

PAYMENT SERVICE PROCESSING METHOD, APPARATUS, AND DEVICE

[0001] This application claims priority to Chinese Patent Application No. 2025101857034, filed with the China National Intellectual Property Administration on February 19, 2025 and
5 entitled "PAYMENT SERVICE PROCESSING METHOD, APPARATUS, AND DEVICE", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This specification relates to the field of electronic payment technologies, and in particular, to a payment service processing method, apparatus, and device.

BACKGROUND

[0003] In daily life, a merchant usually collects a payment from a user through a checkout point of sale (POS) machine deployed at a checkout. The checkout POS machine usually supports conventional payment methods such as bank cards, credit cards, and cashes. However, at present, more new payment methods are emerging and even popularized, for example, a code scanning
15 payment, a near field communication payment, a face scanning payment, and a palm scanning payment, which challenges a capability and convenience of the checkout POS machine.

[0004] To promote new payment methods by fully using inventory checkout POS machines of a large quantity of merchants, payment service providers of the new payment methods promote various corresponding external payment devices, to extend a payment capability of the checkout
20 POS machine, so that the checkout POS machine can indirectly use, by using the external payment device deployed for the checkout POS machine, the extended payment capability provided by the external payment device, thereby supporting the corresponding new payment method. For example, an external payment device is a near field communication payment device, and the external payment device can extend a near field communication payment capability of the checkout POS
25 machine by being connected to the checkout POS machine.

[0005] Specifically, when a user wants to use a near field communication payment method at the checkout, a cashier can perform an operation on the checkout POS machine, and send a trigger signal to a near field communication payment device through the checkout POS machine. The near field communication payment device has a mobile communication module such as 4G or 5G.

5 Triggered by the trigger signal, the near field communication payment device performs service interaction with a remote server of a payment service provider of the near field communication payment device by using a corresponding mobile network service based on a mobile communication module of the near field communication payment device, to perform a deduction from a payment account of the user at the payment service provider. In this way, a current near
10 field communication payment is completed for the user. The deduction is settled to the merchant based on a predetermined policy. In such solutions, even if the merchant continues to use an original checkout POS machine, the checkout POS machine can be conveniently extended to support more new payment methods. Reconstruction costs are small.

[0006] However, in actual applications, some problems occur in the foregoing solution.

15 Specifically, if a mobile network state at a location of a checkout of a merchant is abnormal, for example, a network signal is weak or even no network signal exists, an operation of an external payment device deployed for the checkout POS machine is affected. A payment processing delay becomes large, or even the external payment device directly fails and cannot be used, thereby affecting payment experience of the user and the merchant.

20 **[0007]** Based on this, a solution that helps further improve operation reliability of the external payment device is needed.

SUMMARY

[0008] One or more embodiments of this specification provide a payment service processing method, apparatus, and device, to resolve the following technical problem: A solution that helps
25 further improve operation reliability of an external payment device is needed.

[0009] To resolve the above-mentioned technical problem, one or more embodiments of this specification are implemented as follows:

[0010] One or more embodiments of this specification provide a payment service processing method, applied to an external payment device configured for a checkout POS machine. The

checkout POS machine and the external payment device are separately provided by different service parties, and the method includes:

detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

5 if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

10 when the external payment device uses the extended payment capability, generating corresponding service information, and detecting a mobile network state of the external payment device;

if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; and

15 if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0011] One or more embodiments of this specification provide a payment service processing apparatus, applied to an external payment device configured for a checkout POS machine. The checkout POS machine and the external payment device are separately provided by different service parties, and the apparatus includes:

a first connection detection module, configured to detect whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

25 a second connection establishment module, configured to: if yes, establish a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

30 a network state detection module, configured to: when the external payment device uses the extended payment capability, generate corresponding service information, and detect a

mobile network state of the external payment device;

a service information direct sending module, configured to: if the mobile network state is normal, directly send the service information to a remote server of the service party of the external payment device through a mobile network; and

5 a service information forwarding module, configured to: if the mobile network state is abnormal, send at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

10 **[0012]** One or more embodiments of this specification provide a payment service processing device, applied to an external payment device configured for a checkout POS machine. The checkout POS machine and the external payment device are separately provided by different service parties, and the device includes:

at least one processor; and

15 a storage communicatively connected to the at least one processor.

[0013] The storage stores instructions executable by the at least one processor, and the instructions are executed by the at least one processor to enable the at least one processor to perform the following operations:

20 detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

25 when the external payment device uses the extended payment capability, generating corresponding service information, and detecting a mobile network state of the external payment device;

if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; and

30 if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout

POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0014] The foregoing at least one technical solution used in one or more embodiments of this specification can achieve the following beneficial effects: Based on a proprietary communication protocol provided by a service party of an external payment device, compatible with a plurality of lower-layer universal communication protocols, even if different checkout POS machines are connected (that is, a first connection) to the external payment device in different universal connection manners, and the external payment device can accessibly and automatically establish, based on the connection, a higher-layer connection (that is, a second connection) to the checkout POS machine based on the proprietary communication protocol. The higher-layer connection is used to provide a trigger channel for the checkout POS machine to trigger the external payment device. In addition, the higher-layer connection also prepares the channel for the external payment device to perform indirect remote interaction. Therefore, when a mobile network state of the external payment device is abnormal, a network capability (especially a reliable wired communication connection capability) of the checkout POS machine is automatically used through the channel to exchange service information with a remote server, to reliably complete a payment-related service for a user. This helps improve user experience and merchant experience, and helps better promote more payment methods based on the external payment device.

BRIEF DESCRIPTION OF DRAWINGS

[0015] To describe the technical solutions in the embodiments of this specification or in the existing technology more clearly, the following briefly describes the accompanying drawings needed for describing the embodiments or the existing technology. Clearly, the accompanying drawings in the following descriptions merely show some embodiments of this specification, and a person of ordinary skill in the art can still derive other drawings from these accompanying drawings without creative efforts.

[0016] FIG. 1 is a schematic diagram of a procedure of a payment service processing method according to one or more embodiments of this specification;

[0017] FIG. 2 is a schematic diagram of an implementation system framework of the method in FIG. 1 in an actual scenario according to one or more embodiments of this specification;

[0018] FIG. 3 is a schematic diagram of a procedure of a data processing solution through a small instruction channel according to one or more embodiments of this specification;

[0019] FIG. 4 is a schematic diagram of a procedure of a rerouting solution for information sent by a user mobile terminal according to one or more embodiments of this specification;

5 **[0020]** FIG. 5 is a schematic structural diagram of a payment service processing apparatus according to one or more embodiments of this specification; and

[0021] FIG. 6 is a schematic structural diagram of a payment service processing device according to one or more embodiments of this specification.

DESCRIPTION OF EMBODIMENTS

10 **[0022]** Embodiments of this specification provide a payment service processing method, apparatus, and device, and a storage medium.

