



# CCIE Routing and Switching Lab Builder

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# CCIE Routing and Switching Lab Builder Overview

The CCIE<sup>®</sup> Routing and Switching Lab Builder is a web-based environment for designing and running a network of routers and switches that run Cisco IOS<sup>®</sup> on Linux. It's designed to help Cisco<sup>®</sup> CCIE Routing and Switching candidates like you prepare for their lab exam. It lets you create network topologies to practice deploying configurations, troubleshooting, and gaining the hands-on practice of working with the IOS technologies included in the exam blueprint.

The CCIE Routing and Switching Lab Builder uses the following components:

- **Topology Builder**  
In this environment, you drag and drop icons of routers and switches onto a canvas or workspace. You can then:
  - Specify the device name and IOS version
  - Set an initial configuration
  - Add or remove modules of Ethernet and Serial interfaces
  - Specify the memory allocated to the device
  - Connect the ports from different devices together to create a network

Finally, you can launch the network topology and interact with the devices.

- **Active Topology Run Environment**  
This environment is accessed by selecting **RUN on IOL** from the Topology Builder. You can connect to the console lines to interact with the IOS on Linux devices, and further deploy configurations or experience hands-on how the IOS technologies work in the IOS on Linux environment. The running environment can be saved for later use through the **Save for Distribution** capability.
- **Virtual Images**  
You can select from several IOS on Linux images to use on each device, respectively. The system includes images in the same release as those used in the actual CCIE Lab Exam.

# System Requirements

This section covers the system requirements for the CCIE Routing and Switching Lab Builder.

## CCIE Routing and Switching Lab Builder: End-User System

The following are the minimum hardware and software requirements to support access to the CCIE Routing and Switching Lab Builder:

**PC:**

RAM: 2 GB

Disk Space: 150 MB

Network: Any standard IP-based (non-serial, using IPv4) network card

Windows XP, Windows 7, or Windows 8

Terminal Emulation Application (Putty, Secure CRT)

Web Browser (Internet Explorer 11, Firefox 31, Chrome 37)

**Mac:**

RAM: 2 GB

Disk Space: 150 MB

Network: Any standard IP-based (non-serial, using IPv4) network card

MAC OS 10.8 or OS 10.9

Terminal Emulation Application (Terminal, iTerm2)

Web Browser (Safari 7, Firefox 31, Chrome 37)

**Linux:**

Linux is not officially supported at this time.

**Tablets:**

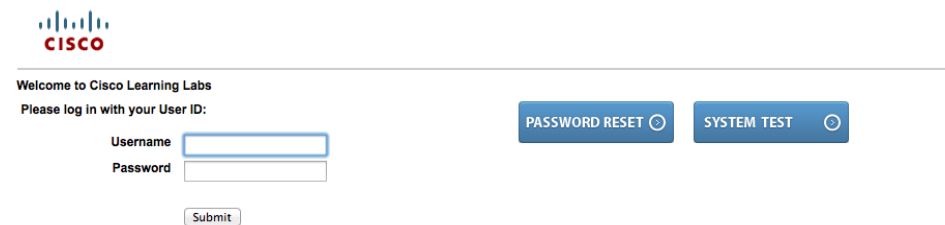
Tablets are not officially supported at this time.

# CCIE Routing and Switching Lab Builder: Access

This section summarizes the methods to access the CCIE Routing and Switching Lab Builder.

## Access

The CCIE Routing and Switching Lab Builder is accessed at <https://cli1.cisco.com>. Enter your username and password to access your CCIE Routing and Switching Lab Builder account. Use the password reset and system test functionality as needed.



Welcome to Cisco Learning Labs

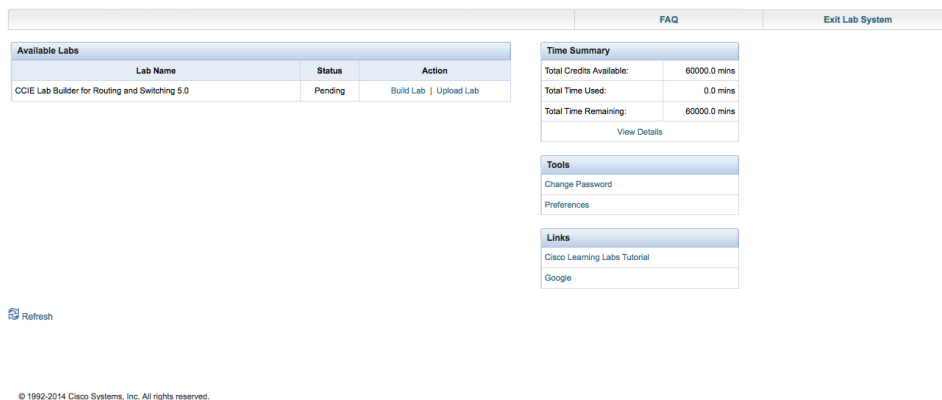
Please log in with your User ID:

Username

Password

## Product and Home Page

Upon successful authentication, you're presented with the Cisco Learning Lab Home Page. If there are multiple Cisco Learning Labs available to you, they'll be listed on the Home Page. If CCIE Routing and Switching Lab Builder is the only product in your inventory, you'll see the CCIE Routing and Switching Lab Builder Product Page.



