

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

CARBYNE BIOMETRICS, LLC,

Patent Owner

IPR2024-00329

U.S. Patent No. 9,972,010

**PETITIONER'S REPLY TO
PATENT OWNER'S RESPONSE**

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PETITIONER'S EXHIBIT LIST

Updated: January 16, 2026

APPL-1001	U.S. Patent No. 9,972,010 to Jakobsson ("010 patent")
APPL-1002	Prosecution File History of U.S. App. No. 13/875,245 ("245 App")
APPL-1003	Declaration of Dr. Creed Jones ("Jones Decl.")
APPL-1004	CV of Dr. Creed Jones
APPL-1005	Prosecution File History of U.S. Prov. App. 61/332,140 ("140 App")
APPL-1006	Prosecution File History of U.S. App. No. 13/099,981 ("981 App")
APPL-1007	RESERVED
APPL-1008	U.S. Pub. No. 2010/0042535 to Stone ("Stone")
APPL-1009	U.S. Patent No. 8,386,620 to Chatterjee ("Chatterjee")
APPL-1010	U.S. Pub. No. 2006/0282660 to Varghese et al. ("Varghese")
APPL-1011	U.S. Pub. No. 2009/0135188 to Ding et al. ("Ding")
APPL-1012	U.S. Patent No. 8,355,530 to Park et al. ("Park")
APPL-1013	U.S. Pub. No. 2010/0014720 to Hoyos et al. ("Hoyos")
APPL-1014	U.S. Pub. No. 2006/0158307 to Lee et al. ("Lee")
APPL-1015	U.S. Patent No. 8,150,772 to Mardikar et al. ("Mardikar")
APPL-1016	U.S. Pub. No. 2009/0157560 to Carter et al. ("Carter")
APPL-1017	U.S. Patent No. 5,164,992 to Turk et al. ("Turk")
APPL-1018	U.S. Patent No. 7,814,332 to Beenau et al. ("Beenau")
APPL-1019	U.S. Patent No. 10,373,173 to Winner et al. ("Winner")
APPL-1020	U.S. Patent No. 7,856,472 to Arav ("Arav")
APPL-1021	Heusch, et al., "Local Binary Patterns as an Image Preprocessing for Face Authentication," IDIAP Research Institute Report, November 2005 ("Heusch")
APPL-1022	Oracle-Bharosa Acquisition Announcement, 2007,

	https://www.oracle.com/us/corporate/acquisitions/bharosa/oracle-bharosa-faq-072369.pdf (retrieved January 17, 2024) (“Oracle-Bharosa Acquisition Announcement”)
APPL-1023	U.S. Patent No. 7,779,268 to Draper et al. (“Draper”)
APPL-1024	U.S. Patent No. 5,930,804 to Yu et al. (“Yu”)
APPL-1025	Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“Director Memo”)
APPL-1026	Preliminary Constructions, <i>Carbyne Biometrics, LLC v. Apple Inc.</i> , WDTX-1:23-cv-00324 (December 11, 2023)
APPL-1027	United States District Courts—National Judicial Caseload Profile (September 30, 2023), https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2023/09/30 (retrieved Dec. 14, 2023)
APPL-1028	Scheduling Order, <i>Carbyne Biometrics, LLC v. Apple Inc.</i> , WDTX-1:23-cv-00324 (July 14, 2023)
APPL-1029	Carbyne Preliminary Infringement Contentions, <i>Carbyne Biometrics, LLC v. Apple Inc.</i> , WDTX-1:23-cv-00324 (June 21, 2023)
APPL-1030 - APPL-1032	RESERVED
APPL-1033	J. P. Campbell, “Speaker Recognition: a Tutorial,” in Proceedings of the IEEE, vol. 85, no. 9, pp. 1437-1462, Sept. 1997 (“Campbell”)
APPL-1034	U.S. App. Pub. No. 2009/0288012A1 to Hertel et al. (“Hertel”)
APPL-1035	U.S. Patent No. 8,533,485 to Bansal et al. (“Bansal”)
APPL-1036	U.S. App. Pub. No. 2006/0271460A1 to Hanif (“Hanif”)
APPL-1037	Federal Financial Institutions Examination Council, FFIEC Press Release and FFIEC Guidance - Authentication in an Internet Banking Environment, Oct 12, 2005, https://www.ffiec.gov/pdf/authentication_guidance.pdf (retrieved January 17, 2024), accessible through hyperlinks in https://www.ffiec.gov/press/pr101205.htm (APPL-1040) and

	https://www.fdic.gov/news/inactive-financial-institution-letters/2005/fil10305.html (APPL-1039) ("Guidance")
APPL-1038	Bhargav-Spantzel et al., "Privacy Preserving Multifactor Authentication with Biometrics," DIM'06, November 3, 2006 ("Bhargav-Spantzel")
APPL-1039	FDIC Financial Institution Letter, FFIEC Guidance Authentication in an Internet Banking Environment, FIL-103-2005, October 12, 2005, https://www.fdic.gov/news/inactive-financial-institution-letters/2005/fil10305.html (retrieved January 17, 2024), including hyperlink for APPL-1037 ("FIL-103-2005")
APPL-1040	Federal Financial Institutions Examination Council, FFIEC Guidance Press Release, Oct 12, 2005, https://www.ffiec.gov/press/pr101205.htm (retrieved January 17, 2024), including hyperlink for APPL-1037 ("FFIEC Guidance Press Release")
APPL-1041	U.S. App. Pub. No. 2010/0317335A1 to Borovsky ("Borovsky")
APPL-1042	Ekler et al., "Similarity Management in Phonebook-Centric Social Networks," 2009 Fourth International Conference on Internet and Web Applications and Services, Venice/Mestre, Italy, 2009, pp. 273-279, doi: 10.1109/ICIW.2009.46 ("Ekler")
APPL-1043	U.S. Patent No. 8,954,500 to Marlow et al. ("Marlow")
APPL-1044	Kollreider et al., "Verifying Liveness by Multiple Experts in Face Biometrics," 2008 IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops, Anchorage, AK, USA, 2008, pp. 1-6, doi: 10.1109/CVPRW.2008.4563115 ("Kollreider")
APPL-1045	Narayanan et al., "De-anonymizing Social Networks," 2009 30th IEEE Symposium on Security and Privacy, 2009 ("Narayanan")
APPL-1046	U.S. App. Pub. No. US2008/0270038A1 to Partovi et al. ("Partovi")
APPL-1047	Vasalou et al., "Avatars in Social Media: Balancing Accuracy, Playfulness and Embodied Messages," International Journal of Human-Computer Studies Volume 66, Issue 11, November 2008, Pages 801-811 ("Vasalou")
APPL-1048	Sotera Stipulation dated April 17, 2024