[0023] To enable a person skilled in the art to better understand the technical solutions in this specification, the following clearly and comprehensively describes the technical solutions in embodiments of this specification with reference to the accompanying drawings in embodiments
15 of this specification. Clearly, the described embodiments are merely some rather than all of the embodiments of this specification. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of this specification without creative efforts shall fall within the protection scope of this application.

[0024] To resolve a problem in the background, in this application, use of a trigger channel
20 between a checkout POS machine and an external payment device is considered, to provide an indirect remote interaction capability for the external payment device. In this way, the remote interaction capability can be temporarily used when a mobile network of the external payment device is abnormal. In addition, it should be further noted that, in consideration that inventory checkout POS machines have different specifications and limited processing capabilities, the
25 trigger channel is constructed based on a lightweight small instruction. Consequently, there is an additional problem that the trigger channel has an insufficient capability. A further matching solution is provided for the additional problem, to provide a higher service capability for the external payment device. This can implement some uses that are not yet implemented.

[0025] The following continues to describe the solutions of this application based on such an

overall idea.

[0026] FIG. 1 is a schematic diagram of a procedure of a payment service processing method according to one or more embodiments of this specification. The method is applied to an external payment device configured for a checkout POS machine. The external payment device can provide one or more payment methods that are not included in the checkout POS machine, to extend an additional payment capability for the checkout POS machine, for example, a near field communication payment (based on touch sensing recognition), a face scanning payment (based on facial recognition), a palm scanning payment (based on palmprint recognition), or an iris payment. Correspondingly, the external payment device is, for example, at least one of the following devices: a near field communication payment device, a face scanning payment device, a palm scanning payment device, an iris payment device, etc.

[0027] In particular, the external payment device can be mobile and compact, to be more conveniently deployed for the checkout POS machine. The checkout POS machine is existing. At present, there are various types of different checkout POS machines on the market. In a solution of this application, a large quantity of different checkout POS machines (different brands, different models, different operating systems, different operating logic, different hardware interfaces, different communication capabilities, different security capabilities, different permission control manners, etc.) can be better compatible with each other. Reconstruction costs are low. The checkout POS machine and the external payment device can be provided by different service parties (which mainly means that the checkout POS machine and the external payment device are products of different manufacturers). For example, the external payment device is provided by a third-party payment service provider, and the checkout POS machine may be provided by some conventional financial equipment manufacturers.

[0028] The procedure in FIG. 1 includes the following steps:

[0029] S102: Detect whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols.

[0030] The term "universal" herein is being common and standard (which can be an internal standard of a leading enterprises in the industry), and is being at a lower layer in terms of a protocol. The checkout POS machine supports one or more universal communication protocols such as a serial port, Bluetooth, USB (including TYPC-C), and Wi-Fi, and has a corresponding hardware

interface or a wireless interface. Certainly, different checkout POS machines can have different support conditions. In addition, these universal communication protocols may overlap and provide mutual support in implementation.. For example, serial port communication may alternatively be implemented based on a USB interface.

5 **[0031]** For these universal communication protocols, the universal communication protocol also supported by the external payment device can be used as a specified universal communication protocol. If a hardware interface connection or a wireless connection is performed between the checkout POS machine and the external payment device based on any specified universal communication protocol, the first connection is established. A serial port (for example, a standard
10 serial port such as RS232 or RS485) is used as an example. The checkout POS machine and the external payment device can be wiredly connected through a serial port data cable. Certainly, a wireless serial port may be used.

[0032] S104: If yes, establish a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the
15 external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability.

[0033] A layer of the proprietary communication protocol is higher than a layer of the universal communication protocol. That is, from a perspective of the proprietary communication protocol, for data transmitted based on the universal communication protocol, encapsulation content can be
20 further added to the data based on the proprietary communication protocol, to carry more special data. In this way, a data receiving peer end performs decapsulation and recognition for use based on the proprietary communication protocol. More special service uses are implemented based on the special data.

[0034] In one or more embodiments of this specification, the proprietary communication
25 protocol can be a protocol that supports or is limited to lightweight small instruction communication. This is particularly applicable to a basic scenario of this application. A reason is that the applicant notes that in actual application, the checkout POS machine has a limited processing capability, and has a high requirement for an immediate service. Although some existing advanced communication protocols can be used in some checkout POS machines to create
30 a service interaction channel between the checkout POS machine and the external payment device, operation efficiency of the checkout POS machine is affected or even a slow response of the

checkout POS machine may be caused. In view of this, the applicant uses a customized proprietary communication protocol, which can be referred to as a small instruction protocol, to establish the second connection at a higher protocol layer based on the first connection, so that the checkout POS machine and the external payment device interact based on a small instruction, thereby simplifying an information format and an information amount, and effectively reducing an interaction burden.

[0035] The checkout POS machine can send a service trigger small instruction through the second connection, to trigger the external payment device to use the extended payment capability, for example, initiate a near field communication payment. Certainly, after the external payment device interacts with a remote server to complete a payment process, a service result small instruction can be sent to the checkout POS machine through the second connection, so that the checkout POS machine obtains a service result and displays the service result to a cashier or a user.

[0036] Because the external payment device and the proprietary communication protocol can be provided by the same service provider, the device can directly support the proprietary communication protocol in a factory presetting manner. Small instruction software can be additionally deployed on the checkout POS machine, to extend support for the proprietary communication protocol. In this way, the external payment device and the checkout POS machine can perform small instruction bidirectional communication interaction based on respective small instruction software.

[0037] In one or more embodiments of this specification, if it is detected that the first connection is established, small instruction software that is deployed on the checkout POS machine and that is based on a proprietary communication protocol provided by a service party of the external payment device can be determined. Communication with the small instruction software on the checkout POS machine is performed based on the first connection, and the second connection based on the proprietary communication protocol is established. Then, some specified service operations on the checkout POS machine can be converted to obtain a corresponding lightweight small instruction, and the small instruction is sent to the external payment device through the second connection, to trigger the external payment device to use the corresponding extended capability.

[0038] The specified service operation is, for example, a payment request operation, a membership login request operation, or an operation for requesting to register biometric feature

information. It should be noted that these service operations can be an additional service operation that corresponds to new service semantics and that is newly defined based on or outside existing service semantics of the checkout POS machine through intention identification or in another manner. Therefore, an additional function of the checkout POS machine is extended in an operation form, so that the cashier still mainly operates the checkout POS machine. This function is actually implemented by the external payment device.

[0039] S106: When the external payment device uses the extended payment capability, generate corresponding service information, and detect a mobile network state of the external payment device.

[0040] In one or more embodiments of this specification, the service information can be in various forms such as a service code value that reflects user account information, a corresponding deduction authorization voucher, a user biometric feature, or a service related image.

