# Managing Your Modem and Router

## A Computer Club Class for the Renaissance Education Series
## May 2, 2022, 10:00–11:00 a.m.

Presenter: Tony Poulos

Modems

Routers

Apartment Wi-Fi Network

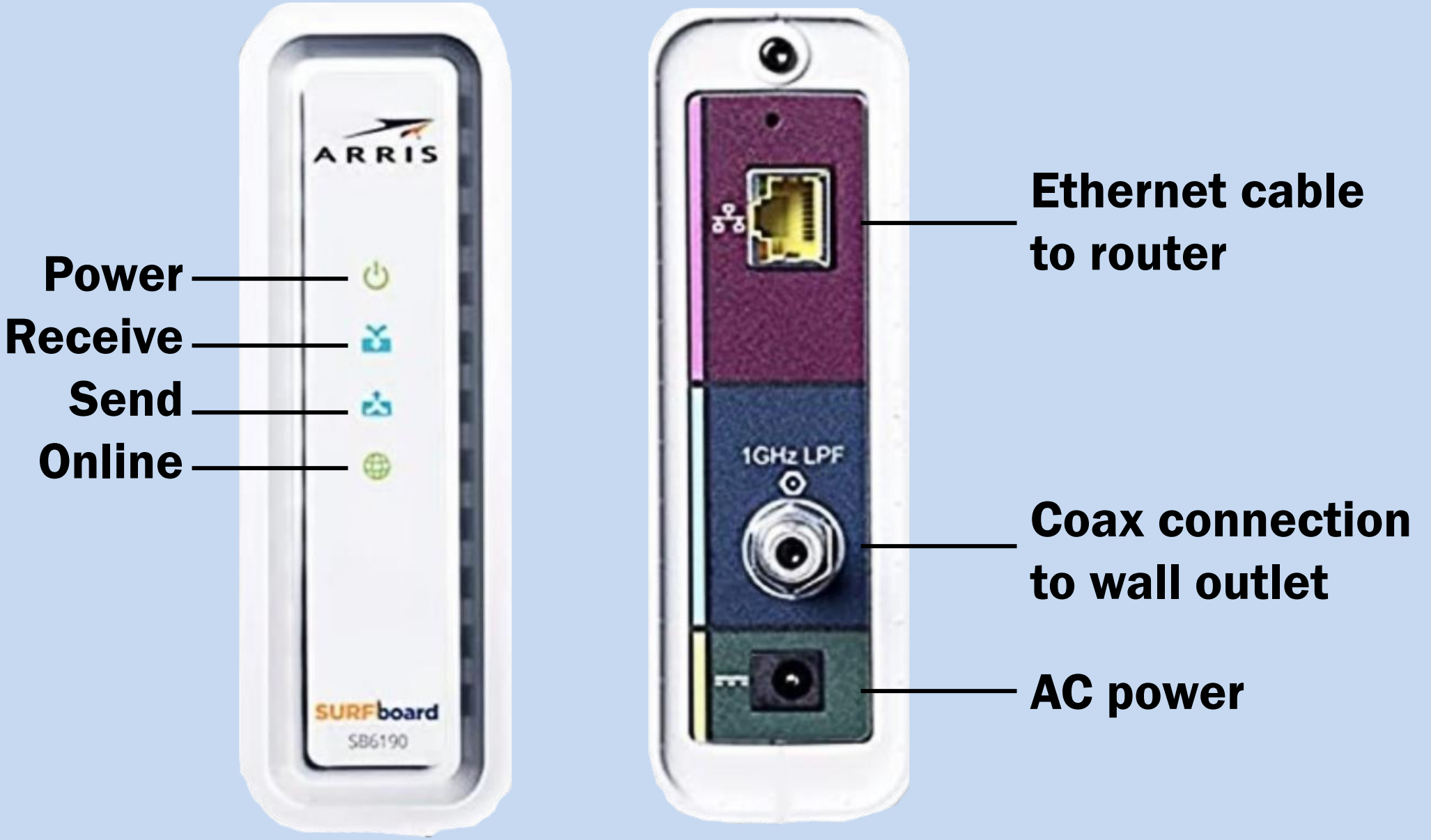
Troubleshooting

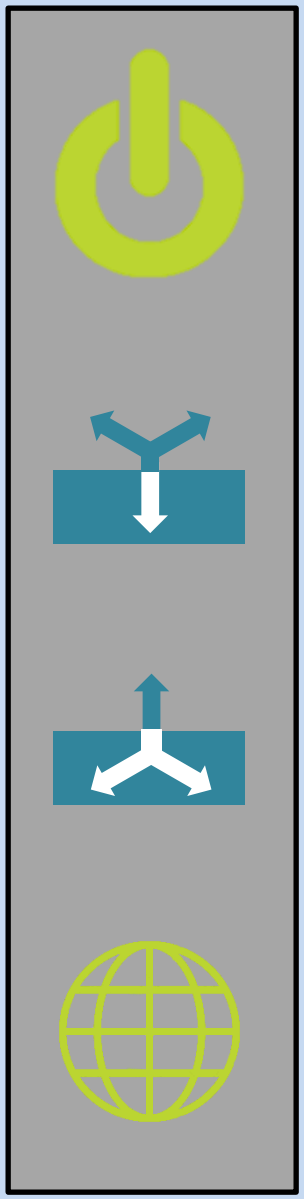
# TOPICS

# MODEM

# Modem

- Modulator/Demodulator
- It takes the signals that come from your Internet Service Provider, or ISP, and translates them into an Internet connection for your Wi-Fi router to broadcast.
- Typically, no Setup or System Settings


Power
Receive
Send
Online
ARRIS
SURFboard
SB6190
1GHz LPF
Ethernet cable
to router
Coax connection
to wall outlet
AC power



Power
Receive
Send
Online

Ethernet cable to router

Coax connection to wall outlet

AC power

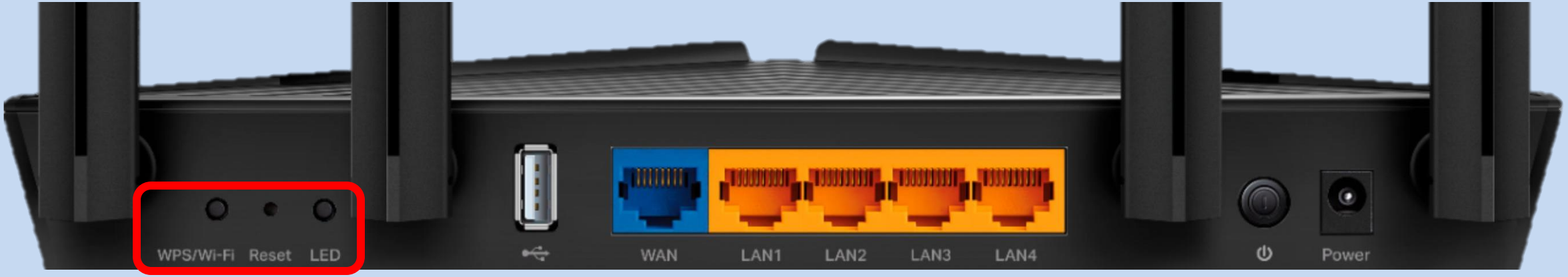
# Modem

- **Data Over Cable Service Interface Specification (DOCSIS)**
  - **An international telecommunications standard that permits the addition of high-bandwidth data transfer to an existing cable television (CATV) system.**
- **Willow Valley recommended modems include: Arris Surfboard DOCSIS 3.0 modem, model SB6183 or SB6190**
- **No maintenance required**
- **Can connect a Laptop to Modem for Testing**
- **Modem/Router combo?**

