IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Guy Fielder	
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Title:	SYSTEM AND METHOD FOR AUTHENTICATING USERS	

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PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 9,577,993 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

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EXHIBITS

USAA-1001	U.S. Patent No. 9,577,993 to Fielder ("the '993 Patent")
USAA-1002	Excerpts from the Prosecution History of the '993 Patent ("the Prosecution History")
USAA-1003	Declaration and Curriculum Vitae of Dr. Seth James Nielson
USAA-1004	U.S. Patent App. Pub. No. 2003/0140235 to Immega et al. ("Immega")
USAA-1005	U.S. Patent No. 6,002,770 to Tomko et al. ("Tomko")
USAA-1006	U.S. Patent App. Pub. No. 2007/0061567 to Day et al. ("Day")
USAA-1007	U.S. Patent App. Pub. No. 2002/0118836 to Howard et al. ("Howard")
USAA-1008	U.S. Patent No. 5,748,744 to Levy et al. ("Levy")
USAA-1009	U.S. Patent No. 8,302,170 to Kramer et al. ("Kramer")
USAA-1010	U.S. Patent No. 8,108,318 to Mardikar ("Mardikar-318")
USAA-1011	U.S. Patent App. Pub. No. 2009/0307140 to Mardikar ("Mardikar-140")
USAA-1012	U.S. Patent App. Pub. No. 2009/0305673 to Mardikar ("Mardikar-673")
USAA-1013	U.S. Patent No. 8,234,697 to Chhabra ("Chhabra")
USAA-1014	U.S. Patent App. Pub. No. 2004/0111625 to Duffy et. al. ("Duffy")

USAA-1015	U.S. Patent App. Pub. No. 2008/0098225 to Baysinger ("Baysinger")
USAA-1016	John Viega, Matt Messier, and Pravir Chandra, *Network Security with OpenSSL: Cryptography for Secure Communications* (1st ed. 2002)("Viega").
USAA-1017	Niels Ferguson and Bruce Schneier, *Practical Cryptography* (1st ed. 2003) ("Ferguson")
USAA-1018	RFC 5246 - The Transport Layer Security (TLS) Protocol Version 1.2 (August 2008), available at: RFC 5246 - The Transport Layer Security (TLS) Protocol Version 1.2
USAA-1019	ITU-T Recommendation X.509 (August 2005)
USAA-1020	Complaint, *PACid Technologies, LLC v. USAA Federal Savings Bank*, Case No. 1:24-cv-321 (W.D. Tex. Mar. 27, 2024)
USAA-1021	[RESERVED]
USAA-1022	Combined Civil and Criminal Federal Court Management Statistics (Dec. 31, 2024) | United States Courts (uscourts.gov), available at: https://www.uscourts.gov/sites/default/files/2025-02/fcms_na_distprofile1231.2024.pdf
USAA-1023	(Excerpts) Gordon Padwick, "Special Edition Using Microsoft Outlook 2000," Que, First printing May 1999, Library of Congress Catalog Card Number 98-87795 ("Padwick").
USAA-1024	Resnick, RFC 5322 - Internet Message Format (October 2008), downloaded from the Internet at: https://datatracker.ietf.org/doc/html/rfc5322 on March 7, 2005 ("Resnick")
USAA-1025	Myer, et al. RFC 680 - Message Transmission Protocol (April 1975), downloaded from the Internet at: https://datatracker.ietf.org/doc/html/rfc680 on March 7, 2005 ("Myer")

USAA-1026	Delerablée, et al., 2008, August. "Dynamic threshold public-key encryption." In *Annual International Cryptology Conference* (pp. 317-334). Berlin, Heidelberg: Springer Berlin Heidelberg.Myer, et al. ("Delerablée)
USAA-1027	Declaration of June Ann Munford (Viega, Ferguson, Padwick)
USAA-1028	U.S. Patent App. Pub. No. 2003/0005336 to Poo, et al. ("Poo")
USAA-1029	U.S. Patent App. Pub. No. 2007/0136604 to Kuhlman, et al ("Kuhlman")
USAA-1030	U.S. Patent App. Pub. No. 2005/0081040 to Johnson, et al. ("Johnson")
USAA-1031	(Excerpts) Vir V. Phoha, "Internet Security Dictionary," Springer, 2002, ISBN 0-387-95261-6 ("Phoha").
USAA-1032	U.S. Patent App. Pub. No. 2008/122796 to Jobs, et al. ("Jobs")
USAA-1033	U.S. Patent App. Pub. No. 2002/0099952 to Lambert, et al. ("Lambert")
USAA-1034	U.S. Patent App. Pub. No. 2006/0258368 to Granito, et al. ("Granito")
USAA-1035	U.S. Patent App. Pub. No. 2005/0246469 to Chu ("Chu")
USAA-1036	Knaggs, P. and Welsh, S., 2004. ARM: Assembly Language Programming. Bournemouth University, School of Design, Engineering, and Computing ("Knaggs")
USAA-1037	U.S. Patent App. Pub. No. 2002/0010819 to Dye ("Dye")

LISTING OF CLAIMS

Claim 1	
[1.pre]	A method for authenticating a user, comprising:
[1.a.i]	generating, by an application running on a computing device and according to a unique user input, a secret,
[1.a.ii]	said secret stored at the computing device with an identifier and in a directory
[1.a.iii]	so as to be retrievable when the unique user input is applied to the computing device;
[1.b]	receiving at the computing device from a remote computer-based station a first communication, said first communication including the identifier associated with the secret;
[1.c.i]	responsive to said receiving, prompting a user for the user input via a user interface of the computing device and,
[1.c.ii]	upon verifying said unique user input to the computing device,
[1.c.iii]	transmitting from the computing device to the remote computer-based station a second communication encoded using the secret.
Claim 2	
[2]	The method of claim 1, wherein the computing device is a mobile communication device.
Claim 3	
[3]	The method of claim 1, wherein the secret is stored in the directory along with other secrets and the identifier is used to distinguish the secret from the other secrets.
Claim 4	
[4]	The method of claim 1, wherein the secret comprises an encryption key, the encryption key is stored in the directory along with other

	encryption keys, and the identifier is used to distinguish the encryption key from the other encryption keys.
Claim 5	
[5]	The method of claim 1, wherein the secret comprises an encryption key, the encryption key is stored in the directory along with decoy encryption keys, and the identifier is used to distinguish the encryption key from the decoy encryption keys.
Claim 6	
[6]	The method of claim 1, wherein the first communication comprises an encrypted communication.
Claim 7	
[7]	The method of claim 1, wherein the first communication comprises a request for user credentials of the user of the computing device.
Claim 8	
[8]	The method of claim 1, further comprising encrypting said secret prior to storing said secret in said directory.
Claim 9	
[9]	The method of claim 1, wherein the unique user input comprises user credentials, and further comprising receiving, via the user interface of the computing device, the user credentials prior to generating the secret.
Claim 10	
[10]	The method of claim 9, further comprising receiving at the computing device an invitation to create the secret prior to generating the secret.
Claim 11	
[11]	The method of claim 10, wherein the invitation to create the secret is received from the remote computer-based station.

Claim 12	
[12]	The method of claim 1, wherein the first and second communications comprise two related communications of a communication session.
Claim 13	
[13.pre]	A token for use in connection with secure communications, comprising:
[13.a]	a processor and a memory communicatively coupled to the processor the memory storing a security application for execution by the processor, said security application, when executed by said processor, causing said processor to perform steps, including:
[13.b.i]	generating, according to a unique user input, a secret, and
[13.b.ii]	storing said secret with an identifier and in a directory which the processor configures in the memory
[13.b.iii]	such that said secret is retrievable when a unique user input is received by the token;
[13.c]	responsive to receiving the identifier associated with the secret, prompting, via a user interface, entry of the unique user input; and
[13.d.i]	upon receipt of the unique user input, verifying said unique user input, and
[13.d.ii]	using said secret to encode a first communication with a remote computer-based station.
Claim 14	
[14]	The token of claim 13, wherein the secret is stored in the directory along with other secrets and the processor uses the identifier to distinguish the secret from the other secrets.
Claim 15	
[15]	The token of claim 13, wherein the secret comprises an encryption key, the encryption key is stored in the directory along with other

	encryption keys, and the processor uses the identifier to distinguish the encryption key from the other encryption keys.
Claim 16	
[16]	The token of claim 13, wherein the secret comprises an encryption key, the encryption key is stored in the directory along with decoy encryption keys, and the processor uses the identifier to distinguish the encryption key from the decoy encryption keys.
Claim 17	
[17]	The token of claim 13, wherein the identifier is received in a second communication with the remote computer-based station.
Claim 18	
[18]	The token of claim 15, wherein the second communication comprises a request for user credentials.
Claim 19	
[19]	The token of claim 13, wherein said security application, when executed by said processor, further causes said processor to encrypt said secret prior to storing said secret in said directory.
Claim 20	
[20]	The token of claim 13, wherein the unique user input comprises user credentials, and said security application, when executed by said processor, further causes said processor to receive, via the user interface of the mobile communication device, the user credentials prior to generating the secret.
Claim 21	
[21]	The token of claim 20, wherein said security application, when executed by said processor, further causes said processor to generate said secret responsive to an invitation to create the secret received prior to generating the secret.
Claim 22	

[22.pre]	A mobile phone, comprising:
[22.a]	a processor and a memory communicatively coupled to the processor the memory storing a security application for execution by the processor, said security application, when executed by said processor, causing said processor to perform steps, including:
[22.b.i]	generating, according to a unique user input, a secret, and
[22.b.ii]	storing said secret with an identifier and in a directory which the processor configures in the memory
[22.b.iii]	such that said secret is retrievable when a unique user input is received via a user interface of the mobile phone;
[22.c]	responsive to receiving the identifier associated with the secret, prompting, via the user interface of the mobile phone, entry of the unique user input; and
[22.d.i]	upon receipt of the unique user input, verifying said unique user input, and
[22.d.ii]	using said secret to encode a first communication with a remote computer-based station,
[22.e]	wherein the unique user input comprises user credentials, and said security application, when executed by said processor, further causes said processor to receive, via the user interface of the mobile phone, the user credentials prior to generating the secret.

USAA Federal Savings Bank ("Petitioner" or "USAA") petitions for Inter Partes Review ("IPR") under 35 U.S.C. §§311–319 and 37 C.F.R. §42 of claims 1-22 ("Challenged Claims") of U.S. Patent No. 9,577,993 ("'993 Patent"). As explained herein, at least a reasonable likelihood exists that USAA will prevail with respect to at least one of the Challenged Claims, which are unpatentable based on prior art teachings described herein. Accordingly, USAA respectfully submits that the Board should institute IPR and the Challenged Claims should be canceled as unpatentable.

I. REQUIREMENTS

A. Grounds for Standing

USAA certifies that the '993 Patent is available for IPR. USAA files this petition within one year of service of a 3/27/24 complaint against USAA in *PACid Technologies, LLC v. USAA Federal Savings Bank*, Case No. 1:24-cv-321 (WDTX). USAA-1020. USAA is not barred or estopped from requesting an IPR challenging the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

USAA requests IPR and cancellation of the Challenged Claims on the grounds below. The declaration of Dr. Nielson (USAA-1003) is furnished herewith.

Ground	Claims	Basis
1A	1-4, 6-7, 9-12	Immega-Day
1B	8, 13-15, 17-22	Immega-Day-Tomko
1C	5	Immega-Day-Howard
1D	16	Immega-Day-Tomko-Howard
2A	1-4, 6-7, 9-15, 17-18, 20-22	Mardikar-Chhabra
2B	1-4, 6-15, 17-22	Mardikar-Chhabra-Duffy
2C	5, 16	Mardikar-Chhabra-Howard
2D	5, 16	Mardikar-Chhabra-Duffy-Howard

The '993 Patent was filed 6/28/2016 and claims priority, via several applications, to a provisional application filed 3/25/2009 ("Critical Date"). USAA does not concede that the Challenged Claims are entitled to the claimed priority, but applies prior art before that date. Applied references are prior art as below:

Reference	Date(s)	Basis (Pre-AIA)
Immega (USAA-1004)	6/24/2003 (published)	§102(a),(b),(e)
Day (USAA-1006)	3/15/2007 (published)	§102(a),(b),(e)
Tomko (USAA-1005)	12/14/1999 (published)	§102(a),(b),(e)
Howard (USAA-1007)	8/29/2002 (published)	§102(a),(b),(e)
Mardikar-318 (USAA-1010)	12/19/2008 (filed)	§102(e)
Mardikar-140 (USAA-1011)	10/10/2008 (filed)	§102(e)
Mardikar-673 (USAA-1012)	12/22/2008 (filed)	§102(e)

Reference	Date(s)	Basis (Pre-AIA)
Chhabra (USAA-1013)	3/31/2008 (filed)	§102(e)
Duffy (USAA-1014)	6/10/2004 (published)	§102(b)

C. Claim Construction

All claim terms should be construed according to the Phillips standard. *Phillips v. AWH Corp.*, 415 F. 3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. USAA submits that no claim terms need be construed to resolve issues of controversy in the present Petition, but reserves the right to respond to construction issues PACid raises. *See Wellman, Inc. v. Eastman Chem. Co*., 642 F.3d 1355, 1361 (Fed. Cir. 2011).

For example, the '993 Patent uses the claim term "secret" consistent with its plain and ordinary meaning. USAA-1003, ¶50; USAA-1001, 9:53-55, 10:21-23, 27:35-63; USAA-1004, [0034], USAA-1017, 136, 347-362; USAA-1010, 7:28-42; USAA-1031, 3.

II. THE '993 PATENT

A. Specification

The '993 Patent is directed to "authenticating users" through verification of unique user inputs (e.g., user credentials). USAA-1001, Abstract. A security application on a computing device allows "generation of a secret," "prompts, e.g., via a user interface of the device, entry of the unique user input" in response to "receiving an identifier associated with the secret," "verifies the unique user

inputs," and "provides the secret for use in encoding a communication with a remote computer-based station." *Id.*, Abstract.

B. Prosecution History

The examiner allowed the claims without a prior art rejection and did not consider any of the art applied in this Petition. USAA-1003, ¶49.

C. POSITA

A person of ordinary skill in the art relating to the subject matter of the '993 Patent ("POSITA") would have had a working knowledge of cryptography and related security techniques. The person would have had a bachelor's degree in an academic discipline emphasizing the design of computer or software technologies, in combination with training or at least one to two years of related work experience with securing and processing of data or information, including but not limited to cryptography. USAA-1003, ¶¶24-25. Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. GROUND 1A – Immega-Day Renders Claims 1-4, 6-7, and 9-12 Obvious

1. Prior Art and Proposed Combination

(a) *Immega*

Immega is directed to a "method for permitting the secure transmission of electronic messages by using biometric certification," where the messages include email. USAA-1004, Abstract, [0006]; USAA-1003, ¶¶51-57. For the method, Immega describes two users, the "sender" and the "receiver" (though both sender and receiver both send and receive messages) and their respective "computers" (e.g., cellular telephone or personal digital assistant). *Id.*, [0041]-[0044], [0050]-[0067].

Sender and receiver "cross-enroll biometric feature sets" using devices with "fingerprint sensor[s]," allowing "confirmation of identity of both parties at both ends of a message exchange" and "user-specific encryption of messages." USAA-1004, [0008]. The method employs a "difference key," generated by subtracting a live-scan fingerprint feature set ("LFFS") of a user from that user's modified enrolled fingerprint feature set (modified "EFFS" or "MEFFS"), to encrypt electronic messages and other fingerprint data. *Id.*, Abstract, [0009]-[0011]; USAA-1003, ¶52.

Immega describes an algorithm for generating MEFFSs, referencing FIG. 3A (below). USAA-1004, [0044]. "[T]he centroid of the fingerprint is determined," then a "random number is used to generate a displacement vector," which is used "to slightly shift or displace all features of the [EFFS] by a random

displacement vector." *Id*. This MEFFS "is then assigned to a specific person with whom messages will be exchanged." *Id.*

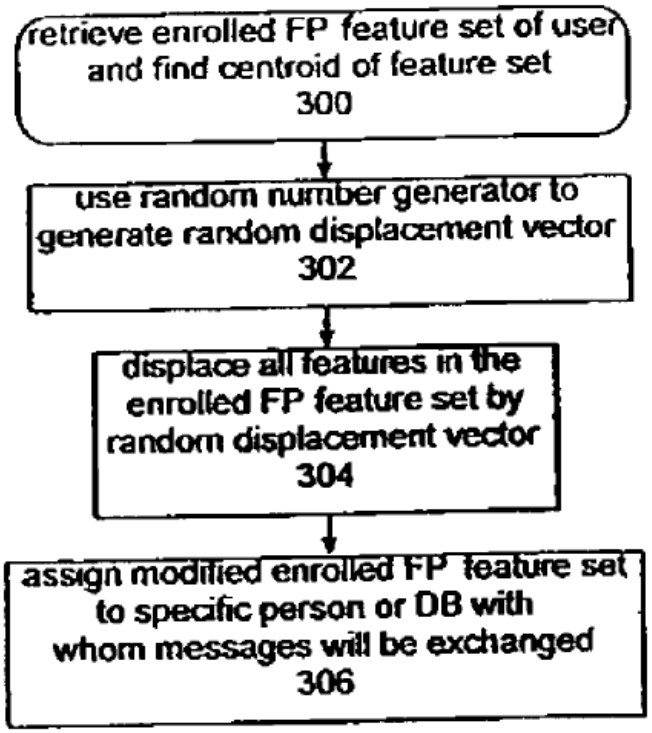


FIG. 3A

USAA-1004, FIG. 3A

"Many uniquely modified [EFFSs], one (or more) for each person with whom messages will be exchanged, may be created and securely stored." USAA-1004, [0044]. "[B]oth the sender and the receiver [are required] to cross-enroll biometric feature sets" on "each other's computer." *Id.*, [0008]. Therefore, through cross-enrollment, a device stores, for each communication partner, the MEFFS for sending encrypted communications to a particular partner, and the

MEFFS created by the particular partner and used by the device to decrypt communications received from the partner, illustrated below. USAA-1003, ¶55.

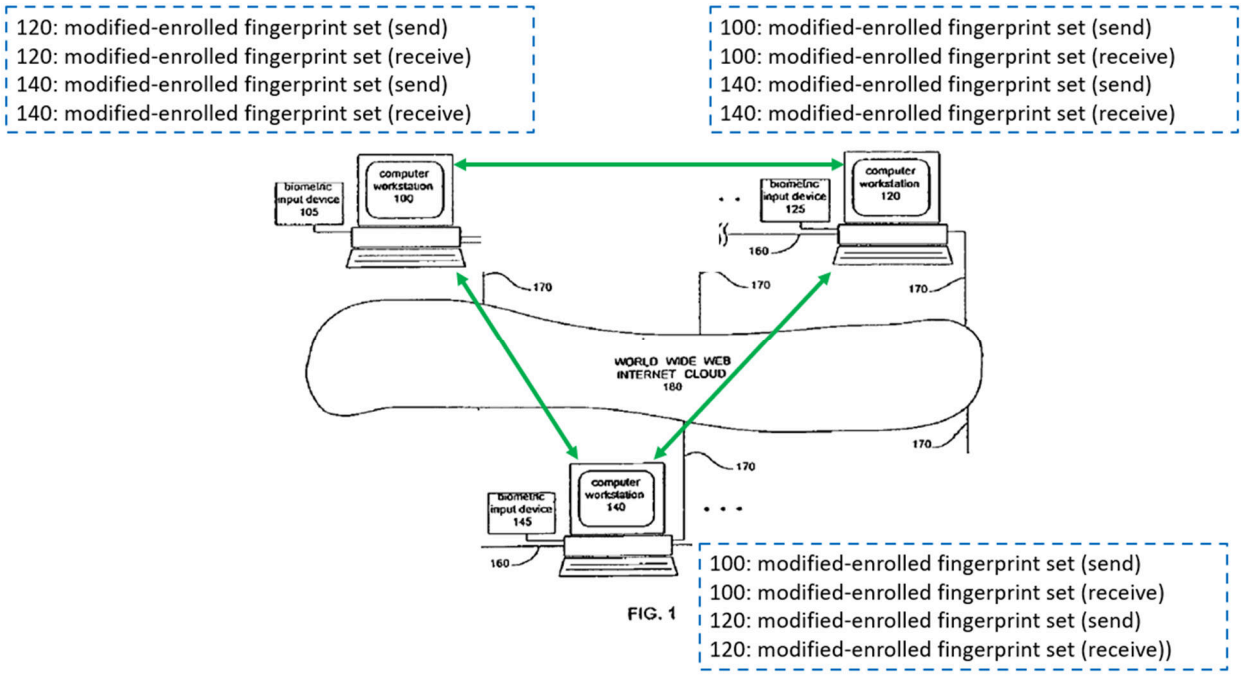


FIG. 1

USAA-1004, FIG. 1 (excerpt, annotated). USAA-1003, ¶55.

