



# Overview of Cisco Modeling Labs

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## Cisco Modeling Labs

Cisco Modeling Labs is a scalable and extensible software platform that enables operators, engineers, network designers, and architects to design Cisco-based networks and run simulations using virtual versions of selected Cisco operating systems. Cisco Modeling Labs comprises the Cisco Modeling Labs server and the Cisco Modeling Labs client. Together, they provide a sandbox environment that facilitates the design, configuration, visualization, and simulation of network topologies quickly and efficiently.

- **Cisco Modeling Labs server:** A shared resource containing the capability to initiate topologies using installed virtual images.
- **Cisco Modeling Labs client:** A point-and-click GUI that simplifies topology creation and initial device configurations along with continuous updates. It also permits access to the Cisco Modeling Labs server functionality.

## Scalability

Cisco Modeling Labs supports a maximum of 300 nodes, allowing users to create large topologies

Since many customers are building bigger and bigger topologies, the previous 200 node limit has been increased to 300 nodes. Used in conjunction with Cisco Modeling Labs clustering capabilities, the 300 node limit allows Cisco Modeling Labs customers to significantly improve their ability to run large simulations.



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**Note** However, this expanded capacity is limited by the underlying compute infrastructure. A simulation of 300 nodes may only be achieved when the bulk of the virtual nodes only require single vCPU allocations. The 300 node capacity might not be attained when employing node images requiring multi-vCPU assignments. Refer to the Cisco Modeling Labs resource calculator for further details.

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## Cisco Modeling Labs Client

The Cisco Modeling Labs client is a cross-platform user interface for creating and editing network designs and simulating those network topologies on the Cisco Modeling Labs server. The Cisco Modeling Labs client offers the following benefits:

- The ability to use a graphical point-and-click editor to quickly create and edit complex network topologies in a sandbox.
- Access to the build, visualization, and launch functions available in the Cisco Modeling Labs server.

The Cisco Modeling Labs client enables you to interact directly with your running simulations from the user interface. The Cisco Modeling Labs client also provides the functionality to generate default router configurations before launching the topology simulation.

For further information on the Cisco Modeling Labs client, see [Using the Cisco Modeling Labs Client Overview](#).

## Virtual Images

### **note**

The ability to run 300 nodes is dependent on available hardware resources. Multiple vCPUs are required some of the Cisco virtual nodes. It is important to understand the resources available and the amount of resources required to run any one simulation. To estimate required resources, refer to the Cisco Modeling Labs resource calculator.

Cisco Modeling Labs 1.5 includes the following images built into the Cisco Modeling Labs client:

- Cisco IOSv Software Release 15.6(3)T
- Cisco IOSv Layer 2 Switch Software Release 15.2 (03.2017)
- Cisco IOS XRv Software Release 6.1.3 CCO
- Linux server (Ubuntu 16.04.3 Cloud-init)
- Cisco ASAv Software Release 9.8.2
- Unmanaged Switch

Additionally, the following demonstration images are available from the Cisco FileExchange:

- Cisco IOS XRv 9000 Software Release 6.2.2 demo image
- Cisco CSR1000v Software Release 16.6.1b XE-based
- Cisco NX-OSv 9000 Software Release 7.0.3.17.1

See [Release Notes for Cisco Modeling Labs 1.5](#) for more information on Cisco virtual software supported features.

## Cisco Modeling Labs Server Requirements

This section details the hardware and software requirements for installing the Cisco Modeling Labs server. The following table lists hardware requirements that are based on the number of virtual nodes used. The recommended servers for Cisco Modeling Labs are the Cisco UCS C220 M4 and Cisco C460 M4 servers.



### Important

4K sector drives are not supported.

For more information on UCS servers, see the applicable data sheets at <http://www.cisco.com/c/en/us/products/servers-unified-computing/ucs-c-series-rack-servers/index.html>.

For bare metal installations, Cisco Modeling Labs ISO package is certified only with the Cisco UCS C220 M4 and Cisco C460 M4 servers.

