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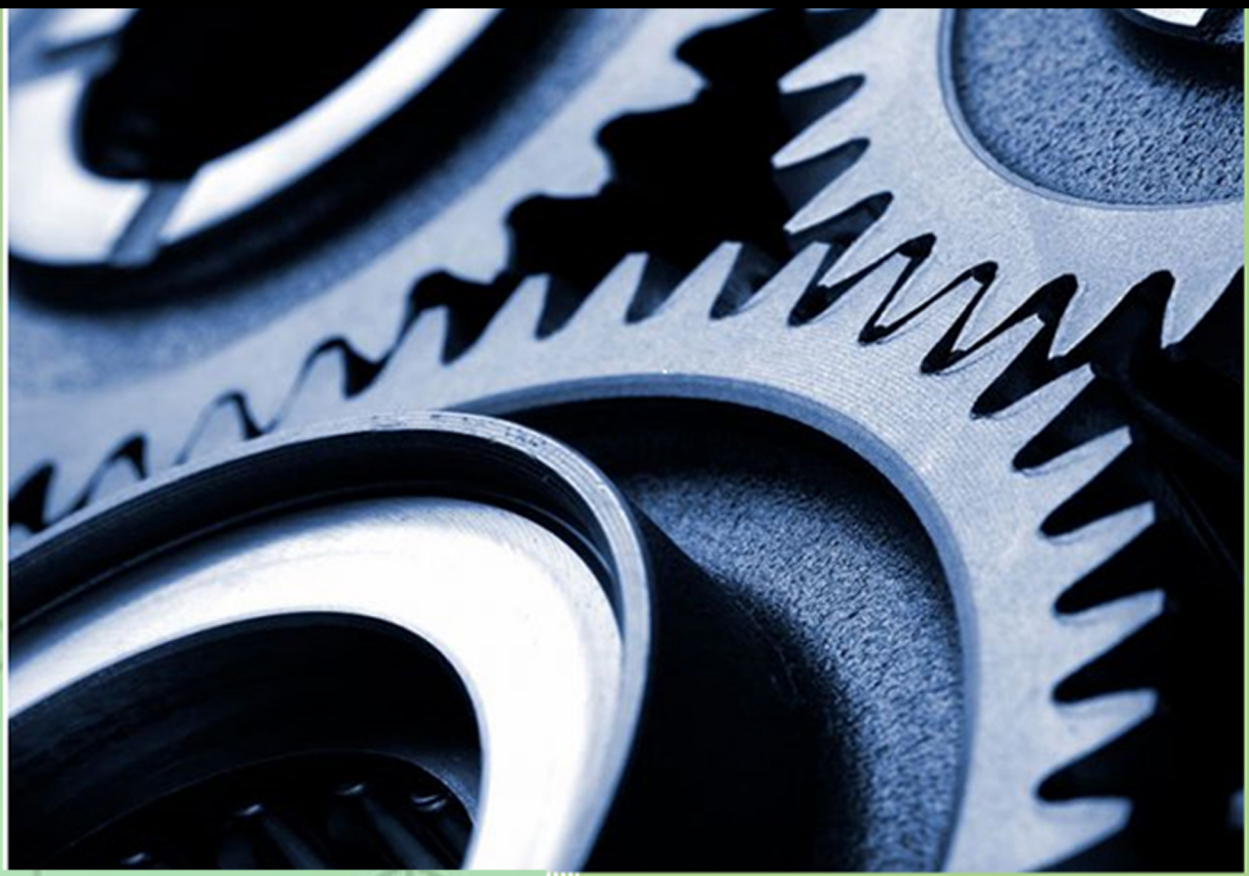
IXNETWORK-LOW LEVEL API QUICK REFERENCE GUIDE



Contents

1. Overview:

Low level API can be used to configure both classic and NGPF GUI. Low level API can be executed in TCL,Perl and Python. This document will give you the idea about the installation of IxNetwork on windows and linux machines and also about the creation of protocol-stack configuration model by executing commands in TCL and Python script using low level API.

2. API Tree Structure:

The internal architecture and implementation of the IxNetwork automation stack is as shown in the following figure. This automation stack shows all the API offerings of IxNetwork.

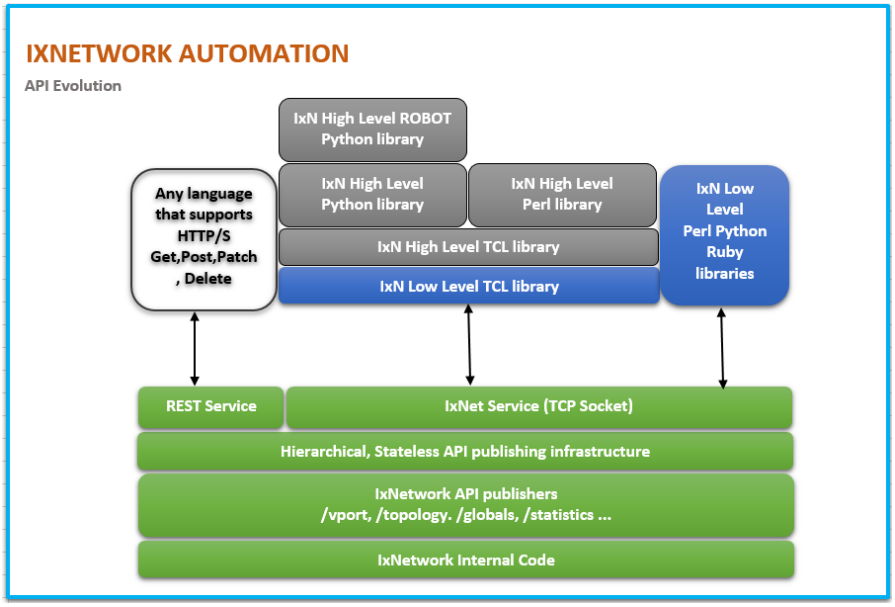


Figure 2.1: IxNetwork API Stack

3. IxNetwork Hierarchical Structure:

Any configuration that you build in the IxNetwork GUI appears as a hierarchical-tree like data-model to the IxNetwork APIs. Nodes of the hierarchical tree are also known as objects, and properties of the nodes are known as attributes of the node or object.

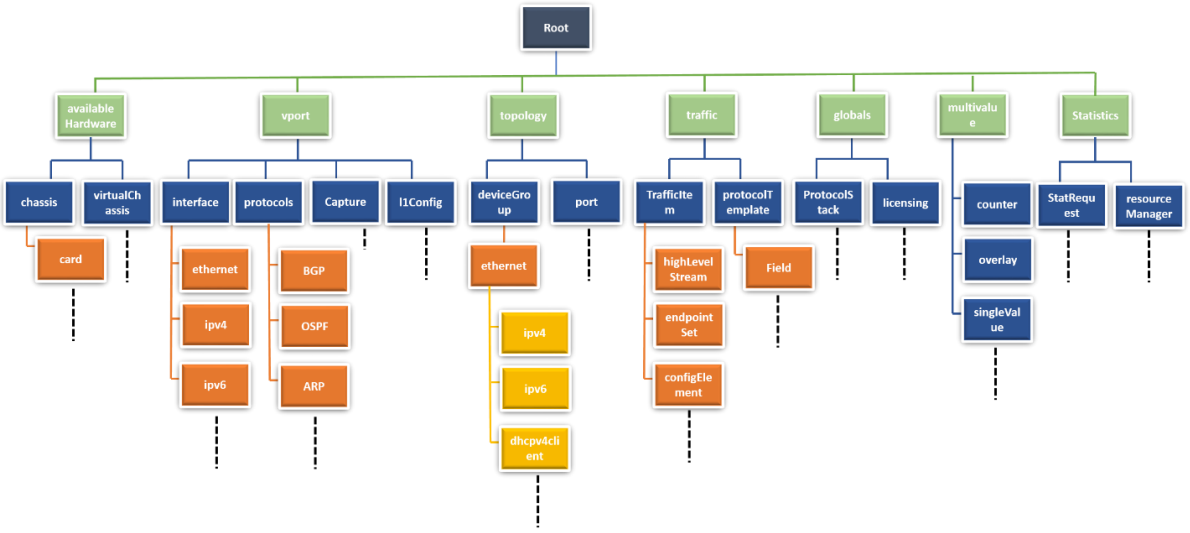


Figure 3.1: Hierarchical-tree Data Model of LLAPI

All IxNetwork TCL commands start with the keyword “ixNet.” The generic format of the IxNetwork TCL commands is “**ixNet subcommand args*.**”

Description of the basic subcommands used commonly in the LLAPI are:

SubCommands	Description
ixNet getRoot	This command returns the id "root" node of the IxNetwork API tree. The return value of the API is a string such as "::ixNet::OBJ-/".
ixNet help <objref> <propname>	This command displays basic help for the listed object reference <objref>, its property <propname>, or command.
ixNet getList <objref> <listName>	This command takes the node id and child type as an argument, and returns a list of children of that type.
ixNet getAttribute <objref> -<attributeName>	This command retrieves the value of an attribute -<attributeName> from the given object reference <objref>.
ixNet setAttribute <objref> -<attributeName> <value>	This command sets the value of a specified attribute (<attributeName>) of an object <objref>.
ixNet setMultiAttribute <objref> -<attributeName1> <value1> -<attributeName2> <value2> …	This command sets the value of several attributes (<attributeName1>, <attributeName2>, ...) of an object (<objref>) at one shot.
ixNet commit	This command applies all changes into the configuration that you have made by using the ixNet setAttribute, ixNet add, or ixNet remove command
ixNet add <objref> <childType>	This command adds an object to an object's list property.
ixNet remapIds <tcl list of objrefs and temporary objrefs>	This command takes the list of temporary object-id and input and returns list of permanent object id as output, provided have run the ixNet commit to complete the change(s).
ixNet execute <function> <arg*>	This command runs a function <function> with argument(s) <arg*>.

Table 3.1: Description of the basic commands used in LLAPI

4. Installation of IxNetwork Low Level TCL:

Environment variables are (case-sensitive) named values that are provisioned and maintained by the operating system, which is used by dynamic programming languages like TCL, Python, Perl, and Ruby to get informed about the operating environment, OS type, and location of library paths.

