Method for programming a vehicular gateway

Verfahren zur Steuerung eines Fahrzeug-Übergangsknotens

Procédé de programmation d'une passerelle mobile

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Description

Cross-Reference to Related Application

[0001] This is a continuation-in-part of commonly-assigned prior application filed 18 March 1998, by Mark A. Gannon entitled “Method for registering vehicular bus functionality”.

Field of the Invention

[0002] This application relates to telematics including, but not limited to, a method, for programming a vehicular gateway.

Background of the Invention

[0003] It is known for a vehicle, such as a car, to have both a vehicle bus and a user bus. As known, typically the vehicle bus supports the various vehicle systems, such as an engine, instrument display, door locks, flashing lights, etc. Also, typically the user bus supports various user devices, such as a cell phone, a radio frequency (“RF”) data device, a pager, a global positioning satellite (“GPS”) receiver, etc.

[0004] As known, the vehicular bus contains various proprietary information and safety-related information such as, for example, an anti-theft system computer program or an anti-lock braking system computer program. As a result, generally the user bus is not directly coupled to the vehicular bus; instead, the user bus is coupled to the vehicular bus by means of a vehicular gateway.

[0005] In order to provide user devices with the ability to communicate and interact with vehicle systems, it is known to arrange the gateway with a method to transport vehicle information that is present on the vehicle bus to the user bus for the benefit of one or more target user devices. Further, in order to support enhanced user device applications, it would be desirable to provide the user devices with a method to program the gateway with various gateway “rules” which rules, in turn, would control the transport of the aforementioned vehicle information to the user bus.

[0006] As well, in order to provide vehicle systems with the ability to communicate and interact with user devices, it is known to arrange the gateway with a method to transport user information that is present on the user bus to the vehicle bus for the benefit of one or more target vehicle systems. Further, in order to support enhanced vehicle system applications, it would be desirable to provide the vehicle systems with a method to program the gateway with various gateway rules which, in turn, would control the transport of the aforementioned user information to the vehicle bus.

[0007] DE 41 10372 discloses a vehicular gateway for transporting vehicle and user information between the vehicle bus and the user bus based on gateway rules. DE 41 10372 does not disclose determining when to receive a rule.

[0008] US 5,386,470 discloses a network repeater which can be programmed with new access rules.

[0009] As a result, there is a need for a method for programming a vehicular gateway.

Summary of the Invention

[0010] In a first aspect, the present invention provides a method for determining the gateway rules in a vehicle, as claimed in claim 1.

[0011] Further aspects are as claimed in the dependent claims.

Brief Description of the Drawings

[0012] FIG. 1 shows a vehicle 100 including a vehicle bus 10, a vehicle gateway 20 and a user bus 30, the vehicle bus coupled to the user bus by means of the gateway; the vehicle 100 being suitable for demonstrating a method for a vehicle gateway to transport information, including a method for programming the gateway, in accordance with the present invention.

FIG. 2 is a flow diagram for a first embodiment for the vehicle gateway to transport information, in accordance with the present information.

FIG. 3 is a flow diagram for a first embodiment of a method for programming the vehicle gateway, in accordance with the present invention.

Description of the Preferred Embodiment

[0013] Briefly, a vehicle includes vehicle systems coupled to a vehicle bus and user devices coupled to a user bus, the user bus coupled to the vehicle bus by a gateway. The user bus transports user information and the vehicle bus transports vehicle information. Based on one or more gateway rules, the gateway transports vehicle information to the user bus for the benefit of target user devices. Also based on these gateway rules, the gateway transports user information to the vehicle bus for the benefit of target vehicle systems. The gateway rules are programmed by both user devices and vehicle systems as follows: First, a proposed rule is provided to the gateway. Second, the gateway determines when to accept the proposed rule based on a variety of factors. Third, when the proposed rule is accepted, the proposed rule becomes a gateway rule.

[0014] Referring now to FIG. 1, there is shown a vehicle 100 having a vehicle bus 10 and a user bus 30, the vehicle bus and the user bus being coupled to a vehicle gateway 20. As shown, the vehicle bus supports and is coupled to a plurality of vehicle systems 11, 12, 13. Also, the user bus supports and is coupled to a plurality of user devices 40, 50, 60. Each of the plurality of vehicle
systems including a unique function; for example, vehicle system 12 is an engine. As well, each of the plurality of user devices supports a unique function. For example, user device 50 comprises a first RF data device arranged to communicate with a first remote device 110, the first remote device 110 being located separately from the vehicle 100. As well, user device 60 comprises a second RF data device arranged to communicate with a second remote device 120, the second remote device 120 being located separately from the vehicle 100.

