

Citation List

Non Patent Literature

- [0006] NPL 1 : 3GPP TR 22.803, "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Feasibility study for Proximity Services (ProSe)"

Summary

Technical Problem

- [0007] For example, a discovery signal that enables another device to discover a device conducting D2D communication is transmitted by the terminal device conducting D2D communication. However, if carrier aggregation is supported, the other terminal device conducting D2D communication may be unable to determine which component carrier the above discovery signal is transmitted on, and whether or not the discovery signal is receivable. For this reason, the other terminal device may, for example, conduct a detection process for detecting the discovery signal on the signals transmitted on all component carriers. As a result, the load on that other terminal device may increase.

- [0008] Accordingly, it is desirable to provide a mechanism that enables a moderation of the load for a device conducting device-to-device communication (D2D communication).

Solution to Problem

- [0008a] According to a first aspect of the present invention, there is provided an electronic device comprising: circuitry configured to control performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; receive carrier information via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier; and monitor the discovery signal both in an RRC_IDLE mode and an RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.

- [0008b] According to a second aspect of the present invention, there is provided a method performed by an electronic device, the method comprising: controlling performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; receiving carrier information via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the

second component carrier is an uplink component carrier; and monitoring the discovery signal both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.

5 [0008c] According to a third aspect of the present invention, there is provided a communication control device comprising: circuitry configured to: control performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; and transmit carrier information to a terminal device via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier, wherein the discovery signal is monitored by the terminal device both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.

10 [0008d] According to a fourth aspect of the present invention, there is provided a method performed by a communication control device, the method comprising: controlling performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; and transmitting carrier information to a terminal device via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier, wherein the discovery signal is monitored by the terminal device both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.

20 [0009] According to an embodiment of the present disclosure, there is provided a communication control device including an acquisition unit that acquires carrier information indicating, from among a plurality of component carriers used for carrier aggregation, a component carrier for transmitting a discovery signal that enables another device to discover a device conducting device-to-device communication, and a control unit that controls transmission of the carrier information to a terminal device.

[0010] According to another embodiment of the present disclosure, there is provided a communication control method including acquiring carrier information indicating, from among a plurality of component carriers used for carrier aggregation, a component carrier for transmitting a discovery signal that enables another device to discover a device conducting device-to-device communication, and controlling, with a processor, transmission of the carrier information to a terminal device.

[0011] According to another embodiment of the present disclosure, there is provided a terminal device including an acquisition unit that acquires carrier information indicating, from among a plurality of component carriers used for carrier aggregation, a component carrier for transmitting a discovery signal that enables another device to discover a device conducting device-to-device communication, and a control unit that controls a detection process for detecting the discovery signal on the basis of the carrier information.

[0012] According to another embodiment of the present disclosure, there is provided a

CLAMS:

1. An electronic device comprising:
 - circuitry configured to control performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation;
 - receive carrier information via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier; and
 - monitor the discovery signal both in an RRC_IDLE mode and an RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.
2. The electronic device of claim 1, wherein the circuitry is further configured to monitor the discovery signal in the second component carrier indicated by the carrier information.
3. The electronic device of claim 2, wherein the circuitry is further configured to monitor the discovery signal in one or more component carriers including the second component carrier indicated by the carrier information.
4. The electronic device of claim 1, wherein the carrier information is received as system information via the first component carrier.
5. The electronic device of claim 1, wherein the second component carrier corresponds to a primary component carrier of the carrier aggregation, the primary component carrier being used to establish the RRC connection.
6. The electronic device of claim 1, wherein the first component carrier corresponds to a primary component carrier of the carrier aggregation, the primary component carrier being used to establish the RRC connection.

7. The electronic device of claim 1, wherein the carrier information further indicates one or more component carriers via which the discovery signal is transmitted.
8. The electronic device of claim 1, wherein the circuitry is further configured to receive the discovery signal and perform device-to-device communication using the second component carrier.
9. The electronic device of claim 8, wherein the circuitry is further configured to relay the discovery signal to another electronic device.
10. The electronic device of claim 9, wherein the relay procedure is performed based on component carrier information of the another electronic device.
11. The electronic device of claim 10, wherein the component carrier information indicates a capability of one or more component carriers.
12. A method performed by an electronic device, the method comprising:
 - controlling performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation;
 - receiving carrier information via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier; and
 - monitoring the discovery signal both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.
13. A communication control device comprising:
 - circuitry configured to: control performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; and

transmit carrier information to a terminal device via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier, wherein

the discovery signal is monitored by the terminal device both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.

14. A method performed by a communication control device, the method comprising:

controlling performing wireless communication via a plurality of component carriers including uplink component carriers and downlink component carriers aggregated by carrier aggregation; and

transmitting carrier information to a terminal device via a first component carrier of the plurality of component carriers, the carrier information indicating a second component carrier of the plurality of component carriers, wherein the second component carrier is used for transmitting a discovery signal for device-to-device communication, and the first component carrier is a downlink component carrier and the second component carrier is an uplink component carrier, wherein

the discovery signal is monitored by the terminal device both in RRC_IDLE mode and RRC_CONNECTED mode based on the carrier information, the RRC_IDLE mode being without a Radio Resource Control (RRC) connection and the RRC_CONNECTED mode being with the RRC connection.