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(54) **Title:** METHOD AND APPARATUS OF DATA TRANSMISSION FOR VEHICLE-TO-VEHICLE COMMUNICATION

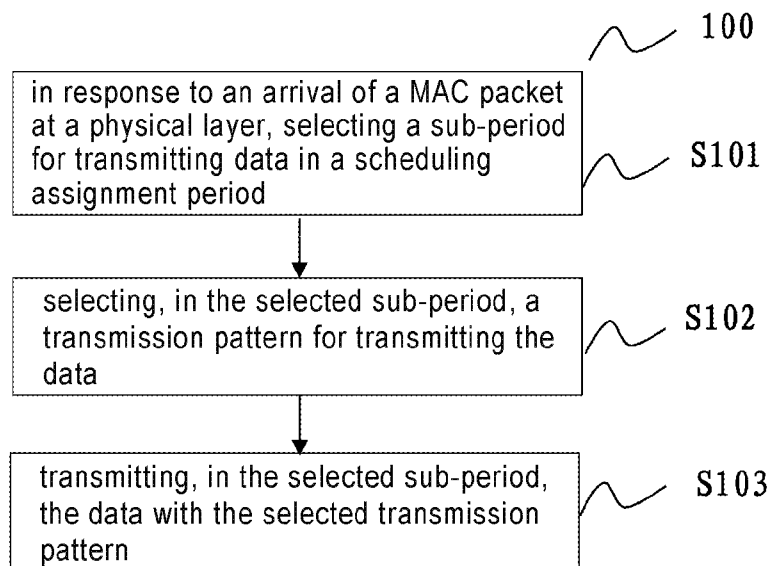


Fig.1

(57) **Abstract:** Embodiments of the present disclosure provide a method of data transmission for vehicle-to-vehicle communication, comprising: in response to an arrival of a media access control (MAC) packet at a physical layer, selecting a sub-period for transmitting data in a scheduling assignment period, in the selected sub-period, selecting a transmission pattern for transmitting the data; and in the selected sub-period, transmitting the data with the selected transmission pattern. Moreover, embodiments of the present disclosure also relate to an apparatus of data transmission for vehicle-to-vehicle communication.



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METHOD AND APPARATUS OF DATA TRANSMISSION FOR VEHICLE-TO-VEHICLE COMMUNICATION

FIELD

- 5 [0001] Embodiments of the present disclosure relate to the communication field, and more particularly to a method and apparatus of data transmission for vehicle-to-vehicle communication.

BACKGROUND

- 10 [0002] In 2015, a new study program on LTE-based (Long Term Evolution) V2X services in 3GPP was started to study and explore the opportunity to realize “the connected cars” for the vehicle industry based on the widely deployed LTE networks. The LTE-based V2X study comprises three parts: V2V (vehicle-to-vehicle), V2P (vehicle-to-pedestrians) and V2I/N (vehicle-to-infrastructure/network). The V2V services cover communications
15 between the vehicles through direct air interface (e.g., based on the PC5 interface defined for D2D, i.e. Apparatus to Apparatus, in LTE Release 12/13), or through indirect air interface via relaying by the eNB. This invention focuses on the V2V transmission with direct air interface.

- [0003] However, D2D direct communication specified in LTE release 12/13 is not efficient
20 for V2V communication. Hence enhancements built on D2D direct communication are needed to realize V2V communication in LTE.

SUMMARY

- [0004] In embodiments of the present disclosure, a new mechanism is provided for data
25 transmission of vehicle-to-vehicle communication to realize speed generated in adjustable packet on the physical layer and to enhance broadcasting performance for V2V communication.

- [0005] According to one aspect of the present disclosure, there is provided a method for data transmission for vehicle-to-vehicle communication, comprising: in response to an
30 arrival of a media access control (MAC) packet at a physical layer, selecting a sub-period for transmitting data in a scheduling assignment period; selecting, in the selected sub-period, a transmission pattern for transmitting the data; and transmitting, in the selected sub-period, the data with the selected transmission pattern.

- [0006] In the method according to embodiments of the present disclosure, selecting a

sub-period for transmitting the data in the scheduling assignment period comprises: randomly selecting a sub-period for transmitting the data.

