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(54) **ERTMS / ETCS radio block centre; method for establishing a connection with said radio block centre**

(57) Radio Block Centre according to the ERTMS / ETCS standard, for train supervision along an area of a railway, comprising a radio communication module and a means for train supervision, characterised in that, said means for train supervision being a primary means for the supervision of trains according to a first version of the ETCS standard, the Radio Block Centre (20, 30) further comprise a secondary means for the supervision of trains according to a second version of the ETCS stand-

ard, and a connection module capable of detecting the ETCS system version of an On Board Unit (10) of a train (3) trying to connect to the Radio Block Centre, based on a table associating to an ETCS identifier of said On Board Unit, a list comprising at least one ETCS system version said On Board Unit supports, and establishing a communication session for the supervision of said train according to the detected ETCS system version.

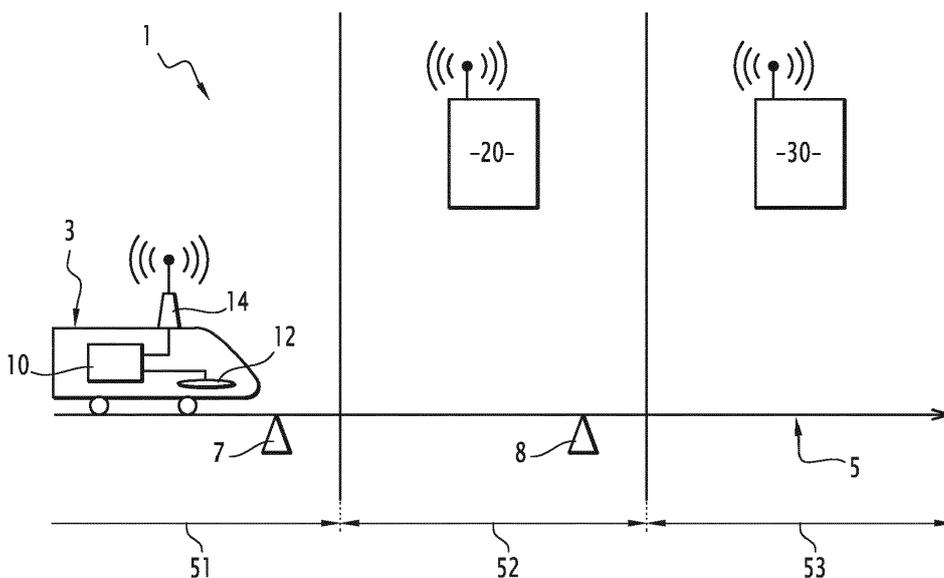


FIG.1

Description

[0001] The present invention relates to version management in the ERTMS/ETCS standard.

[0002] The European Rail Traffic Management System (ERTMS) is a standard for train signalling and traffic management system for European railways, to enhance cross-border interoperability of trains.

[0003] ETCS is a standard for a control-command system composed of ETCS train equipment and ETCS trackside equipment.

[0004] An ETCS system is complemented by a Global System for Mobile communications for Railway (GSM-R). The GSM-R is used in circuit switching and serves as a wide range radio bearer for ETCS data communication, in complement of the short range data communication between ETCS trackside emitters and ETCS on-board antennas located under the frame of a train. These two data communication links constitute interfaces between the ETCS on-board system and the ETCS trackside system.

[0005] ETCS is a signalling, control and train protection system designed to progressively replace the many incompatible national Automatic Train Protection systems currently in use by European railways, hence facilitating the cross-border train interoperability.

[0006] ETCS train equipment comprises an ETCS compatible On Board Unit (OBU).

[0007] In the final form of the ETCS, all trackside information are passed electronically to the driver, providing the driver with safe on-board signalling information and allowing the removal of trackside signals.

[0008] It is now a legal requirement that all new, upgraded or renewed tracks and rolling stock in the European railway system should adopt ETCS, possibly keeping national legacy systems for backward compatibility.

[0009] ETCS is defined at five different levels:

- ERTMS/ETCS Level 0 (a train equipped with ERTMS/ETCS equipment operates on a line without ERTMS/ETCS equipment, without national system, or with the ERTMS/ETCS equipment inhibited).
- ERTMS/ETCS Level STM (a train equipped with ERTMS/ETCS equipment operates on a line equipped with a national system, with which it interfaces by the use of a Specific Transmission Module (STM)).
- ERTMS/ETCS Application Level 1 with or without infill transmission (a train equipped with ERTMS/ETCS equipment operates on a line equipped with ETCS trackside equipment, in particular trackside beacons, called Eurobalises, and optionally Euroloop or EuroRadio infill).
- ERTMS/ETCS Application Level 2 (a train equipped with ERTMS/ETCS equipment operates on a line controlled by a Radio Block Centre (RBC), on the ground, and equipped with Eurobalises and EuroRadio, the train location and the train integrity being

performed by the trackside equipment).

