CHAPTER 1

Product Overview

The NETSYS Enterprise/Solver™ family of simulation-based network planning and problem-solving products consists of a set of tools called the Connectivity Tools. The Connectivity Tools assist network planners in their designing and planning efforts related to network connectivity, route, and flow problems. Using the Connectivity Tools to create a simulation environment, network planners can study the impact of such factors as failed devices and links, and preview the effects of various configuration changes before implementing them in their networks.

While other tools require a theoretical model of the network to be built that approximates a network's configuration, the Connectivity Tools are able to “learn” from the routing configuration files that define your actual network, assimilating information from Cisco® routers. This information is imported into the Connectivity Tools and represents the initial baseline or “snapshot”. The baseline is then used as the starting point for all subsequent off-line analysis.

The Connectivity Tools currently have two components; the Connectivity Baseliner and the Connectivity Solver. The Connectivity Baseliner is a pre-requisite of the Connectivity Solver. As such, the additional functionality of the Connectivity Solver is used in conjunction with the Connectivity Baseliner. The functionality provided is:

- Connectivity Baseliner
  - — Router Configuration File Loader
  - — Diagnostic Report Generator
  - — Topology Builder
- Connectivity Solver
  - — Connectivity Requirements Analyzer
  - — Scenario “what-if” Simulator
  - — Delta IOS command generation

Connectivity Baseliner

The Connectivity Baseliner is the core Connectivity Tools utility. It provides the following functionality:

- loads Cisco router configuration files and creates a baseline network model from them
- creates, opens, and saves baselines
- performs syntax and semantic checks on the router configuration files
- generates a diagnostic report as a result of the syntax and semantic checks

- creates a topology based on the router configuration files.

See Chapter 2, “Connectivity Baseliner,” in the *Enterprise/Solver Connectivity Tools Reference Guide* for detailed information about its features and components. Tutorials are provided in this document showing how to use its features to accomplish various tasks.

Router Configuration File Loader

User specified Cisco router configuration files are copied into a specified directory under Source Code Control System (SCCS) and then parsed by this process to create a baseline model of the network. The baseline model includes explicit defaults for metrics such as bandwidth and delay.

Diagnostic Report Generator

This process performs global semantic and syntactical checking on the router configuration files. As a result of the checks, a diagnostic report describing high priority and warning-level problems is generated. See Appendix B, “Baseline Integrity Checks,” and Appendix C, “Baseline Syntax and Policy Checking,” in the *Enterprise/Solver Connectivity Tools Reference Guide* for detailed descriptions about the integrity and syntax checks performed on the router configuration files.

This process also generates a diagnostic report providing information on high priority and warning-level types of network problems uncovered while performing the syntax and semantic checks. From within this process, router configuration files can be modified to fix the problems described in the diagnostic report. The modified router configuration files can then be used to create a new baseline model. The following list includes, but is not limited to, the types of network problems identified by this process:

- access list problems
- static route problems
- potential routing table update problems
- redundant addresses assigned to router interfaces

See Chapter 5, “Diagnostic Report,” in the *Enterprise/Solver Connectivity Tools Reference Guide* for detailed information about this process. “Creating a Diagnostic Report” in this document provides a tutorial showing how to create a diagnostic report and use it in conjunction with other features to accomplish various tasks.

Topology Builder

This process constructs a topology map of the network depicting the actual connectivity of the live network learned from the router configuration files. The topology allows all aspects of network connectivity to be visualized, including device names and addresses. The topology can be customized through editing capabilities. The topology also provides the ability to view router and end system parameter settings in the current network. See Chapter 4, “Creating the Topology,” in the *Enterprise/Solver Connectivity Tools Reference Guide* for information about creating the topology. “Creating a Topology”in this document provides a tutorial showing how to create a topology and use it in conjunction with other features to accomplish various tasks.

Connectivity Solver

The Connectivity Solver adds to the functionality provided by the Connectivity Baseliner by providing the ability to simulate and analyze "what-if" scenarios on the baseline network. The Solver can be used to assess how configuration changes will affect network routes, security, and "reachability". Implied and user defined network connectivity requirements can be analyzed to determine how configuration changes will impact their round trip paths and protocol dependent routing tables. Assessment of the potential impact of such problems as failed links or devices, protocol mismatches, or encapsulation errors, can be made. After making various configuration changes and reaching a desired configuration, the Solver facilitates implementation of these changes in the actual network by generating a delta IOS command file.

See Chapter 6, "Connectivity Solver," in the *Enterprise/Solver Connectivity Tools Reference Guide* for detailed information about its features and components. Tutorials are provided in this document showing how to use its features to accomplish various tasks.

Connectivity Analyzer

This feature provides the ability to analyze network requirements by:

- creating or modifying network connectivity requirements
- evaluating through analysis which requirements are met and which are violated
- visualizing paths for requirements
- trace towards misconfigured commands for violated requirements.

Scenario "what-if" Simulator

This feature provides the ability to perform "what-if" simulations by:

- modifying or adding additional router configuration commands to the current network
- modifying the status of a link, device, or router interface to operational or failed states
- providing a wide range of configuration changes that can be investigated such as:
  - changes to access lists
  - route filters
  - protocol configuration
  - interface configuration
  - redistribution between multiple routing protocols
- testing proposed configuration changes before implementation to ensure that the configuration changes will have the desired effect; can also test unplanned conditions such as failures, before they occur in your network

Delta Command Generation

After evaluating various configuration changes through "what-if" scenarios and reaching a desired configuration, the Solver facilitates implementation of these configuration changes by providing the ability to generate a delta IOS command file for each router affected. Each file contains IOS commands which represent the configuration changes you have made using the Solver. These delta files can then be appended to the current router configuration files in the actual network to update them as appropriate.