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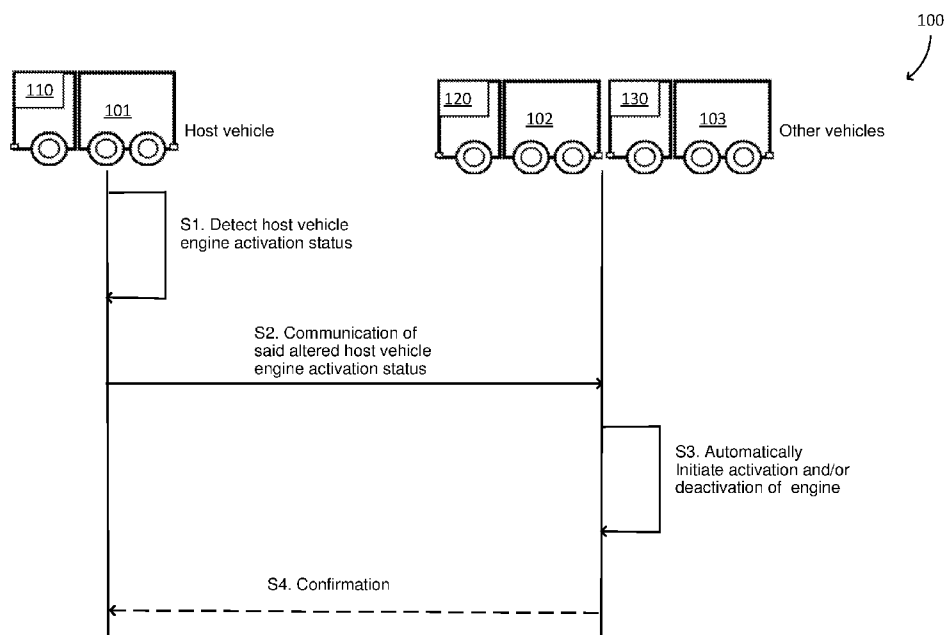


Fig. 3

(57) **Abstract:** Method (500) and control arrangement (110) for a host vehicle (101) comprised in a group of vehicles (100), the control arrangement (110) being arranged to activation and/or deactivation of a respective engine of each vehicle within said group (100) of vehicles. The control arrangement (110) comprises detection means arranged to detection of a host vehicle (101) manual driver input indicative of an altered host vehicle engine activation status; and communication means arranged to communication of said altered host vehicle engine activation status to communication means associated with each one of said other vehicles (102, 103) comprised in said group (100); The control arrangement further comprises enabling engine control means associated with each one of said other vehicles (102, 103) to initiate activation and/or deactivation of each respective engine of said other vehicles (102, 103) within the group of vehicles (100) in response to the altered host vehicle engine activation status.



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METHOD FOR ACTIVATION AND/OR DEACTIVATION OF A RESPECTIVE ENGINE OF EACH VEHICLE IN A GROUP OF VEHICLES

TECHNICAL FIELD

The invention relates to a control arrangement, a method and a system. More particularly, a method, a control arrangement and a system is provided for triggering activation and/or deactivation of a group of vehicles.

BACKGROUND

Vehicles such as heavy vehicles conventionally requires the presence of a driver to drive and to control a specific task or assignment to be performed.

A task such as moving goods from a place A to a place B can be performed by either one or several vehicles depending on the amount of goods to be transported. If such a task requires more than one vehicle e.g. two vehicles, the same amount of drivers is also required to perform that task.

A task such as snow ploughing which is usually performed by a fleet of snow ploughing vehicles proceeding in formation for cleaning e.g. a whole landing stripe is usually also requiring an amount of drivers equal to the number of vehicles comprised in said fleet.

Document US2007018846 relates to remote control and safety monitoring of a group of vehicles also requiring an amount of drivers equal to the number of vehicles comprised in the group.

It appears that further development is required for improving the configuration of a fleet or a group of vehicles for performing a common task and to at least decrease the amount of drivers in relation to the amount of vehicles.

SUMMARY

It is therefore an object of the invention to enable activation/deactivation of a group of vehicles in an efficient and reliable manner.

According to a first aspect of the invention, this objective is achieved by a control arrangement for a host vehicle comprised in a group of vehicles, the control arrangement being arranged for activation and/or deactivation of a respective engine of each vehicle within said group of vehicles. The control arrangement comprises detection means arranged for detection of a host

vehicle manual driver input indicative of an altered host vehicle engine activation status. The control arrangement further comprises communication means arranged for communication of said altered host vehicle engine activation status to communication means associated with each one of said other vehicles comprised in said group and for enabling engine control means associated with each one of said other vehicles to initiate activation and/or deactivation of each respective engine of said other vehicles within the group of vehicles in response to a detected altered host vehicle engine activation status. Thanks to the described aspect, by detecting a manual driver input indicative of an alerted host vehicle engine activation status, the activation and/or deactivation of the other vehicles within the group is triggered.

Thus, when the driver activates and/or deactivates one of the vehicles comprised in the group, every other vehicle within the group activates as well. Hence, only one driver is needed to activate or to deactivate the vehicles within the group and to control a group or a fleet of vehicles for performing a common task. Further, the requirement of manually igniting a vehicle within the group ensures that the vehicles cannot start remotely without the presence of a driver thereby increasing security.

According to an embodiment of the control arrangement, the communication means of the control arrangement is configured to receive a confirmation signal from the communication means associated with each one of said other vehicles, for determination on whether activation and/or deactivation of the respective engine of said other vehicles within the group of vehicles have been performed or not. Hereby, the driver is informed about the engine activation status of every vehicle within the group. Thus the driver does not need to visit the other vehicles for detecting their engine activation status thereby saving time.

According to an embodiment of the control arrangement, the communication means further comprises establish means being arranged for establishing a wireless communication with each one of said other vehicles comprised in said group via Vehicle-to-Vehicle communication. Hereby, the vehicles within the group directly communicates with each other via Vehicle-to-Vehicle communication which is reliable.

According to an embodiment of the control arrangement, the communication means further comprises establish means being arranged for establishing a wireless communication with each one of said other vehicles comprised in said group via a radio access technology. Hereby, the vehicles within the group are able to communicate with each other via an external network. Thereby the communication is independently of the distance between the vehicles in the group.

According to an embodiment of the control arrangement, the control arrangement comprises selection means being arranged for addition of a vehicle to said group, deletion of a vehicle from said group or selection of a subset of vehicles within said group. Hereby, the driver can configure the amount of vehicles for performing a given task.

According to an embodiment of the control arrangement, the control arrangement comprises authentication means being arranged for authenticating a host vehicle driver identity. The communication means of the control arrangement is further arranged when the driver is authenticated for communication of an identity of said driver to communication means associated with each one of said other vehicles comprised in said group. Hereby, security is increased as the vehicles within the group are activated or/and deactivated only when the driver is authenticated.

According to an embodiment of the control arrangement, the control arrangement is further arranged for informing each one of said other vehicles that said host vehicle is acting as a leader vehicle within said group. Hereby, the other vehicles within the group will get notified of the leader vehicle. Hereby, the other vehicles may follow instructions subsequently received from said leader vehicle.

