

# Introduction to Networking

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ITS User Services

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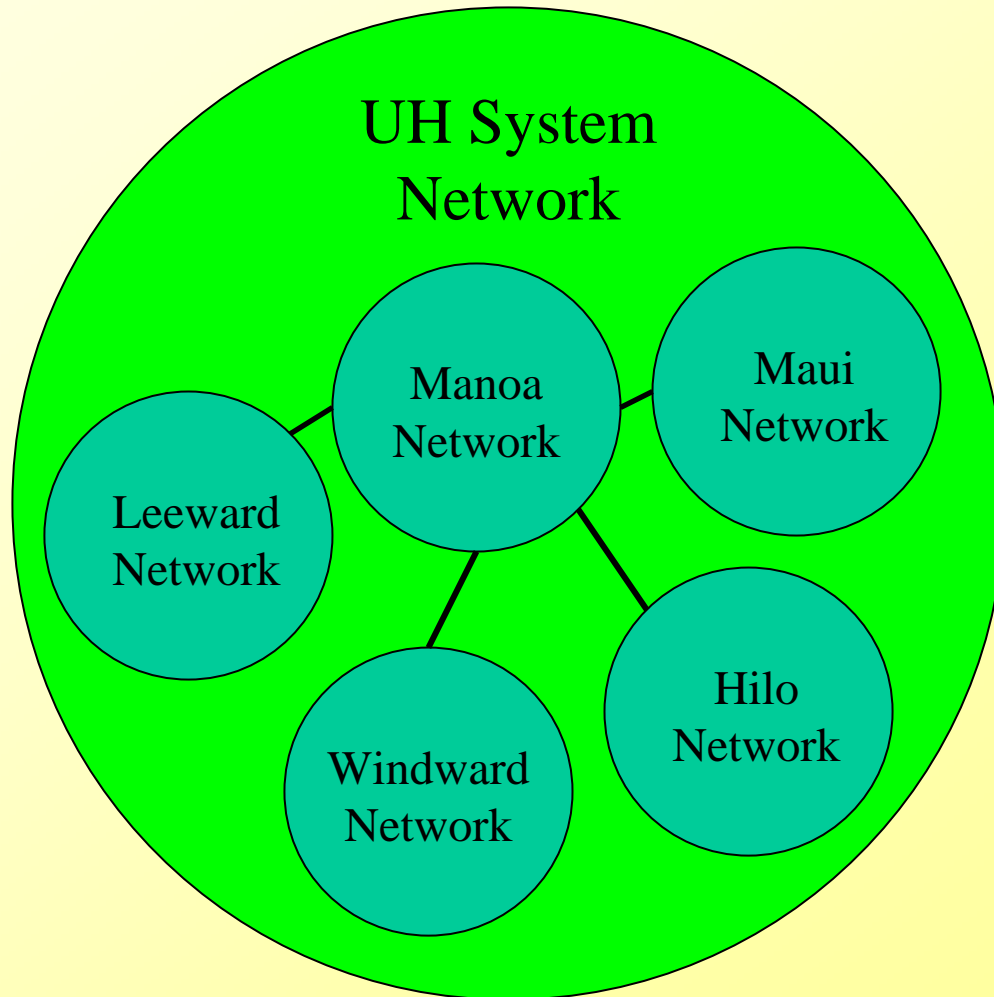
# What are we covering?

- Definition of a Network
- Network Addressing and Subnets
- Overview of Basic Networking Equipment
- Wireless Networking
- Wired or Wireless Network?

