

Managing Your Modem and Router:

Your First Line of Defense Against Cyber Threats ... When Using the Internet

Mike Pancione
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mcpanjr@gmail.com

WV IT estimates there are about 1100 routers,
of varying age,
throughout the community.

What Shape Is Yours In?

Let's find Out...
You're in the Right Place If:

- You use the internet, even a little
- You have heard stories about internet related cybercrime
 - Viruses
 - Theft of personal information
 - Loss of money, sleep
- You're worried about becoming a victim of cybercrime
- You want to reduce the risk of being a cybercrime victim
- You want to know what you should know, but not become an expert

Outline

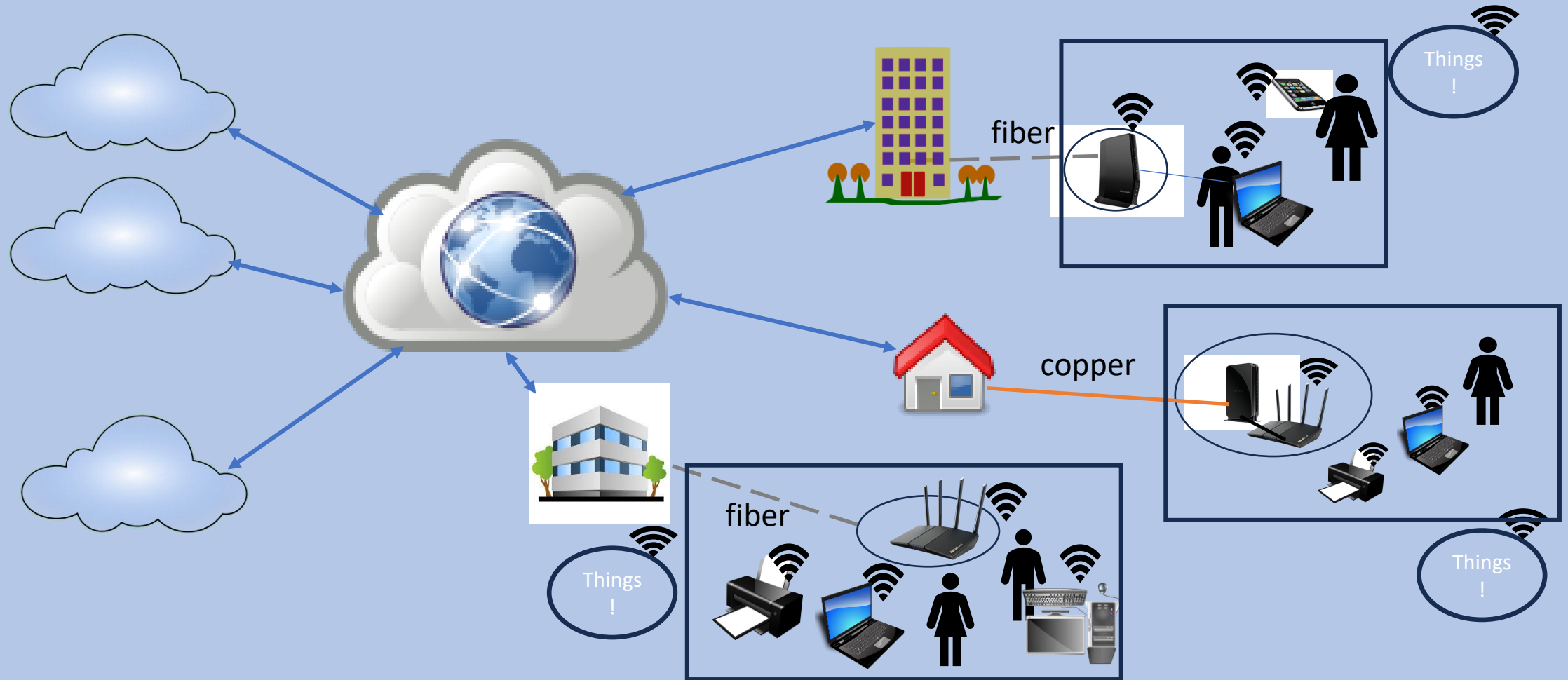
- What we think you need to know
- The Big Picture and the Roles of Modems and Routers
- Internet of Things
- Evolution of WiFi
- Living in Harmony with your Modem and Router
- Router Settings and what they mean
- Where to get help
- If there's time and interest:
 - Checking upload/download speed to your router
 - A peek into an actual router's settings
 - The need for speed

This is what we think you need to know

- Your router is your first line of defense against cyber threats when you attach to the internet
- You should insure is it up to date with the latest security standards
 - How do you find out?
 - Can it keep up with the changing security threats and technology changes?
- Is your router in the best location in your home
 - To give you the best coverage and
 - To keep it from getting damaged or interfered with by other electronics?
- Learning how to directly manage your router yourself is not necessary; you have access to people who do know how...but you'll have to help

