SYSTEM AND METHOD FOR CONDUCTING A TRANSACTION

BACKGROUND

The present invention relates to a system and a method for conducting a transaction.

Typically transactions can be effected using cash, a payment card with a magnetic stripe and/or a chip, for example a credit card that is read by a transaction terminal system. It is also known to make payments using a contactless system using, for example Near Field Communication (NFC) devices. Examples of such devices include payments cards, prepayments cards and mobile communications devices that include an NFC interface module.

A typical transaction terminal system, for example a point of sale (POS) system, an automated teller machine (ATM) workstation or the like, will offer transactions in a currency local to the transaction terminal system. However, sometimes users wish to make a transaction in an alternative currency. Various techniques are known in the art for conducting payments where a user wishes to make a payment in a currency other than the currency local to the transaction terminal system.

For example EP 1,018,711 discloses an approach that includes identifying an identifier code from a payment card number and comparing this to entries in a table containing issuer codes and a corresponding currency code to determine an operating currency for association with a card transaction.

International patent application WO 2006/009816 discloses an approach in which a financial account number associated with a financial institution maintained by a customer at a financial institution is received, a foreign currency type associated with the financial account is determined, and a choice is presented to the user, the currency transaction then being conducted in accordance with a currency selection of the customer.

Traditional POS systems offering alternative currencies involve a merchant at a POS system questioning the user as to whether a customer wishes to effect a payment using a currency local to the POS system, or a billing currency associated with a credit card of the user. Traditional ATM systems offering alternative currencies involve the ATM displaying alternative currency offerings and the user selecting one of the alternative currencies offered using a keyboard of the ATM.

There is a need to provide an improved method of conducting a transaction in which a user has a choice of currencies for payment.

SUMMARY

The presently claimed subject matter is defined in the claims.

A method facilitating selection of a currency for a transaction comprises: in response to interfacing a mobile communications device configured for near field communications, “NFC”, with an NFC interface module of a transaction terminal system, exchanging information between a mobile application on the mobile communications device and the transaction terminal system, wherein the information exchanged includes at least one of information held by the transaction terminal system that is indicative of a terminal system currency of the transaction terminal system and information held on the mobile communications device that is indicative of a user currency; comparing, by the transaction terminal system or the mobile application, the terminal system currency to the user currency, and where there is a difference, causing a currency choice offer to be displayed on a display of the mobile communications device; and in response to user selection of the user currency, causing a transaction to be performed in the user currency.

The exchange of information can, for example, be performed responsive to at least a first tap of the mobile communications device on the NFC interface of the transaction terminal system. Causing a transaction to be performed can be achieved, for example, in response to a user action using the mobile communication device, for example using a second tap of the mobile communications device on the NFC interface of the transaction terminal system.

Causing a currency choice offer to be displayed on a display of the mobile communications device can, for example, comprise displaying an amount of a transaction in at least one currency, including at least one of the terminal system currency and user currency.

Causing a currency choice offer to be displayed on a display of the mobile communications device can, for example, comprise displaying an amount of a transaction in at least one currency, including the user currency, and displaying at least one of a currency conversion rate and a currency conversion charge between the terminal system currency and the user currency.

The amount of the transaction can, for example, be determined by the transaction terminal system as a result of input of information for goods or services to be purchased.

In response to interfacing the mobile communications device with the NFC interface module of the transaction terminal system, the mobile application can, for example, be caused to be activated for the exchange of information.

At least one of the transaction terminal system or the mobile application can, for example, maintain currency conversion values for converting transaction amounts between currencies. A currency conversion value can, for example, identify a currency conversion rate between a first currency and a second currency and an expiry of validity of the currency conversion rate. Where one of the transaction terminal system or the mobile application accesses a currency conversion value for which the validity of the currency conversion rate has expired, said one of the transaction terminal system or the mobile application can, for example, access a remote server to obtain a current currency conversion value. The location of the mobile communications device can be determined, for example, using a geo-location the location of a mobile telecommunications cell to which the mobile communication device is connected, or the location of a transaction terminal system to which it is connected, and currency conversion values can, for example, be downloaded from a remote server to the mobile application based on the determined location of the mobile communications device.

In response to determining the terminal system currency and the user currency as a result of comparing the terminal system currency to the user currency, a current currency conversion value from the transaction currency to the user currency can, for example, be downloaded from a remote server to one of the transaction terminal system or the mobile application.

Although various aspects of the invention are set out in the accompanying claims, other aspects of the invention include any combination of features from the described embodiments and/or the accompanying dependent claims with the features of the independent claims, and not solely the combinations explicitly set out in the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments are described, by way of example only, with reference to the accompanying drawings.

Figure 1 is a schematic block diagram illustrating an example of a configuration of a card payment system providing dynamic currency conversion.

Figure 2 is a block diagram illustrating an example of a transaction terminal system.

Figure 3 is a block diagram illustrating an example of a dynamic currency conversion host system.

Figure 4 is a schematic block diagram of an example of functional components of a mobile communications device.

Figure 5 is a schematic block diagram of functional components of a mobile application.

Figures 6A and 6B are flow diagrams illustrating an example of a method of operation.

DETAILED DESCRIPTION

Figure 1 is a schematic block diagram illustrating an example payment card system 100.

Figure 1 illustrates a transaction terminal system (or transaction station system) 10 that includes card payment functionality and additionally includes dynamic currency conversion (DCC) system functionality. The transaction terminal system 10 can be configured as a point of sale terminal located, for example, in the premises of a retailer, or may, for example, be an automated teller machine.

The transaction terminal system 10 can include one or more interface modules for receiving card payment and purchase details as will be described with reference to Figure 2. The transaction terminal system 10 is in communication via a communications network (for example via the Internet, a telephone network or another network) with a computer system 12 of a bank that provides banking services for the retailer, hereinafter referred to as an acquirer bank system 12. As a part of processing a card payment, the transaction terminal system 10 generates a payment authorisation request message 20.

