

“Cutting the TV Cable Cord”

January 14, 2019

Joel Ewing

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Cutting the TV Cable Cord

- What? – An alternative to using a TV Cable service provider for TV content
- Why? – cost savings and greater flexibility
- How? Use video streaming over the Internet and/or an over-the-air Antenna to receive TV content
 - Probably will need a subscription to some Internet streaming service(s) for live TV, but can easily switch among services or combine several and have a good chance of finding an acceptable replacement for lower cost
 - If important to see non-network, local station programs, you might require an antenna, but an indoor or attic antenna may be sufficient – some streaming services do offer some NWA stations, but none have AETN
 - If you can live with only free Internet video and the local channels you can receive on an OTA antenna, your recurring monthly bill is \$0

Cutting the TV Cable Cord

- Pros

- Less cost (unless you can't do without certain channels that are not easily replaced without using multiple services)
- More choices – not just tied to packages and interfaces offered by one cable provider
- Same setup that allows access to live content streaming over the Internet also gives access to a lot of free video streaming

Cutting the TV Cable Cord

- Cons

- Requires reliable broadband Internet, and Ethernet or decent WiFi access to your LAN where TVs are located
- Unless you are able to get decent Over-The-Air (OTA) antenna access to some local stations, you might not be able to get some local programs
- May involve more up-front cost – OTA antenna & devices to share an OTA antenna over your LAN; purchase of devices (Roku, etc) to interface your home LAN to HDMI input on TV.
- Even when your Internet connection and home LAN is working properly, there will be occasional times when the path between you and a video streaming service may become overly congested resulting in "waiting", "buffering", or "loading" delays. If you have performance problems with your LAN or your Internet provider, those delays will be more frequent.

A Useful Resource

- <https://cordcuttingreport.com/cord-cutting-guide/>
- **Video streaming services and the channels available on them frequently change, so look for most current information**

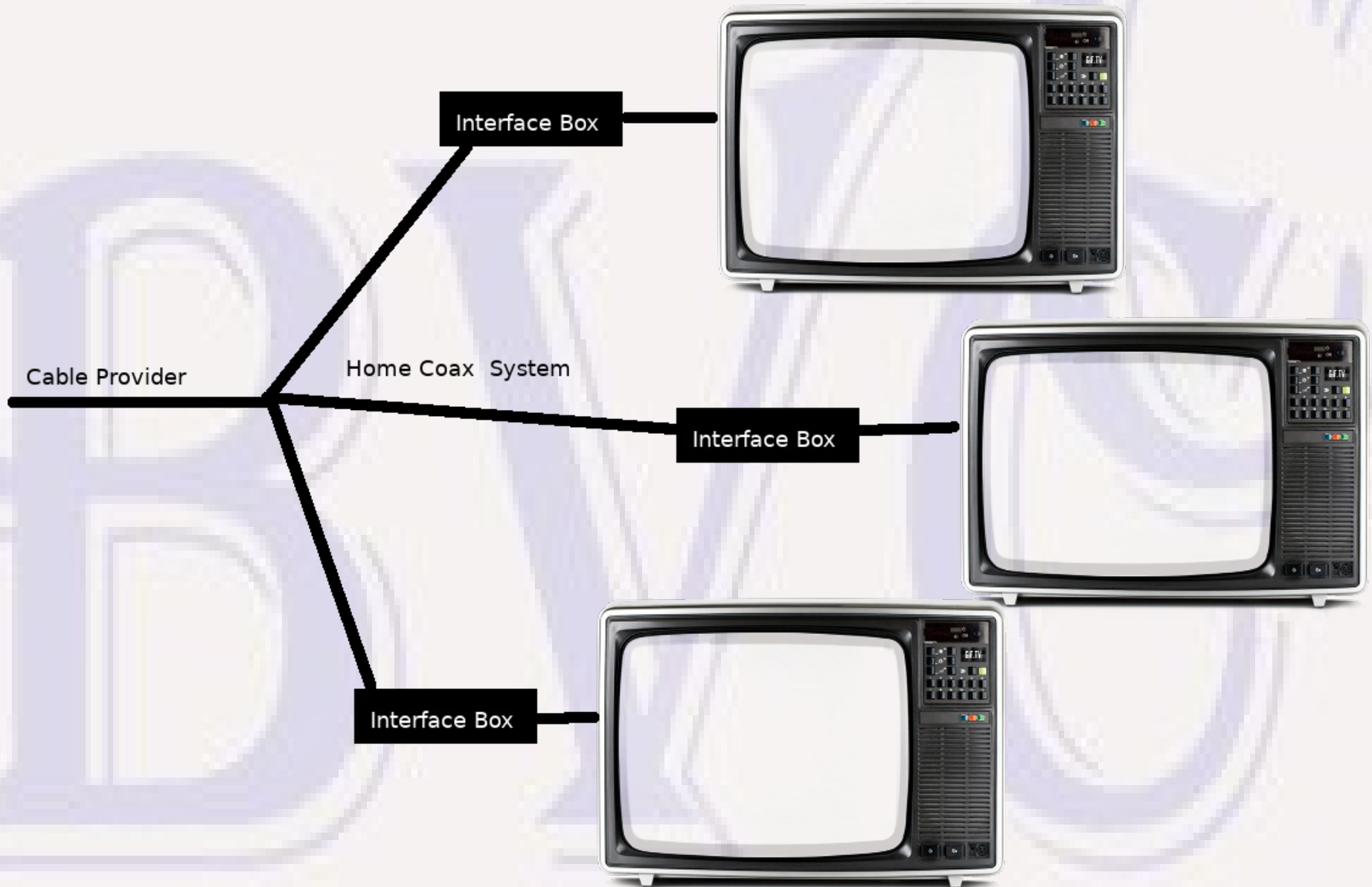
How a Video Signal Is Transmitted

- RF TV signals – over the air, from antenna via coax, or from cable box via coax – requires a “tuner” to select a specific channel and convert to video+audio
- Video+audio – no tuner needed
 - Composite (3 shielded cables) – older pre-HDMI TVs
 - HDMI – all current TVs – video/audio in 1 cable
- TCP/IP – wired Ethernet or WiFi – used for video content streamed from the Internet or devices connected to your home LAN. requires either a smart TV or a special interface box to convert TCP/IP to another interface, like HDMI, understood by a TV

