

METHOD AND SYSTEM FOR TRANSMITTING A TRANSACTION IDENTIFIER**TECHNICAL FIELD**

The present invention relates generally to a method and system of transmitting a transaction identification data using a handheld communication device such as a mobile device, a cellular telephone, PDA, or virtually any self-powered handheld communication device for effecting a proximity payment transaction. More specifically, the present invention relates to a system and method for transmitting the transaction identification data using audio frequency signals.

BACKGROUND

Proximity payment transactions using a handheld communication device are an area of interest to both financial and mobile networking industries. Proximity payment is a wireless payment technology that enables fast and secure payment transactions at a Point of Sale(POS) terminal without the use of cash. A handheld communication device transmits a transaction identification data, required for facilitating the proximity payment transaction, to an Electronic Data Capture (EDC) device such as a Point of Sale(POS) terminal, an Automated Teller Machine (ATM) and the like. The transaction identification data can include credit card or debit card information, the preferred method of payment, a personal identification data, and other personal and financial data of a user. Several methods for transmitting such transaction identification data have been discussed in the prior arts mentioned below.

Near Field Communication (NFC) technology is one of the methods for transmitting the transaction identification data in proximity payment transactions. NFC enables handheld communication devices to conduct contactless proximity payments by transmitting the transaction identification data from the handheld communication device to the Electronic Data Capture (EDC) device using radio frequency communication (RFC). The radio transmission is achieved by, installation of NFC converters on the handheld communication device, and NFC receivers on the Electronic Data Capture (EDC) device. The drawback of using the NFC technique is, it involves the addition of new expensive components such as the NFC converters

on the handheld communication device and the NFC receivers on the Electronic Data Capture (EDC) device, which tend to increase the cost of installation.

Alternatively, systems may use SMS communication to send the transaction identification data, required for facilitating the proximity payment transactions through the handheld communication devices. However, the SMS communication is unreliable, as the messages get stored at a Short Message Service Center (SMSC), and if the messages are stored for more than a scheduled time period, the messages would get deleted and never reach the desired recipient. Further, the SMS communication requires a longer transit time and hence being time consuming would fail to be a feasible solution at a merchant store or a commercial Point of Sale (POS) terminal.

Thirdly, wireless communication protocols such as Wireless Application Protocol(WAP), General Packet Radio Service(GPRS), Integrated Digital Enhanced Network(iDEN), Unstructured Supplementary Service Data(USSD) may be used, by the user logging into an interactive website hosted by a transaction authorizing agency and providing his necessary credentials and financial information as required for conducting a proximity contactless transaction. However, this method requires the availability of and dependency on a mobile network.

Hence there is a need for an alternative method and system for transmitting the transaction identification data from the handheld communication devices to the Electronic Data Capture (EDC) terminals during the proximity payment transaction processes. The alternative method must enable the users to utilize their preferred devices and network carriers; without having to purchase additional hardware and components and without having to wait for long time periods for transmitting the transaction identification data. Moreover, need exists for a method and a system configured to protect the transaction identification data, that comprises of sensitive information, from being compromised as it moves from the handheld communication device to the Electronic Data Capture (EDC) terminal.

SUMMARY

The present invention alleviates the above mentioned drawbacks of the existing prior art by providing a method and system for transmitting transaction identification data of a proximity payment transaction; from a handheld communication device to an Electronic Data Capture(EDC) device using audio frequency signals.

To achieve the aforementioned objective the instant invention provides a method for generating a transaction identification data at a handheld communication device on the basis of valid user inputs, encoding the transaction identification data into audio frequency tones, emitting the audio frequency tones from the handheld communication device, receiving the emitted audio frequency tones by an Electronic Data Capture (EDC) device and finally decoding the audio frequency tones at the EDC device in order to retrieve the transaction identification data.

The instant invention also provides a system for transmitting a transaction identification data from a handheld communication device to an Electronic Data Capture (EDC) device. The system comprises an audio frequency generator module configured to encode the transaction identification data into audio frequency tones at the handheld communication device, an emitter module configured to emit the audio frequency tones from the handheld communication device, a receiving module configured to receive the audio frequency tones at the EDC device, and a tone recognition module configured to decode the audio frequency tones and retrieve the transaction identifier at the EDC device.

The instant invention also provides a computer program product for transmitting a transaction identifier from a handheld communication device to an Electronic Data Capture (EDC) device, the computer program product consists of a plurality of program instructions that are stored on a tangible computer readable media which when run on a computer processor carry out the steps for transmitting the transaction identifier. The steps for transmitting the transaction identifier include, coding the transaction identifier into audio frequency tones at the handheld communication device, emitting the audio frequency tones from the handheld communication device, receiving the emitted audio frequency tones at the EDC device and decoding the received audio frequency tones into the transaction identifier at the EDC device.

