CCNA 200-301 Day 9
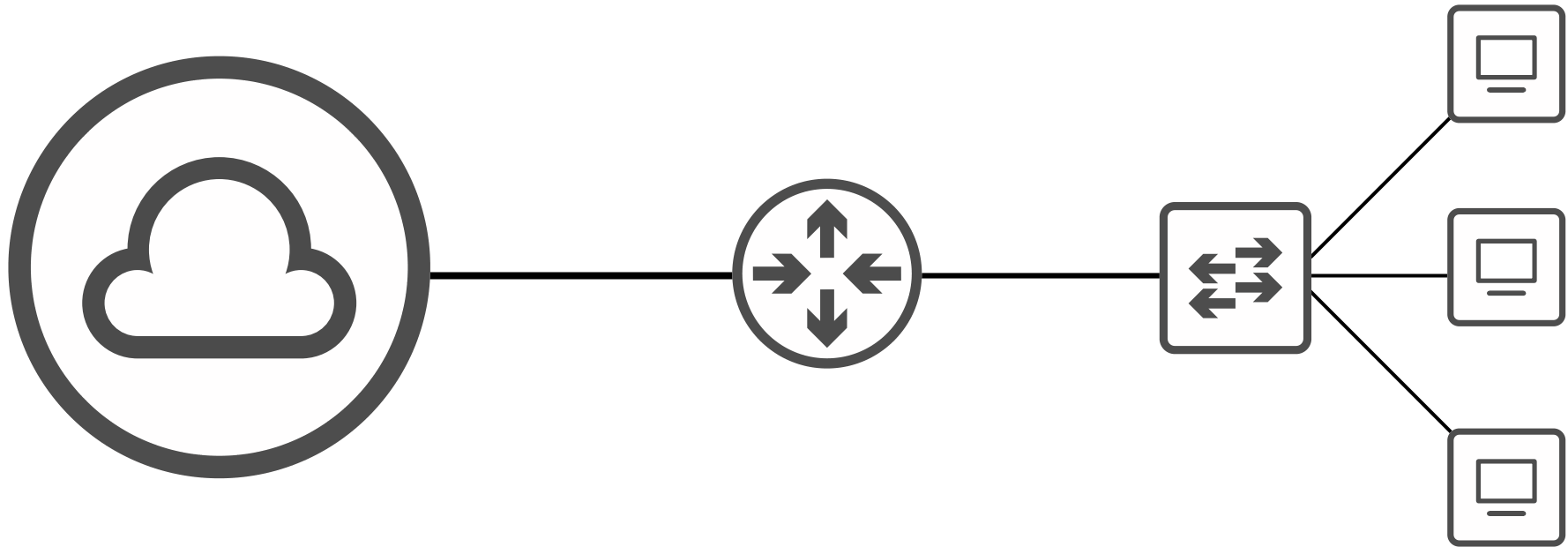
Switch Interfaces

Jeremy's IT Lab

- Interface speed and duplex

- Speed and duplex autonegotiation

- Interface status

- Interface counters & errors

ASR 1000-X Router

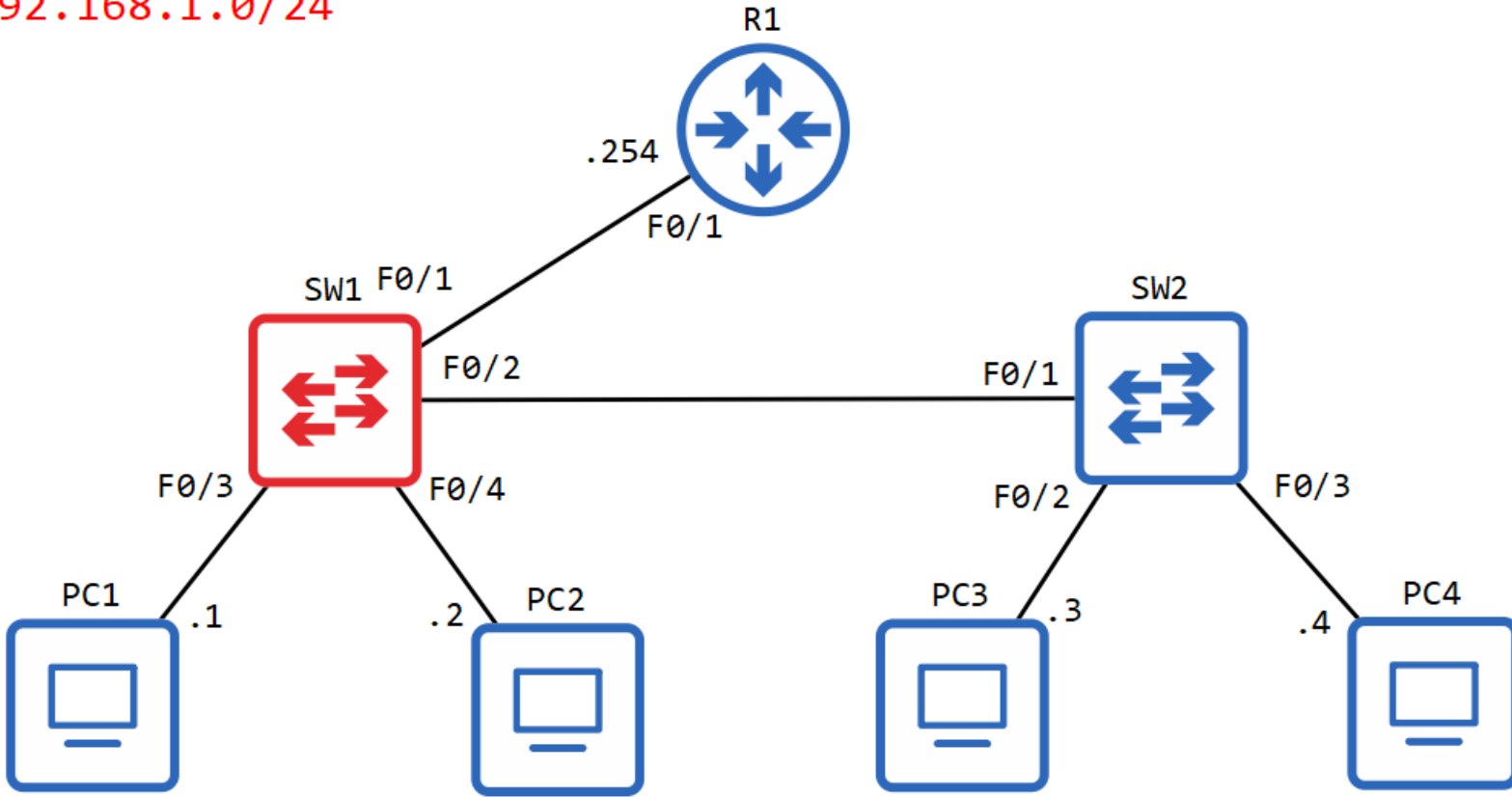Catalyst 9200 Switch

