You Can Do I.T.
Basic Network Technology for Libraries

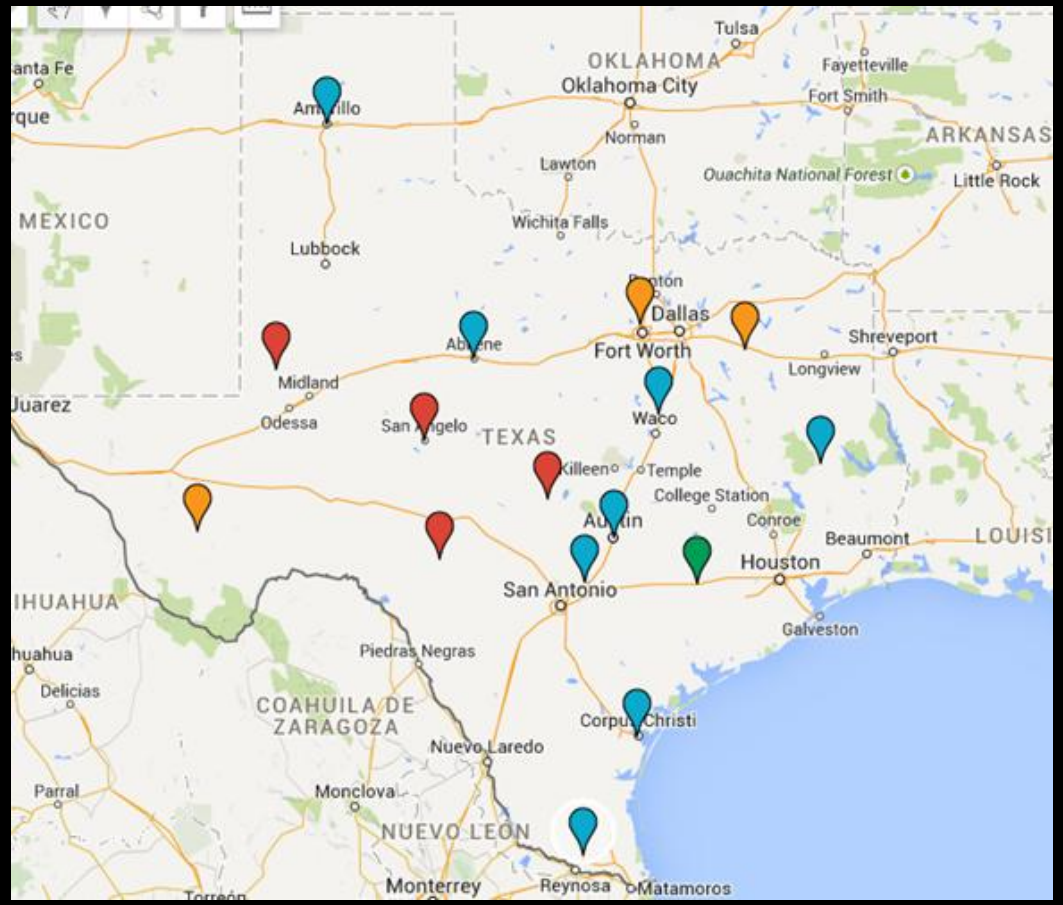
Instructor: Carson Block
@CarsonBlock

INSTITUTE of Museum and Library SERVICES

TEXAS STATE LIBRARY AND ARCHIVES COMMISSION

Carson Block Consulting Inc.
Technology Vision. Technology Power. Your Library.
http://www.carsonblock.com/

What is Basic Network Technology for Libraries?



- 16 sites, Spring and Fall
- Course Objectives:

  Workshop participants will be able to:
  - Define common terms used in computer networking
  - Understand broadband options available and find ISPs serving their library and/or community
  - Demonstrate the ability to conduct speed checks to monitor broadband service in their library
  - Identify hardware devices used/needed in a computer network
  - Understand the functions and/or purpose of common network devices
  - Understand modern cabling design and specifications, and best practices to use when installing network cabling
  - Configure typical wired and wireless routers
  - Implement basic backups, security and restoration procedures

Meet your instructor: Carson Block

- Who I am
- What I believe
- What I do

We want you to be successful!

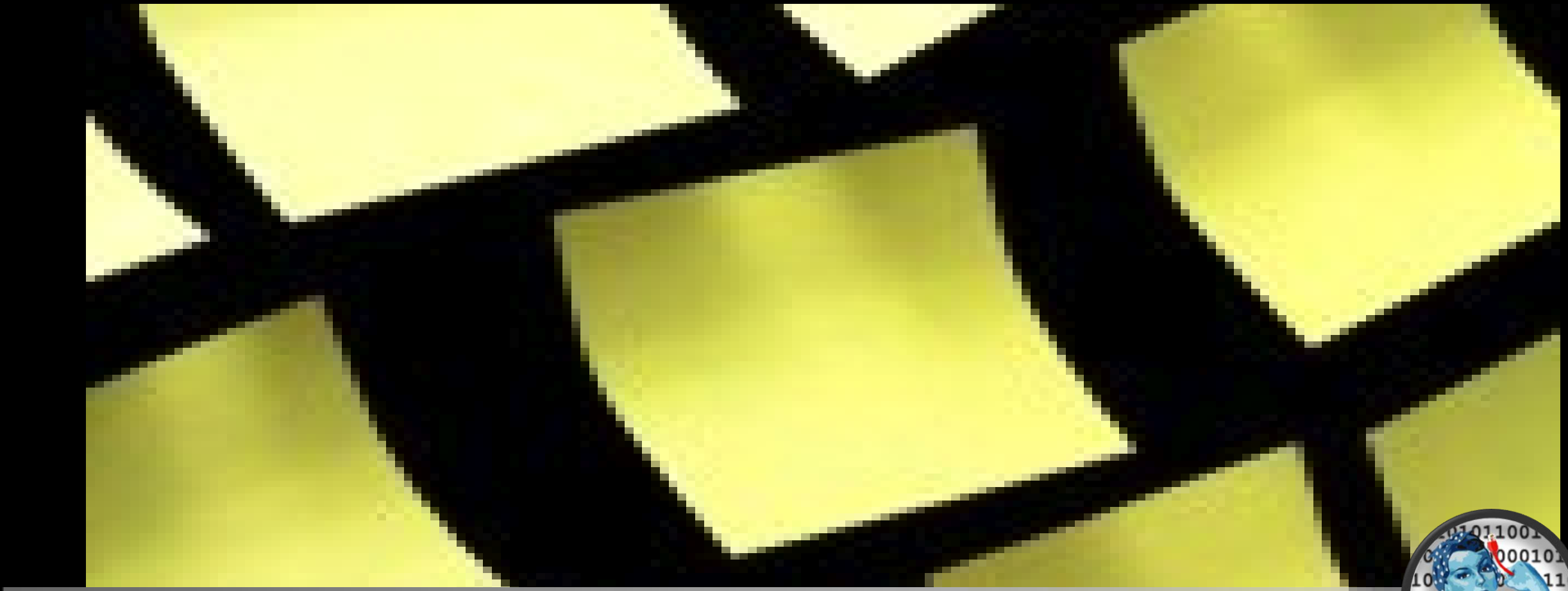
Icebreaker

- Tell us who you are, where you are from, and a little about your library job!
- Tell us about your worst and best experience with technology!

Get ready to engage

- Show and Tell
- Hands on
- Interactive!
- Collaborative
- Conversational
- Safe to explore
- Take comfort breaks when needed

Your thought collector



Workshop Schedule

9:00-11:30 AM	Section I: Network Hardware, Cabling and Internet Service Providers (ISPs)
11:30-12:45 PM	Lunch Break (On Own)
12:45-4:45 PM	Section II: Networking Configuration and Security Skills

Handouts

- Glossary of Common I.T. Terms
- Broadband Tips
- Morning Quiz (“First Quiz”)
- Basic WiFi Router Setup Guide
- Simple Network Diagram
- Segmented Network Diagram
- Afternoon Quiz (“Final Quiz”)
- Take-Home Checklist

Section I: Network Hardware, Cabling and Internet Service Providers (ISPs)

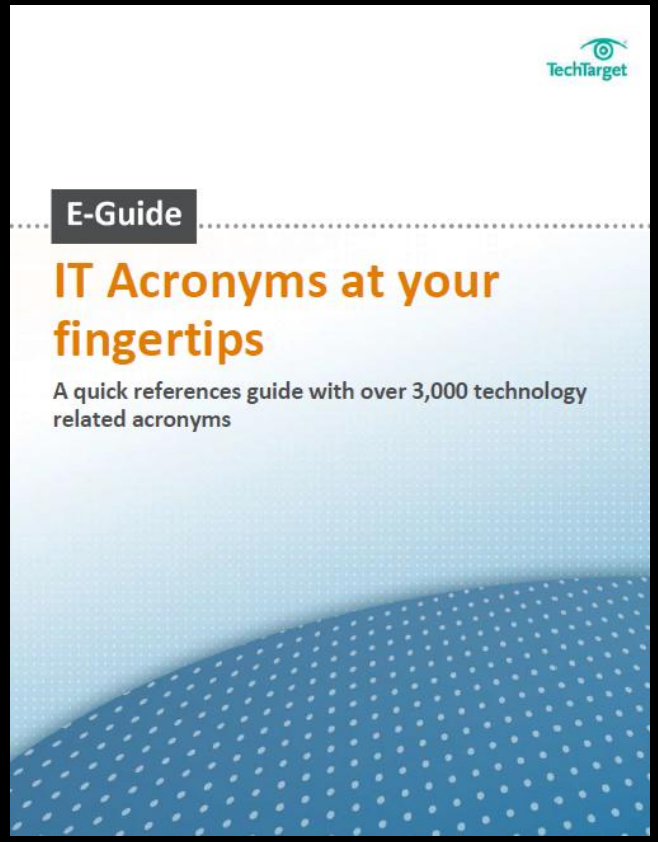
Section I Outline

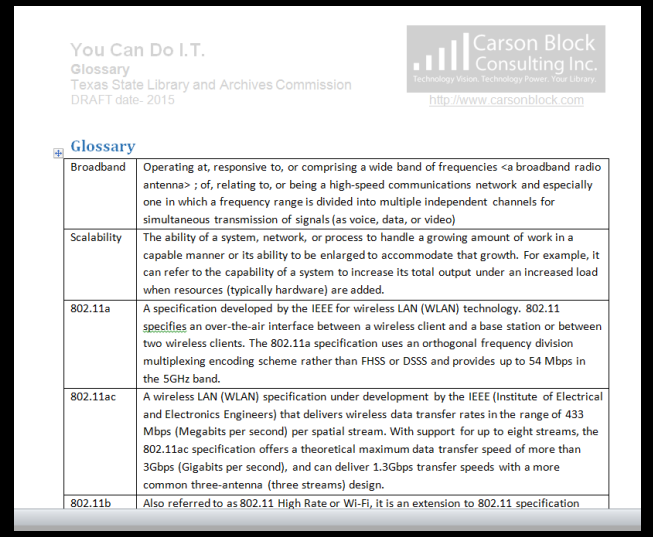
- Alphabet Soup – Technology Edition!
- Broadband – Options and Availability
- Speed Check!
- Break
- Network Spaghetti – Hardware and Functions
- Geek Out: TCP/IP and why UC (U Care :0)
- Quiz

Alphabet Soup—Technology Edition!

Alphabet Soup—Technology Edition!

- Two glossaries:
  - Terms used in this class (for use now)
  - The big “phone book” of IT acronyms (for use later)




You Can Do I.T.
Glossary
Texas State Library and Archives Commission
DRAFT date- 2015
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Glossary

Broadband	Operating at, responsive to, or comprising a wide band of frequencies <a broadband radio antenna> ; of, relating to, or being a high-speed communications network and especially one in which a frequency range is divided into multiple independent channels for simultaneous transmission of signals (as voice, data, or video)
Scalability	The ability of a system, network, or process to handle a growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth. For example, it can refer to the capability of a system to increase its total output under an increased load when resources (typically hardware) are added.
802.11a	A specification developed by the IEEE for wireless LAN (WLAN) technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. The 802.11a specification uses an orthogonal frequency division multiplexing encoding scheme rather than FHSS or DSSS and provides up to 54 Mbps in the 5GHz band.
802.11ac	A wireless LAN (WLAN) specification under development by the IEEE (Institute of Electrical and Electronics Engineers) that delivers wireless data transfer rates in the range of 433 Mbps (Megabits per second) per spatial stream. With support for up to eight streams, the 802.11ac specification offers a theoretical maximum data transfer speed of more than 3Gbps (Gigabits per second), and can deliver 1.3Gbps transfer speeds with a more common three-antenna (three streams) design.
802.11b	Also referred to as 802.11 High Rate or Wi-Fi, it is an extension to 802.11 specification

Alphabet Soup—Technology Edition!

Please take a look at the glossary.

(hint: you may want to page through and skim first)

- Do you see any terms you are familiar with?
- How about terms that are new to you?

Broadband – Options and Availability

BROADBAND.GOV

Why are we taking this class? :0)

What is “Broadband?” It’s Fast!

broadband

adjective | broad·band | \ˈbrȯd-ˌband\

Definition of BROADBAND

1 : operating at, responsive to, or comprising a wide band of frequencies <a *broadband* radio antenna>

2 : of, relating to, or being a high-speed communications network and especially one in which a frequency range is divided into multiple independent channels for simultaneous transmission of signals (as voice, data, or video)

— **broadband** | *noun*

Merriam-Webster

What is "Broadband?" It's Fast!

- Broadband is the word used to, generally speaking, describe high-speed telecommunications and, more specifically, high-speed internet.
- In January the FCC determined that a broadband connection is at least 25 Mb/sec

Why is faster broadband desirable?

How can I choose the broadband speed for my library?

Two Key Factors:

- What is available in your area? (more on that in a bit)
- What can you afford? (and don't forget E-Rate!)

EDGE Formula Calculator: http://impact.ischool.uw.edu/calc.html

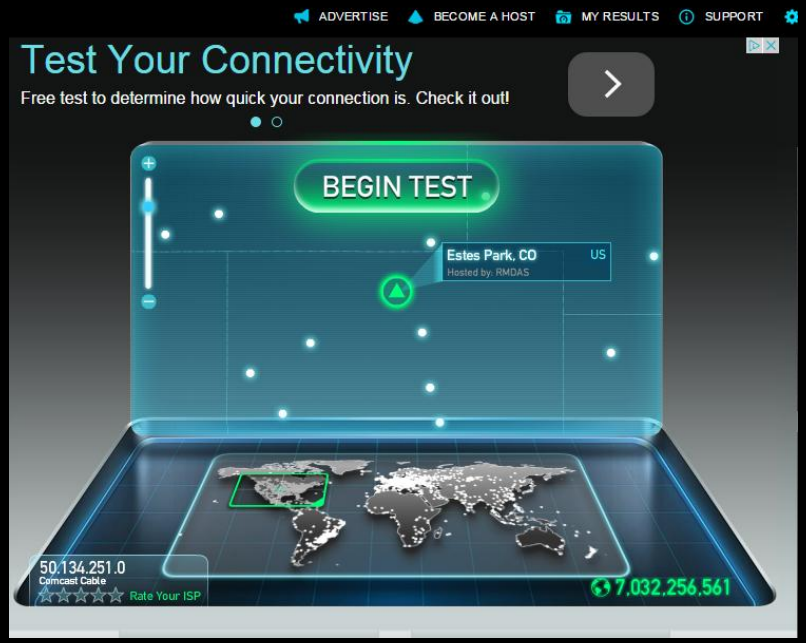
How is speed measured? (And what do you mean by “big pipe” Internet?)

- Bits per second (bps) - slooooooow
- Kilobits per second (kbps) – dial up modem speed
- Megabits per second (Mbps) – “Broadband”
- Gigabits per second (Gbps) – Fast (think the Google Fiber project in Austin).

