

(12) **United States Patent**
Ilincic

(10) **Patent No.:** **US 12,393,926 B2**
(45) **Date of Patent:** ***Aug. 19, 2025**

(54) **SYSTEMS AND METHODS FOR DATA ACCESS CONTROL USING A SHORT-RANGE TRANSCEIVER**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **Capital One Services, LLC**, McLean, VA (US)

4,683,553 A 7/1987 Mollier
4,827,113 A 5/1989 Rikuna
(Continued)

(72) Inventor: **Rajko Ilincic**, Annandale, VA (US)

FOREIGN PATENT DOCUMENTS

(73) Assignee: **Capital One Services, LLC**, McLean, VA (US)

CA 2847636 A1 * 2/2011 G06Q 20/10
CA 3010336 7/2017
CN 101192295 6/2008

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(Continued)

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

Batina, Lejla and Poll, Erik, "SmartCards and RFID", Course PowerPoint Presentation for IPA Security Course, Digital Security at University of Nijmegen, Netherlands (date unknown) 75 pages.

(Continued)

(21) Appl. No.: **17/589,803**

(22) Filed: **Jan. 31, 2022**

(65) **Prior Publication Data**

US 2022/0156720 A1 May 19, 2022

Primary Examiner — Sonji N Johnson

(74) *Attorney, Agent, or Firm* — KDW Firm PLLC; Andrew D. Kasnevich

(57)

ABSTRACT

Systems and methods for controlling data access through the interaction of a short-range transceiver, such as a contactless card, with a client device are presented. An exemplary system and method may include establishing a database storing information for a plurality of accounts, receiving from a client device of the second account holder an account link request to link a first account with a second account, the account link request generated in response to a tap action between a contactless card and the client device, transmitting to a client device of the first account holder a link approval request to approve the account link request, receiving from the first account holder client device, a link approval message generated in response to an indication by the first account holder approving the account link request, and transmitting to the second account holder client device an account link.

Related U.S. Application Data

(63) Continuation of application No. 17/088,117, filed on Nov. 3, 2020, now Pat. No. 11,270,291, which is a (Continued)

(51) **Int. Cl.**

G06Q 20/34 (2012.01)

G06Q 20/36 (2012.01)

(52) **U.S. Cl.**

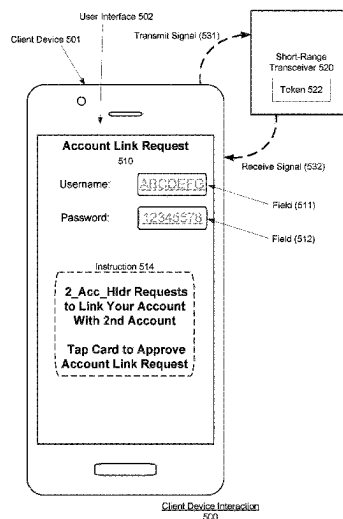
CPC **G06Q 20/352** (2013.01); **G06Q 20/341** (2013.01); **G06Q 20/3672** (2013.01); **G06Q 20/3674** (2013.01)

(58) **Field of Classification Search**

CPC G06Q 20/352; G06Q 20/341; G06Q 20/3672; G06Q 20/3674

See application file for complete search history.

20 Claims, 9 Drawing Sheets



Related U.S. Application Data

continuation of application No. 16/863,952, filed on
Apr. 30, 2020, now Pat. No. 10,861,006.

(56)

References Cited

U.S. PATENT DOCUMENTS

4,910,773 A	3/1990	Hazard et al.	7,287,692 B1	10/2007	Patel et al.
5,036,461 A	7/1991	Elliott et al.	7,290,709 B2	11/2007	Tsai et al.
5,363,448 A	11/1994	Koopman, Jr. et al.	7,306,143 B2	12/2007	Bonneau, Jr. et al.
5,377,270 A	12/1994	Koopman, Jr. et al.	7,319,986 B2	1/2008	Praisner et al.
5,533,126 A	7/1996	Hazard	7,325,132 B2	1/2008	Takayama et al.
5,537,314 A	7/1996	Kanter	7,373,515 B2	5/2008	Owen et al.
5,592,553 A	1/1997	Guski et al.	7,374,099 B2	5/2008	de Jong
5,616,901 A	4/1997	Crandall	7,375,616 B2	5/2008	Rowse et al.
5,666,415 A	9/1997	Kaufman	7,380,710 B2	6/2008	Brown
5,764,789 A	6/1998	Pare, Jr. et al.	7,424,977 B2	9/2008	Smets et al.
5,768,373 A	6/1998	Lohstroh et al.	7,453,439 B1	11/2008	Kushler et al.
5,778,072 A	7/1998	Samar	7,472,829 B2	1/2009	Brown
5,796,827 A	8/1998	Coppersmith et al.	7,487,357 B2	2/2009	Smith et al.
5,832,090 A	11/1998	Raspotnik	7,568,631 B2	8/2009	Gibbs et al.
5,883,810 A	3/1999	Franklin et al.	7,584,153 B2	9/2009	Brown et al.
5,901,874 A	5/1999	Deters	7,597,250 B2	10/2009	Finn
5,929,413 A	7/1999	Gardner	7,628,322 B2	12/2009	Holtmanns et al.
5,960,411 A	9/1999	Hartman et al.	7,652,578 B2	1/2010	Braun et al.
6,021,203 A	2/2000	Douceur et al.	7,689,832 B2	3/2010	Talmor et al.
6,049,328 A	4/2000	Vanderheiden	7,703,142 B1	4/2010	Wilson et al.
6,058,373 A	5/2000	Blinn et al.	7,748,609 B2	7/2010	Sachdeva et al.
6,061,666 A	5/2000	Do et al.	7,748,617 B2	7/2010	Gray
6,105,013 A	8/2000	Curry et al.	7,748,636 B2	7/2010	Finn
6,199,114 B1	3/2001	White et al.	7,762,457 B2	7/2010	Bonalle et al.
6,199,762 B1	3/2001	Hohle	7,789,302 B2	9/2010	Tame
6,216,227 B1	4/2001	Goldstein et al.	7,793,851 B2	9/2010	Mullen
6,227,447 B1	5/2001	Campisano	7,796,013 B2	9/2010	Murakami et al.
6,282,522 B1	8/2001	Davis et al.	7,801,799 B1	9/2010	Brake, Jr. et al.
6,324,271 B1	11/2001	Sawyer et al.	7,801,829 B2	9/2010	Gray et al.
6,342,844 B1	1/2002	Rozin	7,805,755 B2	9/2010	Brown et al.
6,367,011 B1	4/2002	Lee et al.	7,809,643 B2	10/2010	Phillips et al.
6,402,028 B1	6/2002	Graham, Jr. et al.	7,827,115 B2	11/2010	Weller et al.
6,438,550 B1	8/2002	Doyle et al.	7,828,214 B2	11/2010	Narendra et al.
6,501,847 B2	12/2002	Helot et al.	7,848,746 B2	12/2010	Juels
6,631,197 B1	10/2003	Taenzer	7,882,553 B2	2/2011	Tuliani
6,641,050 B2	11/2003	Kelley et al.	7,900,048 B2	3/2011	Andersson
6,655,585 B2	12/2003	Shinn	7,908,216 B1	3/2011	Davis et al.
6,662,020 B1	12/2003	Aaro et al.	7,922,082 B2	4/2011	Muscato
6,721,706 B1	4/2004	Strubbe et al.	7,933,589 B1	4/2011	Mamdani et al.
6,731,778 B1	5/2004	Oda et al.	7,949,559 B2	5/2011	Freiberg
6,779,115 B1	8/2004	Naim	7,954,716 B2	6/2011	Narendra et al.
6,792,533 B2	9/2004	Jablon	7,954,723 B2	6/2011	Charrat
6,829,711 B1	12/2004	Kwok et al.	7,962,369 B2	6/2011	Rosenberg
6,834,271 B1	12/2004	Hodgson et al.	7,993,197 B2	8/2011	Mamdani et al.
6,834,795 B1	12/2004	Rasmussen et al.	8,005,426 B2	8/2011	Huomo et al.
6,852,031 B1	2/2005	Rowe	8,010,405 B1	8/2011	Bortolin et al.
6,865,547 B1	3/2005	Brake, Jr. et al.	RE42,762 E	9/2011	Shin
6,873,260 B2	3/2005	Lancos et al.	8,041,954 B2	10/2011	Plesman
6,877,656 B1	4/2005	Jaros et al.	8,060,012 B2	11/2011	Sklovsky et al.
6,889,198 B2	5/2005	Kawan	8,074,877 B2	12/2011	Mullen et al.
6,905,411 B2	6/2005	Nguyen et al.	8,082,450 B2	12/2011	Frey et al.
6,910,627 B1	6/2005	Simpson-Young et al.	8,095,113 B2	1/2012	Kean et al.
6,971,031 B2	11/2005	Haala	8,099,332 B2	1/2012	Lemay et al.
6,990,588 B1	1/2006	Yasukura	8,103,249 B2	1/2012	Markison
7,006,986 B1	2/2006	Sines et al.	8,108,687 B2	1/2012	Ellis et al.
7,085,931 B1	8/2006	Smith et al.	8,127,143 B2	2/2012	Abdallah et al.
7,127,605 B1	10/2006	Montgomery et al.	8,135,648 B2	3/2012	Oram et al.
7,128,274 B2	10/2006	Kelley et al.	8,140,010 B2	3/2012	Symons et al.
7,140,550 B2	11/2006	Ramachandran	8,141,136 B2	3/2012	Lee et al.
7,152,045 B2	12/2006	Hoffman	8,150,321 B2	4/2012	Winter et al.
7,165,727 B2	1/2007	de Jong	8,150,767 B2	4/2012	Wankmueller
7,175,076 B1	2/2007	Block et al.	8,186,602 B2	5/2012	Itay et al.
7,202,773 B1	4/2007	Oba et al.	8,196,131 B1	6/2012	von Behren et al.
7,206,806 B2	4/2007	Pineau	8,215,563 B2	7/2012	Levy et al.
7,232,073 B1	6/2007	de Jong	8,224,753 B2	7/2012	Atef et al.
7,246,752 B2	7/2007	Brown	8,232,879 B2	7/2012	Davis
7,254,569 B2	8/2007	Goodman et al.	8,233,841 B2	7/2012	Griffin et al.
7,263,507 B1	8/2007	Brake, Jr. et al.	8,245,292 B2	8/2012	Buer
7,270,276 B2	9/2007	Vayssiere	8,249,654 B1	8/2012	Zhu
7,278,025 B2	10/2007	Saito et al.	8,266,451 B2	9/2012	Leydier et al.
			8,285,329 B1	10/2012	Zhu
			8,302,872 B2	11/2012	Mullen
			8,312,519 B1	11/2012	Bailey et al.
			8,316,237 B1	11/2012	Felsher et al.
			8,332,272 B2	12/2012	Fisher
			8,365,988 B1	2/2013	Medina, III et al.
			8,369,960 B2	2/2013	Tran et al.
			8,371,501 B1	2/2013	Hopkins
			8,381,307 B2	2/2013	Cimino

(56)

