



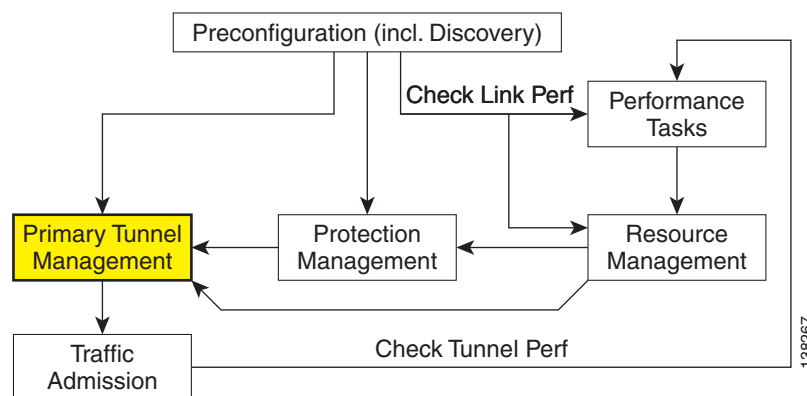
CHAPTER 4

Basic Tunnel Management

This chapter describes the processes involved in creating primary and backup tunnels with TEM. To create a tunnel, certain steps must first be performed as described in previous chapters.

The highlighted box in [Figure 4-1](#) shows where in TEM primary tunnel management occurs.

Figure 4-1 TEM Process Diagram - Primary Tunnel Management



This chapter includes the following sections:

- [Overview, page 4-2](#)
- [Create TE Policy, page 4-2](#)
- [Create Explicit Path, page 4-3](#)
- [Primary Tunnel Operations, page 4-7](#)
 - [Create Primary Tunnel, page 4-8](#)
 - [Edit Primary Tunnel, page 4-13](#)
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 - [Delete Backup Tunnel, page 4-20.](#)

Overview

Primary tunnels are characterized by carrying traffic during normal operation. They have a prioritized list of possible paths, by which traffic can be routed. At any one time, the highest priority path available will be used to route traffic. If this fails, traffic will normally be re-routed via the next available path until a higher priority path becomes available again.

Prior to setting up the tunnel, a TE policy governing the traffic must be defined. An explicit path is created to establish the route and, in the case of a primary tunnel, it is created as either a managed or an unmanaged tunnel.

The purpose of a backup tunnel is to carry Fast Re-Route (FRR) protected traffic around a failed element until the routing in the network has reconverged. It is intended to protect traffic travelling along primary tunnels. There can be many backup tunnels protecting the same traffic through the use of load balancing.

If the network fails to reconverge, the backup tunnel will remain in place.

The difference between managed and unmanaged tunnels is described in [Managed/Unmanaged Primary Tunnels, page F-2](#).

The concept of bandwidth pools from which tunnels reserve bandwidth is important to understand. This is described in [Bandwidth Pools, page F-6](#).

Create TE Policy

To create a primary tunnel, each primary tunnel must be associated with a policy. A policy can be used by multiple tunnels.

For backup tunnels, this step is not necessary. In this case, proceed to [Create Explicit Path, page 4-3](#).

For other TE policy management operations, see [TE Policies, page 8-2](#).

The TE policy is a set of rules governing the TE network and defines the Class-of-Service (for example, gold, silver, bronze) for primary tunnel traffic.

TEM has a notion of **Managed** and **Unmanaged** policies. **Managed** policies have setup/hold priorities of 0/0 and can have additional routing constraints such as protection level and max delay. Tunnels with **Unmanaged** policies are provisioned by the system, but the system only tracks the deployment, not the operation of the tunnel. **Unmanaged** policies cannot have a setup/hold priority of zero.

For more information about managed and unmanaged primary tunnels, see [Managed/Unmanaged Primary Tunnels, page F-2](#).

Policies are managed under **Policies** in **Service Design**. For a more detailed explanation of the **Policies** GUI, see [TE Policies, page 8-2](#).

To create a TE policy, use the following steps:

Step 1 Choose **Service Design > Policies**.

The Policies window in [Figure 4-2](#) appears.

Figure 4-2 Policies Window

The screenshot shows the IP Solution Center interface. At the top, there are navigation tabs: Service Inventory, Service Design, Monitoring, Diagnostics, and Administration. The user is logged in as 'admin'. The breadcrumb trail is 'You Are Here: Service Design > Policies'. The main content area is titled 'Policies' and contains a search bar and a table of policy records. The table has columns for '#', 'Data Files', 'Policy Name', 'Type', and 'Owner'. The first 10 records are visible, showing various tunnel policies. At the bottom of the table, there are buttons for 'Create', 'Edit', 'Copy', and 'Delete'. A dropdown menu is open from the 'Create' button, showing options for different policy types: 'MPLS Policy', 'L2VPN (P2P) Policy', 'VPLS Policy', 'FlexUNI(EVC) Policy', and 'TE Policy'. The 'TE Policy' option is highlighted. The table also shows pagination information: 'Showing 1 - 10 of 16 records' and 'Rows per page: 10'.