(New) APPL-1049	Deposition transcript of Dr. Creed Jones (October 11, 2024)
(New) APPL-1050	Deposition transcript of Dr. Michael Goodrich (January 7, 2025)
(New) APPL-1051	CS 201P - Computer Security, Notes (https://ics.uci.edu/~goodrich/teach/cs201P/notes/ and https://ics.uci.edu/~goodrich/teach/cs201P/notes/Ch10-DRM.pdf)
(New) APPL-1052	WO App. Pub. 2008/020991 to Goodrich et al.
(New) APPL-1053	Deposition transcript of Dr. Michael Goodrich (January 8, 2025)
(New) APPL-1054	Goodrich et al., Introduction to Computer Security (October 15, 2010)
(New) APPL-1055	M.J. Atallah, K.B. Frikken, M.T. Goodrich, and R. Tamassia, "Secure Biometric Authentication for Weak Computational Devices," 9th Int. Conf. on Financial Cryptography and Data Security, Springer, Lecture Notes in Computer Science 3570, 357-371, 2005
(New) APPL-1056	Supplemental Declaration of Dr. Creed Jones ("Jones Suppl. Decl.")

I. Introduction

Carbyne Biometrics (“Patent Owner” or “PO”), in its Patent Owner’s Response (“POR”), cannot dispute that the claims are rendered obvious by the prior art. So, to avoid a clear finding of unpatentability, it attempts to distort the teachings of prior art, misrepresent Petition’s combinations, and misapply the law. The Board should disregard these arguments and find the challenged claims unpatentable.

II. Level of Ordinary Skill in the Art

In the Institution Decision, the Board adopted Petitioner’s POSITA standard “except for the language ‘at least’ that qualifies the experience level and allows the experience level to encompass an expert’s level of skill.” ID, 21. Petitioner applies the standard as clarified by the Board. The analysis of the Petition remains the same, applying this clarified level of skill for a POSITA. APPL-1056, ¶1 (Dr. Jones explaining that his analysis in the original declaration APPL-1003 remains the same).

III. Ground 1: Stone combined with Hoyos (Stone-Hoyos) Render the Challenged Claims Obvious.

A. Stone combined with Hoyos renders obvious the independent claims 1, 9, and 17.

1. Stone combined with Hoyos renders obvious the same “virtual likeness of [a/the] face of [an/the] account holder” recited in [1.2]-[1.5].¹

PO states that neither of the user photo on the virtual currency and the recipient photo as shown in Petition's combination of Stone and Hoyos “is the **same** ‘virtual likeness’” required for limitations [1.2]-[1.5]. POR, 17. It is noted that PO does not dispute that *the virtual likeness of the face of the account holder* rendered in the interface in [1.3]-[1.5]—as by Stone—is the same virtual likeness. *Id.* PO's arguments should be rejected, because the Petition has shown that Stone combined with Hoyos renders obvious that the same *virtual likeness of the face of the account holder* is received, associated with a user's account, and rendered in an interface as recited in [1.2]-[1.5]. Pet., 26-36; APPL-1056, ¶3.

Contrary to PO's assertion, as explained in the Petition and detailed below, the image/photo of a funds recipient (one account holder, also referred to as a “recipient account holder” or “recipient”) and the image/photo of a funds sender

¹ Petitioner's arguments with respect to limitations [1.2]-[1.5] similarly apply to limitations [9.1]-[9.4] and [17.1]-[17.4].

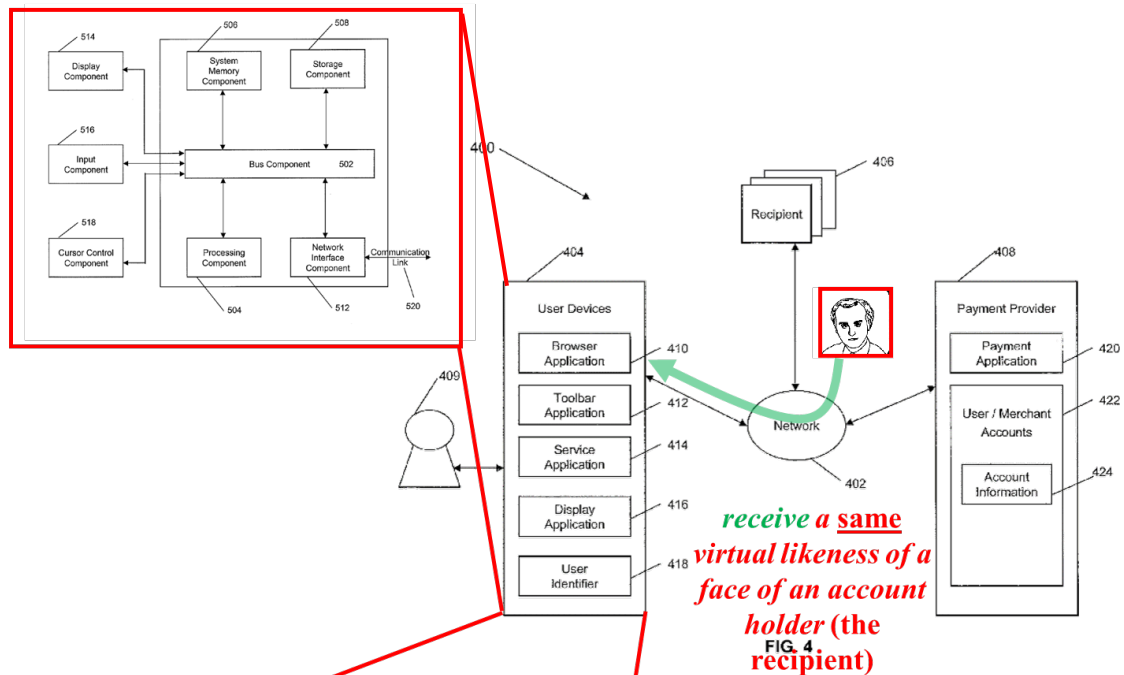
(another account holder, also referred to as a “sender account holder” or “sender”)

in Stone combined with Hoyos **each alone** renders obvious the same “*virtual likeness of [a/the] face of [an/the] account holder*” as recited in [1.2]-[1.5]. Pet., 26-36; APPL-1056, ¶4. As shown in each of Examples 1.1, 1.2, 2.1, and 2.2 of the combination of Stone and Hoyos below, Petitioner establishes obviousness based on (1) the recipient image (each of Examples 1.1 and 1.2), and also separately (2) the sender image (each of Examples 2.1 and 2.2). PO's arguments should be rejected based on each of these examples individually.

