

CLAIMS

What is claimed is:

1. A resource allocation method, comprising:

sending, by a first device, resource allocation information to a second device, wherein the
5 resource allocation information indicates a first virtual resource unit VRU, and the first VRU
comprises a plurality of contiguous subcarriers in frequency domain;

mapping, by the first device, the first VRU to a first physical resource unit PRU based on a
mapping relationship between a VRU and a PRU, and

transmitting data on the first PRU, wherein a plurality of subcarriers comprised in the first
10 PRU are noncontiguous in frequency domain;

wherein the mapping, by the first device, the first VRU to a first PRU comprises:

sequentially inputting, by the first device into rows of the interleaving matrix according to a
first order, sequence numbers of a plurality of subcarriers comprised in a first frequency-domain
resource in which the first VRU is located, and outputting sequence numbers of the subcarriers in
15 the interleaving matrix according to a column direction of the interleaving matrix, wherein the first
order is an ascending order, or the first order is a descending order; and

wherein before a sequence number of each subcarrier comprised in the interleaving matrix is
output, an original row index sequence of the interleaving matrix is changed to a target row index
sequence; and

20 the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8}, and the target row index sequence
is {1, 5, 3, 7, 2, 6, 4, 8} or {1, 6, 3, 8, 4, 7, 2, 5}; or

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}, and the
target row index sequence is {1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16}, or {1, 10, 3, 12, 5,
14, 7, 16, 8, 15, 6, 13, 4, 11, 2, 9}.

25 2. A resource allocation method, comprising:

receiving, by a second device, resource allocation information from a first device, wherein
the resource allocation information indicates a first virtual resource unit VRU, and the first VRU
comprises a plurality of contiguous subcarriers in frequency domain;

determining, by the second device based on a mapping relationship between a VRU and a
30 physical resource unit PRU, a first PRU corresponding to the first VRU, wherein a plurality of
subcarriers comprised in the first PRU are noncontiguous in frequency domain; and

receiving, by the second device, data from the first device on the first PRU;

wherein the determining, by the first device based on a mapping relationship between a VRU
and a PRU, a first PRU corresponding to the first VRU comprises:

sequentially inputting, by the first device into rows of the interleaving matrix according to a first order, sequence numbers of a plurality of subcarriers comprised in a first frequency-domain resource in which the first VRU is located, and outputting sequence numbers of the subcarriers in the interleaving matrix according to a column direction of the interleaving matrix, wherein the first order is an ascending order, or the first order is a descending order; and

wherein before a sequence number of each subcarrier comprised in the interleaving matrix is output, an original row index sequence of the interleaving matrix is changed to a target row index sequence; and

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8}, and the target row index sequence is {1, 5, 3, 7, 2, 6, 4, 8} or {1, 6, 3, 8, 4, 7, 2, 5}; or

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}, and the target row index sequence is {1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16}, or {1, 10, 3, 12, 5, 14, 7, 16, 8, 15, 6, 13, 4, 11, 2, 9}.

3. The method according to claim 1 or 2, wherein a sequence number i of a subcarrier of the first PRU mapped from a subcarrier with a sequence number k of the first VRU based on the interleaving matrix satisfies the following formula:

$$i = N_{\text{ROW}} \cdot (k \bmod N_{\text{COL}}) + \left\lfloor \frac{k}{N_{\text{COL}}} \right\rfloor, \text{ wherein}$$

N_{ROW} is a row quantity of the interleaving matrix, N_{COL} is a column quantity of the interleaving matrix, k is a sequence number of a subcarrier that is input into the interleaving matrix, and i is a sequence number obtained by interleaving a subcarrier whose sequence number is k by using the interleaving matrix.

4. The method according to any one of claims 1 to 3, wherein any adjacent subcarriers comprised in the first PRU are noncontiguous in frequency domain.

5. The method according to any one of the claims 1 to 4, wherein in the plurality of subcarriers comprised in the first frequency-domain resource, subcarriers that are input into the interleaving matrix are first-type subcarriers, or subcarriers that are input into the interleaving matrix are first-type subcarriers and a second-type subcarrier, the first-type subcarrier is used to carry data, and the second-type subcarrier comprises one or more of a null subcarrier, a direct current subcarrier, a guard subcarrier, and a pilot subcarrier; and

sequence numbers of the subcarriers that are input into the interleaving matrix are sequence numbers of the first-type subcarriers in the plurality of subcarriers comprised in the first frequency-domain resource;

sequence numbers of the subcarriers that are input into the interleaving matrix are the sequence numbers of the plurality of subcarriers comprised in the first frequency-domain resource,

each sequence number of the second-type subcarrier in the plurality of subcarriers is a first preset sequence number, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the first preset sequence number; or

sequence numbers of the subcarriers that are input into the interleaving matrix are the sequence numbers of the plurality of subcarriers comprised in the first frequency-domain resource, each sequence number of the second-type subcarrier in the plurality of subcarriers is a first preset sequence number, the first preset sequence number is located at a preset location of the interleaving matrix, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the first preset sequence number.