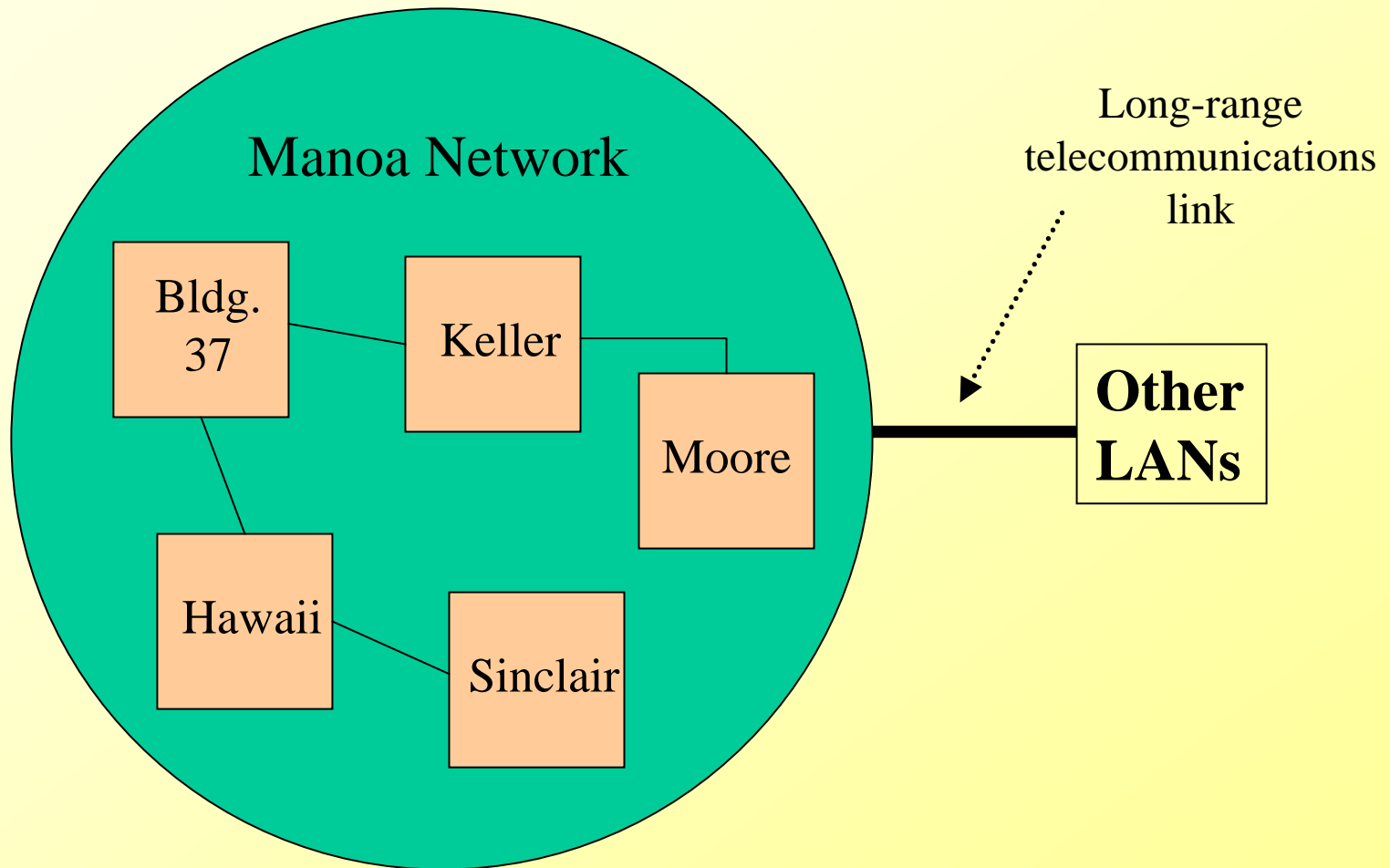
# Definition of a Network

- What is a WAN?
  - WAN = **Wide Area Network**
- What is a LAN?
  - LAN = **Local Area Network**

# Definition of a Network



# Definition of a Network



# Network Addressing

- MAC address
  - “Physical” address given to network hardware
  - All networking hardware have a unique MAC address, provided by the hardware manufacturer
- IP address
  - Used for TCP/IP networks
  - Each device within the network would need a unique IP address
  - UH was given all 128.171.xx.xx addresses (this was formerly known as a “Class B” network)

# Subnets

- A **subnet** (short for subnetwork) is a logical group of devices within a LAN
- Subnets are used to break up a LAN into smaller networks in an effort to manage them more efficiently
- Gateways/routers and a **subnet mask** would play critical roles in defining and using subnets