Hands on: How can I check my speed?

http://www.speakeasy.net/speedtest/

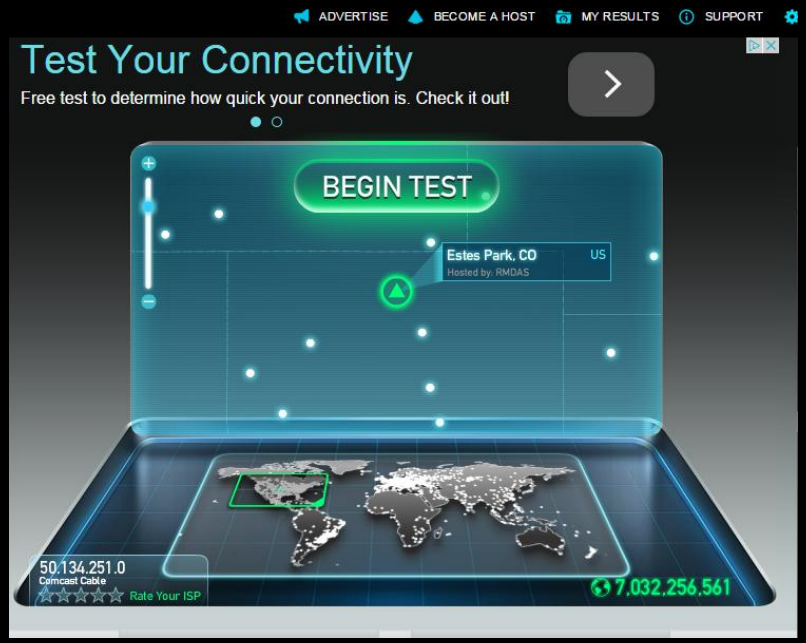
http://www.speedtest.net/



Hands on Speed test: 1 user vs. many users

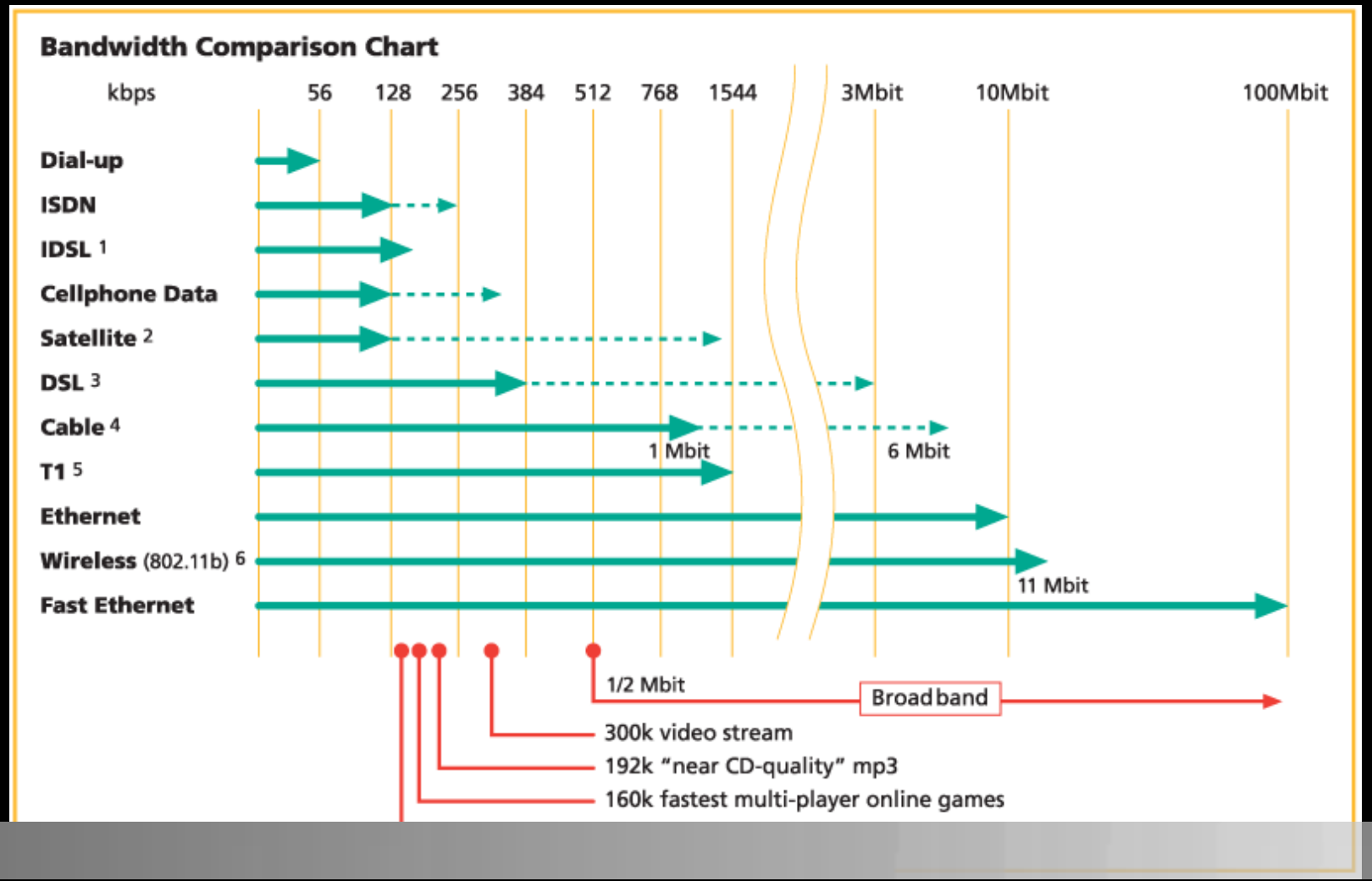
http://www.speakeasy.net/speedtest/

http://www.speedtest.net/



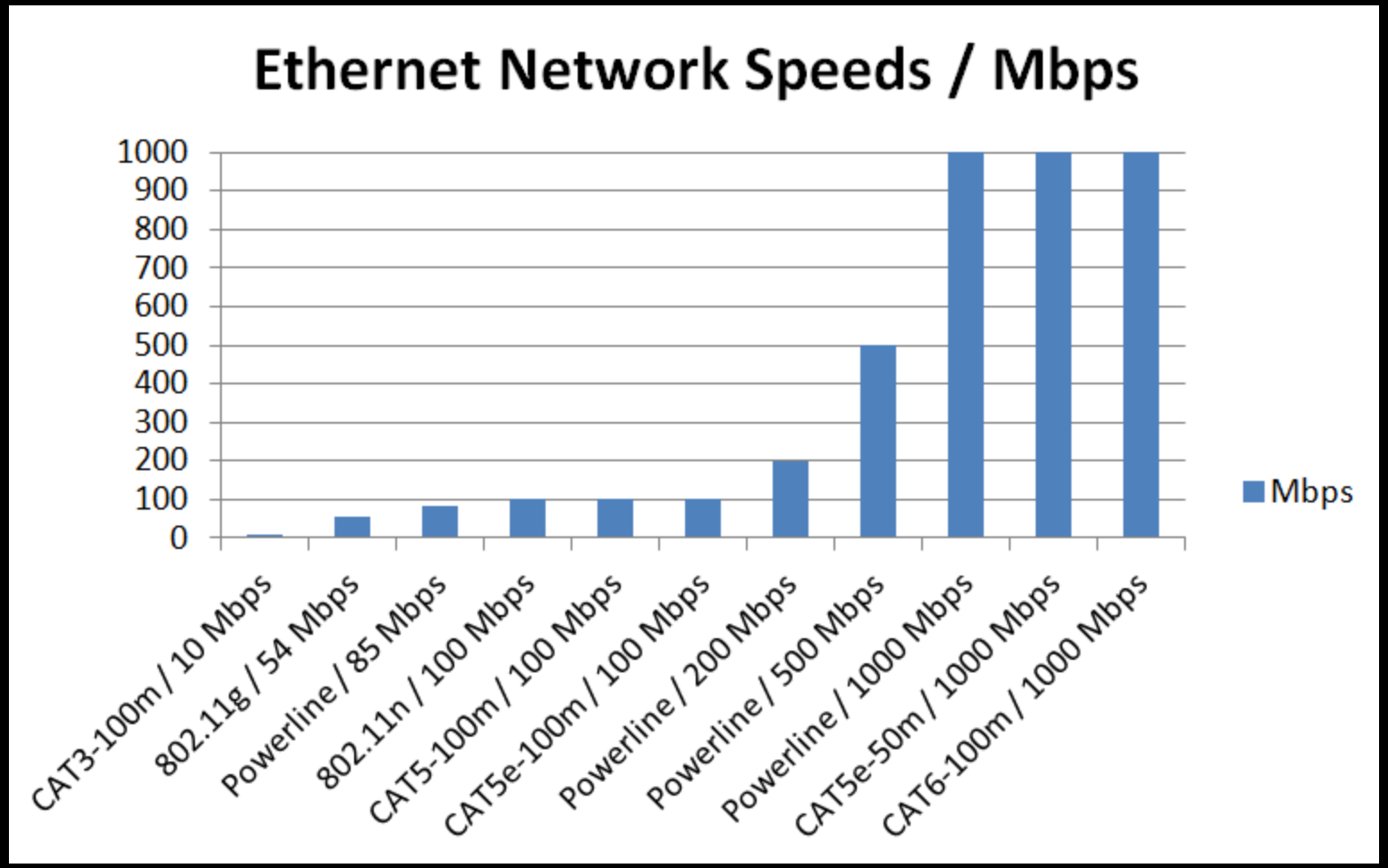
Handout: Broadband Tips

Comparisons of Internet Speeds*



This chart is slightly outdated (does not account for Gig Ethernet or 4G Wireless) but provides a basis to understand where we started…

Comparison of Ethernet Speeds



Comparison of “cell” Wireless Generations

Generation	Speed	Technology	Features
2G	9.6/14.4 kbps	TDMA, CDMA	2G capabilities are achieved by allowing multiple users on a single channel via multiplexing. 2G enabled mobile phones can be used for data along with voice communication.
3G	3.1 Mbps (peak) 500-700 Kbps	CDMA 2000 (1XRTT, EVDO) UMTS, EDGE	3G provides amazing internet browsing speeds. Opens the door to a whole bag of oppurtunities with video calling, video streaming, etc. In 3G, universal access ad portability across different device types are made possible. (Telephone & PDA's)
3.5G	14.4 Mbps (peak) 1-3 Mbps	HSPA	3.5G supports even higher speeds and enhances higher data needs.
4G	100-300 Mbps (peak) 3-5 Mbps	WiMAX LTE	Speeds for 4G are increased to lightning fast in order to keep up with data access demand used by various services. It also supports HD streaming. HD phones can be fully utilized on a 4G network.

How much bandwidth (or speed) do we need?
The answer is always “more.”

MORE
MORE
MORE

What is “Scalability,” and why does it matter?

scalable

adjective | scal·able | \'skā-lə-bəl\

: easy to make larger, more powerful, etc.

Beat your friends at SCRABBLE® with our official **Word Finder Tool** »

Full Definition of SCALABLE

1 : capable of being scaled

2 : capable of being easily expanded or upgraded on demand <a *scalable* computer network>

— scal·abil·i·ty | \ˌskā-lə-ˈbi-lə-tē\ | *noun*

What is an Internet Service Provider (ISP)?

Noun \ˈin-tər-ˌnet\ \ˈsər-vəs\ \prə-ˈvī-dər\

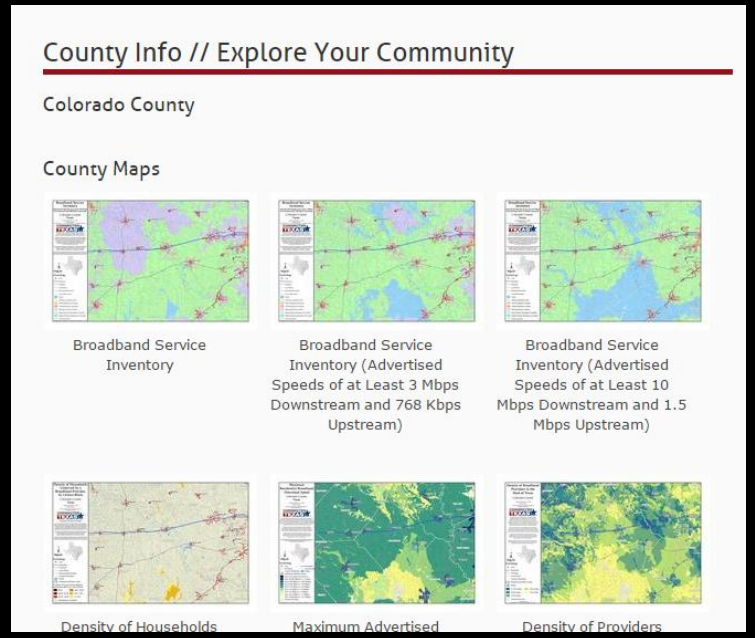
: An organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

What are the different types on Internet Connections available?

Typical connections available to libraries include:

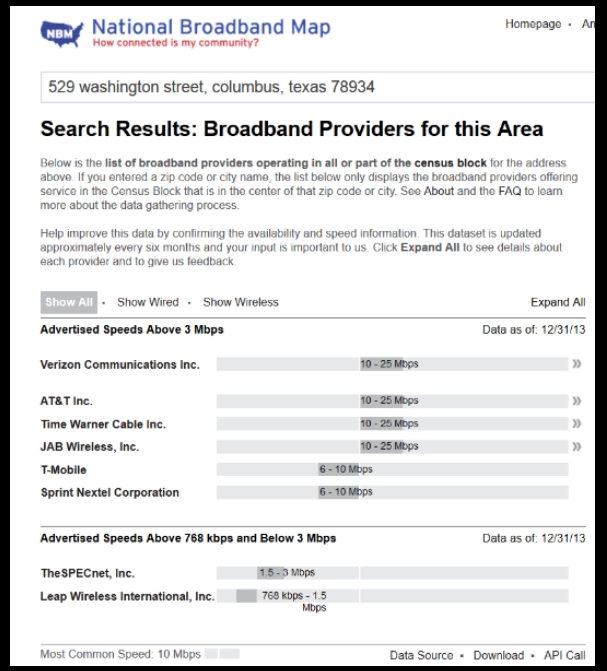
- Municipal or school connection (Government)
- Telephone Company (Dedicated circuit or Digital Subscriber Line – DSL
- Cable Company
- Wireless - “WiFi” or shortwave
- Satellite (mostly just in rural areas

Hands On: How do I Find Broadband?



