CHAPTER 6

Batch Analysis

Overview

This chapter provides a tutorial using the Connectivity Tools Clipboard feature to perform Batch Analysis against the existing connectivity requirement file sets.

The following tasks are performed and described in this tutorial:

- a connectivity requirement file set is created containing multiple connectivity requirements
- batch analysis is performed to analyze all existing connectivity requirement file sets
- the clipboard is populated with routers from the baseline
- batch analysis is performed to analyze the existing connectivity requirement file sets after failing selected routers in the Clipboard window.

Note The Connectivity Tools batch processing capabilities are useful for performing time and processor intensive analysis on large or complex networks. As the baseline network used in this tutorial is relatively simple, the Batch Analysis functions performed in this tutorial will complete quickly.

Tutorial

Step 1 From the Open Baseline window, select the *tutorial_baseline* entry. Click on the **OK** button to load the *tutorial_baseline* and to create the baseline scenario.

Refer to “Creating and Opening a Baseline” for information about creating and opening a baseline. In this tutorial, the baseline (*tutorial_baseline*) created in the first tutorial is used. Figure 6-1 shows the Connectivity Solver’s Connectivity Tools window after the

tutorial_baseline baseline was opened and loaded. By default, when a baseline is opened, an initial baseline scenario is created. It has the same name given to the baseline and is displayed and selected in the **Scenarios** list.

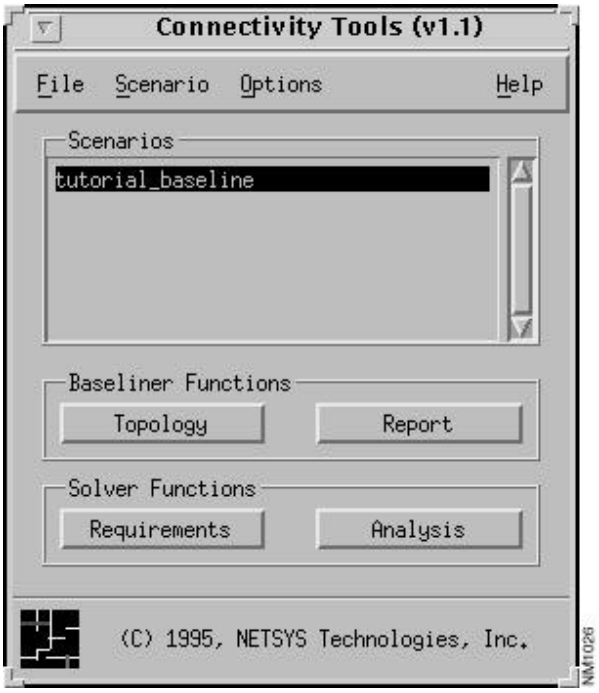

Figure 6-1 Connectivity Tools Window (Solver): Baseline Scenario Created

Step 2 Select the *tutorial_baseline* scenario entry in the Connectivity Tools window's **Scenarios** list, then click on the **Requirements** button.

The Requirement Sets window, shown in Figure 6-2, is displayed. This window is used to create, view, load, unload, delete, and undelete end system connectivity requirements.

Figure 6-2 Requirement Sets Window

A list of network connectivity requirement file sets, if any exist, containing the connectivity requirements for the *tutorial_baseline* baseline, is displayed in the **Requirement Files** list.

Requirement File entries preceded by an asterisk indicate connectivity requirements implicitly derived from the baseline's router configuration files. These connectivity requirement file sets can not be edited or deleted.

The implicitly derived **Routing Loops** requirement set is provided to find routing loops caused by IP redistribution. When you select the **Routing Loops** requirement set and then load it for analysis by clicking on the **Load** button followed by the **OK** button, a list of all the redistribution IP routing loops detected during analysis is displayed in the Requirements Analysis window. The results are a set of paths showing the identified routing loops. Each path displays a source address set to a port address of a router involved in the loop and a destination, which is a subnet or end point address, identifying the Routing Table destination involved in the routing loop. The path also shows a set of routers involved in a loop.

