

EXHIBIT 25

EXHIBIT 25

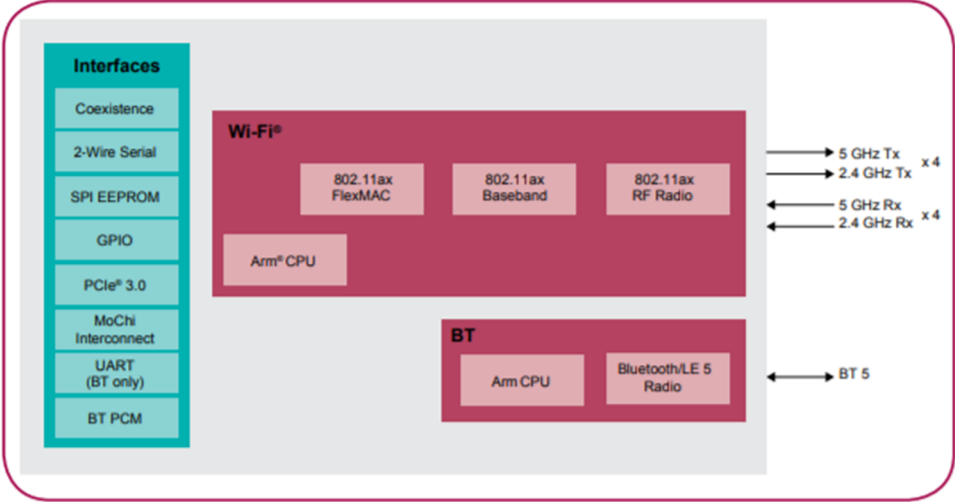
UNITED STATES PATENT NO. 10,200,228

MediaTek hereby identifies evidence demonstrating the infringement of following NXP products: 88W9064, 88W9068, 88W9000S, 88Q9098, 88W9098, IW620, CW641, WLAN8101C, and WLAN8101H (collectively, the “Accused ’228 Products”). These products are made by NXP, and are imported, sold for importation, and/or sold within the United States after importation by NXP, Avnet, Arrow, and Mouser. The chart below is based on evidence of representative products of the Accused ’228 Products.

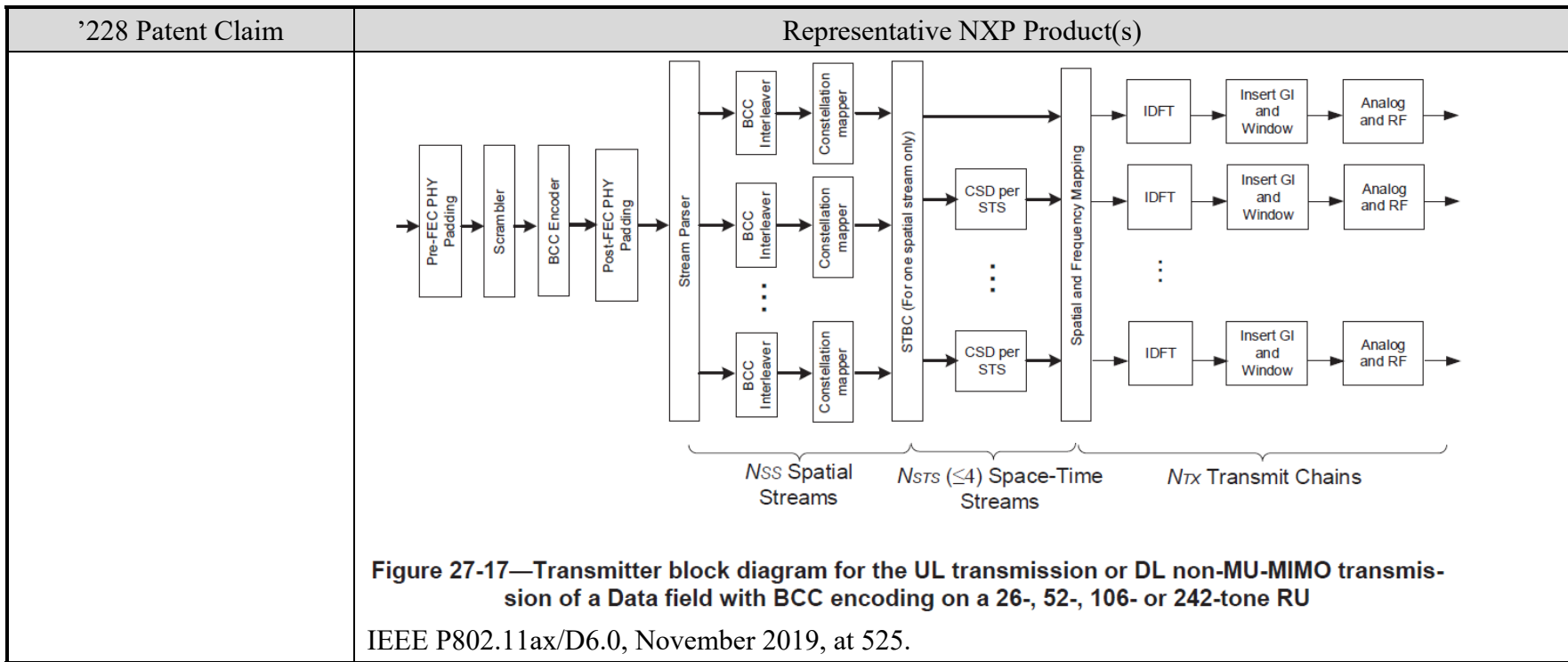
| '228 Patent Claim | Representative NXP Product(s) |
|--|--|
| 11[pre]. A wireless station, comprising: | To the extent the preamble is limiting, the Accused ’228 Products include “[a] wireless station.” <i>See, e.g.:</i> |