- ERTMS/ETCS Application Level 3 (similar to level 2, but with the train location and the train integrity being performed by the train equipment, based on information received by the train)

[0010] At Level 2, if a lot of signalling functions are performed on board, the train integrity supervision functions is performed on the ground. To this end, a train automatically and periodically reports its exact position and direction of travel to a Radio Block Centre (RBC) so that the train movements are continually monitored by the RBC.

[0011] In response, a movement authority is transmitted from the RBC to the OBU of the train, via the GSM-R communication system, together with speed information and route data.

[0012] At level 2, the trackside beacons are mainly used as passive positioning devices. When a train passes a trackside beacon set, this latter gives to the train a reference point. Between two successive trackside beacon sets, the train determines its running distance by means of on-board sensors (such as axle sensors and/or other means). With these two pieces of information the train determines its current position.

[0013] The OBU of a train continuously monitors the maximum permissible speed.

[0014] As a means for ensuring the compatibility and managing its evolutions, the ETCS is subdivided in several ETCS system versions, which are each identified by a variable M_VERSION (See for example UNISIG SUBSET 26 version 3.0.0 chapter 7). For example, the current ETCS system version is M_VERSION = 2.0. This ETCS system version is the newest one of the UNISIG Control Command System Technical Specification for Interoperability (CCS_TSI) and offers new functions for train operators and infrastructure owners. The previous ETCS system version is M_VERSION = 1.0

[0015] More generally, the value of this variable takes the form: M_VERSION=M.N.

[0016] A version, M_VERSION=O.P, will be said different of another version, M_VERSION=M.N, when the "O" value is different from the "M" value and/or the "P" value is different from the "N" value.

[0017] The migration strategy from one ETCS system version to the next one is defined in the specification subset SUBSET 104 "ETCS System Version Management" of the CCS TSI of the ERTMS/ETCS standard. This specification subset can be found, in its current 3.1.0 version, online at the following address: "<http://www.era.europa.eu/Document-Register/Pages/ETCS-System-Version-Management.aspx>".

[0018] An OBU is retro compatible in the ETCS system versions, i.e. an OBU is capable to interpret both the current ETCS system version with which it complies, and the lower ETCS system versions.

[0019] Thus, an OBU adapts to the ETCS system version of the ETCS trackside equipment along a railway.

[0020] An OBU, which has been migrated to the ETCS system version N+1, is capable of using the trackside equipment not yet migrated to the ETCS system version N+1, but still complying with the ETCS system version N, or lower. In this case, the OBU may have to operate with RBCs of the ETCS system version N or N+1.

[0021] The SUBSET 104 takes advantage of this retro compatibility to define the migration strategy from ETCS system version N to version N+1, by first requiring that all the OBUs migrate to the ETCS system version N+1, before allowing the RBC to migrate to the same ETCS system version N+1.

[0022] The main drawback of this migration strategy is that the OBUs of a complete fleet of trains that could run on a specific railway have to be upgraded, before the RBC of said railway be upgraded to the same ETCS system version N+1.

[0023] This migration strategy could only be implemented if the fleet of trains is not too diversified in term of train operators.

[0024] But, in general, this is not the case for railways where the deployment of an ERTMS system is advantageous, such as passageways between countries.

[0025] The trackside infrastructure owner of the railway has to wait that all the trains, even those rarely used on this railway, are upgraded before being able to provide an up to date version of the ETCS trackside equipment.

[0026] The trackside infrastructure operator is thus constrained by the slowest train operator. In return, other train operators, seeing that the railway is not up to date, tend to wait before investing to upgrade their own fleet of trains.

[0027] Such a migration strategy then requires extensive agreement between trackside infrastructure owners and train operators. This slows down and even jeopardises the deployment of system complying with the last updated versions of the ETCS.

[0028] An object of the invention is thus to solve the problem of the delay introduced in the deployment of up to date ETCS systems due to the strategy of the ETCS System Version Management standard.

[0029] To this end, the invention provides a RBC and a method implemented by this RBC according to the claims.

[0030] The invention and its advantages will be better understood on reading the following description given solely by way of example and with reference to the appended drawings in which:

- Figure 1 is general drawing of a ERTMS/ETCS system according to the invention;
- Figure 2 is a schematic view of an RBC of the system of figure 1: and;
- Figure 3 is a block diagram of the method realised by the RBC of figure 2.

[0031] In figure 1, the ERTMS/ETCS system 1 comprises an ETCS level 2 or 3 component and a GSM-R

component.

[0032] A train 3 moves along a track 5, from the left to the right on the figure.

