

*Remote Access Techniques
and Issues*

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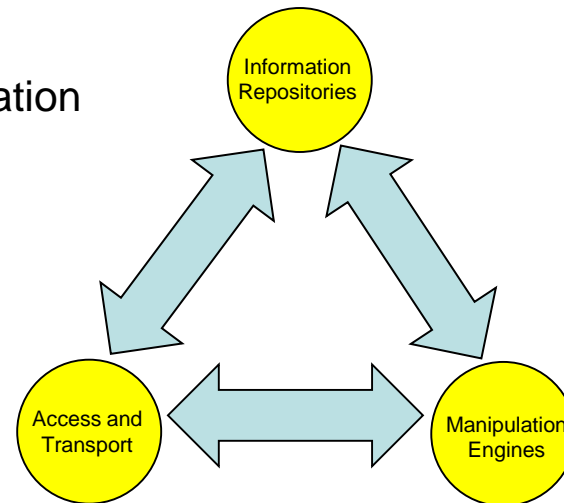
Networking and Telecommunications Services

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Introduction

- Presenter bio
- The Information Services "triad"
 - Information repositories
 - Libraries (physical)
 - Databases (electronic)
 - Information manipulation and presentation
 - Personal computers
 - Servers
 - Applications
 - Information access and transport
 - Networks



Networks

- The "internet" operates on many scales
 - Local Area Network (LAN) technologies
 - Metropolitan Area Network (MAN) technologies
 - Wide Area Network (WAN) technologies
- These technologies are used to build real networks
 - Internet Service Providers (ISPs)
 - Enterprise/corporate networks
 - "Consortium" networks
 - Small office/home networks

Expectations

- Anywhere, anytime access to information and services
 - While traveling (hotels, airports, coffee shops)
 - From home
- How can your home computer be connected to the internet?
 - Wired
 - Wireless

Wires to Your Home

- Electrical connection
- Phone line (twisted pair copper)
- Cable TV (coaxial cable)
- Fiber optic
 - Not yet, but maybe someday ...
- Ethernet is the defacto standard for connecting computers to the internet
 - Speeds up to 1000M bps
 - Distance limitations make its use from home (over existing wiring) impossible (LAN vs. MAN)
 - twisted pair copper: 300 feet
 - coaxial cable: 1000 feet

Can We Use These Wires to Connect to the Internet?

- Electrical connection - No
 - Some experimentation has been done
 - No viable commercial services, yet ...
- Phone line - Yes
 - Dialup modem
 - Digital Subscriber Line (DSL) service*
- Cable TV - Yes
 - Cable modem service*
- * where available!

