



Judging Antennas By Appearance

Doug Lung

dlung@transmitter.com

Antenna Fundamentals

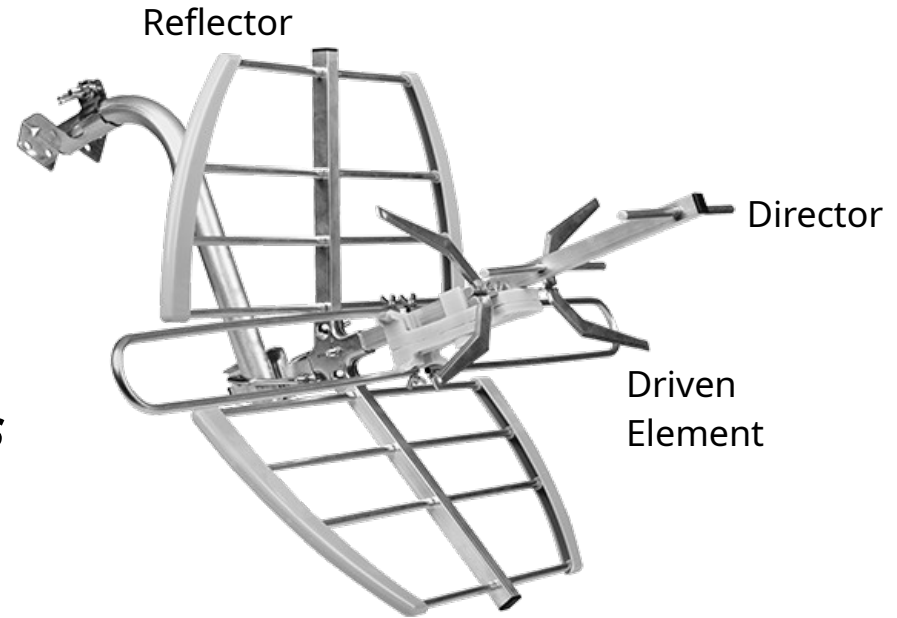
- Frequency versus element length (wavelength) – does it look right?
- Passive gain must come from adding directivity – elements add gain
 - dBi – gain above isotropic (spherical)
 - dBd – gain above a dipole (dipole has 2.15 dBi gain due to directivity)
- Amplifiers can increase the signal but also increase noise and may overload
- Claimed range is useless without knowing the factors used to calculate it.

Half-wavelength at TV Frequencies

	Ch..	Freq. (MHz)	Length (in.)	Length (cm)
Low VHF	2	57	104	263
	6	85	69	176
High VHF	7	177	33	85
	13	213	28	70
UHF	14	473	12	32
	36	605	10	25

Antenna Components

***Analyze an antenna by
looking at its components***



- Driven Element – Every antenna has one – determines frequency range
 May consist of multiple elements to increase bandwidth, add channels
 - Reflector – Provides gain and directivity – the larger, the better
 - Director(s) – Provides gain and directivity – more is not always better
-

Example: Rabbitear & Loop: GE and Antennas Direct

- VHF rabbit ears can be adjusted to optimize a VHF channel
- Simple wire UHF loop is not broadband
- Antennas Direct ClearStream Eclipse varies thickness to increase bandwidth – a better choice
- Typical gain from these antenna is 0 dBd or less
- An amplifier may be added but unless it has a lower noise floor or is needed to overcome cable loss it just increases noise and interference



Example: Onn Clear Indoor

- Different shapes for different frequencies?
Low-VHF broadcasters will recognize the “batwing” element (too small here for VHF)
- Difficult to analyze, but it works okay.



Example: RCA Attic Antenna (Inexpensive and easy to find)

- Folded dipole driven element for VHF
- Broadband “fan” driven element for UHF
- Effective reflector for UHF only
- Small directors for UHF



Example: Teledesic Ellipse Mix UHF/VHF with amplifier

Broadband UHF driven element
Simple VHF dipole & reflector but it works
Unusual director configuration
Includes low noise amplifier



