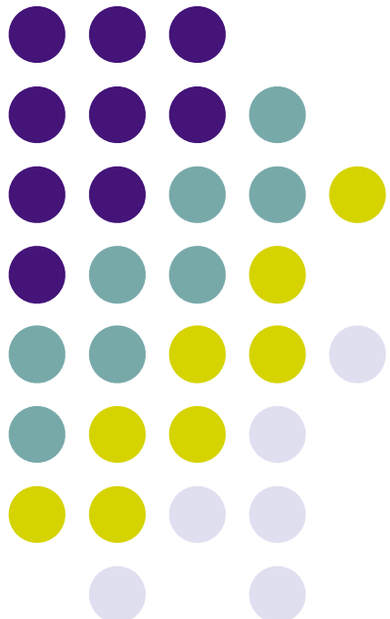
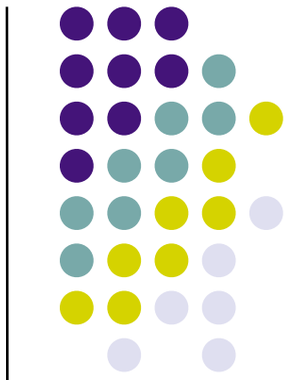
Computer Networks in The Home

Connecting your computers, peripherals and other electronic devices with Ethernet using TCP/IP



Introduction



- Home Networking - connecting computers and other devices together
- Assume use of TCP/IP
- Assume use of Ethernet protocol
- Function of various pieces
- How pieces fit together

Ethernet

- Protocol - a set of rules for communicating between devices at Data link and Physical levels
- Star topology - devices connected to central location
- Uses physical addresses
  - Media Access Control - MAC address
- Speeds
  - 10Base-T - 10 Mb - Original
  - 100Base-TX - 100 Mb - Newer
  - 1000Base-T - 1 Gb - Current

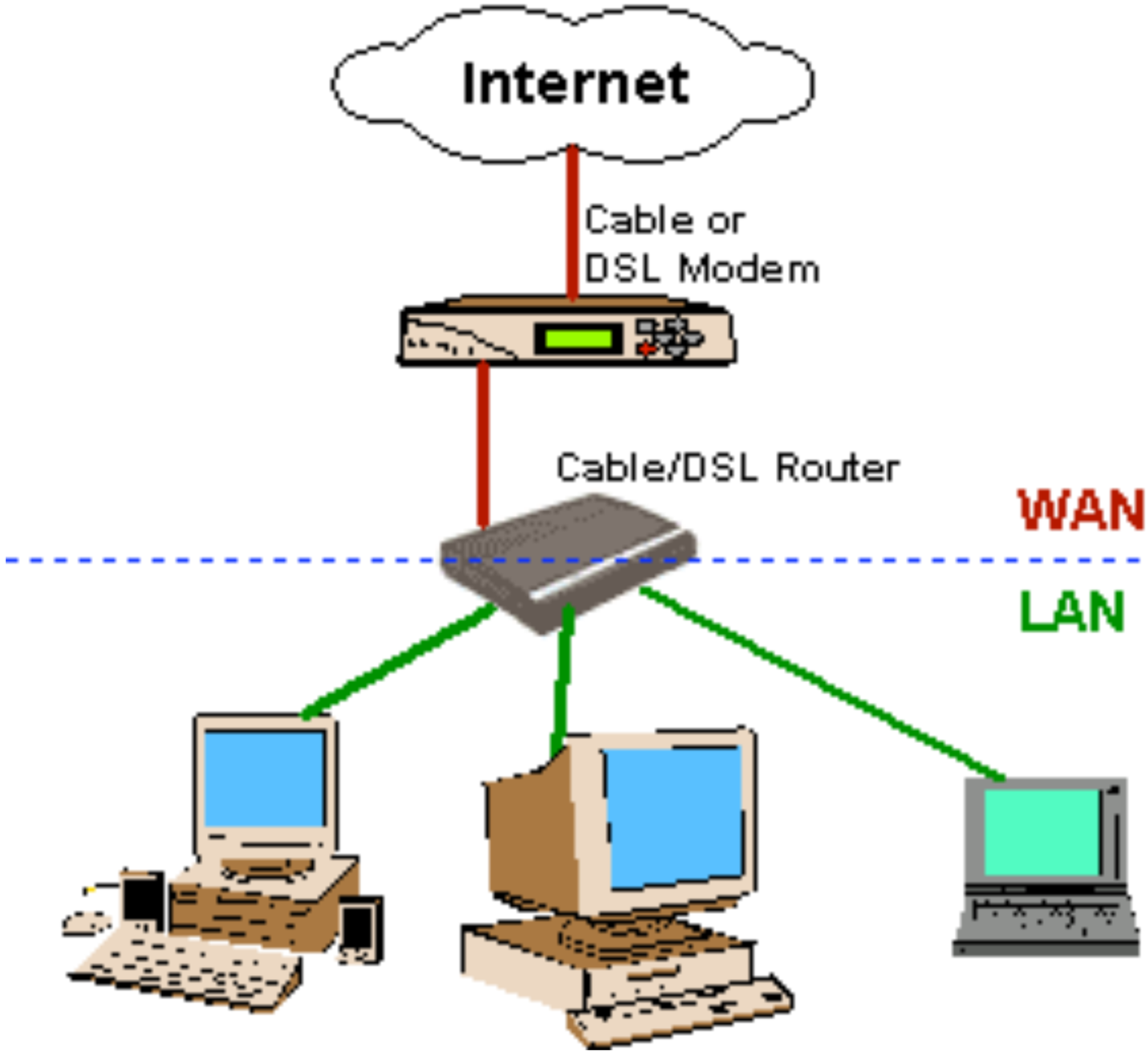
OSI 7 layer model
10Base2 - Thin Ethernet - Coax based with T-connectors