Step 2 Click **Create** and select **TE Policy** to set up a new TE policy.

To edit an existing policy, select the policy that you want to modify and click **Edit**. The TE Policy Editor window in [Figure 8-3](#) appears.



Note A policy that is being used by a tunnel cannot be modified. However, the name and ownership of an in-use policy can be changed.

For an explanation of the various window elements, see [TE Policies, page 8-2](#).

Step 3 Fill in the required fields marked with an asterisk (*) and any optional fields.

If you intend to use the TE policy for managed tunnels, make sure to check the **Managed** check box.

When setting up a policy for a managed tunnel, the **Setup** and **Hold** priorities are automatically set to zero (highest priority). In the case of a policy for an unmanaged tunnel, you can specify the desired **Setup** and **Hold** priority settings.

Step 4 Click **Save**.

Create Explicit Path

This section describes how to create a TE explicit path. For other TE explicit path operations, see [TE Explicit Paths, page B-31](#).

Paths are defined between source and destination routers, possibly with one or more hops in between. Paths are used for primary and backup tunnels in the explicit path option(s).

If you intend to create an explicit path for managed tunnels, the path should not contain any non-TE enabled interfaces. Paths with non-TE enabled interfaces will be filtered out by the tunnel path chooser of the tunnel editor for managed tunnels and backup tunnels (not unmanaged tunnels).

To create or edit an explicit path, use the following steps:

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

Step 2 Click **TE Explicit Paths**.

The TE Explicit Path List window appears. (see [Figure 4-3](#))

Figure 4-3 TE Explicit Path List

#	Path Name	Head	Dest	Head Region	Path Type
1.	<input type="checkbox"/> another_exclude	isctmp1		scotland	EXCLUDE
2.	<input type="checkbox"/> another_loose_hop	isctmp1		scotland	LOOSE
3.	<input type="checkbox"/> excl4	isctmp1		scotland	EXCLUDE
4.	<input type="checkbox"/> excl5	isctmp1		scotland	EXCLUDE
5.	<input type="checkbox"/> excl6	isctmp1		scotland	EXCLUDE
6.	<input type="checkbox"/> excludePath	isctmp1		scotland	EXCLUDE
7.	<input type="checkbox"/> isctmp1-isctmp2-1	isctmp1	isctmp2	scotland	STRICT
8.	<input type="checkbox"/> isctmp1-isctmp2-2	isctmp1	isctmp2	scotland	STRICT
9.	<input type="checkbox"/> isctmp1-isctmp2-3	isctmp1	isctmp2	scotland	STRICT
10.	<input type="checkbox"/> isctmp1-isctmp2-4	isctmp1	isctmp2	scotland	STRICT

For an explanation of the various window elements, see [Create/Edit Explicit Path, page B-32](#).

Step 3 To create an explicit path in the **TE Explicit Path List**, click **Create**.

The New TE Explicit Path window in [Figure 4-4](#) appears.

To edit an explicit path in the explicit path list, select the explicit path that you want to modify and click **Edit**. This opens the TE Explicit Path Editor window. For an explanation of the various window elements, see [Create/Edit Explicit Path, page B-32](#).



Note An explicit path that is being used by a tunnel cannot be modified. However, use Edit to view the path.

Figure 4-4 New TE Explicit Path

For an explanation of the various window elements, see [Create/Edit Explicit Path, page B-32](#) and [Edit TE SR \(Primary or Backup\), page B-50](#).



Note If a path is used by any tunnel, no modifications are possible. The **Outgoing Interface** and **Incoming Interface** links are not selectable and the Provision Preference line and the **Add Link**, **Delete Link**, and **Save** buttons disappear.

Step 4 Specify a pathname and select a head router.

Step 5 Select a path type:

- **Strict:** If **Strict** is chosen, use the current panel that lists the connected links one by one until destination is reached.
- **Loose:** If **Loose** is selected, a new hop is added by entering the IP address. If **Strict** is selected, you are allowed to select from TE Links list only.



Note For IOS XR, the **Loose** type is only available if the head device is running IOS XR 3.4 or later.



Note If **Loose** is chosen, a new panel that adds a loose hop definition one by one is listed. Because a combination of strict and loose hops is allowed for a loose explicit path definition, the flexibility of including strict hops is provided with a constraint of at least a loose hop presence in the path.

- **Exclude**—**Exclude** allows you to specify an exclude IP address. See [Step 7](#).

Step 6 If **Strict** was selected, click the **Add Link** button to add a blank line to the hop list table.

If **Loose** or **Exclude** was selected, an **Add Hop** button appears, which when clicked opens a pop-up window where you specify an IP address.

Step 7 Now an interface must be selected for the head router.

Depending on the path type selection, you will see one of the following windows:

A. Strict path type:

Click the **Add Link** button, then click **Add Interface**. The Select Next Hop window in [Figure 4-5](#) appears.