After users' MEFFSs are cross-enrolled, users can share "biometrically certified message[s]," discussed for FIG. 6 (below). USAA-1004, [0063]. FIG. 6's algorithm describes how the sender and receiver confirm their identities by twice sending their respective encrypted LFFS, which the recipient uses to compare against the stored MEFFS exchanged during cross-enrollment. USAA-1004, [0063]-[0065]. During this process, the receiver generates the receiver's "difference key" "by subtracting the receiver's first [LFFS] from the receiver's [MEFFS]" (612) and the sender similarly generates the receiver's "difference key"

"by subtracting the first [LFFS] of the receiver from the stored [MEFFS] of the receiver" (620); the sender repeats the same. USAA-1004, [0064]-[0065].

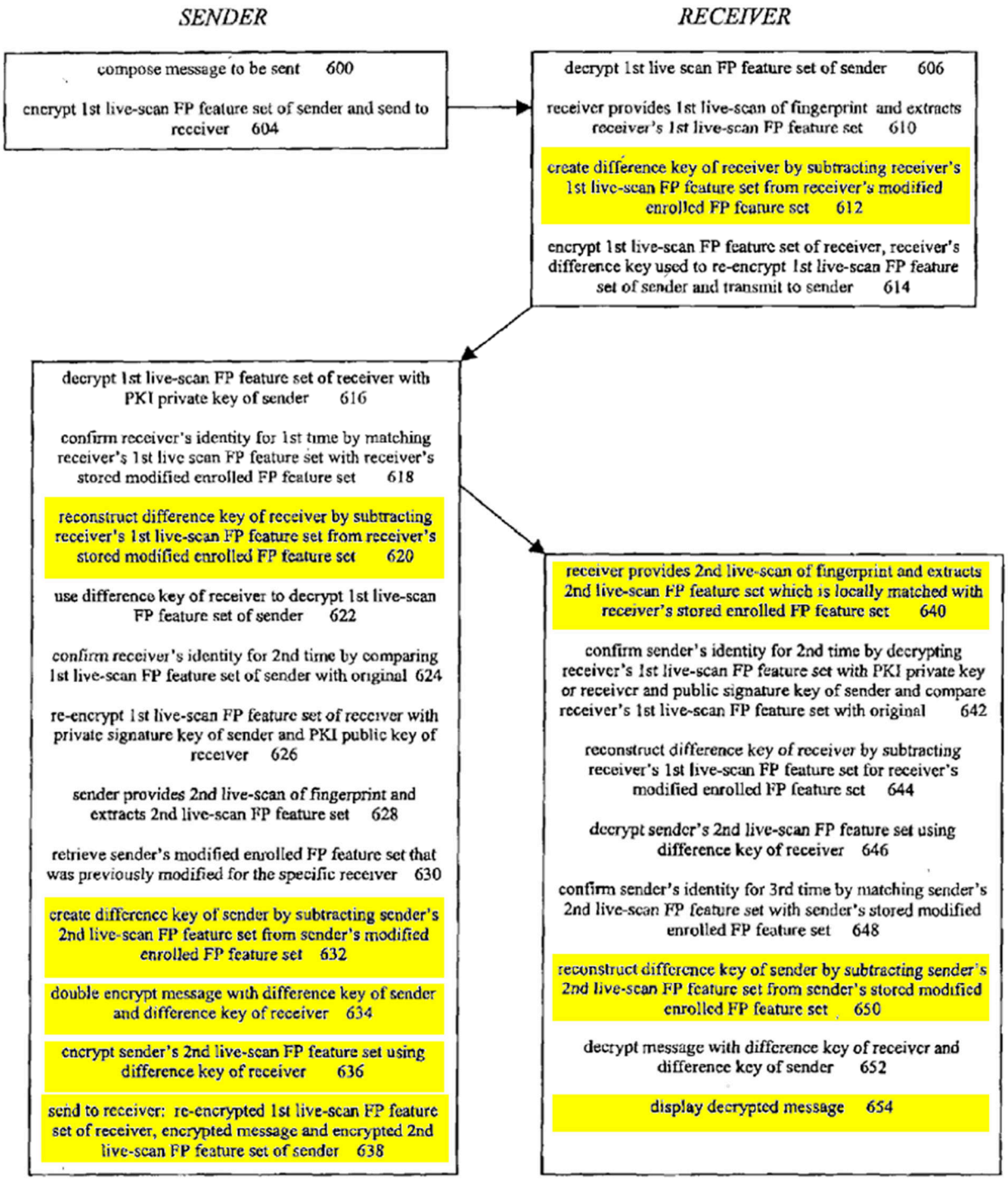


FIG. 6

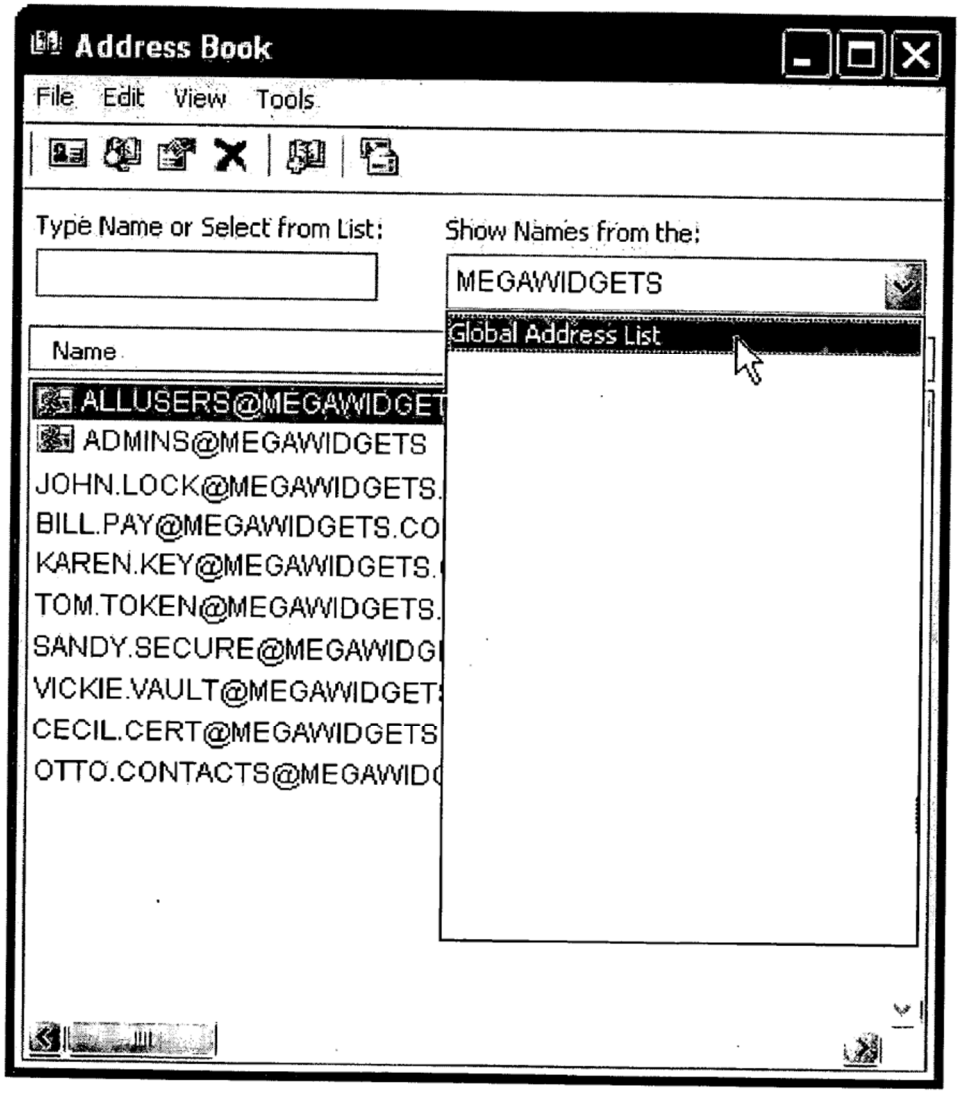
USAA-1004, FIG. 6 (annotated)

"When the receiver receives [the] transmission, the receiver provides a second live-scan fingerprint (step 638) and extracts a second [LFFS], which is then matched against the stored fingerprint feature set of the receiver (the receiver must prove his/her identity for decryption to continue) (step 640)," and the receiver generates the sender's "difference key" "by subtracting the sender's second [LFFS] from the sender's stored [MEFFS] (step 650)." USAA-1004, [0066]. Immega additionally describes "an optional algorithmic subroutine that gives the sender direct confirmation that the correct person has received the message," whereby the "receiver's second [LFFS] (generated at step 640) is encrypted … and transmitted to the sender (after step 654)" for the sender to compare with the MEFFS of the receiver. USAA-1004, [0067].

(b) *Day*

Day describes a "system by which documents and other network resources may be kept secure and private" using "public key encryption" to "provide security, encryption, and privacy for files, e-mail and other messages." *Id.* It "seeks to maintain the integrity of and/or security information in" files and emails by using "personal digital IDs for signatures[,] ensuring that the emails or files coming from a specific individual only." USAA-1006, [0096]. USAA-1003, ¶¶58-61.

"[T]he secure email utility is an extension to MS Outlook and provides a very simple interface for users to secure their e-mail." USAA-1006, [0119]. "To further simplify the use of email encryption for any incoming digitally signed emails, the secure email utility automatically updates and stores the public credentials (key) within the user's Contacts database." USAA-1006, [0170]; *see id.*, [0120], [0181]-[0182], [0186]. An example Contacts data is shown below:



USAA-1006, FIG. 26

(c) *Immega-Day*

Immega explains that, after MEFFSs are generated, they are "securely stored" and "assigned to a specific person with whom messages will be exchanged." USAA-1004, [0009]-[0010], [0012], [0044], [0059]. To the extent that Immega is not explicit about implementation details regarding the storage of MEFFSs in a computing device, a POSITA would have naturally looked to references, such as Day, that offer these details. USAA-1003, ¶¶62-73.

Like Immega, Day describes "provid[ing] security, encryption, and privacy for files, e-mail and other messages." USAA-1006, Abstract. Day describes a "secure email utility" that "automatically configures and associates the personal digital ID with an email program." USAA-1006, [0014], [0020]. Similar to Immega, Day's system uses "personal digital IDs for signatures" to "encrypt [an] email or file so that only authorized individuals can" view the content. *Id.*, [0096].

In combination, the system ("Immega-Day") includes computing devices, per Immega, each including a secure email utility integrated with an email program such as Outlook, per Day, and secures email transmission using MEFFSs to encrypt communications, per Immega. USAA-1004, [0041]-[0042], [0062]-[0068], FIGS. 1-6; USAA-1006, [0014], [0097], [0119]-[0120], [0170]; USAA-1003, ¶65. Further, MEFFSs are stored, per Immega, in each device's email contacts database, per Day. §III.A.1(b)-(c); USAA-1003, ¶65.

Per Immega, in the combination, MEFFSs are "securely stored" and "assigned to a specific person with whom messages will be exchanged." USAA-1004, [0009]-[0010], [0012], [0044], [0059]. Per Day, in Immega-Day, the utility stores MEFFSs in email utility's contact database, which is, e.g., "an extension to MS Outlook and provides a very simple interface for users to secure their e-mail." USAA-1006, [0119]; USAA-1003, ¶66. Additionally, in Immega-Day, per Day, "[w]hen a signed message is received by Outlook and the sender of the e-mail is not within the Outlook's contact list; the secure email utility automatically creates a contact and saves the sender's certificate." USAA-1006, [0120]; USAA-1003, ¶66. Similarly, per Day, to "further simplify the use of email encryption for any incoming digitally signed emails, the secure email utility automatically updates and stores the public credentials (key) within the user's Contacts database," which "not only provides easy storage of contact information, but also a transparent tool for managing individual public certificates to send and receive secure email." USAA-1006, [0170].

Specifically, in Immega-Day, the Contacts database, per Day, stores all MEFFS necessary for secure email communication, per Immega, among communicating computing devices. USAA-1003, ¶67. Both the receiver's MEFFS (modified for sender) and the sender's MEFFS (modified for receiver), per Immega, are securely stored in the receiver's Contacts address book, in the contact

entry associated with the sender, per Day. USAA-1003, ¶66; USAA-1004, [0044], USAA-1006, [0119]-[0120]. That is, the secure information the receiver uses to securely communicate with the sender is stored together in an entry associated with the sender in the receiver's Contacts database. *Id.* Similarly, the sender's Contacts address book includes an entry for the receiver, where that entry includes both the sender's MEFFS (modified for the receiver) and the receiver's MEFFS (modified for the sender) and an identification of the sender (e.g., sender's email address). *Id.* Immega-Day further provides the MEFFS for each person with whom a user communicates. USAA-1003, ¶67 (describing an example with Alice, Bob, and Carol). Therefore, the combination's address book includes the "[m]any uniquely [MEFFSs], one (or more) for each person with whom messages will be exchanged," per both Immega and Day. *Id.*; USAA-1004, [0044], USAA-1006, [0119]-[0120], [0170].

Since Day's systems run on conventional operating systems (e.g., Windows), a POSITA would have understood and found obvious that the Contacts list storing the identifier and secret would be stored in a hierarchical directory, e.g., Windows hierarchical directory. USAA-1003, ¶68 (citing USAA-1023); USAA-1006, [0098].

Further, Immega-Day's secure email utility is an application running on the device. USAA-1003, ¶69. Day describes a "secure email utility" that "associates

the personal digital ID with an email program." USAA-1006, [0014], [0020]. A POSITA would have understood and found obvious that a utility is an application running on a computing device. USAA-1003, ¶69, (citing USAA-1023). Further, Immega describes "an algorithmic flow chart for securely exchanging [EFFSs] between two users, for later use in biometrically certified messages" and "algorithmic flow chart subroutines for modifying the [EFFS] of the user." USAA-1004, [0043]-[0044], FIGS. 2-3A. To the extent that Immega is silent regarding which computer component executes the algorithms, a POSITA would have found obvious to perform these algorithms using an application executing on the communicating computing devices, per Day. USAA-1003, ¶69 (citing USAA-1023). Thus, per Immega and Day, a POSITA would have understood and found obvious that the Immega-Day combination's secure email utility runs as an application on a computing device and is used for enrolling fingerprint feature sets and secure communication. *Id.*

A POSITA would have found obvious that enhancing the encryption/decryption techniques based on MEFFSs, per Immega, with Day's teachings regarding storage and organization of email encryption keys in a Contacts database introduces multiple advantages. USAA-1003, ¶70. For example, Day explains that storing communication partners' credentials "simplif[ies] the use of email encryption for any incoming digitally signed emails."

Id.; USAA-1006, [0170]. Thus, upon receiving an encrypted communication, a device need not retrieve remotely-stored decryption credentials since the credentials are stored locally. USAA-1003, ¶70. A POSITA would have further recognized the benefits of storing the MEFFSs, as in Immega, in a Contacts address book, per Day, would have simplified email communication by co-locating all information required for communicating with another individual (email address, biometric information, keys) in a single record, creating a "transparent tool for managing individual" the communication keys needed "to send and receive secure email." *Id.*; USAA-1006, [0134], [0170]. Further, the combination leverages an existing email component, Contacts, simplifying the system design and administration. USAA-1003, ¶70; USAA-1006, [0170]. Thus, a POSITA would have been motivated to incorporate Day's teaching of storing encryption data in the email system's existing Contacts database. USAA-1003, ¶70.

A POSITA would have found relevant solutions within Day and expected success in incorporating Day's teachings. USAA-1003, ¶71. Day describes "[u]sing public key encryption technology" to "provide security, encryption, and privacy for … e-mail," and Immega similarly teaches using biometrics to "add convenient security to email, by augmenting public key or other encryption." USAA-1004, [0008]; USAA-1006, Abstract.

Moreover, configuring the devices, as in Immega, to leverage Day's teachings would have required only routine programming knowledge well within the skill of a POSITA prior to the Critical Date. USAA-1003, ¶72. Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar devices – in each instance a device equipped with a fingerprint sensor – in a similar way, and combining prior art elements according to known methods to yield the predictable results described above. *Id.*; *KSR v. Teleflex*, 550 U.S. 398, 417 (2007).

Furthermore, the elements of the resulting combination would each perform functions they had been known to perform prior to the combination—receiver's device would perform the same functions generate and store MEFFSs used to send and receive secure email and, per Day, would store the MEFFSs in a Contacts address book located in a directory and that includes the "[m]any uniquely [MEFFSs], one (or more) for each person with whom messages will be exchanged," per Day. USAA-1003, ¶73. Accordingly, a POSITA would have naturally expected success when incorporating Day's teachings into Immega. *Id.*

2. Claim 1

[1.pre]

To the extent the preamble is limiting, Immega-Day renders obvious [1.pre]. USAA-1004, Abstract, [0006], [0008] ("confirmation of identity"), [0013], [0017]-

[0019]; USAA-1003, ¶166. Immega describes a "method for permitting the secure transmission of electronic messages by using biometric certification is provided," where "[EFFSs], which have been uniquely modified for a particular person with whom messages will be exchanged, are cross-enrolled between the sender and receiver such that the biometric identity of both the sender and receiver can be checked during message sending and receiving." USAA-1004, Abstract. Immega further describes "provid[ing] biometric security to electronic messages, such as electronic mail (also known as email), certifying the physical identity of both the sender and receiver." USAA-1004, [0006]; *see id.*, [0008], [0013], [0017]-[0019]. Thus, a POSITA would have understood that Immega provides a method for authenticating a user. USAA-1003, ¶166.

[1.a.i]

Immega-Day renders obvious [1.a.i]. USAA-1004, [0008], [0041], [0043]-[0044], FIG. 3A; §III.A.1(c); USAA-1003, ¶¶40-44 (§V.E), 167-170. A receiver's device ("computing device") generates the receiver's MEFFS ("secret") according to the receiver's live-scan fingerprint ("unique user input"). USAA-1004, [0008], [0041], [0042] ("fingerprint sensor provides a biometric input, unique to each individual"), [0044], FIG. 3A; USAA-1003, ¶167 (citing USAA-1028, USAA-1029, USAA-1030). Immega requires "both the sender and the receiver to cross-enroll biometric feature sets," where a "fingerprint sensor" on the device generates

a "biometric identifier file … uniquely modified for each recipient so that only the designated individual can employ it for messaging." USAA-1004, [0008]. A POSITA would have understood that a MEFFS is a "secret." USAA-1003, ¶167 (citing USAA-1031); USAA-1004, [0009], [0012]-[0014], [0018]-[0019], [0034], [0064]-[0067]; §I.C. FIG. 3A illustrates generating a MEFFS. USAA-1004, [0044].

Immega further explains that the "receiver" device can comprise a "computer or any device equipped to execute the steps" described in Immega, including, for example, "cellular telephones, personal digital assistants and the like." USAA-1004, [0041].

As discussed in §III.A.1(c), the secret is generated in Immega-Day by the device's secure email utility ("application running on the computing device"). USAA-1003, ¶170; USAA-1006, [0014], [0020].

[1.a.ii]

Immega-Day renders obvious [1.a.ii]. USAA-1004, [0008], [0010], [0012]-[0013], [0044], [0047], [0059], [0066]; USAA-1003, ¶¶171-177. The receiver's MEFFS ("secret") is stored at the receiver's device ("computing device") with an identification of the "person with whom messages will be exchanged" (e.g., email address) ("identifier") in a directory. USAA-1004, [0008], [0044], [0047]; USAA-1003, ¶171. Immega first explains that, after being generated, MEFFSs—

including a user's own MEFFSs—are "securely stored" and "assigned to a specific person with whom messages will be exchanged." USAA-1004, [0009]- [0010], [0012], [0044], [0059], FIG. 2. Thus, Immega discloses or suggests securely storing, at the receiver's device, a MEFFS of the receiver "assigned to [the] specific person with whom messages will be exchanged." *Id.*; USAA-1003, ¶171.

As discussed in §III.A.1(c), in Immega-Day, the receiver's MEFFS is securely stored in a Contacts address book located in a directory and that includes the "[m]any uniquely [MEFFSs], one (or more) for each person with whom messages will be exchanged." USAA-1003, ¶172; USAA-1004, [0044], USAA-1006, [0119]-[0120]. Day explains, "To further simplify the use of email encryption for any incoming digitally signed emails, the secure email utility automatically updates and stores the public credentials (key) within the user's Contacts database," which "not only provides easy storage of contact information, but also a transparent tool for managing individual public certificates to send and receive secure email." USAA-1006, [0170]. Thus, the receiver's MEFFS ("secret") is stored with an identification of the person with whom the Contacts entry is associated (e.g., email address) ("identifier"). USAA-1003, ¶172. Additionally, because Day's systems run on a conventional operating system (e.g., Windows), a POSITA would have understood and found obvious that the Contacts

list storing the identifier and secret would be stored in a directory. USAA-1003, ¶¶172-177 (citing USAA-1023); USAA-1006, [0098].

