Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	Guard Band Reduction via overlapped Windowing
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Re:	16m SDD call for contributions: Frame Structure
Abstract	It is proposed to use overlapped windowing in the OFDMA symbols, especially in mixed deployment scenarios with legacy system. The effect of such windowing should be considered in figuring the guard bands when designing the 16m frame.
Purpose	For discussion
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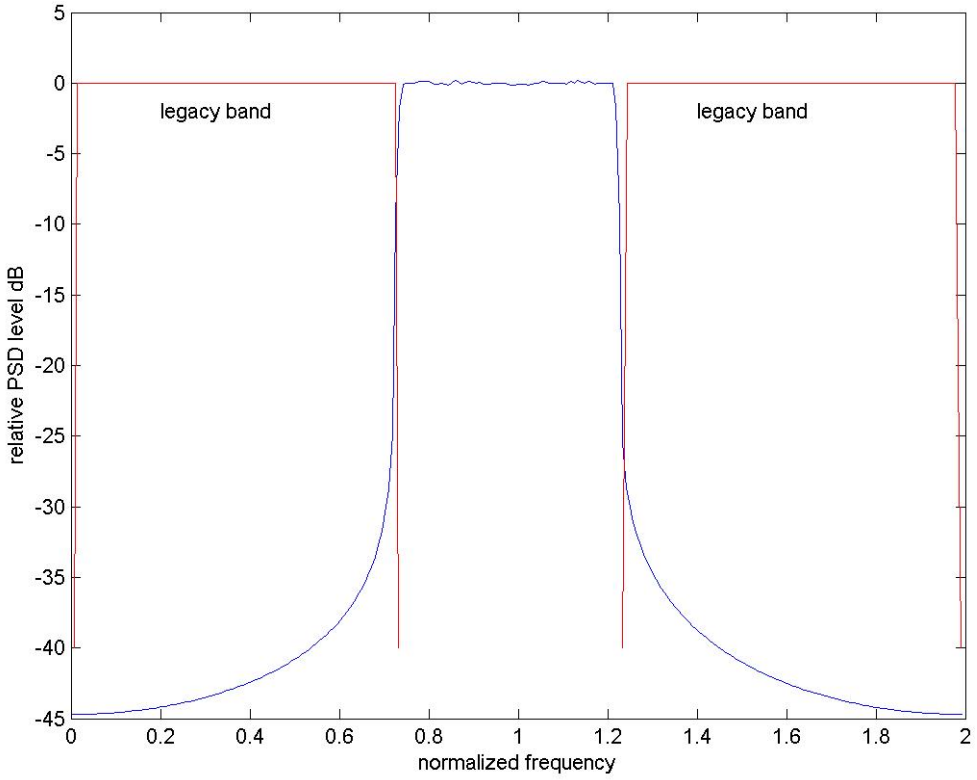
Guard Band Reduction via overlapped Windowing

1 Introduction

In mixed deployment scenarios where OFDM symbols from legacy equipment share part of the bandwidth of new equipment, the interference between the two systems become a problem. The following figure show the out of band spectral level for an OFDM symbol deployed in the midst of legacy bands without any filtering.

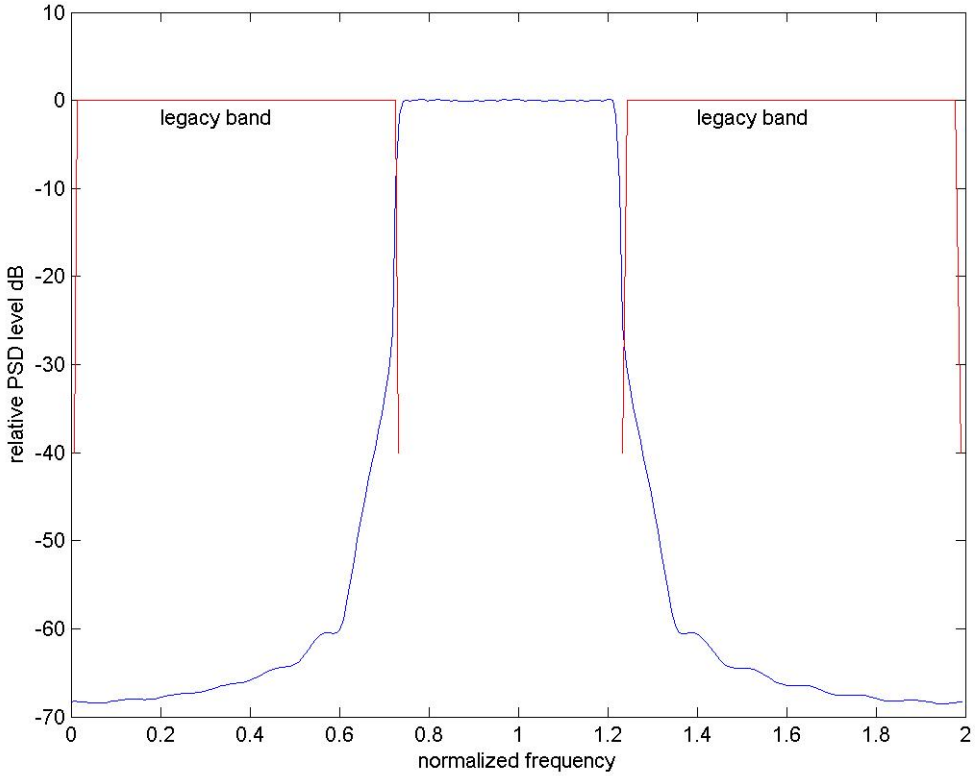


To achieve an acceptable level of interference, the newly inserted OFDM symbol has to be filtered. To apply such filters it has to be employed with guard bands. The guard bands are needed to avoid the need for using sharp filters. Sharp filters tend to prolong the channel impulse response, creating an ISI problem. Filters also will add cost and power consumption in the transmitter chain.

2 Overlapped Windowing

It is proposed herein to use the concept of overlapped windowing, especially in the mixed deployment scenarios. The advantage will be to save the data rate by not using as many guard band pins, or by using no guard bands at all. Also the need for filtering can be reduced or eliminated.

The disadvantage will be the loss of few samples from the cyclic prefix. This loss might lead to a little elevation in the ISI level, but as we only use few samples, this ISI can be neglected. In the following figure we show the effect on the spectrum by using such windowing.



The above figure shows that a drastic reduction in the filter order and/or the guard band can be achieved. This will have a big impact on the complexity of the transmitter and the data rate due to the loss of frequency bins in the guard band.

It is proposed to use the overlapped windowing in such mixed deployment scenarios. The core idea is shown in the following figure: