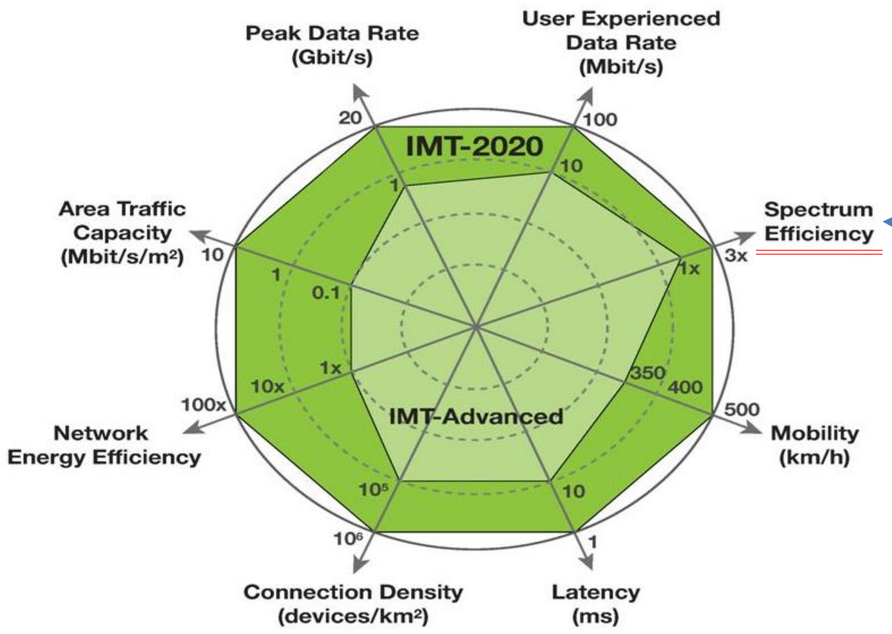
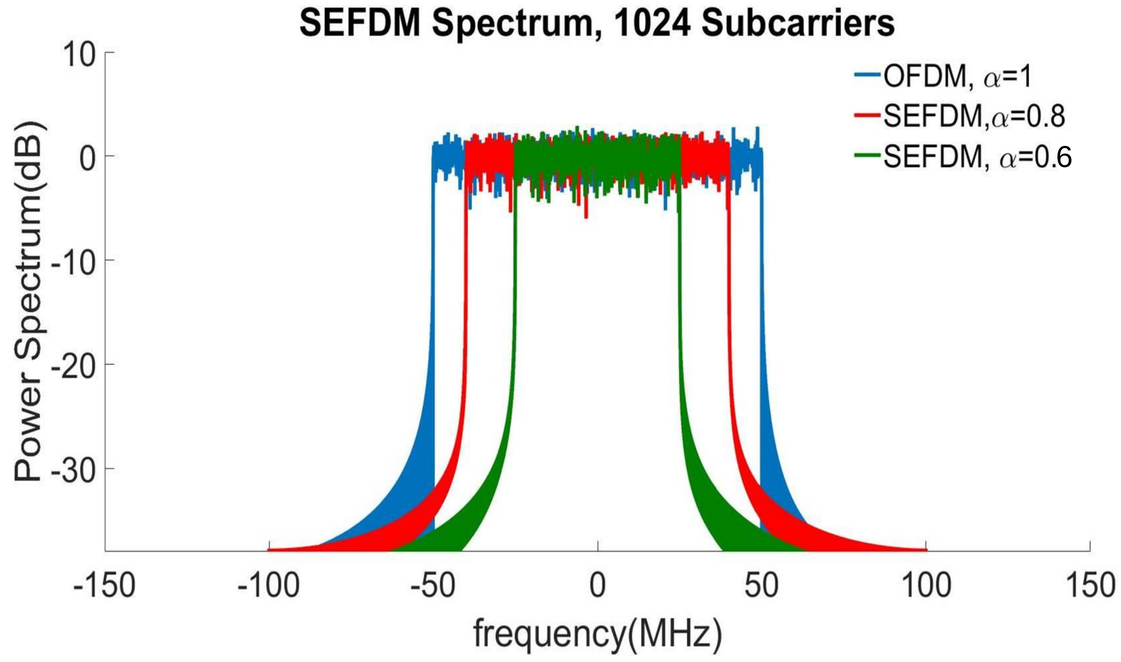
Turbo Coding and Iterative Interference Cancellation of Spectrally Efficient FDM Systems

