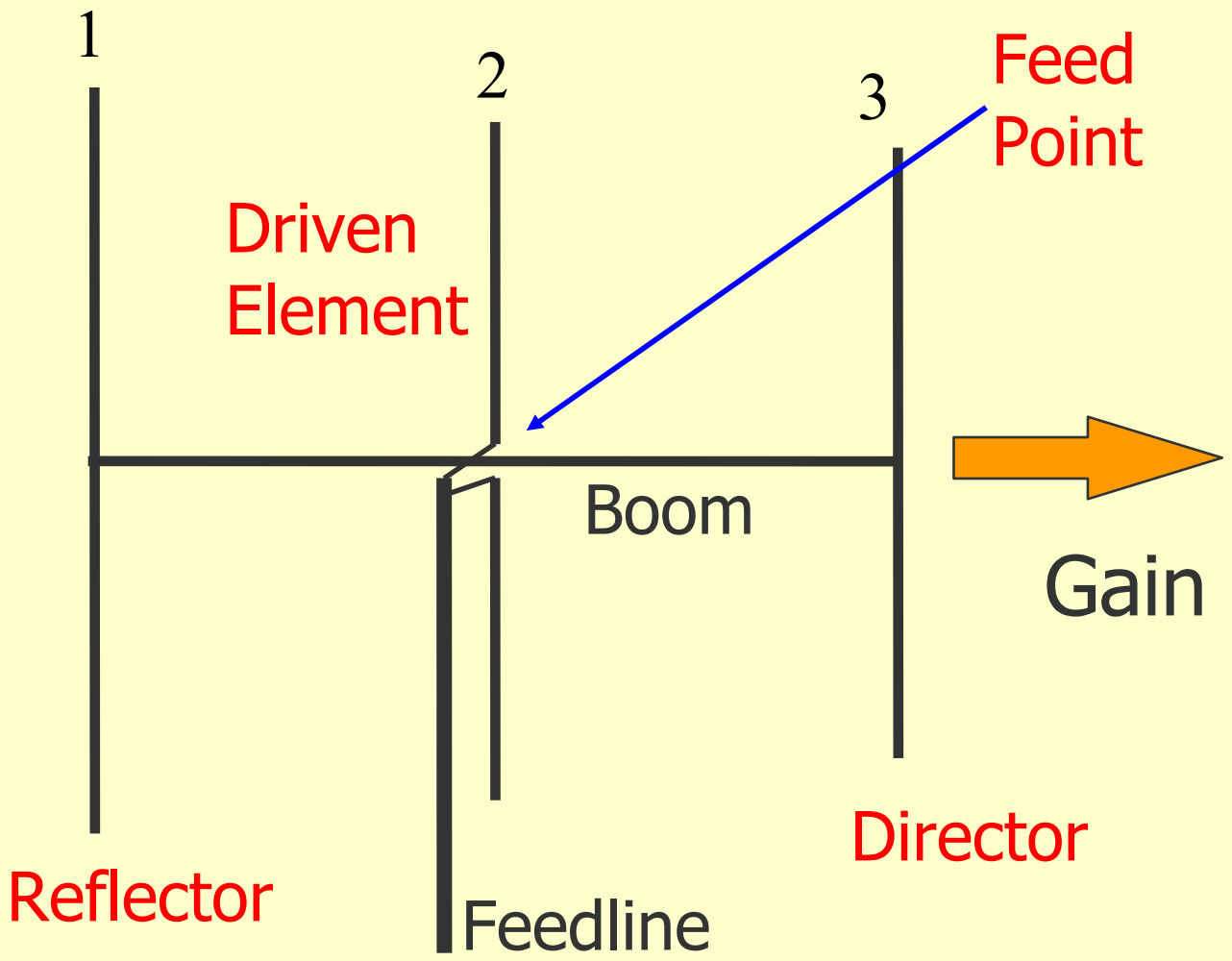
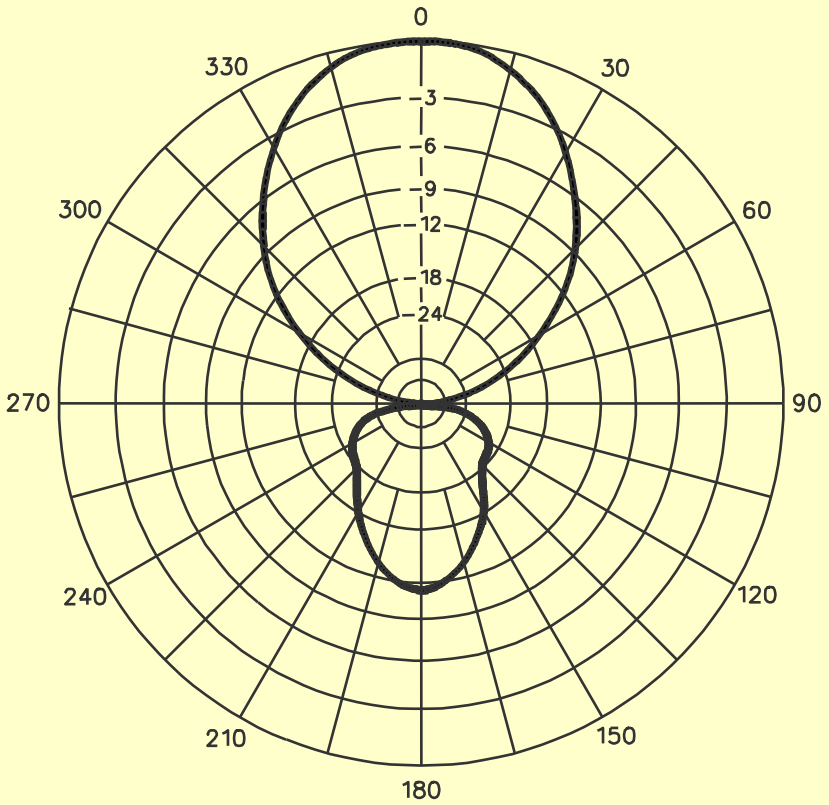
The Yagi

