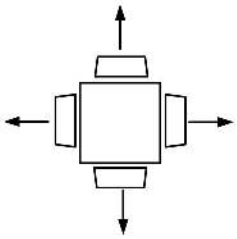
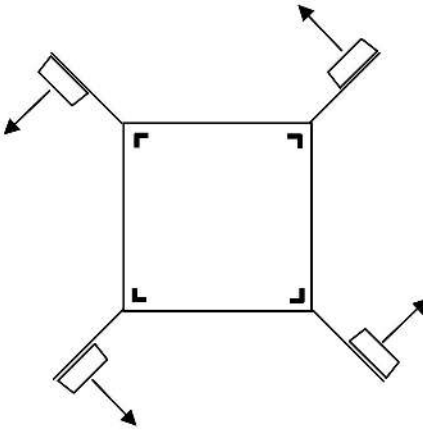
Skew Fire Antenna Arrays

Skew fire antennas are used when traditional radial fire arrays are impossible to build on an existing structure where the top position is occupied by an existing antenna.

It is generally the case that when the structure cross section is too large, typically greater than 1.5m, then Skew fire arrays are appropriate.



Radial fire array



Skew fire array

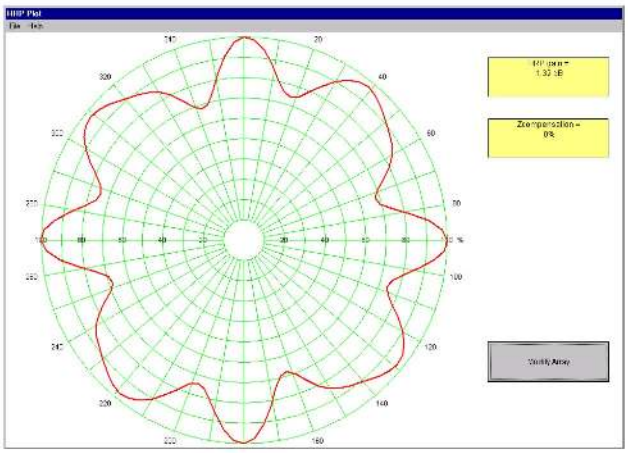
In these circumstances 8 or 12 panel tier radial fire array would be very expensive. Thus the skew fire array can be a cost effective alternative. Typically the array will comprise either 3 or 4 panel per tier. The skew fire array is a narrow band device with the horizontal radiation pattern commutating in and out of specification. The antenna can be tuned to a specific frequency by varying the radius of the panel. If the frequencies can be selected then multi channel operation can be achieved.

The antenna radiation pattern is very sensitive to mechanical tolerances and it is very important to screen the structure with a fine mesh to minimise errors between the factory test and the final installation on site. It is important that each antenna is factory tested to confirm the design, and also to optimise the radiation patterns.

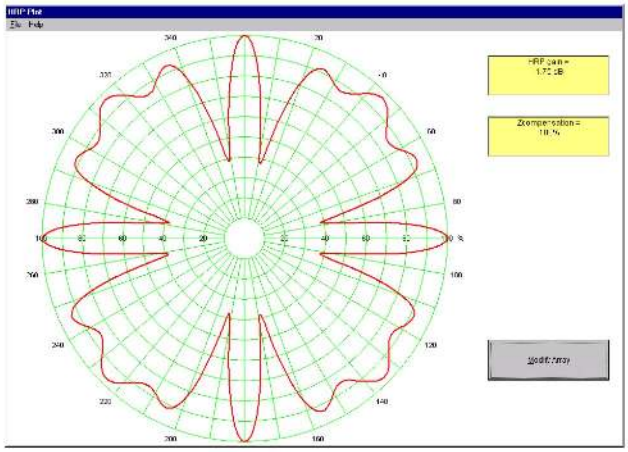
Before commencing a skew fire antenna design accurate structure drawings are required complete with the correct tower orientation. Depending on the channel(s) of operation and the structure size the radius of the panels can then be computed. However due to measurement tolerances only an estimate of the performance can be calculated.

