EE477 Project

İbrahim Kahraman
2015401108

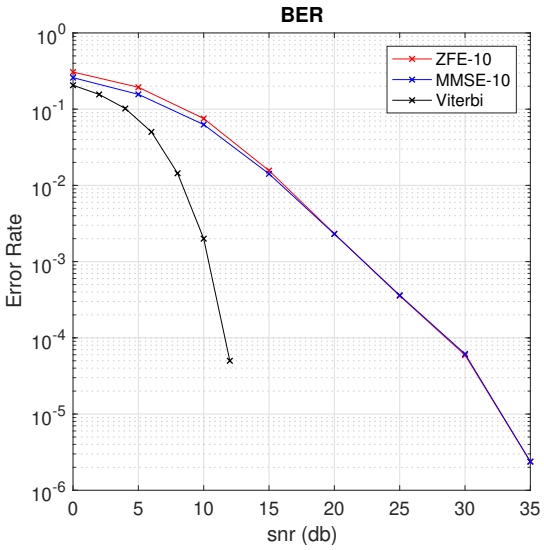

Fig. 1: Viterbi vs MMSE-ZFE

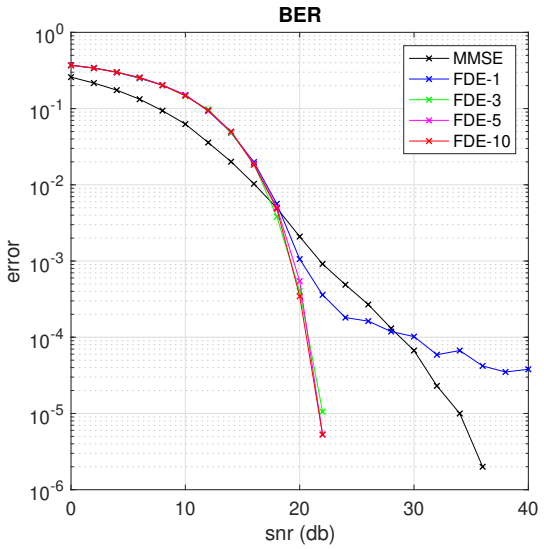

Fig. 2: Frequency Domain Equalization

I. Viterbi

As seen in the Figure 1, Viterbi Algorithm gives us better result. After 12db snr, the error for Viterbi algorithms is zero. In contrast, after 35db snr, the error for mmse or zfe equalizer is zero. Therefore, Viterbi algorithm is better for bit error rate.

The other important issue is complexity. For n bit, viterbi calculates cost for n+1 state and it makes this algorithm slower. So for the aspect of complexity, MMSE and ZFE are better methods than viterbi.

II. Frequency Domain Equalization

Because of multiplication in frequency domain represent circular convolution in time domain. So we should use at least 5-cyclic prefix. Also the for 1-cyclic prefix, error does not decreases even the snr is more than 40db. On the other hand, 5 and 10 cyclic prefix gives mostly the same results that ate a little better than 3-cyclic prefix. However, when snr is lower than 18db, MMSE equalizer is better than frequency domain equalizer. Because many device use 3db snr, MMSE equalizer is more useful. On the other hand, frequency domain equalizer is faster than MMSE. Because frequency domain equalizer calculates dft by using fft and additional matrix multiplication, its complexity is lower than MMSE equalizer.