(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 079 123 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.10.2016 Bulletin 2016/41

(51) Int Cl.:
G07C 5/00 *(2006.01)* ***G07C 5/08*** *(2006.01)*

(21) Application number: **16164242.6**

(22) Date of filing: **07.04.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **07.04.2015 TR 201504277**

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(54) DIGITAL TACHOGRAPH DATA TRANSFER METHOD FOR VEHICLE TRACKING SYSTEMS

(57) The invention relates to a digital tachograph apparatus (40) attached to digital tachographs (60) and enabling retrieval of data from digital tachographs (60), a VTS modem apparatus (30) attached to VTS modems (20), which are GSM/GPS modems used in the already available (prior art) vehicle tracking systems of relevant vehicle owner organizations, and a data management system (100) enabling wireless data transfer (via Bluetooth) through servers between digital tachographs (60) and VTS modems (20) by means of these apparatus.

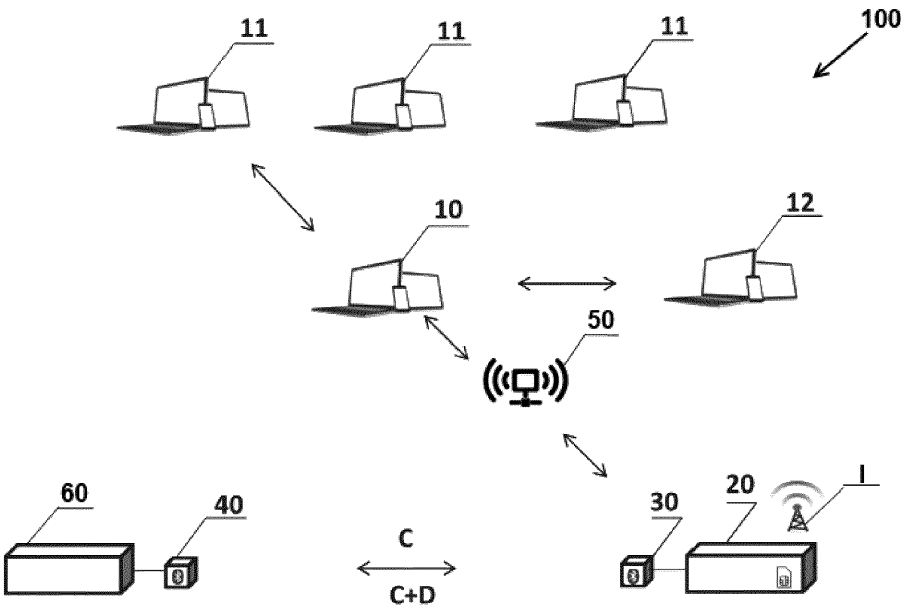

FIGURE 1

EP 3 079 123 A1

Description

The Related Art

[0001] The invention relates to a system for retrieving data from digital tachographs, use of which are mandatory in commercial vehicles, and transmitting the retrieved data to relevant persons and organizations through cloud system.

[0002] The invention particularly relates to a system enabling retrieval/transmission of data through servers via wireless communication, using apparatuses inserted in said digital tachographs and GSM/ GPS modems used in vehicle tracking systems that are already being used vehicle owner organizations.

The Prior Art

[0003] Nowadays, data is retrieved from digital tachographs in three ways.

[0004] The first method comprises retrieving data to an apparatus connected to the 6PIN socket found on digital tachographs and connecting the apparatus to a computer and retrieval of the data from this apparatus and transmission and storage of the data.

[0005] The second method comprises connecting cables to the sockets found at the rear part of the digital tachograph and also connecting this cable to the GSM/ GPS modem found in the vehicle, and thus ensuring retrieval, transmission, and storage of data.

[0006] The third method comprises an apparatus connected to the 6PIN sockets found at the front part of digital tachographs, and retrieving data by means of a GSM/ GPS modem in wireless communication with this apparatus and transmission to and storage in servers operating in a closed circuit manner.

According to regulations, these data are required to be retrieved from digital tachographs based on drivers and vehicles in certain periods and stored in electronic environment.

[0007] In the first method, the person to retrieve the data, inserts the apparatus to the tachograph and thus records the data into the apparatus. The same apparatus is then used in another vehicle and retrieves the data in the same manner. The same operations are repeated for all of the vehicles. In the end, the data recorded in the apparatus are loaded to a computer. This method is quite exhaustive and time consuming, and at the same time, since vehicles are not always found in fixed positions at certain locations, the data may not be retrieved in relevant periods.

