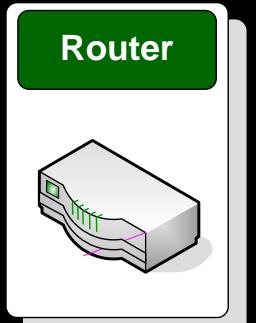
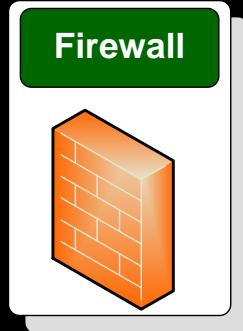
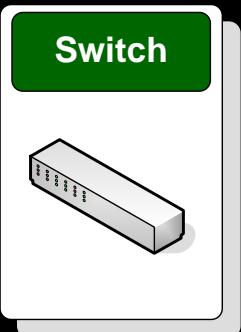


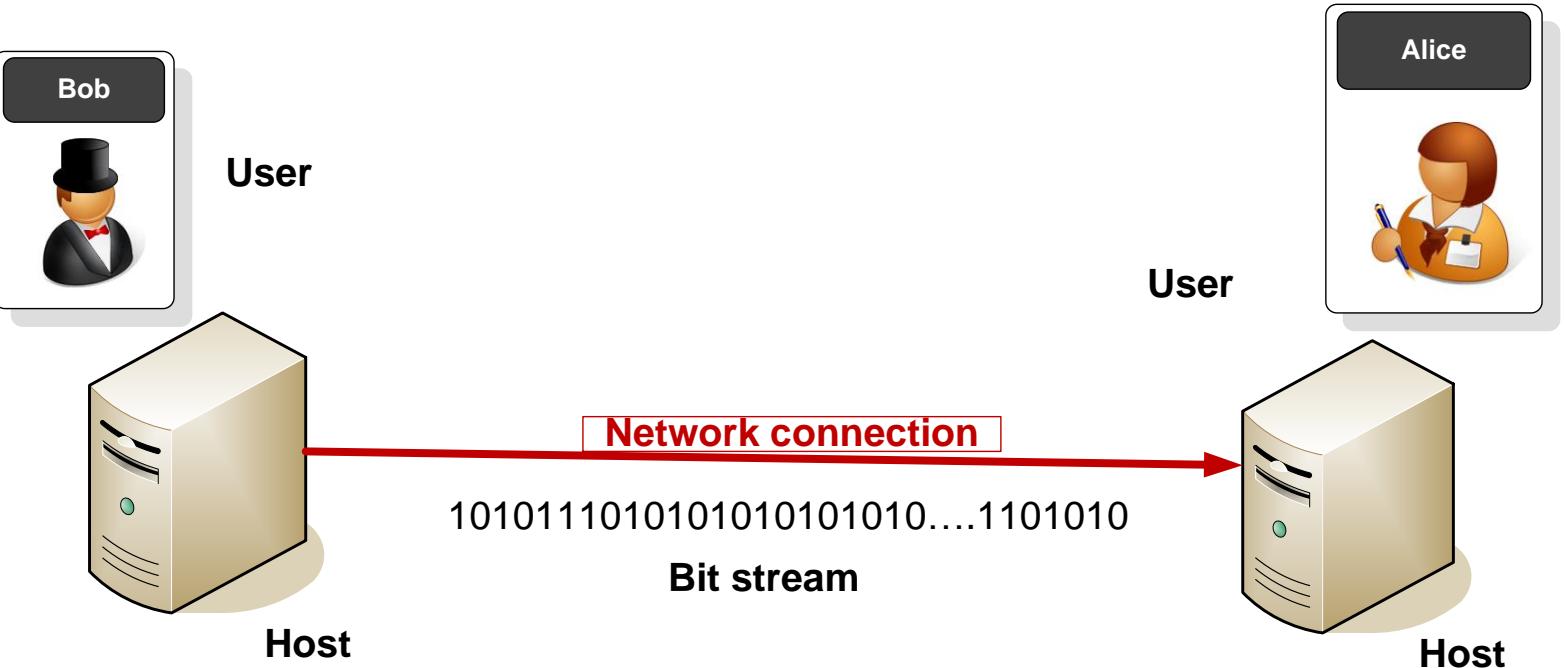
Network Fundamentals

Basic terms.
Topologies.
LAN Technologies.
WANs Technologies.
Network Protocols and Devices
Networking and Addressing.



Net. Fun.

Terms



Network Bandwidth: The number of bits that are passed every second (bps)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
|---|---|---|---|---|---|---|---|

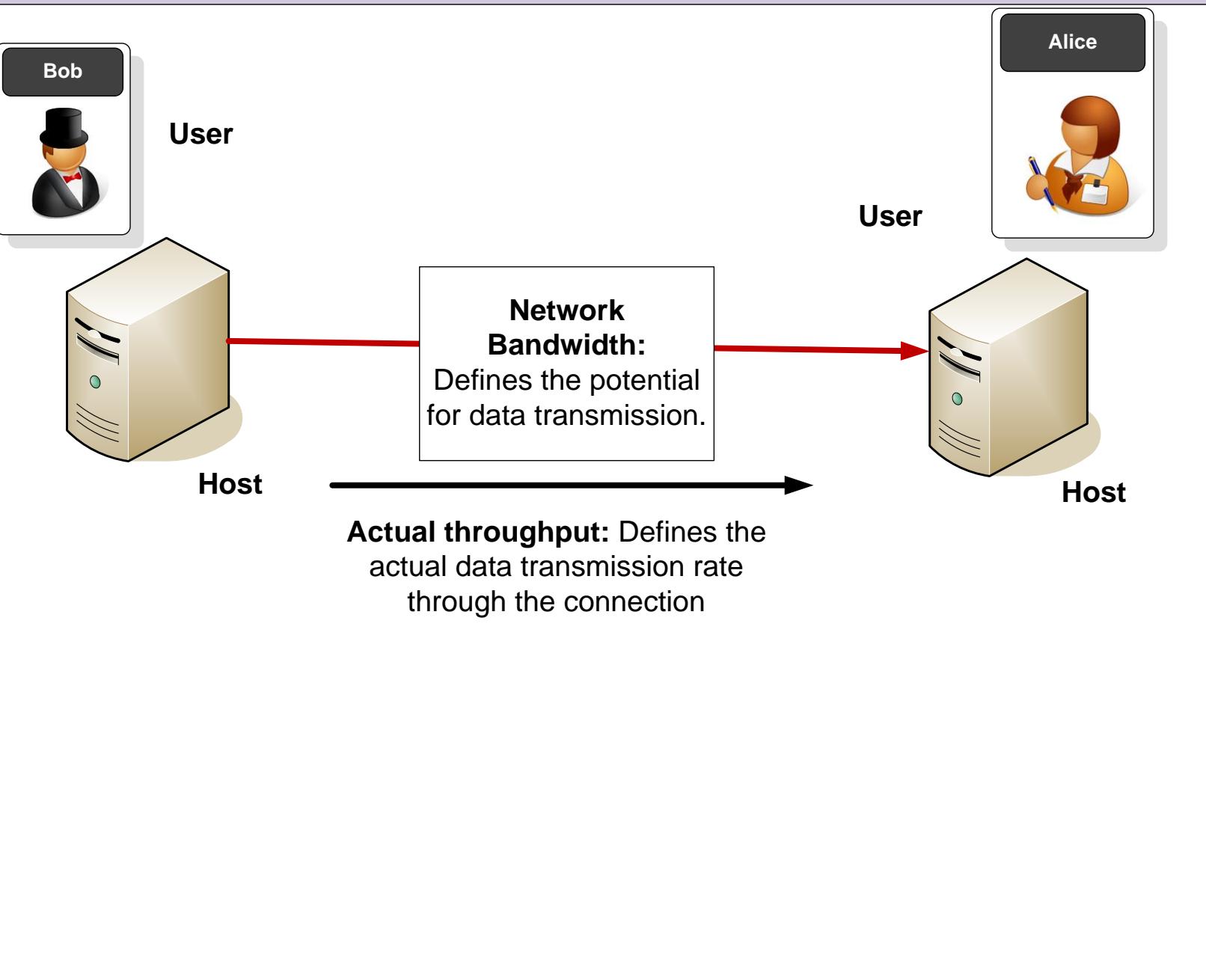
8 bits = 1 Byte

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
|---|---|---|---|---|---|---|---|

Bandwidth can be measured in Bps (Bytes per second). For example 8,000 bps is 1,000 Bps.

Net. Fun.

