Dual-polarized Omni Antenna for Sub6 Base Station

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1. Introduction

In the fifth-generation (5G) wireless communications, the frequency band is divided into Sub6 and millimeter wave bands. Compared with millimeter wave, sub6 has some advantages such as wide coverage, and low cost. It is a challenge to develop the antennas for sub6 base stations, which are wide-band, high gain and compact. In this report, a series fed dual-polarized omni base station antenna with a compact size is presented. By implementing 3 planar antenna arrays in 3 sectional directions, omni radiation pattern in horizontal plane is obtained.

2. Antenna Configuration

Fig. 1 shows the configuration of the dual-polarized omni antenna. The antenna consists of three planar arrays for 3 horizontal sections like a trihedron, with an equal sectional angle of 120°. The radome for the antenna is a circular cylinder with 50 mm diameter, which limits the horizontal dimension of the antenna as shown in the figure.

There are 16 antenna elements on each sectional antenna array, and each 4 of them are fed serially as a sub-array for horizontal and vertical polarizations separately. The dual polarization design is necessary to reduce antenna size, but meanwhile, it causes a problem of narrow bandwidth.

3. Antenna Simulation and Conclusion

Fig. 2 shows the radiation pattern of horizontal polarization and vertical polarizations at 3.7 GHz. A satisfied omni performance is achieved by the comb-shape series feed for horizontal polarization. The average gain at horizontal plane is about 10 dBi. The vertical polarization which is achieved by string-shape also shows a good omni performance in horizontal plane. The gain varies within 3dB on the horizontal plane with an average value of 10 dBi, almost same with horizontal polarization.

In this report, a compact dual-polarized omni antenna for sub6 base station was developed in simulation. To reduce the antenna size, a dual polarization and series fed design was proposed. Omni radiation patterns of both polarizations were realized.

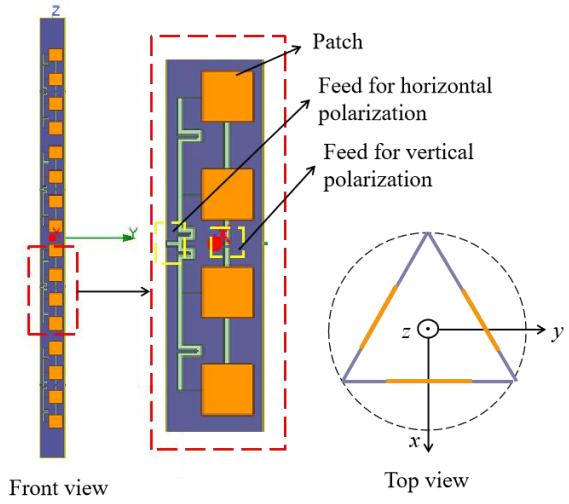
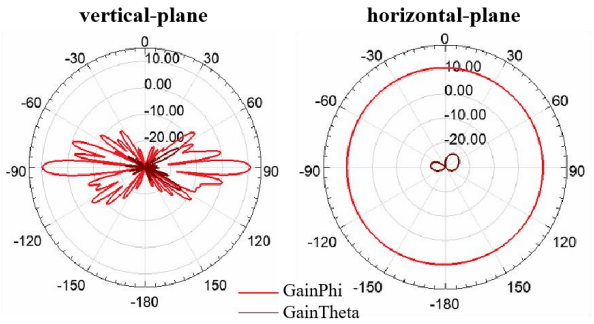
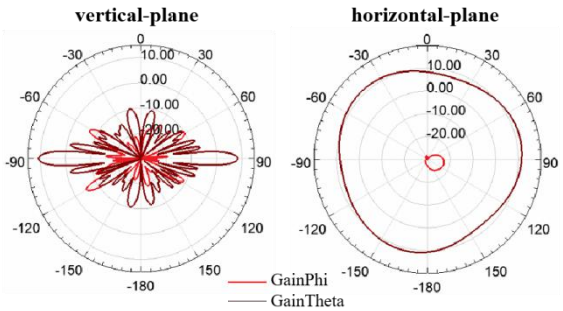


Fig. 1. Antenna configuration



(a) Radiation pattern of horizontal polarization



(b) Radiation pattern of vertical polarization

Fig. 2. Radiation pattern of horizontal and vertical polarizations at 3.7 GHz