The Big Picture: Accessing the Internet

(not drawn to scale)



Modems and Routers Explained

- They are “black boxes” that are actually black (but sometimes white)
- You had to buy or rent them if you wanted to use the internet
- They’re in your home blinking at you and you give them respectful distance

NETGEAR Modem/Routers



Mesh



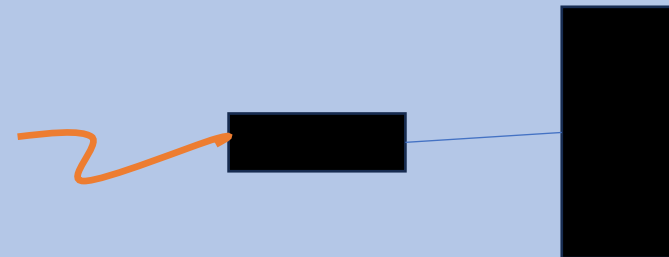
ASUS Modem/Router Currently Sold by WV



NETGEAR and Arris modems



Modem – Router Connection



What Do Modems Do?

- Modem – modulator/demodulator
- The modem is a [networking device](#) used to connect computing devices to the [internet](#).
- Used with cables (such as copper wire) that carry analog signals (voltage) from an Internet Service Provider (ISP) to buildings (such as homes, businesses, apt. buildings)
- The main function of a modem is to convert these [analog signals](#) into a digital form. ***The modem passes these digital signals to a router.***
- In places where the ISP transmits over fiber optic cable, there is no need for a modem because the signal is already in digital form. The cable connects directly to the router.
- Modems rarely fail and don't require much attention, which is a good thing

What Routers Do?

- Router: receives data from an ISP and forwards it between computer networks.
- Within a structure, a router creates (broadcasts) a signal (wireless local area network - WLAN) which allows many digital devices to participate in the network, without physically attaching to it (e.g. Wifi).
- Wifi offers flexibility of movement and location of devices within a structure
(Wifi, WLAN and LAN are often used interchangeably)
- Often, the structure cannot contain the network which then becomes visible to third parties.

Therefore: *Securing the Network with a Strong Password is Critical*

What Routers Do?

(continued)

- By sending data packets to their intended internet addresses, the router manages traffic between different networks and permits several devices to share an [Internet connection](#). So, a router is a digital traffic cop
- The Router also
 - Encrypts data in transit, making the data unreadable to unintended parties
 - Prevents hacking attempts from reaching computing devices connected to the router's network
 - Can evolve automatically, to a certain extent, to keep up with technology changes via firmware updates.
- Routers rarely fail, but if they do:
 - They can sometimes be resuscitated by rebooting (unplugging/plugging)
 - It usually requires expertise beyond the average consumer if rebooting fails

A few more things about routers

- Routers' costs vary depending on such things as
 - Number of devices they support
 - Strength of signal
 - Total area over which connected devices are disbursed
 - Support for latest technology: e.g. Wifi standard
 - Number of frequencies (speeds) supported: 2.5gh, 5.0 Gh, 6.0Gh
 - 2.5Gh is a lower speed but covers more area
 - 5.0Gh is faster but shorter range (covers less area)
 - 6.0Gh isn't faster but can reduce congestion in dense communities

Willow Valley's Router of Choice

Asus RT- AX1800S

- Sold, Installed and configured by WV IT
 - 12 character alphanumeric password
 - 10 character numeric router password
 - Enable the ASUS AiProtection security feature which provides
 - malicious site blocking,
 - intrusion prevention and
 - infected device blocking.
- WVIT upgrades the router to the latest firmware and ensure that automatic firmware updates are enabled.
- Excellent speed support for most: ~ 600mbps low end; ~1200mbps high end

Internet of Things: Devices That Can Connect to a Router's Network

- Computers
- Printers
- Cell Phones
- Tablets
- TV streaming accessories: ROKU, Amazon Fire Stick, Apple TV
- Appliances, even a gas grill
- Your Car

Internet of Things: Why is This Important to Mention?

The more devices that connect to your LAN, the more opportunities there are for things to go wrong, especially from a security standpoint

Evolution of WiFi Transmission Speeds Over the Years*

WiFi Version	Year	Frequency	Max Speed	Notable Features
WiFi 1 (802.11)	1997	2.4 GHz	2 Mbps	First WiFi standard, very slow
WiFi 2 (802.11b)	1999	2.4 GHz	11 Mbps	Affordable but interference-prone
WiFi 3 (802.11g)	2003	2.4 GHz	54 Mbps	Improved speed, still affected by interference
WiFi 4 (802.11n)	2009	2.4 & 5 GHz	600 Mbps	Introduced MIMO, dual-band support
WiFi 5 (802.11ac)	2014	5 GHz	1.3 Gbps	Beamforming, better signal quality
WiFi 6 (802.11ax)	2019	2.4 & 5 GHz	9.6 Gbps	Higher efficiency, lower latency
WiFi 6E (Extended)	2020	6 GHz	9.6 Gbps	More channels, less interference
WiFi 7 (802.11be)	2024	2.4, 5, & 6 GHz	46 Gbps	Faster speeds, lower latency, ideal for Augmented/Virtual Reality

