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DESCRIPTION

TECHNICAL FIELD

[0001] The present disclosure generally relates to the charging technical field, and more particularly, to a communication method, a power adapter and a terminal.

BACKGROUND

[0002] Nowadays, smart phones are favored by more and more consumers. However, the smart phone consumes a lot of electricity, and thus needs to be charged frequently. With the increasing of the battery capacity of the smart phone, the charging time becomes longer. Thus, there is a need to realize a quick charging.

[0003] In the related art, in order to realize the quick charging, the tolerance capacity of the smart phone is generally not considered, which directly increases the output current or output voltage of the power adapter, thus resulting in overheating or even burning of the smart phone, and reducing the life time of the smart phone.

[0004] In addition to this, from CN 104 065 126 A and CN 104 065 147 A there is known a communication between a power adapter and a terminal while details are taught for the communication and the involved handshake messages and signals. Further, a charging protecting circuit is disclosed.

SUMMARY

[0005] The mentioned problems are solved by the subject-matter of the independent claims. Further preferred embodiments are defined in the dependent claims.

[0006] In embodiments of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] In order to make technique solutions according to embodiments of the present

disclosure more apparent, drawings needed to be used in descriptions of the embodiments will be illustrated in the following. Obviously, the drawings to be illustrated in the following only represent some embodiments of the present disclosure, and other drawings can be obtained according to these drawings by those having ordinary skills in the related art without making creative labors.

Fig. 1 is a schematic flow chart of a communication method according to an embodiment of the present disclosure.

Fig. 2 is a schematic flow chart of a communication method according to an embodiment of the present disclosure.

Fig. 3 is a schematic block diagram of a power adapter according to an embodiment of the present disclosure.

Fig. 4 is a schematic block diagram of a terminal according to an embodiment of the present disclosure.

Fig. 5 is a schematic block diagram of a power adapter according to an embodiment of the present disclosure.

Fig. 6 is a schematic block diagram of a terminal according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0008] The technical solutions in embodiments of the present invention are hereinafter described clearly and completely with reference to accompanying drawings.

[0009] Fig. 1 is a schematic flow chart of a communication method according to an embodiment of the present disclosure. It should be understood that, the communication method may be applied in a specific process of negotiating an initial charging parameter before a terminal is charged by a power adapter. The method shown in Fig. 1 includes following acts.

[0010] At block 110, handshake information is received from the terminal before the terminal is charged by the power adapter.

[0011] It should be understood that, the terminal may send the handshake information to the power adapter actively or passively. For example, the power adapter first sends a handshake request message to the terminal, and the terminal feeds back a handshake response message carrying the above handshake information to the power adapter after receiving the handshake request message. For another example, the terminal sends a handshake request message carrying the above handshake information to the power adapter actively.

[0012] The above handshake information may include at least one of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0013] It should be understood that, before the charging, the power adapter may conduct the handshake communication once with the terminal, or conduct the handshake communication for several times with the terminal, until the initial charging parameter is determined.

[0014] At block 120, the initial charging parameter is determined by the power adapter according to the handshake information.

[0015] It should be understood that, the initial charging parameter herein includes a parameter required by the power adapter for charging the terminal. For example, the initial charging parameter may include at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0016] It should be noted that, in practice, the power adapter and the terminal may negotiate whether to charge under the quick charging mode or the conventional charging mode. Then, the power adapter and the terminal may negotiate the charging voltage or charging current. Alternatively, the power adapter only negotiates the charging mode with the terminal. Alternatively, the power adapter only negotiates the charging voltage or charging current with the terminal.

[0017] At block 130, the power adapter charges the terminal according to the initial charging parameter.

[0018] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0019] Alternatively, as an embodiment, block 110 may include: sending by the power adapter a handshake request message to the terminal; receiving by the power adapter from the terminal a handshake response message including the handshake information. In other words, the power adapter actively sends the handshake request message to the terminal. In practice, regardless of whether the power adapter is coupled to the terminal, the power adapter may send the handshake request message to the outside via a charging interface continually, and perform the subsequent process of negotiating the initial charging parameter after the handshake response message is received from the terminal.

[0020] Alternatively, block 110 may include: receiving by the power adapter from the terminal a handshake request message including the handshake information. In other words, the terminal actively sends the handshake request message to the power adapter. In practice, regardless of whether the power adapter is coupled to the terminal, the terminal may send the handshake request message to the outside via a charging interface continually, and execute the subsequent process of negotiating the initial charging parameter after the handshake response message is received from the power adapter.

[0021] Alternatively, as an embodiment, block 110 may include: sending by the power adapter a first handshake request message to the terminal; receiving by the power adapter from the terminal a first handshake response message including first information contained in the handshake information, in which the first information indicates that the terminal supports the quick charging mode. Determining by the power adapter the initial charging parameter according to the handshake information includes: determining by the power adapter a charging mode in the initial charging parameter as the quick charging mode according to the first information contained in the handshake information.

[0022] In other words, the power adapter and the terminal negotiate whether to charge the terminal under the quick charging mode or the conventional charging mode, through one handshake. It should be understood that, the above first handshake request message may not carry any information, or the first handshake request message may indicate that the power adapter supports the quick charging mode.

