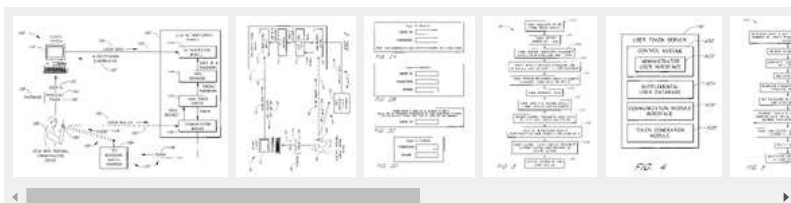


# Use of personal communication devices for user authentication

## Abstract

A password setting system for a secure system includes a user token server and a communication module. The user token server generates a random token in response to a request for a new password from a user. The server creates a new password by concatenating a secret passcode that is known to the user with the token. The server sets the password associated with the user's user ID to be the new password. The communication module transmits the token to a personal communication device, such as a mobile phone or a pager carried by the user. The user concatenates the secret passcode with the received token in order to form a valid password, which the user submits to gain access to the secure system. Accordingly, access to the system is based upon: nonsecret information known to the user, such as the user ID; secret information known to the user, such as the passcode; and information provided to the user through an object possessed by the user, such as the token.

## Images (12)



## Classifications

H04L63/083 Network architectures or network communication protocols for network security for supporting authentication of entities communicating through a packet data network using passwords  
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## Claims (7)

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1. A method of authenticating a user on a first secure computer network, the user having a user account on said first secure computer network, the method comprising:
  - associating the user with a personal communication device possessed by the user, said personal communication device in communication over a second network, wherein said second network is a cell phone network different from the first secure computer network;
  - receiving a request from the user for a token via the personal communication device, over the second network;
  - generating a new password for said first secure computer network based at least upon the token and a passcode, wherein the token is not known to the user and wherein the passcode is known to the user;
  - setting a password associated with the user to be the new password;
  - activating access the user account on the first secure computer network;
  - transmitting the token to the personal communication device;
  - receiving the password from the user via the first secure computer network; and
  - deactivating access to the user account on the first secure computer network within a predetermined amount of time after said activating, such that said user account is not accessible through any password, via said first secure computer network.
2. The method of claim 1, wherein the new password is generated by concatenating the token and the passcode.
3. The method of claim 1, wherein the personal communication device is a mobile phone.
4. The method of claim 1, wherein the personal communication device is a pager.
5. A user authentication system comprising:
  - a computer processor;

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**Worldwide applications**

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**Application US09/519,829 events**

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- 2022-06-17 • US case filed in Texas Eastern District Court

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a user database configured to associate a user with a personal communication device possessed by the user, said personal communication device configured to communicate over a cell phone network with the user authentication system;

a control module executed on the computer processor configured to create a new password based at least upon a token and a passcode, wherein the token is not known to the user and wherein the passcode is known to the user, the control module further configured to set a password associated with the user to be the new password;

a communication module configured to transmit the token to the personal communication device through the cell phone network; and

an authentication module configured to receive the password from the user through a secure computer network, said secure computer network being different from the cell phone network, wherein the user has an account on the secure computer network, wherein the authentication module activates access to the account in response to the password and deactivates the account within a predetermined amount of time after activating the account, such that said account is not accessible through any password via the secure computer network.

6. The system of claim 5, wherein the communication module is further configured to receive a request from the user for the token, and wherein the control module is further configured to create the new password in response to the request.

7. The system of claim 6, wherein the request is transmitted by the user through the personal communication device.

## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates generally to the authentication of users of secure systems and, more particularly, the invention relates to a system through which user tokens required for user authentication are supplied through personal communication devices such as mobile telephones and pagers.

#### 2. Description of the Related Art

Secure systems have traditionally utilized a user ID and password pair to identify and authenticate system users. Operating systems that control local area networks of workstations within a business or institution such as Novell NetWare, Microsoft NT, Windows 2000, and UNIX/Linux typically require submission of a user ID and password combination before allowing access to a workstation.

The incorporation of remote connectivity to secure systems over the Internet has weakened traditional controls imposed by a user's required physical presence within a company's premises and has exposed systems to additional security threats. External users accessing by dial-in or over the Internet, complicated by frequent personnel turnover, require frequent changes in password lists.

Passwords created by users are often combinations of words and names, which are easy to remember but also easily guessed. Guessing passwords is a frequent technique used by "hackers" to break into systems. Therefore, many systems impose regulations on password formats that require mixtures of letters of different cases and symbols and that no part of a password be a word in the dictionary. A user's inability to remember complex combinations of letters, numbers, and symbols often results in the password being written down, sometimes on a note stuck to the side of a workstation.

Present systems face several problems: users dread frequent password changes, frequent password changes with hard-to-remember passwords inevitably result in users surreptitiously writing down passwords, and security is compromised when users write down their passwords.

The SecurID product, which is distributed by RSA Security Inc., solves many of the aforementioned problems by requiring a two-factor authentication process. The first factor is a user passcode or personal identification number. The second factor is a SecurID card that is possessed by the user. The SecurID card generates and displays unpredictable, one-time-only access codes that automatically change every 60 seconds. The user supplies the displayed code upon logging into a system. The system has a corresponding code generator that allows verification of possession of the card.

The SecurID product, however, requires users to carry an additional item on their person in order to access a secure system. It would be advantageous if the benefits of the SecurID system could be achieved using a device that many users already carry—a personal communication device such as a mobile phone or a pager.

### SUMMARY OF THE INVENTION

A preferred embodiment of the present invention is a password setting system for setting user passwords for a secure system, such as a computer system or a secure area of a building. The password setting system preferably includes a user token server and a communication module. The user token server generates a random token in response to a request for a new password from a user. The server creates a new password by concatenating a secret passcode that is known to the user with the token. The server sets the password associated with the user's user ID to be the new password. The communication module transmits the token to a personal communication device, such as a mobile phone or a pager carried by the user. The user concatenates the secret passcode with the received token in order to form a valid password, which the user submits to gain access to the secure system. Accordingly, access to the system is based upon: nonsecret information known to the user, such as the user ID; secret information known to the user, such as the passcode; and information provided to the user through an object possessed by the user, such as the token.

One aspect of the invention is a method for setting passwords. The method includes associating a user ID with a phone number of a personal communication device. The method also includes generating a new password based at least upon a token. The method also includes setting a password associated with the user ID to be the new password. The method also includes transmitting the token to the personal communication device using the phone number associated with the user ID. In another aspect, the method also includes associating the user ID with a passcode. In another aspect, the new password is generated based additionally upon the passcode. In another aspect, the method also includes receiving a request for the user token. In another aspect, the personal communication device is a mobile phone. In another aspect, the personal communication device is a pager.

An additional aspect of the invention is a password setting system. The system includes a first user database configured to associate a user ID with a phone number of a personal communication device. The system also includes a control module configured to create a password based at least upon a token. The control module is further configured to cause a second user database to associate the password with the user ID. The system also includes a communication module interface configured to cause a communication module to transmit the token to the personal communication device using the phone number associated with the user ID. In another aspect, the first user database and the second user database are the same database. In another aspect, the first user database is further configured to associate the user ID with a passcode, and the control module is further configured to create the password based additionally upon the passcode.

An additional aspect of the invention is a method of regulating access to a secure system. The method includes transmitting a user token to a personal communication device. The method also includes receiving login data in response to a request for authentication information, wherein the login data is based at least upon the user token. The method also includes granting access to the secure system based upon the received login data. In another aspect, the login data is additionally based upon a user ID. In another aspect, the login data comprises a user ID. In another aspect, the login data is additionally based upon a passcode. In another aspect, the login data comprises a user ID and a password. In another aspect, the password comprises a passcode and the token. In another aspect, the password is a concatenation of the passcode and the token. In another aspect, the password is a hashed concatenation of the passcode and the token. In another aspect the method also includes generating the user token. In another aspect the method also includes receiving a request for the user token. In another aspect, the personal communication device is a mobile phone. In another aspect, the personal communication device is a pager.