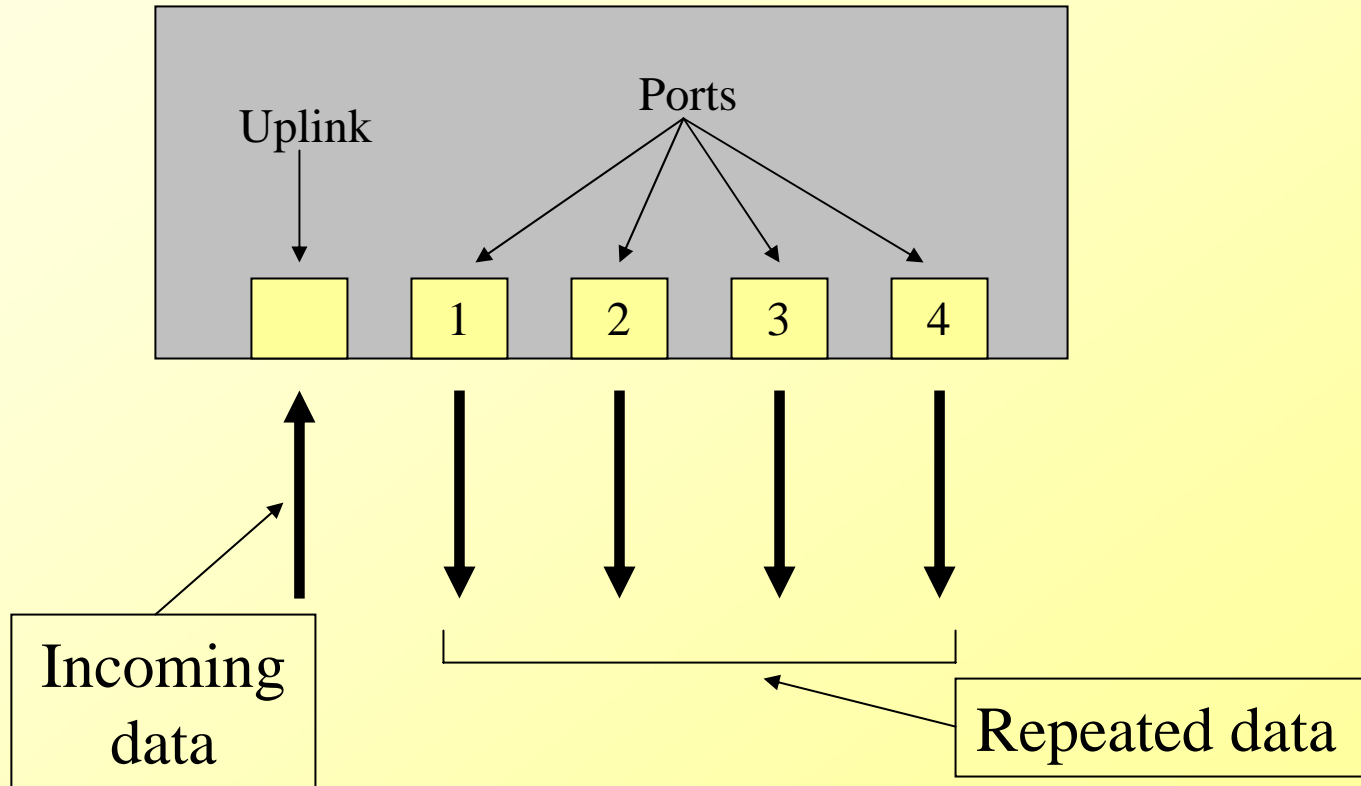
# Basic Networking Equipment

- Wired
  - Hub
  - Switch
  - Router
  - Cables
    - Straight-through
    - Cross-Over
    - USOC
- Wireless
  - Access point
  - Wireless Adapter
    - PC Card (laptops)
    - PCI Expansion Card (desktops)
    - USB Adapter

# Hubs

- Relatively inexpensive
- Comparatively “slow”
- Not “intelligent”, merely acts as a repeater

# Hubs



# Switches

- More costly than a hub
- Comparatively “fast”
- Has “intelligence”, which allows it to determine which device a packet is intended for, and only forward the packet to that device

