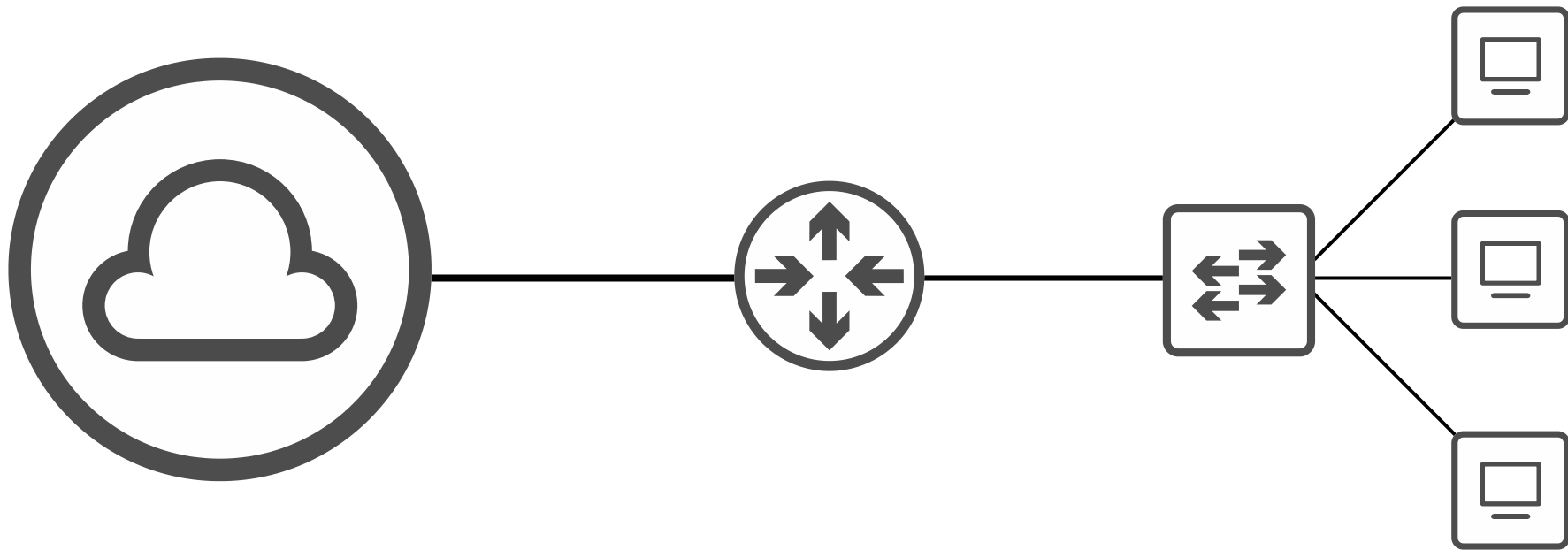




CCNA 200-301 Day 9

Switch Interfaces



Things we'll cover

- Interface speed and duplex
- Speed and duplex autonegotiation
- Interface status
- Interface counters & errors