[0023] Further, block 110 may further include: sending by the power adapter a second handshake request message to the terminal; receiving by the power adapter from the terminal a second handshake response message including second information contained in the handshake information, in which the second information indicates a type or a model of the terminal. Determining by the power adapter the initial charging parameter according to the handshake information further includes: determining by the power adapter a charging voltage and/or a charging current in the initial charging parameter according to the second information.

[0024] In other words, after the charging mode is negotiated, the power adapter and the terminal further negotiate the specific charging voltage or charging current. For example, if the model of the power adapter is matched with the model of the terminal, the power adapter may determine the charging voltage or the charging current of the terminal directly after obtaining the model of the terminal.

[0025] Alternatively, as an embodiment, block 120 may include: determining by the power adapter a charging parameter to be negotiated according to the handshake information; sending by the power adapter to the terminal a negotiation request message including the charging parameter to be negotiated; receiving by the power adapter from the terminal a negotiation response message which is generated by the terminal based on the charging parameter to be negotiated; determining by the power adapter the initial charging parameter of the terminal according to the negotiation response message.

[0026] Specifically, after obtaining the handshake information, the power adapter does not determine the initial charging parameter unilaterally, but first determines the charging parameter to be negotiated and then queries the terminal through the negotiation request message whether the charging parameter to be negotiated is appropriate. If the terminal agrees, the charging parameter to be negotiated is determined as the above initial charging parameter; otherwise, the charging parameter to be negotiated is re-determined or modified according to an indication of the terminal. It should be noted that, the terminal may determine whether the charging parameter to be negotiated is appropriate according to its own working parameter, such as a temperature of a battery, an electricity quantity of the battery, a current working state or other information, which is not limited herein.

[0027] It should be noted that, the above negotiation response message may have various forms. Alternatively, as an embodiment, determining by the power adapter the initial charging parameter of the terminal according to the negotiation response message includes: determining by the power adapter the charging parameter to be negotiated as the initial charging parameter if the negotiation response message indicates that the charging parameter to be negotiated is confirmed by the terminal; adjusting by the power adapter the charging parameter to be negotiated based on an adjustment parameter in the negotiation response message and determining the adjusted charging parameter as the initial charging parameter, if the negotiation response message indicates that the charging parameter to be negotiated is denied by the terminal. The adjustment parameter may be a new charging parameter determined by the terminal based on the charging parameter to be negotiated and its own working parameter, or may be some adjustment values and the power adapter is instructed to adjust the charging parameter to be negotiated according to these adjustment values.

[0028] By referring to Fig. 1, the communication method according to an embodiment of the present disclosure is described above in detail from the perspective of the power adapter. By referring to Fig. 2, the communication method according to an embodiment of the present disclosure will be described below in detail from the perspective of the terminal. It should be understood that, the power adapter and the terminal are two devices interacting with each other in the charging negotiation process, in which interactive information and working process may be the same or corresponding. For the sake of brevity, repeated description may be omitted properly.

[0029] Fig. 2 is a schematic flow chart of a communication method according to an embodiment of the present disclosure. It should be understood that, the method in Fig. 2 may include following acts.

[0030] At block 210, before a terminal receives a charging current from a power adapter, handshake information is sent from the terminal to the power adapter, in which the handshake information is used by the power adapter to determine an initial charging parameter.

[0031] It should be understood that, the above handshake information may include at least

one of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0032] At block 220, the charging current outputted by the power adapter according to the initial charging parameter is received by the terminal.

[0033] The initial charging parameter includes at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0034] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal, and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0035] Alternatively, as an embodiment, sending the handshake information to the power adapter includes: receiving by the terminal from the power adapter a handshake request message; sending by the terminal to the power adapter a handshake response message including the handshake information.

[0036] Alternatively, as an embodiment, sending the handshake information to the power adapter includes: receiving by the terminal from the power adapter a first handshake request message; sending by the terminal to the power adapter a first handshake response message including first information contained in the handshake information, in which the first information indicates that the terminal supports a quick charging mode.

[0037] Alternatively, as an embodiment, sending the handshake information to the power adapter further includes: receiving by the terminal from the power adapter a second handshake request message; sending by the terminal to the power adapter a second handshake response message including second information contained in the handshake information, in which the second information indicates a type or a model of the terminal.

[0038] Alternatively, as an embodiment, before the terminal receives the charging current outputted by the power adapter according to the initial charging parameter, the method further includes: receiving by the terminal from the power adapter a charging parameter to be negotiated which is determined by the power adapter based on the handshake information; determining by the terminal according to a working parameter of the terminal whether the terminal may be charged by the power adapter according to the charging parameter to be negotiated provided by the power adapter; if the terminal can be charged by the power adapter according to the charging parameter to be negotiated, sending by the terminal to the power adapter a negotiation response message, in which the negotiation response message instructs the power adapter to determine the charging parameter to be negotiated as the initial charging

parameter; if the terminal cannot be charged by the power adapter according to the charging parameter to be negotiated, sending by the terminal to the power adapter a negotiation response message, in which the negotiation response message includes an adjustment parameter and instructs the power adapter to determine the initial charging parameter according to the adjustment parameter.

[0039] By referring to Fig. 1 and Fig. 2, the communication method according to embodiments of the present disclosure is described in detail above. By referring to Figs. 3 and 6, the power adapter and the terminal according to embodiments of the present disclosure will be described in detail below.