References Cited

U.S. PATENT DOCUMENTS

8,391,719	B2	3/2013	Alameh et al.	9,665,858	B1	5/2017	Kumar
8,417,231	B2	4/2013	Sanding et al.	9,674,705	B2	6/2017	Rose et al.
8,439,271	B2	5/2013	Smets et al.	9,679,286	B2	6/2017	Colnot et al.
8,475,367	B1	7/2013	Yuen et al.	9,680,942	B2	6/2017	Dimmick
8,489,112	B2	7/2013	Roeding et al.	9,710,804	B2	7/2017	Zhou et al.
8,511,542	B2	8/2013	Pan	9,740,342	B2	8/2017	Paulsen et al.
8,559,872	B2	10/2013	Butler	9,740,988	B1	8/2017	Levin et al.
8,566,916	B1	10/2013	Vernon et al.	9,763,097	B2	9/2017	Robinson et al.
8,567,670	B2	10/2013	Stanfield et al.	9,767,329	B2	9/2017	Forster
8,572,386	B2	10/2013	Takekawa et al.	9,769,662	B1	9/2017	Queru
8,577,810	B1	11/2013	Dalit et al.	9,773,151	B2	9/2017	Mil'shtein et al.
8,583,454	B2	11/2013	Beraja et al.	9,780,953	B2	10/2017	Gaddam et al.
8,589,335	B2	11/2013	Smith et al.	9,891,823	B2	2/2018	Feng et al.
8,594,730	B2	11/2013	Bona et al.	9,940,571	B1	4/2018	Herrington
8,615,468	B2	12/2013	Varadarajan	9,953,323	B2	4/2018	Candelore et al.
8,620,218	B2	12/2013	Awad	9,961,194	B1	5/2018	Wiechman et al.
8,667,285	B2	3/2014	Coulrier et al.	9,965,756	B2	5/2018	Davis et al.
8,723,941	B1	5/2014	Shirbabadi et al.	9,965,911	B2	5/2018	Wishne
8,726,405	B1	5/2014	Bailey et al.	9,978,058	B2	5/2018	Wurmfeld et al.
8,740,073	B2	6/2014	Vijayshankar et al.	10,043,164	B2	8/2018	Dogin et al.
8,750,514	B2	6/2014	Gallo et al.	10,075,437	B1	9/2018	Costigan et al.
8,752,189	B2	6/2014	De Jong	10,129,648	B1	11/2018	Hernandez et al.
8,794,509	B2	8/2014	Bishop et al.	10,133,979	B1	11/2018	Eidam et al.
8,799,668	B2	8/2014	Cheng	10,217,105	B1	2/2019	Sangi et al.
8,806,592	B2	8/2014	Ganesan	10,706,400	B1	7/2020	Puffer et al.
8,807,440	B1	8/2014	Von Behren et al.	10,861,006	B1 *	12/2020	Ilincic G06Q 20/341
8,811,892	B2	8/2014	Khan et al.	2001/0010723	A1	8/2001	Pinkas
8,814,039	B2	8/2014	Bishop et al.	2001/0029485	A1	10/2001	Brody et al.
8,814,052	B2	8/2014	Bona et al.	2001/0034702	A1	10/2001	Mockett et al.
8,818,867	B2	8/2014	Baldwin et al.	2001/0054003	A1	12/2001	Chien et al.
8,850,538	B1	9/2014	Vernon et al.	2002/0078345	A1	6/2002	Sandhu et al.
8,861,733	B2	10/2014	Benteo et al.	2002/0093530	A1	7/2002	Krothapalli et al.
8,880,027	B1	11/2014	Darringer	2002/0100808	A1	8/2002	Norwood et al.
8,888,002	B2	11/2014	Chesney et al.	2002/0120583	A1	8/2002	Keresman, III et al.
8,898,088	B2	11/2014	Springer et al.	2002/0152116	A1	10/2002	Yan et al.
8,934,837	B2	1/2015	Zhu et al.	2002/0153424	A1	10/2002	Li
8,977,569	B2	3/2015	Rao	2002/0165827	A1	11/2002	Gien et al.
8,994,498	B2	3/2015	Agrafioti et al.	2003/0023554	A1	1/2003	Yap et al.
9,004,365	B2	4/2015	Bona et al.	2003/0034873	A1	2/2003	Chase et al.
9,038,894	B2	5/2015	Khalid	2003/0055727	A1	3/2003	Walker et al.
9,042,814	B2	5/2015	Royston et al.	2003/0078882	A1	4/2003	Sukeda et al.
9,047,531	B2	6/2015	Showering et al.	2003/0167350	A1	9/2003	Davis et al.
9,069,976	B2	6/2015	Toole et al.	2003/0208449	A1	11/2003	Diao
9,081,948	B2	7/2015	Magne	2004/0015958	A1	1/2004	Veil et al.
9,104,853	B2	8/2015	Mathur et al.	2004/0039919	A1	2/2004	Takayama et al.
9,118,663	B1	8/2015	Bailey et al.	2004/0127256	A1	7/2004	Goldthwaite et al.
9,122,964	B2	9/2015	Krawczewicz	2004/0215674	A1	10/2004	Odinak et al.
9,129,280	B2	9/2015	Bona et al.	2004/0230799	A1	11/2004	Davis
9,152,832	B2	10/2015	Royston et al.	2004/0235450	A1	11/2004	Rosenberg
9,203,800	B2	12/2015	Izu et al.	2005/0044367	A1	2/2005	Gasparini et al.
9,209,867	B2	12/2015	Royston	2005/0075985	A1	4/2005	Cartmell
9,251,330	B2	2/2016	Boivie et al.	2005/0081038	A1	4/2005	Arditti Modiano et al.
9,251,518	B2	2/2016	Levin et al.	2005/0138387	A1	6/2005	Lam et al.
9,258,715	B2	2/2016	Borghei	2005/0156026	A1	7/2005	Ghosh et al.
9,270,337	B2	2/2016	Zhu et al.	2005/0160049	A1	7/2005	Lundholm
9,306,626	B2	4/2016	Hall et al.	2005/0195975	A1	9/2005	Kawakita
9,306,942	B1	4/2016	Bailey et al.	2005/0247797	A1	11/2005	Ramachandran
9,324,066	B2	4/2016	Archer et al.	2006/0006230	A1	1/2006	Bear et al.
9,324,067	B2	4/2016	Van Os et al.	2006/0040726	A1	2/2006	Szrek et al.
9,332,587	B2	5/2016	Salahshoor	2006/0041402	A1	2/2006	Baker
9,338,622	B2	5/2016	Bjontegard	2006/0044153	A1	3/2006	Dawidowsky
9,373,141	B1	6/2016	Shakkarwar	2006/0047954	A1	3/2006	Sachdeva et al.
9,379,841	B2	6/2016	Fine et al.	2006/0085848	A1	4/2006	Aissi et al.
9,406,011	B2	8/2016	Bartenstein et al.	2006/0136334	A1	6/2006	Atkinson et al.
9,413,430	B2	8/2016	Royston et al.	2006/0173985	A1	8/2006	Moore
9,413,768	B1	8/2016	Gregg et al.	2006/0174331	A1	8/2006	Schuetz
9,420,496	B1	8/2016	Indurkar	2006/0242698	A1	10/2006	Inskeep et al.
9,426,132	B1	8/2016	Alikhani	2006/0280338	A1	12/2006	Rabb
9,432,339	B1	8/2016	Bowness	2007/0033642	A1	2/2007	Ganesan et al.
9,455,968	B1	9/2016	Machani et al.	2007/0055630	A1	3/2007	Gauthier et al.
9,473,509	B2	10/2016	Arsanjani et al.	2007/0061266	A1	3/2007	Moore et al.
9,491,626	B2	11/2016	Sharma et al.	2007/0061487	A1	3/2007	Moore et al.
9,553,637	B2	1/2017	Yang et al.	2007/0116292	A1	5/2007	Kurita et al.
9,619,952	B1	4/2017	Zhao et al.	2007/0118745	A1	5/2007	Buer
9,635,000	B1	4/2017	Muftic	2007/0197261	A1	8/2007	Humbel
				2007/0224969	A1	9/2007	Rao
				2007/0241182	A1	10/2007	Buer
				2007/0256134	A1	11/2007	Lehtonen et al.
				2007/0258594	A1	11/2007	Sandhu et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

2007/0278291	A1	12/2007	Rans et al.	2012/0079281	A1	3/2012	Lowenstein et al.
2008/0008315	A1	1/2008	Fontana et al.	2012/0109735	A1	5/2012	Krawczewicz et al.
2008/0011831	A1	1/2008	Bonalle et al.	2012/0109764	A1	5/2012	Martin et al.
2008/0014867	A1	1/2008	Finn	2012/0143754	A1	6/2012	Patel
2008/0035738	A1	2/2008	Mullen	2012/0150737	A1	6/2012	Rottink
2008/0071681	A1	3/2008	Khalid	2012/0178366	A1	7/2012	Levy et al.
2008/0072303	A1	3/2008	Syed	2012/0196583	A1	8/2012	Kindo
2008/0086767	A1	4/2008	Kulkarni et al.	2012/0207305	A1	8/2012	Gallo et al.
2008/0103968	A1	5/2008	Bies et al.	2012/0209773	A1	8/2012	Ranganathan
2008/0109309	A1	5/2008	Landau et al.	2012/0238206	A1	9/2012	Singh et al.
2008/0110983	A1	5/2008	Ashfield	2012/0239560	A1	9/2012	Pourfallah et al.
2008/0120711	A1	5/2008	Dispensa	2012/0252350	A1	10/2012	Steinmetz et al.
2008/0134295	A1*	6/2008	Bailey G06F 21/30 726/4	2012/0254394	A1	10/2012	Barras
2008/0156873	A1	7/2008	Wilhelm et al.	2012/0284194	A1	11/2012	Liu et al.
2008/0162312	A1	7/2008	Sklovsky et al.	2012/0290472	A1	11/2012	Mullen et al.
2008/0164308	A1	7/2008	Aaron et al.	2012/0296818	A1	11/2012	Nuzzi et al.
2008/0207307	A1	8/2008	Cunningham, II et al.	2012/0316992	A1	12/2012	Oborne
2008/0209543	A1	8/2008	Aaron	2012/0317035	A1	12/2012	Royyuru et al.
2008/0223918	A1	9/2008	Williams et al.	2012/0317628	A1	12/2012	Yeager
2008/0285746	A1	11/2008	Landrock et al.	2012/0331529	A1	12/2012	Maximilian et al.
2008/0308641	A1	12/2008	Finn	2013/0005245	A1	1/2013	Royston
2009/0037275	A1	2/2009	Pollio	2013/0008956	A1	1/2013	Ashfield
2009/0048026	A1	2/2009	French	2013/0026229	A1	1/2013	Jarman et al.
2009/0132417	A1	5/2009	Scipioni et al.	2013/0048713	A1	2/2013	Pan
2009/0143104	A1	6/2009	Loh et al.	2013/0054474	A1	2/2013	Yeager
2009/0171682	A1	7/2009	Dixon et al.	2013/0065564	A1	3/2013	Conner et al.
2009/0210308	A1	8/2009	Toomer et al.	2013/0080228	A1	3/2013	Fisher
2009/0235339	A1	9/2009	Mennes et al.	2013/0080229	A1	3/2013	Fisher
2009/0249077	A1	10/2009	Gargaro et al.	2013/0099587	A1	4/2013	Lou
2009/0282264	A1	11/2009	Amiel et al.	2013/0104251	A1	4/2013	Moore et al.
2010/0023449	A1	1/2010	Skowronek et al.	2013/0106576	A1	5/2013	Hinman et al.
2010/0023455	A1	1/2010	Dispensa et al.	2013/0119130	A1	5/2013	Braams
2010/0029202	A1	2/2010	Jolivet et al.	2013/0130614	A1	5/2013	Busch-Sorensen
2010/0033310	A1	2/2010	Narendra et al.	2013/0144793	A1	6/2013	Royston
2010/0036769	A1	2/2010	Winters et al.	2013/0171929	A1	7/2013	Adams et al.
2010/0078471	A1	4/2010	Lin et al.	2013/0179351	A1	7/2013	Wallner
2010/0082491	A1	4/2010	Rosenblatt et al.	2013/0185772	A1	7/2013	Jaudon et al.
2010/0094754	A1	4/2010	Bertran et al.	2013/0191279	A1	7/2013	Calman et al.
2010/0095130	A1	4/2010	Bertran et al.	2013/0200999	A1	8/2013	Spodak et al.
2010/0100480	A1	4/2010	Altman et al.	2013/0216108	A1	8/2013	Hwang et al.
2010/0114731	A1	5/2010	Kingston et al.	2013/0226791	A1	8/2013	Springer et al.
2010/0192230	A1	7/2010	Steeves et al.	2013/0226796	A1	8/2013	Jiang et al.
2010/0207742	A1	8/2010	Buhot et al.	2013/0232082	A1	9/2013	Krawczewicz et al.
2010/0211797	A1	8/2010	Westerveld et al.	2013/0238894	A1	9/2013	Ferg et al.
2010/0240413	A1	9/2010	He et al.	2013/0282360	A1	10/2013	Shimota et al.
2010/0257357	A1	10/2010	McClain	2013/0303085	A1	11/2013	Boucher et al.
2010/0312634	A1	12/2010	Cervenka	2013/0304651	A1	11/2013	Smith
2010/0312635	A1	12/2010	Cervenka	2013/0312082	A1	11/2013	Izu et al.
2011/0028160	A1	2/2011	Roeding et al.	2013/0314593	A1	11/2013	Reznik et al.
2011/0035604	A1	2/2011	Habraken	2013/0344857	A1	12/2013	Berionne et al.
2011/0060631	A1	3/2011	Grossman et al.	2014/0002238	A1	1/2014	Taveau et al.
2011/0068170	A1	3/2011	Lehman	2014/0019352	A1	1/2014	Shrivastava
2011/0084132	A1	4/2011	Tofighbakhsh	2014/0027506	A1	1/2014	Heo et al.
2011/0101093	A1	5/2011	Ehrensverd	2014/0032409	A1	1/2014	Rosano
2011/0113245	A1	5/2011	Varadajan	2014/0032410	A1	1/2014	Georgiev et al.
2011/0125638	A1	5/2011	Davis et al.	2014/0040120	A1	2/2014	Cho et al.
2011/0131415	A1	6/2011	Schneider	2014/0040139	A1	2/2014	Brudnicki et al.
2011/0153437	A1	6/2011	Archer et al.	2014/0040147	A1	2/2014	Varadarakan et al.
2011/0153496	A1	6/2011	Royyuru	2014/0047235	A1	2/2014	Lessiak et al.
2011/0208658	A1	8/2011	Makhotin	2014/0067690	A1	3/2014	Pitroda et al.
2011/0208965	A1	8/2011	Machani	2014/0074637	A1	3/2014	Hammad
2011/0211219	A1	9/2011	Bradley	2014/0074655	A1	3/2014	Lim et al.
2011/0218911	A1	9/2011	Spodak	2014/0081720	A1	3/2014	Wu
2011/0238564	A1	9/2011	Lim et al.	2014/0138435	A1	5/2014	Khalid
2011/0246780	A1	10/2011	Yeap et al.	2014/0171034	A1	6/2014	Aleksin et al.
2011/0258452	A1	10/2011	Coulier et al.	2014/0171039	A1	6/2014	Bjontegard
2011/0280406	A1	11/2011	Ma et al.	2014/0172700	A1	6/2014	Teuwen et al.
2011/0282785	A1	11/2011	Chin	2014/0180851	A1	6/2014	Fisher
2011/0294418	A1	12/2011	Chen	2014/0208112	A1	7/2014	McDonald et al.
2011/0312271	A1	12/2011	Ma et al.	2014/0214674	A1	7/2014	Narula
2012/0024947	A1	2/2012	Naelon	2014/0229375	A1	8/2014	Zaytsev et al.
2012/0030047	A1	2/2012	Fuentes et al.	2014/0245391	A1	8/2014	Adenuga
2012/0030121	A1	2/2012	Grellier	2014/0256251	A1	9/2014	Caceres et al.
2012/0047071	A1	2/2012	Mullen et al.	2014/0258099	A1	9/2014	Rosano
				2014/0258113	A1	9/2014	Gauthier et al.
				2014/0258125	A1	9/2014	Gerber et al.
				2014/0274179	A1	9/2014	Zhu et al.
				2014/0279479	A1	9/2014	Maniar et al.
				2014/0337235	A1	11/2014	Van Heerden et al.

(56)

References Cited**U.S. PATENT DOCUMENTS**

2014/0339315 A1 11/2014 Ko
 2014/0346860 A1 11/2014 Aubry et al.
 2014/0365780 A1 12/2014 Movassaghi
 2014/0379361 A1 12/2014 Mahadkar et al.
 2015/0012444 A1 1/2015 Brown et al.
 2015/0032635 A1 1/2015 Guise
 2015/0071486 A1 3/2015 Rhoads et al.
 2015/0088757 A1 3/2015 Zhou et al.
 2015/0089586 A1 3/2015 Ballesteros
 2015/0121541 A1 4/2015 Fay
 2015/0134452 A1 5/2015 Williams
 2015/0140960 A1 5/2015 Powell et al.
 2015/0154595 A1 6/2015 Collinge et al.
 2015/0170138 A1 6/2015 Rao
 2015/0178724 A1 6/2015 Ngo et al.
 2015/0178725 A1 6/2015 Poetsch
 2015/0186871 A1 7/2015 Laracey
 2015/0205379 A1 7/2015 Mag et al.
 2015/0271200 A1 9/2015 Shane et al.
 2015/0302409 A1 10/2015 Malek
 2015/0317626 A1 11/2015 Ran et al.
 2015/0332266 A1 11/2015 Friedlander et al.
 2015/0339474 A1 11/2015 Paz et al.
 2015/0371234 A1 12/2015 Huang et al.
 2016/0012465 A1 1/2016 Sharp
 2016/0019536 A1 1/2016 Ortiz et al.
 2016/0026997 A1 1/2016 Tsui et al.
 2016/0034887 A1 2/2016 Lee
 2016/0048913 A1 2/2016 Rausaria et al.
 2016/0055480 A1 2/2016 Shah
 2016/0057619 A1 2/2016 Lopez
 2016/0065370 A1 3/2016 Le Saint et al.
 2016/0087957 A1 3/2016 Shah et al.
 2016/0092696 A1 3/2016 Guglani et al.
 2016/0148193 A1 5/2016 Kelley et al.
 2016/0232523 A1 8/2016 Venot et al.
 2016/0239672 A1 8/2016 Khan et al.
 2016/0253651 A1 9/2016 Park et al.
 2016/0255072 A1 9/2016 Liu
 2016/0267486 A1 9/2016 Mitra et al.
 2016/0277383 A1 9/2016 Guyomarc'h et al.
 2016/0277388 A1 9/2016 Lowe et al.
 2016/0307187 A1 10/2016 Guo et al.
 2016/0307189 A1 10/2016 Zarakas et al.
 2016/0314472 A1 10/2016 Ashfield
 2016/0330027 A1 11/2016 Ebrahimi
 2016/0335531 A1 11/2016 Mullen et al.
 2016/0379217 A1 12/2016 Hammad
 2017/0004502 A1 1/2017 Quentin et al.
 2017/0011395 A1 1/2017 Pillai et al.
 2017/0011406 A1 1/2017 Tunnell et al.
 2017/0017957 A1 1/2017 Radu
 2017/0017964 A1 1/2017 Janefalkar et al.
 2017/0024716 A1 1/2017 Jiam et al.
 2017/0039566 A1 2/2017 Schipperheijn
 2017/0041759 A1 2/2017 Gantert et al.
 2017/0068950 A1 3/2017 Kwon
 2017/0103388 A1 4/2017 Pillai et al.
 2017/0104739 A1 4/2017 Lansler et al.
 2017/0109509 A1 4/2017 Baghdasaryan
 2017/0109730 A1 4/2017 Locke et al.
 2017/0116447 A1 4/2017 Cimino et al.
 2017/0124568 A1 5/2017 Moghadam
 2017/0140379 A1 5/2017 Deck
 2017/0154328 A1 6/2017 Zarakas et al.
 2017/0154333 A1 6/2017 Gleeson et al.
 2017/0180134 A1 6/2017 King
 2017/0230189 A1 8/2017 Toll et al.
 2017/0237301 A1 8/2017 Elad et al.
 2017/0289127 A1 10/2017 Hendrick
 2017/0295013 A1 10/2017 Claes
 2017/0316696 A1 11/2017 Bartel
 2017/0317834 A1 11/2017 Smith et al.
 2017/0330173 A1 11/2017 Woo et al.
 2017/0374070 A1 12/2017 Shah et al.

