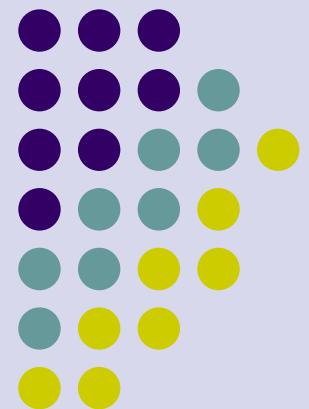
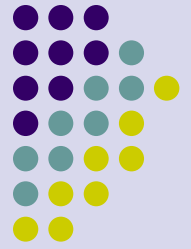


Networking Introduction

What you need to know to set up
a network



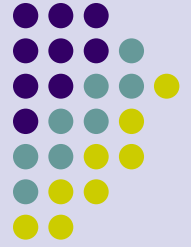


What is a Network?

- Two or more computers connected through cables, or phone lines
- Sharing information made possible

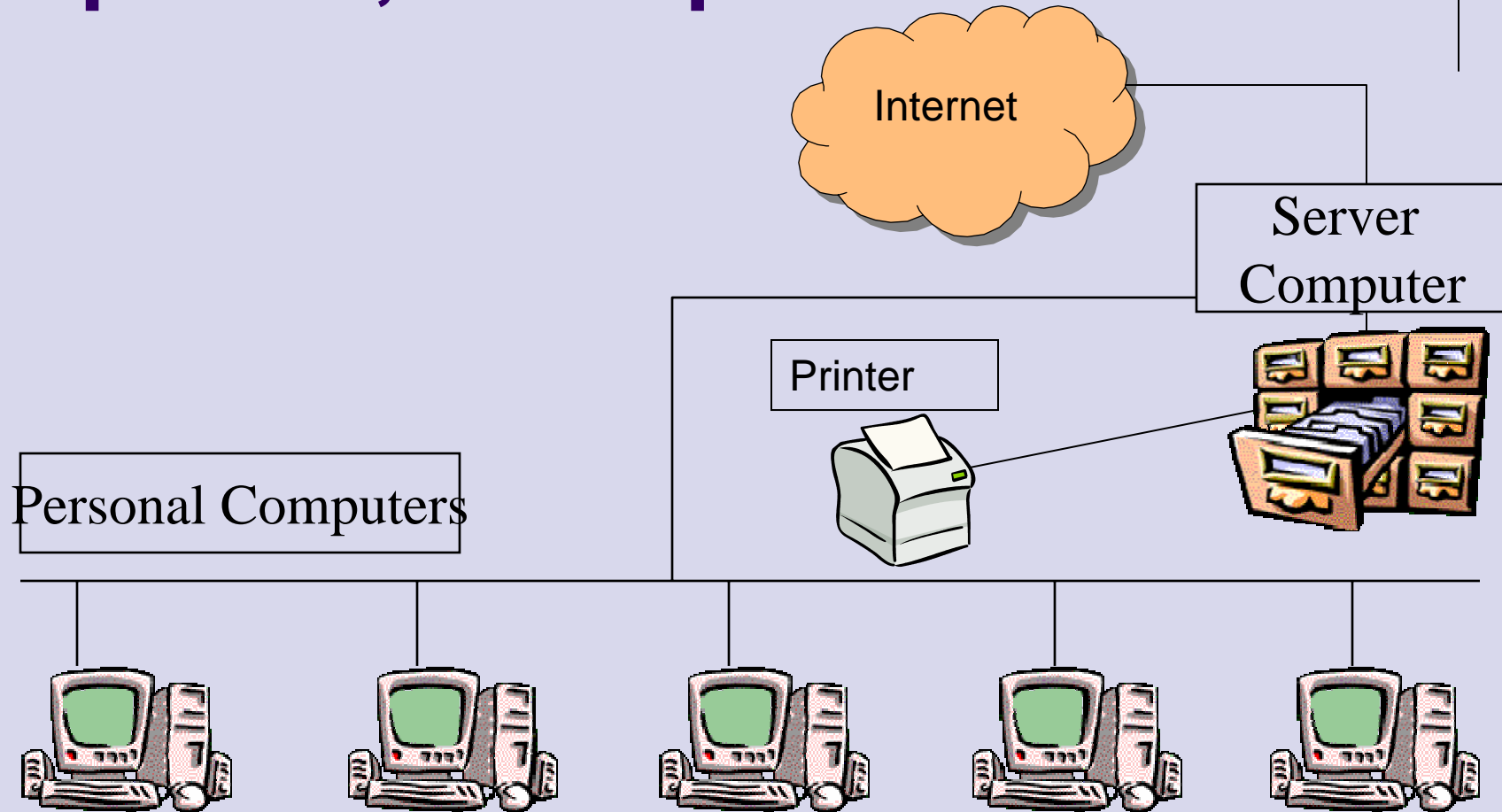
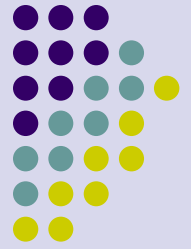


Why Network?

