IEEE P802.11  
Wireless LANs

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| 11ax Comment Resolutions for PHY Data field | | | | |
| Date: 2017-12-05 | | | | |
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Abstract: This document contains proposed resolutions for comments from 11ax D2.1 with the CIDs below.

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| ***Clause 28.3.11.1***   * 11659,13485   ***Clause 28.3.11.2***   * 11660,11661,11662,11663,13374,13396   ***Clause 28.3.11.5***   * 12652,12871,13375,13376,13391,13392,13393,13394,13395,13397,13487, 14181,14182,14184   ***Clause 28.3.11.6***   * 13488   ***Clause 28.3.11.8***   * 14185   ***Clause 28.3.11.9***   * 13490   ***Clause 28.3.11.13***   * 11664,13491   ***Clause 28.3.11.14***   * 11665,11666,11667,11668,11669,13493   ***Clause 28.3.13***   * 13378 | |  |
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| 11659 | Dorothy Stanley | 28.3.11.1 | 452.40 | "Data symbols in an HE PPDU shall support guard interval durations...". I think it should be something like "HE STAs shall support Data symbols in an HE PPDU with guard interval durations..." | as in comment | **Revised.**  Change to as in the resolution of CID11659 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11.1*

* On P454L40 (CID #11659):

HE STAs shall support Data symbols in an HE PPDU with guard interval durations of 0.8 μs, 1.6 μs and 3.2 μs.

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| 13485 | Sigurd Schelstraete | 28.3.11.1 | 452.46 | "the Data field shall consist of the SERVICE field, the PSDU, the pre-FEC PHY padding bits, the tail bits, the post-FEC padding bits and the packet extension." The packet extension is a separate field (see 28.3.12), it is not part of the Data field. | Correct. See also line 49 | **Revised.**  Change to as in the resolution of CID13485 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11.1*

* On P454L46 (CID #13485):

When BCC encoding is used, the Data field shall consist of the SERVICE field, the PSDU, the pre-FEC PHY padding bits, the tail bits, and the post-FEC padding bits. When LDPC encoding is used, the Data field shall consist of the SERVICE field, the PSDU, the pre-FEC PHY padding bits, and the post-FEC padding bits. No tail bits are present when LDPC encoding is used.

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| 11660 | Dorothy Stanley | 28.3.11.2 | 452.56 | "A two-step padding process is applied an HE PPDU." | fix grammar | **Revised.**  Change to as in the resolution of CID11660 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.2

* On P454L56 (CID #11660):

A two-step padding process is applied to an HE PPDU.

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| 11661 | Dorothy Stanley | 28.3.11.2 | 453.41 | Lets define or provide references to definitions of all the variables. | as in comment | **Revised.**  Change to as in the resolution of CID11661 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*2*

* On P455L48 (CID #11661): Please add the following definitions of the vairables in Equation (28-55).

is the number of tail bits per encoder as defined in Table 28-12.

is the number of bits in the SERVICE field as defined in Table 28-12.

is the number of data bits per symbol.

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| 13396 | Ron porat | 28.3.11.2 | 454.47 | Definitions are being used across sections. | Define Ntail = 0 for LDPC and 6 for BCC 28.3.11.1 and move the definition for Nsym,init (ac common definition for both LDPC and BCC) after 28-57 . | **Revised.**  Change to as in the resolution of CID13396 in doc IEEE802.11-18/0111r1. |
| 13375 | ron porat | 28.3.11.5.1 | 456.19 | "define" should be "defined" | Revise as suggested | **Revised.**  Change to as in the resolution of CID13375 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.2

* On P456L47 (CID #13396):

where  is defined as the initial number of OFDM symbols in the Data field with BCC or LDPC encoding in an HE SU PPDU or HE ER SU PPDU  (28-xx)

* On P458L1 (CID #13396): Remove Equition (28-60)
* On P458L19 (CID #13396,CID #13375):

where  is defined in Equation (28-xx), and  is defined in Equation (28-56).

* On P458L46 (CID #13396): Remove Equation (28-65)

where  is defined in Equation (28-xx).