4.1 Windows-based:

The environment variable i.e. TCLLIBPATH should be populated with the IxNetwork's TCL Library path. Set the variables in environment variable prompt as follows:

Variable name: TCLLIBPATH

Variable value: {C:/Program Files (x86)/Ixia/IxNetwork/<IxNetwork install path>/API/TCL/IxTclNetwork}

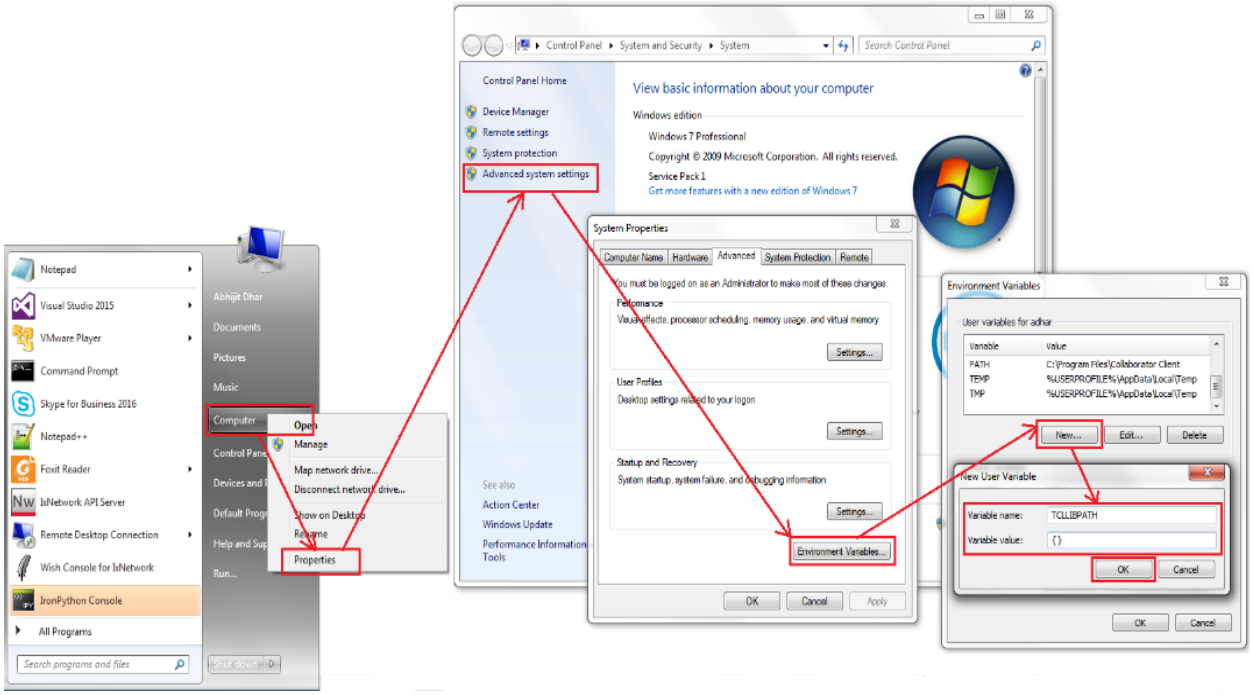


Figure 4.1.1: Setting environment Variable TCLLIBPATH

Type "**package req IxTclNetwork**" on the Command Prompt window. It should return the IxTclNetwork version installed on your computer.

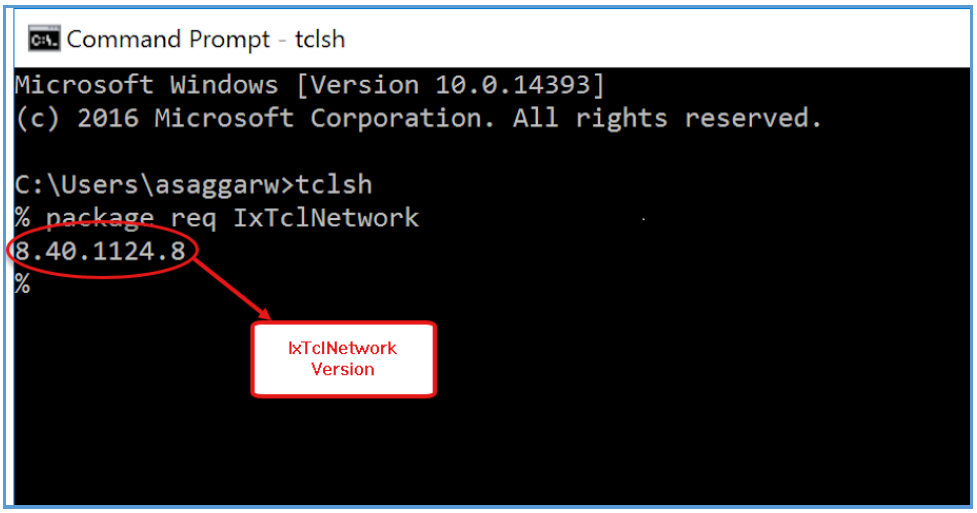


Figure 4.1.2: TCL Interpreter Returned Proper IxNetworkTcl Version

4.2 LINUX-based:

Setting environment can be done from a shell script. Following are bare necessary steps for setting up an environment to run the low-level TCL script:

1. Open a file by using an editor, such as, vi env.sh.
2. Write the following commands in the file:

   export TCLLIBPATH="<IxNetwork Library Path>/ixnetwork/8.40.1077.17/lib/IxTclNetwork/"

3. Close the file.

4. Source the file: source env.sh.

Open a TCL shell. Invoke the low-level TCL packages successfully as shown:

```
[localhost@ixnetwork ~]$ tclsh
% package req IxTclNetwork
8.40.1077.17
% exit [localhost@ixnetwork
~]$
```

5. Configuring BGP by using LLAPI in TCL and Python:

The follow section is intended to give you the basics of configuring BGP in a TCL and Python script using the low-level API. The steps are laid out in the order of execution. Context is also provided through screen shots of the IxNetwork GUI that show the outcome of the commands
Similarly other protocols can also be implemented using the same logic.

5.1 Import ixNetwork Tcl API Package:

In order to use the IxNetwork Tcl and Python API, the Tcl and Python interpreter needs to be told where to find the definitions of the API. These commands load the library so the API can be used.

TCL	***Python***
puts "Load ixNetwork Tcl API package" ***package req IxTclNetwork***	***import os*** ***import sys*** ***import time*** ***ixNetPath = ixNetPath = r'C:\Program Files (x86)\Ixia\IxNetwork\8.40-EA\API\Python'*** ***sys.path.append(ixNetPath)*** ***import IxNetwork***

5.2 Connect to the Chassis:

Assign chassis/client/ixNetwork server port/ chassis port HW port information to the variables. These variables are used later for connecting to the chassis.
Note: Edit these variable values to match your setup

TCL	***Python***
namespace eval ::ixia { ***set ixNServer 10.XXX.XXX.XXX*** ***set ixNPort 8009*** ***}*** ***puts "Connect to IxNetwork Server"*** ***ixNet connect $::ixia::ixNServer -port $::ixia::ixNPort -version 8.40*** ***puts "Create a new config"*** ***ixNet exec newConfig***	***ixNServer = ' 10.XXX.XXX.XXX*** ***ixNPort = '8009'*** ***# get IxNet class*** ***ixNet = IxNetwork.IxNet()*** ***print("Connect to IxNetwork Server")*** ***ixNet.connect(ixNServer, '-port', ixNPort, '-version', '8.40')*** ***print("Create a new config ")*** ***ixNet.execute('newConfig')***

TCL	Python
puts “Adding chassis and edit hostname ip as your chassis ip” set availableHardware [ixNet getL [ixNet getRoot] availableHardware] ixNet add $availableHardware "chassis" -hostname 192.16X.XXX.XXX ixNet commit	print(“Adding chassis and edit hostname ip as your chassis ip” root = ixNet.getRoot() chassisObj1 = ixNet.add(root + '/availableHardware', 'chassis') ixNet.setAttribute(chassisObj1, '-hostname', ' 192.16X.XXX.XXX') ixNet.commit()

*Color coding: Commands - Handle - Child - Attribute -Exec Commands. Refer Table 3.1 for the description of the commands used in the script.

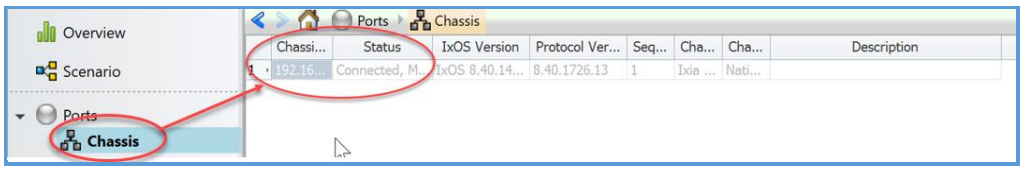


Figure 5.2.1: Chassis got Connected

5.3 Protocol Configuration:

The follow section is intended to give you the basic idea about the assigning of ports, basic configurations and the configurations required for the protocol.

TCL	Python
puts "Adding 2 vports" ixNet add [ixNet getRoot] vport ixNet add [ixNet getRoot] vport ixNet commit set vPorts [ixNet getList [ixNet getRoot] vport] set vportTx [lindex $vPorts 0] set vportRx [lindex $vPorts 1] puts “get the connected chassis card and its ports” set chassis [ixNet getL $availableHardware chassis] set card [ixNet getL $chassis card] set ports [ixNet getL $card port] puts "Assigning the virtual ports to the physical chassis ports" ixNet setA $vportTx -connectedTo [lindex $ports 0] ixNet setA $vportRx -connectedTo [lindex $ports 1] ixNet commit	print(“Adding 2 vports") vport1 = ixNet.add(root, 'vport') vport1 = ixNet.remapIds(vport1)[0] vport2 = ixNet.add(root, 'vport') vport2 = ixNet.remapIds(vport2)[0] ixNet.commit() vportTx = ixNet.getList(root, 'vport')[0] vportRx = ixNet.getList(root, 'vport')[1] print(“get the connected chassis card and its ports”) card = ixNet.getList(chassisObj1,'card') ports = ixNet.getList(card[0],'port') print(“Assigning the virtual ports to the physical chassis ports" ixNet.setMultiAttribute(vportTx, '-connectedTo', ports[0], '-rxMode', 'captureAndMeasure', '-name', 'Ethernet - 001') ixNet.setMultiAttribute(vportRx, '-connectedTo', ports[1], '-rxMode', 'captureAndMeasure', '-name', 'Ethernet - 002') ixNet.commit()

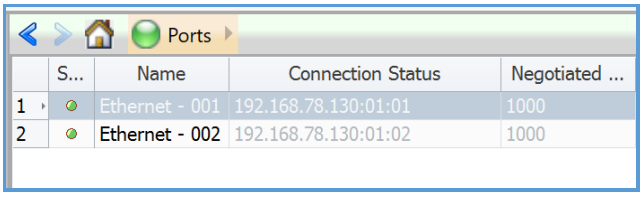


Figure 5.3.1: Showing Chassis Ports got Added and are Up

TCL	Python
puts "Adding 2 topologies" ixNet add [ixNet getRoot] topology -vports $vportTx ixNet add [ixNet getRoot] topology -vports $vportRx ixNet commit	print("adding topologies") ixNet.add(root, 'topology', '-vports', vportTx) ixNet.add(root, 'topology', '-vports', vportRx) ixNet.commit()