* Source: oneworldrental.com

Living in Harmony with Your Router and Modem

- Placement in your residence is important; in this respect every modem and router is the same:
 - They have to be placed near where the cable from your ISP is located
 - If possible, they should be centrally located in your residence
 - They shouldn't be closed inside a box or otherwise confined
 - They shouldn't be on a floor, near a microwave, or other electrical interference
 - They shouldn't be near a damp area

Living in Harmony with Your Router and Modem

Every router is different.

- It's important that your router be set up to **optimize privacy**.
- At minimum you should check that its **settings** are at highest levels consistent with the ages of the devices that have to connect to the LAN
- Some routers can get automatic firmware updates from the manufacturer, that's why you should register yours with the manufacturer when you buy it.
 - **If it doesn't automatically update, you should do it, or cause it to be done**
- Rapidly changing technology may render a router obsolete if it is **5, or more, years old**.
Consider replacing it.

Router Settings and What They Mean

SETTING	STANDS FOR	FUNCTION
WLAN	Wireless Local Area Network	The signal that allows computer devices to collectively share data within the network and acts as a pathway to enter the Internet
SSID	Service Set Identifier	The name of the LAN
KEY	Network password	The password that secures the LAN from unauthorized access
Router Password	Router Password	Secures the router from unauthorized access; you need this to make changes to the router
IP Address	Internet Protocol Address	A unique number in the form: XXX.YYY.Z.A which identifies a computing device to networks. Like a street address
MAC address	Media Access Control address	Identifies the hardware devices with access to your network; e.g. my inkjet printer: 3C:77:E6:57:D9:E3
WPA, WPA2	WiFi Protected Access	Encryption built into a router; protects you from router hackers. Outdated
WEP	Wired Equivalent Privacy	Protocol used to protect wireless networks by encrypting data transmitted over them. Outdated
WPA2 AES	Advanced Encryption Std.	More advanced encryption. Widely used in homes and businesses
WPA3 Personal		Latest standard for networks; encrypts each device in a network. Older devices may not work with this option. Use WPA2 AES instead.

How to Check Your Router's Settings

- Look for a sticker on the outside
- Check the user manual:
 - Are they listed there?
 - Is the manual clear on how to access and change settings?
- Log in from a PC or cell phone
 - If this frightens you, contact: the manufacturer, WVIT (if it's their router), or WV CCTC.
 - Keeping the router and network passwords handy is very important
- Get Help at wvcomputerclub.org
 - Look for Router and/or Modem links - there are several people who may be able to help
 - Of course, if your router is down, you can call: 717-464-6330 (leave a msg.)

WWW.WVCOMPUTERCLUB.ORG

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Apple Users Club

Willow Valley Computer Club > Get Help > Get Help Chart

Get Help Chart

Do you have low vision or other challenges that make it difficult for you to use technology? Visit this page for help. [Accessibility Needs Helpers](#)

Threats	Hardware Devices	Operating Systems	Connectivity Issues	Software Applications
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Questions?

