IxNetwork

Getting Started Guide

Version 8.51 EA

Notices

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About this guide

This section explains the notational and typographical conventions used in this documentation, and provides a list of related documentation.

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Typographical conventions

The following table describes the typographical conventions used in this document.

Convention	Description
bold text	Bold text indicates: • Graphical user interface element names (such as dialog boxes, buttons, menu selections, and so forth). • Command line interface commands and options. • The name of a field, option, or parameter when used as part of an instruction. For example: "Select the desired **Inner Priority** value."
Italic text	Italic text indicates: • A text reference to the name of a field, option, or parameter. • Document and book titles. • The first reference to a new term. • Special identification or emphasis in a statement.
`monospace text`	Text shown in a monospace font is used to indicate: • Text that you input. For example: Enter `cd project1` • Code samples, including keywords and variables within text and as separate paragraphs, and user-defined program elements within text. • Text file content or examples, such as lines of text from an .ini file.

Textual conventions

The following table describes the typographical conventions used in this document.

Convention	Description
Boolean text	Words that represent Boolean notation are written in all uppercase text. For example: 1010 OR 1100.
Keystrokes	Simultaneous keystrokes are shown by joining the key names with a plus sign (+). For example, CTRL+Q.
> (right angle bracket)	Separates levels in a hierarchy of menu selections. For example: "Select **Administration** > **Users**."

Related documentation

Refer to the following product documentation for additional information:

- Release Notes
- All other documents in the document suite for the product
  - IxNetwork Help
  - IxNetwork API Guide
- Third-Party license agreements

Important! The documentation is available from the **Help** pull-down menu in IxNetwork.

Ixia user documentation is also available in the **Support & Services** > **User Guides** area of https://support.ixiacom.com/. User login is required to view this online documentation.

CHAPTER 1 Introduction to IxNetwork

Ixia's IxNetwork is specifically targeted for the performance and functionality testing of high-speed, high-capacity routers and switches. IxNetwork operates only on port-CPU-based test modules of Ixia. With these modules, each test port supports an independent PowerPC running Windows and protocol state machines.

IxNetwork provides a powerful, yet easy-to-use, graphical user interface (GUI) that you can use to configure and run complex tests. With IxNetwork you can quickly and easily configure protocol variables and parameters to suit a particular device under test (DUT). Combined with Ixia family of Chassis and port-CPU-based Load Modules, you can use IxNetwork to create a test environment tailored to your specificrequirements.

IxNetwork offers the flexibility to customize the application to meet a wide range of requirements for testing complex network topologies, consisting of thousands of routing or switching devices. You can emulate millions of routes and reachable hosts within the topology. You can also, easily scale the size of the emulated topologies by adding additional test ports.

IxNetwork also provides with the ability to customize millions of traffic flows to stress the data plane performance. You can create sophisticated configurations using powerful wizards and grid controls in

the graphical user interface. With its enhanced real-time analysis and statistics, IxNetwork is capable of reporting comprehensive protocol status and detailed per-flow traffic performance metrics.

Features of IxNetwork

The following sections describe the features of IxNetwork:

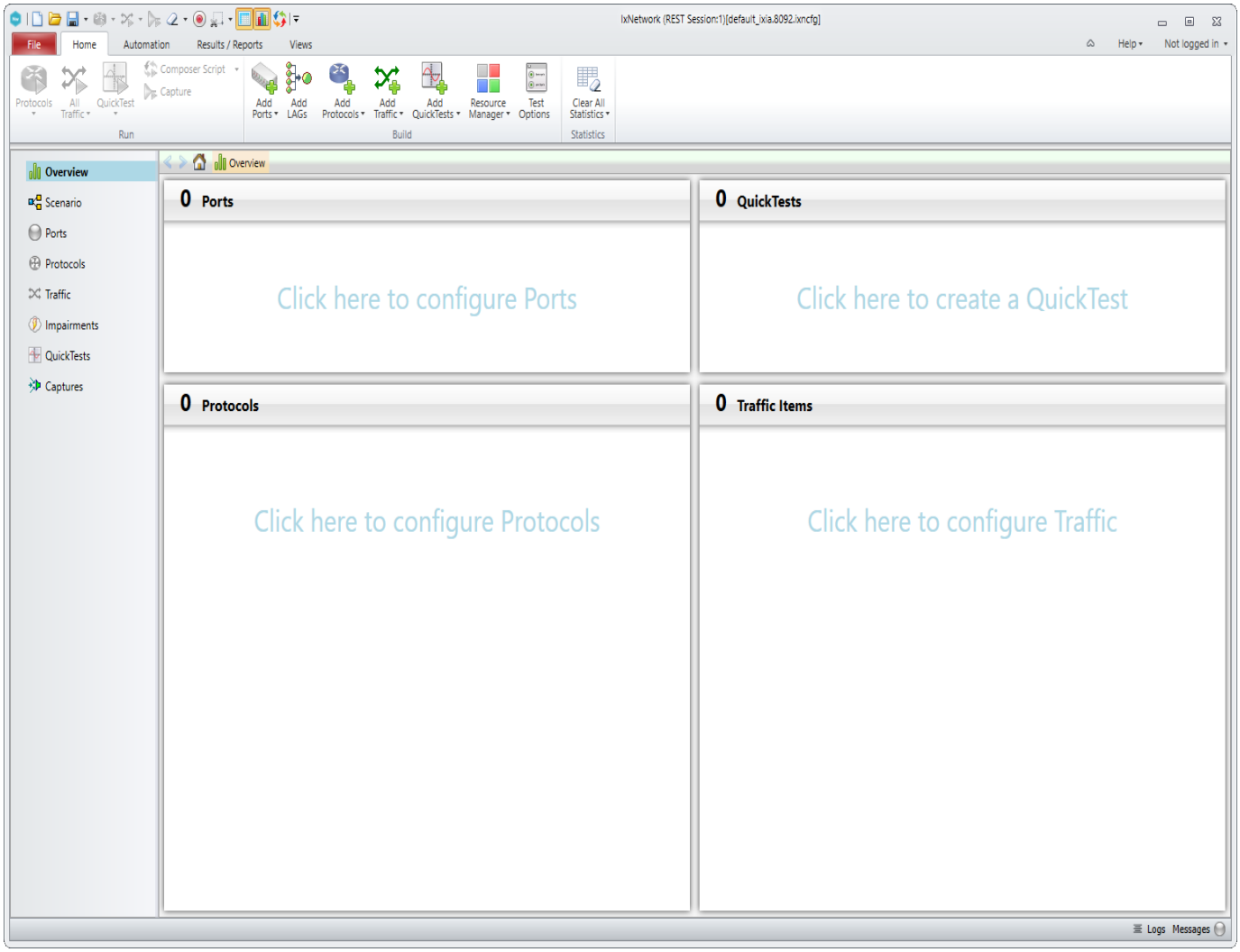
- GUI Framework
- Enhanced Port Management
- Enhanced Protocol Configuration
- Traffic Wizard
- Test Composer
- Enhanced Statistics Reporting
- Log View Window
- Application Traffic
- Quick Tests
- Flow Tracking
- Capture Settings
- Analyzer
- Data Miner

GUI Framework

IxNetwork provides a GUI framework, with a main IxNetwork window that displays sub-windows for Port Configuration, Protocol Configuration, Creation of QuickTests and Traffic Configuration (for L2-L3

Traffic or Application Traffic). Additional panels display Statistics and Captures. You can toggle the Configuration and Statistics information display on and off. With this design, you can simultaneously view

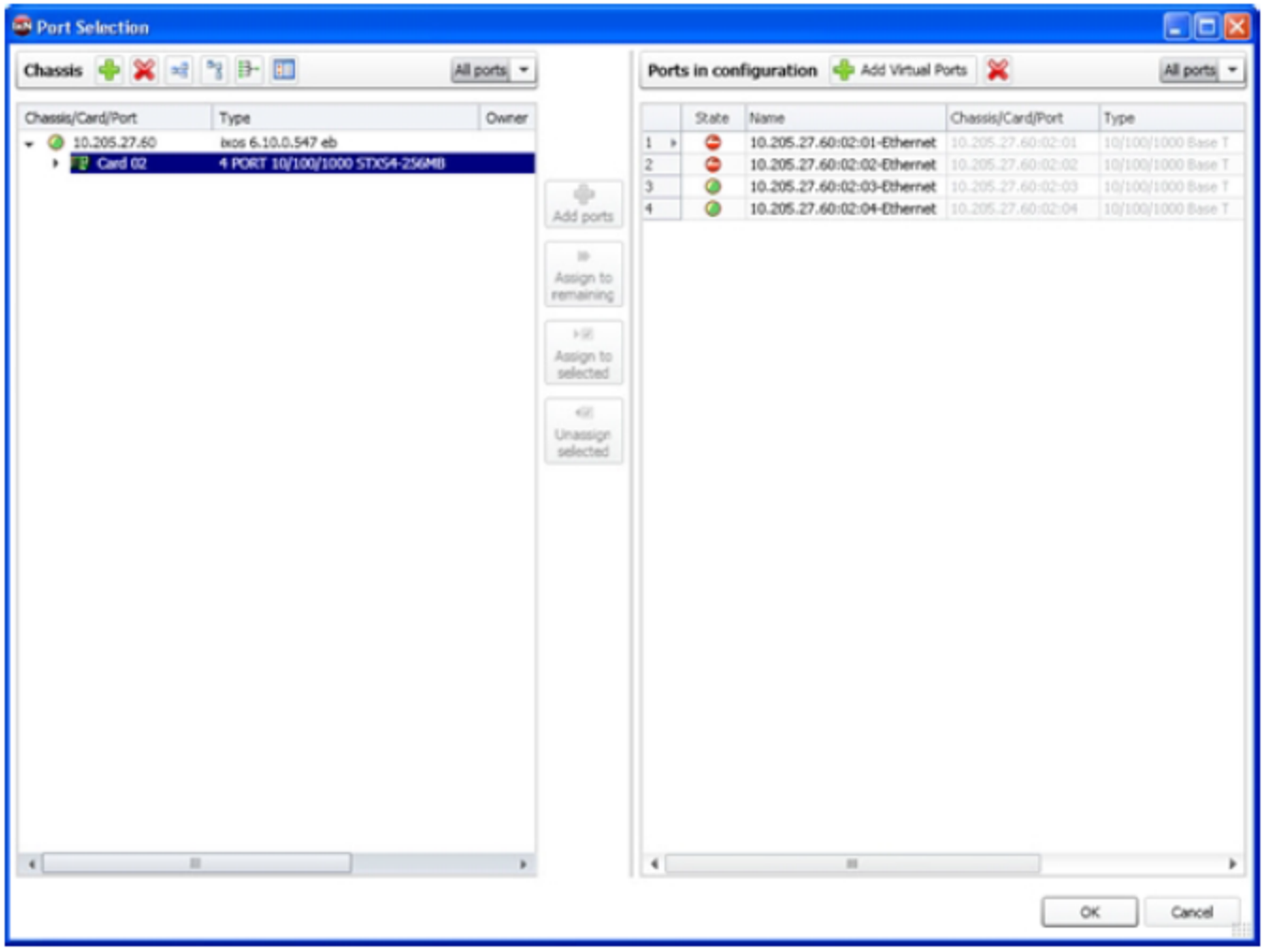
protocol configurations, statistics for traffic and protocols, and statistics information. An example of the GUI framework is shown in the following figure.



Enhanced Port Management

IxNetwork Port Management feature allows you to assign physical ports for immediate configuration. As an alternative, you can create a port configuration image for a port type, such as Ethernet, withouttying up an actual physical port. You can configure protocols for this test port and save the

resulting configuration for later use on a physical port. An example of the Port Management window Port Selection dialog box is shown in the following figure.



Enhanced Protocol Configuration

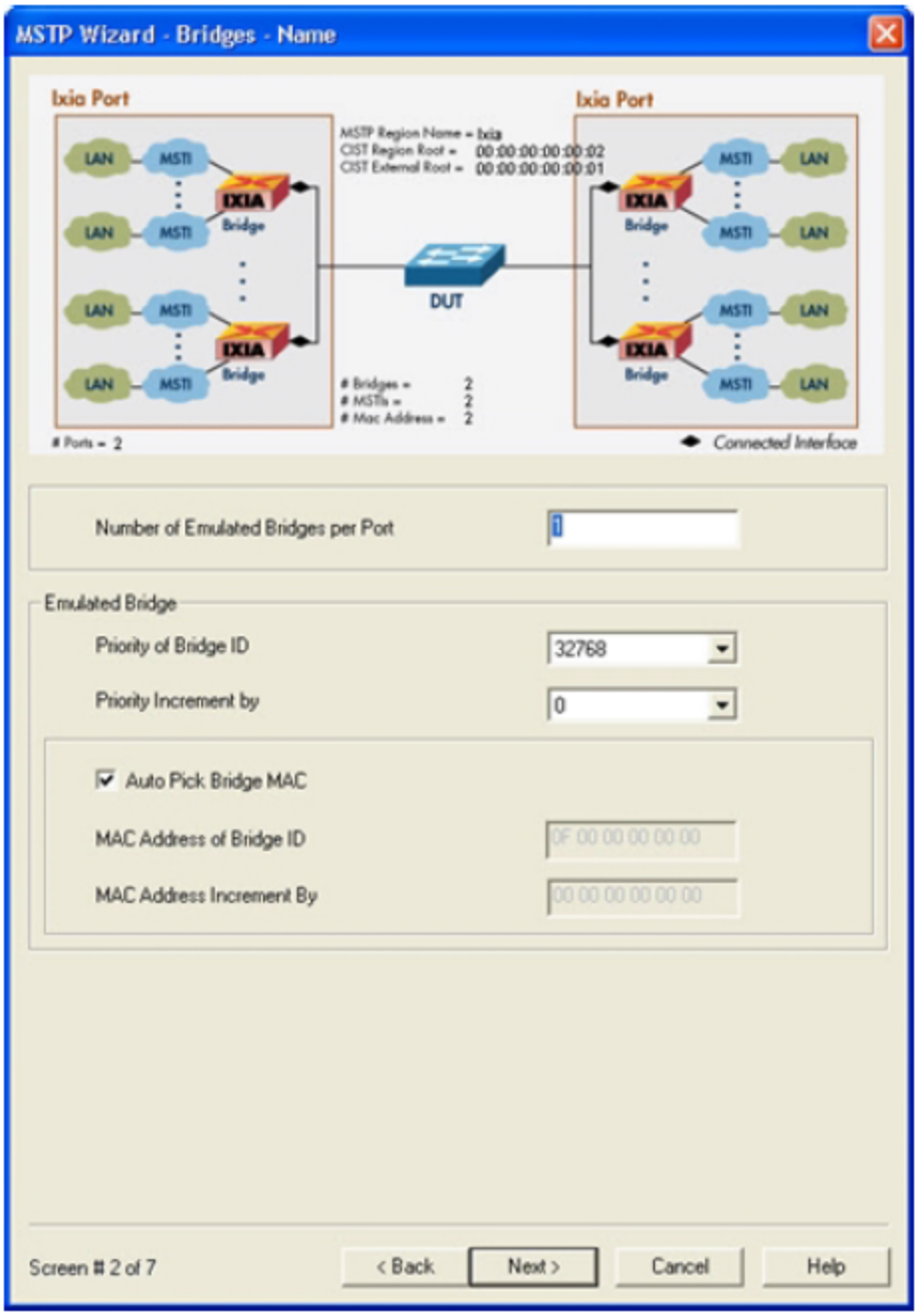
IxNetwork supports emulation of Internet-scale routing topologies to determine the scalability limits, and is designed to emulate a wide variety of bridging and routing protocols. Easy-to-use *Protocol Wizards* allow you to quickly and precisely set up complex topologies, in a step-by-step process for initial setup of small to large-scale test topologies across multiple Ixia ports. The wizards simplify the setup of complex network scenarios across multiple protocols simultaneously. In addition, IxNetwork spreadsheet GUI paradigm provides the entry, editing, and viewing of large configurations across multipletest ports. Once you create a network topology, you can copy it easily across any supported Ixia test port. An example of an IxNetwork configuration wizard is shown in the following figure:

BFD, L2TP, and PPPoX protocol support are present in IxNetwork. Authentication support for DHCP, Static IP, and MAC addresses are also present. Protocol wizard is enhanced with the addition of BGP

VPLS (Kompella Draft) to the L2 VPN wizard. Support for use of RSVP-TE and ISIS together in wizards is added.

You can integrate previously configured protocol interfaces into Interface Groups and use in setting up traffic configurations, with filtering based on IP version, presence of VLANs, or the type of ATM encapsulation (in case of ATM ports). Support to protocol interfaces for Stacked VLANs (QinQ) is also present.

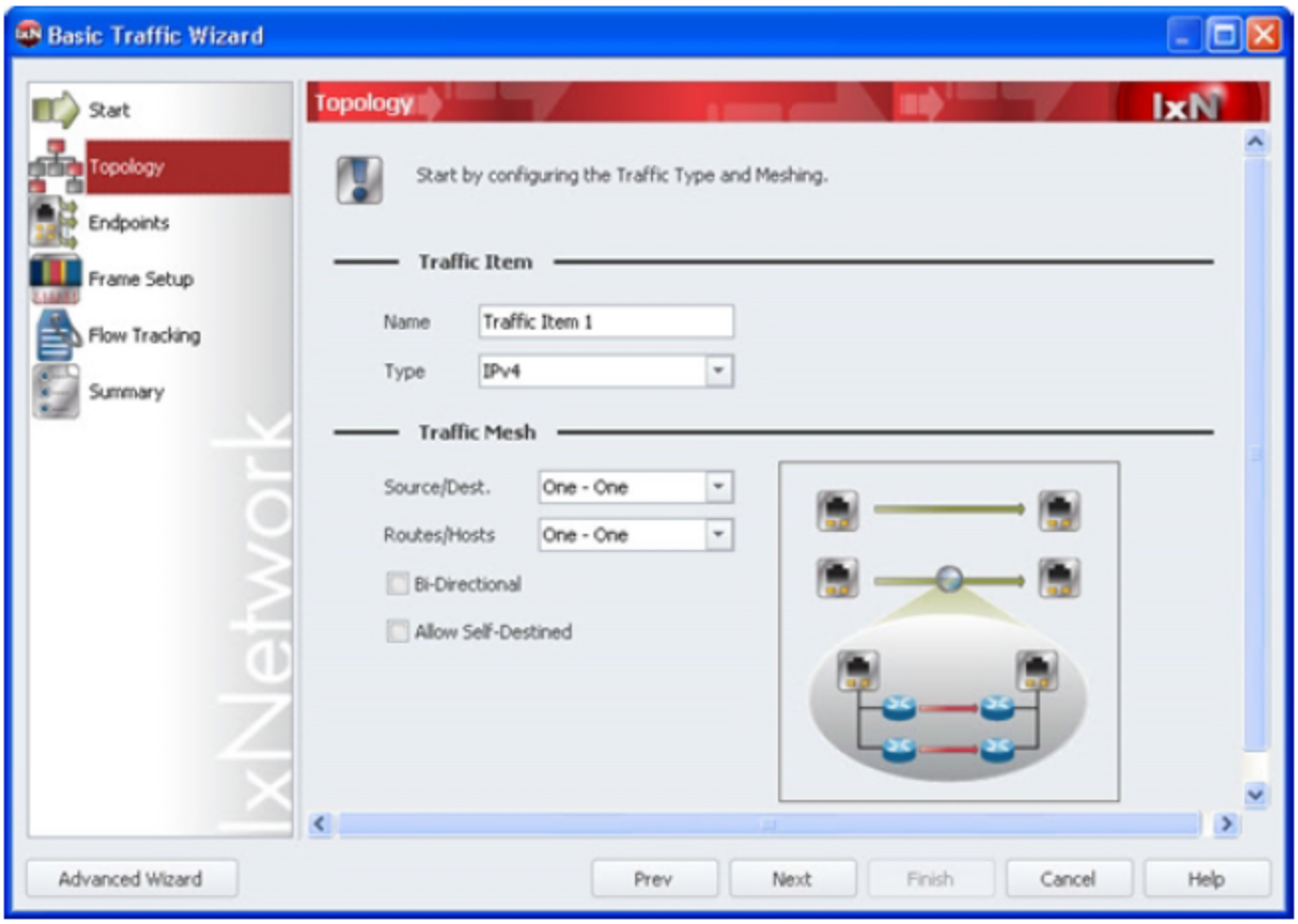
Traffic Groups option is present, which you can automatically configure and display in the Traffic Group window while configuring L2 and L3 VPNs, and Multicast VPNs (MVPNs) using the protocol wizards. You can also manually configure Traffic Groups in the Traffic Group window. The use of Traffic Groups simplifies the setup of traffic for complex topologies such as L2 and L3 VPNs, and MVPNs.



Traffic Wizard

The *Basic Traffic Wizard* and *AdvancedTraffic Wizard* allow you to create millions of traffic flows for validating emulated networks and hosts. The wizards provide great flexibility to set up wire-rate traffic streams to validate every reachable network and host.

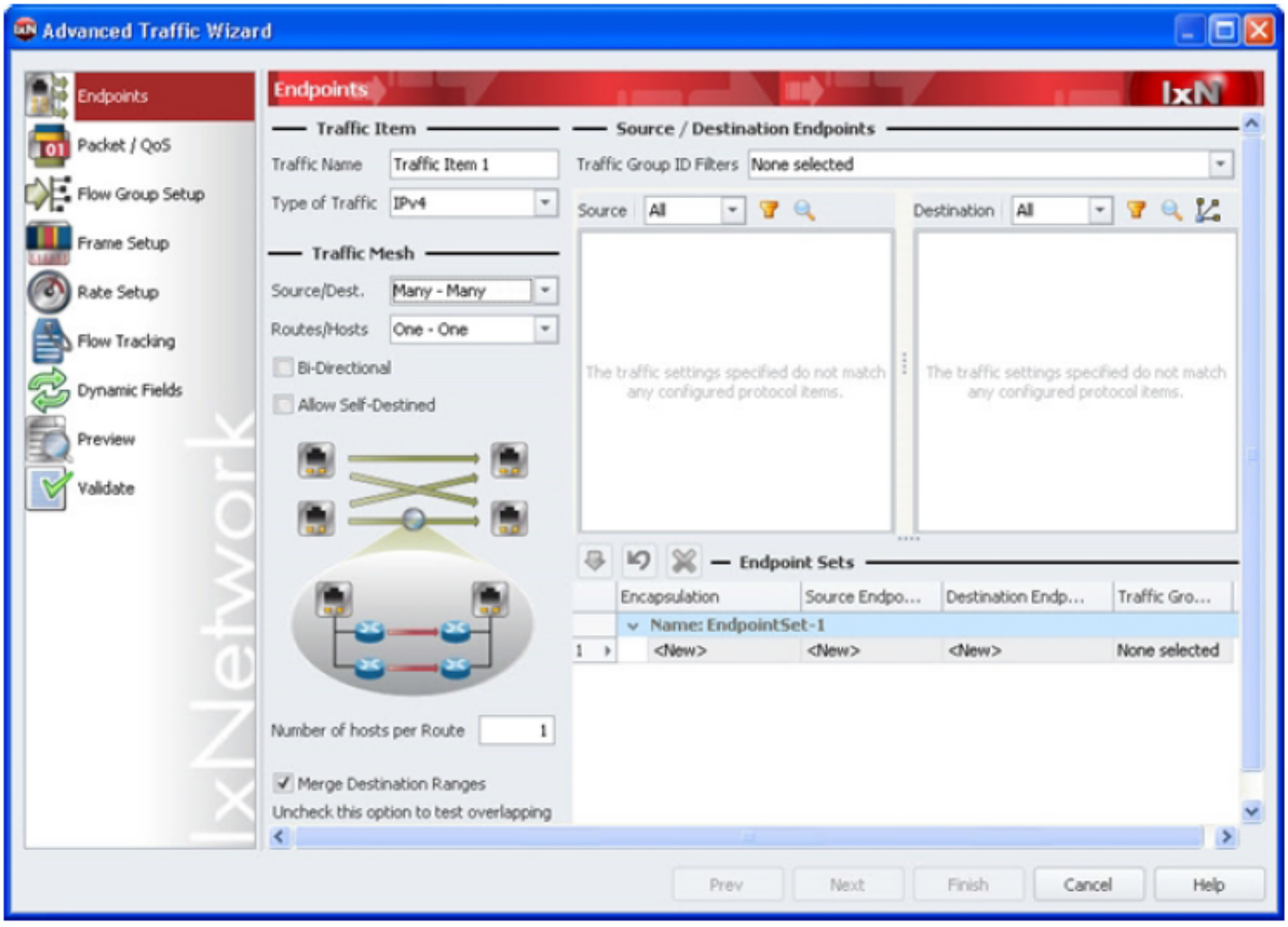
With the help of the Basic Traffic Wizard you can configure traffic with endpoints that have the same encapsulation type. You can configure bi-directional traffic movement easily and quickly with the help of the newly introduced checkbox. Multi-field tracking also can be enabled easily with the Basic Traffic Wizard. An example of the IxNetwork Basic Traffic Wizard is shown in the following figure:



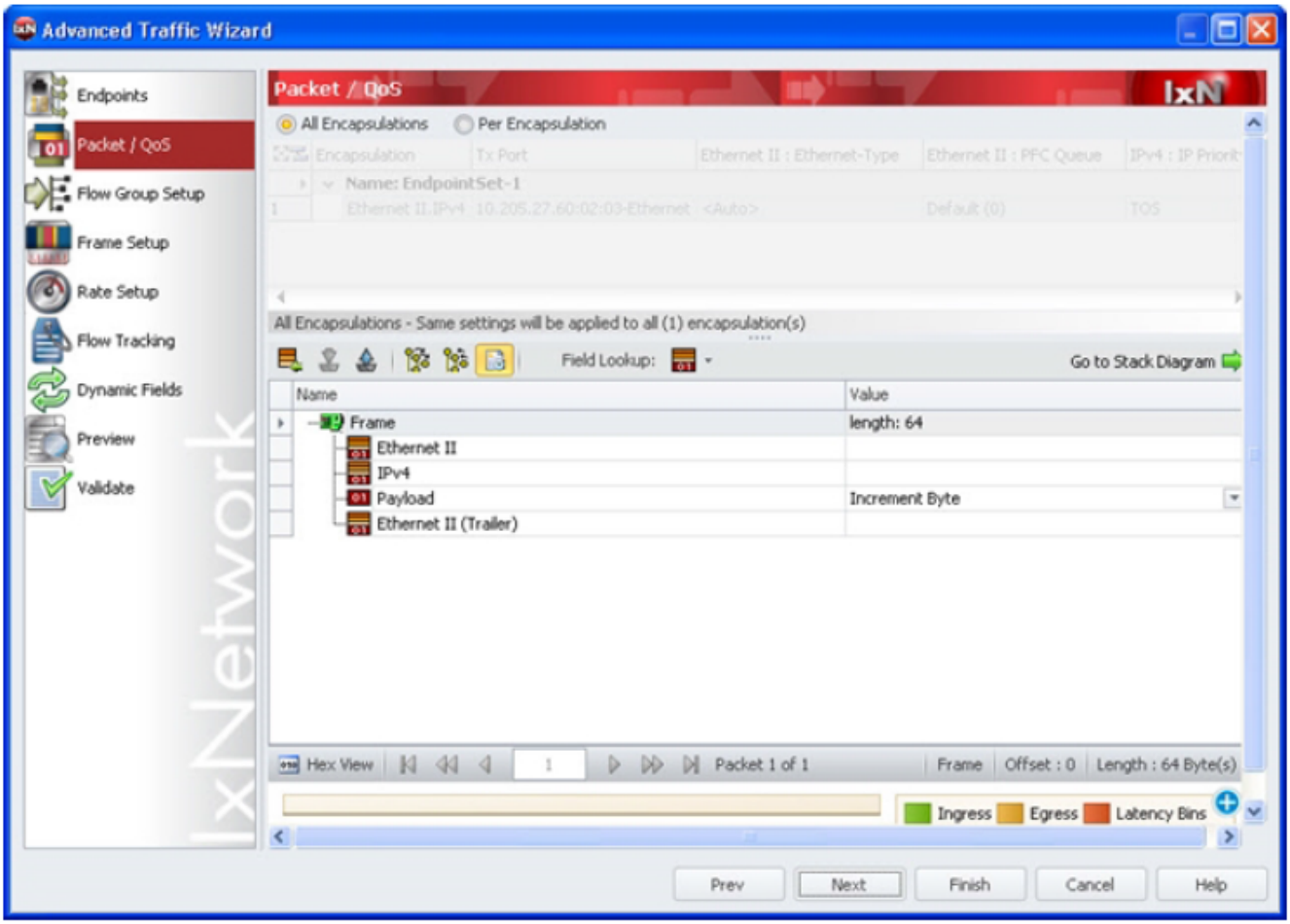
The *Advanced Traffic Wizard* allows to configure flexible traffic set-ups. It has the ability to support mixed encapsulation types and allows bi-directional traffic movement. The *Advanced Wizard* allows to edit and increment field values for optimized QoS testing with the help of the Packet Editor.

Flow Groups feature provides the ability to create traffic groups based on selected criteria such as rate, frame size, and transmit properties. Unique traffic profiles can be created with the help of this function.

An example of the IxNetwork Advanced Traffic Wizard is shown in the following figure:



The final step of the traffic wizard is to set up the receive ports to track the traffic flows with detailed QoS measurements of packet loss, throughput, and latency. You can track the traffic flow based on MAC addresses, IP addresses, TOS/DSCP, MPLS labels, or custom fields. The traffic wizard also provides optional capability for custom-editing the actual packet headers in the new version of the Packet Editor window, such as inserting additional layers of protocol headers. Much of the packet customization capability provided by IxExplorer of Ixia is included in the traffic wizard. An example of the Advanced Traffic Wizard -Packet QoSEditor is shown in following figure:



Test Composer

Test Composer is an Ixia software component, integrated into IxNetwork that permits the creation of complex multi-step test scripts integrating events, DUT configuration commands, local or external procedure

calls, and flow control instructions that permit branching the script flow based on a step result evaluation.

Test scripts created using the Test Composer plug-in support multiple simultaneous connections to test devices that can be configured using a variety of protocol interfaces: Telnet, TL1, SSH1/SSH2/SSHAuto, CmdTool, TclSh, Raw, SNMP, Syslog, and COM.

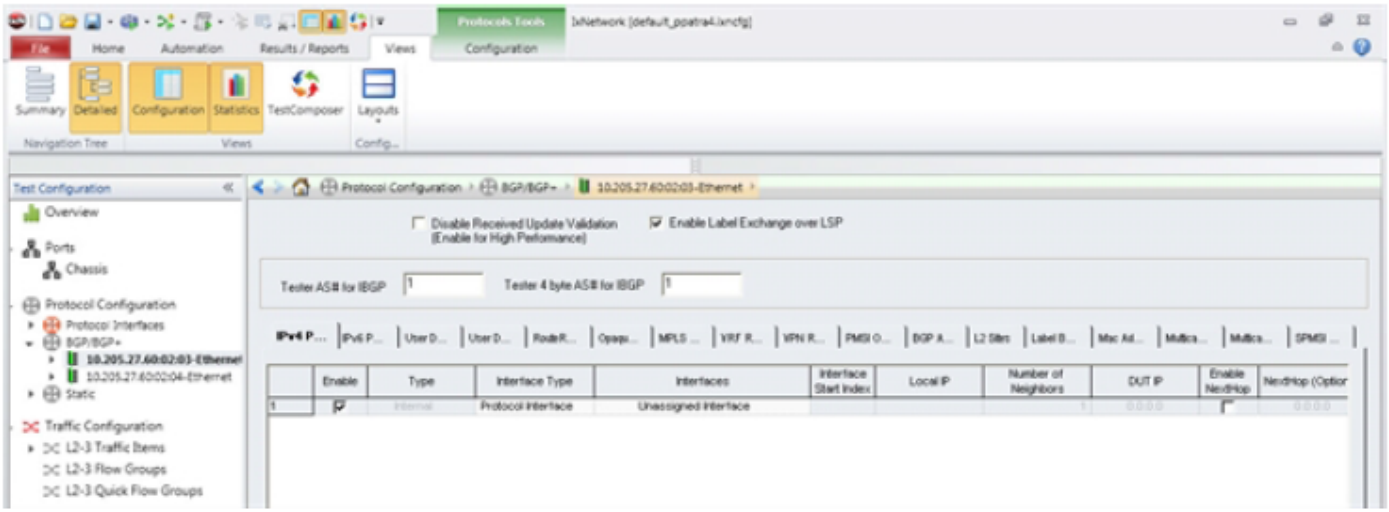
In addition to these protocol interfaces, Test Composer scripts also support a default session of the IxNetwork type. For this default IxNetwork session that is automatically created for every Test Composer script, a number of pre-configured events are available for configuring Ixia chassis ports, applying test configuration files, starting protocol traffic, launching tests, and retrieving test run results.

The *TestComposer Online Help* provides detailed information on the Test Composer window features. Press F1 to access the online help in the Test Composer window.

Enhanced Statistics Reporting

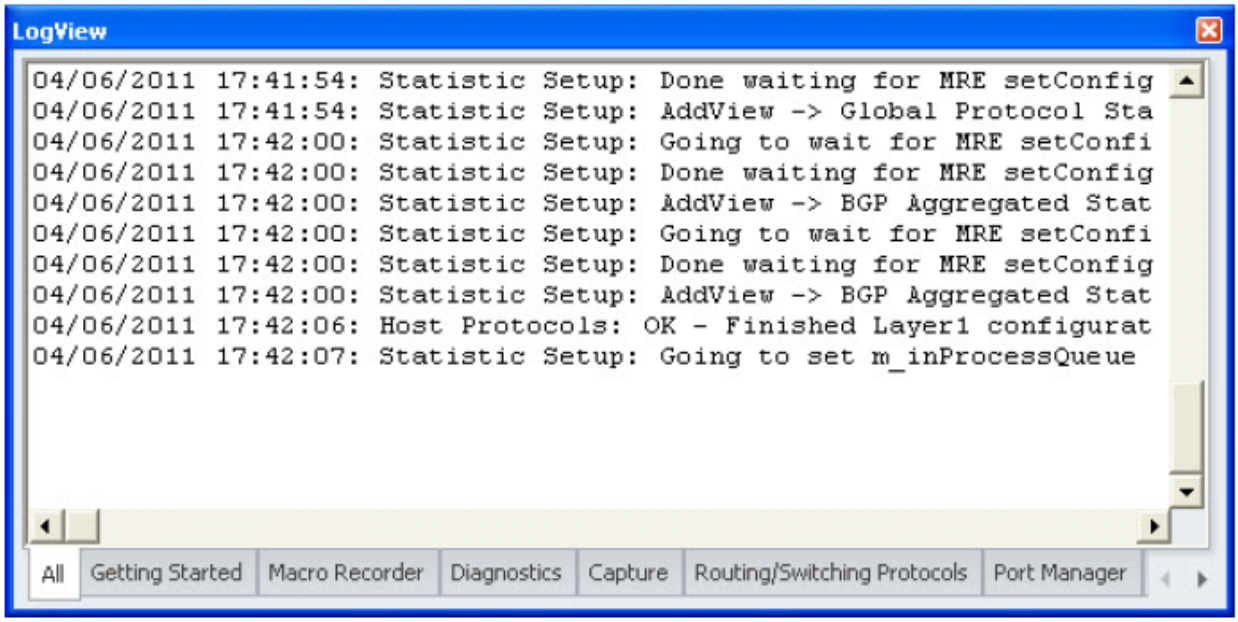
Statistics reporting for protocols has been greatly expanded, to provide far more detailed information about the protocol setup process. Available statistics views include port statistics, global protocol statistics,

traffic statistics, quicktests, and individual statistic views for each of the protocols that you configure. You can tile up to four statistic windows for simultaneous viewing. An example of the IxNetwork Statistics window, is shown in the following figure:



Log View Window

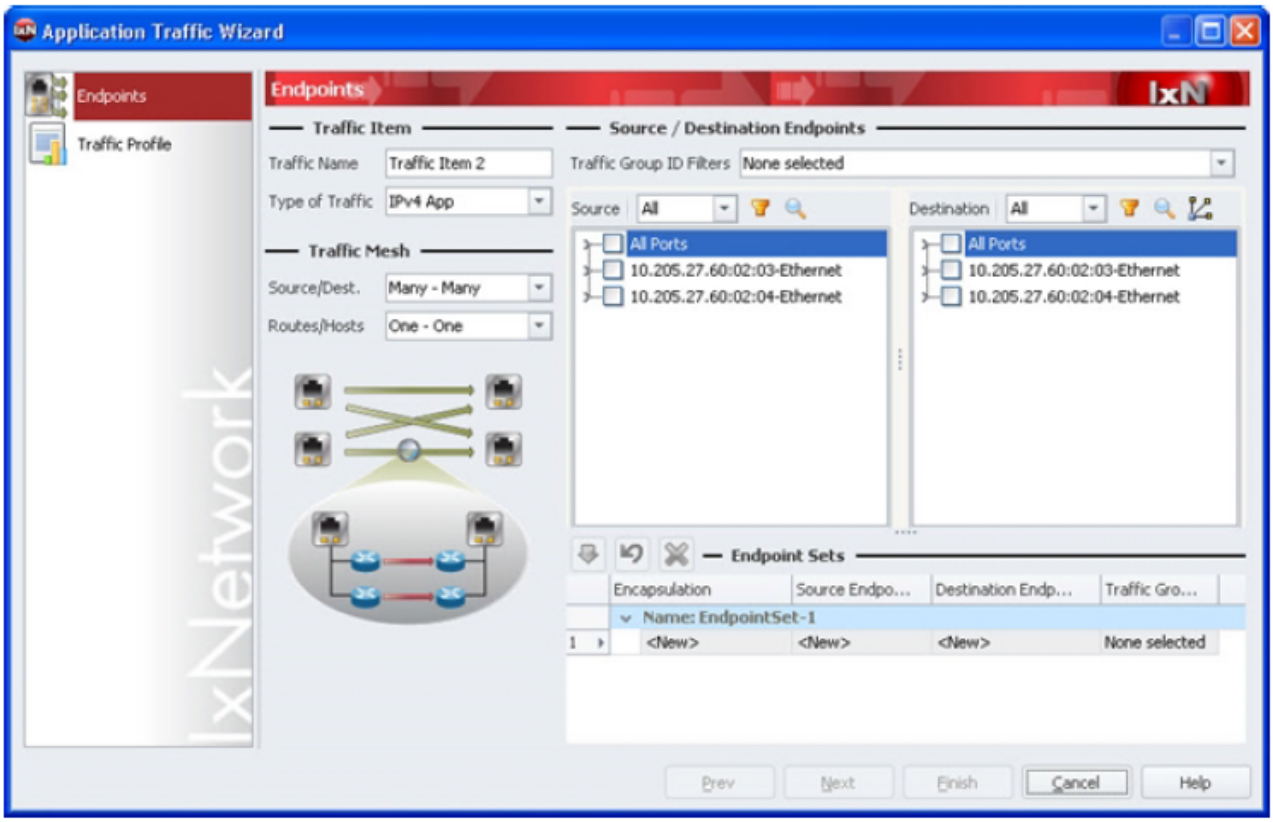
A global LogView window provides real-time information about the status of Port Management, Interfaces, Traffic, Test Composer, and Statistics. You can save the information in this window for later evaluation. In addition, the PortTrace window found in IxNetwork is still available at the port level for every protocol listed in the Protocol Window. An example of IxNetworkLogView window, showing the progress of Port Manager, is shown in the following Figure:



Application Traffic

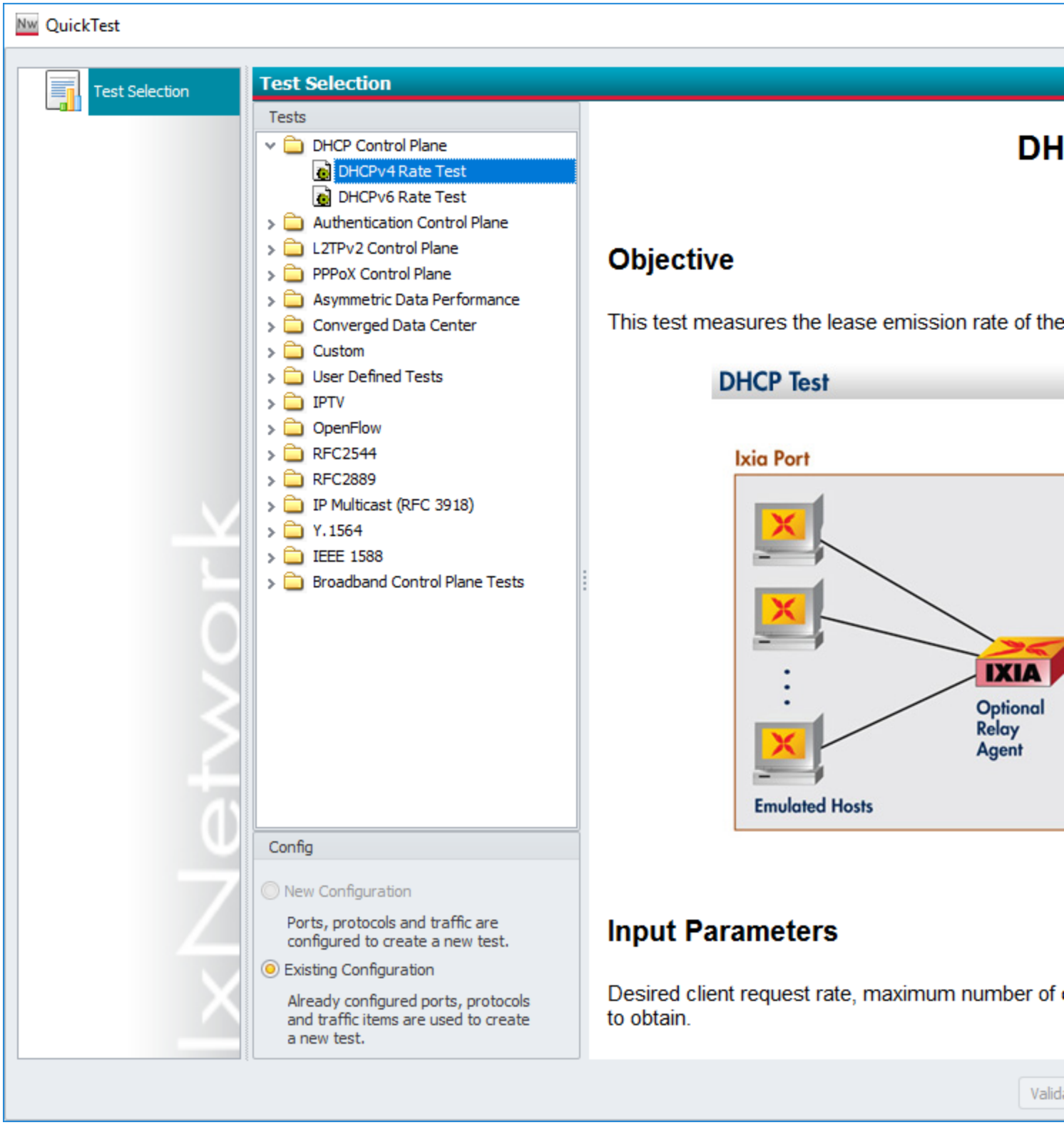
The IxNetwork Traffic Wizard allows the user to create traffic flows for Layer 4 through Layer 7 Application traffic, for transmission over protocol routes, by providing a subset of the IxLoad capabilities within IxNetwork. This subset of the IxLoad features is called IxLoadLite. Refer to the *IxLoad User Guide* for additional information on the use of the IxLoadLite features.