The acquirer bank system 12 can include one or more computers. The acquirer bank system 12 can be operable to receive the payment authorisation request message 20

from the transaction terminal system 10 and to return an authorisation response message 30 in due course to the transaction terminal system 10. The acquirer bank system 12 is further in communication via a communications network (for example via the Internet, a telephone network or another network) with a network 14 of computer systems of a payment card operator (hereinafter referred to as the scheme network system 14). Although only one scheme network system 14 is shown in Figure 1, the acquirer bank system 12 will be in communication with respective scheme network systems for respective payment card operators.

The acquirer bank system 12 is operable to analyse a payment authorisation request message 20 received from the transaction terminal system 10 to determine an appropriate scheme network system 14 for the card concerned and to forward a payment authorisation request message 22 to the appropriate scheme network system 14.

The scheme network system 14 can be operable to receive the payment authorisation request message 22 from the acquirer bank system 12 and to return an authorisation response message 28 in due course to the acquirer bank system 12. The scheme network system 14 is further in communication via a communications network (for example via the Internet, a telephone network or another network) with a computer system 16 of a financial institution that issued the payment card (hereinafter referred to as the issuing financial institution system). Although only one issuing financial institution system 16 is shown in Figure 1, the scheme network system 14 can be in communication with respective issuing financial institution systems 16 for respective issuing financial institutions.

The scheme network system 14 can be operable to analyse the received payment authorisation request message 22 to identify the issuing financial institution that issued the payment card. The scheme network system 14 is then operable to forward a payment authorisation request message 24 to the issuing financial institution system 16 concerned, and to receive a response message 26 from the issuing financial institution system 16.

The issuing financial institution system 16 can be operable to receive the payment authorisation request message 24, to process the authorisation request by comparing the details of the payment request to records held for the payment card concerned, and then to transmit an appropriate authorisation response message 26 to the scheme network system 14. The authorisation response message includes various details including confirmation as

to whether the payment is authorised or not. The authorisation response message 26 is then forwarded via the scheme network system 14 and the acquirer bank system 12 to the transaction terminal system 10.

In the following, further detail will be given of rate request and rate response messages passed between the transaction terminal system 10 and the DCC host system 18.

On confirmation of a currency for a transaction, the transaction terminal system 10 can be operable to transmit an authorization request message or a financial presentment request message or a financial presentment advice message or clearing message (e.g., for the card holder's home or billing currency) to the issuing financial institution 16 via the acquirer bank system 12 and the scheme network systems 14.

Figure 2 is a schematic block diagram of an example transaction terminal system 10. The example transaction terminal system 10 illustrated in Figure 2 is a POS system that includes one or more processors 40, storage 42 (which can include volatile and non-volatile memory and storage), for the storage of programs and data, and a number of peripheral components.

Figure 2 illustrates that the storage 42 includes a card processing application forming a transaction processing (TP) application module 44, a DCC application forming a DCC module 46 and reference country and/or currency information 48, a local currency card file 49 that identifies cards that have been issued in a currency local to the terminal (which file can take various forms including, for example, an Issuer Identification Number/Bank Identifier Number (IIN/BIN) table 49) and a foreign currency table 47. It should be noted that the storage 42 can contain other applications and data.

The reference country/currency information 48 can be held, for example as an ISO country code and an alpha currency code and/or a numeric currency code in a file in the storage 42 or in a register.

Where the local currency card file is implemented as a local IIN/BIN table 49, this can identify local banks and other financial institutions for which a payment card has the local currency of the transaction terminal as the billing currency for the payment card, whereby the user (card holder) for the payment card would not be eligible for dynamic currency conversion. Individual entries in a local IIN/BIN table can include various fields including, for example, one or more of the following fields for:

an IIN/BIN;

an alpha billing currency code (e.g., an alpha ISO currency code);

a numeric billing currency code (e.g., a numeric ISO currency code);

a country code (e.g., an ISO country code).

The foreign currency table 47 can include indications of foreign currencies supported for dynamic currency conversion by the transaction terminal system 10. Individual entries in the foreign currency table 47 can include various fields including, for example, one or more of the following fields for:

an alpha foreign currency code (e.g., an alpha ISO currency code);

a numeric foreign currency code (e.g., a numeric ISO currency code).

Figure 2 also represents, schematically, a keyboard/keypad 50, a scanner 52, a card interface module 54 and a near field communications (NFC) interface module 55. The keyboard/keypad 50 can be keyboard/keypad with separate keys, or can be configured as a touch screen keyboard/keypad and can be used for the input of numerical and/or other characters as appropriate. The scanner 52 can, for example, be a bar code scanner, a QR code scanner or the like. The card interface module 54 can be configured to read data from a payment card. The card interface module 54 can be a magnetic stripe reader, a contact chip card reader, a contactless chip card reader, etc., as appropriate. Also, where appropriate, the card interface module 54 can also be operable to write information to a suitably configured payment card. The NFC interface module 55 can be used to communicate with, for example, a mobile communications device 100, e.g. a mobile phone, of a user. The NFC interface module 55 can be part of the card interface module 54 and can also be used to provide a contactless card interface module.

Figure 2 further represents, schematically, a display 56, a printer 58 and a communication interface module 60. The display 56 can be a numeric display, an alphanumeric display, an image display, etc., as appropriate to display input data and/or messages to assist a retailer/merchant and/or the user in operation of the transaction terminal system 10. The printer can be used for printing purchase receipts and/or other information. The communications interface module 60 enables communications via one or more communications channels 62 from the transaction terminal system 10 to the DCC host system 18, either directly or via an intermediate network (not shown).

In the example described above, the transaction terminal system 10 is a payment acceptance device or an automated teller system or a point of sale system. However, it

should be understood that the transaction terminal system 10 could also be in the form of a workstation connected to the Internet. The transaction terminal system may also be fully or partially integrated into the transaction system of a hotel, theatre, retail establishment, or the like.