These and other features, aspects, and advantages of the present invention will become better understood with reference to the following description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings represent one or more implementations of the present invention, by way of example only, not by way of limitation. In the drawings like reference numerals refer to same or similar elements.

FIG. 1 is a flowchart illustrating a preferred embodiment of a method of transmitting the transaction identification data from the handheld communication device to the EDC device; and

FIG. 2 illustrates a system of transmitting the transaction identification data from the handheld communication device to the Electronic Data Capture (EDC) device.

DETAILED DESCRIPTION

In the following detailed description, examples are provided only for a thorough understanding of the present invention, the examples in no way limit the scope of the invention. The present invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. In other embodiments, well known methods, procedures, components and circuitry have been described at a relatively high-level, without detail, in order to prevent unnecessary obscuring the aspects of the present invention.

The invention describes a system and method for transmitting a transaction identifier between a handheld communication device and an Electronic Data Capture (EDC) device. The transaction identifier comprises of transaction identification data that provide the necessary authentication for a proximity transaction. As used herein, a transaction is defined as an exchange of data that can be used for purchasing a product or a service. In an embodiment of the invention, the transaction can be a proximity payment transaction. The EDC device can be present at a merchant location such as a Point of Sale (POS) terminal or an Automated Teller Machine (ATM). The method of the instant invention enhances the security of the proximity transaction

by communicating the transaction identifier in the form of audio frequency tones. The method uses components already existing on the handheld communication device, thereby avoiding additional investment for implementation. Further, the POS terminal or the ATM terminal also require minimal enhancement viz. the addition of a standard microphone to receive the audio frequency tones.

FIG. 1 represents the essential steps performed by an application that enables functions on the handheld communication device to communicate the transaction identifier in the form of audio frequency tones to the EDC device. In step 102, the user inputs are entered into the handheld communication device. In a preferred embodiment of the invention, the user inputs can comprise of an account number, a unique Personal Identification Number (PIN) and other user authorization data. The account number, selected from a plurality of accounts, can be associated to an account from which the user intends to make a payment for the proximity transaction. The unique PIN can be the unique code used to access the account from which the user intends to make a payment for the proximity transaction. At step 104, a transaction identifier is generated based on the user inputs. The transaction identifier can be generated using any conventionally known process. Further, at step 106 the transaction identifier is encoded into the audio frequency tones at the handheld communication device. At step 108 the audio frequency tones 210(refer FIG. 2) are emitted from the emitter module 204(refer FIG. 2) located within the handheld communication device. In a preferred embodiment the audio frequency tones can be emitted by a standard speaker installed on the handheld communication device. At step 110, the audio frequency tones thus emitted are captured or intercepted by the receiving module 214 (refer FIG. 2) of the EDC device. In an embodiment of the invention the audio frequency tones can be captured by a standard microphone device installed on the EDC device. At step 112 the audio frequency tones that are intercepted at the EDC device are decoded by the tone recognition module 216 (refer FIG. 2) present at the EDC device, and the transaction identifier is retrieved.

In an embodiment of the invention, the user inputs are validated before generating the transaction identifier, to ensure access to the handheld communication device by the user, authorized for performing the proximity transactions. In the event the user inputs, for example the PIN and the account number are incorrect, an error message is preferably displayed on the output interface of the handheld communication device. In the event the user inputs, such as the PIN and the

account number in a preferable embodiment, are verified to be correct, a one-time password; alternatively referred to as the transaction identifier; is generated at the handheld communication device, thereby permitting the user access to the proximity transaction. The user inputs are validated using techniques known in the art. The one-time password can be generated using any of the conventionally available techniques known in the art. The one-time password is dynamically created and is unique for every transaction conducted by the handheld communication device. Dynamically created unique one-time password enhances the security of such proximity transactions.

In an alternate embodiment of the present invention, the transaction identifier can be encrypted by an encryption module before encoding it into audio frequency tones. The transaction identifier can be encrypted using any of the conventionally known algorithms; such as an Advanced Encryption Standard (AES) or a Data Encryption Standard (DES). Alternatively, encrypting the transaction identifier can include an encryption key. Further, the audio frequency tones that are intercepted by the receiving module 114 at the EDC device are decoded by the Tone Recognition module 116 and decrypted by a decryption module for retrieving the transaction identifier.