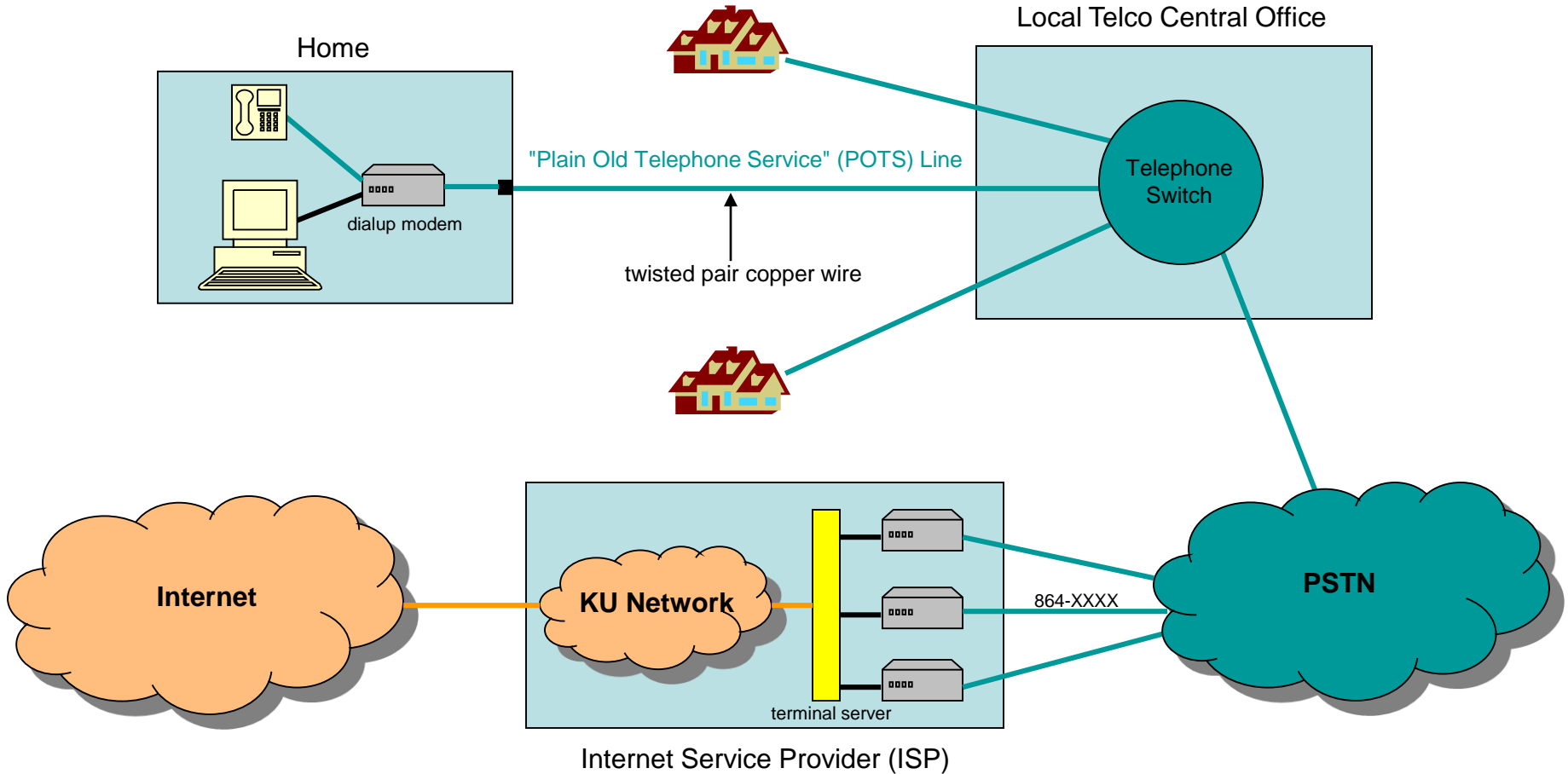
Using the Phone Line: Dialup Modem

- **Mod**ulator / **Dem**odulator
- Converts computer data to "sounds" (in an electrical form) just like your telephone does for the human voice
- Designed to use the "standard" Public Switched Telephone Network (PSTN) just like any normal call would be made
 - No modifications to the PSTN required

Dialup Modem continued

- The earliest (and now the oldest) remote access technology
- The modem uses "all" of your phone line
 - No incoming or outgoing human voice calls while the modem is in use, and vice versa
- The performance is limited by the "capacity" provided by the PSTN for a voice call
 - The best modems today can operate at speeds up to 56K bps. This is slow by today's standards.
 - The use of modems is fading fast.

