IEEE P802.11  
Wireless LANs

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| Proposed Draft Text for 34.3.2.2 Subcarriers and resource allocation for wideband | | | | |
| Date: 2020-09-14 | | | | |
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Abstract:

This document proposes draft text for “34.3.2.2 **Subcarriers and resource allocation for wideband**” in TGbe D0.1

The corresponding motions shown in [1] are: 11, 18, 19, 33, 34, 35, 112 (#SP42), 118.

R0: This is a revision of 20/1314r0 by removing Subsection “Wideband spectrum utilization for PPDU transmission”; changing the subclause 34.3.2.2 title to be “Subcarrier and resource allocation for wideband” and updating the corresponding text proposed in 20/1314r0.

R1: This is a revision of 20/1371r0 with modications by taking into account the received feedback.

R2: Editorial modifications.

R3: Editorial modifications.

R4: Updated by adding 1) additional tables for Data and pilot subcarrier indices for RUs in a 20 MHz, 40 MHz, 160 MHz and 320 MHz EHT PPDU; 2) one paragraph to describe the subcarrier indices related to multi-RU.

**34.3.2 Subcarriers and resource allocation**

**34.3.2.1 General**

**34.3.2.2 Subcarriers and resource allocation for wideband**

The EHT PHY subcarrier frequency spacing is identical to that of HE PHY subcarrier frequency spacing defined in Clause 27 (High Efficiency (HE) PHY specification) [2].

The EHT tone plan and RU locations for a 20 MHz PPDU and 40 MHz PPDU are identical to that of HE PHY defined in Clause 27 (High Efficiency (HE) PHY specification) [2]. The EHT tone plan and RU locations for an 80 MHz PPDU is given in Figure XXX below. An EHT PPDU spanning 160 MHz or wider is composed of multiple 80 MHz segments. The tone plan for each of the 80 MHz segments is identical to that of an EHT 80 MHz PPDU. Any 80 MHz segment in an 80/160/320 MHz EHT PPDU, if it is punctured or used with an OFDMA transmission, uses the tone plan shown in Figure XXX. Each non-punctured 80 MHz segment in a 160/320MHz PPDU uses a 996-tone RU as shown in Figure xxx



Figure XXX – RU Locations in an 80 MHz EHT PPDU

For an EHT PPDU using non-OFDMA transmission:

* The tone plan of an 80/160/80+80 MHz EHT PPDU is identical to that of HE PHY defined in Clause 27 (High Efficiency (HE) PHY specification), with the exception of pilot locations and the exception of any punctured 80 MHz segment.
* The tone plan of a 160 MHz EHT PPDU is used for both the primary and secondary 160 MHz channels within a 320/160+160 MHz EHT PPDU.

The location of the RUs are fixed as defined in Tables XXX-YYY below (note: The subcarrier index of 0 corresponds to the DC tone. Negative subcarrier indices correspond to subcarries with frequency lower than the DC tone, and positive subcarrier indices correspond to subcarriers with frequency higher than the DC tone.).

Table XXX: Data and pilot subcarrier indices for RUs in an 80 MHz EHT PPDU

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU Type** | **RU index and subcarrier range** | | | | |
| 26-tone RU | RU 1  [-499:-474] | RU 2  [-473:-448] | RU 3  [-445:-420] | RU 4  [-419:-394] | RU 5  [-392:-367] |
|  | RU 6  [-365:-340] | RU 7  [-339:-314] | RU 8  [-311:-286] | RU 9  [-285:-260] |  |
|  | RU 10  [-252:-227] | RU 11  [-226:-201] | RU 12  [-198:-173] | RU 13  [-172:-147] | RU 14  [-145:-120] |
|  | RU 15  [-118:-93] | RU 16  [-92:-67] | RU 17  [-64:-39] | RU 18  [-38:-13] |  |
|  | RU 19  ]13:38] | RU 20  [39:64] | RU 21  [67:92] | RU 22  [93:118] | RU 23  [120:145] |
|  | RU 24  [147:172] | RU 25  [173:198] | RU 26  [201:226] | RU 27  [227:252] |  |
|  | RU 28  [260:285] | RU 29  [286:311] | RU 30  [314:339] | RU 31  [340:365] | RU 32  [367:392] |
|  | RU 33  [394:419] | RU 34  [420:445] | RU 35  [448:473] | RU 36  [474:499] |  |
| 52-tone RU | RU 1  [-499:-448] | RU 2  [-445:-394] | RU3  [-365:-314] | RU 4  [-311:-260] |  |
|  | RU 5  [-252:-201] | RU 6  [-198:-147] | RU 7  [-118:-67] | RU 8  [-64:-13] |  |
|  | RU 9  [13:64] | RU 10  [67:118] | RU 11  [147:198] | RU 12  [201:252] |  |
|  | RU 13  [260:311] | RU 14  [314:365] | RU 15  [394:445] | RU 16  [448:499] |  |
| 106-tone RU | RU 1  [-499:-394] | RU 2  [-365:-260] | RU 3  [-252:-147] | RU 4  [-118:-13] |  |
|  | RU 5  [13:118] | RU 6  [147:252] | RU 7  [260:365] | RU 8  [394:499] |  |
| 242-tone RU | RU 1  [-500:-259] | RU 2  [-253:-12] | RU 3  [12:253] | RU 4  [259:500] |  |
| 484-tone RU | RU 1  [-500:-259,  -253:-12] | RU 2  [12:253,  259:500] |  |  |  |
| 996-tone RU | RU 1  [-500:-3,  3:500] |  |  |  |  |
|  | | | | | |

