**C H A P T E R 39**

Advanced Primary Tunnel Management

In addition to the basic tunnel management tools described in Chapter 38, "Basic Tunnel Management", Prime Fulfillment gives access to a set of advanced tunnel planning tools that provide optimal placement of tunnels to ensure efficient use of network resources.

The highlighted box in Figure 39-1 shows where in Prime Fulfillment primary tunnel management occurs.

Figure 39-1   Prime Fulfillment Process Diagram - Primary Tunnel Management
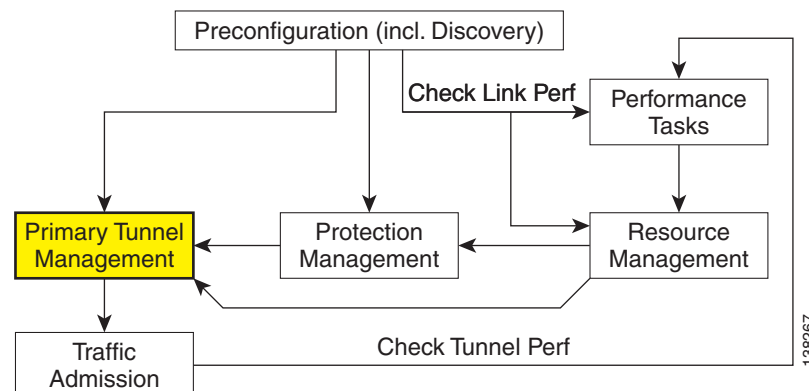
The advanced tools are available for managed tunnels only. The difference between managed and unmanaged tunnels is described in the section Managed/Unmanaged Primary Tunnels in the *Cisco Prime Fulfillment Theory of Operations Guide 6.1*.

This chapter includes the following sections:

Tunnel Operations

This section explains the advanced tunnel operations in Prime Fulfillment that incorporate the planning tools.

An overview of the primary tunnel management process is provided in Figure 39-2.

Figure 39-2   Primary Tunnel Management Processes
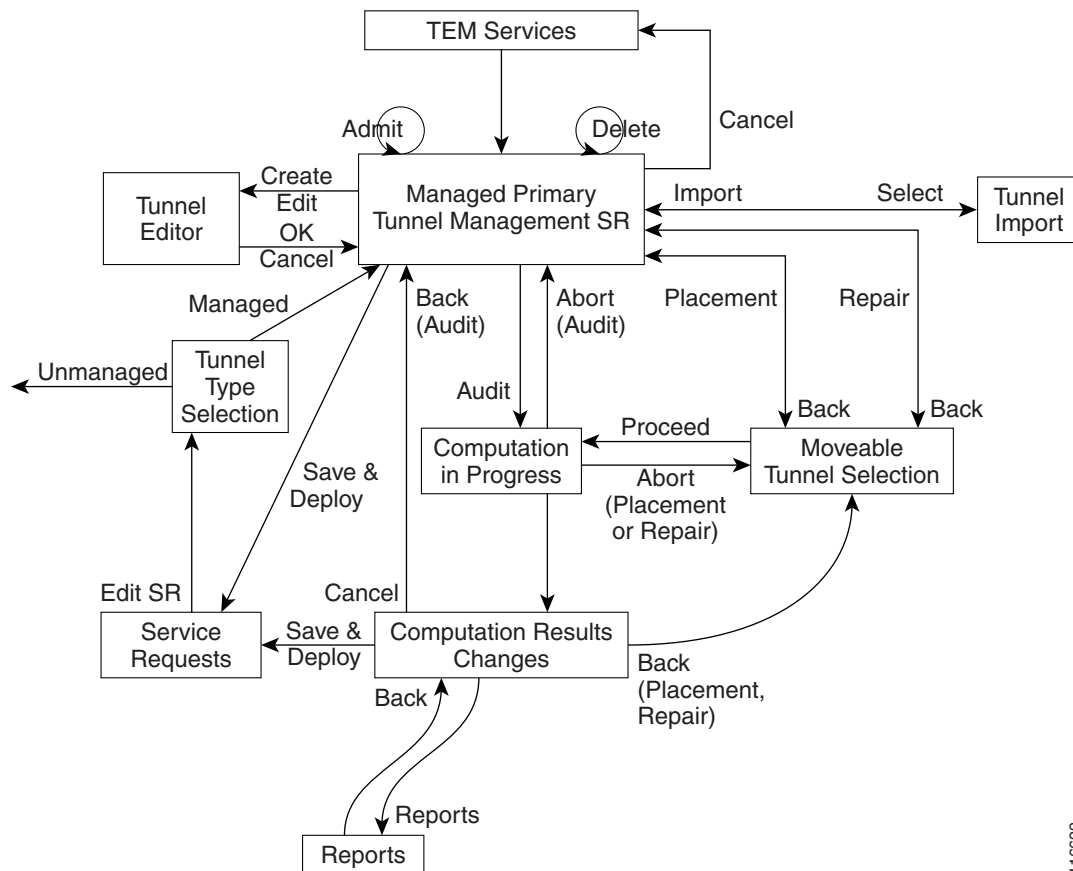
For **Tunnel Type Selection**, when you select **Unmanaged** the TE Unmanaged Primary Tunnel SR window appears (see Chapter 38, "Basic Tunnel Management").

