

CCNA Lab Suggestions

Many people ask me what would make a good CCNA lab? Well, that can be a tricky question based upon your budget and future Cisco aspirations. So let's start off with a few basic concepts I hope we can all agree on.

- 1) You need a physical router as the simulators just don't have the ability to give you the "hands on" you need to see what happens when you disconnect a cable, put a cable in the wrong location or just plain configure the interface incorrectly. Dependant on what you do by mistake, you may see either the interface or protocol go down and based upon that it should give you a clue of where to start troubleshooting (hint, what layer is the interface at and what layer is the protocol at?). Anyway, you will come to find quite quickly that mistakes you make on Router 1 are affecting Router 4 all because you did not screw in a cable properly. No simulator can simulate that, so a router is invaluable.
- 2) Two routers really are required to see if anything works. If you have a very limited budget, you can receive value from only purchasing a single router over working with a simulator. However, you will not be able to see the main thing we are trying to accomplish. The propagation of route tables and the routing of data! The only way you can see if your configurations work, is to have **at least** two routers. That said, if you can afford a kit with more than two routers, it will enable you to exercise more complex scenarios. Therefore, I strongly recommend that you purchase a dual router kit or better that comes with all the accessories you need. Otherwise you can spend days or weeks trying to find all the little extra pieces you need to get your lab up and running. I mention this as some other resellers are selling their kits with 2500 routers and they are not including transceivers. Well how will you use the Ethernet AUI ports without them?? So this is basically how I view it. One router will give you the ability to run the commands on the switch and allow you to memorize the correct syntax and context in which to run the commands. Two routers will allow you to router table information propagate, data propagation and path election. In addition, you will see basic device elections. With three or more routers you will get all of the above and full device elections.
- 3) Do I need a switch? Well, it is a nice to have for the CCNA track. However, with only about 2 questions on the test dedicated to "hands on" switch knowledge, you can make it by without a switch. Most of the information on the test will reference material that is memorization based such as "What is a Layer 2 protocol used to maintain a loop-free network?" Thank goodness we memorized STP. That said, it would be nice for us to be able to actually "see" the switching concepts work. So this is basically how I view it. One switch will give you the ability to run the commands on the switch and allow you to memorize the correct syntax and context in which to run the commands. It will also allow you to do some of the VLAN labs. Two switches will allow you to see VTP Domain & VLAN information propagate. In addition, you will see basic device elections. With three or more switches you will get all of the above and full device

elections. Remember, we are only at the CCNA level right now. If you ask me do I need a switch for my CCNP studies? Most definitely (you will need three full featured switches)! If you have to skimp on something at the CCNA level, skimp on the switch in my opinion.

- 4) Do I need to worry about ISDN? Yes. It is still on the CCNA test. All of my dual router kits for CCNA have either a built-in ISDN port or I have added a module to support ISDN features. Many other resellers neglect ISDN. Trust me, it is not wise as it is on the test! Now that said, I want to explain my logic behind how I do my kits for ISDN, but we can modify this to meet your needs. As I mentioned, most of my kits include support for ISDN. I generally only put support for ISDN on one device. This will only give you the ability to proactive your command syntax and make sure you are entering the command at the correct portion of the IOS tree. You may ask why? Well to have ISDN really work in your lab environment, you need an ISDN simulator. An ISDN simulator runs over \$500 and as I am sure you are aware, that is more than the price of my of the router kits. So if you are on a limited budget, this is the last place I would spend my money. But if you want a full functioning ISDN environment so you can practice for your CCNA test, make sure you have two routers that support ISDN and one ISDN simulator. Finally, a way to work around this exorbitant cost, is to rent my CCNA rack rental for a weekend so you can practice your ISDN commands with the simulator there as that is much, much cheaper.

Now choices, choices, choices. Which 2500/2600 router do I pick? Well, we have many choices which I will list below with some pros and cons to each. I will also include a table at the end of this document to visually aid you in seeing the features of each router. I suggest no matter which router you get, you max out the DRAM and Flash so you can run Enterprise IOS. The 2500s max out at 16 MB DRAM and 16MB Flash and the 2600s max out at 64 MB DRAM and 16 MB Flash.