Switch interfaces



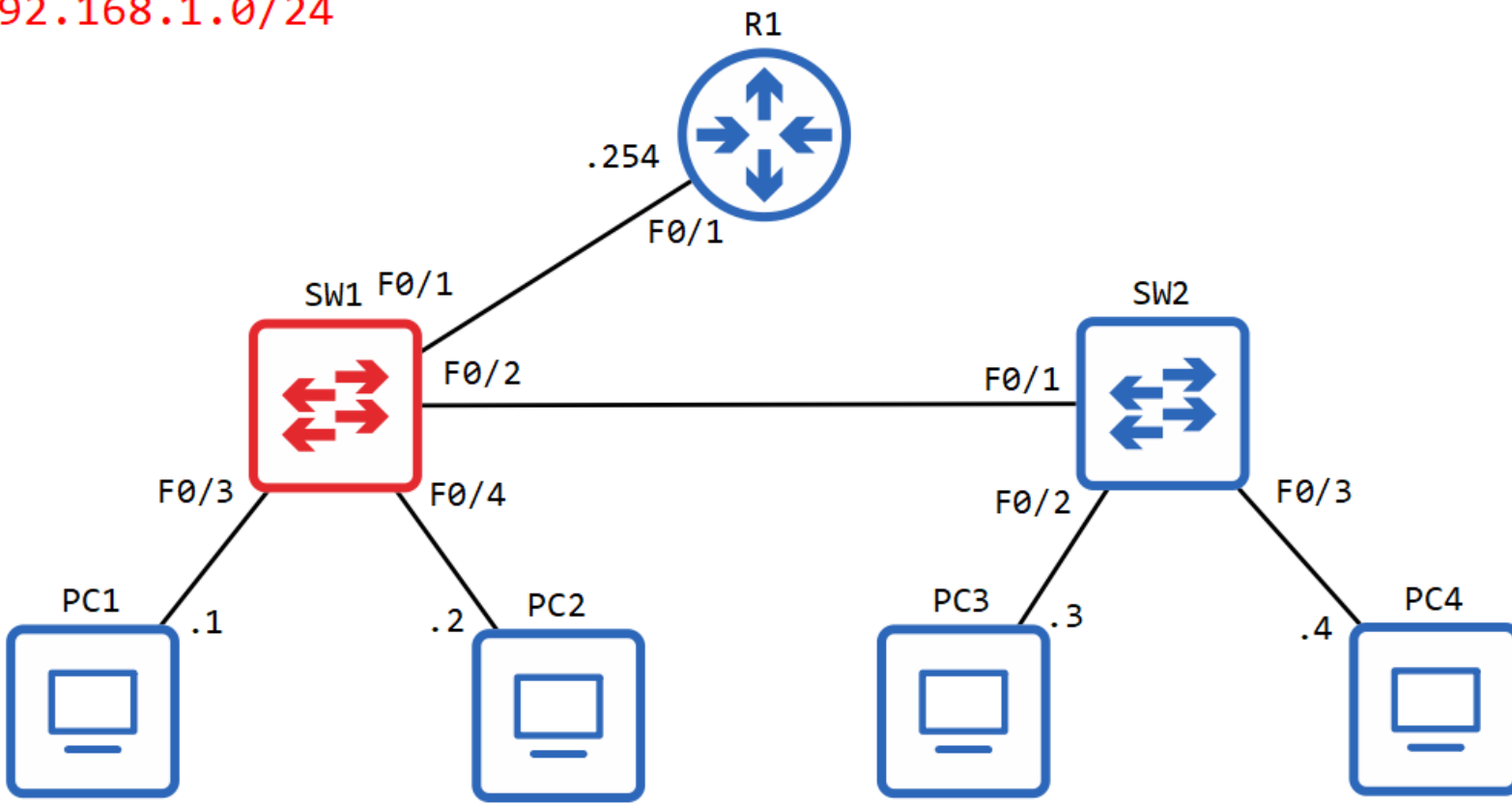
ASR 1000-X Router



Catalyst 9200 Switch

Network Topology

192.168.1.0/24



show ip interface brief

```
SW1>en
```

```
SW1#sh ip int br
```

Interface	IP-Address	OK?	Method	Status	Protocol
Vlan 1	unassigned	YES	unset	up	up
FastEthernet0/1	unassigned	YES	unset	up	up
FastEthernet0/2	unassigned	YES	unset	up	up
FastEthernet0/3	unassigned	YES	unset	up	up
FastEthernet0/4	unassigned	YES	unset	up	up
FastEthernet0/5	unassigned	YES	unset	down	down
FastEthernet0/6	unassigned	YES	unset	down	down
FastEthernet0/7	unassigned	YES	unset	down	down
FastEthernet0/8	unassigned	YES	unset	down	down
FastEthernet0/9	unassigned	YES	unset	down	down
FastEthernet0/10	unassigned	YES	unset	down	down
FastEthernet0/11	unassigned	YES	unset	down	down
FastEthernet0/12	unassigned	YES	unset	down	down

show ip interface brief

```
SW1 R1>en
SW1 R1#show ip interface brief
Int Interface IP-Address OK? Method Status Protocol
Vla GigabitEthernet0/0 unassigned YES unset administratively down down
Fas GigabitEthernet0/1 unassigned YES unset administratively down down
Fas GigabitEthernet0/2 unassigned YES unset administratively down down
Fas GigabitEthernet0/3 unassigned YES unset administratively down down
Fas R1#
FastEthernet0/4 unassigned YES unset un
```

Router interfaces have the `shutdown` command applied by default
=will be in the `administratively down/down` state by default

Switch interfaces do NOT have the '`shutdown`' command applied by default
=will be in the `up/up` state if connected to another device
OR
in the `down/down` state if not connected to another device

show interfaces status

```
SW1#show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Fa0/1		connected	1	a-full	a-100	10/100BaseTX
Fa0/2		connected	trunk	a-full	a-100	10/100BaseTX
Fa0/3		connected	1	a-full	a-100	10/100BaseTX
Fa0/4		connected	1	a-full	a-100	10/100BaseTX
Fa0/5		notconnect	1	auto	auto	10/100BaseTX
Fa0/6		notconnect	1	auto	auto	10/100BaseTX
Fa0/7		notconnect	1	auto	auto	10/100BaseTX
Fa0/8		notconnect	1	auto	auto	10/100BaseTX
Fa0/9		notconnect	1	auto	auto	10/100BaseTX
Fa0/10		notconnect	1	auto	auto	10/100BaseTX
Fa0/11		notconnect	1	auto	auto	10/100BaseTX
Fa0/12		notconnect	1	auto	auto	10/100BaseTX

Configuring interface speed and duplex

```
SW1#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
SW1(config)#int f0/1
```

```
SW1(config-if)#speed ?
```

```
10                Force 10 Mbps operation
```

```
100              Force 100 Mbps operation
```

```
auto             Enable AUTO speed configuration
```

```
SW1(config-if)#speed 100
```

```
SW1(config-if)#duplex ?
```

```
auto             Enable AUTO duplex configuration
```

```
full            Force full duplex operation
```

```
half            Force half-duplex operation
```

```
SW1(config-if)#duplex full
```

```
SW1(config-if)#description ## to R1 ##
```


Configuring interface speed and duplex

```
SW1#sh int status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Fa0/1	## to R1 ##	connected	1	full	100	10/100BaseTX
Fa0/2		connected	trunk	a-full	a-100	10/100BaseTX
Fa0/3		connected	1	a-full	a-100	10/100BaseTX
Fa0/4		connected	1	a-full	a-100	10/100BaseTX
Fa0/5		notconnect	1	auto	auto	10/100BaseTX
Fa0/6		notconnect	1	auto	auto	10/100BaseTX
Fa0/7		notconnect	1	auto	auto	10/100BaseTX
Fa0/8		notconnect	1	auto	auto	10/100BaseTX
Fa0/9		notconnect	1	auto	auto	10/100BaseTX
Fa0/10		notconnect	1	auto	auto	10/100BaseTX
Fa0/11		notconnect	1	auto	auto	10/100BaseTX
Fa0/12		notconnect	1	auto	auto	10/100BaseTX

