



IT Guru Release Notes

Software Release 11.0

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OPNET IT Guru 11.0

Release Notes

These release notes give an overview of the differences between OPNET IT Guru Release 11.0 and the previous release. If you are upgrading from a previous release, you should review this document.

Because release notes are sometimes updated after the product documentation is distributed, visit the OPNET website (www.opnet.com/support) often to check for the newest version of these release notes and previous release notes.

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Release 11.0 Description

OPNET IT Guru 11.0 is a significant software update to the OPNET 10.5 software release. This release contains many new features and enhancements to existing capabilities. This release also implements suggestions and fixes many software problems reported in earlier releases.

System Requirements

Be sure to check the latest system requirements on the OPNET website:

www.opnet.com/support

Changes to Supported Platforms and Products

OPNET 11.0 is supported on the following platforms:

- Solaris—only Solaris 8 and Solaris 9 are supported. Solaris 7 is no longer supported.
- Windows—The supported Windows operating systems for the OPNET products remain as follows: Windows NT 4.0 Professional, Windows 2000 Professional, Windows 2000 Server, Windows 2003 Server, Windows 2003 Advanced Server, and Windows XP Professional.

Licensing Changes

Release 11.0 uses a new format for license files. Because of this, your existing license files need to be converted before the OPNET 11.0 license server can use them. After installing the 11.0 software, you must convert your license files by doing Procedure 11.0-1.

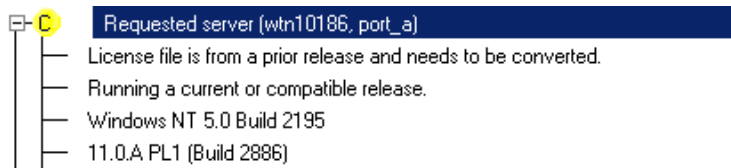
Note the following considerations:

- Until the license file is converted, the 11.0 license server will be unable to provide licenses to any 11.0 clients. (However, it can provide licenses to pre-11.0 clients.)
- After the license file is converted, 11.0 license servers will be able to serve licenses to both 11.0 and older license clients.

Procedure 11.0-1 Converting Pre-11.0 License Files

- 1 Start the 11.0 License Manager (as in Starting the License Manager on page AG-3-7).

- 2 In the License Manager tree view, select the server whose license file you want to convert. Servers with unconverted license files are marked by a yellow dot with a C, as shown in the following figure.



- 3 Click the Convert Pre-11.0 License File button and follow the on-screen prompts.

Note—More detailed instructions on how to convert a license file are posted at the OPNET Support Center (www.opnet.com/support); follow the License Registration link to the Instructions section.

End of Procedure 11.0-1

Loanable Licenses

The basic loanable license system built into the OPNET license server now supports loan authorization. Using a loan authorization file, license administrators can specify which licenses can be loaned by a server and which users are allowed to borrow them. For details, see Restricting Loanable Licenses on page AG-4-13 of the *Administrator Guide*.

PL3 Changes

The following sections describe changes to IT Guru that were introduced in release 11.0 PL3.

ACE Module Enhancements

User Interface Enhancements

Unified Window for Treeview, Data Exchange Charts, and Tier Pair Circle

The ACE graphical interface now uses a tabbed interface so that the Treeview, Data Exchange Chart, and Tier Pair Circle now appear in the same window (instead of appearing in separate windows, as in previous releases).

Embedded Protocol Decodes Viewer

You can now choose to embed the Protocol Decode Viewer in the ACE window (instead of showing the Viewer in a separate window, as in previous releases). Choose View > Embed Protocol Decode Viewer to turn this option on or off.

AppDoctor “Drill-Down” Windows

The AppDoctor Summary of Delays window now includes “drill-down” windows that enable you to view graphical analyses of specific types of delay (such as Protocol/Congestion). For more information, see AppDoctor Drill-Downs: Examining the Cause of Delay on page ACE-12-3.

Filtering Enhancements

Filtering Broadcast/Multicast Traffic

The Default filter used by ACE is now set to filter out broadcast and multicast traffic. In addition, the Capture File Filter dialog box now has a checkbox for filtering out broadcast/multicast traffic.

Multicast and broadcast traffic is filtered out when the Default packet filter is selected in the following situations:

- When you capture traffic using the ACE capture agents
- When you import capture files into ACE

Loading and Saving Filters

When you load or save a capture-file filter, ACE now shows all available filters in all model directories. This enables you to save and browse filters in different directories.

Capturing Traffic Using NetScout Probes

If you have NetScout probes installed on your local computer, you can use them as capture agents in an ACE capture operation. Capturing with Netscout probes can be useful in situations where capturing with ACE agents is impractical. Examples of these types of situations include:

- When you cannot install an agent on a specific machine due to administrative privileges
- Capturing at a high-speed connection, when you are concerned about capturing every packet
- Capturing in a switched network that uses Spanning Tree Protocol

For more information, see Capturing Traffic Using NetScout Probes on page ACE-4-31 of the ACE *User Guide*.

3DNV Module Enhancements

IT Guru 11.0 PL3 includes a new version of the 3DNV module. This version, 3DNV 1.5.0, includes a number of enhancements to the 3D Network Visualizer and 3D Logger programs.

Because of a change in the format of decoration and layer information that is sent from IT Guru to 3DNL, you should be aware of the following compatibility issues:

- 3DNL 1.5.0 cannot be used with IT Guru 11.0 PL1.
- IT Guru 11.0 PL3 cannot be used with 3DNL 1.1.0.

Also, the 3D Logger file format has been changed. This new format is more compact, resulting in smaller log files and faster communications with 3D Logger. 3D Logger 1.5.0 can still read log files created by earlier versions; however, any messages related to decorations and layers will not be processed by 3D Network Visualizer 1.5.0.

3D Network Visualizer

Joystick Support

3D Network Visualizer now supports game controllers such as joysticks, game pads, and spaceballs.

Support for Loading Multiple Database Types

3D Network Visualizer can load and display terrain databases in GDB, CTDB, and DTED formats. It can also load files using the MÄK .map format.

Range Volumes

Range volumes are translucent volumes that identify the area within which an entity's armaments are effective. It is configured in 3D Network Visualizer and does not rely on information coming in over the network.

New and Update Configuration Parameters

3D Network Visualizer has many new parameters to support the new features. See the *Animation Viewers Reference Manual* for details. The `PreloadModels` parameter is now off (0) by default. This means that models will be loaded dynamically. 3D Network Visualizer might freeze while loading a large model. You can configure 3D Network Visualizer to load all models at startup by changing this parameter in `params.mtl`.

3D Logger

Faster Timeskip During Playback

3D Logger now supports indexing of Logger files. The new indexing features support faster skipping during playback, particularly for large Logger files. When you record a simulation with indexing enabled, 3D Logger periodically saves checkpoints with the complete state of the simulation. When you skip forward through the recording, 3D Logger moves to the nearest checkpoint prior to the requested skip time, then fast forwards through the recording to the requested time. This process is transparent to 3D Logger users; however, you must enable indexing for it to work.

If you do not enable indexing, recordings are made identically to those in previous versions of 3D Logger. These recordings, as well as those made with previous versions of 3D Logger, cannot take advantage of the faster timeskip feature.

New File Format The 3D Logger file format has been changed to support indexing. 3D Logger 1.5.0 can play recordings made with previous versions of 3D Logger. However, previous versions cannot play indexed recordings made with 3D Logger 1.5.0.

Converting Non-Indexed Recordings to Indexed Recordings If you load a 3D Logger recording that is not indexed, 3D Logger gives you the option of automatically converting it to indexed format.

New Configuration Parameters To support the new indexing features, 3D Logger has the following new configuration parameters:

- enableIndexing – enables or disables indexing.
- checkpointFreq – specifies how often, in packets, to checkpoint the recording.
- autoCheckpoint – specifies whether or not to automatically convert non-indexed recordings to indexed format. Default: 0 (do not convert).

New Configuration Options in the Configuration Dialog Box The Configuration dialog box now has options to enable and disable indexing and to set the checkpoint frequency.

NetDoctor Enhancements

NetDoctor Concise Web Pages

NetDoctor web reports now include options for specifying the concise or detailed version of a rule's output. To view a different version of the rule, select the Concise or Detail button in the navigation frame or content frame. Clicking the button in the content frame results in subsequent rule selections displaying in the chosen manner. Clicking the button in the content frame results in the selected view for that particular rule.