Dialup Modem Environment



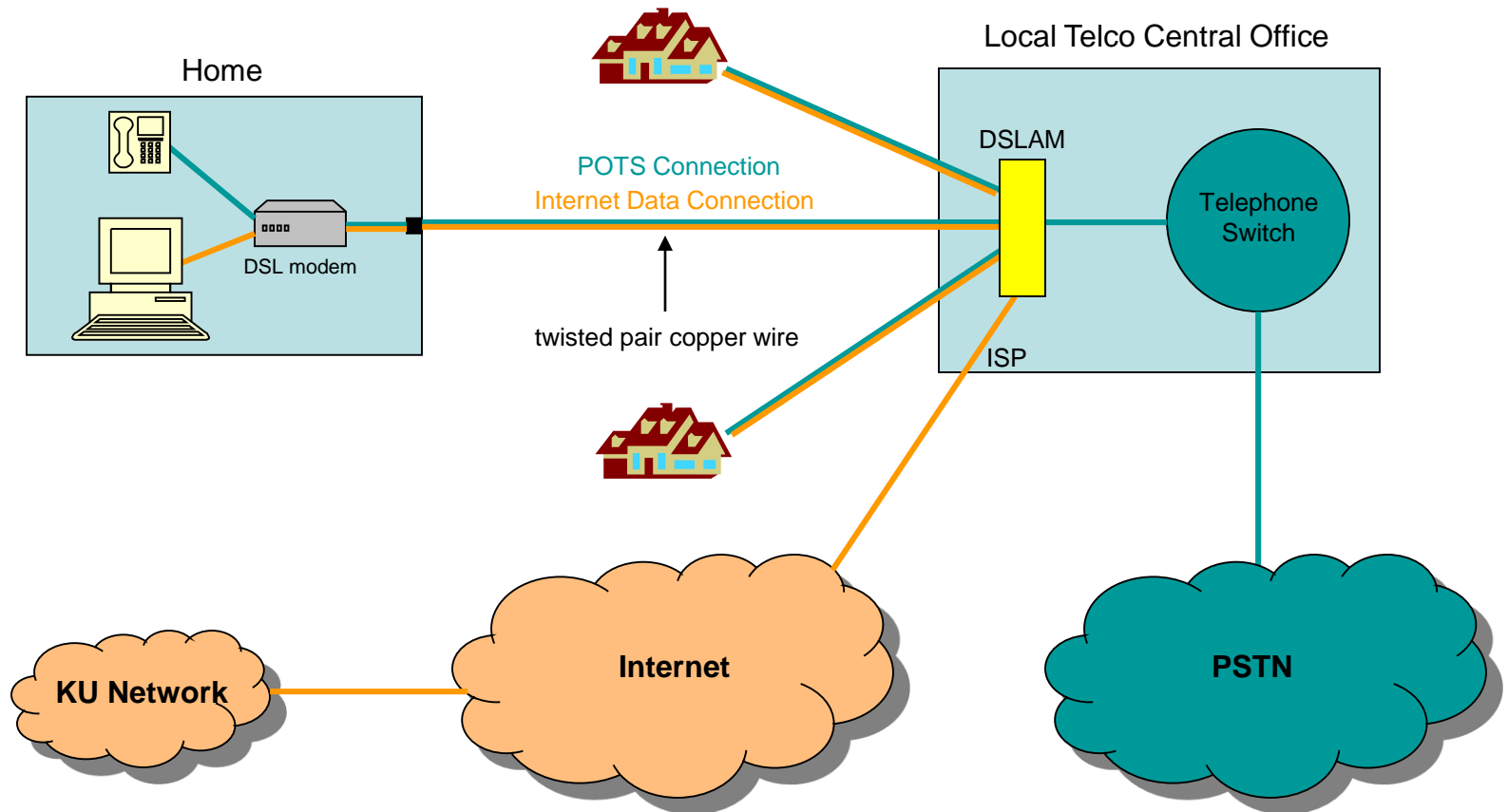
Using the Phone Line: Digital Subscriber Line

- The telephone companies wanted to find a way to offer new data oriented services (and generate revenue) over their existing installed base of telephone wires
- A technological "challenge" at the time
 - The "quality" of the wires is marginal at best for this purpose (one pair of twisted copper wires)
 - New signal processing technologies allow us to "squeeze" more data through the wires

DSL continued

- The solution: Frequency Division Multiplexing (FDM) and some fancy digital signal processing
 - One frequency is used to carry a standard voice call
 - A different frequency is used to carry computer data
 - Both frequencies can be carried simultaneously over the same wires
 - Standard incoming and outgoing voice calls can be made while your computer is connected to the internet
 - Performance is still limited by the nature of the wires and signal processing used, but speeds up to 3M bps are currently possible (at a premium price)
 - I just saw an ad on television where 6M bps performance is claimed