Table XXX: Data and pilot subcarrier indices for RUs in a 160 MHz EHT PPDU

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU Type** | **RU index and subcarrier range** | | | | |
| 26-tone RU | RU 1  [-1011:-986] | RU 2  [-985:-960] | RU 3  [-957:-932] | RU 4  [-931:-906] | RU 5  [-904:-879] |
|  | RU 6  [-877:-852] | RU 7  [-851:-826] | RU 8  [-823:-798] | RU 9  [-797:-772] |  |
|  | RU 10  [-764:-739] | RU 11  [-738:-713] | RU 12  [-710:-685] | RU 13  [-684:-659] | RU 14  [-657:-632] |
|  | RU 15  [-630:-605] | RU 16  [-604:-579] | RU 17  [-576:-551] | RU 18  [-550:-525] |  |
|  | RU 19  [-499:-474] | RU 20  [-473:-448] | RU 21  [-445:-420] | RU 22  [-419:-394] | RU 23  [-392:-367] |
|  | RU 24  [-365:-340] | RU 25  [-339:-314] | RU 26  [-311:-286] | RU 27  [-285:-260] |  |
|  | RU 28  [-252:-227] | RU 29  [-226:-201] | RU 30  [-198:-173] | RU 31  [-172:-147] | RU 32  [-145:-120] |
|  | RU 33  [118:-93] | RU 34  [-92:-67] | RU 35  [-64:-39] | RU 36  [-38:-13] |  |
|  | RU 37  [13:38] | RU 38  [39:64] | RU 39  [67:92] | RU 40  [93:118] | RU 41  [120:145] |
|  | RU 42  [147:172] | RU 43  [173:198] | RU 44  [201:226] | RU 45  [227:252] |  |
|  | RU 46  [260:285] | RU 47  [286:311] | RU 48  [314:339] | RU 49  [340:365] | RU 50  [367:392] |
|  | RU 51  [394:419] | RU 52  [420:445] | RU 53  [448:473] | RU 54  [474:499] |  |
|  | RU 55  [525:550] | RU 56  [551:576] | RU 57  [579:604] | RU 58  [605:630] | RU 59  [632:657] |
|  | RU 60  [659:684] | RU 61  [685:710] | RU 62  [713:738] | RU 63  [739:764] |  |
|  | RU 64  [772:797] | RU 65  [798:823] | RU 66  [826:851] | RU 67  [852:877] | RU 68  [879:904] |
|  | RU 69  [906:931] | RU 70  [932:957] | RU 71  [960:985] | RU 72  [986:1011] |  |
| 52-tone RU | RU 1  [-1011:-960] | RU 2  [-957:-906] | RU 3  [-877:-826] | RU 4  [-823:-772] |  |
|  | RU 5  [-764:-713] | RU 6  [-710:-659] | RU 7  [-630:-579] | RU 8  [-576:-525] |  |
|  | RU 9  [-499:-448] | RU 10  [-445:-394] | RU 11  [-365:-314] | RU 12  [-311:-260] |  |
|  | RU 13  [-252:-201] | RU 14  [-198:-147] | RU 15  [-118:-67] | RU 16  [-64:-13] |  |
|  | RU 17  [13:64] | RU 18  [67:118] | RU 19  [147:198] | RU 20  [201:252] |  |
|  | RU 21  [260:311] | RU 22  [314:365] | RU 23  [394:445] | RU 24  [448:499] |  |
|  | RU 25  [525:576 | RU 26  [579:630] | RU 27  [659:710] | RU 28  [713:764] |  |
|  | RU 29  [772:823] | RU 30  [826:877] | RU 31  [906:957] | RU 32  [960:1011] |  |
| 106-tone RU | RU 1  [-1011:-906] | RU 2  [-877:-772] | RU 3  [-764:-659] | RU 4  [-630:-525] |  |
|  | RU 5  [-499:-394] | RU 6  [-365:-260] | RU 7  [-252:-147] | RU 8  [-118:-13] |  |
|  | RU 9  [13:118] | RU 10  [147:252] | RU 11  [260:365] | RU 12  [394:499] |  |
|  | RU 13  [525:630] | RU 14  [659:764] | RU 15  [772:877] | RU 16  [906:1011] |  |
| 242-tone RU | RU 1  [-1012:-771] | RU 2  [-765:-524] | RU 3  [-500:-259] | RU 4  [-253:-12] |  |
|  | RU 5  [12:253] | RU 6  [259:500] | RU 7  [524:765] | RU 8  [771:1012] |  |
| 484-tone RU | RU 1  [-1012:-771,  -765:-524] | RU 2  [-500:-259,  -253:-12] | RU 3  [12:253,  259:500] | RU 4  [524:765,  771:1012] |  |
| 996-tone RU | RU 1  [-1012:-515,  -509:-12] | RU 2  [12:509,  515:1012] |  |  |  |
| 2x996-tone RU | RU 1  [-1012:-515,  -509:-12,  12:509,  515:1012] |  |  |  |  |