NetDoctor Rules

Rule Library

The following rule suites have been significantly enhanced over previous releases:

- NAT
- Organizational Policies

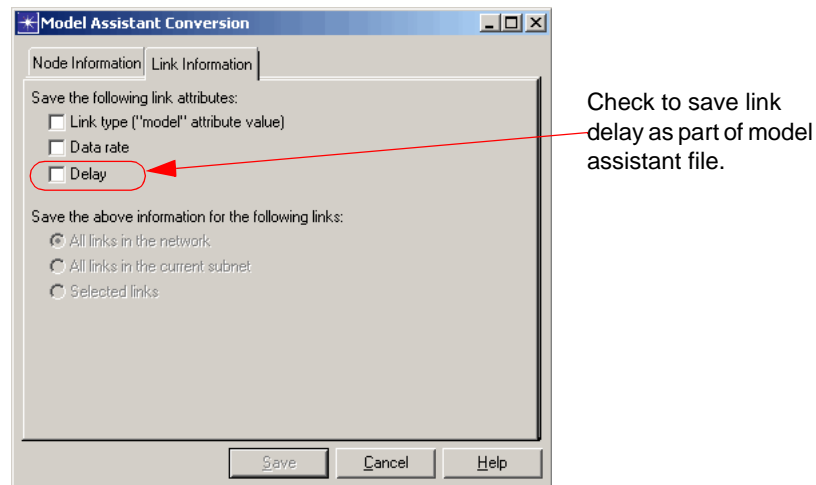
Rule Development

If you create or edit a summary rule that uses groups, you can select the Filter on Selected Objects checkbox. If this box is selected, NetDoctor calls the filter handler only if the Report on selected objects checkbox is selected on the Settings tab of the Configure/Run NetDoctor dialog box.

Model Assistant File Changes

You can now save link delay as part of a model assistant file. Select Topology > Model Assistant > Save Current Topology to File. Observe the new Delay checkbox on the Link Information tab, shown in Figure 11.0-1.

Figure 11.0-1 Saving Link Delay in Model Assistant File



Flow Analysis Enhancements

Protocol Support

The 30-speaker limit on BGP with flow analysis has been changed to apply only to iBGP speakers. This change makes it possible to have an unlimited number of eBGP speakers.

Terrain Modeling Model Enhancement

Pathloss Cache Granularity

TMM now lets you adjust the granularity with which path loss calculations are cached during a simulation. This lets you take advantage of higher-resolution terrain data (by matching the granularity to the resolution of the terrain data being used) at the expense of using more memory. See TMM Cache on page TMM-2-5 of the *TMM User Guide* for details.

Discrete Event Simulation

Memory-Related Preferences

The following preferences have been added:

- `memstat_autogen` — specifies how often a simulation will generate memory statistics.
- `memtag_all` — specifies whether the simulation should tag memory allocations for memory source tracing.
- `memtag_list` — specifies a list of memory categories for which the simulation should tag memory allocations for memory source tracing.

PL0 and PL1 Changes

The following sections describe changes to IT Guru that were introduced in release 11.0 PL0 and PL1.

New Module: 3D Network Visualization

The 3D Network Visualizer (3DNV) module enables you to visualize your network model in a three-dimensional environment. The 3D Network Visualizer provides a view of objects and their wireless and wireline communications in the context of their changing positions in the 3D environment. You can generate 3D animations from the Project Editor or from a discrete event simulation. When you view communication effects in the three-dimensional context of terrain, 3D visualization lets you see the big picture of your mobile network.

For more information, see the Chapter 4 Introduction to 3DNV on page AV-4-1 of the *Animation Viewers Reference Manual*.

New Module: 3D Logger

The 3D Logger is an add-on module that enables you to record and play back 3DNV animations. The 3D Logger module includes the following:

- 3D Logger, a data-recorder/player that you can control through a VCR-style graphical user interface, a text interface, a remote control interface, or programmatically.
- A set of 3D Logger tools that let you combine, modify, and inspect recorded Logger files. You can merge the activity from several exercises into a single Logger file, extract a portion of a recording to a new file, and perform other file operations.
- A User's Guide and online help

For more information, see Chapter 19 Introduction to the OPNET 3D Logger on page AV-19-1 of the *Animation Viewers Reference Manual*.

ACE Whiteboard

The ACE Whiteboard enables you to edit ACE task files and to create application models from scratch. You can use the resulting application models to do predictive studies using discrete event simulations or QuickPredict. The ACE Whiteboard includes the following features:

- A graphical interface for viewing and editing applications. The ACE Whiteboard has a user interface similar to ACE, with tabbed pages that show a Data Exchange Chart, a Tier Pair Circle, and a Treeview.
- Support for Python scripting to describe application characteristics and behaviors in detail.
- A wizard to guide you through the process of creating a new application.
- A spreadsheet-like interface for editing application messages in detail.

For more information, see Chapter 18 ACE Whiteboard—Overview on page ACE-18-1 of the *ACE User Guide*.

Early users of the ACE Whiteboard scripting API should note the following changes in PL1:

- The Application Base method *invoke_child_task()* has two new (optional) arguments: *task_completion_function* and *task_completion_data*.
- The Application Base method *get_nodes_by_tier()* has been renamed to *get_nodes_compatible_with_tier()*.
- The Application Base method *goto_message()* has been renamed to *goto_action()*.
- The Application Base method *op_dist_uniform()* has been renamed to *dist_uniform()*.
- A new method has been added to the Application Base class: *set_final_response()*.
- The Message class has a new boolean property called *take_over_children*. This attribute is generally used to define the dependency relationship between the last message generated by a script and the first message after the script. For more information, see *<message>.take_over_children Attribute* on page ACE-20-48 of the *ACE User Guide*.

ACE Module Enhancements

Capture Agent Security Enhancements

ACE now supports encryption for authentication to, and communication between, the ACE Capture Manager and capture agents. Anonymous (level 1) encryption is used by default. You can also specify Certificate Authentication (level 2) encryption, which requires that the Capture Manager and the capture agents have a signed certificate from a trusted party within your organization.

Note—This feature requires updated versions of the ACE capture agents. You can download capture agent installers and instructions for all available platforms from the *Support Center* section of the OPNET website.

For more information, see Capture Encryption on page ACE-4-2 of the *ACE User Guide*.

Capture File Import Improvements

ACE can now merge capture files where clock skew is present (that is, when one clock runs at a different rate from a clock on another machine). Without required input from you, the ACE import engine detects and resolves clock skew automatically.

ACE can also import capture files with asymmetric bandwidth (for example, files captured in ADSL environments).

You can now select multiple files when you choose capture files in the ACE Import Wizard.

ACE Graph/Statistic Enhancements

Importing HP GlancePlus Server Data

You can import HP GlancePlus data from text files and graph these statistics in the Data Exchange Chart. The workflow for importing GlancePlus data is similar to that for importing Perfmon data.

For more information, see Creating GlancePlus Statistic Files on page ACE-11-10 of the *ACE User Guide*.

Importing Performance Data from OPNET Panorama

You can collect statistics directly from OPNET Panorama as part of the traffic-capture process. In Panorama, a *correlation view* specifies a customized set of statistics for which you want to display data. When a capture operation finishes, the ACE Capture Manager can retrieve data from Panorama based on the capture time window and a correlation view.

For more information, see Collecting Performance Data from OPNET Panorama on page ACE-4-32 of the *ACE User Guide*.

“Packet Delay” Statistic

The Graph Statistics window (Graph > Graph Statistics) now includes a “Packet Delay” statistic that shows per-packet latency between two tiers. This statistic is only available if the ACE file was generated from multiple capture files.

Reporting Enhancements

Sending Reports to Report Server

ACE can now forward the following types of reports to the OPNET Report Server:

- ACE Web reports
- ACE MS Word reports
- ACE Multiple Transaction MS Word reports

Miscellaneous Enhancements

The Protocol Decode Viewer window is now split into two panes: one pane for packets and one pane for decodes. This makes it easier to examine the same protocol in different packets.

You can now save your statistic settings in the ACE Treeview window; this means that you can look at the same set of statistics consistently. The right pane of the treeview also shows tick marks for individual packets.

ACE Decode Module (ADM) Enhancements

Updated Decode Engine

The decode engine has been updated to the latest Network General release, with improved decodes and support for additional protocols.

CORBA Tabbed Page in AppDoctor

If an ACE file contains CORBA traffic, the AppDoctor window includes a CORBA tabbed page with summary and statistic information. There are multiple summary tables available on this page, so you can view the top CORBA operations based on a specific threshold (such as frequency or response time).

For more information, see CORBA Transaction Analysis on page ACE-13-11 of the *ACE User Guide*.

Web Services Decodes and Transaction Analysis

You can view AppDoctor statistics and transaction information for .Net, SOAP, and UDDI traffic. You can see SOAP-specific information in the ACE Treeview window, in AppDoctor, and in the Protocol Decodes Viewer.

For more information, see *Web Services and Transaction Analysis* on page ACE-13-12 of the *ACE User Guide*.

ACE QuickView Enhancements

Quickview now includes a graph that shows the network throughput recorded in the capture file. This makes it easier to filter traffic and see what you have captured.