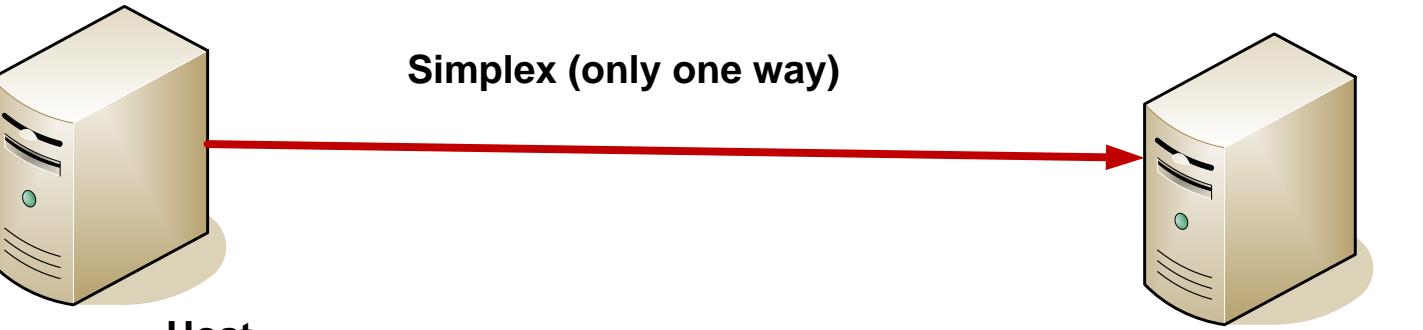
Terms



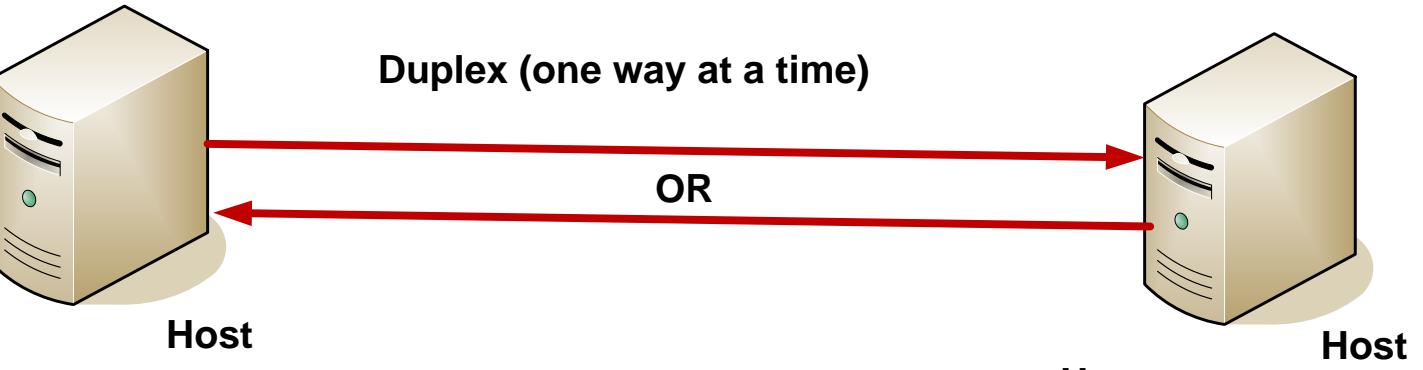
Net. Fun.

Terms

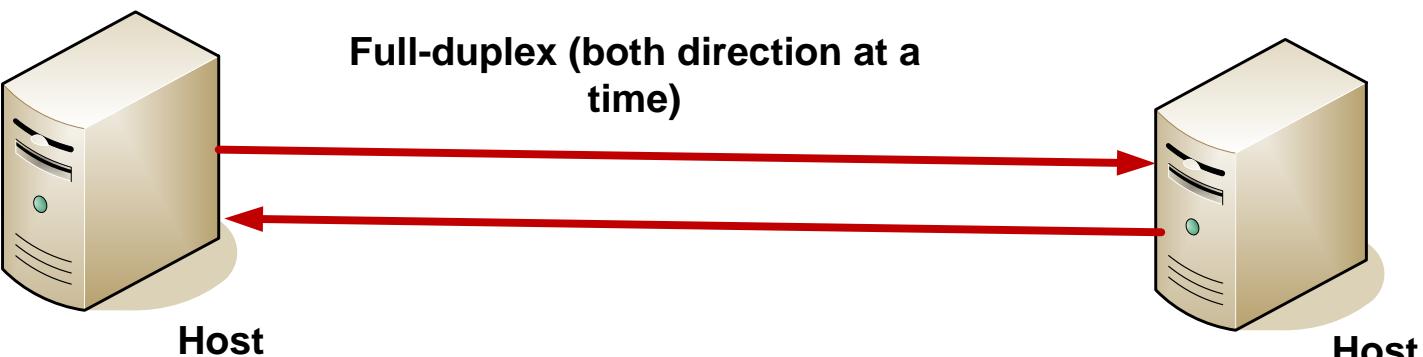
Simplex (only one way)



Duplex (one way at a time)

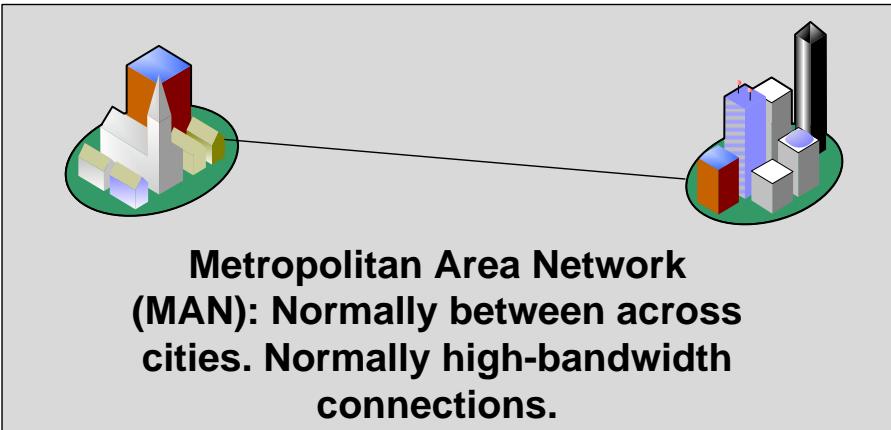
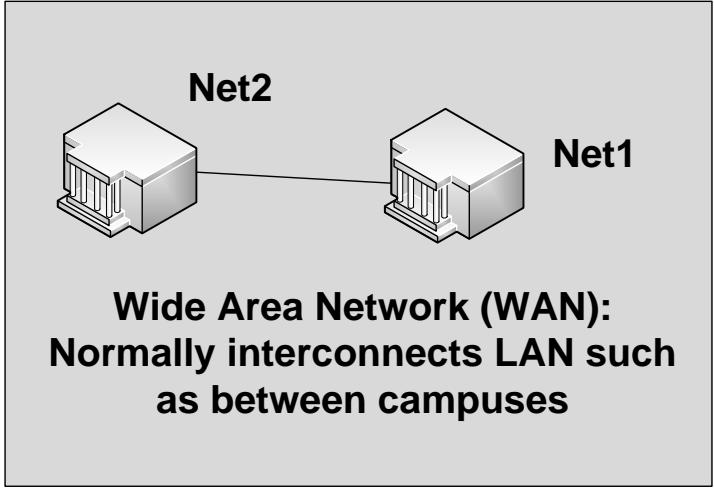
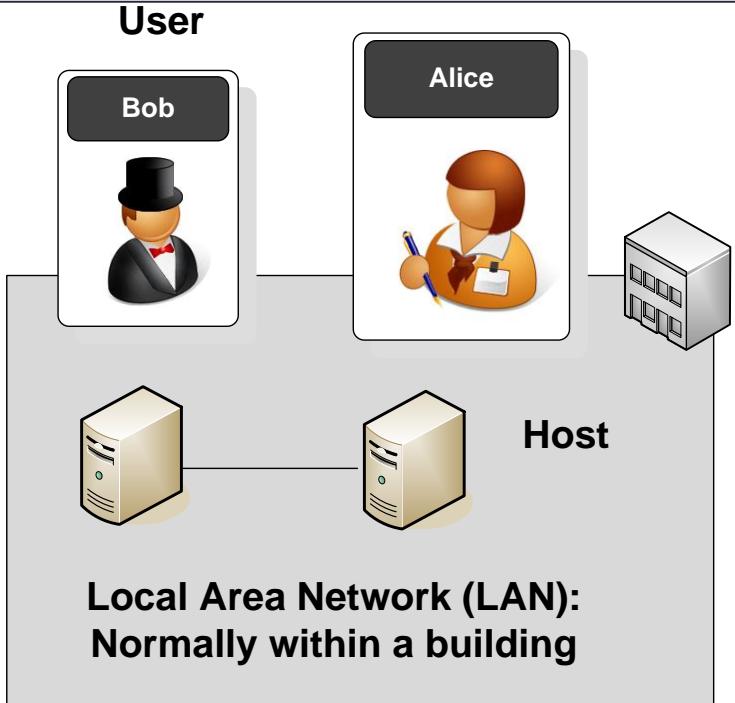


Full-duplex (both direction at a time)



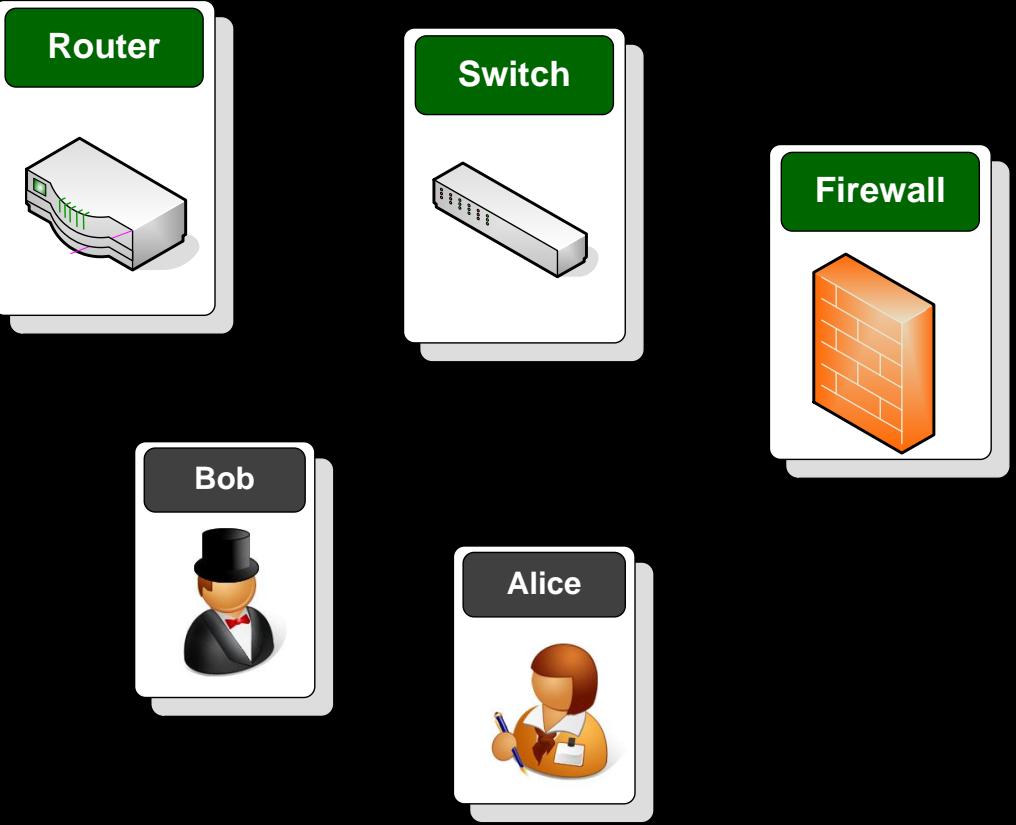
Net. Fun.

