Chapter 20
GMPLS Configuration Guidelines

To configure GMPLS, you must complete the following tasks:

Configure LMP on page 265

Configure MPLS Label-Switched Paths for GMPLS on page 270

Configure LMP

You need to configure the Link Management Protocol (LMP) to define the data channel connection between devices at the [edit protocols link-management] hierarchy level.

```
[edit]
protocols {
   link-management {
      peer peer-name {
         address address;
         control-channel control-channel-name;
         te-link te-link-name;
      }
      te-link te-link-name {
         interface interface-name {
            local-address ip-address;
            remote-address ip-address;
            remote-id id-number;
         }
         local-address ip-address;
         remote-address ip-address;
         remote-id id-number;
      }
      traceoptions {
         file filename <files number> <no-stamp> <replace> <size size>
            <(world-readable | no-world-readable)>;
         flag flag <flag-modifier> <disable>;
      }
   }
}
```

The sections that follow describe how to configure LMP:

Configure LMP TE Links

Using the the te-link statement parameters for LMP, you can define the data channel connection between devices. You define all the te-link statement parameters at the [edit protocols link-management te-link *te-link-name*] and [edit protocols link-management te-link *te-link-name* interface *interface-name*] levels.

Use the local-address statement at the [edit protocols link-management te-link *te-link-name*] hierarchy level and at the [edit protocols link-management te-link *te-link-name* interface *interface-name*] hierarchy level to configure the local IP address associated with the TE link.

Use the remote-address statement at the [edit protocols link-management te-link *te-link-name*] hierarchy level and at the [edit protocols link-management te-link *te-link-name* interface *interface-name*] hierarchy level to configure the remote IP address mapped to the TE link.

We recommend that you configure a different IP address subnet for your TE link addresses from the subnet configured for your physical interfaces. This enables you to identify which addresses are physical and which addresses belong to the TE link.

The local ID for the TE link is automatically assigned by LMP. It also assigns the post-identifier and/or labels for the interfaces (resources) in the TE link. The remote ID for the interface needs to be configured, based on the post-ID assignment of the peer node at the [edit protocols link-management te-link *te-link-name* interface *interface-name*] hierarchy level.

To obtain the TE link and interface local IDs, issue the show link-management te-link command. Once you have these IDs, configure them as the remote IDs on the peer node. The remote IDs at the [edit protocols link-management te-link *te-link-name*] hierarchy level and the [edit protocols link-management te-link *te-link-name* interface *interface-name*] hierarchy level are needed for static mapping of remote labels to local labels.

To configure a TE link, you configure the following statements at the [edit protocols link-management] hierarchy level:

```
[edit]
protocols {
    link-management {
        te-link te-link-name {
            interface interface-name {
                local-address ip-address;
                remote-address ip-address;
                remote-id id-number;
            }
            local-address ip-address;
            remote-address ip-address;
            remote-id id-number;
        }
    }
}
```

Configure LMP Peers

You need to configure network peers for GMPLS at the [edit protocols link-management] hierarchy level. A peer is a network device that your router communicates with when setting up the control and data channels. The peer is often an Optical Cross-Connect (OXC).

Configure a peer name with the peer statement and the peer's router ID with the address statement (often a loopback address). Specify the interface that will be used as a control channel with the control-channel statement, and configure the TE link to be associated with this peer with the te-link statement:

```
[edit]
protocols {
    link-management {
        peer peer-name {
            address ip-address;
            control-channel control-channel-name;
            te-link te-link-name;
        }
    }
}
```

Configure Peer Interfaces on OSPF and RSVP

After you have configured the LMP peers, add the peer interfaces to RSVP and OSPF. The peer interface name must match the peer name configured in LMP. Once the peer interfaces are added to the protocols, the TE link local and remote addresses can be signaled and advertised to peers like any other interface enabled for RSVP and OSPF. These act as virtual interfaces for GMPLS.