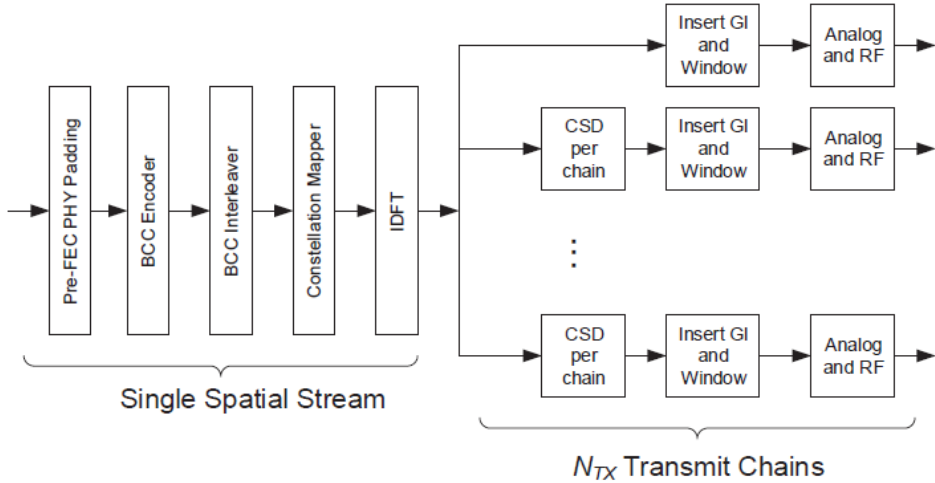
| '228 Patent Claim | Representative NXP Product(s) | | | | |
|-------------------|--|------------------|--------------------|------------------|--------------------|
| | <p data-bbox="583 251 1793 332">88W9064: 2.4/5 GHz Dual-Band 4x4 Wi-Fi® 6 (802.11ax) Access Solution</p> <div data-bbox="583 370 1892 415"> <table border="1"> <tr> <td data-bbox="583 370 856 415">OVERVIEW</td> <td data-bbox="858 370 1182 415">DOCUMENTATION</td> <td data-bbox="1184 370 1528 415">TOOLS & SOFTWARE</td> <td data-bbox="1530 370 1892 415">TRAINING & SUPPORT</td> </tr> </table> </div> <div data-bbox="583 459 655 480"> <p>Jump To</p> </div> <div data-bbox="583 496 737 518"> <p>Overview & Features</p> </div> <div data-bbox="583 532 722 553"> <p>Target Applications</p> </div> <div data-bbox="926 459 1081 493"> <h3>Overview</h3> </div> <div data-bbox="926 516 1377 768"> <p>The 88W9064 is part of the next evolution of our industry-leading Wi-Fi 6 access solutions that have enabled award-winning platforms. This device family provides a complete 802.11ax feature set. Drawing on the strength of our proven implicit and explicit beamforming technologies, our full MU-MIMO and OFDMA solutions help increase capacity not only for downlink traffic but also for uplink traffic. This allows for overall improved network utilization while meeting the growing demands of user applications.</p> </div> <div data-bbox="1423 459 1566 493"> <h3>Features</h3> </div> <div data-bbox="1438 532 1730 878"> <ul style="list-style-type: none"> > Wi-Fi 6 > Flex MAC > Bluetooth > Dedicated In-Service Monitoring > Precision Location > Host Interfaces </div> <div data-bbox="573 943 1892 1011"> <p>https://www.nxp.com/products/wireless/wi-fi-plus-bluetooth/88w9064-2-4-5-ghz-dual-band-4x4-wi-fi-6-802-11ax-access-solution:88W9064</p> </div> | OVERVIEW | DOCUMENTATION | TOOLS & SOFTWARE | TRAINING & SUPPORT |
| OVERVIEW | DOCUMENTATION | TOOLS & SOFTWARE | TRAINING & SUPPORT | | |

