Non Patent Literature

[0006] [NPL 1] 3GPP TR 36.843 V12.0.0 (March 2014)

Summary

Technical Problem

[0007] For example, as radio resources available for D2D communication, periodic radio resources are allocated. For example, at periods of an integer multiple of a radio frame, radio resources of a specific subframe are allocated as the radio resources available for D2D communication. Therefore, D2D communication is performed in the specific subframe.

[0008] For example, when D2D communication is performed in a TDD carrier, radio resources of an uplink subframe of an uplink/downlink configuration (UL/DL configuration) of the TDD carrier are allocated as the radio resources available for D2D communication within a network coverage area. Therefore, D2D communication is performed in the uplink subframe.

[0009] However, when the UL/DL configuration of the TDD carrier is dynamically changed, the uplink subframe in which D2D communication is performed may be changed to a downlink subframe or a special subframe. As a result, D2D communication may be performed in the downlink subframe or the special subframe. That is, D2D communication that does not comply with cellular communication standards may be performed.

[0010] Accordingly, it is preferable to provide a mechanism in which a terminal device can appropriately perform D2D communication under a TDD environment.

Solution to Problem

[0011] According to a first aspect of the present invention, there is provided a device comprising: circuitry configured to dynamically set an uplink/downlink configuration of a time division duplex (TDD) carrier, and notify a terminal device of the set uplink/downlink configuration and a radio resource information for device-to-device communication for the set uplink/downlink configuration, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

[0012] According to a second aspect of the present invention, there is provided a method comprising: dynamically setting, by a processor, an uplink/downlink configuration of a time division duplex (TDD) carrier; and notifying a terminal device of the set uplink/downlink configuration and a radio resource information for device-to-device communication for the set uplink/downlink configuration, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

[0013] According to a third aspect of the present invention, there is provided a device comprising: circuitry configured to acquire radio resource information indicating a

radio resource for device-to-device communication for an uplink/downlink configuration of a time division duple (TDD) carrier that is dynamically set by a base station; and control device-to-device communication using the radio resource information, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

[0014] According to a fourth aspect of the present invention, there is provided a method comprising: acquiring radio resource information indicating a radio resource for device-to-device communication for an uplink/downlink configuration of a time division duple (TDD) carrier that is dynamically set by a base station; andcontrolling, by a processor, device-to-device communication using the radio resource information, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

Advantageous Effects of Invention

[0015] According to one or more of embodiments of the present invention described above, a terminal device can appropriately perform D2D communication under a TDD environment, but the present disclosure is not necessarily limited to this effect. Along with or instead of this effect, any effect shown in this specification or other effects that may be understood from this specification may be achieved.

Brief Description of Drawings

[0016] [fig. 1] FIG. 1 is a first explanatory diagram illustrating a specific example of a use case of D2D communication.

[fig. 2] FIG. 2 is a second explanatory diagram illustrating a specific example of a use case of D2D communication.

[fig. 3] FIG. 3 is an explanatory diagram illustrating exemplary timings of a PSS and an SSS in FDD.

[fig. 4] FIG. 4 is an explanatory diagram illustrating exemplary timings of a PSS and an SSS in TDD.

[fig. 5] FIG. 5 is an explanatory diagram illustrating a radio frame and subframes in a cellular system.

[fig. 6] FIG. 6 is an explanatory diagram illustrating an exemplary resource pool.

[fig. 7] FIG. 7 is an explanatory diagram illustrating an example of a signal and information transmitted in a resource pool.

[fig. 8] FIG. 8 is an explanatory diagram illustrating a UL/DL configuration.

[fig. 9] FIG. 9 is an explanatory diagram schematically illustrating an exemplary configuration of a communication system according to an embodiment of the present disclosure.

[fig. 10] FIG. 10 is a block diagram illustrating an exemplary configuration of a base

Claims

1. A device comprising:

circuitry configured to

dynamically set an uplink/downlink configuration of a time division duplex (TDD) carrier, and

notify a terminal device of the set uplink/downlink configuration and a radio resource information for device-to-device communication for the set uplink/downlink configuration, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

2. The device according to claim 1, wherein the circuitry is further configured to change the uplink/downlink configuration from one configuration among multiple configurations to another configuration among the multiple configurations.

