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(54) **METHOD FOR COMMUNICATING DATA FROM A COMPUTING DEVICE TO A LIGHTING TECHNOLOGY DEVICE**

(57) The invention relates to a method (100) for communicating data, such as commissioning data, from a computing device (301) to a lighting technology device (303) with a DALI interface (305), comprising: opening (101) a web browser app on the computing device (301); accessing (103) a predefined web browser address;

sending (105) data from that web browser address to an interface module (309) connected to the computing device (301), the interface module (309) being designed for translating the data onto a DALI bus (307); and sending (107) the data over the DALI bus (307) to the DALI interface (305) of the lighting technology device (303).

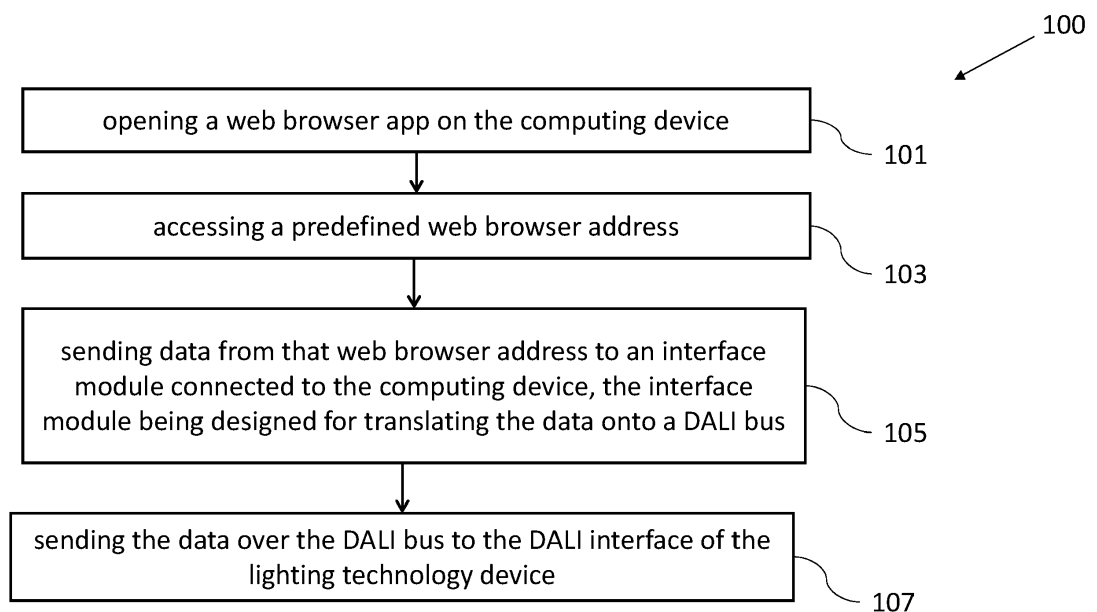


Fig. 1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to methods for exchanging data between a computing device and a lighting technology device that is connected to a DALI bus. The invention further relates to a lighting technology system comprising said computing device and said lighting technology device.

BACKGROUND OF THE INVENTION

[0002] Lighting systems for buildings often comprise a number of lighting technology devices, such as drivers for luminaires, sensors or user interfaces, which can be connected to a DALI bus. The lighting technology devices can exchange communication data, e.g. status messages or commissioning data, with computing devices that are connected to the bus.

[0003] However, in order to establish a communication connection between a computing device and a lighting technology device via DALI, the computing device needs to be connected to the DALI bus and special application software for facilitating the communication needs to be installed on the computing device. This software is often limited to certain operating systems and needs to be updated regularly to make sure that the newest version is used. Furthermore, dedicated drivers usually need to be installed on the computer for establishing the connection to the DALI device.

[0004] Hence, a user requires a special computing device with dedicated software and drivers to exchange data with the lighting technology devices on the DALI bus. This results in increased costs and makes it difficult to access the lighting technology devices if the dedicated computing device is not available.

[0005] Thus, it is an objective to provide a lighting technology system and methods for communicating and receiving data to and from a lighting technology device, respectively, which avoid the above-mentioned disadvantages. In particular, it is an objective to provide a concept for exchanging data between a lighting technology device and a computing device via a DALI bus without requiring dedicated drivers or dedicated software on the computing device.

SUMMARY OF THE INVENTION

[0006] The object of the present invention is achieved by the solution provided in the enclosed independent claims. Advantageous implementations of the present invention are further defined in the dependent claims.

[0007] According to a first aspect, the invention relates to a method for communicating data, such as commissioning data, from a computing device to a lighting technology device with a DALI interface, comprising: opening a web browser app on the computing device; accessing

a predefined web browser address; sending data from that web browser address to an interface module connected to the computing device, the interface module being designed for translating the data onto a DALI bus; and sending the data over the DALI bus to the DALI interface of the lighting technology device. This achieves the advantage that no dedicated software or drivers are required on the computing device to communicate with the lighting technology device.

[0008] The lighting technology device can be a driver for a luminaire, such as a gas discharge lamp, a LED, an OLED or a halogen lamp. The driver can comprise a DALI interface and a microprocessor. Furthermore, the lighting technology device can comprise a sensor, e.g. a motion, a smoke or light sensor, a control unit or a user interface, e.g. a dimmer or a touchscreen.

[0009] The computing device can be a personal computer (PC), a laptop, a tablet or a smartphone.

[0010] The interface module can be an external module or a peripheral that is connected to the computing device, e.g. a DALI USB mouse or a DALI/USB adapter. Alternatively, the interface module can be integrated into the computing device.

[0011] The web browser app can be a pre-installed web browser, in particular a native web browser, of the computing device. The web browser app can be a software or an App of the computing device. For instance, the software can be written in Javascript and is available to all operating systems of the computing device type.

[0012] Preferably, the web browser app is an internet browser and the web browser address corresponds to an internet address. The web browser address can refer to the website having the respective address.

[0013] In particular, sending data from the web browser address comprises sending data provided by a web resource at the respective address.

[0014] In an embodiment, the interface module is connectable to the computing device via a wire bound connection, in particular a USB or an Ethernet-over-USB connection, and/or a wireless connection, in particular a Bluetooth or WiFi connection.

