IEEE P802.11
Wireless LANs

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| Proposed Text Draft on Pilot |
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This document is based on the following IEEE contributions on DRU and 11bn SFD.

1. [11-24/1230r1](https://mentor.ieee.org/802.11/dcn/23/11-23-2200-03-00bn-distribution-bandwidth-of-dru.pptx): 11-24-1230-01-00bn-pilot-tone-design-in-dru-transmission, Lin Yang
	* + 1. **Pilot subcarriers**

For a user transmitting on the *i*-th 26-, 52-, 106-, 242-, and 484-tone RU in a 20 MHz or 40 MHz PPDU bandwidth (see Table 27-8 (Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU and in a non- OFDMA 20 MHz HE PPDU) and Table 27-9 (Data and pilot subcarrier indices for RUs in a 40 MHz HE PPDU and in a non-OFDMA 40 MHz HE PPDU)), the pilot subcarriers defined in 27.3.12.13 (Pilot subcarriers) shall be used.

For a user transmitting on the *i*-th 26-, 52-, 106-, 242-, 484-, 996-, 2×996-tone RU and 4×996-tone RU in an 80 MHz, a 160 MHz, or a 320 MHz PPDU bandwidth (see [Table 36-5 (Data and pilot subcarrier indices for RUs in an 80 MHz EHT PPDU)](#_bookmark17), [Table 36-6 (Data and](#_bookmark18) [pilot subcarrier indices for RUs in a 160 MHz EHT PPDU)](#_bookmark18), and [Table 36-7 (Data and pilot subcarrier](#_bookmark19) [indices for RUs in a 320 MHz EHT PPDU)](#_bookmark19)), the pilot subcarriers defined in 36.3.13.11 (Pilot subcarriers) shall be used.

*i*

For a user transmitting on the *i*-th 26-tone DRU in an 20 MHz, a 40 MHz, or a 60 MHz DBW(see [Table 38-x1 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 20 MHz UHR TB PPDU)](#_bookmark17), Table 38-x2 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 40 MHz UHR TB PPDU), and [Table 38-x3 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 60 MHz UHR TB PPDU), the pilot subcarriers shall be inserted at subcarriers *k*  *KR26* ,

*i*

where *KR26* is given by the *i*-th pilot index set in the row of given distributed bandwidth of [Table 38-a1 (Pilot](#_bookmark235)

*i*

[indices for a 26-tone DRU transmission)](#_bookmark235).

**Table 38-a1—Pilot indices for a 26-tone DRU transmission**

|  |  |
| --- | --- |
| **DBW** | $$K\_{R26\_{i}}$$ |
| 20 MHz, *i* = 1:9 | {-111 15}, {-89 37}, {-100 26}, {-78 48}, {-67 59}, {-56 70}, {-34 92}, {-45 81}, {-23 103} |
| 40 MHz, *i* = 1:18 | {-224 28}, {-125 127}, {-202 50}, {-103 149}, {-81 171}, {-114 138}, {-213 39}, {-92 160}, {-191 61}, {-169 83}, {-70 182}, {-147 105}, {-48 204}, {-180 72}, {-59 193}, {-158 94}, {-37 215}, {-136 116} |
| 60 MHz, *i* = 1:27 | TBD |

The pilot mapping $P\_{n}^{k}$ for the subcarrier k for symbol n shall be as specified in Equation (27-101) in 27.3.12.13 (Pilot subcarriers).

For a user transmitting on the *i*-th 52-tone DRU in a 20 MHz, a 40 MHz, a 60 MHz or an 80 MHz DBW(see [Table 38-x1 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 20 MHz UHR TB PPDU)](#_bookmark17), Table 38-x2 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 40 MHz UHR TB PPDU), [Table 38-x3 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 60 MHz UHR TB PPDU) and [Table 38-x4 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in an 80 MHz UHR TB PPDU), the pilot subcarriers shall be inserted at subcarriers *k*  *KR52* ,

*i*

where *KR52* is given by the *i*-th pilot index set in the row of given distributed bandwidth of [Table 38-a2 (Pilot](#_bookmark235)

*i*

[indices for a 52-tone DRU transmission)](#_bookmark235).

**Table 38-a2—Pilot indices for a 52-tone DRU transmission**

|  |  |
| --- | --- |
| **DBW** | $$K\_{R52\_{i}}$$ |
| 20 MHz, *i* = 1:4 | {-111 -89 15 37}, {-100 -78 26 48}, {-56 -34 70 92}, {-45 -23 81 103} |
| 40 MHz, *i* = 1:8 | {-224 -125 28 127}, {-202 -103 50 149}, {-213 -114 39 138}, {-191 -92 61 160}, {-169 -70 83 182}, {-147 -48 105 204}, {-158 -59 94 193}, {-136 -37 116 215} |
| 60 MHz, *i* = 1:12 | TBD |
| 80 MHz, *i* = 1:16 | {-447 -359 53 141}, {-403 -315 97 185}, {-227 -139 273 361}, {-183 -95 317 405}, {-425 -117 75 383}, {-381 -73 119 427}, {-337 -249 163 251}, {-293 -205 207 295}, {-194 -106 306 394}, {-150 -62 350 438}, {-370 -282 130 218}, {-326 -238 174 262}, {-260 -172 240 328}, {-216 -128 284 372}, {-392 -84 108 416}, {-436 -348 64 152} |

The pilot mapping $P\_{n}^{k}$ for the subcarrier k for symbol n shall be as specified in Equation (27-102) in 27.3.12.13 (Pilot subcarriers).

