



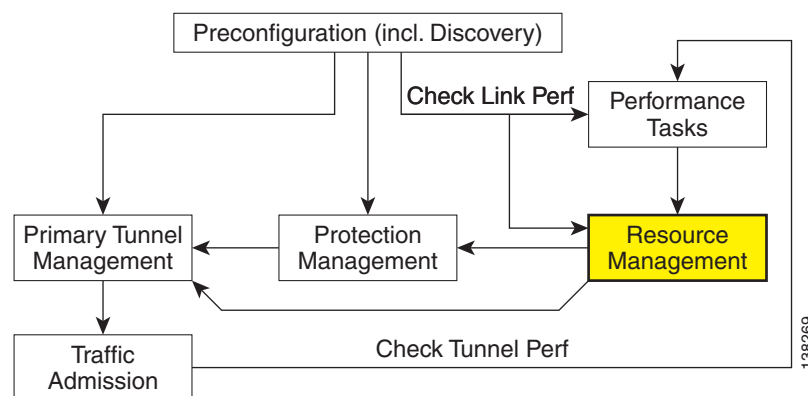
CHAPTER 3

TE Resource Management

TE resource management is defined as the tuning of certain properties on the TE interfaces to optimize the tunnel placement.

The highlighted box in [Figure 3-1](#) shows where in TEM resource management occurs.

Figure 3-1 TEM Process Diagram - Resource Management



This chapter contains the following sections:

- [Overview, page 3-1](#)
- [Modifying Network Resources, page 3-3](#)
- [Changing Link Status, page 3-4](#)
- [Deleting TE Links, page 3-5](#)
- [Deleting TE Nodes, page 3-6.](#)

Overview

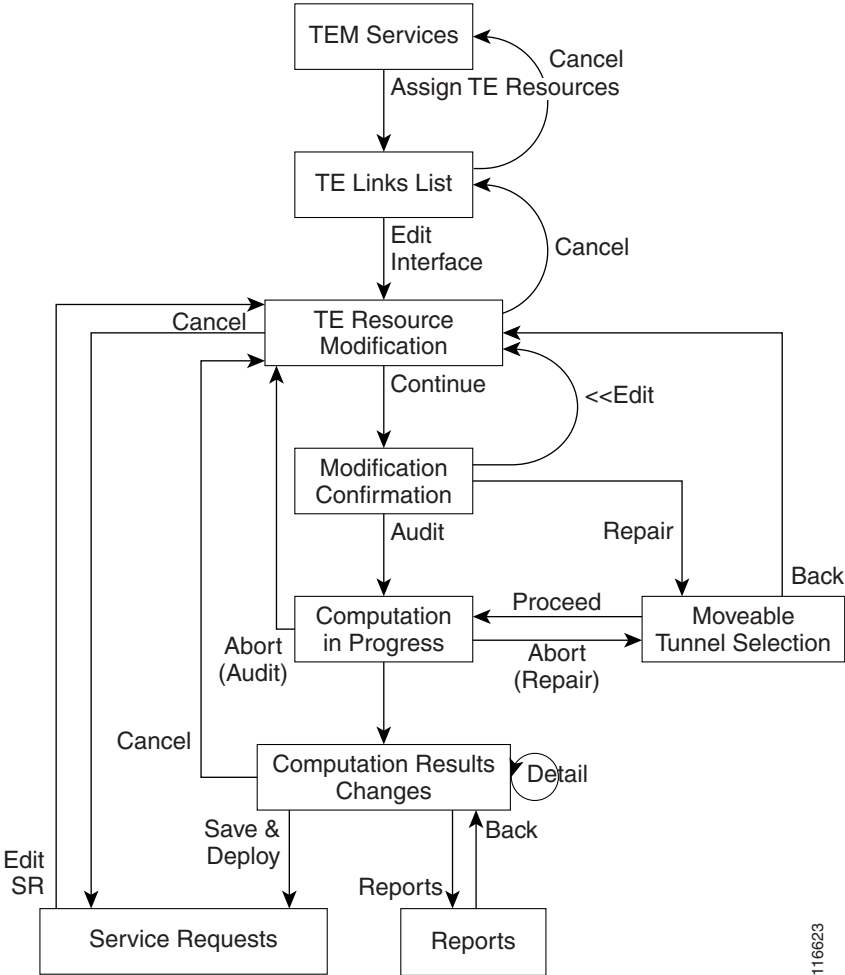
When a tunnel placement is attempted and there is insufficient bandwidth, sometimes the resources on the TE links can be changed and the tunnel placement retried.

