Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	On the issue of frame alignment and gaps	
Date Submitted	2007-03-05	
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Re:	80216j-07_007r2: “Call for Technical Comments and Contributions regarding IEEE Project 802.16j”	
Abstract	This document provides information relating to the specification of the R-TTG and R-RTG gap durations for in the case of different frame alignment scenarios.	
Purpose	Text proposal for 802.16j Baseline Document	
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On the issue of frame alignment and gaps

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1. Introduction

In order to provide support for the one radio RS operation as defined by 802.16j, new gaps (R-TTG and R-RTG) have been introduced, in order to avoid any data drops due to the Tx/Rx and Rx/Tx switching times. This contribution provides some information on the size of these gaps based on the arrangement of the DL and UL subframe start time arrangement between the MR-BS and RSs.

2. Details

These two new gaps have the unique scope to provide a sufficient time for the radio transceiver or sets of transceivers (if diversity schemes are implemented) to properly switch from Tx to Rx or from Rx to Tx.. These gaps were not intended to provide any functionality for any ranging operations. Ideally, if the gaps can be 1 symbol in duration then this will ease implementation. However, the actual gap required depends on the alignment arrangement of the DL and UL subframe start points between the MR-BS and RS, thus any alignment requirements need to be carefully considered in conjunction with the impact of the R-TTG and R-RTG durations and what these results in, in terms of the gaps between zones at the MR-BS or RS.

In order to demonstrate this, Figure 1 shows the frame arrangement when the round trip delay between the MR-BS and RS is not compensated for. Consequently the frame start time at the RS is delayed by RTD/2 relative to the frame start time at the MR-BS. Likewise the UL subframe start time is advanced by RTD/2 relative to the UL subframe start at the MR-BS. Such arrangement would be required when the RS is performing network entry. If this arrangement is maintained when the RS becomes operational, switching the transmit in the DL access zone interval and receive in the UL access zone interval after network entry, then it can be seen that the R-TTG and R-RTG will be an integer number of symbols.

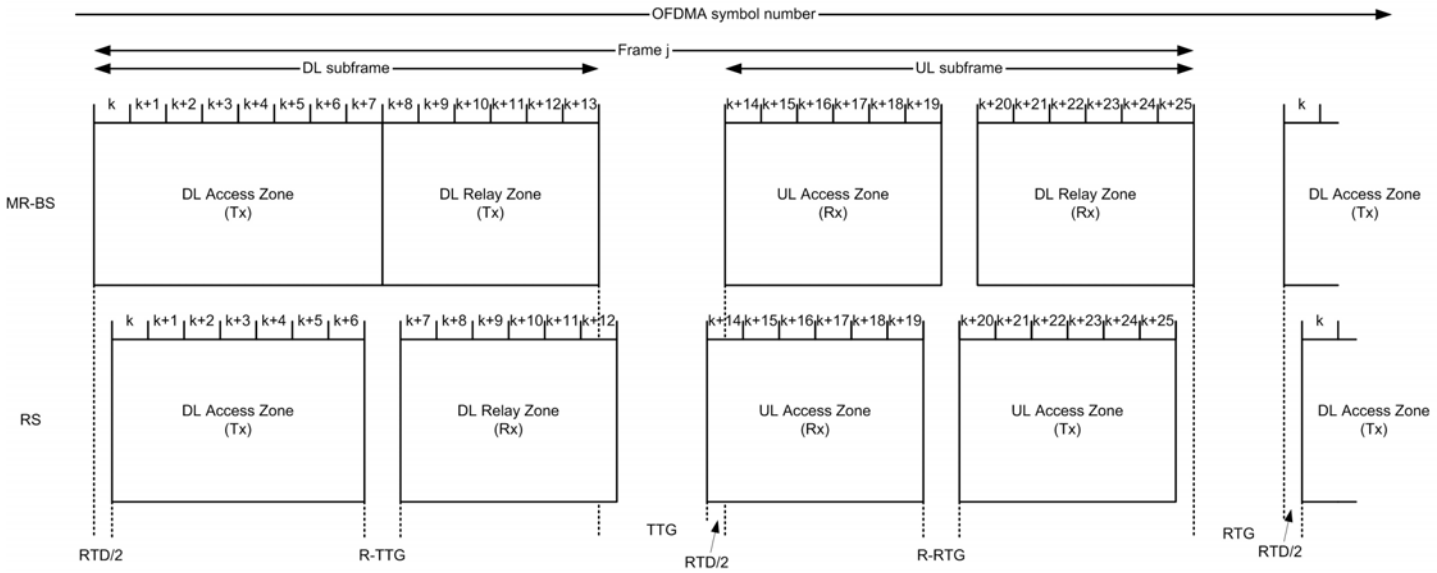

Figure 1. Frame alignment with no modification to timing after network entry.

