



Home Internet Basics

Presented by Avon Lake Public Library



Home Internet Road Map

1. Internet Service Providers

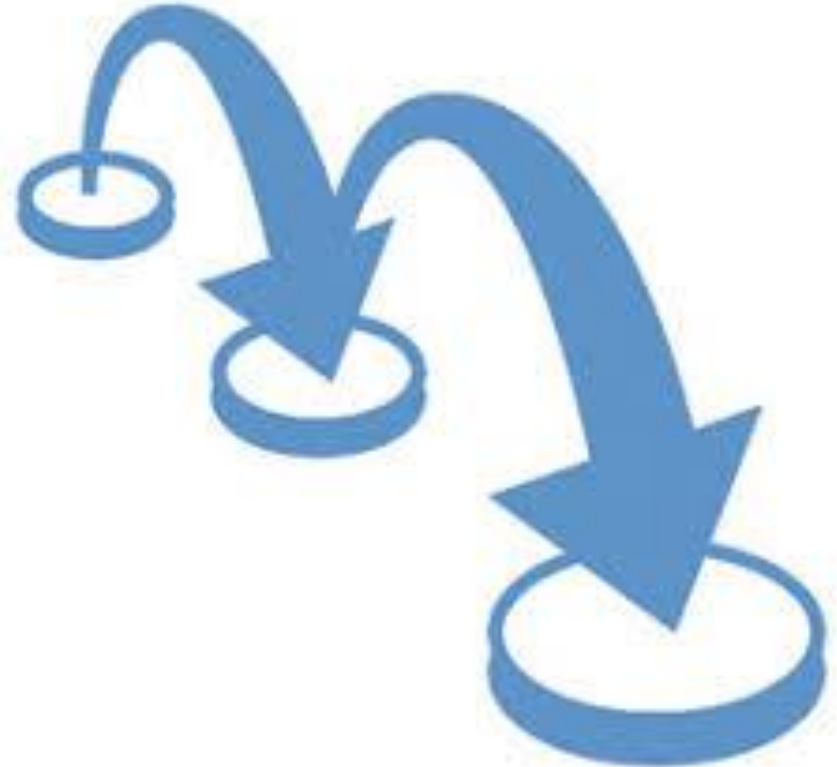
- a. Internet 101
- b. Who is in the area?
- c. How much data do I need?

2. The Physical Parts

- a. Setting up internet at home
 - i. modems and routers
- b. Expanding current internet network
 - i. hubs, switches, and extenders
 - ii. topologies

3. Data Specifics

- a. types of cables
- b. types of wi-fi signals
- c. wired vs. wireless



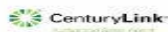


<https://www.youtube.com/watch?v=K1y8aRIm98E>

[Residential \(4\)](#)[Business \(3\)](#)[Mobile \(3\)](#)[Sort by](#)

1. CenturyLink

✓ 98% available in 44012

Connection:
FiberDownload
speeds up to
40Mbps★★★★☆
User Rating (399)[View Plans >](#)

2. Spectrum

✓ 100% available in 44012

Connection:
CableDownload
speeds up to
100Mbps★★★★☆
User Rating (730)[View Plans >](#)

3. Viasat

✓ 99% available in 44012

Connection:
SatelliteDownload
speeds up to
25Mbps★★★☆☆
User Rating (10)[View Plans >](#)

4. WOW!

✓ 97% available in 44012

Connection:
CableDownload
speeds up to
50Mbps★★★★☆
User Rating (9)[View Plans >](#)

How much internet speed do I need?

5+ Mbps

- Regular browsing
- Music streaming
- Ideal for 1 person

10+ Mbps

- HD video streaming
- Casual gaming
- Ideal for 1-2 people

20+ Mbps

- Ultra HD streaming
- Frequent gaming
- Ideal for 2-4 people

40+ Mbps

- Simultaneous HD streaming
- Simultaneous gaming
- Ideal for 4+

[Test your current internet speed](#)[Discover how much internet speed you need](#)

Estimated Data for Common Tasks

- Basic email = **1 Mbps**
- Cloud backup = **2 Mbps**
- Cloud-based services = **5 Mbps**
- Cloud computing = **2 Mbps**
- Data transfer = **2 Mbps**
- Email with attachments = **15 Mbps**
- File sharing = **5 Mbps/500 Kbps**
- General web browsing = **0.33 Mbps/333 Kbps**
- General Wi-Fi use = **1 Mbps**
- High-definition video (HD video) = **4 Mbps**
- Instant messaging = **5 Mbps/500 Kbps**

Video Services

- Youtube TV = **13Mbps**
 - DirectTV Now = **12 Mbps**
 - Sling TV = **25 Mbps**
 - Hulu = **15 Mbps**
 - Netflix = **25 Mbps**
 - Amazon Prime = **15 Mbps**
-
- Online banking and bookkeeping = **2 Mbps**
 - Online research = **33 Mbps/333 Kbps**
 - Social media scheduling = **2 Mbps/200 Kbps**
 - Streaming a webinar = **5 Mbps**
 - Streaming online training courses = **5 Mbps**
 - Uploading photos = **5 Mbps**
 - Uploading large files = **2 Mbps**
 - Video conferencing = **4 Mbps**
 - VoIP call = **1 Mbps/100 Kbps**
 - VoIP video calls = **28 Mbps**





SPEED CALCULATOR

Check how much internet speed you need.

