Home Networking

Part 1

Agenda

- Internet Services Available – Bandwidth and WWW
- LAN – WAN Interconnection – the Modem
- Wiring the Home – and/or – Wireless Networking

Pretest

- I have a strong WiFi signal, so I have Internet access: True or false?
- Fast WiFi = faster Internet access: True or false?

Internet Service Providers Available

- Terrestrial
- Direct Wireless
- Satellite
- Cellular

Terrestrial Internet Service Providers (ISP)

- CenturyLink = xDSL
- Comcast/Xfinity = Cable
- Peak Internet
- Others

ISP Comparison

	Provider	Monthly price	Download speeds	Learn more
CenturyLink	CenturyLink Internet	$45–$85†	10–1000 Mbps	View Plans
AT&T	AT&T Internet	$40–$50‡	5–100 Mbps	View Plans
COX Authorized retailer	Cox Internet	$29.99–$99.99‡	10–940 Mbps	View Plans
suddenlink by altice	Suddenlink Internet	$34.99–$84.99^	100–1000 Mbps	View Plans
windstream	Windstream Internet	$5–$85°	25–1000 Mbps	View Plans
xfinity	Xfinity Internet	$29.99–$299.95**	15–2000 Mbps	View Plans

Comcast\Xfinity

- Speed increases vary based on a customers' current speed subscription, but vast majority will see an increase of 50 Mbps. The changes include:
- **Blast** tier download speeds increasing from **200 Mbps to 250 Mbps**
- **Performance Pro** tier download speeds increasing from **100 Mbps to 150 Mbps**
- **Performance** tier download speeds increasing from **25 Mbps to 60 Mbps**
- **Performance Starter** tier download speeds increasing from **10 Mbps to 15 Mbps**

CenturyLink - xDSL

- The speed you get with CenturyLink depends on where you live and age of telephone lines
- Offers download speeds of 15 to 100 Mbps
- You'll pay the same monthly price whether you hit the download speed jackpot or not
- CenturyLink doesn't stack up as well as other ISPs. It ranked 12th out of 16 providers analyzed in the FCC 2018 report for actual-to-advertised speed performance

Satellite ISPs

- Current Providers
  - HughesNet (purchased DishNetwork's Echo Star)
  - ViaSat (partnered with DirectTV)

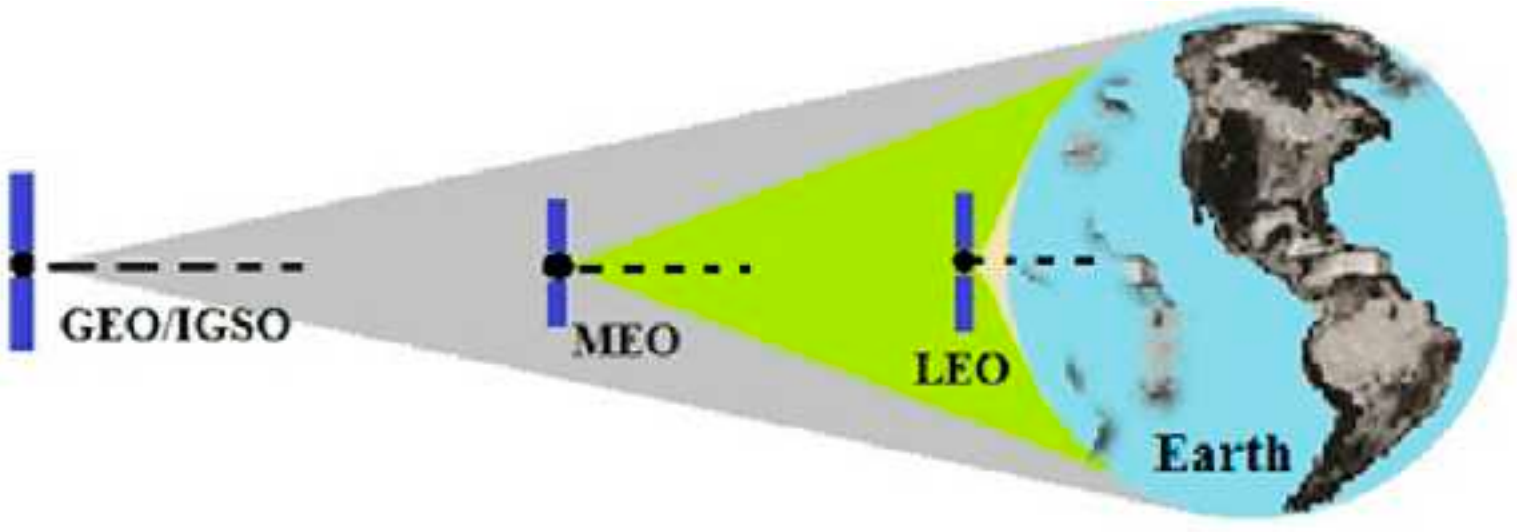
- Near-Future Providers
  - SpaceX
  - Amazon