Example: Scala Paraflector

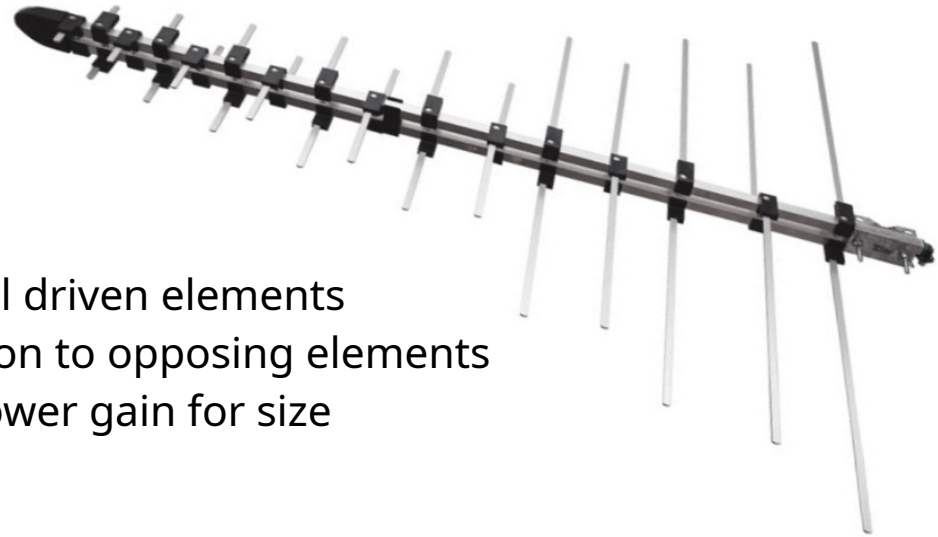


- Parabolic reflector provides high gain
- Driven element optimized for one channel
- Suitable for reception or low power transmission



Example: Antennas Direct ELEMENT

Log Periodic VHF/UHF

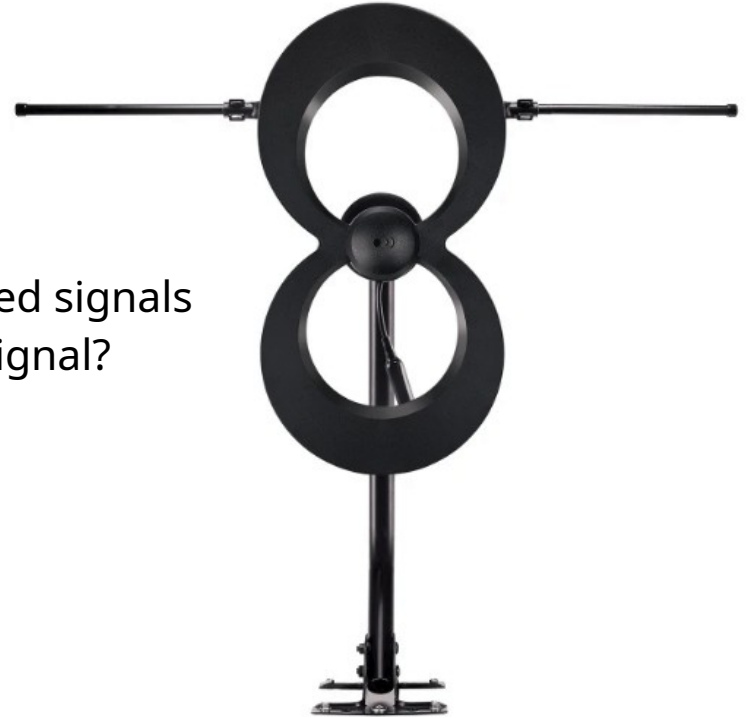


- Log-Periodic antenna design with all driven elements
- Notice two booms provide connection to opposing elements
- Best broadband performance but lower gain for size



Example: Antennas Direct ClearStream^(TM)

