

IxNetwork

Getting Started Guide

Version 8.51 EA

Notices

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CONTENTS

Contact Us	iii
About this guide	viii
Typographical conventions	viii
Textual conventions	ix
Related documentation	ix
Chapter 1 Introduction to IxNetwork	1
Features of IxNetwork	1
GUI Framework	2
Enhanced Port Management	2
Enhanced Protocol Configuration	
Traffic Wizard	5
Test Composer	
Enhanced Statistics Reporting	9
Log View Window	
Application Traffic	10
Quick Tests	11
Flow Tracking	
Capture Settings	13
Analyzer	14
Data Miner	15
Chapter 2 Installation and Licensing	
General Licensing Steps	17

Chassis Installation	
IxNetwork International Language Support	
IxNetwork Installation	
Configuring IxNetwork for Silent Installation	28
Preparing an Ixia Chassis for Silent Installation	
IxNetwork Silent Install using .exe Package	29
Features	
Properties	
IxNetwork setup.exe Package Examples	
Install IxNetwork on a Physical Chassis	32
Uninstall/Modify a Current Installation	
Silent Repair/Modify	32
IxNetwork Linux Installation	32
Installation using IxOS Binary Installer	
Installation using IxOS tgz Package	
Installation/Uninstallation Commands	33
Installation Sequence using the Console Mode	
Installation Sequence Using the GUI Mode	
Shell Wrapper Installation	40
TCL Automation Setup	
Python Automation Setup	41
Perl Automation Setup	42
Versions Supported by IxNetwork	42
Chapter 3 Running a Test with IxNetwork	
Requirements	45
A Simple IxNetwork Test	46
Connect the Ports	

Start IxNetwork	
Select the Ports	48
Configure the Protocol	
Review the Protocol Configuration	55
Ping the DUT	57
Start the BGP Protocol	
Configure Traffic	
Set Up the Test Composer	67
Set Up CSV Logging	
Set Up a QuickTest	
Running a Test with IxNetwork	74
Chapter 4 Accessing IxNetwork Documentation	
If a PDF Help File does not Open	
If you cannot View a CHM Help File	
If you cannot View a WebHelp	
To View the Video Tutorials	
Chapter 5 IxNetwork Licensing	
IxNetwork-Specific License Information	
Types of Licenses	
Node-Locked Licenses	
Floating Licenses	
Evaluation Licenses	
Licensing Models	
Subscription Licenses	
Perpetual Licenses	
Prerequisites	
AppLibrary Licensing	

About this guide

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

Section contents:

Typographical conventions	viii
Textual conventions	ix
Related documentation	ix

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."
<i>Italic text</i>	 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
- <u>Capture Settings</u>
- 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.

Port Selection			
Chassis 🕂 🎇 🖻 🗄 🚺 All ports 💌	Ports in configurat	tion 💠 Add Virtual Ports 🎇	All ports -
Chassis/Card/Port Type Owner 	State Name 1 2 10.205 3 3 10.205 3 3 10.205 sign to elected 4 3 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 3 10.205 10.205 +/2 4 4 <th>Chassis/Card/Port 5.27.60:02:01-Ethernet 5.27.60:02:02-Ethernet 5.27.60:02:03-Ethernet 5.27.60:02:04-Ethernet 10.205.27.60:02:04</th> <th>Type 10/100/1000 Base T 10/100/1000 Base T 10/100/1000 Base T 10/100/1000 Base T</th>	Chassis/Card/Port 5.27.60:02:01-Ethernet 5.27.60:02:02-Ethernet 5.27.60:02:03-Ethernet 5.27.60:02:04-Ethernet 10.205.27.60:02:04	Type 10/100/1000 Base T 10/100/1000 Base T 10/100/1000 Base T 10/100/1000 Base T
		0	K Cancel

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.

xia Port		lxia Port	
LAN MST	MSTP Region None = bria CIST Region Root = 00 0 CIST External Root = 00 0 DUT	0:00:00:00:00:02 0:00:00:00:00:01 Bridge :	MSTI LAN MSTI LAN
LAN MST Bridge	# Bridges = 2 # MSTh = 2 # Mac Address = 2	Dridge	MSTI - LAN
			Corridoed menore
Number of Emulated Bridges	per Port	۵	_
mulated Bridge			
Priority of Bridge ID		32768	•
Priority Increment by		0	
Auto Pick Bridge MAC			
MAC Address of Bridge ID		OF 00 00 00 00	100
MAC Address Increment By		00 00 00 00 00	00

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:

Basic Traffic Wizard		
Start	Topology	IxN
Topology	Start by configuring the Traffic Type and Meshing.	î
Endpoints		
Frame Setup	Traffic Item	
Flow Tracking	Name Traffic Item 1	
Summary	Type IPv4 *	
	Traffic Mesh	
	Source/Dest. One	- (6)
2	Routes/Hosts One - One -	
5	Bi-Directional	- 🖼
	Allow Self-Destined	
-		
L _		
\times		×
Advanced Wizard	Prev Next Finish	Cancel Help

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:

Advanced Traffic Wiz	ard		٦
Endpoints	Endpoints		r
	- Traffic Item -	- Source / Destination Endpoints	_
01 Packet Qos	Traffic Name Traffic Item 1	Traffic Group ID Filters None selected	Ŧ
Flow Group Setup	Type of Traffic IPv4	Source All 👻 🏆 🔍 Destination All 💌 😨 🔍 🕻	
Frame Setup	- Traffic Mesh	-	
Rate Setup	Source/Dest. Many - Many -		
Flow Tracking	Routes/Hosts One - One *		
Dumanis Eislide	Bi-Directional	The traffic settings specified do not match	ch
S Dynamic Pielos	Allow Self-Destined	any coningured prococol items. any coningured prococol items.	
Preview			
Validate			
		IS IS — Endpoint Sets —	_
		Encapsulation Source Endpo Destination Endp Traffic Gro	
		Name: EndpointSet-1	
	35 35	1 > <new> <new> None selecte</new></new>	d
	Number of hosts per Route 1		
	Z Marco Dankinskim Danara		
	Incheck this option to test overlanding		
	<		>
		Prev Next Prish Cancel He	φ

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:

Setup P Name: EndpointSet-1 Ethernet II : Ethernet II : Ethernet II : PFC Queue P Name: EndpointSet-1 Ethernet II. IPV4 : 10 205.27.60:02:03-Ethernet < Auto> Default (0) TOS Ids Image: Prane Image: Pr					IxN
Setup Setup Name: Image:	 All Encapsulati 	ons 🔘 Per Encapsulation			
Setup P Name: EndpointSet-1 Ethernet II. IPv4 10.205.27.60:02:03-Ethernet : <auto> Default (0) TOS P AI Encapsulations - Same settings will be applied to all (1) encapsulation(s) AI Encapsulations - Same settings will be applied to all (1) encapsulation(s) Name Value Name Value Name Value P - P Frame length: 64 P - P Ayload Increment Byte P - P Ayload Increment Byte P - P Ayload P</auto>	05 STE Encapsulatio				IPv4 : IP Prior
p Ng Name	Setup Name: 1 Etherne	EndpointSet-1 t II.IPv4 10.205.27.60:02:03-Ethernel			
Ng Ng Ng Name	P				
All Encapsulations - Same settings will be applied to all (1) encapsulation(s) All Encapsulations - Same settings will be applied to all (1) encapsulation(s) Name Na					
ng Name Field Lookup: Go to Stack Diagram Kas Field Lookup: Go to Stack Diagram Kas Value Name Value Name Value Payload Increment Byte Ethernet II (Trailer)	All Encapsulations	- Same settings will be applied to all (1)	encapsulation(s)		
Ids Name Value Name Value Parame Increment Byte Increment Byte		198 198 🔂 Field Lookup:	*	Go to	Stack Diagram
Frame length: 64 Ethernet II Payload Increment Byte Ethernet II (Trailer)	Name	16* 16* 🔛	Value	0010	and a second sec
Ethernet II Payload Increment Byte Ethernet II (Trailer)	> - JU) Frame		length: e	54	
Ethernet II (Trailer)	Eth	ernet II			
Payload Increment Byte	- IPv	4			
Ethernet II (Trailer)	-OI Pay	load	Increme	nt Byte	
		ernet II (Trailer)			
te	5				
to to	et				
G					
Hex View I I I Packet 1 of 1 Frame Offset : 0 Length : 64 Byte(s)	TO Hex View		Packet 1 of 1	Frame Offset : 0 Le	ngth : 64 Byte(s
Hex View N I I P Packet 1 of 1 Frame Offset : 0 Length : 64 Byte(s)	TO Hex View		Packet 1 of 1	Frame Offset : 0 Le	ngth : 64 Byte(s

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:

Chapter 1 Introduction to IxNetwork

Log¥iew						×
04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011 04/06/2011	17:41:54: 17:41:54: 17:42:00: 17:42:00: 17:42:00: 17:42:00: 17:42:00: 17:42:00: 17:42:00: 17:42:06: 17:42:07:	Statistic Statistic Statistic Statistic Statistic Statistic Statistic Host Proto Statistic	Setup: I Setup: I Setup: I Setup: I Setup: I Setup: I Setup: I Setup: O Setup: (one waiting for MR addView -> Global Pr Going to wait for MR addView -> BGP Aggre Going to wait for MR one waiting for MR addView -> BGP Aggre AddView -> BGP Aggre C - Finished Layer1 Going to set m_inPro	E setConfig rotocol Sta RE setConfig egated Stat RE setConfig egated Stat configurat configurat	•
All Getting Star	rted Macro Re	corder Diagnost	ics Capture	Routing/Switching Protocols	Port Manager	

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:

Application Traffic Wiz	ard		
Endpoints	Endpoints		IxN
Traffic Dutte	- Traffic Item -		
Inamic Prome	Traffic Name Traffic Item 2	Traffic Group ID Filters None selected	*
	Type of Traffic IPv4 App 💌	Source All 💌 🍞 🔍 Destr	ation All 💽 🍞 🔍 🔀
	- Traffic Mesh	Al Ports	All Ports
	Source/Dest. Many - Many -	> 10.205.27.60:02:03-Ethernet	10.205.27.60:02:03-Ethernet
	Routes/Hosts One - One *		10.200.27.00.02.07-20.0100.00
2			
		- Endpoint Sets -	
C C	-35 - 35	Encapsulation Source Endpo D	stination Endp Traffic Gro
		 Name: EndpointSet-1 	
		1 > <new> <new> <</new></new>	New> None selected
	41		
		Prev Next B	hish <u>Cancel</u> Help

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:



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:

Advanced Traffic Wizar		
Endpoints	Flow Tracking	I
Packet / QoS Packet / QoS Prove Group Setup Frame Setup Rate Setup Prove Tracking Dynamic Fields Preview	Track Flows by Custom Override Traffic Item Image: Custom Override Source/Dest Endpoint Pair One - One meshed Source/Dest Value Pair Offset from Root Source Post Port Pair Offset Source Endpoint Image: Custom Override Dest Endpoint Image: Custom Override Source Port Image: Custom Override Traffic Group ID Image: Custom Override MPLS Flow Descriptor Image: Custom Override Frame Size Flow Group Ethernet II : Destination MAC Address Ethernet II : Source MAC Address	
	Ethernet II : Ethernet-Type Image: Constraint of Ethernet Enable Egress Tracking Image: Constraint of Ethernet Enable Egress Tracking Image: Constraint of Ethernet Ethernet:Outer Encapsulation Ethernet:Outer Encapsulation Offset Outer VLAN Priority (To the ethernet of Ethern	
×	Prev Next Finish Cancel Help	

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:

Casture Copen Casture Copen Casture Copen Casture Copen Casture Copen Casture Copen Casture Copen Casture Copen Casture Copen	Adulyrr Capture Copture	brietwork joefault	(opetra3.incty)				- ₽ ¤ 0 0
Test Costinuation #	C D D Contant						
Composition Composition Composition Protocol Configuration Protocol Interfaces Static Configuration Configuration Configuration	Port Port Name 1 0 10.205.27.40.02.01-0hernet 2 0 10.205.27.40.02.01-0hernet 3 0 10.205.27.40.02.00-0hernet 4 0 10.205.27.40.02.00-0hernet 4 0 10.205.27.40.02.00-0hernet	Port Captures Enable 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Con Auto Merge				
Automation Captures C						Hosts	