When used for Application Traffic, the traffic wizard provides a step-by-step procedure to set up traffic between IPv4 Application endpoints, running over routes that have been set up via one of the routing protocols, such as BGP. Users can select which source and destination items will send and receive traffic, how they will be mapped to each item (one-to-one or fully-meshed), and how the flows will be generated between advertised routes (one-to-one or fully-meshed). The traffic wizard will then automatically create fully-meshed or one-to-one application flows between all participating endpoints. After the traffic endpoint type andsource/destination pair has been set up, an Application Traffic Profile can be selected to emulate the Layer 4-7 scenario. An example of the traffic window for Application Traffic is shown in the following Figure:



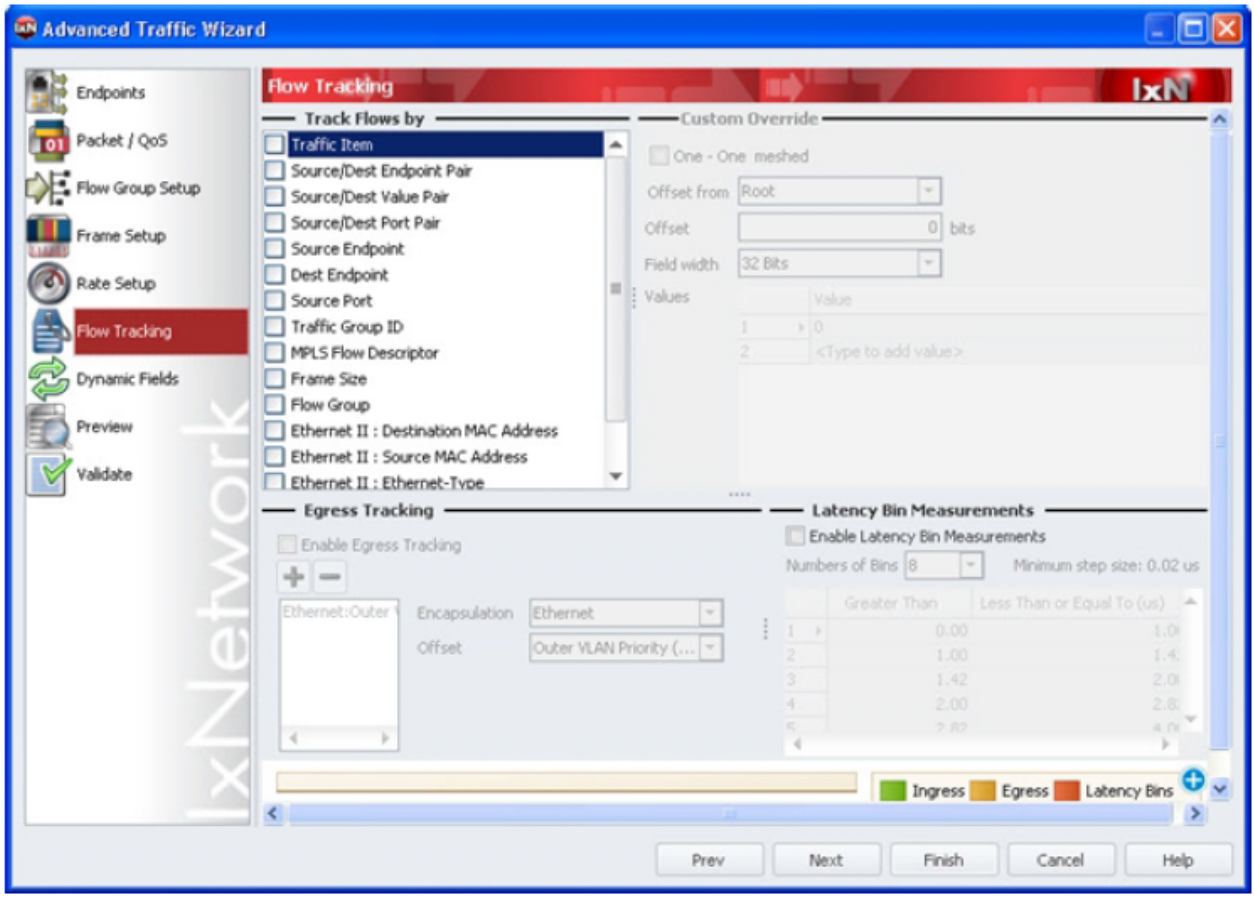
Quick Tests

The *Quick Tests* feature allows you to use pre-defined tests.You can add, access, run, and customize these tests according to your requirements. Step-by-step wizards allow you to set up the Quick Tests.You can view the results of current tests, and previously run tests, and compared them in the Results window. An example of the Quick Tests window is shown in the following figure:


QuickTest
Test Selection
Test Selection
Tests
DHCP Control Plane
DHCPv4 Rate Test
DHCPv6 Rate Test
Authentication Control Plane
L2TPv2 Control Plane
PPPoX Control Plane
Asymmetric Data Performance
Converged Data Center
Custom
User Defined Tests
IPTV
OpenFlow
RFC2544
RFC2889
IP Multicast (RFC 3918)
Y.1564
IEEE 1588
Broadband Control Plane Tests
Config
New Configuration
Ports, protocols and traffic are configured to create a new test.
Existing Configuration
Already configured ports, protocols and traffic items are used to create a new test.
IxNetwork
DH
Objective
This test measures the lease emission rate of the
DHCP Test
Ixia Port
IXIA
Optional Relay Agent
Emulated Hosts
Input Parameters
Desired client request rate, maximum number of
to obtain.

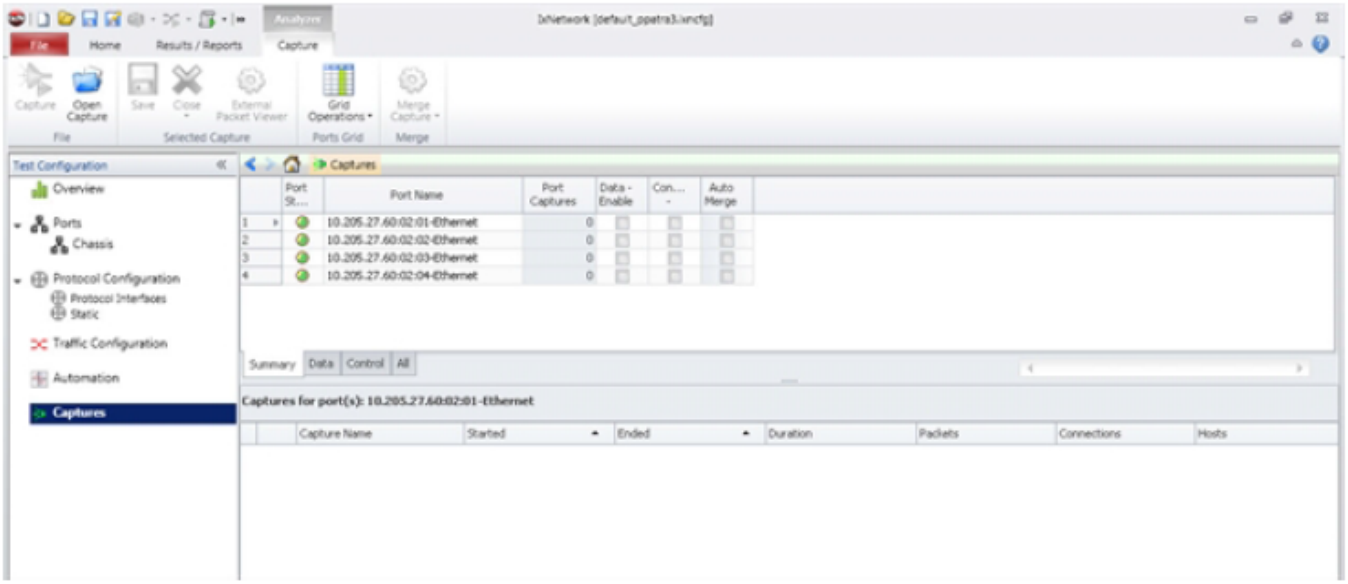
Flow Tracking

The Flow Tracking feature in the Traffic wizard allows an Ixia interface to track flows based on one or more fields. This feature enables a Traffic window to be opened from Statistics; this view shows L2-L3 statistics for a single flow. The flow tracking settings apply to all traffic items transmitted to a particular port. Ingress tracking by source/destination endpoint pair, egress tracking by VLAN, and latency tracking is shown in the following figure:

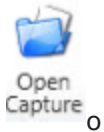


Capture Settings

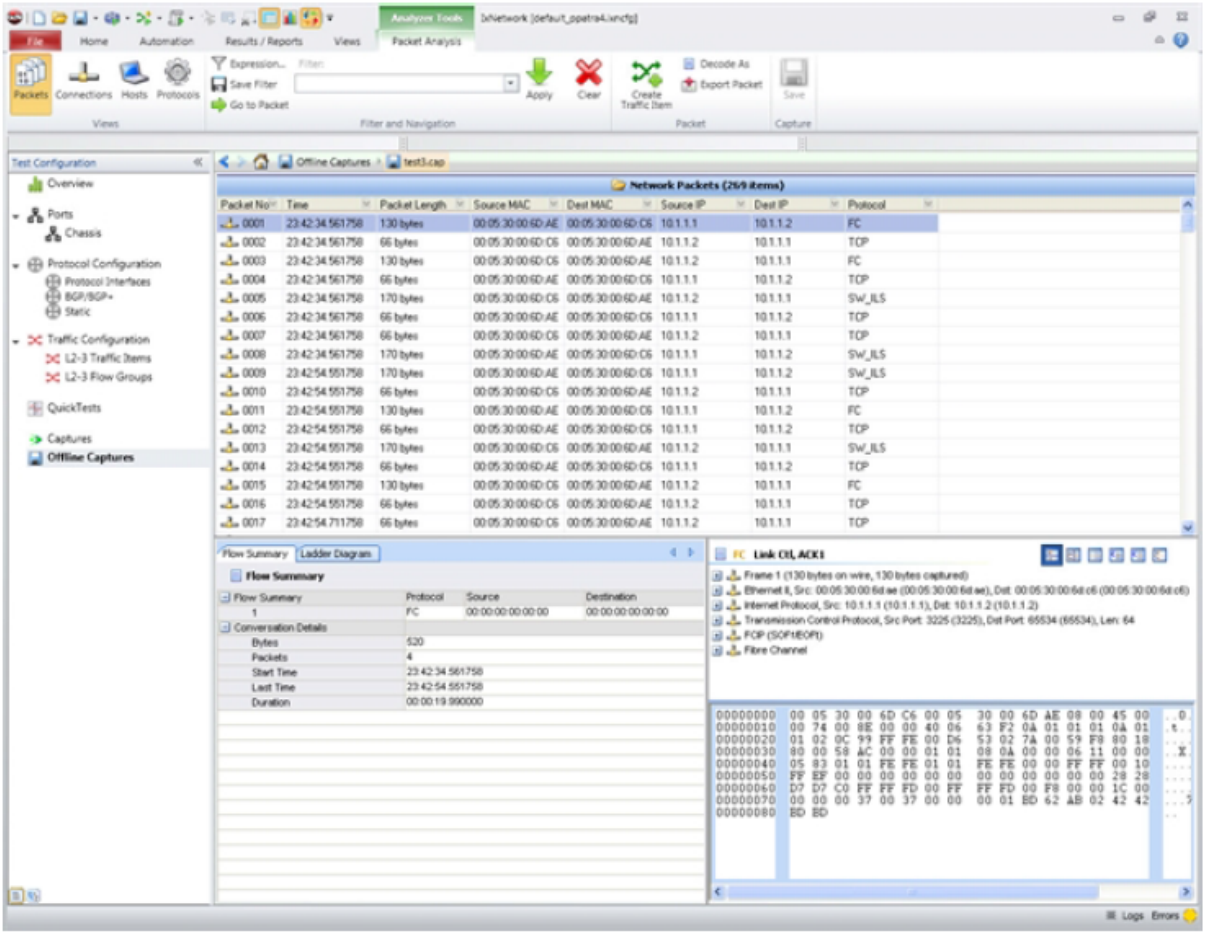
You can access the Capture settings by selecting **Captures** on the **Test Configuration** pane. They control the various capture options available for both control and data packets, and allows the creation of capture filters. You can set capture options for each port, chassis, or for each packet type.The capture settings are shown in the following figure:



Analyzer

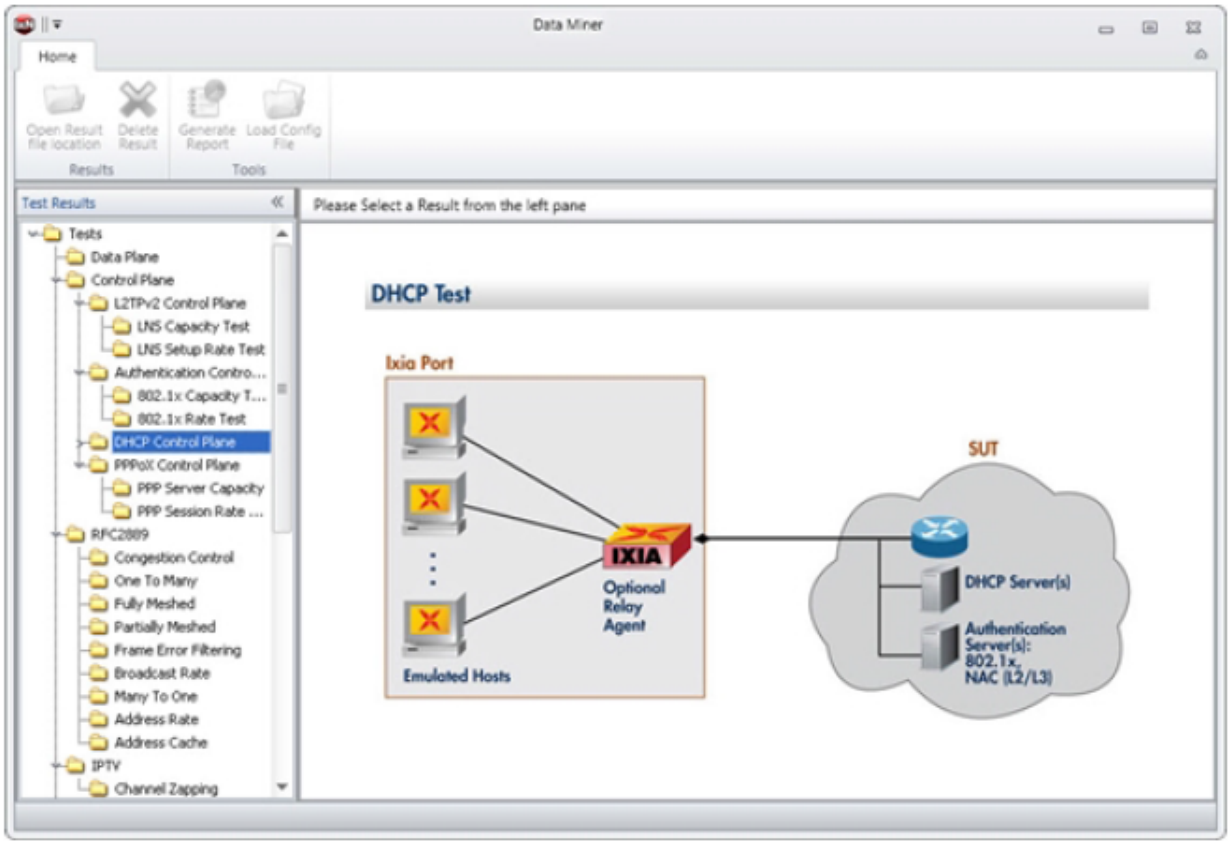
Analyzer allows you to select a captured traffic stream and examine the contents of each packet in detail.You can access this feature by clicking 

on the **Packet Capture** tab.You can save streams and export these streams to IxNetwork's traffic controls and then re-send. The Analyzer view is shown in the following figure:



Data Miner

Data Miner allows you to inspect the results of an integrated test. You can access Data Miner by clicking the **Results/Reports** tab. The *DataMiner* dialog box is shown in the following figure:


Data Miner
Home
Open Result file location
Delete Result
Generate Report
Load Config File
Results
Tools
Test Results
Please Select a Result from the left pane
Tests
Data Plane
Control Plane
L2TPv2 Control Plane
LNS Capacity Test
LNS Setup Rate Test
Authentication Contro...
802.1x Capacity T...
802.1x Rate Test
DHCP Control Plane
PPPoX Control Plane
PPP Server Capacity
PPP Session Rate ...
RFC2889
Congestion Control
One To Many
Fully Meshed
Partially Meshed
Frame Error Filtering
Broadcast Rate
Many To One
Address Rate
Address Cache
IPTV
Channel Zapping
DHCP Test
Ixia Port
IXIA
Optional Relay Agent
Emulated Hosts
SUT
DHCP Server(s)
Authentication Server(s): 802.1x, NAC (L2/L3)

CHAPTER 2 Installation and Licensing

The procedures explained in this chapter helps to install IxNetwork and the licenses necessary to run IxNetwork. For more detailed information on licensing, refer to IxNetwork Licensing and the *Ixia License Management User Guide.*

The topics covered in this chapter are:

- General Licensing Steps
- Chassis Installation
- IxNetwork International Language Support
- IxNetwork Installation
- Configuring IxNetwork for Silent Installation
- IxNetwork Linux Installation
- Shell Wrapper Installation
- TCL Automation Setup
- Python Automation Setup
- Perl Automation Setup
- Versions Supported by IxNetwork

Note: The minimum resolution for viewing the IxNetwork GUI is 1024x768, with a DPI setting of Normal Size (96 DPI).

General Licensing Steps

The following steps indicate the general sequence to use when installing and licensing IxNetwork. These steps assume that you will be installing the license server on your Ixia chassis. If you will be using a dedicated/ standalone PC as a licensing server, see the *Ixia License Management User Guide* for detailed instructions. The Ixia license installation utility is included in the IxNetwork CD build or download file.

To avoid licensing problems, be careful as you proceed through the licensing utility program.Do not just automatically click Next to proceed through the program, or licensing will not be successful and you will not be able to use IxNetwork. You must read each installer screen and provide the requested information. Although the installer takes you through the license installation process, the overview information here is provided to ensure that you do not overlook important installation details. For more detailed information on each step, refer to the *License Management User Guide*.

Important! The IxNetwork installer must be run on both the Ixia chassis and the client PC. When the installer is run on the chassis, it installs the license server component and the statistics engine. However, it does not install the client GUI software. When the installer is run on the client PC, the client software is installed.

Note: There is a separate IxNetwork chassis installer available that is significantly faster than the full installer. Both version can be used to install IxNetwork on the chassis.

Chassis Installation

To install an IxNetwork license onto an Ixia chassis:

1. Download IxNetwork to Ixia chassis from the Ixia Web site or the IxNetwork CD.
2. Launch the installer and answer the questions as required.
3. Once IxNetwork is installed on the chassis, licensing is installed as well.
4. **If you already have a registration number and password**, then launch the Ixia Registration Utility (IRU) and register the software on the chassis. Make sure that the chassis is connected to the Internet. If it is not, follow the offline registration steps in the *License Management User Guide*.

   If you do not have a registration number and password, you do not need to launch the IRU at this time. A temporary license will be issued to you when you first attempt to run a test from the client PC. At run time, a message appears, asking if you would like a temporary license. Make sure that the client PC is connected to the Internet. If it is not, follow the offline temporary license steps on the *License Management User Guide.*
5. Select **register** and follow the prompts that appear.
6. Accept the default **localhostas** the location for the features to be used.
7. When prompted with "Do you want the Ixia application to automatically find your license on the chassis?", select **Yes.** If using a license server, follow the steps in the *License Management User Guide* for registering on a license server.
8. Complete the license installation procedure by clicking **Finish**.

IxNetwork International Language Support

IxNetwork can be installed and run on the following language versions of each of the supported Windows operating systems:

- US English
- Hebrew
- German
- Italian
- French
- Swedish
- Japanese
- Simplified Chinese
- Traditional Chinese
- Spanish

Note that the IxNetwork software and documentation are provided in English only.

IxNetwork Installation

IxNetwork protocol emulation software is available for download from Ixia Web site. Licensing is now used with IxNetwork. See General Licensing Steps, for an overview.

> **Important!** You must have administration privileges to install IxNetwork, on both the chassis and the client machine.

Detailed information on obtaining and installing licenses for IxNetwork is described in IxNetwork Licensing in this guide, and in the *Ixia License Management User Guide*.

IxOS/IxServer and IxNetwork must be installed on the chassis prior to IxNetwork installation on the Client PC.

There is a separate IxNetwork chassis installer available that is significantly faster than the full installer. Both the versions can be used to install IxNetwork on the chassis. The chassis only version provides a panel for feature selection to the users. Only the selected features are installed.

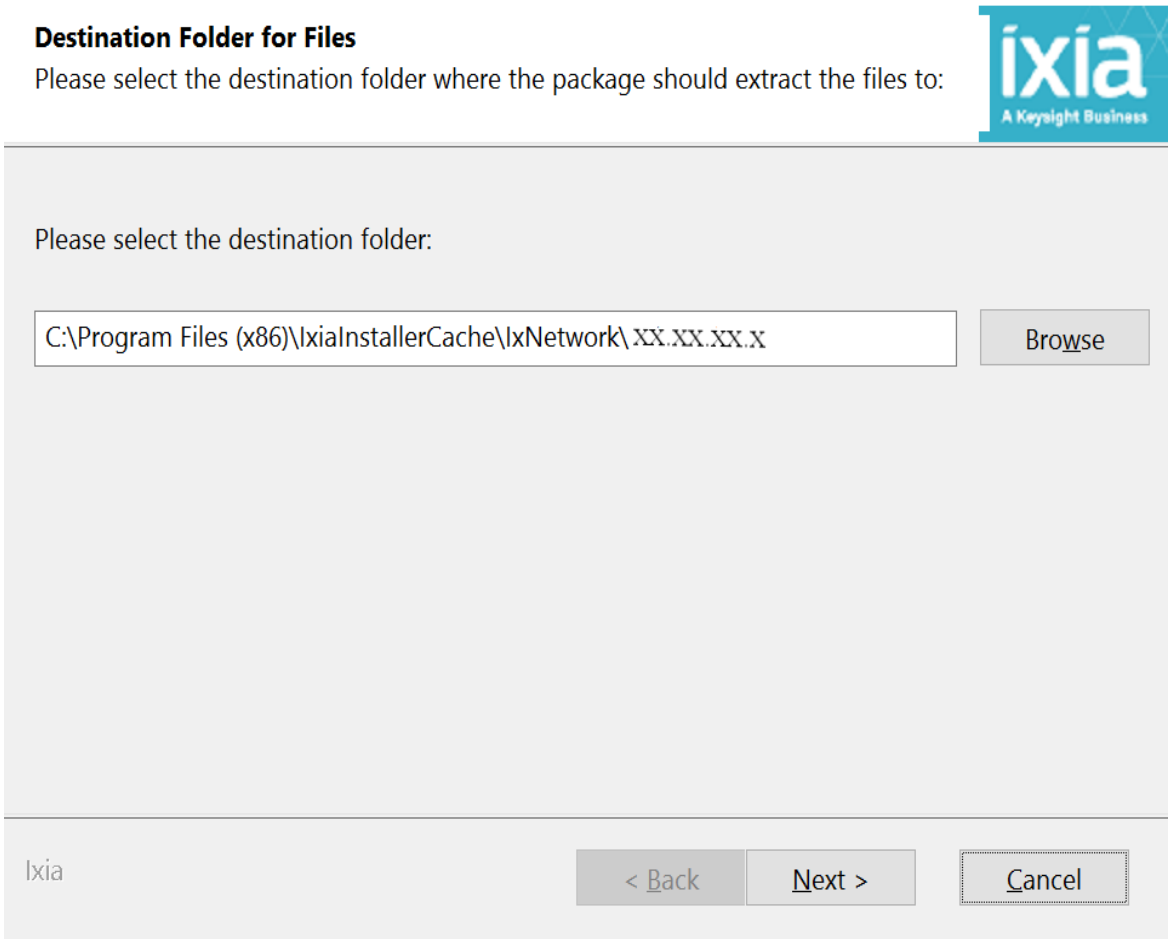
The benefits of chassis only installer are as below:

- It consumes less disk space on a chassis for storing the IxiaInstallerCache files as compared to the Full/ main installer since we bundle only the chassis specific components/ dependencies along with it.
- Installation is faster on a chassis due to the time saved in extracting less number of files.

To install IxNetwork, do the following:

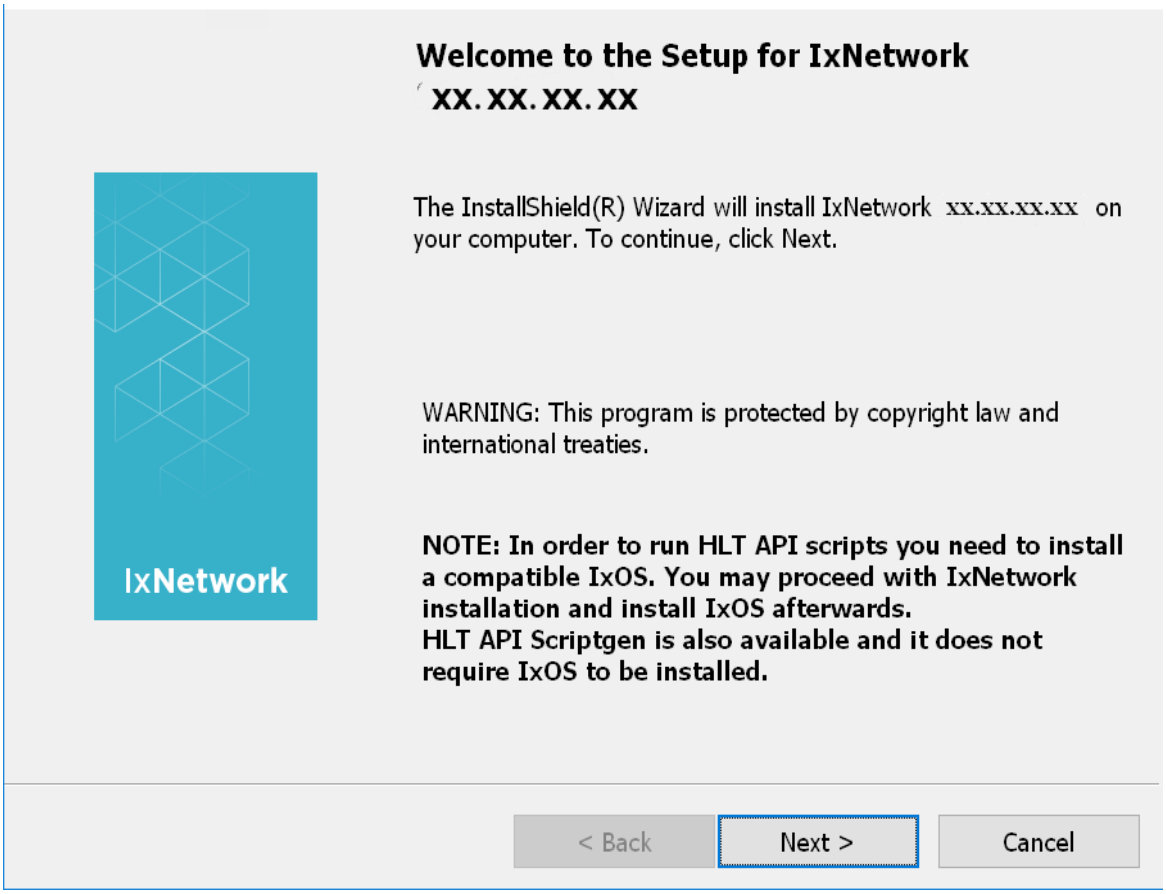
1. Close IxServer if it is running (and if it is installed on the chassis).
2. On a Windows PC, double-click the installation.exe file to start the installation. The installation

wizard appears as shown in the following figure:



3. Select the destination folder for installer extraction and click **Next**.

   The Welcome dialog box appears.



Note: To run HLTAPI scripts, you need to install an IxOS version that is compatible with the IxNetwork version you are installing. You can install IxOS after IxNetwork installation. You need not install IxOS if you work with HLTAPI scriptgen.

4. Click **Next** to go ahead with the installation. The **License Agreement** dialog box appears next.
5. Click **I accept the terms in the license agreement** to accept the license agreement. The **License Warning** dialog box appears next.
6. Select the **I acknowledge this message** check box to proceed with the installation.

   Note that if multiple versions of IxNetwork are installed on your computer, a **Program Maintenance** dialog box appears.

Note: Before installing the program, you can cancel the installation by clicking **Cancel**. You can then remove the existing version installed on your computer by clicking **Remove**.

Note: To modify the program features installed on your computer, click **Modify**.

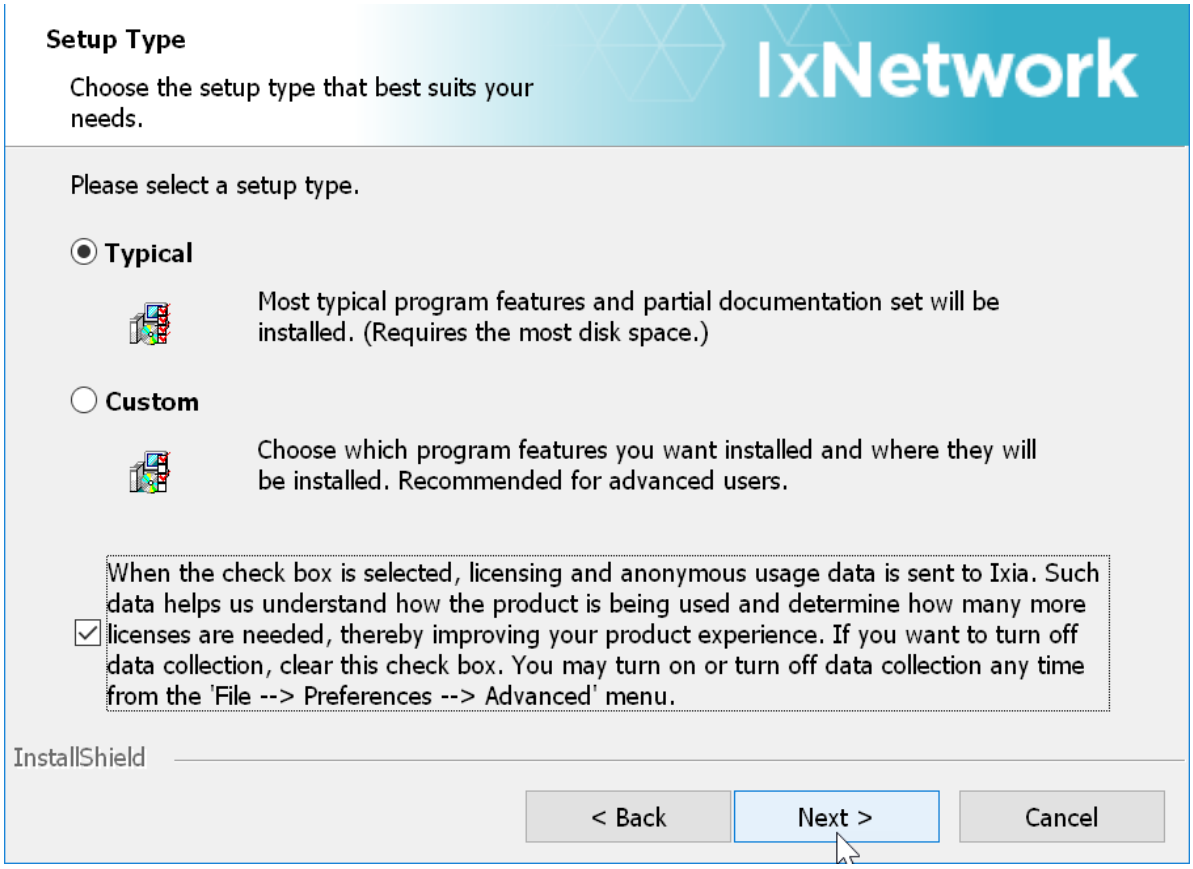
Note: To repair installation errors like missing files or registry entries, click **Repair**.

7. Click **Next** to continue with the installation. The **License Warning** dialog box appears. BE SURE to read the information in the License Warning window regarding license requirements.

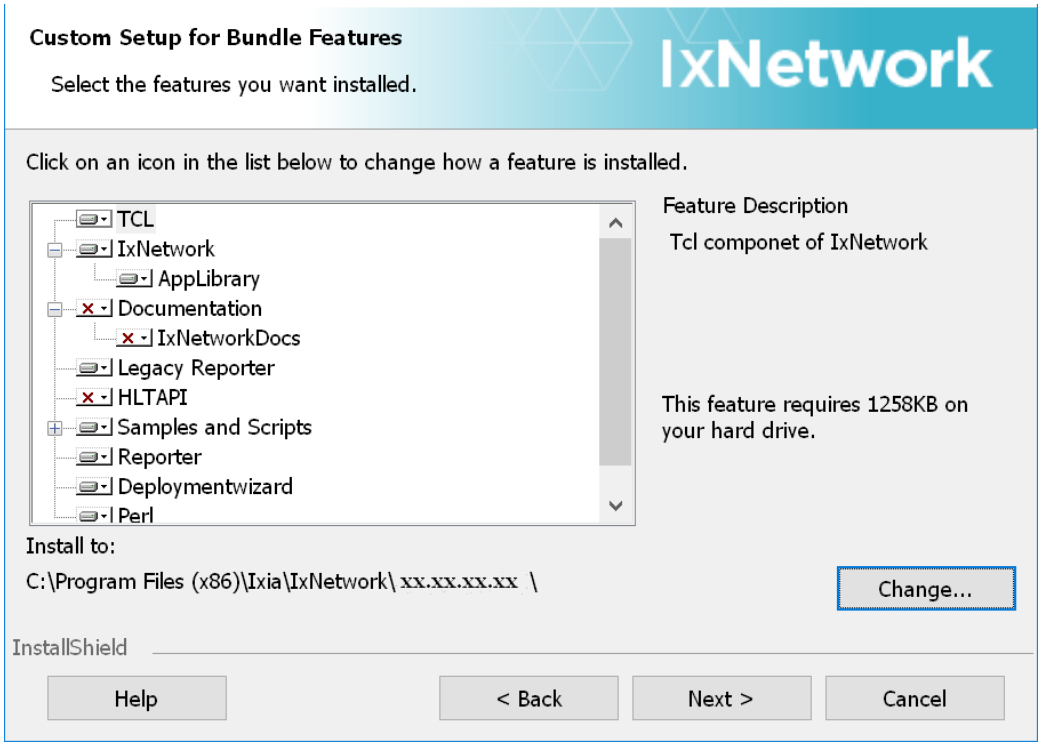
8. Select the **I acknowledge this message** check box.

Note: If you do not select the check box, the Next button is not available and the installation cannot continue.

9. Click **Next** to continue the installation. The **Setup Type** dialog box appears, as shown in the following figure:



10. Select one from the following:
    - *Typical*: Click this option to install the most typical features of IxNetwork.
    - *Custom*: Click this option to select the features you want to install.
11. The check box below this section is selected by default. When it remains selected, licensing and anonymous usage data is sent to Ixia. To turn off data selection, clear this check box. Data collection can be turned on or turned off any time from the 'File > Preferences > Advanced' menu.
12. Click **Next** to continue. If **Custom** setup is selected, the **Custom Setup for Bundle Features** dialog box appears next, as shown in the following figure:



13. Select the feature you want to install and click **Next.**

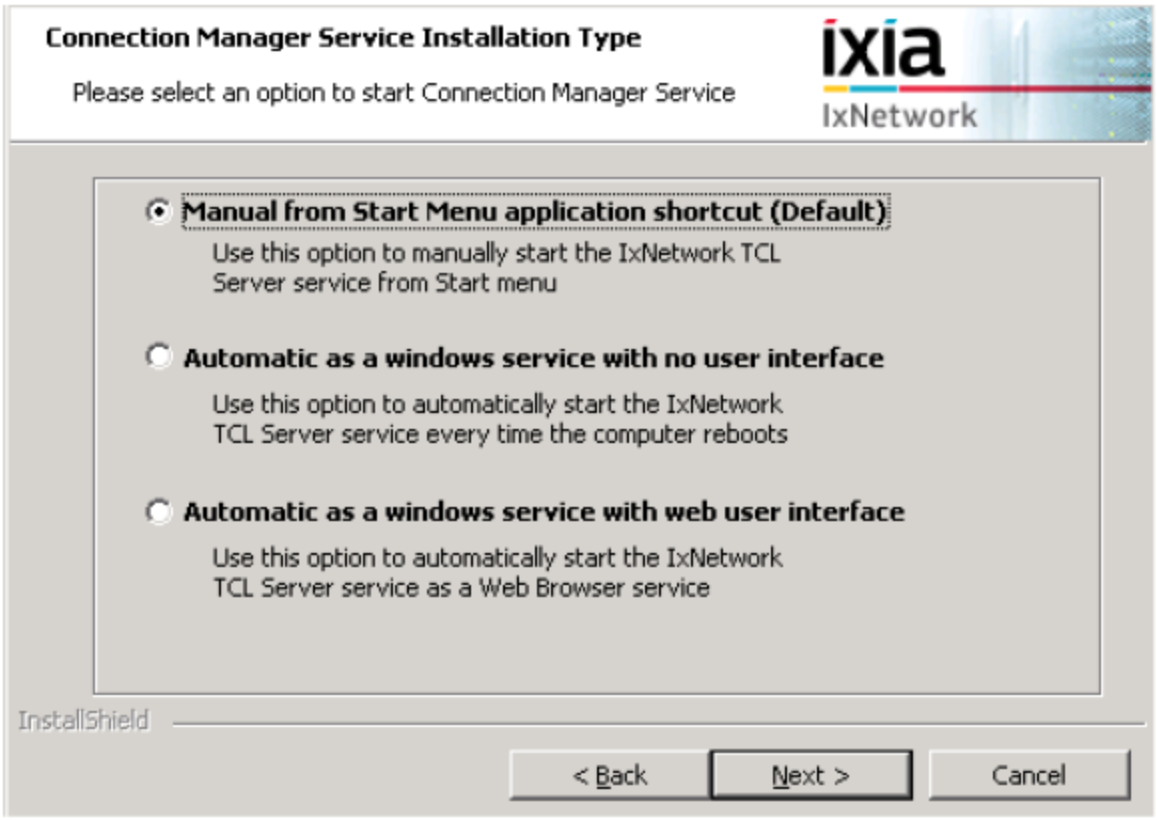
    Starting with IxNetwork 7.50 EA, HLTAPI and Sample Scripts are optional features. To install them, you must select them in the Custom Setup for Bundle Features dialog box.

    If you select **Documentation**, the IxNetwork documents and Help files gets installed along with the program. For windows 7 and earlier versions, these documents are available under **Advanced Information Manager** located under **Ixia** in the Program group.

    From IxNetwork 7.30, on Windows 2012 and Windows 8.1 and later versions, these documents are available under the **Docs** folder in respective IxNetwork build number in the Program group. See Accessing IxNetwork Documentation for guidance on how to access the IxNetwork help files.

    If IxOS is not installed with IxVM Server, IxVM Server Chassis feature is not selected by default. Even if you select it, you will not be able to proceed further and a message appears informing you that IxOS needs to installed along with IxVM Server

    If you are using a server Operating System like Windows 2008 or Windows 2012, the Connection Manager Service Installation Type dialog box appears as shown in the following figure:



14. Select one of the options to start the Connection Manager Service. The descriptions of the options are as follows:

- **Manual from Start Menu application shortcut**

  Select this option to start the Connection Manager Service manually from the **Start** menu.

  The shortcut is available under IxNetwork. This option is selected by default.

  After IxNetwork is installed, click **All Programs** from the **Start** menu of your computer.

  Click **IxNetwork** under **Ixia**. Click **Connection Manager** to open the **Connection Manager** window.

