

CCNA 200-301 v1.1

MODULE 1 — NETWORK FUNDAMENTALS

Complete Hands-on Training Labs

Topology • Sequential Device Configuration • Verification Output • Troubleshooting

NETWORK GUIDE ACADEMY

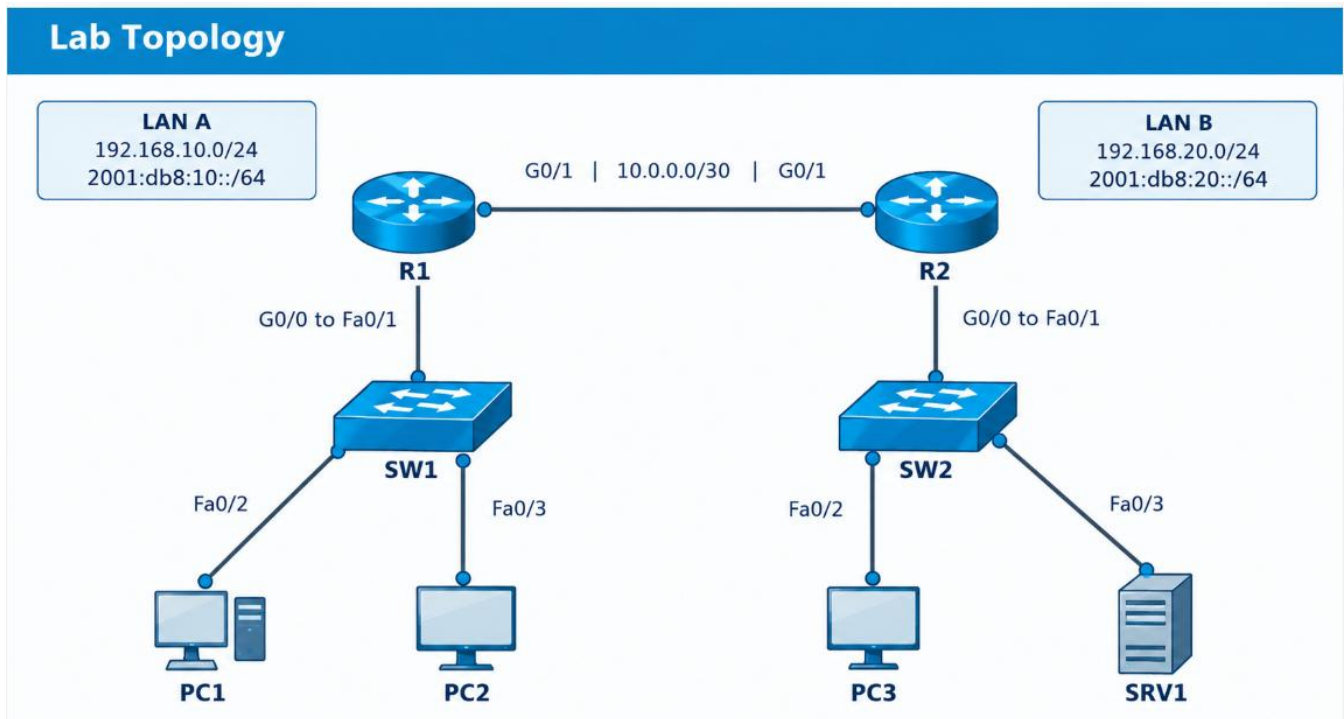
Instructor / Student Lab Guide

Scope: CCNA v1.1 Module 1 — Network Fundamentals objectives 1.1 through 1.7. The labs intentionally use one configuration path per device and then move forward to verification and troubleshooting

Lab sequence

1. Identify network components, physical links and interface health
2. Configure the reference topology, IPv4 addresses and routing
3. Verify IPv4 subnetting, ARP, MAC learning, forwarding and flooding
4. Add IPv6 addressing, types, neighbor discovery and dual-stack tests
5. Observe TCP versus UDP, client IP parameters and application flows
6. Investigate cabling faults and duplex/speed mismatches
7. Wireless, virtualization and architecture observation exercises

Reference topology and equipment



Equipment: two routers (R1/R2), two Layer 2 switches (SW1/SW2), three PCs (PC1–PC3), one server (SRV1), copper Ethernet cables. Use Packet Tracer or equivalent. Routers G0/0 toward LAN and G0/1 toward WAN; switches FastEthernet ports as shown.

Addressing and interface plan

Node	Port / NIC	IPv4 / mask	IPv6 /64 or role
R1	G0/0	192.168.10.1 /24	2001:db8:10::1/64
R1	G0/1	10.0.0.1 /30	2001:db8:12::1/64
R2	G0/0	192.168.20.1 /24	2001:db8:20::1/64
R2	G0/1	10.0.0.2 /30	2001:db8:12::2/64
SW1	VLAN 1	192.168.10.2 /24	management only
SW2	VLAN 1	192.168.20.2 /24	management only

PC1	Fa0	192.168.10.11 /24	2001:db8:10::11/64
PC2	Fa0	192.168.10.12 /24	2001:db8:10::12/64
PC3	Fa0	192.168.20.11 /24	2001:db8:20::11/64
SRV1	Fa0	192.168.20.10 /24	2001:db8:20::10/64

Default gateways: LAN A clients 192.168.10.1 / 2001:db8:10::1; LAN B clients 192.168.20.1 / 2001:db8:20::1. PC and server Ethernet interfaces use static addresses to keep output reproducible.

Lab 1 — Inventory, topology and physical interfaces

CCNA objectives: 1.1, 1.2, 1.3

Objective: Recognize router, Layer 2 switch, hosts/server, LAN/WAN links and cable types.

