



## Visualizing the Topology

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- [AutoNetkit Visualization, page 1](#)
- [Live Visualization, page 10](#)

## AutoNetkit Visualization

The AutoNetkit visualization phase allows you to see how the nodes interact in terms of routing protocol connectivity, autonomous system (AS) numbers, Open Shortest Path First (OSPF) area, and so on. Before entering the AutoNetkit visualization phase, you must have designed the topology and generated the node configurations using parameters defined in AutoNetkit.



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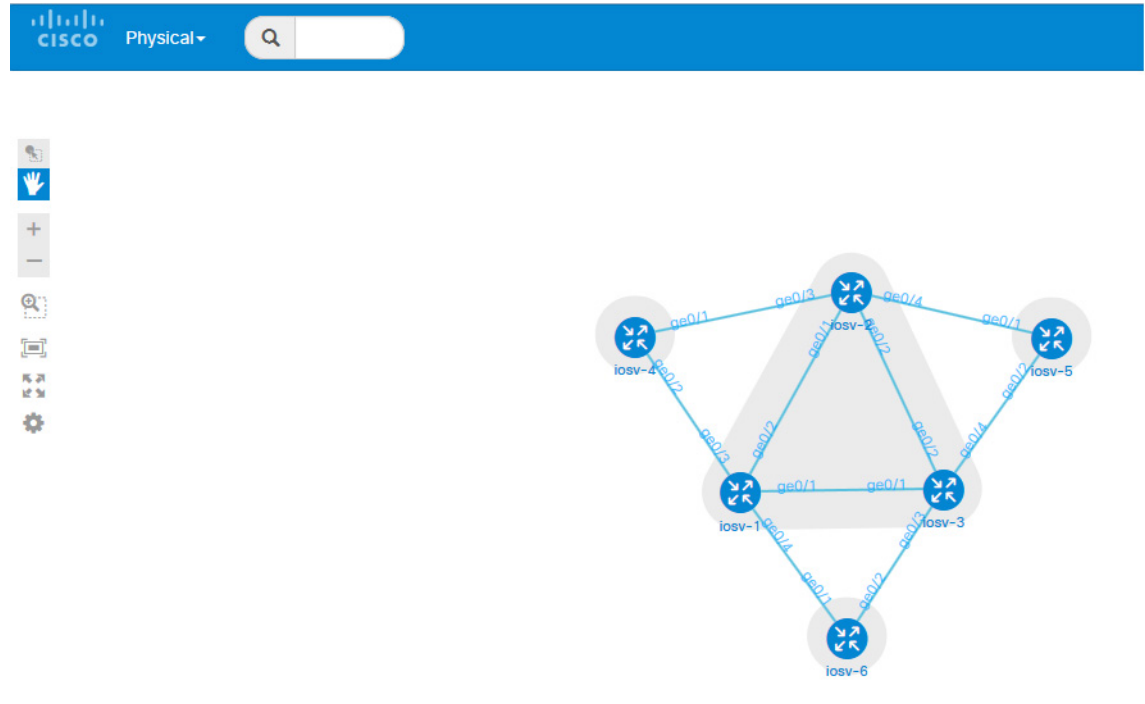
**Note**

AutoNetkit visualization is available before a simulation is launched. A valid Cisco Modeling Labs license is not required to run AutoNetkit visualization. AutoNetkit visualization is only viewable on an external Web browser; internal Web browsers are not supported.

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The following figure shows an overview of the AutoNetkit Visualization phase as it appears in a browser window.

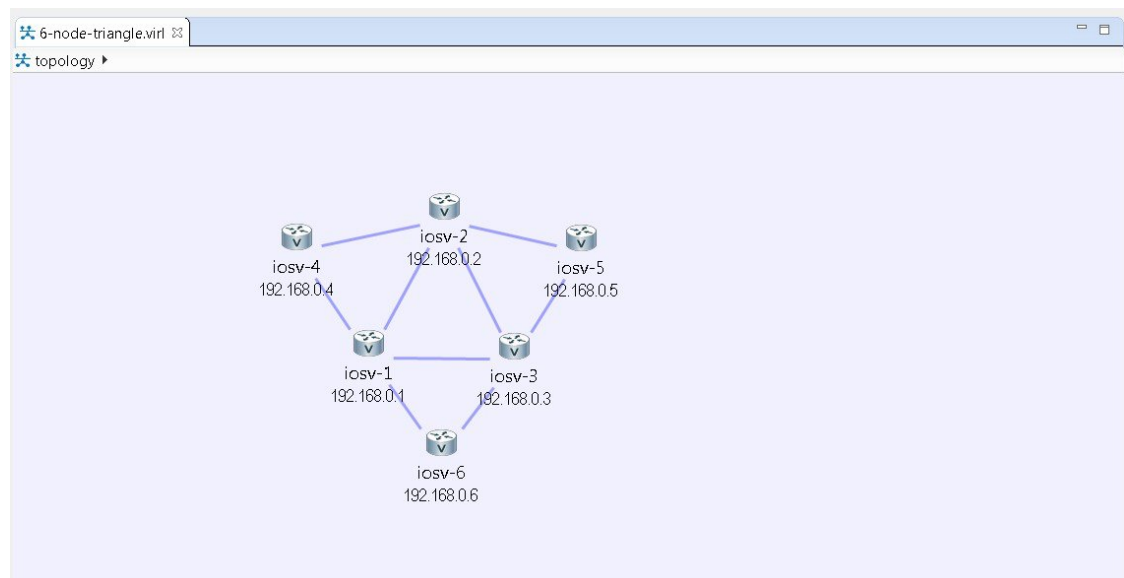
**Figure 1: Visualization Overview**



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The following figure shows how the visualization compares to the topology design.

**Figure 2: Topology Design**



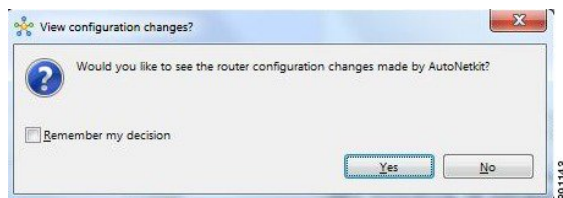
## Access AutoNetkit Visualization

To access AutoNetkit visualization, complete the following steps:

**Step 1** Generate a configuration for the topology.  
Click **Build Initial Configurations** from the toolbar. Alternatively, from the menu bar, choose **Configuration > Build Initial Configurations**.

**Step 2** View the configuration changes.  
AutoNetkit displays a notification after it generates the configuration.

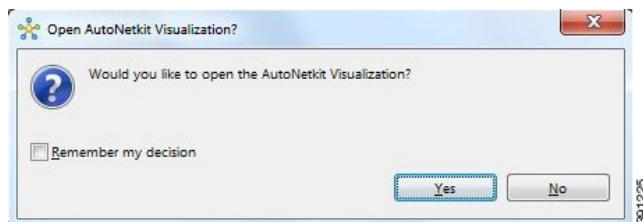
**Figure 3: View Configuration Change Notification**



- Click **No** to skip this step.
- Click **Yes** to open a comparison view of the configuration changes.

**Step 3** Display the AutoNetkit visualization view of the topology.  
When you close the comparison view, a notification prompts you whether to open AutoNetkit visualization.

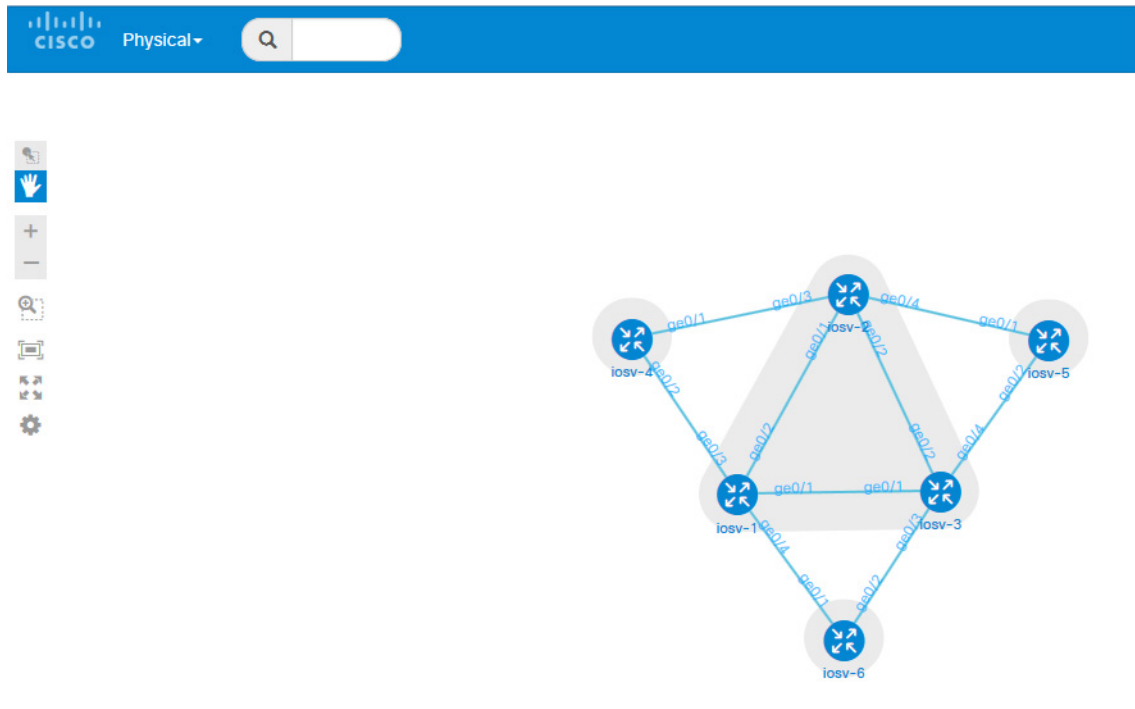
**Figure 4: Open AutoNetkit Visualization**



- Click **No** to skip this step.
- Click **Yes** to display the visualization.  
AutoNetkit visualization opens in a browser window.

**Note** Choose **File > Preferences > Web Services > AutoNetkit Visualization** to control the prompts for visualization.