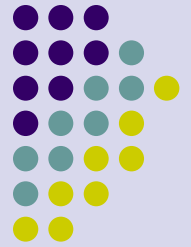


- Share information and data
 - Files and software applications
- Enhance Security
 - Control access to shared data
- Share resources
 - Disk space, printers, scanners, faxes, etc.
- Share Internet access
 - Cable, DSL, or T1

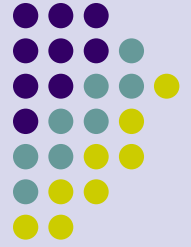
Sharing Resources: files, printer, disk space



Questions to ask before considering a network

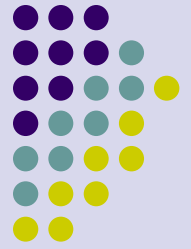


- What do you want to do with a network?
 - Set your objectives for the network
 - Also consider future business growth
- What is your budget?
- What are your productivity goals?
 - Compare goals to costs – determine if a network is really worth it.



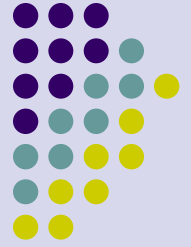
More Questions...

- What equipment do you currently have?
- How many computers do you need to connect?
- What other equipment will you need to connect (i.e. printer, scanner, etc.)?
- Where will you put the network equipment and servers?
- Who will support and maintain the network?



Also consider...

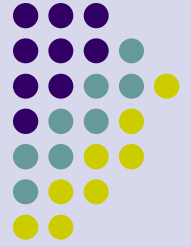
- Security issues
 - Spreading viruses
 - Exposure to hackers
- Installation can be tricky
 - May require a professional
- Support, maintenance and expansion costs should also be considered
 - A dedicated IT person/staff needed
- Remember software licensing issues



What will it cost?

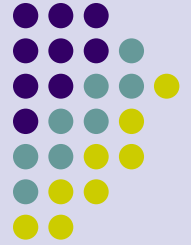
- Well... it depends
 - Some equipment may already be installed in your existing computers
 - i.e. Ethernet adapters (network cards)
- Anywhere from several hundred to several thousand dollars
 - Small network – few pieces of equipment needed
 - Complex network – more equipment needed

What Type of Network: Wired or Wireless?



- Two types of networks available
 - **Wired**
 - Uses cables to connect computers and resources
 - **Wireless**
 - Uses radio signals to connect computers and resources (similar to a cordless phone)

Wired Networks:



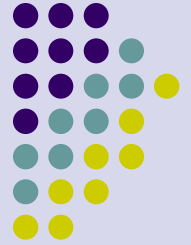
Pros

- Cost effective
- Reliable
- Fast speed - Up to 1000 Mbps
- Long range - 300 feet per segment (segments can be connected)
- Most efficient - Especially for bandwidth intensive applications such as multimedia files

Cons

- Must run cables
- Must ensure all PCs have a network adapter
 - Ethernet card - standard on most newer computers

Wireless Networks:



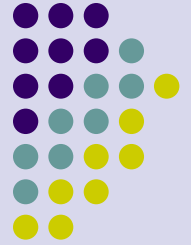
Pros

- No cables to buy or hassle with
- Work from anywhere without having to connect to a cable
- More convenient for mobile laptop users (more public networks are becoming available)

Cons

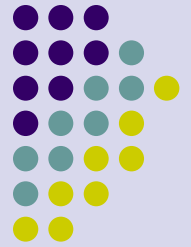
- Not as reliable
- Not as fast
 - 11 to 54 Mbps
- Short range
 - 100 to 150 feet
 - Building materials and other wireless devices (i.e. cordless phones) may interfere

Standards for Wired Networks



- Ethernet network is most common
 - Ethernet Network Access Card
 - Built into most newer computers
 - Ethernet CAT-5 Cables

Standards for Wireless Networks

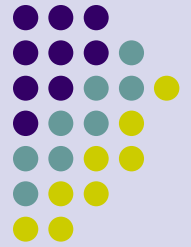


Type	Speed	Range	Public Access	Cost
802.11a	Up to 54Mbps	150 ft	Poor	High
802.11b	Up to 11Mbps	100 ft	Excellent	Low
802.11g	Up to 54Mbps	150 ft	Excellent	Medium

802.11g is the top choice for speed, range, public access, and price.

