Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**GPS Assisted Initial Ranging in IEEE 802.16m**
Date Submitted	**2009-01-05**
Source(s)	Bozo Cesar Joerg Schaepperle Juergen Otterbach Alcatel-Lucent Voice: +49 711 821 32266 E-mail: Bozo.Cesar@alcatel-lucent.de Joerg.Schaepperle@alcatel-lucent.com Juergen.Otterbach@alcatel-lucent.de *<http://standards.ieee.org/faqs/affiliationFAQ.html>
Re:	Contribution in response to TGm "Call for Comments on Project 802.16m SDD" for Session #59 (IEEE 802.16m-08/052), Section 11.9.2.4
Abstract	**Initial ranging in IEEE 802.16m using GPS information in the mobile station**
Purpose	To discuss and adopt the proposed text in the next revision of the 802.16m SDD
Notice	*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.
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: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

GPS Assisted Initial Ranging in IEEE 802.16m

Bozo Cesar, Joerg Schaepperle, Juergen Otterbach
Alcatel-Lucent

Introduction

In a multi cell environment it is recommended for the BSs in chapter 22.1 to use GPS signals to synchronize their operation, i.e. all the BSs start to transmit the downlink frame at the same time and also the uplink frame start is common for all BSs.
When the MS is equipped with GPS capability, it can use the GPS signals to generate the same frame start trigger as it is done by the BSs as shown in Figure 1.
When MS receives the downlink frame start it can measure the delay between the frame start trigger and the received frame start and can calculate the transmission delay between BS and MS - which roughly is half of the round trip delay (RTD) when assuming that the downlink transmit delay is equal to uplink transmit delay. With the knowledge of the RTD the MS knows how to delay the uplink transmit signal and can at least roughly calculate the required transmit power to avoid several iterations of transmit power adaptation for initial ranging. With this mechanism parts of the initial ranging procedure can be skipped, which means that no gap has to be reserved behind the ranging area in the uplink frame and the saved frame resources can be used for traffic data instead and thus the uplink throughput can be increased. Additionally the time duration of the complete ranging process is reduced.

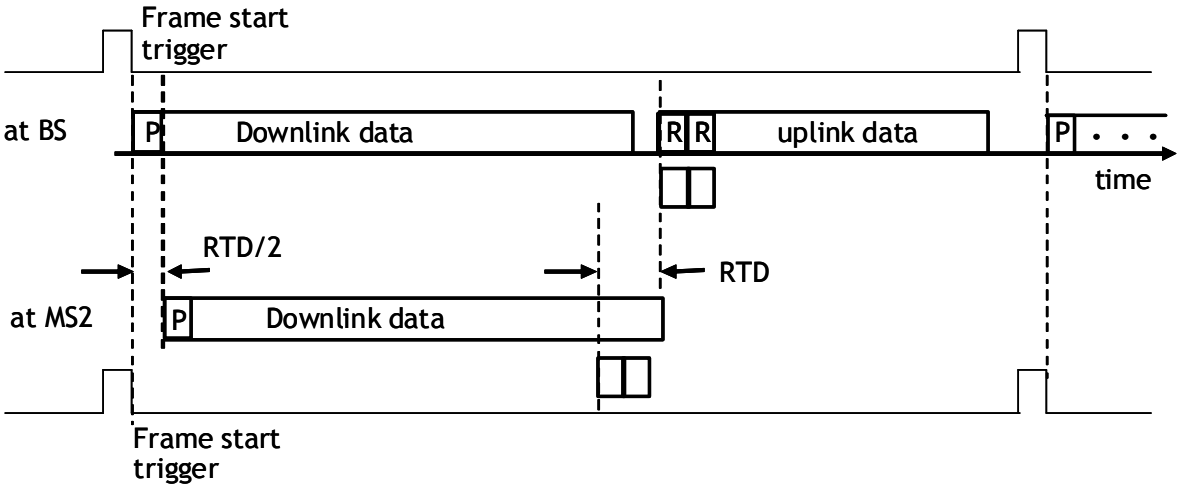

Figure 1: Frame timing TDD

Proposed text for SDD for Initial ranging

Insert the following text into IEEE 802.16m-08/003r6 at page 108, line 34

----------Start of the Text----------

11.9.2.4 Ranging Channel

……

When an AMS is equipped with GPS capability, it can use assistance of locally available GPS information to determine the transmission delay for the first UL transmission and skip the first part of the initial ranging process which uses a completely unsynchronized UL transmission. Thus, the initial ranging procedure can be shortened and the radio resource usage for timing gaps can be reduced.

----------End of the Text----------