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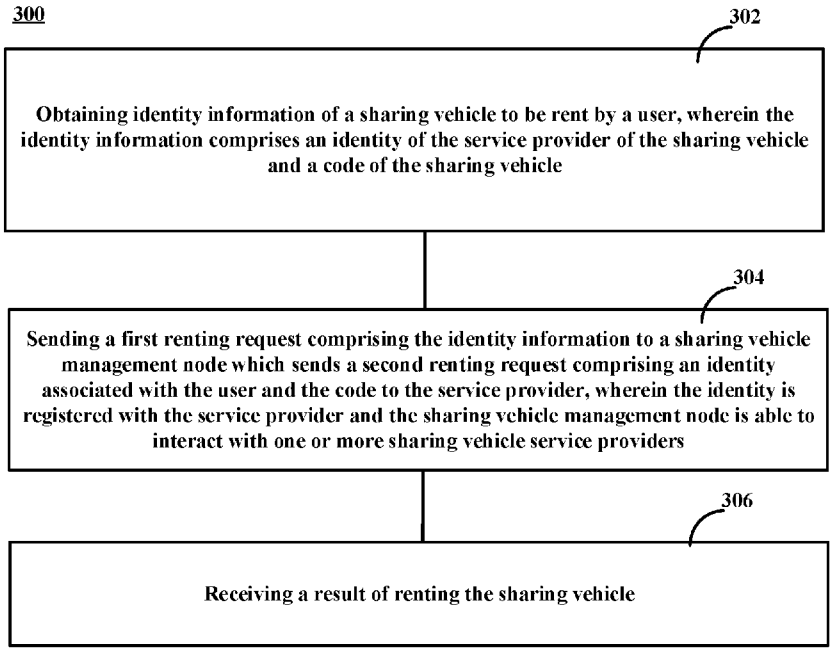

Fig.3

(57) **Abstract:** Method and apparatus for managing sharing vehicle are disclosed. A method comprises obtaining identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; sending a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and receiving a result of renting the sharing vehicle.

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METHOD AND APPARATUS FOR MANAGING SHARING VEHICLE

Technical Field

[0001] Embodiments of the disclosure generally relate to wireless communication, and, more particularly, to method and apparatus for managing sharing vehicle.

Background

[0002] A vehicle-sharing system is a service in which vehicles such as bicycles and cars are available for shared use to individuals for a price. Vehicle-sharing system allows people to borrow or rent a vehicle from parking region A and return it at parking region B.

[0003] However, as the sharing vehicle service industry is growing to meet the users' demands, problems have emerged. For example, the situation of the random or unregulated parking of vehicles is more prominent, which may lead to a sharing vehicles parking jam/congestion problem. Or there is haphazard parking and too many bicycles in crowded areas have disrupted traffic order. Therefore, it would be desirable to provide a solution for managing sharing vehicle.

Summary

[0004] This summary is provided to introduce a selection of concepts in a simplified form that are further described below in detailed description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

[0005] According to a first aspect of the disclosure, it is provided a method for managing sharing vehicle. The method comprises obtaining identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an

identity of the service provider of the sharing vehicle and a code of the sharing vehicle; sending a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and receiving a result of renting the sharing vehicle.

[0006] According to a second aspect of the disclosure, it is provided a method for operating a sharing vehicle management node capable of interacting with one or more sharing vehicle service providers. The method comprises receiving from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; sending a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and receiving, from the service provider, a result of renting the sharing vehicle; and sending the result to the terminal device.

[0007] According to a third aspect of the disclosure, it is provided an apparatus for managing sharing vehicle. The apparatus comprises a processor; and a memory, the memory containing instructions executable by the processor, whereby the apparatus is operative to: obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the

code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and receive a result of renting the sharing vehicle.

[0008] According to a fourth aspect of the disclosure, it is provided an apparatus for managing sharing vehicle. The apparatus comprises a processor; and a memory, the memory containing instructions executable by the processor, whereby the apparatus is operative to receive from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and receive, from the service provider, a result of renting the sharing vehicle; and send the result to the terminal device.

[0009] According to a fifth aspect of the disclosure, it is provided a computer program product. The computer program product comprises instructions which when executed by at least one processor of a first node of a sharing vehicle wireless network, cause the at least one processor to obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or

more sharing vehicle service providers; and receive a result of renting the sharing vehicle.

[0010] According to a sixth aspect of the disclosure, it is provided a computer program product. The computer program product comprises instructions which when executed by at least one processor, cause the at least one processor to receive from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and receive, from the service provider, a result of renting the sharing vehicle; and send the result to the terminal device.

[0011] According to a seventh aspect of the disclosure, it is provided a computer readable storage medium. The computer readable storage medium comprises instructions which when executed by at least one processor of a first node of a sharing vehicle wireless network, cause the at least one processor to obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and receive a result of renting the sharing vehicle.

[0012] According to an eighth aspect of the disclosure, it is provided a computer readable storage medium. The computer readable storage medium comprises instructions which when executed by at least one processor, cause the at least one processor to receive from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and receive, from the service provider, a result of renting the sharing vehicle; and send the result to the terminal device.

[0013] These and other objects, features and advantages of the disclosure will become apparent from the following detailed description of illustrative embodiments thereof, which are to be read in connection with the accompanying drawings.

Brief Description of the Drawings

[0014] Fig.1 depicts a schematic system, in which some embodiments of the present disclosure can be implemented;

[0015] Fig.2 depicts illustrative elements for a Cloud computing environment according to an embodiment of the present disclosure;

[0016] Fig.3 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0017] Fig.4 shows a flow chart depicting a method of obtaining identity information of the sharing vehicle to be rent by a user according to another embodiment of the present disclosure;

[0018] Fig.5 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0019] Fig.6 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0020] Fig.7 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0021] Fig.8 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0022] Fig.9 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0023] Fig.10 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0024] Fig.11 is a flow chart depicting a method according to another embodiment of the present disclosure;

[0025] Fig.12 is a block diagram illustrating an apparatus according to an embodiment of the disclosure; and

[0026] Fig.13 is a block diagram illustrating an apparatus according to another embodiment of the disclosure.

Detailed Description

[0027] For the purpose of explanation, details are set forth in the following description in order to provide a thorough understanding of the embodiments disclosed. It is apparent, however, to those skilled in the art that the embodiments may be implemented without these specific details or with an equivalent arrangement.

[0028] As used herein, the term "wireless network" refers to a network following any suitable communication standards, such as LTE-Advanced (LTE-A), LTE, Wideband Code Division Multiple Access (WCDMA), High-Speed Packet Access (HSPA), and so on. Furthermore, the communications between a terminal device and a network device in the wireless network may be performed according to any suitable generation communication protocols, including, but not limited to, Global System for Mobile Communications (GSM), Universal Mobile Telecommunications System (UMTS), Long Term Evolution (LTE), and/or other suitable the first generation (1G), the second generation (2G), 2.5G, 2.75G, the third generation (3G), the fourth generation (4G), 4.5G, the future fifth generation (5G) communication protocols, wireless local area network (WLAN) standards, such as the IEEE 802.11 standards; and/or any other appropriate wireless communication standard, such as the Worldwide Interoperability for Microwave Access (WiMAX), Bluetooth, and/or ZigBee standards, and/or any other protocols either currently known or to be developed in the future.

[0029] The term "network device" refers to a device in a wireless network via which a terminal device accesses the network and receives services therefrom. The network device refers a base station (BS), an access point (AP), or any other suitable device in

the wireless network. The BS may be, for example, a node B (NodeB or NB), an evolved NodeB (eNodeB or eNB), or gNB, a Remote Radio Unit (RRU), a radio header (RH), a remote radio head (RRH), a relay, a low power node such as a femto, a pico, and so forth. Yet further examples of the network device may include multi-standard radio (MSR) radio equipment such as MSR BSs, network controllers such as radio network controllers (RNCs) or base station controllers (BSCs), base transceiver stations (BTSs), transmission points, transmission nodes. More generally, however, the network device may represent any suitable device (or group of devices) capable, configured, arranged, and/or operable to enable and/or provide a terminal device access to the wireless network or to provide some service to a terminal device that has accessed the wireless network.

[0030] The term "terminal device" refers to any end device that can access a wireless network and receive services therefrom. By way of example and not limitation, the terminal device refers to a mobile terminal, user equipment (UE), or other suitable devices. The UE may be, for example, a Subscriber Station (SS), a Portable Subscriber Station, a Mobile Station (MS), or an Access Terminal (AT). The terminal device may include, but not limited to, portable computers, image capture terminal devices such as digital cameras, gaming terminal devices, music storage and playback appliances, a mobile phone, a cellular phone, a smart phone, voice over IP (VoIP) phones, wireless local loop phones, a tablet, a wearable device, a personal digital assistant (PDA), portable computers, desktop computer, image capture terminal devices such as digital cameras, gaming terminal devices, music storage and playback appliances, wearable terminal devices, vehicle-mounted wireless terminal devices, wireless endpoints, mobile stations, laptop-embedded equipment (LEE), laptop-mounted equipment (LME), USB dongles, smart devices, wireless customer-premises equipment (CPE) and the like. In the following description, the terms "terminal

device", "terminal", "user equipment" and "UE" may be used interchangeably. As one example, a terminal device may represent a UE configured for communication in accordance with one or more communication standards promulgated by the 3rd Generation Partnership Project (3GPP), such as 3GPP's GSM, UMTS, LTE, and/or 5G standards. As used herein, a "user equipment" or "UE" may not necessarily have a "user" in the sense of a human user who owns and/or operates the relevant device. In some embodiments, a terminal device may be configured to transmit and/or receive information without direct human interaction. For instance, a terminal device may be designed to transmit information to a network on a predetermined schedule, when triggered by an internal or external event, or in response to requests from the wireless network. Instead, a UE may represent a device that is intended for sale to, or operation by, a human user but that may not initially be associated with a specific human user.

[0031] As used herein, a downlink, DL transmission refers to a transmission from the network device to a terminal device, and an uplink, UL transmission refers to a transmission in an opposite direction.

[0032] References in the specification to "one embodiment," "an embodiment," "an example embodiment," and the like indicate that the embodiment described may include a particular feature, structure, or characteristic, but it is not necessary that every embodiment includes the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0033] It shall be understood that although the terms “first” and “second” etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another. For example, a first element could be termed a second element, and similarly, a second element could be termed a first element, without departing from the scope of example embodiments. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed terms.

[0034] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be liming of example embodiments. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises”, “comprising”, “has”, “having”, “includes” and/or “including”, when used herein, specify the presence of stated features, elements, and/or components etc., but do not preclude the presence or addition of one or more other features, elements, components and/ or combinations thereof.

[0035] In the following description and claims, unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skills in the art to which this disclosure belongs.

[0036] Now some exemplary embodiments of the present disclosure will be described below with reference to the figures.

[0037] As described above, as more and more sharing vehicle service providers have grown, problems have emerged. For example, the phenomenon of the vehicles of random parking is more prominent, which may lead to a sharing vehicles parking jam/congestion problem. In addition, sharing vehicle service providers such as Ofo

and Mobike that allow users to simply leave their rented bikes in any convenient place, for example, the random parking vehicles may become an obstruction. Moreover, the user is required to register with one or more sharing vehicle service providers and pay a deposit to each of them if the user wants to use the sharing vehicle services of the one or more sharing vehicle service providers, which is not convenient for the user. For example, since there are more and more sharing vehicle service providers, the user may download and install multiple applications from different sharing vehicle services and pay a refundable deposit for different sharing vehicle services, which may be inconvenient for the user and have the user to pay multiple deposits.

[0038] In addition, there are many service providers which can only control the vehicles of their own, and the traditional standalone checking for sharing vehicle parking congestion is isolated and non-systematic. In general, the sharing vehicle parking congestion may be commonly caused by many brands of sharing vehicles parking and mixing together. In this case, a standalone parking regulation is weak and not powerful to solve the problem of sharing vehicle parking congestion. The sharing bike parking congestion information cannot be delivered to every end users immediately to prevent further congestion accumulation.

[0039] To overcome at least one of the drawbacks mentioned above or other drawbacks, the present disclosure proposes a system for managing sharing vehicle, which may be based on Cloud computing.

[0040] Fig.1 depicts a schematic system, in which some embodiments of the present disclosure can be implemented. As shown in Fig.1, the system 100 comprises a network device 110 such as a cellular base station or a radio access point. The

network device 110 may refer to a function element on the network side as compared to a terminal device or UE. For example, the network device 110 may comprise an eNB, a Home eNode B, a femto BS, a pico BS, gNB, a radio access point or any other node capable to serve terminal devices such as sharing vehicles and UEs in the system 100. It is well known that a cellular radio system may comprise a network of radio cells each served by a transmitting station, known as a cell site or base transceiver station. The radio network provides wireless communications service for a plurality of more transceivers (in most cases mobile). The network of network devices working in collaboration allows for wireless service which is greater than the radio coverage provided by a single network device. The individual network device may be connected by another network (in many cases a wired network, not shown), which includes additional controllers for resource management and in some cases access to other network systems (such as the Internet) or metropolitan area networks (MANs). The circle 130 schematically indicates a coverage range of the network device 110.