Automation Module Enhancements

Username/Password Support for Automated Logins

In this release, you can specify username and password information for an automation task. The Automation module uses this information to log on to the host computer. This information might be required if the automation task needs to access advanced system resources such as mapped network drives.

Note—This feature is available on Windows systems only.

Scenario Web Reports

An automation task can now generate scenario web reports using the Scenarios > Generate Scenario Web Report menu operation. A scenario web report enables anyone with a web browser to see all subnetworks, objects, and attributes in a scenario.

Network Time Enhancements

In previous releases, most types of time-varying data were specified using relative times. For example, a traffic profile might specify traffic levels at 15 seconds, 30 seconds, 45 seconds, and so on. Relative times are offsets from time 0 (that is, the start of the discrete event simulation or flow analysis).

In this release, many types of time-varying data are specified using calendar times instead of relative times. A *calendar time* is an absolute date/time value—for example, “13:27:42.000 May 31 2004”.

This change affects how Guru represents and interprets time-varying data such as traffic levels, link loads, statistic graphs, and the locations of mobile nodes. This enhancement has the following effects:

- A scenario can have a *network start time*, which anchors the simulation start to a calendar time. For example, if the network start time is 12am on May 1, 2004, and the simulation time is one hour, the simulation models the network from 12am to 1am on May 1, 2004. (Previously, the simulation time window was 0 to `<simulation_duration_in_seconds>`.)
- If a scenario has no data based on calendar times, the network start time is 0 (undefined) by default. The first time you introduce calendar times into a scenario—for example, by importing traffic—Guru sets the network start time to the earliest imported time.
- When you import traffic flows or link loads with calendar times, Guru preserves the calendar times. Previously, Guru discarded the calendar times: the import engine aligned the earliest imported time with simulation time 0 and calculated relative offsets for later times.
- Discrete event simulations and Flow Analysis ignore all time-varying data outside the simulation time window. For example, if the scenario has traffic from June to July, and the network start time is in August, Guru ignores this traffic.
- If the network start time is defined, Guru converts all relative times to calendar times using the start time. Simulation results also have calendar times.
- Guru includes a Time Controller window so you can see the changes in time-varying results from discrete event simulations and Flow Analysis runs. You can also use the Time Controller to change the network start time manually. For more information, see Time Controller on page RN-11.0-17.

Time Controller

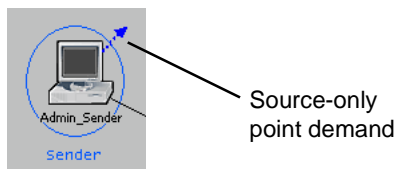
The Time Controller (View > Time Controller) is useful when you want to see how network data changes over time. Examples of time-varying data include:

- A profile attribute that specifies how a value (such as link utilization or traffic levels) changes over time
- An analysis panel that shows a time-varying statistic
- Visualization of link load data from link attributes, discrete event simulations, or Flow Analysis runs
- The movement of mobile nodes along their trajectories in a wireless network

For more information, see Time Controller on page ITU-7-23of the *Guru User Guide*.

Point Demands

Guru now supports point demands. A point demand is a demand with a source or a destination, but not both. Point demands are useful for modeling demands with multiple endpoints, such as multicast traffic.



Traffic Import Enhancements

OptiView Console Traffic Flow Imports

You can now import traffic flows from OptiView Console by Fluke Networks, Inc. You can generate traffic files from OptiView Console and import the files directly into Guru. For more information, see [Creating OptiView Console Traffic Files](#) on page MVI-3-5.

Note—To import traffic flows from OptiView Console, you must have an MVI module license.

Link Load Import Enhancements

Direct Communication Between Guru and External Programs

In this release, Guru can use telnet and ftp to generate and retrieve data from external systems automatically. This capability has the following benefits:

- For Concord imports, Guru can use telnet commands to extract and download link-load data. This eliminates the need to interact with the external system manually.
- For all link load imports from external systems, Guru can retrieve data from remote computers using ftp. This eliminates the need to transfer data to the Guru computer yourself before an import.

User Interface Enhancements

The Import Device/Link Loads dialog box has the following enhancements:

- You can use the Add Server operation to specify a remote host and the information that Guru needs to retrieve data from the host.

- The Concord import operations have default telnet commands for generating data. However, you can specify your own telnet commands to generate data during an import.
- This dialog box has a Summary tabbed page that shows the number of selected files, time window, sampling interval, and the approximate memory required for the import operation.

Link Load Imports from HPOV Performance Insight

Guru can now import link loads from HP OpenView Performance Insight. For more information, see Performance Insight Link Loads: Preparing for an Import on page MVI-4-8 of the Multi-Vendor Import *User Guide*.

Note—To import link loads from Performance Insight, you must have an MVI module license.

Topology Import Enhancements

XML Export/Import Support for Extended Attributes

The XML topology import/export operations now support extended attributes. In previous releases, this information was not included in the XML export/import files. However, IT Guru cannot export or import the following types of extended attributes:

- Compound extended attributes
- Extended attributes with property restrictions

Device Configuration Import (DCI) Enhancements

New Protocol Support

- Aggregate Interface support (such as EtherChannel)
- MPLS (LDP-based VPLS, Layer-2 VPNs, bypass tunnels, Diffserv-aware TE)
- IP Multicast
- Voice over IP (not supported on Cisco multi-layer switches)

Security and System Management Configuration on Switches

Both security and system management commands are now supported for CatOS on Cisco Catalyst Layer-2 switches. Included are

- AAA—Authentication, Authorization and Accounting
- TACACS+
- Kerberos

- RADIUS
- SNMP
- Logging

Concise Import Summary

After device configuration import, a concise import summary report is now displayed. This report is an abbreviated form of the detailed report, listing one-line summaries of significant import information. More specific details are available via tooltips or the View Details button, which brings up a more detailed summary, similar to the summary available in release 10.5.

Figure 11.0-2 Concise Import Summary

Device Information	
Number of Devices Successfully Imported	33
Number of Files Skipped	0
Skipped Information	
ISIS configuration skipped	4 devices
MPLS configuration skipped	4 devices
Missing Information	
Missing CDP information	1 device
Missing data rate information	4 interfaces
Missing VLAN information	5 devices

Aggregate Interface Support

In this release of IT Guru, DCI recognizes and imports aggregate interface configuration. The link configuration of an interface is inferred by way of the aggregate interface of which it is part. Support is provided for

- EtherChannel
- Link Aggregation Control Protocol (LACP)
- Multilink PPP

Static PVC Mapping

IT Guru now reads static PVC mapping from both Frame Relay and ATM device configuration files. In previous releases, you had the option to create a full-mesh of PVCs or none at all. The imported topology will now correctly show static PVC mapping, when configured. Enhancements in show command support for device configuration import include the following:

- Import Device Configuration Dialog—The PVC creation checkbox for device configuration import has changed. You can now specify import to Create PVCs or leave the box unselected. If the box is selected, DCI will parse PVC contract parameters from show commands in imported configurations.
- Frame Relay—Traffic contract parameters are set for PVCs with a static mapping. Information from *show frame-relay map* command is read and used to create a map of the actual PVC configuration in the topology.
- ATM—Static mapping of ATM PVCs is read from the *show atm map* command. Traffic contract parameters are set based on the static PVC configuration in the device.

Layer-3 Import

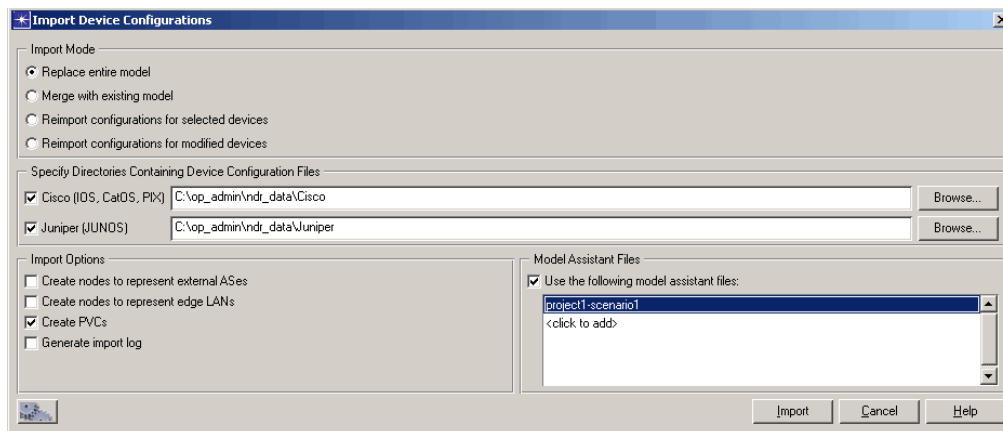
You can now configure DCI to import Layer-3 devices only. By setting the preference `device_import.layer3_only_import` to TRUE in `$HOME/op_admin/env_db11.0`, you restrict the import to include the following devices:

- Routers/Layer-3 modules (IOS/JUNOS)
- Router-Switches (Hybrid OS/Native IOS)
- PIX Firewalls

Layer-2 devices (i.e., CatOS switches and IOS switches) will be disregarded during import when this preference is enabled. Connectivity for router-switches is inferred from the VLAN interfaces rather than from CDP information during import. This preference is disabled by default.