Current Satellite Providers

Broadband satellite internet in the US has historically been dominated by two companies, Hughes Network Systems and ViaSat. Their satellites are in **geosynchronous orbit**, which means the satellites never change position relative to the surface of the Earth. Although Hughes estimates that there are roughly 15 to 18 million unserved or underserved households in the US, Hughes and ViaSat only have about 2.5 million satellite internet customers

Cost is a factor

Satellite Positioning



HughesNet

- HughesNet® Gen5 is faster than ever with **25 Mbps** on every plan
- Four service plans offer a wide range of data options
- All plans also come with off-peak data in the Bonus Zone. With the Bonus Zone, get 50 GB/month of additional plan data to use during off-peak hours (2am-8am) that you can use for downloading large files like movies and system updates to your computer, tablet, or smart phone
- If you exceed your plan data, we won't cut you off or charge you more. You'll be able to stay connected at **reduced speeds** until the next billing cycle. Or, you can always use a Data Token to return to full speed
- HughesNet Gen5 automatically **compresses and optimizes** web content with built-in SmartTechnologies to make webpages load faster while using less of your data. Includes a video data-saver so you can watch more videos using less of your data. It adjusts data rates for streaming video to deliver DVD quality

ViaSat

- The ViaSat-3 ultra-high capacity satellite platform is a highly-advanced global constellation comprised of **three geostationary ViaSat-3 class satellites** and complementary ground network infrastructure. The first ViaSat-3 class satellite will provide service to the Americas, the second ViaSat-3 class satellite will cover Europe, Middle East and Africa, and the third ViaSat-3 class satellite will deliver service to the Asia-Pacific market
- Each ViaSat-3 satellite is expected to offer over 1 Terabit per second (Tbps)—or 1,000 Gbps—of total network capacity to deliver a global broadband network with enough bandwidth to deliver affordable, high-speed, high-quality internet and video streaming services. The ViaSat-3 constellation is anticipated to have approximately 8x the capacity of Viasat's current satellite fleet combined
- When fully-optimized, Viasat's global constellation will be able to dynamically move bandwidth around the globe to where demand exists, in order to:
    - Bring affordable satellite-enabled Community Wi-Fi to the billions of unconnected people in emerging markets;
    - Support thousands of commercial, business and senior leader government aircraft—at any given time—with hundreds of Mbps of data for advanced in-flight entertainment, connectivity and streaming services;
    - Provide up to 1-Gbps speeds for use in enterprise applications, which is comparable to ground-based fiber optic network speeds
    - Enable U.S. and Five Eye militaries to leverage artificial intelligence and cloud-based and applications over a highly-resilient, assured network at the tactical edge; and
    - Deliver 100+ Mbps speeds for residential internet and voice over internet protocol (VoIP) services.