Step 3 Click on the **New** button.

The New Requirement Set window, shown in Figure 6-3, is displayed. The new set of protocol dependent (in this case IP) connectivity requirements to be created are saved to the connectivity requirements file set specified in this window.

Step 4 Specify `batch_test` in the **Name** field, then click on the **OK** button.

A name must be assigned to a new set of connectivity requirements. By default, IP is selected as the requirement type.

Figure 6-3 New Requirement Set Window

Upon clicking on the **OK** button, the Requirements window is displayed. No requirements are defined in the **batch_test** requirement set as yet, therefore the **Requirements** pane is empty.

The **batch_test** connectivity requirement set is populated with the requirements you specify in the subsequent steps. A connectivity requirement set can be used to test a network's redundancy (the extent to which multiple paths are available for network traffic.) The **batch_test** connectivity requirement set will contain a requirement to determine the paths available between three source and three destination end systems.

The **batch_test** connectivity requirement set will then be analyzed using the Connectivity Tools batch analysis feature and a report on connectivity in the current network configuration will be provided. Next, another batch analysis option will be invoked against the **batch_test** connectivity requirement set and a report on connectivity after several selected routers are set to a failed state will be provided.

Step 5 Click on the **Add** button in the Requirements window.

The Add IP Requirements window, shown in Figure 6-4, is displayed. New requirements in the **batch_test** connectivity requirements set are created using this window.

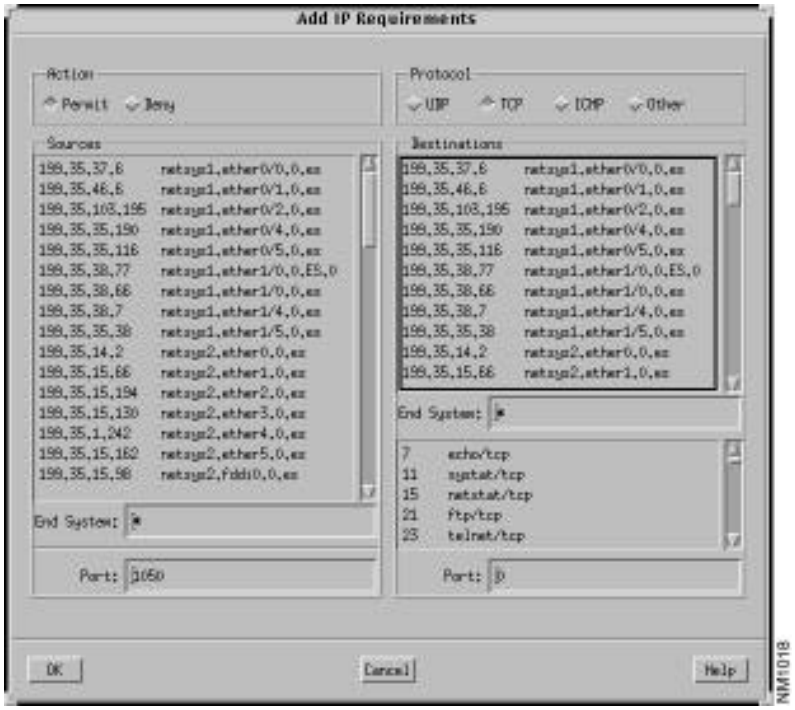

Figure 6-4 Add IP Requirements Window

Step 6 Select a range of addresses from the **Sources** list in one of the following manners:

- press the left mouse button over the **`132.108.52.2`** entry and drag the cursor over the **`132.108.76.7`** entry and release, or
- select the **`132.108.52.2`** entry and then press **Shift** and select the **`132.108.76.7`** entry.

The three source addresses are now selected, as shown in Figure 6-5.

Step 7 Select the **`132.108.43.7`** entry in the **Destinations** list. Next, while pressing **Control**, select the **`132.108.23.6`** entry and then the **`132.108.17.7`** entry from the **Destinations** list.