[0041] As shown in Fig.1, the system 100 may further comprise one or more sharing vehicles 150, 152, 154, 160, 162, 164 and 166. The sharing vehicles may comprise bicycle, electric bicycle, automobile, hybrid electric vehicle, and electric car. The sharing vehicles may be equipped with a sensor such as positioning sensor and a communication module. For a parking area 180, there may be deployed at least one radio access point 104. For example, the sharing vehicle or UE may act as the radio access point. The radio access point may be a fixed access point. The radio access point can act as a gateway which can connect to the network device 110. In addition, the gateway role can be ignored if no gateway device is available from the parking lot/area. For example, a parking lot/area 170 may not have a radio access point. In this case, the sharing vehicles 150, 152, 154 in the parking lot/area 170 may connect to the network device 110 respectively. The sharing vehicles 166 is outside the parking

lot/area 170. The parking lots/areas 170 and 180 may be served by the radio access points 106 and 104 respectively. The radio access points 106 and 104 are capable of communicating with the sharing vehicle and a UE of the user, and the parking lot may be shared by the one or more sharing vehicle service providers. For example, the sharing vehicles 150, 152, 154 in the parking lot/area 170 may belong to different sharing vehicle service providers.

[0042] As shown in Fig.1, the system 100 may further comprise one or more terminal devices 190 and 192, each of which may operably communicate with the network device 110 such as a cellular base station through a wireless link 121 and 123. In addition, the terminal devices 190 and 192 can also communicate with the sharing vehicles. The terminal devices 190 and 192 can be fixed or moveable. Terminal devices 190 and 192 may include, but not limited to, cellular telephones, smart phones, and computers, whether desktop, laptop, or otherwise, as well as mobile devices or terminals such as cellular network UEs, handheld computers, personal digital assistants(PDAs), wearable devices, video cameras, set-top boxes, personal media devices, or any combinations of the foregoing, which may be provided with wireless communication functionality and run with any kind of operating system including, but not limited to, Windows, Linux, UNIX, Android, iOS and their variants. The terminal devices 190 and 192 can be used by the user of the sharing vehicle for renting and/or returning the sharing vehicle. In addition, the terminal devices 190 and 192 can act as the radio access points.

[0043] As shown in Fig.1, the system 100 may further comprise a sharing vehicle management node 140, which may operably communicate with the terminal devices 190, 192, the radio access point 104 and the sharing vehicles 150, 152, 154, 160, 162, 164 and 166 through the network device 110 and communicate with one or more

sharing vehicle service providers 142A, 142B and 142C. The sharing vehicle service providers 142A, 142B and 142C can provide services such as sharing vehicles management, sharing vehicle rent and return and parking regulation. The sharing vehicle management node 140 may provide services such as parking lot/area management, user management, acting as agent of the user to interact with the sharing vehicle service providers 142A, 142B and 142C, sharing vehicle service provider management, etc. For example, the sharing vehicle management node 140 may get the sharing vehicle parking information and the rented sharing vehicles distribution and optimize the parking area according to the sharing vehicle parking information and the sharing vehicle distribution, and manage the sharing vehicle service providers. The optimization may comprise the optimization of the locations of parking areas, the optimization of the number of the parking areas, threshold optimization for the parking areas, threshold optimization for different sharing vehicle service providers within one parking area etc. The sharing vehicle management node 140 can be implemented in form of hardware, software or their combination, including but not limited to, Cloud computer, distributed computing system, virtual computer, servers and PCs. The sharing vehicle management node 140 may run with any kind of operating system including, but not limited to, Windows, Linux, UNIX, Android, iOS and their variants.

[0044] In an embodiment, the sharing vehicle management node 140 is implemented by a Cloud computing environment. Fig.2 depicts illustrative elements for a Cloud computing environment. Cloud computing environment comprises one or more Cloud computing nodes with which computing devices such as, for example, mobile phone or smart devices, wearable computing device, desktop computer, laptop computer communicates. This allows for mobile internet infrastructure to platform and software to be offered as services from the Cloud computing environment so as to not require

each client to separately maintain such resources. It is understood that the types of computing devices in Fig.2 are intended to be exemplified only and that the Cloud computing environment can communicate with any type of computerized device over any type of network. As shown in Figure 2, a set of functional abstraction layers provided by the Cloud computing environment of present disclosure is shown. It should be understood that the components, layers, and functions shown in Fig.2 are intended to be illustrative only and the disclosure is not limited thereto. As depicted in Fig.2, the following layers and corresponding functions may be provided.

[0045] Workloads layer provides functionality for which the Cloud computing environment is utilized. Examples of workloads and functions which can be provided from this layer include parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing; sharing bike rental transaction recording and processing, and Cloud services catalog management.

[0046] Management layer may provide the exemplary functions described below. Resource provisioning provides dynamic vehicle parking congestion identification resources and other resources that are utilized to perform tasks within the Cloud computing environment. Vehicle parking behavior provisioning provides recording tracking and broadcasting as resources are utilized within the Cloud computing environment, and sharing vehicle rental transaction or history recording for consumption of these resources. In an example, these resources may comprise application software licenses. Security provides identity verification for users and tasks, as well as protection for data and other resources. Subscriber portal provides access to the Cloud computing environment for both subscribers and system administrators. Service level management provides Cloud computing resource

allocation and management such that required service levels are met. Service Level Agreement (SLA) planning and fulfillment provides pre-arrangement for, and procurement of, Cloud computing resources for which a future requirement is anticipated in accordance with an SLA.

[0047] Virtualization layer may provide an abstraction layer from which the following exemplary virtual entities may be provided, virtual sharing bike parking records; virtual judger system for decision making; virtual servers; virtual storage; virtual networks, including virtual private networks; virtual applications; and virtual clients.

[0048] Hardware and software (HW&SW) layer may include hardware and software components. Examples of hardware components include mainframes/mainframe computers which are used primarily by Cloud service provider for critical applications, bulk data processing; reduced instruction set computer (RISC) architecture based servers; x86 processor equipped servers; blade server systems; storage devices; networks and networking components. The software components include network application server software, which are used by end-users to create applications and integrate applications with other applications; and database software, which is a computer program that provides sharing bike behavior database services to other computer programs or to computers, as defined by the client–server model. This database software supports both object-relational features and non-relational structures.

[0049] Fig.3 is a flow chart depicting a method 300 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the terminal devices 190 and 192 of Fig.1. As such, the apparatus may provide unit for

accomplishing various parts of the method 300 as well as unit for accomplishing other processes in conjunction with other components.

[0050] As shown in Fig.3, the method 300 may start at block 302 where the terminal device obtains identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle. For example, the identity information may be obtained from two-dimensional code, bar code, RFID (radio frequency identification) or text. The identity of the service provider can be included in the code of the sharing vehicle. In this way, when a user wants to rent a sharing bike, the user may scan/enter a code of the sharing vehicle, and then the terminal device can obtain identity information. In addition, the identity of the service provider may not be included in the code of the sharing vehicle. In this case, the identity of the service provider can be input/selected by the user.

[0051] Fig.4 shows a flow chart depicting a method of obtaining identity information of the sharing vehicle to be rent by a user according to an embodiment of the present disclosure.

[0052] As shown in Fig.4, at block 302-2, the terminal device receives a message for renting the sharing vehicle. For example, the user may open a user interface on his terminal device and press a button/icon for renting the sharing vehicle, and then the terminal device receives the first message for renting the sharing vehicle. In another example, the user may scan/enter the identity information of the sharing vehicle to be rent by the user, and then the message for renting the sharing vehicle may be triggered by this operation.

[0053] At block 302-4, the terminal device provides a user interface comprising information of one or more sharing vehicle service providers for the user to select. For example, the user interface may display a common web portal comprising information of the one or more sharing vehicle service providers.

[0054] At block 302-6, the terminal device receives the identity of the service provider of the sharing vehicle selected by the user. For example, the user can select which service provider of sharing vehicle to use, and then the terminal device receives the identity of the service provider.

[0055] At block 302-8, the terminal device receives the code of the sharing vehicle. For example, in the page of the selected service provider, the user can scan/enter the code of the selected sharing vehicle, and then the terminal device receives the code of the sharing vehicle.

[0056] Turn to Fig.3, at block 304, the terminal device sends a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers. The first renting request may comprise any other suitable information, such as a user identity(ID). The identity associated with the user may be registered with the service provider by the user or the sharing vehicle management node. For example, the user may register with the each or a part of the one or more sharing vehicle service providers to get a first user ID and register with the sharing vehicle management node get a second user ID, then the first renting request may comprise the first user ID and the second user ID and the identity associated with the

user is the first user ID. In another example, the user may only register with the sharing vehicle management node to get the second user ID, the first renting request may comprise the second user ID. The sharing vehicle management node may register with the each or a part of the one or more sharing vehicle service providers to get a third user ID and associate the third user ID with the second user ID, i.e., the identity associated with the user is the third user ID. In addition, at least a part of content of the renting request may be signed by the user to generate a digital signature. A valid digital signature gives a recipient reason to believe that the content was created by a known sender, that the sender cannot deny having sent the content, and that the content was not altered in transit.

[0057] After receiving the first renting request, the sharing vehicle management node may act as an agent of the user to interact with the service provider of the selected sharing vehicle. For example, when the first renting request comprises the first user ID and the second user ID, the sharing vehicle management node may know the service provider from the identity of the service provider and send a second renting request comprising the first user ID and the code of the sharing vehicle to the selected service provider, wherein the first user ID and the code of the sharing vehicle may be signed by the user. In addition, the sharing vehicle management node may extract from the first renting request the first user ID, the second user ID and the identity information, a type of vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history, location data, etc., bind the second user ID with the first user ID and then store these information in a database. As another embodiment, when the first renting request comprises the second user ID without the first user ID, the sharing vehicle management node may send a second renting request comprising the third user ID and the code of the sharing vehicle to the selected service provider, wherein the sharing vehicle management

node may register with the selected service provider to get the third user ID and associate the third user ID with the second user ID, and the third user ID and the code of the sharing vehicle may be signed by the sharing vehicle management node. In addition, the sharing vehicle management node may extract from the first renting request the second user ID and the identity information, bind the second user ID with the third user ID and store these information in the database.

[0058] The sharing vehicle management node may receive a result of renting the sharing vehicle and send the result to the terminal device. In addition, before sending the second renting request to the sharing vehicle service provider, the sharing vehicle management node may check a state of the user, such as a validity of the user. If the user is determined to an invalid user, then the sharing vehicle management node may send a result indicating that the user is an invalid user to the terminal device. If it is determined that the user has not pay the deposit, then the result may comprise prompt information for paying the deposit.

[0059] At block 306, the terminal device may receive the result of renting the sharing vehicle. As described above, the terminal device may receive the result of renting the sharing vehicle from the sharing vehicle management node. In addition, the terminal device may receive the result of renting the sharing vehicle from the selected sharing vehicle service provider. For example, the selected sharing vehicle service provider may obtain the first user ID from the second renting request, and send the result of renting the sharing vehicle to the terminal device associated with the first user ID.

[0060] Fig.5 is a flow chart depicting a method 500 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the terminal devices 190 and 192 of Fig.1. As such, the apparatus may provide unit for

accomplishing various parts of the method 500 as well as unit for accomplishing other processes in conjunction with other components.

[0061] As shown in Fig.5, the method 500 may start at block 502 where the terminal device receives a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle. The identity information may be saved on the terminal device when the user rented the sharing vehicle. The location data may be the location data of the returned sharing vehicle, which can be obtained from Global Position System (GPS), Beidou navigation system and a base station position system of the terminal device or the returned sharing vehicle. The location data may be the location data such as parking ID of a parking lot/area which can be sensed by the terminal device or scanned/entered by the user. For example, the parking lot/area may be deployed with the radio access point which can broadcast the ID of the parking lot/area periodically. Alternatively, the user can scan a bar code of the ID of the parking lot/area by using the terminal device.

[0062] At block 504, the terminal device may send the returning request to the sharing vehicle management node. The returning request may comprise any suitable information, such as the user identity(ID). For example, the returning request may comprise the first user ID and the second user ID as described above. As another example, the renting request may comprise the second user ID as described above. In addition, at least a part of content of the returning request may be signed by the user to generate a digital signature.

[0063] After receiving the returning request, the sharing vehicle management node may process the returning request. For example, the sharing vehicle management

node may act as an agent of the user to interact with the service provider of the returned sharing vehicle. For example, when the returning request comprises the first user ID and the second user ID, the sharing vehicle management node may send another returning request comprising the first user ID, the location data and code of the returned sharing vehicle to the service provider, wherein the first user ID, the location data and the code of the sharing vehicle may be signed by the user. In addition, the sharing vehicle management node may extract from the renting request the first user ID, the second user ID, the identity information, a type of vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history, location data, etc. and then store these information. As another embodiment, when the returning request comprises the second user ID without the first user ID, the sharing vehicle management node may send another returning request comprising the third user ID, the location data and the code of the sharing vehicle to the service provider, wherein the third user ID, the location data and the code of the sharing vehicle may be signed by the sharing vehicle management node and the third user ID is registered by the sharing vehicle management node with the sharing vehicle service provider as described above.

[0064] The sharing vehicle management node may receive a result of returning the sharing vehicle from the selected sharing vehicle service provider and send the result to the terminal device. In addition, if the user only registers with the sharing vehicle management node rather than the selected sharing vehicle service provider, then the sharing vehicle management node may process the received result, generate charging information and send the result comprising the charging information to the terminal device.

[0065] At block 506, the terminal device may receive the result of returning the sharing vehicle. The result may comprise any suitable information, such as whether returning the sharing vehicle is successful or not, a reason of failure, advertising information. As described above, the terminal device may receive the result from the sharing vehicle management node. In addition, the terminal device may receive the result from the sharing vehicle service provider. For example, the sharing vehicle service provider may obtain the first user ID from the returning request, and send the result of returning the sharing vehicle to the terminal device associated with the first user ID.

