Protection Planning

This chapter describes the process of creating and managing the protection of network elements using automated protection tools. See Chapter 5, "Basic Tunnel Management" for a description of the process using the basic tools.

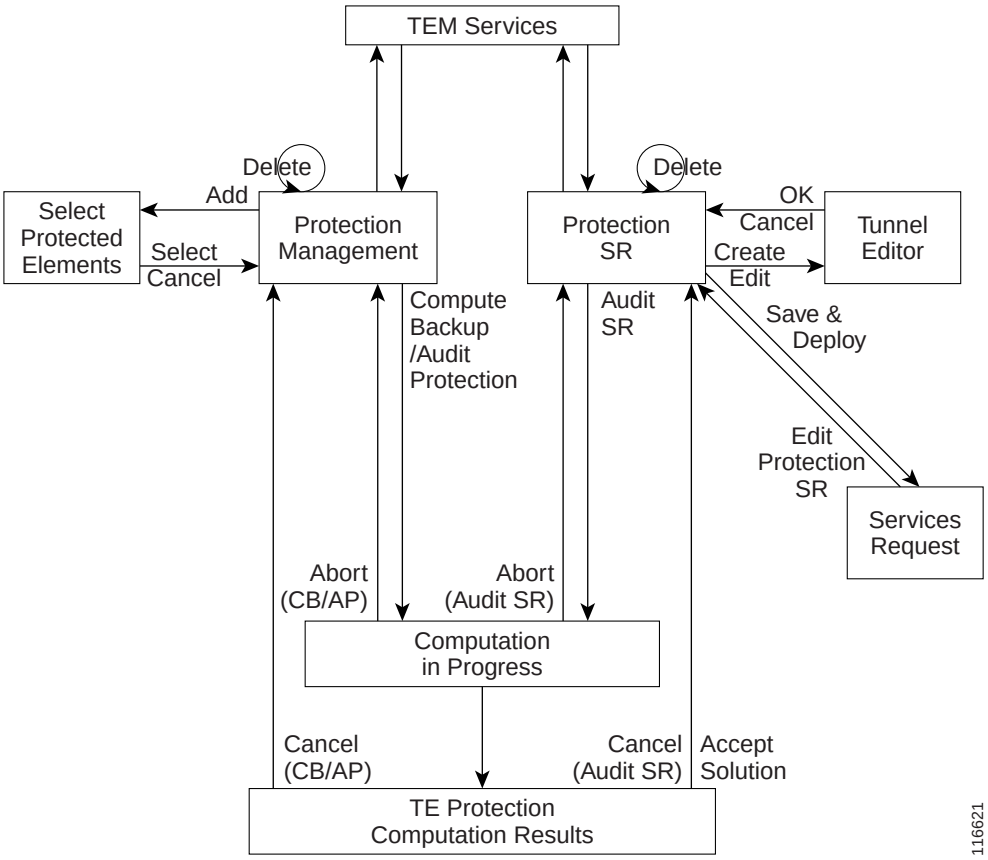
The purpose of protection planning is to protect selected elements in the network (links, routers, or SRLGs) against failure. The first step is to identify the elements that must be protected and then invoke the protection tools to compute the protected tunnels. From the computation, the system responds for each element with either a set of tunnels that protect the element or a set of violations and warnings that help the user to determine why it could not be protected.

For successfully protected elements the tunnels can be deployed on the network. For elements that could not be protected. the protection is either ignored or the constraints are altered on the protection case. More specifically, this can involve changing the TE bandwidth settings of the links associated to the element and then rerunning the protection computation on the altered network.

This chapter contains the following sections:

An overview of the protection management processes is provided in Figure 7-1.

Figure 7-1 Protection Management Processes



SRLG Operations

It is not uncommon for links to have identical physical characteristics, such as being physically located in the same conduit, or being connected to the same hardware. As a result, they could fail as a group during a single failure event. An SRLG addesses this problem by identifying links that could fail together.

After SRLG modifications (create, edit, delete), use the protection planning functions in the **TE Protection Management** window to ensure that adequate protection is available on the network.

Create SRLG

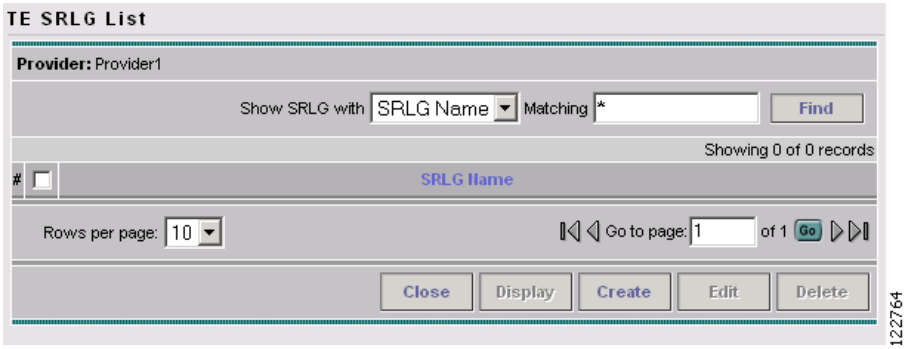
Creating a Shared-Risk Link Group (SRLG) is only necessary if a shared risk link group has been identified and it must be protected.

