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Method, System, and Computer program product for transaction authentication

Marcin Witkowski
VISA

Maciej Maciejewski
VISA

Igor Zacharjasz
VISA

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TITLE: “METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR TRANSACTION AUTHENTICATION”

VISA

MARCIN WITKOWSKI

MACIEJ MACIEJEWSKI

IGOR ZACHARJASZ

TECHNICAL FIELD

[001] The present subject matter relates to transaction authentication and, in some non-limiting embodiments or aspects, to methods, systems, and computer program products for authenticating e-commerce transactions.

BACKGROUND

[002] Consumers may consider the usage of some payment devices (e.g., credit cards, debit cards, etc.) in an e-commerce environment as complicated and unsecure. As an example, entry of details for conventional payment devices via a website may be associated with stolen information. For example, multi-factor authentication requirements may make the usage of conventional payment devices even more complex for consumers. As such, consumers may use alternative methods of payment in an e-commerce environment that completely avoid the use of payment devices, such as credit cards, debit cards, and/or the like.

SUMMARY

[003] Accordingly, provided are improved systems, devices, products, apparatus, and/or methods for authenticating e-commerce transactions in association with payment devices, such as credit cards, debit cards, and/or the like.

[004] According to some non-limiting embodiments or aspects, provided is a computer-implemented method that includes: receiving, with at least one processor, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determining, with at least one processor, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicating, with at least one processor, a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receiving, with at least one processor, from the mobile device, authentication information associated with the user account; authenticating, with at least one processor, based on the authentication information, the user account; communicating, with at least one processor, to the mobile device, account information associated with a payment device; receiving, with at least one processor, from the mobile device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, requesting, with at least one

processor, from a secure remote system, tokenized account information associated with the payment device; and communicating, with at least one processor, the tokenized account information to the payment gateway system.

[005] According to some non-limiting embodiments or aspects, provided is a computing system including at least one processor, the at least one processor programmed and/or configured to: receive, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determine, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicate a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receive from the mobile device, authentication information associated with the user account; authenticate based on the authentication information, the user account; communicate to the mobile device, account information associated with a payment device; receive from the mobile device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, request, from a secure remote system, tokenized account information associated with the payment device; and communicate the tokenized account information to the payment gateway system.

[006] According to some non-limiting embodiments or aspects, provided is a computer program product comprising at least one non-transitory computer-readable medium including program instructions that, when executed by at least one processor, cause the at least one processor to: receive, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determine, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicate a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receive from the mobile device, authentication information associated with the user account; authenticate based on the authentication information, the user account; communicate to the mobile device, account information associated with a payment device; receive from the mobile

device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, request, from a secure remote system, tokenized account information associated with the payment device; and communicate the tokenized account information to the payment gateway system.

[007] Further embodiments or aspects are set forth in the following numbered clauses:

[008] Clause 1. A computer-implemented method comprising: receiving, with at least one processor, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determining, with at least one processor, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicating, with at least one processor, a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receiving, with at least one processor, from the mobile device, authentication information associated with the user account; authenticating, with at least one processor, based on the authentication information, the user account; communicating, with at least one processor, to the mobile device, account information associated with a payment device; receiving, with at least one processor, from the mobile device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, requesting, with at least one processor, from a secure remote system, tokenized account information associated with the payment device; and communicating, with at least one processor, the tokenized account information to the payment gateway system.

[009] Clause 2. The computer-implemented method of clause 1, wherein the authentication information includes at least one of the following: a personal identification number (PIN), a biometric identifier, or any combination thereof.

[010] Clause 3. The computer-implemented method of clauses 1 or 2, wherein the payment device includes a plurality of payment devices, and wherein the confirmation includes a selection of the payment device of the plurality of payment devices.

[011] Clause 4. The computer-implemented method of any of clauses 1-3, further comprising: receiving, with at least one processor, user information associated with the user, wherein the

user information includes the phone number and an email address; communicating, with at least one processor, to at least one of the email address and the phone number, a verification link; receiving, with at least one processor, a confirmation of the verification link in association with a verification code; and in response to receiving the confirmation of the verification link in association with the verification code, generating, with at least one processor, the user account.

[012] Clause 5. The computer-implemented method of any of clauses 1-4, wherein generating the user account includes: requesting from the secure remote system, profile information associated with the email address; receiving a response to the request for the profile information; at least one of updating and creating a user profile associated with the email address in the secure remote system based on the response to the request for the profile information; and linking the user profile to the user account.

[013] Clause 6. The computer-implemented method of any of clauses 1-5, further comprising: receiving, with at least one processor, the account information associated with the payment device; and registering, with at least one processor, in the secure remote system, the payment device in association with the user profile.

[014] Clause 7. The computer-implemented method of any of clauses 1-6, further comprising: determining, with at least one processor, a number of unique tokens associated with the user account based on the tokenized account information associated with the payment device; and providing, with at least one processor, a promotional credit to the payment device based on the number of unique tokens associated with the user account.

[015] Clause 8. A computing system comprising at least one processor, the at least one processor programmed and/or configured to: receive, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determine, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicate a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receive from the mobile device, authentication information associated

with the user account; authenticate based on the authentication information, the user account; communicate to the mobile device, account information associated with a payment device; receive from the mobile device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, request, from a secure remote system, tokenized account information associated with the payment device; and communicate the tokenized account information to the payment gateway system.

[016] Clause 9. The computing system of clause 8, wherein the authentication information includes at least one of the following: a personal identification number (PIN), a biometric identifier, or any combination thereof.

[017] Clause 10. The computing system of clauses 8 or 9, wherein the payment device includes a plurality of payment devices, and wherein the confirmation includes a selection of the payment device of the plurality of payment devices.

[018] Clause 11. The computing system of any of clauses 8-10, wherein the one or more processors are further programmed and/or configured to: receive user information associated with the user, wherein the user information includes the phone number and an email address; communicate to at least one of the email address and the phone number, a verification link; receive a confirmation of the verification link in association with a verification code; and in response to receiving the confirmation of the verification link in association with the verification code, generate the user account.

[019] Clause 12. The computing system of any of clauses 8-11, wherein the one or more processors generate the user account by: requesting from the secure remote system, profile information associated with the email address; receiving a response to the request for the profile information; at least one of updating and creating a user profile associated with the email address in the secure remote system based on the response to the request for the profile information; and linking the user profile to the user account.

[020] Clause 13. The computing system of any of clauses 8-12, wherein the one or more processors are further programmed and/or configured to: receive the account information associated with the payment device; and register, in the secure remote system, the payment device in association with the user profile.

[021] Clause 14. The computing system of any of clauses 8-13, wherein the one or more processors are further programmed and/or configured to: determine a number of unique tokens associated with the user account based on the tokenized account information associated with the payment device; and provide a promotional credit to the payment device based on the number of unique tokens associated with the user account.

[022] Clause 15. A computer program product comprising at least one non-transitory computer-readable medium including program instructions that, when executed by at least one processor, cause the at least one processor to: receive, from a payment gateway system, a request for tokenized account information for a payment transaction between a merchant and a user, wherein the request includes a phone number associated with a user account of the user and transaction data associated with the payment transaction; determine, based on the phone number, the user account associated with the phone number; in response to determining the user account, automatically communicate a notification to a mobile device associated with the phone number, wherein the notification includes the transaction data associated with the payment transaction; receive from the mobile device, authentication information associated with the user account; authenticate based on the authentication information, the user account; communicate to the mobile device, account information associated with a payment device; receive from the mobile device, a confirmation to use the payment device for the payment transaction; in response to receiving the confirmation, request, from a secure remote system, tokenized account information associated with the payment device; and communicate the tokenized account information to the payment gateway system.

[023] Clause 16. The computer program product of clause 15, wherein the authentication information includes at least one of the following: a personal identification number (PIN), a biometric identifier, or any combination thereof.

[024] Clause 17. The computer program product of clauses 15 or 16, wherein the payment device includes a plurality of payment devices, and wherein the confirmation includes a selection of the payment device of the plurality of payment devices.

[025] Clause 18. The computer program product of any of clauses 15-17, wherein the program instructions further cause the at least one processor to: receive user information associated with the user, wherein the user information includes the phone number and an email address;

communicate to at least one of the email address and the phone number, a verification link; receive a confirmation of the verification link in association with a verification code; and in response to receiving the confirmation of the verification link in association with the verification code, generate the user account.

[026] Clause 19. The computer program product of any of clauses 15-18, wherein the program instructions cause the at least one processor to generate the user account by: requesting from the secure remote system, profile information associated with the email address; receiving a response to the request for the profile information; at least one of updating and creating a user profile associated with the email address in the secure remote system based on the response to the request for the profile information; and linking the user profile to the user account.

[027] Clause 20. The computer program product of any of clauses 15-19, wherein the program instructions further cause the at least one processor to: determine a number of unique tokens associated with the user account based on the tokenized account information associated with the payment device; and provide a promotional credit to the payment device based on the number of unique tokens associated with the user account.

[028] These and other features and characteristics of the present disclosure, as well as the methods of operation and functions of the related elements of structures and the combination of parts and economies of manufacture, will become more apparent upon consideration of the following description and the appended claims with reference to the accompanying drawings, all of which form a part of this specification, wherein like reference numerals designate corresponding parts in the various figures. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of limits. As used in the specification and the claims, the singular form of “a,” “an,” and “the” include plural referents unless the context clearly dictates otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

[029] The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the figures to reference like features and components. Some embodiments of device

or system and/or methods in accordance with embodiments of the present subject matter are now described, by way of example only, and with reference to the accompanying figures, in which:

[030] **Figure 1** illustrates a diagram of non-limiting embodiments or aspects of an environment in which systems, devices, products, apparatus, and/or methods, described herein, may be implemented.

[031] **Figure 2** illustrates is a diagram of non-limiting embodiments or aspects of components of one or more devices and/or one or more systems of FIG. 1;

[032] **Figure 3** illustrates an exemplary architecture for supporting mobile payments focusing on user experience and security;

[033] **Figure 4a-b** illustrate high level architecture of MVP with integrated mobile bank application.

[034] **Figure 5a-f** illustrate flow and sequence diagrams for registration of mobile application and architecture;

[035] **Figure 6a-e** illustrate payment process and selection of the payment device of the plurality of payment devices; and

[036] **Figure 7a-c** illustrate card details that includes unique tokens associated with the user account.

DESCRIPTION

[037] It is to be understood that the present disclosure may assume various alternative variations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary and non-limiting embodiments or aspects. Hence, specific dimensions and other physical characteristics related to the embodiments or aspects disclosed herein are not to be considered as limiting.