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

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

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
```

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```
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
```

```
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
```

```
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
```
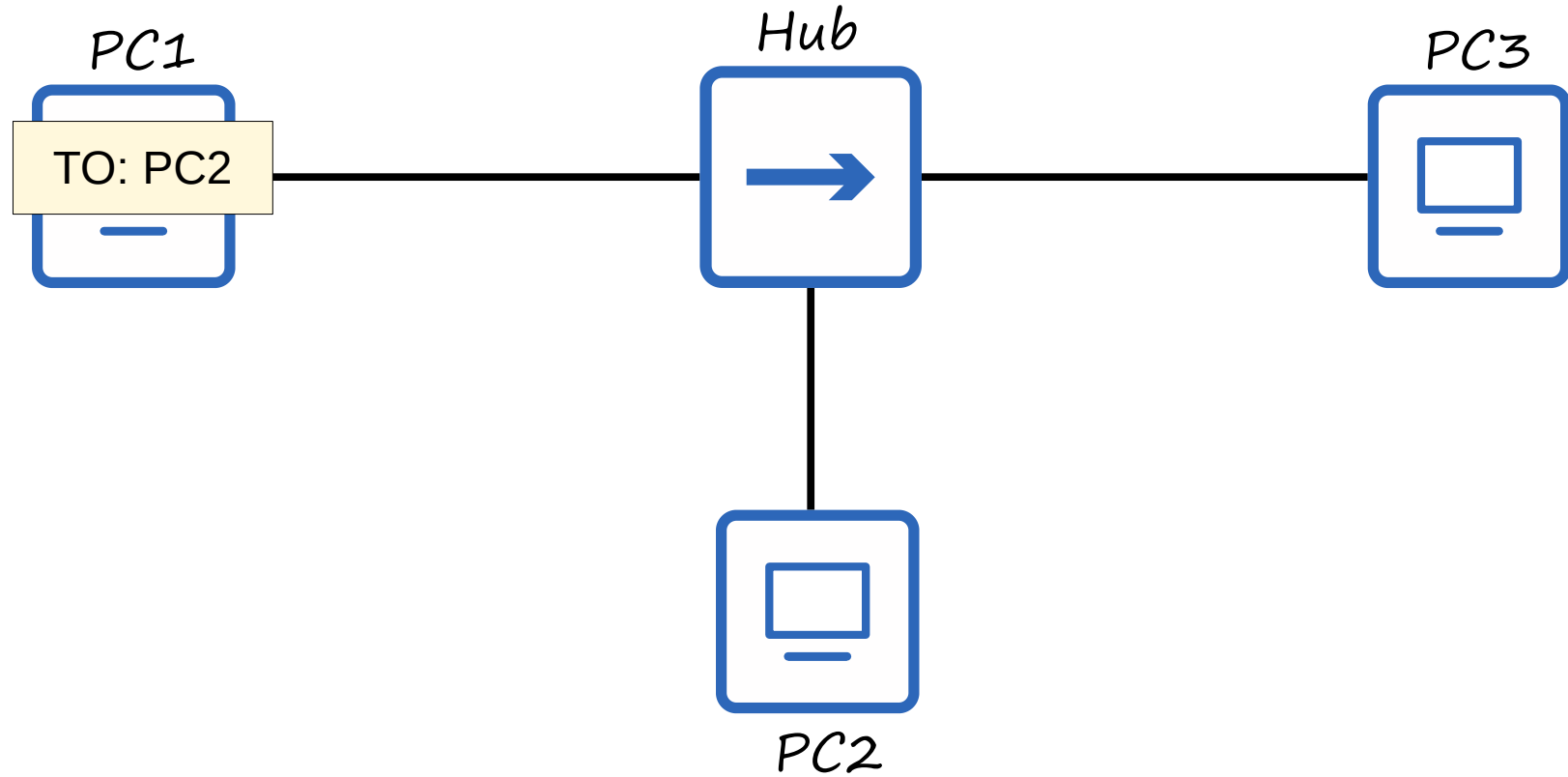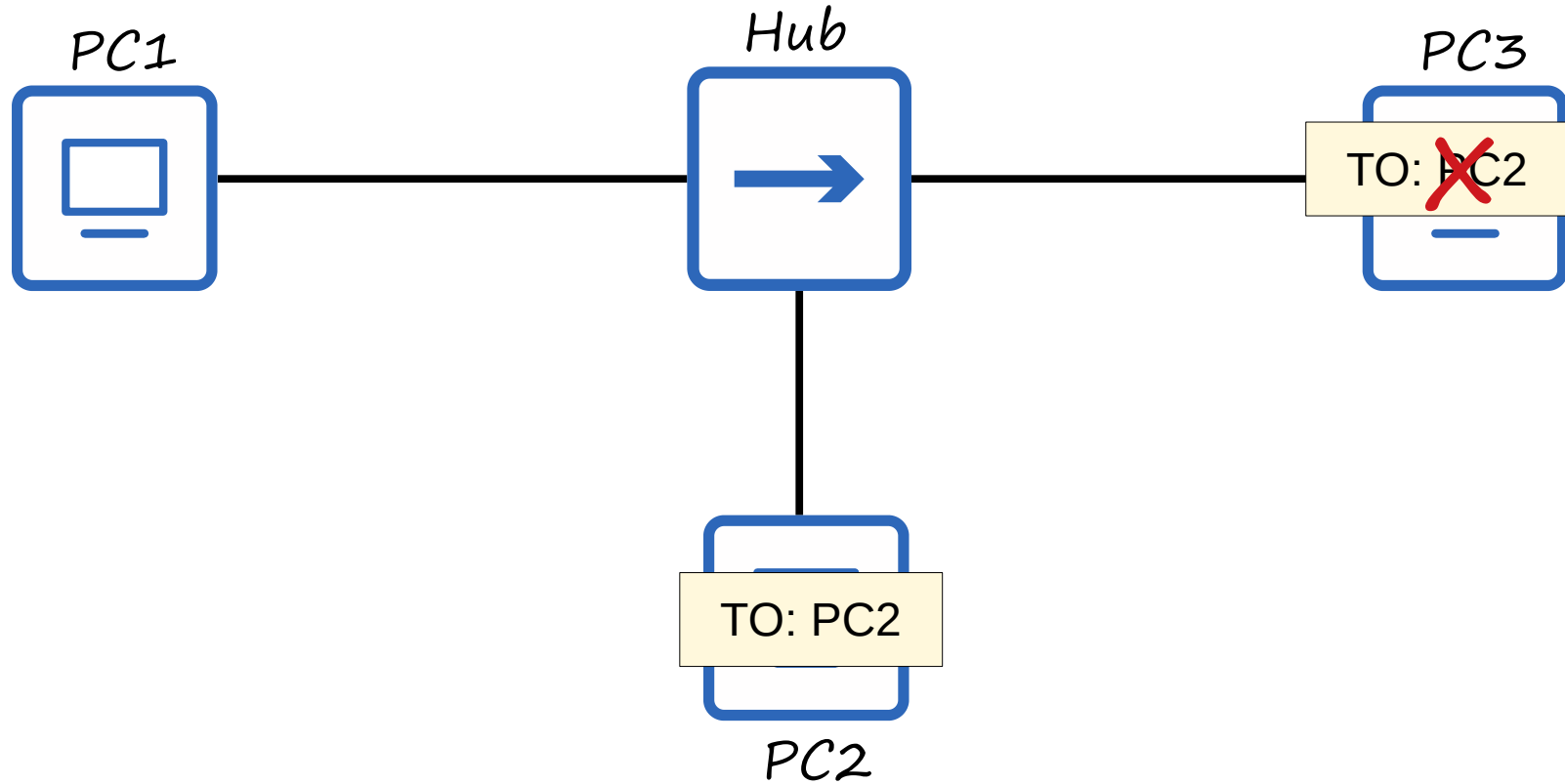
- **Half duplex**: The device cannot send and receive data at the same time. If it is receiving a frame, it must wait before sending a frame.