Table YYY: Data and pilot subcarrier indices for RUs in a 320 MHz EHT PPDU

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RU Type** | **RU index and subcarrier range** | | | | |
| 26-tone RU | RU 1  [-2035:-2010] | RU 2  [-2009:-1984] | RU 3  [-1981:-1956] | RU 4  [-1955:-1930] | RU 5  [-1928:-1903] |
|  | RU 6  [-1901:-1876] | RU 7  [-1875:-1850] | RU 8  [-1847:-1822] | RU 9  [-1821:-1796] |  |
|  | RU 10  [-1788:-1763] | RU 11  [-1762:-1737] | RU 12  [-1734:-1709] | RU 13  [-1708:-1683] | RU 14  [-1681:-1656] |
|  | RU 15  [-1654:-1629] | RU 16  [-1628:-1603] | RU 17  [-1600:-1575] | RU 18  [-1574:-1549] |  |
|  | RU 19  [-1523:-1498] | RU 20  [-1497:-1472] | RU 21  [-1469:-1444] | RU 22  [-1443:-1418] | RU 23  [-1416:-1391] |
|  | RU 24  [-1389:-1364] | RU 25  [-1363:-1338] | RU 26  [-1335:-1310] | RU 27  [-1309:-1284] |  |
|  | RU 28  [-1276:-1251] | RU 29  [-1250:-1225] | RU 30  [-1222:-1197] | RU 31  [-1196:-1171] | RU 32  [-1169:-1144] |
|  | RU 33  [-1142:-1117] | RU 34  [-1116:-1091] | RU 35  [-1088:-1063] | RU 36  [-1062:-1037] |  |
|  | RU 37  [-1011:-986] | RU 38  [-985:-960] | RU 39  [-957:-932] | RU 40  [-931:-906] | RU 41  [-904:-879] |
|  | RU 42  [-877:-852] | RU 43  [-851:-826] | RU 44  [-823:-798] | RU 45  [-797:-772] |  |
|  | RU 46  [-764:-739] | RU 47  [-738:-713] | RU 48  [-710:-685] | RU 49  [-684:-659] | RU 50  [-657:-632] |
|  | RU 51  [-630:-605] | RU 52  [-604:-579] | RU 53  [-576:-551] | RU 54  [-550:-525] |  |
|  | RU 55  [-499:-474] | RU 56  [-473:-448] | RU 57  [-445:-420] | RU 58  [-419:-394] | RU 59  [-392:-367] |
|  | RU 60  [-365:-340] | RU 61  [-339:-314] | RU 62  [-311:-286] | RU 63  [-285:-260] |  |
|  | RU 64  [-252:-227] | RU 65  [-226:-201] | RU 66  [-198:-173] | RU 67  [-172:-147] | RU 68  [-145:-120] |
|  | RU 69  [-118:-93] | RU 70  [-92:-67] | RU 71  [-64:-39] | RU 72  [-38:-13] |  |
|  | RU 73  [13:38] | RU 74  [39:64] | RU 75  [67:92] | RU 76  [93:118] | RU 77  [120:145] |
|  | RU 78  [147:172] | RU 79  [173:198] | RU 80  [201:226] | RU 81  [227:252] |  |
|  | RU 82  [260:285] | RU 83  [286:311] | RU 84  [314:339] | RU 85  [340:365] | RU 86  [367:392] |
|  | RU 87  [394:419] | RU 88  [420:445] | RU 89  [448:473] | RU 90  [474:499] |  |
|  | RU 91  [525:550] | RU 92  [551:576] | RU 93  [579:604] | RU 94  [605:630] | RU 95  [632:657] |
|  | RU 96  [659:684] | RU 97  [685:710] | RU 98  [713:738] | RU 99  [739:764] |  |