[0041] At least a part of the service information needs to be provided to a remote server corresponding to the external payment device for processing, to complete a service related to a current payment, for example, deduction, account login, member login, and verification information change. First, whether the mobile network state of the external payment device is normal is detected, to determine whether it is suitable currently to perform communication interaction with the remote server through a mobile network service of the external payment device. If a signal of the mobile network is not good enough, for example, the signal is too weak or even no signal exists, it can be considered that the mobile network state is abnormal; otherwise, it can be considered that the mobile network state is abnormal. Certainly, detection can also involve more aspects. For example, if a specific network transmission speed, stability, or reliability is not good enough, the mobile network state can be abnormal.

[0042] In addition, the external payment device may not support a mobile network. In this case, it can be directly considered that the mobile network state of the external payment device is abnormal.

[0043] S108: If the mobile network state is normal, directly send the service information to a remote server of the service party of the external payment device through a mobile network.

[0044] For example, the mobile network is a cellular network such as 4G or 5G. The remote server performs processing based on the received service information, and returns a processing result to the external payment device through the mobile network. The external payment device

can correspondingly notify the checkout POS machine through the second connection.

[0045] S110: If the mobile network state is abnormal, send at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0046] In one or more embodiments of this specification, the external payment device indirectly communicates with the remote server through the second connection and based on a remote communication capability (the capability is particularly reliable when the checkout POS machine is wiredly connected to a network end) of the checkout POS machine. The at least a part of the service information mentioned in step S110 can include key information required for the service related to the current payment, for example, a payment code value or an account code value.

[0047] The checkout POS machine directly forwards the at least a part of the service information to the remote server; or forwards the service information to a specified service transit station, and then the service transit station further routes the at least a part of the service information to the remote server. Response information obtained through processing by the remote server can be returned through a reverse path.

[0048] According to the method in FIG. 1, based on a proprietary communication protocol provided by a service party of the external payment device, compatible with a plurality of lower-layer universal communication protocols, even if different checkout POS machines are connected (that is, a first connection) to the external payment device in different universal connection manners, and the external payment device can accessibly and automatically establish, based on the connection, a higher-layer connection (that is, a second connection) to the checkout POS machine based on the proprietary communication protocol. The higher-layer connection is used to provide a trigger channel for the checkout POS machine to trigger the external payment device. In addition, the higher-layer connection also prepares the channel for the external payment device to perform indirect remote interaction. Therefore, when a mobile network state of the external payment device is abnormal, a network capability (especially a reliable wired communication connection capability) of the checkout POS machine is automatically used through the channel to exchange service information with a remote server, to reliably complete a payment-related service for a user. This helps improve user experience and merchant experience, and helps better promote more payment methods based on the external payment device.

[0049] It should be noted that in this application, a small instruction channel (that is, the second connection) sharing manner is mainly used, so that network-free remote communication of the external payment device is implemented. Advantages of this manner further include simple deployment. The small instruction software is mainly installed on the checkout POS machine only, and the merchant does not need to perform an operation such as complex permission configuration for the checkout POS machine. This is applicable to operating systems and operating manners of different checkout POS machines. As long as the first connection is established, the small instruction software automatically establishes the second connection at a higher protocol layer, to get ready. Therefore, the external payment device can stably use the network capability of the checkout POS machine through the small instruction channel, and the merchant does not need to perform an additional operation. It is better to proceed insensitively.

[0100] Based on the method shown in FIG. 1, this specification further provides some specific implementations and extended solutions of the method, which are further described below.

[0101] Based on the foregoing descriptions, for ease of implementation and more intuitively, one or more embodiments of this specification further provide a schematic diagram of an implementation system framework of the method in FIG. 1 in an actual scenario, as shown in FIG. 2.

[0102] In this actual scenario, the universal communication protocol is, for example, another standard protocol supported by the serial port, Bluetooth, or the checkout POS machine. The service information includes at least a corresponding remote procedure call (RPC) request, and the proprietary communication protocol can be a small instruction protocol.

[0103] In FIG. 2, the system framework is mainly divided into three parts. The upper-left side is the external payment device, and the upper-right side is the checkout POS machine, which can be a plurality of inventory heterogeneous models in the market. The two parts are located at a checkout of the merchant. In addition, there is a user mobile terminal, which is omitted. The user mobile terminal can interact with the external payment device, so that the external payment device obtains user-related information, to perform a deduction or another service operation on the user. The lower side is a remote device, including a remote server corresponding to the external payment device, and can be specifically a payment server, and further includes a service transfer station.

[0104] The small instruction software can be deployed on each of the external payment device and the checkout POS machine in advance, so that the external payment device and the checkout

POS machine have a corresponding driver and software capability, and is referred to as external small instruction software and POS machine small instruction software. For example, the POS machine small instruction software includes a small instruction service module, a small instruction protocol management module, and an RPC management module. The small instruction protocol management module includes a small instruction SDK that is used to specifically implement the small instruction protocol, and the small instruction service module is used to manage small instruction bidirectional communication. The external payment device further has a checkout component, configured to generate a corresponding RRC request in response to a service related to a current payment.

10 **[0105]** A typical running process of the system framework in FIG. 2 includes the following actions:

[0106] After the checkout POS machine and the external payment device are connected to Bluetooth, a serial port, or another specified low-layer communication protocol interface, a small instruction connection state is automatically triggered, that is, the second connection is established.

15 **[0107]** A cashier triggers the external payment device by using the checkout POS machine, and/or the user triggers the external payment device by using a mobile phone, so that the external payment device generates a corresponding RRC request, to initiate a request to the remote server, for example, a request for querying payment code and a request for querying a payment result.

[0108] In this case, if the external payment device detects that the mobile network state of the external payment device is that there is no network or there is a weak network, the external payment device sends the RPC request to the small instruction software of the checkout POS machine in a small instruction manner, and acts as a proxy to request a related RPC interface to send the RPC request to the service transfer station.

25 **[0109]** After receiving the RPC request, the RPC request is automatically routed and forwarded to a system service related to the remote server, and then data returned by the system service is returned to the checkout POS machine, and then returned to the external payment device through a small instruction. In this way, a process of a capability of acting as a proxy to run a related interface through the small instruction channel and a checkout POS machine network is completed.

30 **[0110]** For example, the small instruction protocol is further described.

[0111] In terms of the layer, the universal communication protocol is located at, for example,

a lower physical medium layer and a lower transport layer, and the small instruction protocol is located above these layers. After special encapsulation is performed, the small instruction protocol is transferred to a lower layer for processing and transmission. Content of the special encapsulation can mainly include various small instructions, for example, a payment amount and a payment type such as near field communication, face scanning, or palm scanning can be indicated in the small instruction.

