Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**Fix Out-of-Scope PAR violation in 6.3.2.2.2 Grant Management Subheader**	
Date Submitted	**2005-6-7**	
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Re:	Fix Out-of-Scope PAR violation in 6.3.2.2.2 Grant Management Subheader	
Abstract	Current proposed language changes in 802.16e/D8 to 6.3.2.2.2 Grant Management Subheader is out-of-scope of the 16e PAR	
Purpose	Provide remedy to fix 6.3.2.2.2 to bring it back into conformance with the 16e PAR while preserving the added functionality	
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Fix Out-of-Scope PAR violation in 6.3.2.2.2 Grant Management Subheader

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Problem: The instance of 'SS' in the first line is suspect. Unless also reflected in the D3 Corrigenda draft (which it is not), use of 'SS' in this instance would break backwards compatibility with an 802.16-2004 compliant SS in any number of ways, violate the 16e PAR: original 802.16-2004 compliant SS would 1) encode the message using the previous, 2 byte length and format specified in the 802.16-2004 standard, 2) would absolutely fail to properly encode the new message with its changed three byte length message and radically altered format including new conditional loop and new message information elements. Usage of 'SS' in this instance would create a retroactive requirement that is unsupportable. Clearly this feature was intended as an enhancement for MS, but was inappropriately, retroactively applied.

This problem is not easily overcome since the subheader is created by the SS (or MS), not the BS. So legacy SS currently create 2 byte Grant Management subheaders; not the 3 byte subheaders the new language specifies. The correct solution is to leave the original Grant Management Subheader alone and add a new Extended Subheader: Mobility Grant Management Extended Subheader.

Remedy:

[Delete 6.3.2.2.2 Grant Management subheader, page 35, line 9, through page 36, line28]

[In 6.3.2.2.7 Extended Subheader Format, page 37, Table 13b—Description of extended subheaders, modify Table as:]

Table 13b—Description of extended subheaders

ESF bit	Name	Size (bits)	Description
0 (LSB)	SDU_SN Extended subheader	1	See 6.3.2.2.7.1
1	DL Sleep control Extended subheader	3	See 6.3.2.2.7.2
2	Feedback request extended subheader	3	See 6.3.2.2.7.3
3	MIMO mode feedback Extended subheader	1	See 6.3.2.2.7.4
4	UL TX power report Extended subheader	1	See 6.3.2.2.7.5
5	Mini-Feedback Extended subheader	2	See 6.3.2.2.7.6
6	Mobility Grant Management Extended subheader	3	See 6.3.2.2.7.7
Bits #~~6~~7-127	*Reserved*	-	

[At the end of 6.3.2.2.7 Extended Subheader Format, page 35, line 33, add new section 6.3.2.2.7.7 Mobility Grant Management Extended subheader:]

6.3.2.2.7.7 Mobility Grant Management Extended subheader

The Mobility Grant Management Extended subheader is three bytes in length and is used by the MS to convey bandwidth management needs to the BS. This subheader is encoded differently based upon the type of uplink scheduling service for the connection (as given by the CID). The Mobility Grant Management Extended subheader is shown in Table *mm*. Its fields are defined in Table *nn*. The capability of Mobility Grant Management Extended subheader at both BS and MS is optional.

Table *mm*— Mobility Grant Management Extended subheader format

Syntax	Size (bits)	Notes
Mobility Grant Management Extended subheader format {		
if (scheduling service type == UGS) {		
SI	1	
PM	1	
FLI	1	
FL	4	
reserved	9	Shall be set to zero
} else if (scheduling service type == Extended rtPS) {		
Extended Piggyback Request	11	
FLI	1	
FL	4	
} else{		
Piggyback Request	16	
}		
}		

Table *nn*— Mobility Grant Management Extended subheader fields

Name	Size (bits)	Description
SI	1	Slip Indicator 0 = No action 1 = Used by the MS to indicate a slip of uplink grants relative to the uplink queue depth.
PM	1	Poll-Me 0 = No action 1 = Used by the MS to request a bandwidth poll.
FLI	1	Frame Latency indication 0 = Frame latency field disabled for this grant 1 = Frame latency field enabled for this grant
FL	4	Frame Latency The number of frames previous to the current one in which the transmitted data was available. When the latency is greater than 15 then the FL field shall be set to 15.
Extended PBR	11	Extended PiggyBack Request The number of bytes of uplink bandwidth requested by the MS. The bandwidth request is for the CID. The

		request shall not include any PHY overhead. The request shall be incremental. In case of the Extended rtPS, if the MSB is 1, the BS changes its polling size into the size specified in the LSBs of this field.
PBR	16	PiggyBack Request The number of bytes of uplink bandwidth requested by the MS. The bandwidth request is for the CID. The request shall not include any PHY overhead. The request shall be incremental.