[1.a.iii]

Immega-Day renders obvious [1.a.iii]. USAA-1004, [0009], [0050], [0065]; USAA-1003, ¶178. The receiver's MEFFS ("secret") is retrievable when the receiver ("user") applies his/her fingerprint ("unique user input"). *Id.* When a user applies "a live-scan of the [user's] fingerprint," the "stored [MEFFS] of the [user] … is then retrieved."[1] *Id.*

[1.b]

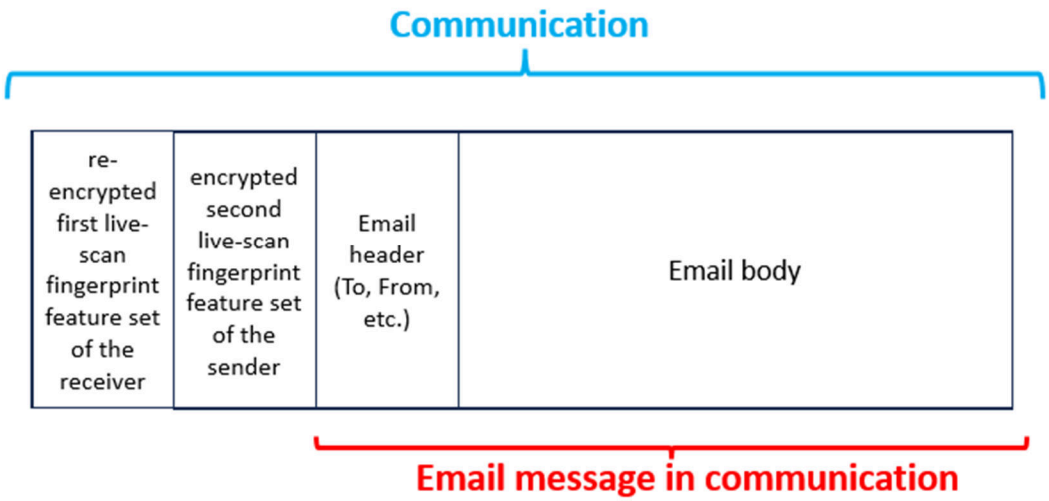
Immega-Day renders obvious [1.b]. USAA-1004, [0009], [0041]-[0042], [0062], [0065], FIG. 6; USAA-1003, ¶¶179-186. Immega's FIG. 6 shows "an algorithm flow chart for sending and receiving a biometrically certified message with higher security protection," which "requires cross-enrollment of [MEFFSs]" of both users. USAA-1004, [0062].

Per FIG. 6, the receiver device ("computing device") receives from a sender's device ("remote computer-based station") a communication ("first communication"). USAA-1004, [0041]-[0042], [0065], FIG. 1. The

[1] Immega's sender/receiver are interchangeable because messages are sent back-and-forth. USAA-1003, ¶178 n.7; USAA-1004, [0009], [0041].

communication includes "the re-encrypted first [LFFS] of the receiver (previously re-encrypted with the receiver's public key at step 626) (step 638), the encrypted message (previously encrypted with the 'difference key' of the sender at step 634), and the encrypted second [LFFS] of the sender (previously encrypted with the 'difference key' of the sender at step 636)." USAA-1004, [0065].

The "encrypted message" can be an email. USAA-1004, [0042], [0065]. A POSITA would have understood and found obvious that the email message (included in the communication), includes a header (with fields including "To," "From," etc.) and body, illustrated below. USAA-1003, ¶¶181-185 (citing USAA-1024, USAA-1025).



Email message. USAA-1003, ¶182.

A POSITA would have further understood or found obvious that the email header would include the identity of, or email address for, the sender of the message, as is in "standard email" ("identifier"). USAA-1003, ¶185. Moreover,

because the sender and receiver are exchanging email, a POSITA would have understood and found obvious that the sender's device is remote from the receiver's device. USAA-1003, ¶186; USAA-1004, [0042], FIG. 1.

[1.c.i][2]

Immega-Day renders obvious [1.c.i]. USAA-1004, [0008], [0019], [0042], [0066], FIG. 6; USAA-1003, ¶187. Responsive to receiving the first communication, the receiver device ("computing device") prompts the receiver ("user") to "provide[] a second live-scan fingerprint" ("prompting a user for the user input via a user interface of the computing device"). USAA-1004, [0019] ("Upon receiving the encrypted message and feature sets, the receiver provides a second live-scan fingerprint"), [0066]. Immega explains that "when the receiver receives [the] transmission [from 638], the receiver provides a second live-scan fingerprint," shown in FIG. 6 (640). USAA-1004, [0066], FIG. 6. Thus, a POSITA would have understood and found obvious that the receiver is "prompted" to provide his/her fingerprint. *Id.*; USAA-1003, ¶187. To input a fingerprint, the sender and receiver devices are "equipped with a fingerprint sensor" ("user

[2] The recited "the user input" of claim 1 lacks antecedent basis. Even if "the user input" means "the unique user input," Immega renders it obvious.

interface of the computing device"). USAA-1004, [0008], FIG. 1 (105); *see id.*, [0022]-[0023], [0042].

[1.c.ii]

Immega-Day renders obvious [1.c.ii]. USAA-1004, [0066]; USAA-1003, ¶188. The receiver's live-scan fingerprint ("unique user input") is used to "extract a second live-scan fingerprint finger set, which is then matched against the stored fingerprint feature set of the receiver" (receiver proves his/her identity to decrypt), thus "verifying the unique user input to the computing device." *Id.*

[1.c.iii]

Immega-Day renders obvious [1.c.iii]. USAA-1004, [0064]-[0065], [0067], FIG. 6; USAA-1003, ¶¶189-191. Immega describes a "subroutine that gives the sender direct confirmation that the correct person has received the message" upon verifying the user. USAA-1004, [0067]. Specifically, the receiver device ("computing device") transmits to the sender ("remote computer-based station") a direct confirmation message ("second communication") that comprises the "receiver's second [LFFS] … encrypted, preferably with the 'difference key' of the sender (reconstructed in step 650)." *Id.*; USAA-1003, ¶189. The confirmation message "enables a notification to be displayed to the sender that the message has been received and decrypted by the proper person." *Id.*

Immega states that the message is "preferably" encrypted with the sender's difference key, but Immega is not so limited. USAA-1003, ¶190. It would have been an obvious design choice to encrypt it with the receiver's difference key because the sender is already in possession of it (per 620), which the sender would use for decrypting the message. *Id.*; USAA-1004, [0065]. The receiver would similarly already be in possession of it (per 612). USAA-1004, [0064]. Thus, use of the receiver's difference key would require no additional transmissions or exchanges by either party and is equally secure. USAA-1003, ¶190; USAA-1004, [0011], [0064]-[0065].

Moreover, because the "difference key" that is used to encode the second communication is "reconstructed by subtracting the first [LFFS] of the receiver from the stored [MEFFS] of the receiver," a POSITA would have understood and found obvious that the second communication is encoded using the receiver's stored MEFFS ("secret"). USAA-1003, ¶191; USAA-1004, [0065].

3. Claim 2

[2]

Immega-Day renders obvious [2]. USAA-1003, ¶192. Immega explains that the receiver's device can comprise a "computer or any device equipped to execute the steps" of Immega, including "cellular telephones" and "personal digital

assistants" ("mobile communication device"). USAA-1004, [0041]; *see id.*, [0021]-[0029], FIGS. 7-9.

4. Claim 3

[3]

Immega-Day renders obvious [3]. USAA-1003, ¶¶193-195; §III.A.1(c). Immega explains that "[m]any uniquely [MEFFSs], one (or more) for each person with whom messages will be exchanged, may be created and securely stored." USAA-1004, [0044], FIG. 3A. Each generated MEFFS is "assigned to a specific person with whom messages will be exchanged." *Id.* Thus, given Immega's description of generating and storing "[m]any uniquely [MEFFSs]," each "assigned to a specific person," a POSITA would have found obvious that the MEFFSs (including the receiver's) would be stored together and the identifier (e.g., email address of the person for whom the MEFFS is modified) is used to distinguish that particular MEFFS from others in the directory. USAA-1003, ¶193 (further describing storage and identification of MEFFSs). Additionally, Day explains that, "[w]hen a signed message is received by Outlook and the sender of the e-mail is not within the Outlook's contact list; the secure email utility automatically creates a contact and saves the sender's certificate" and that "the secure email utility automatically updates and stores the public credentials (key)

within the user's Contacts database," which helps to manage individual public certificates. USAA-1006, [0120], [0170].

As discussed in §III.A.1(c), the Immega-Day receiver device stores, in a Contacts database stored in a directory ("directory"), the receiver's MEFFS (modified for the sender) ("secret") along with other MEFFSs ("along with other secrets"), and the sender's identity (e.g., sender's email address) ("identifier"), which is used to distinguish that MEFFS from others. USAA-1003, ¶195.

5. Claim 4

[4]

Immega-Day renders obvious [4]. USAA-1003, ¶¶196-198; *supra*, [3] (Ground-1A), §III.A.1(c). The process used for encrypting the communication uses information derived from MEFFS. USAA-1003, ¶196. Therefore, a POSITA would have understood and found obvious that the MEFFS is an encryption key. *Id.* Specifically, Immega teaches that messages are encrypted using a "difference key," which is derived from a user's LFFS and the user's MEFFS ("secret"). USAA-1004, [0009]. Because the receiver's MEFFS is used to derive the "difference key" (used for encryption), a POSITA would have found obvious that the MEFFS itself is an encryption key. USAA-1003, ¶196 (citing USAA-1026, defining "encryption key"). *Id.* Moreover, as discussed for [3], the receiver's

MEFFS ("secret"/"encryption key") is stored in the directory with other MEFFSs, and the identifier is used to distinguish the MEFFSs. *Supra*, [3] (Ground-1A).

6. Claim 6

[6]

Immega-Day renders obvious [6]. USAA-1003, ¶199. The receiver device ("computing device") receives from a sender device ("remote computer-based station") a message ("first communication") that includes the encrypted receiver's first LFFS, encrypted message, and encrypted sender's second LFFS. USAA-s1004, [0065].

7. Claim 7

[7]

Immega-Day renders obvious [7]. USAA-1003, ¶200. Immega describes "giv[ing] the sender direct confirmation that the correct person has received the message," whereby, responsive to the sender's message, the receiver sends the sender the "receiver's second [LFFS]." USAA-1004, [0066]-[0067]. Thus, to the extent that Immega does not describe that the sender's message comprises a request for the receiver's user credentials, a POSITA would have found this obvious. USAA-1003, ¶200.

The '993 Patent lists "a username and password" as examples of "user credentials," indicating "[o]ther forms of user credentials may be used." USAA-1001, 13:9-16. Thus, a POSITA would have understood that the receiver's live-

scan fingerprint (included in a LFFS) comprises user credentials. USAA-1004, Abstract, [0042]; USAA-1003, ¶200; *infra*, [9] (Ground-1A). A POSITA would have understood that Immega teaches or at least renders obvious that the sender's communication, which elicits the receiver's second LFFS ("user credentials"), comprises a request for the receiver's user credentials because Immega describes "giv[ing] the sender direct confirmation that the correct person has received the message," whereby, responsive to the sender's message, the receiver sends the sender his/her "second [LFFS]." USAA-1004, [0066]-[0067]; USAA-1003, ¶200.

8. Claim 9

[9]

Immega-Day renders obvious [9]. USAA-1003, ¶¶201-202. The receiver's live-scan fingerprint ("unique user input") comprises user credentials received via the receiver device's fingerprint sensor ("user interface"). USAA-1004, Abstract, [0008], [0042]; USAA-1003, ¶201; *supra*, [7] (Ground-1A). From this and related description, a POSITA would have understood and found obvious that the user's live-scan fingerprint is/includes user credentials. USAA-1003, ¶201 (citing USAA-1028, USAA-1029, USAA-1030); USAA-1004, [0042] ("fingerprint sensor provides a biometric input, unique to each individual, which can be used to certify identity").

Immega teaches that the device receives the fingerprint before generating the MEFFS ("secret"). USAA-1004, [0044], FIG. 3A (information from a live-scan fingerprint is used to generate the MEFFS). Thus, a POSITA would have understood that the fingerprint is received prior to generating the secret. USAA-1003, ¶202.

9. Claim 10

[10]

Immega-Day renders obvious [10]. USAA-1003, ¶¶203-205. In FIG. 2, Immega provides "an algorithmic flow chart for securely exchanging [EFFS] between two users," whereby a first user (sender) creates a MEFFS for the second user (receiver) (205). USAA-1004, [0043]-[0049], FIG. 2. The first user then sends a public signature key to the second user (207), and the second user send a PKI public key associated with a PKI private key (215) to the first user. *Id.*, [0045]-[0046], FIG. 2.

Next, the first user "creates an enrollment message" (222) that includes the first and second user's names and the MEFFS "that has been uniquely changed and assigned to the specific second user from whom messages will be received." USAA-1004, [0047], FIG. 2. The enrollment message is then encrypted and sent to the second user. *Id.* This process is repeated with the first and second users

switching roles for cross-enrollment "where the second user provides his/her [MEFFS] to the first user." *Id.*, [0049].

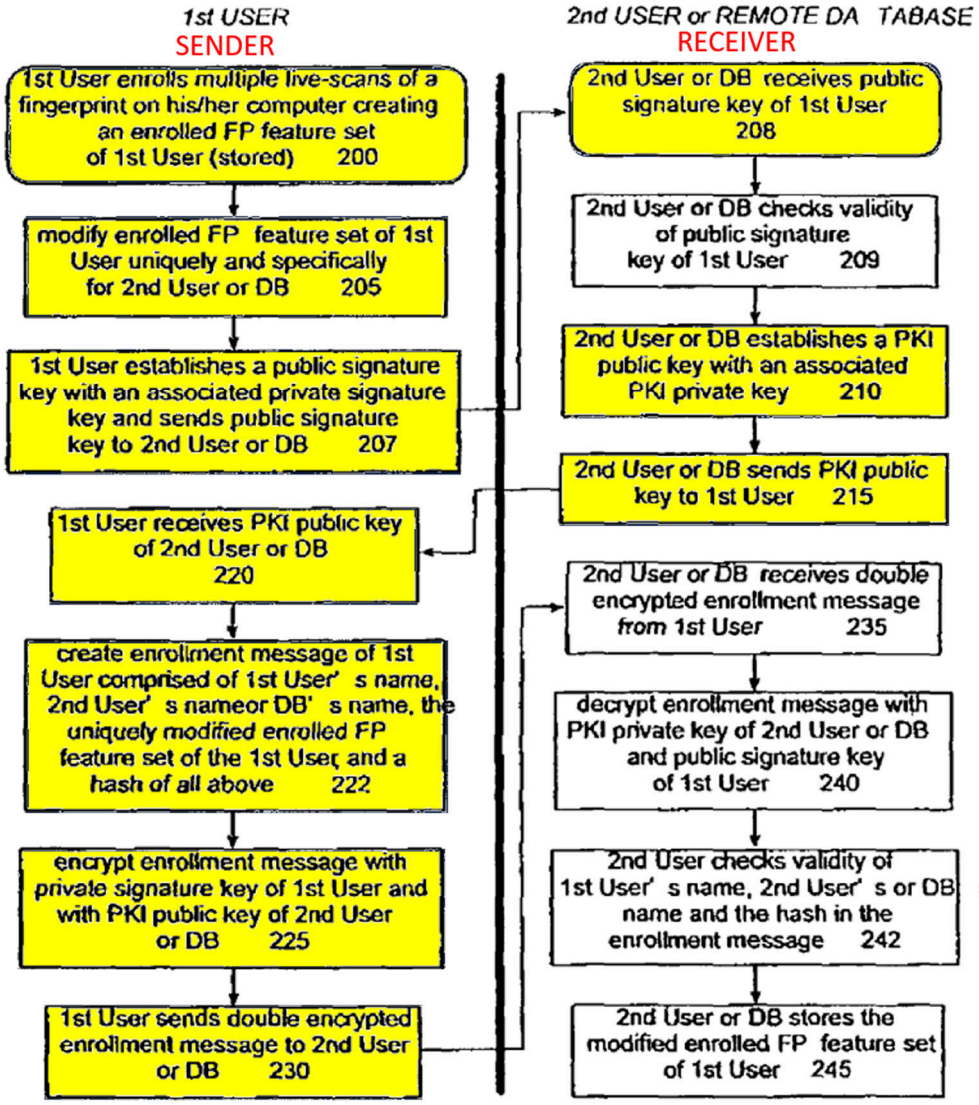


FIG. 2

USAA-1004, FIG. 2 (annotated)

Given Immega's cross-enrollment—where a first user (sender) first initiates enrollment by sending keys and an enrollment message to a second user (receiver),

a POSITA would have found Immega teaches or renders obvious the receiver's device receiving an invitation (sender's keys and enrollment message) to create the receiver's MEFFS ("secret") prior to the receiver generating it. USAA-1003, ¶205. The sender initiates the cross-enrollment, which a POSITA would have understood and found obvious as an invitation from the sender to the receiver for the receiver to transmit the receiver's MEFFS, which would then require the user to generate the MEFFS via 200 and 205. *Id.*; USAA-1004, [0043], [0049], FIG. 2.

10. Claim 11

[11]

Immega-Day renders obvious [11]. USAA-1003, ¶206. As discussed for [10], the invitation to create the secret is received by the receiver from the sender's device ("remote computer-based station"). USAA-1004, [0043]-[0049], FIG. 2; *supra*, [10] (Ground-1A).

11. Claim 12

[12]

Immega-Day renders obvious [12]. USAA-1003, ¶207. Immega teaches the direct confirmation message ("second communication") "gives the sender direct confirmation that the correct person has received the message" ("first communication"). USAA-1004, [0067].

B. GROUND 1B – Immega-Day-Tomko Renders Claims 8, 13-15, and 17-22 Obvious

1. Prior Art and Proposed Combination

(a) *Tomko*

Tomko describes "permitting the secure handling of data between two remote stations," which "involves the generation of an encrypted decryption key which is based," e.g., "on a fingerprint information signal from a user of a first station." USAA-1005, Abstract. The encrypted key is "stored at both stations" so "a message encrypted with the key may be decrypted at either station by retrieving the encrypted key," inputting a fingerprint signal to recover the decryption key, and "applying the decryption key to the encrypted message." *Id.* USAA-1003, ¶¶74-76.

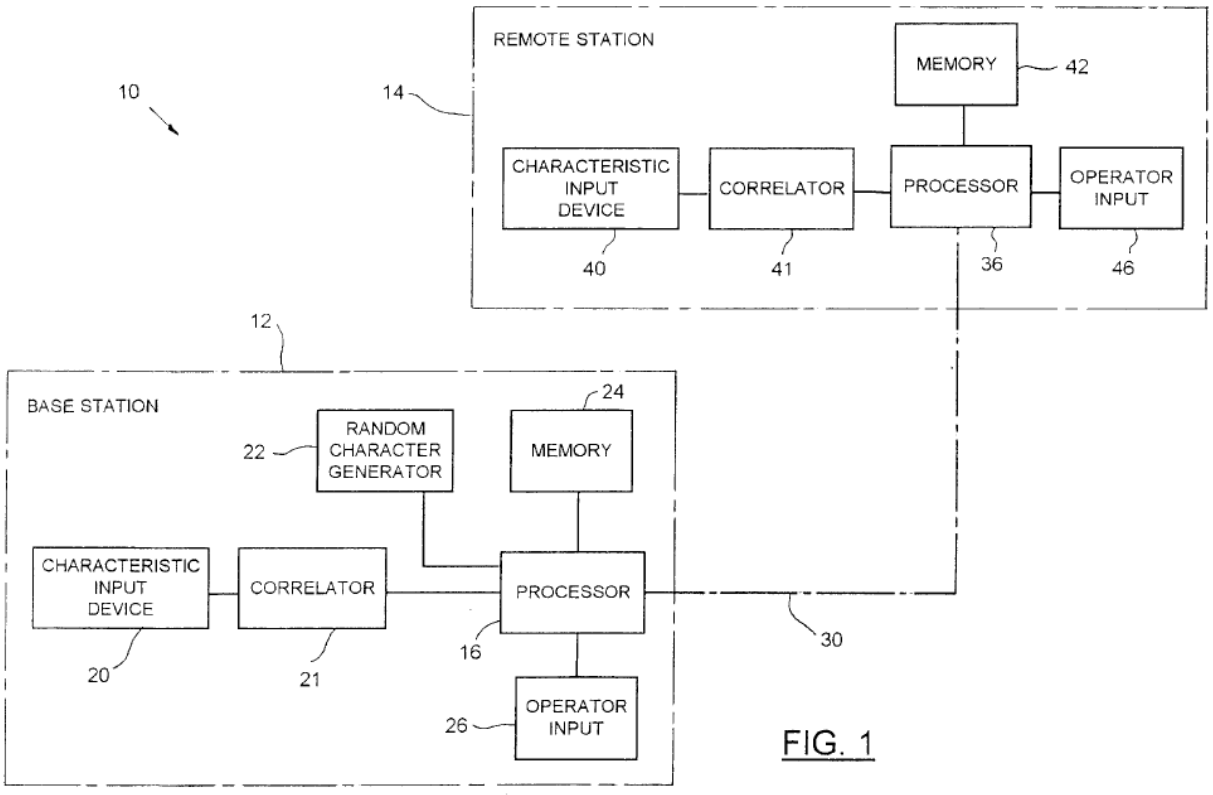


FIG. 1

USAA-1005, FIG. 1

A system includes remote stations, base station 12 and remote station 14 "connected for two-way communication," with each having a processor 16/36, characteristic input device 20/40, and memory 24/42. USAA-1005, 2:18-41, FIG. 1.

Tomko describes "[d]eveloping an encrypted decryption key" where the key is generated and stored in memory in an encrypted form. USAA-1005, 2:48-5:11, 6:56-65.