[0007] In the method according to embodiments of the present disclosure, selecting a sub-period for transmitting the data in the scheduling assignment period comprises:

5 selecting a sub-period for transmitting the data based on sensing.

[0008] In the method according to embodiments of the present disclosure, selecting a sub-period for transmitting the data based on sensing comprises at least one of the followings: obtaining the scheduling assignment information from an user equipment (UE) of a further vehicle; and an energy level of a physical sidelink shared channel (PSSCH) channel.

[0009] In the method according to embodiments of the present disclosure, selecting the transmission pattern for transmitting the data in the selected sub-period comprises: in the selected sub-period, randomly selecting the transmission pattern for transmitting the data.

[0010] In the method according to embodiments of the present disclosure, selecting the transmission pattern for transmitting the data in the selected sub-period comprises: selecting, in the selected sub-period and based on sensing, the transmission pattern for transmitting the data.

[0011] In the method according to embodiments of the present disclosure, selecting the transmission pattern for transmitting the data based on sensing comprises at least one of the followings: obtaining the scheduling assignment information from an user equipment (UE) of a further vehicle; and sensing an energy level of a physical sidelink shared channel (PSSCH) channel.

[0012] In the method according to embodiments of the present disclosure, selecting a sub-period for transmitting the data in the scheduling assignment period comprises: determining the number of sub-periods for transmitting the data in the scheduling assignment period, based on a number of transmission of MAC packets on the physical layer and a subset of predetermined transmission patterns in the sub-period.

[0013] In the method according to embodiments of the present disclosure, selecting the transmission pattern for transmitting the data in the selected sub-period comprises: selecting the sub-frame for transmitting the data in each selected sub-period.

[0014] In the method according to embodiments of the present disclosure, in each selected sub-period, the selected sub-frame used to transmit the data is a same sub-frame.

[0015] In the method according to embodiments of the present disclosure, the selected sub-frame used to transmit the data is a different sub-frame.

[0016] In the method according to embodiments of the present disclosure, in response to the arrival of the MAC packet at the physical layer, selecting the sub-period for transmitting the data in the scheduling assignment period further comprises: in response to the arrival of the MAC packet at the physical layer, determining, based on sensing, whether a congestion degree of a data resource pool in the scheduling assignment period is above a threshold; and; and in response to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold, selecting the sub-period for transmitting the data in the scheduling assignment period.

[0017] According to another aspect of the present disclosure, there is provided an apparatus for data transmission for vehicle-to-vehicle communication, comprising: a first selecting unit configured to select the sub-period for transmitting data in a scheduling assignment period in response to an arrival of a media access control (MAC) packet; a second selecting unit configured to select a transmission pattern for transmitting the data in the selected sub-period; and a transmission unit configured to transmit the data with the selected transmission pattern in the selected sub-period.

[0018] According to an example embodiment of the present disclosure, the first selecting unit is further configured to: select randomly the sub-period for transmitting the data.

[0019] According to an example embodiment of the present disclosure, the first selecting unit is further configured to: select, based on sensing, the sub-period of the data.

[0020] According to an example embodiment of the present disclosure, the first selecting unit is further configured to at least one of the followings: obtain the scheduling assignment information from an user equipment (UE) of a further vehicle; and sense the energy level of a physical sidelink shared channel (PSSCH) channels.

[0021] According to an example embodiment of the present disclosure, the second selecting unit is further configured to: select randomly the transmission pattern for transmitting the data in the selected sub-period.

[0022] According to an example embodiment of the present disclosure, the second selecting unit is further configured to: select, based on sensing, the transmission pattern for transmitting the data in the selected sub-period.

[0023] According to an example embodiment of the present disclosure, the second selecting unit is further configured to at least one of the followings: obtain the scheduling assignment information from UEs of a further vehicle; and sense the energy level of a physical sidelink shared channel (PSSCH) channels.

[0024] According to an example embodiment of the present disclosure, the first selecting

unit is further configured to: determine a number of sub-periods for transmitting the data in the scheduling assignment period, based on a number of transmission of MAC packets on the physical layer and a subset of the predetermined transmission pattern in the sub-period.

[0025] According to an example embodiment of the present disclosure, the second selecting unit is further configured to: select the sub-frame for transmitting the data in each selected sub-period.

[0026] According to an example embodiment of the present disclosure, in each selected sub-period, the selected sub-frame used to transmit the data is a same sub-frame.