Configuring switch interfaces

```
SW1#sh int status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Fa0/1	## to R1 ##	connected	1	full	100	10/100BaseTX
Fa0/2	## to SW2 ##	connected	trunk	a-full	a-100	10/100BaseTX
Fa0/3	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/4	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/5		notconnect	1	auto	auto	10/100BaseTX
Fa0/6		notconnect	1	auto	auto	10/100BaseTX
Fa0/7		notconnect	1	auto	auto	10/100BaseTX
Fa0/8		notconnect	1	auto	auto	10/100BaseTX
Fa0/9		notconnect	1	auto	auto	10/100BaseTX
Fa0/10		notconnect	1	auto	auto	10/100BaseTX
Fa0/11		notconnect	1	auto	auto	10/100BaseTX
Fa0/12		notconnect	1	auto	auto	10/100BaseTX



interface range

```
SW1(config)#interface range f0/5 - 12
```

```
SW1(config-if-range)#description ## not in use ##
```

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

```
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down
00:42:36: %LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down
```

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

```
SW1(config)#int range f0/5 - 6, f0/9 - 12
```

```
SW1(config-if-range)#no shut
```

```
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/5, changed state to up
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/6, changed state to up
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/9, changed state to up
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/10, changed state to up
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/11, changed state to up
00:57:07: %LINK-3-UPDOWN: Interface FastEthernet0/12, changed state to up
```



Configuring switch interfaces

```
SW1(config-if-range)#do sh int status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Fa0/1	## to R1 ##	connected	1	full	100	10/100BaseTX
Fa0/2	## to SW2 ##	connected	trunk	a-full	a-100	10/100BaseTX
Fa0/3	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/4	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/5	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/6	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/7	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/8	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/9	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/10	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/11	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/12	## not in use ##	disabled	1	auto	auto	10/100BaseTX