The three destination addresses are now selected, as shown in Figure 6-5.

Figure 6-5 Add IP Requirements Window: Source and Destination Ranges Selected

Step 8 Click on the **OK** button.

Notice the **Requirements** list, partially shown in Figure 6-6, contains nine IP connectivity requirements consisting of the ordered pairs from the three sources and three destinations.

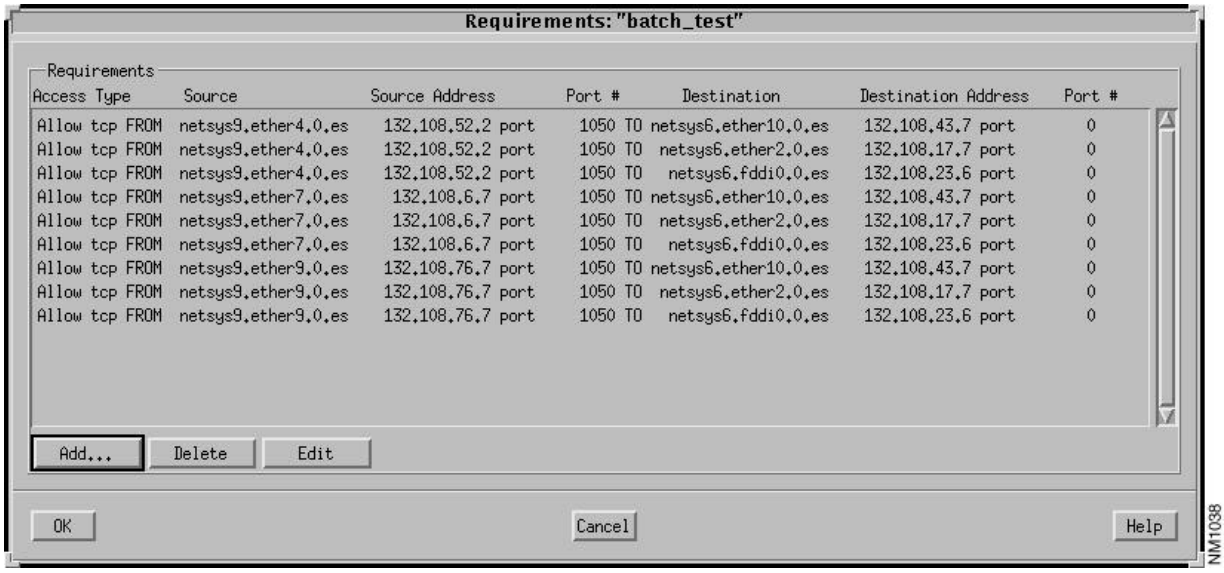

Figure 6-6 Requirements Window: Nine Requirements Created

Step 9 Click on the **OK** button in the Requirements window.

The **batch_test** connectivity requirements file set is now added to the **Requirement Files** list in the Requirement Sets window.

Step 10 Select the **Options>Show Clipboard** menu option in the Connectivity Tools window.

An empty Clipboard window, shown in Figure 6-7, is displayed.

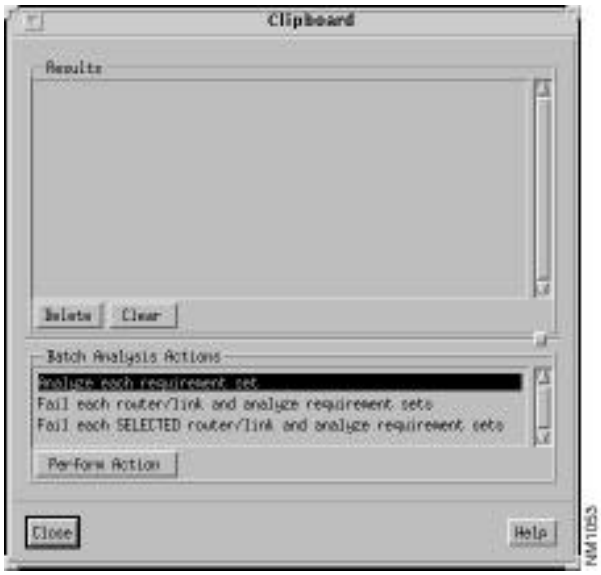

Figure 6-7 Empty Clipboard Window

Step 11 Select the **Analyze each requirement set** option then click on the **Perform Action** button.

