ABSTRACT

Growth of wireless communication systems is currently very fast. The need for high data access and data volume increase from year to year. 5G technology presence to replace the previous technology which is claimed to be able to provide better services for users. At 3GPP release 15 introduces a technique called E-UTRAN New Radio – Dual Connectivity (EN-DC). This technique 4G and 5G operate on two different frequencies where beamforming technology can meet the characteristics of the network. To meet requirement of EN-DC technique needed an antenna device while to support beamforming needed Butler matrix method because can produce an ideal phase difference $\pm135^0$, $\pm45^0$. This research discusses the design of a rectangular microstrip with MIMO 4x4 modeling and the butler matrix method. To get results according to the EN-DC antenna specifications, do iterations on each element of the antennas and Butler matrix so can produce the parameter based on specifications. The simulation results obtained that the phase difference for the Butler matrix is $-58,2^0$, $-213,14^0$, $213,13^0$, $58,2^0$ which has an error phase with the ideal phase of $-13,2^0$, $-78,14^0$, $78,13^0$, $13,2^0$. For the simulation results of 4x4 MIMO antennas with Butler matrix, the output phase at a frequency of 2.1 GHz (4G) at antennas 1, 2, 3 and 4 is $\pm10^0$ while the output phase is at a frequency of 2.375 GHz (5G) at antenna 1 and antenna 4 of $\pm18^0$ then antenna 2 and antenna 3 of $\pm52^0$ which have an error phase with the ideal phase on antenna 1 and antenna 4 of $\pm27^0$ then antenna 2 and antenna 3 of $\pm83^0$.These results proved that Butler matrix combine with design of 4x4 MIMO antennas obtains the different beam directions for each of antenna.

Keywords: *4G/5G, EN-DC, Beamforming,* MIMO 4x4, *Bulter Matrix.*