FIG. 2 illustrates an environment 200 in which various embodiments of the invention can be practiced. The environment 200 includes a user 206, the handheld communication device 208, audio frequency tones 210 and the Electronic Data Capture (EDC) device 212. The handheld communication device 208 includes an audio frequency generator module 202 and an emitter module 204. The EDC device 212 includes a receiving module 214 and a tone recognition module 216. The user 206 is authorized to use the handheld communication device 208. In a preferred embodiment, the handheld communication device 208 may be any suitable handheld electronic device including but not limited to a cell phone, a personal digital assistant (PDA), a handheld computer, a Bluetooth headset, and the like. Further, the present invention is not limited to a wireless communication device; other types of wireless access terminals such as fixed wireless terminals may be used. In a preferred embodiment the Electronic Data Capture (EDC) device 212 at the merchant location comprises any one of a Point of Sale (POS) terminal, an Automated Teller Machine (ATM) or a mobile phone. In an embodiment where the EDC device is a mobile phone, the need for attaching a microphone on the EDC device is eliminated. The EDC device 212 is configured to carry out the transaction in communication with the

handheld communication device 208. The user 206 enters user inputs comprising an account number, a unique Personal Identification Number (PIN) and other authorization data into an input interface present at the handheld communication device 206. The input interface can be a standard interface, as known in art, for entering the user inputs into the handheld communication device 206. The user 206 is validated based on the entered user inputs. In the event the user inputs are incorrect an error message is displayed on an output screen of the handheld communication device 208 indicating incorrect user inputs have been entered by the user. This feature is to ensure that the handheld communication device can be accessed by only such user 206 who is authorized for performing the proximity transaction. In the event the user inputs are correct, the user 206 is validated and the transaction identifier; is generated at the handheld communication device 208. The transaction identifier can be generated using any of the conventionally available applications as known in the art. The transaction identifier is dynamically created and is unique for every transaction conducted by the handheld communication device 208. Dynamically created unique transaction identifier enhances the security of the proximity transaction. The audio frequency generator module 202 converts the transaction identifier into a sequence of audio frequency tones 210. The emitter module 204 on the handheld communication device 208 emits the audio frequency tones. In one embodiment the emitter module 204 comprises of a speaker installed within the handheld communication device 208. The audio frequency tones 210 are communicated over the short distance range between the handheld communication device 108 and the EDC device 212. The receiving module 214 at the EDC device 212 is configured to capture the audio frequency tones 210 that are communicated from the handheld communication device 208. The receiving module 214 includes a standard microphone that can detect audio frequency signals. Further the audio frequency tones 210 so captured by the microphone of the receiving module 214 at the EDC device 212 are decoded by the tone recognition module 216. The transaction identifier is retrieved as an output of the tone recognition module 216. The transaction identifier can be used for further processing of the proximity transaction initiated by the user 206.

In another embodiment of the present invention, the transaction identifier can be converted into (Dual Tone Multi Frequency) DTMF signal using a standard DTMF coder as known in the prior art. On the EDC device 212, a standard DTMF decoder can be employed to detect the DTMF tones emitted from the handheld communication device 208, and to convert them to the actual

digits comprising the transaction identifier. Further for improving the security of the system, the transaction identifier may be encrypted before converting it to the DTMF signal at the handheld communication device 208. The decryption module may be employed for decrypting the DTMF signals received at the EDC device 212.

The present invention may also be embodied in a computer program product for facilitating the transmission of the transaction identifier from the handheld communication device to the EDC device. The computer program product includes a computer usable medium having a set of program instructions comprising a program code for generating the transaction identifier, encoding the transaction identifier into audio frequency signals and emitting the audio frequency tones from the handheld communication device. The set of program instructions further include a program code to decode the audio frequency signals into the transaction identifier. In an embodiment of the present invention, the set of program instruction can include a program code to validate the user based on the user inputs. In a preferred embodiment, the user inputs can be the account number of the user and the unique PIN. In a preferred embodiment, the set of program instructions are configured to encrypt the transaction identifier at the handheld communication device before converting the transaction identifier into audio frequency signals, and decrypting the decoded audio frequency signals at the EDC device, in order to retrieve the transaction identifier.

The set of program instructions may be in the form of a software program that can be stored in one or more storage elements, so as to process input data by a processing machine, the processing machine being disposed in a computing environment. Further, the software program may be in the form of a collection of separate programs, a program module with a large program or a portion of a program module, as in the present invention. The software may also include modular programming in the form of object-oriented programming. The processing of input data by the processing machine may be in response to user commands, results of previous processing or a request made by another processing machine. The computing environment may have additional features. For example, the computing environment can include a storage device, one or more input devices, one or more output devices, and one or more communication connections. The storage devices can include removable or non-removable, and includes magnetic disks, magnetic tapes or cassettes, CD-ROMs, CD-RWs, DVDs, or any other medium which can be

used to store information and which can be accessed within the computing environment. In some embodiments, the storage devices can store the set of program instructions. The input data from the user can be taken from the one or more input devices a touch input device such as a keyboard, mouse, pen, trackball, touch screen, or game controller, a voice input device, a scanning device, a digital camera, or another device that can provides input to the processing machine. The output of the processing is displayed on an output device such as a display, printer, speaker, or another device that can provide output of data. The communication connection(s) enable communication over a communication medium from one computing entity to another. The communication medium conveys information such as computer-executable instructions, audio or video information, or other data in a modulated data signal. A modulated data signal is a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media include wired or wireless techniques implemented with an electrical, optical, RF, infrared, acoustic, or other carrier.