6. The method according to claim 5, wherein the second-type subcarrier is a pilot subcarrier, and the pilot subcarrier is a maximum pilot subcarrier set of a 26-tone RU in the first frequency-domain resource.

7. The method according to any one of claims 1 to 6, wherein a quantity of the subcarriers that are input into the interleaving matrix and that are in the plurality of subcarriers comprised in the first frequency-domain resource is less than a quantity of subcarriers that are input into the interleaving matrix and that are supported by the interleaving matrix; and

the sequence numbers of the subcarriers that are input into the interleaving matrix are sequence numbers of subcarriers that are in the first frequency-domain resource and that are to be input into the interleaving matrix and a sequence number of a padding subcarrier, the sequence number of the padding subcarrier is located in a preset location of the interleaving matrix, each sequence number of the padding subcarrier is a second preset sequence number, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the second preset sequence number.

8. The method according to any one of claims 1 to 7, wherein a quantity of the plurality of subcarriers comprised in the first frequency-domain resource is determined based on a maximum bandwidth supported by the first device.

9. The method according to any one of claims 1 to 8, wherein the first VRU is mapped to the first PRU based on a mapping relationship between a sequence number of each subcarrier comprised in the first VRU and a sequence number of each subcarrier comprised in the first PRU.

10. The method according to any one of claims 1 to 9, wherein the sequence numbers of the subcarriers comprised in the first frequency-domain resource start from 0 or 1;

the sequence numbers of the subcarriers comprised in the first frequency-domain resource are subcarrier numbers in actual frequency bands corresponding to the subcarriers; or

the sequence numbers of the subcarriers comprised in the first frequency-domain resource are preset sequence numbers plus a preset offset value.

11. The method according to any one of claims 1 to 10, wherein the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, and the sequence numbers of the subcarriers corresponding to the first PRU are located in the first set;

the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, the sequence numbers of the subcarriers corresponding to the first PRU are located in a second set, and there is no intersection between the first set and the second set, or a part of sequence numbers in the first set are the same as those in the second set are the same; or

the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, the sequence numbers of the subcarriers corresponding to the first PRU are located in a plurality of second sets, there is no intersection between the plurality of second sets, and there is no intersection between the first set and the plurality of second sets, or there is an intersection between the first set and a part of the plurality of second sets.

12. A communication apparatus, comprising a processing module and a transceiver module, wherein

the transceiver module is configured to send resource allocation information to a second device, wherein the resource allocation information indicates a first virtual resource unit VRU, and the first VRU comprises a plurality of contiguous subcarriers in frequency domain;

the processing module is configured to map the first VRU to a first physical resource unit PRU based on a mapping relationship between a VRU and a PRU, wherein a plurality of subcarriers comprised in the first PRU are noncontiguous in frequency domain; and

the transceiver module is further configured to transmit data on the first PRU;

wherein that the processing module is configured to map the first VRU to a first PRU comprises:

the processing module is configured to sequentially input, into rows of an interleaving matrix according to a first order, sequence numbers of a plurality of subcarriers comprised in a first frequency-domain resource in which the first VRU is located, and output sequence numbers of the subcarriers in the interleaving matrix according to a column direction of the interleaving matrix, wherein the first order is an ascending order, or the first order is a descending order; and

wherein, before a sequence number of each subcarrier comprised in the interleaving matrix is output, an original row index sequence of the interleaving matrix is changed to a target row index sequence; and

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8}, and the target row index sequence is {1, 5, 3, 7, 2, 6, 4, 8} or {1, 6, 3, 8, 4, 7, 2, 5}; or

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}, and the target row index sequence is {1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16}, or {1, 10, 3, 12, 5,

14, 7, 16, 8, 15, 6, 13, 4, 11, 2, 9}.

13. A communication apparatus, comprising a processing module and a transceiver module, wherein

the transceiver module is configured to receive resource allocation information from a first device, wherein the resource allocation information indicates a first virtual resource unit VRU, and the first VRU comprises a plurality of contiguous subcarriers in frequency domain;

the processing module is configured to determine, based on a mapping relationship between a VRU and a physical resource unit PRU, a first PRU corresponding to the first VRU, wherein a plurality of subcarriers comprised in the first PRU are noncontiguous in frequency domain; and

the transceiver module is configured to receive data from the first device on the first PRU;

wherein that the processing module is configured to determine, based on a mapping relationship between a VRU and a PRU, a first PRU corresponding to the first VRU, comprises:

the processing module is configured to sequentially input, into rows of an interleaving matrix according to a first order, sequence numbers of a plurality of subcarriers comprised in a first frequency-domain resource in which the first VRU is located, and output sequence numbers of the subcarriers in the interleaving matrix according to a column direction of the interleaving matrix, wherein the first order is an ascending order, or the first order is a descending order; and

wherein before a sequence number of each subcarrier comprised in the interleaving matrix is output, an original row index sequence of the interleaving matrix is changed to a target row index sequence; and

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8}, and the target row index sequence is {1, 5, 3, 7, 2, 6, 4, 8} or {1, 6, 3, 8, 4, 7, 2, 5}; or

the original row index sequence is {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}, and the target row index sequence is {1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16}, or {1, 10, 3, 12, 5, 14, 7, 16, 8, 15, 6, 13, 4, 11, 2, 9}.

