

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 including: circuitry configured to dynamically change an uplink/downlink configuration of a time division duplex (TDD) carrier, and notify a terminal device of a radio resource for device-to-device communication for the uplink/downlink configuration, wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration, each of the at least one uplink subframe is included in two or more successive uplink subframes of the uplink/downlink configuration, one or more uplink subframes of the two or more successive uplink subframes are not included in the at least one uplink subframe, and the circuitry is further configured to notify the terminal device of the radio resource when the uplink/downlink configuration includes two or more successive uplink subframes.

[0012]

According to a second aspect of the present invention, there is provided a device including: circuitry configured to acquire information indicating a radio resource for device-to-device communication for an uplink/downlink configuration of a time division duplex (TDD) carrier dynamically changed by a base station; and control

device-to-device communication using the radio resource, wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration, 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 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.

[0013] According to a third aspect of the present invention, there is provided a method including: acquiring radio resource information indicating a radio resource for device-to-device communication for an uplink/downlink configuration of a time division duplex (TDD) carrier that is dynamically changed by a base station; and controlling, by a processor, device-to-device communication using the radio resource, wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration, 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 method further includes acquiring 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.

[0014] According to a fourth aspect of the present invention, there is provided a device including: circuitry configured to dynamically change an uplink/downlink configuration of a time division duplex (TDD) carrier, and notify a terminal device of a radio resource for device-to-device communication for the uplink/downlink configuration, wherein the radio resource is periodic and period information indicating a period of the radio resource is notified by the circuitry with a configuration of the uplink/downlink configuration of a TDD, and wherein the radio resource corresponds to an uplink subframe of a first number and 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 less than the first number and is repeated at a second period shorter than the first period when the uplink/downlink configuration is a second configuration.

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 change an uplink/downlink configuration of a time division duplex (TDD) carrier, and
 notify a terminal device of a radio resource for device-to-device communication for the uplink/downlink configuration,
 wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration,
 each of the at least one uplink subframe is included in two or more successive uplink subframes of the uplink/downlink configuration,
 one or more uplink subframes of the two or more successive uplink subframes are not included in the at least one uplink subframe, and
 the circuitry is further configured to notify the terminal device of the radio resource when the uplink/downlink configuration includes two or more successive uplink subframes.
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 for device-to-device communication for the other configuration in accordance with the change of the uplink/downlink configuration, and
 the radio resource appropriate for the another configuration is a radio resource of at least one uplink subframe of the other configuration.
4. The device according to claim 2, wherein the circuitry is further configured to notify the terminal device of the radio resource for device-to-device communication for each of the multiple configurations.

5. The device according to claim 4, wherein the radio resource for each of the multiple configurations includes a radio resource for device-to-device communication for each configuration, and
the radio resource for each configuration corresponds to at least one uplink subframe of the configuration.
6. The device according to claim 4, wherein the radio resource for each of the multiple configurations corresponds to at least one uplink subframe common among the multiple configurations.
7. The device according to claim 1, wherein the number of uplink subframes included in the at least one uplink subframe differs according to the number of uplink subframes of the uplink/downlink configuration.
8. The device according to claim 1, wherein the radio resource 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 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.
10. The device according to claim 1, wherein the uplink/downlink configuration is a configuration including at least a predetermined number of uplink subframes.
11. The device according to claim 1, wherein the uplink/downlink configuration is a configuration including three or more successive uplink subframes.
12. The device according to claim 1, wherein the circuitry is further configured to notify the terminal device of the radio resource by reporting system information indicating the radio resource.
13. The device according to claim 1, wherein the circuitry is further configured to notify the terminal device of the uplink/downlink configuration.

14. A device comprising:

circuitry configured to

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

control device-to-device communication using the radio resource,

wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration,

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 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.

15. 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 duplex (TDD) carrier that is dynamically changed by a base station; and

controlling, by a processor, device-to-device communication using the radio resource,

wherein the radio resource corresponds to at least one uplink subframe of the uplink/downlink configuration,

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 method further includes acquiring 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.

16. A device comprising:

circuitry configured to

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

notify a terminal device of a radio resource for device-to-device communication for the uplink/downlink configuration,

wherein the radio resource is periodic and period information indicating a period of the radio resource is notified by the circuitry with a configuration of the uplink/downlink configuration of a TDD, and

wherein the radio resource corresponds to an uplink subframe of a first number and 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 less than the first number and is repeated at a second period shorter than the first period when the uplink/downlink configuration is a second configuration.