[038] No aspect, component, element, structure, act, step, function, instruction, and/or the like used herein should be construed as critical or essential unless explicitly described as such. Also, as used herein, the articles "a" and "an" are intended to include one or more items and may be used interchangeably with "one or more" and "at least one." Furthermore, as used herein, the term "set" is intended to include one or more items (e.g., related items, unrelated items, a combination of related and unrelated items, etc.) and may be used interchangeably with "one or more" or "at least one." Where only one item is intended, the term "one" or similar language is used. Also, as used herein, the terms "has," "have," "having," or the like are intended to be open-ended terms. Further, the phrase "based on" is intended to mean "based at least partially on" unless explicitly stated otherwise.

[039] As used herein, the term "communication" may refer to the reception, receipt, transmission, transfer, provision, and/or the like, of data (e.g., information, signals, messages, instructions, commands, and/or the like). For one unit (e.g., a device, a system, a component of a device or system, combinations thereof, and/or the like) to be in communication with another unit means that the one unit is able to directly or indirectly receive information from and/or transmit information to the other unit. This may refer to a direct or indirect connection (e.g., a direct communication connection, an indirect communication connection, and/or the like) that is wired and/or wireless in nature. Additionally, two units may be in communication with each other even though the information transmitted may be modified, processed, relayed, and/or routed between the first and second unit. For example, a first unit may be in communication with a second unit even though the first unit passively receives information and does not actively transmit information to the second unit. As another example, a first unit may be in communication with a second unit if at least one intermediary unit processes information received from the first unit and communicates the processed information to the second unit.

[040] It will be apparent that systems and/or methods, described herein, can be implemented in different forms of hardware, software, or a combination of hardware and software. The actual specialized control hardware or software code used to implement these systems and/or methods is not limiting of the implementations. Thus, the operation and behaviour of the systems and/or methods are described herein without reference to specific software code, it being understood that software and hardware can be designed to implement the systems and/or methods based on the description herein.

[041] Some non-limiting embodiments or aspects are described herein in connection with thresholds. As used herein, satisfying a threshold may refer to a value being greater than the threshold, more than the threshold, higher than the threshold, greater than or equal to the threshold, less than the threshold, fewer than the threshold, lower than the threshold, less than or equal to the threshold, equal to the threshold, etc.

[042] As used herein, the term "transaction service provider" may refer to an entity that receives transaction authorization requests from merchants or other entities and provides guarantees of payment, in some cases through an agreement between the transaction service provider and an issuer institution. For example, a transaction service provider may include a payment network such as Visa® or any other entity that processes transactions. The term "transaction processing system" may refer to one or more computing devices operated by or on behalf of a transaction service provider, such as a transaction processing server executing one or more software applications. A transaction processing system may include one or more processors and, in some non-limiting embodiments, may be operated by or on behalf of a transaction service provider.

[043] As used herein, the term "account identifier" may include one or more primary account numbers (PANs), tokens, or other identifiers associated with a customer account. The term "token" may refer to an identifier that is used as a substitute or replacement identifier for an original account identifier, such as a PAN. Account identifiers may be alphanumeric or any combination of characters and/or symbols. Tokens may be associated with a PAN or other original account identifier in one or more data structures (e.g., one or more databases and/or the like) such that they may be used to conduct a transaction without directly using the original account identifier. In some examples, an original account identifier, such as a PAN, may be associated with a plurality of tokens for different individuals or purposes.

[044] As used herein, the terms "issuer institution," "portable financial device issuer," "issuer," or "issuer bank" may refer to one or more entities that provide one or more accounts to a user (e.g., a customer, a consumer, an entity, an organization, and/or the like) for conducting transactions (e.g., payment transactions), such as initiating credit card payment transactions and/or debit card payment transactions. For example, an issuer institution may provide an account identifier, such as a PAN, to a user that uniquely identifies one or more

accounts associated with that user. The account identifier may be embodied on a portable financial device, such as a physical financial instrument (e.g., a payment card), and/or may be electronic and used for electronic payments. In some non-limiting embodiments or aspects, an issuer institution may be associated with a bank identification number (BIN) that uniquely identifies the issuer institution. As used herein, the term "issuer institution system" may refer to one or more computer systems operated by or on behalf of an issuer institution, such as a server computer executing one or more software applications. For example, an issuer institution system may include one or more authorization servers for authorizing a payment transaction.

[045] As used herein, the term "merchant" may refer to an individual or entity that provides goods and/or services, or access to goods and/or services, to users (e.g., customers) based on a transaction (e.g., a payment transaction). As used herein, the terms "merchant" or "merchant system" may also refer to one or more computer systems, computing devices, and/or software application operated by or on behalf of a merchant, such as a server computer executing one or more software applications. A "point-of-sale (POS) system," as used herein, may refer to one or more computers and/or peripheral devices used by a merchant to engage in payment transactions with users, including one or more card readers, near-field communication (NFC) receivers, radio frequency identification (RFID) receivers, and/or other contactless transceivers or receivers, contact-based receivers, payment terminals, computers, servers, input devices, and/or other like devices that can be used to initiate a payment transaction. A POS system may be part of a merchant system. A merchant system may also include a merchant plug-in for facilitating online, Internet-based transactions through a merchant webpage or software application. A merchant plug-in may include software that runs on a merchant server or is hosted by a third-party for facilitating such online transactions.

[046] As used herein, the term "mobile device" may refer to one or more portable electronic devices configured to communicate with one or more networks. As an example, a mobile device may include a cellular phone (e.g., a smartphone or standard cellular phone), a portable computer (e.g., a tablet computer, a laptop computer, etc.), a wearable device (e.g., a watch, pair of glasses, lens, clothing, and/or the like), a personal digital assistant (PDA), and/or other like devices. The terms "client device" and "user device," as used herein, refer to any electronic device that is configured to communicate with one or more servers or remote devices and/or systems. A client device or user device may include a mobile device, a network-enabled

appliance (e.g., a network-enabled television, refrigerator, thermostat, and/or the like), a computer, a POS system, and/or any other device or system capable of communicating with a network.

[047] As used herein, the term "computing device" may refer to one or more electronic devices configured to process data. A computing device may, in some examples, include the necessary components to receive, process, and output data, such as a processor, a display, a memory, an input device, a network interface, and/or the like. A computing device may be a mobile device. As an example, a mobile device may include a cellular phone (e.g., a smartphone or standard cellular phone), a portable computer, a wearable device (e.g., watches, glasses, lenses, clothing, and/or the like), a PDA, and/or other like devices. A computing device may also be a desktop computer or other form of non-mobile computer.

[048] As used herein, the terms "electronic wallet" and "electronic wallet application" refer to one or more electronic devices and/or software applications configured to initiate and/or conduct payment transactions. For example, an electronic wallet may include a mobile device executing an electronic wallet application and may further include server-side software and/or databases for maintaining and providing transaction data to the mobile device. An "electronic wallet provider" may include an entity that provides and/or maintains an electronic wallet for a customer, such as Google Pay®, Android Pay®, Apple Pay®, Samsung Pay®, and/or other like electronic payment systems. In some non-limiting examples, an issuer bank may be an electronic wallet provider.

[049] As used herein, the term "payment device" may refer to a portable financial device, an electronic payment device, a payment card (e.g., a credit or debit card), a gift card, a smartcard, smart media, a payroll card, a healthcare card, a wristband, a machine-readable medium containing account information, a keychain device or fob, an RFID transponder, a retailer discount or loyalty card, a cellular phone, an electronic wallet mobile application, a PDA, a pager, a security card, a computer, an access card, a wireless terminal, a transponder, and/or the like. In some non-limiting embodiments or aspects, the payment device may include volatile or non-volatile memory to store information (e.g., an account identifier, a name of the account holder, and/or the like).

[050] As used herein, the term "server" and/or “processor” may refer to or include one or more computing devices that are operated by or facilitate communication and processing for multiple parties in a network environment, such as the Internet, although it will be appreciated that communication may be facilitated over one or more public or private network environments and that various other arrangements are possible. Further, multiple computing devices (e.g., servers, POS devices, mobile devices, etc.) directly or indirectly communicating in the network environment may constitute a "system.” Reference to “a server” or “a processor,” as used herein, may refer to a previously recited server and/or processor that is recited as performing a previous step or function, a different server and/or processor, and/or a combination of servers and/or processors. For example, as used in the specification and the claims, a first server and/or a first processor that is recited as performing a first step or function may refer to the same or different server and/or a processor recited as performing a second step or function.

[051] As used herein, the term “acquirer” may refer to an entity licensed by the transaction service provider and/or approved by the transaction service provider to originate transactions using a portable financial device of the transaction service provider. Acquirer may also refer to one or more computer systems operated by or on behalf of an acquirer, such as a server computer executing one or more software applications (e.g., “acquirer server”). An “acquirer” may be a merchant bank, or in some cases, the merchant system may be the acquirer. The transactions may include original credit transactions (OCTs) and account funding transactions (AFTs). The acquirer may be authorized by the transaction service provider to sign merchants of service providers to originate transactions using a portable financial device of the transaction service provider. The acquirer may contract with payment facilitators to enable the facilitators to sponsor merchants. The acquirer may monitor compliance of the payment facilitators in accordance with regulations of the transaction service provider. The acquirer may conduct due diligence of payment facilitators and ensure that proper due diligence occurs before signing a sponsored merchant. Acquirers may be liable for all transaction service provider programs that they operate or sponsor. Acquirers may be responsible for the acts of its payment facilitators and the merchants it or its payment facilitators sponsor.

[052] As used herein, the term “payment gateway” may refer to an entity and/or a payment processing system operated by or on behalf of such an entity (e.g., a merchant service provider, a payment service provider, a payment facilitator, a payment facilitator that contracts with an

acquirer, a payment aggregator, and/or the like), which provides payment services (e.g., transaction service provider payment services, payment processing services, and/or the like) to one or more merchants. The payment services may be associated with the use of portable financial devices managed by a transaction service provider. As used herein, the term "payment gateway system" may refer to one or more computer systems, computer devices, servers, groups of servers, and/or the like operated by or on behalf of a payment gateway.

[053] As used herein, the term "application programming interface" (API) may refer to computer code that allows communication between different systems or (hardware and/or software) components of systems. For example, an API may include function calls, functions, subroutines, communication protocols, fields, and/or the like usable and/or accessible by other systems or other (hardware and/or software) components of systems.

[054] As used herein, the term "user interface" or "graphical user interface" refers to a generated display, such as one or more graphical user interfaces (GUIs) with which a user may interact, either directly or indirectly (e.g., through a keyboard, mouse, touchscreen, etc.).

