

9 Grooming LOP to DCL Traffic

This chapter describes how to use SONET/SDH lower-order path (LOP) traffic in SP Guru Transport Planner. Before you can run network design operations using LOP traffic, you must translate the LOP traffic to DCL (STS/STM-level) traffic; thus LOP grooming is a pre-processing step to routing, dimensioning, and DCL grooming. Like DCL grooming, LOP grooming translates higher-layer traffic to lower-layer traffic. Unlike DCL grooming (which uses different grooming strategies), LOP grooming uses end-to-end grooming only. This means that for every LOP traffic flow, grooming creates a matching DCL connection that is used to map LOP traffic between the two end nodes only, and is not used for LOP traffic between any other node pair.

To calculate the number of DCL connections needed to support the LOP connections between a node pair, Transport Planner uses the VT/VC multiplexing hierarchy (described in SONET/SDH Systems on page TrP-2-1).

Workflow Description

Procedure 9-1 describes how to groom an LOP traffic matrix.

Procedure 9-1 Grooming an LOP Traffic Matrix

1 Choose Design > Groom LOP to DCL Traffic to open the Groom LOP to DCL Traffic Dialog Box.

2 Specify the grooming options:

- The LOP traffic matrix you want to groom
- The target bit rate for the resulting DCL traffic matrix
- The capacity usage options

These options are described in Table 9-2 LOP Grooming: Input Options on page TrP-9-3.

3 Groom the LOP traffic matrix:

3.1 Click Groom to map the selected LOP traffic matrix to DCL traffic.

➡ The Routing Results dialog box appears and shows the percentage of traffic that could be set up using the existing DCL capacity (if any). LOP traffic is routed only if both the following conditions were true when you ran step 3.1:

- The network had non-native DCL connections that were already set up
- The “Use existing capacity” option was selected in the LOP Grooming dialog box

3.2 Close the Routing Results dialog box.

- ➔ The percentage of routed traffic appears in the LOP Traffic Matrix table of the Groom LOP to DCL Traffic dialog box.

If the option "Add new capacity" option was selected, and all LOP traffic could not be routed using the existing DCL capacity, the grooming operation results in the following:

- ➔ A new DCL traffic matrix is created and its name appears in the Result field.
- ➔ The Groomed column field is set to Yes to indicated that the LOP traffic has been groomed successfully to DCL traffic.
- ➔ The % Routed column shows 100% only after the newly created DCL traffic is set up (see step 4).

4 If a new DCL traffic matrix was created in step 3, set up this DCL traffic to complete the grooming cycle. You can do this by Dimensioning, Routing or Grooming DCL to OCH Traffic:

4.1 Click one of the Dimension DCL, Route DCL and Groom DCL to OCH buttons to set up the DCL matrix.

5 If setting up the DCL traffic matrix was successful, return to the Groom LOP to DCL Traffic dialog box to verify that 100% of the LOP traffic is routed.

6 If you need to groom additional traffic, return to step 2. Otherwise, click Close.

End of Procedure 9-1

Groom LOP to DCL Traffic Dialog Box

Figure 9-1 shows the Groom LOP to DCL dialog box, which you open by choosing Design > Groom LOP to DCL Traffic. The options in this dialog box are listed in Table 9-1 on page TrP-9-3.

Figure 9-1 Groom LOP to DCL Traffic Dialog Box

| LOP Traffic Matrix | % Routed | Groomed | Bit Rate |
|--------------------|----------|---------|----------|
| LOP_0 | 100.0 | Yes | VT-1.5 |
| LOP_1 | 0.0 | No | VT-6 |

☒ Use existing capacity DCL Bit Rate: STS-3
☒ Add new capacity Multiplex Factor: 21

Result
DCL Traffic Matrix:

Dimension DCL Route DCL Groom DCL to OCH
 Groom Undo Close

Table 9-1 Groom LOP to DCL Traffic Dialog Box

| Section | Description/Reference |
|-------------------------|--|
| Input | LOP Grooming: Input on page TrP-9-3 |
| Result | The DCL Traffic Matrix field shows the name of the DCL traffic matrix that resulted from the grooming operation. |
| Action buttons | LOP Grooming: Action Buttons on page TrP-9-4 |
| End of Table 9-1 | |

LOP Grooming: Input

Table 9-2 lists the fields that appear in the Input group box in the Groom LOP to DCL Traffic Dialog Box.

