## ABSTRAC

Demand on spectral efficiency increase require multilevel modulations techniques such as M-ary PSK (Phase Shift Keying) and M-ary QAM (Quadrature Amplitude Modulation). But on the other side, this techniques cause degradation with the influence of noise phase, multi-path effect and amplifier device. Specifically, Poor linearity of amplifier has consequence for the modulation techniques which non-constant amplitude and phase transitions. Modulated signal have transitions through null carrier conditions (the amplitude carrier equal to zero), therefore in nonlinear channel that signal can be damage. Nonlinearity also can generate new signal as the harmonic that can interfere another system.

In this final project, modulator of 6-PSK with differential encoder are constructed with the objective to avoid that null carrier condition. Focus for the research is about the encoding and decoding method, and also the algorithm of decision circuit. From the simulations, produce the performance result of differential 6-PSK technique in AWGN and nonlinear channel. For BER 10<sup>-3</sup>, differential 6-PSK system have poor performance rather than QPSK technique (with difference 3 dB) in AWGN channel, although each occur equal bandwidth efficiency. In nonlinear channel which taken from mathematical model of nonlinear amplifier, degradation of performance that happen for differential 6-PSK technique is better than QPSK technique. For BER 10<sup>-3</sup>, degradation of performance for differential 6-PSK technique is about 4 dB while QPSK technique is about 5 dB.

Key words: 6-PSK, null carrier, differential, encoding, decoding, decision circuit, BER