

[ME04]

FPGA implementation of multi-frequency continuous phase frequency shift keying (MCPFSK) modulations techniques for HF data communication

Fitri Dewi binti Jaswar, Ahmad Zuri Sha'ameri

Digital Signal Processing Lab, Faculty of Elect. Engr., University Teknologi Malaysia, 81310 UTM-Skudai, Malaysia.

E-mail: fitdew@yahoo.com.

The refraction of radio waves in High Frequency (HF) spectrum (3-30MHz) over the ionosphere makes long distance communication possible. Although, much of long distance communication traffic has been taken over by satellite and fiber optic communication network, the HF spectrum is still widely used by the armature radio, maritime and aeronautical operators, the military and foreign serviced. Unlike satellite communication, HF communication system requires minimum infrastructure at low cost. Due to the variation in electron density in the ionosphere, the transmitted signal is subjected to multi-path fading, Doppler shift and time delay spread problems which limits the maximum data transmission rate to 100 baud. The reliability in data transmission can be improved using advance modulation technique. The propose technique will focus on development of advance modulation technique specifically MCPFSK (Multifrequency Continuous Phase Frequency Shift Keying) suitable for implementation FPGA (Field Programmable Gate Array). Frequency based modulation such as MCPFSK is widely used due to the simplicity of implementation using noncoherent detection schemes. By using the Fast Fourier Transform (FFT), it is possible to implement spectrum-based detection for MCPFSK. The BER performance is slightly lower than coherent detection but phase synchronization is not critical. However, the main advantage is the implementation can be made simpler since the use of multipliers is not required. This will reduce the implementation complexity and area in performance, which are the major issues in hardware implementation. The hardware that is used for real time implementation of this project is FLEX10K board EPF10K70RC240.