3. The device according to claim 2, wherein the circuitry is further configured to

notify the terminal device of the radio resource information for device-to-device communication for the other configuration in accordance with the change of the uplink/downlink configuration, and the radio resource information for the another configuration is a radio resource information include radio frame information indicating a radio frame including at least one uplink subframe of the other configuration and resource period information indicating a period of radio resource for the device-to-device communication.

4. The device according to claim 2, wherein the circuitry is further configured to notify the terminal device of the radio resource information for device-to-device communication for each of the multiple configurations.

5. The device according to claim 4, wherein the radio resource information for each of the multiple configurations includes a radio resource for device-to-device communication for each configuration, and the radio resource information for each configuration includes radio frame information indicating a radio frame including at least one uplink subframe of the configuration and resource period information indicating a period of radio resource for the device-to-device communication.

6. The device according to claim 4, wherein the radio resource information for each of the multiple configurations includes radio frame information indicating a radio frame including at least one uplink subframe common among the multiple configurations and resource period information indicating a period of radio resource for the device-to-device communication.

7. The device according to claim 1, wherein a number of uplink subframes included in the at least one uplink subframe differs according to a number of uplink subframes of the uplink/downlink configuration.

8. The device according to claim 1, wherein the radio resource is a periodic radio resource that is repeated at a period corresponding to a number of uplink subframes of the uplink/downlink configuration.

9. The device according to claim 1, wherein the radio resource is a radio resource of an uplink subframe of a first number and is a periodic radio resource that is repeated at a first period when the uplink/downlink configuration is a first configuration, and the radio resource is a radio resource of an uplink subframe of a second number that is less than the first number and is a periodic radio resource that is repeated at a second period shorter than the first period when the uplink/downlink configuration is a second configuration.

10. The device according to claim 1, wherein the circuitry is further configured to notify terminal device of the radio resource when a number of uplink subframes of the uplink/downlink configuration is equal to or greater than a predetermined number.

11. The device according to claim 1, wherein the uplink/downlink configuration is a configuration including at least a predetermined number of uplink subframes.

12. The device according to claim 1, wherein each of the at least one uplink subframe is included in two or more successive uplink subframes of the uplink/downlink configuration, and wherein one or more uplink subframes of the two or more successive uplink subframes are not included in the at least one uplink subframe.

13. The device according to claim 12, wherein the circuitry is further configured to notify the terminal device of the radio resource when the uplink/downlink configuration includes three or more successive uplink subframes.

14. The device according to claim 12, wherein the uplink/downlink configuration is a configuration including three or more successive uplink subframes.

15. The device according to claim 1, wherein the circuitry is further configured to notify the terminal device of the radio resource information by reporting system information indicating the radio resource information.

16. The device according to claim 1, wherein the circuitry is further configured to notify the terminal device of the uplink/downlink configuration.

17. A method comprising:

dynamically setting, by a processor, an uplink/downlink configuration of a time division duplex (TDD) carrier; and

notifying a terminal device of the set uplink/downlink configuration and a radio resource information for device-to-device communication for the set uplink/downlink configuration, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

18. A device comprising:

circuitry configured to

acquire radio resource information indicating a radio resource for device-to-device communication for an uplink/downlink configuration of a time division duple (TDD) carrier that is dynamically set by a base station; and

control device-to-device communication using the radio resource information, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.

19. The device according to claim 18, wherein the uplink/downlink configuration is a configuration that is changed from one configuration among multiple configurations to another configuration among the multiple configurations, and wherein the circuitry is further configured to acquire the radio resource information indicating the radio resource for the uplink/downlink configuration among radio resources for device-to-device communication for the respective multiple configurations on the basis of the uplink/downlink configuration.

20. A method comprising:

acquiring radio resource information indicating a radio resource for device-to-device communication for an uplink/downlink configuration of a time division duple (TDD) carrier that is dynamically set by a base station; and

controlling, by a processor, device-to-device communication using the radio resource information, wherein the radio resource information includes radio frame information indicating a radio frame including at least one uplink subframe of the uplink/downlink configuration and resource period information indicating a period of radio resource for the device-to-device communication.