Analyzer

Analyzer allows you to select a captured traffic stream and examine the contents of each packet in

5			ļ	
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detail.You can access this feature by clicking Capture 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:

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						00000030 8	0 00 58 AC 00 0	0 01 01 08	0Å 00 00 06 1	11 00 00
						00000040 0	15 83 01 01 FE F	E 01 01 FE	FE 00 00 FF 8	FF 00 10
						00000060 0	07 D7 C0 FF FF FI	D 00 FF FF	FD 00 F8 00 0	10 1C 00
						00000070 0	10 00 00 37 00 3 ED ED	7 00 00 00	01 ED 62 AB 0	12 42 42
						000000000	50° 550'			
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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:



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 <u>IxNetwork Licensing</u> 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 <u>General Licensing Steps</u>, 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 <u>IxNetwork</u> <u>Licensing</u> 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:

Destination Folder for Files Please select the destination folder where the pa	ackage should e	xtract the files to:	Íxía A Keysight Business
Please select the destination folder:			
C:\Program Files (x86)\IxiaInstallerCache\IxNetv	vork\XX.XX.XX	X	Bro <u>w</u> se
lxia	< <u>B</u> ack	<u>N</u> ext >	<u>C</u> ancel

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:

Setup Type Choose the se needs.	tup type that best suits your		IxNet	work
Please select a	setup type.			
• Typical	Most typical program feat installed. (Requires the m	tures and partial de nost disk space.)	ocumentation set wil	l be
○ Custom	Choose which program fe be installed. Recommend	eatures you want ir ed for advanced u	nstalled and where th sers.	hey will
When the data helps data helps licenses are data collec from the 'F	check box is selected, licensi us understand how the proc e needed, thereby improving tion, clear this check box. Yo ile> Preferences> Adva	ng and anonymou duct is being used g your product exp ou may turn on or anced' menu.	s usage data is sent and determine how erience. If you want turn off data collectio	to Ixia. Such many more : to turn off on any time
InstallShield				
		< Back	Next >	Cancel

- 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:

Custom Setup for Bundle Features Select the features you want installed.		IxNet	work
Click on an icon in the list below to change	how a feature is in:	stalled.	
	^	Feature Descript	ion
IxNetwork		Tcl componet o	f IxNetwork
AppLibrary			
Documentation			
IxNetworkDocs			
Legacy Reporter			
		This feature reg	uires 1258KB on
Samples and Scripts		your hard drive.	
		· ·	
@•l Perl	~		
Install to:			
C:\Program Files (x86)\Ixia\IxNetwork\ xx.3	xx.xx.xx \		Change
Help	< Back	Next >	Cancel

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 <u>Accessing IxNetwork Documentation</u> 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:

Connection Manager Service Installat Please select an option to start Connectio	ion Type n Manager Serv	ice IxNetw	a ork
Manual from Start Menu ap	plication shore	tcut (Default)	
Use this option to manually st Server service from Start me	tart the IxNetwo nu	ork TCL	
C Automatic as a windows se	rvice with no	user interface	
Use this option to automatica TCL Server service every tim	lly start the IxN e the computer i	etwork reboots	
C Automatic as a windows se	rvice with wel	o user interface	
Use this option to automatica TCL Server service as a Web	lly start the IxN Browser service	etwork	
stallShield			
	< <u>B</u> ack	<u>N</u> ext >	Cancel

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.

Connection Manager Service Installa Please select an option to start Connect	a tion Type ion Manager Serv	ice IxNetw	ork
C Manual from Start Menu a Use this option to manually Server service from Start m C Automatic as a windows s Use this option to automatic TCL Server service every ti	application show start the IxNetwo enu cervice with no cally start the IxN me the computer	r tcut (Default) ork TCL user interface letwork reboots	
Automatic as a windows s Use this option to automatic TCL Server service as a We Web User Interface Port : Toctal/Shield	ervice with we cally start the IxN b Browser service 8008	b user interface	
uscaloniela	< <u>B</u> ack	Next >	Cancel

- 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.

Ready to Install the Program The wizard is ready to begin installation.	$\times\!$	IxNet	work
Click Install to begin the installation.			
If you want to review or change any of yo the wizard.	our installation setti	ngs, click Back. Click	Cancel to exit
Installed Path: C:\Program Files (x86)\Ix IxNetwork	ia\IxNetwork\ xx.xx be(s): ocol Client	(.xx.xx]	
Features: . Ixia LicenseServerPlus xx. . Ixia StatEngine XX.XX.X	XX.XX.XX X.XX		
InstallShield			
	< Back	Install	Cancel

- 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.

Inst	alling application 'IxNetwork: xx.xx.xx.xx '		ixia	Keysigh usiness
Pa	ackage	Version	Status	
🐣 Pa	ackage Integrity Check		In progress	
M	icrosoft .Net Framework 3.5 Win 10			
M	icrosoft .Net Framework 3.5			
W	indows Installer 4.5			
	Coall Chatter 200 (F. W. X. B.			
	and had be the Print Sector			

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

	Setup Completed		
	The Setup has successfully installed IxNetwork XX.XX.XX.XX Click Finish to exit the wizard.		
lxNetwork	Create Desktop shortcut?		
	< Back Finish Cancel		
- 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 (Imgrd)	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 <u>Preparing an Ixia Chassis for Silent Installation</u> below.

IxNetwork product silent install setup is discussed in <u>IxNetwork Silent Install using .exe Package</u> 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 <u>Features on the next page</u> lists the features available, and Table <u>Properties</u> 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 <u>IxNetwork setup.exe Package Examples</u> 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 guit 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.

😣 🖨 Aptixia IxNetwork	
	Choose Install Folder
	Please choose a destination folder for this installation. NOTE: 1. "ixnetwork/xx.xx.xx.xx " will be appended to the install location in case you change the default directory and you Where Would You Like to Install? /opt/ixia/ixnetwork/xx.xx.xx.xx Restore Default Folder Choose
Ix Network	
InstallAnywhere Cancel	Previous

- 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.

😣 🔵 Aptixia IxNetwork	
	Select HLAPI installation
	Do you want to install HLAPI? • Yes • No
IxNetwork	Previous Next

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

😣 😑 Aptixia IxNetwork		
	Pre-Installation Sum	mary
	Please Review the Following Before Continuing:	
	Product Name: IxNetworkTclClient xx.xx.xx.xx Install Folder: /opt/ixia/ixnetwork/xx.xx.xx.xx Link Folder: /root/ixia	
	/opt/ixia/hlapi/ xx.xx.xx	
	IxOS Install Folder: /opt/ixia/ixos-api/xx.xx.xx	
IxNetwork	Python Install Folder	-
InstallAnywhere Cancel	Previous Ins	tall



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

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

😣 😑 Aptixia IxNetwork	
	Install Complete
	Congratulations! IxNetworkTclClient xx.xx.xx.xx has been successfully installed to: /opt/ixia/ixnetwork/ xx.xx.xx NOTE: 1. The following packages are mandatory for the APIs to work correctly. libXft, libXScrnSaver. Sample packages installation: "yum install libXft libXScrnSaver" 2. Please execute the links created under /root/ixia in order to uninstall Tcl, Perl or Python Press "Done" to quit the installer.
lxNetwork	
InstallAnywhere Cancel	Previous Done

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
- <u>A Simple IxNetwork Test</u>
 - <u>Connect the Ports</u>
 - Start IxNetwork
 - Select the Ports
 - <u>Configure the Protocol</u>
 - <u>Review the Protocol Configuration</u>
 - Ping the DUT
 - <u>Start the BGP Protocol</u>
 - <u>Configure Traffic</u>
 - <u>Set Up the Test Composer</u>
 - 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. <u>Select the Ports</u>
- 4. Configure the Protocol
- 5. <u>Review the Protocol Configuration</u>
- 6. Ping the DUT
- 7. Start the BGP Protocol
- 8. Configure Traffic
- 9. <u>Set Up the Test Composer</u>
- 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 is icon on your Desktop. The IxNetwork GUI window appears as shown in the following figure:

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Protocols All Traffic + QuickTest	Composer Script - Capture Add Add Add Add Add Add Resource Tett Subirts - LAGS Protocols - Traffic - Quedent - Capture Subirts - Subirts
0 Overview	< > 🖸 🍿 Overview
Scenario	O Ports O QuickTests
Ports	
Protocols	
⊅⊄ Traffic	Click here to configure Adverter Voltebuork Click here to create a QuickTest
Impairments	
Arr QuickTests	
* Captures	0 Protocols Items
	Email address
	Password
	Click have to configure to the first first to the set of the set o
	Click here to configure member me Forgot password Click here to configure frame
	LOGIN OFFLINE
	CREATE AN IXIA ACCOUNT
	≣ Logs Messages ⊖

- 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.
 - i 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 <u>https://login.ixiacom.com/?forgot-password</u>. 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 <u>https://login.ixiacom.com/?create-account</u>.

- 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 <u>A Simple</u> IxNetwork Test.

Image: Second Flagst Part Source	C - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 1	H farfigantice										-	19 SI
Image: Second Control C	for Home Results / Repo	ets Port Tools	Data For	mula / Alerta Design	Vena								÷ 😧
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PH 1 MARKS PM 1 MA		Cliefta system in	ANY CANADASA COMPANY							4	11		
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		> 1 10.285.27.60	CardO2,For	Full 1080 Mbpc	Link: Up	2,316	15		1	1		1	
		2 10-205-27-80/0	canilog/PorcoH	Pull LORD Mbes	UKU	18	2,316		1				
		AI 🔾				4	-						
	1.8												

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.

Test Configuration 《	<	20	3 8	Ports >							
Overview		9.	abe	Nane	Connection Status	Negotiated Speed (Mbps)	Loopback.	Transnik Gocking	Transmit Gap No de	Transmit Ignore Link Status	Receive Mode
	1		X	Ethernet - 001	Unassigned						Measure Flow
👻 👬 Ports	z		×	Ethernet - 002	Unsistened		10				Measure Nove
A Chassis	3		x	10.205.27.60.02.01-Eth	In use by 'billebyork/ic		10				Measure Flow
	+		×	10.205.27.60.02.02-Eth	In use by 'billebioright		1				Measure Flow
+ 💮 Protocol Configuration	5		0	10.205.27.60:02:03-Eth	10.205.27.60:02:03		10				Measure Nove
Protocol Interfaces	6		۲	10.205.27.60.02.04-Eth	10.205.27.60.02.04		10			10 A	Measure Flow
 iii 10.205.27.800204-6theme iiii 5tric iiiii Configuration pct 12-3 Traffic Items pct 12-3 Reir Groups iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	r.										

