

High Gain Mobile Base Station Antenna Using Curved Woodpile EBG Technique

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Abstract : This paper presents the gain improvement of a sector antenna for mobile phone base station by using the new technique to enhance its gain for microstrip antenna (MSA) array without construction enlargement. The curved woodpile Electromagnetic Band Gap (EBG) has been utilized to improve the gain instead. The advantages of this proposed antenna are reducing the length of MSAs array but providing the higher gain and easy fabrication and installation. Moreover, it provides a fan-shaped radiation pattern, wide in the horizontal direction and relatively narrow in the vertical direction, which appropriate for mobile phone base station. The paper also presents the design procedures of a 1x8 MSAs array associated with U-shaped reflector for decreasing their back and side lobes. The fabricated curved woodpile EBG exhibits bandgap characteristics at 2.1 GHz and is utilized for realizing a resonant cavity of MSAs array. This idea has been verified by both the Computer Simulation Technology (CST) software and experimental results. As the results, the fabricated proposed antenna achieves a high gain of 20.3 dB and the half-power beam widths in the E- and H-plane of 36.8 and 8.7 degrees, respectively. Good qualitative agreement between measured and simulated results of the proposed antenna was obtained.

Keywords : gain improvement, microstrip antenna array, electromagnetic band gap, base station

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