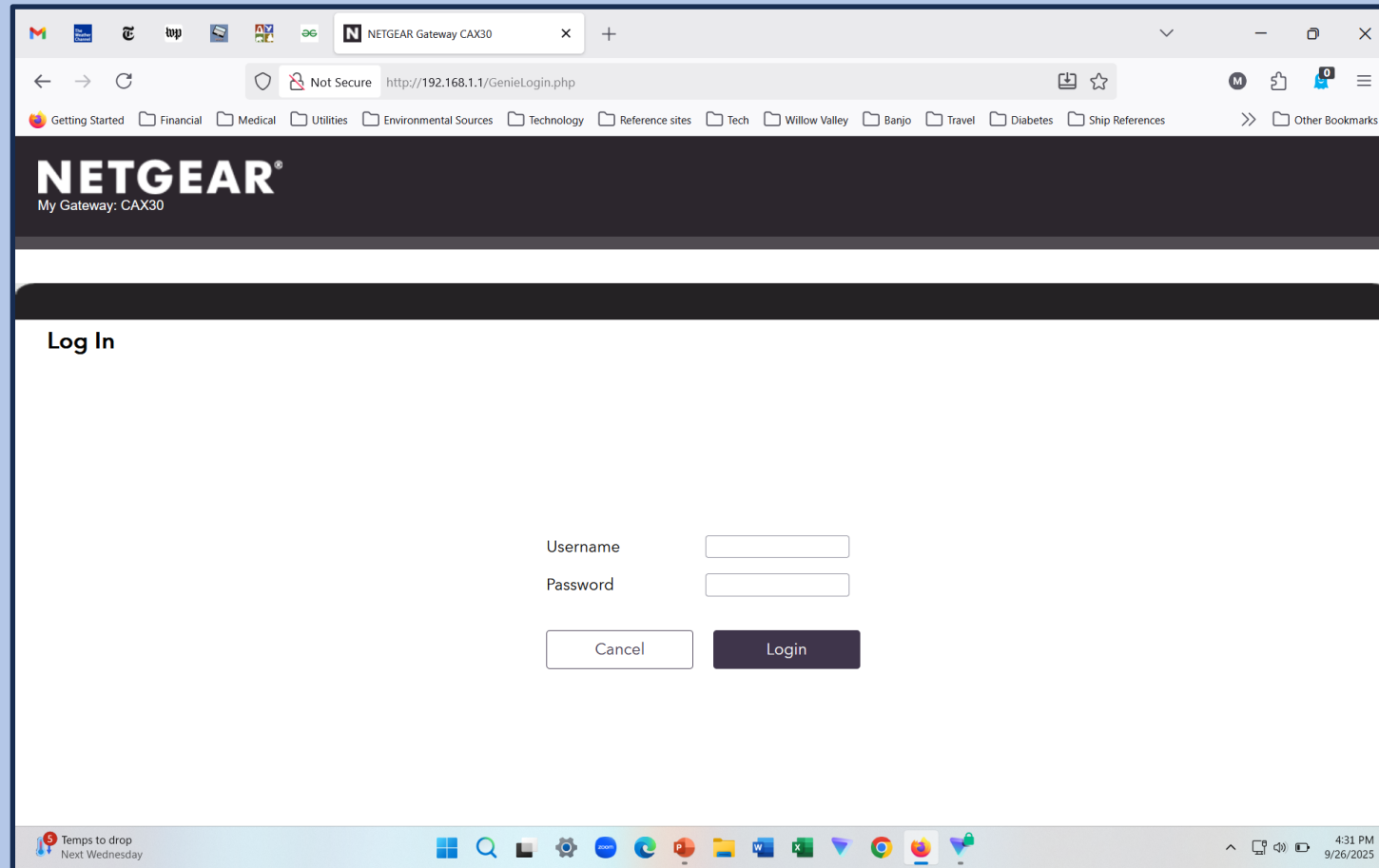
If There is Time and Interest

- Logging into a router
- Speed Testing an Internet Connection

Logging into a Router

Example: Logging into My Netgear Router:

Enter its IP address into the Browser URL: 192.168.1.1



Example: Logging into my Netgear Router

NETGEAR Gateway CAX30

Not Secure http://192.168.1.1/index.php

Getting Started Financial Medical Utilities Environmental Sources Technology Reference sites Tech Willow Valley Banjo Travel Diabetes Ship References Other Bookmarks

Basic Advanced

Home

Cable Connection

Wireless

Attached Devices

ReadySHARE

Guest Network

NETGEAR

Fast and easy control from anywhere.

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Cable Connection

Cable Diagnostic

Status: Good

Action: Your setup looks fine. If you are still experience an internet issue, the [Netgear Cable Knowledge Base](#) can provide additional troubleshooting info.

Internet Access: ■

Downstream Status: ■

Upstream Status: ■

Refresh Save Cable Diagnostic Info

Frequency start Value

This field below allows you to modify the frequency the cable modem start with its scan during initialization and registration. Enter the new start frequency and restart the cable modem for it to take effect.