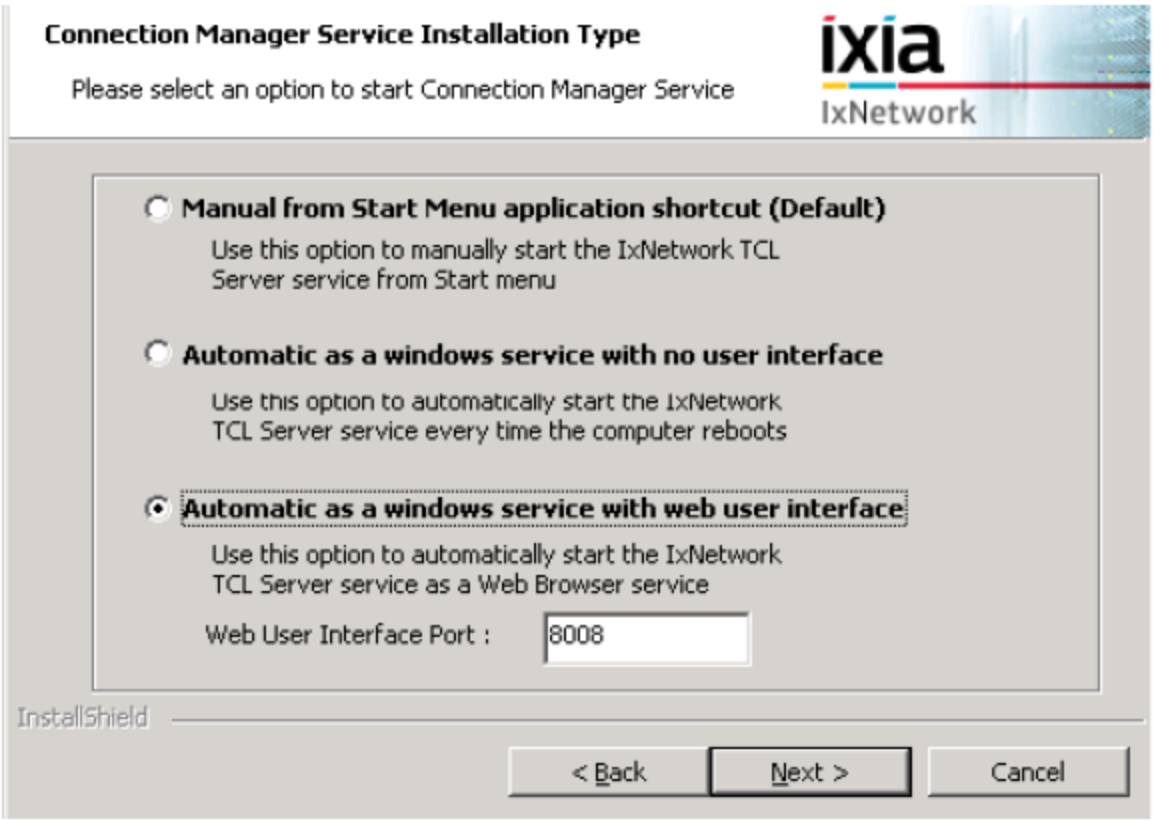
- **Automatic as a windows service with no user interface**

  Select this option to install Connection Manager as a Windows Service which starts automatically. It is accessible from Windows Service Manager. This option assumes that there is no HTTP port available. To make changes to the settings, the executable needs to be run again.

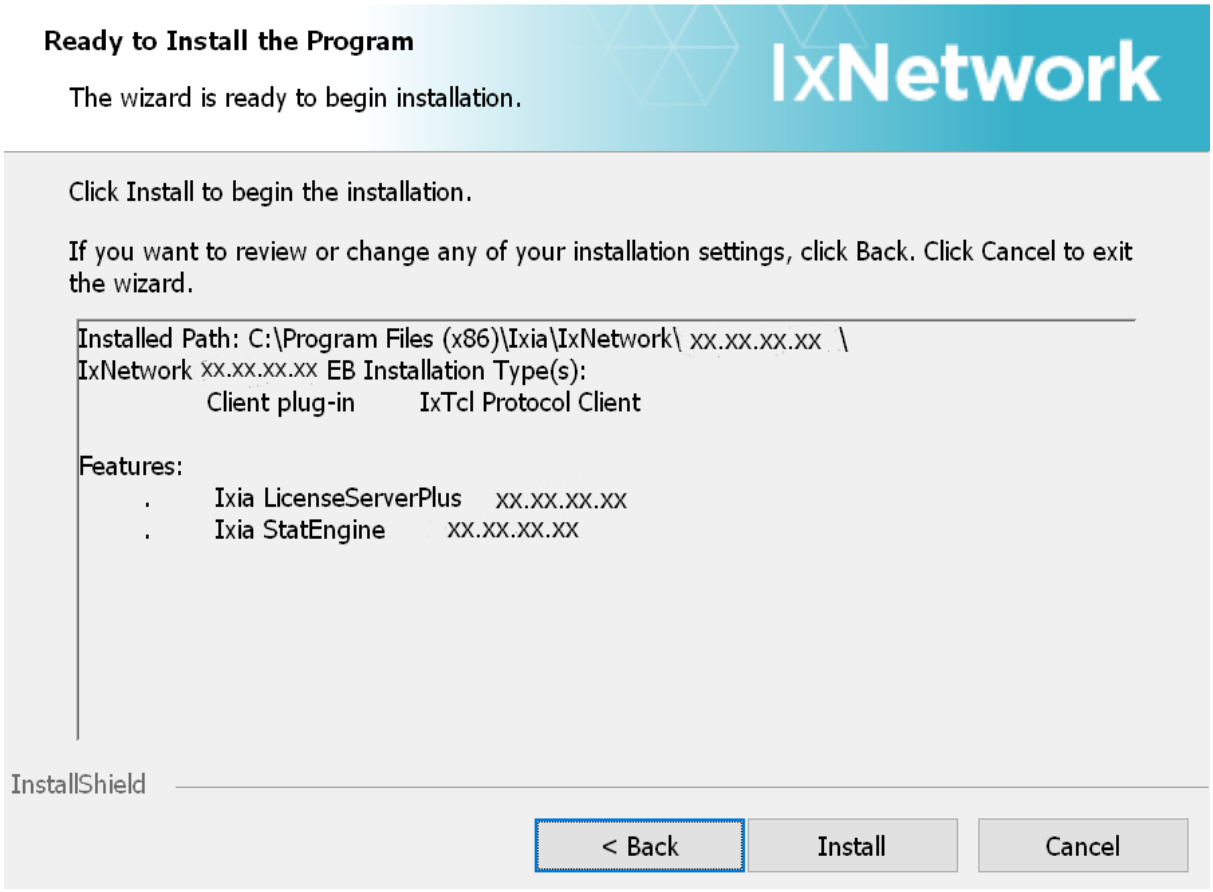
- **Automatic as a windows service with web user interface**

  Select this to install Connection Manager as a Windows Service which starts automatically. However, in this case, the Connection Manager Settings can be managed on a web page. If you select this option, the **Web user interface** port box appears. See the following figure:

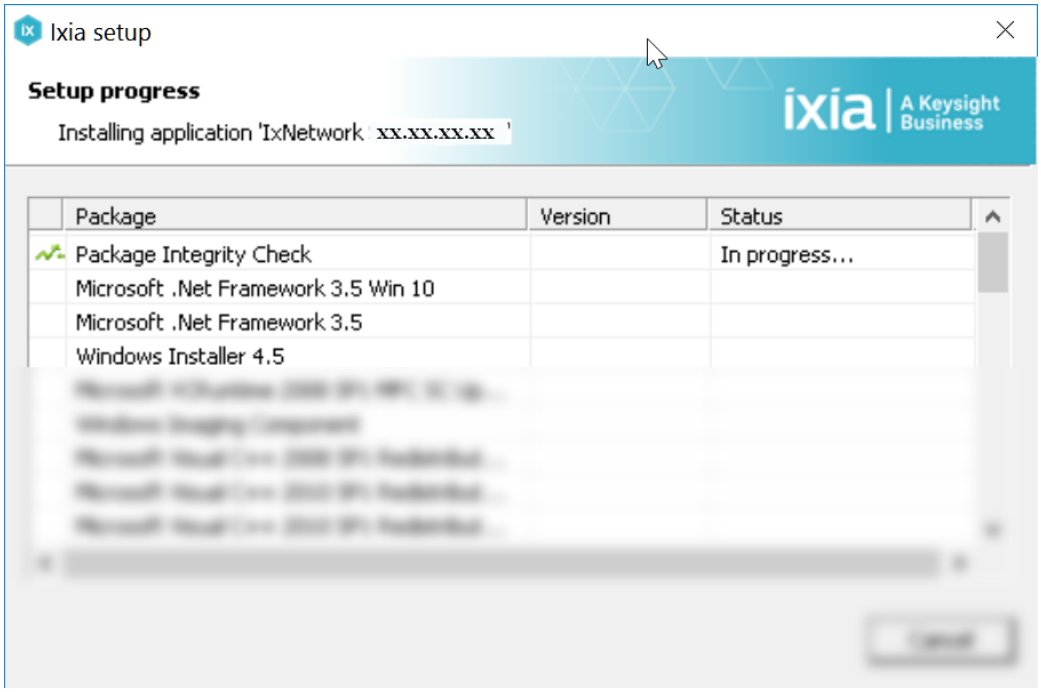
Note: This text box is available only when **Automatic as a windows service** with **web user interface** is selected.



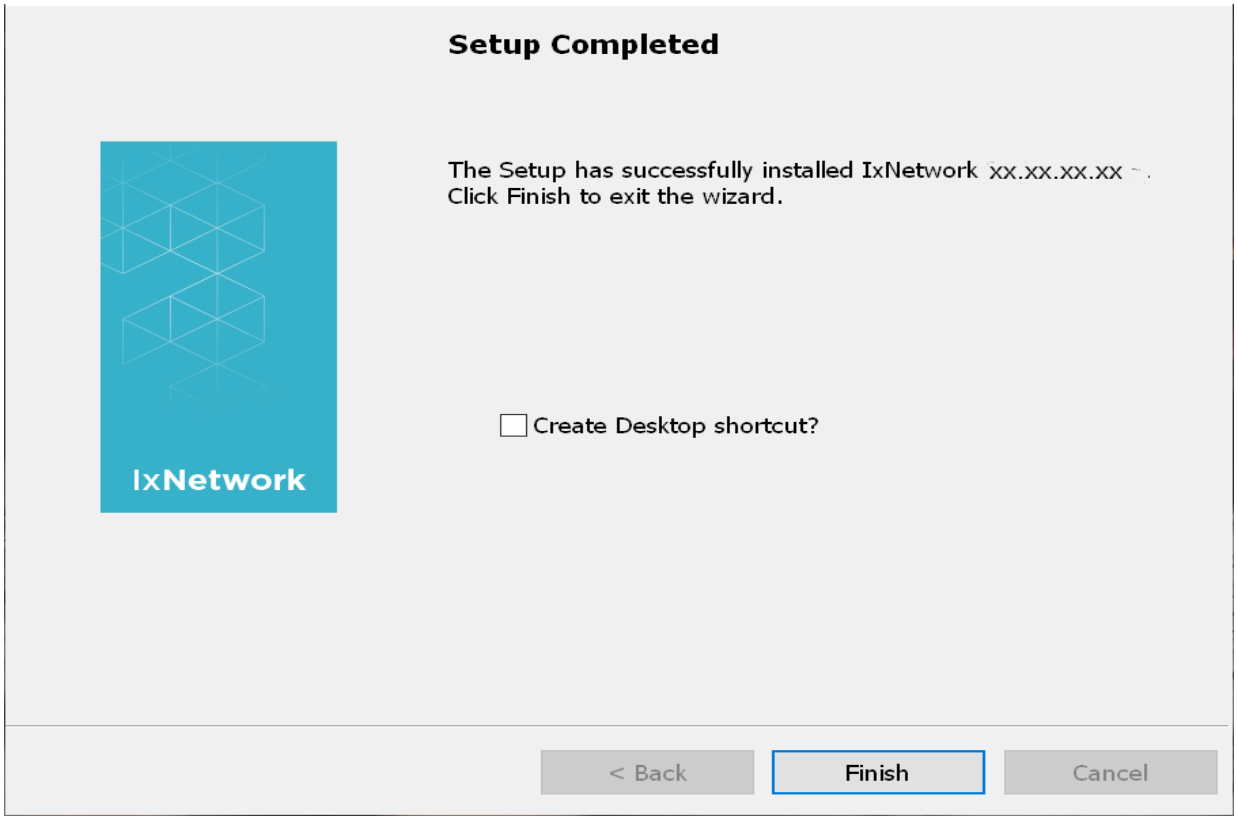
15. Type the HTTP port number in the **Web user interface port** box. **8008** is specified by default.
16. Click **Next**. The **Ready to Install the Program** dialog box appears as shown in the following figure.



17. Click **Install** to proceed with the installation of the program. The **Installing IxNetwork <version number>** dialog box appears displaying the progress of the installation.
18. The **Ixia setup** dialog box is displayed all through the installation, as shown in the following figure. The dialog box runs in the background and verifies if the installation is including all the items successfully.



The installation continues automatically. Once it is complete, the Setup Completed dialog box appears, as shown in the following figure:



19. Select the **Create Desktop shortcut?** check box to create an IxNetwork icon on your desktop, if desired.
20. Click **Finish** to complete the installation and reboot the system.

IxNetwork TCP Ports

Keep the TCP ports specified in the following table open for IxNetwork use:

Component	Direction	Port
Off Chassis HWM	HWM Machine <-- > Chassis	6809
IxProxy		1080
IxNetwork TCL	Wish --> TCL Sever (client)	Default is 8009, user configurable
StatViewer	Client --> Chassis	9102
IxOS	Client --> Chassis, File download Client --> Chassis, Telnet	4500 23
IxLicensing		
License Management	Client --> Chassis	SOCKS 1080
nodded service	Client < -- > License Server	4501
FNP Server (lmgrd)	Client --> License Server	27000- 27009
LicenseServerPlus		
FNE Server	Client --> License Server	Client --> License Server
Ixia Licensing Service (RPF server)	Client --> License Server	8880

Configuring IxNetwork for Silent Installation

IxNetwork Silent Install is a feature which enables you to install IxNetwork software unattended. A silent installation of IxNetwork is ideal for test scenarios or as part of a large-scale enterprise deployment.

If you want to use Silent Installation to install IxNetwork software on an Ixia chassis, you must change the policy that controls Silent Installation. See Preparing an Ixia Chassis for Silent Installation below.

IxNetwork product silent install setup is discussed in IxNetwork Silent Install using .exe Package on the facing page.

Preparing an Ixia Chassis for Silent Installation

If you try to run a Silent Install on an Ixia Chassis with Windows installed, Windows will display the following warning message for the Ixia kernel driver:

```
Signature Not Found
```

To prevent this warning, you must change the Windows policy that governs the installation of unsigned drivers. Perform the following steps. You need to perform this procedure only once.

1. On the Ixia chassis, click **Start**, select **Run**, type **MMC**, and click **OK.**
2. Click **Add/Remove Snap-in**, on the **Console** menu.
3. Click **Add**, select **Group Policy**, and click **Add**.
4. Click **Finish / Close / OK**.
5. Navigate down the following tree:
   - Console Root
   - Local Computer Policy
   - Computer Configuration
   - Windows Settings
   - Security Settings
   - Local Policies
   - Security Options
6. Right-click **unsigned driver installation behavior** and click **Security**.
7. Change the **Local policy setting** to: **Silently succeed**.
8. Click **OK**.

You must reboot the chassis after this operation.

IxNetwork Silent Install using .exe Package

Setting up the silent install for IxNetwork for a chassis involves activating specific features included in the product package, and specifying the server operation mode via a command line dialog box.

The available features and properties (operation modes) are delivered as part of the installer. Table Features on the next page lists the features available, and Table Properties lists the properties.

To run the IxNetwork installer silently, execute IxNetwork<version><release>.exe -e command in order to extract the exe, where <version> is the version of the software, and <release> is the release number for the particular package. The .exe is extracted to %ProgramFiles%\ IxiaInstallerCache\IxNetwork\<full_version>folder by providing a -e switch, for example, IxNetwork<version><release>.exe -e. The setup.exe file is located in this directory.

Perform the following steps to set up silent installation using the .exe package.

1. Open a command line window.
2. Enter the following command line argument, in one line:

```
setup.exe [-s|-q] [-n] [i|x|r] [F.Feature1=Yes|No [F.Feature2=Yes|No]] [P.Prop1-
1=Val1 [P.Prop2=Val2]]
```

3. See IxNetwork setup.exe Package Examples below for examples of using the command line to set up silent installation.

Note: Earlier silent installation of IxNetwork was a two step process in which you had to first extract the setup (example: IxNetwork_8.10_EA.exe -e) and then had to provide the silent installation switch on a command line (example: setup.exe i -s). Now you can install IxNetwork silently using a single command line. Example: IxNetwork_ 8.10_EA.exe i -s.

Setup.exe Switches

Switch	Definition
-s	silent (progress bar only)
-q	quiet (no GUI at all)
-n	external controlled (by IxAdmin)
no switch (default)	GUI installation

Setup.exe Actions

Switch	Definition
i	install
x	uninstall
r	repair
no action (default)	install

Features

F.Feature1=Yes – install the named feature.

These features represent installer components and are detailed in config.xml file, in the ConfigOptions/CannedConfig section. If no features are provided, a default configuration will be used.

Features represent the installer components that can be selected from the GUI in standalone mode. The command line allows the combinations of these features.

Features

Feature	Definition
F.Client	Install Client components
F.Server	Install Chassis components
F.Tcl	Install Tcl components

F.IxVM_ Chassis	Install IxVM components
F. Docs	Install documentation
F. OldReporter	Install Legacy Reporter
F. HLTAPI	Install Hltapi
F. Samples	Install Samples and Scripts for IxNetwork Client

Properties

P.Prop1 =Val1 – pass to the installer a certain property.

If no properties provided, default properties are used.

Properties correspond with settings from the installation GUI, but do not represent the standard features from the feature selection dialog box, however, the options are presented as radio buttons, checkbox or edit fields (like the choice of TCL version in IxNetwork). A special property is InstallDir which (if accepted by the application installer) sets the installation folder.

Properties

Property	Definition
P.INSTALL_ STANDALONE	Install IxNetwork
P.INSTALL_SERVER	Install Chassis Components
P.INSTALL_DOCS	Install Documentation
P.INSTALL_ OLDREPORTER	Install Legacy Reporter

IxNetwork setup.exe Package Examples

The following examples demonstrate various options for setting up silent installation using the *setup.exe* package:

- Silent installation of IxNetwork:
  ```
  setup.exe –s P.INSTALL_STANDALONE=Yes
  ```
- Quiet installation of IxNetwork:
  ```
  setup.exe –q P.INSTALL_STANDALONE=Yes
  ```
- Silent Uninstall (any config)
  ```
  setup.exe –s x
  ```

The following table represents the detailed list of the configuration and corresponding command lines for IxNetwork.

IxNetwork configuration to install	Command line

Install IxNetwork	Silent: setup.exe –s P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes Quiet: setup.exe –q P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes
Install IxNetwork and Docs	Silent: setup.exe –s P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes P.INSTALL_DOCS=Yes Quiet: setup.exe –q P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes P.INSTALL_DOCS=Yes
Install IxNetwork, Docs and IxVM Server Chassis	Silent: setup.exe –s P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes P.INSTALL_DOCS=Yes P.INSTALL_SERVER=Yes Quiet: setup.exe –q P.INSTALL_STANDALONE=Yes P.INSTALL_ OLDREPORTER=Yes P.INSTALL_DOCS=Yes P.INSTALL_SERVER=Yes

Install IxNetwork on a Physical Chassis

To install IxNetwork on a physical Ixia chassis:

1. Type `IxNetworkChassis_7.40_EA.exe -e` at the command line.
2. Run `setup.exe -s` from the extracted folder.

Uninstall/Modify a Current Installation

To remove silently or uninstall the current version of IxNetwork, enter the following argument at the command line:

```
Setup.exe –s x
```

To modify an existing installation, first uninstall it, then reinstall it with the desired features.

Silent Repair/Modify

Silent repair is the same as running silent install on a current installation. Enter the following at the command line:

```
setup.exe -s r
```

IxNetwork Linux Installation

The following section gives information about IxNetwork installation in Linux environment.

Note: Root-level permission is required to run IxNetwork binary installer.

To be able to install and use IxNetwork, IxOS must be first installed on your Linux system.

To install Linux IxOS, you can choose from binary installer or tar.gz format.

Installation using IxOS Binary Installer

1. Copy the IxOS<version>Linux.bin file to the system.
2. Change the file's attribute to make it executable.

   Example: chmod +x IxOS<version>Linux.bin
3. Execute the IxOS installer file (use the –i console option if installing via console or remote shell).

   Example: ./IxOS<version>Linux.bin
4. When the installer prompts, select Tcl version 8.5 (required) and the install location.
5. Follow the rest of the instructions to complete the installation.

Installation using IxOS tgz Package

1. Create the destination folder.
2. Extract and copy all folders and files from the tgz package into the destination folder.

Installation/Uninstallation Commands

The installation commands are in the following mode.

1. GUI Mode:

   ./<Installer_name> -i gui

   Example:

   ./IxNetworkTclClient7.50.68.514Linux.bin -i gui

   ./IxNetworkTclClient7.50.68.514Linux64.bin -i gui
2. Console Mode:

   ./<Installer_Name>

   ./<Installer_Name> -i console

   Example:

   ./IxNetworkTclClient7.50.68.514Linux.bin

   ./IxNetworkTclClient7.50.68.514Linux.bin –i console

   ./IxNetworkTclClient7.50.68.514Linux64.bin

   ./IxNetworkTclClient7.50.68.514Linux64.bin -i console

3. Silent Mode:

   <Installer_Name> –DUSER_INSTALL_DIR=<Specify_Installation_Path> -i silent

   Example – ./IxNetworkTclClient7.50.68.514Linux.bin -DUSER_INSTALL_DIRR=/

   home/vmanral/ixos-3 -i silent

Uninstallation Command

The uninstallation command is given below with an example.

./<Installation_Dir>/Uninstall_<Product_Name>/Uninstall_<Product_Name>

Example – ./IxNetworkTclClient7.50.68.515-EB/ Uninstall_IxNetworkTclClient7.50.68.515/Uninstall_IxNetworkTclClient7.50.68.515

Location of Log Files

<Users_Home_Dir>/logs

Example – /home/vmanral/logs

Note: IxOS is mandatory only during installation through GUI and Console modes. Silent installation does not check for IxOS.

Note: During installation through GUI and Console modes, IxNetwork installation directory should be same as the installation directory of an IxOS build and all the IxNetwork resources are installed under lib folder of IxOS.

Installation Sequence using the Console Mode

This is the default installation mode. The steps are given below:

```
[root@PITcentOS ixia]# ./IxNetworkTclClient7.51.1015.62Linux64.bin
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...
Launching installer...
===============================================================================
IxNetworkTclClient7.51.1015.62 (created with InstallAnywhere)
-------------------------------------------------------------------------------
Preparing CONSOLE Mode Installation...
===============================================================================
Introduction
------------
InstallAnywhere will guide you through the installation of
IxNetworkTclClient7.51.1015.62.
It is strongly recommended that you quit all programs before continuing with
this installation.
Respond to each prompt to proceed to the next step in the installation. If you
want to change something on a previous step, type 'back'.
You may cancel this installation at any time by typing 'quit'.
PRESS <ENTER> TO CONTINUE:
===============================================================================
IMPORTANT NOTE
----------------------
Please note that the installation should be done using a root account or you
need at least rwx on /opt
PRESS <ENTER> TO CONTINUE:
===============================================================================
Choose Install Folder
```

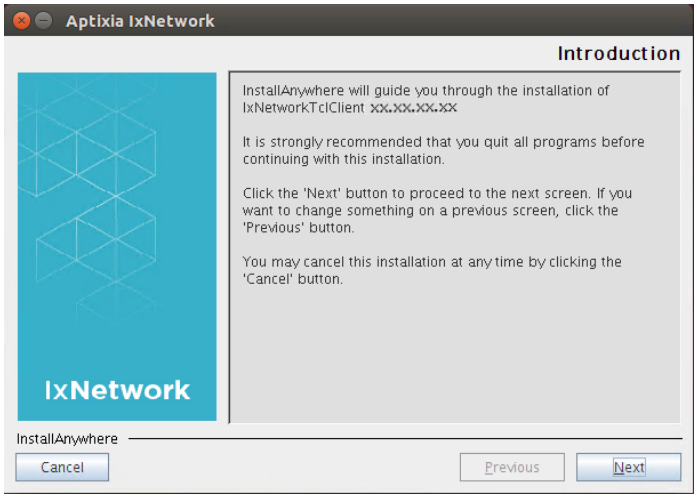
```
----------------------------
NOTE: "ixnetwork/7.51.1015.62" will be appended to the install location in case
you change the default directory and you do not add that at the end
Where would you like to install?
Default Install Folder: /opt/ixia/ixnetwork/7.51.1015.62
ENTER AN ABSOLUTE PATH, OR PRESS <ENTER> TO ACCEPT THE DEFAULT
: /root/ixia
INSTALL FOLDER IS: /root/ixia
IS THIS CORRECT? (Y/N): Y
================================================================================
Select HLAPI installation
------------------------------
Do you want to install HLAPI?
->1- Yes
2- No
ENTER THE NUMBER FOR YOUR CHOICE, OR PRESS <ENTER> TO ACCEPT THE DEFAULT:: 1
================================================================================
Pre-Installation Summary
--------------------------------
Please Review the Following Before Continuing:
Product Name:
IxNetworkTclClient7.51.1015.62
Install Folder:
/root/ixia/ixnetwork/7.51.1015.62
HLAPI Install Folder:
/root/ixia/hlapi/4.98.122.24
IxOS Install Folder:
/root/ixia/ixos-api/6.91.1.24
Python Install Folder:
/opt/ixia/python/2.7.6
Perl Install Folder:
/opt/ixia/perl/5.18.1.1800
Tcl Install Folder:
/opt/ixia/tcl/8.5.17.0
Disk Space Information (for Installation Target):
Required: 949,509,338 Bytes
Available: 49,475,362,816 Bytes
PRESS <ENTER> TO CONTINUE:
================================================================================
Installing...
---------------
================================================================================
Installation Complete
----------------------------
Congratulations. IxNetworkTclClient7.51.1015.62 has been successfully installed
to:
/root/ixia/ixnetwork/7.51.1015.62
NOTE:
HLPy API requires to have installed: libXft libXScrnSaver
Sample packages installation: "yum install libXft libXScrnSaver"
PRESS <ENTER> TO EXIT THE INSTALLER:
[root@PITcentOS ixia]#
```

Installation Sequence Using the GUI Mode

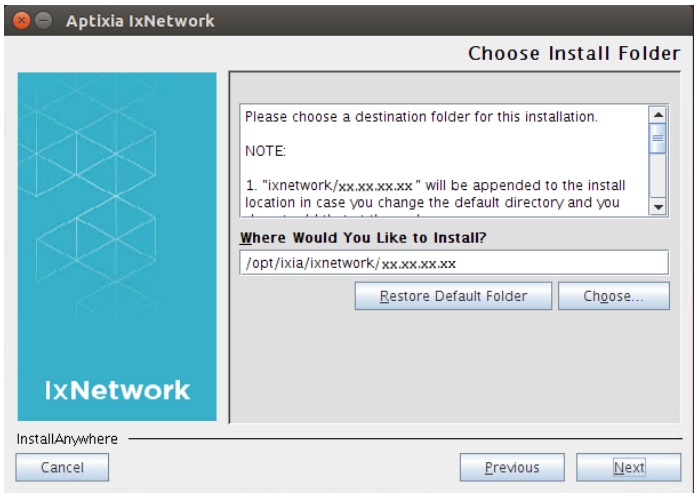
The following figure shows the initial panel in the installation sequence.

For GUI installation, perform the following steps:

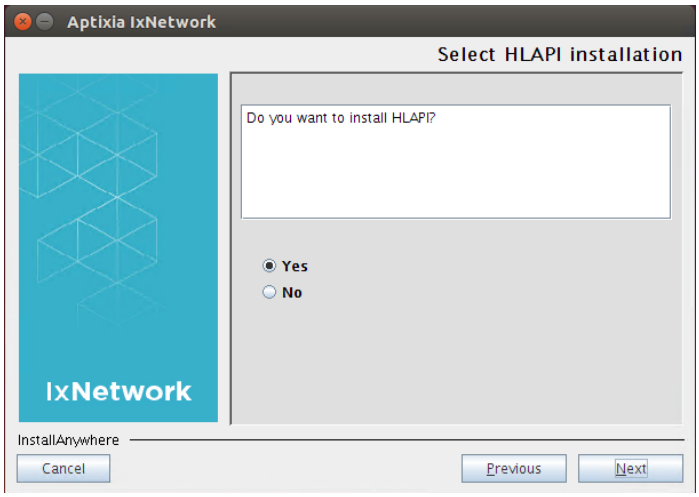
1. Click **Next** in the **Introduction** dialog box of the wizard as shown in the following figure:



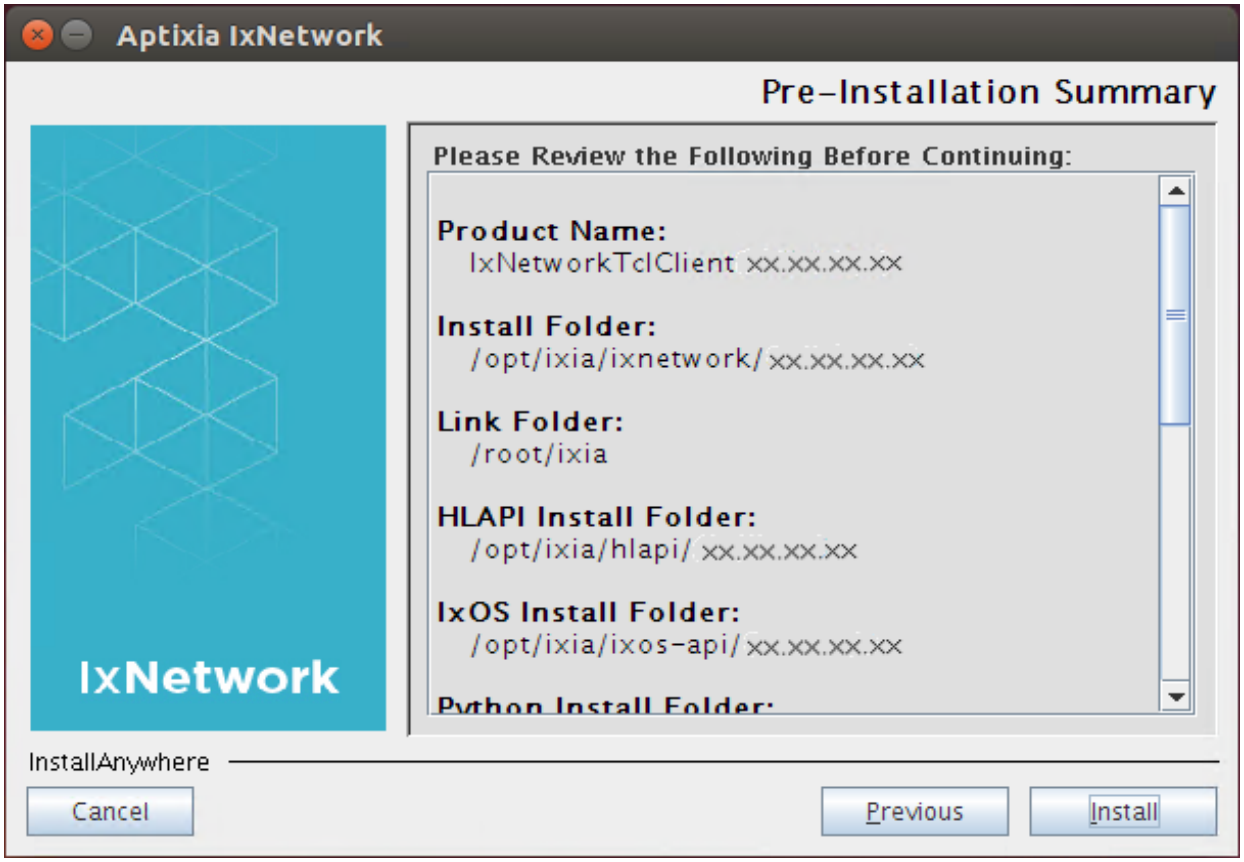
2. In the **Choose Install Folder** dialog box, select the folder location for the installer.



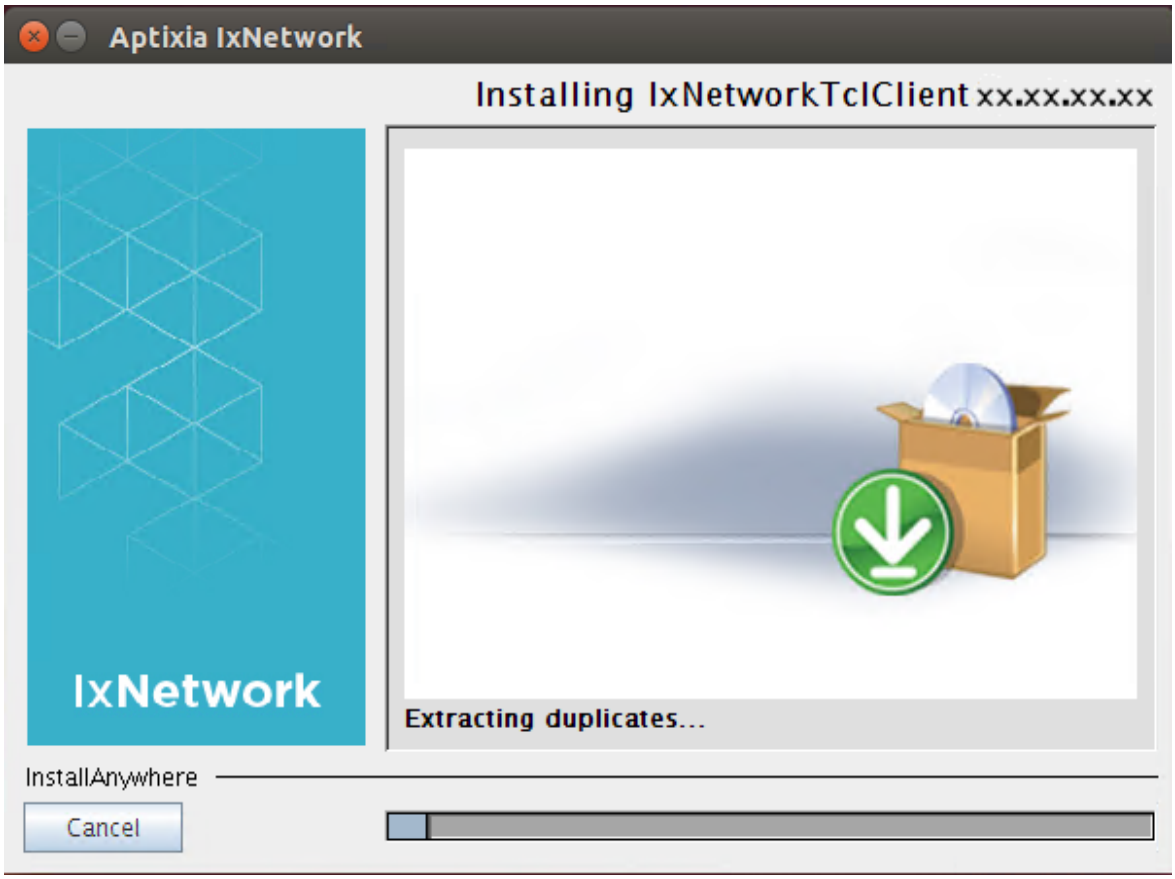
3. Perform the following actions:
    i. Click **Choose** to select a new folder location.
    ii. Click **Restore Default Folder** to restore the default folder location.
4. Click **Next**, then **Yes** to install HLTAPI.



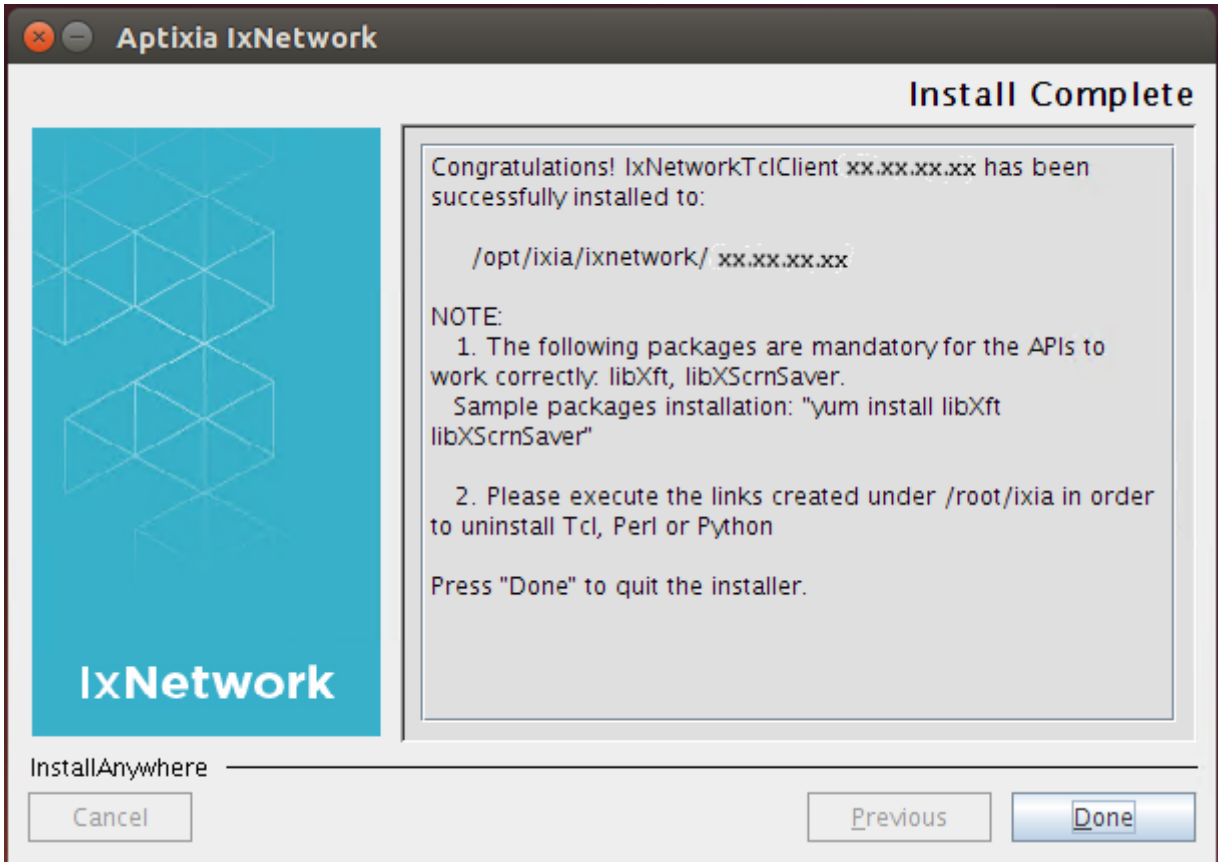
5. Click **Next**, the **Pre-Installation Summary** dialog box appears.



6. Click **Install**.The installation progress is shown as follows:



After the installation is complete, the **Install Complete** dialog box appears.



7. Click Done to exit the installation wizard.

Shell Wrapper Installation

When IxNetworkTclClient bin file is installed, shell wrappers are installed in /<install folder->/ixnetwork/<version>/bin folder.

- ixnettcl : Sets TCLLIBPATH and calls the ixiatcl8.5.17 link in /usr/bin. To execute Tcl script, execute "ixnettcl <lowLevelScriptName>"
- ixnetperl : Sets PERL5LIB and calls the ixiaperl5.18 link in /usr/bin. To execute Perl script, execute "ixnetperl < lowLevelScriptName >"
- ixnetpython : Sets PYTHONPATH and calls the ixiapython2.7.6 link in /usr/bin. To execute Python script, execute "ixnetpython < lowLevelScriptName >"
- ixnetwish : Sets TCLLIBPATH and calls the ixiawish8.5.17 link in /usr/bin. To execute Wish script, execute "ixnetwish < lowLevelScriptName >"

TCL Automation Setup

The ScriptGen feature of IxNetwork requires an underlying TCL platform (compiled with Thread support). If Platform independent libraries are used, supported TCL version is 8.5. The binary installer delivers TCL 8.5.

During installation the Tcl files are installed in /opt/ixia/tcl/<version> location.

To run a Tcl script:

- Run the "ixnettcl <script name>" located in /<install folder>/ixnetwork/<version>/bin directory. The script sets TCLLIBPATH and calls ixiatcl8.5.17, which is a link in /usr/bin folder that points to ixiatcl file in /opt/ixia/tcl/<version>/bin location.
- ixiatcl file sets the other required environment variables and calls /opt/ixia/tcl/<version>/bin/tcl

The main low level automation package used by IxNetwork is called IxTclNetwork and should be loaded upon starting the TCL interpreter using the following command:

```
package req IxTclNetwork.
```

Optionally, for running Test Composer automation, the Thread and ix_tc package need to be loaded in this order.

Upon successful loading, it should print the IxNetwork version:

```
% package req IxTclNetwork
7.50.0.150
% package req Thread
2.6.5
% package req ix_tc
1.0
```

The binary installers create two environment variables on the system (LD_LIBRARY_PATH and TCLLIBPATH). Both variables are appended to existing values.

- LD_LIBRARY_PATH is used to specify all the locations of the dynamic .so / .dll libraries needed for the correct functionality of the Ixia TCL automation (.e.g. mpexpr1.0.so / mpexpr.dll for floating point extended precision).
- TCLLIBPATH is used to provide Tcl with additional site-specific locations to search for Ixia automation packages without installing it all the locations of the packages needed for "package require" commands.

See *TestComposer ScriptGen Tcl Reference Guide* for more information.

Python Automation Setup

Python 2.7.6 comes with both Linux and Windows IxNetwork installers.

The Python version installed by IxNetworkTclClient can be accessed using the `ixiapython2.7.6` command, which is a symbolic link created while installing IxNetworkTclClient. In case you have installed multiple versions of Python on your system, the `ixiapython` command runs the Python version added with the latest IxNetwork application installed.

The recommended version is python.org 2.7.6.

During installation the Python files are installed in /opt/ixia/python/<version> location.

To run a Python script:

- Run the "ixnetpython <script name>" located in /<install folder>/ixnetwork/<version>/bin directory. The script sets PYTHON5LIB and calls ixiapython2.7.6, which is a link in /usr/bin folder

that points to ixiapython file in /opt/ixia/python/<version>/bin location.