The Driven Element is approximately ½ wavelength long.

The Boom length has the greatest effect on the gain of a Yagi.



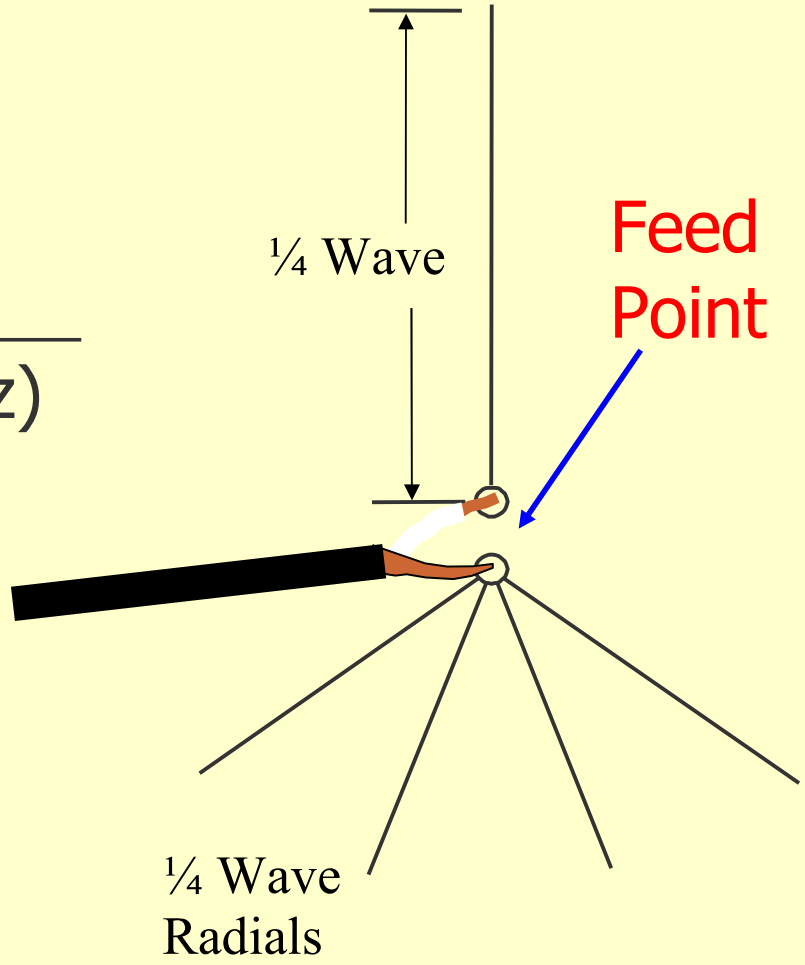
The Yagi



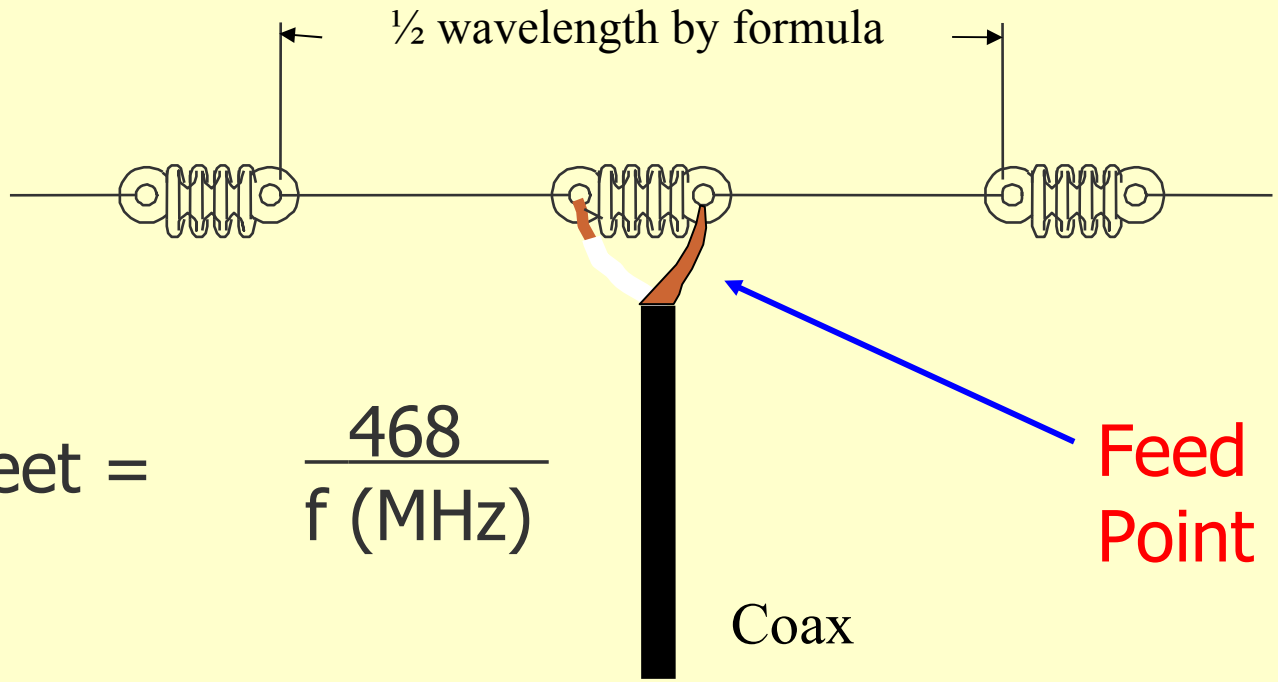
- The yagi antenna focuses RF energy in one direction, giving the appearance of getting “free power.”
- This free power is called Antenna Gain.
- If an antenna has a gain of 3 dB the effective radiated power will double.
- Many yagis are multiband antennas allowing them to operate on several bands with a single feed line.