Figure 4-5 Select Next Hop

#	Outgoing Interface	Outgoing IP	Next Hop	Type	Incoming Interface	Incoming IP
1.	<input type="radio"/> FastEthernet2/0/1	10.2.2.145	isctmp2	CISCO_ROUTER	FastEthernet1/0	10.2.2.158
2.	<input type="radio"/>		isctmp2	CISCO_ROUTER	Loopback0	192.168.118.189
3.	<input type="radio"/> FastEthernet2/1/0	10.2.3.54	isctmp9	CISCO_ROUTER	FastEthernet2/0	10.2.3.53
4.	<input type="radio"/>		isctmp9	CISCO_ROUTER	Loopback0	192.168.118.219
5.	<input type="radio"/> FastEthernet2/1/1	10.2.3.57	isctmp9	CISCO_ROUTER	FastEthernet2/1	10.2.3.58
6.	<input type="radio"/> FastEthernet1/0/0	10.2.2.161	isctmp8	CISCO_ROUTER	FastEthernet3/0	10.2.2.174
7.	<input type="radio"/>		isctmp8	CISCO_ROUTER	Loopback0	192.168.118.183
8.	<input type="radio"/> FastEthernet1/1/0	10.2.2.110	isctmp7	CISCO_ROUTER	FastEthernet0/0	10.2.2.97
9.	<input type="radio"/>		isctmp7	CISCO_ROUTER	Loopback0	192.168.118.214
10.	<input type="radio"/> FastEthernet3/1/0	10.2.3.93	isctmp7	CISCO_ROUTER	FastEthernet4/0	10.2.3.94

The next hop list contains all the possible next hops of the router, excluding the ones already included in the explicit paths (to avoid path loops).

The next hop list contains TE interfaces and at most one non-TE interface for each router (if the loopback interface is used as the MPLS TE ID of the device). For TE interfaces, the **Outgoing Interface** and **Outgoing IP** columns are populated by the application.



Note If a non-TE interface is selected, **Provision Preference** ([Figure 4-4](#)) is set to **Incoming Interface**. The provision preference cannot be set manually.

Select an interface and click **Select**. The corresponding link information is added to the new explicit path in the **Links** table.

In the New TE Explicit Path window, both the incoming and outgoing interface fields are populated.

B. Loose path type:

Click the **Add Hop** button. The Loose Hop Definition window appears.

In this window, specify an IP address for the desired loose hop and click **OK**. The Loose Hop Definition window closes.

The New TE Explicit Path window now displays the added loose hop. In [Figure 4-6](#), a strict hop signifying a specific link has also been added.

Figure 4-6 New TE Explicit Path with Loose and Strict Hops

New TE Explicit Path

Path Name *: Loose1

Head Router *: isctmp3

Path Type *: Strict Loose Exclude

Next-Address Strict/Loose Hop Addresses:

Showing 1 - 2 of 2 records

#	<input type="checkbox"/>	Hop Address	Hop Type
1.	<input type="checkbox"/>	192.168.18.3	LOOSE
2.	<input type="checkbox"/>	10.2.2.222	STRICT

Rows per page: 10

Provision Preference *: Outgoing Interface Incoming Interface

Note: * - Required Field

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C. Exclude path type:

Click the **Add Hop** button. The Exclude Hop Definition window appears.

In this window, specify an IP address for the desired exclude hop and click **OK**. The Exclude Hop Definition window closes.

The New TE Explicit Path window now displays the added exclude hop.

- Step 8** To add another link, click either **Add Link** or **Add Hop**.
- Step 9** For Strict hops, a **Provision Preference** can optionally be selected by clicking either the **Outgoing Interface** or the **Incoming Interface** radio button.



Note If you try to select the **Provision Preference** before adding a link when non-TE interfaces are present, the **Add Link** process overrides the **Provision Preference** and sets it to incoming.

- Step 10** Click **Save** to keep the created TE explicit path or click **Cancel** to quit without saving.

Primary Tunnel Operations

TEM allows you to perform a number of primary tunnel operations, which are described in the following.

Create Primary Tunnel

After a TE Policy and an explicit path have been set up, a primary tunnel can be created. There are two types of primary tunnels:

- Managed Primary Tunnels
- Unmanaged Primary Tunnels

Below, the GUI flow is described for creating unmanaged primary tunnels. It is very similar for managed primary tunnels and the few differences that exist are described in [Managed/Unmanaged Primary Tunnels, page F-2](#) and [Create Unmanaged TE Tunnel, page B-57](#).

To create a managed or an unmanaged primary tunnel, use the following steps:

- Step 1** Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management**.
- Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window in [Figure 4-7](#) appears.
or
Click **Create Unmanaged TE Tunnel**. The TE Unmanaged Primary Tunnels SR window in [Figure 4-8](#) appears.

