the actor and partner are both in passive mode, they do not exchange LACP packets, which results in the aggregated Ethernet links not coming up. By default, LACP is in passive mode. To initiate transmission of LACP packets and responses to LACP packets, you must enable LACP in active mode.

By default, the actor and partner send LACP packets every second. You can configure the interval at which the interfaces send LACP packets by including the periodic statement at the [edit interfaces *interface-name* aggregated-ether-options lacp] hierarchy level.

The interval can be fast (every second) or slow (every 30 seconds).

## Configuring LACP for the LAGs on the Virtual Chassis Access Switch

To configure LACP for the access switch LAGs, perform these tasks:

**CLI Quick Configuration** To quickly configure LACP for the access switch LAGs, copy the following commands and paste them into the switch terminal window:

```
[edit]
set interfaces ae0 aggregated-ether-options lacp active periodic fast
set interfaces ae1 aggregated-ether-options lacp active periodic fast
```

**Step-by-Step Procedure** To configure LACP for Host-A LAGs ae0 and ae1:

1. Specify the aggregated Ethernet options for both bundles:

```
[edit interfaces]
user@Host-A#set ae0 aggregated-ether-options lacp active periodic fast
user@Host-A#set ae1 aggregated-ether-options lacp active periodic fast
```

**Results** Display the results of the configuration:

```
aggregated-ether-options{
  lacp{
    active;
    periodic fast;
  }
}
```

## Configuring LACP for the LAGs on the Virtual Chassis Distribution Switch

To configure LACP for the two uplink LAGs from the virtual chassis access switch to the virtual chassis distribution switch, perform these tasks:

**CLI Quick Configuration** To quickly configure LACP for the distribution switch LAGs, copy the following commands and paste them into the switch terminal window:

```
[edit interfaces]
set ae0 aggregated-ether-options lacp passive periodic fast
set ae1 aggregated-ether-options lacp passive periodic fast
```

**Step-by-Step Procedure** To configure LACP for Host D LAGs ae0 and ae1:

1. Specify the aggregated ethernet options for both bundles:

```
[edit interfaces]
user@Host-D#set ae0 aggregated-ether-options lacp passive periodic fast
user@Host-D#set ae1 aggregated-ether-options lacp passive periodic fast
```

**Results** Display the results of the configuration:

```
aggregated-ether-options{
  lacp{
    passive;
    periodic fast;
  }
}
```

## Verification

To verify that LACP packets are being exchanged, perform these tasks:

- Verifying the LACP Settings on page 3
- Verifying That the LACP Packets Are Being Exchanged on page 4

### Verifying the LACP Settings

**Purpose** To verify that the LACP has been set up correctly.

**Action** Use the `show lacp interfaces interface-name` command to check that LACP has been enabled as active on one end.

```
show lacp interfaces xe-0/1/0
```

```
show lacp interfaces xe-0/1/0
```

```
Aggregated interface: ae0
```

LACP state:	Role	Exp	Def	Dist	Col	Syn	Aggr	Timeout	Activity
xe-0/1/0	Actor	No	Yes	No	No	No	Yes	Fast	Active
xe-0/1/0	Partner	No	Yes	No	No	No	Yes	Fast	Passive

LACP protocol:	Receive State	Transmit State	Mux State
xe-0/1/0	Defaulted	Fast periodic	Detached

**Meaning** The output indicates that the LACP has been set up correctly and is active at one end.

### Verifying That the LACP Packets Are Being Exchanged

**Purpose** To verify that LACP packets are being exchanged.

**Action** Use the show interfaces *lag-name* statistics command to display LACP information.

#### show interfaces ae0 statistics

```
Physical interface: ae0, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 30
  Link-level type: Ethernet, MTU: 1514, Speed: Unspecified, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
  Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Current address: 02:19:e2:50:45:e0, Hardware address: 02:19:e2:50:45:e0
  Last flapped   : Never
  Statistics last cleared: Never
    Input packets : 0
    Output packets: 0
  Input errors: 0, Output errors: 0

Logical interface ae0.0 (Index 71) (SNMP ifIndex 34)
  Flags: Hardware-Down Device-Down SNMP-Traps Encapsulation: ENET2
  Statistics      Packets      pps      Bytes      bps
  Bundle:
    Input :          0          0          0          0
    Output:          0          0          0          0
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255
```

**Meaning** The output here shows that the link is down and that no PDUs are being exchanged.

## Troubleshooting

These are some tips for troubleshooting:

### Troubleshooting a Nonworking LACP Link

**Problem** The LACP link is not working.

**Solution** Check the following:

- Remove the LACP configuration and verify whether the static LAG is up.
- Verify that LACP is configured at both ends.
- Verify that LACP is not passive at both ends.
- Verify whether LACP protocol data units are being exchanged by running the `monitor traffic-interface lag-member detail` command.

**Related Topics**

- Example: Connecting an Access Switch to a Distribution Switch
- Virtual Chassis Cabling Configuration Examples for EX 4200 Switches
- Installing an Uplink Module in an EX 3200 or EX 4200 Switch