2018/0034507 A1 2/2018 Wobak et al.
 2018/0039986 A1 2/2018 Essebag et al.
 2018/0068316 A1 3/2018 Essebag et al.
 2018/0129945 A1 5/2018 Saxena et al.
 2018/0160255 A1 6/2018 Park
 2018/0191501 A1 7/2018 Lindemann
 2018/0205712 A1 7/2018 Versteeg et al.
 2018/0219867 A1 8/2018 Patterson et al.
 2018/0240106 A1 8/2018 Garrett et al.
 2018/0254909 A1 9/2018 Hancock
 2018/0268132 A1 9/2018 Buer et al.
 2018/0270214 A1 9/2018 Caterino et al.
 2018/0294959 A1 10/2018 Traynor et al.
 2018/0300716 A1 10/2018 Carlson
 2018/0302396 A1 10/2018 Camenisch et al.
 2018/0315050 A1 11/2018 Hammad
 2018/0316666 A1 11/2018 Koved et al.
 2018/0322486 A1 11/2018 Deliwala et al.
 2018/0359100 A1 12/2018 Gaddam et al.
 2019/0014107 A1 1/2019 George
 2019/0019375 A1 1/2019 Foley
 2019/0036678 A1 1/2019 Ahmed
 2019/0238517 A1 8/2019 D'Agostino et al.
 2019/0392416 A1 12/2019 Bernholc
 2020/0028841 A1* 1/2020 Mars H04B 10/1141
 2020/0104833 A1 4/2020 Rule et al.
 2022/0058633 A1* 2/2022 Yantis G06Q 20/3676

FOREIGN PATENT DOCUMENTS

CN 103023643 4/2013
 CN 103417202 12/2013
 EP 1 085 424 3/2001
 EP 1 223 565 7/2002
 EP 1 265 186 12/2002
 EP 1 783 919 5/2007
 EP 2 852 070 1/2009
 EP 2 139 196 12/2009
 EP 1 469 419 2/2012
 GB 2 457 221 8/2009
 GB 2 516 861 2/2015
 GB 2 551 907 1/2018
 JP 2004199534 A 7/2004
 JP 2007516513 A 6/2007
 JP 2012147945 A 8/2012
 JP 2014211873 A 11/2014
 JP 2018508091 A 3/2018
 KR 101508320 4/2015
 KR 101560440 B1 10/2015
 WO WO 00/49586 8/2000
 WO WO 2006070189 7/2006
 WO WO 2008055170 5/2008
 WO WO 2009025605 2/2009
 WO WO 2010049252 5/2010
 WO WO 2011112158 9/2011
 WO WO 2012001624 1/2012
 WO WO 2013039395 3/2013
 WO WO 2013155562 10/2013
 WO WO 2013192358 12/2013
 WO WO 2014043278 3/2014
 WO WO 2014170741 10/2014
 WO WO 2015179649 11/2015
 WO WO 2015183818 12/2015
 WO WO 2016097718 6/2016
 WO WO 2016160816 10/2016
 WO WO 2016168394 10/2016
 WO WO 2017042375 3/2017
 WO WO 2017042400 3/2017
 WO WO 2017157859 9/2017
 WO WO 2017208063 12/2017
 WO WO 2018063809 4/2018
 WO WO 2018137888 8/2018

OTHER PUBLICATIONS

Haykin M. and Warnar, R., "Smart Card Technology: New Methods for Computer Access Control," Computer Science and Technology NIST Special Publication 500-157:1-60 (1988).

(56)

References Cited**OTHER PUBLICATIONS**

Lehpamer, Harvey, "Component of the RFID System," RFID Design Principles, 2nd edition pp. 133-201 (2012).

Pourghomi, Pardis et al., "A Proposed NFC Payment Application, International Journal of Advanced Computer Science and Applications," vol. 4, No. 8, 2013.

Author Unknown, "CardrefresherSM from American Express®," [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://merchant-channel.americanexpress.com/merchant/en-US/cardrefresher>, 2 pages.

Author Unknown, "Add Account Updater to your recurring payment tool," [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.authorize.net/our-features/account-updater/>, 5 pages.

Author Unknown, "Visa® Account Updater for Merchants," [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://usa.visa.com/dam/VCOM/download/merchants/visa-account-updater-product-information-fact-sheet-for-merchants.pdf>, 2 pages.

Author Unknown, "Manage the cards that you use with Apple Pay," Apple Support [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://support.apple.com/en-us/HT205583>, 5 pages.

Author Unknown, "Contactless Specifications for Payment Systems," EMV Book B—Entry Point Specification [online] 2016 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: https://www.emvco.com/wp-content/uploads/2017/05/BookB_Entry_Point_Specification_v2_6_20160809023257319.pdf, 52 pages.

Author Unknown, "EMV Integrated Circuit Card Specifications for Payment Systems, Book 2, Security and Key Management," Version 3.4, [online] 2011 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: https://www.emvco.com/wp-content/uploads/2017/05/EMV_v4.3_Book_2_Security_and_Key_Management_20120607061923900.pdf, 174 pages.

Author unknown, "NFC Guide: All You Need to Know About Near Field Communication" Square Guide [online] 2018 [retrieved on Nov. 13, 2018]. Retrieved from Internet URL: <https://squareup.com/guides/nfc>, 8 pages.

Profis, S., "Everything you need to know about NFC and mobile payments" CNET Directory [online], 2014 [retrieved on Mar. 25, 2019]. Retrieved from the Internet URL: <https://www.cnet.com/how-to/how-nfc-works-and-mobile-payments/>, 6 pages.

Cozma, N., "Copy data from other devices in Android 5.0 Lollipop setup" CNET Directory [online] 2014 [retrieved on Mar. 25, 2019]. Retrieved from the Internet URL: <https://www.cnet.com/how-to/copy-data-from-other-devices-in-android-5-0-lollipop-setup/>, 5 pages.

Kevin, Android Enthusiast, "How to copy text string from nfc tag" StackExchange [online] 2013 [retrieved on Mar. 25, 2019]. Retrieved from the Internet URL: <https://android.stackexchange.com/questions/55689/how-to-copy-text-string-from-nfc-tag>, 11 pages.

Author unknown, "Tap & Go Device Setup" Samsung [online] date unknown [retrieved on Mar. 25, 2019]. Retrieved from the Internet URL: <https://www.samsung.com/us/switch-me/switch-to-the-galaxy-s-5/app/partial/setup-device/tap-go.html>, 1 page.

Author Unknown, "Multiple encryption", Wikipedia [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: https://en.wikipedia.org/wiki/Multiple_encryption, 4 pages.

Krawczyk, et al., "HMAC: Keyed-Hashing for Message Authentication", Network Working Group RFC:2104 memo [online] 1997 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://tools.ietf.org/html/rfc2104>, 12 pages.

Song, et al., "The AES-CMAC Algorithm", Network Working Group RFC: 4493 memo [online] 2006 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://tools.ietf.org/html/rfc4493>, 21 pages.

Katz, J., and Lindell, Y., "Aggregate Message Authentication Codes", Topics in Cryptology [online] 2008 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.cs.umd.edu/~jkatz/papers/aggregateMAC.pdf>, 11 pages.

Adams, D., and Maier, A-K, "Goldbug Big Seven open source crypto-messengers to be compared- or Comprehensive Confiden-

tiality Review & Audit of GoldBug Encrypting E-Mail—Client & Secure Instant Messenger", Big Seven Study 2016 [online] [retrieved on Mar. 25, 2018]. Retrieved from Internet URL: <https://sf.net/projects/goldbug/files/bigseven-crypto-audit.pdf>, 309 pages.

Author Unknown, "Triple DES", Wikipedia [online] 2018 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: https://simple.wikipedia.org/wiki/Triple_DES, 2 pages.

Song, F., and Yun, A.I., "Quantum Security of NMAC and Related Constructions—PRF domain extension against quantum attacks", IACR Cryptology ePrint Archive [online] 2017 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://eprint.iacr.org/2017/509.pdf>, 41 pages.

Saxena, N., "Lecture 10: NMAC, HMAC and Number Theory", CS 6903 Modern Cryptography [online] 2008 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <http://isis.poly.edu/courses/cs6903/Lectures/lecture10.pdf>, 8 pages.

Berg, Guy, "Fundamentals of EMV" Smart Card Alliance [online] date unknown [retrieved on Mar. 27, 2019]. Retrieved from Internet URL: https://www.securetechalliance.org/resources/media/scap13_preconference/02.pdf, 37 pages.

Pierce, Kevin, "Is the amazon echo NFC compatible,?" Amazon.com Customer Q&A [online] 2016 [retrieved on Mar. 26, 2019]. Retrieved from Internet URL: https://www.amazon.com/ask/questions/Tx1RJXYSPE6XLJD?_encoding=. . ., 2 pages.

Author Unknown, "Multi-Factor Authentication", idaptive [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.centrify.com/products/application-services/adaptive-multi-factor-authentication/risk-based-mfa/>, 10 pages.

Author Unknown, "Adaptive Authentication", SecureAuth [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.secureauth.com/products/access-management/adaptive-authentication>, 7 pages.

Van den Breekel, J., et al., "EMV in a nutshell", Technical Report, 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.cs.ru.nl/E.Poll/papers/EMVtechreport.pdf>, 37 pages.

Author Unknown, "Autofill", Computer Hope [online] 2018 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.computerhope.com/jargon/a/autofill.htm>, 2 pages.

Author Unknown, "Fill out forms automatically", Google Chrome Help [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://support.google.com/chrome/answer/142893?co=GENIE.Platform%3DDesktop&hl=en>, 3 pages.

Author unknown, "Autofill credit cards, contacts, and passwords in Safari on Mac", Apple Safari User Guide [online] 2019 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://support.apple.com/guide/safari/use-autofill-ibrw1103/mac>, 3 pages.

Menghin, M.J., "Power Optimization Techniques for Near Field Communication Systems" 2014 Dissertation at Technical University of Graz [online]. Retrieved from Internet URL: <https://diglib.tugraz.at/download.php?id=576a7b910d2d6&location=browse>, 135 pages.

Mareli, M., et al., "Experimental evaluation of NFC reliability between an RFID tag and a smartphone" Conference paper (2013) IEEE AFRICON At Mauritius [online] [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://core.ac.uk/download/pdf/54204839.pdf>, 5 pages.

Davison, A., et al., "MonoSLAM: Real-Time Single Camera SLAM", IEEE Transactions on Pattern Analysis and Machine Intelligence 29(6): 1052-1067 (2007).

Barba, R., "Sharing your location with your bank sounds creepy, but it's also useful", Bankrate, LLC [online] 2017 [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.bankrate.com/banking/banking-app-location-sharing/>, 6 pages.

Author unknown: "onetappayment™", [online] Jan. 24, 2019, [retrieved on Mar. 25, 2019]. Retrieved from Internet URL: <https://www.payubiz.in/onetap>, 4 pages.

Vu et al., (2012). "Distinguishing users with capacitive touch communication" Proceedings of the Annual International Conference on Mobile Computing and Networking, MOBICOM. 10.1145/2348543.2348569.

EMVCo, EMV Card Personalization Specification, version 1.0 (Jun. 2003), 81 pages.

(56)

References Cited

OTHER PUBLICATIONS

Ullmann et al., (2012). "On-Card User Authentication for Contact-less Smart Cards based on Gesture Recognition", LNI, 223-234, 12 pages.

Faraj et al. (2008). "Investigation of Java Smart Card Technology for Multi-Task Applications" J. of Al-Anbar University for Pure Science, vol. 2: No. 1: 2008, 11 pages.

Dhamdhere (2017) "Key Benefits of a Unified Platform for Loyalty, Referral Marketing, and UGC" Annex Cloud [retrieved on Jul. 3, 2019]. Retrieved from Internet URL: <https://www.annexcloud.com/blog/benefits-unified-platform/>, 13 pages.