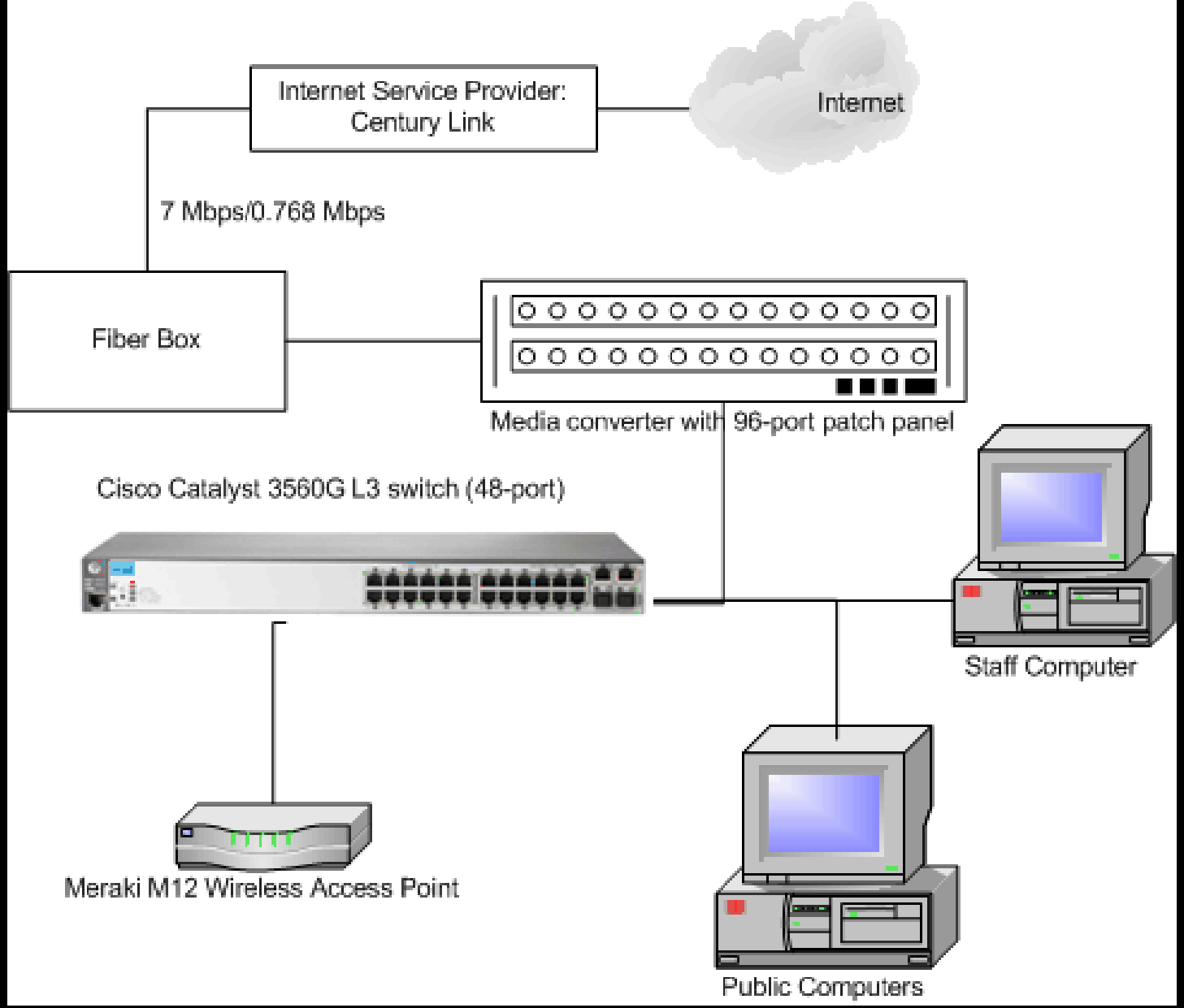
- http://www.connectedtx.org/

http://broadbandmap.gov/



Network Spaghetti – Hardware and Functions

Simple Network Diagram



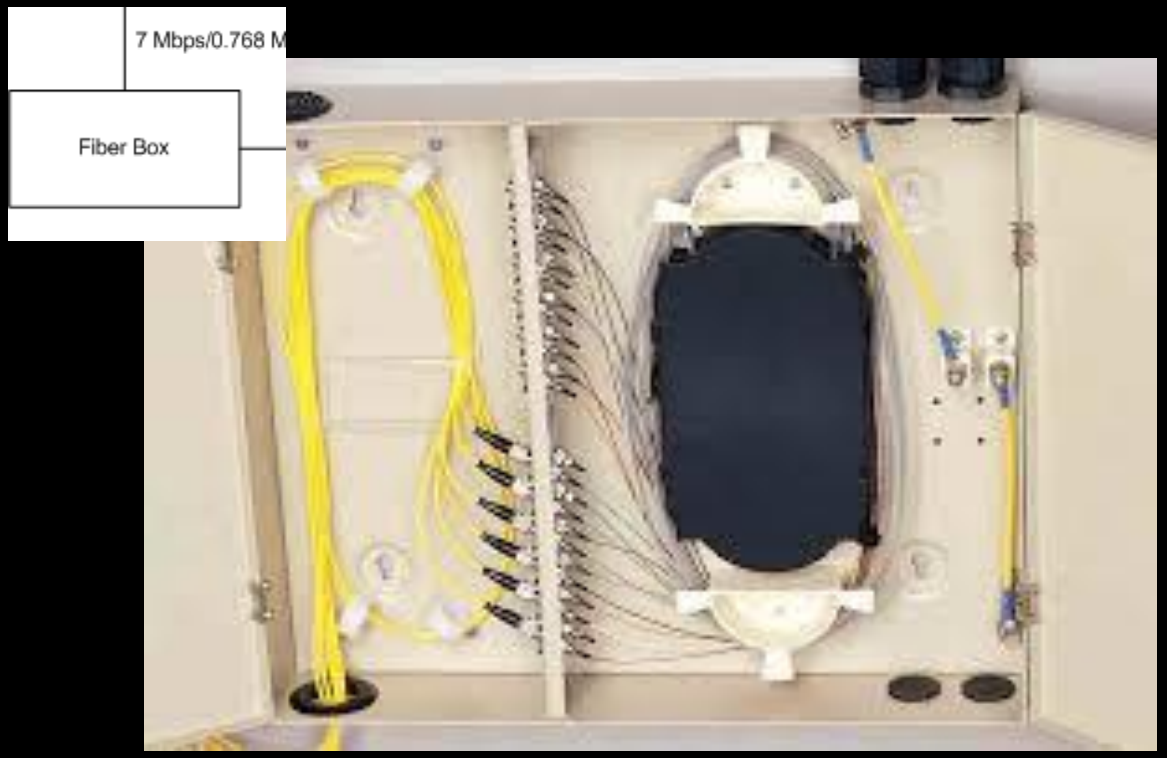
A diagram of your network is essential for you and others to see something is mostly invisible to the naked eye – the route your data travels.

Many networks share similarities, but few are exactly the same.

Let’s draw a network together as we go….

The Internet (a.k.a. “The Cloud”)

Fiber Box



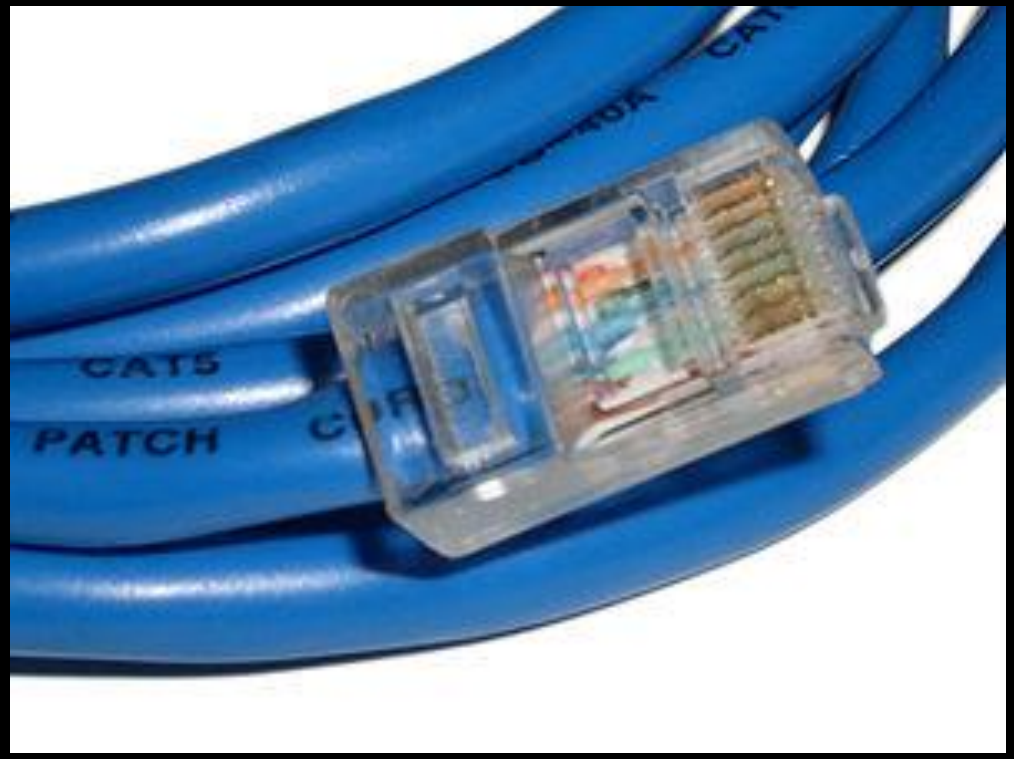
- From Wikipedia: First developed in the 1970s, fiber-optic communication systems have revolutionized the telecommunications industry and have played a major role in the advent of the Information Age. Because of its advantages over electrical transmission, optical fibers have largely replaced copper wire communications in core networks in the developed world. Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals.

Ethernet

Noun \ˈē-thər-ˌnet\

: a computer network architecture consisting of various specified local-area network protocols, devices, and connection methods

Category 5 Cable (Cat 5)



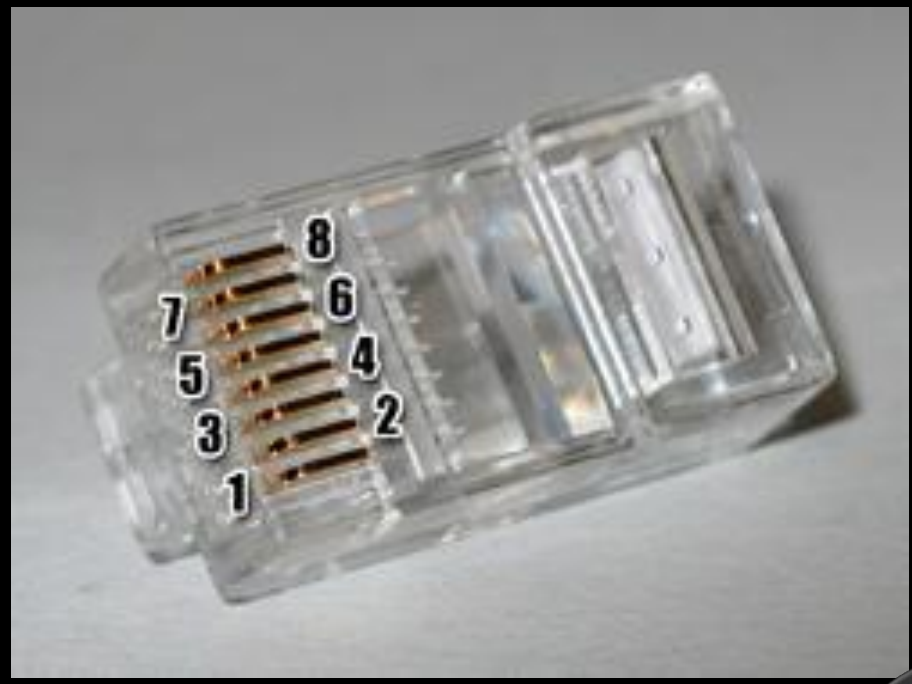
Cat 5 is a twisted pair cable for carrying signals. This type of cable is used in structured cabling for computer networks such as Ethernet. The cable standard provides performance of up to 100 MHz and is suitable for 10BASE-T, 100BASE-TX (Fast Ethernet), and 1000BASE-T (Gigabit Ethernet). Cat 5 is also used to carry other signals such as telephony and video.

Category 5e Cable (Cat 5e)

The category 5e specification improves upon the category 5 specification by tightening some crosstalk specifications and introducing new crosstalk specifications that were not present in the original category 5 specification. The bandwidth of category 5 and 5e is the same – 100 MHz. The differences between category 5 and category 5e are in their transmission performance. Category 5e components are most suitable for a high-speed Gigabit Ethernet. While category 5 components may function to some degree in a Gigabit Ethernet, they perform below standard during high-data transfer scenarios.

Category 6 Cable (Cat 6)

Cat 6 cable is a standardized cable for Gigabit Ethernet and other network physical layers that is backward compatible with the Category 5/5e and Category 3 cable standards. Compared with Cat 5 and Cat 5e, Cat 6 features more stringent specifications for crosstalk and system noise. The cable standard provides performance of up to 250 MHz and is suitable for 10BASE-T, 100BASE-TX (Fast Ethernet), 1000BASE-T/1000BASE-TX (Gigabit Ethernet) and 10GBASE-T (10-Gigabit Ethernet).



Wireless Access Point (AP)

Noun \ˈwī(-ə)r-ləs\ \ˈak-ˌses\ \ˈpȯint\

: a device that allows wireless devices to connect to a wired network using Wi-Fi, or related standards. The AP usually connects to a router (via a wired network) as a standalone device, but it can also be an integral component of the router itself.

What is a Switch?

Noun \ˈswich\

: a network switch is a computer networking device that connects devices together on a computer network, by using packet switching to receive, process and forward data to the destination device.

Syn: switching hub; bridging hub; MAC bridge

“Endpoint”

Noun \’*end*\ \ˈ*pȯint*\

: anything that attached to the network, including PC, laptop, tablet, phone, ipod, etc.

Geek Out: TCP/IP and why UC (U Care :0)

Transmission Control Protocol/Internet Protocol (TCP/IP)

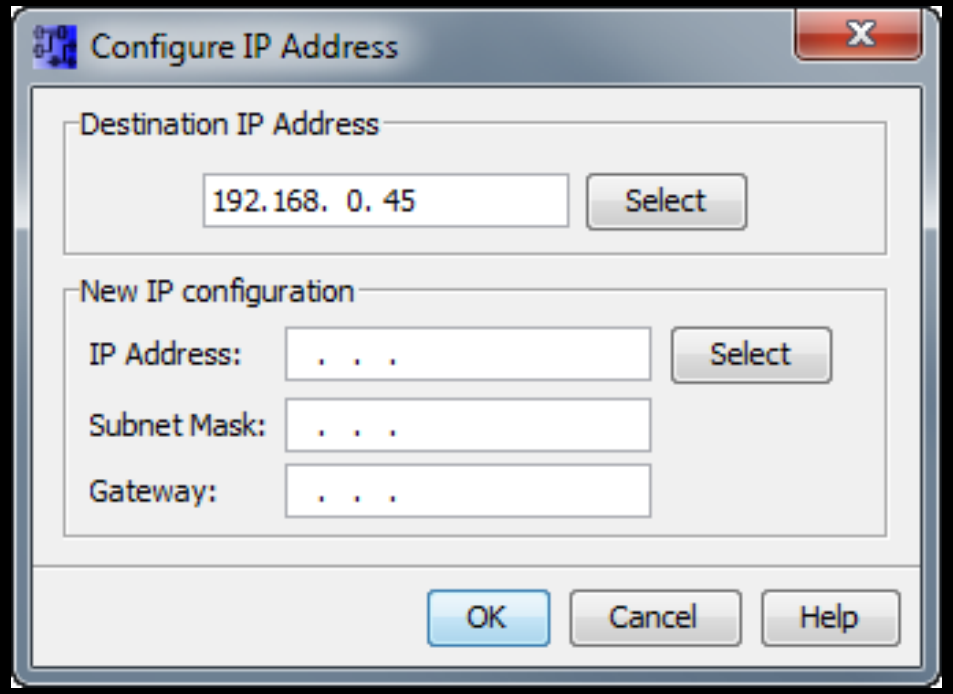
Noun \TCP\ \'IP\

: the suite of communications protocols used to connect hosts on the Internet. TCP/IP uses several protocols, the two main ones being TCP and IP. TCP/IP is built into the UNIX operating system and is used by the Internet, making it the standard for transmitting data over networks.

What is an IP Address?

Noun \I Pˈa-ˌdres\

: a unique string of numbers separated by periods that identifies each computer using the Internet Protocol to communicate over a network.



What is a Subnet Mask?

Noun \ˈsəb-ˌnet\\ˈmask\

: a mask (a filter that selectively includes or excludes certain values) used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address.

Subnetting 131.100.0.0/20
255.255.240.0

No. of Subnets = 2^4-2 = 14

No. of hosts/subnet = 2^12-2 = 4094

block size = 256 - 240 = 16

Block	Valid IP range	N/W Address	B/C address
16	131.100.16.1 - 131.100.31.254	131.100.16.0	131.100.31.255
32	131.100.32.1 - 131.100.47.254	131.100.32.0	131.100.47.255
48	131.100.48.1 - 131.100.63.254	131.100.48.0	131.100.63.255
64	131.100.64.1 - 131.100.79.254	131.100.64.0	131.100.79.255
80	131.100.80.1 - 131.100.95.254	131.100.80.0	131.100.95.255
96	131.100.96.1 - 131.100.111.254	131.100.96.0	131.100.111.255
112	131.100.112.1 - 131.100.127.254	131.100.112.0	131.100.127.255
128	131.100.128.1 - 131.100.143.254	131.100.128.0	131.100.143.255
144	131.100.144.1 - 131.100.159.254	131.100.144.0	131.100.159.255
160	131.100.160.1 - 131.100.175.254	131.100.160.0	131.100.175.255
176	131.100.176.1 - 131.100.191.254	131.100.176.0	131.100.191
192	131.100.192.1 - 131.100.207.254	131.100.192.0	131.100
208	131.100.208.1 - 131.100.223.254	131.100.208.0	131.10
		131.100.224.0	131.1

Well, uh.....?

Think of the IP address as the number on a house.

Think of the subnet mask as the name of the street the house is on.

The post office needs to know both to deliver a letter.

(Yes, this letter is from Elvis)

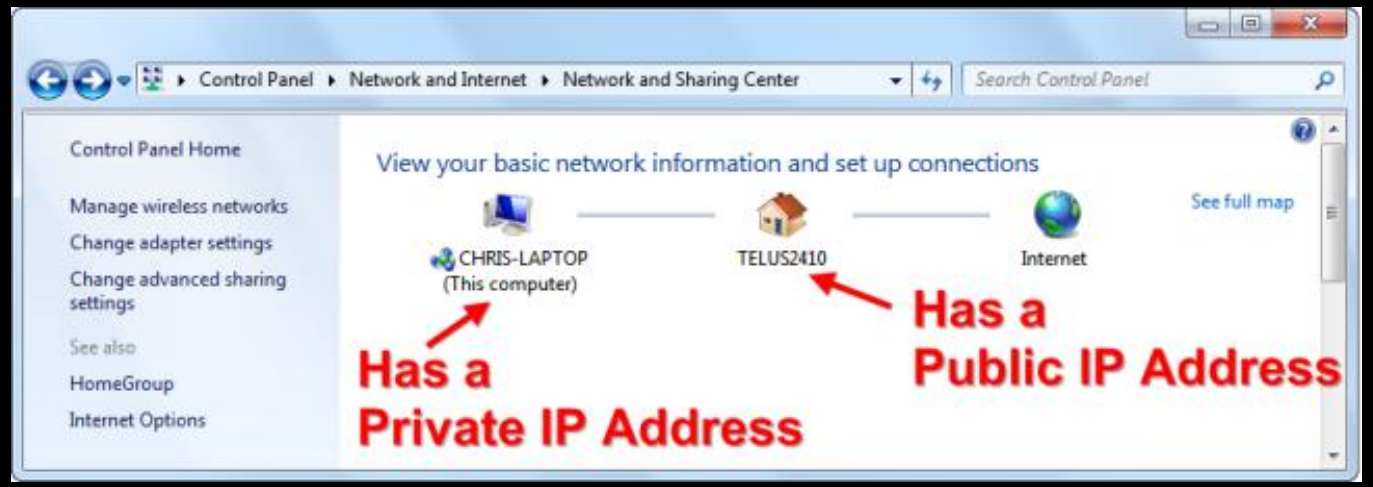
What is a gateway?

Noun \ˈgāt-ˌwā\

A gateway routes packets from a wireless LAN to another network, wired or wireless WAN. It may be implemented as software or hardware or combination of both. Wireless gateways combine the functions of a wireless access point, a router, and often provide firewall functions as well.

For our purposes today, our router *is* our gateway.