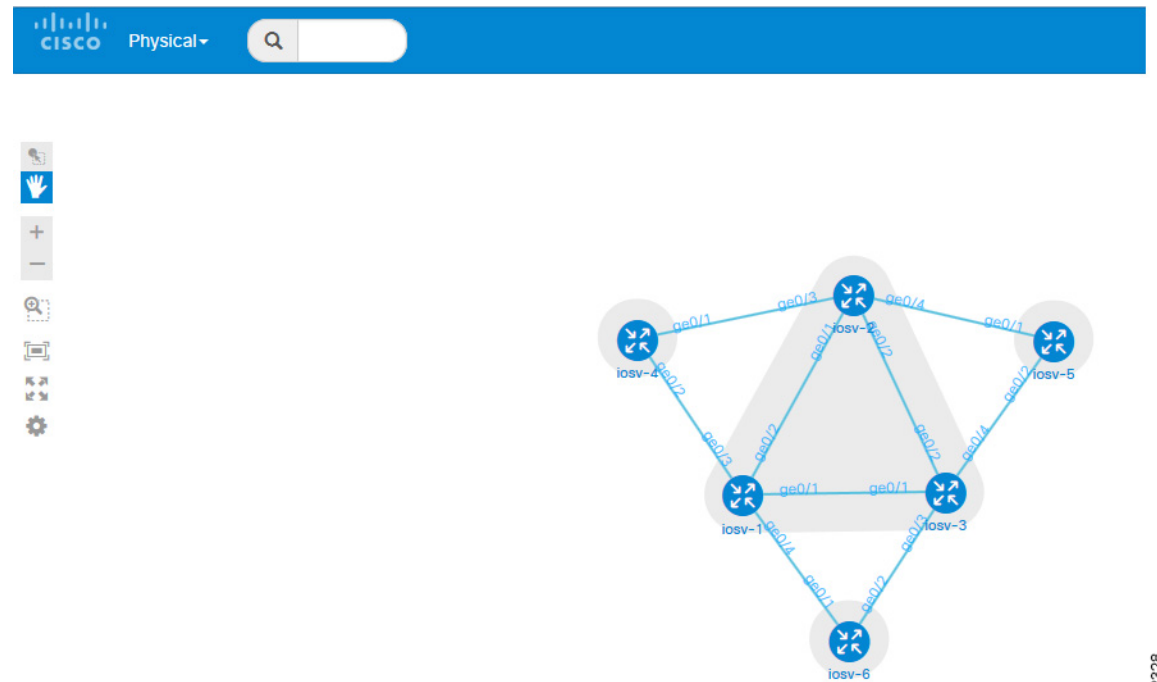
Figure 5: AutoNetkit Visualization Window



## AutoNetkit View Options

The initial AutoNetkit visualization view that is displayed in the browser window is the physical model of the topology. The physical model shows the nodes and interface connections between the nodes. It is similar to the Cisco Modeling Labs topology view.

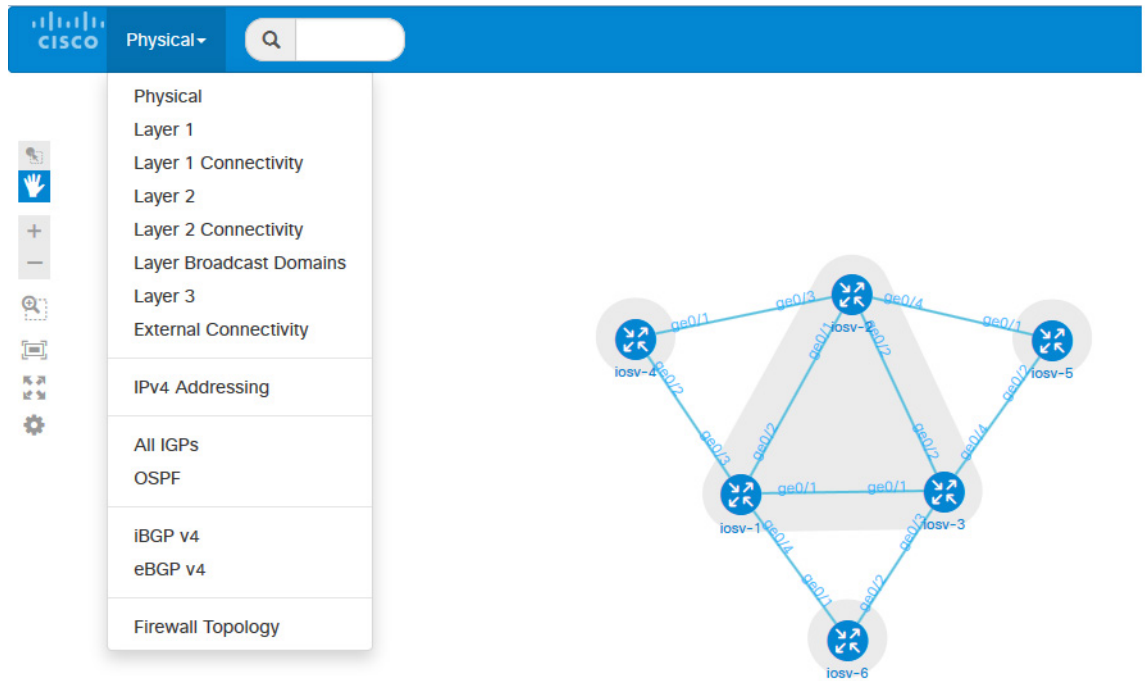
**Figure 6: Initial View**



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To select another view, place the cursor over the **Physical** selection in the browser window.

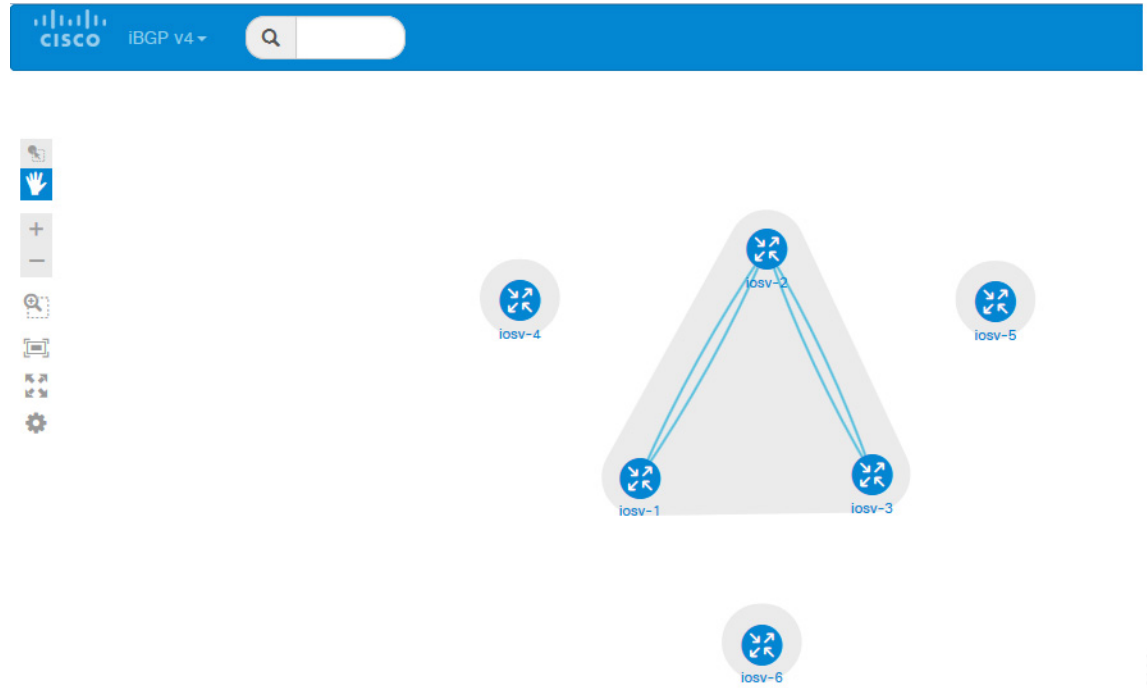
**Figure 7: List of Available Views**



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When you place the cursor over the Overlay view, several choices appear. For example, selecting **iBGP v4** will show the IPv4 iBGP topology.

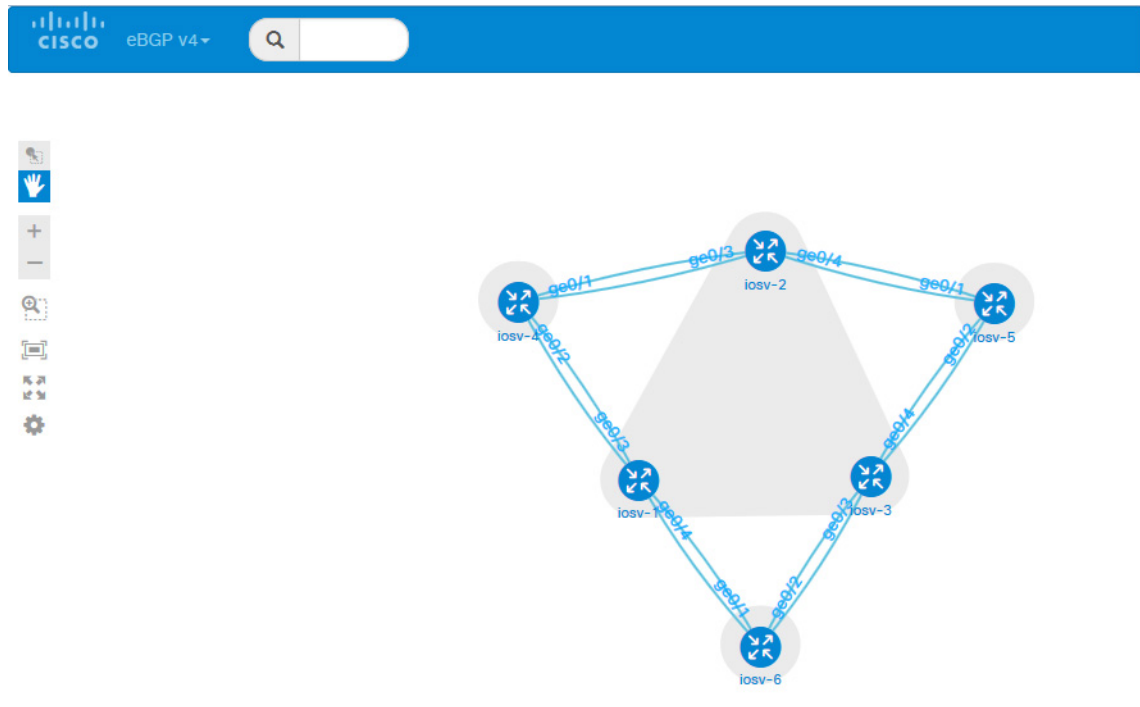
**Figure 8: iBGP v4 View**



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For example, selecting **eBGP v4** will show the IPv4 eBGP topology.