(b) *Immega-Day-Tomko*

A POSITA would have found obvious integration of Tomko's teachings relating to hardware components and data encryption into Immega-Day, further enhancing security and offering implementation details. USAA-1003, ¶¶77-89.

i. Device Components

Immega describes "secure transmission of electronic messages" using "biometric certification," USAA-1004, Abstract, [0006]. The receiver's device can comprise a "computer or any device equipped to execute the steps" described in Immega. USAA-1004, [0041]. To the extent that Immega does not describe hardware components, a POSITA would have included these components for processing and storing in Immega's method, as was well-known, per Tomko, and

executing the secure email utility (application) of Immega-Day. USAA-1003, ¶¶40-44 (§V.E), 79, VIII.C-D; *supra* §§III.A.1(c), III.B.1(a).

Like Immega and Day, Tomko is directed to "secure handling of data between two remote stations" using fingerprints. USAA-1005, Abstract. In Tomko's FIG. 1 (below), each device includes a processor 16/36, characteristic input device 20/40, and memory 24/42. USAA-1005, 2:18-41, FIG. 1. Processor 16 is used to process received user input (e.g., a fingerprint via the characteristic input device 20) to derive and encrypt a decryption key stored in memory 24. USAA-1005, 2:49-4:65. The processor also assists in sending messages, including obtaining the encrypted decryption key when a user "applies his fingerprint to the characteristic input device." USAA-1005, 5:13-26.

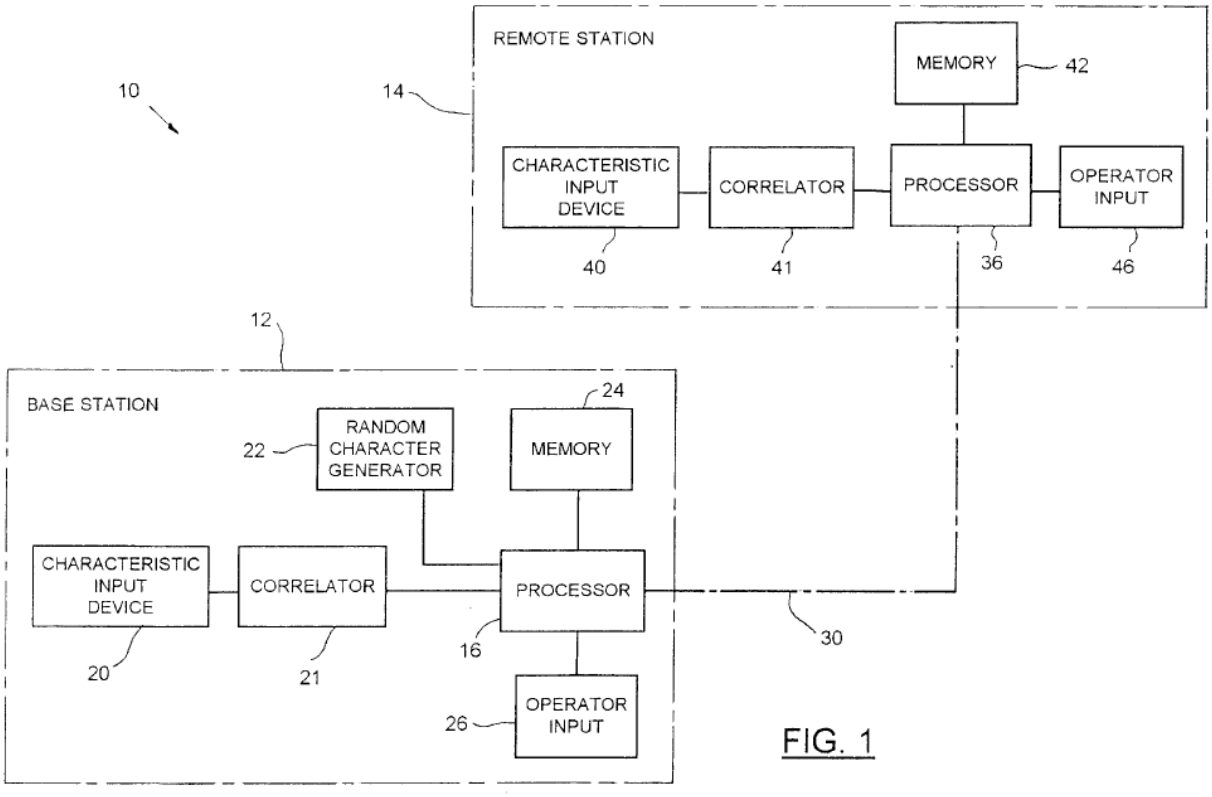


FIG. 1

USAA-1005, FIG. 1

Given the similarities among Immega, Day, and Tomko, a POSITA would have naturally looked to Tomko for implementation details regarding the Immega-Day devices, including what components would be included. USAA-1003, ¶80. Combining the teachings of Immega-Day and Tomko would have merely involved combining prior art elements according to known methods to yield predictable results. *Id.* Indeed, both systems involve communications between devices that are secured with fingerprints. USAA-1004, Abstract; USAA-1005, Abstract; USAA-1003, ¶80. A POSITA would have been motivated to combine the teachings of Immega-Day and Tomko to realize the implementation details, *e.g.*,

processor, memory, and other components, to execute the functionality of the device. *Id.*; USAA-1004, [0041] ("any device equipped to execute the steps described"). The combination ("Immega-Day-Tomko") would have been predictable and foreseeable and a POSITA would have had a reasonable expectation of success because 1) Immega, Day, and Tomko disclose secure communications between remote devices secured using fingerprint information (USAA-1004, Abstract; USAA-1005, Abstract; USAA-1006, Abstract) and 2) the combination merely involves incorporating known features explicitly disclosed by Tomko and understood by a POSITA as likely present, but not explicitly disclosed by Immega. USAA-1003, ¶80. The combination is predictable, at least in part, because elements of the combined system would each perform similar functions they had been known to perform prior to the combination. *Id*. For example, the devices in Tomko would still perform the same or similar functions, including generating and sharing MEFFSs and transmitting secure communications with the use of that data, as it did prior to the combination with Tomko. *Id*.

ii. Data Encryption

As discussed above, Immega teaches storing the receiver's MEFFS ("secret") in a directory. *Supra*, [1.a.ii] (Ground-1A). Immega further teaches that, during cross-enrollment, the receiver encrypts the receiver's MEFFS ("secret"). USAA-1004, [0047], claim 4. Specifically, Immega describes creating

an "enrollment message (step 222) comprised of the first user's name, the second user's name[, and] the uniquely [MEFFS]" that is double encrypted and sent to the second user. USAA-1004, [0047]. To the extent that Immega is not explicit about the timing of storing the receiver's MEFFS ("secret") in the directory, it would have been obvious to a POSITA to encrypt it prior to storing it. USAA-1003, ¶81.

Tomko teaches generating "an encrypted version of a message decryption key" which is based on a fingerprint information signal from a user of a first station" and used to "encrypt messages." USAA-1005, Abstract, 2:42-5:11. Notably, Tomko teaches that the finger-print based key is "stored in memory 24" as an "encrypted version." USAA-1004, 4:60-65. In Immega-Day-Tomko, during cross-enrollment, the receiver device stores the double encrypted enrollment message prior to transmitting the enrollment message to the sender device, as illustrated in modified FIG. 2 below.

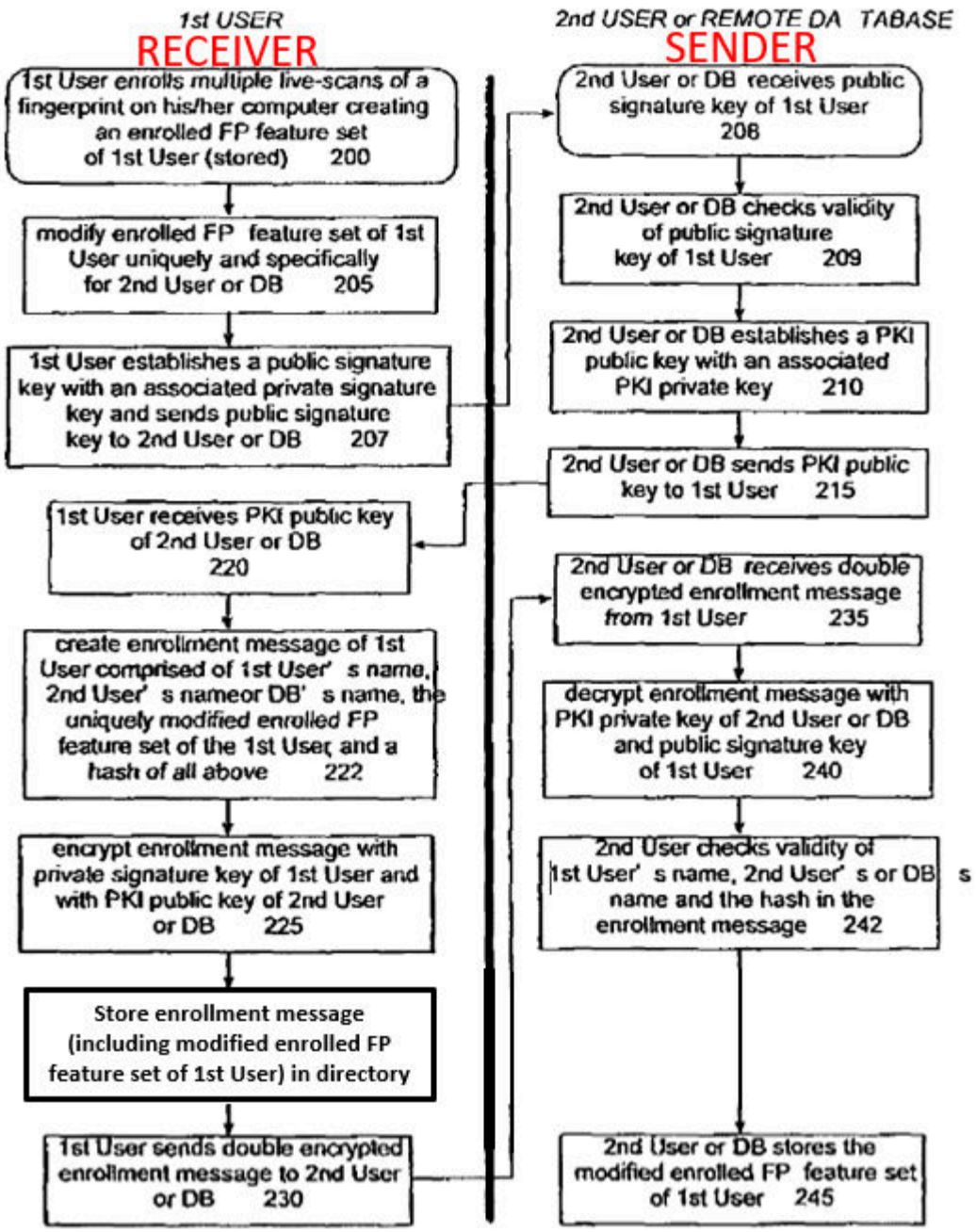


FIG. 2

USAA-1004, FIG. 2 (modified, annotated)

Indeed, as discussed in [1.a.ii], Immega teaches securely storing MEFFS "assigned to a specific person with whom messages will be exchanged." USAA-

1004, [0044], [0009]-[0010], [0012], [0059], FIG. 12. Moreover, as discussed in [1.a.ii], for the receiver's device to distinguish the receiver's MEFFSs from one another, it would have been obvious that each MEFFS would be stored with an identifier identifying the user for which the MEFFS facilitates communication. USAA-1003, ¶83. This information is already included in Immega's enrollment message (e.g., first and second user's names, MEFFS). USAA-1004, [0047]. Thus, it would been obvious to a POSITA that, in Immega-Day-Tomko, during enrollment, the receiver's device stores the encrypted enrollment message for each user with whom messages are exchanged. USAA-1003, ¶83. When the receiver's device later required use of the receiver's MEFFS, the receiver would apply his/her fingerprint to retrieve the enrollment message/MEFFS, per Immega, and decrypt it. *Id.*; USAA-1004, [0009], [0050], [0045]-[0047].

A POSITA would have found obvious that enhancing Immega's method based on Tomko's teachings of storing an encrypted decryption key would introduce multiple advantages and been motivated to do so at least because of the added security benefits of locally storing encrypted versions of sensitive information. USAA-1003, ¶84. Tomko explains that storing an encrypted version of the decryption key allows the decryption key to "be passed to the remote station" and "remain secure even if intercepted." USAA-1004, 4:60-65. Moreover, the recipient "remote station stores the received decryption key in its

memory 42," further benefiting from a secure encrypted decryption key. *Id.*; USAA-1003, ¶84. A POSITA would have further recognized the benefits of storing the decryption key in an encrypted format locally, especially in instances where the base station is not sufficiently secure. USAA-1003, ¶¶84-86; USAA-1005, 6:10-12; USAA-1008, Abstract, 3:26-37, 1:14-39.

A POSITA would have found relevant solutions within Tomko and expected success in incorporating Tomko's solutions within Immega given that Tomko describes various methods for "[d]eveloping an encrypted decryption key," and Immega similarly teaches encrypting its MEFFSs. USAA-1004, [0047]; USAA-1005, 2:48-5:11; USAA-1003, ¶87.

Moreover, configuring Immega's devices to leverage Tomko's teachings would have required only routine programming knowledge well within the skill of a POSITA prior to the Critical Date. USAA-1003, ¶88. Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar devices – in each instance a device equipped with a fingerprint sensor – in a similar way, and combining prior art elements according to known methods to yield the predictable results described above. *KSR*, 550 U.S. at 417; USAA-1003, ¶88.

Furthermore, the elements of the resulting combination would each perform functions they had been known to perform prior to the combination—receiver's

device would perform the same functions generate and store MEFFSs used to send and receive secure email but, per Tomko, would store the MEFFSs in an encrypted form for improved security. USAA-1003, ¶89. Accordingly, a POSITA would have naturally expected success when incorporating Tomko's teachings. *Id.*

2. Claim 8

[8]

Immega-Day-Tomko renders obvious [8]. USAA-1004, [0047]; USAA-1005, Abstract, 2:42-5:11; USAA-1003, ¶208. As discussed in §III.B.1(b), in Immega-Day-Tomko, during enrollment, the receiver's device stores the encrypted enrollment message for each user with whom messages will be exchanged before transmitting the enrollment message, thus encrypting the "secret" prior to storing it in the directory. USAA-1003, ¶208; §III.B.1(b). Notably, Tomko teaches that the finger-print based key is "stored in memory 24" as an "encrypted version." USAA-1004, 4:60-65.

3. Claim 13

[13.pre]

To the extent the preamble is limiting, Immega-Day-Tomko discloses or renders obvious [1.pre]. USAA-1003, ¶209. The '993 Patent describes a person's "computing device" as an example token. USAA-1001, 21:57-59. Immega similarly describes a receiver's device can comprise a "computer or any device equipped to execute the steps" of Immega, including "cellular telephones, personal

digital assistants and the like" ("token"). USAA-1004, [0041]; *see id.*, [0021]-[0029], FIGS. 7-9.

[13.a]

Immega-Day-Tomko renders obvious [13.a]. USAA-1003, ¶¶40-44 (§V.E), 210-211. As discussed in §III.B.1(b), the Immega-Day-Tomko receiver device includes a processor and a memory communicatively coupled to the processor. USAA-1003, ¶210; §III.B.1(b). Specifically, Tomko describes a base station that includes a processor communicatively coupled to memory. USAA-1005, 2:18-41, FIG. 1.

To the extent that Immega does not explicitly describe "memory storing a security application for execution by the processor," use of a security application and its storage in Immega-Day-Tomko's memory would have been obvious to a POSITA. USAA-1003, ¶211 (citing USAA-1032, USAA-1033, USAA-1034); *supra*, [1.a.i] (Ground-1A). Immega describes algorithmic flow charts "for securely exchanging [EFFS] between two users" and "subroutines for modifying the [EFFS] of the user." USAA-1004, [0043]-[0044], FIGS. 2-3A. A POSITA would have found obvious that an application executing on the receiver device would perform these algorithms . USAA-1003, ¶211. Moreover, a POSITA would have recognized that the processor of Immega-Day-Tomko would execute the application, causing it to perform the steps of Immega-Day-Tomko's method.

USAA-1003, ¶211; USAA-1005, 2:49-4:65 (describing generating fingerprint information and storing an encrypted decryption key), 5:13-26 (describing obtaining the stored encryption key in response to a fingerprint and sending secure messages using the processor).

[13.b.i]-[13.b.iii], [13.c], [13.d.i]-[13.d.ii]

Supra, [1.a.i]-[1.a.iii], [1.c.i]-[1.c.iii][3] (Ground-1A).

4. Claim 14

[14]

Supra, [3] (Ground-1A).

5. Claim 15

[15]

Supra, [4] (Ground-1A).

6. Claim 17

[17]

Supra, [1.b] (Ground-1A).[4]

7. Claim 18

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[3] "[S]econd communication" (direct confirmation message) of Immega discussed for [1.c.iii] maps to "first communication" of [13.d.ii].

[4] "[F]irst communication" (communication described in USAA-1004, [0065]) discussed for [1.b] maps to "second communication" of [17].

[18]

Supra, [7] (Ground-1A).

8. Claim 19

[19]

Supra, [8] (Ground-1A).

9. Claim 20

[20]

Supra, [9] (Ground-1A).

10. Claim 21

[21]

Supra, [10] (Ground-1A).

11. Claim 22

[22.pre]

Supra, [2] (Ground-1A).

[22.a]-[22.d.ii], [22.e]

Supra, [13.a]-[13.d.ii], [20] (Ground-1B).

C. GROUNDS 1C & 1D – Immega-Day-Howard Renders Claim 5 Obvious and Immega-Day-Tomko-Howard Renders Claim 16 Obvious

1. Prior Art and Proposed Combinations

(a) *Howard*

Howard describes "securing private data" with a first device providing data to a second device "configured to encrypt/decrypt the data, as needed by the first device." USAA-1007, Abstract, [0006].

Howard describes storing "obfuscated encryption information within a device used for encryption/decryption of data." USAA-1007, [0012], FIG. 4. Figure 4 shows "a registry file" with "pairs 400 of associated name entries 402 and value entries 404"; where "[m]ost of the entries…are decoys." *Id.*, [0048]; USAA-1003, ¶91.

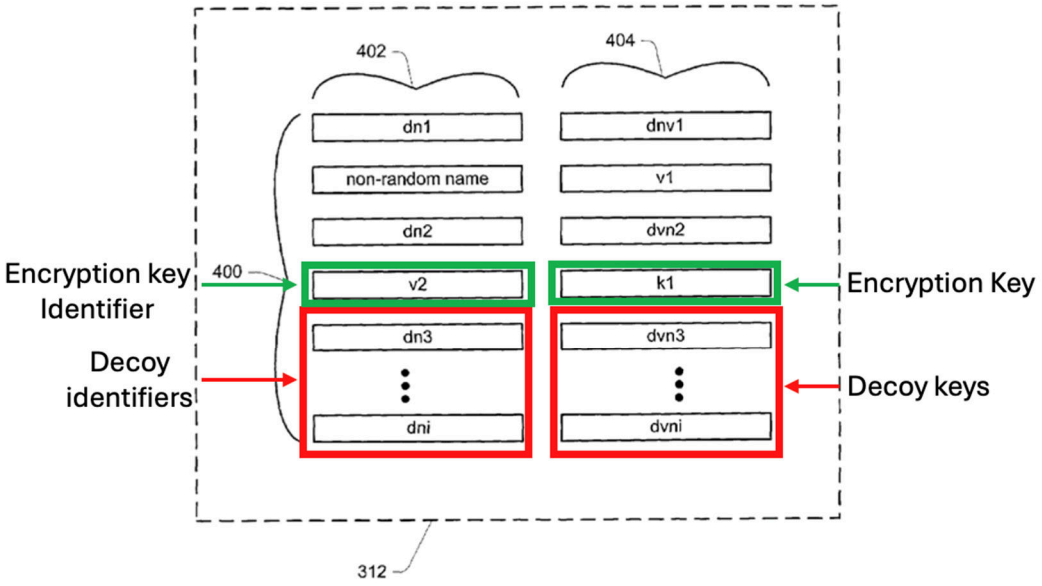


Fig. 4

USAA-1007, FIG. 4 (annotated)

(b) *Immega-Day-Howard & Immega-Day-Tomko-Howard*

As discussed in §§III.A.1(c) and III.B.1(b), Immega-Day and Immega-Day-Tomko store a secret in a directory with other secrets. A POSITA would have found it obvious to further store, in the directory, decoys, per Howard, enhancing security. USAA-1003, ¶¶92-98; USAA-1007, [0044], [0048].

In Immega-Day-Howard and Immega-Day-Tomko-Howard, MEFFSs are "securely stored" and "assigned to a specific person with whom messages will be exchanged" in a contact entry associated with the respective person in a directory, per Immega and Day, while the directory further stores decoys (e.g., decoy MEFFSs), per Howard. USAA-1004, [0009]-[0010], [0012], [0044], [0059]; USAA-1006, [0119]-[0120], [0170]; USAA-1007, [0044], [0048]; USAA-1003, ¶93. A POSITA would have been motivated to incorporate Howard's use of decoys because decoys were a well-known tool to "confuse a potential attacker" to improve sensitive information security. USAA-1003, ¶93 (citing USAA-1009). A POSITA would have understood and found obvious that Howard discloses an encryption key stored alongside decoys with an identifier to distinguish the encryption key from decoys. USAA-1003, ¶¶93-95.