[0015] In an embodiment, the predefined web browser address is accessed upon detecting a connection of the interface module to the computing device. This achieves the advantage that the user does not have to access the web browser address via a manual input.

[0016] In an embodiment, the interface module is adapted to provide a power supply to the DALI bus, in particular if the interface module is connected to the computing device via a USB-C connection. This achieves the advantage that an additional power supply for devices on the DALI bus can be provided. The power supply can be provided in the form of a DC supply voltage.

[0017] In particular, the interface module is adapted to provide a power supply to the lighting technology device via the DALI bus.

[0018] In an embodiment, the interface module can be configured by the computing device, in particular to es-

establish a wireless communication connection to the computing device. This achieves the advantage that a wireless communication can be established efficiently between the interface module and the computing device.

[0019] In particular, configuring the interface module comprises setting or retrieving addresses for the wireless communication.

[0020] In an embodiment, the web browser address corresponds to an internet address, wherein the computing device is configured to download a web resource from the internet address address if the computer is connected to the internet, such that the web browser app can access the web resource after disconnecting the computing device from the internet. This achieves the advantage that the computing device continue exchanging data with the lighting technology device if the computing device is no longer connected to the internet.

[0021] According to a second aspect, the invention relates to a method for receiving data, such as status messages, from a lighting technology device with a DALI-interface at a computing device, comprising: opening a web browser app on the computing device; accessing a predefined web browser address; sending data from a DALI interface of the lighting technology device over a DALI bus to an interface module connected to the computing device, the interface module being designed for translating the data from the DALI bus, in particular to a computer readable format; and forwarding the translated data from the interface module to the web browser address. This achieves the advantage that no dedicated software or drivers are required on the computing device to communicate with the lighting technology device.

[0022] According to a third aspect, the invention relates to a lighting technology system, comprising a computing device, a lighting technology device having a DALI interface configured to connect the device to a DALI bus, and an interface module, wherein the interface module is connectable to the computing device, and wherein the interface module is connectable to the DALI bus, wherein the computing device is configured to open a web browser app and to access a predefined web browser address, wherein the computing device is further configured to send data from that web browser address to the interface module, the interface module being designed for translating the data onto the DALI bus, and wherein the interface module is adapted to send the data over the DALI bus to the DALI interface of the lighting technology device. This achieves the advantage that no dedicated software or drivers are required on the computing device to communicate with the lighting technology device.

[0023] In an embodiment, the interface module is further configured to receive data from the lighting technology device via the DALI bus, wherein the interface module is designed for translating the data from the DALI bus, in particular to a computer readable format, and to forward the data to the computing device. This achieves the advantage that no data can be send to and received from the lighting technology device without using dedicated

software or drivers on the computing device.

[0024] In an embodiment, the interface module comprises a USB interface, in particular a USB-C interface, and/or a wireless interface, in particular a Bluetooth, Thread, or WiFi interface, for connecting the interface module to the computing device.

[0025] In an embodiment, the interface module comprises a DALI interface for connecting the interface module to the DALI bus.

[0026] In an embodiment, the computing device is configured to access the predefined web browser address on the web browser app upon detecting a connection to the interface module. This achieves the advantage that the user does not have to access the web browser address via manual input.

[0027] In an embodiment, the interface module is adapted to provide a power supply to the DALI bus, in particular if the interface module is connected to the computing device via a USB-C connection. This achieves the advantage that an additional power supply for devices on the DALI bus can be provided. The power supply can be provided in the form of a DC supply voltage.

[0028] Preferably, the computing device provides a power supply to the interface module via the USB-C connection. The interface module can then in turn provide a power supply to the DALI bus. In particular, the interface module provides a power supply to the lighting technology device of the system via the DALI bus.

[0029] In an embodiment, the interface module comprises a galvanic isolation stage and/or a DC/DC converter for providing the power supply to the DALI bus. This achieves the advantage that the interface module can provide a suitable DC supply voltage for devices on the DALI bus.

[0030] In an embodiment, the interface module is configured to receive a power supply from the DALI bus. This achieves the advantage that interface modules configured for wireless communication with the computing device can be supplied with electrical power.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The invention will be explained in the followings together with the figures.

Fig. 1 shows a schematic diagram of a method for communicating data from a computing device to a lighting technology device according to an embodiment;

Fig. 2 shows a schematic diagram of a method for receiving data from a lighting technology device at a computing device according to an embodiment;

Fig. 3 shows a schematic diagram of a lighting technology system according to an embodiment;

- Fig. 4a shows a schematic diagram of an interface module according to an embodiment;
- Fig. 4b shows a block diagram of an interface module according to an embodiment; and
- Fig. 5 shows a schematic diagram of a lighting technology architecture according to an embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] The present invention is described more fully hereinafter with reference to the accompanying drawings, in which various aspects of the present invention are shown. This invention however may be embodied in many different forms and should not be construed as limited to the various aspects of the present invention presented through this disclosure. Rather, these aspects are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the present invention to those skilled in the art. The various aspects of the present invention illustrated in the drawings may not be drawn to scale. Rather, the dimensions of the various features may be expanded or reduced for clarity. In addition, some of the drawings may be simplified for clarity. Thus, the drawings may not depict all of the components of a given apparatus.

[0033] The term "LED luminaire" shall mean a luminaire with a light source comprising one or more LEDs. LEDs are well-known in the art, and therefore, will only briefly be discussed to provide a complete description of the invention.

[0034] It is further understood that the aspect of the present invention might contain integrated circuits that are readily manufacturable using conventional semiconductor technologies, such as complementary metal-oxide semiconductor technology, short "CMOS". In addition, the aspects of the present invention may be implemented with other manufacturing processes for making optical as well as electrical devices. Reference will now be made in detail to implementations of the exemplary aspects as illustrated in the accompanying drawings. The same reference signs will be used throughout the drawings and the following detailed descriptions to refer to the same or like parts.

[0035] Fig. 1 shows a schematic diagram of a method 100 for communicating data from a computing device to a lighting technology device according to an embodiment.