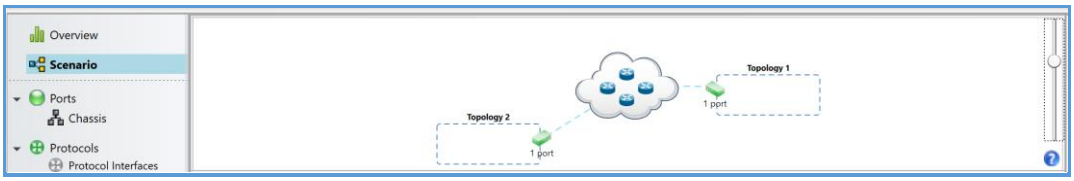


Figure 4.3.2: Showing Topologies are Added

TCL	Python
set topologies [ixNet getList [ixNet getRoot] topology] set topo1 [lindex $topologies 0] set topo2 [lindex $topologies 1]	topologies = ixNet.getList(ixNet.getRoot(), 'topology') topo1 = topologies[0] topo2 = topologies[1]

TCL	Python
puts "Adding 2 device groups" ixNet add $topo1 deviceGroup ixNet add $topo2 deviceGroup ixNet commit	print "Adding 2 device groups" ixNet.add(topo1, 'deviceGroup') ixNet.add(topo2, 'deviceGroup') ixNet.commit()

TCL	Python
set t1devices [ixNet getList $topo1 deviceGroup] set t2devices [ixNet getList $topo2 deviceGroup] set t1dev1 [lindex $t1devices 0] set t2dev1 [lindex $t2devices 0] puts "Configuring the multipliers (number of sessions)" ixNet setAttr $t1dev1 -multiplier 1 ixNet setAttr $t2dev1 -multiplier 1 ixNet commit	t1devices = ixNet.getList(topo1, 'deviceGroup') t2devices = ixNet.getList(topo2, 'deviceGroup') t1dev1 = t1devices[0] t2dev1 = t2devices[0] print("Configuring the multipliers (number of sessions)") ixNet.setAttribute(t1dev1, '-multiplier', '1') ixNet.setAttribute(t2dev1, '-multiplier', '1') ixNet.commit()

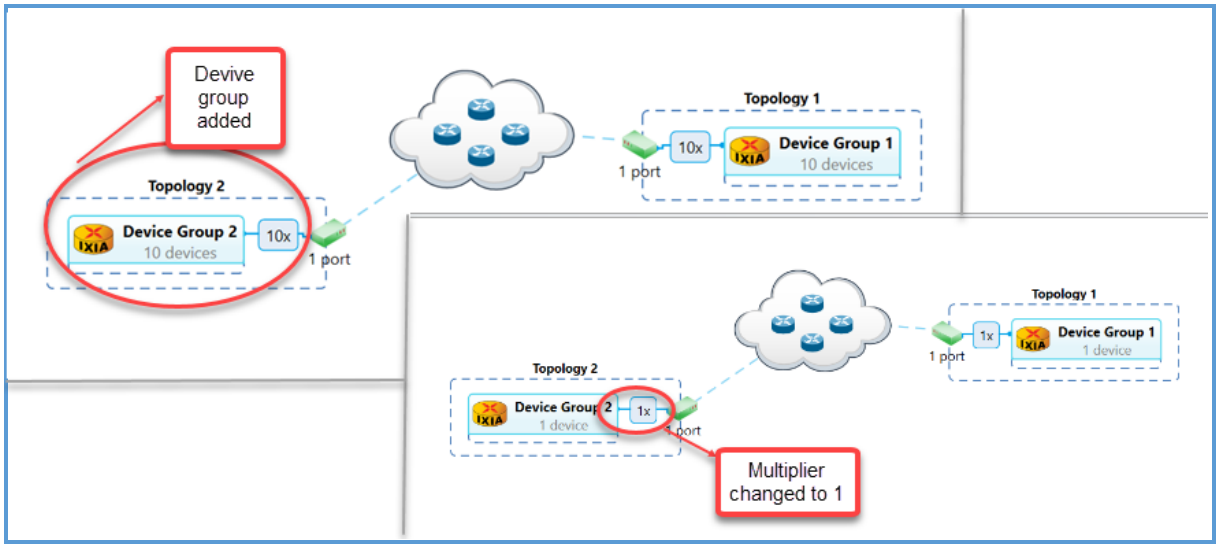


Figure 5.3.3: Showing Device Group is Added and Multiplier Value Changed

TCL

```
puts "Adding ethernet/mac endpoints"
ixNet add $t1dev1 ethernet
ixNet add $t2dev1 ethernet
ixNet commit

set mac1 [ixNet getList $t1dev1 ethernet]
set mac2 [ixNet getList $t2dev1 ethernet]

puts "Configuring the mac addresses"
ixNet setMultiAttr [ixNet getAttr $mac1 -
mac]/counter\
      -direction  increment                \
      -start      {18:03:73:C7:6C:B1}      \
      -step       {00:00:00:00:00:01}

ixNet setAttr [ixNet getAttr $mac2 -
mac]/singleValue\
      -value      {18:03:73:C7:6C:01}
ixNet commit
```

Python

```
print("Adding ethernet/mac endpoints")
ixNet.add(t1dev1, 'ethernet')
ixNet.add(t2dev1, 'ethernet')
ixNet.commit()

mac1 = ixNet.getList(t1dev1, 'ethernet')[0]
mac2 = ixNet.getList(t2dev1, 'ethernet')[0]

print("Configuring the mac addresses")
ixNet.setMultiAttribute(ixNet.getAttribute(mac1, '-
mac') + '/counter',
   '-direction', 'increment',
   '-start',     '18:03:73:C7:6C:B1',
   '-step',      '00:00:00:00:00:01')

ixNet.setAttribute(ixNet.getAttribute(mac2, '-mac') +
'/singleValue',
   '-value', '18:03:73:C7:6C:01')
ixNet.commit()
```

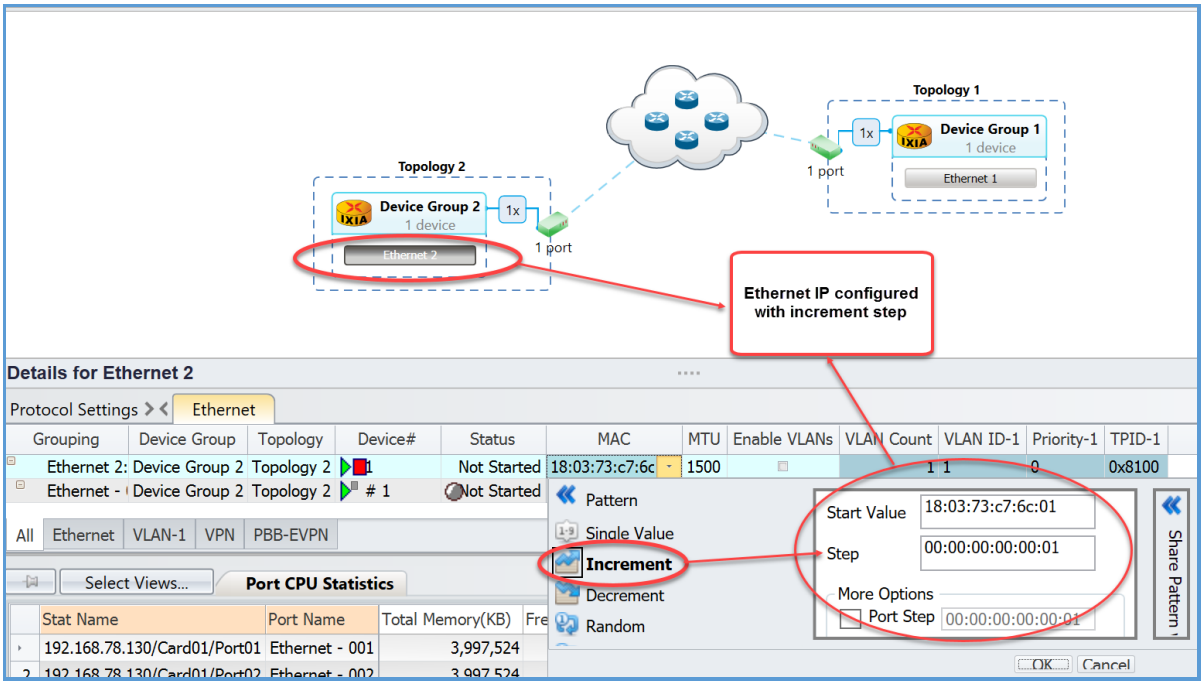


Figure 5.3.4: Showing Mac Address is Configured

TCL

```
puts "Add ipv6"
ixNet add $mac1 ipv6
ixNet add $mac2 ipv6
ixNet commit

set ip1 [ixNet getList $mac1 ipv6]
set ip2 [ixNet getList $mac2 ipv6]

set mvAdd1 [ixNet getAttr $ip1 -address]
```

Python

```
print("Add ipv6")
ixNet.add(mac1, 'ipv6')
ixNet.add(mac2, 'ipv6')
ixNet.commit()

ip1 = ixNet.getList(mac1, 'ipv6')[0]
ip2 = ixNet.getList(mac2, 'ipv6')[0]

mvAdd1 = ixNet.getAttribute(ip1, '-address')
```