Starting Frequency

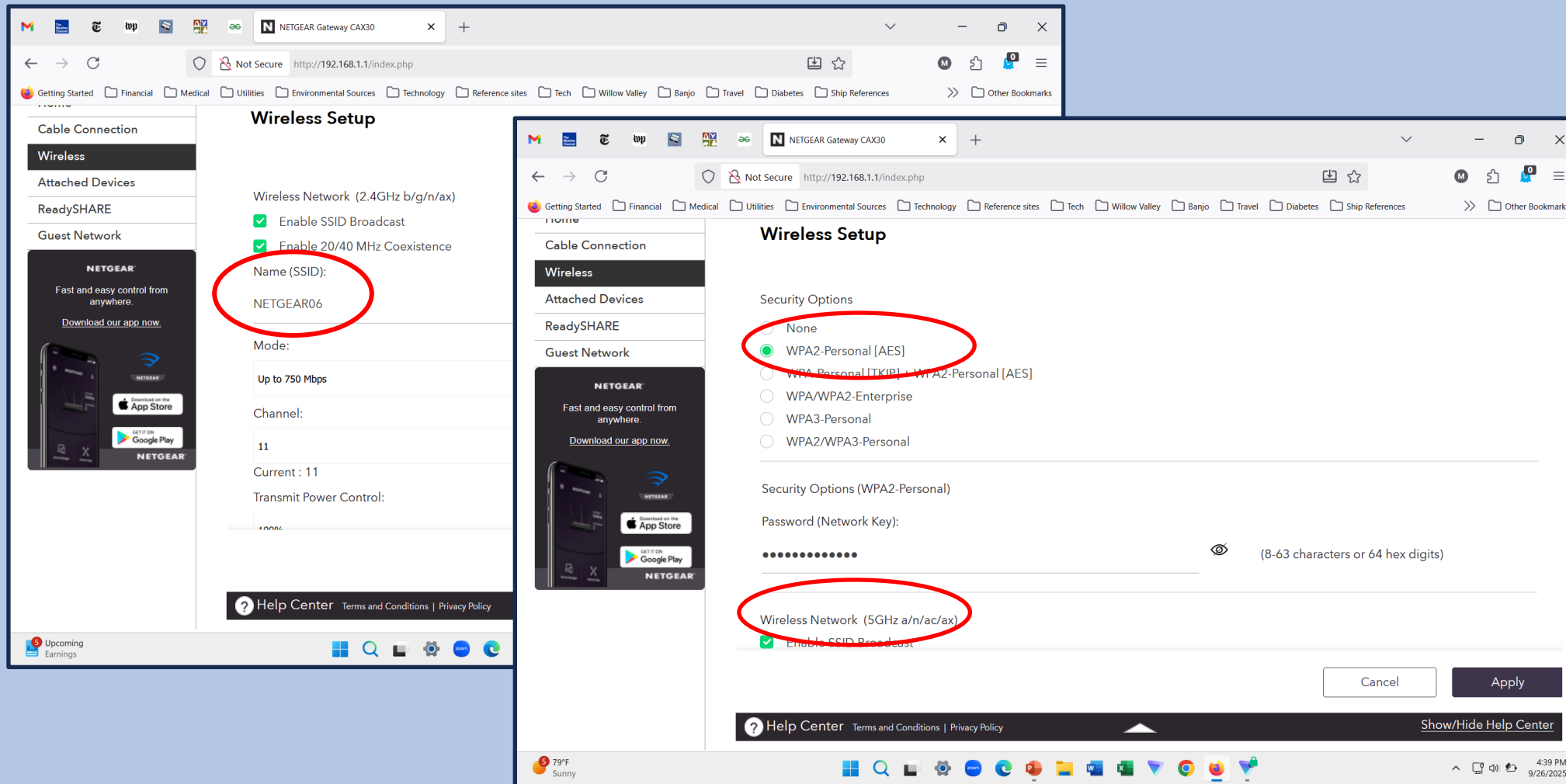
489000000

http://192.168.1.1/RgAttachedDevices.php

LVA - IND In 3 hours

4:35 PM 9/26/2025

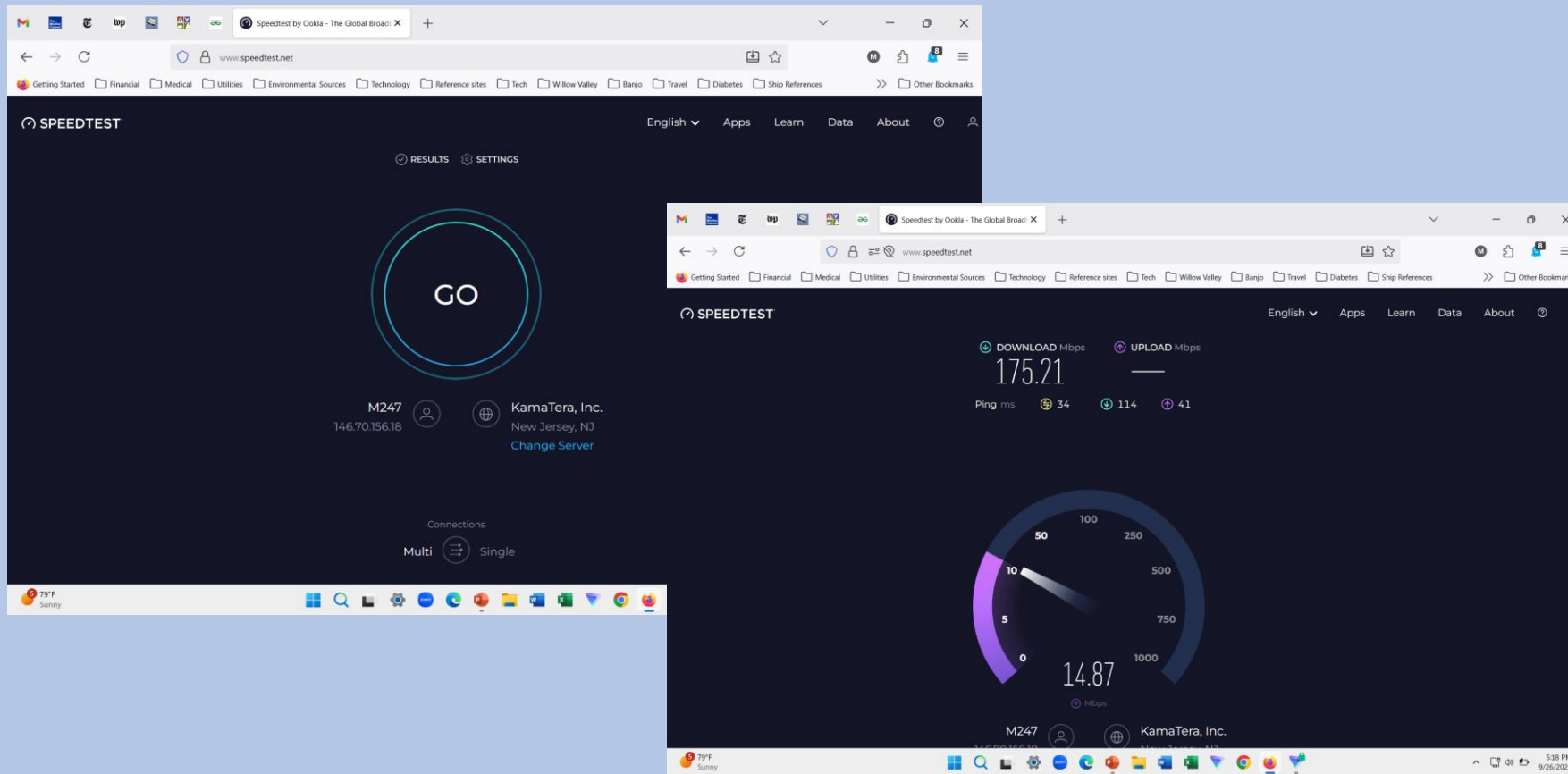
Example: Logging into My Netgear Router



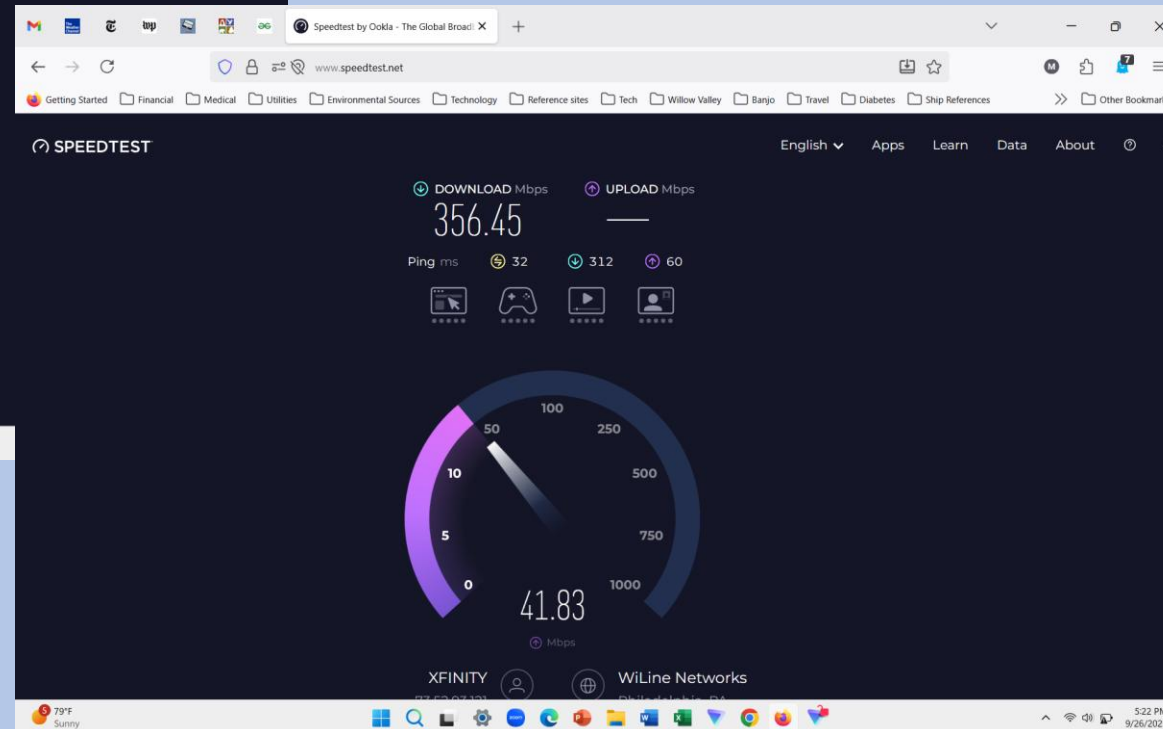
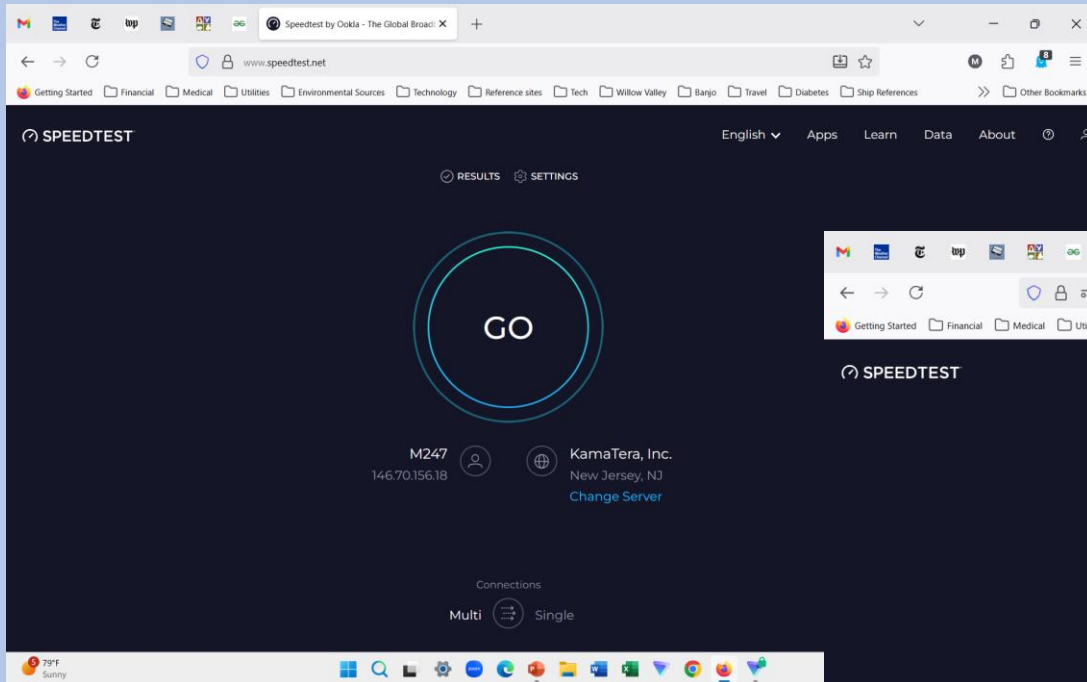
Cable Connection Wireless Attached Devices ReadySHARE Guest Network NETGEAR Fast and easy control from anywhere. Download our app now.  