[0036] The method 100 comprises: opening 101 a web browser app on the computing device; accessing 103 a predefined web browser address; sending 105 data from that web browser address to an interface module connected to the computing device, the interface module being designed for translating the data onto a DALI bus; and sending 107 the data over the DALI bus to a DALI

interface of the lighting technology device.

[0037] For example, the data comprises commissioning data and the method 100 is used to commission the lighting technology device.

5 **[0038]** The web browser address can correspond to an internet address. The computing device can be configured to download a web resource, e.g. a Web-App, from the internet address if the computer is connected to the internet. If the computer is subsequently disconnected from the internet the web browser app can still access the downloaded web resource. Thus, an internet connection is only initially required to forward data to the lighting technology device.

10 **[0039]** The interface module can be connected to the computing device via a wire bound connection, e.g. a USB, WebUSB, or Ethernet-over-USB connection, or a wireless connection, e.g. via Bluetooth or WiFi.

15 **[0040]** The predefined web browser address can be accessed upon detecting a connection of the interface module to the computing device. Said connection can be detected by the computing device, in particular by the web browser app.

20 **[0041]** Preferably, a user has to manually agree to the connection between the interface module by the web browser address. The web browser address can refer to a website using regular web technologies, such as HTML, JS, or CSS.

25 **[0042]** If the interface module has a wireless functionality, it can be configured by the computing device as long as it is connected to the computing device via a wire bound connection, e.g. a USB connection.

30 **[0043]** Fig. 2 shows a schematic diagram of a method 200 for receiving data from the lighting technology device at the computing device according to an embodiment.

35 **[0044]** The method 200 comprises: opening 201 a web browser app on the computing device; accessing 203 a predefined web browser address; sending 205 data from a DALI interface of the lighting technology device over a DALI bus to an interface module connected to the computing device, the interface module being designed for translating the data from the DALI bus, in particular to a computer readable format; and forwarding 207 the translated data from the interface module to the web browser address.

40 **[0045]** For example, the data that is retrieved by the method 200 comprises status messages from the lighting technology device such as error messages. The method 200 can be used to monitor the lighting technology device on the computing device.

45 **[0046]** The method 100 for communicating data and the method 200 for receiving data can be performed successively or simultaneously using the same computing device, interface module and lighting technology device. In particular, the web browser app and web browser address are designed for supporting both methods 100, 200.

50 **[0047]** Fig. 3 shows a schematic diagram of a lighting technology system 300 according to an embodiment ac-

cording.

[0048] The system 300 comprises the computing device 301, the lighting technology device 303 having the DALI interface 305 configured to connect the device 303 to a DALI bus 307, and an interface module 309, wherein the interface module 309 is connectable to the computing device 301.

[0049] The interface module 309 of the system 300 can be connectable to the DALI bus 307, and in particular to the lighting technology device 303 via the DALI bus 307. The computing device 301 can be configured to open a web browser app on the computing device and to access a predefined web browser address, wherein the computing device 301 can further be configured to send data from that web browser address to the interface module 309, the interface module 309 being designed for translating the data onto the DALI bus 307, and wherein the interface module 309 is adapted to send the data over the DALI bus 307 to the DALI interface 305 of the lighting technology device 303.

[0050] Preferably, the interface module 309 is further configured to receive data from the lighting technology device 303 via the DALI bus 307. The interface module 309 can be designed to translate the data from the DALI bus to a computer readable format and to transfer the translated data to the computing device 301.

[0051] In this way, data can be exchanged in both directions between the computing device 301 and the lighting technology device 303 via the interface module 309.

[0052] The interface module can comprise a communication interface 311 for establishing a communication connection to the computing device. The communication interface 311 can be a USB interface, in particular a USB-C interface or a wireless communication interface, e.g. a Bluetooth, Thread, or WiFi interface.

[0053] Preferably, the interface module 309 also comprises a DALI interface 313 for connecting the module 309 to the DALI bus 307.

[0054] Preferably, if the USB interface 311 of the interface module 309 is a USB-C interface, it is possible to supply the interface module 309 with electrical power from the computing device 301. The interface module 309 can in turn provide a power supply to the DALI bus 307 and the devices on the DALI bus 307. For this purpose, the interface module 309 can comprise a galvanic isolation stage, for instance by means of a DC/DC converter.

[0055] The computing device 301 can be configured to access the predefined web browser address on the web browser app in response to detecting the connection to the interface module 309.

[0056] Fig. 4a shows a schematic diagram of the interface module 309 according to an embodiment.

[0057] The interface module 309 in Fig. 4a is shown as an external module that can be connected to the computing device 301 via a USB connector 401.

[0058] The interface module 309 in Fig. 4a further comprises a housing 403 and the DALI interface 313 for con-

necting the module 309 to the DALI bus 307.

[0059] Fig. 4b shows a block diagram of the interface module 309 according to an embodiment. In particular Figs. 4a and 4b show the same interface module 309.

[0060] The interface module 309 shown in Fig. 4b comprises a USB-C interface 311 that is connected to a USB port 411, e.g. of the computing device 301 and the DALI interface 313 that is connected to the DALI bus 307.

[0061] The interface module 309 further comprises a USB-C power supply unit 405 configured to receive an electrical power supply from the computing device via the USB interface 311. The interface module 309 comprises a further DALI power supply unit 407 configured to forward electrical energy to the DALI bus 307.

[0062] Preferably, the interface module further comprises a processing unit 409. The processing unit 409 can have a WebUSB and/or an USB-EEM (USB-Ethernet Emulation) functionality. The processing unit 409 in Fig. 4b also has an optional wireless functionality.

[0063] Preferably, the interface module 309 can also be adapted as a wireless radio adapter, which for instance uses Bluetooth to connect to the computing device 301. The interface module 309 can additionally comprise the USB interface 311 for configuring the interface module 309 before establishing the wireless connection. If the interface module 309 is not connected to the computing device 301 via USB it can receive a separate voltage supply via the DALI bus 307.

[0064] The processing unit 409 can further be configured to perform the task of translating the data from the DALI bus 307 to a computer readable format and/or translating the data from the computing device 301 on the DALI bus 307.