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:

🚭 Protocols Wizards			×
Select a Wated	bia Port	Inco Pert	Envirted Natives
		[Close Help

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

Inia Bost			SIT	2
Best Nos - Internal	legal AS # = 55001		-	
ion yr	20.20.20.2724	4		20.20.20.1
	10.00 × 10			23
			/	BOP Peer
	: \	6	Te	
	: /			
100.00		20.21.20.1	and /	23
	IXIA			ATE Day
VIAN-			-	
effective/rearies	Weatx = 1			
Man = X				Connected Interfe
-to -h Davila') (m)	Grand Danfin mation			
elect Hangs) for 1	Wizard Loniguration	1	1	f a sefelale
Enable	Port Description	Interface Type	Start Range	Interface Count
Г	10.205.27.60:02:01-Ether	Protocol Interface	None	
Г	10.205.27 E0:02:02-Ether	Protocol Interface	None	
V	10.205.27.60:02:03-Ether	Protocol Interface	None	
	10.205.27 E0:02:04-Ether	Protocol Interface	None	
·				
· Lī-;				
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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:

Ixia Port	SUT
Peer Type = internal isod AS #= 05001 20 20 20 boxes isote i	2 2/24 20 20 20 1 50 20 1 50 20 20 1 5
Configuration Options	
Configure Topology & Generate	
C Import from File	
Import File Type Isia Format	×
Peer Topology	
Number of Peers per part	h
C Config to BGP Poors over Connect	chert interfaree
C Configure BGP Peers over Uncon	mested interfaces

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

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

in Bost	97
her Type - Internal Lacel AS # - 053D1	301
20.30.30.304	10.20.20.1
Rube Carlos	25 N
	BOP Poer
: \	
. /	Octownay
has No.	20.20.20.1
IXIA -	100 Peer
NLON - Routes Perry - 0 VErena - 1	
Moru - 2	
-	 Connected Interface
P Peers	
Enable VLAN	
Sumber Of VLANs Per Port	Router Distribution Over VLAN Round Robin 💌
ADAN ID	Increment By
Repeat VLAN Across Ports	
Р Туре	IPv4 ·
GP Protocol	Defeat
01 11000001	dorr e spiers
GP is needed only if BGP Peers are config	ured on Unconnected Interfaces
or patter performance in appendimode, on	cose None, if all peers to be configured already exist.
ornected Interface Information	ioose None. if all peers to be configured already exist.
or better performance in appendimode, on onnected Interface Information Invalued Peer IP Address	oose None, if all peers to be configured already exist. Gateway Address
on better performance in appendimotes on onnacted Interface Information Intulated Peer IP Address 20.20.20.2/24	Gateway Address Gateway Address 20.20.20.1
or beas performance in appendimode, on onnacted Interface Information Inulated Peer IP Address 20.20.20.2/24 Increment Per Router	Gateway Address 20.20.20.1 Increment Por VLAN
or becke performance in oppend mode, on onnacted Interface Information Invalated Peer IP Address 20 20 20 2/24 Increment Per Router 0.0.0.1	Gateway Address Gateway Address 20.20.20.1 Increment Per VLAN 00.1.5
or bees performance in oppend mode, on onnacted Interface Information Enulated Peer IP Address 20.00.20 2/24 Interement Per Router 0.0.0.1	Cateway Address Cateway Address 20.20.20.1 Increment Per VLAN 0.0.10
or beste performance in oppend mode, on onnected Interface Information Enulated Peer IP Address 20.20.20.2/24 Interement Per Router 0.0.0.1 rocement Per Port	Caleway Address Caleway Address 20.20.1 Increment Per VLAN D.0.1 Continuous Increment Across Ports
on becks performance in oppend mode, on onnacted Interface Information Enulated Peer IP Address 20.20.20.2/24 Interement Per Router 0.0.0.1 Incient Per Port 0.1.00	Caleway Address Caleway Address 20.20.10 Increment Per VLAN 0.01.0 Continuous Increment Across Ports
Consequent Performance in appendimode, ch consected Interface Information Enviload Peer IP Address 20.20.20.2/24 Interement Per Router 0.0.0.1 consecut Per Router 0.0.0.1 Environ Per Port 0.1.00 Environ RED Operation Mode	Caleway Address Caleway Address D.2.2.2.0.1 Increment Per VLAN D.0.1.0 Continuous Increment Across Ports Single Hop Y Pptons Pptons
Consequent performance in oppondimode, ch consected Interface Information Enulated Peer IP Address 20.20.20.2/24 Instement Per Router 0.0.0.1 Consection Per Port 0.1.0.0 Consection Mode	Caleway Address Caleway Address 20.20.20.1 Increment Per VLAN DOI 10 Continuous Increment Across Ports Single Hop Potents
Consequent performance in oppondimode, ch consected Interface Information Enulated Peer IP Address 20.20.20.2/24 Instanaert Per Router 0.0.0.1 Conserved Peer Port 0.1.0.0 Enable BFD Operation Mode	Caleway Address Caleway Address 20.20.20.1 Increment Per VLAN DOI 10 Continuous Increment Across Ports Single Hop Priors
Consider Interface Information Consider Information Consider Per PAddress Consider Per Paddress Consider Per Paddress Consider Per Paddress Consider Per Paddres Co	Caleway Address Caleway Address 20.20.20.1 Increment Per VLAN DOI 10 Continuous Increment Across Ports Single Hop Differs Differs
Consequent Performance in appendimode, ch Consequent Per PAddress 20 20 27/24 Instant Per Pouter 0.0.0.1 notement Per Pout 0.1.0.0 Enable BFD Operation Mode Inconnected Interface Information PAddress	Cateway Address Cateway Address 20.20.20.1 Increment Per VLAN 001.0 Continuous Increment Across Ports Single Hop Portons Increment per Router Increment per
Consected Interface in opportunities, chi Connected Interface information Connected Interface information Connected Interface Information Connected Interface Information P Address Connected Interface Connected Interface Connected Interface Connected Conne	Increment per Router
Consequent performance in appendimode, ch Consequent Per Paddress 20 20 20 2724 Instance Per Router 0.0.0.1 notement Per Router 0.1.0.0 Enable BFD Operation Mode Inconnected Interface Information P Address 22 2 2 notement per Pot	Cateway Address Continuous Increment Across Ports Single Hop Priors Increment per Router 00.03

- 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:

tice Part Type - Internal Loss IA3 # - 95101 21 23 .20 .27 4 Rose CAN Chan Ch	SUT 20.20.20.10.10.10.10.10.10.10.10.10.10.10.10.10
P Specific Configuration	 Connected interfo
BGP Type	Internal 💌
Local &S. Number Start	85,001
Configure Routes Manually Advantas Routes Number of routes per peer First route	I Increment by (per peer)
Configure Routes Imported from File	Jense
Internal peer send MED Value	
C Advester Best Routes Only	
Maximum sumbar of Deutes and Descus Daute Daute	22 000,000
Maximum Humber of Houres per Opaque House Hang	

- 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:

BGP/BGP+ Wizard - Name		X
Ixio Port Per Type - Internal Local AS # - 5 Rover Notes Note	0001 0.20.20.2/24 20.20.20.1	SUT 20 20 20.1 SCP Nex : SCP Nex : SCP Nex
Nation Sava Wa Generate Generate Generate (WARNIN	zard Config, But Do Not Generate on Por and Append to Existing Configuration and Dyenwite Existing Configuration and Dyenwite All Protocol Configuration NG : This will clear the interface configura	ta 15 abions also)
Screen # 5 of 5	< Back Finish	Cancel Help

- 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:

Uverview .	Racting/Serisching bBLS Mittaat Carterthemet Access Adventication Data Cartertining															
Ports		Port Description	Port Owner	Link	APP	PING for IPv4	BP D	BGP(BGP+	BORP	525 L2L3	LACP	OSPT	OSPEVS	RP	MPng	STP
Protocol Configuration	1	10.205.27.50.02:01-Ethernet -	bNetwor	b	Г	Г	Г	Г	Г	Г	Г	Г	Г	Г	Г	Г
Protocol Interfaces	2	10.205.27.50.02:02-Ethernet -	bNetwor	8				E		<u> </u>	E			E		E
BGP/BGP+	3	10.205.27.50.02:03-Ethernet -	bNetwor	<u>.</u>	9	E		9	E	<u> </u>	E			E .	E	E
Static	4	10.205.27.50:02:04-Ethernet -	bNetwor		P		E	9	E	E	E			E	L D	E
🔀 Traffic Configuration																
- Automation																
POTOTIVEDOTI																

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

Test Configuration 0	Cassed	ted Interfaces Uniconnected Inter	Esters	0 RE Tweets Dev	covered Neis	pieces interface Addresses	DHCPV4.D	isonvered interes	0HOPv6 Discovered More.	. Rate Ca	tiol Parameters
Ports	E AR	Pon Link Up 🔽 Send Single A	RP pe	Galeway 🔽 NS on L	ink.Up 🛛	Send Single NS per Batery	4				
Protocol Configuration		Port Description	Port Link	Intertace Description	Enable	Pv4 Aukiress (10.0.x.x Reserved P)	Pv4 Medil Width	Gateway	Pv6 Address	Pv6 Mask Witth	IPv6 Gatew
BGP/8GP+	1	10.205.27.60:02.01-Ethernet -	8	(Enpty)							
Static	2	10.205.27.60:02.02.Eltwrnet -	58	(Enpty)							
	3	10.205 27.60:02 03-Ethernet -		20 20 20 20 204 - 118:15 -	9	20.20.20.2	24	20.20.20.1			
Traffic Configuration	4	10.205 27.60.02 04-Ethernet -		20.21.20.224 - 118:16 -	R	20.21.20.2	24	20.21.20.1			
Automation											

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

Routing/Sw	ritching/In	tertaces								
Start	Stop			Sisable Received L Enable for High Pe	Ipdate Validation formance)	🔽 Enab	le Label Exchange	over LSP		
Tester AS#	for IBGP		Tester 4 byte AS#	tor IBGP	A	dvanced				
IPv4 Peers	Pu5 Peas	RouteRanges	Cpaque Route R.	WFLS Route R	a VIRFa 1	(PN Route Range	s LZStes U	abel Block List	Mac Address Ra	Muttcast F
+ ***	× Ę	ļ.								
Ena	ble 1	уре	Local P	Number of Neighbors	DUTIP	Enable NextHop	NextHop (Optional	0 Enable BOP ID	BGP D	No. of RouteRanges
1	7 inte	rnal	20.20.20.2	1	20.20.20.1		0.0.0.0	R	69.122.0.1	1

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:

Overview	Cannect	led interfaces un	convected Interfac		GPE Tunnels D	scovered Neigh	ibers Interface Addresses	DHOP+40	isca varad inform	DHCPv6 Discovered Inform.	Rate C	ortici Parameters
Ports	E AR	Pon Link Up 🔽 S	end Single ARE	P per 0	Saterway 🔲 NS on	Link Up 🔽	Send Single NS per Gatew	lay				
& Changin		Port Descri	iption P	ort FR	Interface Description	Cristle	Pv4 Askress (10 Dx x - Reparted P)	Pv4 Nosk Valet	Gatemay	Pv6.Address	Pv6 Mask	IPv6 Gate
Protocol Configuration	1	10 205 27 60 02 0	ri-Ethernet - 16	0 0	T-iov4-0	R	198.18.3.100	24	198.18.3.1		Tuan	
Protocol Interfaces	2			1 0	T-ipv4-0	F	198.18.3.100	24	198.18.3.1			
BGP/BGP+	3	10 205 27 60 02 0	2-Ethernet - 🦉	0 0	7T-ipv-4-0	P	198.18.4.100	24	195.15.4.1			
 30.205.27.60:02:03-8thernet 	4	1		1 C	7-ipw4-0	R	198.18.4.100	24	195.10.4.1			
10.205.27.60.02:04-Ethernet	6	10.205.27.60.0214	O Discound B	-	T loud 0	1 17	198.18.5.100	24	198,18,5,1			
E Static	5	10 205 27 60 02	Ner		Cbri+N	R	199.18.8.100	24	198.18.6.1			
	7	E9-wrred - 001 -	Add Multiple	Interf	ACRIE	P	198.18.1.10D	24	195.15.1.1			
Inattic Contiguration	8		and strengt		et al an	P	198.18.1.10D	24	195.15.1.1			
DC L2-3 Traffic Items	9	Ethernet - 002 -	ADD LPYY		1.00144	F	199.19.2.100	24	198.18.2.1			
C L2-3 Flow Groups	1D		HAPROVE LEVE	•	71 1 1 7	F	198.18.2.100	24	198.18.2.1			
of 12-3 Ouick Flow Groups		-	Add IPV6		CB1+6							
De re e denn une e este			Reniove IPv	0								
OuickTexts			Set Default I	Interra	ace Manie							
			Delete		Del							
Carthuran			Conv		Chi+C							
Capitores	<		Rasha		Children							
	Inter	face (NAC) t -	1 Station		SAULAR	N ATM /						
_			Increment									
100		and Restaural Plant	Increment D	Y								-
1		CON PTOTOCO STAT	Decrement									•
			Decrement B									
			Same									
			Ping									
			Send Router	Solicit	tation							
			ARP									
			Neighbor Sol	citatio	an 🕨							
			Pilor Selects	d Port	ba .							
			Fordurka Sala	stard I	Deaths							
			second day where									
			Truck Mar Cala									

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:

File Window Pring (20, 21, 20, 2/24 - 118; 16 - 1) Image: Comparison of the second s	
Ping (20, 21, 20, 2/24 - 118;16 - 1)	
- Destination Address	
IPv4 V 2020202	
- Results	
Pinging 20.20.20.2	
Close	

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:

C		Global Protocol Statistics	Global Proto	col Statistics								Ψ× 0
I		Stat Name	Control Packet Tx.	Control Packet Rx.	Ping Reply Tx.	Ping Request Tx.	Ping Reply Rx.	Ping Request Rx.	Arp Reply Tx.	Arp Request Tx.	Arp Request Rx.	Arp Rep
I	F 1	10.205.27.60/Card02/Por	0	0	0	0	0	0	0	0	0)
I	2	10.205.27.60/Card02/Port04	0	0	0	0	0	0	0	0	0	
IF												

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.