[0027] In the method according to embodiments of the present disclosure, in each selected sub-period, the selected sub-frame used to transmit the data is a different sub-frame.

[0028] According to an example embodiment of the present disclosure, the first selecting unit is further configured to: determine, based on sensing, whether a congestion degree of a data resource pool in the scheduling assignment period is above a threshold, in response to the arrival of the MAC packet at the physical layer; select the sub-period for transmitting the data in the scheduling assignment period, in responding to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] In the present disclosure, with reference to the accompanying drawings, embodiments as proposed in the present disclosure will be described in detail hereinafter. Dashed boxes or dotted arrows in the drawings represent optional steps or optional operations. In the drawings:

[0030] FIG. 1 illustrates a flowchart of a method of data transmission for vehicle-to-vehicle communication according to an embodiment of the present disclosure.

[0031] FIG. 2 illustrates a schematic diagram of frame architecture for D2D direct communication in LTE release 12.

[0032] FIG. 3 illustrates a schematic diagram of frame architecture for V2V communication according to the embodiments of the present disclosure.

[0033] FIG. 4 illustrates a schematic diagram of frame architecture for broadcasting transmission of the vehicle UE according to the embodiments of the present disclosure.

[0034] FIG. 5 illustrates an apparatus for data transmission for vehicle-to-vehicle communication according to the embodiments of the present disclosure.

Detailed Description

[0035] In this section, examples will be presented in detail to show principles of the solution as proposed in the present disclosure.

[0036] FIG. 1 illustrates a flowchart of method 100 of data transmission for vehicle-to-vehicle communication according to an embodiment of the present disclosure.

Specifically, at S101, in response to an arrival of a MAC packet at a physical layer, selecting a sub-period for transmitting data in a scheduling assignment period. At S102, in the selected sub-period, selecting a transmission pattern for transmitting the data. At S103, in the selected sub-period, transmitting the data with the selected transmission pattern.

[0037] In one embodiment of the present disclosure, at S101 of method 100, in response to an arrival of a MAC packet at a physical layer, it can be determined based on sensing whether a congestion degree of the data resource pool in the scheduling assignment period is above the threshold. In response to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold, selecting the sub-period for transmitting the data in the scheduling assignment period. Once the data resource pool is consider as overcrowded, i.e. the congestion degree of the data resource pool is above the threshold of the data resource pool, the vehicle UE can keep silent by discarding MAC, namely, not perform data transmission.

[0038] It should be noted that determining, based on sensing, whether the congestion degree of the data resource pool in the scheduling assignment period is above the threshold can be performed with at least one of the following methods: obtaining the scheduling assignment information from UE of a further vehicle; and sensing the energy level of PSSCH channels. It should be noted that the two methods can be performed separately or jointly.

[0039] Once it determines that the congestion degree of the data resource pool in the scheduling assignment period being below the threshold, data transmission can be performed. At S101 of method 100, the sub-period for transmitting data can be selected randomly.

[0040] In one embodiment of the present disclosure, at S101 of method 100, a sub-period for transmitting data can be selected based on sensing.

[0041] In one embodiment of the present disclosure, at S101 of method 100, selecting, based on sensing, a sub-period for transmitting data can be implemented with at least one of the following methods: obtaining the scheduling assignment information from UE of a further vehicle; and sensing the energy level of PSSCH channels. It should be noted that the two methods can be performed separately or jointly.

[0042] At S102 of method 100, in the selected sub-period, select randomly the transmission pattern for transmitting data.

[0043] In one embodiment of the present disclosure, in the selected sub-period, select, based on sensing, the transmission pattern for transmitting the data.

5 [0044] In one embodiment of the present disclosure, at S102 of method 100, selecting the transmission pattern for transmitting the data based on sensing can be implemented with at least one of the following methods: obtaining the scheduling assignment information from UE of a further vehicle; and sensing the energy level of PSSCH channels. It should be noted that the two methods can be performed separately or jointly.

10 [0045] Those skilled in the art can understand that based on the result sensed at S101 and S102 of method 100, the vehicle UE can identify resources occupied by neighboring UEs for transmission. To avoid potential collision or to reduce the impact of interference due to in-band emissions, the vehicle UE can choose the least crowded sub-periods in the scheduling assignment period and/or transmit data in the sub-frame of the sub-period.