| '228 Patent Claim | Representative NXP Product(s) |
|-------------------|---|
| | <div data-bbox="577 245 1581 427" style="background-color: #800040; color: white; padding: 10px; border-radius: 10px 10px 0 0;"> <h2 style="margin: 0;">NXP® 88W9064 4x4 Wi-Fi® 6 Dual Band with Bluetooth® 5 SoC</h2> </div> <div data-bbox="611 459 1583 578" style="border: 1px solid #ccc; border-radius: 15px; padding: 10px; margin-top: 10px;"> <p>The NXP 88W9064 SoC family of Wi-Fi access solutions provides an advanced 802.11ax feature set and draws on the strength of our beamforming technologies. Integrated MU-MIMO and OFDMA solutions help increase capacity for downlink and uplink traffic to allow for overall improved network utilization while meeting the growing demands of user applications. standard compliance.</p> </div> <div style="margin-top: 20px;"> <div style="display: flex; justify-content: space-between;"> <div data-bbox="611 623 1081 1044" style="width: 48%;"> <p>PRODUCT OVERVIEW</p> <p>The NXP 88W9064 SoC family of Wi-Fi access solutions provides an advanced 802.11ax feature set and draws on the strength of our beamforming technologies. Integrated MU-MIMO and OFDMA solutions help increase capacity for downlink and uplink traffic to allow for overall improved network utilization while meeting the growing demands of user applications.</p> <p>Other features of the 88W9064 family include integrated Bluetooth 5 and precision device location function that provides accurate positioning within 1 meter and 10 degrees. Bluetooth 5 supports classic Bluetooth and Bluetooth Low Energy with features such as long-range and direction finding using angle of arrival (AoA) and angle of departure (AoD). The added Bluetooth capability can be leveraged to provide a more cost-effective and complete solution for users' connectivity needs.</p> </div> <div data-bbox="1108 623 1388 867" style="width: 48%;"> <p>TARGET APPLICATIONS</p> <ul style="list-style-type: none"> ▶ 88W9064 SoC <ul style="list-style-type: none"> – Enterprise & retail access points – Broadband gateway – Fixed wireless ▶ 88W9064S SoC <ul style="list-style-type: none"> – Service provider set-top box – Over-the-top set-top box </div> </div> </div> <div data-bbox="577 1076 1482 1109" style="margin-top: 20px;"> <p>https://www.nxp.com/docs/en/fact-sheet/88W9064-FACT-SHEET.pdf</p> </div> |

| '228 Patent Claim | Representative NXP Product(s) |
|---|--|
| | <p data-bbox="600 256 1066 280">88W9064/88W9064S BLOCK DIAGRAM</p>  <p data-bbox="575 837 1482 870">https://www.nxp.com/docs/en/fact-sheet/88W9064-FACT-SHEET.pdf</p> |
| <p data-bbox="191 967 541 1248">11[a]. an encoder operable to encodes a data packet to be transmitted from a source station to a destination station over a resource unit (RU) in a wireless local area network to generate encoded bits,</p> | <p data-bbox="575 967 1885 1073">The Accused '228 Products include “an encoder operable to encodes a data packet to be transmitted from a source station to a destination station over a resource unit (RU) in a wireless local area network to generate encoded bits.”</p> <p data-bbox="575 1127 695 1159"><i>See, e.g.:</i></p> |

| '228 Patent Claim | Representative NXP Product(s) |
|-------------------|--|
| | <p data-bbox="583 251 764 280">27.3 HE PHY</p> <p data-bbox="583 326 827 355">27.3.1 Introduction</p> <p data-bbox="583 397 1745 456">This subclause provides the procedure by which PSDUs are converted to and from transmissions on the wireless medium.</p> <p data-bbox="583 500 1745 591">During transmission, a PSDU (in the SU case) or one or more PSDUs (in the MU case) are processed (i.e., scrambled and coded) and appended to the PHY preamble to create the PPDU. At the receiver, the PHY preamble is processed to aid in the detection, demodulation, and delivery of the PSDU.</p> <p data-bbox="573 609 1184 638">IEEE P802.11ax/D6.0, November 2019, at 504.</p> <p data-bbox="583 695 1131 724">27.3.5 Transmitter block diagram</p> <p data-bbox="583 751 1892 1011">Figure 27-17 (Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a 26-, 52-, 106- or 242-tone RU) shows the transmitter blocks for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a 26-, 52-, 106-, or 242-tone RU for a single frequency segment if the number of spatial streams is less than or equal to 4. Figure 27-17 applies to the Data field of an HE MU PPDU that is transmitted on an RU allocated to a single user, the Data field of an HE SU PPDU, and the Data field of an HE TB PPDU (whether or not it is spatially multiplexed with other users).</p> <p data-bbox="573 1029 1226 1058">IEEE P802.11ax/D6.0, November 2019, at 524-25.</p> |



| '228 Patent Claim | Representative NXP Product(s) |
|-------------------|---|
| | <p data-bbox="583 251 1900 430">Figure 27-16 (Transmitter block diagram for the HE-SIG-B field) shows the transmit process for the HE-SIG-B field of an HE MU PPDU using one frequency segment. This block diagram is for transmitting HE-SIG-B in one 20 MHz subchannel. Refer to 27.3.11.8.2 (HE-SIG-B content channels) for the methods of transmitting HE-SIG-B in 40 MHz, 80 MHz and 160 MHz. The DCM tone mapper, which is defined in 27.3.12.9 (Constellation mapping), is applied only if the HE-SIG-B DCM field in the HE-SIG-A field is 1.</p>  <p data-bbox="787 1036 1696 1071">Figure 27-16—Transmitter block diagram for the HE-SIG-B field</p> <p data-bbox="583 1088 1186 1120">IEEE P802.11ax/D6.0, November 2019, at 524.</p> <p data-bbox="583 1169 955 1201">27.3.4 HE PPDU formats</p> |

