

Section 5:Modern Ethernet

Section 5:Modern Ethernet:

23.100BaseT

- 100Mbps Ethernet (Hubs are obsolete)
- Half Duplex - Can talk, but cannot hear until you stop talking (Two way Radio)
- Full Duplex - Can talk and listen at the same time (Telephone)
- **Everyone today is Full Duplex

What came out with 100BaseT:

100BaseT4 (Disappeared)

- 100Mbps
- 1024 nodes per hub
- 100m from hub to any node 100m
- Cat 3 (four unshielded pairs)
- *Not capable of Full Duplex

100BaseTX (Now known as 100BaseT)

- 100Mbps
- 1024 nodes per hub
- 100m from hub to any node 100m
- CAT 5e (two unshielded pairs)
- *Full Duplex

100BaseFX(fiber)

- 100 Mbps
- 1024 Nodes per hub
- Multimode fiber
- 2 km (very long distance)

**For the exam know Hubs/Switches, Full/Half Duplex, and 3 versions of 100Base Ethernet above.

24.Connecting Switches

Patch Cables are used:

- 1.Regular Patch cable is wired the same on each end. (Straight through)
- 2.Crossover cable

In the old days you could take a crossover cable and plug it in from one switch to another (any ports). A more complicated way is to plug into an "uplink port".

-An uplink port has crossover built in so that you can use a straight cable and plug it into the uplink port and then plug the other end into a port on the other switch.

Todays switches have "Auto Sensing ports". Any port will recognize that it is plugged into another switch and configure itself. So you just use straight through cables and they will automatically work.

25.Gigabit Ethernet and 10-Gigabit Ethernet

Gigabit Ethernet is 1000Base"____" 4 standards that will be seen on the exam

*Works with Ethernet

Coaxial

1. 1000BaseCX

-Copper standard and used Twinax

-25 Meters between switch and each node

Fiber optic

2. 1000BaseSX

-Multimode fiberoptic cable

-up to 500 meters

3. 1000BaseLX

-Single-Mode or multi-mode

-up to 5km

Unshielded Twisted pair

4. 1000BaseT

-was made to be used with CAT 5e, but CAT 6 is used

-100m

10 Gigabit Ethernet

*Designed to work with "SONET" (backbone of the Internet LAN)

Unshielded Twisted Pairs

1. 10GBaseT

-CAT 6 up to 55meters

-CAT 6a up to 100meters

Three kinds of Fiber Optic

2.10GBaseSR

-Multimode Cable

-Low as 26m to 400m

3.10GBaseLR(Long Range) - wavelength of 1310nm

-up to 10km

4.10GBase(ER) - Wavelength of 1550 nm

-up to 40km

*For each of these there is an equivalent SW,EW,LW version

10GBaseSR - 10GBaseSW

10GBaseLR - 10GBaseLW

10GBaseER - 10GBaseEW

These have the exact same values as above but they are designed to work on the sonet networks.

Need to Know these standards for the exam

QUICK REVIEW				
	1000BaseCX	Twinax	25 meters	
	Fiber-Optic	1000BaseSX	Multimode	500 meters
		1000BaseLX	Single-mode	5 kilometers
	UTP	1000BaseT	Cat 6	100 meters
	10GBaseT	Cat 6	55 meters	
		Cat 6a	100 meters	
	10GBaseSR	Multimode	26-400 meters	
	10GBaseLR	Single-mode	1310 nm	10 kilometers
	10GBaseER	Single-mode	1550 nm	40 Kilometers

26. Transceivers

The challenge of using fiber Ethernet is that there isn't a standard when it come to connection.

To get around this problem the guys that make switches got together and solved this problem by making an interchangeable module that will work with any switch. That module is called an MSA (Multisource connectors).

MSA (MultiSource Connectors) - pluggable devices that allow you to keep one switch and use any type of fiber connectors within that standard

Types of MSA:

-1st Generation is called a (GBIC) -Gigabit interface converter - Designed more for sc/st connectors

-SFP (Small form-factor Pluggable) - Designed for small form factors such as LC connector