[0033] The train 3 is provided with an OBU 10, connected to an antenna 12, which is capable of receiving signal from trackside beacon sets 7, 8 located on the track, and a GSM unit 14, which is capable of emitting and receiving radio signals.

[0034] The track 5 is subdivided into three successive areas 51, 52 and 53.

[0035] No supervision system is provided for the first area 51, whereas the second and third areas 52, 53 are provided with an ETCS supervision system. This system consists in a first RBC 20 for area 52 and a second RBC 30 for area 53.

[0036] A first beacon set 7 is placed on the track to announce the boundary between the first area 51, with no supervision, and the second area 52, with ETCS supervision. The first beacon set 7, which is also a positioning beacon set, is also capable of emitting a signal comprising a message indicating the phone number/network address RBC_NUM of the first RBC 20, with which an OBU 10 of the train has to establish a communication in order to be controlled and supervised when travelling on the second area 52, together with an identifier RBC_ETC_ID of this first RBC 20, whose signification will be explained in relation with the connection method.

[0037] A second beacon set 8 is placed on the track 5 to announce the boundary between the second area 52, with ETCS supervision, and the third area 53, with ETCS supervision too. The second beacon set 8 is a positioning beacon set.

[0038] The first and second RBC 20, 30, which are similar to each other, will now be described with reference to figure 2.

[0039] Compare to a prior art RBC, RBC 20, respectively RBS 30, is enhanced to manage automatically and at the same time different ETCS system versions, for allowing the management of several trains, which may differ one from the other by the ETCS system version with which their OBUs comply.

[0040] The RBC 20, 30, comprises a GSM-R management unit 24 for receiving and emitting signal from and to the GSM unit 14 of a train.

[0041] RBC 20, 30, comprises a first module 26, a second module 27 and a third module 28.

[0042] The first module 26 implements the full functionalities of the ETCS system version N+1. For example, the first module 26 complies with the ETCS system version M_VERSION = 3.0.

[0043] In order to be able to perform train supervision according to different versions of the ETCS, the RBC 20, 30, also comprises at least one subsidiary module implementing the full functionalities of a lower version of the ETCS standard. For example, the second module 27 complies with the ETCS system version M_VERSION=2.0 and the second module 28 complies with the ETCS system version M_VERSION=1.0

[0044] An RBC may contain as many as possible subsidiary modules, like modules 27 and 28, so as to permit the management of a larger number of ETCS system versions by this RBC.

[0045] RBC 20, 30, is also provided with a table T, which comprises, for each train authorised to travel along track 5, the ETCS system version of its OBU (i.e. the value of the variable M_VERSION associated to this OBU), and for each module 26, 27, 28, of each RBC 20, 30, along track 5, the ETCS system version this module manages (i.e. the value of the variable M_VERSION for each module of each RBC).

[0046] More specifically, table T comprises for each OBU of a train authorised to travel along track 5:

- the value of an ETCS identifier, OBU_ETC_ID, preferably composed of a first variable NID_ENGINE and a second variable NID_C, as defined in UNISIG SUBSET 26 chapter 7. OBU_ETC_ID is a unique ETCS identifier for each OBU on-board trains authorised to travel along track 5;
- the value of a ETCS system version list, OBU_VERSION_LIST, corresponding to a list of the ETCS system versions, i.e. the values of variable M_VERSION, managed by the OBU 10; and,
- the value of keys, OBU_KEYS, used for the safe and secured ETCS radio message exchanges between this OBU and a RBC.

[0047] Similarly, table T comprises for each RBC:

- several values of an ETCS identifier, RBC_ETC_ID, preferably composed of a first variable NID_RBC and a second variable NID_C as defined by UNISIG SUBSET26 chapter 7. RBC_ETC_ID is an ETCS identifier identifying each set of modules of the RBCs along the track 5, a set of modules comprising at least one module;
- for each value of the ETCS identifier RBC_ETC_ID, the value of an ETCS system version list, RBC_VERSION_LIST, corresponding to a list of the ETCS system versions, i.e. the values of variable M_VERSION, managed by the set of modules associated with the ETCS identifier RBC_ETC_ID;
- for each value of the ETCS identifier RBC_ETC_ID, the value of keys, RBC_KEYS, used for safe and secured messages exchanges between the set of modules, associated with the ETCS identifier RBC_ETC_ID, and a train.

[0048] Thus, each OBU is associated with only one ETCS identifier OBU_ETC_ID.

[0049] A given RCB is associated with a unique telephone number/network address RBC_NUM, but may be associated with more than one ETCS identifier RBC_ETC_ID.