[0008] In the second method, reaching the modem from behind the digital tachograph by a cable is a quite difficult and costly operation, and interfering with the sealed parts found at the rear part of the digital tachograph has legal sanctions and fines under relevant regulations.

[0009] In the third method, for collecting data from the tachograph and sending to the relevant server, a modem is required to be found in the data collecting structure. This method requires an additional modem and an additional sim card cost in addition to the modems already used in the vehicle tracking systems.

[0010] Application No. 2006/03512 encountered as a result of technical research relates to improvement of electronic tachograph systems and their intended uses and fields. Patent No. RU2010136270 encountered as a result of technical research comprises digital tachographs and a method for data transfer. However, the prior art structures do not have a novelty aiming to provide solution for the above said drawbacks.

[0011] As a result, the above said drawbacks and the inadequacy of the prior art solutions about the subject have necessitated an improvement in the related technical field.

Purpose of the Invention

[0012] The invention is formed with the inspiration from the prior art situations and aims to solve the above said problems.

[0013] The main purpose of the invention is to enable vehicle owners who have digital tachograph equipment to have a digital tachograph data downloading/storing/analysis system integrated to the vehicle tracking systems they already use, without the need for an extra GSM/ GPS modem and sim card cost, and ensure that they download/store data on time and do not interfere with the sealed parts of the digital tachograph according to relevant regulations.

[0014] Another purpose of the invention is to, prevent vehicle tracking system producers from interfering the operating processes of customer vehicles thanks to apparatuses used by easily inserting into already present GSM/ GPS modems and digital tachographs.

[0015] Another purpose of the invention is to provide a system that can be presented as SaaS (Software as a Service) especially for small and medium sized enterprise vehicle tracking system producers, since Remote Authentication, complex 6PIN socket structure, and analysis of digital tachograph data etc. complicated subjects require long time periods to be solved and their research and development costs are high, and thus prevent loss of time and additional costs for these companies.

[0016] In order to achieve the above said purposes, the invention is a data management system enabling retrieval of digital tachograph data from digital tachographs and transferring of these data to relevant persons, institutions, and organizations via cloud system, comprising:

- a digital tachograph apparatus enabling retrieval of data from the digital tachograph by being inserted into digital tachographs,
- a VTS modem apparatus attached to VTS modems, which are GSM/GPS modems used in vehicle tracking systems, and capable of performing data ex-

change with the digital tachograph apparatus,

- a central server that is in communication with the VTS modem apparatus via VTS modem and provides coordination of communication between all of the servers,
- VTS servers transmitting the data calls requested from the digital tachograph, by the VTS, to the central server,
- a VTS modem server providing data exchange between the central server and the VTS modem,
- an organization server where the data retrieved from the digital tachographs are stored and the vehicle is registered, and
- an organization card connected to the organization servers where the authentication information is stored.

[0017] The structural and characteristic features of the invention and all of its advantages shall be understood better with the figures and the detailed description given below in reference to the figures, and therefore, the assessment should be made by taking into account the said figures and detailed explanations.

Figures for Better Understanding of the Invention

[0018] Figure 1 is a schematic view of the components forming the system according to the present invention.

[0019] Drawings do not have to be scaled and details not necessary for understanding the present invention may be neglected. Moreover, components which are at least widely equal or which have at least widely equal functions are shown with the same number.

Description of Parts References

[0020]

100. Data Management System

10. Central Server

11. VTS Servers
12. Organization Servers

20. VTS Modem
30. VTS Modem Apparatus
40. Digital Tachograph Apparatus
50. VTS Modem Servers
60. Digital Tachograph

I: Internet
C: Crypto data
D: Digital Tachograph Data

Abbreviations for Simplicity:

[0021]

VTS: Vehicle Tracking System

Detailed Description of the Invention

[0022] In this detailed description, the preferred embodiments of the invention are only disclosed for better understanding of the subject without forming any limiting effect.

[0023] The invention relates to a data management system (100) enabling wireless data transfer (via Bluetooth) through servers between digital tachographs (60) and VTS modems (20) by a digital tachograph apparatus (40) attached to the 6PIN socket found in front of digital tachographs (60) and enabling retrieval of data from digital tachographs (60) and a VTS modem apparatus (30) attached to the VTS modems (20), which are GSM/GPS modems used in the already available (prior art) vehicle tracking systems of relevant vehicle owner organizations.