| '228 Patent Claim | Representative NXP Product(s) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------|-----------|------------|----------------------|-----------|-----------|--------|--------|--------|------|----|-------|-------|-------|--------|----------|--------|--------|-----|--|--------|------|----|-----------|-----------|-----------|-----------|-----------|----------------------|-----------|-----|--|--------|------|----|-------|-------|-------|--------|----------|----------|--------|--------|-----|--|--------|------|----|-----------|-----------|-----------|-----------|------------|-----------|-----|--|--------|------|----|-------|-------|-------|--------|----------|--------|--------|-----|--|--------|------|----|
| | <p>The format of the HE SU PPDU is defined as in Figure 27-8 (HE SU PPDU format). This PPDU format is used for SU transmission and, in this format, the HE-SIG-A field is not repeated.</p> <div style="text-align: center;"> <p>Variable durations per HE-LTF symbol</p> <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> <tr> <td style="text-align: center;">L-STF</td> <td style="text-align: center;">L-LTF</td> <td style="text-align: center;">L-SIG</td> <td style="text-align: center;">RL-SIG</td> <td style="text-align: center;">HE-SIG-A</td> <td style="text-align: center;">HE-STF</td> <td style="text-align: center;">HE-LTF</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> </table> </div> <p style="text-align: center;">Figure 27-8—HE SU PPDU format</p> <p>The format of the HE MU PPDU is defined as in Figure 27-9 (HE MU PPDU format). This format is used for transmission to one or more users if the PPDU is not a response of a Trigger frame. In the HE MU PPDU, the HE-SIG-A field is not repeated. The HE-SIG-B field is present in this format.</p> <div style="text-align: center;"> <p>Variable durations per HE-LTF symbol</p> <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs per symbol</td> <td style="text-align: center;">4 μs</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> <tr> <td style="text-align: center;">L-STF</td> <td style="text-align: center;">L-LTF</td> <td style="text-align: center;">L-SIG</td> <td style="text-align: center;">RL-SIG</td> <td style="text-align: center;">HE-SIG-A</td> <td style="text-align: center;">HE-SIG-B</td> <td style="text-align: center;">HE-STF</td> <td style="text-align: center;">HE-LTF</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> </table> </div> <p style="text-align: center;">Figure 27-9—HE MU PPDU format</p> <p>The format of the HE ER SU PPDU is defined as in Figure 27-10 (HE ER SU PPDU format). This format is used for SU transmission and, in this format, the HE-SIG-A field is twice as long as the HE-SIG-A field in other HE PPDU formats.</p> <div style="text-align: center;"> <p>Variable durations per HE-LTF symbol</p> <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">16 μs</td> <td style="text-align: center;">4 μs</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> <tr> <td style="text-align: center;">L-STF</td> <td style="text-align: center;">L-LTF</td> <td style="text-align: center;">L-SIG</td> <td style="text-align: center;">RL-SIG</td> <td style="text-align: center;">HE-SIG-A</td> <td style="text-align: center;">HE-STF</td> <td style="text-align: center;">HE-LTF</td> <td colspan="2" style="text-align: center;">...</td> <td style="text-align: center;">HE-LTF</td> <td style="text-align: center;">Data</td> <td style="text-align: center;">PE</td> </tr> </table> </div> <p style="text-align: center;">Figure 27-10—HE ER SU PPDU format</p> <p>IEEE P802.11ax/D6.0, November 2019, at 519.</p> | 8 μ s | 8 μ s | 4 μ s | 4 μ s | 8 μ s | 4 μ s | ... | | HE-LTF | Data | PE | L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE | 8 μ s | 8 μ s | 4 μ s | 4 μ s | 8 μ s | 4 μ s per symbol | 4 μ s | ... | | HE-LTF | Data | PE | L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-SIG-B | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE | 8 μ s | 8 μ s | 4 μ s | 4 μ s | 16 μ s | 4 μ s | ... | | HE-LTF | Data | PE | L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE |
| 8 μ s | 8 μ s | 4 μ s | 4 μ s | 8 μ s | 4 μ s | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 μ s | 8 μ s | 4 μ s | 4 μ s | 8 μ s | 4 μ s per symbol | 4 μ s | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-SIG-B | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 μ s | 8 μ s | 4 μ s | 4 μ s | 16 μ s | 4 μ s | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L-STF | L-LTF | L-SIG | RL-SIG | HE-SIG-A | HE-STF | HE-LTF | ... | | HE-LTF | Data | PE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11[b]. wherein the data packet comprises a bit to indicate to use dual carrier modulation (DCM), | <p>The Accused '228 Products include a “data packet” that “comprises a bit to indicate to use dual carrier modulation (DCM), wherein the RU comprises a total number of data tones.”</p> <p><i>See, e.g.:</i></p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| '228 Patent Claim | Representative NXP Product(s) | |
|---|---------------------------------|---|
| wherein the RU comprises a total number of data tones; | FEATURES | 88W9064 |
| | Wi-Fi® | <ul style="list-style-type: none"> • IEEE® 802.11ax, 802.11ac Wave 2, 802.11a/b/g/n • 20/40/80/160 (80+80) MHz channel bandwidths • 2.4 Gbit/s peak data rate • Implicit and explicit beamforming |
| | 802.11ax | <ul style="list-style-type: none"> • Downlink OFDMA and MU-MIMO • Uplink OFDMA and MU-MIMO • 1024 QAM • Spatial re-use • Range extension • DCM |
| | Flex MAC | <ul style="list-style-type: none"> • Adaptable architecture for standards evolution • Management of high number of traffic queues • Advanced scheduling |
| | Bluetooth® | <ul style="list-style-type: none"> • Support for Bluetooth 5 • Direction finding • Long range • Co-existence arbitration |
| | Dedicated In-Service Monitoring | <ul style="list-style-type: none"> • Concurrent spectrum scanning • Zero wait DFS |
| | Precision Location | <ul style="list-style-type: none"> • Distance: within 1 meter • Angle: within 10 degrees |
| | Host Interfaces | <ul style="list-style-type: none"> • MCi (2-Lane) • PCIe® 3.0 (2-Lane) • High-Speed UART (for Bluetooth only) |
| https://www.nxp.com/docs/en/fact-sheet/88W9064-FACT-SHEET.pdf | | |
| 27.3.4 HE PPDU formats | | |

