

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Enhancements for AAS support in IEEE 802.16-REVd	
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Re:	Working Group re-circulation Ballot #13a Announcement	
Abstract	Enhancements for AAS support, to enable operation in degraded S/N environment with improved dynamic response of the antenna array	
Purpose	Adoption of proposed enhancement into P802.16-REVd/D3-2003	
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Enhancement on AAS support in IEEE 802.16-REVd

1 Motivation and explanation of changes

The proposed additions to AAS mode in this contribution enable an ASS SS to perform channel estimation that is not based on the FL frame preamble. This is essential, as the DL frame preamble is broadcast, and therefore represents different channel conditions than those expected when the AAS beam is directed at the AAS SS. Further, an active DL scan mechanism is introduced which enables faster network entry for an ASS SS.

2 Proposed changes

2.1 Change #1

	Comment type	Starting page	Starting line	Fig./Table	Section
	Technical, Non-binding	159	63		6.4.7.6.3
Comment	In high S/N conditions, synchronization based on DL preamble alone may not suffice				

Suggested Remedy:

Add the following sentence:

“The BS may further employ active scanning methods to speed up and enhance the process of downlink synchronization. These methods are PHY-specific, and described in the respective PHY section.”

2.2 Change #2

	Comment type	Starting page	Starting line	Fig./Table	Section
	Technical, Non-binding	457	32		8.4.4.7
Comment	In high S/N conditions, synchronization based on DL preamble alone may not suffice				

Suggested Remedy:

Add the following paragraph:

“8.4.4.7 Optional active DL AAS scan

Sub-channels 30 and 31 of the DL frame may be dedicated at the discretion of the BS for active AAS scanning. When these sub-channels are used for this purpose, they shall not be allocated in the normal DL_MAP message.

These sub-channels will be used to transmit the AAS_DL_SCAN_IE(), whose physical construction is shown in figure aaa. The AAS_DL_SCAN_IE() is transmitted with a well known modulation and coding, namely QPSK rate $\frac{1}{8}$ with 4 repetitions.

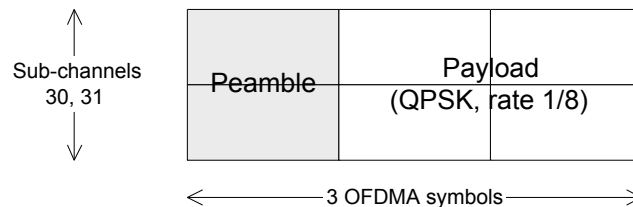


Figure aaa

The contents of the AAS_DL_SCAN_IE() payload is described by table bbb below,

Syntax	Size	Notes
AAS_DL_SCAN_IE() {		
AAS beam direction index	6 bits	This index shall correspond to the direction the AAS beam is pointing at. The range of angles the AAS element should be linearly covered by the range

		0-63 of this field.
Private Ranging Allocation IE() {		
OFDMA Symbol offset	10 bits	
Sub-channel offset	6 bits	
No. OFDMA Symbols	8 bits	
Ranging Method	2 bits	00 - Initial Ranging over two symbols 01 - Initial Ranging over four symbols 10 - BW Request/Periodic Ranging over one symbol 11 - BW Request/Periodic Ranging over three symbols
}		
Private MAP Allocation IE() {		
OFDMA Symbol offset	10 bits	
Sub-channel offset	5 bits	
Boosting	3 bits	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;
No. OFDMA Symbols	9 bits	
No. Sub-channels	5 bits	
}		
}		

Table bbb

The AAS_DL_SCAN_IE() is transmitted by the BS with in a specific direction of the AAS beam, and includes a preamble to facilitate channel equalization by the AAS SS. The preamble used in sub-channels 30, 31 is defined in section 8.4.6.1.1, and shall be selected to have the same segment number as the DL frame preamble, and the cell ID shall equal $(DL\text{-Preamble cell-ID} + 16) \bmod 32$.

The IE is composed of the Private_Ranging_Allocation_IE() that indicates to the AAS SS a suitable slot to perform UL ranging. The BS should point its AAS beam to appropriate direction in the time indicated by this IE, such that it can receive the SS UL ranging. Should a response to the UL ranging attempt by the SS fail to arrive, the SS shall apply the exponential backoff algorithm for selecting the next opportunity to perform UL ranging.

The other part of the AAS_DL_SCAN_IE() is a Private_MAP_Allocation_IE(). This IE indicates to the AAS SS where and when it might find its private DL_MAP and, such that AAS SS can start the process of network entry.

An AAS SS may respond to the AAS_DL_SCAN_IE() when performing initial network entry, and also as a means of tracking whether it has shifted position with regards to the direction the AAS beam should be pointing in order to communicate with it.”

2.3 Change #3

	Comment type	Starting page	Starting line	Fig./Table	Section
	Technical, Non-binding	460	8		8.5.4.3.2
Comment	Messages directed to ASS SS require dedicated preamble, as the frame preamble transmitted in broadcast fashion does not represent the correct channel compared to the directed beam				

Suggested Remedy:

Add the following sentence:

“All DL bursts in the AAS portion of the frame shall be preceded by a preamble. The preamble is defined in section 8.4.6.1.1, and shall be selected to have the same segment number as the DL frame preamble, and the cell ID shall equal $(DL\text{-Preamble cell-ID} + 16) \bmod 32$. The preamble shall exist only on those sub-channels used by the DL burst.”