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| 11662 | Dorothy Stanley | 28.3.11.2 | 455.1 | If N\_PAD,Pre-FEC,MAC is PSDU\_LENGTH - APEP\_LENGTH, then why do we need the equation in 28-59? Its confusing to have two equations for the same variable. | as in comment | **Revised.**  Change to as in the resolution of CID11662 in doc IEEE802.11-18/0111r1. |
| 11663 | Dorothy Stanley | 28.3.11.2 | 455.1 | N\_PAD,Pre-FEC,MAC is in bits and PSDU\_LENGTH and APEP\_LENGTH are in bytes. Need to correct this | as in comment | **Revised.**  Change to as in the resolution of CID11663 in doc IEEE802.11-18/0111r1. |
| 13374 | ron porat | 28.3.11.2 | 455.1 | NPAD,Pre-FEC,MAC is 8\*(PSDU\_LENGTH-APEP\_LENGTH) | Revise as suggested | **Revised.**  Change to as in the resolution of CID13374 in doc IEEE802.11-18/0111r1. |

**Discussions:**

 can be derived by Equation (28-59). The commentors are right that the statement that “ is wrong. To eliminate any confusion, the statement “Note …PPDU)” should be deleted.

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*2*

* On P457L1 (CID #11662,CID #11663, CID #13374): Please remove the following sentences.

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| 13397 | ron porat | 28.3.11.5 | 455.48 | Mention here also that RU 26/52/106 dont support 1024 QAM | as in comment | **Rejected.**  “HE-MCS 10 and 11 (1024-QAM) are applicable only to RU sizes equal to or larger than 242 tones.” is mentioned in section 28.5 Parameters for HE-MCSs. This section is for HE Data field coding which describes mandatory and optional support of BCC and LDPC coding, not for HE-MCS. |

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| 13391 | ron porat | 28.3.11.5.1 | 455.65 | Wrong section reference - 21.3.10.5.3 (Binary convolutional coding and puncturing)was used. Use one term consistently. | 21.3.10.5.3 to be replaced by 20.3.11.5 | **Revised.**  Change to as in the resolution of CID13391 in doc IEEE802.11-18/0111r1. |
| 14182 | yujin noh | 28.3.11.5.1 | 455.65 | worng reference. It should be "In the case that rate 5/6 coding is selected, the puncturing scheme will be the same as described in 19.3.11.6 (Binary convolutional coding and puncturin.)" | as in comment | **Revised.**  Change to as in the resolution of CID14182 in doc IEEE802.11-18/0111r1 |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.1*

* On P457L65 (CID #13391,CID #14182):

In the case that rate 5/6 coding is selected, the puncturing scheme will be the same as described in 19.3.11.6(Binary convolutional coding and puncturing).

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| 14181 | yujin noh | 28.3.11.5.1 | 455.63 | wrong reference. It shouyld be "After encoding, the encoded data is punctured by the method defined in 17.3.5.7 (Data interleaving)" | as in comment | **Rejected.**  The reference is correct. Statements “Higher rates are derived from it by employing  “puncturing.” Puncturing is a procedure for omitting some of the encoded bits in the transmitter (thus  reducing the number of transmitted bits and increasing the coding rate) and inserting a dummy “zero” metric  into the convolutional decoder on the receive side in place of the omitted bits.” are included in 17.3.5.6 Convolutional encoder. |

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| 12871 | Mark RISON | 28.3.11.5.4 | 458.1 | An arg max vector operator is used but not defined | Define the arg max operator | **Revised.**  Change to as in the resolution of CID12871 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.4*

* On P460L1 (CID #12871): Please add the following on P460L3

where .

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| 14184 | Yujin noh | 28.3.11.5.4 | 458.1 | add the defintion of N\_u in Equation (28-72) | As in comment | **Revised.**  Change to as in the resolution of CID14184 in doc IEEE802.11-18/0111r1. |

**Discussions:**

 should be replaced with  which is defined in Table 28-15 (Frequently used parameters).