Terms



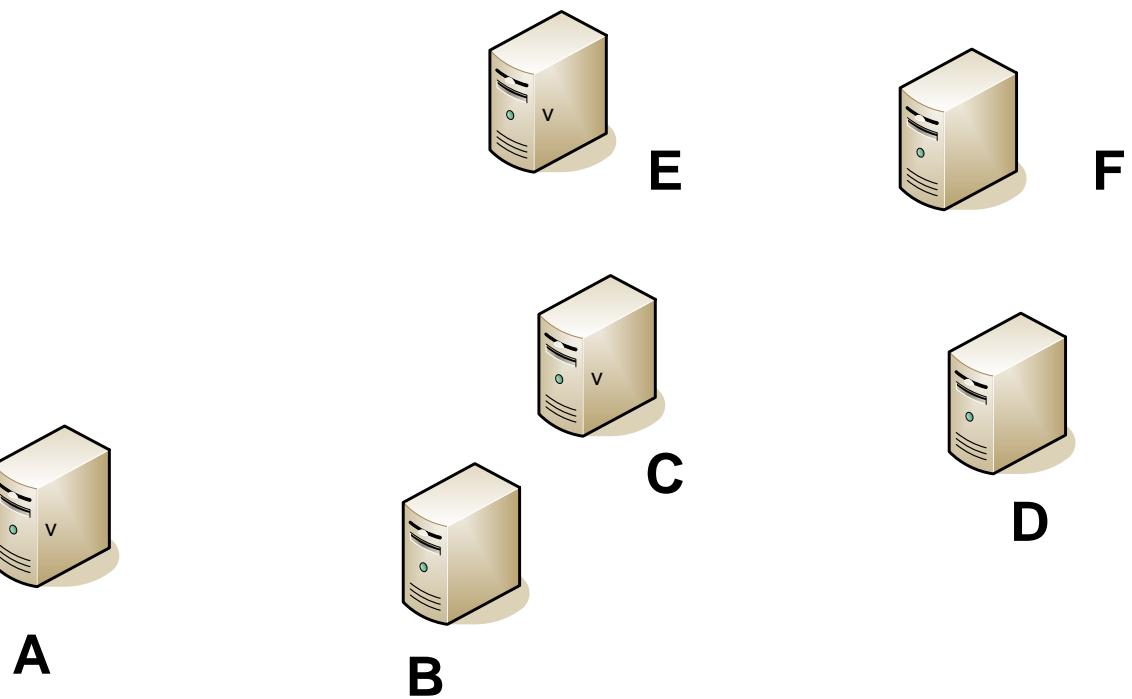
Network Fundamentals

Topologies



Net. Fun.

Topologies

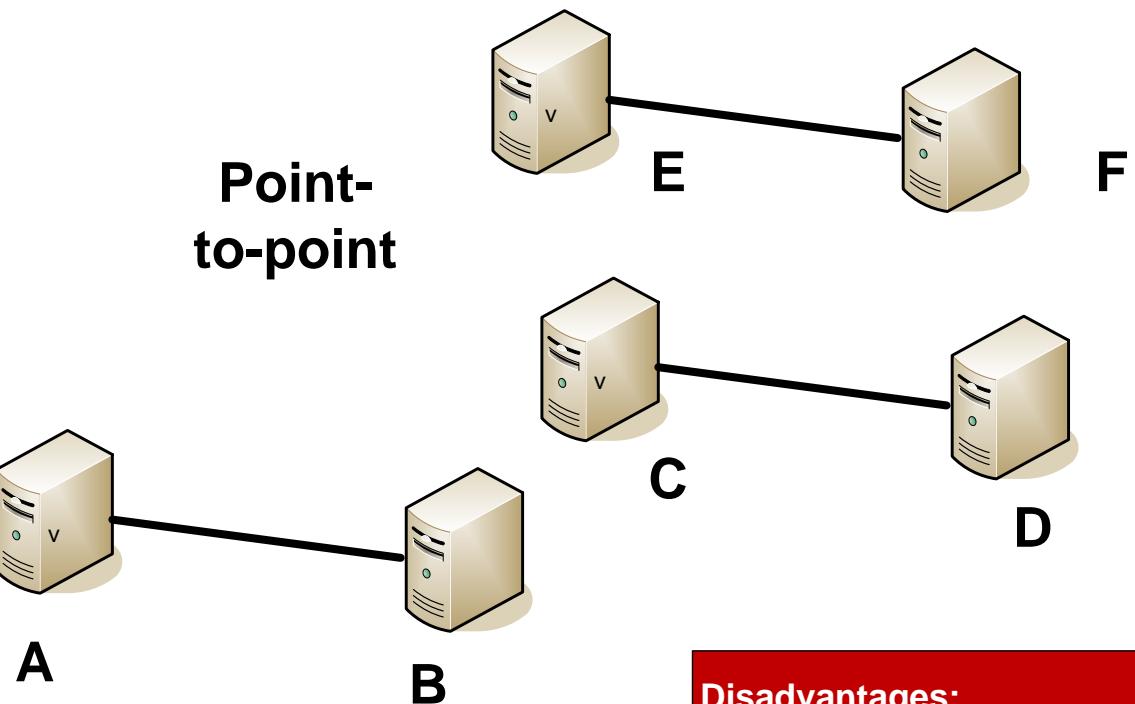


Point-to-point

Net. Fun.

Topologies

Point-to-point



Advantages:

- Guaranteed connection with no contention.
- Fairly security, as the media is not shared.

Disadvantages:

- Costing in cabling.
- Not scalable.

Net. Fun.

Topologies

Advantages:

- Simple to cable.
- Easy to disconnect/reconnect.

Bus

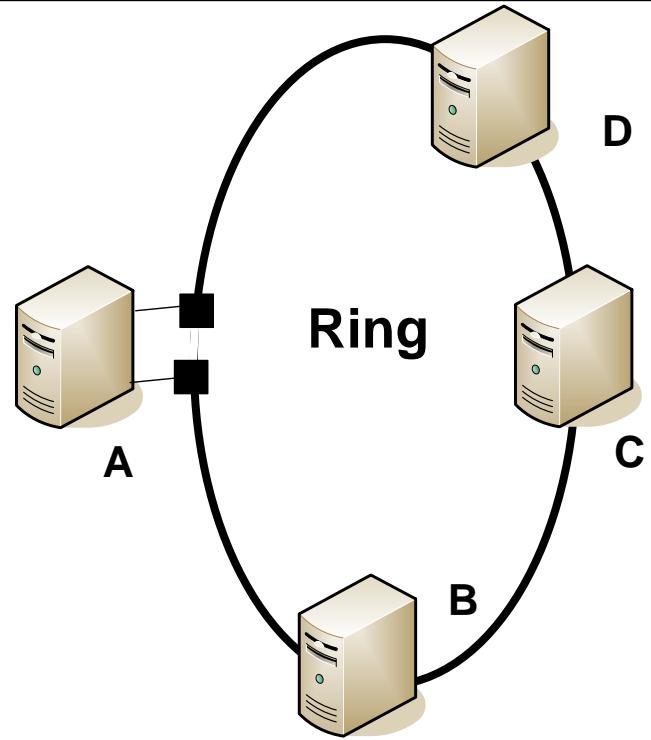
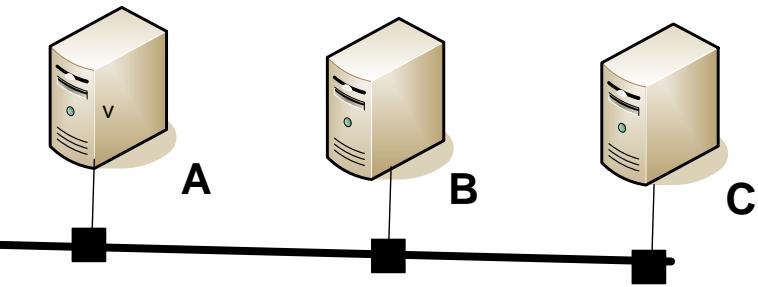
Disadvantages:

- Shared media.
- Nodes contend to get access.
- Normally only one connection at a time.
- Failure of bus can effect other nodes.
- Collisions as two nodes speak at the same time.

Disadvantages:

Disadvantages:

- Fault in the ring brings the whole network down.
- Two network connections required (in and out).
- Adding/deleting nodes from network is difficult (requires a shutdown).
- Difficult to debug.