An additional aspect of the invention is an access control system. The system includes a user token server configured to transmit a token to a personal communication device. The user token server is further configured to generate a valid password based at least upon the token. The system also includes an authentication module configured to receive at least a submitted password in response to a request for authentication of a user. The authentication module is further configured to grant access to the user if at least the submitted password is based at least upon the token and matches the valid password. In another aspect, the user token server is further configured to generate the valid password based additionally upon a valid passcode that is known to the user. In another aspect, the user token server is further configured to transmit the token in response to a request by the user. In another aspect, the user token server is further configured to associate the valid password with a valid user ID, the authentication module is further configured to receive a submitted user ID in response to the request for authentication, and the authentication module is further configured to grant access to the user if, in addition, the submitted user ID matches the valid user ID.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described below in connection with the attached drawings in which:

FIG. 1 illustrates an overview, including system components, of a user authentication system according to a preferred embodiment of the present invention;

FIGS. 2A–D illustrate login screens that can be used in conjunction with various embodiments of the invention;

FIG. 3 illustrates a preferred process performed by the system to authenticate users;

FIG. 4 illustrates a preferred embodiment of a user token server;

FIG. 5 illustrates a preferred process by which the user token server provides tokens and administrates user accounts;

FIGS. 6A–C illustrate three embodiments of a token delivery communication link;

FIGS. 7A–B illustrate two embodiments of a token request communication link; and

FIG. 8 illustrates an embodiment of a combined token request and delivery communication link.

#### DETAILED DESCRIPTION OF THE EMBODIMENTS

In the following description, reference is made to the accompanying drawings, which form a part hereof, and which show, by way of illustration, specific embodiments or processes in which the invention may be practiced. Where possible, the same reference numbers are used throughout the drawings to refer to the same or like components. In some instances, numerous specific details are set forth in order to provide a thorough understanding of the present invention. The present invention, however, may be practiced without the specific details or with certain alternative equivalent devices and methods to those described herein. In other instances, well-known methods and devices have not been described in detail so as not to unnecessarily obscure aspects of the present invention.

##### I. Overview and System Components

FIG. 1 illustrates an overview, including system components, of a user authentication system **100** according to a preferred embodiment of the present invention. FIG. 2A illustrates a login screen that can be used in accordance with the preferred embodiment. FIGS. 2B–D illustrate login screens that can be used in accordance with alternative embodiments.

The user authentication system **100** includes an authentication server **102**, a text messaging service provider **104**, a personal communication device **106** carried by a user **108**, and a secure system **110** to which the authentication system **100** regulates access. The personal communication device **106** is preferably a pager or a mobile phone having SMS (short message service) receive capability. SMS is a secure text messaging capability that is incorporated into most digital mobile phones. The secure system **110** is preferably a Windows NT computer workstation, but may be any system, device, account, or area to which it is desired to limit access to authenticated users. The secure system **110** may be, for example, a user account on a network of computer workstations, a user account on a web site, or a secure area of a building. The secure system **110** is preferably connected to the user authentication server **102** by a computer network **103**. In one embodiment, the user authentication server **102** is integrated into the secure system **110**.

The user authentication server **102** preferably includes a program or a suite of programs running on a computer system to perform user authentication services. The user authentication server **102** may also include the computer system and hardware upon which the programs run. The user authentication server **102** is preferably configured to require that the user **108** supply authentication information through the secure system **110** in order to gain access to the secure system **110**.

The authentication information preferably includes a user ID **152**, a passcode **154** and a user token **156**. The user **108** preferably commits to memory the user ID **152** and passcode **154**. The user ID **152** may be publicly known and used to identify the user **108**. The passcode **154** is preferably secret and only known to the user **108**. The token **156** is preferably provided only to the user **108** by the user authentication server **102** through the user's personal communication device **106** on an as needed basis. The token **156** preferably has a limited lifespan, such as 1 minute or 1 day. Accordingly, the user **108** needs to be in possession of his personal communication device **106** in order to gain access to the secure system **110**. Therefore, if the user's user ID **152** and passcode **154** are compromised, a malicious party still cannot access the secure system without possession of the personal communication device **106**.

In the preferred embodiment, the user **108** combines the token **156** with the passcode **154** to form a password **158**. For example, the user **108** can combine a valid, memorized passcode of "abcd" with a valid token of "1234" to form a valid password of "abcd1234." In this manner, a login screen such as is illustrated in FIG. 2A, which is similar or identical to standard login screens that require a user ID **152** and a password **158**, can be used. In an alternative embodiment, the passcode **154** and the token **156** are submitted separately, as is illustrated in FIG. 2B. In another embodiment, the passcode **154** is null in which case the token **156** alone is used as the password **158**. In still another embodiment, the token **156** can be requested through the secure system **110** as is illustrated in FIGS. 2C–D.

The user authentication server **102** is preferably a secure system itself and may be a part or component of the secure system **110**. The user authentication server **102** preferably includes an authentication module **112** and a user database **114**. The authentication module **112** is preferably identical to the code or software provided with operating systems such as Windows NT that authenticates users upon login. In alternative embodiments, the authentication module **112** may be any code, device, or

module capable of authenticating a user based upon a supplied user ID **152** supplemented by a supplied password **158** or a passcode **154** and a token **156** combination. The authentication module **112** preferably responds to an authentication request transmitted over the computer network **103** by supplying an authentication confirmation **162** over the network **103**. If the user **108** has been authenticated, the confirmation **162** instructs the secure system **110** to allow access to the user **108**. The user database **114** is preferably similar or identical to the database accessed by the authentication module **112** that stores user ID and password data (or passcode and token data) in operating systems such as Windows NT. In alternative embodiments, the user database **114** can be any database capable of storing user ID and password data.

The user authentication server **102** preferably also includes a user token server **116** that responds to requests for tokens **160** by generating a token **156** and transmitting the token **156** to the user's personal communication device **106**. The user authentication server **102** preferably also resets passwords in the user database **114** based upon generated tokens and passcode data. The user authentication server **102** preferably transmits the tokens **156** over a token delivery communication link **105** to the user's personal communication device **106**.

The user authentication server **102** preferably also includes a communication module **118**, which is also part of the token delivery communication link **105**. The communication module **118** forwards tokens **156** to a text messaging service provider **104**, which may be a pager or mobile phone service provider. The text messaging service provider **104** then forwards the token **156** preferably in the form of a secure text message to the personal communication device **106**.

In the preferred embodiment, the communication module **118** is a mobile phone with SMS text messaging send capability. One applicable mobile phone is the presently available Ericsson T-28. The mobile phone **118** is preferably connected to the user authentication server **102** via a presently available serial port cable that makes the phone accessible in a manner similar to a computer modem. Accordingly, the user authentication server **102** can send tokens **156** via the server's mobile phone **118** to the user's mobile phone **106** using SMS. In this case, the server's mobile phone **118** transmits a message including the token **156** to the user's personal communication device **106** using the phone number of the user's personal communication device **106**. During the transmission, the message is relayed by the mobile phone service provider **104** to its final destination.

Preferably, the communication module **118** is also configured to receive requests for tokens **160**. The user preferably transmits a request for tokens **160** over a request communication link **107**. The request communication link **107** may be the same communication link as the delivery communication link **105** or it may be a different link. Various embodiments of the token delivery communication link **105** and the token request communication link **107** will be discussed in Section III below.

In the preferred embodiment, the communication module **118** is a mobile phone that also has SMS text messaging receive capability. The communication module **118** receives an SMS message from the user's mobile SMS send enabled mobile phone **106**, and the token server **116** preferably processes the message as a token request **160**. The incoming SMS message is tagged with the sending phone's phone number, which the user token server **116** can use to identify the requesting user and respond with a new token **156**. The token request **160** may also be in the form of a phone call, in which case the user token server **116** may use a caller ID feature to identify the calling phone number as a valid user's personal communication device **106**. The user token server **116** can then respond with a new token **156**. Alternatively, the user token server **116** may allow a calling user **108** to enter the phone number of his personal communication device **106** using the mobile phone keypad once a connection has been established.

In an alternative embodiment, the communication module **118** is an ISDN card that is connected to the text messaging service provider **104** preferably via an X.25 connection. The ISDN card **118** preferably transmits new tokens directly to the text messaging service provider **104** for forwarding to the user's personal communication device **106**. The ISDN card **118** may also be configured to be accessible at a phone number to receive calls for requests for tokens **160**.

FIG. 3 illustrates a preferred process **300** performed by the system **100** to authenticate users. At a step **302**, the user **108** requests a token from the user token server **116** through the token request communication link **107**. In the preferred embodiment, the user's mobile phone **106** has SMS send capability and the user sends an SMS message to the communication module **118** requesting a new token **156**. The SMS message need not contain any data in its body since the phone number of the sending mobile phone is automatically sent along with the message. The user token server **116** preferably identifies the user's mobile phone **106** based upon the phone number with which the SMS message is tagged. In an alternative embodiment, the user **108** makes a phone call with his personal communication device **106** to the communication module **118**. The user token server **116** identifies the user's personal communication device **106** preferably based upon a caller ID feature. Alternatively, the user **108** may call from any phone and enter in the phone number of his personal communication device **106**. As another alternative, the user **108** may request the token **156** through the secure system **110** itself as illustrated in FIGS. 2C-D. As another alternative, the step **302** may be omitted altogether. In this case, the user token server **116** can automatically send tokens **156** to the user **108** at predetermined intervals, such as once per day where the tokens have a lifespan of one day.