The Old Days – OTA Antenna



With A Content Provider



With A TV Content Provider

- **Advantages**

- **Better picture quality [usually], large selection of channels including all local stations**
- **Generally not affected by local weather, although specific channels can be affected by severe weather elsewhere**

- **Disadvantages**

- **Channels packaged in a few large groups requiring subscribing to many unwanted channels to get wanted channels**
- **Additional monthly charges per TV for interface boxes, add-on features, taxes and fees can easily exceed \$100 per month (\$126+)**
- **Costs go up, never down**
- **Changing provider not trivial**
 - **Requires service call and physical changes**
 - **May also be constrained by a contract**

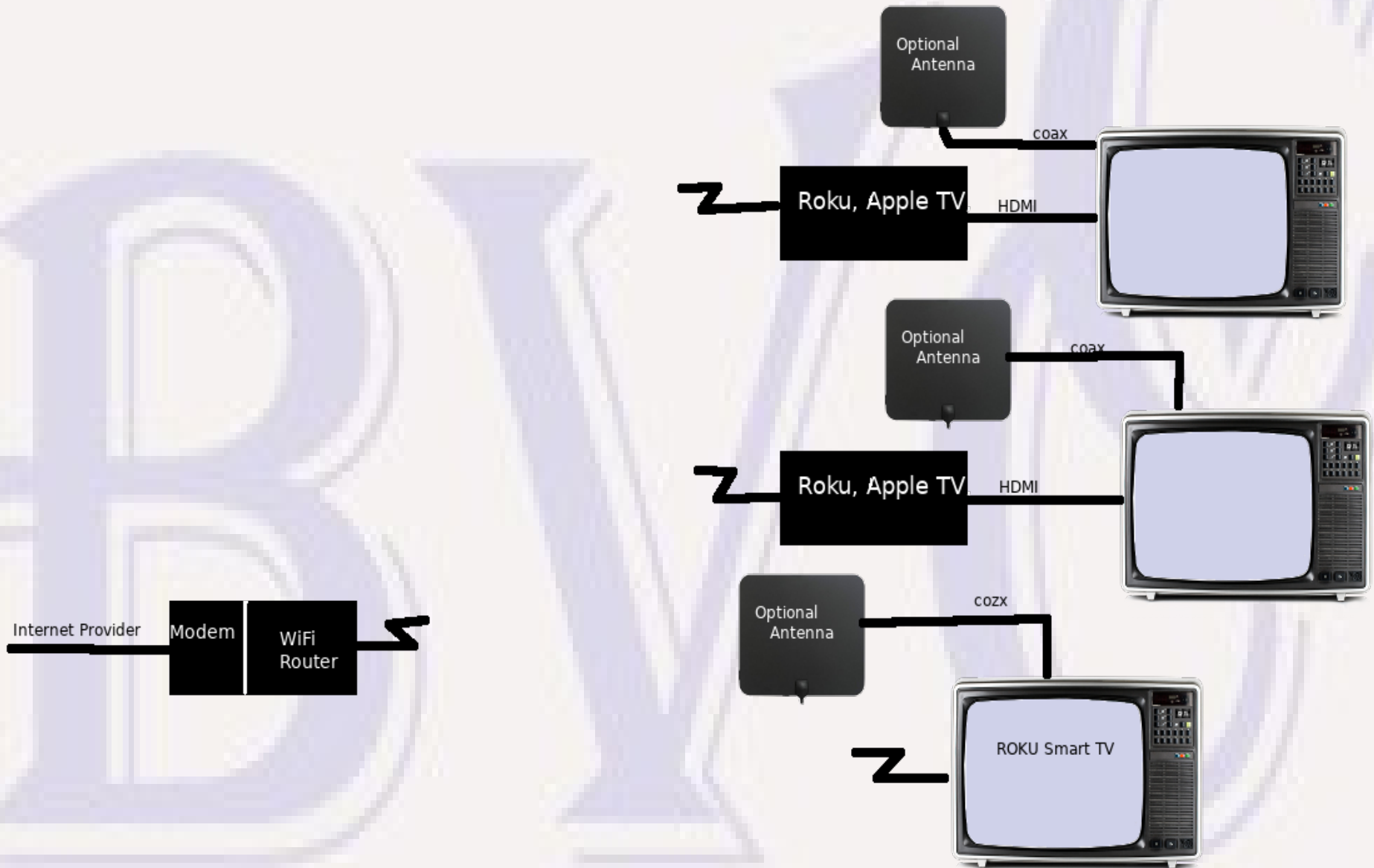
Alternatives with OTA Antenna

- **Receivable channels limited to stations whose transmission tower is within about a 60 mile radius from your antenna. Terrain and other obstructions in the path from your antenna to the transmission tower, and the design of your antenna, can greatly affect whether reception is possible.**
- **Options**
 - **One antenna per TV – doesn't allow for optimum antenna location. In NWA antenna must be VHF/UHF to pick up VHF channels 5 (CBS) and 13 (PBS)**
 - **One antenna with VHF/UHF amplifier feeding existing house coax distribution system – not an option if Cox is Internet provider and house coax already used for that signal.**
 - **One antenna connected to Tablo converter, which converts RF signal to TCP/IP over your home LAN via Ethernet or WiFi. Tablo comes in 2-tuner (\$140), 4-tuner (\$200) versions. Can be accessed/controlled from a web browser and from free apps on iPhone, iPad, AppleTV, Roku and can record OTA broadcasts. 24-hr TV Guide free, 14-day TV Guide for \$5/mo or \$50/yr.**