[0065] Fig. 5 shows a schematic diagram of a lighting technology architecture 500 according to an embodiment.

[0066] The architecture 500 comprises a DALI bus 307 and a mains supply 501 with three lines. The mains supply is connected to the DALI bus 307 via a DALI power supply unit 503 for providing a power supply to the DALI bus 307. In addition, two processor controlled ballasts 505, 507 are connected to the DALI bus 307 and the mains supply 501.

[0067] The architecture 500 further comprises a number of lighting technology devices 303a-303d, which are connected to the DALI bus 307. The lighting technology devices 303a-303d comprise a DALI touch panel 303a, control modules for dimming and switching 303b-c and a control module to set an recall lighting scenes 303d.

[0068] In addition, a number of computing devices 301a-c is connected to the DALI bus via two interface modules 309a-b. Each one of the interface modules 309a-b can correspond to the interface modules 309 as depicted in Fig. 3, 4a and/or 4b. Each one of the computing devices 301a-c can be configured to open a web browser app on the devices 301a-c and to access the predefined web browser address to exchange data with

the interface modules 309a-b.

[0069] The computing devices 301a-c can be connected to an IP network 509, such as the internet or a local network. The web browser address can be an address in the IP network 509 and can refer to a web resource. Updates of the resource stored at this address can be provided centrally to IP network 509 and are thus available to all users.

[0070] In particular, the computing device 301a can have a WebUSB functionality and the computing device 301b has an USB-EEM (USB-Ethernet Emulation) functionality for providing access to the interface module 309a-b from the web browser address. Suitable USB-Ethernet Emulation protocols such as RNDIS, CDC (ECM, EEM, NCM) can be used in the interface modules 309a-b, such that they can be used as network interfaces. The host can then route network traffic which encoded DALI commands into the interface modules 309a-b. Thus, the interface modules 309a-b provide a IP networked DALI interface for the computing devices 301a-c.

[0071] In particular, the interface modules 309a-b can be integrated into the IP network 509 via the computing devices 301a-c without requiring host side applications.

[0072] All features of all embodiments described, shown and/or claimed herein can be combined with each other.

[0073] While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only and not limitation. Numerous changes to the disclosed embodiments can be made in accordance with the disclosure herein without departing from the spirit of scope of the invention. Thus, the breadth and scope of the present invention should not be limited by any of the above-described embodiments. Rather, the scope of the invention should be defined in accordance with the following claims and their equivalence.

[0074] Although the invention has been illustrated and described with respect to one or more implementations, equivalent alternations and modifications will occur to those skilled in the art upon the reading of the understanding of the specification and the annexed drawings. In addition, while a particular feature of the invention may have been disclosed with respect to only one of the several implementations, such features may be combined with one or more other features of the other implementations as may be desired and advantage for any given or particular application.

Claims

1. Method (100) for communicating data, such as commissioning data, from a computing device (301) to a lighting technology device (303) with a DALI interface (305), comprising:

- opening (101) a web browser app on the com-

puting device (301) ;

- accessing (103) a predefined web browser address;

- sending (105) data from that web browser address to an interface module (309) connected to the computing device (301), the interface module (309) being designed for translating the data onto a DALI bus (307); and

- sending (107) the data over the DALI bus (307) to the DALI interface (305) of the lighting technology device (303).

2. Method (100) according to claim 1, wherein the interface module (309) is connectable to the computing device (301) via a wire bound connection, in particular a USB or an Ethernet-over-USB connection, and/or a wireless connection, in particular a Bluetooth, Thread, or WiFi connection.

3. Method (100) according to any one of the preceding claims, wherein the predefined web browser address is accessed upon detecting a connection of the interface module (309) to the computing device (301).

4. Method (100) according to any one of the preceding claims, wherein the interface module (309) is adapted to provide a power supply to the DALI bus (307), in particular if the interface module (309) is connected to the computing device (301) via a USB-C connection.

5. Method (100) according to any one of the preceding claims, wherein the interface module (309) can be configured by the computing device (301), in particular to establish a wireless communication connection to the computing device (301).

6. Method (100) according to any one of the preceding claims, wherein the web browser address corresponds to an internet address, wherein the computing device (301) is configured to download a web resource from the internet address if the computer is connected to the internet, such that the web browser app can access the web resource after disconnecting the computing device (301) from the internet.

7. Method (200) for receiving data, such as status messages, from a lighting technology device (303) with a DALI interface (305) at a computing device (301), comprising:

- opening (201) a web browser app on the computing device (301) ;

- accessing (203) a predefined web browser address;

- sending (205) data from a DALI interface (305) of the lighting technology device (303) over a DALI bus (307) to an interface module (309) con-

- connected to the computing device (301), the interface module (309) being designed for translating the data from the DALI bus (307), in particular to a computer readable format; and
 - forwarding (207) the translated data from the interface module (309) to the web browser address.
8. Lighting technology system (300), comprising:
- a computing device (301),
 - a lighting technology device (303) having a DALI interface (305) configured to connect the device (303) to a DALI bus (307), and
 - an interface module (309),
- wherein the interface module (309) is connectable to the computing device, and wherein the interface module (309) is connectable to the DALI bus (307),
- wherein the computing device (301) is configured to open a web browser app and to access a predefined web browser address,
- wherein the computing device (301) is further configured to send data from that web browser address to the interface module (309), the interface module (309) being designed for translating the data onto the DALI bus (307), and
- wherein the interface module (309) is adapted to send the data over the DALI bus to the DALI interface (305) of the lighting technology device (303).
9. System (300) according to claim 8, wherein the interface module (309) is further configured to receive data from the lighting technology device (303) via the DALI bus (307), wherein the interface module (309) is designed for translating the data from the DALI bus (307), in particular to a computer readable format, and to forward the data to the computing device (301).
10. System (300) according to claim 8 or 9, wherein the interface module (309) comprises a USB interface (311), in particular a USB-C interface, and/or a wireless interface, in particular a Bluetooth or WiFi interface, for connecting the interface module (309) to the computing device (301).
11. System (300) according to any one of claims 8 to 10, wherein the interface module (309) comprises a DALI interface (313) for connecting the interface module to the DALI bus (307) .
12. System (300) according to any one of claims 8 to 11, wherein the computing device (301) is configured to access the predefined web browser address on the web browser app upon detecting a connection to the interface module (309).
13. System (300) according to any one of claims 8 to 12, wherein the interface module (309) is adapted to provide a power supply to the DALI bus (307), in particular if the interface module (309) is connected to the computing device via a USB-C connection.
14. System (300) according to claim 13, wherein the interface module comprises a galvanic isolation stage and/or a DC/DC converter for providing the power supply to the DALI bus (307) .
15. System (300) according to any one of claims 8 to 14, wherein the interface module is configured to receive a power supply from the DALI bus (307).