At a step **304** the user token server **116** generates a token **156**. The token **156** may be generated by any of a number of methods that preferably produces a random or pseudo-random sequence of numbers and/or digits. The token **156** is preferably long enough such that it cannot be guessed, but short enough such that it is relatively easy to enter, such as six to eight characters.

At a step **306**, the token server **116** generates a new password **158**. The token server **116** preferably creates the new password **158** by combining the user's passcode **154**, which is stored by the user token server **116**, with the newly generated token **156**. At a step **308**, the token server updates the user database **114** with the new password **158**. In the case that the user's account in the user database **114** is inactive or deactivated, the token server **116** activates the user's account.

In the preferred embodiment, the token server creates a hash of the password **158** and stores the hash of the password **158** in the user database **114** rather than storing the password **158** itself. The hash is typically performed using a one-way hashing algorithm where the same password always produces the same hash, but where the password cannot be determined from the hash. In typical systems, passwords **158** are stored as hashes rather than as plain text in order to prevent system administrators and others from being able to determine users' passwords by examining the user database **114**. Also, when a user **108** submits a password **158** upon login to a secure system **110**, the submitted password **158** is immediately hashed using the same one-way hashing algorithm before transmission to the authentication module **112**. The authentication module **112** then compares hashes of passwords rather than the passwords themselves to authenticate the user **108**. In this manner, passwords **158** need not be transmitted over any communication links or computer networks as clear text. It will be apparent to one skilled in the art that the present invention can be implemented with or without the hashing of passwords and that incorporating hashing of passwords does not substantively affect the scope or spirit of the invention. So as not to unnecessarily obscure aspects of the present invention, a password as referred to herein may be an unhashed or a hashed password. For example, a receipt of a password may be a receipt of an unhashed or hashed password, and a comparison of passwords may be a comparison of unhashed or hashed passwords.

At a step **310**, the token server **116** transmits the token **156** to the user's personal communication device **106** via the token delivery communication link **105**. In the preferred embodiment, the communication module **118** is a mobile phone, and the user token server **116** uses the SMS send capability of the phone **118** to send an SMS message including the token **156** to the user's personal communication device **106**. At a step **312**, the user **108** receives the token through his personal communication device **106**.

At a step **314**, the user **108** logs into the secure system **110** using the user ID **152** and the password **158**. In the preferred embodiment, the user **108** combines the passcode **154** and the token **156** by concatenation to form the password **158**. In an alternative embodiment, the passcode **154** and the token **156** are submitted separately.

At a step 316, the secure system 110 transmits login data 159 to the user authentication server 102 over the computer network 103 for authentication of the user 108. The login data 159 preferably includes the user ID 152 and a hash of the password 158 that the secure system 110 creates in order to avoid sending the password 158 over the computer network 103 in clear text. Alternatively, the login data 159 may include a hash of the passcode 154 and the token 156. As another alternative, the password 158, or the passcode 154 and token 156 are not hashed.

At a step 318, the user authentication server 102 authenticates the user 108 based upon the login data 159. In order to authenticate the user 108, the authentication server 102 preferably compares the login data to the password 158 (hashed or unhashed) or the passcode 154 and token 156 (hashed or unhashed) corresponding to the user ID 152 stored in the user database 114.

At a step 320, the user authentication server 102 transmits an authentication confirmation 162 to the secure system 110. At a step 322, the secure system 110 allows the user 108 access based upon the authentication confirmation 162.

## II. The User Token Server

FIG. 4 illustrates a preferred embodiment of the user token server 116. The user token server 116 preferably includes a process or program running on or in conjunction with the user authentication server 102. The user token server 116 may, however, include a computer upon which the process or program executes. The user token server 116 preferably includes a control module 402, a supplemental user database 404, a communication module interface 406, and a token generation module 408. The various modules and components of the user token server 116 are described herein from a functional perspective. The various functional components may, however, be seamlessly integrated into one or more executable programs, data structures, and/or physical components.

The control module 402 preferably serves as the top level component of the user token server 116. The control module 402 preferably handles any tasks or functions not handled by the other modules of the token server 116, in addition to controlling the other modules. The control module 402 preferably maintains a supplemental user database 404, which preferably stores associations of user IDs with passcodes, phone numbers of users' personal communication devices, and any other supplemental user data. The other supplemental user data may include one or more of: whether an account is active, the expiration time of passwords, and the frequency with which tokens may be automatically distributed. The supplemental user database 404 is preferably accessed and modified through an administrator user interface 403 provided by the control module 402. The administrator user interface 403 allows administration of user privileges by adding, modifying and removing user IDs, passcodes, and phone numbers from the supplemental user database 404.

In the preferred embodiment, the supplemental user database 404 is maintained separately from the user database 114 of the user authentication server 102. In this configuration, the user database 114 supplied with an OEM system need not be modified or reconfigured. The user token server 116 can be added to existing secure systems in order to provide additional security functionality. In an alternative embodiment, the supplemental user database 404 may be integrated into the user database 114. In this case, user authentication module 102 is preferably configured and supplied as a single integrated component.

FIG. 5 illustrates a preferred process 500 by which the user token server 116 provides tokens 156 and administers user accounts. The process 500 is described below in conjunction with the description of the functionality of the various modules and components of the user token server 116.

At a step 502, the control module 402 associates a user ID with a passcode 154 and a phone number of a user's personal communication device 106. Upon initially setting up an account, the association can be performed manually by a system administrator through the administrator user interface 403. The administrator user interface 403 preferably solicits a desired user ID 152, passcode 154, and phone number from a system administrator. The control module 402 then preferably creates a deactivated user account with a user ID 152 for the secure system 110 on the user database 114 of the user authentication server 102. The control module 402 preferably accesses the user database 114 using an application program interface (API) (not illustrated), which is typically provided with OEM systems. The control module 402 also preferably creates an entry in the supplemental user database 404 including the user ID 152, the passcode 154, and the phone number.

At a step 504, the user token server 116 receives a token request 160 from the user 108, possibly in order to activate his deactivated account. The token request 160 is preferably received through the communication module 118, which the control module 402 preferably controls through a communication module interface 406. The communication module interface 406 is preferably a device driver tailored for the specific implementation of the communication module 118. In alternative embodiments, the user may request the token 156 through the secure system 110 itself, as illustrated in FIGS. 2C-D. In this case, the request 160 may be received through the computer network 103.

At a step 506, the control module 402 associates the token request 160 with a valid user ID 152. The control module 402 may make this association based upon a supplied phone number by querying the supplemental user database 404. In one embodiment, if the user ID 152 is supplied in conjunction with the request 160, the step 506 is not performed.

At a step 508, the token generation module 408 generates a token by a method that produces a random or pseudo-random sequence of numbers or digits or both numbers and digits. Many methods are presently known for producing such random sequences. The token generation module 408 preferably passes the newly generated token 156 to the control module 402.

At a step 510, the control module 402 generates a new password 158 based upon the generated token 156 and the passcode 154 associated with the user ID 152 as listed in the supplemental user database 404. The new password 158 is preferably generated by concatenating the passcode 154 and the token 156.

At a step 512, the control module 402 sets or resets the password associated with the user ID 152 in the user database 114. In the preferred embodiment, the control module 402 sets the password to be a one-way hash of the newly generated password 158. In alternative embodiments, the password 158 need not be hashed. In the case the user's account has been deactivated, the control module 402 activates the user ID 152 in the user database 114. The control module 402 preferably accesses the user database 114 through the database API (not illustrated).

At a step 514, the control module 402 transmits the token 156 to the user's personal communication device 106 preferably based upon the phone number associated with the user ID 152 in the supplemental user database 404. In the preferred embodiment, the control module 402 causes the communication module 118 to generate and send an SMS message containing the token 156 to the user's mobile phone. In an alternative embodiment, the communication module 118 may call the phone number of the user's pager and transmit the token 156 as the page data.

At a step 516, the user 108 is able to access the secure system 110 by logging in using the supplied token 156. The user 108 preferably concatenates his memorized secret passcode 154 with the valid token 156 to create the password 158. The user then logs in using his user ID 152 and the password 158.

At a step 518, if the token has an expiry time, the token 156 expires. At a step 520, upon expiration of the token 156, the control module 402 deactivates the user account in the user database 114.

Finally, the process 500 repetitively continues either from the step 502, if a new user 108 is to be added, or from the step 504 if an existing user 108 requests a token 156.