Figure 4-7 TE Managed Primary Tunnels SR

TE Managed Primary Tunnels SR

SR Job ID: 1 TE Provider: cisco SR State: REQUESTED
 SR ID: New Creator: Type: ADD

Description :
 cisco - TE Managed Tunnel SR

Show Existing Tunnels with All matching * Find

Showing 16 - 20 of 39 records

#	Op	Tunnel ID	T#	Head	Dest	Policy	BW	AutoBW	Deploy Status	Verified	Allow Reroute	Head Region	Tail Region
16.	<input checked="" type="checkbox"/>	ISC-P44	88	isctmp2	isctmp3	ISC-P39-isctmp2:Tunnel6	1500	true	DEPLOYED	succeed	false	scotland	scotland
17.	<input type="checkbox"/>	ISC-P46	1004	isctmp2	isctmp6	ISC-P6-isctmp1:Tunnel45	80	false	DEPLOYED	succeed	false	scotland	scotland
18.	<input type="checkbox"/>	ISC-P48	1014	isctmp2	isctmp9	ISC-P6-isctmp1:Tunnel45	77	false	DEPLOYED	succeed	false	scotland	scotland
19.	<input type="checkbox"/>	ISC-P71	1007	isctmp6	isctmp1	ISC-P71-isctmp6:Tunnel1007	1	false	DEPLOYED	succeed	false	scotland	scotland
20.	<input type="checkbox"/>	ISC-P81	2008	isctmp6	isctmp9	ISC-P39-isctmp2:Tunnel6	11000	true	DEPLOYED	succeed	false	scotland	scotland

Rows per page: 5 Go to page: 4 of 8 Go

Close Display Details Admit Create Edit Delete

Import Placement Tools Update Tunnel ID Proceed with Changes >> Save & Deploy Cancel

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Figure 4-8 TE Unmanaged Primary Tunnels SR

TE Unmanaged Primary Tunnels SR

TE Provider: cisco
Creator:

Show Existing Tunnels with All matching * Find

Showing 1 - 5 of 78 records

#	<input type="checkbox"/>	Op	Tunnel ID	T#	Head	Dest	Policy	BW	AutoBW	Deploy Status	Conformance	Head Region	Tail Region
1.	<input checked="" type="checkbox"/>		ISC-P3	2	isctmp1	isctmp8	ISC-P3-isctmp1:Tunnel2	332	false	DEPLOYED	Yes	scotland	scotland
2.	<input type="checkbox"/>		ISC-P4	4	isctmp1	isctmp8	ISC-P3-isctmp1:Tunnel2	6	false	DEPLOYED	Yes	scotland	scotland
3.	<input type="checkbox"/>		ISC-P5	44	isctmp1	isctmp8	ISC-P3-isctmp1:Tunnel2	77	false	DEPLOYED	Yes	scotland	scotland
4.	<input type="checkbox"/>		ISC-P8	63	isctmp1	isctmp6	ISC-P8-isctmp1:Tunnel63	0	false	DEPLOYED	Yes	scotland	scotland
5.	<input type="checkbox"/>		ISC-P12	120	isctmp1	isctmp7	ISC-P12-isctmp1:Tunnel120	1500	true	DEPLOYED	Yes	scotland	scotland

Rows per page: 5 Go to page: 1 of 16 Go

Close Display Details Create Edit Delete

Update Tunnel ID Save & Deploy Cancel

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For an explanation of the various window elements, see [Create Managed TE Tunnel, page B-38](#).

Note that for the unmanaged tunnels list, the last two columns in the managed tunnels list in [Figure 4-7](#) (Verified and Allow Reroute) are replaced by the Conformance column.

In the following example, an unmanaged tunnel is created.

Step 3 Click **Create**.

The Create TE Unmanaged Primary Tunnel window in [Figure 4-9](#) appears.

Figure 4-9 Create TE Unmanaged Primary Tunnel

Create TE Unmanaged Primary Tunnel

SR Job ID: New SR ID: New SR State: REQUESTED
 Creator: Type: ADD

Head Device * :

Destination Device * :

Tunnel Policy * :

Tunnel Bandwidth (Kbps):

Description :

Tunnel Number: Auto Gen

Tunnel ID:

Customer:

Auto BW: Enable:

Freq (sec):

Min (Kbps):

Max (Kbps):

Path Options:

Showing 0 of 0 records

<input type="checkbox"/>	Option #	Path Name	Path Type	Lock Down
Rows per page: 5 Go to page: 1 of 1 <input type="button" value="Go"/>				
		<input type="button" value="Add"/>		<input type="button" value="Delete"/>
		<input type="button" value="OK"/>		<input type="button" value="Cancel"/>

Note: * - Required Field

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For an explanation of the various window elements, see [Create Managed TE Tunnel](#), page B-38 and [Create Unmanaged TE Tunnel](#), page B-57.

- Step 4** To select a **Head Device** in the Create TE Unmanaged Primary Tunnel window, click the corresponding **Select** button to open the Select Device for TE Head Router window shown in [Figure B-38](#).
- Step 5** Select a device name and click **Select**.
 The Select Device for TE Head Router window closes and the prompt returns to the Create TE Unmanaged Primary Tunnel window.
- Step 6** To select a **Destination Device** in the Create TE Unmanaged Primary Tunnel window, click the corresponding **Select** button to open the Select Device for TE Tail Router window.
- Step 7** Select a device name and click **Select**.