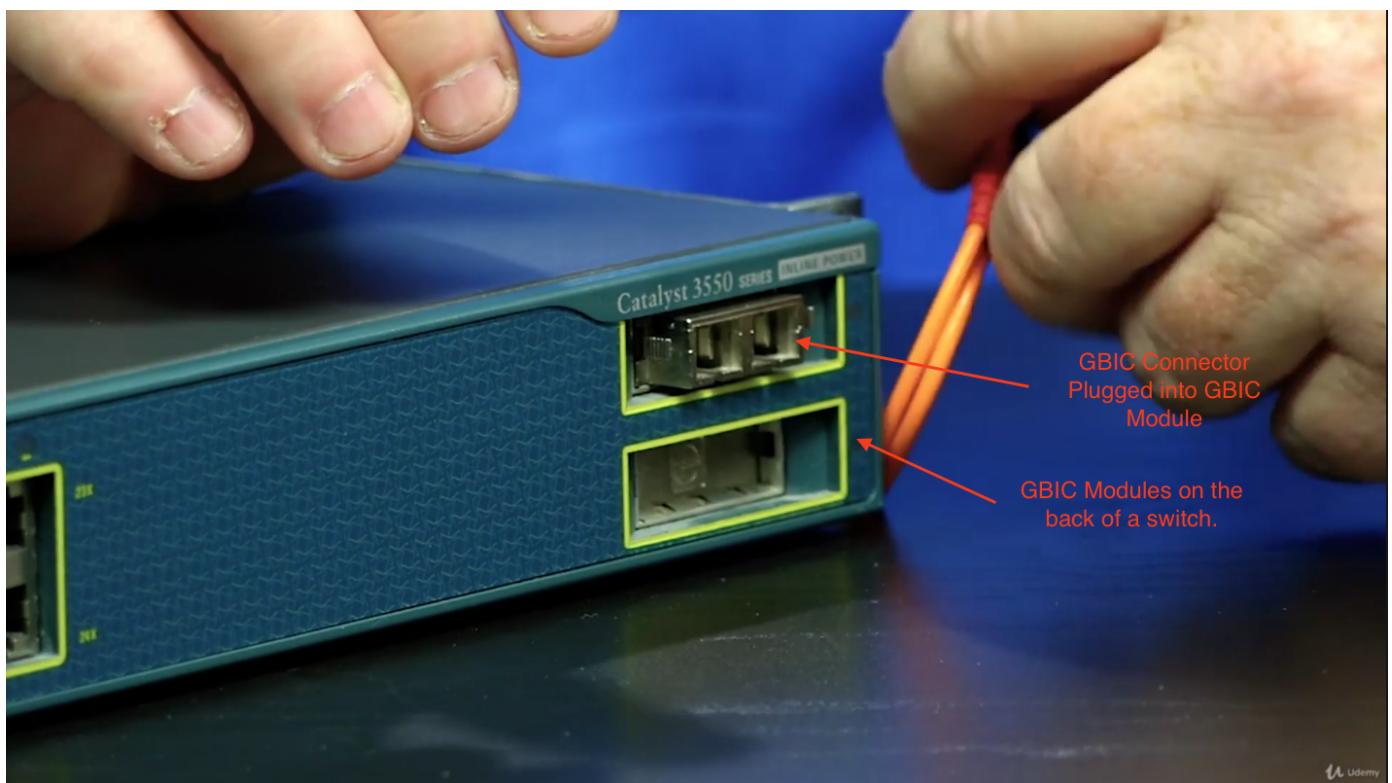
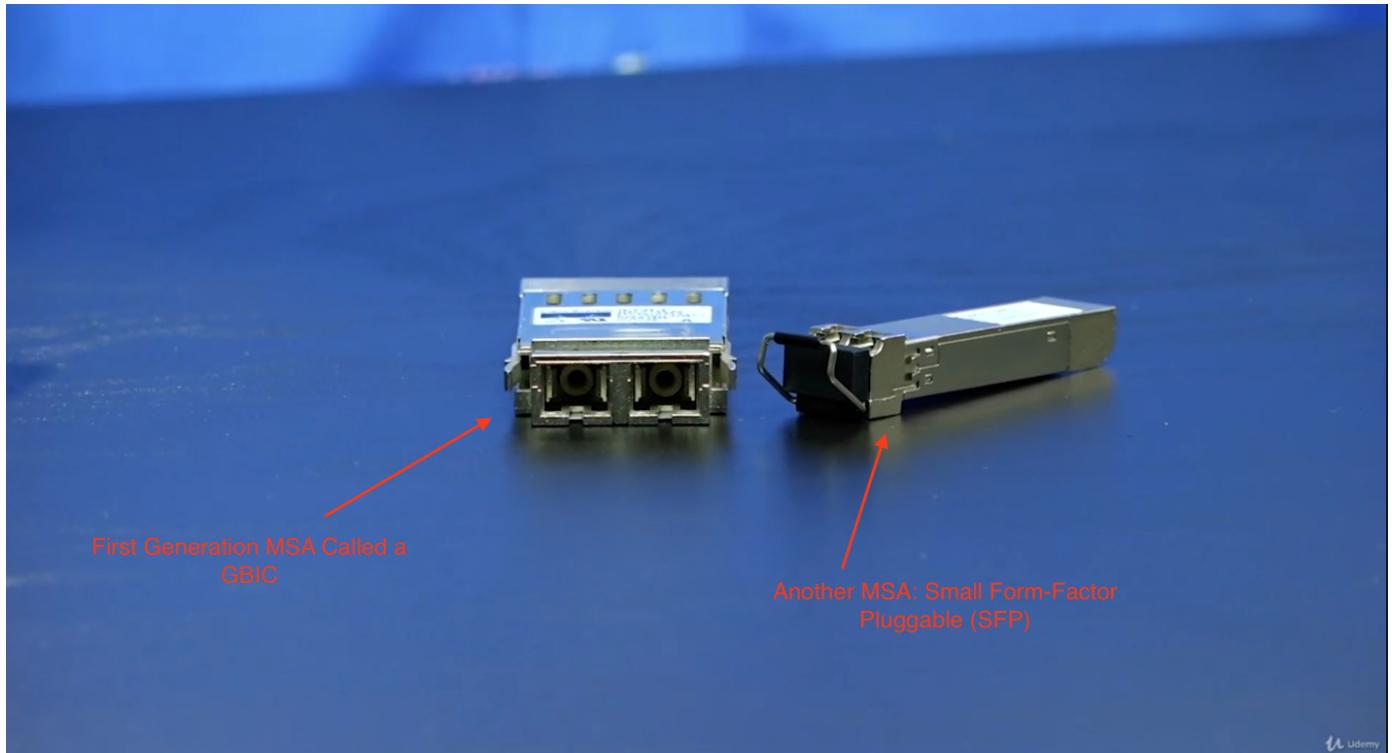
There is an improved version called on SFP+ if the hardware specifys. The SFP+ is more common today than the SFP.