Connection map: R1 G0/0 ↔ SW1 Fa0/1; SW1 Fa0/2 ↔ PC1; SW1 Fa0/3 ↔ PC2; R1 G0/1 ↔ R2 G0/1; R2 G0/0 ↔ SW2 Fa0/1; SW2 Fa0/2 ↔ PC3; SW2 Fa0/3 ↔ SRV1.

Device discovery commands (read-only; run on each router and switch before configuration):

```
show version
show inventory
show interfaces status          ! switch platforms supporting this syntax
show ip interface brief
show interfaces description
```

VERIFY — Model and interface count match inventory; interface LEDs and link states correspond to each cable.

VERIFY — Router separates IP networks; Layer 2 switch bridges hosts in a LAN; SRV1 provides services; endpoint initiates traffic.

VERIFY — Copper cables connect Ethernet endpoints; recognize that fiber and optics are alternatives depending on range and interface.

Lab 2 — Complete baseline configuration — IPv4 connectivity

CCNA objectives: 1.6, 1.7, 1.10

Objective: Build the topology once with per-device configurations and verified routed reachability.

Step 1 — R1: baseline and IPv4

```
enable
configure terminal
hostname R1
no ip domain-lookup
interface GigabitEthernet0/0
  description LAN-A-to-SW1-Fa0/1
  ip address 192.168.10.1 255.255.255.0
  no shutdown
exit
interface GigabitEthernet0/1
  description WAN-to-R2-G0/1
  ip address 10.0.0.1 255.255.255.252
  no shutdown
exit
ip route 192.168.20.0 255.255.255.0 10.0.0.2
end
copy running-config startup-config
```

Step 2 — R2: baseline and IPv4

```
enable
configure terminal
hostname R2
no ip domain-lookup
interface GigabitEthernet0/0
  description LAN-B-to-SW2-Fa0/1
  ip address 192.168.20.1 255.255.255.0
  no shutdown
exit
interface GigabitEthernet0/1
  description WAN-to-R1-G0/1
  ip address 10.0.0.2 255.255.255.252
  no shutdown
exit
ip route 192.168.10.0 255.255.255.0 10.0.0.1
end
copy running-config startup-config
```

Step 3 — SW1: baseline, management and ports

```
enable
configure terminal
hostname SW1
no ip domain-lookup
interface FastEthernet0/1
  description UPLINK-to-R1-G0/0
  switchport mode access
  no shutdown
exit
interface FastEthernet0/2
  description PC1
  switchport mode access
  no shutdown
exit
interface FastEthernet0/3
  description PC2
  switchport mode access
  no shutdown
exit
interface Vlan1
  ip address 192.168.10.2 255.255.255.0
  no shutdown
exit
ip default-gateway 192.168.10.1
end
copy running-config startup-config
```

Step 4 — SW2: baseline, management and ports

```
enable
configure terminal
hostname SW2
no ip domain-lookup
interface FastEthernet0/1
  description UPLINK-to-R2-G0/0
  switchport mode access
  no shutdown
exit
interface FastEthernet0/2
  description PC3
```

```
switchport mode access
no shutdown
exit
interface FastEthernet0/3
description SRV1
switchport mode access
no shutdown
exit
interface Vlan1
ip address 192.168.20.2 255.255.255.0
no shutdown
exit
ip default-gateway 192.168.20.1
end
copy running-config startup-config
```

Step 5 — PCs and server: host NIC settings

In Packet Tracer: Desktop → IP Configuration (PC) or Config → FastEthernet (server). Set addresses in the plan; add subnet mask 255.255.255.0 and the correct IPv4 gateway. Enable HTTP and DNS on SRV1 using Services where supported. DNS record: www.lab.local → 192.168.20.10 (lab-only name). DNS server on PC1/PC2/PC3: 192.168.20.10.

Step 6 — Verify immediately after configuration

```
R1# show ip interface brief
GigabitEthernet0/0    192.168.10.1    YES manual up    up
GigabitEthernet0/1    10.0.0.1        YES manual up    up

R1# show ip route static
S 192.168.20.0/24 [1/0] via 10.0.0.2

R1# ping 10.0.0.2
Success rate is 100 percent (5/5)

PC1> ping 192.168.20.10
Reply from 192.168.20.10: bytes=32 ...
```

VERIFY — Both interfaces on R1/R2 are up/up and have the correct IP/mask.

VERIFY — Both routers have one static route to the remote LAN (shown as S); connected networks are present as C.

VERIFY — PC1→PC2 succeeds within the LAN; PC1→SRV1 succeeds across R1–R2.

VERIFY — SW1/SW2 VLAN 1 SVI is up only after VLAN 1 has at least one active member port and is operational.

VERIFY — A first ping can time out during ARP resolution; repeat it before troubleshooting.

Lab 3 — IPv4 subnetting, ARP and Layer 2 MAC forwarding

CCNA objectives: 1.6, 1.7, 1.13

Objective: Prove how hosts discover MACs, how switches learn source MACs and how routers separate broadcast domains.

Step 1 — Examine subnets (no new configuration)

192.168.10.0/24: network 192.168.10.0, usable .1–.254, broadcast .255. 192.168.20.0/24: another LAN. 10.0.0.0/30: usable 10.0.0.1 and 10.0.0.2, broadcast 10.0.0.3. All 192.168.x.x and 10.x.x.x examples are RFC 1918 private addressing.

Step 2 — Trigger a frame and observe learning

```
SW1# show mac address-table dynamic
PC1> ping 192.168.10.12
SW1# show mac address-table dynamic
```