To create an SRLG, use the following steps:

Step 1 Navigate to **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management**.

Step 2 Click **TE SRLGs**. The TE SRLG List window in Figure 7-2 appears.

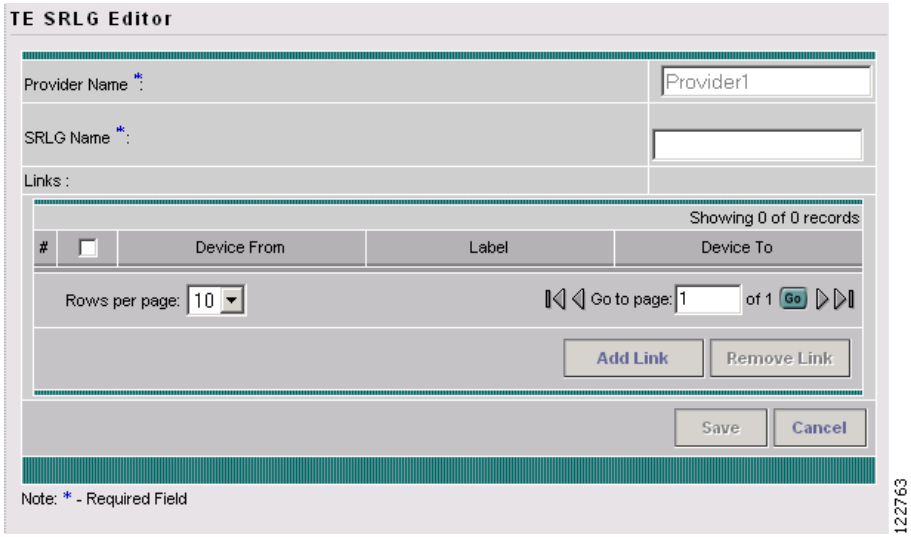
Figure 7-2 TE SRLG List



For an explanation of the various window elements, see Create/Edit TE SRLG, page A-30.

Step 3 To create an SRLG in the **TE SRLG List**, click **Create**. The TE SRLG Editor window in Figure 7-3 appears.

Figure 7-3 TE SRLG Editor

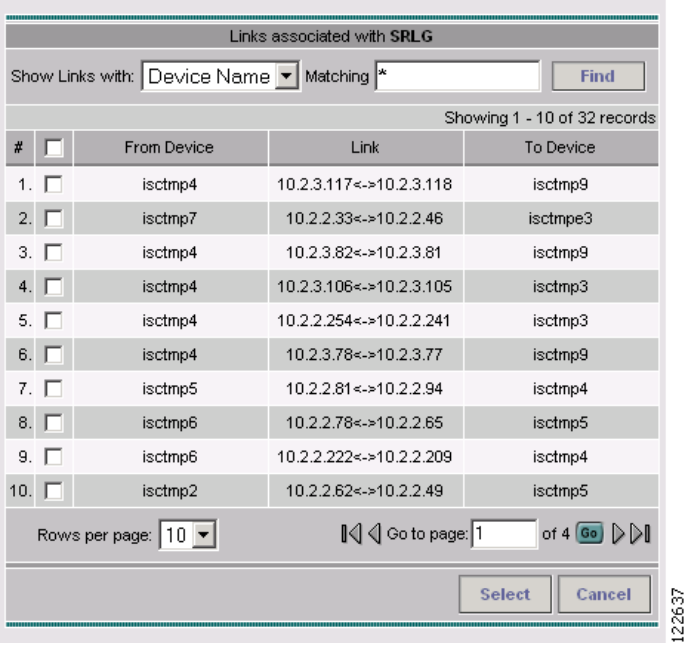


For an explanation of the various window elements , see Create/Edit TE SRLG, page A-30.

Step 4 Specify an **SRLG Name**.

Step 5 Click **Add Link**. The Links associated with SRLG window in Figure 7-4 appears.

Figure 7-4 Links associated with SRLG



For an explanation of the various window elements , see Create/Edit TE SRLG, page A-30.

Step 6 Select one or more links and click **Select**. The corresponding link information is added to the link list and the Select window closes and returns to the SRLG editor.

Step 7 Click **Save** to save the SRLG. This closes the SRLG editor and brings back the TE SRLG List as the active window, where the newly created SRLG is listed.

Edit SRLG

To edit an SRLG, use the following steps:

Step 1 Navigate to **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management**.

Step 2 Click **TE SRLGs**. The TE SRLG List window in Figure 7-2 appears.

Step 3 To edit an SRLG in the TE SRLG List, from the TE SRLG List window select the SRLG that you want to modify and click **Edit**. The TE SRLG Editor window in Figure 7-3 appears

Step 4 Use **Add Link** and **Remove Link** to adjust to the desired set of links for the selected SRLG.