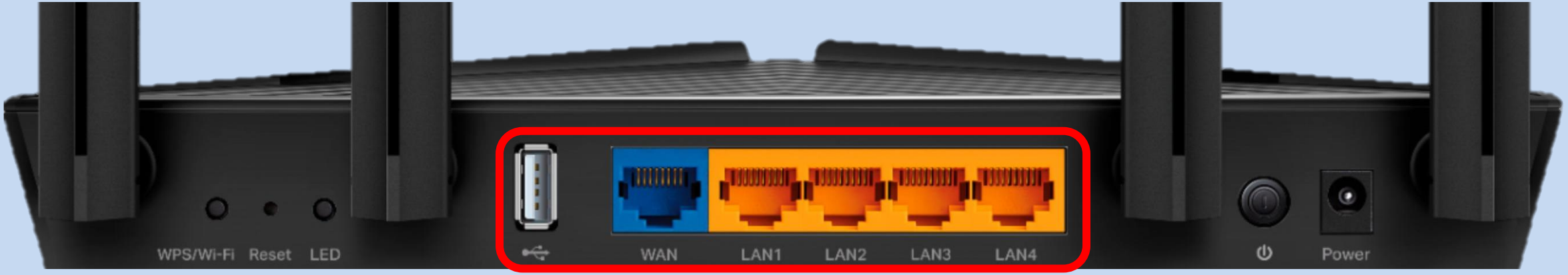
# ROUTER

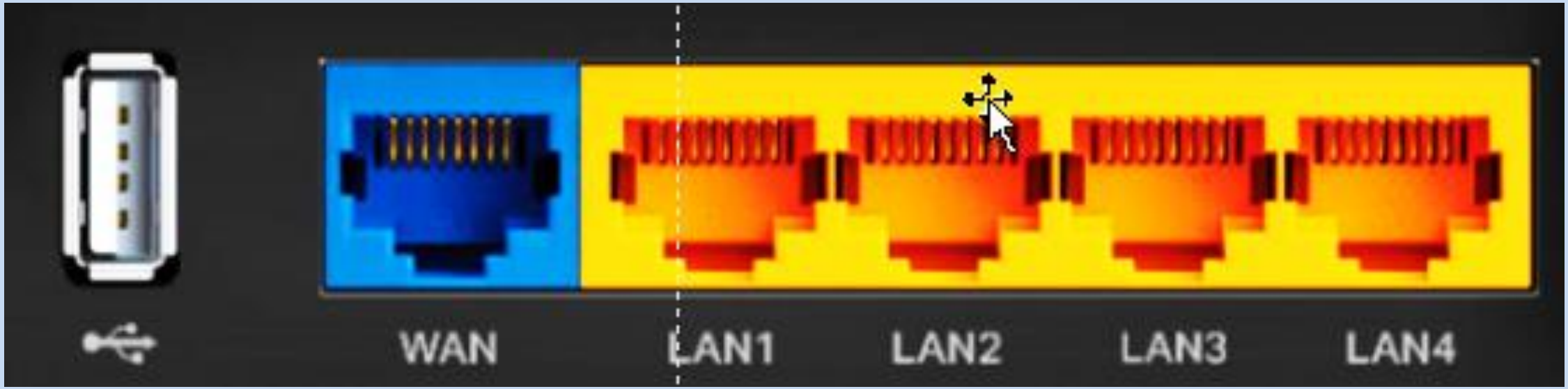
# Routing

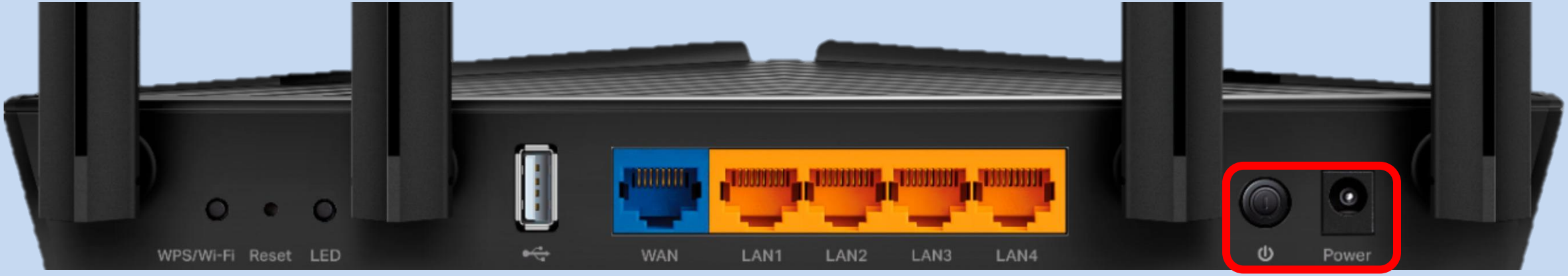
- Home and small office routers simply forward data (IP packets) between the computer and the Internet.
- Your router's main responsibility is to route data between devices in your home, and between those devices and the Internet.
- The system of interconnected devices in your home plus the router itself collectively makes up your home network.



