

# **Build a Configuration**

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# **Build a Configuration Overview**

In the build phase, you build the configurations for each node. After selecting the options for the overall topology and each node, you create the configuration files. Alternatively, you can use AutoNetkit to create the configuration files.

You can modify and save configuration files for the topology and for each node in your topology.

# **Create and Modify a Node Configuration**

While AutoNetkit is useful for generating configuration files for all the nodes in the topology, you can bypass AutoNetkit and enter node configuration information directly.

You can enter configuration information in either of the following ways:

- During the design phase, copy and paste configuration commands for each node.
- During the simulation phase, connect to a node console and change its configuration when the topology is running. See the chapter Simulate the Topology for more information on how to modify, extract, and save a running configuration.



When you create your configuration files:

- Changes that are manually entered are not visible in the topology design. If you create a new interface by entering configuration commands, the interface is not created in OpenStack nor does the interface show up in any of the node views.
- Depending on how the AutoNetkit Auto-generate the configuration based on these attributes feature is set, you may overwrite the changes you enter.

While in the **Design** perspective, any changes you manually make to a node configuration are saved in the current filename .virl file. Before you launch a simulation from the **Design** perspective, a notification window advises you to save the changes or cancel the simulation launch.

#### Figure 1: Save Changes Before Launch

The topology editor contains unsaved changes, and continue to launch the s launch process.		
	ОК	Cancel

# **Create a Node Configuration Manually**

# **Before You Begin**

The topology design should be complete.

**Step 1** In the **Topology Editor**, click a node.

**Step 2** In the **Properties** view, click **AutoNetkit** and uncheck the **Auto-generate the configuration based on these attributes** check box.

Figure 2: Uncheck Auto-generate Check Box

■ Properties 🛙	2 Problems	
Node	Auto-generate the <u>configuration</u> based on these attributes.	<u>^</u>
🕏 AutoNetkit	- General	
Configuration	ASN: 1	Default
Extensions		Dendare
	→ IGP	
	OSPF Area: 0	Default
	* IBGP	FC3
	iBGP Role: Peer Default	100

**Step 3** Click the **Configuration** tab.

Step 4

**p 4** Enter the configuration commands in the **Configuration** view.

**Note** All changes are automatically saved to the filename .virl file. However, the changes made do not appear in the topology on the canvas.

# **Use an Existing Node Configuration**

You can use an existing configuration file to create a node configuration in Cisco Modeling Labs.

### **Before You Begin**

The topology design should be complete.

- **Step 1** In the **Topology Editor**, click a node.
- **Step 2** In the **Properties** view, click **AutoNetkit** and uncheck the **Auto-generate the configuration based on these attributes** check box.
- **Step 3** Click the **Configuration** tab.
  - a) Open the configuration file you want to use and copy the configuration commands.
  - b) In the Configuration view, paste the configuration commands.
    - **Note** All changes are automatically saved to the *filename*.virl file. However, the changes made do not appear in the topology on the canvas.

### What to Do Next

Launch a simulation to observe the changes.

# Import the Configuration from Other Types of Files

For this version of Cisco Modeling Labs, you are able to import configurations from a number of other file types, such as, Cariden MATE, Visio, GNS3 to name a few. These are discussed in the following sections.

# Import the Configuration from a Cariden MATE File

You can import a topology from an existing Cariden MATE file, version 5.2.0 or later or version 6.1.0. Cisco Modeling Labs client will accept site imports up to two layers deep. Any Cariden MATE file that has a topology with more than two layers of sites will not import correctly.

### **Before You Begin**

- A valid Cariden MATE file is available on your file system.
- Cisco Modeling Labs client is running.
- **Step 1** Choose File > Import.

A window appears, prompting you to Import Cariden MATE file.

- **Step 2** Choose **Import Cariden MATE File** then click **Next**.
- Step 3 Choose the From data file Cariden MATE file to import. Use Browse to select the directory and file to import.
- Step 4 Choose the location Into target folder for the Cariden MATE file. Use Browse to select the target Project folder.

#### Figure 3: Choose the From and To Locations

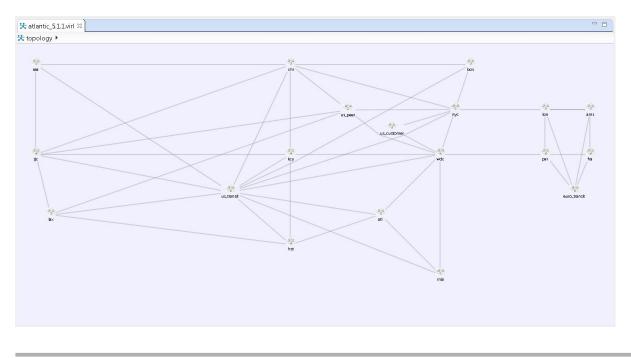
🔆 Import Caride	n Mate file	
Import Cariden	MATE file from file system.	cariden
From data file:	C:\atlantic_5.1.1.pln ▼	Browse
Into target fold	er: /Sample Topologies/atlantic_5.1.1.virl	Browse
8		
	< Back Next > Finish	Cancel

- **Step 5** Enter a filename for the imported Cariden MATE file.
  - **Important** The filename you enter must have the extension .virl. For example, **Lab\_import.virl** is a valid filename. Otherwise, you cannot open the file in the topology editor.

The Cariden MATE file converts to a Cisco Modeling Labs .virl file.

- Step 6 In the **Projects** view, expand the project folder where you saved the imported file.
- Step 7 Right click on the imported file, for example, Lab\_import.virl and choose Open With > Topology Editor. The canvas opens and displays the topology.

### Figure 4: Imported Cariden MATE File



# **Export the Configuration to Cariden MATE File**

### **Before You Begin**

- Cisco Modeling Labs client is running.
- A topology is open in the Topology Editor.

#### Step 1 Choose File > Export. A window appears, prompting you to Export to Cariden MATE file. Step 2 Choose Export Cariden MATE File then click Next. Step 3 Choose the location To file for the Cariden MATE file export. Use Browse to select the target Project folder. Step 4 Enter a filename for the exported Cariden MATE file, or use the default filename. For example, sample\_topology.virl is converted to sample\_topology.pln and saved in the target directory.