Model Assistant File Usage

A new checkbox was added that allows you to specify whether or not you want DCI to consider Import Assistant files during import. If the box for “Use the following model assistant files” is deselected, DCI will not consider any model assistant files specified in the area provided. If this box is selected (default), DCI will consider the model assistant files that you specified.

Figure 11.0-3 Using Model Assistant Files

VNE Server Import Enhancements

New Protocols

Support for import of the following protocols was added:

- Voice over IP
- IP multicast
- Aggregate interfaces (EtherChannel, Multilink PPP, and LACP)
- Legacy protocols (IPX, RSRB, DLSw+)
- ATM-Frame Relay PVC mapping
- Security parameters on Layer-2 switches
- System management commands on Layer-2 switches

New Devices

Support for the following device types was added:

- Juniper ERX
- Checkpoint Firewall-1

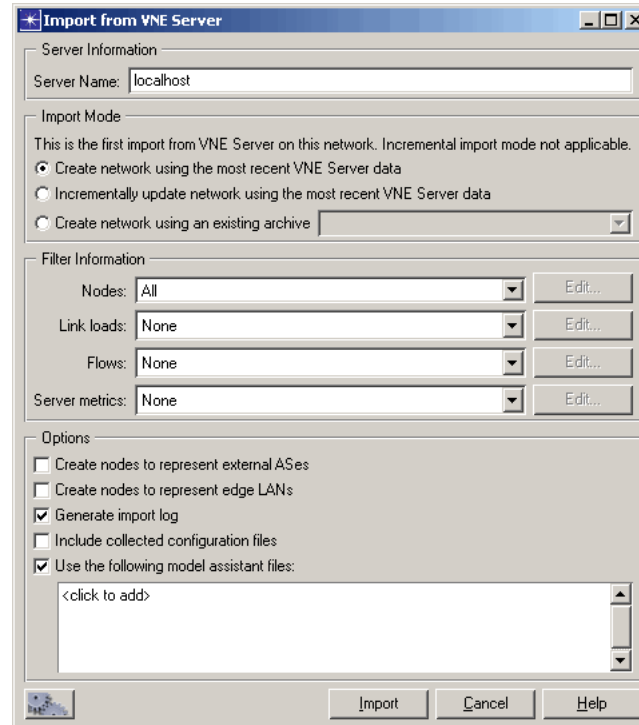
WARNING—Juniper ERX devices are not supported for incremental import.

User Interface Enhancements

Significant enhancements to the user interface for VNE Server import are introduced in this release, including:

- the ability to specify a VNE Server hostname instead of an .ior file.
- the ability to specify an import mode, including incremental import.

- the ability to selectively filter and import server metric data.
- the ability to include or not include model assistant files during import.

Figure 11.0-4 Import from VNE Server Dialog Box

Incremental Import

Import from VNE Server now includes support for incremental import. This option allows you to import just the changes in your network devices since the last import, rather than reimporting the entire topology. To determine changes, the import tool examines the timestamp of the last VNE Server import in the IT Guru project and imports any changes that have occurred in VNE Server since then.

Note—An incremental import will not take into account changes you make to the network model once it is imported from VNE Server. It is important to save a copy of your the topology immediately after an import from VNE Server and to use that as your baseline for the next incremental import.

Import Summary

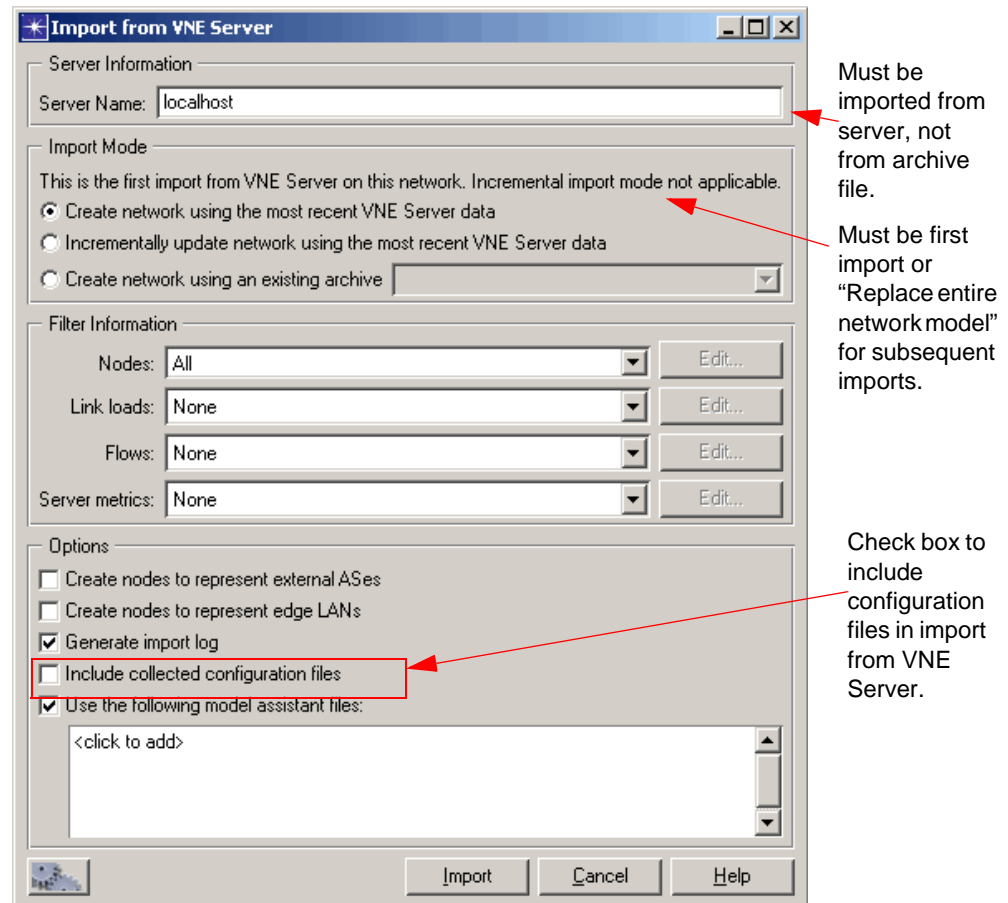
When an import from VNE Server is complete, an import summary report now displays. The report contains information about the import including timestamp, duration of process, and information about devices that were imported.

Import Device Configuration Source Files

You can now import the device configuration files that are collected by VNE Server when you import your network model from VNE Server. This feature allows you to view the configuration files for a node within the project in Guru. You can also run NetDoctor using rules that analyze the actual configuration files.

You may only import the device configuration files with a fresh import (full or filtered) from VNE Server. It does not work with import from archive file or with incremental imports.

Figure 11.0-5 Include Collected Configuration Files



The files that are sent from VNE Server when the “include collected configuration files” option is selected are config files, “show version”, and “show vlan” data imported into VNE Server using the Device Configuration File Import, Device Version Import, and Device VLAN Database Import adapters, respectively. These files are typically provided by Device Configuration File Collection adapter but can also be copied via the Remote File Collection adapter as is the case with some users.)

Note—With VNE Server version 3.0.1 build 783, Ciscoworks Configuration File Import can also be a source for configuration files, however you **MUST** have updated model libraries for this feature to work.

Custom Attributes

You may have custom attributes configured in VNE Server. When these exist, they will be mapped as extended attributes during import from VNE Server. The attributes are available for viewing and editing through the Extended Attributes button on the Edit Attributes dialog box.

Link Utilizations

Link Load Visualizations

In previous versions of IT Guru, you could view link-load visualizations using different operations, depending on the source of the link-load data:

- View > Visualize Link Baseline Loads (link object attributes)
- DES > Color Links by Utilization (discrete event simulation results)
- Flow Analysis > Color Links by Utilization (Flow Analysis results)

These different operations have been combined into one set of operations on the View > Visualize Link Loads submenu. You can set visualization settings (line thickness and color) for all data sources in one dialog box. You can also animate through link visualizations using the Time Controller (described in Time Controller on page RN-11.0-17).

For more information, see Visualizing Link Loads on page ITU-7-28 of the *Guru User Guide*.

Link Peak Usage Reports

Link peak usage reports let you view utilization and throughput information for a link. Link peak usage reports show you the highest utilization attained on the link during a flow analysis or discrete event simulation. These reports consider the traffic from traffic flows, link loads, and PVCs. Application and other types of explicit traffic are not considered.

