BestPriceRadio
A part of the Can-Do Network

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Tower Planner

The biggest single factor in extending communications range is height! When possible, a site with the highest possible ground elevation should be selected. Power should be available unless you want to invest in solar and a suitable enclosure should be available for your base station.

The higher the antenna support tower, the greater the view over the Earth's horizon and consequently the operating range of 2-way radios. However, there are some practical issues, such as cost, that should be considered. Fundamentally, you start with getting the antenna above the trees in the immediate area. Trees are great big signal suckers!

If there are no trees or other obstructions in the immediate area, the optimum tower heights are 50, 100, and 200 feet. Above 200 feet, towers must be painted and lighted which is generally prohibitive for all but larger users. Towers basically come in three versions – Monopole (actually not a tower), guyed, and self supporting. More information on towers at www.tessco.com/yts/industry/products/infra/infrastructure/tower/tower.html.

Monopoles require the least space but they tend to be a little pricey. For example a 100' Monopole will cost about $180 per foot ($18,000 for 100' installed).

A 100' self supporting triangular tower such as the Titan Series by Trylon shown at the left would cost around $80 per foot ($8,000 installed).

A 100' guyed triangular tower such as the Rohn #25G will cost around $60 per foot ($6,000) including normal installation.

From an economic/performance consideration, a 100' tower will provide the best ratio of cost versus range. Obviously, a guyed tower is the least expensive IF you have sufficient area available for guy wires which will generally extend in three directions extending 50' from the tower, secured at 30' intervals.

As strange as it may seem, a 50' tower will normally provide 75% of the coverage of a 100' tower. Don't ask us why this is. We just know from experience that it just works out this way. Engineers use terms like linearity, logarithmic progression, and other technical terms to try to explain this condition. Suffice it to say that this opens some interesting alternatives in system planning since a 50' tower with a high performance rating can often outperform a 100' tower with a lesser rating known as Effective Radiated Power or ERP.

Antennas come in all shapes and sizes and are rated with the Decibel of a measurement of efficiency. Zero dB means the antenna emits or receives the amount of power inserted (i.e. a 50 watt transmitter would have an ERP of 50 watts). A dB gain antenna would have an power factor of 2X (i.e. 50 watts input would have an ERP or 100 watts) and a 5.2 to 6 dB gain would have an ERP of 4X or 200 watts.

As a general rule, size is the determining factor for increasing the dB rating of an antenna coupled with matching the antenna to the same impedance of the associated transmission line and radio (normally 50 Ohms). A typical unity (0 dB) gain antenna for VHF will be around 20 inches high. A 3 dB gain VHF antenna will be about 8 feet and a 5/6 dB gain antenna will be around 18 feet.

The cost of an antenna is based on dB gain, quality, and shipping (high dB gain antennas cannot be shipped by UPS and are normally shipped by Motor Carrier). Typical costs are as follows:

Unity (0 dB gain) antenna	-	$150
3 dB (2X gain) antenna	-	250
5/6 db (4X gain) antenna	-	900

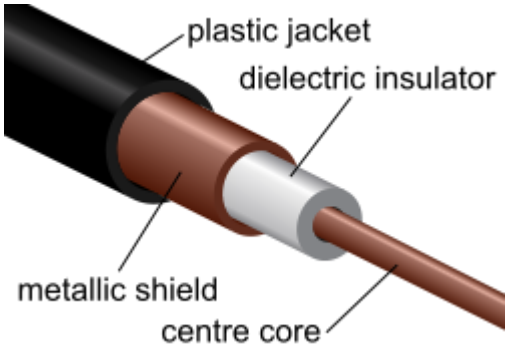
Similar antennas for UHF are rated at 0 dB, 6 dB and 10 dB gain and are approximately the same size and price.

The antenna shown at the above left is a VHF 5.2 dB open dipole type. These are commonly used for 2-way mobile radio systems. The UHF version is similar in appearance except it has eight smaller dipoles as opposed to the four dipoles shown on the VHF model.

An enclosed dipole collinear antenna is generally preferred for use with portable radios (less noise on the received signal). The price is the same for VHF or UHF for either exposed dipole or collinear type antennas.

The better brands, at least in our opinion, are Sinclair and Telewave.

The third component of a fixed station antenna system, along with the tower and antenna, is the transmission line. Choosing the right important line is very important since any cable will have loss – some more than others. For more information on transmission line, visit http://en.wikipedia.org/wiki/Coaxial_cable.



Transmission line conducts the power from the radio to the antenna. The least expensive line, known as RG-8A is approximately ½" in diameter and has a power loss of 1.575 dB per hundred feet. This would pass approximately 34 watts to the antenna from a 50 watt station.

The best value for most applications of up to 200' is a cable type known as LDF4-50A with a lower line loss which would provide a power output of approximately 41 watts for a 100' length.

A 200' length of RG-8A cable would loss approximately half the power of the associated transmitter (actually 24.2 watts) whereas a 200' run of LDF4-50A would retain an output power level of approximately 34 watts. Larger diameter cables have even lower loss figures, but for most users, we recommend LDF4-50A.

The cost of LDF4-50A cable is $3 per foot including shipping plus $50 for a connector kit. For more information on cable and losses, please visit www.ocarc.ca/coax.htm. We hope you have found this information helpful. We look forward to serving you!

The Best Price Team

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