[0040] Fig. 3 is a schematic block diagram of a power adapter according to an embodiment of the present disclosure. It should be understood that, the power adapter 300 in Fig. 3 may implement respective acts in Figs. 1 and 2 executed by a power adapter, which is not described herein to avoid repetition. The power adapter 300 in Fig. 3 includes: a transmitting-receiving unit 310, a determining unit 320 and a charging unit 330.

[0041] The transmitting-receiving unit 310 is configured to receive handshake information from a terminal before the terminal is charged by the power adapter 300.

[0042] The determining unit 320 is configured to determine an initial charging parameter according to the handshake information received by the transmitting-receiving unit 310.

[0043] The charging unit 330 is configured to charge the terminal according to the initial charging parameter determined by the determining unit 320.

[0044] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0045] Alternatively, as an embodiment, the transmitting-receiving unit 310 is specifically configured to send a handshake request message to the terminal, to receive a handshake response message including the handshake information from the terminal.

[0046] Alternatively, as an embodiment, the transmitting-receiving unit 310 is specifically configured to send a first handshake request message to the terminal, to receive a first handshake response message including first information contained in the handshake information from the terminal, in which the first information indicates that the terminal supports a quick charging mode. The determining unit 320 is specifically configured to determine a charging mode in the initial charging parameter as the quick charging mode according to the first information contained in the handshake information.

[0047] Alternatively, as an embodiment, the transmitting-receiving unit 310 is further configured to send a second handshake request message to the terminal, to receive a second handshake response message including second information contained in the handshake information from the terminal, in which the second information indicates a type or a model of the terminal. The determining unit 320 is further configured to determine a charging voltage and/or a charging current in the initial charging parameter according to the second information.

[0048] Alternatively, as an embodiment, the handshake information may include at least one of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0049] Alternatively, as an embodiment, the initial charging parameter may include at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0050] Alternatively, as an embodiment, the determining unit 320 is specifically configured to determine a charging parameter to be negotiated according to the handshake information, to send a negotiation request message including the charging parameter to be negotiated to the terminal, to receive from the terminal a negotiation response message generated by the terminal based on the charging parameter to be negotiated, and to determine the initial charging parameter of the terminal according to the negotiation response message.

[0051] Alternatively, as an embodiment, the determining unit 320 is specifically configured to determine the charging parameter to be negotiated as the initial charging parameter if the negotiation response message indicates that the charging parameter to be negotiated is confirmed by the terminal, to adjust the charging parameter to be negotiated based on an adjustment parameter in the negotiation response message and determine the adjusted charging parameter as the initial charging parameter if the negotiation response message indicates that the charging parameter to be negotiated is denied by the terminal.

[0052] Fig. 4 is a schematic block diagram of a terminal according to an embodiment of the present disclosure. It should be understood that, the terminal 400 in Fig. 4 may implement respective acts in Figs. 1 and 2 executed by a terminal, which is not described herein to avoid repetition. The terminal 400 includes: a transmitting-receiving unit 410, and a charging unit 420.

[0053] The transmitting-receiving unit 410 is configured to send handshake information to a power adapter before a charging current is received from the power adapter, in which the handshake information is used by the power adapter to determine an initial charging parameter.

[0054] The charging unit 420 is configured to receive the charging current outputted by the power adapter according to the initial charging parameter.

[0055] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0056] Alternatively, as an embodiment, the transmitting-receiving unit 410 is specifically configured to receive a handshake request message from the power adapter, to send a handshake response message to the power adapter, in which the handshake response message includes the handshake information.

[0057] Alternatively, as an embodiment, the transmitting-receiving unit 410 is specifically configured to receive a first handshake request message from the power adapter, to send a first handshake response message including first information contained in the handshake information to the power adapter, in which the first information indicates that the terminal supports a quick charging mode.

[0058] Alternatively, as an embodiment, the transmitting-receiving unit 410 is further configured to receive a second handshake request message from the power adapter, to send a second handshake response message including second information contained in the handshake information to the power adapter, in which the second information indicates a type or a model of the terminal.

[0059] Alternatively, as an embodiment, the handshake information may include at least one of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0060] Alternatively, as an embodiment, the initial charging parameter may include at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0061] Alternatively, as an embodiment, the terminal further includes a negotiating unit. The negotiating unit is configured to: receive a charging parameter to be negotiated from the power adapter, in which the charging parameter to be negotiated is generated by the power adapter based on the handshake information; determine according to a working parameter of the terminal whether the terminal can be charged by the power adapter according to the charging parameter to be negotiated provided by the power adapter; if the terminal can be charged by the power adapter according to the charging parameter to be negotiated, send a negotiation response message to the power adapter, the negotiation response message instructing the power adapter to determine the charging parameter to be negotiated as the initial charging parameter; if the terminal cannot be charged by the power adapter according to the charging parameter to be negotiated, send a negotiation response message to the power adapter, the

negotiation response message including an adjustment parameter and instructing the power adapter to determine the initial charging parameter according to the adjustment parameter.

[0062] Fig. 5 is a schematic block diagram of a power adapter according to an embodiment of the present disclosure. It should be understood that, the power adapter 500 in Fig. 5 may implement respective acts in Figs. 1 and 2 executed by a power adapter, which is not described herein to avoid repetition. The power adapter 500 in Fig. 5 includes: a transceiver 510, a processor 520 and a charger 530.

