



# Ultimate Cisco Networking Test Notes

This is the **complete set**—just use these to study and you'll be well-prepared for your exam!

## MODULE 1: Cisco Device Basics

### Router & Switch Storage

- **ROM:** Bootstrap program (starts the device)
- **Flash/RAM:** Stores and runs the IOS
- **RAM:** Running configuration
- **NVRAM:** Startup configuration

### Encapsulation & De-encapsulation

- **Encapsulation:** Adds MAC info when sending a frame
- **De-encapsulation:** Removes MAC info when receiving a frame

### Switch Boot Sequence

1. **POST:** Checks CPU and memory
2. **Boot loader (ROM):** Initializes CPU, loads OS
3. **OS:** Loads startup config into RAM

### Switch Mode Button & LEDs

- **System LED:** On = operating
- **Mode button:** Cycles Port Status, Duplex, Speed
- **Port LEDs:**
  - Link up/down
  - Duplex: Full/Half
  - Speed: [Off = 10 Mbps, Green = 100 Mbps, Blinking = 1 Gbps]

### SVI for Remote Management

1. interface vlan 1
2. ip address 192.168.1.2 255.255.255.0
3. no shutdown
4. exit

5. ip default-gateway 192.168.1.1

6. write memory

## Switch Port Configuration

- Set duplex: duplex [auto|full|half]
- Set speed: speed [auto|10|100|1000]
- mdix auto: Enables auto-crossover (if speed/duplex is auto)

## Basic Router Config

- Assign interface IP, enable it:

```
conf t
interface g0/0
ip address 192.168.10.1 255.255.255.0
no shutdown
```

## Verification

- show ip int brief
- show interfaces [type][number]
- show version
- show flash
- show run
- show start
- show mac-address-table
- show ip route

## Network Layer Issues

- **Runts:** < 64 bytes; **Giants:** > 1518 bytes; **CRC:** Bad cable/interference; **Collisions:** Retransmits on Ethernet

## Telnet vs SSH

- **SSH:** Secure!
  - ip domain-name cisco.com
  - crypto key generate rsa
  - username admin secret password
  - VTY line config:

```
line vty 0 15
transport input ssh
login local
```

- ip ssh version 2

- **Command history:**
  - show history
  - terminal history size [N]

## MODULE 2: Switching Concepts & Router Config

### Switching Key Concepts

- **MAC Table:** Maps MACs to ports (switch learns from traffic)
- **Frame Forwarding:** Store-and-Forward (checks, safer), Cut-through (faster, less safe)
- **Collision Domain:** Per switch port (no collisions full duplex)
- **Broadcast Domain:** All LAN devices (routers break them up)
- **Reduce Congestion:** Fast ports, big buffers, high port density

### Router Configuration Commands for VLAN/Trunk/Inter-VLAN

#### Assign IP Address to Interface

```
conf t
interface [type][number]
ip address [ip_address] [subnet_mask]
no shutdown
exit
```

Example:

```
interface g0/0
ip address 192.168.10.1 255.255.255.0
no shutdown
```

#### Create VLANs & Name Them (on switch)

```
vlan [id]
name [VLAN_NAME]
```

#### Assign Switch Port to VLAN

```
interface [type][number]
switchport mode access
switchport access vlan [VLAN_ID]
```

## Inter-VLAN Routing (Router-on-a-stick)

*One physical router interface, many logical subinterfaces:*

```
interface g0/0.10
encapsulation dot1Q 10
ip address 192.168.10.1 255.255.255.0
no shutdown

interface g0/0.20
encapsulation dot1Q 20
ip address 192.168.20.1 255.255.255.0
no shutdown
```

(Physical interface must be up: no shutdown)

## Enable Switch Trunking (for router link)

```
interface [type][number]
switchport mode trunk
switchport trunk allowed vlan [vlan_list]
```

Example:

```
interface g0/1
switchport mode trunk
switchport trunk allowed vlan 10,20
```

## Show & Troubleshoot

```
show running-config
show interfaces trunk
show vlan brief
show ip interface brief
show interfaces [type][number] switchport
```

## Concept Recap:

- *Router-on-a-stick:* Router interface for each VLAN (via subinterface), switchport must be trunk.
- *Default gateway* for each VLAN is the router's subinterface IP (e.g., 192.168.10.1 for VLAN 10).

## MODULE 3: VLANs

- **Data VLAN:** User data.
- **Default VLAN:** VLAN 1 (cannot be deleted).
- **Management VLAN:** For switch management.
- **Native VLAN:** Untagged trunk traffic.
- VLAN 1-1005: Normal/Standard range
- VLAN operations store config in `vlan.dat` (flash)

### Key VLAN Commands Covered Above

- Create, assign ports, delete, trunking, allowed VLANs, config checks.

## MODULE 4: Inter-VLAN Routing

- **Legacy:** Each VLAN—separate router interface.
- **Router-on-a-Stick:** One router interface w/ many subinterfaces, each with own VLAN/tag/gateway IP.
- Switch trunk ON for related port.
- Subinterfaces use encapsulation `dot1Q [VLAN]` and correct IP.

## MODULE 5: Spanning Tree Protocol (STP)

- **Prevents loops** in Layer 2 switched networks.
- **Steps:**
  1. Elect Root Bridge (lowest Bridge ID)
  2. Determine Root Ports (lowest cost to root)
  3. Designated Ports (all on root; connects root on others)
  4. Blocked Ports (prevent loops)
- **STP Versions:** Classic, RSTP, PVST, Rapid PVST

## Quick Review Table: Key Commands

Task	Command Example
Show interfaces	<code>show ip int brief</code>
Show MAC table	<code>show mac-address-table</code>
Show VLANs	<code>show vlan brief</code>
Show trunks	<code>show interfaces trunk</code>
Create VLAN	<code>vlan 10 + name Sales</code>

Task	Command Example
Assign port to VLAN	<code>switchport mode access + switchport access vlan 10</code>
Enable trunk	<code>switchport mode trunk</code>
Allow VLANs on trunk	<code>switchport trunk allowed vlan 10,20</code>
Configure SVI	<code>interface vlan 1 + ip address ...</code>
Set default gateway	<code>ip default-gateway 192.168.1.1</code>
SSH setup	See SSH steps above
<b>Router subinterface for VLAN</b>	<code>interface g0/0.10 + encapsulation dot1Q 10 + ip address ...</code>

**TIP:** Practice the above by drawing a network, listing each port's VLAN, default gateway, and tracing frames/packets.

**Want practice questions or a config challenge? Let me know!**