to the mobile device. Additionally, the server records a relationship between the payment code and a user account associated with the mobile device. The mobile device then forwards the received payment code to the wearable device and the wearable device displays the payment code. A merchant's payee device scans the payment code and sends transaction data (e.g., the payment code, the payment sum, and other transaction information) to the server. The server deducts the payment sum from the user account corresponding to the payment code and transfers the sum to the merchant's account, thereby completing the payment.

[0005] In the payment process described above, when the connection between the wearable device and the cell phone is poor, or the network performance between the cell phone and the server is poor, the wearable device generally cannot obtain the payment code or cannot display the payment code in time, resulting in failure of the payment transaction.

BRIEF SUMMARY

[0006] One aspect of the disclosure is drawn to a method for binding a wearable device. The method includes providing, by the wearable device, device information of the wearable device to a terminal based on an established connection between the wearable device and the terminal, the device information including a device identification; receiving, by the wearable device, a device certificate from a server, the device certificate generated by the server based on the device identification and the device certificate corresponds to a user account associated with the wearable device; generating, by the wearable device, a device-side key and a server-side key used for encrypting the device certificate during transmission; storing, by the wearable device, the device-side key on the wearable device, the device-side key being the same as the server-side key or based on the server-side key; transmitting, by the wearable device, the server-side key to the server; and storing, by the wearable device, the device certificate on the wearable device, the device certificate enabling the wearable device to perform a payment operation using the user account, wherein the payment operation is capable of being performed by the wearable device if the established connection between the wearable device and the terminal is not detected and wherein the payment operation comprises: generating, by the wearable device, a decrypted device certificate by decrypting the device certificate using the device-side key, wherein the device certificate is encrypted by the server using the server-side key; generating, by the wearable device, a transaction certificate based on the device certificate; and providing, by the wearable device, the transaction certificate to a payee device.

[0007] Another aspect of the disclosure is drawn to a method for binding a wearable device. The method includes receiving, by a server, a binding request from the wearable device via a terminal,

the binding request including a device identification of the wearable device and user account information associated with the wearable device; generating, by the server, a device certificate of the wearable device based on the device identification wherein the device certificate corresponds to a user account associated with the

wearable device; receiving, from the wearable device at the server, a server-side key generated by the wearable device; storing, by the server, a relationship between the device certificate and a user account associated with the wearable device; and providing, by the server, the device certificate to the wearable device, the device certificate enabling the wearable device to perform a payment operation using the user account wherein the payment operation is capable of being performed by the wearable device if an established connection between the wearable device and the terminal is not detected, the providing the device certificate to the wearable device comprising: encrypting the device certificate using the server-side key; and sending the encrypted device the certificate to the wearable device via the terminal.

[0008] Another aspect of the disclosure is drawn to a method for binding a wearable device. The method includes establishing, by a terminal, a connection between a wearable device and the terminal; acquiring, by the terminal, device information of the wearable device, the device information including a device identification of the wearable device; sending, by the terminal, a binding request to a server, the binding request including the device identification of the wearable device and user account information, the binding request enabling the server to generate a device certificate corresponding to a user account associated with the wearable device and provide the device certificate to the wearable device; receiving, by the terminal, a server-side key from the wearable device using the established connection, the server-side key being used by the server for encrypting the device certificate for the wearable device; and transmitting, by the terminal, the device certificate to the wearable device using the established connection, the device certificate enabling the wearable device to perform a payment operation using the user account wherein the payment operation is capable of being performed by the wearable device if the established connection between the wearable device and the terminal is not detected.

[0009] Another aspect of the disclosure is drawn to a method for facilitating electronic payments. The method includes receiving, by the wearable device, a device certificate corresponding to a user account associated with the wearable device from the terminal based on an established connection between the wearable device and the terminal; storing, by the wearable device, a security certificate corresponding to the user account; generating, by the wearable device, a transaction certificate according to a stored device certificate for a user account associated with the wearable device, wherein the transaction certificate is capable of being generated by the wearable device if the established connection between the wearable device and a

terminal is not detected, the generating a transaction certificate comprising generating a transaction certificate carrying validation information using a certificate generation algorithm, the transaction certificate generation algorithm corresponding to a certificate restoration algorithm adopted by the server for retrieving the device certificate and the security certificate from the transaction certificate; and providing, by the wearable device, the transaction certificate to a payee device, the transaction certificate enabling the payee device to upload the transaction certificate to a server for processing a payment using the user account corresponding to the device certificate.