|  | RU 100  [772:797] | RU 101 [798:823] | RU 102 [826:851] | RU 103 [852:877] | RU 104 [879:904] |
|  | RU 105  [906:931] | RU 106 [932:957] | RU 107 [960:985] | RU 108 [986:1011] |  |
|  | RU 109 [1037:1062] | RU 110 [1063:1088] | RU 111 [1091:1116] | RU 112 [1117:1142] | RU 113 [1144:1169] |
|  | RU 114 [1171:1196] | RU 115 [1197:1222] | RU 116 [1225:1250] | RU 117 [1251:1276] |  |
|  | RU 118 [1284:1309] | RU 119 [1310:1335] | RU 120 [1338:1363] | RU 121 [1364:1389] | RU 122 [1391:1416] |
|  | RU 123 [1418:1443] | RU 124 [1444:1469] | RU 125 [1472:1497] | RU 126 [1498:1523] |  |
|  | RU 127 [1549:1574] | RU 128 [1575:1600] | RU 129 [1603:1628] | RU 130 [1629:1654] | RU 131 [1656:1681] |
|  | RU 132 [1683:1708] | RU 133 [1709:1734] | RU 134 [1737:1762] | RU 135 [1763:1788] |  |
|  | RU 136 [1796:1821] | RU 137 [1822:1847] | RU 138 [1850:1875] | RU 139 [1876:1901] | RU 140 [1903:1928] |
|  | RU 141 [1930:1955] | RU 142 [1956:1981] | RU 143 [1984:2009] | RU 144 [2010:2035] |  |
|  | RU 1 [-2035:-2010] | RU 2 [-2009:-1984] | RU 3 [-1981:-1956] | RU 4 [-1955:-1930] | RU 5 [-1928:-1903] |
| 52-tone RU | RU 1  [-2035:-1984] | RU 2  [-1981:-1930] | RU 3  [-1901:-1850] | RU 4  [-1847:-1796] |  |
|  | RU 5  [-1788:-1737] | RU 6  [-1734:-1683] | RU 7  [-1654:-1603] | RU 8  [-1600:-1549] |  |
|  | RU 9  [-1523:-1472] | RU 10  [-1469:-1418] | RU 11  [-1389:-1338] | RU 12  [-1335:-1284] |  |
|  | RU 13  [-1276:-1225] | RU 14  [-1222:-1171] | RU 15  [-1142:-1091] | RU 16  [-1088:-1037] |  |
|  | RU 17  [-1011:-960] | RU 18  [-957:-906] | RU 19  [-877:-826] | RU 20  [-823:-772] |  |
|  | RU 21  [-764:-713] | RU 22  [-710:-659] | RU 23  [-630:-579] | RU 24  [-576:-525] |  |
|  | RU 25  [-499:-448] | RU 26  [-445:-394] | RU 27  [-365:-314] | RU 28  [-311:-260] |  |
|  | RU 29  [-252:-201] | RU 30  [-198:-147] | RU 31  [-118:-67] | RU 32  [-64:-13] |  |
|  | RU 33  [13:64] | RU 34  [67:118] | RU 35  [147:198] | RU 36  [201:252] |  |
|  | RU 37  [260:311] | RU 38  [314:365] | RU 39  [394:445] | RU 40  [448:499] |  |
|  | RU 41  [525:576] | RU 42  [579:630] | RU 43  [659:710] | RU 44  [713:764] |  |
|  | RU 45  [772:823] | RU 46  [826:877] | RU 47  [906:957] | RU 48  [960:1011] |  |
|  | RU 49  [1037:1088] | RU 50  [1091:1142] | [RU 51  1171:1222] | RU 52  [1225:1276] |  |
|  | RU 53  [1284:1335] | RU 54  [1338:1389] | RU 55  [1418:1469] | RU 56  [1472:1523] |  |
|  | RU 57  [1549:1600] | RU 58  [1603:1654] | RU 59  [1683:1734] | RU 60  [1737:1788] |  |
