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(54) **Method and arrangement for communicating vehicle data**

(57) The invention relates to a communication method and an arrangement for communicating vehicular driving data. More specifically, the invention relates to a communication method and an arrangement for communicating vehicular weight measurements and other driving data. The present inventive method and arrangement enables the transfer of weighing data from a weighing system to an on-board computer without stops. A document regarding the weighing may be composed in the weighing system or in the on-board computer. The invention is preferably applicable to vehicular control weighings as well as to commercial weighings e.g. within factory areas, in road traffic, and in railway yards.

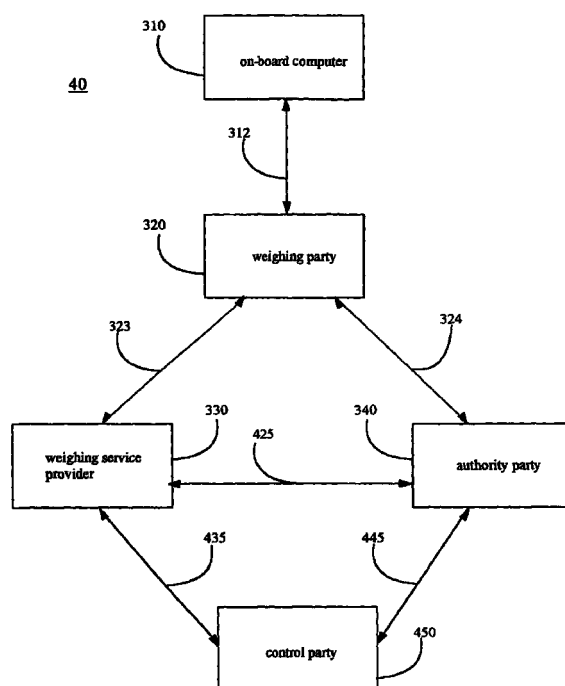


FIG. 4

Description

[0001] The invention relates to a communication method and an arrangement for communicating vehicular driving data. The invention is particularly applicable to communicating weight measurements and other driving data of a vehicle.

[0002] In the prior art vehicle weighing methods, the vehicle is stopped and the driving data is fed, typically by means of a telecommunication board and/or a keyboard, e.g. into a weighing system. Finally, a document is printed regarding the weighing results and other data of a vehicle. Even if the driving data were transferred without a stop, the stopping is still unavoidable as the weighing instrument typically prints out a document which is needed in the vehicle for example for a customer or the authorities.

[0003] The prior art solutions involve substantial drawbacks. Stopping for weighing and picking up a document always takes time and hinders other traffic. Moreover, non-scheduled stops increase fuel consumption, especially in heavy-duty vehicles, and may also cause hazardous situations.

[0004] It is an object of the present invention to alleviate or eliminate the above drawbacks associated with prior art solutions. The present inventive method and arrangement can be used for transferring the driving data into a weighing system without stops. In addition, the vehicle can be weighed and the weighing result and driving data can be compiled into a document which can be transferred to the vehicle automatically, without stops. Alternatively, the weighing results can be transferred to a vehicle and a document can be compiled in an on-board computer on the basis of the weighing results and the driving data already existing on board. Both the driver of a vehicle and other appropriate parties can obtain desired driving and weighing data, without having to stop the vehicle.

[0005] All the above benefits associated with a solution of the invention are preferably achievable by means of an embodiment, wherein the on-board computer of a vehicle is used for transmitting driving data to a weighing party by way of a wireless communication link. The weighing party receives the driving data, performs a weighing, and compiles a document about the weighing and the driving data. After this, the weighing party transmits the document to the on-board computer by way of a wireless communication link. Alternatively, the weighing party does not process all driving data associated with the document, but the on-board computer compiles a document by using driving data stored in its memory.

[0006] A method of the invention for communicating vehicular data is characterized in that

- a vehicle is weighed by a weighing party and
- the weighing data is transmitted by the weighing party to an on-board computer by way of a communication link.

communication link.

[0007] The invention relates also to a method for communicating vehicular data, which is characterized in that

- an on-board computer transmits driving data to a weighing party by way of a communication link and
- the on-board computer transmits the driving data to a weighing party,
- a weighing party judges a necessity of weighing on the basis of the transmitted driving data.

[0008] An arrangement of the invention for communicating vehicular data is characterized in that

- a vehicle is adapted to be weighed by a weighing party and
- the weighing data is adapted to be transmitted by the weighing party to an on-board computer by way of a communication link.