To configure RSVP signaling for LMP peers, configure the name of the LMP peer using the peer-interface statement at the [edit protocols rsvp] hierarchy level. The statements at the [edit protocols rsvp peer-interface *peer-name*] hierarchy level have the same functionality as the statements at the [edit protocols rsvp interface] hierarchy level.

```
[edit]
protocols {
   rsvp {
      peer-interface peer-name {
         (aggregate | no-aggregate);
         authentication-key key;
         disable;
         hello-interval seconds;
         (reliable | no-reliable);
      }
   }
```

To configure OSPF routing for LMP peers, configure the name of the LMP peer using the peer-interface statement at the [edit protocols ospf area *area-number*] hierarchy level. For information on how to configure the statements at the [edit protocols ospf area *area-number* peer-interface *peer-interface-name*] hierarchy level, see the *JUNOS Internet Software Configuration Guide: Routing and Routing Protocols*.

```
[edit]
   ospf {
      area area-number {
         peer-interface peer-interface-name {
            dead-interval seconds;
            disable;
            hello-interval seconds;
            retransmit-interval seconds;
            transit-delay seconds;
         }
      }
   }
}
```

When adding the virtual peer interfaces to RSVP and OSPF, do not configure the corresponding physical control channel interface in either protocol. If you include the interface all statement, you must disable the protocols manually on the control channel interface.

To disable OSPF, use the disable statement at the [edit protocols ospf area *area-number* interface *interface-name*] hierarchy level.

To disable RSVP, use the disable statement at the [edit protocols rsvp interface *interface-name*] hierarchy level.

Configure MPLS Paths for GMPLS

As part of the configuration for GMPLS, you need to establish an MPLS path for each unique device connected through GMPLS. Configure the TE link remote address as the address at the [edit protocols mpls path *path-name*] hierarchy level. CSPF is supported so you can choose either the strict or loose option with the address.

See "Configure LMP" on page 265 for information about how to obtain a TE link remote address.

Configure the MPLS path as follows:

```
[edit]
protocols {
   mpls {
      path path-name {
         next-hop-address (strict | loose);
      }
   }
}
```

See "Create a Named Path" on page 46 for information about how to configure MPLS paths.

Trace LMP Traffic

To trace LMP protocol traffic, specify options with the global traceoptions statement at the [edit routing-options] hierarchy level. You can specify LMP-specific options by including the traceoptions statement at the [edit protocols link-management] hierarchy level:

```
[edit protocols link-management]
traceoptions {
   file filename <files number> <no-stamp> <replace> <size size>
      <(world-readable | no-world-readable)>;
   flag flag <flag-modifier> <disable>;
}
```

Use the file statement to specify the name of the file that receives the output of the tracing operation. All files are placed in the directory /var/log.

The following trace flags display the operations associated with the sending and receiving of various LMP messages:

all—Trace all available operations

init—Output from the initialization messages

parse—Operation of the parser

process—Operation of the general configuration

route-socket—Operation of route socket events

routing—Operation of the routing protocols

server—Server processing operations

show—Show command servicing operations

Each flag can carry one or more of the following flag modifiers:

detail—Provide detailed trace information

receive—Packets being received

send—Packets being transmitted

Configure MPLS Label-Switched Paths for GMPLS

To enable the proper GMPLS switching parameters, configure the LSP attributes that are appropriate for your network connection. The default values, which are also appropriate for standard MPLS, are psc-1 for switching-type.

You configure the LSP attributes statements at the [edit protocols mpls label-switched-path *lsp-name* lsp-attributes] hierarchy level.

```
[edit]
   protocols {
      mpls {
         label-switched-path lsp-name {
            from ip-address;
            to ip-address;
            primary path-name;
            secondary path-name;
            lsp-attributes {
               gpid type;
               signal-bandwidth type;
               switching-type type;
            }
         }
      }
   }
}
```

If you configure the no-cspf statement for the label-switched path configuration, you must configure primary and secondary paths or the configuration cannot be committed.

Because MPLS and GMPLS use the same configuration hierarchy for LSPs, it is helpful to know which LSP attributes control LSP functionality. Standard MPLS packet-switched LSPs are unidirectional, while GMPLS non-packet LSPs are bidirectional.

If you use the default packet switching type of psc-1, your LSP becomes unidirectional. To enable a GMPLS bidirectional LSP, you must select a non-packet switching type option, such as lambda, fiber, or ethernet, using the switching-type statement at the [edit mpls label-switched-path *lsp-name* lsp-attributes] hierarchy level.