TCP/IP

- Protocol - a set of rules for communicating between devices at Network and Transport levels
- Uses logical addresses
  - Public (routable)- addressable by any device on the Internet
  - Private (non-routable) - addressable only by device on the local network
- Uses Ports
  - Multiple doors at the address

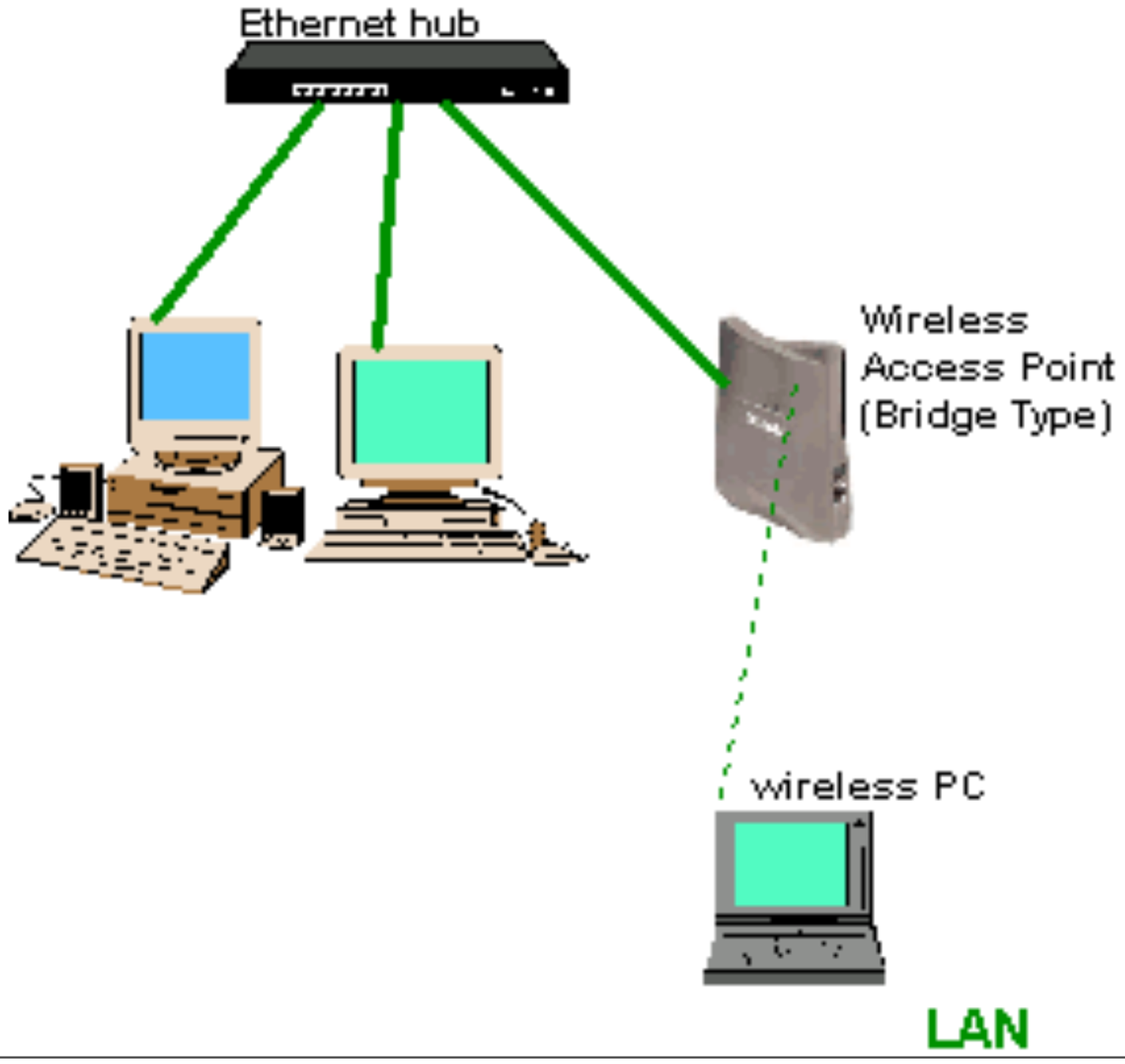
Physical Level

- Routers - Connect networks together



Physical Level

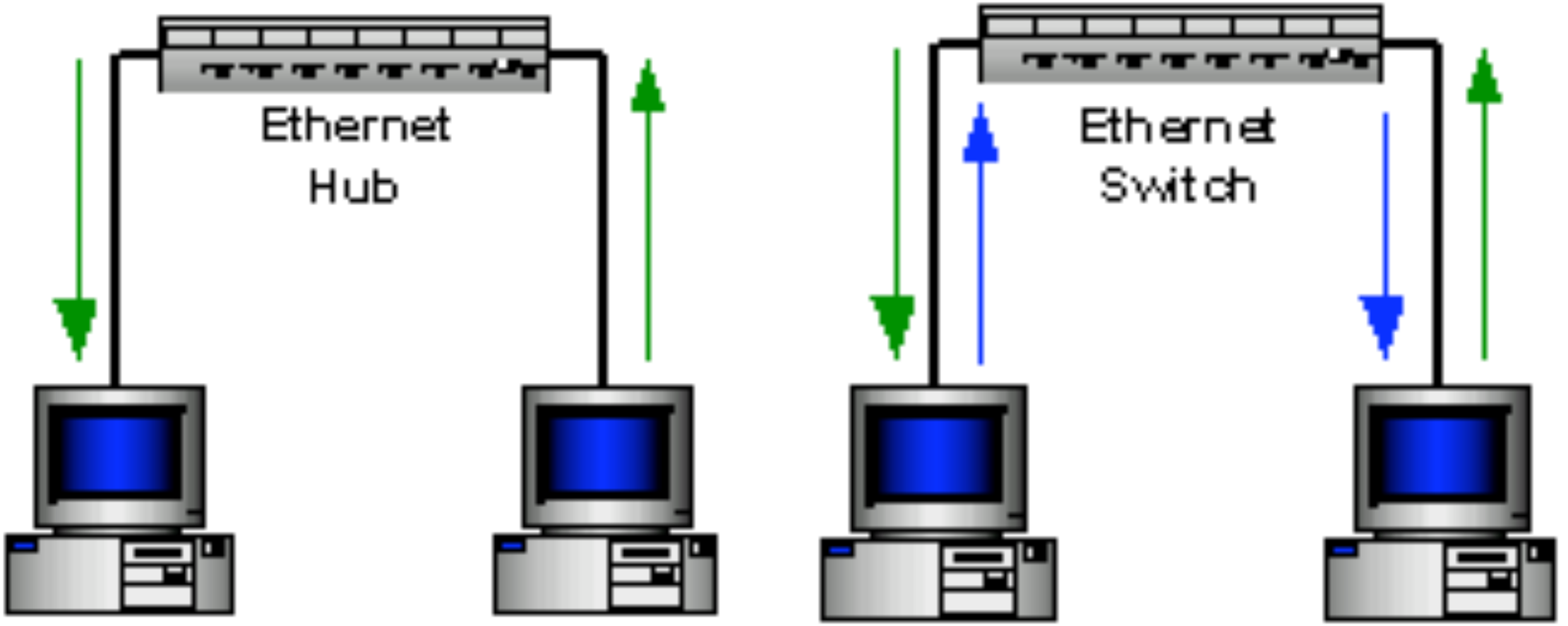
- Bridges - Connect different media together
- Wireless Access Points
  - Combination of bridge and hub for WiFi