🗳 Advanced Traffic Wiza	rd		
En dpoints	Endpoints	·····	LxN
Padat / QeS Padat / QeS Parans Satup Prans Prans Pran	Traffic Barn Traffic Reve Traffic Neve Traffic Neve Traffic Mesh Source/Dest Revy - Nevy Bo-Decisional Alow Sel-Destined Sel Sel	Source / Destination Endpoints - Ineffic Group ID Filters Hane selected Source All All Parts ID 205,27,4010203-Ethernet ID 205,27,40102104-Ethernet	Destination Al V AllPorts Destination 20, 27 & 0: 02: 03-8th emat V 10 205. 27 & 0: 02: 04-8th emat
2		😺 😒 — Endpoint Sets —	o Destination Endo Treffic Gro
XNeh	Number of hosts per Route 1	v Name: EndpointSet-1 t v New> <new></new>	<pre>divew.> None selected</pre>
		Prev Next	Finish Cancel Help

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:

Endpoints	Endpoints				- IxN
0.1.1.0.6	- Traffic Item -	- Source / Destination	Endpoints		
Harrise L Gaz	Traffic None Traffic Item 1	Traffic Group ID Pilters Nore	s selected		
Plow Group Setup	Type of Traffic IPv4	Source Al 💌 🍞	Q D	estination Al	2
Frame Setup	Teally Mech	Al Ports		- Al Ports	
Rate Setup	Source/Dest. Nany - Nany *	10.205.27.60.02.03	Ethernet	10.205.27.60:02	103-Ethernet
	Roubes/Hosts One - One *		-D. HEI IE.	10.20527-00.02	COT EDICITICS
Plow Tracking	The Direction of	-			
Dynamic Fields	Alba Self-Dathed				
Commission (- HEM JOI DOX HOU				
PTEVEN					
Validate					
		🕀 🧐 💥 — tedps	oint Sets		
		Encapsulation	Source Endpo	Destination Endp	Traffic Gro
		 Name: Endpoints 	Set-1		
		1 Ethernet ELIPy4	t Endpoints	1 En dpo into	None selected
		 Name: Endpoint! 	Set-2		
		2 D Chewo	<new></new>	<new></new>	None selected
	Number of hosts per Route 1				
	Marine Description Dependent				
	M Perge Destination Ranges				
	Uncheck this option to test overlapping	1			1

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.

Encipainte	Packet / DoS		- IxN
Perint / Dats	All Encapsulations Per Encapsulation		
Lapaci dan	57% Ereptulation To Part Ethernal C	1 : Ethernel-Type Ethernel: D : PPC Qu	ina IPy4 : IPPriorit
Flow Group Setup	Particle EndpointSet-1 Ethemet II. Dv4 16.206.27.60.02.09-Ethemet <auto></auto>		
Frane Setup			
Rate Setup	4		
Hau Tracking	All Encapsulations - Same settings will be applied to all (1) encapsulation	nn(s)	
now necking	📑 🗸 🎍 🎇 🎉 🔝 🛛 Field Lookups 🚍 -		Go to Stack Diagram 🛱
Dynamic Fields	Name	Value	
Preview	> - PP Frane	length: 64	
1.	Ethernet II		
Vali date	- WI Payload	Increment Oxte	1
	Ethernet II (Traler)		
	This Many 0 44 4 1 D DD 0 Packet 1	of 1 Pranse Offmet:0	Length : 64 Byte(1

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

Advanced Traffic Wize	and	
Drubpoints Pathet J QoS From Group Setup Frome Setup Rate Setup	How Drouge Setup Image: All Encapsulations Per Encapsulation 2015 Encapsulations To Per Encapsulation 2016 Encapsulation To Per Encapsulation 1 Encapsulation To Per Encapsulation 1 Encapsulation To Per Encapsulation	Plan Group Setup
Flow Tracking Dynamic Flatck Preview Ueldate	Al Enceptulations - Same mettings will be apple Create Flow Groups based on Society Endpoint Pair Reflect Endpoint Pair Reflect Frame Ste Ethermet II : Detination MAC Address Ethermet II : Determet-Type Ethermet II : Determet II : Determet-Type Ethermet II : Determet II : Determe	et to all (1) encapandation(s) A files group provides the ability to controlinate and frame size per unique value of the field instantiation will be like in the degram below
	6	Prev Neg. Finish Cancel Help

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).

Endpoints	Frame Setup		`		- IxN
	All Encapsulations O Per Encap	sulation			
Packet / Qo5			Prane Stre GR		
Flow Group Setup	1 + 10,205,27,60:02,01-Dhernet				
Franie Setup					
Rate Setup					
Plaw Tracking	AllEncapsulations - Same settings will Fname Size	be applied to all (1) e	mcapsulation(s)	Payload	
Dynamic Fields	Roted minu	64		Type Increment Byte	
Preview	Incerent			Pattern	
	Randon			Repeat	
Validate	O MIX			- CRC Settings -	
	O contra mark			No Error	
	O Californi Prix			Bad CRC	
S	Quad Gaussian			Disparity Proven	
	C Auto			2 cohenel et en	
	- Preamble Size			-	
	 Auto 				
	O Custom 8	bytes			

- 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.

Endpoints	Rate Setup						1	JxN
Product Low	C All Encapsulations	Per Encapeulat	ion					
Packet (Qos	Name Name	Encapsulation	Tr ensmission	Target Rate	Target Rate	Distribution		
Flow Group Setup	1 EndpointSet-1	Ethernet ELIPv4	Continuous	10% Line Rate	Apply Rate t	o al ports. Event	split port rate	arrongth
Frame Setup	2 EndpointSet-2	Ethernet ELIPY	Continuous	10% Line Rate	Apply Rate t	o all ports. Eveni	split port rate	anongth
Rate Setup	4							
Flow Tracking	Per Encapsulation - Set	tings will be applied t	to: EndpointSet-	1 / Othernet IL IP	14			
	- Traffic Item Tra	ans mission Mode		- How Gr	oup Transm	ission Mode -		
Dynanic Fields	() Interleaved			🦲 Continuo.	8	Stop After	1	forsilor
Preview	Sequential			C Road Pad	ket Count	Start Dalay	a	bytes
Validate	The Interleaved Trans	st mode will interlear	vethe	C Pixed Iber	ation Count	Minimum Gap	12	bytes
	packets From each Plan	Group when lends	ig Traffic	C Road Dur	ation			
				🔘 Bunit (Au	to)			
				🖸 Burst (Cu	stom)			
				Hew it villook	an the wine:	1 2 3 1	2 3 1 2	3 1
	- Rate			- Rate Dis	stribution -			
	Une rate	10.00	%	Ports				
	O Packet rate	100000.00	per second	Apply rate	on all ports	mate		
	O Lawr 7 Di S et a	1000.00	bos 💌	Plane Groups:	evenile among	(perce		
	C LOPELL OLIVALE			C Acoly por	trate to all R	ow Groups		
				Salt mart	rata manda a	and Figure Groups		

- 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.

Tankanta	Flow Tracking				- IvN
C Dioponio	Track flows by		untern Descride		
Packet / Qo5	V Traffic Item	A			
	Source/Dest Endpoint Pair	0	ns - One meshed		
Flow Group Setup	Source/Dest Value Pair	Offset	from Rook		
	Source/Dest Port Pair	CPT CAR		0 bic	
Frame Setup	Source Endpoint			- 015	
Babs False	DestEndpoint	 Teld w 	edth 32 Bits	· · ·	
Made Setup	Source Port	Values		talue	
Haw Tracking	Traffic Group ID				
riow mooning	MPLS Flow Descriptor				
Dynamic Fields	Frame Size				
	Flow Group				
Preview	Themet II : Destination MAC Address	3			
6	E				
	Ethernet II : Source MAC Address				
Vali dake	Ethernet II : Source MAC Address Ethernet II : Ethernet-Type	-			
Vali date	Ethernet II : Source MAC Address Ethernet II : Sthemet-Type Ethernet II : Sthemet-Type Ethernet Tracking	-		atency Bin Measurements	
Validate	Ethernet II : Source MAC Address Ethernet II : Ethernet-Type Cyress Tracking	Ŧ		atency Din Measurements rable Latency Din Measurement	
Vali date	Ethernet II : Source MAC Address Ethernet II : Starret Type Ethernet II : Ethernet Type Endole Egress Tracking Endole Egress Tracking	Ŧ		atency (in Measurements nable Latency (in Measurements serv of Dire (B) - Mini	n Irrum step size: 0.02 us
Validate	Ethernet II: Source MAC Address Ethernet II: Ethernet I vos Egress Tracking Enable Egress Tracking H =	Ŧ		atency Din Measurements nable Latency Din Measurement ann of Brie B - Mini Greeter Then Less The	n imum atap atas: D.022.ca an or Dauel To (us)
Validate		*		atency (in Measurements nable Latency (in Measurement sens of time (in) — Mini Greater Than Less Tha 0.00	n Image step size: 0.022 cas on or Equal To (us)
Validate	Ethernet II : Storren MAC Address Ethernet II : Storren MAC A	wmat ter VLAN Priority (J		atency Bin Measurements nable Latancy Bin Measurements area of Bina B Mea Greater FinanLess The Greater FinanLess The Greater FinanLess The	n mure step size: 0.022 us on or Equal To (us) 1.00 1.42
Validate	Ethernet II: Source MAC Address Ethernet II: Ethernet Type Torress Tracking Enable Egress Tracking Enable Egress Tracking Offset	wroat ter VLAN Priorky C.		atency Din Measurements natie Latancy Bin Measurement area of Bina Greater Than 1.00 1.42 1.42 	more shap alon: 0.02 un en or Equal To (us) 1.42 2.00
Valdate	Ethernet II: Source MAC Address Ethernet II: Ethernet Ives Enable Egress Tracking Enable Egress Tracking Ethernet: Outer Encommittee Ethernet: Outer Encommittee	wroat ter VLAN Priority Co		atency Bin Measurements natio Litency Bin Measurements and Greater Than East The Greater Than Less The 0.00 1.00 1.42 2.00	n mune step store: D.022 cm en or Equiel To (us) 1.42 2.60 2.62
Valdare	Ethernet II : Storren MAC Address Ethernet II : Storren MAC Address Ethernet II : Storren MAC Address Enclose Egrees Trading Enclose Egrees Trading Enclose Enclose Context Discourse Con	semet ter VLAN Priorky Gr		atency Bin Measurements nadie Licency Bin Measurements are of Bine D Mini Greater Then Less The 0.00 1.00 1.40 1.42 2.00 2.82	a inverse straps extract 10,002 can an or Equal To (us) 1,42 2,00 2,82 4,00
Valdate	Ethernet II : Storren MAC Address Ethernet II : Sthemet-Type Dropess Tracking Enable Egress Tracking Ethernet Cuter Ethernet Cuter Ethernet Cuter Ethernet Cuter	vernet ter VLAN Priorky (,.		atency Din Measurements nable Latarcy Bin Measurement arm of Bine 0 Mea Greater Fran 1.00 1.10 1.10 1.10 2.00 2.81 0.00	n many step site: 0.02 us in or Equal To (us) 1.00 1.42 2.00 2.60 4.60 1.46
Valdate	Ethernet II : Storren MAC Address Ethernet II : Ethernet Type Drafter Tracking Enable Egress Tracking Ethernet: Outer Ethernet: Outer Et	wroat ter VLAN Priority (atency Din Measurements natio Litency Bin Measurements area of Bina Print Greater Than Less The 000 1.00 1.42 2.00 2.42 2.00 2.42 2.00 2.44 2.44	many step state D.02 as on or Equal To (us) 1.42 2.60 2.62 4.00 2.62 4.00 2.63 4.00 2.64 4.00 2.65 4.00 2.00 2.00 2.65 5.00 2.00 2.00 2.00 2.00 2.00 2.00 2.0
- 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.