[0015] Moreover, the vehicle 100 comprises a plurality of vehicle systems, a plurality of user devices, a vehicle bus and a user bus, the vehicle bus transporting vehicle information and coupled to the vehicle systems, the user bus transporting user information and coupled to the user devices, the vehicle bus coupled to the user bus by means of the gateway 20.

[0016] Therefore, in accordance with an example, in order to provide user devices 40-60 with the ability to communicate and interact with vehicle systems 11-13, the gateway 20 is arranged with a method to transport vehicle information that is present on the vehicle bus 10 to the user bus 30 for the benefit of one or more target user devices.

[0017] Referring now to FIG. 2, there is a flow diagram for a method for the gateway 20 to transport vehicle information to the user bus 30 for the benefit of one or more target user devices. The process starts, step 201, and then proceeds to step 203.

[0018] In step 203, the gateway detects vehicle information on the vehicle bus.

[0019] Next, in step 205, the gateway determines when to receive the vehicle information. If the result of this determination is positive, the process goes to step 207; but if the result is negative, the process goes to step 230.

[0020] In one example, each vehicle system provides a unique type of vehicle information, and the determining step 205 is based on the type of vehicle information.

[0021] In another example, the determining step 205 is based on one or more receiving gateway rules, the one or more receiving gateway rules based on one or more proposed rules provided by one or more user devices.

[0022] In step 207, when the gateway has determined to receive the vehicle information, the gateway receives the vehicle information, thus forming received information.

[0023] The process next goes to step 209. Generally, the user information for each target user device has a unique user format. In step 209, the gateway determines when to format the received information based on one or more user formats. If the result of this determination is positive, the process goes to step 211; but if the result is negative, the process goes to step 213.

[0024] In one example, the determining step 209 is based on one or more formatting gateway rules, the one or more formatting gateway rules based on one or more proposed rules provided by one or more user devices.

[0025] In step 211, when the gateway has determined to format the received information, the gateway formats the received information based on one or more user formats.

[0026] The process next goes to step 213. Generally, each target user device has a unique user address. In step 213, the gateway determines when to address the received information based on one or more user addresses. If the result of this determination is positive, the process goes to step 215; but if the result is negative, the process goes to step 217.

[0027] In one example, the determining step 213 is based on one or more addressing gateway rules, the one or more addressing gateway rules based on one or more proposed rules provided by one or more user devices.

[0028] In step 215, when it is determined to address the received information, the gateway addresses the received information based on one or more user addresses.

[0029] The process next goes to step 217. In step 217, the gateway determines when to transport the received information to the user bus. If the result of this determination is positive, the process goes to step 219; but if the result is negative, the process goes to step 230.

[0030] In one example, the determining step 217 is based on one or more transporting gateway rules, the one or more transporting gateway rules based on one or more proposed rules provided by one or more user devices.

[0031] In step 219, when it is determined to transport the received information to the user bus, the gateway transports the received information to the user bus.

[0032] In the next step, step 230, the process ends.

[0033] As well, in accordance with an example, in order to provide vehicle systems 11-13 with the ability to communicate and interact with user devices 40-60, the gateway 20 is arranged with a method to transport user information that is present on the user bus 30 to the vehicle bus 10 for the benefit of one or more target vehicle systems.

[0034] Referring again to FIG. 2, the flow diagram there and which flow diagram has been discussed above also serves as a flow diagram for a method for the gateway 20 to transport user information to the vehicle bus 10 for the benefit of one or more target vehicle systems. The process starts, step 201, and then proceeds to step 203.

[0035] In step 203, the gateway detects user information on the user bus.

[0036] Next, in step 205, the gateway determines when to receive the user information. If the result of this determination is positive, the process goes to step 207; but if the result is negative, the process goes to step 230.

[0037] In one example, each user device provides a unique type of user information, and the determining step 205 is based on the type of user information.
In another example, the determining step 205 is based on one or more receiving gateway rules, the one or more receiving gateway rules based on one or more proposed rules provided by one or more vehicle systems.

In step 207, when the gateway has determined to receive the user information, the gateway receives the user information, thus forming received information.

The process next goes to step 209. Generally, the vehicle information for each target vehicle system has a unique vehicle format. In step 209, the gateway determines when to format the received information based on one or more vehicle formats. If the result of this determination is positive, the process goes to step 211; but if the result is negative, the process goes to step 213.

In one example, the determining step 209 is based on one or more formatting gateway rules, the one or more formatting gateway rules based on one or more proposed rules provided by one or more vehicle systems.