Cable modem example of bridge

Physical Level

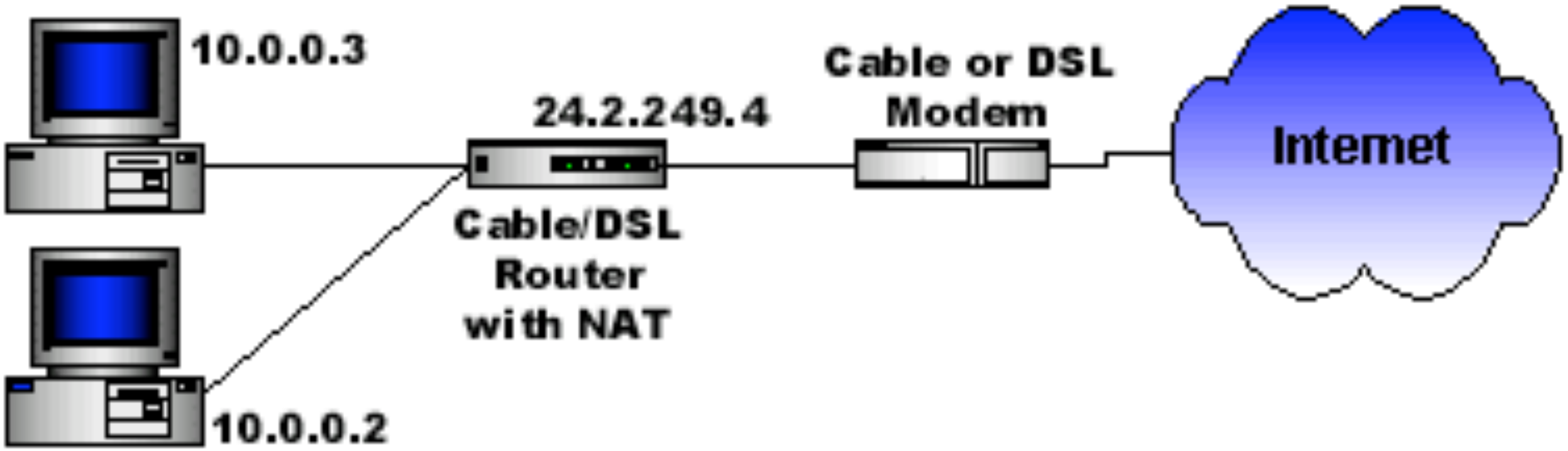
- Hubs - Central location for device connection
- Switches - Better than hubs