Hedaia Ghannam, Izzat Darwazeh

Communications and Information System Group
Electronic & Electrical Engineering

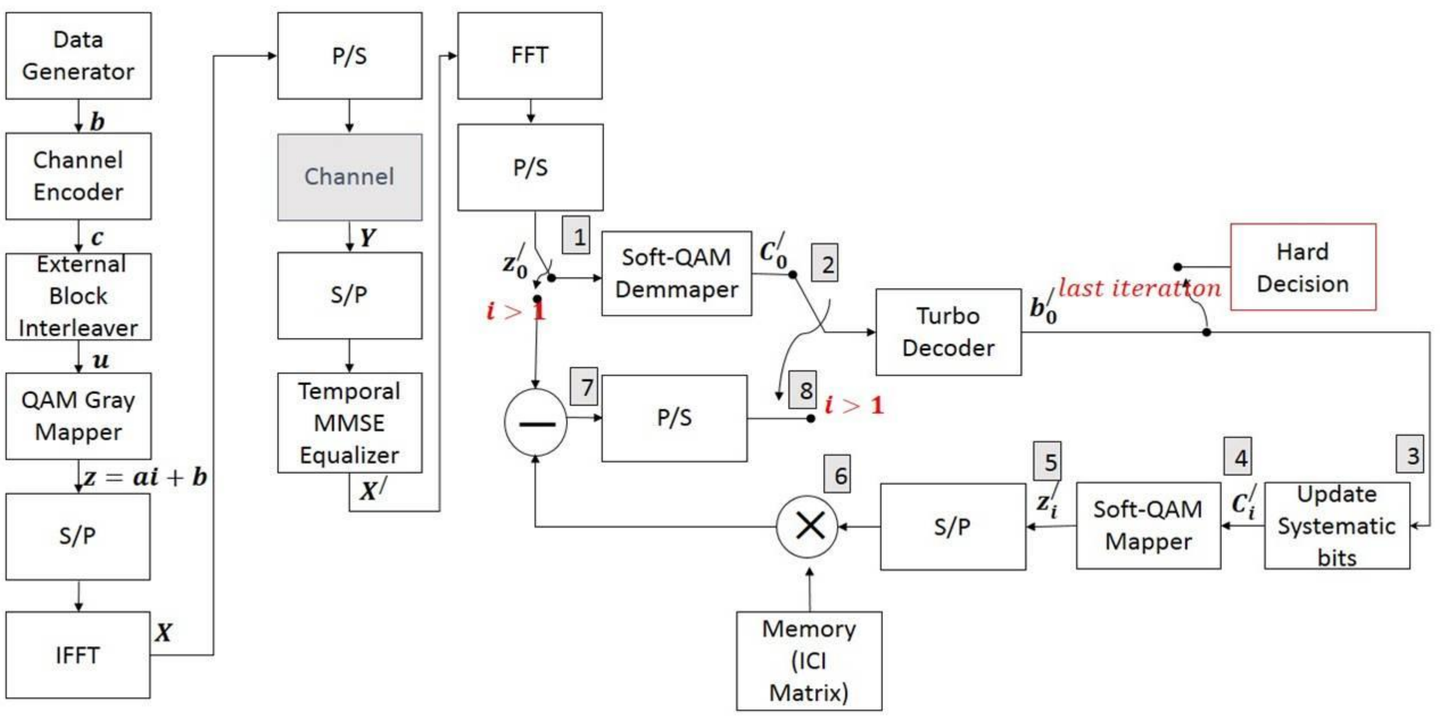
UCL



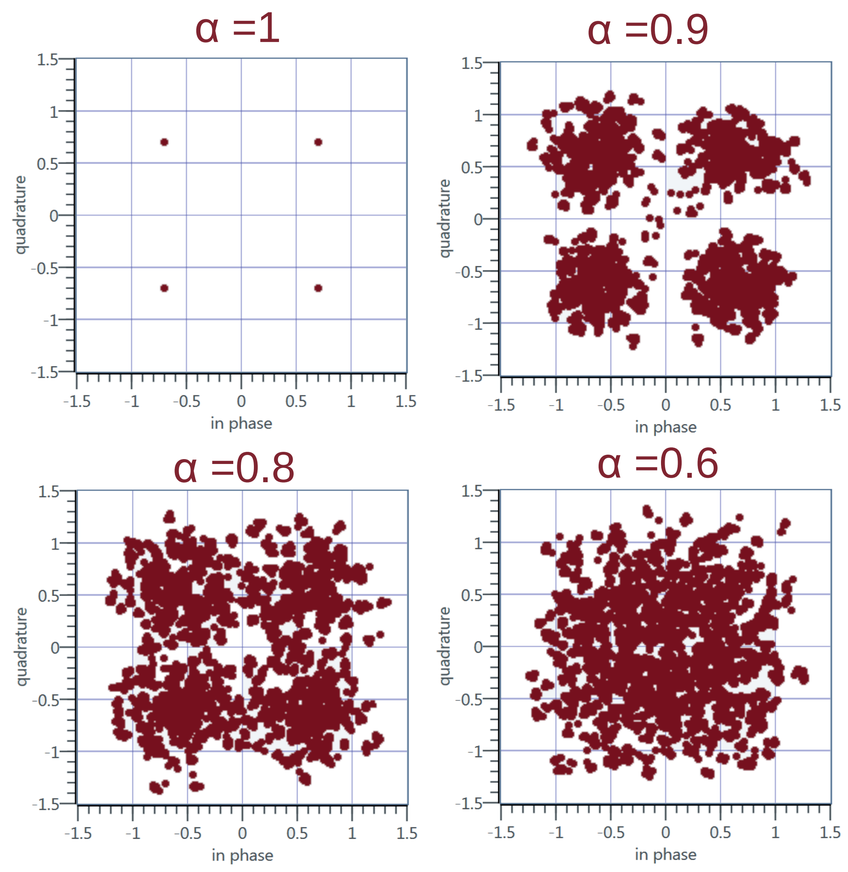


Spectrally Efficient Frequency Division Multiplexing SEFDM:

- A technique developed at UCL to improve bit rates in wireless/wired systems.
- Multi-carrier signal orthogonality is intentionally violated to increase spectral efficiency (SE).



Transceiver Block Diagram



Constellation Diagrams

Turbo Coding (1/3), 4-QAM BER Performance

SEFDM can replace the ubiquitously adopted OFDM with some advantages and drawbacks:

- ✓ Better spectrum utilization and higher bit rates in the same bandwidth
- ✓ Each subcarrier satisfies flat fading
- ✓ Good in frequency selective channels
- ✓ Tolerant to RF effects due to relaxed orthogonality
- ✓ Suited to Turbo coding/decoding/equalization
- ✓ Iterative methods simplify the detection process
- ✓ More robust to time/frequency offset
- ✓ Higher tolerance to non-linear effects
- ✗ Higher complexity of transmitter and receiver
- ✗ Trade of between complexity and error rates
- ✗ High peak to average power ratio (PAPR) compared to a single carrier (SC) systems, but better PAPR compared to OFDM