[0112] A customized format of a small instruction protocol data frame, for example, includes a 3-byte frame header, a 1-byte version number, a 4-byte data length, data of several (few) bytes, a 1-byte checksum, and a 3-byte frame tail. A key data field, for example, includes the following enumerated types: "Collect", "Face scanning", "Set", or "Cancel". A corresponding predetermined key is triggered on the checkout POS machine, to trigger a small instruction of a corresponding type to be sent to the external payment device. For example, the "Collect" type corresponds to a collection button of the checkout POS machine. When the cashier inputs a collection amount and presses the collection button, original collection logic of the checkout POS machine can be triggered to enter a collection state. In addition, a corresponding collection instruction can be generated, and sent to the external payment device through the small instruction channel, to trigger the external payment device to enter the collection state based on an extended payment method provided by the external payment device. In this case, the user can freely choose to use the external payment device to perform payment.

[0113] Further, in the solution of this application, the RPC request generated by the external payment device (which can be simplified based on a specified rule and is converted into more lightweight small instruction content data) can be encapsulated in the small instruction protocol data frame, and is indirectly sent to a remote end through the small instruction channel and the checkout POS machine, without a need to depend on the mobile network of the external payment device. In addition, the checkout POS machine has a small burden, and the small instruction channel is more fully used.

[0114] In one or more embodiments of this specification, in consideration of a case in which a data amount may be large if corresponding service information is generated when the external payment device uses the extended payment capability, transmission through the small instruction channel may cause an obstacle. In addition, because this application further considers that more special information is carried by using the service information to implement additional special

uses, the obstacle problem may be aggravated.

[0115] In view of this obstacle problem, one or more embodiments of this specification provide a data processing solution through a small instruction channel as a response solution, FIG. 3 is a schematic diagram of a procedure of the solution.

5 **[0116]** The solution in FIG. 3 includes the following steps.

[0117] S302: Specifically split the corresponding service information into a lightweight information part and another information part when the at least a part of the service information is sent to the checkout POS machine through the second connection.

10 **[0118]** Compared with the lightweight information part, in the another information part, a data amount is larger and/or a structure is more complex, and transmission through the small instruction channel may have a problem in efficiency, reliability, etc.

[0119] In one or more embodiments of this specification, key information (which may be especially minimum key information) required for executing the service related to the current payment is included in the at least a part of the service information. Preferably, the key information
15 can be included in the lightweight information part. Therefore, a current basic and high-priority service task can be completed merely by successfully performing corresponding lightweight interaction. In this way, user experience and merchant experience can be ensured. For example, if the service related to the current payment is a deduction payment, the key information is, for example, a payment code value or a user account, and other information is, for example,
20 verification information or behavior record information. Certainly, the service related to the current payment can alternatively be a compound task that includes a deduction payment and more other additional tasks. An information amount or information types of other information also increase accordingly. For example, additional screenshot images, biometric feature information, and instrumentation collection information may be included.

25 **[0120]** Further, the at least a part of the service information is split at a field granularity, to more accurately obtain the lightweight information part. Specifically, a key field is extracted from a plurality of fields in a same structure, a key field extracted from a plurality of structures is restructured into a new structure, which is used as the lightweight information part, and a remaining part is used as the another information part.

30 **[0121]** In one or more embodiments of this specification, based on the external payment device and the foregoing information splitting solution, another solution in which biometric feature

information is additionally registered and bound in a payment process is further provided. In this way, the user does not need to perform a cumbersome active registration operation on the mobile phone of the user, and impact on efficiency of executing a payment service by the external payment device is low.

5 **[0122]** In this case, the another information part can include first biometric feature information that is to be used by a current user for registration, and the extended payment capability is the near field communication payment capability or a payment capability based on second biometric feature information. The first biometric feature information and the second biometric feature information correspond to different types of biometric features.

10 **[0123]** For example, if the external payment device is a near field payment device, before the current user uses the user mobile terminal (a mobile phone that supports near field communication is used as an example) to touch the near field payment device, the near field payment device can prompt the user to conveniently and quickly register the first biometric feature information (facial information is used as an example). If the user agrees, when the user uses the mobile phone to
15 touch the near field payment device, key information used for payment such as user account information or a payment code value is read based on near field communication sensing, and is used as information corresponding to the user. In addition, the facial information of the user is collected together through the near field payment device. The corresponding information can be used as lightweight information and is transmitted through the second connection. The facial
20 information can be used as the another information part, and is transmitted through the first connection. Then, on the remote server, the facial information can be bound (the binding operation can be locally performed on the external payment device and then updated to the remote server) to a user reflected by the corresponding information. Therefore, the user can directly perform a face scanning payment on a face scanning payment device provided by a corresponding payment
25 service provider.

[0124] Similarly, the external payment device can be further a face scanning payment device. In this case, a second biometric feature can be a facial feature (if necessary, lightweight processing can be performed on the facial feature, to adapt to a small instruction capability), and a first biometric feature is, for example, a palmprint feature (the palmprint feature can be correspondingly
30 collected more precisely, to ensure adequate and accurate registration information). In this case, the user can conveniently register the palmprint feature during the face scanning payment.

According to the same idea, there can be more different implementations based on different payment capabilities of the external payment device.

[0125] S304: Send the lightweight information part to the small instruction software through the second connection, and send the another information part to the checkout POS machine through the first connection.

[0126] In one or more embodiments of this specification, the lightweight information part is transmitted through the small instruction channel, so that efficiency is higher and adverse impact on the small instruction channel is effectively reduced. In addition, special security processing can be applied to the lightweight information part through encapsulation based on the small instruction protocol. In this way, security is better. However, the another information part may not be encapsulated based on the small instruction protocol; instead, is encapsulated based on a lower-layer universal communication protocol, and then is directly sent through the first connection.

[0127] To improve reliability of sending through the first connection and for subsequent successful and accurate parsing, the another information part is further additionally processed and then sent. Specifically, for example, an information type corresponding to a universal communication protocol corresponding to the first connection is determined, and the another information part is converted or packaged, to masquerade as masqueraded information of the corresponding information type (masquerade as information suitable for transmission based on the corresponding universal communication protocol, for example, masquerade as an image, audio, a common file, or a meaningless byte stream). Then, the masqueraded information is sent to the checkout POS machine through the first connection, so that the another information part is subsequently restored based on the masqueraded information. For determining of the corresponding information type, if an information type of historical information that is actually directly transmitted most frequently by the current checkout POS machine based on the universal communication protocol can be obtained, the information type can be determined as the corresponding information type. In this case, the another information part can be further masqueraded as the historical information. In this case, security and reliability are better. Otherwise, an information type corresponding to the universal communication protocol can be determined based on general experience.

[0128] In one or more embodiments of this specification, in consideration that in actual application, the solution can be implemented in different checkout POS machine environments,

because the checkout POS machine is provided by another service provider, the checkout POS machine is not necessarily reliable enough. Therefore, a defense attitude is maintained, and whether a capability of the checkout POS machine is fully used specifically is determined based on a current actual situation.