Step 5 Click Finish.

The Cisco Modeling Labs .virl file silently converts to a Cariden MATE .pln file.

# Import the Configuration from a Visio vsdx File

You can import a topology from an existing Visio .vsdx file, version 2013 and later.

### **Before You Begin**

- A valid Visio file is available on your file system.
- Cisco Modeling Labs client is running.

**Step 1** Choose File > Import.

I

The **Import** dialog box appears.

**Step 2** Expand the **Topology** folder, choose **Import Visio vsdx File** and click **Next**.

### Figure 5: Import Visio vsdx File

ဖို့ဖ Import	
Select Import topology from the Visio vsdx file.	Ľ
Select an import source:	
type filter text	
<ul> <li>Content of the system</li> </ul>	
< <u>B</u> ack <u><u>N</u>ext &gt; <u>F</u>inish</u>	Cancel

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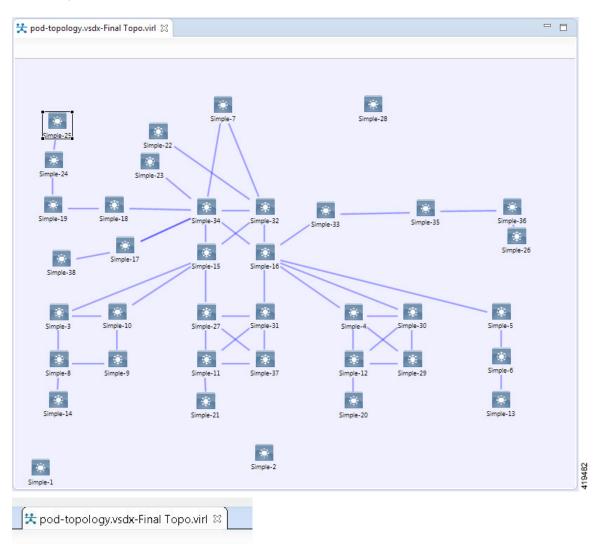
- **Step 3** Choose the **From data file** Visio .vsdx file to import. Use **Browse** to select the directory and file to import.
- **Step 4** Choose the location **Into target folder** for the Visio .vsdx file. Use **Browse** to select the target Project folder.

#### Figure 6: Choose the From and To Locations

🔆 Import Visio v	sdx file	
Please select t Must specify ar	the Microsoft Visio vsdx file you want to import.	V
From data file:	C:/Desktop/pod-topology.vsdx	Browse
Into target fold	er: /My Topologies	Browse
	< <u>B</u> ack <u>N</u> ext > <u>Einish</u>	Cancel

Step 5 Click Finish.

The Visio .vsdx file converts to a Cisco Modeling Labs .virl file, using the original filename of the file and it is automatically opened on the canvas.



### Figure 7: Imported Visio .vsdx File

Note In this example, the file pod-topology.vsdx has been renamed by Cisco Modeling Labs to pod-topology.vsdx-Final Topo.virl. We recommend that for your .vsdx file imports, you rename the file(s) replacing the dot in .vsdx with '\_'. In this example, pod-topology.vsdx-Final Topo.virl becomes pod-topology\_vsdx-Final Topo.virl. You must do this as in Cisco Modeling Labs, the roster will parse the extra dot as a hierarchy delimiter and the simulation will fail.

# **Export the Configuration to SVG Files**

For this release of Cisco Modeling Labs, export to Visio .vsdx files is not supported. However, export to .svg files is supported, as Visio supports the use of .svg files. The **Export** option can be used to export .virl files as .svg files.

### **Before You Begin**

- · Cisco Modeling Labs client is running.
- A topology is open in the Topology Editor.

Step 1	Choose File > Export. A window appears, prompting you to Export to SVG file.
Step 2	Choose <b>Export to SVG file</b> then click <b>Next</b> .
Step 3	Choose the location <b>To file</b> for the SVG file export. Use <b>Browse</b> to select the target Project folder.
Step 4	Enter a filename for the exported SVG file, or use the default filename. For example, <b>sample_topology.virl</b> is converted to <b>sample_topology.svg</b> and saved in the target directory.
Step 5	Click <b>Finish</b> . The Cisco Modeling Labs .virl file silently converts to a SVG .svg file.

# Import the Configuration from a GNS3 File

You can import a topology from an existing GNS3 .gns3 file.

### **Before You Begin**

- A valid GNS3 JSON-based (.gns3) file is available on your file system.
- Cisco Modeling Labs client is running.

**Step 1** Choose File > Import.

I

The **Import** dialog box appears.

**Step 2** Expand the **Topology** folder, choose **Import GNS3 File** and click **Next**.

## Figure 8: Import a GNS3 .gns3 File

🔆 Import	
Select	Ľ
Select an import source:	
type filter text	
<ul> <li>Content of the system</li> <li>Content of the system</li> <li>Content of the system</li> <li>The system</li> <li>The system</li> <li>The system</li> <li>The system</li> <li>The system</li> <li>The system</li> </ul>	
< <u>B</u> ack Next > <u>F</u> inish	Cancel

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The Import GNS3 File dialog box is displayed.

Step 3 In the From source file field, use Browse to select the directory and GNS3 .gns3 file to import.

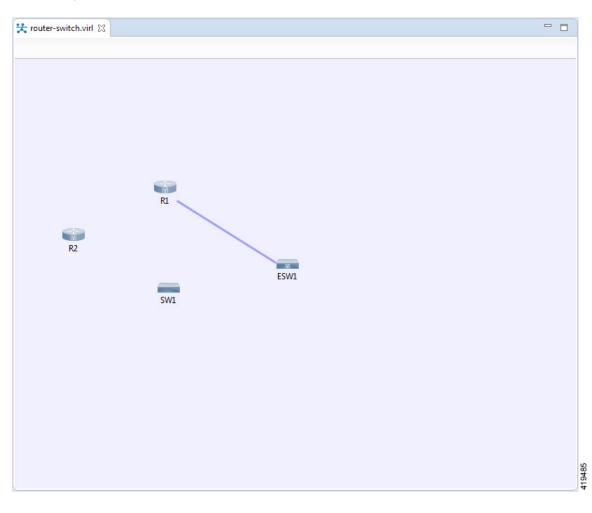
**Step 4** In the **Into destination file** field, use **Browse** to select the target folder.

