IEEE P802.11
Wireless LANs

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| D2.0 Comment Resolutions for 32.3.11 (Receiver Specification) |
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Abstract

This submission proposes resolution to the comments received on subsection 32.3.11 (Receiver specification) in TGbd D2.0. The following is the list of 15 CIDs:

* 2199, 2272, 2273, 2274, 2110, 2275, 2276, 2201, 2278, 2011, 2202, 2279, 2280, 2112, 2113

Revisions:

* r0: initial version
* r1: editorial changes

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| 2199 | 32.3.11 | 106.01 | The sentence seems to be grammatically incorrect. "For requirements on ... apply to PPDUs that meet all the following conditions:" replace with "The requirements on ... apply to PPDUs that meet all of the following conditions:" | as in comment | Accepted. |
| 2272 | 32.3.11.1 | 106.15 | "The PSDU length shall be 2048 octets for BPSK with DCM or 4096 octets for all other modulations." The problem with this is that no PPDU is permitted (section 10.13) to last longer than aPPDUMaxTime (5.484 ms; Table 32-19), and that duration would be exceeded for the lowest two modulation schemes in 10 MHz and the lowest modulation scheme in 20 MHz. Thus, for these three cases, the normative requirement is specified in terms of an invalid PDDU, which seems very unsatisfactory. | Modify the specified PPDU langths so that all are valid lengths for a PPDU of the modulation decsribed. For example (and preferably), change "The PSDU length shall be 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to ""The PSDU length shall be 1024 octets for all other modulations." | Rejected.The comment is based on the wrong aPPDUMaxTime in D2.0. As in 11-21/1526r0, the aPPDUMaxTime is corrected to 10.968ms based on LENGTH setting in L-SIG. There is no constraint to support PSDU length of 4096 octets expect for MCS15. In previous 802.11 amendments, like 11n/ac/ax, the sensivity requirement is defined based on PSDU size of 4096 octets. As 11bd defines similar advanced technologies, like LDPC, A-MPDU, etc. There is no need to relax the sensitivity definition.  |
| 2273 | 32.3.11.1 | 106.15 | "The PSDU length shall be 2048 octets for BPSK modulation with DCM or 4096 octets for all other modulations." Why is it necessary to single out DCM in this way? It would simplify the draft to specify a single value for all modulations. | Change "The PSDU length shall be 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "The PSDU length shall be 1024 octets for all other modulations". | Duplicate comment of 2272. |
| 2274 | 32.3.11.1 | 106.27 | The receiver minimum input sensitivity for 20 MHz PPDUs using BPSK modulation with DCM is the same as for 20 MHz PPDUs using BPSK modulation (-82 dBm). This is jarring, because BPSK with DCM has half the data rate of BPSK. If the mode has no lower receiver minimum input senstitivity than BPSK, what is the point of the mode? If that's the case, the mode should be removed from the draft. It seems clear, however, that that is not the case, and that BPSK with DCM in 20 MHz can support a receiver minimum input sensitivity below that of BPSK. Accordingly, a lower value should be specified: something in the range -83 dBm to -85 dBm. The proposed resiolution chooses the middle of these, but any would be acceptable. | For BPSK with DCM in 20 MHz, change "-82 dBm" to "-84 dBm". | Rejected.Agree with the commenter that MCS15 (BPSK-DCM) was defined for better sensivity and thereforth longer range. For 10MHz NGV PPDU modulated with MCS15, to support better sensivity, preamble power boost and NGV-LTF-2x-repeat format are designed to guarantee better sensitivity (3dB). However, for 20MHz NGV PPDU, there is no corresponding design standardized. But rather a receiver that wants to get better range for 20MHz NGV PPDU needs to add more preabmle processing design, like preamble combining, to achieve the sensitivity gain. As range extension is mostly for the smallest BW, 20MHz range extension does not need to be a baseline requirement to be specified in the Receive Sensitivity table. This can leave some design flexibility to the product.  |