The 1/4 Wave Vertical

$$\text{Length of vertical in feet} = \frac{234}{f\ (\text{MHz})}$$



The 1/2 Wave Dipole



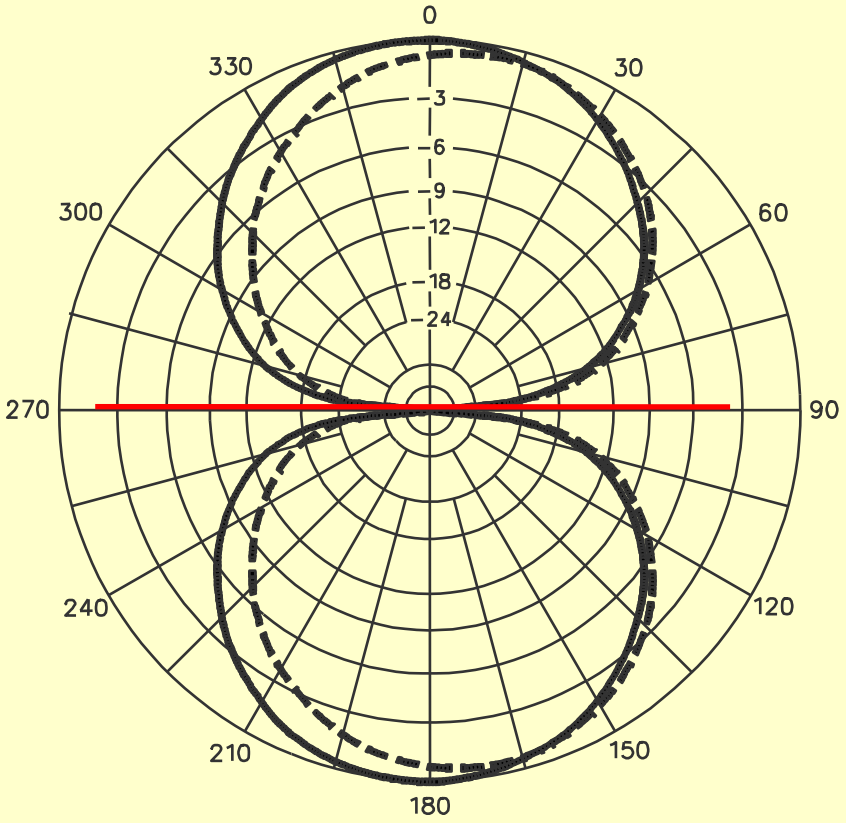
Length of dipole in feet = $\frac{468}{f\ (MHz)}$

The physical length of a dipole and other antennas can be reduced without changing its resonant frequency by adding a loading coil.

The 1/2 Wave Dipole

Radiation pattern for a dipole antenna looking down from above the antenna.

If the ends of a ½ wave dipole antenna point east and west most of the radio energy is radiated north and south.



