FIELD RADIO BRIEFING

Ham Radio Antenna Myths & Reality

Understanding SWR, EFHWs, feedlines, common mode current, and real-world performance.

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RF PATHS • MATCHING • PROPAGATION

MYTHS BEGIN HERE

Why Are Antennas So Confusing?

“If you ask 10 hams about antennas, you get 15 opinions.”

Reality: antennas combine physics, local site conditions, operating goals, and personal experience. The same design can behave differently in a different yard.

“My tuner fixed it.”

“SWR is perfect.”

RF OPINION STORM

“No counterpoise needed.”

“More gain solves all.”

THE SYSTEM VIEW

What Actually Matters?

The radio is only one part of the path. Real performance comes from the complete antenna system: what radiates, what is lost, and where the RF current actually flows.

RADIO	FEEDLINE	ANTENNA
SOURCE	LOSS & CURRENT PATH	RADIATION

- Height
- Efficiency
- Ground
- Propagation
- Feedlines

MYTH CHECK

LOW SWR DOES NOT EQUAL GREAT ANTENNA

Dummy Load

1.0:1

Nearly perfect match. Nearly no useful radiation. The meter looks happy while the signal goes nowhere.

Real Antenna

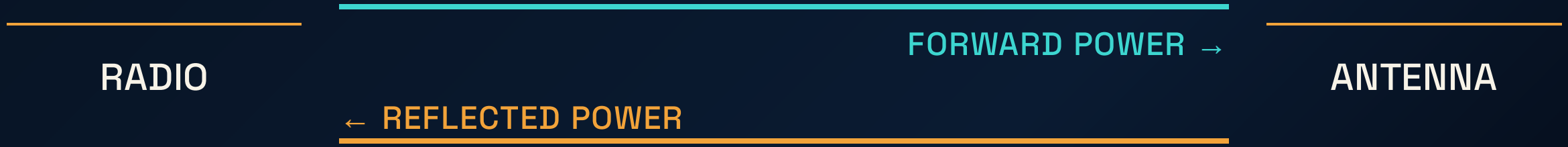
Useful RF

Performance depends on radiation efficiency, pattern, height, losses, and installation details.

SWR is a clue — not a performance certificate.

What SWR Actually Measures

SWR describes the impedance mismatch seen on the feedline. It helps protect gear and diagnose matching problems, but it does not directly tell you how well the antenna radiates.



Mismatch

between system impedances

Not Efficiency

losses may be hidden

Not Gain

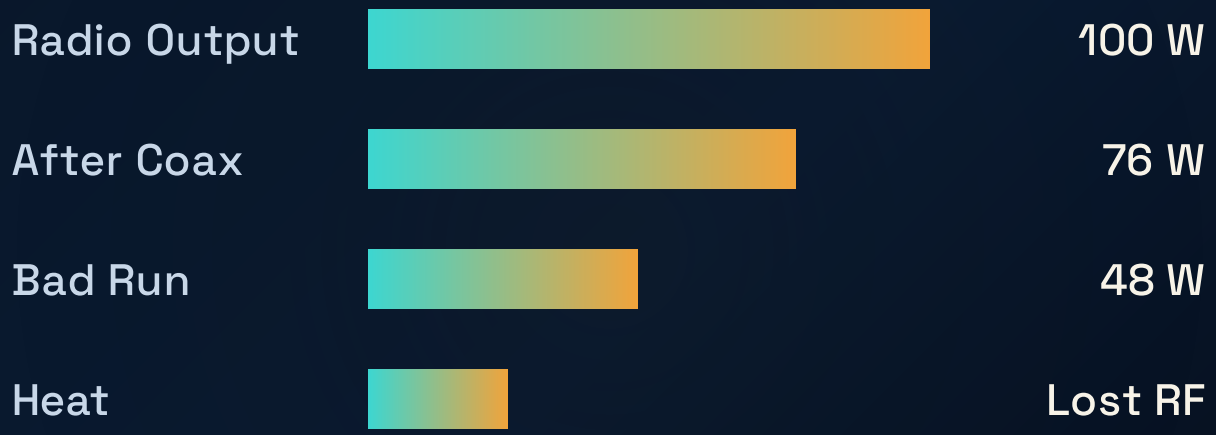
pattern is separate

HIDDEN LOSS

Lossy Coax Can Fool You

A long, poor, wet, or frequency-challenged feedline can absorb reflected power before it reaches your meter. The reading improves while useful RF quietly turns into heat.