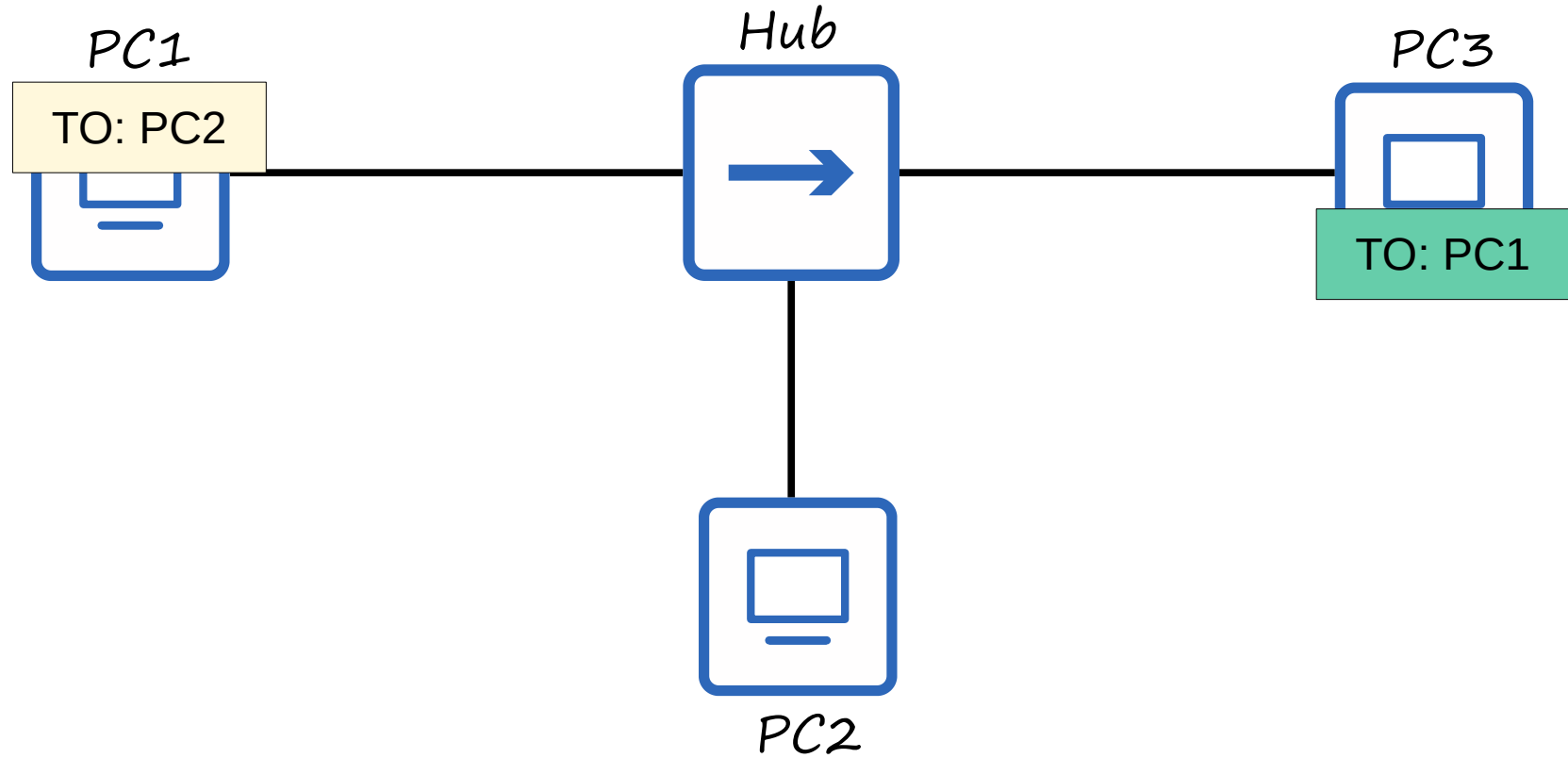- **Full duplex**: The device **can** send and receive