'228 Patent Claim

Representative NXP Product(s)

The format of the HE SU PPDU is defined as in Figure 27-8 (HE SU PPDU format). This PPDU format is used for SU transmission and, in this format, the HE-SIG-A field is not repeated.

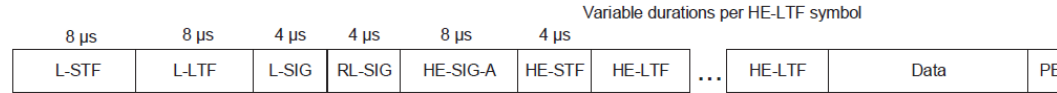


Figure 27-8—HE SU PPDU format

The format of the HE MU PPDU is defined as in Figure 27-9 (HE MU PPDU format). This format is used for transmission to one or more users if the PPDU is not a response of a Trigger frame. In the HE MU PPDU, the HE-SIG-A field is not repeated. The HE-SIG-B field is present in this format.

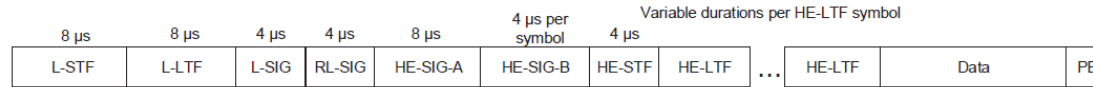


Figure 27-9—HE MU PPDU format

The format of the HE ER SU PPDU is defined as in Figure 27-10 (HE ER SU PPDU format). This format is used for SU transmission and, in this format, the HE-SIG-A field is twice as long as the HE-SIG-A field in other HE PPDU formats.

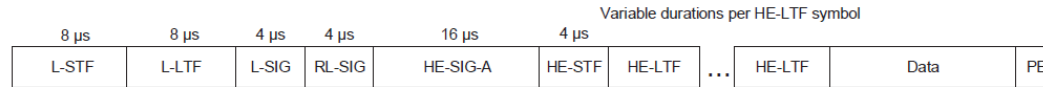


Figure 27-10—HE ER SU PPDU format

IEEE P802.11ax/D6.0, November 2019, at 519.

27.3.11.7 HE-SIG-A

'228 Patent Claim

Representative NXP Product(s)

Table 27-20—HE-SIG-A field of an HE MU PDU

| Two Parts of HE-SIG-A | Bit | Field | Number of bits | Description |
|-----------------------|-------|--------------|----------------|--|
| HE-SIG-A1 | B0 | UL/DL | 1 | Indicates whether the PDU is sent UL or DL. Set to 1 if the PDU is addressed to an AP. Set to 0 otherwise. See the TXVECTOR parameter UPLINK_FLAG. NOTE—The TDLS peer can identify the TDLS frame by To DS and From DS fields in the MAC header of the frame. |
| | B1-B3 | HE-SIG-B-MCS | 3 | Indicates the HE-MCS of the HE-SIG-B field: Set to 0 for HE-SIG-B-MCS 0 Set to 1 for HE-SIG-B-MCS 1 Set to 2 for HE-SIG-B-MCS 2 Set to 3 for HE-SIG-B-MCS 3 Set to 4 for HE-SIG-B-MCS 4 Set to 5 for HE-SIG-B-MCS 5 Values 6 and 7 are reserved |
| | B4 | HE-SIG-B DCM | 1 | Set to 1 indicates that the HE-SIG-B is modulated with DCM for the HE-MCS. Set to 0 indicates that the HE-SIG-B is not modulated with DCM for the HE-MCS. NOTE—DCM is only applicable to HE-SIG-B-MCS 0, 1, 3, and 4. |

IEEE P802.11ax/D6.0, November 2019, at 555-56.

