2: Wi-Fi Extenders

by Francis Chao
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EXECUTIVE SUMMARY

You can add a Wi-Fi extender to increase the speed and/or coverage area for computers, tablets, cell phones, televisions, or cameras that connect to the existing Wi-Fi routers in your home or business.

TOPICS

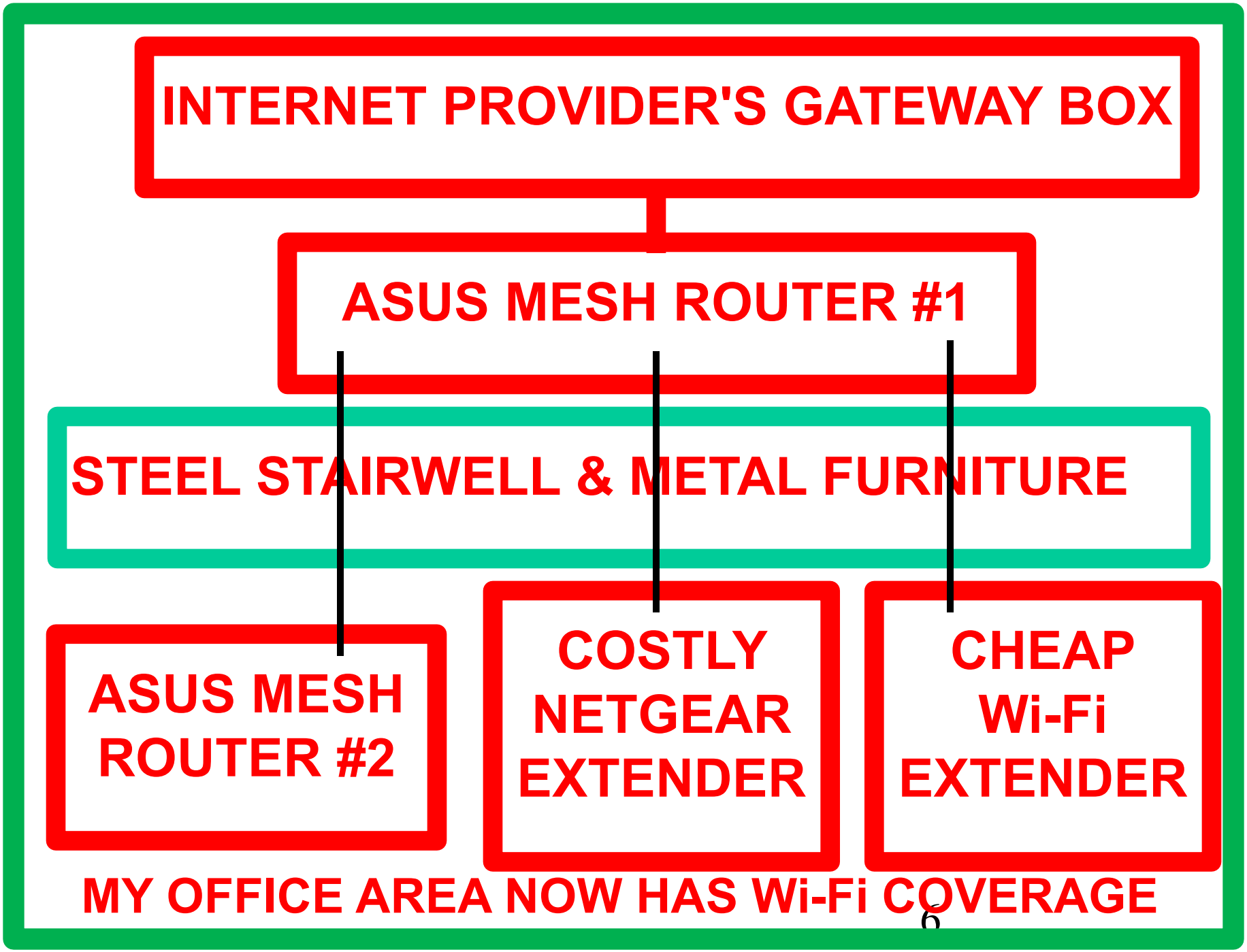
- Examples of Wi-Fi Extenders and Wi-f Mesh
- Two Modes of Operation for Wi-Fi Extenders
- Features of Wi-Fi Extenders
- Wi-Fi Extenders That We Recommend

