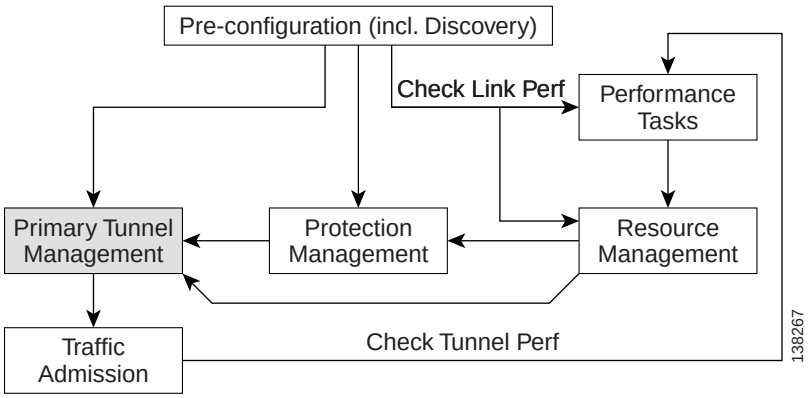

# Advanced Primary Tunnel Management




In addition to the basic tunnel management tools described in Chapter 5, “Basic Tunnel Management”, ISC TEM gives access to a set of advanced tunnel planning tools that provide optimal placement of tunnels to ensure efficient use of network resources.

The advanced tools are available for managed tunnels only. The difference between managed and unmanaged tunnels is described in Managed/Unmanaged Primary Tunnels, page 1-3.

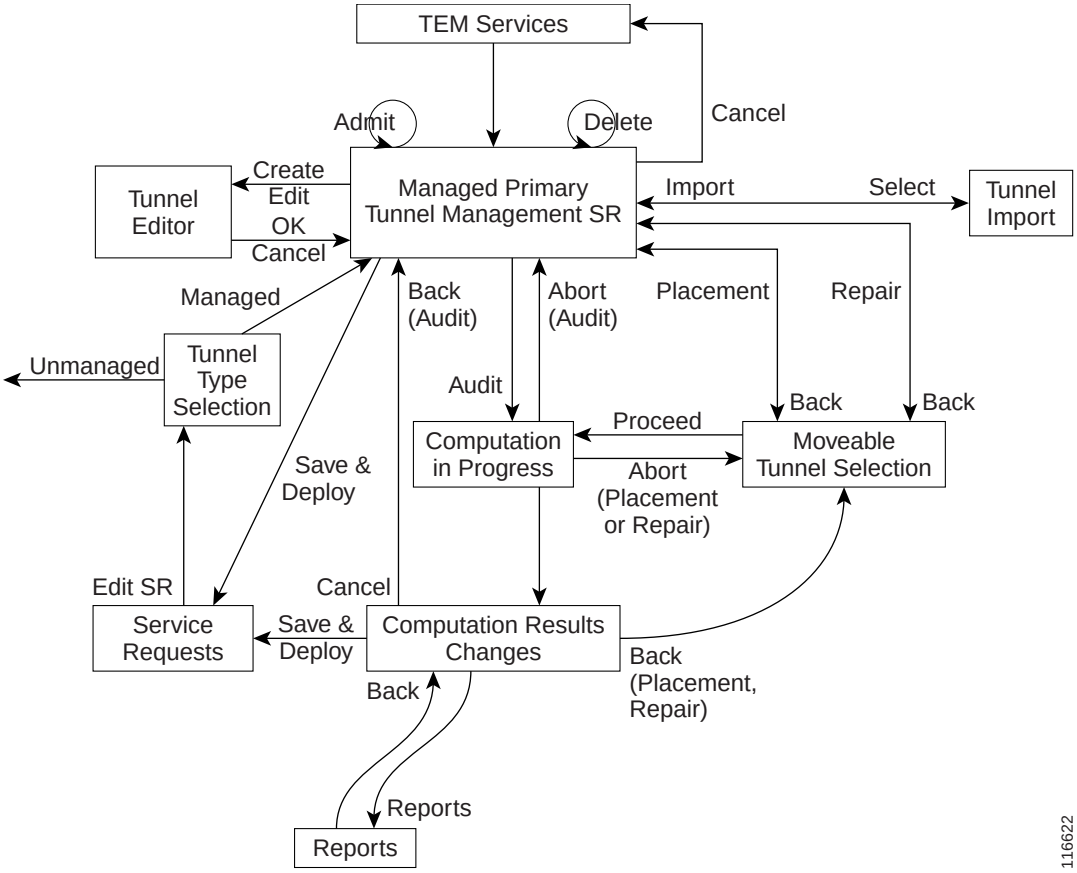
This chapter includes the following sections:

# Tunnel Operations

This section explains the advanced tunnel operations in ISC TEM that incorporate the planning tools.

An overview of the primary tunnel management process is provided in Figure 6-1.

***Figure 6-1 Primary Tunnel Management Processes***




For **Tunnel Type Selection**, when you select **Unmanaged** the TE Unmanaged Primary Tunnel SR window appears (see Chapter 5, "Basic Tunnel Management").

All other elements in Figure 6-1 are described in this chapter.

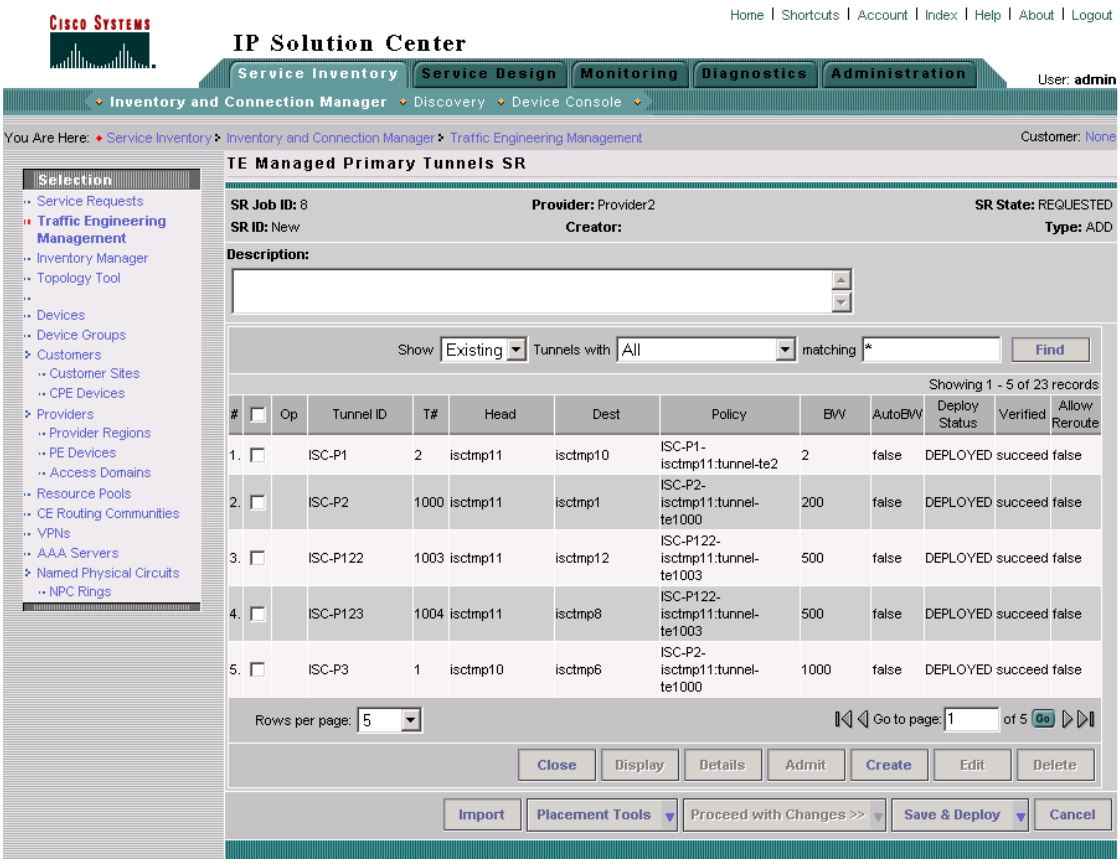
# Create Primary Tunnel

To create a TE managed primary tunnel with the RG license installed, use the following steps:

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

**Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

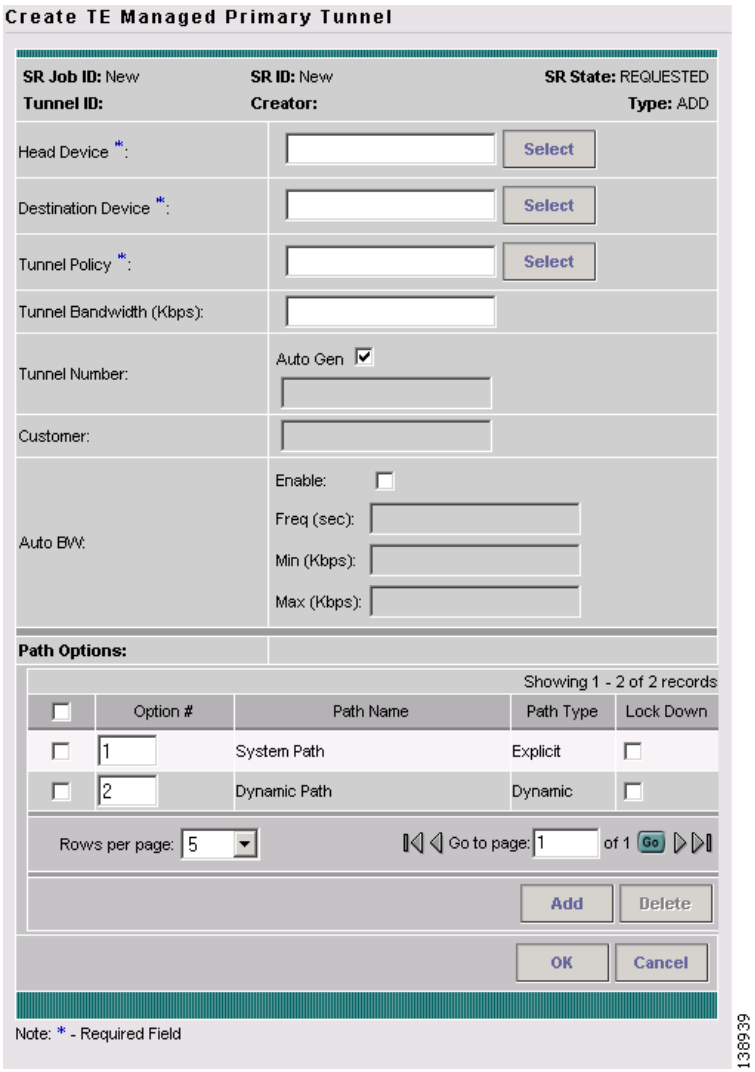
*Figure 6-2 TE Managed Primary Tunnels SR*




For an explanation of the various window elements, see Create Managed TE Tunnel, page A-41.

**Step 3** Click **Create**. The Create TE Managed Primary Tunnel window appears as shown in Figure 6-3.

*Figure 6-3 Create TE Managed Primary Tunnel*




For an explanation of the various window elements, see Create Managed TE Tunnel, page A-41.

The **Path Options** section provides three path types, **System Path**, **Explicit Path**, and **Dynamic Path**.