Alternatives With Hi-Speed Internet

- **Requires each TV either be a smart TV with connection to your LAN, or the TV requires a separate external box (Roku, AppleTV4, etc.) that can “play” a video stream from the Internet or your LAN to the TV**
 - **Most options with an external box require a TV with an available HDMI input port.**
 - **A Smart TV that is not a Roku TV may still require a separate box (check to see if it directly supports the streaming services you need)**
- **Streaming services also viewable on computer, smart phones, and other mobile devices**

Internet TV Configuration



Things to Consider Before “Cutting”

- **Determine what channels/stations are a “must have” for those in your household and whether seeing all those programs live is required. Many past seasons of popular series can be streamed for free.**
- **Do research on what combinations of free video streams and paid subscription streaming services will supply those channels.**
- **Verify what external boxes or smart TVs have support for those streaming services (Roku and Apple TV support more than others)**
- **Do research and experimentation with OTA antenna reception if local stations are a must and your best fit streaming service lacks some of those stations.**
- **Internet connection speed and data requirements depend on how many video streams will be viewed at the same time**
- **Internet video streaming can encounter “buffering” delays if your Internet connection to the streaming service or your LAN WiFi connection experiences periods of degraded performance – expect this at least occasionally**

Free Streaming Services

- **YouTube**
- **Vimeo**
- **Amazon Video (first episode of shows)**
- **Crackle**
- **go90**
- **Kanopy (with some public library cards)**
- **Popcornflix**
- **Others (search for free streaming video)**

Semi-Free Streaming

- **Streaming as a by-product of other things you may already be paying for**
 - **AETN Passport, if you donate at \$60 or above annually**
 - **Amazon Prime, if you subscribed for other reasons**

Non-Free Data Streaming Services

- **Non-Live, Older shows and series – tend to be cheap by comparison with Live streaming services**
 - **Netflix (\$8.75/mo SD, 1 stream)**
 - **Acorn TV (British) (\$49.99/year)**
 - **others**

Live-TV Paid Streaming Services

Product

Hulu



Sling TV



CBS All Access



fuboTV



Amazon Video



Starting Price

\$7.99/month

\$20/month

\$5.99/month

\$44.99/month

\$8.99/month

Product

Philo



Netflix



HBO Now



DirecTV NOW



YouTube TV



Starting Price

\$16/month

\$7.99/month

\$14.99/month

\$40/month

\$40/month

Comparison of Top 8 Live-TV Paid Services

- **For comparison of channels, see**
<https://www.cordcuttersnews.com/playstation-vue-vs-directv-now-vs-youtube-tv-vs-sling-tv-vs-philo-vs-fubotv-vs-watch-tv-vs-hulu-updated-november-2018/>
- **Some “Local” Stations available:**
 - YouTubeTV has 40/29-KHBS, 5-KFSM, Fox 24-KFTA, and 51-KNWA, but doesn't have 13-AETN
 - Hulu has KHBS, KFSM, and KFTA
 - Fubo – has Tulsa & Springfield, no NWA stations

Comparison of Top 8 Live-TV Paid Services

- **Check on default # concurrent streams**
 - **Sling: 1,3, or 4 (depending on pkg)**
 - **YouTube: 3**
 - **Hulu: 2**
- **DVR support – included or extra, or on-demand viewing of older shows**
- **Special offers – Sling offers Roku device at \$30 discount**