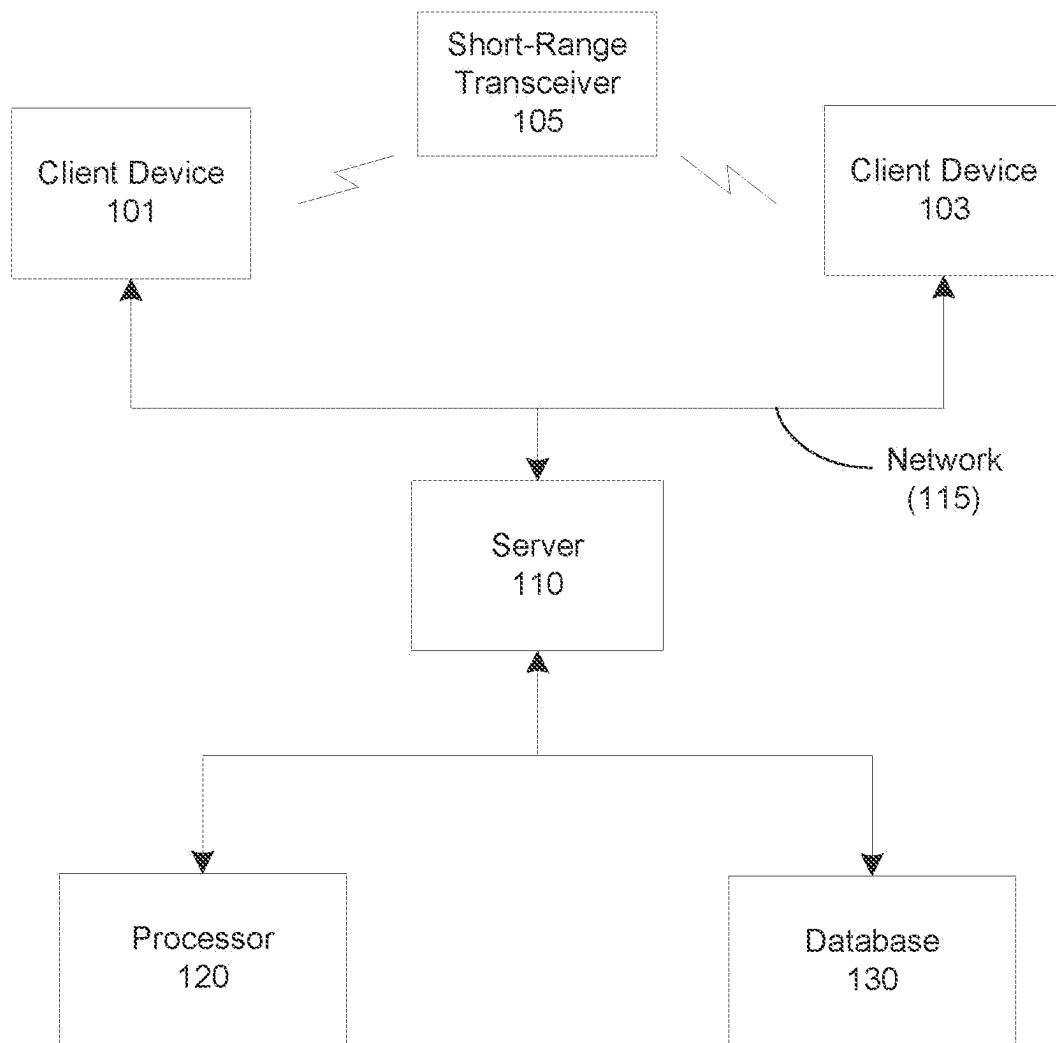
European Extended Search Report issued in related European Patent Application No. EP 21156457.0, mailed Jun. 21, 2021.

Singapore Patent Office Search Report and Written Opinion issued in related Singapore Patent Application No. 10202101473Q mailed Apr. 11, 2023, 11 pages.

European Examination Report issued in related European Patent Application No. EP 21156457.0, dated Jul. 5, 2023.

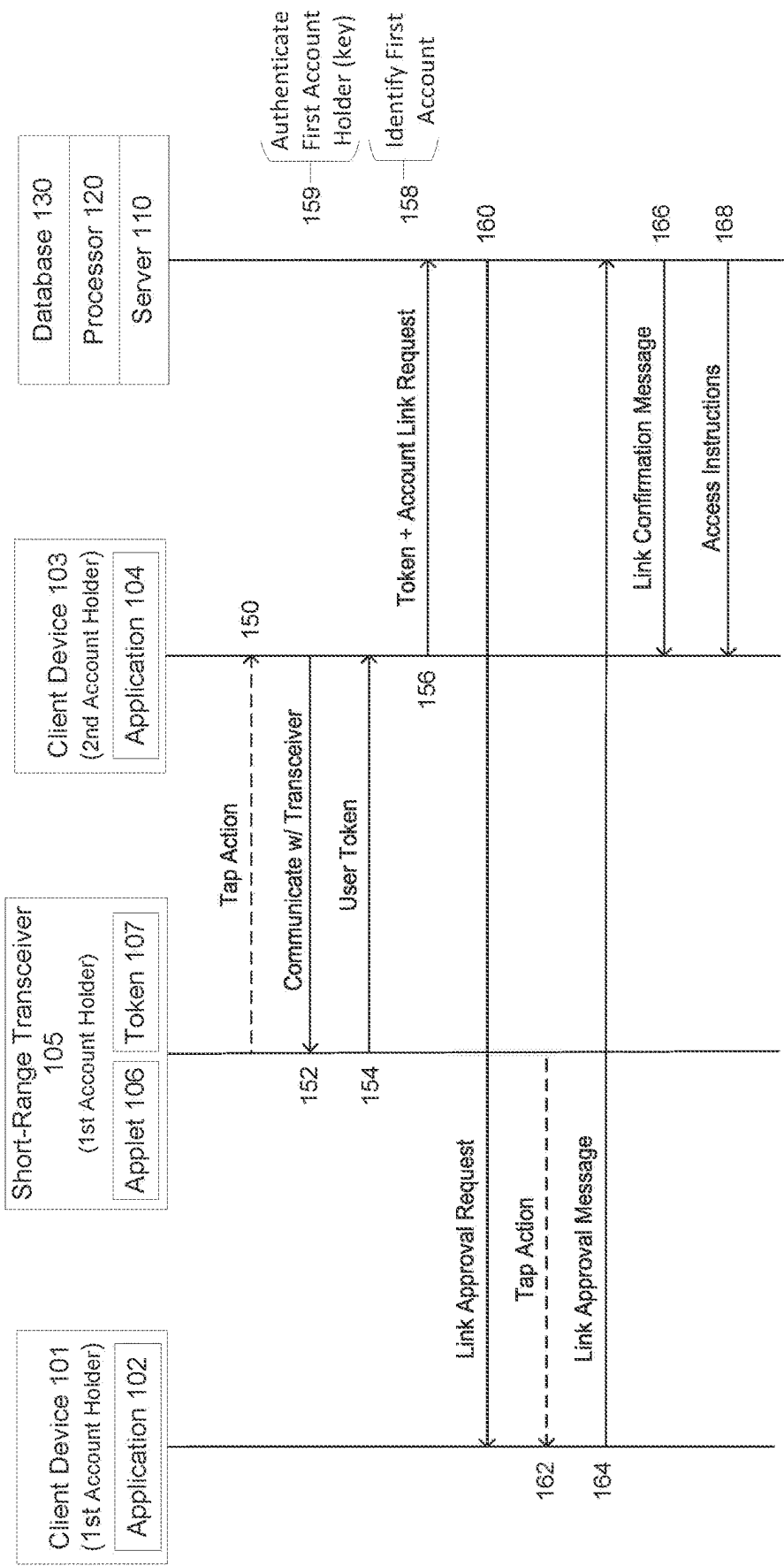
Canadian Examination Report for related Canadian Application No. 3,108,475, dated Nov. 8, 2023, 5 pages.

* cited by examiner



System 100

FIG. 1A



System 100

FIG. 1B

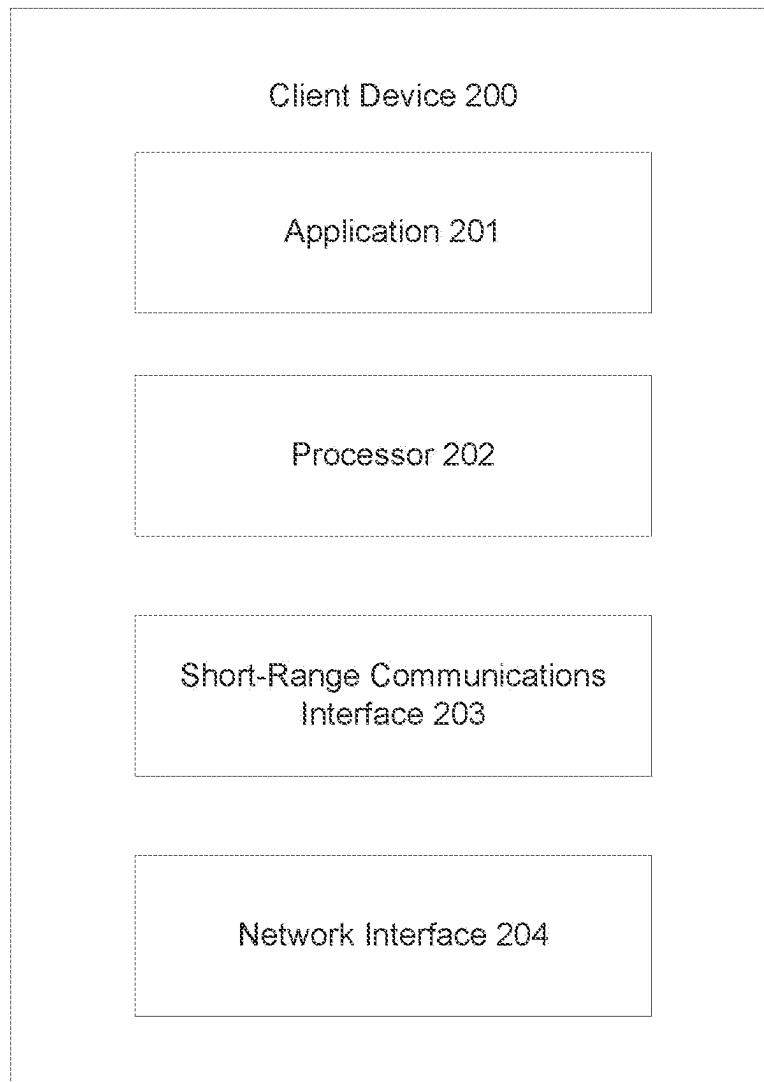
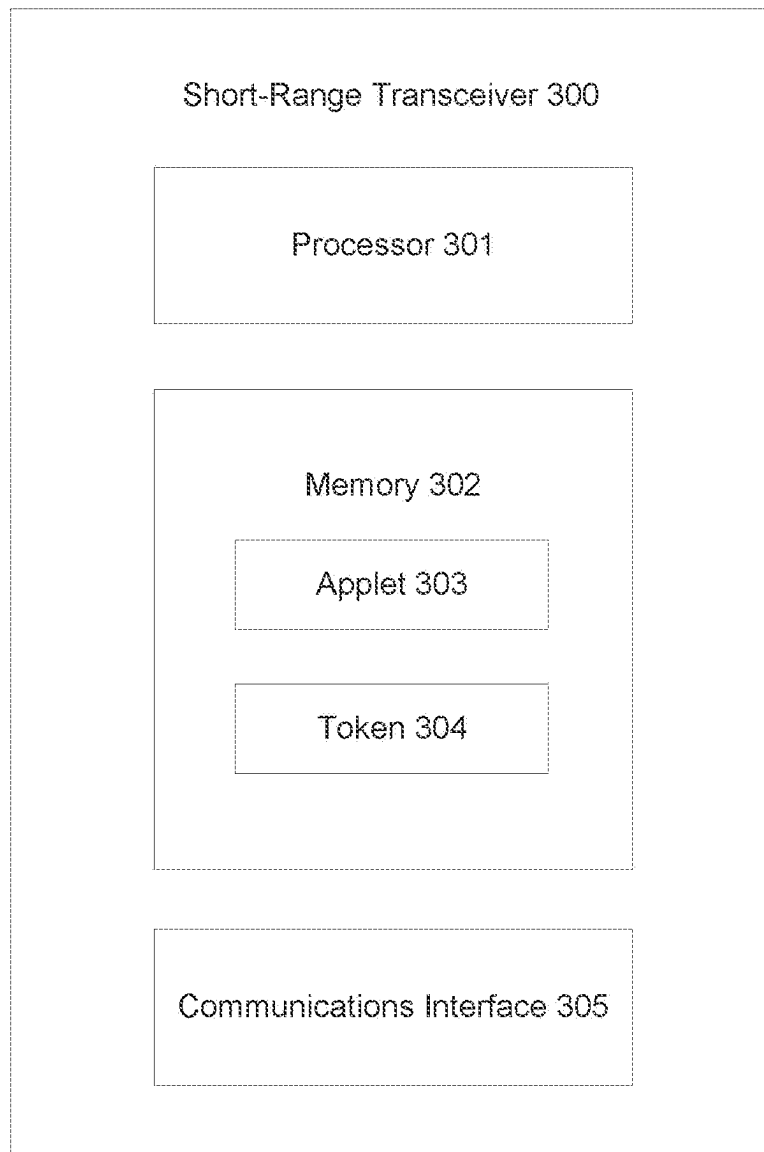


