

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	<b>Initial Ranging Channel Design</b>	
Date Submitted	<b>2008-09-05</b>	
Source(s)	Eugene Visotsky Mark Cudak Amitava Ghosh Fred Vook Fan Wang Bishwarup Mondal William Hillery  Motorola	Voice: +1 847 538 9458 E-mail: <a href="mailto:eugenev@motorola.com">eugenev@motorola.com</a>
Re:	SDD Session 56 Cleanup, in response to the call for PHY details.	
Abstract	This is revised version of Section 11.9 of IEEE 802.16m-08/003r4. This document provides further physical layer details on the initial ranging channel.	
Purpose	Draft for further development of the IEEE 802.16m SDD	
Notice	<i>This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.</i>	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: < <a href="http://standards.ieee.org/guides/bylaws/sect6-7.html#6">http://standards.ieee.org/guides/bylaws/sect6-7.html#6</a> > and < <a href="http://standards.ieee.org/guides/opman/sect6.html#6.3">http://standards.ieee.org/guides/opman/sect6.html#6.3</a> >. Further information is located at < <a href="http://standards.ieee.org/board/pat/pat-material.html">http://standards.ieee.org/board/pat/pat-material.html</a> > and < <a href="http://standards.ieee.org/board/pat">http://standards.ieee.org/board/pat</a> >.	

# Initial Ranging Channel Design

*Eugene Visotsky, Mark Cudak, Amitava Ghosh, Fred Vook,  
Fan Wang, Bishwarup Mondal, William Hillery  
Motorola*

## Introduction

The initial ranging channel is a random access channel designed to provide an initial UL transmission opportunity to an MS entering into the system. Since the MS entering into the system has no knowledge of the correct UL transmit timing to the BS, significant timing offsets due to propagation delays maybe observed in this channel at the BS. In 16m, support of cells with radius of up to 100 km is specified, thereby requiring an initial ranging region design capable of handling very long timing offsets. In view of this design requirement, a separate OFDM symbol structure, with a much longer symbol duration and cyclic prefix length, relative to the regular 16m symbol structure, is necessary. Below, changes to Section 11.9.2.4 are proposed consistent with the new OFDM symbol structure for the initial ranging region.

## Proposed Text for the System Description Document SDD

----- *Start of the text* -----  
--

### 11.9.2.4 UL Ranging Channel

The UL ranging channel is used for UL synchronization. The UL ranging channel can be further classified into ranging channel for non-synchronized mobile stations and synchronized mobiles stations. A random access procedure, which can be contention based or non-contention based is used for ranging. Contention-based random access is used for initial ranging, periodic ranging and handover. Non-contention based random access is used for periodic ranging and handover.

#### 11.9.2.4.1 Ranging Channel for non-synchronized mobile stations

The ranging channel for non-synchronized MSs is used for initial access and handover.

##### 11.9.2.4.1.1 Multiplexing with other control channels and data channels

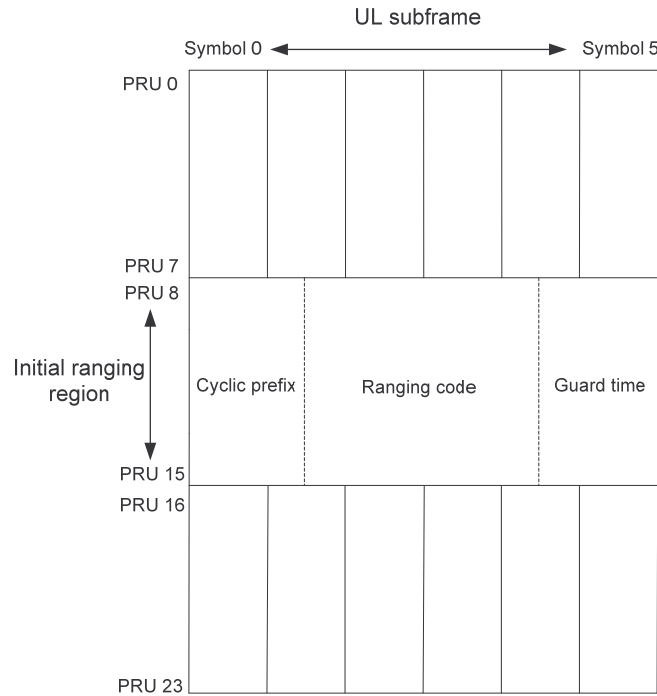
The UL ranging channel for non-synchronized MSs starts at a configurable location with the configuration defined in a DL broadcast control message.

The UL ranging channel for non-synchronized MSs is FDM with other UL control channels and data channels.

