

## ABSTRACT

Multi-Band OFDM UWB Receiver

with Narrowband Interference Suppression. (December 2007)

Burak Kelleci, B.S., Istanbul Technical University;

M.S., Istanbul Technical University

Chair of Advisory Committee: Dr. Aydın İlker Karşıl原因

A multi band orthogonal frequency division multiplexing (MB-OFDM) compatible ultra wideband (UWB) receiver with narrowband interference (NBI) suppression capability is presented. The average transmit power of UWB system is limited to  $-41.3$  dBm/MHz in order to not interfere existing narrowband systems. Moreover, it must operate even in the presence of unintentional radiation of FCC Class-B compatible devices. If this unintentional radiation resides in the UWB band, it can jam the communication. Since removing the interference in digital domain requires higher dynamic range of analog front-end than removing it in analog domain, a programmable analog notch filter is used to relax the receiver requirements in the presence of NBI. The baseband filter is placed before the variable gain amplifier (VGA) in order to reduce the signal swing at the VGA input. The frequency hopping period of MB-OFDM puts a lower limit on the settling time of the filter, which is inverse proportional to notch bandwidth. However, notch bandwidth should be low enough not to attenuate the adjacent OFDM tones. Since these requirements are contradictory, optimization is needed to maximize overall performance. Two different NBI suppression schemes are tested. In the first scheme, the notch filter is operating for all sub-bands. In the second scheme, the notch filter is turned on during the sub-band affected by NBI. Simulation results indicate that the UWB system with the first and the second sup-

pression schemes can handle up to 6 dB and 14 dB more NBI power, respectively. The results of this work are not limited to MB-OFDM UWB system, and can be applied to other frequency hopping systems.