15 [0046] At S101 of method 100, determine the number of sub-periods for transmitting the data in the scheduling assignment period based on the number of transmission of MAC packets on the physical layer and the subsets of the transmission pattern predetermined in the sub-period.

[0047] At S102 of method 100, select the sub-frame for transmitting the data in each
20 selected sub-period, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a same sub-frame or a different sub-frame.

[0048] With reference to Figs 2 and 4, division and selection of sub-period in the scheduling assignment period and selection of the scheduling pattern in the scheme architecture for V2V communication according to an embodiment of the present disclosure
25 are depicted further.

[0049] FIG. 2 illustrates a schematic diagram of the frame architecture for D2D direct communication in LTE release 12. With reference to FIG. 2, as specified in LTE release 12, PSCCH channels (control channel to transmit scheduling assignment (SA)) and PSSCH channels (data channel) are based on physical resource pool periodicity. The SA resource
30 pools and data resource pools of preconfigured duration are periodically repeated in time, as illustrated in FIG.2. Each data transmission is scheduled by an SA. A receiving UE knows time and frequency of data transmission after decoding the associated SA. In FIG. 2, each scheduling assignment period has 40 sub-frames with 8 occupied by SA and 32 occupied by data. In LTE release 12, the transmission pattern specified for data consists of

three subsets: (8, k) with $k=1, 2, 4$, which denotes that a transmitting UE selects k out of 8 sub-frames for transmission.

[0050] FIG. 3 illustrates a schematic diagram of the frame architecture for V2V communication according to the embodiments of the present disclosure. With reference to FIG. 3, the D2D data resource pool in scheduling assignment period shown in FIG. 2 is divided into a plurality of sub-periods of 8 sub-frames since the length of a transmission pattern is 8. As in FIG. 2, the data in the scheduling assignment period has a length of 32 sub-frames, the data resource pool is divided into 4 sub-periods.

[0051] It should be noted that how many sub-periods the data resource pool should be divided depends on the number of sub-frames of the whole scheduling assignment period. Dividing the data resource pool in the scheduling assignment period into 4 sub-periods shown in FIG. 3 is only an example, not intending to limit the number of sub-periods.

[0052] FIG. 4 illustrates a schematic diagram of the frame architecture for broadcasting transmission of the vehicle UE according to the embodiments of the present disclosure.

[0053] For broadcasting the vehicle UE, the number of sub-periods selected for data transmission in a scheduling assignment period depends on the number of MAC packets transmitted on the physical layer and subsets of the predetermined transmission pattern. With reference to the schematic diagram shown in FIG. 4, if MAC packet has been transmitted twice on the physical layer and the subset of the transmission pattern is configured as (8, 1), there is only one sub-frame for transmission in each sub-period. Therefore, the number of sub-periods selected for transmitting data is 2. It should be noted that for the scenario of in-network coverage, the transmission pattern subset is configured by eNB. For the scenario of out-of-network coverage, the transmission pattern can be pre-configured. Those skilled in the art can understand that if the transmission pattern subset is configured is (8, 1), the number of sub-periods for transmission equals to the number of transmissions of MAC on the physical layer, wherein the number of transmission of MAC on the physical layer can be 1, 2, 3 or 4.

[0054] After the number of sub-periods for transmitting data has been determined, it can be determined which sub-periods can be selected for transmitting data based on sensing. As indicated in FIG. 4, the first and third sub-periods are selected for data transmission and marked as Tx while they keep silent on the second and fourth period and marked as Silent.

[0055] In one embodiment of the present disclosure, the same or different transmission patterns can be selected in each selected sub-period. In other words, the same or different sub-frames for transmitting data are selected. Adopting repeated transmission patterns for

sub-periods in a scheduling assignment period can simplify SA signaling but at the cost of performance. On the contrary, employing different transmission patterns for sub-periods in a scheduling assignment period requires more SA signaling but with better performance. The performance advantage provided by different transmission patterns over sub-periods is due to the addition of available time domain patterns in the entire data part of a scheduling assignment period.

