

Frequency Offset Estimation for Satellite Communications with Adaptive Frame Averaging

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Abstract-The modified Luise and Reggiannini (L&R) algorithm is one of the frequency offset estimation algorithms suitable for use with the Digital Video Broadcasting - Satellite (DVB-S2) standard. Recently we demonstrated an enhanced poly-polarization multiplexing (EPPM) system incorporating L&R frequency recovery as a hardware prototype in order to evaluate its high spectral-efficiency in a real satellite channel. In order to provide sufficient performance at low SNR, it is recommended to average the correlation estimates over 2048 frames. In high SNR regions however, such a large averaging size is unnecessary. In this paper, two techniques are proposed in order to reduce the averaging size. The first technique measures the average noise power and selects an efficient frame averaging length using a noise look-up-table (LUT). The second technique uses a cyclic redundancy check (CRC) to determine if sufficient performance is achievable with the averaging size. Performance results show that the size of the averaging window can be reduced whilst maintaining a target BER. The noise LUT adaptive scheme has been implemented in hardware and we describe the real-time behavior.

Keyword-satellite communications, polarization multiplexing, frequency offset estimation, latency reduction.



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