BROADBANDNOW®

Speed Calculator

We recommend at least
137 Mbps



Based on your internet usage
we recommended speed of at least:

137 Mbps

Enter Zip to see providers in your area

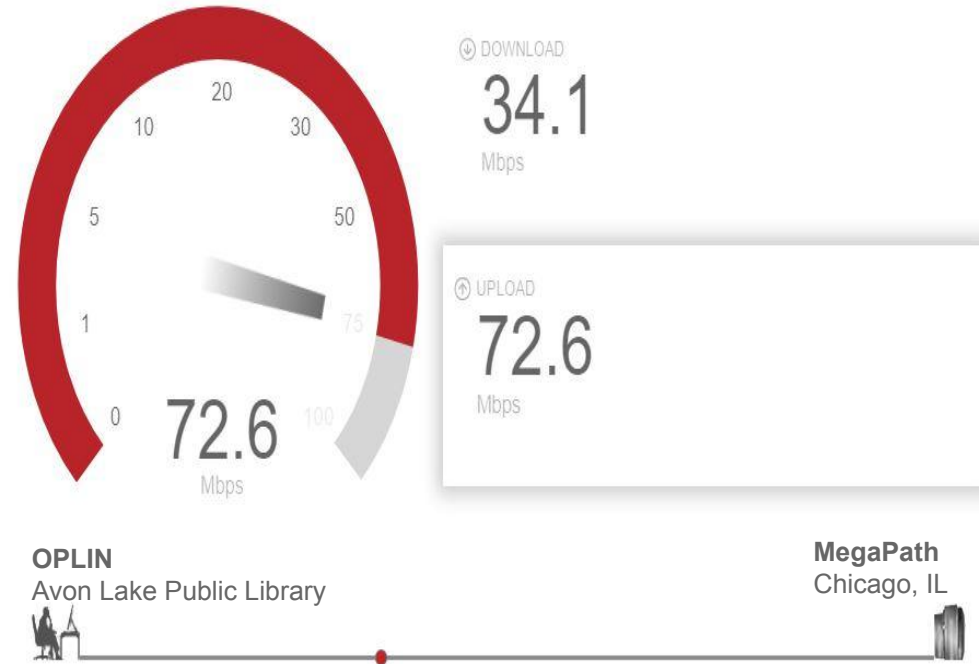
Question 4/4

Back

<https://broadbandnow.com/bandwidth-calculator>

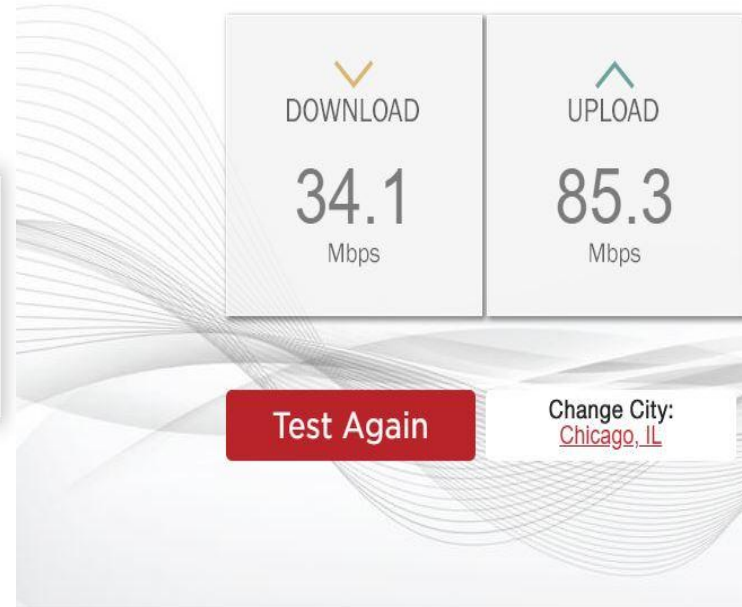
<https://www.speakeasy.net/speedtest/>

SPEAKEASY SPEED TEST



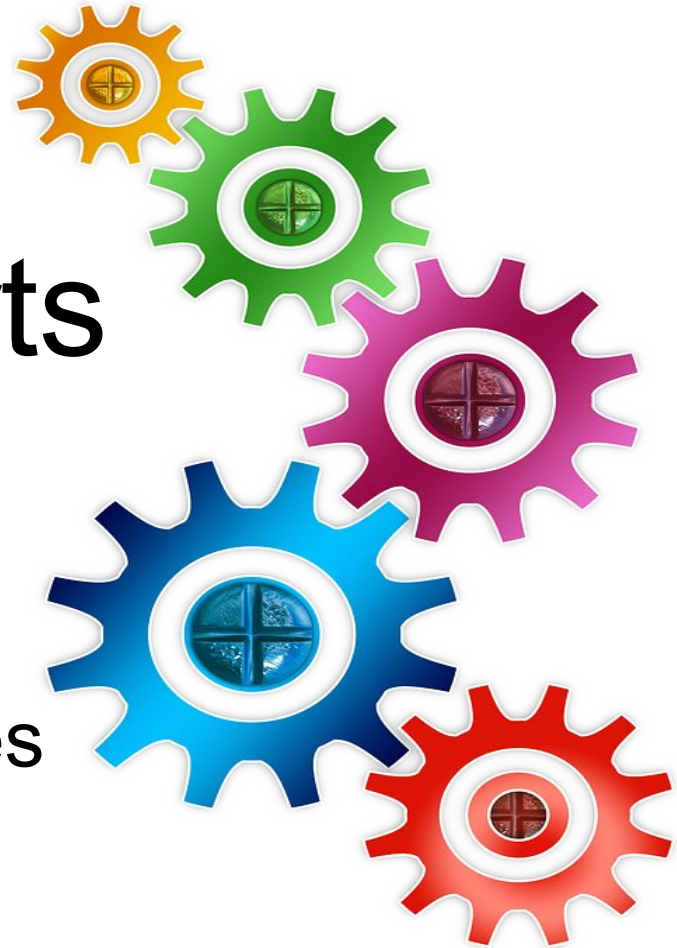
SPEAKEASY SPEED TEST

Your Speed Results



Home Internet Parts

- modem and router
- hub and switch
- wi-fi extenders and topologies



Modems: Cable vs. DSL (Digital Subscriber Line)





<https://www.youtube.com/watch?v=RLooclr7wA>

ISP

I nternet
S ervice
P rovider

ISPs in
Avon Lake

- Century Link
- Frontier
- Spectrum
- Viast
- Windstream
- WOW !