A POSITA would have found relevant solutions within Howard and expected success in incorporating Howard's use of decoys within Immega-Day and Immega-Day-Tomko. USAA-1003, ¶96. Howard describes providing "additional security" "for protecting private data," and Immega similarly teaches sending

"biometrically certified message[s] with higher security protection." USAA-1004, Abstract, [0062]; USAA-1007, [0007].

Configuring Immega's devices to leverage Howard's decoys would have required only routine programming knowledge well within the skill of a POSITA prior to the Critical Date. USAA-1003, ¶97. The change would have amounted to nothing more than the use of a known technique to improve similar devices – in each instance a device equipped with a fingerprint sensor – in a similar way, and combining prior art elements according to known methods to yield the predictable results described above. *KSR*, 550 U.S. at 417; USAA-1003, ¶97.

Furthermore, the elements of the resulting combination would each perform functions they had been known to perform prior to the combination—receiver's device would perform the same functions generating and storing MEFFSs used to transmit secure email but, per Howard, would further store decoy for improved security. USAA-1003, ¶98. Accordingly, a POSITA would have naturally expected success when incorporating Howard's teachings. *Id.*

2. Claim 5

[5]

Immega-Day-Howard renders obvious [5]. USAA-1003, ¶¶228-229; §III.C.1(b). As discussed for [4], the combination renders obvious the secret comprising an encryption key. *Supra*, [4] (Ground-1A).

As discussed in §III.C.1(b), in Immega-Day-Howard, MEFFSs are "securely stored" and "assigned to a specific person with whom messages will be exchanged" in a contact entry associated with the respective person in a directory, per Immega and Day, while the directory further stores one or more decoys (e.g., decoy MEFFSs), per Howard. USAA-1004, [0009]-[0010], [0012], [0044], [0059]; USAA-1006, [0119]-[0120], [0170]; USAA-1007, [0044], [0048]; USAA-1003, ¶229. A POSITA would have understood and found obvious that Howard discloses an encryption key stored alongside decoys with an identifier to distinguish encryption key from decoys. USAA-1003, ¶229.

3. Claim 16

[16]

Immega-Day-Howard renders obvious [16]. USAA-1003, ¶230; *supra*, [5] (Ground-1C) and [13] (Ground-1B); §§III.B.1(b), III.C.1(b).

D. GROUND 2A – Mardikar-318 and Chhabra Render Claims 1-4, 6-7, 9-15, 17-18, and 20-22 Obvious

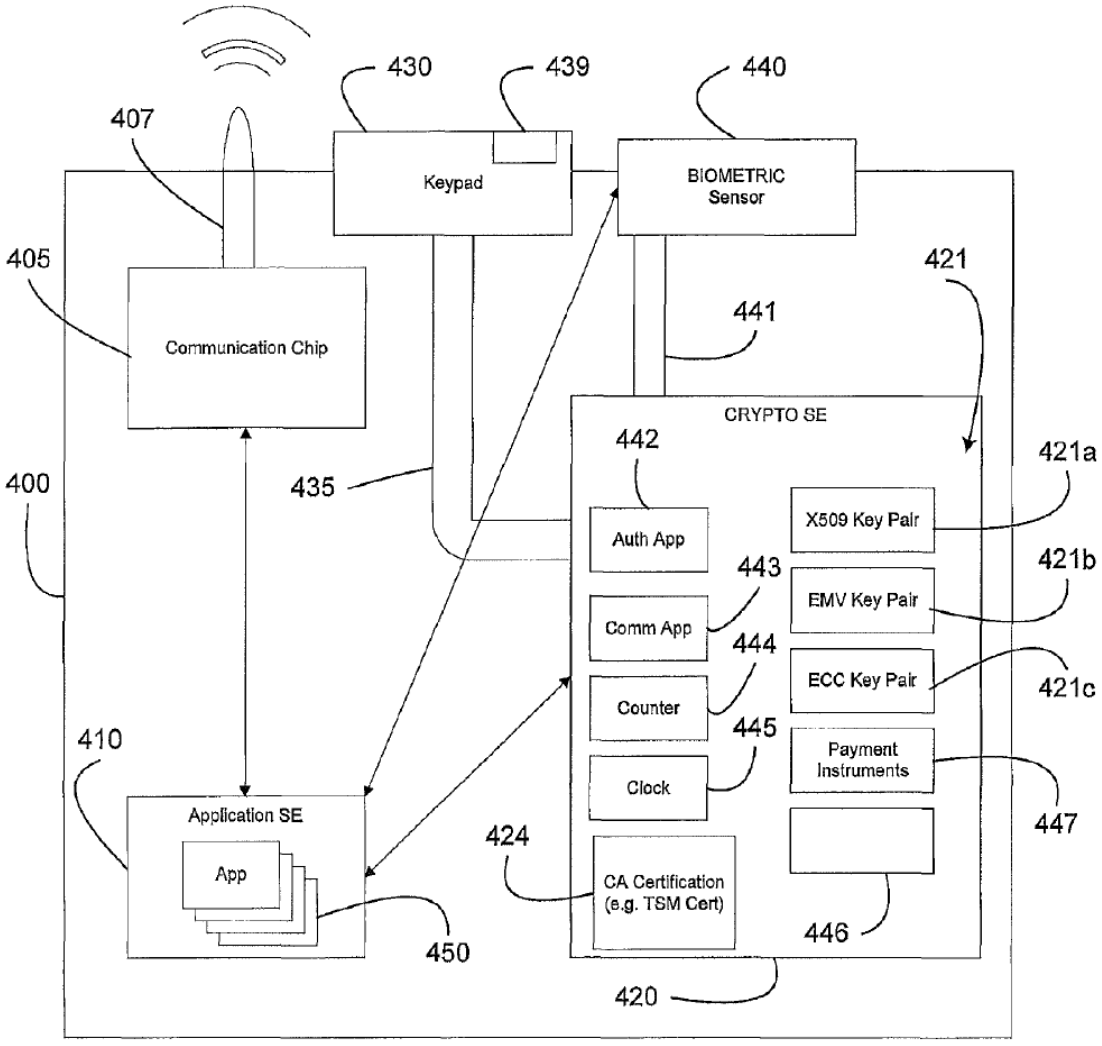
1. Prior Art and Proposed Combination

(a) *Mardikar-318*

Mardikar-318 discloses methods for securing "financial transactions initiated from an electronic device," including authenticating a user based on "biometric

information" input to the device through an included biometric sensor. USAA-1010, Abstract, 1:15-17, 3:11-33, FIGS. 4, 5a, 5b, 6a. USAA-1003, ¶¶99-115.

Mardikar-318's FIG. 4 (reproduced below) "shows an example…client device 400…such as a mobile phone" that "may include a communication chip 405…secure elements 410, 420, …and a biometric sensor 440." USAA-1010, 6:43-49.



USAA-1010, FIG. 4

Mardikar-318 explains that a secure element (SE) may be "a smart card" with a CPU and storage that "makes it possible for the card to keep some secrets…." *Id.*, 7:45-57. For example, FIG. 4's "Application SE" and "Crypto SE" "may be pre-loaded with applications…for facilitating financial transactions" with a service provider (SP) such as "PayPal," and Crypto SE 420 may store

"authentication data," "payment instruments," "certificates," "crypto keys," and "unique biometric authentication information related to a specific user." *Id.*, 7:58-63, 8:62-9:59.

In that regard, Crypto SE's biometric authentication application evaluates user biometric data received from biometric sensor 440, both for purposes of registering/storing the user's derived biometric profile(s), and for purposes of authorizing requested transactions on the basis of comparisons against one or more previously registered profiles. *Id.*, 9:60-65, 10:42-13:36, FIGS. 4, 5a, 5b, 6a, 6b, 6c.

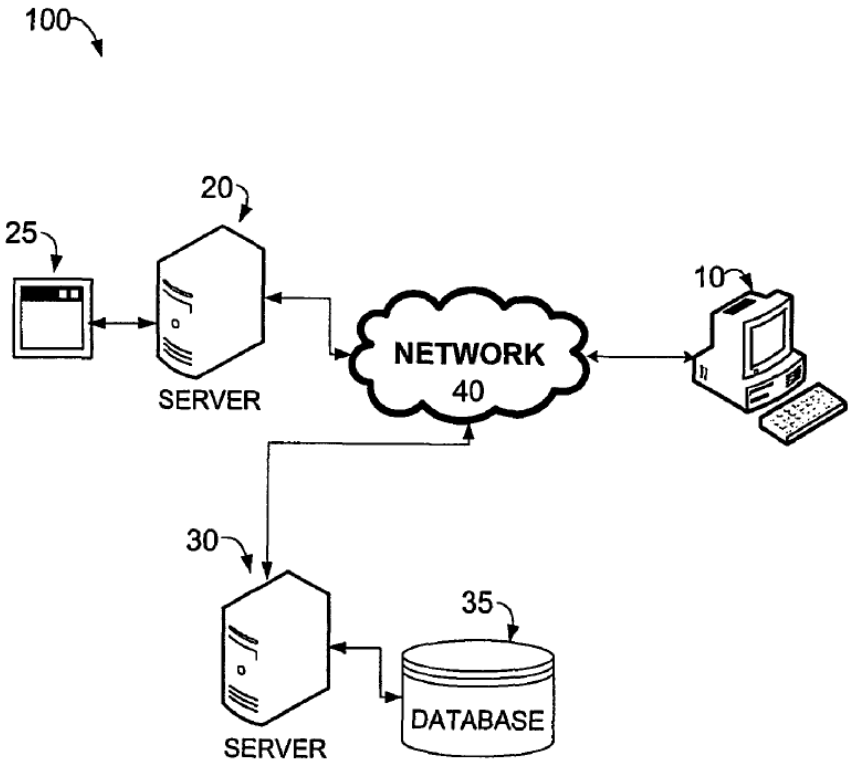
For example, Mardikar-318 explains that "PayPal…may provide payment processing for online transactions on behalf of the customer so that the customer does not expose payment information directly to the merchant." *Id.*, 6:13-29. In that regard, "the customer may pre-register his account with the payment provider system…and then use the payment provider system to make purchases" using device 400 "when redirected to the payment provider system from the merchant's site." *Id.* "After the financial transaction is authorized, the…payment provider system completes the transaction." *Id.*, 12:22-30; 3:11-33, 4:27-36, 13:37-14:19.

(b) *Chhabra*

Like Mardikar-318, Chhabra describes secure mobile Internet transactions that are facilitated through "an on-line payment service (e.g. PayPal®)." USAA-1013, Abstract, 10:47-65, 5:41-11:29, FIGS. 1, 3, 4, 5. USAA-1003, ¶¶116-121.

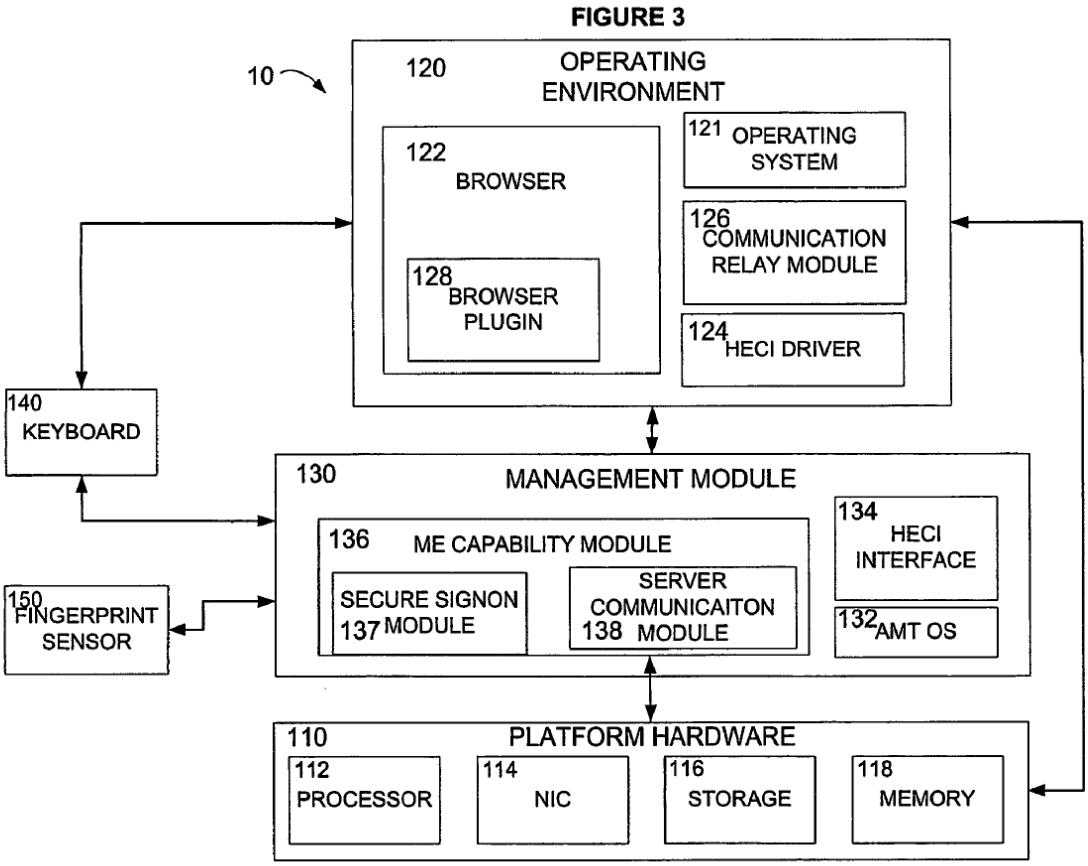
Chhabra's FIG. 1 (below) illustrates "a system for sending credentials securely to a remote server" 20 from a user computing platform 10 featuring a "web browser as an application for retrieving and viewing web content." *Id.*, 1:6-13, 1:24-25, 3:44-56, 2:64-7:64.

FIGURE 1



USAA-1013, FIG. 1

As shown in Chhabra's FIG. 3 (below), platform 10 features a "management module" 130 that "may request a user's input for authorization" in the context of a web-based financial transaction facilitated by remote servers 20 and/or 30, which the user provides through "a sensor such as … fingerprint sensor 150…." *Id.*, 9:32-44.

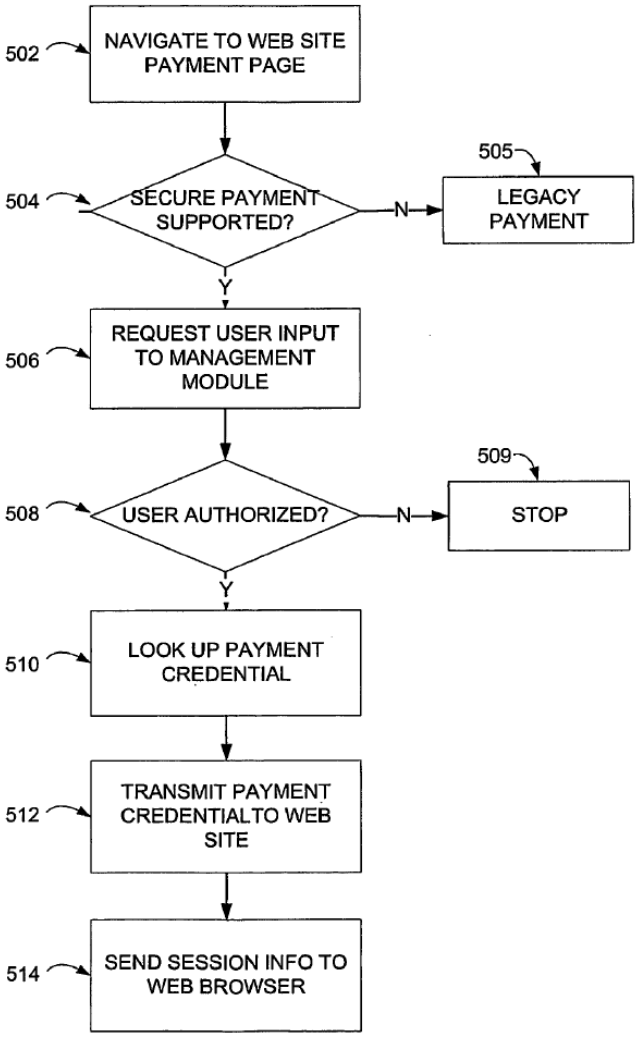


USAA-1013, FIG. 3

Chhabra's FIG. 5 (below) illustrates "a method for a secure payment transaction" in which "a user desiring to complete a financial transaction on a web site…may be automatically redirected to a payment page" that requests user

payment and authorization credentials. *Id.*, 10:40-55. "If the user is authorized" through a process involving a table/database lookup and fingerprint matching, the management module may look up in a table/database "the appropriate identifier or credential needed," and "encrypt and transmit the requisite…payment credential" to the server. *Id.*, 3:3-25, 7:44-56, 11:10-29, 9:45-11:9, FIG. 2.

FIGURE 5



USAA-1013, FIG. 5

(c) *Mardikar-Chhabra*

A POSITA would have been motivated and found it obvious to apply Chhabra's authentication techniques to Mardikar-318's system, thereby enabling a user to conveniently and securely log in to a payment provider's site when redirected to that site during a browser session, and/or to securely and conveniently complete an associated financial transaction during that browser session. USAA-1010, 6:13-29, FIGS. 4, 5a, 5b; USAA-1013, 10:40-55, FIGS. 1, 3, 4, 5; USAA-1003, ¶122.

For instance, in view of the strong similarities between their respective systems and goals, a POSITA would have found it obvious to supplement Mardikar-318 with Chhabra's teachings on biometric authentication for browser-based web transactions facilitated by a payment provider's remote server. USAA-1003, ¶¶123-131; USAA-1010, 4:58-62, 6:19-29, 7:58-9:3, 9:60-65, 10:42-12:43, FIG. 4; USAA-1013, 6:45-48, 9:32-44, 10:40-11:9, 13:58-14:24, FIGS. 3, 5.

For example, Crypto SE's authentication application would, consistent with Chhabra, "request user input for authorization" in response to a message communicated to device 400 from the remote server, upon or after the user's redirection to the payment provider's site. *See* USAA-1013, 9:32-44, 6:45-48, 10:65-11:9, 13:58-14:24, FIGS. 1, 3, 4, 5; USAA-1010, 6:24-29, FIG. 4; USAA-1003, ¶132.

Upon receiving the user's biometric input, the Crypto SE application would "verify or confirm that the user is authorized" through a table/database lookup and "fingerprint matching," with a "positive match" yielding authentication. USAA-1013, 7:44-56, 9:45-64,10:65-11:9; USAA-1010, 9:60-65, 11:44-51; USAA-1003, ¶133.

And, upon authentication, the Crypto SE application would complete the transaction by "look[ing] up the appropriate payment credential," and would "encrypt and transmit the…payment credential" to the remote server. USAA-1013, 3:3-25, 9:55-10:16, 11:10-29, FIG. 2; USAA-1010, 11:62-12:21, 12:22-43; USAA-1003, ¶134.

A POSITA would have been motivated to enhance Mardikar-318's system based on Chhabra in this and other ways because doing so would provide the user with a more convenient and secure process for completing web-based financial transactions, among additional advantages including:

1. Securely and conveniently sending user credentials for SP login. USAA-1013, 1:31-33, 7:65-10:55, FIGS. 4, 5; USAA-1010, 4:9-11, 6:13-29, FIGS. 4, 5a, 5b; USAA-1003, ¶¶135-136.

2. Securely and conveniently sending payment information for transaction completion. USAA-1010, 4:9-11, 6:19-23; USAA-1013, 1:31-33, FIG. 4; USAA-1003, ¶137.
3. Enabling "a payment provider system (PP), such as PayPal" to provide secure "payment processing for online transactions," thereby enhancing user convenience, transaction security, and overall PP utility. USAA-1010, 5:34-47, 6:19-23, FIG. 3; USAA-1013, 1:34-45, 7:65-11:29, FIGS. 4, 5; USAA-1003, ¶138.
4. Providing strong second factor authentication for web-based transactions. USAA-1010, 4:7-17, 5:34-61, FIG.3; USAA-1012, ¶¶ [0005]-[0014], [0020], [0030]-[0031]; USAA-1003, ¶139.

Moreover, configuring Mardikar-318's systems to leverage Chhabra's teachings would have required only routine programming knowledge that was well within the skill of a POSITA. USAA-1003, ¶¶140-141. Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar devices in a similar way, and combining prior art elements according to known methods to yield the predictable results described above. *KSR*, 550 U.S. at 417; USAA-1003, ¶141; USAA-1010, 9:60-65, 10:42-12:43, FIG. 4; USAA-1013, 6:45-48, 9:32-44, 10:40-11:9, 13:58-14:24, FIGS. 3, 5. In addition, the elements of

the resulting combination would each perform functions they had been known to perform prior to the combination. USAA-1003, ¶141. Accordingly, a POSITA would have had more than a reasonable expectation of success when incorporating Chhabra's teachings into Mardikar-318. *Id.*

2. Claim 1

[1.pre]

To the extent the preamble is limiting, Mardikar-Chhabra renders obvious [1.pre]. USAA-1003, ¶231.