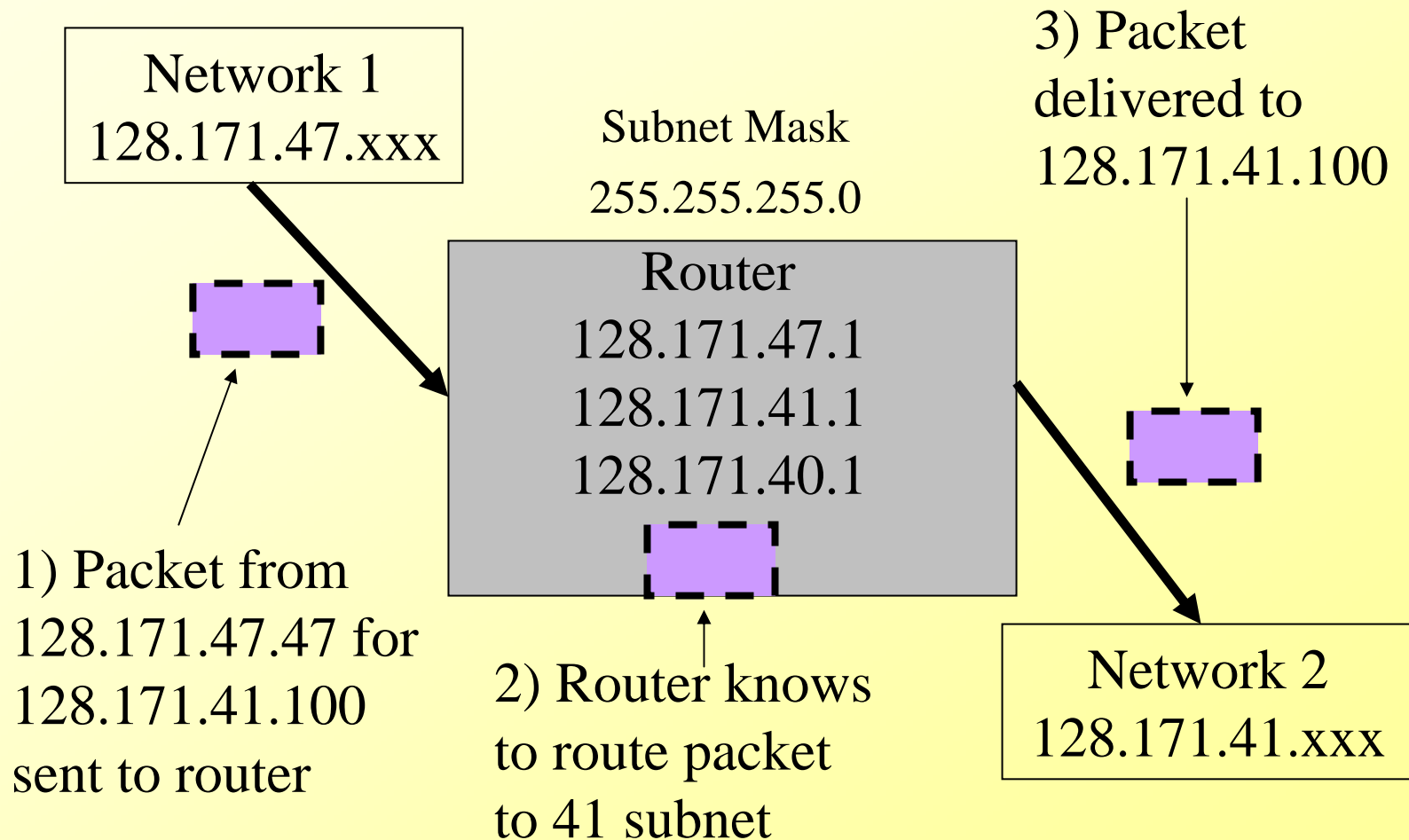
# Switches



# Gateways/Routers

- Device that determines the next network point a packet should be forwarded to
- The functions of a router can be combined with switches (routing and switching work hand in hand), but are distinct
- More costly than hubs or switches
- Also has “intelligence”, to determine where a packet should be routed