Skew Fire Antenna Arrays

The following Horizontal Radiation Patterns show effect of increasing the radius of a radial fire antenna:

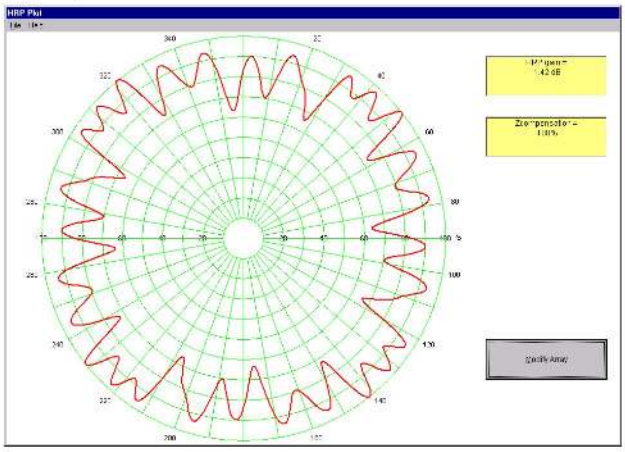


Radial Fire Radius 350 Offset 120 @ 600MHz

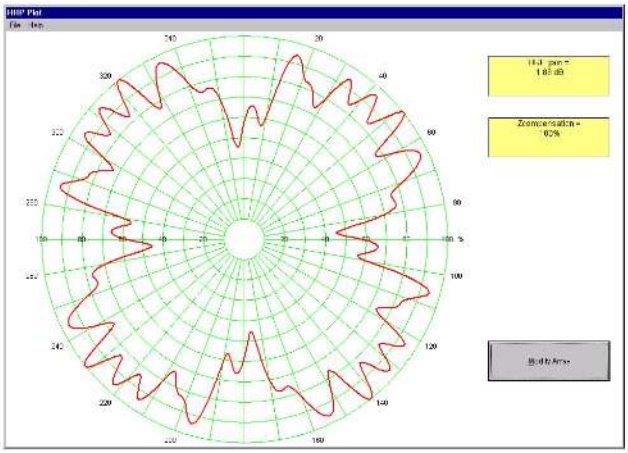


Radial Fire Radius 750mm @600MHz

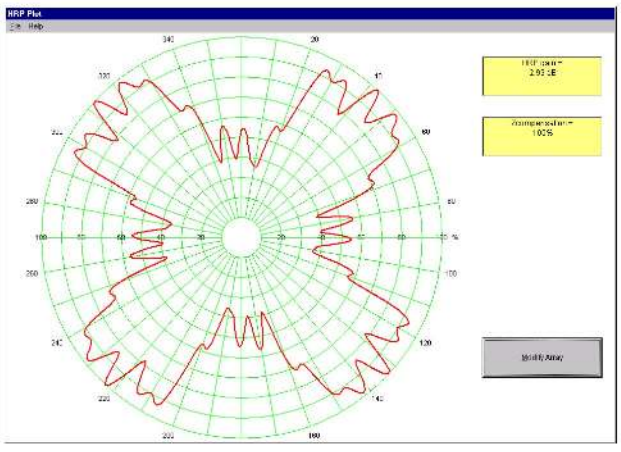
The following four patterns show the effect of frequency on the Horizontal Radiation Pattern, clearly the antenna can be used at 600MHz and 740MHz, but not at 680MHz.



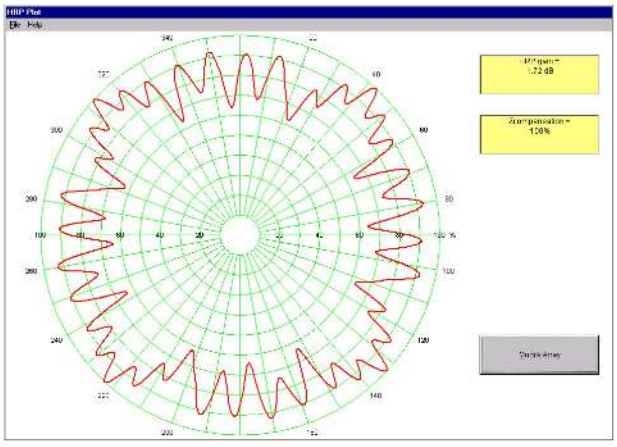
Skew Fire 4 panels Radius 1465mm @600MHz



Skew Fire 4 panels Radius1465mm@620MHz



Skew Fire 4 Panels Radius 1465mm @ 680MHz



Skew Fire 4 Panels Radius 1465mm @ 740MH

Skew Fire Antenna Arrays

Plan view of skew fire array showing the important features. The setting bars (four sets, one only shown below) are only used during factory test and installation at site to ensure correct alignment of the panels, and are removed prior to commissioning the antenna. The plan view shows only a single tier, however in practice alternate tiers are staggered by a quarter wave to provide impedance compensation and a measure of pattern smoothing.

The face of the structure is fully screened with a 1" wire mesh, 3mm diameter. With such a close mesh spacing it is impossible to climb on the outside of the structure for installation and maintenance purposes. Therefore we usually fit a ladder behind each set of panels.