TCL	Python
set mvAdd2 [ixNet getAttr $ip2 -address] set mvGw1 [ixNet getAttr $ip1 -gatewayIp] set mvGw2 [ixNet getAttr $ip2 -gatewayIp]	mvAdd2 = ixNet.getAttribute(ip2, '-address') mvGw1 = ixNet.getAttribute(ip1, '-gatewayIp') mvGw2 = ixNet.getAttribute(ip2, '-gatewayIp')
puts "configuring ipv6 addresses" ixNet setAttr $mvAdd1/singleValue -value "11:0:0:0:0:0:0:1" ixNet setAttr $mvAdd2/singleValue -value "11:0:0:0:0:0:0:2" ixNet setAttr $mvGw1/singleValue -value "11:0:0:0:0:0:0:2" ixNet setAttr $mvGw2/singleValue -value "11:0:0:0:0:0:0:1"	print("configuring ipv6 addresses") ixNet.setAttribute(mvAdd1 + '/singleValue', '-value', '11:0:0:0:0:0:0:1') ixNet.setAttribute(mvAdd2 + '/singleValue', '-value', '11:0:0:0:0:0:0:2') ixNet.setAttribute(mvGw1 + '/singleValue', '-value', '11:0:0:0:0:0:0:2') ixNet.setAttribute(mvGw2 + '/singleValue', '-value', '11:0:0:0:0:0:0:1')
ixNet setAttr [ixNet getAttr $ip1 -prefix]/singleValue -value 64 ixNet setAttr [ixNet getAttr $ip2 -prefix]/singleValue -value 64	ixNet.setAttribute(ixNet.getAttribute(ip1, '-prefix') + '/singleValue', '-value', '64') ixNet.setAttribute(ixNet.getAttribute(ip2, '-prefix') + '/singleValue', '-value', '64')
puts "Adding BGP+ over IPv6 stack" ixNet add $ip1 bgpIpv6Peer ixNet add $ip2 bgpIpv6Peer ixNet commit	print("Adding BGP+ over IPv6 stacks") ixNet.add(ip1, 'bgpIpv6Peer') ixNet.add(ip2, 'bgpIpv6Peer') ixNet.commit()
set bgp1 [ixNet getList $ip1 bgpIpv6Peer] set bgp2 [ixNet getList $ip2 bgpIpv6Peer]	bgp1 = ixNet.getList(ip1, 'bgpIpv6Peer')[0] bgp2 = ixNet.getList(ip2, 'bgpIpv6Peer')[0]
puts "Renaming the topologies and the device groups" ixNet setAttr $topo1 -name "BGP+ Topology 1" ixNet setAttr $topo2 -name "BGP+ Topology 2" ixNet setAttr $t1dev1 -name "BGP+ Topology 1 Router" ixNet setAttr $t2dev1 -name "BGP+ Topology 2 Router" ixNet commit	print("Renaming the topologies and the device groups") ixNet.setAttribute(topo1, '-name', 'BGP+ Topology 1') ixNet.setAttribute(topo2, '-name', 'BGP+ Topology 2') ixNet.setAttribute(t1dev1, '-name', 'BGP+ Topology 1 Router') ixNet.setAttribute(t2dev1, '-name', 'BGP+ Topology 2 Router') ixNet.commit()

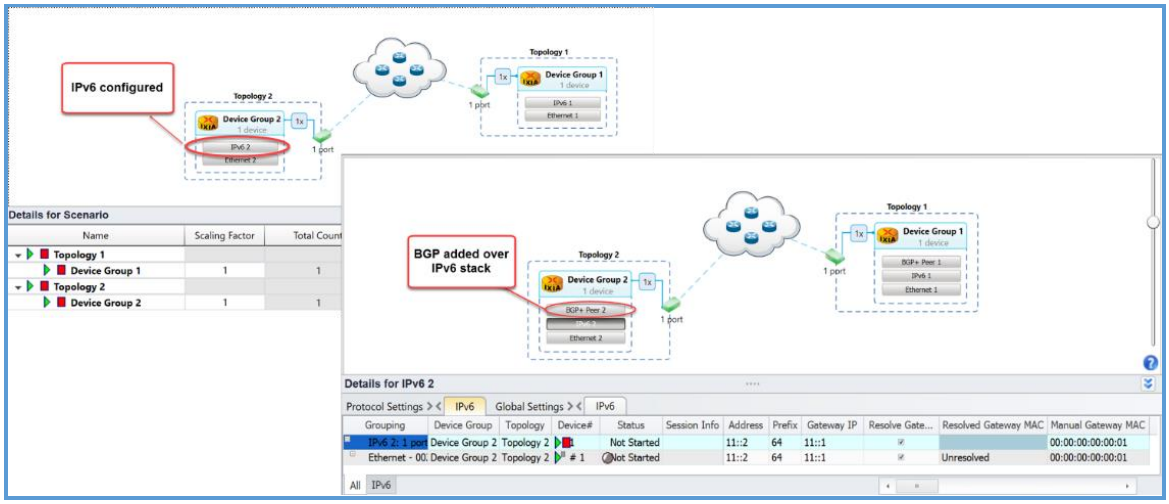


Figure 5.3.5: Showing IPv6 Configuration and BGP Added over IPv6 Stack

TCL

```
puts "Setting IPs in BGP+ DUT IP tab"
ixNet setAttr [ixNet getAttr $bgp1 -
dutIp]/singleValue -value "11:0:0:0:0:0:0:2"
ixNet setAttr [ixNet getAttr $bgp2 -
dutIp]/singleValue -value "11:0:0:0:0:0:0:1"
ixNet commit
```

Python

```
print("Setting IPs in BGP+ DUT IP tab")
ixNet.setAttribute(ixNet.getAttribute(bgp1, '-dutIp')
+ '/singleValue', '-value', '11:0:0:0:0:0:0:2')
ixNet.setAttribute(ixNet.getAttribute(bgp2, '-dutIp')
+ '/singleValue', '-value', '11:0:0:0:0:0:0:1')
ixNet.commit()
```

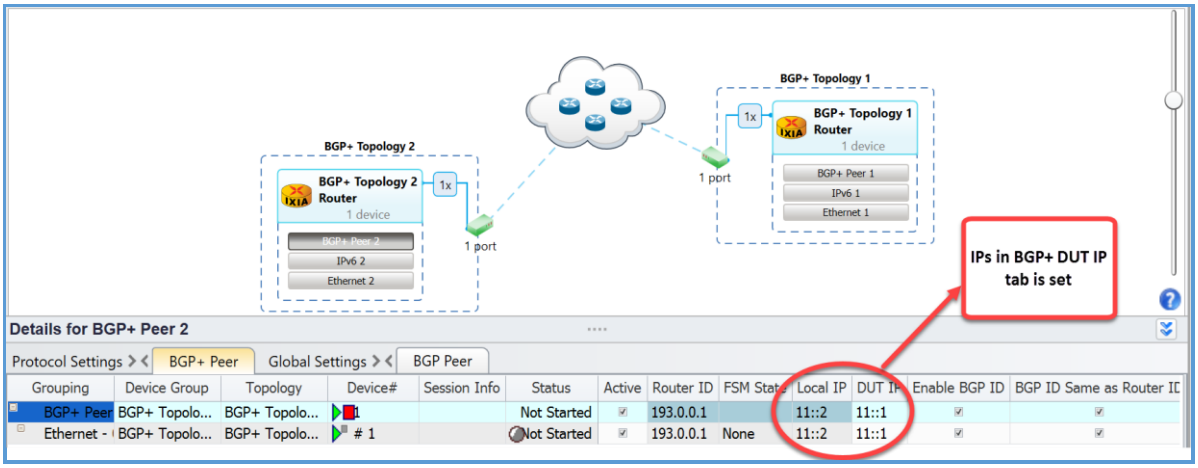


Figure 5.3.6: Showing IPs is Set

TCL

```
puts "Adding the NetworkGroup with Routers at
back of it"
ixNet exec createDefaultStack $t1devices
ipv6PrefixPools
ixNet exec createDefaultStack $t2devices
ipv6PrefixPools

set networkGroup1 [lindex [ixNet getList
$t1devices networkGroup] 0]
set networkGroup2 [lindex [ixNet getList
$t2devices networkGroup] 0]

ixNet setAttr $networkGroup1 -name
"BGP+_1_Network_Group1"
ixNet setAttr $networkGroup2 -name
"BGP+_2_Network_Group1"
ixNet commit
```

Python

```
print("Adding the NetworkGroup with Routers at
back of it")
ixNet.execute('createDefaultStack', t1devices,
'ipv6PrefixPools')
ixNet.execute('createDefaultStack', t2devices,
'ipv6PrefixPools')

networkGroup1 = ixNet.getList(t1dev1,
'networkGroup')[0]
networkGroup2 = ixNet.getList(t2dev1,
'networkGroup')[0]

ixNet.setAttribute(networkGroup1, '-name',
'BGP+_1_Network_Group1')
ixNet.setAttribute(networkGroup2, '-name',
'BGP+_2_Network_Group1')
ixNet.commit()
```

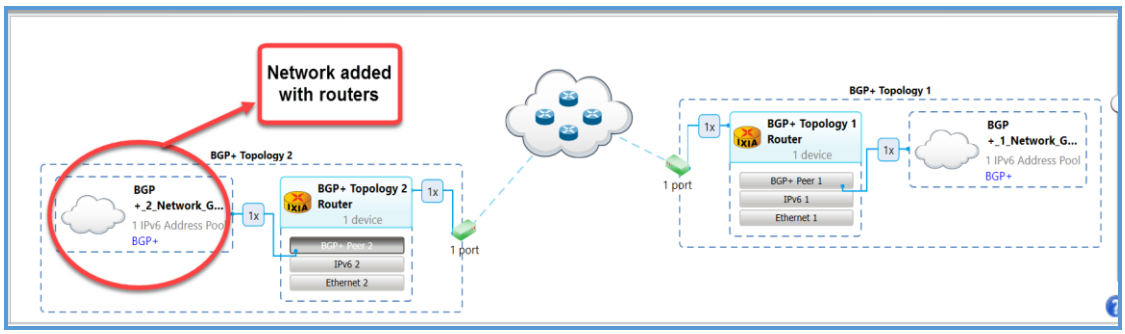


Figure 5.3.7: Showing NetworkGroup with Routers Added at Back of it

########################## add ipv6 loopback1 for applib traffic ############################

TCL

```
set chainedDg1 [ixNet add $networkGroup1 deviceGroup]
ixNet setMultiAttribute $chainedDg1\
   -multiplier 1\
            -name {Device Group 4}
ixNet commit

set chainedDg1 [lindex [ixNet remapIds $chainedDg1] 0]

set loopback1 [ixNet add $chainedDg1 "ipv6Loopback"]
ixNet setMultiAttribute $loopback1\
   -stackedLayers [list]\
   -name {IPv6 Loopback 2}
ixNet commit

set addressSet1 [ixNet getAttribute $loopback1 -address]
ixNet setMultiAttribute $addressSet1\
   -clearOverlays false\
   -pattern counter
ixNet commit

set addressSet1 [ixNet add $addressSet1 "counter"]
ixNet setMultiAttribute $addressSet1\
   -step 0:0:0:0:0:0:0:1\
   -start 3000:0:1:1:0:0:0:0\
   -direction increment
ixNet commit
```