5 **[0129]** Specifically, for example, after the corresponding service information is split into the lightweight information part and the another information part, a capability extension security degree corresponding to the checkout POS machine is obtained. The capability extension security degree is obtained through calculation based on the universal communication protocol (for example, security of the protocol) based on which the first connection is established and/or related
10 information (for example, popularity of the service party and a model capability of the checkout POS machine) of a service party of the checkout POS machine, and can be used to represent a reliability degree of the checkout POS machine relative to the external payment device. If the capability extension security degree is high enough, the lightweight information part carries a first indication identifier (for example, which can be an additional flag bit), to indicate to reassemble
15 the lightweight information part and the another information part on the checkout POS machine. If the capability extension security degree is not high enough, the lightweight information part carries a second indication identifier, to indicate to reassemble the lightweight information part and the another information part on the remote server. The small instruction software of the POS machine performs corresponding processing based on an indication identifier.

20 **[0130]** To further ensure transmission efficiency of the lightweight information part and prevent congestion of the first connection, after the capability extension security degree corresponding to the checkout POS machine is obtained, the lightweight information part can be preferentially transmitted, and the another information part is asynchronously sent later than the lightweight information part. It should be noted that the another information part may not be
25 directly transmitted through the first connection, or may be asynchronously transmitted later through the second connection. In this case, the another information part needs to be encapsulated based on the small instruction protocol.

[0131] In one or more embodiments of this specification, it is considered that when the mobile network state of the external payment device is abnormal, a mobile network state of a current user
30 mobile terminal that performs a payment may also be abnormal. Therefore, this application further provides a rerouting solution for information sent by the user mobile terminal, to guarantee service

reliability for the user mobile terminal through the external payment device and the checkout POS machine insensitively. FIG. 4 is a schematic flowchart of the rerouting solution.

[0132] The procedure in FIG. 4 includes the following steps.

[0133] S402: Receive a rerouting indication and payment interaction information that are sent by a user mobile terminal through short-range communication when a mobile network state of the user mobile terminal is abnormal.

[0134] The rerouting indication is used to request the external payment device to provide network assistance. The payment interaction information (for example, payment confirmation information) is originally information that is directly sent by the user mobile terminal to the corresponding payment server (for example, the remote server or another server provided by the payment service provider) through a mobile network of the user mobile terminal.

[0135] If the mobile network state of the user mobile terminal is normal, only the payment interaction information can be sent.

[0136] S404: Convert the payment interaction information into a user-party small instruction in response to the rerouting indication.

[0137] S406: Send the user-party small instruction to the checkout POS machine through the second connection, to help the user mobile terminal perform remote interaction.

[0138] In one or more embodiments of this specification, the second connection can be divided into a first channel and a second channel with data isolation; and the user-party small instruction is sent to the checkout POS machine through the first channel. The second channel is used to send the at least a part of the service information. In this way, data confusion can be avoided. In addition, this helps control a sending sequence and facilitates execution. Optionally, targeted differential processing can be performed.

[0139] S408: Receive remote response small instruction forwarded by the checkout POS machine, and return the remote response small instruction to the user mobile terminal through short-range communication.

[0140] According to the solution in FIG. 4, even if the user mobile terminal and the external payment device are in an abnormal mobile network state, remote interaction can still be performed insensitively. In addition, efficiency and security are better.

[0141] Based on the same idea, one or more embodiments of this specification further provide apparatuses and devices corresponding to the above-mentioned methods, as shown in FIG. 5 and

FIG. 6. The apparatuses and the devices can correspondingly perform the above-mentioned methods and related optional solutions.

[0142] FIG. 5 is a schematic structural diagram of a payment service processing apparatus according to one or more embodiments of this specification. The payment service processing apparatus is applied to an external payment device configured for a checkout POS machine. The checkout POS machine and the external payment device are separately provided by different service parties, and the apparatus includes:

a first connection detection module 502, configured to detect whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

a second connection establishment module 504, configured to: if yes, establish a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

a network state detection module 506, configured to: when the external payment device uses the extended payment capability, generate corresponding service information, and detect a mobile network state of the external payment device;

a service information direct sending module 508, configured to: if the mobile network state is normal, directly send the service information to a remote server of the service party of the external payment device through a mobile network; and

a service information forwarding module 510, configured to: if the mobile network state is abnormal, send at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0143] Optionally, the second connection establishment module 504 is configured to: determine small instruction software that is deployed on the checkout POS machine and that is based on the proprietary communication protocol provided by the service party of the external payment device; and

communicate with the small instruction software on the checkout POS machine based

on the first connection, and establish the second connection based on the proprietary communication protocol, to send, to the external payment device, a lightweight small instruction obtained by converting a service operation on the checkout POS machine, so as to trigger the external payment device to use the extended payment capability.

5 **[0144]** Optionally, the proprietary communication protocol is a protocol limited to lightweight small instruction communication; and

the universal communication protocol includes at least one of the following types: a serial port, Bluetooth, USB, and Wi-Fi.

[0145] Optionally, the service information forwarding module 510 is configured to: split the
10 corresponding service information into a lightweight information part and another information part;
and

send the lightweight information part to the small instruction software through the second connection, and send the another information part to the checkout POS machine through the first connection.

15 **[0146]** Optionally, the service information forwarding module 510 is configured to: determine an information type corresponding to the universal communication protocol corresponding to the first connection;

convert or package the another information part, to masquerade as masqueraded information of the corresponding information type; and

20 send the masqueraded information to the checkout POS machine through the first connection, so that the another information part is subsequently restored based on the masqueraded information.

[0147] Optionally, the service information forwarding module 510 is configured to: after the corresponding service information is split into the lightweight information part and the another
25 information part, obtain a capability extension security degree corresponding to the checkout POS machine, where the capability extension security degree is obtained through calculation based on the universal communication protocol based on which the first connection is established and related information of a service party of the checkout POS machine; and

if the capability extension security degree is high enough, use the lightweight
30 information part to carry a first indication identifier, to indicate to reassemble the lightweight information part and the another information part on the checkout POS machine; or

if the capability extension security degree is not high enough, use the lightweight information part to carry a second indication identifier, to indicate to reassemble the lightweight information part and the another information part on the remote server.

[0148] Optionally, key information required for executing a service related to a current payment is included in the lightweight information part; and

the service information forwarding module 510 is configured to: after the capability extension security degree corresponding to the checkout POS machine is obtained, asynchronously send the another information part later than the lightweight information part.

[0149] Optionally, the another information part includes first biometric feature information to be used by a current user for registration;

the extended payment capability is a near field communication payment capability, or a payment capability based on second biometric feature information; and

the first biometric feature information and the second biometric feature information correspond to different types of biometric features.