[055] The present disclosure provides a technical solution to the shortcomings of existing systems and methods for completing e-commerce transactions using payment devices (e.g., credit cards, debit cards, etc.), which are comparatively more complicated, slower, and less secure. The present disclosure provides a unique solution of authenticating a user via a mobile application and a phone number associated with the user and, in response thereto, requesting from a secure remote system, tokenized account information associated with a payment device tied to the authenticated user to complete an e-commerce transaction. In this way, the present disclosure provides an improved communications structure/architecture for implementing electronic payment transactions that improves the speed and security thereof by avoiding the need for a user to enter payment device details via a web-page of an e-commerce site, avoiding the communication of actual and/or non-tokenized payment device information via the e-commerce website and/or a payment gateway, enabling biometric-based and/or less complicated two factor authentication of a payment device, faster completion and processing of e-commerce transactions, and/or the like. Additional technical benefits may be appreciated with further reference to the following figures and appendices.

[056] Figure 1 illustrates a diagram of an example environment 100 in which devices, systems, methods, and/or products described herein, may be implemented. As shown in FIG. 1, environment 100 includes transaction processing network 101, which may include merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or issuer system 110, user device 112, and/or communication network 114. Transaction processing network 101, merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, issuer system 110, and/or user device 112 may interconnect (e.g., establish a connection to communicate, etc.) via wired connections, wireless connections, or a combination of wired and wireless connections.

[057] Merchant system 102 may include one or more devices capable of receiving information and/or data from payment gateway system 104, acquirer system 106, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114 and/or communicating information and/or data to payment gateway system 104, acquirer system 106, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114. Merchant system 102 may include a device capable of receiving information and/or data from user device 112 via a communication connection (e.g., an NFC communication connection, an RFID communication connection, a Bluetooth® communication connection, etc.) with user device 112, and/or communicating information and/or data to user device 112 via the communication connection. For example, merchant system 102 may include a computing device, such as a server, a group of servers, a client device, a group of client devices, and/or other like devices. In some non-limiting embodiments or aspects, merchant system 102 may be associated with a merchant as described herein. In some non-limiting embodiments or aspects, merchant system 102 may include one or more devices, such as computers, computer systems, and/or peripheral devices capable of being used by a merchant to conduct a payment transaction with a user. For example, merchant system 102 may include a POS device and/or a POS system.

[058] Payment gateway system 104 may include one or more devices capable of receiving information and/or data from merchant system 102, acquirer system 106, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114 and/or communicating information and/or data to merchant system 102, acquirer system 106, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114. For example, payment gateway system 104 may include a

computing device, such as a server, a group of servers, and/or other like devices. In some non-limiting embodiments or aspects, payment gateway system 104 is associated with a payment gateway as described herein.

[059] Acquirer system 106 may include one or more devices capable of receiving information and/or data from merchant system 102, payment gateway system 104, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114 and/or communicating information and/or data to merchant system 102, payment gateway system 104, transaction service provider system 108, issuer system 110, and/or user device 112 via communication network 114. For example, acquirer system 106 may include a computing device, such as a server, a group of servers, and/or other like devices. In some non-limiting embodiments or aspects, acquirer system 106 may be associated with an acquirer as described herein.

[060] Transaction service provider system 108 may include one or more devices capable of receiving information and/or data from merchant system 102, payment gateway system 104, acquirer system 106, issuer system 110, and/or user device 112 via communication network 114 and/or communicating information and/or data to merchant system 102, payment gateway system 104, acquirer system 106, issuer system 110, and/or user device 112 via communication network 114. For example, transaction service provider system 108 may include a computing device, such as a server (e.g., a transaction processing server, etc.), a group of servers, and/or other like devices. In some non-limiting embodiments or aspects, transaction service provider system 108 may be associated with a transaction service provider as described herein. In some non-limiting embodiments or aspects, transaction service provider 108 may include and/or access one or more one or more internal and/or external databases including transaction data.

[061] Issuer system 110 may include one or more devices capable of receiving information and/or data from merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or user device 112 via communication network 114 and/or communicating information and/or data to merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or user device 112 via communication network 114. For example, issuer system 110 may include a computing device, such as a server, a group of servers, and/or other like devices. In some non-limiting embodiments or aspects, issuer system 110 may be associated with an issuer institution

as described herein. For example, issuer system 110 may be associated with an issuer institution that issued a payment account or instrument (e.g., a credit account, a debit account, a credit card, a debit card, etc.) to a user (e.g., a user associated with user device 112, etc.).

[062] In some non-limiting embodiments or aspects, transaction processing network 101 includes a plurality of systems in a communication path for processing a transaction. For example, transaction processing network 101 can include merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or issuer system 110 in a communication path (e.g., a communication path, a communication channel, a communication network, etc.) for processing an electronic payment transaction. As an example, transaction processing network 101 can process (e.g., initiate, conduct, authorize, etc.) an electronic payment transaction via the communication path between merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or issuer system 110.

[063] User device 112 may include one or more devices capable of receiving information and/or data from merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or issuer system 110 via communication network 114 and/or communicating information and/or data to merchant system 102, payment gateway system 104, acquirer system 106, transaction service provider system 108, and/or issuer system 110 via communication network 114. For example, user device 112 may include a client device and/or the like. In some non-limiting embodiments or aspects, user device 112 may be capable of receiving information (e.g., from merchant system 102, etc.) via a shortrange wireless communication connection (e.g., an NFC communication connection, an RFID communication connection, a Bluetooth® communication connection, and/or the like), and/or communicating information (e.g., to merchant system 102, etc.) via a short-range wireless communication connection. In some non-limiting embodiments or aspects, user device 112 may include an application associated with user device 112, such as an application stored on user device 112, a mobile application (e.g., a mobile device application, a native application for a mobile device, a mobile cloud application for a mobile device, an electronic wallet application, an issuer bank application, and/or the like) stored and/or executed on user device 112.

[064] Communication network 114 may include one or more wired and/or wireless networks. For example, communication network 114 may include a cellular network (e.g., a long-term

evolution (LTE) network, a third generation (3G) network, a fourth generation (4G) network, a code division multiple access (CDMA) network, etc.), a public land mobile network (PLMN), a local area network (LAN), a wide area network(WAN), a metropolitan area network (MAN), a telephone network (e.g., the public switched telephone network (PSTN)), a private network, an ad hoc network, an intranet, the Internet, a fiber optic-based network, a cloud computing network, and/or the like, and/or a combination of these or other types of networks.

[065] The number and arrangement of devices and systems shown in FIG. 1 is provided as an example. There may be additional devices and/or systems, fewer devices and/or systems, different devices and/or systems, or differently arranged devices and/or systems than those shown in FIG. 1. Furthermore, two or more devices and/or systems shown in FIG. 1 may be implemented within a single device and/or system, or a single device and/or system shown in FIG. 1 may be implemented as multiple, distributed devices and/or systems. Additionally, or alternatively, a set of devices and/or systems (e.g., one or more devices or systems) of environment 100 may perform one or more functions described as being performed by another set of devices and/or systems of environment 100.

[066] **Figure 2** illustrates a diagram of example components of a device 200. Device 200 may correspond to one or more devices of merchant system 102, one or more devices of payment gateway system 104, one or more devices of acquirer system 106, one or more devices of transaction service provider system 108, one or more devices of issuer system 110, and/or user device 112 (e.g., one or more devices of a system of user device 112, etc.). In some non-limiting embodiments or aspects, one or more devices of merchant system 102, one or more devices of payment gateway system 104, one or more devices of acquirer system 106, one or more devices of transaction service provider system 108, one or more devices of issuer system 110, and/or user device 112 (e.g., one or more devices of a system of user device 112, etc.) may include at least one device 200 and/or at least one component of device 200. As shown in FIG. 2, device 200 may include a bus 202, a processor 204, memory 206, a storage component 208, an input component 210, an output component 212, and a communication interface 214.

[067] Bus 202 may include a component that permits communication among the components of device 200. In some non-limiting embodiments or aspects, processor 204 may be implemented in hardware, software, or a combination of hardware and software. For example, processor 204 may include a processor (e.g., a central processing unit (CPU), a graphics

processing unit (GPU), an accelerated processing unit (APU), etc.), a microprocessor, a digital signal processor (DSP), and/or any processing component (e.g., a field-programmable gate array (FPGA), an application-specific integrated circuit (ASIC), etc.) that can be programmed to perform a function. Memory 206 may include random access memory (RAM), read-only memory (ROM), and/or another type of dynamic or static storage device (e.g., flash memory, magnetic memory, optical memory, etc.) that stores information and/or instructions for use by processor 204.

[068] Storage component 208 may store information and/or software related to the operation and use of device 200. For example, storage component 208 may include a hard disk (e.g., a magnetic disk, an optical disk, a magneto-optic disk, a solid-state disk, etc.), a compact disc (CD), a digital versatile disc (DVD), a floppy disk, a cartridge, a magnetic tape, and/or another type of computer-readable medium, along with a corresponding drive.

[069] Input component 210 may include a component that permits device 200 to receive information, such as via user input (e.g., a touch screen display, a keyboard, a keypad, a mouse, a button, a switch, a microphone, etc.). Additionally, or alternatively, input component 210 may include a sensor for sensing information (e.g., a global positioning system (GPS) component, an accelerometer, a gyroscope, an actuator, etc.). Output component 212 may include a component that provides output information from device 200 (e.g., a display, a speaker, one or more light-emitting diodes (LEDs), etc.).

[070] Communication interface 214 may include a transceiver-like component (e.g., a transceiver, a separate receiver and transmitter, etc.) that enables device 200 to communicate with other devices, such as via a wired connection, a wireless connection, or a combination of wired and wireless connections. Communication interface 214 may permit device 200 to receive information from another device and/or provide information to another device. For example, communication interface 214 may include an Ethernet interface, an optical interface, a coaxial interface, an infrared interface, a radio frequency (RF) interface, a universal serial bus (USB) interface, a Wi-Fi® interface, a cellular network interface, and/or the like.

[071] Device 200 may perform one or more processes described herein. Device 200 may perform these processes based on processor 204 executing software instructions stored by a computer-readable medium, such as memory 206 and/or storage component 208. A computer-

readable medium (e.g., a non-transitory computer-readable medium) is defined herein as a non-transitory memory device. A memory device includes memory space located inside of a single physical storage device or memory space spread across multiple physical storage devices.

[072] Software instructions may be read into memory 206 and/or storage component 208 from another computer-readable medium or from another device via communication interface 214. When executed, software instructions stored in memory 206 and/or storage component 208 may cause processor 204 to perform one or more processes described herein. Additionally, or alternatively, hardwired circuitry may be used in place of or in combination with software instructions to perform one or more processes described herein. Thus, embodiments or aspects described herein are not limited to any specific combination of hardware circuitry and software.