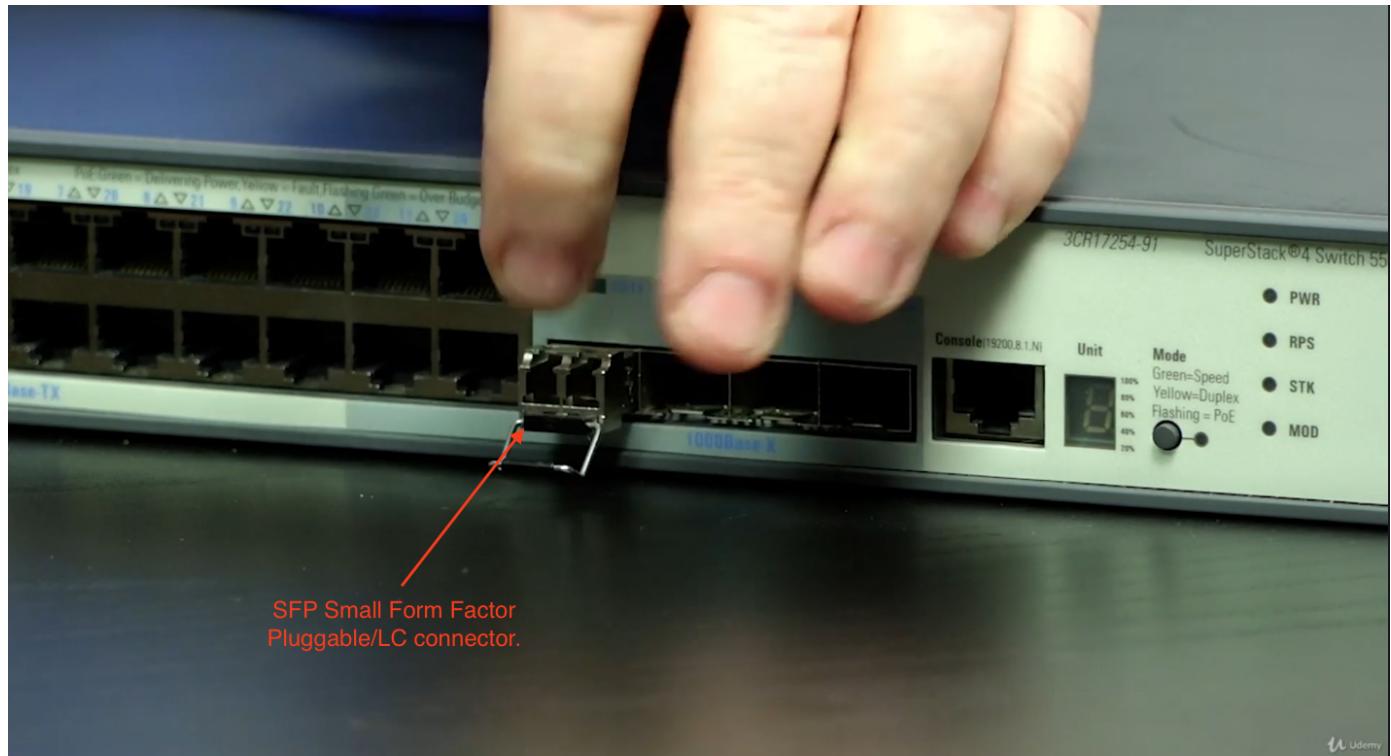
-Quad Small for-factor Pluggable (QSFP)-Designed for 40Gigabit Ethernet (Will be on the exam)

*Whenever we use fiberoptics we use duplex where one cable is send and one cable is receive.