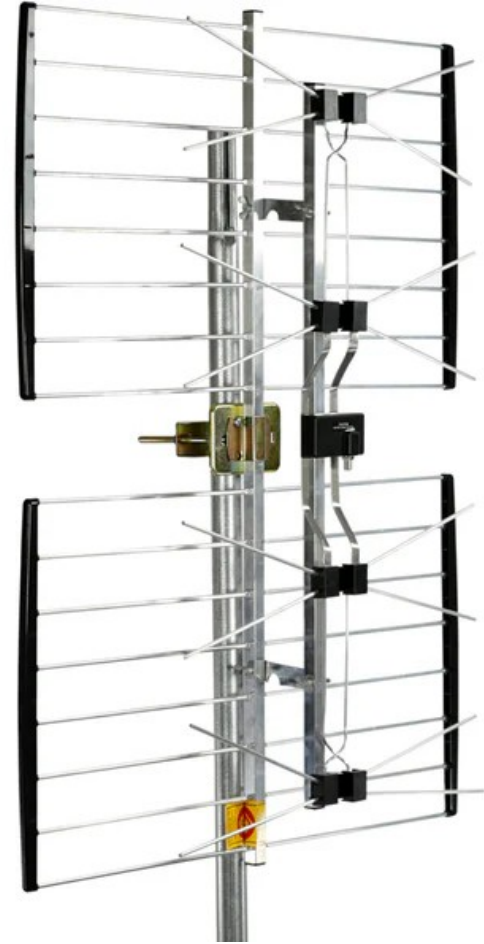
- Simple dipole for VHF limits VHF performance
- Two phased driven elements add UHF gain
- Versions with reflectors increase gain
- Potential issues with reception of elliptically polarized signals
Does loop phasing partially cancel the EP or CP signal?



Example: 4-bay "bow-tie": Channel Master ULTRAntenna 60

- Fan dipoles provide good match across UHF band
- Doubling driven elements doubles* gain
- Reflector doubles* gain
- Advertised 10 dB gain at UHF
- Advertised 3.5 dB gain at high VHF (how?)

*If there was a perfect reflector and no loss in the phasing lines.



Example: Scala ParaPanel

- Transmit antenna using similar principle as 4-bay bow-tie
- Solid metal reflector behind bow-tie driven elements
- Panels can be combined to create different directional patterns and increase gain
- Gain per panel 9.5 dBd
- Antenna covers entire UHF band and can be used by multiple stations on different channels
- Similar antennas available from Kathrein and Dielectric



Example: Slot Antenna

- A slot in a conductive surface is equivalent to a dipole in free space – Babinet's Principle
- A vertically oriented slot radiates a horizontally polarized signal
- A vertically oriented dipole can be coupled to a slot to create an elliptically polarized signal



Evaluate this antenna:

SAVE UP TO 7% WHEN YOU BUY MORE

US Seller
Fast Shipping From USA

IN 111 CARTS

300 Mile Long Range Antenna

4K ULTRA HD Full HD 1080p

300 Mile

CBS FOX CW NBC TNT CNN UNIVISION UNIMÁS TELEMUÑODO HSN abc NEWS

1.4K

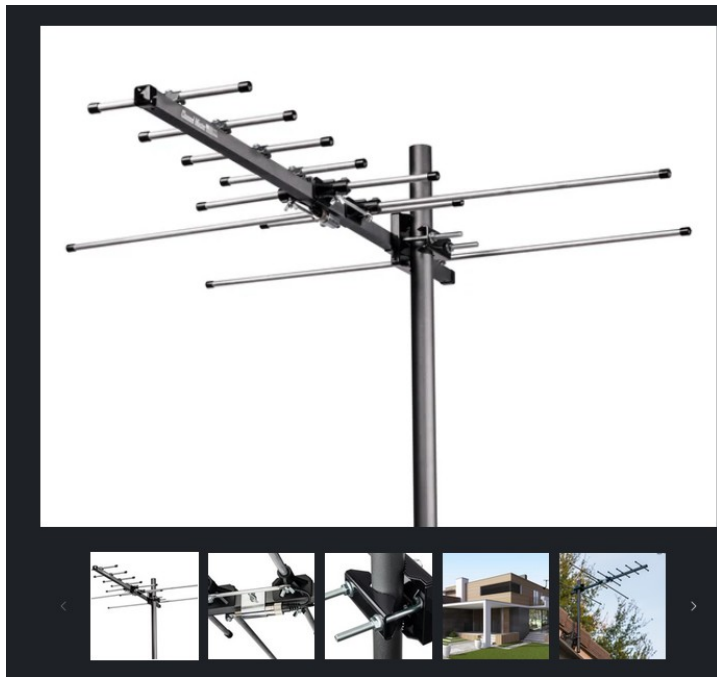
Have one to sell? Sell one like this Sell something else Share

- How does size compare with wavelength?
- Does mileage claim make sense?
 - Other irrelevant or wrong information
- Identify the elements
 - Gain compared to dipole?
 - Antenna polarization is wrong

Evaluate this antenna:

Pro-Model UHF/VHF TV Antenna

Long range upgradable TV antenna with 70+ mile reception range.