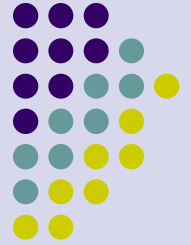
Uses the same frequency as many other appliances such as cordless phones and microwaves which may cause interference.

Network Equipment: Wired Network

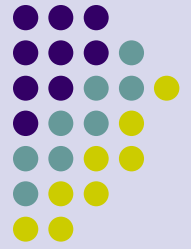


- Routers
 - To route data over the network
- Network access cards for each computer
 - To receive data from the network
- Server
 - For file storage and application sharing in one central location

Network Equipment: Wireless Network



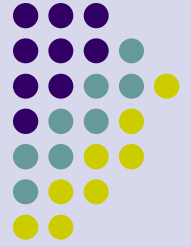
- Wireless Routers
 - To route data over the network
- Access points
 - Allows communication with a wired network and can expand the range of the wireless network
- Network access cards for each computer
 - To receive data from the network
- Server(s)
 - For file storage and application sharing in one central location



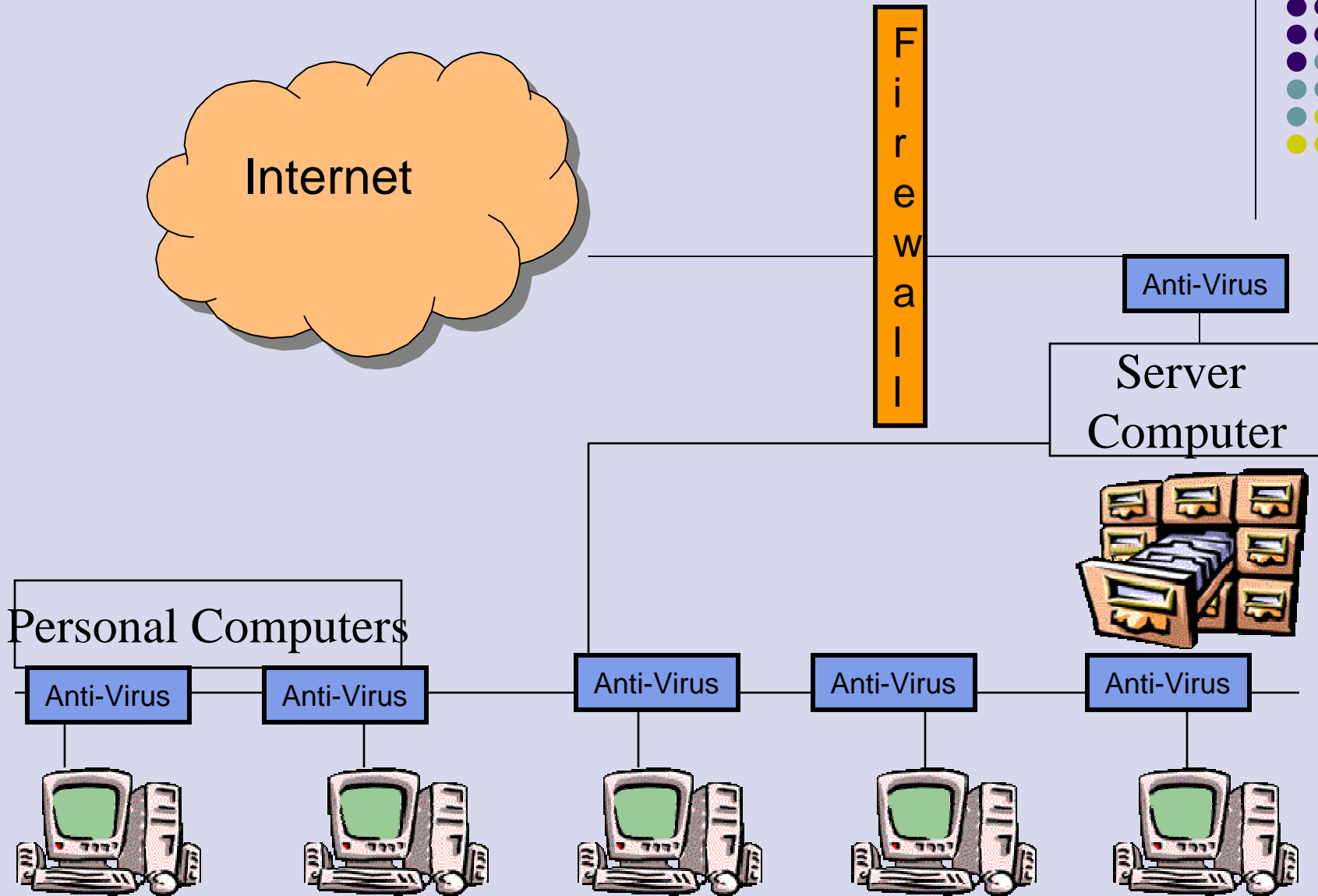
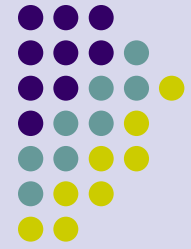
What type of server?