“The wattmeter doesn’t tell you where the watts went.”



Conceptual illustration: actual loss depends on cable type, length, frequency, connectors, and condition.

What Gain Really Means

Antenna gain does not create extra transmitter power. It concentrates radiation in some directions, usually by reducing it in others.

Light Bulb

Broad coverage can be useful, but energy is spread across many directions.

Flashlight

Gain focuses energy toward favored angles or headings, improving signal where the pattern points.

Gain reshapes RF energy.

DX vs NVIS

Different radiation angles serve different communication goals.

DX

Lower-angle radiation favors longer skip paths and distant contacts when propagation supports them.

Low angle · long path

NVIS

High-angle radiation supports regional coverage by sending energy upward for near-vertical return.

High angle · regional path

HEIGHT CHANGES GEOMETRY

Raise the System. Change the Angle.

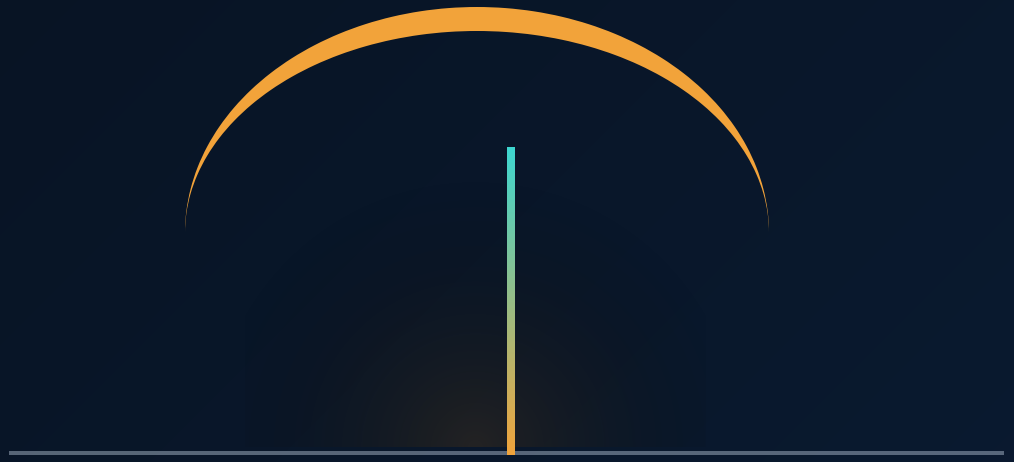
More height can improve practical results by changing where your RF energy is aimed, especially for longer-distance contacts.

Height is often one of the most effective station upgrades.

Low vs Higher Installation

Same energy.
Different shape.

Low Height Behavior

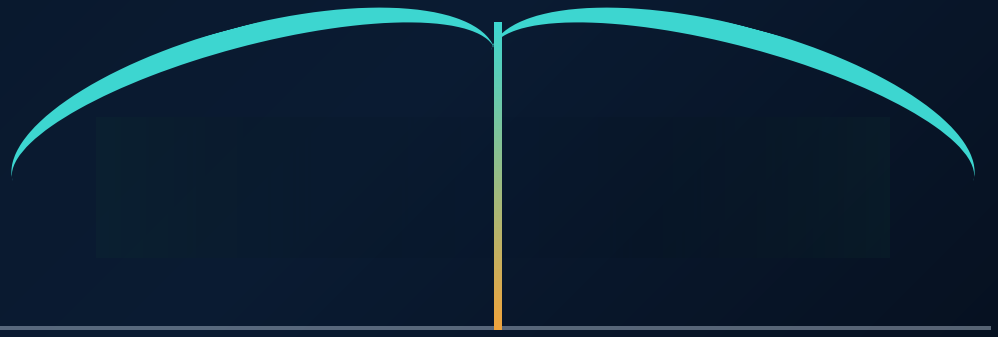


energy tends upward

High-angle radiation can be useful for nearer regional contacts when propagation supports NVIS-style coverage.

Regional coverage tendency

Higher Height Behavior



energy spreads outward

More height can create lower-angle energy that better supports longer-distance paths.

DX potential tendency

Verticals vs Dipoles

No antenna type wins every situation. The best choice depends on space, supports, soil, noise, bands, and operating goal.