FIG. 2

**FIG. 3**

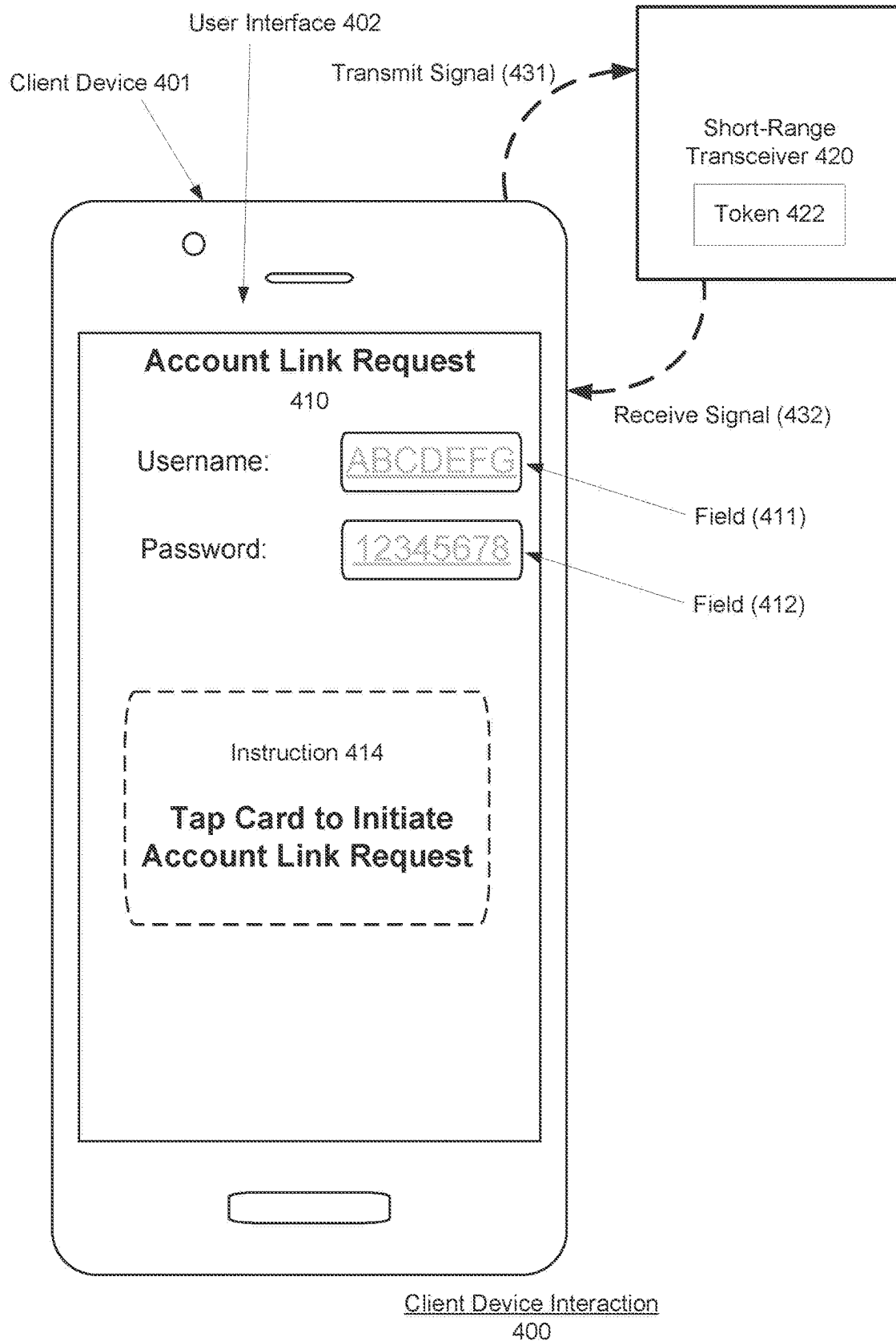


FIG. 4

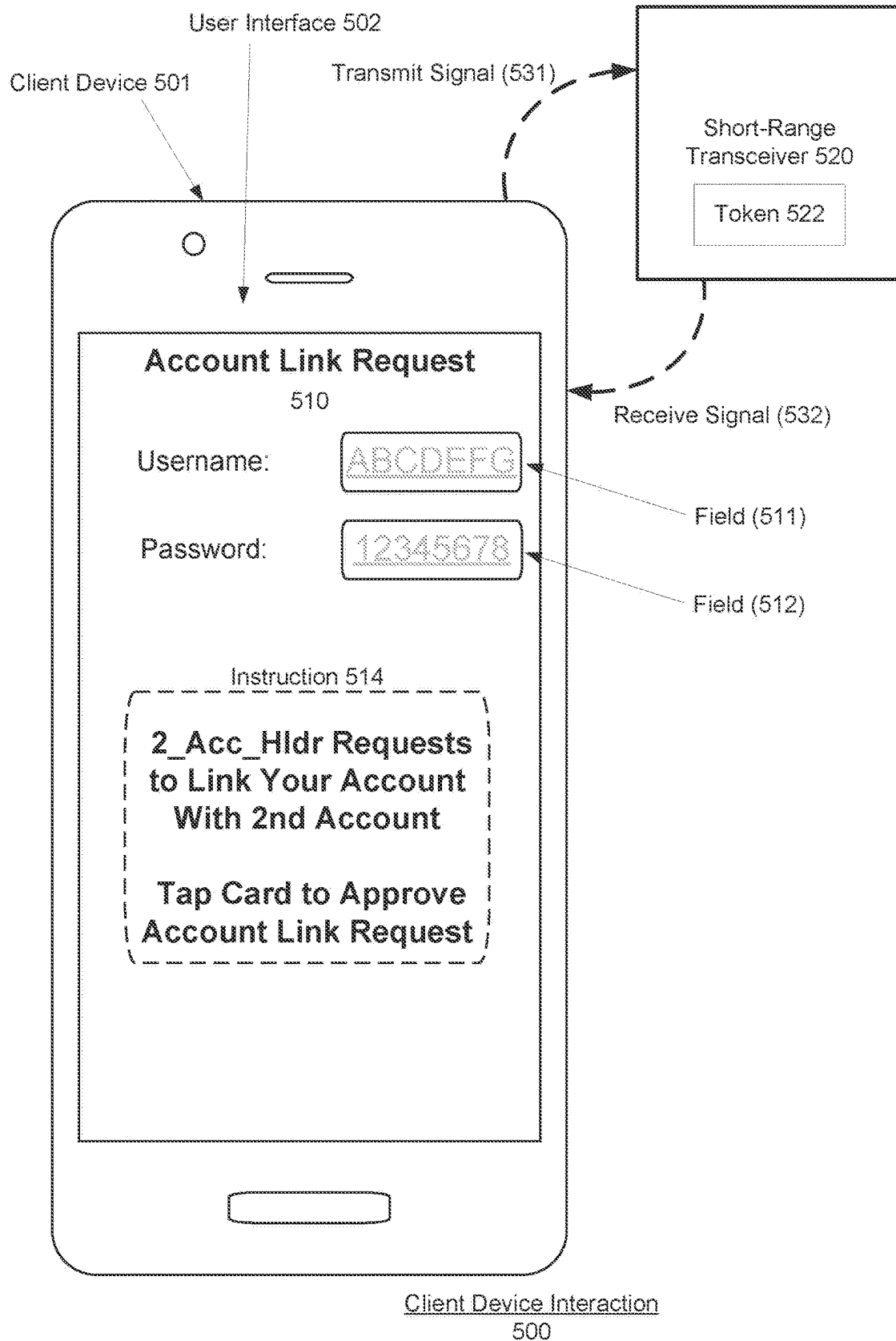
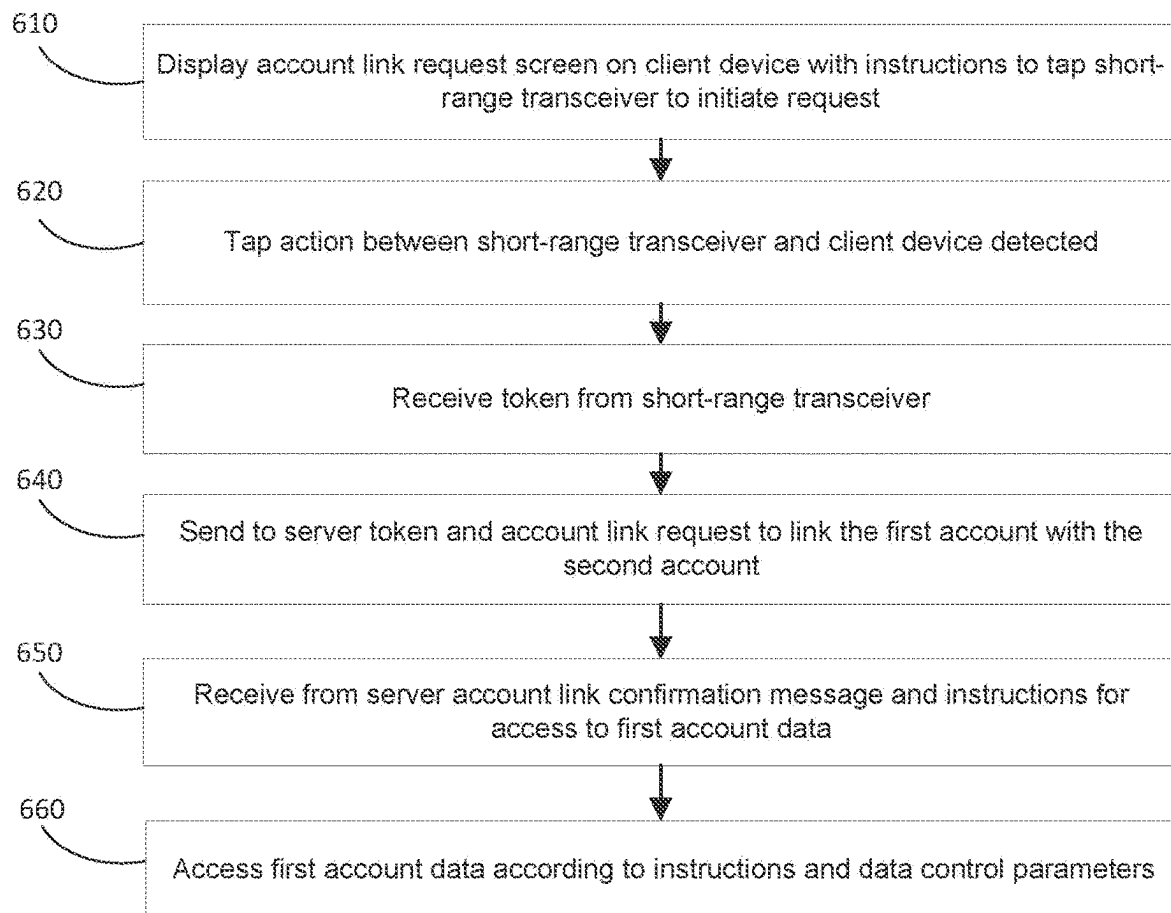
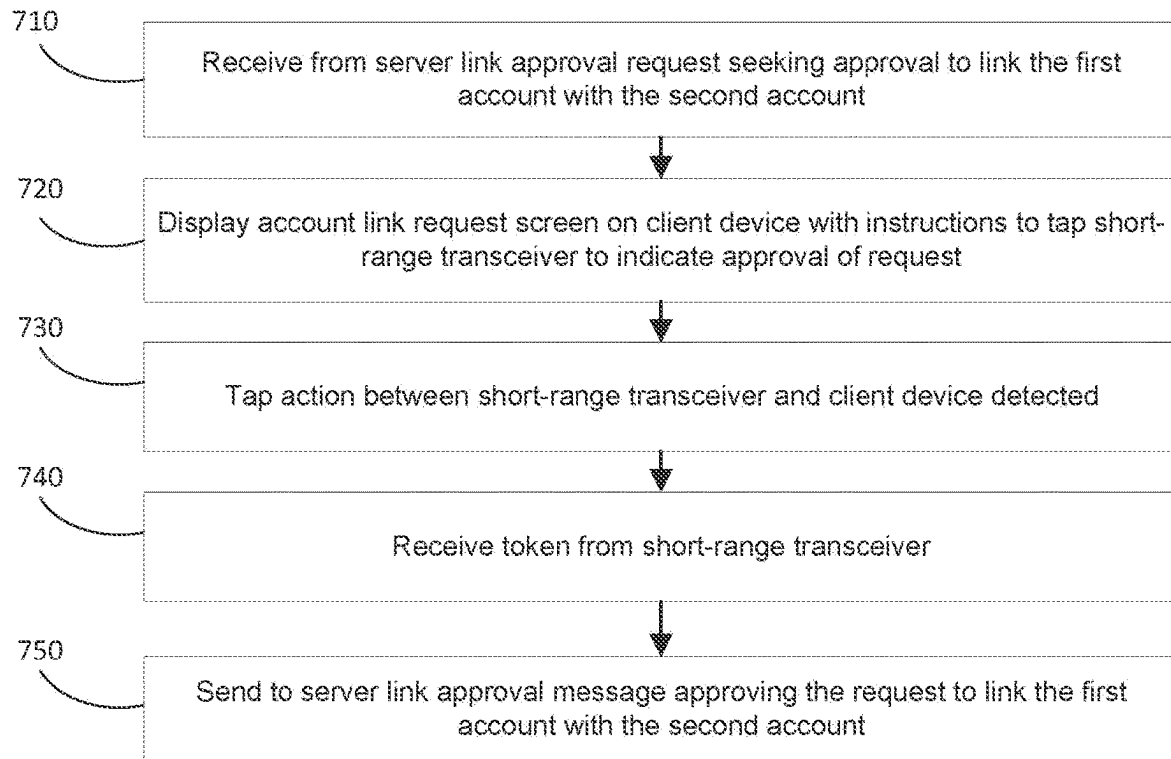
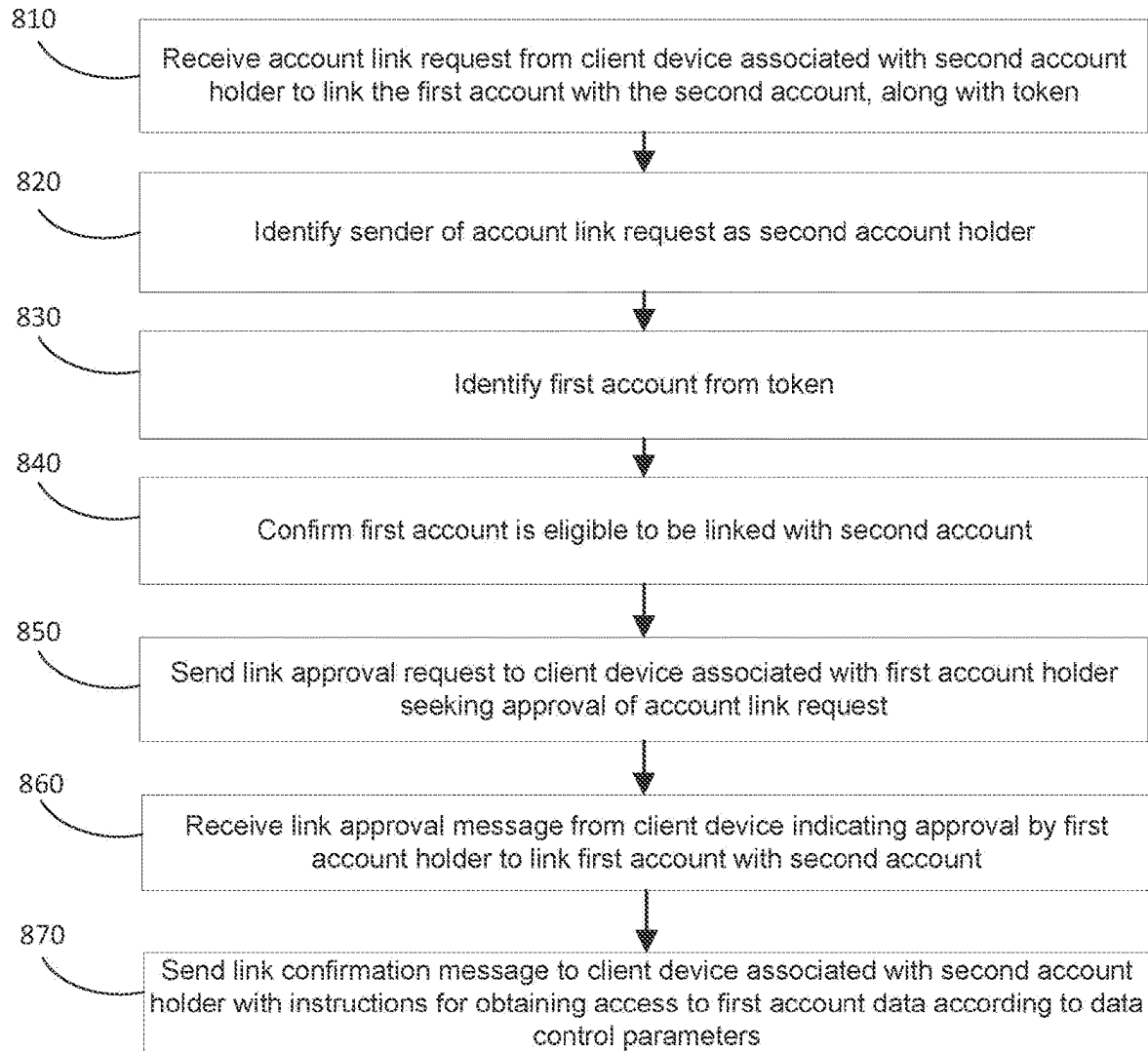


FIG. 5

600**FIG. 6**

700**FIG. 7**



800

FIG. 8

1

SYSTEMS AND METHODS FOR DATA ACCESS CONTROL USING A SHORT-RANGE TRANSCIEVER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 17/088,117 filed Nov. 3, 2020, which is a continuation of U.S. patent application Ser. No. 16/863,952 filed Apr. 30, 2020, now U.S. Pat. No. 10,861,006, the complete disclosure of which is incorporated herein by reference in their entireties.