FAQ Exit Lab System

Available Labs			
Lab Name	Status	Action	
CCIE Lab Builder for Routing and Switching 5.0	Pending	Build Lab	Upload Lab

Time Summary

Total Credits Available:	60000.0 mins
Total Time Used:	0.0 mins
Total Time Remaining:	60000.0 mins

[View Details](#)

Tools

[Change Password](#)

[Preferences](#)

Links

[Cisco Learning Labs Tutorial](#)

[Google](#)

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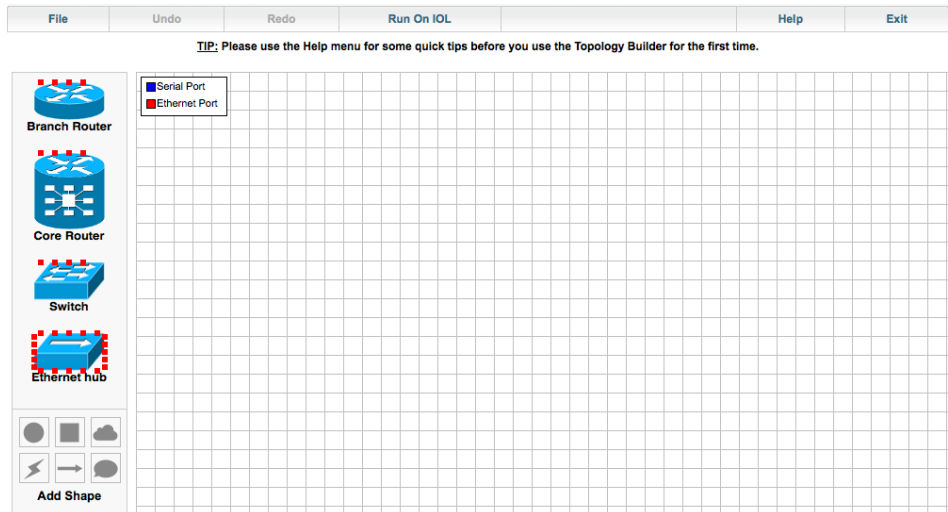
Once at the CCIE Routing and Switching Lab Builder product page, you can take one of two actions, Build Lab or Upload Lab.

# CCIE Routing and Switching Lab Builder: Build Lab

The CCIE Routing and Switching Lab Builder allows you to build a network topology from the Topology Builder.

## Topology Builder

The Topology Builder is the drag-and-drop environment where you can layout the network devices and connect ports together to create a network topology.



The left frame shows the inventory available to you. This includes two types of routers, the Branch Router and Core Router. They're essentially the same device, except that the Core Router permits more modules to be deployed and more memory to be assigned to the device. It's recommended that you use the Branch Router, unless the port and memory requirements for your network exceed the capacity of the Branch Router.

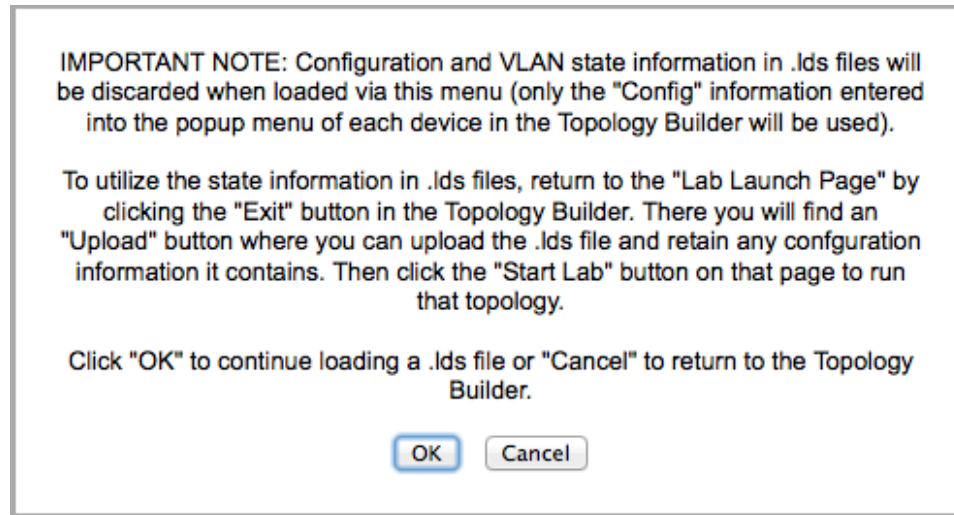
The Switch is a Layer-2 and Layer-3 device that can be used to provide both routing and switching solutions. The Ethernet Hub is a Layer-1 type device that lets you put multiple devices onto the same Ethernet line segment. Also in the inventory are the shape icons that permit you to customize the look of the topology by adding circles, ovals, squares, rectangles arrows, callouts, and clouds to the diagram.

At the top of the Topology Builder screen is a centralized toolbar. Here, you can select from multiple dropdown menus to access additional features:

### File

- **New Topology:** Select to clear any existing topology and begin with an empty topology canvas.
- **Save Lab as .Idc file:** Select to save the current design to the .Idc format. The .Idc format allows further manipulation in the Topology Builder environment.
- **Load Lab from .Idc file:** Select to load a previously saved .Idc file back into the Topology Builder for further manipulation and design work.
- **Load Lab from .Ids file:** Select to load from previously run lab design saved for distribution in the .Ids file format. When this is selected, there are limitations to what's

imported back into the Topology Builder. Vlan.dat state, and any configuration beyond what was initially included in the popup menu in the Topology Builder in the .lds files is not included.

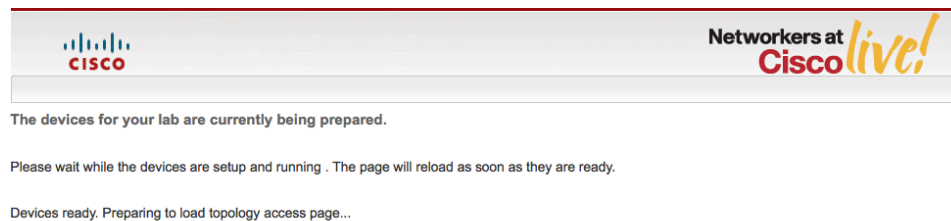


### Undo and Redo

- These buttons let you undo or redo the last manipulation. You can undo up to the initial action taken at the start of the topology builder session.