**Figure 9: eBGP v4 View**

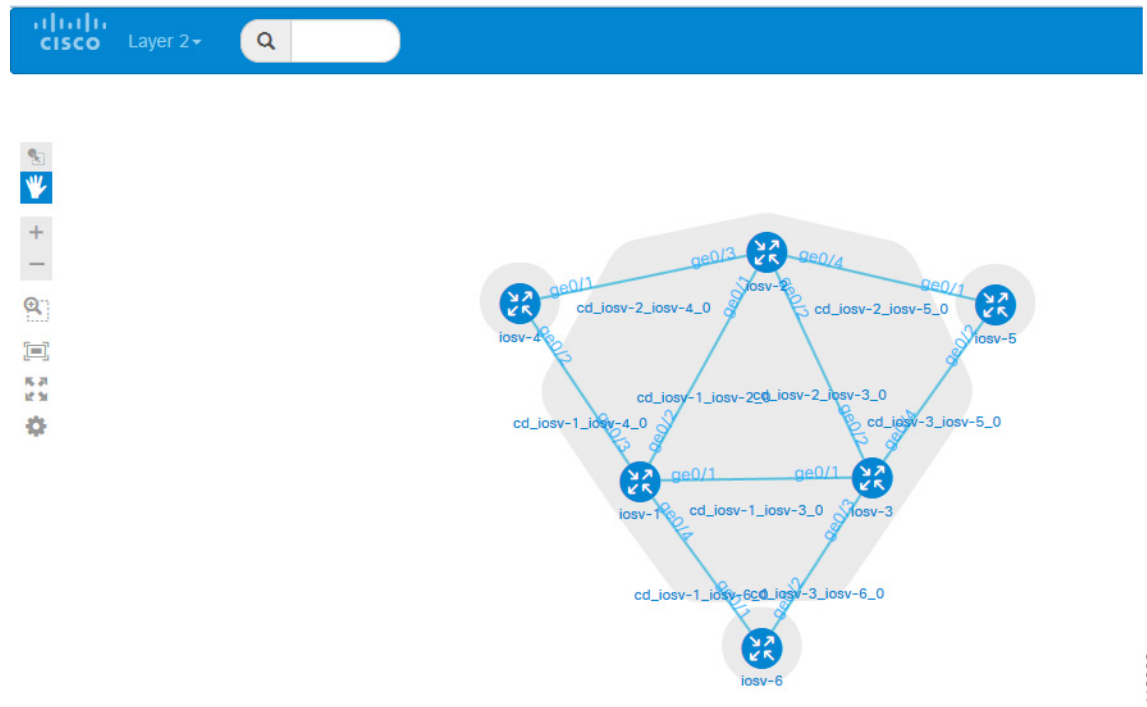


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For example, selecting **Layer 2** will show the IPv4 Layer 2 topology.

**Figure 10: Layer 2 View**



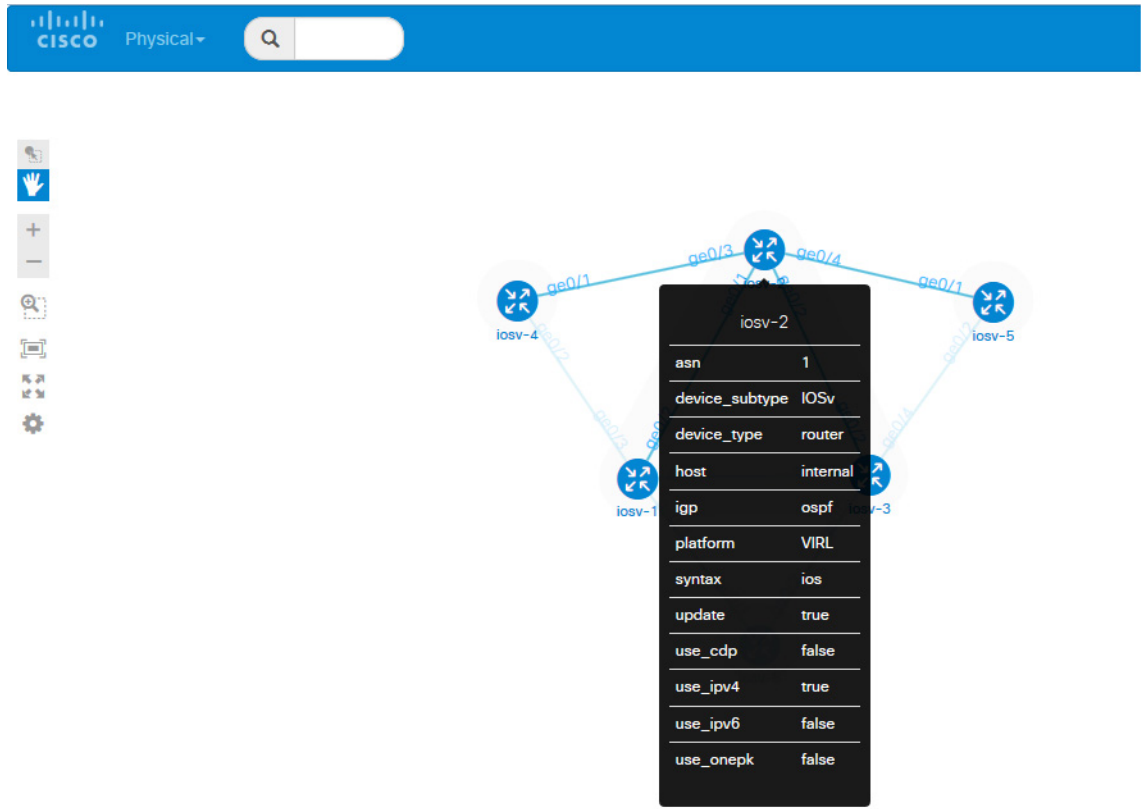
Placing the cursor over one of the nodes displays a pop-up view of information about that node. The type of information displayed depends on the selected option and node configuration.

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**Note**

You can also hover over the connections to see connection details.

**Figure 11: Node Information**



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You can continue to select different protocol views to see how the protocol-centric view changes. In a complex topology, you can use the **Physical** views to verify that the protocols, nodes, and connections meet the design requirements.

## Live Visualization

The Live Visualization phase provides a live, real-time visual representation of the running simulation in the Cisco Modeling Labs client.

**Note**

In order to use the Live Visualization feature, the topology must use an LXC management node when launched. Under **Properties > Topology**, check the **Use an LXC Management Node** check box when designing your topology. Then generate the node configurations using parameters defined in AutoNetkit.

For the running simulation, you can see the LXC management node in the **Simulations** view.

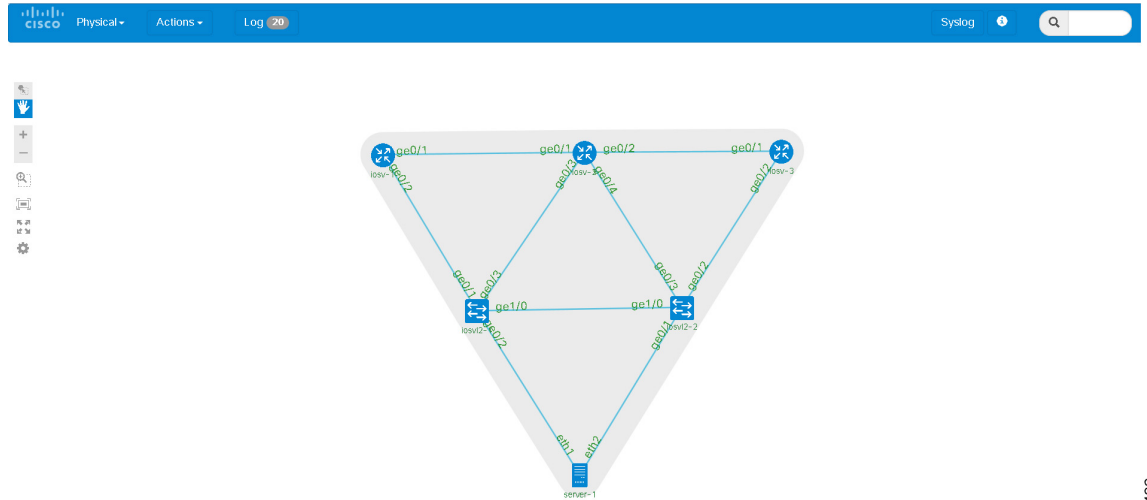
Live Visualization runs in an separate, external Web browser window. Ensure that you use a compatible browser, as described in [Cisco Modeling Labs Server Requirements](#) for the version of Cisco Modeling Labs that you are using.



**Note** Live Visualization is independent of AutoNetkit. It does not require AutoNetkit to run. However, a valid Cisco Modeling Labs license is required in order to use this feature. Also, ensure that each node has started up successfully and has applied its configuration before attempting to run a Live Visualization. A running node is displayed in green on the canvas and is displayed in green with [ACTIVE] in the **Simulations** view.

The following figure shows an overview of the Live Visualization phase as it appears in a browser window.