FIELD OF THE DISCLOSURE

The present disclosure relates generally to user data control and, more specifically, to an exemplary system and method for active control of user access to data through the interaction of a short-range transceiver with a client device.

BACKGROUND

A typical user has multiple different accounts with one or more entities. When a user creates an account, the user will generally provide a certain amount of personal, identifying information regarding the user, as well as information for account access such as a username and password. Each entity may have, for example, different user data retention policies, different use policies, and different user data sharing policies. The policies of using user-information may further change without any notification to the user. In addition, the possessor of the user information may also change through a merger or buy-out of one entity by another, many times without any notice to the user.

Account access will often rely on log-in credentials (e.g., username and password) to confirm a cardholder's identity. However, if the log-in credentials are compromised, another person could have access to the user's account. In addition, the more entities or individuals that a user shares their personal information with, the greater the risk of the user's information being stolen by a breach at one of the entities. Further, a user may only desire to share certain pieces of personal information with an entity or individual for limited purposes or limited in time.

Thus, it may be beneficial to provide exemplary systems and methods which allow users to control the use of user information to overcome at least some of the deficiencies described herein.

SUMMARY

Aspects of the disclosed technology include systems and methods for controlling data access through the interaction of a short-range transceiver, such as a contactless card, with a client device. Data access control may be provided in the context of account information, including handling requests to link a first account with a second account, via the interaction of a short-range transceiver, such as a contactless card, with a client device such that disclosure of certain account identifier information, or account login information, need not be disclosed to individuals or entities requesting access to account data of another individual or entity.

Embodiments of the present disclosure provide a data access control system, comprising: a database storing information for a plurality of accounts comprising, for a first account associated with a first account holder, a first account

2

identifier and first account data, and, for a second account associated with a second account holder, a second account identifier; a server configured to communicate over a network with a plurality of client devices, including a first client device associated with the first account holder and a second client device associated with the second account holder; a contactless card comprising a communications interface, a processor, and a memory, the memory storing an applet and a token, wherein the contactless card is associated with the first account holder; a client application comprising instructions for execution on at least one of the first client device or the second client device, the client application configured to: when executed on the second client device: in response to a tap action between the contactless card and the second client device: receive the token from the contactless card, and transmit to the server the token and an account link request to link the first account with the second account; and receive from the server an account link confirmation message including instructions for access to the first account data; and, when executed on the first client device: in response to a link approval request from the server to approve the account link request, transmit to the server a link approval message approving the account link request; and, a processor in data communication with the server and the database, the processor configured to: receive from the second client device the token and the account link request; identify the first account based on the token; transmit to the first client device the link approval request to approve the account link request; receive from the first client device the link approval message approving the account link request; and transmit to the second client device the account link confirmation message including instructions for access to the first account data.

Embodiments of the present disclosure provide a method for controlling data access, comprising: establishing a database storing information for a plurality of accounts comprising, for a first account associated with a first account holder, a first account identifier, first account data and data control parameters, and, for a second account associated with a second account holder, a second account identifier; receiving from a client device of the second account holder, via a network, an account link request to link the first account with the second account, the account link request generated in response to a tap action between a contactless card and the second account holder client device, the account link request accompanied by a token stored on the contactless card, wherein the contactless card is associated with the first account holder; identifying the first account based on the token; transmitting to a client device of the first account holder, via the network, a link approval request to approve the account link request; receiving from the first account holder client device, via the network, a link approval message, the link approval message generated in response to an indication by the first account holder approving the account link request; and transmitting to the second account holder client device, via the network, an account link confirmation message, the account link confirmation message confirming approval of the account link request and providing instructions for access to the first account data.

Embodiments of the present disclosure provide a method for controlling data access, comprising: establishing a database storing information for a plurality of accounts comprising, for a first account associated with a first account holder, a first account identifier, first account data and data control parameters, and, for a second account associated with a second account holder, a second account identifier; providing a contactless card comprising a communications

3

interface, a processor, and a memory, the memory storing an applet and a token, wherein the communications interface is configured to support at least one of near field communication, Bluetooth, or Wi-Fi, and wherein the contactless card is associated with the first account holder; and providing a client application comprising instructions for execution on at least one of a first client device of the first account holder or a second client device of the second account holder, the client application configured to: when executed on the second client device: in response to a tap action between the contactless card and the second client device: receive the token from the contactless card, and transmit to the server the token and an account link request to link the first account with the second account; and receive from the server an account link confirmation message including instructions for access to the first account data, the data access provided according to the data control parameters; and, when executed on the first client device: determine a tap action between the contactless card and the first client device, the tap action in response to a link approval request to approve the account link request, the tap action indicating approval of the account link request; and transmit to the server a link approval message approving the account link request.

Further features of the disclosed design, and the advantages offered thereby, are explained in greater detail hereinafter with reference to specific example embodiments described below and illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a diagram of a data access control system according to one or more example embodiments.

FIG. 1B is a diagram illustrating a sequence for providing data access control according to one or more example embodiments.

FIG. 2 illustrates components of a client device used in a data access control system according to one or more example embodiments.

FIG. 3 illustrates components of a short-range transceiver used in a data access control system according to one or more example embodiments.

FIG. 4 is diagram illustrating interaction between a client device and a short-range transceiver used in a data access control system according to one or more example embodiments.

FIG. 5 is diagram illustrating interaction between a client device and a short-range transceiver used in a data access control system according to one or more example embodiments.

FIG. 6 is a flowchart illustrating a method of data access control according to one or more example embodiments.

FIG. 7 is a flowchart illustrating a method of data access control according to one or more example embodiments.

FIG. 8 is a flowchart illustrating a method of data access control according to one or more example embodiments.

DETAILED DESCRIPTION

The following description of embodiments provides non-limiting representative examples referencing numerals to particularly describe features and teachings of different aspects of the invention. The embodiments described should be recognized as capable of implementation separately, or in combination, with other embodiments from the description of the embodiments. A person of ordinary skill in the art reviewing the description of embodiments should be able to

4

learn and understand the different described aspects of the invention. The description of embodiments should facilitate understanding of the invention to such an extent that other implementations, not specifically covered but within the knowledge of a person of skill in the art having read the description of embodiments, would be understood to be consistent with an application of the invention.

Exemplary embodiments of the disclosed systems and methods provide for controlling data access through the interaction of a short-range transceiver, such as a contactless card, with a client device. Data access control may be provided in the context of controlling access to account information. Requests to link a first account with a second account may be handled via the interaction of a short-range transceiver, such as a contactless card, with a client device such that disclosure of certain account identifier information, or account login information, need not be disclosed to individuals or entities requesting access to account data of another individual or entity. Benefits of the disclosed technology may include improved data security for account information, improved fraud prevention, and improved user experience.

FIG. 1A shows a diagram illustrating a data access control system **100** according to one or more example embodiments. As discussed further below, system **100** may include client device **101**, client device **103**, short-range transceiver **105**, server **110**, processor **120** and database **130**. Client device **101** and client device **103** may communicate with server **110** via network **115**. Although FIG. 1 illustrates certain components connected in certain ways, system **100** may include additional or multiple components connected in various ways.

System **100** may include one or more client devices, such as client device **101** and/or client device **103**, which may each be a network-enabled computer. As referred to herein, a network-enabled computer may include, but is not limited to a computer device, or communications device including, e.g., a server, a network appliance, a personal computer, a workstation, a phone, a handheld PC, a personal digital assistant, a thin client, a fat client, an Internet browser, or other device. Each of client devices **101** and **103** also may be a mobile device; for example, a mobile device may include an iPhone, iPod, iPad from Apple® or any other mobile device running Apple's iOS® operating system, any device running Microsoft's Windows® Mobile operating system, any device running Google's Android® operating system, and/or any other smartphone, tablet, or like wearable mobile device. Additional features that may be included in a client device, such as client device **101** and/or client device **103**, are further described below with reference to FIG. 2.

System **100** may include one or more short-range transceivers, such as short-range transceiver **105**. Short-range transceiver **105** may be in wireless communication with a client device, such as client device **101** and/or client device **103**, within a short-range communications field such as, for example, near field communication (NFC). Short-range transceiver **105** may include, for example, a contactless card, a smart card, or may include a device with a varying form factor such as a fob, pendant or other device configured to communicate within a short-range communications field. In other embodiments, the short-range transceiver **105** may be the same or similar as the client devices **101**, **103**. Additional features that may be included in a short-range transceiver, such as short-range transceiver **105**, are further described below with reference to FIG. 3.

System **100** may include one or more servers **110**. In some example embodiments, server **110** may include one or more processors (such as, e.g., a microprocessor) which are coupled to memory. Server **110** may be configured as a central system, server or platform to control and call various data at different times to execute a plurality of workflow actions. Server **110** may be a dedicated server computer, such as bladed servers, or may be personal computers, laptop computers, notebook computers, palm top computers, network computers, mobile devices, or any processor-controlled device capable of supporting the system **100**.

Server **110** may be configured for data communication (such as, e.g., via a connection) with one or more processors, such as processor **120**. In some example embodiments, server **110** may incorporate processor **120**. In some example embodiments, server **110** may be physically separate and/or remote from processor **120**. Processor **120** may be configured to serve as a back-end processor. Processor **120** may be configured for data communication (such as, e.g., via a connection) with database **130** and/or server **110**. Processor **120** may include one or more processing devices such as a microprocessor, RISC processor, ASIC, etc., along with associated processing circuitry. Processor **120** may include, or be connected to, memory storing executable instructions and/or data. Processor **120** may communicate, send or receive messages, requests, notifications, data, etc. to/from other devices, such as client devices **101** and/or **103**, via server **110**.

Server **110** may be configured for data communication (such as, e.g., via a connection) with one or more databases, such as database **130**. Database **130** may be a relational or non-relational database, or a combination of more than one database. In some example embodiments, server **110** may incorporate database **130**. In some example embodiments, database **130** may be physically separate and/or remote from server **110**, located in another server, on a cloud-based platform, or in any storage device that is in data communication with server **110**.

Connections between server **110**, processor **120** and database **130** may be made via any communications line, link or network, or combination thereof, wired and/or wireless, suitable for communicating between these components. Such network may include network **115** and/or one or more networks of same or similar type as those described herein with reference to network **115**. In some example embodiments, connections between server **110**, processor **120** and database **130** may include a corporate LAN.

Server **110** and/or database **130** may include user login credentials used to control access to user accounts. The login credentials may include, without limitation, user names, passwords, access codes, security questions, swipe patterns, image recognition, identification scans (e.g., driver's license scan and passport scan), device registrations, telephone numbers, email addresses, social media account access information, and biometric identification (e.g., voice recognition, fingerprint scans, retina scans, and facial scans).

Database **130** may contain data relating to one or more accounts. Accounts may be maintained by (or on behalf of) and/or relate to any one or more of a variety of entities, such as, for example (and without limitation) a bank, merchant, online retailer, service provider, merchandizer, manufacturer, social media provider, provider or promoter of sporting or entertainment events, or hotel chain. For example, database **130** may include, without limitation, account identification information (e.g., account number, account owner identification number, account owner name and contact information—any one or more of which may comprise an

account identifier), account characteristics (e.g., type of account, funding and trading limitations, and restrictions on access and other activity), and may include data pertinent to the account, including financial (such as balance information, payment history, and transaction history), social and/or personal information. Data stored in database **130** may be stored in any suitable format, and may be encrypted and stored in a secure format to prevent unauthorized access. Any suitable algorithm/procedure may be used for data encryption and for authorized decryption.

Server **110** may be configured to communicate with one or more client devices, such as such as client device **101** and/or client device **103**, via one or more networks, such as network **115**. Network **115** may include one or more of a wireless network, a wired network or any combination of wireless network and wired network, and may be configured to connect client devices **101** and/or **103** to server **110**. For example, network **115** may include one or more of a fiber optics network, a passive optical network, a cable network, an Internet network, a satellite network, a wireless local area network (LAN), a Global System for Mobile Communication, a Personal Communication Service, a Personal Area Network, Wireless Application Protocol, Multimedia Messaging Service, Enhanced Messaging Service, Short Message Service, Time Division Multiplexing based systems, Code Division Multiple Access based systems, D-AMPS, Wi-Fi, Fixed Wireless Data, IEEE 802.11b, 802.15.1, 802.11n and 802.11g, Bluetooth, NFC, Radio Frequency Identification (RFID), Wi-Fi, and/or the like.

In addition, network **115** may include, without limitation, telephone lines, fiber optics, IEEE Ethernet 902.3, a wide area network, a wireless personal area network, a LAN, or a global network such as the Internet. In addition, network **115** may support an Internet network, a wireless communication network, a cellular network, or the like, or any combination thereof. Network **115** may further include one network, or any number of the exemplary types of networks mentioned above, operating as a stand-alone network or in cooperation with each other. Network **115** may utilize one or more protocols of one or more network elements to which they are communicatively coupled. Network **115** may translate to or from other protocols to one or more protocols of network devices. Although network **115** is depicted as a single network, it should be appreciated that according to one or more example embodiments, network **115** may comprise a plurality of interconnected networks, such as, for example, the Internet, a service provider's network, a cable television network, corporate networks, such as credit card association networks, a LAN, and/or home networks.

In some example embodiments, server **110** may access records, including records in database **130**, to determine a method or methods for communicating with client device **101** and/or client device **103**. The communication method may include an actionable push notification with an application stored on client device **101** and/or client device **103**. Other communication methods may include a text message or an e-mail, or other messaging techniques appropriate in a network-based client/server configuration. Messages or requests by client devices **101** and/or **103** may be communicated to server **110** via an application on the client device, or may be sent by a text message or an e-mail, or other messaging techniques appropriate in a network-based client/server configuration. Communications originating with client device **101** or client device **103** may be sent to server **110** using the same communications method as communications originating with server **110**, or via a different communications method.

7

FIG. 1B shows a diagram illustrating a sequence for providing data access control according to one or more example embodiments, which may include a request to link two accounts, each account held by separate account holders. FIG. 1B references similar components of example embodiment system 100 as illustrated in FIG. 1A. Client device 101 may be associated with a first account holder. The first account holder may have an associated first account, which may include a first account identifier and first account data. Client device 101 may include application 102, which may include instructions for execution by client device 101. Client device 101 may include features further described below with reference to FIG. 2. Application 102 may be configured to provide a user interface for the first account holder when using client device 101. Application 102 may be configured to communicate, via client device 101, with other client devices, with short-range transceiver 105, and with server 110. Application 102 may be configured to receive requests and send messages as described herein with reference to client device 101. Account information, including account identifiers and account data, may be stored in database 130.