According to a second aspect of the invention, the objective is achieved by a method, performed by a control arrangement for a host vehicle comprised in a group of vehicles for activating and/or deactivation of a respective engine of each vehicle within said group of vehicles. The method comprises the steps of detecting by a detection means a host vehicle manual driver input indicative of an altered host vehicle engine activation status. The method further comprises communicating by a communication means said altered host vehicle engine activation status to communication means associated with each one of said other vehicles comprised in said group and for enabling engine control means associated with each one of said other vehicles to initiate activation and/or deactivation of each respective engine of said other vehicles within the group of vehicles in response to a detected altered host vehicle engine activation status.

According to an embodiment of the method, the method further comprises the step of receiving by the communication means of the control arrangement a confirmation signal from the communication means associated with each one of said other vehicles, for determination on whether activation and/or deactivation of the respective engine of said other vehicles within the group of vehicles have been performed or not.

According to an embodiment of the method, the method further comprises the step of establishing by establishing means a wireless communication with each one of said other vehicles comprised in said group via vehicle to vehicle communication.

According to an embodiment of the method, the method further comprises the step of establishing by establishing means a wireless communication with each one of said other vehicles comprised in said group via a radio access technology.

According to an embodiment of the method, the method further comprises the step of selecting by selection means addition of a vehicle to said group, deletion of a vehicle from said group or selection of a subset of vehicles within said group.

According to an embodiment of the method, the method further comprises the steps of authenticating by authentication means a host vehicle driver identity and communicating by said communication means the identity of said driver to communication means associated with each one of said other vehicles comprised in said group.

According to an embodiment of the method, the method further comprises the step of informing by said communication means that said host vehicle is acting as a leader vehicle within said group.

The method according to the invention has the advantages according to the corresponding arrangement as set out herein.

According to a third aspect of the invention, the objective is achieved by a multiple vehicle activation system. The system comprises a host vehicle control arrangement arranged to be mounted in a host vehicle and arranged to, by detection means to detect driver input indicative of host vehicle engine activation status and to, by communication means to send a signal indicative thereto to at least one second vehicle control arrangement, The system is further comprising a second vehicle control arrangement arranged to be mounted in a second vehicle and arranged to, by communication means, to receive the host vehicle engine status signal from the host vehicle control arrangement and to, by activation/deactivation means, activate/deactivate an engine of the second vehicle in response to the received signal

According to a fourth object of the invention, the objective is achieved by a computer program comprising program code for performing the methods as set out herein when the computer program is executed in a computer.

Other advantages and additional novel features will become apparent from the subsequent detailed description.

FIGURES

Embodiments of the invention will now be described in further detail with reference to the accompanying figures, in which:

- Figure 1** illustrates a side view of a conventional vehicle formation according to an embodiment;
- Figure 2** illustrates a side view of a vehicle formation according to an embodiment;
- Figure 3** illustrates schematically a signalling scheme according to an embodiment;
- Figure 4** illustrates schematically a signalling scheme according to an embodiment;
- Figure 5** is a flow chart illustrating an embodiment of the method;
- Figure 6** is an illustration depicting a system according to an embodiment;

DETAILED DESCRIPTION

Embodiments of the invention described herein are defined as a control arrangement and a method in a control arrangement, which may be put into practice in the embodiments described below. These embodiments may, however, be exemplified and realised in many different forms and are not to be limited to the examples set forth herein; rather, these illustrative examples of embodiments are provided so that this disclosure will be thorough and complete.

Still other objects and features may become apparent from the following detailed description, considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the herein disclosed embodiments, for which reference is to be made to the appended claims. Further, the drawings are not necessarily drawn to scale and, unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein.

Hereinafter the term “group of vehicles” refers to any number of vehicles exceeding one vehicle. Such vehicles may comprise e.g. a truck, a car, a multi-passenger vehicle such as a bus, a coach or any similar vehicle or other means of conveyance. Such vehicles may comprise vehicles of the same, or different types in different embodiments. Such vehicles may be driver controlled or driverless autonomously controlled vehicles. Such vehicles are expected to

perform a common task or assignment such as snow ploughing or delivering goods, transporting people or the like. The group of vehicles comprises one host vehicle and one or more other vehicles.

Hereinafter the term “host vehicle” refers to a vehicle wherein the engine of said vehicle may manually be activated/deactivate using an ignition key or any other suitable means for activating/deactivating such a vehicle’s engine. Thus, any vehicle within the group of vehicles may act as the host vehicle given that the engine of said vehicle is manually activated.

Hereinafter the term “other vehicles” refers to one or more vehicles excluding the host vehicle wherein the engine of said vehicles may automatically activate/deactivate in response to communication received from the host vehicle. The other vehicles may be driverless autonomously controlled vehicles. The other vehicles may be controlled by the host vehicle or self-controlled having some relation to the host vehicle.

Figure 1 illustrates a prior art scenario wherein a plurality of vehicles **11, 12, 13** forms a group of vehicles **10**. The vehicles 11, 12, 13 may proceed in formation for performing a common assignment such as ploughing snow, delivering goods or the like.

Each vehicle 11,12,13 within the group 10 comprises a driver. Hence the number of drivers reflects the number of vehicles 11, 12, 13 within the group 10. A drawback with this setup is the waste of drivers as the vehicles may autonomously proceed in an organised formation having some relation to each other without any driver intervention.

Further, the group of vehicles 10 may comprise semi-autonomously driven vehicles 11, 12, 13 having no drivers (not shown in fig.1). Such a setup would comprise a group of vehicles that are controlled by a human operator via a communication link (not shown in fig.1). All actions are thus determined by that operator. A drawback with such a setup is the requirement of a control centre for activating and controlling the vehicles.

A further setup may comprise a group of autonomous vehicles 11, 12, 13 that are capable of navigating and manoeuvring without human control (not shown in fig.1). The vehicles would use sensors to obtain an understanding of its surroundings. Sensor data are then used by control algorithms to determine what the next step for the vehicles to take is, based on a goal for the vehicles, such as to retrieve and deliver goods at various locations or to ploughing snow or the like. A drawback with this setup is that autonomous vehicles may not yet operate where people or normal manually controlled vehicles are within the work area of the autonomous vehicles for security reasons.

To solve some of the drawbacks mentioned above, a group of vehicles for performing a common assignment are configured such that manual activation of a vehicle within a group of vehicles triggers activation of the rest of the vehicles within said group. This procedure is described in detail below in relation to **Figure 2**.

Figure 2 illustrates a scenario wherein a plurality of vehicles **101, 102, 103** forms a group of vehicles **100**.

The vehicles 101, 102, 103 may proceed in formation for performing a common assignment such as ploughing snow, delivering goods, transporting people or the like. The group of vehicles 100 may comprise any arbitrary number of vehicles 101, 102, 103 exceeding one.

In order to start an assignment, the vehicles 101, 102, 103 within the group 100 needs to get activated. The group of vehicles 100 therefore comprises a host vehicle which is configured to get its engine manually activated by a driver. For enhanced clarity, the vehicle 101 is subsequently described as the host vehicle and the rest of the vehicles 102, 103 are subsequently described as the other vehicles within the group of vehicles.

