CLAIMS

1. A communication apparatus for executing wireless communication complying with an IEEE 802.11 standard series, comprising:

link establishment means for establishing, by communicating an Association Request frame and an Association Response frame by using a first frequency channel, a first link using the first frequency channel and a second link using a second frequency channel with another apparatus; and

transmission means for including first information and second information into a single message for a first Group Key Handshake, and transmitting the single message to the other apparatus,

wherein the first information associates, with each other,

a first Key ID field including an identifier related to a key;

a first Tx field including information indicative of whether a key is applied to merely reception or both reception and transmission;

a first Link ID field including identification information of the first link established by the link establishment means; and

a first field including information related to a first encryption key to be set for the first link,

wherein the second information associates, with each other,

a second Key ID field including an identifier related to a key;

a second Tx field including information indicative of whether a key is applied to merely reception or both reception and transmission;

a second Link ID field including identification information of the second link established by the link establishment means; and

a second field including information related to a first encryption key to be set for the first link.

2. The communication apparatus according to claim 1, wherein the single

message for the first Group Key Handshake is a Group Key Handshake message 1 included in messages communicated with the other apparatus in the first Group Key Handshake.

3. The communication apparatus according to claim 2, wherein a Key Data Encapsulation (KDE) for the first link and a KDE for the second link are included into the Group Key Handshake message 1 in the first Group Key Handshake, and the Group Key Handshake message 1 in the first Group Key Handshake is transmitted to the other apparatus.

4. The communication apparatus according to any one of claims 1 to 3, wherein the transmission means includes, into a second single message for a second Group Key Handshake different from the first Group Key Handshake, third information that associates a third Link ID field including the identification information of the first link and a third field including information related to a third encryption key different from the first encryption key to be set for the first link, and fourth information that associates a fourth Link ID field including the identification information of the second link and a fourth field including information related to a fourth encryption key different from the second encryption key to be set for the second link, and transmit the second single message for the second Group Key Handshake to the other apparatus.

5. The communication apparatus according to claim 4, wherein the second single message for the second Group Key Handshake is a Group Key Handshake message 1 included in messages communicated with the other apparatus in the second Group Key Handshake.

6. The communication apparatus according to claim 5, wherein a Key Data Encapsulation (KDE) for the first link and a KDE for the second link are included into

the Group Key Handshake message 1 in the second Group Key Handshake, and the Group Key Handshake message 1 in the second Group Key Handshake is transmitted to the other apparatus.

7. The communication apparatus according to any one of claims 4 to 6, further comprising update means for updating, based on transmission of the second single message in the second Group Key Handshake, an encryption key for the first link with the third encryption key and an encryption key for the second link with the fourth encryption key.

8. The communication apparatus according to any one of claims 4 to 6, further comprising update means for updating, based on reception from the other apparatus of a response to the second single message in the second Group Key Handshake, an encryption key for the first link with the third encryption key and an encryption key for the second link with the fourth encryption key.

9. The communication apparatus according to claim 8, further comprising setting means for setting an interval for updating an encryption key for the first link and an encryption key for the second link.

10. The communication apparatus according to claim 9, wherein the update means updates an encryption key for the first link and an encryption key for the second link based on the interval set by the setting means.

11. The communication apparatus according to any one of claims 1 to 10, wherein, in a case where a link is added between the communication apparatus and the other apparatus, an encryption key for the added link is included into a message for a Group Key Handshake, and the message is transmitted to the other apparatus.

12. The communication apparatus according to any one of claims 1 to 11, wherein, in a case where a link used between the communication apparatus and the other apparatus is deleted, an encryption key for a link to be maintained without deletion is included into a message for a Group Key Handshake, and the message is transmitted to the other apparatus.

13. The communication apparatus according to any one of claims 1 to 12, wherein the encryption key is an encryption key for multicast communication.

14. The communication apparatus according to any one of claims 1 to 13, wherein the communication apparatus is an access point capable of executing communication complying with an IEEE 802.11be standard, and the other apparatus is a station capable of executing communication complying with the IEEE 802.11be standard.

15. A control method executed by a communication apparatus for executing wireless communication complying with an IEEE 802.11 standard series, comprising:

establishing, by communicating an Association Request frame and an Association Response frame by using a first frequency channel, a first link using the first frequency channel and a second link using a second frequency channel with another apparatus; and

including first information and second information into a single message for a first Group Key Handshake, and transmitting the single message to the other apparatus,

wherein the first information associates, with each other,

a first Key ID field including an identifier related to a key;

a first Tx field including information indicative of whether a key is applied to merely reception or both reception and transmission;

a first Link ID field including identification information of the first

link established in the establishing; and

a first field including information related to a first encryption key to be set for the first link,

wherein the second information associates, with each other,

a second Key ID field including an identifier related to a key;

a second Tx field including information indicative of whether a key is applied to merely reception or both reception and transmission;

a second Link ID field including identification information of the second link established by the link establishment means; and

a second field including information related to a first encryption key to be set for the first link.

16. A computer program for causing a computer included in a communication apparatus for executing wireless communication complying with an IEEE 802.11 standard series to execute the control method according to claim 15.