Z-Wave Alliance ITU Specification Errata List

Release 0.9.0

Z-Wave Alliance

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1 Preamble

1.1 Description

This document contains a list of proposed changes to the ITU G.9959 OHY and MAC layer specification.

Reviewed and approved by the Z-Wave Alliance Core Stack Working Group (CSWG).

1.2 Disclaimer

THIS SPECIFICATION IS BEING OFFERED WITHOUT ANY WARRANTY WHATSOEVER, AND IN PARTICULAR, ANY WARRANTY OF NON-INFRINGEMENT IS EXPRESSLY DISCLAIMED. ANY USE OF THIS SPECIFICATION SHALL BE MADE ENTIRELY AT THE IMPLEMENTER'S OWN RISK, AND NEITHER THE ALLIANCE, NOR ANY OF ITS MEMBERS OR SUBMITTERS, SHALL HAVE ANY LIABILITY WHATSOEVER TO ANY IMPLEMENTER OR THIRD PARTY FOR ANY DAMAGES OF ANY NATURE WHATSOEVER, DIRECTLY OR INDIRECTLY, ARISING FROM THE USE OF THIS SPECIFICATION.

1.3 Revision Record

Table 1.1: Revision History

Doc. Rev	Date	By	Pages Affected	Brief Description of Changes
0.5.0	2022/06/23	CSWG	ALL	Initial Version
0.5.1	2024/10/22	CSWG	ALL	Conversion from Microsoft Word to RST.
0.7.0	2025/03/21	CSWG	n/a	Ready for the TC review.
0.9.0	2025/05/30	TC	n/a	Approved for IPR review.

1.4 Abbreviations

Table 1.2: Abbreviations

Abbreviation	Explanation
ITU	The International Telecommunication Union
MAC	Media Access Control layer
PHY	Physical layer

2 INTRODUCTION

2.1 Purpose

This document holds a list of changes and bug fixes that the Z-Wave alliance would like to get updated in the ITU G.9959 specification [1], when a cooperation between ITU and the Z-Wave alliance has been established.

2.2 Audience and Prerequisites

Z-Wave MAC and PHY layer developers and certification testers.

3 ERRATA LIST

This section contains a number of proposed changes to the ITU G.9959 specification.

The changes and bug fixes in this specification will be used by Z-Wave protocol implementations and all implementations of Z-Wave PHY/MAC **shall** follow the descriptions in section 3, instead of the ITU G.9995 sections mentioned in each issue.

3.1 Preamble length

3.1.1 Reason for change

ITU G.9959 specifies that the minimum number of preamble bytes is different for singlecast/broadcast frames and multicast frames. That is a strange requirement as a radio will always be designed to be able to detect the minimum number of preambles, so setting a higher minimum for multicast seems like a waste of bandwidth and added complexity for no apparent reason.

3.1.2 Existing text

Table 3.1: Table 7-10 - Minimum Preamble Length

Channel Configurations	Rate	Minimum Preamble length in bytes		
		Singlecast/ broadcast	Multicast	Beam
1	R1	10	10	n/a
	R2	10	20	20
	R3	n/a	n/a	n/a
2	R1	10	10	n/a
	R2	10	20	20
	R3	40	40	n/a
3	R1	n/a	n/a	n/a
	R2	n/a	n/a	n/a
	R3	24	24	8

Table 3.2: Table A-10 - Minimum Preamble Length

Channel Configurations	Rate	Minimum Preamble length in bytes		
		Singlecast/ broadcast	Multicast	Beam
1	R1	10	10	n/a
	R2	10	20	20
	R3	n/a	n/a	n/a
2	R1	10	10	n/a
	R2	10	20	20
	R3	40	40	n/a
3	R1	n/a	n/a	n/a
	R2	n/a	n/a	n/a
	R3	24	24	8

3.1.3 Proposed text

Table 3.3: Table 7-10 - Minimum Preamble Length

Channel Configurations	Rate	Minimum Preamble length in bytes		
		Singlecast/ broadcast	Multicast	Beam
1	R1	10	10	n/a
	R2	10	*10*	20
	R3	n/a	n/a	n/a
2	R1	10	10	n/a
	R2	10	*10*	20
	R3	40	40	n/a
3	R1	n/a	n/a	n/a
	R2	n/a	n/a	n/a
	R3	24	24	8