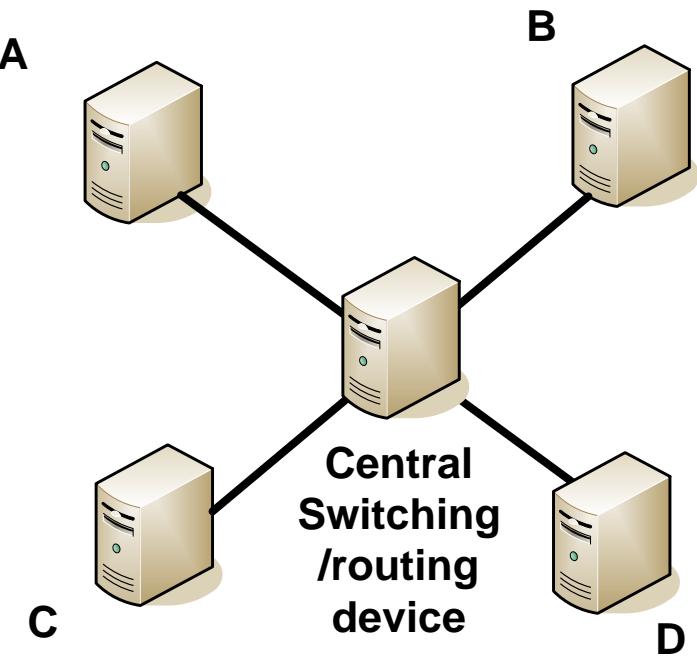
Advantages:

- Nodes get a fair chance to gain access.
- Priority can be allocated.

Net. Fun.

Topologies

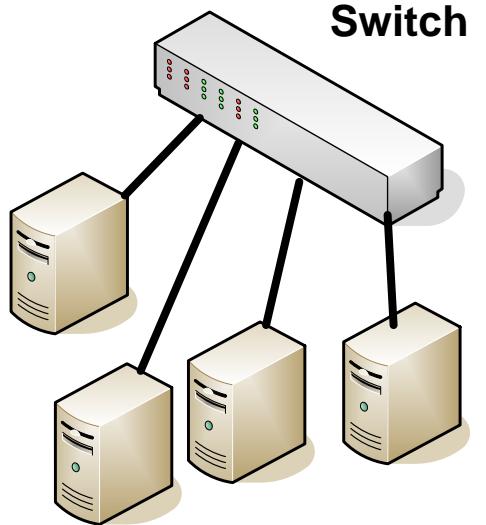
Star



Advantages:

- Multiple connections at a time.
- No contention for access.
- Throughput is multiplied up.

Star

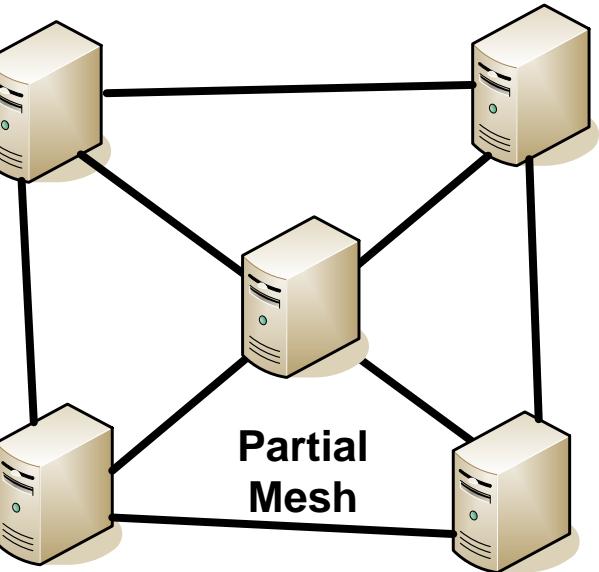


Net. Fun.

Topologies

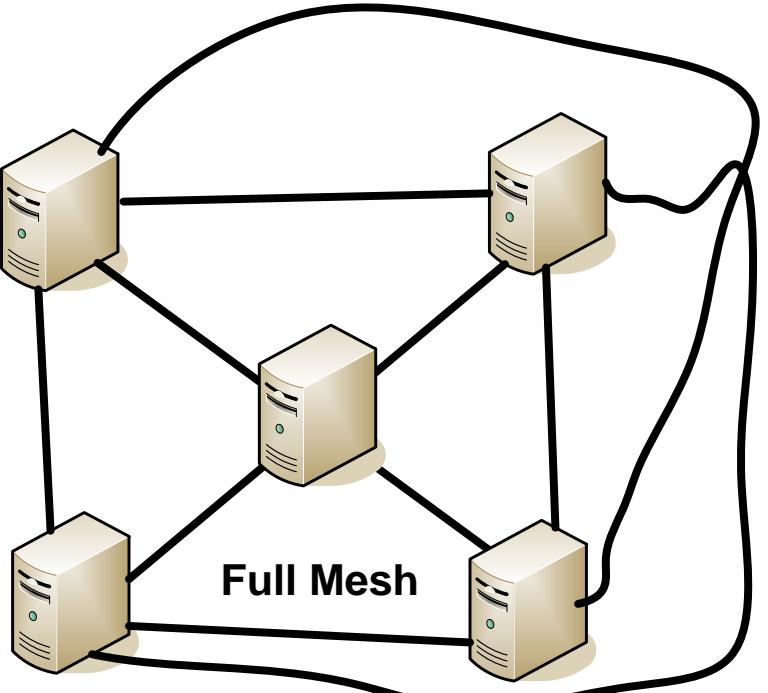
Advantages:

- Tolerant of faults in the connections.
- Optimal usage of connections..



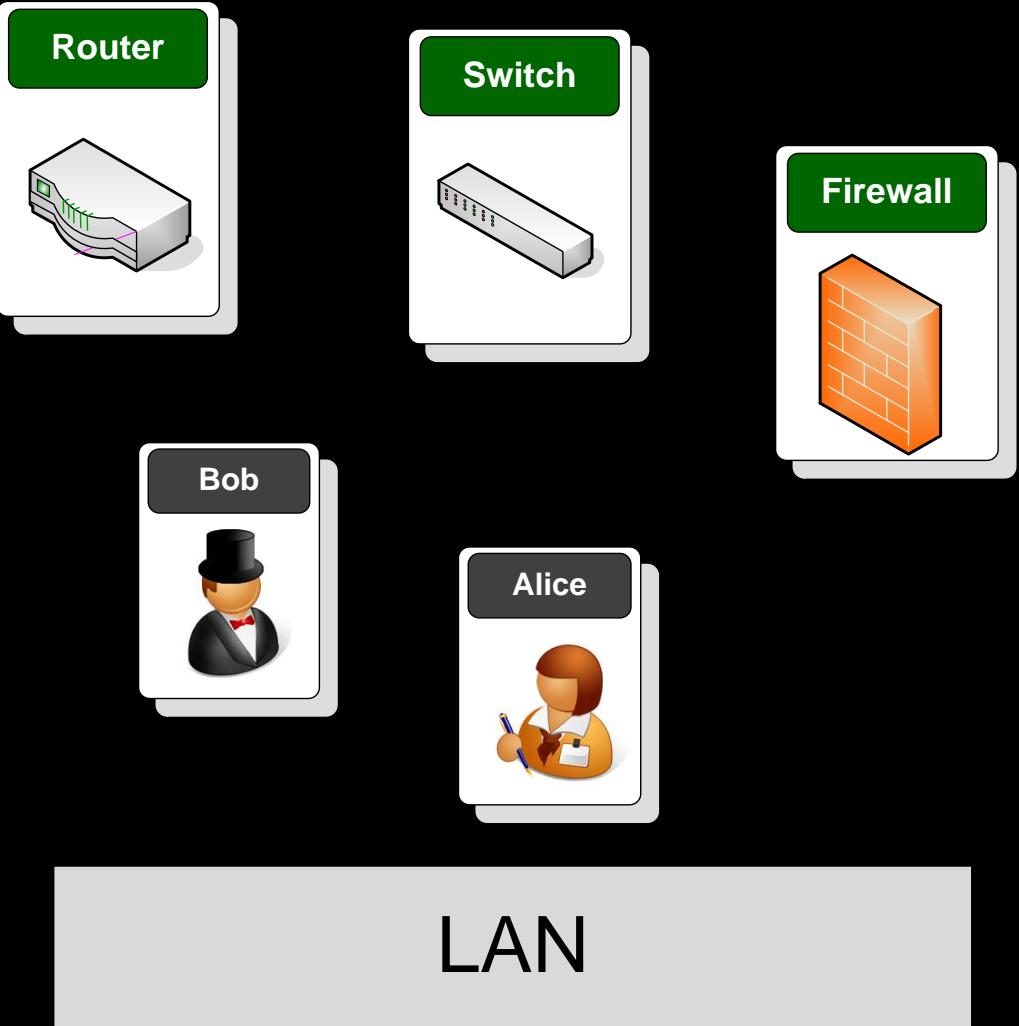
Disadvantages:

- Costly in terms of cabling.
- Complex in terms of organisation with large networks.
- Difficult to manage security.