A computer only reads digital signals.

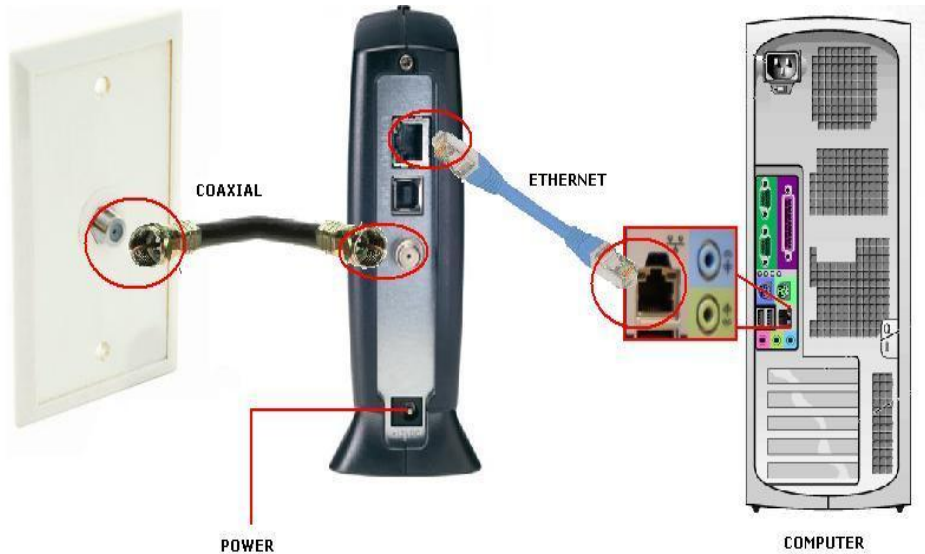
The internet only reads analog signals.

Modem **demodulates** incoming analog signals into a digital signal.

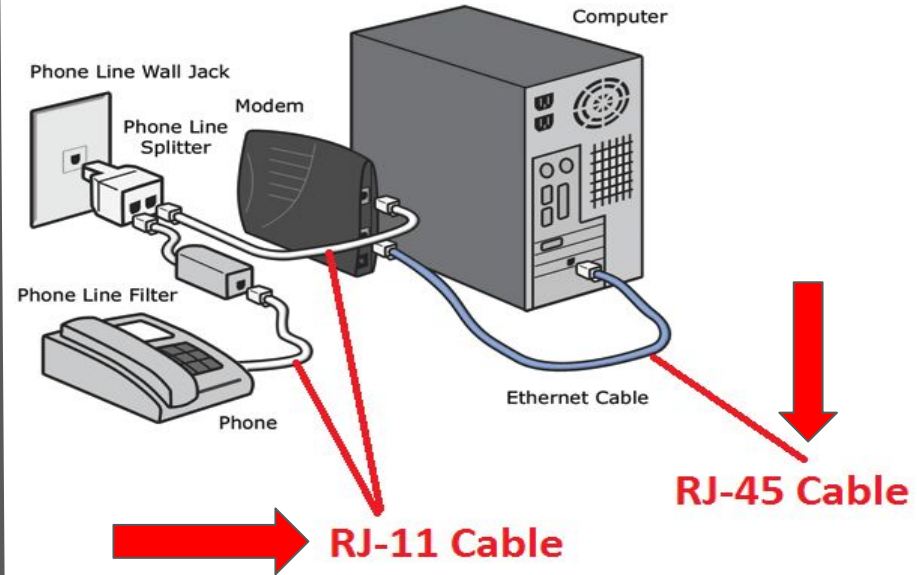


Modem **modulates** outgoing digital signals into an analog signal.

Current setup with just a modem.



Coaxial Modem



DSL Modem



A modem is what brings the internet into your home or business.

What can I connect to a modem?

Only **ONE** device?

Does a modem give me wi-fi ?