27.3.11.8 HE-SIG-B

27.3.11.8.4 User Specific field

| '228 Patent Claim | Representative NXP Product(s) | | | | | | | | | | | | | | |
|-------------------|---|----------------|--|-----|----------|----------------|-------------|---------|--------|---|---|-----|-----|---|--|
| | <p align="center">Table 27-28—User field format for a non-MU-MIMO allocation</p> <table border="1" data-bbox="579 326 1751 1037"> <thead> <tr> <th data-bbox="585 331 732 428">Bit</th> <th data-bbox="737 331 926 428">Subfield</th> <th data-bbox="930 331 1079 428">Number of bits</th> <th data-bbox="1083 331 1745 428">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="585 431 732 672">B15–B18</td> <td data-bbox="737 431 926 672">HE-MCS</td> <td data-bbox="930 431 1079 672">4</td> <td data-bbox="1083 431 1745 672"> If the STA-ID subfield is not 2046, indicates the modulation and coding scheme: Set to n for HE-MCS n, where $n = 0, 1, 2, \dots, 11$ Values 12-15 are reserved Set to an arbitrary value if the STA-ID subfield is 2046. </td> </tr> <tr> <td data-bbox="585 675 732 1032">B19</td> <td data-bbox="737 675 926 1032">DCM</td> <td data-bbox="930 675 1079 1032">1</td> <td data-bbox="1083 675 1745 1032"> If the STA-ID subfield is not 2046, indicates whether or not DCM is used: Set to 1 to indicate that the payload of the corresponding user of the HE MU PPDU is modulated with DCM for the HE-MCS. Set to 0 to indicate that the payload of the corresponding user of the PPDU is not modulated with DCM for the HE-MCS. Set to an arbitrary value if the STA-ID subfield is 2046. </td> </tr> </tbody> </table> <p data-bbox="579 1045 1251 1078">IEEE P802.11ax/D6.0, November 2019, at 572, 583.</p> <p data-bbox="579 1133 957 1214">27.3.11.8 HE-SIG-B 27.3.11.8.3 Common field</p> | | | Bit | Subfield | Number of bits | Description | B15–B18 | HE-MCS | 4 | If the STA-ID subfield is not 2046, indicates the modulation and coding scheme: Set to n for HE-MCS n , where $n = 0, 1, 2, \dots, 11$ Values 12-15 are reserved Set to an arbitrary value if the STA-ID subfield is 2046. | B19 | DCM | 1 | If the STA-ID subfield is not 2046, indicates whether or not DCM is used: Set to 1 to indicate that the payload of the corresponding user of the HE MU PPDU is modulated with DCM for the HE-MCS. Set to 0 to indicate that the payload of the corresponding user of the PPDU is not modulated with DCM for the HE-MCS. Set to an arbitrary value if the STA-ID subfield is 2046. |
| Bit | Subfield | Number of bits | Description | | | | | | | | | | | | |
| B15–B18 | HE-MCS | 4 | If the STA-ID subfield is not 2046, indicates the modulation and coding scheme: Set to n for HE-MCS n , where $n = 0, 1, 2, \dots, 11$ Values 12-15 are reserved Set to an arbitrary value if the STA-ID subfield is 2046. | | | | | | | | | | | | |
| B19 | DCM | 1 | If the STA-ID subfield is not 2046, indicates whether or not DCM is used: Set to 1 to indicate that the payload of the corresponding user of the HE MU PPDU is modulated with DCM for the HE-MCS. Set to 0 to indicate that the payload of the corresponding user of the PPDU is not modulated with DCM for the HE-MCS. Set to an arbitrary value if the STA-ID subfield is 2046. | | | | | | | | | | | | |

'228 Patent Claim

Representative NXP Product(s)

Table 27-24—Common field

| Subfield | Number of subfields | Number of bits per subfield | Description |
|---------------|---------------------|-----------------------------|---|
| RU Allocation | N | 8 | <p>NRU Allocation subfields are present in an HE-SIG-B content channel, where:</p> <p>$N = 1$ if the Bandwidth field in the HE-SIG-A field is 0 or 1 (indicating a 20 MHz or 40 MHz HE MU PPDU)</p> <p>$N = 2$ if the Bandwidth field in the HE-SIG-A field is 2, 4, or 5 (indicating an 80 MHz HE MU PPDU)</p> <p>$N = 4$ if the Bandwidth field in the HE-SIG-A field is 3, 6, or 7 (indicating a 160 MHz or 80+80 MHz HE MU PPDU)</p> <p>Each RU Allocation subfield in an HE-SIG-B content channel corresponding to a 20 MHz frequency segment indicates the RU assignment, including the size of the RU(s) and their placement in the frequency domain, to be used in the HE modulated fields of the HE MU PPDU in the frequency domain, also indicates information needed to compute the number of users allocated to each RU, where the subcarrier indices of the RU(s) meet the conditions in Table 27-25 (RUs associated with each RU Allocation subfield for each HE-SIG-B content channel and PPDU bandwidth).</p> |

IEEE P802.11ax/D6.0, November 2019, at 573.