### Figure 9: Choose the From and To Locations

🐝 Import GNS3 file	- • •
Import GNS3 file from file system.	
From source file: bols.gns3.core.tests\resources\router-switch.gns3 -	Browse
Into destination file: /Sample Topologies/router-switch.virl	Browse
< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	Cancel

Step 5 Click Finish.

The GNS3 .gns3 file converts to a Cisco Modeling Labs .virl file, using the original filename of the file and it is automatically opened on the canvas.



### Figure 10: Imported GNS3 .gns3 File

# **Export the Configuration to GNS3 Files**

# **Before You Begin**

• Cisco Modeling Labs client is running.

• A topology is open in the Topology Editor.

# Step 1Choose File > Export.The Export dialog box appears.

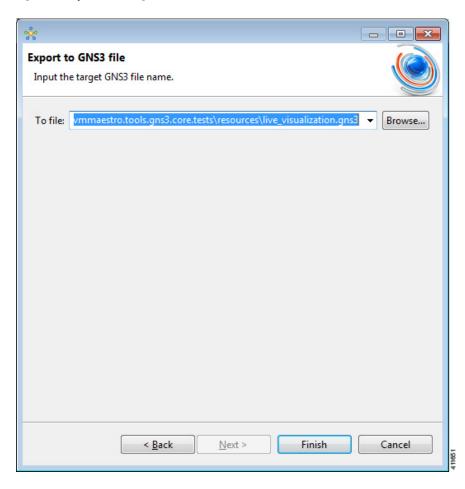
**Step 2** Expand the **Topology** folder, choose **Export to GNS3 File** and click **Next**.

## Figure 11: Export a GNS3 .gns3 File

Select	$\Delta$
Select an export destination:	
type filter text	

**Step 3** In the **To file** field, use **Browse** to select the target folder.

#### Figure 12: Export a GNS3 .gs3 File



**Step 4** Enter a filename for the exported GNS3 file, or use the default filename. For example, **sample\_topology.virl** is converted to **sample\_topology.gns3** and saved in the target directory.

# Step 5 Click Finish.

The Cisco Modeling Labs .virl file silently converts to a GNS3 .gns3 file.

# Import the Configuration from a GraphML File

You can import a topology from an existing GraphML .graphml file.

# **Before You Begin**

• A valid GraphML file is available on your file system.

• Cisco Modeling Labs client is running.

# Step 1Choose File > Import.

# The **Import** dialog box appears.

**Step 2** Expand the **Topology** folder, choose **Import GraphML** and click **Next**.

## Figure 13: Import a GraphML .graphml File

နိုး Import	- • •
Select	Ľ
Select an import source:	
type filter text	
<ul> <li>See General</li> <li>Git</li> <li>Team</li> <li>Topology</li> <li>Import Cariden MATE file</li> <li>Import Configurations into Existing Topology</li> <li>Import GNS3 file</li> <li>Import GraphML file</li> <li>Import Visio vsdx file</li> <li>Import topology file(s) from local file system</li> <li>Import topology file(s) from remote repository</li> </ul>	
< <u>B</u> ack Next > <u>F</u> i	nish Cancel

The Import GraphML File dialog box is displayed.

**Step 3** In the **From source file** field, use **Browse** to select the directory and GraphML .graphml file to import.

**Step 4** In the **Into destination file** field, use **Browse** to select the target folder.

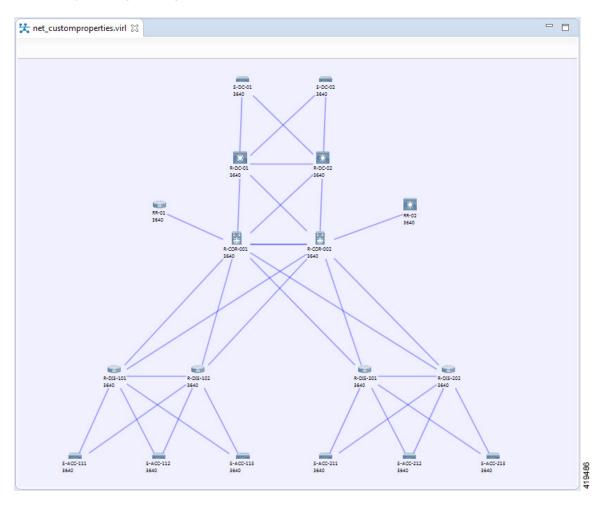
## Figure 14: Choose the From and To Locations

🔆 Import GraphML fil	2			- • •
Please select the Gr Please specify the de		want to imp	ort.	
From source file: re	tests\resources\ne	t_customprop	erties.graphml	Browse
Into destination file:	/My Topologies			Browse
	< <u>B</u> ack	<u>N</u> ext >	<u>F</u> inish	Cancel

Step 5 Click Finish.

I

The GraphML .graphml file converts to a Cisco Modeling Labs .virl file, using the original filename of the file and it is automatically opened on the canvas.





# **Export the Configuration to GraphML Files**

# **Before You Begin**

- Cisco Modeling Labs client is running.
- A topology is open in the Topology Editor.

**Step 1** Choose File > Export.

I

The **Export** dialog box appears.

**Step 2** Expand the **Topology** folder, choose **Export to GraphML File** and click **Next**.

Figure 16: Export a GraphML .graphml File

Select	Ż
Select an export destination:	
type filter text       > > General	
<ul> <li>Team</li> <li>Topology</li> <li>Export Nodes' Configurations to Files</li> <li>Export Topology Diagram to Image</li> <li>Export Topology file to File System</li> <li>Export to Cariden MATE file</li> </ul>	
<ul> <li>Export to GNS3 file</li> <li>Export to GraphML file</li> <li>Export to SVG file</li> </ul>	

**Step 3** In the **To file** field, use **Browse** to select the target folder.

#### Figure 17: Choose the To Location

*	- • •
Export to GraphML file	ACCES.
Input the target GraphML file name.	
To file: stro.tools.graphml.core.tests\resources\live_visualization.graphml	Browse
< Back Next > Finish	Cancel
<u>Cack</u> <u>Next</u> Finish	Cancei

**Step 4** Enter a filename for the exported GraphML file, or use the default filename. For example, **sample\_topology.virl** is converted to **sample\_topology.graphml** and saved in the target directory.