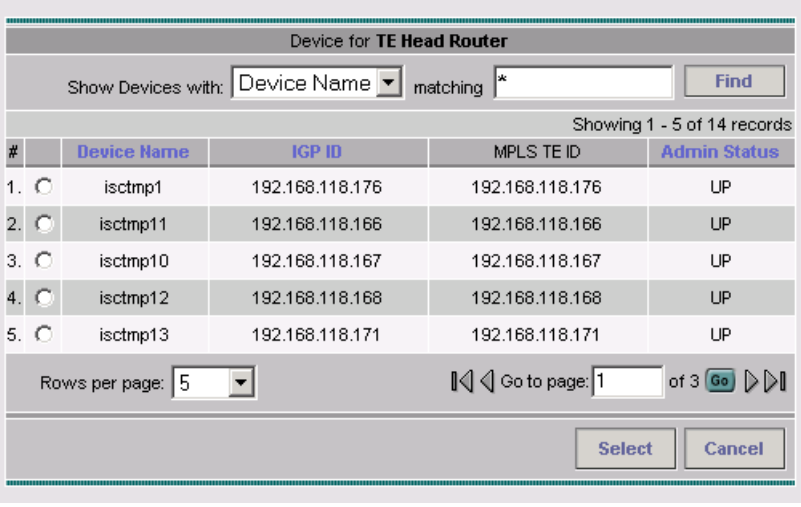
A **System Path** is an ISC system generated explicit path (immovable). The first path has to be an explicit path.

An **Explicit Path** is a fixed path from a specific head to a specific destination device.

A **Dynamic Path** is provisioned by allowing the head router to find a path. The **dynamic** keyword is provisioned to the routers.

**Step 4** To select a **Head Device**, click the corresponding **Select** button to open the window shown in Figure 6-4.

*Figure 6-4 Select Device for TE Head Router*

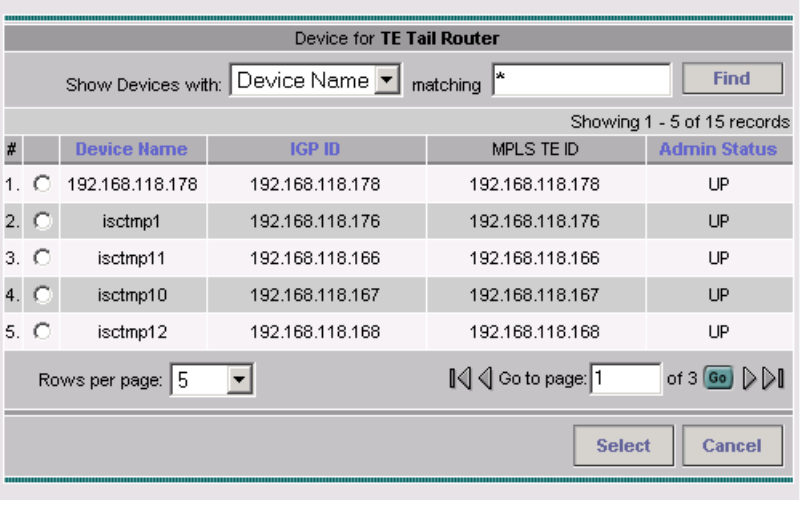



For an explanation of the various window elements, see Create TE Managed Primary Tunnel, page A-44.

Select a head device and click **Select**.

**Step 5** To select a **Destination Device**, click the corresponding **Select** button to open the window shown in Figure 6-5.

*Figure 6-5 Select Device for TE Tail Router*



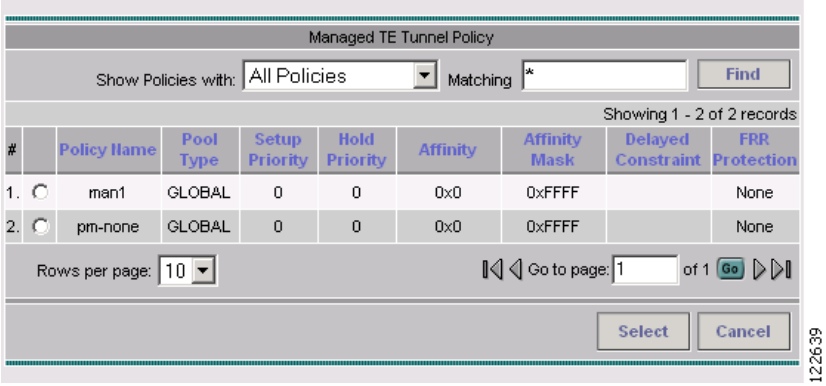

For an explanation of the various window elements, see Create TE Managed Primary Tunnel, page A-44.

Select a tail device and click **Select**.

**Step 6** To select a **Tunnel Policy**, click the corresponding **Select** button to open the window shown in Figure 6-6.

**Note** If no tunnel policies are available, the reason could be that they are all unmanaged. To create a managed tunnel, use the **Policy Manager** (see Create Primary Tunnel, page 6-2) and make sure to check the **Managed** check box.

***Figure 6-6 Select Managed TE Tunnel Policy***




For an explanation of the various window elements, see Create TE Managed Primary Tunnel, page A-44.

**Step 7** Specify a tunnel bandwidth greater than zero. Add other tunnel information as desired.

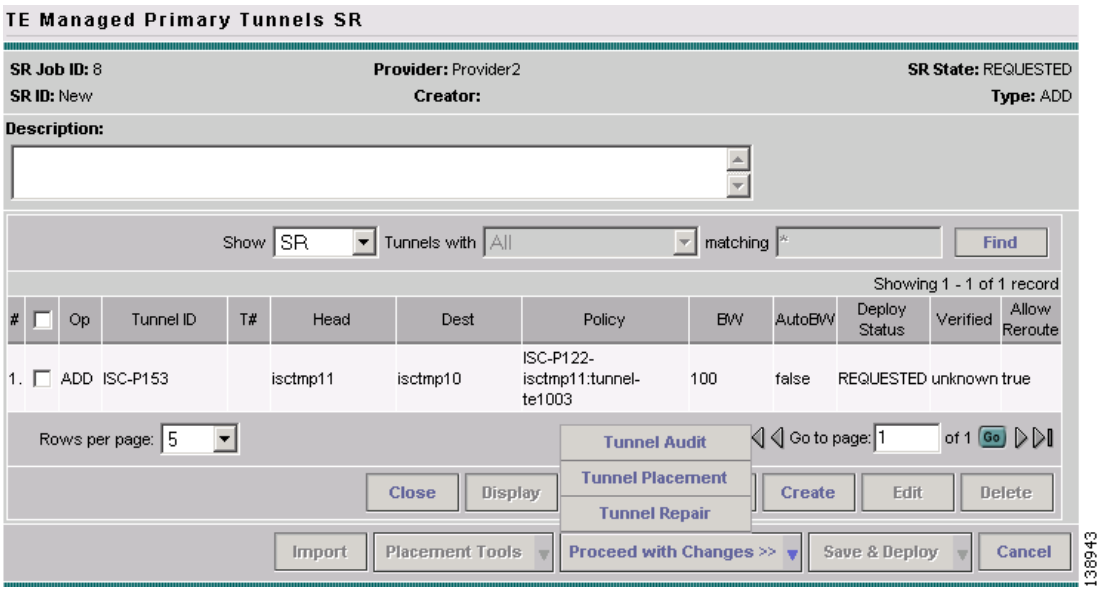
**Step 8** Optionally, if you want to specify an explicit path rather than using the system path provided by ISC TEM, delete the system path and subsequently add the explicit path. For a more detailed explanation of this step, see Create Primary Tunnel, page 5-8.

**Step 9** In the Create TE Managed Tunnel window, click **OK** to accept the entered tunnel information or **Cancel** to quit and return to the TE Managed Primary Tunnels SR window.

The TE Managed Primary Tunnel SR window in Figure 6-7 appears displaying the new tunnel with the Op field set to ADD to signify that an SR has been added.

**Note** The added tunnel can be reverted to its original state by selecting it and clicking **Delete**. The tunnel is removed from the tunnel list.

*Figure 6-7 TE Managed Primary Tunnel SR - Added Tunnel*




**Step 10** In the TE Managed Primary Tunnel SR window, you can create or edit more tunnels, or if you are done with all the changes, proceed in one of the following two ways depending on which of the following buttons are active (**Save & Deploy** is not available after the **Create** operation):

- **Proceed with Changes**: The changes you entered impacts tunnel placement. Click on this to continue with one of the planning flows described in the Placement Tools (see Placement Tools, page 6-11) until the SR can be saved and deployed.
- **Save & Deploy**: The changes you entered do not impact tunnel placement. Click on this to save and deploy the SR. This function is further described in Create Managed TE Tunnel, page A-41.

**Note** When you click Save & Deploy, a background process is started. To avoid a potential conflict with another deployment, wait until the 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 Request window under Inventory and Connection Manager or open the Task Manager under Monitoring.

**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 11** If Save & Deploy was selected in Step 10, the Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** opens and displays the state of the deployed SR.

For more information on working with service requests, see Appendix B, “Managing Service Requests.”

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

# Edit Primary Tunnel

The only difference between creating and editing tunnels is that in the tunnel editor, the head and destination devices and tunnel number fields are not editable. Otherwise, you create and edit the same attributes.

Only **Proceed with Changes** or **Save & Deploy**, not both, are available depending on whether the changes you entered impacts tunnel placement.

To edit a primary tunnel, see Chapter 5, “Basic Tunnel Management.”

# Delete Primary Tunnel

To delete one or more tunnels, see Chapter 5, “Basic Tunnel Management.”.

# Admit Primary Tunnel

The Admit function is used to admit selected tunnels not previously verified into the managed topology. This feature is used only for discovered tunnels that failed verification. During the discovery process, verification is performed with the Tunnel Placement algorithm, as if the tunnels were admitted for the first time.

Verification means that the discovered managed tunnel is verified against the network topology and ISC TEM checks if there is enough bandwidth along the tunnel path (both are specified in the tunnel).

In general, verification will fail if there is not enough bandwidth due to the existence of other tunnels or a limitation on link capacity/bandwidth.

More specifically, this can happen when a priority 0 tunnel is created independently of ISC TEM and a TE Discovery task is run. If the tunnel does not satisfy all the managed tunnel constraints (that is, if it is reserving more bandwidth than is available in a link that it passes through) TE discovery will mark it as ‘verified = false’. It will not be managed by ISC TEM until you use the Admit button to make it verified. Typically this would have to be accompanied with some other tunnel or resource change to ensure that the constraint is now satisfied.

To admit a primary tunnel, use the following steps:

**Step 1** In the **TE Managed Primary Tunnel SR**, select one or more unverified tunnels to migrate.

**Step 2** Click **Admit**. The unverified tunnel(s) are verified and, if sucessful, an **ADMIT** flag will appear in the **Op** column.

**Step 3** Select **Proceed with Changes >>** > **Tunnel Placement** to determine if the tunnels can be placed. If not, edit the tunnels and try again.

# Import Primary Tunnel

This feature allows you to update tunnels in bulk through a file-based import mechanism. The data is migrated into the managed primary tunnel service request.

## Construct XML Import File

To import tunnels from a file, first construct an XML import file conforming to the structure defined in the system supplied Document Type Definition (DTD) file (see Appendix D, "Document Type Definition (DTD) File"), and save the XML file together with the DTD file on the ISC server under the same directory. To create a valid import file, use the provided command line validation tool (see Command Line Validation Tool, page 6-9).

The following files are necessary for importing data into the ISC TEM application and are included in the installation:

- DTD file for the import file in
  *< installedDir >/ resources/java/xml/com/cisco/vpnsc/ui/te*
  - **TeImport.dtd**

    (a sample file, '**sample.xml**', is also included)
- Shell script for executing the command line validator in the *<installedDir>/bin* directory.
  - **ImportTeTunnels**

    Usage: **importTeTunnels** <*importfile*>

*importfile* is a XML file and must specify **TeImport.dtd** as its DTD. **TeImport.dtd** must be in the same directory as *importfile*.