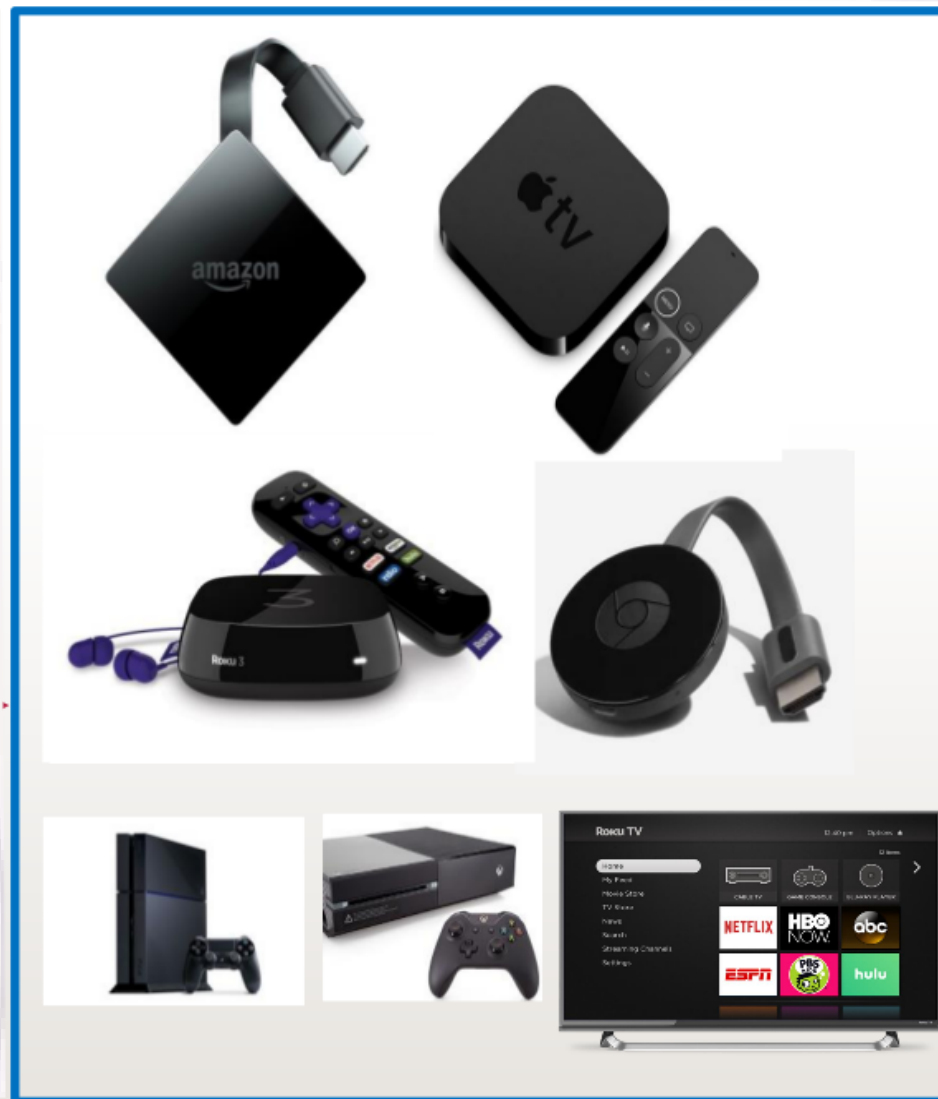
Comparison of Top 8 Live-TV Paid Services (Sample)

Channel	Sling TV	Hulu Beta	PS Vue	DIRECTV NOW	YouTube TV	FuboTV	Philo	Watch TV
AFRO	X							
AXS TV	X			X			X	
A&E	X	X		X		X	X	X
AMC	X		X	X	X	X	X	X
American Heroes Channel			X	X			X	
Animal Planet			X	X			X	X

LAN to TV HDMI Interface Boxes

- A small specialized computer
- Roku dominates, Apple TV is 2nd - I haven't tried others.
- When TV input set to HDMI from device, menu displays are available that can be controlled with a remote to select from available streams.
- There is an initial cost but no monthly charge associated with the device itself
- Both have ways to add free and non-free applications or “channels” to access additional video streaming services. When you subscribe to a streaming service, the first time it is used it will ask for your logon and password.
- Both include support to access a Tablo device on your LAN as a “streaming service” to share an OTA antenna

TV Interface Box Choices



**Amazon TV – Apple TV – Roku – Chromecast
PlayStation (PS) – Xbox – Smart TV**

Streaming Services vs Device

Streaming Player	Sling TV	PS Vue	DIRECTV NOW	YouTube TV	Hulu Beta	FuboTV	Philo	Watch TV
Roku	X	X	X	X	X	X	X	
Fire TV	X	X	X		X	X	X	X
Apple TV	X	X	X	X	X	X	X	X
Chromecast	X	X	X	X	X	X		
iOS	X	X	X	X	X	X	X	X
Android Phones/Tablet	X	X	X	X	X	X	X	X
Android TV	X	X		X		X		
Xbox One	X			X	X			
PlayStation 4		X						

Comparison of Roku & Apple TV

- **Roku Express (\$30)** is cheap enough you can afford to experiment with one. Also very small physically. Its WiFi connection was more sensitive to positioning than AppleTV – had to move it several feet higher to get good reception.
- **Apple TV (G4) (\$149)**. Probably only worth paying this much if you can benefit from having ability to and air-play and mirror from Apple iPhone & iPad devices. Was able to support WiFi when signal was marginal for Roku Express and can also be hard-wired to an Ethernet cable
- **The Roku Ultra (\$90)** has more function than the Roku Express. If you don't need a device that will display screen mirroring from iPhones and iPads, this is a more cost-effective choice than an Apple TV. There are some features where the Apple TV wins and some some where Roku Ultra wins.
- There are other devices available, some quite new, some that support 4K video, although few streaming services support 4K at this point

Consider an OTA Antenna

- **Advantages**

- modest one-time cost of antenna & installation
- no monthly fees, ever
- Uses no Internet bandwidth or data allotment