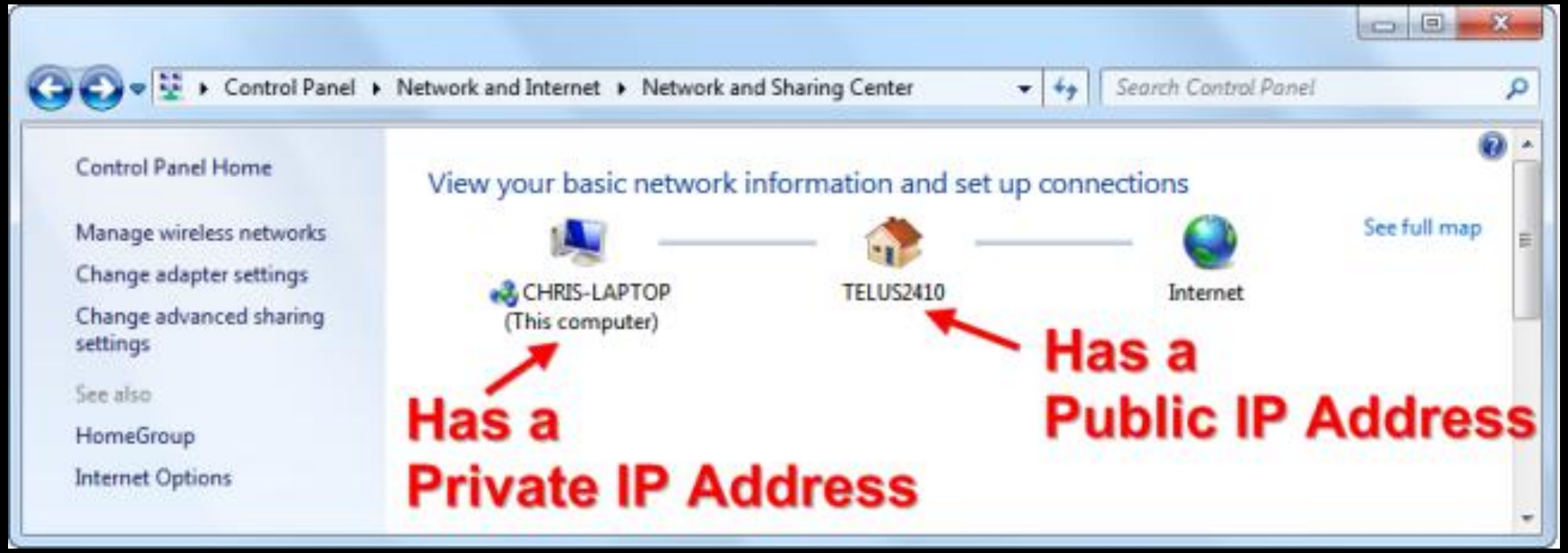
What is a “public” IP address?



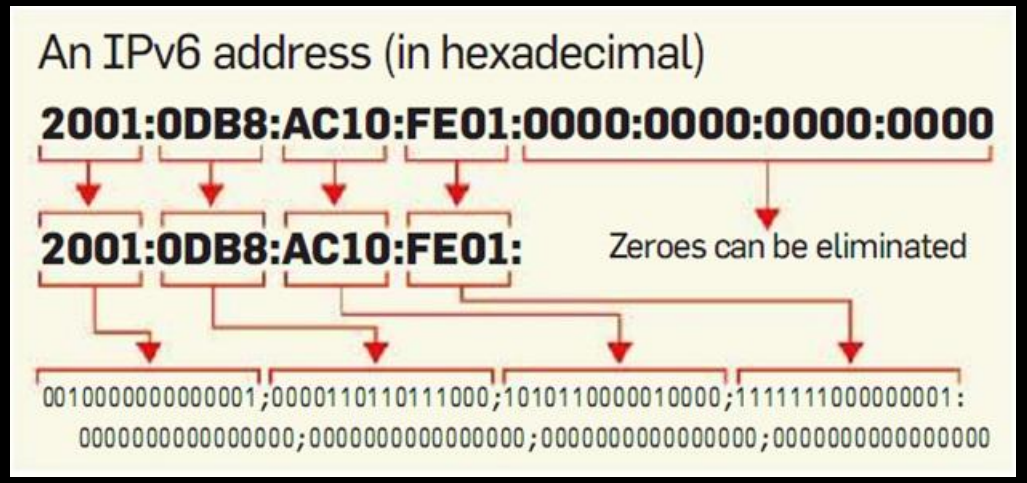
Public addresses are assigned by InterNIC and consist of class-based network IDs that are guaranteed to be globally unique to the Internet.

When the public addresses are assigned, routes are programmed into the routers of the Internet so that traffic to the assigned public addresses can reach their locations. Traffic to destination public addresses are reachable on the Internet.

Public IP address are also called “routable IPs”



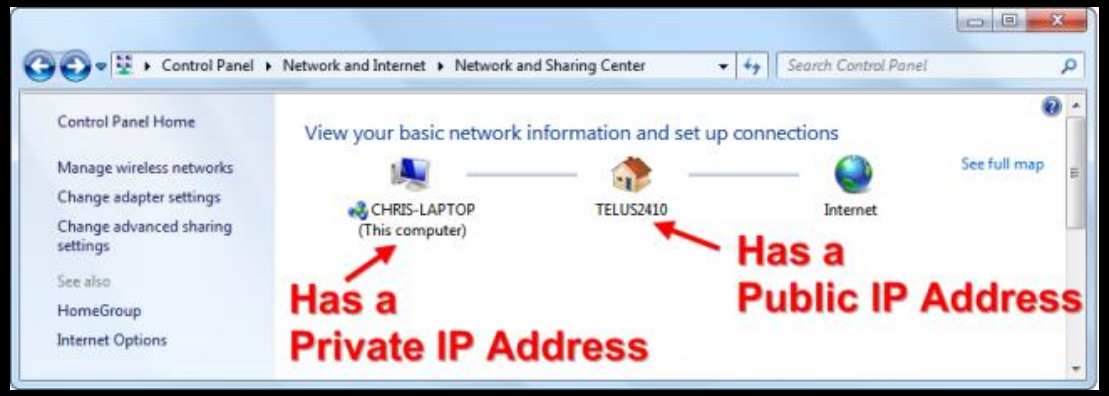
IP addresses and IPv6



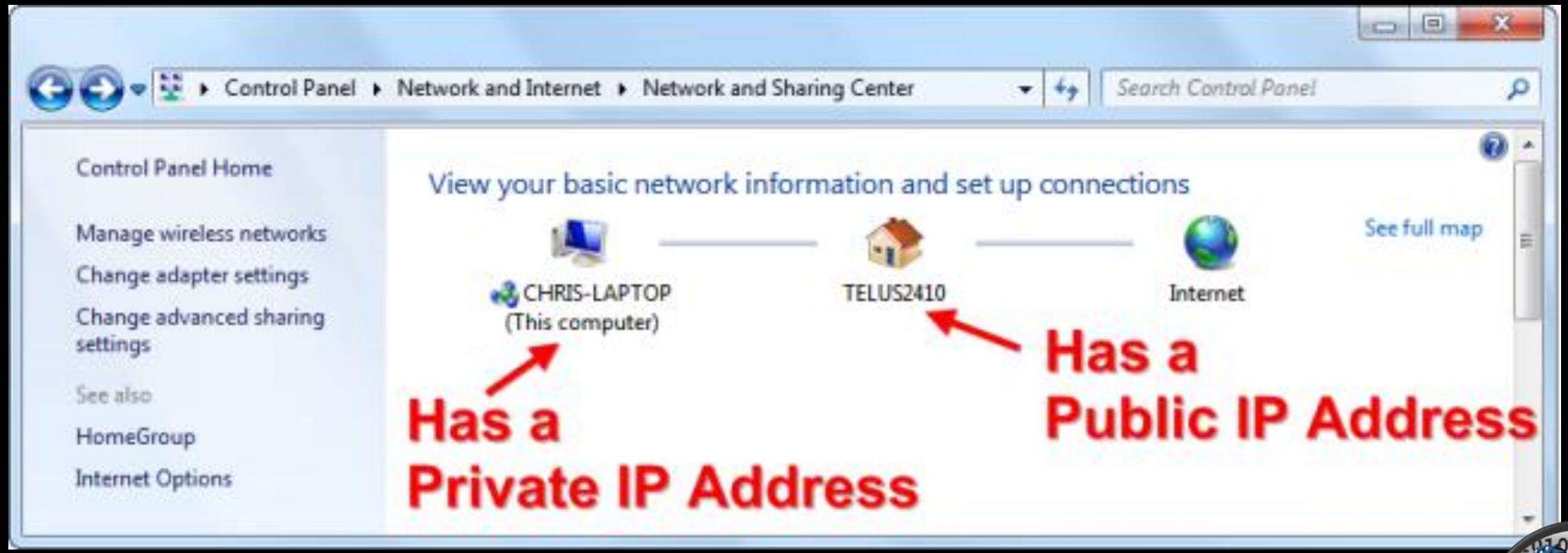
Internet Protocol version 6 (IPv6) is the latest version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet. IPv6 was developed by the Internet Engineering Task Force (IETF) to deal with the long-anticipated problem of IPv4 address exhaustion. IPv6 is intended to replace IPv4.

What is a “private” IP address?

- A private IP address is a non-Internet facing IP address on an internal network. Private IP addresses are provided by network devices, such as routers, using network address translation (NAT).

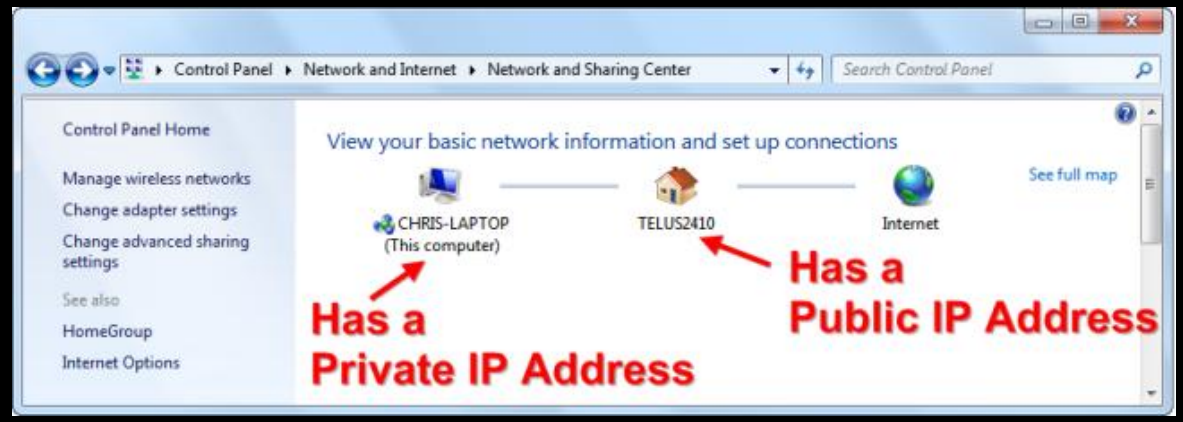


“Private” IP addresses are we most often use for our internal networks.



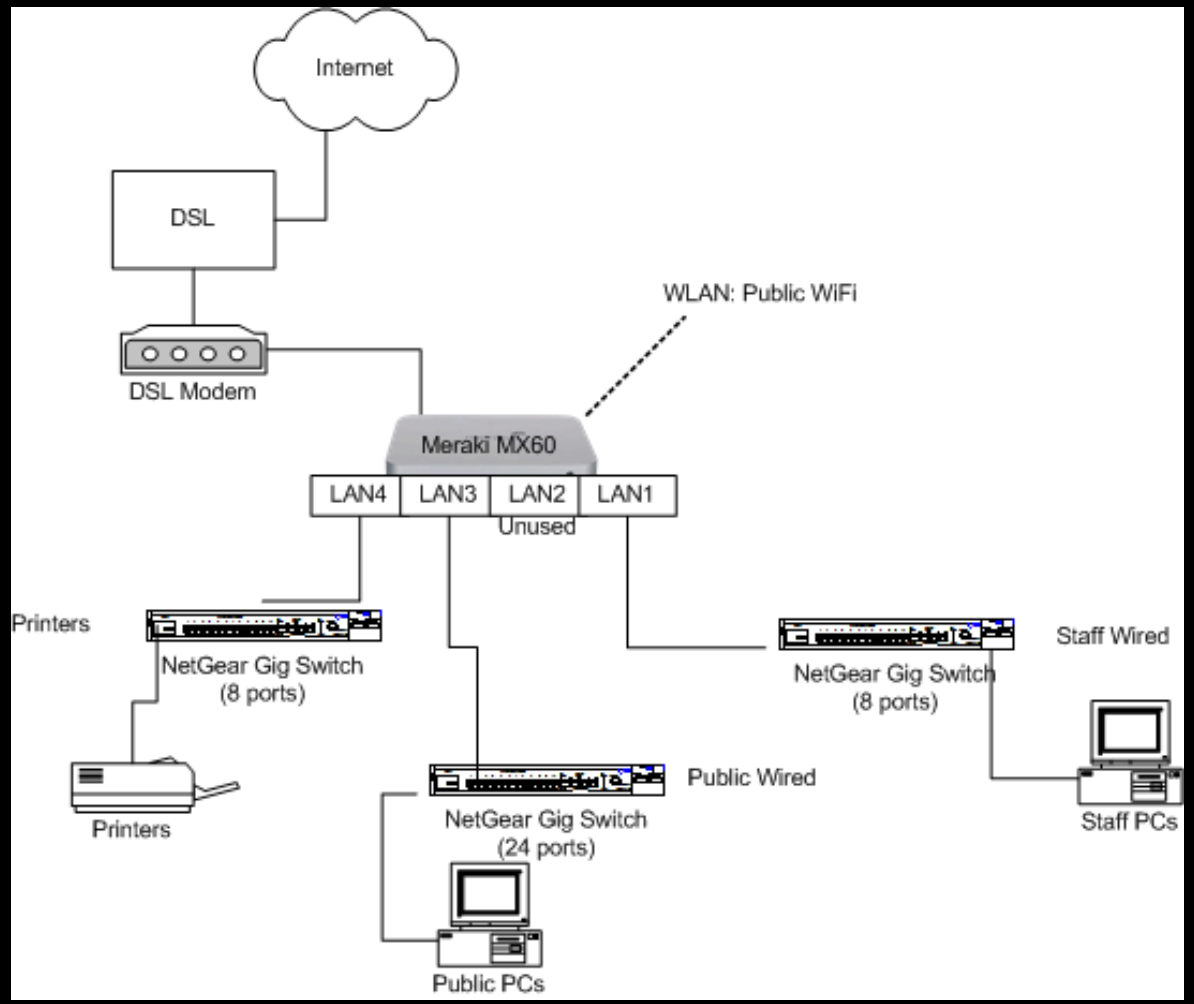
What is NAT (Network Address Translation)?

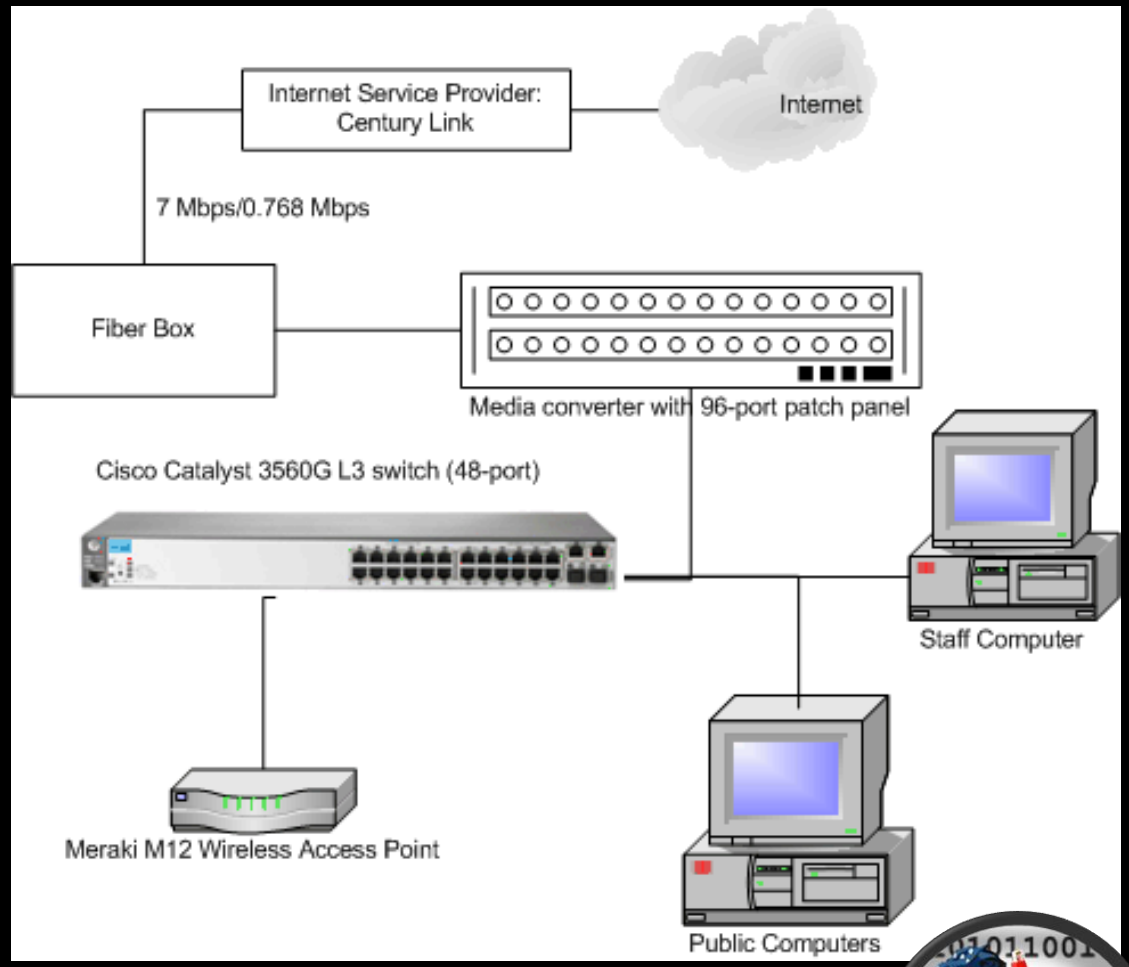
NAT (Network Address Translation or Network Address Translator) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the inside network and the other is the outside. The router or gateway provides NAT.