All other elements in Figure 39-2 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   Choose **Traffic Engineering**.

Step 2   Click **Create Managed TE Tunnel**.

The TE Managed Primary Tunnels SR window appears.

For an explanation of the various window elements, see Create Primary Tunnel, page 38-6.

Step 3   Click **Create**.

The Create TE Managed Primary Tunnel window appears.

For an explanation of the various window elements, see Create Primary Tunnel, page 38-6.

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

A **System Path** is an Prime Fulfillment 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 device selection window.

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

Step 5   To select a **Destination Device**, click the corresponding **Select** button to open the device selection window.

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

Step 6   To select a **Tunnel Policy**, click the corresponding **Select** button to open the policy selection window.

> **Note**   If no tunnel policies are available, the reason could be that they are all unmanaged. To create a managed tunnel, first create a managed policy in **Service Design > Policy Manager** (see Create Policy, page 42-2) by making sure to check the **Managed** check box.

The Select Managed TE Tunnel Policy window includes the following elements:

- **Policy Name**—Name of the TE policy.

- **Pool Type**—Tunnel bandwidth pool type for this policy. For a definition of pool types, see the Bandwidth Pools section in the *Cisco Prime Fulfillment Theory of Operations Guide 6.1*.

  - **SUB_POOL**—Bandwidth will be reserved from Sub Pool.

  - **GLOBAL**—Bandwidth will be reserved from Global Pool.

- **Setup Priority**—Priority used when signaling an LSP for the tunnel to determine, which of the existing tunnels can be preempted. Valid values are from 0 to 7, where a lower number indicates a higher priority. Therefore, an LSP with a setup priority of 0 can preempt any LSP with a non-0 hold priority.

- **Hold Priority**—Priority associated with an LSP for the tunnel to determine if it should be preempted by other LSPs that are being signaled. Valid values are from 0 to 7, where a lower number indicates a higher priority.

- **Affinity**—Attribute values required for links carrying the tunnel (bit values are either 0 or 1).

- **Affinity Mask**—Attribute values to be checked. If a bit in the mask is 0, a link's attribute value of that bit is irrelevant. If a bit in the mask is 1, the link's attribute value and the tunnel's required affinity for that bit must match.

- **Delayed Constraint**—True or false value. If true, the tunnel has a maximum delay that its path must not exceed.

- **FRR Protection**—Used to enable an MPLS traffic engineering tunnel to use a backup tunnel in the event of a link failure if a backup tunnel exists.

    - **None**—No backup tunnel needed.

    - **Best Effort**—Use backup tunnel if available.

    - **Link and SRLG**—Specifies that primary tunnels should be routed only through links and SRLGs that are protected by FRR backup tunnels.

    - **Link, SRLG and Node**—Specifies that primary tunnels should be routed only through links, SRLGs and nodes that are protected by FRR backup tunnels.

- **MPLS IP Enabled**—Specifies whether MPLS IP has been configured for the corresponding tunnel.

Step 7   Specify a tunnel bandwidth greater than zero.

Step 8   Add other tunnel information as desired.

Step 9   Optionally, if you want to specify an explicit path rather than using the system path provided by Prime Fulfillment, delete the system path and subsequently add the explicit path.

For a more detailed explanation of this step, see Create Primary Tunnel, page 38-6.

Step 10   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 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.

Step 11   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 39-8) 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 Primary Tunnel, page 38-6.

When you click **Save & Deploy**, Prime Fulfillment locks the TE routers effected, which will block any subsequent SRs which use that TE router until the SRs are finished. It is safe to try and deploy other SRs in the system. If there is any conflict with the SR currently being processed, Prime Fulfillment will simply ask you to wait until it is complete. To see the state of deployment, go to the Service Requests 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 window, not from the Service Requests page in **Inventory and Connection Manager**.

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

For more information on working with service requests, see the managing service requests part elsewhere in this guide.

> **Note** You might see Elixir Warnings during TE Tunnel deployment. The deployment will be successful and the warning messages can safely be ignored.