### Run On IOL

- This button will launch the existing topology in the Active IOL Run Environment. Once selected, you're presented with an intermediary web page in a new popup, detailing that the selected topology is being brought into a running state.



- Once the devices are active, you're presented with a clickable topology of the network.

### Help

This button provides access to the following information:

- **Adding devices to your topology:**
  - Drag icons from the palette on the left onto the canvas. This will open a configuration menu for that device:
    - You can reopen the menu for each device later by relicking the appropriate device.

- You **must** assign a **unique** label to each device.
  - You should also assign at least one four-port module or Ethernet or Serial to each device.
  - You can optionally enter a startup configuration for each device.
  - Some devices will let you select different image types and set memory for the image.
- **Double-click on empty space in the canvas to add a text label:**
  - This will insert placeholder text; double-click it to edit it.
  - While the text is selected, press the plus ("+") key to increase the text size (or minus ["-"] to shrink it).
  - You can insert text labels for any use you desire: for example, a header at the top of the diagram, a name for each device, IP addresses, miscellaneous notes, and more.
- **Making connections:**
  - Hold your mouse over the red Ethernet ports or blue Serial ports for the **slot or port** number.
  - Drag one red Ethernet port (or blue Serial port) to another port of the same type to create a connection.
  - The Ethernet hub can be added for Ethernet ports that aren't point-to-point.
- **Editing connections:**
  - Select one or more connections by:
    - Clicking directly on the connection line (hold the "Shift" key to select multiple connections).
    - Dragging a selection box over one or more connections.
  - Selected connections will turn bright green.
  - Toggle between Manhattan and Straight Line routing on selected connections by pressing the "S" key.
- **Adding and editing shapes:**
  - Click the desired shape icon in the left palette, and it will appear on the canvas.
  - Resize or rotate the shape using the handles.
  - To lock dimensions when scaling, double-click the shape.
- **To remove a link, text label, and more:**
  - Either:
    - 1) Use the Undo button on the menu bar (this can be useful if you just added the item you want to remove).
    - 2) Select the item and press the "Delete" key.
- Labs can be saved offline for later use by using the File, Save Lab menu option (and reloaded by using File, Load Lab).

## Sample Configurations for a Quick Two-Router Topology

Note: Use with two routers where you have connected e0/0 on the devices together. It simply puts IPs on the e0/0 interfaces, adds a loopback on each device, and supports basic EIGRP routing. Once the routers boot, you should be able to see the loopback on the adjacent router in "sh ip route."

**R1:**

```
hostname R1
int e0/0
 ip addr 1.1.1.1 255.255.255.0
int lo0
 ip addr 1.1.99.1 255.255.255.255
router eigrp 10  network 1.0.0.0
end
```



**R2:**

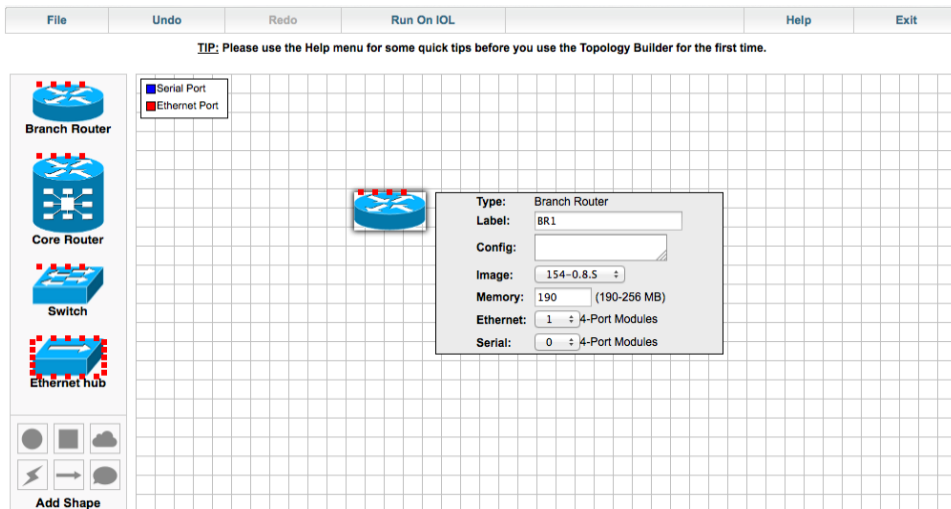
```
hostname R2
int e0/0
 ip addr 1.1.1.2 255.255.255.0
int lo0 ip addr 1.1.99.2 255.255.255.255
router eigrp 10
 network 1.0.0.0
end
```

**Exit**

- This button will end the topology design session.
- No automatic saving of the topology is provided.

## CCIE Routing and Switching Lab Builder: Adding a Device

To begin creating a new topology, click on a device from the inventory frame, then drag and drop it onto the canvas.



