

Turbo Equalization/Estimation for Downlink MIMO Schemes

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Discussion and approval

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IEEE 802.16m Channel Setups (EMD)

	<u>norm. Doppler</u>
" ITU-Pedestrian B @ 3 kmph :	0.007
" ITU-Vehicular A @ 30 kmph :	0.071
" ITU-Vehicular A @ 120 kmph :	0.286

$f_c = 2.5\text{GHz}$,

OFDM symbol duration $T = 102.86 \mu\text{sec}$.

Frequency domain Channel Fading

Doubly Selective

" Severe ICI in OFDM(A) setup

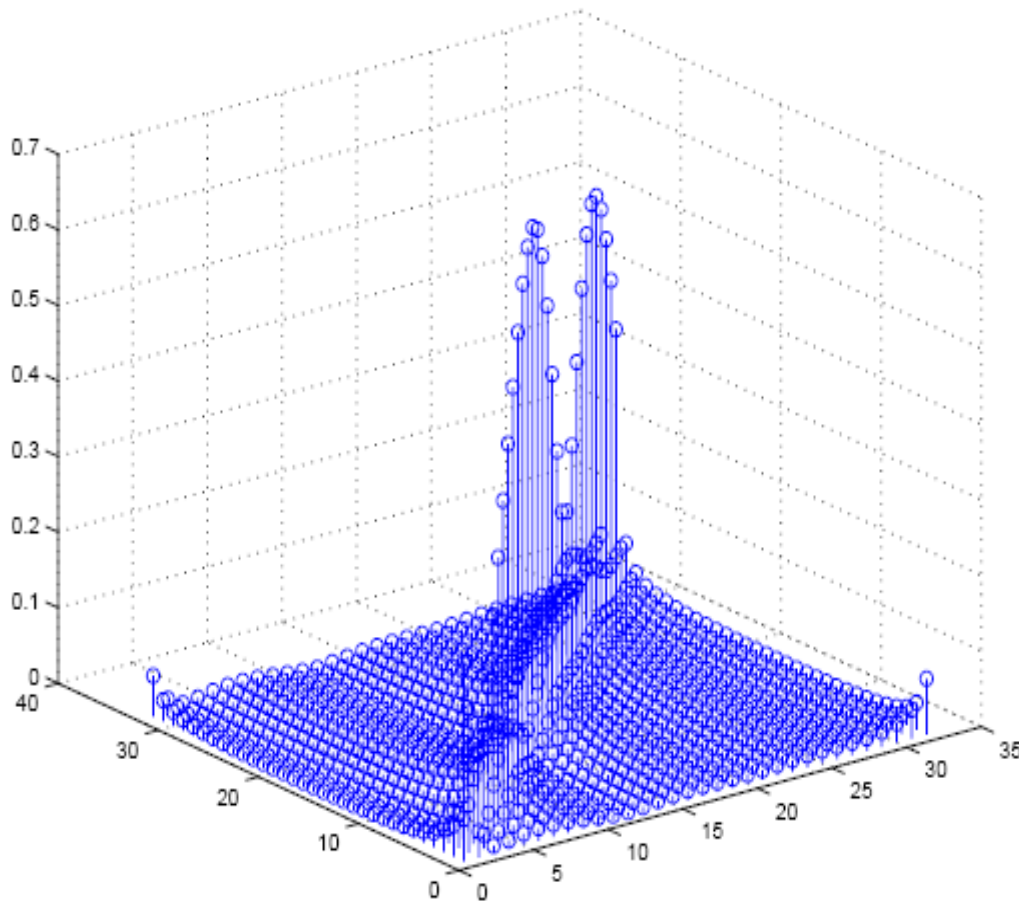


Figure is taken from (*)