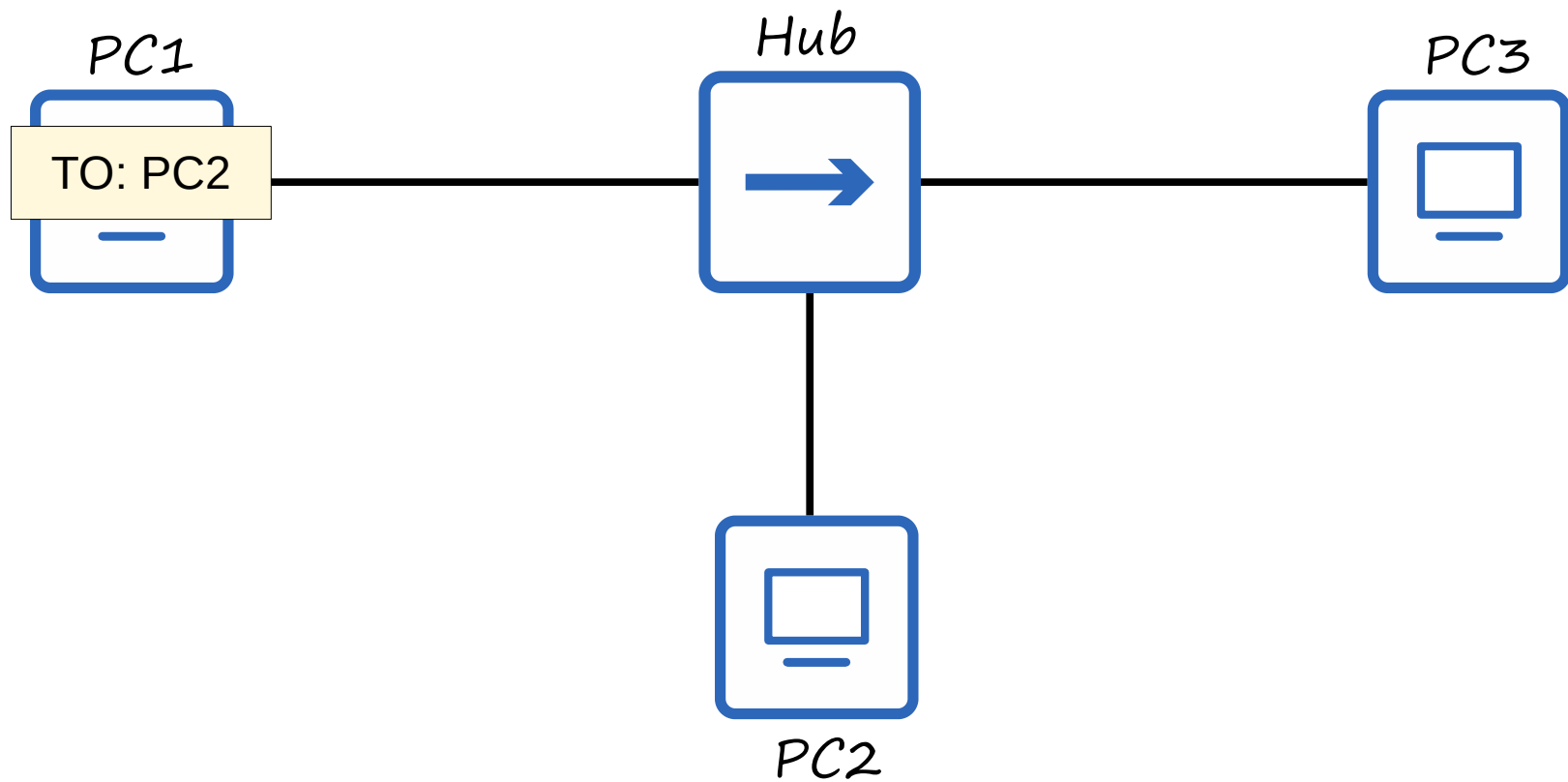


Full/Half Duplex

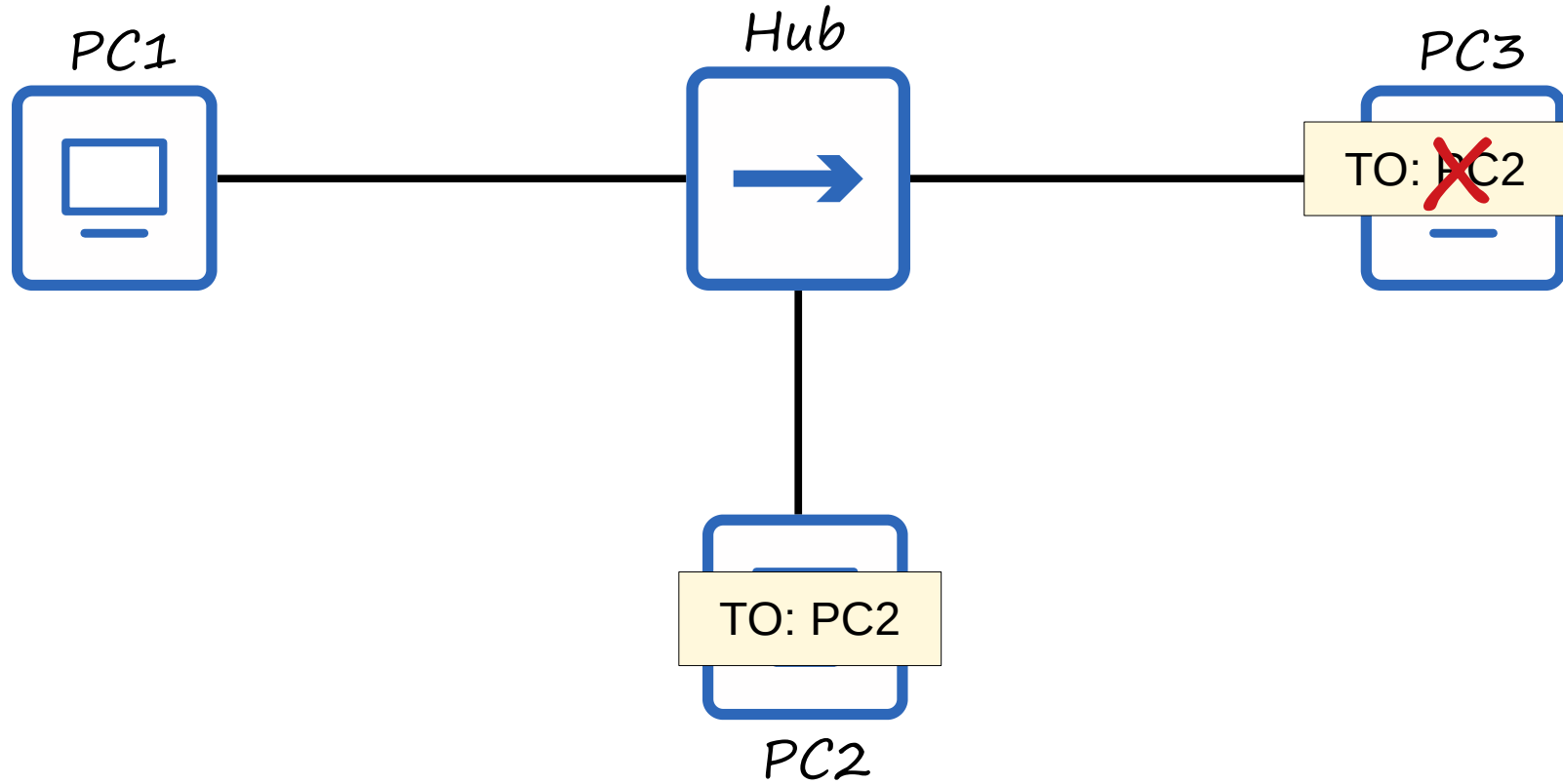
- *Half duplex: The device cannot send and receive data at the same time. If it is receiving a frame, it must wait before sending a frame.*
- *Full duplex: The device can send and receive data at the same time. It does not have to wait.*



