[0008] In a first example, the present disclosure provides a communication apparatus of a plurality of communication apparatuses affiliated with a first multi-link device (MLD), each of the plurality of communication apparatuses operating in a corresponding link of the first MLD, the communication apparatus comprising: circuitry, which in operation, generates a request frame, the request frame being one of a discovery request frame to discover a peer-to-peer communication capability of another communication apparatus, or a setup request frame to request setup of one or more direct links, the request frame carrying a multi-link (ML) indication identifying that the communication apparatus is affiliated with the first MLD; and a transmitter, which in operation, transmits the request frame in a link.

[0008a] In a first aspect, the present disclosure refers to a first non-Access Point (non-AP) multi-link device (MLD) including a plurality of affiliated stations (STAs) that are operable on a plurality of links, the non-AP MLD comprising a transmitter, which in operation, transmits via an Access Point (AP) or an AP MLD a Tunnelled Direct Link Setup (TDLS) Setup Request frame for setting up a direct link on at least one linkto a second non-AP MLD, the TDLS Setup Request frame including a first TDLS Multi-Link element that contains a first MLD MAC address information indicating the first non-AP MLD and a receiver, which in operation, receives a TDLS Setup Response frame via the AP from the second non-AP MLD.

[0009] In a second example, the present disclosure provides an access point (AP) of a plurality of APs affiliated with an AP MLD, each of the plurality of APs operating in a corresponding link of the AP MLD, the AP comprising: a receiver, which in operation, receives in a link, from an associated communication apparatus affiliated with an MLD, a Data frame with a Destination Address (DA) field set to another associated communication apparatus that is not affiliated with an MLD; circuitry, which

in operation, sets a source address (SA) field of the Data frame as a MAC address of the associated communication apparatus ; and a transmitter, which in operation, transmits the Data frame to the other associated communication apparatus.

[0009a] In a second aspect, the present disclosure provides a communication method for a first non-Access Point (non-AP) multi-link device (MLD) including a plurality of affiliated stations (STAs) that are operable on a plurality of links, the communication method comprising: transmitting via an Access Point (AP) or an AP MLD a Tunnelled Direct Link Setup (TDLS) Setup Request frame for setting up a direct link on at least one link to a second non-AP MLD, the TDLS Setup Request frame including a first TDLS Multi-Link element that contains a first MLD MAC address information indicating the first non-AP MLD; and receiving a TDLS Setup Response frame via the AP from the second non-AP MLD.

[0010] In a third example, the present disclosure provides a communication method comprising: generating a request frame, the request frame being one of a discovery request frame to discover a peer-to-peer communication capability of a communication

CLAIMS

1. A first non-Access Point (non-AP) multi-link device (MLD) including a plurality of affiliated stations (STAs) that are operable on a plurality of links, the non-AP MLD comprising:

a transmitter, which in operation, transmits via an Access Point (AP) or an AP MLD a Tunnelled Direct Link Setup (TDLS) Setup Request frame for setting up a direct link on at least one link to a second non-AP MLD, the TDLS Setup Request frame including a first TDLS Multi-Link element that contains a first MLD MAC address information indicating the first non-AP MLD; and

a receiver, which in operation, receives a TDLS Setup Response frame via the AP from the second non-AP MLD.

2. The first non-AP MLD according to claim 1, wherein the first TDLS Multi-Link element includes a Type subfield that is set to indicate TDLS and a Common Information field that carries the first MLD MAC address information.

3. The first non-AP MLD according to claim 1, wherein prior to transmission of the TDLS Setup Request frame,

the transmitter, in operation, transmits a TDLS Discovery Request frame via the AP to the second non-AP MLD; and

the receiver, in operation, receives a TDLS Discovery Response frame a on a direct link from the second non-AP MLD.

4. The first non-AP MLD according to claim 3, wherein the TDLS Discovery Request frame includes a Link Identifier element that contains a BSSID subfield.

5. The first non-AP MLD according to claim 3, wherein

the TDLS Discovery Request frame includes a second TDLS Multi-Link element that contains a second MLD MAC address information.

6. The first non-AP MLD according to claim 1, wherein

the TDLS Setup Request frame carries a first TDLS Peer Key (TPK) handshake message;

the TDLS Setup Response frame carries a second TPK handshake message; and

the transmitter, in operation, transmits via the AP MLD a TDLS Setup Confirmation frame that carries a third TPK handshake message.

7. The first non-AP MLD of claim 6, wherein the TDLS Setup Request frame includes an RSNE, an Timeout Interval element and an FTE added to the first TDLS Multi-Link element.

8. The first non-AP MLD of claim 3, wherein

the transmitter, in operation, transmits a request frame indicating a quiet time period for protecting a direct link communication on the direct link.

9. A communication method for a first non-Access Point (non-AP) multi-link device (MLD) including a plurality of affiliated stations (STAs) that are operable on a plurality of links, the communication method comprising:

transmitting via an Access Point (AP) or an AP MLD a Tunnelled Direct Link Setup (TDLS) Setup Request frame for setting up a direct link on at least one link to a second non-AP MLD, the TDLS Setup Request frame including a first TDLS Multi-Link element that contains a first MLD MAC address information indicating the first non-AP MLD; and

receiving a TDLS Setup Response frame via the AP from the second non-AP MLD.

10. The communication method according to claim 9, wherein the first TDLS Multi-Link element includes a Type subfield that is set to indicate TDLS and a Common Information field that carries the first MLD MAC address information.

11. The communication method according to claim 9, wherein

prior to transmission of the TDLS Setup Request frame, the communication method comprising:

transmitting a TDLS Discovery Request frame via the AP to the second non-AP MLD; and

receiving a TDLS Discovery Response frame a on a direct link from the second non-AP MLD.

12. The communication method according to claim 11, wherein the TDLS Discovery Request frame includes a Link Identifier element that contains a BSSID subfield.

13. The communication method according to claim 11, wherein

the TDLS Discovery Request frame includes a second TDLS Multi-Link element that contains a second MLD MAC address information.

14. The communication method according to claim 9, wherein

the TDLS Setup Request frame carries a first TDLS Peer Key (TPK) handshake message;

the TDLS Setup Response frame carries a second TPK handshake message; and

the communication method comprising:

transmitting via the AP MLD a TDLS Setup Confirmation frame that carries a third TPK handshake message.

15. The communication method of claim 14, wherein the TDLS Setup Request frame includes an RSNE, a Timeout Interval element and an FTE added to the first TDLS Multi-Link element.

16. The communication method of claim 11, comprising

transmitting a request frame indicating a quiet time period for protecting a direct link communication Quiet Time Period (QTP) Request frame to the AP MLD for setting up a QTP on the direct link.