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.4*

* On P460L1 (CID #14184):Replace Equation (28-72) with Equation below

 (28-72)

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| 13376 | Ron porat | 28.3.11.5.4 | 459.29 | "a\_init" should have subscript "init" dropped | Revise as suggested | **Revised.**  Change to as in the resolution of CID13376 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.4*

* On P461L29 (CID #13376): Replace the Equation for with Equation below



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| 13392 | Ron porat | 28.3.11.5.4 | 459.29 | Wrong section reference - 19.3.11.7.5 (LDPC PPDU encoding process) | 19.3.11.7.5 to be replaced by 20.3.11.6.5 | **Rejected.**  19.3.11.7.5 (LDPC PPDU encoding process) is the correct reference in 11REVmd\_D0.4. |

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| 13487 | Sigurd Schelstraete | 28.3.11.5.4 | 459.7 | "meets the above mentioned condition". Be more specific. Add reference to "condition". | See comment | **Revised.**  Change to as in the resolution of CID13487 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.4*

* On P461L6 (CID #13487):

If none of the users with LDPC encoding in step d) of 19.3.11.7.5 (LDPC PPDU encoding process) meets the condition,  AND  is true OR if  is true, or if all the users in the HE MU PPDU are BCC encoded, then the LDPC Extra Symbol Segment field in HE-SIG-A shall be set to 0, and the common pre-FEC padding factor and  values for all users shall be updated by Equation (28-81).

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| 12652 | Mark RISON | 28.3.11.5.5 | 459.60 | "The AP indicates the common NSYM, pre-FEC padding factor, STBC indication and LDPC Extra Symbol Segment fields in the Trigger frame." -- no, it indicates the L-SIG Length, not NSYM | Change "NSYM" to "L-SIG Length" in the cited text; add a sentence "In the UMRS Control field it indicates N\_SYM rather than the L-SIG Length." after; number the N\_SYM equation after Equation (28-110) as Equation (28-110b); after the cited sentence add a "NOTE---N\_SYM is derived from these parameters using Equation (28-110b)"; after the list of parameters following "A non-AP HE STA transmitting an HE TB PPDU in response to a Trigger frame shall set the TXVECTOR parameters as follows" in 27.5.3.3, add a "NOTE---The number of symbols (N\_SYM) contained in the HE TB PPDU is derived from the Length subfield in the Common Info field of the Trigger frame according to Equation (28-110b)."; (re)number the NOTEs in 27.5.3.3 | **Revised.**  Change to as in the resolution of CID12652 in doc IEEE802.11-18/0111r1. |
| 13393 | Ron porat | 28.3.11.5.5 | 459.60 | "The AP indicates the common NSYM, pre-FEC padding factor, STBC indication and LDPC Extra Symbol Segment fields in the Trigger frame."  AP doesn't indicate NSYM but LENGTH. Also missing is the PE disambiguity bit. (in the trigger frame the Packet Extension Subfield contain both pre-FEC Padding factor and PE Disambiguity). | Change to:  "The AP indicates the common LENGTH, pre-FEC padding factor, PE disambiguity, STBC indication and LDPC Extra Symbol Segment fields in the Trigger frame." | **Revised.**  Change to as in the resolution of CID13393 in doc IEEE802.11-18/0111r1. |
| 13394 | Ron porat | 28.3.11.5.5 | 459.60 | The text says that the AP indicates certain common parameters for the HE TB PPDU, but it does not explicitly mention that the AP is free to select these independent of the rules for other PPDU types. In particular, the selection of LDPC extra symbol, and the amount of packet extension (T\_PE), may be selected by the AP in a way that is unique for the HE TB PPDU, and may vary between AP manufacturers. This reviewer believes that the spec has been designed such that this should not be a problem for interoperability, yet, it would be prudent to emphasize this point explicitly to avoid that non-AP STA manufacturers assume restrictions that do not exist. | insert a note: "Note: The AP may at its own discretion select a NOMINAL\_PACKET\_PADDING (0, 8, 16), pre-FEC padding factor (1,2,3,4) and a LDPC extra symbol (0, 1) for the HE TB PPDU. | **Revised.**  Change to as in the resolution of CID13394 in doc IEEE802.11-18/0111r1. |
| 13395 | Ron porat | 28.3.11.5.5 | 459.62 | Missing description how the non-AP STA transmitting the HE TB PPDU derives T\_PE and N\_SYM. | Insert: "The STA transmitting an HE TB PPDU computes NSYM and TPE as defined in 28.3.12 Packet Extension". | **Revised.**  Change to as in the resolution of CID13395 in doc IEEE802.11-18/0111r1. |

**Discussions:**

This subclause describes “Encoding process for HE TB PPDU”. Adding sentence "In the UMRS Control field it indicates N\_SYM rather than the L-SIG Length." will only confuse readers.