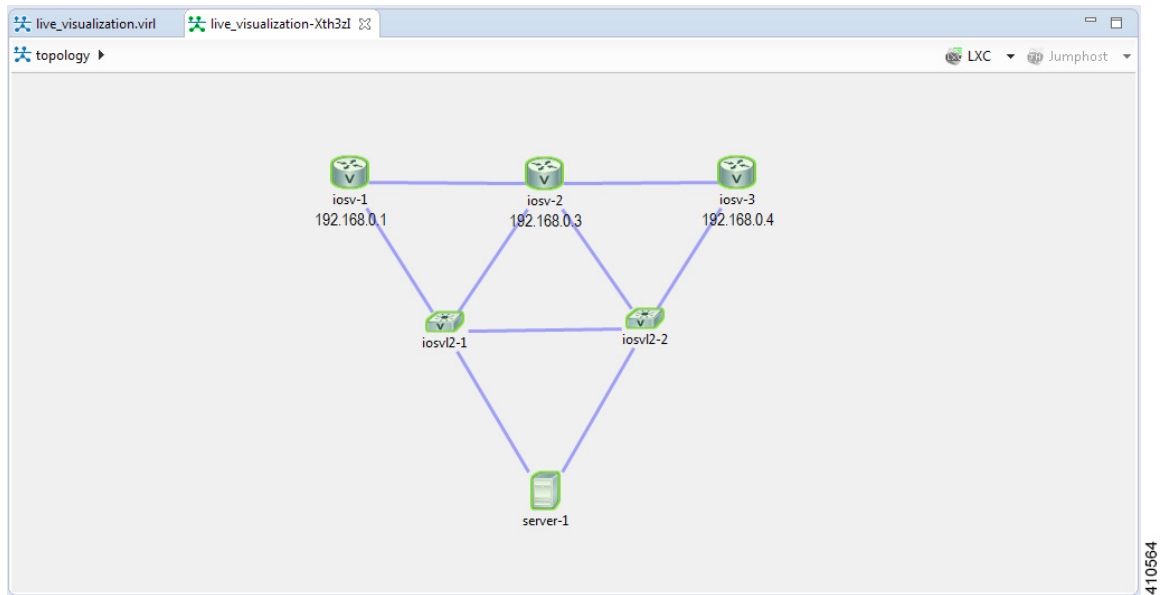
**Figure 12: Live Visualization Overview**



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The following figure shows how the Live Visualization compares to the topology design.

**Figure 13: Topology Design**



## View the Live Visualization

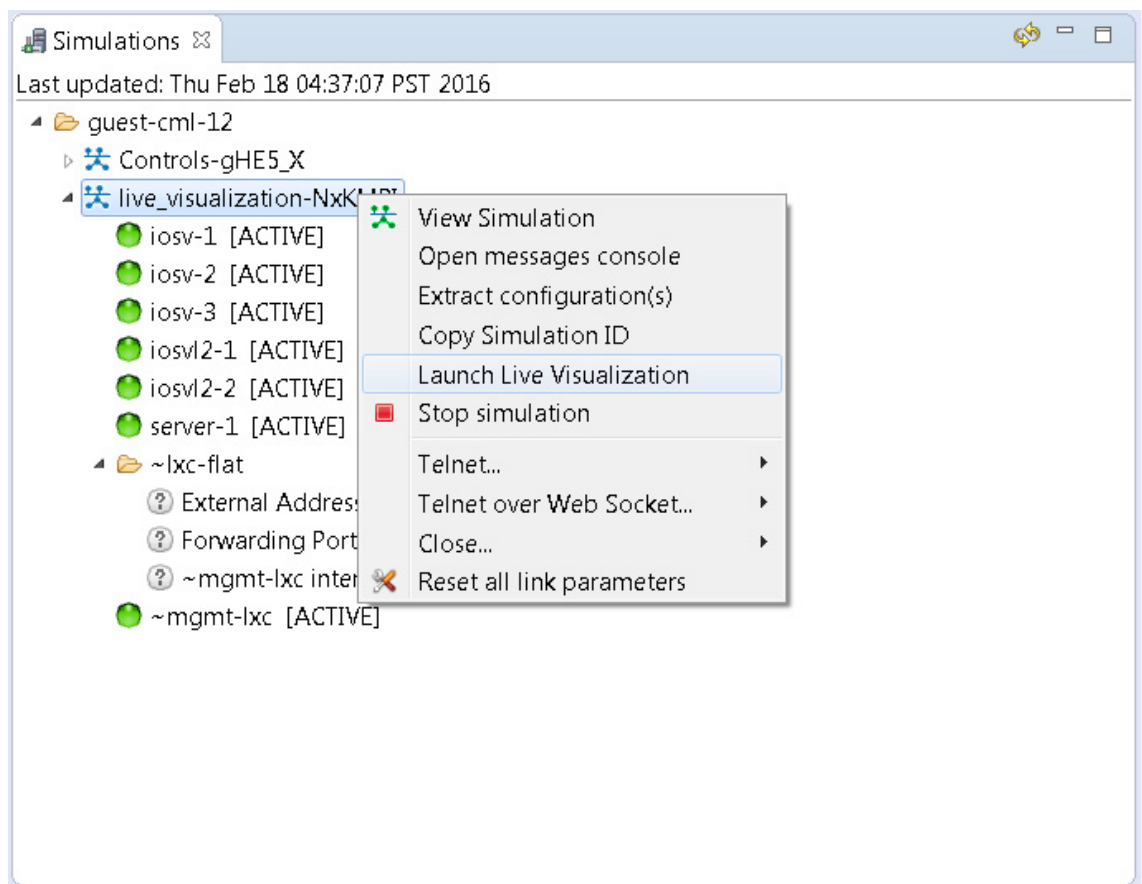
To access the Live Visualization for a running simulation, complete the following steps:



**Note** The simulation must be configured to use an LXC management node when launched. This is enabled under **Properties** > **Topology** view by checking the **Use an LXC Management Node** check box. Then generate the node configurations using AutoNetkit.

- Step 1** In the **Simulations** view, right-click the simulation name.
- Step 2** From the drop-down list displayed, click **Launch Live Visualization**.

**Figure 14: Launch Live Visualization Option**

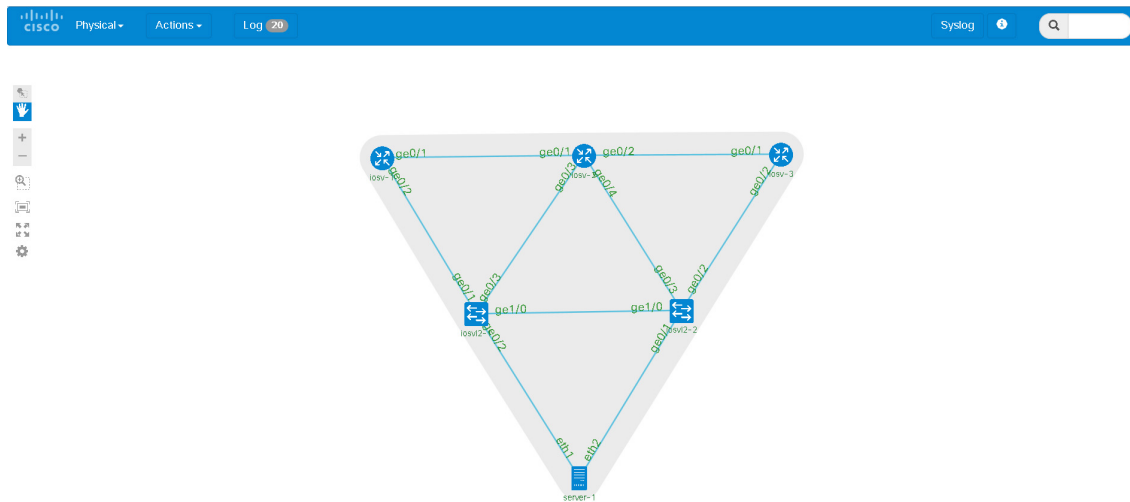


A web browser opens.

- Step 3** Enter your username and password and click **Log In**.
- Step 4** From the **Simulation ID** drop-down list displayed, choose the applicable simulation to launch.

The Live Visualization opens in a web browser as shown.

**Figure 15: Live Visualization View**



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**Note** You are only prompted for your user credentials the first time you launch a Live Visualization.

### Step 5

You can also access the Live Visualization for a running simulation from the User Workspace Management interface. In the User Workspace Management interface, login and under **My Simulations**, choose the applicable running simulation. The details page for the running simulation is displayed.

**Figure 16: Accessing Live Simulations from the User Workspace Management Interface**

Overview

My simulations

Project simulations

Projects

Users

CML Server

Connectivity

VM Control

Licenses

Node resources

Repositories

Documentation

### Simulation live\_vis\_traceroute-U5TsdJ details

Simulations / live\_vis\_traceroute-U5TsdJ

Refresh Live Visualization Stop simulation Set expiration Download original virt file

User	Project	Status	Started	Expires
guest	guest	ACTIVE	2016-03-21 17:18:32	never

Nodes

Show 10 entries

Start nodes Stop nodes Extract configs

Node	Subtype	State	Management IPs	External Connections	Options
iosv-1	IOSv	ACTIVE	10.255.0.9	telnet://172.23.81.124:17108 telnet://172.23.81.124:17109	Start Stop Extract
iosv-2	IOSv	ACTIVE	10.255.0.4	telnet://172.23.81.124:17000 telnet://172.23.81.124:17001	Start Stop Extract
iosv-3	IOSv	ACTIVE	10.255.0.7	telnet://172.23.81.124:17007 telnet://172.23.81.124:17104	Start Stop Extract
iosv-4	IOSv	ACTIVE	10.255.0.5	telnet://172.23.81.124:17002 telnet://172.23.81.124:17003	Start Stop Extract
iosrv-1	IOS XRV	ACTIVE	10.255.0.8	telnet://172.23.81.124:17105 telnet://172.23.81.124:17106	Start Stop Extract

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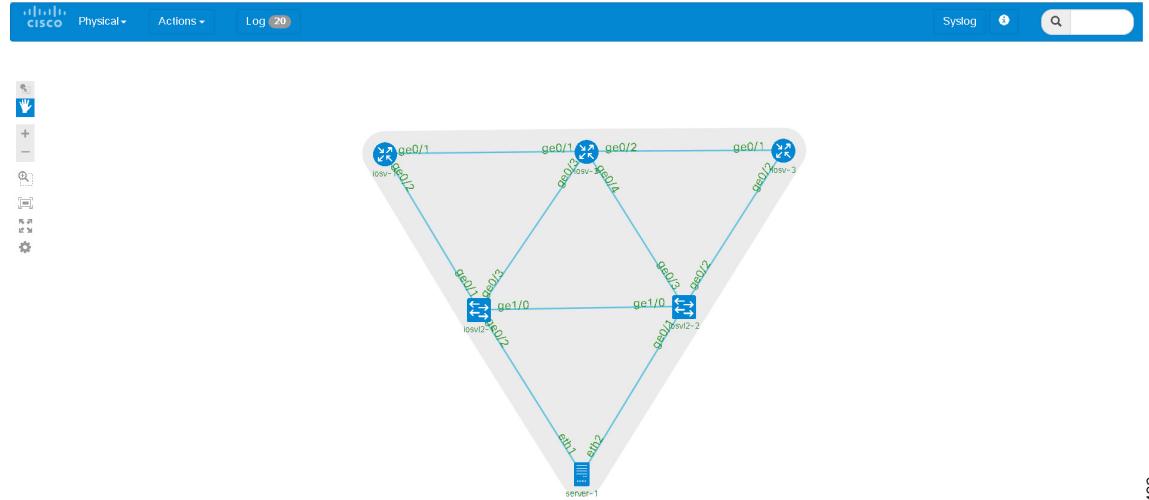
### Step 6

Choose **Live Visualization** to launch the Live Visualization for the running simulation in a new web browser.