III. Token Delivery and Request Communication Links

FIGS. 6A–C illustrate three embodiments of the token delivery communication link 105. FIGS. 7A–B illustrate two embodiments of the token request communication link 107. In some embodiments, the same communication link may be used as the token delivery communication link 105 and the token request communication link 107. FIG. 8 illustrates an embodiment of a combined token request and delivery communication link that can function in conjunction with a mobile phone without text messaging capability. Additionally, communication technologies other than those illustrated here by example may be used to implement the communication links 105 and 107.

FIG. 6A illustrates a preferred embodiment of the token delivery communication link 105. The communication module 118 is a mobile phone 602 with SMS send capability. The mobile phone 602 sends an SMS message 603 including the token 156 to the user's mobile phone 604. While in transit, the message 603 is received and retransmitted by the SMS system 606 of a mobile phone service provider.

FIG. 6B illustrates a first alternative embodiment of the token delivery communication link 105. In this case, the communication module 118 is an ISDN card or an X.25 connection card 612 that connects to an SMS gateway 616 of a mobile phone service provider via an ISDN or X.25 connection 613. The card 612 transmits the token 156 to the SMS gateway 616, which then creates an SMS message 615 and transmits the message 615 to the user's mobile phone 614.

FIG. 6C illustrates a second alternative embodiment of the token delivery communication link 105. In this case, the communication module 118 is a phone dialer 622, the personal communication device 106 is a pager 624, and the text messaging service provider is a paging service 626. In order to transmit a token 156, the phone dialer 622 places a phone call 623 to the phone number of the user's pager 624. The paging service provider 626 answers and the phone dialer 622 enters a numeric token 156 to be transmitted to the pager 624. The paging service provider 626, in turn, sends a page 625 containing the token 156 to the user's pager 624.

FIG. 7A illustrates a preferred embodiment of the token request communication link 107. The personal communication device 106 is preferably the mobile phone 604, the communication module 118 is preferably the mobile phone 602, and the text messaging service provider 104 is preferably the SMS system 606 of the preferred embodiment of the token delivery communication link 105 (FIG. 6A). Alternatively, the communication module 118 may be the ISDN card or X.25 connection card 612 connected through the ISDN or X.25 connection 613 as in the first alternative embodiment of the token delivery communication link 105 (FIG. 6B). The mobile phone 604 preferably sends an SMS message 703 as a token request 160 to the mobile phone 602 or the ISDN card 612. The SMS message 703 may have a blank message body but the message preferably includes the sending phone's phone number in a tag or header field. While in transit, the message 603 is received and retransmitted by the SMS system 606. The user token server 116 preferably identifies the sending phone's phone number, and if the phone number matches a valid user ID 152, the token server 116 processes the message 703 as a token request 160.

FIG. 7B illustrates a first alternative embodiment of the token request communication link 107 in accordance with the token request and login screens of FIGS. 2C–D. The user 108 makes the token request 160 through a first login screen (FIG. 2C) on the secure system 110. The token request 160 in this case preferably includes the user's user ID 152 and is preferably transmitted through the computer network 103 to the user token server 116 through a network interface card 702. In this case, the token request 160 need not be communicated through the communication module 118. Also, the personal communication device 106 need not be used in requesting the token 156 but is preferably used in delivering the token 156.

FIG. 8 illustrates a combined token request and delivery link in which the personal communication device 106 is preferably a mobile phone. The communication module 118 is preferably an automated telephone response system 802 with a caller ID capability. The user 108 places a phone call 803 to the telephone response system 802, which identifies the calling phone 804 using caller ID. The telephone response system 802 interprets the call as a token request 160 and responds by generating a voice synthesized recitation of the token 156 that the user hears through the mobile phone 804. The mobile phone 804, in this case, need not have any text messaging or SMS capability.

In still other embodiments, various other technologies and combinations of technologies, which will be apparent to one skilled in the art, can be used to implement the token delivery 105 and token request 107 communication links. For example, a token request may be made through a land line phone, and in response, a token may be delivered to a mobile phone.

IV. Conclusion

Although the invention has been described in terms of certain preferred embodiments, other embodiments that are apparent to those of ordinary skill in the art, including embodiments which do not provide all of the features and advantages set forth herein, are also within the scope of this invention. Accordingly, the scope of the invention is defined by the claims that follow. In the claims, a portion shall include greater than none and up to the whole of a thing; encryption of a thing shall include encryption of a portion of the thing; a password may be an unhashed or a hashed password. In the method claims, reference characters are used for convenience of description only, and do not indicate a particular order for performing the method.

Patent Citations (17)

Publication number	Priority date	Publication date	Assignee	Title
<a href="#">US5153919A</a> *	1991-09-13	1992-10-06	At&T Bell Laboratories	Service provision authentication protocol
<a href="#">US5265155A</a> *	1991-07-31	1993-11-23	Integrated Communications, Ltd.	Method and apparatus for prepayment of telecommunication connections in a telecommunication switching network
<a href="#">US5323146A</a> *	1990-03-20	1994-06-21	Siemens Nixdorf Informationssysteme Ag	Method for authenticating the user of a data station connected to a computer system
<a href="#">US5497411A</a> *	1994-03-14	1996-03-05	Pellerin; Joseph C. E.	Telecommunications card-access system
<a href="#">US5590198A</a>	1995-12-19	1996-12-31	Pitney Bowes Inc.	Open metering system with super password vault access
<a href="#">US5749075A</a> *	1995-06-06	1998-05-05	Interactive Media Works, L.L.C.	Method for providing prepaid internet access and/or long distance calling including the distribution of specialized calling cards
<a href="#">EP0875871A2</a>	1997-04-29	1998-11-04	Kim Schmitz	Authorization method in data transfer systems
<a href="#">US5875394A</a> *	1996-12-27	1999-02-23	At & T Wireless Services Inc.	Method of mutual authentication for secure wireless service provision
<a href="#">US5923763A</a>	1996-03-21	1999-07-13	Walker Asset Management	Method and apparatus for secure document timestamping

Limited Partnership				
<a href="#">US5949882A</a> *	1996-12-13	1999-09-07	Compaq Computer Corporation	Method and apparatus for allowing access to secured computer resources by utilizing a password and an external encryption algorithm
<a href="#">US5956633A</a> *	1995-06-19	1999-09-21	Nokia Mobile Phones Limited	Method and apparatus for controlling the right of use/activating of a mobile station which uses at least two predefined codes which are pre-stored in a SIM module
<a href="#">US6049877A</a>	1997-07-16	2000-04-11	International Business Machines Corporation	Systems, methods and computer program products for authorizing common gateway interface application requests
<a href="#">US6075860A</a> *	1997-02-19	2000-06-13	3Com Corporation	Apparatus and method for authentication and encryption of a remote terminal over a wireless link
<a href="#">US6161182A</a>	1998-03-06	2000-12-12	Lucent Technologies Inc.	Method and apparatus for restricting outbound access to remote equipment
<a href="#">US6173400B1</a>	1998-07-31	2001-01-09	Sun Microsystems, Inc.	Methods and systems for establishing a shared secret using an authentication token
<a href="#">US6226364B1</a> *	1997-12-08	2001-05-01	Bellsouth Intellectual Property Management Corporation	Method and system for providing prepaid and credit-limited telephone services
<a href="#">US6795852B1</a> *	1995-09-11	2004-09-21	Nomadix, Inc.	Automatic network connection
Family To Family Citations				

\* Cited by examiner, † Cited by third party

### Non-Patent Citations (8)

Title
24-hour cellphone cyberwatch-Internet-printed on May 19, 2000.
ACE/Server, <a href="http://www.computerps.com/internet/security/secdyn/aceserv.html">http://www.computerps.com/internet/security/secdyn/aceserv.html</a> , last modified Jul. 15, 1998.
International Search Report for PCT/US01/07058 (3-pages).
Menezes, "Handbook of Applied Cryptography," 1997, p. 390. *
Monkey (mobile network key)-Internet-6 pages, printed on May 19, 2000.
Monkey as authentication software-Internet-2 pages, printed on May 19, 2000.
RSA Security Inc.-RSA SecurID Two-Factor Authentication System, <a href="http://www.securid.com/products/securid/index.html">http://www.securid.com/products/securid/index.html</a> , printed on Mar. 3, 2000.
Security Dynamics-SecurID Tokens Datasheet, <a href="http://www.computerterps.com/internet/security/secdyn/tokens.html">http://www.computerterps.com/internet/security/secdyn/tokens.html</a> , last modified Jul. 31, 1998.