Step 5 Click **Save** to save the changes.

Delete SRLG

To delete an SRLG, use the following steps:

Step 1 Navigate to **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management**.

Step 2 Click **TE SRLGs**. The TE SRLG List window in Figure 7-2 appears.

Step 3 To delete an SRLG in the TE SRLG List, from the TE SRLG List window select the SRLG(s) that you want to delete and click **Delete**. The Delete Confirm window appears.

Step 4 Click **Delete** to confirm. The Delete Confirm window closes. After the TE SRLG List window has been updated, the deleted SRLG no longer appears in the SRLG list.

Configure Element Protection

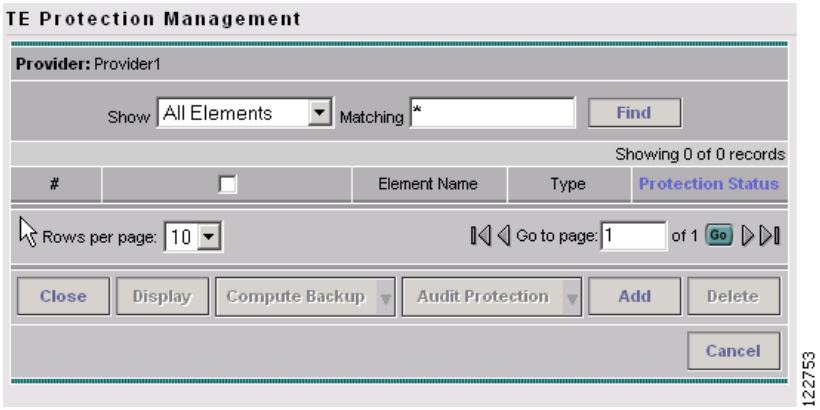
Before a protection computation can be performed, it is necessary to configure the network element protection.

To do so, use the following steps:

Step 1 Navigate **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management** > **TE Protected Elements**.

The TE Protection Management window in Figure 7-5 appears.

Figure 7-5 TE Protection Management

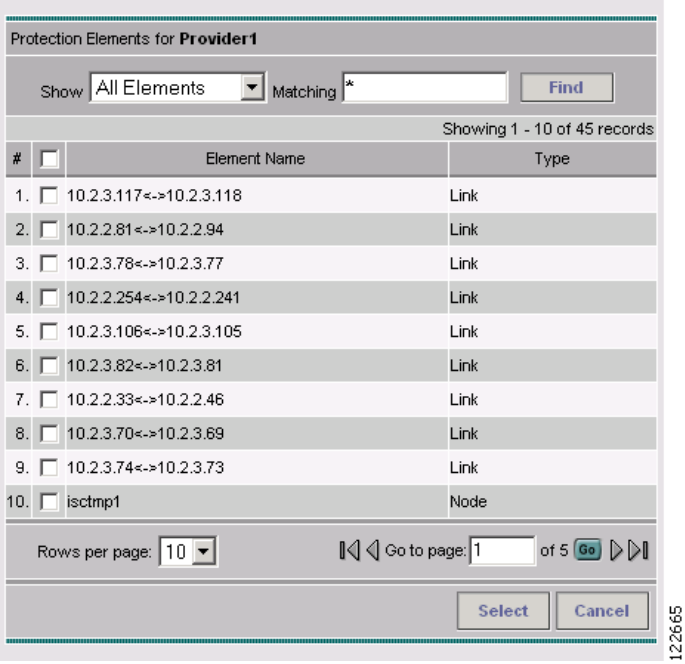


For an explanation of the various window elements, see Accessing Protection Management, page A-35.

Step 2 First, decide which network elements must be protected.

In the TE Protection Management window, click **Add** to add a protection element. The Select Protection Elements window in Figure 7-6 appears.

Figure 7-6 Select Protection Elements



For an explanation of the various window elements, see Accessing Protection Management, page A-35.

Step 3 Select one or more elements to be protected and click **Select.** The Select Protection Element window closes and the TE Protection Management window reappears.

Next, decide which protection tools should be applied.

Protection Tools

Relying on manual creation of backup tunnels as described in Chapter 5, “Basic Tunnel Management” has its limitations, not just for larger and more complicated networks.

The protection tools available in ISC TEM provide a number of tools that automatically compute and verify protection of specified network elements.

Compute Backup

Compute Backup is used to let ISC TEM automatically compute the necessary backup tunnels to protect specified network elements. The manual process is described in Chapter 5, “Basic Tunnel Management.”

To run Compute Backup, use the following steps:

Step 1 Navigate **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management** > **TE Protected Elements**.

Step 2 Configure the necessary protection elements as described in Configure Element Protection, page 7-5.