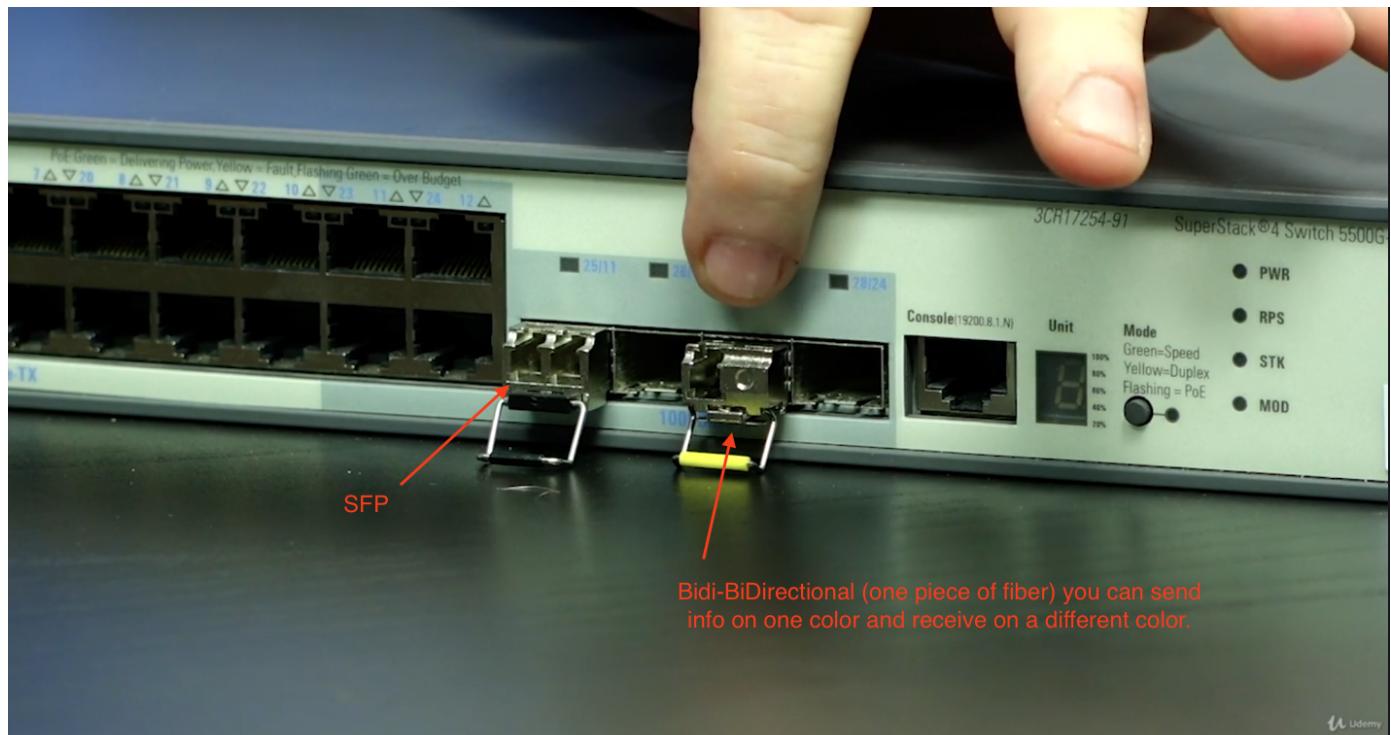
*There is multimode and Single mode (As noted in previous sections)

*One thing you can do with single mode is use different colors of lasers to send and receive on the same cable and this is call BIDIRECTIONAL OR "BIDI"





Quad small form-factor pluggable (QSFP)



27. Connecting Ethernet Scenarios

A lot of questions about scenarios on the exam. Many ways we can mess up connecting switches.

1. Loop Issues:

Bridging loop - without anything to protect us Data will flow through the loop infinitely and take down the entire broadcast domain.

Spanning tree protocol (STP) was developed to avoid these kind of bridging loops. Before a bridge comes along. The root (main) switch will watch any data that goes through in any situation. The root switch will automatically turn off one of its ports and the switches work as they should without human intervention.