# Step 5 Click Finish.

The Cisco Modeling Labs .virl file silently converts to a GraphML .graphml file.

# **Import the Nodes Configuration Files**

You can import the per-node configurations previously exported as individual text files (.cfg suffix) into your .virl file. You can import the configuration files having made any necessary changes to them.

### **Before You Begin**

· Cisco Modeling Labs client is running.

• A topology file is open in the Topology Editor.

## Step 1

I

Choose File > Import. The Import dialog box is displayed.

## Figure 18: Import Dialog Box

elect Import configura		cal files into an	existing topo	logy's nodes.	Ľ
Select an import s	source:				
Contractions in the second sec	y nt Cariden MATE nt Configuration: nt GNS3 file nt GraphML file nt GraphML file nt Visio vsdx file nt topology file(s nt topology file(s	s into Existing T ;) from local file	e system		

**Step 2** Choose **Import Configurations into Existing Topology** and click **Next**.

The Import Configurations into Existing Topology dialog box is displayed.

Figure 19: Import Configurations into Existing Topology

🐝 Import Configs into Existing Topology	
Select Directory of Configuration Files	
Import node configurations from C:\Users\CML\Configurations into net_customproperties.virl.	
From directory: C:\Users\CML\Configurations	Browse
< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	Cancel

- **Step 3** Select the applicable location from the **From Directory** drop-down list or choose **Browse**.
- Step 4Click Finish to import the node configuration files.<br/>The node configuration files are imported into the existing topology and a message is displayed to confirm this

Figure 20: Config Import Finished Dialog Box

🔆 Conf	ig Import Finished	<b>—</b>
i	Configurations for all 4 nodes successfully imported into topology.	
		ОК

# **Export the Nodes Configuration Files**

You can export the per-node configurations from within your .virl file and export them to a directory location of your choice as individual text files (.cfg suffix). There you can make necessary changes to the configuration files before importing the configuration files back into the .virl file.

### **Before You Begin**

- Cisco Modeling Labs client is running.
- A topology file is open in the Topology Editor.

**Step 1** Choose File > Export.

The Export dialog box is displayed.

## Figure 21: Export Dialog Box

🔆 Export
Select Export configuration text from topology's nodes to files in a local directory.
Select an export destination: type filter text
<ul> <li>General</li> <li>Team</li> <li>Topology</li> <li>Export Nodes' Configurations to Files</li> <li>Export Topology Diagram to Image</li> <li>Export Topology file to File System</li> <li>Export to Cariden MATE file</li> <li>Export to GNS3 file</li> <li>Export to GraphML file</li> <li>Export to SVG file</li> </ul>
< <u>B</u> ack Next > Einish Cancel

**Step 2** Choose **Export Nodes' Configurations to Files** and click **Next**.

I

The Export Nodes' Configurations to Files dialog box is displayed.

Figure 22: Export Nodes' Configurations to Files

se Export Nodes' Configurations to Files	- • •
Select Output Directory	
Export configurations from Controls.virl to C:\Users\CML \Configurations\Controls.	
To directory: C:\Users\CML\Configurations\Controls	Browse
Options Create a timestamp-based directory	
< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	Cancel

**Step 3** Select a location from the **To Directory** drop-down list or choose **Browse** to select the applicable location.

Step 4Click Finish to export the node configuration files.<br/>The node configuration files are exported to the chosen location.

# **Create Node and Interface Configurations Using AutoNetkit**

### **Before You Begin**

The topology design should be complete.

**Step 1** AutoNetkit displays a notification after it generates the configuration. Click **No** to skip a comparison of configuration changes. Click **Yes** to open a comparison view of the configuration changes.

Figure 23: View Configuration Changes? Notification



The .virl file opens and displays previous and current configurations side-by-side, with the changes highlighted. You can scroll through the contents and see the differences. However, you cannot edit the configurations.

Figure 24: Show Configuration Comparison Side-by-Side

🔀 Text Compare					42 64
ocal history: Sample 3 Node virl Feb 21, 2014, 9:15:13 AM		1			
ip address 10.0.0.5 255.255.255.252 ip ospf cost 1 duplex auto speed auto no shutdown I		ip o duple spee	ddress 10.0 spf cost 1 ex auto d auto hutdown	.0.5 255.255.255.252	
! router ospf 1 network 192.168.0.1 0.0.0.0 area 0 log-adjacency-changes passive-interface Loopback0 network 10.0.0.0 0.0.0.3 area 0 network 10.0.0.4 0.0.0.3 area 0		desc no i duplo spee		Ethernet0/3 abitEthernet0/3	
! ! router bgp 1 bgp router-id 192.168.0.1 no synchronization		netwo log-a	adjacency-c	.0.1 0.0.0.0 area 0 hanges ce Loopback0	 
✓ III	•	•	III		F

Click **OK** to close the comparison view.

- **Step 2** When you close the comparison view, a notification is displayed, and you can choose whether or not to open AutoNetkit Visualization.
  - Click No to skip the visualization. You return to the Design perspective.

• Click **Yes** to display the visualization. The AutoNetkit Visualization opens in a browser window. For more information about this feature, see AutoNetkit Visualization.

#### Figure 25: Open AutoNetkit Visualization? Notification

Would you like to open the Auto	Netkit Visualization?
Remember my decision	
	Yes No

**Note** Selecting the **Remember my decision** check box will always open AutoNetkit visualization for subsequent invocations. You can later change this behavior by choosing **File** > **Preferences** > **Web Services** > **AutoNetkit**.

# Generate an Infrastructure-only Configuration Using AutoNetkit

AutoNetkit allows you to generate a stripped-back configuration that provides the basic infrastructure configuration required to support configuration extraction and Live Visualization.

With this feature enabled, no IP addressing or routing protocol configuration is created. This leaves the node in a state where it is ready for manual configuration. This is ideal when using a simulation for study practice or when wanting to go through the process of building an environment by hand.