[0009] The invention relates also to an arrangement for communicating vehicular data, which is characterized in that

- an on-board computer is adapted to transmit driving data to a weighing party,
- a weighing party is adapted to judge the necessity of weighing on the basis of the transmitted driving data.

[0010] Preferred embodiments of the invention are set forth in the non-independent claims.

[0011] Some preferred embodiments of the invention will now be described in more detail with reference to the accompanying drawings.

Fig. 1A shows a flowchart regarding one preferred embodiment for a method of the invention, wherein an on-board computer produces a document.

Fig. 1B shows a flowchart regarding a second preferred embodiment for a method of the invention, wherein an on-board computer produces a document.

Fig. 2 shows a flowchart regarding a third preferred embodiment for a method of the invention, wherein the weighing is performed in compliance with driving data.

Fig. 3 shows a block diagram regarding one preferred embodiment 30 of the invention.

Fig. 4 shows a block diagram regarding a second preferred embodiment 40 of the invention.

[0012] A sequence 100 in fig. 1A is used for identifying a weighing party from a vehicle. This is followed by establishing a communication link between an on-board computer and the weighing party in a sequence 110. A sequence 120 is used for transmitting driving data to the weighing party, followed by weighing the vehicle in a sequence 130. The digital signature of the on-board computer may also be transmitted. After the reception of a weighing result, a document is composed about the driving data and the weighing result in a sequence 140. Finally, the document is transmitted to the on-board computer in a sequence 150. The digital signature of the weighing party can be transmitted as well.

[0013] Fig. 1B illustrates a method of the invention, wherein a document is composed in an on-board computer. In a sequence 105, an approaching vehicle is identified by a weighing party. This can be carried out by means of a communication link between the vehicle and the weighing party, or the weighing party may comprise a camera for detecting the license plate number of an approaching vehicle. The individualizing identification of a vehicle is not always necessary, but it may be sufficient that the individualizing information be only stored in an on-board computer and the weighing result is transferred to a vehicle, which has crossed the weighing device, without identifying the same.

[0014] In a sequence 115, the vehicle is weighed by the weighing party. This is followed by establishing a communication link between the weighing party and the on-board computer in a sequence 125 and by transmitting the weighing data to the on-board computer, a sequence 135. After this, the on-board computer reads the driving data stored in its memory, a sequence 145, and composes a document on the basis of the driving data and the weighing data in a sequence 155. The composed document can be printed out and/or transferred further to control/monitoring systems external of the vehicle.

[0015] Thus, in the first of the two foregoing embodiments, a document along with driving data was composed by a weighing party and the document was transferred in its entirety to an on-board computer, while in the second embodiment, it was principally the weighing data that was transferred to an on-board computer and a document was composed in the on-board computer by exploiting the driving data stored in the on-board computer. Along with these two embodiments, it is of course possible to apply combined solutions, wherein some of the driving data for a document is also obtained from the weighing party and some is picked up from the memory of the on-board computer. Furthermore, in all foregoing embodiments, it is possible to use vehicle identification conducted by a weighing party and/or identification of a weighing party conducted by an on-board computer. These identification actions may be based e.g. on wireless communication, camera identification, or manual input of data.

[0016] In some preferred embodiments of the

invention, the driving data contains information relating to cargo, customer, destination, supplier, supplier's account information, carrier, carrier's operating license, carrier's account information, carrier's schedules, vehicle, vehicle speed, amount of fuel, driver's logbook, vehicle's number of axles, total weight, total length, total width, engine temperature, vehicle's year model, kilometers driven, driver, driver's criminal record, driver's operating license, axle weight, registration number, and/or driver's and/or on-board computer's PIN (Personal Identification Number) and/or the digital signature of an on-board computer.

[0017] It is obvious that the driving data can be used for the determination of a vehicle's load. For example, the amount of fuel can be used for correcting the tare weight of a vehicle.

[0018] It is likewise obvious that, in a number of preferred embodiments, the vehicle can be a motorcycle, a passenger car, a truck and/or a bus or a train.

[0019] In several inventive embodiments, the communication of both driving data and a document is conducted in a wireless fashion. Some preferred embodiments of the invention make use of GSM (Global System for Mobile Communications), UMTS (Universal Mobile Telecommunications Service), CDMA (Code Division Multiple Access), WCDMA (Wideband Code Division Multiple Access), Bluetooth, Iridium, Inmarsat, TelDesic, TCP/IP and/or IrDA (infrared) wireless communication links.