Advanced Traffic Wizar	đ	
Enclosinis Padret / QoS Padret / QoS Plane Group Setup Prave Satup Refer Setup Plane Tracking Plane Keldk	Dynamic fields Dynamic Fields Dynamic Updates I-DP Prep I-DP Transcolutions Session Aware Traffic I-DP Session Aware Traffic	Enabling 'Dynamic Fields' alloves I chloshork to updato the conceptonding to affic packet fields on the fly with the information learned from protocols DSG 000 000 000 000 000 000 000 000 000 0
Preverv Variable		
		Prev Rest Raish Cencel Help

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.

🔹 Advanced Traffic Wizard	1							
Endpoints	Preview		1000				- b	N.
Packet / Qos	- Flow C	Poups/Packets	😑 Current	t Traffic Item 🤇	All Traffic 1	tenis Via	w Filow Groups/Pa	ickata
How Group Setup	v Port	Flow Group 10.205.27.60:02:03-Eth	ernet		Tra	ffic Item		
Franci Satup	L > Traff	ic Item 1-EndpointSet-L - Plo	on Group DOO1	Traffic Item 1				
🚳 Rate Setup								
Row Tracking								
🔁 Dynamic Pields								
Previon	- L Packets fo	r flow group: Traffic Item 1-	EndpointSet-1 - Flow 6	Sroup 0001				
Validate	Packet #	Destination NAC Address	Source MAC Address	Ethemet-Type	PPC Queue	Precedence	Source Address	Destina
	1	reniovePacket(Unable t	00:00:77:22:87:5	800	D	000 Routine	20.20.20.2	20.21.2
>								
2								
0								
\rightarrow								
\times								
	1	61 222 2021 4						+
			Prev	Next	Br	ish 🔤	Cancel	Help

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

High level view to quickly identify category of error Traffic Item Traffic Item 1	s detected per Traffic Item Configuration	Packata	Flow Groups	
Traffic Itan Traffic Itan	Configuration	Packate	Flow Groups	=1
Traffic Item 1			-	1° IDA1
	-	¥	V 1	V N
1 Errors 1 Warnings 1 0 Messages	📕 Show Details 🛛 🗎 Co	PV .		
A Not all the Packets could be Generated - One	or more destinction MACs or	VPNa are involu	d or un reachable a	nd the pe
	1 Errors 1 Wernings 1 0 Messages Error Mot all the Packets could be Generated - One	1 Enrors 1 Wernings 1 D Messages Enror Enror Mot all the Packets could be Generated - One or more destination PMCs or	1 Enrors A 1 Wernings 0 0 Messages S Show Details Copy Enror Enror A Kot all the Packets could be Generated - One or more destination PMACs or VPNs are invelo	1 Errors 1 Warnings 1 D Messages Error Error Mot all the Packets could be Generated—One or more destination MACs or VPNs are invalid or unreachable a

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:

Test Configuration 《	<	🔉 🚮 🔀 Traffic (Configuration 🕴 🔀 L2-3 Traffi	: Zerra >					
Overview		Transmit 32 ats	Traffic Ibers Name	Enabled	Tx Ports	R.: Porta	Plow Groups	Endpoint/Enc apeulation	
	٤.		Traffic Item L	V	1	1	1	. 1	
Ports									
- Protocol Configuration									
Protocol Interfaces BGP/BGP+ Static									
- X Traffic Configuration									
CL2-3 Traffic Items									
CL2-3 Flow Groups	1								
Automation									
Captures	L .								
	50	nmary Settings T	iracking and Latency 🛛 All 📋						- F
		Traffic Statis	etice 💌						⇒ × ₽

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.

Properties	Froperties	
Packat Editor	Name Quick Play Groups - Play Group 0001	Suspend
Proviow Packets	France Size Frand size A	Payload Type IncrementByte Pattern
	Randon Ruix Guatass INIX Outd Sa essa	CRC Settings
	Auto Rate (ii) Line rate 10.00 %	Otsparity Errors Otsparity Errors Otsparity Construction Mode Otsparity Construction Stop After L Rendoors
	Padet rate 10000.00 pr second Layer288 Rate 1000.00 bps -	Rived Packet Count Start Delay Derytes = Treed Daration Count Minimum Gap 32 bytes Preed Dureton
	Preamble Size Auto Ouston Outon	Burst (Auto) Burst (Custon) How it will look on the wire:

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:

In Oraniau												
Chernien	Disgra	Pots IPv4 P.	- P/6 P.	User. User.	Faste Open	R., MPLS., VRFR., VPP	N.R., PMS.,	DEP K 12:58	rs Label M	ter K Matter.	. Mate. 39	
Rorts		-										
-		Port	Ennkle	Туре	Interface Type	Interfaces	Statinde	Local P	Number of Neinbloor	of DL	IT P Erabi	ian Ne
Protocol Configuration	1	10.205.27.60.02:03-	3	Internal	Protocol Interface	20.20.20.2/24 - 118:15 - 1		20.20.20.2	. agent	1 20.2	0.20.1	
Protocol Interfaces	2	10 205.27 60 02:04-	R	Internal	Protocol Interface	20.21.20.2/24 - 118:16 - 1				1 20.2	0.20.1	
Static Traffic Configuration												
Static Traffic Configuration Automation	C Neigh	heer ∫(Rap), Adro	λ beam	Learned Routes Filter	rs), Capabilities)	(AT /						_
Static Traffic Configuration Automation Captures	(Neigh	i ner √ Rap) , Adva Giobal Protocol Start	nced 入 istics (Learned Routes Filter	rs), Capabilities)	(A1 /						¥ ×
Traffic Configuration Automation Automation Captures	K	ber / Rap /, Adva Global Protocol Start Stat Name	nced <u>A</u> istics	Global Proto Garanterol Packat Tx.	rs), Capabilities) col Statistics Cantrol Pachat Rs.	Ping Ruphy Tr. Ping Repaint Tr.	Ping Raply Rx.	Ping Request Rz.	Arp Reply Tx. Ar	p Request Tx.	Arp Raquant R.c.	∓ × Arp Rep
Static Traffic Configuration Automation Automation Captures	Neigh	ber / Rap /, Adva Global Protocol Stati Stat Name 10.205.27 40)Card	stics (Global Proto Groutes Filter Global Proto Control Packet Tx. 2,346	rs), Capabilities) col Statistics Cantrol Pachat R.s. 3 47	All /	Ping Raphy Rx. 2 1	Ping Request Rx.	Arp Reply Tx. Ar	p Request Tx. 54	Arp Raspanet R.s. 47	æ × i Arp Rep

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:

S Main_P	rocedure*					
	ommand Type	(Command String			
1 1	Config Ge	t 🖂				
	Trac Write Wate Show GetV GetT IoNetwo Conf Conf	e eCSV ch Message alue ime rk ig Get ig Add ig Remove ig Action	Cancel .::			
Breakpoints						Ę X
	0 0	i ii				
Step #	Туре	Command S	ettings Con	mand Parame	. Description	
Find / Repl.	Validation .	. Breakpoints	Command	Events	Execution	Variables

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:

10	User Events				
Use	er Events:			+ 🗙 🕆	•
	Event Name	Procedure To Run	Additional Action	Event Handling	
0.	Event1	<enter n<="" procedure="" td=""><td>Continue With Curr</td><td>Scheduled</td><td></td></enter>	Continue With Curr	Scheduled	
_					
			_		
				Ok (Cancel

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.

	Execute	Built-In Event		All Protocols Start IxN::availableItems="{::ixNet::OBJ-jeventScheduler/availableEvents:\"REG_Start\"/
0	Sleep			00:03:00.000
	Execute	Built-In Event		Statistics Write CSVs for all Views content="All Pages" newcsvfile/overwrite=Overwrite csvfilelocation
10	StartSession	CSV_Stat		CSVAnalyzer, startSession_csvFileName="\$port_stats" csvTemplateName="\$stat_template"
-	Execute	CSV_Stat	ProtocolStats	StatQuery_category="Statistics_1" filter="" items="((Statistics_1.Sessions_Initiated) with caption: (Se
	Trace			\${ProtocolStats.Statistics_1.Sessions_Failed}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Initiated}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Succeeded}
=	Assign		maxtime	[expr [clock seconds] + 900]
EC	While			(\${ProtocolStats.Statistics_1.Sessions_Initiated} != \${ProtocolStats.Statistics_1.Sessions_Succeeded}
	u 1⊘1			[clock seconds] >\$maxtime
	RunProced			UGS-info "Failed to start protocols"
	🕐 Return			0 "Failed to start protocols in 15 minutes"
	EndIf			
	🕤 Sleep			00:01:00.000
	Execute	Buit-In Event		Statistics Write CSVs for all Views content="All Pages" newcsvfile/overwrite=Overwrite csvfile/ocation
	Execute	CSV_Stat	ProtocolStats	StatQuery_category="Statistics_1" filter=** items="{{Statistics_1.Sessions_Initiated} with caption: {Se
	Trace			\$(ProtocolStats.Statistics_1.Sessions_Failed)
	Trace			\${ProtocolStats.Statistics_1.Sessions_Initiated}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Succeeded}
	EndWhile			
-	StopSession	CSV_Stat		
🗉 🕻	Procedure		<none></none>	UGS-info (String:msg)