INTERNET PROVIDER'S GATEWAY BOX

ASUS MESH ROUTER #1

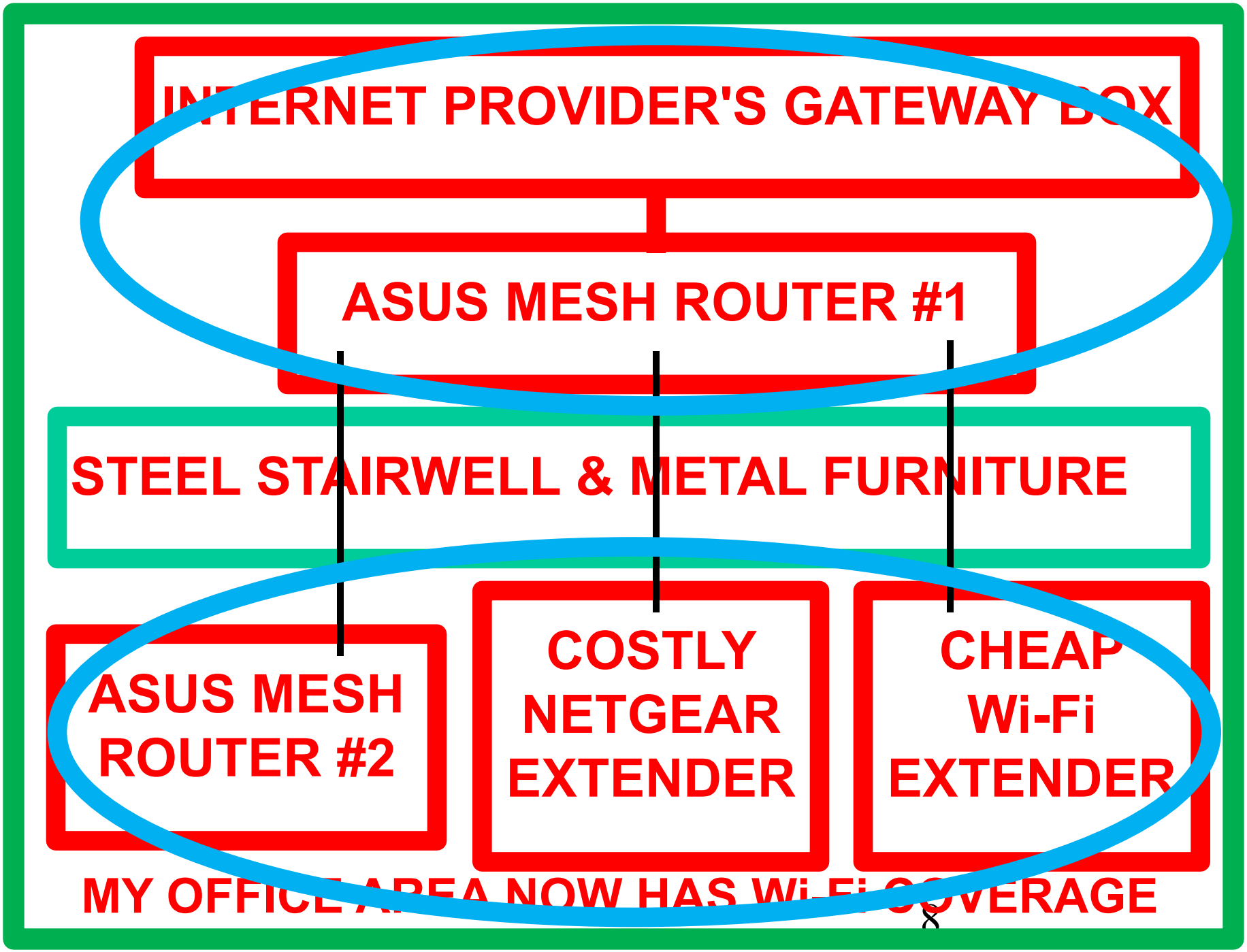
STEEL STAIRWELL & METAL FURNITURE

MY OFFICE AREA LACKS Wi-Fi COVERAGE


INTERNET PROVIDER'S GATEWAY BOX
ASUS MESH ROUTER #1
STEEL STAIRWELL & METAL FURNITURE
ASUS MESH ROUTER #2
COSTLY NETGEAR EXTENDER
CHEAP Wi-Fi EXTENDER
MY OFFICE AREA NOW HAS Wi-Fi COVERAGE