[073] Memory 206 and/or storage component 208 may include data storage or one or more data structures (e.g., a database, etc.). Device 200 may be capable of receiving information from, storing information in, communicating information to, or searching information stored in the data storage or one or more data structures in memory 206 and/or storage component 208.

[074] The number and arrangement of components shown in FIG. 2 are provided as an example. In some non-limiting embodiments or aspects, device 200 may include additional components, fewer components, different components, or differently arranged components than those shown in FIG. 2. Additionally, or alternatively, a set of components (e.g., one or more components) of device 200 may perform one or more functions described as being performed by another set of components of device 200. **Figure 6a-e** illustrate exemplary payment transactions flow and sequence diagrams. As shown, a consumer can select a payment device associated with the application at an e-commerce website, enter the mobile phone number, and in response receive a notification on a mobile phone associated with the application.

[075] **Figure 3** illustrates an exemplary architecture for supporting mobile payments focusing on user experience and security. Payment transaction supported is a standard on-line card not present transaction. Payment data (tokenized card) is obtained from a SRC system. When using the mobile application for a payment, a customer may not receive any additional verification requests (like3DSecure), customer using mobile application is strongly

authenticated (according to SCA requirements). All required APIs for the mobile application are already present in the SRC product.

[076] **Figure 4a-b** illustrate an exemplary architecture of Model View Presenter (MVP) with integrated mobile bank application. As shown, the present invention may deliver a set of backend APIs supporting this kind of integration. The API's delivered for the issuer mobile application are same as for the mobile application but exposed on a different gateway – B2B and supporting different authentication.

[077] **Figure 5a-f** illustrate exemplary flow and sequence diagrams for registering mobile application and architecture which includes receiving, with at least one processor, the account information associated with the payment device and registering with at least one processor, in the secure remote system where the payment device in association with the user profile.

[078] **Figure 7a-c** illustrate an exemplary embodiment for linking card for promotion. As shown, the embodiment includes determining a number of unique tokens associated with the user account based on the tokenized account information associated with the payment device and providing a promotional credit to the payment device based on the number of unique tokens associated with the user account. Further, as shown, initiating credit card payment transactions and/or debit card payment transactions. For example, an issuer institution may provide an account identifier, such as a PAN, to a user that uniquely identifies one or more accounts associated with that user. The account identifier may be embodied on a portable financial device, such as a physical financial instrument (e.g., a payment card), and/or may be electronic and used for electronic payments.

[079] Finally, the language used in the specification has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter.

METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR TRANSACTION AUTHENTICATION

ABSTRACT

Methods, systems, and computer program products for transaction authentication may use a mobile phone number as a consumer identifier to trigger transaction authentication inside a trusted mobile application. A consumer may select a payment device associated with the application at an e-commerce website, enter the mobile phone number, and in response thereto, receive a notification on a mobile phone associated with the application. The consumer reviews the transaction details and approves the transaction via the application using biometrics and/or a personal identification number (PIN).

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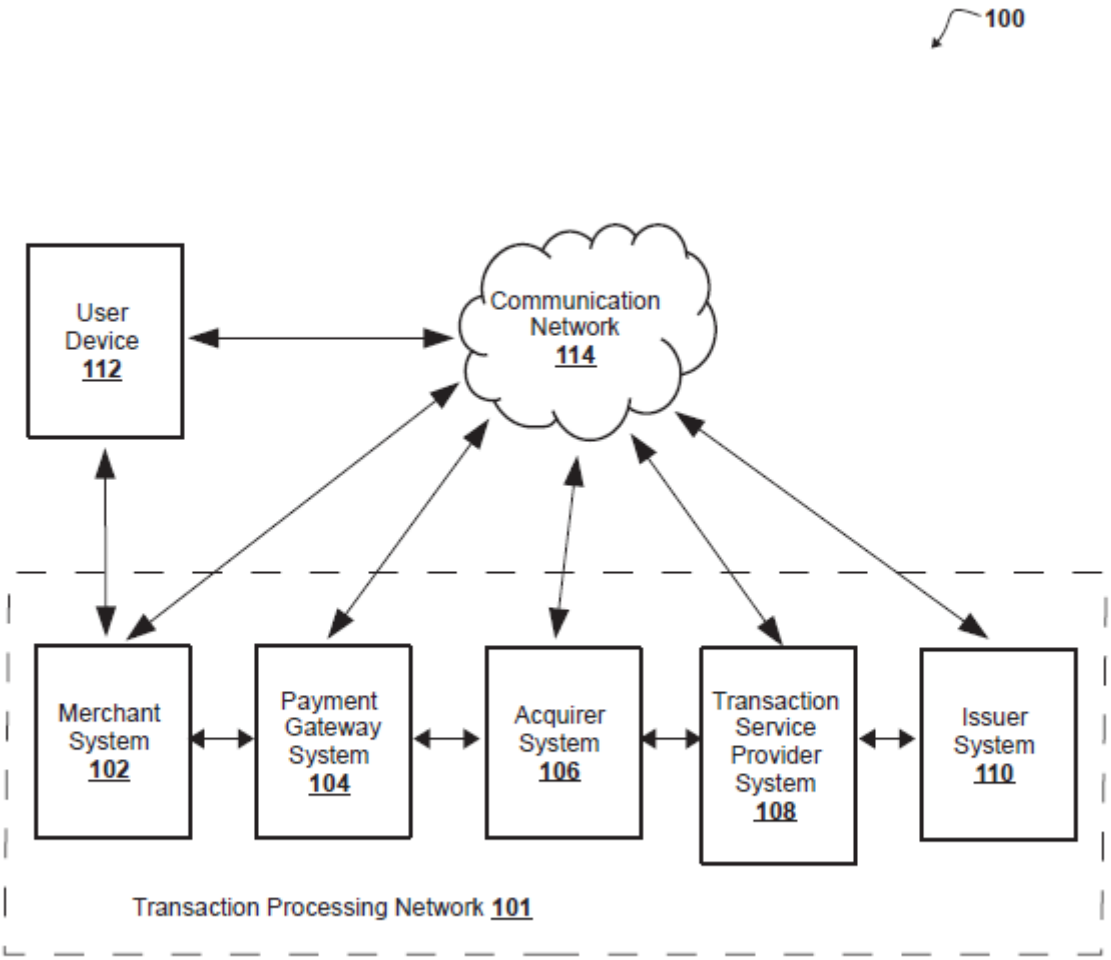
100
User Device 112
Communication Network 114
Merchant System 102
Payment Gateway System 104
Acquirer System 106
Transaction Service Provider System 108
Issuer System 110
Transaction Processing Network 101

Figure 1

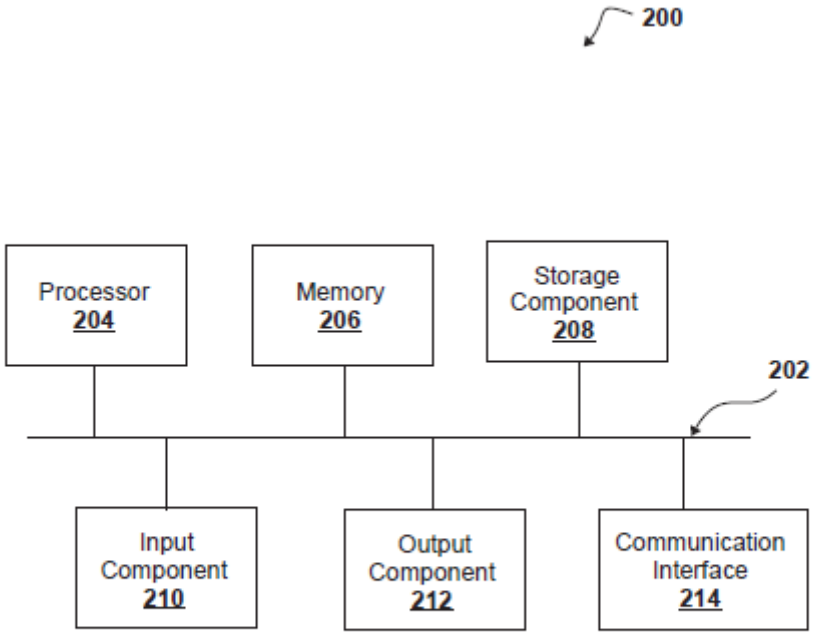
200
Processor
204
Memory
206
Storage
Component
208
202
Input
Component
210
Output
Component
212
Communication
Interface
214

Figure 2

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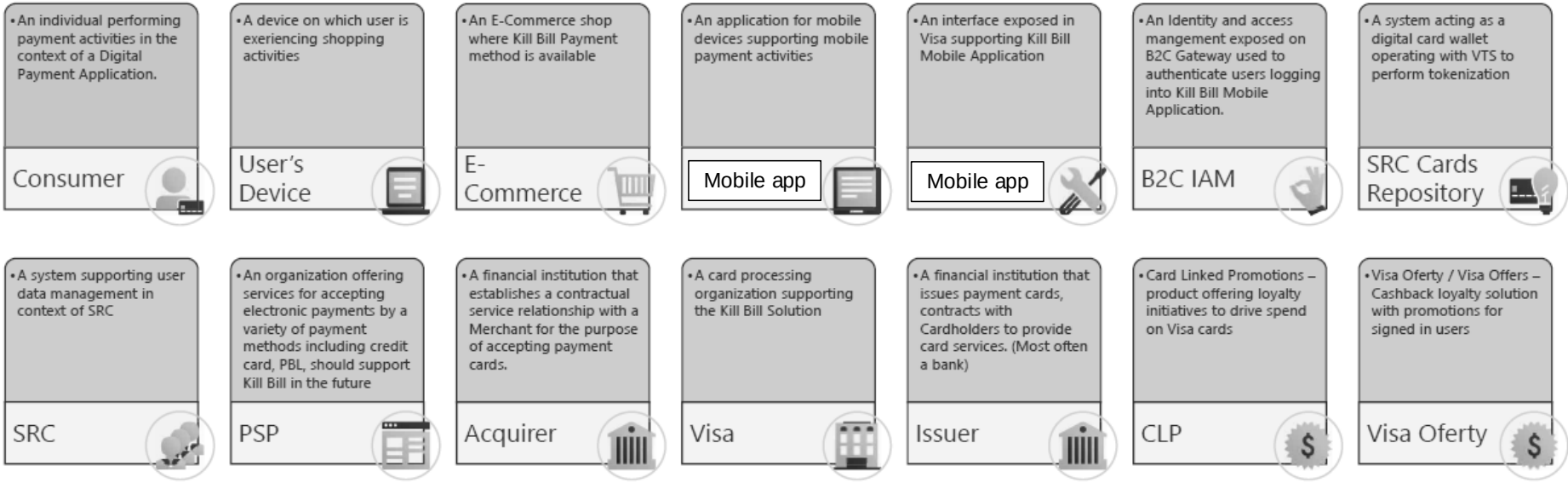
•An individual performing payment activities in the context of a Digital Payment Application.
Consumer
•A device on which user is exeriencing shopping activities
User's Device
•An E-Commerce shop where Kill Bill Payment method is available
E-Commerce
•An application for mobile devices supporting mobile payment activities
Mobile app
•An interface exposed in Visa supporting Kill Bill Mobile Application
Mobile app
•An Identity and access mangement exposed on B2C Gateway used to authenticate users logging into Kill Bill Mobile Application.
B2C IAM
•A system acting as a digital card wallet operating with VTS to perform tokenization
SRC Cards Repository
•A system supporting user data management in context of SRC
SRC
•An organization offering services for accepting electronic payments by a variety of payment methods including credit card, PBL, should support Kill Bill in the future
PSP
•A financial institution that establishes a contractual service relationship with a Merchant for the purpose of accepting payment cards.
Acquirer
•A card processing organization supporting the Kill Bill Solution
Visa
•A financial institution that issues payment cards, contracts with Cardholders to provide card services. (Most often a bank)
Issuer
•Card Linked Promotions – product offering loyalty initiatives to drive spend on Visa cards
CLP
•Visa Oferty / Visa Offers – Cashback loyalty solution with promotions for signed in users
Visa Oferty