[0150] Optionally, the extended payment capability is the near field communication payment capability; and

the network state detection module 506 is configured to: prompt the current user to register the first biometric feature information together before a user mobile terminal touches the external payment device;

if the user agrees, when the user mobile terminal touches the external payment device, read key information used for payment based on near field communication sensing as the lightweight information part; and

collect the first biometric feature information of the user together as the another information part.

[0151] Optionally, the service information forwarding module 510 is configured to: receive a rerouting indication and payment interaction information that are sent by a user mobile terminal through short-range communication when a mobile network state of the user mobile terminal is abnormal;

convert the payment interaction information into a user-party small instruction in response to the rerouting indication;

send the user-party small instruction to the checkout POS machine through the second

connection, to help the user mobile terminal perform remote interaction; and

receive a remote response small instruction forwarded by the checkout POS machine, and return the remote response small instruction to the user mobile terminal through short-range communication.

5 **[0152]** Optionally, the service information forwarding module 510 is configured to: divide the second connection into a first channel and a second channel with data isolation; and

send the user-party small instruction to the checkout POS machine through the first channel.

[0153] The second channel is used to send the at least a part of the service information.

10 **[0154]** Optionally, the external payment device belongs to at least one of the following devices:
a near field communication payment device, a facial scanning payment device, and a palm scanning payment device.

[0155] FIG. 6 is a schematic structural diagram of a payment service processing device according to one or more embodiments of this specification. The payment service processing
15 apparatus is applied to an external payment device configured for a checkout POS machine. The checkout POS machine and the external payment device are separately provided by different service parties, and the device includes:

at least one processor; and

a storage communicatively connected to the at least one processor.

20 **[0156]** The storage stores instructions executable by the at least one processor, and the instructions are executed by the at least one processor to enable the at least one processor to perform the following operations:

detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

25 if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

 when the external payment device uses the extended payment capability, generating
30 corresponding service information, and detecting a mobile network state of the external payment device;

if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; and

if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0157] Based on the same idea, one or more embodiments of this specification further provide a non-volatile computer storage medium, applied to an external payment device configured for a checkout POS machine. The checkout POS machine and the external payment device are provided by different service parties, the medium stores computer-executable instructions, and the computer-executable instructions are set as follows:

detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

when the external payment device uses the extended payment capability, generating corresponding service information, and detecting a mobile network state of the external payment device;

if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; and

if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

[0158] In the 1990s, whether a technical improvement is a hardware improvement (for example, an improvement to a circuit structure, such as a diode, a transistor, or a switch) or a software improvement (an improvement to a method procedure) can be clearly distinguished. However, as technologies develop, current improvements to many method procedures can be considered as direct improvements to hardware circuit structures. Almost all designers obtain the

corresponding hardware circuit structure by programming the improved method process into the hardware circuit. Therefore, a method procedure can be improved by using a hardware entity module. For example, a programmable logic device (PLD) (for example, a field programmable gate array (FPGA)) is such an integrated circuit, and a logical function of the PLD is determined by a user through device programming. The designer performs programming to "integrate" a digital system into a PLD without requesting a chip manufacturer to design and produce an application-specific integrated circuit chip. In addition, currently, instead of manually manufacturing an integrated circuit chip, such programming is mostly implemented by using "logic compiler" software. The "logic compiler" software is similar to a software compiler used to develop and write a program. Original code needs to be written in a particular programming language before being compiled. The language is referred to as a hardware description language (HDL). There are many HDLs such as the Advanced Boolean Expression Language (ABEL), the Altera Hardware Description Language (AHDL), Confluence, the Cornell University Programming Language (CUPL), HDCal, the Java Hardware Description Language (JHDL), Lava, Lola, MyHDL, PALASM, and the Ruby Hardware Description Language (RHDL). Currently, the Very-High-Speed Integrated Circuit Hardware Description Language (VHDL) and Verilog are most commonly used. It should also be clear to a person skilled in the art that a hardware circuit for implementing a logical method procedure can be easily obtained by performing slight logic programming on the method procedure by using the above-mentioned several hardware description languages and programming the method procedure into an integrated circuit.

[0159] A controller can be implemented by using any appropriate method. For example, the controller can be in a form of a microprocessor or a processor, a computer-readable medium that stores computer-readable program code (such as software or firmware) that can be executed by the microprocessor or the processor, a logic gate, a switch, an application-specific integrated circuit (ASIC), a programmable logic controller, or an embedded microcontroller. Examples of the controller include but are not limited to the following microcontrollers: ARC 625D, Atmel AT91SAM, Microchip PIC18F26K20, and Silicone Labs C8051F320. A memory controller can also be implemented as a part of control logic of a memory. A person skilled in the art also knows that in addition to implementing the controller by using only the computer-readable program code, logic programming can be performed on method steps to enable the controller to implement the same function in a form of a logic gate, a switch, an application-specific integrated circuit, a

programmable logic controller, an embedded microcontroller, etc. Therefore, the controller can be considered as a hardware component, and an apparatus that is configured to implement various functions and that is included in the controller can also be considered as a structure in the hardware component. Alternatively, the apparatus configured to implement various functions can even be considered as both a software module implementing a method and a structure in the hardware component.

[0160] Systems, apparatuses, modules, or units that are set forth in the previous implementations can be embodied by a computer chip or an entity or by a product with a specific function. A typical implementation device is a computer. Specifically, the computer can be, for example, a personal computer, a laptop computer, a cellular phone, a camera phone, a smartphone, a personal digital assistant, a media player, a navigation device, an email device, a game console, a tablet computer, a wearable device, or a combination of any of these devices.

[0161] For ease of description, the above-mentioned apparatus is divided into units based on functions for separate description. Certainly, when this specification is implemented, the functions of the units can be implemented in one or more pieces of software and/or hardware.

[0162] A person skilled in the art should understand that embodiments of this specification can be provided as methods, systems, or computer program products. Therefore, the embodiments of this specification can use a form of hardware only embodiments, software only embodiments, or embodiments with a combination of software and hardware. In addition, a form of a computer program product that is implemented on one or more computer-usable storage media (including but not limited to a disk storage, a CD-ROM, an optical storage, etc.) that include computer-usable program code can be used in the embodiments of this specification.

[0163] This specification is described with reference to the flowcharts and/or block diagrams of the method, the device (system), and the computer program product according to embodiments of this specification. It should be understood that computer program instructions may be used to implement each process and/or each block in the flowcharts and/or the block diagrams and a combination of a process and/or a block in the flowcharts and/or the block diagrams. These computer program instructions can be provided for a general-purpose computer, a special-purpose computer, an embedded processor, or a processor of another programmable data processing device to generate a machine, so that the instructions executed by the computer or the processor of the another programmable data processing device generate an apparatus for implementing a specific

function in one or more procedures in the flowcharts and/or in one or more blocks in the block diagrams.