Once the device has been dropped onto the topology canvas, you can enter and select multiple aspects to the new device:

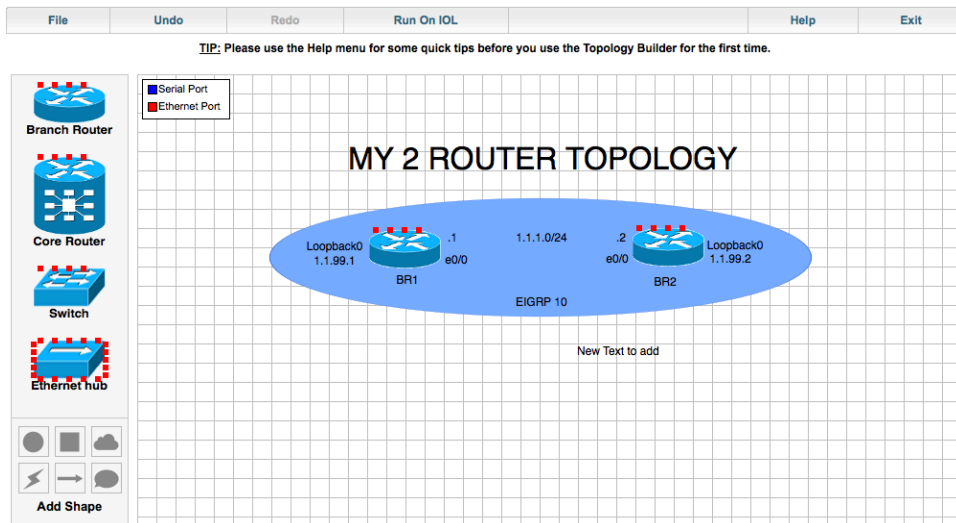
- **Type:** This shows the type of device, which can be Branch Router, Core Router, or Switch.
- **Label:** This is the name the system will use as a reference to the virtual device at run time. This value may or may not match the hostname of the device. For ease of use, it's recommended that the Label and Hostname match. The Label will be automatically incremented, although you can change the value. Label values need to be unique across the topology.
- **Config:** This is the initial configuration you want applied upon startup or reboot of the device. You must configure an IP address configuration without errors on at least one Ethernet, Serial, or Loopback interface to avoid the initial configuration

dialog. You can copy and paste an entire configuration. Clicking in the text box will expand it in size, and it can be further resized by clicking and dragging the resize handle in the lower right of the text box.

- **Image:** This dropdown menu allows you to select the specific version of IOS on Linux to boot the device with. It's recommended that you select the release that matches to the release in the blue print of the exam, but other releases are provided for exploration.
- **Memory:** This text box allows you to allocate memory from a minimum to maximum value for the device. If you experience memory allocation errors, it's recommended you increase the value of memory assigned to the device.
- **Ethernet:** This dropdown menu allows you to allocate the number of four-port Ethernet modules on the device. The maximum number of Ethernet modules is four on a Branch Router, five on a Core Router, and six on a Switch. Any use of Serial modules on the device will reduce the maximum number of Ethernet modules by the same amount.
- **Serial:** This dropdown menu allows you to allocate the number of four-port Serial modules on the device. The maximum number of Serial modules is four on a Branch Router and five on a Core Router. No Serial modules are permitted on a Switch. Any use of Ethernet modules on the device will reduce the maximum number of Serial modules by the same amount.

## CCIE Routing and Switching Lab Builder: Adding a Text Label

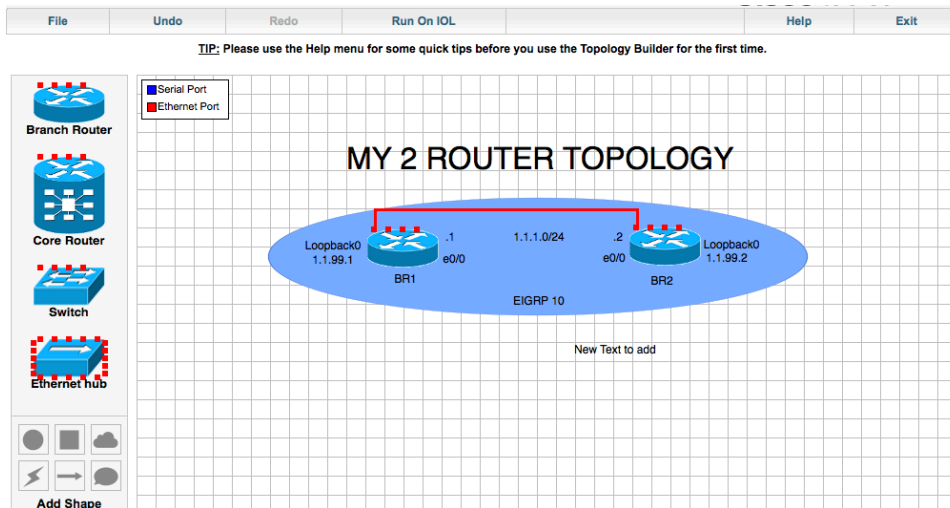
To add text to your topology, simply double-click in an empty space on the topology canvas. Double-click on the text labeled "Doubleclick to edit" to edit the text. Press the return or enter key to complete editing the text. Single-click on the text and drag to move the text into position. Use the "+" and "-" keys to resize the text as desired.



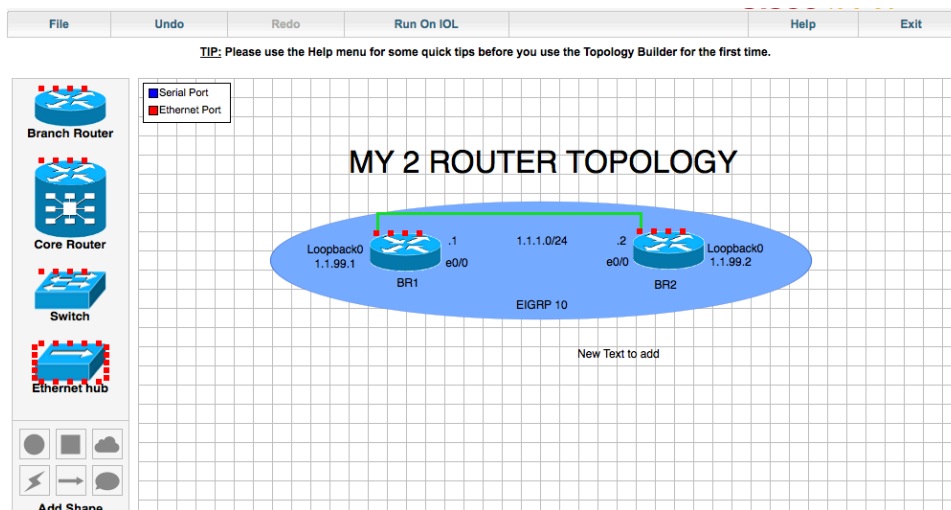
# CCIE Routing and Switching Lab Builder: Making Connections

To connect ports together on different devices, hold your mouse over the Red Ethernet ports or Blue Serial ports for the **slot or port** number to be used. Drag one red Ethernet port (or blue Serial port) to another port of the same type on another device to create the connection. Use the Ethernet hub for connecting multiple Ethernet ports to the same line segment.

