Acoustic Modem Project Milestone 3

# Optional:

Size of nfft and cp:

The channel can be represented by an equivalent discrete time model and its effects can be modeled by a linear Finite Impulse Response (FIR) filtering with Channel Impulse Response cN = [c1, . . . , cL−1, 0, . . . , 0]. Usually, the system is designed so that D is smaller than N (D= N 4 ) and greater than (L − 1). One can notice that the redundancy factor is equal to N N+D . On the one hand, in order to avoid spectrally inefficient transmissions, N has to be chosen far greater than D (limN→∞ N/ N+D = 1: for a fixed D, the redundancy factor tends to 1 as the the number of carriers increases). On the other hand, the FFT complexity per carrier grows with the size of N. Moreover, the channel should not change inside one OFDM symbol to be able to circularize the convolution. Finally, the carrier spacing is related to the factor 1/NT and reduces as N increases: there is no gain in terms of diversity for a fixed channel by increasing N. The choice of N depends therefore on the type of channel (slow 0-5 varying, fast fading, high diversity channel, impulse response length...) and the complexity cost one is able to accept.

(<https://pdfs.semanticscholar.org/4f1e/a04499b71893b1a1b52ef1e1042bb3a6ed9b.pdf>)