data at the same time. It does not have to wait.
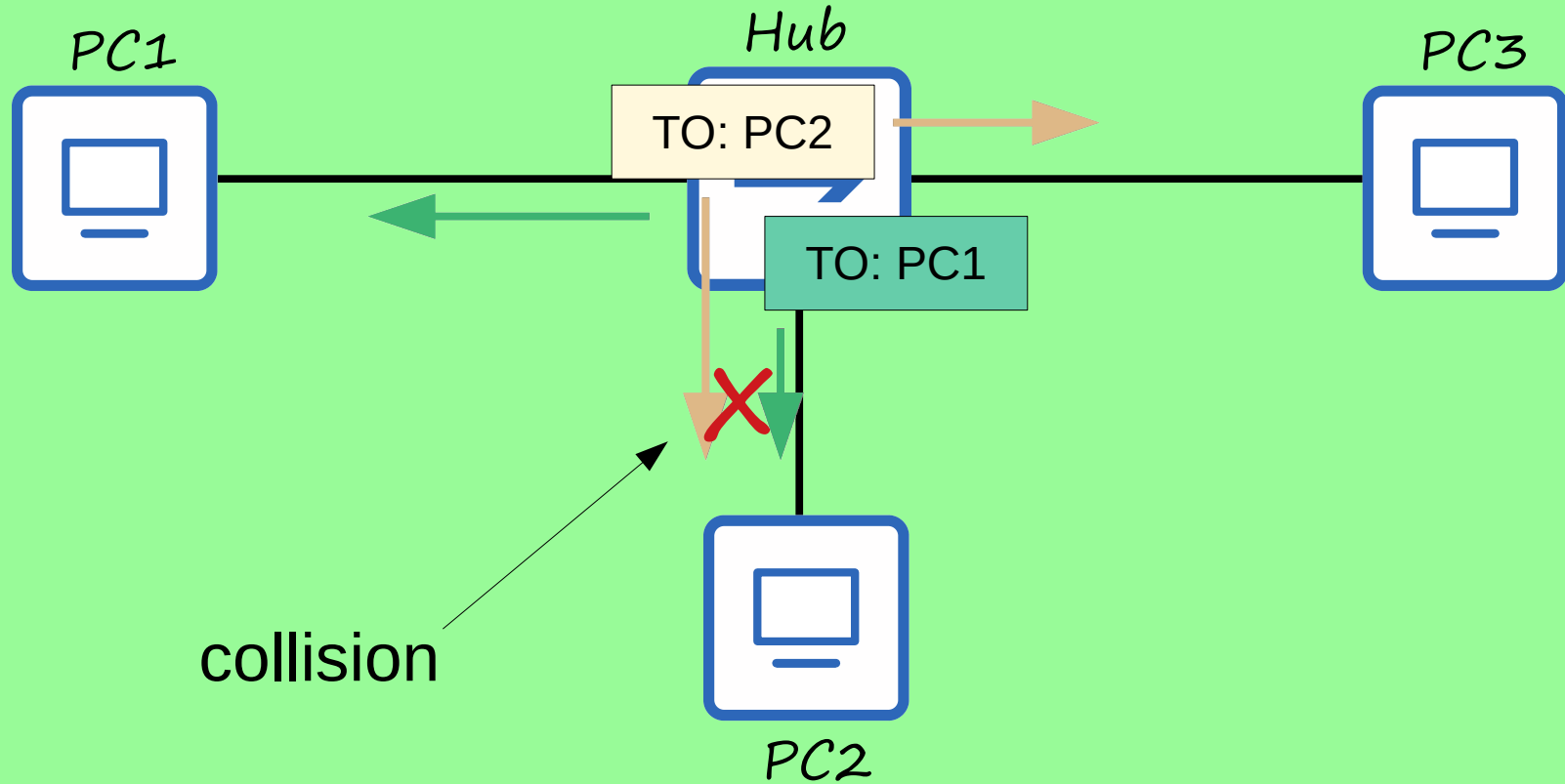
LAN Hubs