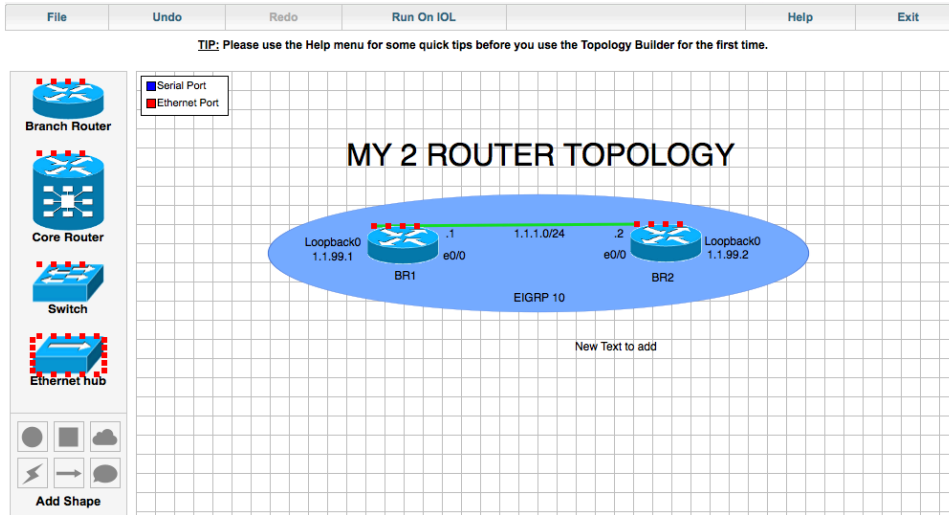
Two routing methods are provided. The default connection routing method is Manhattan Routing. All connections in Manhattan Routing are made with up to two 90-degree turns between end points, until the connection is made.



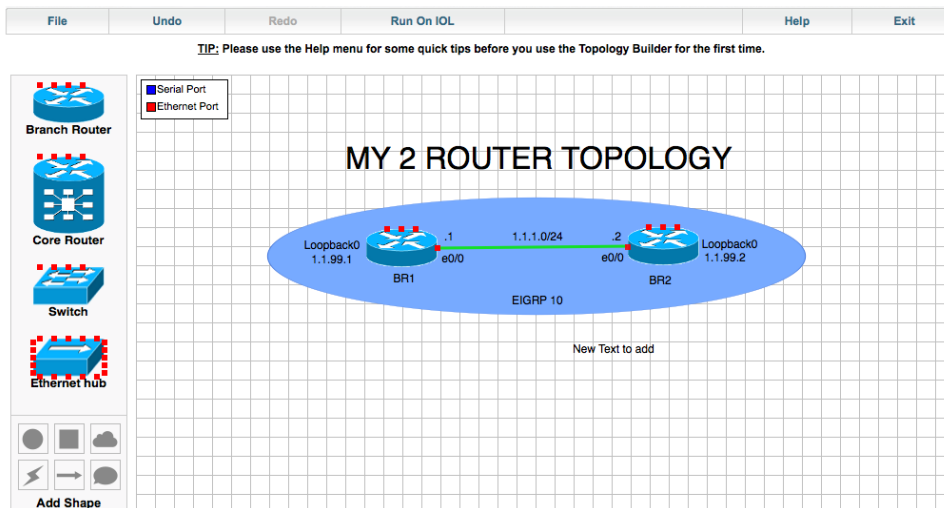
The optional routing method is Straight Routing. To toggle between Manhattan Routing and Straight Routing for an individual connection, click on the connection until the connection turns green to indicate it's selected.



Then press the "S" key to toggle between Manhattan and Straight Line Routing.

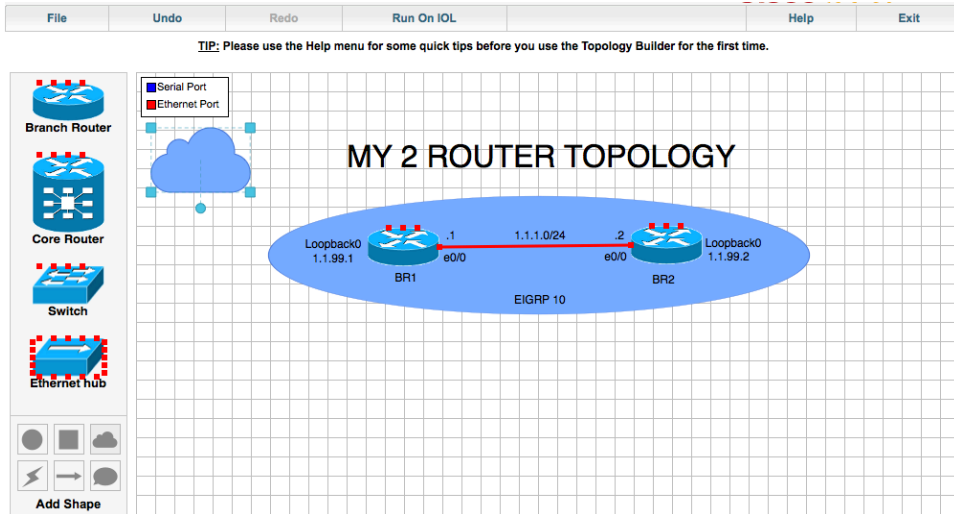


To adjust the location of a port, click and hold the red Ethernet or blue Serial port, and drag it to a location not occupied by an existing port on the device.

