IEEE P802.11
Wireless LANs

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| CR PHY for ELR Introduction and Requirement |
| Date: 2025-04-10 |
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Abstract

This submission proposes a resolution for the following CID for TGbn CC50:

356, 357, 2180, 3300, 3562, 3566, 3671

Revisions:

* Rev 0: Initial version of the document
* Rev 1: Updated resolution based on offline feedback

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbn Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbn Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbn Editor: Editing instructions preceded by “TGbn Editor” are instructions to the TGbn editor to modify existing material in the TGbn draft. As a result of adopting the changes, the TGbn editor will execute the instructions rather than copy them to the TGbn Draft.***

***TGbn editor: The baseline for this document is 11bn D0.2.***

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| CID | Clause | Pg/Ln | Comment | Proposed Change | Resolution |
| 2180 | 38.3.8 | 116.14 | Is the description for why ELR is used (or for what purpose) needed in the spec? | remove this sentence | Rejected.In many PHY section, we have similar description. For example, please refer 36.3.17.1. |
| 3300 | 38.3.8 | 116.16 | Change "or" to "and" | as in comment | AcceptedNote to the editor: apply changes in 11-25/643r2 marked with (#3300). |

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| CID | Clause | Pg/Ln | Comment | Proposed Change | Resolution |
| 356 | 38.3.20.1 | 207.19 | Change "There is no requirement for an AP STA" to "There is no precorrection requirement for an AP STA" | See comment | RevisedNote to the editor: apply changes in 11-25/643r2 marked with (#356). |
| 357 | 38.3.20.2 | 207.28 | Precorrection requirements for ELR PPDUs are only specified for PPDUs sent as immediate responses to an AP PPDU. What requirements apply to other ELR PPDUs? Without the proper precompensation, the extended range property may be lost. | Conside requirements for ELR PPDUs not sent as immediate responses to an AP PPDUWill bring submission with further details. | Revised.Adopt changes in 11-25/643r2 marked with (#357).It is difficult to specify for non-immediate response cases. We may add following sentence. "NOTE - For the UL UHR ELR PPDU not carrying immediate response frame, i.e. TXOP-initiating ELR transmission, the non-AP STA also tries to reduce residual CFO error to meet the same target. In cases that the target is not met, it might impact performance. " |
| 3562 | 38.3.20.2 | 207.34 | Incorrect spec | It says"The residual CFO error measurement on a UHR ELR PPDU shall be made after the U-SIG field." | Revised.Adopt changes in 11-25/643r2 marked with (#3562).Measurement at U-SIG was from EHT TB PPDU requirement and it does not mean precorrection is not done for L-STF/L-LTF. We can update it to L-STF following non-HT PPDU. Update as follows: "The residual CFO error measurement on a UHR ELR PPDU shall be made after the ~~U-SIG~~ L-STF field." |
| 3566 | 38.3.20.2 | 207.24 | STAs transmitting an ELR PPDU may wait a long time before being able to transmit an ELR PPDU. E.g. when there are no downlink frames to the STA, the STA may only be able to transmit after every beacon interval. This may result in a very high latency. | Propose to allow a STA to be able to precorrect the CFO on unicast frames not addressed to the STA. Also, it would help if the AP periodically transmits control/management frames that can be used by ELR STAs to precorrect its CFO. | Rejected.Beacon will be transmitted every 100ms or similar period which should be more than enough. No need to add additional periodic signal. Also, there is CoBF related PPDU which may have different center frequency. So, using other frame seems not a good idea.  |
| 3671 | 38.3.20.2 | 207.29 | The CFO compensation requirement only applies in UL. | At L29, change "For the ELR PPDU" to "For the UL UHR ELR PPDU".At L35, change "measurement on a UHR ELR PPDU" to "measurement on an UL UHR ELR PPDU". | RevisedNote to the editor: apply changes in 11-25/643r2 marked with (#3671). |

**Discussion:**

***Proposed change #1***

***TGbn Editor: Update section 38.3.8 as follows:***

* Enhanced long range PPDU

A UHR Enhanced Long Range (ELR) PPDU can be used to overcome the link budget imbalance between downlink and uplink and (#3300) can be used to achieve higher data rate when compared to a DSSS PPDU defined in Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications).

A UHR ELR PPDU is applicable for 2.4 GHz, 5 GHz, and 6 GHz bands in uplink, and only for 2.4 GHz in downlink. A UHR ELR PPDU is defined only for 20 MHz PPDU bandwidth, a single spatial stream and UHR-MCSs 0 and 1 with four times frequency domain duplication over 52-tone regular RUs (RRU52s or 52-tone RRUs) in primary 20 MHz channel. UHR ELR PPDU supports using BCC and LDPC coding with codeword block length up to 1944 bits. A UHR ELR PPDU sets the PPDU Type And Compression Mode subfield in the U-SIG field (Table38-21 (U-SIG field of a UHR ELR PPDU)) to 3, and includes the ELR-MARK field right after the U-SIG field.

---- End of proposed change #1 ----

***Proposed change #2***

***TGbn Editor: Update section 38.3.20 as follows:***

* Transmit requirements for a UHR ELR PPDU
* Introduction

A non-AP STA and an AP STA may transmit a UHR ELR PPDU. A non-AP STA that supports UHR ELR PPDU transmission shall meet the pre-correction accuracy requirement described in 38.3.20.2 (Pre-correction accuracy requirements). There is no pre-correction (#356) requirement for an AP STA.

* Pre-correction accuracy requirements

A non-AP STA compensates for carrier frequency offset (CFO) error and symbol clock error with respect to PPDU(s) carrying frame(s) by a target AP STA that is addressed to the STA or broadcast frame when transmitting a UHR ELR PPDU.

For the UL UHR (#3671) ELR PPDU carrying immediate response frame in response to a preceding soliciting frame, after compensation, the absolute value of residual CFO error with respect to the preceding PPDU carrying soliciting frame shall not exceed 15 kHz at the 10% point of the complementary cumulative distribution function (CCDF) of CFO error in AWGN at a received power of -82 dBm in the primary 20 MHz channel.

NOTE - For the UL UHR ELR PPDU not carrying immediate response frame, i.e. TXOP-initiating ELR transmission, the non-AP STA also tries to reduce residual CFO error to meet the same target. In cases that the target is not met, it might impact performance. (#357)

The residual CFO error measurement on a UL (#3671) UHR ELR PPDU shall be made after the L-STF (#3562) field. The symbol clock error shall be compensated by the same ppm amount as the CFO error.

---- End of proposed change #2 ----

**Reference:**

**[1]**