

CLAIMS

1. A method for wireless communication, comprising:
 - generating a first frame, at a first wireless communication device, that includes at least a first aggregated media access control protocol data unit (A-MPDU), wherein the first A-MPDU includes one or more media access control protocol data units (MPDUs);
 - setting a first recipient address (RA) field to a first value in a first MPDU of the one or more MPDUs in the first A-MPDU;
 - setting a first field in the first MPDU to a second value; and
 - outputting the first frame for transmission to at least a second wireless communication device.
2. The method of claim 1, wherein setting the first field includes setting the first field to the second value that represents an identifier of the second wireless communication device, further comprising:
 - setting a second field in the first MPDU to a third value, different than the second value, that represents an identifier of a third wireless communication device, and
 - outputting the first frame for transmission to at least the second and third wireless communication devices.
3. The method of claim 2, wherein the first frame is a Multi-Station (Multi-STA) BlockAck (BA) frame, and wherein
 - setting the first RA field in the first MPDU to the first value includes setting the first RA field to a broadcast address,
 - setting the first field in the first MPDU to the second value includes setting a first RA subfield of the first field to a first media access control (MAC) address associated with the second wireless communication device, and
 - setting the second field in the first MPDU to the third value includes setting a second RA subfield of the second field to a second MAC address associated with the third wireless communication device.

4. The method of claim 1, wherein the first value is the same as the second value, and wherein setting the first RA field in the first MPDU to the first value includes setting the first RA field to a MAC address associated with the second wireless communication device, and setting the first field in the first MPDU to the second value includes setting a first RA subfield of the first field to the MAC address associated with the second wireless communication device.

5. The method of claim 1, wherein
 setting the first RA field in the first MPDU to the first value includes setting the first RA field to a MAC address associated with the second wireless communication device, and
 setting the first field in the first MPDU to the second value includes setting a triggered response scheduling (TRS) control field in the first MPDU to allocate resources and provide response information to the second wireless communication device.

6. The method of claim 1, wherein setting the first RA field in the first MPDU to the first value includes setting the first RA field to a broadcast address, and wherein the first frame is directed to all unassociated wireless communication devices including the second wireless communication device.

7. The method of claim 2, prior to transmitting the first frame, further comprising:

 outputting a trigger frame that allocates one or more resource units for communications by one or more wireless communication devices unassociated with the first wireless communication device;

 receiving, at the first wireless communication device and in response to the trigger frame, a first message from the second wireless communication device that is unassociated with the first wireless communication device, the first message received in a first resource unit allocated by the trigger frame; and

 receiving, at the first wireless communication device and in response to the trigger frame, a second message from the third wireless communication device that is

unassociated with the first wireless communication device, the second message received in a second resource unit allocated by the trigger frame.

8. The method of claim 1, further comprising:

setting a second field in a second MPDU in the first A-MPDU to a third value, different than the second value, that represents an identifier of a third wireless communication device.

9. The method of claim 8, wherein the first field in the first MPDU and the second field in the second MPDU are address 4 fields, and the first frame is a MAC frame.

10. The method of claim 8, further comprising:

including a first TRS control field in the first frame that assigns a first resource unit to the second wireless communication device that is unassociated with the first wireless communication device to allow the second wireless communication device to send a first response frame to the first wireless communication device in the first resource unit; and

including a second TRS control field in the first frame that assigns a second resource unit to the third wireless communication device that is unassociated with the first wireless communication device to allow the third wireless communication device to send a second response frame to the first wireless communication device in the second resource unit.

11. The method of claim 8, further comprising aggregating a first trigger frame and a second trigger frame with the first MPDU and the second MPDU in the first A-MPDU;

wherein the first trigger frame assigns a first resource unit to the second wireless communication device that is unassociated with the first wireless communication device to allow the second wireless communication device to send a first response frame to the first wireless communication device in the first resource unit; and

wherein the second trigger frame assigns a second resource unit to the third wireless communication device that is unassociated with the first wireless communication device to allow the third wireless communication device to send a second response frame to the first wireless communication device in the second resource unit.