Adding "NOTE---The number of symbols (N\_SYM) contained in the HE TB PPDU is derived from the Length subfield in the Common Info field of the Trigger frame according to Equation (28-110b).” is out of place in 27.5.3.3.

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*5.5*

* On P461L60(CID #12652, CID #13393, CID #13394, CID #13395)

The AP indicates the common length, pre-FEC padding factor, STBC and LDPC Extra Symbol Segment fields in the Trigger frame. The common values  and  are derived by non-AP STAs as shown in Equations (28-110) and (28-110b).

Note that the AP may at its own discretion select a value for pre-FEC padding factor, and a value for LDPC Extra Symbol Segment fields for the HE TB PPDU regardless of the respective values derived from the calculations described in the BCC or LDPC encoding process.

* On P480L46 (CID #12652): move Equation for  after sentence “ is the number …”

 for an HE TB PPDU

LENGTH is the the value …

…

 is the number …

 is derived as in Equation (28-110b)

 (28-110b)

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| 13488 | Sigurd Schelstraete | 28.3.11.6 | 460.37 | Change "After coding, scrambling, puncturing" to "After scrambling, coding, puncturing" to respect the order of operations. | See comment | **Revised.**  Change to as in the resolution of CID13488 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*6*

* On P462L37 (CID #13488)

After scrambling, coding, puncturing and post-FEC padding, the data bits are processed in groups of  bits.

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| 14185 | Yujin noh | 28.3.11.8 | 462.3 | It missed the bracket to close in the sentence. For example, it could be below (The interleaver parameters, NCOL, NROW, and NROT, for the Data field depend on the RU size and whether or not DCM used are defined in the RU  size column of Table 28-31 (BCC interleaver parameters)). | As in comment | **Revised.**  Change to as in the resolution of CID14185 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*8*

* On P463L65 (CID #14185): Remove the left bracket before “The interleaver parameters, …”

The interleaver parameters, ,  and

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| 13490 | Sigurd Schelstraete | 28.3.11.9 | 465.16 | q(k) = k + N\_SD. This doesn't look correct for 160 MHz based on the ranges given above. | Correct is needed | **Revised.**  Change to as in the resolution of CID13490 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*9*

* On P467L16 (CID #13490)

To maximize the frequency diversity, the indices of a pair of DCM subcarriers is  for a 996-tone or smaller RU, and  for a 2x996-tone RU.

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| 11664 | Dorothy Stanley | 28.3.11.13 | 468.50 | using slashes with numbers are confused with divide in Table 28-33 | Change #/# to {#,#} | **Revised.**  Change to as in the resolution of CID11664 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*13*

* On P470L50 (CID #11664): Replace Table 28-33 – Pilot indices for a 26-tone RU with the table shown below.

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| **PPDU BW** |  |
| 20 MHz, *i* =1:9 | {-116,-102},{-90,-76}, {-62,-48}, {-36,-22}, {-10,10}, {22,36}, {48,62}, {76,90}, {102,116} |
| 40 MHz, *i* =1:18 | {-238,-224}, {-212,-198}, {-184,-170}, {-158,-144}, {-130,-116}, {-104,-90}, {-78,-64}, {-50,36}, {-24,-10}, {10,24}, {36,50}, {64,78}, {90,104}, {116,130}, {144,158}, {170,184}, {198,212}, {224,238} |
| 80 MHz, *i* =1:37 | {-494,-480}, {-468,-454}, {-440,-426}, {-414,-400}, {-386,-372}, {-360,-346}, {-334,-320}, {-306,-292}, {-280,-266}, {-252,-238}, {-226,-212}, {-198,-184}, {-172,-158}, {-144,-130}, {-118,104}, {-92,-78},  {-64,-50}, {-38,-24}, {-10,10}, {24,38}, {50,64}, {78,92}, {104,118}, {130,144}, {158, 172}, {184,198}, {212,226}, {238,252}, {266,280}, {292,306}, {320,334}, {346,360}, {372,386}, {400,414}, {426,440}, {454,468}, {480,494} |
| 160 MHz, *i* =1:74 | {pilot subcarrier indices in 80 MHz -512, pilot subcarrier indices in 80 MHz +512} |

Please replace the slashes with brackets and parentsis as shown above for Table 28-35, Table 28-37, Table 28-38, Table 28-40, Table 28-41.