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\"}
"
```

 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**.
- 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.
- 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:

- <u>Requirements</u>
- <u>A Simple IxNetwork Test</u>
 - <u>Connect the Ports</u>
 - Start IxNetwork
 - Select the Ports
 - <u>Configure the Protocol</u>
 - Review the Protocol Configuration
 - Ping the DUT
 - <u>Start the BGP Protocol</u>
 - <u>Configure Traffic</u>
 - <u>Set Up the Test Composer</u>
 - 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. <u>Connect the Ports</u>
- 2. <u>Start IxNetwork</u>
- 3. Select the Ports
- 4. Configure the Protocol
- 5. <u>Review the Protocol Configuration</u>
- 6. Ping the DUT
- 7. <u>Start the BGP Protocol</u>
- 8. <u>Configure Traffic</u>
- 9. <u>Set Up the Test Composer</u>
- 10. Set Up CSV Logging
- 11. <u>Set Up a Quick Test</u>

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.

i 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 <u>https://login.ixiacom.com/?forgot-password</u>. 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 <u>A Simple</u> <u>IxNetwork Test</u>.

Home Results / Report		ative .	dar Mana							•	19 El
There where Deets Correct Rate	ta Potr To Cesr Ovi St St St St St St St St St St St St St	selected Link Unix	Portuga / Aneta Desig	n Vena Li Propetiec Rath of Legacy- Use	en Castor Statute 👔 Rommel L1 — Cognet	I. @		Acte Data Acte Data			• •
Add/Remove	Overenhip		Actions		L1 Centiguration			Quick Traffic			
Test contrauxation K	<> 3 %	Forts +									
Oversiev	90800 L + 🐱	Nalie 10.295.27 AD 82:03-8	Connection Status	Megotrated speed	Pbps Looplask	TIGESTIE	transhit	Translat	Receive Mode Pressure Pleve	Transvill Pode Markeyved	Type
- 🚴 Perts	2	10.295.27.00; 82:02-D	the in use by briefwork/ic		1001			1	Pleasa flore	Interleaved	Diverset
Chaosis	3 0	10.295.27 AD 82:05-8	 10.285.27.40 82:05 10.285.27.40 82:05 		1000				Plencare Floor	lateries.ed	Rhward
Protocol Configuration Protocol Interfaces Protocol Interfaces											
- Automation											
in Captures											
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						Constant Sec.					
	Stat Ma	ine I	Duplex Mode Line Speed	Link Rate Feature	KTA Valid Rahec R	s. PLEASE IS.	eace praidmane	CRICERSON (LL	stallategrity Franes	Rot. (Data Dataget)	inter i
	Star Ua > 1 1000	10 S.27.50(Car602,Ror	Rull 1000 Mbp	Link State Frank Link Up	a tu Malid Franki R 2,316	15	E E	C KA, KARA LL	sta lategrity Franes	Ro. Data Dategat;	i Grecora - G B
	Start Un > 1 10.28 2 10.295	ne (5.22.60(Cané02,¥er) -27.60(Cané02,¥or.04	Puli L080 Mbg	Link Robert Frank Link Up S Unk Up	k Tr. Valid Franks R 3, 316 19 EV	15 15	E E E	E RECEILE	ata lategrity Franes	i Ra. Data Drivegit) II II	inter i i i
	Stor to 1 1007 2 1007 5	ve 5.27.53/10#902/947. 27.63/1081902/94794	ingdor/Mode Fail LoboHog Fuil LoboHog Fuil LoboHog	Link Stank Frank c Links Up c Unik Up	8 TAL (WALSHAMMER) 2,346 19 EU	n polaris (r. 15 15 199		E E	ata lategi ty Franeo	Rs. Data langery	y Errors (6 B B

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.

1	fest Configuration 《	<	1	Ports >							
Γ	Overview		State	Nane	Connection Status	Negotiated Speed (Mbps)	Loopback.	Transnik Gocking	Transmit Gap No de	Transmit Ignore Link Status	Receive Mode
L		1	X	Ethernet - 001	Unassigned		10				Measure Flow
ŀ	Ports	z	×	Ethernet - 002	Unweigned		10				Pleasure Ploys
L	2 Channin	3	X	10.205.27.60.02.01Eth	In use by 'biNetwork/ic		10			(C)	Measure Flow
L		+)	X	10.205.27.60.02.02-Eth	In use by 'billebioright						Measure Flow
ŀ	 Protocol Configuration 	5		10.205.27.60:02:03-Eth	10.205.27.60:02:03						Pleasure Ploys
L	Protocol Interfaces	6	۲	10.205.27.60.02.04-Eth	10.205.27.60.02104		13				Measure Flow
	 II 12:05:27:8002:03-Ethemet II 12:05:27:8002:04-Ethemet Static X: Traffic Configuration p:q: L2-3 Traffic Barms p:q: L2-3 Traffic Barms p:q: L2-3 Quick Row Groups QuickTeats Captures 										

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:

IT Range	20.20.20.1
AT Ronge	20.20.20.1 SP Per : : : : : : : : : : : : :
at Range	Silf Part Silf Part
Art Range	Aveilable
ri Range	Consected Interfe
rf Range	Consected Interfe
rri Ronge	Cosrected Interfe
rri Ronge	Cosrected Interfe
rri Ronge	Cosrected hisrfe
rt Range	Connected Interfa
iri Range bore bore bore bore	Available
iri Range	Aveliable Interface Count
int Range	Avelable Interface Count
	Interface Count
one	
lane	

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:

Per Type - Hernal aud AS = - 0001 (20.20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20.20) (20.20) (20.20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (20.20) (2	Peer Topology Number of Peers per pet Peer Topology Import Price and Peers over Unconnected Interfaces	bia Port			3	SUT	
Configuration Options Configure Topology & Generate Configure Topology & Generate Import File Type bis Format File Name Peer Topology Number of Peers per port Configure BGP Peers over Connected Interfaces Configure BGP Peers over Unconnected Interfaces Configure BGP Peers over Unconnected Interfaces	Configuration Options Configure Topology & Generate Import File Type Interface Peer Topology Number of Peers per port Configure BGP Peers over Connected Interfaces Configure BGP Peers over Unconnected Interfaces	Pres Type - Internal Local AS # - 6500 20 20 Ream Ream Ream Ream Ream Ream Ream Ream	20.224	30 20.21.1	24	20 20 20 1 169 Par : : : :	
Configure Topology & Generale Configure Topology & Generale Import File Type Interforment File Name Peer Topology Number of Peers per part Configure BGP Peers over Connected Interfaces Configure BGP Peers over Unconnected Interfaces	Configure Topology & Generate Configure Topology & Generate Import File Type Inia Format File Name Peer Topology Number of Peers per port Configure BGP Peers over Connected Interfaces Configure BGP Peers over Unconnected Interfaces	ston - 2				+ Connecte	d laterfoce
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Configure BGP Peers over Unconnected Interfaces Configure BGP Peers over Unconnected Interfaces	Configure BGP Peers over Unconnected Interfaces	Number of Peers on part			1		
Configure BGP Peers over Unconnected Interfaces Configure BGP Peers over Unconnected Interfaces	Configure BGP Peers over Unconnected Interfaces	Render of reasper part			1		
C Longure Bur Peers over Unconnected interaces	C Lamgure BLaP Peers over Unconnected Interaces	Configure BGP Peers over Con	nected Interta	1098			
		C Loningure BLSP Peers over Uno	onnected into	staces			

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

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

Nucer wizard - Peers - Name	
xia Port	SUT
Peer Type - Internal Local AS # - 05101 20 30 30 30 4	30.20.20.1
- CCA	BOP Pres
	20.20.20.1
NAN-	100 Pert
Picutas/Pear - 0 Means - 1 Picutas - 2	Connected interface
GP Peers	
Enable VLAN	Burger Birely for Owney and Bound Bohin
VLAN ID	Increment By
E Bepeal VLAN Across Ports	, ,
IP Туре	IPv4 •
IGP Protocol	OSPF - Options
IGP is needed only if BGP Peers are confi For better performance in append mode, o	gured on Unconnected Interfaces shoose None, if all peers to be configured already exist.
Connected Interface Information	
Enulated Peer IP Address 20.20.20.2/24	Gateway Address 20.20.20.1
Increment Per Router	Increment Per VLAN
0.0.1	0.01.0
0.1.0.0	Continuous Increment Across Ports
Enable BFD Operation Mod	e Single Hop 💌 Dpfons
Income a shared being dama to factored in a	
unconnecced interface information	Increment per Router_
IP Address	80.01
IP Address 22.2.2	(ALL)
IP Address 22.2.2 Increment per Port 0.0.1.0	Continuous Increment Acress Parts

- 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:

Per Type - Hermal Local AS # - 65301 21 23 30 374 Herman Type - Herman - 2 20 30 31 30 Herman Type - 1 EPS Specific Configuration BGP Type Local AS Number Start	10 20 20.1 25 10 fbr 10 fbr
BP Specific Configuration BGP Type LocaLAS Number Start	
86P Type Local AS Number Start	Internel -
Local AS Number Start	
	65,001
Local &C III, where I are marked Bu	1
Number of routes per peer First route 1321631.0/24	Increment by (per peer)
Configure Routes In ported from File	'
Internal peer send MED Value	
Advertise Best Routes Only	Tes cos
Revis Bistikutise Tuse	BULLIU
Route Distribution Type	Distibuted 💌

- 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:

Islia Port Peer type - Inter Work - Inter Mark - O Work - O	13 Incel A5 # - 55001 20.20.20.20 Normes Normes Phase - 1	4 20 20 20 1	SUT 2D 2D 2D 4 SUP Ner Company of the	}
	Hame Save Wizard Config Generate and Appe Generate and Dyan Generate and Dyan (WARNING : This w), But Do Not Generate on F nd to Existing Configuration write Existing Configuration write Al Protocol Configuration will clear the interface config	Portu ions urations also)	

- 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:

Overview	Real	ing/Switching MPLS Matter	t Carter	CB area	t Ac	err Aderded	in]i	ada Cender Brid gir	«]							
A Ports		Port Description	Port Owner	Link	APP	PING for IPv4	BP D	BGP(BGP+	BORP	595 L2L3	LACP	OSPT	05PFv3	RP	MPing	STP
Protocol Configuration	1	10.205.27.50.02:01-Ethernet -	b:Networ	8	Г	E	E	E		E	Е	Г	E	Г	_	Е
Protocol Interfaces	2	10 205 27 60 02 02 Ethernet -	bNetwor bNetwor	8		E		E .	E	E		E	E		E	F
EGP/SGP+	4	10.205.27.60:02:04-Ethernet -	b:Networ	i.	9	F	È.	9	E.	Ē	E.	E	Ē	F	E.	E.
🔀 Traffic Configuration																
Automation																

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

Test Configuration 0	Connect	Hell Interfaces Unconnected Inter	Chies	ORE Tweets Dec	overed Net	gikon identace Akkenses	DHOPV4.D	isonvered inferen	DHOPv6 Discovered More.	Rate Car	toi Parameters
Ports	E AR	Pon Link Up 🔽 Send Single A	RP pe	Galeway 🗖 NS on L	ini.Up	SendSingle NS per Batery	e .				
Protocol Configuration		Port Description	Port Link	Intertace Description	Enable	Pv4 Aukireos (10.0.x.x Reserved P)	Pv4 Meck Width	Gateway	Pv6 Address	Pv6 Mask Witth	IPv6 Gatew
H BCR/BCR+	1	10.205.27.60:02.01-Ethernet -	8	(Enpty)							
E Stells	2	10:205 27:60:02:02.Eltwrvel -	58	(Enpty)							
	3	10.205 27.60.02 03-Ethernet -		20 20 20 20 204 - 118:15 -	R	20.20.20.2	24	20.20.20.1			
Traffic Configuration	4	10.205.27.60.02.04-Ethernet -		20 21 20 224 - 118:16 -	R	20.21.20.2	24	20.21.20.1			
 Automation Captures 											

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

loutin	g/Switch	ing/Interlaces	1							
▶ s	itant 📕	Stop	ſ	Disable Received U (Enable for High Per	o date Validation formance)	🔽 Enat	vie Label Exchangs ov	er LSP		
Teste	r AS# for IBI	sp 1	Tester 4 byte 4	S# for IBGP	Adv	vanced				
IPv4 F	Peers Put	Feers RouteRa	nges Opaque Route	R. MFL& Route Ra	YRF5 YF	N Route Range	es LZātes Lab	el Block List	Moc Address R	a Multicast
	Enable	Type	Local P	Number of Neighbors	DUTIP	Enable NextHop	Nexthiop (Optional)	Enable BGP D	BGP ID	No. of RouteRanges
d .	V	internal	20.20.20.2	1	20.20.20.1		0.0.0.0	R	69.122.0.1	1

The emulated BGP topology is shown in the following figure:



BGP AS = 65001

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:

Trace and Statistic Windows		
File Window		
Ping (20, 21, 20, 2/24 - 118:16 - 1)		
Destinetion Address		
IPv4 💌 20.2022	- Send	
Results		
Pinging 20.20.20.2		
	2	
	Close	

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:

	C	Global Protocol Statistics	Global Proto	col Statistics								Ψ× ₹
Г		Stat Name	Control Packet Tx.	Control Packet Rx.	Ping Reply Tx.	Ping Request Tx.	Ping Reply Rx.	Ping Request Rx.	Arp Reply Tx.	Arp Request Tx.	Arp Request Rx.	Arp Rep
,	1	10.205.27.60/Card02/Por	0	0	0	0	0	0	0	0	0	0
Г	2	10.205.27.60/Card02/Port04	0	0	0	0	0	0	0	0	0	0
Г												

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 is to add the source and destination pairs in the lower pane of the window as shown in the following figure:

Endpoints	Endpoints /						- IxN
	- Traffic Item		- Source / De	stination E	indpoints —		
Packet / QdS	Traffic None Traffic Iton 1	т	raffic Group ID Pill	ters None a	elected		
Flow Group Setup	Type of Traffic IPv4	* s	iource All	- 7 6	a De	stination Al	- <u>-</u> <u>-</u> <u>-</u>
Frame Setup	- Traffic Mesh		- Al Ports			- Al Ports	
Rate Setup	Source/Dest. Many - Many	*	≱- 10.205.27 ≯- 10.205.27	.60:02:03-B .60:02:04-B	themet 2	- 10.205.27.60:00 10.205.27.60:00	2:03-Ethernet 2:04-Ethernet
Plow Tracking	Routes/Hosts One - One	٣					
Dynamic Fields	Di-Directional				-		
2 C							
	Allow Self-Dest ned						
Preview	Alter Sel-Descred						
Preview Velidete							
Preview							
Preview Velidate			÷ 19 % -	— Indpoir	at Sets		
Preview Veldate			HO X - Encapadiator	— Endpoi r	et Sets	Destination Endp	Traffic Gro
Vekiete			 HO XX Encapaulation Name: E 	- Endpoint n EndpointS e	at Sata	Destination Endp	Traffic Gro
Vekiete	Carted Herein		Encapsulation	EndpointSe EndpointSe ELIPy4	st Sets Source Endpo t-1 1 Endpoints	Destination Endp	Traffic Gro
Preview Veldete	Contract-loc main		 KO XX Encapaulation Name: I Ethemat V Neme: I 	- Endpoint n EndpointSe t ELIPy4 EndpointSe	et Sets Source Endpo t-1 1 Endpoints t-2	Destination Endp 1 Endpoints	Traffic Gro
Preview Veldete			 KO XX Encapadatos Name I Etranst V Name I Klavo 	= Endpoint EndpointS et ELIP v4 EndpointS et	st Sets Source Endpo I Endpoints I-2 Clien>	Destination Endp 1 Endpoints dNew>	Traffic Gro None selected
Preview Veldete	Number of hots per Route		 IO X Encapalatio Name I Encapalatio V Name I V Name I Olien> 	— Endpoint indpointSe indpointSe indpointSe	source Endpo Fol 1 Endpoints Fo2 (NEN>	Destination Endp 1 Endpoints «New»	Traffic Gro None selected
Preview Veldete	Number of hosts per Route		IO IO Encapaulation V Encapaulation V Versenset V Versenset V Versenset	= Endpoint n EndpointSe E1.IPv4 EndpointSe	source Endpo 1 Endpoints 1-2 <nen></nen>	Destination Endp 1 Endpoints «New»	Traffic Gro None-selected None-selected
Veldate	Number of hosts per Route		 IO X Encapaulation Name: II Ethernal Viene: II ofilews 	EndpointSet Cl.IP44 cndpointSet	et Sets Source Endpo E-1 1 Endpoints E-2 Oleno	Destination Endp 1 Endpoints «New»	Traffic Gro None selected None selected

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.

cain fai	Packet / QoS			IxN
	All Encapsulations Per Encapsulation			
	5272 Encapsulation To Port	Ethernet II: Ethernet-Type	Ethernet EL: PPC Queue	(Pe4 : PPrin