The feature is enabled in the Cisco Modeling Labs client, by selecting the **Infrastructure Only** option available under **General** at the topology level under the **AutoNetkit** tab, as shown.

关 *Controls.virl 🖇	2					
	new-york 192.168.0.4 san-francisco 192.168.0.3	>		london 192.168.0.1 paris 192.168.0.2		
Properties 🔀						E
□ Properties ⊠ Topology	▼ General					
Topology AutoNetkit	✓ General Enable CDP:	false	•	Default		
Topology AutoNetkit		false	T	Default Default		E
Topology AutoNetkit	Enable CDP:	false true	<b>T</b>			
Topology AutoNetkit	Enable CDP: Enable OnePK: Infrastructure Only:	false true <not spec<="" td=""><td><b>T</b></td><td>Default</td><td></td><td></td></not>	<b>T</b>	Default		
Topology AutoNetkit	Enable CDP: Enable OnePK:	false true	<b>T</b>	Default	Default	
	Enable CDP: Enable OnePK: Infrastructure Only: Addressing	false true <not spec<br="">true false</not>	<b>T</b>	Default		
Topology AutoNetkit	Enable CDP: Enable OnePK: Infrastructure Only: Addressing IP Address Family:	false true <not spec<br="">true false ubnet: 10,</not>	₹   ₹	Default	Default	
Topology AutoNetkit	Enable CDP: Enable OnePK: Infrastructure Only: Addressing IP Address Family: IPv4 Infrastructure Su	false true <not spec<br="">true false ubnet: 10, refix: 8</not>	.0.0.0	Default	Default Default	
opology	Enable CDP: Enable OnePK: Infrastructure Only: Addressing IP Address Family: IPv4 Infrastructure So IPv4 Infrastructure Pr	false true <not spec<br="">true false ubnet: 10, refix: 8 net: 19,</not>	.0.0.0 2.168.0.0	Default	Default Default Default	
opology	Enable CDP: Enable OnePK: Infrastructure Only: Addressing IP Address Family: IPv4 Infrastructure St IPv4 Infrastructure Pr IPv4 Loopback Subm	false true <not spec<br="">true false ubnet: 10, refix: 8 net: 19; Prefix: 22</not>	.0.0.0 2.168.0.0	Default	Default Default Default Default	
Topology AutoNetkit	Enable CDP: Enable OnePK: Infrastructure Only: <ul> <li>Addressing</li> <li>IP Address Family:</li> <li>IPv4 Infrastructure Su</li> <li>IPv4 Loopback Submini</li> <li>IPv4 Loopback Pool</li> </ul>	false true <not spec<br="">true false ubnet: 10, refix: 8 net: 19; Prefix: 22</not>	0.0.0 2.168.0.0	Default	Default Default Default Default Default	
Topology AutoNetkit	Enable CDP: Enable OnePK: Infrastructure Only: Addressing IP Address Family: IPv4 Infrastructure St IPv4 Infrastructure Pr IPv4 Loopback Subne IPv4 Loopback Pool IPv4 VRF Subnet:	false true <not spec<br="">true false ubnet: 10. refix: 8 net: 192 Prefix: 22 172 24</not>	0.0.0 2.168.0.0	Default	Default Default Default Default Default Default	E

#### Figure 26: Using GRE Tunnels

# **Static TCP Port Allocation Control**

You can specify the TCP port number that you want to use when connecting to the **console**, **auxiliary**, or **monitor** ports of a particular node running in a simulation. These port numbers are optional and can be set via the Cisco Modeling Labs client. The port number allocation is retained in the settings.ini file and is applied each time the simulation is started. Functionality is provided so that the TCP port numbers in use are easily adjusted.

To set these port numbers, in the **Design** perspective, select a node and choose the **Node** configuration tab. Update the **Static Serial Ports'** fields as required.

🔲 Properties 🛛			▽ □ E
Node	Name:	iosv-2	
AutoNetkit	Subtype:	IOSv 👻	
Configuration	IPv4:	192.168.0.2	
Extensions	IP√6:		
		erial Ports	
	(C)onsole	port:	
	(A)uxiliary	port:	
	(M)onitor		
	(E)xtra por	t	
	VM Image:	Prove	
	VM Flavor:	Browse	-
	Exclude	node from simulation launch.	411731

Figure 27: Specify TCP Port Numbers

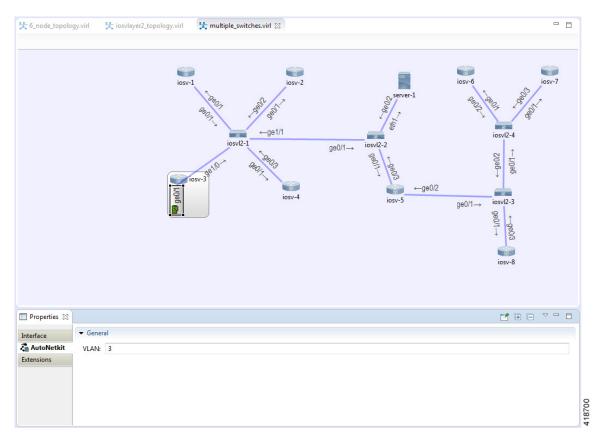
# **Assign VLANs**

I

VLANs can be assigned to the interfaces of the end nodes, using the **Properties** > Interface view.

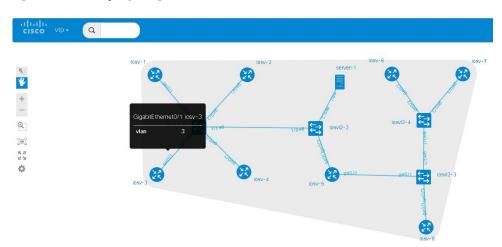
VLANs are set using the VLAN property under the **General** tab in the **AutoNetkit** field on the interface. The properties are set on the interfaces of the nodes connected to the IOSvL2 image, such as on the IOSv nodes, server node interfaces.

The following example shows how to set a VLAN property.



