IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 11be PDT: Transmitter block diagram | | | | |
| Date: 2020-08-25 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Xiaogang Chen | Intel |  |  | Xiaogang.c.chen@Intel.com |
| Rui Yang | InterDigital |  |  |  |
| Lin Yang | Qualcomm |  |  |  |
| Bo Sun | ZTE |  |  |  |
| Youhan Kim | Qualcomm |  |  |  |

Abstract

This contribution proposes the draft text on transmitter block diagram for TGbe D0.1.

R0: main changes comparing with 11ax include:

* Remove STBC related blocks and use SS or Nss instead of STS and N\_STS (highlighted as yellow as TBD);
* MUMIMO applicable to 242 tone RU/MRU or larger;
* DCM clean up since DCM is an MCS;
* Per 80MHz variable U-SIG;
* More than 2 segments parser.

R1: incorporated the comments from Lin Yang, and replace RU with RU/MRU

R3: remove TBDs related to STBC and 80+80/160+160

R4: editorial updates

To TGbe editor:

1. please refer to the three comments for the changes in R3.
2. In addition, please remove the “TBD” in the caption of every figures in this clause.

36.3.5 Transmitter block diagram

The generation of each field in an EHT PPDU uses many of the following blocks:

* pre-FEC PHY padding
* Scrambler
* FEC (BCC or LDPC) encoders
* post-FEC PHY padding
* Stream parser
* Segment parser (for RU/MRU size > 996 tone)
* BCC interleaver
* Constellation mapper
* DCM tone mapper
* Pilot insertion
* Replication over multiple 20 MHz (for BW > 20 MHz)
* Multiplication by 1st column of *PEHT-LTF*
* LDPC tone mapper
* Frequency domain duplicate for MCS14 if BW >= 80 MHz
* Segment deparser (for RU/MRU size > 996 tone)
* Cyclic shift diversity (CSD) per spatial stream insertion
* Spatial mapper
* Frequency mapping
* Inverse discrete Fourier transform (IDFT)
* Cyclic shift diversity (CSD) per chain insertion
* Guard interval (GI) insertion
* Windowing

~~w) TBD for DUP~~

Figure 36-x1 (Transmitter block diagram for the L-SIG, RL-SIG and U-SIG fields for an EHT MU PPDU) to Figure 36-xx (Transmitter block diagram for the Data field of an EHT SU PPDU in 80+80 MHz with LDPC encoding) show example transmitter block diagrams. The actual structure of the transmitter is implementation dependent.

In particular, Figure 36-x1 (Transmitter block diagram for the L-SIG, RL-SIG and U-SIG fields for an EHT MU PPDU) shows the transmit process for the L-SIG, RL-SIG, and U-SIG fields of an EHT MU PPDU using one frequency segment. These transmit blocks are also used to generate the L-STF and L-LTF fields of the EHT MU PPDU with the following exceptions:

* The BCC encoder and interleaver as well as constellation mapper are not used when generating the L-STF and L-LTF fields.

|  |
| --- |
|  |
| Figure 36-x1 Transmitter block diagram for the L-SIG, RL-SIG and U-SIG fields for an EHT MU PPDU |

NOTE—For an EHT MU PPDU, the duplication on 20 MHz channels is subject to the availability of 20 MHz channels in the case of(#22023) preamble puncturing. The U-SIG contents may be different in different 80MHz segments for PPDU BW > 80MHz.

Figure 36-x2 (Transmitter block diagram for the L-SIG, RL-SIG and U-SIG fields of an EHT TB PPDU) shows the transmit process for the L-SIG, RL-SIG and U-SIG fields of an EHT TB PPDU using one frequency segment. The BCC encoder and interleaver are not used when generating the L-STF and L-LTF fields.

|  |
| --- |
|  |
| Figure 36-x2 Transmitter block diagram for the L-SIG, RL-SIG and U-SIG fields of an EHT TB PPDU |

Figure 36-x3 (Transmitter block diagram for the EHT-SIG field) shows the transmit process for the EHT-SIG field of an EHT MU PPDU using one frequency segment. This block diagram is for transmitting EHT-SIG in one 20 MHz subchannel. Refer to 36.3.11.8.2 (EHT-SIG content channels) for the methods of transmitting EHT-SIG in 40 MHz, 80 MHz, 160 MHz and 320MHz. The DCM tone mapper, which is defined in 36.3.12.7 (Constellation mapping), is applied only if the EHT-SIG-MCS field in the U-SIG field indicate EHT-SIG-MCS is MCS15.