## Command Line Validation Tool

The purpose of a command line validator is to help construct a valid import file off-line that corresponds to **TeImport.dtd**. The tool helps screen out errors associated with files that are not well-formed and files that do not conform to the rules set by the DTD.

For instructions on how to use the DTD file, see the DTD file documentation.

The tool reads the import file line-by-line, echoes each line in on the output as it parses, and reports any parsing error it encounters. The parsing and validation continues even when parsing errors are encountered for as long as the file structure makes sense.

**Note** This tool does not check for cross field validation or data integrity errors with respect to the ISC TEM application.

## Import Procedure

The file-based import feature is only enabled when there are no uncommitted new, changed, or deleted tunnels in the service request.

It provides a way of adding, editing, deleting, or migrating many tunnels at a time.

To start the import procedure, use the following steps:

**Step 1** Prepare the XML import file in accordance with the DTD file.

**Step 2** Go to **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management**.

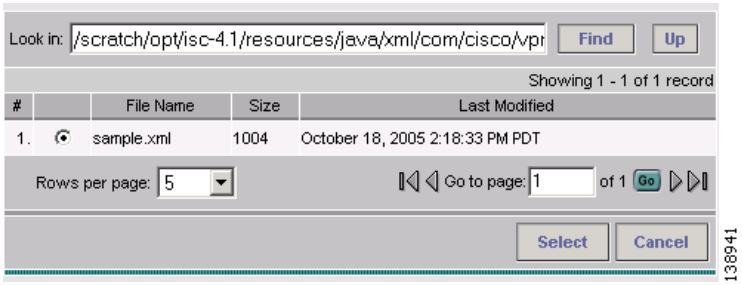
**Step 3** Select provider if this has not been done earlier in the session.

**Step 4** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

**Step 5** Click **Import** to start the import process. The Select Import File window in Figure 6-8 appears.

**Note** The Import button is only enabled when there are no uncommitted new, changed, or deleted tunnels in the service request.

***Figure 6-8 Select Import File***




For an explanation of the various window elements, see Import Tunnel, page A-50.

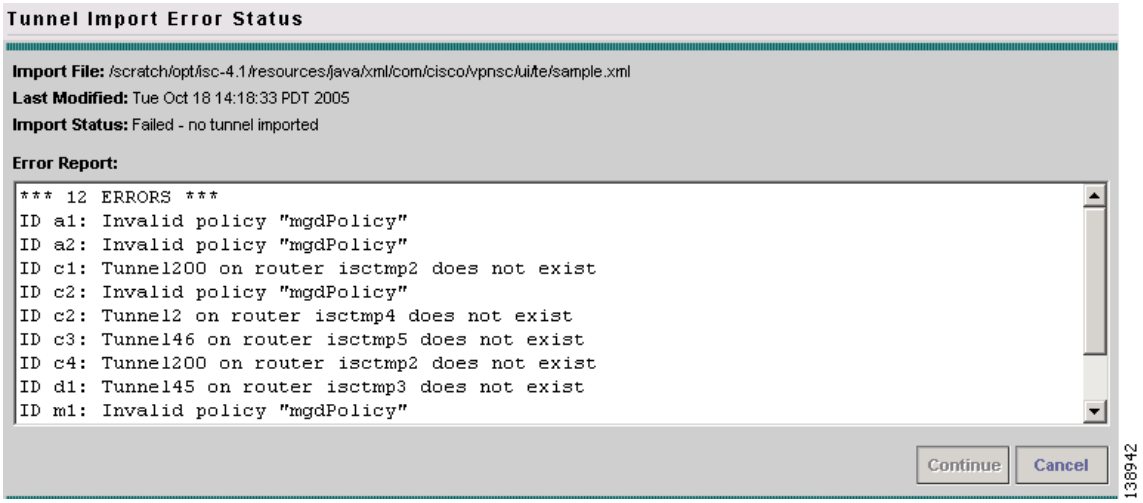
The Select Import File window lists all the XML files and any directories under the directory name shown in the **Look in** field.

The default directory shown in the **Look in** field in Figure 6-8 corresponds to the installation directory in which the DTD and sample XML files reside.

**Step 6** Select the desired XML file to be used for the import operation.

The system then parses the file. If any error is detected, it will be reported in the Tunnel Import Error Status window shown in Figure 6-9.

***Figure 6-9 Tunnel Import Error Status***




For an explanation of the various window elements, see Import Tunnel, page A-50.

The Tunnel Import Error Status window shows the URL of the file, its last modified timestamp, the import status, and any error/warning messages.

**Step 7** If the import operation failed, **Cancel** to return to the previous screen. If it is partially successful, the **Continue** button is enabled, thereby providing an additional option to accept system treatment for errors/warnings and continue with the import operation.

**Step 8** If the file is parsed successfully or you click **Continue**, all valid tunnels in the file are added to the service request and the TE Managed Primary Tunnels SR window is re-displayed in the SR view. The imported tunnels are displayed with the appropriate tunnel **Op** type.

# Planning Strategy

The main objective of using the planning tools is to achieve optimal overall network utilization while causing minimal impact on any existing traffic on the network.

In most cases, the following strategy can be applied:

- Attempt to admit the new traffic optimising on utilisation (Placement feature) without allowing existing traffic to be moved. This offers the possibility of accommodating the new traffic without any changes to the existing traffic, while still optimising reserved bandwidth utilisation under the constraint that existing tunnels do not move.
- If this fails, attempt to admit the same new traffic minimising change to existing traffic (Repair feature) to see if the new traffic can be accommodated without affecting any more existing tunnels than necessary.
- If this succeeds in placing the new traffic, but you feel that the overall reserved bandwidth utilisation is higher than would be preferred, consider grooming the network.
- If the Repair fails, review the parameters that control how many changes can be considered. Alternatively the specification to the desired traffic could be changed, or resource modifications could be made.

This strategy reflects the different approaches taken by the different algorithms in searching for solutions. However, other combinations are possible.

# Placement Tools

Planning tools for primary tunnels are available in two buttons on the TE Primary Tunnel SR screen as shown in Figure 6-10 and Figure 6-11 depending on whether a change has been made to the managed primary tunnels.

- Proceed with Changes: Used when you have made changes (add/change/delete/admit) to the tunnels. Tunnel operations are described in Tunnel Operations, page 6-2. Then choose one of the placement tools to verify primary placement with the system and continue with deployment. This button is also available in Resource Management.
- Placement Tools: Used to perform planning function on the existing network.
  - The Tunnel Audit option should be used to verify the constraint-based placement of existing managed primary tunnels with the existing network topology. You can use this option to find out the optimality of your primary placement. If you are requiring protection levels above "Best Effort" on your primary tunnels, it is also important to perform an audit after any changes have been made in the protection network. If the audit results in warnings/violations, you can use the Tunnel Repair option help you find a solution.

– The **Groom** option is used for optimizing your primary placement. In all primary computation, a quality report is produced which displays the optimality and utilization of the bandwidth pools. You can perform a Tunnel Audit first to determine if grooming is needed on your network.

They are accessed from two buttons in the TE Managed Primary Tunnels SR window as shown in Figure 6-10 and Figure 6-11.

***Figure 6-10 Proceed with Changes Button***

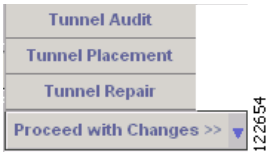



***Figure 6-11 Placement Tools Button***


The planning tools are described in detail in the following sections.

**Note** If tunnel attributes that are not supported by the placement tools (such as auto-bw frequency) are changed in conjunction with attributes that are supported, the attributes appear correctly in the TE Computation Results window. But if only unsupported attributes are changed, the TE Computation Results window still shows no achieved changes and the Save & Deploy button is grayed out so the change cannot be deployed.

# Tunnel Audit

When any type of change is required, whether tunnel modifications or TE resource modifications, a Tunnel Audit is run to determine what inconsistencies the change might cause, if any. Tunnel Audit can also be used anytime to check the for optimality of network utilization.

The audit can be performed from the primary tunnel window or from the **TE Resource Modifications** window.

Tunnel Audit can also be invoked from the Resource Management window (see Chapter 4, “TE Resource Management”).

To perform an audit on the created tunnel, use the following steps:

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

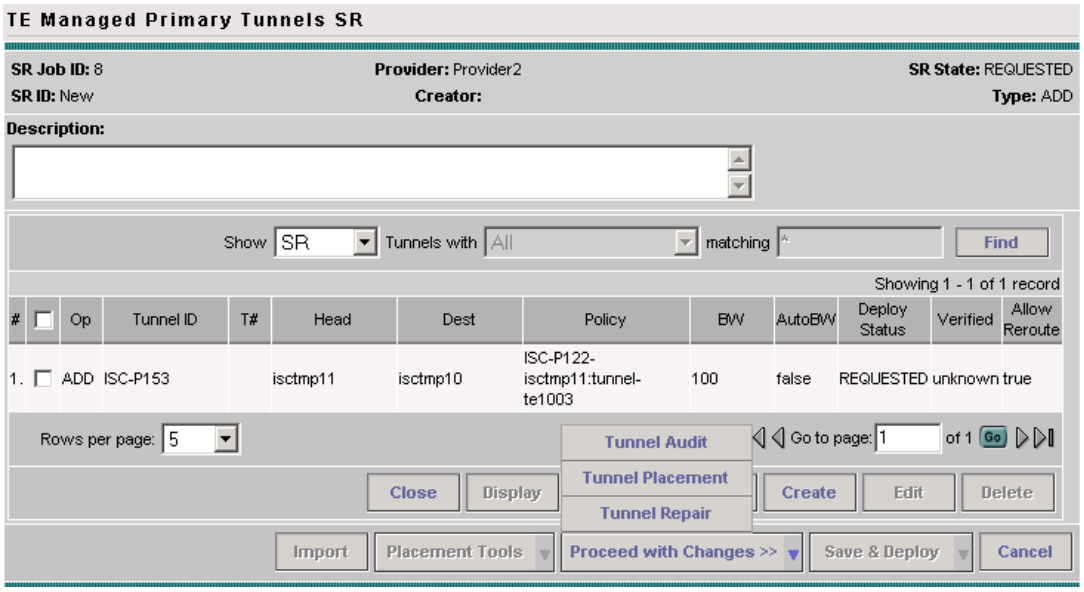
**Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

Tunnel Audit can be used in two ways:

- When one or more tunnels have been created or their attributes altered (see Create Primary Tunnel, page 6-2), Tunnel Audit can be activated by selecting **Proceed with Changes** >>.
- When no changes have taken place, Tunnel Audit can be accessed by selecting **Placement Tools**.

**Step 3** As an example, assume that a new primary tunnel SR has been created. The TE Managed Primary Tunnel SR window shown in Figure 6-12 appears.