The Yagi

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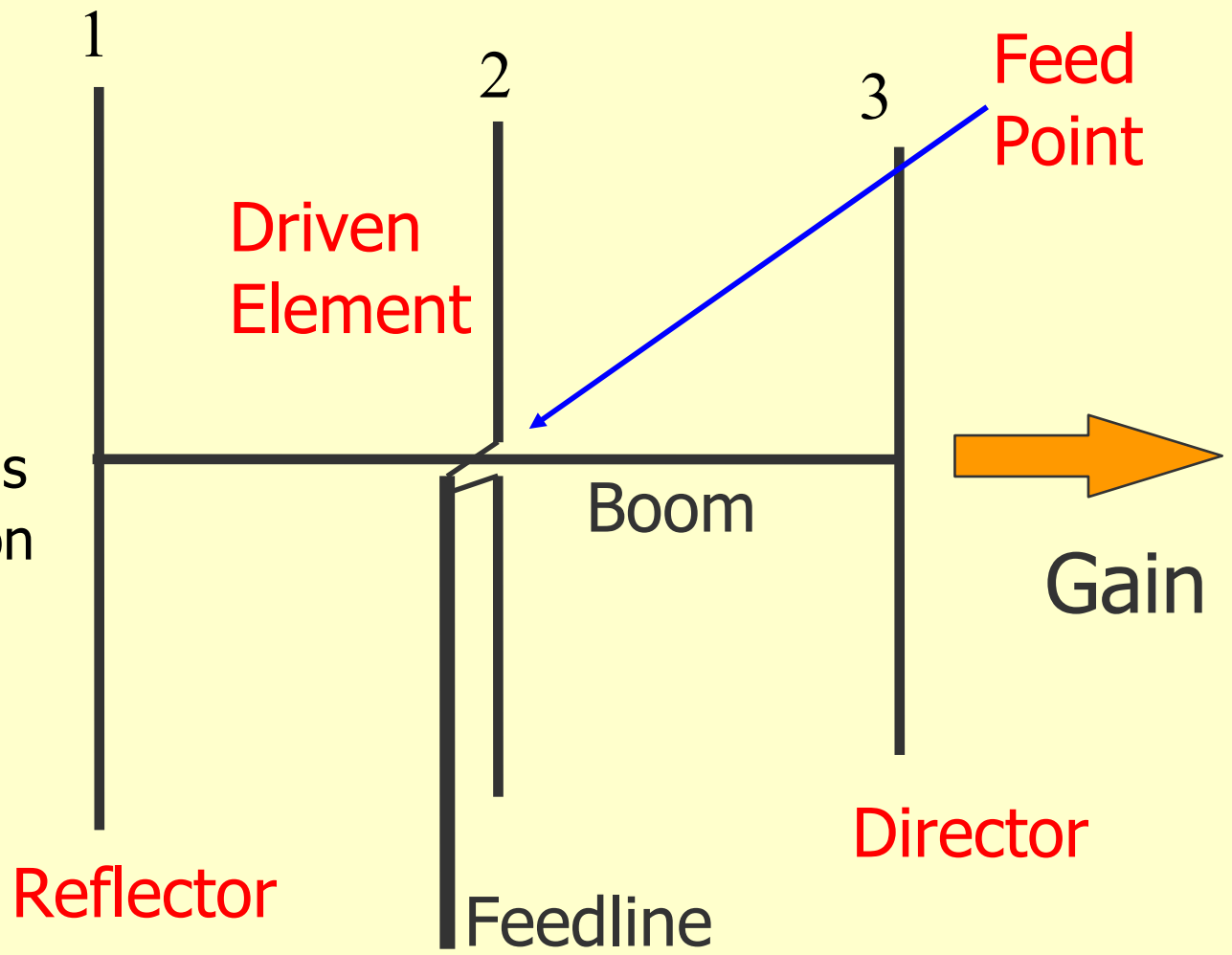
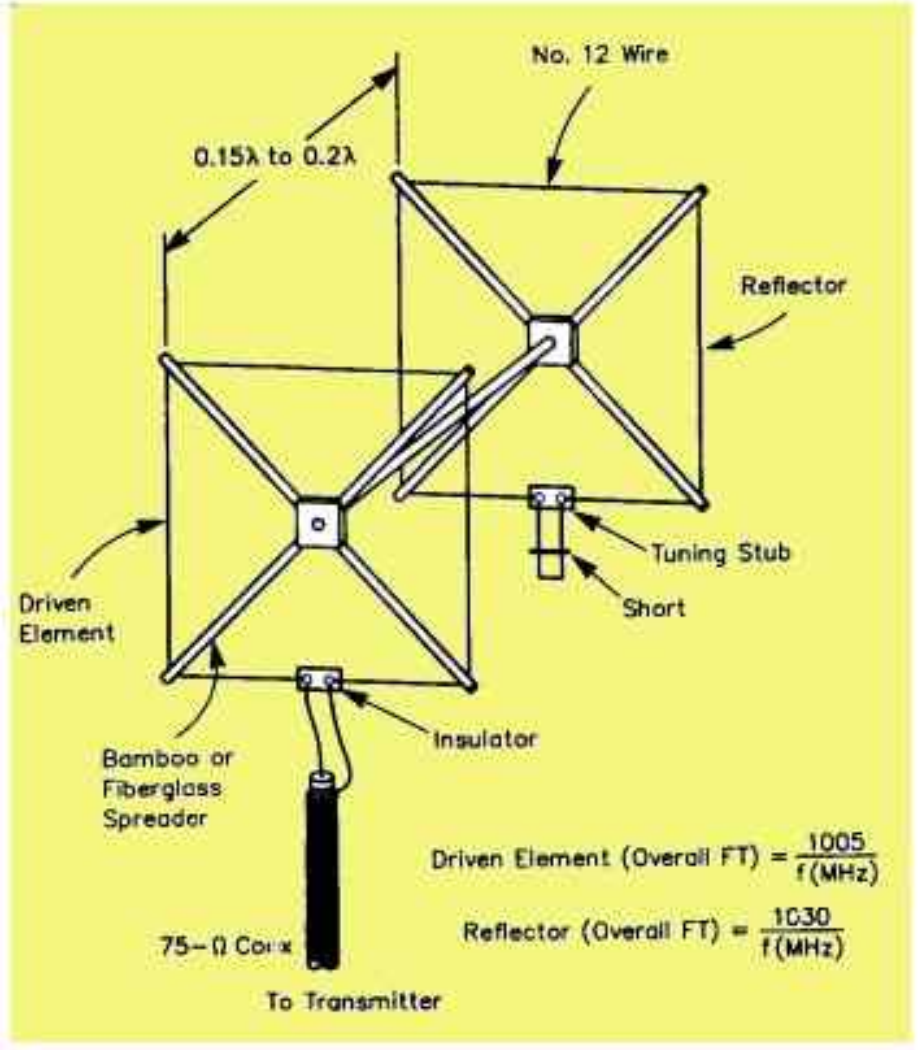