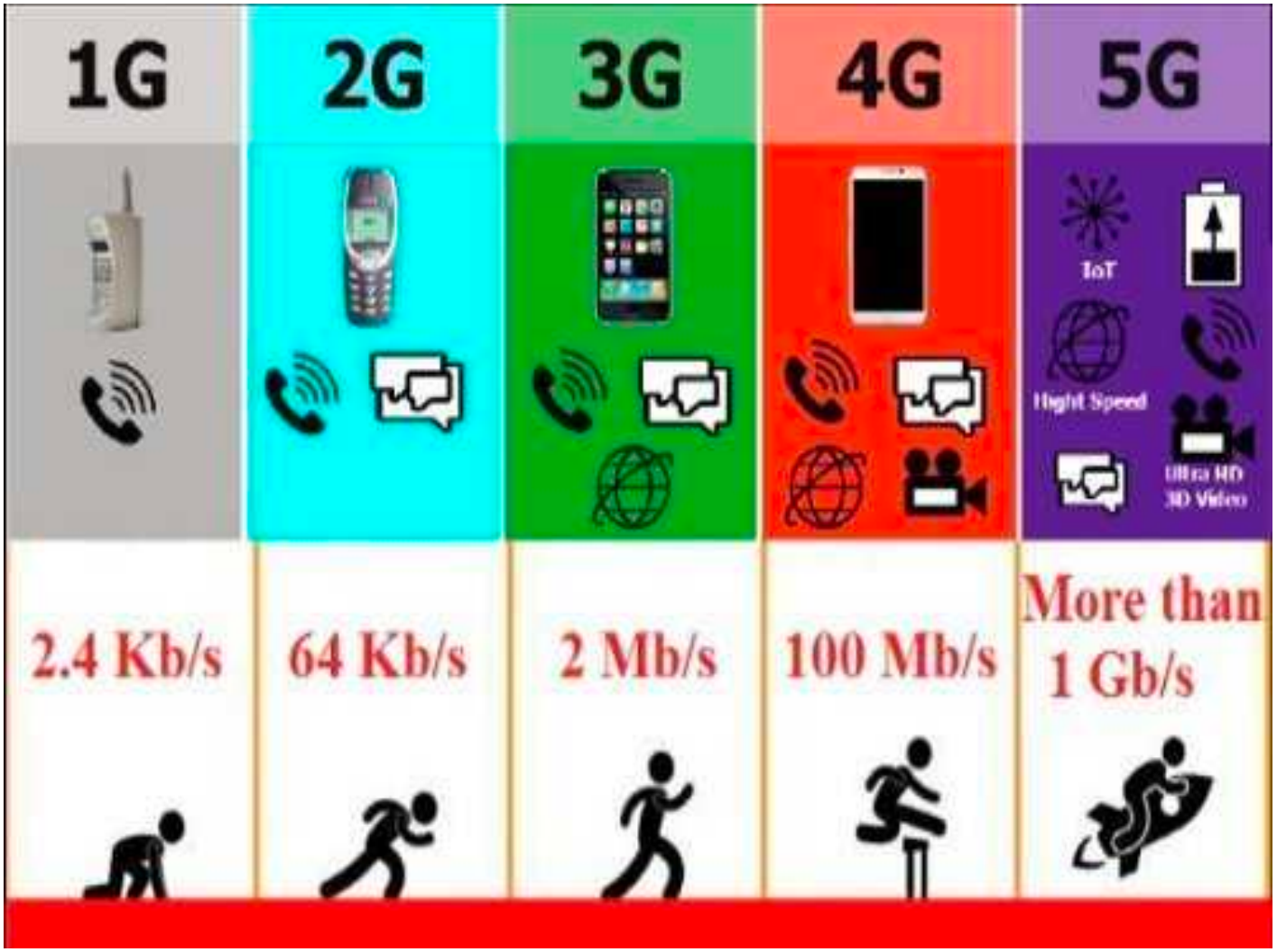
SpaceX's Starlink

- By 2027, SpaceX plans to have as many 12,000 Starlink satellites in orbit beaming high-speed internet to tens of millions of customers around the planet
- LEO: Low Earth Orbit = low latency, less jitter, more available bandwidth
- 244 satellites flying now
- Service to begin in 2020
- Cost to subscribers is uncertain, but will compare to other ISPs