[0066] In an embodiment, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot when the parking lot is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot if the parking lot/area is congested; and suggesting at least one neighboring other parking lot in which the sharing vehicle can park if the parking lot/area is congested. As an example, if the parking lot/area is congested, the result may comprises information of charging two times for parking the incoming sharing vehicle in the parking lot/area and/or requiring the user of the incoming sharing vehicle to display advertisement if the incoming sharing vehicle is parked in the parking lot/area.

[0067] For example, when the terminal device receives the result of returning the sharing vehicle, it may output it to the user of the terminal device for example through

a display or speaker, or send it to a wearable Bluetooth device of the user by a Bluetooth radio link, or any other suitable ways. Then the user may get the result of returning the sharing vehicle and perform an action such as parking the sharing vehicle in the parking lot/area if the parking lot/area is not congested. If the parking lot/area is congested and the sharing vehicle is rejected to be parked in the parking lot/area, then the sharing vehicle can not be locked when the user attempts to park the sharing vehicle in the parking lot/area. If the parking lot/area is congested and the result of returning the sharing vehicle comprises information of charging two times fees for parking the sharing vehicle in the parking lot/area, then the user will be charged two times fees when the user insists to park the sharing vehicle in the parking lot/area.

[0068] The congestion state may be determined by any suitable ways. For example, the congestion state may be determined based on a comparison of the number of current vehicles or current vehicles belonging to the same sharing vehicle service provider as the returned sharing vehicle in the parking lot/area and a threshold. The threshold may be determined by any suitable ways. For example, the threshold may be determined by performing big data analysis on the sharing vehicle parking information. The threshold may be determined based on sharing vehicle parking information and the rented sharing vehicle distribution. The threshold may be determined by performing joint optimization of parking lots/regions. In addition, the threshold may be dynamically adjusted. For example, the threshold may be adjusted for different times such as rush hour and non-rush hour. When an emergency (such as accident and traffic control) around the parking area results in that the vehicle cannot be parked in the parking area anymore, the threshold may be set as zero. An another example, if many vehicles are parked in a parking area and few vehicles are parked in a neighboring parking area, then the threshold for the parking area may be decreased

and the threshold for the neighboring parking area may be increased. In addition, different thresholds may be assigned to different sharing vehicle service providers within one parking area.

[0069] In another example, the congestion state may be determined based on the history information of the parking area. For example, if the history information of the parking area indicates that the parking area is certainly congested during the morning from 8 to 9, then the congestion state may be determined as congestion during the morning from 8 to 9. The congestion state may be determined by the sharing vehicle management node, radio access point or the first node, which will be described in detail in the following. By using the history information, the parking congestion can be predicted and prevention actions can be performed in advance. In addition, the congestion state may be set by the sharing vehicle service provider.

[0070] Fig.6 is a flow chart depicting a method 600 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the terminal devices 190 and 192 of Fig.1. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity.

[0071] In this embodiment, a transaction data set is required to be corrected. For example, the location data obtained from the base station position system may be not precise, or the location data is not consistent with the user's history route information.

[0072] At block 602, the terminal device receives, from the sharing vehicle management node, a correction request for the user to correct a transaction data set. The transaction data set may comprise an identity of UE/vehicle, a type of vehicle, the code of the sharing vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history data, location data, etc.

The transaction data set may be compared to an extracted transaction data set obtained from a database containing the user's history information. As an example, if the location data indicates that the user returns the sharing vehicle at a location A at 8:00 am and the extracted location data from the database indicates that the user usually returned the sharing vehicle at location B around 8:00 am, then the sharing vehicle management node may send the correction request for the user to correct the location data. Similarly, the sharing vehicle management node may send the correction request for the user to correct any other parameters in the transaction data set.

[0073] At block 604, the terminal device send a correction response to the sharing vehicle management node. The correction response may comprise any suitable information, such as the corrected transaction data set or an indication that the transaction data set is correct. For example, when the correction request comprises the at least one estimated location, the user may select one from the at least one estimated location or the user may enter a new location and the correction response may comprise the selected/entered location. If the user believes that the transaction data set is correct, then the correction response may comprise an indication that the transaction data set is correct.

[0074] As another example, target location data may be stored in a vehicle parking location database at Cloud computing environment. For example, the target location data may be compared to similar identified parking location data, which is like the target location data. The vehicle parking location database may store both normal parking and vehicle parking congestion data, from which vehicle parking location may be retrieved in response to a data request. In response to the data request from the Cloud computing environment, the vehicle parking location database may send vehicle location data back to the Cloud computing environment. When a sharing

vehicle enters a parking lot, the sharing vehicle will connect to the nearest Radio Access point of this parking lot automatically. The location can be fetched by using of wireless technology e.g. GPS/BeiDou, WLAN, RF RSSI level based location sensors. Radio Access point will report the location of the sharing vehicle to the parking location processing system of the Cloud computing environment. The input data is processed by a Sharing Vehicle Parking Processing System of the Cloud computing environment. The Sharing Parking Processing System inputs the vehicle parking extraction parameters (e.g. identity of UE/vehicle, type of vehicle, serial number, brand of vehicle service provider, brand of UE/vehicle, date, time of collection, credit record, parking location history) and inform the subscriber/vehicle service provider via the user interface to correct/refresh the latest vehicle information in the provider. The confirmed sharing vehicle parking location is stored in the database of the Cloud computing environment.

[0075] Fig.7 is a flow chart depicting a method 700 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the terminal devices 190 and 192 of Fig.1. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity. Blocks 704, 706 and 708 is similar to blocks 502, 504 and 506.

[0076] At block 702, the terminal device receives congestion prediction information for at least one parking lot/area associated with the user. The parking lot/area associated with the user may be determined by various ways. For example, the sharing vehicle management node may determine the at least one parking lot/area associated with the user by using the user's current location which may be sent by the terminal device to the sharing vehicle management node. As another example, the sharing vehicle management node may learn the at least one parking lot/area

associated with the user from the user's history information. For example, if the user's history information indicates that the user always rents the sharing vehicle at parking lot A and returns it at parking lot B, then the sharing vehicle management node may learn that location B is the parking lot/area associated with the user. Then the sharing vehicle management node may predict a congestion level and a congestion trend for the parking lot/area associated with the user for example based on the history congestion information of the parking lot/area and send it to the terminal device.

[0077] Fig.8 is a flow chart depicting a method 800 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the sharing vehicle management node 140 of Fig.1, wherein the sharing vehicle management node 140 is capable of interacting with one or more sharing vehicle service providers. As such, the apparatus may provide unit for accomplishing various parts of the method 800 as well as unit for accomplishing other processes in conjunction with other components. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity.

[0078] As shown in Fig.8, the method 800 may start at block 802 where the sharing vehicle management node receives from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle.

[0079] At block 804, the sharing vehicle management node sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider. As described above, the first renting request received from the terminal device may comprises the

first user ID and the second user ID and the sharing vehicle management node may know the service provider from the identity of the service provider and send a second renting request comprising the first user ID and the code of the sharing vehicle to the service provider, wherein the first user ID and the code of the sharing vehicle may be signed by the user. In addition, the sharing vehicle management node may extract from the renting request the first user ID, the second user ID and the identity information, a type of vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history, location data, etc. and then store these information in the database. As another embodiment, when the first renting request received from the terminal device comprises the second user ID without the first user ID, the sharing vehicle management node may send a second renting request comprising the third user ID and the code of the sharing vehicle to the selected service provider, wherein the sharing vehicle management node may register with the service provider to get the third user ID and the third user ID and the code of the sharing vehicle may be signed by the sharing vehicle management node. In addition, the sharing vehicle management node may extract from the renting request the second user ID and the identity information, a type of vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history, location data, etc., bind the second user ID with the third user ID and store these information in the database.

[0080] At block 806, the sharing vehicle management node may receive a result of renting the sharing vehicle and send the result to the terminal device at block 808. In addition, before sending the second renting request to the service provider, the sharing vehicle management node may check a state of the user, such as a validity of the user. If the user is determined to an invalid user, then the sharing vehicle management node may send a result indicating that the user is the invalid user to the terminal device. If it

is determined that the user has not pay a deposit, then the result may comprise prompt information for paying the deposit.

[0081] Fig.9 is a flow chart depicting a method 900 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the sharing vehicle management node of Fig.1. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity.

[0082] As shown in Fig.9, the method 900 may start at block 902 where the sharing vehicle management node receives from the terminal device a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle. As described above, the location data may be the location data of the returned sharing vehicle or the location data of a parking lot/area.

[0083] At block 904, the sharing vehicle management node processes the returning request to generate the result of returning the sharing vehicle. For example, the sharing vehicle management node may act as an agent of the user to interact with the service provider of the sharing vehicle. As an example, when the returning request comprises the first user ID and the second user ID, the sharing vehicle management node may send the returning request comprising the first user ID, the location data and code of the returned sharing vehicle to the service provider. As another embodiment, when the returning request comprises the second user ID without the first user ID, the sharing vehicle management node may send the returning request comprising the third user ID, the location data and the code of the sharing vehicle to the service provider, wherein the third user ID, the location data and the code of the sharing vehicle may be signed by the sharing vehicle management node. The sharing

vehicle management node may receive the result of returning the sharing vehicle from the sharing vehicle service provider. In addition, if the user only registers with the sharing vehicle management node rather than the sharing vehicle service provider, then the sharing vehicle management node may obtain charging information from the result received from the sharing vehicle service provider and charge the user based on the charging information. The result of returning the sharing vehicle may comprise the charging information generated by the sharing vehicle management node.

[0084] At block 906, the sharing vehicle management node may send the generated result to the terminal device. The generated result may comprise any suitable information, such as whether returning the sharing vehicle is successful or not, a reason of failure, charging information, and advertising information.

[0085] In an embodiment, the result of returning the sharing vehicle may be generated based on a congestion state of a parking lot associated with the location data. and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot when the parking lot is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot if the parking lot/area is congested; and suggesting at least one neighboring other parking lot in which the sharing vehicle can park if the parking lot/area is congested. As an example, if the parking lot/area is congested, the result may comprise information of requiring the user of the sharing vehicle to display advertisements if the sharing vehicle is parked in the parking lot. The congestion state may be determined by any suitable ways as described above.

[0086] As an example, the sharing vehicle management node gets the target location metadata (e.g identity of UE/vehicle, type of vehicle, serial number, date, time of collection, location); selects the key feature by using sharing vehicle feature parameters (e.g identity of UE/vehicle, type of vehicle, serial number, date, time of collection, location); gets the confirmed vehicle location related information; retrieve the history data from the data base of cloud network; evaluates the congestion level and forecast the congestion trend basing on the database inputs; compares the congestion level with the predefined threshold value (the number of permitted vehicles in this area) to decide the congestion currently; if the sharing vehicle management node judges the congestion, then enters into one of the following congestion handling processes: not allow parking, charge more money if parking; or recommend a free parking area close to this congestion area.

[0087] As still another example, the UE or the sharing vehicle reports its location to the sharing vehicle management node. The sharing vehicle management node will extract the UE/sharing vehicle history data from the database of the Cloud computing environment and also the data of the possible nearby parking lot. The sharing vehicle management node uses different keys to do data resampling to give the better recommendation about the parking lot.

[0088] As still another example, target location of sharing vehicle to be parked is acquired using known techniques, such as the use of GPS/BeiDou or RF RSSI level based location sensors. After acquiring target location of sharing bike to be parked, The sharing vehicle management node extracts the key feature parameters of sharing vehicle target location. The definitions of feature parameters are defined based on the application scenarios. Later, metadata of target location are extracted e.g., feature parameters, time, location and record parameters such as date, time of collection, and

new or used for long, device type of collection) when bike parking location was acquired. Additional preprocessing of target location may be advisable or even required depending on the manner in which location is acquired or is going to be manipulated in accordance with various ways of method. The sharing vehicle management node determines whether target location contains parking congestion feature parameters, and if so, how many parking congestion parameter, by reference to corresponding similar reference location information from the database of the Cloud computing environment can be obtained. Thus, the sharing vehicle management node retrieves similar reference vehicle parking location information from the database of the Cloud computing environment by reference to feature parameters of target location of sharing vehicle under checking. For example, a bounding box of target location is identified and tied to its related feature parameters e.g. serial number, brand of bike service provider etc. The bounding box may be co-extensive with the boundaries of target location or it may define an area of interest within target location of vehicle parking under checking. Feature parameters of the bounding box of target location may be automatically identified from metadata accompanying target location. The feature parameters of the bounding box are used to retrieve similar reference location that may be vehicle parking congested with or contain the same feature parameters of the bounding box. The sharing vehicle management node extracts the feature parameters of target location under check to which similar reference location from database corresponds; similar reference location from the Cloud computing environment is then retrieved from the database. The sharing vehicle management node automatically matches at least one feature of target location under checking, applying an optimized feature matching algorithm, in which feature in target location under checking is matched with a coincident feature in similar reference location from the database. Feature parameters in common

between target location under check and similar reference location will tend to match well, while features that are not common between target location and reference location will not match well. Feature matching exploits a characteristic of feature matching statistic that tends to match very poorly with vehicle parking congestion feature parameters. From feature matching statistic, a presence probability is automatically determined for each suspect feature in target location under checking. A probability coefficient is produced based on the bike parking congestion feature presence probability for each feature box in target location under checking. Using the probability coefficient, overall confidence is automatically determined, overall confidence level representing a ratio of high probability bike parking congestion feature to total number of features in target location under checking. A confidence measure is also automatically computed. If overall confidence measure result is low under a certain level, then it is deemed likely that the target location and status of vehicle parking is substantially parking congestion. Whether values are “high” or “low” may be determined by reference to previously established thresholds or other parameters. As such target location under checking is a candidate to update the vehicle parking congestion database. The sharing vehicle management node designates the target location processed for inclusion in vehicle parking congestion database. Target location processed may be included in vehicle parking congestion database. Finally, for each processed target location and feature of sharking vehicle parking, a unique ID can be assigned to index. Similar feature parameters of vehicle parking congestion can be accumulated and categorized for next checking process.