***Figure 6-12 TE Managed Primary Tunnel SR (Audit)***

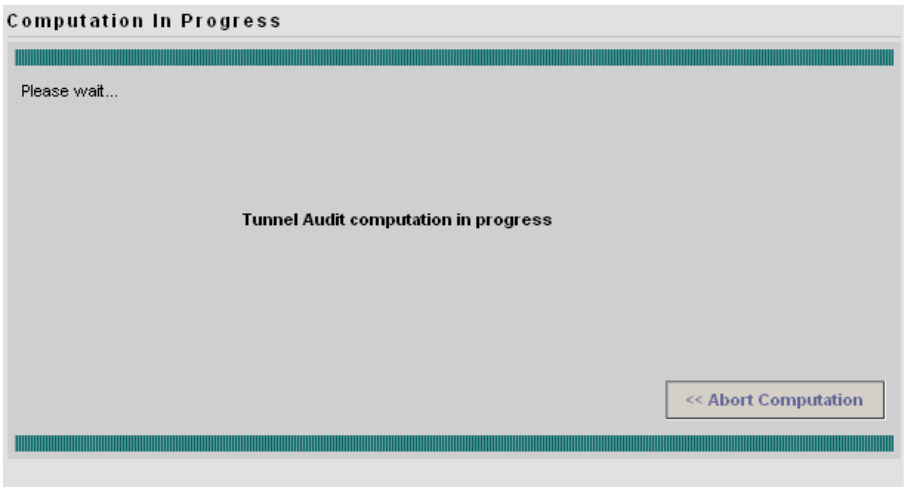



For an explanation of the various window elements, see Create Managed TE Tunnel, page A-41.

**Step 4** Select **Proceed with Changes** >> > **Tunnel Audit**.

The Computation In Progress window shown in Figure 6-13 appears.

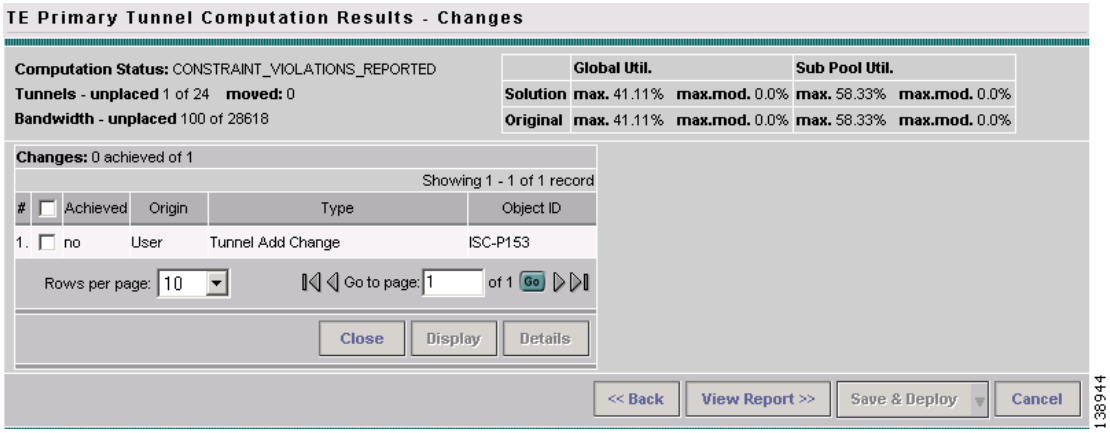
*Figure 6-13 Computation In Progress - Audit*




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

**Step 5** The TE Primary Tunnel Computation Results - Changes window in Figure 6-14 appears.

*Figure 6-14 TE Primary Tunnel Computation Results - Changes*

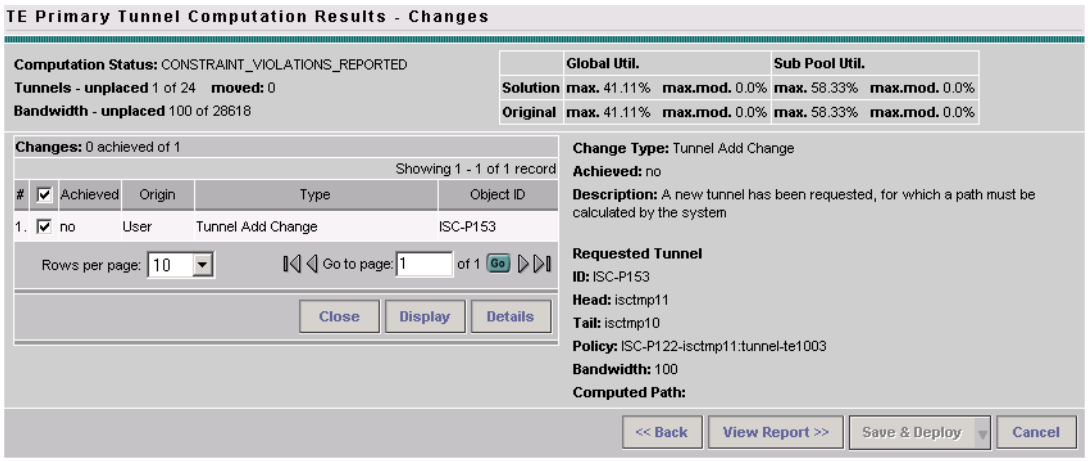



For an explanation of the various window elements, see Planning Tools, page A-52.

**Note** Certain attributes, such as Description, that do not impact the computation carried out by the placement tools and updates to these are not displayed in the Computation Result Window.

**Step 6** To obtain detailed information about the tunnel and whether the change request was achieved, select the specific tunnel and click **Detail**. The detail section in the right side of the window appears as shown in Figure 6-15.

*Figure 6-15 TE Primary Tunnel Computation Results - Audit Changes (Details)*



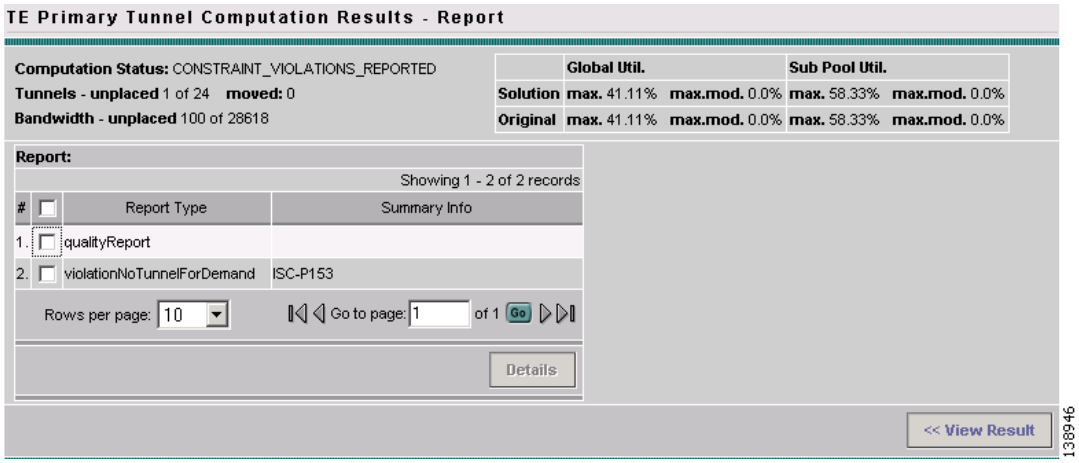

For an explanation of the various window elements, see Planning Tools, page A-52.

A **qualityReport** is always generated. If the computation was successful, this will be the only report.

If a warning or a violation was encountered, one or more warning or violation reports will also be generated.

**Step 7** To view an audit report, click **View Report** >>. The TE Primary Tunnel Computation Results - Report window in Figure 6-16 appears.

*Figure 6-16 TE Primary Tunnel Computation Results - Audit Report*

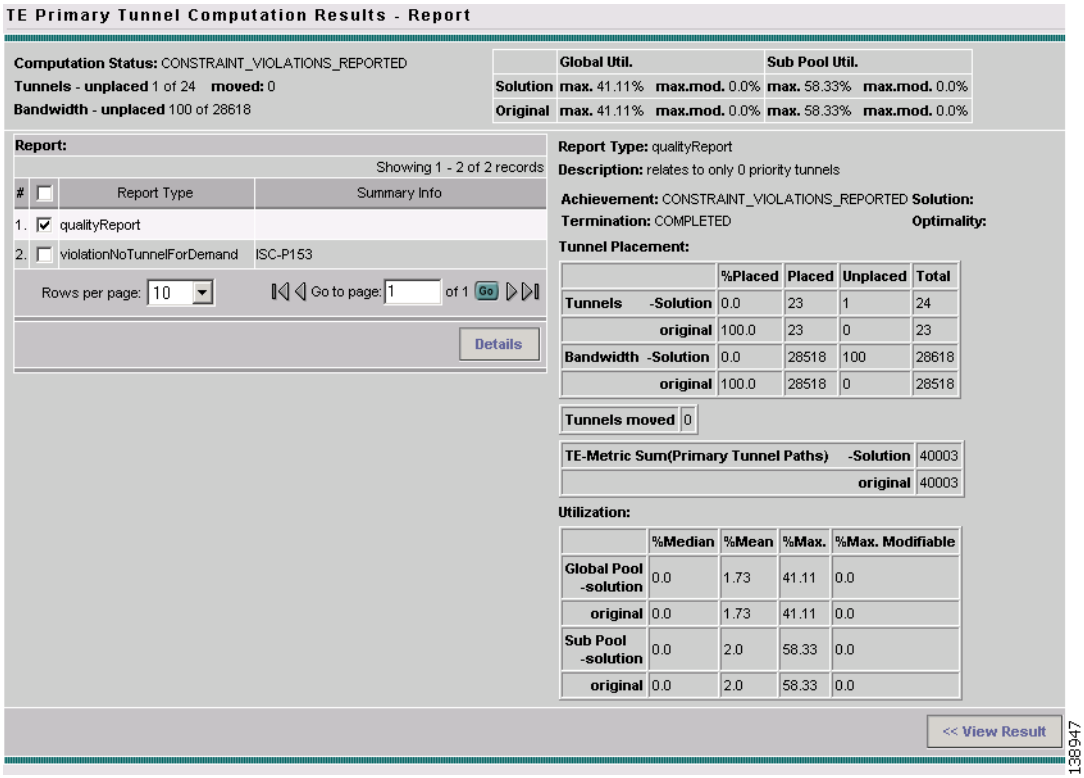



For an explanation of the various window elements, see Planning Tools, page A-52.

In this case, as shown in Figure 6-16, both a **qualityReport** and a violation report have been generated.

**Step 8** To view the contents of the **qualityReport**, select the **qualityReport** and click the **Detail** button. The TE Primary Tunnel Computation Results - Report (details) window in Figure 6-17 appears.

*Figure 6-17 TE Managed Primary Tunnels SR - Audit qualityReport (Details)*

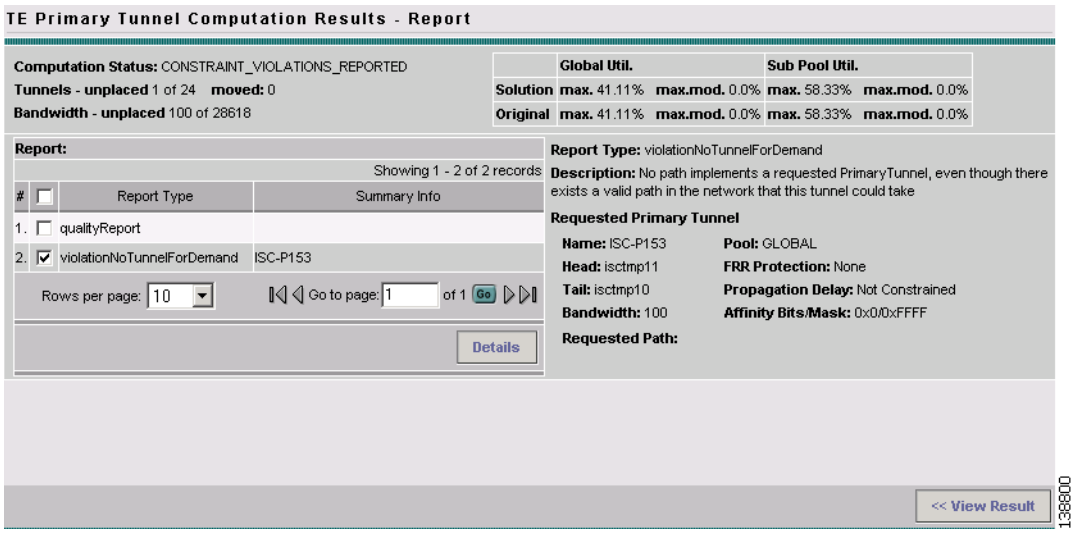



For an explanation of the various window elements, see Planning Tools, page A-52.

