ELECTRONICALLY STEERABLE YAGI-UDA MICROSTRIP PATCH ANTENNA ARRAY

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This presentation describes a four microstrip Yagi-Uda antenna array. The single microstrip Yagi-Uda antenna was developed by J. Huang at Jet Propulsion Laboratory, and had a maximum gain of 8dBic (J. Huang; "Planar Microstrip Yagi Array Antenna", IEEE AP-S Symposium Digest June 1989, pp 894-897). A single Yagi-Uda antenna consists of a single driven patch, a larger reflector patch and two smaller director patches. This arrangement shows many advantages over a single microstrip patch antenna, which include a slightly increased forward gain and an increased directivity. The bandwidth is also increased significantly from that of a single patch, due to the effects of the parasitic patches.

The array consists of four Yagi-Uda antennas arranged around a common reflector patch (Figure 1). This array is electronically steerable, having one antenna active at a time while the remaining three elements are earthed with pin diodes at their feed points. During tests the switching was done by manually swapping the feed and shorting stubs. The linear polarised radiation pattern from the array (single active antenna) at an elevation of 26 degrees above the planar array is presented in Figure 2. By switching between the four Yagi-Uda antennas in the array, 360 degree coverage within 10dB is possible. This L-band antenna array (fabricated on 4.8mm thick FR-4 epoxy/fibre-glass PCB substrate) is suitable as a low profile, low cost land mobile communications antenna.

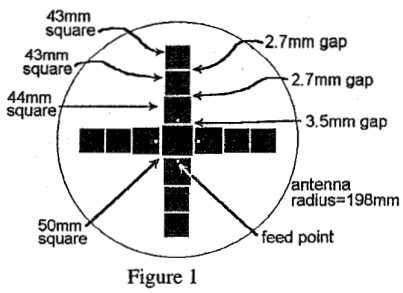

Figure 1

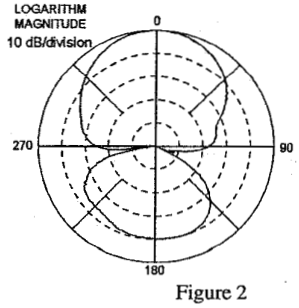

Figure 2

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