- ixiapython file sets the other required environment variables and calls /opt/ixia/python/<version>/bin/python

PYTHON5LIB needs to be setup to include path to the required IxNetwork.py. To run your script using the latest version of Python installed, use the following syntax:

```
ixiapython <script name>
```

Perl Automation Setup

Perl 5.18.1 comes with the Windows IxNetwork installer, as well as with the Linux TCL client binary installer.

On a Linux system, the Perl version installed by IxNetwork can be accessed using the `ixiaperl5.18` command, which is a symbolic link created while installing IxNetwork. In case you have installed multiple versions of Perl, the `ixiaperl` command runs the highest version of Perl installed.

During installation the Perl files are installed in /opt/ixia/perl/<version> location.

To run a Perl script:

- Run the "ixnetperl <script name>" located in /<install folder>/ixnetwork/<version>/bin directory.The script sets PERL5LIB and calls ixiaperl5.18, which is a link in /usr/bin folder that points to ixiaperl file in /opt/ixia/perl/<version>/bin location.
- ixiaperl file sets the other required environment variables and calls /opt/ixia/perl/<version>/bin/perl

PERL5LIB needs to be setup correctly to include path to the required IxNetwork.pm. To execute your script using the highest version of Perl installed, use the following syntax:

PERL5LIB needs to be setup correctly to include path to the required IxNetwork.pm. To execute your script using the highest version of Perl installed, use the following syntax:

```
ixiaperl <script name>
```

Note: PIT Notes: The Platform Independent tgz packages do not contain Perl, Python or Tcl interpreters. The IxNetwork dependencies (mpexpr, snit, tclx) are also not included. Download the all-in-one language packages and dependencies installer for Linux x86 and x64 to use with any app PIT installer from the Ixia website.

Versions Supported by IxNetwork

The windows versions that are supported by the current release of IxNetwork for client machine are:

Location	Supported OS versions
Client machine	Windows Vista SP2 32-bit and 64-bit
Client machine	Windows 2008 Enterprise SP2 32-bit

Client machine	Windows 2008 Server R2 Enterprise 64-bit
Client machine	Windows 2008 Server R2 Standard 64-bit
Client machine	Windows 2008 Server Standard SP2 32-bit
Client machine	Windows 7 Enterprise 32-bit and 64-bit
Client machine	Windows 7 Professional 32-bit and 64-bit
Client machine	Windows 7 Ultimate 32-bit and 64-bit
Client machine	Windows 8.1 Enterprise 32-bit and 64-bit
Client machine	Windows Server 2012 R2 Standard 64-bit

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CHAPTER 3 Running a Test with IxNetwork

Follow the procedures in this guide to run a simple test and quickly gain experience with IxNetwork. If you need to perform more advanced testing, refer to *IxNetwork User Guide*.

For detailed information on IxNetwork installation and licensing, see:

- Installation and Licensing

For detailed information on licensing, see:

- IxNetwork Licensing
- *Ixia License Management User Guide*

Following are the topics covered in this chapter:

- Requirements
- A Simple IxNetwork Test
  - Connect the Ports
  - Start IxNetwork
  - Select the Ports
  - Configure the Protocol
  - Review the Protocol Configuration
  - Ping the DUT
  - Start the BGP Protocol
  - Configure Traffic
  - Set Up the Test Composer
  - Set Up CSV Logging
  - Set Up a QuickTest

Note: The minimum resolution for viewing the IxNetwork GUI is 1024x768, with a DPI setting of Normal Size (96 DPI)

Requirements

IxNetwork is a client application that runs under Windows. It operates in conjunction with one or more chassis running IxOS/IxServer.

To run the IxNetwork test in this guide, you need the following:

- An Ixia chassis with an Ethernet-based CPU-per-port load module.
- Two ports available on the load module.
- Connection cables.
- A Windows PC to run IxNetwork. The IxNetwork Client is run on the Windows workstation, while IxOS/IxServer is run on the chassis.

A Simple IxNetwork Test

To get acquainted with IxNetwork, perform the following steps to set up and run a simple test.

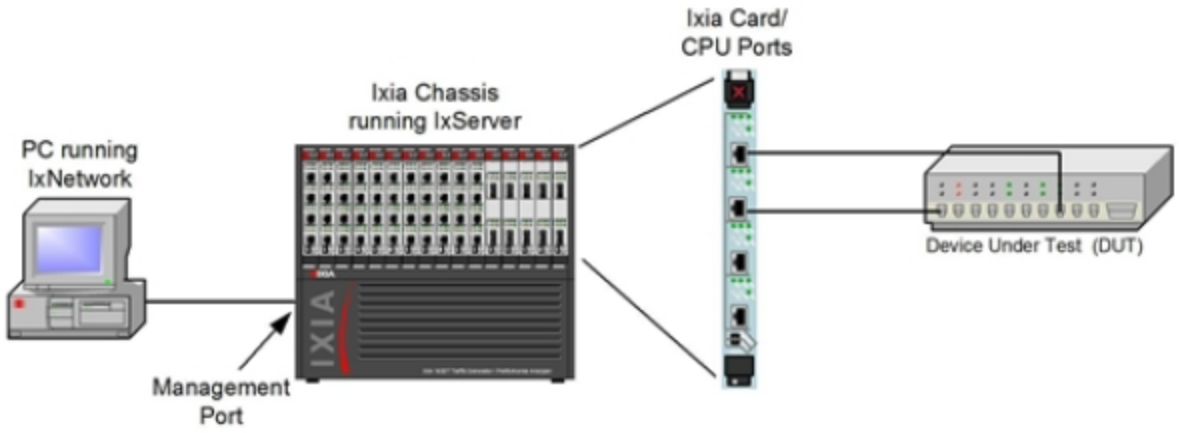
The test configuration used as an example in this document is the BGP protocol, hence, install the IxNetwork BGP protocol emulation. Configure the Ixia ports to run the BGP protocol and send the traffic through the DUT to Route Ranges advertised by BGP.

To run a simple test in IxNetwork, you need to perform the following steps:

1. Connect the Ports
2. Start IxNetwork
3. Select the Ports
4. Configure the Protocol
5. Review the Protocol Configuration
6. Ping the DUT
7. Start the BGP Protocol
8. Configure Traffic
9. Set Up the Test Composer
10. Set Up CSV Logging
11. Set Up a Quick Test

Connect the Ports

Before starting a test, connect the DUT ports to the Ixia chassis, using the correct cables for the connection as shown in Ixia Chassis — DUT Cable Connections below. The PC running IxNetwork is connected to Ixia chassis through a network connection to the management port on the chassis.



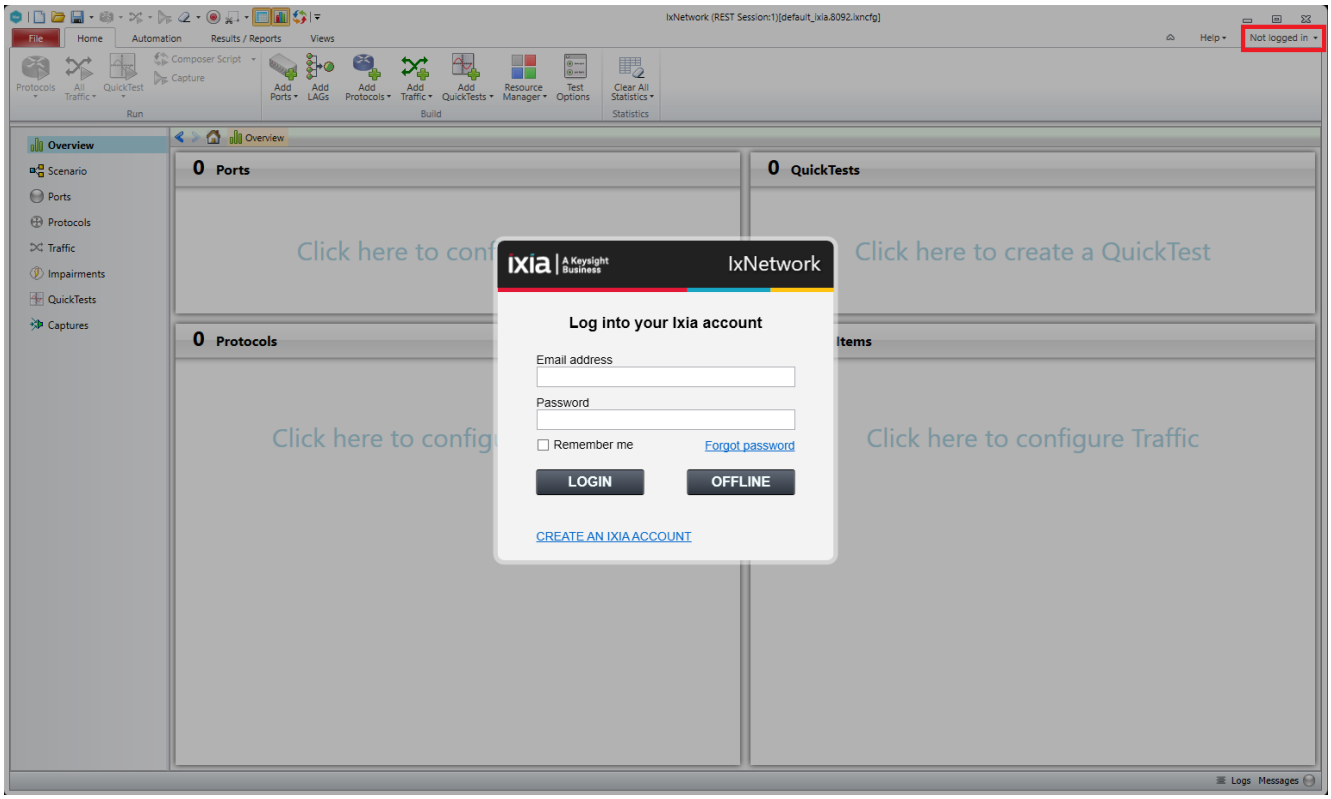
Start IxNetwork

Before you start IxNetwork:

- Make sure IxServer is running on Ixia chassis. IxServer normally starts automatically when the chassis boots up.
- Make sure you know the available ports on the chassis. Applications such as IxExplorer, Scriptmate, and Tcl scripts allow you to take ownership of the ports on Ixia chassis. If the ports are already in use, they are not available for assignment in the IxNetwork Port Management window.

To start the IxNetwork application, perform the following tasks:

1. Double-click the IxNetwork icon on your Desktop. The IxNetwork GUI window appears as shown in the following figure:



2. Sign in to your Ixia account to use IxNetwork. Select the **Remember me** check box, if you want to store your sign in information.

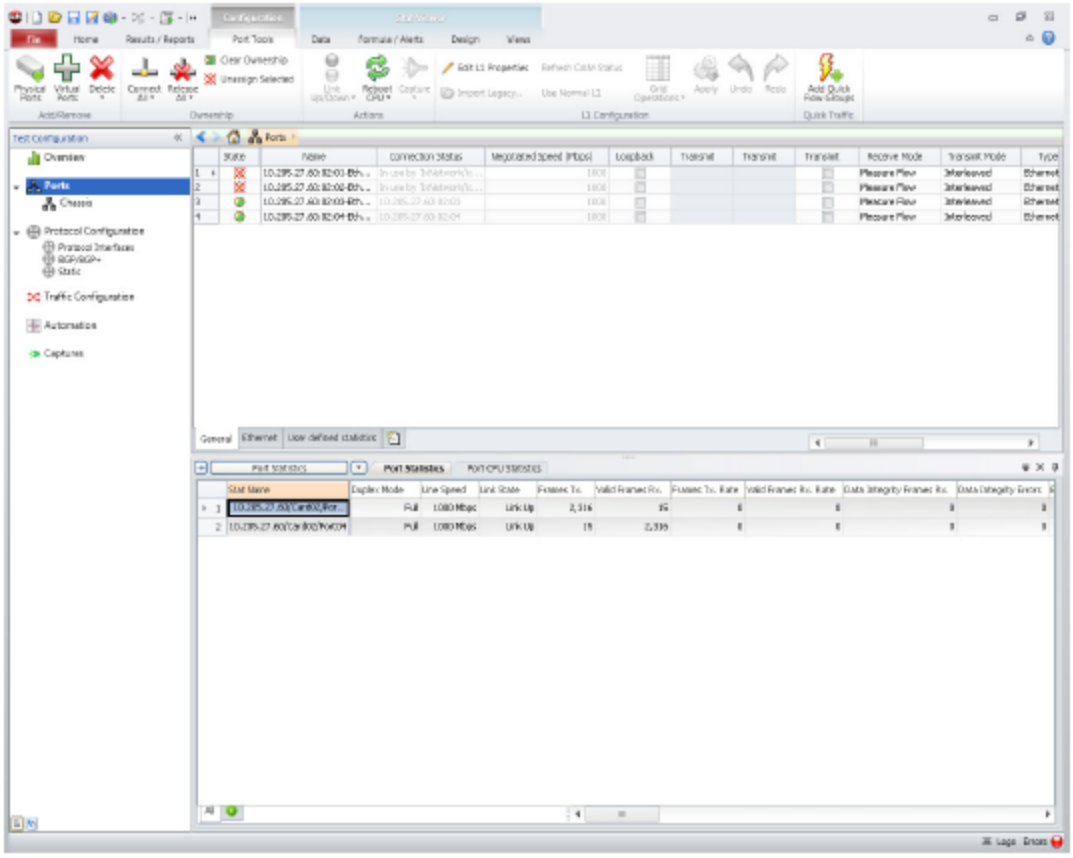
Note:

- Your IxNetwork account is already created using your ixiacom.com e-mail address. To sign in for the first time, click **Forgot Password** or go to https://login.ixiacom.com/?forgot-password. Enter your e-mail address and submit the form. You will receive an e-mail with instructions on how to proceed.
- If you do not receive an e-mail in your ixiacom.com account, click **CREATE AN IXIA ACCOUNT** link or go to https://login.ixiacom.com/?create-account.

3. Click **OFFLINE**, if you do not want to type any credential. In the offline mode, you will not get the following features:
   - New Ixia product releases and feature notifications
   - One-click feedback and support
   - Cloud config storage
   - One-click config sharing

   At any point of time, you can sign in to IxNetwork by clicking **Not logged in** in the top right corner of the IxNetwork window. See the above screenshot for reference.

4. Click **Ports** on the Test Configuration pane to view the ports in use, as shown in A Simple IxNetwork Test.



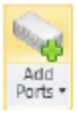
IxNetwork automatically logs you in using the local host name configured on your PC. When you select Ixia ports for the test, IxNetwork uses this name to identify those ports as being reserved for your exclusive use.

Select the Ports

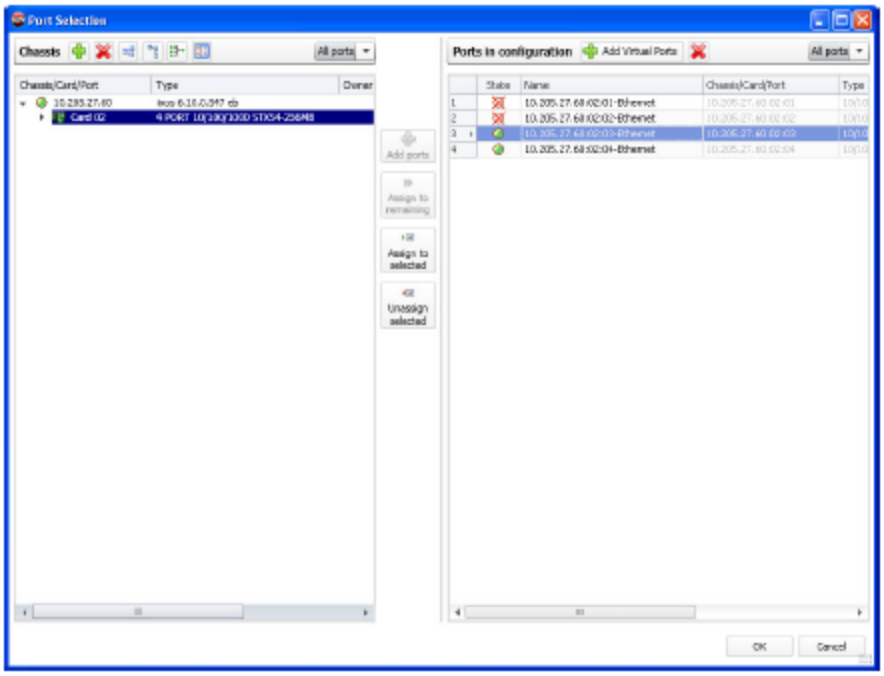
You can make IxNetwork configurations directly on the physical ports, or create configuration images, which you can save and apply to the ports at a later time. For this test, apply the configuration directly

on the physical ports.

1. Click **Add Ports** in the *Port Manager* window.



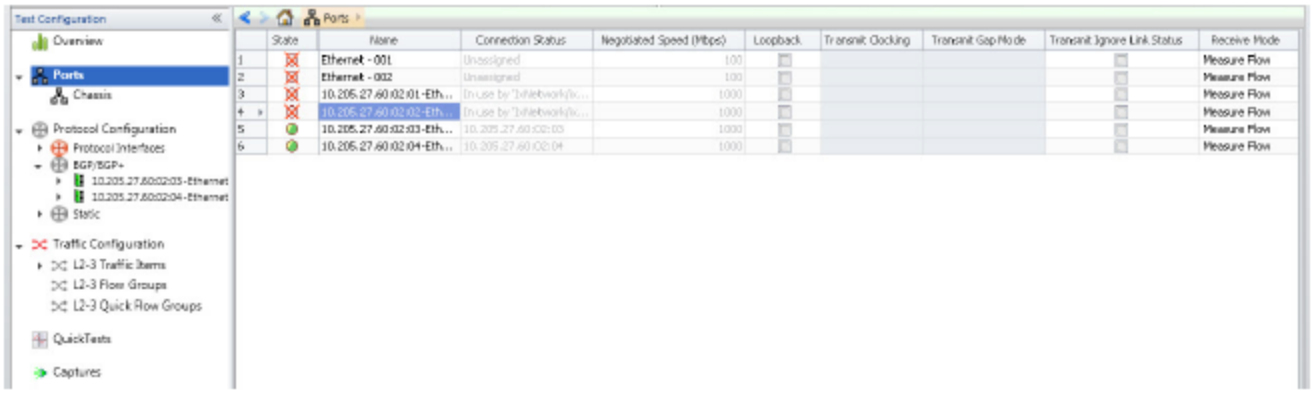
The Port Selection dialog box appears, as shown in the following figure. The available ports appear in the left pane of the window.



2. Click **Add Ports** to add the ports to the right pane.
3. Click **OK**.

   The Ports window appears with a list of the newly added ports, as shown in the following figure.

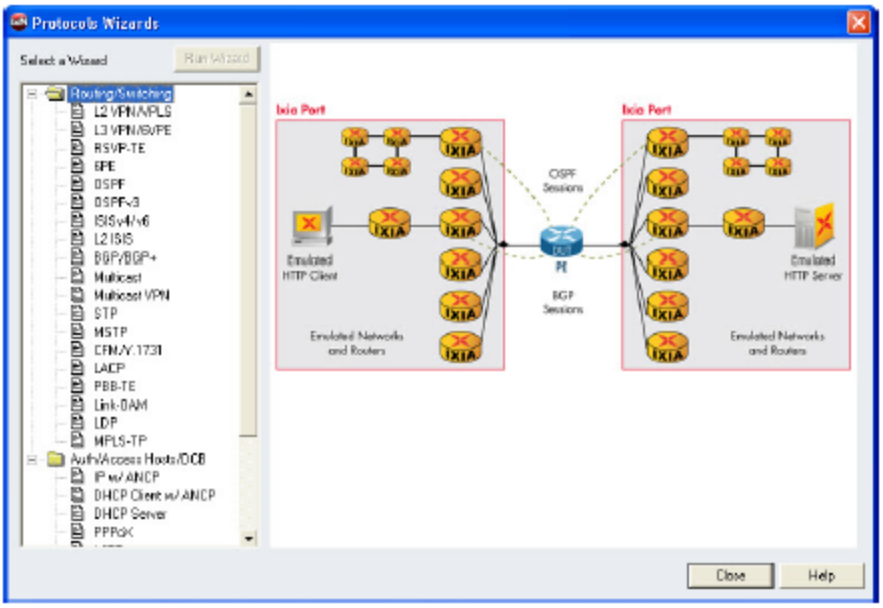
The ports are available for protocol configuration.



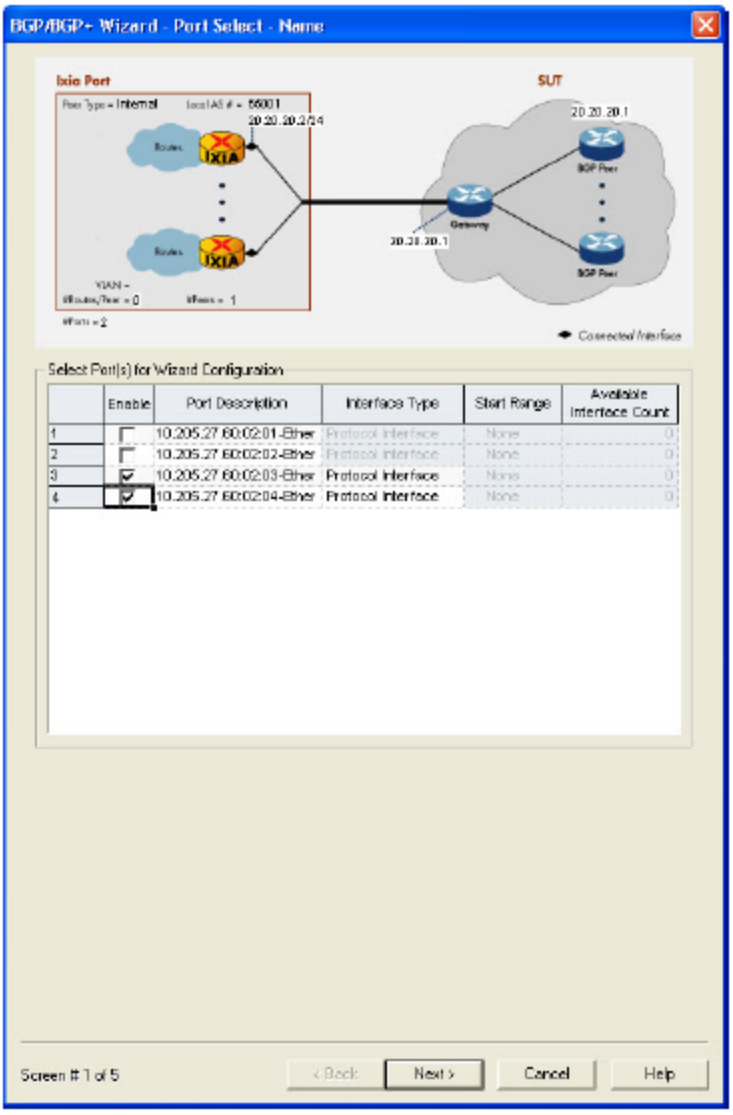
Configure the Protocol

Configure the protocol. For this example, use the Protocol Wizards to configure the BGP protocol on Ixia ports.

1. On the Home tab, click **Add Protocols**. the **Protocol Wizards** dialog box appears as shown in the following figure:

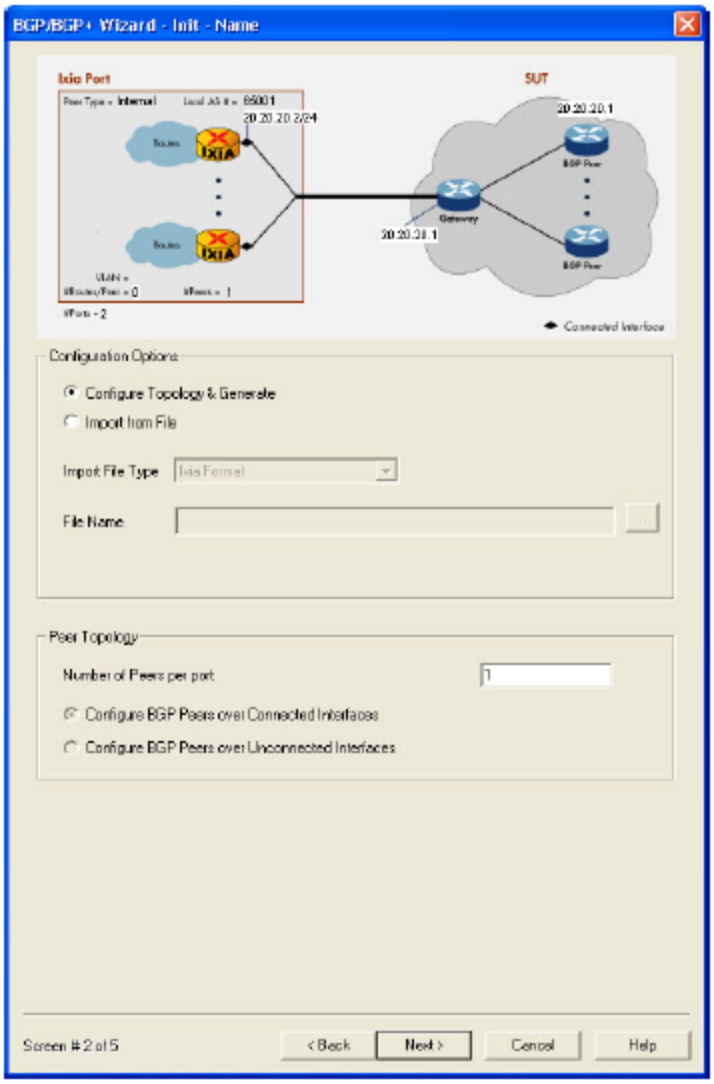


2. Click **BGP/BGP+**, then **Run Wizard**. The *BGP/BGP+ Wizard - Port Select* dialog box appears, as shown in the following figure:



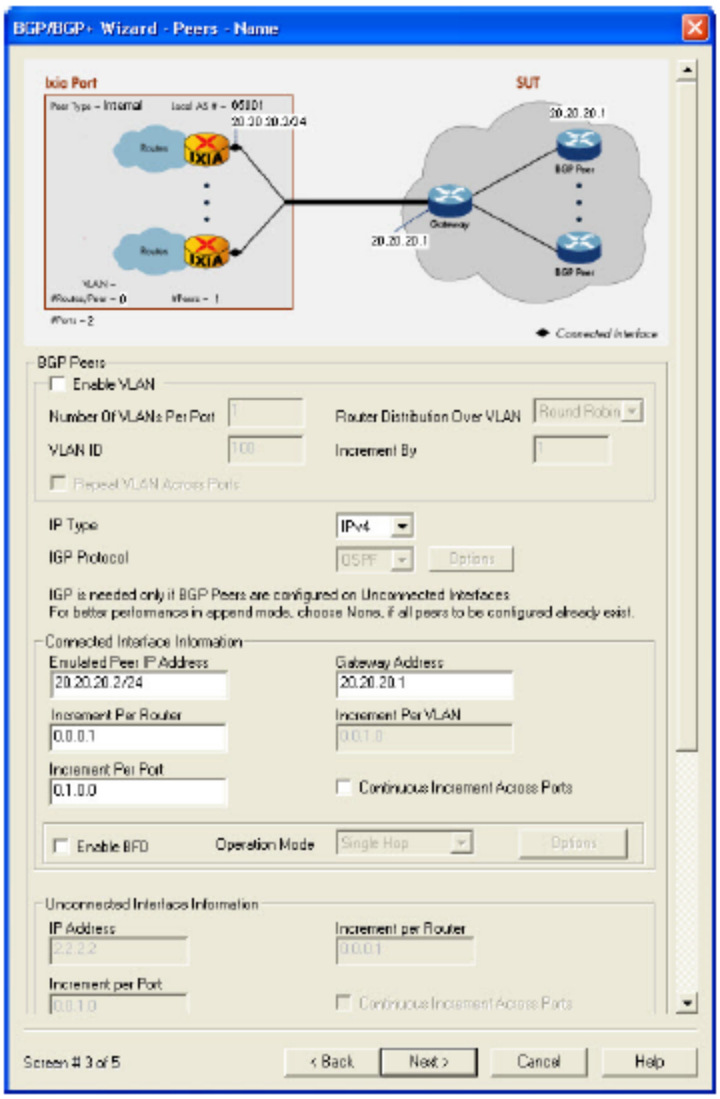
The two ports that you configured are listed with their description.

3. Select the **Enable** check box against each port, then click **Next**.
4. The *BGP/BGP+ Wizard - Init* dialog box appears as shown in the following figure:



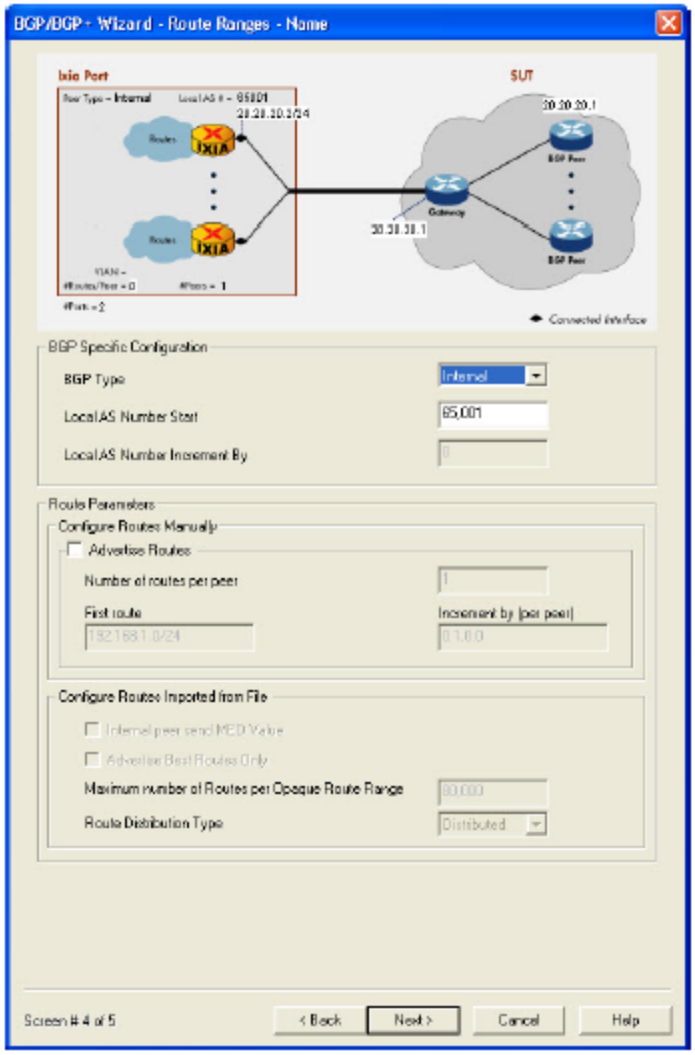
5. Click **Configure Topology & Generate**, then click **Next**.

   The *BGP/BGP+ Wizard - Peers dialog box* appears as shown in the following figure:



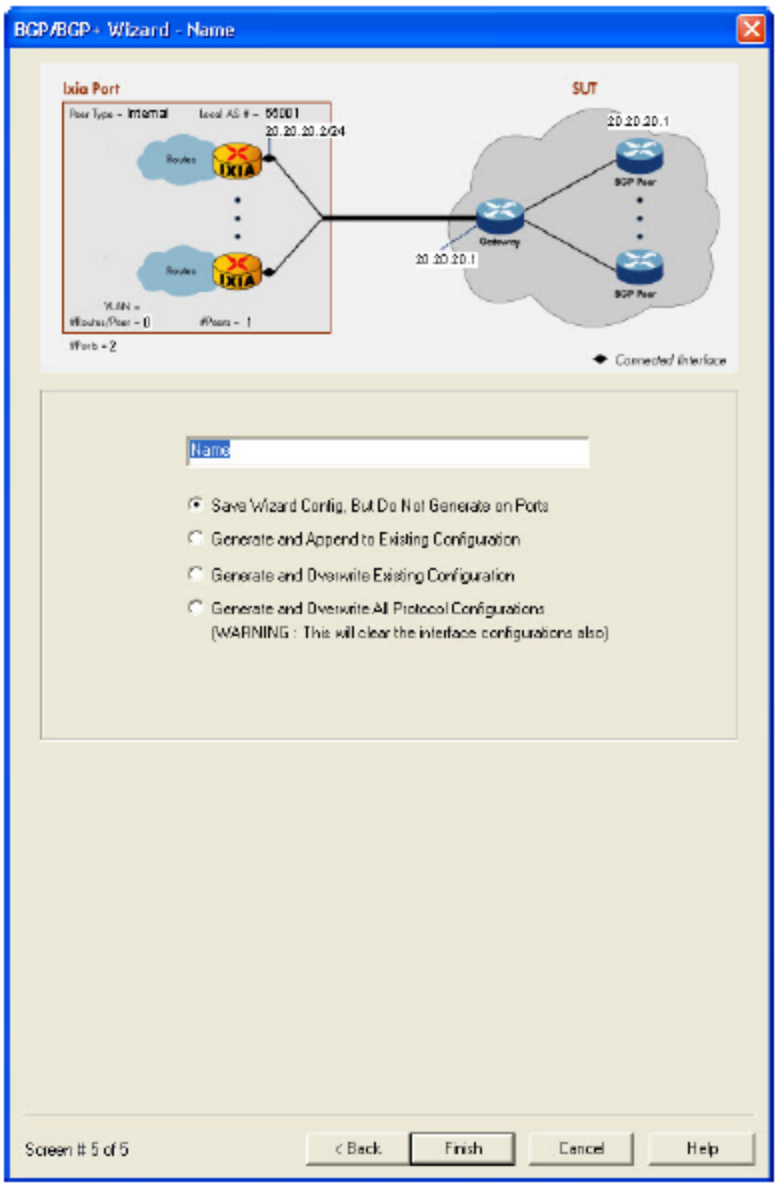
6. Enable VLAN and configure the IP addressing for Ixia and DUT ports.
7. Configure the number of Ixia-emulated BGP routers per port and click **Next**.

   The *BGP/BGP+ Wizard - Route Ranges* dialog box appears as shown in the following figure:



8. Set the BGP route ranges and select the **Advertise Routes** check box.
9. Click **Next**.

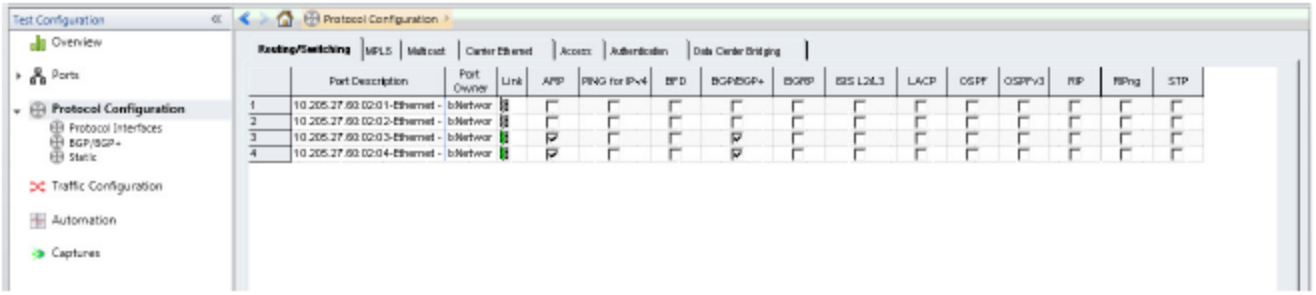
   The *BGP/BGP+ Wizard - Save* dialog box appears, as shown in the following figure:



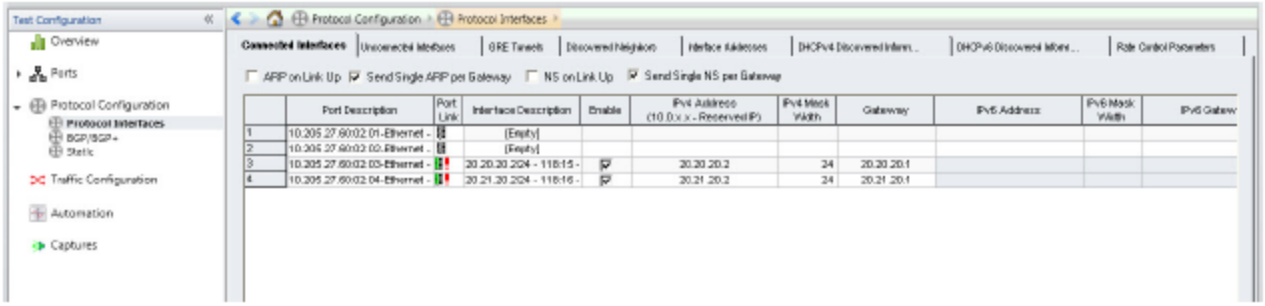
10. You can save the protocol configuration for later use, or apply to the port immediately. For this example, click **Generate and Overwrite Existing Configuration**.
11. Click **Finish** to close the dialog box and apply the protocol configuration to the ports.

Review the Protocol Configuration

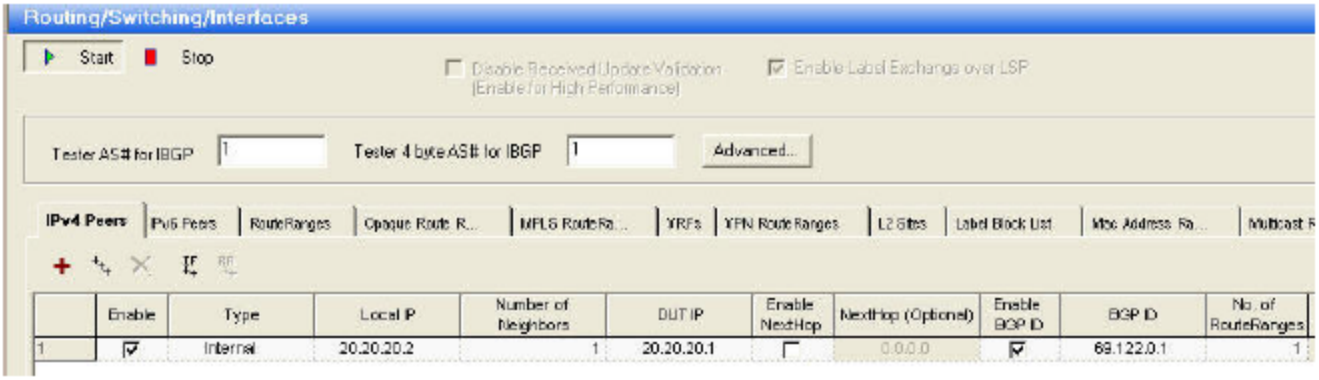
The wizard automatically enables the BGP (and ARP) protocol, as shown in the following figure:



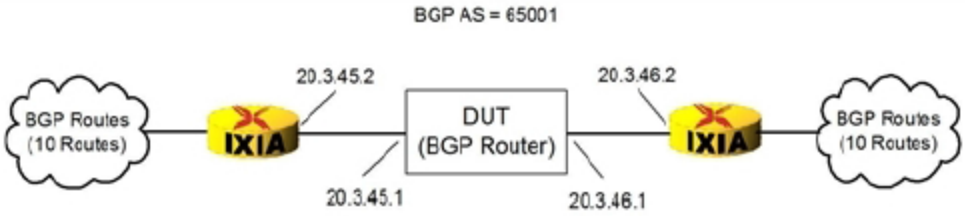
It creates connected protocol interfaces for each port, as shown in the following figure:



It also enters the BGP protocol configuration for each of the ports, as shown in the following figure:



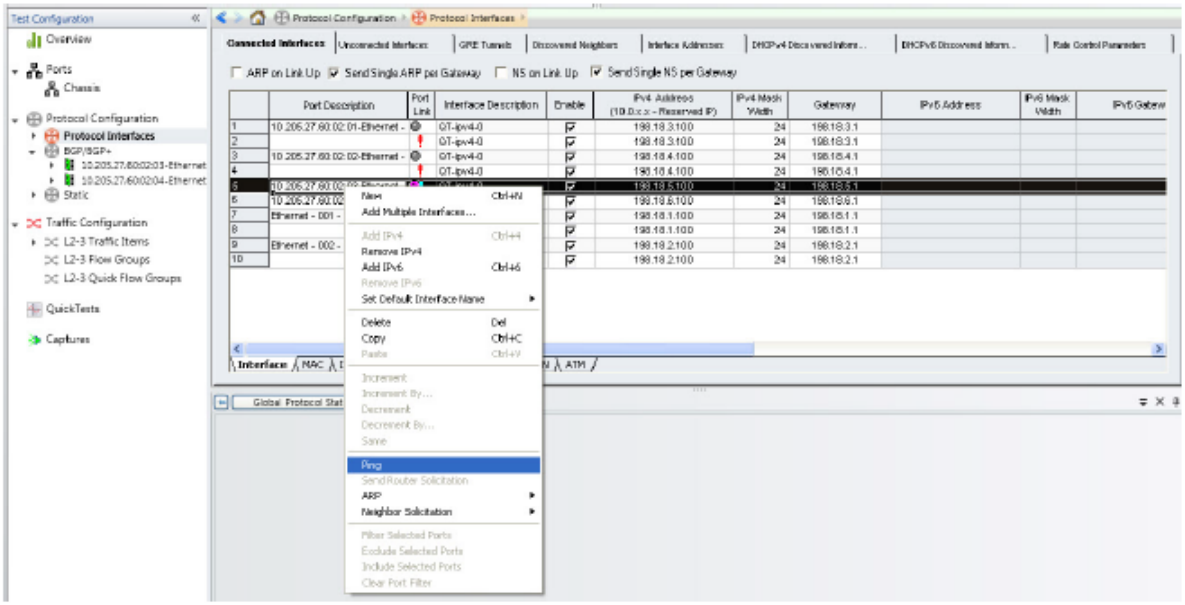
The emulated BGP topology is shown in the following figure:



Ping the DUT

To ensure connectivity between Ixia ports and the device under test (DUT) ping the DUT.