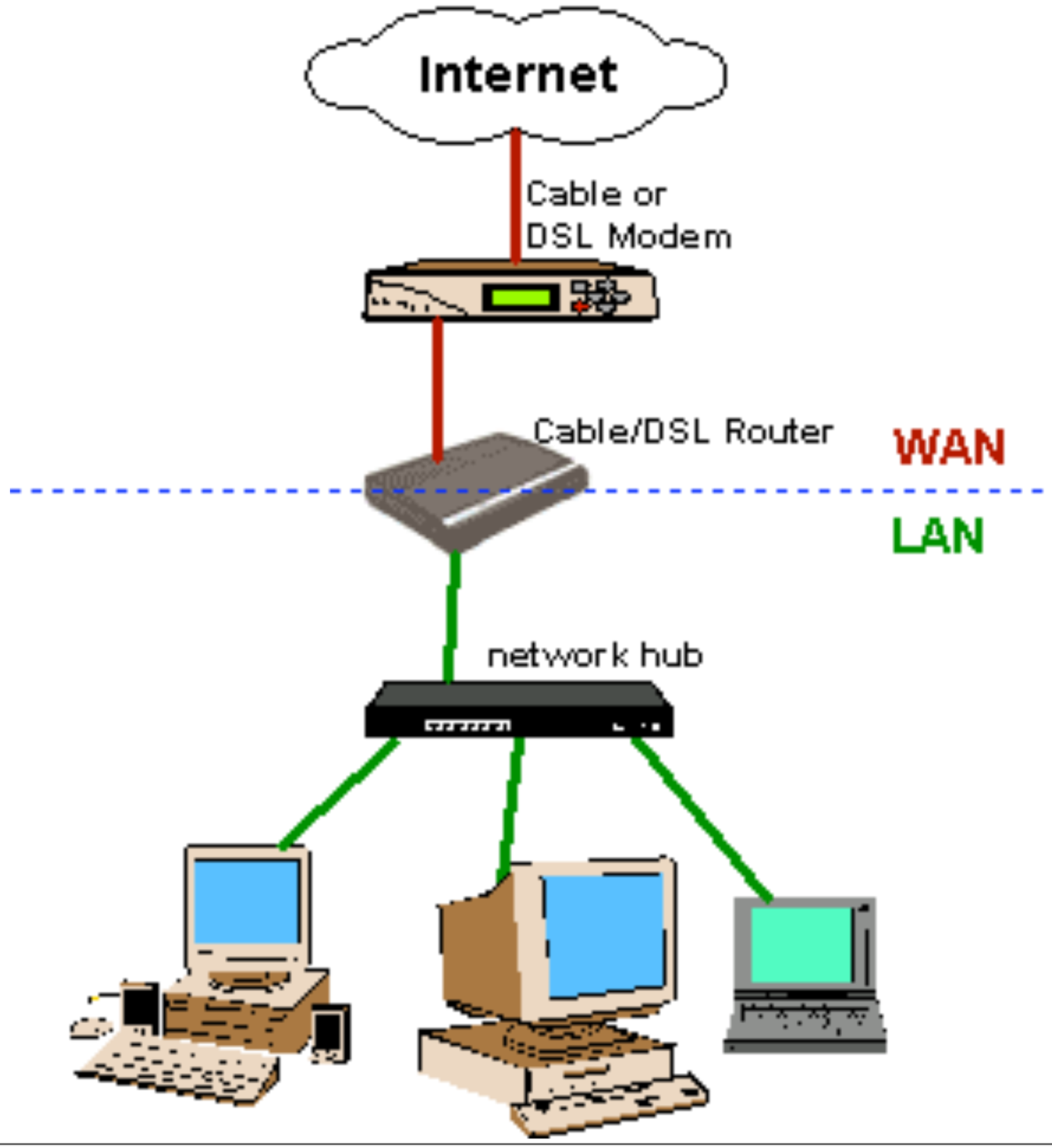
- Half-duplex vs. Full-Duplex
- Broadcast vs. fixed path

Routers

- Gateway to other networks
- Central to your local network
- Network Address Translation - NAT
  - WAN side has PUBLIC address - 72.48.160.XXX
  - LAN side has PRIVATE address - 192.168.xxx.xxx
    - 10.xxx.xxx.xxx



