FPGA Implementation of a BPSK Modem utilized for Amateur Radio Satellite Communication

Abstract:

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| Introductory background information: **broad picture** | Research done by engineers in the Amateur Radio Satellite community has shown that the current method of transmission for Amateur Satellites, the Frequency Shift keying (FSK), contains several deficiencies and few benefits despite the current technology. Over the years, the Amateur Radio community has relied on outdated communication method to transmit telemetry data and has settled for poor error rates. As a result, engineers such as Phil Karn have presented improvements on the current transmitter\ receiver systems in attempt of reducing the cost necessary to install a transceiver’s station, which is currently based on the need of a high (SNR = 23dB). |
| Intro to the **hypothesis under investigation** | A more efficient approach to transmit and receive has been suggested, for improving the current telemetry systems. The Binary Phase Shifted Keyed modulating scheme certainly has a more affordable bandwidth than the older FSK signal, in addition to BPSK, source coding techniques is an additional way of improving the current systems. |
| This study: **methods** | In summary our project looks at both modulating schemes unto an FPGA and analyzes the FSK modem and BPSK modem with and without error correction over an Additive White Gaussian Noise channel. |
| **Results** |  |
| **Discussion** |  |

Research done by engineers in the Amateur Radio Satellite community has shown that the current method of transmission for Amateur Satellites, the Frequency Shift keying (FSK), contains several deficiencies and few benefits despite the current technology. Over the years, the Amateur Radio community has relied on outdated communication method to transmit telemetry data and has settled for poor error rates. As a result, engineers such as Phil Karn have presented improvements on the current transmitter\ receiver systems in attempt of reducing the cost necessary to install a transceiver’s station, which is currently based on the need of a high (SNR = 23dB). A more efficient approach to transmit and receive has been suggested, for improving the current telemetry systems. The Binary Phase Shifted Keyed modulating scheme certainly has a more affordable bandwidth than the older FSK signal, in addition to BPSK, source coding techniques is an additional way of improving the current systems. In summary our project looks at both modulating schemes unto an FPGA and analyzes the FSK modem and BPSK modem with and without error correction over an Additive White Gaussian Noise channel.