SUMMARY

Embodiments of the present invention provide a resource scheduling method, apparatus, and device, which can support reduction of transmission resource overheads in resource scheduling.

According to a first aspect, a resource scheduling method is provided, and applied to a wireless local area network, where a next generation protocol followed by the wireless local area network predefines locations of resource units possibly allocated from a to-be-assigned frequency domain resource, and the method includes: generating, by a sending end, resource scheduling information, where the resource scheduling information includes a bit sequence to indicate an actual allocation of a resource unit(s) from the to-be-assigned frequency domain resource, and at least some bits in the bit sequence are to indicate whether the one or more resource unit locations possibly allocated for the to-be-assigned frequency domain resource is\are the actually allocated resource unit; and sending the resource scheduling information to a receiving end.

According to a second aspect, a resource scheduling method is provided, and applied to a wireless local area network, where a next generation protocol followed by the wireless local area network predefines locations of resource units possibly allocated from a to-be-assigned frequency domain resource, and the method includes: receiving, by a receiving end, resource scheduling information sent by a sending end, where the resource scheduling information includes a bit sequence to indicate an actual allocation of a resource unit(s) from the to-be-assigned frequency domain resource, and at least some bits in the bit sequence are to indicate whether a to-be-assigned resource unit actually allocated for the to-be-assigned frequency domain resource is in one or more resource unit locations in the locations of the resource units possibly allocated from the to-be-assigned frequency domain resource; and determining, according to the resource scheduling information, the resource unit(s) actually allocated by the sending end to the receiving end.

According to a third aspect, a resource scheduling apparatus is provided, and configured in a wireless local area network, where a next generation protocol followed by the wireless local area network predefines locations of resource units possibly allocated from a to-be-assigned frequency domain resource, and the apparatus includes: a generation unit, configured to generate resource scheduling information, where the resource scheduling information includes a bit sequence to indicate an actual allocation of a resource unit(s) from the to-be-assigned frequency domain resource, and at least some bits in the bit sequence are to indicate whether a to-be-assigned resource unit actually allocated for the to-be-assigned frequency domain resource is in one or more resource unit locations in the locations of the resource units possibly allocated from the to-be-assigned frequency domain resource; and a sending unit, configured to send the resource scheduling information to a receiving end.

According to a fourth aspect, a resource scheduling apparatus is provided, and configured in a wireless local area network, where a next generation protocol followed by the wireless local area network predefines locations of resource units possibly allocated from a to-be-assigned frequency domain resource, and the apparatus includes: a receiving unit, configured to receive resource scheduling information sent by a sending end, where the resource scheduling information includes a bit sequence to indicate an actual allocation of a resource unit(s) from the to-be-assigned frequency domain resource, and at least some bits in the bit sequence are to indicate whether a to-be-assigned resource unit actually allocated for the to-be-assigned frequency domain resource is in one or more resource unit locations in the locations of the resource units possibly allocated from the to-be-assigned frequency domain resource; and a determining unit, configured to determine, according to the resource scheduling information, the resource unit(s) actually allocated by the sending end to the receiving end.

In the resource scheduling method, apparatus, and device according to the embodiments of the present invention, at least some bits in a bit sequence are to indicate whether a to-be-assigned resource unit actually allocated from a to-be-assigned frequency domain resource is in one or more resource unit locations possibly allocated from the to-be-assigned frequency domain resource, and based on the allocation of the resource unit(s) in the actual allocation and by comparing with the locations of the resource units possibly allocated from the to-be-assigned frequency domain

CLAIMS

1. An apparatus, comprising:

a processor;

a transmitter;

memory connected to the processor and including instructions that cause the apparatus to generate resource scheduling information for a frequency domain resource, wherein the frequency domain resource comprises a 20MHz frequency segment, the resource scheduling information comprises a resource allocation (RA) field for the 20MHz frequency segment, the RA field indicating both information related to a number of stations scheduled on a resource unit (RU) and an allocation of one or more RUs in the frequency domain resource, wherein the allocation of the one or more RUs comprises:

size of each RU, the size indicating a quantity of subcarriers included in the RU; and

location of each RU within a bandwidth of the frequency domain resource;

the transmitter being configured to transmit the resource scheduling information;

wherein for a first RU in the allocation, which first RU has a smaller number of subcarriers than a smallest number of subcarriers for multi-user multiple-input multiple-output (MU-MIMO), the number of stations scheduled on the first RU is a default value; and

for a second RU in the allocation, which second RU has a number of subcarriers that is equal to or greater than the smallest number of subcarriers for MU-MIMO, at least 2 bits in the RA field are used for indicating the number of stations scheduled on the second RU.