The Batch Analysis window, shown in Figure 6-8, is displayed. Selecting this option causes each of the existing connectivity requirement file sets to be analyzed, one at a time. As each requirement set is analyzed, a message confirming the analysis being performed is displayed in this window and the results of the analysis is briefly displayed in the Requirements Analysis window.

Output from the analysis (exceptions only -- paths with status other than “OK”) is saved to the following text files:

- */tmp/batch_reqts.txt* when the **Analyze each requirement set** option is selected
- */tmp/batch_fail.txt* when the **“fail devices” batch analysis** options are selected.

Note You can interrupt the analysis operation being performed by clicking on the **Interrupt** button. The **Interrupt** button then becomes the **Restart** button which you can click on to restart the batch analysis operation you had previously interrupted. You can also abort the batch analysis operation by clicking on the **Abort** button.

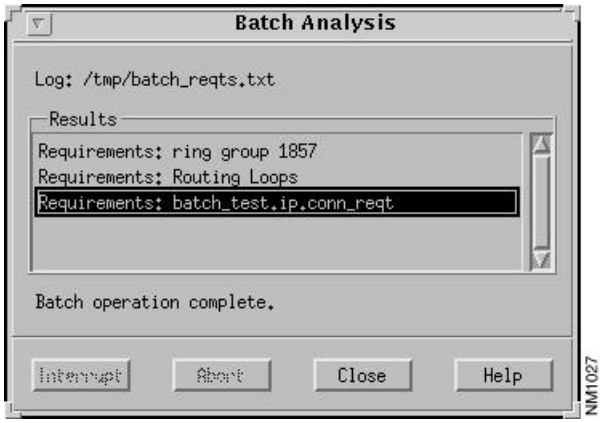

Figure 6-8 Batch Analysis Window: Status of Analysis Being Performed

The next steps demonstrate batch analysis of the same connectivity requirement sets, although in this case several routers are set to a failed state before the connectivity requirements are analyzed. In this manner, a network's redundancy is analyzed in the context of device failures.

Step 12 Select the **Scenario>Create New** menu option from the Connectivity Tools window.

Simulating a device failure cannot be performed on the baseline scenario. A new scenario must be created prior to this batch analysis process thereby allowing selected routers to be set to a failed state.

Step 13 Choose the **Options>Find Device** menu option from the Connectivity Tools window.

The Find Device window is used to populate the Clipboard window for the remaining batch analysis operations.

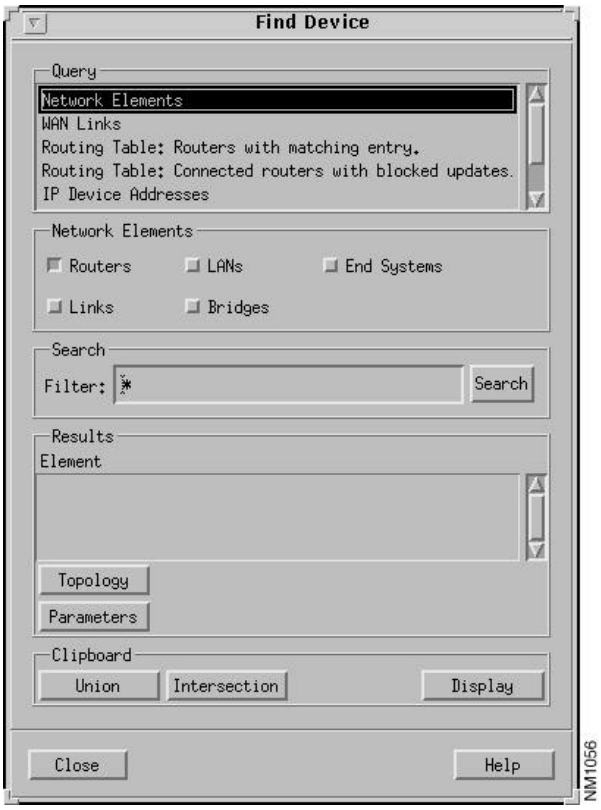

Figure 6-9 Find Device Window

Step 14 Confirm the **Network Elements** entry is selected in the Query pane and the **Routers** button is selected in the Network Elements pane.