# Gateways/Routers

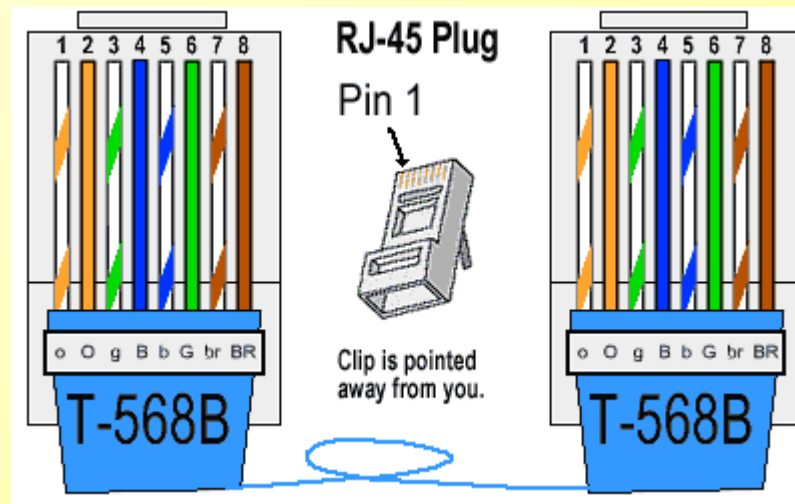


# Cables

- 8 copper wires, twisted into 4 pairs
- Ethernet adapters transmit on wires 1 and 2 and receive on wires 3 and 6
- Wires 4, 5, 7, and 8 are not used for 10BASE-T (10 Mbps) and 100BASE-TX (100 Mbps)

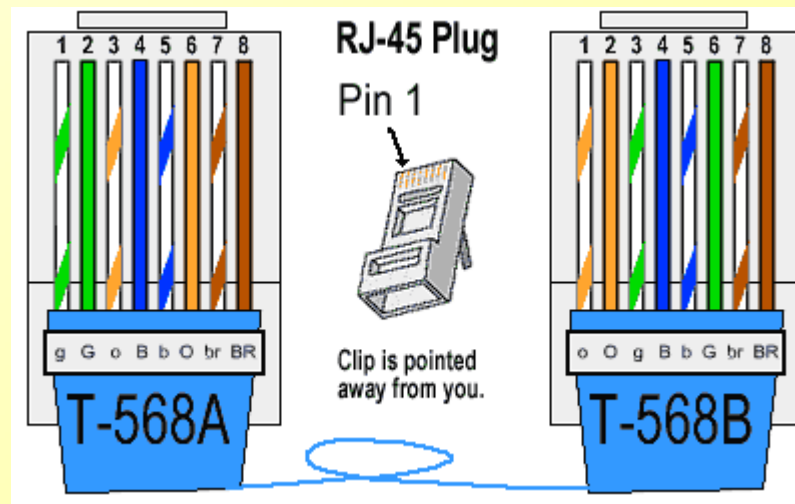
# Cables

- **Straight-through (Black)** – standard networking cable, with both cable ends identical; also called CAT5 cable



# Cables

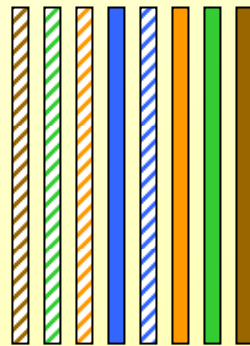
- **Cross-over (White)** – networking cable with wire pairs “crossed over” to allow 2 computers to communicate directly



