

Claims

- [Claim 1] A transmitting device for transmitting vehicular data via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for transmitting the vehicular data via the sidelink interface, wherein the transmitting device comprises:
- an application layer, which in operation, generates the vehicular data, wherein the application layer, when in operation, forwards the vehicular data together with a priority indication and one or more quality of service parameters to a transmission layer responsible for transmission of the vehicular data via the sidelink interface, and
 - the transmission layer, which in operation, performs autonomous radio resource allocation based on the received priority indication and the one or more quality of service parameters, wherein the transmission layer, when in operation, transmits the vehicular data via the sidelink interface to the one or more receiving devices according to the performed autonomous radio resource allocation.
- [Claim 2] The transmitting device according to claim 1, wherein the one or more quality of service parameters indicate at least one of:
- a packet delay budget: indicating an upper time limit allowed for transmitting the vehicular data upon becoming available for transmission,
 - a packet error loss rate: indicating the allowed rate of lost vehicular data,
 - a resource type: having or not having a guaranteed bit rate.
- [Claim 3] The transmitting device according to claim 1 or 2, wherein an aggregated maximum bit rate is defined for the transmitting device, indicating the maximum-allowed total data throughput of the transmitting device via the sidelink interface, optionally wherein the aggregated maximum bit rate is configured by a radio base station controlling the transmitting device, and
- wherein the aggregated maximum bit rate is used for a sidelink logical channel prioritization procedure as a limit to the amount of data throughput by the transmitting device via the sidelink interface, the sidelink logical channel prioritization procedure being performed by the transmitting device for allocating radio resources to generate a data packet carrying the vehicular data.

- [Claim 4] A method for transmitting vehicular data from a transmitting device via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for transmitting the vehicular data via the sidelink interface, the method comprising the following steps performed by the transmitting device:
- generating the vehicular data in an application layer and forwarding the vehicular data together with a priority indication and one or more quality of service parameters to a transmission layer responsible for transmission of the vehicular data via the sidelink interface, and
 - performing by the transmission layer autonomous radio resource allocation based on the received priority indication and the one or more quality of service parameters,
 - transmitting by the transmission layer the vehicular data via the sidelink interface to the one or more receiving devices according to the performed autonomous radio resource allocation.
- [Claim 5] The method according to claim 4, wherein the one or more quality of service parameters indicate at least one of:
- a packet delay budget: indicating an upper time limit allowed for transmitting the vehicular data upon becoming available for transmission,
 - a packet error loss rate: indicating the allowed rate of lost vehicular data,
 - a resource type: having or not having a guaranteed bit rate.
- [Claim 6] A transmitting device for transmitting vehicular data via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for transmitting the vehicular data via the sidelink interface, wherein the transmitting device comprises:
- a receiver, which in operation, receives system information broadcast by a radio base station in its radio cell, the system information comprising one or more quality of service configurations,
 - an application layer, which in operation, generates the vehicular data and forwards the generated vehicular data together with an indication to a transmission layer responsible for transmission of the vehicular data via the sidelink interface,
 - the transmission layer, which in operation, determines one of the received one or more quality of service configurations depending on the indication received together with the vehicular data, and the

transmission layer, when in operation, performs the autonomous radio resource allocation based on the determined one quality of service configuration, and

wherein the transmission layer, when in operation, transmits the vehicular data via the sidelink interface to the one or more receiving devices according to the performed autonomous radio resource allocation.

[Claim 7]

The transmitting device according to claim 6, wherein each of the one or more quality of service configurations indicates at least one of:

- a packet delay budget: indicating an upper time limit allowed for transmitting the vehicular data upon becoming available for transmission,
- a packet error loss rate: indicating the allowed rate of lost vehicular data

[Claim 8]

The transmitting device according to claim 6 or 7, wherein the indication transmitted together with the vehicular data to the transmission layer is a priority indication, indicating the priority of the vehicular data,

wherein the transmission layer determines the one quality of service configuration using the received priority indication and a mapping stored in the transmitting device associating each of the one or more quality of service configurations with a priority indication value, and optionally wherein the mapping is received in the system information broadcast by the radio base station in its radio cell or provided by the application layer.