|  |
| --- |
|  |
| Figure 36-x3 Transmitter block diagram for the EHT-SIG field |

Figure 36-x4 (Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a RU/MRU smaller than or equal to 242-tone) shows the transmitter blocks for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a RU/MRU smaller than or equal to 242-tone if the number of spatial streams is less than or equal to 4. Figure 36-x4 applies to the Data field of an EHT MU PPDU that is transmitted on an RU/MRU allocated to a single user and the Data field of an EHT TB PPDU (whether or not it is spatially multiplexed with other users).

A subset of these transmitter blocks consisting of the constellation mapper and CSD blocks, as well as the blocks to the right of, and including, the spatial mapping block, are also used to generate the EHT-LTF fields. A subset of these transmitter blocks consisting of the constellation mapper and CSD blocks, as well as the blocks to the right of, and including, the spatial and frequency mapping block of Figure 36-x4 (Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a RU/MRU smaller than or equal to 242-tone), are also used to generate the EHT-STF field. This figure also applies to the Data field with BCC encoding in an EHT TB PPDU.

|  |
| --- |
|  |
| Figure 36-x4 Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a RU/MRU smaller than or equal to 242-tone |

Figure 36-x5 (Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with LDPC encoding on a RU/MRU less than or equal to 996-tone) shows the transmitter blocks for the UL transmission or DL non-MU-MIMO transmission of a Data field with LDPC encoding on a RU/MRU less than or equal to 996-tone for a single frequency segment. Figure 36-x5 applies to the Data field of an EHT MU PPDU that is transmitted on an RU/MRU allocated to a single user and the Data field of an EHT TB PPDU (whether or not it is spatially multiplexed with other users).

|  |
| --- |
|  |
| Figure 36-x5 Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with LDPC encoding on a RU/MRU less than or equal to 996-tone |

Figure 36-x6 (Transmitter block diagram for the DL MU-MIMO transmission of a Data field with BCC encoding on a 242-tone RU) shows the transmitter blocks for the transmission, in an EHT MU PPDU, of the Data field with BCC encoding on a 242-tone RU/MRU allocated to more than one user.

|  |
| --- |
|  |
| Figure 36-x6 Transmitter block diagram for the DL MU-MIMO transmission of a Data field with BCC encoding on a 242-tone RU |

Figure 36-x7 (Transmitter block diagram for the DL MU-MIMO transmission of a Data field with LDPC encoding on a 242-, 484- , 242+484-, or 996-tone RU/MRU) shows the transmitter blocks for the transmission, in an EHT MU PPDU, of the Data field with LDPC encoding on a 242-, 484-, 242+484- or 996-tone RU/MRU allocated to more than one user.

|  |
| --- |
|  |
| Figure 36-x7 Transmitter block diagram for the DL MU-MIMO transmission of a Data field with LDPC encoding on a 242-, 484-, 242+484- or 996-tone RU/MRU |

Figure 36-x8 (Transmitter block diagram for the Data field of an EHT single user transmission in RU/MRU size larger than 996 tone with LDPC encoding) shows the transmitter blocks used to generate the Data field of a single-user EHT transmission in RU/MRU size larger than 996 tone with LDPC encoding.

|  |
| --- |
|  |
| Figure 36-x8 Transmitter block diagram for the Data field of an EHT single user transmission in RU/MRU size larger than 996 tone with LDPC encoding |

~~Figure 35-x9 (Transmitter block diagram for the Data field of an EHT single user transmission in 80+80 MHz with LDPC encoding) shows the transmitter blocks used to generate the Data field of a single-user EHT transmission in 80+80 MHz with LDPC encoding.~~

~~Transmitter block diagram for the Data field of an EHT single user transmission in 160+160 MHz with LDPC encoding is TBD.~~

|  |
| --- |
|  |
| ~~Figure 35-x9 Transmitter block diagram for the Data field of an EHT single user transmission in 80+80 MHz with LDPC encoding~~ |