\* Cited by examiner, † Cited by third party

### Cited By (206)

Publication number	Priority date	Publication date	Assignee	Title
<a href="#">US20030046546A1</a> *	2001-09-04	2003-03-06	Hitoshi Endo	Identifying method
<a href="#">US20030163694A1</a> *	2002-02-25	2003-08-28	Chaing Chen	Method and system to deliver authentication authority web services using non-reusable and non-reversible one-time identity codes
<a href="#">US20040073802A1</a> *	2001-03-02	2004-04-15	Dong-Seok Seol	User identification with an improved password input method
<a href="#">US20040073795A1</a> *	2002-10-10	2004-04-15	Jablon David P.	Systems and methods for password-based connection
<a href="#">US20040107143A1</a> *	2002-11-29	2004-06-03	Aki Niemi	Method for authorizing indirect content download
<a href="#">US20040143730A1</a> *	2001-06-15	2004-07-22	Wu Wen	Universal secure messaging for remote security tokens
<a href="#">US20050021982A1</a> *	2003-06-11	2005-01-27	Nicolas Popp	Hybrid authentication
<a href="#">US20050081044A1</a> *	2003-10-14	2005-04-14	Ibm Corporation	Method and apparatus for pervasive authentication domains
<a href="#">US20050208891A1</a> *	2004-03-16	2005-09-22	Rajendra Khare	Integration of secure identification logic into cell phone
<a href="#">US20060004656A1</a> *	1999-12-28	2006-01-05	Jong-Il Lee	Electronic money management method and system using mobile communication terminal
<a href="#">US20060020799A1</a> *	2004-07-06	2006-01-26	Kemshall Andrew C	Secure messaging

US20060053281A1 *	2000-08-15	2006-03-09	Stefan Andersson	Network authentication
US20060059359A1 *	2004-09-15	2006-03-16	Microsoft Corporation	Method and system for controlling access privileges for trusted network nodes
US20060095785A1 *	2004-10-29	2006-05-04	Electronic Data Systems Corporation	System, method, and computer program product for user password reset
US20060107068A1 *	2004-11-18	2006-05-18	Michael Fiske	Method of generating access keys
US20060107064A1 *	2004-11-18	2006-05-18	Michael Fiske	API for a system having a passcode authenticator
US20060143705A1 *	2004-12-29	2006-06-29	Lucent Technologies	User authentication in a conversion system
US20060230284A1 *	2004-12-20	2006-10-12	Michael Fiske	System for generating requests to a passcode protected entity
US20070006286A1 *	2005-07-02	2007-01-04	Singhal Tara C	System and method for security in global computer transactions that enable reverse-authentication of a server by a client
US20070015492A1 *	2001-05-24	2007-01-18	International Business Machines Corporation	Methods and apparatus for restricting access of a user using a cellular telephone
US20070016796A1 *	2002-08-12	2007-01-18	Singhal Tara C	Systems and methods for remote user authentication
US20070016804A1 *	2005-07-13	2007-01-18	Kemshall Andrew C	Password management system
US20070037552A1 *	2005-08-11	2007-02-15	Timothy Lee	Method and system for performing two factor mutual authentication
US20070157018A1 *	2005-12-30	2007-07-05	Honeywell International, Inc.	Method and apparatus for using SMS short code messaging to facilitate the transmission of a status update for a security system
US20070207773A1 *	2006-03-06	2007-09-06	Braunstein Andrew S	Remote personnel tracking
US20070249375A1 *	2006-03-31	2007-10-25	Ontela, Inc.	Method and system for phone-number discovery and phone-number authentication for mobile communications devices
US20070271464A1 *	2002-01-15	2007-11-22	Rico Novella Francisco J	Method of sending and validating documents
US20080027857A1 *	2006-07-26	2008-01-31	Benson Tracey M	Method of Preventing Fraud
US20080077526A1 *	2006-09-20	2008-03-27	First Data Corporation	Online payer authorization systems and methods
US20080089521A1 *	2003-04-29	2008-04-17	Eric Le Saint	Universal secure messaging for cryptographic modules
US20080098461A1 *	2006-10-24	2008-04-24	Avatier Corporation	Controlling access to a protected network
US20080098464A1 *	2006-10-24	2008-04-24	Authernative, Inc.	Two-channel challenge-response authentication method in random partial shared secret recognition system
US20080120395A1 *	2002-02-12	2008-05-22	Smith Steven G	Methods and Systems for Communicating with Service Technicians in a Telecommunications System
US20080118041A1 *	2006-11-22	2008-05-22	Alexander Finogenov	Secure access to restricted resource
US20080200156A1 *	2007-02-16	2008-08-21	Mary Anne Hicks	Methods and apparatus to provide medical information using a communication system
US20080295169A1 *	2007-05-25	2008-11-27	Crume Jeffery L	Detecting and defending against man-in-the-middle attacks
US20080305769A1 *	2007-06-08	2008-12-11	Nahum Rubinstein	Device Method & System For Facilitating Mobile Transactions
US20090045253A1 *	2006-03-10	2009-02-19	Min Gyu Han	System and method for providing virtual discernment information
WO2009040495A1 *	2007-09-26	2009-04-02	British Telecommunications Public Limited Company	Password management
US20090106138A1 *	2007-10-22	2009-04-23	Smith Steven E	Transaction authentication over independent network
US20090119759A1 *	2005-10-03	2009-05-07	Petter Taugbol	Method and Arrangement for Secure Authentication
US20100011222A1 *	2004-11-18	2010-01-14	Michael Fiske	Interfacing with a system that includes a passcode authenticator
US7650509B1 *	2004-01-28	2010-01-19	Gordon & Howard Associates, Inc.	Encoding data in a password
WO2010039487A2 *	2008-09-23	2010-04-08	Peer 1	Password management systems and methods
US20100100725A1 *	2008-10-20	2010-04-22	Microsoft Corporation	Providing remote user authentication
US20100100945A1 *	2008-10-20	2010-04-22	Microsoft Corporation	User authentication management
US20100269162A1 *	2009-04-15	2010-10-21	Jose Bravo	Website authentication



US20110138483A1 *	2009-12-04	2011-06-09	International Business Machines Corporation	Mobile phone and ip address correlation service
US8046012B2	2005-01-31	2011-10-25	Destine Systems Co. L.L.C.	Permission based text messaging
US8166311B1 *	2002-06-20	2012-04-24	At&T Intellectual Property I, Lp	Methods and systems for promoting authentication of technical service communications in a telecommunications system
US20120179915A1 *	2011-01-07	2012-07-12	Apple Inc.	System and method for full disk encryption authentication
US20130054414A1 *	2011-08-25	2013-02-28	Teliasonera Ab	Online payment method and a network element, a system and a computer program product therefor
US20130069778A1 *	2005-10-25	2013-03-21	Nxstage Medical, Inc.	Safety features for medical devices requiring assistance and supervision
KR101250230B1	2011-07-21	2013-04-03	주식회사 모비솔루션	Two channel authentication system and method based position value
US8442527B1	2009-01-23	2013-05-14	Sprint Communications Company L.P.	Cellular authentication for authentication to a service
US8484698B2	2000-09-05	2013-07-09	Strikeforce Technologies, Inc.	Multichannel device utilizing a centralized out-of-band authentication system (COBAS)
US8508349B2	2008-12-12	2013-08-13	Gordon*Howard Associates, Inc.	Automated geo-fence boundary configuration and activation
US8566914B2 *	2011-10-21	2013-10-22	Cellco Partnership	Triple authentication: mobile hardware, mobile user, and user account
US20130295882A1 *	2011-01-27	2013-11-07	Tencent Technology (Shenzhen) Company Limited	System, server and method for invalidating a password remembered by an application associated with a mobile terminal
US8581711B2	2011-03-22	2013-11-12	Gordon*Howard Associates, Inc.	Methods and systems of rule-based intoxicating substance testing associated with vehicles
US8581712B2	2008-12-12	2013-11-12	Gordon * Howard Associates, Inc .	Methods and systems related to establishing geo-fence boundaries
US20140052223A1 *	2012-08-17	2014-02-20	Zoom Tan, Inc.	System and method for controlling a tanning bed
US8659404B2	2008-12-12	2014-02-25	Gordon Howard Associates, Inc.	Methods and systems related to establishing geo-fence boundaries and collecting data
US8689297B2 *	2010-11-19	2014-04-01	Blackberry Limited	System, devices and method for secure authentication
US8686841B2	2008-12-12	2014-04-01	Gordon*Howard Associates, Inc.	Methods and systems related to activating geo-fence boundaries and collecting location data
US8781900B2	2011-09-09	2014-07-15	Gordon*Howard Associates, Inc.	Method and system of providing information to an occupant of a vehicle
GB2510002A *	2012-07-26	2014-07-23	Highgate Labs Ltd	Authenticating a user using a pair of user devices by transferring a token between them.
US8838988B2	2011-04-12	2014-09-16	International Business Machines Corporation	Verification of transactional integrity
US20140298432A1 *	2013-03-28	2014-10-02	Wendell Brown	Method and apparatus for automated password entry
US20140359703A1 *	2011-06-08	2014-12-04	Genmsecure	Method for securing an action that an actuating device must carry out at the request of a user
US8917826B2	2012-07-31	2014-12-23	International Business Machines Corporation	Detecting man-in-the-middle attacks in electronic transactions using prompts
US8928471B2	2013-03-14	2015-01-06	Gordon*Howard Associates, Inc.	Methods and systems related to remote tamper detection
US8935769B2	2012-09-28	2015-01-13	Liveensure, Inc.	Method for mobile security via multi-factor context authentication
US9009797B1 *	2008-06-13	2015-04-14	West Corporation	MRCP resource access control mechanism for mobile devices
US9013333B2	2013-06-24	2015-04-21	Gordon*Howard Associates, Inc.	Methods and systems related to time triggered geofencing
US20150109100A1 *	2002-02-01	2015-04-23	Comcast Cable Communications, Llc	Lifestyle multimedia security system
US9027099B1	2012-07-11	2015-05-05	Microstrategy Incorporated	User credentials
US9026267B2	2007-03-09	2015-05-05	Gordon*Howard Associates, Inc.	Methods and systems of selectively enabling a vehicle by way of a portable wireless device
US9035756B2	2013-03-14	2015-05-19	Gordon*Howard Associates, Inc.	Methods and systems related to remote tamper detection
US9060057B1	2013-03-07	2015-06-16	Serdar Artun Danis	Systems and methods for caller ID authentication, spoof detection and list based call handling