Figure 3

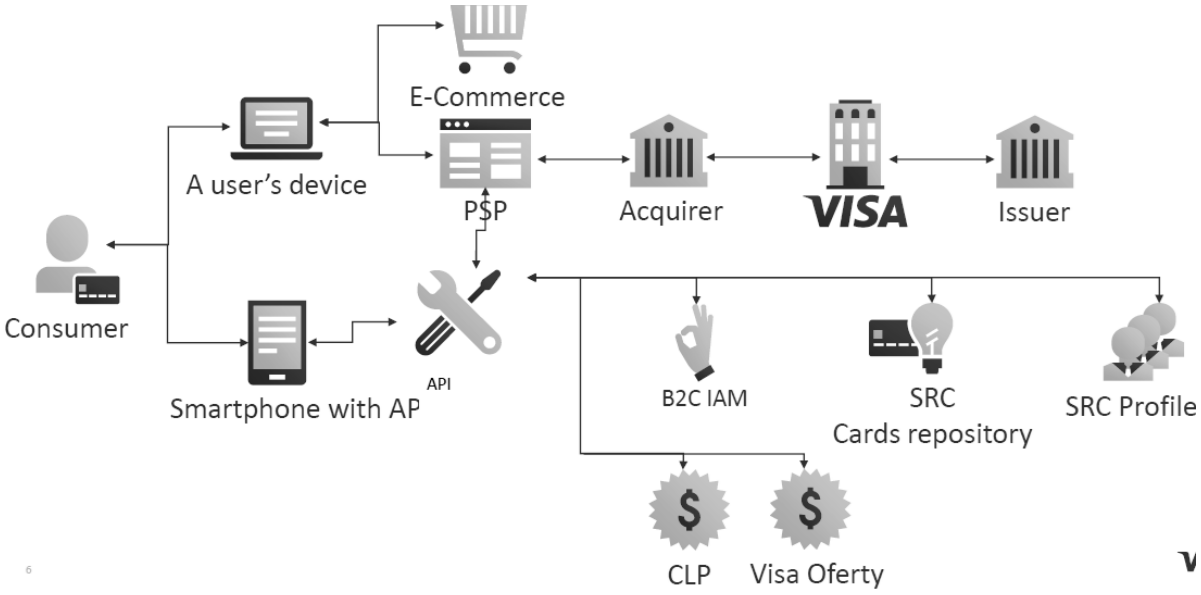

Figure 4a

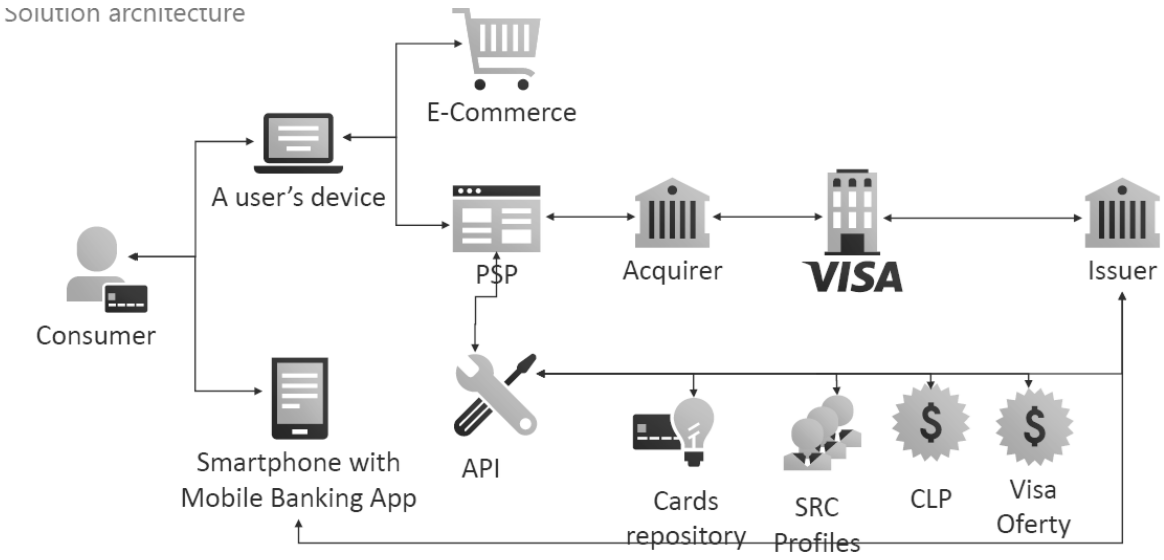

Figure 4b

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Figure 5a

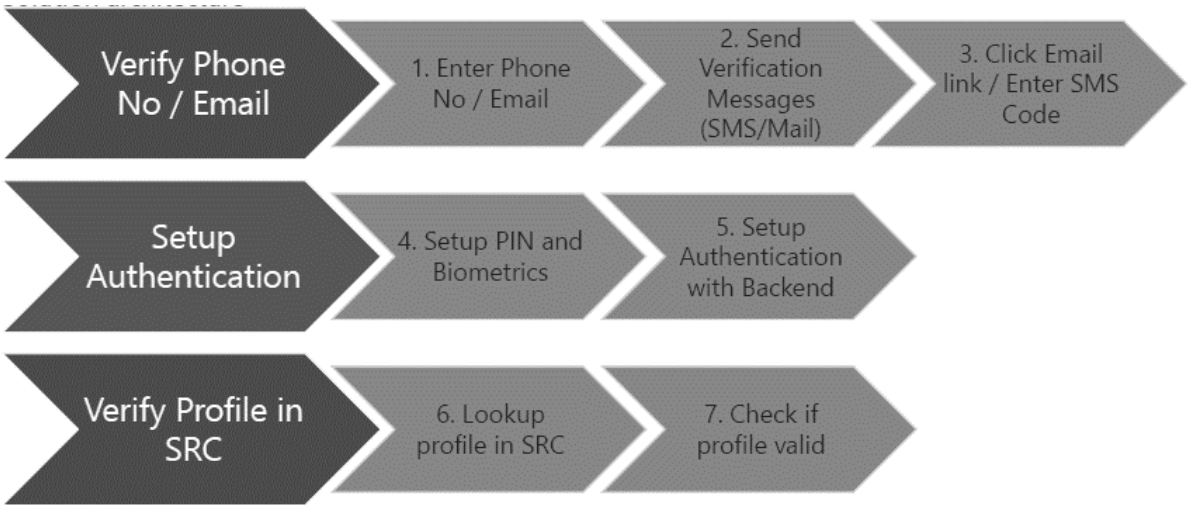

Figure 5b

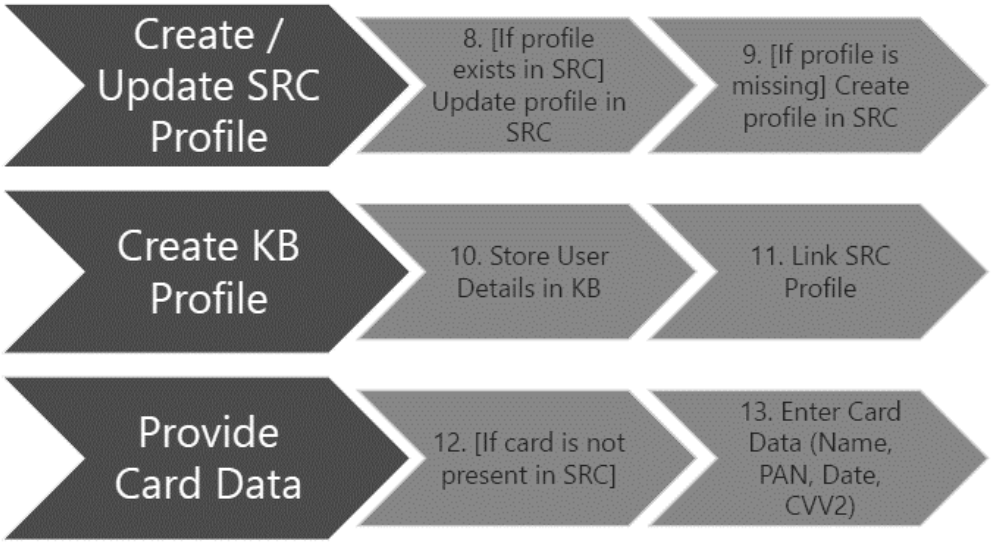
Create / Update SRC Profile
8. [If profile exists in SRC] Update profile in SRC
9. [If profile is missing] Create profile in SRC
Create KB Profile
10. Store User Details in KB
11. Link SRC Profile
Provide Card Data
12. [If card is not present in SRC]
13. Enter Card Data (Name, PAN, Date, CVV2)

