CLAIMS

1. A wireless communication device for vehicles, the wireless communication device receiving information using a plurality of service channels and a control channel, the service channels and the control channel which are assigned with a plurality of mutually different frequency channels,

the wireless communication device comprising:

a first wireless receiver that designates, as a reception channel, a service channel identified from the plurality of service channels based on a kind of a service, and receives service execution information to execute the service;

a second wireless receiver that designates, as a reception channel, the control channel, and receives service announcement information including channel information identifying the service channel; and

a reception control unit that causes the first wireless receiver to set the reception channel based on the channel information included in the service announcement information received by the second wireless receiver,

wherein:

the first wireless receiver is enabled to designate also the control channel as the reception channel;

the reception control unit causes the first wireless receiver to designate the control channel as the reception channel, when any service channel is not designated as the reception channel of the first wireless receiver; and

in cases where the first wireless receiver designates the control channel as the reception channel and receives service announcement information including channel information identifying a service channel,

the reception control unit causes the first wireless receiver to designate, as the reception channel, the service channel identified from the channel information included in the received service announcement information,

based on that, the service channel identified from the channel information included in the service announcement information received by the first wireless receiver is enabled to be designated by the first wireless receiver as the reception channel.

2. The wireless communication device for vehicles according to claim 1, further comprising:

a storage that stores the service announcement information received by the second wireless receiver,

wherein

the reception control unit acquires the channel information included in the service announcement information, from the storage, and causes the first wireless receiver to set the reception channel based on the acquired channel information.

3. The wireless communication device for vehicles according to claim 2, further comprising:

a storage control unit that stores the service announcement information in the storage,

based on

(i) that the service channel identified from the channel information included in the service announcement information received by the second wireless receiver is enabled to be designated by the first wireless receiver as the reception channel, and simultaneously

(ii) that the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information when the second wireless receiver receives the service announcement information.

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

a first reception control unit that serves as the reception control unit; and

a second reception control unit that controls the reception channel of the second wireless receiver,

wherein:

the second wireless receiver is enabled to designate at least one service

channel among the plurality of service channels in addition to the control channel, as the reception channel; and

the second reception control unit causes the second wireless receiver to designate the service channel identified from the channel information as the reception channel,

based on that the service channel identified from the channel information included in the service announcement information received by the second wireless receiver is enabled to be designated by the second wireless receiver as the reception channel.

5. The wireless communication device for vehicles according to claim 4, wherein:

the second wireless receiver is enabled to designate at least one of the plurality of service channels enabled to be designated by the first wireless receiver as the reception channel of the second wireless receiver; and

the second reception control unit causes the second wireless receiver to designate, as the reception channel, the service channel identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating the control channel as the reception channel,

based on

(i) that that the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information, and simultaneously

(ii) that the service channel identified from the channel information included in the service announcement information is enabled to be designated as the reception channel by each of the first wireless receiver and the second wireless receiver.

6. The wireless communication device for vehicles according to claim 5, wherein:

the second wireless receiver is enabled to designate as the reception channel, in addition to the control channel, two or more service channels that contain at least one of the plurality of service channels that are enabled to be designated by the first wireless receiver;

the second reception control unit causes the second wireless receiver to designate, as the reception channel, alternately (i) the control channel and (ii) one service channel of the two or more service channels; and

the second wireless receiver receives the service execution information when the second wireless receiver is designating the one service channel as the reception channel;

the second wireless receiver receives the service announcement information when the second wireless receiver is designating the control channel as the reception channel;

the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information received by the second wireless receiver;

the second wireless receiver is enabled to designate, as the reception channel, the service channel included in the service announcement information received by the second wireless receiver; and

based on that a priority of a service identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating, as the reception channel, the control channel is higher than a priority of a service identified from the service execution information received by the second wireless receiver when the second wireless receiver is designating, as the reception channel, the one service channel of the two or more service channels,

the second reception control unit causes the second wireless receiver to designate, as the reception channel, the service channel identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating the control channel as the reception channel.

7. The wireless communication device for vehicles according to claim 3, wherein:

the reception control unit acquires the service announcement information from the storage after the first wireless receiver receives the service execution information indicating completion of the service based on the service announcement information being stored in the storage; and

the storage control unit deletes the service announcement information from the storage based on that a period of time for which the service announcement information is stored in the storage exceeds a deletion time.

8. The wireless communication device for vehicles according to claim 7, wherein:

in addition to the channel information, the service announcement information includes information identifying a kind of a service; and

the storage control unit specifies the deletion time that is specified depending on the kind of the service identified from the service announcement information.

9. The wireless communication device for vehicles according to any one of claim 3, claim 7, and claim 8,

wherein:

the service announcement information includes the channel information, information identifying a kind of a service, and information specifying a priority of the service;

based on

(i) that the service announcement information is stored in the storage, and simultaneously

(ii) that a service identified from the service announcement information received by the second wireless receiver is different from a service identified from the service announcement information stored in the storage,

the storage control unit stores the service announcement information received

by the second wireless receiver in the storage while the storage control unit continues storing the service announcement information already stored in the storage; and

when a plurality of service announcement informations are stored in the storage, the reception control unit causes the first wireless receiver to designate, as the reception channel, the service channel identified from the service announcement information having a highest priority.

10. A wireless communication system comprising:

a wireless communication device for vehicles according to any one of claims 1 to 9; and

an announcement roadside unit that transmits the service announcement information, in addition to the service execution information.