And why do you care? :0)

Public and Private IP addresses in action!





Krum Public Library
As of 2011

Centurylink DSL

Emberq 660 DSL Modem Gateway

Linksys E2000 Router
with Firewall

dLink WBR 1310
Wireless Access Point

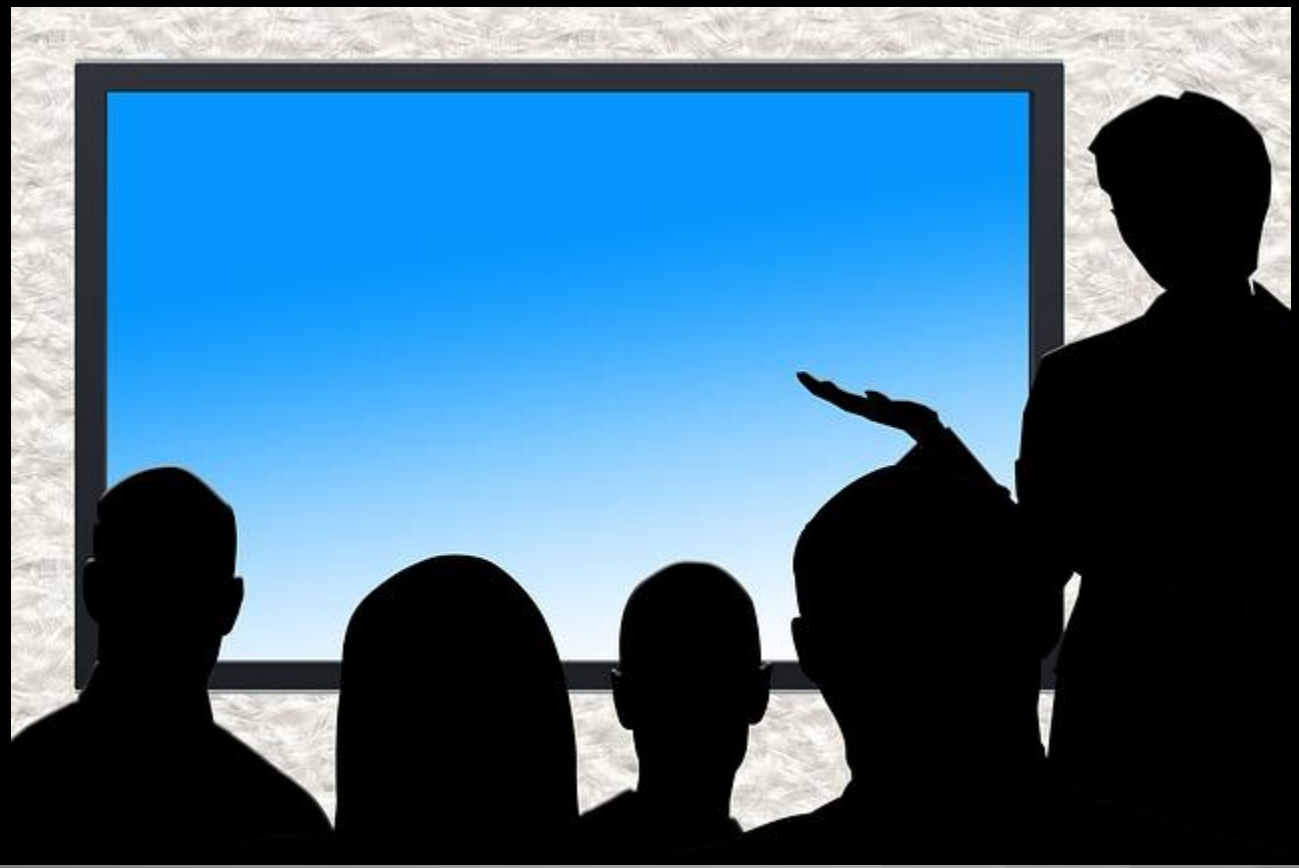
Cisco SBS SD2008
Switch

Speedstream
Public Switch

- 8 Public Computers
- 1 Children's Computer

- Server
- Printer
- 5 Staff Computers

QUIZ



Lunchtime!
Please return at 12:45

Section II: Networking Configuration and Security Skills

Section II Outline

- Invisible but Powerful: Wireless Networks
- Geek Out: Hands on with network equipment
- Sometimes Splitting Up is the Best Choice: Segmenting Networks
- Break
- Computer Security 101
- File Sharing and Backups 101
- Distribute and explain Take-Home Checklist
- Recap, Farewell and final questions
- Final Quiz

Invisible but Powerful: Wireless Networks

What is WiFi (802.11x wireless)?

802.11 and 802.11x refers to a family of specifications developed by the IEEE for wireless LAN (WLAN) technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. The IEEE accepted the specification in 1997. WiFi uses tiny radios to send and receive information.

WiFi comes in flavors?

802.11a
The Earliest “WiFi”

A specification developed by the IEEE for wireless LAN (WLAN) technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. When the 802.11a specification was created it provided a 5 Mbps connection - today it provides up to 54 Mbps in the 5GHz band.

802.11b -- Faster!

Also referred to as 802.11 High Rate or Wi-Fi, it is an extension to 802.11 specification developed by the IEEE for wireless LAN (WLAN) technology that applies to wireless LANS and provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1 Mbps) in the 2.4 GHz band. 802.11b was a 1999 ratification to the original 802.11 standard, allowing wireless functionality comparable to Ethernet.

802.11g -- even faster than b!

An extension to 802.11 specification developed by the IEEE for wireless LAN (WLAN) technology that is used for transmission over short distances at up to 54-Mbps in the 2.4 GHz bands.

802.11n – even faster (and farther) than g!

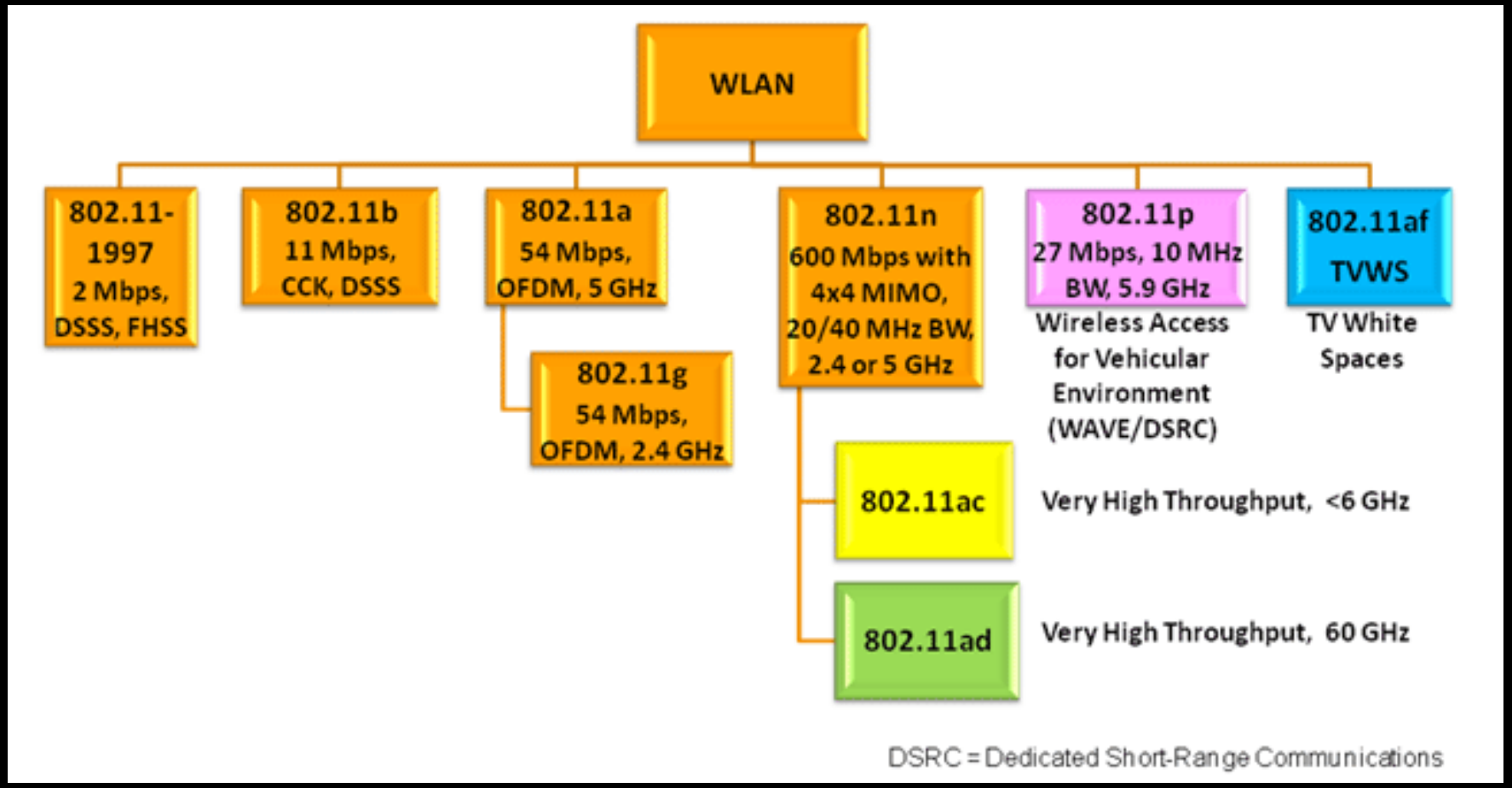
An extension to 802.11 specification developed by the IEEE for wireless LAN (WLAN) technology. 802.11n builds upon previous 802.11 standards by adding multiple-input multiple-output (MIMO). The additional transmitter and receiver antennas allow for increased data throughput through spatial multiplexing and increased range. The speed is 100 Mbit/s, and so up to 4-5 times faster than 802.11g. 802.11n also offers a better operating distance than current networks.

802.11ac – and this is the fastest (for now)!

A wireless LAN (WLAN) specification under development by the IEEE (Institute of Electrical and Electronics Engineers) that delivers wireless data transfer rates in the range of 433 Mbps (Megabits per second) per spatial stream. With support for up to eight streams, the 802.11ac specification offers a theoretical maximum data transfer speed of more than 3Gbps (Gigabits per second), and can deliver 1.3Gbps transfer speeds with a more common three-antenna (three streams) design.

802.11ac extends earlier 802.11 specifications, including 802.11n, and provides backwards compatibility with previous 802.11 specs. The 802.11ac specification operates only in the 5 GHz frequency range (where there is currently far less potential for interference), as opposed to the 802.11n spec, which operates in both 5 GHz and 2.4 GHz ranges.

WiFi comes in flavors?



What is an SSID?

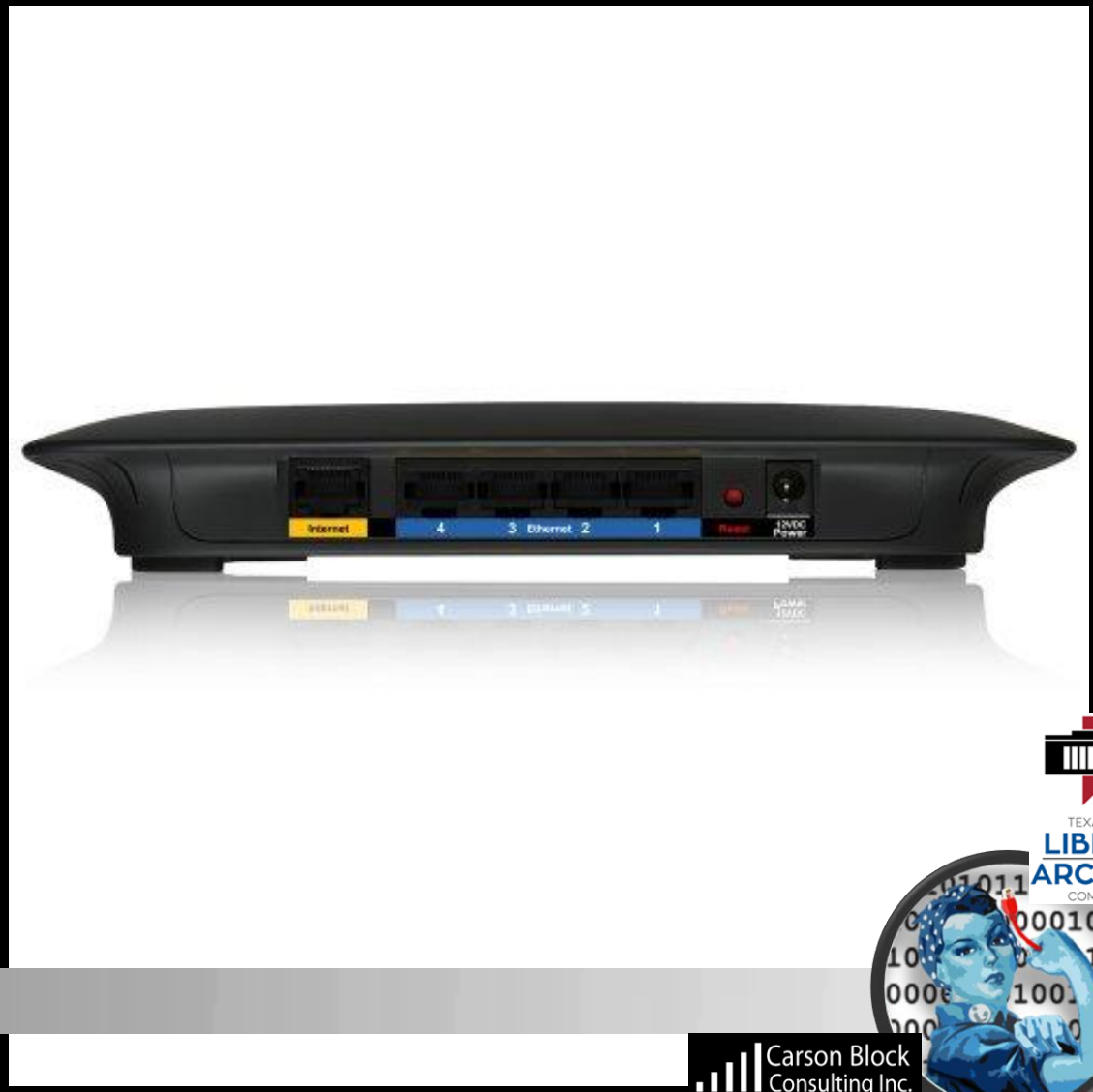
- Stands for Service Set Identifier
- It is the “name” of the wireless network that you see listed when browsing networks.
- Questions: What SSID are you using now?

WiFi Security

- Passwords for access to the WiFi Access Point
- Passwords and encryption of the connection

What about the “wired” ports on a WiFi Router?

- The “WAN” *(Wide Area Network)* or “Internet” port is special – it connects the router to the Internet!
- The other ports are available to connect wired devices to your network, including switches, PCs and other devices.



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User Authentication – Local

The Local Authentication framework provides facilities for requesting authentication from users with specified security policies. A local user record often consists of a username, the user's full name, and the user's password.

Device Authentication – MAC Address

Is used to authenticate devices based on their physical media access control (MAC) address. While not the most secure and scalable method, MAC-based authentication implicitly provides an addition layer of security authentication devices. MAC-based authentication is often used to authenticate and allow network access through certain devices while denying access to the rest. For example, if clients are allowed access to the network via station A, then one method of authenticating station A is MAC-based. Clients may be required to authenticate themselves using other methods depending on the network privileges required.

User Authentication – enterprise

This profile defines a means to establish one name per user that can be used on all of the devices and software that participate in this integration profile. It greatly facilitates centralized user authentication management and provides users with the convenience and speed of a single sign-on. User authentication is a necessary step for most application and data access operations and streamlines workflow for users.

RADIUS Server--Remote Authentication Dial-In User Service

RADIUS is often used by Internet authenticate and authorize users. It's often used in for staff WiFi in larger libraries.

A RADIUS server receives user credentials and connection information from clients and authenticates them to the network.

WiFi Security & Encryption – What and Why

How does encryption work?

https://www.youtube.com/watch?v=3QnD2c4Xovk

Types of WiFi Security

- Open is generally used for public WiFi access points (we'll talk about why in a bit)
- WEP and TKIP (also called WPA-PSK) are old and not considered secure – do not use!
- WPA2-PSK (AES) is the recommended option.
- When in doubt, talk with your tech.

