

Beam Steering Antenna Array for 5G Telecommunication Systems Applications

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Abstract

This work provides an in-depth study on a linear antenna array that consists of 32 elements of CRLH unit cells, and the main radiating beam can be controlled by changing the capacitance of the varicap diode that was designed and simulated with Advanced Design System (ADS 2014) software. ADS software was selected because of its flexibility in accommodating complex design equations. Results show that the main beam can be steered up to 50 degrees from the direction of maximum radiation by changing the capacitances. The main beam gain of the antenna array at boresight of 12 dB has been achieved with an impedance bandwidth of 3 GHz at 10 dB gain threshold. The antenna array performance was analysed in the mmWave frequency range at centre frequency of 28 GHz making it suitable for the upcoming 5G applications. The mmWave path losses were handled by increasing the gain of the antenna array and steering the main lobe over 50 degrees to balance the gain coverage tradeoff. The direction of the main beam is controlled by changing the varicap capacitance accordingly.

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