# TP-Link AX1800

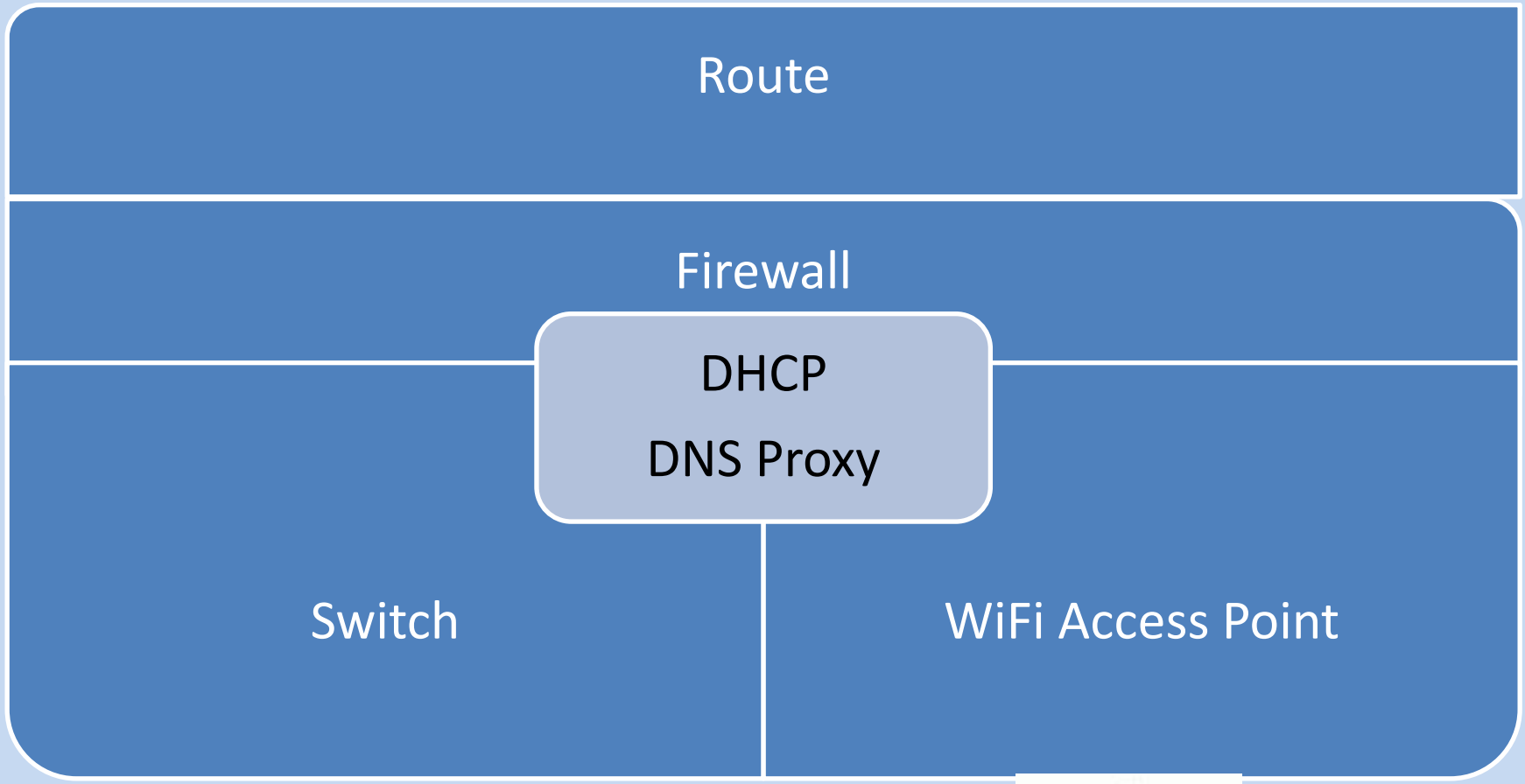

WPS/Wi-Fi
Reset
LED
WAN
LAN1
LAN2
LAN3
LAN4
Power

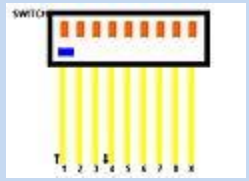

WAN
LAN1
LAN2
LAN3
LAN4


WPS/Wi-Fi
Reset
LED
WAN
LAN1
LAN2
LAN3
LAN4
Power

Power

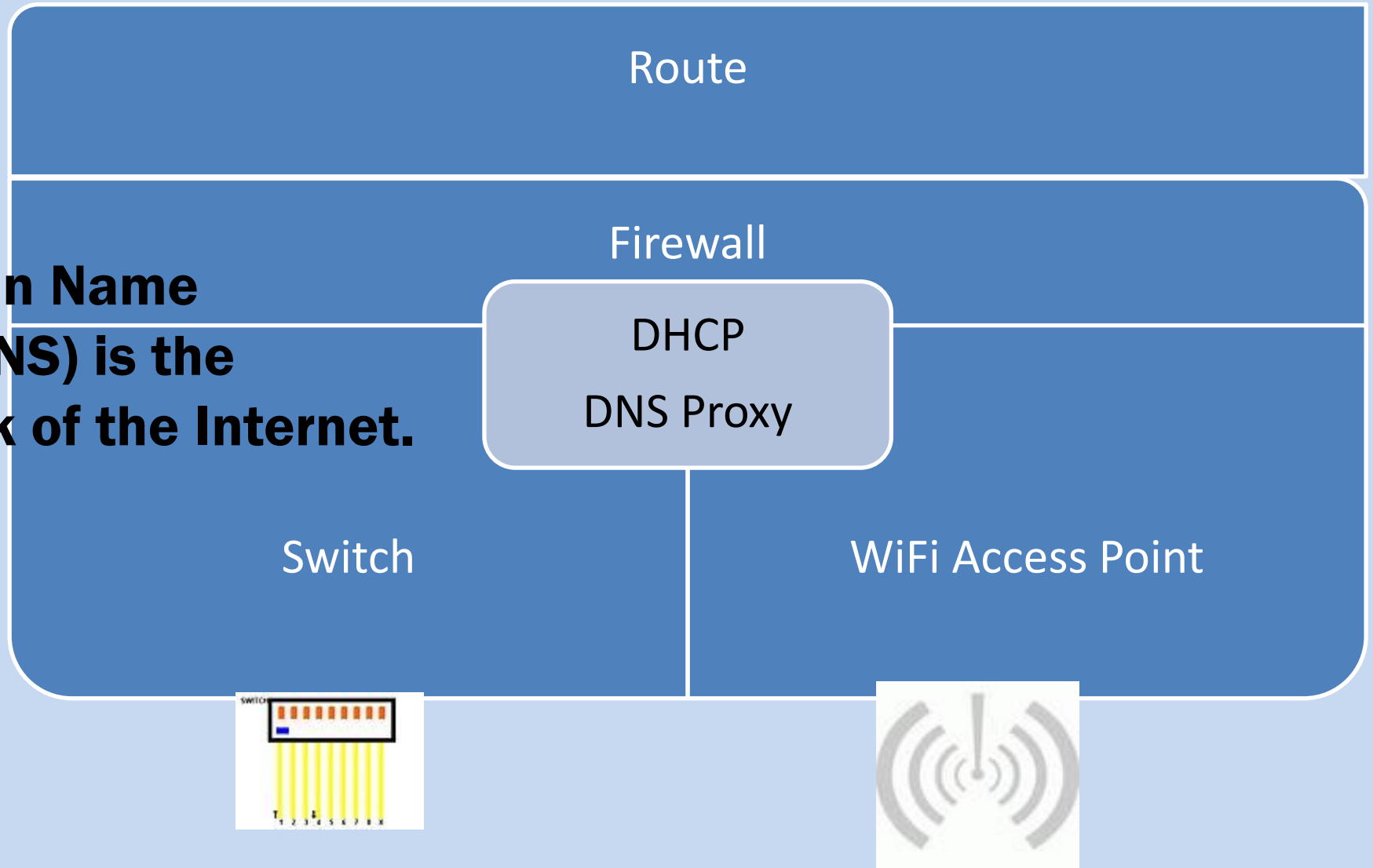
# Modern Router



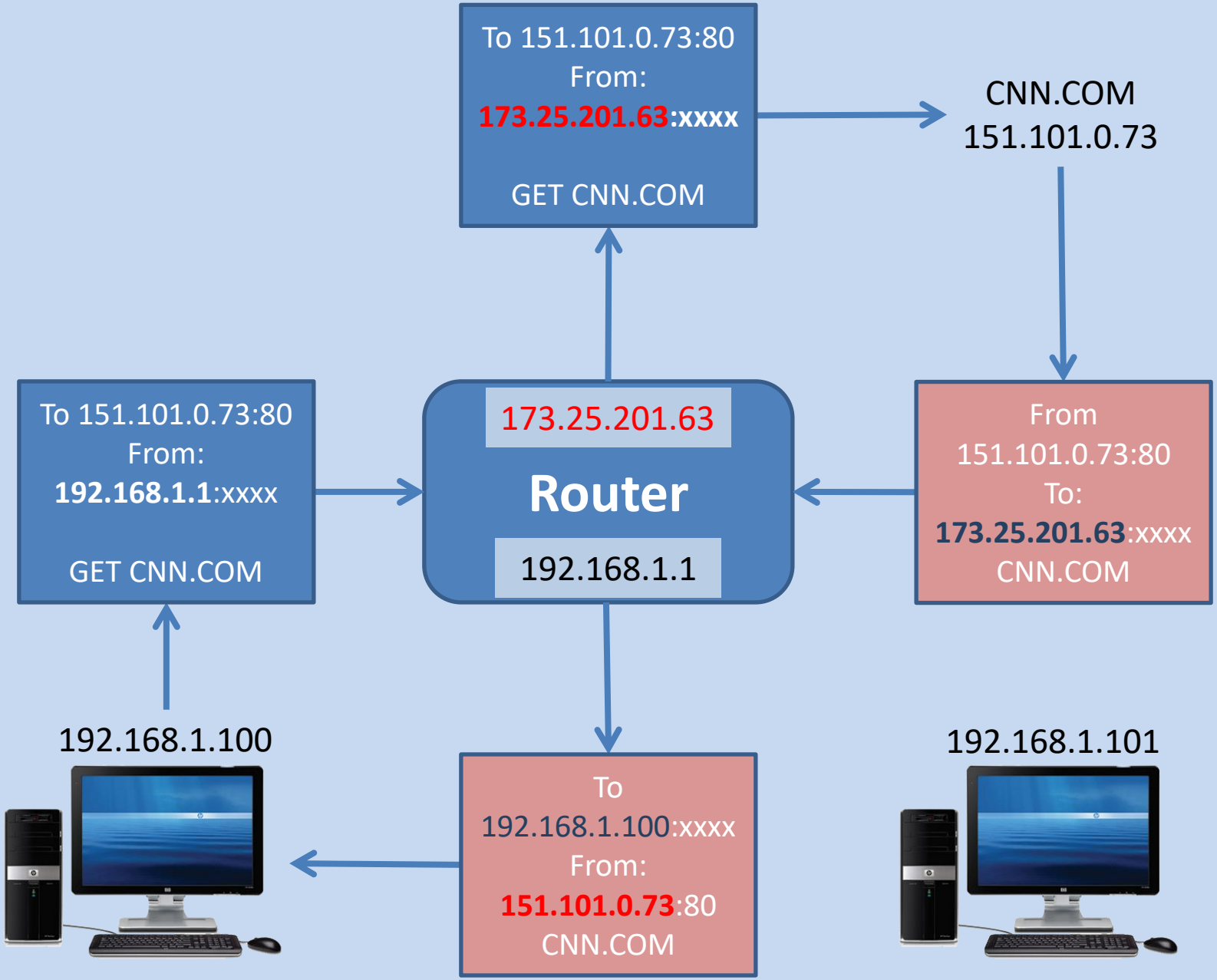
**DHCP (Dynamic Host Configuration Protocol) is a network management protocol used to dynamically assign an Internet Protocol (IP) address to any device, or node, on a network so they can communicate using IP.**

**The Domain Name System (DNS) is the phonebook of the Internet.**

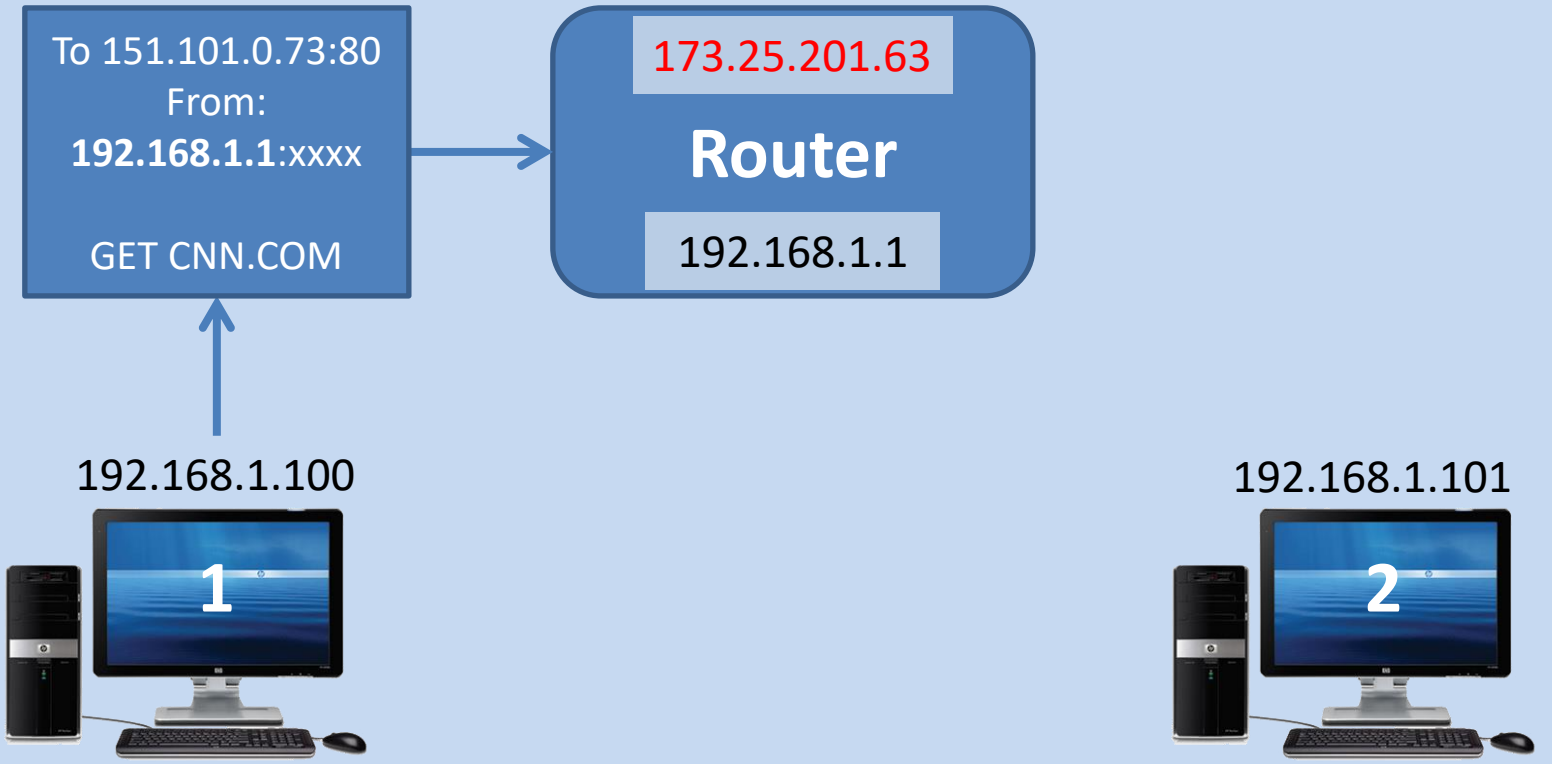


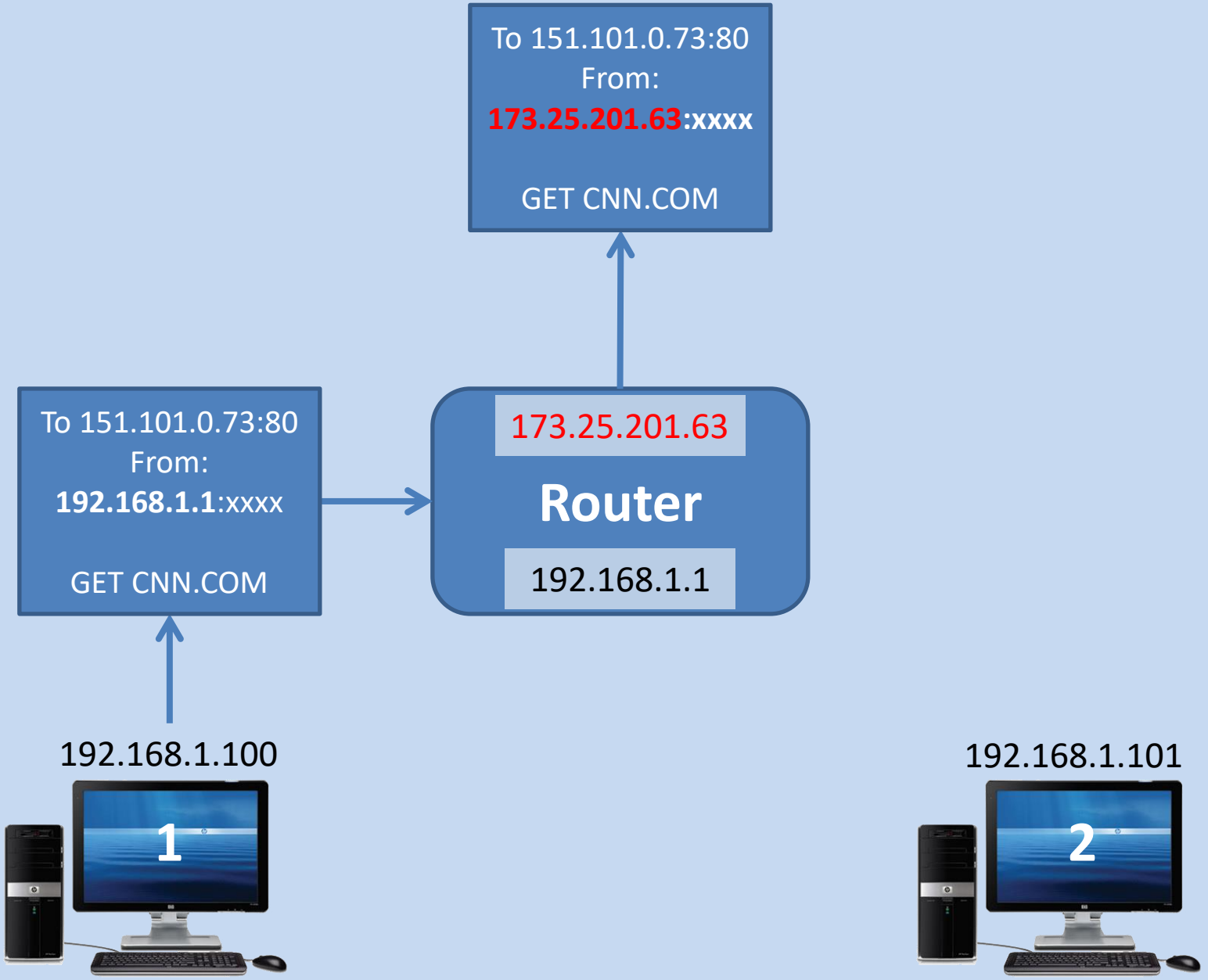
# Routing

- Logs Outgoing Requests
- Accepts Only Requested Traffic
- Provides Addressing for LAN (DHCP)
- Directs Incoming Traffic to Proper Device