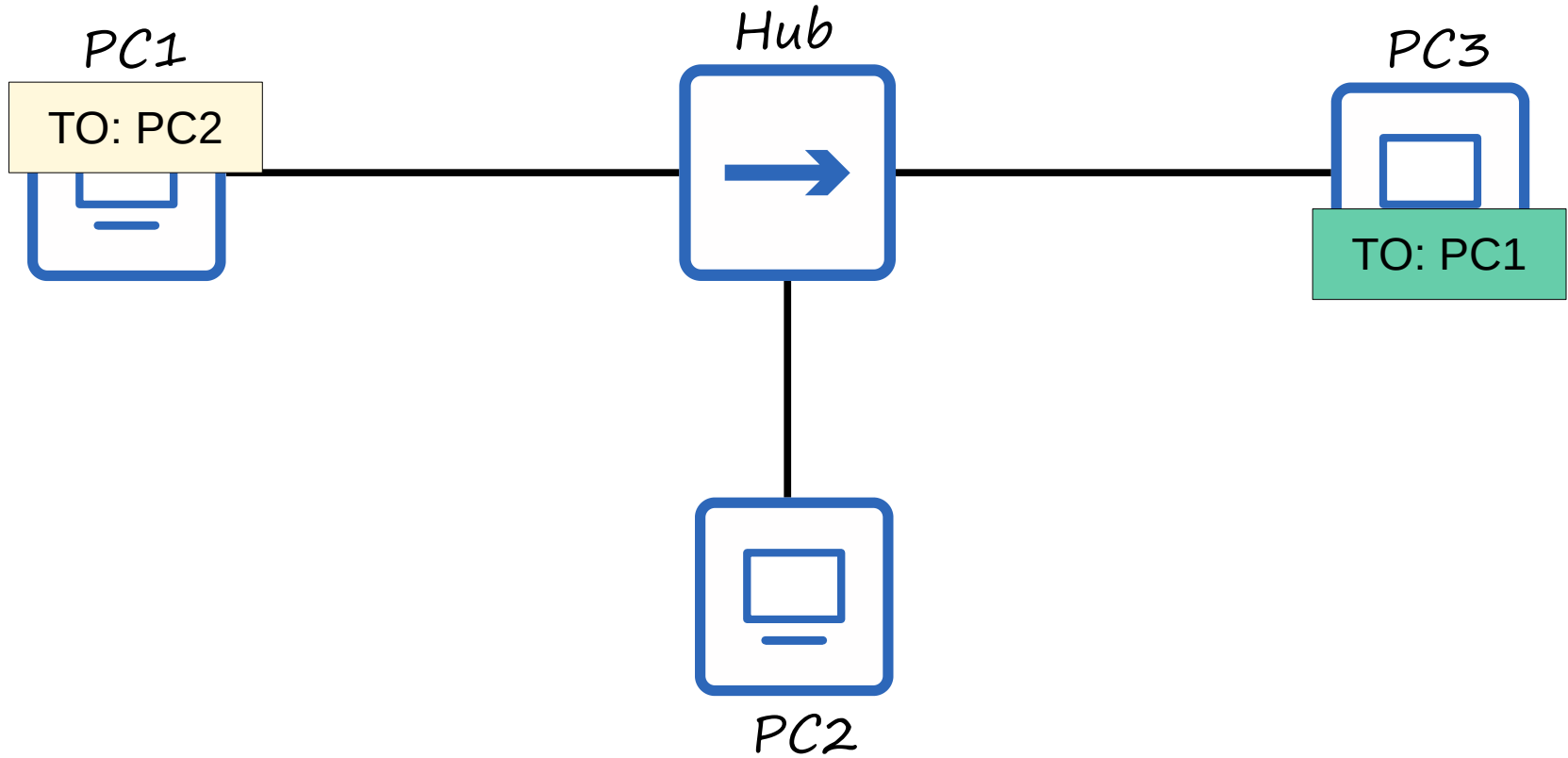
LAN Hubs



LAN Hubs

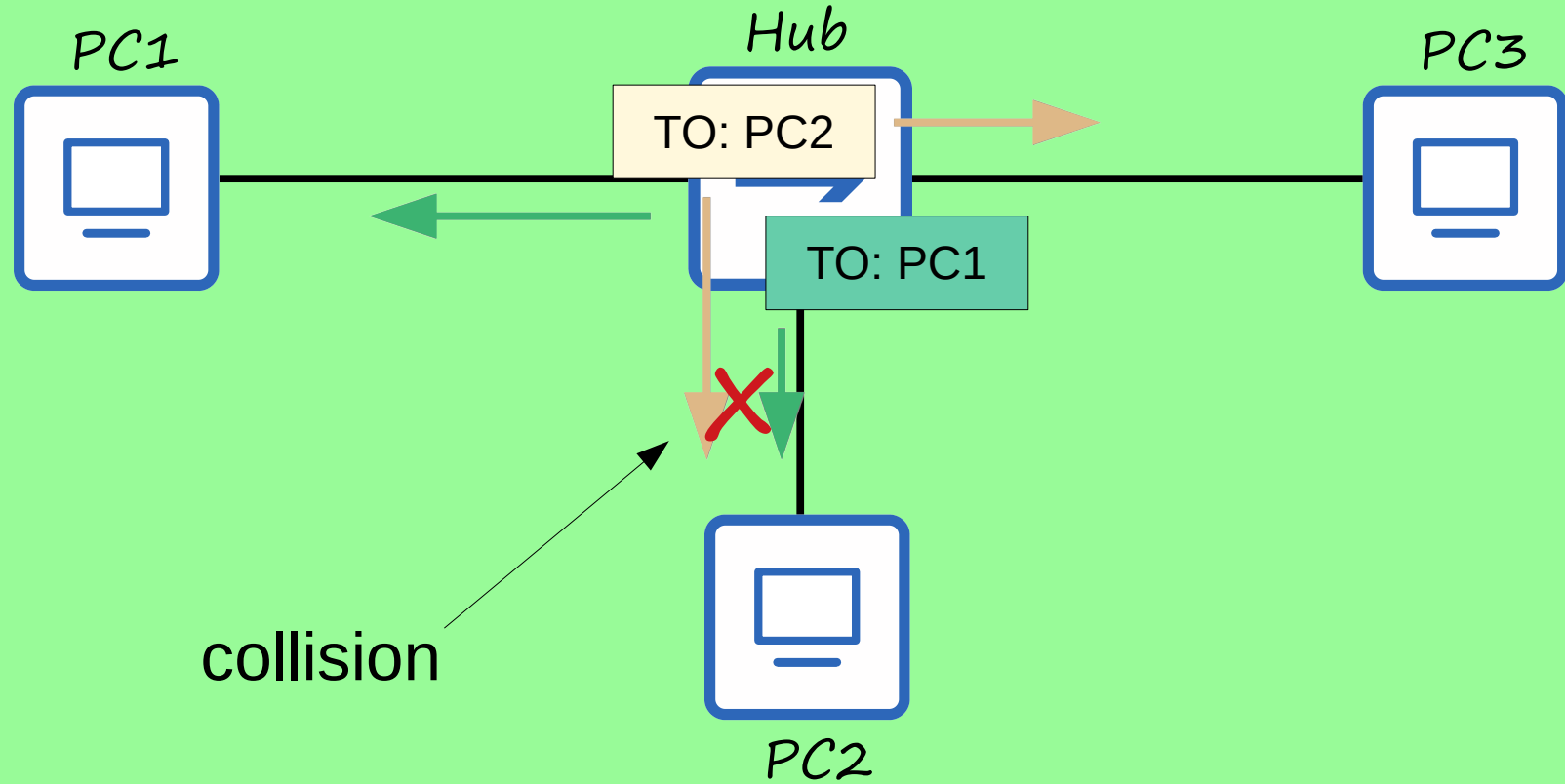


LAN Hubs



LAN Hubs

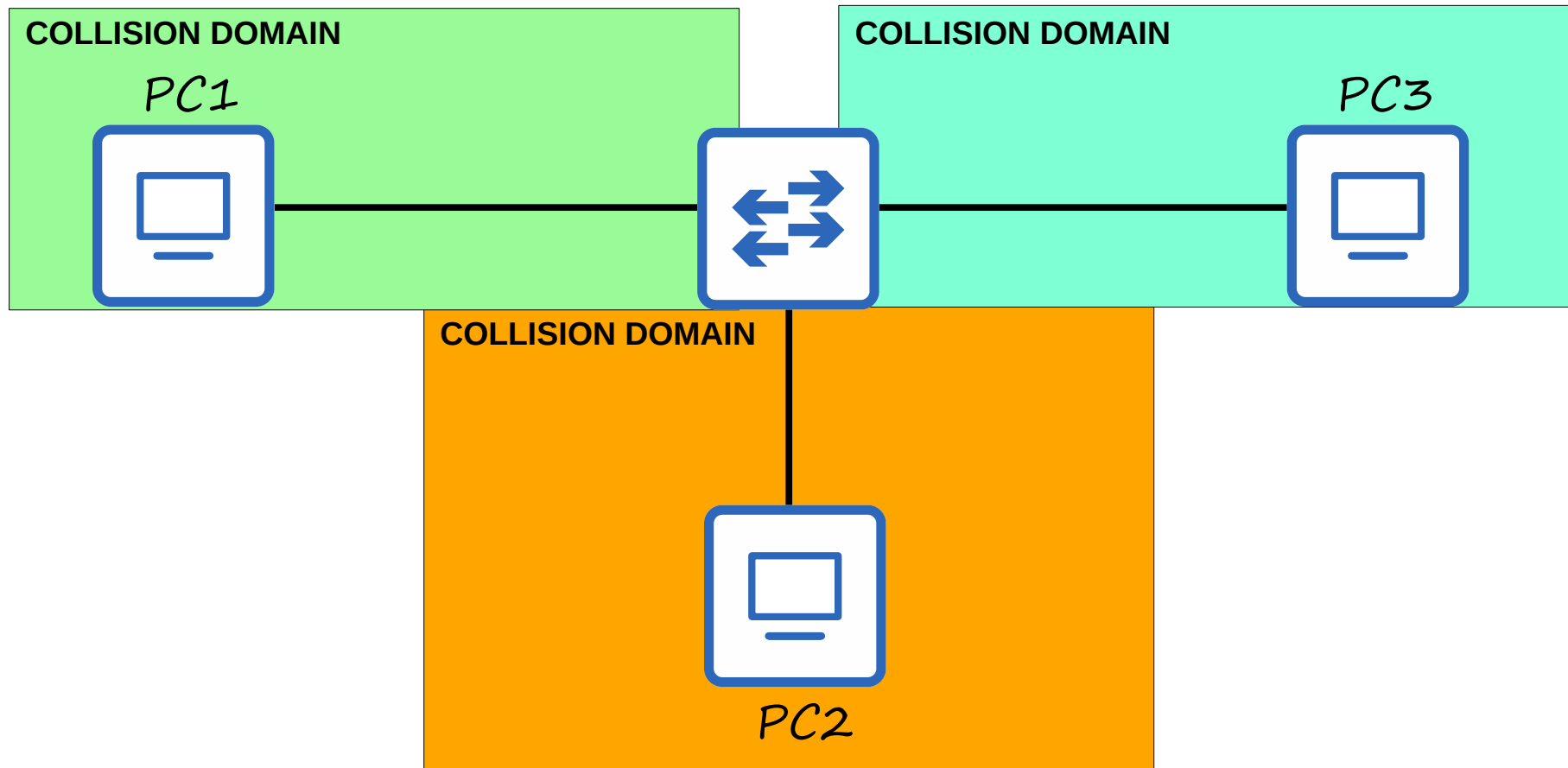
COLLISION DOMAIN



- *Carrier Sense Multiple Access with Collision Detection*
- *Before sending frames, devices 'listen' to the collision domain until they detect that other devices are not sending.*
- *If a collision does occur, the device sends a jamming signal to inform the other devices that a collision happened.*
- *Each device will wait a random period of time before sending frames again.*
- *The process repeats.*