However, if the frame alignment is adjusted after network entry such that the DL and UL subframe start times are aligned, as shown in Figure 2, then the impact is that the gaps for R-RTG and R-TTG will no longer be an integer number of symbols at either one of the MR-BS or RS, due to the fact that whilst the relative position of the access zone at the RS in the DL and UL is now different compared to the case in Figure 1, the relative timing between the relay zones is the same. Thus the adjustment in the access zone start point is absorbed into the gap between the access and relay zones.

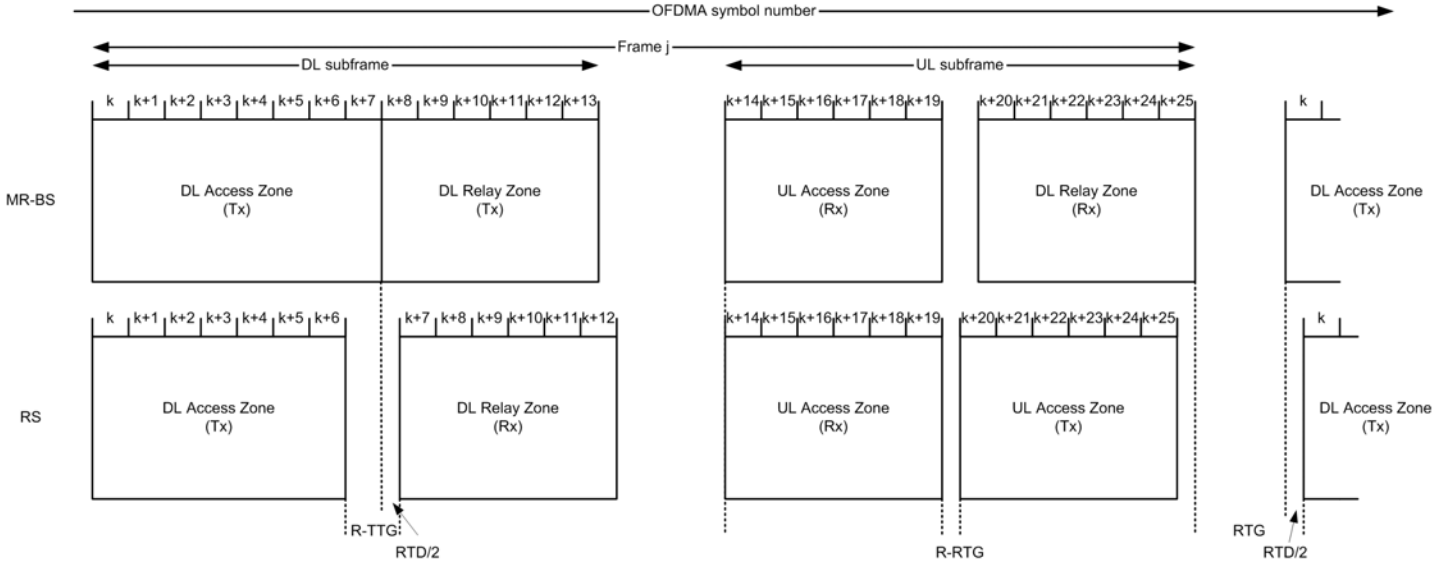

Figure 2. Frame alignment with modification to timing after network entry.

Note that in the case of Figure 2 it is assumed the OFDMA symbol spacing across the DL and UL subframe is maintained, else it will render the remainder of the subframe after the access interval useless for communications between a .16e MS and the MR-BS. It would therefore prevent the operation of features such as the common sync symbol. The consequence is that the RS must support gaps which are not an integer number of symbols. In fact the R-TTG is an integer number of symbols plus RTD/2, whereas the R-RTG is an integer number of symbols minus RTD/2. If such as arrangement is undesired at the RS, then the alternative is to break the spacing of integer symbols between the zones at the MR-BS.

3. Conclusion

Whilst, as proposed in [1], it could be benefitial to alter the subframe alignment at the RS after network entry, it is proposed that this not be specified as a requirement until further discussion on the impact on the gap times at the MR-BS and RS is had.

4. Specific text changes

None at present.

References

1. C802.16j-07/102r2, “Frame Alignment Requirements”