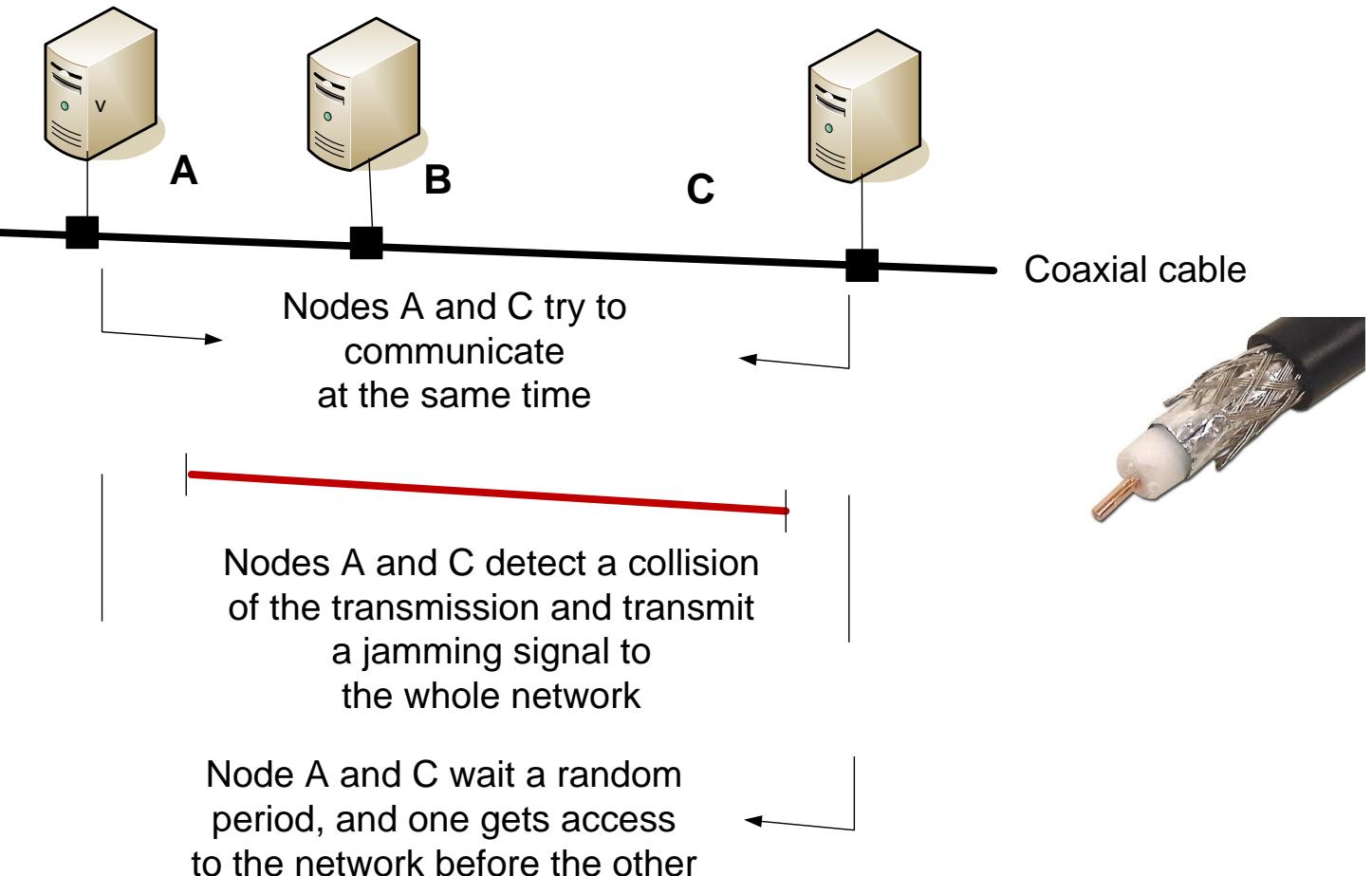
Mesh

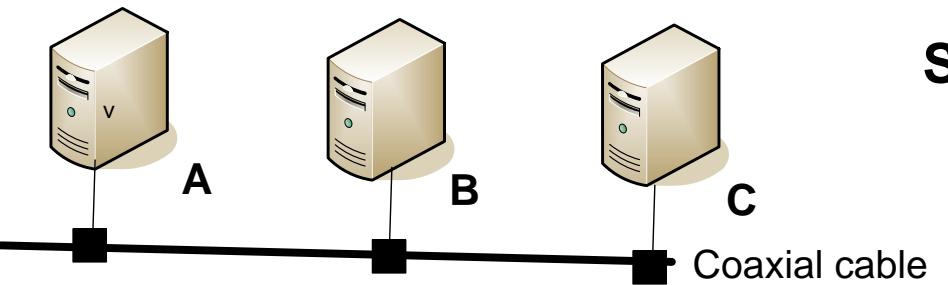
Network Fundamentals



CSMA (Carrier Sense Multiple Access)/CD (Collision Detect)

Standard Ethernet





Standard Ethernet

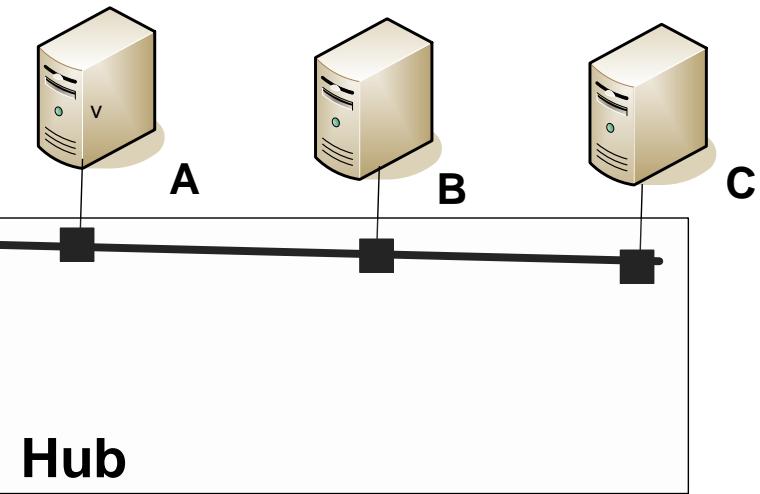
CSMA (Carrier Sense Multiple Access)/CD (Collision Detect)

Types:

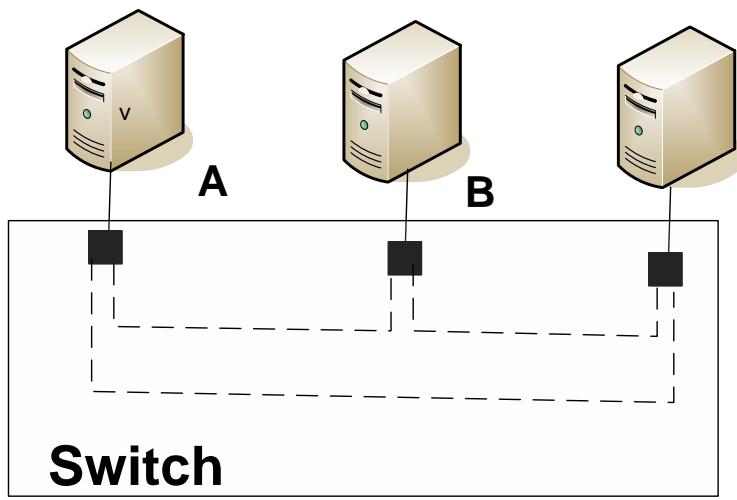
- 10BASE-2 (used thin coaxial) – 10Mbps. Range: 185m
- 10BASE-5 (used thick coaxial) – 10Mbps. Range: 500m

Net. Fun.

LAN



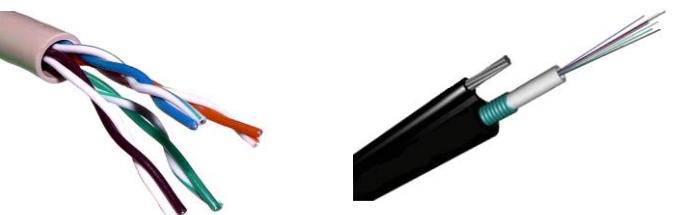
Hub



Switch

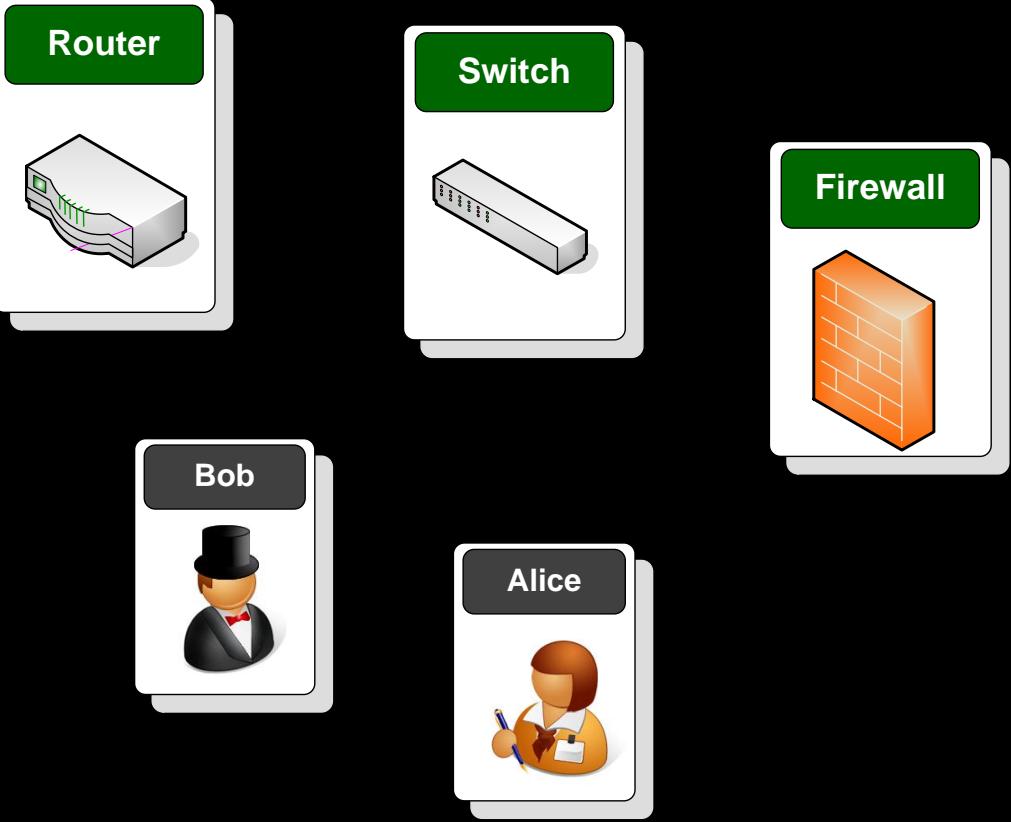
Types:

- 802.3. 10/100Base-T – Maximum range: 100m (UTP)
- 802.3u. 100Base-T. Maximum range: 100m (UTP)
- 802.3u. 100Base-FX. Maximum range: 400m (Fiber).
- 802.3ab. 1000Base-T. Maximum range: 100m (UTP).
- 802.3z. 1000Base-ZX. Maximum range: 100km (Fibre).



