Description

Title of Invention: COMMUNICATION CONTROL METHOD, COMMUNICATION SYSTEM, AND MANAGEMENT SERVER

Technical Field

[0001] The present invention relates to a communication control method, a communication system, and a management server.

Background Art

[0002] In recent years, a heterogeneous network has been proposed as a next-generation communication network. The heterogeneous network is a network in which a plurality of kinds of small-to-medium-sized base stations coexist in a macro cell by performing underlay transmission or spectrum sharing. The small-to-medium-sized base stations involve a RRH (Remote RadioHead) cell base station, a hotzone base station (Pico/micro cell eNB), a femtocell base station (Home eNB), a relay node (relay base station) and the like.

[0003] In such a heterogeneous network, there is a concern that, when different base stations, such as a macro cell base station and a femtocell base station, for example, use the same frequency, improvement of an area capacity is hindered due to the occurrence of interference. Regarding such a concern, Patent Literature 1 and Patent Literature 2, for example, disclose techniques to overcome the interference issue between different transmitting devices.

Citation List

Patent Literature

[0004] PTL 1: Japanese Patent Laid-open No. 2009-159452

PTL 2: Published Japanese Translation No. 2009-542043 of PCT International Publication

Summary of Invention

[0005] According to ~~one exemplary embodiment, the disclosure is directed to~~a first aspect of the present invention, there is provided a management server in a network including a first transmitting device configured to communicate with a first receiving device and a second transmitting device configured to communicate with a second receiving device, the management server comprising: a network interface configured to receive a parameter corresponding to a level of improvement of communication quality at the second receiving device; a processor configured to calculate an allowable interference amount at the first receiving device based on the parameter, wherein the network communication unit is configured to output the calculated allowable interference amount.

[0006] The second transmitting device and the second receiving device may communicate

using a frequency that overlaps with a frequency used for communication between the first transmitting device and the first receiving device.

[0007] The network interface may be configured to receive management information indicating a state of a cell formed by the first transmitting device.

[0008] The processor may be configured to control communication in the cell formed by the first transmitting device based on the received management information.

[0009] The network communication unit may be configured to output the calculated allowable interference amount to a second management server that controls communications between the second transmitting device and the second receiving device.

[0010] The processor may be configured to calculate a maximum allowable interference amount based on the parameter, and the allowable interference amount may be calculated to be less than the maximum allowable interference amount.

[0011] The processor may be configured to set at least one of a transmitting power of the first transmitting device and a transmission rate of the first transmitting device based on the allowable interference amount.

[0012] The processor may be configured to calculate the allowable interference amount based on at least one or more of a reception power at the first receiving device, a reception power at the second receiving device, interference from the first transmitting device at the second receiving device, interference from the second transmitting device at the first transmitting device, a power of the first receiving device and a power of the second receiving device.

[0013] According to ~~another exemplary embodiment, the disclosure is directed to~~a second aspect, there is provided a management server in a network including a first transmitting device configured to communicate with a first receiving device and a second transmitting device configured to communicate with a second receiving device, the management server comprising: a processor configured to calculate a parameter corresponding to a level of improvement of communication quality at the second receiving device; a network interface configured to transmit the calculated parameter to a another management server, and receive an allowable interference amount at the first receiving device from the another management server, wherein the processor is configured to control communications between the second transmitting device and the second receiving device based on the allowable interference amount.

[0014] The second transmitting device and the second receiving device may communicate using a frequency that overlaps with a frequency used for communication between the first transmitting device and the first receiving device.

[0015] The network interface may be configured to receive management information indicating a state of a cell formed by the second transmitting device.

[0016] The processor may be configured to control communication in the cell formed by the

second transmitting device based on the received management information.

[0017] The processor may be configured to determine whether to improve the receiving communication quality based on a comparison between a current communication quality and a desired communication quality.

[0018] The processor may be configured to calculate the parameter based on a relationship between the current communication quality and the desired communication quality.

[0019] The relationship between the current communication quality and the desired communication quality may be a ratio between the desired communication quality and the current communication quality.

[0020] The processor may be configured to control communications between the second transmitting device and the second receiving device so that an amount of interference caused by the second transmitting device at the first receiving device is less than the allowable interference amount.

[0021] According to ~~another exemplary embodiment, the disclosure is directed to~~a third aspect, there is provided a network comprising: a first management server configured to control communications between a first transmitting device and a first receiving device; a second management server configured to control communications between a second transmitting device and a second receiving device; a first processor, at the second management server, configured to calculate a parameter corresponding to a level of improvement of communication quality at the second receiving device; a first network interface, at the second management server, configured to transmit the calculated parameter to the first management server; a second processor, at the first management server, configured to calculate an allowable interference amount at the first receiving device based on the parameter; a second network interface, at the first management server, configured to transmit the calculated allowable interference amount to the second management server, wherein the processor of the second management server is configured to control communications between the second transmitting device and the second receiving device based on the allowable interference amount.

[0022] According to ~~another exemplary embodiment, the disclosure is directed to~~a fourth aspect, there is provided a method of controlling communications in a network including a first management server configured to control communications between a first transmitting device and a first receiving device and a second management server configured to control communications between a second transmitting device and a second receiving device, the method comprising: calculating, at the second management server, a parameter corresponding to a level of improvement of communication quality at the second receiving device; transmitting the calculated parameter from the second management server to the first management server; calculating, by the first management server, an allowable interference amount at the first receiving device based on the parameter; transmitting