Network resources in this context are understood to be routers in the TE network, the interfaces that connect them, and the RSVP bandwidths and other properties configured on the links. Because TEM relies on the discovery process to add the network elements to the repository, the resources must be discovered before resource management can be performed.

TE resource management is a manual process that should be performed on an as needed basis. If the original configuration is already optimal, there is no need to do any resource management tasks. If subsequent discovery unveils any discrepancy, or if you experience difficulty achieving desired results in protection planning or placing primary tunnels, adjustments on the resources might be warranted.

An overview of the resource management process is provided in Figure 3-2.

Figure 3-2 Resource Management Processes



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Modifying Network Resources

The resource management tasks are mainly carried out from the TE Links List window.



Note

Certain attributes, such as Description, that do not impact the computation carried out by these tools and updates to these are, therefore, not displayed in the computation results window.

To modify a TE link, use the following steps:

- Step 1** Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management > TE Links**.

The TE Links List window shown in [Figure 3-3](#) appears.

Figure 3-3 TE Links List

#	<input type="checkbox"/>	End Device A	Type	Interface A	End Device B	Type	Interface B	Label	Admin Status
6.	<input type="checkbox"/>	isctmp1	CISCO_ROUTER	FastEthernet1/0/0	isctmp8	CISCO_ROUTER	FastEthernet0/1	10.2.2.161<->10.2.2.174	UP
7.	<input type="checkbox"/>	isctmp1	CISCO_ROUTER	FastEthernet2/1/0	isctmp9	CISCO_ROUTER	FastEthernet2/0	10.2.3.54<->10.2.3.53	UP
8.	<input type="checkbox"/>	isctmp8	CISCO_ROUTER	FastEthernet0/0	isctmp6	CISCO_ROUTER	FastEthernet0/1	10.2.2.238<->10.2.2.225	UP
9.	<input type="checkbox"/>	isctmp8	CISCO_ROUTER	FastEthernet4/0	isctmp7	CISCO_ROUTER	FastEthernet1/0	10.2.2.126<->10.2.2.113	UP
10.	<input type="checkbox"/>	isctmp2	CISCO_ROUTER	FastEthernet6/0	isctmp6	CISCO_ROUTER	FastEthernet5/1	10.2.2.193<->10.2.2.206	UP

For an explanation of the various window elements, see [TE Links, page B-20](#).

The links list shows the current active links in the TE network. Use the arrows to page forward as needed.

- Step 2** Select the desired link in the links list.
- Step 3** Click **Edit > Interface A** or **Edit > Interface B** to edit one of interfaces on the link.



Note

If a non-Cisco interface is selected for editing, changes made in the Edit window will be saved in the ISC repository but they will not be deployed.

The TE Resource Modification window appears.

For an explanation of the various fields, see [Edit Interface, page B-26](#).

- Step 4** Make the desired modifications and click **Continue** to proceed to the confirmation page to verify the changes or click **Cancel** to quit without saving.
- Step 5** Click **Edit** to return to the editable window or proceed in one of the following ways:
- **Proceed with Changes**—Perform Tunnel Audit or Tunnel Repair.
For a detailed explanation of Tunnel Audit and Tunnel Repair, see [Chapter 5, “Advanced Primary Tunnel Management.”](#)
If a non-Cisco device is edited, **Proceed with Changes** will be disabled. Instead, **Save & Deploy** is enabled and the changes can be saved (not deployed).
 - **Save & Deploy**—If the changes made do not affect tunnel placement, click **Save & Deploy** to proceed. In this case, there is no need for performing Tunnel Audit or Tunnel Repair.

**Note**

When you click **Save & Deploy**, a background process is started. To avoid a potential conflict with another deployment, wait until the service request (SR) has completed the Requested and Pending states before deploying another SR with Save & Deploy. To see the state of deployment, go to the Service Requests window under **Inventory and Connection Manager > Service Requests** or open **Monitoring > Task Manager**.

**Note**

In TEM, service requests (SRs) are generally deployed from each TE service, not from the **Service Requests** page in **Inventory and Connection Manager** with the exception of the TE Traffic Admission SR.

After deployment, the SR status can be viewed from the SR window at **Service Inventory > Inventory and Connection Manager > Service Requests**.

For more information on working with service requests, see [Appendix C, “Managing Service Requests.”](#)

If the SR does not go to the **Deployed** state, go to the Task Log to see the deployment log (**Monitoring > Task Manager > Logs**). Task logs are further described in [TE Task Logs, page 9-1](#).