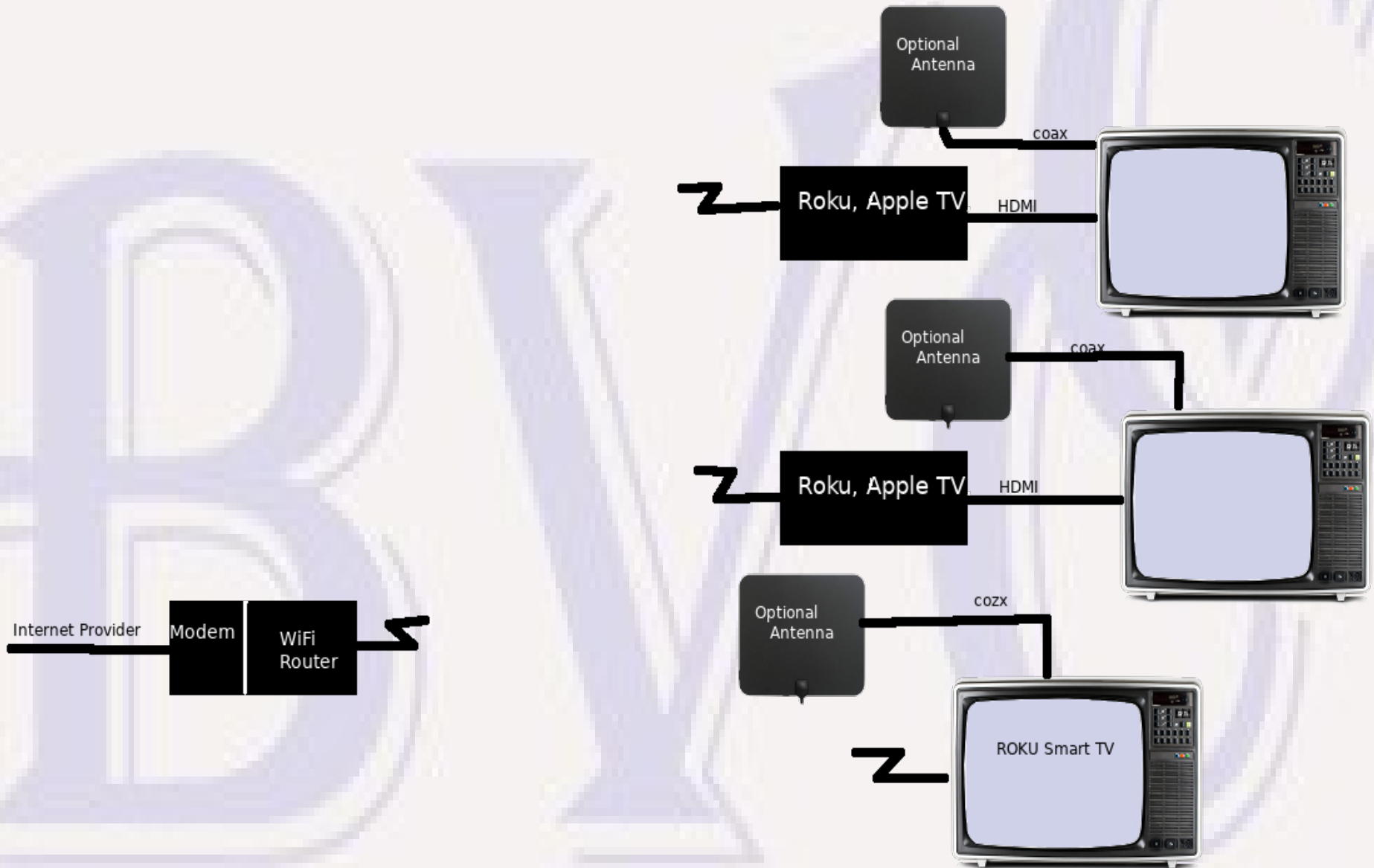
- **Disadvantages**

- Limited to a few relatively close stations (< 60 miles, depending on station power and elevation of both antennas). More channels than you might expect, because many stations broadcast a main digital channel and several sub-channels.
- Reception quality influenced by weather and terrain. Best if unobstructed path between your antenna and the transmitting tower – being in a valley or surrounded by large trees or other structures can cause problems.
- TV may not be located close enough to where antenna gets good reception and may not be practical to run a coax between antenna and TV.
- If good reception requires an outside antenna, professional installation of OTA antenna may be required.

OTA Antenna – VHF vs UHF

- Many of the smaller antennas are designed for only UHF reception. Antennas capable of decent reception of lower-frequency VHF tend to be physically larger.
- In our area, be sure you get an antenna designed for both VHF and UHF or you won't have any chance of receiving VHF stations CBS(5) or AETN/PBS (13)
- With an outdoor antenna “hung” in my attic in Bentonville, I have gotten good reception (with some glitches during bad weather) on as many as 14 channels, including CBS, PBS, ABC, NBC, FOX, and others
 - The closest any subscription service comes on local stations is YouTubeTV (\$43/mo), which has our local CBS, ABC, NBC, and Fox stations. Hulu includes the first three of these. Currently no Internet streaming service is available for live AETN/PBS programs.