[0050] An ETCS identifier RBC_ETC_ID is associated with a unique set of ETCS system versions that the cor-

responding RBC is able to handle. A particular ETCS system version handled by the corresponding RBC belongs to only one set of versions, but a set of versions may comprise several ETCS system versions. In fact, an ETCS identifier RBC_ETC_ID identifies the way the communication with the corresponding RBC is managed for a given set of ETCS system versions.

[0051] Each module 26, 27, 28 of a given RBC is associated with a unique ETCS system version M_VERSION.

[0052] For example, RBC_ETC_ID equal to "2" identifies a management realised by the RBC 20 according to ETCS system version M_VERSION=1.0, i.e. a management realised by the module 28 of RBC 20;

[0053] RBC_ETC_ID equal to "4" identifies a management realised by the RBC 20 according to ETCS system version M_VERSION=2.0 and according to ETCS system version M_VERSION = 3.0, i.e. a management realised respectively by the modules 27 and 26 of RBC 20;

[0054] RBC_ETC_ID equal to "3" identifies a management realised by the RBC 30 according to ETCS system version M_VERSION=1.0, i.e. a management realised by the secondary module 28 of RBC 30; and,

[0055] RBC_ETC_ID equal to "5" identifies a management realised by the RBC 30 according to the management according to ETCS system version M_VERSION=2.0, i.e. a management realised by the primary module 26 of RBC 30.

[0056] RBC 20, 30, comprises a connection module 22 to automatically establish a communication session between a requesting OBU, for example OBU 10 of train 3, by taking into account the list of ETCS system versions of said OBU and selecting the appropriate module of the RBC, for example one of the modules 26, 27 or 28 of RBC 20, 30, to manage the supervision of said OBU 10 on the corresponding area of the track, area 52 for RBC 20 and area 53, for RBC 30.

[0057] The method performed by the connection module 22 will now be described with reference to figure 3.

[0058] When a train 3 arrives near the border between the first area 51 of the railway 5 and the second area 52, it passes over the beacon set 7.

[0059] From the beacon set 7, the OBU 10 then receives the phone number/network address RBC_NUM and an ETCS identifier RBC_ETC_ID of the RBC 20. These data indicate to which RBC the OBU 10 has to connect in order the movements of the train 3 be supervised when travelling on the area beyond the beacon set.

[0060] At step 110, by means of the GSM-R unit 14, the OBU 10 sends a connection request message M1 to the designated RBC 20. The message M1 comprises the ETCS identifier OBU_ETC_ID of the requesting OBU 10, and the ETCS identifier RBC_ETC_ID given by the beacon set 7.

[0061] At step 120, the connection module 22 of RBC 20 receives, via GSM-R unit 24, the connection request message M1, and extracts the ETCS identifier OBU_ETC_ID of OBU 10 (i.e. NID_ENGINE and NID_C),

and the ETCS identifier RBC_ETC_ID (i.e. NID_RBC and NID_C) given by beacon set 7.

[0062] At step 130, the connection module 22 reads the matching table T in order to determine a first list OBU_VERSION_LIST containing the values of the ETCS system version associated with the ETCS identifier OBU_ETC_ID of OBU 10, and a second list RBC_VERSION_LIST containing the values of the ETCS system version associated with the ETCS identifier RBC_ETC_ID given by the beacon set.

[0063] At step 140, if there is no entry in table T corresponding to the ETCS identifier OBU_ETC_ID, the process moves to step 190: the connection module 22 disconnects the train 3 if already connected or do not accept to supervise it.

[0064] If there is an entry in table T for the ETCS identifier OBU_ETC_ID, the corresponding first list OBU_VERSION_LIST is compared with the second list RBC_VERSION_LIST. Advantageously, if OBU_ETC_ID is present in table T, but is associated with no specific ETCS system version, the lowest version, i.e. the default version in accordance with the infrastructure owner design choice, is selected.

[0065] At step 150, if the OBU 10 tries to connect to the RBC 20 with the proper ETCS identifier RBC_ETC_ID, i.e. if at least one ETCS system version mentioned in the second list RBC_VERSION_LIST corresponds to an ETCS system version mentioned in the first list OBU_VERSION_LIST, the connection module 22 initialises a variable BEST_RBC_VERSION with the value of this common ETCS system version.

[0066] If more than one of the ETCS system versions mentioned in the second list RBC_VERSION_LIST correspond to an ETCS system version mentioned in the second list OBU_VERSION_LIST, the latest version common to the first and second lists is selected as the most appropriate ETCS system version for said OBU 10. Consequently, module 22 initialises the variable BEST_RBC_VERSION with the value of the most appropriate ETCS system version.

[0067] Then, at step 170, the session establishment is completed for the supervision of train 3. The connection module 22 allocates the management of said train to the module implementing the best ETCS system version for train 3: RBC_VERSION = BEST RBC VERSION.