Figure 3 is a schematic block diagram of an example of a DCC host system 18. The example DCC host system 18 illustrated in Figure 3 includes one or more processors 70, storage 72 (which can include volatile and non-volatile memory), for the storage of programs and data. Figure 3 illustrates that the storage 72 includes one or more DCC programs forming a DCC module 76 and one or more data tables including a home currency file 75, currency conversion, or exchange rate tables 74, a country to currency table 77 and a default currency table 73. It should be noted that the storage 72 can contain other applications and data.

The home currency file 75 can, for example, be in the form of a billing currency file (BCF 75) that can have entries that can include various fields, including, for example, fields for:

an account billing file identifier;

a lower value of card account number range;

a upper value of card account number range; and

an alpha billing currency code (e.g., a 2-3 character alpha ISO currency code);

a numeric billing currency code (e.g., a 3-digit numeric ISO currency code);

The currency conversion rate tables 74 can contain information from which current currency conversion data can be extracted. A header entry in the currency conversion table can include various fields, including for example, one or more of the following fields for:

an outgoing file prefix;

a file identifier;

a start effective date;

a start effective time;

a base currency code (e.g., using an ISO currency code);

a country code (e.g., using an ISO country code);

a file sequence number (e.g., 001, unless more than one file for the date);

a file extension (e.g., DAT).

A volume in the currency conversion tables 74 can include various fields, including, for example, one or more of the following fields for:

a volume header;

a start effective date;

a start effective time;'

a Rate ID.

Individual currency conversion entries in the currency conversion tables 74 can include various fields, including, for example, one or more of the following fields for:

an alpha currency code (e.g., an ISO standard 3 character alpha code);

a numeric currency code (e.g., an ISO standard 2-3 character numeric code);

a Euroband indicator (e.g., a flag to indicate whether the currency is a Euroband currency);

a currency conversion rate (e.g., a rate of exchange rounded to 4 decimal places);

a merchant FX-rate category;

a valid from date (e.g., the date from which the currency conversion rate is valid);

a valid from time (e.g., the time on that date from which the currency conversion rate is valid);

a valid to date (e.g., the date after which the currency conversion rate is not valid);

a valid to time (e.g., the time on that date after which the currency conversion rate is not valid);

a markup percentage value;

a markup precision value (e.g., to indicate a markup decimal place precision).

A final field in the currency conversion tables 74 can include various fields, including, for example, one or more of the following fields for:

a trailer line;

a checksum on the currency code field;

a checksum on the currency conversion rate field;

a record count.

A country to currency table 77 is used to map between a country and its official national currency. Typically one official national currency is associated with per country, but there may be multiple countries associated with one official national currency, e.g., EURO. In one example, the country to currency table is arranged by country and each

entry for a country identifies an official national currency associated therewith. In this example, each entry can include one or more fields including, for example, one or more of the following fields:

a country code (e.g., an ISO country code);

an alpha currency code (e.g., an ISO standard 3 character alpha code);

a numeric currency code (e.g., an ISO standard 2-3 character numeric code).

The default currency table 73 can be used to identify a default currency to be used for a transaction. The default currency table 73 can include, for example, a mapping between a non-supported DCC currency and a default supported DCC currency and can be used in certain circumstances to identify a default DCC currency to be used when a payment card is used that was issued for a currency that is not supported by the transaction terminal system 10 and/or the direct currency conversion host system 18. It can also be used in certain circumstances to identify a default DCC currency to be used for a payment card that is not issued for the local currency for the transaction terminal system 10. In one example, the default currency table 73 is arranged by input currency (e.g., the currency local to the terminal payment system and/or a non-supported currency, etc.) and each entry for an input currency identifies a corresponding default currency associated therewith. In this example, each entry can include one or more fields including, for example, one or more of the following fields:

an alpha input currency code (e.g., an ISO standard 3 character alpha code);

a numeric input currency code (e.g., an ISO standard 2-3 character numeric code);

an alpha default currency code (e.g., an ISO standard 3 character alpha code);

a numeric default currency code (e.g., an ISO standard 2-3 character numeric code)

Figure 3 also represents, schematically, a keyboard 78 and a display 80. The keyboard 78 can be keyboard with separate keys, or can be configured as a touch screen keyboard and can be used for the input of numerical and/or other characters as appropriate. The display 80 can be a numeric display, an alphanumeric display, an image display, etc., as appropriate to enable an operator to view system data.

Figure 3 further illustrates a printer 82 and a communications interface module 84. The printer can be used for printing system data. The communications interface module 84 enables communication via one or more communication channels 86 with the transaction

terminal system 10 and the acquirer bank system 12, either directly or via intermediate networks (not shown).

Figure 4 is a schematic block diagram illustrating functional components of a mobile communications device 40, for example a mobile telephone such as a smart phone, a tablet device or the like. The example mobile communications device 40 includes one or more processors 170 and memory 172 for the storage of programs and data. Various inputs and outputs are provided including audio inputs and outputs 176 (for example, a speaker and microphone), a vibration mechanism 178 for providing vibratory alerts, a touch sensor mechanism 180 for user input, the touch sensor being arranged to overlie the display 174, and one or more keys 182. Various communication interface modules can be provided including a radio module 184 for radio communication with a cellular network, a NFC interface module 186 for interacting with near field communications technology, a WiFi module 188 for communication with WiFi base stations, a Bluetooth module 190 for communication using Bluetooth technology and a GPS module 192 for position location of the mobile communications device. A subscriber identity (SIM) card reader 194 can be provided for connection to a SIM card 196 that contains user specific data including, for example, mobile network account data and payment card account data held in a secure storage 198 within the SIM card. It will be appreciated that the interaction of the various functional components shown in Figure 4 is merely illustrated in a schematic manner, and that any appropriate conventional configuration of individual components is possible within the mobile communications device.

Figure 5 is a schematic block diagram of functional components of a mobile application 720. The mobile application 720 can be held in storage 172 in the mobile communications device 40 and can be operable to the control the one or more processors 170 of the mobile device to provide various functions. These can include functions that will not be described here in that they are not relevant to an understanding of the claimed subject matter. For example the mobile application can provide various functions for supporting a traveller as a user to aid the user in his or her travels. For example, functional modules can provide travel recommendations and information and can, for example, support functions to assist a traveller with a tax refund process.