Cubical Quad Antenna

A cubical quad has two or more parallel four-sided wire loops, each approximately one-electrical wavelength long.



Approximate length, in inches, of a quarter-wavelength at 146 MHz?

2 Meters / 4 = 0.5 Meter

1 Meter = 39.37 Inches

39 / 2 = 19.5

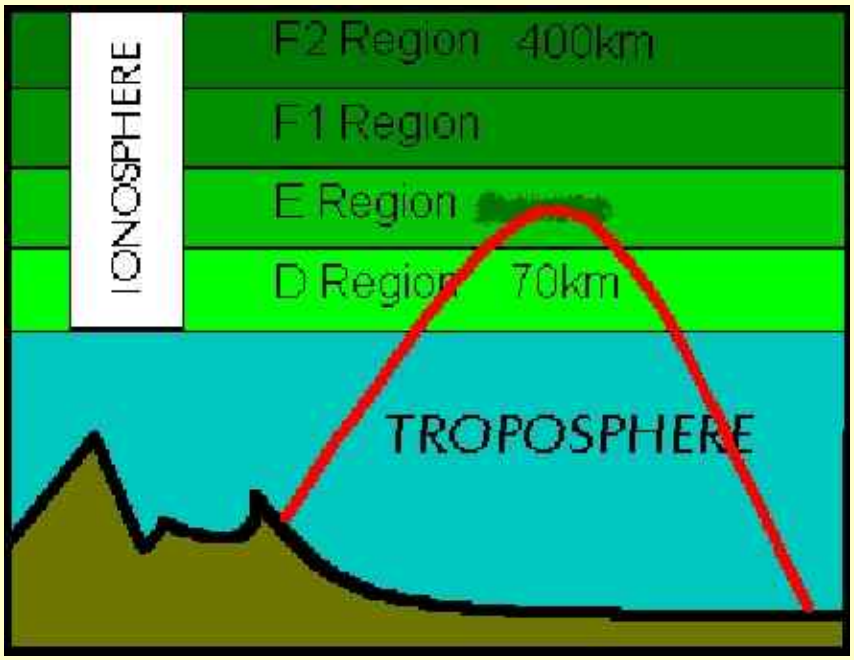
Quarter-wavelength formula

234 / Frequency in Mhz = Length in ft.