Each vehicle 101, 102, 103 comprises a control arrangement **110, 120, 130** for exchanging signals over a wireless communication interface. The control arrangement 110 of the host vehicle 101 comprises detection means for detecting manual activation of the host vehicle. The control arrangement 110 of the host vehicle 101 further comprises a communication means for communicating the activation status of the host vehicle 101 to the other vehicles 102, 103. The control arrangement 120, 130 of the other vehicles 102, 103 comprises communication means for receiving the activation status of the host vehicle 101. The control arrangement 120, 130 of the other vehicles 102, 103 further comprises activation means configured to in response to the received signal to automatically activate the vehicles 102, 103. The function of the control arrangement 110, 120, 130 is described in detail below.

Figure 3 schematically illustrates a host vehicle 101 and two other vehicles 102, 103 within a group 100. The engine of the host vehicle gets activated and the activation status is sent to the other vehicles 102, 103 within the group 100.

The scenarios described below may be related to activation of the engine of the host vehicle. However, the same procedure is also applicable for the deactivation of the engine of the host vehicle such that the other vehicles 102, 103 deactivates their engine in response to a deactivation status received by the host vehicle .

In step **S1** the control arrangement 110 of the host vehicle 101 comprises detection means for detecting that the engine status of the host vehicle has manually been altered.

According to an embodiment, the step of detection comprises detecting the use of the ignition key of the vehicle.

According to an embodiment, the step of detection comprises detecting the use of a remote keyless ignition system for activation without inserting a key in the ignition, provided the driver has the key nearby the car, typically by pressing a starter button/ignition switch whereas the key is identified via one of several antennas in the bodywork of the car.

According to an embodiment, the step of detection comprises detecting the usage of a fingerprint of the driver which once the fingerprint is recognized causes the vehicle to automatically activate by pressing a starter button/ignition switch.

According to an embodiment, the step of detection comprises detecting the usage of a cellular smart phone which may comprise the use of an application installed in the smart phone comprising functions for activating the vehicle.

According to an embodiment, the control arrangement 110 of the host vehicle 101 is configured to output to the driver a default set of vehicles comprised in the group of vehicles. The control arrangement is further configured to await confirmation of said group from the driver before communicating the engine activation status to said set.

According to an embodiment, the information comprising the default set of vehicles is provided to the driver e.g. on an output unit such as e.g. a display on the dashboard, a projector projecting inside or outside the vehicle, intelligent glasses of the driver, the mobile phone wearables by the driver, etc. The information comprising the default set of vehicles may be stored and retrieved from a database accessible by the control arrangement 110. Alternatively, the database is comprised in the control arrangement 110 in some embodiment.

According to an embodiment, the driver may confirm said default set of vehicles, alter said default set by addition of a vehicle within said group, deletion of a vehicle from said group or selection of a subset of vehicles within said group. The control arrangement 110 of the host vehicle 101 is therefore configured to receive input from the driver e.g. on an input unit such as a touch display on the dashboard, the mobile phone of the driver, etc. for altering said default set and for updating said database with such information.

According to an embodiment, the control arrangement 110 of the host vehicle 101 comprises authentication means being arranged for authenticating the driver of the host vehicle 101. Information for authenticating the driver may be stored in said database.

According to an embodiment, the control arrangement 110 of the host vehicle 101 is configured for authenticating the driver of the host vehicle as a valid operator for the group of vehicles 102, 103. In one embodiment, the control arrangement comprises means for identifying and authenticating the ignition keys of said group of vehicles. Thus the driver of the host vehicle may carry the ignition keys of said group of vehicles and authenticate himself as a valid operator of said group of vehicles using said ignition keys. The means for identifying the ignition keys of said group of vehicles may comprise any suitable type of identification means such as, scanning means for scanning of a Radio Frequency Identification (RFID) tag attached to said keys or Bluetooth means for communication and authentication of said keys or the like.

According to an embodiment, the control arrangement 110 of the host vehicle 101 is further configured to when the driver is authenticated for communication of an identity of said driver to communication means associated with each one of said other vehicles comprised in said group.

The control arrangement 110 further comprises communication means configured to in step **S2** for communicating said altered host vehicle engine activation status to communication means associated with each one of said other vehicles 102, 103 comprised in the group 100. Both the host vehicle as well as the other vehicles may thus comprise communication means for wireless communication. According to an embodiment, the driver identify for authenticating the driver of the host vehicle 101 as valid operator for the other vehicles 102, 103 is also communicated together with the communication of the vehicle engine activation status. Hence the identity of the driver may be checked by the other vehicles 102, 103 to determine whether the driver is a valid operator of the other vehicles 102, 103.

According to an embodiment the identity of the driver may comprise any form of authentication means e.g. the fingerprint of the driver, biometry of the driver, eye/face recognition of the driver or the like. Thus the driver may be authenticated by the host vehicle 101 as well as by the other vehicles 102, 103.

The other vehicles 102, 103 thus comprises control arrangement 120, 130, the control arrangement of the other vehicles 102, 103 further comprises communication means for receiving in step S2 the host vehicle engine status signal sent by the host vehicle 101. The

other vehicles 102, 103 further comprises activation means configured to in step **S3** for activating the engine of the other vehicles 102, 103 in response to the received signal.

According to an embodiment, the activation means for activating the engine of the other vehicles 102, 103 is configured to activate only if the driver of the host vehicle is authenticated as valid operator of the other vehicles 102, 103.

According to an embodiment, the vehicles 101, 102, 103 in the group of vehicles 100 may directly communicate via Vehicle-to-Vehicle (V2V) communication. Thus, the control arrangement 110 of the host vehicle 101 comprises establishing means being arranged for establishing a wireless communication with the other vehicles 102, 103 comprised in the group 100 via V2V communication. Such communication may comprise, or at least be inspired by wireless communication technology such as Wi-Fi, Wireless Local Area Network (WLAN), Ultra Mobile Broadband (UMB), Bluetooth (BT), Near Field Communication (NFC), Radio-Frequency Identification (RFID), optical communication such as Infrared Data Association (IrDA) or infrared transmission to name but a few possible examples of wireless communications in some embodiments.

Step **S4** may be performed only in some embodiments wherein communication means of the other vehicles 102, 103 are configured for sending an acknowledgement message to the host vehicle 101.

In one embodiment, the acknowledgement comprises information about the engine status of the respective other vehicles 102,103.

In one embodiment, the acknowledgement may also comprise other relevant information such as the fuel level of the respective other vehicle 102, 103, the tire pressure of the respective other vehicle 102, 103 etc. for alerting the driver of any issues in connection to the other vehicles 102, 103.

