

# Home Lab Starter Guide

Physical and virtual lab paths for CCNA practice, job skills, cabling, switching, routing, and real troubleshooting.

A good home lab has a reason for every box. Buy gear when it teaches physical work, cabling, PoE, optics, console recovery, or real failure modes.

## Start With One Real Switch

If you buy one physical device, make it a managed switch. It teaches cabling, console access, VLANs, trunks, PoE, optics, link lights, and the mistakes you cannot feel in a simulator.

## Add A Router On Purpose

A physical router is useful for WAN, NAT, VPN, serial-style edge thinking, and IOS XE practice. It is not required for every CCNA lab because a Layer 3 switch or CML can cover many routing basics.

## PRICE GUIDE WITH PHYSICAL GEAR

BUDGET	PHYSICAL GEAR TO CONSIDER	BEST PROJECTS
\$75 to \$175	Used Catalyst 2960-X, for example WS-C2960X-24TS-L or WS-C2960X-24PS-L, console cable, patch cables.	Access ports, VLANs, trunks, STP, EtherChannel, port security, DHCP snooping.
\$150 to \$350	Compact switch like C1000-8T-2G-L, C1000-8P-2G-L, or used WS-C3560CX-12PC-S.	Quiet desk lab, PoE AP or phone, SVI routing, optics, small office design.
\$150 to \$400	Router like C1101-4P, C1111-4P, C1111-8P, ISR 4321, or ISR 4331.	NAT, DHCP relay, ACLs, OSPF edge, VPN concepts, WAN handoff, IOS XE practice.
\$300 to \$700	Two switches plus one router, or one switch plus a mini PC running CML, Linux, pfSense, or OPNsense.	End-to-end labs with clients, services, routing, firewalling, logging, and captures.

Used prices move fast. Compare total shipped price, seller return policy, included power supply, rack ears, software image, license state, and noise before buying.

## Good Switch Targets

- Catalyst 1000 8 or 16 port: quiet, newer, good desk lab option.
- Catalyst 2960-X 24 port: common used access switch for L2 practice.
- Catalyst 3560-CX 12 port: compact, L3 capable, often PoE, but check end-of-sale status.
- Catalyst 9200CX: modern compact option, usually too expensive unless you find a deal.

## Good Router Targets

- C1101-4P: small IOS XE branch router for basic edge labs.
- C1111-4P or C1111-8P: useful if you want integrated switch ports and IOS XE.
- ISR 4321 or 4331: larger, rackable, more enterprise style, but louder and license-sensitive.
- Skip very old routers unless they are nearly free and you know why you need them.

## WHAT EACH DEVICE TEACHES

DEVICE	LOOK FOR	AVOID OR VERIFY
L2 switch	Gigabit ports, SFP uplinks, console port, IOS CLI, PoE if you want AP or phone labs.	Fast Ethernet only, missing power supply, no console access, very loud fans.
L3 switch	SVIs, static routing, OSPF support, routed ports, DHCP snooping, DAI, ACLs.	License level that blocks routing features, dead PoE, no image or password recovery path.
Router	IOS XE, at least two routed interfaces or useful WAN/LAN layout, security license needs understood.	Locked config, missing power brick, LTE-only variants you do not need, feature licensing surprises.

## CONNECTION DIAGRAMS AND PROJECTS

### 1. One Switch Starter

Laptop

ETHERNET

Managed Switch

ACCESS PORTS

PC, AP, Phone

Projects: VLANs, access ports, trunk to laptop adapter, STP edge behavior, PoE check, port security, DHCP snooping.

### 2. Router-On-A-Stick

Clients

VLANs 10,20

Switch Trunk

802.1Q

Router Subinterfaces

Projects: inter-VLAN routing, DHCP relay, ACL between VLANs, NAT to internet, packet capture before and after routing.

### 3. Hybrid Virtual

Physical Switch

TRUNK

Mini PC

VIRTUAL NODES

CML, Linux, Firewall

Projects: real switchports into virtual routers, syslog, DNS, DHCP, firewall policy, monitoring, backup and restore.

## BUILD THESE IN ORDER

PROJECT	TOPOLOGY	PROOF
VLAN baseline	One switch, two clients, two VLANs.	show vlan brief, MAC table, failed cross-VLAN ping.
Inter-VLAN routing	Router-on-a-stick or L3 switch SVI routing.	Client IPs, gateways, route table, capture showing routed traffic.
Edge network	Router or firewall between lab and home network.	NAT table, ACL hit count, curl test, rollback note.
Ops stack	Switch and router sending logs to Linux VM.	Syslog entries, NTP sync, config backup, topology diagram.

### Buy Old Gear Carefully

Old Cisco routers, ASAs, and large chassis or 48-port PoE switches can still teach basics, but they are often loud, hot, power hungry, unsupported, and missing modern features.

- Buy only when the exact command set matters.
- Check fan noise, rack depth, power draw, optics, license state, and console access.
- Do not spend real money on gear that a simulator covers better.

### Image Licensing

Do not build your learning plan around random router images from the internet. CML images are licensed for use inside CML. If you use EVE-NG or GNS3, make sure you have legal rights to every image you import.

## WHAT TO PRACTICE FIRST

LAB	BUILD	VERIFY
Basic LAN	Two VLANs, trunk, SVI or router-on-a-stick, DHCP.	show vlan brief, show interfaces trunk, client IP, ping gateway.
Routing	Static default route, OSPF single area, one failure.	show ip route, show ip ospf neighbor, traceroute.
Security	SSH only, local user, ACL, port security or DHCP snooping.	Blocked test, allowed test, logs, rollback plan.
Ops	Syslog, NTP, config backup, diagram, change note.	Timestamped logs, saved config, recovery steps.

## STARTER CISCO EXAMPLES

```
hostname LAB-SW1
no ip domain-lookup
ip domain-name lab.local
username admin privilege 15 secret <long-secret>
crypto key generate rsa modulus 2048
ip ssh version 2
line vty 0 4
  login local
  transport input ssh

vlan 10
  name USERS
vlan 20
  name LAB
interface gi0/1
  description trunk-to-router
  switchport mode trunk
  switchport trunk allowed vlan 10,20
```

### Do Not Skip Physical Skills

- Console into a switch.
- Label both ends of a cable.
- Identify copper vs fiber vs DAC.
- Read link lights without guessing.
- Document port, VLAN, speed, and neighbor.

### Stop Buying When

- You are collecting gear instead of doing labs.
- You cannot explain what the next device teaches.
- The lab is too loud to leave powered on.
- You are blocked by image licensing or old software.

Sources checked: Cisco Catalyst 1000, 2960-X, 2960-CX/3560-CX, ISR 1100, and ISR 4000 data sheets and support pages, Cisco CML Free documentation, Cisco Networking Academy and Packet Tracer access pages, and current used-market listing samples.