New Module: Design Module

The Design Module enables you to configure and run network design actions. Design actions provide a very flexible way to make automated changes to your network.

The OPNET Model Library includes a set of standard design actions. Each design action combines internal design logic with a set of configurable attributes. You can configure a design action in the same way that you configure other types of objects.

For more information, see the Design Module User Guide.

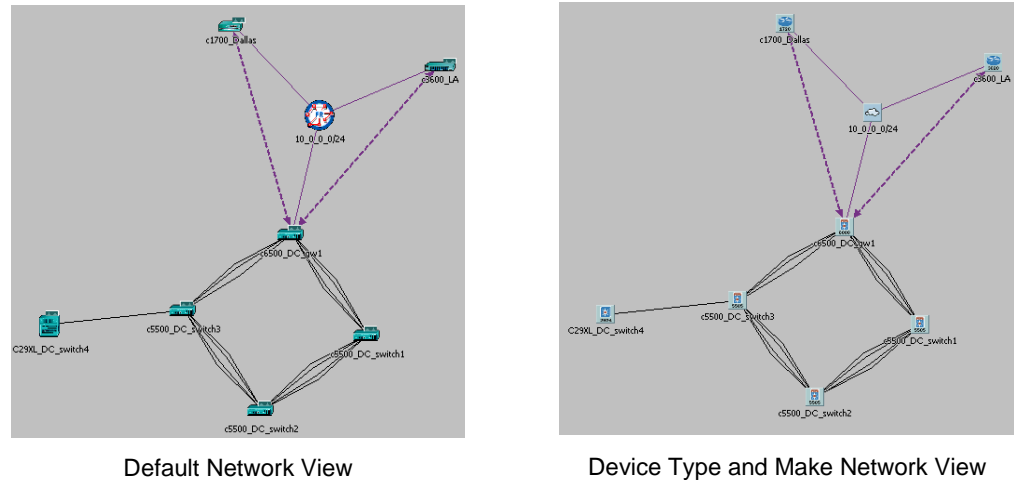
Live Report Tables

You can now view object attributes across many selected objects using a Live Report Table (Scenarios > User-Defined Reports > Open Live Report Table). A Live Report Table uses an attribute template to show the settings of related attributes on selected objects; the table also updates its contents when you change the attributes shown or select different objects.

For more information, see User-Defined Reports on page ITU-15-13 of the *Guru User Guide*.

Device Type and Make Network Views

This release includes a new network view that lets you replace the standard OPNET icons with generic icons that indicate the type and make of the device. For example, with this view applied, all routers share the same icon. The only difference from one router to the next would be the model information, which is also shown. This view is available from the View > Set View for Subnet/Network > Device Type and Make menu option.

Figure 11.0-6 Effect of Device Type and Make Network View

For more information, see *User-Defined Reports* on page ITU-15-13 of the *Guru User Guide*.

Random Mobility Trajectories

You can now create trajectories based on the movements generated by a random mobility. A new attribute of random mobility profiles lets you turn trajectory creation on and off. When this feature is turned on, a trajectory will be created during the next simulation. You can then assign the trajectory to a node and reuse it in subsequent simulations.

For more information, see *Creating Random Trajectories* on page WM-2-24 of the *Wireless Module User Guide*.

Editing Attributes on Multiple Objects

You can now edit attributes on multiple objects in one window, using an attribute table similar to a User Defined Report. You can create your own attribute templates that specify the related attributes you want to edit. The Edit menu includes the following new menu items:

- **Edit > Edit Attribute Template**—Create and edit an attribute template; this template defines the object types and attributes that you can edit, as well as the attributes you can view in a user-defined report. This operation has the same functionality as the **Scenarios > User-Defined Reports > Define Report** operation in previous releases; for this reason, the latter menu item has been removed.
- **Edit > Edit Objects Using Template**—Select the attribute template you want to open, then view and edit the relevant attributes.

For more information, see Using the Attribute Template Method on page ITU-9-9 of the Guru *User Guide*.

Reporting Enhancements

User-Defined Report Changes

The new functionality for editing attributes on multiple objects has changed the workflow for defining user-defined reports. In previous releases, the menu operation to define a report was Scenarios > User-Defined Reports > Define Report. In this release, the menu operation is Edit > Edit Attribute Template.

Improved Network Difference Reports

Network Difference Reports are improved in this release. The web report now has an updated look and includes a navigation bar on the left. Report results appear as clickable objects in the body of the report, similar to other OPNET web reports.

Moving Nodes or Subnets to a New Parent Subnet

This release includes four new ways to move nodes or subnets from one parent subnet to another:

- Drag and drop from the Network Browser treeview—Select one or more nodes in the treeview; then drag the selection to a subnet icon in the treeview or the workspace.
- Shift-drag and drop within the Project Editor workspace—Select one or more nodes; then hold down the Shift key and drag the selection over a subnet icon.
- “Move Selected Nodes into Subnet” menu option—Select one or more nodes; then right-click on the destination subnet and choose Move Selected Nodes into Subnet.
- “Move Selected Nodes to Parent Subnet” menu option—Select one or more nodes; then right-click in the background (not on the selected objects) and choose Move Selected Nodes to Parent Subnet.

All four operations move the selected nodes to the new subnet and retain all attached links, paths, and demands. If the positions of the relocated nodes do not fall within the target subnet's bounds, Guru refreshes the subnet layout to determine the new positions of the nodes.

Bird's-Eye View

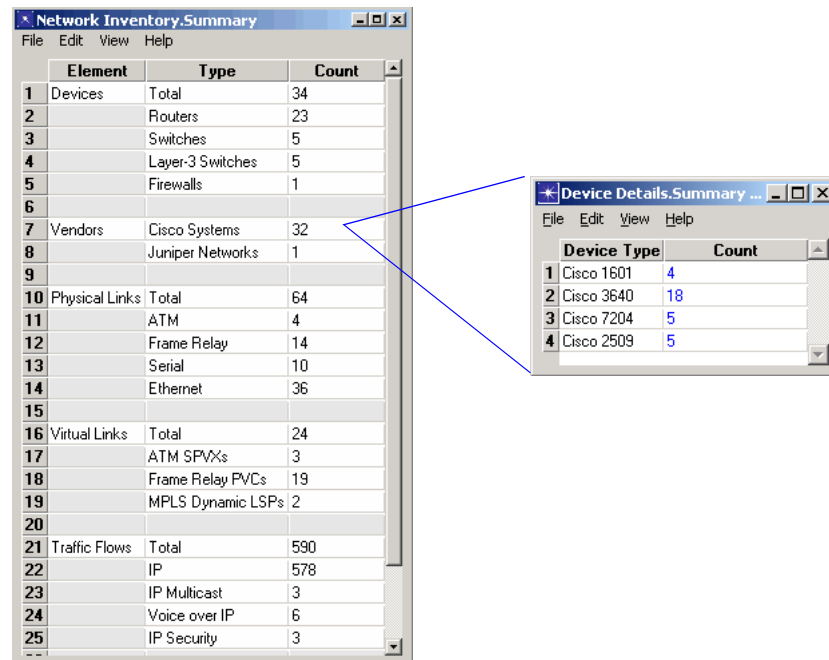
You can quickly focus and adjust the zoom level of the Project Editor window using the Bird's Eye View window (View > Bird's Eye View) This window is especially useful for specifying a desirable zoom level quickly and for finding areas of interest in large or crowded networks.

For more information, see Bird's-Eye View on page ITU-7-34 of the *Guru User Guide*.

Network Inventory Summary

You can now get a summary report of the objects in your network model including network devices, physical and virtual links, traffic flows, and a count of vendor devices. The report is exportable to various formats such as MS-Excel.

Figure 11.0-7 Network Inventory Summary

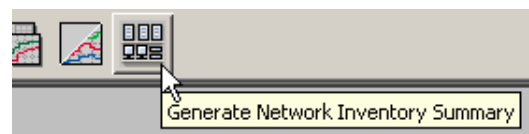


Element	Type	Count	
1	Devices	Total	34
2		Routers	23
3		Switches	5
4		Layer-3 Switches	5
5		Firewalls	1
6			
7	Vendors	Cisco Systems	32
8		Juniper Networks	1
9			
10	Physical Links	Total	64
11		ATM	4
12		Frame Relay	14
13		Serial	10
14		Ethernet	36
15			
16	Virtual Links	Total	24
17		ATM SPVXs	3
18		Frame Relay PVCs	19
19		MPLS Dynamic LSPs	2
20			
21	Traffic Flows	Total	590
22		IP	578
23		IP Multicast	3
24		Voice over IP	6
25		IP Security	3
--			

Device Type	Count	
1	Cisco 1601	4
2	Cisco 3640	18
3	Cisco 7204	5
4	Cisco 2509	5

To launch this feature, you can either click on the toolbar button, as shown in , or you can select **Scenarios > Generate Network Inventory Summary**.