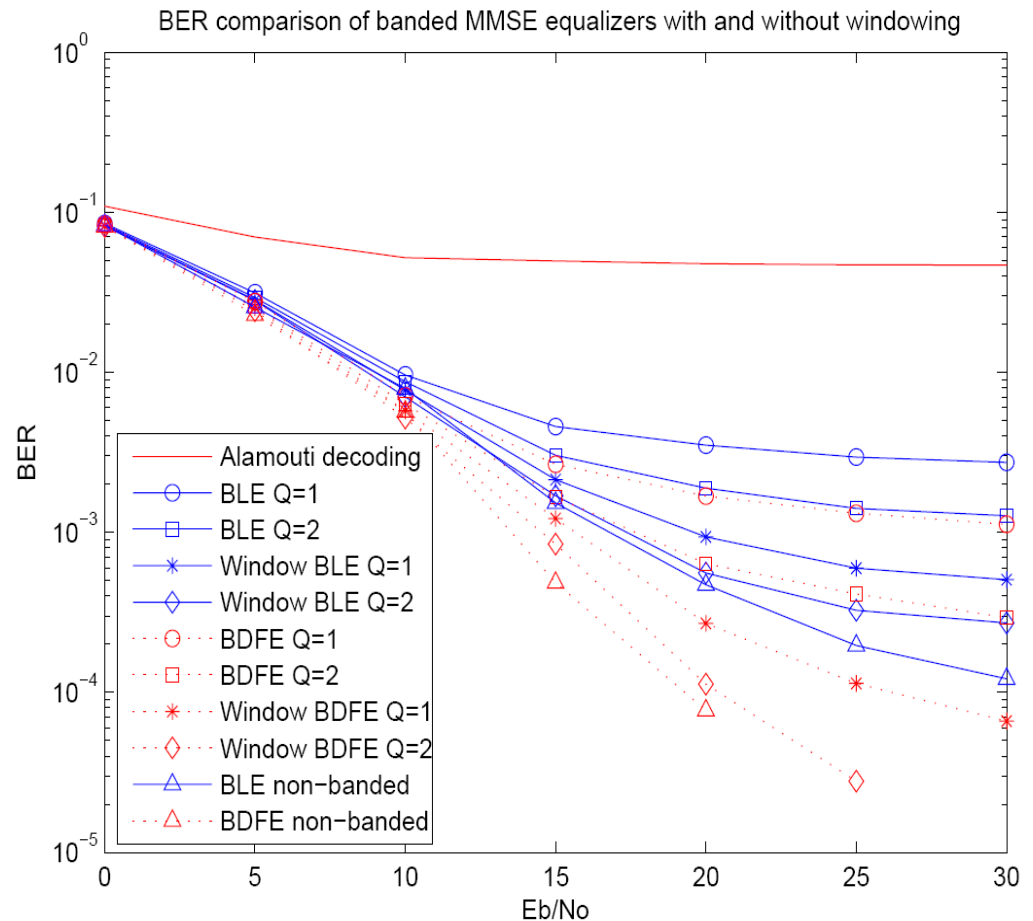
Matrix A Performance (2x1) (*)

" Normalized Doppler freq.
= 0.12

" **ICI Elimination
NEEDED:**

BLE = Block Linear
Equalizer

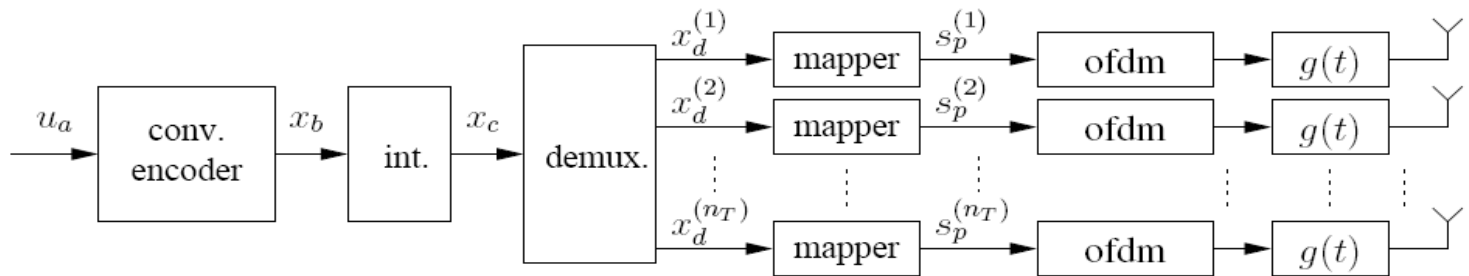
BDFE = Block decision
feedback equalizer