[0089] Fig.10 is a flow chart depicting a method 1000 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the sharing vehicle management node 140 of Fig.1. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity.

[0090] At block 1002, the sharing vehicle management node determines whether a transaction data set is required to be corrected. The transaction data set may comprise the identity information, a type of vehicle, a brand of the service provider, a brand of UE/vehicle, date, a time of parking, credit record, parking location history, location data, etc. For example, if the sharing vehicle management node determines that the location data is obtained from the base station position system, then the sharing vehicle management node may require the user to provide the GPS location data.

[0091] In an embodiment, the sharing vehicle management node may estimate a transaction data set of the returned sharing vehicle; compare the estimated data set with the feature data in database; and determine whether the transaction data set is required to be corrected based on the comparison. For example, if the sharing vehicle management node determines that the location data is not consistent with the user's history route information, the sharing vehicle management node may require the terminal device or the service provider to correct the location data. As another example, the transaction data set may be compared to the retrieved history transaction data set from the database containing the user's history information and determine whether the transaction data set is required to be corrected based on the comparison.

[0092] At block 1004, in response to a determination that the transaction data set is required to be corrected, the sharing vehicle management node may send a correction request to the terminal device or the service provider and receive a correction response from the terminal device or the sharing vehicle service provider at block 1006.

[0093] Fig.11 is a flow chart depicting a method 1100 according to an embodiment of the present disclosure, which may be performed at an apparatus such as the sharing

vehicle management node 140 of Fig.1. For some parts which have been described in the above embodiments, detailed description thereof is omitted here for brevity.

[0094] At block 1102, the sharing vehicle management node retrieves data associated with at least one parking lot/area associated with the user. The parking lot/area associated with the user may be determined by various ways as described above. The data may comprise the real time and/or history sharing vehicle parking information, the location and distribution of the rented sharing vehicles, traffic event, the habit and behavior of the sharing vehicle user, seasonal variation, public events, traffic control, etc.

[0095] At block 1104, the sharing vehicle management node predicts a congestion level and a congestion trend for the at least one parking lot/area based on the data. For example, the sharing vehicle management node may perform big data analysis on the retrieved data to predict the congestion level and congestion trend. When an emergency such as traffic control around the parking area results in that the vehicle cannot be parked in the parking area anymore and the traffic control will continue from 8:00 AM to 9:00 AM, then the congestion trend may be predicted as congestion from 8:00 AM to 9:00 AM. As another example, the sharing vehicle management node may get the target parking lot/area metadata (e.g. identity of UE/vehicle, type of vehicle, serial number, date, time of collection, location), select the key feature by using sharing vehicle feature parameters (e.g. identity of UE/vehicle, type of vehicle, serial number, date, time of collection, location), retrieve the history parking lot/area data from the database of the sharing vehicle management node, predict the congestion level and the congestion trend basing on the history parking lot/area data, for example, by comparing with a predefined threshold value (e.g., the number of

permitted vehicles in the parking lot/area) to predict the congestion level and the congestion trend.

[0096] At block 1106, the sharing vehicle management node sends the congestion level and the congestion trend to the terminal device.

[0097] In an embodiment, the sharing vehicle management node may optimize at least one parking lot/area by performing big data analysis on data associated with the at least one parking lot/area. The data may comprise the real time and/or history sharing vehicle parking information, the location and distribution of the rented sharing vehicles, traffic event, the habit and behavior of the sharing vehicle user, seasonal variation, public events, traffic control, etc. The optimization may comprise the optimization of the locations of parking areas, the optimization of the number of the parking areas, threshold optimization for the parking areas, threshold optimization for different sharing vehicle service providers within one parking area etc. For example, the sharing vehicle management node may get the sharing vehicle parking information and the rented sharing vehicles distribution and optimize the locations of parking areas according to the sharing vehicle parking information and the sharing vehicle distribution.

[0098] Fig.12 depicts an apparatus capable of managing sharing vehicle as described above, wherein the apparatus may be implemented by or included in the first node of the parking lot/area. As shown in Fig.12, the apparatus 1200 comprises a processing device 1204, a memory 1205, and a transceiver 1201 in operative communication with the processor 1204. The transceiver 1201 comprises at least one transmitter 1202 and at least one receiver 1203. While only one processor is illustrated in Fig.12, the processing device 1204 may comprises one or more processors or multi-core

processor(s). Additionally, the processing device 1204 may also comprise cache to facilitate processing operations.

[0099] Computer-executable instructions can be loaded in the memory 1205 and, when executed by the processing device 1204, cause the apparatus 1200 to implement the above-described methods for managing sharing vehicle. In particular, the computer-executable instructions can cause the apparatus 1200 to obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and receive a result of renting the sharing vehicle.

[00100] In an embodiment, the apparatus 1200 is further configured to receive a message for renting a sharing vehicle; provide a user interface comprising information of one or more sharing vehicle service providers for a user to select; receive the identity of the service provider selected by the user; and receive a code of the sharing vehicle.

[00101] In an embodiment, the apparatus 1200 is further configured to receive a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle; send the returning request to the sharing vehicle management node; receive a result of returning the sharing vehicle.

[00102] In an embodiment, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and suggesting at least one neighboring other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

[00103] In an embodiment, the apparatus 1200 is further configured to receive, from the sharing vehicle management node, a correction request for the user to correct a transaction data set; and send a correction response to the sharing vehicle management node.

[00104] In an embodiment, the apparatus 1200 is further configured to receive congestion prediction information for at least one parking lot/area associated with the user.

[00105] In an embodiment, the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing;

sharing vehicle rental transaction recording and processing, Cloud services catalog management.

[00106] In an embodiment, the parking lot/area is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

[00107] In an embodiment, the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

[00108] Fig.13 depicts an apparatus capable of managing sharing vehicle as described above, wherein the apparatus may be implemented by or included in the first node of the parking lot/area. As shown in Fig.13, the apparatus 1500 comprises a processing device 1304, a memory 1305, and a transceiver 1301 in operative communication with the processor 1304. The transceiver 1301 comprises at least one transmitter 1302 and at least one receiver 1303. While only one processor is illustrated in Fig.13, the processing device 1304 may comprises one or more processors or multi-core processor(s). Additionally, the processing device 1304 may also comprise cache to facilitate processing operations.

[00109] Computer-executable instructions can be loaded in the memory 1305 and, when executed by the processing device 1304, cause the apparatus 1300 to implement the above-described methods for managing sharing vehicle. In particular, the computer-executable instructions can cause the apparatus 1300 to receive from a terminal device a first renting request comprising identity information of a sharing

vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and receive, from the service provider, a result of renting the sharing vehicle; and send the result to the terminal device.

[00110] In an embodiment, the apparatus 1300 is further configured to receive from the terminal device a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle; process the returning request to generate the result of returning the sharing vehicle; and send the generated result to the terminal device.

[00111] In an embodiment, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and suggesting at least one neighboring other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

[00112] In an embodiment, the apparatus 1300 is further configured to determine whether a transaction data set is required to be corrected in response to a

determination that the transaction data set is required to be corrected, send a correction request to the terminal device or the service provider and receive a correction response from the terminal device or the sharing vehicle service provider.

[00113] In an embodiment, the apparatus 1300 is further configured to estimate a transaction data set of the returned sharing vehicle; compare the estimated data set with the feature data in database; and determine whether the transaction data set is required to be corrected based on the comparison.

[00114] In an embodiment, the apparatus 1300 is further configured to retrieve data associated with at least one parking lot/area associated with the user; predict a congestion level and a congestion trend for the at least one parking lot/area based on the data; and send the congestion level and the congestion trend to the terminal device.

[00115] In an embodiment, the apparatus 1300 is further configured to optimize at least one parking lot/area by performing big data analysis on data associated with the at least one parking lot/area.

[00116] In an embodiment, the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing; sharing vehicle rental transaction recording and processing, Cloud services catalog management.

[00117] In an embodiment, the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

[00118] In an embodiment, the parking lot is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

[00119] According to an aspect of the disclosure it is provided an apparatus capable of implementing the methods for managing sharing vehicle as described above, wherein the apparatus may be implemented by or included in the terminal device.

[00120] The apparatus may comprise an obtaining unit configured to obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; a sending unit configured to send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and a receiving unit configured to receive a result of renting the sharing vehicle.

[00121] In an embodiment, the apparatus further comprise a receiving unit configured to receive a message for renting a sharing vehicle; a providing unit configured to provide a user interface comprising information of one or more sharing vehicle service providers for a user to select; the receiving unit further configured to receive

the identity of the service provider selected by the user; and receive a code of the sharing vehicle.

[00122] In an embodiment, the apparatus further comprises the receiving unit further configured to receive a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle; the sending unit further configured to send the returning request to the sharing vehicle management node; the receiving unit further configured to receive a result of returning the sharing vehicle.

[00123] In an embodiment, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and suggesting at least one neighboring other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

[00124] In an embodiment, the receiving unit further is configured to receive, from the sharing vehicle management node, a correction request for the user to correct a transaction data set; and the sending unit is further configured to send a correction response to the sharing vehicle management node.

[00125] In an embodiment, the receiving unit further is configured to receive congestion prediction information for at least one parking lot/area associated with the user.

[00126] In an embodiment, the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing; sharing vehicle rental transaction recording and processing, Cloud services catalog management.

[00127] In an embodiment, the parking lot/area is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

[00128] In an embodiment, the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

[00129] According to an aspect of the disclosure it is provided an apparatus capable of implementing the methods for managing sharing vehicle as described above, wherein the apparatus may be implemented by or included in the sharing vehicle management node.

[00130] The apparatus comprises a receiving unit configured to receive from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle; a sending unit configured to send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and the receiving unit further configured to receive, from the service provider, a result of renting the sharing vehicle; and send the result to the terminal device.

[00131] In an embodiment, the apparatus further comprises the receiving unit further configured to receive from the terminal device a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle; a processing unit configured to process the returning request to generate the result of returning the sharing vehicle; and the sending unit further configured to send the generated result to the terminal device.

[00132] In an embodiment, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested; rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested; charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested; requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and suggesting at least one neighboring

other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

[00133] In an embodiment, the apparatus further comprises a determining unit configured to determine whether a transaction data set is required to be corrected in response to a determination that the transaction data set is required to be corrected, the sending unit further configured to a correction request to the terminal device or the service provider and the receiving unit further configured to receive a correction response from the terminal device or the sharing vehicle service provider.

[00134] In an embodiment, the apparatus further comprises a estimating unit configured to estimate a transaction data set of the returned sharing vehicle; a comparing unit configured to compare the estimated data set with the feature data in database; and a determining unit configured to determine whether the transaction data set is required to be corrected based on the comparison.

[00135] In an embodiment, the apparatus further comprises a retrieving unit configured to retrieve data associated with at least one parking lot/area associated with the user; a predicting unit configured to predict a congestion level and a congestion trend for the at least one parking lot/area based on the data; and the sending unit further configured to send the congestion level and the congestion trend to the terminal device.

[00136] In an embodiment, the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert

broadcasting; location based vehicle parking data analytics recording and processing; sharing vehicle rental transaction recording and processing, Cloud services catalog management.

[00137] In an embodiment, the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

[00138] In an embodiment, the parking lot is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

[00139] In an embodiment, the apparatus further comprises an optimizing units configured to optimize at least one parking lot/area by performing big data analysis on data associated with the at least one parking lot/area.

[00140] According to an aspect of the disclosure it is provided a computer program product comprising at least one non-transitory computer-readable storage medium having computer-executable program instructions stored therein, the computer-executable instructions being configured to, when being executed, cause an apparatus to operate as described above.

[00141] According to an aspect of the disclosure it is provided a computer readable storage medium comprising instructions which when executed by at least one processor, cause the at least one processor to perform the method as described above.

[00142] The embodiments of the disclosure may have the following advantages. The embodiments of the disclosure can saves the local labor resource to manage the parking congestion issue, by remote decision making, it can prevent sharing vehicle parking congestion. The solution of the embodiments of the disclosure is a low-cost cloud plus radio network specified for sharing vehicle application, the dynamic control and management of the sharing vehicles can real-time adjust the parking strategy and regulating parking behavior of the sharing bicycles. The embodiments of the disclosure realize real smart parking. The embodiments of the disclosure uses low power IoT (Internet of Thing) senor, which can save great energy resource which is more beneficial for sharing vehicle maintenance. The embodiments of the disclosure provides a united control system, the decision made can be passed to every nodes (vehicle) and node can share the parking situation to other nodes and back to the sharing vehicle management node at the same time. The embodiments of the disclosure can monitor multiple incoming sharing vehicles to be parked and judge whether they will cause local parking congestion in advance for prevention. Autonomous parking congestion prevention can be implemented by auto-decision making for vehicle lock-disable and alarm for parking congestions. Solution and decision making can be automatically made to prevent sharing vehicle congestion happening. The embodiments of the disclosure can coordinate multiple sharing vehicle service providers together to solve the problem of vehicle parking congestion. The embodiments of the disclosure can realize one APP installed on UEs of subscribers to use the services of the one or more sharing vehicle service providers. Use public user portal to enable user to rent and return sharing vehicles, by scanning the code of the vehicle. Both the UEs of subscribers and the sharing vehicle can connect to the radio AP automatically. One radio AP serves one parking lot which can be shared by several service providers' sharing vehicle. The radio AP can report the

parking number of sharing vehicle to the sharing vehicle management node which can interact with one or more sharing vehicle service providers.