Client device 103 may be associated with a second account holder. The second account holder may have an associated second account, which may include a second account identifier. Client device 103 may include application 104, which may include instructions for execution by client device 103. Client device 103 may include features further described below with reference to FIG. 2. Application 104 may be configured to provide a user interface for the second account holder when using client device 103. Application 104 may be configured to communicate, via client device 103, with other client devices, with short-range transceiver 105, and with server 110. Application 104 may be configured to send requests and receive messages as described herein with reference to client device 103.

Short-range transceiver 105 may be associated with the first account holder. Short-range transceiver 105 may include, for example, a contactless card, and may include features further described below with reference to FIG. 3. Short-range transceiver 105 may have memory storing an applet 106 and/or a token 107, token 107 being associated with the first account holder.

A token may be used to increase security through token authorization. Server 110 may send a validation request to client device 101 and/or 103, receive responsive information from client device 101 and/or 103, and if validated, send a validation token back to client device 101 and/or 103. The validation token may be based on a pre-determined token, or may be a dynamic token based on an algorithm that can be secret and known only to server 110 and client device 101 and/or 103; the algorithm may include live parameters independently verifiable by the participants, such as the temperature at a particular location or the time. The token may be used to verify the identity of the first account holder or the second account holder. The validation request and/or validation token may be based on token 107 stored on short-range transceiver 105.

In some example embodiments, application 104 may display an instruction on client device 103 prompting the second account holder to initiate a tap action between short-range transceiver 105 and client device 103. As used herein, a tap action may include tapping short-range transceiver 105 against client device 103 (or vice-versa). For example, if short-range transceiver 105 is a contactless card and client device 103 is a mobile device, the tap action may include tapping the contactless card on a screen or other

8

portion of client device 103. However, a tap action is not limited to a physical tap by short-range transceiver 105 against client device 103, and may include other gestures, such as, e.g., a wave or other movement of short-range transceiver 105 in the vicinity of client device 103 (or vice-versa).

At label 150, there may be a tap action between short-range transceiver 105 and client device 103. The tap action may be in response to a prompt displayed on client device 103.

At label 152, application 104 may communicate (via client device 103) with short-range transceiver 105 (e.g., after short-range transceiver 105 is brought near client device 103). Communication between application 104 and short-range transceiver 105 may involve short-range transceiver 105 (such as, e.g., a contactless card) being sufficiently close to a card reader (not shown) of the client device 103 to enable NFC data transfer between application 104 and short-range transceiver 105, and may occur in conjunction with (or response to) a tap action between short-range transceiver 105 and client device 103 (such as, e.g., the tap action at label 150). The communication may include exchange of data or commands to establish a communication session between application 104 and short-range transceiver 105. The exchange of data may include transfer or exchange of one or more keys, which may be preexisting keys or generated as session keys. In some example embodiments, the communication may occur upon entry of short-range transceiver 105 into a short-range communication field of client device 103 prior to a tap action between short-range transceiver 105 and client device 103.

At label 154, short-range transceiver 105 may send token 107 associated with the first account holder to application 104. Token 107 may include the first account identifier, which may be unique to a specific user account. In an example embodiment, token 107 may include an identifier unique to the first account holder, but not to a specific account; in which case if the first account holder has more than one account, the second account holder would need to select the account to be linked. In some example embodiments, token 107 may include a key associated with the first account holder. In some example embodiments, the sending of token 107 to application 104 may be in conjunction with (or response to) a tap action between short-range transceiver 105 and client device 103 (such as, e.g., the tap action at label 150). In some example embodiments, the sending of token 107 to application 104 may occur upon entry of short-range transceiver 105 into a short-range communication field of client device 103 prior to a tap action between short-range transceiver 105 and client device 103.

At label 156, application 104 may send token 107 to server 110, along with an account link request to link the first account (associated with the first account holder) with the second account (associated with the second account holder). This may be carried out in response to a tap action between short-range transceiver 105 and client device 103 (such as, e.g., the tap action at label 150).

At label 158, processor 120 may receive (e.g., via server 110) the token and the account link request. Processor 120 may use the token to identify the first account associated with the first account holder. In some example embodiments, identifying the first account may be carried out by using the first account identifier in the token to look up account information in database 130. In some example embodiments, at label 159, if the token includes the key associated with the first account holder, processor 120 may use the key

in the token to authenticate the first account holder as the first account holder associated with short-range transceiver 105.

At label 160, processor 120 may send (e.g., via server 110) a link approval request to client device 101, requesting that the first account holder approve the account link request, by the second account holder, to link the first account with the second account. The link approval request may include, for example, the name of the second account holder, and any information or instructions required by the first account holder to consider the request. The link approval request may include a notice that the first account holder may approve or deny the request. The link approval request may be sent as a push notification to application 102 (via client device 101). In some example embodiments, application 102 may display an instruction on client device 101 prompting the first account holder to initiate a tap action between short-range transceiver 105 and client device 101.

At label 162, there may be a tap action between short-range transceiver 105 and client device 101. The tap action may be responsive to the link approval request (and/or to a prompt displayed on client device 101), and may indicate approval by the first account holder of the account link request.

At label 164, application 102 may send a link approval message to the server, indicating approval by the first account holder of the account link request. This may be carried out in response to a tap action between short-range transceiver 105 and client device 101 (such as, e.g., the tap action at label 162). In an example embodiment, application 102 may instead send a denial message (not shown) to the server, indicating denial by the first account holder of the account link request.

At label 166, processor 120 may send (e.g., via server 110) a link confirmation message to client device 103, confirming approval of the request to link the first account with the second account. The link confirmation message may be sent as a push notification to application 104 (via client device 103). In some example embodiments, information for the first account and/or the second account in database 130 may be updated with the permission granted by the first account holder to link the first and second accounts.

In an example embodiment, processor 120 may instead send a denial notification (not shown) to client device 103, indicating denial by the first account holder of the account link request.

At label 168, processor 120 may send (e.g., via server 110) to client device 103 instructions for obtaining access to first account data in the first account. The instructions for access to the first account data may be included with the link confirmation message (at label 166), or may be sent as part of a separate communication, including a push notification to application 104.

Processor 120 may retrieve the requested first account data from database 130 and transmit the data to client device 103. Processor 120 may encrypt the requested first account data, prior to transmission to client device 103, using any suitable encryption method, such as Triple DES, RSA public-key private-key encryption, asymmetric encryption, Blowfish encryption, Twofish encryption, Advanced Encryption Standard (AES), quantum key distribution, Honey Encryption, etc. In some embodiments, the requested first account data may already be encrypted as stored in database 130 prior to retrieval by processor 120.

Upon receipt of the requested first account data, client device 103 may decrypt the information, if the information was encrypted prior to transmission by processor 120. Client

device 103 may receive a decryption key separate from the first communication of encrypted first account data. The encryption may allow for control of access to first account data according to data control parameters. For example, the first account data may be encrypted in a manner that requires a new key to be requested by client device 103 from processor 120 each time client device 103 desires to gain access to the first account data, such that the data would need to be decrypted for each access by client device 103; this procedure would permit processor 120 to keep track of and ensure that the first account data is not accessed in a manner inconsistent with data control parameters.

In an example embodiment, the second account holder may login to the second account and, via data sharing on the backend, obtain access to first account data, in accordance with any data control parameters.

Application 104 executing on client device 103 may through the use of application programming interfaces (APIs), perform the steps of sending and receiving messages and requests with server 110/processor 120. Application 104 may be configured to receive, decrypt, and access the requested first account data. Through interaction with application 104, processor 120 may monitor access of the requested first account data by client device 103, including in accordance with data control parameters. For example, processor 120 may through interaction with application 104 determine the number of times client device 103 has obtained access to the requested first account data, or the period(s) of time such access occurred. In some embodiments, application 104 may be permitted to store the requested first account data on a time-limited, or limited number of uses, basis.

In an example embodiment, processor 120 may be configured to determine whether the first account is eligible to be linked with the second account. Eligibility for account linking may be based on, for example, the type of accounts involved (e.g., business accounts), or identity of the account holders (e.g., family members or members of the same business entity). Eligibility may also be based on whether the first account holder has previously approved or revoked approval of account linking, or whether requested access would violate data control parameters (discussed further below). Eligibility for account linking may, e.g., be indicated in a flag stored in database 130 or in memory of short-range transceiver 105.

In one or more example embodiments, access by the second account holder to first account data may be limited in accordance with data control parameters. In an example embodiment, data control parameters may be stored in database 130 with the first account information. Application 102 may provide an interface for the first account holder to select the data control parameters stored in database 130. The selected data control parameters may be stored in database 130 and may be applied to limit access by the second account holder to first account data. Application 102 may also transmit the selected data control parameters to short-range transceiver 105. In an example embodiment, data control parameters may be stored in memory of short-range transceiver 105. Data control parameters stored in memory of short-range transceiver 105 may be sent to application 104 and used by application 104 to limit access by the second account holder to first account data. Applet 106 may be configured to receive the data control parameters and store the data control parameters in memory of short-range transceiver 105. Applet 106 may be further configured to transmit the data control parameters to client device 103. In some example embodiments, the first account

11

holder may select data control parameters at the time of approving the request to link accounts, and application **102** may transmit the selected data control parameters to server **110** along with the link approval message. The selected data control parameters may be stored in database **130** and may be applied to limit access by the second account holder to first account data.

In one or more example embodiments, data control parameters may be used to limit access by the second account holder to first account data in one or more ways. For example, the data control parameters may permit access only for a specific or limited period of time. As another example, the data control parameters may permit access to a single use by the second account holder. As another example, the data control parameters may permit access for an unlimited period of time, unless the first account holder revokes the approval of the request to link the first account with the second account. As another example, the data control parameters may permit access only to portions of first account data corresponding to a predefined category. As another example, the data control parameters may provide different access permissions based on the identity of the second account holder. As another example, the data control parameters may permit access only when short-range transceiver **105** is detected within range of a short-range communication field of client device **103**. In some example embodiments, each time the second account holder attempts to access first account data after account linking approval is obtained, processor **120** may check to determine whether such access is permitted based on data control parameters and any revocation by the first account holder.

In an example embodiment, application **104** may be launched in response to a tap action between short-range transceiver **105** and client device **103**. In an example embodiment, application **102** may be launched in response to a tap action between short-range transceiver **105** and client device **101**.

FIG. 2 illustrates components of a client device **200** used in a data access control system according to one or more example embodiments. In one or more example embodiments, client device **200** may be one or more of client devices **101** and/or **103**, described above with reference to FIG. 1A and FIG. 1B. Client device **200** may include one or more applications **201**, one or more processors **202**, a short-range communications interface **203**, and a network interface **204**. Application **201** may include a software application or executable program code to be executed on processor **202** and configured to carry out features described herein for any of the client devices, such as client devices **101** and/or **103**, and/or any of the features described herein with reference to application **102**. Application **201** may be configured, for example, to transmit and/or receive data with other devices via client device **200**, such as via short-range communications interface **203** and/or network interface **204**. For example, application **201** may be configured to initiate one or more requests, such as near field data exchange requests to a short-range transceiver (such as a contactless card). Application **201** may also be configured to provide a user interface via a display (not shown) for a user of the client device. Application **201** may be stored in memory in client device **200**; the memory may include a read-only memory, write-once read-multiple memory and/or read/write memory, e.g., RAM, ROM, and EEPROM.

Processor **202** may include one or more processing devices such as a microprocessor, RISC processor, ASIC, etc., and may include associated processing circuitry. Processor **202** may include, or be connected to, memory storing

12

executable instructions and/or data, as may be necessary or appropriate to control, operate or interface with the other features of client device **200**, including application **201**. Processor **202** (including any associated processing circuitry) may contain additional components including processors, memories, error and parity/CRC checkers, data encoders, anticollision algorithms, controllers, command decoders, security primitives and tamperproofing hardware, as necessary to perform the functions described herein.

Short-range communications interface **203** may support communication via a short-range wireless communication field, such as NFC, RFID, or Bluetooth. Short-range communications interface **203** may include a reader, such as a mobile device NFC reader. Short-range communications interface **203** may be incorporated into network interface **204**, or may be provided as a separate interface.

Network interface **204** may include wired or wireless data communication capability. These capabilities may support data communication with a wired or wireless communication network, including the Internet, a cellular network, a wide area network, a local area network, a wireless personal area network, a wide body area network, any other wired or wireless network for transmitting and receiving a data signal, or any combination thereof. Such network may include, without limitation, telephone lines, fiber optics, IEEE Ethernet 902.3, a wide area network, a local area network, a wireless personal area network, a wide body area network or a global network such as the Internet.

Client device **200** may also include a display (not shown). Such display may be any type of device for presenting visual information such as a computer monitor, a flat panel display, or a mobile device screen, including liquid crystal displays, light-emitting diode displays, plasma panels, and cathode ray tube displays.

Client device **200** may also include one or more device inputs (not shown). Such inputs may include any device for entering information into the client device that is available and supported by the client device **300**, such as a touchscreen, keyboard, mouse, cursor-control device, touchscreen, microphone, digital camera, video recorder, or camcorder. The device inputs may be used to enter information and interact with the client device **200** and, by extension, with the systems described herein.

FIG. 3 illustrates components of a short-range transceiver **300** used in a data access control system according to one or more example embodiments. In one or more example embodiments, short-range transceiver **300** may be one or more of short-range transceiver **105**, described above with reference to FIG. 1A and FIG. 1B. Short-range transceiver **300** may include, for example, a contactless card, or may include a device with a varying form factor such as a fob, pendant or other device configured to communicate within a short-range communications field. Short-range transceiver **300** may include a processor **301**, memory **302**, and short-range communications interface **305**.

Processor **301** may include one or more processing devices such as a microprocessor, RISC processor, ASIC, etc., and may include associated processing circuitry. Processor **301** may include, or be connected to, memory storing executable instructions and/or data, as may be necessary or appropriate to control, operate or interface with the other features of short-range transceiver **300**, including applet **303**. Processor **301** (including any associated processing circuitry) may contain additional components including processors, memories, error and parity/CRC checkers, data encoders, anticollision algorithms, controllers, command

13

decoders, security primitives and tamperproofing hardware, as necessary to perform the functions described herein.

Memory 302 may be a read-only memory, write-once read-multiple memory or read/write memory, e.g., RAM, ROM, and EEPROM. Memory 302 may be configured to store one or more applets 303, and one or more tokens 304. Applet 303 may comprise one or more software applications configured to execute on processor 301, such as a Java Card applet that may be executable on a contactless card. However, it is understood that applet 303 is not limited to Java Card applets, and instead may be any software application operable on contactless cards or other devices having limited memory. Applet 303 may be configured to respond to one or more requests, such as near field data exchange requests from a client device, including requests from a device having a reader such as a mobile device NFC reader. Applet 303 may be configured to read (or write) data, including token 304, from (or to) memory 302 and provide the data, including token 304, in response to a request.

Token 304 may include a unique alphanumeric identifier assigned to a user of the short-range transceiver 300, and the identifier may distinguish the user of the short-range transceiver 300 from other users of other short-range transceivers (such as other contactless card users). In some example embodiments, token 304 may identify both a customer and an account assigned to that customer and may further identify the short-range transceiver (such as a contactless card) associated with the customer's account. In some example embodiments, token 304 may include a key unique to the user or customer with which the short-range transceiver is associated.