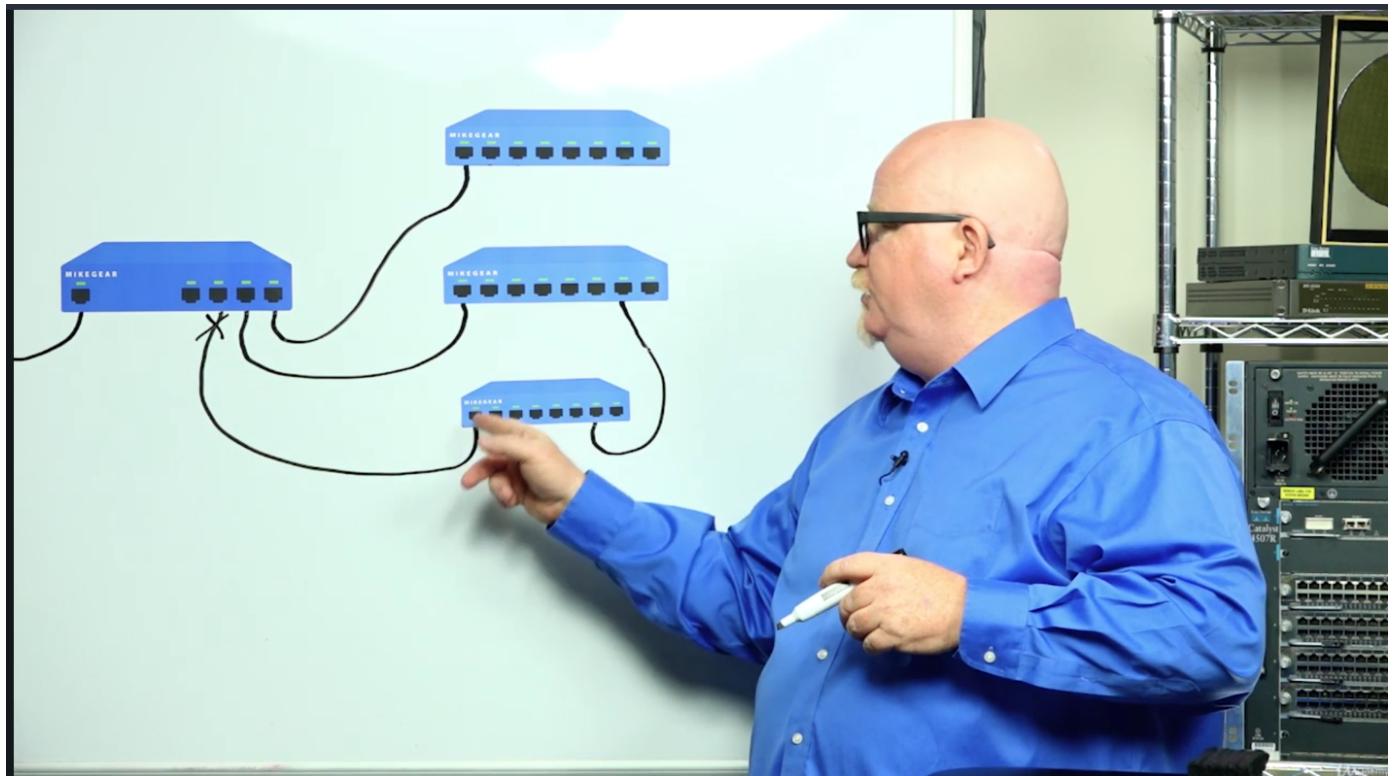
If there is a bad box spamming information (MAC address info). Flooding the Network it is called a Layer 2 attack. (Layer 2 is the Data Link Layer in the OSI model). This is known as a FLOOD.

A FLOOD is a bad thing that happens within our network.

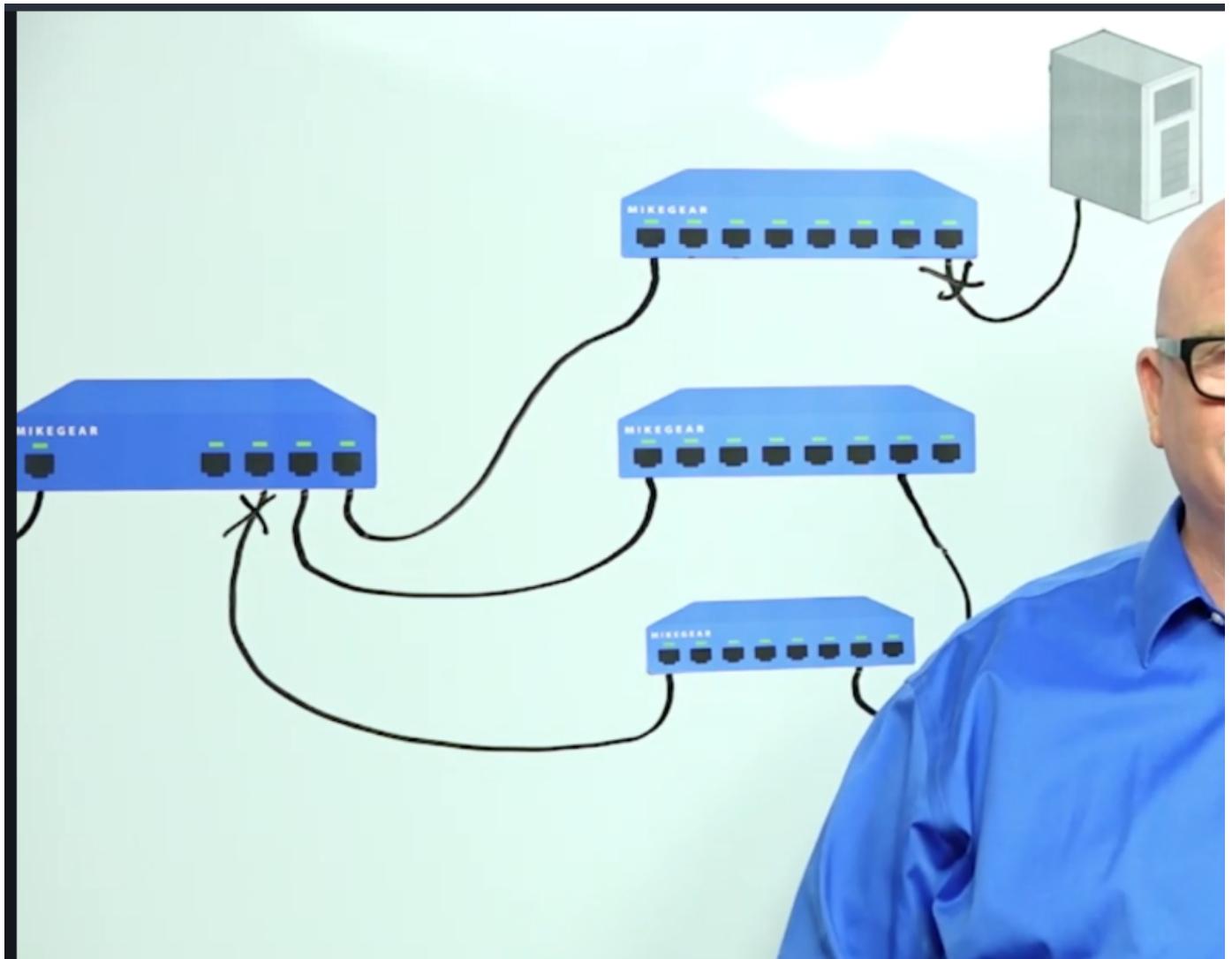
Smart switches can detect these with Flood guards and turn off the port(s).