| 2110 | 32.3.11.1 | 106.17 | The receiver input sensitivity in Table 32-15 is based on the VHT (Clause 21) and further rooted back to the OFDM (Clause 17), that was developed for the stationary environment. The assumptions of the receiver minimum sensitivity were stated in subclause 17.3.10.2. 11bd is developed for the vehicular environment. There is a need to note the difference prior to the table is given to avoid confusion or misinterpretation. | Suggest adding "The receiver minimum sensitivity provided herein is evolved from that in Table 21-25 (VHT) to maintain consistent baseline." at the end of the paragraph. | Revised.Though reference to legacy 802.11 specfication for receiver sensitivity is a common rationale, it does not hurt to add such a sentence. As other receiver specification also follow the same rationale, a sentence is added to to the start of the subclause.TGbd editor: please make changes as in [https://mentor.ieee.org/802.11/dcn/21/11-21-1530-01-00bd-d2-0-cr-for-receiver-specification.docx](https://mentor.ieee.org/802.11/dcn/21/11-21-1530-00-00bd-d2-0-cr-for-receiver-specification.docx) |
| 2275 | 32.3.11.2 | 106.55 | "is caused for a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations." The problem with this is that no PPDU is permitted (section 10.13) to last longer than aPPDUMaxTime (5.484 ms; Table 32-19), and that duration would be exceeded for the lowest two modulation schemes in 10 MHz and the lowest modulation scheme in 20 MHz. Thus, for these three cases, the normative requirement is specified in terms of an invalid PDDU, which seems very unsatisfactory. | Modify the specified PPDU langths so that all are valid lengths for a PPDU of the modulation decsribed. For example (and preferably), change "is caused for a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "is caused for a PSDU length of 1024 octets". | Rejected.This is a similar comment as CID2272. Please refer the resolution to CID2272. |
| 2276 | 32.3.11.2 | 106.55 | "is caused for a PSDU length of 2048 octets for BPSK modulation with DCM or 4096 octets for all other modulations." Why is it necessary to single out DCM in this way? It would simplify the draft to specify a single value for all modulations. | Change "is caused for a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "is caused for a PSDU length of 1024 octets". | Duplicate comment of 2275. |
| 2201 | 32.3.11.2 | 107.38 | In the last row 3rd column it states "-9 (only applies to 20 MHz)". This is also the case for the last row 4th column. Hence remove the statement in "()" and add a Note to the end of Table 32-16:Note - The row for Modulation 256-QAM and Rate 5/6 only appies to 20 MHz.Please apply the same changes to Table 32--17 P108L35. | As in the comment. | RevisedAgree with the commenter for the suggestion. TGbd editor: please make changes as in [https://mentor.ieee.org/802.11/dcn/21/11-21-1530-01-00bd-d2-0-cr-for-receiver-specification.docx](https://mentor.ieee.org/802.11/dcn/21/11-21-1530-00-00bd-d2-0-cr-for-receiver-specification.docx) |
| 2278 | 32.3.11.3 | 107.48 | "occurs for a PSDU length of 2048 octets for BPSK modulation with DCM or 4096 octets for all other modulations." Why is it necessary to single out DCM in this way? It would simplify the draft to specify a single value for all modulations. | Change "occurs for a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "occurs for a PSDU length of 1024 octets". | Rejected.This is a similar comment as CID2272. Please refer the resolution to CID2272. |