Typical Home Network



Router Usage Recommendations

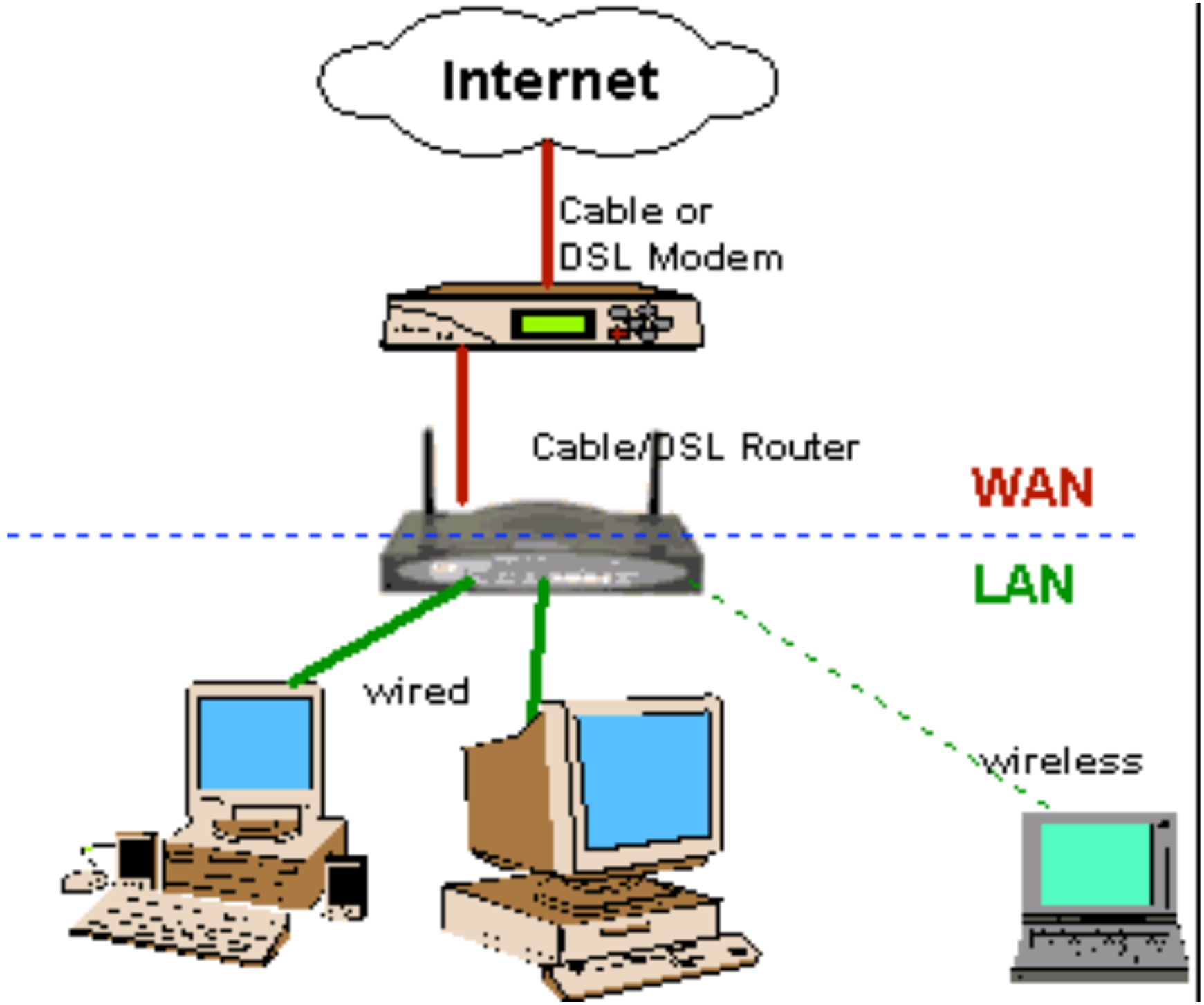
- Change server address from 192.168.1.1 to 192.168.X.1
- Change admin password

Medium - Cabling

- Unshielded twisted pair
  - Each cable has 4 pair
- Cat 5 good for up to 100 Mb
- Cat 6 needed to ensure 1 Gb
- Cables generally better than other media

Medium - Wireless

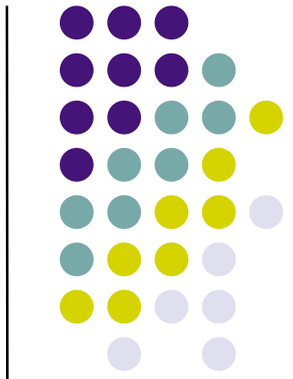
- Uses Wireless Access Points (WAP)
  - Usually incorporated in Router



Medium - Wireless

Name	Frequency	Max	Typical	Range
802.11a	5 GHz	54 Mbps	23 Mbps	35 m
802.11b	2.4 GHz	11 Mbps	4.5 Mbps	35 m
802.11g	2.4 GHz	54 Mbps	23 Mbps	35 m
802.11n	2.4 GHz 5 GHz	300 Mbps	74 Mbps	70 m