Figure 11.0-8 Network Inventory Summary Button



Network Layout Enhancements

Several new operations allow you to control how network objects are displayed and arranged in the workspace. For more information about the following features, refer to Network Layout and Appearance on page ITU-7-16 of the *Guru User Guide*.

Automatic Icon Scaling and Label Placement

The Project Editor window can size node icons and move node labels automatically to reduce overlapping. Icons can be automatically scaled to a smaller size if they overlap other icons. To turn automatic icon scaling on or off, choose View > Layout > Automatic Icon Scaling.

If there is no space to show a node label, it can be hidden unless the node is selected. To turn automatic label placement on or off, choose View > Layout > Automatic Label Placement.

Automatic icon scaling in large networks can slow down performance. For this reason, autoscaling is turned off if the node count reaches or exceeds the threshold specified by the `icon_autosizing.large_element_count` preference. There are also two other new preferences related to this feature: `icon_autosizing.disable` and `icon_autosizing.max_neighbors`.

Interactive Node Layout

You can quickly adjust the layout of some or all sites in a subnet using the new Interactive Layout dialog box (View > Layout > Layout Nodes Interactively...). You can move nodes closer together or farther apart, rotate nodes around an axis, or disperse nodes throughout a rectangular region.

Automatic Node Layout

You can automatically reposition the sites in a subnet using either of two layout algorithms. Both attempt to position sites in an orderly layout. The operations that do this are

- View > Layout > Layout Nodes Automatically (Balanced)
- View > Layout > Layout Nodes Automatically (Simple)

The balanced algorithm produces a more elegant layout, but the simple algorithm is faster and uses less memory (thus is better for subnets with a large number of sites). A new preference, `network_layout.use_simple_threshold`, allows you to set a threshold below which the balanced algorithm is used. Above the threshold the simple algorithm is used. Certain topology imports, such as Device Configuration Import and Import from VNE Server, use the balanced algorithm to position sites for small networks (fewer nodes than the threshold set by the `network_layout.use_simple_threshold` preference) and the simple algorithm for networks with a number of nodes greater than the set threshold.

Annotation Enhancements

Box, ellipse, and text annotation objects have a new “rotation” attribute that enables you to rotate an annotation by the specified number of degrees.

Text annotations have a new “background color” attribute that enables you to set a background color for the text box background.

You can now create “icon annotations” from the object palette (Topology > Object Palette). These objects have an “icon name” attribute that enables you to use an icon from one of the icon databases listed in your model directories.

Memory Improvements

Guru now uses 40 to 60 percent less memory (RAM) to represent network models that contain large numbers of objects. For example, a network that used about 500 MB of memory in release 10.5 now uses between 200 MB and 300 MB.

Encrypted Passwords

IT Guru now encrypts preferences that specify passwords (including Report Server and license-registration passwords) in the environment database file and the Preferences dialog box.

Note—This feature might be unavailable due to legal restrictions in your country.

Connection Browser Enhancements

You can now show LSP routes calculated during an design action or Flow Analysis run in the Connection Browser (Topology > Connection Browser). Each route appears as a child of its associated LSP path object. When you select a route in the treeview, the route is highlighted in the network pane.

NetDoctor Enhancements

Rule Library

New rule suites have been added in this release:

- IP multicast
- Link aggregation

- MPLS VPNs
- Spanning tree
- Voice over IP

The following rule suites have been significantly enhanced over previous releases:

- AAA
- Administration
- ATM
- IP routing
- NAT
- PIX firewall
- Organizational Policies
- VLANs

Other enhancements to rule suites include

- Charts (bar and pie) added to selected summary rules
- Handling of security and system management on switches
- Handling of VRFs
- Support for auto-template creation
- Support for internationalization on selected suites
- Aggregate interface support for Layer-3 devices
- Aggregate port support for Layer-2 devices
- PIX ACL support
- Juniper firewall filter support

Automatic Template Creation

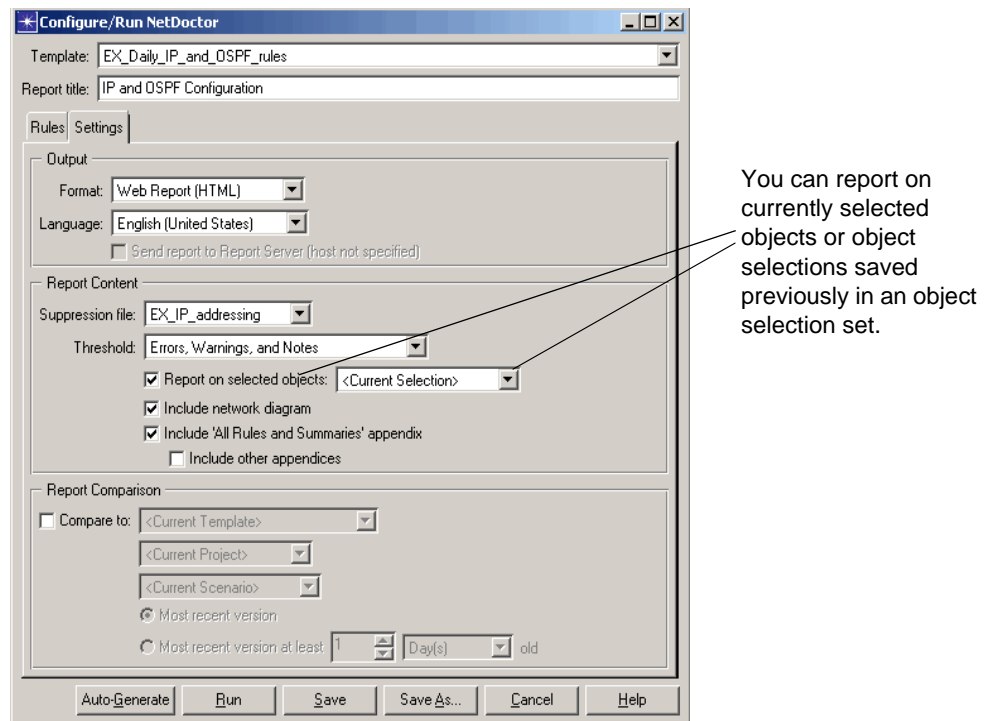
You can now have NetDoctor automatically create a template of rules. This method of creating templates lets you specify broad characteristics of the rules you want to check without having to individually build the rule set. NetDoctor uses this information plus an analysis of your network model to intelligently select rules.

For example, if you are interested in analyzing the security configurations in your network, you can tell NetDoctor to choose security-related rules. NetDoctor then intelligently selects rules related to security that apply to your network model.

Reports on Selected Objects

In this release, support is included for reporting on a selected set of objects. You can select one or more objects in the workspace prior to running NetDoctor and then run the report on just that selection. In the NetDoctor dialog box, a checkbox on the Settings tab allows you to specify reporting on the currently selected objects (default) or saved object selection sets.

Figure 11.0-9 Report on Selected Objects



Language Option for Reports

NetDoctor now supports reports in languages other than English. The open architecture allows you to include additional languages. When creating a template, you can specify the language in which you wish to produce the report, and you can save the setting along with the template.

Note—Currently, some of NetDoctor's older rules only support reports in English.

You can also specify an output language for a NetDoctor report when using the menu option NetDoctor > Run NetDoctor...

Viewing Recent Reports

You can now retrieve a configurable number of reports previously generated by NetDoctor. In past releases, NetDoctor stored data from multiple runs, but you could only view the last report that was created. Now you can view previous reports in the output format of your choice. This feature is accessed from NetDoctor > View Recent NetDoctor Reports.

New Charts

Charts are now incorporated into NetDoctor reports to illustrate the results. This includes bar and pie charts designed to enhance the information presented.

Customizing NetDoctor

Adding/Editing Rule Parameters

The ability to add and edit rule parameters has been enhanced. Instead of creating parameters with editable string values, you can now specify the values from which a user will select. Support has also been added to let you specify a number type as an integer or double rather than simply “number”.

WARNING—If you have custom rules that contain parameters, they will not work in this release until you update them. For instructions, refer to the Customizing NetDoctor chapter in the User Guide, Editing a Rule on page ND-4-15. If you encounter problems or need assistance, please contact OPNET Technical Support.

Message Suppression Files

If you have message suppression files created using a prior release of OPNET, they will not work in this release. Only new suppression files, created using OPNET 11.0, will work.

Additional Color Choices

NetDoctor now supports four additional user-specified color options in reports.

Internationalization

This release of NetDoctor provides an infrastructure for report generation in multiple languages.

Charting

NetDoctor supports charting within this release. This includes the ability to customize different kinds of charts within reports (e.g., bar chart, pie chart).