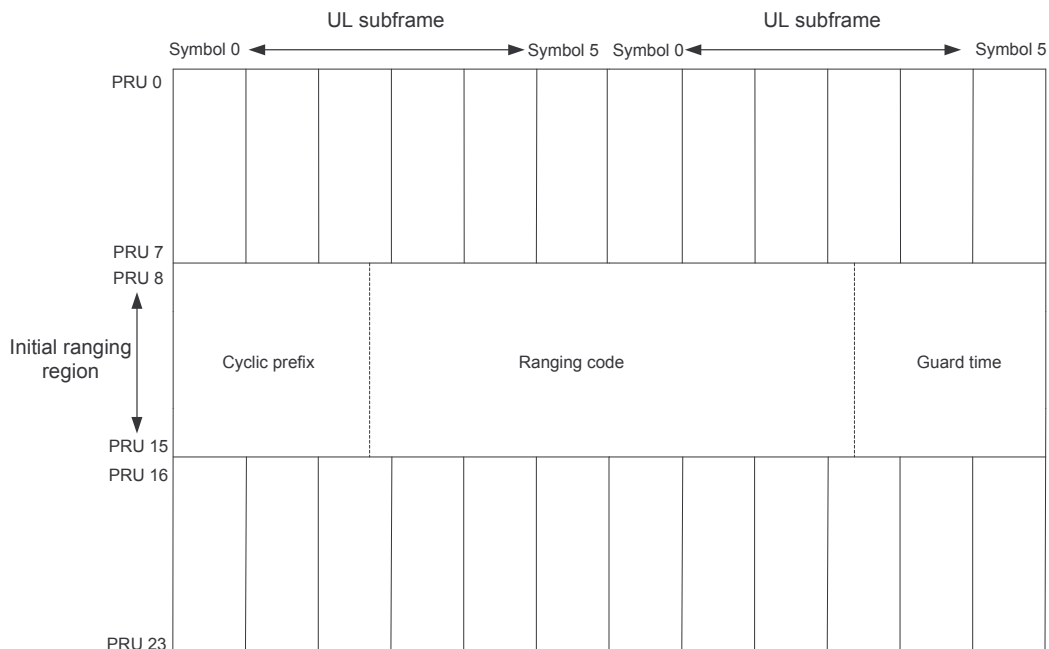
##### 11.9.2.4.1.2 PHY structure

~~The ranging sequence design and mapping to subcarriers are TBD.~~ The UL ranging channel for non-synchronized MSs occupies in frequency an integer number of UL PRUs. More specifically, the UL ranging channel consists of 8 contiguous UL PRUs (other numbers are FFS). To support larger cell radii, the UL ranging channel for non-synchronized MS is constructed by concatenating 2 (3 is FFS) UL subframes together and defining a single continuous ranging region spanning all concatenated subframes. The duration of the OFDM symbol in the ranging region and the length of the cyclic prefix are FFS. The choice of the ranging

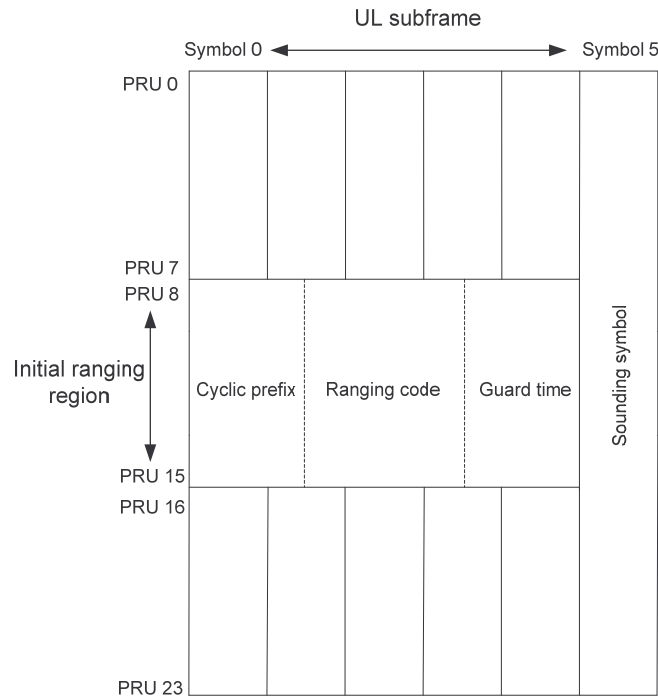
1 waveform is also FFS. Guard subcarriers shall be allocated on the boundaries of the ranging region to prevent  
 2 interference between asynchronous MS transmissions and synchronized UL transmissions. The ranging region  
 3 shall include a guard time interval at the end of the region. The length of the guard time interval is FFS. If UL  
 4 sounding is performed in the same subframe as the initial ranging, a shorter ranging symbol shall be used to  
 5 allow sounding to occupy the last symbol of the subframe. Examples of the proposed ranging region  
 6 configurations are shown in Figures x, x+1, and x+2.  
 7



8  
 9 Figure x. Example of the Initial Ranging Region for a 5 MHz BW system.  
 10



1 Figure x+1. Example of two-subframe concatenation for forming a longer ranging symbol.



2  
3 Figure x+2. Example of the Initial Ranging Region coexistence with the Sounding Region.

#### 4 **11.9.2.4.2 Ranging Channel for synchronized mobile stations**

5 The ranging channel for synchronized MSs is used for periodic ranging. The use of the ranging channel for  
6 synchronized MSs for handover is FFS.

##### 7 **11.9.2.4.2.1 Multiplexing with other control channels and data channels**

8 The UL ranging channel for synchronized MSs starts at a configurable location with the configuration defined  
9 in a DL broadcast control message.

10 The UL ranging channel for synchronized MSs is FDM with other UL control channels and data channels.

##### 12 **11.9.2.4.2.2 PHY structure**

13 The ranging sequence design and mapping to subcarriers are TBD.