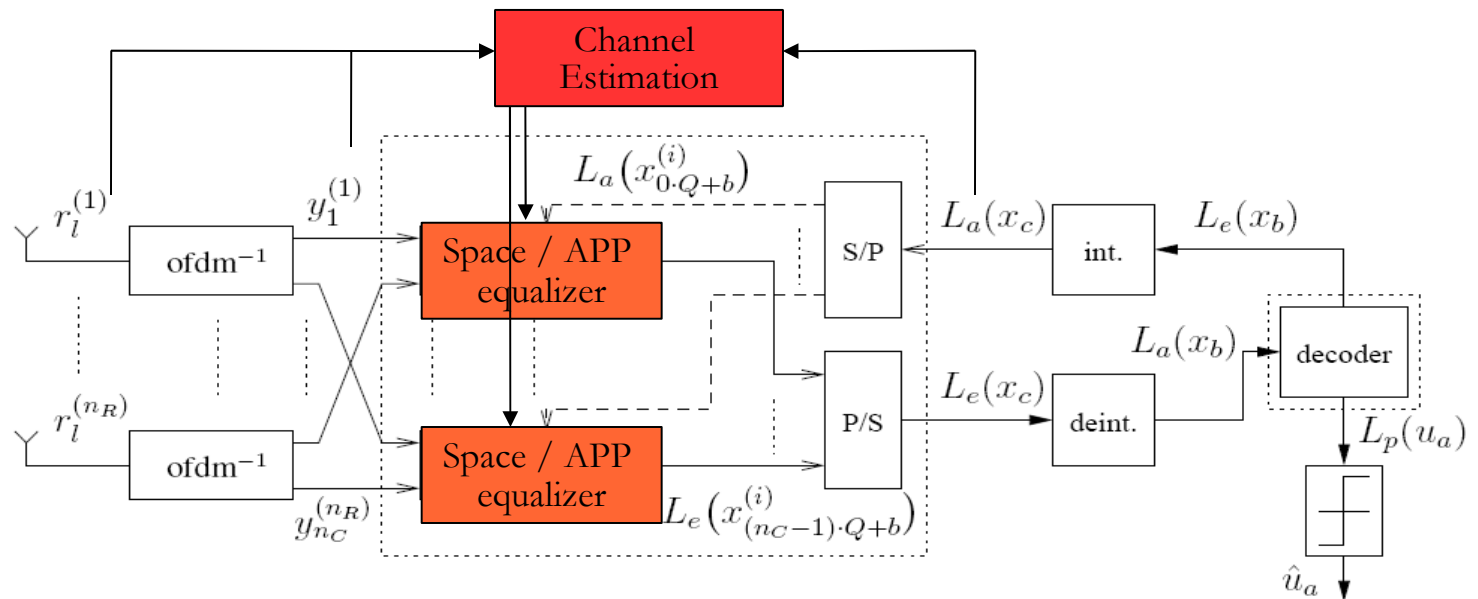
(*) K. Fang, G. Leus, and L. Rugini, "Alamouti Space-Time Coded OFDM Systems in Time- and Frequency-Selective Channels," In Proc. of the Global Communications Conference (GLOBECOM 2006), San Francisco, CA, November-December 2006.