[0020] Fig. 2 shows an inventive embodiment, wherein a sequence 200 is used for identifying a vehicle. In a sequence 210, a communication is established with the vehicle's on-board computer. This is followed by requesting driving data in a sequence 220. After the on-board computer has supplied the driving data, the necessity of weighing is judged in a sequence 230. If the weighing is deemed necessary, the vehicle is called for weighing in a sequence 240. If this is not necessary, the on-board computer is supplied with a document about the request in a sequence 250.

[0021] The present embodiment 20 is very well applicable to routine traffic control. For example, it is often quite unnecessary to weigh vehicles with a load clearly below the overload restrictions.

[0022] In some preferred embodiments, a transmission is kept on continuously either by a weighing party and/or an on-board computer at a given frequency for identifying a vehicle and/or a weighing party. A camera can also be used for identifying both a vehicle and a weighing party.

[0023] In fig. 3, an on-board computer 310 is preferably in communication with a weighing party 320. The weighing party 320 is preferably in communication with an authority party 340 and/or a weighing service provider 300. Communication links 312, 323, 324 are preferably GSM, UMTS, CDMA, WCDMA, Bluetooth, Iridium, Inmarsat, TelDesic, TCP/IP and/or IrDA wireless communication connections. They can also be

fixed telephone connections, with the exception of the link 312.

[0024] The weighing party 320 comprises preferably a computer hooked up with a mobile communicator. In one typical preferred embodiment of the invention, the weighing party 320 comprises a mobile communicator and a PC (personal computer), an Apple Macintosh computer, and/or any computer solution based on Microsoft CE and/or Sybase operating system. The weighing party 320 may also comprise a camera and/or a video camera.. The weighing party may also comprise a weighing display, stop lights and/or a gate. These are controlled preferably on the basis of vehicular data.

[0025] In some embodiments, the on-board computer 310 is likewise designed as a mobile communicator and/or a combination including a mobile communicator and a PC (personal computer), an Apple Macintosh computer, and/or any computer solution based on Microsoft CE and/or Sybase operating system. The on-board computer 310 may also comprise a camera and/or a video camera.

[0026] The weighing party 320 is preferably set up in communication with an authority party 340, such as police or a customs authority. Hence, the authorities are capable of real-time monitoring the observance or violation of traffic and overload regulations. The weighing service provider 330 is also preferably in communication 323 with the weighing party. In some embodiments, the weighing service provider 330 is preferably capable of telechecking the weighing party 320 for its action and documents. In addition, the software updates and tele-diagnosing faults can be handled by way of the communication link 323.

[0027] Fig. 4 illustrates the inventive arrangement in reference to its operation in a larger scale. Both the weighing service provider 330 and the authority party 340 can be preferably in communication with each other by way of a link 425. Thus, the authorities 340 are able to request updated information from the weighing service provider 330 and to transmit information, say about wanted vehicles, to the weighing service provider 330. The weighing service provider 330 and the authority party 340 are both preferably in communication with a control party 450. The control party 450 is preferably located in the Internet and comprises, for example, the factory register of a vehicle manufacturer. The thus obtained driving data and weighing result can be checked for validity from several sources.

[0028] In several preferred embodiments, the weighing party 320 may also be fitted with traffic lights, gates, and/or weighing displays. The invention is particularly well applicable to performing weighings at border stations and to monitoring traffic flow. In both instances, the invention offers major advantages as the vehicle need not be stopped.

[0029] The invention has been described above with reference to the enclosed embodiments. However, it is obvious that the invention is not limited to just those,

but encompasses all embodiments falling within the scope of the inventive concept and the annexed claims.

Claims

1. A method for communicating vehicular data, **characterized** in that
 - a vehicle (130) is weighed by a weighing party (320) and
 - the weighing data is transmitted by the weighing party (320) to an on-board computer (310) by way (150) of a communication link (312).
2. A method as set forth in claim 1, **characterized** in that the on-board computer (310) supplies the weighing party (320) with driving data by way of the communication link (312).
3. A method as set forth in claim 2, **characterized** in that the weighing party (320) composes a document regarding the driving data and a weighing result (140) and transmits said document to the on-board computer (310) by way (150) of the communication link (312).
4. A method as set forth in claim 1 or 2, **characterized** in that the on-board computer (310) composes a document on the basis of received weighing data and driving data stored in the on-board computer.
5. A method for communicating vehicular data, **characterized** in that
 - an on-board computer (310) transmits driving data to a weighing party (320) by way (220) of a communication link (120) and
 - a weighing party (200) judges a necessity (230) of weighing on the basis of the transmitted driving data.
6. A method as set forth in any of the preceding claims, **characterized** in that said communication link (312) comprises a GSM, UMTS, CDMA, WCDMA, Bluetooth, Iridium, Inmarsat, TelDesic, TCP/IP, IrDA or some other wireless communication link.
7. A method as set forth in any of claims 2-5, **characterized** in that the driving data comprises information relating to cargo, customer, destination, supplier, supplier's account information, carrier, carrier's operating license, carrier's account information, carrier's schedules, vehicle, vehicle speed, amount of fuel, driver's logbook, vehicle's number of axles, total weight, total length, total width, engine temperature, vehicle's year model, kilometers driven, driver, driver's criminal record, driver's

