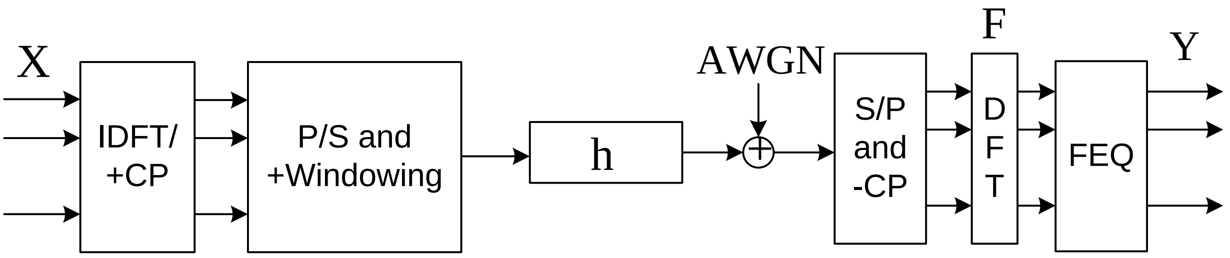
Broadband Transmission Technology
Department of Communication engineering, NCU
Course Instructor: Prof. Dah-Chung Chang

Lab6: OFDM Principle

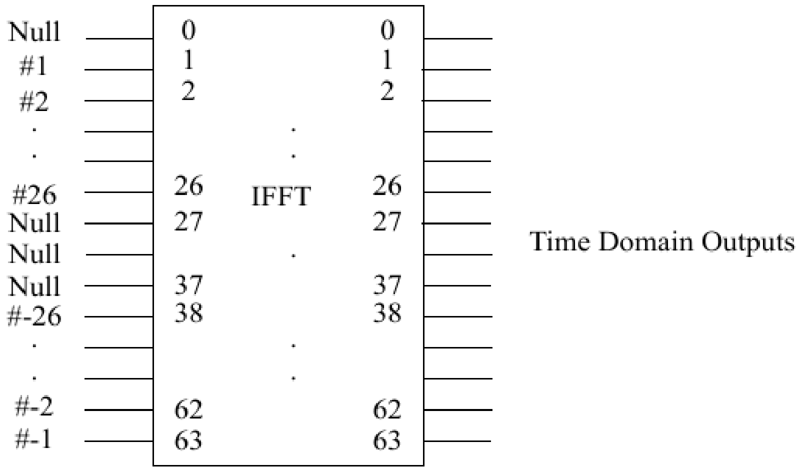
Consider the following OFDM Transceiver System:



The 64-point OFDM system has the specification of 64-QAM signaling where 52 sub-carriers are used for data, 12 sub-carriers are not used as nulls, and 16 samples are added for cyclic prefix (CP). The 64-point DFT OFDM symbol duration is T_{FFT} =3.2 μ sec (50ns for each sample).

Evaluate 2000 random 64-QAM OFDM symbols in the following:

1. Let the number index of the IFFT input be from #0 through #63, and the inputs of indices #0 and #27 thru #37 are set to zeros. Plot the power spectral density (PSD) diagrams of the transmitted OFDM signals for the total 20 MHz (=1/3.2 μs $\times$64) bandwidth.



2. Assume that the channel frequency response can be exactly known in advance. Compare the constellation diagrams of the received signal after the frequency-domain equalization (FEQ) for the following two channel models when the receiver SNR is infinite and 30 dB.

Channel 1: $h(t)=\delta(t)+(0.2-j0.1)\delta(t-0.7\mu\text{sec})$
Channel 2: $h(t)=\delta(t)+(0.2-j0.1)\delta(t-0.7\mu\text{sec})-0.2\delta(t-0.9\mu\text{sec})$