[0024] Said digital tachograph apparatus (40) comprises:

- a K-Line module enabling receiving data and authentication information from the digital tachograph (60),
- a Max232 integrated circuit converting the signals received from R232 serial ports into a suitable format for TTL circuits,
- a microprocessor performing the tasks of management, inspection, and control and enabling digital tachograph apparatus (40) to receive data from the digital tachograph (60) and enabling digital tachograph apparatus (40) to send of these data to the VTS modem apparatus (30),
- a wireless communication unit enabling the digital tachograph apparatus (40) to perform wireless data exchange (Bluetooth) with the VTS modem apparatus (30), and
- an electronic circuit comprising the other chips required for operation of the system.

[0025] Said VTS modem apparatus (30) comprises;

- a microprocessor performing the tasks of management, inspection, and control, and enabling the data requests made by the VTS from the digital tachograph (60) to be received from the VTS modem (20) and sent to the digital tachograph apparatus (40),
- a communication unit enabling the VTS modem apparatus (30) to perform wireless data exchange with the digital tachograph apparatus (40), and
- an electronic circuit comprising the other chips required for operation of the system.

[0026] The system also comprises a central server (10) communicating with the VTS modem apparatus (30) through the VTS modem (20), VTS servers (11) transmitting the data calls requested from the digital tachograph (60) by the VTS to the central server (10), a VTS

modem server (50) providing/managing the data exchange between the central server (10) and the VTS modem (20), and the organization server (12) where the vehicle is registered, and the organization card connected to the organization servers (12).

[0027] The invention basically is a system responding the data retrieval requests coming to the central server (10) from the VTS servers (11) by realizing processes indicated below;

- authentication by the company card of relevant organization by means of communication with the VTS modem apparatus (30) through the VTS modem (20) found in the relevant vehicle,
- after said authentication, retrieving the vehicle/driver data from the digital tachograph (60) by means of the digital tachograph apparatus (40) and then transmitting to these data to the central server (10) through a VTS modem (20).

[0028] The system according to the invention comprises the operation steps of:

- introduction of the VTS Servers (11) and the central server (10) to each other in electronic environment by means of registering/entering the introductory information of the VTS Servers (11) and the central server (10) into the relevant modules of the VTS Servers (11) and the central server (11) in order to ensure formation of bidirectional data traffic,
- introduction of the digital tachograph (60) by means of registering its introductory information (vehicle owner tax number, vehicle licence plate etc.) into the relevant modules of the VTS servers (11) and the central server (10) in order to ensure formation of bidirectional data traffic,
- introduction of the digital tachograph apparatus (40), VTS modem apparatus (30), and VTS modem (20) to each other by means of registering (sending mapping messages) the introductory information of the digital tachograph apparatus (40), VTS modem apparatus (30), and the VTS modem (20) into the relevant modules of the VTS Servers (11) and the central server (10) in order to ensure formation of bidirectional data traffic,
- sending of a request by the VTS server (11) to the central server (10) for retrieving the vehicle and driver data from the digital tachograph (60),
- the central server (10) deciding on which VTS modem server (50) to connect, by means of interpreting the received vehicle and driver data request,
- conversion of the received vehicle and driver data request, by the central server (10), into a message format to be sent to the K-Line module of the digital tachograph (60) by the digital tachograph apparatus (40),
- encryption of the format-converted data, by the central server (10),
- sending of the encrypted data, by the central server (10), to the VTS modem server (50),
- sending of the received encrypted data, by the VTS modem server (50), to the VTS modem (20), without interfering the data,
- transmission of the received encrypted data, by the VTS modem (20), to the VTS modem apparatus (30) integrated thereon, without interfering the data,
- transferring of the received data, by the VTS modem apparatus (30), to the digital tachograph apparatus (40) via wireless communication,
- decryption of the received encrypted data, by the digital tachograph apparatus (40), by means of the microprocessor found therein,
- the digital tachograph apparatus (40), making an inquiry to the digital tachograph (60) about the authentication code to be used in authentication, via the K-Line module found therein,
- sending of the authentication code, by the digital tachograph (60), to the digital tachograph apparatus (40),
- encryption of the received authentication code, by the digital tachograph apparatus (40),
- transmission of the encrypted authentication code, by the digital tachograph apparatus (40), to the VTS modem apparatus (30) via wireless communication,
- transmission of the received encrypted data, by the VTS modem server (30), to the VTS modem (20), without interfering the data,
- transmission of the received encrypted data, by the VTS modem (20), to the VTS modem server (50),
- transmission of the received encrypted data, by the VTS modem server (50), to the central server (10),
- decryption of the incoming encrypted data, by the central server (10),
- transmission of the data containing the authentication code, by the central server (10), to the organization card found as inserted in the organization server (12), via the organization server (12) operating in an integrated manner with the central server (10),
- retrieval of the data containing the authentication approval code from the organization card, by the central server (10),
- notification of the VTS server (11), by the central server (10), about the result of the authentication operation,
- encryption of the received authentication approval code, by the central server (10),
- transmission of the encrypted authentication approval code, by the central server (10), to the VTS modem server (50),
- transmission of the encrypted authentication approval code, by the VTS modem server (50), to the VTS modem (20),
- transmission of the encrypted authentication approval code, by the VTS modem (20), to the VTS modem apparatus (30),