# Live Visualization Overlay Options

The initial Live Visualization overlay that is displayed in the browser window is the physical model of the topology. The physical model shows the nodes and interface connections between the nodes based on the .virl file. It is similar to the Cisco Modeling Labs topology view.

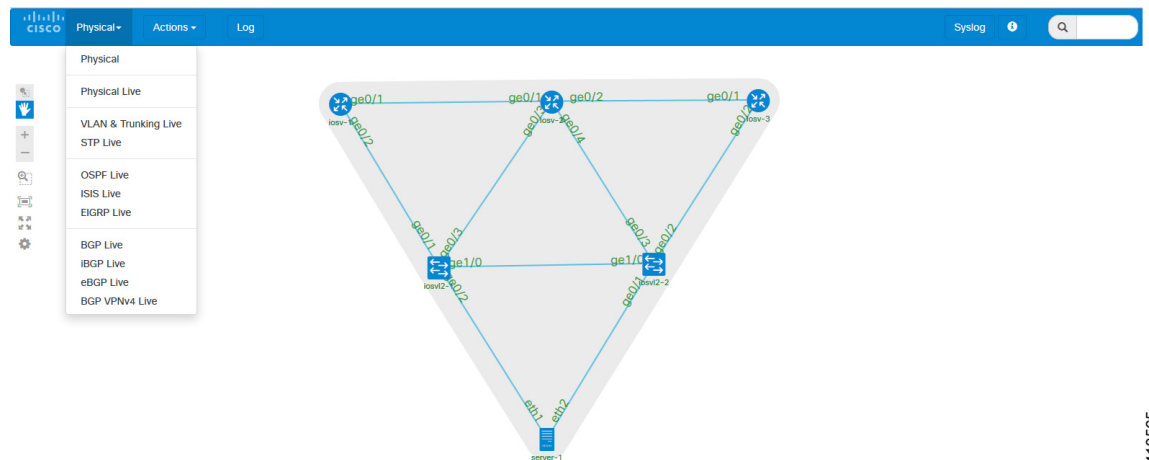
Figure 17: Initial Overlay



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The **Physical** drop-down list provides a series of overlays such as the physical live overlay, the OSPF live overlay, the iBGP live overlay and so on. When you select one of these options, Cisco Modeling Labs collects the live data from the nodes in the topology and draws the protocol map.

Figure 18: List of Physical Overlays

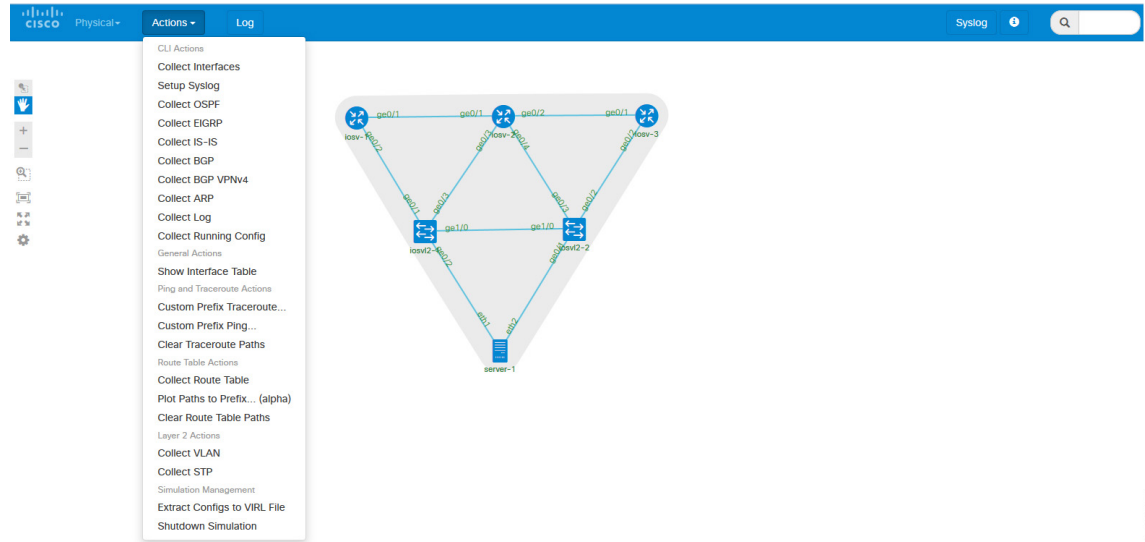


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The **Actions** drop-down list provides a list of actions that are applied for each specific protocol. When an action is selected from the **Actions** drop-down list, this results in commands being executed on each active

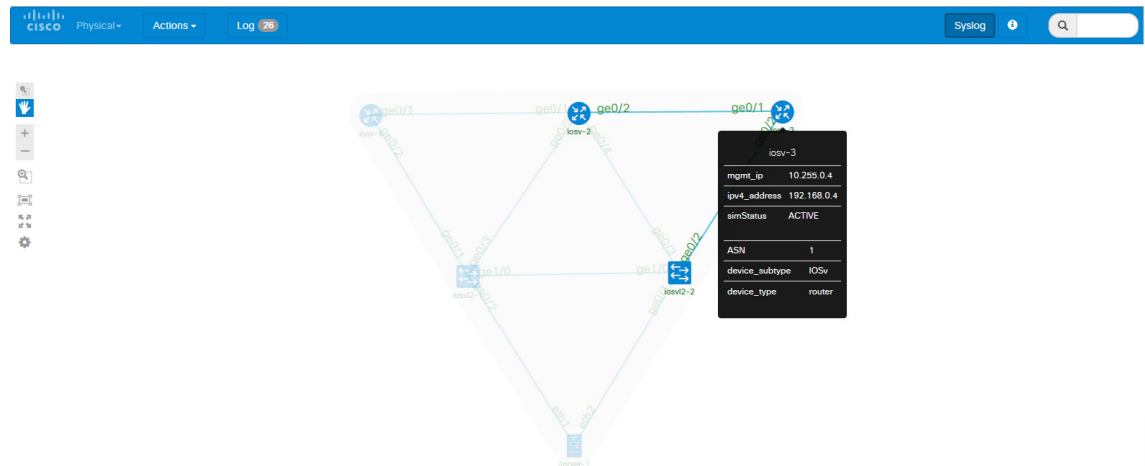
virtual machine. The **Actions** drop-down list also provides other functions such as Shutdown Simulation, Show Interface Table, Clear Traceroute Paths.

**Figure 19: List of Actions Options**



Placing the cursor over a node displays a pop-up view of information about that node. The type of information displayed depends on the selected option and node configuration. You can also hover over the connections to see connection details.

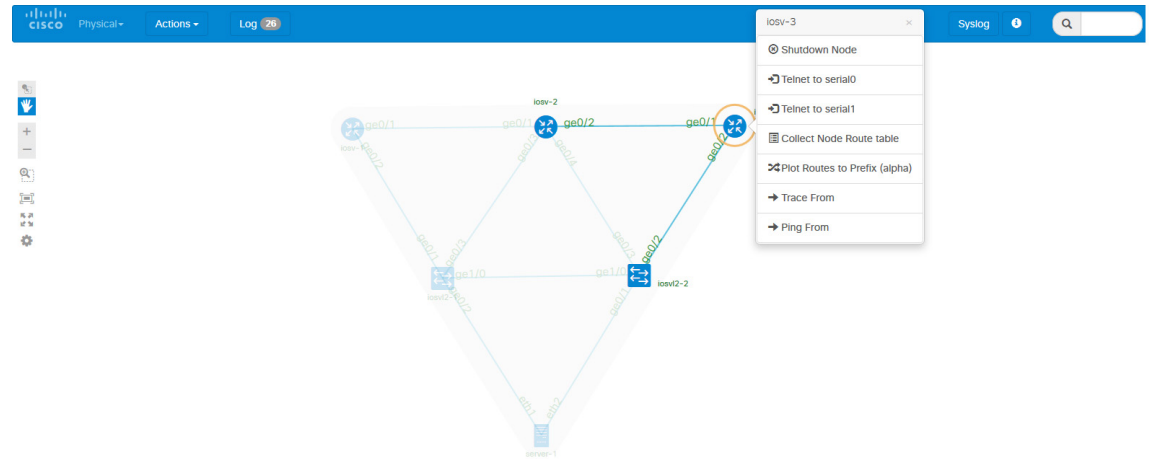
**Figure 20: Node Information**





Selecting a node displays a pop-up menu of available options for the node.

