Wires Hubs and Switches

Linux Network Management Tools

Connection

• Four basic connections
  – back to back with a crossover cable
  – to a hub (descendant of repeater)
  – to a switch (descendant of bridge)
  – to a router
Crossover Cables

- If you connect a PC NIC card to a hub or switch you will need a "straight" cable
- If you connect PCs back to back you will need a crossover cable
- If you connect a PC directly to a router port you will also need a crossover

MDI or MDX

- PC = MDI
- Hub = MDX
- Router = MDI
- Switch = MDX

MDI <=> MDX or MDX <=> MDI
use STRAIGHT CABLE

MDI <=> MDI or MDX <=> MDX
use CROSSOVER CABLE
Life Saver

Buy a couple crossover cables
Buy a couple straight cables
Get weird colors so yours don't get mixed in

When there's any kind of question --

USE YOUR CABLES TO BE SURE

Check the link light

• Try one cable
• Try the other cable
• Check the MII registers
• Try back to back with your laptop
Hubs

- 10 Base T concentrator
- Almost like a wire
  - All nodes see traffic from all other ports
  - Single Collision Domain
- Most hubs will partition for excess collisions
- Dual speed hubs have some buffering

In the beginning there was a bridge

BRIDGE

network A

Original function was to extend maximum Ethernet length

network B
Then the idea

If most of the traffic on net A is addressed to net A and most of the traffic on net B is addressed to net B, why not partition and just forward the inter network packets?

The "learning" bridge

The bridge tracks every source MAC from A and every source MAC on B. Only forward frames with a source and destination on different nets.
The "learning" bridge becomes a switch

The switch learns the MAC addresses attached to each port and only forwards to that port.

Network A

Network B

Net d

Net c

Broadcasts Always Forwarded

Broadcasts and Multicasts go to all ports *always*

Destination MAC

FF:FF:FF:FF:FF:FF goes to all ports
Addresses Get Learned

On power up, address cache is empty. Switch will learn the MAC addresses from the source MACs of received frames.

```
Dest MAC = 0:2:2:2:2:2:0
Src MAC = 0:1:1:1:1:1:0
```

**SWITCH CACHE**

empty

First Frame In

The first packet to a MAC address goes to all ports, but the switch learns the location of the sender and puts it in the cache.

```
Dest MAC = 0:2:2:2:2:2:0
Src MAC = 0:1:1:1:1:1:0
```

**SWITCH CACHE**

MAC 0:1:1:1:1:0 @ Port 1
Reply ONLY to sending port

Since the switch has already learned that 0:1:1:1:1:1:0 is at Port 1 it does NOT forward it to the other ports.

**Switch Cache**

- MAC 0:1:1:1:1:0 @ Port 1
- MAC 0:2:2:2:2:2:0 @ Port 2

Switches have different features

- Some switches will learn new addresses after the address cache is full - some don’t.
- New MAC address location may be immediate or may be delayed.
- Some switches have management consoles that allow more configuration control.
- Some switches have additional features such as port mirroring, VLANs per MAC address or other extended functions.