[00143] It is noted that any of the components of the network device and terminal device can be implemented as hardware or software modules. In the case of software modules, they can be embodied on a tangible computer-readable recordable storage medium. All of the software modules (or any subset thereof) can be on the same medium, or each can be on a different medium, for example. The software modules can run, for example, on a hardware processor. The method steps can then be carried out using the distinct software modules, as described above, executing on a hardware processor.

[00144] The terms “computer program”, “software” and “computer program code” are meant to include any sequences or human or machine cognizable steps which perform a function. Such program may be rendered in virtually any programming language or environment including, for example, C/C++, Fortran, COBOL, PASCAL, assembly language, markup languages (e.g., HTML, SGML, XML), and the like, as well as object-oriented environments such as the Common Object Request Broker Architecture (CORBA), JavaTM (including J2ME, Java Beans, etc.), Binary Runtime Environment (BREW), and the like.

[00145] The terms “memory” and “storage device” are meant to include, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the memory or storage device would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a

read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing.

[00146] In any case, it should be understood that the components illustrated herein may be implemented in various forms of hardware, software, or combinations thereof, for example, application specific integrated circuit(s) (ASICS), functional circuitry, an appropriately programmed general purpose digital computer with associated memory, and the like. Given the teachings of the disclosure provided herein, one of ordinary skill in the related art will be able to contemplate other implementations of the components of the disclosure.

[00147] The descriptions of the various embodiments have been presented for purposes of illustration, but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments.

Claims

What is claimed is:

1. A method (300, 400, 500, 600, 700) for managing sharing vehicle, comprising:

obtaining (302) identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle;

sending (304) a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and

receiving (306) a result of renting the sharing vehicle.

2. The method according to claim 1, wherein obtaining identity information of a sharing vehicle to be rent by a user comprises

receiving (302-2) a message for renting a sharing vehicle;

providing (302-4) a user interface comprising information of the one or more sharing vehicle service providers for a user to select;

receiving (302-6) the identity of the service provider selected by the user; and

receiving (302-8) a code of the sharing vehicle.

3. The method according to claim 1 or 2, further comprising

receiving (502) a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle;

sending (504) the returning request to the sharing vehicle management node;

receiving (506) a result of returning the sharing vehicle.

4. The method according to claim 3, wherein the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of

allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested;

rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested;

charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested;

requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and

suggesting at least one neighboring other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

5. The method according to 4, wherein the congestion state is determined based on a comparison of the number of current vehicles or current vehicles belonging to the same sharing vehicle service provider as the returned sharing vehicle in the parking lot/area and a threshold.

6. The method according to any one of claims 1-5, further comprising

receiving (602), from the sharing vehicle management node, a correction request for the user to correct a transaction data set; and

sending (604) a correction response to the sharing vehicle management node.

7. The method according to any one of claims 1-6, further comprising:

receiving (702) congestion prediction information for at least one parking lot/area associated with the user.

8. The method according to any one of claims 1-7, wherein the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing; sharing vehicle rental transaction recording and processing, Cloud services catalog management.

9. The method according to any one of claims 1-8, wherein the parking lot/area is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

10. The method according to any one of claims 1-9, wherein the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

11. A method (800, 900, 1000) for operating a sharing vehicle management node, comprising:

receiving (802) from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle;

sending (804) a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and

receiving (806), from the service provider, a result of renting the sharing vehicle; and

sending the result to the terminal device.

12. The method according to claim 11, further comprising

receiving (902) from the terminal device a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle;

processing (904) the returning request to generate the result of returning the sharing vehicle; and

sending (906) the generated result to the terminal device.

13. The method according to claim 11, the result of returning the sharing vehicle is generated based on a congestion state of a parking lot/area associated with the location data and the result of returning the sharing vehicle comprises at least one information of

allowing the sharing vehicle to park in the parking lot if the parking lot/area is not congested;

rejecting the sharing vehicle to park in the parking lot if the parking lot/area is congested;

charging more fees for parking the sharing vehicle in the parking lot/area if the parking lot/area is congested;

requiring the user of the sharing vehicle to perform a specific action if the sharing vehicle is parked in the parking lot/area if the parking lot/area is congested; and

suggesting at least one neighboring other parking lot/area in which the sharing vehicle can park if the parking lot/area is congested.

14. The method according to 13, wherein the congestion state is determined based on a comparison of the number of current vehicles or current vehicles belonging to the same sharing vehicle service provider as the returned sharing vehicle in the parking lot/area and a threshold.

15. The method according to any one of claims 11-14, further comprising

determining (1002) whether a transaction data set is required to be corrected;

in response to a determination that the transaction data set is required to be corrected, sending (1004) a correction request to the terminal device or the service provider and receiving (1006) a correction response from the terminal device or the sharing vehicle service provider.

16. The method according to claim 15, wherein determining whether the transaction data set is required to be corrected comprises:

estimating a transaction data set of the returned sharing vehicle;

comparing the estimated data set with the feature data in database; and

determining whether the transaction data set is required to be corrected based on the comparison.

17. The method according to any one of claims 11-16 , further comprising:

retrieving (1102) data associated with at least one parking lot/area associated with the user;

predicting (1104) a congestion level and a congestion trend for the at least one parking lot/area based on the data; and

sending (1106) the congestion level and the congestion trend to the terminal device.

18. The method according to any one of claims 11-17, wherein the sharing vehicle management node is implemented on a Cloud computing environment and provides at least one Cloud service from at least one Cloud node in the Cloud computing environment, and the at least one Cloud service comprises at least one of parking congestion checking and reporting; typical/customary parking behavior and status recording and warning/alert broadcasting; location based vehicle parking data analytics recording and processing; sharing vehicle rental transaction recording and processing, Cloud services catalog management.

19. The method according to any one of claims 11-18, wherein the identity is registered with the service provider by the sharing vehicle management node, the user is registered with the sharing vehicle management node to get a user identity, and the user identity is associated with the identity.

20. The method according to any one of claims 11-19, wherein the parking lot is served by at least one radio access point capable of communicating with the sharing vehicle and a terminal device of the user, and the parking lot is shared by the one or more sharing vehicle service providers.

21. The method according to any one of claims 11-20, further comprising:

optimizing at least one parking lot/area by performing big data analysis on data associated with the at least one parking lot/area.

22. An apparatus (1200) for managing sharing vehicle, comprising:

a processor (1204); and

a memory (1205), the memory (1205) containing instructions executable by the processor (1204), whereby the apparatus (1200) is operative to:

obtain identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle;

send a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers; and

receive a result of renting the sharing vehicle.

23. The apparatus according to claim 22, wherein the apparatus is operative to perform the method of any one of claims 1 to 10.

24. An apparatus (1300) for managing sharing vehicle, comprising:

a processor (1304); and

a memory (1305), the memory (1305) containing instructions executable by the processor (1304), whereby the apparatus (1300) is operative to:

receive from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle;

send a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider; and

receive, from the service provider, a result of renting the sharing vehicle; and

send the result to the terminal device.

25. The apparatus according to claim 24, wherein the apparatus is operative to perform the method of any one of claims 11 to 21.

26. A computer program product comprising instructions which when executed by at least one processor, cause the at least one processor to perform the method according to any one of claims 1 to 21.

27. A computer readable storage medium comprising instructions which when executed by at least one processor, cause the at least one processor to perform the method according to any one of claims 1 to 21.

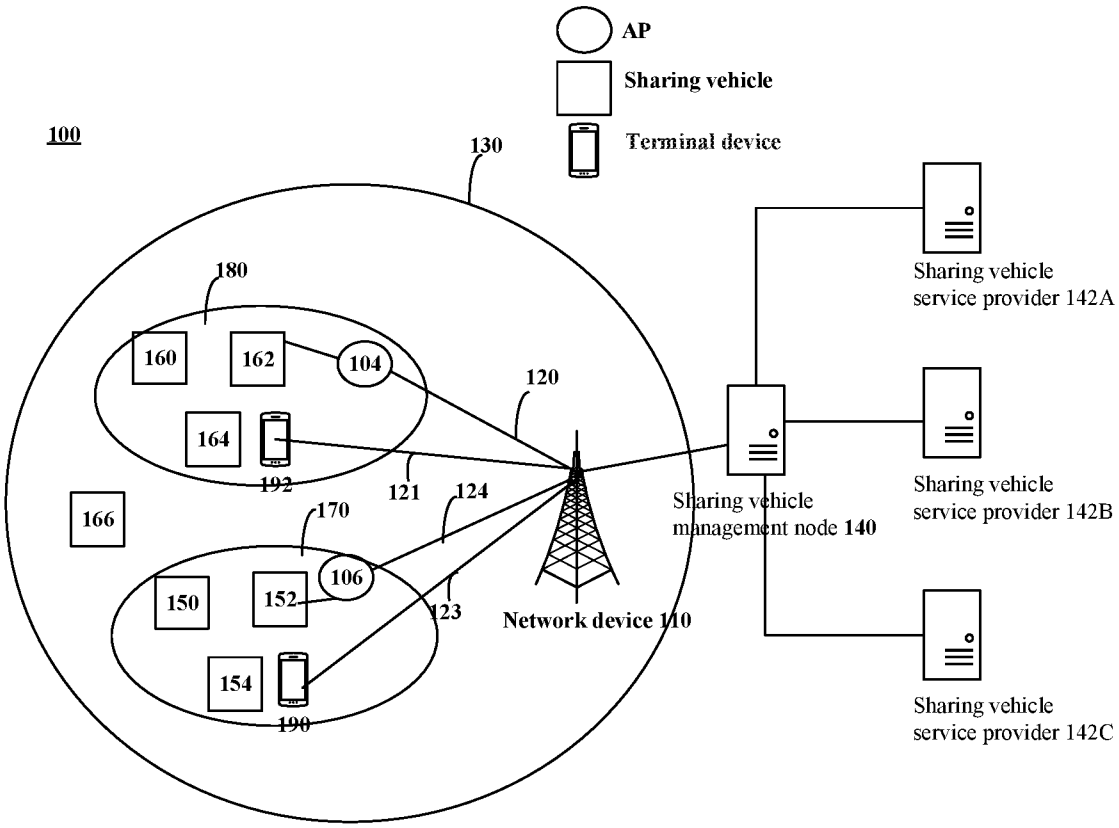
AP
Sharing vehicle
Terminal device
100
130
180
160
162
104
120
164
192
121
124
166
170
106
150
152
123
Network device 110
154
190
Sharing vehicle management node 140
Sharing vehicle service provider 142A
Sharing vehicle service provider 142B
Sharing vehicle service provider 142C

Fig.1

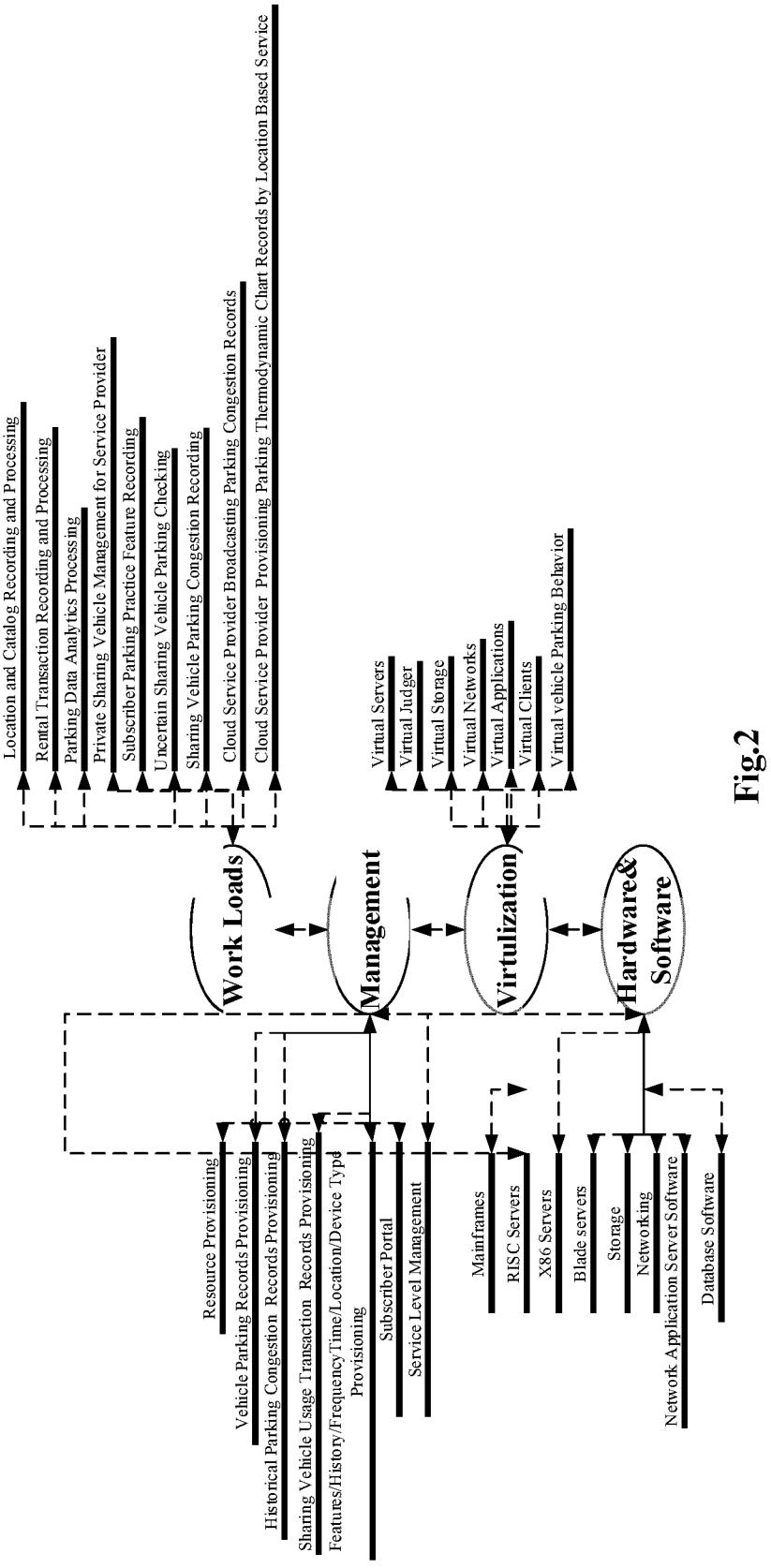
Location and Catalog Recording and Processing
Rental Transaction Recording and Processing
Parking Data Analytics Processing
Private Sharing Vehicle Management for Service Provider
Subscriber Parking Practice Feature Recording
Uncertain Sharing Vehicle Parking Checking
Sharing Vehicle Parking Congestion Recording
Cloud Service Provider Broadcasting Parking Congestion Records
Cloud Service Provider Provisioning Parking Thermodynamic Chart Records by Location Based Service
Virtual Servers
Virtual Judger
Virtual Storage
Virtual Networks
Virtual Applications
Virtual Clients
Virtual vehicle Parking Behavior
Work Loads
Management
Virtulization
Hardware& Software
Resource Provisioning
Vehicle Parking Records Provisioning
Historical Parking Congestion Records Provisioning
Sharing Vehicle Usage Transaction Records Provisioning
Features/History/FrequencyTime/Location/Device Type Provisioning
Subscriber Portal
Service Level Management
Mainframes
RISC Servers
X86 Servers
Blade servers
Storage
Networking
Network Application Server Software
Database Software