<a href="#">US9154303B1</a>	2013-03-14	2015-10-06	Microstrategy Incorporated	Third-party authorization of user credentials
<a href="#">US9160724B2</a>	2014-01-27	2015-10-13	Canon Kabushiki Kaisha	Devices, systems, and methods for device provisioning
<a href="#">US20150317625A1</a> *	2009-05-15	2015-11-05	Ayman Hammad	Verification of portable consumer devices
<a href="#">US20150333915A1</a> *	2013-03-15	2015-11-19	Arris Technology, Inc.	Method and apparatus for embedding secret information in digital certificates
<a href="#">US20150372834A1</a> *	2014-06-23	2015-12-24	Google Inc.	Methods and apparatus for using smart environment devices via application program interfaces
<a href="#">US20150381593A1</a> *	2014-06-27	2015-12-31	International Business Machines Corporation	Privileged access gateway for accessing systems and/or applications
<a href="#">US20160005042A1</a> *	2014-07-02	2016-01-07	Mistral Mobile	Host card emulation out-of-bound device binding verification
<a href="#">US9235697B2</a> *	2012-03-05	2016-01-12	Biogy, Inc.	One-time passcodes with asymmetric keys
<a href="#">US20160050199A1</a> *	2011-04-19	2016-02-18	Authenticate, Inc.	Key management using quasi out of band authentication architecture
<a href="#">US9277049B1</a>	2013-03-07	2016-03-01	Serdar Artun Danis	Systems and methods for caller ID and call destination authentication
<a href="#">US9378480B2</a>	2013-03-14	2016-06-28	Gordon*Howard Associates, Inc.	Methods and systems related to asset identification triggered geofencing
<a href="#">US20160239657A1</a> *	2015-02-13	2016-08-18	Yoti Ltd	Digital identity system
<a href="#">US20160274759A1</a>	2008-08-25	2016-09-22	Paul J. Dawes	Security system with networked touchscreen and gateway
<a href="#">US20170019395A1</a> *	2002-04-25	2017-01-19	Intertrust Technologies Corporation	Secure authentication systems and methods
<a href="#">US9582801B2</a>	2009-05-15	2017-02-28	Visa International Service Association	Secure communication of payment information to merchants using a verification token
<a href="#">US9589268B2</a>	2010-02-24	2017-03-07	Visa International Service Association	Integration of payment capability into secure elements of computers
<a href="#">WO2017040638A1</a> *	2015-09-02	2017-03-09	Jpmorgan Chase Bank, N.A.	System and method for mobile device limits
<a href="#">US9640001B1</a>	2012-11-30	2017-05-02	Microstrategy Incorporated	Time-varying representations of user credentials
<a href="#">US9648496B2</a>	2015-02-13	2017-05-09	Yoti Ltd	Authentication of web content
<a href="#">US9665997B2</a>	2013-01-08	2017-05-30	Gordon*Howard Associates, Inc.	Method and system for providing feedback based on driving behavior
<a href="#">US9701279B1</a>	2016-01-12	2017-07-11	Gordon*Howard Associates, Inc.	On board monitoring device
<a href="#">US9703938B2</a>	2001-08-29	2017-07-11	Nader Asghari-Kamrani	Direct authentication system and method via trusted authenticators
<a href="#">US9715681B2</a>	2009-04-28	2017-07-25	Visa International Service Association	Verification of portable consumer devices
<a href="#">US9727864B2</a>	2001-08-29	2017-08-08	Nader Asghari-Kamrani	Centralized identification and authentication system and method
<a href="#">US9754097B2</a>	2014-02-21	2017-09-05	Liveensure, Inc.	Method for peer to peer mobile context authentication
<a href="#">US20170272425A1</a> *	2016-03-18	2017-09-21	Beijing Xiaomi Mobile Software Co., Ltd.	Method and device for accessing smart camera
<a href="#">US9785764B2</a>	2015-02-13	2017-10-10	Yoti Ltd	Digital identity
<a href="#">US9788039B2</a>	2014-06-23	2017-10-10	Google Inc.	Camera system API for third-party integrations
<a href="#">US9792611B2</a>	2009-05-15	2017-10-17	Visa International Service Association	Secure authentication system and method
<a href="#">US9840229B2</a>	2013-03-14	2017-12-12	Gordon*Howard Associates, Inc.	Methods and systems related to a remote tamper detection
<a href="#">US9852285B2</a>	2015-02-13	2017-12-26	Yoti Holding Limited	Digital identity
<a href="#">US9880186B2</a>	2014-09-29	2018-01-30	Laird Technologies, Inc.	Telematics devices and methods for vehicle speeding detection
<a href="#">US9886569B1</a>	2012-10-26	2018-02-06	Microstrategy Incorporated	Credential tracking
<a href="#">US9887992B1</a>	2012-07-11	2018-02-06	Microstrategy Incorporated	Sight codes for website authentication
<a href="#">US20180176017A1</a> *	2015-02-13	2018-06-21	Yoti Ltd	Digital Identity System
<a href="#">US10009177B2</a>	2009-05-15	2018-06-26	Visa International Service Association	Integration of verification tokens with mobile communication devices