ANTENNA	STRENGTHS	TRADEOFFS
Vertical	Compact footprint and useful **low-angle radiation** for DX.	Needs a radial or ground system and may hear more local noise.
Dipole	Simple, efficient, easy to build, and predictable when installed well.	Needs support height and space; pattern changes strongly with height.
Portable Wire	Fast deployment, flexible placement, and practical for temporary operation.	Often compromises height, counterpoise, or efficiency for convenience.

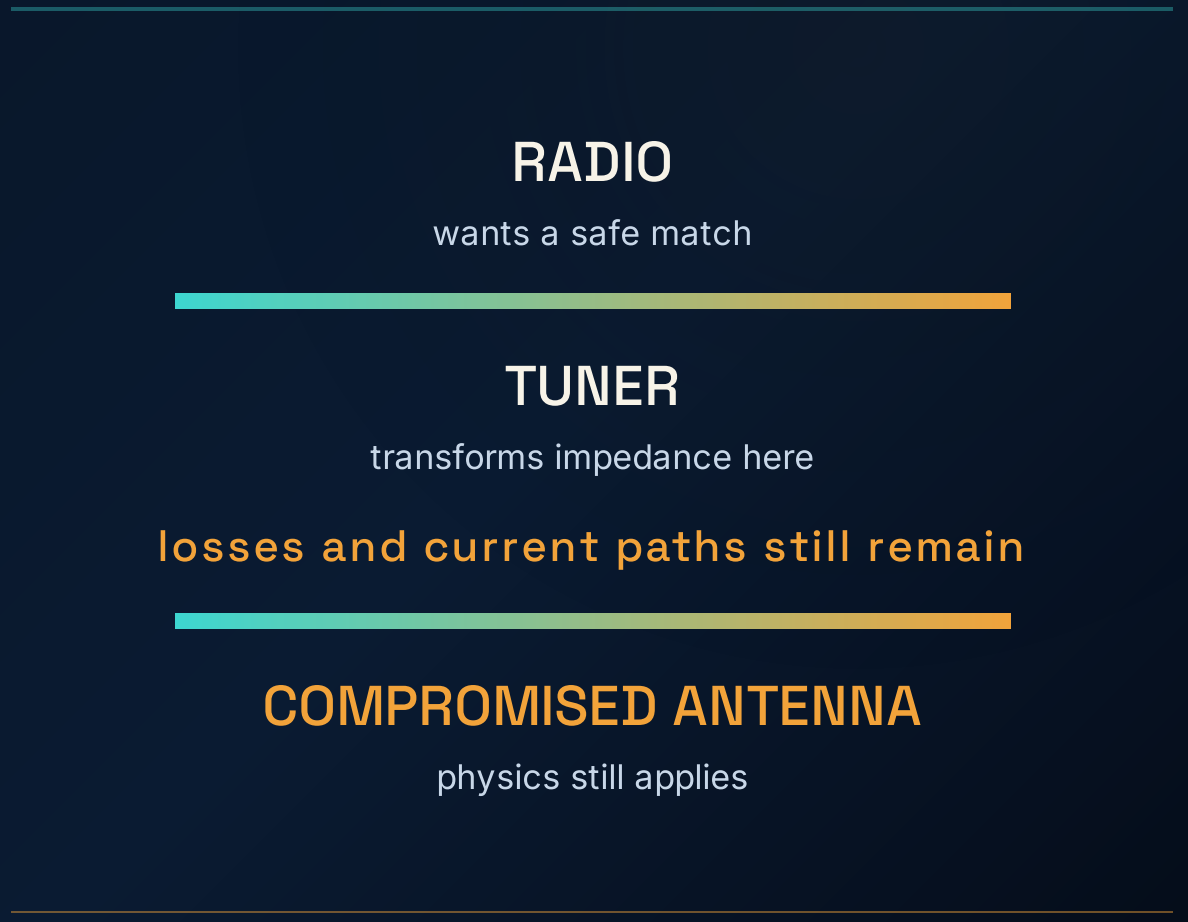
Choose the antenna for the mission, not the myth.

MYTH CHECK

Tuners Do Not Fix Antennas

A tuner helps the transmitter see an acceptable impedance. It does not erase feedline loss, restore missing ground systems, or make a poor radiator efficient.

“The tuner protects the radio, not physics.”



WHY OPERATORS LIKE THEM

EFHWs Became Popular Because They Are Practical

The appeal is not mystery. It is convenience under real installation limits.