Python

```
chainedDg1 = ixNet.add(networkGroup1, 'deviceGroup')
ixNet.setMultiAttribute(chainedDg1, '-multiplier', '1', '-name', 'Device Group 4')

ixNet.commit()

chainedDg1 = ixNet.remapIds(chainedDg1)[0]


loopback1 = ixNet.add(chainedDg1, 'ipv6Loopback')

ixNet.setMultiAttribute(loopback1, '-stackedLayers', [], '-name', 'IPv6 Loopback 2')

ixNet.commit()

addressSet1 = ixNet.getAttribute(loopback1, '-address')
ixNet.setMultiAttribute(addressSet1, '-clearOverlays', 'false', '-pattern', 'counter')

ixNet.commit()

addressSet1 = ixNet.add(addressSet1, 'counter')
ixNet.setMultiAttribute(addressSet1, '-step', '0:0:0:0:0:0:0:1', '-start', '3000:0:1:1:0:0:0:0', '-direction', 'increment')


ixNet.commit()
```

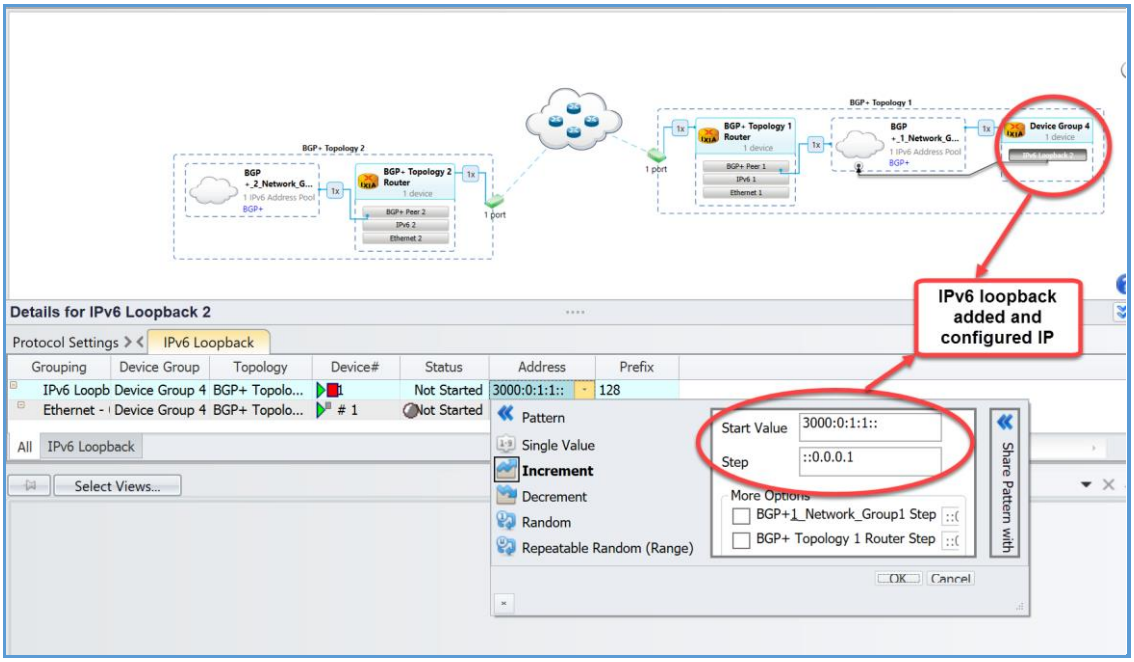


Figure 5.3.8: Showing IPv4 Loopback Added and IP is Configured

########################## add ipv6 loopback2 for applib traffic ##########################

TCL	Python
set chainedDg2 [ixNet add $networkGroup2 deviceGroup] ixNet setMultiAttribute $chainedDg2\ -multiplier 1\ -name {Device Group 3} ixNet commit set chainedDg2 [lindex [ixNet remapIds $chainedDg2] 0] set loopback2 [ixNet add $chainedDg2 "ipv6Loopback"] ixNet setMultiAttribute $loopback2\ -stackedLayers [list]\ -name {IPv6 Loopback 1} ixNet commit set addressSet2 [ixNet getAttribute $loopback2 -address] ixNet setMultiAttribute $addressSet2\ -clearOverlays false\ -pattern counter ixNet commit set addressSet2 [ixNet add $addressSet2 "counter"] ixNet setMultiAttribute $addressSet2\ -step 0:0:0:0:0:0:0:1\ -start 3000:1:1:1:0:0:0:0\ -direction increment ixNet commit	chainedDg2 = ixNet.add(networkGroup2, 'deviceGroup') ixNet.setMultiAttribute(chainedDg2, '-multiplier', '1', '-name', 'Device Group 3') ixNet.commit() chainedDg2 = ixNet.remapIds(chainedDg2)[0] loopback2 = ixNet.add(chainedDg2, 'ipv6Loopback') ixNet.setMultiAttribute(loopback2, '-stackedLayers', [], '-name', 'IPv6 Loopback 1') ixNet.commit() addressSet2 = ixNet.getAttribute(loopback2, '-address') ixNet.setMultiAttribute(addressSet2, '-clearOverlays', 'false', '-pattern', 'counter') ixNet.commit() addressSet2 = ixNet.add(addressSet2, 'counter') ixNet.setMultiAttribute(addressSet2, '-step', '0:0:0:0:0:0:0:1', '-start', '3000:1:1:1:0:0:0:0', '-direction', 'increment') ixNet.commit()

5.4 Start Protocol and Check Statistics:

The follow section shows how to start the protocols and checking the statistics after protocol has started running.

TCL	Python

set timer 45000
puts "Starting protocols and waiting for 45 seconds for protocols to come up"
ixNet exec startAllProtocols
after $timer
 	
puts "Verifying all the stats\n"
set viewPage {::ixNet::OBJ-/statistics/view:"Protocols Summary"/page}
set statcap [ixNet getAttr $viewPage -columnCaptions]
 	
foreach statValList [ixNet getAttr $viewPage -rowValues] {
foreach statVal $statValList {
	timer = 45
	print("Starting protocols and waiting for 45 seconds for protocols to come up")
	ixNet.execute('startAllProtocols')
	time.sleep(timer)
	
	print ("Fetching all Protocol Summary Stats\n")
	viewPage = '::ixNet::OBJ-/statistics/view:"Protocols Summary"/page'
	statcap = ixNet.getAttribute(viewPage, '-columnCaptions')
	
	for statValList in ixNet.getAttribute(viewPage, '-rowValues') :
	for statVal in statValList :

```
    puts
"****************************************
***********"
    set index 0
    foreach satIndv $statVal {
      puts [format "%*s:%*s" -30 [lindex
$statcap $index]\
          -10 $satIndv]
      incr index
    }
  }
}
```

```
print("****************************************
***********")
    index = 0
    for satIndv in statVal :
      print("%-30s:%s" % (statcap[index], satIndv))
      index = index + 1
    # end for
  # end for
# end for
```

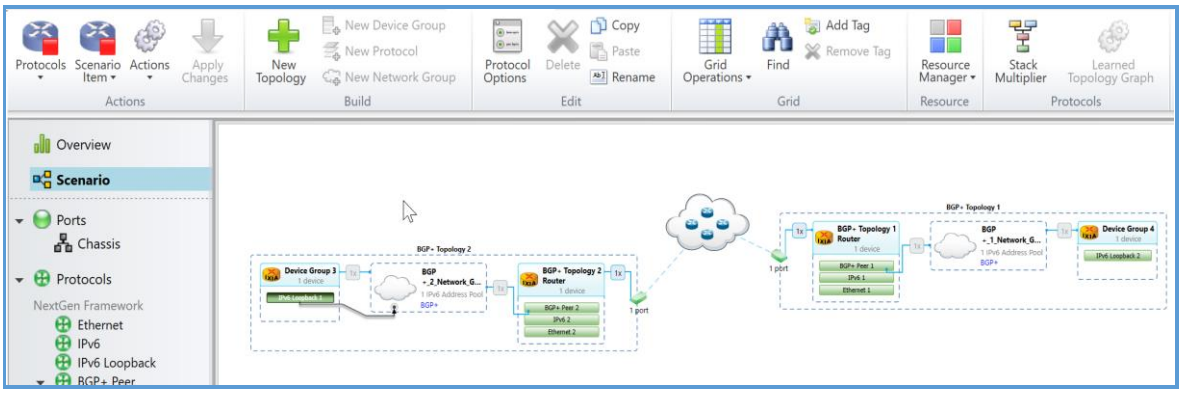


Figure 5.4.1: Protocol Comes Up and is Running

############Enabling the IPv6 Learned Information on the fly section ################################

TCL	Python

puts "Enabling IPv6 Unicast Learned Information for BGP+ Router"
ixNet setAttr [ixNet getAttr $bgp1 -filterIpV6Unicast]/singleValue -value true
ixNet setAttr [ixNet getAttr $bgp2 -filterIpV6Unicast]/singleValue -value true
 	
ixNet commit
 	
set globals [ixNet getRoot]/globals
set topology $globals/topology
set timer 10000
 	
if {[catch {ixNet exec applyOnTheFly $topology}] == 1} {
  puts "error in applying on the fly change"
  puts "$::errorInfo"
}
after $timer
	print("Enabling IPv6 Unicast Learned Information for BGP+ Router")
	ixNet.setAttribute(ixNet.getAttribute(bgp1, '-filterIpV6Unicast') + '/singleValue', '-value', 'true')
	ixNet.setAttribute(ixNet.getAttribute(bgp2, '-filterIpV6Unicast') + '/singleValue', '-value', 'true')
	
	ixNet.commit()
	
	globalObj = ixNet.getRoot() + '/globals'
	topology = globalObj + '/topology'
	timer = 10
	try :
	  ixNet.execute('applyOnTheFly', topology)
	except :
	  print("error in applying on the fly change")
	# end try/expect
	
	time.sleep(timer)

#################### Fetching BGP+ learned info after enabling ipv6 learned info ####################

TCL	Python
ixNet exec getIPv6LearnedInfo $bgp1 1 set timer 5000 after $timer	ixNet.execute('getIPv6LearnedInfo', bgp1, '1') timer = 5 time.sleep($timer)

```
set linfo [ixNet getList $bgp1 learnedInfo]

set values [ixNet getAttribute $linfo -values]

puts "BGP+ learned info"
puts
"************************************
***********"
foreach v $values {
   puts $v
}
puts
"************************************
***********"
```

```
linfo  = ixNet.getList(bgp1, 'learnedInfo')[0]

values = ixNet.getAttribute(linfo, '-values')

print("BGP+ learned info")
print("************************************
***********")
for v in values :
   print(v)
# end for

print("************************************
***********")
```