a. Example 1.1 of combination of Stone and Hoyos: The recipient image renders obvious the same “*virtual likeness of [a/the] face of [an/the] account holder*,” where a single processor performs [1.2]-[1.5].

As shown Example 1.1 of the combination of Stone and Hoyos below, Stone combined with Hoyos renders obvious [1.2]-[1.5], where the same recipient image (the same “*virtual likeness of [a/the] face of [an/the] account holder*”) is received, associated with an account holder, and rendered in an interface as recited in [1.2]-[1.5], all steps performed by a processor of a user device 404. APPL-1056, ¶5.

*associate, in a data store, the same
virtual likeness of the face of the
account holder (the recipient) with an
account (the recipient account) of the
account holder (the recipient)*



*render, in an interface, the
same virtual likeness of the
face of the account holder
(the recipient)*

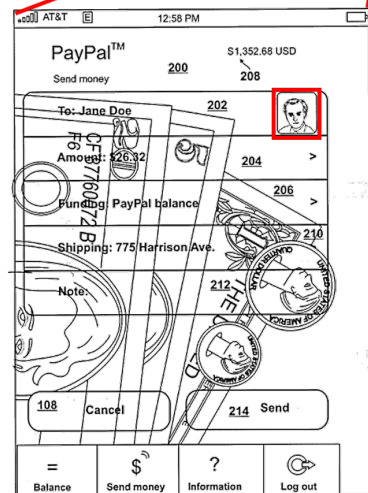


FIG. 2

**Example 1.1 of Stone Combined with Hoyos
(annotated based on APPL-1008, Stone, FIGS. 2 and 4).**

Specifically, as shown in Example 1.1, Stone combined with Hoyos renders obvious [1.2]-[1.5], because for sender user device 404 to display the recipient image on the interface of FIG. 2, sender user device 404 has to *receive* the recipient image (e.g., through the network from recipient device 406) to display it, and has to *associate* it with the recipient account for “Jane Doe”, such that the recipient image is displayed together with “To: Jane Doe” in the field 202 of FIG. 2. APPL-1008, Stone, [0020] (“When the user is **connected to a network** with other users, the user display may visually show other users,” indicating that the icons of the other uses are pulled by the user through the network), [0046] (“each recipient may be associated with one or more devices that **can communicate with network 402....As a result**, user device 404 may be able to **access recipient attributes**, such as **icon information, for display** or use by user device 404.”); APPL-1056, ¶6 .

Thus, as shown in Example 1.1, Stone combined with Hoyos renders obvious that *one or more processors* (a processor 504 in user device 404 alone) *is configured to*:

[1.2] *receive* (e.g., using processor 504 in sender user device 404, from network 402) *a virtual likeness of a face of an account holder* (a recipient image of a recipient account holder); *associate* (e.g., using processor 504 in sender user device 404 to associate), *in a data store* (storage of sender user device 404), *the virtual likeness of the face of the account holder* (the image of the recipient) *with an account*

of the account holder (a recipient account to “Jane Doe,” where the association is used to display the recipient account and recipient image in field 202 in FIG. 2 of Stone);

[1.3] *render* (using processor 504 in sender user device 404), *in an interface* (FIG. 2), *the virtual likeness of the face of the account holder* (the image of the recipient), and [1.4]-[1.5] as discussed in the Petition. Pet., 26-35; APPL-1008, Stone, [0046], [0048]; APPL-1056, ¶7.

Example 1.1's teaching is consistent with the '010 Patent's description, for which PO's expert explains that a user device practices all of the steps of claim 1, which includes receiving a recipient image, associating the recipient image with a recipient account, and rendering the recipient image on an interface. APPL-1001, FIG. 1; APPL-1050, Goodrich Tr., 61:24-26 (“the device 106 [of FIG. 1 of '010 Patent] can also practice all the steps of claim 1”); APPL-1056, ¶8.

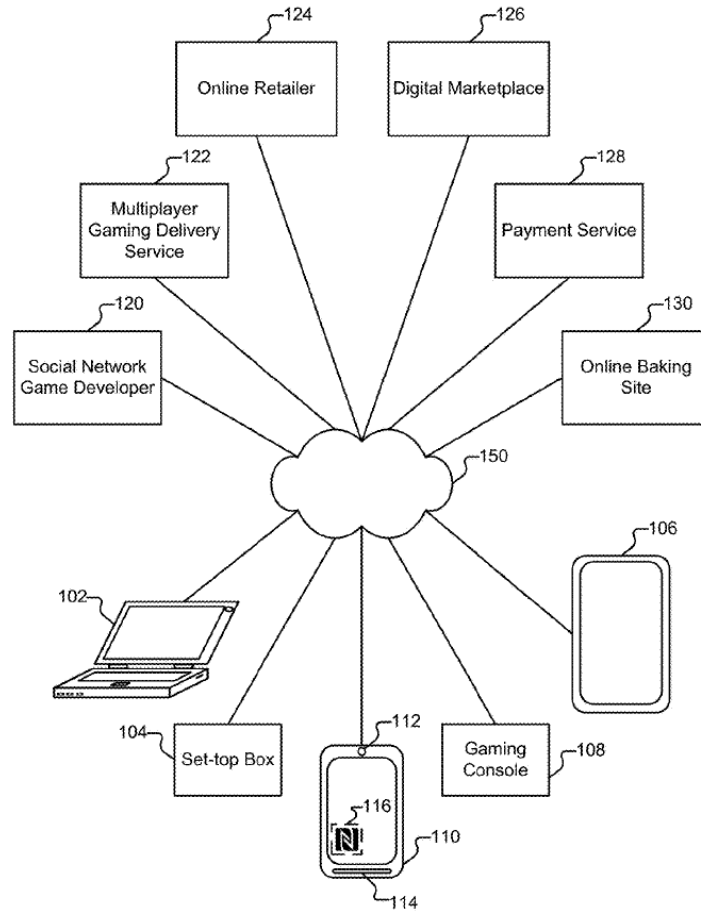


FIG. 1

APPL-1001, FIG. 1.

b. Example 1.2 of combination of Stone and Hoyos: The recipient image renders obvious the same “virtual likeness of [a/the] face of [an/the] account holder,” where [1.2]-[1.5] are performed using multiple processors.