The communication means of the control arrangement 110 of the host vehicle is thus configured to in step S4 for receiving a confirmation signal from the communication means associated with each one of said other vehicles 102, 103, for determination of the activation status of the respective engine of said other vehicles 102, 103 within the group of vehicles 100. According to an embodiment, the communication device of the control arrangement 110 of the host vehicle 101 is configured to communicate to each one of said other vehicles 102, 103 that the host vehicle 101 is acting as a leader vehicle within said group 100. Thus upon activation

of all vehicles 101, 102, 103 within the group of vehicles 100, the other vehicles 102, 103 may attend to instructions given by the host vehicle 101 such as instructions for autonomously keeping a given distance in relation to each other for e.g. effectively ploughing snow.

Figure 4 schematically illustrates the same scenario as in relation to Figure 3 with the exception of having indirect communication between the vehicles 101, 102, 103 via a communication node **204**.

According to this embodiment, the vehicles 101, 102, 103 within the group of vehicles 100 are configured for communication indirectly via a radio access technology. Thus, The control arrangement 110 of the host vehicle 101 comprises establishing means being arranged for establishing a wireless communication with each one of the other vehicles 102, 103 via a radio access technology.

In one embodiment, the wireless communication may be established via one or more Sim Cards comprised in the group of vehicles 100.

In one embodiment, the wireless communication may be established via one or more Soft SIM Cards comprised in the group of vehicles 100 having no SIM hardware where all SIM functionality is carried out by a software layer. Having no SIM hardware is a cheaper alternative in relation to a conventional SIM Card.

In one embodiment, the control arrangement of the group of vehicles comprises software for enabling initial connection to a radio access technology for requesting the radio access network to remotely provision and activate a SIM Card functionality to the vehicles 101, 102, 103. The provisioning and the activation of the Sim functionality may cease or automatically gets deleted after the completion of a given assignment or after a certain period of time in some embodiment. Having no SIM hardware and only obtaining SIM Software upon request is further cheaper.

The radio access technology may comprise, or at least be inspired by e.g., 3rd Generation Partnership Project (3GPP) Long Term Evolution (LTE), LTE-Advanced, Evolved Universal Terrestrial Radio Access Network (E-UTRAN), Universal Mobile Telecommunications System (UMTS), Global System for Mobile Communications (originally: Groupe Spécial Mobile) (GSM)/ Enhanced Data rate for GSM Evolution (GSM/EDGE), Wideband Code Division

Multiple Access (WCDMA), Time Division Multiple Access (TDMA) networks, Frequency Division Multiple Access (FDMA) networks, Orthogonal FDMA (OFDMA) networks, Single-Carrier FDMA (SC-FDMA) networks, Worldwide Interoperability for Microwave Access (WiMax), or Ultra Mobile Broadband (UMB), High Speed Packet Access (HSPA) Evolved Universal Terrestrial Radio Access (E-UTRA), High-Speed Uplink Packet Access (HSUPA), High Speed Downlink Packet Access (HSDPA), Universal Terrestrial Radio Access (UTRA), GSM EDGE Radio Access Network (GERAN), 3GPP2 CDMA technologies, e.g., CDMA2000 1x RTT and High Rate Packet Data (HRPD), or similar, just to mention some few options.

In Figure 4, step **S1.1.** corresponds to step S1 in Figure 3 wherein the control arrangement 110 of the host vehicle 101 comprises detection means configured to detect that the engine status of the host vehicle has manually been altered.

In step **S2.1.** the engine activation status is communicated to the other vehicles 102, 103 via a communication node 204. The communication node 204 may comprise a computer e.g. a server reachable via the Internet.

In one embodiment, the communication node 204 is configured for receiving the engine activation status of the host vehicle 101 as well as the identity of the host vehicle 101. The communication node 204 may be pre-configured with a given set of identities of vehicles forming a group of vehicles such that when the communication node 204 is notified of a manually altered engine activation status for one of the vehicle within said group using the identity of said vehicle, the communication node is configured for communicating such an alert to the other vehicles in the group.

In Step **S3.1.** the communication node 204 communicates the host vehicle 101 engine activation status to the other vehicles 102, 103.

In one embodiment, the communication node 204 is configured for communicating the host vehicle activation status to the other vehicles 102, 103 via the Internet Protocol (IP) addresses of the control arrangement 120, 130 comprised in the other vehicles.

In one embodiment, one or more of the other vehicles 102, 103 does not have an active IP address. The communication node may therefore be configured for alerting the one or more of the other vehicles via a Short Message Service (SMS) to connect to the communication network for obtaining an IP address. Once an IP address is obtained, the communication node 204 is configured for communicating the host vehicle activation status to the other vehicles

102, 103 Via the Internet Protocol (IP) addresses of said vehicles.

Step **S4.1.** corresponds to step S3 in Figure 3 wherein the communication means of the control arrangement of the other vehicles 102, 103 is configured for receiving S4.1 the host vehicle engine activation status signal. The other vehicles 102, 103 further comprises activation/deactivation means configured for activating/deactivating the engine of each one of the other vehicles in response to the received signal.

In an optional step **S5.1.** the other vehicles 102, 103 sends an acknowledgement message to the host vehicle 101 via the communication node 204. The communication node 204 may reach the host vehicle 101 according to any one of the alternatives described above in step S3.1.

Figure 5 illustrates an example of a method **500** according to an embodiment. The flow chart in Figure 5 shows the method 500 in a control arrangement 110 for initiating activation and/or deactivation of the engine of the vehicles 102, 103 within the group 100.

In order for initiating the activation of the engine of the vehicles 102, 103 within the group 100, the method 500 may comprise a number of steps **501-503**. Step 503 may only be performed in some particular embodiments. The method 500 may comprise the subsequent steps:

Step 501 comprises detection of a host vehicle 101 manual driver input indicative of an altered host vehicle engine activation status.

Step 502 comprises communication of the altered host vehicle 101 engine activation status to communication means associated with each one of said other vehicles 102, 103 comprised in the group 100.

Step 503 which only may be performed in some particular embodiments, comprises receiving a confirmation signal from the communication means associated with each one of said other vehicles, for determination on whether activation and/or deactivation of the respective engine of said other vehicles within the group of vehicles have been performed or not.

Figure 6 illustrates an embodiment of a multiple vehicle activation system **600**. The system

600 is configured for initiating activation and/or deactivation of the engine of the vehicles 102, 103 within the group 100.

The system 600 comprises a control arrangement 110 which may be situated in a host vehicle 101.

The control arrangement 110 of the host vehicle is arranged to by detection means to detect a driver input indicative of host vehicle engine activation status. Further, the control arrangement 110 is also configured to by communication means for sending a signal indicative thereto to at least one second vehicle control arrangement 120, 130. The control arrangement 120, 130 of the least one second vehicle 102, 103 is arranged to, by communication means, to receive the host vehicle engine status signal from the host vehicle control arrangement 110 and to, by activation/deactivation means, activate/deactivate an engine of the at least one second vehicle 102, 103 in response to the received signal.

The control arrangement 110 may comprise a database **610** for storing information for authenticating the driver as well as information related to the default or updated set of other vehicles 102, 103 to be used by the control arrangement for sending an altered engine activation status signal of the host vehicle 101 to the other vehicles 102, 103 comprised in said set.