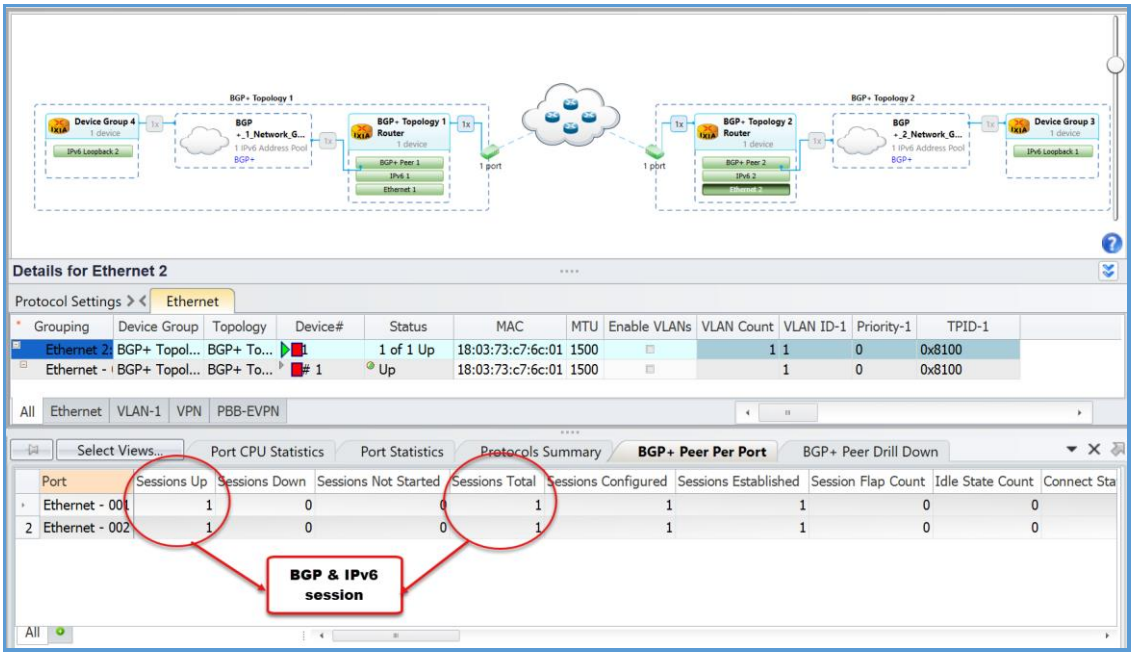


Figure 5.4.2: Statistics on GUI of protocol

```
(8.40-EA) 121 % foreach statValList [ixNet getAttr $viewPage -rowValues] {
>     foreach statVal $statValList  {
>         puts "***********************************************"
>         set index 0
>         foreach satIndv $statVal {
>             puts [format "%*s:%*s" -30 [lindex $statcap $index]\
>                 -10 $satIndv]
>             incr index
>         }
>     }
> }
************************************************
Protocol Type                 :BGP+ Peer
Sessions Up                   :2
Sessions Down                 :0
Sessions Not Started          :0
Sessions Total                :2
Average Setup Rate            :N/A
Average Teardown Rate         :N/A
************************************************
Protocol Type                 :IPv6
Sessions Up                   :2
Sessions Down                 :0
Sessions Not Started          :0
Sessions Total                :2
Average Setup Rate            :N/A
Average Teardown Rate         :N/A
(8.40-EA) 122 %
```

Figure 5.4.3: Statistics Printed on Wish Console is same as seen in Figure 5.4.2

5.5 L2/L3 Traffic Configuration/Apply/Start Section:

The follow section gives you the idea how to configure traffic and shows how to modify global traffic options.

TCL

```
set trafficItem1 [ixNet add [ixNet getRoot]/traffic
"trafficItem"]

ixNet setMultiAttribute $trafficItem1\
   -name {Traffic Item 1}          \
   -roundRobinPacketOrdering false  \
   -trafficType ipv6

ixNet commit

set trafficItem1 [lindex [ixNet remapIds
$trafficItem1] 0]

puts “Adding endpoint set in traffic item”
set endpointSet1 [ixNet add $trafficItem1
"endpointSet"]

set source      [list
$networkGroup1/ipv6PrefixPools:1]
set destination  [list
$networkGroup2/ipv6PrefixPools:1]

ixNet setMultiAttribute $endpointSet1\
   -name              "EndpointSet-1"\
              -multicastDestinations [list]\
              -scalableSources      [list]\
              -multicastReceivers    [list]\
              -scalableDestinations  [list]\
              -ngpfFilters          [list]\
              -trafficGroups        [list]\
              -sources             $source\
              -destinations         $destination\

ixNet commit

ixNet setMultiAttribute $trafficItem1/tracking\
   -trackBy       [list sourceDestEndpointPair0
trackingenabled0]\
   -fieldWidth     thirtyTwoBits\
   -protocolOffset Root.0\
   -values        [list]\

ixNet commit
```

Python

```
trafficItem1 = ixNet.add(ixNet.getRoot() + '/traffic',
'trafficItem')

ixNet.setMultiAttribute(trafficItem1, '-name',
'Traffic Item 1',
   '-roundRobinPacketOrdering', 'false', '-
trafficType', 'ipv6')

ixNet.commit()

trafficItem1 = ixNet.remapIds(trafficItem1)[0]


print(“Adding endpoint set in traffic item”)
endpointSet1 = ixNet.add(trafficItem1,
'endpointSet')

source      = [networkGroup1 + '/ipv6PrefixPools:1']

destination  = [networkGroup2 +
'/ipv6PrefixPools:1']

ixNet.setMultiAttribute(endpointSet1,
   '-name',              'EndpointSet-1',
   '-multicastDestinations', [],
   '-scalableSources',      [],
   '-multicastReceivers',    [],
   '-scalableDestinations',  [],
   '-ngpfFilters',          [],
   '-trafficGroups',        [],
   '-sources',             source,
   '-destinations',         destination)

ixNet.commit()

ixNet.setMultiAttribute(trafficItem1 + '/tracking',
   '-trackBy',       ['sourceDestEndpointPair0',
'trackingenabled0'],
   '-fieldWidth',     'thirtyTwoBits',
   '-protocolOffset', 'Root.0',
   '-values',        [])

ixNet.commit()
```

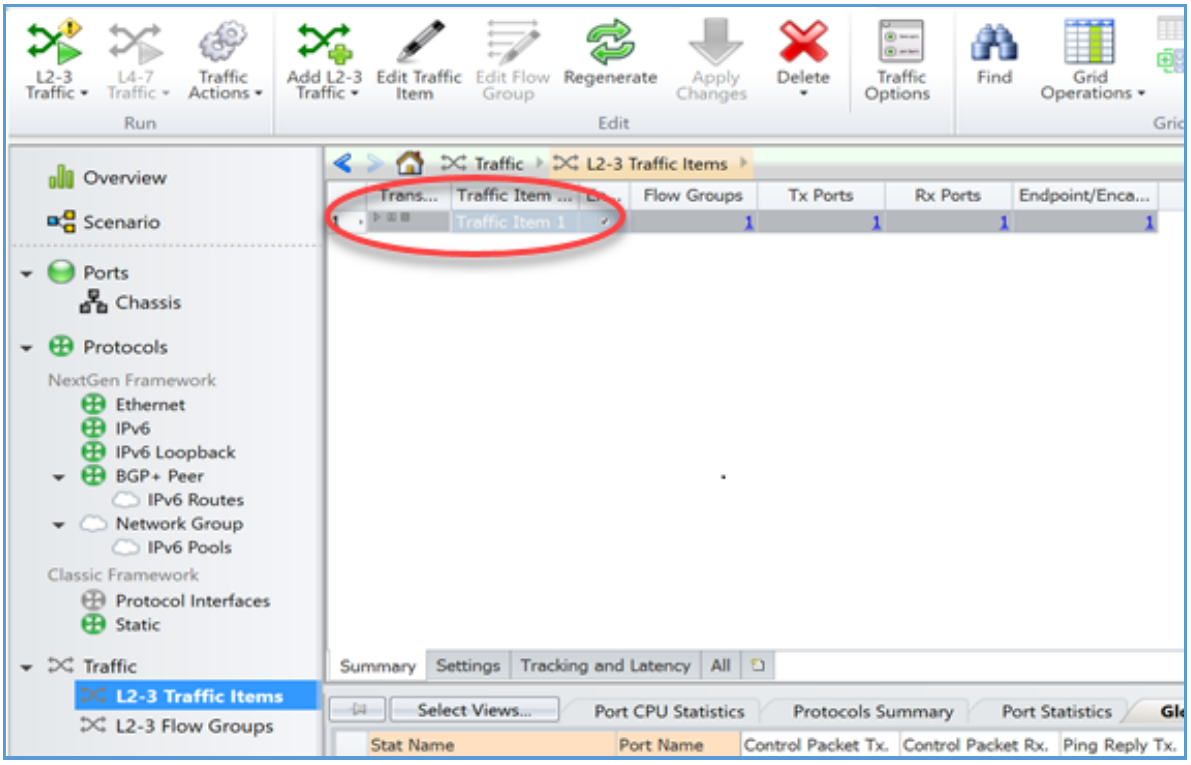


Figure 5.5.1: Showing Traffic Item Added

5.6 Packet Captures:

IxNetwork's packet capture module has two types of capture: control capture and data capture. Control capture is used to capture protocols packets only and data capture is used to captures both packets and data packets.

