appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

## SUMMARY

**[0006]** Non-limiting and exemplary embodiments facilitate providing communication apparatuses and communication methods for Multi-AP synchronous transmission.

**[0007]** According to an aspect of the present disclosure, there is provided a communication apparatus, comprising: circuitry, which in operation, generates a frame comprising information indicating whether a type of a subsequent transmission is asynchronous or synchronous; and a transmitter, which in operation, transmits the frame to another communication apparatus, wherein when the type of subsequent transmission is asynchronous, the communication apparatus does not control a subchannel assigned to the another communication apparatus, and when the type of subsequent transmission is synchronous, the communication apparatus controls all frequency resources.

**[0008]** According to another aspect of the present disclosure, there is provided a communication method comprising: generating a frame comprising information indicating whether a type of a subsequent transmission is asynchronous or synchronous; and transmitting the frame to a communication apparatus, wherein when the type of subsequent transmission is asynchronous, the communication apparatus does not control a subchannel assigned to the another communication apparatus, and when the

type of subsequent transmission is synchronous, the communication apparatus controls all frequency resources.

**[0009]** It should be noted that general or specific embodiments may be implemented as a system, a method, an integrated circuit, a computer program, a storage medium, or any selective combination thereof. Additional benefits and advantages of the disclosed embodiments will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various embodiments and features of the specification and drawings, which need not all be provided in order to obtain one or more of such benefits and/or advantages.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** The accompanying figures where like reference numerals refer to identical or functionally similar elements throughout the separate views and which together with the detailed description below are incorporated in and form part of the specification,

**CLAIMS**

1. A communication apparatus, comprising:

circuitry, which in operation, generates a frame comprising information indicating whether a type of a subsequent transmission is asynchronous or synchronous; and

a transmitter, which in operation, transmits the frame to another communication apparatus, wherein

when the type of subsequent transmission is asynchronous, the communication apparatus does not control a subchannel assigned to the another communication apparatus, and

when the type of subsequent transmission is synchronous, the communication apparatus controls all frequency resources.

2. The communication apparatus according to claim 1, wherein the another communication apparatus performs coordinated orthogonal frequency-division multiple access (C-OFDMA) transmission.

3. The communication apparatus according to claim 1, wherein the communication apparatus and the another communication apparatus are access points (APs).

4. The communication apparatus according to claim 1, wherein the information indicates parameters of a physical layer protocol data unit (PPDU) carrying block acknowledgement (BlockAck) frame for the subsequent transmission.

5. The communication apparatus according to claim 4, wherein the circuitry is configured to determine the parameters based on a maximal length of bitmap in a BlockAck frame.

6. The communication apparatus according to claim 4, wherein the information further indicates that the subsequent transmission is a downlink (DL) transmission, wherein the transmitter is configured to transmit data to an associated STA based on the information, and wherein the communication apparatus further comprises a

receiver, which in operation, receives a PPDU carrying BlockAck frame from the associated STA based on the parameters after transmitting the data.

7. The communication apparatus according to claim 4, wherein the information further indicates that the subsequent transmission is a uplink (UL) transmission, wherein the communication apparatus further comprises a receiver, which in operation, receives data from an associated STA based on the information, and wherein the transmitter is configured to transmit a PPDU carrying BlockAck frame to the associated STA based on the parameters after receiving the data.

8. The communication apparatus according to claim 1, wherein the frame is a MAP trigger frame, and when a BA Soliciting Manner subfield in the MAP trigger frame is indicated as 'triggered response scheduling (TRS) Control field or Trigger frame', the transmitter may be configured to transmit a frame carrying a TRS Control subfield or a MAP BlockAck Scheduling (MBS) Control subfield to indicate parameters of BlockAck frame to an associated STA.

9. The communication apparatus according to claim 1, wherein the transmitter is configured to transmit a multi-user block acknowledgement request (MU-BAR) Trigger frame or MAP-BAR trigger frame to indicate parameters of PPDU carrying BlockAck frame to an associated STA.

10. The communication apparatus according to claim 1, wherein the frame is a MAP trigger frame, the MAP Trigger frame comprising a request for a MAP response from the another communication apparatus; wherein the communication apparatus further comprises a receiver, which in operation, receives the MAP response from the another communication apparatus, wherein the MAP response comprises estimated parameters of an expected BlockAck frame for the subsequent transmission.

11. The communication apparatus according to claim 10, wherein the transmitter is configured to transmit another MAP Trigger frame indicating parameters of PPDU carrying BlockAck frame to the another communication apparatus, such that the parameters are determined based on the estimated parameters in the MAP response;

and wherein the transmitter is further configured to transmit data to an associated STA, such that the data indicates parameters of PPDU carrying BlockAck frame.

12. The communication apparatus according to claim 1, wherein the transmitter is configured to transmit a MAC protocol data unit (MPDU) or aggregated-MPDU (A-MPDU) that requires an Ack or BlockAck frame as a response, and wherein the transmitter is further configured to commence another transmission to the another communication apparatus at a time duration after transmission of the MPDU or A-MPDU, when no ACK or BlockAck frame is received within an AckTimeout interval after transmission of the MPDU or A-MPDU.

13. The communication apparatus according to claim 12, wherein the time duration is an extended interframe space (EIFS) = a short interframe space (SIFS) time + EstimatedAckTxTime + arbitration interframe space (AIFS), or a coordinated Orthogonal Frequency Division Multiple Access (C-OFDMA) Error Recovery interval = aSIFSTime + EstimatedAckTxTime + aSIFSTime, wherein the EstimatedAckTxTime is an expected duration of a PPDU carrying BlockAck frame.

14. The communication apparatus according to claim 12, wherein the transmitter is further configured to transmit one or more short PPDUs to an associated STA or back to the communication apparatus at a Priority Interframe Space (PIFS) after the transmission of the MPDU or A-MPDU, wherein the another transmission is commenced at a SIFS after the transmission of the one or more short PPDUs.

15. The communication apparatus according to claim 10, wherein when an expected ACK or BlockAck frame is received within an AckTimeout interval after a previous transmission, and when no MAP response is received during another AckTimeout interval starting at a PHY-RXEND.confirm primitive, the transmitter is configured to commence another transmission to the another communication apparatus at a PIFS after the end of the received ACK or BlockAck frame.

16. The communication apparatus according to claim 10, wherein when an expected ACK or BlockAck frame is not received within an AckTimeout interval after a previous transmission, and when no MAP response is received during another

AckTimeout interval after an estimated end of the expected ACK or BlockAck frame, the transmitter is configured to commence another transmission to the another communication apparatus at a PIFS after the end of the received ACK or BlockAck frame, or at a EIFS after the previous transmission.

17. A communication method comprising:

generating a frame comprising information indicating whether a type of a subsequent transmission is asynchronous or synchronous; and

transmitting the frame to a communication apparatus, wherein

when the type of subsequent transmission is asynchronous, the communication apparatus does not control a subchannel assigned to the another communication apparatus, and

when the type of subsequent transmission is synchronous, the communication apparatus controls all frequency resources.