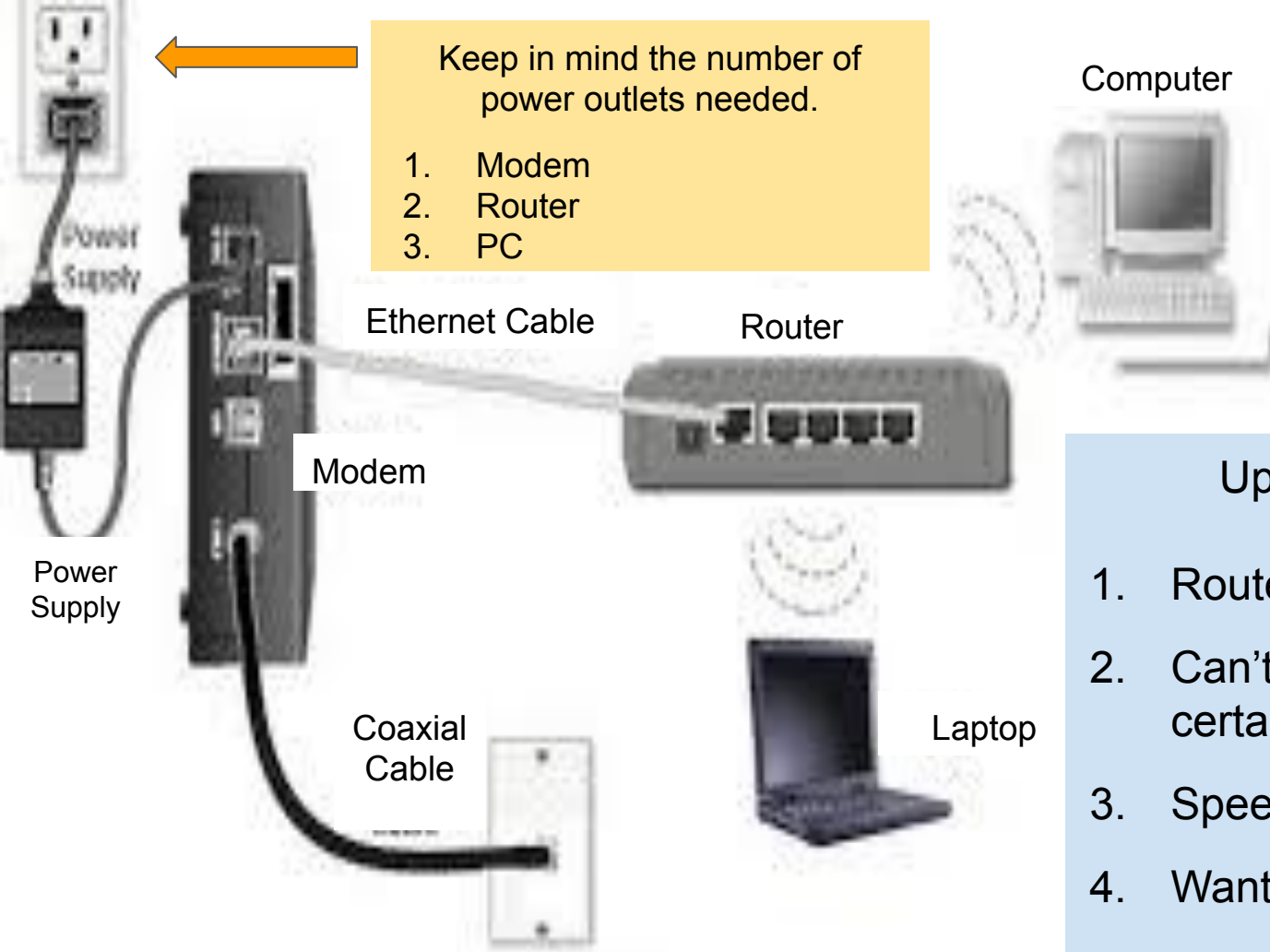


Business router



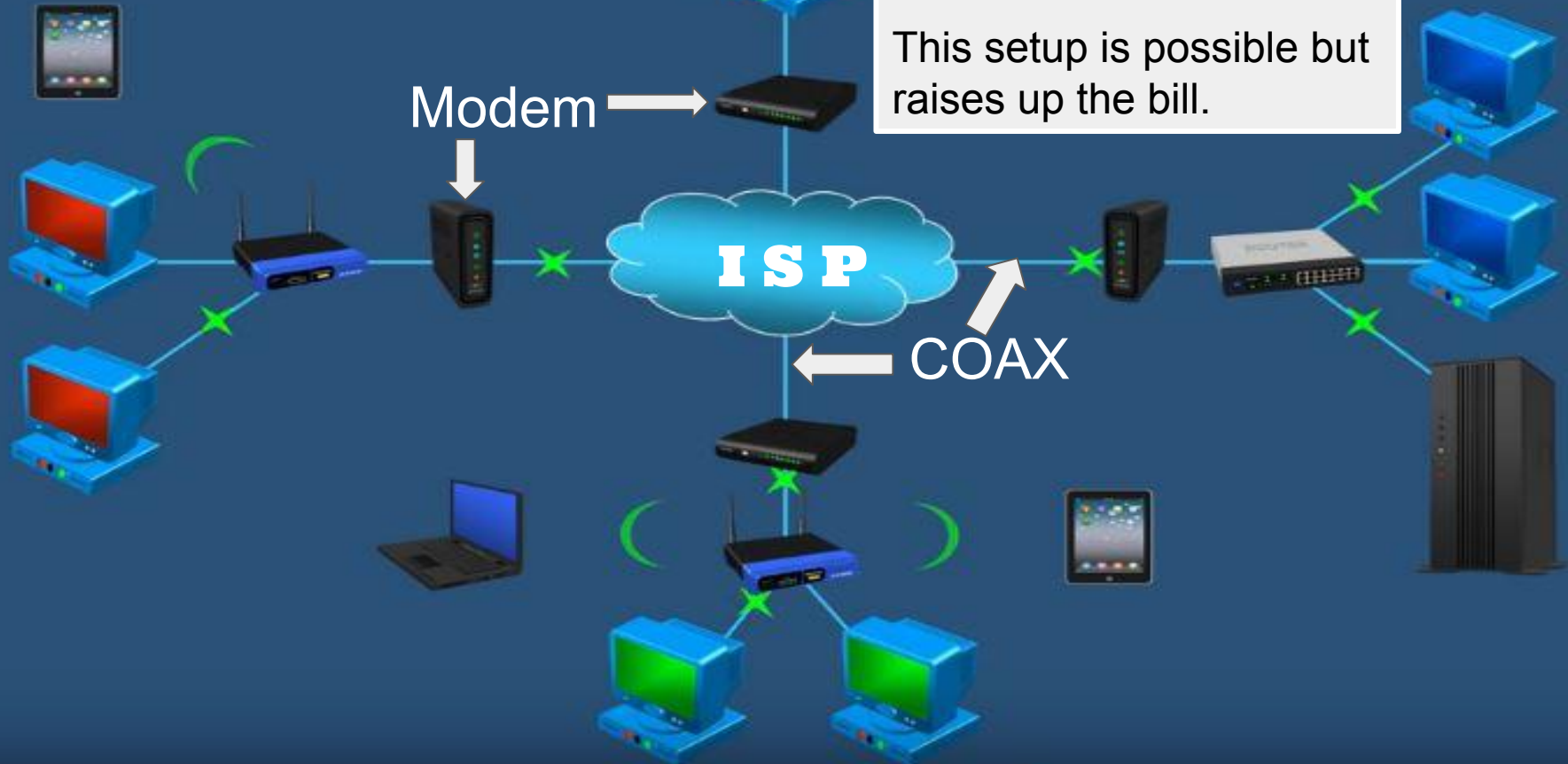
Small office / home office
router





Upcoming Problems

1. Router has no more ports
2. Can't connect to the wifi in certain areas.
3. Speeds are slow.
4. Want to share files in network



Splitting up the coax and dividing it between different modems.

This setup is possible but raises up the bill.

Modem

ISP

COAX

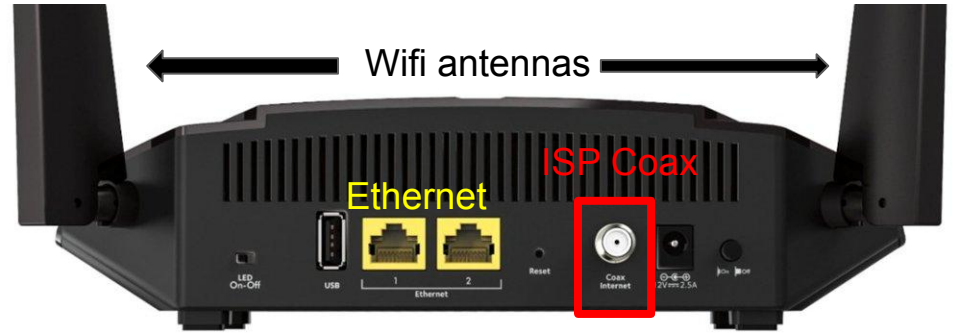
HUB, SWITCH, ROUTER

ANIMATED



WHAT'S THE DIFFERENCE?

https://www.youtube.com/watch?v=1z0ULvg_pW8



- Some modems have a **built-in** router.
- All routers have a built-in switch.



NETWORK TOPOLOGIES



EXPLAINED

<https://www.youtube.com/watch?v=zbqrNg4C98U>

Leave for the class to discover for themselves.

WIFI EXTENDER