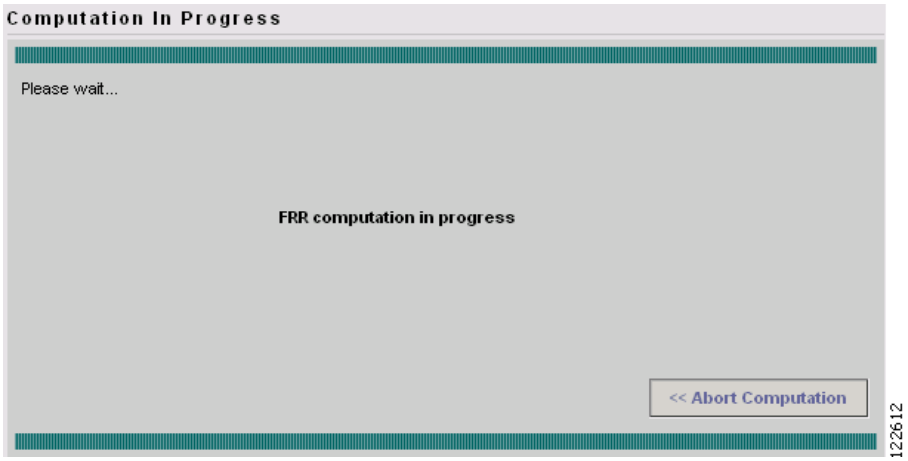
Step 3 If you only want to perform Compute Backup on selected tunnels (elements), select one or more elements on which to calculate a backup path.

Click **Compute Backup** and select one of the following:

- All Elements
- Selected Elements

The Computation In Progress window shown in Figure 7-7 appears.

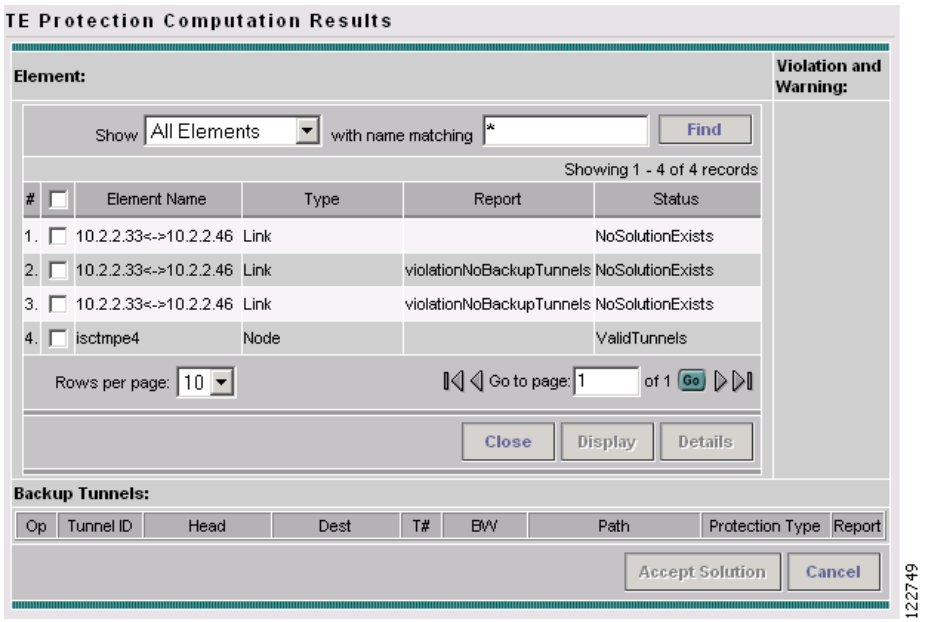
Figure 7-7 FRR Computation In Progress - Compute Backup



To abort the computation and return to the previous window, click **<< Abort Computation**.

Step 4 The window in Figure 7-8 appears.