The qualityReport fields in the right window pane are described in TE Primary Tunnel Computation Results - Report, page A-57.

**Step 9** To view the contents of the violation report, select the violation report and click the **Detail** button. The TE Primary Tunnel Computation Results - Report (details) window in Figure 6-18 appears.

*Figure 6-18 TE Managed Primary Tunnels SR - Audit Violation Report (Details)*




For an explanation of the various window elements, see Planning Tools, page A-52.

The report fields in the right window pane are described for each report in Appendix C, "Warnings and Violations."

**Step 10** Click **<< View Result** to return to the Changes window (Figure 6-14 or Figure 6-15). If the proposed changes were achieved, you can click on **Save & Deploy** to save the achievable changes to the repository and implement the tunnel modifications on the network.

**Note** **Save & Deploy** will discard any changes that were not achievable.

**Step 11** The Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** appears and displays the state of the deployed SR.

For more information on working with service requests, see Appendix B, "Managing Service Requests."

# Tunnel Placement

The Placement feature supports the admission of new tunnels into the network and the modification of tunnels already admitted into the network. ISC TEM will attempt to implement the changes in such a way that network utilization is optimized.

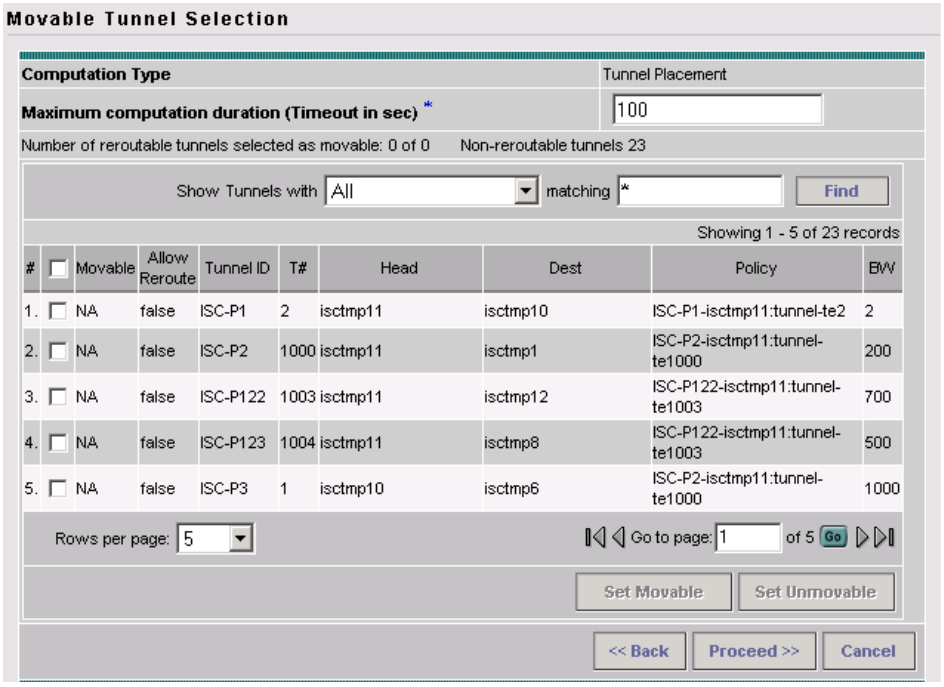
To place a created tunnel, use the following steps:

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

**Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

**Step 3** When one or more tunnels have been created or their attributes altered (see Create Primary Tunnel, page 6-2), select **Proceed with Changes** >> > **Tunnel Placement**. The Movable Tunnel Selection (Placement) window shown in Figure 6-19 appears.

***Figure 6-19 Movable Tunnel Selection - Placement***



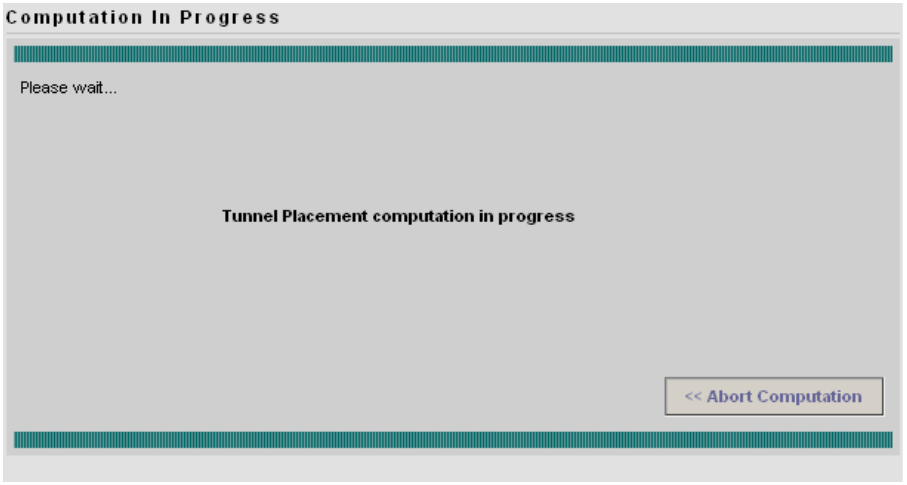

For an explanation of the various window elements, see Planning Tools, page A-52.

**Step 4** Set the movable and unmovable managed tunnels.

You can specify whether, when admitting a new tunnel, existing tunnels can be moved (re-routed). This is configurable by the user. The default is that managed tunnels are not movable.

**Step 5** Click **Proceed** >>. The Computation In Progress window shown in Figure 6-20 appears.

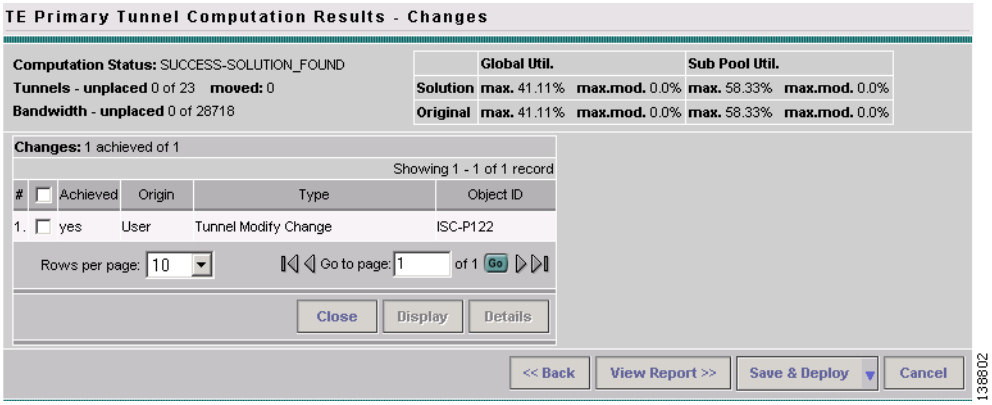
*Figure 6-20 Computation In Progress - Placement*




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

The TE Primary Tunnel Computation Results - Changes window shown in Figure 6-21 appears.

*Figure 6-21 TE Primary Tunnel Computation Results - Placement Changes*

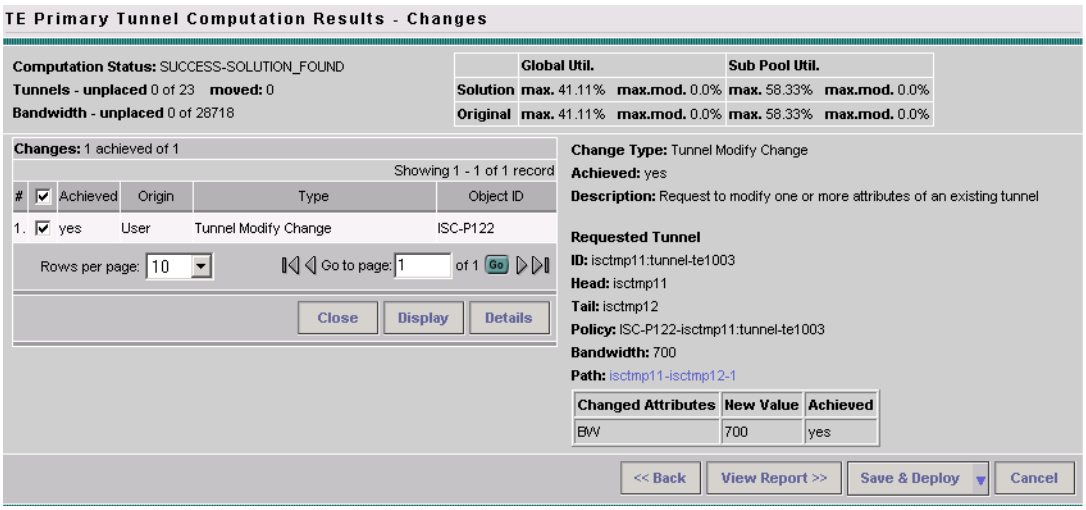



For an explanation of the various window elements, see Planning Tools, page A-52.

**Note** Certain attributes, such as Description, that do not impact the computation carried out by the placement tools and updates to these are not displayed in the Computation Result Window.

**Step 6** To obtain detailed information about the tunnel and whether the placement request was achieved, select the specific tunnel and click **Detail**. The detail section in the right side of the window appears as shown in Figure 6-14.

*Figure 6-22 TE Primary Tunnel Computation Results - Placement Changes (Details)*

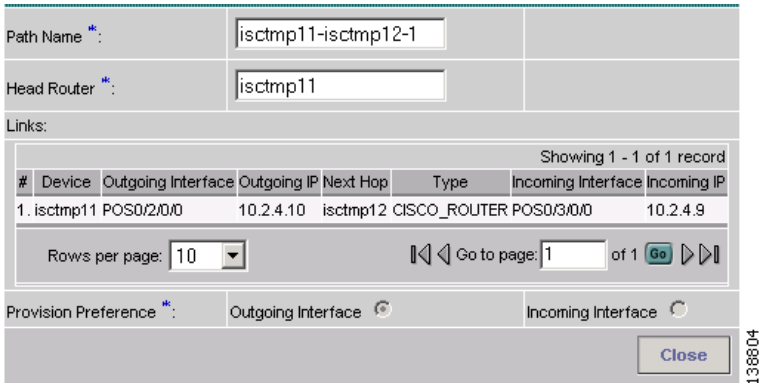



For an explanation of the various window elements, see Planning Tools, page A-52.

If the placement request succeeded (**Achieved**: **yes**), the Detail pane will contain a computed **Path** that is selectable as shown in Figure 6-22.

