The Radio Hotel – Four Whys of our Antenna Systems – Rick – W5RH

Why does the antenna length vary for the same resonant frequency?

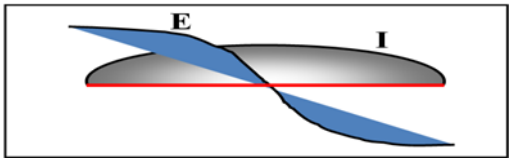
All of us know the formula: 468 / F Mhz = Length (in feet) of a ½ lambda (wave length) `dipole……but that typically isn't correct. Sometimes the length needs to be shorter, sometimes longer. It really depends on the environment into which we place the antenna. Is it close to the earth, close to the house, close to power lines or close to the chain link fence? Or is it far away from everything? 468 / F MHz gets us in the ball park for the ½ wl length, but be prepared to vary the length (tune it) to obtain the resonant frequency desired at the physical location you place it.

Why does the feed impedance (Z_L) change depending on where it is fed?

Another issue with basic dipole antennas is the feed Impedance -- Z_L. Between 50 and 75 ohms is the feed impedance range of a dipole. These values are measured at the center of the dipole, which is where we typically feed (connect) the feedline/coax. If you feed it with coax, you want it to be close to a 50 ohm feed Z, for sure. We can, however, feed a dipole anywhere we wish to feed it. Some are fed 1/3 a way from the end – often called an Off Center Fed Dipole or OCFD. (*Note: some call this a Windom – it is not -- Google Windom Antenna)*

You can feed the dipole at the end, which is the highest impedance point on an antenna. The LNR Precision 'Par EndFedz ®' are good examples of this.

Why does the feed Z vary on an antenna as you go from the center to the end? Look at the diagram below. This shows the standing waves of Voltage E and Current I on a ½ wave dipole. If at any point we take the voltage and current and calculate Resistance R using Ohms Law **R = E/I**, you will get a low Resistance in the middle (low voltage/ high current) and an ever increasing impedance as you move the feed point out to the end where you will measure a high impedance (high voltage/low current).



Why does all this matter? Because, the lowest SWR is found when the antenna is resonant (no matter where it is fed or how it is fed) and if you use coax you want to have a fairly close match to the coax cable Zo (surge Z or characteristic Z) to avoid loss. Second, you want to feed the antenna at a place that matches your feedline Zo. With 50 or 75 ohm coax you would feed it at the center. With 450 ohm ladder line, feed it at the 1/3 length point, and by using a matching section or parallel circuit (a tank) you can feed it at the high impedance end. Nuf said for now! de Whiskey 5 Radio Hotel

The purpose of ***The Radio Hotel*** *is to give you a practical kickstart into exploring the workings of antenna systems. Do a bit of research – Google the buzz words and find out what they mean. Read up on antenna theory to see how it all works together. You will be glad you did.*

THE BVARC Rag Chew Net
March Check-ins

02/26/14, K5LKJ (NCS), W5TKZ, KF5TFJ, K5IZO, KE5OBY (R), AF5T, K5LJ, W5TOM, K5CEK/5 (RCS), VK2AJB/5 (RCS) (Sidney, Australia), N5DTT (Bellaire), WS5H, N5CPA, AA0ST (Dickenson), KL7AX (Katy), N5NYV (Clear Lake), KF5OXF (Needville), W5RH. (18 Check-Ins)
Solar Cycle 24: SFI = 174, SN = 157, A = 4, K = 1

03/05/14, K5LKJ (NCS), W5TKZ, K5LBU, WA5CYI (T), AA0ST (Dickenson), W5TOM, W5HFF, KL7AX (Katy), N5DTT (Bellaire), K5LJ, K5CAM, KE5OBY (R), AA5OA, K5WRN, WS5H, K5CEK/5 (RCS), VK2AJB/5 (RCS) (Sidney, Australia), AF5T, W5RH, KF5PHA, K5IZO, W5CJA (M) (Jackson, TX), K5LKB, KF5JMJ (Pasadena), N5CPA. (25 Check-Ins)
Solar Cycle 24: SFI = 149, SN = 171, A = 7, K = 2

03/12/14, K5LKJ (NCS), W5HFF, W5TKZ, W5TOM, K5CAM, KF5TFJ, N5DTT (Bellaire), KE5OBY, K5LJ, KF5PHA, AA5OA, WS5H, KL7AX (Katy), K5IZO, AA0ST (Dickenson), K0NM, N5CPA, K5LKB. (18 Check-Ins)
Solar Cycle 24: SFI = 165, SN = 108, A = 4, K = 1