Fig.2

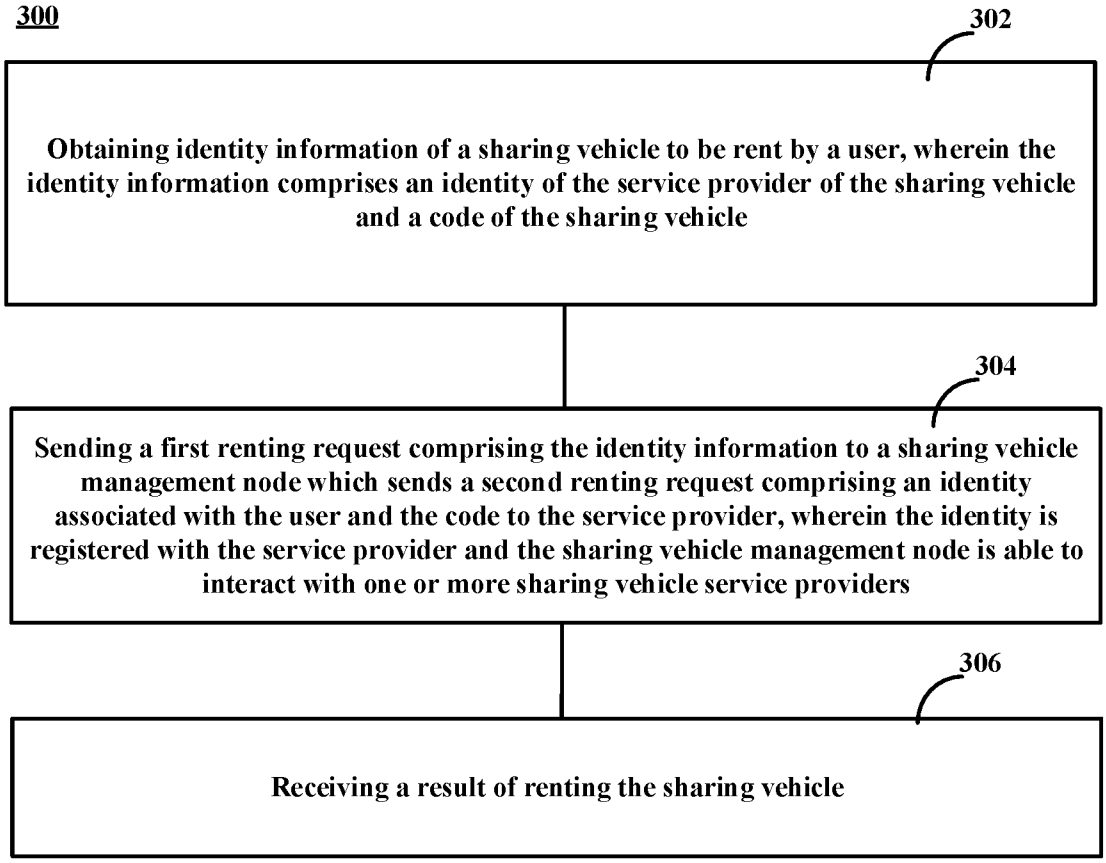
300
302
Obtaining identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle
304
Sending a first renting request comprising the identity information to a sharing vehicle management node which sends a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider and the sharing vehicle management node is able to interact with one or more sharing vehicle service providers
306
Receiving a result of renting the sharing vehicle

Fig.3

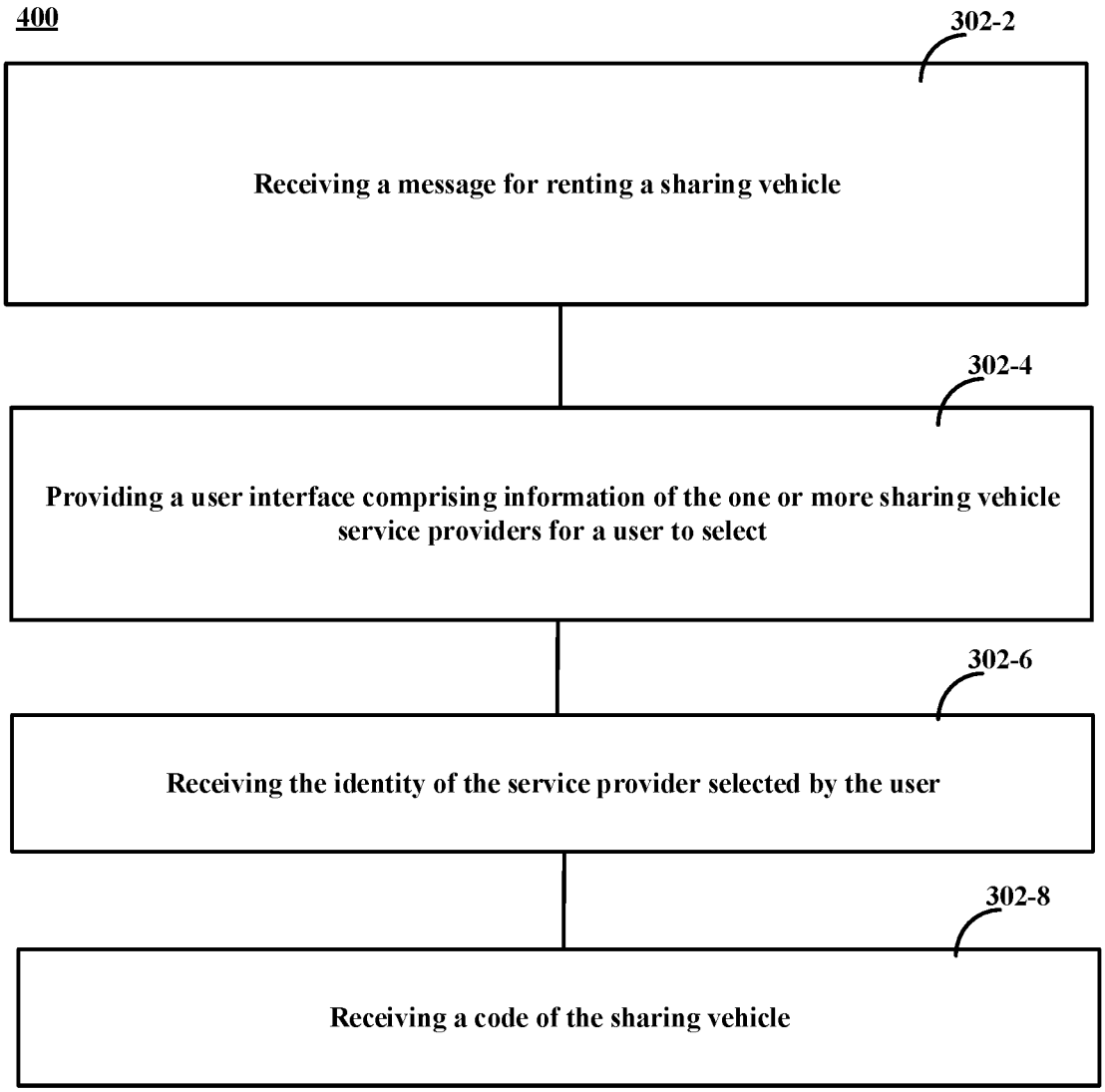
400
302-2
Receiving a message for renting a sharing vehicle
302-4
Providing a user interface comprising information of the one or more sharing vehicle service providers for a user to select
302-6
Receiving the identity of the service provider selected by the user
302-8
Receiving a code of the sharing vehicle

Fig.4

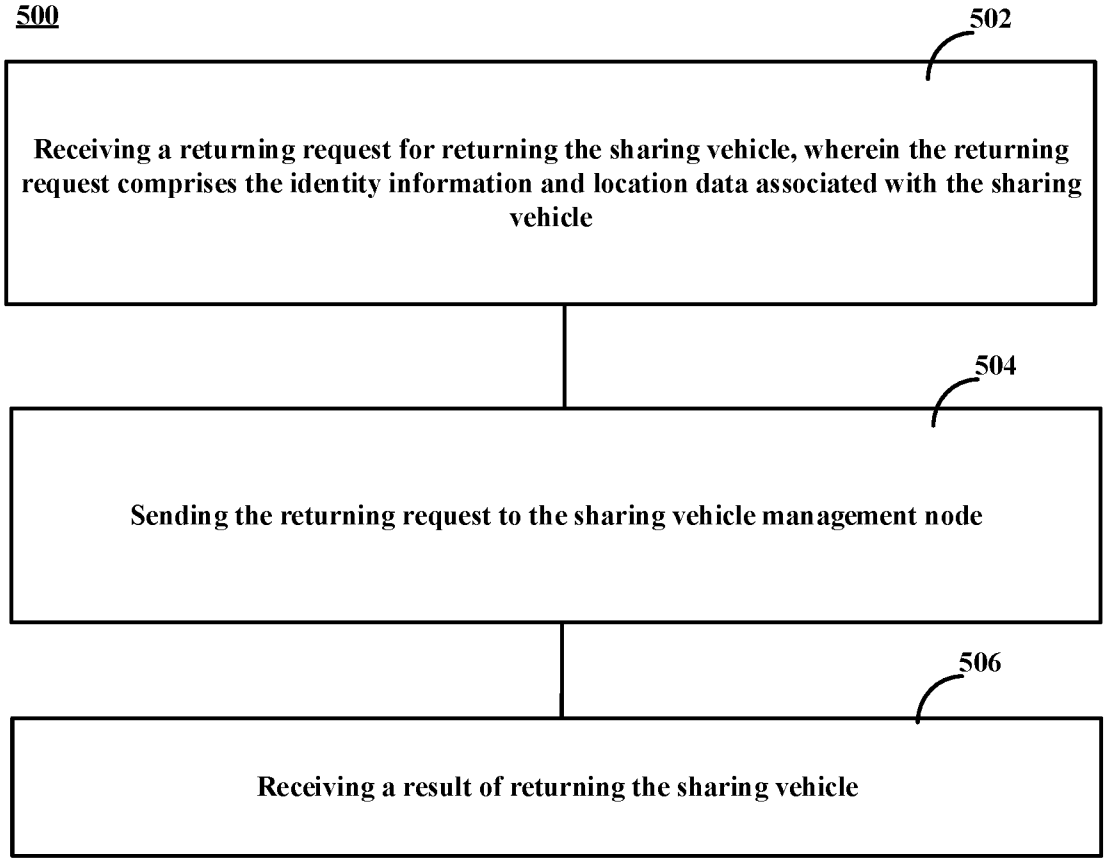
500
502
Receiving a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle
504
Sending the returning request to the sharing vehicle management node
506
Receiving a result of returning the sharing vehicle