The process next goes to step 213. Generally, each target vehicle system has a unique vehicle address. In step 213, the gateway determines when to address the received information based on one or more vehicle addresses. If the result of this determination is positive, the process goes to step 215; but if the result is negative, the process goes to step 217.

In one example, the determining step 213 is based on one or more addressing gateway rules, the one or more addressing gateway rules based on one or more proposed rules provided by one or more vehicle systems.

In step 215, when it is determined to address the received information, the gateway addresses the received information based on one or more vehicle addresses.

The process next goes to step 217. In step 217, the gateway determines when to transport the received information to the vehicle bus. If the result of this determination is positive, the process goes to step 219; but if the result is negative, the process goes to step 230.

In one example, the determining step 217 is based on one or more transporting gateway rules, the one or more transporting gateway rules based on one or more proposed rules provided by one or more vehicle systems.

In step 219, when it is determined to transport the received information to the vehicle bus, the gateway transports the received information to the vehicle bus.

Next, in step 230, the process ends.

Further, in order to support enhanced user device applications, in accordance with the present invention, the user devices 40-60 are provided with a method to program the gateway with various gateway rules which rules, in turn, control the transport of the aforementioned vehicle information from the vehicle bus 10 to the user bus 30.

Referring now to FIG. 3, there is shown a flow diagram for a first embodiment of a method for programming the vehicle gateway 20 by the user devices 40-60, in accordance with the present invention. The process starts, step 301, and then proceeds to step 303.

In step 303, a requesting user device provides the gateway with a proposed rule.

Next, in step 305, the gateway determines when to accept the proposed rule. If the result of this determination is positive, the process goes to step 307; but if the result is negative, the process goes to step 309.

In one embodiment, the gateway determining step 305 always determines to accept the proposed rule; thus, in this embodiment, the decision of step 305 is predetermined, fixed, unilateral, and independent of and without regard to other factors, conditions, or parameters.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the serial number or identification code ("ID") of the requesting user device.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on when an associated fee has been paid.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on when a correct password has been input.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the vehicle's identification number ("VIN").

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the security clearance of the user.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on an encrypted challenge and response provided by the user.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the current location of the vehicle.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the current date.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the current time.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on obtaining authorization.
When the gateway has determined to accept the proposed rule, in step 307, the gateway accepts the proposed rule as a gateway rule.

The process then ends, step 309.

It will be understood that these gateway rules discussed here in connection with FIG. 3 correspond to the receiving, formatting, addressing and transporting gateway rules discussed above in connection with FIG. 2.

Further, in order to support enhanced vehicle system applications, in accordance with the present invention, the vehicle systems 11-13 are provided with a method to program the gateway with various gateway rules which, in turn, control the transport of the aforementioned user information from the user bus 30 to the vehicle bus 10.

Referring again to FIG. 3, the flow diagram there and which flow diagram has been discussed above also serves as a flow diagram for a method for programming the vehicle gateway 20 by the vehicle systems 11-13, in accordance with the present invention. The process starts, step 301, and then proceeds to step 303.

In step 303, a requesting vehicle system provides the gateway with a proposed rule.

Next, in step 305, the gateway determines when to accept the proposed rule. If the result of this determination is positive, the process goes to step 307; but if the result is negative, the process goes to step 309.

In one embodiment, the gateway determining step 305 always determines to accept the proposed rule; thus, in this embodiment, the decision of step 305 is predetermined, fixed, unilateral, and independent of and without regard to other factors, conditions, or parameters.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the serial number or identification code ("ID") of the requesting vehicle system.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on when an associated fee has been paid.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on when a correct password has been input.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the vehicle's identification number ("VIN").

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the security clearance of the user.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on an encrypted challenge and response provided by the user.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the current location of the vehicle.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the current time.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on the time of one or more of the group consisting of the vehicle and the requesting user device.

In another embodiment, the gateway determining step 305 includes a step of determining when to accept the proposed rule based on obtaining authorization from a remote source.

When the gateway has determined to accept the proposed rule, in step 307, the gateway accepts the proposed rule as a gateway rule.

The process then ends, step 309.

As mentioned above, these gateway rules discussed here in connection with FIG. 3 correspond to the receiving, formatting, addressing and transporting gateway rules discussed above in connection with FIG. 2.

Claims

1. A method for determining the gateway rules in a vehicle (100) having a plurality of vehicle systems (11-13), a plurality of user devices (40-60), and having a vehicle bus (10) and a user bus (30), the vehicle bus transporting vehicle information and coupled to the plurality of vehicle systems, the user bus transporting user information and coupled to the plurality of user devices, the vehicle bus coupled to the user bus by means of a gateway (20) arranged for transporting vehicle information between the vehicle bus and the user bus based on one or more gateway rules, the method characterized by the steps of:

   by one or more of the group consisting of a vehicle system and a requesting user device, providing (303) the gateway with a proposed rule; by the gateway, determining (305) when to accept the proposed rule; and by the gateway, when the gateway has determined to accept the proposed rule, accepting (307) the proposed rule as a gateway rule.