01

Single-End Station Placement

The feed end can be near the operator, which is useful for temporary or space-limited setups.

02

Fast Deployment

Fewer support requirements make the antenna attractive for portable and emergency operation.

03

Lower Visual Impact

A simple wire system can be easier to fit into HOA, backyard, or stealth environments.

Reality Check

Convenience is real, but it does not remove the need to manage return currents, choking, feedline routing, and noise pickup.

POPULAR DOES NOT MEAN MAGIC — IT MEANS USEFUL.

THE COUNTERPOISE MYTH

No Planned Return Path? The System Chooses One.

RF current does not disappear because an installation looks simple. It must complete a path through the system.

"The feedline always votes."

Return Current Management

Intentional Path

More predictable pattern, less station RF, and easier troubleshooting.

Uncontrolled Path

Noise pickup, RF feedback, and changing performance can become part of the operating experience.

Reality: counterpoise choices, choking, and routing decide whether the system behaves intentionally or accidentally.

Common Mode Current

Common mode current is RF flowing on the outside of the coax shield, where it can act like an unintended part of the antenna.

current on outside of shield

Symptoms You May Notice

01 RF in the shack

02 Unstable SWR

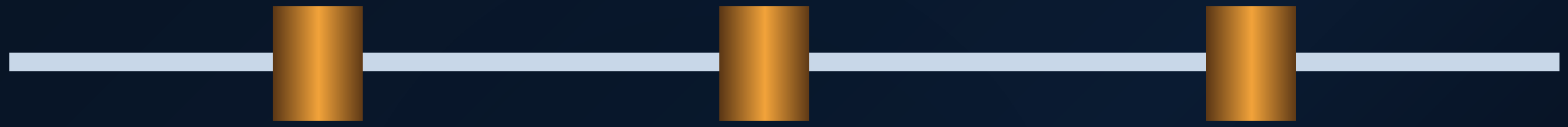
03 Computer or audio trouble

04 Extra received noise

The usual cure is better choking, grounding, physical layout, or a more intentional counterpoise.

Ferrite Chokes

Ferrite chokes help reduce unwanted current on the outside of feedlines, making the station more stable and predictable.



Reduce RF

Chokes add impedance to unwanted common mode current.

Placement Matters

The right location depends on how RF is returning in your setup.

Band Specific

Ferrite mix and turns should match the frequency range.

The goal is controlled current paths.

ANTENNA GEOMETRY

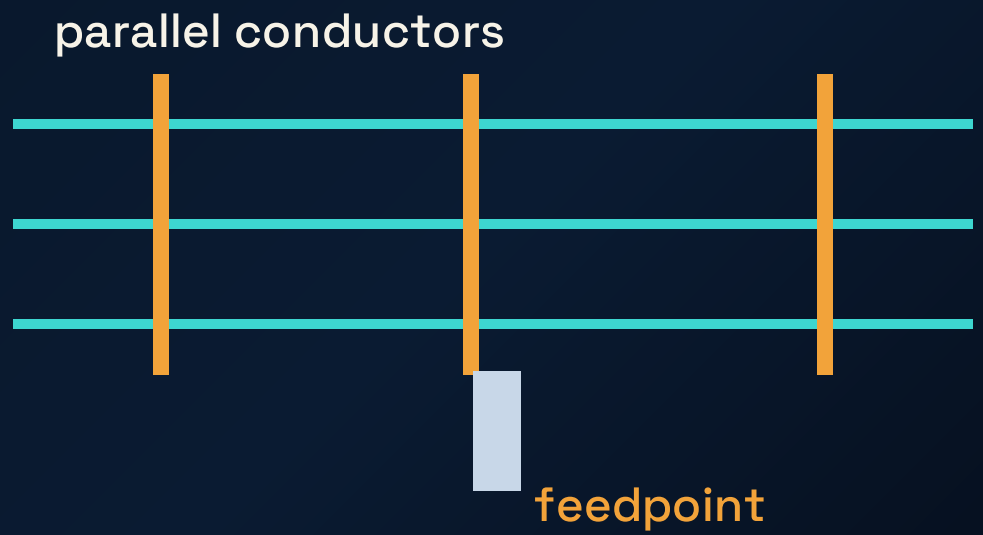
What Is a Caged Dipole?

A caged dipole uses **multiple parallel conductors** to act like a larger effective element diameter. That larger diameter broadens the usable bandwidth.