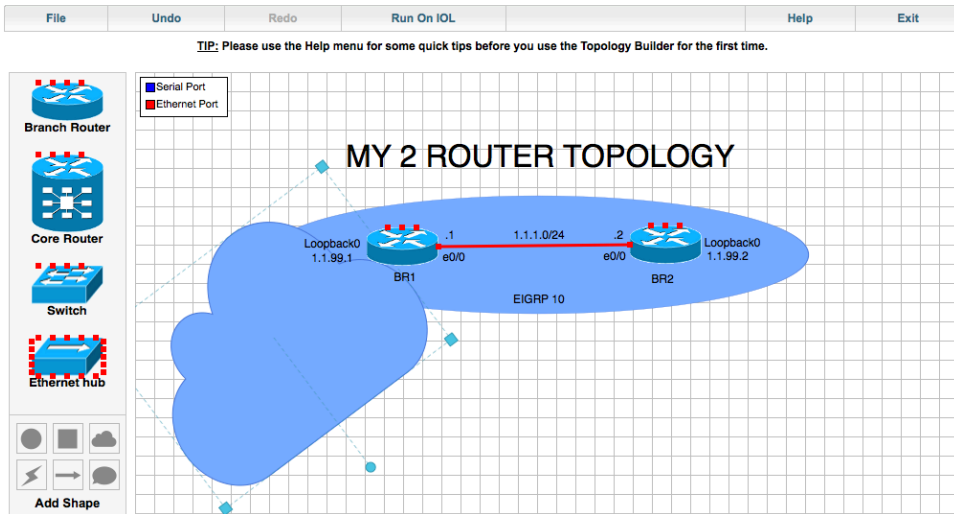


# CCIE Routing and Switching Lab Builder: Adding and Editing Shapes

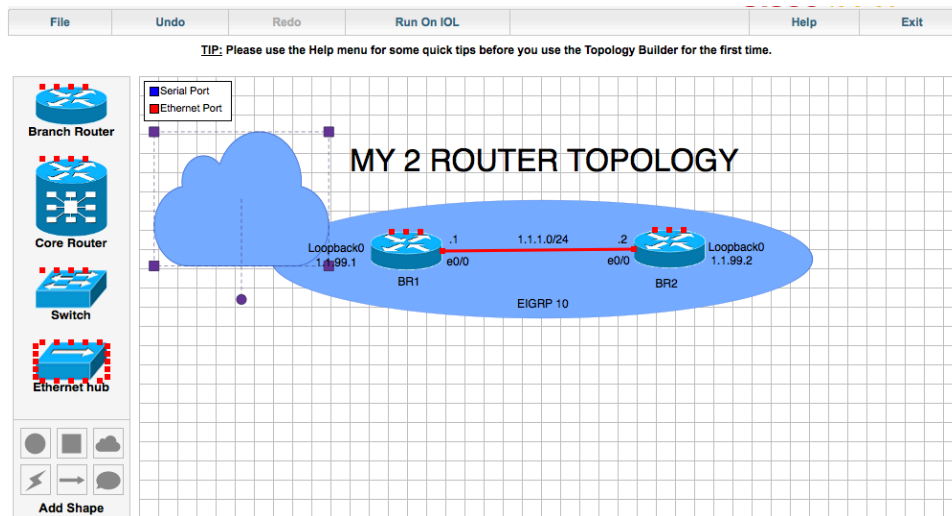
To add a shape to the topology, simply click on the desired shape in the left frame, and the icon will appear in the top left of the canvas.



You can resize or rotate the shape, using the handles at the corners or bottom of the shape.



To lock dimensions when scaling, double-click the shape. When purple handles appear on the shape, the dimensions are locked.

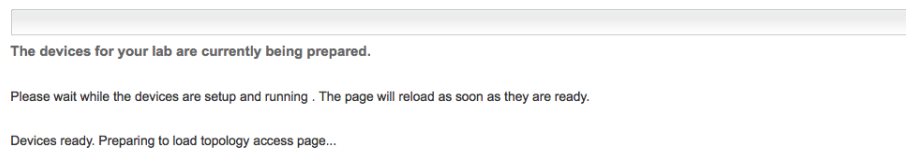


## CCIE Routing and Switching Lab Builder: Removing Items

To remove a device, link, text, or shape, click on the item to select it. Then use the “Delete” or “Backspace” key to remove the item. If the item was the last item added to the topology, you can alternatively use the “Undo” key.

## CCIE Routing and Switching Lab Builder: Run On IOL

Once you have your network designed and any configuration you desire entered into to each device, click on the **Run on IOL** button. A pre-launch screen will be displayed, while the system launches the virtual routers and switches in your topology.

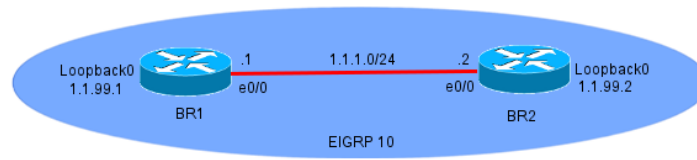


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Once all the devices have started successfully, the pre-launch screen will close, and the Active Lab will be displayed.