[0056] FIG. 5 illustrates a schematic diagram of an apparatus for data transmission for vehicle-to-vehicle communication according to the embodiments of the present disclosure. As shown in FIG. 5, the apparatus 500 for data transmission for vehicle-to-vehicle communication comprises: a first selecting unit 510 configured to select the sub-period for transmitting data in a scheduling assignment period in response to an arrival of a media access control (MAC) packet; a second selecting unit 520 configured to select a transmission pattern for transmitting the data in the selected sub-period; and a transmission unit 530 configured to transmit the data with the selected transmission pattern in the selected sub-period.

[0057] In one embodiment of the present disclosure, the first selecting unit 510 is further configured to: select randomly the sub-period for transmitting the data.

[0058] In one embodiment of the present disclosure, the first selecting unit 510 is further configured to: select, based on sensing, the sub-period of the data.

[0059] In one embodiment of the present disclosure, the first selecting unit 510 is further configured to at least one of the followings: obtain the scheduling assignment information from an user equipment (UE) of a further vehicle; and sense the energy level of a physical sidelink shared channel (PSSCH) channel.

[0060] In one embodiment of the present disclosure, the second selecting unit 520 is further configured to: select randomly the transmission pattern for transmitting the data in the selected sub-period.

[0061] In one embodiment of the present disclosure, the second selecting unit 520 is further configured to: select, based on sensing, the transmission pattern for transmitting the data in the selected sub-period.

[0062] In one embodiment of the present disclosure, the second selecting unit 520 is further configured to at least one of the followings: obtain the scheduling assignment information from UEs of a further vehicle; and sense the energy level of a physical sidelink shared channel (PSSCH) channels.

[0063] Furthermore, the first selecting unit 510 is further configured to: determine a

number of sub-periods for transmitting the data in the scheduling assignment period, based on a number of transmission of MAC packets on the physical layer and a subsets of the predetermined transmission pattern in the sub-period.

[0064] The second selecting unit 520 is further configured to: select the sub-frame for transmitting the data in each selected sub-period, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a same or different sub-frame.

[0065] In one embodiment of the present disclosure, the first selecting unit 150 is further configured to: determine, based on sensing, whether a congestion degree of a data resource pool in the scheduling assignment period is above a threshold, in response to the arrival of the MAC packet at the physical layer; select the sub-period for transmitting the data in the scheduling assignment period, in responding to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold.

[0066] To sum up, with the method and apparatus for data transmission for vehicle-to-vehicle communication according to the embodiments of the present disclosure, speed generated by the adjustable packet on the physical layer can be realized and broadcasting performance for V2V communication can be enhanced.

[0067] As discussed above, various embodiments according to the present disclosure have been described, but it should be appreciated that these embodiments are not intended to limit embodiments of the present disclosure, and the scope of embodiments of the present disclosure is only defined by appended claims.

WHAT IS CLAIMED IS:

1. A method of data transmission for a vehicle-to-vehicle communication, comprising:

5 in response to an arrival of a media access control (MAC) packet at a physical layer, selecting a sub-period for transmitting data in a scheduling assignment period; selecting, in the selected sub-period, a transmission pattern for transmitting the data; and transmitting, in the selected sub-period, the data with the selected transmission
10 pattern.

2. The method according to Claim 1, wherein selecting the sub-period for transmitting the data in the scheduling assignment period comprises: randomly selecting the sub-period for transmitting the data.

15

3. The method according to Claim 1, wherein selecting the sub-period for transmitting the data in the scheduling assignment period comprises: selecting the sub-period for transmitting the data based on sensing.

20

4. The method according to Claim 3, wherein selecting the sub-period for transmitting the data based on sensing comprises at least one of the followings: obtaining the scheduling assignment information from an user equipment (UE) of a further vehicle; and sensing an energy level of a physical sidelink shared channel (PSSCH) channel.

25

5. The method according to Claim 1, wherein selecting the transmission pattern for transmitting the data in the selected sub-period comprises: randomly selecting the transmission pattern for transmitting the data.

30

6. The method according to Claim 1, wherein selecting the transmission pattern for transmitting the data in the selected sub-period comprises: selecting, in the selected sub-period and based on sensing, the transmission pattern for transmitting the data.

7. The method according to Claim 6, wherein selecting the transmission pattern for transmitting the data comprises at least one of the followings:

obtaining the scheduling assignment information from an user equipment (UE) of a further vehicle; and

5 sensing an energy level of a physical sidelink shared channel (PSSCH) channel.