To 151.101.0.73:80
From:
173.25.201.63:xxxx
GET CNN.COM
CNN.COM
151.101.0.73
To 151.101.0.73:80
From:
192.168.1.1:xxxx
GET CNN.COM
173.25.201.63
Router
192.168.1.1
From
151.101.0.73:80
To:
173.25.201.63:xxxx
CNN.COM
192.168.1.100
To
192.168.1.100:xxxx
From:
151.101.0.73:80
CNN.COM
192.168.1.101

**An IP address, or Internet Protocol address, is a series of numbers that identifies any device on a network.**


To 151.101.0.73:80
From:
192.168.1.1:xxxx
GET CNN.COM
173.25.201.63
Router
192.168.1.1
192.168.1.100
1
192.168.1.101
2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173.25.201.63:xxxx
GET CNN.COM
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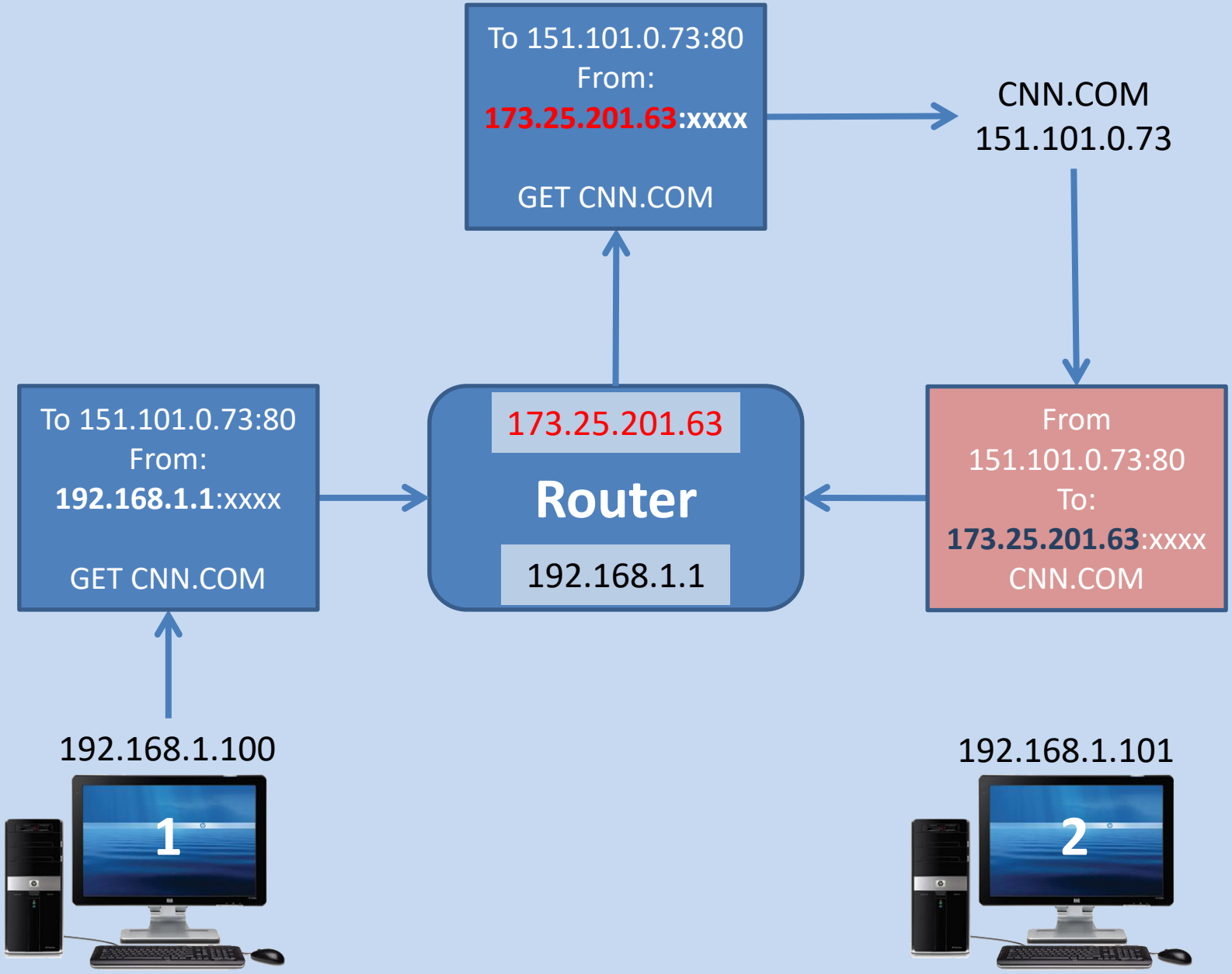
From:
192.168.1.1:xxxx
GET CNN.COM
173.25.201.63
Router
192.168.1.1
192.168.1.100
192.168.1.101
1
2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Router
192.168.1.1
From
151.101.0.73:80
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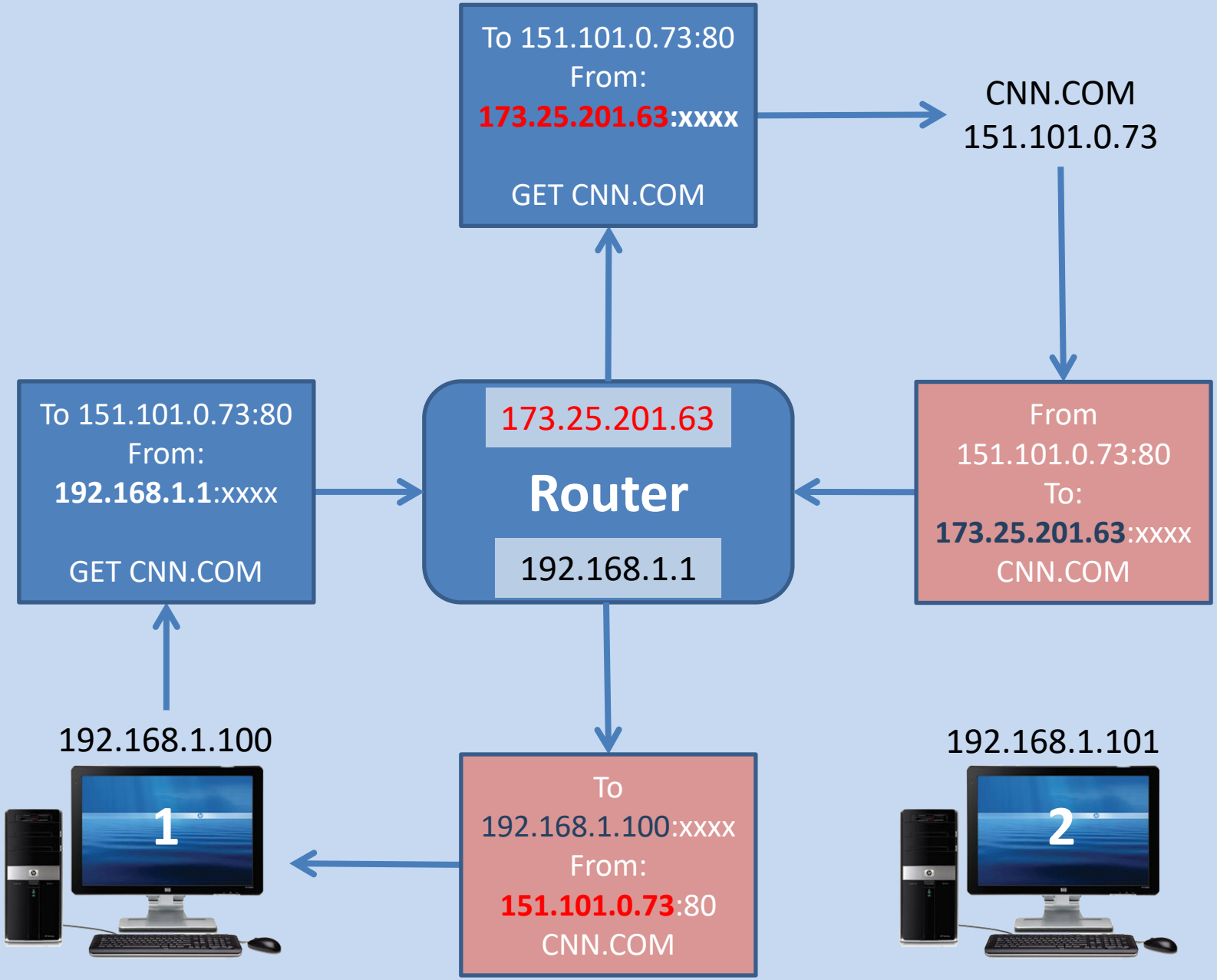
173.25.201.63:xxxx
CNN.COM
192.168.1.100
1
192.168.1.101
2


To 151.101.0.73:80
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GET CNN.COM
CNN.COM
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173.25.201.63
Router
192.168.1.1
From
151.101.0.73:80
To:
173.25.201.63:xxxx
CNN.COM
192.168.1.100
1
To
192.168.1.100:xxxx
From:
151.101.0.73:80
CNN.COM
192.168.1.101
2

# 2.4 GHz vs 5 GHz

- 2.5 G has longer range, but isn’t as fast
- 5 G is faster, but has a shorter range

- My recommendation: use 5G unless signal strength is a problem

# Mesh Routers

- A main router connected to the Internet plus satellite routers
- Usually for large homes

- A Wi-Fi extender

# Signal Attenuation

| Obstacle | Additional losses (dB) | Effective distance* |
|---|---|---|
| Open space | 0 | 100% |
| Window without tinting (no metalized coating) | 3 | 70% |
| Window with tinting (metalized coating) | 5-8 | 50% |
| Wooden wall | 10 | 30% |
| Interior wall (15.2 cm) | 15-20 | 15% |
| Bearing wall (30.5 cm) | 20-25 | 10% |
| Concrete floor/ceiling | 15-25 | 10-15% |
| Monolithic reinforced concrete slab | 20-25 | 10% |