### Sizing the Server: Number of Cores and Memory Requirements

The calculation for the number of cores and memory requirement is dependent on a number of factors:

- Type and number of virtual machines concurrently active
- Number of routing protocols
- Timer sets within the configurations
- Amount of traffic generated

The general rule of thumb is three virtual nodes to one physical core CPU for simulation of 49 nodes and below, and two virtual nodes to one physical core CPU for 50 nodes and above.



### Note

In order to size the Cisco Modeling Lab Server resources, you must use the Cisco Modeling Labs resource calculator available at <http://www.cisco.com/go/cml>

**Table 1: Software Requirements**

Requirement	Description
VMware	

Requirement	Description
VMware vSphere	<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• Release 5.1 U2 (Build 1483097) with VMware ESXi</li> <li>• Release 5.5 U1 (Build 1623387) with VMware ESXi</li> <li>• Release 6.0 (Build 2494585) with VMware ESXi</li> <li>• Release 6.5 (Build 4564106) with VMware ESXi</li> </ul> <p><b>Note</b> You must verify that you are using vSphere Client v5.5 Update 2 (Build 1993072) or later before deploying Cisco Modeling Labs. Failure to use the minimum version will result in a failed deployment that will return an error stating that nested virtualization is not supported.</p>
Browser	<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• Google Chrome 33.0 or later</li> <li>• Internet Explorer 10.0 or later</li> <li>• Mozilla Firefox 28.0 or later</li> <li>• Safari 7.0 or later</li> </ul> <p><b>Note</b> Internet Explorer is not supported for use with the AutoNetkit Visualization feature, the Live Visualization feature or with the <b>User Workspace Management</b> interface. See <a href="#">Cisco Modeling Labs Corporate Edition User Guide, Release 1.5</a> for more information.</p>

Table 2: Required BIOS Virtualization Parameters

Name	Description
Intel Hyper-Threading Technology	<p><b>Note</b> This parameter must be <b>Enabled</b>.</p> <p>The processor uses Intel Hyper-Threading Technology, which allows multithreaded software applications to execute threads in parallel within each processor. The processor can be either of the following:</p> <ul style="list-style-type: none"> <li>• <b>Enabled</b>—The processor allows for the parallel execution of multiple threads.</li> <li>• <b>Disabled</b>—The processor does not permit Hyper-Threading.</li> </ul>
Intel VT	<p><b>Note</b> This parameter must be <b>Enabled</b>.</p> <p><b>Note</b> If you change this option, you must power-cycle the server before the change takes effect.</p> <p>The processor uses Intel Virtualization Technology (VT), which allows a platform to run multiple operating systems and applications in independent partitions. The processor can be either of the following:</p> <ul style="list-style-type: none"> <li>• <b>Enabled</b>—The processor allows multiple operating systems in independent partitions.</li> <li>• <b>Disabled</b>—The processor does not permit virtualization.</li> </ul>

Name	Description
Intel VT-d	<p><b>Note</b> This parameter must be <b>Enabled</b>.</p> <p>The processor uses Intel Virtualization Technology for Directed I/O (VT-d). The processor can be either of the following:</p> <ul style="list-style-type: none"><li>• <b>Enabled</b>—The processor uses virtualization technology.</li><li>• <b>Disabled</b>—The processor does not use virtualization technology.</li></ul>

## Cisco Modeling Labs Framework

Cisco Modeling Labs includes numerous features that enable you to create and simulate small and large network designs. This user guide is organized in a task-based format where the main features are grouped into four sections that are referred to as phases.

The following items describe each phase which should help you determine, which section to refer to when using this guide:

## Topology Node Count Changes

In previous releases of Cisco Modeling Labs, the capacity calculation rules were applied on a per-simulation basis. This meant that with a 35-node license, the largest topology that you could theoretically launch would be one with up to 35 Cisco virtual machines (not including 3rd party VMs or containers.) Any topology that exceeded the 35 nodes would be rejected, irrespective of the node's run state.

Changes introduced in this release mean that the capacity calculation is now performed on a per-node basis. This means that you are now able to launch up to 35 nodes (assuming a 35 node license) of a much larger topology by selecting which nodes would be started. For example, if you have a 40 node topology, you are able to mark 5 out of the 40 as **Excluded from launch**.

Once started, you are able to stop nodes and start other nodes in the topology, as long as you remain within the total node count capacity of your license.