Fig.5

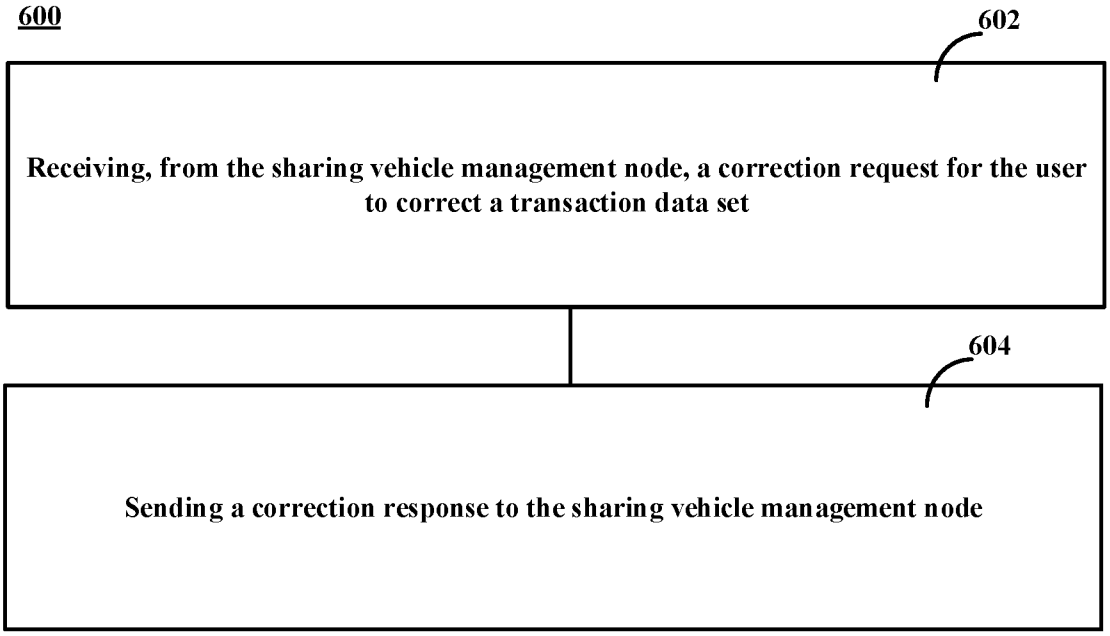
600
602
Receiving, from the sharing vehicle management node, a correction request for the user to correct a transaction data set
604
Sending a correction response to the sharing vehicle management node

Fig.6

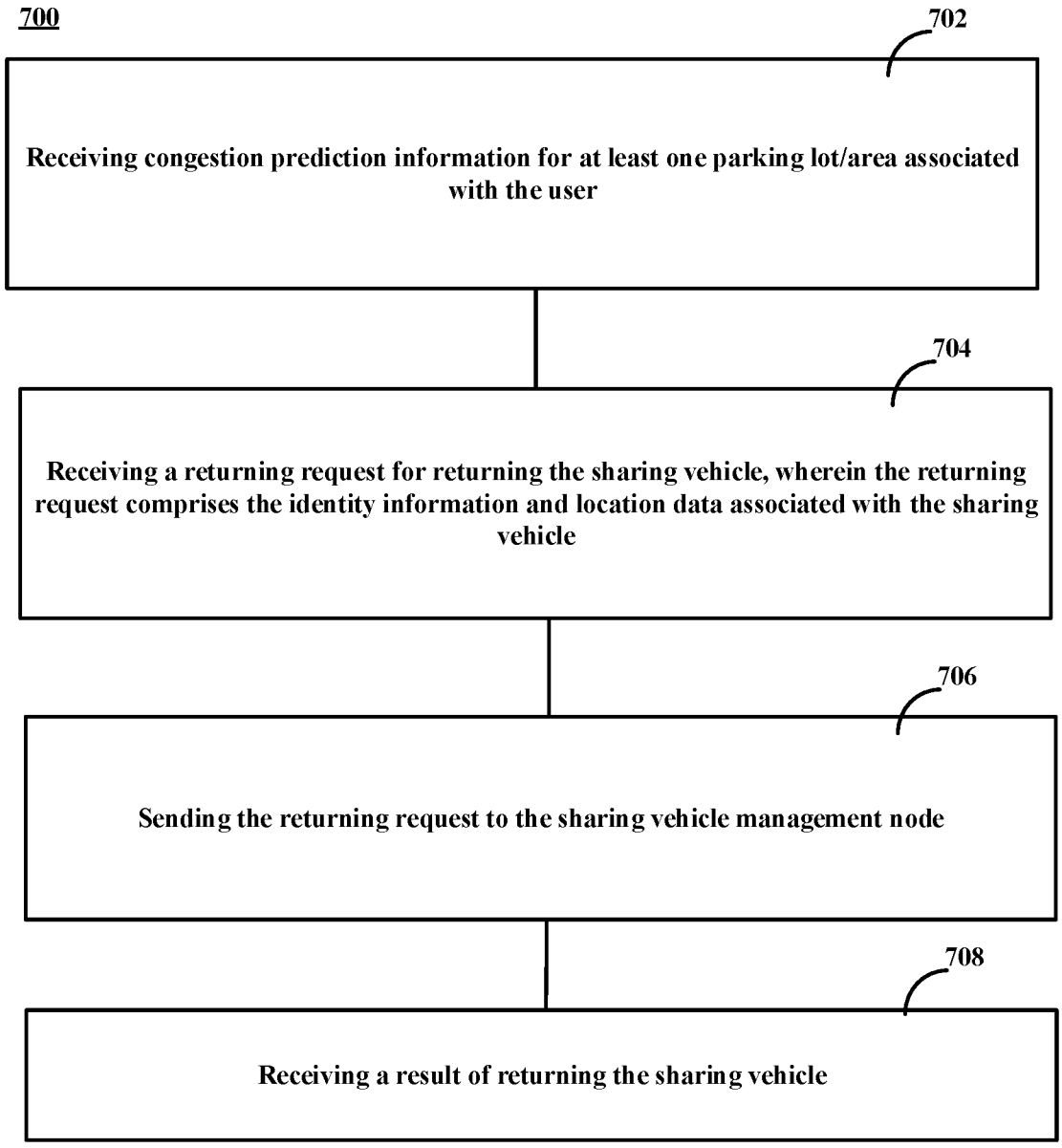
700
702
Receiving congestion prediction information for at least one parking lot/area associated with the user
704
Receiving a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle
706
Sending the returning request to the sharing vehicle management node
708
Receiving a result of returning the sharing vehicle

Fig.7

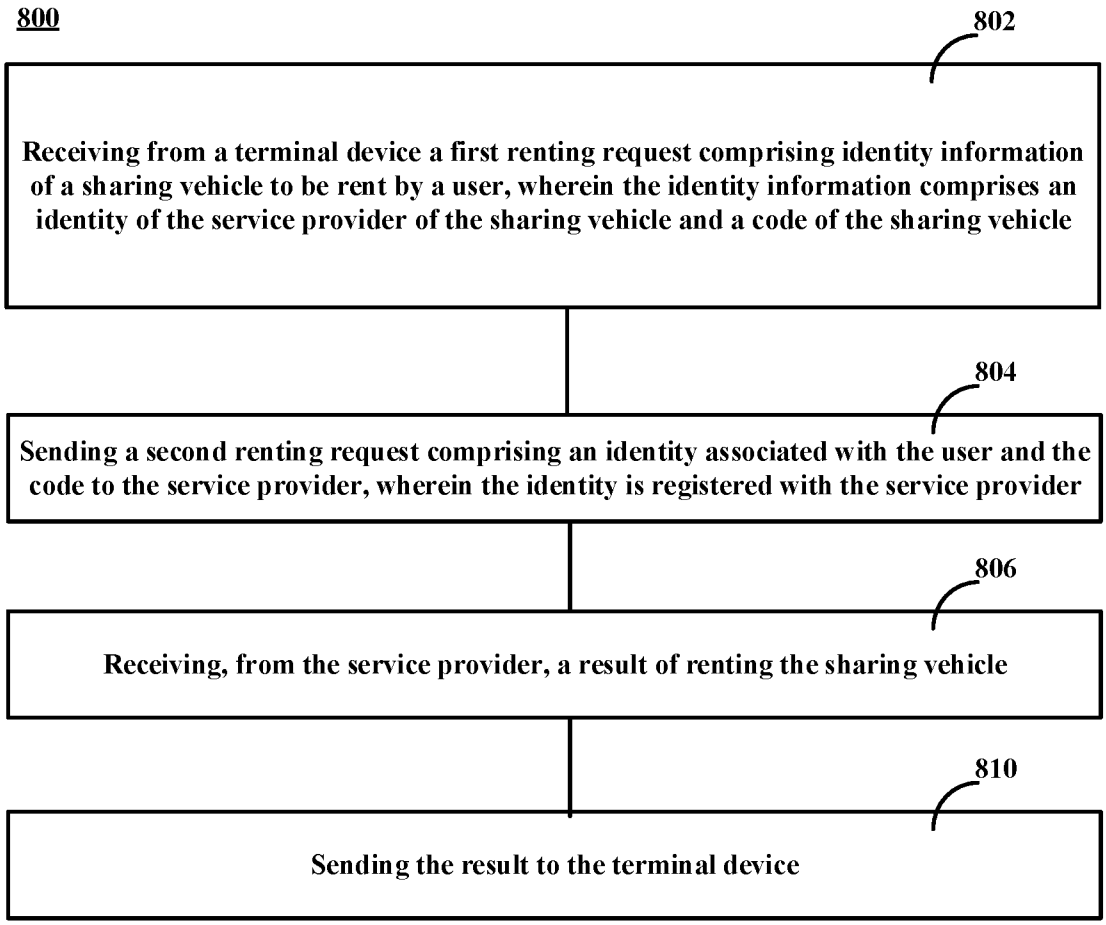
800
802
Receiving from a terminal device a first renting request comprising identity information of a sharing vehicle to be rent by a user, wherein the identity information comprises an identity of the service provider of the sharing vehicle and a code of the sharing vehicle
804
Sending a second renting request comprising an identity associated with the user and the code to the service provider, wherein the identity is registered with the service provider
806
Receiving, from the service provider, a result of renting the sharing vehicle
810
Sending the result to the terminal device

Fig.8

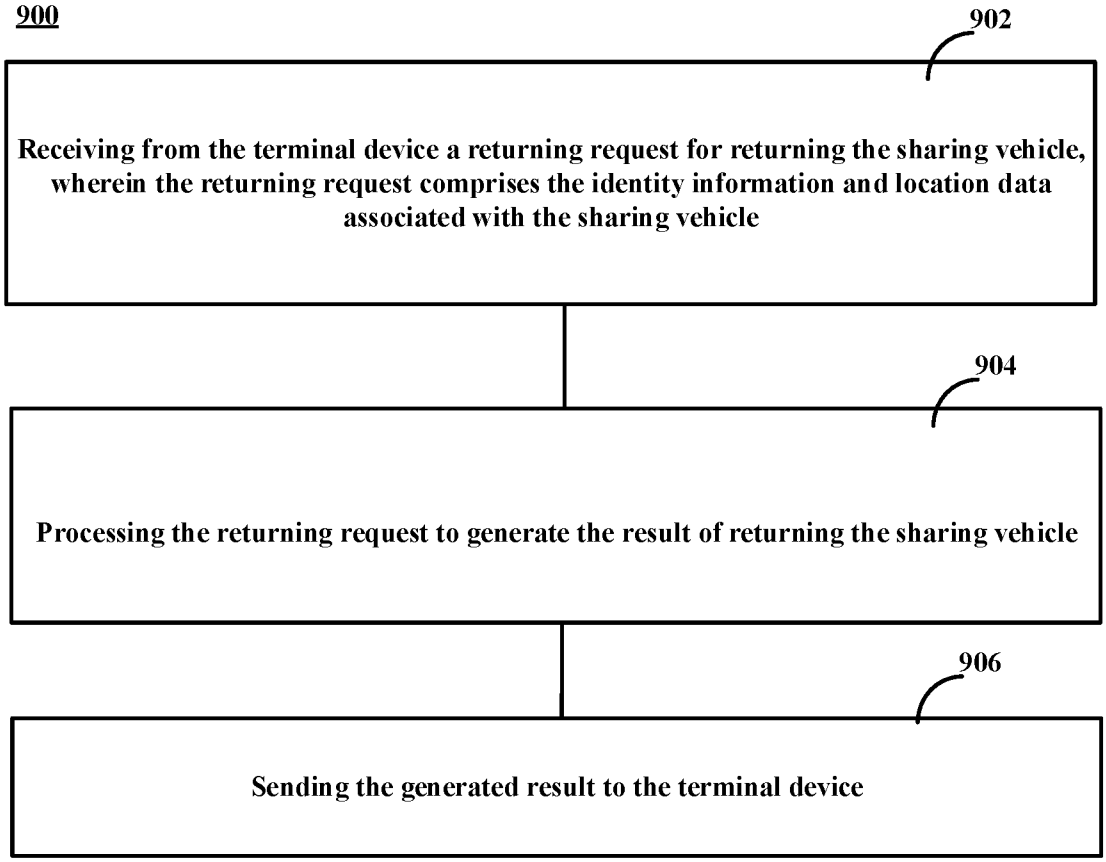
900
902
Receiving from the terminal device a returning request for returning the sharing vehicle, wherein the returning request comprises the identity information and location data associated with the sharing vehicle
904
Processing the returning request to generate the result of returning the sharing vehicle
906
Sending the generated result to the terminal device