operating license, axle weight, registration number, and/or driver's and/or on-board computer's PIN (Personal Identification Number) and/or the digital signature of an on-board computer.

8. A method as set forth in any of the preceding claims, **characterized** in that said on-board computer (310) comprises a mobile communicator and/or a combination including a mobile communicator and a PC, an Apple Macintosh computer, and/or any computer solution based on Microsoft CE and/or Sybase operating system.

9. A method as set forth in any of the preceding claims, **characterized** in that said weighing party (320) comprises weighing instruments and/or a mobile communicator and/or a combination including a mobile communicator and a PC, an Apple Macintosh computer, and/or any computer solution based on Microsoft CE and/or Sybase operating system.

10. A method as set forth in any of the preceding claims, **characterized** in that the weighing party (320), a weighing service provider (330), an authority party (340), and a control party (350) are in communication with each other by way of communication links (323, 324, 334, 435, 445).

11. An arrangement for communicating vehicular data, **characterized** in that

- a vehicle is adapted to be weighed by a weighing party (320) and
- the weighing data is adapted to be transmitted by the weighing party (320) to an on-board computer (310) by way of a communication link (312).

12. An arrangement as set forth in claim 11, **characterized** in that the on-board computer (310) is adapted to transmit driving data to the weighing party (320) by way of the communication link (312).

13. An arrangement as set forth in claim 12, **characterized** in that the weighing party (320) is adapted to compose a document regarding the driving data and a weighing result and to transfer the document to an on-board computer by way of a communication link.

14. An arrangement as set forth in claim 11, **characterized** in that the on-board computer (310) is adapted to compose a document on the basis of weighing data received from the weighing party (320) and driving data stored in the on-board computer.

15. An arrangement for communicating vehicular data,

characterized in that

- an on-board computer (310) is adapted to transmit driving data to a weighing party (200) by way of a communication link (312),
- a weighing party (320) is adapted to judge the necessity of weighing on the basis of the transmitted driving data.

16. An arrangement as set forth in any of claims 11-15, **characterized** in that the weighing party (320) is adapted to comprise at least one set of traffic lights, a gate, and/or a weighing display.

17. An arrangement as set forth in claim 16, **characterized** in that said traffic lights and/or gate are adapted to be controlled on the basis of vehicular data.

18. An arrangement as set forth in any of claims 11-17, **characterized** by comprising the communication links (323, 324, 334, 435, 445) between the weighing party (320), the weighing service provider (330), and the control party (450) for transferring vehicular data by way of the communication links.