Multiple conductors

Larger effective diameter

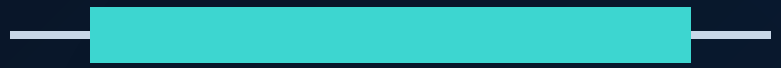
Wider operating bandwidth



BANDWIDTH VS GAIN

Caged Dipoles Can Widen the Match — Not Create Magic Gain

What Improves:
Operating Bandwidth



A larger effective conductor diameter can make the antenna easier to use across more of a band.

What Does Not:
Automatic Gain

Gain still depends on height, pattern, losses, ground interaction, and current distribution.

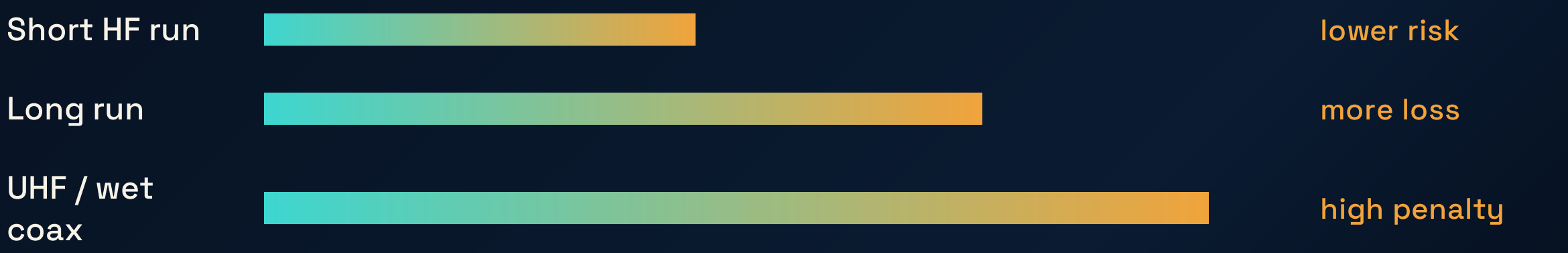
Myth broken:

Wider bandwidth is valuable because it reduces retuning and makes operation easier, not because it violates antenna physics.

MORE BANDWIDTH CAN BE PRACTICAL VALUE WITHOUT BEING EXTRA GAIN.

Feedlines Matter

The cable is part of the station. Loss, age, water, connectors, and frequency can quietly decide how much RF reaches the antenna.



Coax Type

Different cables have different loss characteristics.

Frequency

Loss generally becomes more important as frequency rises.

Water

Moisture intrusion can damage performance quietly.

Connectors

Poor joints waste power and create intermittent faults.

A good antenna with a bad feedline is still a compromised system.

PORTABLE ANTENNA REALITY

Every Field Setup Is a Tradeoff

Portable does not mean bad. It means the design priorities changed.

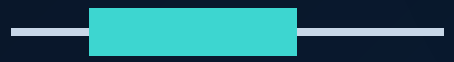
01

Speed

Faster setup can matter more than laboratory perfection during short activations.

02

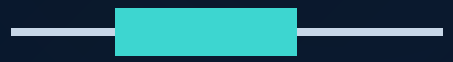
Weight



Light gear is easier to carry, but it can limit hardware, length, and accessories.

03

Height



Available supports and safety limits often define the final operating result.

04

Efficiency

Small or simplified systems may trade convenience for wasted RF energy.

Reality Check

The winning portable setup is the one that matches the activation goal: time, terrain, safety, band, and operating distance.

CHOOSE THE COMPROMISE ON PURPOSE.

Trust Measurements

Measurements turn antenna debates into evidence. Use instruments and on-air reports to compare changes in your actual station environment.

NanoVNA

S11 · Z · SWR

Reveals resonance, impedance trends, and feedline surprises.

WSPR

REAL SIGNAL PATHS

Compares weak-signal reach under changing propagation.

RBN

SPOT REPORTS

Reverse Beacon Network helps compare real-world transmitted signal reports.

Measure, change one thing, then measure again.

Key Takeaways

01 Low SWR does not prove high efficiency.

02 Height changes takeoff angle and practical coverage.

03 Feedlines, grounds, and current paths matter.

04 Physics beats marketing every time.

Think antenna system.

“The best antenna is usually the one you can actually get in the air.”

Questions?

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SWR • EFHW • FEEDLINES • COMMON MODE • PERFORMANCE