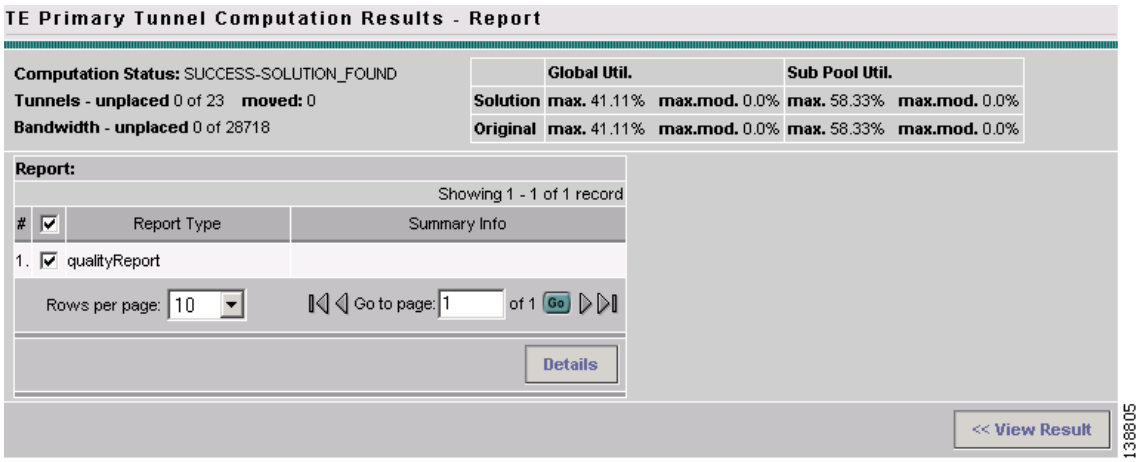
To view the path information, click the blue link in the computed **Path** field. The TE Explicit Path window shown in Figure 6-23 appears.

*Figure 6-23 TE Explicit Path for Placement Request*




**Step 7** To view the placement report(s), click **View Report** >> in the Changes window (Figure 6-22). The TE Primary Tunnel Computation Results - Report window in Figure 6-24 appears.

*Figure 6-24 TE Primary Tunnel Computation Results - Placement Report Window*




For an explanation of the various window elements, see Planning Tools, page A-52.

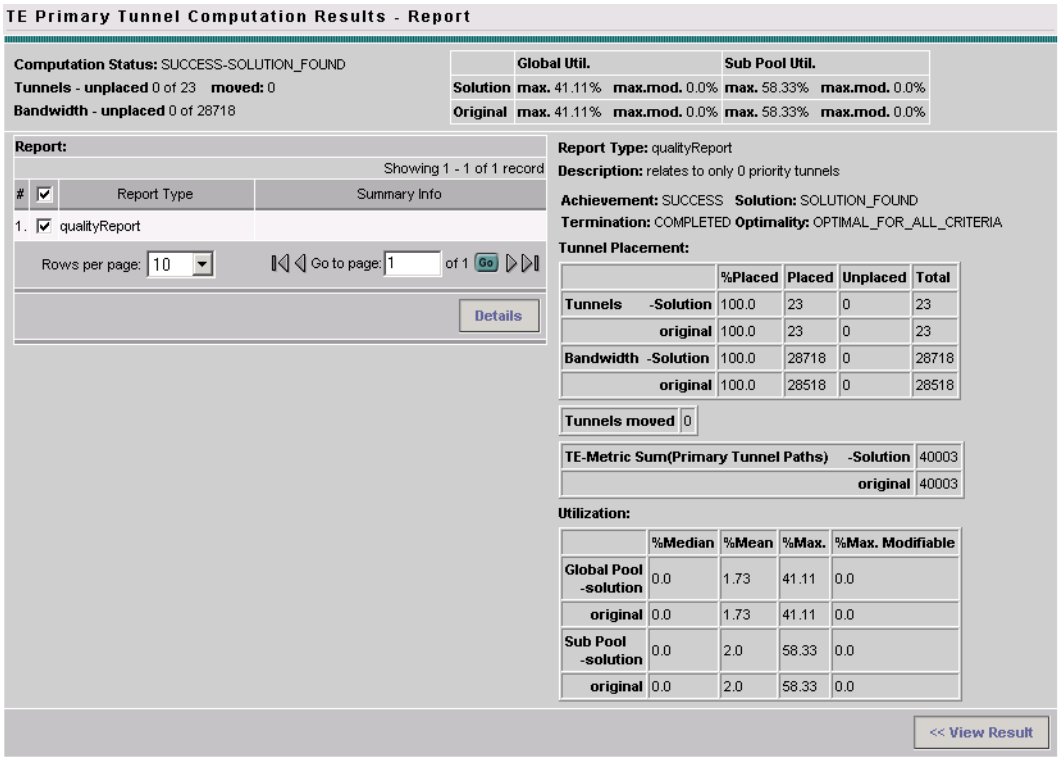
A **qualityReport** is always generated. If the computation was successful, this will be the only report.

If a warning or a violation was encountered, one or more warning or violation reports will be generated as well.

**Step 8** To view the contents of a placement report, select one of the reports and click the **Detail** button. In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window in Figure 6-25 appears in the report pane on the right.

For an example of a violation report, see Figure 6-18.

*Figure 6-25 TE Managed Primary Tunnels SR - Placement Report (Details)*




For an explanation of the various window elements, see Planning Tools, page A-52.

The qualityReport fields in the right window pane are described in TE Primary Tunnel Computation Results - Report, page A-57.

**Step 9** Click **<< View Result** to return to the Changes window and click **Save & Deploy** to save the change to the repository and implement the tunnel modifications on network.

**Step 10** The Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** appears and displays the state of the deployed SR.

For more information on working with service requests, see Appendix B, "Managing Service Requests."

# Tunnel Repair

As changes are made to the bandwidth requirements or delay parameters of existing tunnels, inconsistencies can arise with the Tunnel Placement. You can run a Tunnel Repair to address such inconsistencies. The objective of Tunnel Repair is to try to move as few existing tunnels as possible to accommodate the changes.

Tunnel Repair can also be invoked from the Resource Management window (see Chapter 4, "TE Resource Management").

In the following, the case of an edited tunnel has been used:

**Step 1** Navigate **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management** > **Create Managed TE Tunnel**.

**Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

Tunnel Repair can be used in two ways:

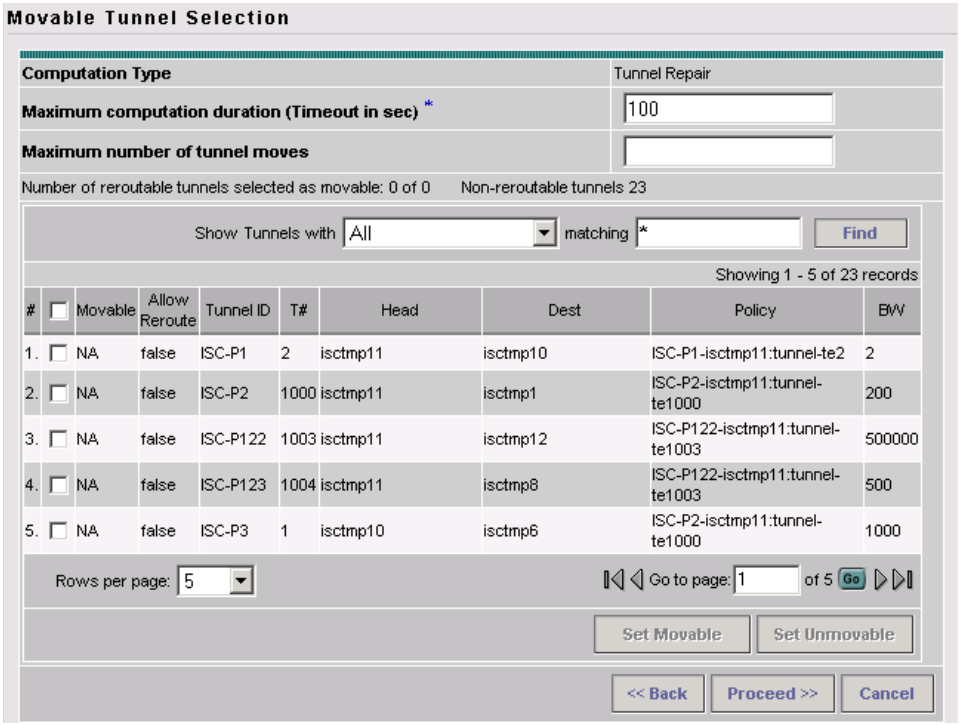
- When one or more tunnels have been created or their attributes altered (see Create Primary Tunnel, page 6-2), Tunnel Repair can be activated by selecting **Proceed with Changes >> > Tunnel Repair**.
- When no changes have taken place, Tunnel Repair can be accessed by selecting **Placement Tools** > **Tunnel Repair**.

**Step 3** As an example, let us say that a new primary tunnel SR has been created. Run Tunnel Repair on the modified tunnels from the TE Managed Primary Tunnels SR window (Figure 6-12) by navigating

**Proceed with Changes** -> **Tunnel Repair**

The Movable Tunnel Selection window shown in Figure 6-26 appears.

***Figure 6-26 Movable Tunnel Selection - Repair***




For an explanation of the various window elements, see Planning Tools, page A-52.

**Step 4** Set the tunnels that should be movable.

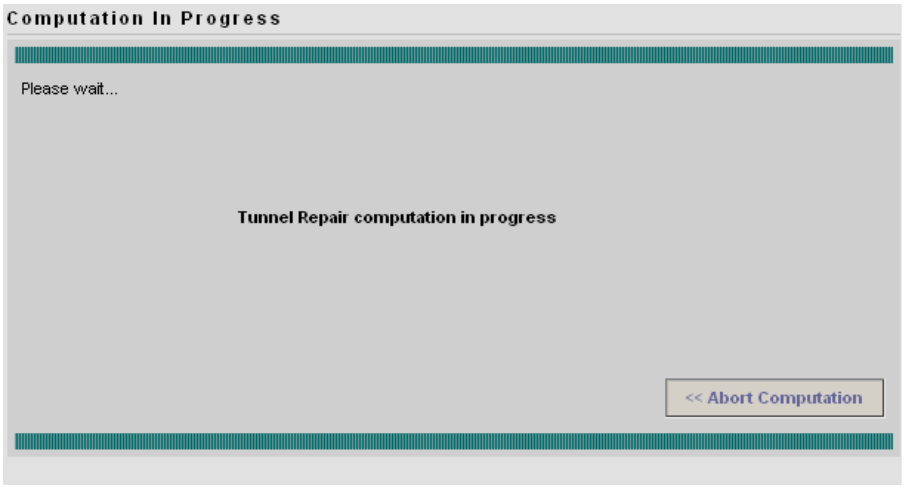
Tunnel Repair will only move existing tunnels if it has to. If you do not want certain tunnels to be moved during Tunnel Repair, these tunnels should be explicitly excluded from the selected list of movable tunnels.

You can also specify a limit on the maximum number of tunnel moves that are acceptable using the **Maximum number of tunnel moves** field.