STP and Flood Guard are different things, but they work the same way. By turning off ports.

STP:



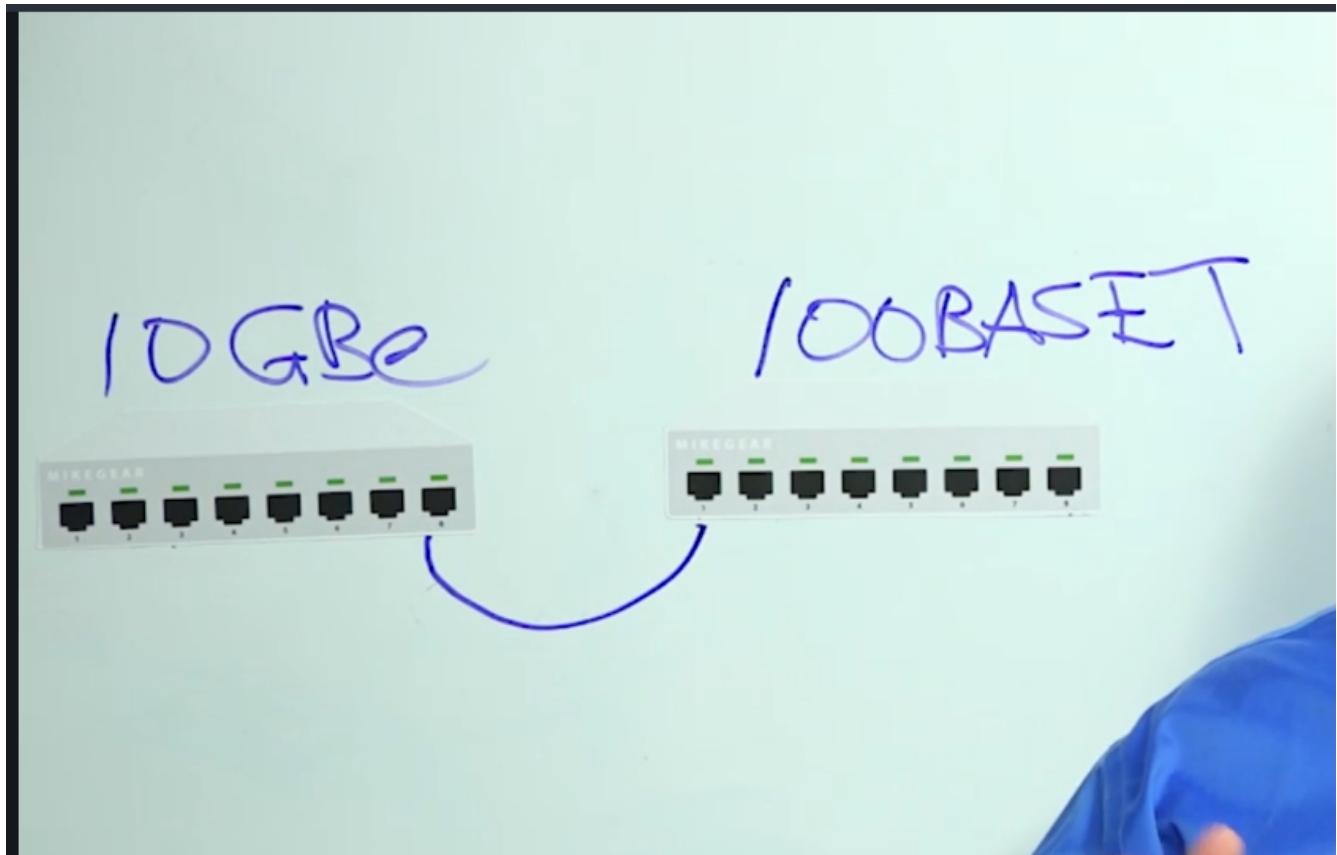
Flood Guard:



2. Mismatched Switch issues

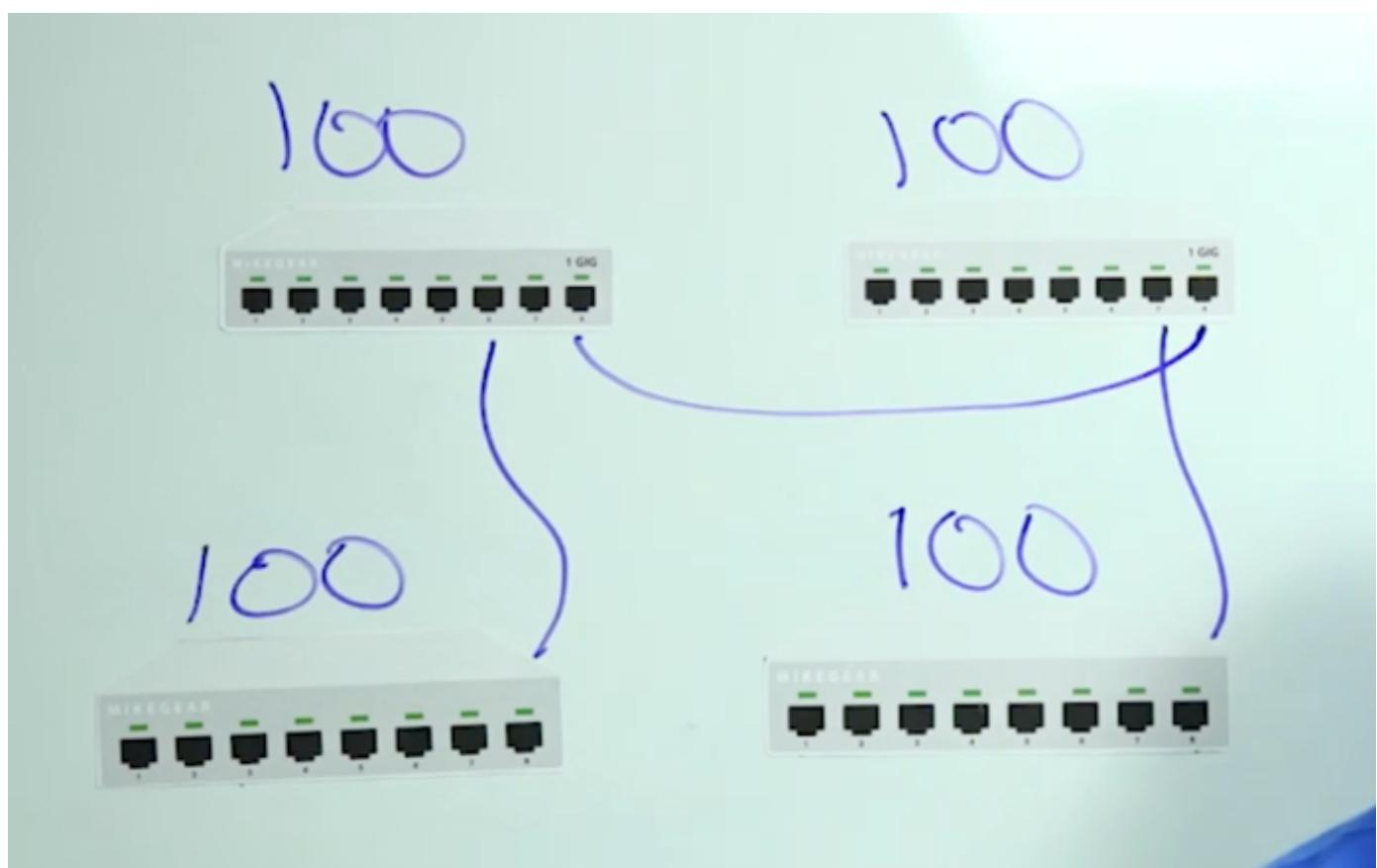
If you plug an old slow switch into a new fast switch using a crossover cable (if the ports are not autosensing) it will not work at all. You can trouble shoot this by looking at the speed lights on the

ports and they may show nothing or they may show different colors for different speeds.



3. Dedicated High Speed Ports

Connect Dedicated High speed ports to other Dedicated High speed ports and switches that do not have Dedicated High Speed Ports into standard ports to avoid slow downs. See photo below for reference of 2 switches with Dedicated High Speed Ports, and two switches with standard ports and how to connect them.