2. The apparatus according to claim 1,

wherein the 20MHz frequency segment comprises a first default 26-RU which includes 26 subcarriers, the first default 26-RU being located at the center of the 20MHz frequency segment;

the RA field being a bit sequence of not more than 8 bits, the RA field further indicating whether using the first default 26-RU of the 20MHz frequency segment.

3. The apparatus according to claim 1, wherein the smallest number of subcarriers for MU-MIMO is 106 subcarriers, the first RU comprises 26-RU or 52-RU, and the second RU comprises 106-RU, 242-RU, 484-RU, or 996-RU.

4. The apparatus according to claim 1,

the frequency domain resource is provided with one of an 80MHz bandwidth or an 160MHz bandwidth, the 80MHz bandwidth including four 20MHz frequency segments, the 160MHz bandwidth including eight 20MHz frequency segments; and

for the 80MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a second default 26-RU of the 80MHz bandwidth is allocated to a station, the second default 26-RU being located at the center of the 80MHz bandwidth;

for the 160MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a third default 26-RU of each 80MHz frequency segment in the 160 MHz bandwidth is allocated to a station, the third default 26-RU being located at the center of the each 80MHz frequency segment.

5. The apparatus according to claim 4, wherein:

the frequency domain resource is provided with the 160MHz bandwidth; and

the resource scheduling information for each 80 MHz frequency segment of the 160MHz bandwidth is sent in parallel on the frequency domain resource.

6. An apparatus, comprising:

a processor;

a receiver connected to the processor; and

memory connected to the processor, the receiver being configured to receive resource scheduling information for a frequency domain resource, wherein the frequency domain resource comprises a 20MHz frequency segment, the resource scheduling information comprises a resource allocation (RA) field for the 20MHz frequency segment, the RA field indicating both information related to a number of stations scheduled on a

resource unit (RU) and an allocation of one or more RUs in the frequency domain resource, wherein the allocation of the one or more RUs comprises:

size of each RU, the size indicating a quantity of subcarriers included in an allocated RU; and

location of each RU within a bandwidth of the frequency domain resource;

the memory including instructions that, when executed by the processor, cause the apparatus to determine, according to the received resource scheduling information, the one or more allocated RUs;

wherein for a first RU in the allocation, which first RU has a smaller number of subcarriers than a smallest number of subcarriers for multi-user multiple-input multiple-output (MU-MIMO), the number of stations scheduled on the first resource unit is a default value;

for a second RU in the allocation, which second RU has a number of subcarriers that is equal to or greater than the smallest number of subcarriers for MU-MIMO, at least 2 bits in the RA field are used for indicating the number of stations scheduled on the second RU.

7. The resource scheduling apparatus according to claim 6, wherein the 20MHz segment comprises a first default 26-RU which includes 26 subcarriers, the first default 26-RU being located at the center of the 20MHz frequency segment;

the RA field being a bit sequence of not more than 8 bits, and the RA field further indicating whether using the first default 26-RU of the 20MHz frequency segment.

8. The apparatus according to claim 6, wherein the smallest number of subcarriers for MU-MIMO is 106 subcarriers, the first RU comprises 26-RU or 52-RU and the second RU comprises106-RU, 242-RU, 484-RU, or 996-RU.

9. The resource scheduling apparatus according to claim 6, the frequency domain resource is provided with one of an 80MHz bandwidth or an 160MHz bandwidth, the 80MHz bandwidth including four 20MHz frequency segments, the 160MHz bandwidth including eight 20MHz frequency segments; and

for the 80MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a second default 26-RU of the 80MHz bandwidth is allocated to a station, the second default 26-RU being located at the center of the 80MHz bandwidth;

for the 160MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a third default 26-RU of each 80MHz frequency segment in the 160 MHz bandwidth is allocated to a station, the third default 26-RU being located at the center of the each 80MHz frequency segment.

10. The apparatus according to claim 9, wherein:

the frequency domain resource is provided with the 160MHz bandwidth; and

the resource scheduling information for each 80 MHz frequency segment of the 160MHz bandwidth is received in parallel on the frequency domain resource.

