station, the handover due to the mobile station does not necessarily occur. However, in this case, the collision between the cell ID allocated to the relay station and the cell ID of the nearby base station might occur in response to the movement of the relay station. The collision of the cell IDs means that two or more base stations or relay stations providing the service in an overlapping position use the same cell ID. Since the collision of the cell IDs causes the communication disturbance due to data interference, it is necessary to avoid the communication disturbance as much as possible.

[0008]

~~The~~Embodiments of the present invention ~~thus~~ provide~~s~~ a relay station and a communication control method which are novel and improved by avoiding a collision of cell IDs while suppressing the throughput from being decreased in a relay communication of the movable relay station.

Solution to Problem

[0009]

According to the first aspect of the present invention ~~in order to achieve the above-mentioned object~~, there is provided a relay station relaying wireless signals between a base station and a mobile station, the relay station including: a communication unit configured to relay the wireless signals; a determination unit configured to determine whether or not it is necessary to change a cell ID in order to avoid a collision between a cell ID of the relay station and a cell ID of the base station due to a movement of the relay station; and a control unit configured to cause a cell ID of an access point of the mobile station belonging to the relay station to be changed from a first cell ID to a second cell ID when the determination unit determines that it is necessary to change the cell ID.

[0010]

When the determination unit is notified of a possibility of the collision of the cell IDs by a node that determines the possibility of the collision of the cell IDs based on position data of the relay station and cell ID data in which the cell ID and a position of the base station are associated with each other, the determination unit may

ID by the mobile station is completed.

[0016]

According to the second aspect of the present invention ~~in order to achieve the above-mentioned object~~, there is provided a communication control method using a relay station relaying wireless signals between a base station and a mobile station, the communication control method including: determining whether or not it is necessary to change a cell ID in order to avoid a collision between a cell ID of the relay station and a cell ID of the base station due to a movement of the relay station; and causing a cell ID of an access point of the mobile station belonging to the relay station to be changed from a first cell ID to a second cell ID when it is determined that it is necessary to change the cell ID.

[0017]

According to the third aspect of the present invention ~~in order to achieve the above-mentioned object~~, there is provided a relay station relaying wireless signals between a base station and a mobile station, the relay station including: a communication unit configured to transmit the wireless signals to the mobile station; and a control unit configured to cause a synchronization signal in which a synchronization sequence corresponding to a first cell ID and a synchronization sequence corresponding to a second cell ID are multiplexed to be transmitted from the communication unit to the mobile station belonging to the relay station and to also instruct the mobile station to carry out handover from the first cell ID to the second cell ID.

[0018]

According to the fourth aspect of the present invention ~~in order to achieve the above-mentioned object~~, there is provided a communication control method using a relay station relaying wireless signals between a base station and a mobile station, the communication control method including: transmitting a synchronization signal in which a synchronization sequence corresponding to a first cell ID and a synchronization sequence corresponding to a second cell ID are multiplexed to the mobile station belonging to the relay station from the relay station; and causing the relay station to instruct the mobile station to carry out handover from the first cell ID

to the second cell ID.

Advantageous Effects of Invention

[0019]

According to embodiments of the relay station and the communication control method of the present invention, it is possible to avoid the collision of cell IDs while suppressing the throughput from being decreased in a relay communication of the movable relay station.

Brief Description of Drawings

[0020]

[Fig. 1] Fig. 1 is a diagram schematically illustrating an outline of a wireless communication system according to an embodiment.

[Fig. 2] Fig. 2 is a diagram illustrating an example configuration of communication resources.

[Fig. 3] Fig. 3 is a diagram illustrating an example arrangement of reference signals.

[Fig. 4] Fig. 4 is a sequence diagram illustrating a flow of a general handover procedure.

[Fig. 5] Fig. 5 is a diagram illustrating a problem associated with the present invention.

[Fig. 6] Fig. 6 is a block diagram illustrating an example configuration of a mobile station according to a first embodiment.

[Fig. 7] Fig. 7 is a block diagram illustrating an example configuration of a relay station according to the first embodiment.

[Fig. 8] Fig. 8 is a diagram illustrating a cell ID change determination process according to the first embodiment.

[Fig. 9] Fig. 9 is a block diagram illustrating an example configuration of a base station according to the first embodiment.

[Fig. 10] Fig. 10 is a flowchart illustrating an example flow of a cell ID change determination process according to the first embodiment.

[Fig. 11] Fig. 11 is a flowchart illustrating an example flow of a communication