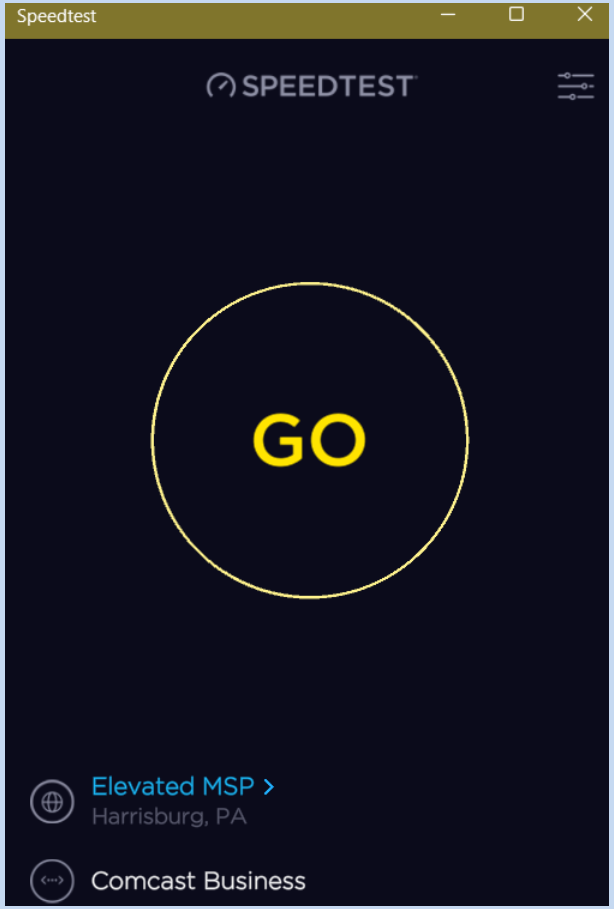
**Source: Keenetic.com.**

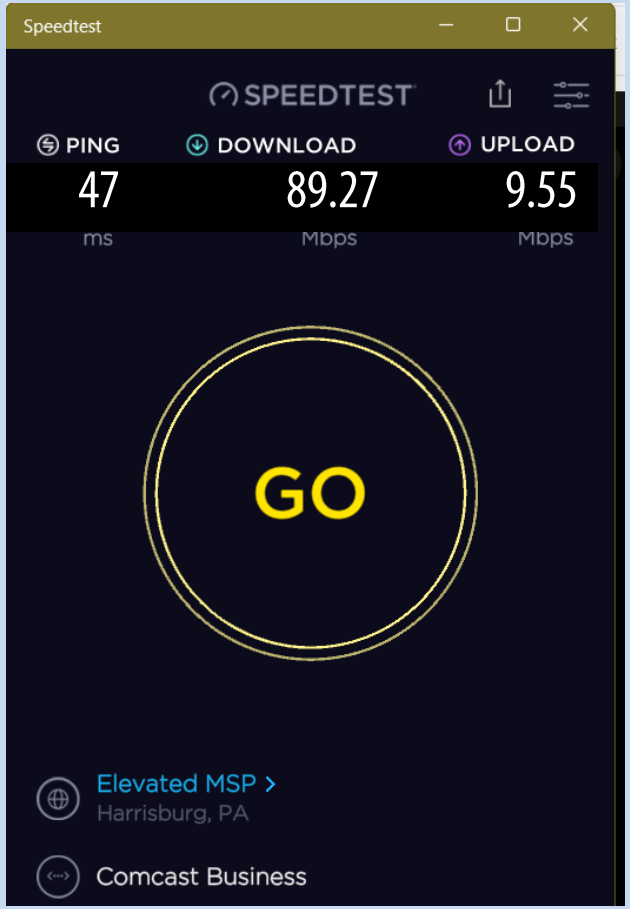
# Check Speed

# Speedtest.net by OOKLA

**Netflix**
**5 Mbps for full HD**
**25 Mbps for 4K**

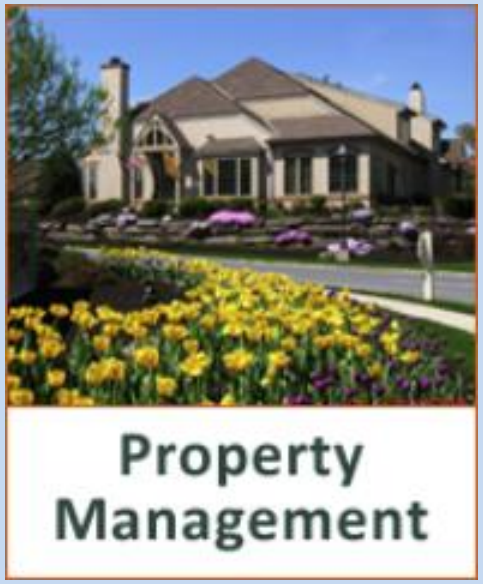
**In General**
**25 Mbps down is good for most residents**




**Mbps,** megabits per second

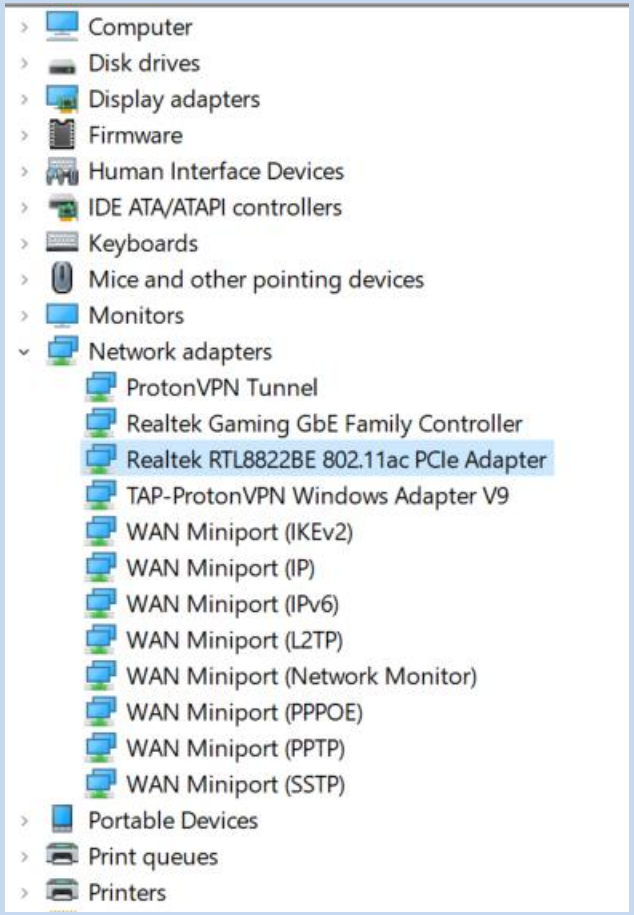
# Property Management




- From Property Management>TV and Internet Information>CampusNET
- Modem $60  Router $120 from Willow Valley
- Recommended modems include: Arris Surfboard DOCSIS 3.0 modem, model SB6183 or SB6190.
- TP-Link Router for Wireless, model AX1800 (Archer AX21)
- AVOID “ZOOM” brand modems—connection issues have occurred with this brand

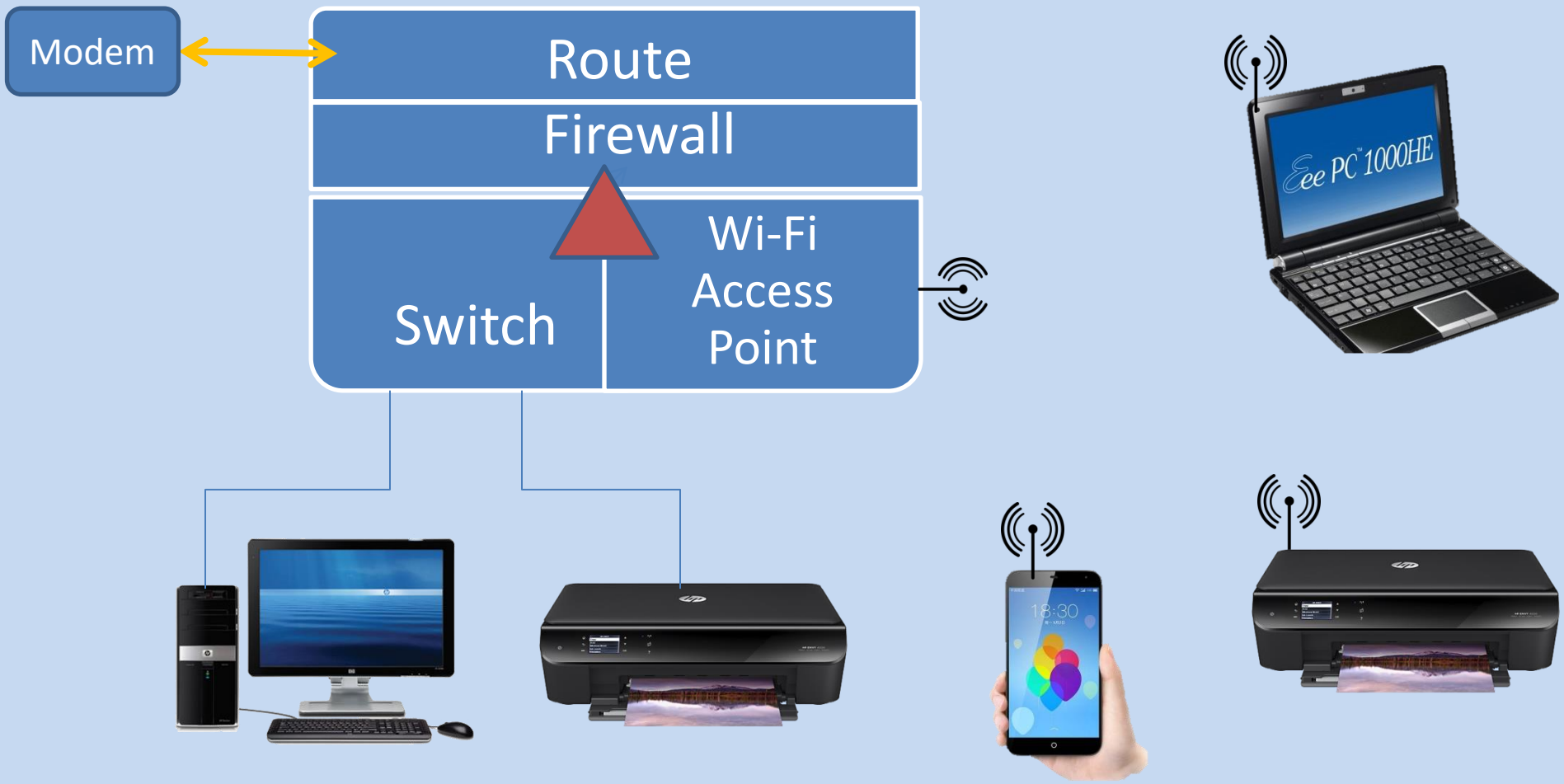
# Maintenance

- Periodically check for router firmware updates
  - Sign into router setup screen
- Periodically check for updates to the network adapters in your computer
  - Device Manager>Network Adapters right click on Wi-Fi adapter>select update driver>search automatically for drivers