In a multi-processing system, multiple processing machines can be deployed to execute the set of program instructions to increase processing power. A memory such as a volatile memory (e.g., registers, cache, RAM) or a non-volatile memory (e.g., ROM, EEPROM, flash memory, etc.) or a combination of volatile and non-volatile memory may be deployed in communication with the processing machine for storing the set of program instructions. In some embodiments, the memory can store software for implementing described techniques. Typically, an operating system software provides an operating environment for other software to function, and coordinates activities of various embodiments required for processing of the set of program instructions.

While the foregoing has described certain embodiments and the best mode of practicing the invention, it is understood that various implementations, modifications and examples of the subject matter disclosed herein may be made. It is intended by the following claims to cover the various implementations, modifications, and variations that may fall within the scope of the subject matter described.

CLAIMS

What is claimed is:

1. A method for transmitting a transaction identifier from a handheld communication device to an Electronic Data Capture (EDC) device, comprising:
 - coding the transaction identifier into audio frequency tones, by the handheld communication device;
 - emitting the audio frequency tones by the handheld communication device;
 - receiving the emitted audio frequency tones by the EDC device; and
 - decoding the audio frequency tones and retrieving the transaction identifier, by the EDC device;wherein the Electronic Data Capture (EDC) device is an Automated Teller Machine (ATM).
2. The method according to claim 1, further comprising:
 - capturing user inputs at the handheld communication device; and
 - generating the transaction identifier.
3. The method according to claim 2, wherein the user inputs comprise of a Personal Identification Number (PIN) and an account number of the user.
4. The method according to claim 1, further comprising:
 - encrypting the transaction identifier at the handheld communication device; and
 - decrypting the transaction identifier at the EDC device.

5. A system for transmitting a transaction identifier from a handheld communication device to an Electronic Data Capture (EDC) device, the system comprising:
 - an audio frequency generator module configured to encode the transaction identifier into audio frequency tones at the handheld communication device,
 - an emitter module configured to emit the audio frequency tones from the handheld communication device,
 - a receiving module configured to receive the audio frequency tones at the EDC device,
 - and
 - a tone recognition module configured to decode the audio frequency tones and retrieve the transaction identifier at the EDC device.
6. The system according to claim 5, further comprising:
 - means for entering user inputs to the handheld communication device; and
 - means for generating the transaction identifier.
7. The system according to claim 6, wherein the user inputs comprise of a Personal Identification Number (PIN) and an account number of the user.
8. The system according to claim 5, further comprising:
 - an encryption module configured to encrypt the transaction identifier at the handheld communication device; and
 - a decryption module configured to decrypt the transaction identifier at the EDC device.
9. The system according to claim 5, wherein the EDC is a Point of Sale (POS) terminal.
10. The system according to claim 5, wherein the EDC is an Automated Teller Machine (ATM).
11. The method according to claim 5, wherein the Electronic Data Capture (EDC) device is a mobile device.

12. A computer program product for transmitting a transaction identifier from a handheld communication device to an Electronic Data Capture (EDC) device, the computer program product consisting of a plurality of program instructions stored on a tangible computer readable media which when run upon a computer processor carries out steps for transmitting the transaction identifier, the program instructions comprising:

means for coding the transaction identifier into audio frequency tones, by the handheld communication device;

means for emitting the audio frequency tones by the handheld communication device;

means for receiving the emitted audio frequency tones by the EDC device; and

means for decoding the audio frequency tones and retrieving the transaction identifier, by the EDC device.

13. The computer program product of claim 12, wherein the program instructions further comprise:

means for providing user inputs at the handheld communication device;

means for generating the transaction identifier.

14. The computer program product according to claim 13, wherein the user inputs comprise of a Personal Identification Number (PIN) and an account number of the user.

15. The computer program product according to claim 12, wherein the program instructions further comprise:

means for encrypting the transaction identifier at the handheld communication device;

and

means for decrypting the transaction identifier at the EDC device.

16. The computer program product according to claim 12, wherein the EDC device is a Point of Sale (POS) terminal.

17. The computer program product according to claim 12, wherein the EDC device is an Automated Teller Machine (ATM) terminal.

18. The method according to claim 12, wherein the Electronic Data Capture (EDC) device is a mobile device.