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Re:	IEEE P802.16e/D5-2004	
Abstract	The document contains suggestions for enabling ARQ for UGS Service Flows in 802.16e.	
Purpose	To enable ARQ for UGS Service Flows in 802.16e	
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ARQ for UGS Service Flows in 802.16e

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1. The Document's Goal

The document's goal is to propose mechanisms enabling ARQ to be used in UGS service flows in 802.16e.

2. Incentive for Development of ARQ for UGS

UGS has been defined in order to support real-time service flows that generate fixed size data packets on a periodic basis, for example E1/T1 or Voice Over IP (VoIP) without silence suppression. As such, UGS service flows cannot request bandwidth. This presents a major problem if ARQ is enabled for such a service flow. First, an SS does not have the necessary bandwidth needed to send ARQ feedbacks to the BS. Second, an SS does not have the necessary bandwidth needed to send retransmissions. This problem is serious as the SS cannot even indicate this to the BS, nor can it ask for the needed bandwidth. Moreover, bandwidth request mechanisms incur a certain delay which might be unreasonable given the demands of UGS service flows. The Slip Indicator (SI) bit mechanism defined is unsuitable for these cases as it does not indicate how much bandwidth is desired.

To countermand these problems and in order to enable ARQ to be used with UGS service flows, the following is proposed. First, the BS will allocate some bandwidth for ARQ feedbacks whenever it sends data to the SS on UGS service flows. The exact size of the ARQ feedback can be calculated by the BS. The exact timing for this allocation depends on the SS ability to respond with an ARQ feedback. This ability shall be negotiated in the dynamic service establishment phase.

Second, the BS will allocate bandwidth for retransmissions of the SS on UGS connections. The data grant needed for retransmission is basically the same grant size that the BS normally allocates for this UGS service flow. An extra grant will be allocated to an SS whenever the BS does not receive data from this SS on a grant allocated for a UGS service flow. The BS will perceive this as a failed transmission and will allocate an extra grant to compensate. The exact timing for this extra grant depends on the service flow parameters.

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3. Specific changes in the Standard

[New section 6.3.4.7]

6.3.4.7 ARQ Support for VOIP Connections

For ARQ-enabled VOIP connections (e.g.UGS Extended rtPS) in the DL, the BS **shall** **may** allocate enough bandwidth to allow the SS to transmit ARQ feedback IEs. . These allocations are recommended to be distant from data transmission not more than specified by. **ARQ feedback response time.**

[Add the following text to section 11.7.8:]

11.7.8.x ARQ feedback response time

This parameter defines the minimum ARQ feedback response time capability of the MSS. If these TLV are absent then the default value (2 frames) should be used.

Type	Length	Value	Scope
	1	Number of frames between the frame where DL data is transmitted at a connection and the frame where MSS is ready to transmit its related UL ARQ feedback. Default value = 2.	REG-REQ REG-RSP