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Title	ARQ support for Primary Management connection	
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Re:	IEEE 802.16Rev2/D2, Letter Ballot 26a Technical Comments	
Abstract	Proposal to provide support for ARQ for the primary management connection	
Purpose	Adopt proposed text changes for IEEE 802.16Rev2/D2 revision	
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ARQ support for Primary Management connection

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Explanation

Primary management connections support fragmentation. The large primary management connection messages will especially tend to be fragmented. Only errored fragments need to be retransmitted. Retransmitting the whole message is a waste of resources.

ARQ support for primary connections is proposed.

Proposed Text Changes

- *Modify sections 6.3.2.3.23 and 6.3.2.3.24 as follows:*

6.3.2.3.23 SBC-REQ (SS basic capability request) message

[...]

The following parameters may be included:

Capabilities for construction and transmission of MAC PDUs (see 11.8.2)

Security Negotiation Parameters (see 11.8.4)

Service Information Query (see 11.8.9)

Visited NSP ID (see 11.8.11)

Auth Type for EAP (see 11.8.12)

MIH Capability Supported (see 11.8.10)

Extended capability (see 11.8.15)

[ARQ support \(11.8.3.5.1\)](#)

[ARQ parameters \(11.8.3.5.2\)](#)

[...]

6.3.2.3.24 SBC-RSP (SS basic capability response) message

[...]

The following parameters shall be included in the SBC-RSP if found in the SBC-REQ:

Physical Parameters Supported (see 11.8.3)

Bandwidth Allocation Support (see 11.8.1)

The BS response to the subset of SS capabilities present in the SBC-REQ message. The BS responds to the SS capabilities to indicate whether they may be used. If the BS does not recognize an SS capability, it may return this as “off” in the SBC-RSP. Only capabilities set to “on” in the SBC-REQ may be set “on” in the SBC-RSP, as this is the handshake indicating that they have been successfully negotiated.

Security Negotiation Parameters (see 11.8.4)

HMAC/CMAC Tuple

Either HMAC Tuple or CMAC Tuple shall be the final attribute in the message’s TLV attribute list. This attribute should be included in the message during HO reentry (see 11.1.2).

[ARQ support \(11.8.3.5.1\)](#)

[ARQ parameters \(11.8.3.5.2\)](#)

[...]

- *Modify section 11.8 as follows:*

11.8 SBC-REQ/RSP management message encodings

[...]

11.8.3.5.1 ARQ Support

This field indicates the availability of SS support for ARQ.

Type	Length	Value	Scope
<u>10</u>	<u>1</u>	<u>0: No ARQ support capability</u> <u>1: ARQ supported</u> <u>2–255: Reserved</u>	<u>SBC-REQ, SBC-RSP</u>

[...]

11.8.3.5.2 ARQ Parameters

This field provides the fragmentation and ARQ parameters for the Primary Management connection. For purposes of ARQ parameter negotiation, the appearance of the field in the SBC-REQ message is equivalent to its appearance in the DSA-REQ message. The appearance of the field in the SBC-RSP message is equivalent to its appearance in the DSA-RSP message.

This field is a compound TLV that may take on any of the ARQ parameters described in 11.13.18. The subtype values defined for use within the 145/146 service flow definitions are applicable for this TLV as well.

Type	Length	Value	Scope
<u>1</u>	<u>variable</u>	<u>Compound</u>	<u>SBC-REQ, SBC-RSP</u>

[...]

- *Add SBC-REQ and SBC-RSP messages to the scope of the ARQ TLVs in sections 11.13.18.1 through 11.13.18.9 as follows:*

11.13.18.1 ARQ Enable TLV

This TLV indicates whether ARQ use is requested for the connection that is being setup. A value of 0 indicates that ARQ is not requested and a value of 1 indicates that ARQ is requested. The DSA-REQ shall contain the request to use ARQ or not. The DSA-RSP message shall contain the acceptance or rejection of the request. ARQ shall be enabled for this connection only if both sides report this TLV to be nonzero. The SS shall either reject the connection or accept the connection with ARQ.

Type	Length	Value	Scope
[145/146].181.18	1	0 = ARQ Not Requested/Accepted 1 = ARQ Requested/Accepted	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.2 ARQ_WINDOW_SIZE TLV

This parameter is negotiated upon connection setup or during operation. The DSA-REQ/DSC-REQ message shall contain the suggested value for this parameter. The DSA-RSP/DSC-RSP message shall contain the confirmation value or an alternate value for this parameter. The smaller of the two shall be used as the ARQ_WINDOW_SIZE TLV.