2. The method of claim 1, the gateway determining step (305) including a step of determining when to accept the proposed rule based on an identification of one or more of the group consisting of the vehicle system and the requesting user device.
3. The method of claim 1, the gateway determining step (305) including a step of determining when to accept the proposed rule based on when an associated fee has been paid.

4. The method of claim 1, wherein the providing step (303) only includes a requesting user device, further including the steps of:

   - detecting (203) vehicle information on the vehicle bus;
   - determining (205) when to receive the vehicle information; and
   - when it is determined to receive the vehicle information, receiving (207) the vehicle information, thus forming received information.

5. The method of claim 4, wherein each vehicle system providing a unique type of vehicle information, the determining when to receive the vehicle information step (205) based on the type of vehicle information.

6. The method of claim 1, wherein the providing step (303) only includes a vehicle system, further including the steps of:

   - detecting (203) user information on the user bus;
   - determining (205) when to receive the user information; and
   - when it is determined to receive the user information, receiving (207) the user information, thus forming received information.

7. The method of claim 6, each user device providing a unique type of user information, the determining when to receive the user information step (205) based on the type of user information.

8. The method of claim 7, the determining when to receive the user information step (205) based on one or more receiving gateway rules, the one or more receiving gateway rules based on one or more proposed rules provided by one or more vehicle systems.

Patentansprüche

1. Verfahren zum Bestimmen der Gatewayregeln in einem Fahrzeug (100), das über eine Mehrzahl von Fahrzeugsystemen (11 - 13), eine Mehrzahl von Anwendervorräcken (40 - 60), einen Fahrzeugbus (10) und einen Anwenderbus (30) verfügt, wobei das Fahrzeugbus Fahrzeuginformationen transportiert und an die Mehrzahl von Anwendervorräcken gekoppelt ist, der Fahrzeugbus an den Anwenderbus mittels eines Gateways (20) gekoppelt ist, das geeignet ist, Fahrzeuginformationen zwischen dem Fahrzeugbus und dem Anwenderbus basierend auf einer oder mehreren Gatewayregeln zu transportieren, wobei das Verfahren durch die folgenden Schritte gekennzeichnet ist:

   - Bereitstellen (303) einer vorgeschlagenen Regel an das Gateway durch ein oder mehrere Elemente der Gruppe, die ein Fahrzeugsystem und eine anfragende Anwendervorräckigkeit umfasst;
   - Bestimmen (305) durch das Gateway, wann die vorgeschlagene Regel zu akzeptieren ist; und
   - Akzeptieren (307) der vorgeschlagenen Regel als eine Gatewayregel durch das Gateway, wenn das Gateway bestimmt hat, die vorgeschlagene Regel zu akzeptieren.

2. Verfahren gemäß Anspruch 1, wobei der Gatewaybestimmungsschritt (305) einen Schritt zum Bestimmen umfasst, wann die vorgeschlagene Regel basierend auf einer Identifizierung einer oder mehrerer von der Gruppe, die das Fahrzeugsystem und die anfragende Anwendervorräckigkeit umfasst, zu akzeptieren ist.

3. Verfahren gemäß Anspruch 1, wobei der Gatewaybestimmungsschritt (305) einen Schritt zum Bestimmen umfasst, wann die vorgeschlagene Regel basierend darauf, wann eine verknüpfte Gebühr bezahlt worden ist, zu akzeptieren ist.

4. Verfahren gemäß Anspruch 1, bei dem der Bereitstellungsschritt (303) nur eine anfragende Anwendervorräckigkeit umfasst, das weiterhin die folgenden Schritte umfasst:

   - Detektieren (203) von Fahrzeuginformationen auf dem Fahrzeugbus;
   - Bestimmen (205), wann die Fahrzeuginformationen zu empfangen sind; und
   - wenn bestimmt worden ist, die Fahrzeuginformationen zu empfangen, Empfangen (207) der Fahrzeuginformationen, wodurch empfangene Informationen gebildet werden.

5. Verfahren gemäß Anspruch 4, bei dem jedes Fahrzeugsystem eine eindeutige Art von Fahrzeuginformation zur Verfügung stellt, wobei der Bestimmungsschritt (205), wann die Fahrzeuginformationen empfangen werden sollen, auf der Art von Fahrzeuginformationen basiert.