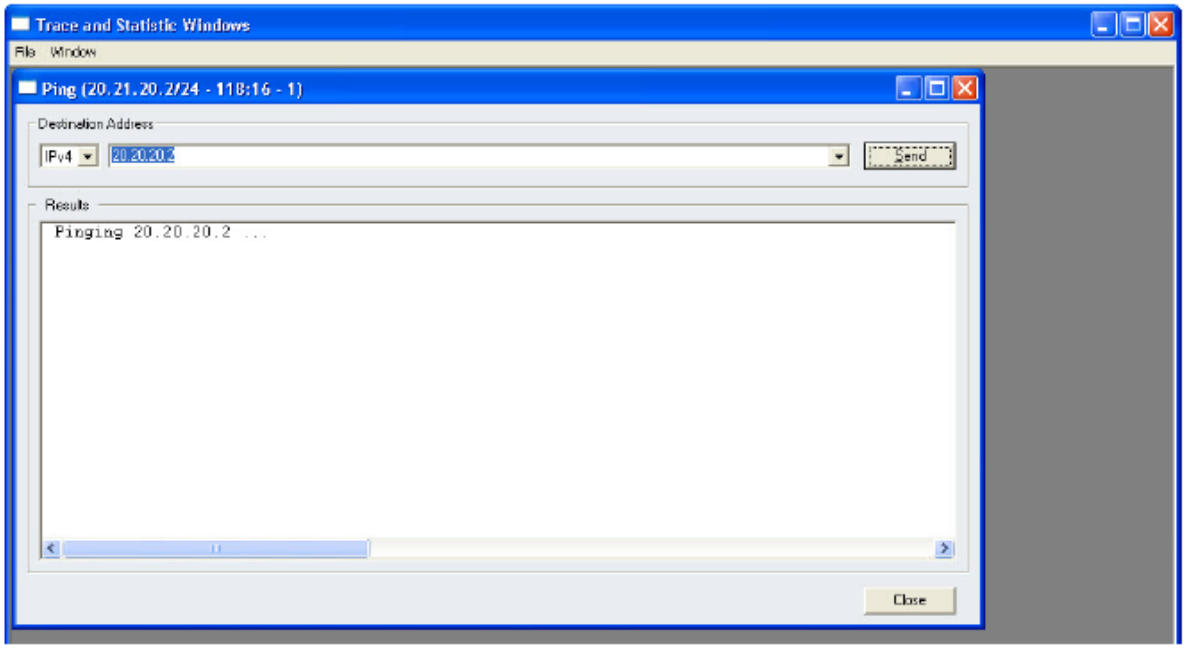
1. Right-click the port and click Ping from the pop-up menu as shown in the following figure:



The *Trace and Statistics*Window appears.

2. Enter the IP address of the DUT in the Trace and Statistics Window and click **Send**. The received

response appears on the Ping window as shown in the following figure:



Start the BGP Protocol

Start BGP Protocol on both the ports in the Protocol window (see Start BGP Protocol below).

1. Click **Start All Protocols** to start the protocols for both the ports simultaneously.

You can view the Global Protocol Statistics in the Statistics window, as shown in the following figure:

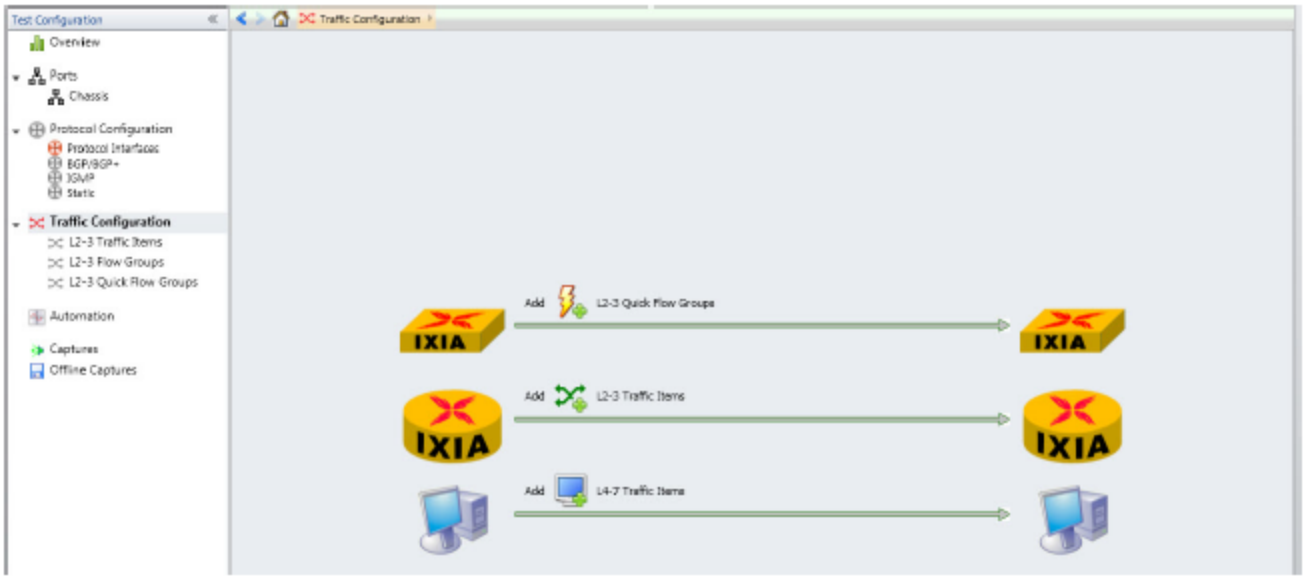
2. Verify that the BGP protocol is operating on both the ports.

Configure Traffic

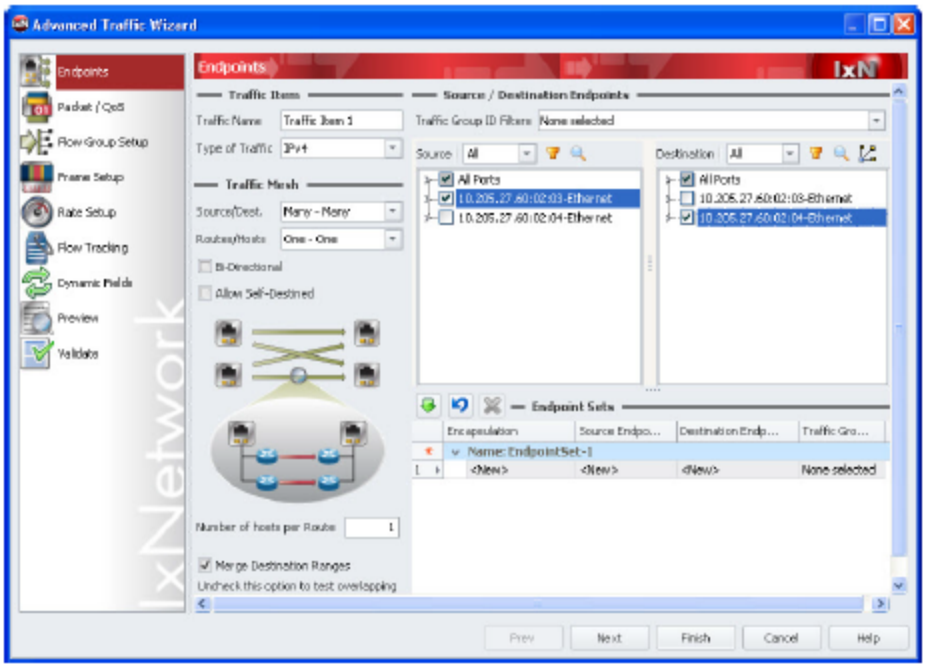
You must configure a traffic for the protocol on the ports.

1. Click Traffic Configuration on the Test Configuration pane of the IxNetwork window.

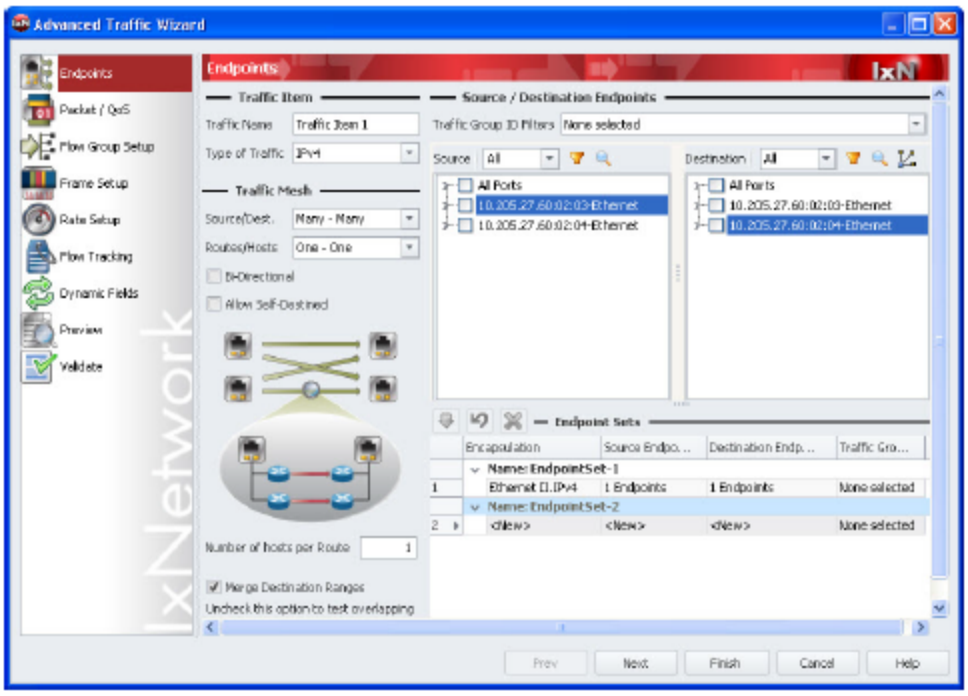
   The *Traffic Configuration* window appears, as shown in the following figure:



2. On the Home tab, click **Add Traffic** ,then **Advanced Traffic**. The Advanced Traffic Wizard window appears as shown in the following figure.
3. Select the **One-One** option for **Source/Dest** and **Fully Meshed for Routes/Hosts** from the drop-down lists to define the Mesh Type.
4. Select the source and destination IPs in Source and Destination IP Pairs below.



5. Click the apply icon to add the source and destination pairs in the lower pane of the window as shown in the following figure:



6. Repeat procedures 5 and 6 to add more pairs.

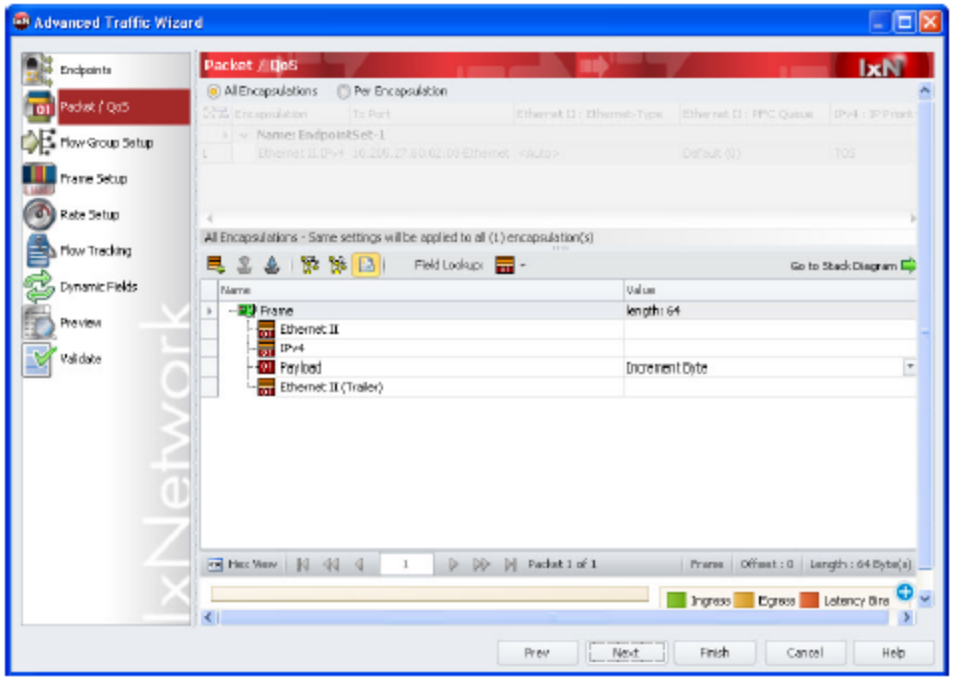
   As shown in Applying the Source and Destination Pairs on the previous page, traffic is sent from the source (on the left pane) to the destination (on the right pane).

   The Source/Destination Mesh type is, 'One-One.' Since two Ixia ports are being used, and bidirectional traffic is sent between the two ports, two sources and two destinations are created. (Each port acts as both source and destination.)

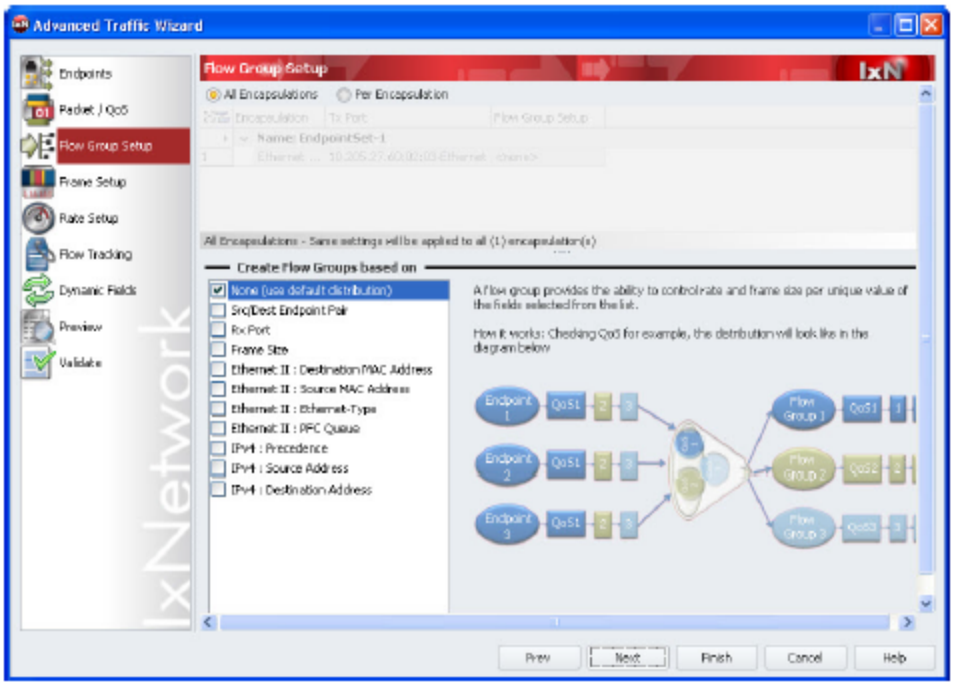
   The Route Mesh type is, 'Fully Meshed'. Since there are 10 route ranges set up for each port, a full mesh will create 100 pairs of route ranges. The Encapsulation type is non-MPLS, and the Endpoint type is IPv4.

   Creating the pairs at the high-level of the trees saves configuration time. Each port acts as both source and destination, so the Source / Destination Pair includes 2 source items and 2 destination items. If you select individual items from the expanded tree, you must add two Source / Destination Pairs—one for each of the two directions of traffic.

7. Click **Next** to continue with the configuration.
8. The Packet QoS dialog box appears, as shown in the following figure. You need not make any changes in the dialog box.

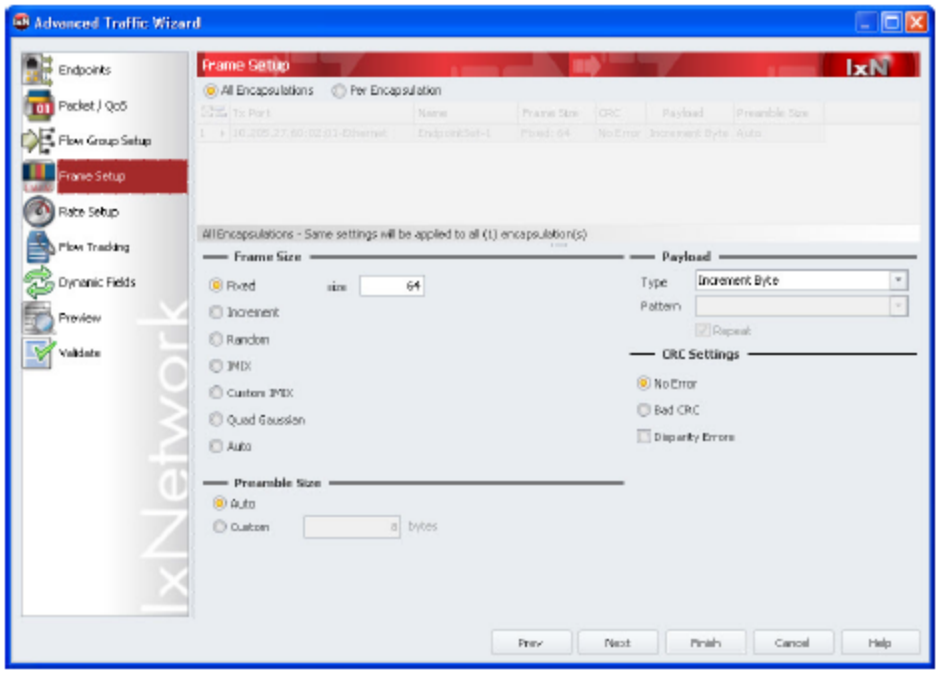


9. Click **Next** to continue with the configuration. The **Flow Group Setup** dialog box appears, as shown in the following figure:

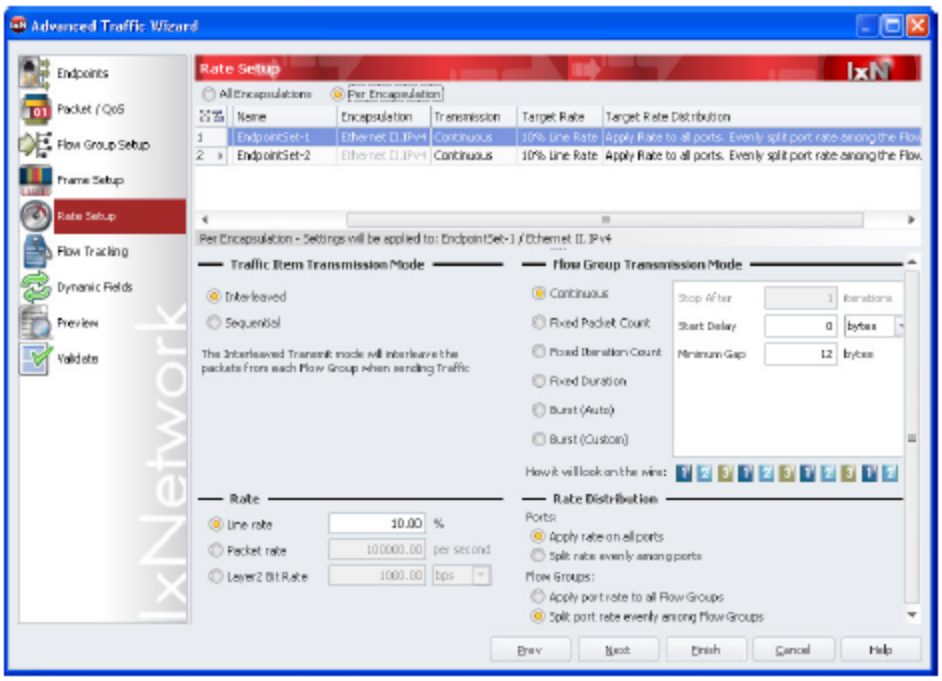


10. Select the desired Flow Group from the left navigation pane. If you select **None**, the default distribution is taken for the configuration.

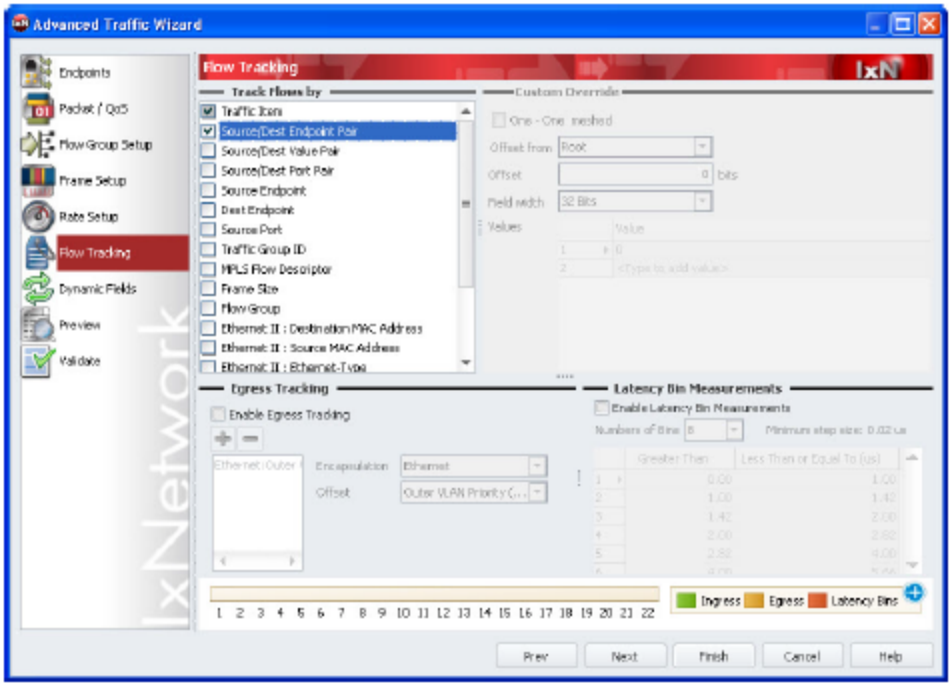
11. Click **Next** to continue with the configuration. The Frame Setup dialog box appears, as shown in the following figure. If required, increase the Frame Size from the default value (64).



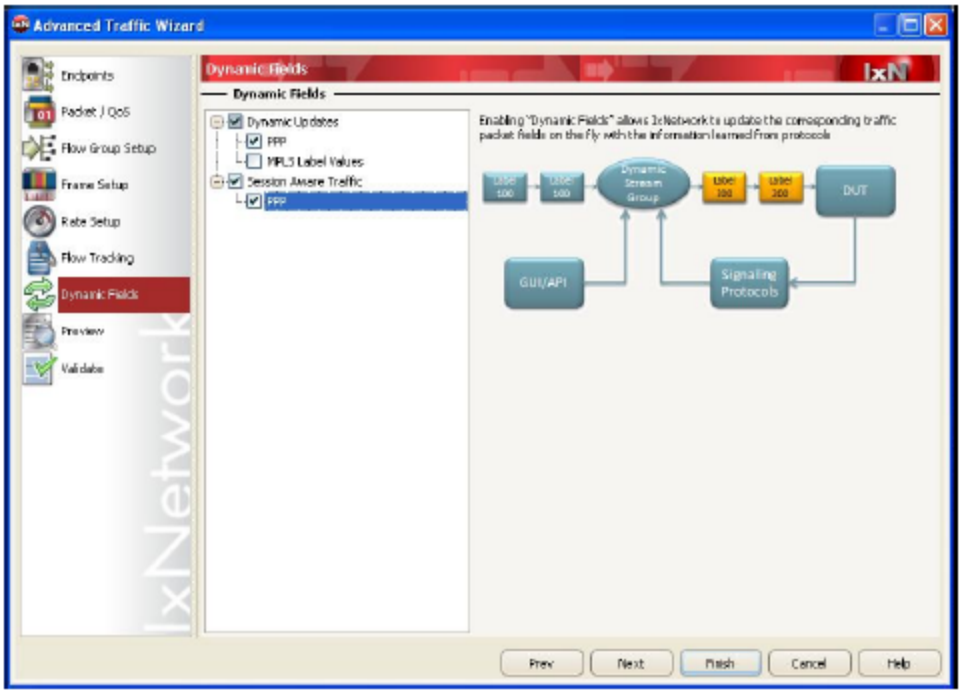
12. Click **Next** to continue with the configuration.
13. The *Rate Setup* dialog box appears, as shown in the following figure. You can perform the rate setup per encapsulation or for all encapsulations by clicking the relevant option. Select the desired transmission mode (Interleaved or Sequential) and specify 10 for % Line rate.



14. Click **Next** to continue with the configuration.
15. The Flow Tracking dialog box appears, as shown in the following figure. Select the desired track flow from the Traffic Flows by navigation pane. For this example, select Source/Dest Endpoint Pair.



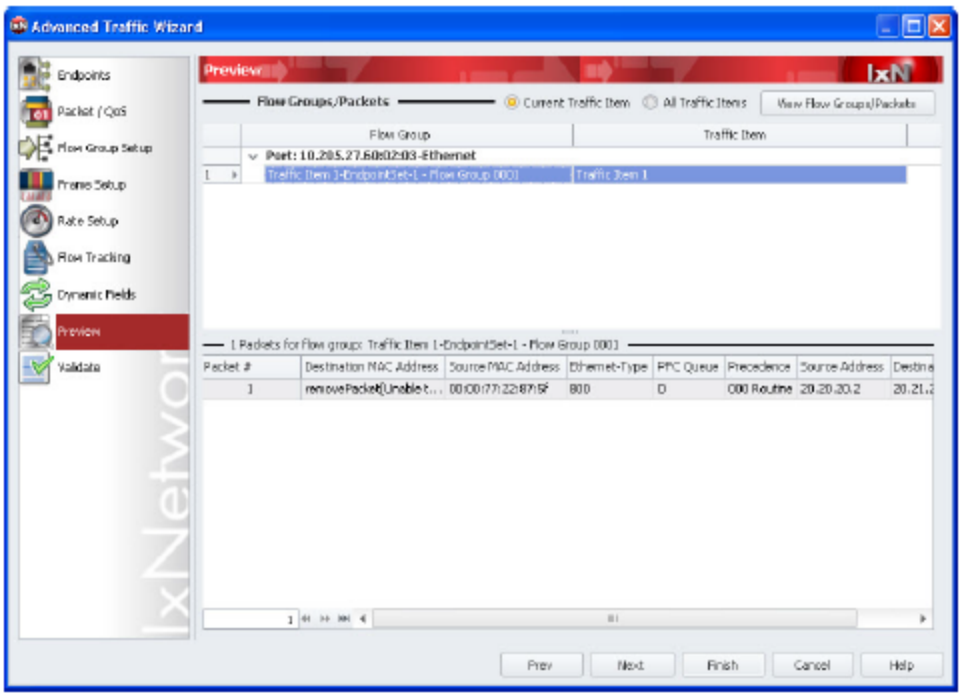
16. Click **Next** to continue with the configuration.
17. The Dynamic Fields dialog box appears, as shown in the following figure. Select the MPLS Label Values check box.



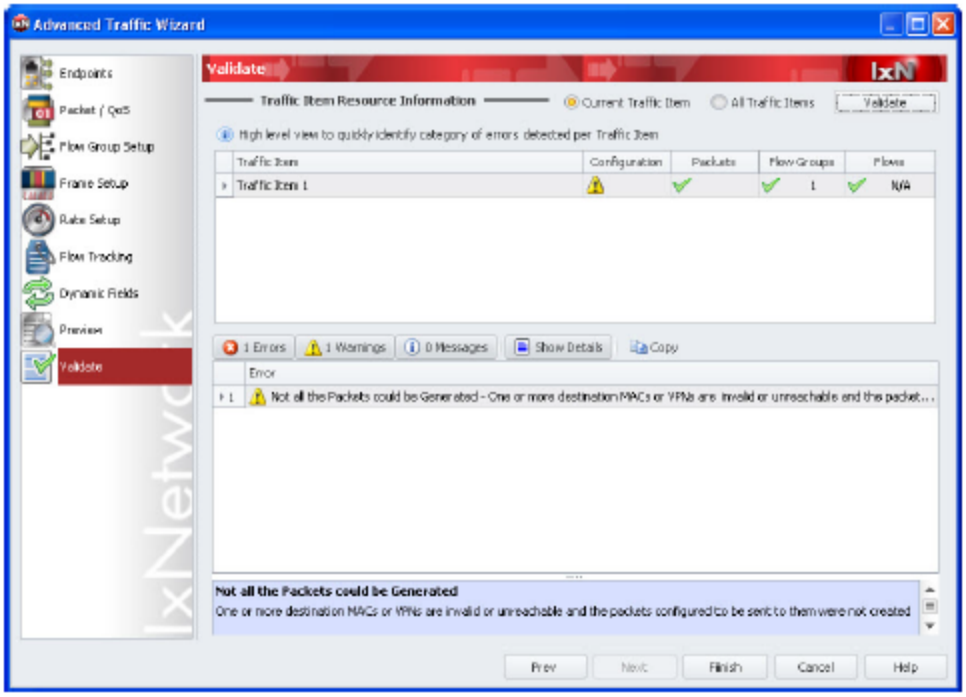
18. Click **Next** to continue with the configuration.

    The *Preview* dialog box appears.

19. Click **View Flow Groups/Packets** in the upper right corner. The Flow Groups and Packets of the configured Traffic Item is displayed.
20. Select a flow group. The packets for the flow group are displayed in the lower pane.



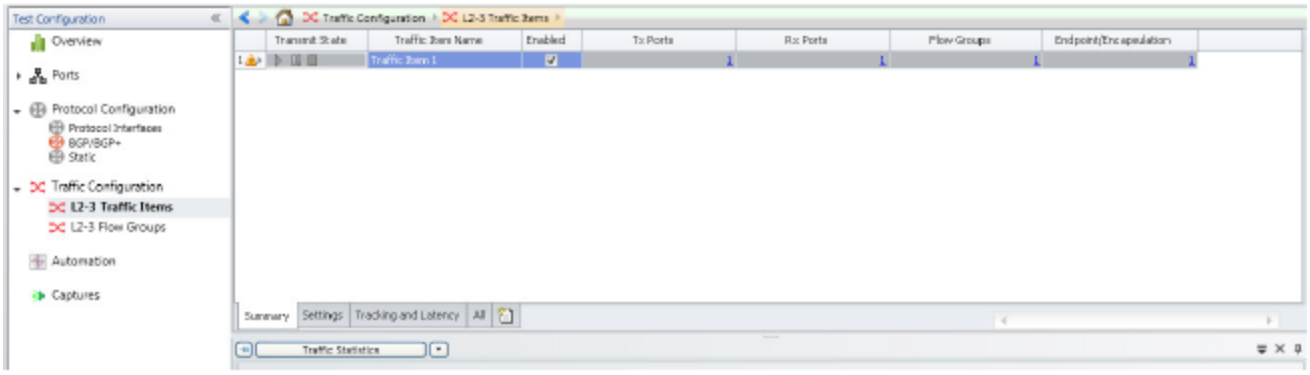
21. Click **Next** to continue. The *Validate* dialog box appears.



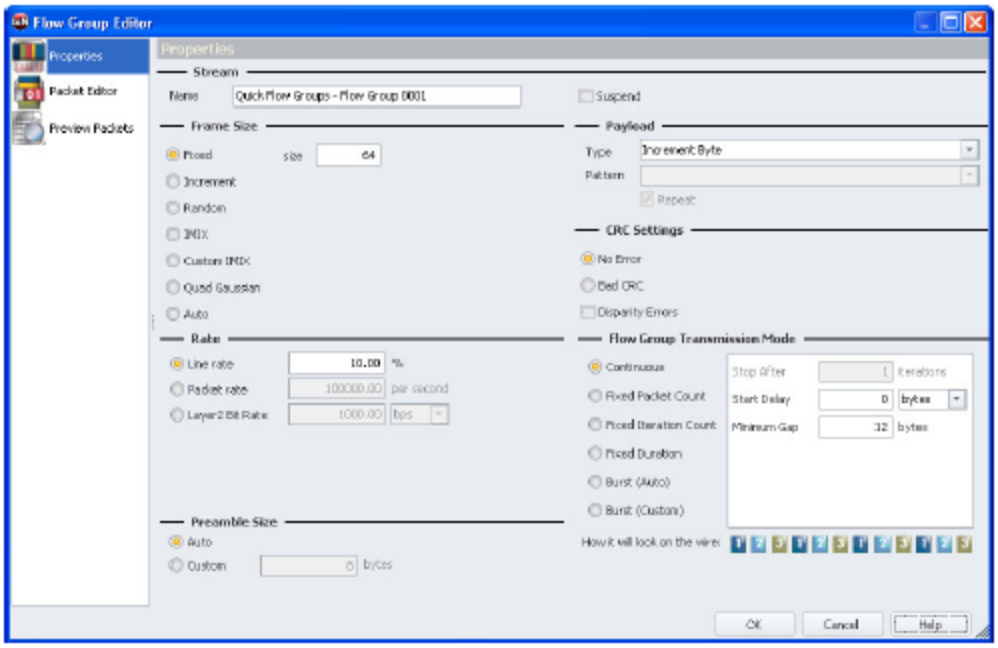
22. Click **Validate** in the upper right corner. The result of the configured Traffic Item is displayed, as shown in the figure.

23. Click **Finish** to close the wizard.
24. Click **L2-3 Traffic Items** under **Traffic Configuration** in the Test Configuration pane.

    The configured Traffic Item appears in the Traffic window, as shown in the following figure:

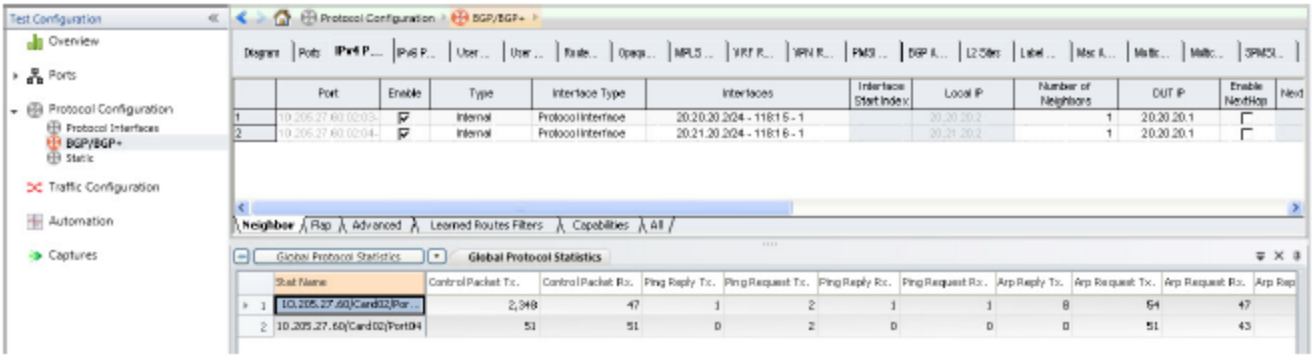


25. Double-click a traffic item to display the Flow Group Editor dialog box. Note that the information in the Properties reflects the changes that were made in Frame Setup Dialog Box.



26. On the Home tab, click **L2-3 Traffic**, then **Apply L2-3 Traffic** to write the traffic configuration to the ports. Then click **Start All L2-3.**

27. View the progress of the streams in the Statistics window, as shown in the following figure:



Set Up the Test Composer

Test Composer is an Ixia software component, integrated into IxNetwork that permits the creation of complex multi-step test scripts integrating Event Scheduler events, DUT configuration commands, local or external procedure calls, and flow control instructions that permit branching the script flow based on a step result evaluation.

To open the IxNetwork - Test Composer Window click the

dedicated button on the IxNetwork GUI Views tab.

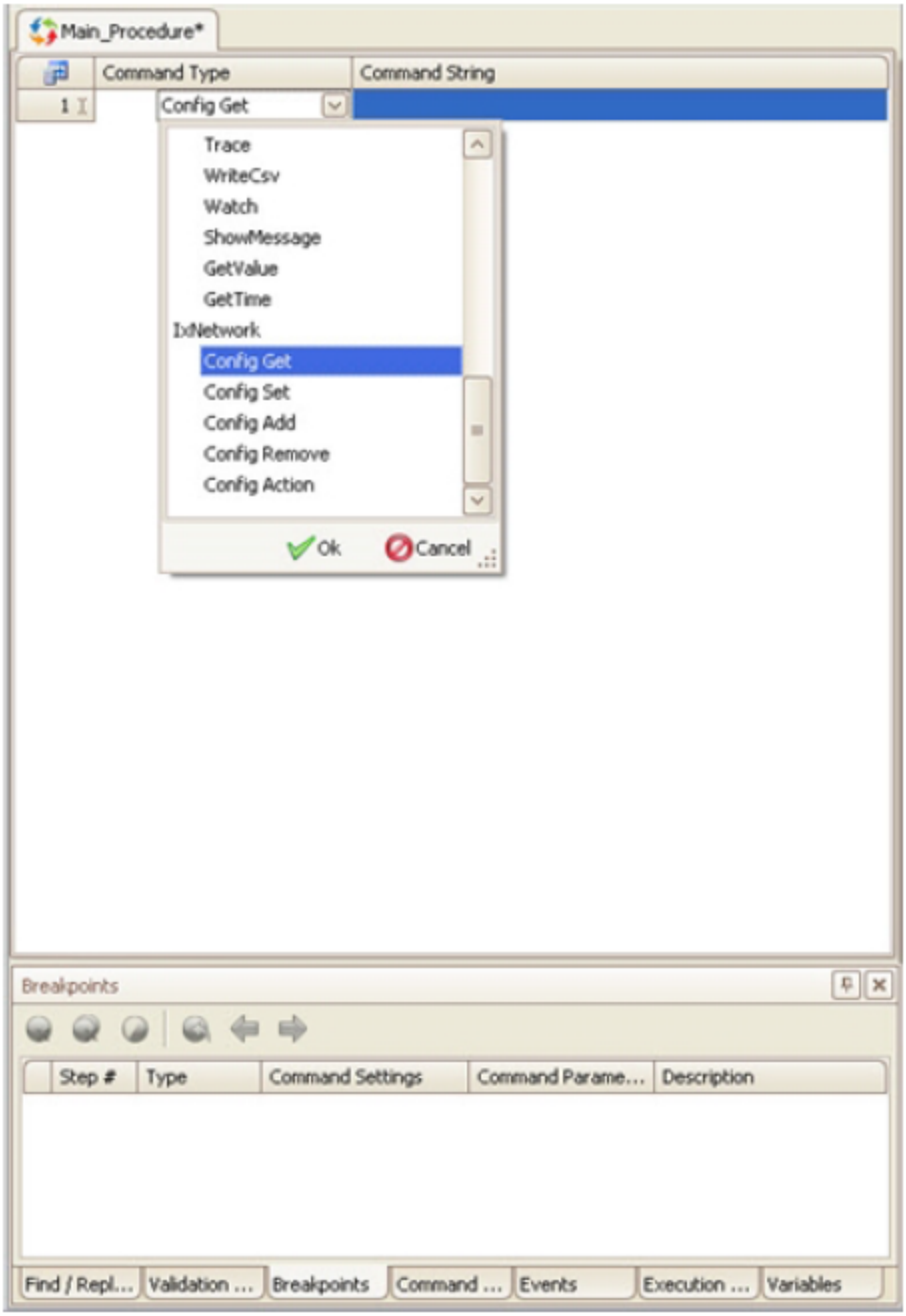
The IxNetwork - Test Composer application appears as a separate panel.

The *TestComposer Online Help* provides detailed information on the Test Composer window features. Press F1 to access the online help in the Test Composer window.

To set up TestComposer, do the following:

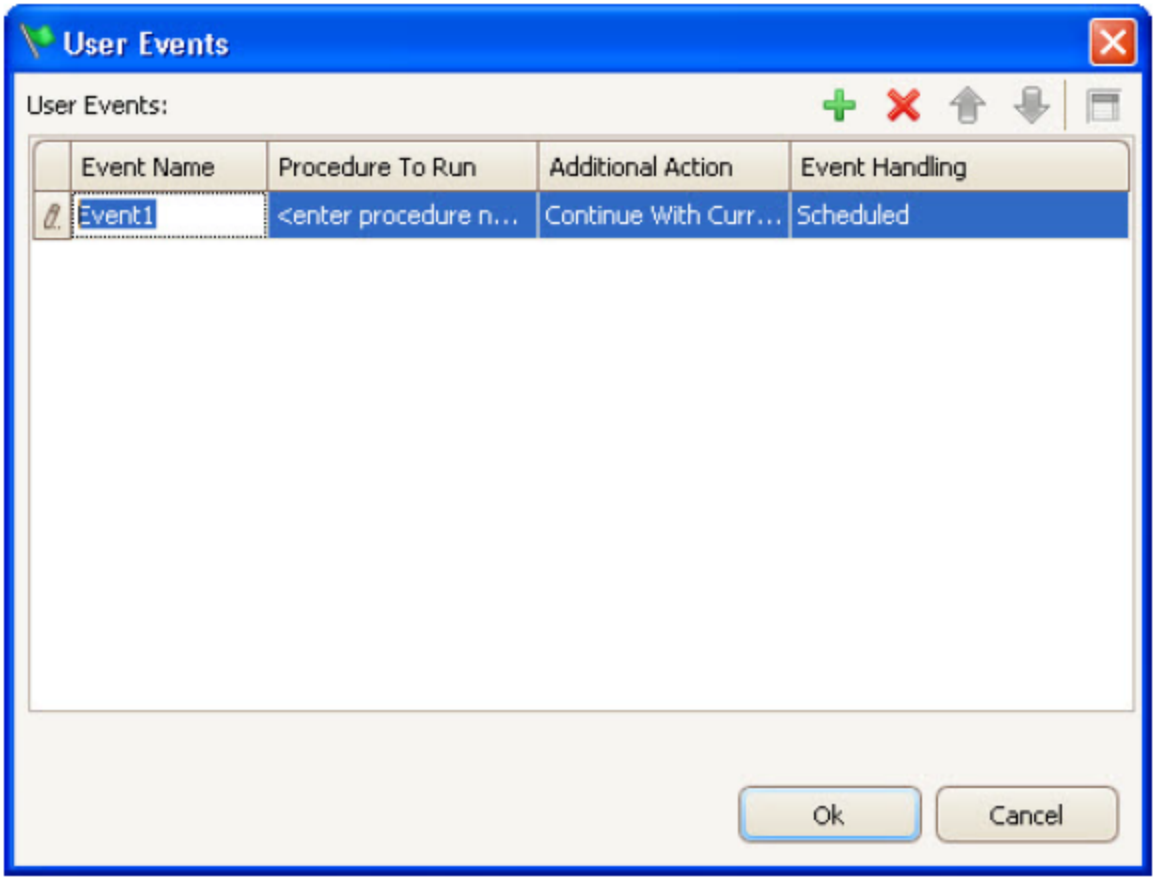
1. Click **Test Composer** on the **Views** tab to display a separate panel on the right of the IxNetwork GUI.