For a user transmitting on the *i*-th 106-tone DRU in a 20 MHz, a 40 MHz, a 60 MHz or an 80 MHz DBW(see [Table 38-x1 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 20 MHz UHR TB PPDU)](#_bookmark17), Table 38-x2 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 40 MHz UHR TB PPDU), [Table 38-x3 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 60 MHz UHR TB PPDU) and [Table 38-x4 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in an 80 MHz UHR TB PPDU), the pilot subcarriers shall be inserted at subcarriers *k*  *KR106* ,

*i*

where *KR106* is given by the *i*-th pilot index set in the row of given distributed bandwidth of [Table 38-a3 (Pilot](#_bookmark235)

*i*

[indices for a 106-tone DRU transmission)](#_bookmark235).

**Table 38-a3—Pilot indices for a 106-tone DRU transmission**

|  |  |
| --- | --- |
| **DBW** | $$K\_{R106\_{i}}$$ |
| 20 MHz, *i* = 1:2 | {-111 -78 15 48}, {-56 -23 70 103} |
| 40 MHz, *i* = 1:4 | {-224 -103 28 149}, {-213 -92 39 160}, {-169 -48 83 204}, {-158 -37 94 215} |
| 60 MHz, *i* = 1:6 | TBD |
| 80 MHz, *i* = 1:8 | {-403 -315 97 185}, {-227 -139 273 361}, {-381 -117 119 383}, {-293 -205 207 295}, {-150 -62 350 438}, {-326 -238 174 262}, {-260 -172 240 328}, {-348 -84 152 416} |

The pilot mapping $P\_{n}^{k}$ for the subcarrier k for symbol n shall be as specified in Equation (27-103) in 27.3.12.13 (Pilot subcarriers).

For a user transmitting on the *i*-th 242-tone DRU in a 40 MHz, a 60 MHz or an 80 MHz DBW(see Table 38-x2 (Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 40 MHz UHR TB PPDU), [Table 38-x3 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in a 60 MHz UHR TB PPDU) and [Table 38-x4 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in an 80 MHz UHR TB PPDU), the pilot subcarriers shall be inserted at subcarriers *k*  *KR242* ,

*i*

where *KR242* is given by the *i*-th pilot index set in the row of given distributed bandwidth of [Table 38-a4 (Pilot](#_bookmark235)

*i*

[indices for a 242-tone DRU transmission)](#_bookmark235).

**Table 38-a3—Pilot indices for a 242-tone DRU transmission**

|  |  |
| --- | --- |
| **DBW** | $$K\_{R242\_{i}}$$ |
| 40 MHz, *i* = 1:2 | {-224 -213 -103 -92 28 39 149 160}, {-169 -158 -48 -37 83 94 204 215} |
| 60 MHz, *i* = 1:3 | TBD |
| 80 MHz, *i* = 1:4 | {-403 -315 -227 -139 97 185 273 361}, {-381 -293 -205 -117 119 207 295 383}, {-326 -238 -150 -62 174 262 350 438}, {-348 -260 -172 -84 152 240 328 416} |

The pilot mapping $P\_{n}^{k}$ for the subcarrier k for symbol n shall be as specified in Equation (27-104) in 27.3.12.13 (Pilot subcarriers).

For a user transmitting on the *i*-th 484-tone DRU in an 80 MHz DBW(see [Table 38-x4 (](#_bookmark19)Data and pilot subcarrier indices for Distributed-tone RUs (DRU) in an 80 MHz UHR TB PPDU), the pilot subcarriers shall be inserted at subcarriers *k*  *KR484* ,

*i*

where *KR484* is given by the *i*-th pilot index set in the row of given distributed bandwidth of [Table 38-a5 (Pilot](#_bookmark235)

*i*

[indices for a 484-tone DRU transmission)](#_bookmark235).

**Table 38-a4—Pilot indices for a 484-tone DRU transmission**

|  |  |
| --- | --- |
| **DBW** | $$K\_{R484\_{i}}$$ |
| 80 MHz, *i* = 1:2 | {-403 -381 -315 -293 -227 -205 -139 -117 97 119 185 207 273 295 361 383}, {-348 -326 -260 -238 -172 -150 -84 -62 152 174 240 262 328 350 416 438} |

The pilot mapping $P\_{n}^{k}$ for the subcarrier k for symbol n shall be as specified in Equation (27-105) in 27.3.12.13 (Pilot subcarriers).

For a user transmitting on the MRUs, the pilot subcarriers, mapping and values of MRUs shall follow the pilot subcarriers, mapping, and values defined in 36.3.13.11 (Pilot subcarriers).