[Claim 9]

The transmitting device according to one of claims 6 to 8, wherein the application layer determines which quality of service configuration to use and generates a quality of service class indication indicating the determined one quality of service configuration, wherein the indication transmitted together with the vehicular data to the transmission layer is the generated quality of service class indication, and optionally wherein a priority indication is transmitted together with the vehicular data to the transmission layer, the priority indication indicating the priority of the vehicular data.

[Claim 10]

A method for transmitting vehicular data from a transmitting device via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for

transmitting the vehicular data via the sidelink interface, the method comprising the following steps performed by the transmitting device:

receiving system information broadcast by a radio base station in its radio cell, the system information comprising one or more quality of service configurations,

generating in an application layer the vehicular data and forwarding the generated vehicular data together with an indication to a transmission layer responsible for transmission of the vehicular data via the sidelink interface,

determining by the transmission layer one of the received one or more quality of service configurations depending on the indication received together with the vehicular data, and, performing by the transmission layer the autonomous radio resource allocation based on the determined one quality of service configuration, and

transmitting the vehicular data via the sidelink interface to the one or more receiving devices according to the performed autonomous radio resource allocation.

[Claim 11]

The method according to claim 10, wherein each of the one or more quality of service configurations indicates at least one of:

- a packet delay budget: indicating an upper time limit allowed for transmitting the vehicular data upon becoming available for transmission,
- a packet error loss rate: indicating the allowed rate of lost vehicular data
- a resource type: having or not having a guaranteed bit rate.

[Claim 12]

A transmitting device for transmitting vehicular data via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for transmitting the vehicular data via the sidelink interface, wherein an aggregate maximum bit rate is defined for the transmitting device, indicating the maximum-allowed total vehicular data throughput of the transmitting device via the sidelink interface, wherein the transmitting device comprises:

an application layer, which in operation, generates the vehicular data, wherein the application layer, when in operation, forwards the vehicular data to a transmission layer responsible for transmission of the vehicular data via the sidelink interface,

the transmission layer, which in operation, performs the autonomous

radio resource allocation for the vehicular data, including the selection of frequency-time radio resources,

the transmission layer, which in operation, performs a sidelink logical channel prioritization procedure for allocating the selected frequency-time radio resources to generate a data packet carrying the vehicular data, the sidelink logical channel procedure considering the aggregate maximum bit rate as a limit to the throughput of vehicular data to be transmitted by the transmitting device via the sidelink interface, and

the transmission layer, which in operation, transmits the generated data packet carrying the vehicular data to the one or more receiving devices using the allocated frequency-time radio resources.

[Claim 13] The transmitting device according to claim 12, wherein the aggregate maximum bit rate is used in the sidelink logical channel prioritization as an upper limit parameter of a token bucket in a token bucket algorithm for the vehicular data.

[Claim 14] The transmitting device according to claim 12 or 13, wherein the application layer generates non-vehicular data, and the sidelink logical channel prioritization procedure does not consider the aggregate maximum bit rate when allocating radio resources to generate a data packet carrying the non-vehicular data.

[Claim 15] A method for transmitting vehicular data from a transmitting device via a sidelink interface to one or more receiving devices, wherein the transmitting device performs autonomous radio resource allocation for transmitting the vehicular data via the sidelink interface, wherein an aggregate maximum bit rate is defined for the transmitting device, indicating the maximum-allowed total vehicular data throughput of the transmitting device via the sidelink interface, the method comprising the following steps performed by the transmitting device:

generates by an application layer the vehicular data and forwarding by the application layer the vehicular data to a transmission layer responsible for transmission of the vehicular data via the sidelink interface,

performing by the transmission layer the autonomous radio resource allocation for the vehicular data, including the selection of frequency-time radio resources,

performing by the transmission layer a sidelink logical channel prioritization procedure for allocating the selected frequency-time radio

resources to generate a data packet carrying the vehicular data, the sidelink logical channel procedure considering the aggregate maximum bit rate as a limit to the throughput of vehicular data to be transmitted by the transmitting device via the sidelink interface, and

transmitting by the transmission layer the generated data packet carrying the vehicular data to the one or more receiving devices using the allocated frequency-time radio resources.