The database may comprise a Database Management System (DBMS), i.e. a computer software application that interacts with the user, other applications, and the database itself to capture and analyse data. A general-purpose DBMS is designed to allow the definition, creation, querying, update, and administration of databases. Some arbitrary examples of DBMSs may comprise e.g. MySQL, PostgreSQL, Microsoft SQL Server, Oracle, Sybase, SAP HANA, and/ or IBM DB2.

The control arrangement 110 further comprises a receiver **620** configured to receive information such as confirmation signals from the other vehicles 102, 103 in the group of vehicles 100.

The control arrangement 110 further comprises a processor **630** configured for performing various calculations and computations in order to perform the method 500, according to the previously described steps 501-503.

Such processor 630 may comprise one or more instances of a processing circuit, i.e. a Central Processing Unit (CPU), a processing unit, an Application Specific Integrated Circuit (ASIC), a microprocessor, or other processing logic that may interpret and execute instructions. The herein utilised expression “processor” may thus represent a processing circuitry comprising a plurality of processing circuits, such as, e.g., any, some or all of the ones enumerated above.

Furthermore, the control arrangement 110 may also comprise a memory **635** in some embodiments. The optional memory 635 may comprise a physical device utilised to store data or programs, i.e., sequences of instructions, on a temporary or permanent basis. According to some embodiments, the memory 635 may comprise integrated circuits comprising silicon-based transistors. The memory 635 may comprise e.g. a memory card, a flash memory, a USB memory, a hard disc, or another similar volatile or non-volatile storage unit for storing data such as e.g. ROM (Read-Only Memory), PROM (Programmable Read-Only Memory), EPROM (Erasable PROM), EEPROM (Electrically Erasable PROM), etc. in different embodiments.

Further, the control arrangement 110 also comprises a transmitter **640**, configured to transmit information to the other vehicles 102, 103.

The previously described steps 501-503 to be performed in the control arrangement 110 may be implemented through the one or more processors 630 within the control arrangement 110, together with computer program product for performing at least some of the functions of the steps 501-503. Thus, a computer program product, comprising instructions for performing the steps 501-503 in the control arrangement 110 may perform the method 500 comprising at least some of the steps 501-503 for initiating activation and/or deactivation of the engine of the vehicles 102, 103 within the group 100 when the computer program is loaded into the one or more processors 630 of the control arrangement 110. The described steps 501-503 thus may be performed by a computer algorithm, a machine executable code, a non-transitory computer-readable medium, or a software instructions programmed into a suitable programmable logic such as the processor 630 in the control arrangement 110.

The computer program product mentioned above may be provided for instance in the form of a data carrier carrying computer program code for performing at least some of the step 501-503 according to some embodiments when being loaded into the one or more processors 630 of the control arrangement 110. The data carrier may be, e.g., a hard disk, a CD ROM disc, a memory stick, an optical storage device, a magnetic storage device or any other appropriate

medium such as a disk or tape that may hold machine readable data in a non-transitory manner. The computer program product may furthermore be provided as computer program code on a server and downloaded to the control arrangement 110 remotely, e.g., over an Internet or an intranet connection.

The terminology used in the description of the embodiments as illustrated in the accompanying drawings is not intended to be limiting of the described method 500, control arrangement 110, computer program and system 600. Various changes, substitutions and/ or alterations may be made, without departing from invention embodiments as defined by the appended claims.

As used herein, the term "and/ or" comprises any and all combinations of one or more of the associated listed items. The term "or" as used herein, is to be interpreted as a mathematical OR, i.e., as an inclusive disjunction; not as a mathematical exclusive OR (XOR), unless expressly stated otherwise. In addition, the singular forms "a", "an" and "the" are to be interpreted as "at least one", thus also possibly comprising a plurality of entities of the same kind, unless expressly stated otherwise. It will be further understood that the terms "includes", "comprises", "including" and/ or "comprising", specifies the presence of stated features, actions, integers, steps, operations, elements, and/ or components, but do not preclude the presence or addition of one or more other features, actions, integers, steps, operations, elements, components, and/ or groups thereof. A single unit such as e.g. a processor may fulfil the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. A computer program may be stored/ distributed on a suitable medium, such as an optical storage medium or a solid-state medium supplied together with or as part of other hardware, but may also be distributed in other forms such as via Internet or other wired or wireless communication system.

CLAIMS

1. A control arrangement (110) for a host vehicle (101) comprised in a group of vehicles (100), the control arrangement (110) being arranged for activation and/or deactivation of a respective engine of each vehicle within said group (100) of vehicles, wherein the control arrangement (110) comprises:

detection means arranged for detection of a host vehicle (101) manual driver input indicative of an altered host vehicle engine activation status; and

communication means arranged for communication of said altered host vehicle engine activation status to communication means associated with each one of said other vehicles (102, 103) comprised in said group (100); and for

enabling engine control means associated with each one of said other vehicles (102, 103) to initiate activation and/or deactivation of each respective engine of said other vehicles (102, 103) within the group of vehicles (100) in response to a detected altered host vehicle engine activation status.

2. The control arrangement according to claim 1 wherein the communication means of the control arrangement (110) is configured to receive a confirmation signal from the communication means associated with each one of said other vehicles, for determination on whether activation and/or deactivation of the respective engine of said other vehicles within the group of vehicles have been performed or not.

3. The control arrangement according to claim 1 wherein the communication means further comprises:

establish means being arranged for establishing a wireless communication with each one of said other vehicles comprised in said group via Vehicle-to-Vehicle communication.

4. The control arrangement according to claim 1 wherein the communication means further comprises:

establish means being arranged for establishing a wireless communication with each one of said other vehicles comprised in said group via a radio access technology.

5. The control arrangement according to claim 1 further comprising:

selection means being arranged for addition of a vehicle to said group, deletion of a vehicle from said group or selection of a subset of vehicles within said group.

6. The control arrangement according to claim 1 further comprising:
authentication means being arranged for authentication of a host vehicle driver identity;
the communication means is further arranged when the driver is authenticated for:
communication of the identity of said driver to the communication means associated with each one of said other vehicles comprised in said group.
7. The control arrangement according to claim 1 wherein the communication means is further arranged for:
informing each one of said other vehicles that said host vehicle is acting as a leader vehicle within said group.
8. A method (500), performed by a control arrangement (110) for a host vehicle (101) comprised in a group of vehicles (100) for activating and/or deactivation of a respective engine of each vehicle within said group of vehicles (100), wherein the method comprises the steps of:
detecting (501) by a detection means a host vehicle manual driver input indicative of an altered host vehicle engine activation status; and
communicating (502) by a communication means said altered host vehicle engine activation status to communication means associated with each one of said other vehicles (102, 103) comprised in said group (100) and for enabling engine control means associated with each one of said other vehicles (102, 103) to initiate activation and/or deactivation of each respective engine of said other vehicles (102, 103) within the group (100) of vehicles in response to a detected altered host vehicle engine activation status.
9. The method according to claim 8 further comprising the step of:
receiving (503) by the communication means of the control arrangement a confirmation signal from the communication means associated with each one of said other vehicles, for determination on whether activation and/or deactivation of the respective engine of said other vehicles within the group of vehicles have been performed or not.
10. The method according to claim 8 further comprising the step of:
establishing by establishing means a wireless communication with each one of said other vehicles comprised in said group via Vehicle-to-Vehicle communication.
11. The method according to claim 8 further comprising the step of:
establishing by establishing means a wireless communication with each one of said

other vehicles comprised in said group via a radio access technology.