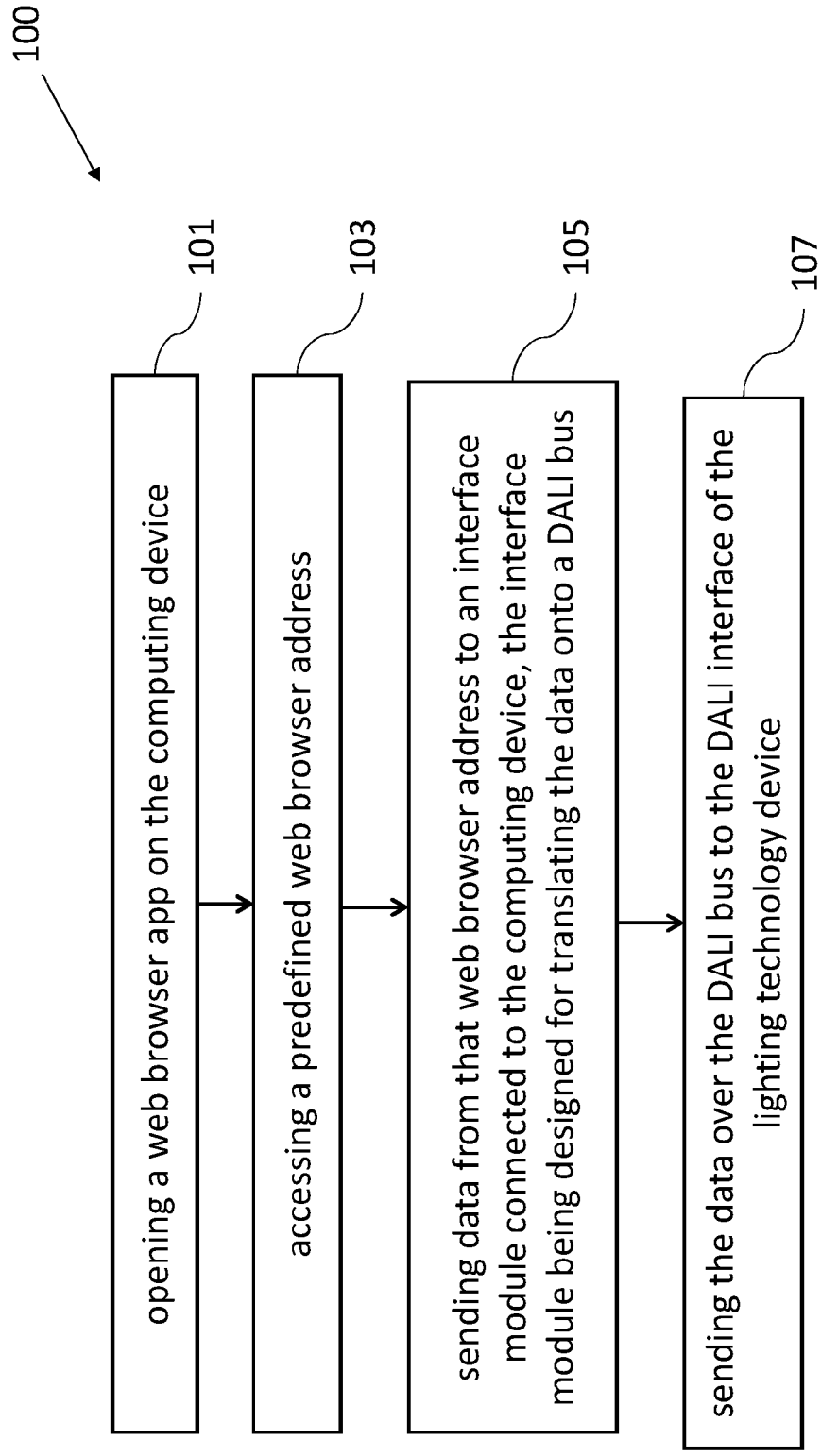


Fig. 1

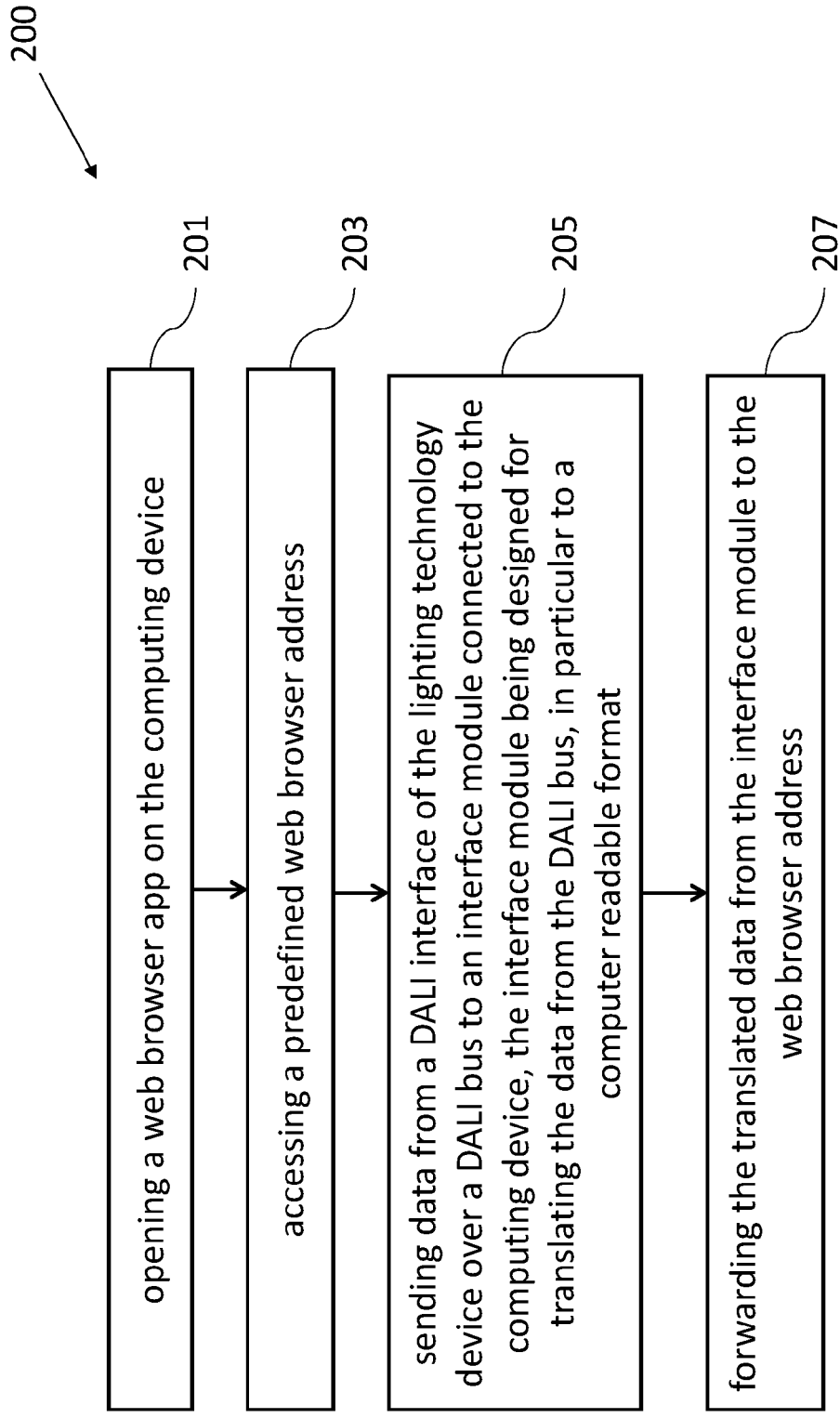


Fig. 2

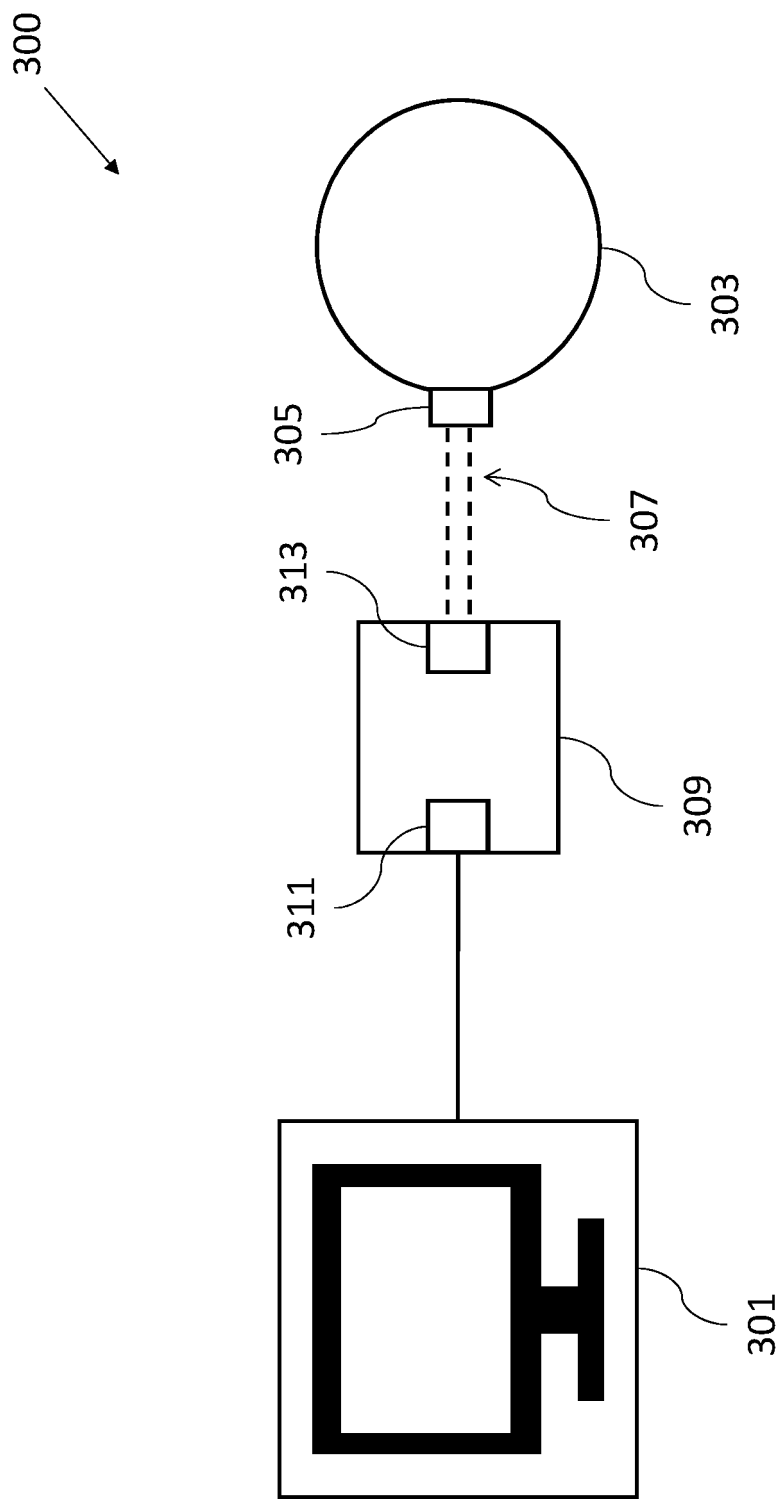


Fig. 3

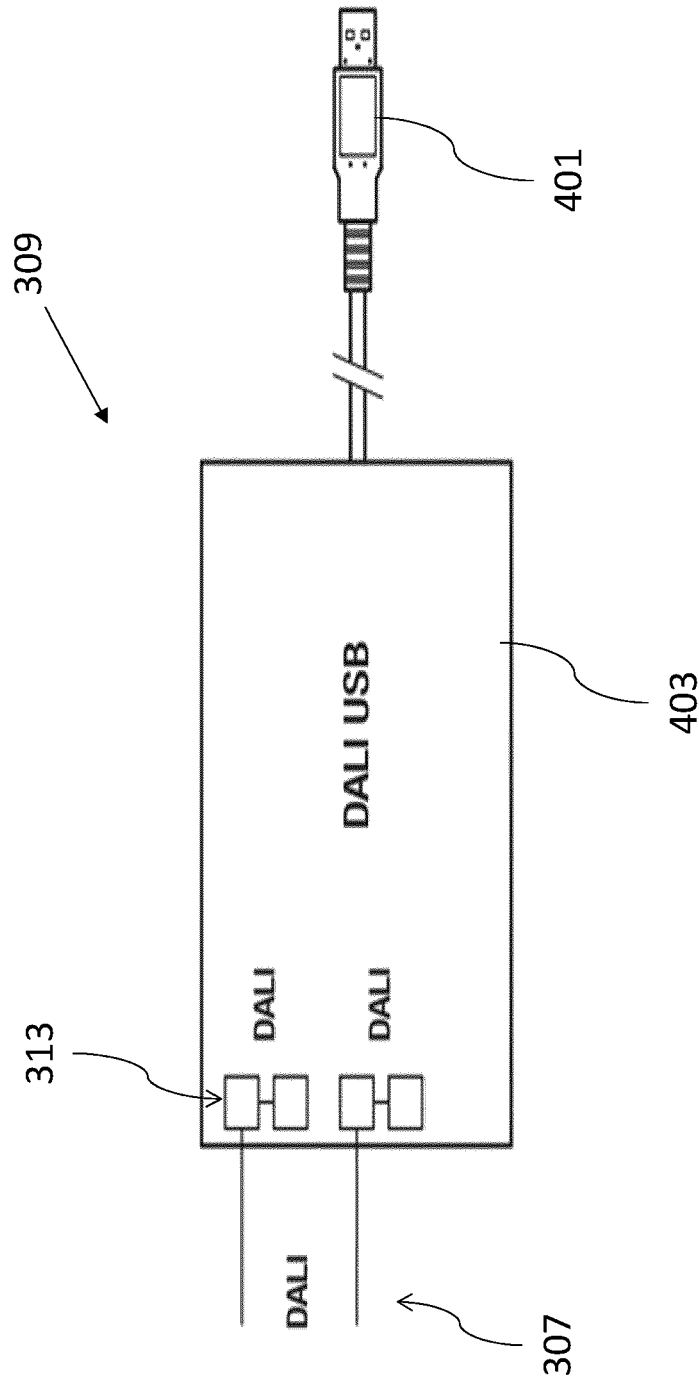


Fig. 4a

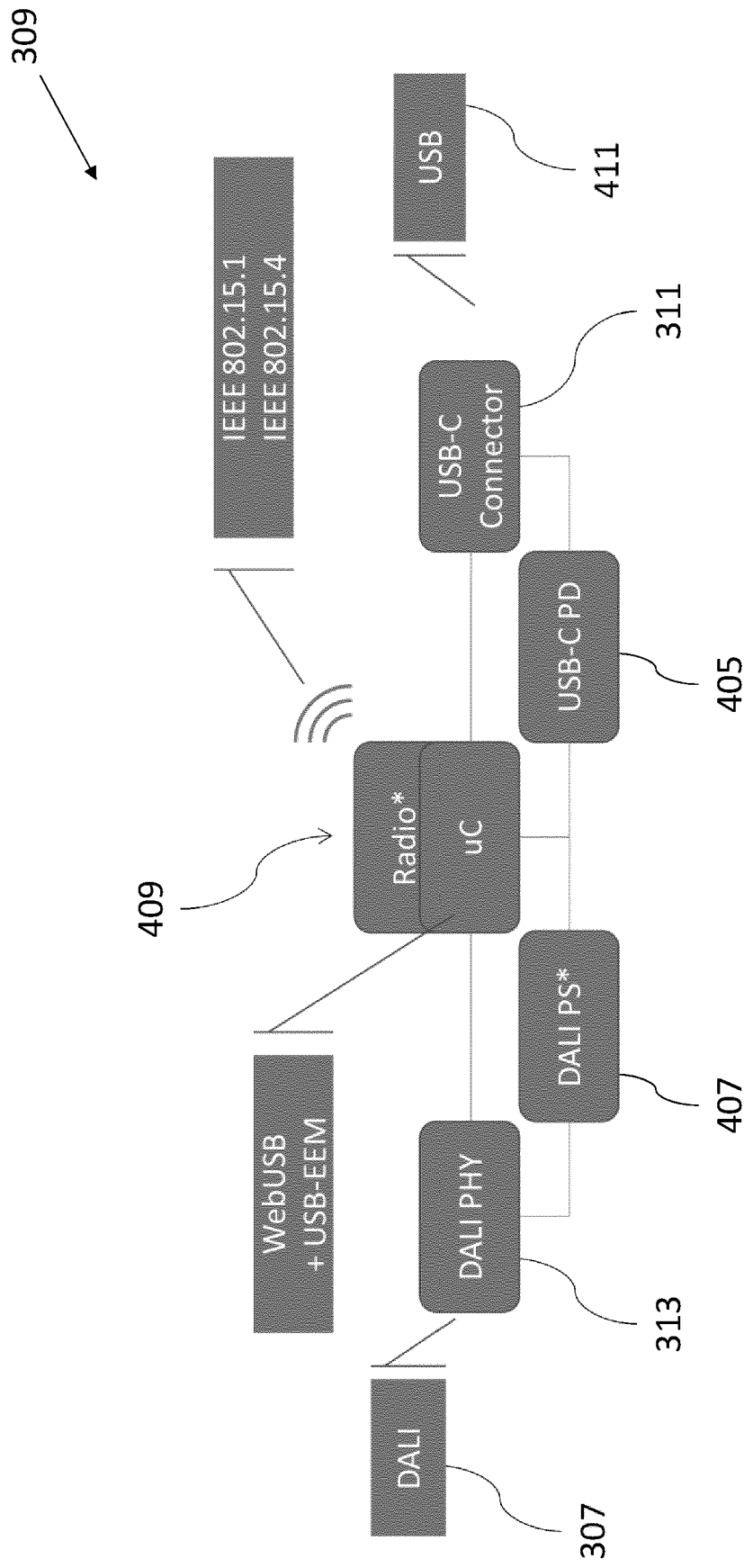


Fig. 4b

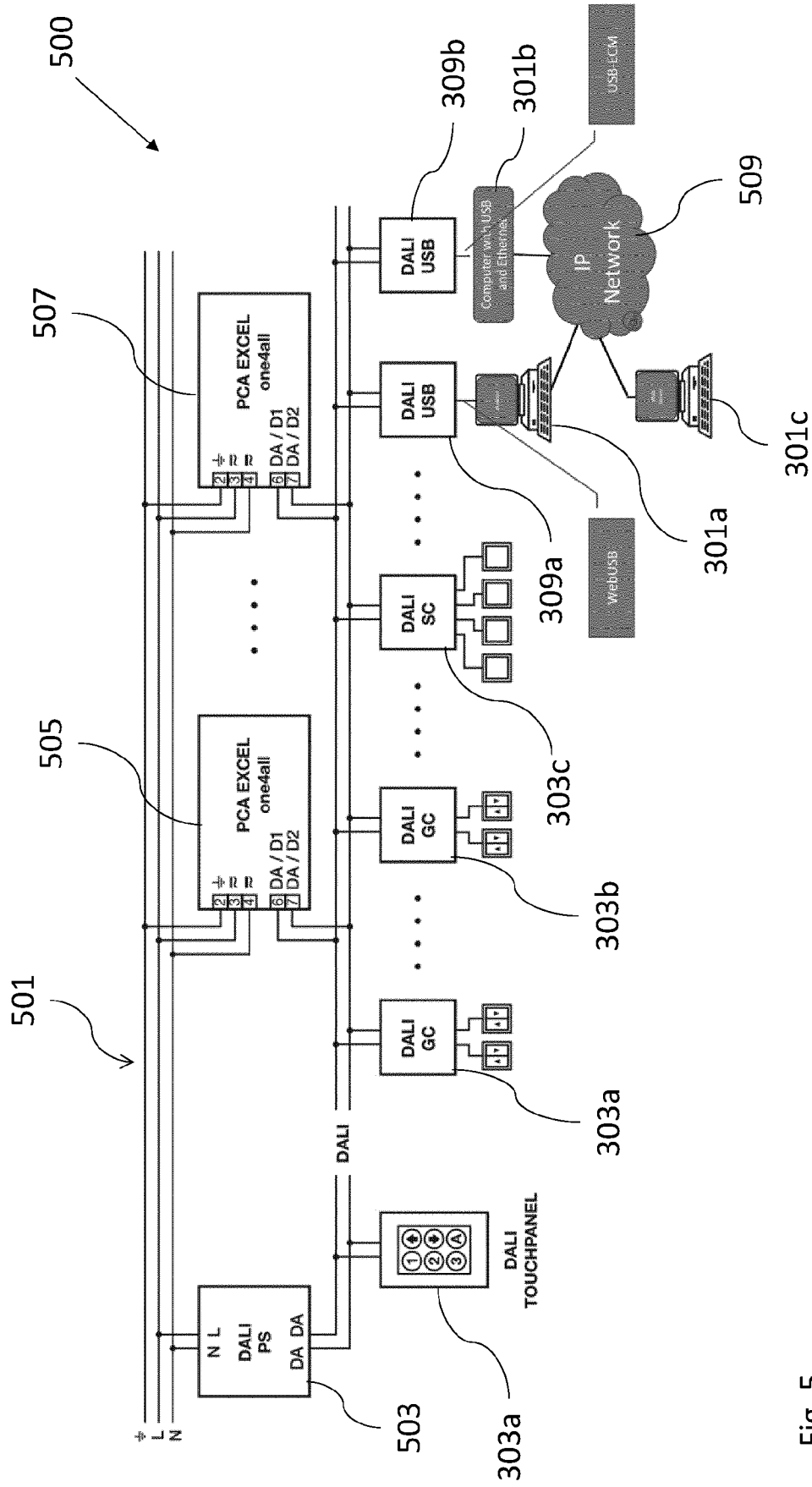


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 20 15 4262