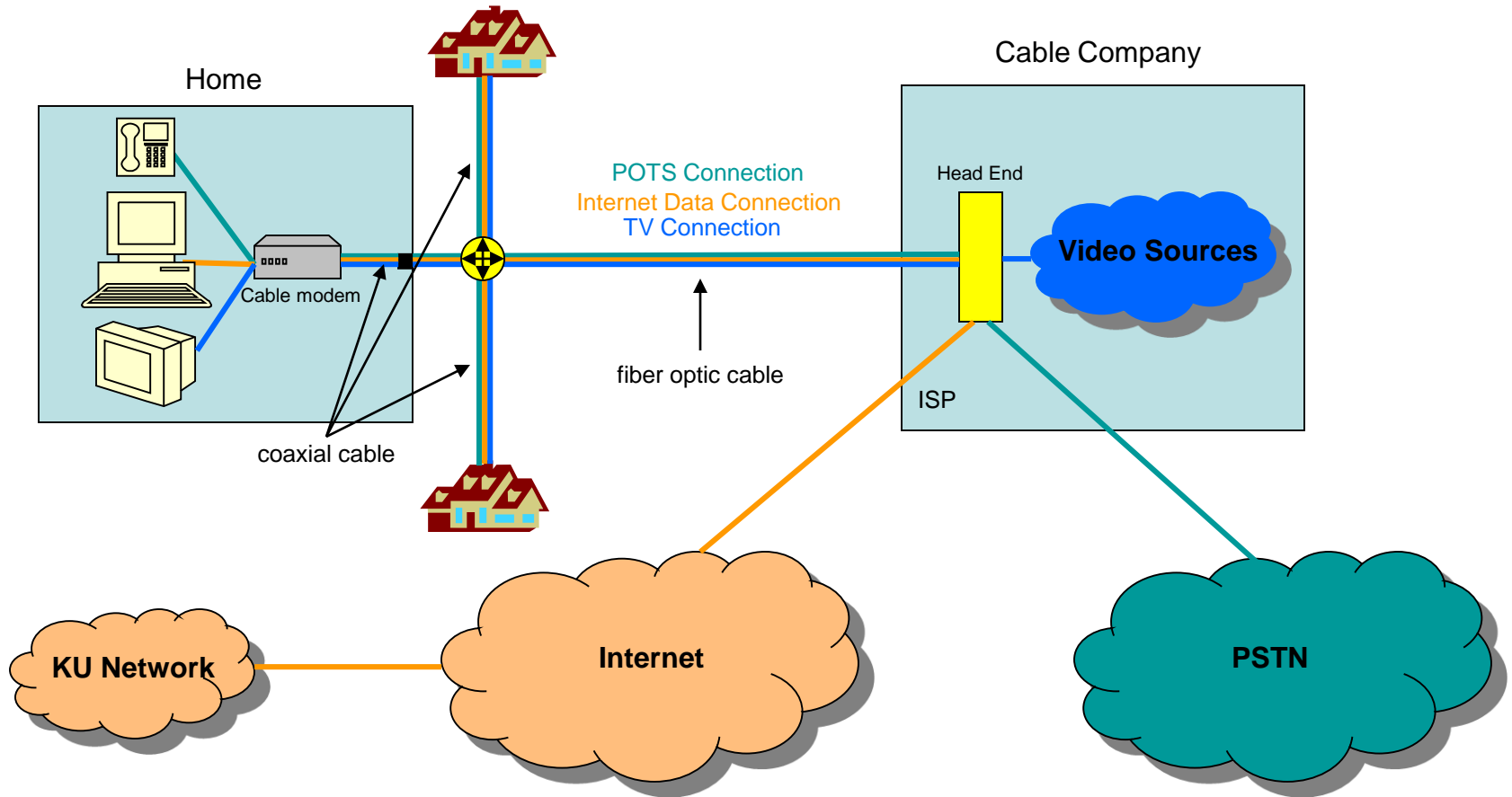
DSL Environment



Using Cable

- Your standard cable TV "wire" uses FDM to carry many TV channels simultaneously
 - The "wire" is a coaxial cable, which by its design can carry 100s of individual TV channels (not all are used in practice) simultaneously
 - One (or more) of these unused TV channels can be used to transport computer data
 - Current service offerings can provide up to 10M bps (at a premium price)