PC1

TO: PC2

Hub

PC3

PC2

LAN Hubs

PC1

Hub

PC3

TO: PC2

TO: PC2

PC2

LAN Hubs

PC1

TO: PC2

Hub

PC3

TO: PC1

PC2

LAN Hubs

COLLISION DOMAIN

PC1

Hub

PC3

TO: PC2

TO: PC1

collision

PC2

- **C**arrier **S**ense **M**ultiple **A**ccess with **C**ollision **D**etection
- 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.
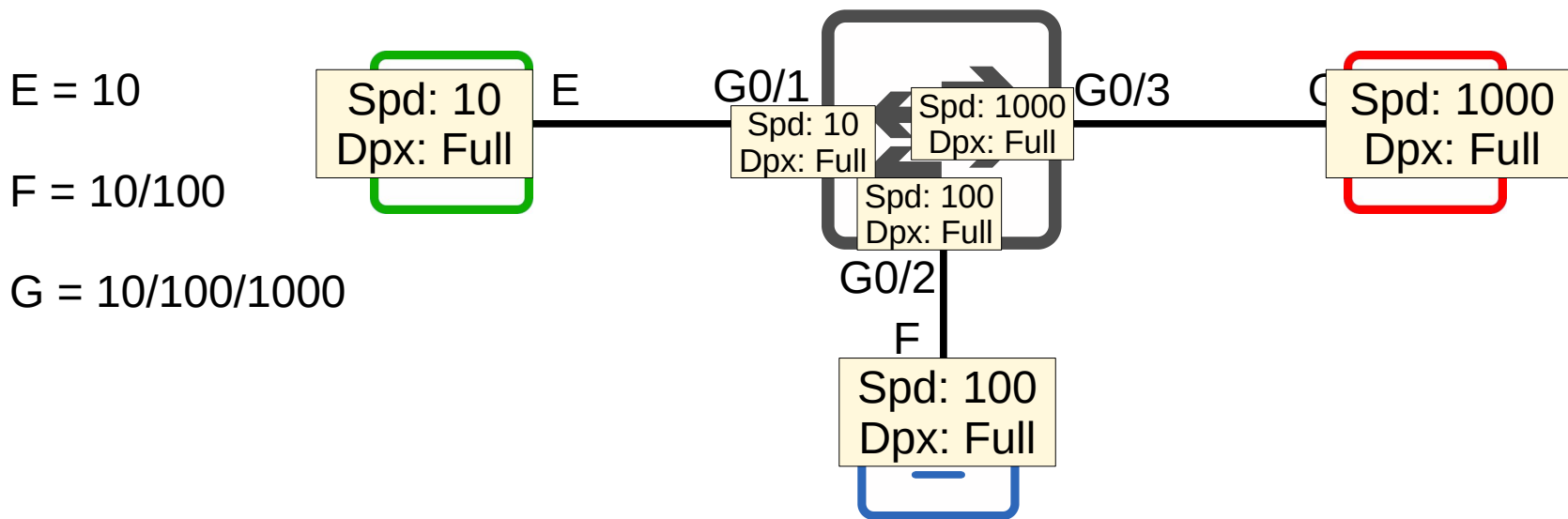- The process repeats.