BACKHAUL CONNECTIONS

- The vertical black lines represent the backhaul connections between the router in the North side of the house and the South side of the house represent the **backhaul** connections.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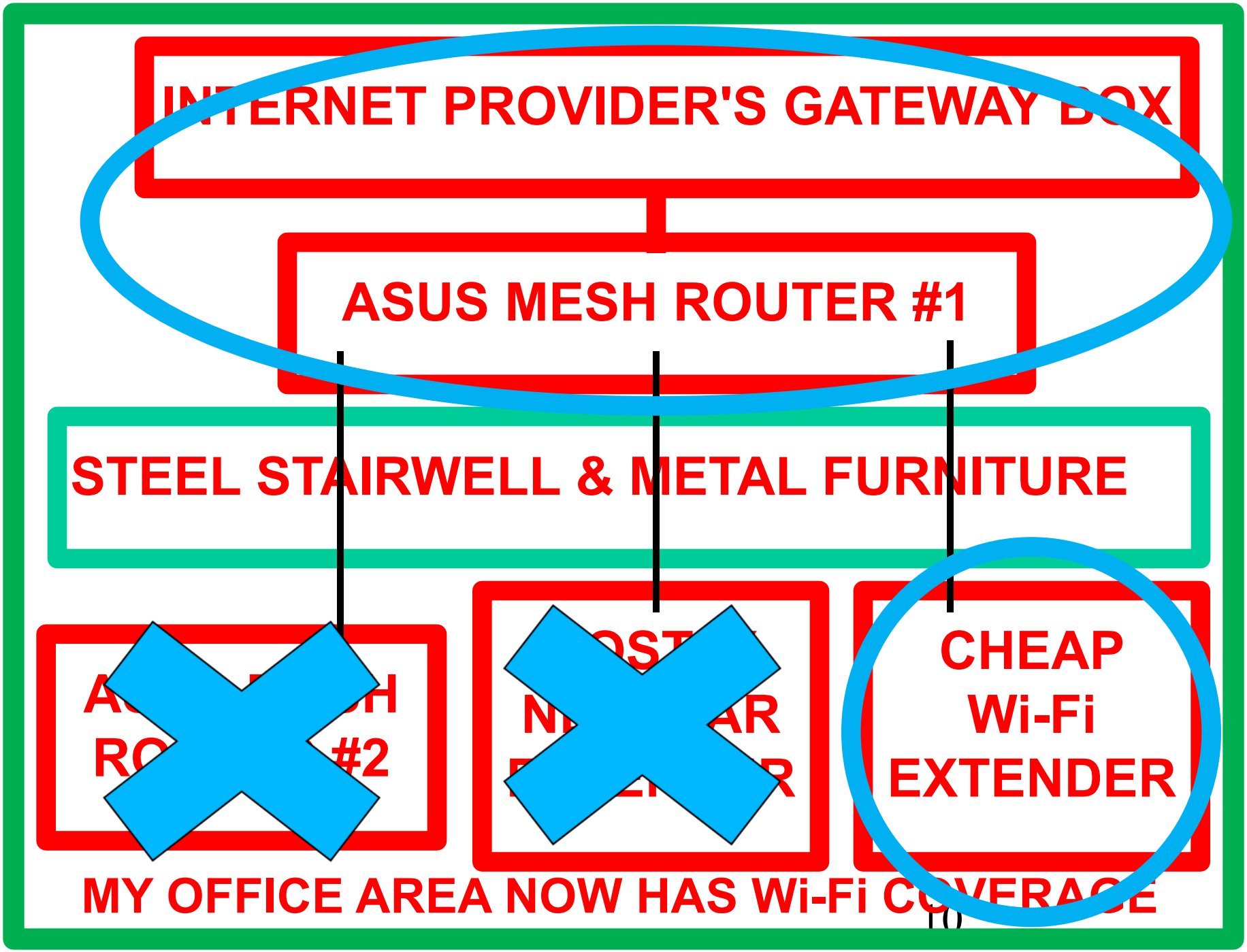
BACKHAUL CONNECTIONS