Cable Environment



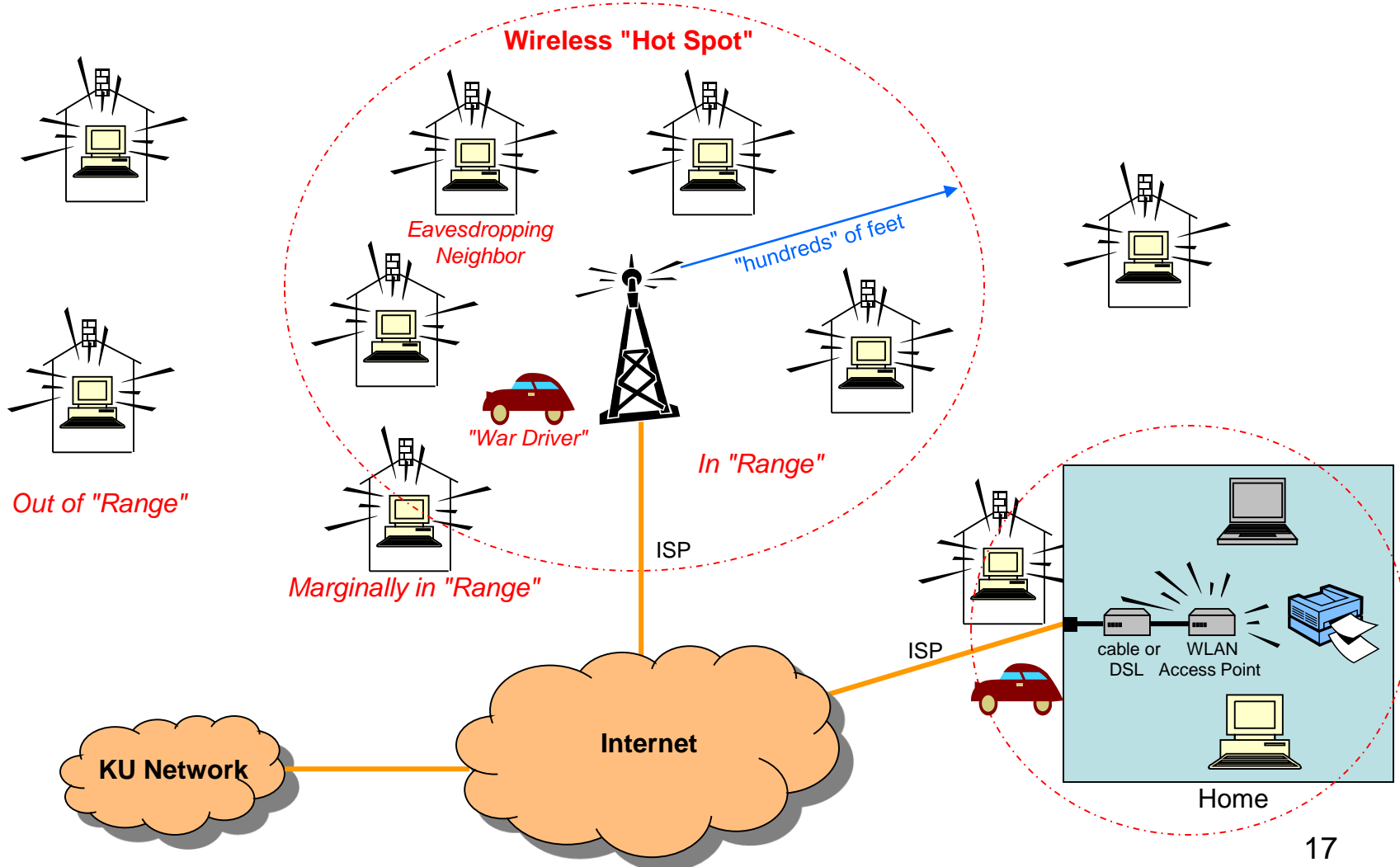
Wireless

- Many different technologies
 - AM/FM
 - Cellular phone
 - Satellite
 - Microwave
 - Laser
 - WiFi (IEEE 802.11)
 - aka wireless LAN
 - the most common technology used (today) for connecting computers to the internet wirelessly

WiFi

- Distance and speed limited
 - Depends on "environment"
 - physical mass reduces signal strength
 - up to several hundred feet
 - 54M bps possible
 - » actual speeds are typically 2M to 6M bps
- Other issues
 - Interference from other signals
 - uses unlicensed radio frequency spectrum
 - Security
 - your data is transmitted "through the air" and can be easily intercepted by someone in range
 - use encryption

WiFi Environment



Watch Out For ...

- Vendor performance claims
 - They rarely lie per se, but they don't always divulge the full picture readily (read the fine print carefully)
 - Advertised performance is only possible under "ideal" conditions
 - Asymmetric speeds
 - assumes that you will download more information from the internet to your computer than the other way around
 - max performance from the ISP to you, less performance in the other direction
- Performance on the internet in general
 - There are **NO** performance guarantees!
- Security
 - ***You should assume the worst unless you take specific steps***
 - Protecting you computer
 - firewalls
 - anti-virus
 - Protecting your data during network transit
 - If the data you are transmitting/accessing is confidential, then you must use encryption
 - Secure Socket Layer (SSL)
 - Virtual Private Network (VPN) technology/service

Questions