Collision domains



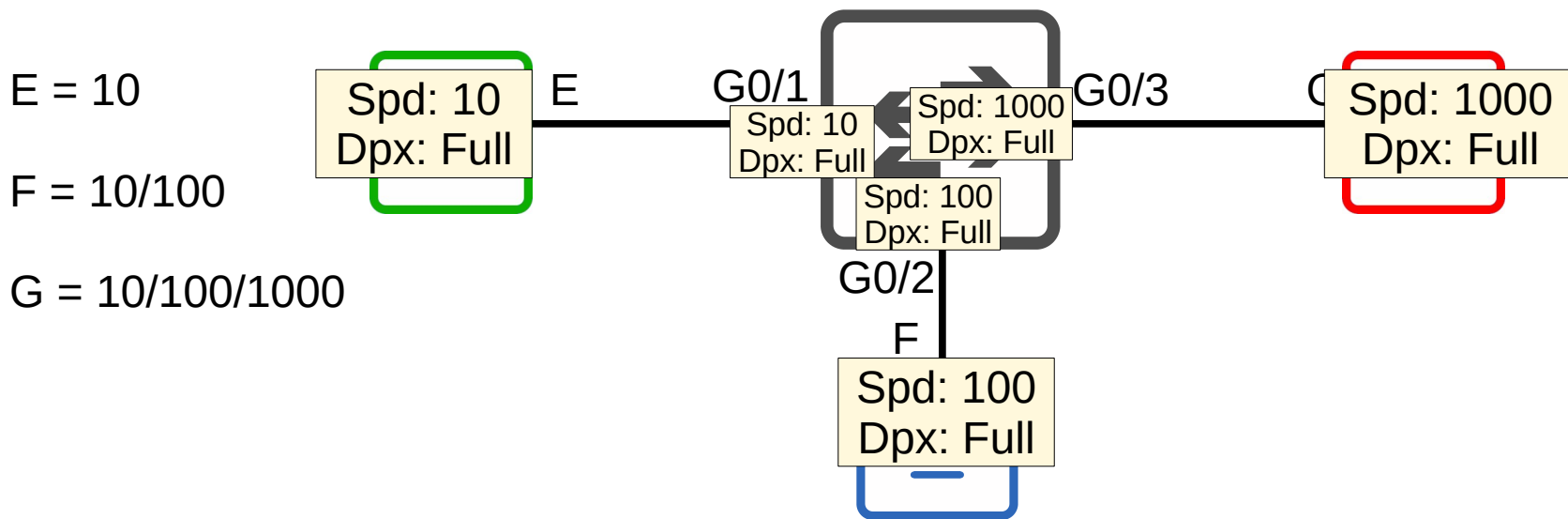


Full/Half Duplex

- *Half duplex: The device cannot send and receive data at the same time. If it is receiving a frame, it must wait before sending a frame.*
- *Devices attached to a hub must operate in half duplex.*
- *Full duplex: The device can send and receive data at the same time. It does not have to wait.*
- *Devices attached to a switch can operate in full duplex.*

Speed/Duplex Autonegotiation

- Interfaces that can run at different speeds (10/100 or 10/100/1000) have default settings of **speed auto** and **duplex auto**.
- Interfaces 'advertise' their capabilities to the neighboring device, and they negotiate the best **speed** and **duplex** settings they are both capable of.

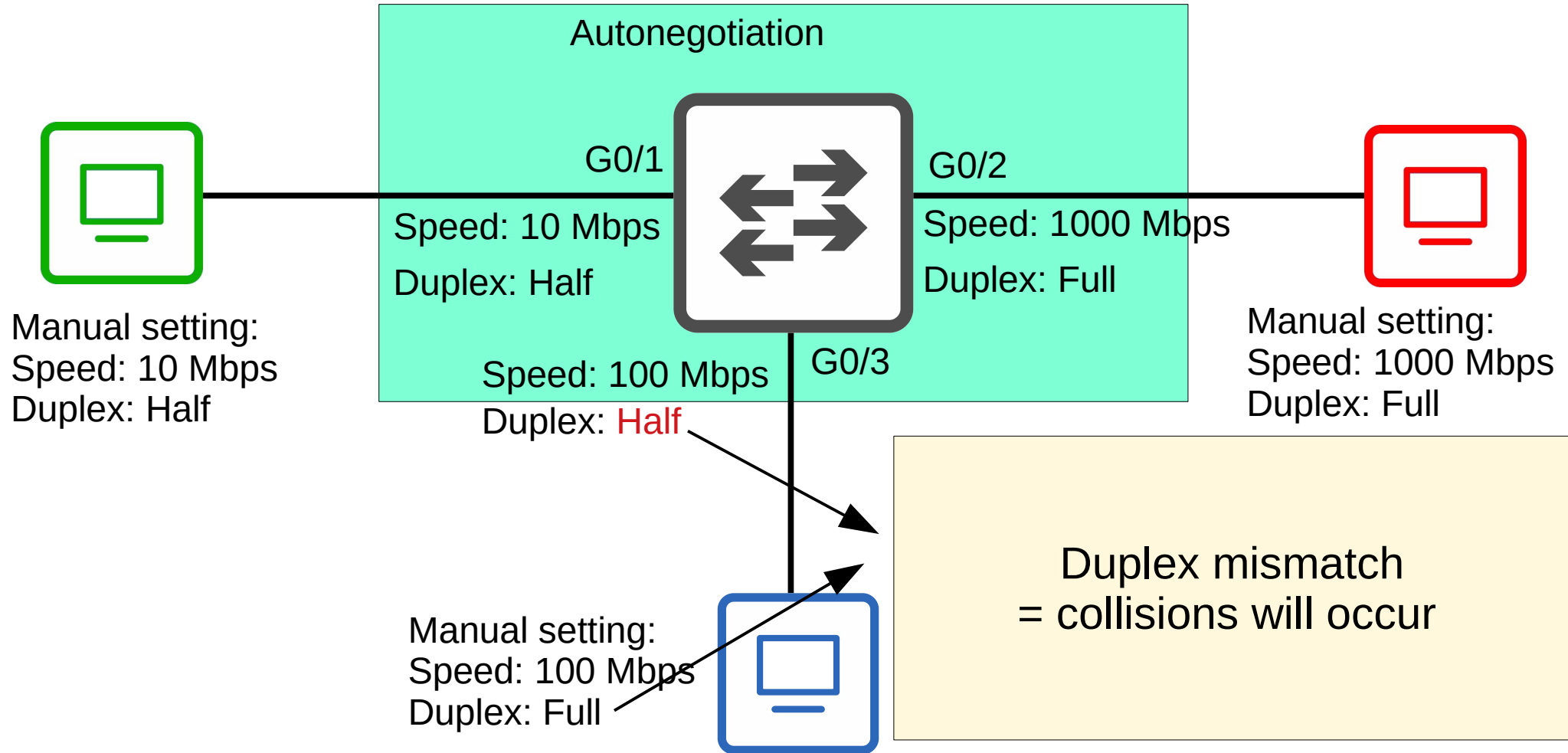


Speed/Duplex Autonegotiation

- What if autonegotiation is disabled on the device connected to the switch?
- **SPEED:** The switch will try to sense the speed that the other device is operating at.
If it fails to sense the speed, it will use the slowest supported speed (ie. 10 Mbps on a 10/100/1000 interface)
- **DUPLEX:** If the speed is 10 or 100 Mbps, the switch will use half duplex.
If the speed is 1000 Mbps or greater, use full duplex.