Amazon’s Project Kuiper

- Plan to put 3,236 satellites in low Earth orbit — including 784 satellites at an altitude of 367 miles (590 kilometers); 1,296 satellites at a height of 379 miles (610 kilometers); and 1,156 satellites in 391-mile (630-kilometer) orbits.
- New initiative to launch a constellation of low Earth orbit satellites that will provide low-latency, high-speed broadband connectivity to unserved and underserved communities around the world,”
- Amazon said the satellites would provide data coverage for spots on Earth ranging in latitude from 56 degrees north to 56 degrees south. About 95 percent of the world’s population lives within that wide swath of the planet

Cellular


1G
2G
3G
4G
5G
IoT
High Speed
Ultra HD
3D Video
2.4 Kb/s
64 Kb/s
2 Mb/s
100 Mb/s
More than
1 Gb/s

Bottom Line

- You soon will have other viable options to Comcast and CenturyLink
- Increased competition normally drives down consumer costs
- Remains to be seen if new satellite services will be able to compete with terrestrial in urban areas
- Be aware of data caps!!
- Be aware of upstream speeds on satellite services

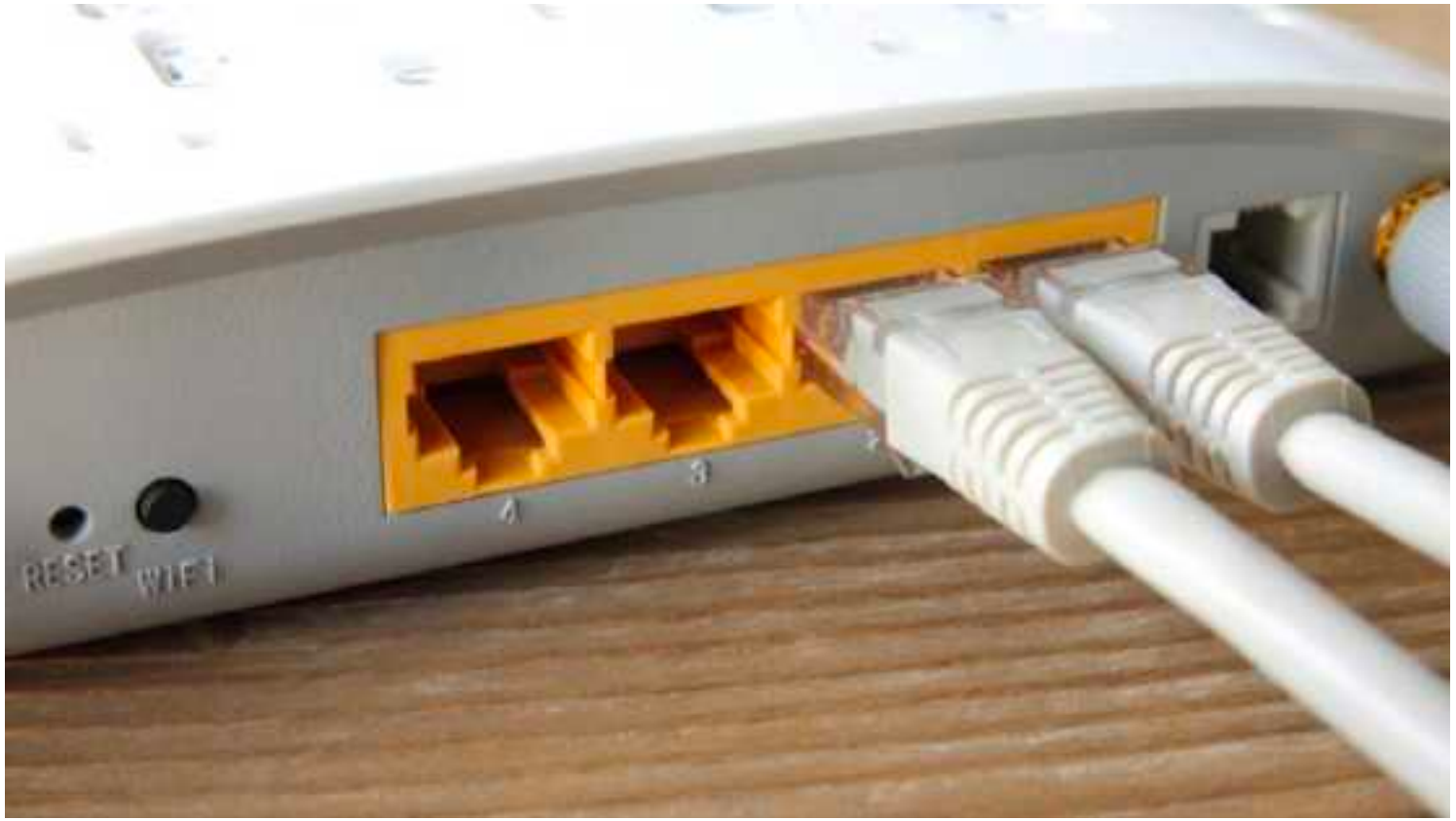
Internet Modems: Your gateway to the Internet