These VLAN values are displayed in the VLAN attribute of the interfaces in AutoNetkit visualization:

Figure 29: VLAN Property Assigned

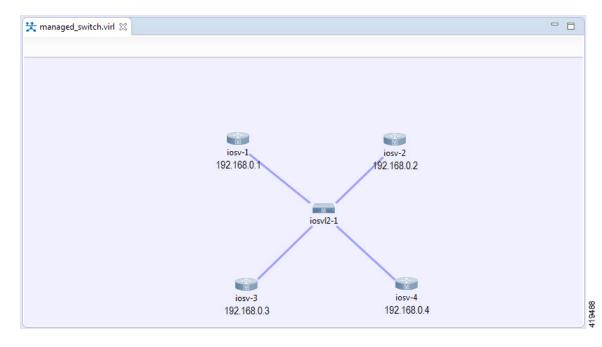


# **Use a Managed Switch**

The Cisco IOSv Layer 2 switch introduces a managed switch to the Cisco Modeling Labs environment. By default, all VLANs are placed in vlan2.

For example, consider the following topology which includes four nodes and one Cisco IOSvL2 image:

### Figure 30: Using a Managed Switch



After running AutoNetkit, you can see the default VLAN assigned using the vtp view:

Cisco vtp≁ (Q

Figure 31: VLAN Assignment



The layer2 view shows the vtp domain originating from the virtual switch for vlan2:

 Image: Second second

Figure 32: Vtp Domain - layer2.tiff

The resultant interface configurations for the Cisco IOSvL2 image are reflected as follows::

```
interface GigabitEthernet0/1
description to iosv-1
switchport access vlan 2
switchport mode access
no shutdown
!
interface GigabitEthernet0/2
description to iosv-3
switchport access vlan 2
switchport mode access
```

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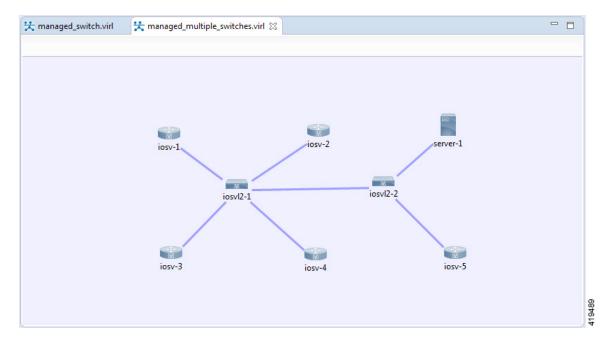
```
no shutdown
!
interface GigabitEthernet0/3
description to iosv-2
switchport access vlan 2
switchport mode access
no shutdown
!
interface GigabitEthernet1/0
description to iosv-4
switchport access vlan 2
switchport mode access
no shutdown
!
```

# **Use Multiple Managed Switches**

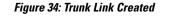
It is permissible to connect multiple managed switches together. Multiple managed switches connected together form a trunk link between the switches and their appropriate vtp domains.

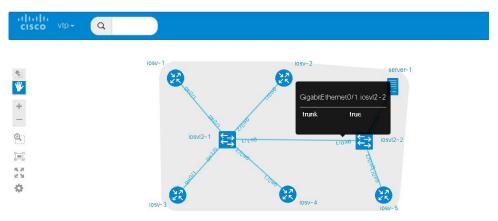
In the following example, two managed switches are connected together:

#### Figure 33: Using Multiple Managed Switches



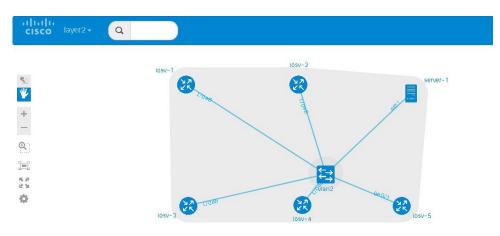
The vtp view shows the trunk link created between the two managed switches:





The **layer2** view shows the resulting layer2 connectivity, where both of the managed switches have been aggregated into a single vtp domain for the default vlan2:

Figure 35: Layer2 Connectivity



The resultant interface configurations for iosvl2-1 and iosvl2-2 are as follows:

#### iosvl2-1

```
interface GigabitEthernet0/1
description to iosv-1
switchport access vlan 2
switchport mode access
no shutdown
!
interface GigabitEthernet0/2
description to iosv-3
switchport access vlan 2
switchport mode access
no shutdown
```

```
interface GigabitEthernet0/3
description to iosv-2
switchport access vlan 2
switchport mode access
no shutdown
1
interface GigabitEthernet1/0
description to iosv-4
 switchport access vlan 2
 switchport mode access
no shutdown
interface GigabitEthernet1/1
description to iosvl2-2
 switchport trunk encapsulation dotlq
switchport mode trunk
no shutdown
1
```

### iosvl2-2

```
interface GigabitEthernet0/1
description to iosvl2-1
 switchport trunk encapsulation dotlq
 switchport mode trunk
no shutdown
interface GigabitEthernet0/2
description to server-1
 switchport access vlan 2
switchport mode access
no shutdown
T
interface GigabitEthernet0/3
description to iosv-5
switchport access vlan 2
switchport mode access
no shutdown
1
```

# **Set Firewall Capabilities**

This release of Cisco Modeling Labs includes the demo version of the Cisco ASAv image (a fully-operational license is available by separate purchase). The Cisco ASAv image adds firewall capabilities to Cisco Modeling Labs.

The default AutoNetkit configuration puts each interface into security-level 0, adds a nameif, and allows http, SSH, and Telnet access to this nameif.