**Figure 21: Node Options**



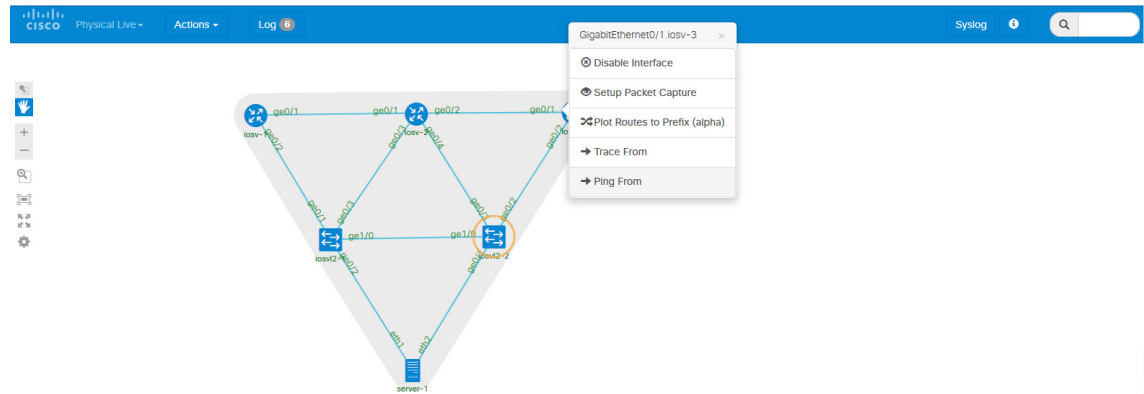
Available options are:

- **Shutdown Node:** Allows you to shutdown a running node, with the results reported in the **Log** view.
- **Telnet to Serial0/Serial1:** Allows you to Telnet to a node's serial ports 0 and 1. Opens a console port to serial or aux ports from within the web browser.
- **Collect Node Route Table:** Allows you to collect the route table from every node in the simulation, with the results reported in the **Log** view.
- **Plot Routes to Prefix (alpha):** Allows you to select a node and the system will show the next hops taken by traffic to this node's loopback address. This only work for nodes that are Cisco IOSv instances.
- **Ping From/To:** Allows you to ping from one node to another node. A five packet ping is triggered from source to destination, with the results reported in the **Log** view.
- **Trace From/To:** Allows you to execute a traceroute between nodes, with the results reported in the **Log** view.

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Selecting an interface displays a pop-up menu of available options for the interface.

**Figure 22: Interface Options**



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Available options are:

- **Disable/Enable Interface:** Allows you to disable an interface, with the results reported in the **Log** view.
- **Setup Packet Capture:** Allows you to start a packet capture. Opens the User Workspace Management interface in a new web browser, where you can set the required capture limits.
- **Plot Routes to Prefix (alpha):** Allows you to select an interface and the system will show the next hops taken by traffic to this interface's loopback address.
- **Trace From/To:** Allows you to execute a traceroute between interfaces, with the results reported in the **Log** view.
- **Ping From/To:** Allows you to ping from one interface to another interface, with the results reported in the **Log** view.

### Physical Connections

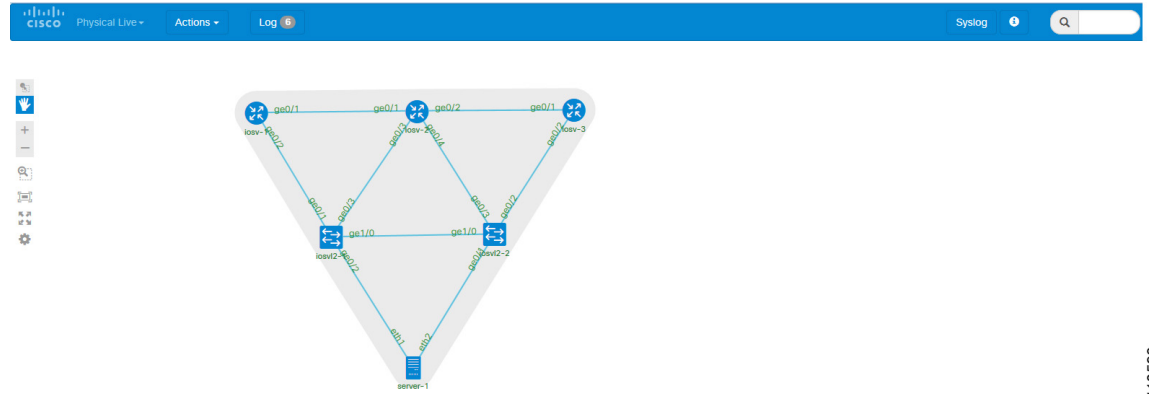
To view the live physical data, place the cursor over the **Physical** list and select **Physical Live** from the drop-down list.



**Note**

The collect interfaces action is run automatically when a Live Visualization session is first loaded.

**Figure 23: Physical Live Overlay**



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Hovering over an interface displays the information collected about the interface. The command **Actions > Collect Interfaces** is used to collect IP addressing information from the interfaces in order to perform reverse mappings, such as, IGP, BGP, and traceroute data processing. If the IPs are changed, you need to re-run this command. You can view the command applied in the **Log** view.

**Figure 24: Physical Live Log Output**

The screenshot shows the 'Log' view of the network visualization tool. The header includes 'CISCO Physical Live+', 'Actions', and 'Log'. Below the header is a search bar with 'Syslog' and a magnifying glass icon. The main area displays the output of the 'ifconfig -a' command for 'hostname server-1'. The output shows details for interfaces eth0, eth1, eth2, and lo, including their link encap, hardware addresses, IP addresses, and various statistics like RX and TX bytes, errors, and collisions.

```

hostname server-1 Mon Feb 29 2016 8:5:46 ifconfig -a

ifconfig -a
eth0  Link encap:Ethernet  HWaddr fa:16:3e:f8:8b:97
      inet addr:10.255.0.8  Bcast:10.255.255.255  Mask:255.255.0.0
      inet6 addr: fe80::f816:3eff:fe8b:8b97/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:1713 errors:0 dropped:0 overruns:0 frame:0
      TX packets:646 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueue:1000
      RX bytes:63951 (63.9 KB)  TX bytes:70515 (70.5 KB)

eth1  Link encap:Ethernet  HWaddr fa:16:3e:c0:9a:e3
      inet addr:10.0.0.2  Bcast:10.0.127.255  Mask:255.255.128.0
      inet6 addr: fe80::f816:3eff:fe8b:9ae3/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:13828 errors:0 dropped:2326 overruns:0 frame:0
      TX packets:17 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueue:1000
      RX bytes:288928 (288.9 KB)  TX bytes:578 (578.0 B)

eth2  Link encap:Ethernet  HWaddr fa:16:3e:6f:22:e9
      inet addr:10.0.0.3  Bcast:10.0.127.255  Mask:255.255.128.0
      inet6 addr: fe80::f816:3eff:fe6f:22e9/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:13823 errors:0 dropped:2325 overruns:0 frame:0
      TX packets:17 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueue:1000
      RX bytes:288577 (288.5 KB)  TX bytes:578 (578.0 B)

lo    Link encap:Local Loopback
      inet addr:127.0.0.1  Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
    
```

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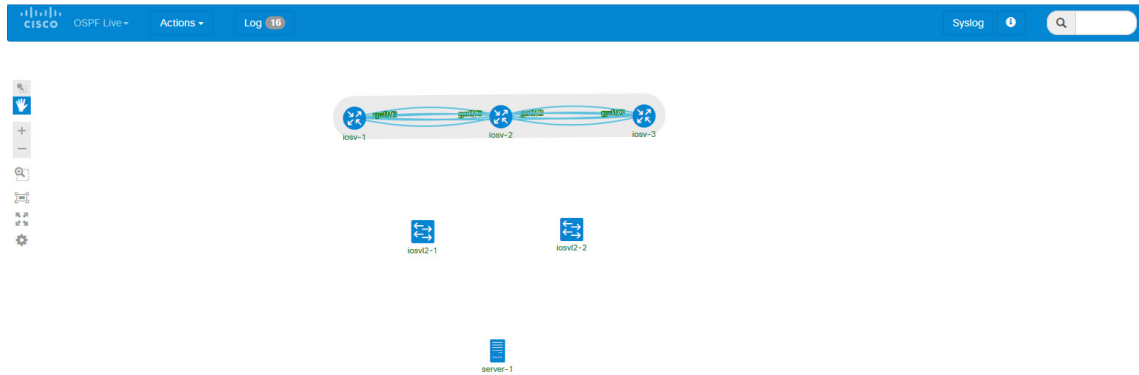
**OSPF**

To view the live OSPF data, do either of the following:

- Choose **Physical > OSPF Live** from the drop-down list; or

- Choose **Actions** > **Collect OSPF**. For both options, the **Collect OSPF** action runs the relevant show OSPF command on the nodes and then triggers the processor to parse and build the connectivity. The results are shown as adjacencies on the topology.

**Figure 25: OSPF Live Overlay**



You can view the show command applied in the **Log** view.

**Figure 26: OSPF Live Log Output**

Log

iosv-3 Thu Feb 25 2016 10:7:39 show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.0.1	1	FULL/DROTHER	00:00:37	10.0.0.1	GigabitEthernet0/2
192.168.0.3	1	FULL/BDR	00:00:37	10.0.0.4	GigabitEthernet0/2
192.168.0.3	1	FULL/BDR	00:00:32	10.0.128.5	GigabitEthernet0/1

iosv-1 Thu Feb 25 2016 10:7:39 show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.0.3	1	FULL/BDR	00:00:37	10.0.0.4	GigabitEthernet0/2
192.168.0.4	1	FULL/DR	00:00:39	10.0.0.6	GigabitEthernet0/2
192.168.0.3	1	FULL/DR	00:00:36	10.0.128.2	GigabitEthernet0/1

iosv-2 Thu Feb 25 2016 10:7:39 show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.0.1	1	FULL/DROTHER	00:00:37	10.0.0.1	GigabitEthernet0/3
192.168.0.4	1	FULL/DR	00:00:39	10.0.0.6	GigabitEthernet0/3
192.168.0.4	1	FULL/DR	00:00:38	10.0.128.6	GigabitEthernet0/2
192.168.0.1	1	FULL/BDR	00:00:34	10.0.128.1	GigabitEthernet0/1

iosv2-2 Thu Feb 25 2016 10:7:39 show ip ospf neighbor

iosv2-1 Thu Feb 25 2016 10:7:39 show ip ospf neighbor

iosv-1 Thu Feb 25 2016 10:7:39 show ip ospf int brief

Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C
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## iBGP

To view the live iBGP data, do either of the following:

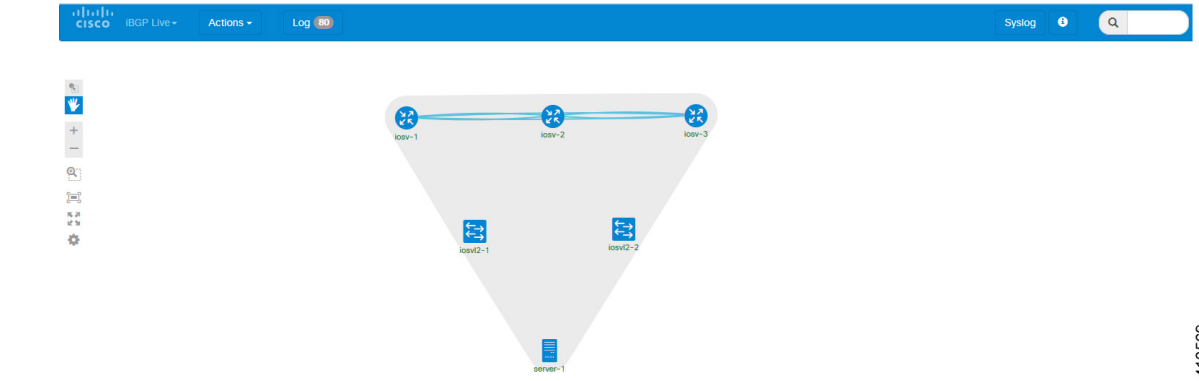
- Choose **Physical** > **iBGP Live** from the drop-down list; or

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- Choose **Actions > Collect BGP**. For both options, the **Collect BGP** action runs the relevant show BGP command on the nodes and then triggers the processor to parse and build the connectivity. The results are shown as adjacencies on the topology.