- The vertical black lines represent the connections between the router in the North side of the house and extender devices in the South side of the house.
- These connections are called backhaul connections.
- Backhaul connections can be either wireless or wired.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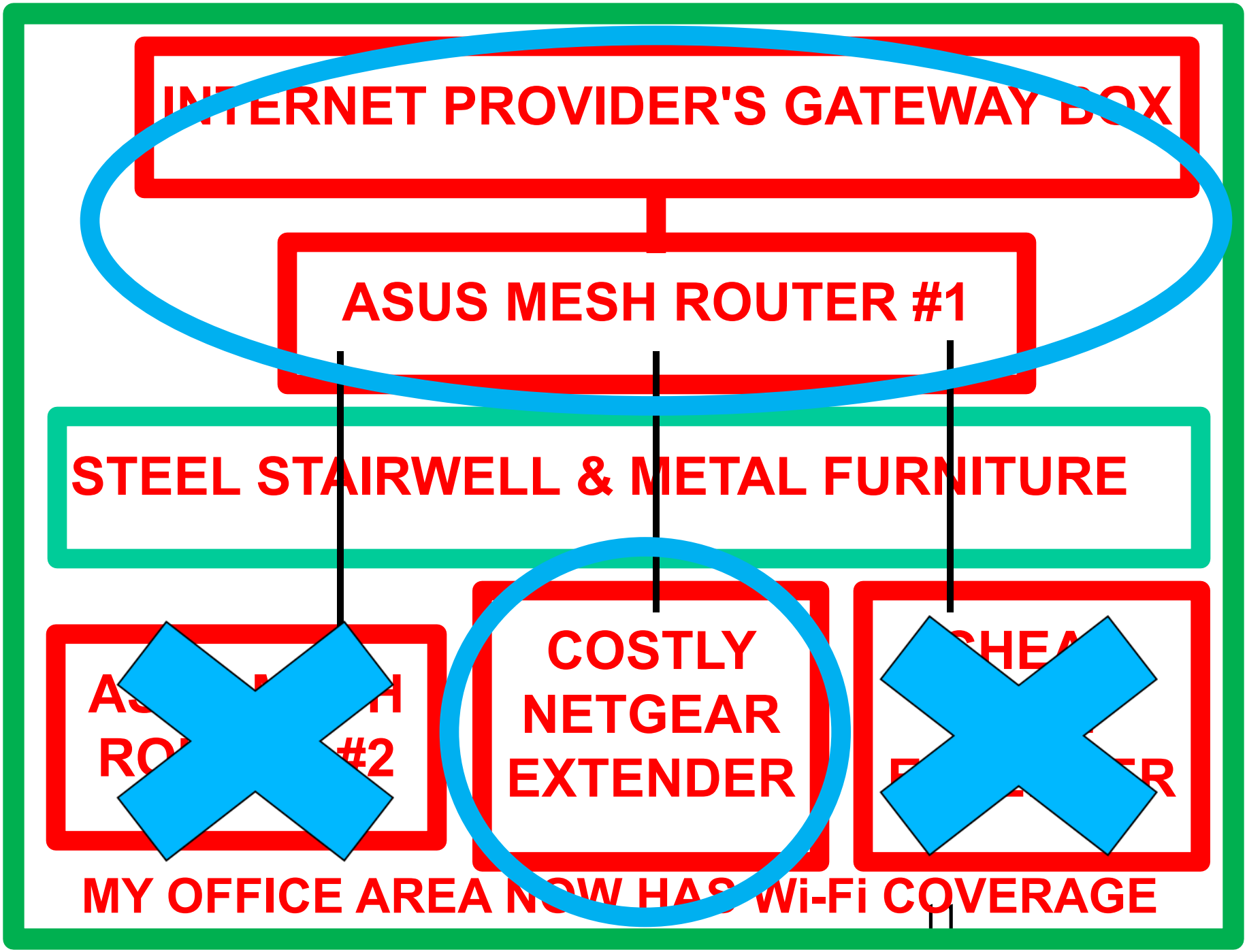
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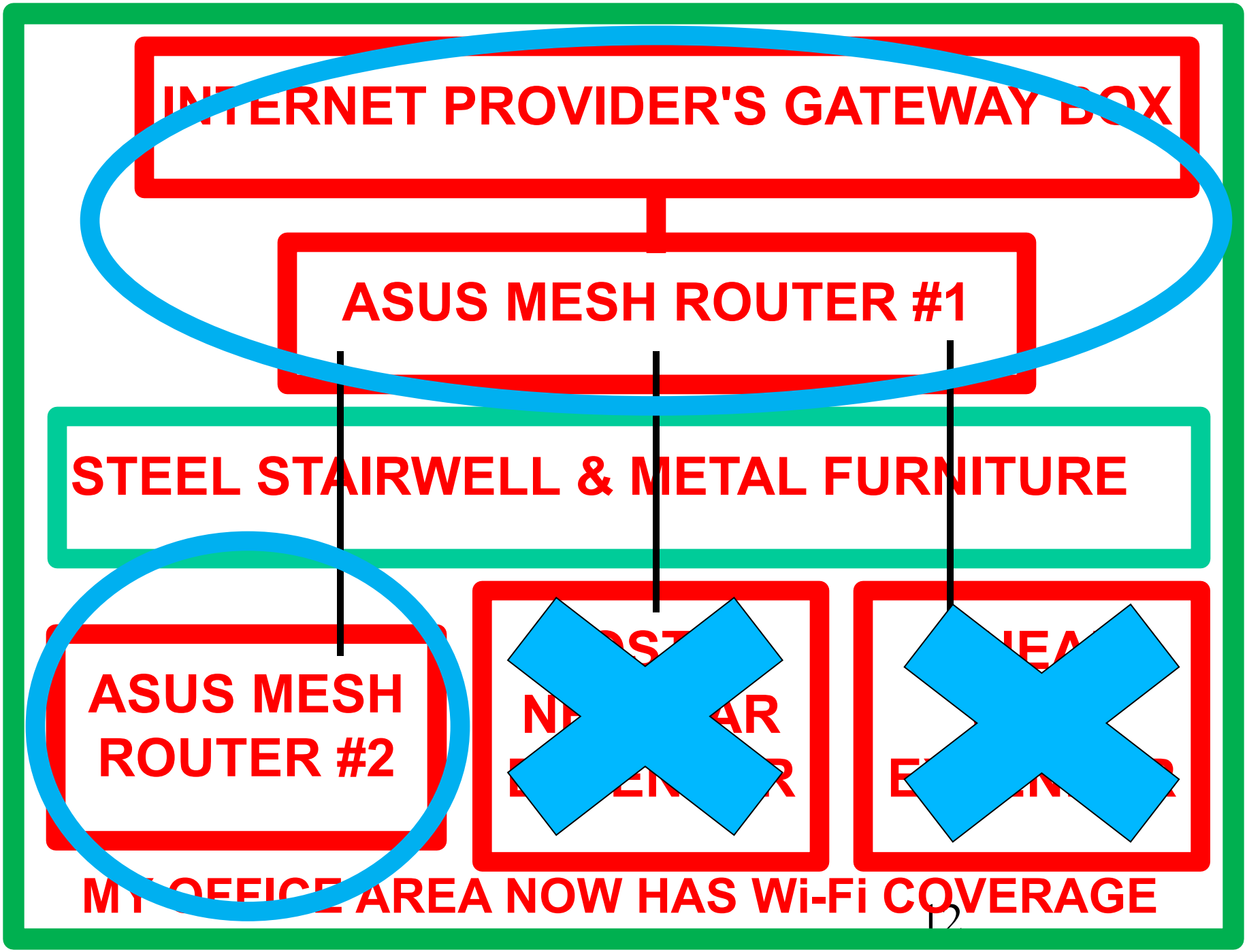
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TWO MODES OF OPERATION FOR A Wi-Fi EXTENDER