For example, consider the following topology which includes three IOSv nodes, one server node and one ASAv node:

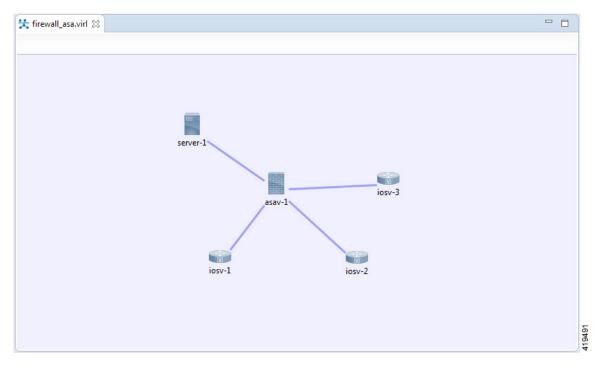


Figure 36: Example Topology Showing a Cisco ASAv Node

After running AutoNetkit, the firewall view shows the allocated properties on the interfaces:

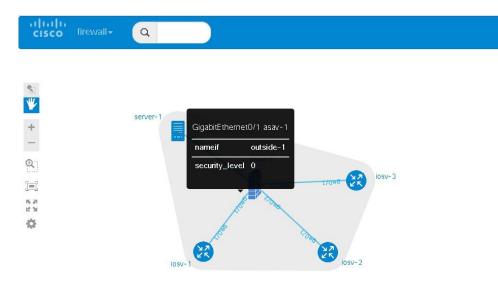


Figure 37: Allocated Firewall Properties

The configuration for the interface is:

```
interface GigabitEthernet0/0
 description to server-1
nameif outside
 security-level 0
no shutdown
ip address 10.0.0.5 255.255.255.252
interface GigabitEthernet0/1
 description to iosv-1
nameif outside-1
security-level 0
no shutdown
ip address 10.0.0.9 255.255.255.252
interface GigabitEthernet0/2
description to iosv-2
nameif outside-2
security-level 0
no shutdown
 ip address 10.0.0.13 255.255.255.252
interface GigabitEthernet0/3
description to iosv-3
nameif outside-3
 security-level 0
no shutdown
ip address 10.0.0.17 255.255.255.252
```

#### The access details are:

```
http 0.0.0.0 0.0.0.0 mgmt
ssh 0.0.0.0 0.0.0.0 mgmt
telnet 0.0.0.0 0.0.0.0 mgmt
http 0.0.0.0 0.0.0.0 outside
ssh 0.0.0.0 0.0.0.0 outside
telnet 0.0.0.0 0.0.0.0 outside-1
ssh 0.0.0.0 0.0.0.0 outside-1
telnet 0.0.0.0 0.0.0.0 outside-2
ssh 0.0.0.0 0.0.0.0 outside-2
telnet 0.0.0.0 0.0.0 outside-2
http 0.0.0.0 0.0.0.0 outside-2
http 0.0.0.0 0.0.0.0 outside-3
ssh 0.0.0.0 0.0.0.0 outside-3
telnet 0.0.0.0 0.0.0.0 outside-3
```

# **Set Security Levels**

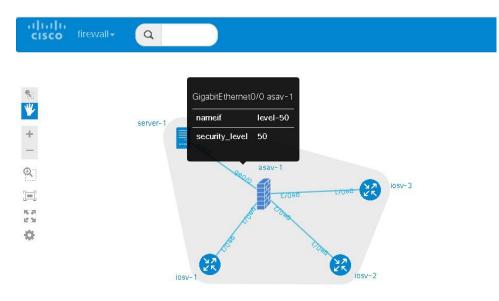
Security levels are set using the **Security Level** property under the **Firewall** tab in the **AutoNetkit** field on the interface. The properties are set on the Cisco ASAv node's interfaces, as shown.

## Figure 38: Set the Security Level

topolog	ıy.virl 🔀 iosvlayer2_topology.virl 🚼	ultiple_switches.virl	🛠 firewall_asa.virl 🛛		-	
	server-1	ssav-1 ge0/1→ ge0/1→ ge0/1→				
🔲 Properties 🔀						
Interface	← General					
AutoNetkit Extensions	VLAN:					
Extensions	▼ Firewall					
	Security Level: 50					
						418680

The security level is displayed in the security\_level attribute of the interfaces in AutoNetkit visualization:

Figure 39: Security Level Attribute Set



#### The configuration for **nameif** is updated.

```
interface GigabitEthernet0/0
description to server-1
nameif level-50
security-level 50
no shutdown
ip address 10.0.0.5 255.255.255.252
interface GigabitEthernet0/1
description to iosv-1
nameif outside
security-level 0
no shutdown
ip address 10.0.0.9 255.255.255.252
interface GigabitEthernet0/2
description to iosv-2
nameif outside-1
security-level 0
no shutdown
ip address 10.0.0.13 255.255.255.252
interface GigabitEthernet0/3
description to iosv-3
nameif outside-2
security-level 0
no shutdown
ip address 10.0.0.17 255.255.255.252
```

#### The access details are also updated.

http 0.0.0.0 0.0.0.0 level-50 ssh 0.0.0.0 0.0.0.0 level-50 telnet 0.0.0 0 0.0.0.0 level-50 http 0.0.0 0.0.0.0 mgmt ssh 0.0.0.0 0.0.0.0 mgmt telnet 0.0.0.0 0.0.0 mgmt http 0.0.0.0 0.0.0 outside ssh 0.0.0.0 0.0.0 outside telnet 0.0.0 0 0.0.0 outside-1 ssh 0.0.0.0 0.0.0 outside-1

```
telnet 0.0.0.0 0.0.0.0 outside-1
http 0.0.0.0 0.0.0.0 outside-2
ssh 0.0.0.0 0.0.0.0 outside-2
telnet 0.0.0.0 0.0.0.0 outside-2
```



AutoNetkit automatically renames the nameif if there are multiple interfaces with the same security level.

# **Configure GRE Tunnels**

Generic routing encapsulation (GRE) is a simple IP packet encapsulation protocol that is used to transport packets over a network. Information is sent from one network to the other through a GRE tunnel.

The GRE tunnel functionality uses the IOSv subtype as the GRE tunnel head and connects from an IOSv instance out over the FLAT/FLAT1/SNAT connector to some other device which is the far-end of the GRE Tunnel.

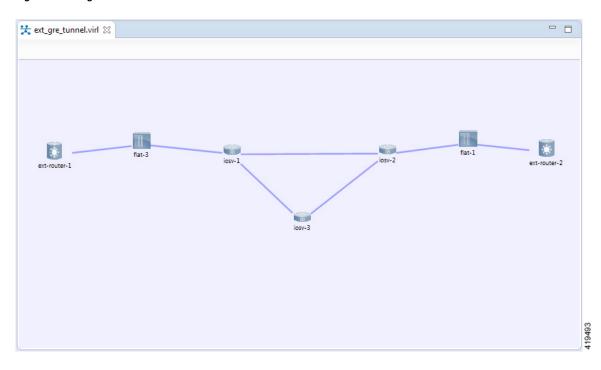


Figure 40: Using GRE Tunnels

In this example, you set the values on node iosv-1 and node iosv-2 to tell AutoNetkit to create the configuration for a GRE tunnel terminating on the external router node, ext\_router\_1.