12. The method of claim 1, wherein the first value of the first RA field in the first MPDU indicates a MAC address of the second wireless communication device, further comprising:

setting a second RA field in a second MPDU to a third value, different than the first value, wherein the third value of the second RA field in the second MPDU indicates a MAC address of the third wireless communication device.

13. The method of claim 1, wherein the first frame is included in a resource unit of a downlink (DL) multi-user (MU) PPDU having a station identification (STA ID) field set to a value of 2045 indicating a broadcast communication with one or more unassociated wireless communication devices.

14. A method for wireless communication, comprising:

receiving a first frame, by a second wireless communication device from a first wireless communication device, that includes at least a first aggregated media access control protocol data unit (A-MPDU), wherein the first A-MPDU includes one or more media access control protocol data units (MPDUs);

decoding at least a portion of a first MPDU of the one or more MPDUs in the first A-MPDU and identifying a first recipient address (RA) field in the first MPDU;

determining that the first RA field of the first MPDU includes a first value; and

determining whether a first field in the first MPDU is addressed to the second wireless communication device or a different wireless communication device, in response to the first RA field including the first value.

15. The method of claim 14, further comprising:
in response to determining the first RA field includes the first value and determining the first field is addressed to the second wireless communication device, processing information associated with the first field that is directed to the second wireless communication device; and
in response to determining the first RA field includes the first value and determining the first field is not addressed to the second wireless communication device, determining whether a second field in the first MPDU is addressed to the second wireless communication device or a different wireless communication device.
16. The method of claim 15, further comprising:
in response to determining the first RA field includes the first value and determining the second field is addressed to the second wireless communication device, processing information associated with the second field that is directed to the second wireless communication device.
17. The method of claim 15, wherein the first frame is a Multi-Station (Multi-STA) BlockAck (BA) frame, wherein the first field includes a first RA subfield having a second value and the second field includes a second RA subfield having a third value, and wherein determining that the first field is addressed to the second wireless communication device is responsive to determining that the second value is a first media access control (MAC) address associated with the second wireless communication device, and determining that the second field is addressed to the second wireless communication device is responsive to determining that the third value is the first MAC address associated with the second wireless communication device.
18. The method of claim 14, further comprising:
receiving a second frame after receiving the first frame, the second frame including
a second RA field that indicates a MAC address of the second wireless communication device, and

a triggered response scheduling (TRS) control field that allocates resources and provides response information to the second wireless communication device.

19. The method of claim 15, wherein the first frame includes the first field in the first MPDU having a second value and the first frame includes a second field in a second MPDU having a third value, wherein the first field of the first MPDU is a first address 4 field and the second field of the second MPDU is a second address 4 field, and wherein determining that the first field is addressed to the second wireless communication device is responsive to determining that the second value is a first MAC address associated with the second wireless communication device, and determining that the second field is addressed to the second wireless communication device is responsive to determining that the third value is the first MAC address associated with the second wireless communication device.

20. The method of claim 19, further comprising:

determining that the first field of the first MPDU or the second field of the second MPDU is addressed to the second wireless communication device;

identifying a TRS control field in the first frame that assigns a resource unit to the second wireless communication device; and

outputting a response frame for transmission to the first wireless communication device in the assigned resource unit.

21. The method of claim 19, further comprising:

determining that the first field of the first MPDU is addressed to the second wireless communication device;

identifying a trigger frame positioned after the first MPDU in the first A-MPDU;

determining that the trigger frame is allocating a resource unit for the second wireless communication device, and not a different wireless communication device, based on the trigger frame being positioned after the first MPDU in the first A-MPDU; and

outputting a response frame for transmission to the first wireless communication device in the assigned resource unit.