[0068] If the OBU 10 tries to connect to the RBC 20 with an improper ETCS identifier RBC_ETC_ID, i.e. no ETCS system version of the second list RBC_VERSION_LIST matches with an ETCS system version of the first list OBU_VERSION_LIST, then, at step 180, module 22 checks whether at least one of the ETCS system version supported by the RBC is compatible with one of the ETCS system versions mentioned in the first list OBU_VERSION_LIST.

[0069] If no compatible version is identified, the connection module 22 disconnects the train if already connected or do not accept to supervise it (step 190), because the train is trying to connect to the RBC as if it was

able to manage a higher version of ETCS standard. To avoid any safety issues, no session is opened for the supervision of the train.

[0070] If one compatible version is identified, its value is used to initialise the variable BEST_RBC_VERSION for train 3.

[0071] Because the OBU 10 of the train 3 connects to the RBC with a RBC_ETC_ID not corresponding to the best ETCS system version, BEST_RBC_VERSION, the connection module 22 generates and emits (step 200) a reconnection message M2 to the OBU 10. Message M2 contains the RBC_ETC_ID referring the best ETCS system version BEST_RBC_VERSION for train 3, according to table T.

[0072] On reception of the reconnection message M2, the OBU 10 emits a corrected connection request message M3 containing the ETCS identifier OBU_ETC_ID of the OBU 10, together with the adapted ETCS identifier RBC_ETC_ID.

[0073] The connection module 22 then allocates the management of the said OBU 10 to the proper module capable of handling the ETCS system version designated by the current value of variable BEST_RBC_VERSION.

[0074] For example, the beacon set 7 transmits to the train 3 an ETCS identifier RBC_ETC_ID equal to "2" (M_VERSION=1.0). But, when the OBU 10, listed in table T as supporting ETCS system version M_VERSION=2.0, tries to connect the RBC 20 with the ETCS identifier RBC_ETC_ID equal to "2", corresponding to an older ETCS system version, the RBC 20 forces a reconnection of the OBU with the ETCS identifier RBC_ETC_ID associated to BEST_RBC_VERSION=2.0. Message M2 then comprises RBC_ETC_ID equal to "4" corresponding to BEST_RBC_VERSION=2. Once reconnected, the supervision of train 3 will be managed by module 27.

[0075] For an handing over procedure, for example between the first RBC 20 and the second RBC 30, just before the train 3 cross the boundary between the two adjacent areas 52 and 53, a method similar to the one which has been described above is realised, except that the initial ETCS identifier RBC_ETC_ID of the RBC for the next area is not provided to the train 3 by beacon set 8, but by the previous RCB, in this case RCB 20.

[0076] The previous RBC 20 transmits to the OBU 10 of train 3 the proper ETCS identifier RBC_ETC_ID, i.e. the ETCS identifier of the next RBC associated, in table T, with the current value of variable BEST_RBC_VERSION.

[0077] The train 3 will then be able to manage the handing over procedure itself according to the ETCS standard.

[0078] Thus, for the supervision of a given train, the module of the RBC capable of handling a specific version of the ETCS standard is selected on the basis of the ETCS system version supported by said train.

[0079] The person skill in the art will notice that the RBC according to the invention is able to relax the constraints defined by the version management strategy defined in SUBSET 104 of the ETCS standard, by allowing

the RBC to migrate independently of the OBUs of the trains allow to circulate on the railway.

[0080] To do so, the RBC has to know in advance the ETCS system version(s) used by each OBU. But, according to SUBSET 036 of the ETCS standard, to establish a safe radio communication with an OBU, an RBC has already to know in advance the Euroradio KMAC key applicable to each individual OBU (attributes CBU_KEYS and RBC-KEYS in table T). The identification of the KMAC key is identified by the unique ETCS identifier of each OBU. The invention consists in adding to this individual information, the list of ETCS system versions applicable to each OBU.

[0081] The invention represents an essential added value for a trackside infrastructure operator, which can provide the up to date version of the standard to the infrastructure owners.

[0082] In another embodiment of the RBC according to the invention, rather than having a primary module implementing a full version of the latest version of the ETCS standard and at least one secondary module implementing a full version of an older version of the ETCS standard, the RBC is provided with an input module for the management of the older version(s) than the latest version of the primary module. This input module is capable of filtering the input messages received from a train via the GSM-R unit and, when these messages complies with the older version of the standard, to convert these messages to the latest version, before transmitting the converted messages to the primary module for treatment, the primary module realising the supervision of the corresponding train.

[0083] Similarly, still in this alternative embodiment, an RBC is provided with an output module for filtering the messages outputted by the primary module, and converting the messages to an older version, or even cancelling a message if no equivalent exists in the older version, before transmitting the converted messages to the corresponding train, via the GSM-R unit.

