

CLAIMS

1. A PPDU transmission method, wherein the method comprises:

generating a physical layer protocol data unit PPDU with a bandwidth of X MHz, wherein X > 160, some or all fields in the PPDU are rotated in the bandwidth of X MHz by using a rotation factor sequence, the bandwidth of X MHz comprises n bandwidths of Y MHz, the rotation factor sequence comprises n rotation factors, and each bandwidth of Y MHz is corresponding to one rotation factor; and

sending the PPDU with the bandwidth of X MHz.

2. A PPDU transmission method, wherein the method comprises:

receiving a physical layer protocol data unit PPDU with a bandwidth of X MHz, wherein X > 160, some or all fields in the PPDU are rotated in the bandwidth of X MHz by using a rotation factor sequence, the bandwidth of X MHz comprises n bandwidths of Y MHz, the rotation factor sequence comprises n rotation factors, and each bandwidth of Y MHz is corresponding to one rotation factor; and

performing rotation recovery on the PPDU based on the rotation factor sequence.

3. The method according to claim 1 or 2, wherein the X MHz is any one of 240 MHz or 320 MHz.

4. The method according to any one of claims 1 to 3, wherein one or more fields in a legacy short training field L-STF, a legacy long training field L-LTF, a legacy signal field L-SIG, a repeated legacy signal field RL-SIG, a universal signal field U-SIG, or an extremely high throughput signal field EHT-SIG that are comprised in the PPDU are duplicated in the n bandwidths of Y MHz; and the one or more fields in the L-STF, L-LTF, L-SIG, U-SIG, and EHT-SIG are rotated by using the rotation factor sequence.

5. The method according to any one of claims 1 to 4, wherein Y=20 MHz, and the first four rotation factors in the rotation factor sequence are [1 -1 -1 -1]; or

Y=20 MHz, and the first eight rotation factors in the rotation factor sequence are [1 -1 -1 -1 1 -1 -1 -1].

6. The method according to any one of claims 1 to 4, wherein X=320, and the rotation factor sequence is [PR₈₀ C₁PR₈₀ C₂PR₈₀ C₃PR₈₀], wherein PR₈₀ is a rotation factor [1 -1 -1 -1] of a bandwidth of 80 MHz, C₁ is 1, -1, j, or -j, C₂ is 1, -1, j, or -j, and C₃ is 1, -1, j, or -j.

7. The method according to any one of claims 1 to 5, wherein $C_1=1$, $C_2=-1$, $C_3=-1$, and the rotation factor sequence is [1 -1 -1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 1 1].

8. The method according to claim 6 or 7, wherein there are one or more of the following puncturing patterns for 320 MHz:

case 1	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 9	240 MHz [1 1 1 1 x x x x 1 1 1 1 1 1 1 1]
case 10	240 MHz [1 1 1 1 1 1 1 1 x x x x 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x x x]
case 12	240 MHz [x x x x 1 1 1 1 1 1 1 1 1 1 1 1]

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wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "240 MHz" or "280 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

10 9. The method according to claim 6 or 7, wherein there are one or more of the following puncturing patterns for 320 MHz:

case 1	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1]

case 5	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 9	240 MHz [1 1 1 1 x x x 1 1 1 1 1 1 1]
case 10	240 MHz [1 1 1 1 1 1 1 1 x x x 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x x]
case 12	240 MHz [x x x 1 1 1 1 1 1 1 1 1 1 1]
case 13	160 MHz [1 1 1 1 1 1 1 1 x x x x x x]
case 14	160 MHz [x x x x x x x 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "280 MHz", "240 MHz", or "160 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[]" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

10. The method according to claim 6 or 7, wherein there are one or more of the following puncturing patterns for 320 MHz:

case 1	320 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1]

case 9	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 10	240 MHz [1 1 1 1 x x x 1 1 1 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 x x x 1 1 1 1]
case 12	240 MHz [1 1 1 1 1 1 1 1 1 1 1 x x x]
case 13	240 MHz [x x x 1 1 1 1 1 1 1 1 1 1 1]
case 14	160 MHz [1 1 1 1 1 1 1 x x x x x x]
case 15	160 MHz [x x x x x x 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "320 MHz", "280 MHz", "240 MHz", or "160 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[]" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

11. The method according to claim 6 or 7, wherein there are one or more of the following puncturing patterns for 320 MHz:

case 1	320 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 9	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 10	240 MHz [1 1 1 1 x x x 1 1 1 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 x x x 1 1 1 1]

of Y MHz, the rotation factor sequence comprises n rotation factors, and each bandwidth of Y MHz is corresponding to one rotation factor; and

a sending unit, configured to send the PPDU with the bandwidth of X MHz.

15. A PPDU transmission apparatus, wherein the apparatus comprises:

- 5 a receiving unit, configured to receive a physical layer protocol data unit PPDU with a bandwidth of X MHz, wherein $X > 160$, some or all fields in the PPDU are rotated in the bandwidth of X MHz by using a rotation factor sequence, the bandwidth of X MHz comprises n bandwidths of Y MHz, the rotation factor sequence comprises n rotation factors, and each bandwidth of Y MHz is corresponding to one rotation factor; and
- 10 a processing unit, configured to perform rotation recovery on the PPDU based on the rotation factor sequence.

16. The PPDU transmission apparatus according to claim ~~10-14~~ or ~~11-15~~, wherein the X MHz is any one of the following: 240 MHz or 320 MHz.

