FIG. 13. “Mixed” means that a given STA may have an allocation of a MRU 400 defined by using both alternatives 1 and 2 at the same time, as illustrated in FIG. 14. In this example, a same STA may use (i.e., is allocated) a MRU 400 defined by (mixed) alternatives 1 and 2, while all other STAs use, e.g., alternative 2.

FIG. 15 shows a method 1500 according to an embodiment of the invention. The method 1500 is for resource allocation, and may be performed by the wireless network device 300. The method 1500 comprises a step 1501 of defining a non-contiguous MRU 400 in the bandwidth of a channel 301. The channel 301comprises a plurality of RUs 401. Further, the MRU 400 is defined based on non-punctured RUs 401 after puncturing one or more of the RUs, i.e. by obtaining one or more punctured RUs 401p of the channel 301 and/or is defined by aggregating two or more non-adjacent RUs 401 of the channel 301. Further, the method 1500 comprises a step 1502 of allocating the MRU 400 to a wireless station 303 (STA).

In summary, it is suggested to expand and improve the method of utilizing the channel resources in the 802.11be standard, by allowing the use of multiple and non-contiguous portions (RUs 401) of the channel 301 to define a MRU 400. Supporting an MRU 400 and non-contiguous RUs 401 to be allocated to the same STA 303 improves the channel utilization by making it more efficient, due to enhancing the capability of leveraging the channel selectivity. Improving the usage of the channel 301 may increase the overall system throughput and performance.

In particular, the 802.11ax RU definition is far from being optimal. In particular, the inability to aggregate MRUs for the same STA makes the channel utilization sub-optimal especially in two common cases: when channel puncturing exists; and when the channel is selective.

The present disclosure presents two alternatives 1 and 2 to apply an MRU 400 per STA without adding overhead to MU-PPDU, and by adding only a small amount of overhead to SU-PPDU. By allowing puncturing in SU-PPDU, and by allowing the use of non-contiguous RUs, the channel utilization for SU-PPDU can be significantly improved.

The present invention has been described in conjunction with various embodiments as examples as well as implementations. However, other variations can be understood and effected by those persons skilled in the art and practicing the claimed invention, from the studies of the drawings, this disclosure and the independent claims. In the claims as well as in the description the word “comprising” does not exclude other elements or steps and the indefinite article “a” or “an” does not exclude a plurality. A single element or other unit may fulfill the functions of several

CLAIMS

1. A method (1500) for resource allocation, the method (1500) comprising:

defining (1501) a non-contiguous multiple resource unit, MRU, (400) in the bandwidth of a channel (301);

wherein the channel (301) comprises a plurality of resource units, RUs, (401, 401p) and

wherein the MRU (400) is defined based on non-punctured RUs (401) after puncturing one or more of the RUs (401p) of the channel (301) and/or is defined by aggregating two or more non-adjacent RUs (401) of the channel (301); and

allocating (1502) the MRU (400) to a wireless station (303).

2. The method (1500) according to claim 1, wherein:

the RUs (401) are sub-channels.

3. The method (1500) according to claim 2, wherein:

the channel (301) comprises one, two, three or four 80MHz segments (500), and each 80MHz segment (500) comprises four 20Mhz sub-channels (401).

4. The method (1500) according to claim 1, wherein:

the RUs (401) each comprise a plurality of contiguous frequency tones.

5. The method (1500) according to claim 4, wherein:

the frequency tones each have a 78.125 kHz bandwidth.

6. The method (1500) according to any one of the claims 1 to 5, wherein:

the MRU (400) comprises one 26-tone RU and one 52-tone RU;

the MRU (400) comprises one 26-tone RU and one 106-tone RU; or

the MRU (400) comprises one 242-tone RU and one 484-tone RU.

7. The method (1500) according to any one of the claims 1 to 6, wherein:

the MRU (400) comprises at least two contiguous and/or non-contiguous parts.

8. The method (1500) according to any one of the claims 1 to 7, comprising:

transmit a packet (302) to the wireless station (303) utilizing the determined MRU (400).

9. The method (1500) according to claim 8, wherein:

a preamble of the packet (302) comprises information indicating, for transmitting the packet (302) to the wireless station (303) utilizing the determined MRU (400), the RUs (401) that are used and/or the non-punctured RUs (401) and/or the punctured RUs (401p).

10. The method (1500) according to claim 9, wherein:

the packet (302) is a physical layer conformance procedure, PLCP, protocol data unit, PPDU, and the information is included in a Universal Signaling, U-SIG, or Extremely High Throughput Signaling, EHT-SIG, field of the preamble of the PPDU.

11. The method (1500) according to claim 10 wherein:

the packet (302) is a multi-user PPDU; and

the EHT-SIG field of the multi-user PPDU comprises a sub-field for each of one or more wireless stations (303), and the information is included in the sub-field associated with the wireless station (303) to which the packet is transmitted utilizing the determined MRU (400).

12. The method (1500) according to claim 10, wherein:

the packet (302) is a single-user PPDU or multi-user PPDU; and

the information is included as a bitmap in the U-SIG field of the single-user PPDU or multi-user PPDU.

13. The method (1500) according to any one of the claims 1 to 12, wherein:

the method (1500) is executed in an access point of a Wi-Fi network.

14. A wireless network device (300), in particular a Wi-Fi device, for resource allocation, the wireless network device (300) being configured to implement the method according to any one of claims 1 to 13.

15. A computer program comprising a program code for performing, when running on a computer, the method (1500) according to any one of claims 1 to 13.

16. A non-transitory storage medium storing executable program code which, when executed by a processor, causes the method according to any one of claims 1 to 13 to be performed.