# APARTMENT WI-FI NETWORK

# Sample Apartment Network



Modem

173.25.201.63

ROUTER

192.168.1.1

Local Area Network (LAN)

192.168.1.100

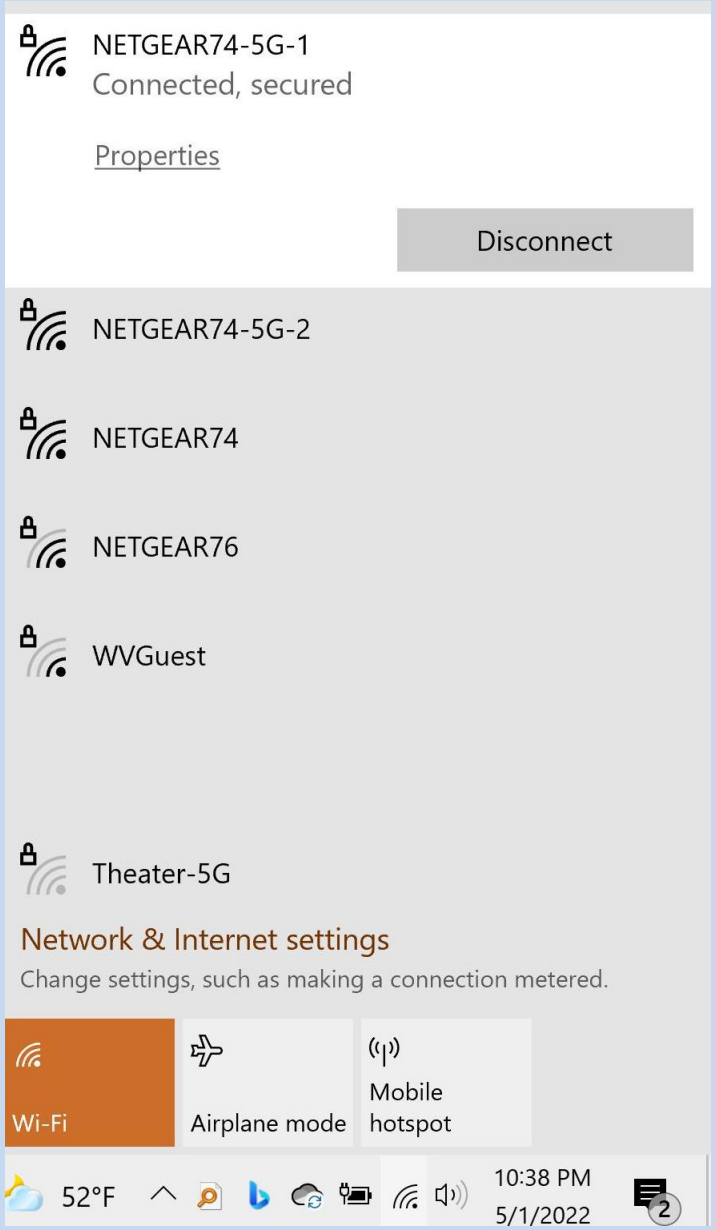
192.168.1.101

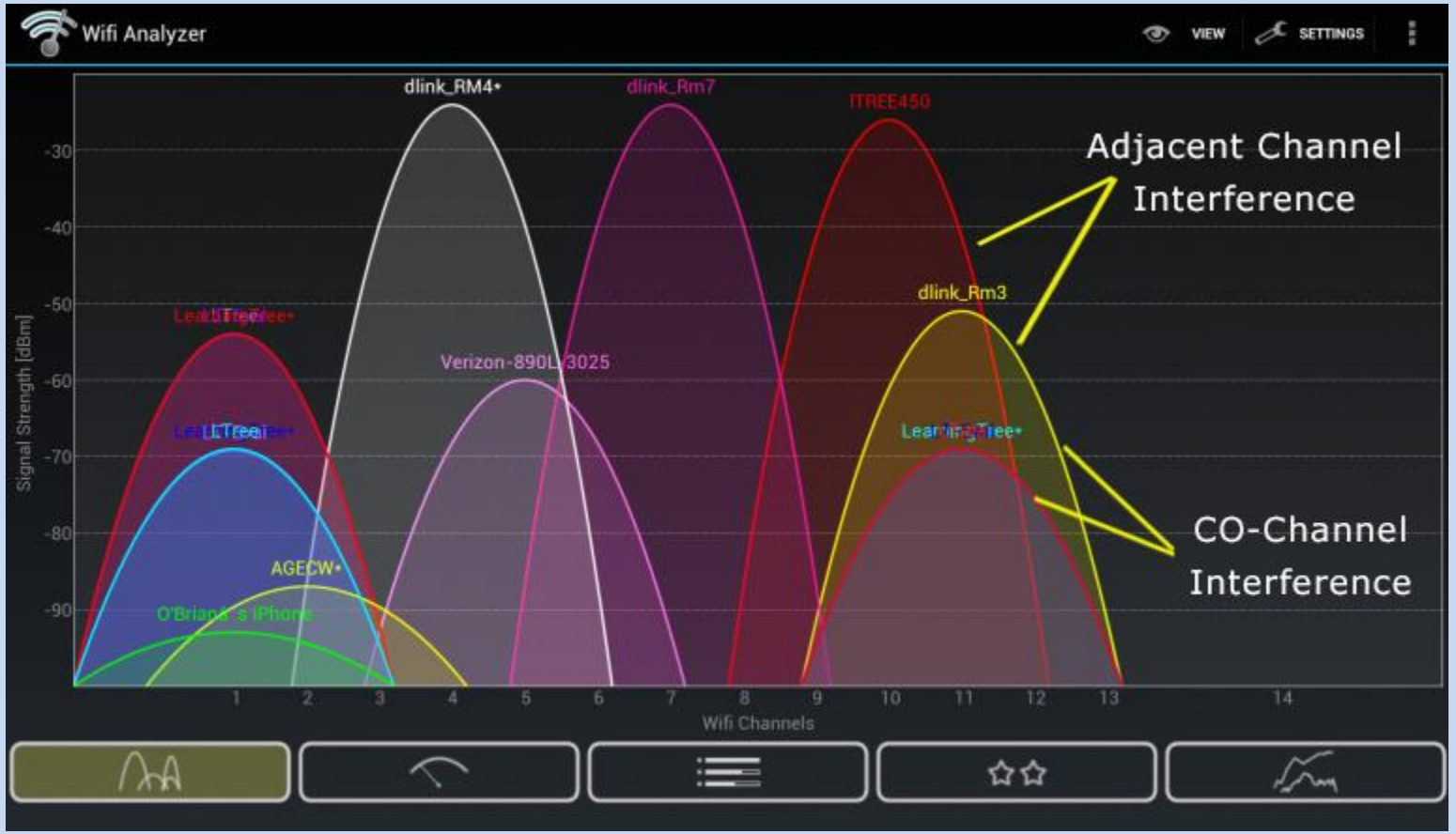
192.168.1.102

# Local Area Network

- Router serves as an interface between the Internet and the LAN
- Each Device in the LAN has a unique address
- Portions of Internet Address Range reserved for local “Private” network addressing
- Addresses usually provided by the Router