Internet TV Configuration

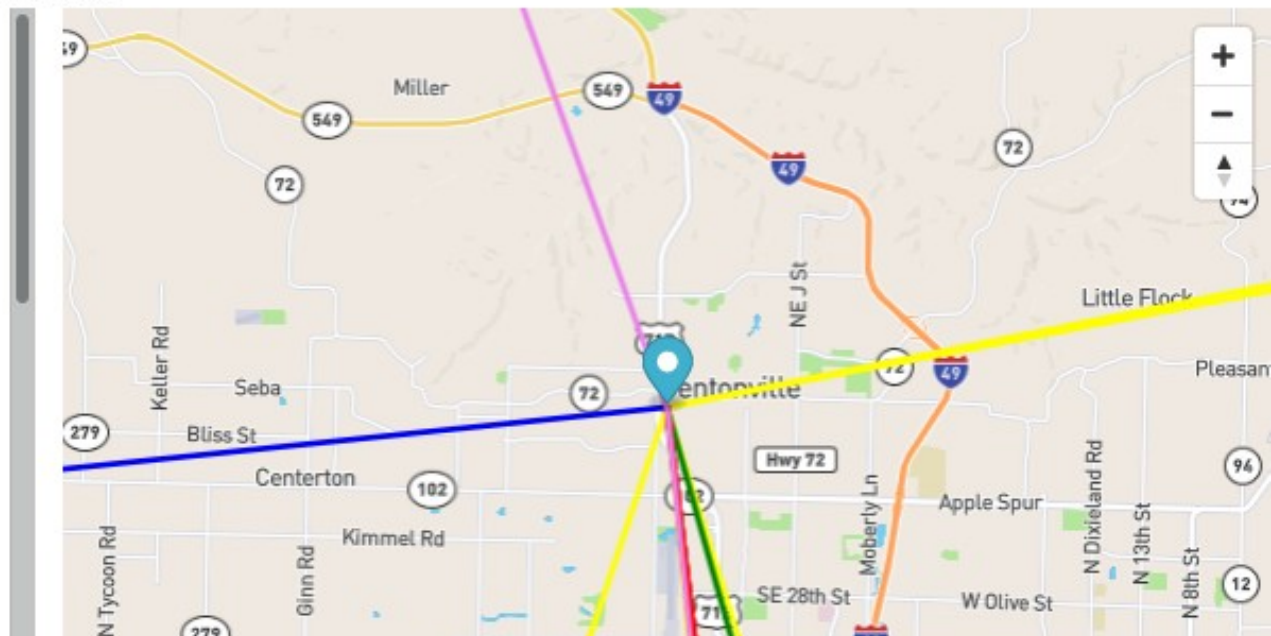


Determining What Antenna is Needed

- See <https://antennaweb.org>
 - Enter zip code or address, get list of stations and directions (Sample shown for 72712 BTV). Exact street address can give different results.
 - Antenna “color” indicates sophistication of antenna required (may still be terrain issues)

Up to 61 channels from 16 over-the-air stations may be received at this location.








Stations	Antenna	FCC Repack
KWOG-DT 57.1 IND RF Channel: 29 14 miles at 197°	 Yellow	
KXNW-DT 34.1 MNT RF Channel: 25 15 miles at 77°	 Yellow	
KHOG-DT 29.1 ABC RF Channel: 15 26 miles at 161°	 Yellow	
KFSM-DT 5.1 CBS RF Channel: 18 37 miles at 173°	 Yellow	
KNWA-DT 51.1 NBC RF Channel: 50 15 miles at 77°	 Yellow	
KAFT-DT 13.1 PBS RF Channel: 9	 Green	

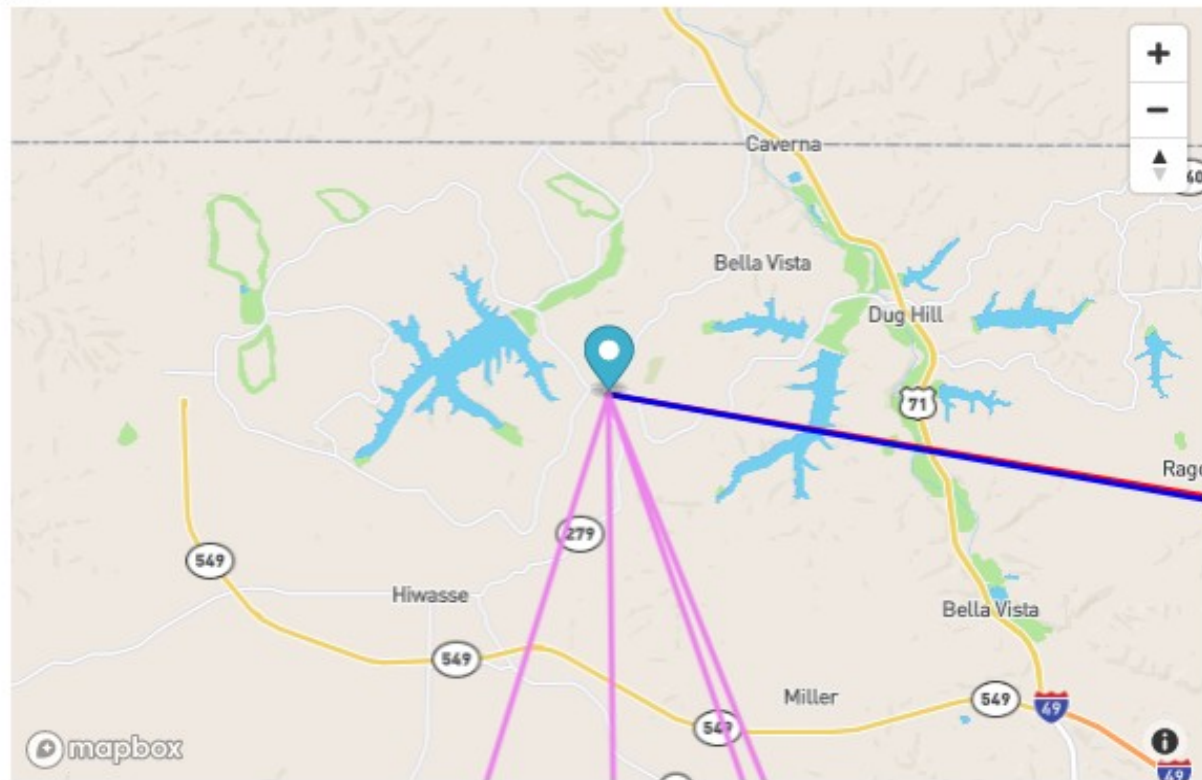


Determining What Antenna is Needed

- **For 1801 Forest Hills Blvd BV**
 - **Nothing unless antenna > 30ft above ground.**
Decent reception may be impossible in a valley

Up to 19 channels from 6 over-the-air stations may be received at this location.

