A Process for Loading Data and Software into a Vehicle Computer

The invention relates to a process for loading data and software into a vehicle computer, a system for the implementation of the process and a download server.

Vehicle computers, also known as on-board computers or on-board units and referred to in the following as OBUs, provide for the automatic execution of different actions in public transport vehicles, such as for example position indication, announcement of stops or display of the stop name. The OBUs require application software and reference data for this purpose. The application software determines the type of actions while the reference data contain given routes and points for the triggering of the actions. For optimal use of the vehicle fleets, new application software and/or reference data are frequently required. If for example a public transport bus for short-distance service is to be used for a different route, the reference data of the OBU must be adapted accordingly. In accordance with known processes, the reference data are loaded into the OBU manually or semi-automatically, in particular by means of memory cards, infrared beacons or laptops. This process is time-consuming, complicated and always includes all the reference data.

The object of the invention is to provide a process which permits faster, simpler and fully automated loading of the OBU.

In accordance with the invention, this object is achieved by the characterising features of Claim 1. The structuring of the data and software into individual data blocks enables individual data blocks to be separately exchanged, so that program parts which are not to be changed are retained. This results in a simplification of the loading process. For example, a change to the route can be implemented by selective loading of those parts of the

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reference data which are assigned to the route change. In particular in the case of diversions likely to occur only occasionally or in the case of unchanging sub-sections of the overall route, only the affected data blocks are thus exchanged.

For the implementation of the process, in accordance with Claim 2 a download server is provided. On the basis of the determined load state of the OBUs, said download server initiates the data block loading of those data blocks which are missing or to be exchanged.

Claim 3 characterises an advantageous embodiment of the data block structure. Here the configuration CONFIG ID represents the internal equipment of the vehicle. For example a vehicle with no stop announcement facility has a different CONFIG ID to a vehicle which has an automatic stop announcement facility. The configuration CONFIG ID can thus simplify the data block administration as a specific number of application software blocks SWVERSION NR is assigned to each CONFIG ID. Additionally, operating data can also be stored as data blocks SIGNATURE which are used in the manner of the CONFIG ID as selection criterion for reference data DATAVERSION NR and/or application software SWVERSION NR. Such operating data depend upon operational requirements and can contain for example a driver code or schedule code. Very finely structured data blocks would also be conceivable. In particular, the reference data DATAVERSION NR and the application software SWVERSION NR can be subdivided into further blocks which - as described in the foregoing - can be individually exchanged, erased or added. The download server reads the data blocks and decides which measures are needed for the updating of the data- and software base. In particular this process proceeds as follows: The download server reads and recognises the provided data blocks CONFIG ID, SWVERSION NR, DATAVERSION NR and SIGNATURE. As a function

of the CONFIG ID, the download server selects a suitable SWVERSION NR if new software is to be installed and initiates the loading process. Here the selection can be made by a dispatcher or also automatically on the basis of preprogrammed parameters. If new reference data are required, a new data block DATAVERSION NR is installed in accordance with the same principle, and here CONFIG ID and SIGNATURE can be taken into consideration as selection criteria in the selection of the suitable data block.

The bilateral data transfer between the OBU and the download server takes place in accordance with Claim 4, preferably via wireless communication, preference being given in particular to LAN (local area network) radio communication which is very cheap and versatile.

The core elements of the download server substantially comprise computing means according to Claim 5 and control means according to Claim 6. The control means, for example in the form of a keyboard, are used by a dispatcher in particular for the presetting of the data blocks.

In accordance with Claim 7, the vehicle computer is equipped with means for the storage and administration of the data blocks. This ensures that missing data blocks can be individually added and "incorrect" data blocks can be individually replaced.

In the following the invention will be explained in detail making reference to an exemplary embodiment illustrated in the drawing.

A system, shown in diagram form, for loading data and software into a vehicle computer, substantially comprises an on-board unit (OBU) (1), a download server (2) and a LAN (local area network) connection (3) between the OBU (1) and the download server (2). The OBU (1) is normally

permanently installed in a vehicle (4). A changing location of use of the OBU (1) would also be conceivable however. In such a case, or in the case of changes of all kinds, for example relating to route, vehicle configuration, equipment level and so on, the OBU (1) must be reprogrammed with the correct data and the correct software. For this purpose the data as a whole is subdivided into individual data blocks (5). Via the LAN connection (3) the download server (2) calls up the instantaneous load state, which in the exemplary embodiment consists of four data blocks (5). The data blocks CONFIG ID (5.1), SWVERSION NR (5.2), DATAVERSION NR (5.3) and SIGNATURE (5.4) are provided. CONFIG ID (5.1) contains information relating to the vehicle configuration, i.e. relating to the vehicle devices to be actuated by the OBU (1), such as stop indicator, ticket invalidator etc. SWVERSION NR (5.2) defines the software required for the actuation and DATVERSION NR (5.3.1) determines the reference data of the route. Additionally, operating data such as driver code or schedule code are provided in the form of a data block (5) SIGNATURE (5.4). On the basis of the data blocks (5.1 - 5.4) the download server (2) recognises whether the instantaneous load state is identical to the future use of the OBU (1). If this is not the case and for example a changed route is to be taken, a different DATAVERSION NR (5.3.1) is required. The download server (2) identifies the correct data block DATAVERSION NR (5.3.1) for the new route in dependence upon the presettings by CONFIG ID (5.1) and SIGNATURE (5.4). These vehicle-specific and operational presettings determine the structure of the new reference data DATAVERSION NR (5.3.1). For the storage and administration of the data blocks (5), the download server (2) is equipped with computing means (6). The download server (2) also comprises control means (7) for the input and/or selection and/or modification of the data blocks (5).

The invention is not limited to the exemplary embodiment described in the foregoing. Rather, a number of variants are conceivable which also utilize the features of the invention in a basically different type of embodiment.

Claims

1. A process for loading data and software into a vehicle computer (1), characterised in that the data and software are structured in data blocks (5), that the instantaneous load state of the vehicle computer (1) is determined, and that on the basis of the load state those data blocks (5) which are missing and/or to be exchanged are loaded into the vehicle computer (1).

2. A system for implementing the process according to Claim 1, characterised by a download server (2) for loading into the vehicle computer (1) those data blocks (5) which are missing and/or to be exchanged and which have been determined on the basis of the load state.

3. A system according to Claim 2, characterised by data blocks (5) which comprise:

- configurations of the vehicle computer (1) CONFIG ID (5.1),
- application software SWVERSION NR (5.2),
- reference data DATAVERSION NR (5.3; 5.31) and optionally
- operating data SIGNATURE (5.4).

4. A system according to Claim 2 or 3, characterised in that the vehicle computer (1) and the download server (2) comprise means for wireless communication, in particular via LAN (local area network) radio (3) or IR (infrared) beacons.

5. A download server (2) according to one of Claims 2 to 4, characterised by computing means (6) for the storage and administration of the data blocks (5).

6. A download server (2) according to one of Claims 2 to 5, characterised by control means (7) for the input and/or selection and/or modification of the data blocks (5).

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7. A vehicle computer (1) according to one of Claims 2 to 6, characterised by means for the storage and administration of the data blocks (5).