- To bring the internet into your home, you're going to need a modem
- This small device connects to your internet service provider (ISP). The connection is made via a cable (for cable or fiber internet) or phone line (DSL) from outside your house that plugs into the back of your modem

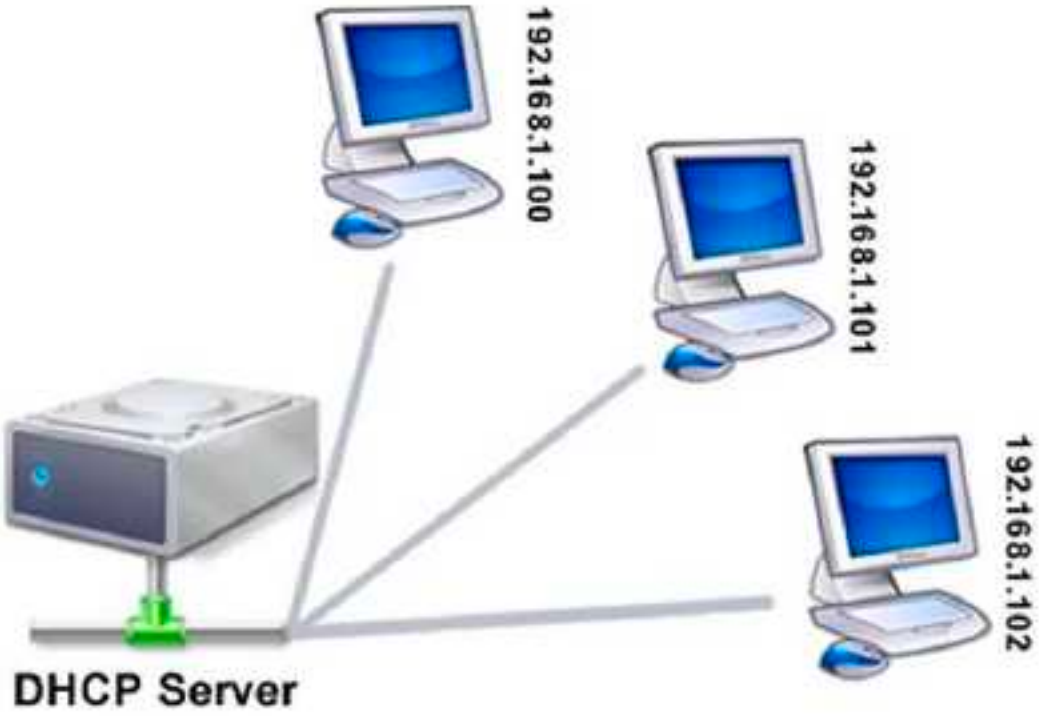
Modem – Router – Access Point

- Along with firewall and other services (e.g., DHCP server)

Switch



DHCP



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IP Addressing