[0010] Another aspect of the disclosure is drawn to a method for facilitating electronic payments. The method includes receiving, by a server, a payment collection request sent by a payee device, the payment collection request including a transaction certificate generated by a wearable device and payment sum information, wherein the transaction certificate is capable of being generated by the wearable device if an available connection between the wearable device and a terminal is detected; restoring, by the server, a device certificate of the wearable device from the transaction certificate he restoring the device certificate comprising: obtaining the device certificate restoration algorithm on the transaction certificate, the certificate restoration algorithm corresponding to a certificate generation algorithm used by the wearable device for generation the transaction certificate; and processing, by the server, a payment according to the payment sum information using a user account corresponding to the device certificate based on a relationship between the device certificate of the wearable device and the user account stored by the server, the processing the payment comprising performing validation on the transaction certificate using the security certificate, and, and if the validation is successful, performing a payment operation according to the payment sum information using the user account corresponding to the device certificate as payer.

[0011] An embodiment of the disclosure is drawn to a method for facilitating electronic payments. The method includes acquiring, by a payee device, a transaction certificate of a wearable device, the transaction certificate generated by the wearable device according to a device certificate corresponding to a user account associated with the wearable device, wherein the transaction certificate is capable of being generated by the wearable device if an available connection between the wearable device and a terminal is not detected; and sending, by the payee device, a payment collection request to a server, the payment collection request including the transaction certificate of the wearable device and payment sum information, the payment collection request being configured for allowing the server to restore the device certificate from the transaction certificate, and perform a payment operation according to the payment sum information using the user account corresponding to the device certificate.

[0012] Another embodiment of the disclosure is drawn to a wearable device. The wearable device includes one or more processors, and a non-transitory computer-readable medium storing computer-executable instructions. When executed by the one or more processors, the instructions cause the wearable device to establish a connection between the wearable device

and a terminal; provide device information of the wearable device to a terminal, the device information including a device identification; receive a device certificate from a server, the device certificate generated by the server based on the device identification and a user account associated with the wearable device; and store the device certificate on the wearable device, the device certificate enabling the wearable device to perform a payment operation

CLAIMS

What is claimed is:

1. A method for binding a wearable device, the method comprising:

providing, by the wearable device, device information of the wearable device to a terminal based on an established connection between the wearable device and the terminal, the device information including a device identification;

receiving, by the wearable device, a device certificate from a server, the device certificate generated by the server based on the device identification and the device certificate corresponding to a user account associated with the wearable device;

generating, by the wearable device, a device-side key and a server-side key used for encrypting the device certificate during transmission;

storing, by the wearable device, the device-side key on the wearable device, the device-side key being the same as the server-side key or based on the server-side key;

transmitting, by the wearable device, the server-side key to the server; and

storing, by the wearable device, the device certificate on the wearable device, the device certificate enabling the wearable device to perform a payment operation using the user account, wherein the payment operation is capable of being performed by the wearable device if the established connection between the wearable device and the terminal is not detected and wherein the payment operation comprises:

generating, by the wearable device, a decrypted device certificate by decrypting the device certificate using the device-side key, wherein the device certificate is encrypted by the server using the server-side key;

generating, by the wearable device, a transaction certificate based on the decrypted device certificate; and

providing, by the wearable device, the transaction certificate to a payee device.

2. The method according to claim 1, wherein providing device information of the wearable device to a terminal comprises displaying a two-dimensional code including the device information on a screen of the wearable device for the terminal to scan.

3. The method according to claim 1, wherein receiving a device certificate from a server comprises receiving a device certificate from the server via the connection between the wearable device and a terminal.

4. The method according to claim 1, further comprising sending, by the wearable device, an authorization request to the server, the authorization request including the device identification of the wearable device.

5. The method according to claim 1, wherein receiving a device certificate from a server comprises receiving the device certificate and a security certificate from the server, the security certificate being used for performing validation of the device certificate during the payment operation.

6. The method according to claim 1, wherein the storing the device certificate comprises:

encrypting, by the wearable device, the device certificate using an encryption algorithm to produce ciphertext; and

storing, by the wearable device, the ciphertext on the wearable device.

7. A method for binding a wearable device, the method comprising:

receiving, by a server, a binding request from the wearable device via a terminal, the binding request including a device identification of the wearable device and user account information associated with the wearable device;

generating, by the server, a device certificate of the wearable device based on the device identification, wherein the device certificate corresponds to a user account associated with the wearable device;

receiving, from the wearable device at the server, a server-side key generated by the wearable device;

storing, by the server, a relationship between the device certificate and a user account associated with the wearable device; and

providing, by the server, the device certificate to the wearable device, the device certificate enabling the wearable device to perform a payment operation using the user account wherein the payment operation is capable of being performed by the wearable device if an established connection between the wearable device and the terminal is not detected, the providing the device certificate to the wearable device comprising:

encrypting the device certificate using the server-side key; and

sending the encrypted device the certificate to the wearable device via the terminal.

8. The method according to claim 7, wherein the providing the device certificate comprises sending the device certificate to the wearable device via the terminal.

