

# CS100: CPADS

## Wired Network Devices

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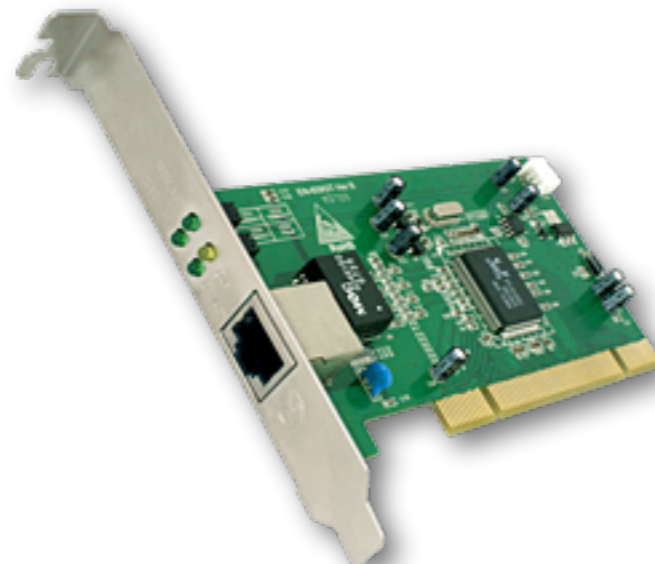
David Babcock / James Moscola  
Department of Physical Sciences  
York College of Pennsylvania



# Network Interface / Ethernet Controller

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- **Allows a computer to connect to a network**
- **Can be connected to computer in a variety of ways**
  - Built directly into most modern motherboards
  - Network Interface Cards (NICs)
  - External USB Device



# Switches & Hubs

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- A **hub/switch** is a device for connecting *multiple computers* together on the same **Local Area Network (LAN)**
  - A **hub** broadcasts (or relays) packets to ALL computers on a LAN
  - A **switch** is a 'smart' hub that directs packets only to the appropriate output port



Oftentimes, network switches and a network hubs have similar appearances.

