CLAIMS

1. A communication control device for a vehicle, comprising:

a short range communication processing unit that executes a direct vehicle-to-vehicle communication, which is a direct vehicle-to-vehicle communication without passing through a wide area communication network, with a peripheral vehicle disposed around the vehicle in cooperation with a short range communication module for executing a direct wireless communication with an external device without passing through the wide area communication network;

a wide area communication processing unit that executes an indirect vehicle-to-vehicle communication, which is an indirect vehicle-to-vehicle communication with passing through the wide area communication network, with the peripheral vehicle in cooperation with a wide area communication module for wirelessly communicating with the external device via the wide area communication network;

a vehicle data generation unit that generates vehicle data indicating a traveling state of the vehicle based on a detection result of a sensor mounted on the vehicle; and

a communication quality determination unit that determines whether a communication quality of the direct vehicle-to-vehicle communication provided by the short range communication processing unit is equal to or higher than a predetermined permissible level, wherein:

the short range communication processing unit wirelessly transmits a communication packet including the vehicle data from the short range communication module in a predetermined short range transmission cycle;

the wide area communication processing unit performs a process of

transmitting the communication packet including the vehicle data to the peripheral vehicle via the wide area communication module and the wide area communication network in a predetermined wide range transmission cycle;

the wide area communication processing unit selects a predetermined first wide area transmission cycle longer than the short range transmission cycle as the wide area transmission cycle when the communication quality determination unit determines that the communication quality of the direct vehicle-to-vehicle communication is equal to or higher than the predetermined permissible level; and

the wide area communication processing units selects a predetermined second wide area transmission cycle equal to or smaller than the short range transmission cycle as the wide range transmission cycle when the communication quality determination unit determines that the communication quality of the direct vehicle-to-vehicle communication is lower than the predetermined permissible level.

2. The communication control device according to claim 1, further comprising:

a peripheral vehicle determination unit that determines whether an other vehicle corresponding to the peripheral vehicle is disposed within a predetermined area from the vehicle, based on the vehicle data acquired by the short range communication processing unit and the wide area communication processing unit, wherein:

the wide area communication processing unit selects the second wide area transmission cycle as the wide area transmission cycle when the peripheral vehicle determination unit determines that the other vehicle corresponding to

the peripheral vehicle is disposed within the predetermined area, and the communication quality determination unit determines that the communication quality of the direct vehicle-to-vehicle communication is lower than the predetermined permissible level.

3. The communication control device according to claim 2, wherein:

the wide area communication processing unit selects the first wide area transmission cycle as the wide area transmission cycle when the peripheral vehicle determination unit determines that no other vehicle corresponding to the peripheral vehicle is disposed within the predetermined area.

4. The communication control device according to any one of claims 1 to 3, further comprising:

a communication quality estimation unit that estimates whether the communication quality of the direct vehicle-to-vehicle communication is deteriorated until the vehicle travels a predetermined distance from a current position or within a predetermined time, based on the vehicle data acquired by the short range communication processing unit and the wide range communication processing unit or based on a structure of a road disposed ahead of the vehicle, wherein:

the wide area communication processing unit selects the second wide area transmission cycle as the wide area transmission cycle when the communication quality estimation unit estimates that the communication quality of the direct vehicle-to-vehicle communication is deteriorated.

5. The communication control device according to any one of claims 1