How does size compare with wavelength?

Does mileage claim make sense?

Other irrelevant or wrong information

Identify the elements

Estimate expected gain

Performance over full TV band?

Claimed gain:

UHF: 9.7 dB (Max)

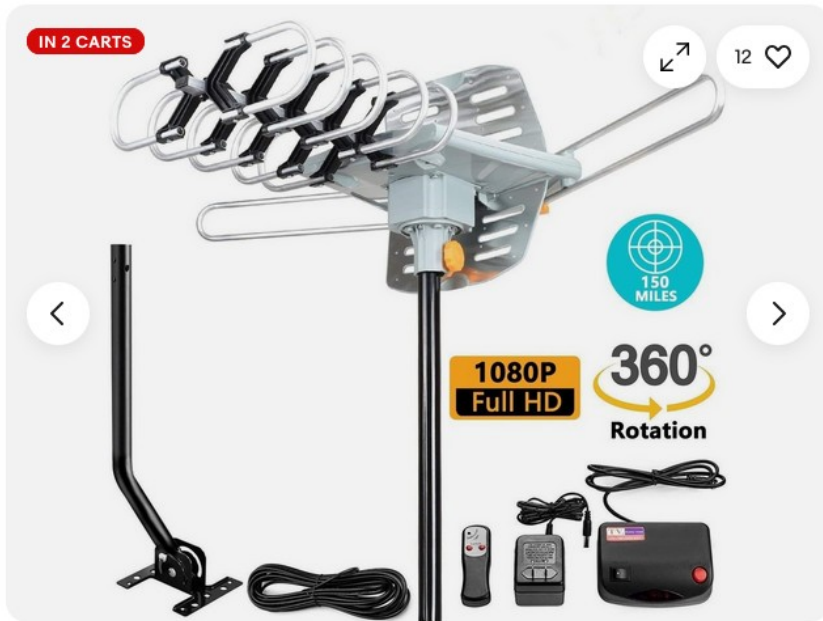
VHF: 5.9 dB (Max)

Claimed frequency range:

54 ~ 216 MHz & 470 ~ 608 MHz

Evaluate this antenna:

PBD Amplified Outdoor TV Antenna with 360° Motorized Rotation, UHF/VHF Long-Range Reception, Remote Control, Mounting Pole & 40FT RG6 Cable, Dual TV Outputs, Supports 4K/1080P Smart & Older TVs



How does size compare with wavelength?

Does mileage claim make sense?

Identify the elements

Estimate expected gain

Performance over full TV band?

Amplifier noise figure?

Amplifier maximum input level?

Manufacturer also offers more basic antennas (4-bay bow-tie) on their Amazon store.

Evaluate this antenna:

5500+ Miles Long Range TV Antenna-2026 Digital TV Antenna for Smart and Old TV-Indoor Outdoor HD Antenna for Local Channels with Strongest Amplifier-52ft Coaxial Cable/AC Adapter-Support 8K 4K 1080p



Item Dimensions L x W x H:
10.4"L x 3"W x 20"H

From images, this is likely a UHF 2 or 4-bay bow-tie in a plastic case with amplifier.

"5500+ Miles Long Range & Advanced Signal Booster— Upgraded by our professional R&D team, this smart TV antenna features an enhanced amplifier signal booster covers 5500+ miles, effectively blocks interference from cellular and FM signals, ensuring stable reception even if you live in remote, suburb or weak-signal areas. Supports 8K, 4K, 1080p and ATSC 3.0, delivering theater-like HD picture quality and immersive sound. Warm Tips: Switch amplifier to "short range" if within 35 miles of towers."

Evaluate this antenna:

20+ Mile Range Unfolded Paperclip Antenna



Element dimensions:

10 cm – quarter wave at ~ 750 MHz

Gain and directivity?

No coax loss from mismatch if plugged directly into TV's F-connector

Surprisingly, this antenna provides acceptable reception in many locations!

Scrape plastic coating off wire for best results.

What antennas have you tested?

Let me know the results!
dlung@transmitter.com

Slides will be available at
<https://www.transmitter.com/nta2026>