Step 15 Specify **`netsys9*`** in the Search **Filter** field, then press **Return** or click on the **Search** button.

The results of the search (all routers whose names start with **netsys9**) are displayed in the `Results` pane, as shown in Figure 6-10.

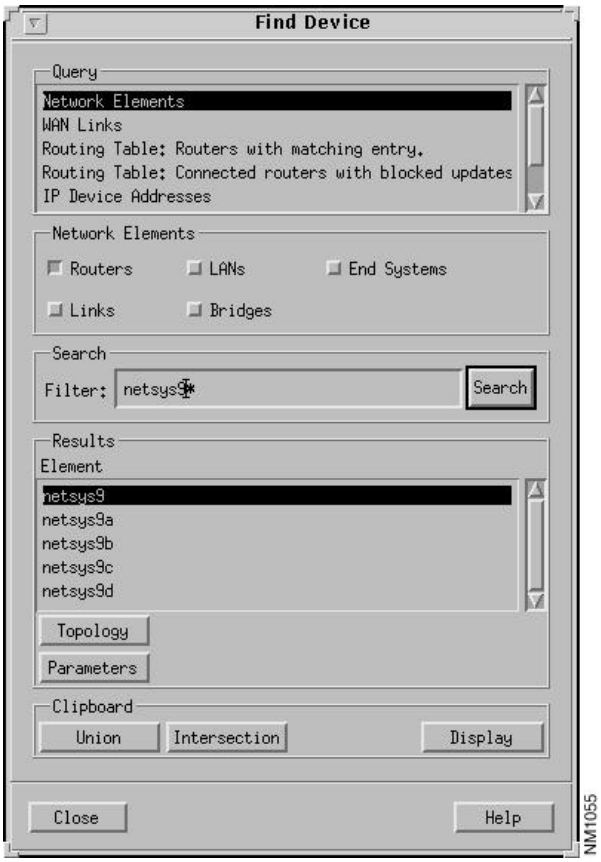

Figure 6-10 Find Device Window: netsys9* Search Results

Step 16 Click on the Clipboard **Display** button to open the Clipboard window, then click on the Clipboard **Union** button.

The routers listed in the Find Device window's **Results** list are merged with the set of routers in Clipboard window's **Results** list (which is empty at this time). If the Clipboard window's **Results** list had been populated with other routers, only the routers from the Find

Device window's **Results** list not already existing in the Clipboard window's **Results** list, are added to the Clipboard window. The Clipboard window, after the merging of the two **Results** lists, is shown in Figure 6-11.

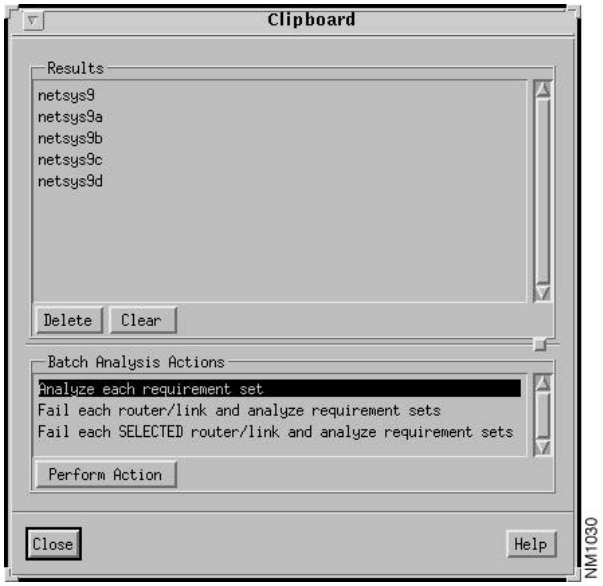

Figure 6-11 Clipboard Window: Populated From Find Device Results List

Step 17 Add the router **netsys6** to the Clipboard list by specifying **`netsys6`** in the Find Device window's Search field, pressing **Return**, then clicking on the Clipboard **Union** button.