A switch does not have any collisions but a hub does.

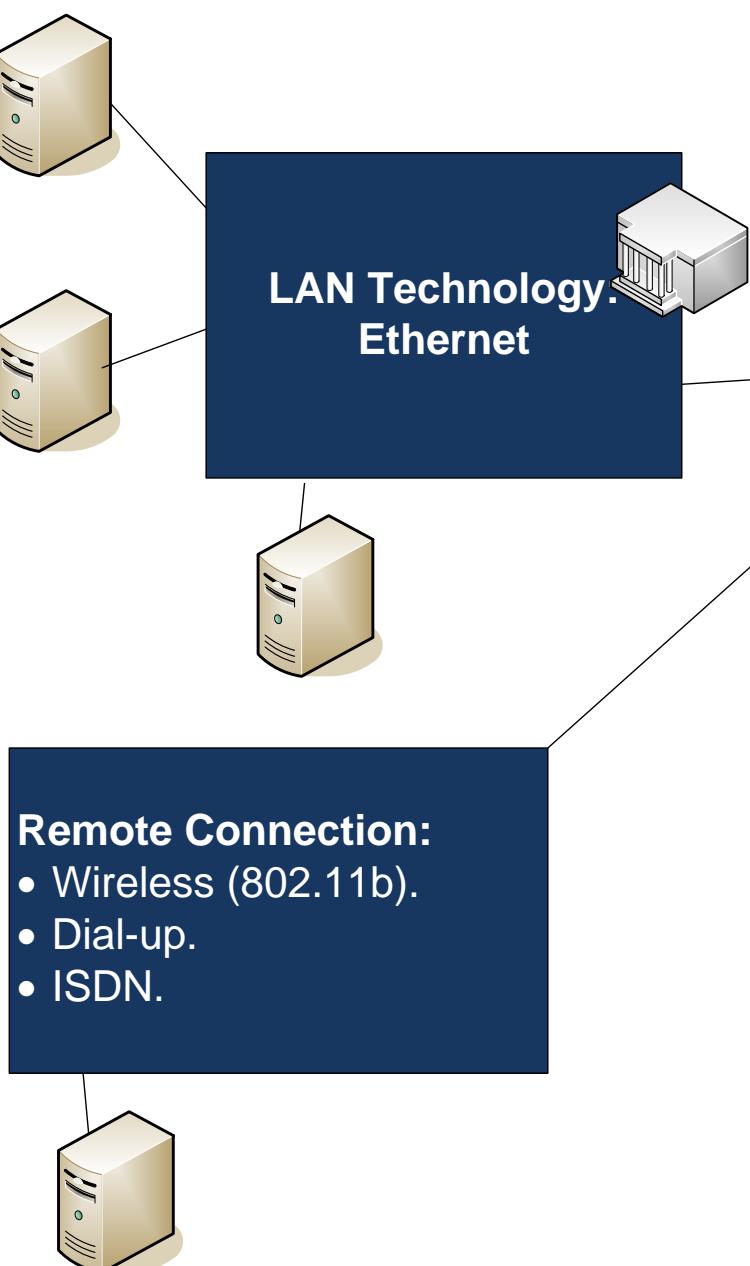
Network Fundamentals



WAN Connections

Net. Fun.

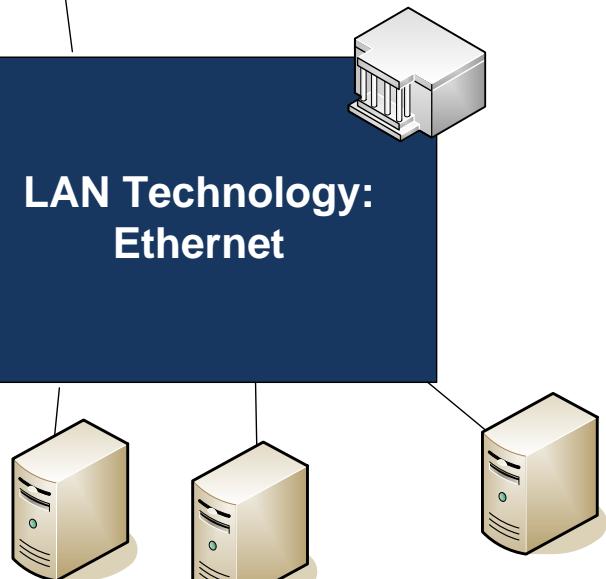
WAN



WAN Connection:

- Leased line (HDLC/PPP or SLIP).
- Circuit-switched (ISDN, T1/E1).
- Packet switched (Frame relay).
- Cell switched (ATM).

LAN Technology:
Ethernet

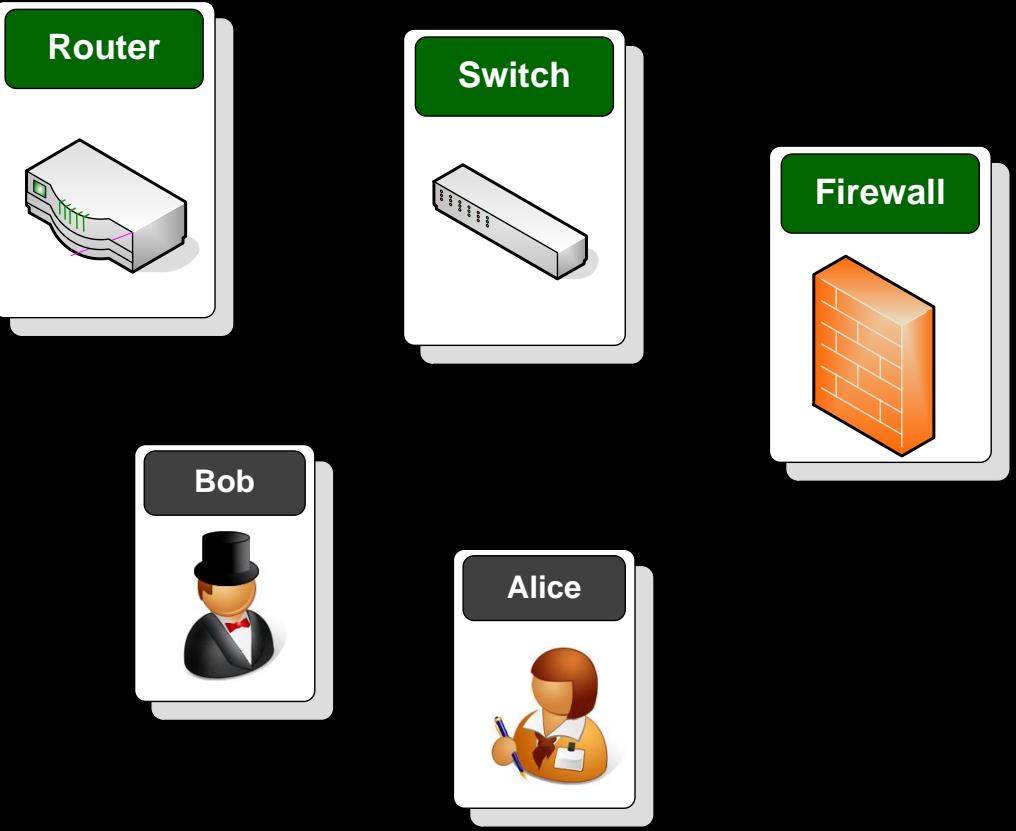


Remote Connection:

- Wireless (802.11b).
- Dial-up.
- ISDN.

WAN

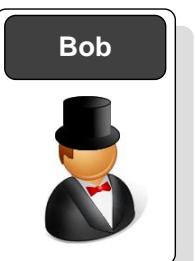
Network Fundamentals



Network Protocols and
Devices

Net. Fun.

Terms



Application:
FTP: File transfer
Telnet: Remote Connection
HTTP: Web Connection



Network

Terms

Net. Fun.