2. Click to add a new script as shown in the following figure:



See Chapter 27: Test Composer in *TestComposer Online Help* for details on the Test Composer Script.

3. Click **UserEvents** on the **Test** tab to add an event as shown in the following figure:



You can define global user events and associate them with executed procedures and additional actions.

An Execute command output or a device session to configured test devices can be monitored for the occurrence of specified messages. When a matching message is received by either an Execute or a Watch script step, an event is triggered and processing for the event can be configured.

See Chapter 3: Defining User Events in *TestComposer Online Help* for details on User Events.

Creating a Test Composer Script

See Chapter 3: Creating and Editing a Test Composer Script in *TestComposer Online Help* for creating a Test Composer Script.

Creating a Sample Test Composer Script

This section describes a sample operations sequence for defining a Composer test and saving it with the IxNetwork configuration file.

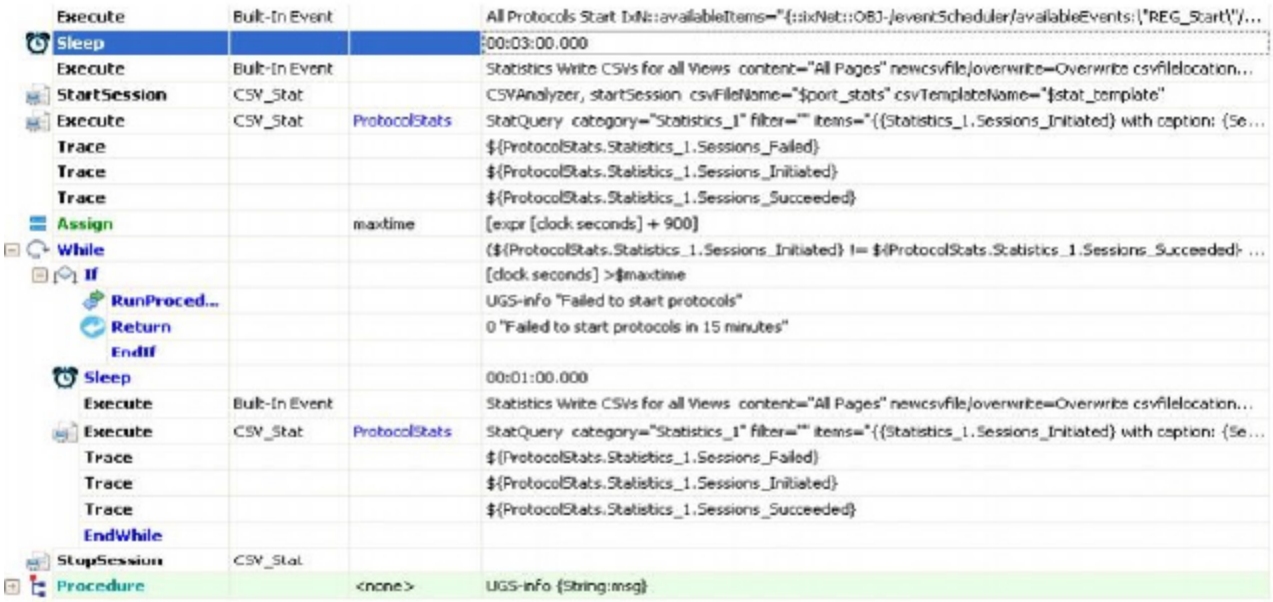
Test Overview

For the purpose of our example, we are considering a TestComposer test script that runs against a router DUT that is connected to an Ixia chassis port. The test starts the PPoE and DHCP protocols on the chassis port and tests repeatedly for a steady state condition with a total number of sessions below a configured amount no failed sessions and no sessions that are in an inconsistent state.

Initially the test script starts the protocols on the selected chassis port using the automatically created Built-In Event session of the IxNetwork type, waits for a period of 3 minutes and then writes all statistics to CSV files using the Write CSVs for all views command.

The resulting CSV file is opened by a CSVAnalyzer session and the Sessions_Initiated, Sessions_ Successful and Sessions_Failed statistics are retrieved into the ProtocolStats composite variable using the CSVAnalyzer StatQuery command. The statistic values are displayed using Trace commands that reference the composite variable retrieved previously.

The script then tests for a steady DUT condition that translates into a state whereby the number of initiated sessions equals the sum of successful and failed sessions. In addition, this state is characterized by a number of session lower than a configured amount, and no failed sessions. While this condition is not met, the script loops repeatedly (using a While statement) with a 1 minute frequency (Sleep statement),where by at each new iteration the session statistics are written anew into CSV files, retrieved by the StatQuery function and then displayed. Inside the While loop, an If statement tests if the initially allocated time of 15 minutes, or 900 seconds, expired, after which the test script calls an inline logging procedure and exits using a failed condition.



Creating the Composer Test

To create the test script described in Test Overview proceed as follows:

1. While in the TestComposer plugin, right-click the script tab and click the **Properties** button, then type in a test name and an optional description in the Information window that appears.
2. Start adding the steps sequence described below.

Click the **Append last Step** button and add an **Execute (All Protocols Start)** step on the default Built-In Event session that is created automatically for every TestComposer script. This command starts two protocols, PPoE and DHCP, on the selected Ixia chassis port.

```
All Protocols Start IxN::availableItems="{::ixNet::OBJ-/eventScheduler/
availableEvents:\"REG_Start\"/availableItems/node:\"aptixia.1\"} {::ixNet::OBJ-
/eventScheduler/availableEvents:\"REG_Start\"/availableItems/node:\"aptixia.2\"}
"
```

3. After pausing the script execution for 3 minutes using a Sleep statement, add an Execute step that writes all statistics to CSV files using the Write CSVs for all Views command on the Builtin Event Session:

```
Statistics Write CSVs for all Views content="All Pages"
newcsvfile/overwrite=Overwrite csvfilelocation="$stat/../"
```

4. Add a `startSession` step that opens a CSVAnalyzer session to the file referenced by the $port_ stats variable:

```
CSVAnalyzer, startSession csvFileName="$port_stats" csvTemplateName="$stat_
template"
```

5. Using the previously created CSVAnalyzer session, add a statQuery step that retrieves the aggregate `Sessions_Initiated`, `Sessions_Succeeded`, and `Sessions_Failed` values using the *ProtocolStats* return variable assigned to the step:

```
StatQuery category="Statistics_1" filter=""items="{{Statistics_1.Sessions_
Initiated}
with caption:
{Sessions_Initiated} aggregation:
Sum}{{Statistics_1.Sessions_Succeeded} with caption:
{Sessions_Succeeded} aggregation:
Sum}{{Statistics_1.Sessions_Failed} with caption:
{Sessions_Failed} aggregation: Sum}"
```

6. Output all three variables to the screen using the Trace commands that reference the `${ProtocolStats.Statistics_1.Sessions_Failed}`, `${ProtocolStats.Statistics_1.Sessions_ Failed}`, and `${ProtocolStats.Statistics_1.Sessions_Failed}` variables respectively.
7. Configure a `maxtime` timeout value using the following Tcl expression inside an `Assign` statement:

```
Assign maxtime [expr [clock seconds] + 900]
```

8. Inside a `While` statement test for the steady state condition using a conditional expression that evaluates if the number of initiated sessions equals the sum of successful and failed sessions. In addition, the number of initiated sessions should be lower than 1000 and there should be no failed sessions:

```
(${ProtocolStats.Statistics_1.Sessions_Initiated} !=
${ProtocolStats.Statistics_1.Sessions_Succeeded} +
${ProtocolStats.Statistics_1.Sessions_Failed} ) || (
${ProtocolStats.Statistics_1.Sessions_Failed}== 0 ) ||
```

```
(${ProtocolStats.Statistics_1.Sessions_Initiated} < 1000)
```

9. Nested within the `While` loop configure an If statement to test if the time expired since test start exceeds the initially configured amount `(maxtime)`; while the initial time was not exceeded, similar operations with those from steps 4, 5, and 6 are performed repeatedly with a frequency of 1 minute, with the session statistics being retrieved and displayed.

When the timeout expires, a `RunProcedure` statement calls the *UGS-info* logging procedure and terminates the test execution using a fail status (zero value) as an argument to the `Return` statement.

```
Return 0 "Failed to start protocols in 15 minutes"
```

10. Click the **Save** button. The TestComposer script is saved into the IxNetwork configuration using the name specified at step 1.

As part of the IxNetwork test configuration, it can then be run from the Home ribbon of IxNetwork. When run in this mode, script-generated logs and files are can be accessed from the IxNetwork Data Miner, while statistics exported by the script are displayed in the IxNetwork StatViewer plugin.

The script can also be run from **Test Composer** ribbon in the Edit or Debug mode.

Set Up CSV Logging

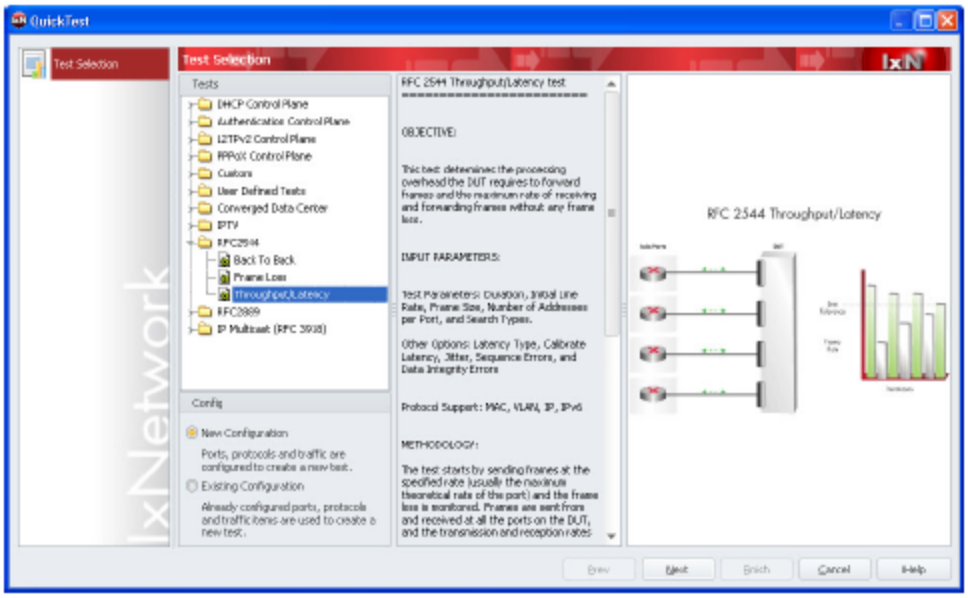
To set up CSV Logging, perform the following steps.

1. On the **Home tab**, click **Test Options**. The **Test Options** dialog box appears.
2. On the left panel, click **Stat Viewer Options**.
3. On the **Advanced Settings** tab, select the **Enable CSV Logging for All Views** check box.
4. Click the **File** tab, then **Preferences**. The **Preferences** dialog box appears.
5. On the left panel, click **StatViewer Options**.
6. Select the location of the CSV file. The data is saved to the CSV file path. Use the CSV information with IxReporter to create a PDF or HTML report, or export the information to an Excel sheet.
7. Click **OK** to save the settings.

Set Up a QuickTest

To set up a QuickTest, do the following:

1. Select **QuickTests** on the Test Configuration pane.
2. On the configuration tab, click **Add QuickTests.** The *QuickTest* window appears.
3. Select a test from the list. For this example, select RFC 2544 Throughput/Latency test.



4. Click **Next**. The Ports page appears. Modify existing ports and add new ports. You can modify existing ports only if they are unassigned (virtual) as it is assumed that any assigned ports are already configured correctly through the Port Manager of IxNetwork. You can also add virtual ports.
5. Click **Next.** The Frame Data page appears. Configure the frame data.
6. Click **Next**. The Traffic page appears. This page dispays the ports used in the test. You can map source/destination ports and add them.
7. Click **Next**. The **Traffic Options** page appears. This page enables you to set various parameters related to traffic, such as the frame sizes and delays used for the validation traffic and the learning process parameters.
8. Click **Next**. The **Test Parameters** page appears. This page enables you to configure the parameters for the test.
9. Click **Next**. The **Finish page** appears. This page allows to give a name to the newly configured test.
10. Click **Finish** to complete the configuration.
11. Click

to begin the test.
12. Select **Data Miner** in the **Test Configuration** pane. The results of the test appear in the Results section of the *Data Miner* window.

Running a Test with IxNetwork

Follow the procedures in this guide to run a simple test and quickly gain experience with IxNetwork. If you need to perform more advanced testing, refer to *IxNetwork User Guide*.

For detailed information on IxNetwork installation and licensing, see:

- Installation and Licensing

For detailed information on licensing, see:

- IxNetwork Licensing
- *Ixia License Management User Guide*

Following are the topics covered in this chapter:

- Requirements
- A Simple IxNetwork Test
  - Connect the Ports
  - Start IxNetwork
  - Select the Ports
  - Configure the Protocol
  - Review the Protocol Configuration
  - Ping the DUT
  - Start the BGP Protocol
  - Configure Traffic
  - Set Up the Test Composer
  - Set Up CSV Logging
  - Set Up a QuickTest

Note: The minimum resolution for viewing the IxNetwork GUI is 1024x768, with a DPI setting of Normal Size (96 DPI)

Requirements

IxNetwork is a client application that runs under Windows. It operates in conjunction with one or more chassis running IxOS/IxServer.

To run the IxNetwork test in this guide, you need the following:

- An Ixia chassis with an Ethernet-based CPU-per-port load module.
- Two ports available on the load module.
- Connection cables.
- A Windows PC to run IxNetwork. The IxNetwork Client is run on the Windows workstation, while IxOS/IxServer is run on the chassis.

A Simple IxNetwork Test

To get acquainted with IxNetwork, perform the following steps to set up and run a simple test.

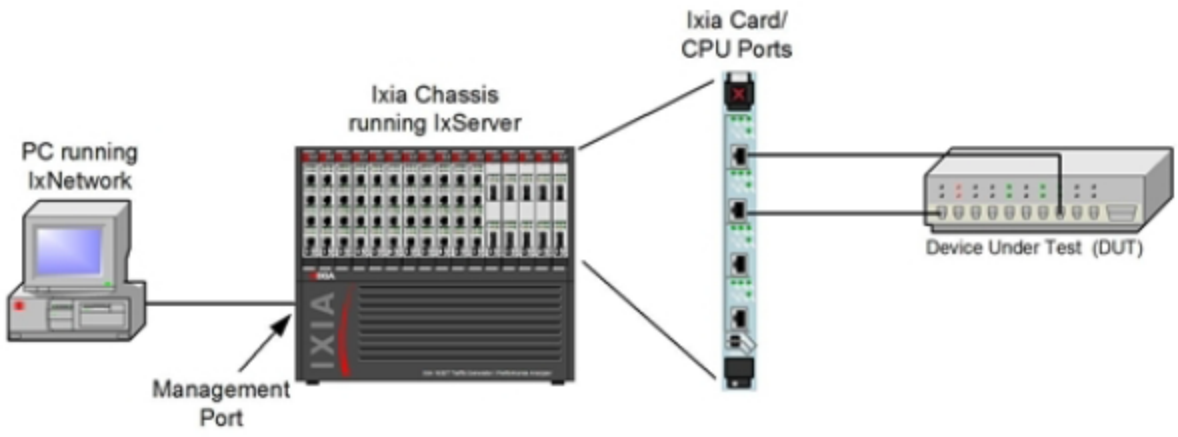
The test configuration used as an example in this document is the BGP protocol, hence, install the IxNetwork BGP protocol emulation. Configure the Ixia ports to run the BGP protocol and send the traffic through the DUT to Route Ranges advertised by BGP.

To run a simple test in IxNetwork, you need to perform the following steps:

1. Connect the Ports
2. Start IxNetwork
3. Select the Ports
4. Configure the Protocol
5. Review the Protocol Configuration
6. Ping the DUT
7. Start the BGP Protocol
8. Configure Traffic
9. Set Up the Test Composer
10. Set Up CSV Logging
11. Set Up a Quick Test

Connect the Ports

Before starting a test, connect the DUT ports to the Ixia chassis, using the correct cables for the connection as shown in Ixia Chassis — DUT Cable Connections below. The PC running IxNetwork is connected to Ixia chassis through a network connection to the management port on the chassis.



Start IxNetwork

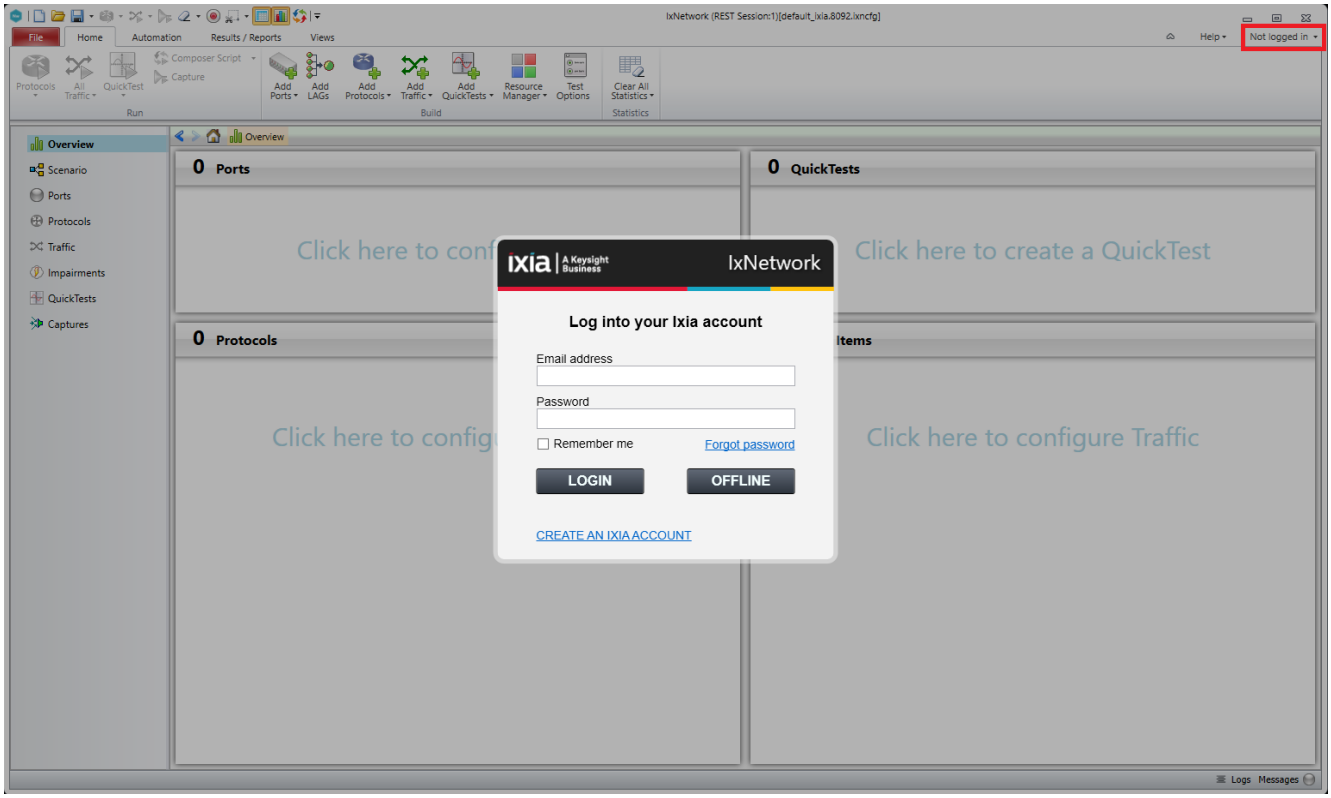
Before you start IxNetwork:

- Make sure IxServer is running on Ixia chassis. IxServer normally starts automatically when the chassis boots up.
- Make sure you know the available ports on the chassis. Applications such as IxExplorer, Scriptmate, and Tcl scripts allow you to take ownership of the ports on Ixia chassis. If the ports

are already in use, they are not available for assignment in the IxNetwork Port Management window.

To start the IxNetwork application, perform the following tasks:

1. Double-click the IxNetwork icon on your Desktop. The IxNetwork GUI window appears as shown in the following figure:



2. Sign in to your Ixia account to use IxNetwork. Select the **Remember me** check box, if you want to store your sign in information.

Note:

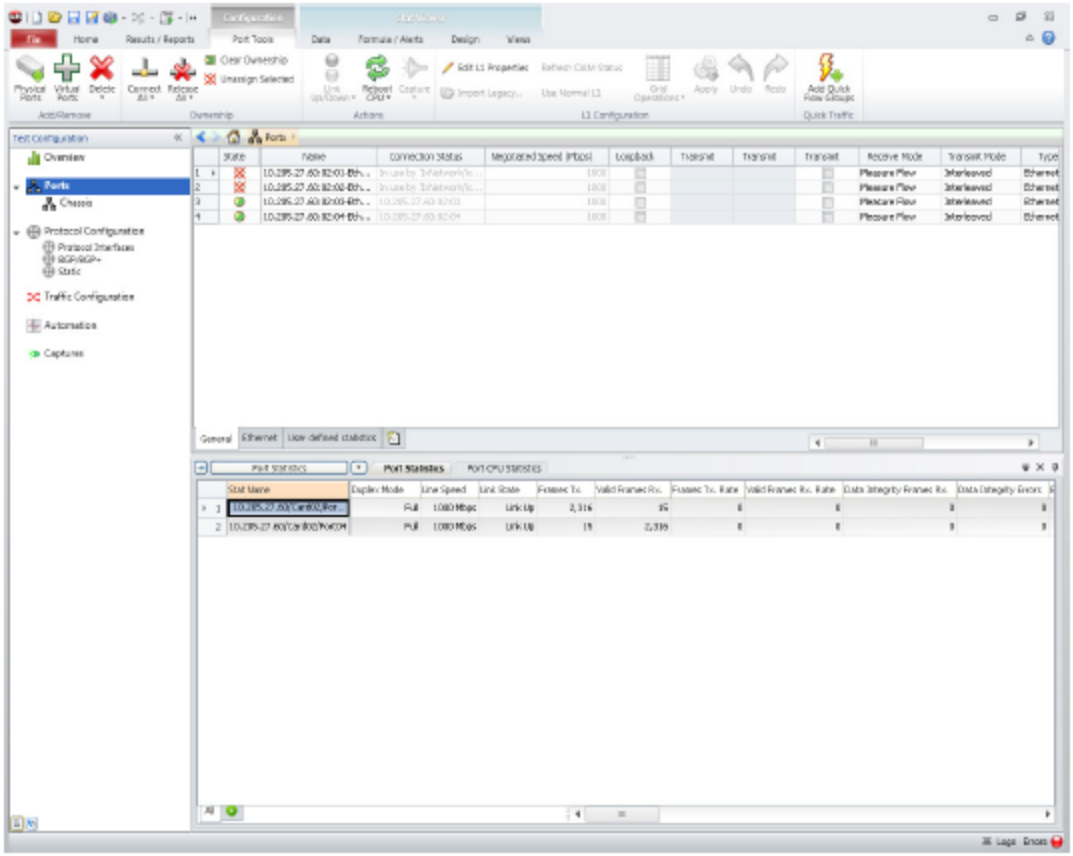
- Your IxNetwork account is already created using your ixiacom.com e-mail address. To sign in for the first time, click **Forgot Password** or go to https://login.ixiacom.com/?forgot-password. Enter your e-mail address and submit the form. You will receive an e-mail with instructions on how to proceed.
- If you do not receive an e-mail in your ixiacom.com account, click **CREATE AN IXIA ACCOUNT** link or go to https://login.ixiacom.com/?create-account.

3. Click **OFFLINE**, if you do not want to type any credential. In the offline mode, you will not get the following features:
   - New Ixia product releases and feature notifications
   - One-click feedback and support

- Cloud config storage
- One-click config sharing

At any point of time, you can sign in to IxNetwork by clicking **Not logged in** in the top right corner of the IxNetwork window. See the above screenshot for reference.

4. Click **Ports** on the Test Configuration pane to view the ports in use, as shown in A Simple IxNetwork Test.

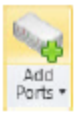


IxNetwork automatically logs you in using the local host name configured on your PC. When you select Ixia ports for the test, IxNetwork uses this name to identify those ports as being reserved for your exclusive use.

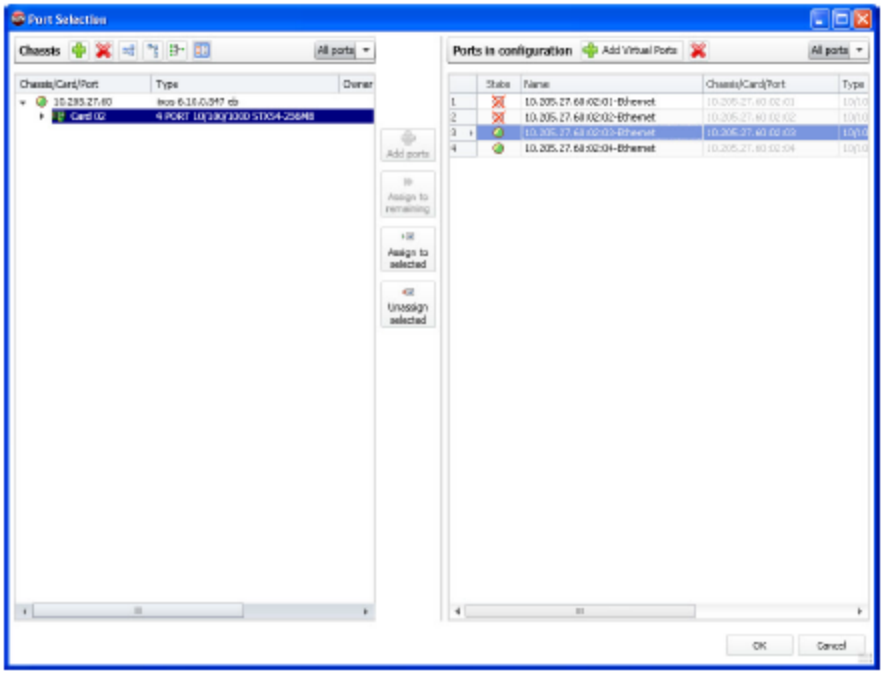
Select the Ports

You can make IxNetwork configurations directly on the physical ports, or create configuration images, which you can save and apply to the ports at a later time. For this test, apply the configuration directly on the physical ports.

1. Click **Add Ports** in the *Port Manager* window.

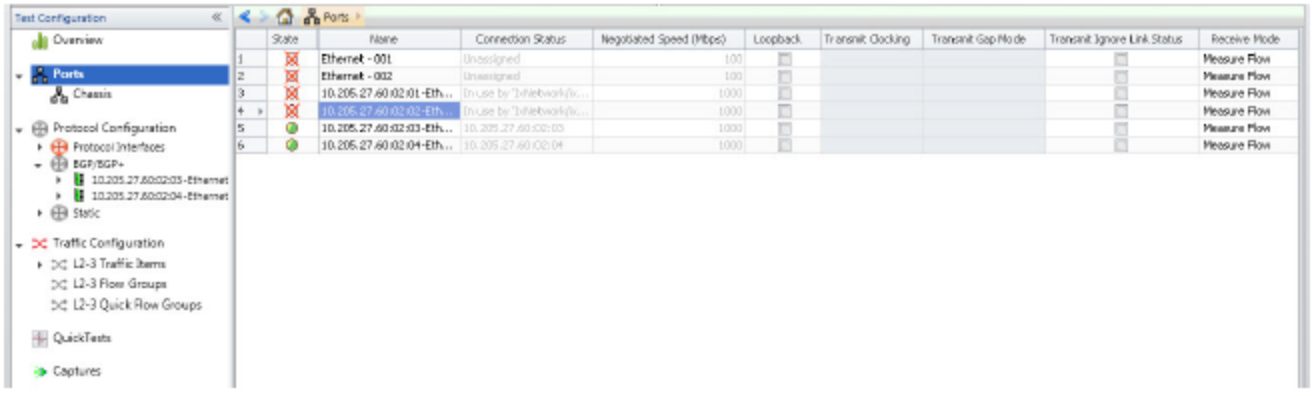


The Port Selection dialog box appears, as shown in the following figure. The available ports appear in the left pane of the window.



2. Click **Add Ports** to add the ports to the right pane.
3. Click **OK**.

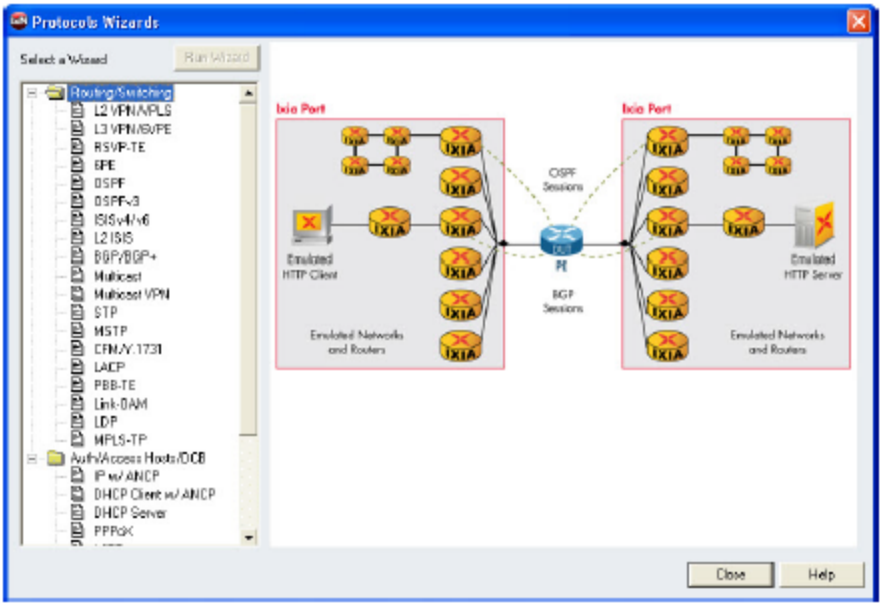
   The Ports window appears with a list of the newly added ports, as shown in the following figure. The ports are available for protocol configuration.



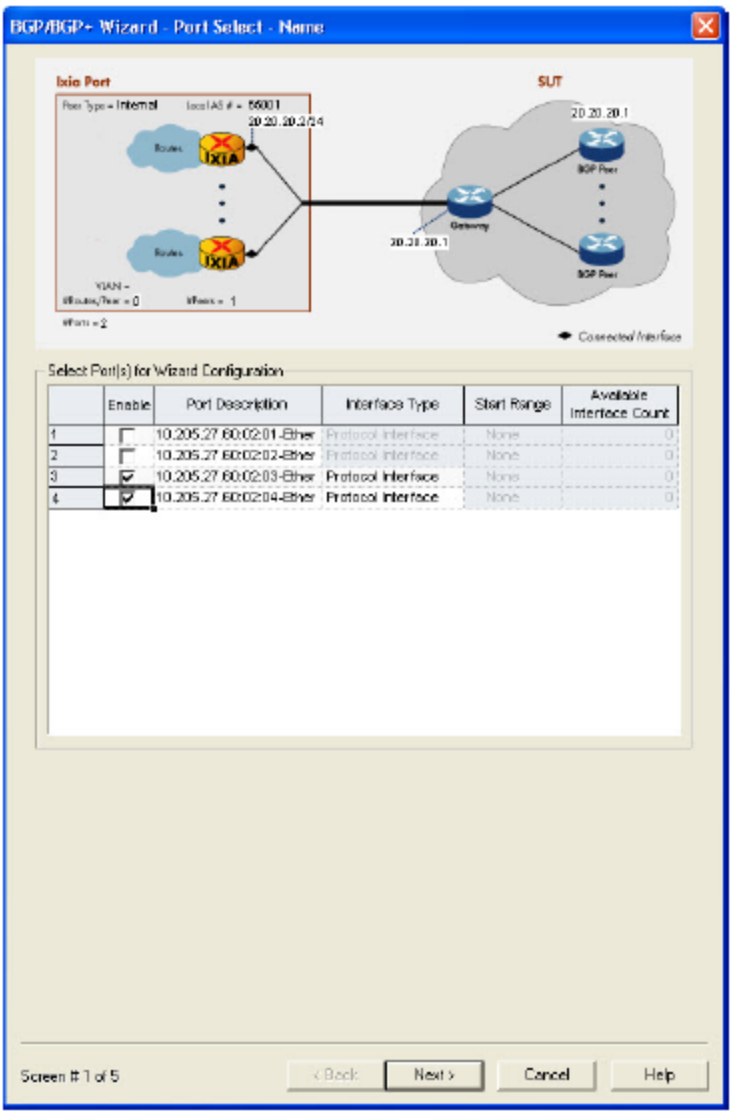
Configure the Protocol

Configure the protocol. For this example, use the Protocol Wizards to configure the BGP protocol on Ixia ports.

1. On the Home tab, click **Add Protocols**. the **Protocol Wizards** dialog box appears as shown in the following figure:

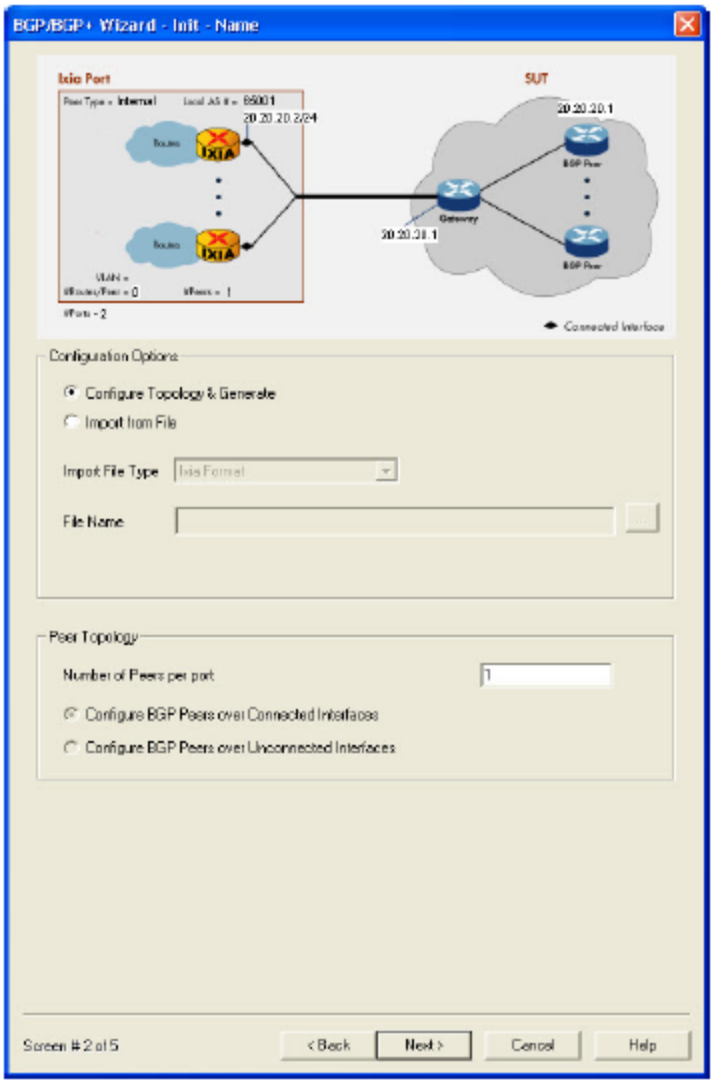


2. Click **BGP/BGP+**, then **Run Wizard**. The *BGP/BGP+ Wizard - Port Select* dialog box appears, as shown in the following figure:



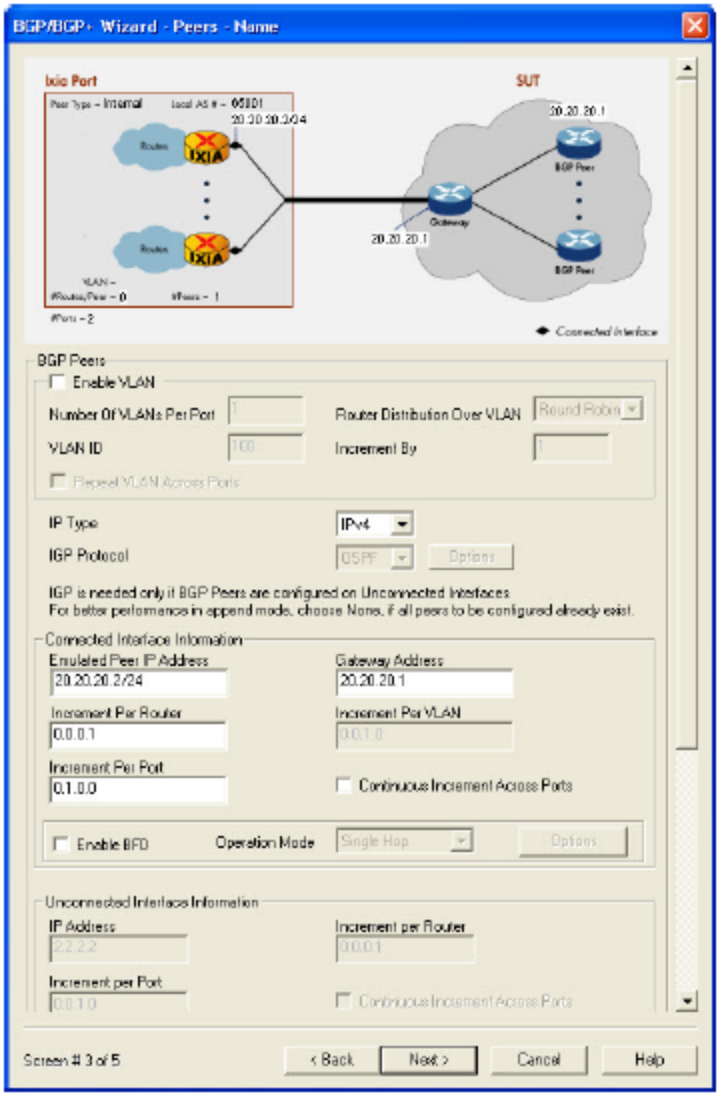
The two ports that you configured are listed with their description.

3. Select the **Enable** check box against each port, then click **Next**.
4. The *BGP/BGP+ Wizard - Init* dialog box appears as shown in the following figure:



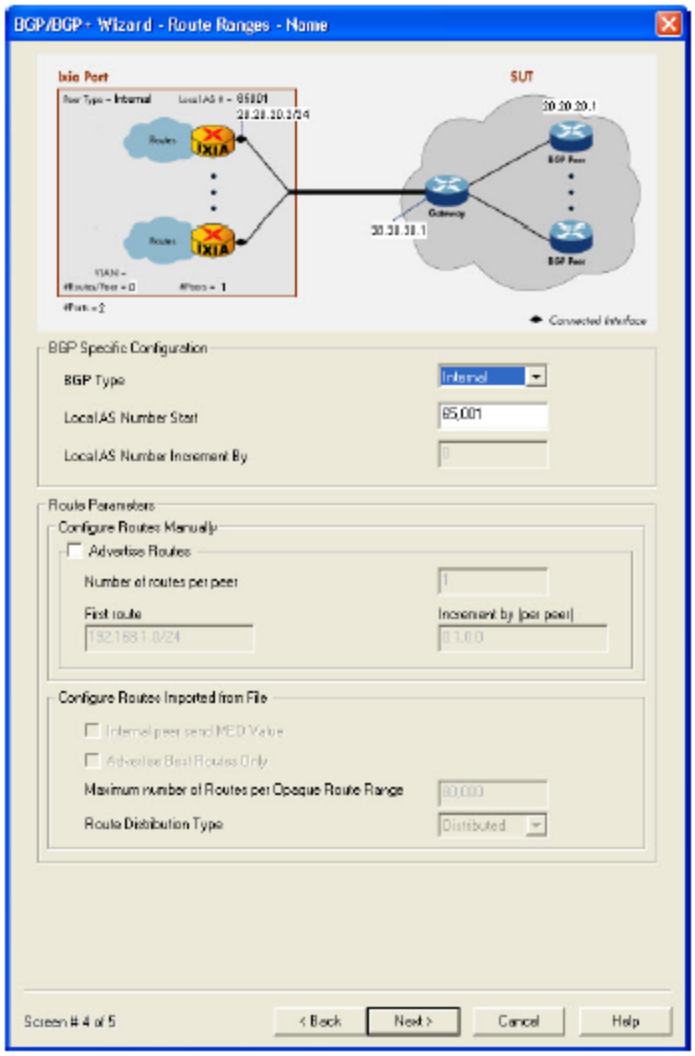
5. Click **Configure Topology & Generate**, then click **Next**.