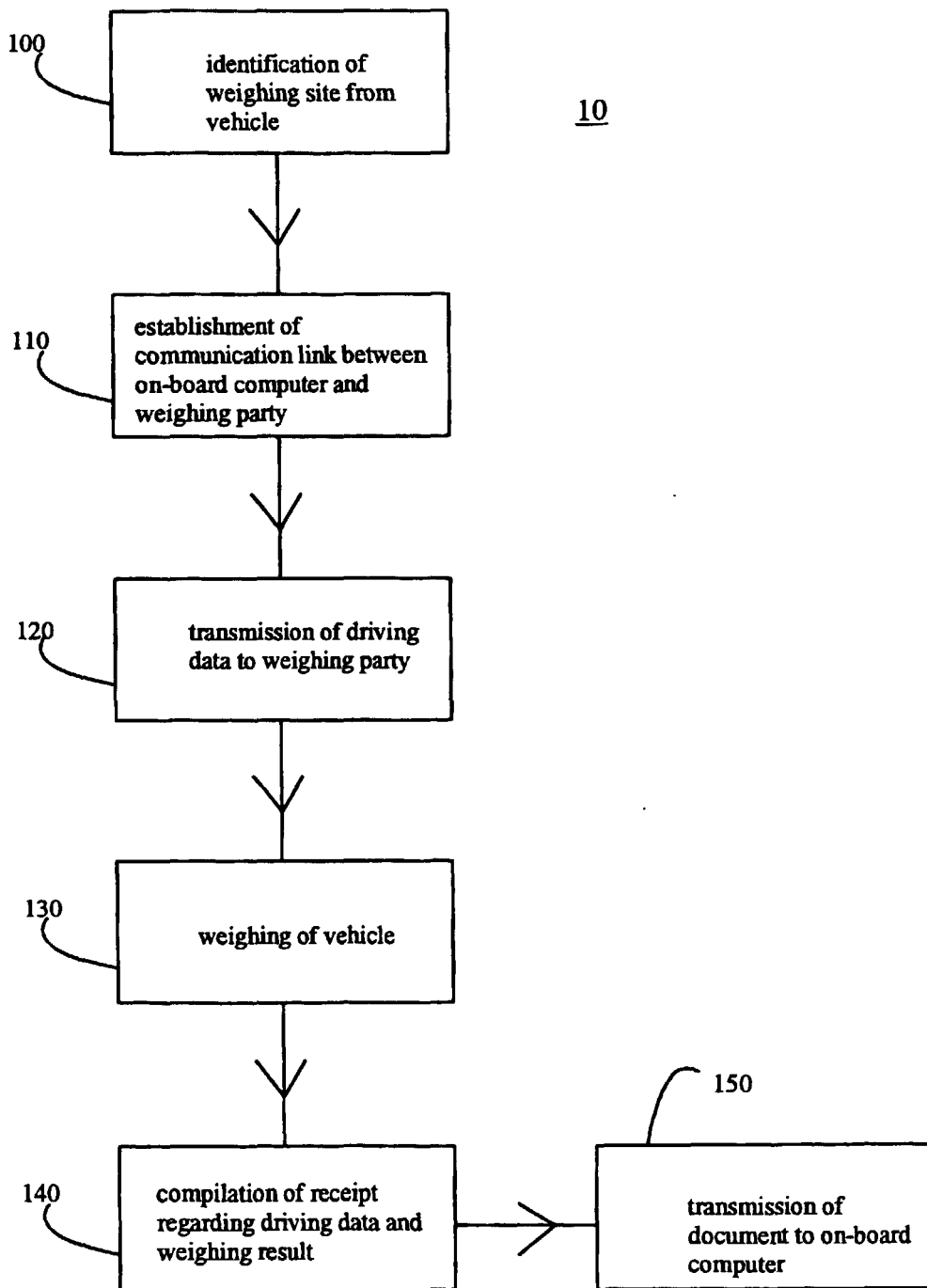


FIG. 1A