[0063] The transceiver 510 is configured to receive handshake information from a terminal before the terminal is charged by the power adapter 500.

[0064] The processor 520 is configured to determine an initial charging parameter according to the handshake information received by the transceiver 510.

[0065] The charger 530 is configured to charge the terminal according to the initial charging parameter determined by the processor 520.

[0066] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0067] Alternatively, as an embodiment, the transceiver 510 is specifically configured to send a handshake request message to the terminal, to receive a handshake response message including the handshake information from the terminal.

[0068] Alternatively, as an embodiment, the transceiver 510 is specifically configured to send a first handshake request message to the terminal, to receive from the terminal a first handshake response message including first information contained in the handshake information, in which the first information indicates that the terminal supports a quick charging mode. The processor 520 is specifically configured to determine a charging mode in the initial charging parameter as the quick charging mode according to the first information contained in the handshake information.

[0069] Alternatively, as an embodiment, the transceiver 510 is further configured to send a second handshake request message to the terminal, to receive from the terminal a second handshake response message including second information contained in the handshake information, in which the second information indicates a type or a model of the terminal. The processor 520 is further configured to determine a charging voltage and/or a charging current in the initial charging parameter according to the second information.

[0070] Alternatively, as an embodiment, the handshake information may include at least one

of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0071] Alternatively, as an embodiment, the initial charging parameter may include at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0072] Alternatively, as an embodiment, the processor 520 is specifically configured to determine a charging parameter to be negotiated according to the handshake information, to send a negotiation request message including the charging parameter to be negotiated to the terminal, to receive from the terminal a negotiation response message generated by the terminal based on the charging parameter to be negotiated, and to determine the initial charging parameter of the terminal according to the negotiation response message.

[0073] Alternatively, as an embodiment, the processor 520 is specifically configured to determine the charging parameter to be negotiated as the initial charging parameter if the negotiation response message indicates that the charging parameter to be negotiated is confirmed by the terminal, to adjust the charging parameter to be negotiated based on an adjustment parameter in the negotiation response message and determine the adjusted charging parameter as the initial charging parameter if the negotiation response message indicates that the charging parameter to be negotiated is denied by the terminal.

[0074] Fig. 6 is a schematic block diagram of a terminal according to an embodiment of the present disclosure. It should be understood that, the terminal 600 in Fig. 6 may implement respective acts in Figs. 1 and 2 executed by a terminal, which is not described herein to avoid repetition. The terminal 600 includes: a transceiver 610, and a charger 620.

[0075] The transceiver 610 is configured to send handshake information to a power adapter before a charging current is received from the power adapter, in which the handshake information is used by the power adapter to determine an initial charging parameter.

[0076] The charger 620 is configured to receive the charging current outputted by the power adapter according to the initial charging parameter.

[0077] In an embodiment of the present disclosure, before the power adapter charges the terminal, the power adapter receives the handshake information from the terminal and determines the initial charging parameter according to the handshake information, such that the phenomenon in which the mobile phone heats or even is burned out caused by blindly increasing voltage or current of the power adapter may be avoided effectively.

[0078] Alternatively, as an embodiment, the transceiver 610 is specifically configured to receive a handshake request message from the power adapter, to send a handshake response message to the power adapter, in which the handshake response message includes the

handshake information.

[0079] Alternatively, as an embodiment, the transceiver 610 is specifically configured to receive a first handshake request message from the power adapter, to send to the power adapter a first handshake response message including first information contained in the handshake information, in which the first information indicates that the terminal supports a quick charging mode.

[0080] Alternatively, as an embodiment, the transceiver 610 is further configured to receive a second handshake request message from the power adapter, to send to the power adapter a second handshake response message including second information contained in the handshake information, in which the second information indicates a type or a model of the terminal.

[0081] Alternatively, as an embodiment, the handshake information may include at least one of: a model of the terminal, an identification of the terminal; a temperature of a battery in the terminal; a maximum charging voltage supported by the terminal; a maximum charging current supported by the terminal and a charging mode supported by the terminal.

[0082] Alternatively, as an embodiment, the initial charging parameter may include at least one of: a charging mode, a charging voltage and a charging current; in which the charging mode includes a quick charging mode and a conventional charging mode.

[0083] Alternatively, as an embodiment, the terminal further includes a processor. The processor is configured to: receive a charging parameter to be negotiated from the power adapter, in which the charging parameter to be negotiated is generated by the power adapter based on the handshake information; determine according to a working parameter of the terminal whether the terminal can be charged by the power adapter according to the charging parameter to be negotiated provided by the power adapter; if the terminal can be charged by the power adapter according to the charging parameter to be negotiated, send to the power adapter a negotiation response message instructing the power adapter to determine the charging parameter to be negotiated as the initial charging parameter; if the terminal cannot be charged by the power adapter according to the charging parameter to be negotiated, send to the power adapter a negotiation response message including an adjustment parameter and instructing the power adapter to determine the initial charging parameter according to the adjustment parameter.

[0084] It should be understood that, the term "and/or" in this specification describes only an association relationship for describing associated objects and indicates that three relationships may exist. For example, A and/or B may represent the following three cases: only A exists, both A and B exist, and only B exists. In addition, the character "/" in this specification generally indicates an "or" relationship between the associated objects.

