

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	Quasi-Orthogonal Multicarrier CDMA with Interference Cancellation	
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Re:	IEEE 802.16m-07/040 Call for Contributions on Project 802.16m SDD	
Abstract	One of the limitations of OFDM scheme is that it inherently has no enough frequency diversity gain. A low rate coding scheme is therefore applied in general. On the other hand, due to fading, the achievable rate of regular OFDM scheme is less than that in AWGN channel. For achieving high spectral efficiency, a quasi-orthogonal multicarrier CDMA scheme is proposed with a new interference cancellation framework.	
Purpose	For discussion and approval by TGM	
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**Suggested ToC Topic for IEEE 802.16m SDD:** Forwardlink Transmission.

**Title:** Quasi-Orthogonal Multi-carrier CDMA with Interference Cancellation.

**Description:** One of the limitations of OFDM scheme is it inherently has no good enough frequency diversity gain. Therefore, a low rate channel coding scheme is typically applied. On the other hand, due to frequency fading, the achievable rate of regular OFDM scheme is less than that in AWGN channel. For achieving high spectral efficiency, a quasi-orthogonal multicarrier CDMA scheme is

With this scheme, frequency diversity gain achieved through frequency-domain spreading even with high-rate channel coding. Frequency-selective fading loss can be recovered by overloaded spreading. Higher spectral efficiency and/or user capacity are obtained by layered/superposition coding. This means better network performance is achievable with more dimension for scheduling. This is more attractive for delay-sensitive applications. However, maximum capacity achieving is not free. It requires the receivers capable of interference cancellation.

For interference cancellation receiver design, subspace-based model is popular, since it gives us in-deep presentation of the received signal structure. And the performance of subspace-based detectors can be the exactly the same to conventional detectors. However, the bad thing is the signal subspace separation or matrix inverse is non-trivial. A new signal model is proposed here and shown in the following. For the new blind multiuser signal model, many new blind receiver design scheme can be devised with different signal processing criteria., such as 1) least squares based approaches, 2) minimum mean-squared errors based approaches, and 3) maximum likelihood based approaches. And the good thing is that there is no channel estimation necessary.

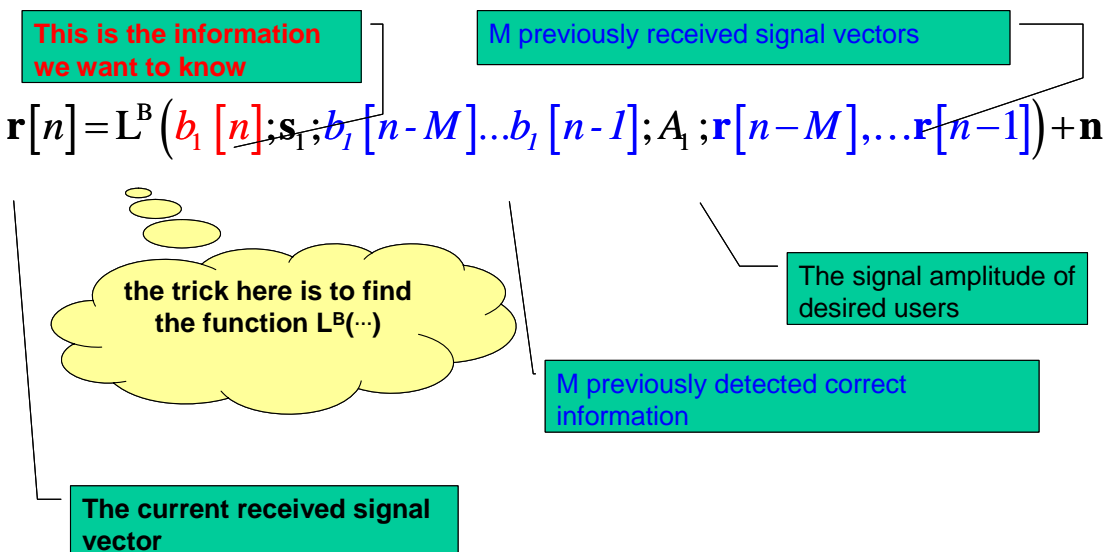


Figure 1. A New Interference Cancellation Model

**Related Area(s) in SRD:**  
**5.2 complexity.**  
**6.1 peak data rate.**