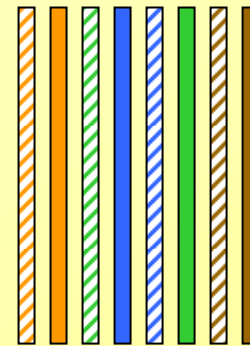
# Cables

- **USOC (Yellow)** – old telecommunications cable standard utilized by UH

Datajack



Computer



# Wireless Devices

- Access points – specially configured node on WLAN

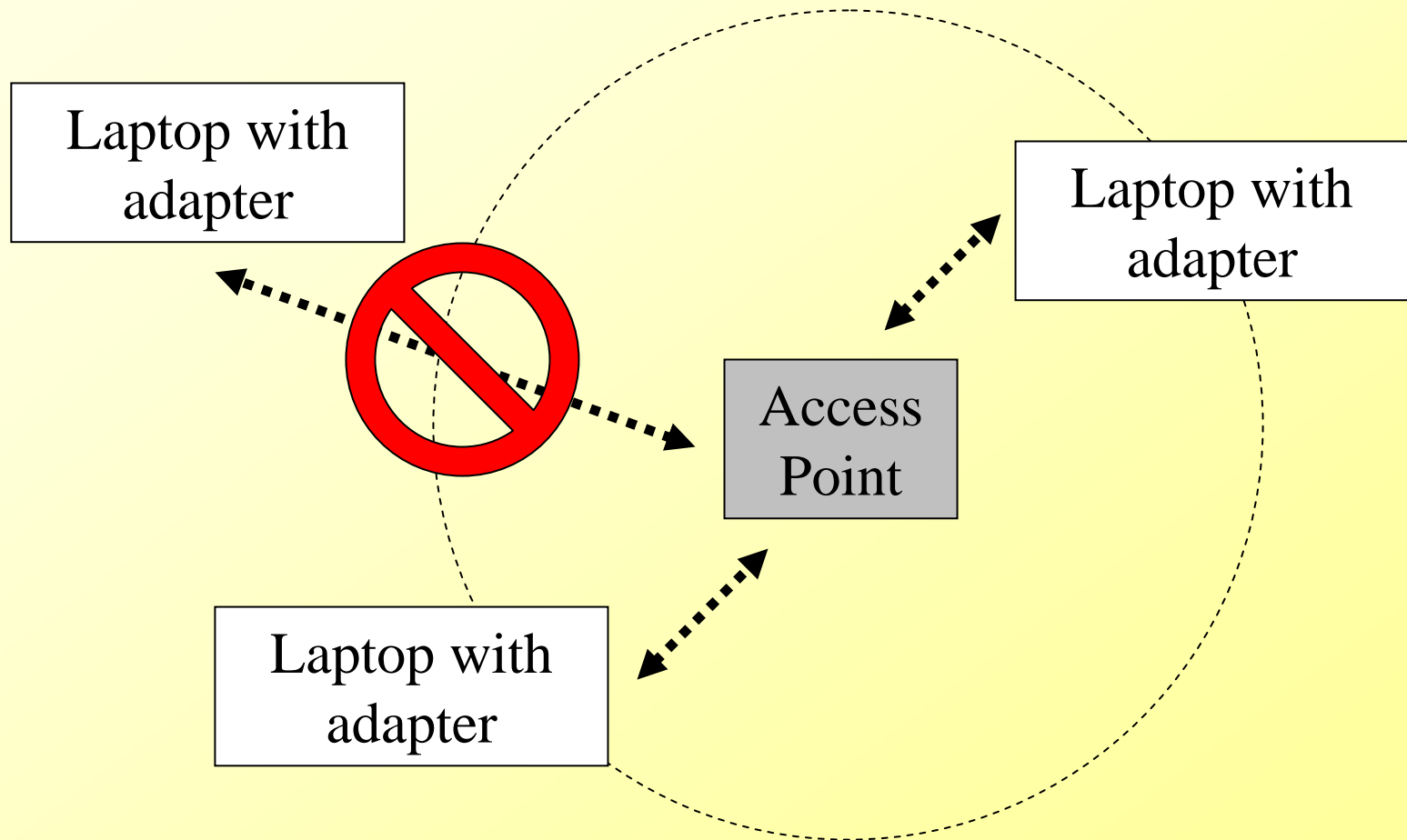


# Wireless Devices

- Adapters – card or device attached to laptop or desktop to allow connection on a wireless network
  - PC Card
  - PCI Expansion Card
  - USB Adapter



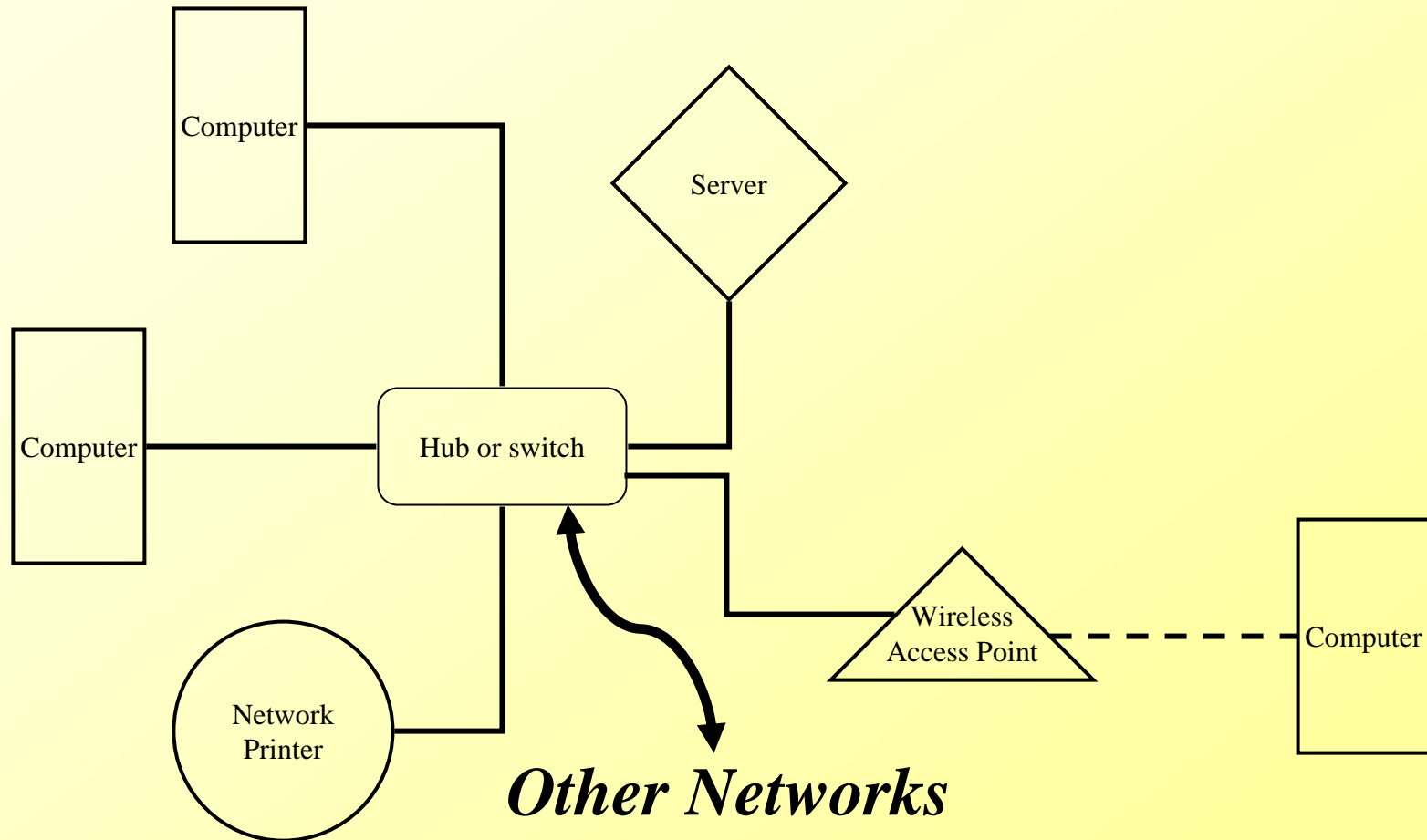
# Wireless Devices



# Wireless Security

- WEP – Wired Equivalent Privacy
- WPA – Wi-Fi Protected Access
- WPA2 – defined by IEEE 802.11i wireless standard to address security concerns with other wireless encryption methods
- MAC address filtering

# Simple Network Diagram



# Wireless or Wired?

- Wired
  - Pros
    - Signal interference not a big problem
    - More assurance of connections and easier troubleshooting
    - Lower cost (hub/switch vs. access point)
  - Cons
    - Lots of physical infrastructure
    - Physical limitations
    - Maintenance of the equipment

# Wireless or Wired?

- Wireless
  - Pros
    - Physical flexibility of network
    - Less physical infrastructure and potentially less maintenance
  - Cons
    - Performance degradation caused by interference
    - Troubleshooting more difficult
    - Security over the wireless connection
    - Higher cost (access point vs. hub/switch)

Thank you for coming!

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