As shown Example 1.2 of the combination of Stone and Hoyos below, Stone combined with Hoyos renders obvious [1.2]-[1.5], where the same recipient image (the same “virtual likeness of [a/the] face of [an/the] account holder”) is received, associated with an account holder, and rendered in an interface as recited in [1.2]-[1.5], where the steps are performed by multiple processors (processor 504 in user

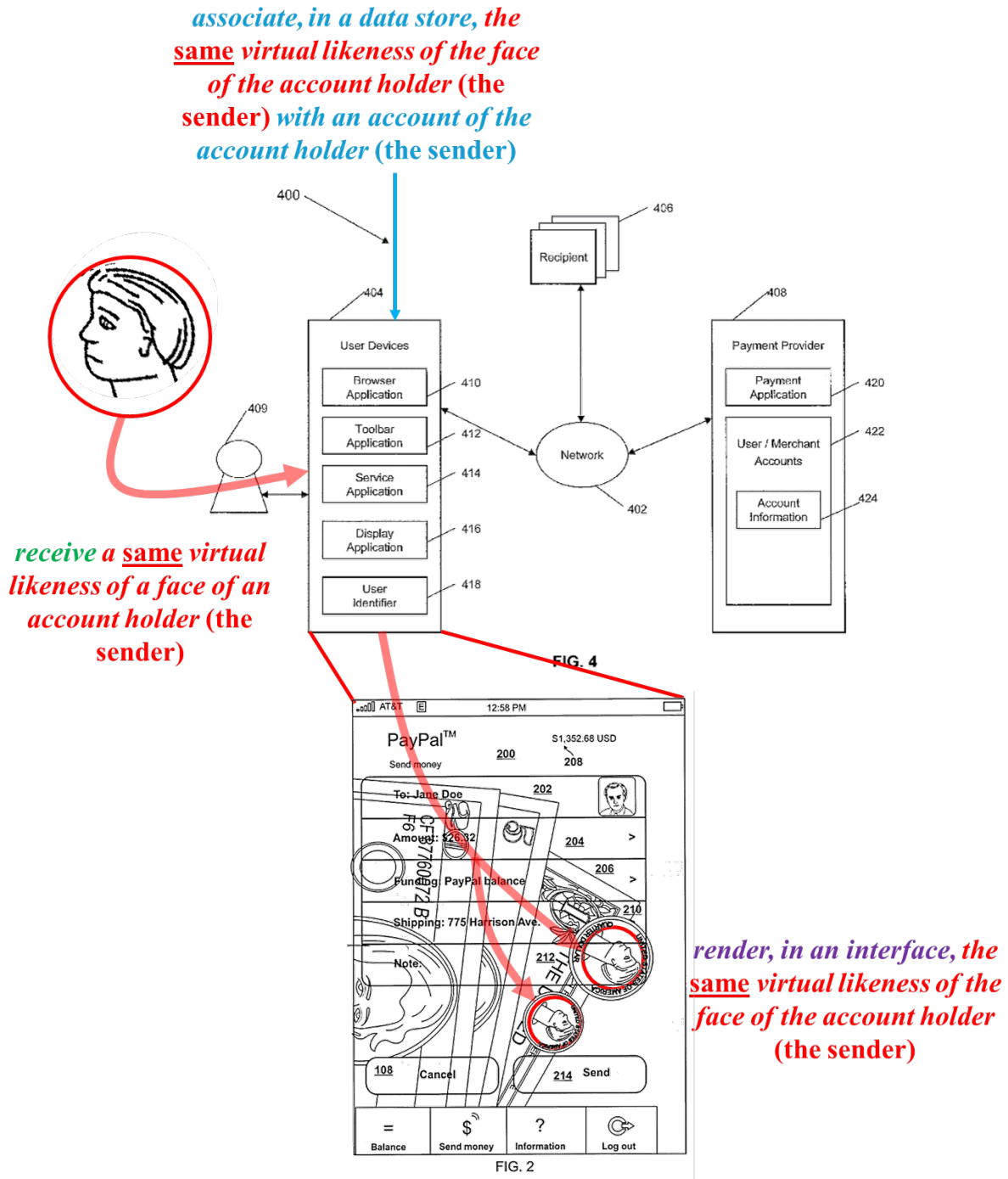
payment provider server 408, processor in recipient device 406, and/or other processors of system 400) *are configured to:*

[1.2] *receive* (using processor 504 in recipient device 406) *a virtual likeness of a face of an account holder* (a recipient image of a recipient account holder); *associate, in a data store* (associate using processor 504 of user device 404 in storage of user device 404, associate using processor 504 of recipient device 406 in storage of recipient device 406, or using processor 504 of payment provider server 408 in storage of payment provider server 408), *the virtual likeness of the face of the account holder* (recipient image) *with an account of the account holder* (recipient account holder);

[1.3] *render* (using processor 504 in user device 404), *in an interface* (FIG. 2), *the virtual likeness of the face of the account holder* (recipient image), and [1.4]-[1.5] as discussed in Petition. Pet., 26-35; APPL-1008, Stone, [0046], [0048] (“payment provider server 408 may be configured to maintain a plurality of user and recipient accounts 422, each of which may include account information 424 associated with individual users, including user 409, and the one or more recipient device 406.”); APPL-1056, ¶10.

