

[0007] In one aspect, the present disclosure provides an access point (AP) of a plurality of APs affiliated with an AP multi-link device (MLD), each of the plurality of APs operating in a corresponding link of the AP MLD, the AP comprising: circuitry, which in operation, generates a frame comprising a traffic indication map (TIM) element and a starting associated identifier (AID), the TIM element comprising a partial virtual bitmap (PVM) indicating presence of one or more buffered units (BUs) for each of a plurality of a non-AP MLDs, the starting AID indicating a smallest AID among AIDs assigned to a subset of the plurality of non-AP MLDs for which additional information relating to the one or more BUs is present in the frame; and a transmitter, which in operation, transmits the frame in a link.

[0008] In an example, the present disclosure provides a station (STA) of a plurality of STAs affiliated with a non-access-point (non-AP) multi-link device (MLD) associated with an AP MLD, each of the plurality of STAs operating in a corresponding link of the non-AP MLD, the STA comprising: a receiver, which in operation, receives a frame in a link, the frame comprising a traffic indication map (TIM) element and a presence bitmap, the element comprising a partial virtual bitmap (PVM) indicating presence of one or more buffered units for the non-AP MLD, the presence bitmap indicating whether additional information relating to the one or more BUs is present in the frame for the non-AP MLD; circuitry, which in operation, process the frame.

[0009] In another aspect, the present disclosure provides a communication method an access point (AP) of a plurality of APs affiliated with an AP multi-link device (MLD), each of the plurality of APs operating in a corresponding link of the AP MLD, the communication method comprising: generating a frame comprising a traffic indication map (TIM) element and a

starting associated identifier (AID), the TIM element comprising a partial virtual bitmap (PVM) indicating presence of

one or more buffered units (BUs) for each of a plurality of a non-AP MLDs, the starting AID indicating a smallest AID among AIDs assigned to a subset of the plurality of non-AP MLDs for which additional information relating to the one or more BUs is present in the frame; and transmitting the frame in a link.

[0010] Additional benefits and advantages of the examples in the disclosure will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various examples 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

[0011] 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, serve to illustrate various embodiments and to explain various principles and advantages in accordance with present embodiments.

[0012] Fig. 1 depicts a TIM element and Bitmap Control field of the TIM element.

[0013] Fig. 2 depicts a schematic diagram illustrating communications between an AP MLD and a non-AP MLD for multi-link power management and traffic indication.

[0014] Fig. 3 depicts a TIM bitmap and a set of Link mapping bitmap (LMBs).

CLAIMS

1. An Access Point (AP) of a plurality of APs affiliated with an AP multi-link device (MLD), each of the plurality of APs operating in a corresponding link of the AP MLD, the AP comprising:

circuitry, which in operation, generates a frame comprising a traffic indication map (TIM) element and a starting associated identifier (AID), the TIM element comprising a partial virtual bitmap (PVM) indicating presence of one or more buffered units (BUs) for each of a plurality of non-AP MLDs, the starting AID indicating a smallest AID among AIDs assigned to a subset of the plurality of non-AP MLDs for which additional information relating to the one or more BUs is present in the frame; and

a transmitter, which in operation, transmits the frame in a link.

2. The AP according to claim 1, wherein the frame comprises a Per-Link Traffic Indication Bitmap which indicates presence or absence of per-link traffic information for each of a plurality of links of a corresponding non-AP MLD.

3. The AP according to claim 1, wherein, the presence of the one or more BUs is indicated by bit 1 and the absence of the one or more BUs is indicated by bit 0 in the PVM, and wherein the additional information comprises a Link Mapping Bitmap (LMB).

4. The AP according to claim 1, wherein a first portion of the PVM in the TIM element is associated with AIDs assigned to legacy STAs and non-MLD Extremely High Throughput (EHT) STAs and a second portion of the PVM in the TIM element is associated with AIDs assigned to the plurality of non-AP MLDs, wherein the first portion and the second portion of the PVM do not overlap each other.

5. The AP according to claim 4, wherein the second portion of the PVM in the TIM element starts immediately after the first portion of the PVM in the TIM element.

6. The AP according to claim 1, wherein the frame is one of a Beacon frame, a TIM frame, a Fast Initial Link Setup (FILS) Discovery frame and Operation (OPS) frame.

7. The AP according to claim 1, wherein the PVM for the plurality of non-AP MLDs and another PVM for a plurality of non-AP STAs that are associated with the plurality of APs are carried in different TIM elements.

8. A communication method for an Access Point (AP) of a plurality of APs affiliated with an AP multi-link device (MLD), each of the plurality of APs operating in a corresponding link of the AP MLD, the communication method comprising:

generating a frame comprising a traffic indication map (TIM) element and a starting associated identifier (AID), the TIM element comprising a partial virtual bitmap (PVM) indicating presence of one or more buffered units (BUs) for each of a plurality non-AP MLDs, the starting AID indicating a smallest AID among AIDs assigned to a subset of the

plurality of non-AP MLDs for which additional information relating to the one or more BUs is present in the frame; and

transmitting the frame in a link.

9. The communication method according to claim 8, wherein the frame comprises a Per-Link Traffic Indication Bitmap which indicates presence or absence of per-link traffic information for each of a plurality of links of a corresponding non-AP MLD.

10. The communication method according to claim 8, wherein, the presence of the one or more BUs is indicated by bit 1 and the absence of the one or more BUs is indicated by bit 0 in the PVM, and wherein the additional information comprises a Link Mapping Bitmap (LMB).

11. The communication method according to claim 8, wherein a first portion of the PVM in the TIM element is associated with AIDs assigned to legacy STAs and non-MLD Extremely High Throughput (EHT) STAs and a second portion of the PVM in the TIM element is associated with AIDs assigned to the plurality of non-AP MLDs, wherein the first portion and the second portion of the PVM do not overlap each other.

12. The communication method according to claim 11, wherein the second portion of the PVM in the TIM element starts immediately after the first portion of the PVM in the TIM element.

13. The communication method according to claim 8, wherein the frame is one of a Beacon frame, a TIM frame, a Fast Initial Link Setup (FILS) Discovery frame and Operation (OPS) frame.

14. The communication method according to claim 8, wherein the PVM for the plurality of non-AP MLDs and another PVM for a plurality of non-AP STAs that are associated with the plurality of APs are carried in different TIM elements.