|  | RU 61  [1796:1847] | RU 62  [1850:1901] | RU 63  [1930:1981] | RU 64  [1984:2035] |  |
| 106-tone RU | RU 1  [-2035:-1930] | RU 2  [-1901:-1796] | RU 3  [-1788:-1683] | RU 4  [-1654:-1549] |  |
|  | RU 5  [-1523:-1418] | RU 6  [-1389:-1284] | RU 7  [-1276:-1171] | RU 8  [-1142:-1037] |  |
|  | RU 9  [-1011:-906] | RU 10  [-877:-772] | RU 11  [-764:-659] | RU 12  [-630:-525] |  |
|  | RU 13  [-499:-394] | RU 14  [-365:-260] | RU 15  [-252:-147] | RU 16  [-118:-13] |  |
|  | RU 17  [13:118] | RU 18  [147:252] | RU 19  [260:365] | RU 20  [394:499] |  |
|  | RU 21  [525:630] | RU 22  [659:764] | RU 23  [772:877] | RU 24  [906:1011] |  |
|  | RU 25  [1037:1142] | RU 26  [1171:1276] | RU 27  [1284:1389] | RU 28  [1418:1523] |  |
|  | RU 29  [1549:1654] | RU 30  [1683:1788] | RU 31  [1796:1901] | RU 32  [1930:2035] |  |
| 242-tone RU | RU 1  [-2036:-1795] | RU 2  [-1789:-1548] | RU 3  [-1524:-1283] | RU 4  [-1277:-1036] |  |
|  | RU 5  [-1012:-771] | RU 6  [-765:-524] | RU 7  [-500:-259] | RU 8  [-253:-12] |  |
|  | RU 9  [12:253] | RU 10  [259:500] | RU 11  [524:765] | RU 12  [771:1012] |  |
|  | RU 13  [1036:1277] | RU 14  [1283:1524] | RU 15  [1548:1789] | RU 16  [1795:2036] |  |
| 484-tone RU | RU 1  [-2036:-1795,  -1789:-1548] | RU 2  [-1524:1283,  -1277:-1036] | RU 3  [-1012:-771,  -765:-524] | RU 4  [-500:-259,  -253:-12] |  |
|  | RU 5  [12:253,  259:500] | RU 6  [524:765,  771:1012] | RU 7  [1036:1277,  1283:1524] | RU 8  [1548:1789,  1795:2036] |  |
| 996-tone RU | RU 1  [-2036:-1539,  -1533:-1036] | RU 2  [-1012:-515,  -509:-12] | RU 3  [12:509,  515:1012] | RU 4  [1036:1533,  1539:2036] |  |
| 2x996-tone RU | RU 1  [-2036:-1539,  -1533:-1036,  -1012:-515,  -509:-12] | RU 2  [12:509,  515:1012,  1036:1533,  1539:2036] |  |  |  |
| 4x996 | RU 1  [-2036:-1539,  -1533:-1036,  -1012:-515,  -509:-12,  12:509,  515:1012,  1036:1533,  1539:2036] |  |  |  |  |

Multiple RUs can be assigned to an EHT STA (see 34.3.3 Subcarriers and Resource Allocation for Multiple RUs). The subcarrier indices of a Multi-RU consist of the indices of the corresponding RUs shown in the tables xxx-yyy from which the Multi-RU is built and are defined in 34.3.3 Subcarriers and Resource Allocation for Multiple RUs.

**References:**

[1] 802.11-20/0566r59, Edward Au, Compendium of straw polls and potential changes to the specification framework document.

[2] P802.11ax\_D6.1.

Visio files