EXPLAINED



<https://www.youtube.com/watch?v=1rJ1tSzgvpE>

POWERLINE NETWORKING



ANIMATED

<https://www.youtube.com/watch?v=1SpY1vwEIJI>

Home Internet Parts in Summary

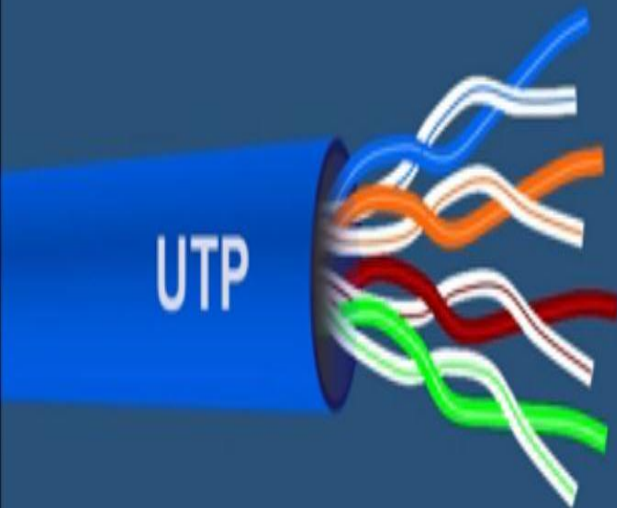


<https://www.youtube.com/watch?v=Vc16CCAAz7Q&t=265s>

Data Specifics

- Types of cables
- Wi-Fi signals and antennas
- Choosing between a wired or wireless setup

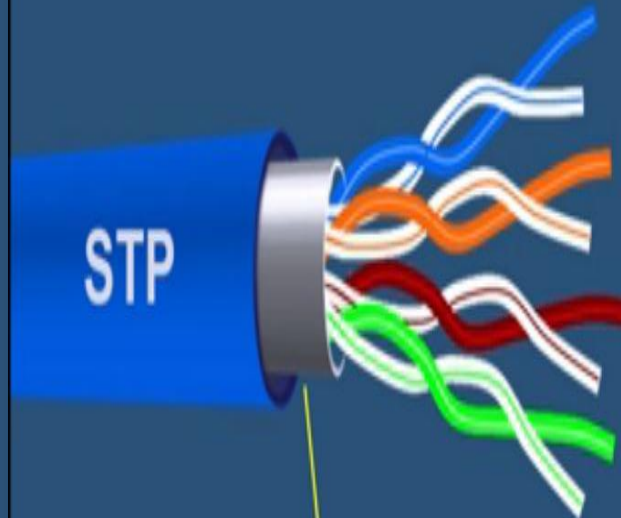
Unshielded Twisted Pair



UTP consists of 4 pairs of color-coded wires twisted around each other.

The wires are twisted to prevent electromagnetic interference (crosstalk).

Shielded Twisted Pair



STP has a **foil shield** that covers the wires.

The foil shield adds a layer of protection against electromagnetic interference leaking into and out of the cable.