Figure 5c

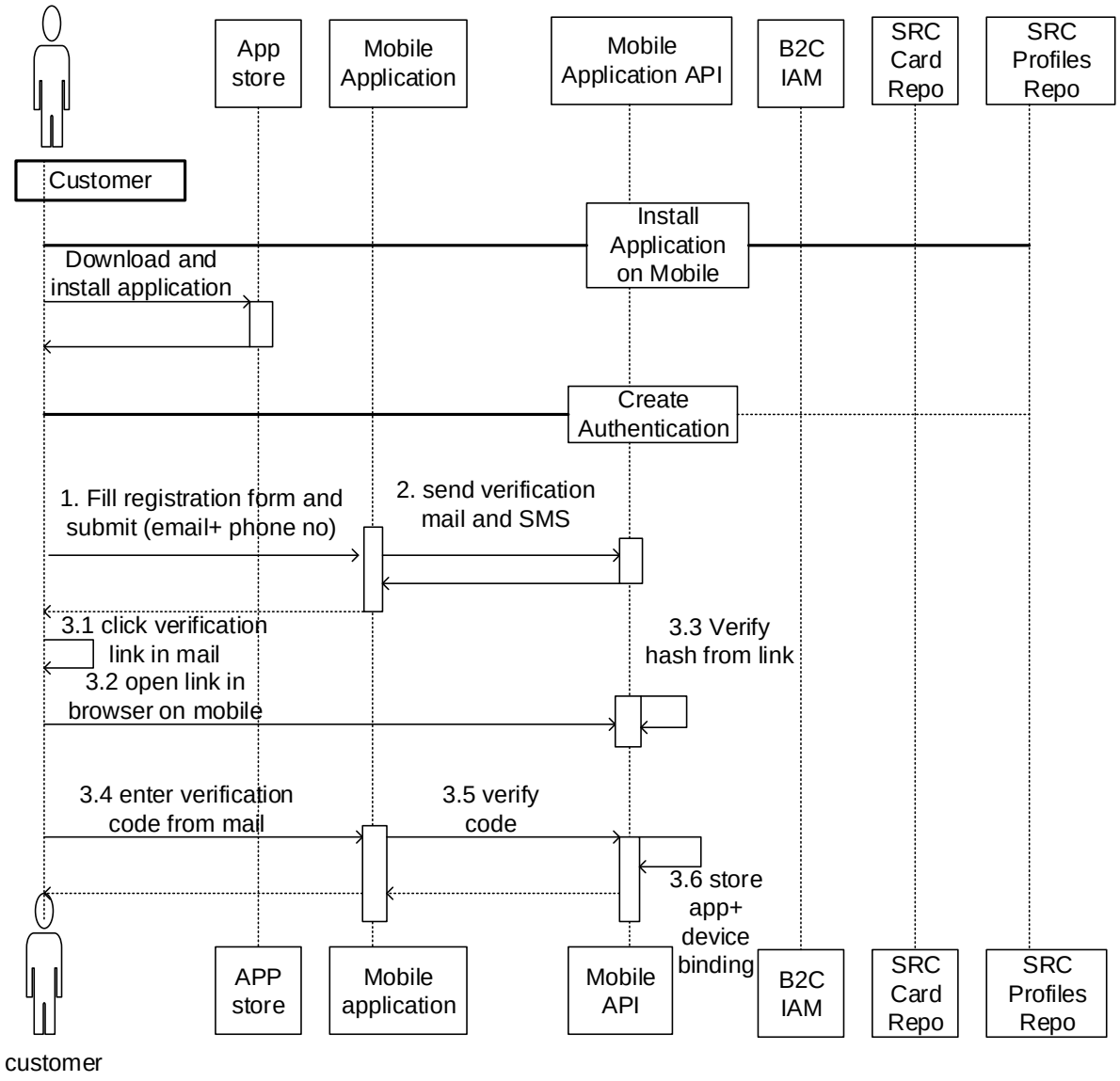
App store
Mobile Application
Mobile Application API
B2C IAM
SRC Card Repo
SRC Profiles Repo
Customer
Install Application on Mobile
Download and install application
Create Authentication
1. Fill registration form and submit (email+ phone no)
2. send verification mail and SMS
3.1 click verification link in mail
3.3 Verify hash from link
3.2 open link in browser on mobile
3.4 enter verification code from mail
3.5 verify code
3.6 store app+ device binding
APP store
Mobile application
Mobile API
B2C IAM
SRC Card Repo
SRC Profiles Repo
customer

Figure 5d

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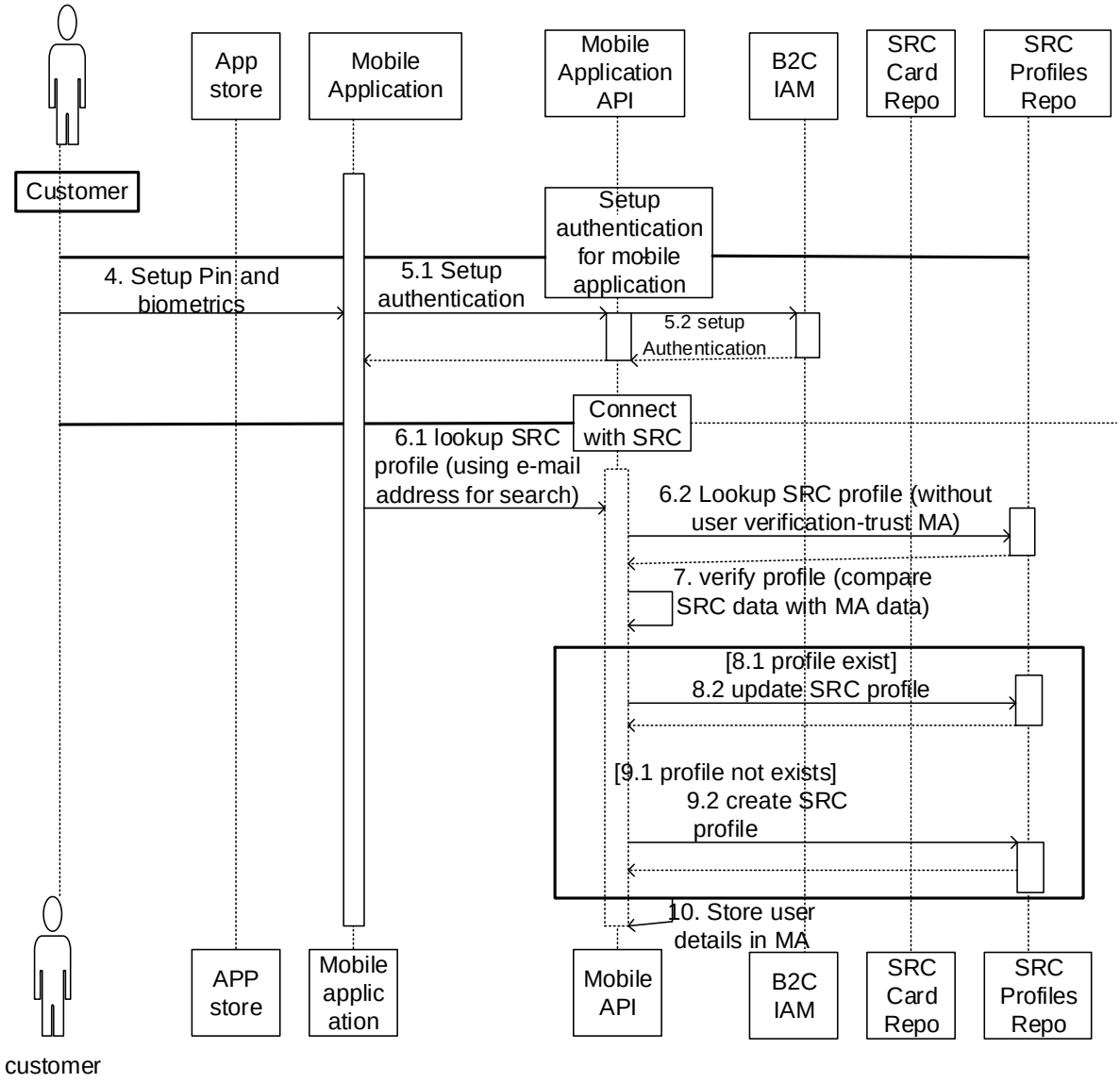

Figure 5e

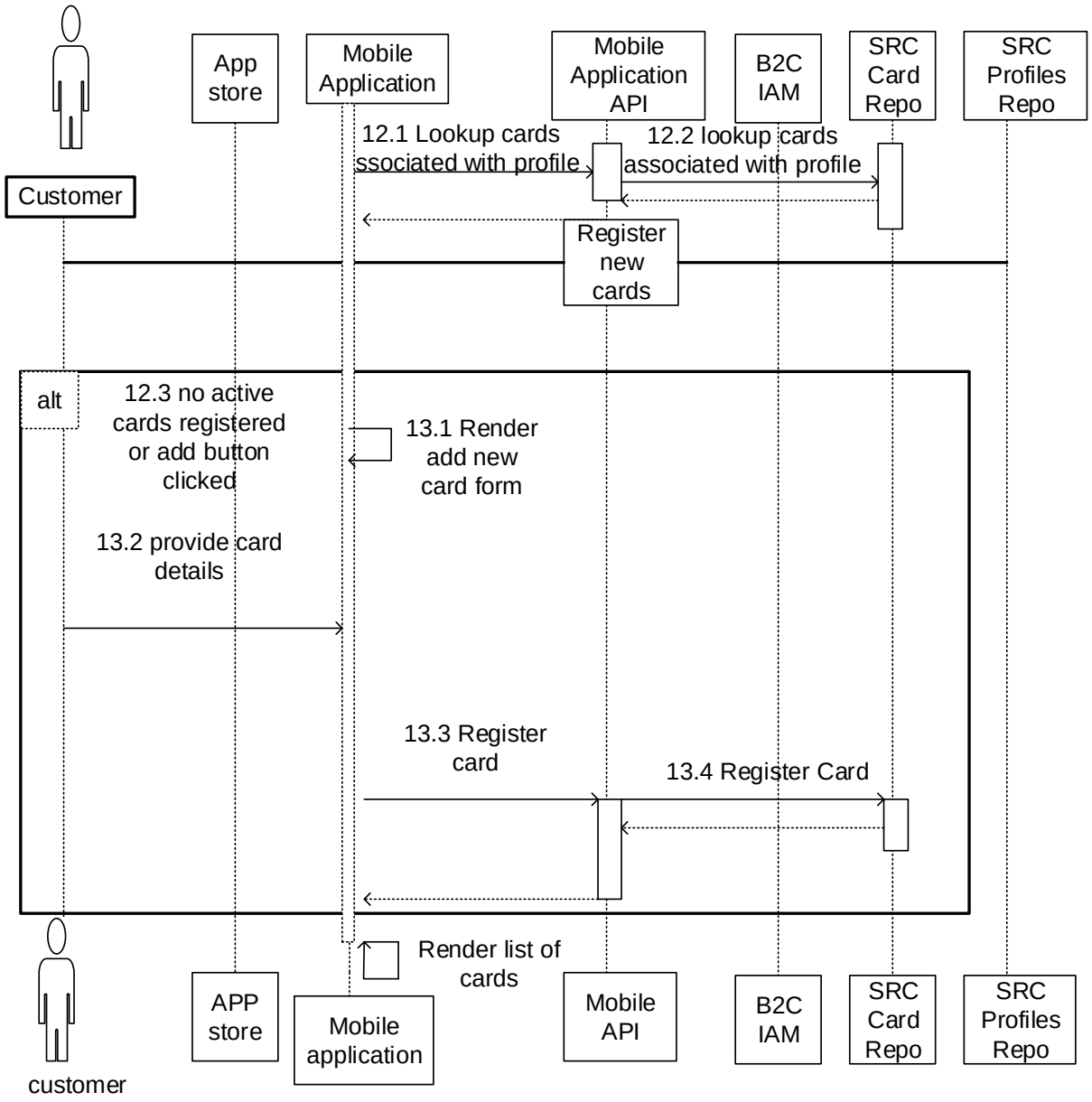
Customer
App store
Mobile Application
Mobile Application API
B2C IAM
SRC Card Repo
SRC Profiles Repo
12.1 Lookup cards ssociated with profile
12.2 lookup cards associated with profile
Register new cards
alt
12.3 no active cards registered or add button clicked
13.1 Render add new card form
13.2 provide card details
13.3 Register card
13.4 Register Card
Render list of cards
customer
APP store
Mobile application
Mobile API
B2C IAM
SRC Card Repo
SRC Profiles Repo

