

Day 9: Switch Interfaces

CCNA 200-301 Study Guide: Switch Interface Configuration & Troubleshooting

Introduction: Mastering the Fundamentals of Network Access

The configuration of Layer 2 switchports is a fundamental skill for network professionals. It represents the point of entry for all devices into the network. This guide covers default states, speed/duplex negotiation, collision domains, and essential troubleshooting commands.

CCNA Exam Objectives Covered:

- 1.1: Role and function of network components (Switches)
- 1.4: Identify interface and cable issues (collisions, errors, duplex/speed mismatch)
- 2.1: Configure and verify Layer 2 protocols (Switching)

1.0 Default Interface States: Routers vs. Switches

Cisco devices have different default behaviors based on their role. Switches are generally "plug-and-play," while routers follow a "security-first" approach.

1.1 Comparative Analysis of Default Settings

Feature	Router Interface	Switch Interface
Default State	Disabled (shutdown)	Enabled (no shutdown)
Status (Unplugged)	administratively down / down	down / down
Status (Connected)	up / up (after manual enable)	up / up (immediate)
Security Practice	Enable only necessary ports.	Shutdown all unused ports.

Security Note: Because switchports are active by default, an unauthorized user can gain network access just by plugging in. Always manually disable unused ports.

2.0 Mastering Speed and Duplex Settings

- Speed: The data rate (10, 100, 1000 Mbps).
- Duplex: The direction of flow (Half = one way at a time; Full = simultaneous).

2.1 The Autonegotiation Process

By default, ports use autonegotiation to find the highest common denominator for speed and duplex. If a 1 Gbps port connects to a 100 Mbps port, they agree on 100 Mbps/Full.

2.2 The Duplex Mismatch

A mismatch occurs when one side is hardcoded (manual) and the other is set to Auto. The "Auto" side disables negotiation and must guess:

- Speed: Sensed via electrical signal (usually successful).
- Duplex Rule:
 - If Speed = 10 or 100 Mbps \rightarrow Default to Half-Duplex.
 - If Speed = 1000 Mbps or higher \rightarrow Default to Full-Duplex.

Result: A 100 Mbps link where one side is Full and the other defaults to Half causes massive Late Collisions and CRC errors.

3.0 Understanding Collision Domains and CSMA/CD

Device	Collision Domain Logic	Duplex Capability
Hub (Layer 1)	All ports share one collision domain.	Half-Duplex only.
Switch (Layer 2)	Each port is a separate collision domain.	Full-Duplex capable.

3.1 The Role of CSMA/CD

Carrier Sense Multiple Access with Collision Detection manages media access in Half-Duplex environments.

- Full-Duplex: Collisions are impossible; CSMA/CD is disabled.
- Half-Duplex: Devices must listen before talking; CSMA/CD is enabled.

4.0 Verification and Troubleshooting

4.1 Essential "show" Commands

Command	Purpose
show ip interface brief	High-level status: Status (L1) and Protocol (L2).
show interfaces status	(Switch only) Tabular view of VLAN, Speed, and Duplex.
show interfaces <id>	Detailed counters and error statistics.

4.2 Interpreting Error Counters

- Runts: Frames < 64 bytes. Often caused by collisions.
- Giants: Frames > 1518 bytes.
- CRC: Checksum failure. Indicates corrupted data, usually due to bad cabling or EMI.
- Late Collisions: Occur after the first 64 bytes. The primary indicator of a duplex mismatch or excessive cable length (> 100 m).

5.0 CLI Configuration Command Reference

5.1 Basic Interface Setup

```
SW1(config)# interface g0/1
```

```
SW1(config-if)# description ## Connection to Server_01 ##
```

```
SW1(config-if)# speed 100      # Manual speed: 10, 100, 1000
```

```
SW1(config-if)# duplex full    # Manual duplex: full, half
```

```
SW1(config-if)# shutdown      # Disable port
```

```
SW1(config-if)# no shutdown   # Enable port
```

5.2 Bulk Configuration

```
SW1(config)# interface range f0/1 - 10, g0/1 - 2
```

```
SW1(config-if-range)# description ## User Access Ports ##
```

```
SW1(config-if-range)# shutdown
```

5.3 Saving Configuration

- Standard: copy running-config startup-config

- Shortcuts: copy run start or write memory (wr)

6.0 Key Takeaways Summary

1. Defaults: Switchports are no shutdown by default; Router ports are shutdown by default.
2. Mismatches: If autonegotiation fails at 10/100 Mbps, the auto-side defaults to Half-Duplex.
3. Troubleshooting: Use show interfaces to find Late Collisions (Mismatch) or CRC Errors (Bad Cable).
4. CSMA/CD: Only active on Half-Duplex links.

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