- transmission of the encrypted authentication approval code, by the VTS modem apparatus (30), to the digital tachograph apparatus (40),
- decryption of the received encrypted authentication approval code, by the digital tachograph apparatus (40), by means of the microprocessor found therein,
- transmission of the authentication approval code, by the digital tachograph apparatus (40), to the digital tachograph (60), via the K-Line module found therein,
- after the digital tachograph (60) accepts the authentication approval code;
- requesting of the vehicle and driver data, by the digital tachograph apparatus (40), from the digital tachograph (60),
- encryption of the vehicle and driver data received from the digital tachograph (60), by the digital tachograph apparatus (40),
- transmission of the encrypted data, by the digital tachograph apparatus (40), to the VTS modem apparatus (30),
- transmission of the received encrypted data, by the VTS modem server (30), to the VTS modem (20),
- transmission of the received encrypted data, by the VTS modem (20), to the VTS modem server (50),
- transmission of the received encrypted data, by the VTS modem server (50), to the central server (10),
- decryption of the incoming encrypted data, by the central server (10),
- transmission of the decrypted data, by the central server (10), to the organization servers (12), after converting them into suitable formats (such as storage format for storage, instant call/request format for monitoring, and analysis format for reporting) for the operations to be performed with the data.

[0029] As a result of these operations, vehicle owner organizations will be able to perform all required operations with the data they retrieve from the digital tachographs (60) of their vehicle tracking systems already in use, without the need for extra costs. At the same time, VTS producers will also be able to use this system as Software as a Service (SaaS) without investing on this complicated structure.

[0030] The system of the invention cannot be limited by the descriptions and figures shown herein. Formal changes can be made on the invention regardless of materials and sizes. The positions and numbers of the parts used can be changed and auxiliary accessories can be added. For example, in case of managing the system through the K-Line PINs found at the rear part of digital tachographs (60) and use of sim cards in digital tachographs (60), digital tachograph apparatuses (40) will be able to download vehicle/driver data, collect GPS data, read CAN Bus data directly from the digital tachographs (60).

Claims

1. A data management system (100) enabling retrieval of digital tachograph data (D) from digital tachographs (60) and transferring of these data to relevant persons, institutions, and organizations via cloud system, and it is **characterized in that**; it comprises:

   - a digital tachograph apparatus (40) enabling retrieval of data from the digital tachograph (60) by being inserted into digital tachographs (60),
   - a VTS modem apparatus (30) attached to VTS modems (20), which are GSM/ GPS modems used in vehicle tracking systems, and capable of performing data exchange with the digital tachograph apparatus (40),
   - a central server (10) that is in communication with the VTS modem apparatus (30) via VTS modem (20) and provides coordination of communication between all of the servers,
   - VTS servers (11) transmitting the data calls requested from the digital tachograph (60), by the VTS, to the central server (10),
   - a VTS modem server (50) providing data exchange between the central server (10) and the VTS modem (20),
   - an organization server (12) where the data retrieved from the digital tachographs (60) are stored and the vehicle is registered, and
   - an organization card connected to the organization servers (12) where the authentication information is stored.

2. The data management system (100) according to Claim 1, **characterized in that**; said digital tachograph apparatus (40) comprises:

   - a K-Line module enabling receiving data and authentication information from the digital tachograph (60),
   - a microprocessor performing the tasks of management, inspection, and control and enabling digital tachograph apparatus (40) to receive data from the digital tachograph (60) and enabling digital tachograph apparatus (40) to send of these data to the VTS modem apparatus (30), and
   - a communication unit enabling the digital tachograph apparatus (40) to perform wireless data exchange with the VTS modem apparatus (30).

3. The data management system (100) according to Claim 1, **characterized in that**; said digital tachograph (60) comprises a 6PIN socket enabling connection of the digital tachograph apparatus (40).