<a href="#">US10027619B2</a>	2004-11-22	2018-07-17	Seven Networks, Llc	Messaging centre for forwarding e-mail
<a href="#">US10051078B2</a>	2007-06-12	2018-08-14	Icontrol Networks, Inc.	WiFi-to-serial encapsulation in systems
<a href="#">US10062245B2</a>	2005-03-16	2018-08-28	Icontrol Networks, Inc.	Cross-client sensor user interface in an integrated security network
<a href="#">US10062273B2</a>	2010-09-28	2018-08-28	Icontrol Networks, Inc.	Integrated security system with parallel processing architecture
<a href="#">US10078958B2</a>	2010-12-17	2018-09-18	Icontrol Networks, Inc.	Method and system for logging security event data
<a href="#">US10079839B1</a>	2007-06-12	2018-09-18	Icontrol Networks, Inc.	Activation of gateway device
<a href="#">US10091014B2</a>	2005-03-16	2018-10-02	Icontrol Networks, Inc.	Integrated security network with security alarm signaling system
<a href="#">US10127801B2</a>	2005-03-16	2018-11-13	Icontrol Networks, Inc.	Integrated security system with parallel processing architecture
<a href="#">US10142392B2</a>	2007-01-24	2018-11-27	Icontrol Networks, Inc.	Methods and systems for improved system performance
<a href="#">US10142166B2</a>	2004-03-16	2018-11-27	Icontrol Networks, Inc.	Takeover of security network
<a href="#">US10140840B2</a>	2007-04-23	2018-11-27	Icontrol Networks, Inc.	Method and system for providing alternate network access
<a href="#">US10142394B2</a>	2007-06-12	2018-11-27	Icontrol Networks, Inc.	Generating risk profile using data of home monitoring and security system
<a href="#">US20180343562A1 *</a>	2017-05-26	2018-11-29	Honeywell International Inc.	Systems and methods for providing a secured password and authentication mechanism for programming and updating software or firmware
<a href="#">US10156959B2</a>	2005-03-16	2018-12-18	Icontrol Networks, Inc.	Cross-client sensor user interface in an integrated security network
<a href="#">US10156831B2</a>	2004-03-16	2018-12-18	Icontrol Networks, Inc.	Automation system with mobile interface
<a href="#">US10200504B2</a>	2007-06-12	2019-02-05	Icontrol Networks, Inc.	Communication protocols over internet protocol (IP) networks
<a href="#">US10237237B2</a>	2007-06-12	2019-03-19	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US10237806B2</a>	2009-04-30	2019-03-19	Icontrol Networks, Inc.	Activation of a home automation controller
<a href="#">US10268843B2</a>	2011-12-06	2019-04-23	AEMEA Inc.	Non-deterministic secure active element machine
<a href="#">US10282724B2</a>	2012-03-06	2019-05-07	Visa International Service Association	Security system incorporating mobile device
<a href="#">US10313303B2</a>	2007-06-12	2019-06-04	Icontrol Networks, Inc.	Forming a security network including integrated security system components and network devices
<a href="#">US10326759B2 *</a>	2015-04-02	2019-06-18	Syracuse University	Website authentication using an internet-connected device
<a href="#">US10339791B2</a>	2007-06-12	2019-07-02	Icontrol Networks, Inc.	Security network integrated with premise security system
<a href="#">US10348575B2</a>	2013-06-27	2019-07-09	Icontrol Networks, Inc.	Control system user interface
<a href="#">US10365810B2</a>	2007-06-12	2019-07-30	Icontrol Networks, Inc.	Control system user interface
<a href="#">US10380871B2</a>	2005-03-16	2019-08-13	Icontrol Networks, Inc.	Control system user interface
<a href="#">US10382452B1</a>	2007-06-12	2019-08-13	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US10389736B2</a>	2007-06-12	2019-08-20	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US10423309B2</a>	2007-06-12	2019-09-24	Icontrol Networks, Inc.	Device integration framework
<a href="#">US10440627B2</a>	2014-04-17	2019-10-08	Twilio Inc.	System and method for enabling multi-modal communication
<a href="#">US10469670B2</a>	2012-07-24	2019-11-05	Twilio Inc.	Method and system for preventing illicit use of a telephony platform
<a href="#">US10498830B2</a>	2007-06-12	2019-12-03	Icontrol Networks, Inc.	Wi-Fi-to-serial encapsulation in systems
<a href="#">US10523689B2</a>	2007-06-12	2019-12-31	Icontrol Networks, Inc.	Communication protocols over internet protocol (IP) networks
<a href="#">US10521623B2</a>	2015-02-13	2019-12-31	Yoti Holding Limited	Digital identity system
<a href="#">US10522026B2</a>	2008-08-11	2019-12-31	Icontrol Networks, Inc.	Automation system user interface with three-dimensional display
<a href="#">US10530839B2</a>	2008-08-11	2020-01-07	Icontrol Networks, Inc.	Integrated cloud system with lightweight gateway for premises automation
<a href="#">US10560495B2</a>	2008-04-02	2020-02-11	Twilio Inc.	System and method for processing telephony sessions
<a href="#">US10576927B2</a>	2006-02-07	2020-03-03	Gordon*Howard Associates, Inc	Starter-interrupt device incorporating global positioning system

				functionality
<a href="#">US10616075B2</a>	2007-06-12	2020-04-07	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US10666523B2</a>	2007-06-12	2020-05-26	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US10692085B2</a>	2015-02-13	2020-06-23	Yoti Holding Limited	Secure electronic payment
<a href="#">US10694042B2</a>	2008-04-02	2020-06-23	Twilio Inc.	System and method for processing media requests during telephony sessions
<a href="#">US10721087B2</a>	2005-03-16	2020-07-21	Icontrol Networks, Inc.	Method for networked touchscreen with integrated interfaces
<a href="#">US10747216B2</a>	2007-02-28	2020-08-18	Icontrol Networks, Inc.	Method and system for communicating with and controlling an alarm system from a remote server
<a href="#">US10785319B2</a>	2006-06-12	2020-09-22	Icontrol Networks, Inc.	IP device discovery systems and methods
<a href="#">US10841381B2</a>	2005-03-16	2020-11-17	Icontrol Networks, Inc.	Security system with networked touchscreen
<a href="#">US10979389B2</a>	2004-03-16	2021-04-13	Icontrol Networks, Inc.	Premises management configuration and control
<a href="#">US10999254B2</a>	2005-03-16	2021-05-04	Icontrol Networks, Inc.	System for data routing in networks
<a href="#">US11062319B1</a>	2015-11-06	2021-07-13	Wells Fargo Bank, N.A.	Systems and methods for funds transfers via a token management system
<a href="#">US11089122B2</a>	2007-06-12	2021-08-10	Icontrol Networks, Inc.	Controlling data routing among networks
<a href="#">US11113950B2</a>	2005-03-16	2021-09-07	Icontrol Networks, Inc.	Gateway integrated with premises security system
<a href="#">US20210306324A1 *</a>	2020-03-31	2021-09-30	Konica Minolta Business Solutions U.S.A., Inc.	Authentication server and method that allow user to log into application or service provided via client devices
<a href="#">US11146637B2</a>	2014-03-03	2021-10-12	Icontrol Networks, Inc.	Media content management
<a href="#">US11153266B2</a>	2004-03-16	2021-10-19	Icontrol Networks, Inc.	Gateway registry methods and systems
<a href="#">US11182060B2</a>	2004-03-16	2021-11-23	Icontrol Networks, Inc.	Networked touchscreen with integrated interfaces
<a href="#">US11201755B2</a>	2004-03-16	2021-12-14	Icontrol Networks, Inc.	Premises system management using status signal
<a href="#">US11210387B2 *</a>	2018-08-16	2021-12-28	Cyberark Software Ltd.	Detecting and preventing unauthorized credential change
<a href="#">US11212192B2</a>	2007-06-12	2021-12-28	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US11218878B2</a>	2007-06-12	2022-01-04	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US11240059B2</a>	2010-12-20	2022-02-01	Icontrol Networks, Inc.	Defining and implementing sensor triggered response rules
<a href="#">US11237714B2</a>	2007-06-12	2022-02-01	Control Networks, Inc.	Control system user interface
<a href="#">US11244545B2</a>	2004-03-16	2022-02-08	Icontrol Networks, Inc.	Cross-client sensor user interface in an integrated security network
<a href="#">US11258625B2</a>	2008-08-11	2022-02-22	Icontrol Networks, Inc.	Mobile premises automation platform
<a href="#">US11277465B2</a>	2004-03-16	2022-03-15	Icontrol Networks, Inc.	Generating risk profile using data of home monitoring and security system
<a href="#">US11310199B2</a>	2004-03-16	2022-04-19	Icontrol Networks, Inc.	Premises management configuration and control
<a href="#">US11316753B2</a>	2007-06-12	2022-04-26	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US11316958B2</a>	2008-08-11	2022-04-26	Icontrol Networks, Inc.	Virtual device systems and methods
<a href="#">US11328325B2</a>	2012-03-23	2022-05-10	Secureads, Inc.	Method and/or system for user authentication with targeted electronic advertising content through personal communication devices
<a href="#">US11330098B1</a>	2020-11-06	2022-05-10	Sevis Systems, Llc	System and method for enabling trusted caller identity and spoofed call prevention
<a href="#">US11343380B2</a>	2004-03-16	2022-05-24	Icontrol Networks, Inc.	Premises system automation
<a href="#">US11368327B2</a>	2008-08-11	2022-06-21	Icontrol Networks, Inc.	Integrated cloud system for premises automation
<a href="#">US11398147B2</a>	2010-09-28	2022-07-26	Icontrol Networks, Inc.	Method, system and apparatus for automated reporting of account and sensor zone information to a central station
<a href="#">US11405463B2</a>	2014-03-03	2022-08-02	Icontrol Networks, Inc.	Media content management
<a href="#">US11424980B2</a>	2005-03-16	2022-08-23	Icontrol Networks, Inc.	Forming a security network including integrated security system components