   The *BGP/BGP+ Wizard - Peers dialog box* appears as shown in the following figure:



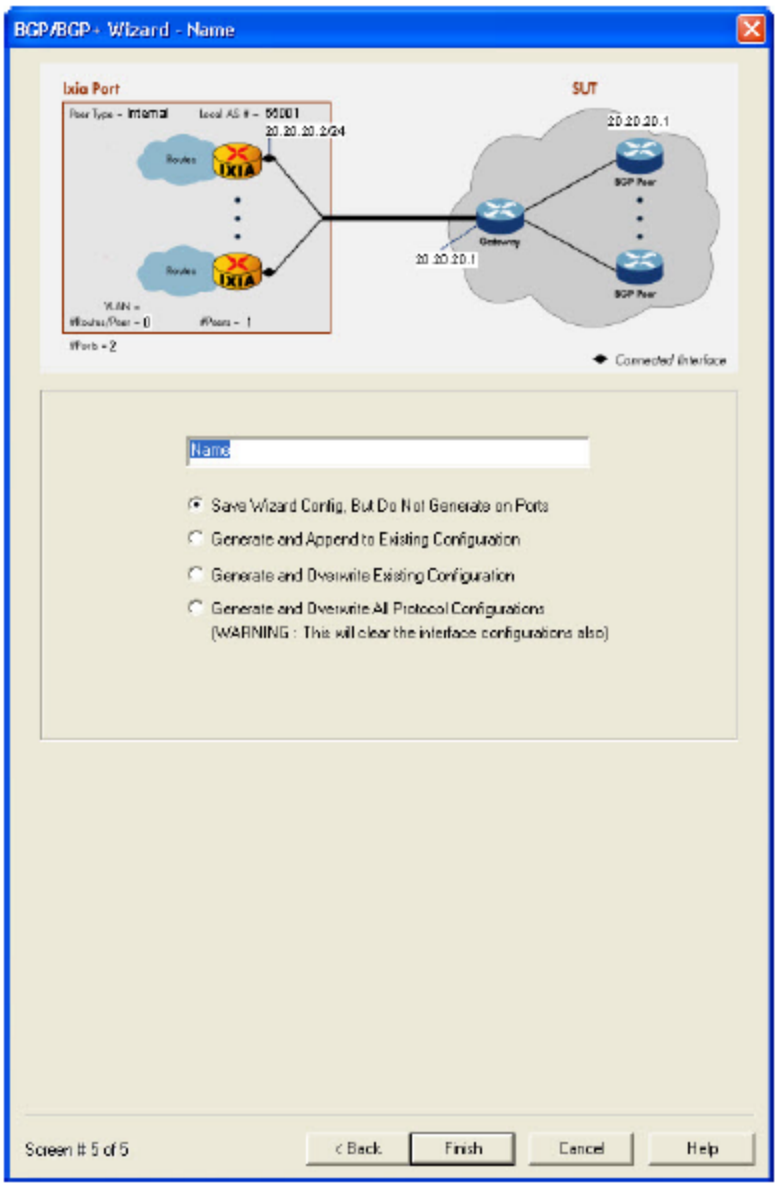
6. Enable VLAN and configure the IP addressing for Ixia and DUT ports.
7. Configure the number of Ixia-emulated BGP routers per port and click **Next**.

   The *BGP/BGP+ Wizard - Route Ranges* dialog box appears as shown in the following figure:



8. Set the BGP route ranges and select the **Advertise Routes** check box.
9. Click **Next**.

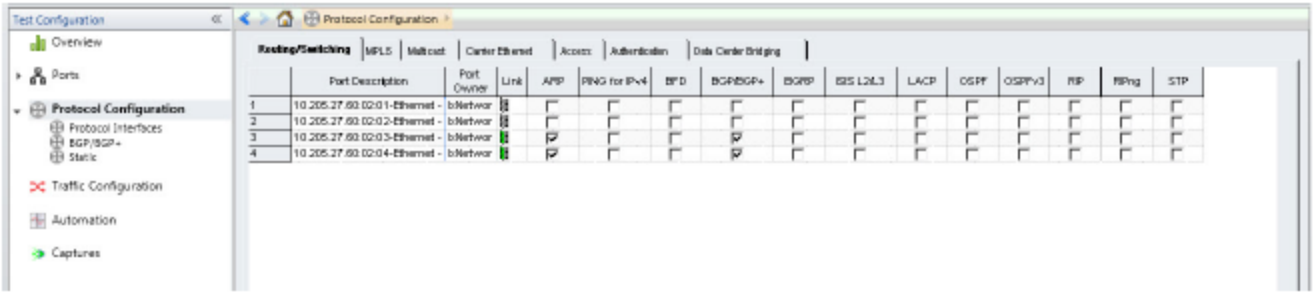
The *BGP/BGP+ Wizard - Save* dialog box appears, as shown in the following figure:



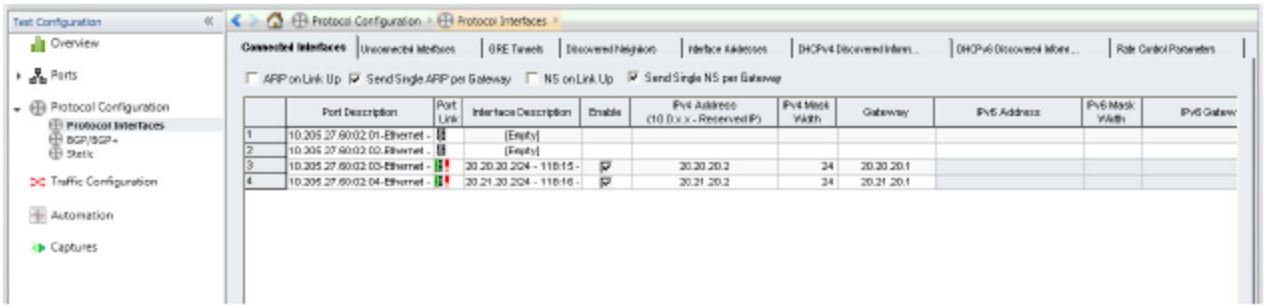
10. You can save the protocol configuration for later use, or apply to the port immediately. For this example, click **Generate and Overwrite Existing Configuration**.
11. Click **Finish** to close the dialog box and apply the protocol configuration to the ports.

Review the Protocol Configuration

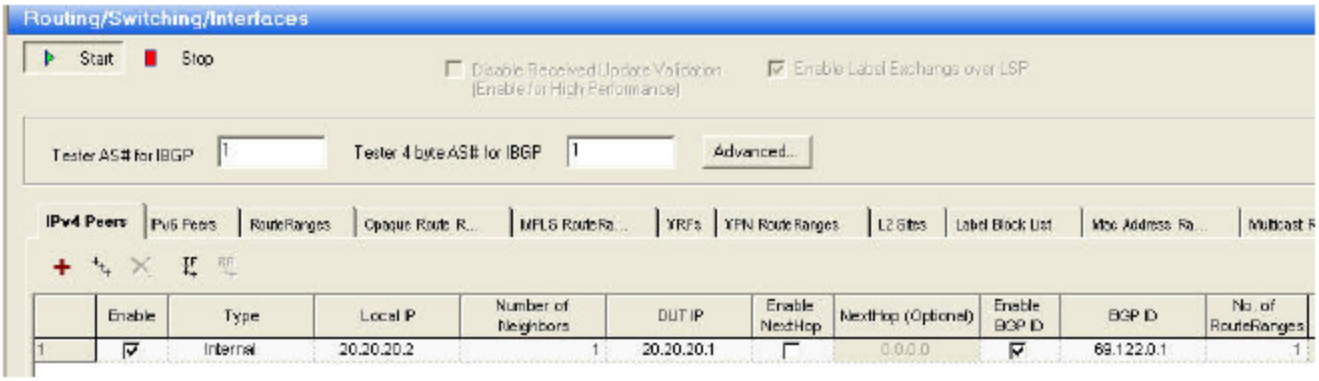
The wizard automatically enables the BGP (and ARP) protocol, as shown in the following figure:



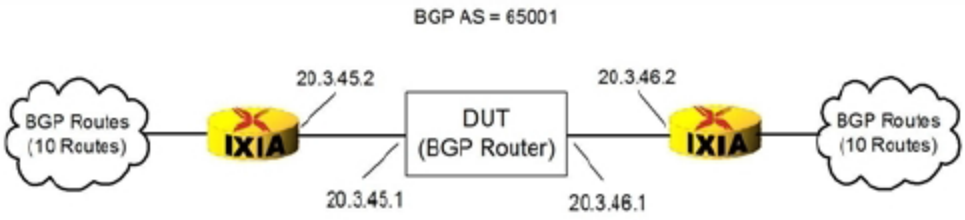
It creates connected protocol interfaces for each port, as shown in the following figure:



It also enters the BGP protocol configuration for each of the ports, as shown in the following figure:



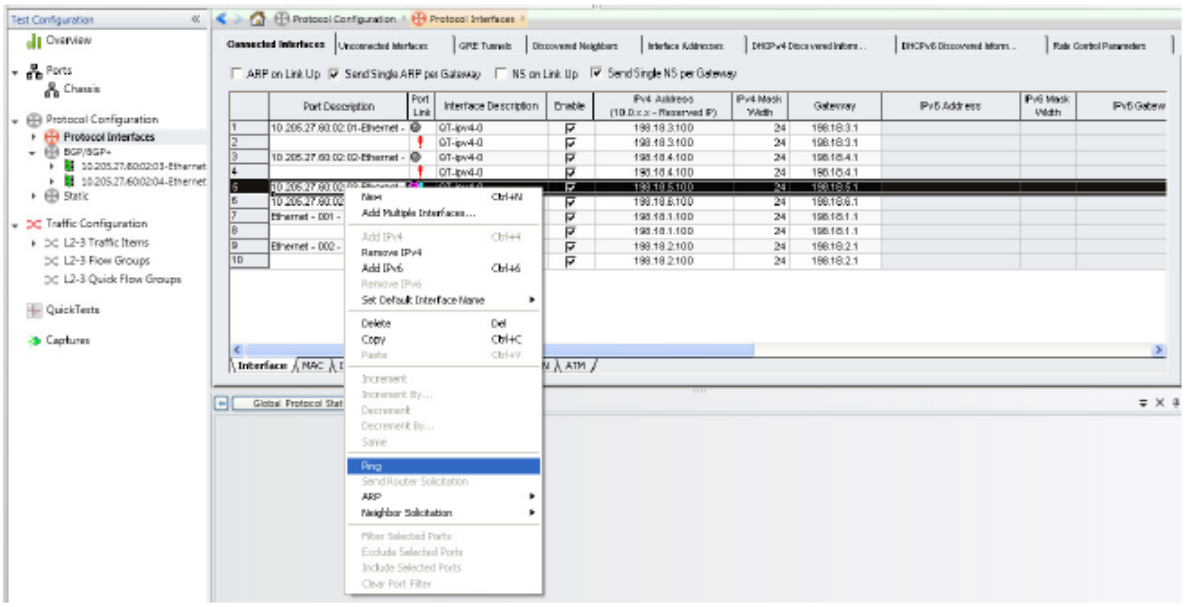
The emulated BGP topology is shown in the following figure:



Ping the DUT

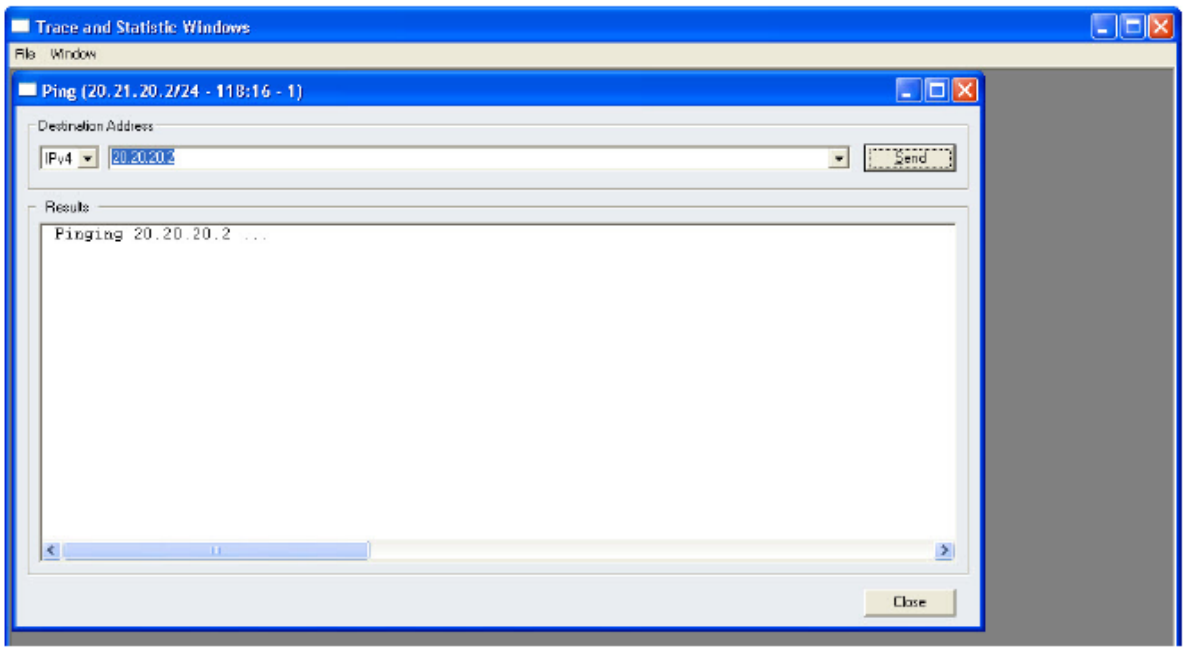
To ensure connectivity between Ixia ports and the device under test (DUT) ping the DUT.

1. Right-click the port and click Ping from the pop-up menu as shown in the following figure:



The *Trace and Statistics*Window appears.

2. Enter the IP address of the DUT in the Trace and Statistics Window and click **Send**. The received response appears on the Ping window as shown in the following figure:



Start the BGP Protocol

Start BGP Protocol on both the ports in the Protocol window (see Start BGP Protocol below).

1. Click **Start All Protocols** to start the protocols for both the ports simultaneously.

You can view the Global Protocol Statistics in the Statistics window, as shown in the following figure:

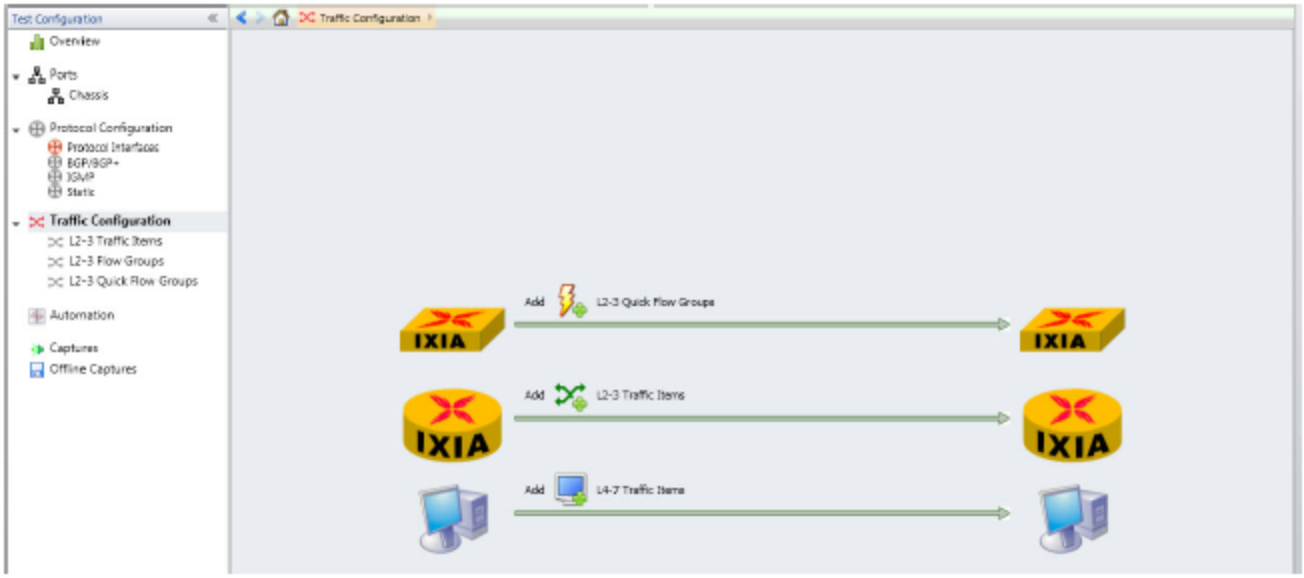
2. Verify that the BGP protocol is operating on both the ports.

Configure Traffic

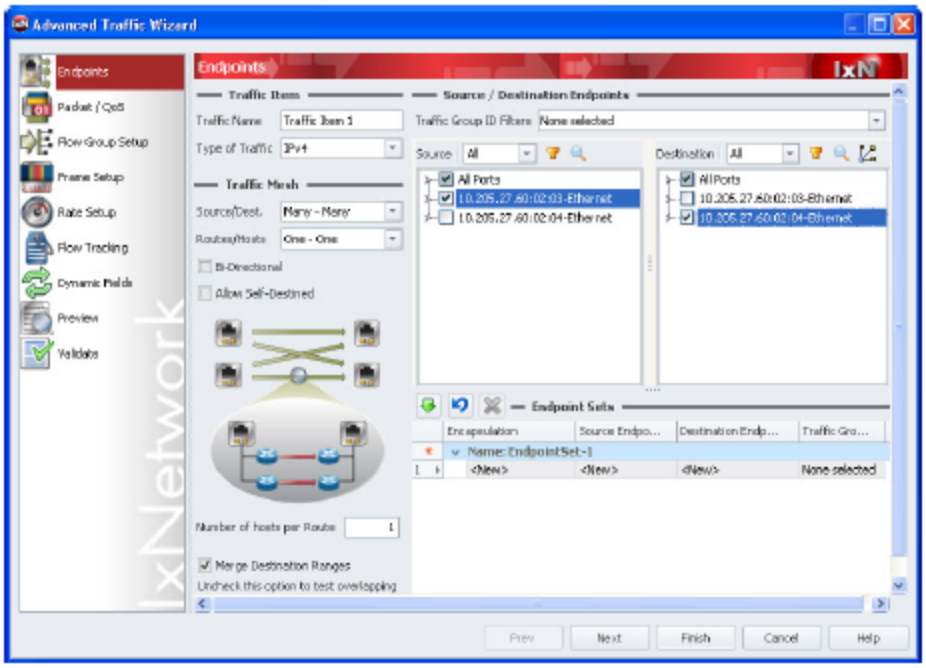
You must configure a traffic for the protocol on the ports.

1. Click Traffic Configuration on the Test Configuration pane of the IxNetwork window.

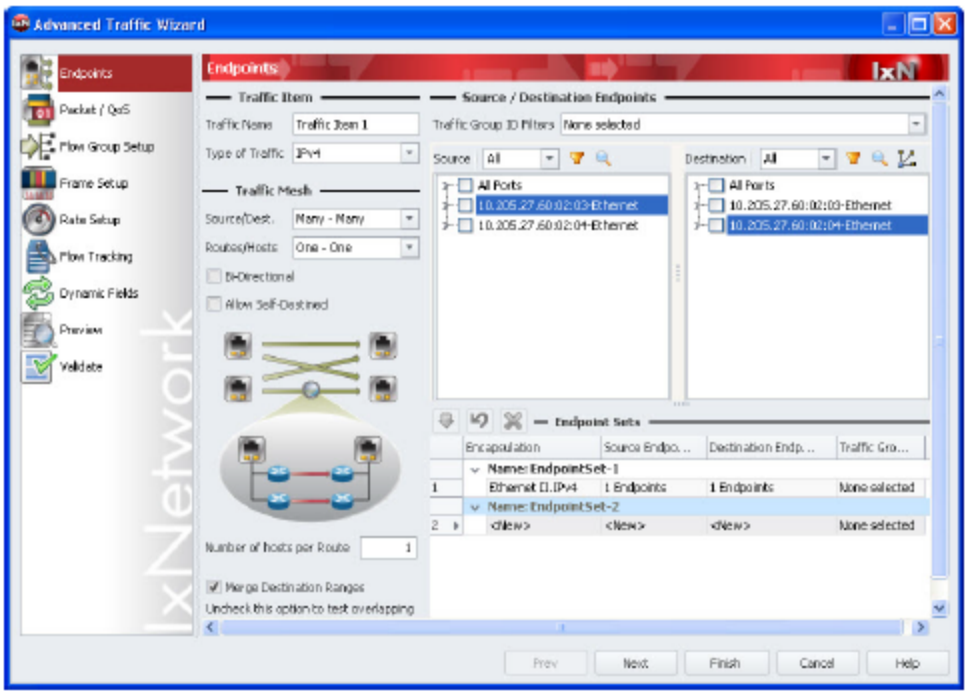
   The *Traffic Configuration* window appears, as shown in the following figure:



2. On the Home tab, click **Add Traffic** ,then **Advanced Traffic**. The Advanced Traffic Wizard window appears as shown in the following figure.
3. Select the **One-One** option for **Source/Dest** and **Fully Meshed for Routes/Hosts** from the drop-down lists to define the Mesh Type.
4. Select the source and destination IPs in Source and Destination IP Pairs below.



5. Click the apply icon to add the source and destination pairs in the lower pane of the window as shown in the following figure:



6. Repeat procedures 5 and 6 to add more pairs.

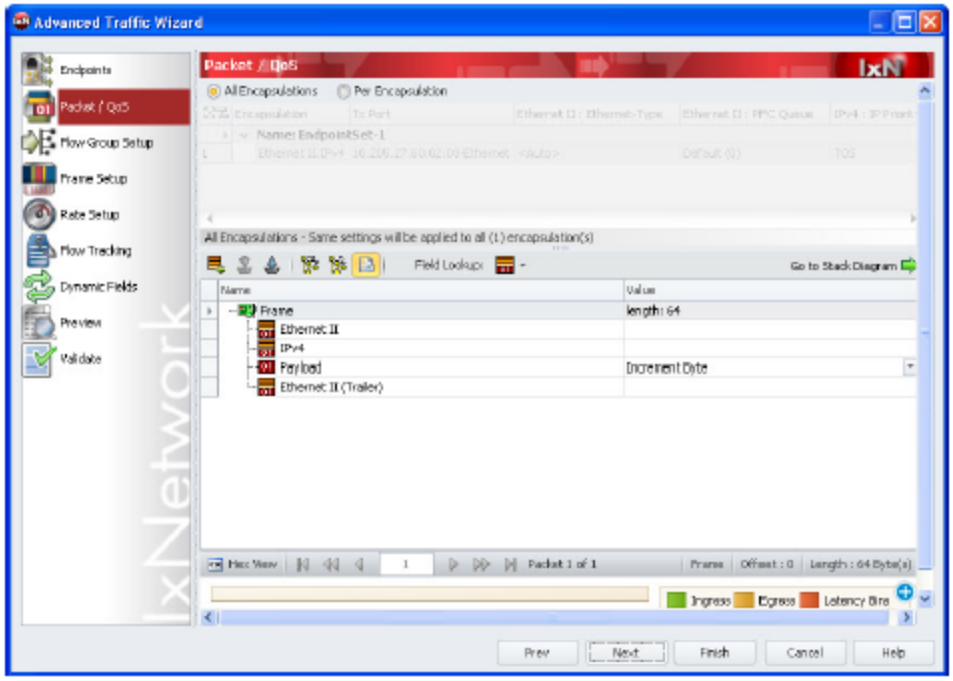
   As shown in Applying the Source and Destination Pairs on the previous page, traffic is sent from the source (on the left pane) to the destination (on the right pane).

   The Source/Destination Mesh type is, 'One-One.' Since two Ixia ports are being used, and bidirectional traffic is sent between the two ports, two sources and two destinations are created. (Each port acts as both source and destination.)

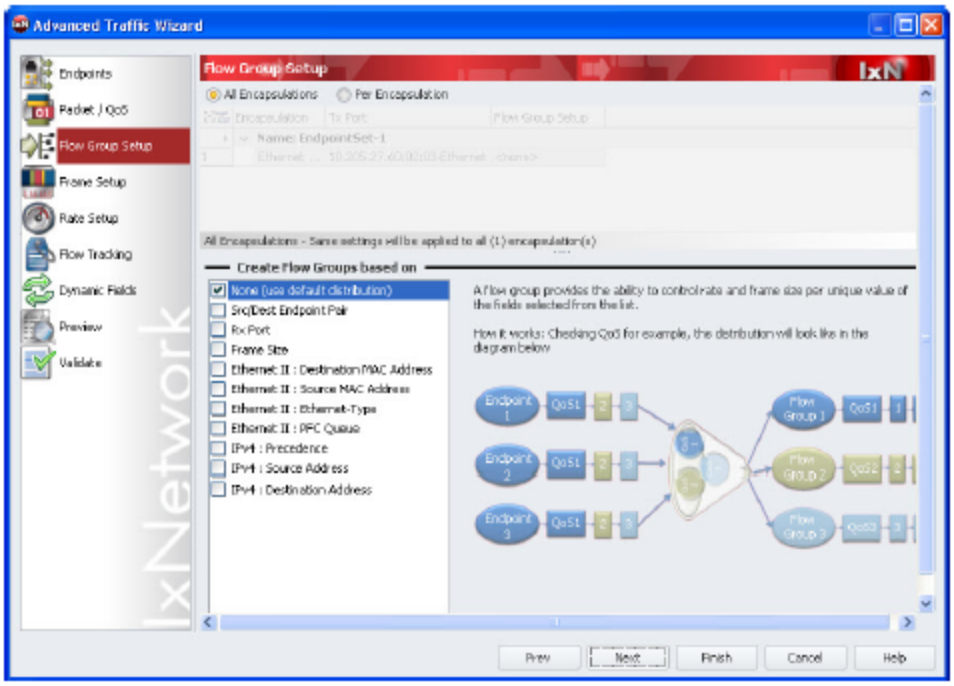
   The Route Mesh type is, 'Fully Meshed'. Since there are 10 route ranges set up for each port, a full mesh will create 100 pairs of route ranges. The Encapsulation type is non-MPLS, and the Endpoint type is IPv4.

   Creating the pairs at the high-level of the trees saves configuration time. Each port acts as both source and destination, so the Source / Destination Pair includes 2 source items and 2 destination items. If you select individual items from the expanded tree, you must add two Source / Destination Pairs—one for each of the two directions of traffic.

7. Click **Next** to continue with the configuration.
8. The Packet QoS dialog box appears, as shown in the following figure. You need not make any changes in the dialog box.

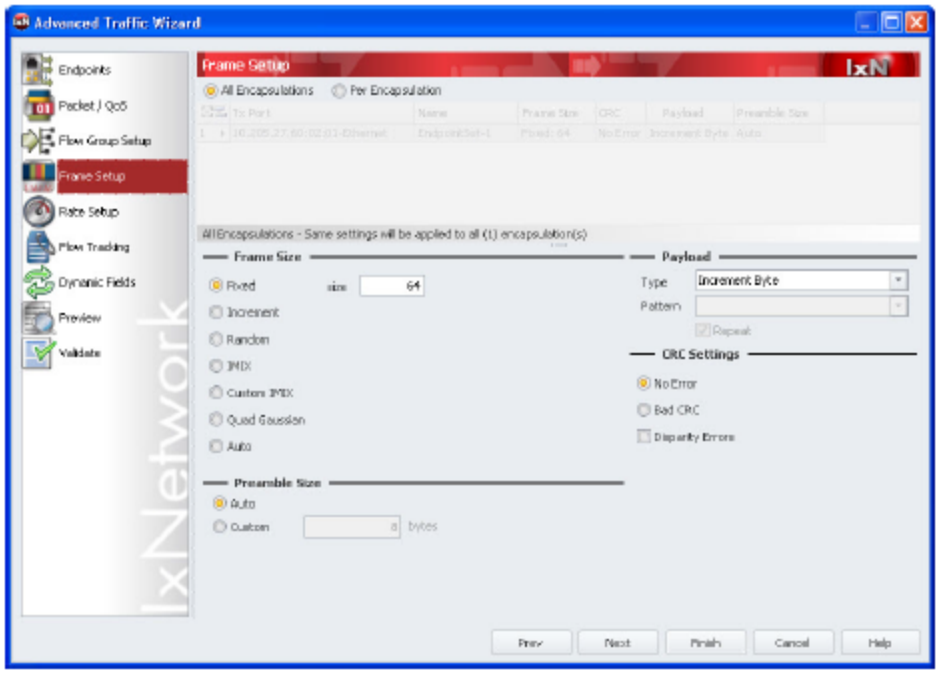


9. Click **Next** to continue with the configuration. The **Flow Group Setup** dialog box appears, as shown in the following figure:

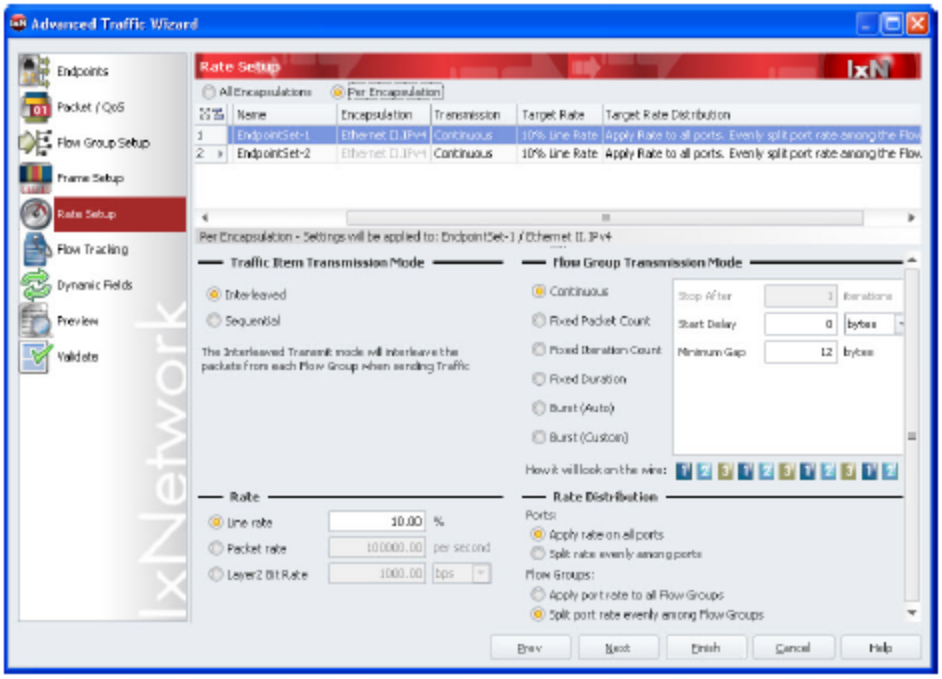


10. Select the desired Flow Group from the left navigation pane. If you select **None**, the default distribution is taken for the configuration.

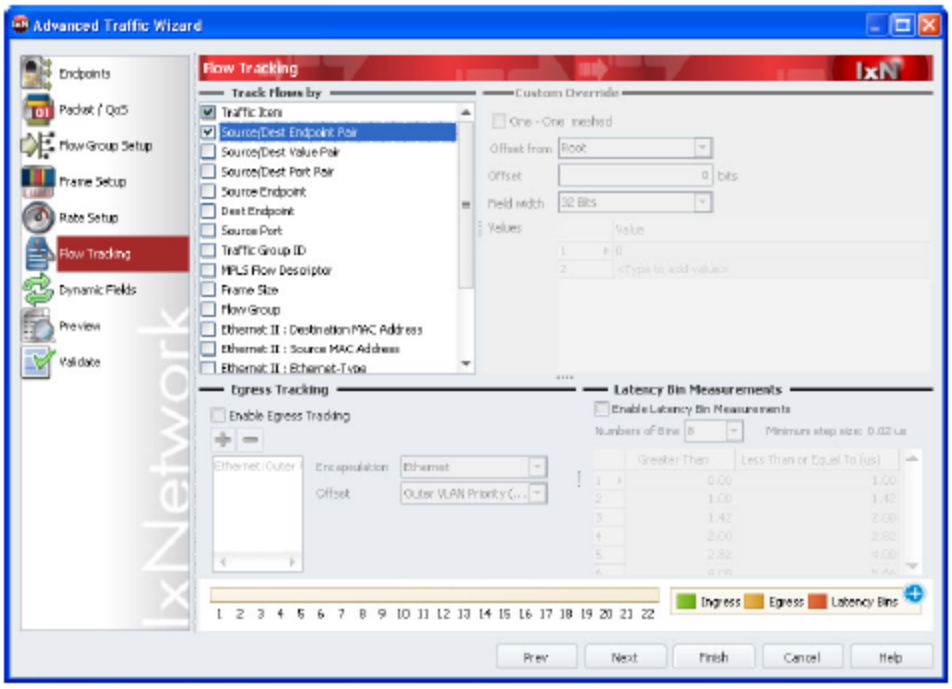
11. Click **Next** to continue with the configuration. The Frame Setup dialog box appears, as shown in the following figure. If required, increase the Frame Size from the default value (64).



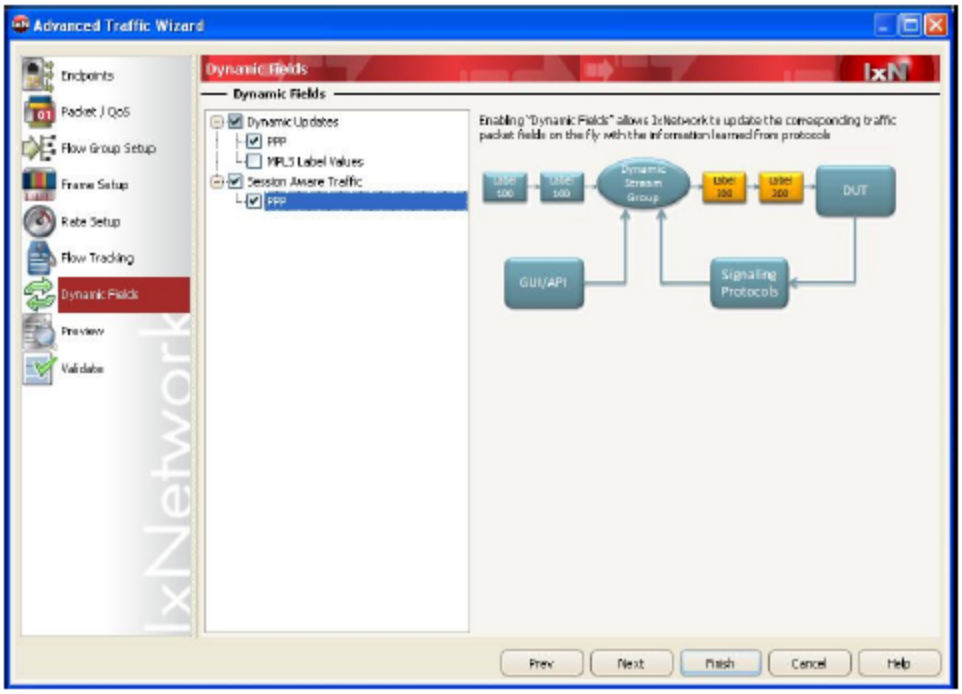
12. Click **Next** to continue with the configuration.
13. The *Rate Setup* dialog box appears, as shown in the following figure. You can perform the rate setup per encapsulation or for all encapsulations by clicking the relevant option. Select the desired transmission mode (Interleaved or Sequential) and specify 10 for % Line rate.



14. Click **Next** to continue with the configuration.
15. The Flow Tracking dialog box appears, as shown in the following figure. Select the desired track flow from the Traffic Flows by navigation pane. For this example, select Source/Dest Endpoint Pair.



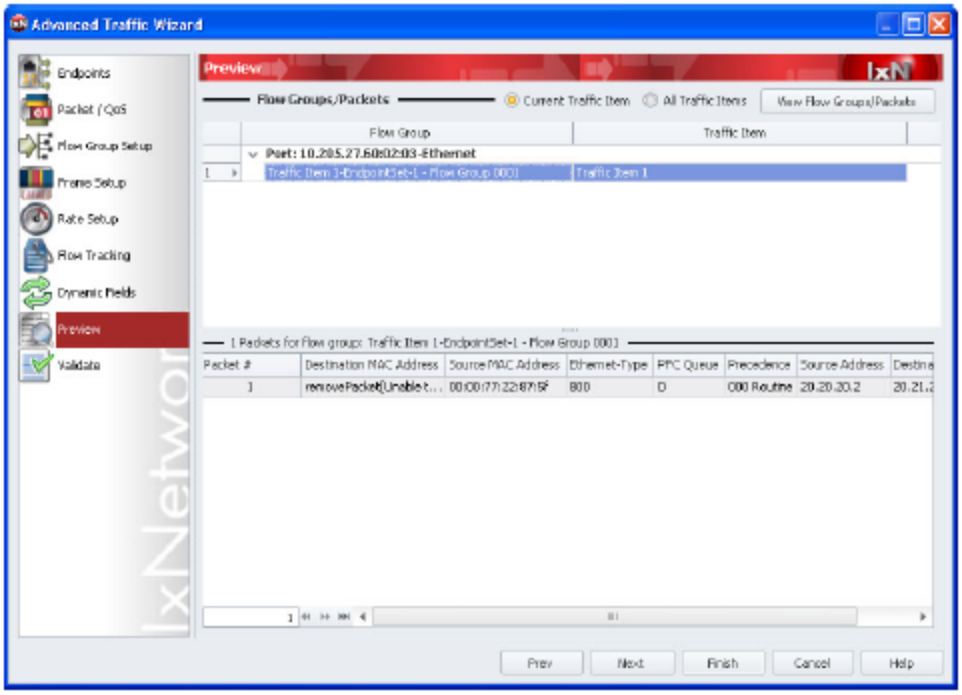
16. Click **Next** to continue with the configuration.
17. The Dynamic Fields dialog box appears, as shown in the following figure. Select the MPLS Label Values check box.



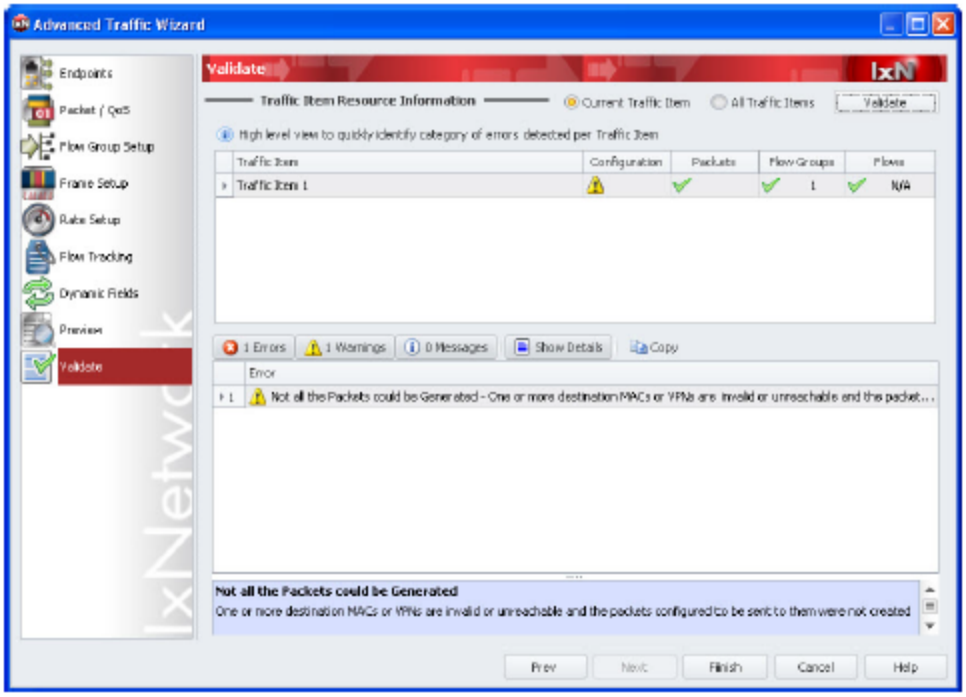
18. Click **Next** to continue with the configuration.

    The *Preview* dialog box appears.

19. Click **View Flow Groups/Packets** in the upper right corner. The Flow Groups and Packets of the configured Traffic Item is displayed.
20. Select a flow group. The packets for the flow group are displayed in the lower pane.



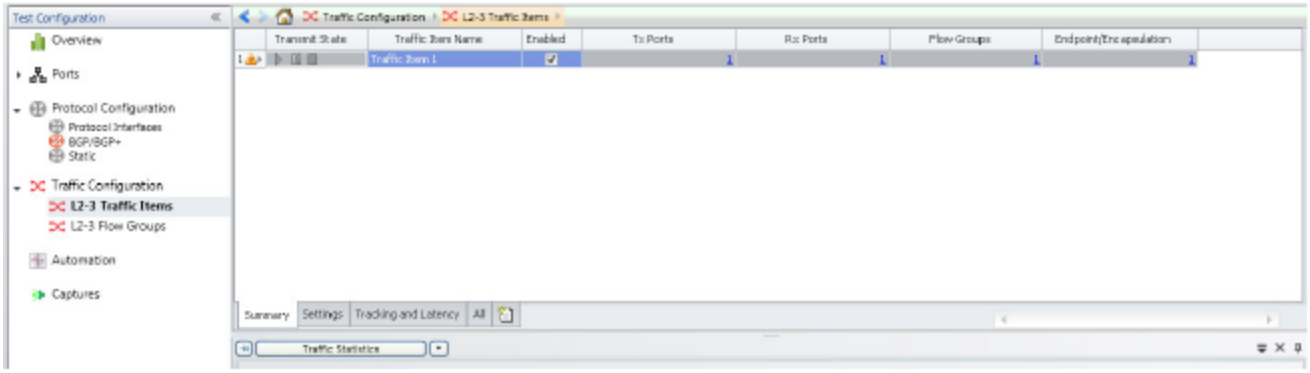
21. Click **Next** to continue. The *Validate* dialog box appears.



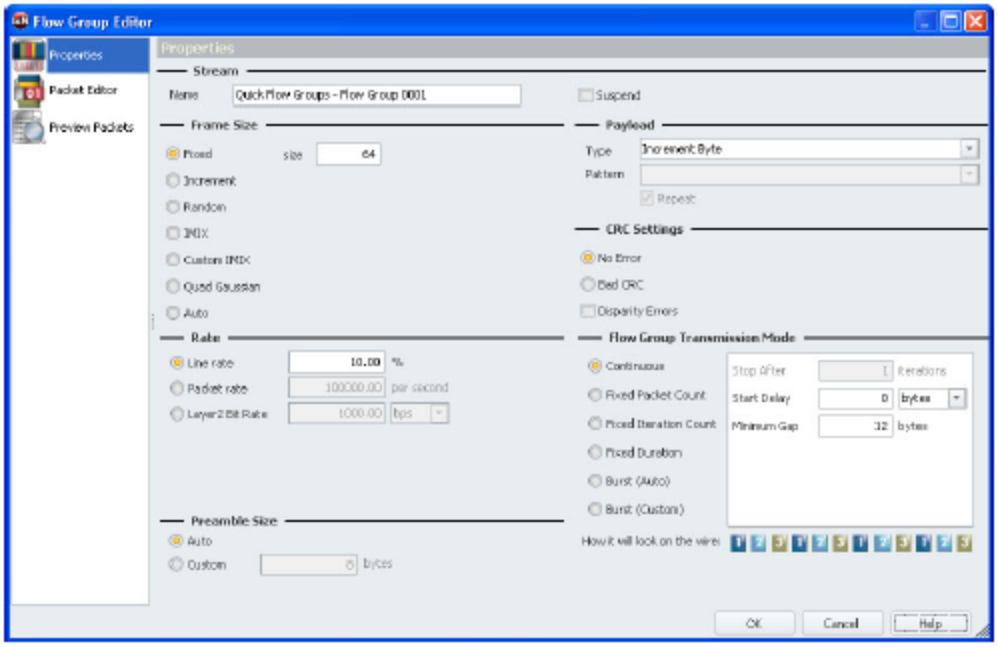
22. Click **Validate** in the upper right corner. The result of the configured Traffic Item is displayed, as shown in the figure.