9. The method according to claim 7, the method further comprising receiving, by the server, an authorization request sent by the wearable device, the authorization request including the device identification of the wearable device, and wherein providing the device certificate to the wearable device comprises returning a response to the authorization request to the wearable device, the response including the device certificate.

10. The method according to claim 9, wherein the authorization request further includes a server-side key generated by the wearable device, and wherein the device certificate is encrypted using the server-side key.

11. The method according to claim 7, wherein providing the device certificate to the wearable device further comprises providing a security certificate to the wearable device, the security certificate used for performing validation on the device certificate during the payment operation.

12. A method for binding a wearable device, the method comprising:

establishing, by a terminal, a connection between a wearable device and the terminal;

acquiring, by the terminal, device information of the wearable device, the device information including a device identification of the wearable device;

sending, by the terminal, a binding request to a server, the binding request including the device identification of the wearable device and user account information, the binding request enabling the server to generate a device certificate corresponding to a user account associated with the wearable device and provide the device certificate to the wearable device;

receiving, by the terminal, a server-side key from the wearable device using the established connection, the server-side key being used by the server for encrypting the device certificate for the wearable device;

transmitting, by the terminal, the device certificate to the wearable device using the established connection, the device certificate enabling the wearable device to perform a payment operation using the user account wherein the payment operation is capable of being performed by the wearable device if the established connection between the wearable device and the terminal is not detected.

13. The method according to claim 12, the method further comprising:

receiving, by the terminal, the device certificate provided by the server; and

forwarding, by the terminal, the device certificate to the wearable device using the established connection.

14. The method according to claim 12, wherein the acquiring device information of the wearable device comprises:

scanning, by the terminal, a two-dimensional code displayed on a screen of the wearable device; and

acquiring, by the terminal, the device information of the wearable device from the scanned two-dimensional code.

15. A method for facilitating electronic payments, the method comprising:

receiving, by the wearable device, a device certificate corresponding to a user account associated with the wearable device from the terminal based on an established connection between the wearable device and the terminal;

storing, by the wearable device, a security certificate corresponding to the user account;

generating, by the wearable device, a transaction certificate according to a stored device certificate for the user account associated with the wearable device, wherein the transaction certificate is capable of being generated by the wearable device if the established connection between the wearable device and a terminal is not detected, the generating a transaction certificate comprising generating a transaction certificate carrying validation information using a certificate generation algorithm, the transaction certificate generation algorithm corresponding to a certificate restoration algorithm adopted by the server for retrieving the device certificate and the security certificate from the transaction certificate; and

providing, by the wearable device, the transaction certificate to a payee device, the transaction certificate enabling the payee device to upload the transaction certificate to a server for processing a payment using the user account corresponding to the device certificate.

16. The method according to claim 15, wherein the stored device certificate is a device certificate ciphertext produced by encrypting the device certificate using an encryption algorithm, and wherein generating a transaction certificate comprises:

reading, by the wearable device, the device certificate ciphertext;

decrypting, by the wearable device, the ciphertext based on an decryption algorithm; and

generating, by the wearable device, the transaction certificate according to the device certificate obtained from the decrypted ciphertext.

17. The method according to claim 15, wherein the transaction certificate includes a two-dimensional code or a bar code.

18. A method for facilitating electronic payments, the method comprising:

receiving, by a server, a payment collection request sent by a payee device, the payment collection request including a transaction certificate generated by a wearable device and payment sum information, wherein the transaction certificate is capable of being generated by the wearable device if an available connection between the wearable device and a terminal is not detected;

restoring, by the server, a device certificate of the wearable device from the transaction certificate, the restoring the device certificate comprising:

obtaining the device certificate restoration algorithm on the transaction certificate, the certificate restoration algorithm corresponding to a certificate generation algorithm used by the wearable device for generation the transaction certificate; and

processing, by the server, a payment according to the payment sum information using a user account corresponding to the device certificate based on a relationship between the device certificate of the wearable device and the user account stored by the server, the processing the payment comprising performing validation on the transaction certificate using

the security certificate, and, and if the validation is successful, performing a payment operation according to the payment sum information using the user account corresponding to the device certificate as payer.

19. The method according to claim 18, wherein the restoring a device certificate of the wearable device from the transaction certificate further comprises:

obtaining the device certificate and a security certificate of the wearable device by executing a certificate restoration algorithm on the transaction certificate, the certificate restoration algorithm corresponding to a certificate generation algorithm used by the wearable device for generating the transaction certificate, and

wherein the processing the payment further comprises performing validation on the transaction certificate using the security certificate, and, and if the validation is successful, performing a payment operation according to the payment sum information using the user account corresponding to the device certificate as payer.

20. The method according to claim 18, the method further comprising returning a result to the payee device indicating whether payment is successful.