Mardikar-318 discloses methods for securing "financial transactions," including methods for authenticating a user based on "biometric information." USAA-1010, Abstract, 1:15-17, 3:11-33, 4:27-36, 6:13-29, 7:28-42, 9:60-65, 10:42-12:30, 13:37-14:19, 15:54-16:45, FIGS. 4, 5a, 5b, 6a; USAA-1003, ¶¶231-235. And, as explained above, Mardikar-Chhabra further enables authenticated web transactions. USAA-1003, ¶¶236-240.

[1.a.i]

A POSITA would have understood and found obvious that a biometric authentication application "on the Crypto SE 420" ("application running on a computing device") evaluates biometric data ("unique user input") received from biometric sensor 440 and, "as part of a registration or certification procedure," generates a "biometric profile" or "biometric signature" ("secret") from the

biometric data. USAA-1010, 7:28-42, 9:60-65, 10:42-11:7; 15:54-16:45, FIGS. 4, 5a, 5b. USAA-1003, ¶241.

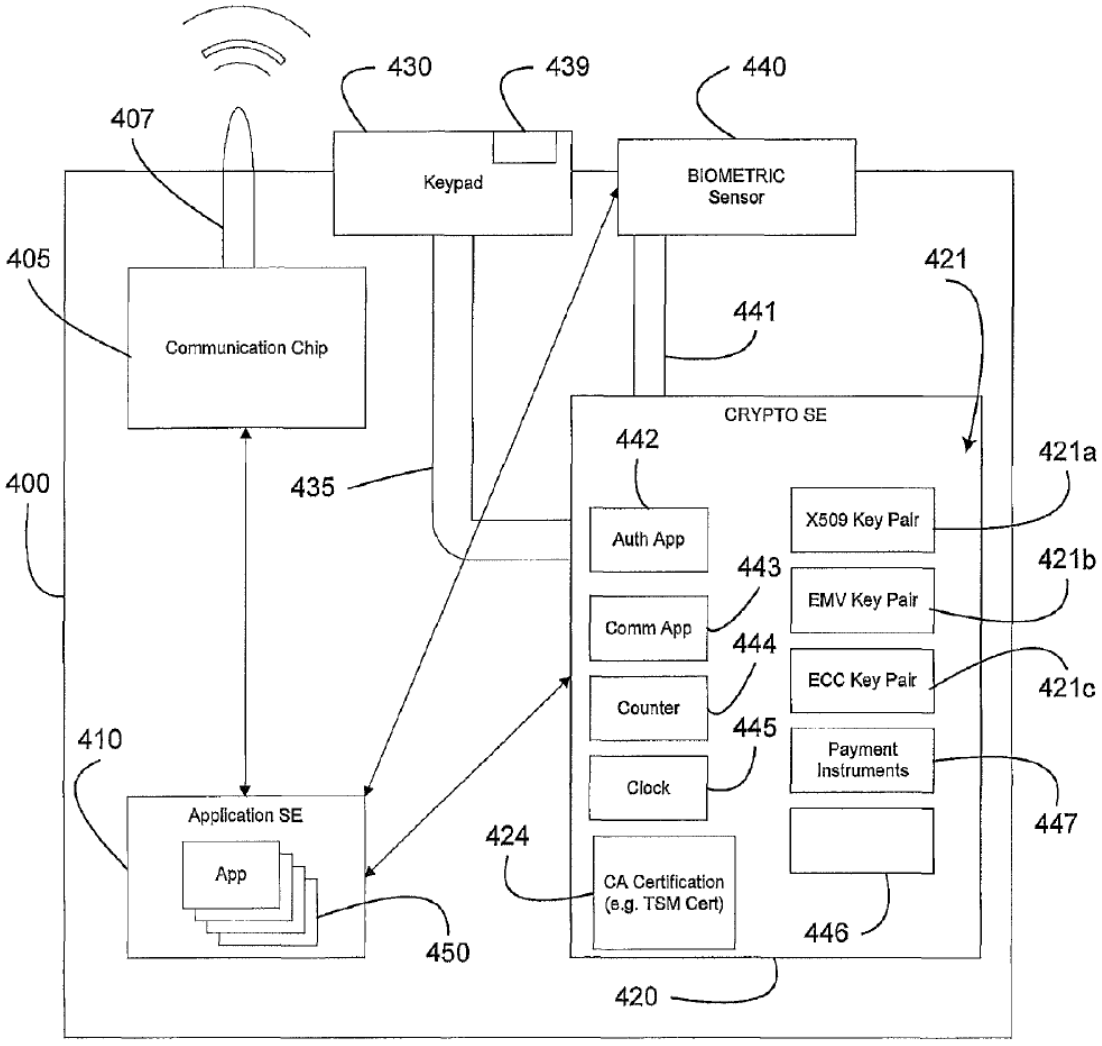
Mardikar-318 explains that "[r]egistration may include" unlocking "a payment credential…by registering the user's unique biometric profile using the biometric sensor 440 (FIG. 4)…by registering a thumb-print twice…." USAA-1010, 10:47-60, 7:28-42, 15:54-16:45; *see also* USAA-1013, 7:44-51, 7:57-64, 8:33-35, 9:31-39, 9:45-50, 11:2-7, FIG.4. For example, device 400's user provides unique user inputs through sensor 440, which captures and sends those inputs to Crypto SE 420, and Crypto SE 420's application generates and stores the user's unique biometric profile/signature based on the received inputs. USAA-1003, ¶¶242-243; USAA-1010, 2:58-59, 7:28-42, 9:60-65, 10:42-11:7, 15:54-16:45, FIGS. 4, 5a, 5b; USAA-1013, Abstract, 7:44-64, 8:33-40, 9:31-39, 9:45-50, 11:2-7, FIG. 4; *see also* USAA-1011, [0040]-[0046], FIGS. 4, 5.

A POSITA would have understood and found obvious that Mardikar-Chhabra's "biometric profile" is a "secret," both because Mardikar-318 and Chhabra emphasize the importance of maintaining the security/secrecy of the user's biometric data, and because sensitive data was commonly understood to be a type of "secret." *See* USAA-1010, 7:28-9:23, FIG. 4; USAA-1013, 5:59-7:64, FIG. 3; *see also* USAA-1017, 136 ("we have two types of secrets: the keys and the data"), 347-362; USAA-1003, ¶244; §I.C.

[1.a.ii]

A POSITA would have understood and found obvious that Mardikar-Chhabra stores the user's "biometric profile" ("secret") at Crypto SE 420 with an identifier and in a directory so as to be retrievable when the user's biometric data ("unique user input") is again applied to the computing device. USAA-1010, Abstract, 2:37-39, 7:41-43, 7:44-57, 9:36-47, 9:60-65, 10:42-11:7, FIGS. 4, 5a, 5b, 15:54-16:45; USAA-1003, ¶¶245-247.

As shown in Mardikar-318's FIG.4 (below), Crypto SE 420 is "arranged for loading and storing…unique biometric authentication information related to a specific user," for comparison to further biometric inputs. USAA-1010, 9:36-65, 10:42-11:7, 11:44-51, FIGS. 4, 5a, 5b; *see also* USAA-1011, [0041]-[0046], FIG. 4; *see also* USAA-1013, 9:45-11:9, 7:44-56.



USAA-1010, FIG. 4

Mardikar and Chhabra describe a multitude of identifiers with which the user's "biometric profile"/"reference digital templates" are stored, including user account identifiers and encryption key identifiers that the Mardikar-Chhabra system uses to retrieve the user's biometric profile for comparison during a transaction. USAA-1003, ¶248; USAA-1010, 10:41-11:7, FIGS. 5a ("TSM issues

cert based on account # or for IMEI #"), 5b ("account #, CVV, SMS encryption and MAC keys are stored in Crypto SE"); USAA-1013, 2:22-34.

For example, Mardikar-318 describes the "biometric profile" "related to" the user as being generated through the registration system illustrated in Mardikar-318's FIGS. 5a and 5b (below), which yields registration of the client device 400 (e.g., with a trusted service manager), unlocking of "a payment credential or CA certificate 424" that is "pre-loaded on the device 400," and association of the certificate 424 with the "user account." USAA-1010, 10:5-11:7, FIGS. 5a, 5b; USAA-1003, ¶249.

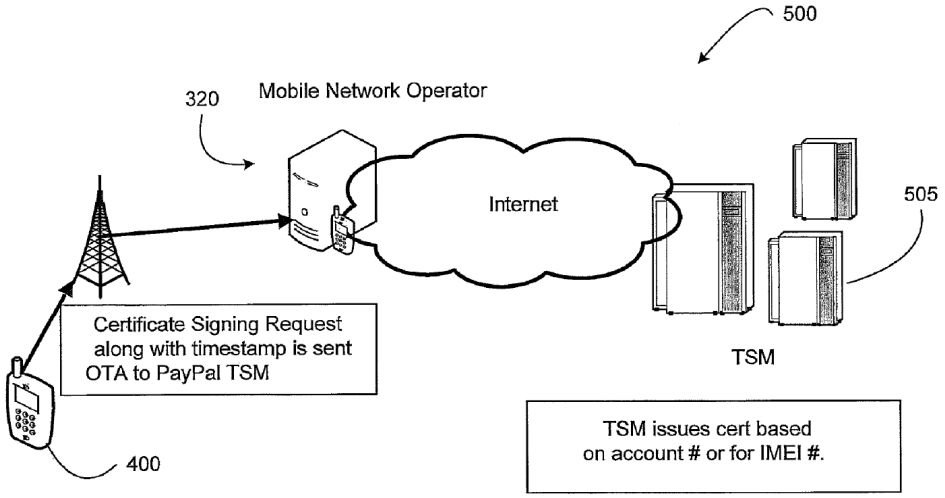


FIG. 5a

USAA-1010, FIG. 5a

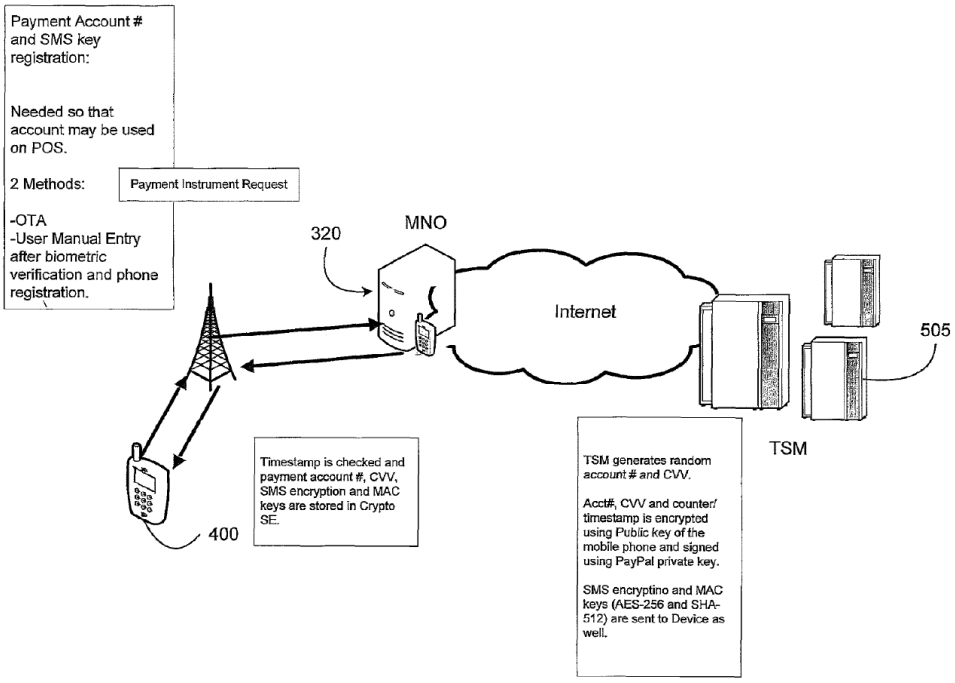


FIG. 5b

USAA-1010, FIG. 5b

For example, "a payment credential or CA certificate 424" may "be unlocked by registering the user's unique biometric profile"; the "certificate 424 is entered and associated with the…user account," and a certificate "based on" the associated account or IMEI number is issued to device 400, which stores the "account #, CVV…encryption and MAC keys...in Crypto SE." USAA-1010, 10:42-11:7, FIGS. 5a, 5b; USAA-1003, ¶250.

[1.a.iii]

As explained *supra* [1.a.ii], *infra* [1.b], [1.c.i], a POSITA would have understood and found obvious that the account or IMEI device numbers, server

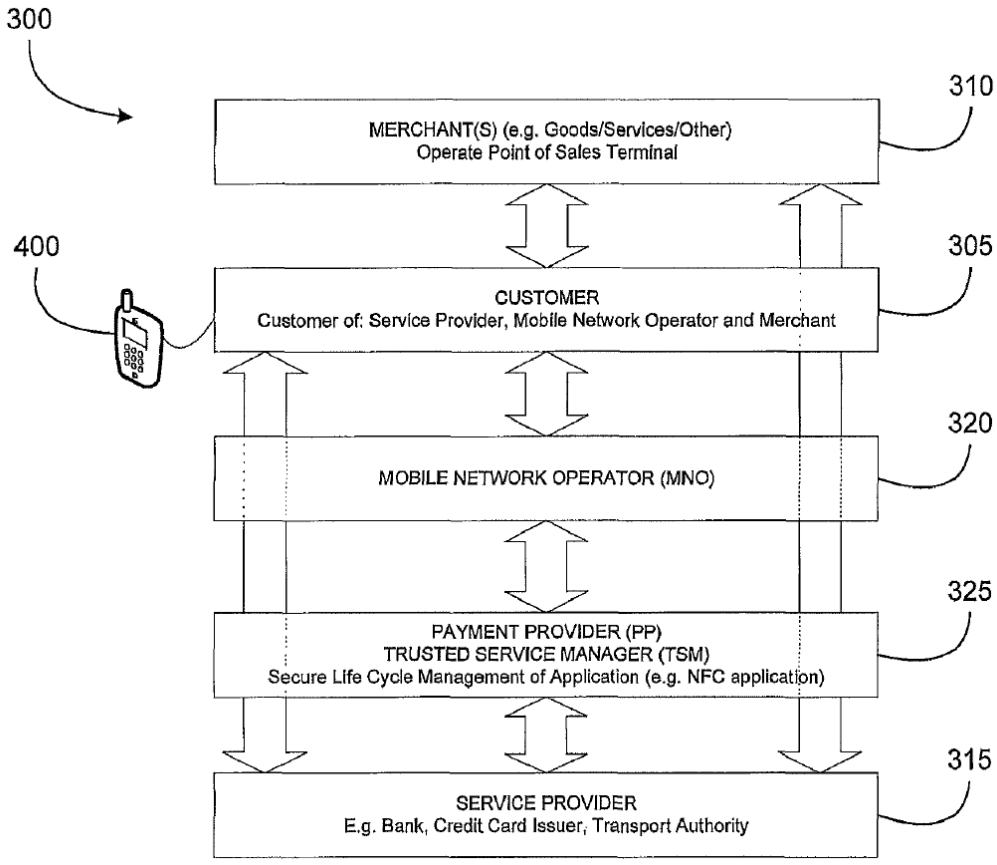
name, server domain, encryption keys, and MAC keys that Mardikar-Chhabra associates through registration with the "biometric profile"/"biometric signature" are identifiers that allow the profile/signature to be retrievable when the user's biometric data ("unique user input") is again applied to device 400 ("the computing device") through biometric sensor 440. USAA-1003, ¶251; USAA-1010, Abstract, 2:37-39, 7:41-43, 7:44-57, 9:36-47, 9:60-65, 10:42-11:7, 12:4-21, 15:54-16:45, FIGS. 4, 5a, 5b; USAA-1013, 2:22-34, 4:18-21, 8:22-43, 10:8-14; USAA-1016, 10, 11-17.

In that regard, Mardikar-Chhabra's Crypto SE application verifies "that the user is authorized" to complete a given transaction through a process including "a table or database lookup, [and] fingerprint matching …." USAA-1013, 8:22-35, 9:45-64, 10:40-55, 10:65-11:9, FIGS. 4, 5; USAA-1010, 9:45-64, 11:44-51, 13:16-21; USAA-1003, ¶252.

A POSITA would have understood and found obvious that the user's registered "biometric profile"/"biometric signature" is stored in a directory with an identifier associating the "biometric profile" with a corresponding account, including identifiers in the associated certificate 424. USAA-1003, ¶253; USAA-1010, 4:20-26, 10:42-11:7, FIGS. 5a, 5b.

Mardikar-318 further explains that a user may maintain accounts with each of several SPs, and register each based on unique user biometric data. USAA-

1010, 2:2-3, 2:11-14, 9:53-65, 10:25-11:7, FIGS. 3, 5b; USAA-1003, ¶254. In that regard, Mardikar-318's FIG. 3 (below) illustrates various SPs, and a POSITA would have understood and found obvious that Crypto SE would, in each registration procedure for each SP, generate a unique "biometric profile"/"biometric signature" that would thereafter be stored in a Crypto SE directory with associated identifiers, so as to be retrievable when the user's biometric data is again applied in the course of a transaction. USAA-1003, ¶255; USAA-1010, 10:55-58, 2:11-14, 3:19-22, 7:27-43, 9:37-43, FIGS. 4, 5a, 5b; USAA-1013, 7:44-51.



USAA-1010, FIG. 3

[1.b]

A POSITA would have understood and found obvious that Mardikar-Chhabra receives at device 400 ("the computing device") from a payment provider's remote server ("remote computer-based station") a first communication including multiple identifiers associated with the user's biometric profile ("secret"). USAA-1003, ¶256; USAA-1010, 6:19-29, 9:60-65, 10:42-11:7, 12:4-21, FIGS. 4, 5a, 5b; USAA-1013, 4:18-21, 8:22-43, 10:8-14, 10:40-55; USAA-1016, 10-17; USAA-1018, 33-63.

As explained above, "a user desiring to complete a financial transaction on a web site…may be automatically redirected to a payment page…." USAA-1013, 10:40-55; USAA-1010, 12:4-21; USAA-1003, ¶¶257-258. In that regard, Chhabra explains that the communication "between computing platform 10 and remote server 20 may utilize a secure connection such as" SSL and/or TLS, and that the client device may "encrypt and transmit" a string including the user's credential(s) "using for example a TLS or an SSL cryptographic protocol." USAA-1013, 4:18-21, 8:22-43, 10:8-14; USAA-1003, ¶259.

As a first step toward completing the secure SSL/TLS transaction, a POSITA would have understood and found obvious that the Mardikar-Chhabra client and remote server would engage in a SSL/TLS "handshake," during which

the client would receive a message from the server including the server's certificate. *See* USAA-1003, ¶260; USAA-1010, 12:4-21, 10:65-67; USAA-1013, 4:18-21, 8:22-43, 10:8-14; USAA-1016, 10-12, 17.

Mardikar-318 expressly describes the SSL handshake as involving verification of a received certificate against the CA certificate already stored in device 400, and a POSITA would have found obvious that Mardikar-Chhabra's device 400 would compare identifiers included in the server's certificate against the same identifiers included in the stored CA certificate. USAA-1003, ¶261; USAA-1010, 12:4-21; USAA-1013, 4:18-21, 8:22-43, 10:8-14; USAA-1016, 10, 11-17.

More, the POSITA would have understood those same identifiers as being associated with the user's biometric profile, at least insofar as Mardikar-318 explains that the "CA certificate" may "be unlocked by registering the user's unique biometric profile," that the "certificate…is entered and associated with the Service Provider's user account," and that device 400 stores the account number, CVV, and "encryption and MAC keys...in Crypto SE." USAA-1003, ¶262; USAA-1010, 4:20-26, 10:42-11:7, FIGS. 5a, 5b.

[1.c.i]

A POSITA would have understood and found obvious that, in response to receiving the message from the remote server, device 400 would prompt the user to

again provide their unique biometric input through biometric sensor 440, to authenticate the user by comparing that input against the user's registered biometric profile, as part of the process of completing the desired financial transaction. USAA-1003, ¶263; USAA-1010, 9:60-65, 11:44-51; USAA-1013, 3:3-25, 7:44-56, 9:55-10:16, 11:10-29; *supra*, [1.pre] (Ground-2A).

Mardikar-318 explains, for example, that if a certificate received during the SSL handshake matches the stored CA certificate, payment information may be provided "using an SSL/IPSec/secure channel." USAA-1010, 12:4-21; USAA-1013, 4:18-21, 8:22-43, 10:8-14. To provide that payment information, a Crypto SE application would first "request user input for authorization" and, upon receiving the user's unique biometric input, "verify or confirm that the user is authorized" through a process including but "not limited to a table or database lookup, [and] fingerprint matching …." USAA-1010, 7:28-42, 9:60-65, 10:42-12:43, 13:16-21, 15:54-16:45, FIGS. 4, 6a; USAA-1013, 6:45-48, 7:44-64, 8:22-35, 9:32-64, 10:40-11:9, 13:58-14:24, FIGS. 3, 4, 5; USAA-1003, ¶¶264-266.

