

ABSTRACT

On satellite communication system, bandwidth and power are the main parameters that need to be considered carefully during the operation because those parameters are limited availability. The lack of satellite power transponder is caused by the limitation of power reserve that can be carried by satellite when the launching and the effect of nonlinearity amplifier with IBO/OBO will reduce power consumption. Meanwhile, the limitation of bandwidth transponder is caused by the lack of its transponder power and operating frequencies among the satellites. That is why, a research need to be performed to tend the most appropriate condition for the use power and bandwidth transponder.

The technique to compensate bandwidth availability and satellite power transponder is modulation and coding using. This research will test the *M*-PSK, *M*-QAM, *M*-APSK modulation reliability using Turbo Code and TCM. The recent issue that can increase system performance in coding technique is the using of the Maximum a Posterior (MAP) algorithm in decoding process which results in decreasing of bit error rate (BER). Beside to overcome the effect of nonlinear amplifier, can use *M*-APSK modulation which has multiring signal constellation.

Research process which has been done is simulating kind of modulation and coding by turning and changing parameters and also comparison analysis for every modulation and coding. Based on the result, the best coding is Trellis Code Modulation (TCM) on QPSK modulation for 2.048 Mbps data rate. Nevertheless, for low data rate and high order modulation the best kind of coding is Turbo Code because having the higher power efficiency. For high order modulation, the suggested modulation constellation is *M*-APSK rather than *M*-QAM.

Keywords: *Turbo Code, Trellis Code Modulation (TCM), Amplitude and Phase Shift Keying (APSK)*