[0085] It should be understood that, the sequence numbers in the foregoing procedures do not

mean the order of the implementation. The implementation order of the procedures is determined according to functions and internal logic of the procedures, and should not impose any limitation on the implementation procedure of the embodiments of the present application.

[0086] Those skilled in the art can be aware that, units and algorithm steps in respective examples described with reference to embodiments disclosed in the present disclosure can be realized by electronic hardware or combination of computer software and electronic hardware. Executing these functions in hardware or software depends on particular applications and design constraint conditions of the technical solutions. Technology professionals can use different methods to realize the described functions for each particular application, which should be regarded as being within the scope of the present disclosure.

[0087] Those skilled in the art can understand clearly that, for convenience and simplicity of description, specific working process of the above system, devices and units may refer to corresponding process in the above method embodiments, which will not be elaborated herein.

[0088] It should be understood that, the system, devices and method disclosed in several embodiments provided by the present disclosure can be realized in any other manner. For example, the device embodiments described above can be merely exemplary, for example, the units are just divided according to logic functions. In practical implementation, the units can be divided in other manners, for example, multiple units or components can be combined or integrated into another system, or some features can be omitted or not executed. In addition, the mutual coupling or direct coupling or communication connection described or discussed can be via some interfaces, and indirect coupling or communication connection between devices or units may be electrical, mechanical or of other forms.

[0089] The units illustrated as separate components can be or not be separated physically, and components described as units can be or not be physical units, i.e., can be located at one place, or can be distributed onto multiple network units. It is possible to select some or all of the units according to actual needs, for realizing the objective of embodiments of the present disclosure.

[0090] In addition, respective functional units in respective embodiments of the present disclosure can be integrated into one processing unit, or can be present as separate physical entities. It is also possible that two or more than two units are integrated into one unit.

[0091] If the functions are realized in form of functional software units and are sold or used as separate products, they can be stored in a computer readable storage medium. Based on this understanding, the parts of the technical solutions or the essential parts of the technical solutions (i.e. the parts making a contribution to the related art) can be embodied in form of software product, which is stored in a storage medium, and includes several instruction used for causing a computer device (for example, a personal computer, a server or a network device) to execute all or part of steps in the methods described in respective embodiments of the present disclosure. The above storage medium may be any medium capable of storing

program codes, including a USB flash disk, a mobile hard disk, a Read-Only Memory (ROM), a Random Access Memory (RAM), a disc, or a light disk.

[0092] The foregoing description is only directed to preferred embodiments of the present disclosure.

REFERENCES CITED IN THE DESCRIPTION

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Patentkrav

1. Kommunikationsfremgangsmåde, som, før en strømadapter (300) oplader en terminal (400), omfatter:
- 5 afsendelse fra strømadapteren (300) af en første meddelelse om håndtryksanmodning til terminalen (400);
modtagelse ved strømadapteren (300) af en første meddelelse om håndtrykssvar fra terminalen (400), hvor den første meddelelse om håndtrykssvar omfatter en første oplysning, der angiver, at
- 10 terminalen (400) understøtter en hurtigladefunktion, bestemmelse, ved strømadapteren (300), af en ladefunktion i den første ladeparameter som hurtigladefunktionen, ifølge den første oplysning,
afsendelse fra strømadapteren (300) af en anden meddelelse om
- 15 håndtryksanmodning til terminalen (400);
modtagelse ved strømadapteren (300) af en anden meddelelse om håndtrykssvar fra terminalen (400), hvor den anden meddelelse om håndtrykssvar omfatter en anden oplysning, der angiver en type eller model for terminalen (400);
- 20 bestemmelse, ved strømadapteren (300), af en ladespænding og/eller ladestrømstyrke i den første ladeparameter ifølge den anden oplysning, og
opladning, ved strømadapteren (300), af terminalen (400) ifølge den første ladeparameter i henhold til den fastlagte
- 25 ladefunktion og den fastlagte ladespænding og/eller en ladestrømstyrke.
2. Fremgangsmåden ifølge krav 1, der yderligere omfatter:
bestemmelse, ved strømadapteren (300), af en ladeparameter,
- 30 der skal forhandles, i henhold til håndtryksoplysningerne;
afsendelse, ved strømadapteren (300), af en meddelelse om forhandlingsanmodning til terminalen (400), hvor meddelelsen om forhandlingsanmodning omfatter den ladeparameter, der skal forhandles;
- 35 modtagelse, ved strømadapteren (300), af en meddelelse om forhandlingssvar fra terminalen (400), hvor meddelelsen om forhandlingssvar genereres ved hjælp af terminalen på grundlag af den ladeparameter, der skal forhandles;

bestemmelse, ved strømadapteren (300), af den første ladeparameter for terminalen i henhold til meddelelsen om forhandlingssvar;

bestemmelse, ved strømadapteren (300), af den ladeparameter, der skal forhandles, som den første ladeparameter, hvis meddelelsen om forhandlingssvar angiver, at den ladeparameter, der skal forhandles, bekræftes af terminalen; og

justering, ved strømadapteren (300), af den ladeparameter, der skal forhandles, på grundlag af en justeringsparameter i meddelelsen om forhandlingssvar, og bestemmelse, ved strømadapteren (300), af en justeret ladeparameter som den første ladeparameter, hvis meddelelsen om forhandlingssvar angiver, at den ladeparameter, der skal forhandles, er afvist af terminalen (400).