Figure 5 illustrates session identifier that can be stored by the mobile application 720 in storage 172 in the mobile communications device 40. Session identifier processing

logic 724 can be operable, in combination with transaction terminal software of a transaction terminal, to manage the session identifier 722 for identifying a transaction session between the mobile communications device 40 and a transaction terminal system 10. Figure 5 also illustrates currency choice preference 726 that can be stored by the mobile application 720 in storage 172 in the mobile communications device 40. Currency choice preference logic 728 can be operable to store a currency choice preference 726 in the storage 172 in response to user selection of a currency choice. For example, the currency choice preference logic 728 can provide the user with an option, for example as part of a set up process, to select that all transactions or one or more classes of transactions are performed, where possible, using a currency chosen by the user from a selection of currencies offered to the user, for example one or more currencies associated with a payment account of the user.

Figure 6 illustrates an example of a process flow 200 illustrating the use of a communication device of a user, for example a mobile phone, a tablet, a wearable device such as a smart watch, etc., that is provided with RFID capabilities, for example for near field communications (NFC), for interaction with a transaction terminal system such as the transaction terminal system 10. In an example embodiment, the mobile communications device 40 is a mobile phone provided with the mobile application 720 that can interact with the transaction terminal system 10 via an NFC interface module 186 of the mobile phone 10 and an NFC interface module 55 of the transaction terminal system 10.

The transaction terminal system 10 can, for example, be a point of sale terminal of a merchant that is selling goods and/or services to a user. In step 202, the transaction terminal system can, for example, be operable to collect information including cost information relating to one or more goods or services that a user wishes to purchase. The transaction terminal system can be configured to record details of a number of items to be purchased including the price or cost of the items, for example as a result of manual entry of the details or cost of each item (item value), for example using a keyboard, or by scanning, contactless reading, or otherwise a machine readable device indicating a value. For example, the value of an item can be retrieved from storage of the transaction terminal system or by remote look up from a server based on the entry of product code or the like for the item, for example by manual entry, or by scanning, contactless reading, or the like of a machine readable product code. The item value will typically be in a primary

currency for the terminal, thereafter termed the terminal currency. As each item is entered, the item value, an item identifier and potentially further data are stored in the storage in the transaction terminal system and/or in a server associated with the transaction terminal system.

An alternative cost or price in a second or further currency may also be stored in the transaction terminal system. Translation between the primary and alternative currencies can be performed, for example, using a conversion data structure (for example a table) identifying conversion rates between currencies. The conversion data structure can be updated at intervals, with the conversion values between respective currencies being associated with a validity period within which they are valid, whereby at the end of the validity period the conversion rates are updated by downloading current conversion rates and expiry dates from the remote server.

In the present example, rather than holding a conversion data structure locally to the transaction terminal system, the transaction terminal system can be operable to request a currency conversion rate in response to a transaction being performed.

In step 204, in response to collection in step 202 of the information relating to one or more goods or services that a user wishes to purchase, the user can be prompted (either automatically by at least one of an audio or visual output from the transaction terminal system) to tap the mobile communications device 40 on the NFC interface module 55 of the transaction terminal system 10 in order to interface the mobile communications device 40 to the transaction terminal system 10.

In steps 206 and 208, a handshake process takes place between the transaction terminal system 10 and the mobile communications device 40. This can include, as a result of tapping of the mobile communications device 40 on the NFC interface module 55 of the transaction terminal system 10, in step 204 the transaction terminal system sends a wake up call via the NFC interface modules 186 and 55 to the mobile communications device to cause the mobile application 720 to wake up and become active if it is dormant (in an inactive or sleep mode).

The handshake process can also include the transaction processing module 44 of transaction terminal system 10 determining whether the tapping of the mobile communications device 40 represents a new session with the transaction terminal system 10 or a continuation of a previous session. Whether this is a new session or not can be

determined by the transaction processing module 44 interrogating the mobile application 720 to determine whether the mobile application 720 has recorded a session identifier 722 still identified as active by the transaction processing module 44. The transaction terminal system (and/or the mobile application) can allocate and maintain a record 45 of session identifiers and the status of the sessions concerned. In one example as described herein, the transaction processing module 44 of the transaction terminal system allocates a session identifier on a first tap for a transaction session with a mobile communications device 40 and maintains that session identifier along with supplemental identifiers that identify the stage in processing reached. The session processing logic 724 of the mobile application 720 stores the session identifier allocated by the transaction processing logic 44 as the session identifier 722 in the mobile communication application storage and then also maintains supplemental identifiers that identify the stage in processing reached. For example a session identifier can be a number allocated to a session in a session identifier field of a session record, and the supplemental identifiers can be bits in supplemental bit fields, each bit being initially set to a first value and then changed to a second value when that stage of processing is reached.

The transaction terminal system is operable to compare any session identifier held by the mobile application and, if a session identifier is identified with one or more supplemental identifiers set to the second value, then the transaction terminal system can identify the tap of the mobile communications device on the NFC interface module of the transaction terminal system is a continuation of a previous session, the continuation being from the stage in the processing identified by the supplemental identifiers set to the second value. Otherwise, if tapping of the mobile communication device represents a new transaction session between the mobile communications device 40 and the transaction terminal system 10, then the transaction processing module 44 allocates a new session identifier to the session, and causes the session identified to the recorded in storage in the transaction terminal system 10 and to be recorded in storage of the mobile communications device 40 by the session processing logic 724 of the mobile application 720 as discussed above.

In step 210, the transaction processing module 44 causes information to be exchanged between the mobile communication device 40 and the transaction terminal system 10.

This can include the transaction processing module 44 interrogating the mobile communications device 40 via the NFC interface modules 186 and 55 to determine whether information is held on the mobile communications device 40 that is indicative of a user currency and/or a user country that can be transferred to the transaction terminal system and compared to information, held by the transaction terminal system, that is indicative of a terminal system currency (or country) of the transaction terminal system.