Open Public WiFi

- Why do we do it?
- Is is OK?

Geek Out: Hands on with network equipment

Note On Network Configuration

- Think of this as a “sample approach” to setting up a simple network
- These instructions are specific to our activities today – they may or may not be directly applicable when using different equipment in a different environment.

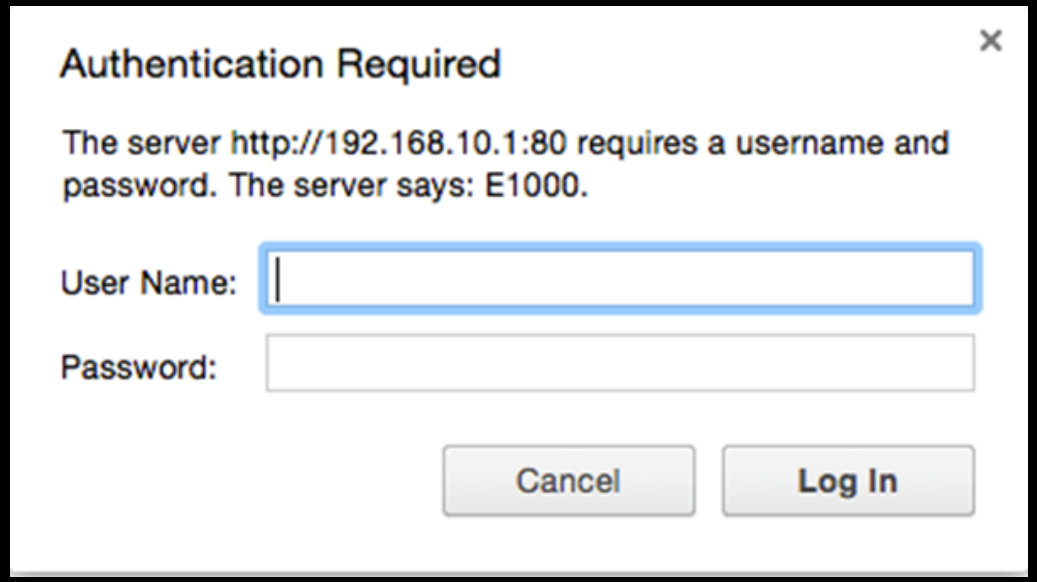
Update to Written Instructions

1. We will not be using a wired connection to the router today.
2. You will log in using a special IP address based on the router your team is using:

SSID	Gateway
CiscoRED	192.168.10.1
CiscoGREEN	192.168.20.1
CiscoYELLOW	192.168.30.1
CiscoBLUE	192.168.40.1

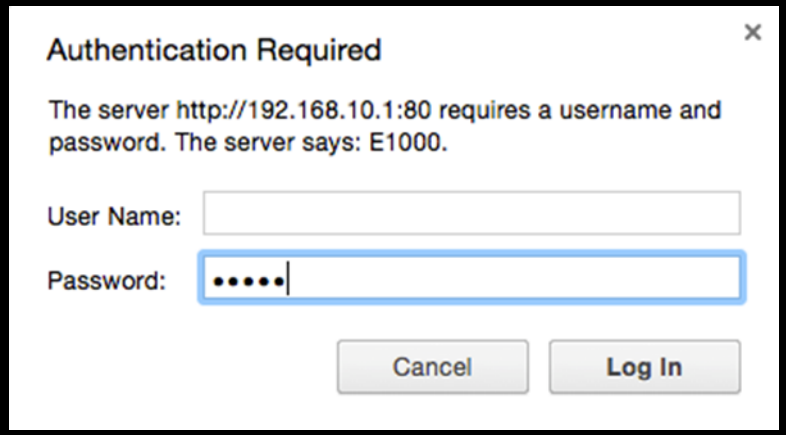
Network Configuration

1. Connect power to the router
2. Connect the library's Ethernet cable to the WAN port (this connects your router to the Internet)
3. Using another Ethernet cable, connect the laptop to one of the Ethernet ports on the router
4. Open a web browser (internet explorer, Firefox, etc.) on the laptop.
   - Log in to the router by entering 192.168.10.1 into the address bar
5. With this router, the first time you log in you will see this box:



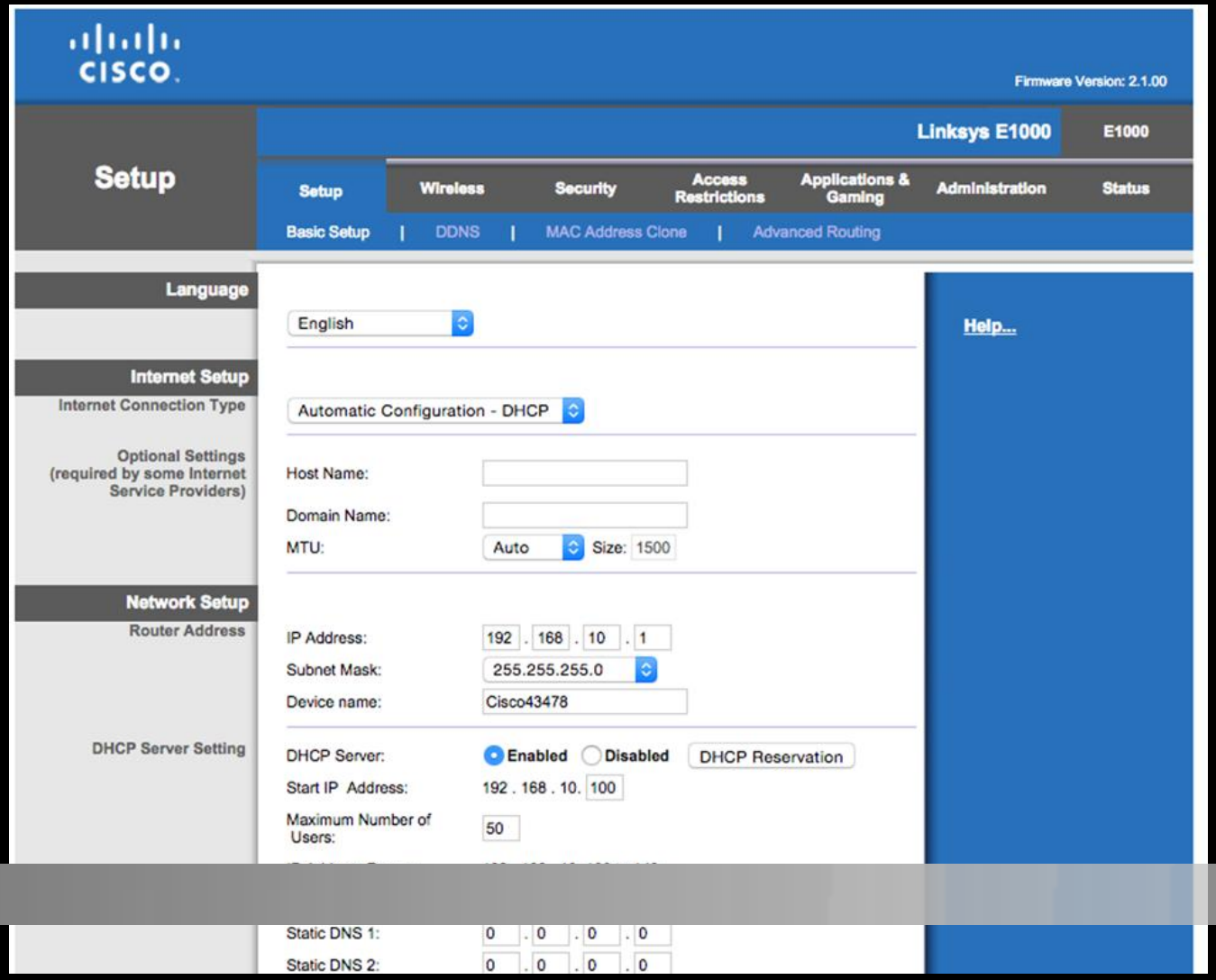
Network Configuration

For this first login, leave the username empty and type in “admin” for the password.



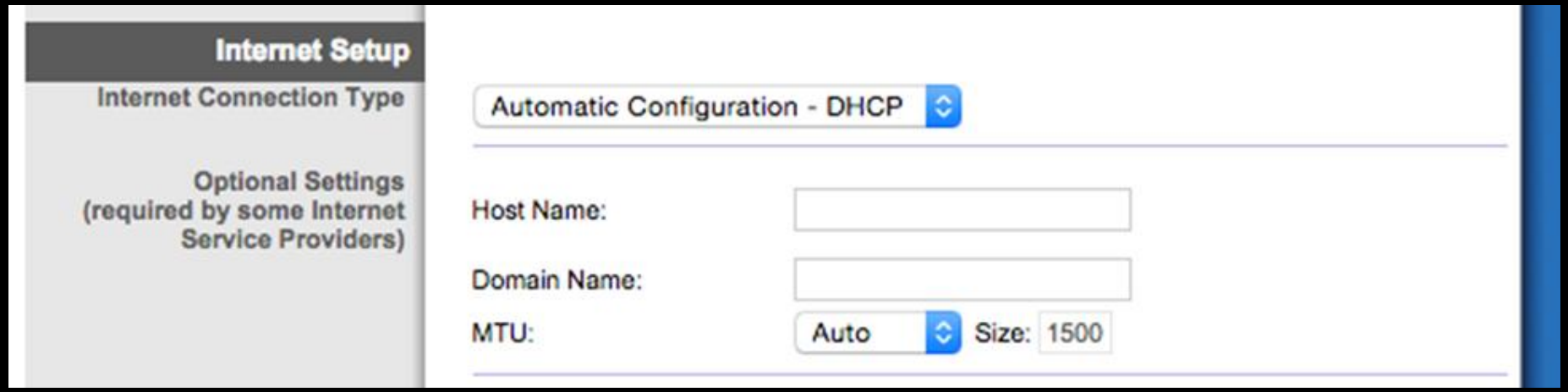
Network Configuration

This is the first screen you see



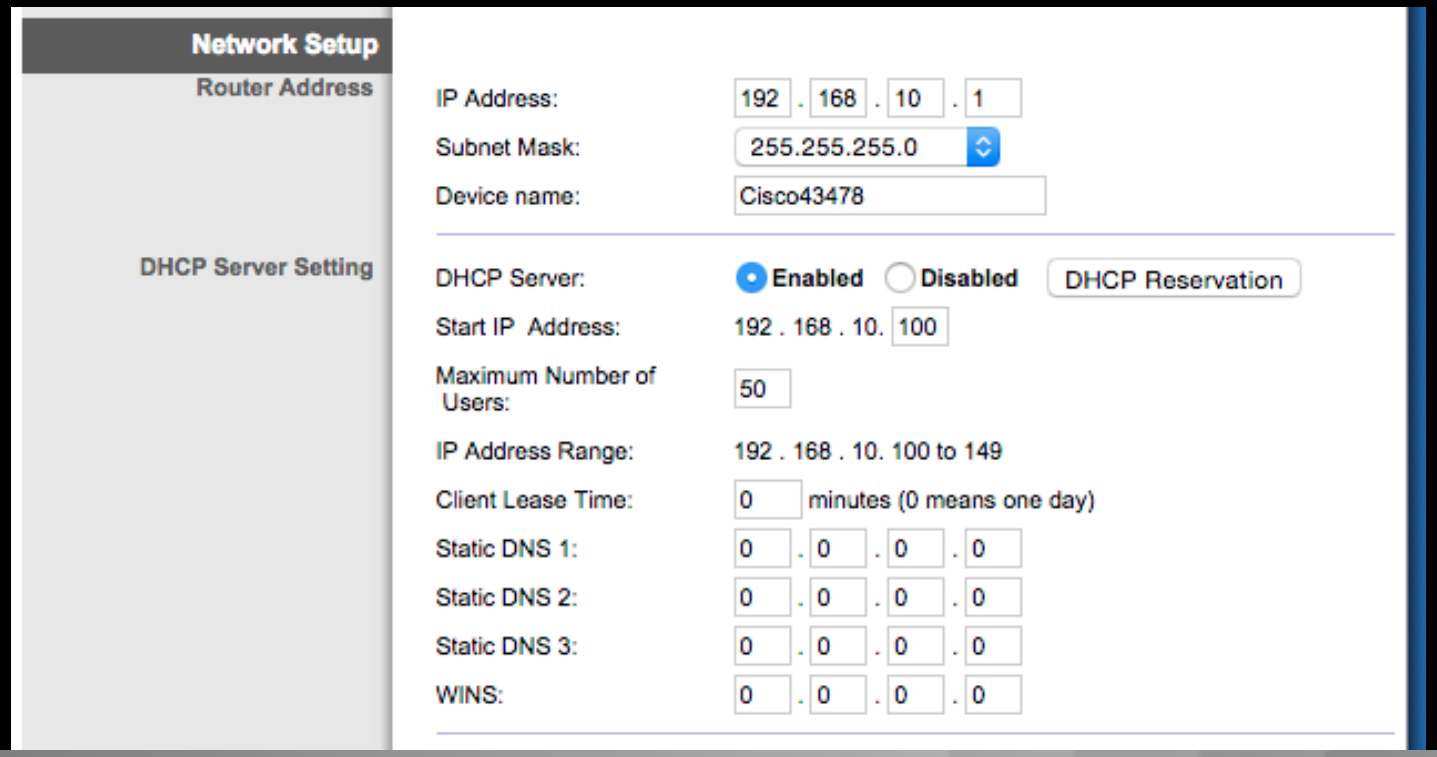
Network Configuration

This section is where you tell your router how it will get its own IP address so that it can communicate to the network. We will leave it at DHCP (dynamic host control protocol), which will allow it to get its address from an upstream DHCP server.



Network Configuration

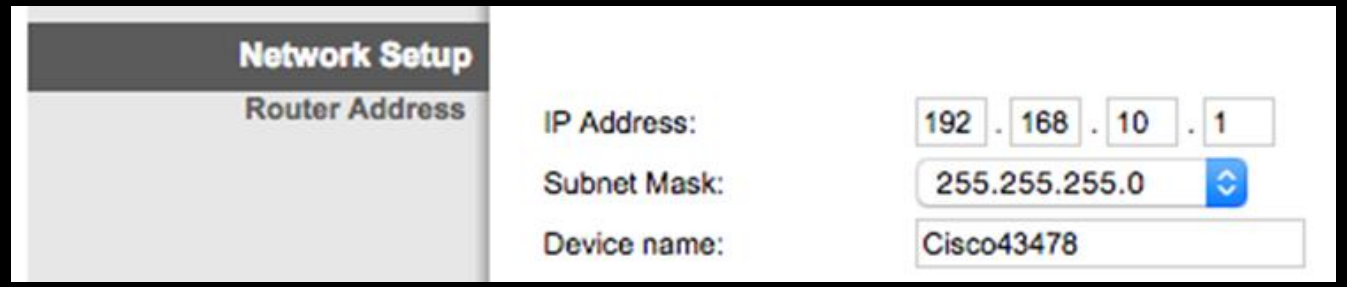
This section is where you set up your local area network (LAN).



Network Configuration

This is a very important part of the setup:

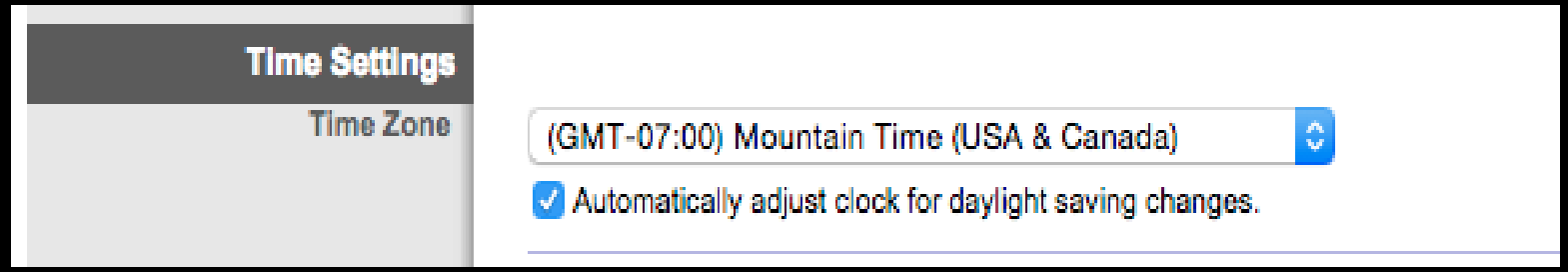
It shows the address of the router (also called the gateway) and you will notice that it is the same address you see in the location bar of your web browser! This area also contains the subnet mask and the name of the device.