The Clipboard window, shown in Figure 6-12, is displayed.

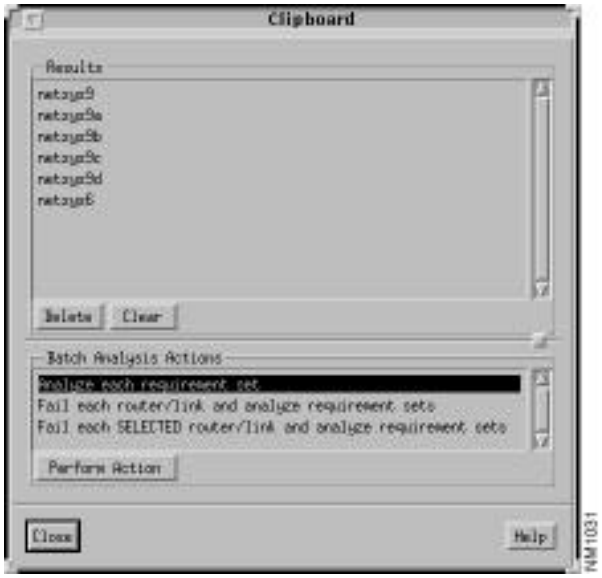

Figure 6-12 Clipboard Window: netsys6 Router Added to Results List

Step 18 Select the "**Fail each SELECTED router/link...**" batch analysis option, then select the **netsys6** and **netsys9** routers from the **Results** list as shown in Figure 6-13. (Use the **Control** key to make multiple selections.)

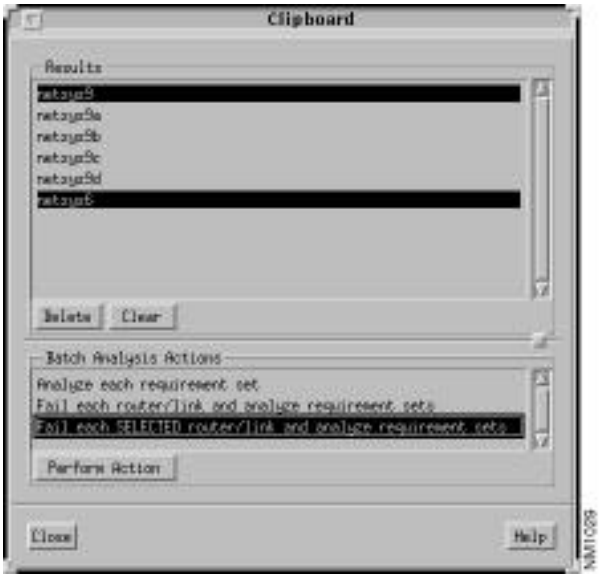

Figure 6-13 Clipboard: Fail Each Selected Device

Step 19 Click on the **Perform Action** button in the Clipboard window.

The first router selected (in this case **netsys9**) is set to a failed state and then analysis of each of the existing connectivity requirement file sets is performed. The results of the analysis is briefly displayed in the Requirements Analysis window. Upon completion, the next router (in this case **netsys6**) is set to a failed state and analysis of each of the existing connectivity requirement file sets is again performed. The process continues until all of the selected routers have been processed. The exception results (connectivity requirements in which a status other than "OK" is returned) of the analyses performed are saved as described earlier.

The third batch analysis option, "**Fail each router/link and analyze requirement sets**", can be used to perform the above analysis (setting each network element to a failed state in turn) for all of the network elements listed in the Clipboard window's **Results** list.