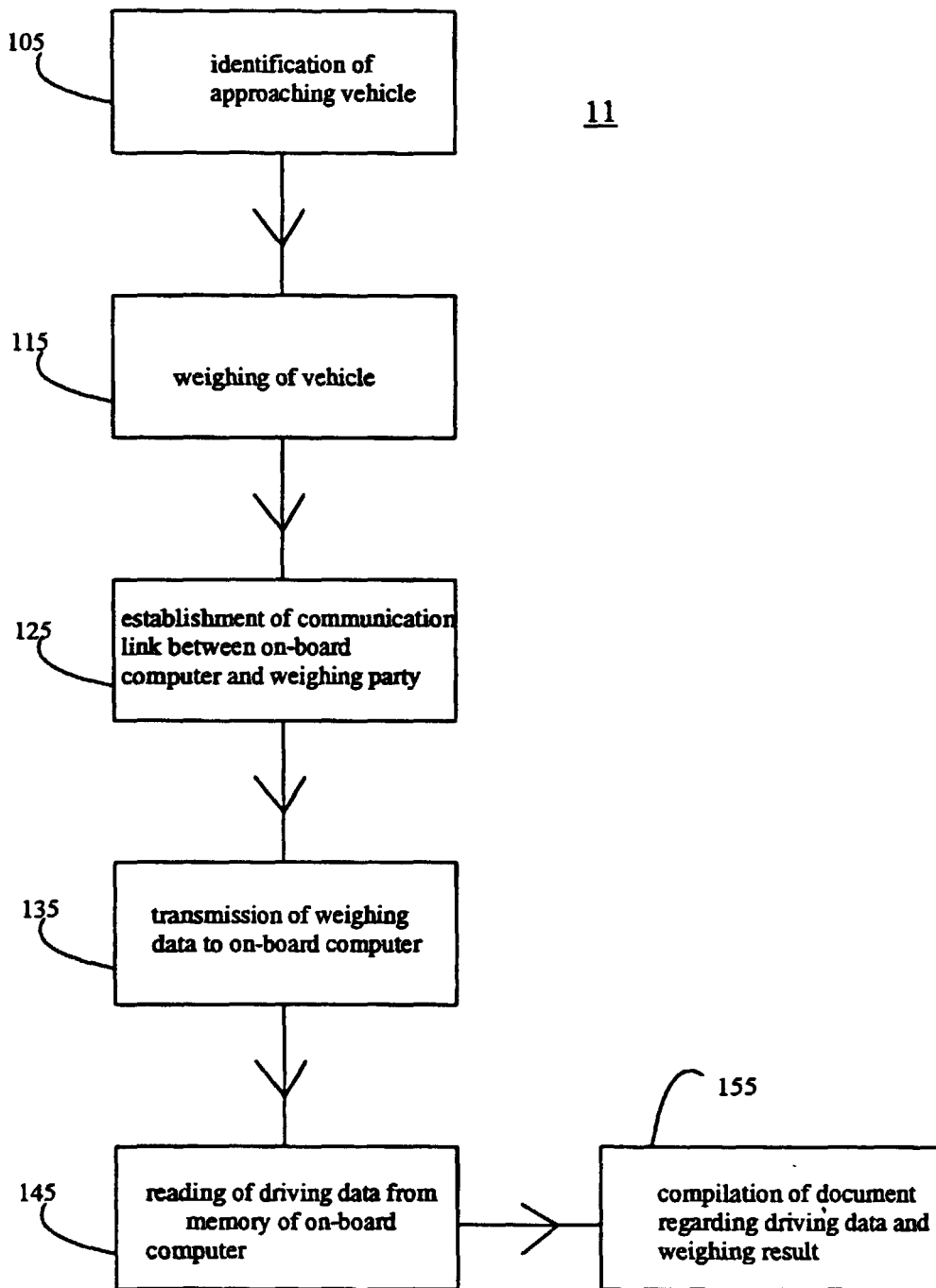


FIG. 1B

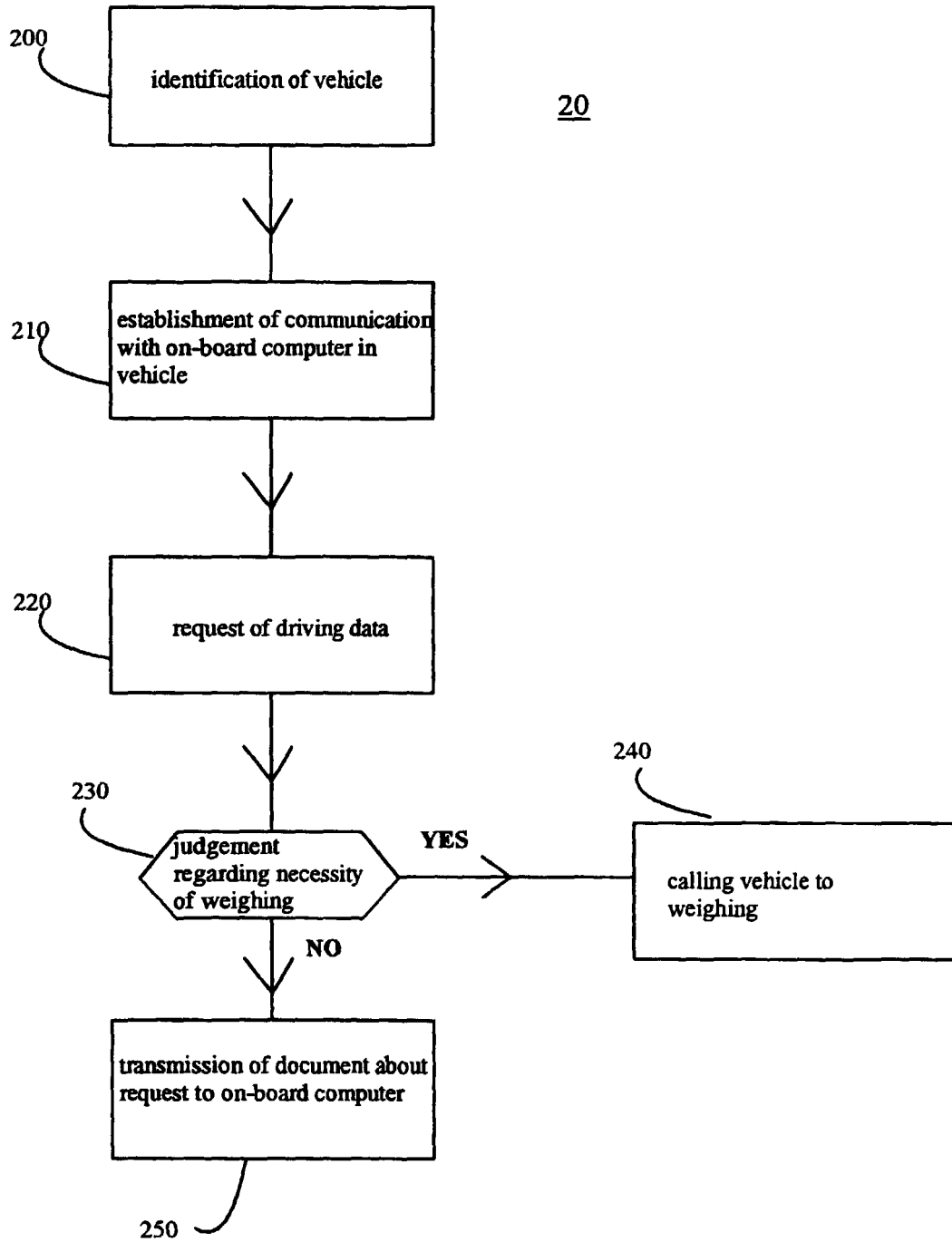