11. A resource scheduling method, comprising:

generating, by a communication apparatus in a WLAN, resource scheduling information for a frequency domain resource, wherein the frequency domain resource comprises a 20MHz frequency segment, the resource scheduling information comprises a resource allocation (RA) field for the 20MHz frequency segment, the RA field indicating both information related to the number of stations scheduled on a resource unit (RU) and an allocation of one or more RUs in the frequency domain resource, wherein the allocation of the one or more RUs comprises:

size of each RU, the size indicating a quantity of subcarriers included in an allocated RU; and

location of each RU within a bandwidth of the frequency domain resource; and

sending, by the communication apparatus, the resource scheduling information;

wherein for a first RU in the allocation, which first RU has a smaller number of subcarriers than a smallest number of subcarriers for multi-user multiple-input multiple-output (MU-MIMO), the number of stations scheduled on the first RU is a default value;

for a second RU in the allocation, which second RU has a number of subcarriers that is equal to or greater than the smallest number of subcarriers for MU-MIMO, at least 2 bits in the RA field are used for indicating the number of stations scheduled on the second RU.

12. The method according to claim 11,

wherein the 20MHz frequency segment comprises a first default 26-RU which includes 26 subcarriers, the first default 26-RU being located at the center of the 20MHz frequency segment;

the RA field being a bit sequence of not more than 8 bits, the RA field further indicating whether using the first default 26-RU of the 20MHz frequency segment.

13. The method according to claim 11, wherein the smallest number of subcarriers for MU-MIMO is 106 subcarriers, the first RU comprises 26-RU or 52-RU and the second RU comprises 106-RU, 242-RU, 484-RU, or 996-RU.

14. The method according to claim 11, the frequency domain resource being provided with one of an 80MHz bandwidth or an 160MHz bandwidth, the 80MHz bandwidth including four 20MHz frequency segments, the 160MHz bandwidth including eight 20MHz frequency segments; and

for the 80MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a second default 26-RU of the 80MHz bandwidth is allocated to a station, the second default 26-RU being located at the center of the 80MHz bandwidth;

for the 160MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a third default 26-RU of each 80MHz frequency segment in the 160 MHz bandwidth is allocated to a station, the third default 26-RU being located at the center of the each 80MHz frequency segment.

15. The method according to claim 14,

the frequency domain resource is provided with the 160MHz bandwidth; and the sending the resource scheduling information of the 160MHz bandwidth comprises:

sending a resource scheduling information for each 80 MHz frequency segment of the 160MHz bandwidth in parallel on the frequency domain resource.

16. A resource scheduling method, comprising:

receiving, by a communication apparatus in a WLAN, resource scheduling information for a frequency domain resource, wherein the frequency domain resource comprises a 20MHz frequency segment, the resource scheduling information comprises a resource allocation (RA) field for the 20MHz frequency segment, the RA field indicating both information related to a number of stations scheduled on a resource unit (RU) and an allocation of one or more RUs in the frequency domain resource, wherein the allocation of the one or more RUs comprises:

size of each RU, the size indicating a quantity of subcarriers included in an allocated RU; and

location of each RU within a bandwidth of the frequency domain resource; and

determining, by the communication apparatus, according to the received resource scheduling information, the one or more allocated RUs;

wherein for a first RU in the allocation, which first RU has a smaller number of subcarriers than a smallest number of subcarriers for multi-user multiple-input multiple-output (MU-MIMO), the number of stations scheduled on the first RU is a default value;

for a second RU in the allocation, which second RU has a number of subcarriers that is equal to or greater than the smallest number of subcarriers for MU-MIMO, at least 2 bits in the RA field are used for indicating the number of stations scheduled on the second RU.

17. The method according to claim 16, wherein the 20MHz segment comprises a first default 26-RU which includes 26 subcarriers, the first default 26-RU being located at the center of the 20MHz frequency segment;

the RA field being a bit sequence of not more than 8 bits, and the RA field further indicating:

whether using the first default 26-RU of the 20MHz frequency segment.

18. The method according to claim 16, wherein the smallest number of subcarriers for MU-MIMO is 106 subcarriers, the first RU comprises 26-RU or 52-RU and the second RU comprises 106-RU, 242-RU, 484-RU, or 996-RU.

19. The method according to claim 16,

the frequency domain resource is provided with one of an 80MHz bandwidth or an 160MHz bandwidth, the 80MHz bandwidth including four 20MHz frequency segments, the 160MHz bandwidth including eight 20MHz frequency segments;

for the 80MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a second default 26-RU of the 80MHz bandwidth is allocated to a station, the second default 26-RU being located at the center of the 80MHz bandwidth;

for the 160MHz bandwidth communication, the resource scheduling information further includes 1 bit to indicate whether a third default 26-RU of each 80MHz frequency segment in the 160 MHz bandwidth is allocated to a station, the third default 26-RU being located at the center of the each 80MHz frequency segment.

20. The method according to claim 19,

the frequency domain resource is provided with the 160MHz bandwidth; and the receiving the resource scheduling information comprises:

receiving a resource scheduling information for each 80 MHz frequency segment of the 160MHz bandwidth in parallel on the frequency domain resource.