# A MODIFIED BOW-TIE ANTENNA FOR SINGLE AND DUAL POLARIZED WIDEBAND PHASED ARRAY APPLICATIONS

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Radar systems that operate in the C and X-bands are normally designed as separate systems. Since it is becoming more and more important to use such systems in one setting, it is desirable to design a system that operates in both frequency bands. This, in turn, requires a wideband antenna that covers the two bands. In addition, many applications require end fire patterns, which can be produced by different types of antenna elements. Printed microstrip antennas are widely used in phased array radar systems. They exhibit a low profile, small size, light weight, low cost, high efficiency, and ease of fabrication and installation. This paper introduces a modified printed bow-tie antenna that exhibits a wide impedance bandwidth with good radiation characteristics. The antenna consists of two identical printed bows, one printed on the top side and the other printed on the bottom side of the substrate material. The top and bottom bows are connected to a microstrip feed line and the ground plane through a stub and mitered transition to match the bow-tie with the 50 Ohms feeding network. The return loss, VSWR and far field radiation characteristics of this antenna are analyzed using the commercial computer software package HFSS and verification for the computed return loss is performed using measurements. This new design provides over 90 percent impedance bandwidth that covers the entire C and X bands and part of the Ku band. The single element antenna provides more than 95 degrees beamwidth, low cross polarization level (less than 18 dB), and relatively high gain in the frequency range between 5.3 and 10 GHz in addition to the endfire radiation pattern with a good front-to-back ratio that exceeds 12 dB. A stable radiation pattern and a wide bandwidth are also obtained using a modified two-element array configuration. Two of this two-element array configuration are snapped perpendicular to each other to form antenna unit providing circular, vertical, or horizontal polarization based on the feeding arrangements of the ports of the four individual antenna elements. The new antenna design is found to be a good candidate for wideband phased array systems with single linear, dual linear or circular polarization.

Abstract Submission Form

2004 National Radio Science Meeting

Abstract: elsherbeni7138

Date Received: September 22, 2004

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4. C - Contributed Paper

5. This paper is submitted along with the request for student travel support.