TCL	Python
puts "Enable Control capture" set captureObj1 "$vportTx/capture" ixNet setA $captureObj1 -softwareEnabled true ixNet commit puts "Enable Data capture" set captureObj2 "$vportRx/capture" ixNet setA $captureObj2 -hardwareEnabled true ixNet commit	captureObj1 = ixNet.getList(vportTx,'capture') ixNet.setAttribute(captureObj1[0], '-softwareEnabled', 'true') ixNet.commit() captureObj2 = ixNet.getList(vportRx,'capture') ixNet.setAttribute(captureObj2[0], '-hardwareEnabled', 'true') ixNet.commit()

	Po...	Port Name	Port Captures	Data - Enable	Control - Enable
1		Ethernet - 001	0	☐	☑
2		Ethernet - 002	0	☑	☐

Figure 5.6.1: Showing Data and Control Enabled

TCL	Python
puts "Starting capture" set timer 30000 ixNet exec startCapture after $timer	print("Starting capture") timer = 30 ixNet.execute('startCapture') time.sleep(timer)

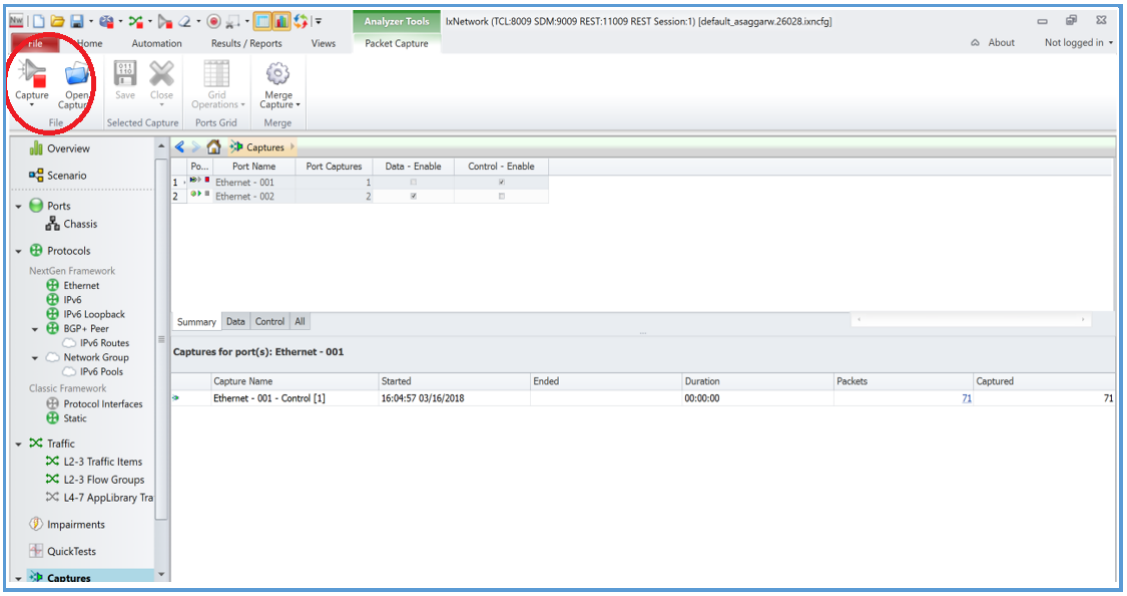


Figure 5.6.2: Showing Capture is Started

5.7 Apply Start Traffic:

In the follow section it is shown how the traffic is applied and started. Screenshots are shown to show the outcome for the same.

TCL	***Python***
puts "applying traffic" ***set timer 5000*** ***ixNet exec apply [ixNet getRoot]/traffic*** ***puts "let the traffic gets applied"*** ***after $timer*** ***puts "starting traffic"*** ***ixNet exec start [ixNet getRoot]/traffic*** ***set timer 60000*** ***puts "let traffic run for 60 seconds"*** ***after $timer***	***print ('applying L2/L3 traffic')*** ***timer = 5*** ***ixNet.execute('apply', ixNet.getRoot() + '/traffic')*** ***print("let the traffic gets applied")*** ***time.sleep(timer)*** ***print ('starting traffic')*** ***ixNet.execute('start', ixNet.getRoot() + '/traffic')*** ***timer = 60*** ***print("let traffic run for 60 seconds")*** ***time.sleep(timer)***

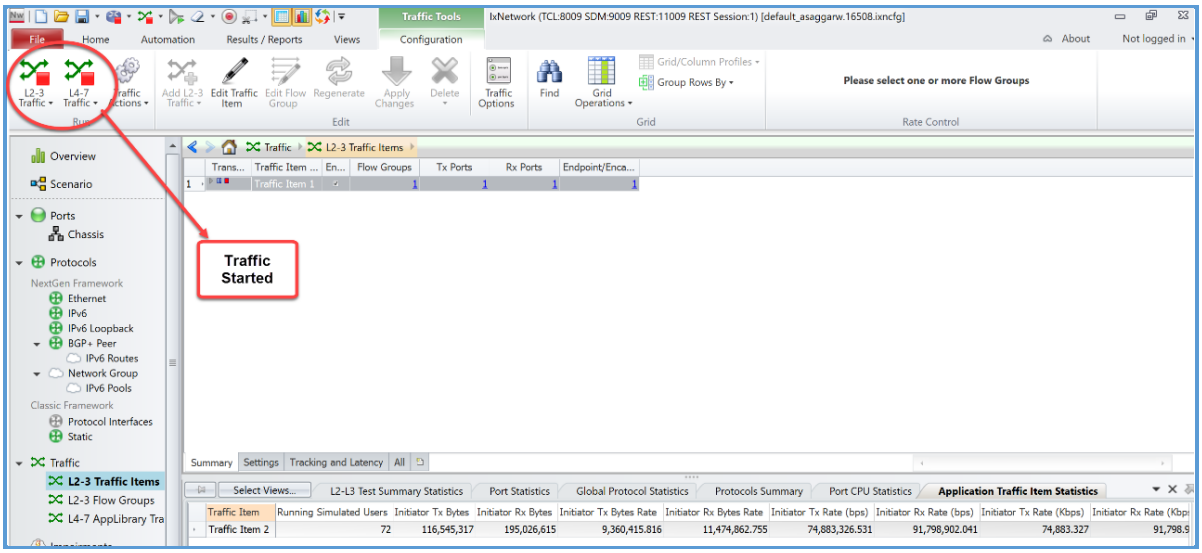


Figure 5.7.1: Traffic is Started

5.8 Retrieving Statistics:

The follow section shows all the traffic statistics collected when the traffic is running and the packets captured.

TCL	Python
puts "Stopping capture" set timer 30000 ixNet exec stopCapture after $timer	print("Stopping capture") timer = 30 ixNet.execute('stopCapture') time.sleep(timer)

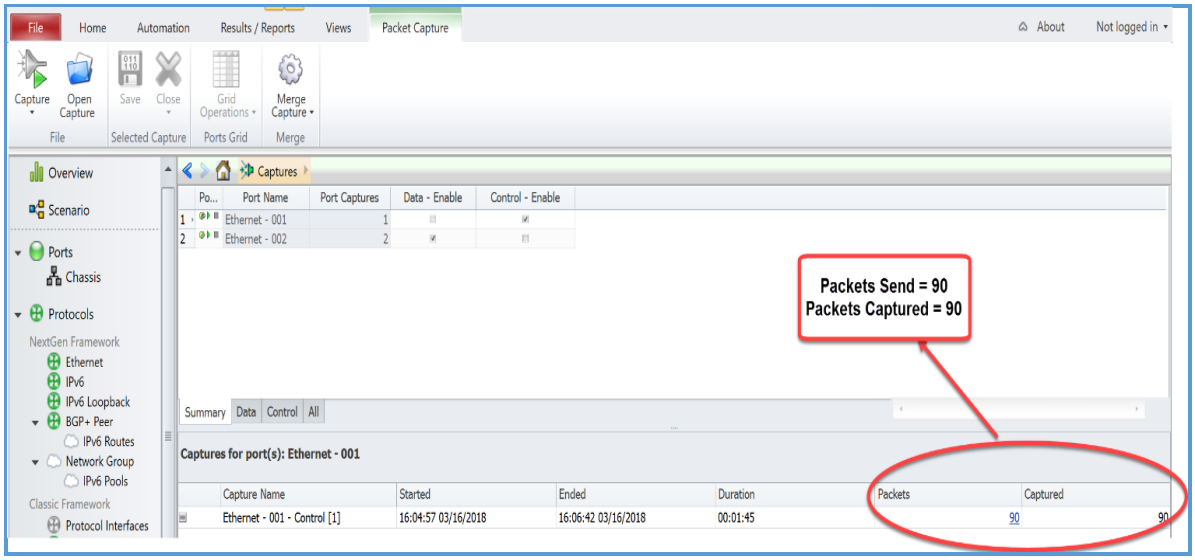


Figure 5.8.1: Showing Packets Captured after Stopping Captures

###################### print traffic item statistics ##############################

TCL

```
puts "Verifying all the application traffic stats\n"
set viewPage {::ixNet::OBJ-/statistics/view:"Flow Statistics"/page }
set statcap [ixNet getAttr $viewPage -columnCaptions]
foreach statValList [ixNet getAttr $page -rowValues] {
   foreach statVal $statValList  {
      puts "***************************************************"
      set index 0
      foreach satIndv $statVal {
         puts [format "%*s:%*s" -30 [lindex $statcap $index]\
            -10 $satIndv]
         incr index
      }
   }
}
```

Python

```
print ('Verifying all the L2-L3 traffic stats')
viewPage = '::ixNet::OBJ-/statistics/view:"Flow Statistics"/page'
statcap =  ixNet.getAttribute(viewPage, '-columnCaptions')
for statValList in ixNet.getAttribute(viewPage, '-rowValues') :
   for  statVal in statValList :
      index = 0
      for satIndv in statVal :
         print("%-30s:%s" % (statcap[index], satIndv))
         index = index + 1
      # end for
   # end for
# end for
```

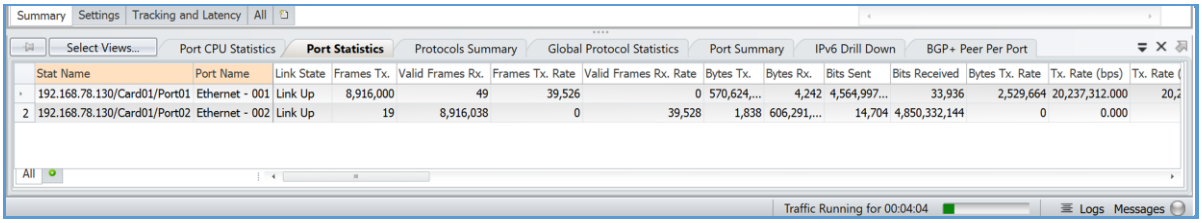


Figure 5.8.2: Showing Traffic Item Statistics

TCL	Python
puts "ixNet help ::ixNet::OBJ-/topology/deviceGroup/ethernet" puts "[ixNet help ::ixNet::OBJ-/topology/deviceGroup/ethernet]"	print ('ixNet.help(\'::ixNet::OBJ-/topology/deviceGroup/ethernet\')') print (ixNet.help('::ixNet::OBJ-/topology/deviceGroup/ethernet'))

TCL	Python
puts "stopping traffic" ixNet exec stop [ixNet getRoot]/traffic set timer 5000 puts “let the traffic stops” after $timer puts "Stopping all protocols" ixNet exec stopAllProtocols puts “let the protocol stops” after $timer	print ('Stopping traffic') ixNet.execute('stop', ixNet.getRoot() + '/traffic') timer = 5 print(‘let the traffic stops’) time.sleep(timer) print ('Stopping all protocols') ixNet.execute('stopAllProtocols') print(“let the protocol stops”) time.sleep(timer)