[In 6.3.5.2.1 UGS, page 150, line 22, modify, including modification of the editorial instruction, as:]
[Change ~~Insert at the end of~~ 6.3.5.2.1 as indicated:]
The UGS is designed to support real-time service flows that generate fixed size data packets on a periodic basis, such as T1/E1 and Voice over IP without silence suppression. The service offers fixed size grants on a real-time periodic basis, which eliminate the overhead and latency of SS requests and assure that grants are available to meet the flow's real-time needs. The BS shall provide Data Grant Burst IEs to the SS at periodic intervals based upon the Maximum Sustained Traffic Rate of the service flow. The size of these grants shall be sufficient to hold the fixed length data associated with the service flow (with associated generic MAC header and Grant management subheader or Mobility Grant Management Extended subheader) but may be larger at the discretion of the BS scheduler. In order for this service to work correctly, the Request/Transmission Policy (see 11.13.12) setting shall be such that the SS is prohibited from using any contention request opportunities for this connection. The key service IEs are the Maximum Sustained Traffic, Maximum Latency, the Tolerated Jitter, and the Request/Transmission Policy. If present, the Minimum Reserved Traffic Rate parameter shall have the same value as the Maximum Sustained Traffic Rate parameter.

For SS, ~~T~~the Grant Management subheader (6.3.2.2.2), and for MS, the Mobility Grant Management Extended subheader is used to pass status information from the SS or MS to the BS regarding the state of the UGS service flow. The most significant bit of the Grant Management field is the Slip Indicator (SI) bit. The SS shall set this flag once it detects that this service flow has exceeded its transmit queue depth. Once the SS detects that the service flow's transmit queue is back within limits, it shall clear the SI flag. The flag allows the BS to provide for long term compensation for conditions, such as lost maps or clock rate mismatches, by issuing additional grants. The poll-me (PM) bit (6.3.6.3.3) may be used to request to be polled for a different, non-UGS connection.

The BS shall not allocate more bandwidth than the Maximum Sustained Traffic Rate parameter of the Active QoS Parameter Set, excluding the case when the SI bit of the Grant Management field is set. In this case, the BS may grant up to 1% additional bandwidth for clock rate mismatch compensation.

The FL and FLI fields may be used to provide the BS with information on the synchronization of the MS application that is generating periodic data for UGS/Extended rtPS Service Flows.

The MS may use these fields to detect whether latency experienced by this service flow at the MS exceeds a certain limit, e.g. a single frame duration. If the FL indicates inordinate latency, the BS may shift scheduled grants earlier for this service flow (taking into account the –Frame Latency – FL).

[In page 151, line 1, insert, including editorial instruction, prior to 6.3.7 MAC support of PHY:]
[Change 6.3.6.3.3 as indicated:]

6.3.6.3.3 PM bit

SSs or MS with currently active UGS connections may set the PM bit [bit PM in the Grant Management subheader (6.3.2.2.2) or Mobility Grant Management Extended subheader (6.3.2.2.7.7)] in a MAC packet of the UGS connection to indicate to the BS that they need to be polled to request bandwidth for non-UGS connections. To reduce the bandwidth (BW) requirements of individual polling, SSs with active UGS connections need be individually polled only if the PM bit is set (or if the interval of the UGS is too long to satisfy the QoS of the SS's other connections). Once the BS detects this request for polling, the process for individual polling is used to satisfy the request. The procedure by which an SS stimulates the BS to poll it is shown in Figure 40. To minimize the risk of the BS missing the PM bit, the SS or MS may set the bit in all UGS MAC Grant Management subheaders or Mobility Grant Management Extended subheaders in the uplink scheduling interval.