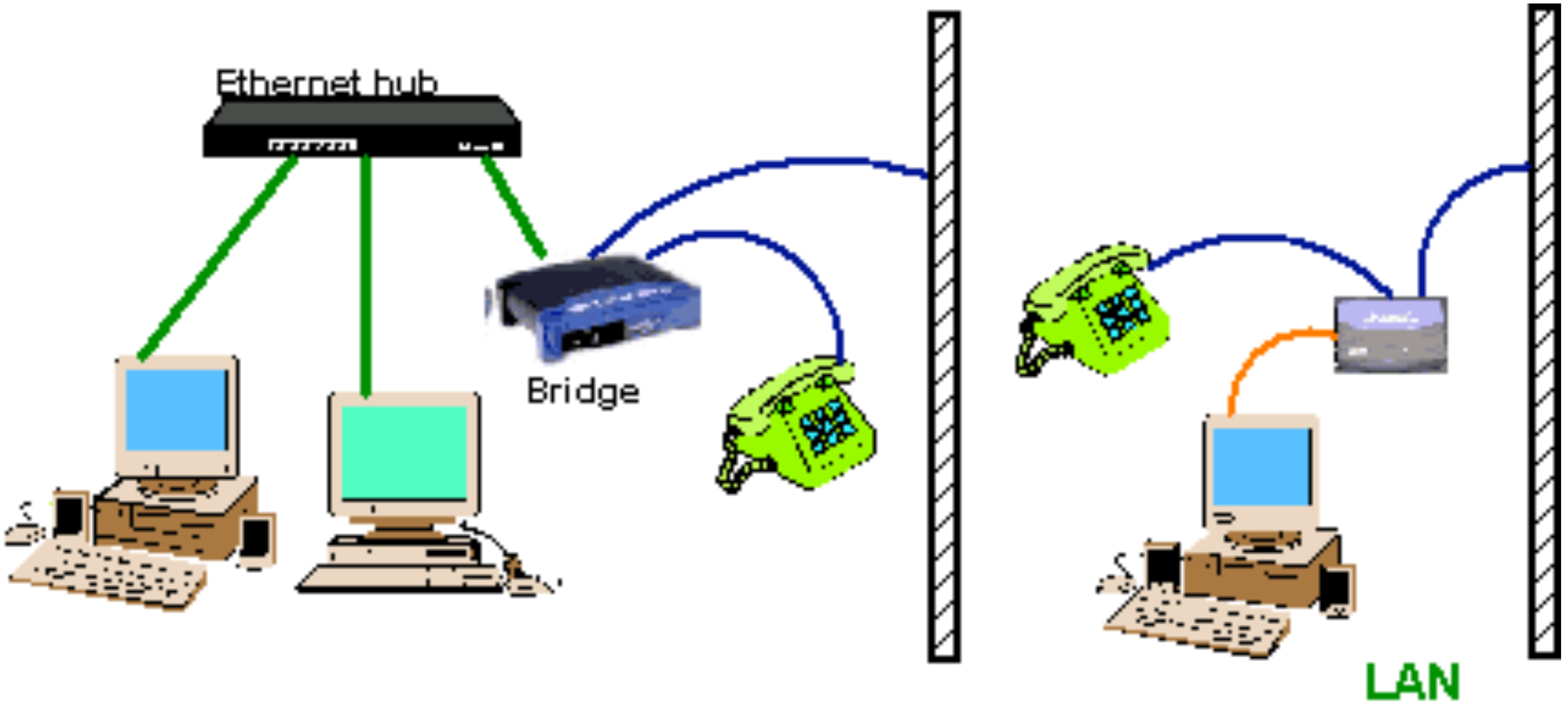
WiFi
Usage Recommendations



- Use Security
  - WPA2 is best - WEP can be hacked
  - WEP at least
- Change SSID
- Be aware of channel and set to one not used in your area
  - Use Stumbler to find channels being used in your area
  - Set to channel 3 away from others