- 1) Cisco 2501 Router with 16 MB Flash/16MB DRAM The cheapest introduction router which can support a vast majority of the commands that you will need to learn for your CCNA test. You will need to add a transceiver to this unit to convert the Ethernet AUI port to an RJ-45 style Ethernet port.
- 2) Cisco 2502 Router This is a Token Ring router and for that reason many people are of the opinion that it has no use in today's lab setups. I disagree. I will try to explain why. If you are trying to keep costs down, and you want to add a third router into your setup, you can put this router in between your two other routers. Here is the situation. On Router A(2501), you have your back to back cable connected to Serial 0 which then connects over to Router B(2502) to Serial 0. Then again on Router B(2502), you have another back to back cable connected to Serial 1 which connects to Router C(2501) on Serial 0 of Router C. Now you just made a more complicated lab with a low cost router that many people might throw out otherwise. You don't have to use the Token Ring features, but the Serial ports and the propagation of router tables still work the same way. There are also some other tricks you can do such as turning it into a very cheap two router frame-relay switch. Would it be better to have 3 or 4 routers in your

frame-relay cloud? Sure, but we can't all afford to have 4 to 5 routers in our labs.

- 3) Cisco 2503 Router with 16 MB Flash/16MB DRAM This is the same as a Cisco 2501 except it adds an ISDN BRI port so you can complete all your ISDN commands for the CCNA test. The ISDN BRI port will be very helpful come CCNP time too. You will need to add a transceiver to convert the Ethernet AUI port to an RJ-45 style Ethernet port.
- 4) Cisco 2505 or 2507 Router with 16 MB Flash/16MB DRAM The same as a Cisco 2501 except it has a built-in 8 port hub(2505) or a built-in 16 port hub(2507) so you do not have to purchase a transceiver. This is a great money saving tip and then you don't have to deal with pain in the butt transceivers!
- 5) Cisco 2514 Router with 16 MB Flash/16MB DRAM This router is the same as a Cisco 2501 except instead of one Ethernet port you have two. You may ask, what is the big deal? Well, you can use this as your Cable Modem/DSL Modem router. Now you can test your ability to setup a firewall and router in a live environment on the Internet. Lots of fun! You will need to add two transceivers to convert the Ethernet AUI ports to an RJ-45 style Ethernet ports.
- 6) Cisco 1720 Router This is a modular router unlike any of the 2500 series routers. There are two big benefits. The first is that you get a 100mb Ethernet port so you can support features that require 100mb. The second is that you can buy extra modules to add functionality such as more serial ports, ISDN ports, Ethernet ports, WICs and such. However, due to the 100mb port and flexibility you will pay a bit more. In the long run it will be cheaper than purchasing a bunch of dedicated routers for each discipline you want to learn. Most people start off adding a serial module such as a WIC-1T which gives you a serial port.
- 7) Cisco 2610 Router with 32 DRAM and 8 MB Flash This is a modular router unlike any of the 2500 series routers. So the big benefit of this is you can buy extra modules to add functionality such as more serial ports, ISDN ports, Ethernet ports, WICs and such. However, due to the flexibility you will pay a bit more. One day it is a frame relay switch, the next it is your ISDN router. In the long run it will be cheaper than purchasing a bunch of dedicated routers for each discipline you want to learn. Most people start off adding a serial module such as a Wic-1T which gives you a serial port and then they eventually add another Ethernet port.
- 8) Cisco 1912 or 1924 Switch with Enterprise Software This is a good low cost switch to run a majority of the commands and concepts covered on the test. The only draw back is it is a 10mb switch except for the two 100mb uplink ports. Not a big deal since you have 10mb routers. Keep in mind that this does not support every single command the new CCNA test covers (as mentioned above it covers most commands) as on some of them the syntax is a little different. However it will cover all the same concepts so you get a good understanding of how STP, Vlans and trunking work. If you can afford the 2900 Series switches (2912, 2924, 2924M, 2950), go with them. Otherwise this is a great switch for the money.

- 9) Cisco 2912 or 2924 Switch with Enterprise Software This switch will run more of the current commands needed for the test and is a full 100mb switch. If you can afford this over the 1912/1924 this is the way to go. However, if cost is a factor, you may want to go with the 1912/1924 switches. **Note, there is also a 2916 that only supports IOS 11.x. It does not support 12.x like the normal 2912 or 2924 switches so we generally do not suggest this switch.
- 10) Cisco 2950 Switch with Enterprise Software. Watch out for resellers selling these new. Most of them are counterfeits from the Orient. This switch will run all the current commands needed for the test and is a full 100mb switch.