[1.c.ii]

A POSITA would have understood and found obvious that, upon verifying the user's unique biometric input to computing device 400, computing device 400 transmits a second communication to the payment provider's server encoded using the biometric profile. USAA-1003, ¶267.

For example, the Crypto SE application would "look up the appropriate payment credential needed to complete the transaction," and "encrypt and transmit the requisite http request string and payment credential" to the remote server. USAA-1013, 3:3-25, 8:22-44, 9:45-10:16, 11:10-29, FIGS. 2, 4, 5; USAA-1010, 11:62-12:21, 12:22-43, 13:16-21; USAA-1003, ¶¶268-269.

[1.c.iii]

A POSITA would have understood and found obvious that a remote server that sends a first communication including one or more identifiers associated with the user's biometric profile would be the same remote server that receives a second communication that is sent by device 400, and that is encoded using the biometric profile. USAA-1003, ¶270; USAA-1010, 4:20-21, 5:48-51, 5:65-6:1, 6:19-29, 9:60-65, 10:42-11:7, 12:4-21, FIGS. 3, 4, 5a, 5b; USAA-1013, 4:18-21, 8:22-43, 10:8-14, 10:40-55; USAA-1016, 10-17.

For example, Mardikar-318 explains that a trusted service manager may additionally "act as a payment provider system (PP), such as PayPal…." USAA-1010, 6:13-29, 4:20-21, 5:48-51, 5:65-6:1, FIG. 3. A POSITA would have accordingly understood and found obvious that a single remote server operated by, e.g., PayPal, would advantageously/efficiently perform the processes Chhabra describes with respect to both the "remote server 20" and the "database server 30." *See* USAA-1010, 4:20-21, 5:48-51, 5:65-6:1, 6:19-29, 9:60-65, 10:42-11:7, FIGS.

3, 4; USAA-1013, 7:65-11:29, FIGS. 1, 4, 5. USAA-1003, ¶¶271-273.More, a POSITA would have understood and found obvious that, to complete the desired transaction through a secure SSL connection, the client would earlier have to establish that connection to the server through the SSL handshake. USAA-1003, ¶274; USAA-1010, 4:20-21, 5:48-6:29, 9:60-65, 10:42-11:7, 12:4-21, FIGS. 3, 4, 5a, 5b; USAA-1013, 4:18-21, 8:22-43, 10:8-55; USAA-1016, 10-17; USAA-1018, 33-63.

Regarding the second communication being encoded using the secret, a POSITA would have understood and found obvious that the Crypto SE application would "encrypt and transmit the requisite http request string and payment credential over the public network" upon, and as an immediate consequence of, verifying/authenticating the user based on the registered biometric profile to which the payment credential relates. USAA-1003, ¶275; USAA-1013, 8:33-49, 9:65-10:16, 11:10-29, FIGS. 4, 5; USAA-1010, 11:62-12:43, 16:33-40.

In that regard, the POSITA would have understood and found obvious that the second communication is encoded as an immediate consequence of the client device's successful authentication check using the biometric profile, and therefore at least implicitly conveys to the remote server that the user has been authorized to proceed with the requested transaction based on the biometric profile. USAA-

1003, ¶276; USAA-1010, 11:62-12:43, 16:33-40; USAA-1013, 8:33-49, 9:65-10:16, 11:10-29, FIGS. 4, 5**.**

Mardikar-318 further describes enabling a remote server to additionally "identify the client device and its user" through "signature" information that the client device correlates with payment information and encodes into the transmitted communication. USAA-1003, ¶277; USAA-1010, 12:22-43; *see also* USAA-1013, 7:44-56.

From this and related description, a POSITA would have understood and found obvious that the "signature information" in the transmitted second communication that is used to identify the user would be information of the user's registered biometric profile, which could then be used by the TSM for fraud detection as described by Mardikar-318. USAA-1003, ¶278; USAA-1010, 11:62-14:19; USAA-1012, Abstract, FIG. 2, [0029]-[0033]; USAA-1014, [0036], [0082]-[0085].

Indeed, Mardikar-318 interchangeably refers to the registered user authentication data as a "biometric profile"/"biometric signature," and a POSITA would have found obvious that storage of "biometric profile"/"biometric signature" information at the remote server would enable the server to compare the "biometric signature" information transmitted by the client device to the "biometric signature" information stored by the server, for purposes of further

authentication/security. USAA-1003, ¶279; USAA-1010, 7:28-43, 10:5-11:7, 12:31-43, 15:54-16:50, FIGS. 5a, 5b; USAA-1012, Abstract, FIG. 2, [0029]-[0033]; USAA-1013, 7:44-56; USAA-1014, [0036], [0082]-[0085].

In that regard, a POSITA would have understood and found obvious that the second communication is encoded using the biometric profile, at least because[5] information about (i.e., an encoding of) the biometric profile (i.e., the secret) is included in the second communication. USAA-1003, ¶¶280-289.

3. Claim 2

[2]

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[5] To the extent that a POSITA would have understood the recited '993 patent's "transmitting … a second communication encoded using the secret" language to encompass transmitting a second communication that is encoded as an immediate consequence of a process using the secret, and/or that is encoded to implicitly convey information based on the secret, Mardikar-Chhabra additionally renders that language obvious in view of Mardikar-Chhabra's encoding of a message as an immediate consequence of the successful authentication check, and in view of that message at least implicitly conveying that the user has been authorized using the biometric profile. USAA-1003, ¶280; USAA-1010, 11:62-12:43, 16:33-40; USAA-1013, 8:33-49, 9:65-10:16, 11:10-29, FIGS. 4, 5.

Mardikar-318 explains that "client device 400 may be implemented as a wireless telephone." USAA-1010, 4:7-49. For example, as shown in Mardikar-318's FIGS. 4 and 5b (below), client device 400 features a communication chip 405 that enables communication with other devices over a network. USAA-1003, ¶¶290-291; USAA-1010, 1:60-64, 4:7-49, FIGS. 3, 4, 5a, 5b.

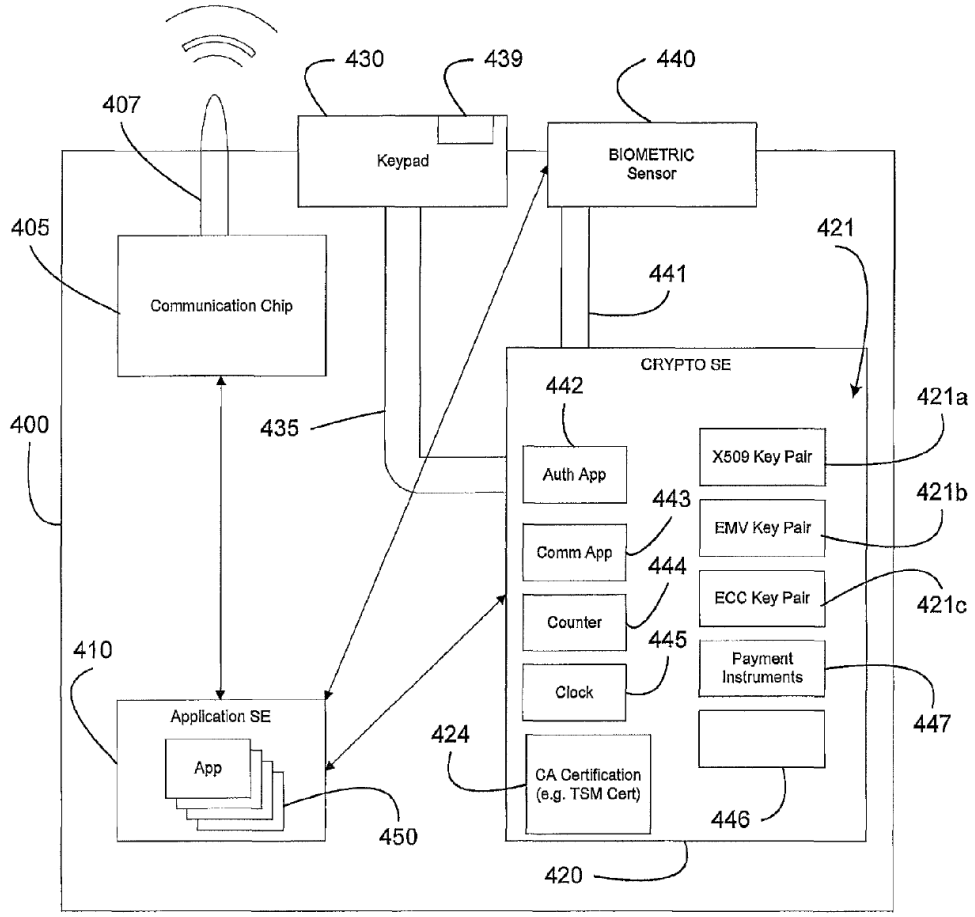

FIG. 4

USAA-1010, FIG.4

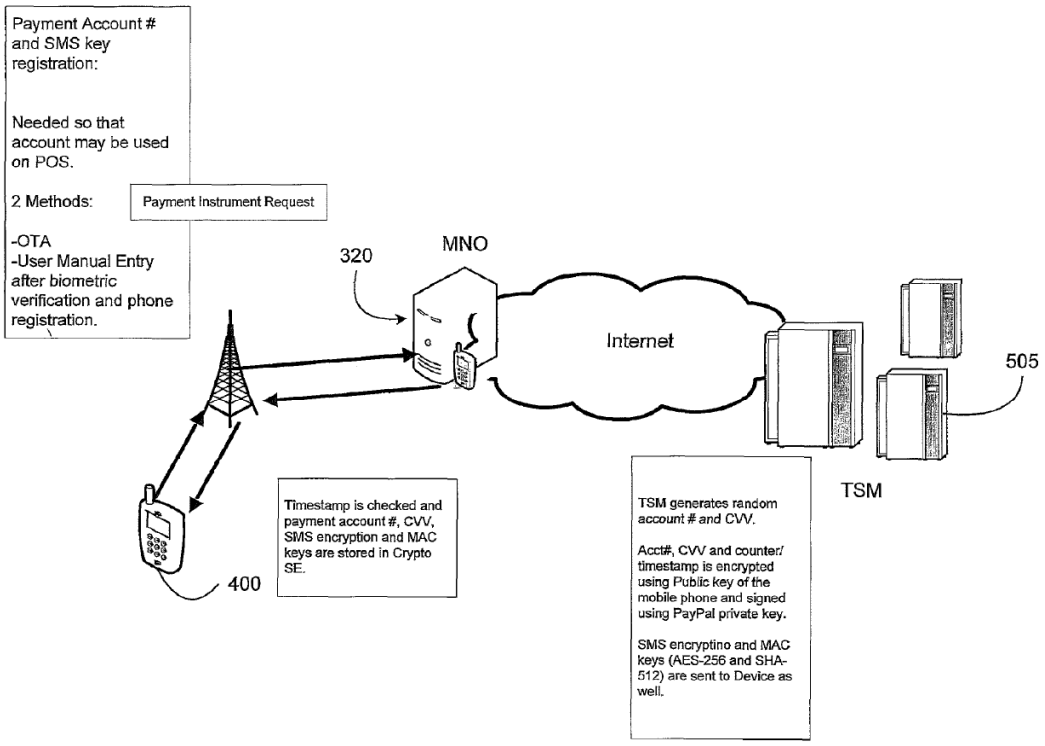

FIG. 5b

USAA-1010, FIG. 5b

A POSITA would have further understood and found obvious that device 400 includes another mobile communication device: Crypto SE 421, a smart card that includes a CPU, non-volatile storage, and means to "establish a direct, secure transmission" with other devices using SSL. USAA-1010, 7:28-42, 7:27-9:23, 9:66-10:4, 12:4-21, FIG. 4; USAA-1013, 5:59-7:64, FIG. 3; *see also* USAA-1017, 347-362; USAA-1003, ¶292.

4. Claim 3

[3]

As explained *supra* [1.a.iii], a user may maintain separate accounts with each of several SPs, and Crypto SE may "register[]…various applications 450 separately for each Service Provider" based on unique user biometric data. USAA-1010, 2:2-3, 2:11-14, 9:53-65, 10:25-11:7, FIGS. 3, 5b; USAA-1003, ¶¶293-296.

A POSITA would have understood and found obvious that Crypto SE would, in each registration for each provider, generate a unique "biometric profile" that would thereafter be stored in a common Crypto SE directory with associated identifiers, and that the identifiers for a given profile (e.g., a provider account number and additional identifiers in the associated certificate) would distinguish that profile from the others. USAA-1003, ¶¶297-298; USAA-1010, 2:11-14, 3:19-22, 7:27-43, 9:37-43, 10:55-58, 11:44-51, 13:16-21, FIGS. 4, 5a, 5b; USAA-1013, 7:44-51, 8:22-35, 9:45-64, 10:40-55, 10:65-11:9, FIGS. 4, 5.

5. Claim 4

[4]

Mardikar-318 describes binding "public keys with respective user identities by means of a certificate authority (CA)" through a "registration and issuance process" by which "the user identity, the public key, their binding, validity conditions and other attributes are made unforgeable in public key certificates issued by the CA." USAA-1010, 10:26-40. A POSITA would have understood and found obvious to bind the user's public key with their unique user identity

based on the user's unique biometric profile, which is already generated by the client device and registered with the CA as part of the same registration process. USAA-1003, ¶¶299-301; USAA-1010, 9:60-65, 10:5-11:7, FIGS. 5a, 5b.

More, a POSITA would have found it obvious to generate the user's key-pair based on the user's unique biometric profile during the registration process for a given SP, and to store the same together in a Crypto SE directory with the corresponding biometric profile and identifiers (e.g., a SP account number and additional identifiers included in the associated certificate), as doing so would provide an efficient, secure, and convenient means of implementing related teachings. USAA-1003, ¶¶302-304; USAA-1010, 7:28-42, 9:37-46, 10:26-14:19, FIGS. 5a, 5b; USAA-1014, [0033]-[0036], [0081]-[0085], FIG. 10, USAA-1015, [0007]-[0009], [0016]-[0017], [0024], FIGS. 1, 1A, 3; USAA-1019, §7.1; USAA-1004, [0009]; USAA-1014, [0008], [0035], [0043], [0117], FIG. 2 (describing generation of a key based on a biometric value), FIG. 6.

The resulting stored secret would include both the biometric profile and generated key-pairs. USAA-1003, ¶305; USAA-1010, 7:28-9:23, FIG. 4; USAA-1013, 5:59-7:64, FIG. 3; USAA-1017, 136.

Moreover, the POSITA would have understood and found obvious that each key-pair generated based on a biometric profile would be stored in the Crypto SE directory along with other key pairs corresponding to different SPs, and that

identifiers would distinguish the stored key pairs. USAA-1003, ¶306; USAA-1010, 11:44-51, 13:16-21, FIGS. 4, 5a, 5b; USAA-1013, 8:22-35, 9:45-64, 10:40-55, 10:65-11:9, FIGS. 4, 5.

6. Claim 6

[6]

As discussed for [1.b], Mardikar-Chhabra's device 400 and the remote server engage in a SSL "handshake," during which the client device sends a message to the server initiating the handshake, and receives during the handshake a message ("first communication") from the server including the server's certificate. USAA-1003, ¶307; USAA-1010, 12:4-21; USAA-1016, 10, 12, 11-17.

A POSITA would have understood that "[t]his initial *handshake* involves heavy use of public key cryptography," and for at least that reason would have found obvious that this first communication includes an encrypted communication. USAA-1016, 13; *see also* USAA-1018, 33-63; USAA-1010, 10:25-40, 12:4-21, FIG. 4; USAA-1013, 4:18-21, 8:22-43, 10:8-14; USAA-1003, ¶308.

7. Claim 7

[7]

As discussed at [1.b], [1.c], and [6], Mardikar-Chhabra's client device receives a first communication from the remote server including the server's certificate as part of the SSL handshake and, after establishing a secure SSL

channel, the client sends a second communication to the server including payment information, among other credentials. USAA-1003, ¶309.

A POSITA would have understood and found obvious that the first communication includes a request for user credentials of the user of the client device for at least two reasons: (1) because the following steps in the SSL handshake involve the client device sending its certificate to the server; and (2) because the first communication is part of a process of establishing a secure SSL channel for the transmission, by the client device to the server, of "payment information" including additional user credentials. USAA-1003, ¶310; USAA-1010, 12:4-26; USAA-1016, 10-17; USAA-1018, 33-63. Indeed, Chhabra expressly describes that the remote server sends a request for the user to provide user credentials "as required to complete the financial transaction…." USAA-1013, 10:40-55, Abstract, 2:22-34, 3:3-14, 3:26-31, 11:11-16, FIGS. 4, 5.

8. Claim 9

[9]

As shown in Mardikar-318's FIG. 6a below), Mardikar-318 describes receiving, via "a biometric sensor" on the client device "biometric information" ("unique user input") prior to generating the "biometric profile" ("secret"). USAA-1010, 3:19-22, 6:42-49, 7:27-43, 10:57, FIG. 4; USAA-1003, ¶311.

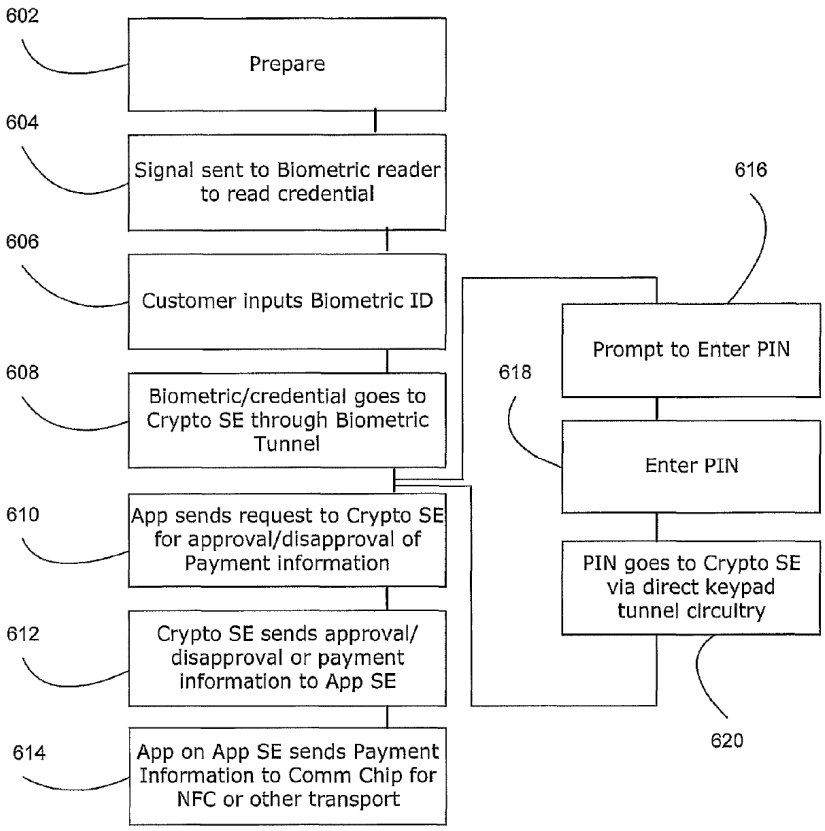

FIG. 6a

USAA-1010, FIG. 6a

From this and related description, a POSITA would have understood and found obvious that the user's unique biometric input is/includes user credentials. USAA-1003, ¶312; USAA-1010, FIG. 6b, 11:44-55; USAA-1013, 2:22-28, 5:60-64, 6:38-45, 7:44-48, 7:57-64, 9:31-39, 11:2-9, FIG. 3.

9. Claim 10

[10]

Mardikar-318 explains that "payment account numbers may be deployed OTA…by the Service Provider along with CVV...." USAA-1010, 11:7-19. A POSITA would have understood and found obvious that deployment of a payment credential by the SP to the client device constitutes an invitation to unlock the deployed credential by creating a unique biometric profile associated with the SP's account, and that that invitation is received prior to generating the biometric signature/profile. USAA-1003, ¶¶313-314; USAA-1010, 7:28-42, 9:25-10:24, 10:41-11:22, 15:54-16:45, FIGS. 4, 5a, 5b; USAA-1013, 7:44-51, 7:57-64, 8:33-35, 9:31-39, 9:45-50, 11:2-7, FIG.4.

10. Claim 11

[11]

A POSITA would have understood and found obvious that the SP's invitation to create the secret is received from the SP's remote computer-based station (e.g., PayPal's remote server). USAA-1003, ¶315; USAA-1010, 5:48-51, 6:19-29, 9:25-10:24, 10:41-11:22, FIGS. 4, 5a, 5b; USAA-1013, 10:40-55, FIGS. 1, 3, 4, 5; *supra,* [10] (Ground-2A).

11. Claim 12

[12]

As explained *supra* [1], the first communication is received by the client device from the remote server as part of the SSL handshake that establishes the

secure channel through with the client device sends the second communication, with both communications occurring in the context of the same web-based transaction ("two related communications of a communication session"). USAA-1003, ¶316; USAA-1010, 6:19-29, 9:60-65, 10:42-11:7, 12:4-21, FIGS. 4, 5a, 5b; USAA-1013, 4:18-21, 8:22-43, 10:8-55; USAA-1016, 10-17; USAA-1018, 33-63.