Stations	Antenna	FCC Repack
KNWA-DT 51.1 NBC RF Channel: 50 20 miles at 98°	 Red	
KXNW-DT 34.1 MNT RF Channel: 25 20 miles at 99°	 Blue	
KWOG-DT 57.1 IND RF Channel: 29 19 miles at 178°	 Violet	
KHOG-DT 29.1 ABC RF Channel: 15 33 miles at 157°	 Violet	
KAFT-DT 13.1 PBS RF Channel: 9 47 miles at 160°	 Violet	
K28NT-D 48.1 FMN RF Channel: 28 7 miles at 196°	 Violet	



Location of Antenna

- **If OTA signal is strong enough, antenna could work inside near TV, but should get better reception and more stations if**
 - antenna is moved to a window facing the station
 - antenna is moved to a upper floor in the house
 - antenna is moved to attic
 - antenna is placed where minimal objects (walls, external trees, buildings, terrain features) are in the path from antenna to transmitting tower
 - antenna is placed outside above roof (requires professional installation, grounded lightning arrester, etc.), which will add to the cost. If you are in a valley or surrounded by obstructions, reception might still not be great
- **I quickly found that my inexpensive indoor antenna wouldn't come close to receiving the NWA stations I wanted unless the antenna was upstairs, remote from two of the TVs. To get better reception required a more serious antenna in my attic, carefully aimed by trial and error.**

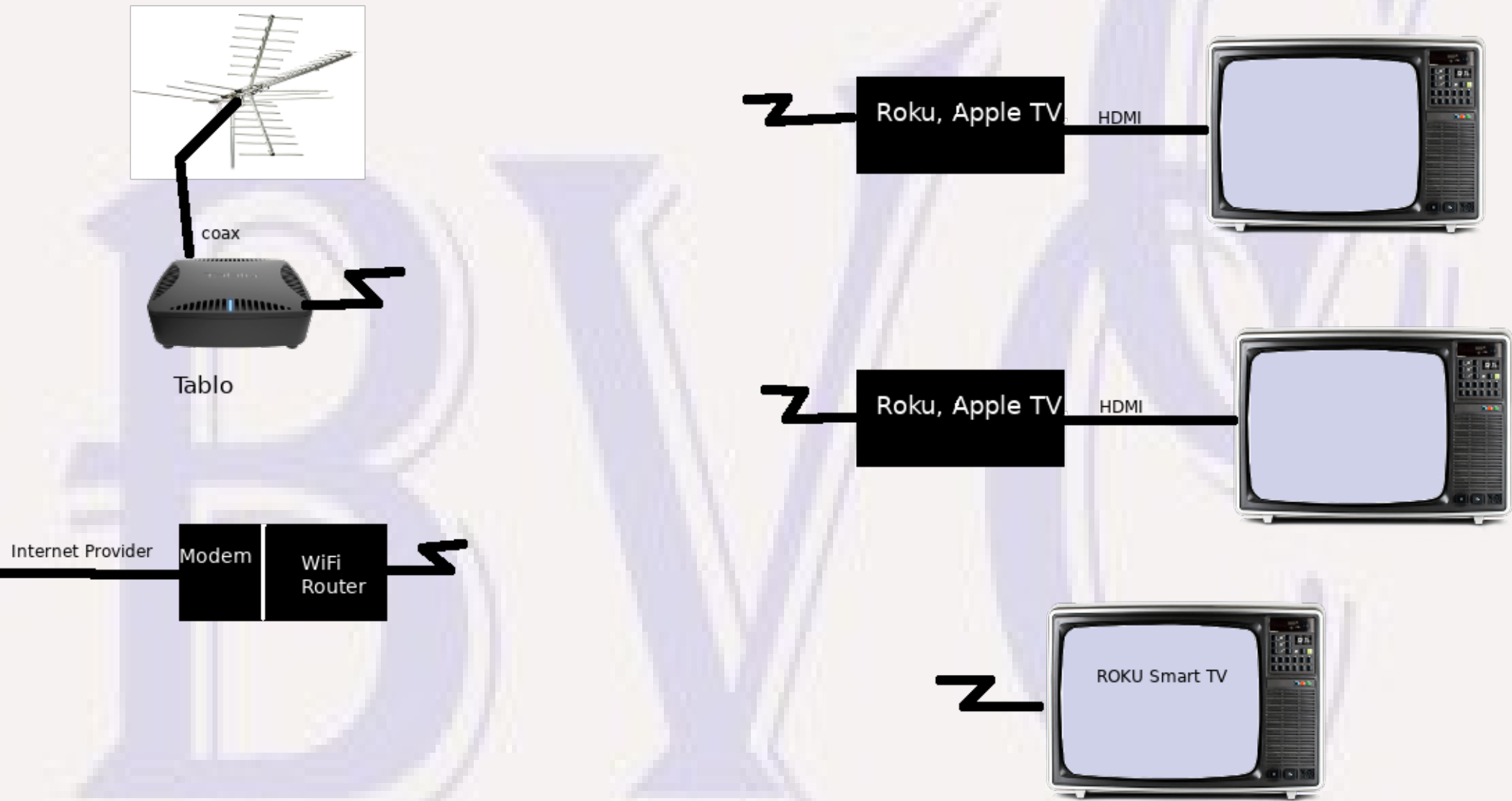
Types of Antenna

- **Indoor antennas designed to be smaller and less noticeable and may include an optional amplifier. My \$30 indoor antenna found some stations were strong enough to overload the amplifier and others weak enough to require it. Couldn't have it both ways.**
- **Outdoor antennas tend to be larger, especially when also rated for VHF, but may function almost as well in the attic if there is room to aim them properly.**
- **Antennas designed for weakest signals are usually direction-sensitive and finding best angle may be trial and error.**

TV's Sharing a Remote Antenna

- **How to get signal from one remotely-located antenna to one or more remote TV's**
 - **Run or use existing coax – may need RF amp or**
 - **Convert signal to TCP/IP and send over house LAN via WiFi or Ethernet cable**
- Two commonly preferred devices:**
- **Tablo – \$150 for 2 streams, \$200 for 4 streams**
 - **AirTV – \$120 for 2 streams – integration w Sling TV**