Speed/Duplex Autonegotiation





Interface Errors

```
SW1#show interfaces f0/2
FastEthernet0/2 is up, line protocol is up
  Hardware is Fast Ethernet, address is 000C.3168.8461 (bia 000C.3168.8461)
  Description: ## to SW2 ##
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Auto-duplex, Auto-speed
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 02:29:44, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queuing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    269 packets input, 71059 bytes, 0 no buffer
    Received 6 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    7290 packets output, 429075 bytes, 0 underruns
    0 output errors, 3 interface resets
    0 output buffer failures, 0 output buffers swapped out
```




Interface Errors

```
269 packets input, 71059 bytes, 0 no buffer
Received 6 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
7290 packets output, 429075 bytes, 0 underruns
0 output errors, 3 interface resets
0 output buffer failures, 0 output buffers swapped out
```

- *Runts*: Frames that are smaller than the minimum frame size (64 bytes)
- *Giants*: Frames that are larger than the maximum frame size (1518 bytes)
- *CRC*: Frames that failed the CRC check (in the Ethernet FCS trailer)
- *Frame*: Frames that have an incorrect format (due to an error)
- *Input errors*: Total of various counters, such as the above four
- *Output errors*: Frames the switch tried to send, but failed due to an error

Things we covered

- Interface speed and duplex
- Speed and duplex autonegotiation
- Interface status
- Interface counters & errors



QUIZ

Quiz Question 1

There is a duplex mismatch between SW1's FO/1 interface and SW2's FO/1 interface, which are connected. Autonegotiation is disabled. What will be the result?

- a) Improved performance
- b) Collisions will occur
- c) SW1 will sense SW'2 duplex setting and adjust to match

Quiz Question 2

What is used on half-duplex interfaces to detect and avoid collisions?

- a) CSMA/CD
- b) CSMA/CA
- c) Autonegotiation
- d) Duplex Auto

Quiz Question 3

Which command shows various counters of errors detected on an interface?

- a) *show interfaces*
- b) *show ip interface brief*
- c) *show interfaces status*
- d) *show interfaces errors*

Quiz Question 3

~~X~~) show ip interface brief

```
SW1#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
Vlan 1	unassigned	YES	unset	up	up
FastEthernet0/1	unassigned	YES	unset	up	up
FastEthernet0/2	unassigned	YES	unset	up	up
FastEthernet0/3	unassigned	YES	unset	up	up
FastEthernet0/4	unassigned	YES	unset	up	up
FastEthernet0/5	unassigned	YES	unset	administratively down	down
FastEthernet0/6	unassigned	YES	unset	administratively down	down
FastEthernet0/7	unassigned	YES	unset	administratively down	down
FastEthernet0/8	unassigned	YES	unset	administratively down	down
FastEthernet0/9	unassigned	YES	unset	administratively down	down
FastEthernet0/10	unassigned	YES	unset	administratively down	down
FastEthernet0/11	unassigned	YES	unset	administratively down	down
FastEthernet0/12	unassigned	YES	unset	administratively down	down

Quiz Question 3

~~X~~ show interfaces status

```
SW1#show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Fa0/1	## to R1 ##	connected	1	full	100	10/100BaseTX
Fa0/2	## to SW2 ##	connected	trunk	a-full	a-100	10/100BaseTX
Fa0/3	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/4	## to end hosts ##	connected	1	a-full	a-100	10/100BaseTX
Fa0/5	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/6	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/7	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/8	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/9	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/10	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/11	## not in use ##	disabled	1	auto	auto	10/100BaseTX
Fa0/12	## not in use ##	disabled	1	auto	auto	10/100BaseTX

Quiz Question 3

~~X~~) show interfaces errors

```
SW1#show interfaces errors  
% Invalid input detected at '^' marker.
```

Quiz Question 3

★ a) show interfaces

```
FastEthernet0/1 is up, line protocol is up
  Hardware is Fast Ethernet, address is 000C.2110.5542 (bia 000C.2110.5542)
SW1#show interfaces f0/1
FastEthernet0/1 is up, line protocol is up
  Hardware is Fast Ethernet, address is 000C.2110.5542 (bia 000C.2110.5542)
  Description: ## to R1 ##
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Full-duplex, 100Mb/s
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 02:29:44, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queuing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    269 packets input, 71059 bytes, 0 no buffer
    Received 6 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    7290 packets output, 429075 bytes, 0 underruns
    0 output errors, 3 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

Quiz Question 4

Which are examples of errors that might occur on a network interface?

- a) Runts, Giants, Broadcasts
- b) Shorts, Longs, Oversizes
- c) Packets, Bytes, Inputs, Outputs
- d) Runts, Giants, CRC

Quiz Question 5

SW1 is trying to autonegotiate interface speed settings with SW2. However, autonegotiation is disabled on SW2's interface. SW2's interface is configured with a speed of 100 Mbps and full duplex. What speed and duplex settings will SW1 use, assuming it succeeds in sensing the speed?

- a) Speed: 100 Mbps, Duplex: Full
- b) Speed: 100 Mbps, Duplex: Half
- c) Speed: 10 Mbps, Duplex: Full
- d) Speed: 10 Mbps, Duplex: Half