Twisted Pair CABLE

CATEGORY

SPEED

CATEGORY 3

10 Mbps

CATEGORY 5

100 Mbps

CATEGORY 5e

1 Gbps

Enhanced

CATEGORY 6

1 Gbps

10 Gbps (cable length
under 100 meters)

CATEGORY 6a

10 Gbps

Augmented

CATEGORY 7

10 Gbps

Added shielding to
the wires.

The difference between these are the maximum speed and ability to transfer data without interference.

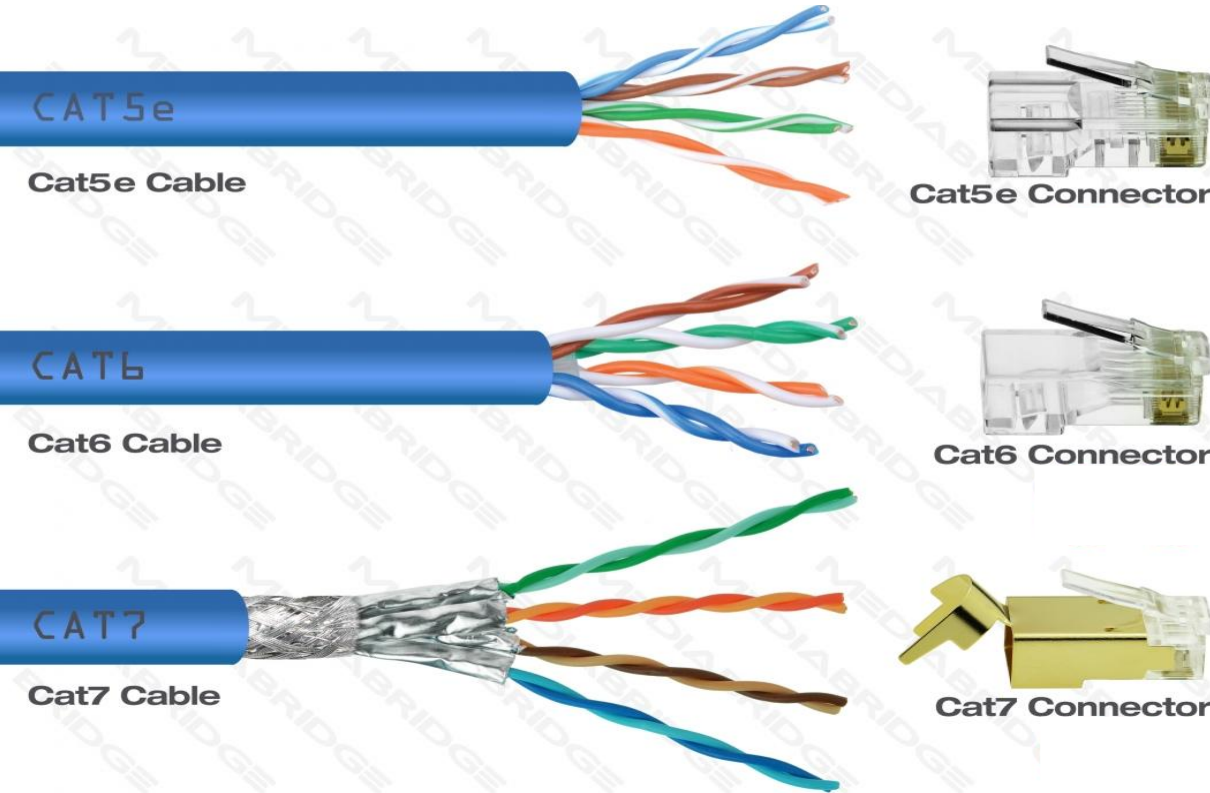
The numbers represent the tightness of the twists that are applied to the wires.

Ethernet Cables aka RJ-45s

Electrical signal degraded over long distances.

The limit of ethernet cable length is **90 -100 meters** or **295 - 328 feet** to the next switch.

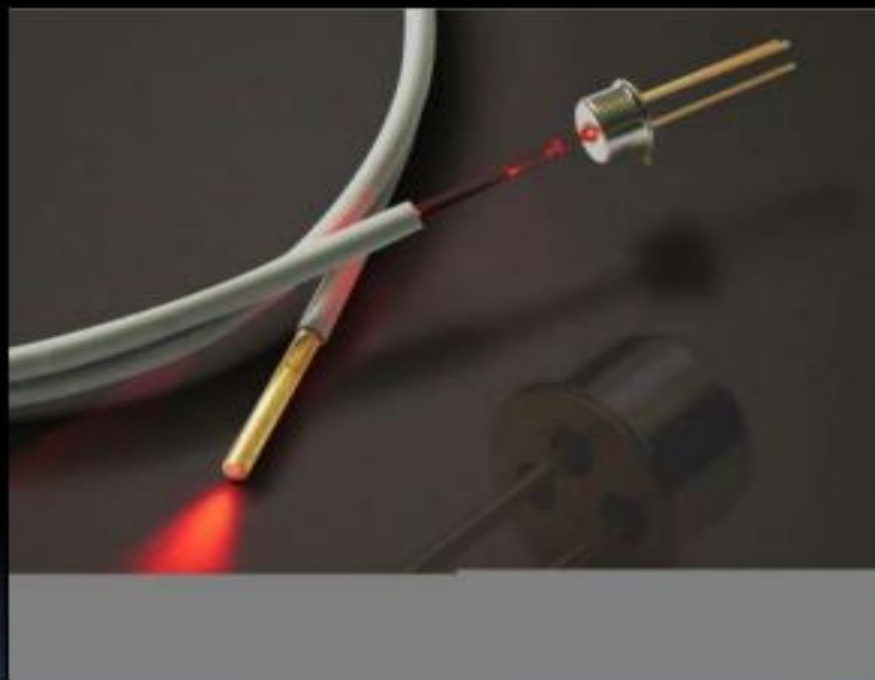
A **switch** is needed for multiple long runs of cable.