22. A wireless communication apparatus of a first wireless communication device, comprising:

a processor configured to:

generate a first frame that includes at least a first aggregated media access control protocol data unit (A-MPDU), wherein the first A-MPDU includes one or more media access control protocol data units (MPDUs),

set a first recipient address (RA) field to a first value in a first MPDU of the one or more MPDUs in the first A-MPDU, and

set a first field in the first MPDU to a second value; and

a transmitter coupled with the processor, the transmitter configured to output the first frame for transmission to at least a second wireless communication device.

23. The wireless communication apparatus of claim 22, wherein the processor configured to set the first field includes the processor configured to set the first field to the second value that represents an identifier of the second wireless communication device, and wherein

the processor is further configured to set a second field in the first MPDU to a third value, different than the second value, that represents an identifier of a third wireless communication device, and

the transmitter is further configured to output the first frame for transmission to at least the second and third wireless communication devices.

24. The wireless communication apparatus of claim 23, wherein the first frame is a Multi-Station (Multi-STA) BlockAck (BA) frame, wherein

the processor configured to set the first RA field in the first MPDU to the first value includes the processor configured to set the first RA field to a broadcast address,

the processor configured to set the first field in the first MPDU to the second value includes the processor configured to set a first RA subfield of the first field to a first media access control (MAC) address associated with the second wireless communication device, and

the processor configured to set the second field in the first MPDU to the third value includes the processor configured to set a second RA subfield of the second field to a second MAC address associated with the third wireless communication device.

25. The wireless communication apparatus of claim 22, wherein the first frame is directed to all unassociated wireless communication devices including the second wireless communication device, and wherein the processor configured to set the first RA field in the first MPDU to the first value includes the processor configured to set the first RA field to a broadcast address.

26. The wireless communication apparatus of claim 22, wherein
the processor configured to set the first RA field in the first MPDU to the first value includes the processor configured to set the first RA field to a MAC address associated with the second wireless communication device, and
the processor configured to set the first field in the first MPDU to the second value includes the processor configured to set a triggered response scheduling (TRS) control field in the first MPDU to allocate resources and provide response information to the second wireless communication device.

27. A wireless communication apparatus of a second wireless communication device, comprising:

a receiver configured to:

receive a first frame, from a first wireless communication device, that includes at least a first aggregated media access control protocol data unit (A-MPDU), wherein the first A-MPDU includes one or more media access control protocol data units (MPDUs); and

a processor coupled with the receiver, the processor configured to:

decode at least a portion of a first MPDU of the one or more MPDUs in the first A-MPDU and identify a first recipient address (RA) field in the first MPDU,
determine that the first RA field of the first MPDU includes a first value, and
determine whether a first field in the first MPDU is addressed to the second wireless communication device or a different wireless communication device, in response to a determination that the first RA field includes the first value.

28. The wireless communication apparatus of claim 27, wherein the processor is further configured to:

process information associated with the first field that is directed to the second wireless communication device, in response to a determination that the first RA field includes the first value and a determination that the first field is addressed to the second wireless communication device; and

determine whether a second field in the first MPDU is addressed to the second wireless communication device or a different wireless communication device, in response to a determination that the first RA field includes the first value and a determination that the first field is not addressed to the second wireless communication device.

29. The wireless communication apparatus of claim 28, wherein the processor is further configured to:

process information associated with the second field that is directed to the second wireless communication device, in response a determination that the first RA field includes the first value and a determination that the second field is addressed to the second wireless communication device.

30. The wireless communication apparatus of claim 28, wherein the first frame is a Multi-Station (Multi-STA) BlockAck (BA) frame, wherein the first field includes a first RA subfield having a second value and the second field includes a second RA

subfield having a third value, and wherein the determination that the first field is addressed to the second wireless communication device is responsive to a determination that the second value is a first media access control (MAC) address associated with the second wireless communication device, and a determination that the second field is addressed to the second wireless communication device is responsive to a determination that the third value is the first MAC address associated with the second wireless communication device.