# Routers

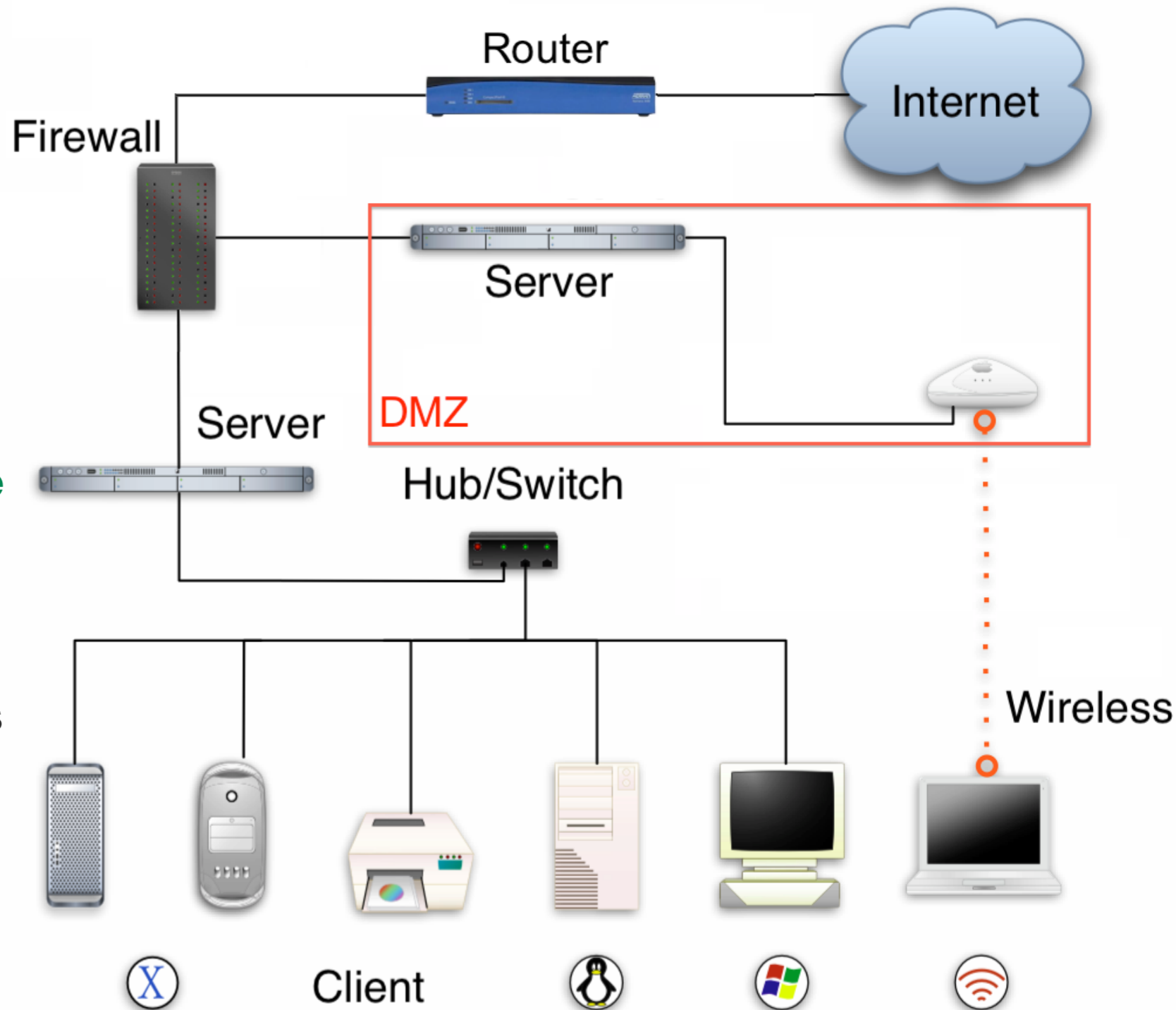
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- **A router is a device for connecting *multiple networks* together (i.e. machines on different subnets, e.g. Internet).**
  - Often integrated with a switch
  - Commonly employs **NAT** (Network Address Translation) to “hide” machines from outside
    - Translates a local network IP address to an external IP address
    - Allows multiple computers to easily share a single external IP address
  - Home routers often include a **firewall** built in as well
    - Open or block ports to allow/deny access to particular services



# General Networking Layout

- **Router** directs traffic into and out of the network
- **Firewall** protects devices on local area network from the evils of the Internet
- **DMZ** is a portion of the network that is exposed to the outside world but cannot access clients on the internal network
  - Clients, however, can access machines in the DMZ
- **Hubs/Switches** distribute the traffic throughout the local area network (LAN)



Modified from [http://en.wikipedia.org/wiki/Image:Schema\\_di\\_una\\_LAN.png](http://en.wikipedia.org/wiki/Image:Schema_di_una_LAN.png)

# Different Classes of Ethernet

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- **There are several different Ethernet standards**

- **10Base-T** – Ethernet
  - 10 Mbits/s theoretical throughput
  - Cat 3 cable – rated for 16MHz
- **100Base-TX** – Fast Ethernet
  - 100 Mbits/s theoretical throughput
  - Cat 5 cable – rated for 100MHz
  - 100 m cable length limit
- **1000-Base-TX** – Gigabit Ethernet
  - 1000 Mbits/s theoretical throughput
  - Cat 5e cable – rated for 125MHz
  - Cat 6 cable – rated for 250MHz



# Ethernet Cable (Cont.)

- **Wiring diagram for Ethernet (RJ-45) cables (8 conductor twisted pair)**

Pin	Pair	Wire	Color
1	2	1	 white/orange
2	2	2	 orange
3	3	1	 white/green
4	1	2	 blue
5	1	1	 white/blue
6	3	2	 green
7	4	1	 white/brown
8	4	2	 brown

[http://en.wikipedia.org/wiki/Category\\_5\\_cable](http://en.wikipedia.org/wiki/Category_5_cable)



Note, dashed line indicates the tab is on the **UNDERSIDE** of the connector