[0084] It is to be noticed that packet switching radio communication (e.g. GPRS), Automatic Train Operation (ATO) and other new features will modify the ETCS language and functions and will therefore only be authorised from a given ETCS system version. This invention permits the in advance introduction of new features, as the RBC will adapt to each specific OBU, prior to the formal implementation of the new ETCS standard that include new ETCS features, but without jeopardizing the interoperability needs of trains that are not yet ready to use these new features: non-specific trains will interface with the ETCS language in the applicable standard without the new features.

Claims

1. Radio Block Centre according to the European Rail Traffic Management System - ERTMS / European

Train Control System - ETCS standard, for train supervision along an area of a railway, comprising a radio communication module and a means for train supervision, **characterised in that**, said means for train supervision being a primary means (26) for the supervision of trains according to a first version of the ETCS standard, the Radio Block Centre (20, 30) further comprise a secondary means (28) for the supervision of trains according to a second version of the ETCS standard, and a connection module (22) capable of automatically detecting the ETCS system version of an On Board Unit (10) of a train (3) trying to connect to the Radio Block Centre, based on a table (T) associating to an ETCS identifier of said On Board Unit a list comprising at least one ETCS system version said On Board Unit supports, and establishing a communication session for the supervision of said train according to the detected ETCS system version.

2. The Radio Block Centre according to claim 1, **characterised in that** it comprises a plurality of modules (26, 27, 28), each module being associated with a particular ETCS system version, in order to allow several ETCS system versions to be managed by the Radio Block Centre.

3. Radio Block Centre according to claim 1 or claim 2, **characterised in that** said primary means for train supervision is a primary module (26) dedicated to the supervision according to a first version of the ETCS standard, defined by a first value of a variable M_VERSION of the ETCS standard, and said secondary means (28) for train supervision is a secondary module dedicated to the supervision according to a second version of the ETCS standard, defined by a second value of the variable M_VERSION of the ETCS standard, the second value being different from the first value.

4. Radio Block Centre according to claim 1, **characterised in that** said primary means for supervision is a primary module dedicated to the supervision according to a first version of the ETCS standard and said secondary means for train supervision comprises an input module capable of translating messages according to a second version of the ETCS standard, different from the first version, into messages according to the first version of the ETCS standard, and an output module capable of translating messages according to the first version of the ETCS standard into messages according to the second version of the ETCS standard, the input and output module embedded the primary module for the supervision of a train (3) whose On Board Unit (10) complies with the second version of the ETCS standard.

5. Radio Block Centre according to any one of the pre-

vious claims, wherein the table (T) of said Radio Block Centre associates an ETCS identifier of the On Board Unit (10) of each train (3) allowed to travel on the railway area supervised by said Radio Block Centre, with a list of the ETCS system versions said On Board Unit (10) complies with.

6. Radio Block Centre according to claim 5, wherein the table (T) of said Radio Block Centre further associates an ETCS identifier of each means for train supervision of each Radio Block Centres positioned along the railway, with a list of the ETCS system version said means for train supervision is capable of handling.

7. Radio Block Centre according to any one of the previous claims, wherein the ETCS system version handled by each means for train supervision of said Radio Block Centre complies with the ETCS Level 2 and / or ETCS Level 3 standard.

8. Method for establishing a connection for communication between a Radio Block Centre, as defined by the European Rail Traffic Management System - ERTMS / European Train Control System - ETCS standard, according to any one of claims 1 to 7, and an On Board Unit (10) of a train (3) complying with a given version of the ETCS standard, **characterised in that** it comprises the step of:

- sending from the On Board Unit a connection request message (M1) containing an ETCS identifier of said On Board Unit;
- based on said ETCS identifier of the On Board Unit, retrieving from the table (T) a first list of ETCS system versions said On Board Unit supports; and,
- when possible, establishing a connection between said On Board Unit and the means for train supervision of said a Radio Block Centre capable of dealing with one of the ETCS system versions of the first list said On Board Unit support.

9. Method according to claim 8, wherein, before entering a railway area managed by a Radio Block Centre, the On Board Unit (10) of a train (3) receives a phone number or a network address of the Radio Block Centre to contact and an ETCS identifier of said Radio Block Centre, said identifier being associated with at least one means for train supervision of said Radio Block Centre, the On Board Unit (10) passing said ETCS identifier of said Radio Block Centre into the connection request message (M1).

10. Method according to claim 8, wherein, when the train (3) arrives near a border between two adjacent areas of the railway that are managed by two different Ra-

dio Block Centres, the hand over procedure from a first Radio Block Centre to a second Radio Block Centre is managed by the On Board Unit (10) of the train which receives from the first Radio Block Centre (20) a phone number or a network address of the second Radio Block Centre (30) to contact and an ETCS identifier of said Radio Block Centre, said identifier being associated with at least one means for train supervision of said second Radio Block Centre, the On Board Unit (10) passing said ETCS identifier into the connection request message (M1).