Internet TV with Shared Antenna



Why a Tablo

- **Saw more favorable comments; two-stream model adequate for our household; supports DVR with 64GB storage; can connect to LAN through Ethernet or WiFi; 24-hr TV Guide free.**
- **Didn't like AirTV tying features to Sling video streaming service when unsure if I would use Sling.**



Experience with Tablo

- Needs a power outlet, within an easy coax run from antenna. Produces significant heat so shouldn't be in a hot attic. Needs either an Ethernet connection or in a location with good WiFi access.
- Can purchase 14-day TV Guide support (after 30-day free trial ends) for \$4.99/mo, \$50/yr, or \$150 for lifetime (can use with multiple Tablo devices and with upgraded devices). That support also allows you to access your OTA channels from mobile devices when outside the house. Currently doing without – of greatest use if you want to schedule future recordings more than 24 hours in advance and don't have other ways to find date, time and channel of the program. Apple-TV Tablo app is currently broken and won't let you schedule any recordings without the Extended Guide, but you can still schedule from iPhone Tablo app, web browser, or if you have a Roku interface box.
- First tested with \$30 indoor antenna located on 2nd floor on South-facing wall. Unable to receive all the UHF NWA stations, none of VHF (5, 13).

Test with VHF/UHF Outdoor Antenna (in garage)

<input checked="" type="checkbox"/>	5-1 CBS	1080i	●●●○○
<input checked="" type="checkbox"/>	5-2 MNT	720p	●●●○○
<input checked="" type="checkbox"/>	5-3 ANTENNA	480i	●●●○○
<input checked="" type="checkbox"/>	13-1 PBS	720p	●●●●●
<input checked="" type="checkbox"/>	13-2 CREATE	480i	●●●●●
<input checked="" type="checkbox"/>	13-3 HD06	480i	●●●●●
<input checked="" type="checkbox"/>	13-4 WORLD	480i	●●●●●
<input checked="" type="checkbox"/>	29-1 ABC	720p	●●●●●
<input checked="" type="checkbox"/>	29-2 CWPLUS	720p	●●●●●
<input checked="" type="checkbox"/>	29-3 METVN	480i	●●●●●
<input type="checkbox"/>	33-1 TELE	1080i	●○○○○

UHF/VHF Antenna in Attic

– Just the channels with 5of5 signal strength

5-1	CBS	1080i
5-2	MNT	720p
5-3	ANTENNA	480i
13-1	PBS	720p
13-2	CREATE	480i
13-3	HD06	480i
13-4	WORLD	480i
29-1	ABC	720p
29-2	CWPLUS	720p
29-3	METVN	480i
51-1	NBC	1080i
51-2	FOX	720p
51-3	LAFF	480i
51-4	GRIT	480i

My Attic Antenna

- **Note the high-tech mounting: suspended from two nails with nylon cord.**




Tablo Live-TV Guide Display



Live TV

	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM
5-1 CBS	NCIS	FBI		48 Hours NEW	
5-2 MNT	Pawn Stars	Pawn Stars	Pawn Stars	5NEWS at 9pm	Friends
5-3 ANTENNA	McHale's Navy	Father Knows Best	The Jack Benny Program	The Burns and Allen Show	I Dream of Jeannie
13-1 PBS	As Time Goes By	Father Brown		Maigret	
13-2 CREATE	Christopher Kimball's Milk Street Television	Christopher Kimball's Milk Street Television	Christopher Kimball's Milk Street Television	Christopher Kimball's Milk Street Television	Christopher Kimball's Milk Street Television

Tablo Menu



● Tablo

- 👁 Live TV
- 🕒 Prime Time
- 📺 TV Shows
- 🎬 Movies
- 🏀 Sports
- 🕒 Scheduled
- 📹 Recordings
- ⚙ Settings
- ⚡ Disconnect

Tablo Channel 51-1 NBC

51-1 NBC

FSU 6 ND 25 2nd 6:49 :16 3rd & 6

0:17 / 0:26

CC 20 30

Internet Connection Requirements

Number of Devices	Light Use	Moderate Use	High Use	Very High Use
1-3	5-10 Mbps	15 Mbps	25 Mbps	50 Mbps
4-8	15 Mbps	25 Mbps	50 Mbps	100 Mbps
8-10	25 Mbps	50 Mbps	100 Mbps	150 Mbps
10+	50 Mbps	100 Mbps	150 Mbps	200+ Mbps

Light use: *emails, web browsing, social media, SD video streaming*

Moderate use: *music streaming, occasional online gaming, streaming HD video on one or two devices*

High use: *Multiple devices streaming HD video simultaneously, real-time gaming, video conferencing*

Very high use: *Multiple devices streaming HD or 4K video simultaneously, large file downloading, real-time gaming, video conferencing*

Data Requirements for Streaming

- SD (480p) – 1 GB/hr
- HD (720p) – 2 GB/hr
- HD (1080i) – 3 GB/hr
- UHD (~4K) - 7 GB/hr
- One TV showing HD streaming video for a solid 8 hrs/day for 31 days would download 748 GB/mo; two streams would be 1496 GB, etc.
- If you have very heavy TV usage with multiple people downloading HD video it would be physically possible to exceed Cox's 1024 GB/mo default data limit, and the monthly overage charges in 50GB chunks for the next 1TB is a steep \$200. If most of the video streaming is SD, only 1/3 the data is required.
- But, if a substantial part of your video streaming is from watching OTA channels from a Tablo box on your own LAN, that data isn't coming from the Internet and doesn't count against any Internet service provider data limit.

Questions?

BVCS