The Select Device for TE Tail Router window closes and the prompt returns to the Create TE Unmanaged Primary Tunnel window.

- Step 8** To select a **Tunnel Policy** in the Create TE Unmanaged Primary Tunnel window, click the corresponding **Select** button to open the Select Unmanaged TE Tunnel Policy window.



Note When creating a managed tunnel, make sure that one or more managed tunnel policies are available. If that is not the case, go to **Policies** (see [Create TE Policy, page 4-2](#)) and make sure to check the **Managed** check box.

For an explanation of the various window elements, see [Create Managed TE Tunnel, page B-38](#) and [Create Unmanaged TE Tunnel, page B-57](#).

- Step 9** Select a policy and click the **Select** button.

This brings you back to the tunnel editor.

- Step 10** Click **Add** to set up path options for the tunnel. The Select TE Explicit Path window in [Figure B-40](#) appears.

The **Path Options** section provides two path types:

Explicit Path—A fixed path from a specific head to a specific destination device that includes three types of paths: **Strict**, **Loose**, and **Exclude**.

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

- Step 11** Select the desired TE Explicit Path unless you prefer dynamic path only.

If none is available, you can set one up first. To do so, see [Create Explicit Path, page 4-3](#).

- Step 12** Click **Select**.

The selected path appears in the **Path Options** section of the create window as shown in [Figure B-41](#).

For explicit paths (<head_device>-<destination_device>), you can click the pathname to open the non-editable Explicit Path Viewer as shown in [Figure B-42](#).

For an explanation of the various window elements, see [Create/Edit Explicit Path, page B-32](#).

- Step 13** In the Create TE Unmanaged Tunnel window, click **OK** to accept the entered tunnel information or click **Cancel** to quit and return to the TE Unmanaged Primary Tunnels SR window.

The TE Unmanaged Primary Tunnel SR window appears with the newly created SR ([Figure 4-10](#)) with the **Op** field set to ADD.



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

Figure 4-10 Service Requests - Unmanaged Tunnels

TE Unmanaged Primary Tunnels SR

TE Provider: cisco
Creator:

Show SR Tunnels with All matching Find

Showing 1 - 1 of 1 record

#	Op	Tunnel ID	T#	Head	Dest	Policy	BW	AutoBW	Deploy Status	Conformance	Head Region	Tail Region
1.	<input type="checkbox"/> ADD	ISC-P329		isctmp1	isctmp2	ISC-P12-isctmp1:Tunnell120	100	false	REQUESTED	Yes	scotland	scotland

Rows per page: 5 Go to page: 1 of 1

Close Display Details Create Edit Delete

Update Tunnel ID Save & Deploy Cancel

Step 14 In the TE Unmanaged Primary Tunnel window, click **Save & Deploy** (see [Note](#) on page 12) to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more primary tunnels and then save and deploy all changes.

When you click **Save & Deploy**, TEM 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, TEM will simply ask you to wait until it is complete.

To see the state of deployment, go to the Service Requests window at **Inventory and Connection Manager > Service Requests** or open **Monitoring > Task Manager**.

For a further description of save and deploy options, see [Create Managed TE Tunnel, page B-38](#).

**Note**

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

**Note**

For managed tunnels, you cannot deploy the service request until you have used the **Proceed with Changes** button to perform either Tunnel Placement, Tunnel Audit, or Tunnel Repair (see [Chapter 5, "Advanced Primary Tunnel Management"](#)).

**Note**

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

The Service Requests window (**Service Inventory > Inventory and Connection Manager > Service Requests**) appears (see [Figure 4-11](#)) and displays the state of the deployed SR (first REQUESTED, then PENDING, then DEPLOYED, if successful).

Figure 4-11 Service Requests - Unmanaged Tunnels

Service Requests

Show Services with Job ID matching * of Type All Find

Showing 1 - 5 of 42 records

#	<input type="checkbox"/>	Job ID	Data Files	State	Type	Operation Type	Creator	Customer Name	Policy Name	Last Modified	Description
1.	<input type="checkbox"/>	1		DEPLOYED	TE Tunnel	ADD	admin			9/3/08 5:30 PM	cisco - TE Managed Tunnel SR
2.	<input type="checkbox"/>	2		REQUESTED	TE Tunnel	MODIFY	admin			10/2/08 10:50 AM	isctmp1 - TE Unmanaged Tunn...
3.	<input type="checkbox"/>	3		DEPLOYED	TE Tunnel	ADD	admin			9/3/08 5:30 PM	isctmp8 - TE Unmanaged Tunn...
4.	<input type="checkbox"/>	4		DEPLOYED	TE Tunnel	ADD	admin			9/3/08 5:30 PM	isctmp2 - TE Unmanaged Tunn...
5.	<input type="checkbox"/>	5		DEPLOYED	TE Tunnel	ADD	admin			9/3/08 5:30 PM	isctmp6 - TE Unmanaged Tunn...