Convolutional (or Turbo) encoding & Iterative Joint Estimation-Detection

Transmitter



Receiver



Advantages

" Flexible

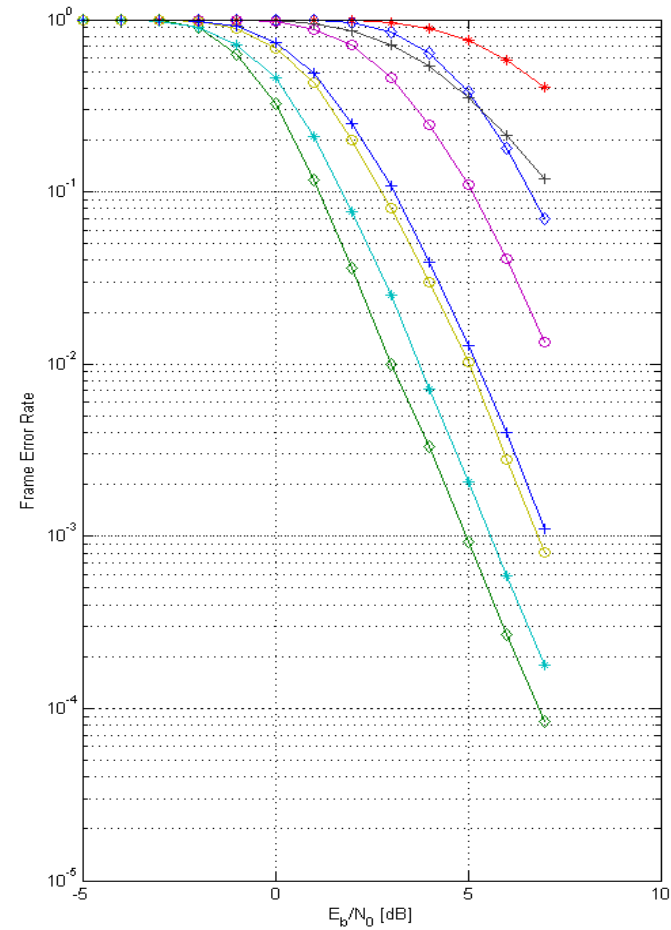
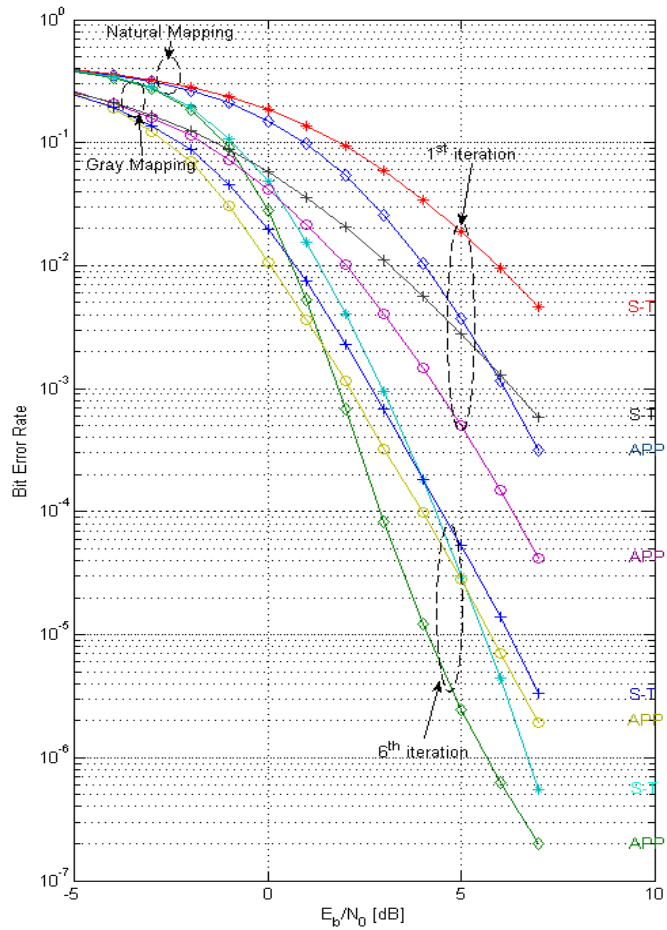
Code selection