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So on iosv-1, set the tunnel IP address and subnet mask of the far-end device ext-router-1. Similarly, on the ext-router-1, set the tunnel IP address and subnet mask of the far-end device iosv-1.

### Figure 41: Tunnel IP Address and Subnet Mask for ext\_router\_1

IPv4 Tunnel Enabled:	true Tefault
Tunnel IPv4 Address:	172.16.100.2
Tunnel IPv4 Netmask:	255.255.252
IPv6 Tunnel Enabled:	false 🔽 Default
Tunnel IPv6 Address:	
Tunnel IPv6 Netmask:	

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### Figure 42: Tunnel IP Address and Subnet Mask for iosv-1

IPv4 Tunnel Enabled:	true	- Default
Tunnel IPv4 Address:	172.16.100.1	
Tunnel IPv4 Netmask:	255.255.255.252	
IPv6 Tunnel Enabled:	false	▼ Default
Tunnel IPv6 Address:		
Tunnel IPv6 Netmask:		

On iosv-2, set the tunnel IP address and subnet mask of the far-end device ext-router-2. Similarly, on the ext-router-2, set the tunnel IP address and subnet mask of the far-end device iosv-2.

#### Figure 43: Tunnel IP Address and Subnet Mask for ext\_router\_2

- GRE Tunnel	
IPv4 Tunnel Enabled:	true 👻 Default
Tunnel IPv4 Address:	172.16.200.1
Tunnel IPv4 Netmask:	255.255.255.252
IPv6 Tunnel Enabled:	false Tefault
Tunnel IPv6 Address:	
Tunnel IPv6 Netmask:	

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#### Figure 44: Tunnel IP Address and Subnet Mask for iosv-2

IPv4 Tunnel Enabled:	true	-	Default		
Tunnel IPv4 Address:	172.16.200.2				
Tunnel IPv4 Netmask:	255.255.255.252			Tunnel IPv4 Address	
IPv6 Tunnel Enabled:	false	-	Default		
Tunnel IPv6 Address:					
Tunnel IPv6 Netmask:					

When the configurations are built, AutoNetkit selects the appropriate corresponding IP address and applies it to the interface as follows:

```
interface Tunnel1
ip address 172.16.100.2 255.255.255.252
tunnel source GigabitEthernet0/3
tunnel destination 0.0.0.0
```

The tunnel destination is blank since it needs to be set to the IP address of the far-end device, which you may or may not know in advance. However, you can edit the configuration in the Cisco Modeling Labs client GUI before you start up the simulation. So if you do know the target address, you can add the target IP address in there (tunnel destination x.x.x.x.) Remember that it is not the IP address of the tunnel that goes in here but the IP address of the router/device terminating the GRE tunnel itself. If this is a devices that is on the FLAT network directly, then a 172.16.1.x address would go in here.

To make things simple and repeatable, you can use a static IP address on the interface of the IOSv GRE tunnel device that connects to the FLAT/FLAT1/SNAT connector.

Figure 45: Static IP Address for flat-1

Key:	static_ip	
Value:	172.16.1.100	^
	4	•
Туре:	String	

Figure 46: Static IP Address for flat-2

Key:	static_ip	
Value:	172.16.1.101	*
	<	
Type:	String	•
	OK Cancel	

This provides a target address that the other device can then try to connect to and it is the same IP address each time the simulation is started.

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You cannot do this using the standard guest account. The simulation will fail as you are using a system-level resource (the Static IP address), so an account with administrative permissions is required.

You must create this account in the User Workspace Management interface.

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In the User Workspace Management interface, under the **Projects** tab, click **Add** to create a new project, as follows:

Figure 47: Create a New Project

# **Create Project**

General Settings		
Name	gre_tunnelling	
Description	Description	А
Expires	never	
Enabled		
Project Quotas		
Instances	100	C
RAM (MB)	512000	S
VCPUS	200	S
	Create Cancel	

I

In the corresponding user created for the project, set Role to admin.

### Figure 48: Update the Role Field

# Edit User gre\_tunnelling

Password	Password
Password again	Password again
Email	unset
Role	admin
Expires	never
Enabled	
SSH public key	unset
SSH host key	unset
	Save Cancel

In the Cisco Modeling Labs client GUI, choose **File** > **Preferences** > **Web Services**. In the **Web Services** dialog box, click **Change** under Master Credentials to login with the newly created user.

🔆 Preferences	
type filter text	Web Services 🗢 🗢 🗸 🗸
<ul> <li>General</li> <li>Appearance Compare/Patch Content Types</li> <li>Editors Keys</li> <li>Network Connectic Perspectives Reset all "Rememt</li> <li>Security</li> <li>Startup and Shutdc Web Browser</li> <li>Workspace</li> <li>Help</li> <li>Install/Update Node Subtypes</li> <li>Team</li> <li>Terminal Topology Editor</li> <li>Web Services</li> </ul>	Active profile: cml-3Latest
< >	✓ Store encrypted passwords in system's secure storage.         Restore Defaults
4	OK Cancel

#### Figure 49: Log In as New Role

You can now start your simulation.

# Automatic Configuration for OpenDayLight Controllers

Cisco IOS XRv virtual machines, version 5.3.0 and upwards can be automatically configured for communication and operation with an OpenDayLight (ODL) controller for path manipulation and control using MPLS TE tunnels. An option in available under the **AutoNetkit** properties tab in the Cisco Modeling Labs client called **ODL Management Group**. Cisco IOS XRv devices set with the ODL management group attribute must be paired with an external router entity, which is configured with the matching **ODL Management Group** attribute and an ODL external server IP address. The ODL server may be running on your Cisco Modeling Labs server or another location. It does not need to be part of the Cisco Modeling Labs simulation itself. However, connectivity between the simulation and the server must be provided.