3. Kommunikationsfremgangsmåde, der omfatter:

modtagelse, ved en terminal (400), af en første meddelelse om håndtrykssvar til terminalen (400), hvor den første meddelelse om håndtrykssvar omfatter en første oplysning, der angiver, at terminalen (400) understøtter en hurtigladedefunktion,

afsendelse, ved terminalen (400), af en første meddelelse om håndtrykssvar til terminalen (400), hvor den første meddelelse om håndtrykssvar omfatter en første oplysning, der angiver, at terminalen (400) understøtter en hurtigladedefunktion,

modtagelse, ved terminalen (400), af en anden meddelelse om håndtrykssvar til terminalen (400), hvor den anden meddelelse om håndtrykssvar omfatter en anden oplysning i håndtrykssvarene, og den anden oplysning angiver en type eller model for terminalen (400).

afsendelse, ved strømadapteren (400), af en anden meddelelse om håndtrykssvar til strømadapteren, hvor den anden meddelelse om håndtrykssvar omfatter en anden oplysning i håndtrykssvarene, og den anden oplysning angiver en type eller model for terminalen (400).

4. Fremgangsmåden ifølge krav 3, hvor, før modtagelse ved terminalen (400), den ladestrømstyrke, der produceres af strømadapteren (300) i henhold til den første ladeparameter, yderligere omfatter:

modtagelse, ved terminalen (400), af en ladeparameter, der skal forhandles, fra strømadapteren, hvor den ladeparameter, der skal forhandles, bestemmes af strømadapteren (300) på grundlag af håndtrykssvarene;

bestemmelse, ved terminalen (400), i henhold til en arbejdsparameter for terminalen, af, om terminalen kan oplades af strømadapteren, i henhold til den ladeparameter, der skal forhandles, og som tilvejebringes af strømadapteren (300);

5 om terminalen (400) kan oplades af strømadapteren (300) i henhold til den ladeparameter, der skal forhandles, hvorved der sendes en meddelelse om forhandlingssvar til strømadapteren (300), hvor meddelelsen om forhandlingssvar instruerer strømadapteren til at bestemme den ladeparameter,
10 der skal forhandles, som den første ladeparameter;
om terminalen (400) ikke kan oplades af strømadapteren (300) i henhold til den ladeparameter, der skal forhandles, hvorved der sendes en meddelelse om forhandlingssvar til strømadapteren (300), hvor meddelelsen om forhandlingssvar
15 omfatter en justeringsparameter og instruerer strømadapteren til at bestemme den første ladeparameter i henhold til justeringsparameteren.

5. Strømadapter, der omfatter:

20 en sender-/modtagerenhed (310), der er konfigureret til at modtage håndtryksoplysninger fra en terminal (400), før terminalen oplades af strømadapteren;
en bestemmelsesenhed (320), der er konfigureret til at bestemme en første ladeparameter i henhold til de
25 håndtryksoplysninger, der modtages af sender-/modtagerenheden (310); og
en ladeenhed (330), der er konfigureret til at oplade terminalen (400) i henhold til den første ladeparameter, der er bestemt af bestemmelsesenheden, hvor sender-
30 /modtagerenheden (310) er særligt konfigureret til at sende en første meddelelse om håndtryksanmodning til terminalen (400) og til at modtage en første meddelelse om håndtrykssvar fra terminalen (400), hvor den første meddelelse om håndtrykssvar omfatter en første oplysning i håndtryksoplysningerne, og hvor
35 den første oplysning angiver, at terminalen (400) understøtter en hurtigladefunktion;
bestemmelsesenheden (320) er særligt konfigureret til at bestemme ladefunktionen i den første ladeparameter som

hurtigladefunktionen, i henhold til den første oplysning i håndtryksoplysningerne, og hvor sender-/modtagerenheden (310) er yderligere konfigureret til at sende en anden meddelelse om håndtryksanmodning til terminalen og til at modtage en anden meddelelse om håndtryksanmodning fra terminalen (400), hvor den anden meddelelse om håndtrykssvar omfatter en anden oplysning i håndtryksoplysningerne, og den anden oplysning angiver en type eller en model for terminalen (400); bestemmelsesenheden (320) er yderligere konfigureret til at bestemme en ladespænding og/eller en ladestrømstyrke i den første ladeparameter, i henhold til den anden oplysning i håndtryksoplysningerne.

6. Strømadapteren (300) ifølge krav 5, hvor bestemmelsesenheden (320) er særligt konfigureret til at: bestemme en ladeparameter, der skal forhandles, i henhold til håndtryksoplysningerne; afsende en meddelelse om forhandlingsanmodning til terminalen (400), hvor meddelelsen om forhandlingsanmodning omfatter den ladeparameter, der skal forhandles; modtage en meddelelse om forhandlingssvar fra terminalen (400), hvor meddelelsen om forhandlingssvar genereres ved hjælp af terminalen på grundlag af den ladeparameter, der skal forhandles; og bestemme den første ladeparameter for terminalen (400) i henhold til meddelelsen om forhandlingssvar, og hvor bestemmelsesenheden (320) er særligt konfigureret til at: bestemme den ladeparameter, der skal forhandles, som den første ladeparameter, hvis meddelelsen om forhandlingssvar angiver, at den ladeparameter, der skal forhandles, bekræftes af terminalen (400); og justere den ladeparameter, der skal forhandles, på grundlag af en justeringsparameter i meddelelsen om forhandlingssvar, og bestemme en justeret ladeparameter som den første ladeparameter, hvis meddelelsen om forhandlingssvar angiver, at den ladeparameter, der skal forhandles, er afvist af terminalen (400).