# Nearby Networks

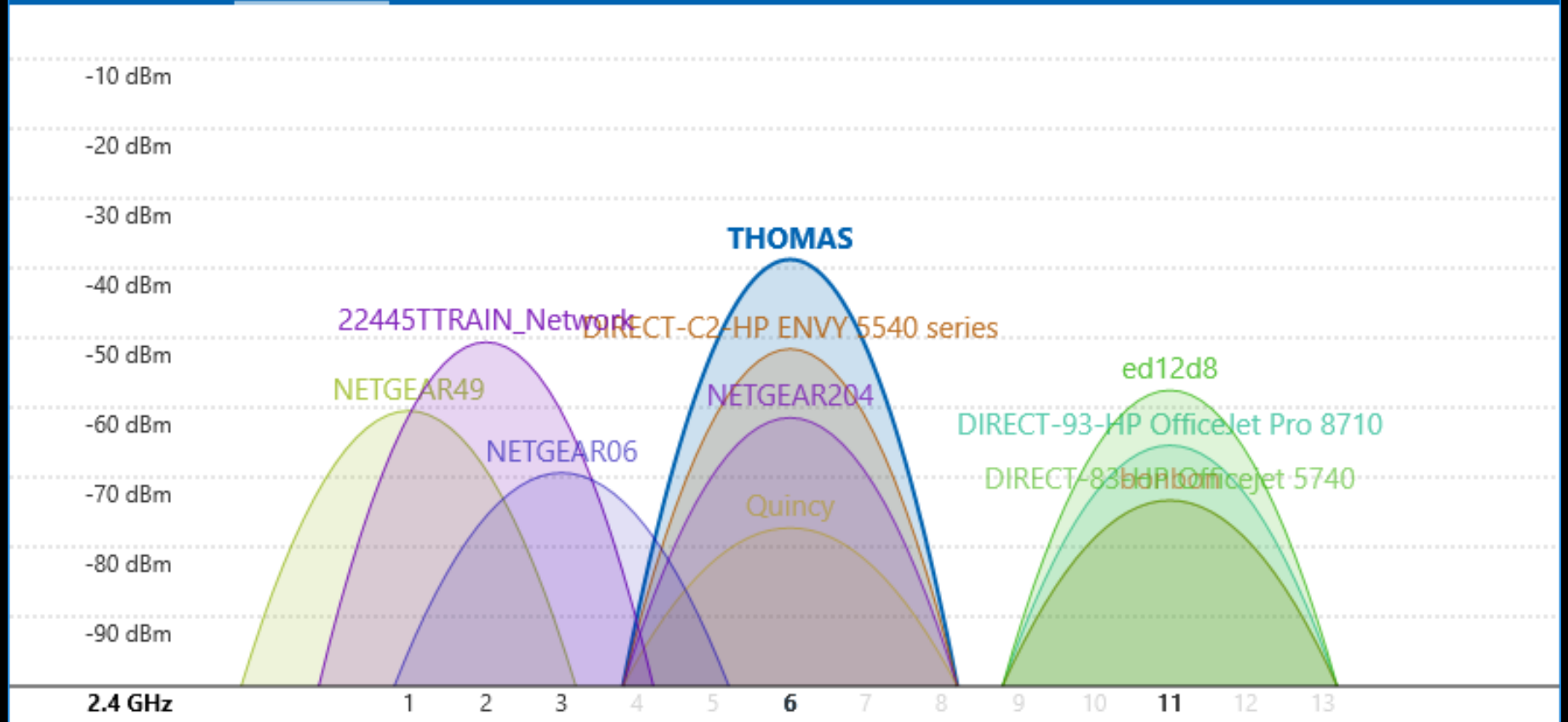



# Also shows signal strength

WiFi Analyzer

Connected | Analyze | Networks | Upgrade

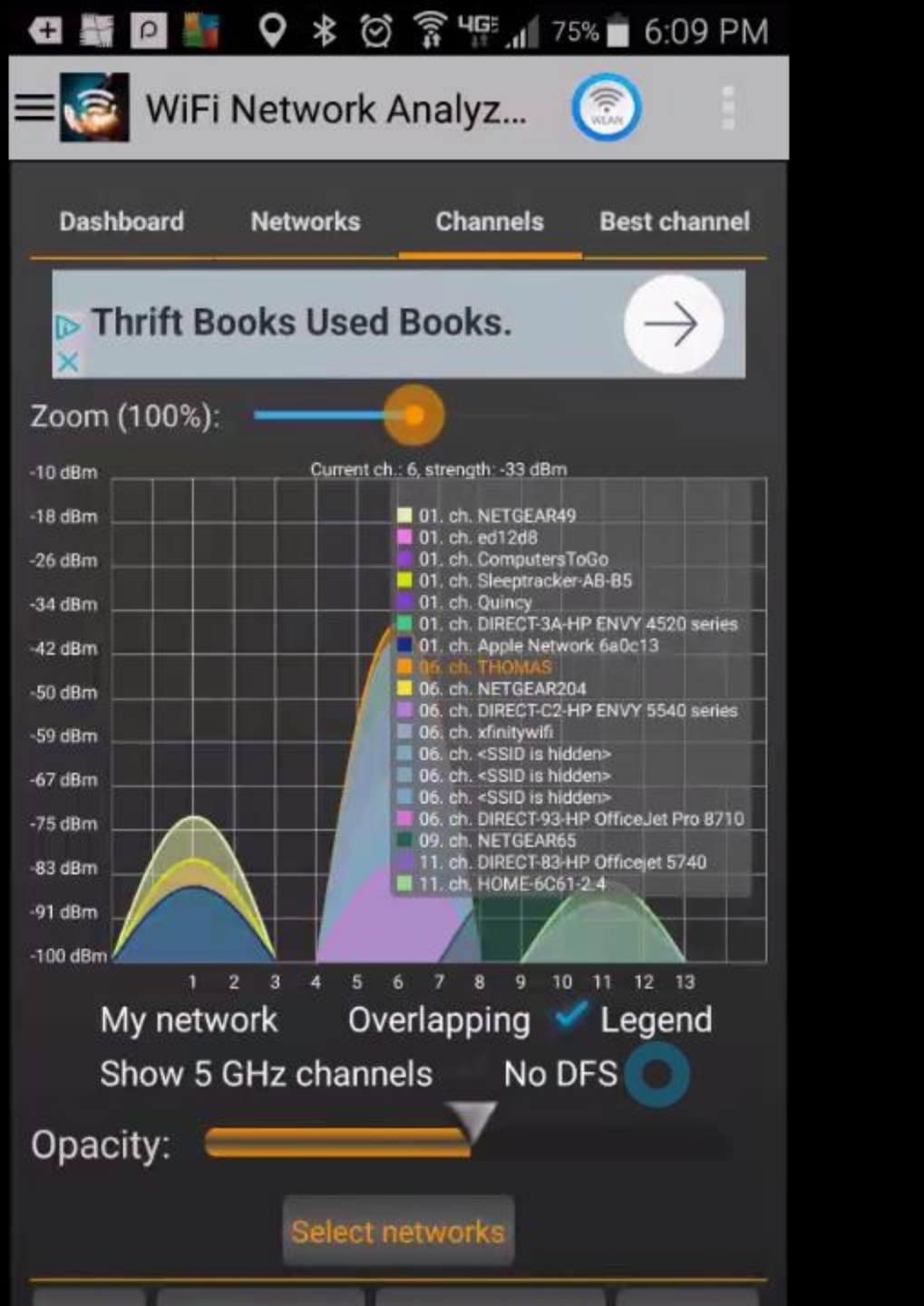



MINIMIZE

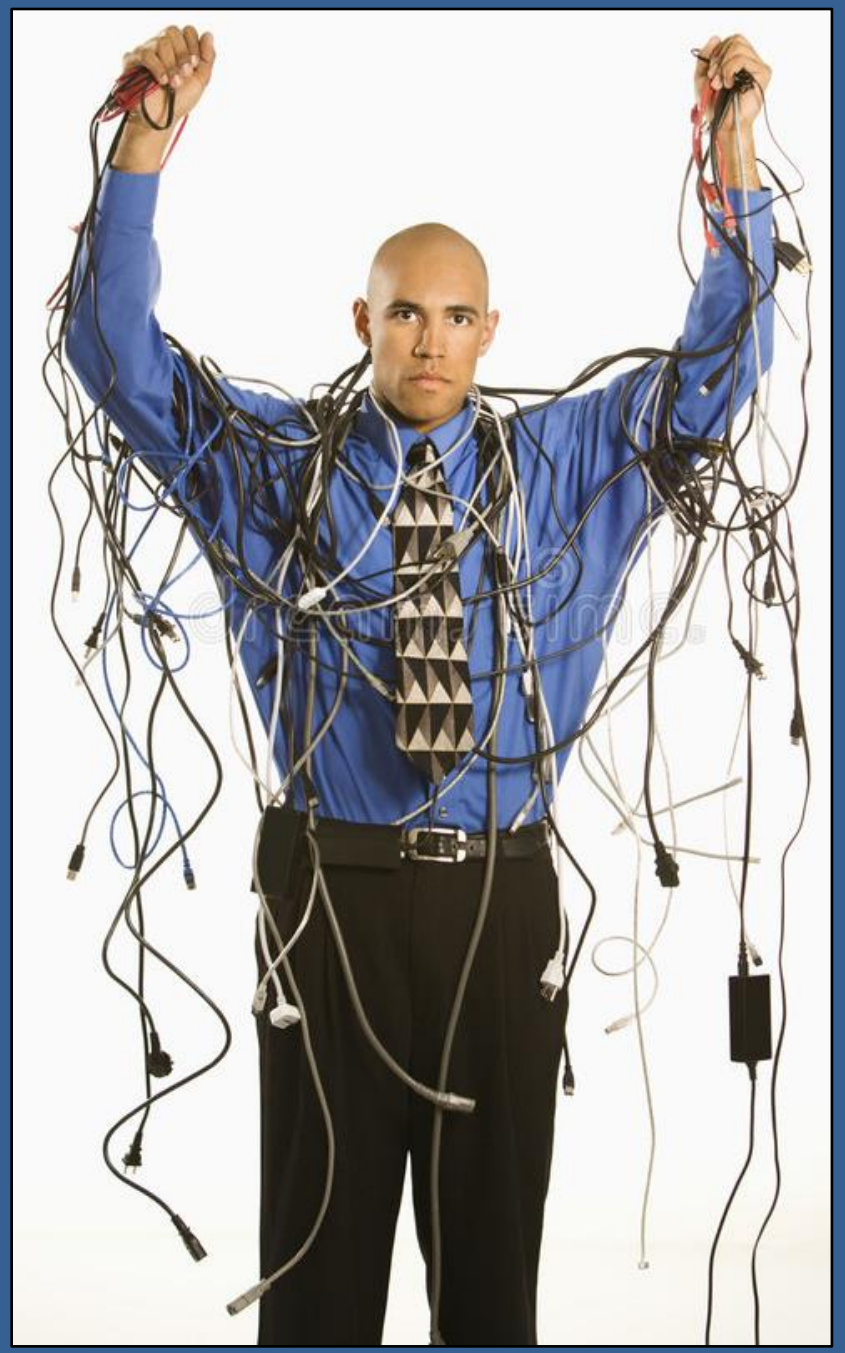
RECOMMEND

CH 11 ★★★★★☆☆☆☆

5 GHz | Graph | View | Filter [PRO] | ...


75% 6:09 PM
WiFi Network Analyz...
Dashboard
Networks
Channels
Best channel
Thrift Books Used Books.
Zoom (100%):
Current ch.: 6, strength: -33 dBm
-10 dBm
-18 dBm
-26 dBm
-34 dBm
-42 dBm
-50 dBm
-59 dBm
-67 dBm
-75 dBm
-83 dBm
-91 dBm
-100 dBm
01. ch. NETGEAR49
01. ch. ed12d8
01. ch. ComputersToGo
01. ch. Sleeptracker-AB-B5
01. ch. Quincy
01. ch. DIRECT-3A-HP ENVY 4520 series
01. ch. Apple Network 6a0c13
06. ch. THOMAS
06. ch. NETGEAR204
06. ch. DIRECT-C2-HP ENVY 5540 series
06. ch. xfinitywifi
06. ch. <SSID is hidden>
06. ch. <SSID is hidden>
06. ch. <SSID is hidden>
06. ch. DIRECT-93-HP OfficeJet Pro 8710
09. ch. NETGEAR65
11. ch. DIRECT-83-HP Officejet 5740
11. ch. HOME-6C61-2.4
1 2 3 4 5 6 7 8 9 10 11 12 13
My network
Overlapping
Legend
Show 5 GHz channels
No DFS
Opacity:
Select networks

# TROUBLESHOOTING

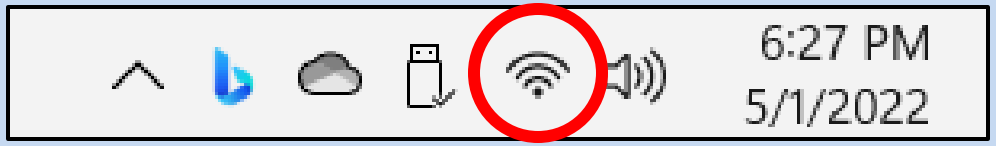


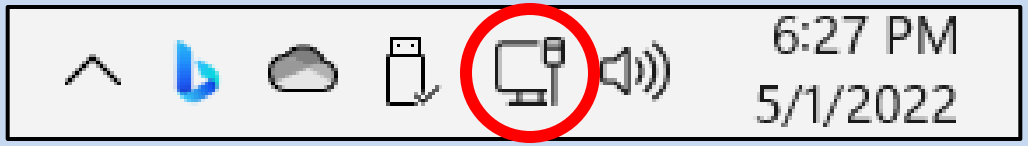
# What Devices are Affected?