Mapping

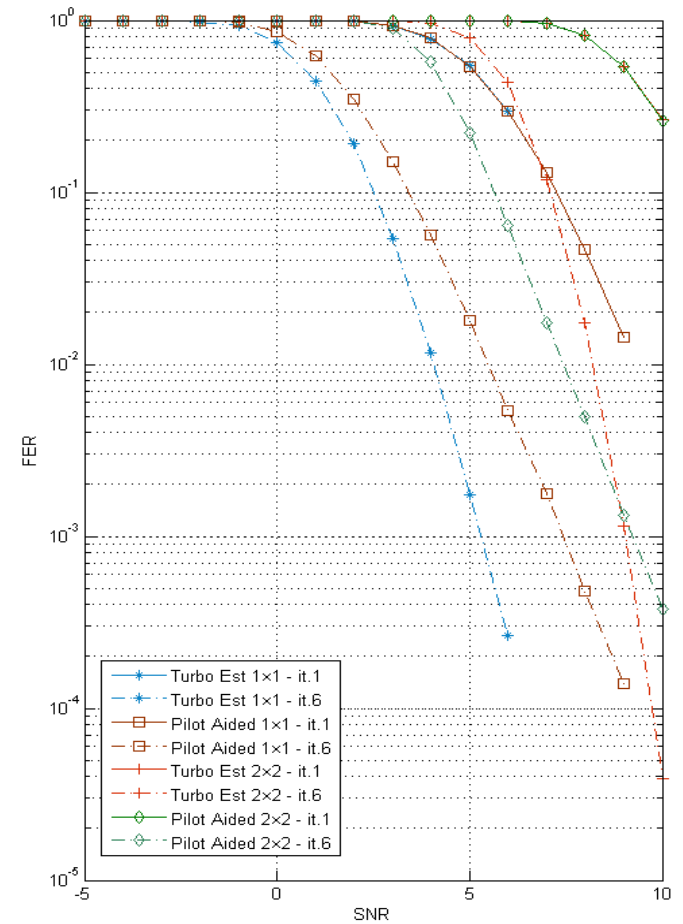
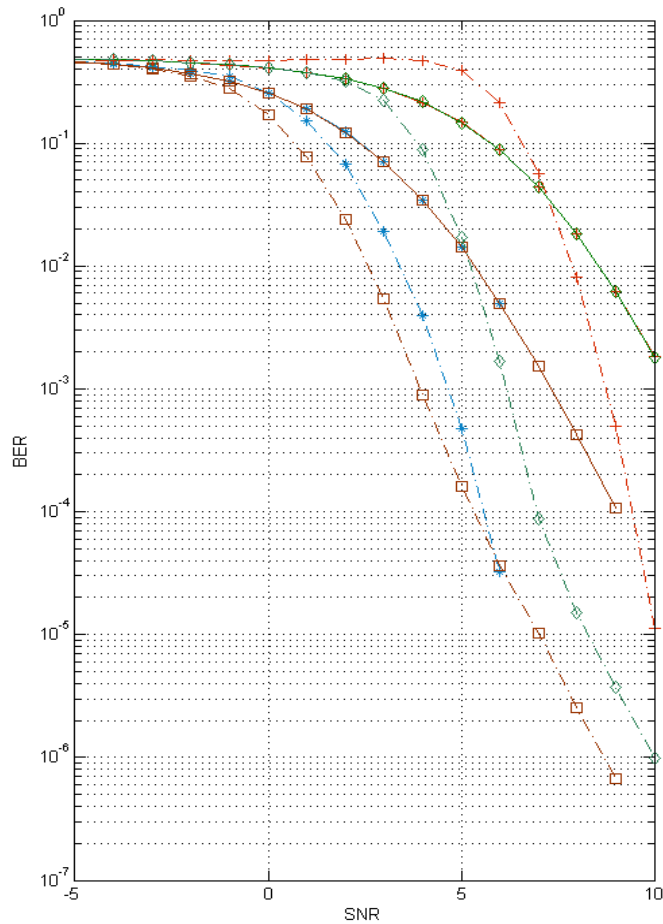
Decoding scheme