7. Terminal (400), der omfatter:

en sender-/modtagerenhed (410), der er konfigureret til at sende håndtryksoplysninger til en strømadapter (300), før den modtager en ladestrømstyrke fra strømadapteren, hvor
5 håndtryksoplysningerne bruges af strømadapteren (300) til at bestemme en første ladeparameter; og
en ladeenhed (420), der er konfigureret til at modtage den ladestrøm, der produceres af strømadapteren, i henhold til den første ladeparameter,

10 hvor sender-/modtagerenheden (410) er særligt konfigureret til at:

modtage en første meddelelse om håndtryksanmodning fra strømadapteren; og

sende en første meddelelse om håndtrykssvar til strømadapteren
15 (300), hvor den første meddelelse om håndtrykssvar omfatter en første oplysning i håndtryksoplysningen, og den første oplysning angiver, at terminalen (400) understøtter en hurtiglade-funktion, og

20 hvor sender-/modtagerenheden (410) er yderligere konfigureret til at:

modtage en anden meddelelse om håndtryksanmodning fra strømadapteren (300); og

sende en anden meddelelse om håndtrykssvar til strømadapteren (300), hvor den anden meddelelse om håndtrykssvar omfatter en
25 anden oplysning i håndtryksoplysningerne, og den anden oplysning angiver en type eller model for terminalen (400).

8. Terminalen (400) ifølge krav 7, der yderligere omfatter en forhandlingsenhed, der er konfigureret til at:

30 modtage en ladeparameter, der skal forhandles, fra strømadapteren (300), hvor den ladeparameter, der skal forhandles, bestemmes af strømadapteren (300) på grundlag af håndtryksoplysningen;

bestemme i henhold til en arbejdsparameter for terminalen
35 (400), om terminalen kan oplades af strømadapteren (300) i henhold til den ladeparameter, der skal forhandles, og som tilvejebringes af strømadapteren;

hvis terminalen kan oplades af strømadapteren (300) i henhold

til den ladeparameter, der skal forhandles, sende en meddelelse om forhandlingssvar til strømadapteren (300), hvor meddelelsen om forhandlingssvar instruerer strømadapteren (300) til at bestemme den ladeparameter, der skal forhandles, 5 som den første ladeparameter; hvis terminalen (400) ikke kan oplades af strømadapteren (300) i henhold til den ladeparameter, der skal forhandles, sende en meddelelse om forhandlingssvar til strømadapteren (300), hvor meddelelsen om forhandlingssvar omfatter en 10 justeringsparameter og instruerer strømadapteren til at bestemme den første ladeparameter i henhold til justeringsparameteren.

9. Kommunikationsfremgangsmåden ifølge et hvilket som helst 15 af kravene 1 til 4 eller strømadapter ifølge et hvilket som helst af kravene 5 til 6 eller terminalen ifølge et hvilket som helst af kravene 7 til 8, hvor håndtryksoplysningen omfatter mindst én af: en model af terminalen (400), et id for terminalen (400), en temperatur for et batteri i terminalen 20 (400) , en maksimal ladespænding, der understøttes af terminalen (400), en maksimal ladestrømstyrke, der understøttes af terminalen (400), og en ladefunktion, der understøttes af terminalen (400), og hvor den første ladeparameter omfatter mindst én af: en ladefunktion, en 25 ladespænding og en ladestrømstyrke, hvor ladefunktionen omfatter en hurtigladefunktion og en konventionel ladefunktion.