**Figure 27: iBGP Live Overlay**



You can view the show command applied in the **Log** view.

**Figure 28: iBGP Live Log Output**

**SYSLOG**

You can configure all nodes to send syslog messages to a syslog process. From the **Actions** drop-down list, click **Setup Syslog**. This sets up the virtual machines to send syslog messages to the LXC management node.

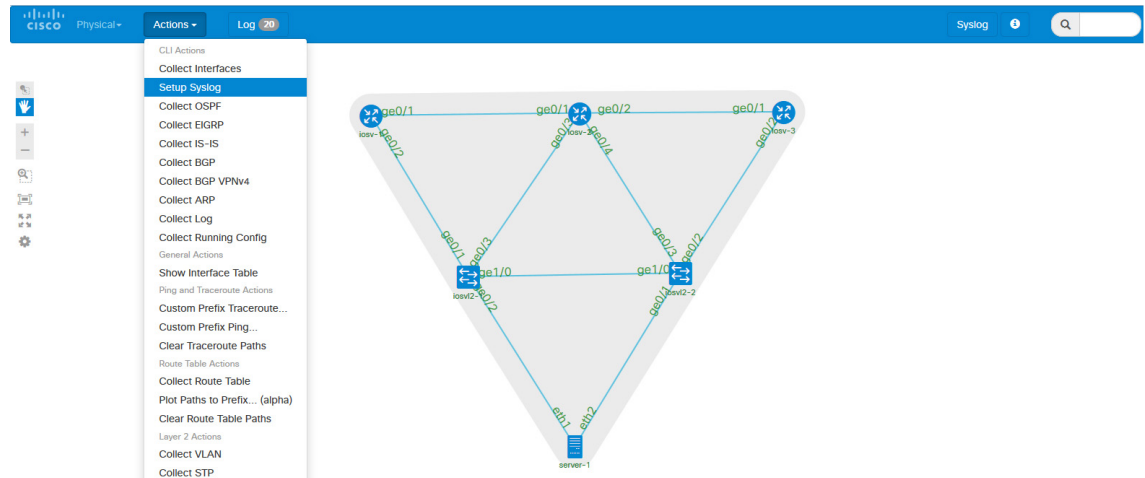
The screenshot shows the 'Log' view of the Cisco iBGP Live interface. The header includes the Cisco logo, 'iBGP Live', and tabs for 'Actions' and 'Log'. A search bar for 'Syslog' is on the right. The main content area displays log entries for three nodes: iosv-3, iosv-2, and iosw2-1. Each entry shows the output of the 'show ip bgp summary' command. The log for iosv-3 includes a table of BGP neighbors.

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
192.168.0.1	4	1	104	104	4	0	0	01:31:05	1
192.168.0.3	4	1	105	104	4	0	0	01:31:09	1

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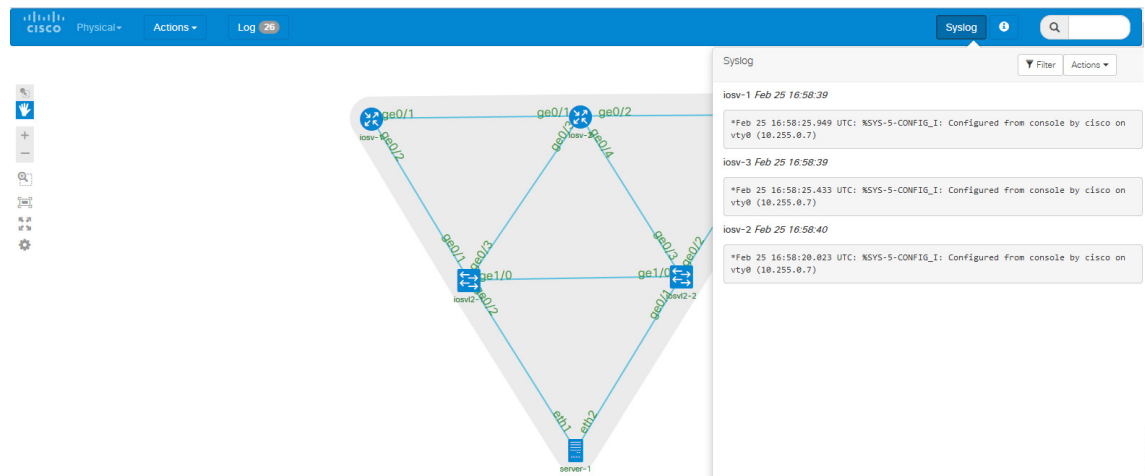
Figure 29: Setup Syslog Option



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These messages are forwarded through a web socket to the front-end and can be seen under the **Syslog** option.

Figure 30: Syslog Process



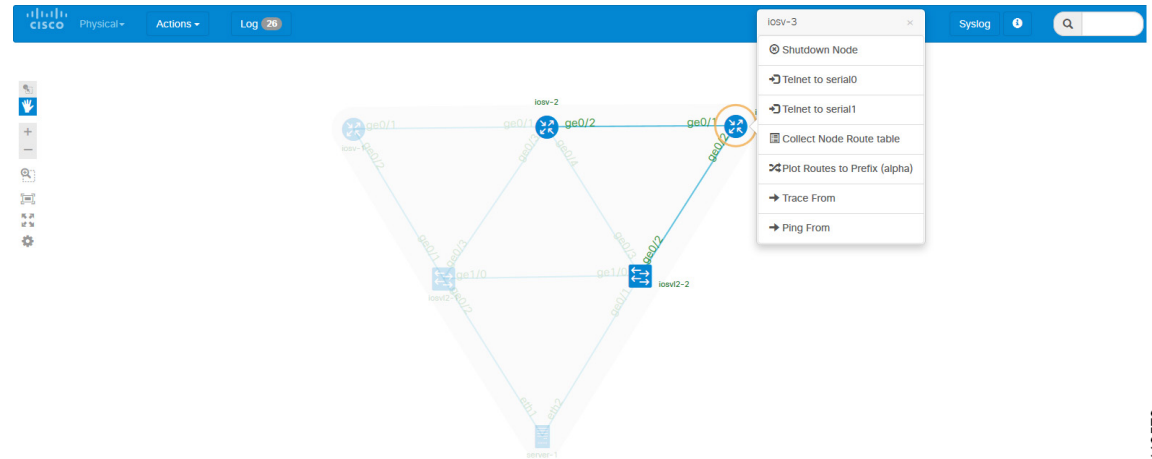
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## Live Visualization Traceroute

The traceroute functionality allows you to view the different routes used between the nodes in your topology.

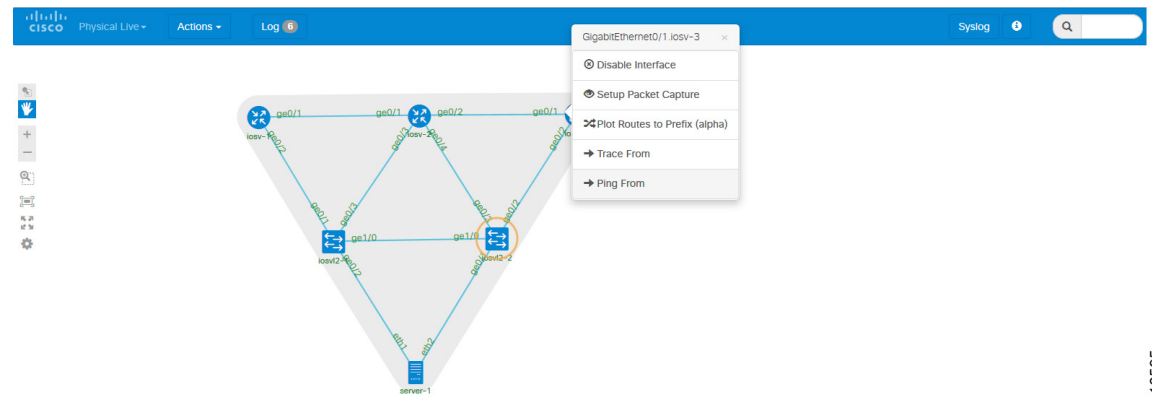
In the Live Visualization, for the source node or source interface, left-click on the applicable node to access the drop-down menu and choose **Trace From**.

