CHAPTER 1

Overview

WAE Design is standalone software that can run on multiple platforms, or on standard laptops, or desktops. It can be accessed in three ways: through a GUI, web browser (WAE Design Archive application only), and CLI. This guide describes how to use the WAE Design GUI.

> **Note** This guide references `$CARIDEN_HOME`, which is the directory in which the WAE Design, WAE Live, and WAE Collector executables and binaries are installed. On Linux, the default is `/opt/cariden/software/mate/current` where `/opt/cariden` is the default installation directory.

Applications

WAE Design enables you to model, simulate, and analyze failures, design changes, and impact of traffic growth, as well as optimize your network for maximum efficiency. For instance, with WAE Design models and tools, you can answer a wide variety of questions about traffic management.

Planning

- Where is traffic going in the network?
- When and where will my network run out of capacity?
- How do I convert my growth forecasts into upgrade plans?

Engineering

- How can I better distribute traffic throughout the network?
- How can I design for differentiated quality of service?
- Where is my network most vulnerable to failure, and how can I mitigate it?
- How will a Layer 1 design affect the resilience of Layer 3?

Operations

- How can I visualize the current health of the network?
- What caused the outage experienced earlier today?
- How would a current failure affect the network at peak time tomorrow?
- Which VPN customers will be affected by a planned outage or by an unplanned failure?

Additional WAE Design Use Cases

WAE Design can be used for creating models of networks, as well as for modifying existing network models. Other applications, such as WAE Live, use the WAE Design GUI for template layouts. WAE Live and WAE Design also integrate for producing forecasted models. Furthermore, you can use WAE Design to make modifications before saving a plan file back to the WAE Automation server or before deploying LSPs to the network.

For detailed information on visualizing layouts, accessing and saving remote plan files and templates, and on deploying LSPs, see the *WAE Network Visualization Guide*.

For detailed information on integrating WAE Live traffic reports for use in the WAE Design Forecasting tool, see the *WAE Design Integration and Development Guide*.

WAE Design Fundamentals

Initially, network topology and routing information is captured by WAE Collector discovery tools and stored in plan files within a series of tables. These plan files are the basis of information displayed in and used by WAE Design. Following is a high-level overview of what they contain.

- Network configurations
- Visual layouts
- IP/MPLS routes, including multicast and LSPs
- Measured traffic
- Estimated end-to-end traffic matrix
- Operational state of network objects
- Results of analyses, such as worst-case failure analysis results

This information is displayed in the GUI through tables and a network plot where you can both visualize and manipulate it further. For example, you can change the visual layouts, simulated traffic, configurations, and operational states.

WAE Design Tools

WAE Design contains numerous tools with user-friendly features, such as easy navigation of object dependencies, bulk editing, and tight interaction between plots and tables. Following is an overview of the categories under which these tools fall.

- **Visualization**—Provides graphical layouts of the network, showing views of different regions and layers, as well as utilizations and routings.

  Related chapters: User Interface, Plan Objects, Plot Legend for Design Layouts, Plan Files and Patch Files

  Related guide: *WAE Network Visualization Guide*

- **Simulation**—Enables you to perform interactive what-if simulations by, for example, failing objects, modifying network topology, creating and changing the traffic demands (which simulate traffic flows), and modifying routing configurations.

  - Demand Deduction—Estimates an end-to-end traffic flow matrix based on available measured traffic, such as interface utilizations and LSP traffic statistics.

- – Failures and Simulation Analysis—Allows evaluation of the effect of failures of network objects, including circuits, nodes, and Layer 1 equipment. You can evaluate overall risk using worst-case analyses over these failures.

- – Forecasting—Enables you to create plans for future expected traffic levels.

Related chapters: Traffic Demand Modeling, Simulation, Simulation Analysis, Forecasting Traffic, IGP Simulation, MPLS Simulation, RSVP-TE Simulation, Segment Routing Simulation, Quality of Service Simulation, BGP Simulation, Advanced Routing with External Endpoints, VPN Simulation, Multicast Simulation, Layer 1 Simulation, Plan Files and Patch Files, LSP Setup Bandwidth Optimization, Capacity Planning Optimization

- **Offline Traffic Engineering**—Enables you to optimize the network's reliability and performance.

  - – Metric Optimization—Suggests changes to the OSPF or IS-IS metrics that enable you to optimize the network, for example, by reducing congestion under circuit failures.

  - – LSP Optimization

    The Explicit LSP Optimization, Tactical Explicit LSP Optimization, and RSVP-TE Optimization tools optimize the placement of primary and secondary paths for RSVP-TE LSPs.

    The Segment Routing (SR) TE Optimization tool creates or updates segment lists to minimize the sum total of user-specified metrics for selected SR LSPs using the fewest number of segment list hops as possible.

    The SR TE Bandwidth Optimization tool reduces the traffic utilization to below a specified threshold while creating segment list hops to achieve this goal.

    The LSP Disjoint Path Optimization tool optimizes existing LSP paths to be disjoint.

    The LSP Loadshare Optimization tool optimizes LSP load balancing percentages between parallel LSPs.

  - – Changeover—Recommends a step-by-step series of configuration changes to maneuver a network safely from one configuration state to another.

Related chapters: Metric Optimization, RSVP-TE Optimization, Explicit and Tactical RSVP-TE LSP Optimization, SR-TE Optimization, SR-TE Bandwidth Optimization, LSP Disjoint Path Optimization, LSP Loadshare Optimization, Changeover, Plan Files and Patch Files

- **Other Tools**

  - – Reporting—Enables you to generate reports that compare IP/MPLS topology and configuration information, demand routings, demand groupings, and LSP routings. You can also generate reports that compare traffic, compare plan files, and estimate network infrastructure costs. Other reports, such as Simulation Analysis and Demand Deduction, are automatically generated.

    Related chapters: Reports, Cost Modeling

  - – Patch Files—Enables you to create patch files for deployment and apply patch files to plan files.

    Related chapters: Patch Files

  - – Importing, exporting, and getting plans—Multiple tools are available for importing traffic and objects, exporting routes, tables, explicit LSP settings, and lambda utilization, and for getting data from sources such as config files and IGP databases.

    Related guide: *WAE Design Integration and Development Guide*

Extensible Tools

The plan file format is open and documented. Add-on capabilities are available for extending GUI functionality. Additionally, command-line tool equivalents of the GUI tools are provided for scripting and automation. For information, see the *WAE Design Integration and Development Guide*.

Related Information

- *WAE Design Tutorials*
- *WAE Network Visualization Guide*
- *WAE Design Integration and Development Guide*
- Sample plan files—`$CARIDEN_HOME/samples`
- CLI tools—`$CARIDEN_HOME/bin`