| 2011 | 32.3.11.3 | 108.09 | The rejection values are not correct from "QPSK-1/2 to 256QAM-5/6". For example, ACI rejection level of 27dB for QPSK-1/2 should be 25dB acoording to the definition 11p. Need to update the table accordingly. | As in the comment. | Revised.Agree with the commenter that the rejection values are not correct for the QAM levels other than BPSK. The values were copied from Clause 17 without skippin the non-NGV rate of BPSK-3/4 rate. Make the corresponding change according with 12dB shift from the value in Table 32-16. TGbd editor: please make changes as in [https://mentor.ieee.org/802.11/dcn/21/11-21-1530-01-00bd-d2-0-cr-for-receiver-specification.docx](https://mentor.ieee.org/802.11/dcn/21/11-21-1530-00-00bd-d2-0-cr-for-receiver-specification.docx) |
| 2202 | 32.3.11.3 | 108.20 | Comparing Tables 32-16 and 32-17 with Tables 17-18 and 17-19 in 802.11-2020, the improvement for BPSK of the optional enhanced requirements is 12 dB and 10 dB for adjacent and nonadjacent channel rejection. In Tables 17-18 and 17-19, this is also the case for all other MCS. However, in Tables 32-16 and 32-17 the improvements for QPSK are 14 dB and 12 dB, for 16-QAM 15 to 16dB and 13 to 14 dB, for 64- and 256-QAM 13 dB and 11 dB for adjacent and nonadjacent channel rejection. It is unclear where these tighter requirements come from. May be the additional tighter requirements are caused by the fact that in Tables 17-18 and 17-19 there is also BPSK R=3/4 defined but not in Tables 32-16 and 31-17. Hence, change the values as follows:Modulation Rate Adjacent NonadjacentQPSK 1/2 25 39QPSK 3/4 23 3716-QAM 1/2 20 3416-QAM 3/4 20 3464-QAM 2/3 12 2664-QAM 3/4 11 2564-QAM 5/6 10 24256-QAM 3/4 5 19256-QAM 5/6 3 17 | As in the comment. | Revised.Similar comment as CID 2011. The same resolution to CID 2011 applies here. No further changes are needed.  |
| 2279 | 32.3.11.4 | 108.41 | "at a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations." The problem with this is that no PPDU is permitted (section 10.13) to last longer than aPPDUMaxTime (5.484 ms; Table 32-19), and that duration would be exceeded for the lowest two modulation schemes in 10 MHz and the lowest modulation scheme in 20 MHz. Thus, for these three cases, the normative requirement is specified in terms of an invalid PDDU, which seems very unsatisfactory. | Modify the specified PPDU langths so that all are valid lengths for a PPDU of the modulation decsribed. For example (and preferably), change "at a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "at a PSDU length of 1024 octets". | Rejected.This is a similar comment as CID2272. Please refer the resolution to CID2272. |
| 2280 | 32.3.11.4 | 108.41 | "at a PSDU length of 2048 octets for BPSK modulation with DCM or 4096 octets for all other modulations." Why is it necessary to single out DCM in this way? It would simplify the draft to specify a single value for all modulations. | Change "at a PSDU length of 2048 octets for BPSK with DCM or 4096 octets for all other modulations" to "at a PSDU length of 1024 octets". | Duplicate comment of 2279 |
| 2112 | 32.3.11.5.2 | 108.62 | The start of a PPDU should be specified not defined. | change "defined" to "specified." | Rejected.Agree that there is some ambiguity in wording in the first read. The meaning of “The start of .. defined …” is “The start of … is detected based on the requirement defined …”. The same language has been used in all previous generations. To avoid creating confusion among amendents, suggest to make the comment to 11me to make appropriate and consistent changes. |
| 2113 | 32.3.11.5.2 | 109.07 | The then statement is confusing. Is it meant to say the PHY-CCA.indication(BUSY,{primary}) should not be repeated as long as the signal is exceeding the threshold? | Please clarify PHY-CCA.indication(BUSY,{primary}). There should be a hyphen for PHYCCA.iindication(IDLE). | Revised.Agree that “primary” should be “secondary”, and a hyphen is needed.TGbd editor: please make changes as in [https://mentor.ieee.org/802.11/dcn/21/11-21-1530-01-00bd-d2-0-cr-for-receiver-specification.docx](https://mentor.ieee.org/802.11/dcn/21/11-21-1530-00-00bd-d2-0-cr-for-receiver-specification.docx) |