6. Verfahren gemäß Anspruch 1, bei dem der Bereit-
7. *Verfahren gemäß Anspruch 6, bei dem jede Anwendervorrichtung eine eindeutige Art von Anwenderinformationen zur Verfügung stellt, wobei der Bestimmungsschritt (205), wann die Anwenderinformationen empfangen werden sollen, auf der Art von Anwenderinformationen basiert.*

8. *Verfahren gemäß Anspruch 7, wobei der Bestimmungsschritt (205), wann die Anwenderinformationen empfangen werden sollen, auf einer oder mehreren Gatewayempfangsregeln basiert, wobei die eine oder mehrere Gatewayempfangsregeln auf einer oder mehreren vorgeschlagenen Regeln basieren, die durch ein oder mehrere Fahrzeugsysteme zur Verfügung gestellt werden.*

**Revendications**

1. *Procédé pour déterminer les règles de passerelle dans un véhicule (100) ayant une pluralité de systèmes de véhicule (11 à 13), une pluralité de dispositifs d'utilisateur (40 à 60), et ayant un bus de véhicule (10) et un bus d'utilisateur (30), le bus de véhicule transportant des informations de véhicule et étant couplé à la pluralité de systèmes de véhicule, le bus d'utilisateur transportant des informations d'utilisateur et étant couplé à la pluralité de dispositifs d'utilisateur, le bus de véhicule étant couplé au bus d'utilisateur au moyen d'une passerelle (20) disposée pour transporter les informations de véhicule entre le bus de véhicule et le bus d'utilisateur sur la base d'une ou plusieurs règles de passerelle, le procédé étant caractérisé par les étapes consistant à :*

- détecter (203) les informations de véhicule sur le bus de véhicule ;
- déterminer (205) quand recevoir les informations de véhicule ; et
- lorsqu’il est déterminé de recevoir les informations de véhicule, recevoir (207) les informations de véhicule, formant ainsi les informations reçues.

2. *Procédé selon la revendication 1, l’étape de détermination de la passerelle (305) incluant une étape consistant à déterminer quand accepter la règle proposée sur la base d’une identification d’un ou plusieurs du groupe se composant du système de véhicule et du dispositif d’utilisateur demandeur.*

3. *Procédé selon la revendication 1, l’étape de détermination de la passerelle (305) incluant une étape consistant à déterminer quand accepter la règle proposée sur la base de quand une taxe associée a été payée.*

4. *Procédé selon la revendication 1, dans lequel l’étape de fourniture (303) inclut uniquement un dispositif d’utilisateur demandeur, incluant en outre les étapes consistant à :*

- détecter (203) les informations de véhicule sur le bus de véhicule ;
- déterminer (205) quand recevoir les informations de véhicule ; et
- lorsqu’il est déterminé de recevoir les informations de véhicule, recevoir (207) les informations de véhicule, formant ainsi les informations reçues.

5. *Procédé selon la revendication 4, dans lequel chaque système de véhicule fournissant un type unique d’informations de véhicule, la détermination de quand recevoir les informations de véhicule à l’étape (205) est basée sur le type d’informations de véhicule.*

6. *Procédé selon la revendication 1, dans lequel l’étape de fourniture (303) inclut uniquement un système de véhicule, incluant en outre les étapes consistant à :*

- détecter (203) les informations d’utilisateur sur le bus d’utilisateur ;
- déterminer (205) quand recevoir les informations d’utilisateur ; et
- lorsqu’il est déterminé de recevoir les informations d’utilisateur, recevoir (207) les informations d’utilisateur, formant ainsi les informations reçues.

7. *Procédé selon la revendication 6, chaque dispositif d’utilisateur fournissant un type unique d’informations d’utilisateur, la détermination de quand recevoir les informations d’utilisateur à l’étape (205) est basée sur le type d’informations d’utilisateur.*

8. *Procédé selon la revendication 7, la détermination de quand recevoir les informations d’utilisateur à l’étape (205) est basée sur une ou plusieurs règles de passerelle de réception, les une ou plusieurs rè-
gles de passerelle de réception étant basées sur une ou plusieurs règles proposées fournies par un ou plusieurs systèmes de véhicule.
**FIG. 1**

START

DETECT INFORMATION

RECEIVE?

YES

RECEIVE INFORMATION

NO

FORMAT?

YES

FORMAT

NO

ADDRESS?

YES

ADDRESS

NO

TRANSPORT?

YES

TRANSPORT

NO

END

**FIG. 2**

**FIG. 3**

START

PROVIDE GATEWAY WITH PROPOSED RULE

ACCEPT RULE?

NO

YES

ACCEPT PROPOSED RULE AS A GATEWAY RULE

END

END