As discussed above, the mobile communication can include a subscriber identity module (SIM) 196 that can include a secure element 198. The secure element 198 can include payment information (for example credit or other payment card information) and/or information identifying a payment currency or a country associated with an account of the user (for example the credit or other payment card information). In this regard it should be noted that references to a credit or other payment card does not mean that a physical card is necessary, as the payment token may comprise a virtual card, as defined by information in the secure element of the SIM or otherwise held in secure storage in the mobile communications device.

The terminal system currency is typically a primary currency of the transaction terminal system, which forms a default currency for conducting transactions by the transaction terminal system. For example, if the transaction terminal system is located in Germany, the primary currency is typically Euros. However it is to be noted that multiple terminal system currencies could be provided, where for example the transaction terminal system is configured to allow transactions in multiple currencies. The terminal system currency or currencies can each be identified by a currency code held in storage in the transaction terminal system. A terminal country code for the country in which the terminal is located can also be held in storage in the transaction terminal system 10. The transaction terminal system 10 can include country to currency conversion tables 48 for converting between country information and currency information.

The user currency is a currency stored in the mobile communications device 40. For example, the information held on the mobile communications device 40 that is indicative of a user currency and is read by the transaction terminal system 10 can be held in the secure element 198 of the SIM 196 or another secure element within the mobile communications device 40. This can, for example, be the currency of an account (e.g., a credit or debit account) of the user of the mobile communications device, or a currency

selected by the user when configuring the mobile application. In an example application multiple user currencies can be specified, for example for respective accounts of the user. The user currency or currencies can each be identified by a respective currency code held in the secure element 198 of the SIM 196 or another secure element within the mobile communications device 40. In addition, a user country can be identified by a country code held in the secure element 198 of the SIM 196 or another secure element within the mobile communications device 40. The user country can be the issuing country of an account (e.g., a credit or debit account) of the user of the mobile communications device.

In an example embodiment, in step 212, where the secure element of a SIM contains payment details for the user that includes an indication of a user currency, these details are provided via the NFC interface modules 186 and 55 from the mobile communication device 40 to the transaction terminal system 10. At this stage a first supplemental identifier can be set to the second value by the session processing logic 724 of the mobile application 720 to indicate that the information required has been transmitted to the transaction terminal system and a second supplemental identifier can be set to the second value by the transaction processing module 44 to indicate that the information required has been received by the transaction terminal system.

In step 214, the transaction terminal system compares the terminal system currency or currencies to the user currency or currencies.

Where a difference is detected, then in step 216 the transaction terminal system can be operable to determine a currency conversion rate between a terminal currency relating to a base currency for the goods to be purchased and the user currency or currencies for determining the cost of the one or more purchases in different currencies based on the currency conversion rate.

For example, as discussed above, if a conversion data structure held locally in the transaction terminal system can be interrogated, and if the expiry date for a given currency conversion is out of date, then the transaction terminal system can be operable to send a rate request message to a remote server to obtain the download of a current conversion rate from the remote server. In the event that no conversion data structure is held locally to the transaction terminal system, for each transaction the transaction terminal system can be operable to send a rate request message to a remote server to obtain the download of a current conversion rate from the remote server. Further supplemental identifiers can be set

to the second value by the transaction processing module 44 during this processing to record the stage in the processing reached.

In step 218, the transaction terminal system is operable to compute the alternative prices in a terminal currency and the user currency or currencies based on the conversion rates obtained and to generate a purchase offer containing price and conversion rate information. The purchase offer can include, for example, transaction amounts in the terminal system and user currencies, currency codes for the currencies and the currency conversions rates and/or charges applied. Optionally a description and/or product code of each of the goods to be purchased can be provided in the purchase offer. The transaction terminal system can then be operable to send the purchase offer to the mobile communications device. Further supplemental identifiers can be set to the second value by the transaction processing module 44 during this processing to record the stage in the processing reached and by the session processing logic 724 of the mobile application 720 to indicate that the purchase offer has been received.

If, in step 214, no difference between the terminal system and user currencies is determined, then the purchase offer provided in step 218 contains the transaction amounts in the terminal system currency and the currency code for that currency and, optionally details of the purchases and this is transferred to the mobile communications device.

If the calculation is completed before the user has removed the mobile communications device 40 from the NFC interface module 55 of the transaction terminal system 10, then the currency choice offering can be transferred directly from the transaction terminal system 10 to the mobile application 720 via the NFC interface modules 55 and 186 of the transaction terminal system 10 and the mobile communications device 40. Typically the processing from the instant of the initial tap will take less than of the order of 200ms, so that in most cases the currency choice offering will be transferred to the mobile communications device 40 before the user has lifted the mobile communications device 40 from the NFC interface module 55 of the transactions terminal system 10.

On receipt of the purchase offer, a further supplemental identifier can be set to the second value by the session processing logic 724 of the mobile application 720 to indicate that the purchase offer has been received. The session processing logic 724 of the mobile application can then be operable in step 220 to display the purchase offer using the UI

logic 730 and invite the user to select the transaction amount and currency or currency choice offered (if there is a choice available). Displaying a purchase offer on a display of the mobile communications device can comprise displaying an amount of a transaction in at least one currency, including the terminal system currency and, where there is a currency choice, at least one user currency. For example, displaying a currency choice offer on a display of the mobile communications device can comprise displaying an amount of a transaction in at least one currency including the user currency and displaying at least one of a currency conversion rate and a currency conversion charge between the terminal system currency and the user currency. Further supplemental identifiers can be set to the second value by the session processing logic 724 of the mobile application 720 to indicate the stage on the processing reached.

The display can be configured to allow a user to select the purchase offer, and/or where there is a currency choice, to select a currency for the transaction. For example user selectable buttons can be displayed adjacent currency options, or the currency choice offerings can be displayed within user selectable displayed buttons. The user can be prompted to input verification of acceptance. For example, if the mobile communication device can be provided with a biometric sensor, for example a fingerprint sensor. Where the mobile communications device is provided with a biometric sensor, for example a fingerprint sensor, and the currency choice is indicated by selection of a selectable (real or virtual) button, or is preselected by a currency choice preference 726 held in the mobile communications device, sensing of verified fingerprint of a user by the fingerprint sensor could be used for confirm and verify a currency choice in one action. Alternatively, if the mobile communications device is not provided with a biometric scanner, the input of a PIN or other verification code could be required to verify acceptance of a purchase offer.