	weight of the second seco			
	4			
	All Encapsulations - Same settings will be applied to all (1) en	ncapsulation(s)		
	📑 🕹 🐉 🎦 Field Lookup: 📻	-	Go to	Stack Diagram
\$	Name	Value		
	- P Frane	len gth : 4	64	
	The former in			
		Increase	nt Fate	
	Ethernet II (Traler)	00000	110900	
		Darket 1 of 1	Prares Offmet: 0 Le	ngth : 64 Evbels
	The Ware N 40 4 1 D DD D	PREPART OF T		

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

vovanceo marrie wi		
Endpoints Padvet / QoS How Group Setup	Flow Group Setup Al Encepsulation Sats Encepsulation The Part Warner EndpointSet-1 Charmet 10.205.27.40.02:08	Plen Group Setup
Rate Setup Row Tracking Dynamic Fields Preview Ueldete	Al Encapsolitions - Same actings will be appl Create Flow Groups based on Societa Endpoint Pai Reve Ste Chernet II: Destination MAC Address Chernet II: Destination MAC Address Chernet II: Societation MAC Address Chernet II: Starmat-Type Ethernet II: Starmat-Type Ethernet II: Pher Quase Privi : Precedence Privi : Societ Address Privi : Destination Address	ad to all (1) encapsulation(s) Afflow group provides the ability to control rate and frame size per unique value of the fields estacted from the list. How it works: Checking Qo2 for example, the detribution will bok like in the degrambelow
	<u> </u>	

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).

Packet / Qo5 Flow Group Setup	All Encapsulations O Per Encap Size 11: Part	sulation					
Packet / Qo5 Flow Group Setup							
Flow Group Setup			Prane Stre				
And the second sec							
Franie Setup							
Rate Setup							
Plan Trading	AllEncapsulations - Same settings will t Frame Size	be applied to all (1) e	ancapsulation(s)	Par	doad		
Dynamic Fields	Road size	64		Туре	Incremen	nt Byte	
Previou	Incenent			Pattern			
	C Random				Repe	at	
Validate	C MIX			- CR	C Settings		
	0.000			🖲 No E	TOP		
S	Canton Pux			Bad (RC		
S	C Quad Gaussian			Dime	ale France		
	C Auto			1.1 maps	any Lines		
15	Presemble Size			_			
U) Auto						
	O Outon a	bytes					
X							

- 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.

Endpoints	Rate Setup							JxN
	C All Encapsulations	Per Encapeulat	ion					
Packet / QoS	Name Name	Encepsulation	Trensmission	Target Rate	Target Rate Distrib	ution		
Fina Grain Setun	1 EndpointSet-1	Ethernet ELIPv4	Continuous	10% Line Rate	Apply Rate to all p	orts, Evenly sp	lit port rate	arrong the
Frame Setup	2 EndpointSet-2	Ethernet ELIPv4	Continuous	10% Line Rate	Apply Rate to all p	orts. Evenly sp	lit port rate	anongthe
Rate Setup								
	Per Encapsulation - 5et	ings will be applied t	o: EndpointSet-) (Chernet II. P	14			_
Flow Tracking	- Traffic Item Tr	ans mission Mode		- How Gr	oup Transmission	Mode -		
Dynanic Fields	(a) Interleaved			🦲 Continuo.	s Stop	After	1	bratione
Preview	Sequential			C Road Pac	ket Count Start	Delay	a	bytes
Validate	The Interleaved Trans	st made will interlear	/ mithe	C Pixed Iber	ation Count Minia	rum Gap	12	bytes
	packets From each Plow	Group when sendin	g Traffic	C Road Dur	ation			
				🔘 Bunit (Au	to)			
				🖸 Burst (Cu	ston)			
				How it will look	anthe wine: 🚺	2 3 1 2	3 1 2	3 1 5
	Rate			- Rate Dis	stribution —			
	 Une rate 	10.00	%	Ports				
	Packet rate	100000.00	per second	Appry rate	e on all ports			
	C Laver2 Bt Rate	1000.00	bps 🔻	Flow Groups:				
				C Apply por	trate to all Flow Gro	sups		
				Solt part	the events encode	Ana Groups		

- 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.

ainta 🕴	Flow Tracking			-				- IxN
1	- Track flows i	by			n Dverride			
t/Q05	 Traffic Item 			Done-O	hedren en			
Second Radian	Source/Dest End	ipoint Pair			(march)			
a cob perub	Source/Dest Valu	Je Pair		Officet from	1000	7		
Setup	Source/Dest Port	t Pair		Offset		a	bits	
	Source Endpoint			Deldarath.	32 Bits	· · ·		
Setup	Dest Endpoint							
_	Source Port			Values				
racking	Traffic Group ID							
	MPLS Flow Despi	iptor						
905	Frame Size							
в	Frame Size							
4s	Frame Size Flow Group Dthemet II : Des	stination MAC Ad	kar ea s					
	Frame Size How Group Uthernet: II : Des Uthernet: II : Sou Uthernet: II : Sou	stination MAC Ad Iron MAC Address	kdress					
	Frame Size How Group Uthernet II : Des Ethernet II : Sou Ethernet II : Bou	stination MAC Ad area MAC Address emet-Type	ktreos					
	Frame Size How Group Uthernet: II : Des Ethernet: II : Sou Ethernet: II : Bth Egness Track	stination PAC Ad area MAC Address emet-Type ting	kår en s	,		stency Bin Mea	surements	
Y J O N	Frame Size How Group Ethernet: II : Des Ethernet: II : Sou Ethernet: II : Eth Cgress Track Enable Egress 1	stination MAC Address area MAC Address arriet-Type ting Trading	ktress 			able Laboracy Din Meas	aurements Nearanami	
	Frame Size How Group Dhermst II : Des Dhermst II : Sou Ethermst II : Sta Dyness Track Enable Egress 1 + =	stination MAC Ad arcs MAC Address emet-Type ting Tradding	kireos m	,		abency Bin Mea able Latency Bin en of Bine B	aurements Neaurarant	ta imum alap aiza: 0.022 c
	Frame State How Group Dhermst II : Des Dhermst II : Sou Dhermst II : Sou Dhermst II : Sou Dhermst II : Sou Dhermst II : Shu Dhermst Duter Dhermst Outer	stination MAC Address erret-Type ting Trading	bireos			abency Din Mea abla Latarcy Din ars of Bina B Greater Than	eur ernenits Neaure ren + Min Less Thr	te Arnurs etege eize: 0.02 t en or Dquel To (us)
etwork	Frame Stee How Group Dhermst II : Des Dhermst II : Sou Ethernst II : St Dhable Egress Track Enable Egress T	stination MAC Ad area MAC Ad down emet-Trop ting Tracking Enceptulation	bireos m		num – L Der Numb	stency Din Mea able Latancy Din an of Dine D Greater Than D	Aur ements Neaurstein + Min Less Thr 20	te imum ships size: 0.02 c en or Equiel To (us) 1.00
etwork	Frame State How Group Diverse II : Des Diverse II : Des Diverse II : Sou Ethernet II : Sou Dyness Track Duble Egress T Duble Egress T	stinetton MAC Ad arcs MAC Addees ernst-Tuse ting Tradsing Encoperation Offset	Ethemet Outer VLAN	- Priority Gro	inni Er Numb I I J 2	atency Din Mea able Latancy Din en of Dine (B Greater Then 0 1	Aur ements Nearan ment + Min Less Thr 20	te émune stepp eitres: 0.422 k en or Equiel To (us) 1.42 1.42
letwork	Frame State How Group How Group Ethernet II : Des Ethernet II : Sou Ethernet : Cutor	stinetton MAC Ad arca MAC Addees ernet-Trope ding Tracking Enc.episulation Offset	Ethemet Outer VLAN	- Priority G		atency Din Mea able Latency Din Greater Than 0 1 1	Aur ements Nearurament + Min Less Thr CO CO 42	te énum step size: 0.02 s en or Equiel To (us) 1.42 2.00
Letwork .	Fram Ste Max Group Max Group Drivenst II : Cee themat II : Sau Ethemat II : Sau	stinetion MAC Address area MAC Address arrist. Trans ting Tracking Encoposition Offset	Ethemet Outer VLAN	- Priority (*		atency Din Mea adris Latency Din Greater Then 0 1 1 2 2	Aur ernenits Nearure nent – Min Less Thr .00 .00 .42 .00	te imum step stat: 0.02 s en or Equal To (us) 1.00 1.42 2.50 2.52
Network.	Harr Ste Hav Group Diverset II : Des thermet II : Seu Bibernet II : Seu Bibernet II : Seu Date Egress Track Date Egress Thermet Couter	stination PMC Ad area MAC Address amat-1 vas ting Tracking Encoperation Offset	Ethemet Outer VLAN	- Priority G		atency Din Mea adde Latency Din en of Dra Greeter Then 0 1 2 2 2	Aurernenits Maauurernenits w Min Less Thr Less Thr Less Thr 20 82	te imum shap size: 0.02 v en or Equel To (us) 1.00 1.42 2.50 4.09

- 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.

🚭 Advanced Traffic Wizar	ð	
Endpoints	Dynamic Fields	lxN
Podet J QoS Podet J QoS Power Setup Prove Setup Provideor Provideor Provideor Validate	Levis	Enabling "Dynamic Fields" allows belietworkts update the corresponding traffic packet fields on the fly with the information learned from protocols
		Prev Next Prish Cencel Help

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.

Advanced Traffic Wizar	d							
Endpoints	Preview		A DESCRIPTION OF				- b	(N
Packet / QoS	- Flow	Groups/Packets	Current	Traffic Item 🤇	Al Traffic I	teris Vie	w Filow Groups/Pe	ickata
Flow Group Setup	V Poet	Flow Group 10.205.27.60:02:03-8th	ernet er Stalin 1001	Traffic Dep 1	Tra	ffic Ibem		
Rate Setup								
Cyrrenic Pields	- 1 Barkets fr	or firm ormers. Itseffic firm 1-	Freihnintfiel-1 - Pinas G	Strain 0001				
Validate	Packet #	Destination NAC Address	Source MAC Address	Ethemet-Type	PPC Queue	Precedence	Source Address	Destina
atwo	1	remove Packet (Unable t	0010017712218715	800	D	000 Routine	20.20.20.2	20.21.3
XN.		1 41 20 2001 4						,
			Prev	Next	Br	ish 🔤	Cancel	Help

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

Packet / Qet5	Traffic Item Resource Information -	Ourrent Traffic	ltem 🔘 All	Traffic Items	Velida
Fire Group Setup	(ii) High level view to quickly identify category of a	mors detected per Traffic Item			
r ion droup serup	Traffic Itam	Configuration	Packate	Plow Groups	File
Frame Setup	 Traffic Item 1 		¥	🎸 1	¥ 1
Velabore	Error + 1 A Not all the Packets could be Generated - 4	One ar more destination MACs ar	VPNs are invol	id ar un reachable a	nd this p
	Not all the Backets could be Generated				

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:

Test Configuration	<	🙆 🔀 Traffic C	Configuration 🕴 🔀 L2-3 Traff	ic Zerra >						
Overview 0		Transmit State	Traffic Ibers Name	Enabled	Tx Ports		R.:: Porta	Plow Groups	Endpoint/Enc appulation	
	L 🎰	100	Traffic Jorn L	2		1	1		L 1	
• at Ports										
- Protocol Configuration										
Protocol Interfaces										
60 Static										
de sais										
 X Traffic Configuration 										
C L2-3 Traffic Items										
C L2-3 Flow Groups										
Automation										
Captures	l. –									
	Sun	many Settings T	racking and Latency 🛛 🗛 🐔	1						- F
		Traffic Statis	tice •							Ψ×

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.

perties	Properties					
Packat Editor Preview Packets	Stream Name QuickFlow Groups - Flow Group 0001. Frame Size Prood Size 64 Discrement Rendon PR0X Cuation IPDC Quicd Gaussian	Support Paylead Type Pattern Repest CRC Settings				
	Auto Rate Rate Rate Rate Radet rate Radet rate Layer208 Rate Rate Recomble Size Auto	Obparity Enrors Objecting Transmission Mode Objecting Transmission Modie Objecting Transmission Mode Obje				

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:

Test Configuration	< <>	🚰 💮 Protocol Co	rfguration	🕨 🔁 BGP/BGP+ 🕴								
Overview	Diagn	Pots IPert P.	Pris P.	User. User.	. Nute. Open] MPLS] YRT R] YP	N.R PMSI	56P A 12:58	rs Latel M	se K Madic.	. Mater	SPMSL.
Ports		Port	Eneble	Туре	Interface Type	Interfaces	Interteo Start Inde	Local P	Number of Neighbor	5 DI	IT P N	trable N
Mel Protocol Comguration	1	10.205.27.60.02:03-	3	Internal	Protocol Interface	20.20.20.2/24 - 118:15 - 1		20.20.20.2		1 20.2	0.20.1	Г
E Probocol Interfaces	2	10.205.27.60.02:04-	R	Internal	Protocol Interface	20.21.20.2/24 - 118:16 - 1				1 20.2	0.20.1	Г
	<											
H Automation	Neig	Noer / Rap / Adva	A tean	earned Routes Filter	s / Capabilities /	(AT/						
 Automation Captures) Neig	Noer / Rap / Advis Global Protocol Stati	nced A	Global Proto	s / Capabilities /	(AT /						¥ ×
 Automation Captures 		hbor / Rap / Adva Global Protocol Stati Stat Nerve	nced A stics	Global Proto Global Proto Global Tx.	s A Capabilities / col Statistics Contro I Pachat R.s.	Al / Ping Reply Tx. Ping Request Tx.	Ping Raphy Rc.	Ping Request Rx.	Arp Reply Tz. Ar	p Request Tx.	Arp Request I	₩ ×
 Automation Captures 		hbor /, Rap /, Adva Global Protocol Stat Stat Name 10.205.27.60/Card	stics	Global Proto Global Tx. 2,348	s A Capabilities / coll Statiistics Control Pachat Ro. 47	AT / Ping Reply Tx. Ping Request Tx.	Ping Reply Rc. 2 1	Ping Request R.s.,	Arp Reply Tz. Arj B	p Request Tx. 54	Arp Request F	∓ × Ls. Arp Re 47

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 IxNetwork GUI Views tab.

dedicated button on the

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:

🛟 Main_	Procedure*					
	Command Type	e	Command Str	ng		
1 1	Config	Get 🖂				
	Tr W Sh Ge Dolleb	ace riteCsv latch nowMessage etValue etTime work onfig Get onfig Add onfig Remove onfig Action V Ok	Cancel			
Breakpoint	s					Ę 🗙
	0	+ +				
Step 4	# Type	Command	Settings	Command Para	me Descri	ption
Find / Rep	I Validation	n Breakpoin	ts Commany	Events	Executio	n Variables

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:

10	User Events							×
Use	er Events:			+	×	♠	♣	
	Event Name	Procedure To Run	Additional Action	Event	Hand	ling		
Ø.	Event1	<enter n<="" procedure="" td=""><td>Continue With Curr</td><td>Schedu</td><td>uled</td><td></td><td></td><td></td></enter>	Continue With Curr	Schedu	uled			
_								
			_			_		
				Ok		0	ancel	

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.

	Execute	Built-In Event		All Protocols Start IxN::availableItems="{::ixNet::OBJ-/eventScheduler/availableEvents:\"REG_Start\"/
O	Sleep			00:03:00.000
	Execute	Built-In Event		Statistics Write CSVs for all Views content="All Pages" newcsvfile/overwrite=Overwrite csvfile/ocation
10	StartSession	CSV_Stat		CSVAnalyzer, startSession_csvFileName="\$port_stats" csvTemplateName="\$stat_template"
-	Execute	CSV_Stat	ProtocolStats	StatQuery_category="Statistics_1" filter="" items="((Statistics_1.Sessions_Initiated) with caption: (Se
	Trace			\${ProtocolStats.Statistics_1.Sessions_Failed}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Initiated}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Succeeded}
=	Assign		maxtime	[expr [clock seconds] + 900]
EC	While			(\${ProtocolStats.Statistics_1.Sessions_Initiated} != \${ProtocolStats.Statistics_1.Sessions_Succeeded}
	1 ⊆1 11			[clock seconds] >\$maxtime
	PRunProced			UGS-info "Failed to start protocols"
	C Return			0 "Failed to start protocols in 15 minutes"
	EndIf			
	😇 Sleep			00:01:00.000
	Execute	Buit-In Event		Statistics Write CSVs for all Views content="All Pages" newcsvfile/overwrite=Overwrite csvfilelocation
	Execute	CSV_Stat	ProtocolStats	StatQuery_category="Statistics_1" filter="" items="{{Statistics_1.Sessions_Initiated} with ception: {Se
	Trace			\$(ProtocolStats.Statistics_1.Sessions_Failed)
	Trace			\${ProtocolStats.Statistics_1.Sessions_Initiated}
	Trace			\${ProtocolStats.Statistics_1.Sessions_Succeeded}
	EndWhile			
-	StopSession	CSV_Stat		
🗉 🕻	Procedure		<none></none>	UGS-info (String:msg)

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\"}
"
```