- Repeater mode
- Access Point mode

TWO MODES OF OPERATION FOR A Wi-Fi EXTENDER (continued)

- Repeater mode
  reduces Internet download and upload speeds down to 20 to 40 percent of the source signals that are being repeated
- Access Point mode
  does not reduce Internet download and upload speeds by much but requires Ethernet or Ethernet equivalent to connect the Wi-Fi extender

Repeater Mode: As a wireless signal extender

A. Extend your Wi-Fi signal without using any cables to reduce wiring troubles.

B. Extend your Wi-Fi signal with a cable, connect your device and extender stably.

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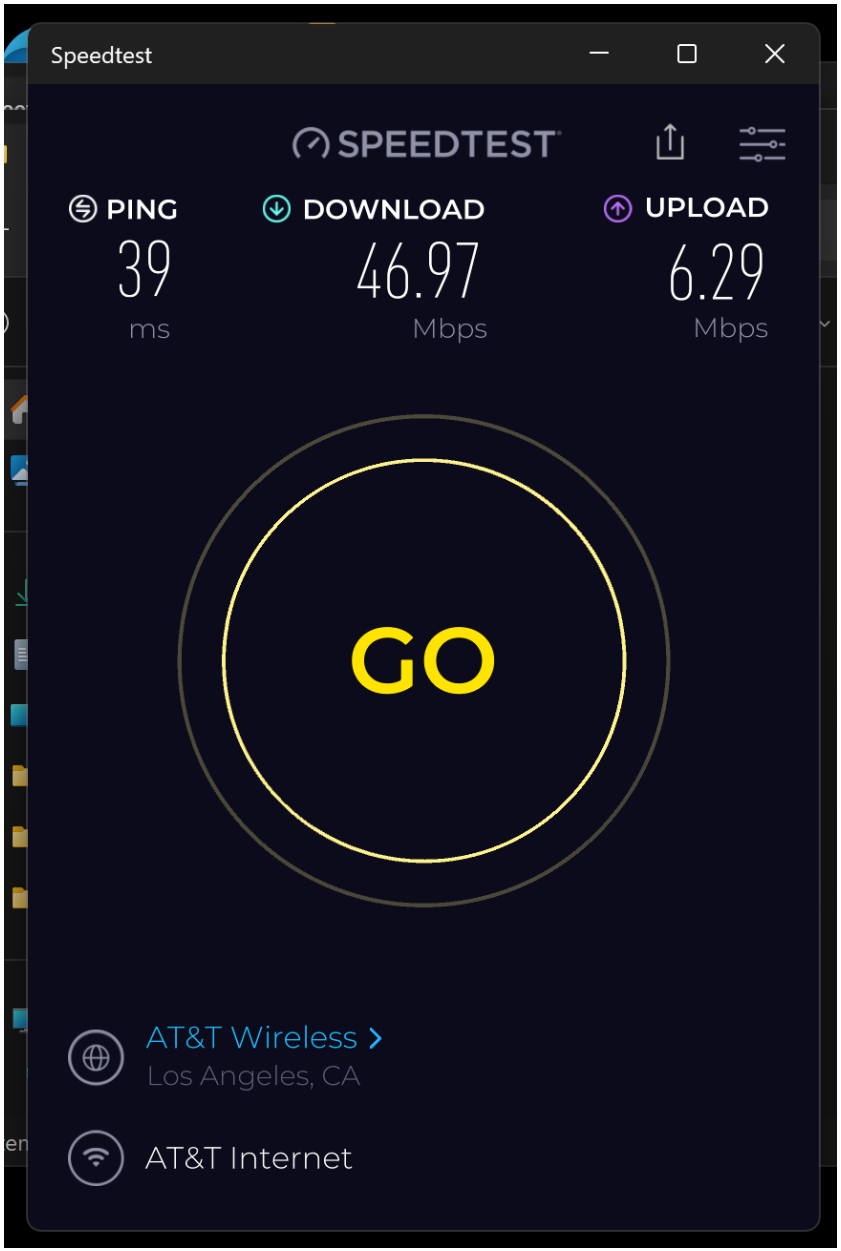
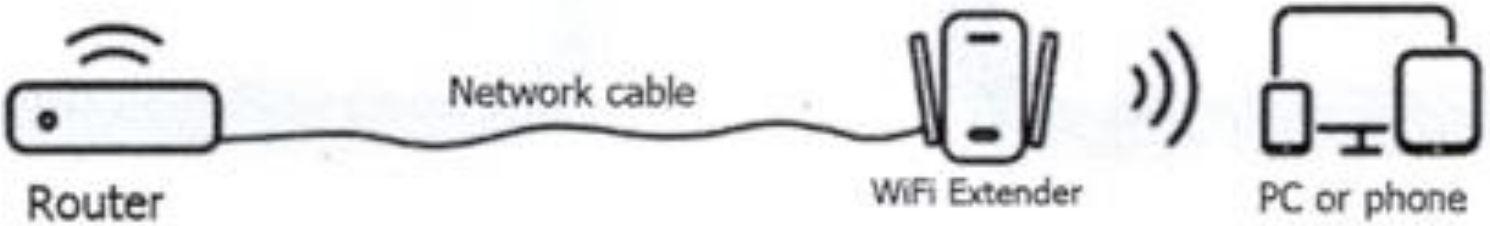

Speedtest
SPEEDTEST
PING
39
ms
DOWNLOAD
46.97
Mbps
UPLOAD
6.29
Mbps
GO
AT&T Wireless
Los Angeles, CA
AT&T Internet

AP Mode: As a wired signal extender (access point)

Get better WiFi speed by connecting the router and the extender with network cable in the poor WiFi signal area.



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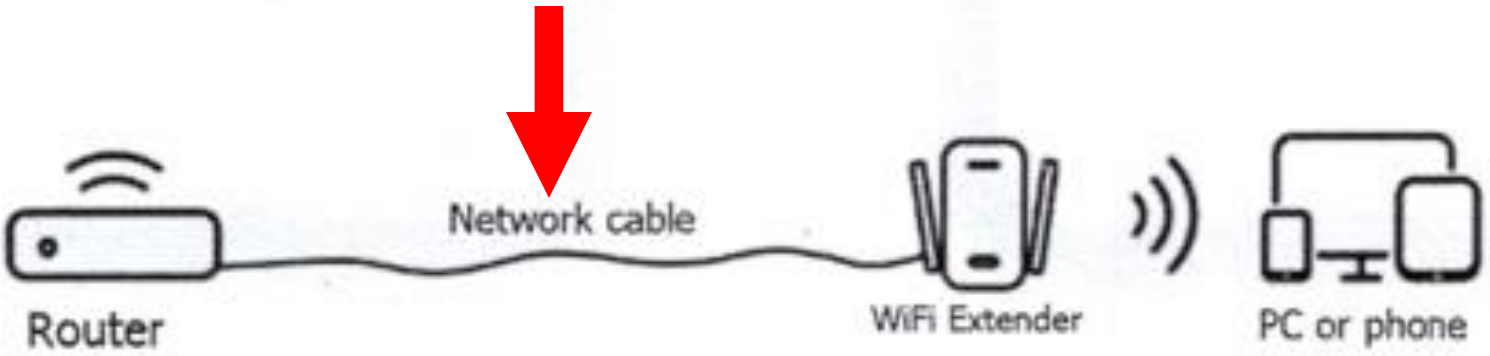