DRAWINGS

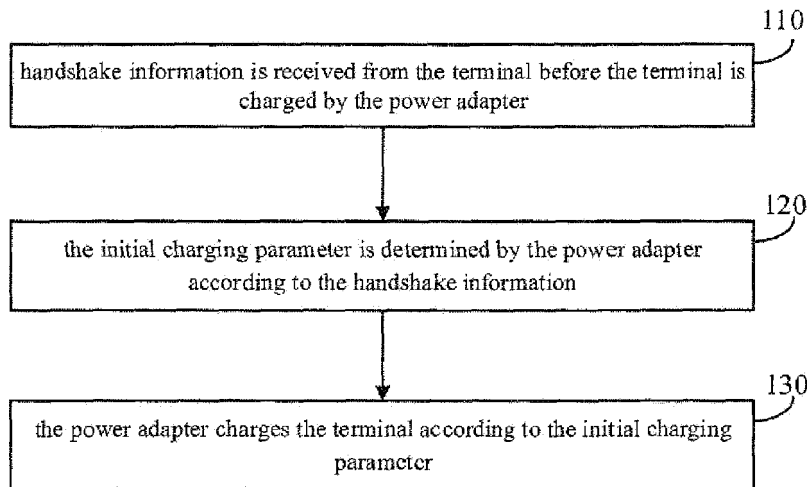


Fig. 1

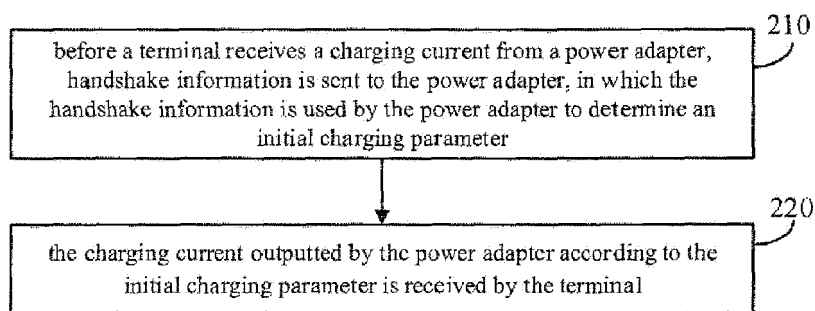


Fig. 2

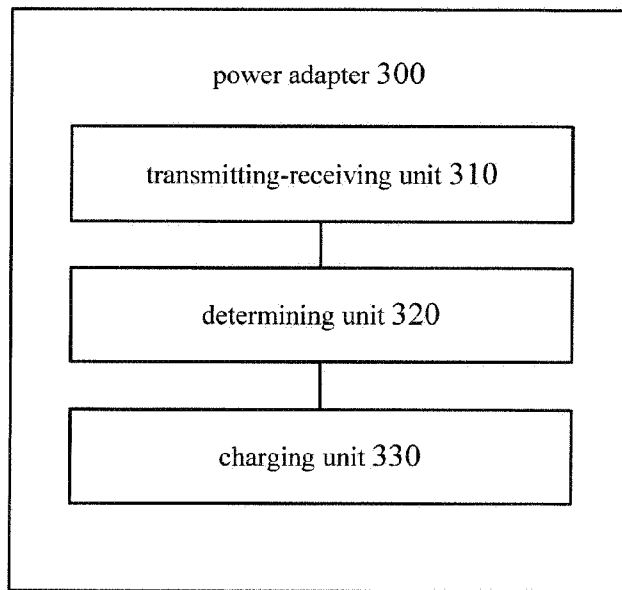


Fig. 3

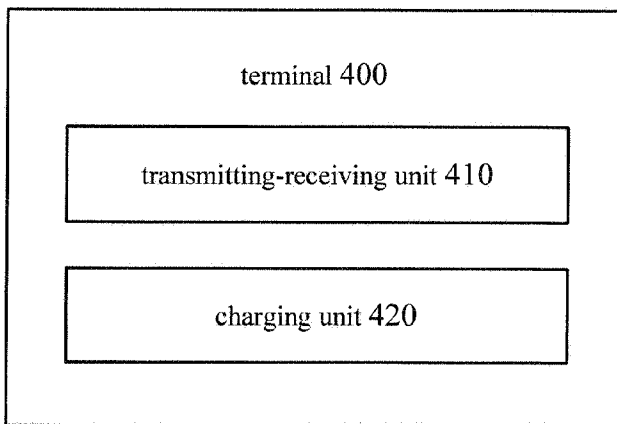


Fig. 4

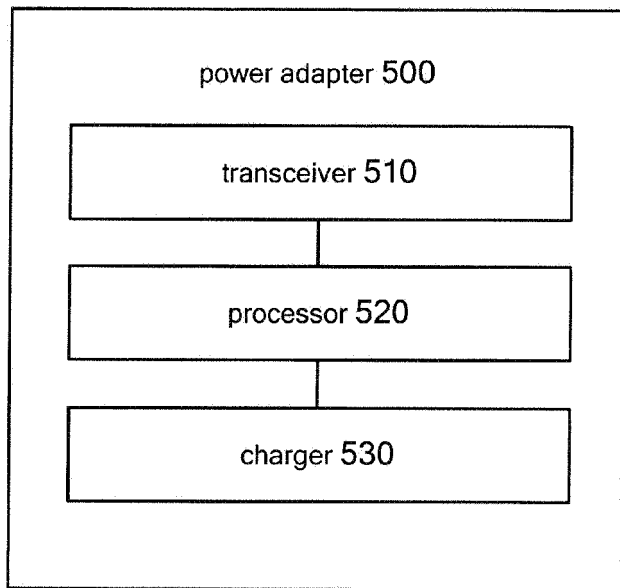


Fig. 5

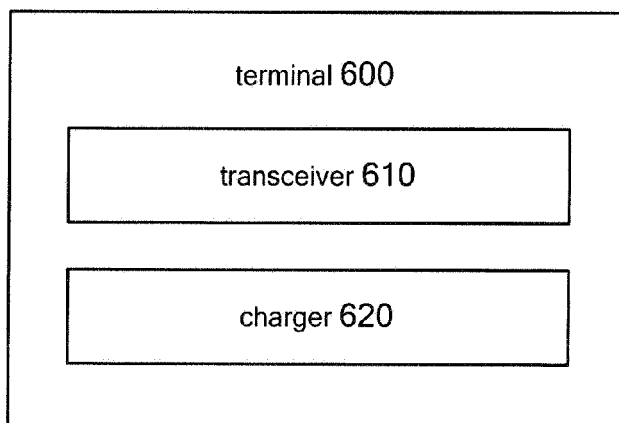


Fig. 6