Medium- HPNA

- Telephone wire infra-structure (HPNA)
  - Requires 2 bridges



Bridge on right is a PhoneNet to USB
Could be PhoneNet to ethernet

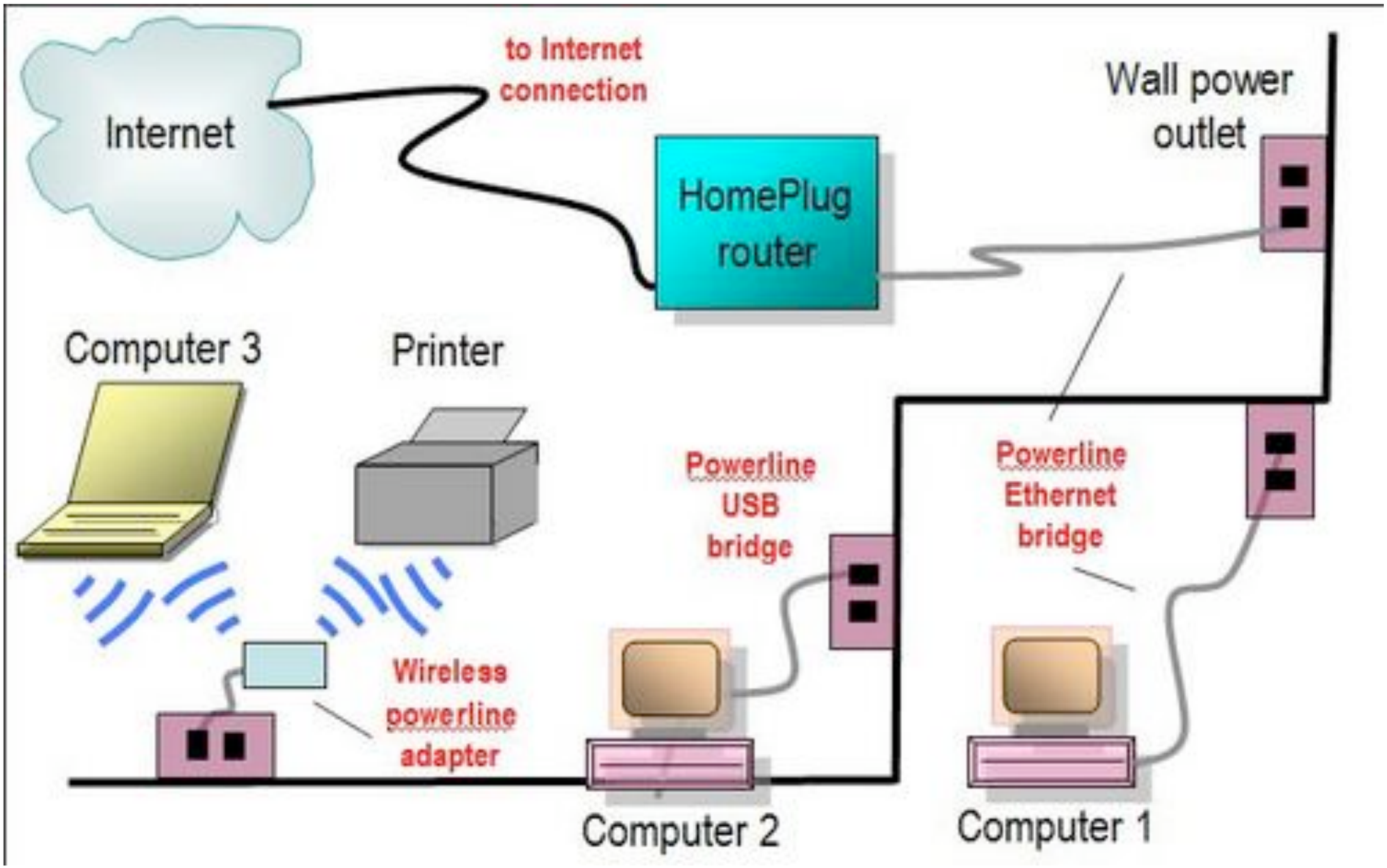
Medium - Phone Wires

Version	Max Speed
1.0	1 Mbps
2.0	10 Mbps
3.0	100 Mbps
3.1	320 Mbps

Not well known
Have to really look for product
Could not find products using version 3.0 or 3.1

Medium- HomePlug

- Electrical wire infra-structure (HomePlug)
  - Requires at least 2 bridges



- Have 3 in house

Medium - HomePlug

Version	Max Speed
1.0	14 Mbps
1.0 Turbo	85 Mbps
AV	189 Mbps

Netgear and ZyXel main suppliers

Summary

- Home Networking - connecting computers together
- Uses Ethernet protocol
- Function of various pieces
- How pieces fit together