8. The method according to Claim 1, wherein selecting the sub-period for transmitting the data in the scheduling assignment period comprises:

10 determining the number of sub-periods for transmitting the data in the scheduling assignment period, based on a number of transmission of MAC packets on the physical layer and a subset of predetermined transmission patterns in the sub-period.

9. The method according to Claim 1, wherein selecting the transmission pattern for transmitting the data in the selected sub-period comprises:

15 selecting the sub-frame for transmitting the data in each selected sub-period.

10. The method according to Claim 9, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a same sub-frame.

20 11. The method according to Claim 9, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a different sub-frame.

12. The method according to Claim 1, wherein selecting the sub-period for transmitting the data in the scheduling assignment period comprises:

25 in response to the arrival of the MAC packet at the physical layer, determining, based on sensing, whether a congestion degree of a data resource pool in the scheduling assignment period is above a threshold; and

in response to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold, selecting the sub-period for transmitting the data in the scheduling assignment period.

30

13. An apparatus for data transmission for vehicle-to-vehicle communication, comprising:

a first selecting unit configured to select the sub-period for transmitting data in a

scheduling assignment period in response to an arrival of a media access control (MAC) packet;

a second selecting unit configured to select a transmission pattern for transmitting the data in the selected sub-period; and

5 a transmission unit configured to transmit the data with the selected transmission pattern in the selected sub-period.

14. The apparatus according to Claim 13, wherein the first selecting unit is further configured to:

10 randomly select the sub-period for transmitting the data.

15. The apparatus according to Claim 13, wherein the first selecting unit is further configured to:

select the sub-period for transmitting the data based on sensing.

15

16. The apparatus according to Claim 15, wherein the first selecting unit is further configured to at least one of the followings:

obtain the scheduling assignment information from an user equipment (UE) of a further vehicle; and

20 sense the energy level of a physical sidelink shared channel (PSSCH) channels.

17. The apparatus according to Claim 13, wherein the second selecting unit is further configured to:

randomly select the transmission pattern for transmitting the data in the selected sub-period.

25

18. The apparatus according to Claim 13, wherein the second selecting unit is further configured to:

select, in the selected sub-period and based on sensing the transmission pattern for transmitting the data .

30

19. The apparatus according to Claim 18, wherein the second selecting unit is further configured to at least one of the followings:

obtain the scheduling assignment information from UEs of a further vehicle; and

sense the energy level of a physical sidelink shared channel (PSSCH) channels.

20. The apparatus according to Claim 13, wherein the first selecting unit is further configured to:

5 determine the number of sub-periods for transmitting the data in the scheduling assignment period, based on a number of transmission of MAC packets on the physical layer and a subsets of the predetermined transmission pattern in the sub-period.

21. The apparatus according to Claim 13, wherein the second selecting unit is further
10 configured to:

select the sub-frame for transmitting the data in each selected sub-period.

22. The apparatus according to Claim 21, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a same sub-frame.

15 23. The apparatus according to Claim 21, wherein in each selected sub-period, the selected sub-frame used to transmit the data is a different sub-frame.

24. The apparatus according to Claim 13, wherein the first selecting unit is further
20 configured to:

determine, based on sensing, whether a congestion degree of a data resource pool in the scheduling assignment period is above a threshold, in response to the arrival of the MAC packet at the physical layer;

25 select the sub-period for transmitting the data in the scheduling assignment period, in responding to the congestion degree of the data resource pool in the scheduling assignment period being below the threshold.

