ABSTRACT

In recent years the growth in traffic increases rapidly, so that the new technology is needed to handle the problem. One of the technologies in wireless communications in the future is mmWave technology. The number of antennas used in this technology causes the RF *Chain* to be used also increases. It takes a more techniques evolved to support the performance of the system and minimize the amount of the RF *chain*.

Hybrid beamforming techniques are used to minimize the use of RF *Chain* and Algorithms ESPRIT (Estimation of Signal Parameters via Rotational invariance tecniques) is used to improve system performance in terms of positioning and location of a user or commonly referred to estimate DOA (Direction of Arrival). This final project analysis is aimed at the influence of number of antenna, number of RF *chain*, number of incident angle, and SNR to the accuracy of DOA estimation and *hybrid beamforming* performance on *rayleigh* channel.

From the simulation result when used the parameters of the number of antennas 4x4 and 8x8 in the *hybrid beamforming* system with RF chain value is 2, the smallest BER occurs when using 8x8 antenna, with Eb/No of 20 dB has BER value $5.41x10^{-5}$. When used the parameters the number of RF *chain*s (N_{RF}) of 2, 4, and 6 on the *hybrid beamforming* system with number of antennas is 8x8, the system with N_{RF} of 6 has the best BER value 5.7x10-6 when Eb/No is 5 dB. While the influence of the number of antennas on the accuracy of DOA estimation, the highest accuracy occurs when using an 8x8 antenna with an average Δ is 0,00033°,. The more RF *chain*s are used and The greater value of SNR, then the accuracy of DOA estimation will be higher. While the more number of angles, the accuracy of DOA estimation will decrease.

Keywords: mmWave, *hybrid beamforming*, DOA, ESPRIT.