Download on the App Store GET IT ON Google Play NETGEAR	Attached Devices						
	☐	allow	Wired	 MikesPC	192.168.1.11	F8:E4:3B:7A:CE:9A	
	☐	allow	2.4G Wireless	 BRW3C77E657D9E3.hsd1.pa.comcast.net	192.168.1.7	3C:77:E6:57:D9:E3	
	☐	allow	5G Wireless	 iPhone	192.168.1.5	FE:DE:A9:DA:5F:A2	
	☐	allow	5G Wireless	 Roku	192.168.1.176	C8:3A:6B:57:01:62	
	☐	allow	5G Wireless	 TP-Link-AX1500 Wi-Fi 6 Range Extender	192.168.1.2	3C:52:A1:14:A5:AE	
Wireless Attached Devices ReadySHARE Guest Network NETGEAR Fast and easy control from anywhere. Download our app now.  Download on the App Store GET IT ON Google Play NETGEAR	☐	allow	5G Wireless	 iPad	192.168.1.8	DE:44:C7:CD:29:0B	
	☐	allow	5G Wireless	 MikesPC	192.168.1.3	00:D4:9E:B3:D1:ED	
	☐	allow	5G Wireless	 Samsung	192.168.1.4	64:07:F6:98:0B:F0	

How Much Speed Do You Need?