14. The communication apparatus according to claim 12 or 13, wherein a sequence number i of a subcarrier of the first PRU mapped from a subcarrier with a sequence number k of the first VRU based on the interleaving matrix satisfies the following formula:

$$i = N_{\text{ROW}} \cdot (k \bmod N_{\text{COL}}) + \left\lfloor \frac{k}{N_{\text{COL}}} \right\rfloor, \text{ wherein}$$

N_{ROW} is a row quantity of the interleaving matrix, N_{COL} is a column quantity of the interleaving matrix, k is a sequence number of a subcarrier that is input into the interleaving matrix, and i is a sequence number obtained by interleaving a subcarrier whose sequence number is k by using the interleaving matrix.

15. The communication apparatus according to any one of claims 12 to 14, wherein any

adjacent subcarriers comprised in the first PRU are noncontiguous in frequency domain.

16. The communication apparatus according to any one of claims 12 to 15, wherein in the plurality of subcarriers comprised in the first frequency-domain resource, subcarriers that are input into the interleaving matrix are first-type subcarriers, or subcarriers that are input into the interleaving matrix are first-type subcarriers and a second-type subcarrier, the first-type subcarrier is used to carry data, and the second-type subcarrier comprises one or more of a null subcarrier, a direct current subcarrier, a guard subcarrier, and a pilot subcarrier; and

sequence numbers of the subcarriers that are input into the interleaving matrix are sequence numbers of the first-type subcarriers in the plurality of subcarriers comprised in the first frequency-domain resource;

sequence numbers of the subcarriers that are input into the interleaving matrix are the sequence numbers of the plurality of subcarriers comprised in the first frequency-domain resource, each sequence number of the second-type subcarrier in the plurality of subcarriers is a first preset sequence number, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the first preset sequence number; or

sequence numbers of the subcarriers that are input into the interleaving matrix are the sequence numbers of the plurality of subcarriers comprised in the first frequency-domain resource, each sequence number of the second-type subcarrier in the plurality of subcarriers is a first preset sequence number, a sequence number of the first preset sequence number is located at a preset location of the interleaving matrix, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the first preset sequence number.

17. The communication apparatus according to claim 16, wherein the second-type subcarrier is a pilot subcarrier, and the pilot subcarrier is a maximum pilot subcarrier set of a 26-tone RU in the first frequency-domain resource.

18. The communication apparatus according to any one of claims 12 to 17, wherein a quantity of the subcarriers that are input into the interleaving matrix and that are in the plurality of subcarriers comprised in the first frequency-domain resource is less than a quantity of subcarriers that are input into the interleaving matrix and that are supported by the interleaving matrix; and

the sequence numbers of the subcarriers that are input into the interleaving matrix are sequence numbers of subcarriers that are in the first frequency-domain resource and that are to be input into the interleaving matrix and a sequence number of a padding subcarrier, the sequence number of the padding subcarrier is located in a preset location of the interleaving matrix, each sequence number of the padding subcarrier is a second preset sequence number, and the sequence numbers of the subcarriers output from the interleaving matrix do not comprise the second preset sequence number.

19. The communication apparatus according to any one of claims 12 to 18, wherein a quantity of the plurality of subcarriers comprised in the first frequency-domain resource is determined based on a maximum bandwidth supported by the first device.

5 20. The communication apparatus according to any one of claims 12 to 19, wherein the first VRU is mapped to the first PRU based on a mapping relationship between a sequence number of each subcarrier comprised in the first VRU and a sequence number of each subcarrier comprised in the first PRU.

21. The communication apparatus according to any one of claims 12 to 20, wherein the sequence numbers of the subcarriers comprised in the first frequency-domain resource start from
10 0 or 1;

the sequence numbers of the subcarriers comprised in the first frequency-domain resource are subcarrier numbers in actual frequency bands corresponding to the subcarriers; or

the sequence numbers of the subcarriers comprised in the first frequency-domain resource are preset sequence numbers plus a preset offset value.

15 22. The communication apparatus according to any one of claims 12 to 21, wherein the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, and the sequence numbers of the subcarriers corresponding to the first PRU are located in the first set;

the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, the sequence numbers of the subcarriers corresponding to the first PRU are located in a second
20 set, and there is no intersection between the first set and the second set, or a part of sequence numbers in the first set are the same as those in the second set are the same; or

the sequence numbers of the subcarriers corresponding to the first VRU are located in a first set, the sequence numbers of the subcarriers corresponding to the first PRU are located in a plurality of second sets, there is no intersection between the plurality of second sets, and there is
25 no intersection between the first set and the plurality of second sets, or there is an intersection between the first set and a part of the plurality of second sets.

23. A chip, wherein the chip comprises at least one processor and an interface, the processor is configured to read and execute instructions stored in a memory, and when the instructions are run, the chip is enabled to perform the method according to any one of claims 1 to 11.

30 24. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, the computer program comprises program instructions, and when the program instructions are executed by a computer, the computer is enabled to perform the method according to any one of claims 1 to 11.