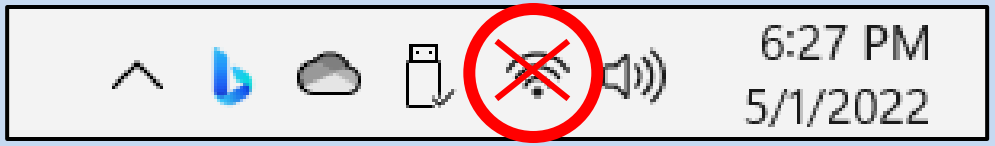
- Single Wired Device
- Single Wireless Device
- All Wired Devices
- All Wireless Devices
- All Devices

# I’ve Lost My Internet Connection

- **What does the network icon in Notification area show?**




- **Modem and router lights on?**
- **Is Wi-Fi on for both computer and router?**
- **Are other devices working?**

# I’ve Lost My Internet Connection

- Turn off modem, router, computer.
  - Turn on modem, wait five minutes or until stabilized
  - Turn on Router, wait five minutes or until stabilized
  - Turn on computer, wait five minutes or until stabilized
  - The sequence is critical
- Unplug and reinsert ethernet cables
- Plug modem directly into wall outlet

# I’ve Lost My Internet Connection

- Use Troubleshooting button in the Network and Sharing Center
- Use a channel analyzer to check for channel interference
- Update router firmware and Network Adapter driver

- Substitute other hardware and cables

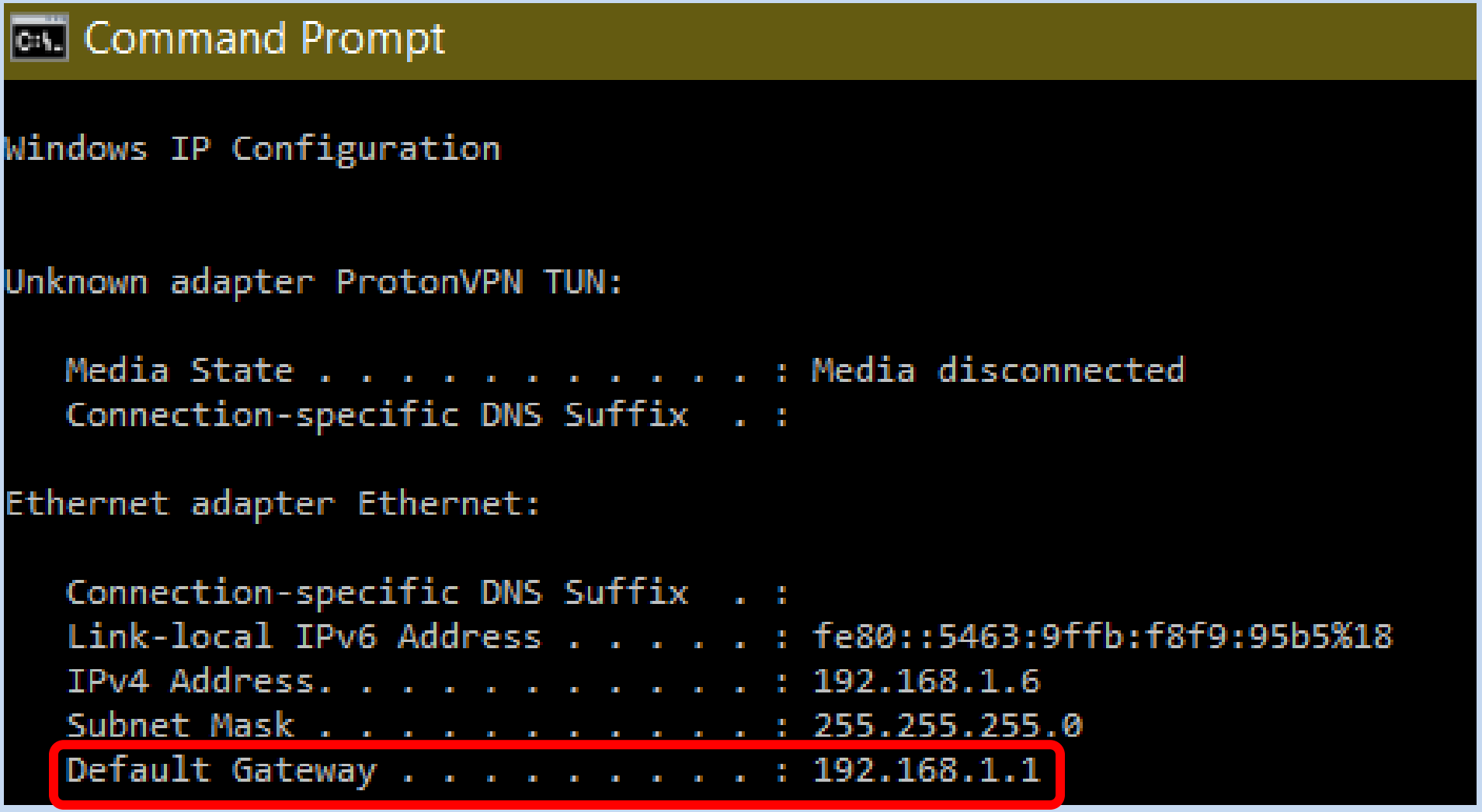
# I’ve Lost My Internet Connection

- **Buy a new router**
  - **About every five years**
  - **The technology changes quickly**
- **1997 802.11  2.4GHz**
  **1999 802.11b 2.4GHz**
  **2003 802.11g 2.4 GHz**
  **2009 802.11n 5/2.4GHz**
  **2013 802.11ac 5 GHz**
  **2020 802.11ax 5/2.4GHz**

# Router Access

- Comcast 10.0.0.1
- NetGear 192.168.0.1, 192.168.1.1
- airPort 10.1.0.1
- LinkSys 192.168.1.1

# IPConfig


Command Prompt
Windows IP Configuration
Unknown adapter ProtonVPN TUN:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::5463:9ffb:f8f9:95b5%18
IPv4 Address. . . . . : 192.168.1.6
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1

# Router Settings

- Default Factory Settings usually correct for WV
- DHCP – ON,  NAT (Network Address Translation) – ON
- WiFi Security  WPA2 AES
- Passwords
  - Set Wi-Fi Passphrase
  - Router Password

NETGEAR Router Nighthawk X6 R

Not secure | 192.168.1.1/start.htm

News | Calendar | Merrill | MSSB | Wells Fargo | Mint | Costco | B&H | Google | Amazon | Res Login | CCWV | In Learning | Kindle | Amazon.com: Mana... | Other | Vimeo | Daily | 13 Fantastic Places... | WeTransfer | PTE Manual | DirecTV outage

NETGEAR

NighthawkNighthawk X6 R8000

Speed up your experience by using the Nighthawk App. Learn more

Logout

Firmware Version
V1.0.4.84_10.1.84

English

BASIC ADVANCED

- Home
- Internet
- Wireless
- Attached Devices
- Dynamic QoS
- Parental Controls
- ReadySHARE
- Guest Network

NETGEAR
Fast and easy control from anywhere.
Download the app now.
App Store
Google Play
NETGEAR

**Internet**
STATUS: GOOD

**Wireless**
(SSID): NETGEAR74 Nar
assword: wittybutter651Key

**Attached Devices**
Number of devices : 7
Dynamic QoS : Off

**Parental Controls**
STATUS: NOT ENABLED

**Guest Network**
STATUS: NOT ENABLED

**Security**
STATUS: NOT ACTIVATED

Help & Support Documentation | Online Support | Router FAQ | GNU GPL | Terms and Conditions | Privacy Policy

SEARCH HELP Enter Search Item GO

54°F
Partly sunny

8:46 AM
5/2/2022

NETGEAR Router Nighthawk X6 R

Not secure | 192.168.1.1/start.htm

News | Calendar | Merrill | MSSB | Wells Fargo | Mint | Costco | B&H | Google | Amazon | Res Login | CCWV | In Learning | Kindle | Amazon.com: Mana... | Other | Vimeo | Daily | 13 Fantastic Places... | WeTransfer | PTE Manual | DirecTV outage

NETGEAR
NighthawkNighthawk X6 R8000

Speed up your experience by using the Nighthawk App. Learn more

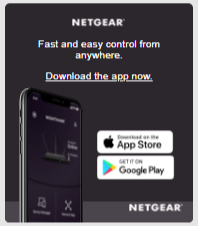
Logout

Firmware Version
V1.0.4.84_10.1.84

English

BASIC | ADVANCED

- Home
- Internet
- Wireless
- Attached Devices
- Dynamic QoS
- Parental Controls
- ReadySHARE
- Guest Network




## Wireless Setup

Apply | Cancel

**Region Selection**
Region: North America

**Smart connect**
Enable Smart Connect - Let the router select the best WiFi band for your WiFi connection. With Smart Connect, you must use the same WiFi network name (SSID), security options, and password for all radios for which you enable Smart Connect.
One Wireless Network Name (SSID) for 2.4G and both 5G radios

**Wireless Network (2.4GHz b/g/n)**
Enable SSID Broadcast
Name (SSID): NETGEAR74
Channel: Auto
Mode: Up to 600 Mbps

**Security Options**
None
WPA2-PSK [AES]
WPA-PSK [TKIP] + WPA2-PSK [AES]
WPA/WPA2 Enterprise

Password (Network Key): wittybutter651 (8-63 characters or 64 hex digits)

**Wireless Network (5GHz a/n/ac)**

**5GHz-1**
Enable SSID Broadcast
Name (SSID): NETGEAR74-5G-1
Channel: 44
Mode: Up to 1300 Mbps

**Security Options**
None
WPA2-PSK [AES]
WPA-PSK [TKIP] + WPA2-PSK [AES]
WPA/WPA2 Enterprise

Password (Network Key): wittybutter651 (8-63 characters or 64 hex digits)

**5GHz-2**
Enable SSID Broadcast
Name (SSID): NETGEAR74-5G-2
Channel: 153
Mode: Up to 1300 Mbps

**Security Options**
None
WPA2-PSK [AES]
WPA-PSK [TKIP] + WPA2-PSK [AES]
WPA/WPA2 Enterprise

Password (Network Key): wittybutter651 (8-63 characters or 64 hex digits)

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Apartment Wi-Fi Network

Troubleshooting

SUMMARY

tonypoulos3@gmail.com