Rows per page: 5 Go to page: 1 of 9 Go

Auto Refresh: Create Details Status Edit Deploy Decommission Purge

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

If the SR does not go to the **Deployed** state, go to the Task Logs window to see the deployment log (**Monitoring > Task Manager > Logs**) as described in [SR Deployment Logs, page 9-1](#).

To edit the service request from the **Service Requests** window, go back to the TE Managed Primary Tunnels SR or the TE Unmanaged Primary Tunnels SR window as described in [Edit Primary Tunnel, page 4-13](#).

Edit Primary Tunnel

Primary tunnel attributes can be modified in the primary tunnel editor.

There are two ways to access the primary tunnel editor:

- from the managed or unmanaged primary tunnels SR window or
- from the Service Requests window.

Access from Primary Tunnel SR Window

To access the primary tunnel editor from the primary tunnel SR window (TE Managed Primary Tunnels SR or TE Unmanaged Primary Tunnels SR window) and edit a managed or an unmanaged primary tunnel, use the following steps:

- Step 1** Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management**.
- Step 2** Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears.
or
Click **Create Unmanaged TE Tunnel**. The TE Unmanaged Primary Tunnels SR window appears.
- Step 3** To edit a tunnel SR, select the desired SR and click **Edit**. The Edit TE Managed Primary Tunnel or the Edit TE Unmanaged Primary Tunnel window appears.

The primary tunnel editor is identical to that of the create primary tunnel GUI. For an explanation of the various window elements, see [Create Managed TE Tunnel, page B-38](#) and [Create Unmanaged TE Tunnel, page B-57](#).

Step 4 Make the desired changes and click **OK** to accept, or **Cancel** to discard the changes.

In the TE Unmanaged Primary Tunnel SR window, the **Op** field changes to MODIFY.



Note The modified tunnel can be reverted to its original state by selecting it and clicking **Delete**. The MODIFY flag in the Op column disappears.

Step 5 Click **Save & Deploy** to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more primary tunnels and then save and deploy all changes.

The Service Requests window (**Service Inventory > Inventory and Connection Manager > Service Requests**) appears (see [Figure 4-11](#)) and displays the state of the deployed SR.

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

Access from Service Requests Window

To access the primary tunnel editor from the Service Requests window, assuming that the SR has been created, use the following steps:

Step 1 Choose **Service Inventory > Inventory and Connection Manager > Service Requests**.

Step 2 To edit the desired tunnel SR, select the SR in question and click **Edit**.

Depending on whether a managed or an unmanaged tunnel has been selected, the TE Managed Primary Tunnel SR or the TE Unmanaged Primary Tunnel SR window appears displaying the SR selected in the Service Requests window.

An example of the TE Unmanaged Primary Tunnel SR window is shown in [Figure 4-8](#).

Step 3 Select the tunnel SR and click **Edit**.

The Edit TE Unmanaged Primary Tunnel window appears.

Go to [Access from Primary Tunnel SR Window, page 4-13](#) and continue the process from [Step 4](#).

Delete Primary Tunnel

To delete a managed or an unmanaged primary tunnel from the primary tunnel SR window (TE Managed Primary Tunnels SR or TE Unmanaged Primary Tunnels SR window), use the following steps:

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

Step 2 Click **Create Managed TE Tunnel**. The TE Managed Primary Tunnels SR window appears.

or

Click **Create Unmanaged TE Tunnel**. The TE Unmanaged Primary Tunnels SR window in [Figure 4-8](#) appears.

- Step 3** To delete a tunnel, select the desired tunnel(s) and click **Delete**. The **Op** field status changes to **DELETE** as shown in [Figure 4-12](#).

Figure 4-12 TE Unmanaged Primary Tunnels SR - Delete Requested

TE Unmanaged Primary Tunnels SR

TE Provider: cisco
Creator:

Show Existing Tunnels with All matching * Find

Showing 16 - 20 of 78 records

#	<input type="checkbox"/>	Op	Tunnel ID	T#	Head	Dest	Policy	BW	AutoBW	Deploy Status	Conformance	Head Region	Tail Region
16.	<input type="checkbox"/>		ISC-P31	2014	isctmp1	isctmp2	ISC-P26-isctmp1:Tunnel2001	100	false	DEPLOYED	Yes	scotland	scotland
17.	<input type="checkbox"/>		ISC-P32	2015	isctmp1	isctmp8	ISC-P26-isctmp1:Tunnel2001	100	false	DEPLOYED	Yes	scotland	scotland
18.	<input type="checkbox"/>		ISC-P33	3002	isctmp1	isctmp8	ISC-P21-isctmp1:Tunnel1012	67	false	DEPLOYED	Yes	scotland	scotland
19.	<input type="checkbox"/>		ISC-P34	10001	isctmp1	192.168.118.213	ISC-P34-isctmp1:Tunnel10001	100	false	DEPLOYED	No	scotland	scotland
20.	<input checked="" type="checkbox"/>	DELETE	ISC-P318	1004	isctmp8	isctmp2	ISC-P53-isctmp2:Tunnel3003	50	false	REQUESTED	Yes	scotland	scotland

Rows per page: 5 Go to page: 4 of 16 Go

Close Display Details Create Edit Delete

Save & Deploy Cancel

For an explanation of the various window elements, see [Create Managed TE Tunnel, page B-38](#) and [Create Unmanaged TE Tunnel, page B-57](#).