234 / 146 = 1.6 ft

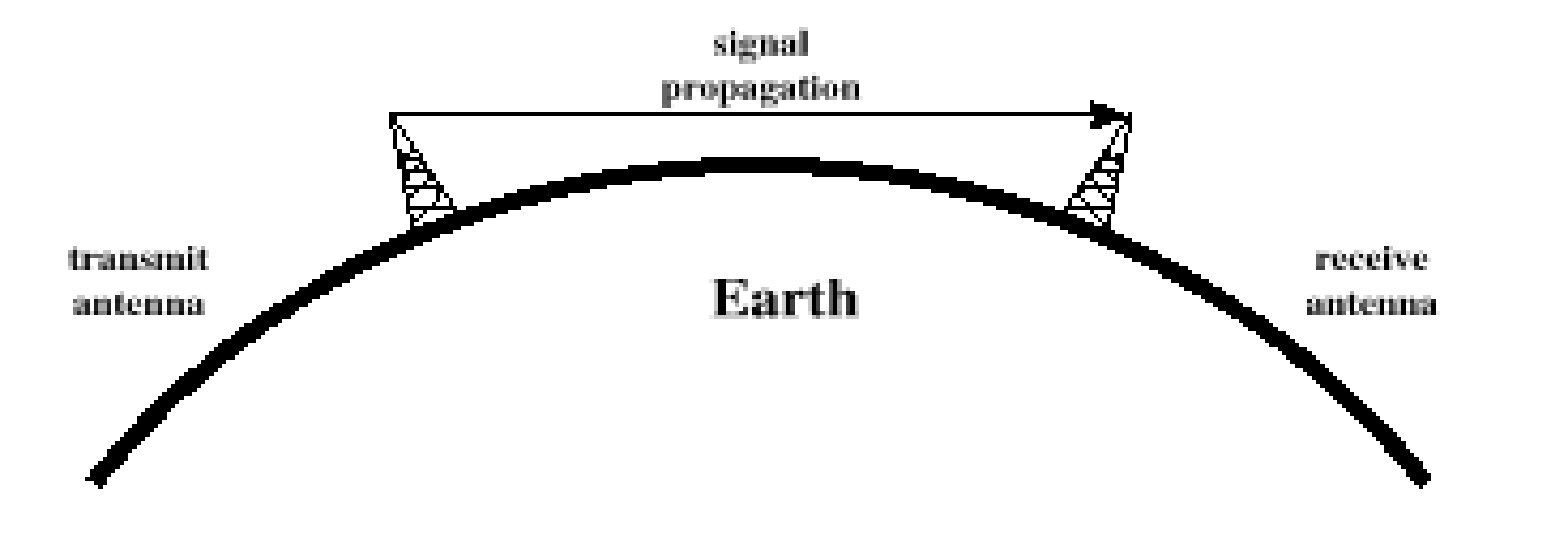
1.6 X 12 = 19

Sporadic “E” Propagation



- Small areas of the “E” Region can become highly ionized
- Allows long distance sky-wave propagation on the VHF bands
- Most likely to occur on the 6 meter band in the summertime
- By its name, it is “sporadic”

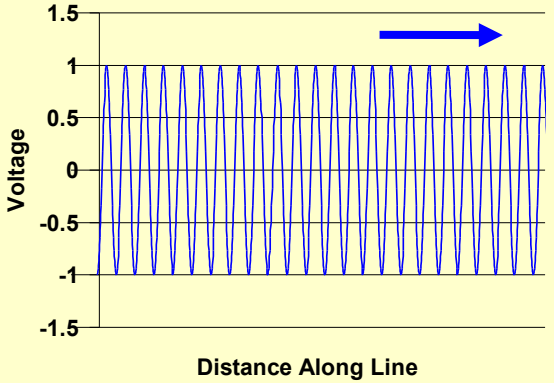
Line-of-Sight Propagation



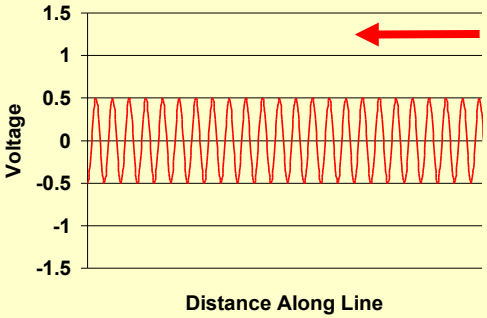
Line of sight propagation is when radio signals travel in a straight line from one antenna to another.

Concept of Standing Wave Ratio

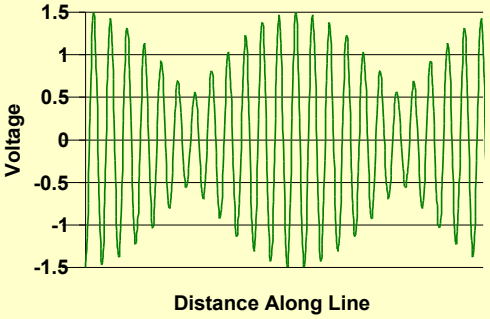
- If an antenna system matches the characteristic impedance of the transmitter all the power is radiated. Power travelling from the transmitter to the antenna is called *Forward Power*.
- If an antenna system does not match the characteristic impedance of the transmitter, some of the power is reflected back to the transmitter. This is called *Reflected Power*.
- At any point along the transmission line, the Forward Power and Reflected Power will add or subtract.
- The Ratio of the Maximum Voltage to Minimum Voltage along the line is called *Standing Wave Ratio* (SWR).