23. Click **Finish** to close the wizard.
24. Click **L2-3 Traffic Items** under **Traffic Configuration** in the Test Configuration pane.

    The configured Traffic Item appears in the Traffic window, as shown in the following figure:

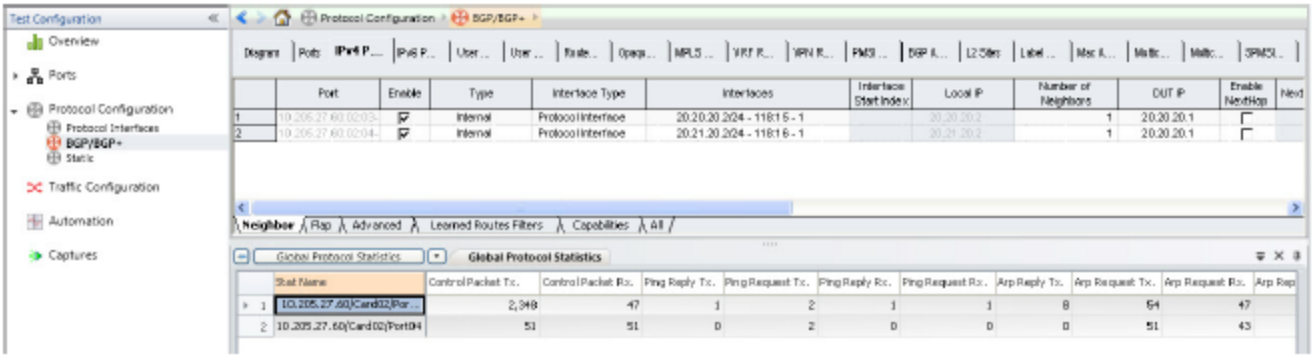


25. Double-click a traffic item to display the Flow Group Editor dialog box. Note that the information in the Properties reflects the changes that were made in Frame Setup Dialog Box.



26. On the Home tab, click **L2-3 Traffic**, then **Apply L2-3 Traffic** to write the traffic configuration to the ports. Then click **Start All L2-3.**

27. View the progress of the streams in the Statistics window, as shown in the following figure:



Set Up the Test Composer

Test Composer is an Ixia software component, integrated into IxNetwork that permits the creation of complex multi-step test scripts integrating Event Scheduler events, DUT configuration commands, local or external procedure calls, and flow control instructions that permit branching the script flow based on a step result evaluation.

To open the IxNetwork - Test Composer Window click the

dedicated button on the IxNetwork GUI Views tab.

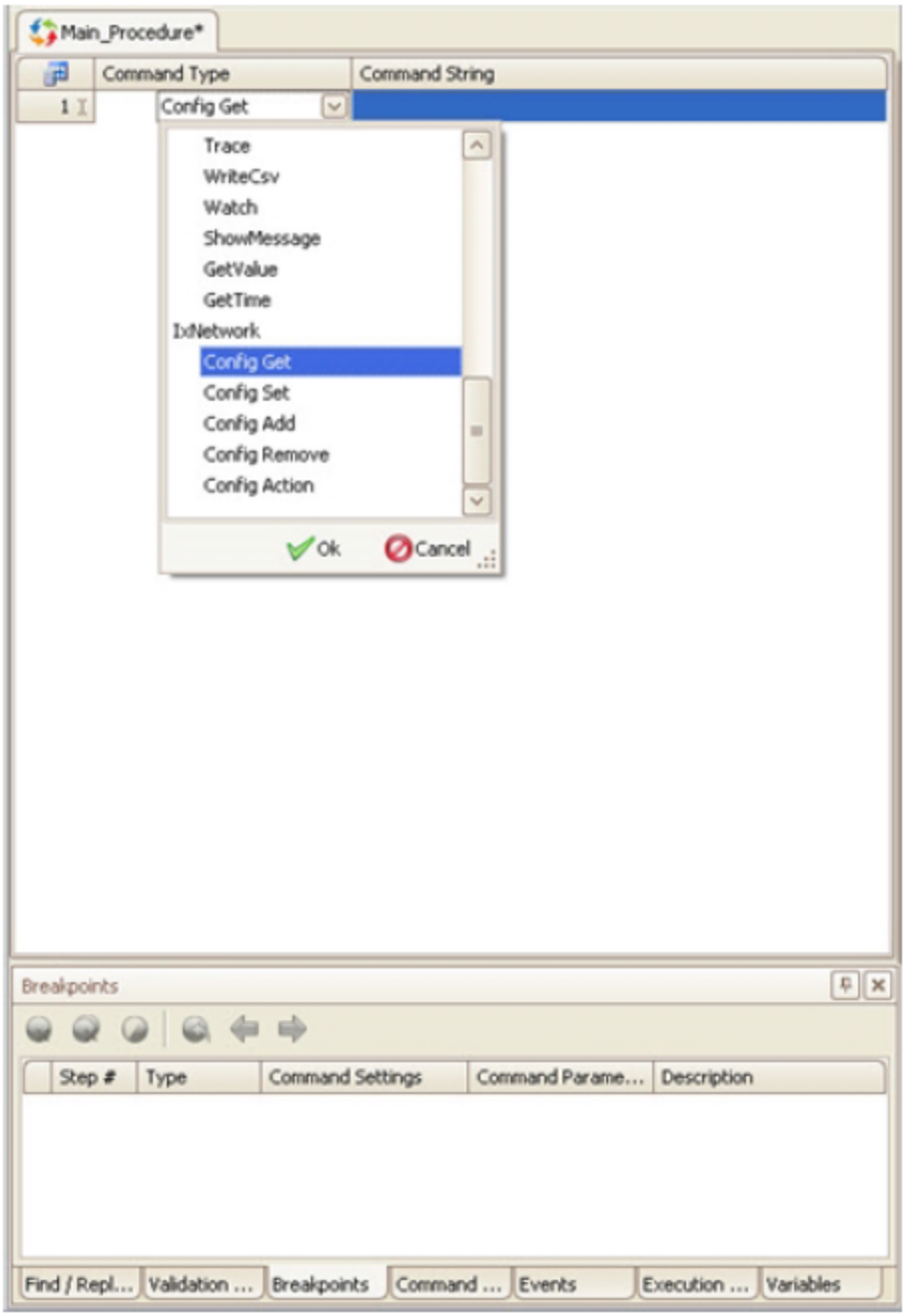
The IxNetwork - Test Composer application appears as a separate panel.

The *TestComposer Online Help* provides detailed information on the Test Composer window features. Press F1 to access the online help in the Test Composer window.

To set up TestComposer, do the following:

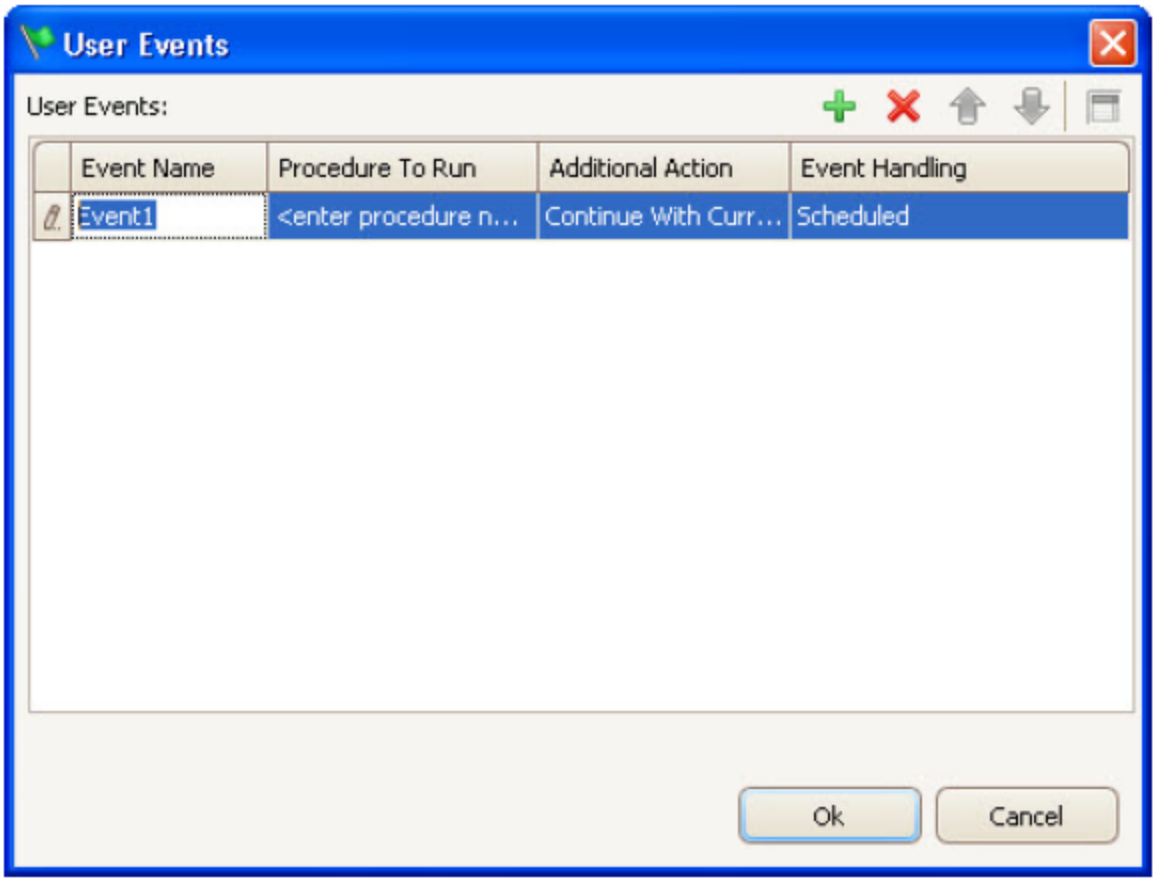
1. Click **Test Composer** on the **Views** tab to display a separate panel on the right of the IxNetwork GUI.

2. Click to add a new script as shown in the following figure:



See Chapter 27: Test Composer in *TestComposer Online Help* for details on the Test Composer Script.

3. Click **UserEvents** on the **Test** tab to add an event as shown in the following figure:



You can define global user events and associate them with executed procedures and additional actions.

An Execute command output or a device session to configured test devices can be monitored for the occurrence of specified messages. When a matching message is received by either an Execute or a Watch script step, an event is triggered and processing for the event can be configured.

See Chapter 3: Defining User Events in *TestComposer Online Help* for details on User Events.

Creating a Test Composer Script

See Chapter 3: Creating and Editing a Test Composer Script in *TestComposer Online Help* for creating a Test Composer Script.

Creating a Sample Test Composer Script

This section describes a sample operations sequence for defining a Composer test and saving it with the IxNetwork configuration file.

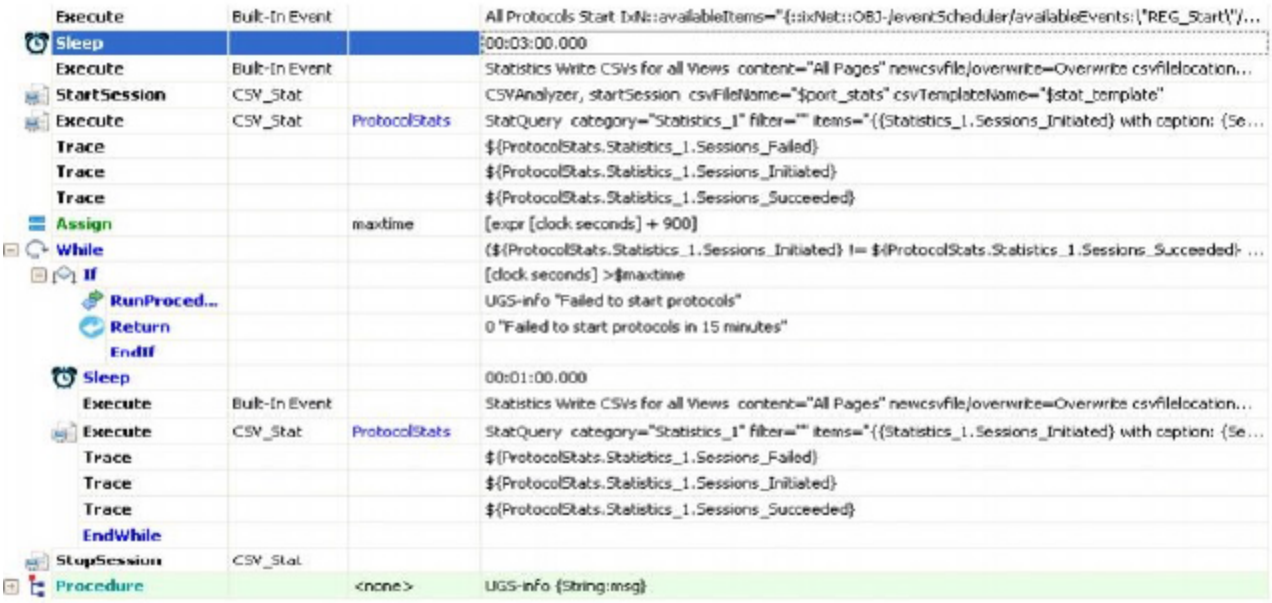
Test Overview

For the purpose of our example, we are considering a TestComposer test script that runs against a router DUT that is connected to an Ixia chassis port. The test starts the PPoE and DHCP protocols on the chassis port and tests repeatedly for a steady state condition with a total number of sessions below a configured amount no failed sessions and no sessions that are in an inconsistent state.

Initially the test script starts the protocols on the selected chassis port using the automatically created Built-In Event session of the IxNetwork type, waits for a period of 3 minutes and then writes all statistics to CSV files using the Write CSVs for all views command.

The resulting CSV file is opened by a CSVAnalyzer session and the Sessions_Initiated, Sessions_ Successful and Sessions_Failed statistics are retrieved into the ProtocolStats composite variable using the CSVAnalyzer StatQuery command. The statistic values are displayed using Trace commands that reference the composite variable retrieved previously.

The script then tests for a steady DUT condition that translates into a state whereby the number of initiated sessions equals the sum of successful and failed sessions. In addition, this state is characterized by a number of session lower than a configured amount, and no failed sessions. While this condition is not met, the script loops repeatedly (using a While statement) with a 1 minute frequency (Sleep statement),where by at each new iteration the session statistics are written anew into CSV files, retrieved by the StatQuery function and then displayed. Inside the While loop, an If statement tests if the initially allocated time of 15 minutes, or 900 seconds, expired, after which the test script calls an inline logging procedure and exits using a failed condition.



Creating the Composer Test

To create the test script described in Test Overview proceed as follows:

1. While in the TestComposer plugin, right-click the script tab and click the **Properties** button, then type in a test name and an optional description in the Information window that appears.
2. Start adding the steps sequence described below.

Click the **Append last Step** button and add an **Execute (All Protocols Start)** step on the default Built-In Event session that is created automatically for every TestComposer script. This command starts two protocols, PPoE and DHCP, on the selected Ixia chassis port.

```
All Protocols Start IxN::availableItems="{::ixNet::OBJ-/eventScheduler/
availableEvents:\"REG_Start\"/availableItems/node:\"aptixia.1\"} {::ixNet::OBJ-
/eventScheduler/availableEvents:\"REG_Start\"/availableItems/node:\"aptixia.2\"}
"
```

3. After pausing the script execution for 3 minutes using a Sleep statement, add an Execute step that writes all statistics to CSV files using the Write CSVs for all Views command on the Builtin Event Session:

```
Statistics Write CSVs for all Views content="All Pages"
newcsvfile/overwrite=Overwrite csvfilelocation="$stat/../"
```

4. Add a `startSession` step that opens a CSVAnalyzer session to the file referenced by the $port_ stats variable:

```
CSVAnalyzer, startSession csvFileName="$port_stats" csvTemplateName="$stat_
template"
```

5. Using the previously created CSVAnalyzer session, add a statQuery step that retrieves the aggregate `Sessions_Initiated`, `Sessions_Succeeded`, and `Sessions_Failed` values using the *ProtocolStats* return variable assigned to the step:

```
StatQuery category="Statistics_1" filter=""items="{{Statistics_1.Sessions_
Initiated}
with caption:
{Sessions_Initiated} aggregation:
Sum}{{Statistics_1.Sessions_Succeeded} with caption:
{Sessions_Succeeded} aggregation:
Sum}{{Statistics_1.Sessions_Failed} with caption:
{Sessions_Failed} aggregation: Sum}"
```

6. Output all three variables to the screen using the Trace commands that reference the `${ProtocolStats.Statistics_1.Sessions_Failed}`, `${ProtocolStats.Statistics_1.Sessions_ Failed}`, and `${ProtocolStats.Statistics_1.Sessions_Failed}` variables respectively.
7. Configure a `maxtime` timeout value using the following Tcl expression inside an `Assign` statement:

```
Assign maxtime [expr [clock seconds] + 900]
```

8. Inside a `While` statement test for the steady state condition using a conditional expression that evaluates if the number of initiated sessions equals the sum of successful and failed sessions. In addition, the number of initiated sessions should be lower than 1000 and there should be no failed sessions:

```
(${ProtocolStats.Statistics_1.Sessions_Initiated} !=
${ProtocolStats.Statistics_1.Sessions_Succeeded} +
${ProtocolStats.Statistics_1.Sessions_Failed} ) || (
${ProtocolStats.Statistics_1.Sessions_Failed}== 0 ) ||
```

```
($${ProtocolStats.Statistics_1.Sessions_Initiated} < 1000)
```

9. Nested within the `While` loop configure an If statement to test if the time expired since test start exceeds the initially configured amount `(maxtime)`; while the initial time was not exceeded, similar operations with those from steps 4, 5, and 6 are performed repeatedly with a frequency of 1 minute, with the session statistics being retrieved and displayed.

When the timeout expires, a `RunProcedure` statement calls the *UGS-info* logging procedure and terminates the test execution using a fail status (zero value) as an argument to the `Return` statement.

```
Return 0 "Failed to start protocols in 15 minutes"
```

10. Click the **Save** button. The TestComposer script is saved into the IxNetwork configuration using the name specified at step 1.

As part of the IxNetwork test configuration, it can then be run from the Home ribbon of IxNetwork. When run in this mode, script-generated logs and files are can be accessed from the IxNetwork Data Miner, while statistics exported by the script are displayed in the IxNetwork StatViewer plugin.

The script can also be run from **Test Composer** ribbon in the Edit or Debug mode.

Set Up CSV Logging

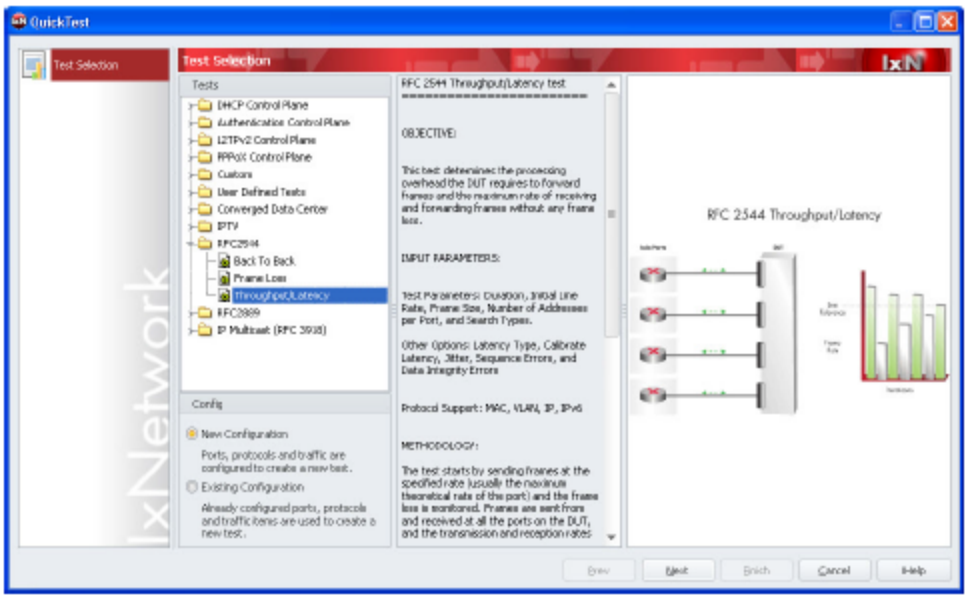
To set up CSV Logging, perform the following steps.

1. On the **Home tab**, click **Test Options**. The **Test Options** dialog box appears.
2. On the left panel, click **Stat Viewer Options**.
3. On the **Advanced Settings** tab, select the **Enable CSV Logging for All Views** check box.
4. Click the **File** tab, then **Preferences**. The **Preferences** dialog box appears.
5. On the left panel, click **StatViewer Options**.
6. Select the location of the CSV file. The data is saved to the CSV file path. Use the CSV information with IxReporter to create a PDF or HTML report, or export the information to an Excel sheet.
7. Click **OK** to save the settings.

Set Up a QuickTest

To set up a QuickTest, do the following:

1. Select **QuickTests** on the Test Configuration pane.
2. On the configuration tab, click **Add QuickTests.** The *QuickTest* window appears.
3. Select a test from the list. For this example, select RFC 2544 Throughput/Latency test.



4. Click **Next**. The Ports page appears. Modify existing ports and add new ports. You can modify existing ports only if they are unassigned (virtual) as it is assumed that any assigned ports are already configured correctly through the Port Manager of IxNetwork. You can also add virtual ports.
5. Click **Next.** The Frame Data page appears. Configure the frame data.
6. Click **Next**. The Traffic page appears. This page dispays the ports used in the test. You can map source/destination ports and add them.
7. Click **Next**. The **Traffic Options** page appears. This page enables you to set various parameters related to traffic, such as the frame sizes and delays used for the validation traffic and the learning process parameters.
8. Click **Next**. The **Test Parameters** page appears. This page enables you to configure the parameters for the test.
9. Click **Next**. The **Finish page** appears. This page allows to give a name to the newly configured test.
10. Click **Finish** to complete the configuration.
11. Click

to begin the test.
12. Select **Data Miner** in the **Test Configuration** pane. The results of the test appear in the Results section of the *Data Miner* window.

CHAPTER 4 Accessing IxNetwork Documentation

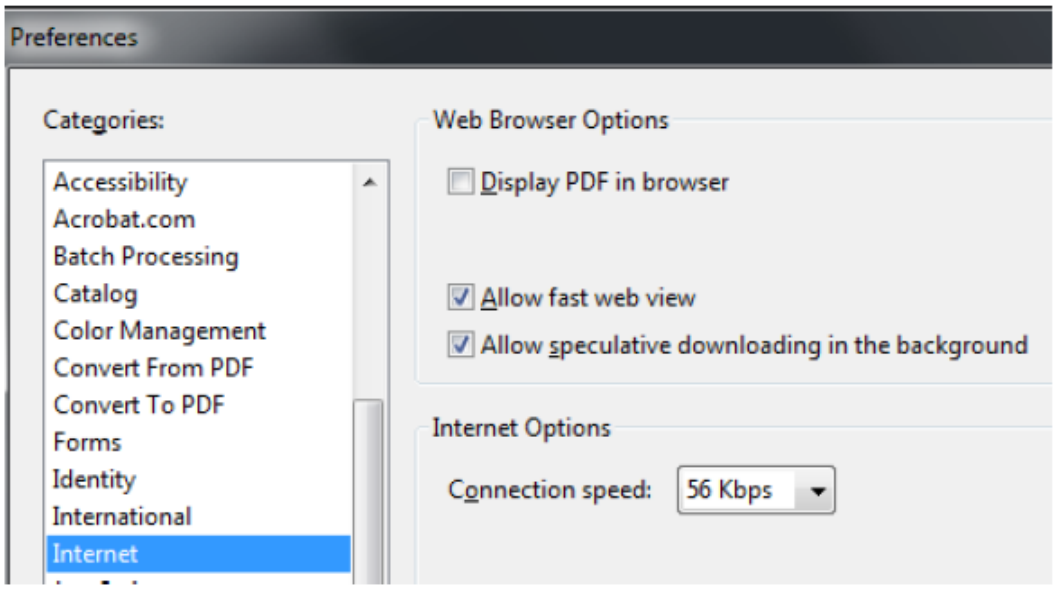
The guidelines provided in this chapter help you to access the IxNetwork documentation. The documentation set comprises of the following output formats. Click the following links to see instructions pertaining to each format.

- PDF
- CHM
- WebHelp
- Video Tutorial

If a PDF Help File does not Open

Some of our PDF files seem to be too long or difficult for the Microsoft Internet Explorer to display within a browser window. If this happens to you, you can adjust the settings in Adobe Acrobat to cause it to display in a separate window. To make the adjustment, follow these steps:

1. Start Adobe Acrobat. From the **Start** button, select **Programs** Adobe Acrobat <version>. Some versions of Acrobat are called Acrobat Reader. If your Start menu does not contain Adobe Acrobat or Adobe Reader, then you can browse to the executable and start it directly. It should be located at C:\Program Files\Adobe\Acrobat <version>\Acrobat\acrobat.exe.
2. Within Acrobat, select **Edit...Preferences...Internet**.
3. Select **Options** from the list on the left.
4. Clear the **Display PDF in Browser** check box as shown in the following figure.
5. Click **OK** and exit Acrobat.



If you cannot View a CHM Help File

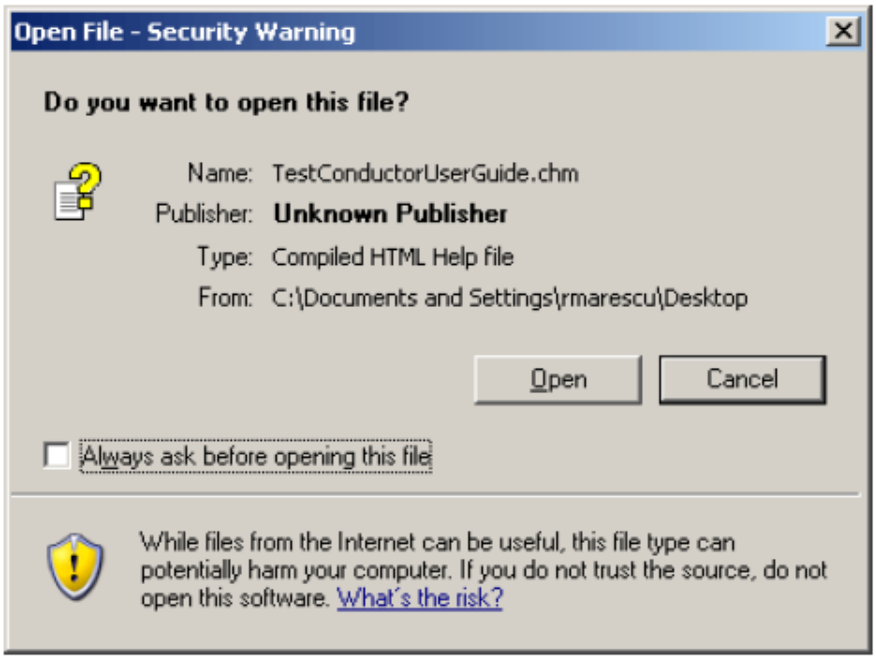
After you install security update 896358 or Microsoft Windows Server 2012, you may experience one or both of the following symptoms after you click a link to an HTML Help .chm file in Internet Explorer:

- Topics in the .chm file cannot be viewed when you click **Open** instead of **Save** in the **File Download** dialog box.
- Topics in the .chm file cannot be viewed when you click **Save** in the **File Download** dialog box, and you then try to open the file.

In the **File Download** dialog box, click **Save**, and then choose where you want to save the .chm file. Use one of the following set of instructions to view the CHM help file:

Method 1

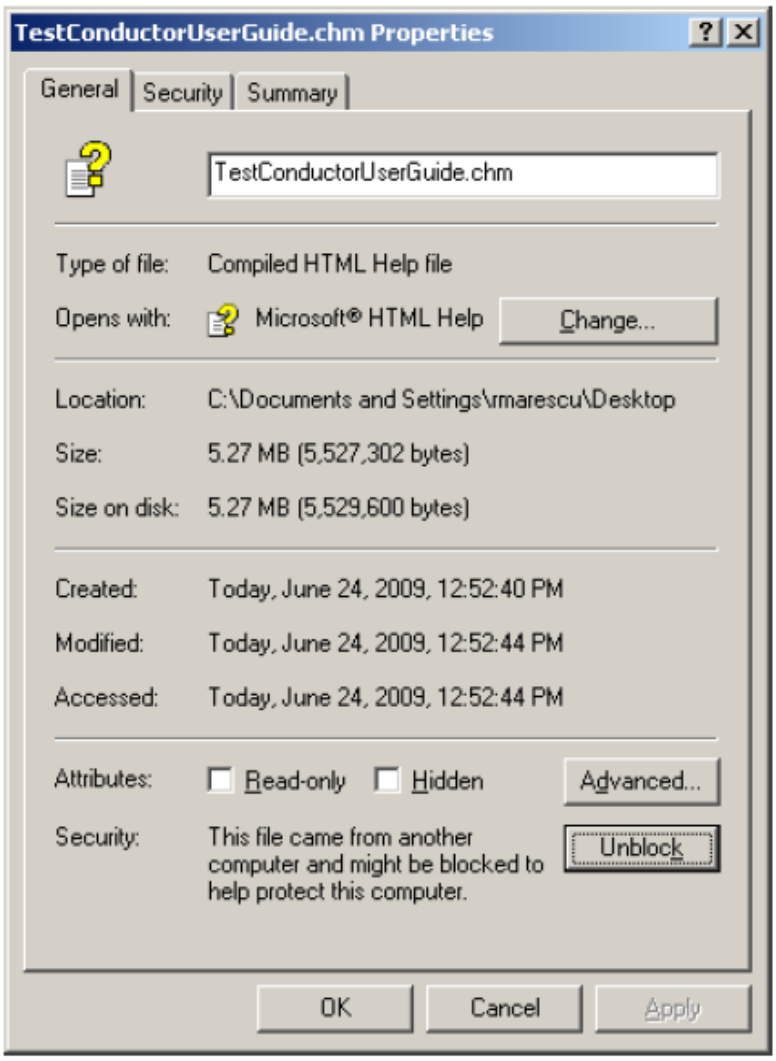
1. Double-click the .chm file.
2. In the **Open File-Security Warning** dialog box, clear the **Always ask before opening this file** check box.
3. Click **Open**.



Method 2

1. Right-click the CHM file, and click **Properties**.
2. Click **Unblock** as shown in the following figure.

3. Double-click the .chm file to open the file.

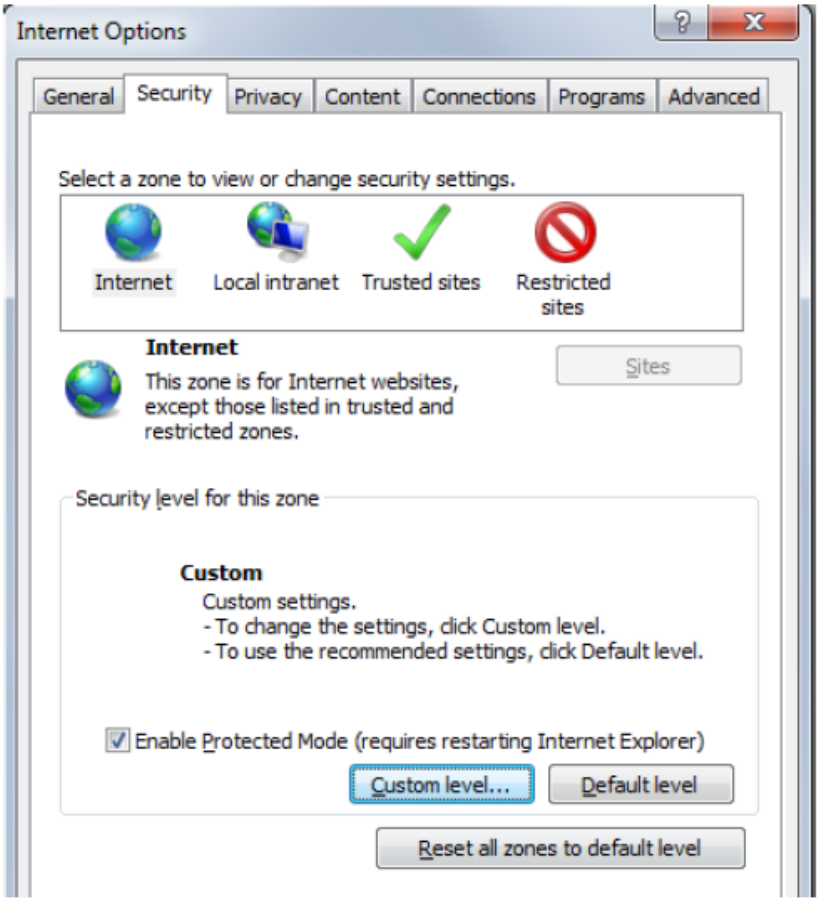


Note: You can run applications in Windows 8.1 Enterprise for both 32-bit and 64-bit Operating System. It will also be upgraded to SQL Server 2008 R2 SP2. All applications are compatible with .NET 4.5.1. IxNetwork will support Active State Perl 5.18.1.

If you cannot View a WebHelp

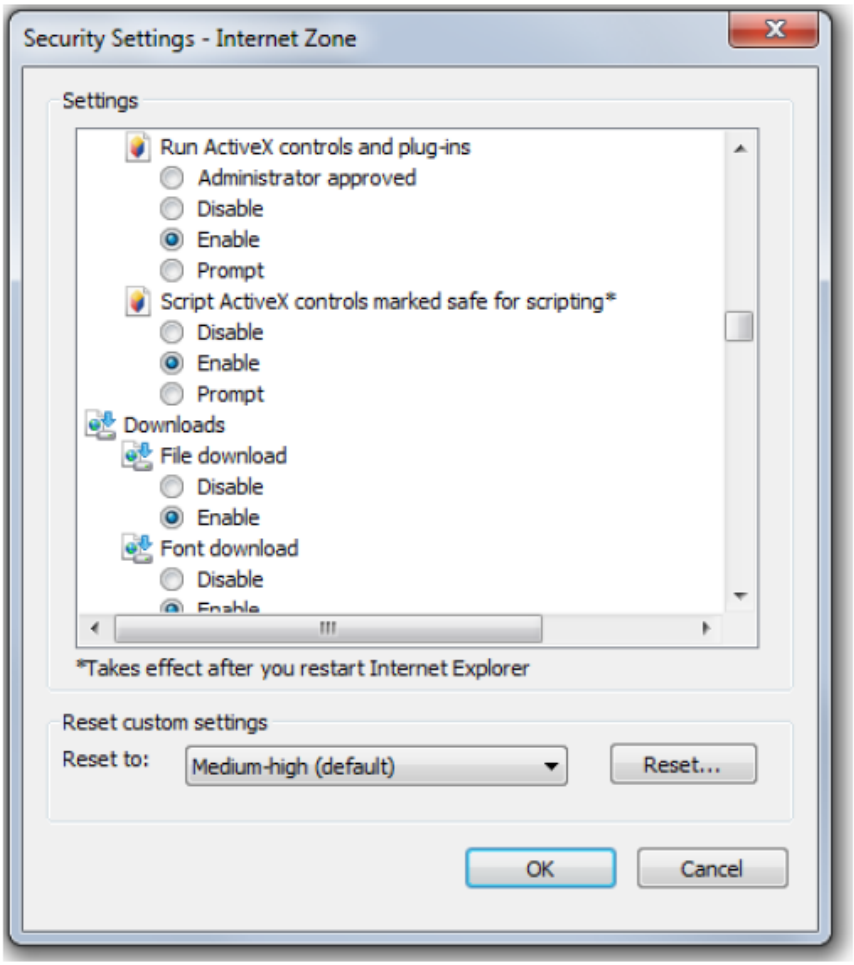
If you are using Internet Explorer to view our WebHelp, you may not be able to view the contents. Please configure the following browser settings before accessing the WebHelp.

1. Open the **Security** tab in the **Internet Options** dialog box from Internet Explorer **Settings**.
2. Click **Custom level** button. See figure below for illustration.



The **Security Settings–Internet Zone** dialog box appears.

3. Under **ActiveX controls and plug-ins**, click **Enable** against the following settings:
   - Run ActiveX controls and plug-ins
   - Script ActiveX controls marked safe for scripting*



4. Click **Enable** against all settings under **Scripting**.
5. Click **OK** to save your settings.
6. Click **OK** in the **Internet Options** dialog box.

To View the Video Tutorials

Install the MadCap Movie Viewer to view the video tutorials. To get the latest version please visit http://www.madcapsoftware.com/downloads/redistributables.aspx

To install the MadCap Movie Viewer:

1. Double-click **SetupMadCapMovieViewer0600.msi**.
2. Follow the instructions to install the movie viewer successfully.
3. Double-click the movie that you want to view.

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CHAPTER 5 IxNetwork Licensing

With IxNetwork 4.30 EA release, IxNetwork introduces a new license management system. **Ixia Licensing Utility (ILU)** and **License Server Plus (LS+)** replace **Ixia Registration Utility (IRU)** and **License Server (LS)** used in earlier versions of IxLicensing.

By using Ixia's license management mechanism, you can:

- Centralize and monitor your software usage.
- Maintain an accurate license inventory.
- Smoothly transfer licenses across different hosts and teams.

The **Activation Code** for the purchased Ixia product(s) is sent in an e-mail message, when you purchase an Ixia software. Enter this **Activation Code** in Ixia Licensing Utility to generate a license. For the licensed software to work properly, licenses must be activated. (For activation steps, see *Ixia Licensing Management User Guide*). License activation for an Ixia product can be done after the software installation, but must be done before the software usage.

The licensing operation is done with a simple wizard and can be run in the following ways:

- The same computer on which the software was installed
- Some other Windows-based computer with the following minimum system requirements:
  - Microsoft® Windows® XP, Microsoft® Windows® 7 and later
  - 1 Ghz or higher processor
  - 512 MB of RAM
  - 950 MB of free hard drive space (x86)
  - 2.1 GB of free hard drive space (x64)

The computer used to perform the licensing process must be connected to the Ixia chassis and to workstations in the lab environment. If at all possible, it should also be connected to the Internet. If simultaneous

connections to the lab network and Internet are not feasible, it is still possible to complete all licensing operations. For information about the offline activation and deactivation processes, see *Overview of Offline Activation/ Deactivation section* in the *Ixia Licensing Management User Guide*.

This chapter covers the license information for IxNetwork software in the following sections:

- IxNetwork-Specific License Information
- Types of Licenses
- Licensing Models
- Prerequisites

IxNetwork-Specific License Information

Licenses for the IxNetwork based software and protocol emulation packages for load modules are available with separate purchase, including:

- IxNetwork base Software, Layer 2-3 Performance Test Application, which supports traffic generation and analysis.
- IxNetwork Protocol Emulation Bundles with multiple protocol emulations, for CPU-per-port load modules.
- IxNetwork Protocol Emulations (individual), for CPU-per-port load modules.

To place an order, see Ordering section in the Ixia website.

Types of Licenses

Ixia provides the following types of licenses for its products:

- Node-Locked Licenses below
- Floating Licenses below
- Evaluation Licenses below

Node-Locked Licenses

Node-locked licenses are locked to a particular chassis or workstation and allow only certain product functions to run on that chassis or workstation.

Floating Licenses

Floating licenses are stored on a license server and allow a set number of chassis or workstations to use product software features. All chassis or workstations that use this type of license must be connected to the license server and the server must be up and running. Once the set number of users is reached for that particular feature, additional users for the product features are denied.

Note: You can mix both node-locked and floating licenses to get the best solution according to your testing environment.

Evaluation Licenses

Evaluation licenses evaluate Ixia products. Except for a time limit, they act in all respects as a regular license (must be activated using ILU).

Licensing Models

Ixia provides the following licensing models for its products:

- Subscription Licenses
- Perpetual Licenses

Subscription Licenses

Subscription licenses are floating and limited licenses, stored on a license server. They are checked out from the defined license servers and allow only a limited number of licenses to be used concurrently.

Note: For specific details on subscription licenses, please refer to the documentation of your product of interest.

Perpetual Licenses

Perpetual licenses are node-locked licenses, stored on a chassis. They are checked out from the individual chassis and cannot be installed on a different license server.

Note: For specific details on perpetual licenses, please refer to the documentation of your product of interest.

Prerequisites

Before activating a license, you must have the following:

- The e-mail message from Ixia with the activation code. The key contents of this e-mail message are as follows:
  - Activation Code: A unique number for the license.
  - Quantity: The number of licenses.
  - Product: The product for which the license is activated.
  - Start Date: The date from which the license can be activated.
  - End Date: The date on which the license will expire.
  - Entitlement Code: If you provide the entitlement code, ILU loads all the available activation codes associated with that entitlement code.

For Licensing Scenarios and guidance for installing Ixia Licensing Utility, see *Ixia Licensing Management User Guide*.

AppLibrary Licensing

AppLibrary supports counted licensing with subscription. The software license is counted by the number of cards for the chassis, but is able to float across any card in the chassis that supports the feature (node locked to the chassis).

On its application, it is counted per node and is floating across appliances. A single AppLibrary license enables the feature on a single appliance.

Note: AppLibrary license enables subscription valid for a year from purchase. Once expired, the feature can continue to be used; however, it is not entitled to new updates.

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