Note The deleted tunnel can be reverted to its original state by selecting it and clicking **Delete**. The DELETE flag in the Op column disappears.

- Step 4** Click **Save & Deploy** to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more primary tunnels and then save and deploy all changes.

The Service Requests window (**Service Inventory > Inventory and Connection Manager > Service Requests**) appears (see [Figure 4-11](#)) and displays the state of the deployed SR.

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

Backup Tunnel Operations

TEM allows you to perform a number of backup tunnel operations, which are described in this section.

Appendix F contains a description of [Connectivity Protection \(CSPF\) Backup Tunnels, page F-7](#), which is one of the techniques used to provide backup protection.

Create Backup Tunnel

Backup tunnels are created in much the same way as primary tunnels. In both cases, building an explicit path is not required when an existing path already traverses the desired routers. A path can be used for any number of tunnels within its bandwidth capacity.

A precondition for creating a backup tunnel is the presence of an explicit path. To create an explicit path, see [Create Explicit Path, page 4-3](#).

To create a backup tunnel, use the following steps:

- Step 1** Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management**.
- Step 2** Click **Create TE Backup Tunnel**. The TE Protection SR window in [Figure 4-13](#) appears.

Figure 4-13 TE Protection SR

The screenshot shows the 'TE Protection SR' window. At the top, it displays 'SR Job ID: 10', 'TE Provider: cisco', and 'SR State: REQUESTED'. Below this, there are fields for 'SR ID: New' and 'Creator:'. A 'Description:' field is present but empty. A search bar shows 'Show Existing Tunnels with All matching *'. Below the search bar, it says 'Showing 21 - 25 of 30 records'. A table lists tunnels with columns for '#', 'Op', 'Tunnel ID', 'T#', 'Head', 'Dest', 'BW Quota', 'Deploy Status', 'Conformance', 'Backup Type', 'Head Region', and 'Tail Region'. The table contains 5 rows of data. At the bottom, there are buttons for 'Close', 'Display', 'Details', 'Create', 'Edit', 'Delete', 'Audit SR', 'Update Tunnel ID', 'Save & Deploy', and 'Cancel'. A vertical label '205119' is on the right side.

#	Op	Tunnel ID	T#	Head	Dest	BW Quota	Deploy Status	Conformance	Backup Type	Head Region	Tail Region
21.	<input checked="" type="checkbox"/>	ISC-B273	1013	isctmp6	isctmp14 0		DEPLOYED	No	CSPF	scotland	scotland
22.	<input type="checkbox"/>	ISC-B274	1014	isctmp6	isctmp14 0		DEPLOYED	No	CSPF	scotland	scotland
23.	<input type="checkbox"/>	ISC-B275	1000	isctmp3	isctmp2	60000	DEPLOYED	Yes	BW Protected	scotland	scotland
24.	<input type="checkbox"/>	ISC-B276	1002	isctmp3	isctmp1	30006	DEPLOYED	Yes	BW Protected	scotland	scotland
25.	<input type="checkbox"/>	ISC-B277	1003	isctmp3	isctmp1	30000	DEPLOYED	Yes	BW Protected	scotland	scotland

For an explanation of the various window elements, see [Create TE Backup Tunnel, page B-57](#).

- Step 3** Click **Create**. The Create TE Backup Tunnel window in [Figure 4-14](#) appears.

Figure 4-14 Create TE Backup Tunnel

Create TE Backup Tunnel

SR Job ID: New **SR ID:** New **SR State:** REQUESTED
Creator: **Type:** ADD

Head Device * :

Destination Device * :

Protected Interface(s) * :

Description :

Backup Bandwidth Limit (Kbps) * : Any Pool BW Sub Pool (BC1) BW Global Pool (BC0) BW

Tunnel Number: Auto Gen

Tunnel ID:

Tunnel Bandwidth (Kbps):

Tunnel Pool Type: Global Pool (BC0) Sub Pool (BC1)

Setup Priority (0-7):

Hold Priority (0-7):

Affinity (0x0-0xFFFFFFFF):

Affinity Mask (0x0-0xFFFFFFFF):

Path Options:

Showing 0 of 0 records

<input type="checkbox"/>	Option #	Path Name	Path Type	Lock Down
Rows per page: 5 <input type="button" value="Go to page: 1 of 1"/> <input type="button" value="Go"/> <input type="button" value="Next"/> <input type="button" value="Previous"/>				
<input type="button" value="Add"/> <input type="button" value="Delete"/>				
<input type="button" value="OK"/> <input type="button" value="Cancel"/>				

Note: * - Required Field

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For an explanation of the various window elements, see [Create TE Backup Tunnel, page B-57](#).