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2017 215125 A1 (TRIDONIC GMBH & CO KG [AT]) 28 February 2019 (2019-02-28)	1,6-9	INV. H05B47/18
Y	* paragraph [0001] - paragraph [0024]; figure 1 *	2-5, 10-15	
X	Mdt Technologies Gmbh: "Technical Manual MDT DaliControl IP Gateway w/ Webinterface", 31 May 2013 (2013-05-31), pages 1-99, XP055512364, 51766 Engelskirchen - Papiermühle 1 Retrieved from the Internet: URL:https://www.mdt.de/download/MDT_TM_Dal iController_02.pdf [retrieved on 2018-10-04] * page 24 - page 25 *	1,7,8	
X	US 2017/311421 A1 (MUELLER SVEN [DE]) 26 October 2017 (2017-10-26) * paragraph [0074] - paragraph [0079]; figures 1, 2 * * paragraph [0093] *	1,7,8	TECHNICAL FIELDS SEARCHED (IPC) H05B
Y	WO 2010/043263 A1 (OSRAM GMBH [DE]; SCHLEICHER GOTTHARD [DE]; SCHNEIDER MATTHIAS [DE]) 22 April 2010 (2010-04-22) * page 5, line 16 - page 11, line 7; figures 1, 2 *	2-5, 10-15	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 June 2020	Examiner Plamann, Tobias
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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