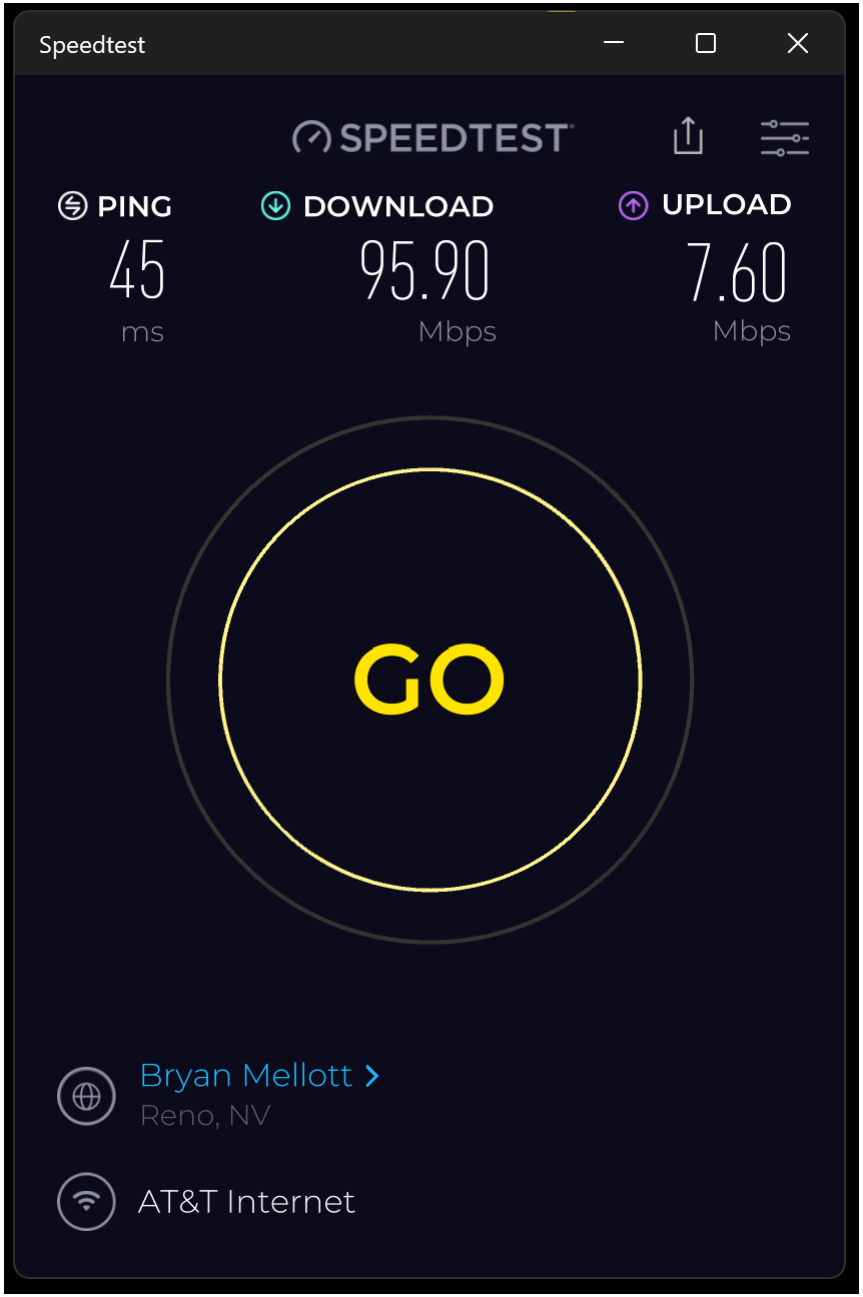
Speedtest
SPEEDTEST
PING
45
ms
DOWNLOAD
95.90
Mbps
UPLOAD
7.60
Mbps
GO
Bryan Mellott
Reno, NV
AT&T Internet

THE KEY TO GETTING REASONABLY FAST SPEEDS FOR THE BACKHAUL CONNECTION..

- ..is to use a wired or wired equivalent backhaul connection instead of wireless Wi-Fi backhaul connection.

OPTIONS FOR THE BACKHAUL CONNECTION

- Option 1:
  A CAT 5E cable or a CAT 6 cable or a CAT 7 cable or a CAT 8 cable
- Option 2:
  a Powerline Networking kit
- Option 3:
  a Multimedia over Coax Alliance kit

POWERLINE NETWORKING KIT

- For most of us, a powerline networking kit is much easier and cheaper to install relative to a CAT 6 or CAT 7 or CAT 8 cable:
  Installing a powerline networking kit will reduce Internet upload and download speeds that are provided by Wi-Fi extenders about 20 to 30 percent relative to using a CAT 6 or CAT 7 or CAT 8 cable

POWERLINE NETWORKING KIT (continued)

- For the fastest possible "Powerline Networking" connection, install a "Powerline Networking" kit that conforms to the "Wave 2" version of the international "G.hn" standard:

POWERLINE NETWORKING KIT (continued)

- https://www.amazon.com/Comtrend-2000Mbps-Powerline-Ethernet-PG-9182AC/dp/B07Z5R3N1M/

POWERLINE NETWORKING KIT (continued)

- For step-by-step details, please see https://aztcs.apcug.org/meeting_notes/windhardsig/networks/powerline/powerline.pdf

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REQUIREMENTS FOR Wi-Fi EXTENDERS

- Able to work in both "Repeater Mode" and "Access Point Mode"

REQUIREMENTS FOR Wi-Fi EXTENDERS (CONTINUED)

- Dual channel extender for existing dual channel router
- Tri-channel extender for existing tri-channel router
- Quad-channel extender for existing tri-channel router

REQUIREMENTS FOR Wi-Fi EXTENDERS (continued)

- Has at least one 2.5 Gigahertz Wi-Fi transmitter/receiver
- Has at least one 5 Gigahertz Wi-Fi transmitter/receiver
- Has at least one 6 Gigahertz Wi-Fi transmitter/receiver if the existing Wi-Fi router has one of more 6 Gigahertz Wi-Fi transmitter/receivers

REQUIREMENTS FOR Wi-Fi EXTENDERS (continued)

- At least one "Fast Ethernet" 100-Gigabit" port if your Internet Provider is providing you with download speed is less than 100 Megabits per second and at least one Gigabit Ethernet or faster port if Internet Provider is greater tan 100 Megabits per second

REQUIREMENTS FOR Wi-Fi EXTENDERS (continued)

- In "Repeater Mode", a 100 Megabits per second Ethernet port on a Wi-Fi extender will bottleneck the download and upload speeds of an Internet provider that is providing Internet speeds faster than 100 Megabits per second, if you are using the Ethernet port to connect to a downstream computer, tablet, or camera.