Terms

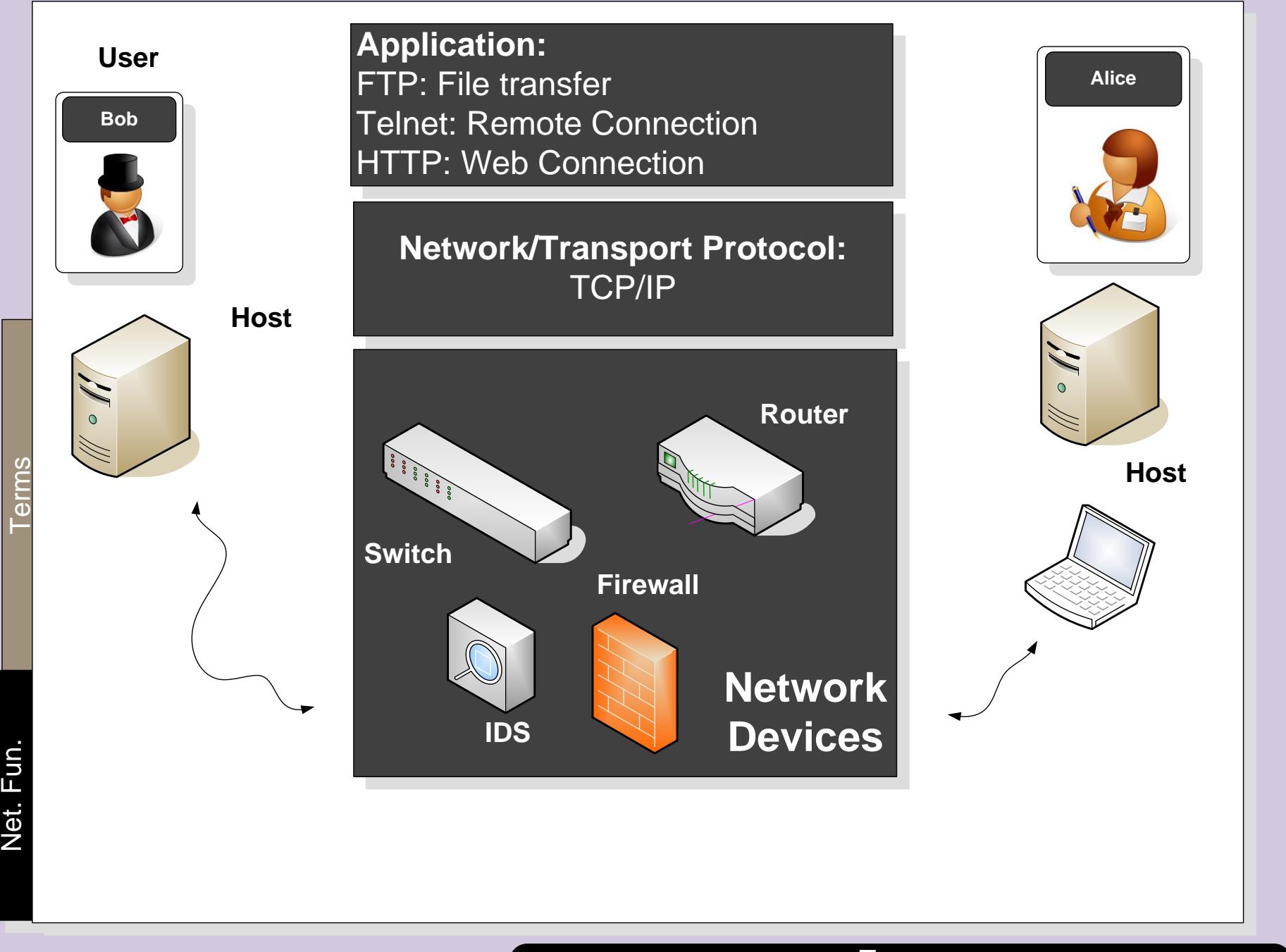


Application:
FTP: File transfer
Telnet: Remote Connection
HTTP: Web Connection

Network/Transport Protocol:
TCP/IP



Terms



Net. Fun.

User

Bob



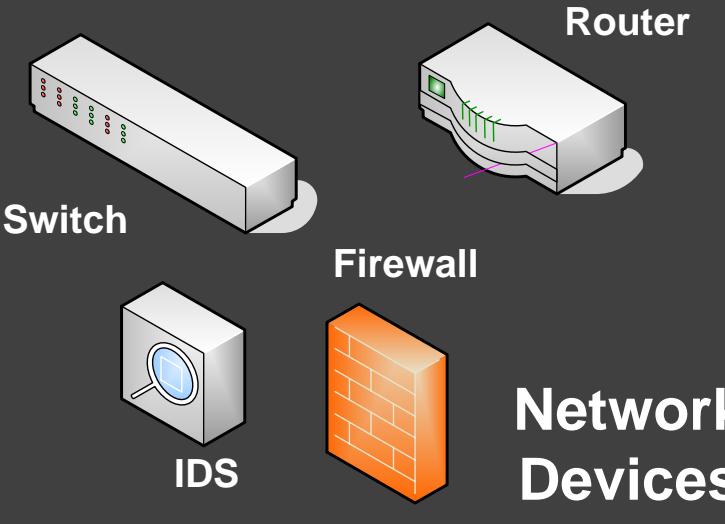
Host



Application:

FTP: File transfer
Telnet: Remote Connection
HTTP: Web Connection

Network/Transport Protocol:
TCP/IP

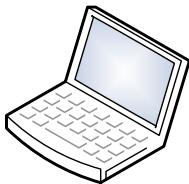


Cables/Communication Connection

Alice



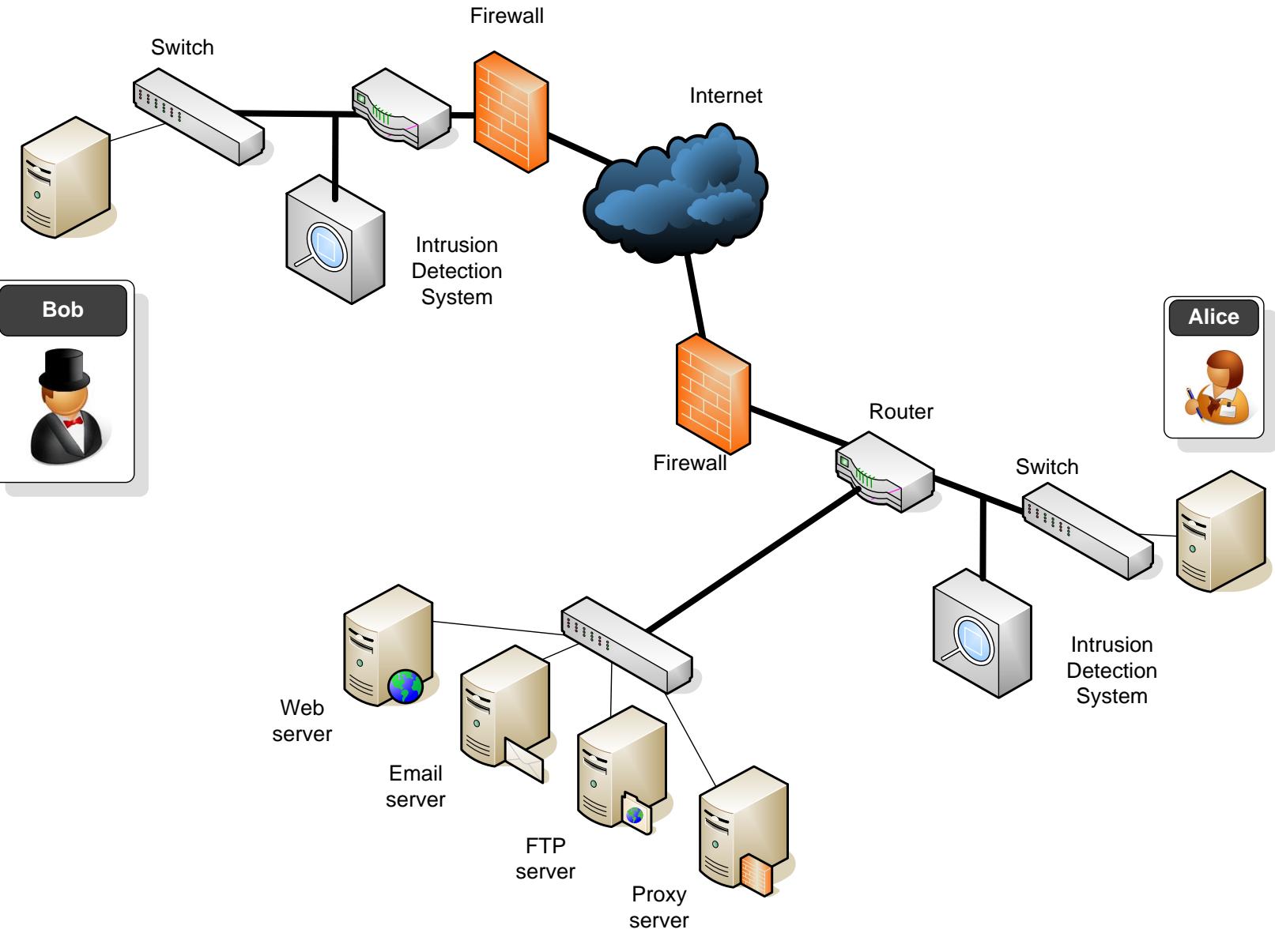
Host



Terms

Net. Fun.