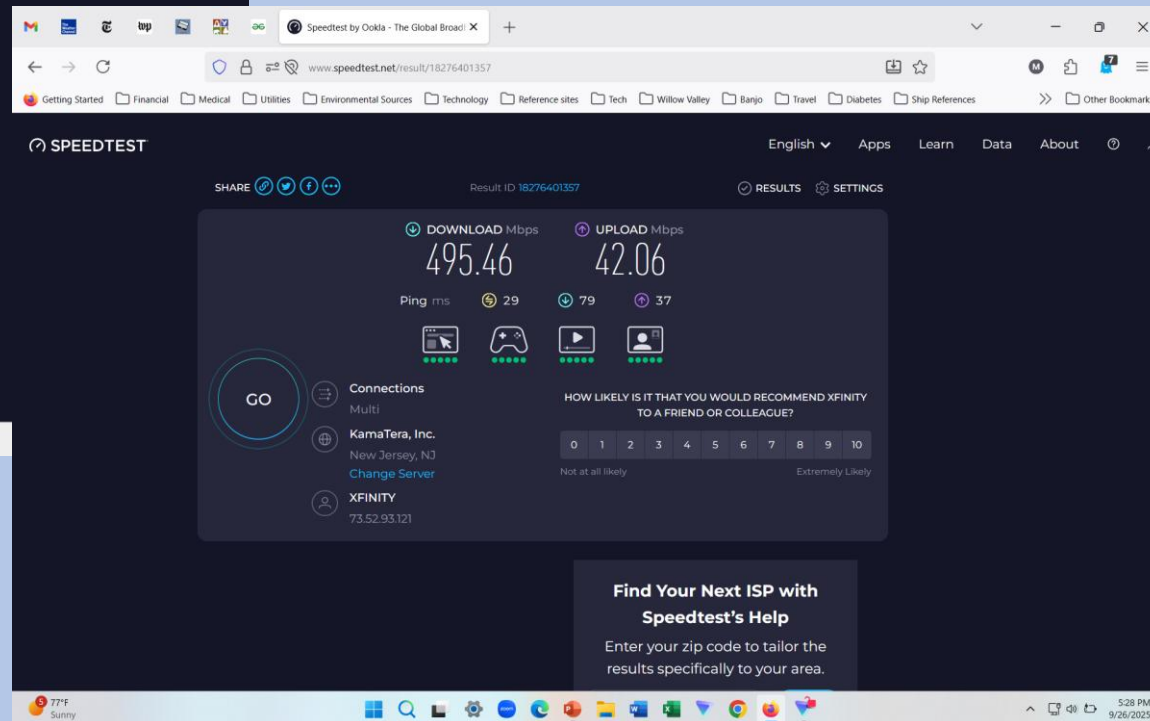
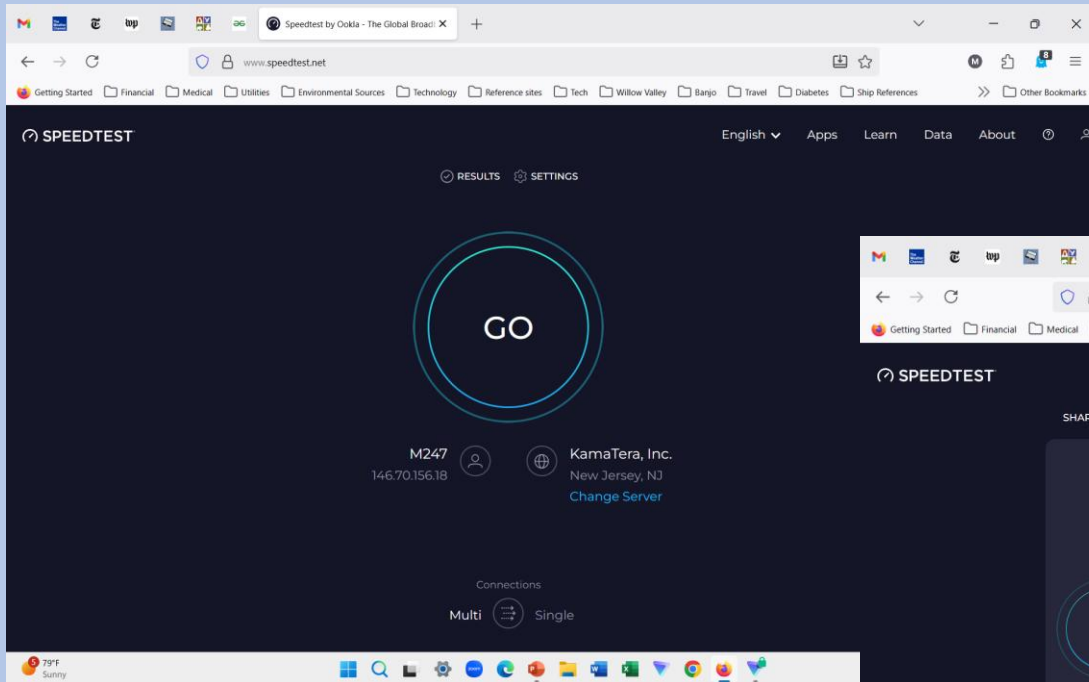
Example: Speed testing, VPN on www.speedtest.net



Example: Speed testing, VPN Off



Example: Speed testing, VPN ON, Wired connection



How Much Speed Do You Need?*



Streaming 4K: Speed Requirements by Platform

Streaming Service	Minimum Speed for 4K	Recommended Speed
Netflix	15 Mbps	25 Mbps
Amazon Prime Video	15 Mbps	25 Mbps
Disney+	25 Mbps	30 Mbps
YouTube	20 Mbps	25 Mbps

* Thanks to Tony Poulos

How Much Speed Do You Need?*

- Maximum Speed Over Much of Willow Valley
 - 200 Mbs download (probably enough for most)
 - 10 Mbs upload
- SouthPointe > 400 Mbs download, > 40 Mbs upload
- WVIT currently upgrading internet speeds

* Thanks to Tony Poulos