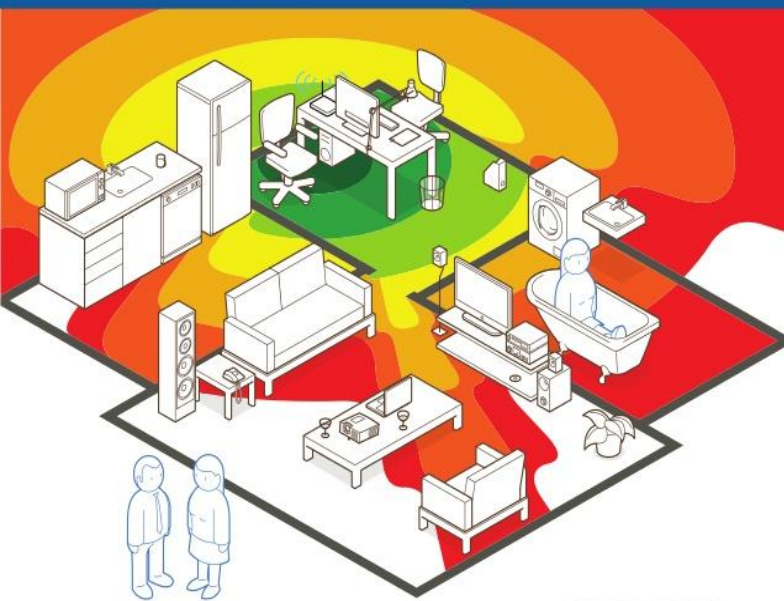
What are optical fibers?

- Fiber optics = Fiber + optics
- in essence = Light is guided in optical fiber.
- Fiber = Extremely **pure glass(silica)** or **plastic**
- **Speed= current record**
15.5tbps

Total internal reflection



5 GHz vs. 2.4 GHz: The New Wave in Wi-Fi



DeepBlue
A Passion for Wi-Fi

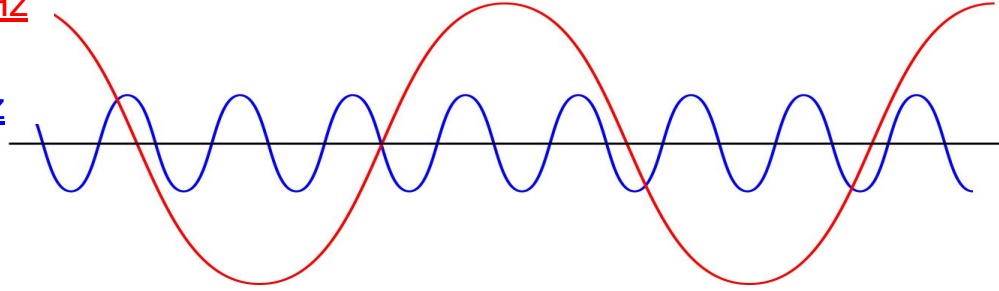


www.deepbluecommunications.com

2.4 GHz and 5 GHz Wavelengths

2.4 GHz

5 GHz



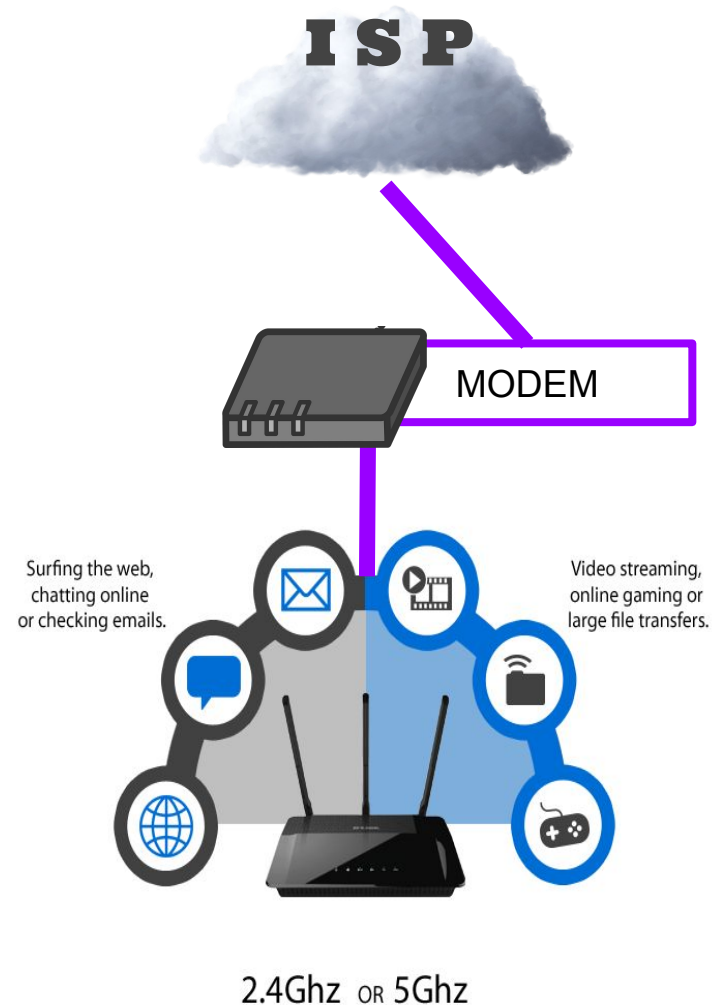
Surfing the web,
chatting online
or checking emails.

Video streaming,
online gaming or
large file transfers.