Table 27-25—RUs associated with each RU Allocation subfield for each HE-SIG-B content channel and PPDU bandwidth

| PPDU bandwidth | RU Allocation subfield and Center 26-tone RU subfield (if present) | RUs in the subcarrier range, or overlapping with the subcarrier range if the RU is larger than a 242-tone RU |
|----------------|--|--|
| 20 MHz | The RU Allocation subfield in a single HE-SIG-B content channel | [−122:122] |

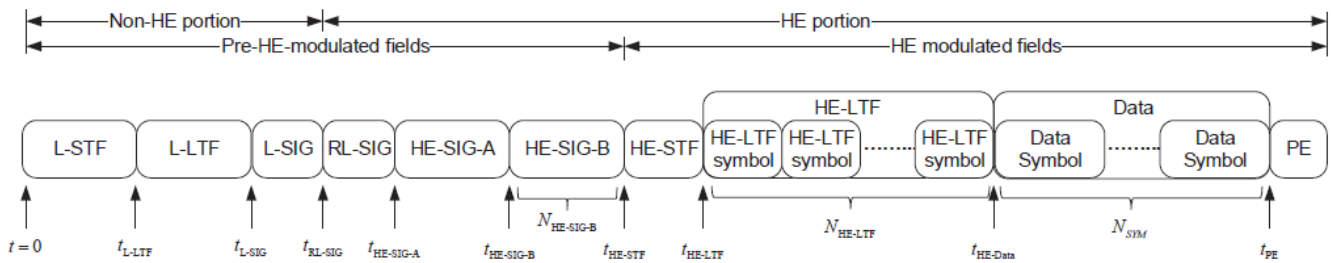
IEEE P802.11ax/D6.0, November 2019, at 575.

| '228 Patent Claim | Representative NXP Product(s) |
|---|--|
| | <p>27.3.7 HE modulation and coding schemes (HE-MCSs)</p> <p>DCM is an optional modulation scheme used for the HE-SIG-B field and the Data field in an HE PPDU. The use of DCM for the HE-SIG-B field in an HE MU PPDU is indicated in the HE-SIG-A field. For the HE-SIG-B field, DCM is applicable to only the HE-SIG-B-MCSs 0, 1, 3 and 4. The use of DCM on the Data field of an HE SU PPDU and HE ER SU PPDU is indicated in the HE-SIG-A field. The use of DCM in the Data field of an HE MU PPDU is indicated in the HE-SIG-B field. For the Data field, DCM is applicable to only the HE-MCSs 0, 1, 3 and 4.</p> <p>IEEE P802.11ax/D6.0, November 2019, at 537-38.</p> |
| <p>11[c]. an interleaver operable to interleaves a set of the encoded bits to produce a set of interleaved bits by using interleaving parameters, wherein in response to the bit indicating to use the DCM, the interleaver is operable to determine the interleaving parameters based on half of the total number of data tones of the RU, wherein the set of the encoded bits is interleaved with respect to half of the total number of data tones of the RU in response to the bit indicating to use the DCM;</p> | <p>The Accused '228 Products include “an interleaver operable to interleaves a set of the encoded bits to produce a set of interleaved bits by using interleaving parameters, wherein in response to the bit indicating to use the DCM, the interleaver is operable to determine the interleaving parameters based on half of the total number of data tones of the RU, wherein the set of the encoded bits is interleaved with respect to half of the total number of data tones of the RU in response to the bit indicating to use the DCM.”</p> <p><i>See, e.g.:</i></p> <p>27.3.5 Transmitter block diagram</p> |

| '228 Patent Claim | Representative NXP Product(s) |
|--|---|
| | <p>The diagram illustrates the transmitter block structure. It starts with a sequence of four blocks: Pre-FEC PHY Padding, Scrambler, BCC Encoder, and Post-FEC PHY Padding. These feed into a Stream Parser. The output of the Stream Parser is distributed to $N_{Spatial}$ parallel paths. Each path contains a BCC Interleaver and a Constellation mapper. The outputs of these paths feed into an STBC (For one spatial stream only) block. The output of the STBC block is distributed to $N_{STS} (\leq 4)$ parallel paths, each containing a CSD per STS block. The outputs of these paths feed into a Spatial and Frequency Mapping block. The output of the Spatial and Frequency Mapping block is distributed to N_{Tx} parallel paths. Each path contains an IDFT block, an Insert GI and Window block, and an Analog and RF block. The diagram is divided into three sections: $N_{Spatial}$ Spatial Streams, $N_{STS} (\leq 4)$ Space-Time Streams, and N_{Tx} Transmit Chains.</p> |
| <p>Figure 27-17—Transmitter block diagram for the UL transmission or DL non-MU-MIMO transmission of a Data field with BCC encoding on a 26-, 52-, 106- or 242-tone RU</p> | |
| <p>IEEE P802.11ax/D6.0, November 2019, at 525.</p> | |
| <p>27.3.12.8 BCC interleavers</p> | |
| <p>The BCC interleaver operation is specified in 21.3.10.8 (BCC interleaver). The interleaver parameters, N_{COL}, N_{ROW}, and N_{ROT}, for the Data field depend on the RU size and whether or not DCM is used and are defined in the RU size column of Table 27-35 (BCC interleaver parameters).</p> | |