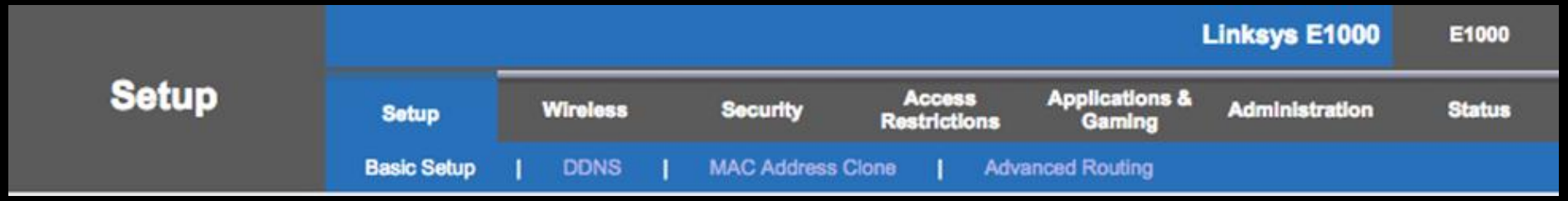
Network Configuration

Next is the DHCP server settings—this is the section that allows your router to create a local area network (LAN) using DHCP. For our purposes today, we will use the default settings, which allow us a DHCP pool of 50 addresses, starting with 192.168.10.100 and ending with 192.168.10.149. This section would also allow us to enter static DNS Servers. Since we are getting out DNS information automatically from an “upstream server” we can leave those blank for now.

Time settings—do you see anything wrong with this picture?



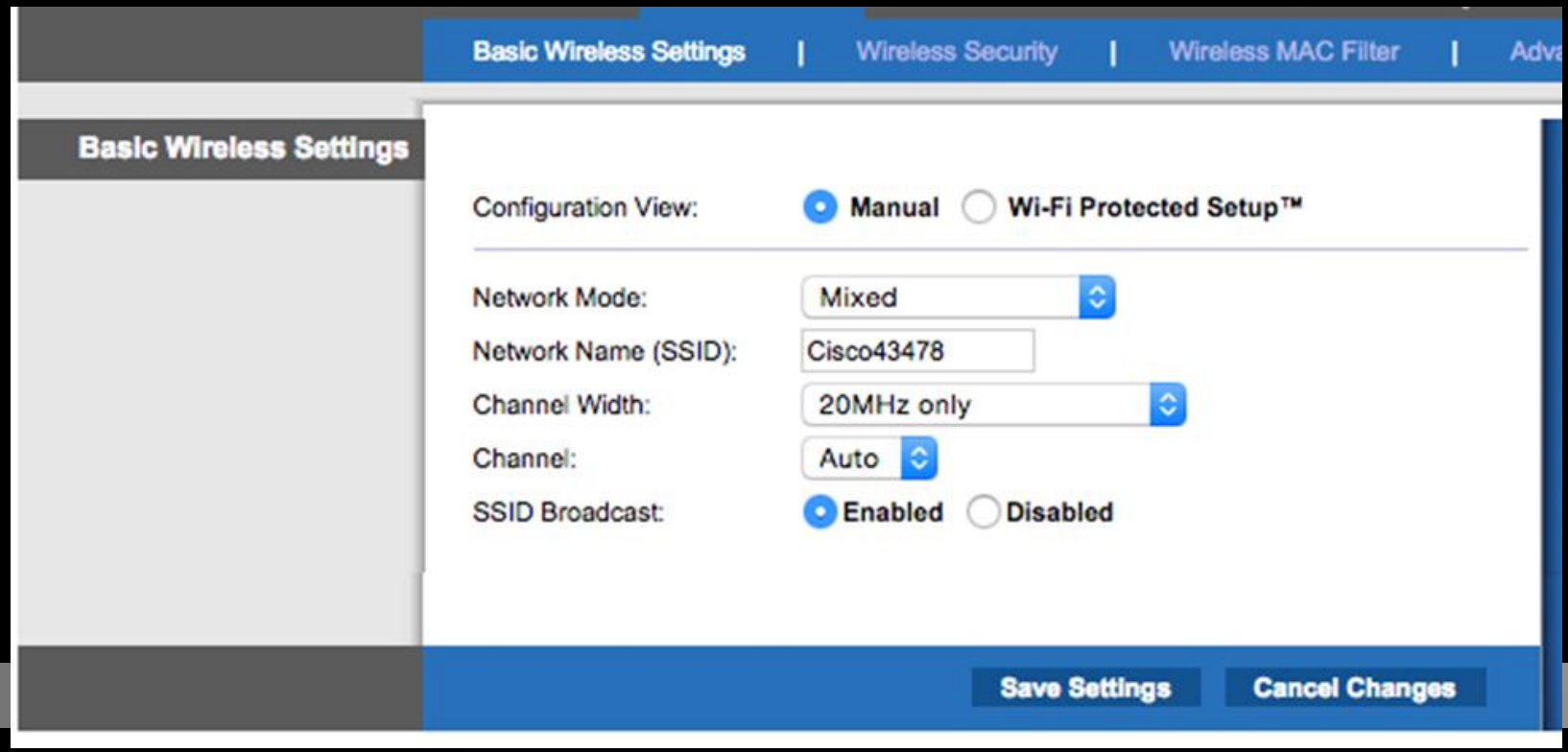
With our basic setup complete, we will now set up our wireless network.



Please notice: for each tab, there is a sub-menu of options. Under the wireless tab, we have several options.

Network Configuration

Some routers, like this one, have a simplified setup (called “WiFi Protected Setup”) that includes simplified security and other settings. For the purpose of our class, we will use manual settings.



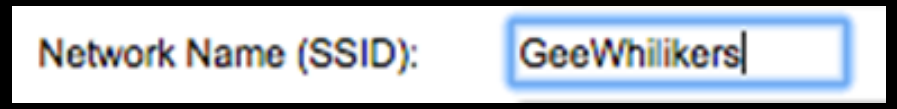
Network Configuration

Under Network Mode, we can see that this router supports several flavors of 802.11x WiFi: we want to allow all possible choices here—so we will leave it at "mixed," which will support B, G, and N.

Network Configuration

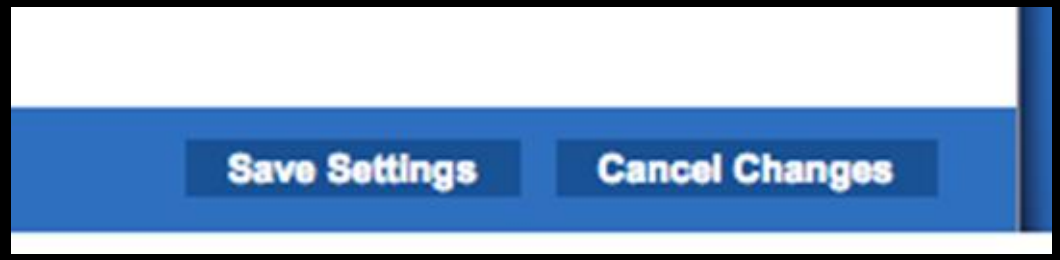
This is the default SSID—also known as the name of the wireless network. How boring!

Action Step: Let's change it to something better!



Network Configuration

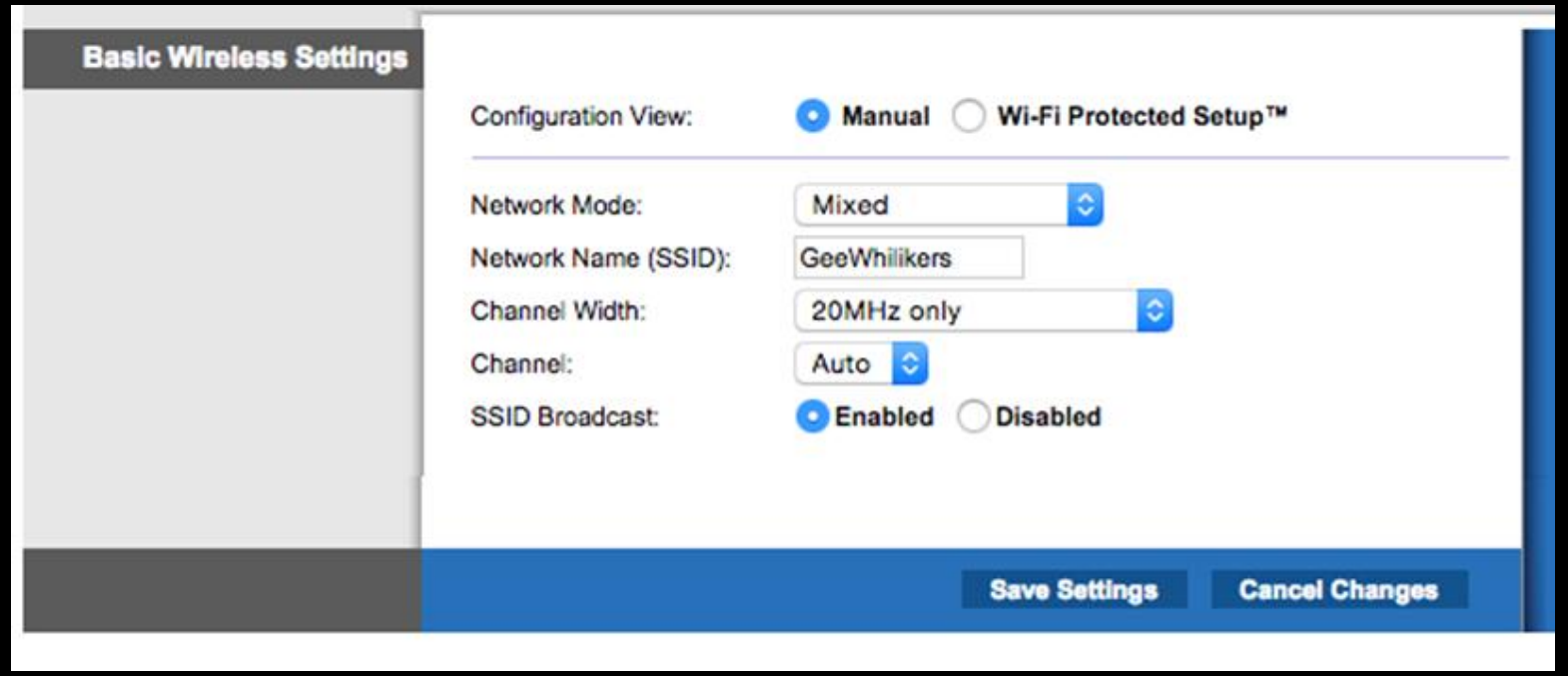
Whenever you make a change to the router, you always have to “save” for the new settings to take effect. Here, the save button is at the bottom of the page.



Network Configuration

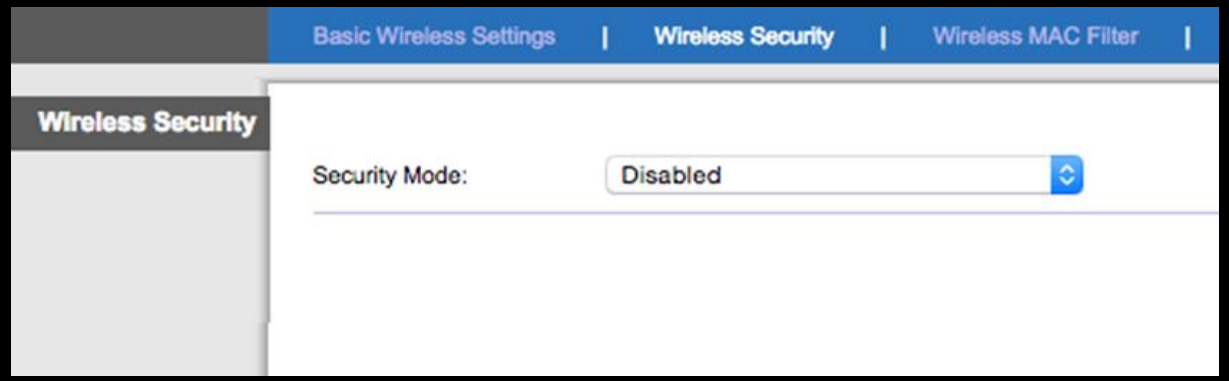
Since we are configuring this using the router's wireless connection, we will be disconnected after making a major change like this.

We will leave the rest of these settings just as they are for now.

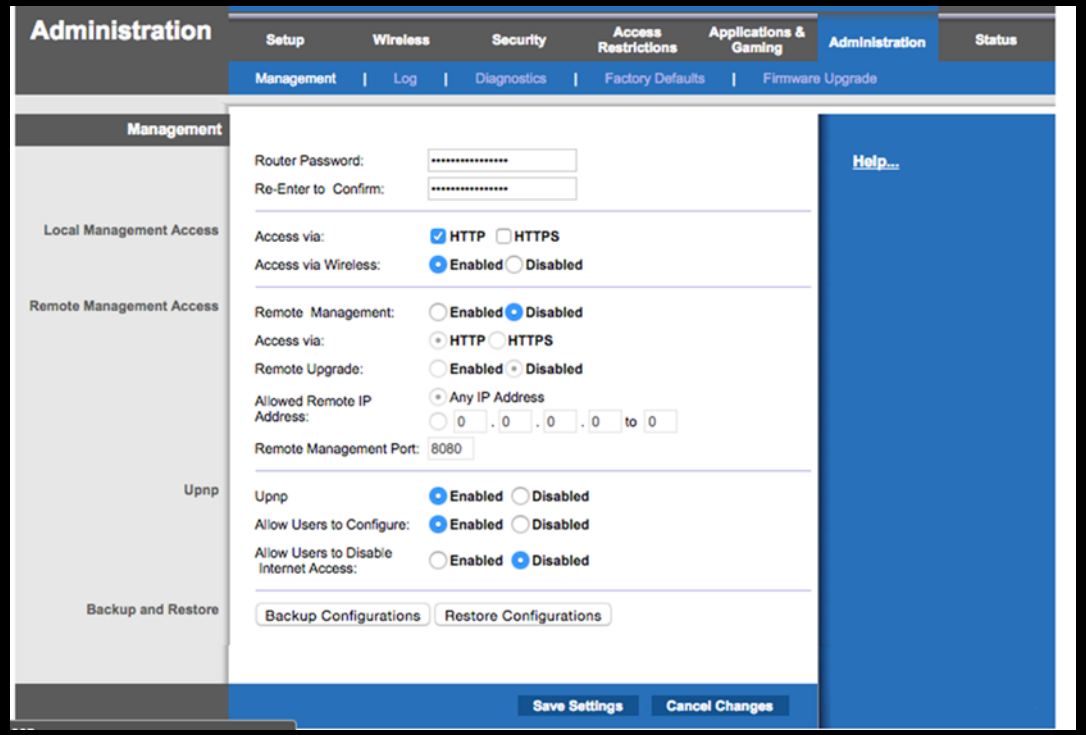


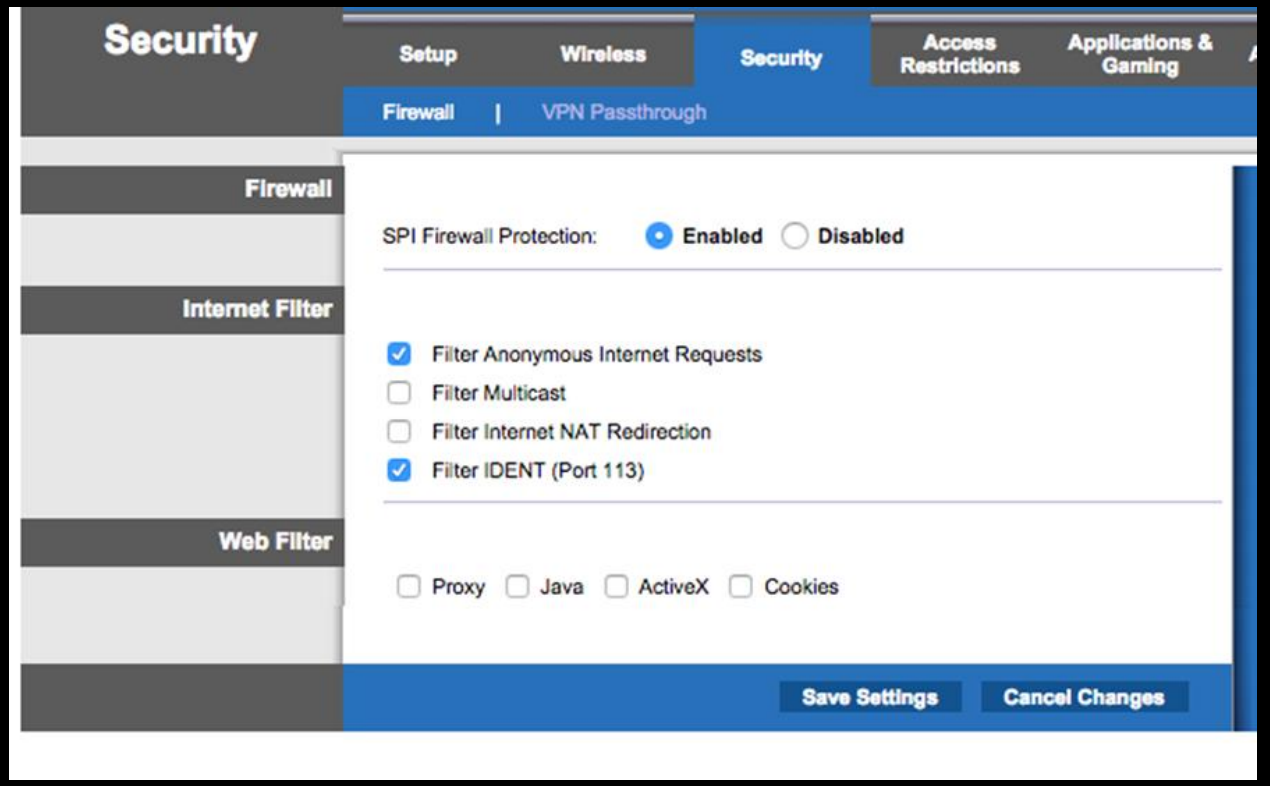
Network Configuration

In this tab, we would have the opportunity to require a password to allow use of the WiFi systems. Since we want to have user-friendly services, we will not require a password for this router. Please note: if you have wireless access for staff, it is strongly recommended that those connections be encrypted and secured.