**Note** It is not necessary to set modified tunnels to be movable as these are movable by deafult.

**Step 5** Click **Proceed** >>. The Computation In Progress window shown in Figure 6-27 appears.

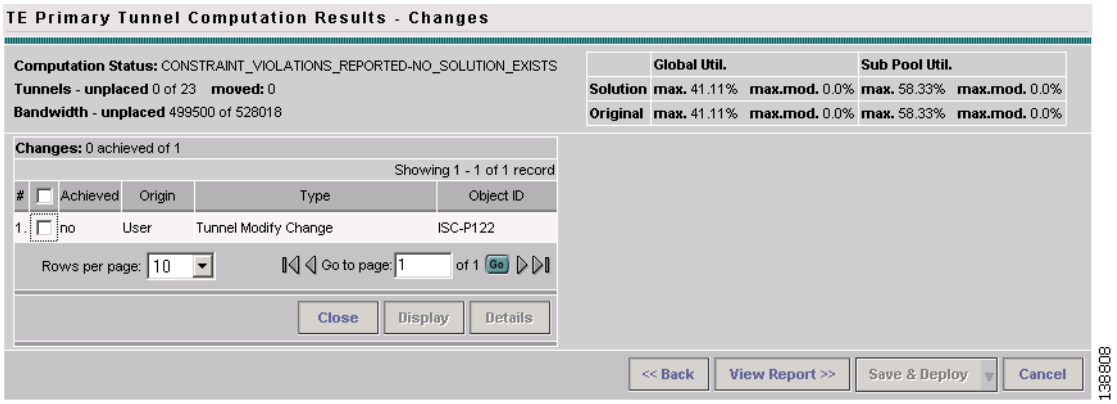
***Figure 6-27 Computation In Progress - Repair***




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

The TE Primary Tunnel Computation Results - Changes window shown in Figure 6-28 appears.

***Figure 6-28 TE Primary Tunnel Computation Results - Repair Changes***

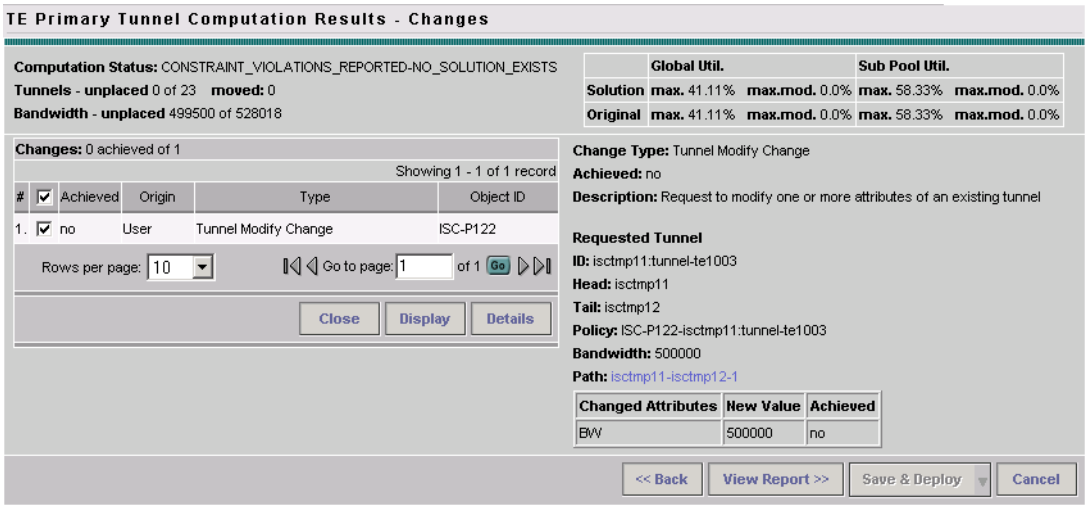



For an explanation of the various window elements, see Planning Tools, page A-52.

**Note** Certain attributes, such as Description, that do not impact the computation carried out by the placement tools and updates to these are not displayed in the Computation Result Window.

**Step 6** To obtain detailed information about the tunnel and whether the change request was achieved, select the specific tunnel and click **Detail**. The detail section in the right side of the window appears as shown in Figure 6-29.

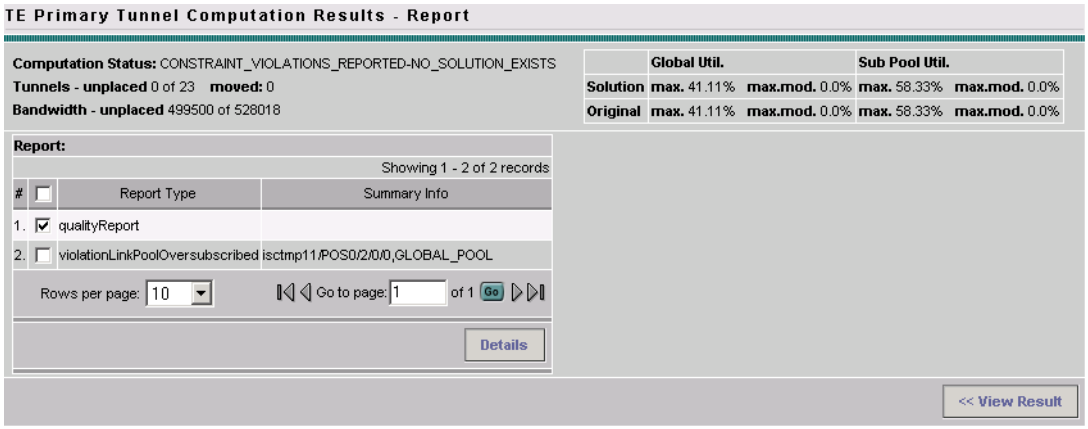
***Figure 6-29 TE Primary Tunnel Computation Results - Repair Changes (Details)***




For an explanation of the various window elements, see Planning Tools, page A-52.

**Step 7** To view a repair report, click **View Report** >>. The TE Primary Tunnel Computation Results - Report window in Figure 6-30 appears.

***Figure 6-30 TE Primary Tunnel Computation Results - Repair Report***




For an explanation of the various window elements, see Planning Tools, page A-52.

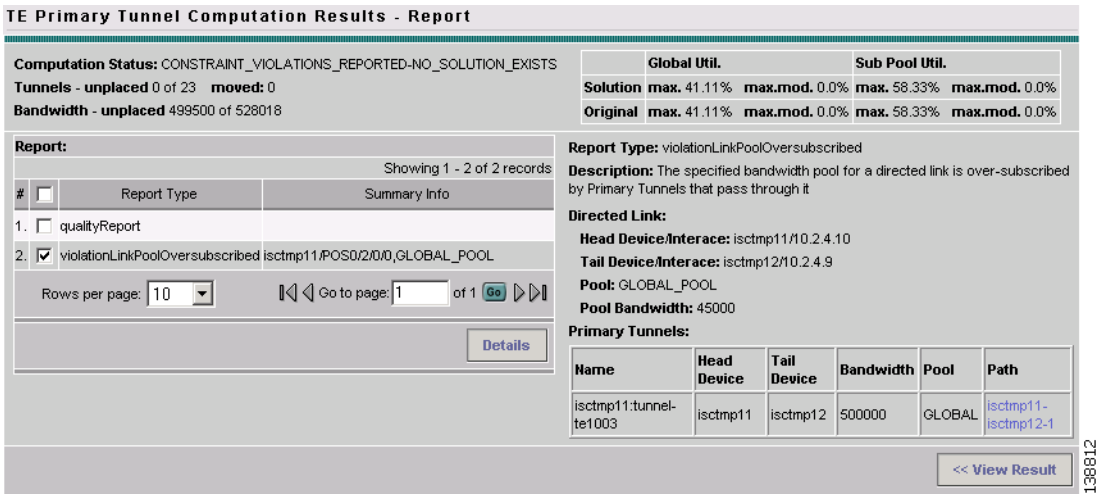
A **qualityReport** is always generated. If the computation was successful, this will be the only report.

If a warning or a violation was encountered, one or more warning or violation reports will also be generated.

**Step 8** To view the contents of the repair report, click the **Detail** button. In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window in Figure 6-31 appears.

For an example of a violation report, see Figure 6-18.

***Figure 6-31 TE Managed Primary Tunnels SR - Repair Report (Details)***




For an explanation of the various window elements, see Planning Tools, page A-52.

The report fields in the right window pane are described for each report in Appendix C, "Warnings and Violations."

**Step 9** Click **<< View Result** to return to the Changes window and click **Save & Deploy** to save the change to the repository and implement the tunnel modifications on network.

**Step 10** The Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** appears and displays the state of the deployed SR.

For more information on working with service requests, see Appendix B, "Managing Service Requests."

# Grooming

The purpose of grooming is to analyze the tunnel pathing with respect to the network elements and optimize resource allocation.

Grooming is not available when change requests have been created. In that case, only the placement tools under **Proceed with Changes >>** will be available.

To perform grooming on the network, use the following steps:

**Step 1** Navigate **Service Inventory** > **Inventory and Connection Manager** > **Traffic Engineering Management** > **Create Managed TE Tunnel**.

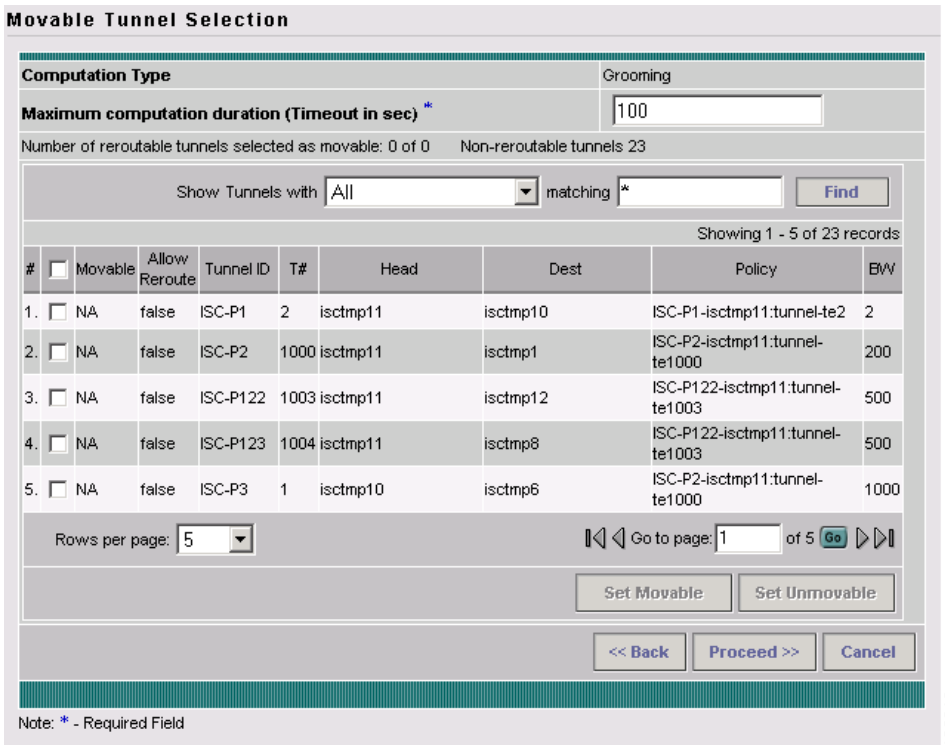
**Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears as shown in Figure 6-2.

**Step 3** Run Grooming by navigating

**Placement Tools -> Groom**

The Movable Tunnel Selection window shown in Figure 6-32 appears.

*Figure 6-32 Movable Tunnel Selection*



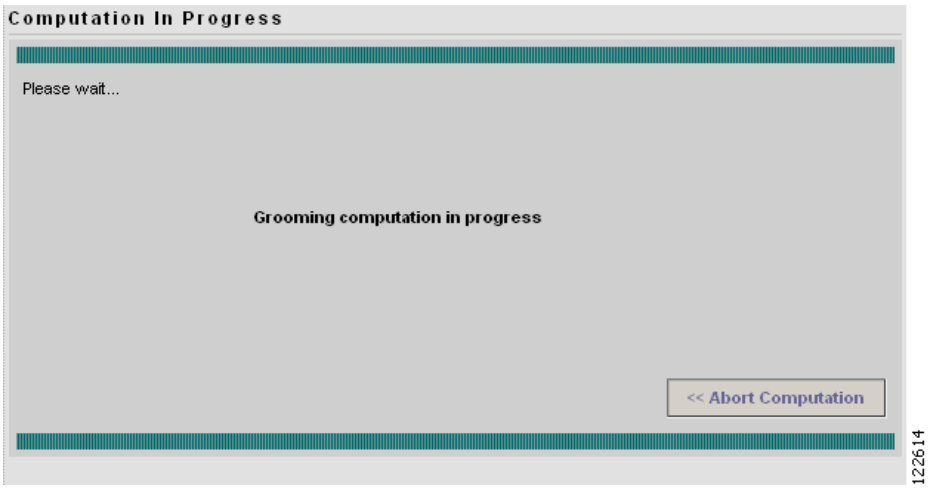

For an explanation of the various window elements, see Planning Tools, page A-52.