Table 3.4: Table A-10 - Minimum Preamble Length

Channel Configurations	Rate	Minimum Preamble length in bytes		
		Singlecast/ broadcast	Multicast	Beam
1	R1	10	10	n/a
	R2	10	*10*	20
	R3	n/a	n/a	n/a
2	R1	10	10	n/a
	R2	10	*10*	20
	R3	40	40	n/a
3	R1	n/a	n/a	n/a
	R2	n/a	n/a	n/a
	R3	24	24	8

3.2 Beam addressing

3.2.1 Reason for change

Z-Wave has introduced a multicast beaming feature. For optimizing that feature for fragmented beaming, it should be allowed to send and acknowledge to a broadcast beam so the sender of the fragmented beam can stop transmission when an ack is received from all expected destinations.

3.2.2 Existing text

ITU G.9959 Section 8.1.3.11

"… A receiving node may interrupt the transmission of a fragmented beam by acknowledging a singlecast beam fragment. A receiving node **shall not** acknowledge a broadcast beam fragment…"

3.2.3 Proposed text

ITU G.9959 Section 8.1.3.11

"… A receiving node may interrupt the transmission of a fragmented beam by acknowledging a single-cast beam fragment. A receiving node *should acknowledge a broadcast beam fragment so the sender can determine when to stop the transmission*…"

3.3 Retransmission description

3.3.1 Reason for change

The retransmission description in section 8.1.5.1.4.3 and A.4.4.1.4.3 describes that when a node has been waiting for an ACK for *aMacMinAckWaitDuration* it should deem the transmission failed and start a retransmission after a random backoff. This wording prevents an implementation from deeming a transmission successful if the ACK is received during the random backoff period.

3.3.2 Existing text

"…If an ACK MPDU is not received within *aMacMinAckWaitDuration* symbols, the transmission attempt has failed. The originator **shall** repeat the process of transmitting the MPDU and waiting for the ACK MPDU up to *aMacMaxFrameRetries* times. Before retransmitting, the node **shall** wait for a random backoff period (see clause 8.1.5.1.4.4)."

3.3.3 Proposed text

""…If an ACK MPDU is not received within *aMacMinAckWaitDuration* symbols, the originator of **shall** start the random backoff period (see clause 8.1.5.1.4.4) and repeat the process of transmitting the MPDU and wait for the ACK MPDU up to *aMacMaxFrameRetries* times."

3.4 Transport Service Command Class

3.4.1 Reason for change

The SAR layer and the transport service command class seems like it doesn't belong to the PHY/MAC specification, and it seems like a more natural approach is to remove the transport service command class from the ITU specification and host in the Z-Wave alliance command class specifications, where all other command classes are defined.

3.4.2 Existing text

Section 10.

3.4.3 Proposed text

Move section 10 to the Z-Wave alliance command class specification or network layer specification.

3.5 End of Frame field

3.5.1 Reason for change

The End of Frame delimiter in section 7.1.3.5 for data rate R1 is no longer used in Z-Wave implementations. It is not being transmitted and the receiver does not expect to receive it either.

3.5.2 Existing text

"…The EOF delimiter field shall be sent only when transmitting at data rate R1. The field shall carry a sequence of 8 Manchester code violations each denoted E. Each violation, E, shall be a symbol without transition. Refer to Figure 7-7."

3.5.3 Proposed text

"…The EOF delimiter fields shall not be sent as it is considered obsolete, however receivers shall handle receiving an End of Frame delimiter on data rate R1 consisting of a sequence of 8 Manchester violations each denoted E."

4 Z-WAVE LONG RANGE PHY/MAC

The Z-Wave Long Range PHY and MAC layer specification is currently hosted by the Z-Wave alliance NOT the ITU. Long term the Z-Wave alliance will work on getting both PHY/MAC specifications under one standardization organization.

References

[1] ITU-T, G.9959. (01/2015).

[2] Z-Wave Alliance. ZWA_Z-Wave Long Range PHY and MAC Layer Specification.