 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**.
- 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.
- 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 Run 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.

- <u>PDF</u>
- 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.

Preferences	
Categories:	Web Browser Options
Accessibility Acrobat.com	Display PDF in browser
Catalog Color Management Convert From PDF	✓ <u>A</u> llow fast web view ✓ Allow <u>speculative</u> downloading in the background
Convert To PDF Forms Identity International	Internet Options Connection speed: 56 Kbps -
Internet	

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**.

Open File - Security Warning 📉 🗙				
Do you want to open this file?				
P	Name: TestO Publisher: Unkr	ionductorUserGuide.chm nown Publisher		
	Type: Comp	iled HTML Help file		
	From: C:\Do	cuments and Settings\rmarescu\Desktop		
		<u>O</u> pen Cancel] [
Always ask before opening this file				
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not open this software. What's the risk?			iot	

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.

TestConductorUserGuide.chm Properties				
General Security Summary				
2	TestConductorUserGuide.chm			
Type of file:	Compiled HTML Help file			
Opens with:	Microsoft® HTML Help			
Location:	C:\Documents and Settings\rmarescu\Desktop			
Size:	5.27 MB (5,527,302 bytes)			
Size on disk:	5.27 MB (5,529,600 bytes)			
Created:	Today, June 24, 2009, 12:52:40 PM			
Modified:	Today, June 24, 2009, 12:52:44 PM			
Accessed:	Today, June 24, 2009, 12:52:44 PM			
Attributes:	□ <u>R</u> ead-only □ <u>H</u> idden <u>Ad</u> vanced			
Security:	This file came from another computer and might be blocked to help protect this computer.			
	OK Cancel Apply			

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.

Internet Options				
General Security Privacy Content Connections Programs Advanced				
Select a zone to view or change security settings.				
Internet Local intranet Trusted sites Restricted sites				
Internet				
This zone is for Internet websites, except those listed in trusted and restricted zones.				
Security level for this zone				
Custom Custom settings. - To change the settings, dick Custom level. - To use the recommended settings, dick Default level.				
Enable Protected Mode (requires restarting Internet Explorer) Custom level Default level				
Reset all zones to default level				

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*

Security Settings - Internet Zone	x
Settings	
Run ActiveX controls and plug-ins	
Administrator approved	
 Disable 	
Enable	
Prompt	
Script ActiveX controls marked safe for scripting*	
 Disable 	
Enable	
Prompt	
🛃 Downloads	
🛃 File download	
O Disable	
Enable	
💑 Font download	
 Disable 	-
Fnahla	· ·
*Takes effect after you restart Internet Explorer	
Reset custom settings	
Reset to: Medium-high (default)	•
OK Car	ncel

- 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 <u>Ordering</u> 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:

- <u>Subscription Licenses</u>
- 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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INDEX

Α

accessing IxNetwork documentation 103 applibrary licenses 111 applibrary licensing 111 С chassis installation 18 configuring IxNetwork for silent installation 28 Е evaluation licenses 110 F floating licenses 110 G general licensing steps 17 Ι if a PDF help file does not open 103 if you cannot view a CHM help file 104 if you cannot view a WebHelp 105 IxNetwork installation 19 IxNetwork international language support 18 IxRouter installation 109 L licensing models 110 Ν

node locked 110

Ρ

perpetual licenses 111 prerequisities 111

R

registering licenses 110

S

subscription 110

Т

to view the video tutorials 107 typographical conventions viii



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