| '228 Patent Claim | Representative NXP Product(s) | | | | | | |
|---|---|------------------|------------------------|----------------------|----------------------|----------------------|----------------------------------|
| | Table 27-35—BCC interleaver parameters | | | | | | |
| | DCM | Parameter | RU size (tones) | | | | HE-SIG-A/HE-SIG-B (tones) |
| | | | 26 | 52 | 106 | 242 | 56 |
| | Not used | N_{COL} | 8 | 16 | 17 | 26 | 13 |
| | | N_{ROW} | $3 \times N_{BPSCS}$ | $3 \times N_{BPSCS}$ | $6 \times N_{BPSCS}$ | $9 \times N_{BPSCS}$ | $4 \times N_{BPSCS}$ |
| | | N_{ROT} | 2 | 11 | 29 | 58 | - |
| | Used | N_{COL} | 4 | 8 | 17 | 13 | 13 |
| | | N_{ROW} | $3 \times N_{BPSCS}$ | $3 \times N_{BPSCS}$ | $3 \times N_{BPSCS}$ | $9 \times N_{BPSCS}$ | $2 \times N_{BPSCS}$ |
| | | N_{ROT} | 2 | 2 | 11 | 29 | - |
| | <p>The interleaver parameters, N_{COL} and N_{ROW}, for the HE-SIG-A and HE-SIG-B fields are defined in the HE-SIG-A/HE-SIG-B column of Table 27-35 (BCC interleaver parameters).</p> | | | | | | |
| <p>IEEE P802.11ax/D6.0, November 2019, at 619-20.</p> | | | | | | | |

| '228 Patent Claim | Representative NXP Product(s) |
|---|---|
| <p>11[d]. a modulator operable to modulate the set of interleaved bits to generate a modulated output, wherein in response to the bit indicating to use the DCM, the modulator is operable to modulates the set of interleaved bits onto a first half of frequency subcarriers of the RU using a first modulation scheme; and is operable to modulate a copy of the set of interleaved bits onto a second half of frequency subcarriers of the RU using a second modulation scheme; and</p> | <p>On information and belief, the Accused '228 Products include “a modulator operable to modulate the set of interleaved bits to generate a modulated output, wherein in response to the bit indicating to use the DCM, the modulator is operable to modulates the set of interleaved bits onto a first half of frequency subcarriers of the RU using a first modulation scheme; and is operable to modulate a copy of the set of interleaved bits onto a second half of frequency subcarriers of the RU using a second modulation scheme.”</p> <p><i>See, e.g.:</i></p> <p>27.3.12.9 Constellation mapping</p> <p>If DCM is employed, bit sequences are mapped to a pair of symbols $(d_k^l, d_{q(k)}^l)$ where k is in the range of $0 \leq k \leq N_{SD} - 1$ and $q(k)$ is in the range of $N_{SD} \leq q(k) \leq 2N_{SD} - 1$ in order to exploit frequency diversity for a 996-tone or smaller RU, and $0 \leq k \leq N_{SD}/2 - 1$ and $q(k)$ is in the range of $N_{SD}/2 \leq q(k) \leq N_{SD} - 1$ for a 2×996-tone RU. To maximize the frequency diversity, the indices of a pair of DCM subcarriers $(k, q(k))$ is $q(k) = k + N_{SD}$ for a 996-tone or smaller RU and $q(k) = k + N_{SD}/2$ for a 2×996-tone RU. The N_{SD} here refers to the N_{SD} with DCM = 1, which is half the value of N_{SD} with DCM = 0.</p> <p>For BPSK modulation with DCM, the input stream is broken into groups of N_{CBPS} or $N_{CBPS,u}$ bits $(B_0, B_1, \dots, B_{N_{CBPS,u}-1})$. Each bit B_k is BPSK modulated to a sample d_k^l. This generates the samples for the lower half of the data subcarriers. For the upper half of the subcarriers, the samples are generated as $d_{k+N_{SD}}^l = d_k^l \times e^{j(k+N_{SD})\pi}$, $k = 0, 1, \dots, N_{SD} - 1$. The N_{SD} here refers to the N_{SD} with DCM = 1, which is half the value of N_{SD} with DCM = 0.</p> <p>IEEE P802.11ax/D6.0, November 2019, at 620-23.</p> |
| <p>11[e]. a transmitter operable to transmit the modulated output that</p> | <p>The Accused '228 Products include “a transmitter operable to transmit the modulated output that represents the data packet for receipt by the destination station.”</p> |

| '228 Patent Claim | Representative NXP Product(s) |
|---|---|
| <p>represents the data packet for receipt by the destination station.</p> | <p>See, e.g.:</p> <p>27.3 HE PHY</p> <p>27.3.1 Introduction</p> <p>This subclause provides the procedure by which PSDUs are converted to and from transmissions on the wireless medium.</p> <p>During transmission, a PSDU (in the SU case) or one or more PSDUs (in the MU case) are processed (i.e., scrambled and coded) and appended to the PHY preamble to create the PPDU. At the receiver, the PHY preamble is processed to aid in the detection, demodulation, and delivery of the PSDU.</p> <p>IEEE P802.11ax/D6.0, November 2019, at 504.</p>  <p>Figure 27-23—Timing boundaries for HE PPDU fields if midamble is not present</p> <p>IEEE P802.11ax/D6.0, November 2019, at 544.</p> |