API Enhancements

This release includes support for new classes, methods and functions and modifications to existing APIs. For example,

- The new method *Port.get_technology_type()* can be used to determine the link technology of a port. This method returns a *Port_Technology_Type*.
 - *Report_Run.report_on_selected_objects()* checks to see if the Run on Selected Objects check box is selected, and *Node.is_selected()* checks to see if an individual node is selected in the network model.
-

General Enhancements

Model Documentation

The Modulation Curve Editor (in the Wireless Module) and the PDF Editor now allow you to add comments that are stored with the model. This allows each modulation and PDF curve to have specific information about what the model does and how it should be used.

Discrete Event Simulation

Various enhancements have been made to discrete event simulation.

Memory Use on Windows

By default, most versions of Windows allows a process to use at most 2GB of memory, regardless of how much swap space is available. However, some versions (such as Windows Server) can be configured to allow a process to use up to 3GB of memory. In Guru 11.0, the following executables can use this additional memory space, if allowed by the OS:

- Dynamic simulations (those using *op_runsim* and related applications)
- All OPNET-created static executables (such as static simulations)
- EMA programs

At this time, Guru and OPNET modules are limited to 2GB of memory space.

Simulation Summaries

The final summary information generated by a simulation is now saved in the simulation log file. You can save individual log files if you need to compare performance across several simulations. This information is saved as a low-level simulation summary, with a message similar to the following:

```
Program: op_runsim (2834)
Kernel: development (not optimized), sequential
Events: Total (10,525), Average Speed (8,866 events/sec.)
Time: Elapsed (1.2 sec.), Simulated (1 hr. 0 min. 0 sec.)
Memory: general(3,177 kb), categorized (5,698 kb), pooled (5,753 kb)
```

Changes to Constant Values

The values of two constants have been changed:

- Pi is now the full precision defined for the operating system in use (UNIX or Windows). Prior to 11.0, this constant was limited to 7 decimal positions.
- Earth radius is now precise to the nearest meter (6378137 m). Prior to 11.0, this constant was specified to the nearest kilometer (6378 km). This change adds 137 meters to the radius, which results in longer distances along the surface.

The combination of these two changes can result in varying numbers of events between releases 10.5 and 11.0 using the same models. The longer the distances between points, the greater the impact (thus, for example, WANs are affected more than LANs). In addition, even if simulations have the same event counts in both releases, the individual events might be shifted (different time values) or reordered.

Tests have not shown any significant differences in statistics except in low-level statistics (such as busy duration) that are directly affected by longer propagation times.

Changes to Geocentric Coordinate System

The ability to use different geocentric coordinate systems has been added to Guru. Prior to release 11.0, Guru used a left-handed coordinate system; the new default is right-handed. The geocentric coordinate system being used is specified by the `geocentric_model` preference.

Preference Removed

The `parallel_sim.ui_selected` preference has been removed. It was made unnecessary by the general support for parallel simulation added in release 10.0.

Cosimulation Speed Control

A new `op_runsim` preference, `realtime_ratio`, lets you control the speed of a simulation relative to real time.

Packet Duplication in Wireless Simulations

Wireless simulations now defer the duplication of packets until after closure and channel match have succeeded for each potential receiver. This speeds up simulations by avoiding unnecessary packet duplication. A new `op_runsim` preference, `radio_transmission_defer_packet_duplication`, lets you return to the old behavior.

This change can speed up wireless simulations that have many closure or channel match failures by up to 33%. It has no effect for simulations in which all packets are delivered.

Preferences

The following preferences have been added.

- `log_endsim_perf` specifies that a simulation should generate a simulation log entry based on the final performance report.
- `verbose_event_report` specifies that a simulation generate a report giving details about event generation.
- `verbose_packet_report` specifies that a simulation generate a report giving details about packet creation.
- `code_editor_prog` specifies an external editor program for editing C/C++ source code.

The `ov_date` and `ov_time` preferences have been removed, because this information is now part of the network model (as part of the Network Time Enhancements).

Terrain Modeling Module

TIREM Support

TMM now includes an integrated TIREM propagation model with an optional licensed module, OPNET TIREM. TIREM provides greater precision than the Longley-Rice propagation model, with fewer frequency and distance limitations. For details, see TIREM Propagation Model on page TMM-2-4 of the *TMM User Guide*.

Model Library Behavior Changes

OSPF

The default value of the OSPF Parameters > Processes > Process Parameters > Reference Bandwidth attribute has changed from 1 000 Mbps to 100 Mbps. This change is consistent with the OSPF standard (RFC 1850) and with the default configurations of devices from vendors such as Cisco and Juniper.

IP Multicast

Joining Time Default Change

The default value of the Application > Multicasting Specification > Joining Time attribute has changed from 10 seconds to 75 seconds.

IP Multicast Tree

Previously, the IP multicast tree switched from a shared tree to a shortest path tree based on the traffic load for a time period. In this release, a leaf router joins the shortest path tree immediately after the first packet arrives from the source.

Hybrid Simulation Efficiency Mode

The Hybrid Simulation Efficiency mode is enabled in the network by default. This mode speeds up simulations with background traffic. This might result in loss of accuracy for some simulation results, such as end-to-end delays and application response times.

The following efficiency techniques are used:

- “Purely Analytical” Traffic Modeling Approach
- “Always Tolerant” Queue Size Convergence
- “Averaged” Flow Mixing Mode

The individual settings for these efficiency techniques can be configured using the attributes in the Background Traffic Config utility object.

New Format for Routing Table Imports

DES now imports routing tables from output tables (.ot) instead of gdf files. The IP Routing Table Export/Import simulation attribute used to export routing tables to GDF and later use these tables for import. If you have been running simulations with this attribute set to “Import”, run the simulation with the attribute set to “Export” to create the import files in the new format. You can then resume importing the routing tables during simulations.

MRAI Delays for BGP Routes

BGP now introduces extra delays before sending routing updates. This is due to a new timer, Minimum Route Advertisement Interval (MRAI). This timer can be configured on a per-neighbor and per-node basis. The MRAI timers might result in changes in convergence behavior compared to previous releases.

RTP Overhead for Voice Packets

Voice packets now incur an RTP overhead of 12 bytes. This additional overhead will result in an increased traffic load compared to previous releases.

EtherChannel

EtherChannel links are no longer supported. In this release, Ethernet links replace the old EtherChannel links. To retain the old behavior, you can aggregate multiple Ethernet ports or interfaces into a single port or interface. See Ethernet Link Aggregation on page RN-11.0-40 for more information.

Duplicate ACK Threshold for Windows

The TCP > TCP Parameters > Duplicate ACK Threshold default value has been modified for "Windows 2000" and "Windows XP" symbol maps. The default value was modified from 3 to 2, in reference to "Microsoft Windows 2000 TCP/IP protocols and Services Technical Reference" (Lee and Davies, pg. 316). According to the authors, this is the default value from TcpMaxDupAck in the Windows process registry. The TcpMaxDupAck entry is mapped to Duplicate ACK Threshold in OPNET.

Model Library Enhancements

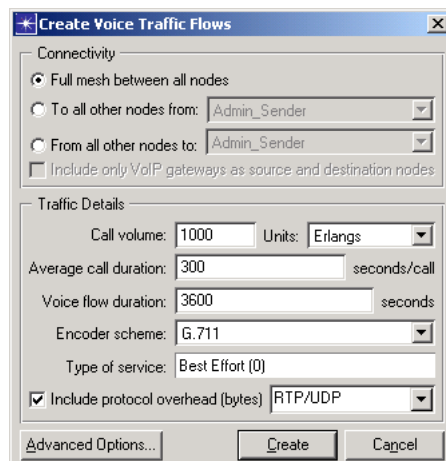
Application

The Application model suite now supports the following features:

- RTP. The real-time protocol (RTP) is now modeled. The voice application now resides on top of RTP, which in turn is on top of UDP. No additional configuration is required to use RTP other than to collect any statistics you want to view. A new group, RTP, is available under node statistics to analyze RTP behavior. End-to-end delay and jitter statistics are available on a per-caller, per-callee basis.

An API, `rtp_api.h`, is available for RTP in the following directory:
`<opnet_dir>/<reldir>/models/std/include`

- Voice traffic flows. A new utility lets you quickly create a full or partial mesh of VoIP (voice over IP) traffic flows. The configuration is similar to that for IP flows, but includes additional configuration parameters that are specific to VoIP traffic. To access this feature, select the Traffic > Create Traffic Flows > VOIP... menu option.

Figure 11.0-10 Creating VoIP Traffic Flows

- Application deployment visualization. You can now visualize the application deployments in the network from within the Application Deployment Dialog (ADD). You can access the ADD from the Protocols > Applications > Deploy Defined Applications... menu option.