In response to verifying acceptance of the purchase offer and/or a currency where there is a currency choice and if this is verified before the user has removed the mobile communications device 40 from the NFC interface module 55 of the transaction terminal system 10, then the session processing logic can be operable in step 222 to transfer the acceptance of the purchase offer and/or the currency choice selection to the transaction terminal system via the NFC interface modules 186 and 55 of the mobile communications device 40 and the transaction terminal system 10. Further supplemental identifiers can be set to the second value by the session processing logic 724 of the mobile application 720

and the transaction processing module 44 of the transaction terminal system 10 to indicate the stage of processing reached.

Where in step 224, the transaction is completed successfully, then in step 226 the transaction processing module 44 can be operable to send confirmation from the transaction terminal system 10 to the mobile application 720 via the NFC interface modules 55 and 186 of the transaction terminal system 10 and the mobile communications device 40 to confirm that the transaction is complete, which can then be indicated to the user by the session processing logic, for example by displaying a confirmation in step 228 on the display of the mobile communications device. Further supplemental identifiers can be set to the second value by the session processing logic 724 of the mobile application 720 and the transaction processing module 44 of the transaction terminal system 10 to indicate the stage of processing reached.

Where in step 224, the transaction is not completed, for example because payment is refused by an issuing bank, then in step 226 the transaction processing module 44 can be operable to send an appropriate message from the transaction terminal system 10 to the mobile application 720 via the NFC interface modules 55 and 186 of the transaction terminal system 10 and the mobile communications device 40, which can then be indicated to the user by the session processing logic, for example by displaying a confirmation in step 228 on the display of the mobile communications device. The user can be prompted, for example, to initiate the process again using a different payment account, for example where multiple payment accounts are held by the mobile communications device. Further supplemental identifiers can be set to the second value by the session processing logic 724 of the mobile application 720 and the transaction processing module 44 of the transaction terminal system 10 to indicate the stage of processing reached.

In step 222 and 224, it is assumed that the user has not removed the mobile communications device from the NFC reader. However, it is possible that the user may remove the mobile communications device from NFC interface module 55 of the transactions terminal system 10, for example to read information on the display of the mobile communications device and/or to operate buttons of or displayed on the mobile communications device. The handshake protocol between the transaction terminal system can be configured to monitor whether the NFC connection is broken (for example, using a heartbeat signal).

If the NFC connection is broken, for example as a result of the user removing the mobile communications device from the NFC reader 55, before the processing described above is complete, then the session processing logic of the mobile communications device and/or the transaction processing module of the transaction terminal system can be operable to cause the user to be prompted to tap the mobile communications device on the NFC interface module 55 of the transaction terminal system again in order that the processing may continue. As the transaction processing module 44 of the transaction terminal system 10 and the session processing logic 724 of the mobile application maintains a record, or log, of the stage of processing reached using the supplemental identifiers, in the event that the NFC interface module is interrupted, processing can restart from an appropriate point on the mobile communications device being tapped once more on the NFC interface module 55 of the transaction terminal system 10 and by the session processing logic 724 of the mobile application 720 and the transaction processing module 44 of the transaction terminal system 10 interrogating the supplemental identifiers to determine the stage of processing reached.

For example, if the mobile communications device 40 has been removed from the NFC interface module 55 of the transaction terminal system 10 before receiving a currency choice offering in step 220, then the session processing logic 724 can cause user interface (UI) logic 730 to cause the user to be prompted, for example by at least one of an audio, vibrational or visual prompt by the mobile communication device to tap the mobile communications device on the NFC interface module of the transaction terminal system again to receive the purchase offer. On this tap the transaction terminal system compares the session identifier 722 held by the mobile application and a session identifier 45 for the current session held by the transaction terminal system, and takes note of the transaction log recording the stage of the transaction processing and recognises that the currency choice offering needs to be transferred to the mobile application as a continuation of that session.

Figure 6B illustrates in more detail an example of the operation of steps 214, 216 and 218 of Figure 6A.

In the example shown in Figure 6B, in step 214-1 the transaction terminal system compares a terminal system currency to a user currency.

If the terminal system currency is equal to the user currency, then in step 214-2, processing moves to step 218.

If the terminal system currency is not equal to the user currency, then in step 214-2, processing moves to step 216.

In step 216-1, the transaction processing module 44 send a rate request message to a remote server to obtain the download of a current conversion rate from the remote server. The rate request message can specify a transaction identifier and the terminal system currency and the user currency using appropriate currency codes.

In step 216-2, the transaction processing module 44 receives a currency conversion rate response from remote server. The conversion currency response can include the transaction identifier, the terminal system currency and user currency codes and a conversion rate.

In step 216-3, the transaction processing module 44 computes alternative prices in the user currency based on the transaction amount in the terminal currency and the conversion rate obtained.

In step 218-1 the transaction processing module 44 generates a purchase offer containing price and conversion rate information. In the event that the terminal system currency and the user currency were determined to the be same in step 214-1, then the purchase offer can include, for example, a transaction amount in the terminal system currency. Optionally a description and/or product code of each of the goods to be purchased can be provided in the purchase offer. In the event that the terminal system currency and the user currency were determined to the be different in step 214-1, then the purchase offer can include, for example, a transaction amount in the terminal system and user currencies, currency codes for the currencies and the currency conversions rate and/or charges applied. Optionally a description and/or product code of each of the goods to be purchased can be provided in the purchase offer.

In step 218-2, the transaction processing module can then be operable to send the purchase offer to the mobile communications device 40 via the NFC interface modules 55 and 186 of the transaction terminal system 10 and the mobile communications device 40.

As discussed with reference to Figure 6A, supplemental identifiers can be set to the second value by the transaction processing module 44 during the processing of steps 214,

216 and 218 to record the stage in the processing reached and by the session processing logic 724.