FIG. 2

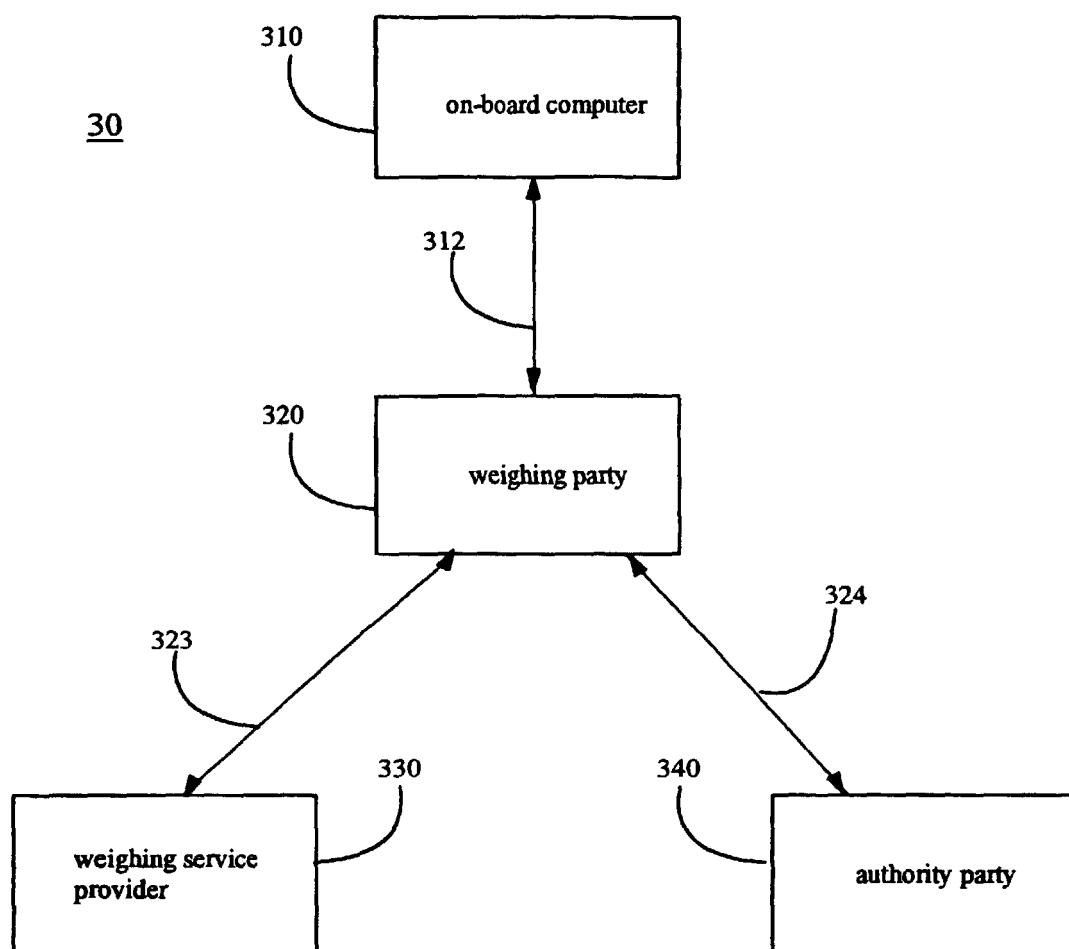