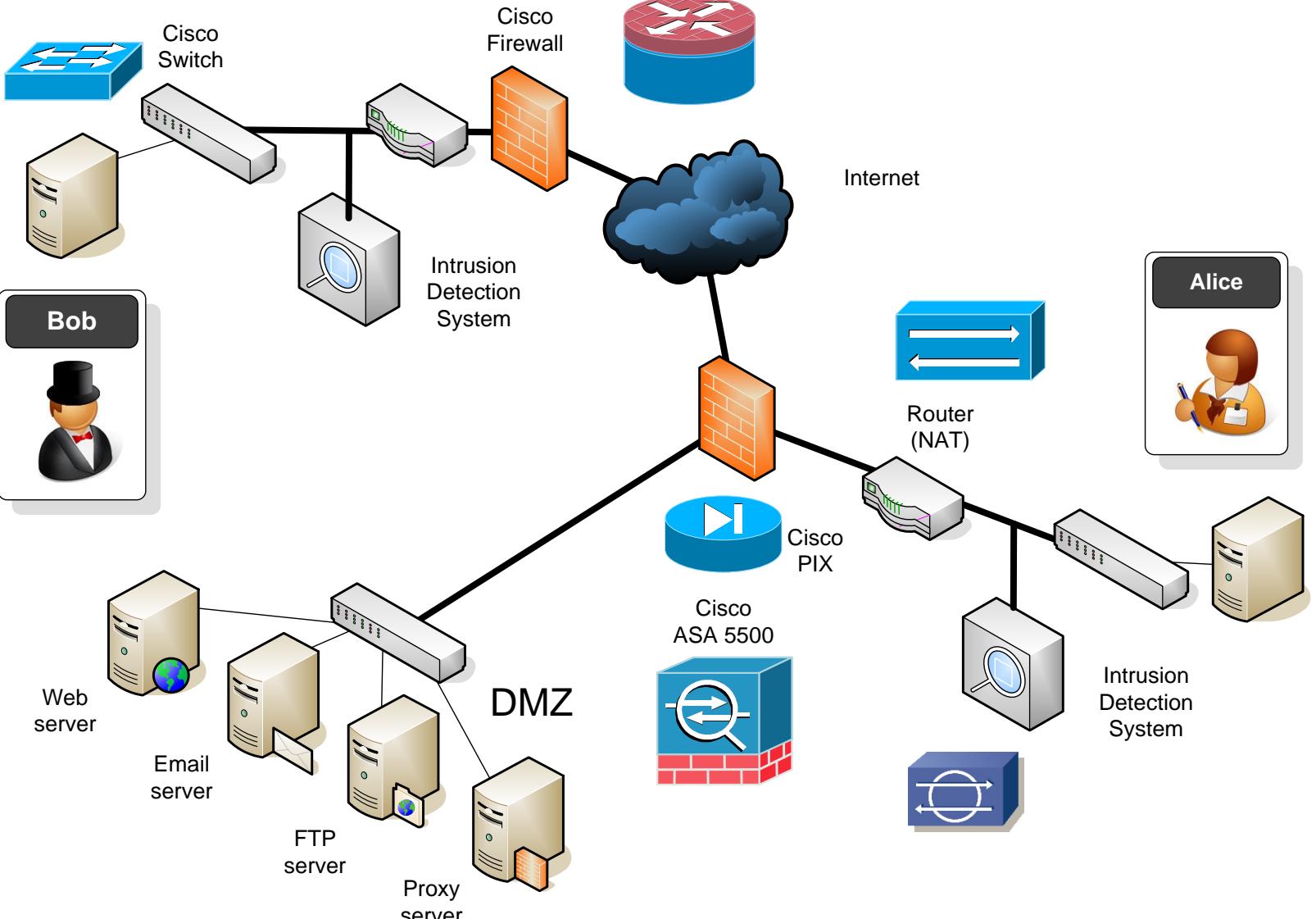
Terms



Example Infrastructure

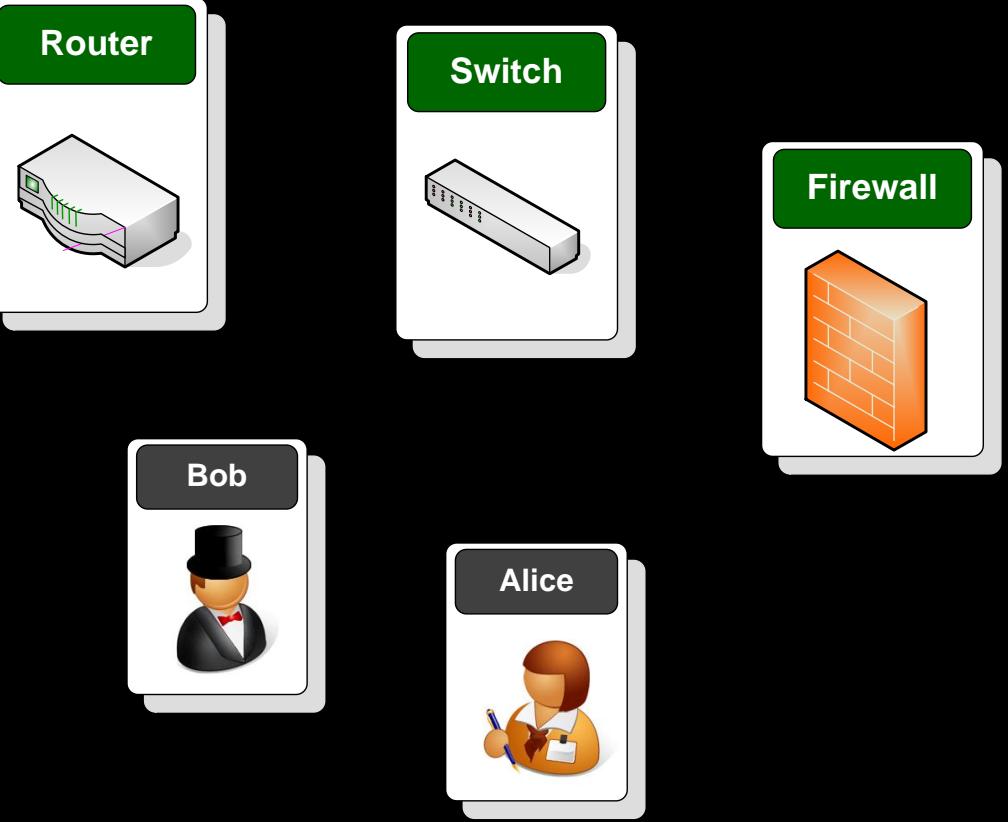
Network Fun.

Terms



Example Infrastructure

Network Fundamentals



Addressing and Routing

Net. Fun.

Domain Name: pc1.napier.ac.uk

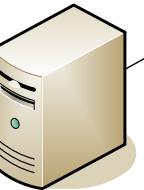
IP Address: 192.168.0.2

Physical Address: C8-F7-33-4B-82-37

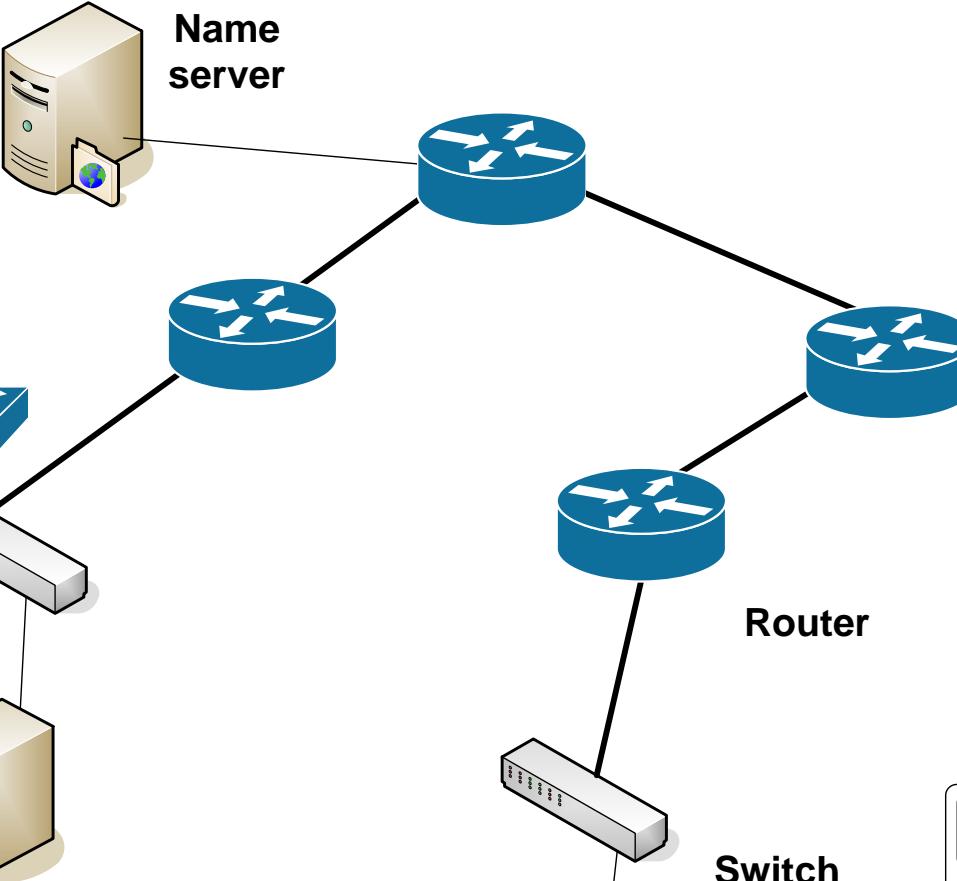
Basic Connections



Network Address



Physical Address



Domain Name

Network Address



Physical Address



Net. Fun.

Domain Name: pc1.napier.ac.uk

IP Address: 192.168.0.2

Physical Address: C8-F7-33-4B-82-37

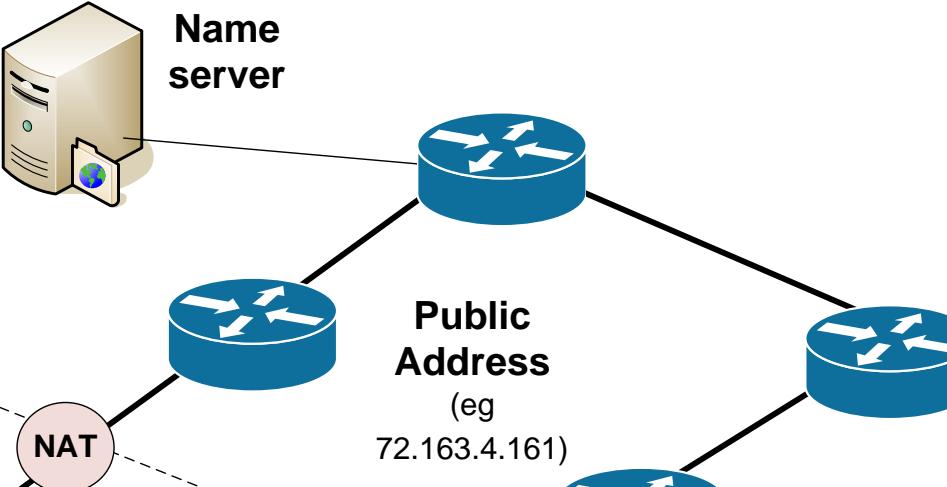
Basic Connections



Network Address



Physical Address



Name
server

**Public
Address**

(eg
72.163.4.161)

Router

NAT

**Private
Address**

(eg
192.168.0.1)

Switch

Alice



**Physical
Address**

Domain Name

Basic Network Connections