[0164] These computer program instructions can alternatively be stored in a computer-readable memory that can instruct the computer or the another programmable data processing device to work in a specific way, so the instructions stored in the computer-readable memory generate an artifact that includes an instruction apparatus. The instruction apparatus implements a specific function in one or more procedures in the flowcharts and/or in one or more blocks in the block diagrams.

[0165] These computer program instructions can alternatively be loaded onto the computer or the another programmable data processing device, so that a series of operation steps are performed on the computer or the another programmable device, thereby generating computer-implemented processing. Therefore, the instructions executed on the computer or the another programmable device provide steps for implementing a specific function in one or more procedures in the flowcharts and/or in one or more blocks in the block diagrams.

[0166] In a typical configuration, a computing device includes one or more central processing units (CPU), input/output interfaces, network interfaces, and memories.

[0167] The memory can include a non-persistent memory, a random access memory (RAM), a non-volatile memory, and/or another form in a computer-readable medium, for example, a read-only memory (ROM) or a flash random access memory (flash RAM). The memory is an example of the computer-readable medium.

[0168] Computer-readable media, including permanent and non-permanent, removable and non-removable media, can be implemented by any method or technology for information storage. The information can be computer-readable instructions, a data structure, a program module, or other data. Examples of the computer storage medium include but are not limited to a phase-change random access memory (PRAM), a static random access memory (SRAM), a dynamic random access memory (DRAM), another type of random access memory (RAM), a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM), a flash memory or another memory technology, a compact disc read-only memory (CD-ROM), a digital versatile disc (DVD) or another optical storage, a cassette magnetic tape, a magnetic tape/magnetic disk storage or another magnetic storage device, or any other non-transmission medium. The computer storage medium can be configured to store information accessible to a computing device. As described in

this specification, the computer-readable medium does not include computer-readable transitory media such as a modulated data signal and a carrier.

[0169] It should be further noted that the terms "include", "comprise", or their any other variants are intended to cover a non-exclusive inclusion, so that a process, a method, a product, or a device that includes a list of elements not only includes those elements but also includes other elements which are not expressly listed, or further includes elements inherent to such a process, method, product, or device. Without more constraints, an element preceded by "includes a ..." does not preclude the presence of additional identical elements in the process, method, product, or device that includes the element.

[0170] This specification can be described in the general context of computer-executable instructions executed by a computer, for example, a program module. Generally, the program module includes a routine, a program, an object, a component, a data structure, etc. executing a specific task or implementing a specific abstract data type. This specification can alternatively be practiced in distributed computing environments. In the distributed computing environments, tasks are performed by remote processing devices connected through a communication network. In a distributed computing environment, the program module can be located in both local and remote computer storage media including storage devices.

[0171] The embodiments of this specification are described in a progressive method. For same or similar parts in the embodiments, references can be made to each other. Each embodiment focuses on a difference from another embodiment. Particularly, the apparatus, device, and nonvolatile computer storage medium embodiments are basically similar to the method embodiment, and therefore is briefly described. For a related part, refer to some descriptions in the method embodiment.

[0172] Specific embodiments of this specification are described above. Other embodiments fall within the scope of the appended claims. In some cases, the actions or steps described in the claims can be performed in an order different from that in the embodiments and desired results can still be achieved. In addition, the process depicted in the accompanying drawings does not necessarily require the shown particular execution order to achieve the desired results. In some implementations, multitasking and parallel processing are feasible or may be advantageous.

[0173] The above-mentioned content is merely one or more embodiments of this specification, and is not intended to limit this specification. A person skilled in the art knows that one or more

embodiments of this specification can have various modifications and changes. Any modification, equivalent replacement, improvement, etc. made within the spirit and principle of one or more embodiments of this specification shall fall within the scope of the claims of this specification.

CLAIMS

What is claimed is:

1. A payment service processing method, applied to an external payment device configured for a checkout POS machine, wherein the checkout POS machine and the external payment device
5 are separately provided by different service parties, and the method comprises:

detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the
10 external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

when the external payment device uses the extended payment capability, generating corresponding service information, and detecting a mobile network state of the external payment device; and

15 if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; or

if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service
20 information to indirectly arrive at the remote server.

2. The method according to claim 1, wherein the establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device specifically comprises:

determining small instruction software that is deployed on the checkout POS machine and
25 that is based on the proprietary communication protocol provided by the service party of the external payment device; and

communicating with the small instruction software on the checkout POS machine based on the first connection, and establishing the second connection based on the proprietary communication protocol, to send, to the external payment device, a lightweight small instruction
30 obtained by converting a service operation on the checkout POS machine, so as to trigger the

external payment device to use the extended payment capability.

3. The method according to claim 2, wherein the proprietary communication protocol is a protocol limited to lightweight small instruction communication; and

the universal communication protocol comprises at least one of the following types: a serial
5 port, Bluetooth, USB, and Wi-Fi.

4. The method according to claim 2, wherein the sending at least a part of the service information to the checkout POS machine through the second connection specifically comprises:

splitting the corresponding service information into a lightweight information part and another information part; and

10 sending the lightweight information part to the small instruction software through the second connection, and sending the another information part to the checkout POS machine through the first connection.

5. The method according to claim 4, wherein the sending the another information part to the checkout POS machine through the first connection specifically comprises:

15 determining an information type corresponding to the universal communication protocol corresponding to the first connection;

converting or packaging the another information part, to masquerade as masqueraded information of the corresponding information type; and

20 sending the masqueraded information to the checkout POS machine through the first connection, so that the another information part is subsequently restored based on the masqueraded information.

6. The method according to claim 4, wherein after the splitting the corresponding service information into a lightweight information part and another information part, the method further comprises:

25 obtaining a capability extension security degree corresponding to the checkout POS machine, wherein the capability extension security degree is obtained through calculation based on the universal communication protocol based on which the first connection is established and related information of a service party of the checkout POS machine; and

if the capability extension security degree is high enough, using the lightweight information
30 part to carry a first indication identifier, to indicate to reassemble the lightweight information part and the another information part on the checkout POS machine; or

if the capability extension security degree is not high enough, using the lightweight information part to carry a second indication identifier, to indicate to reassemble the lightweight information part and the another information part on the remote server.

5 7. The method according to claim 6, wherein key information required for executing a service related to a current payment is comprised in the lightweight information part; and

after the obtaining a capability extension security degree corresponding to the checkout POS machine, the method further comprises:

asynchronously sending the another information part later than the lightweight information part.

10 8. The method according to claim 4, wherein the another information part comprises first biometric feature information to be used by a current user for registration;

the extended payment capability is a near field communication payment capability, or a payment capability based on second biometric feature information; and

15 the first biometric feature information and the second biometric feature information correspond to different types of biometric features.

9. The method according to claim 8, wherein the extended payment capability is the near field communication payment capability; and

the generating corresponding service information specifically comprises:

20 prompting the current user to register the first biometric feature information together before a user mobile terminal touches the external payment device;

if the user agrees, when the user mobile terminal touches the external payment device, reading key information used for payment based on near field communication sensing as the lightweight information part; and

25 collecting the first biometric feature information of the user together as the another information part.