Figure 7-8 TE Protection Computation Results

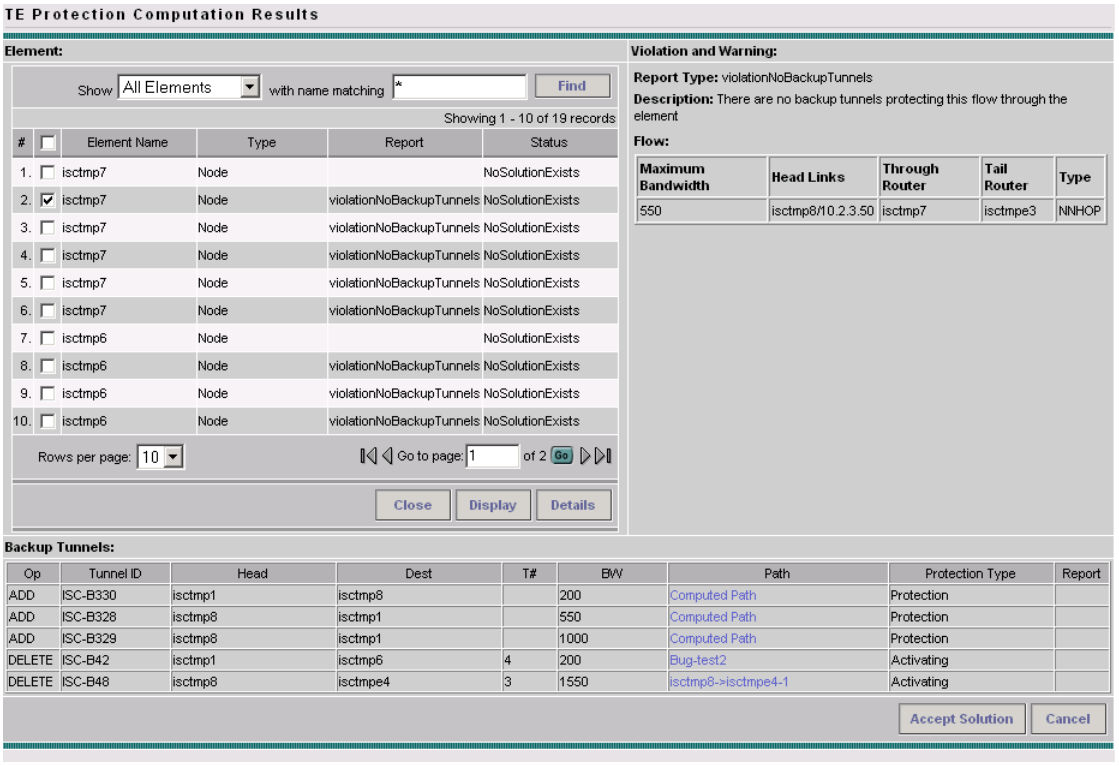


For an explanation of the various window elements, see Compute Backup, page A-36.

Step 5 Select a row corresponding to a specific warning or violation and click **Detail** to display a detailed description in the right pane and backup tunnels associated with the selected item in the bottom pane as shown in Figure 7-9.

For a description of warnings and violations, see Appendix B, "Warnings and Violations."

Figure 7-9 TE Protection Computation Results with Backup Tunnels

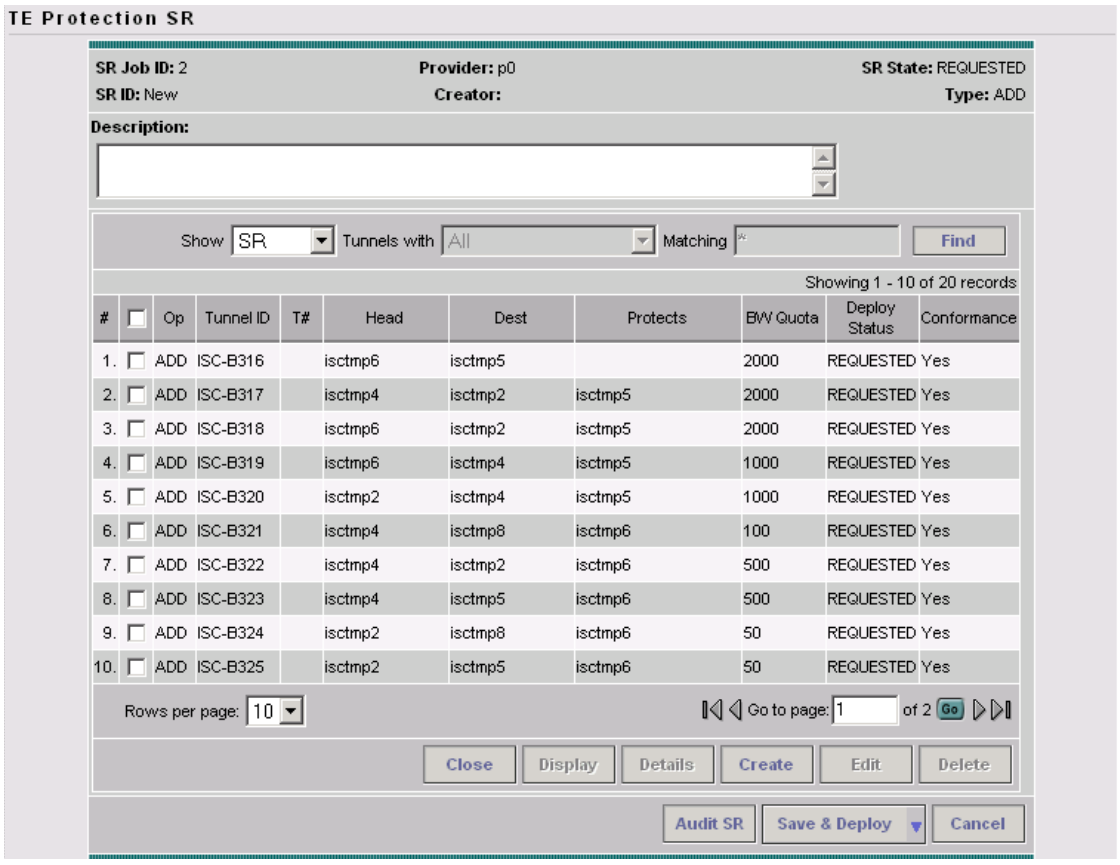


For an explanation of the various window elements, see Compute Backup, page A-36.