Table 9-2 LOP Grooming: Input Options

| Item | Description |
|--------------------|--|
| LOP Traffic Matrix | The LOP traffic matrix you want to groom |
| % Routed | The percentage of LOP traffic already routed due to a previous grooming operation |
| Groomed | Yes if the LOP traffic matrix was groomed with the option “Add new capacity” and a new DCL traffic matrix was created as a result No if either of the following conditions is true: <ul style="list-style-type: none"> • The LOP traffic matrix has not been groomed yet • The LOP traffic matrix could be (partly) routed using existing DCL capacity (non-native DCL connections), in which case no new DCL traffic matrix was needed |
| Bit Rate | The bit rate of the LOP traffic matrix |
| DCL Bit Rate | The bit rate of the resulting DCL traffic matrix to which you want to groom the selected LOP traffic |

Table 9-2 LOP Grooming: Input Options (Continued)

| Item | Description |
|-------------------------|--|
| Multiplex factor | The multiplex factor between the selected LOP traffic matrix and the selected DCL bit rate. This shows the number of elementary LOP connections (of the selected bit rate) that can fit into one capacity unit of the selected DCL bit rate |
| Use existing capacity | If selected, consider the existing capacity (pre-existing, non-native DCL connections that are already set up) for grooming the LOP connections. For more information, see Use Existing Capacity/Add New Capacity Settings: Effects on page TrP-9-5. |
| Add new capacity | If selected, create a new DCL traffic matrix (if needed) to groom the selected LOP connections. For more information, see Use Existing Capacity/Add New Capacity Settings: Effects on page TrP-9-5. |
| End of Table 9-2 | |

LOP Grooming: Action Buttons

Table 9-3 describes the action buttons in the Groom LOP to DCL Traffic Dialog Box.

Table 9-3 LOP Grooming: Action Buttons

| Item | Description |
|-------------------------|---|
| Groom | Groom the selected LOP traffic matrix |
| Dimension DCL | If the grooming created a new DCL traffic matrix to support the groomed LOP traffic, click this button to open the Dimension DCL/OCH Layer Dialog Box and dimension the DCL layer using the new matrix. |
| Route DCL | If the grooming created a new DCL traffic matrix to support the groomed LOP traffic, click this button to open the Route DCL/OCH Traffic Dialog Box and route the DCL traffic in the network. |
| Groom DCL to OCH | If the grooming created a new DCL traffic matrix to support the groomed LOP traffic, click this button to open the Groom DCL to OCH Traffic - Optimized Routes Dialog Box and groom the DCL traffic to OCH traffic. |
| Undo | Undo the grooming operation. Specifically, this operation tears down the selected LOP traffic matrix and the DCL traffic matrix (if any) that resulted from the grooming. |
| End of Table 9-3 | |

Use Existing Capacity/Add New Capacity Settings: Effects

The following settings in the Groom LOP to DCL Traffic Dialog Box affect how the LOP grooming operation uses network capacity:

- Use existing capacity—If this option is selected, the grooming operation can set up the LOP traffic using existing capacity (non-native DCL connections that are already set up).
- Add new capacity—If this option is selected, the grooming operation creates a new DCL traffic matrix to support the LOP traffic.

Table 9-4 lists the effects of different settings for these options.

Table 9-4 Effects of Use Existing Capacity/Add New Capacity Settings on LOP Traffic Grooming

| | Use Existing Capacity = Not Selected | Use Existing Capacity = Selected |
|--|---|--|
| Add New Capacity = Not Selected | <p>The LOP traffic will not be groomed or set up because no existing or new capacity can be used.</p> <p>This combination is not useful.</p> | <p>The grooming algorithm tries to route the selected LOP traffic using existing capacity (non-native DCL connections that are already set up).</p> <p>Result: the % Routed cell shows the percentage of LOP traffic that could be routed, and the remaining traffic remains unrouted.</p> |
| Add New Capacity = Selected | <p>The selected LOP traffic is groomed into a new DCL traffic matrix without considering the existing capacity.</p> <p>Result: the Groomed cell is set to “Yes” and the Result cell shows the name of the created DCL traffic matrix.</p> | <p>The grooming algorithm tries to route the selected LOP traffic using existing capacity.</p> <p>If all traffic could be routed, the % Routed field shows 100%, the Groomed cell shows “No”, and no new DCL traffic matrix is created.</p> <p>If all traffic could not be routed this way, the remaining LOP traffic is groomed into a new DCL traffic matrix, the Groomed field is set to “Yes”, and the Result cell shows the name of the created DCL traffic matrix.</p> |
| End of Table 9-4 | | |