- c. **Example 2.1 of combination of Stone and Hoyos: The sender image renders obvious the same “*virtual likeness of [a/the] face of [an/the] account holder*,” where [1.2]-[1.5] are performed using a single processor.**

As shown Example 2.1 of the combination of Stone and Hoyos below, Stone combined with Hoyos Stone combined with Hoyos renders obvious [1.2]-[1.5], where the same **sender** image (the same “*virtual likeness of [a/the] face of [an/the] account holder*”) is received, associated with an account holder, and rendered in an interface as recited in [1.2]-[1.5], all steps performed by **a processor** of a user device 404. APPL-1056, ¶11.



**Example 2.1 of Stone Combined with Hoyos
(annotated based on APPL-1008, Stone, FIGS. 2 and 4).**

PO states, “the ‘photo of the user’s face or other selected image’ is **not the same photo** of the user that Petitioner identifies as disclosing ‘the virtual likeness

of the face of the account holder' that is 'received' or 'associated' with the 'account of the account holder',' because "Stone does not disclose that the photo used for the individualized currency displayed in the interface comes from the user photo that is user identifier 418." POR, 17-18.

PO's arguments are incorrect and contrary to the disclosure of the prior art as explained in the Petition. Pet., 26-29; APPL-1056, ¶¶12-13. As shown in Example 2.1 of Stone combined with Hoyos above, the user device 404 receives a sender image and associates it with a sender user account (e.g., using a user identifier 418) in a storage of user device 404. It would have been obvious to use the already received and associated sender image in [1.2] that is stored in user device 404 for display on the virtual currency in [1.3], because that sender image is already associated with the sender account and stored in the system 400. Use of the already received, associated, and stored image of the sender would have the benefits of being efficient and reliable and avoid redundancy and unnecessary user effort, compared to a new separate user image that PO apparently would hypothesize could be separately provided by the user. APPL-1056, ¶13.

Thus, as shown in Example 2.1, Stone combined with Hoyos renders obvious that *one or more processors* (a processor 504 in user device 404 alone) *are configured to:*

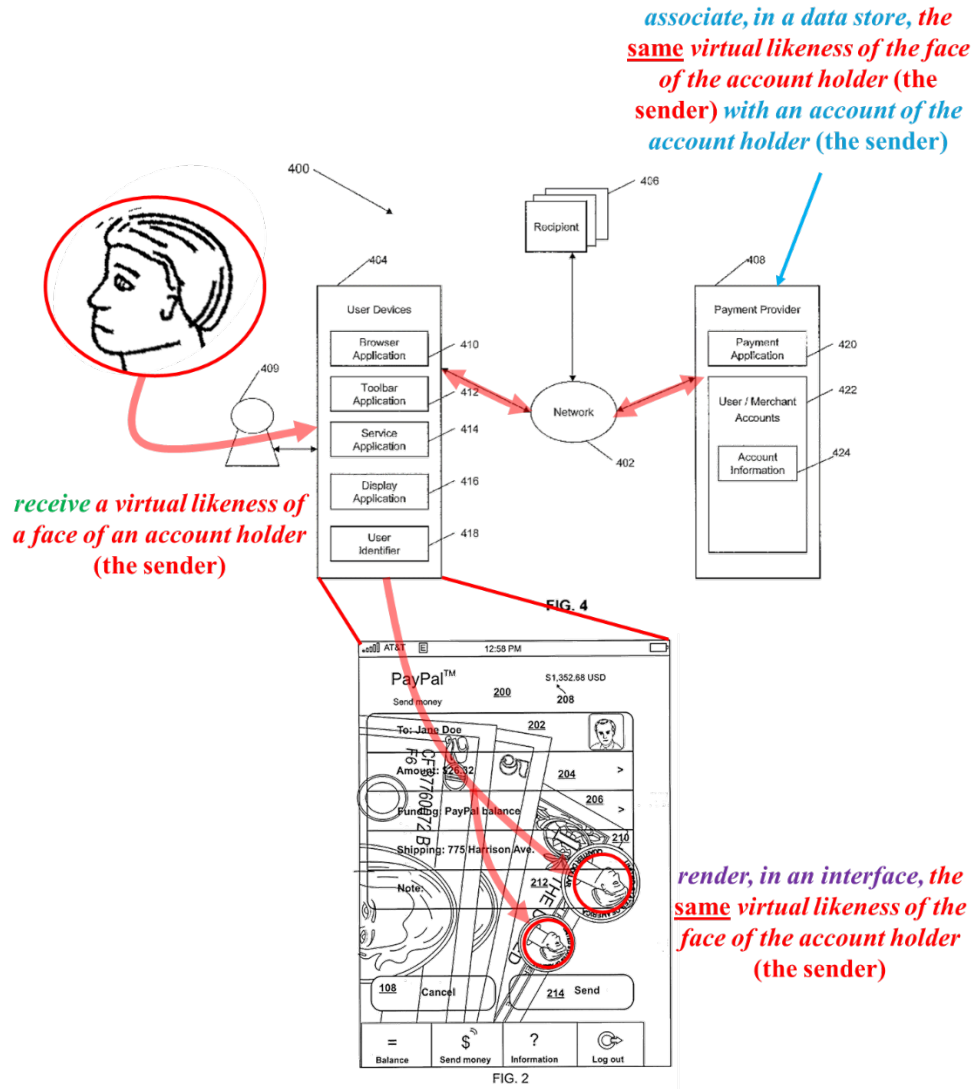
[1.2] *receive* (e.g., using processor 504 in sender user device 404) *a virtual likeness of a face of an account holder* (a sender image of a sender account holder); *associate* (e.g., using processor 504 in sender user device 404 to associate), *in a data store* (storage of sender user device 404), *the virtual likeness of the face of the account holder* (the sender image) *with an account of the account holder* (a sender account that “logged in” with “PayPal” having a balance 208 (“\$1,352.68 USD”) as shown in FIG. 2 of Stone);

[1.3] *render* (e.g., using processor 504 in sender user device 404), *in an interface* (FIG. 2), *the virtual likeness of the face of the account holder* (the sender image of the sender rendered on the virtual currency), and [1.4]-[1.5] as discussed in Petition. Pet., 26-35; APPL-1008, Stone, [0046], [0048]; APPL-1056, ¶14.