10. The method according to claim 2, further comprising:

receiving a rerouting indication and payment interaction information that are sent by a user mobile terminal through short-range communication when a mobile network state of the user mobile terminal is abnormal;

30 converting the payment interaction information into a user-party small instruction in response to the rerouting indication;

sending the user-party small instruction to the checkout POS machine through the second connection, to help the user mobile terminal perform remote interaction; and

receiving a remote response small instruction forwarded by the checkout POS machine, and returning the remote response small instruction to the user mobile terminal through short-range

5 communication.

11. The method according to claim 10, wherein the sending the user-party small instruction to the checkout POS machine through the second connection specifically comprises:

dividing the second connection into a first channel and a second channel with data isolation; and

10 sending the user-party small instruction to the checkout POS machine through the first channel, wherein

the second channel is used to send the at least a part of the service information.

12. The method according to any one of claims 1 to 11, wherein the external payment device belongs to at least one of the following devices:

15 a near field communication payment device, a facial scanning payment device, and a palm scanning payment device.

13. A payment service processing apparatus, applied to an external payment device configured for a checkout POS machine, wherein the checkout POS machine and the external payment device are separately provided by different service parties, and the apparatus comprises:

20 a first connection detection module, configured to detect whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

a second connection establishment module, configured to: if yes, establish a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

25 a network state detection module, configured to: when the external payment device uses the extended payment capability, generate corresponding service information, and detect a mobile network state of the external payment device;

30 a service information direct sending module, configured to: if the mobile network state is

normal, directly send the service information to a remote server of the service party of the external payment device through a mobile network; and

a service information forwarding module, configured to: if the mobile network state is abnormal, send at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.

14. The apparatus according to claim 13, wherein the second connection establishment module is configured to: determine small instruction software that is deployed on the checkout POS machine and that is based on the proprietary communication protocol provided by the service party of the external payment device; and

communicate with the small instruction software on the checkout POS machine based on the first connection, and establish the second connection based on the proprietary communication protocol, to send, to the external payment device, a lightweight small instruction obtained by converting a service operation on the checkout POS machine, so as to trigger the external payment device to use the extended payment capability.

15. The apparatus according to claim 14, wherein the proprietary communication protocol is a protocol limited to lightweight small instruction communication; and

the universal communication protocol comprises at least one of the following types: a serial port, Bluetooth, USB, and Wi-Fi.

16. The apparatus according to claim 14, wherein the service information forwarding module is configured to: split the corresponding service information into a lightweight information part and another information part; and

send the lightweight information part to the small instruction software through the second connection, and send the another information part to the checkout POS machine through the first connection.

17. The apparatus according to claim 16, wherein the service information forwarding module is configured to: determine an information type corresponding to the universal communication protocol corresponding to the first connection;

convert or package the another information part, to masquerade as masqueraded information of the corresponding information type; and

send the masqueraded information to the checkout POS machine through the first connection, so that the another information part is subsequently restored based on the masqueraded information.

18. The apparatus according to claim 16, wherein the service information forwarding module is configured to: after the corresponding service information is split into the lightweight information part and the another information part, obtain a capability extension security degree corresponding to the checkout POS machine, wherein the capability extension security degree is obtained through calculation based on the universal communication protocol based on which the first connection is established and related information of a service party of the checkout POS machine; and

if the capability extension security degree is high enough, use the lightweight information part to carry a first indication identifier, to indicate to reassemble the lightweight information part and the another information part on the checkout POS machine; or

if the capability extension security degree is not high enough, use the lightweight information part to carry a second indication identifier, to indicate to reassemble the lightweight information part and the another information part on the remote server.

19. The apparatus according to claim 18, wherein key information required for executing a service related to a current payment is comprised in the lightweight information part; and

the service information forwarding module is configured to: after the capability extension security degree corresponding to the checkout POS machine is obtained, asynchronously send the another information part later than the lightweight information part.

20. The apparatus according to claim 16, wherein the another information part comprises first biometric feature information to be used by a current user for registration;

the extended payment capability is a near field communication payment capability, or a payment capability based on second biometric feature information; and

the first biometric feature information and the second biometric feature information correspond to different types of biometric features.

21. The apparatus according to claim 20, wherein the extended payment capability is the near field communication payment capability; and

the network state detection module is configured to: prompt the current user to register the first biometric feature information together before a user mobile terminal touches the external payment device;

if the user agrees, when the user mobile terminal touches the external payment device, read key information used for payment based on near field communication sensing as the lightweight information part; and

5 collect the first biometric feature information of the user together as the another information part.

22. The apparatus according to claim 14, wherein the service information forwarding module is configured to: receive a rerouting indication and payment interaction information that are sent by a user mobile terminal through short-range communication when a mobile network state of the user mobile terminal is abnormal;

10 convert the payment interaction information into a user-party small instruction in response to the rerouting indication;

send the user-party small instruction to the checkout POS machine through the second connection, to help the user mobile terminal perform remote interaction; and

15 receive a remote response small instruction forwarded by the checkout POS machine, and return the remote response small instruction to the user mobile terminal through short-range communication.

23. The apparatus according to claim 22, wherein the service information forwarding module is configured to: divide the second connection into a first channel and a second channel with data isolation; and

20 send the user-party small instruction to the checkout POS machine through the first channel, wherein

the second channel is used to send the at least a part of the service information.

24. The apparatus according to any one of claims 13 to 23, wherein the external payment device belongs to at least one of the following devices:

25 a near field communication payment device, a facial scanning payment device, and a palm scanning payment device.

25. A payment service processing device, applied to an external payment device configured for a checkout POS machine, wherein the checkout POS machine and the external payment device are separately provided by different service parties, and the device comprises:

30 at least one processor; and

a storage communicatively connected to the at least one processor, wherein

the storage stores instructions executable by the at least one processor, and the instructions are executed by the at least one processor to enable the at least one processor to perform the following operations:

5 detecting whether the checkout POS machine has established a first connection to the external payment device through one of a plurality of specified universal communication protocols;

 if yes, establishing a second connection to the checkout POS machine based on the first connection through a proprietary communication protocol provided by a service party of the external payment device, so that the checkout POS machine triggers, through the second connection, the external payment device to use an extended payment capability;

10 when the external payment device uses the extended payment capability, generating corresponding service information, and detecting a mobile network state of the external payment device;

 if the mobile network state is normal, directly sending the service information to a remote server of the service party of the external payment device through a mobile network; and

15 if the mobile network state is abnormal, sending at least a part of the service information to the checkout POS machine through the second connection, so that the checkout POS machine forwards the at least a part of the service information, to enable the at least a part of the service information to indirectly arrive at the remote server.