

Configuring LLC2 Options

Logical link control 2 (LLC2) options can be configured for data link switching (DLSw) protocol support on J-series Services Routers. DLSw allows you to tunnel System Network Architecture (SNA) and NetBIOS traffic over an IP network.

DLSw enables SNA clients to communicate to SNA applications on a mainframe through an IP network. After a connection is established, a DLSw circuit can be created for transporting SNA traffic.

The IP network between an SNA client and an SNA application becomes transparent with DLSw. DLSw transports any SNA traffic. DLSw has an LLC session on one SNA device and recreates it (almost identically) on the other SNA device, making the devices operate as if they were directly connected. DLSw is configured on peer IP routers and transports everything between the peers using Switch-to-Switch Protocol (SSP).

For information about configuring DLSw, see the *JUNOS Services Interfaces Configuration Guide* and the *J-series Services Router Advanced WAN Access Configuration Guide*.

For more information, see the following sections:

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Configuring LLC2 Properties

For basic DLSw configuration, include the `llc2` statement at the `[edit interfaces interface-name unit logical-unit-number family]` hierarchy level. All other LLC2 statements that follow are optional and should be used only if recommended by support or a services professional to solve specific problems or for specific network designs.

To configure logical link control properties, include the `llc2` statement:

```
llc2 {  
    ack-delay-time time;  
    ack-max count;  
    idle-time time;  
    local-window count;  
    max-retry count;  
    p-bit-timeout time;  
    t1-time time;  
    t2-time time;  
    trej-time time;  
}
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family]

You can configure the following LLC options:

- **ack-delay-time**—The maximum time allowed for incoming Information-frames (I-frames) to remain unacknowledged. Specify the number of milliseconds from 1 through 60000. The default value is 100 milliseconds.
- **ack-max**—The maximum number of I-frames received before acknowledgment is sent. Specify the number of I-frames from 1 through 127. The default value is three I-frames.
- **idle-time**—The number of seconds that a TCP connection between DLSw peers will stay up without any circuit using the connection. Specify the number of seconds from 1 through 60000. The default value is 10 seconds.
- **local-window**—The maximum number of I-frames to send before waiting for acknowledgment. Specify the number of I-frames from 1 through 127. The default value is 7 I-frames.
- **max-retry**—The number of retries the router should attempt when waiting for a response. Specify the number of I-frames from 1 through 127. The default value is 10 I-frames.
- **p-bit-timeout**—The length of time the router waits for response to a poll bit. Specify the number of milliseconds from 1 through 60000. The default value is 3000 milliseconds.
- **t1-time**—The length of time the router waits for an acknowledgment of transmitted frames. Specify the number of milliseconds from 1 through 60000. The default value is 1000 milliseconds.
- **t2-time**—The length of time the router withholds the I-frame response. Specify the number of milliseconds from 1 through 60000. The default value is 100 milliseconds.
- **trej-time**—Q.391-specific timer for T310, in seconds. Specify the number of milliseconds from 1 through 60000. The default value is 3000 milliseconds.

Configuring DLSw Ethernet Redundancy Using LLC2 Properties

DLSw is a means of tunneling SNA and NetBIOS traffic over IP networks. To achieve fault tolerance and load sharing, you can configure Ethernet redundancy and deploy multiple DLSw routers on the same LAN segment. These redundant routers provide alternate paths to the destinations and avoid a single point of failure.

When you configure DLSw Ethernet redundancy on a LAN segment, a master router is selected from a group of DLSw neighbors. The master router establishes the circuits.

To configure DLSw Ethernet redundancy, include the **redundancy-group** statement and define redundancy group options:

```

llc2 {
  redundancy-group group-number {
    [Unresolved xref] seconds;
    map {
      local-mac mac-address remote-mac mac-address;
      preempt [Unresolved xref] seconds;
      no-preempt;
      [Unresolved xref] priority;
      track {
        dls {
          [Unresolved xref] mac-address priority-cost priority;
          peer ip-address priority-cost priority;
        }
        [Unresolved xref] interface-name priority-cost priority;
      }
    }
  }
}

```

You can include these statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family]

You can configure the following redundancy options:

- **redundancy-group *group-number***—The group to which this router belongs. Specify the group number, in the range from 0 through 255.
- **advertise-interval**—The advertisement interval of DLSw peers on the network. All routers in the redundancy group must use the same advertisement interval. Specify the number of seconds, from 1 through 255. The default is 1 second.
- **map**—Map a local peer MAC address to a remote peer MAC address.
 - **local-mac**—The local MAC address to be mapped to a remote destination MAC address.
 - **mac-address**—The MAC address. Specify the MAC address as six hexadecimal bytes in one of the following formats: *nn:nn:nn:nn:nn:nn* or *nnnn .nnnn.nnnn*. For example, 0011.2233.4455 or 00:11:22:33:44:55.
 - **remote-mac**—The remote destination MAC address to be mapped to a local MAC address.
- **preempt hold-time *seconds***— Configure the time to wait before a higher-priority backup router preempts the master router. Specify the number of seconds, from 0 through 3600. DLSw preemption is 0 by default.
- **no-preempt**—Prohibit the preemption of the master router.
- **priority *priority***—The router's priority for becoming the master router. The router with the highest priority within the redundancy group becomes the master. A

larger value indicates a higher priority for being elected. Specify the priority from 1 through 255. The default is 100 (for backup routers).

- track—Enable the following tracking options for the remote peer and the destination peer:
 - dls w—DLSw protocol.
 - destination *mac-address* priority-cost *priority*—The local MAC address and the priority. Specify the MAC address as six hexadecimal bytes in one of the following formats: *nn:nn:nn:nn:nn:nn* or *nnnn.nnnn.nnnn*. For example, 0011.2233.4455 or 00:11:22:33:44:55. The priority cost is the value subtracted from the priority value when remote peer connectivity is lost. Specify a value from 1 through 254.
 - peer *ip-address* priority-cost *priority*—The IP address of the remote peer. The priority cost is the value subtracted from the priority value when remote peer connectivity is lost. Specify a value from 1 through 254.
 - interface *interface-name*—The interface name. Include the logical portion of the name, which corresponds to the logical unit number.

Example: Configuring LLC Options on an Interface

Configure LLC options on an unnumbered interface:

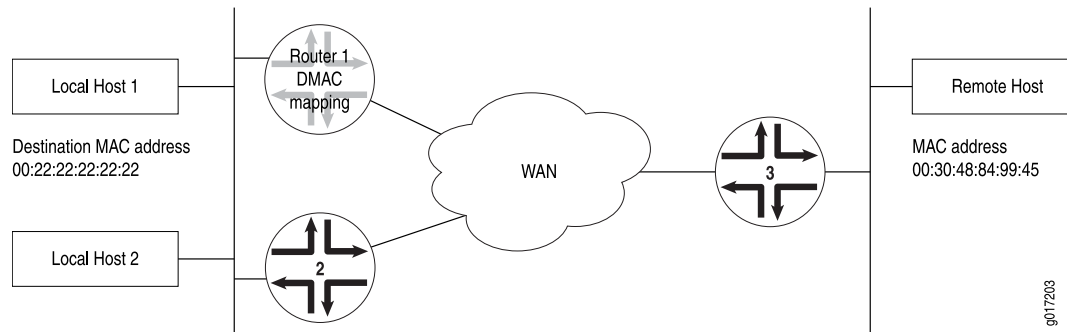
```
[edit]
interfaces {
  fe-0/0/0 {
    unit 0 {
      family inet;
      address 10.10.10.2/24;
    }
    family llc2 {
      ack-delay-time 3000;
      ack-max 10;
      idle-time 102;
      local-window 15;
      max-retry 20;
      p-bit-timeout 100;
      t1-time 101;
      t2-time 101;
      max-retry 5;
      trej-time 4000;
    }
  }
}
```

Example: Configuring DLSw Ethernet Redundancy

In Figure 1, the local hosts share the same destination MAC address of 00:00:5E:00:01:01 and send DLSw traffic to the remote host with a MAC address of 00:02:00:00:00:01. Router 1 and Router 2 are configured for DLSw redundancy and map the local destination MAC address to the remote MAC address. Router 1 is also

the designated master. If Router 1 becomes unavailable, Router 2, the backup router, takes over as the master router.

Figure 1: DLSw Ethernet Redundancy Topology



To configure DLSw Ethernet redundancy, do the following:

Configuration on Router 1 Configure the redundancy group, redundancy group options, and the priority cost of each redundancy group option:

```
[edit]
interfaces {
  fe-0/0/0 {
    unit 0 {
      family llc2 {
        redundancy-group 1 {
          advertise-interval 1;
          map {
            local-mac 00:00:5e:00:01:01 remote-mac 00:02:00:00:00:01;
            preempt hold-time 20;
            priority 200;
            track {
              dls {
                destination 00:02:00:00:00:01 priority-cost 50;
                peer 10.10.10.10 priority-cost 25;
              }
            }
            interface e1-0/0/2.0 priority-cost 40;
          }
        }
      }
    }
  }
}
```

Configuration on Router 2 Configure the redundancy group, redundancy group options, and the priority cost of each redundancy group option:

```
[edit]
interfaces {
  fe-0/0/1 {
    unit 0 {
      family llc2 {
```

```

    redundancy-group 1 {
        map {
            local-mac 00:00:5e:00:01:01 remote-mac 00:02:00:00:00:01;
            priority-cost 190;
            track {
                dls {
                    destination 00:02:00:00:00:01 priority-cost 50;
                    peer 10.10.10.10 priority-cost 25;
                }
                interface e1-0/0/2.0 priority-cost 40;
            }
        }
    }
}

```