Example 2.1's teaching is consistent with the '010 Patent's description, for which PO's expert explains that a user device practices all of the steps of claim 1, which includes receiving a user image, associating the user image with a user account, and rendering the user image on an interface. APPL-1001, FIG. 1; APPL-1050, Goodrich Tr., 61:24-26 (“the device 106 [of FIG. 1 of '010 Patent] can also practice all the steps of claim 1”); APPL-1056, ¶15.

d. Example 2.2 of combination of Stone and Hoyos: The sender image renders obvious the same “*virtual likeness of [a/the] face of [an/the] account holder,*” where [1.2]-[1.5] are performed using multiple processors.

As shown in Example 2.2 of combination of Stone and Hoyos below, the sender image in Stone combined with Hoyos renders obvious the same “*virtual likeness of [a/the] face of [an/the] account holder,*” for reasons similar to those discussed at III.A.1.c, above. The difference here (for Example 2.2) is to also note that processor 504 in payment provider server 408 is configured to *associate, in a data store* (storage of payment provider server 408), *the virtual likeness of the face of the account holder* (the sender image) *with an account of the account holder* (the sender account of the sender account holder). APPL-1056, ¶16.



**Example 2.2 of Stone Combined with Hoyos
(annotated based on APPL-1008, Stone, FIGS. 2 and 4).**

In Example 2.2 of the combination of Stone and Hoyos, a POSITA would have been motivated to use the already received and associated sender image in [1.2] that is stored in payment provider server 408 for display on the virtual currency in [1.3], because that sender image is already associated with the sender account and stored in system 400. Use of the already received, associated, and

stored image of the sender would have the benefits of being efficient and reliable and avoid redundancy and unnecessary user effort, compared to a new separate user image that PO apparently would hypothesize could be separately provided by the user. APPL-1056, ¶17.

2. Stone combined with Hoyos renders obvious “*a memory coupled to the one or more processors*” of [1.9].

As discussed in the Petition, it would have been within the skills of a POSITA to implement the teachings of Hoyos in the system of Stone, e.g., implementing biometric information capturing in the user device, and implementing fraud detection analysis locally using the user device (also referred to as client-side authentication), or remotely (also referred to as server-side authentication). Pet. 32; APPL-1003, ¶¶67-68 (citing APPL-1016, [0040], [0042] (describing that fraud detection can “be performed locally or by transmission of []data to a remote source”), [0076]; APPL-1015, FIG. 3, 4:4-10; APPL-1016, [0040], [0042]; APPL-1038, 64. As discussed below, the combination of Stone and Hoyos with client-side authentication (III.A.2.a) and the combination of Stone and Hoyos with server-side authentication (III.A.2.b), each render obvious [1.9]. APPL-1056, ¶18.

a. Combination of Stone and Hoyos with client-side authentication renders [1.9] obvious.

The combination of Stone and Hoyos, with a client-side authentication implementation, renders [1.9] obvious, because a single processor of the user device 404 is configured to perform all the steps of [1.2]-[1.8] of claim 1. APPL-1056, ¶19.

Specifically, as discussed above at III.A.1.a and III.A.1.c, in each of Examples 1.1 and 2.1 of the combination of Stone and Hoyos, [1.2]-[1.5] are performed using the processor of user device 404. APPL-1056, ¶20. Furthermore, in each of Example 1.1 implemented with client-side authentication and Example 2.1 implemented with client-side authentication, [1.6]-[1.8] are performed using the processor of user device 404. *Id.*

As such, the combination of Stone and Hoyos (e.g., each of Examples 1.1 and 2.1 implemented with a **client-side** authentication) renders [1.9] obvious, with *a memory* (a memory of user device 404) *coupled to the one or more processors* (processor of user device 404) *and configured to provide the one or more processors* (processor of user device 404) *with instructions*. APPL-1056, ¶21.

b. Combination of Stone and Hoyos with server-side authentication renders [1.9] obvious.

The combination of Stone and Hoyos with **server-side** authentication (e.g., where a payment provider server performs a fraud detection analysis [1.7]) also renders [1.9] obvious. APPL-1056, ¶22.

Specifically, PO does not dispute that in the combination of Stone and Hoyos, a memory (506) is coupled to processor 504 of user device 404 and configured to provide instructions to processor 504 of user device 404. *See*, POR, 19-22. The undisputed teaching is itself sufficient to render obvious [1.9]. Specifically, in the combination of Stone and Hoyos, *a memory* (a memory

component 506 of the user device) is *coupled to the one or more processors* (directly coupled to processor 504 of user device 404, which is at least one of the collective “one or more processors” and coupled through the network to other processors in system 400) *and is configured to provide the one or more processors with instructions* (providing instructions to processor 504 of user device 404, which is at least one of the collective “one or more processors”). APPL-1056, ¶23.

c. PO's improper importation of “instructions to perform the steps of claim 1” into “instructions” should be rejected.

PO's only support is Dr. Goodrich's conclusory statements, which improperly imports a requirement for “instructions to perform all steps of claim 1” into the term “*instructions*.” APPL-1050, Goodrich Tr., 59:3-8 (“in this context of this one or more processors configured to perform a number of steps recited in claim 1, a person of ordinary skill in the art would understand the instructions to be the **instructions to perform the steps of claim 1 that came above as an antecedent basis**.”). APPL-1056, ¶24.

Dr. Goodrich's incorrect requirement for the term “*instructions*” should be rejected, because it is contrary to its plain and ordinary meaning in light of the patent's specification, which does not impose such a requirement. APPL-1001, 1:67-2:1 (“a processor configured to execute **instructions** stored on and/or provided by a memory coupled to the processor”); 2:11-13 (“As used herein, the term ‘processor’

refers to one or more devices, circuits, and/or processing cores configured to process data, such as computer program **instructions**"); APPL-1056, ¶25 (Dr. Jones explaining that the plain and ordinary meaning in light of the patent's specification for "*instructions*" is not limited to "to perform the steps of claim 1" as required by Dr. Goodrich.); *see also*, POR, 13 (PO does not propose any term for claim construction, thereby admitting that all claim terms (including "*instructions*") should be given plain and ordinary meaning in light of the patent's specification). APPL-1056, ¶25.