Short-range communications interface 305 may support communication via a short-range wireless communication field, such as NFC, RFID, or Bluetooth. Short-range transceiver 300 may also include one or more antennas (not shown) connected to short-range communications interface 305 to provide connectivity with a short-range wireless communications field.

FIG. 4 is diagram illustrating the interaction 400 between a client device 401 and a short-range transceiver 420 used in a data access control system according to one or more example embodiments, including embodiments described above with reference to FIGS. 1A-1B. Client device 401 may be client device 103 described above with reference to FIG. 1A and FIG. 1B. Client device 401 may be associated with the second account holder. User interface 402 may be generated by application 104 described above with reference to FIG. 1B. Short-range transceiver 420 may be short-range transceiver 105 described above with reference to FIG. 1A and FIG. 1B. Upon entry of short-range transceiver 420 into a short-range communication field of client device 401 (such as, e.g., via a tap action), client device 401 may communicate with short-range transceiver 420. Client device 401 may send data or commands to short-range transceiver 420 via transmit signal 431, and may receive data from short-range transceiver 420, including token 422, via receive signal 432. Communication between client device 401 and short-range transceiver 420 may proceed as described above with reference to FIG. 1B (e.g., client device 101 or 103 and short-range transceiver 105).

User interface 402 may present on client device 401 a screen display for an account link request 410, which may include field 411 and field 412. If necessary, the second account holder may enter a username in field 411 and password in field 412. The screen display may include an instruction 414 prompting the second account holder to tap short-range transceiver 420 (in the example shown, short-

14

range transceiver 420 may be a contactless card) to initiate an account link request to link the first account with the second account. Instruction 414 may be a push notification from server 110 (shown in FIGS. 1A and 1B). Client device 401 may transmit an account link request to server 110 (shown in FIG. 1A and FIG. 1B) in response to a tap action.

FIG. 5 is diagram illustrating the interaction 500 between a client device 501 and a short-range transceiver 520 used in a data access control system according to one or more example embodiments, including embodiments described above with reference to FIGS. 1A-1B. Client device 501 may be client device 101 described above with reference to FIG. 1A and FIG. 1B. Client device 501 may be associated with the first account holder. User interface 502 may be generated by application 102 described above with reference to FIG. 1B. Short-range transceiver 520 may be short-range transceiver 105 described above with reference to FIG. 1A and FIG. 1B. Upon entry of short-range transceiver 520 into a short-range communication field of client device 501 (such as, e.g., via a tap action), client device 501 may communicate with short-range transceiver 520. Client device 501 may send data or commands to short-range transceiver 520 via transmit signal 531, and may receive data from short-range transceiver 520, including token 522, via receive signal 532. Communication between client device 501 and short-range transceiver 520 may proceed as described above with reference to FIG. 1B (e.g., client device 101 or 103 and short-range transceiver 105).

User interface 502 may present on client device 501 a screen display for an account link request 510, which may include field 511 and field 512. If necessary, the first account holder may enter a username in field 511 and password in field 512. The screen display may include an instruction 514 notifying the first account holder that the second account holder (named 2_Acc_Hldr as shown in the example) has requested to link the first account with the second account, and prompting the first account holder to tap short-range transceiver 520 (in the example shown, short-range transceiver 520 may be a contactless card) to approve the account link request to link the first account with the second account. Instruction 514 may result from a push notification from server 110 (shown in FIG. 1A and FIG. 1B). Client device 501 may transmit an account link approval message to server 110 in response to a tap action. In some example embodiments, user interface 502 may provide the first account holder the option to select data control parameters at the time of approving the request to link accounts. Client device 501 may transmit the selected data control parameters to server 110 along with the link approval message; the selected data control parameters may be stored and may be applied to limit access by the second account holder to first account data, as discussed above.

FIG. 6 is a flowchart illustrating a method of data access control 600 according to one or more example embodiments, with reference to components and features described above including but not limited to the figures and associated description. Data access control method 600 may be carried out by application 104 executing on client device 103 associated with the second account holder. Short-range transceiver 105 is associated with the first account holder.

At block 610, application 104 may cause client device 103 to display an account link request screen (such as shown in, and described above with reference to, FIG. 4). The account link request screen may include an instruction to tap short-range transceiver 105 with/against client device 103 to initiate the account link request. As described above with

15

reference to FIG. 4, short-range transceiver 420 (and, hence, short-range transceiver 105) may be a contactless card.

At block 620, a tap action may be detected between short-range transceiver 105 and client device 103.

At block 630, token 107 may be received from short-range transceiver 105. Receiving token 107 may be in response to the tap action of block 620. Token 107 may include the first account identifier. In some example embodiments, token 107 may include a key associated with the first account holder.

At block 640, token 107 may be transmitted to server 110 along with an account link request to link the first account with the second account. Transmission of token 107 and the account link request to server 110 may be in response to the tap action of block 620.

At block 650, an account link confirmation message may be received from server 110 along with instructions for access to first account data. As discussed above, the instructions may be part of the account link confirmation message, or part of a separate message.

At block 660, the second account holder may access the first account data according to the received instructions. As discussed above, in some example embodiments access to first account data may be only provided in accordance with data control parameters. In some example embodiments, the data control parameters are stored in database 130 with the first account information, and data access is limited by processor 120. In some example embodiments, the data control parameters are stored in memory of short-range transceiver 105 and are received by application 104 from short-range transceiver 105. In some example embodiments, the first account data may be encrypted prior to receiving instructions for access to the first account data. Decryption of the encrypted first account data may be performed using the key associated with the first account holder.

FIG. 7 is a flowchart illustrating a method of data access control 700 according to one or more example embodiments, with reference to components and features described above including but not limited to the figures and associated description. Data access control method 700 may be carried out by application 102 executing on client device 101 associated with the first account holder. Short-range transceiver 105 is associated with the first account holder.

At block 710, a link approval request may be received from server 110 seeking approval to link the first account with the second account.

At block 720, application 102 may cause client device 101 to display an account link request screen (such as shown in, and described above with reference to, FIG. 5). The account link request screen may include an instruction to tap short-range transceiver 105 with/against client device 101 to approve the account link request. As described above with reference to FIG. 5, short-range transceiver 520 (and, hence, short-range transceiver 105) may be a contactless card.

At block 730, a tap action may be detected between short-range transceiver 105 and client device 101 indicating approval of the link approval request. The tap action may be responsive to the link approval request. In an example embodiment, approval may be indicated by other methods (such as, e.g. selecting a button).

At block 740, token 107 may be received from short-range transceiver 105. Token 107 may include the first account identifier. In some example embodiments, token 107 may include a key associated with the first account holder.

At block 750, a link approval message may be sent to server 110 indicating approval of the request to link the first account with the second account.

16

FIG. 8 is a flowchart illustrating a method of data access control 800 according to one or more example embodiments, with reference to components and features described above including but not limited to the figures and associated description. Data access control method 800 may be carried out by processor 120 in communication with, via server 110, client device 101 associated with the first account holder and/or client device 103 associated with the second account holder.

At block 810 an account link request may be received, along with token 107, from client device 103 associated with the second account holder, requesting to link the first account with the second account. Token 107 may include the first account identifier. In some example embodiments, token 107 may include a key associated with the first account holder.

At block 820, the sender of the account link request may be identified as the second account holder.

At block 830, the first account may be identified based on received token 107. In some example embodiments, when token 107 includes the key associated with the first account holder, the key associated with the first account holder may be used to authenticate the first account holder.

At block 840, the processor may confirm that the first account is eligible to be linked with the second account. As discussed above with reference to FIG. 1B, eligibility for account linking may be based on, for example, the type of accounts involved (e.g., business accounts), or identity of the account holders (e.g., family members or members of the same business entity).

At block 850, a link approval request may be sent to client device 101 associated with the first account holder seeking approval to link the first account with the second account.

At block 860, a link approval message may be received from client device 101, indicating approval of the request to link the first account with the second account.

At block 870, an account link confirmation message may be sent to client device 103 associated with the second account holder, along with instructions for access to first account data. As discussed above, the instructions may be part of the account link confirmation message, or part of a separate message. In some example embodiments, access to first account data may be limited in accordance with data control parameters. In some example embodiments, processor 120 may encrypt the first account data prior to providing client device 103 instructions for access to the first account data. Encryption of the first account data may be performed using the key associated with the first account holder.

The description of embodiments in this disclosure provides non-limiting representative examples referencing figures and numerals to particularly describe features and teachings of different aspects of the disclosure. The embodiments described should be recognized as capable of implementation separately, or in combination, with other embodiments from the description of the embodiments. A person of ordinary skill in the art reviewing the description of embodiments should be able to learn and understand the different described aspects of the disclosure. The description of embodiments should facilitate understanding of the disclosure to such an extent that other implementations, not specifically covered but within the knowledge of a person of skill in the art having read the description of embodiments, would be understood to be consistent with an application of the disclosure.

Throughout the specification and the claims, the following terms take at least the meanings explicitly associated herein, unless the context clearly dictates otherwise. The

term “or” is intended to mean an inclusive “or.” Further, the terms “a,” “an,” and “the” are intended to mean one or more unless specified otherwise or clear from the context to be directed to a singular form.

In this description, numerous specific details have been set forth. It is to be understood, however, that implementations of the disclosed technology may be practiced without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description. References to “some examples,” “other examples,” “one example,” “an example,” “various examples,” “one embodiment,” “an embodiment,” “some embodiments,” “example embodiment,” “various embodiments,” “one implementation,” “an implementation,” “example implementation,” “various implementations,” “some implementations,” etc., indicate that the implementation(s) of the disclosed technology so described may include a particular feature, structure, or characteristic, but not every implementation necessarily includes the particular feature, structure, or characteristic. Further, repeated use of the phrases “in one example,” “in one embodiment,” or “in one implementation” does not necessarily refer to the same example, embodiment, or implementation, although it may.

As used herein, unless otherwise specified the use of the ordinal adjectives “first,” “second,” “third,” etc., to describe a common object, merely indicate that different instances of like objects are being referred to, and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking, or in any other manner.

While certain implementations of the disclosed technology have been described in connection with what is presently considered to be the most practical and various implementations, it is to be understood that the disclosed technology is not to be limited to the disclosed implementations, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

This written description uses examples to disclose certain implementations of the disclosed technology, including the best mode, and also to enable any person skilled in the art to practice certain implementations of the disclosed technology, including making and using any devices or systems and performing any incorporated methods. The patentable scope of certain implementations of the disclosed technology is defined in the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

What is claimed is:

1. A method for controlling data access, comprising:

receiving, by a server via a network, an account link request to link a first account associated with a first account holder with a second account associated with a second account holder, the account link request accompanied by a token;

identifying, by the server, the first account based on the token;

determining whether the first account is eligible for linking to the second account based on at least one selected from the group of an identity of the first account holder

and an identity of the second account holder and based on at least one selected from the group of an account type of the first account and an account type of the second account,

wherein the identity of the first account holder and the identity of the second account holder are at least one selected from the group of family members and members of the same business entity:

transmitting, by the server via the network, a link approval request to approve the account link request; receiving, by the server via the network, a link approval message generated in response to an indication by the first account holder approving the account link request and one or more data control parameters for limiting access by the second account holder to the first account; and

transmitting, by the server via the network, an account link confirmation message and the one or more data control parameters, the account link confirmation message confirming approval of the account link request.

2. The method of claim 1, wherein the token comprises a key associated with the first account holder.

3. The method of claim 2, wherein identifying the first account based on the token comprises identifying the first account based on the key.

4. The method of claim 1, wherein the token comprise a first identifier associated with the first account holder.

5. The method of claim 1, wherein:

the server is in data communication with a database storing information for a plurality of accounts, and the plurality of accounts includes at least the first account and the second account.

6. The method of claim 5, wherein:

for the first account, the database stores information comprising a first account identifier and first account data, and

for the second account, the database stores information comprising a second account identifier.

7. The method of claim 1, wherein the account type of the first account and the account type of the second account are corporate accounts.

8. The method of claim 1, wherein:

the account link confirmation message includes instructions for access to first account data associate with the first account holder, and

access to the first account data is limited by at least one of the one or more data control parameters.

9. The method of claim 8, wherein the data control parameters permit access to the first account data for a limited period of time.

10. A server, comprising:

a processor; and

a memory,

wherein the processor:

receives, via a network, an account link request and a token, wherein the account link request is to link a first account associated with a first account holder with a second account associated with a second account holder,

identifies the first account based on the token,

determines whether the first account is eligible for linking to the second account based on at least one selected from the group of an identity of the first account holder and an identity of the second account holder and based on at least one selected from the group of an account type of the first account and an account type of the second account, wherein the

19

identity of the first account holder and the identity of the second account holder are at least one selected from the group of family members and members of the same business entity,

transmits, via the network, a link approval request to approve the account link request,

receives, via the network, a link approval message generated in response to an indication by the first account holder approving the account link request and one or more data control parameters for limiting access by the second account holder to the first account, and

transmits, via the network, an account link confirmation message and the one or more data control parameters, the account link confirmation message confirming approval of the account link request.

11. The server of claim 10, wherein:

the processor is in data communication with a database, and

the database stores information for a plurality of accounts, the information including:

for the first account associated with the first account holder, a first account identifier and first account data, and,

for the second account associated with a second account holder, a second account identifier.

12. The server of claim 11, wherein the processor:

retrieves at least a portion of the first account data from the database,

encrypts the at least a portion of the first account data to generate encrypted first account data, and

following transmission of the account link confirmation message, transmits the encrypted first account data.

13. The server of claim 12, wherein the processor transmits, in a separate communication from the encrypted first account data, a decryption key.

14. The server of claim 13, wherein the decryption key is a key associated with the first account holder.

20

15. A system for data access control, comprising:

a short-range transceiver comprising a processor and a memory, wherein:

the short-range transceiver is associated with a first account holder, and

the memory of the short-range transceiver contains a token; and

a server comprising a processor and a memory, wherein the server is in data communication with a database storing information for a plurality of accounts, the information including, for a first account associated with the first account holder, a first account identifier, first account data, and, for a second account associated with a second account holder, a second account identifier,

wherein the short-range transceiver transmits an account link request to link the first account with the second account and the token to the server, and

wherein, after receipt of the account link request, the server:

identifies the first account based on the token, and transmits a link approval request to approve the account link request,

receives a link approval message generated in response to an indication by the first account holder approving the account link request and one or more data control parameters for limiting access by the second account holder to the first account, and

transmits an account link confirmation message and the one or more data control parameters, the account link confirmation message confirming approval of the account link request.

16. The system of claim 15, wherein the server transmits instructions for access to the first account data.

17. The system of claim 16, wherein access to the first account data is limited by at least one of the one or more data control parameters selected by the first account holder.

18. The system of claim 15, wherein the token comprises a key associated with the first account holder.

19. The system of claim 18, wherein identifying the first account based on the token comprises identifying the first account based on the key.

20. The system of claim 18, wherein the key comprises a session key generated by the short-range transceiver.

* * * * *