11. The wireless communication system according to claim 10, further comprising:

a non-announcement roadside unit that transmits the service execution information, without transmitting the service announcement information.

12. A wireless communication device for vehicles, the wireless communication device receiving information using a plurality of service channels and a control channel, the service channels and the control channel which are assigned with a plurality of mutually different frequency channels,

the wireless communication device comprising:

a first wireless receiver that designates, as a reception channel, a service channel identified from the plurality of service channels based on a kind of a service, and receives service execution information to execute the service;

a second wireless receiver that designates, as a reception channel, the control channel, and receives service announcement information including channel information identifying the service channel;

a first reception control unit that causes the first wireless receiver to set the reception channel based on the channel information included in the service

announcement information received by the second wireless receiver; and

a second reception control unit that controls the reception channel of the second wireless receiver,

wherein:

the second wireless receiver is enabled to designate at least one service channel among the plurality of service channels in addition to the control channel, as the reception channel; and

the second reception control unit causes the second wireless receiver to designate the service channel identified from the channel information as the reception channel,

based on that the service channel identified from the channel information included in the service announcement information received by the second wireless receiver is enabled to be designated by the second wireless receiver as the reception channel.

13. The wireless communication device for vehicles according to claim 12, further comprising:

a storage that stores the service announcement information received by the second wireless receiver,

wherein

the first reception control unit acquires the channel information included in the service announcement information, from the storage, and causes the first wireless receiver to set the reception channel based on the acquired channel information.

14. The wireless communication device for vehicles according to claim 12 or claim 13, wherein:

the first wireless receiver is enabled to designate also the control channel as the reception channel; and

the first reception control unit causes the first wireless receiver to designate the control channel as the reception channel, when any service channel is not designated as the reception channel of the first wireless receiver.

15. The wireless communication device for vehicles according to claim 13, further comprising:

a storage control unit that stores the service announcement information in the storage,

based on

(i) that the service channel identified from the channel information included in the service announcement information received by the second wireless receiver is enabled to be designated by the first wireless receiver as the reception channel, and simultaneously

(ii) that the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information when the second wireless receiver receives the service announcement information.

16. The wireless communication device for vehicles according to claim 12, wherein:

the second wireless receiver is enabled to designate at least one of the plurality of service channels enabled to be designated by the first wireless receiver as the reception channel of the second wireless receiver; and

the second reception control unit causes the second wireless receiver to designate, as the reception channel, the service channel identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating the control channel as the reception channel,

based on

(i) that that the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information, and simultaneously

(ii) that the service channel identified from the channel information included in the service announcement information is enabled to be designated as the

reception channel by each of the first wireless receiver and the second wireless receiver.

17. The wireless communication device for vehicles according to claim 16, wherein:

the second wireless receiver is enabled to designate as the reception channel, in addition to the control channel, two or more service channels that contain at least one of the plurality of service channels that are enabled to be designated by the first wireless receiver;

the second reception control unit causes the second wireless receiver to designate, as the reception channel, alternately (i) the control channel and (ii) one service channel of the two or more service channels; and

the second wireless receiver receives the service execution information when the second wireless receiver is designating the one service channel as the reception channel;

the second wireless receiver receives the service announcement information when the second wireless receiver is designating the control channel as the reception channel;

the first wireless receiver is designating a different service channel that is different from the service channel identified from the channel information included in the service announcement information received by the second wireless receiver;

the second wireless receiver is enabled to designate, as the reception channel, the service channel included in the service announcement information received by the second wireless receiver; and

based on that a priority of a service identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating, as the reception channel, the control channel is higher than a priority of a service identified from the service execution information received by the second wireless receiver when the second wireless receiver is designating, as the reception channel, the one service channel of the two or more service channels,

the second reception control unit causes the second wireless receiver to designate, as the reception channel, the service channel identified from the channel information included in the service announcement information received by the second wireless receiver when the second wireless receiver is designating the control channel as the reception channel.

18. The wireless communication device for vehicles according to claim 15, wherein:

the first reception control unit acquires the service announcement information from the storage after the first wireless receiver receives the service execution information indicating completion of the service based on the service announcement information being stored in the storage; and

the storage control unit deletes the service announcement information from the storage based on that a period of time for which the service announcement information is stored in the storage exceeds a deletion time.

19. The wireless communication device for vehicles according to claim 18, wherein:

in addition to the channel information, the service announcement information includes information identifying a kind of a service; and

the storage control unit specifies the deletion time that is specified depending on the kind of the service identified from the service announcement information.

20. The wireless communication device for vehicles according to any one of claim 15, claim 18, and claim 19,

wherein:

the service announcement information includes the channel information, information identifying a kind of a service, and information specifying a priority of the service;

based on

(i) that the service announcement information is stored in the storage,

and simultaneously

(ii) that a service identified from the service announcement information received by the second wireless receiver is different from a service identified from the service announcement information stored in the storage,

the storage control unit stores the service announcement information received by the second wireless receiver in the storage while the storage control unit continues storing the service announcement information already stored in the storage; and

when a plurality of service announcement informations are stored in the storage, the first reception control unit causes the first wireless receiver to designate, as the reception channel, the service channel identified from the service announcement information having a highest priority.

21. A wireless communication system comprising:

a wireless communication device for vehicles according to any one of claims 12 to 20; and

an announcement roadside unit that transmits the service announcement information, in addition to the service execution information.

22. The wireless communication system according to claim 21, further comprising:

a non-announcement roadside unit that transmits the service execution information, without transmitting the service announcement information.