Repeater Mode: As a wireless signal extender

A. Extend your Wi-Fi signal without using any cables to reduce wiring troubles.

B. Extend your Wi-Fi signal with a cable, connect your device and extender stably.

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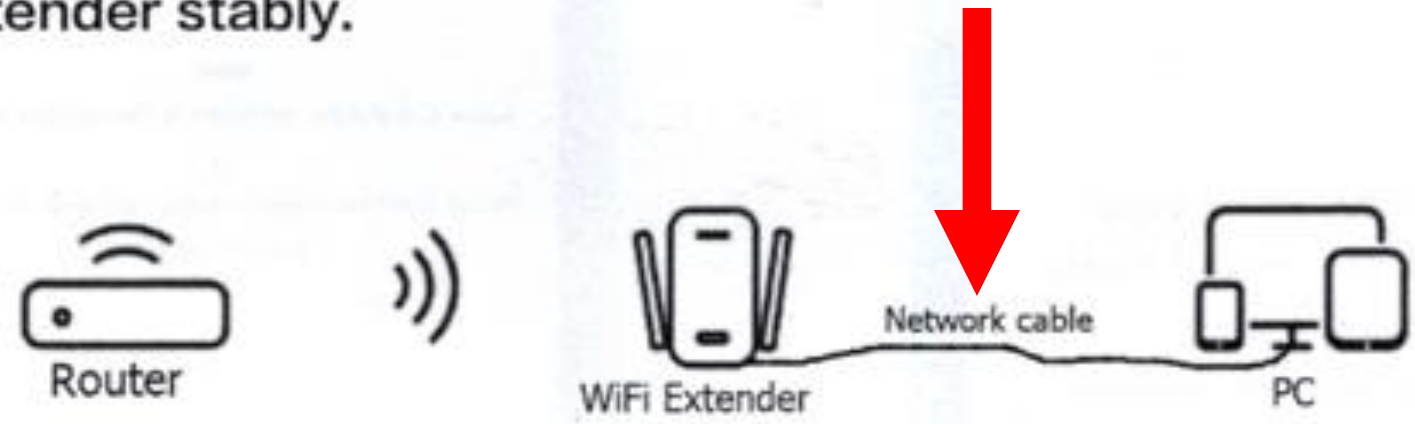
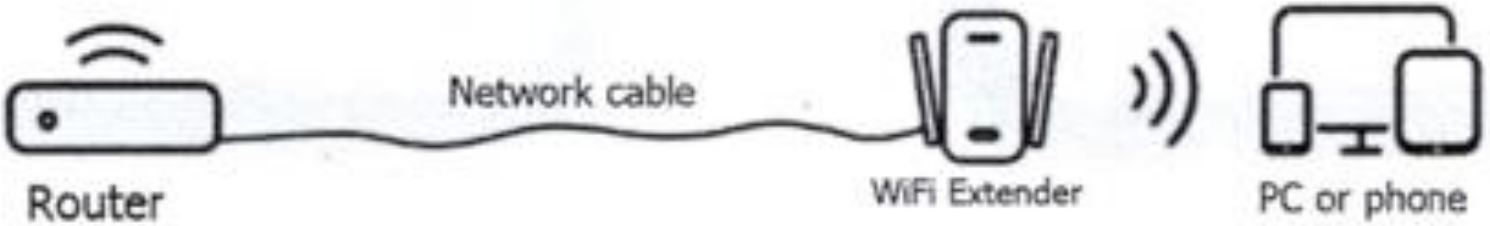


REQUIREMENTS FOR Wi-Fi EXTENDERS (continued)

- In "Access Point Mode", a 100 Megabits per second Ethernet port on a Wi-Fi extender will bottleneck the download and upload speeds of an Internet provider that is providing Internet speeds faster than 100 Megabits per second, since the Ethernet port is used to connect the Wi-Fi extender to the existing router in "Access Point Mode".

AP Mode: As a wired signal extender (access point)

Get better WiFi speed by connecting the router and the extender with network cable in the poor WiFi signal area.



REQUIREMENTS FOR Wi-Fi EXTENDERS (continued)

- The Wi-Fi transmitter/receivers should be capable of operating at the highest Wi-Fi generation that the existing Wi-Fi router can operate on.

Wi-Fi Generations

Generation	IEEE Standard	Maximum Linkrate (Mbit/s)	Adopted	Radio Frequency (GHz)
Wi-Fi 7	**802.11be**	721 to 46120	2024	2.4/5/6
Wi-Fi 6E	802.11ax	600 to 9608	2020	2.4/5/6
Wi-Fi 6	802.11ax	600 to 9608	2019	2.4/5
Wi-Fi 5	802.11ac	433 to 6933	2014	5
Wi-Fi 4	802.11n	72 to 600	2008	2.4/5
(Wi-Fi 3)*	802.11g	6 to 54	2003	2.4
(Wi-Fi 2)*	802.11a	6 to 54	1999	5
(Wi-Fi 1)*	802.11b	1 to 11	1999	2.4
(Wi-Fi 0)*	802.11	1 to 2	1997	2.4

INSTALL CAT 6 OR 7 CABLING FOR THE LOWEST COST FOR ETHERNET CABLING

- as explained at https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Ethernet.pdf
  and
  https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Ethernet.pptx

INSTALL CAT 6 OR 7 CABLING FOR THE LOWEST COST OF ETHERNET CABLING (continued)

- and https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Cat7-6-5-installation.pdf
  and
- https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Cat7-6-5-installation.pptx

INSTALL CAT 8 CABLING FOR THE FASTEST POSSIBLE ETHERNET CONNECTION

- as explained at
  is explained at
  https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Cat8-installation.pdf
  and
  https://aztcs.apcug.org/meeting_notes/winhardsig/networks/Ethernet/Cat8-installation.pptx