BGP

The BGP model suite now supports minimum route advertisement interval (MRAI) timers, which are helpful for convergence studies. These timers are configurable on a per-node and per-neighbor basis.

Ethernet Link Aggregation

The model library now supports Ethernet link aggregation by implementing the Link Aggregation Control Protocol (LACP) specified in section 43 of the IEEE 802.3-2002 standard. Cisco's EtherChannel is a form of link aggregation. In link aggregation, two or more Ethernet links of the same speed that connect a pair of nodes are aggregated to form a link aggregation group. These groups are treated as a single link by MAC layer protocols such as spanning tree. LACP performs conversation-based load sharing among the links of the group.

This new implementation provides a more accurate modeling of link aggregation that is not compatible with the EtherChannel models of earlier releases. The EtherChannel link models used in previous releases do not work in this release. For projects that use the older link modes, replace the links with regular Ethernet links and activate LACP at the ports of those links to aggregate them. For instance, if there is a Gig_EthCh_2 link model in a network, replace it with two Gigabit Ethernet links connecting the two nodes to which the Gig_EthCh_2 link was connected. You can then turn on LACP on the ports of these two links by setting the attribute Switch Port Configuration > Port Grouping Parameters > Aggregation Protocol to "LACP" for both ports.

IP

The IP model suite now includes the following features.

- Serial links now model PPP headers. Link utilization over serial links will therefore increase accordingly.
- You can now use the routing tables built by flow analysis in a discrete event simulation. For large networks, this can reduce simulation run times. To use this feature, set the IP Routing Table Export/Import simulation attribute to “Import” and set the IP Routing Table Source to “FLAN”.
- Explicit traffic on IP flows. You can now configure IP traffic flows to generate explicit traffic, background (analytic) traffic, or a mixture of the two. Previously, IP flows generated only background traffic. This feature lets you quickly load a network with traffic without losing some of the detailed analysis options as you do with purely background traffic. You can configure the ratio of explicit/background traffic in the Traffic Mix attribute on the flow objects. Now, per-demand statistics are available after a simulation.
- Congestion area. You now have several ways to view information about congested areas in the network when using discrete event simulation.
 - Results Viewer Table.
 - Route Browser.
 - Time Controller Visualization.

See Chapter 11 IP Model User Guide on page STM-11-1 of the *Standard Models User Guide* for details on using these features.

IP Multicast

The IP multicast model suite has been enhanced to make the model attributes more closely resemble operational device configuration parameters. As a result, many attributes that were only configurable on a per-node basis are now configurable on a per-interface basis.

When configuring IP multicast in a network model, you no longer need the IP Multicast configuration object. The attributes of the configuration object now appear on the router and host nodes. For IP multicast projects created in earlier releases, the model will still read the information contained in IP Multicast configuration object, however, you will be unable to edit the configuration object settings.

The model now supports dynamically chosen rendezvous points (RPs). The following options are now available:

- Static RP
- Auto-RP (Cisco)
- Bootstrap

A new type of demand is available to represent IP multicast traffic. This demand, `ip_mcast_traffic_flow`, is available on the demands object palette and is a source demand, which is a demand attached to a source but not to a destination. You can configure the destination IP address for the demand to be that of the multicast group. The IP multicast traffic will then be routed to all destinations listening to the given multicast destination address.

IPv6

The IPv6 model suite now supports the following features:

- **Neighbor discovery.** Neighbor discovery is now configurable on a per-interface basis on all router and host nodes. Two new compound attributes, Router Solicitation Parameters and Neighbor Cache Parameters, let you configure neighbor discovery parameters on nodes.
- **Mobile IPv6.** Mobile IPv6 provides connectivity to mobile users across IPv6 networks. The model supports the following Mobile IPv6 features:
 - Route optimization
 - Mobile node (MN)—Home agent (HA) bi-directional tunneling
 - Extension headers (Mobility, Routing (type 2), and Destination Option)
 - IPv6 (Neighbor discovery, router advertisements, duplicate address detection)

OLSR

The model library now includes support for OLSR (Optimized Link State Routing), which is a routing protocol used in Mobile Ad Hoc Networks (MANET). The following protocol features are included in this model:

- MPR flooding mechanism
- Neighbor sensing mechanism
- Topology discovery/diffusion mechanism
- Multiple interface support
- IPv4 Support
- IP common table usage

For more information, see Chapter 19 OLSR Model User Guide on page STM-19-1 of the Model User Guide.

Wireless LAN

The Wireless LAN model suite now includes a new statistic that reports on status of access point connectivity for the WLAN MAC. You can find this new module statistic, AP Connectivity, in the WLAN statistic group.

Flow Analysis Enhancements

Default Start Time

The default start time for a flow analysis is now the configured network start time. If no network start time is set, the default time is the earliest profile start time configured on any of the traffic flows in the network. If neither of these values are set, the current time is used for the default start time. This default can be changed, as required.

Common User Interface for ATM and IP Flow Analysis

The IP mode and ATM mode for Flow Analysis have been combined into a single mode. You no longer need to switch modes when changing from an ATM network to an IP network. Further, Flow Analysis lets you analyze networks that are running IP and ATM. Flow Analysis uses the IP settings to analyze the IP portion of the network and the ATM settings to analyze the ATM portion of the network.

By default, Flow Analysis is set up to run on packet-switched networks. To run Flow Analysis on circuit-switched networks, you need to set the `flow_analysis_network_mode` environment preference to circuit-switched.

Capacity Planning

Flow Analysis now includes a Capacity Planning feature that lets you forecast and analyze traffic. You can use the Capacity Planning feature to study the effects of future traffic patterns on a network. This operation looks for trends in the current traffic and creates additional future traffic based on those trends. Guru presents the results of the capacity planning analysis in a detailed web report.

The Capacity Planning feature also requires the Planning and Design (PAD) module. The PAD module is standard with SP Guru but optional for IT Guru. For more information, see Chapter 4 Using Capacity Planning on page FA-4-1 of the *Flow Analysis User Guide*.

Unconnected Interfaces

Flow Analysis now has an option that lets you include or exclude unconnected interfaces from the flow analysis. In earlier releases, connected and unconnected interfaces were included in the analysis.

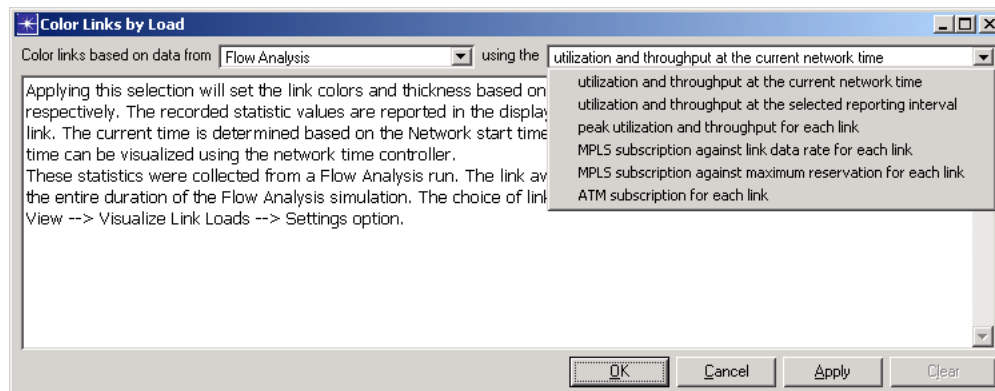
Link Utilization Visualizations

The visualization and animation operation for link utilizations have moved from the Flow Analysis menu to the View menu. You now have several options besides utilization when visualizing loads on links.

This release includes the following new link load visualization options:

- Utilization and throughput at the current network time
- Utilization and throughput at the selected reporting interval
- Peak utilization and throughput for each link
- ATM subscription for each link

Figure 11.0-11 Visualizing Link Loads



For more information, see Link Utilizations on page RN-11.0-25.

New Protocol Support

Flow Analysis now includes support for the following features:

- Link Aggregation
- IP Multicasting
- Layer-3 aggregation
- Voice over IP
- RIP offset lists
- RIP default information
- PVPs
- Frame Relay and FRF.8
- Facility protected FRR

Applying Changes in the Configure/Run Flow Analysis Dialog Box

The Apply button works differently from previous releases. Clicking on this button no longer switches you from one interval to another. Instead, the Apply button now saves the current configuration without opening the Flow Analysis Log.

OPNET Documentation Changes

New Titles

Table 11.0-1 lists new titles that have been added to the document set in this release.

Table 11.0-1 New Books in the IT Guru Document Set

Title	Contents
Animation Viewers Reference Manual ¹	Describes the 2-Dimensional and 3-Dimensional Animation Viewers that are available with various OPNET products.

¹ Replaces the Utility Programs Reference Manual that previously contained information about the 2-Dimensional Animation Viewer (op_vuanim) only.