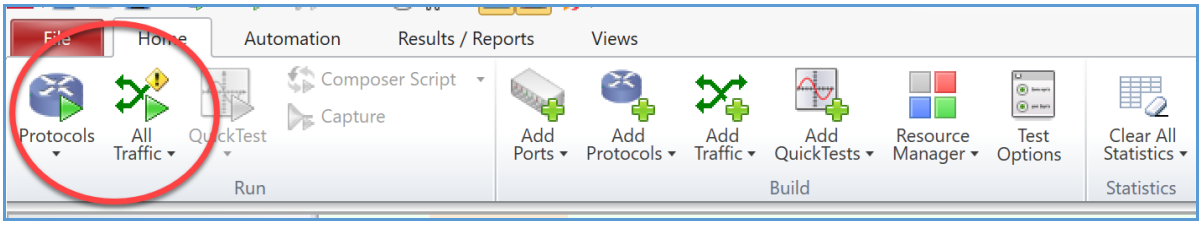
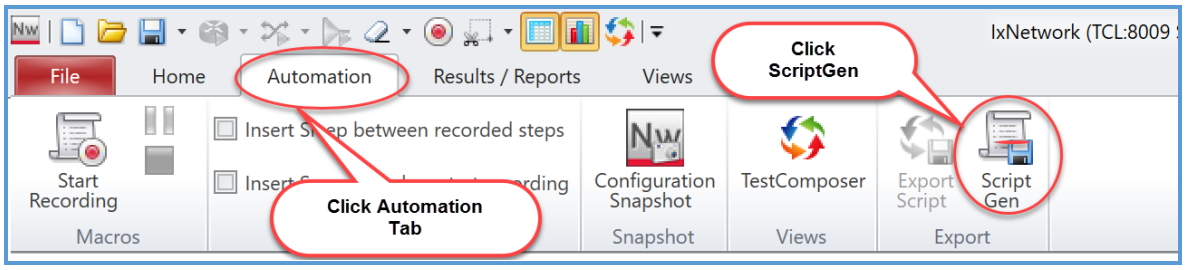


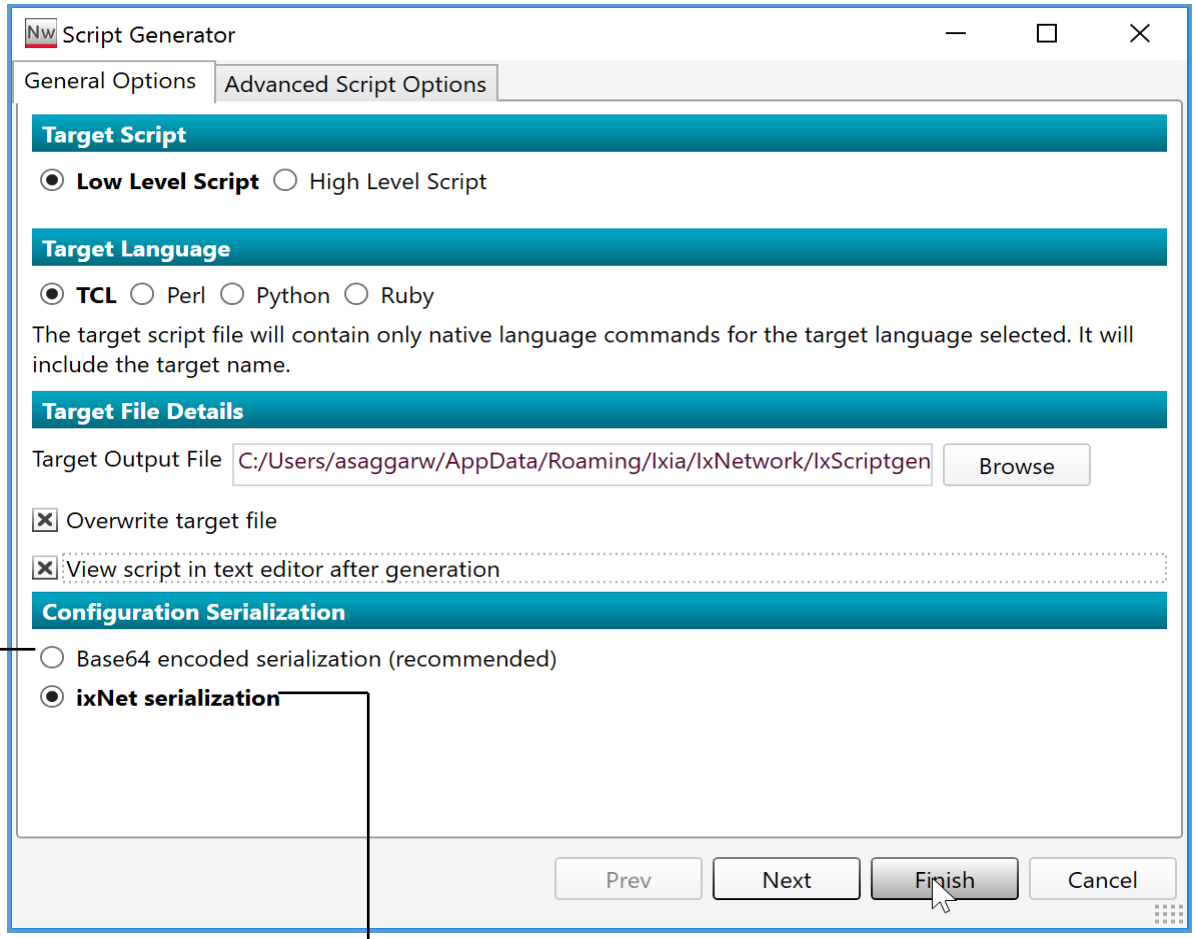
Figure 5.8.3: Showing Protocol and Traffic is Stopped

5.9 Generate Scriptgen:

On the IxNetwork GUI's toolbar, click Automation, and then click ScriptGen.



Make your selections, and then in the bottom section, click ixNet Serialization. Click Finish.



Serialized to the target script file as a base64 encoded method. This is a fast method for all sizes of configuration.

Serialized to the target script file as ixNet commands.

6. References:

1. Discover the hierarchical structure by using API browser:

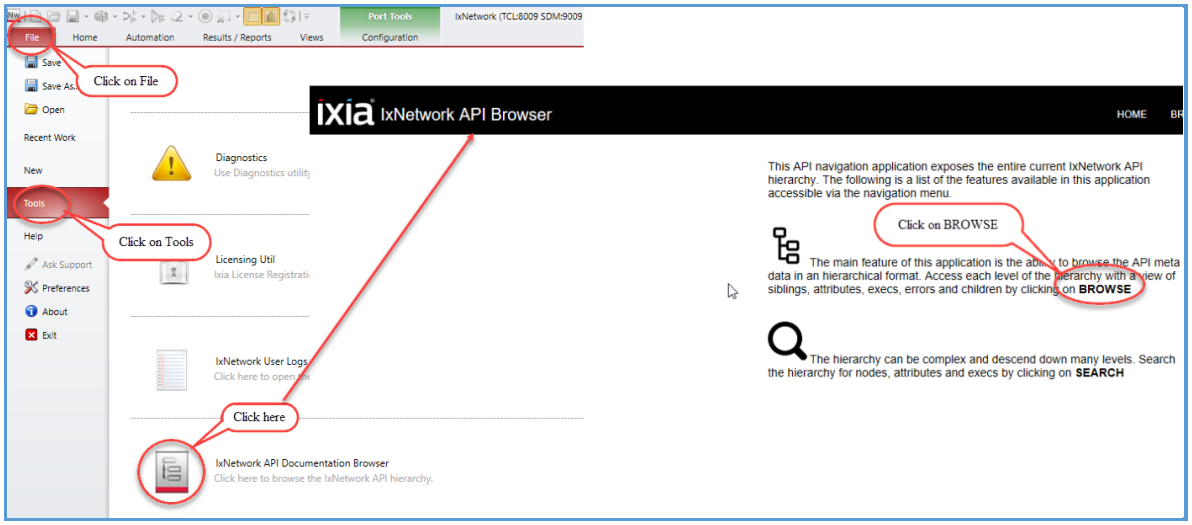


Figure 6.1: Accessing the IxNetwork API Browser

2. For more information, see https://github.com/OpenIxia/IxNetwork/tree/master/LowLevelApi.

7. Support:

For more information, visit https://support.ixiacom.com/.

For support assistance, contact support.ix@keysight.com

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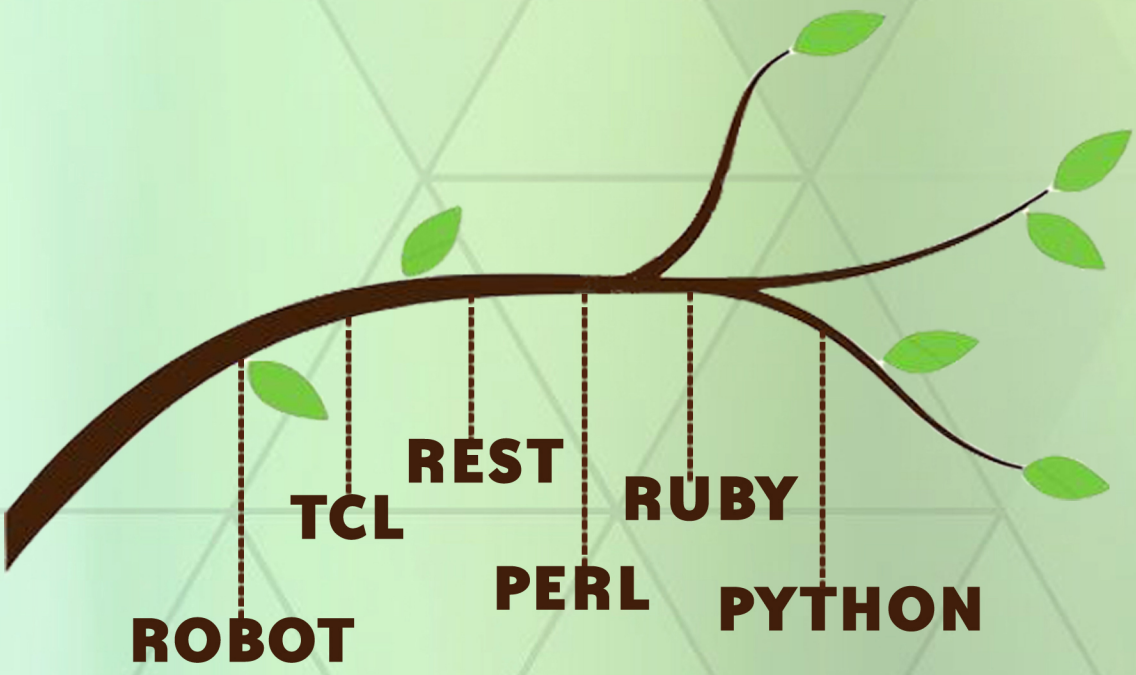
AUTOMATION

#WeMakeItEasier



https://github.com/openixia

For queries : support.ix@keysight.com