4. The data management system (100) according to Claim 1, **characterized in that**; said VTS modem

apparatus (30) comprises;

- a microprocessor performing the tasks of management, inspection, and control, and enabling the data requests made by the VTS from the digital tachograph (60) to be received from the VTS modem (20) and sent to the digital tachograph apparatus (40),
- a communication unit enabling the VTS modem apparatus (30) to perform wireless data exchange with the digital tachograph apparatus (40).

5. The data management system (100) according to Claim 2 or 4, and it is **characterized in that**; said wireless data exchange is Bluetooth.

6. A data management system (100) enabling receiving of digital tachograph data (D) from digital tachographs (60) and transferring of these data to relevant persons, institutions, and organizations via cloud system, and it is **characterized in that**; it comprises the operation steps of:

- introduction of the VTS Servers (11) and the central server (10) to each other in electronic environment by means of registering/entering the introductory information of the VTS Servers (11) and the central server (10) into the relevant modules of the VTS Servers (11) and the central server (11) in order to ensure formation of bidirectional data traffic,
- introduction of the digital tachograph (60) by means of registering its introductory information into the relevant modules of the VTS servers (11) and the central server (10), in order to ensure formation of bidirectional data traffic,
- introduction of the digital tachograph apparatus (40), VTS modem apparatus (30), and VTS modem (20) to each other by means of registering the introductory information of the digital tachograph apparatus (40), VTS modem apparatus (30), and the VTS modem (20) into the relevant modules of the VTS Servers (11) and the central server (10), in order to ensure formation of bidirectional data traffic,
- sending of a request by the VTS server (11) to the central server (10) for retrieving the vehicle and driver data from the digital tachograph (60),
- the central server (10) deciding on which VTS modem server (50) to connect, by means of interpreting the received vehicle and driver data request,
- conversion of the received vehicle and driver data request, by the central server (10), into a message format to be sent to the K-Line module of the digital tachograph (60) by the digital tachograph apparatus (40),
- encryption of the format-converted data, by the central server (10),
- sending of the encrypted data, by the central server (10), to the VTS modem server (50),
- sending of the received encrypted data, by the VTS modem server (50), to the VTS modem (20), without interfering the data,
- transmission of the received encrypted data, by the VTS modem (20), to the VTS modem apparatus (30) integrated thereon, without interfering the data,
- transferring of the received data, by the VTS modem apparatus (30), to the digital tachograph apparatus (40) via wireless communication,
- decryption of the received encrypted data, by the digital tachograph apparatus (40), by means of the microprocessor found therein,
- the digital tachograph apparatus (40), making an inquiry to the digital tachograph (60) about the authentication code to be used in authentication, via the K-Line module found therein,
- sending of the authentication code, by the digital tachograph (60), to the digital tachograph apparatus (40),
- encryption of the received authentication code, by the digital tachograph apparatus (40),
- transmission of the encrypted authentication code, by the digital tachograph apparatus (40), to the VTS modem apparatus (30) via wireless communication,
- transmission of the received encrypted data, by the VTS modem server (30), to the VTS modem (20), without interfering the data,
- transmission of the received encrypted data, by the VTS modem (20), to the VTS modem server (50),
- transmission of the received encrypted data, by the VTS modem server (50), to the central server (10),
- decryption of the incoming encrypted data, by the central server (10),
- transmission of the data containing the authentication code, by the central server (10), to the organization card found as inserted in the organization server (12), via the organization server (12) operating in an integrated manner with the central server,
- retrieval of the data containing the authentication approval code from the organization card, by the central server (10),
- notification of the VTS server (11), by the central server (10), about the result of the authentication operation,
- encryption of the received authentication approval code, by the central server (10),
- transmission of the encrypted authentication approval code, by the central server (10), to the VTS modem server (50),

- transmission of the encrypted authentication approval code, by the VTS modem server (50), to the VTS modem (20),
- transmission of the encrypted authentication approval code, by the VTS modem (20), to the VTS modem apparatus (30),
- transmission of the encrypted authentication approval code, by the VTS modem apparatus (30), to the digital tachograph apparatus (40),
- decryption of the received encrypted authentication approval code, by the digital tachograph apparatus (40), by means of the microprocessor found therein,
- transmission of the authentication approval code, by the digital tachograph apparatus (40), to the digital tachograph (60), via the K-Line module,
- after the digital tachograph (60) accepts the authentication approval code;

