Antenna Gain (cont.)

that the gain peak is at a point some 25-30 degrees above the horizon, due to the effect of the limited ground plane.

Therefore, when referencing the gain of a mobile antenna against a ¼ wave centre roof mounted whip, the gain can be considered as being referenced to an isotropic radiator at a plane perpendicular to the whip (that is, at the horizon or 0 degree elevation).

BUT THEN THERE'S MOUNTING

All antenna radiation patterns are affected by their mounting environment.

The gain exhibited by certain mobile antennas when mounted on a vehicle gutter or roof bar can be better than their specifications would suggest.

This is especially true for the ground independent Mopoles and high gain Mopoles offered by RFI. These antennas, being ground independent, are usually range tested and rated against a standard dipole reference. When a Mopole is placed on a vehicle gutter or roof bar, the vehicle's roof, again being a less than infinite ground plane, causes a slight uptilting AND compression of the major lobe, increasing the effective gain of the antenna. Thus, an end fed dipole antenna, range tested at 0dBd in controlled field tests (2.15dBi gain at the horizon) will, when gutter or roof bar mounted, perform significantly better than a roof mounted quarter wave due to this additional gain contribution.

The brief statements made on our Mopole antenna pages characterize this additional gain as "improved performance" rather than textbook gain, as the additional performance claimed is dependent on the mounting position for the antenna. RFI have collated and published extensive information on the performance of mobile antennas in various mounting locations to help illustrate the resulting compromises of antenna mounting and operational performance in mobile antennas.

Similarly, base station antennas are dramatically affected by antenna mounting positions. The side mounting of base station antennas is a point of particular interest and this can be characterized, and even quite accurately modelled. Each application however tends to be individual and mounting arrangements are rarely precisely controlled enough to allow system planners to take this into account.

The RFI engineering team is happy to advise on individual antenna selection and regularly prepares papers and presentations on the optimal antenna choices in typical applications.

CATALOGUED GAIN FIGURES

In general, stated gain specifications are nominal, and taken at the centre of the tuned bandwidth of the antenna, but slight variations can be expected. Where comprehensive data is required for use in coverage analysis software packages, RFI can provide digitised antenna pattern data in accordance with industry standard TIA-804-B formats for most of our base station antennas. For more specific gain information please contact your local RFI representative.

WIND RATINGS

The listed wind ratings for base station antennas are defined as follows:

- **Projected Area (no ice)** - A statement of the equivalent flat plate surface area of the antenna. This has been calculated in accordance with AS1170.2:2002, the Australian Wind Loading standard, which is based on ISO4354, an international standard covering wind actions on structures.
- **Projected Area (with ice)** - A uniform radial build-up of 12.7mm of ice is applied to all surfaces of the antenna, in accordance with TIA329C. The projected area is then re-calculated in accordance with AS1170.2:2002.
- **Wind Load (thrust)** - The effective force applied perpendicular to the plane of the antenna presenting the greatest projected area, as a result of the pressure applied due to a constant 160km/h wind velocity.
- **Wind Gust Rating** - A structural engineering calculation in accordance with AS1170.2:2002, giving consideration to the yield strength of the materials used in the construction of the antenna. This figure determines the maximum wind velocity at which the mechanical stresses in the antenna components are just below the allowable yield strength of the boom and/or other elements.
- **Torque** - The bending or turning moment resulting from the Wind Load (thrust) calculated above, acting at the uppermost clamping point. For Corner Reflectors, the torque figure represents a rotational torque.

These important engineering specifications have been published in metric units. The following conversion factors may be used to convert these and other listed mechanical units to imperial units:

Length	1 ft = 0.305 m
	1 in = 25.4 mm
Weight	1 lbs = 0.454 kg
Projected Area	1 ft^2 = 929 cm^2
Wind Load	1lbs (f) = 4.448 N
Wind Gust Rating	1 mph = 1.609 km/h
Torque	1 ft-lbs = 1.356 Nm