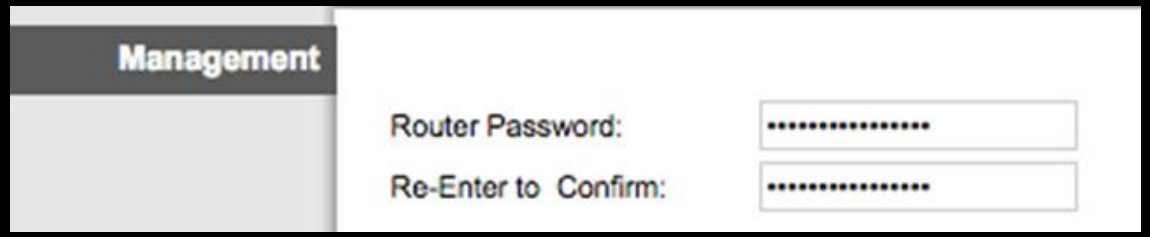
Even consumer routers have a simple firewall to help protect devices on your LAN. On this router, the administration panel is a key piece of basic security.




Security
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Firewall | VPN Passthrough
Firewall
SPI Firewall Protection: Enabled Disabled
Internet Filter
Filter Anonymous Internet Requests
Filter Multicast
Filter Internet NAT Redirection
Filter IDENT (Port 113)
Web Filter
Proxy Java ActiveX Cookies
Save Settings
Cancel Changes

Network Configuration

- This is a place where you can set a password for your router.
- It is essential for you to change the default password
- Default passwords for common routers are easy to find on the internet, which is why you must change yours!



What if you get stuck or make a mistake?

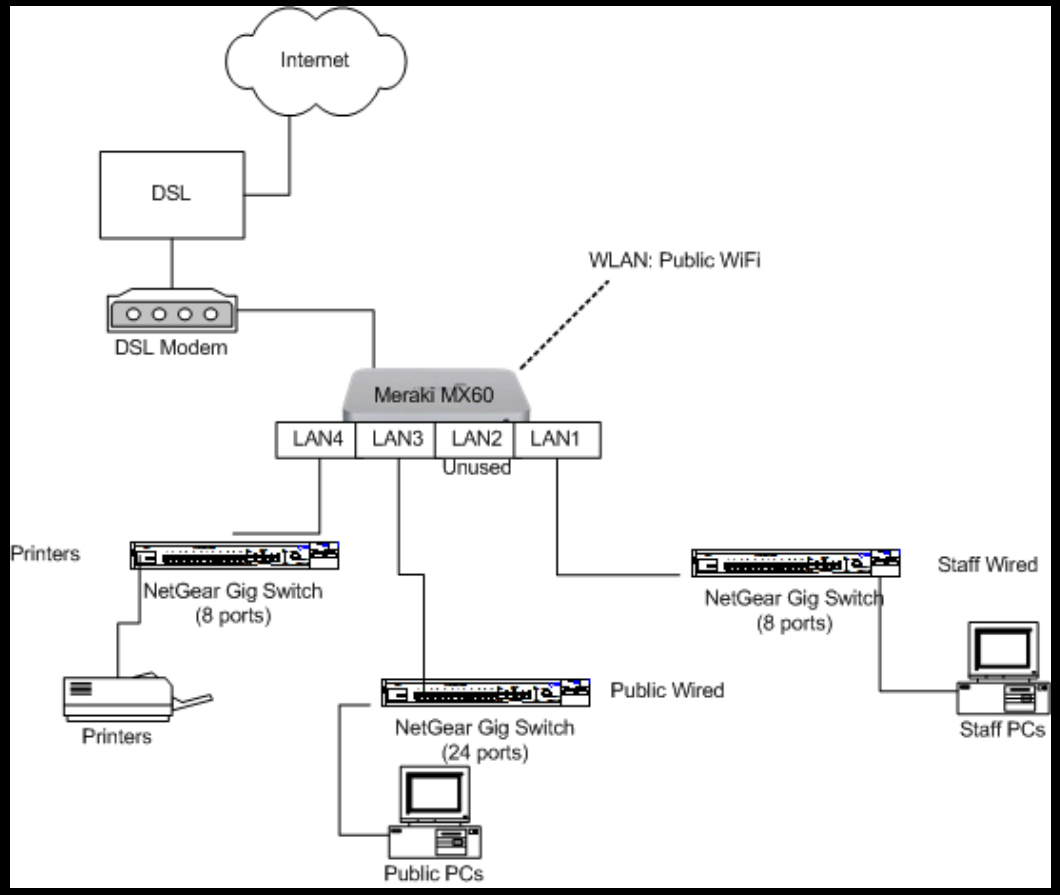
The “reset” button will help you start again! It will erase all settings and bring you back to the factory defaults.

Now, let’s set up our laptops to connect!

Let’s do a quick test —can we connect to the internet?

Break!

Sometimes Splitting Up is the Best Choice: Segmenting Networks



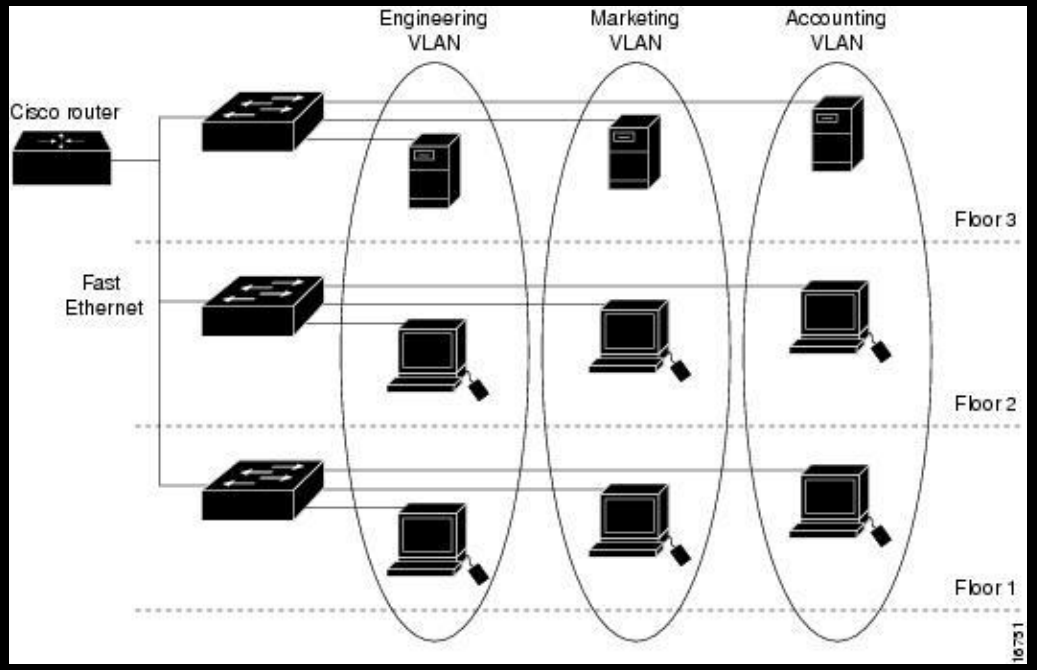
How are networks split?

- Physically
- Electronically (Virtual Local Area Networks – or VLANS)

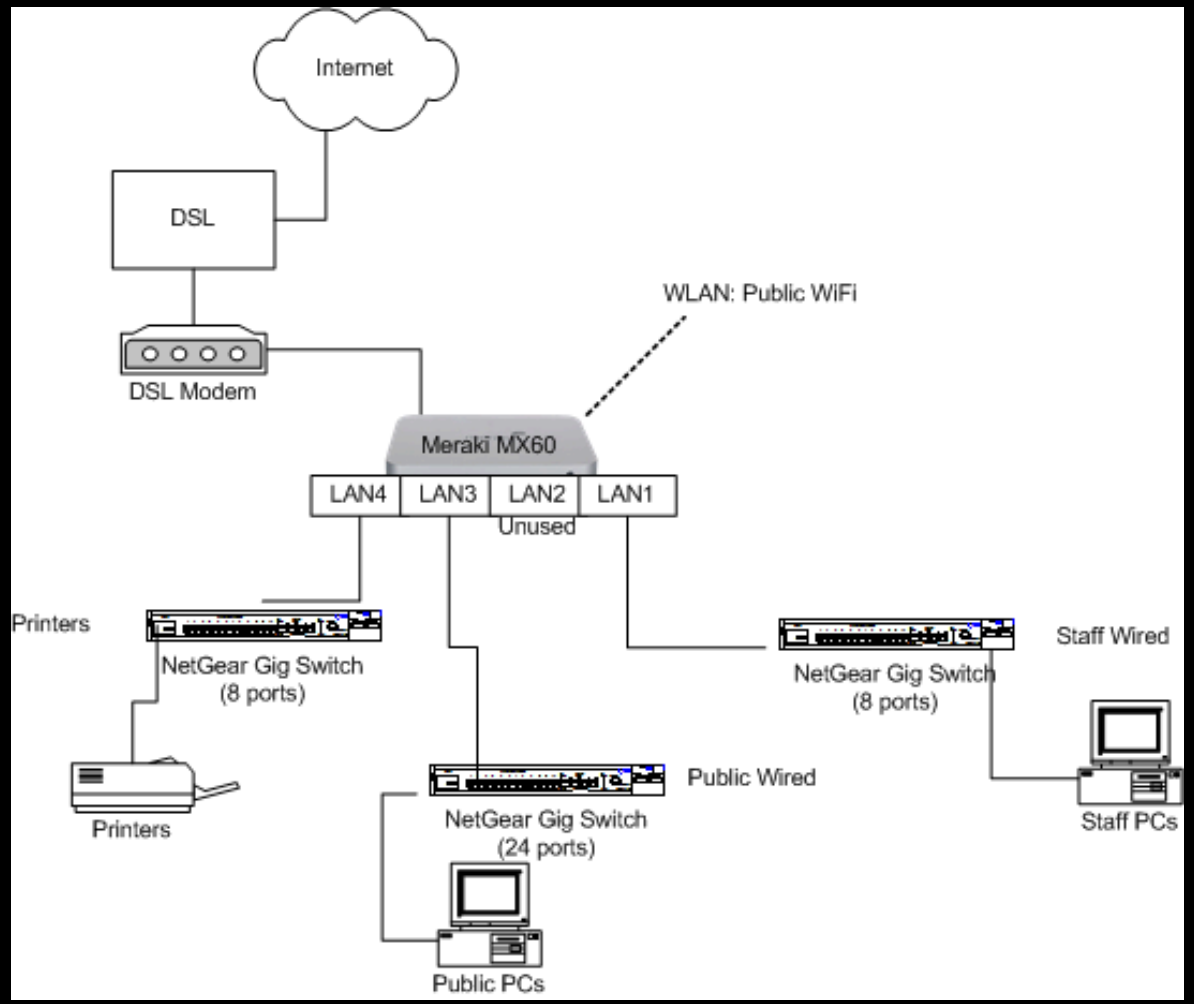
What's a "Virtual LAN" (VLAN)?

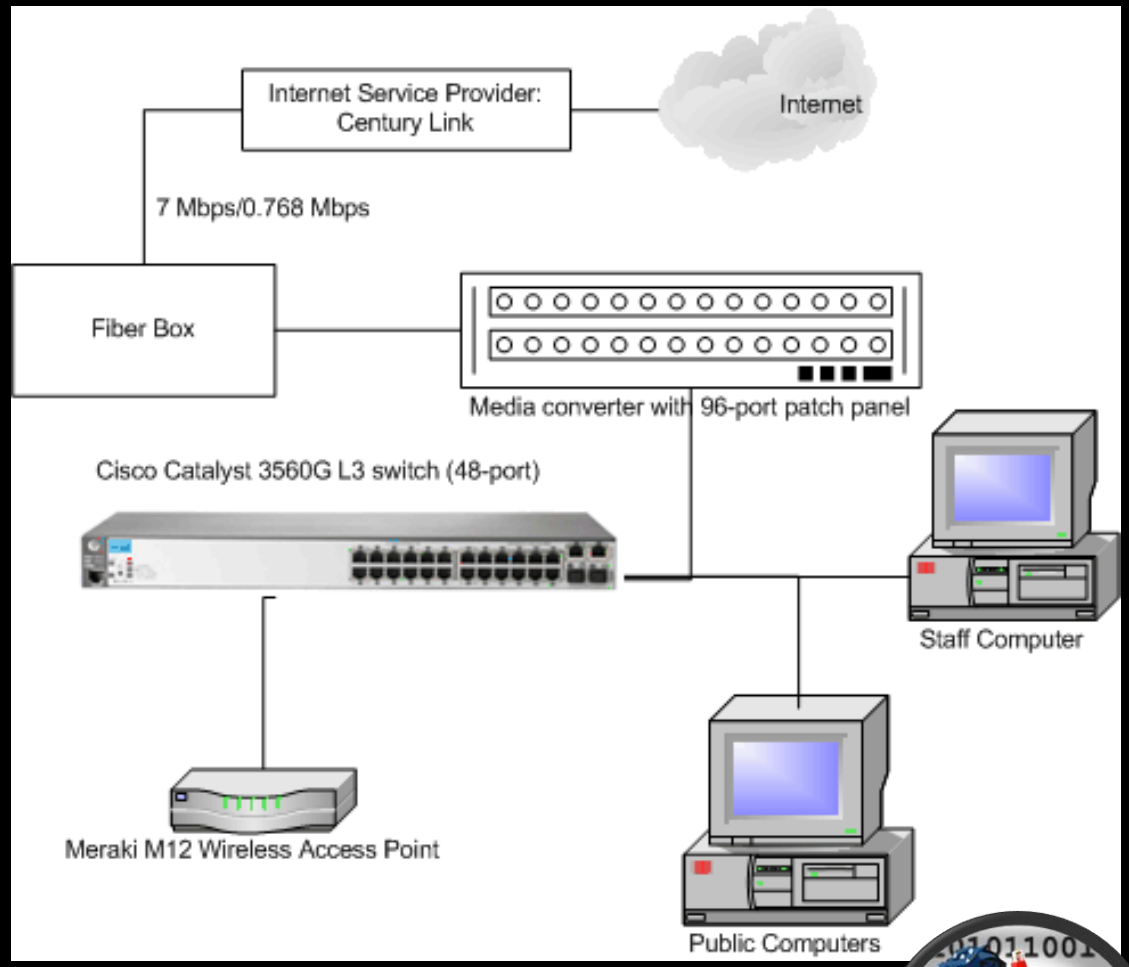
Noun \'V L A N\

: a VLAN has the same attributes as a physical local area network (LAN), but it allows for end stations to be grouped together more easily even if they are not on the same network switch. VLAN membership can be configured through software instead of physically relocating devices or connections.



Public and Private IP addresses in action!





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As of 2011

Centurylink DSL

Emberq 660 DSL Modem Gateway

dLink WBR 1310
Wireless Access Point

Linksys E2000 Router
with Firewall

Cisco SBS SD2008
Switch

Speedstream
Public Switch

- 8 Public Computers
- 1 Children's Computer

- Server
- Printer
- 5 Staff Computers

Computer Security 101

Basic PC Security

A look at
Microsoft Security
Essentials

What about Antivirus software?

I’ve set up my security – am I safe now?

Security is an ongoing process
– it is not “set and forget.”

Security is best

applied in

layers.....

File Sharing and Backups 101

Class Discussion:
Fire Sharing

What is a backup?

- It’s a copy of your data!
- It can be on a variety of media, including:
  - *External Hard Drive*
  - *Thumb Drive*
  - *CD-R or DVD-R*
- It can be in a variety of places:
  - Attached to your computer
  - Attached to your network
  - Attached to the Internet (cloud)

The Rule of 3-2-1 (or “Rule of 3”)

- Always have 3 copies of anything you really care about
- Use 2 types of backup media
- At least 1 Copy should be stored offsite

Now – let’s sketch some scenarios together to see if they follow the 3-2-1 rule!

Testing recovery of your backups

This is something even the professionals forget to do sometimes….

Your Take – Home Checklist!

The tail end…

This workshop is made possible by a grant from the Institute of Museum and Library Services to the Texas State Library and Archives Commission under the provisions of the Library Services and Technology Act. (2015)

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- CB for content
- MGW for graphics and assembly of learning materials
- TSLAC for lots & lots of stuff….

Graphics Credit

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- PQ to Extend Language Laws to Letters in Alphabet Soup625 x 370 · 28 kB · jpeg montreal.mediacoop.ca
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- http://freemagazinedownloads.blogspot.com/2010/11/what-is-ipv6-why-we-need-ipv6-and.html
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