The **Backup Tunnel** table displays which new protection tunnels are required and any existing tunnels that should be kept or deleted for each element.

Step 6 In the TE Protection Computation Results window, check whether the proposed protection solution is acceptable. It so, click **Accept Solution**. The TE Protection SR window in Figure 7-10 appears with all tunnel additions and deletions computed by the system.

Figure 7-10 TE Protection SR - Computed Path



For an explanation of the various window elements, see Create TE Backup Tunnel, page A-58.

Optionally, you can make tunnel changes here and then run **Audit SR** to ensure that you have the desired level of protection before you deploy (see Audit SR, page 7-12).

Step 7 Click **Save & Deploy** to deploy the new tunnel SR to the network.

Note With the exception of TE Traffic Admission SRs, TE SRs are always deployed immediately from the specific TE SR screen, not from the **Service Requests** page in **Inventory and Connection Manager**.

Step 8 The Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** opens and displays the state of the deployed SR.

If the SR does not go to the **Deployed** state, go to the Task Logs screen to see the deployment log (**Monitoring > Task Manager** > **Logs**) as described in SR Deployment Logs, page 10-1.

Audit Protection

As opposed to the Compute Backup tool described on page 6, Audit Protection does not attempt to create a backup solution. It seeks to verify protection of specified network elements with the current set of backup tunnels and reports any warnings or violations that are discovered. It is recommended that any time a change has been committed on the TE topology such as resources on TE links or SRLG memebership, a protection audit be run to verify the protection status on all elements.

The computation will display the same computation result page as for Compute Backup. When you return from computation result page, the Protection Status column in the TE Protection Management window is updated to show the level of protection for each element.

This section describes the necessary steps to perform Audit Protection on one or more network elements.

To run Audit Protection, use the following steps:

Step 1 Navigate **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management > TE Protected Elements**.

The TE Protection Management window in Figure 7-5 appears.

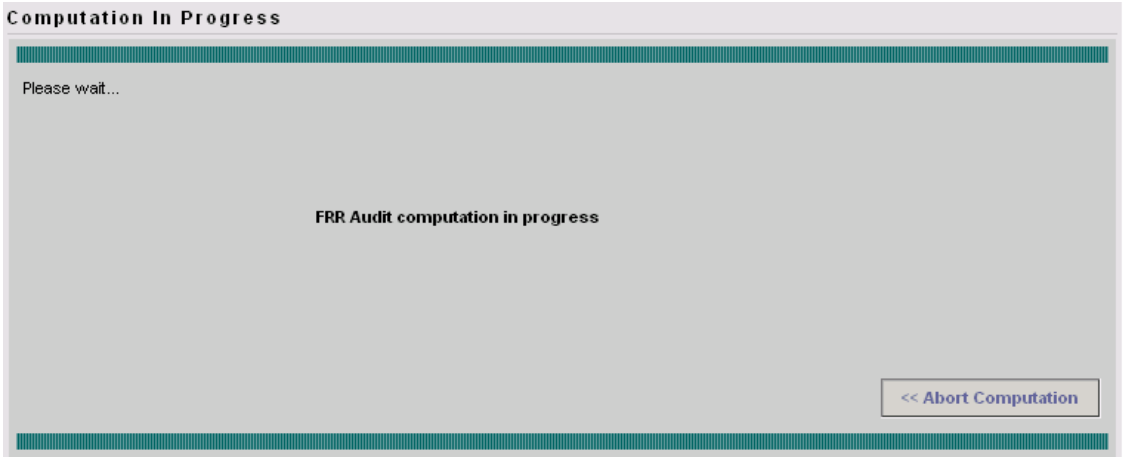
Step 2 If you only want to perform Audit Protection on selected tunnels (elements), select one or more tunnels on which to calculate a backup path.

Click **Audit Protection** and select one of the following:

- All Elements
- Selected Elements

The Computation In Progress window shown in Figure 7-7 appears.