Collision domains
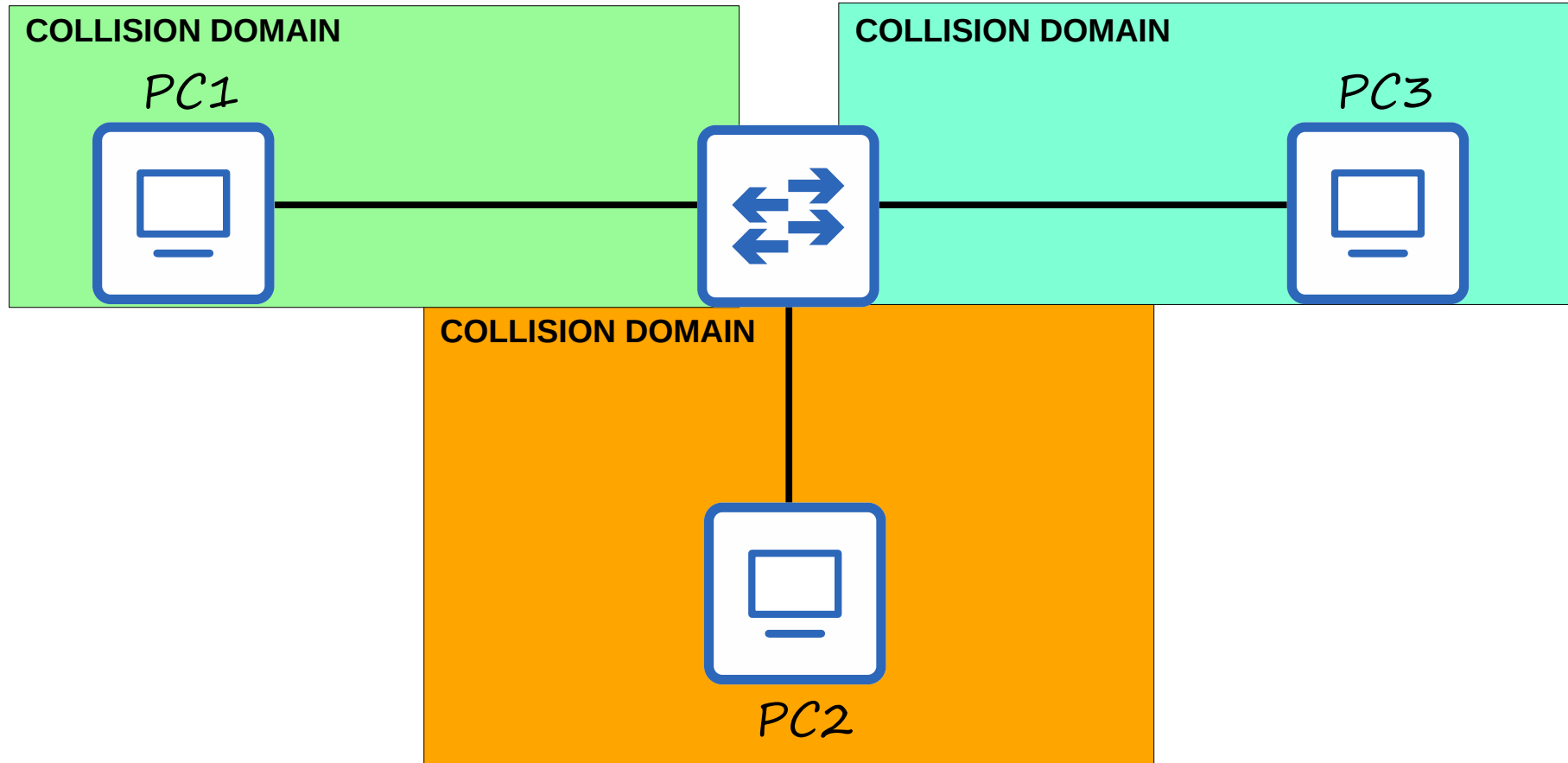
COLLISION DOMAIN

PC1

COLLISION DOMAIN

PC3

COLLISION DOMAIN

PC2

- **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.
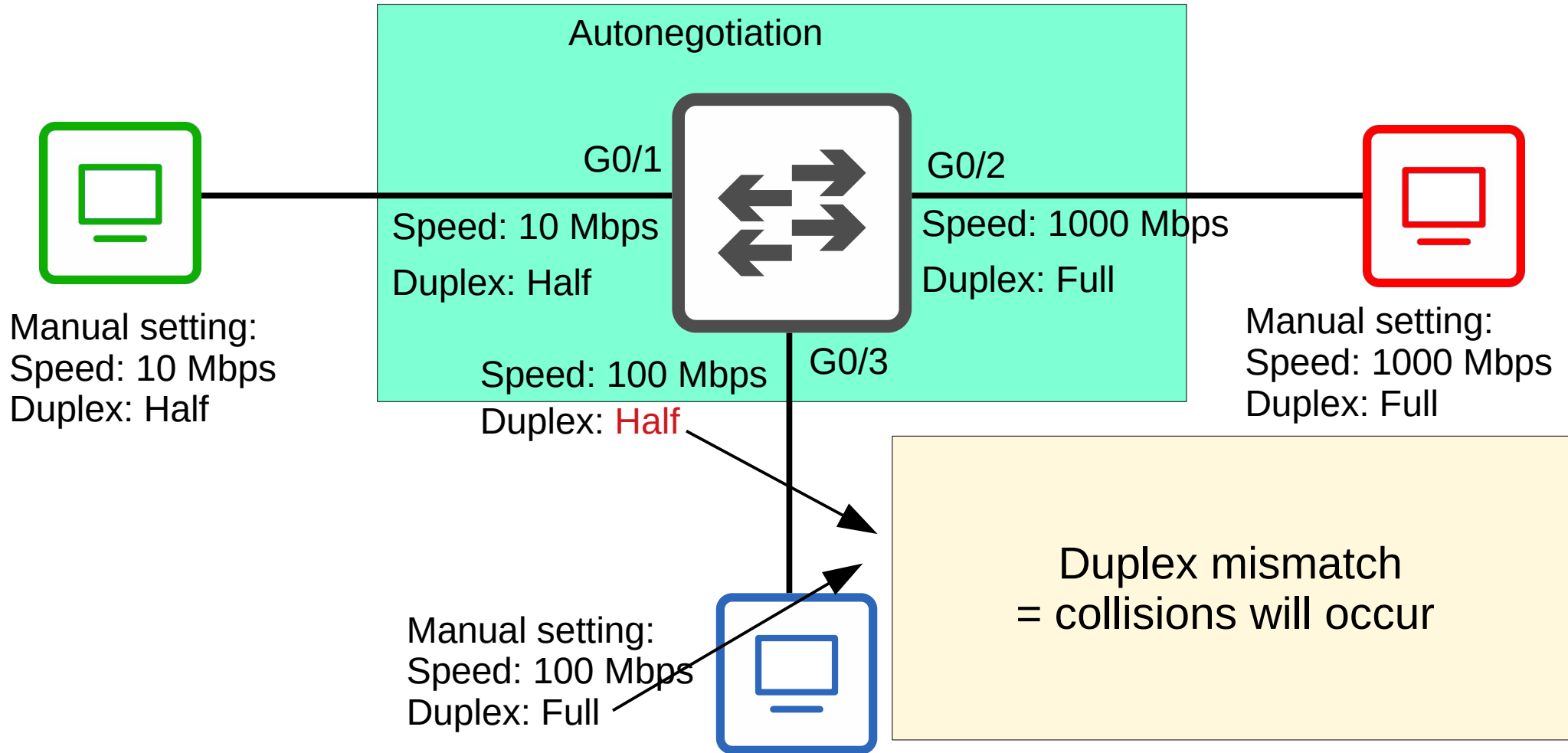- Devices attached to a **switch** can operate in full duplex.

- 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.

E = 10

F = 10/100

G = 10/100/1000

Spd: 10
Dpx: Full

E

G0/1

Spd: 10
Dpx: Full

Spd: 1000
Dpx: Full

G0/3

Spd: 1000
Dpx: Full

Spd: 100
Dpx: Full

G0/2

F

Spd: 100
Dpx: Full

- 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 if 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

Autonegotiation

G0/1

Speed: 10 Mbps

Duplex: Half

G0/2

Speed: 1000 Mbps

Duplex: Full

Speed: 100 Mbps

G0/3

Duplex: Half

Manual setting:
Speed: 10 Mbps
Duplex: Half

Manual setting:
Speed: 1000 Mbps
Duplex: Full

Manual setting:
Speed: 100 Mbps
Duplex: Full

Duplex mismatch
= collisions will occur

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```
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
```

```
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

- Interface speed and duplex

- Speed and duplex autonegotiation

- Interface status

- Interface counters & errors

QUIZ

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There is a duplex mismatch between SW1's F0/1 interface and SW2's F0/1 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

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

a) CSMA/CD

b) CSMA/CA

c) Autonegotiation

d) Duplex Auto

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**

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
```

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
```

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X) show interfaces errors

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

⭐ 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
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    7290 packets output, 429075 bytes, 0 underruns
    0 output errors, 3 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

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

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