<a href="#">US11423756B2</a>	2007-06-12	2022-08-23	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US11451409B2</a>	2005-03-16	2022-09-20	Icontrol Networks, Inc.	Security network integrating security system and network devices
<a href="#">US11489812B2</a>	2004-03-16	2022-11-01	Icontrol Networks, Inc.	Forming a security network including integrated security system components and network devices
<a href="#">US11496568B2</a>	2005-03-16	2022-11-08	Icontrol Networks, Inc.	Security system with networked touchscreen
<a href="#">US11582065B2</a>	2007-06-12	2023-02-14	Icontrol Networks, Inc.	Systems and methods for device communication
<a href="#">US11601810B2</a>	2007-06-12	2023-03-07	Icontrol Networks, Inc.	Communication protocols in integrated systems
<a href="#">US11615697B2</a>	2005-03-16	2023-03-28	Icontrol Networks, Inc.	Premise management systems and methods
<a href="#">US11632308B2</a>	2022-04-22	2023-04-18	Icontrol Networks, Inc.	Communication protocols in integrated systems
Family To Family Citations				
<a href="#">US20060059344A1</a>	2004-09-10	2006-03-16	Nokia Corporation	Service authentication
<a href="#">US7949114B2</a> *	2005-03-15	2011-05-24	Avaya Inc.	Granting privileges to a telecommunications terminal based on the relationship of a first signal to a second signal
<a href="#">EP1739588A1</a> *	2005-06-30	2007-01-03	Exo System Italia SRL	Method and system for registration and user identification of web users
<a href="#">EP2536096A1</a> *	2011-06-17	2012-12-19	ABB Research Ltd.	Securing an industrial control system
<a href="#">JP5759305B2</a> *	2011-08-19	2015-08-05	キャノン株式会社	Access management system, access management method, access management server, linkage server, and program
<a href="#">WO2013044307A1</a> *	2011-09-30	2013-04-04	Cocoon Data Holdings Limited	A system and method for distributing secured data
<a href="#">CN103581105B</a> *	2012-07-18	2017-09-22	财付通支付科技有限公司	Login validation method and login authentication system
<a href="#">EP2991014A1</a> *	2014-08-25	2016-03-02	Oberthur Technologies	Distributing tokens for token-based transactions

\* Cited by examiner, † Cited by third party, ‡ Family to family citation

## Similar Documents

Publication	Publication Date	Title
<a href="#">US6993658B1</a>	2006-01-31	Use of personal communication devices for user authentication
<a href="#">US6161185A</a>	2000-12-12	Personal authentication system and method for multiple computer platform
<a href="#">US7555655B2</a>	2009-06-30	Apparatus, system, and method for generating and authenticating a computer password
<a href="#">US8196193B2</a>	2012-06-05	Method for retrofitting password enabled computer software with a redirection user authentication method
<a href="#">US7707626B2</a>	2010-04-27	Authentication management platform for managed security service providers
<a href="#">US8955076B1</a>	2015-02-10	Controlling access to a protected resource using multiple user devices
<a href="#">JP4384117B2</a>	2009-12-16	Data processing system user authentication method and system
<a href="#">US7512967B2</a>	2009-03-31	User authentication in a conversion system
<a href="#">ES2517865T3</a>	2014-11-04	Methods, devices and software to use a token to calculate time-limited password on cell phone
<a href="#">US20070250914A1</a>	2007-10-25	Method and system for resetting secure passwords
<a href="#">JPH10341224A</a>	1998-12-22	Authentication method in data transmission system and system to execute the authentication method
<a href="#">US20020169988A1</a>	2002-11-14	Method and apparatus for providing user authentication using a back channel
<a href="#">US20060288230A1</a>	2006-12-21	One time password integration with Kerberos
<a href="#">US20030061520A1</a>	2003-03-27	Method and system to securely change a password in a distributed computing system
<a href="#">US20050021975A1</a>	2005-01-27	Proxy based adaptive two factor authentication having automated enrollment
<a href="#">NZ541711A</a>	2006-10-27	Human factors authentication using abstract definitions of viewable or audible objects
<a href="#">EP1107089A1</a>	2001-06-13	Strong authentication method using a telecommunications device
<a href="#">JPH1066158A</a>	1998-03-06	Security with respect to access control system
<a href="#">JP2007516512A5</a>	2011-06-16	

Ex. 2001

<a href="#">KR20010041363A</a>	2001-05-15	Method, arrangement and apparatus for authentication through a communications network
<a href="#">EP1878161A1</a>	2008-01-16	Method and system for electronic reauthentication of a communication party
<a href="#">GB2379040A</a>	2003-02-26	Controlling user access to a remote service by sending a one-time password to a portable device after normal login
<a href="#">KR101537097B1</a>	2015-07-15	Otp certification method using the sms and system thereof
<a href="#">US6711610B1</a>	2004-03-23	System and method for establishing secure internet communication between a remote computer and a host computer via an intermediate internet computer
<a href="#">JPH11187016A</a>	1999-07-09	Network authenticating system

## Priority And Related Applications

### Priority Applications (3)

Application	Priority date	Filing date	Title
<a href="#">US09/519,829</a>	2000-03-06	2000-03-06	Use of personal communication devices for user authentication
<a href="#">AU2001245448A</a>	2000-03-06	2001-03-06	Use of personal communication devices for user authentication
<a href="#">PCT/US2001/007058</a>	2000-03-06	2001-03-06	Use of personal communication devices for user authentication

### Applications Claiming Priority (1)

Application	Filing date	Title
<a href="#">US09/519,829</a>	2000-03-06	Use of personal communication devices for user authentication

## Legal Events

Date	Code	Title	Description
2000-06-19	AS	Assignment	<b>Owner name:</b> APRIL SYSTEM DESIGN AB, SWEDEN <b>Free format text:</b> ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNORS:ENGBERG, STEN-OLOV;JONSSON, AKE;REEL/FRAME:010912/0873 <b>Effective date:</b> 20000511
2006-01-11	STCF	Information on status: patent grant	<b>Free format text:</b> PATENTED CASE
2007-04-03	CC	Certificate of correction	
2009-04-06	FPAY	Fee payment	<b>Year of fee payment:</b> 4
2011-11-14	AS	Assignment	<b>Owner name:</b> DYNAPASS INC., CALIFORNIA <b>Free format text:</b> ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:APRIL SYSTEM DESIGN AB;REEL/FRAME:027223/0817 <b>Effective date:</b> 20111107
2013-09-13	REMI	Maintenance fee reminder mailed	
2013-09-25	FPAY	Fee payment	<b>Year of fee payment:</b> 8
2013-09-25	SULP	Surcharge for late payment	<b>Year of fee payment:</b> 7
2014-02-21	AS	Assignment	<b>Owner name:</b> DYNAPASS, INC., CALIFORNIA <b>Free format text:</b> CHANGE OF ADDRESS;ASSIGNOR:DYNAPASS, INC.;REEL/FRAME:032322/0510 <b>Effective date:</b> 20140221
2017-09-11	FEPP	Fee payment procedure	<b>Free format text:</b> MAINTENANCE FEE REMINDER MAILED (ORIGINAL EVENT CODE: REM.)

2018-02-05	PRDP	Patent reinstated due to the acceptance of a late maintenance fee	<b>Effective date:</b> 20180206
2018-02-06	FEPP	Fee payment procedure	<p><b>Free format text:</b> SURCHARGE, PETITION TO ACCEPT PYMT AFTER EXP, UNINTENTIONAL. (ORIGINAL EVENT CODE: M2558); ENTITY STATUS OF PATENT OWNER: SMALL ENTITY</p> <p><b>Free format text:</b> PETITION RELATED TO MAINTENANCE FEES GRANTED (ORIGINAL EVENT CODE: PMFG)</p> <p><b>Free format text:</b> PETITION RELATED TO MAINTENANCE FEES FILED (ORIGINAL EVENT CODE: PMFP)</p>
2018-02-06	MAFP	Maintenance fee payment	<p><b>Free format text:</b> PAYMENT OF MAINTENANCE FEE, 12TH YR, SMALL ENTITY (ORIGINAL EVENT CODE: M2553)</p> <p><b>Year of fee payment:</b> 12</p>
2022-01-02	AS	Assignment	<p><b>Owner name:</b> DYNAPASS IP HOLDINGS LLC, DELAWARE</p> <p><b>Free format text:</b> ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:DYNAPASS, INC.;REEL/FRAME:058521/0700</p> <p><b>Effective date:</b> 20211112</p>
2023-02-21	IPR	Aia trial proceeding filed before the patent and appeal board: inter partes review	<p><b>Free format text:</b> TRIAL NO: IPR2023-00425</p> <p><b>Opponent name:</b> UNIFIED PATENTS, LLC</p> <p><b>Effective date:</b> 20230106</p> <p><b>Free format text:</b> TRIAL NO: IPR2023-00367</p> <p><b>Opponent name:</b> BANK OF AMERICA CORPORATION, BANK OF AMERICA, N.A., BOKF, N.A., OKTA, INC., TRUIST BANK, TRUIST FINANCIAL CORP, WELLS FARGO BANK, N.A., WELLS FARGO COMPANY, PNC BANK, N.A.,4 AND THE PNC FINANCIAL SERVICES GROUP, INC.</p> <p><b>Effective date:</b> 20230103</p>

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