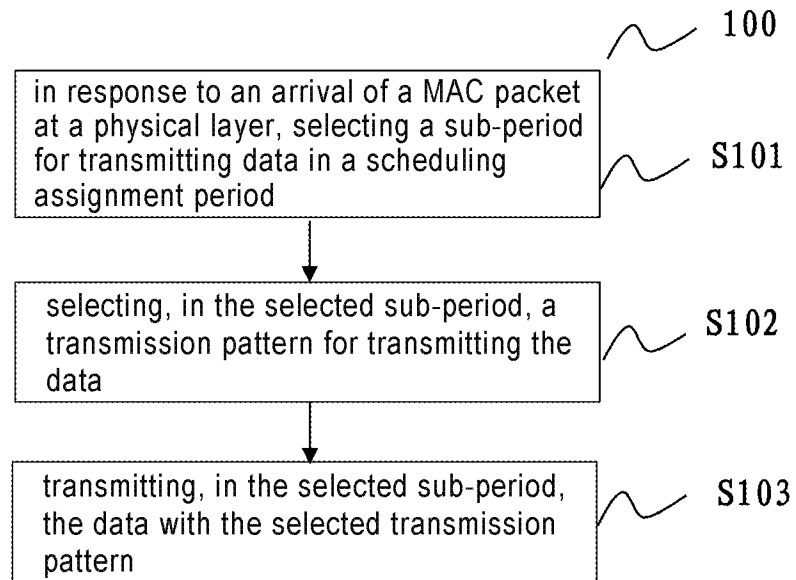


Fig.1

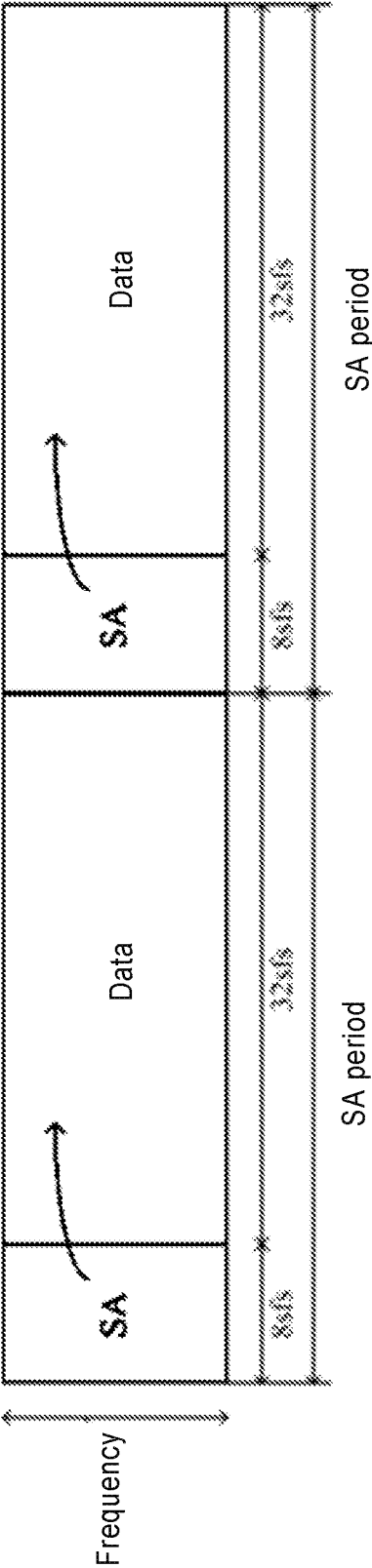


Fig.2

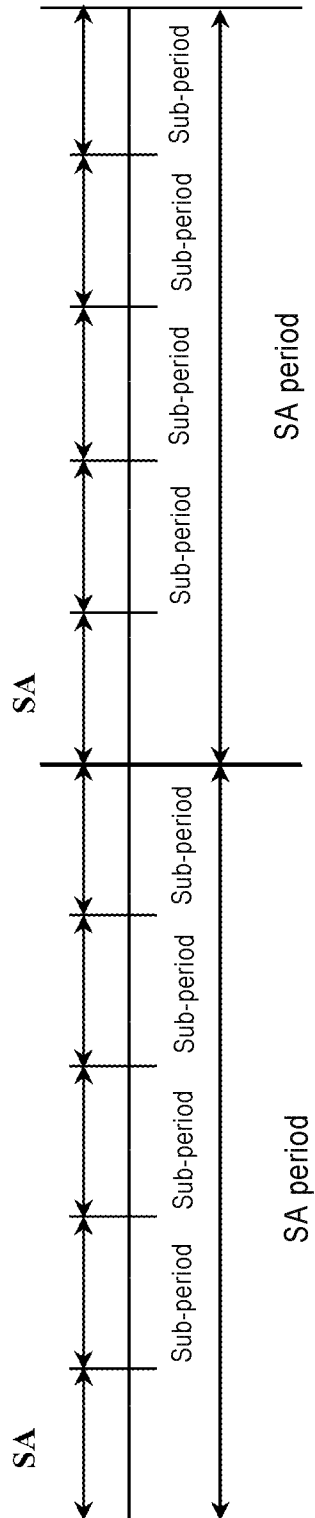


Fig. 3

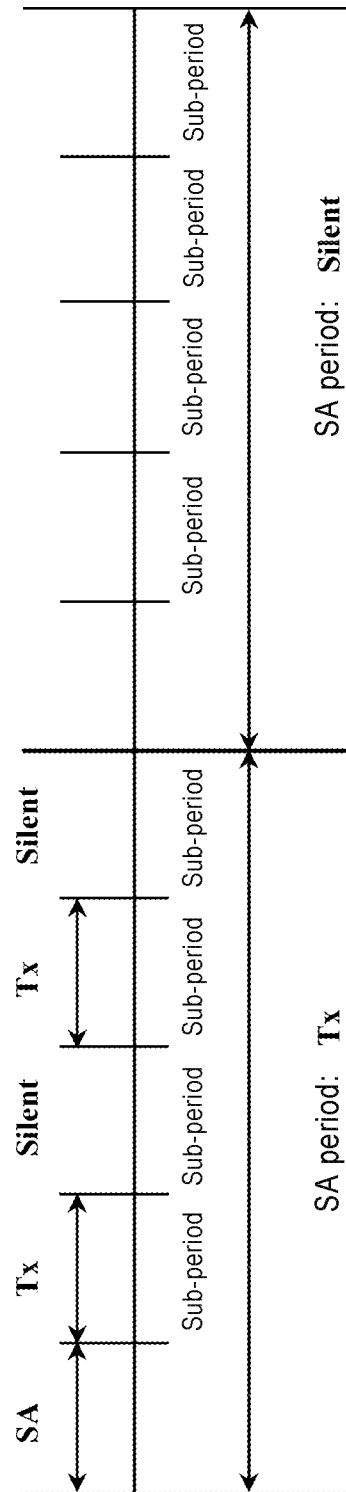


Fig. 4

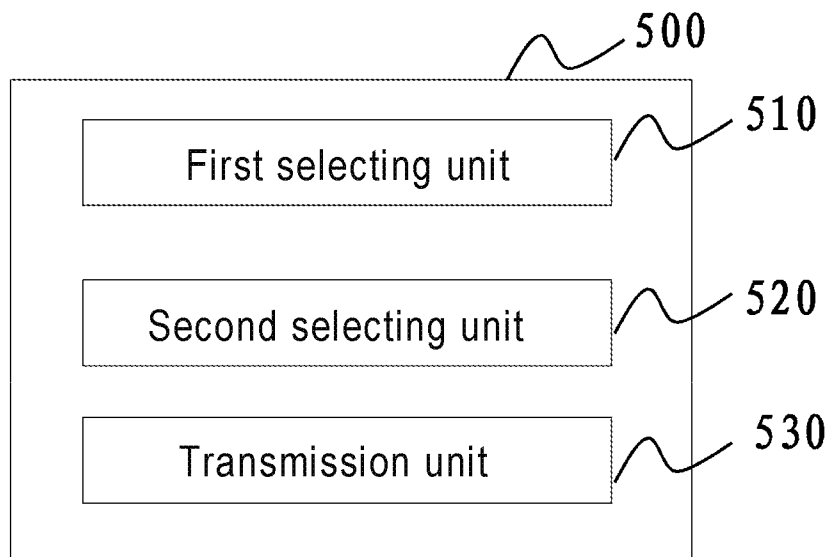


Fig.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/001983

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W76/02

ADD. H04W72/04 H04W74/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ALCATEL-LUCENT SHANGHAI BELL ET AL: "System level consideration and evaluation for V2V communication", 3GPP DRAFT; R1-156978 - V2V SYSTEM LEVEL CONSIDERATION AND EVALUATION, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; ; vol. RAN WG1, no. Anaheim, USA; 20151115 - 20151122 15 November 2015 (2015-11-15), XP051003294, Retrieved from the Internet: URL: http://www.3gpp.org/ftp/Meetings_3GPP_ SYNC/RAN1/Docs/ [retrieved on 2015-11-15]	1,9-11, 13,21-23
Y	figures 1, 5-7 -/-	2-8,12,



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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2016/001983

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