Figure 5f

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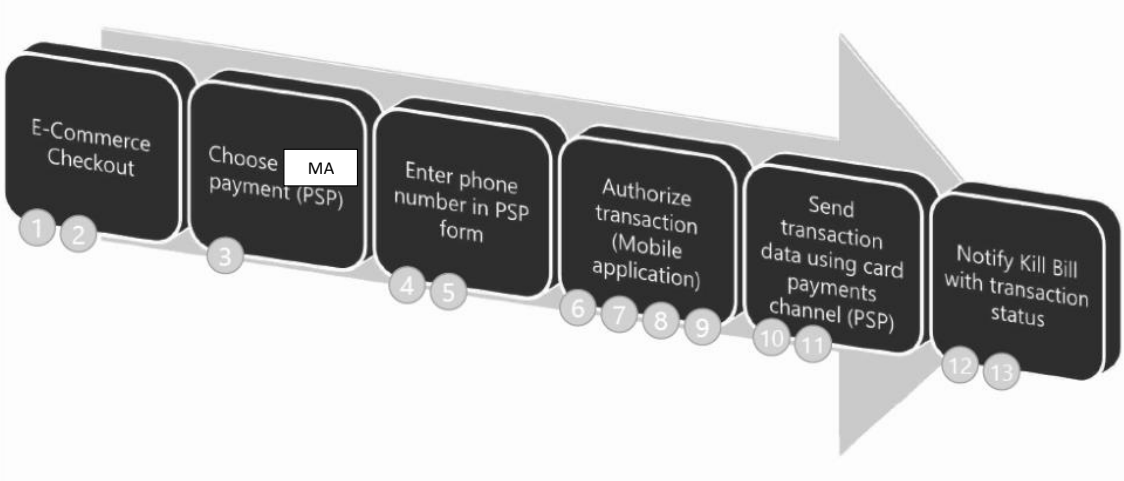

Figure 6a

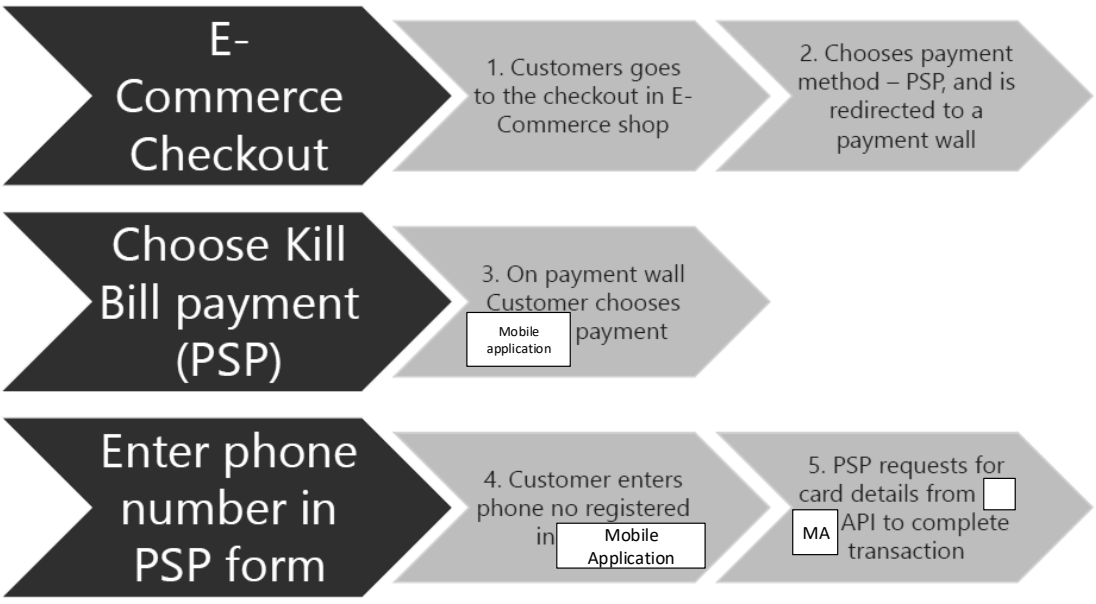

Figure 6b

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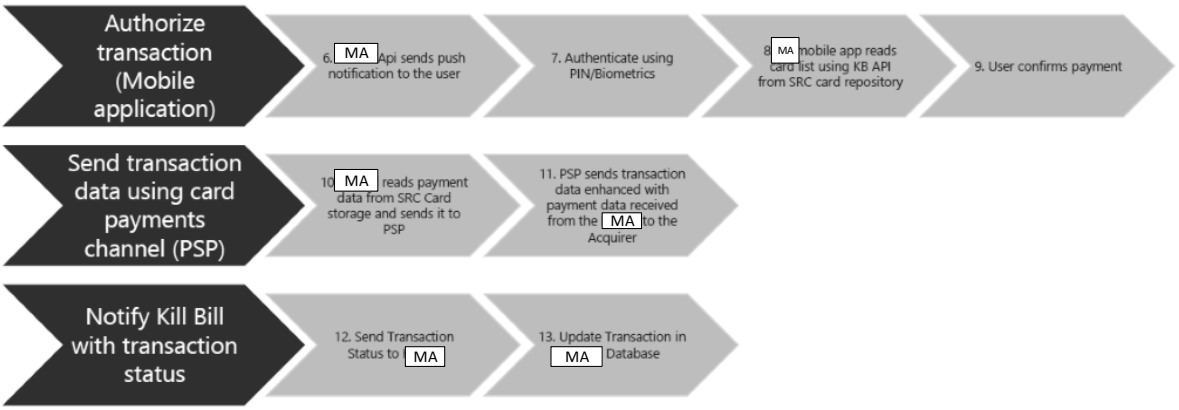

Figure 6c

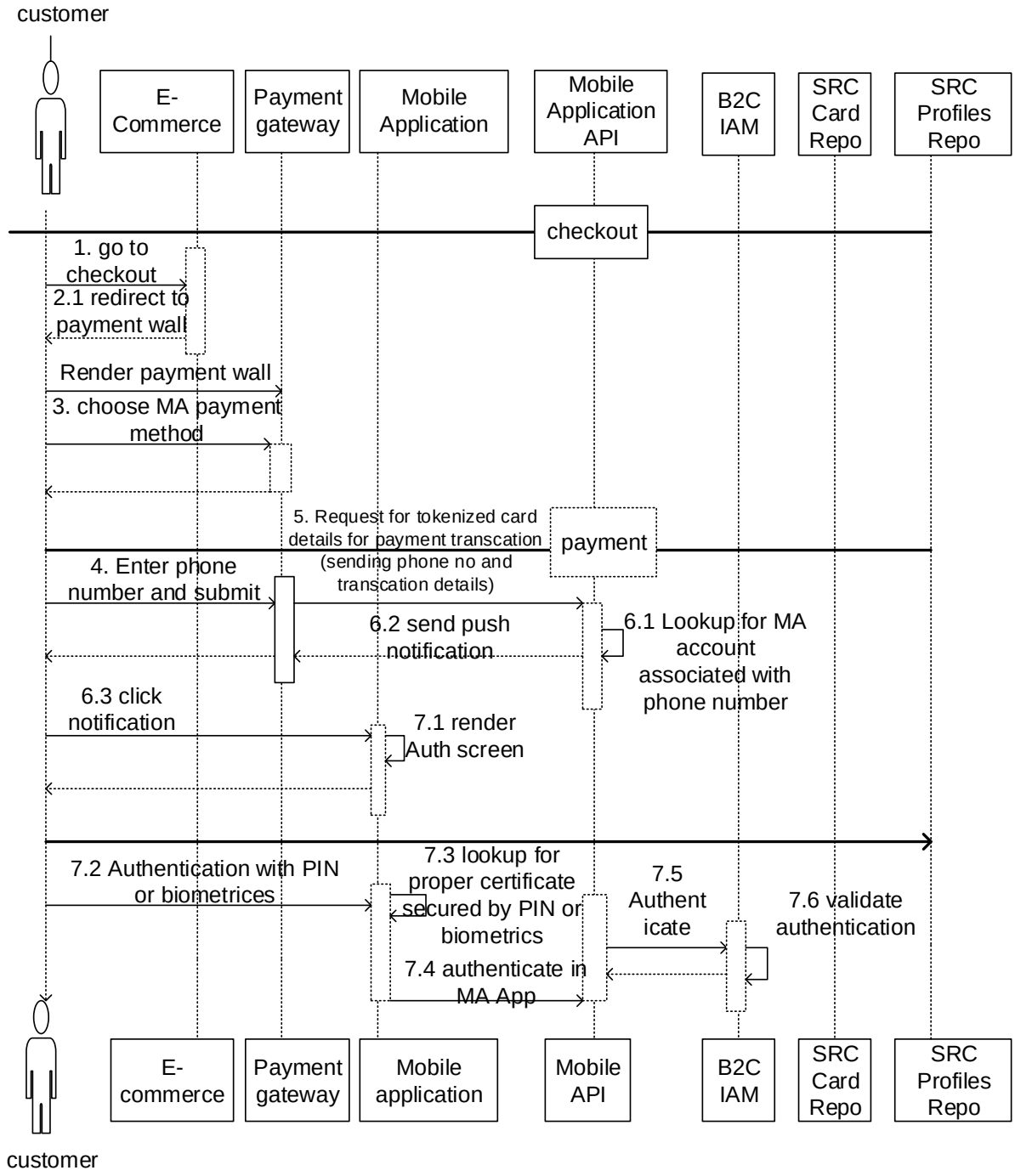
customer
E-Commerce
Payment gateway
Mobile Application
Mobile Application API
B2C IAM
SRC Card Repo
SRC Profiles Repo
checkout
1. go to checkout
2.1 redirect to payment wall
Render payment wall
3. choose MA payment method
5. Request for tokenized card details for payment transcation (sending phone no and transcation details)
payment
4. Enter phone number and submit
6.2 send push notification
6.1 Lookup for MA account associated with phone number
6.3 click notification
7.1 render Auth screen
7.2 Authentication with PIN or biometrices
7.3 lookup for proper certificate secured by PIN or biometrics
7.4 authenticate in MA App
7.5 Authenticate
7.6 validate authentication
E-commerce
Payment gateway
Mobile application
Mobile API
B2C IAM
SRC Card Repo
SRC Profiles Repo
customer