In the process described with reference to Figure 6, the calculation of the currency choice options is performed by the transaction terminal system and is then transferred to the mobile application. In an alternative example, the transaction terminal system can be caused to transfer the terminal system currency code and the details of the purchase(s) to the mobile application in response to the first tap of the mobile communications device on the NFC interface module of the transaction terminal system. In the alternative example, the mobile application rather than the transaction terminal system can be caused to compare the terminal system currency or currencies to the user currency or currencies. Where a difference is detected, then the mobile application can be caused to calculate and present the currency choice on the display of the mobile communications device. In this case, the currency choice can be made on the basis of currency conversion rates held by the mobile application. For example, a conversion data structure held locally or remotely with respect to the mobile communications device can be interrogated, and if the expiry date for a given currency conversion is out of date, then the current conversion rate can be downloaded from a remote server. Following selection of a currency choice by the user, the user can be prompted to tap the communications device on the NFC interface module of the transaction terminal system to transfer the currency choice selection to the transaction terminal system, which can then proceed to effect the transaction in a conventional manner in the selected currency, for example using a credit card account of the user. Where the conversion rates are held on the mobile communications device, then these could be downloaded at certain intervals (for example when the user connects via Wi-Fi to avoid potential roaming charges), and as discussed the rates can be given a time stamp so that they “time out” after a certain time interval. In order to minimise the storage needed for conversion rates, the rates that are downloaded and stored on the mobile communications could be rates specific or relating to a current location of the mobile communications device. The current location of the mobile communications device can be determined, for example, from conventional geo-location techniques, the location of a mobile telecommunications cell to which the mobile communication device is or has been recently connected, or the location of a transaction terminal system to which mobile communication device is or has been recently connected,

As described above, the mobile communication device can include payment card details in a secured element (e.g. in the SIM), whereby the mobile application and/or the transaction terminal system can be operable to detect that the mobile phone is provided with the payment card details and to use the payment account of the payment card details to effect the transaction. However, in another example, the payment card to be used for a transaction could be separate from the mobile communication device, whereby the mobile communications device contains the indication of the user currency or country, but not the payment account of the user, the separate payment card being used to conduct the transaction.

As discussed above, the mobile application 720 can be configured to enable a user to predefine a currency choice, or to enable the user to make a currency choice for each transaction separately.

The application can be configured to enable the user to set a preferred currency.

An example operation can include steps of the transaction terminal system detecting the mobile application, querying the application rather than a chip on the phone, noting whether a predefined currency is identified in the application, or alternatively identifying from where the phone originates, and based on these determinations, offering currency choice.

The mobile application on the mobile communication device can be configured to interface module with a remote currency choice server in real time, or the rates can be provided preloaded on the mobile communications device.

The program modules may each be embodied in one or more computer program products for operating the processors 40 and 170, respectively. One or more computer program products operable to control the processor(s) 40/170 of the transaction terminal system and/or the mobile communications device can implement the processes and modules described with reference to Figure 6. Each computer program product may be in the form of one or more computer programs provided, for example on a carrier medium forming a computer readable medium. The carrier medium could be a storage medium such as a solid state, magnetic, optical, magneto-optical or other storage medium. The carrier medium could be a transmission medium such as broadcast, telephonic, computer network, wired, wireless, electrical, electromagnetic optical or any other transmission medium.

It should be noted that the term “payment card” as used herein is used in a generic manner to describe a token or device or carrier that can be used to effect a transaction based on an account associated therewith. It should be noted that the “payment card” does not need to take form of a conventional rectangular plastic credit card or the like, possible with an integrated chip integrated therein, but the “payment card”, within the meaning applied herein, may take any other form that can be operable as a credit, debit, or other form of payment token, device or carrier. For example, within the meaning of the term “payment card” as used herein, a payment system could be based on, or permit the use of mobile telephones, personal data assistants (PDAs), or other carriers of information as the “payment card”. In such a case the mobile telephone is typically provided with a chip or software having functionality equivalent to that of chip of an EMV card. Accordingly, where reference is herein to a payment card, it is to be understood that the “payment card” can take any suitable form to be operable as a payment token, device or carrier that is configured to conduct transactions based on an account associated therewith, for example means of appropriate software and/or a mechanism for transferring information to and from a payment terminal system (for example via contacts or in a contactless manner).

Although reference is made to “tapping” the mobile communications device on an NFC interface module of a transaction terminal system, it should be understood that this is referenced as an example of interfacing the NFC interface modules of the mobile communications device and the transaction terminal system. Physical contact between the NFC interfaces modules of the mobile communications device and the transaction terminal system may not be needed, and indeed, in example embodiments the NFC interface modules of the mobile communications device and the transaction terminal system may only need to be brought into sufficient proximity that the NFC interface module of the mobile communications device falls within the effective field range of the NFC interface module of the transaction terminal system. Accordingly, references to a “tap” or “tapping “as used herein are to be understood to mean bringing of the NFC interface module of the mobile communications device into sufficient proximity to the NFC interface module of the transaction terminal system so that it falls within the effective field range of the NFC interface module of the transaction terminal system.

Although the embodiments described above have been described in detail, numerous variations and modifications will become apparent to those skilled in the art

once the above disclosure is fully appreciated. It is intended that the following claims be interpreted to include all such variations and modifications and their equivalents.

CLAIMS

1. A method comprising,

in response to interfacing a mobile communications device configured for near field communications, “NFC”, with an NFC interface module of a transaction terminal system, exchanging information between a mobile application on the mobile communications device and the transaction terminal system, wherein the information exchanged includes at least one of

information held by the transaction terminal system that is indicative of a terminal system currency of the transaction terminal system, and

information held on the mobile communications device that is indicative of a user currency;

comparing, by the transaction terminal system or the mobile application, the terminal system currency to the user currency, and where there is a difference, causing a currency choice offering to be displayed on a display of the mobile communications device; and

in response to user selecting the user currency, causing a transaction to be performed in the user currency.

2. The method of claim 1, wherein the exchange of information is performed responsive to at least a first tap of the mobile communications device on the NFC interface module of the transaction terminal system.