If the SR does not go to the **Deployed** state, go to the Task Logs window to see the deployment log (**Operate > Task Manager > Logs**) as described in TE Task Logs, page 56-1.

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 38, "Edit Primary Tunnel."

Delete Primary Tunnel

To delete one or more tunnels, see Chapter 38, "Delete Primary Tunnel.".

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 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 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 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   Choose **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 Chapter 46, "Document Type Definition (DTD) File"), and save the XML file together with the DTD file on the Prime Fulfillment server under the same directory. To create a valid import file, use the provided command line validation tool (see Command Line Validation Tool, page 39-6).

The following files are necessary for importing data into the Prime Fulfillment 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 Prime Fulfillment 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 **Traffic Engineering**.

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.

Step 5   Click **Import** to start the import process.

The Select Import File window appears.

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

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 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.

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, click **Cancel** to return to the previous window.

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 optimizing on utilization (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 utilization under the constraint that existing tunnels do not move.

- If this fails, attempt to admit the same new traffic minimizing 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 utilization 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 from the **Proceed with Changes** and **Placement Tools** buttons in the TE Primary Tunnel SR window 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 39-2. 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 functions 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.

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 for the optimality of network utilization.

The audit can be performed from the primary tunnel window or from the TE Links List window. (See Chapter 37, "TE Resource Management".)

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

Step 1   Choose **Traffic Engineering**.

Step 2   Click **Create Managed Tunnel**.

The TE Managed Primary Tunnels SR window appears.

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 39-3), 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**.

As an example, assume that a new primary tunnel SR has been created.

The TE Managed Primary Tunnel SR window appears.

Step 3   Choose **Proceed with Changes** > **Tunnel Audit**.

The Computation In Progress window appears temporarily. Then the TE Primary Tunnel Computation Results - Changes window appears.

This window includes the following elements:

Status section (top):

- **Computation Status**—Indicates whether the computation succeeded or failed.

- **Tunnels:**

  - **unplaced**—Number of unplaced tunnels out of the total.

  - **moved**—Number of tunnels that were moved.

- **Bandwidth - unplaced**—Amount of tunnel bandwidth that was not placed out of the total bandwidth of all existing and new tunnels.

- **Global Util.**—Global Pool bandwidth utilization percentage.

  The utilization values can be the following:

  - **Global Pool**—Comparison data for various Global Pool attributes.

  - **Sub Pool**—Comparison data for various Sub Pool attributes.

  - **Median**—Utilization of the link that is the middle link when all links are ordered by utilization.

  - **Max. Modifiable**—Utilization value for the most utilized link that has movable tunnels passing through it.

  - **Mean**—Average link utilization for the network as a whole.

  - **Max.**—Utilization value for the most utilized link in the topology.

- **Sub Pool Util.**—Sub Pool bandwidth utilization percentage.

- **Solution**—Utilization for the generated solution.

- **Original**—Utilizations for the original placement.

Changes section (left):

- **Changes**—Number of changes achieved out of the total number of changes.
    - **Achieved**—Indicates whether a specific change is successful (**Yes** or **No**).
    - **Origin**—The originator of the change. Can be **user** (change by user) or **compute** (from a computation, e.g. rerouting of a tunnel).
    - **Type**—The type of change requested: **Tunnel Add Change**, **Tunnel Modify Change**, **Tunnel Remove Change**, or **Element Modify Change**.
    - **Object ID**—A tunnel or link ID.

> ✎
> **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 results window.

Step 4 To obtain detailed information about the tunnel and whether the change request was achieved, select the specific tunnel and click **Details**.

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 5 To view an audit report, click **View Report** .

In some cases, both a **qualityReport** and a violation report is generated.

Step 6 To view the contents of the **qualityReport**, select the **qualityReport** and click the **Details** button.

The qualityReport fields in the right window pane include the following elements:

Status section (top): described above.

Report section (left):

- **Report Type**—There are three basic report types: a **qualityReport** (generated every time), warning reports, and violation reports.
- **Summary Info**—Summary information about the findings of the report.

Information section (right):

- **Report Type**—See description above.
- **Description**—Specific information about the report.
- **Achievement**—Success or failure of the computation attempt/solution (**SUCCESS** or **CONSTRAINT_VIOLATIONS_REPORTED**).
- **Solution**—Indicates whether a solution was found (**SOLUTION_FOUND**, **PARTIAL_SOLUTION_FOUND** or **NO_SOLUTION_FOUND**).
- **Termination**—Indicates whether the computation was completed:
    - **COMPLETED**—The computation completed processing before the time limit.
    - **TIMED_OUT**—The computation was not able to complete processing within the time limit. The solution presented is the best solution it was able to find in the time available.