FIG. 3

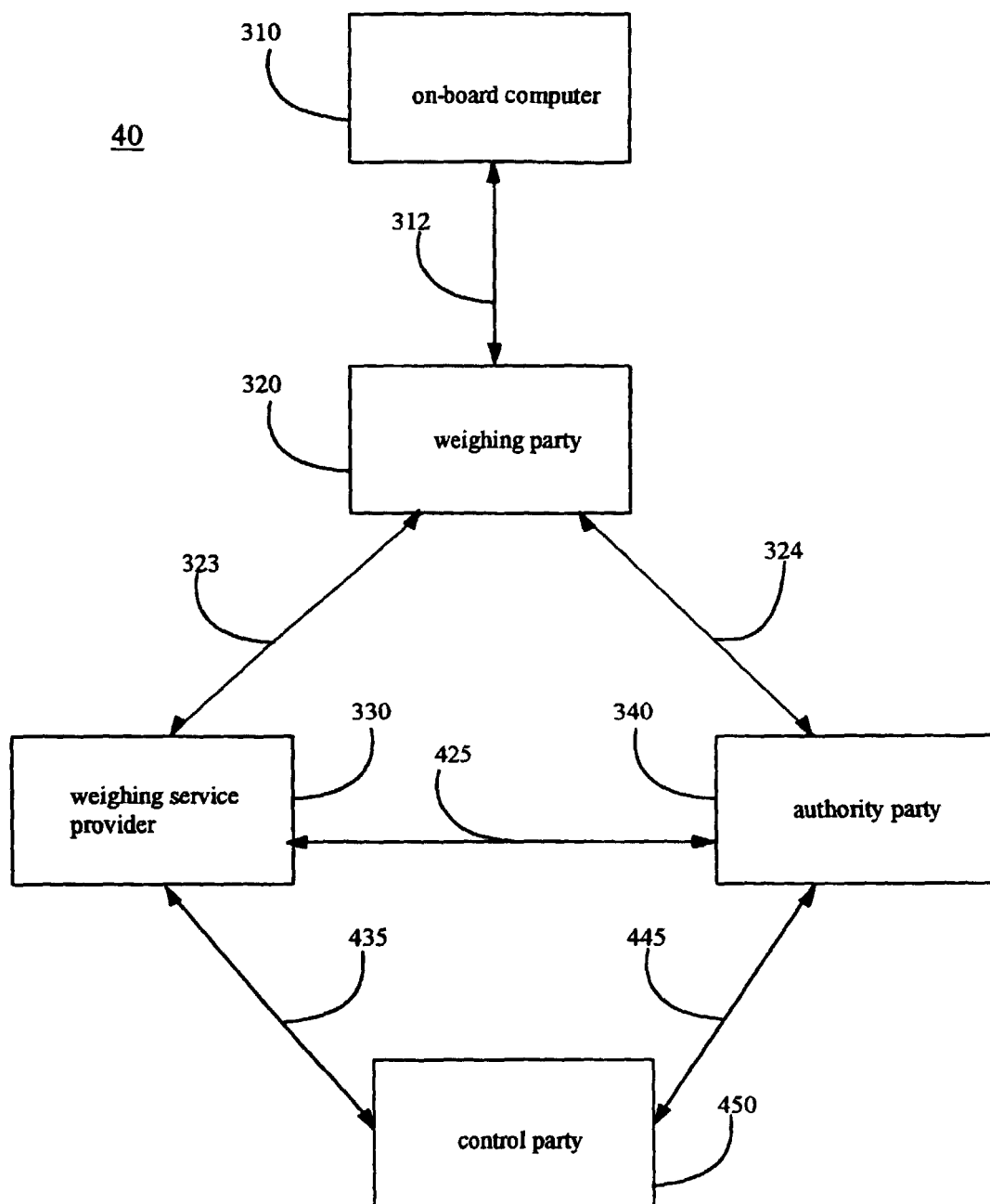


FIG. 4