12. The method according to claim 8 further comprising the steps of:
Selecting by selection means addition of a vehicle to said group, deletion of a vehicle from said group or selection of a subset of vehicles within said group.
13. The method according to claim 8 further comprising the the steps of:
authenticating by authentication means a host vehicle driver identity; and
communicating by said communication means the identity of said driver to the communication means associated with each one of said other vehicles comprised in said group.
14. The method according to claim 8 further comprises the steps of:
informing by said communication means that said host vehicle is acting as a leader vehicle within said group.
15. A multiple vehicle activation system (300), which system comprises
a host vehicle control arrangement (110), arranged to be mounted in a host vehicle (101) and arranged to, by detection means thereof, to detect (S1) driver input indicative of host vehicle engine activation status and to, by communication means thereof, to send (S2) a signal indicative thereto to at least one second vehicle control arrangement (120, 130),
a second vehicle control arrangement (120, 130), arranged to be mounted in a second vehicle (102, 103) and arranged to, by communication means thereof, to receive (S2) the host vehicle engine status signal from the host vehicle control arrangement (110) and to, by activation/deactivation means thereof, activate/deactivate (S3) an engine of the second vehicle (102, 103) in response to the received signal (S2)
16. A computer program comprising program code for performing a method (500) according to any of claims 8-14, when the computer program is executed in a computer.