Figure 6d

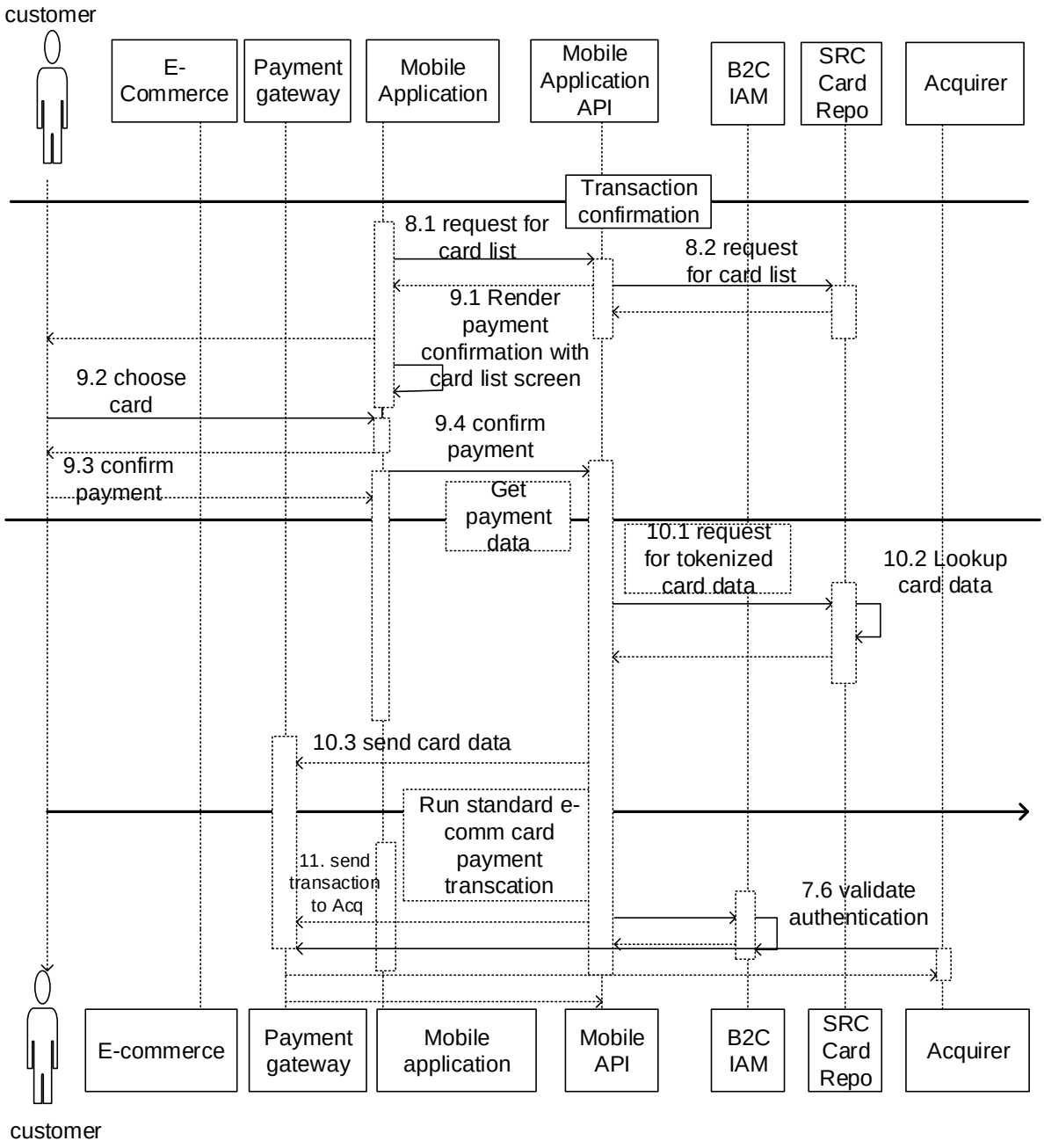
customer
E-Commerce
Payment gateway
Mobile Application
Mobile Application API
B2C IAM
SRC Card Repo
Acquirer
Transaction confirmation
8.1 request for card list
8.2 request for card list
9.1 Render payment confirmation with card list screen
9.2 choose card
9.4 confirm payment
9.3 confirm payment
Get payment data
10.1 request for tokenized card data
10.2 Lookup card data
10.3 send card data
Run standard e-comm card payment transcation
11. send transaction to Acq
7.6 validate authentication
E-commerce
Payment gateway
Mobile application
Mobile API
B2C IAM
SRC Card Repo
Acquirer
customer

Figure 6e

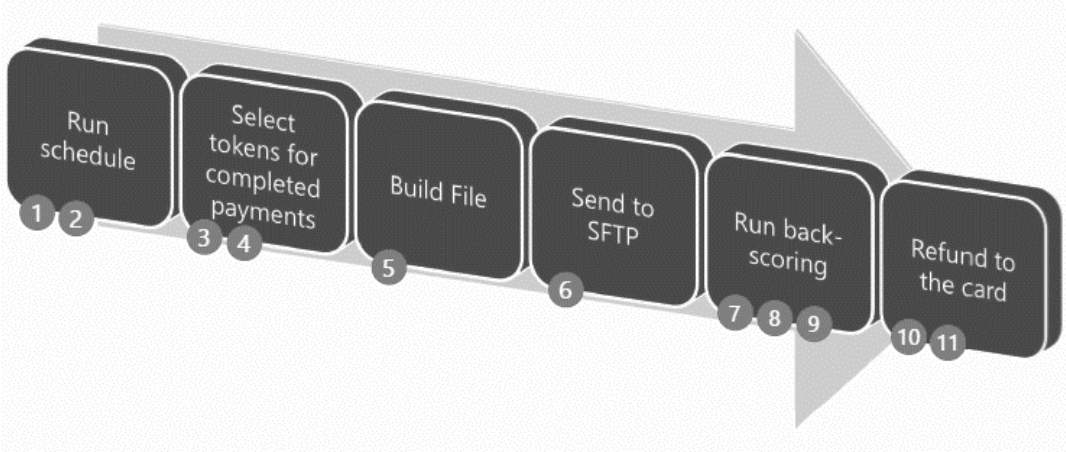

Figure 7a

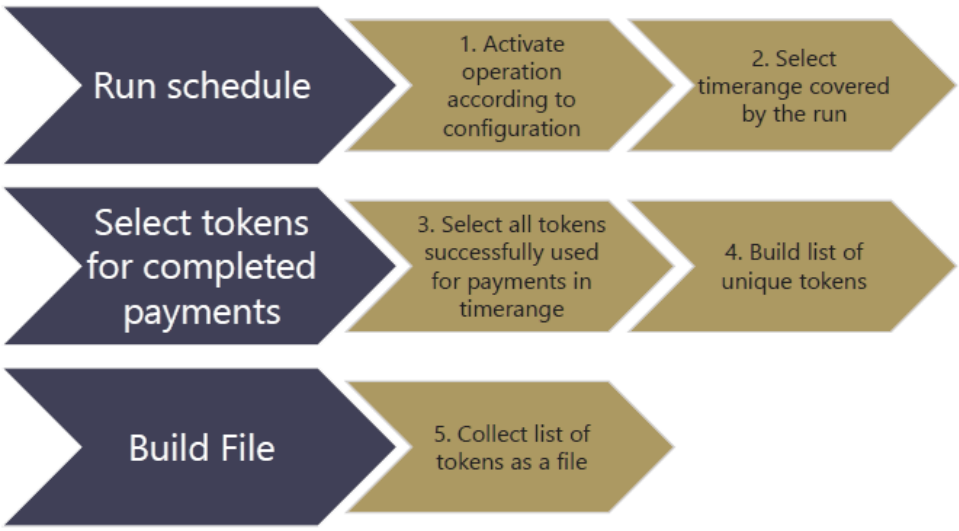

Figure 7b

15/15

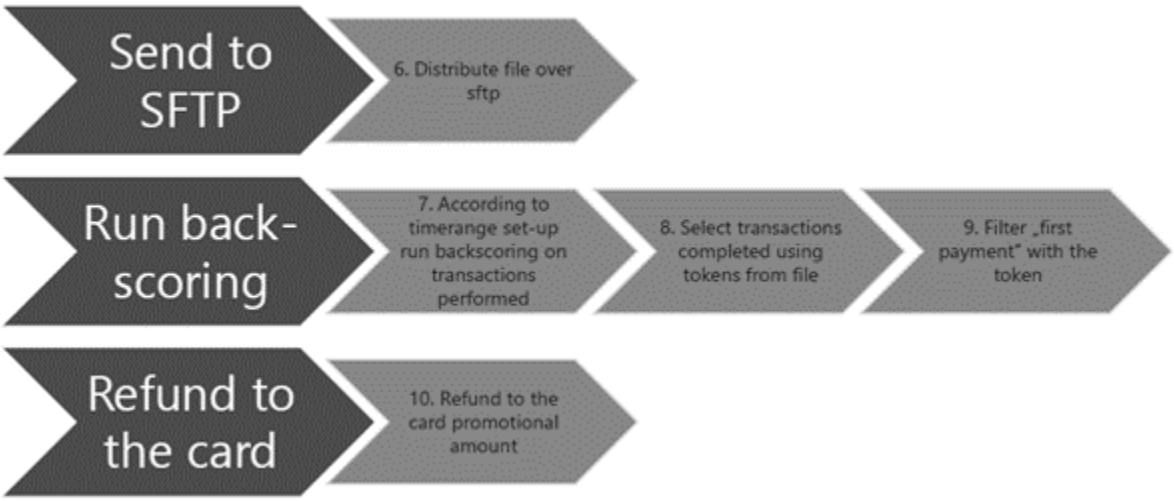

Figure 7c