Changing Link Status

From the TE Links List window ([Figure 3-3](#)), you can also find out what effect it will have if a link is taken offline. This approach can be used to move tunnels off a link before actually shutting down the interface.

**Note**

Link status in TEM is of local significance. Changing link status as described in this section is not provisioned down to the network.

To change the link status, use the following steps:

- Step 1** Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management > TE Links**.
- The TE Links List window appears.
- Step 2** Select one or more links and click the **Change Status** button.

For an explanation of the various window elements, see [TE Links, page B-20](#).

Step 3 Select **Enable** or **Disable** to enable or disable the selected link.

As an example, selecting **Disable** will change the link status to **DOWN** as shown in [Figure 3-4](#).

Figure 3-4 Link Status Down

1.	<input checked="" type="checkbox"/>	isctmp11	CISCO_ROUTER POS0/2/0/0	isctmp12	CISCO_ROUTER POS0/3/0/0	10.2.4.10<- >10.2.4.9	DOWN
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Similarly, use **Enable** to change the status back to **UP**.

Step 4 Click **Proceed with Changes** to assess any impact on tunnel placement using Tunnel Audit or Tunnel Repair and deploy the changes.

For a detailed explanation of Tunnel Audit and Tunnel Repair, see [Chapter 5, “Advanced Primary Tunnel Management.”](#)

Deleting TE Links

The TE Link List window shown in [Figure 3-3](#) includes a delete function (the **Delete** button), which allows you to delete a TE link and the TE interfaces at each end of the link from the ISC repository. It does not make any change to the physical link in the network.

Restrictions

The TEM GUI prevents you from deleting a link if any TE object is still using that link.

It checks the following objects:

- strict explicit paths
- protected interfaces of backup tunnels
- SRLGs
- protected elements
- TE resource SRs.

If any of these objects is using the link, an attempt to delete the link results in an error message and the link and its interfaces remain unchanged.

Use Case

An example of this feature is when a TE link needs to be removed from the network as part of a topology change.

The steps needed to enable you to delete this link might include the following:

1. Reroute all managed tunnels away from this link using Tunnel Repair.
2. Reroute all unmanaged and backup tunnels using the link as part of their path away from it.
3. Delete any backup tunnels that protect either of the interfaces that make up the link.

4. Delete any explicit paths that use the link.
5. Delete the link from the ISC repository from the TE Links List window.
6. Outside ISC, during a suitable outage window, physically decommission the link, and set up its replacement(s).
7. Run a new **TE Discovery** task, which result in the newly added links being added to the ISC repository.
8. Depending on the FRR requirements of the network, protect the new link(s) using Compute Backup. (See [Compute Backup](#), page 6-6.)
9. Run network grooming (see [Grooming](#), page 5-23) to optimise the managed tunnels, so that they will make use of the new link(s).

Deleting TE Nodes

You can also delete a TE node. This works in a very similar way to deleting a link but is done from the PE devices screen. By deleting the corresponding PE device, you effectively delete the TE node.

Similar restrictions apply as in the case of TE links. The delete operation can only be successful if no TE objects are using the node.

Restrictions

The TEM GUI prevents you from deleting a node if any TE object is still using that node.

As with TE links, it checks the following objects:

- strict explicit paths
- protected interfaces of backup tunnels
- SRLGs
- protected elements
- TE resource SRs.

In addition, the node deletion checks that no managed, unmanaged, or backup tunnel starts or ends at the node in question.

If any of these objects is using the node, an attempt to delete the node will result in an error message and the node and its interfaces remain unchanged.

Use Case

An example of this feature is when a TE router is to be decommissioned from the network and replaced by one or more new TE routers as part of a major topology change.

The steps needed to enable you to delete this node might include the following:

1. Reroute all managed tunnels away from this node using Tunnel Repair.
2. Reroute all unmanaged and backup tunnels using the node as part of their path away from it.
3. Delete any backup tunnels that protect either of the interfaces that make up the node.
4. Delete any explicit paths that use the node.

5. Delete the node from the ISC repository from the TE Links List window.
6. Outside ISC, during a suitable outage window, physically decommission the node, and set up its replacement(s).
7. Run a new **TE Discovery** task, which result in the newly added nodes being added to the ISC repository.
8. Depending on the FRR requirements of the network, protect the new node(s) using Compute Backup. (See [Compute Backup, page 6-6.](#))
9. Run network grooming (see [Grooming, page 5-23](#)) to optimise the managed tunnels, so that they will make use of the new node(s).

If this check succeeds, the TE node and all TE links and TE interfaces starting at that node are removed from the ISC repository.