In any case, even if [1.9] were to be construed such that the "*instructions*" term requires instructions for performing all steps of [1.2]-[1.8] of claim 1, the combination of Stone and Hoyos still renders [1.9] obvious, because as discussed at III.A.2.a, in each of Examples 1.1 and 2.1 of combination of Stone and Hoyos with client-authentication, a single processor of user device 404 performs [1.2]-[1.8]. As such, a POSITA would have understood that the memory of user device 404 provides the all of the required instructions for performing all of [1.2]-[1.8] to the processor of user device 404. APPL-1056, ¶26.

B. A POSITA would have been motivated to combine Stone and Hoyos.

PO states, "Petitioner's explanation for the alleged motivation to combine is conclusory," "Stone is not analogous art to the '010 Patent," and "Stone and Hoyos

teach away from each other.” POR, 22. PO’s arguments are contrary to the record, and incorrect both legally and technically. APPL-1056, ¶27.

First, PO fails to rebut any of the Petition’s reasons to combine Stone and Hoyos, which are fully supported by the evidence. Pet. 17-22 (citing numerous supporting references and Dr. Jones’ testimony); APPL-1056, ¶28.

Second, Stone is analogous art, because Stone explicitly describes its implementation in the context of PayPal, which is in the same field of endeavor of the ’010 Patent. *See, e.g.*, APPL-1008, Stone, FIG. 2 (illustrating a user logged into “PayPal” with a balance displayed). POSITA would have understood PayPal to be a widely used online payment platform allowing users to send and receive money and transfer funds between bank accounts or credit cards. APPL-1056, ¶29. Furthermore, Stone is analogous art because it is pertinent to the particular problem of making an electronic financial transaction seem “more concrete” because “physical cash is a concrete, tangible item while a digital payment for a digital good is a more abstract concept.” APPL-1001, 4:28–30, 4:62–67, 5:16–18; APPL-1008, Figs. 1-2 (displaying the “actual currency” for an electronic financial transaction); APPL-1003, ¶ 122; APPL-1056, ¶29.

Third, Hoyos does not teach away from implementing its fraud resistant biometric financial transaction system in Stone’s financial transactions. To the contrary, Hoyos describes the reasons to combine with Stone, including the benefits

of improved fraud resistance. APPL-1013, [0015], [0017]-[0022]; APPL-1003, ¶¶59-68; APPL-1056, ¶30. PO fails to identify anything in the prior art that criticizes, discredits, or otherwise discourages the claimed invention. *See In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); APPL-1056, ¶¶31-32.

As explained by the Petition and supported by Dr. Jones' declarations, Stone's client-server model and Hoyos' authentication methods are complementary. A POSITA would adapt Hoyos' biometric methods to function within Stone's system (either on the client or on a server), achieving secure authentication without undermining the system's architecture. Pet., 22; APPL-1003, ¶¶67-68 (citing APPL-1016, [0040], [0042] (describing that fraud detection can "be performed locally or by transmission of []data to a remote source"), [0076]; APPL-1015, FIG. 3, 4:4-10; APPL-1038, 64); APPL-1056, ¶33. PO's own expert, Dr. Goodrich, explains for biometric authentications, "[t]here are two broad approaches: The one where the comparison is done at the remote server, and **the one where the comparison is done at the client end** (the portable device where the biometric measurement is done). Most of the recent work has focused on the second category." APPL-1054, 2 (cited as C-101 in Dr. Goodrich's declaration Ex. 2032, paragraph 9); APPL-1050, 75:17-20 (Dr. Goodrich testifying that C-101 is related to applications "for financial transactions, such as with a bank"), 74:10-19 (Dr. Goodrich testifying that whether to perform computations for biometric authentication including "convert[ing]

biometric raw data into a template” on client or server is a well-known design choice, taking into consideration of the computational power of the client device).

Accordingly, a POSITA would have been motivated to combine Stone and Hoyos.

C. Stone combined with Hoyos renders obvious dependent claims 2, 4-6, 10, 12-14, 20-21 and 23.

PO does not dispute that Stone combined with Hoyos renders obvious the limitations of dependent claims 2, 5-6, 10, 12-13, 20-21, and 23. PO's arguments for dependent claim limitations are limited to “*wherein the transaction icon includes a graphical representation of payment form*” in claims 4 and 12, and “*wherein the virtual likeness comprises an avatar selected by the account holder*” in claims 6 and 14. PO's arguments should be rejected, because they are contrary to the disclosure of the prior art. Pet. 46-50; APPL-1003, ¶¶124-127; APPL-1056, ¶35.

1. Stone combined with Hoyos renders obvious “*wherein the transaction icon includes a graphical representation of payment form*” in claims 4 and 12.

Regarding claims 4 and 12, PO states, “[n]either Stone nor Hoyos discloses that a transaction icon can be a payment form,” and “Petitioner provides no explanation or justification why this would be obvious without working backward from claim 4 of the '010 Patent using hindsight.” POR, 34-35. This is incorrect. APPL-1056, ¶36.

POSITA would have been motivated to implement *a graphical representation* related to a specific user transaction for a user interface item (*transaction icon*) related to that specific user transaction. APPL-1056, ¶38.

Similarly, PO fails to rebut Petition's explanation that a POSITA would have been similarly motivated to use payment form icons (e.g., type of currency) associated with blocks 300 and 302 for selecting types of currency. APPL-1056, ¶39.

Accordingly, PO's arguments are meritless and should be rejected. APPL-1056, ¶40.

2. Stone combined with Hoyos renders obvious “*wherein the virtual likeness comprises an avatar selected by the account holder*” in claims 6 and 14.

PO argues that “Petitioner provides no justification why it would be obvious to use an avatar for an electronic payment system—besides hindsight bias.” POR, 35.

However, PO disregards Petition's explanation that an “avatar selected by the account holder is **a well-known alternative of a picture for a user icon,**” and is within a POSITA's knowledge. Pet., 52-53; *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1732 (POSITA “has good reason to pursue the known options within his or her technical grasp” where there are “there are a finite number of identified, predictable solutions” for solving the design need). PO further disregards the Petition's explanation of the benefits of using an avatar,

supported by multiple references. Pet., 52-53. Thus, PO's arguments should be rejected. APPL-1056, ¶¶41-43.