Fig.9

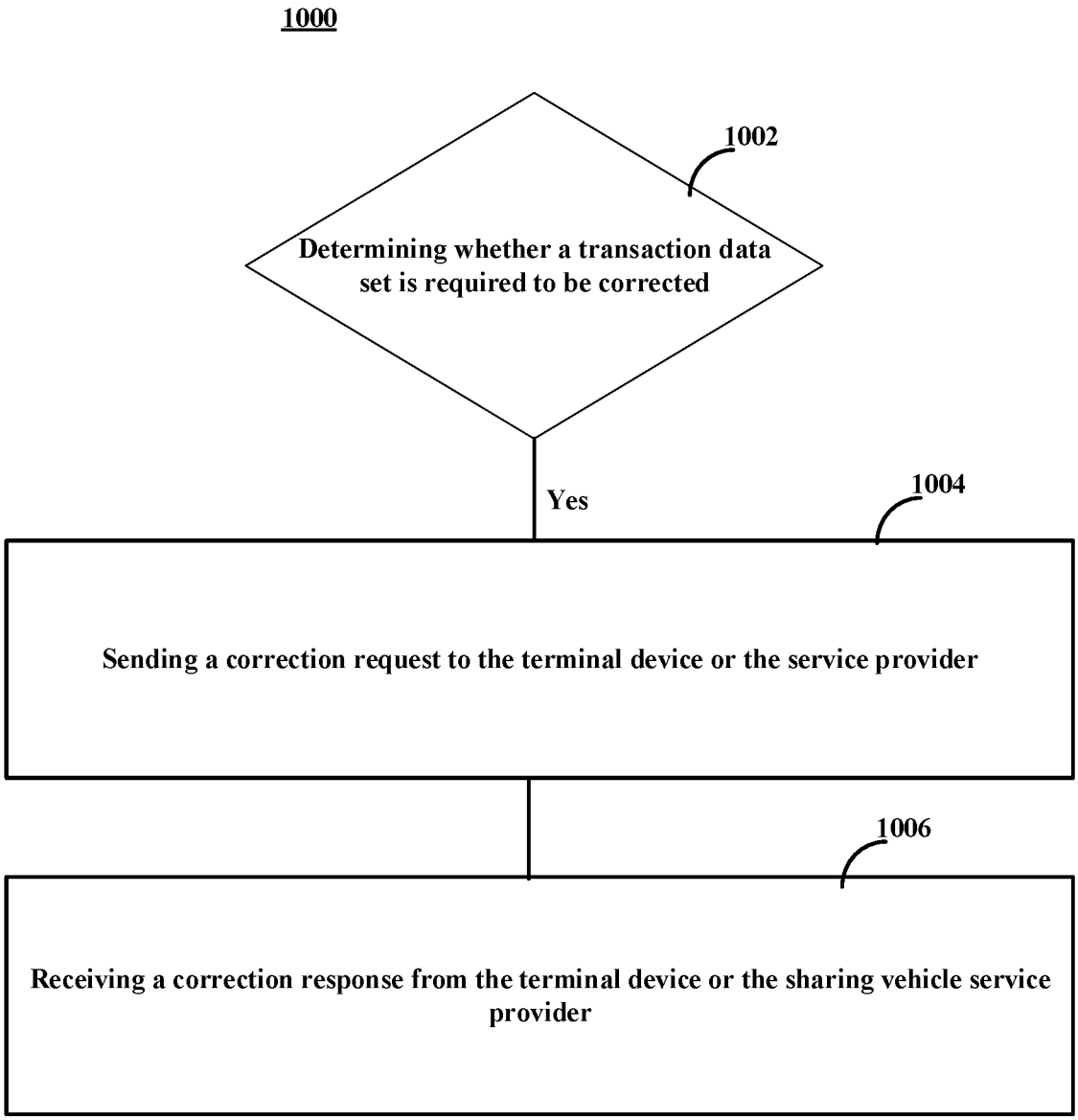
1000
1002
Determining whether a transaction data set is required to be corrected
Yes
1004
Sending a correction request to the terminal device or the service provider
1006
Receiving a correction response from the terminal device or the sharing vehicle service provider

Fig.10

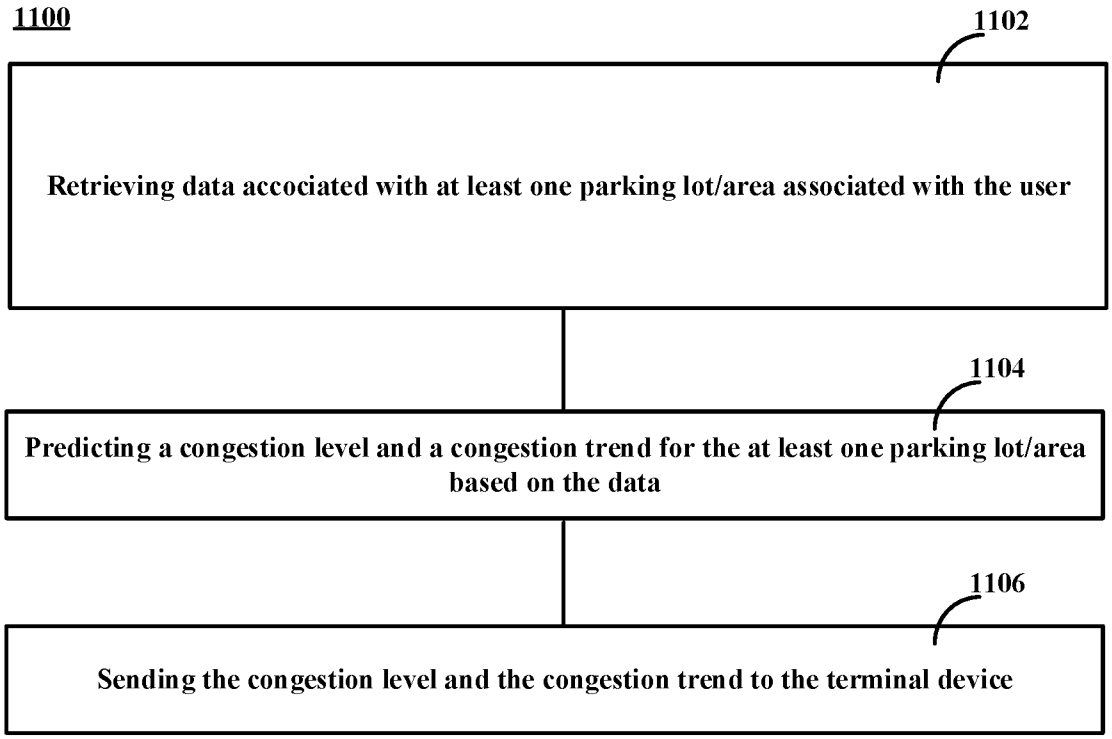
1100
1102
Retrieving data accociated with at least one parking lot/area associated with the user
1104
Predicting a congestion level and a congestion trend for the at least one parking lot/area based on the data
1106
Sending the congestion level and the congestion trend to the terminal device

Fig.11

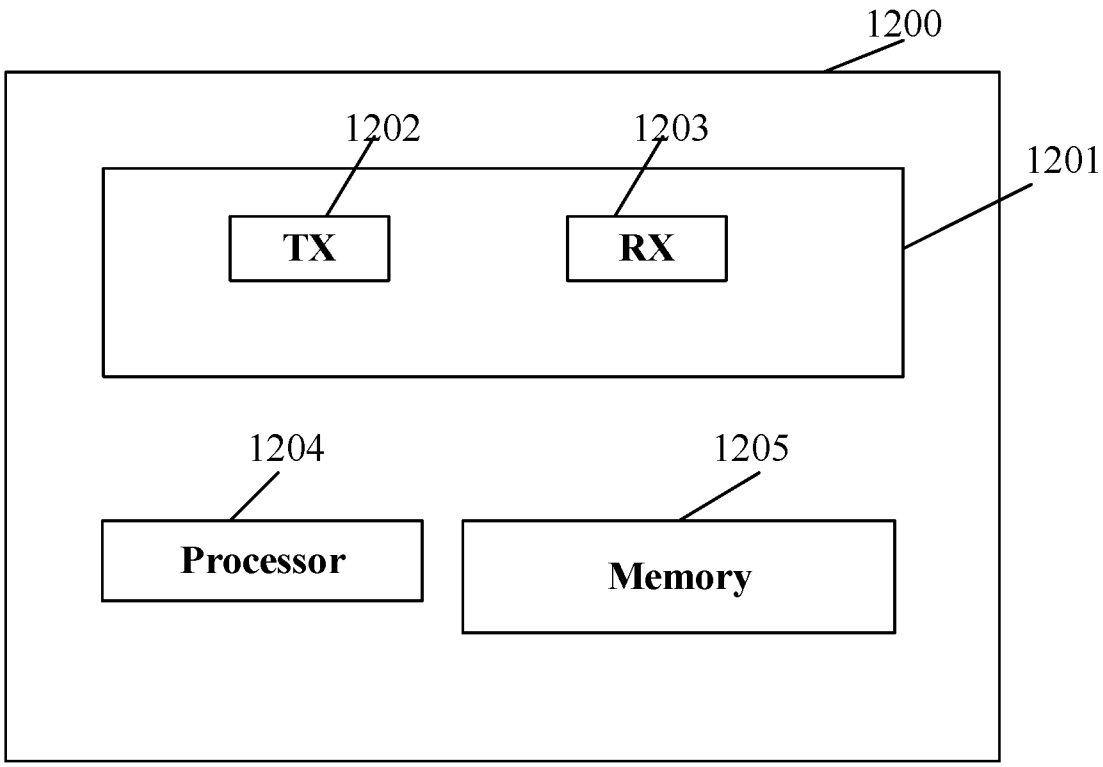
1200
1202
1203
1201
TX
RX
1204
1205
Processor
Memory

Fig.12

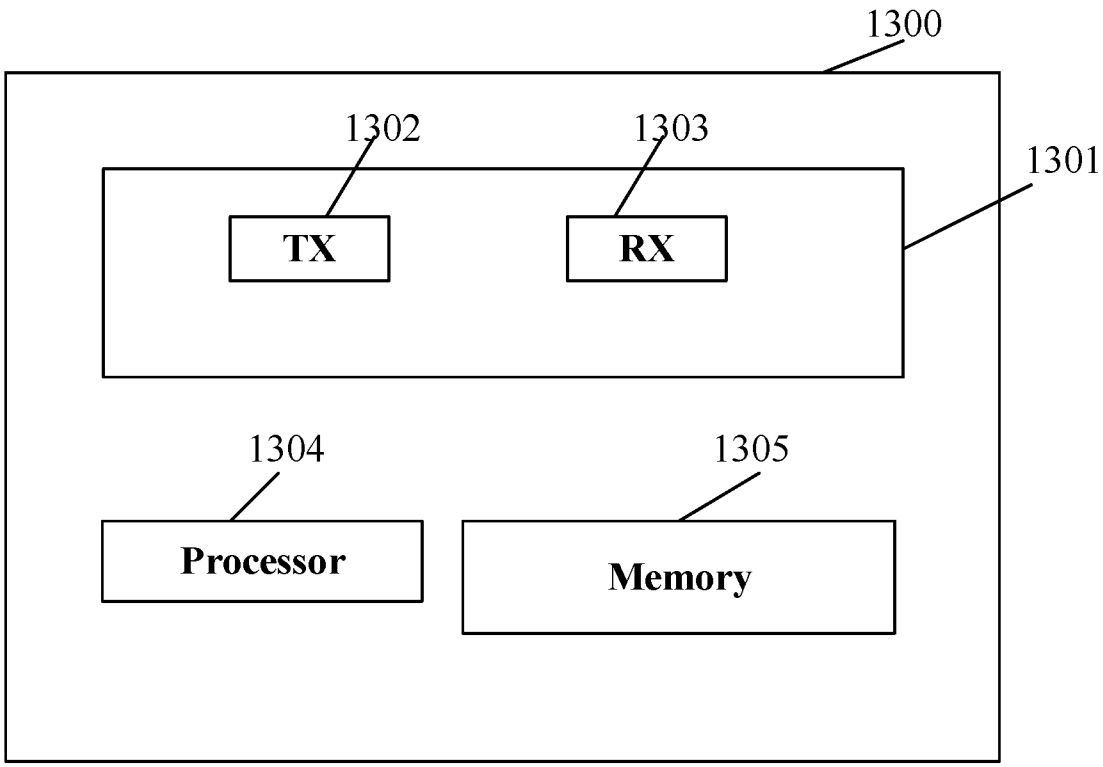
1300
1302
1303
1301
TX
RX
1304
1305
Processor
Memory

Fig.13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/115240

A. CLASSIFICATION OF SUBJECT MATTER

G06Q 30/06(2012.01)i; G08G 1/123(2006.01)i

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)

G06Q; H04W; G08G

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)

CNPAT,WPI,EPODOC,CNKI:shar+,vehicle or bicycle or car or bike, obtain or scan,two-dimension code,identity or identifier, control or manage, provider or brand,return or park,lot or area or point

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 107330760 A (SUZHOU JIANZHEN IOT TECHNOLOGY CO., LTD.) 07 November 2017 (2017-11-07) description, paragraphs [0005]-[0010]	1-2, 6-11, 15-27
Y	CN 107330760 A (SUZHOU JIANZHEN IOT TECHNOLOGY CO., LTD.) 07 November 2017 (2017-11-07) the description, paragraphs [0005]-[0010]	3-5, 12-14
Y	CN 105761125 A (WUHAN TTGEEKS NETWORK TECHNOLOGY CO., LTD.) 13 July 2016 (2016-07-13) the description, paragraphs [0092]-[0109]	3-5, 12-14
Y	CN 107093277 A (BEIJING TUZIZAI IOT TECHNOLOGY CO., LTD.) 25 August 2017 (2017-08-25) the description, paragraphs [0032]-[0034]	3-5, 12-14
Y	CN 107016594 A (GUANGDONG E-STRONGER SOFTWARE CO., LTD.) 04 August 2017 (2017-08-04) the whole document	1-27

☐ 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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 August 2018	**14 September 2018**

Name and mailing address of the ISA/CN	Authorized officer
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/115240

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	107330760	A	07 November 2017	None	
CN	105761125	A	13 July 2016	None	
CN	107093277	A	25 August 2017	None	
CN	107016594	A	04 August 2017	None	