"MULTIMEDIA OVER COAX ALLIANCE" OPTION

- "MoCA version 2.5" is an Ethernet equivalent technology that requires new or existing RG6 coaxial cable
- https://www.amazon.com/Hitron-Adapter-Ethernet-Enhanced-Streaming/dp/B0C47MJT83/

Wi-Fi EXTENDERS THAT WE RECOMMEND

- https://www.amazon.com/dp/B0DT1NYBMJ?ref_=ppx_hzsearch_conn_dt_b_fed_asin_title_6
- This Wi-Fi extender is adequate if your Internet provider is providing your with upload and download speeds below 100 Megabits per second

Wi-Fi EXTENDERS THAT WE RECOMMEND (continued)

- https://www.amazon.com/dp/B0D5YR7HKF?ref_=ppx_hzsearch_conn_dt_b_fed_asin_title_3
- This Wi-Fi extender is adequate if your Internet provider is providing you with upload and download speeds below 100 Megabits per second

Wi-Fi EXTENDERS THAT WE RECOMMEND (continued)

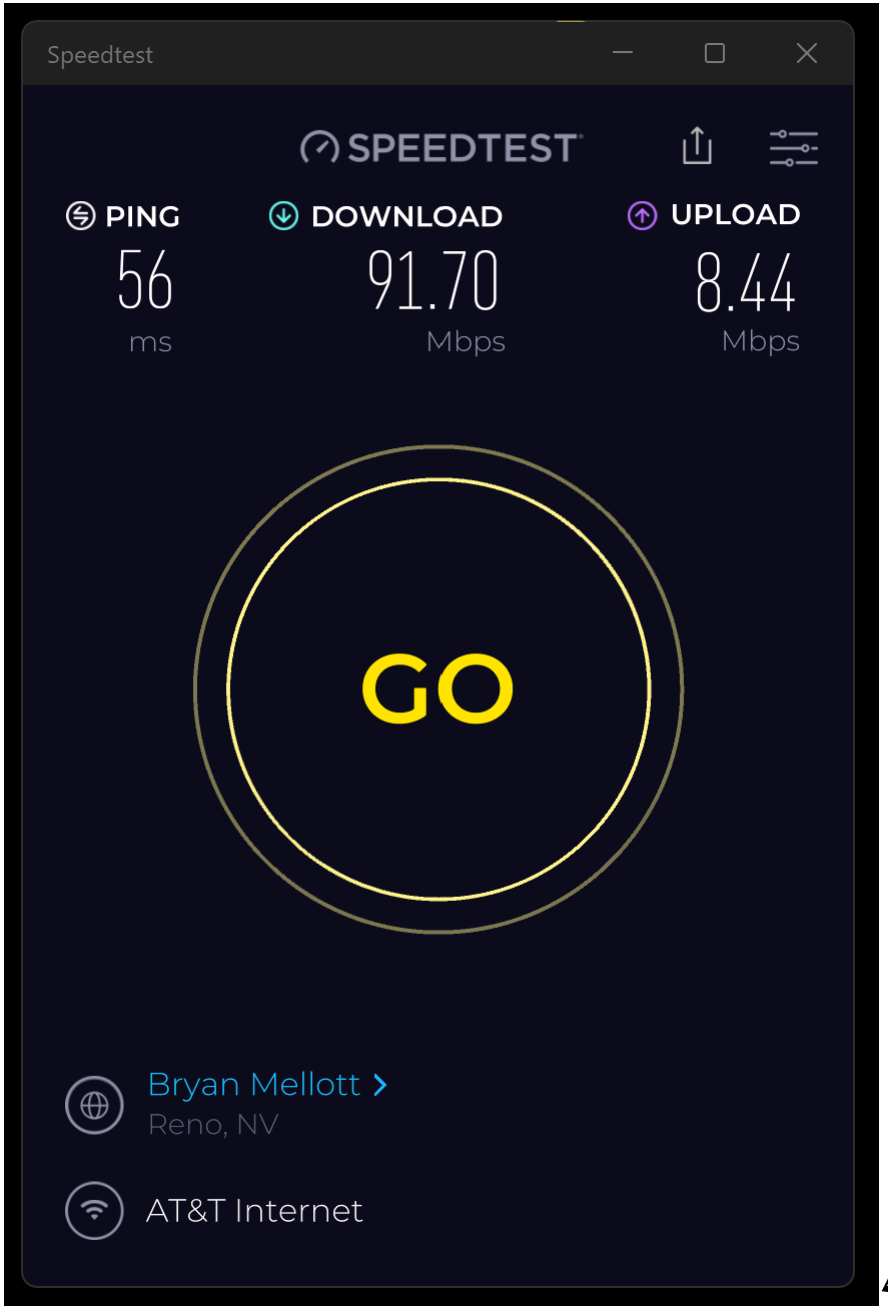
- https://www.amazon.com/dp/B0DMBXDY75?ref_=ppx_hzsearch_conn_dt_b_fed_asin_title_1&th=1
- This Wi-Fi extender has a Gigabit Ethernet port so it is fast enough if your Internet provider is providing you with upload and/or download speeds greater than 100 Megabits per second.

MESH ROUTERS ARE USUALLY FASTER THAN Wi-Fi EXTENDERS

- Mesh routers usually have extra access points/transmitter-receivers to speed up the backhaul communications between the subordinate mesh router(s) and the main mesh routers

MESH ROUTERS ARE USUALLY FASTER THAN Wi-Fi EXTENDERS

- This moderately-priced pair of Asus mesh router is the best deal that we have been able to find. You will need two of them for an entry-level mesh: https://www.amazon.com/dp/B0DHWCQ3FP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Bryan Mellott
Reno, NV
AT&T Internet