3. The method of claim 1 or claim 2, wherein causing a currency choice offering to be displayed on a display of the mobile communications device comprises displaying an amount of a transaction in at least one currency, including at least one of the terminal system currency and user currency.

4. The method of any one of the preceding claims, wherein causing a currency choice offering to be displayed on a display of the mobile communications device comprises displaying an amount of a transaction in at least one currency including the user currency

and displaying at least one of a currency conversion rate and a currency conversion charge between the terminal system currency and the user currency.

5. The method of claim 3 or claim 4, wherein the amount of the transaction is determined by the transaction terminal system as a result of input of information for goods or services to be purchased.

6. The method of any one of the preceding claims, wherein:

in response to interfacing the mobile communications device with the NFC interface module of the transaction terminal system, the mobile application is caused to be activated for the exchange of information.

7. The method of any one of the preceding claims, comprising maintaining, by at least one of the transaction terminal system or the mobile application, currency conversion values for converting transaction amounts between currencies.

8. The method of claim 7, wherein currency conversion value identifies a currency conversion rate between a first currency and a second currency and indicates the expiry of validity of the currency conversion rate.

9. The method of claim 8, wherein, where one of the transaction terminal system or the mobile application accesses a currency conversion value for which the validity of the currency conversion rate has expired, said one of the transaction terminal system or the mobile application accesses a remote server to obtain a current currency conversion value.

10. The method of any one of the preceding claims, comprising determining a location of the mobile communications device by using geo-location, the location of a mobile telecommunications cell to which the mobile communication device is connected, or the location of a transaction terminal system to which it is connected, and causing currency conversion values to be downloaded from a remote server to the mobile application based on the determined location of the mobile communications device.

11. The method of any one of the preceding claims comprising, in response to determining the terminal system currency and the user currency as a result of said comparing, by the transaction terminal system or the mobile application, of the terminal system currency to the user currency, causing a current currency conversion value from the transaction currency to the user currency to be downloaded from a remote server to one of the transaction terminal system or the mobile application.

12. The method of any one of the preceding claims, comprising maintaining, by at least one of the transaction terminal system and the mobile communications device, a session identifier identifying a transaction session, wherein the session identifier identifies a stage in processing of a session, whereby in the event of a session being interrupted by a break in NFC communication, the session can be restarted on resumption of the NFC session.

13. The method of any one of the preceding claims, wherein at least one of the transaction terminal system and the mobile communications device is operable to identify a break in NFC communication and to prompt a user to re-establish an interface between the mobile communications device with the transaction terminal system.

14. One or more computer programs comprising program code operable to carry out the method of any of the preceding claims.

15. A transaction terminal system, comprising a near field communications, “NFC” interface module, the transaction terminal system being configured, in response to interfacing of a mobile communications device configured for NFC with the NFC interface module of the transaction terminal system:

to cause an exchange of information between a mobile application on the mobile communications device and the transaction terminal system, wherein the information exchanged includes at least one of

information held by the transaction terminal system that is indicative of a terminal system currency of the transaction terminal system, and

information held on the mobile communications device that is indicative of a user currency;

to compare the terminal system currency to the user currency, and where there is a difference, causing a currency choice offering to be displayed on a display of the mobile communications device; and

in response to user selection of the user currency, causing a transaction to be performed in the user currency.

16. The transaction terminal system of claim 15, further configured to perform the exchange of information responsive to at least a first tap of the mobile communications device on the NFC interface module of the transaction terminal system.

17. The transaction terminal system of claim 15 or claim 16, configured to determine the amount of the transaction as a result of input of information for goods or services to be purchased.

18. The transaction terminal system of any one of claims 15 to 17, configured, in response to determining that the terminal system currency and the user currency differ, to cause a current currency conversion value from the transaction currency to the user currency to be downloaded from a remote server to the transaction terminal system.

19. The transaction terminal system of any one of claims 15 to 18, configured to maintain a session identifier identifying a transaction session, wherein the session identifier identifies a stage in processing of a session, whereby in the event of a session being interrupted by a break in NFC communication, the session is restarted on resumption of the NFC session.

20. The transaction terminal system of any one claims 15 to 19, configured to identify a break in NFC communication and to prompt a user to re-establish an interface between the mobile communications device with the transaction terminal system.

21. A mobile communications device comprising a near field communications, “NFC” interface module, the mobile communications device being configured, in response to

interfacing of the mobile communications device with an NFC interface module of a transaction terminal system:

to exchange of information between a mobile application on the mobile communications device and the transaction terminal system, wherein the information exchanged includes at least one of

information held by the transaction terminal system that is indicative of a terminal system currency of the transaction terminal system, and

information held on the mobile communications device that is indicative of a user currency;

in response to receiving a currency choice offering from the transaction terminal system, to display the currency choice offering on a display of the mobile communications device; and

in response to user selection of the user currency, to transmit the user selection to the transaction terminal system for a transaction to be performed in the user currency.

22. The device of claim 21, configured to perform the exchange of information responsive to at least a first tap of the mobile communications device on the NFC interface module of the transaction terminal system.

23. The device of claim 21 or claim 22, configured to display an amount of a transaction in at least one currency, including at least one of the terminal system currency and user currency.

24. The device of any one of claims 21 to 23, configured to display an amount of a transaction in at least one currency including the user currency and displaying at least one of a currency conversion rate and a currency conversion charge between the terminal system currency and the user currency.

25. The device of any one of claims 21 to 24, configured, in response to interfacing the mobile communications device with the NFC interface module of the transaction terminal system, to cause the mobile application to be activated for the exchange of information.

26. The device of any one of claims 21 to 25, configured to maintain a session identifier identifying a transaction session, wherein the session identifier identifies a stage in processing of a session, whereby in the event of a session being interrupted by a break in NFC communication, the session can be restarted on resumption of the NFC session.

27. The device of any one claims 21 to 26, configured to identify a break in NFC communication and to prompt a user to re-establish an interface between the mobile communications device with the transaction terminal system.