Running BYO lab CCIE Lab Builder for Routing and Switching 5.0

## MY 2 ROUTER TOPOLOGY



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## CCIE Routing and Switching Lab Builder: Console Connection

In the Active Lab, simply click on a router or switch to gain access to the console of the device. The Telnets are configured to traverse on TCP ports above 30000. If TCP ports above 30000 are not permitted on the network that you're accessing CCIE Routing and Switching Lab Builder from, you won't be able to connect to the console. You need to have a terminal application installed and your web browser needs to be configured to handle the Telnet:// url properly.

You can download a modified version of PuTTY on the Cisco Learning Labs Home Page, once you authenticate at <https://cl1.cisco.com>. Mac OSX users can use the default terminal or other terminal application, such as iTerm2, available at <http://iterm2.com/>.

## CCIE Routing and Switching Lab Builder: Save for Distribution

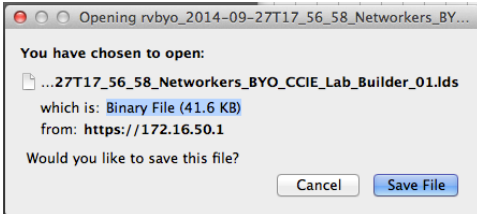
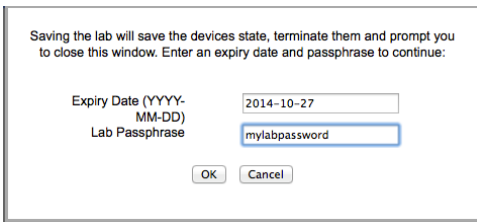
In the Active Lab, you can save your running lab setup for distribution. Click on the **Save for Distribution** button on the main toolbar.

Running BYO lab CCIE Lab Builder for Routing and Switching 5.0

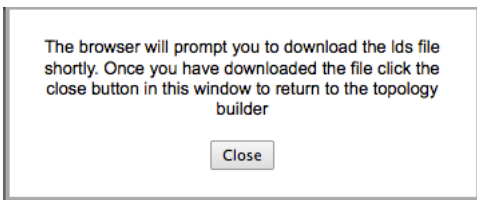
## MY 2 ROUTER TOPOLOGY



You need to set an expiration date and a passphrase to protect the lab, then click **OK** to permit the system to connect to the devices, collect the configuration of the devices, and create the .lds file for distribution. Finally, click on **Save File** to download the .lds information.



Finally, select **Close** to return to the topology builder.



There is no option to continue in the active lab environment.

## CCIE Routing and Switching Lab Builder: Switch to Web Telnet

If Telnet on TCP ports above 30000 is not permitted from your network, use the Web Telnet feature in CCIE Lab Builder. This creates a tabbed window environment, where the clickable topology diagram and Telnet connections can be tabbed. To access the console of a device, simply click on the device icon in the diagram, then click in the subsequent tab for that device to select it.

To open more console connections, click on the diagram tab, click on the desired device, then click in the new tab to select it and activate the connection.

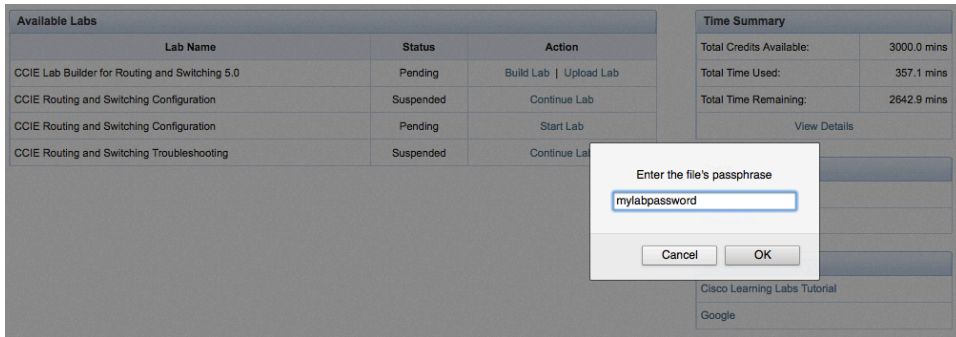
## CCIE Routing and Switching Lab Builder: Close

When you've finished your lab exercise, save the configurations of the devices if you want, and exit the lab. You can continue where you left off with that lab by selecting **Continue Lab** at the resulting product page. You can only continue the last lab you ran. If you load a lab by using a .lds file, you can start at the configuration state of the .lds file.

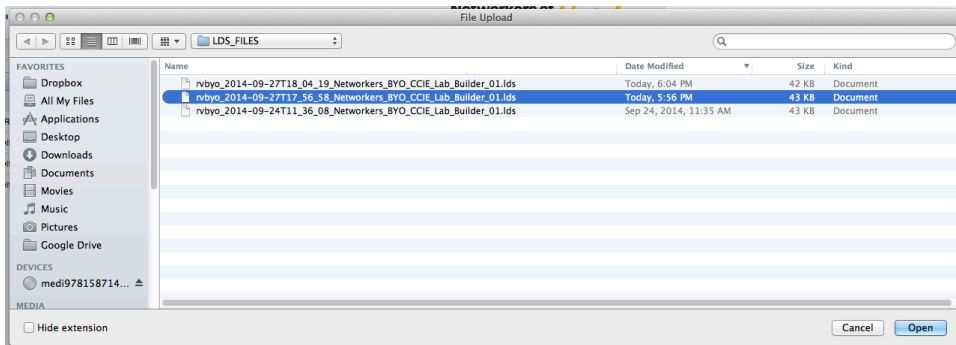


## CCIE Routing and Switching Lab Builder: Upload Lab

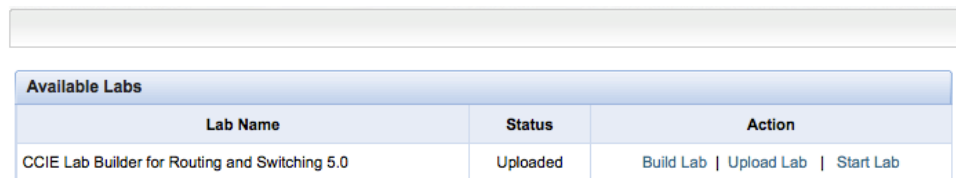
From the CCIE Routing and Switching Lab Builder product page, you can upload an existing lab in the .lds format, provided you have the passphrase used when the .lds file was created. Select **Upload Lab**, enter the passphrase, then select **OK**.