*TGbd Editor: Please make the following changes in Section 32.3.11 of D2.0.*

32.3.11 Receiver specification

The requirements on receiver minimum input sensitivity in 32.3.11.1 (Receiver minimum input sensitivity),

adjacent channel rejection in 32.3.11.2 (Adjacent channel rejection) and nonadjacent channel rejection in

32.3.11.3 (Nonadjacent channel rejection) apply to PPDUs that meet all the following conditions:

— 1.6 μs GI is used.

— NGV-LTF-2x is used.

— LDPC is used.

— The PPDU is an NGV PPDU.

The requirements on receiver minimum input sensitivity in 32.3.11.1 (Receiver minimum input sensitivity),

adjacent channel rejection in 32.3.11.2 (Adjacent channel rejection) and nonadjacent channel rejection in

32.3.11.3 (Nonadjacent channel rejection) are derived from the corresponding requirements for VHT PPDUs specified in 21.3.18 (VHT receiver specification). (#2110)

*TGbd Editor: Please make the following changes in Table 32-16 in Section 32.3.11 of D2.0.*

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| Table 32-16 Minimum required adjacent and nonadjacent channel rejection level  |
| Modulation | Rate (R) | Adjacent channel rejection (dB)10 MHz/20 MHz Channel | Nonadjacent channel rejection (dB)10 MHz/20 MHz Channel |
| BPSK with DCM | 1/2 | 19 (10MHz), 16 (20MHz) | 35 (10MHz), 32 (20MHz) |
| BPSK | 1/2 | 16 | 32 |
| QPSK | 1/2 | 13 | 29 |
| QPSK | 3/4 | 11 | 27 |
| 16-QAM | 1/2  | 8 | 24 |
| 16-QAM | 3/4  | 4 | 20 |
| 64-QAM | 2/3 | 0 | 16 |
| 64-QAM | 3/4 | -1 | 15 |
| 64-QAM | 5/6 | -2 | 14 |
| 256-QAM | 3/4 | -7 | 9 |
| 256-QAM | 5/6 | -9 | 7 |
| NOTE-the values defined for 256-QAM with 5/6 coding rate only apply to 20MHz Channel. |

(#2201)

*TGbd Editor: Please make the following changes in Table 32-17 in Section 32.3.11 of D2.0.*

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| Table 32-17 Optional enhanced minimum required adjacent and nonadjacent channel rejection level  |
| Modulation | Rate (R) | Adjacent channel rejection (dB)10 MHz/20 MHz Channel | Nonadjacent channel rejection (dB)10 MHz/20 MHz Channel |
| BPSK with DCM | 1/2 | 31 (10MHz), 28 (20MHz) | 45 (10MHz), 42 (20MHz) |
| BPSK | 1/2 | 28 | 42 |
| QPSK | 1/2 | 25 | 39 |
| QPSK | 3/4 | 23 | 37 |
| 16-QAM | 1/2  | 20 | 34 |
| 16-QAM | 3/4  | 16 | 30 |
| 64-QAM | 2/3 | 12 | 26 |
| 64-QAM | 3/4 | 11 | 25 |
| 64-QAM | 5/6 | 10 | 24 |
| 256-QAM | 3/4 | 5 | 19 |
| 256-QAM | 5/6 | 3  | 17 |
| NOTE-the values defined for 256-QAM with 5/6 coding rate only apply to 20MHz Channel. |

(#2011, #2201)

*TGbd Editor: Please make the following changes P109L7 in Section 32.3.11.5.2 of D2.0.*

The receiver shall issue a PHY-CCA.indication(BUSY, {primary}) primitive for any signal that exceeds a threshold of -65 dBm in the primary 10 MHz channel within a period of aCCATime after the signal arrives at the receiver’s antenna(s); then the receiver shall not issue a PHY-CCA.indication(BUSY, {secondary}), or PHY-CCA.indication(IDLE) primitive while the threshold continues to be exceeded. (#2113)