1 Volt



0.5 Volt



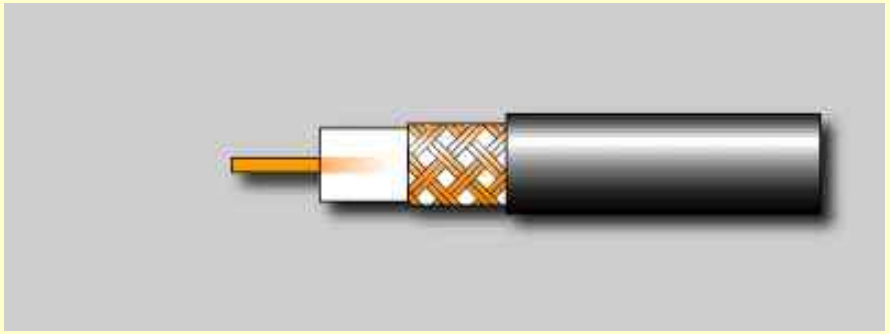
R=1.5/0.5 = 3

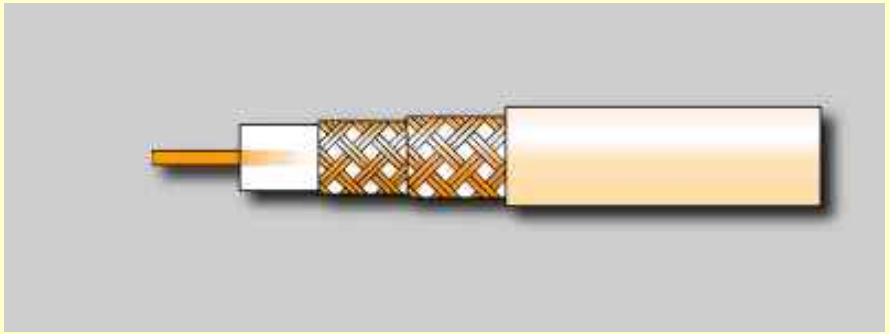
SWR Analysis

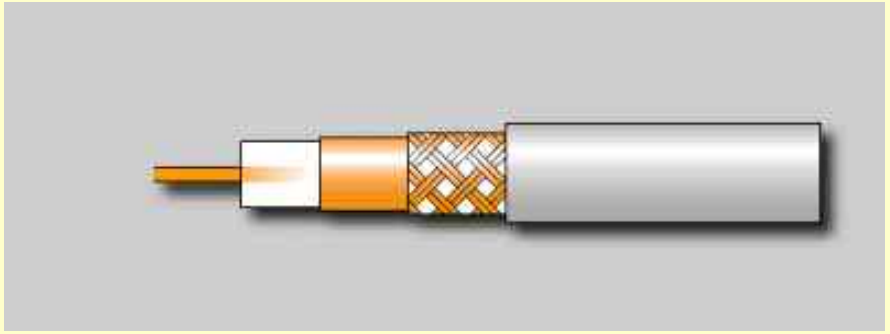
- An SWR of 1:1 would indicate the impedance of the antenna and its transmission line are matched.
- An SWR of 4:1 would indicate an impedance mismatch; something may be wrong with the antenna system.

- If a directional RF wattmeter has a forward power reading of 90 watts and a reflected power reading of 10 watts the actual transmitted power would be 80 watts.
- Most RF wattmeters operate with a line impedance of 50 ohms.

Coaxial Cable







- Coaxial cable has a center wire inside an insulating material covered by a shield and an insulating cover.
- Good quality coax should be used for a UHF antenna system to keep RF loss low.
- Radio energy is converted to heat in a poor quality coaxial cable.
- Coax is Unbalanced Feedline in that one conductor is connected to ground.