**Figure 31: Node Menu**



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**Figure 32: Interface Menu**

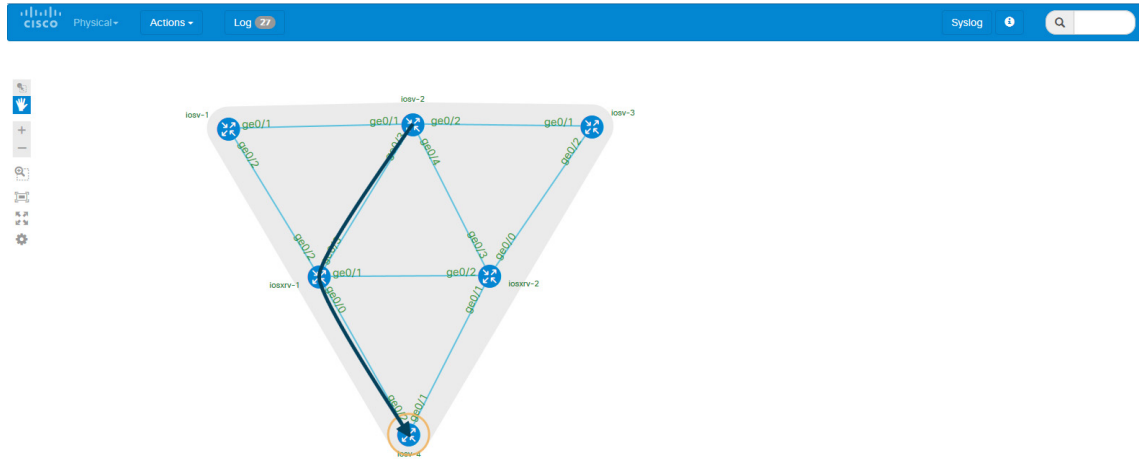


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Next choose a destination node (for the loopback), or destination interface and from the drop-down menu, choose **Trace To**.

This is then matched to the appropriate IP address, using the interfaces IP addresses collected using the interfaces command. This, together with the node identifier, is then sent to the Live Visualization back-end for formatting and running of the command.

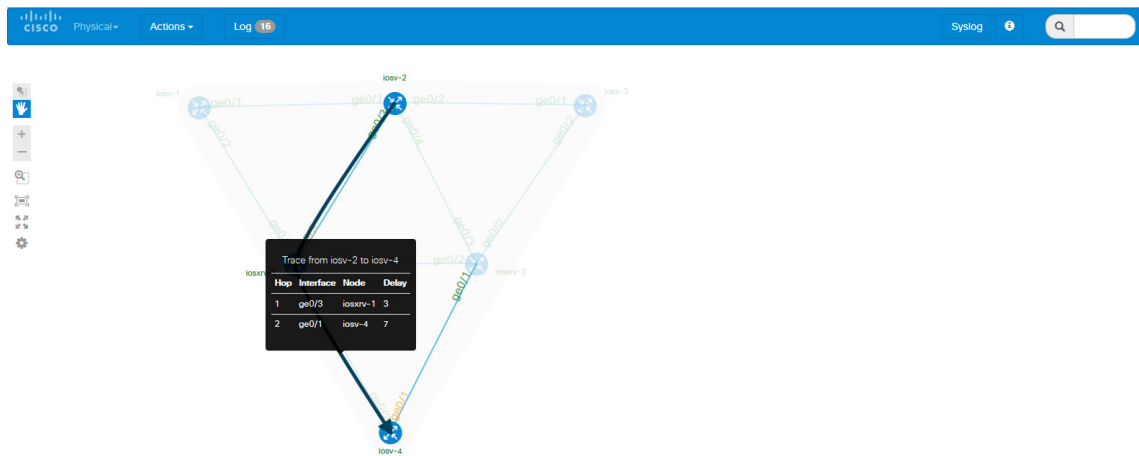
**Figure 33: Traceroute Path Displayed**



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When a traceroute is executed, hovering the mouse over the path displays information on the path taken.

**Figure 34: Information on the Path Taken**

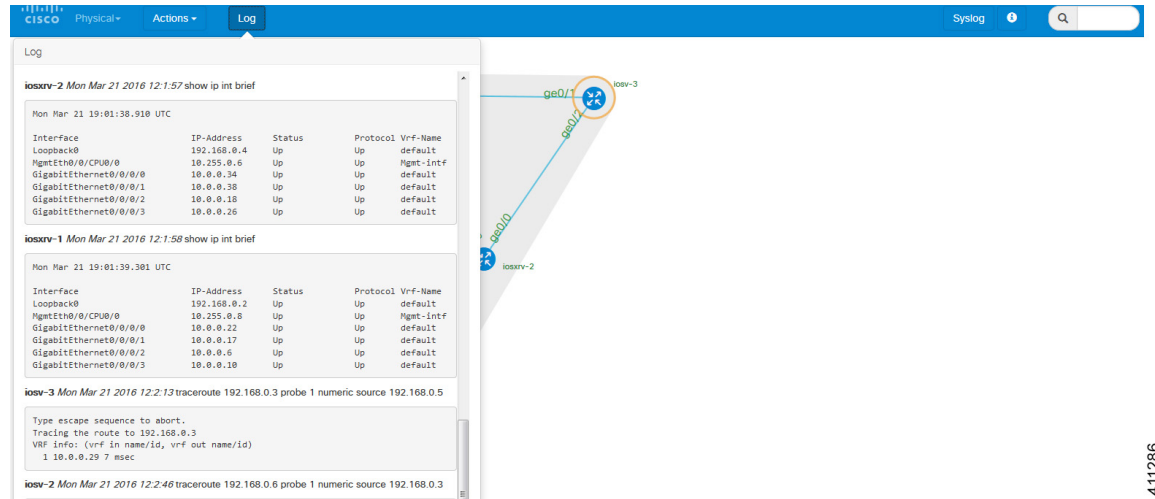


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Details on the command executed for the traceroute are available in the Log view.

**Figure 35: Traceroute Log**



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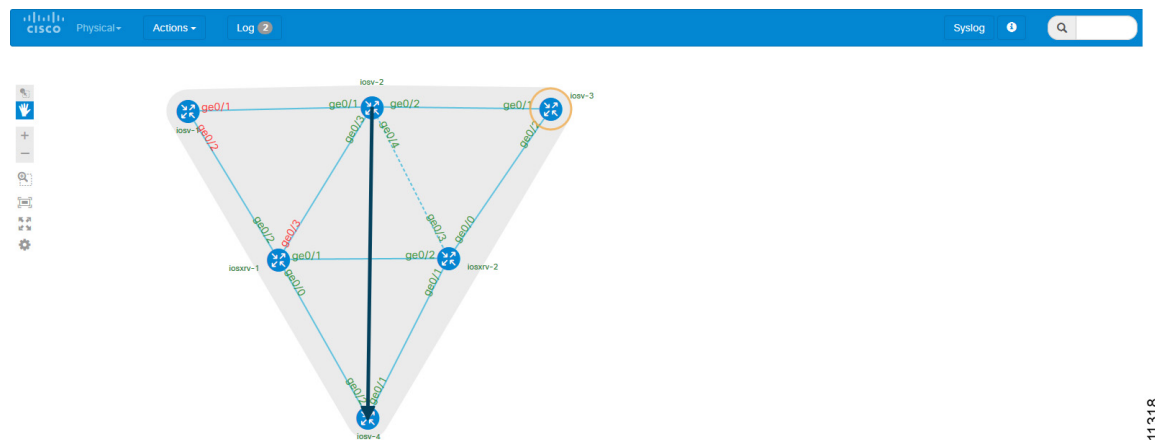
When an interface is disabled in the Live Visualization, the disabled interface name is shown in red. For a disabled node, all its interface names are shown in red. An interface that has link parameters set is displayed as a dashed line.

In the following example, the interface ge0/3 has been disabled so the path is rerouted. The interfaces ge0/1 and ge0/2 for node iosv-1 indicate that the node is disabled.

The interfaces ge0/4 and ge0/3 connecting nodes iosv-2 and iosrv-2 indicate that link parameters have been set for this link.

Re-running the previous traceroute now shows a different path.

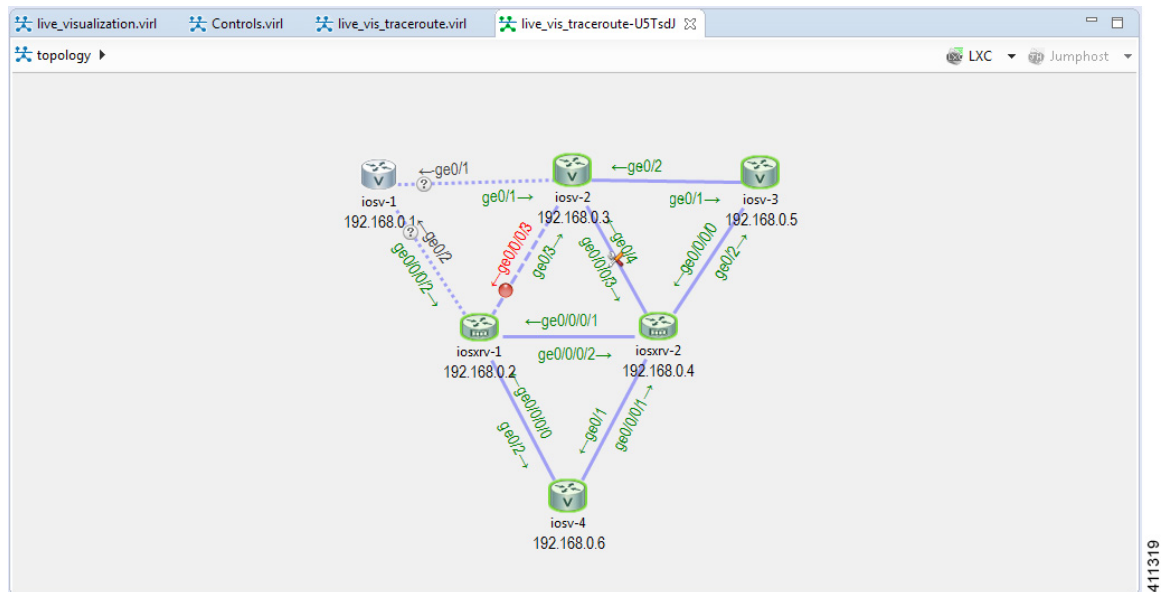
**Figure 36: Updated Image Showing Rerouted Path**



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Additionally, the disabled interface is displayed in the Cisco Modeling Labs client with red text and a red dot on a broken line. The link parameters link is shown with a Tools icon. The disabled node is shown in grey with its interfaces displayed as dashed lines, as shown in the following image.

**Figure 37: Updated Details in the Cisco Modeling Labs Client**



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