LOP End-to-End Grooming Algorithm

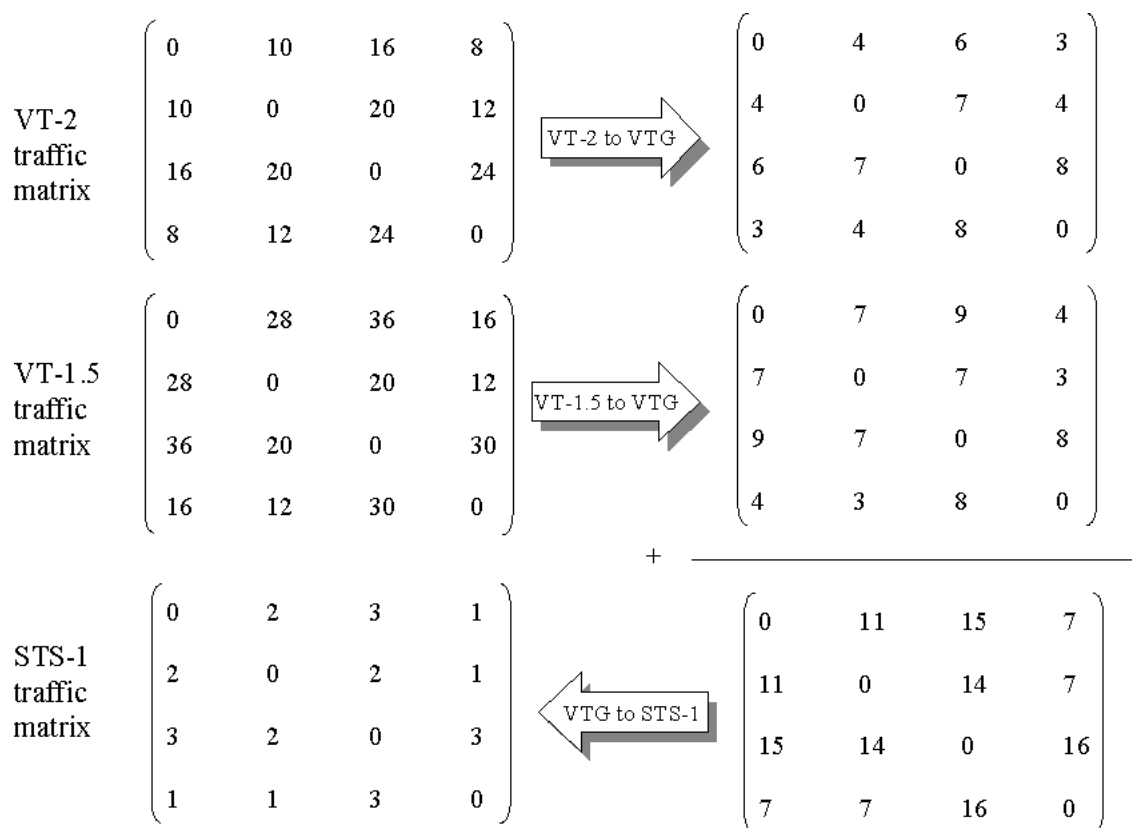
LOP grooming uses an end-to-end grooming algorithm. This means that each node pair that has LOP traffic requires an equivalent amount of DCL traffic. The exact amount of DCL traffic required depends on the bit rates of the LOP and DCL traffic. The LOP-to-DCL traffic mapping is based on the SONET/SDH multiplexing hierarchy of mapping VT/VC containers into VT groups in STS/STM signals (as described in SONET/SDH Systems on page TrP-2-1).

LOP End-to-End Grooming: Example

This example assumes the VT-2 and VT-1.5 traffic matrix shown in Figure 9-2. The multiplexing characteristics are as follows:

- Three VT-2 connections can be multiplexed into a VTG, so the resulting amount of VTGs is $\text{<number_of_VT_2_connections>/3}$.
- Four VT-1.5 connections can be multiplexed into a VTG. However, a VTG that was already started for multiplexing a VT-2, though not completely used, cannot be reused for multiplexing another signal. Hence the number of VTGs required for the VT-1.5 connections is $\text{<number_of_VT_1.5_connections>/4}$.
- The total number of required VTGs equals the sum of both, as illustrated in Figure 9-2. Therefore, one STS-1 is required for seven VTGs.

Figure 9-2 LOP Grooming: Example



Visualizing LOP Connections in the Connections Browser

After you groom the LOP traffic to DCL traffic and set up the DCL traffic, you can view the routes of a LOP connection using the Connection Browser. Select the LOP radio button (under Traffic) and select a connection to see its route in the Project Editor window. The LOP route follows the DCL connection to which it is groomed.