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| 13491 | Sigurd Schelstraete | 28.3.11.13 | 471.54 | How can mapping for 996-tone RU be the same as that for 484-tone RU? Delete "For a 996-tone RU transmission, the pilot mapping for its 16 pilots is the same as the mapping for 484-tone RU transmission. Specifically,". | See comment | **Revised.**  Change to as in the resolution of CID13491 in doc IEEE802.11-18/0111r1. |

**Discussions:**

The intention is to emphasize that the mapped value assigned for subcarrier k of symbol n is the same for both 996-tone RU transmission and 484-tone RU transmission, although the pilot tone indices are different for 996-tone RU transmission and 484-tone RU transmission.

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*13*

* On P473L54 (CID #13491):

For a 996-tone RU transmission, the same mapping method is applied to its 16 pilots as that for 484-tone RU transmission.

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| 11665 | Dorothy Stanley | 28.3.11.14 | 473.29 | Lets define or provide references to definitions of all the variables, e.g. K\_r, M\_r,u, etc. | as in comment | **Revised.**  Change to as in the resolution of CID11665 in doc IEEE802.11-18/0111r1. |
| 13493 | Sigurd Schelstraete | 28.3.11.14 | 473.30 | Define alpha\_r used in (28-105) | See comment | **Rejected.**  It is already defined in previous subclause. Doc IEEE802.11-18/0201r1 provides guidelines for Equation variable definitions. |
| 11669 | Dorothy Stanley | 28.3.11.14 | 474.18 | Lets define or provide references to definitions of all the variables, e.g. K\_r, N\_STS,r,u, etc. | as in comment | **Rejected.**  It is already defined in previous subclause. Doc IEEE802.11-18/0201r1 provides guidelines for Equation variable definitions. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*14*

* On P475L30(CID #11665): Please add the following on P475L30

 is given in Table 28-12 (Timing-related constants).

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| 11666 | Dorothy Stanley | 28.3.11.14 | 473.62 | Are we using N\_SR or N\_SR,r? | as in comment | **Revised.**  Change to as in the resolution of CID11666 in doc IEEE802.11-18/0111r1. |
| 11667 | Dorothy Stanley | 28.3.11.14 | 473.63 | Is N\_SD,r defined anywhere? | as in comment | **Revised.**  Change to as in the resolution of CID11667 in doc IEEE802.11-18/0111r1. |

**Discussions:**

 and  do not exist.  does not apply to OFDMA transmission. The definition of  does not depend on .

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*14*

* On P475L62 (CID #11666, CID #11667):

NOTE –  translates a subcarrier index k () into the index of data symbols in a transmission over RU r (0 ≤ ≤ *NSD*).

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| 11668 | Dorothy Stanley | 28.3.11.14 | 474.10 | Looks like part of the Equation 28-108 is cut off. |  | as in comment | **Revised.**  Change to as in the resolution of CID11668 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.11*.*14*

* On P476L10(CID #11668) Please replace Equation (28-108) with the Equation below

 (28-108)

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| 13378 | Ron porat | 28.3.13 | 480.46 | Wrong reference. Eqn 28-55 does not specify Data field in 40MHz non-HT Dup. | Replace reference to equation 28-55 by correct reference. | **Revised.**  Change to as in the resolution of CID13378 in doc IEEE802.11-18/0111r1. |

ax editor: please make the following change in D2.1 *Clause 28.3.13*

* On P482L46 (CID #13378):

In a 40 MHz non-HT duplicate transmission, the Data field shall be as defined by Equation(19-61).

For 80 MHz and 160 MHz non-HT duplicate transmissions, the Data field shall be as defined by Equation (21-100). In a noncontiguous 80+80 MHz non-HT duplicate transmission, data transmission in each frequency seg-ment shall be as defined for an 80 MHz non-HT duplicate transmission in Equation (21-100).