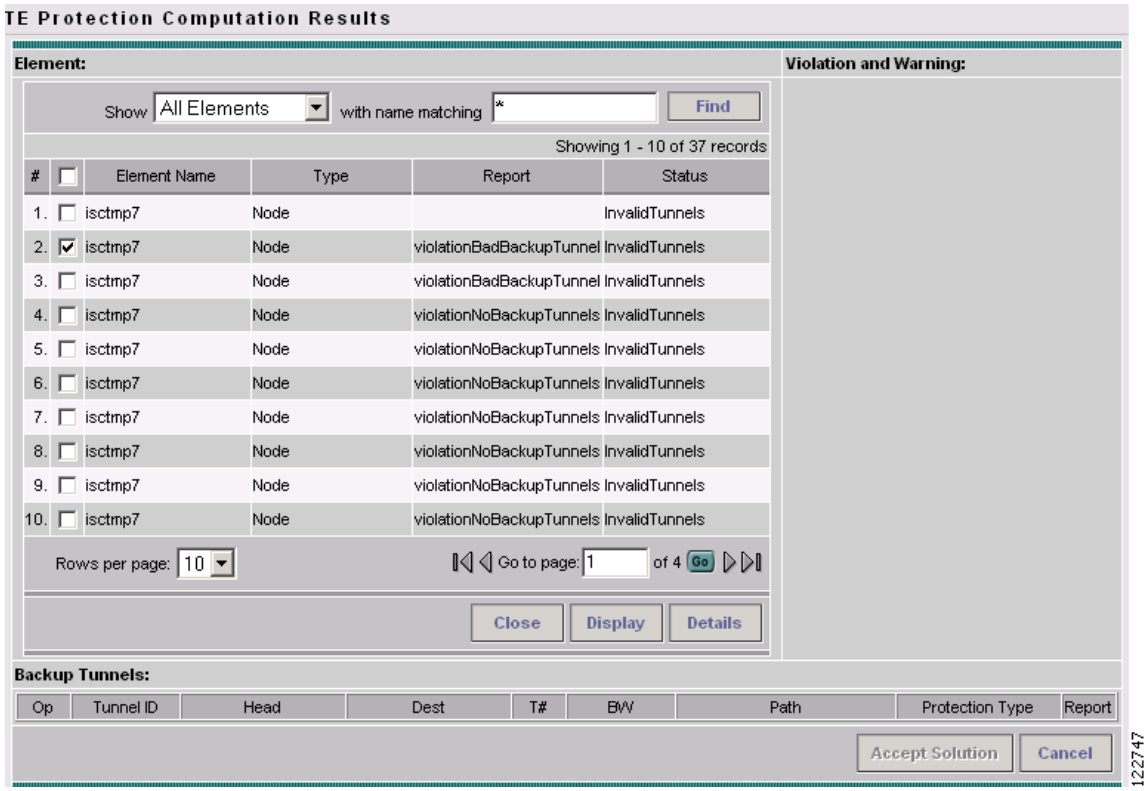
Figure 7-11 FRR Audit Computation in Progress - Audit Protection



To abort the computation and return to the previous window, click **<< Abort Computation**.

The TE Protection Computation Results window in Figure 7-12 appears.

Figure 7-12 TE Protection Computation Results

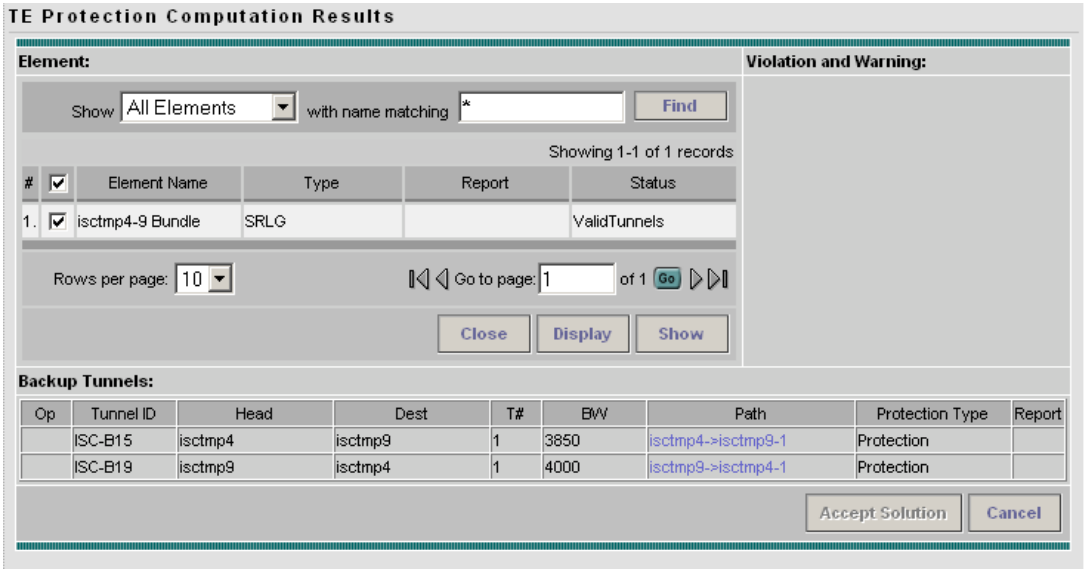


For an explanation of the various window elements, see Compute Backup, page A-36.

Step 3 To view the backup tunnels for a particular element, select the element and click **Details**.

The TE Protection Computation Results window in Figure 7-13 appears.

Figure 7-13 TE Protection Computation Results with Backup Tunnels



For an explanation of the various window elements, see Compute Backup, page A-36.

Step 4 Select a row corresponding to a specific warning or violation and click **Show** to display a detailed description in the right pane and backup tunnels associated with the selected item in the bottom pane as shown in Figure 7-9.

Tunnels associated with a warning or violation are flagged in the **Report** column in the **Backup Tunnels** table in the bottom pane.