12. Claim 13

[13.pre]:

To the extent the preamble is limiting, Mardikar-Chhabra renders obvious [13.pre]. USAA-1003, ¶317.

As explained *supra* [1], [2], Mardikar-Chhabra's client device 400 includes Crypto SE, a "smart card" computer that "contain[s] a CPU and some non-volatile storage," and means to "establish a direct, secure transmission between the Crypto SE 410" and other devices using SSL. USAA-1010, 7:28-42, 7:27-9:23, 9:66-10:4, 12:4-21, FIG. 4; USAA-1013, 5:59-7:64, FIG. 3; USAA-1017, 347-362; USAA-1003, ¶317.

Accordingly, a POSITA would have understood and found obvious that Mardikar-Chhabra's Crypto SE is a token for use in connection with secure communications. USAA-1003, ¶318; USAA-1010, 4:37-49, 14:20-23, FIG. 4; USAA-1013, 3:44-57; USAA-1017, 353; *see also* USAA-1001, 21:57-59.

[13.a]

Mardikar-318 explains that Crypto SE, a "smart card" that "contain[s] a CPU and some non-volatile storage," both performs "its own cryptographic operations" and also includes means to "establish a direct, secure transmission between the Crypto SE" and other devices using SSL. USAA-1010, 7:28-9:23, 9:60-10:4, 12:4-21, FIG. 4; USAA-1013, 5:59-7:64, FIG. 3; USAA-1017, 347-362; USAA-1003, ¶319.

For example, Mardikar-318's FIG. 4 (reproduced below) illustrates "a biometric authentication application" 442 that "reside[s] on the Crypto SE 420…" USAA-1003, ¶320; USAA-1010, 7:44-63, 9:60-65, FIG. 4.

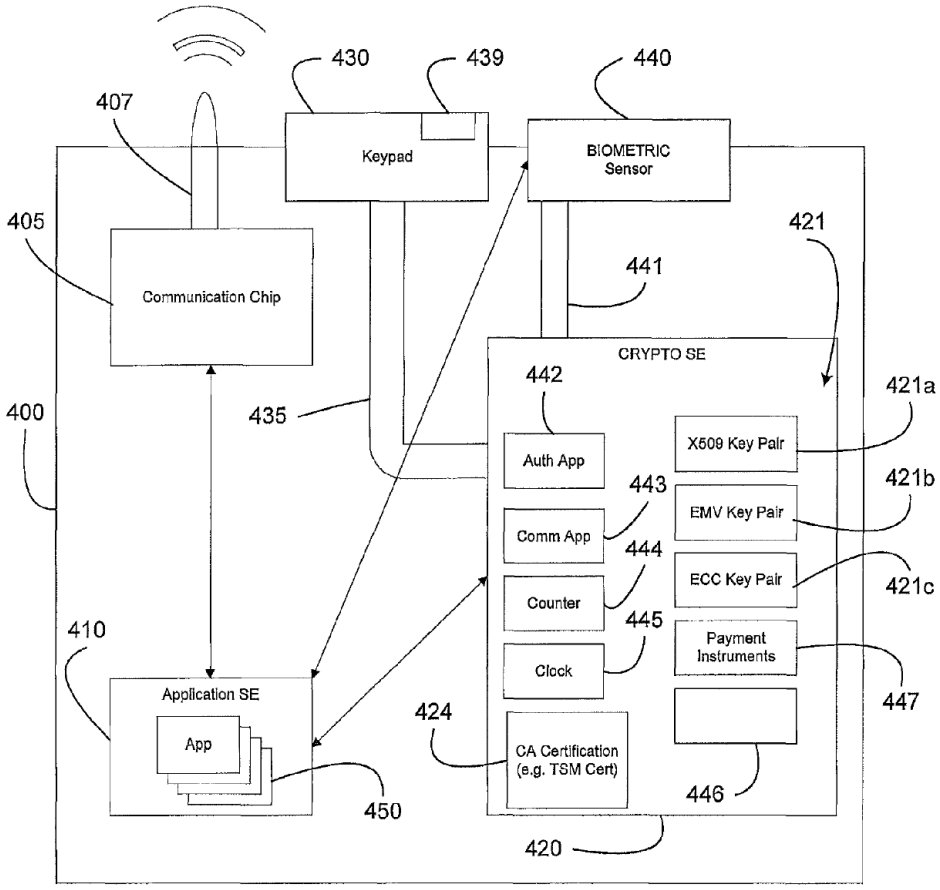

FIG. 4

USAA-1010, FIG. 4

Accordingly, a POSITA would have understood and found obvious that the Crypto SE includes a processor and a memory communicatively coupled to the processor, that the memory stores the authentication application ("security application") for execution by the processor, and that the authentication application, when executed by the processor, causes the processor to perform the

authentication, cryptographic, and communication operations involved in enabling a secure web-based transaction. USAA-1003, ¶321; USAA-1010, 15:5-18, FIG. 4; USAA-1012, [0037]; USAA-1013, 4:41-5:9, 12:30-37, FIG. 3.

[13.b.i]-[13.b.iii], [13.c], [13.d.i]-[13.d.ii]

Supra, [1.a.i]-[1.a.iii], [1.c.i]-[1.c.iii][6] (Ground-2A).

13. Claim 14

[14]

Supra, [3] (Ground-2A).

14. Claim 15

[15]

Supra, [4] (Ground-2A).

15. Claim 17

[17]

Supra, [1.b] (Ground-2A)[7]

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[6] Mardikar-Chhabra's ***second communication*** (message containing payment information to complete a transaction) discussed for [1.c.iii] corresponds to the ***first communication*** of [13.d.ii].

[7] Mardikar-Chhabra's ***first communication*** (first message from the server including the server's certificate) discussed for [1.b] corresponds to the ***second communication*** of [17].

16. Claim 18

[18]

Supra, [7] (Ground-2A).

17. Claim 20

[20]

Supra, [9] (Ground-2A).

18. Claim 21

[21]

Supra, [10] (Ground-2A).

19. Claim 22

[22.pre]

Supra, [1], [2] (Ground-2A).

[22.a]-[22.d.ii]

Supra, [13.a]-[13.d.ii] (Ground-2A).

[22.e]

Supra, [9], [20] (Ground-2A).

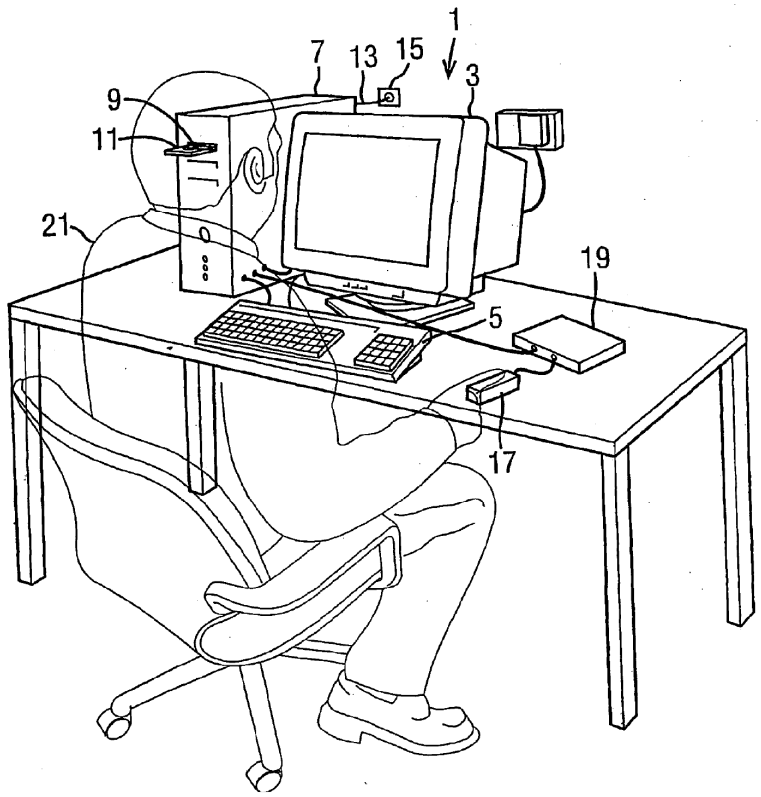
E. GROUND 2B – Mardikar-318, Chhabra, and Duffy Render Claims 1-4, 6-15, and 17-22 Obvious

1. Prior Art and Proposed Combination

(a) *Duffy*

Duffy describes "a computer system including a fingerprint sensor and a cryptography unit" that generates "a cryptographic key" "using biometric data…." USAA-1003, ¶142; USAA-1014, Abstract, [0001], [0015], [0029], [0088], FIG. 1.

Fig. 1



USAA-1014, FIG. 1

Duffy teaches mitigating system vulnerabilities associated with storage of cryptographic keys by storing a combination of (1) an intermediate key ("biometric value K_{bio}") (reflecting a post-enrollment biometric capture) with (2) a "mapping key K_{map}" (generated during biometric enrollment), without keeping a permanent record of the private key, which can be regenerated whenever needed by combining the biometric value and the mapping key. USAA-1014, Abstract,

[0003], [0008], [0031]-[0044], [0081], [0113], [0117], FIGS. 2, 5, 6. USAA-1003, ¶¶143-154.

(b) *Mardikar-Chhabra-Duffy*

A POSITA would have been motivated to integrate Duffy's technology into Mardikar-Chhabra's system, including the use of K_{map}, to further enhance security associated with a user's private keys by regenerating an entire key whenever needed, while permanently storing the K_{map} portion generated during the enrollment/registration process, thereby reducing the ability of malicious actors to compromise the user's cryptographic engine. USAA-1003, ¶155; USAA-1014, [0088].

For example, Mardikar-Chhabra-Duffy would generate a "mapping key" from a combination of a biometric value (e.g., Mardikar-Chhabra's biometric signature/profile) with a private key, storing the mapping key locally (e.g., in Crypto SE), and only forming the entire private key whenever needed, based on the mapping key (K_{map}) and the biometric value. USAA-1003, ¶¶156-160; USAA-1010, 7:26-51, 10:54-62; USAA-1013, 2:22-28, 5:60-64, 7:44-64; USAA-1014, Abstract, [0008], [0031]-[0036], [0043]-[0044], [0113], [0117], FIGS. 2, 6, 7A, 7B, 8.

Configuring Mardikar-Chhabra's system to leverage Duffy's teachings would have required only routine programming knowledge that was well within

the skill of a POSITA. USAA-1003, ¶161. Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar devices in a similar way to yield the predictable results described above. *KSR*, 550 U.S. at 417; USAA-1003, ¶¶161-162; *e.g.*, USAA-1010, 4:37-5:1 (client device 400), 7:27-8:47, 10:25-11:7, 11:11-14:28; USAA-1013, 5:59-7:21, 7:44-64, 7:65-10:24, 10:25-11:29; USAA-1014, [0029], [0030-[0044], [0088]. Accordingly, a POSITA would have had a reasonable expectation of success when incorporating Duffy's teachings into Mardikar-Chhabra. *Id.*

2. Claim 1

Mardikar-Chhabra-Duffy renders claims 1-3, 6-14, 17-22 obvious for at least the same reasons discussed above in the analyses of these claims under the Mardikar-Chhabra ground. *Supra*, §III.D; USAA-1003, ¶¶337-339. If the Board were to require the recited "secret" appearing in element [1.a.i] and [1.c.iii] to represent or include a cryptographic key, Mardikar-Chhabra-Duffy further renders obvious those limitations. As described above, Mardikar-Chhabra-Duffy generates a modified biometric signature/profile ("secret"), which is a mapping key, through a combination of a biometric value and a private key, in accordance with Duffy.

Mardikar-Chhabra-Duffy also further renders obvious [1.c.iii]'s "encoded using the secret." Specifically, Duffy describes "generat[ing] a digital signature, using the private key K_{pri}…to authenticate the source and integrity of a message,"

which allows the server to execute any underlying transaction. USAA-1014, [0036], [0033], [0083]-[0085], FIG. 10; USAA-1003, ¶340.

A POSITA would have found obvious that Mardikar-Chhabra-Duffy's message with payment credential ("second communication") to complete a transaction is signed ("encoded") with a digital signature, and that the private key used to create the digital signature is regenerated using the modified biometric signature/profile of the user ("using the secret"), per Duffy. USAA-1003, ¶341.

3. Claim 4

[4]

For example, as discussed above, the modified biometric signature/profile ("secret") is a mapping key, which is a combination of a biometric value and a private key ("comprises an encryption key"). USAA-1003, ¶342; §III.E.1(a)-(b); USAA-1014, [0008], [0043], FIG. 2, FIG. 6, [0117].

The private key is used for encryption ("encryption key"). USAA-1014, [0002], [0082]; *supra*, [4] (Ground-2A); USAA-1003, ¶343.

As discussed above for [3], Mardikar-Chhabra's biometric signature/profile ("secret") associated with one SP is stored in the directory along with other biometric signatures/profiles ("other secrets") associated with other SPs, and identifiers for a particular SP are used to distinguish a biometric signature/profile for that SP from the other biometric signatures/profiles for other SPs. *Supra*, [3]

(Ground-2A); USAA-1013, 10:53-55. Likewise, in Mardikar-Chhabra-Duffy, identifiers for a particular SP are used to distinguish the private key ("encryption key") (part of the modified biometric signature/profile for that SP) from the other private keys ("other encryption keys") in the other biometric signatures/profiles for other SPs. USAA-1003, ¶¶344-345.

4. Claim 8

[8]

Mardikar-318 describes encrypting its "keys," and "keys are stored in Crypto SE." USAA-1003, ¶346; USAA-1010, 13:54-61, FIG. 5b; USAA-1012, [0040].

A POSITA would have understood and found obvious that Mardikar-Chhabra-Duffy's mapping key (the modified biometric signature/profile) ("secret"), like the other "keys," is also encrypted prior to being stored in the directory, to achieve further enhanced security. *Supra*, [1.a.ii] and [4] (Ground-2B); USAA-1005, Abstract, 2:42-5:11, 4:60-65; USAA-1003, ¶347.

5. Claim 15

[15]

Supra, [4] (Ground-2B).

6. Claim 19

[19]

Supra, [8] (Ground-2B).

F. GROUNDS 2C & 2D – Mardikar-Chhabra-Howard and Mardikar-Chhabra-Duffy-Howard Render Obvious Claims 5 and 16

1. Proposed Combination

(a) *Mardikar-Chhabra-Howard & Mardikar-Chhabra-Duffy-Howard*

As discussed in above in §§III.D-E, Mardikar-Chhabra and Mardikar-Chhabra-Duffy store the secret and corresponding encryption key in a directory along with other secrets and keys. To further enhance security by confusing potential attackers, a POSITA would have been motivated and found it obvious to further store decoys in the directory, in accordance with Howard's teachings. USAA-1003, ¶163; USAA-1007, [0012], [0044], [0048], FIG. 4; USAA-1009, 15:14-22. For example, the biometric profile/signature comprising an encryption key would be stored with one or more decoys. USAA-1003, ¶164; USAA-1007, [0044], [0048]; *supra*, [1], [3], [4] (Grounds-2A and 2B).

A POSITA would have reasonably expected success in incorporating Howard's use of decoys within Mardikar-Chhabra and Mardikar-Chhabra-Duffy, because the change would be the nothing more than the application of a known technique to improve similar devices in a similar way, to yield predictable results. *KSR*, 550 U.S. at 417; USAA-1003, ¶165.

2. Claim 5

[5]

Both Mardikar-Chhabra-Howard and Mardikar-Chhabra-Duffy-Howard render obvious [5]. USAA-1003, ¶350; USAA-1007, [0012], [0044], [0048]; *supra*, §III.F.1(a), [1], [3], [4] (Grounds-2A and 2B). As discussed above, a POSITA would have understood and found obvious that in the Mardikar-Chhabra-Howard and Mardikar-Chhabra-Duffy-Howard combinations, the secret (biometric profile/signature) comprising an encryption key, which is associated with a particular SP, is stored in a directory along with one or more decoys ("decoy encryption keys"), and the identifiers associated with that particular SP are used to distinguish the encryption key from other encryption keys, including from decoy encryption keys. *Id.*

3. Claim 16

[16]

Supra, [5] (Ground-2C) and [13] (Ground-2A).

IV. §314(a)

Consistent with Congressional intent and the goals of *Fintiv*, USAA respectfully asks the Board to reach the merits of the challenges raised herein, which are both compelling and supported by substantial evidence including Dr. Nielson's robustly corroborated testimony. *Apple Inc. v. Fintiv, Inc.*, IPR2020-

00019, Paper 11, 6 (PTAB Mar. 20, 2020)(precedential)("*Fintiv*"). This evidence, if unrebutted, would compel a conclusion that the Challenged Claims are unpatentable, which would go far toward efficiently resolving a dispute that would otherwise continue to interfere with USAA's mission of providing services to members of the U.S. Armed Forces and their families.

Moreover, as demonstrated below, the *Fintiv* factors favor institution.

Factor 1 is neutral; neither party has requested a stay in co-pending litigation. *See Fintiv*, 12; *Sand Revolution II, LLC v. Cont'l Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24, 7 (PTAB Jun. 16, 2020)("*Sand Revolution*")(informative); *Sotera Wireless Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12, 14 (PTAB Dec. 1, 2020)("Sotera")(precedential).

Factor 2 strongly favors institution. Based on PACid's 3/27/2024 filing date, an average time-to-trial of 33.9 months, and the 18-month IPR schedule, the Board is expected to issue its FWD in October 2026, three months ahead of the statistically-indicated January 2027 district court trial date. USAA-1020, 30; USAA-1022, 37. Moreover, the District Court only just resolved a motion to dismiss with the case effectively stayed during its pendency, so any reasonable time-to-trial estimation cannot be calculated from Patent Owner's complaint.

Factor 3 strongly favors institution; Petitioner filed this Petition immediately after the Court's 2/28/2025 denial of a motion to dismiss. By any

objective standard, Petitioner filed this petition at an early stage of the litigation, which "weigh[s] against exercising the authority to deny institution under *NHK*." *Apple Inc. v. SEVEN Networks*, *LLC*, IPR2020-00255, Paper 13, 11-12 (PTAB Jul. 28, 2020)(quoting *Fintiv*, 11). The parties have yet to file infringement contentions, invalidity contentions, or claim construction briefs; no scheduling order has been entered and discovery has not begun.

Factor 4 strongly favors institution; Patent Owner only alleges infringement of claims 1-4, 6, and 8-12, while this Petition challenges claims 1-22. USAA-1020, 11-14. Accordingly, a material number of Challenged Claims will likely be unaddressed in the litigation. *See SEVEN Networks*, 15-20.

Factor 5 should, at worst, be neutral. The *Fintiv* decision says nothing about weighing Factor 5 in favor of denial when the petitioner and the defendant are the same; *Fintiv* instead notes that "if a petitioner is unrelated" the Board has weighed that "fact against exercising discretion to deny institution." *Fintiv*, 13-14; *see also Snap, Inc. v. SRK Technology LLC*, IPR2020-00820, Paper 15 at 16 (Oct. 21, 2020)("*Snap*")(precedential).

Factor 6 strongly favors institution. The strength of the merits alone outweighs any potential inefficiencies. *Fintiv*, 14-15 (noting under Factor 6 that "if the merits of a ground raised in the petition seem particularly strong…institution of a trial may serve…overall system efficiency and integrity").

With Factors 2-4 and 6 disfavoring denial and Factors 1 and 5 neutral, discretion should not be exercised to deny institution. *Fintiv*, 19.

V. CONCLUSION AND PAYMENT OF FEES

The Challenged Claims are unpatentable. Please charge fees to Deposit Account 06-1050.

VI. MANDATORY NOTICES UNDER 37 C.F.R §42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. §42.8(b)(1)

Petitioner USAA Federal Savings Bank is the real party-in-interest.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for inter partes review for the '993 Patent. The '993 Patent is the subject of a number of civil actions including: *PACid Technologies, LLC v. USAA Federal Savings Bank*, 1-24-cv-00321 (WDTX), filed March 27, 2024; *PACid Technologies, LLC v. PNC Bank, NA f/k/a BBVA USA*, 1-24-cv-00271 (WDTX), filed March 12, 2024; *PACid Technologies, LLC v. Citibank NA*, 1-24-cv-00272 (WDTX), filed March 12, 2024; *PACid Technologies, LLC v. Bank of America Corporation et al.*, 1-23-cv-00607 (WDTX), filed May 30, 2023; *PACid Technologies, LLC v. Bank of America Corporation et al*., 1-23-cv-00251 (WDTX), filed March 7, 2023; *PACid Technologies, LLC v. Gemalto, Inc.*, 6-19-cv-00154 (WDTX); filed February 14, 2019; and *PACid Technologies, LLC v. Samsung Electronics Co., Ltd. et al.*, 2-18-cv-00133 (EDTX), filed April 6, 2018.

C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

USAA provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

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Respectfully submitted,

Dated 3/26/2025

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CERTIFICATION UNDER 37 CFR §42.24

Under the provisions of 37 CFR §42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter partes* Review totals 13,977 words, which is less than the 14,000 allowed under 37 CFR §42.24.

Dated 3/26/2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on March 26, 2025, a complete and entire copy of this Petition for *Inter partes* Review, Power of Attorney, and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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