Step 4 Select, at a minimum, a **Head Device** ([Figure B-38](#)), a **Destination Device**, and a **Protected Interface** ([Figure B-51](#)).

Also, specify a **Backup Bandwidth Limit** greater than zero. Add other tunnel information as desired.

For an explanation of the various window elements, see [Select TE Protected Interface, page B-62](#).

Step 5 Click **Add** to add just one path.

The Select TE Explicit Path window in [Figure B-40](#) appears.

Step 6 Select an explicit path.

It must match the head and destination of an existing path. If none is available, you first must set one up. To do so, see [Create Explicit Path, page 4-3](#).

Step 7 Click **Select**.

The selected path appears in the **Path Options** section of the page as shown in the Select TE Explicit Path window in [Figure B-41](#).

For explicit paths, you can click the pathname to open the Explicit Path Viewer as shown in [Figure B-42](#).

Step 8 In the Create TE Backup Tunnel window, click **OK** to accept the entered tunnel information or click **Cancel** to quit the window without saving it.

In the TE Protection SR window, a new backup tunnel is added in the tunnel list with the **Op** field set to **ADD**.



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 9 Click **Save & Deploy** to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more backup tunnels and then save and deploy all changes.

The **Save & Deploy** button provides two options:

- **SR Tunnels Only**—Deploy all tunnel changes that does not impact tunnel placement, or if no changes were made to the SR, use this to redeploy the SR that was in **Requested** or **Invalid** state.
- **Force Deploy All Tunnels**—Force deployment of all tunnels in this SR. This could be useful when previous provisioning of the SR has failed, so that it is necessary to force through the deployment of all tunnels in the SR.

When you click **Save & Deploy**, TEM 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, TEM 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 You might see Elixir Warnings during TE Tunnel deployment. The deployment will be successful and the warning messages can safely be ignored.



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**.

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 C, “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 [SR Deployment Logs, page 9-1](#).

Edit Backup Tunnel

Backup tunnel attributes can be modified in the backup tunnel editor.

There are two ways to access the backup tunnel editor:

- from the Protection SR window or
- from the Service Requests window.

From the Protection SR Window

To access the Protection SR window to edit a backup tunnel, use the following steps:

Step 1 Choose **Service Inventory > Inventory and Connection Manager > Traffic Engineering Management > Create TE Backup Tunnel**. The TE Protection SR window appears.

Step 2 To edit a tunnel SR, select the desired SR and click **Edit**.

The Edit TE Backup Tunnel window appears. The backup tunnel editor is identical to that of the create backup tunnel GUI. For an explanation of the various window elements, see [Create TE Backup Tunnel, page B-57](#).

Step 3 Make the desired changes and click **OK**.

Step 4 In the TE Protection window, the **Op** field changes to MODIFY.



Note The modified tunnel can be reverted to its original state by selecting it and clicking **Delete**. The MODIFY flag in the Op column disappears.

Step 5 In the TE Protection SR window, click **Save & Deploy** to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more backup tunnels and then save and deploy all changes.

The **Save & Deploy** button options are discussed in [Create Managed TE Tunnel, page B-38](#).

The Service Requests window (**Service Inventory > Inventory and Connection Manager > Service Requests**) appears (see [Figure 4-11](#)) and displays the state of the deployed SR.

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

From the Service Requests Window

To edit a backup tunnel from the **Service Requests** window, assuming that the SR has been created use the following steps:

Step 1 Choose **Service Inventory > Inventory and Connection Manager > Service Requests**.

Step 2 To edit the desired tunnel SR, select the SR in question and click **Edit**.

The TE Protection SR window appears displaying the SR selected in the Service Requests window. An example of the TE Protection SR window is shown in [Figure 4-13](#).

Step 3 Select the tunnel SR and click **Edit**.

The Edit TE Backup Tunnel window appears.

Go to [Figure 4-13](#) and continue the process from [Step 3](#).

Delete Backup Tunnel

To delete a backup tunnel from the TE Protection SR window, use the following steps:

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

The TE Protection SR window in [Figure 4-13](#) appears.

Step 2 To delete a tunnel SR, select the desired SR and click **Delete**.

The **Op** field status changes to **DELETE** as shown in [Figure 4-12](#) for unmanaged tunnels.

For an explanation of the various window elements, see [Create TE Backup Tunnel, page B-57](#).



Note The deleted tunnel can be reverted to its original state by selecting it and clicking **Delete**. The **DELETE** flag in the **Op** column disappears.

Click **Save & Deploy** to either deploy the new tunnel SR to the network or force deploy all tunnels, or you can create or edit more primary tunnels and then save and deploy all changes.

The Service Requests window (**Service Inventory > Inventory and Connection Manager > Service Requests**) appears (see [Figure 4-11](#)) and displays the state of the deployed SR.

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