The **Accept Solution** button is greyed out because the audit does not provide a solution but rather an evaluation.

For a description of warnings and violations, see Appendix B, "Warnings and Violations."

Step 5 Click **Cancel** to return to the TE Protection Management window. The protection status is updated in the Protection Status column.

Audit SR

Audit SR audits protection of all elements in the **TE Protection Management** window against backup tunnels in the **TE Protection SR** window.

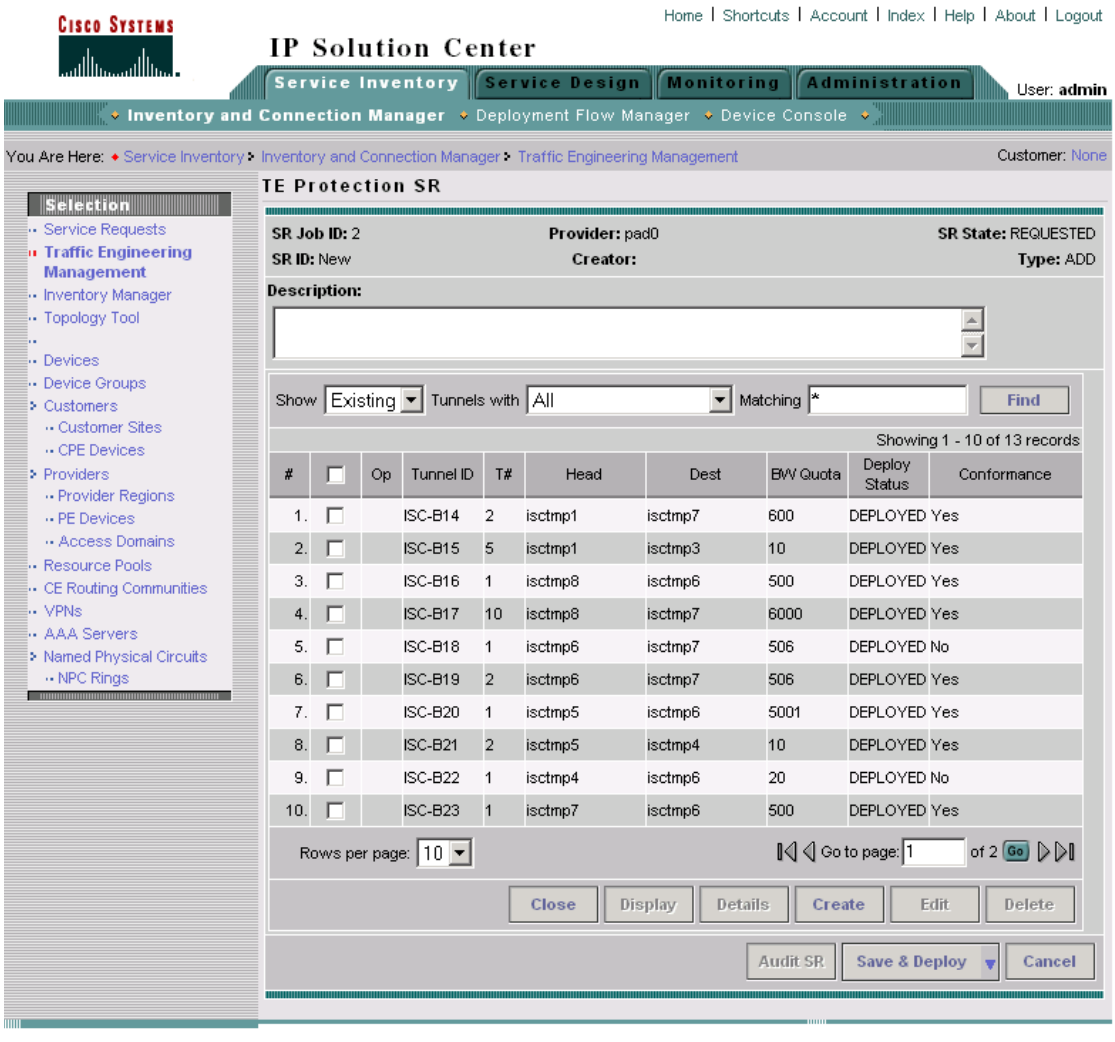
This feature can be used to audit the protection for manually added, modified, and deleted tunnels in the **TE Protection SR** window before deploying them.

To audit a TE backup tunnel SR, use the following steps:

Step 1 Navigate to **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management**.

Step 2 Click **Create TE Backup Tunnel**. The **TE Protection SR** window in Figure 7-14 appears.

Figure 7-14 TE Protection SR



For an explanation of the various window elements, see Create TE Backup Tunnel, page A-58.

Step 3 To audit the protection SRs, click **Audit SR**.

The FRR Audit process begins and the TE Protection Computation Results window in Figure 7-12 appears.

See Audit Protection, page 7-10 for a description of the rest of the process. Detail and report windows are identical in these two processes.