  - requesting of the vehicle and driver data, by the digital tachograph apparatus (40), from the digital tachograph (60),
  - encryption of the vehicle and driver data received from the digital tachograph (60), by the digital tachograph apparatus (40),
  - transmission of the encrypted data, by the digital tachograph apparatus (40), to the VTS modem apparatus (30),
  - transmission of the received encrypted data, by the VTS modem server (30), to the VTS modem (20),
  - transmission of the received encrypted data, by the VTS modem (20), to the VTS modem server (50),
  - transmission of the received encrypted data, by the VTS modem server (50), to the central server (10),
  - decryption of the incoming encrypted data, by the central server (10),
  - transmission of the decrypted data, by the central server (10), to the organization servers (12), after converting them into suitable formats for the operations to be performed with the data.

7. The data management system (100) according to Claim 6, **characterized in that**; it comprises introduction of the digital tachograph (60) on the basis of vehicle owner tax number and vehicle licence plate.

8. The data management system (100) according to Claim 6, **characterized in that**; in the operation step of: "transmission of the decrypted data, by the central server (10), to the organization servers (12), after converting them into suitable a format for the operations to be performed with the data", said suitable formats comprise a storage format for storage, an instant call/request format for monitoring, and an analysis format for reporting.

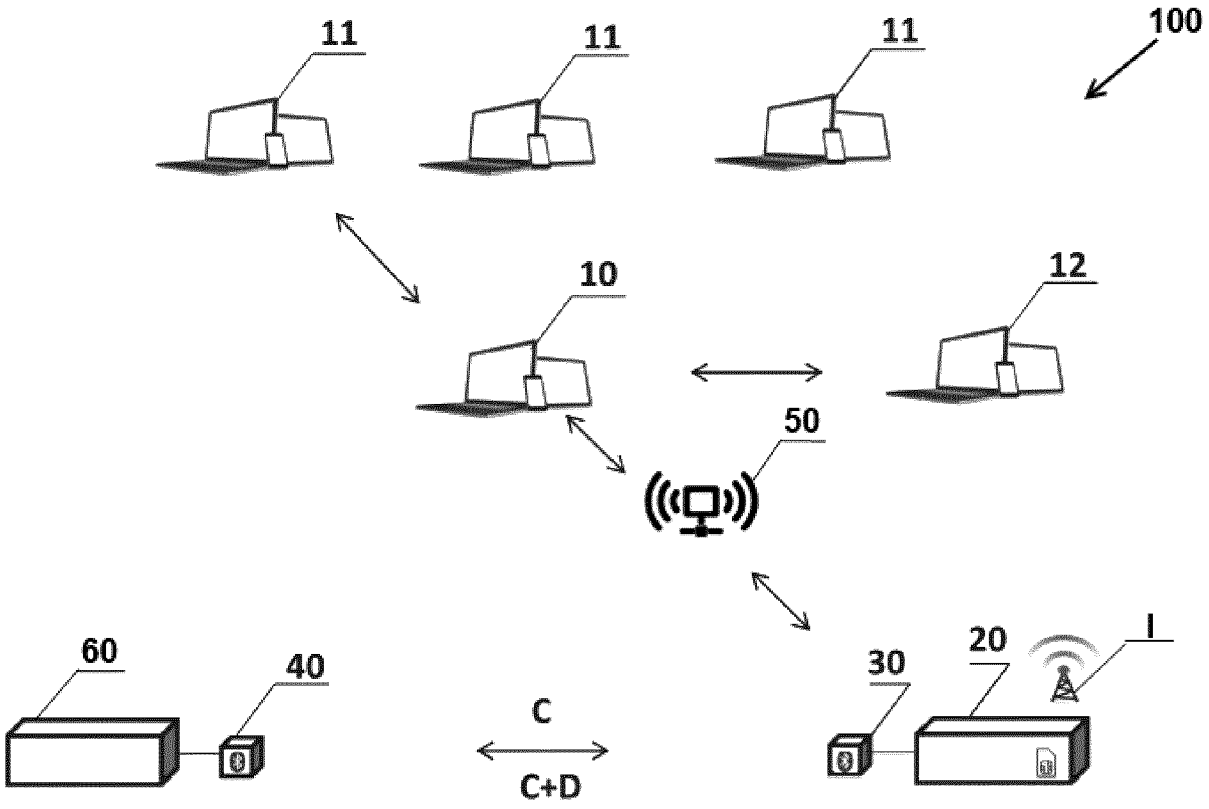

FIGURE 1

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 4242

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)
G07C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 August 2016	Teutloff, Ivo

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