2.4Ghz OR 5Ghz





- Wi-Fi is used to connect to a router or another access point which in turn provides internet access.
 - Wi-Fi is a wireless connection to a device, NOT the internet itself.
- Instead of using wired connections Wi-Fi uses radio waves to transmit information at specific air frequencies
 - 2.4 GHz and 5 GHz
 - GHz is unit of measurement of alternating current or electromagnetic wave frequencies.
- Typical range reaches up to 100 meters or 300 ft in OPEN AIR.
- Actual distance
 - 10 - 35 meters
 - 32 - 114 feet
- Strength of the router antenna and frequency impact the effective range of the network.



Signals →

Antennas ↓

WIRELESS		SPEED (Mbps)
Wireless a		11
Wireless b		54
Wireless g		54
Wireless n		300
Wireless an		900
Wireless ac		450 + 1300

		Antennas (Tx*Rx)	Spatial Streams	Maximum Link Speed	Band Support		
	{	Single Stream	1 x 1	1	72 Mbps	2.4	B,G,N Single Stream
		Dual Stream	1 x 2	2	150 Mbps	2.4	B,G,N DualStream
	{	Dual Stream	2 x 2	2	150 Mbps	2.4	
		Dual Stream	2 x 3	2	150 Mbps	2.4	
	{	Dual Stream	2 x 2	2	300 Mbps	2.4 & 5	A,B,G,N Dual Stream
		Dual Stream	2 x 3	2	300 Mbps	2.4 & 5	
		Multi Stream	3 x 3	3	450 Mbps	2.4 & 5	A,B,G,N Multi Stream

ASUS

ASUS RT-ACRH13 Dual-Band 2x2 AC1300 Wi-Fi 4-port Gigabit Router with USB 3.0

Free gifts w/ purchase, limited offer

Write a Review (4)

Write a Review

See 7 Questions | 16 Answers

SHARE

In stock. Ships from United States.

Sold and Shipped by Newegg

☒ ADD THIS OFFER TO CART



FREE GIFT ITEM

Asus Certified USB-AC53 Nano AC1200 Dual-band USB Wi-Fi Adapter IEEE 802.11ac USB 2.0 AC1200 Wireless Data Rates

Value: \$12.99

- Dual-band AC1300 with the latest 2x2 MU-MIMO technology for combined speeds of up to 1267 Mbps
- Four external 5 dBi antennas for improved Wi-Fi range and multi-device performance
- Monitor and manage your network with ease from your mobile device using the intuitive ASUS Router App
- Effortless router setup with the ASUSWRT web-based interface, Super-Fast Wi-Fi - Dual-band 802.11ac Wi-Fi with concurrent speeds up to 867 Mbps (5 GHz) and 400 Mbps (2.4 GHz)
- Integrated USB 3.0 port allows you to share external drives / flash drives with your network

4 New from \$59.99

1 Used from \$47.99

wifi
600Mbps

2.4G

5.8G

2dB 150M

WiFi



Wi-Fi Adapters



iPad



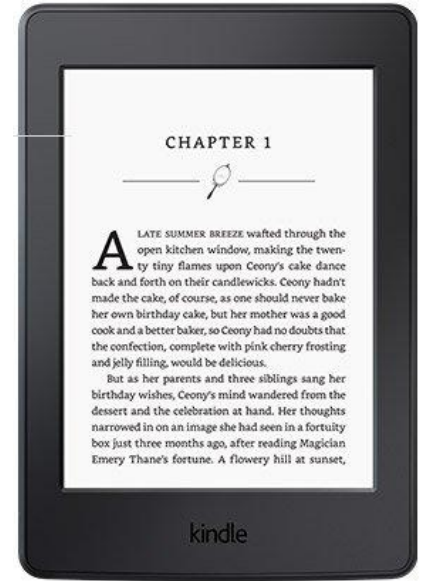
Wi-Fi Specs

- Wi-Fi (802.11a/b/g/n/ac);
- Dual band (2.4GHz and 5GHz)
- Bluetooth 4.2 technology

Not all devices are
made the same.

Always check
the tech specs.

Kindle Paper Weight



Wi-Fi Specs

- Wi-Fi(802.11a/b/g/n/ac)
- 2.4GHz

Physical vs. Wireless Connection

Physical

Pros:

1. Increased Security
 - a. Hard to read a wired signal.
2. Reliable Speed
 - a. No non-essential traffic.
 - b. Can't be blocked.
3. Can receive and send info at the same time. (Known as **Full Duplex**)

Cons:

1. Cable management
 - a. Buying enough cables and parts.
 - b. Lost of cables together can could interference. (unlikely)

Wireless

Pros:

1. No wires
2. Easily accessible
 - a. Connecting new devices is easier.

Cons:

1. More vulnerable to security problems.
 - a. Sensitive and private info being sent through the air.
2. Certain walls or items can block signals.
3. Can only send or receive data one at a time per antenna. (Known as **Half-Duplex**)



<https://www.youtube.com/watch?v=YTRImxNRk7U>

Resources:

This information had to come from somewhere.

- <https://www.broadbandnow.com/bandwidth-calculator>
 - <https://www.highspeedinternet.com>
 - <https://www.speakeasy.net/speedtest/>
 - <https://edu.gcfglobal.org/en/subjects/tech/>
 - <https://www.youtube.com/user/Techquickie>
 - https://www.youtube.com/results?search_query=power+cert+animated+videos
 - <https://www.linksys.com/us/r/resource-center/whole-home-mesh-wifi/>
-
- [**https://kb.netgear.com/119/How-to-configure-your-NETGEAR-router-for-cable-internet-connection-with-Smart-Wizard**](https://kb.netgear.com/119/How-to-configure-your-NETGEAR-router-for-cable-internet-connection-with-Smart-Wizard)