11. Method according to claim 9 or 10, wherein:

- the Radio Block Centre retrieves from the table (T), based on said ETCS identifier of said Radio Block Centre, a second list of ETCS system versions managed by means for train supervision of said Radio Block Centre;
- the Radio Block Centre compare the first and second list;
- If one of the versions of said second list corresponds to one of the versions of the first list, the connection module (22) initiates a session for the supervision of the train (3) by the corresponding means for train supervision;
- If none of the versions of said second list corresponds to a version of the first list, the connection module (22) selects, from the first list, the value of the ETCS system version corresponding to the most appropriate ETCS system version for said On Board Unit, and read the ETCS identifier of the Radio Block Centre that matches with the value of this most appropriate ETCS system value, and emits a reconnection message (M2) to the On Board Unit, said message comprising said ETCS identifier of Radio Block Centre, and on reception of the reconnection message (M2), the On Board Unit (10) emits a corrected connection request message (M3) containing the ETCS identifier of the Radio Block Centre referring to the most appropriate version of the ETCS system version for the said On Board Unit.

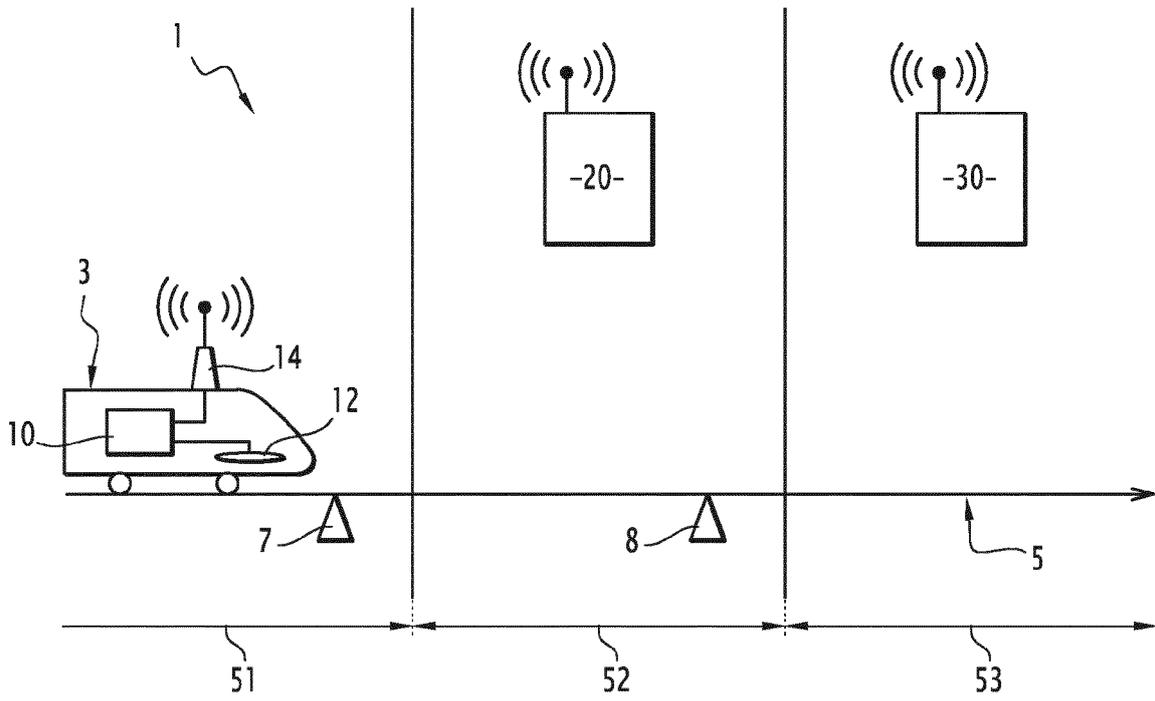


FIG. 1

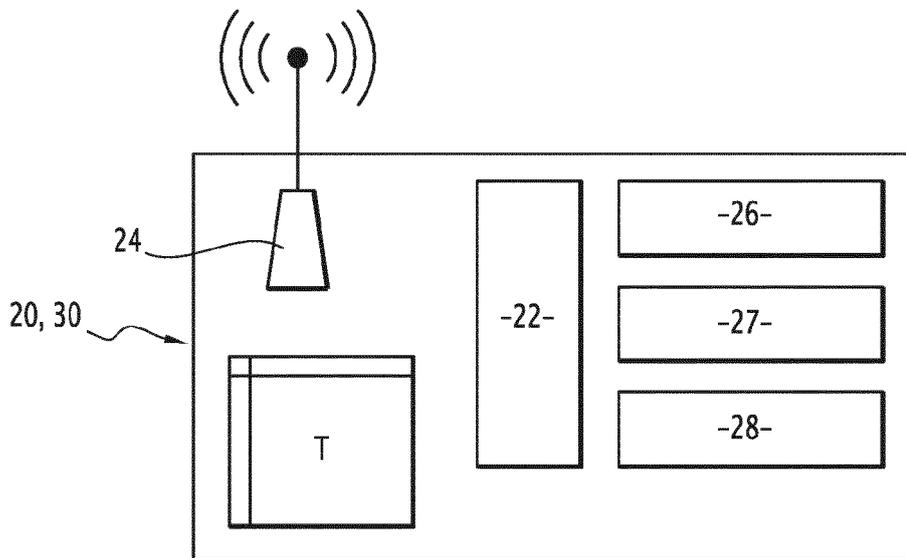


FIG. 2

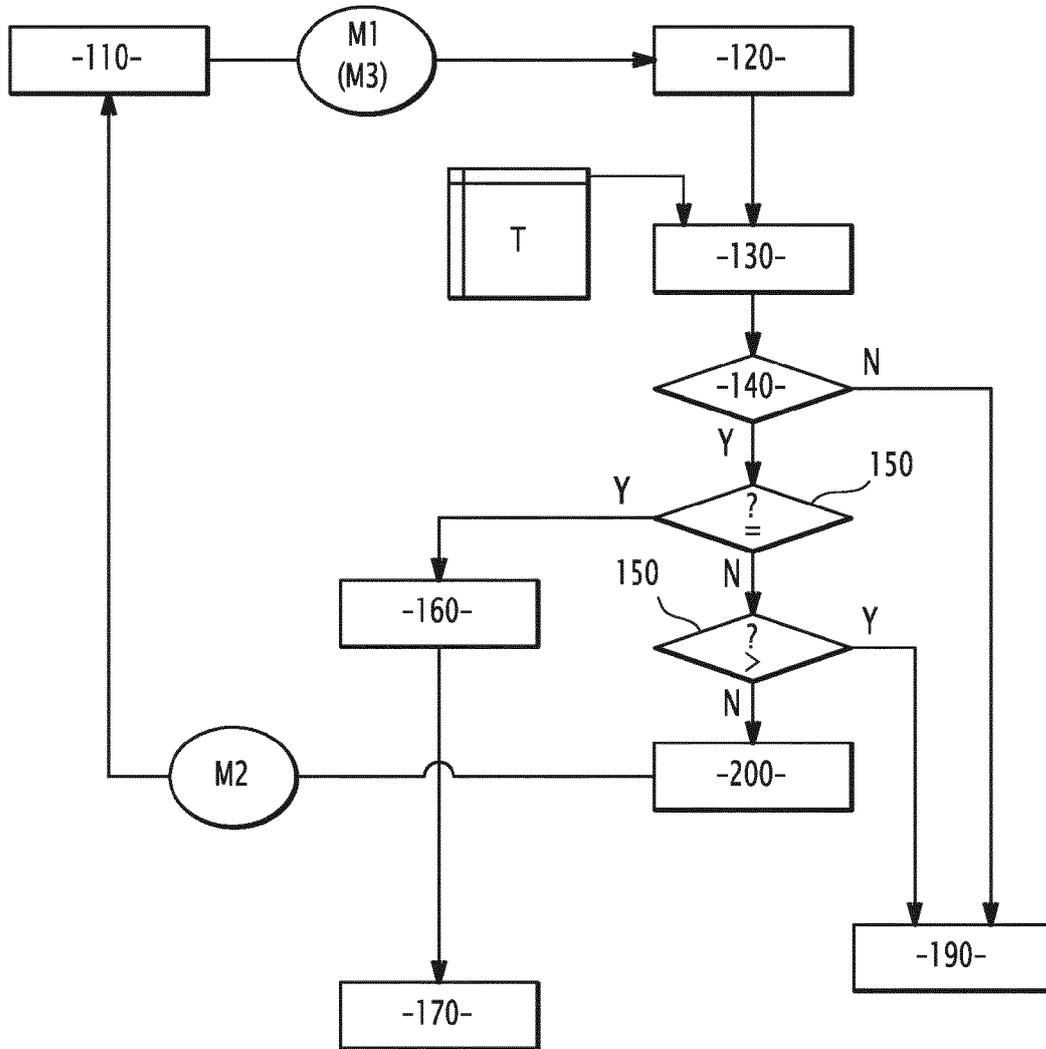


FIG. 3



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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 March 2015	Examiner Robinson, Victoria
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82