10 Prior art

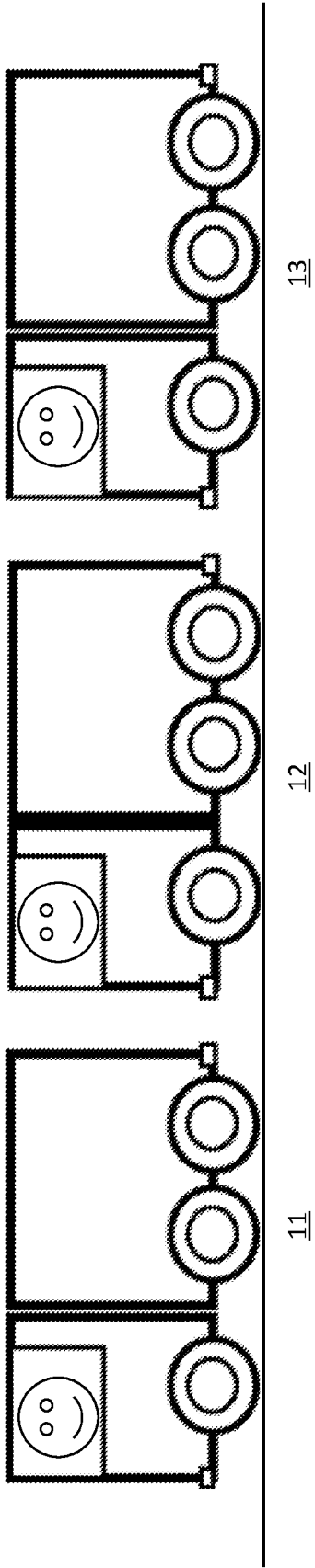


Fig. 1

100

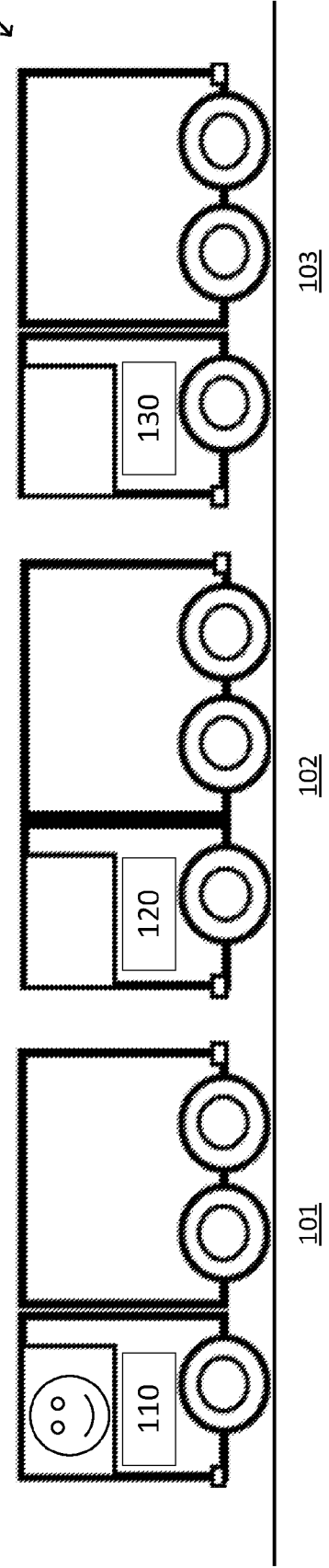


Fig. 2

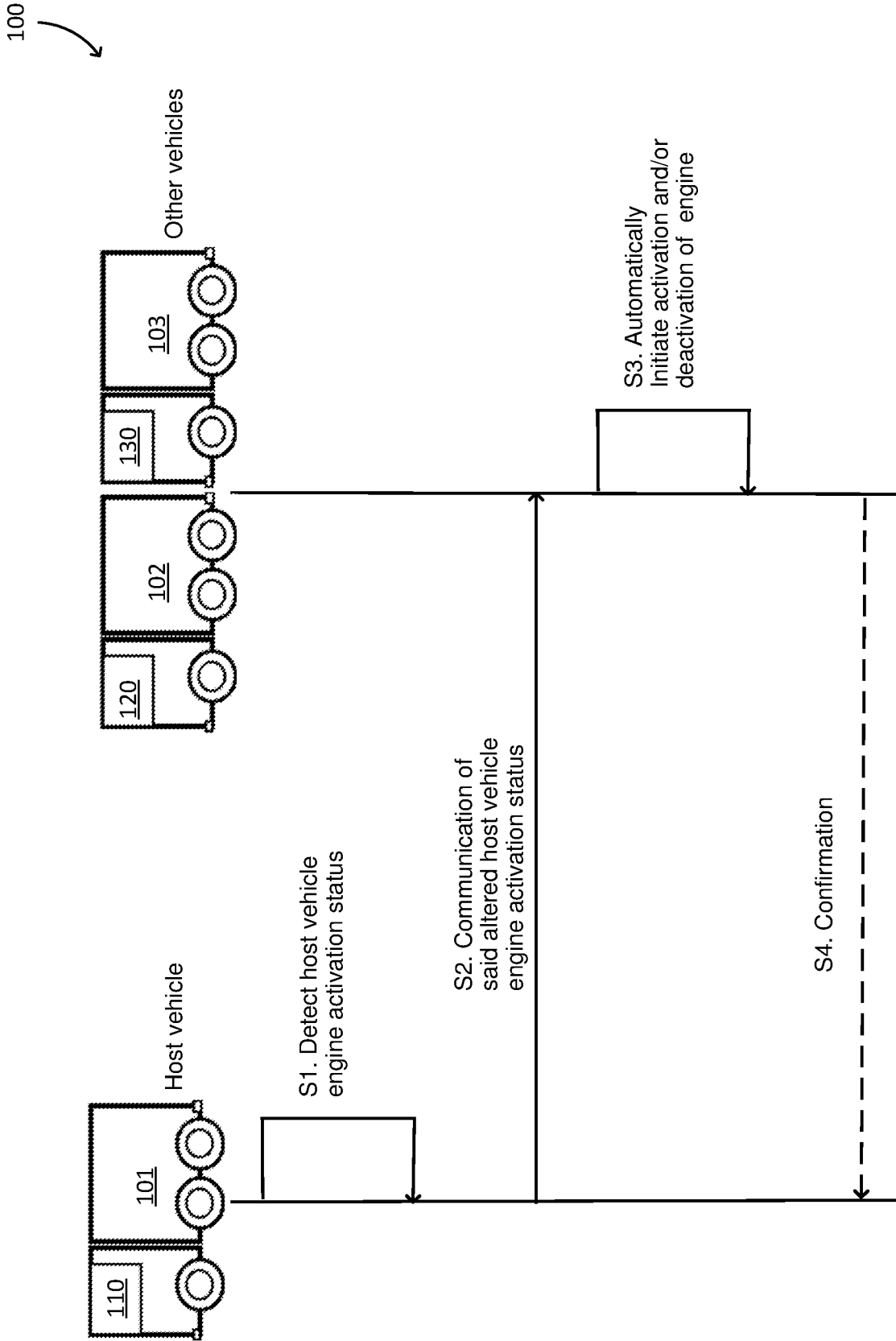


Fig. 3

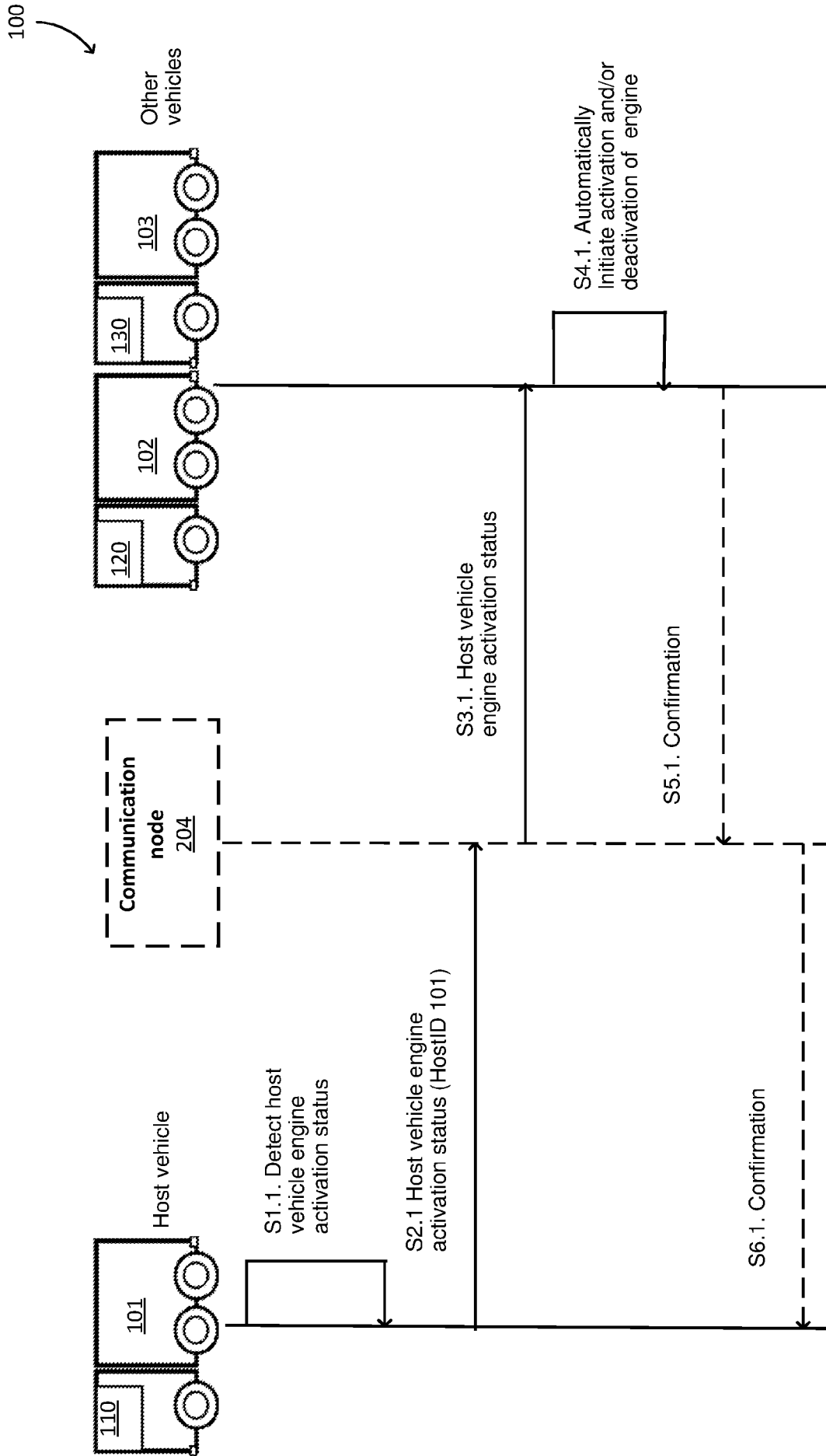


Fig. 4

500

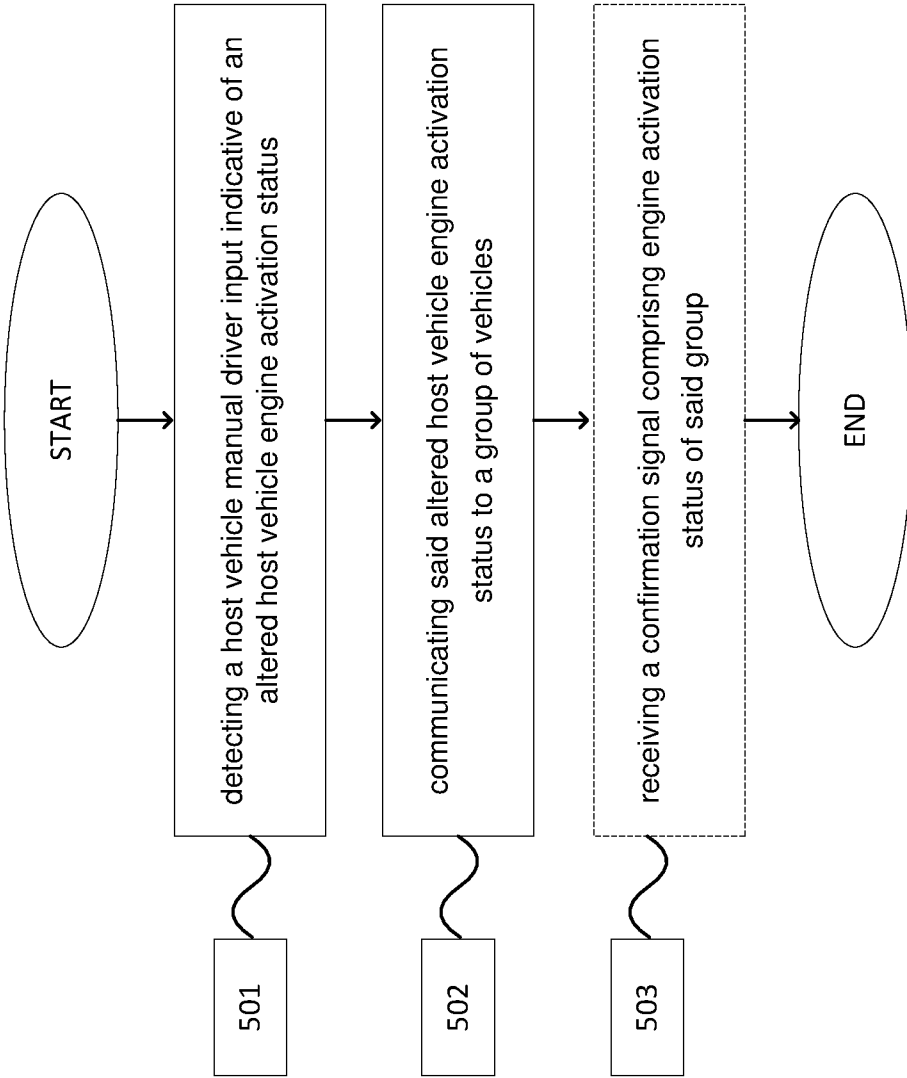


Fig. 5

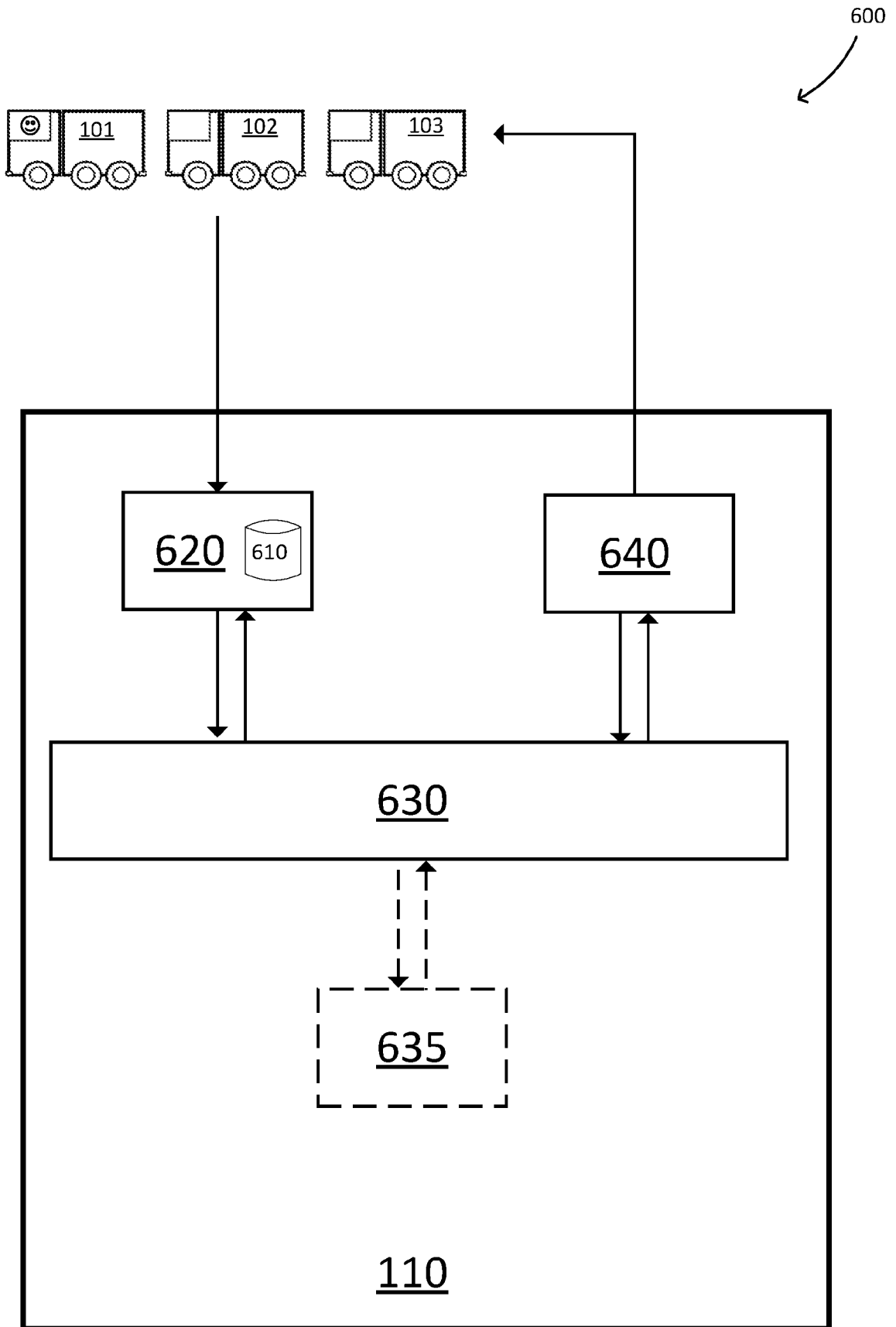


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2017/051250

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: B60W, G05D, G08G

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE 1451113 A1 (SCANIA CV AB), 23 March 2016 (2016-03-23); pages 2-4; page 5, line 10 - page 5, line 17; page 8, line 15 - page 8, line 22; page 12, line 10 - page 12, line 23; page 13, line 1 - page 13, line 25 --	1-16
A	EP 2390744 A1 (VOLVO CAR CORP), 30 November 2011 (2011-11-30); paragraphs [0026]-[0030] --	1-16
A	US 20080106390 A1 (YAQUB RAZIQ ET AL), 8 May 2008 (2008-05-08); abstract --	1-16

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23-02-2018

Date of mailing of the international search report

27-02-2018

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2017/051250

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0991046 A1 (HONDA MOTOR CO LTD), 5 April 2000 (2000-04-05); abstract --	1-16
A	US 20160355184 A1 (RUTH ERIC J), 8 December 2016 (2016-12-08); abstract -- -----	1-16

Continuation of: second sheet

International Patent Classification (IPC)

G08G 1/00 (2006.01)

B60W 30/165 (2012.01)

G05D 1/02 (2006.01)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SE2017/051250

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			JP	2013534655 A	05/09/2013
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			US	6128559 A	03/10/2000
US	20160355184 A1	08/12/2016	NONE		