**Step 4** Set the tunnels that should be movable.

As with Tunnel Repair, Grooming will only move existing tunnels if it has to. If you do not want certain tunnels to be moved during the Grooming process, these tunnels should be explicitly excluded from the selected list of movable tunnels.

**Step 5** Click **Proceed** >>. The Computation In Progress window shown in Figure 6-33 appears.

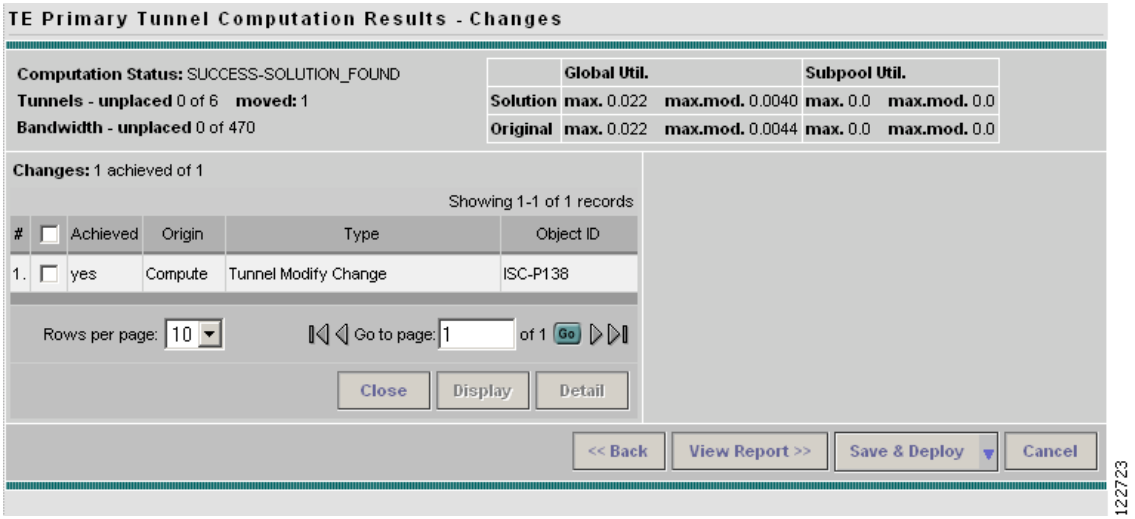
*Figure 6-33 Computation In Progress - Grooming*




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

The TE Primary Tunnel Computation Results - Changes window shown in Figure 6-34 appears.

*Figure 6-34 TE Primary Tunnel Computation Results - Grooming Changes*

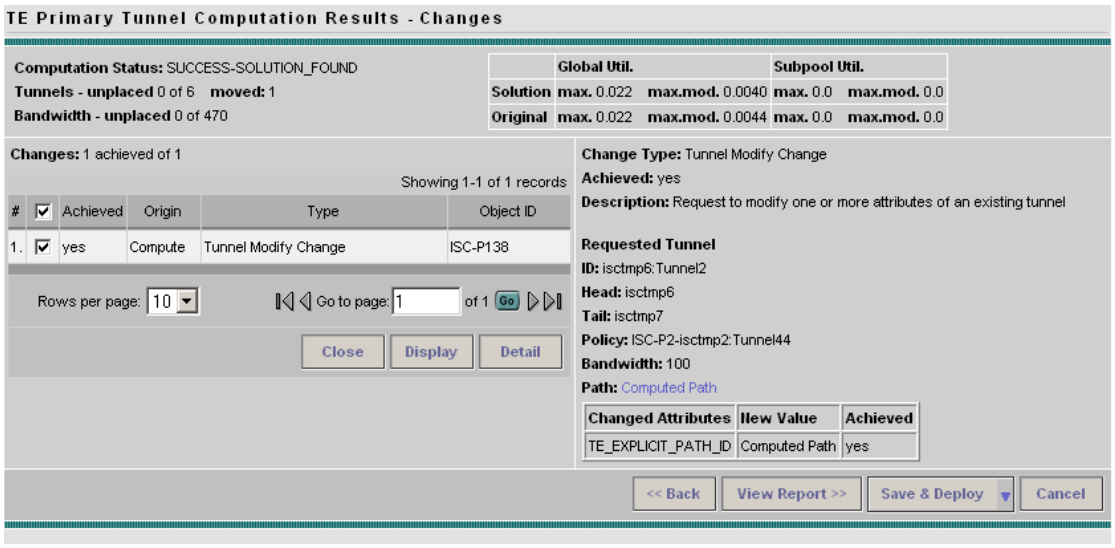



For an explanation of the various window elements, see Planning Tools, page A-52.

**Note** Certain attributes, such as Description, that do not impact the computation carried out by the placement tools and updates to these are not displayed in the Computation Result Window.

**Step 6** To obtain detailed information about the Grooming and whether it succeeded, select the specific tunnel and click **Detail**. The detail section in the right side of the window appears as shown in Figure 6-35.

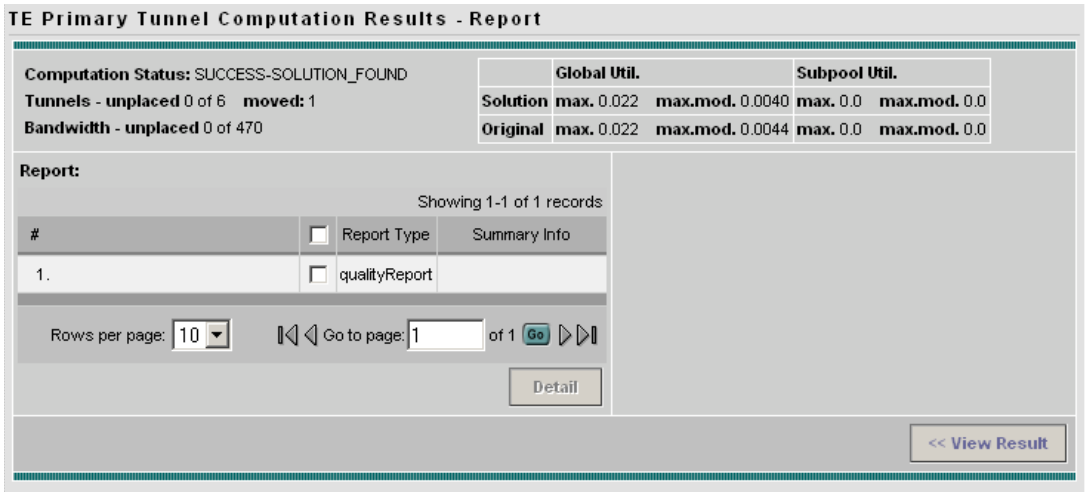
*Figure 6-35 TE Primary Tunnel Computation Results - Grooming Changes (Details)*




For an explanation of the various window elements, see Planning Tools, page A-52.

**Step 7** To view a Grooming report, click **View Report** >>. The TE Primary Tunnel Computation Results - Report window in Figure 6-30 appears.

*Figure 6-36 TE Primary Tunnel Computation Results - Grooming Report*




For an explanation of the various window elements, see Planning Tools, page A-52.

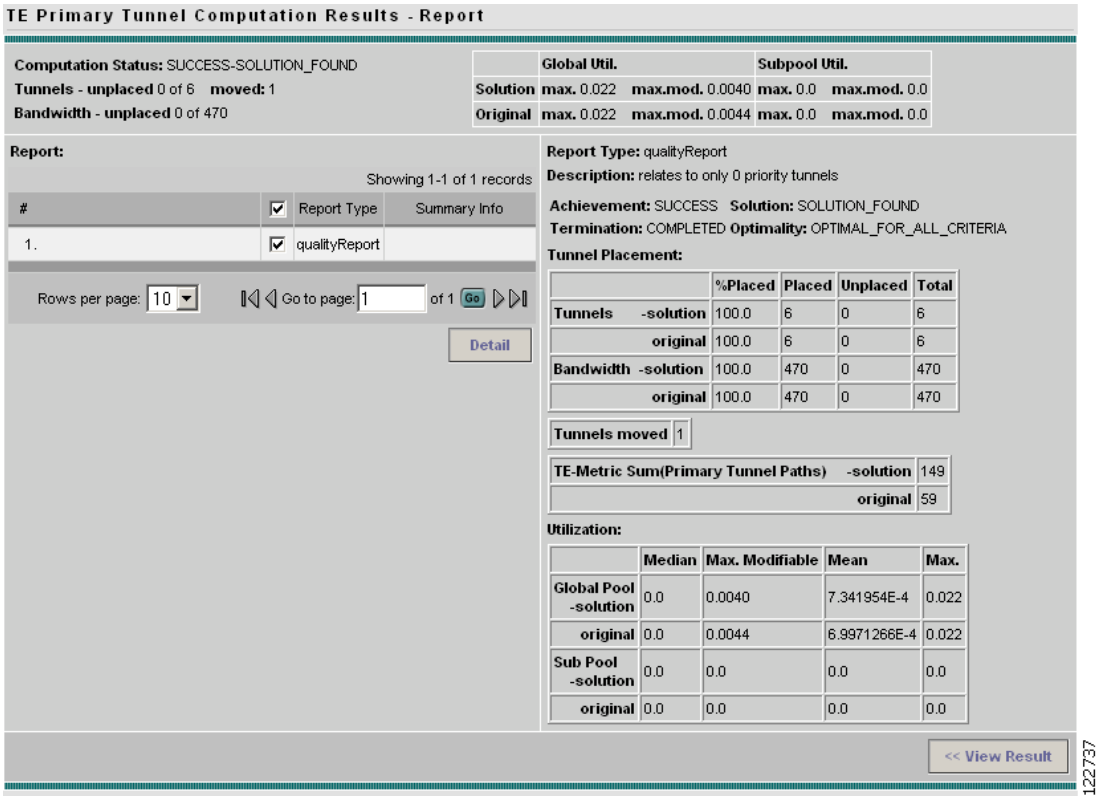
A **qualityReport** is always generated. If the computation was successful, this will be the only report.

If a warning or a violation was encountered, one or more warning or violation reports will also be generated.

**Step 8** To view the contents of the Grooming report, click the **Detail** button. In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window in Figure 6-37 appears.

For an example of a violation report, see Figure 6-18.

*Figure 6-37 TE Managed Primary Tunnels SR - Grooming Report (Details)*




For an explanation of the various window elements, see Planning Tools, page A-52.

The report fields in the right window pane are described for each report in Appendix C, "Warnings and Violations."

**Step 9** Click **<< View Result** to return to the Changes window and click **Save & Deploy** to save the change to the repository and implement the tunnel modifications on the network.

**Step 10** The Service Requests window (**Service Inventory** > **Inventory and Connection Manager** > **Service Requests)** appears and displays the state of the deployed SR.

For more information on working with service requests, see Appendix B, "Managing Service Requests."