" ICI canceling preprocessing is optional, not necessary

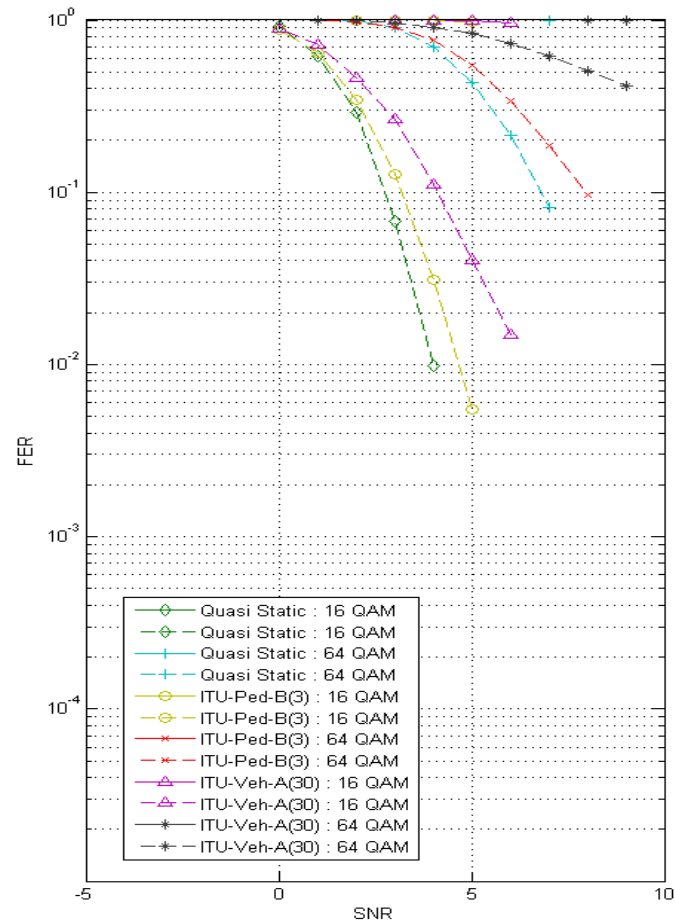
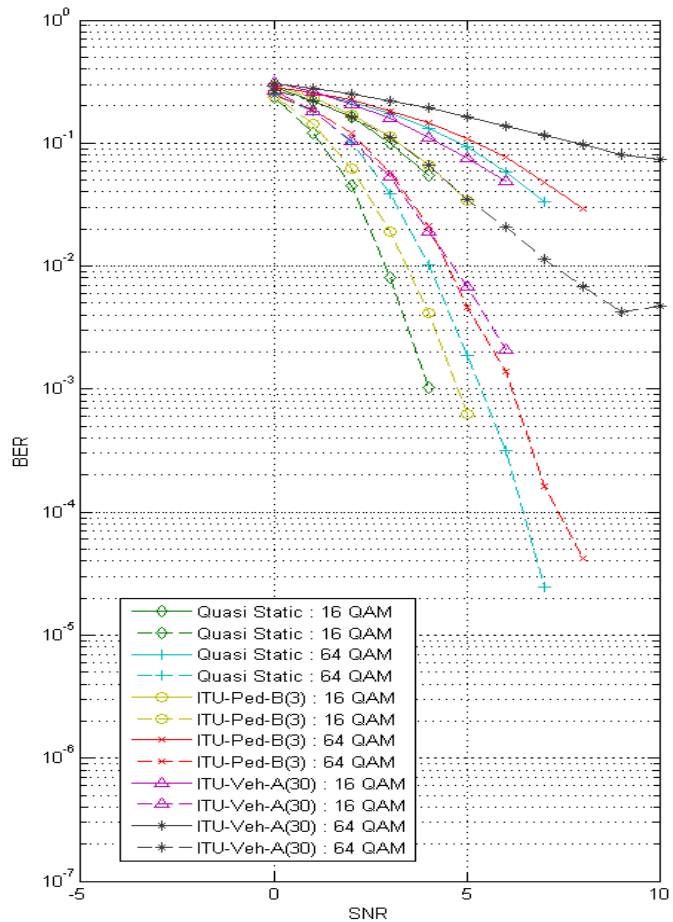
BER/FER Performance of proposed scheme with Perfect CSI



BER-FER performance with Channel Estimation



Ber-Fer performance with Perfect CSI under Proposed scenarios (EMD)



Conclusion

" BICM/TURBO FEC

Different mapping, code pairs can be adapted
Suitable for multi modal operation.

CC codes are indicated to perform better than
MIMO Block Codes (STC)^(*)

" Special importance should be given to this kind
of FEC for fast fading conditions.

(*) Muller, S.H., "Coding approaches for multiple antenna transmission in fast fading and ofdm" IEEE TSP. 50(10), 2002