17. The PPDU transmission apparatus according to any one of claims ~~10-14~~ to ~~12-16~~, wherein
- 15 one or more fields in a legacy short training field L-STF, a legacy long training field L-LTF, a legacy signal field L-SIG, a repeated legacy signal field RL-SIG, a universal signal field U-SIG, or an extremely high throughput signal field EHT-SIG that are comprised in the PPDU are duplicated in the n bandwidths of Y MHz; and the one or more fields in the L-STF, L-LTF, L-SIG, U-SIG, and EHT-SIG are rotated by using the rotation factor sequence.

- 20 18. The PPDU transmission apparatus according to any one of claims 14 to 17, wherein $Y=20$ MHz, and the first four rotation factors in the rotation factor sequence are $[1 \ -1 \ -1 \ -1]$; or

$Y=20$ MHz, and the first eight rotation factors in the rotation factor sequence are $[1 \ -1 \ -1 \ -1 \ 1 \ -1 \ -1 \ -1]$.

19. The PPDU transmission apparatus according to any one of claims 14 to 18, wherein
- 25 $X=320$, and the rotation factor sequence is $[PR_{80} \ C_1PR_{80} \ C_2PR_{80} \ C_3PR_{80}]$, wherein PR_{80} is a rotation factor $[1 \ -1 \ -1 \ -1]$ of a bandwidth of 80 MHz, C_1 is 1, -1, j, or -j, C_2 is 1, -1, j, or -j, and C_3 is 1, -1, j, or -j.

20. The PPDU transmission apparatus according to any one of claims 14 to 19, wherein $C_1=1$, $C_2=-1$, $C_3=-1$, and the rotation factor sequence is $[1 \ -1 \ -1 \ -1 \ 1 \ -1 \ -1 \ -1 \ -1 \ 1 \ 1 \ 1 \ -1 \ 1 \ 1 \ 1]$.

- 30 21. The PPDU transmission apparatus according to claim 19 or 20, wherein there are any one or more of the following puncturing patterns for 320 MHz:

case 1	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 9	240 MHz [1 1 1 1 x x x x 1 1 1 1 1 1 1]
case 10	240 MHz [1 1 1 1 1 1 1 1 x x x x 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x x x]
case 12	240 MHz [x x x x 1 1 1 1 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "240 MHz" or "280 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

22. The PPDU transmission apparatus according to claim 19 or 20, wherein there are any one or more of the following puncturing patterns for 320 MHz:

case 1	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1 1]

case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 9	240 MHz [1 1 1 1 x x x 1 1 1 1 1 1 1]
case 10	240 MHz [1 1 1 1 1 1 1 x x x 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 1 1 1 x x x]
case 12	240 MHz [x x x 1 1 1 1 1 1 1 1 1 1 1]
case 13	160 MHz [1 1 1 1 1 1 1 x x x x x x]
case 14	160 MHz [x x x x x x 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "280 MHz", "240 MHz", or "160 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

23. The PPDU transmission apparatus according to claim 19 or 20, wherein there are any one or more of the following puncturing patterns for 320 MHz:

case 1	320 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 x x 1 1 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 x x 1 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 x x 1 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 9	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 10	240 MHz [1 1 1 1 x x x 1 1 1 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 x x x 1 1 1 1]

case 12	240 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x x x]
case 13	240 MHz [x x x x 1 1 1 1 1 1 1 1 1 1 1 1]
case 14	160 MHz [1 1 1 1 1 1 1 1 x x x x x x x x]
case 15	160 MHz [x x x x x x x x 1 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not punctured, "x" indicates that the 20 MHz is punctured, "320 MHz", "280 MHz", "240 MHz", or "160 MHz" indicates a size of a frequency occupied after the 320 MHz is punctured, and 20 MHz in "[]" is sorted in a sequence from a low frequency to a high frequency or from a high frequency to a low frequency in 320 MHz.

24. The PPDU transmission apparatus according to claim 19 or 20, wherein there are any one or more of the following puncturing patterns for 320 MHz:

case 1	320 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 2	280 MHz [x x 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
case 3	280 MHz [1 1 x x 1 1 1 1 1 1 1 1 1 1 1 1]
case 4	280 MHz [1 1 1 1 x x 1 1 1 1 1 1 1 1 1 1]
case 5	280 MHz [1 1 1 1 1 1 x x 1 1 1 1 1 1 1 1]
case 6	280 MHz [1 1 1 1 1 1 1 1 x x 1 1 1 1 1 1]
case 7	280 MHz [1 1 1 1 1 1 1 1 1 1 x x 1 1 1 1]
case 8	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x 1 1]
case 9	280 MHz [1 1 1 1 1 1 1 1 1 1 1 1 1 1 x x]
case 10	240 MHz [1 1 1 1 x x x x 1 1 1 1 1 1 1 1]
case 11	240 MHz [1 1 1 1 1 1 1 1 x x x x 1 1 1 1]
case 12	240 MHz [1 1 1 1 1 1 1 1 1 1 1 1 x x x x]
case 13	240 MHz [x x x x 1 1 1 1 1 1 1 1 1 1 1 1]

wherein 1 or x represents one 20 MHz in the 320 MHz, "1" indicates that the 20 MHz is not

the PPDU transmission apparatus according to any one of claims 15-26.