- **Optimality**—Indicates whether the computation was optimal:

  - **OPTIMAL_FOR_ALL_CRITERIA**—The solution generated has proven to be the best for all optimization criteria.

  - **NO_OPTIMALITY_PROOF**—The solution's optimality is unknown.

  - **OPTIMAL_FOR_DEMAND_SELECTION**—The solution generated has proven to be the best in terms of total bandwidth placed, but utilization optimality is unknown.

  OPTIMAL_FOR_SUB_POOL_PATH_SELECTION—The solution generated has proven to be the best in terms of total bandwidth placed and maximum sub pool utilization, but has not proven to be optimal in terms of global pool utilization.

Step 7   To view the contents of the violation report, select the violation report and click the **Details** button.

The TE Primary Tunnel Computation Results - Report (Details) window appears.

The report fields in the right window pane are described for each report in Chapter 45, "Warnings and Violations."

Step 8   Click **View Result** to return to the Changes window.

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.

The Service Requests window (**Operate > Service Request Manager)** appears and displays the state of the deployed SR.

For more information on working with service requests, see the managing service requests part elsewhere in this guide.

Tunnel Placement

The Placement feature supports the admission of new tunnels into the network and the modification of tunnels already admitted into the network. Prime Fulfillment 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   Choose **Traffic Engineering**.

Step 2   Click **Create Managed TE Tunnel**.

The TE Managed Primary Tunnels SR window appears.

Step 3   When one or more tunnels have been created or their attributes altered (see Create Primary Tunnel, page 39-3), select **Proceed with Changes > Tunnel Placement**.

The Movable Tunnel Selection (Placement) window appears.

Step 4   Set the movable and unmovable managed tunnels.

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

Step 5   Click **Proceed**.

The Computation In Progress window shown appears temporarily. Then the TE Primary Tunnel Computation Results - Changes window appears.

> **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 results 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.

If the placement request succeeded (**Achieved**: **yes**), the Detail pane will contain a computed **Path** that is selectable.

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

Step 7 To view the placement report(s), click **View Report** in the Changes window.

The TE Primary Tunnel Computation Results - Report window appears.

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 **Details** button.

In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window appears in the report pane on the right.

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.

The Service Requests window (**Operate > Service Request Manager)** appears and displays the state of the deployed SR.

For more information on working with service requests, see the managing service requests part elsewhere in this guide.

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.

The repair operation can be performed from the primary tunnel window or from the TE Links List window. (See Chapter 37, "TE Resource Management".)

In the following, we will seek to repair an edited tunnel:

Step 1 Choose **Traffic Engineering** > **Create Managed Tunnel**.

The TE Managed Primary Tunnels SR window appears.

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 39-3), 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 2 In this example, a new primary tunnel SR has been created.

Run Tunnel Repair on the modified tunnels from the TE Managed Primary Tunnels SR window by navigating

Proceed with Changes > **Tunnel Repair**

The Movable Tunnel Selection window appears.

Step 3 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 default.

Step 4 Click **Proceed**.

The Computation In Progress window shown appears temporarily. Then the TE Primary Tunnel Computation Results - Changes window s appears.

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 results window.

Step 5 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.

Step 6 To view a repair report, click **View Report**.

The TE Primary Tunnel Computation Results - Report window appears.

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 the contents of the repair report, click the **Details** button.

In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window appears.

The report fields in the right window pane are described for each report in Chapter 45, "Warnings and Violations."

Step 8   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.

The Service Requests window (**Operate > Service Request Manager)** appears and displays the state of the deployed SR.

For more information on working with service requests, see the managing service requests part elsewhere in this guide.

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** are available.

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

Step 1   Choose **Traffic Engineering > Create Managed TE Tunnel**.

The TE Managed Primary Tunnels SR window appears.

Step 2   Run Grooming by navigating

Placement Tools > Groom

The Movable Tunnel Selection window appears.

Step 3   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 4   Click **Proceed**.

The Computation In Progress window shown appears temporarily. Then the TE Primary Tunnel Computation Results - Changes window appears.

✎ **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 results window.

Step 5   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.

Step 6   To view a Grooming report, click **View Report** .

The TE Primary Tunnel Computation Results - Report window appears.

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 the contents of the Grooming report, click the **Details** button.

In the case of a **qualityReport**, the TE Primary Tunnel Computation Results - Report (details) window appears.

The report fields in the right window pane are described for each report in Chapter 45, "Warnings and Violations."

Step 8   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.

The Service Requests window (**Operate > Service Request Manager**) appears and displays the state of the deployed SR.

For more information on working with service requests, see the managing service requests part elsewhere in this guide.

Placement Tools