IV. Ground 2: Stone combined with Hoyos and Varghese (Stone-Hoyos-Varghese) Renders the Challenged Claims obvious.

PO states, "a POSITA would not have been motivated to combine Varghese with Stone and Hoyos," because "Varghese amplifies the disconnect between Stone and Hoyos regarding the server and client distinction." POR, 36. PO's arguments fail for the same reasons discussed at III.A.1, because there is no disconnect between Stone and Hoyos regarding the server and client distinction, and because a POSITA would have applied Hoyos' biometric methods to function within Stone's system (either on the client or on a server), achieving secure authentication without undermining the system's architecture. Pet., 22; APPL-1003, ¶¶67-68 (citing APPL-1016, [0040], [0042] (describing that fraud detection can "be performed locally or by transmission of []data to a remote source"), [0076]; APPL-1015, FIG. 3, 4:4-10; APPL-1038, 64); APPL-1054, 2 (A paper by PO's own expert, Dr. Goodrich, explains for biometric authentications, "[t]here are two broad approaches: The one where the comparison is done at the remote server, and **the one where the comparison is done at the client end** (the portable device where the biometric measurement is done). Most of the recent work has focused on the second category"); APPL-1056, ¶44.

PO then states that the “hardware-based biometrics collection and authentication techniques described in Hoyos do not support Varghese’s stated goal of providing a ‘purely software based solution’.” POR, 36, 38. PO’s arguments mischaracterize Varghese and should be rejected. Varghese describes a “purely software based solution to identify theft that *does not require hardware devices to be issued and maintained*”, APPL-1010, Varghese, [0022]. Varghese does not exclude sensors for capturing biometrics, because its description of “*does not require hardware devices to be issued and maintained*” refers to tokens associated with the “something the user has” factor (e.g., password-generating token). *See, e.g.*, APPL-1037, FFIEC Guidance, APPL-1037, 8-9. Contrary to PO’s assertion, Varghese explicitly describes the use of sensor-based biometrics including “obtaining biometric identification information (e.g., fingerprints, retinal scans, or the like).” APPL-1010 Varghese, [00079]. As such, PO’s arguments should be rejected. APPL-1056, ¶45.

V. Ground 3: Stone in view of FFIEC (Stone-FFIEC) Renders the Challenged Claims obvious.

A. A POSITA would have been motivated to combine Stone and FFIEC.

PO does not dispute that the Guidance is analogous art to the ’010 Patent, nor does PO dispute that a POSITA “could have accessed” the Guidance. POR, 44. Instead, PO argues that the “Guidance is outside a POSITA’s area of interest”

because a POSITA “**would not have been inclined to** look to high-level and non-technical regulatory guidance directed to the banking industry to develop precise technical solutions for electronic fraud.” POR, 44. PO’s arguments are contrary to the record illustrating a POSITA’s interest in the Guidance, contrary to its own expert’s practices, contrary to the law, and should be rejected. APPL-1056, ¶46.

First, PO’s arguments are contrary to the record illustrating a POSITA’s interest in the Guidance. Pet., 12; APPL-1003, ¶¶47-52 (citing APPL-1039, APPL-1040, Google Scholar cites, archive.org links, and patent disclosures referencing Guidance as the driver for multifactor authentication in financial transactions); APPL-1049, 54:19-57:9 (Dr. Jones testifying to the significance of the Guidance in the biometrics industry and personal knowledge of the Guidance); APPL-1056, ¶¶47-52 (Dr. Jones explaining that a POSITA would have interest in the Guidance). A POSITA working in the field of biometric authentication would have recognized the importance of understanding regulatory frameworks that guide industry best practices, even if the guidance itself is not technical in nature because these frameworks influence the design and deployment of security technologies in real-world applications where regulatory compliance is crucial. APPL-1056, ¶¶47-52.

Second, PO’s arguments are contrary to its own expert’s, Dr. Goodrich’s, own practices. For example, in his own patent application, WO 2008/020991, Dr. Goodrich describes that technical solutions are developed in response to regulatory

guidelines. APPL-1052, [0010] (“In the past decade, the European Union and its member states have implemented a legal framework to provide guidance on processing of personal data with the specific aim to restore citizens’ control over their data. To complement the legal framework, Camenisch et al. presented the architecture of PRIME (Privacy and Identity Management for Europe), which implements a technical framework for processing personal data.”). Similarly, Dr. Goodrich’s class notes for computer security, which is a course for undergraduates, include an entire chapter for “Digital Rights Management,” covering “U.S. Copyright History” including “US Constitution,” “Copyright Act of 1790,” “Copyright Act of 1976,” “Faire Use Doctrine,” “Sony vs. Universal Studios,” “Digital Millennium Copyright Act (DMCA). APPL-1051, 2-9; APPL-1053, 13:4-7, 23-24 (Dr. Goodrich testifying that for the “computer security course,” “the goal was to design it for freshmen and sophomores,” and “I was going for undergraduates for that class.”); APPL-1054, 10 (Dr. Goodrich’s textbook “Introduction to Computer Security” used for his undergraduate class includes an entire section on “Legal Issues” in Digital-Rights Management). As such, a student at the undergraduate level (a threshold which a POSITA has met) would have understood that the integration of technical knowledge with regulatory compliance is standard practice to ensure that products meet both technical specifications and legal

requirements. A POSITA would therefore be interested in the Guidance. APPL-1056, ¶53.

PO's reliance on *Samsung* is misplaced, because *Samsung* does not address the issue of a POSITA's interest in regulation, but is directed at the legal standard for whether a POSITA "could have accessed" a reference, which is not in dispute here. *Samsung Elecs. Co., Ltd. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1375 (Fed. Cir. 2019).

B. Stone combined with Guidance renders obvious claims 1-2, 4-7, 9-10, 12-15, 17, 20-23.

PO relied upon its arguments in Ground 1 and argued that Stone combined with Guidance does not render the Challenged Claims obvious. POR, 40-46. PO's arguments fail for the same reasons that they fail for Ground as explained above. APPL-1056, ¶54.

Respectfully submitted,

Dated: January 16, 2025
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VI. Certificate of Word Count

Pursuant to 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner declares that the argument section of this Reply (Sections I-V) has a total of 5,072 words, according to the word count tool in Microsoft Word™.

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CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e), service was made on Patent Owner as detailed below.

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