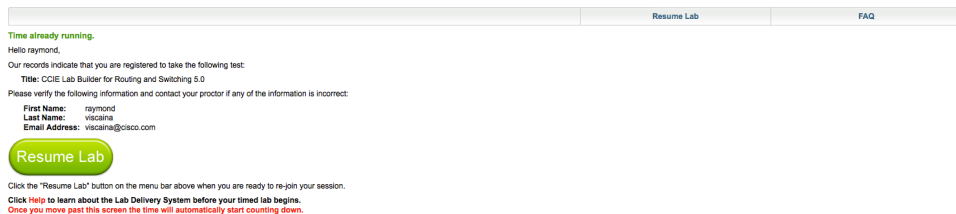
Select the .lds file to upload and select **Open**.



Now select **Start Lab** from the product page.

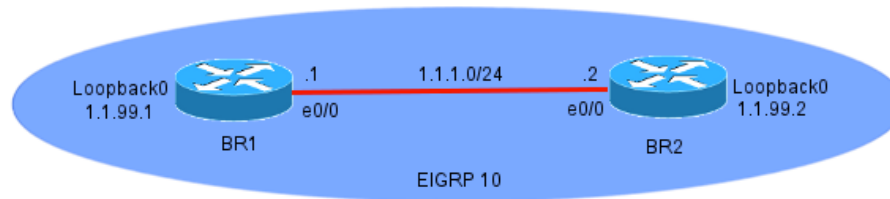


After selecting **Start Lab**, a pre-launch screen will be presented. Once the lab is ready to be accessed, a **Start Lab** or **Resume Lab** button will be displayed. Select **Start Lab** or **Resume Lab** to access the active lab.



After the lab starts, you'll see the clickable topology. You can access your devices by clicking on the device icon.

## MY 2 ROUTER TOPOLOGY



### Cisco IOS on Unix and IOS on Unix L2 Supported Features

Cisco IOS on Linux and IOS on Linux Layer 2 provide a robust feature list. Since this is still a virtual environment, any hardware-related functionality, including some Layer 2 functions, are not supported.

### CCIE Routing and Switching Lab Builder: Frequently Asked Questions (FAQs)

#### Virtual Cisco IOS Software Labs

##### What is IOL? (IOS over Linux)

- It's a Cisco software program that currently runs IOS as a Linux user-mode application
- It offers much faster packet processing, switching, and reloads
- It's not an IOS simulator because it runs real Cisco IOS code.
- It doesn't emulate other Cisco hardware; it's platform-independent

With CCIE Lab Builder, CCIE Routing and Switching candidates can virtually access and implement routing and Layer 2 core switching lab configurations over the Internet—from the convenience of a personal computer.

Many networking learners struggle with gaining access to physical lab gear, or have to deal with the costs and time of setting up a home lab. But CCIE Lab Builder provides a hassle-free solution for gaining an economical and authentic lab experience.

##### How do I access CCIE Lab Builder?

The CCIE Lab Builder is presented using a web-based interface. You'll see a topology design tool and an active lab window with a clickable interface. These will easily bring you to the command line of any device, just by clicking on the device shown on the lab image presented.

The CCIE Lab Builder product is accessed through the Cisco Learning Labs portal, located at <https://cll1.cisco.com>. You'll need the unique username and password that was provided to you in an email at the time of product purchase. Please refer to that email for login credentials, as well as important support information contained within the package sent. If you cannot locate the original email, please contact customer support or perform a password reset at <https://cll1.cisco.com>.

### **I forgot my password. How do I access CCIE Lab Builder?**

The Cisco Learning Labs portal allows you to perform a password recovery. Simply browse to <https://cll1.cisco.com> and select **Password Reset**. Enter the email address associated with your account, then follow the instructions that will be emailed to you.

### **How do I use the Cisco Terminal Installer?**

The Cisco Terminal Installer file found on the Cisco Learning Labs Portal includes a modified version of the PuTTY terminal emulation software. It also includes a registry modification tool that allows newer versions of Windows Internet Explorer to launch Telnet applications directly from the browser interface. Once you download the package, run the file and follow the installation instructions.

### **Telnet is not allowed on my network. What do I do?**

If the Telnet protocol or the TCP ports above 30,000 are not permitted on your network, use the Web-Based Telnet within Cisco Learning Labs. You can set Web-Based Telnet in the preference section of Cisco Learning Labs once you login, or you can switch to Web-Based Telnet from within an active lab exercise by clicking on the **Help and Settings** link and selecting the **Switch to Web-Based Telnet** link.

### **Where can I find more information and help regarding Cisco Lab Builder in Cisco Learning Labs?**

To access a forum that's dedicated to Cisco Learning Labs and CCIE Lab Builder, please log into the Cisco Learning Network (registration required) and access the forum at: <https://learningnetwork.cisco.com/groups/cll>.

## **CCIE Routing and Switching Lab Builder: Support**

For support with CCIE Lab Builder, please use the following contacts:

- Email [cll-info@cisco.com](mailto:cll-info@cisco.com) for general questions
- Open an online case at [www.cisco.com/go/certsupport](http://www.cisco.com/go/certsupport)
- Call a Customer Support Agent at 1-800-553-6387 (United States and Canada)
- International customers, click [here](#), then select your country under the Regional Certification Support Phone Numbers