Type	Length	Value	Scope
[145/146].19 1.19	2	> 0 and \leq (ARQ_BSN_MODULUS/2)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.3 ARQ_RETRY_TIMEOUT TLV

The ARQ_RETRY_TIMEOUT TLV should account for the transmitter and receiver processing delays and any other delays relevant to the system. TRANSMITTER_DELAY: This is the total transmitter delay, including sending (e.g., MAC PDUs) and receiving (e.g., ARQ feedback) delays and other implementation dependent processing delays. If the transmitter is the BS, it may include other delays such as scheduling and propagation delay. RECEIVER_DELAY: This is the total receiver delay, including receiving (e.g., MAC PDUs) and sending (e.g., ARQ feedback) delays and other implementation-dependent processing delays. If the receiver is the BS, it may include other delays such as scheduling and propagation delay. The DSA-REQ and DSA-RSP

messages shall contain the values for these parameters, where the receiver and transmitter each declare their capabilities. When the DSA handshake is completed, each party shall calculate ARQ_RETRY_TIMEOUT TLV to be the sum of TRANSMITTER_DELAY and RECEIVER_DELAY.

Type	Length	Value	Scope
[145/146].20 1.20	2	TRANSMITTER_DELAY 0-6553500 μ s (100 μ s granularity)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP
[145/146].21 1.21	2	RECEIVER_DELAY 0-6553500 μ s (100 μ s granularity)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.4 ARQ_BLOCK_LIFETIME TLV

The DSA-REQ message shall contain the value of this parameter as defined by the parent service flow. If this parameter is set to 0, then the ARQ_BLOCK_LIFETIME TLV value shall be considered infinite.

Type	Length	Value	Scope
[145/146].22 1.22	2	0 = Infinite 1-6553500 μ s (100 μ s granularity)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.5 ARQ_SYNC_LOSS_TIMEOUT TLV

The BS shall set this parameter. The DSA-REQ or DSA-RSP messages shall contain the value of this parameter as set by the BS. If this parameter is set to 0, then the ARQ_SYNC_LOSS_TIMEOUT TLV value shall be considered infinite.

Type	Length	Value	Scope
[145/146].23 1.23	2	0 = Infinite 1-6553500 μ s (100 μ s granularity)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.6 ARQ_DELIVER_IN_ORDER TLV

The DSA-REQ message shall contain the value of this parameter. This TLV indicates whether data is to be delivered by the receiving MAC to its client application in the order in which the data was handed off to the originating MAC.

Type	Length	Value	Scope
[145/146].24 1.24	1	0 – Order of delivery is not preserved 1 – Order of delivery is preserved	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

If this flag is not set, then the order of delivery is not preserved. If this flag is set (to 1), then the order of delivery is preserved.

[When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.](#)

11.13.18.7 ARQ_RX_PURGE_TIMEOUT TLV

The DSA-REQ message shall contain the value of this parameter as defined by the parent service flow. If this parameter is set to 0, then the ARQ_RX_PURGE_TIMEOUT TLV value shall be considered infinite.

Type	Length	Value	Scope
[145/146].25 1.25	2	0 = Infinite 0-6553500 μ s (100 μ s granularity)	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

[When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.](#)

11.13.18.8 ARQ_BLOCK_SIZE TLV

This value of this parameter specifies the size of an ARQ block. This parameter shall be established by negotiation during the connection creation dialog. The requester includes its desired minimum and maximum setting in the DSA-REQ/REG-REQ message. The receiver of the DSA-REQ/REG-REQ message shall select the value it prefers within the range of the two values, inclusive, in the DSA-REQ/REG-REQ message. This selected value is included in selected block size of the DSA-RSP/REG-RSP message. Absence of the parameter during a DSA dialog shall indicate the originator of the message desires the maximum value.

Type	Length	Value	Scope
[145/146].26 1.26	2	For DSA-REQ and REG-REQ: Bit 0-3: encoding for proposed minimum block size (M) Bit 4-7: encoding for proposed maximum block size (N) where: The minimum block size is equal to $2^{(M+4)}$ and the	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

		<p>maximum block size is equal to $2^{(N+4)}$, $M \leq 6$, $N \leq 6$, and $M \leq N$</p> <p>For DSA-RSP and REG-RSP: Bit 0-3: encoding for selected block size (P) Bit 4-7: set to 0 where: The selected block size is equal to $2^{(P+4)}$, $P \leq 6$ and $M \leq P \leq N$</p>	
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When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.

11.13.18.9 RECEIVER_ARQ_ACK_PROCESSING_TIME TLV

The BS or SS may provide this parameter. The DSA-REQ and DSA-RSP messages may contain the value of this parameter. This optional parameter indicates the number of ms required by the ARQ receiver to process the received ARQ blocks and provide a valid ACK or NAK. This does not mean that the receiver would actually transmit an ACK or NAK after this time, but rather it can be optionally used by the transmitter that receives an ACK bit-map to determine which bits are retransmissions of historical NAKs or ACKs, that are not based on newly received ARQ blocks.

Type	Length	Value	Scope
[145/146].27 1.27	1	0-255	DSA-REQ, DSA-RSP REG-REQ, REG-RSP SBC-REQ, SBC-RSP

When included in a SBC-REQ/RSP message, the TLV applies to the Primary Management connection.