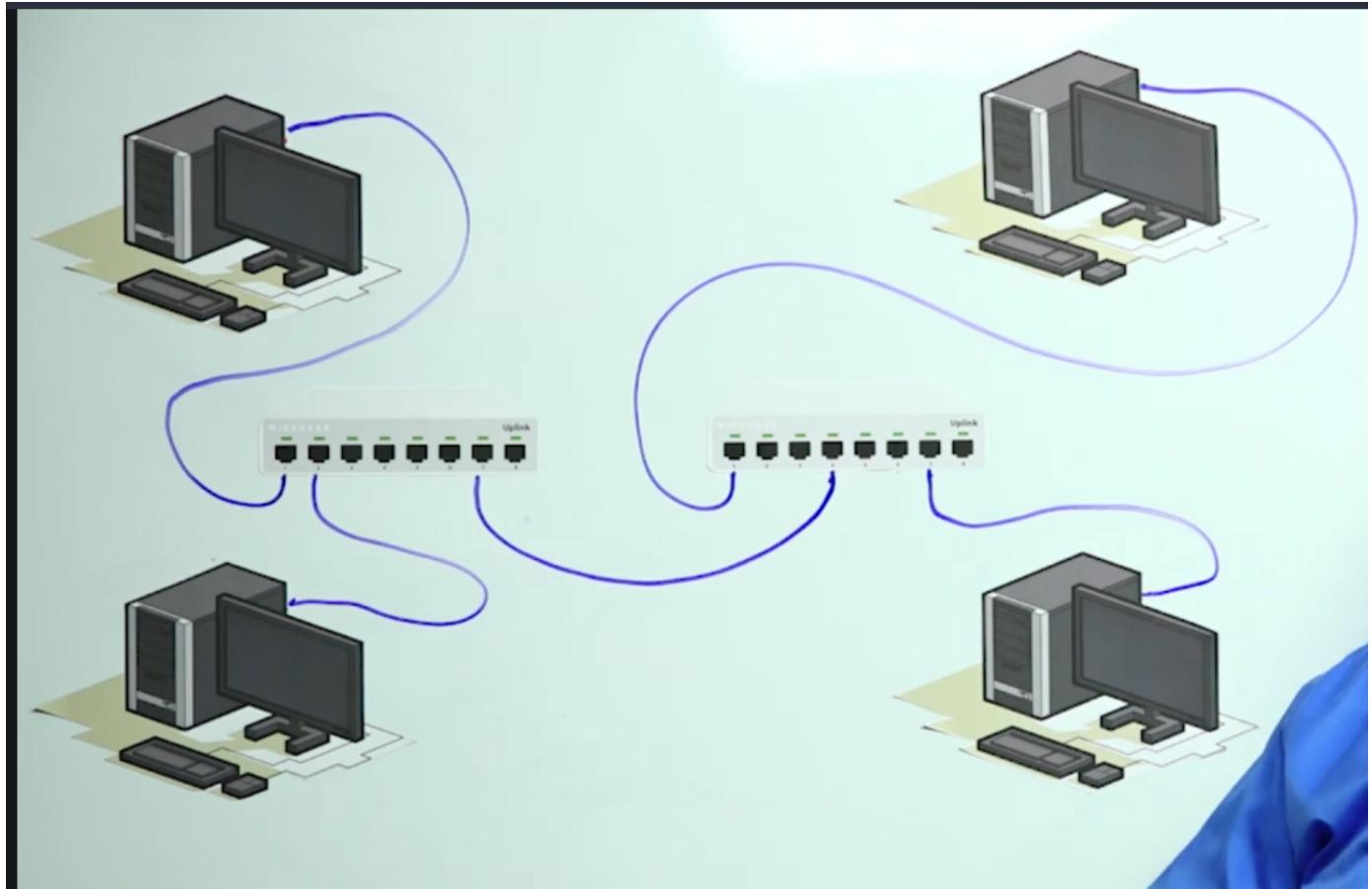


4. Uplink and Crossover:

Straight link cable to uplink port or vice versa

or

port to port with a crossover cable



5. Duplex Mismatch

Using a cross over cable to connect two machines, but they will auto negotiate the speed which will be full duplex. This will not work. You need to go to device settings and set it from auto negotiate to half duplex which will let the computer show up in the other computers network neighborhood.

QUIZ

1. Which statement is not true of 100 megabit Ethernet?

a. **100BaseTX supports runs of up to 2KM**

b. Both 100BaseT and 100BaseTX run over unshielded twisted pair

c. Both 100BaseF and 100BaseFX run over multi-mode cable

d. Ethernet can run at 100mbps on fiber or copper

2. Why can straight-through cables be used to connect modern switches together?

a. Straight-through cables cannot be used to connect modern switches together

b. Straight-through cables can be used to connect modern switches together but autosensing sets the switch port to half-duplex, reducing performance by half.

c. The switch will re-wire the cable termination so that it becomes a crossover cable

d.Autosensing in the switch will cause the switch port to re-wire itself into a crossover configuration

3. Which of the following statements is not true of Gigabit Ethernet?
 - a.1000BaseT support up to 100 meter runs over UTP
 - b.1000BaseLX supports between 100m and 5km and can be used with multi-mode or single-mode fiber optic cable
 - c.1000BaseSX supports runs of 100m over multi-mode fiber optic cable
 - d.1000BaseSX supports between 100m and 10km and can be used with multi-mode or single-mode fiber optic cable.**
4. Which of the following is not a common network problem?
 - a.Loops
 - b.Connecting switches in a tree structure**
 - c.Replay Attack
 - d.Initializing Vector Attack

*Replay Attack - A replay attack (also known as playback attack) is a form of network attack in which a valid data transmission is maliciously or fraudulently repeated or delayed.

*Initializing Vector Attack - An initialization vector (IV) attack is an attack on wireless networks. It modifies the IV of an encrypted wireless packet during transmission. Once an attacker learns the plaintext of one packet, the attacker can compute the RC4 key stream generated by the IV used.