Some other accessories we may want to consider are as follows:

- 1) If you purchase a 2500 series router with an AUI Ethernet port, don't forget to add a transceiver. They are included in my dual router kits.
- 2) If you purchase two routers and you want them to communicate together you will need a back to back serial cable. This connects the synchronous serial ports between two routers to simulate a WAN connection. They are included in my dual router kits.
- 3) If you purchase a router, you will need a console cable kit to console into the router. All my router kits come with console cable kits.
- 4) Believe it or not, many resellers don't include power cables with their routers. Make sure your router comes with a power cable so you don't have to buy one for \$10.00 at CompUSA.
- 5) Some labs, basic procedure documentation and some review questions with the router would also be a big help. I include over 50 labs, 300 questions and various how to documents on CD with my router kits.

Now building a lab is only one part of the solution to pass your CCNA exam. Yes, I do include tons of articles, 50+ labs and 300+ test questions on my CD to assist you in your studies. You will also gain tons of valuable knowledge with your lab, but you must also supplement that with additional tools to help you pass your exam! First you **must** have some sort of text book. I personally think the Sybex CCNA Study Guide is written very well and also has some labs in it you can follow. The CiscoPress CCNA study guide will also work, but I do not think it is written as well as the Sybex book. Finally, once you have read in great detail all of the concepts Cisco wants you to be aware of in your Study Guides, you have practiced until your labs until your fingers bleed, you will want to review the test questions on the CD. All these components together should assist you in passing your CCNA test. However, I will make one final suggestion on practicing the CCNA exam questions, you may want to consider the Transcender CCNA Practice Exam CD. If you can pass the Transcender CCNA Practice Exam without memorizing the questions, you will definitely pass the CCNA exam! Transcender is so sure of this, that if you fail, they will refund the money you paid for their product!

Ok, now that we have the knowledge above what are some good guidelines to use for our CCNA lab purchase? Well, pick at least a dual router kit! Remember, we want to see if our router tables actually propagate and we can route our data. The dual router kits will be more than the price of two single routers as the dual router kit includes all the cables and transceivers you will need to hit the ground running. You can see many of these kits on my website at <http://www.ciscokits.com> You can then add a switch to it if you have the funds available as you will eventually need it if you plan to expand your Cisco knowledge base and tackle the CCNP tests. Finally, if you have any questions, drop me an email at bob@ciscokits.com and I will be happy to provide some guidance once I have a better understanding of what you are looking to accomplish to meet your Cisco goals.

Best Regards,

Bob

Summary of Router Interfaces

Model	Ethernet	Latest IOS	Sync Serial (DB-60)	ISDN ² BRI ³ (RJ-45)	Async/Sync Serial Ports	NM Slots Available	Wan Slots Available
Cisco 2501	1 AUI 10mb	12.3.x	2	0	0	0	0
Cisco 2503	1 AUI 10mb	12.3.x	2	1	0	0	0
Cisco 2507	16 Pt Hub10mb	12.3.x	2	0	0	0	0
Cisco 2514	2 AUI 10mb	12.3.x	2	0	0	0	0
Cisco 2520	1 AUI 10mb	12.3.x	2	1	2	0	0
Cisco 2610	1 RJ-45 10mb	12.3.x	Optional	Optional	Optional	1	2
Cisco 2610XM	1 RJ-45 100mb	12.4.x	Optional	Optional	Optional	1	2
Cisco 2611	2 RJ-45 10mb	12.3.x	Optional	Optional	Optional	1	2
Cisco 2612	1 RJ-45 10mb	12.3.x	Optional	Optional	Optional	1	2
Cisco 2620	1 RJ-45 100mb	12.3.x	Optional	Optional	Optional	1	2
Cisco 2621	2 RJ-45 100mb	12.3.x	Optional	Optional	Optional	1	2
Cisco 1720	1 RJ-45 100mb	12.3.x	Optional	Optional	Optional	0	2
Cisco 1841	2 RJ-45 100mb	12.4.x	Optional	Optional	Optional	0	2
Cisco 3620	10/100 Optional	12.3.x	Optional	Optional	Optional	2	Optional
Cisco 3640	10/100 Optional	12.4.x	Optional	Optional	Optional	4	Optional

¹ AUI = attachment unit interface.

² ISDN = Integrated Services Digital

Network.

Summary of Switch Features

	1912/1924	2912/2924	2950	3550
Port Speed	10/100MB	100MB	100MB	100MB
VLans	X	X	X	X
Trunking	X	X	X	X
Port Aggregation	X	X	X	X
Mirroring	X	X	X	X
ISL	X	X		
802.1Q		X	X	X
QoS			X	X
Layer 3 Switching				X
IOS Version	9.007	12.x	12.x	12.x