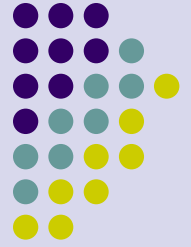
- How many computers will access the server?
 - Processor speeds tend to vary and will be noticeable with more than 20 users connected
- What types of applications and how many will the server support?
 - Email vs. streaming video
- What is your budget?
 - Will a low-end server be adequate for your immediate needs and allow for upgrades later?
 - How much data do you have to store?

Security



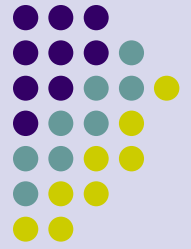
- Virus
 - Anti-virus software and subscription
- Firewall technology
 - Hardware firewall (built into most routers) protects the network
 - Software firewall on individual computers protects the computers themselves





Router Security Features

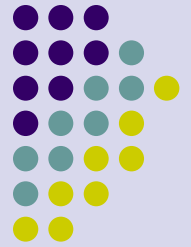
- NAT – network address translation
 - Changes your IP addresses to a different IP address for the internet
- SPI Firewall – stateful packet inspection
 - Inspects incoming data packets and rejects possibly harmful packets
- VPN – virtual private network
 - Creates a secure connection between your network and another network over the Internet



Wireless Network Security

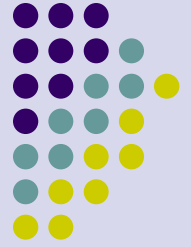
- Router firmware – software embedded in your router
 - Download updates from vendor
- Change router's default administrator password
- Change SSID (Service Set Identifier) - wireless network name

Wireless Network Security continued



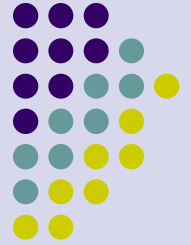
- Disable SSID broadcasting – turn off broadcasting your network name to anyone
- WEP (wired equivalent privacy) – encrypts data to and from computers connecting to a wireless network
- WPA (Wi-Fi protected access) – latest high-security standard for wireless networks
- Limit access by MAC Address (media access control address) – identifies the installed network card

Additional Security Considerations



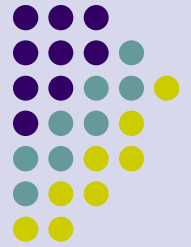
- Control access to certain files
 - Create security profiles (who has access to which files)
- Educate users on changing passwords
 - Using passwords that are not easily guessed
- Create official corporate security policy
 - Policy on email correspondence
 - Policy on personal use of the Internet

Internal Support and Maintenance



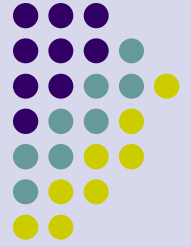
- IT professional (administrator)/staff
 - Set up user IDs
 - Distribute corporate use policy
 - Maintain periodic upgrades firmware and software
 - Especially anti-virus definitions
 - Monitor network performance
 - Schedule and perform regular data backups
 - Troubleshoot (help desk)
 - User problems
 - Performance problems
 - Network failure

External Support and Maintenance



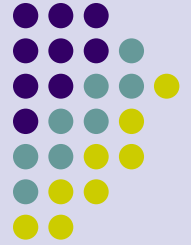
- Outsource management of network
 - Backup to off-site disk space for a monthly fee
 - Administration of network – set up user IDs, user profiles, etc.
- Regular reporting of network statistics
 - Performance, speed, problems, need for upgrades

How Important is a Server to Your Business?



- What if the server crashes?
 - What is the cost to your business if you lose mission critical data?
 - Importance of periodic backups
- Will you need redundancy and what type?
 - RAID – redundant array of inexpensive discs (mirroring data from one hard drive to another)
 - Outsourcing IT resources (rent computing power and disc space offsite for a monthly fee)

Informational Resources for Networks



- www.cnet.com
- www.linksys.com
- www.blackbox.com
- www.webopedia.com (online technical dictionary)
- Call vendors – talk to sales people
 - IBM, Dell, HP