

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

RFCYBER CORP.,
Patent Owner.

IPR2022-01256
Patent 11,018,724 B2

Before JOSIAH C. COCKS, PATRICK R. SCANLON, and
KEVIN W. CHERRY, *Administrative Patent Judges*.

CHERRY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

This is a Final Written Decision in an *inter partes* review challenging the patentability of claims 1–11 (collectively, “the challenged claims”) of U.S. Patent No. 11,018,724 B2 (“the ’724 patent,” Ex. 1001). We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner demonstrates, by a preponderance of the evidence, that claims 1–11 are unpatentable.

A. *Procedural History*

Apple Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review under 35 U.S.C. § 311. RFCyber Corp. (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”). On January 23, 2023, we instituted an *inter partes* review of the challenged claims. Paper 7 (“Institution Decision” or “Dec.”).

Following institution, Patent Owner filed a Response (Paper 11, “PO Resp.”), Petitioner filed a Reply (Paper 15, “Reply”), and Patent Owner filed a Sur-reply (Paper 16, “Sur-reply”).

We heard oral argument on October 24, 2023, and the record includes a transcript of the argument. Paper 22 (“Tr.”).

B. *Related Matters*

The parties identify the following district-court proceedings as related matters involving the ’724 patent: *RF Cyber Corp. v. Apple, Inc.*, Case No. 6:21-cv-00916-ADA (W.D. Tex.); *RF Cyber Corp. v. Visa U.S.A. Inc.*, No. 6:22-cv-00697 (W.D. Tex.). Pet.60; Paper 5, 1 (Patent Owner’s Mandatory Notices).

C. *Real Parties in Interest*

Petitioner identifies its real party in interest as Apple Inc. Pet. 60.

Patent Owner identifies RFCyber Corp. as its real party in interest.
Paper 5, 1.

D. *The '724 Patent (Ex. 1001)*

The '724 patent is entitled “Method and Apparatus for Emulating Multiple Cards in Mobile Devices,” and “is related to a mobile device configured to support multiple cards (e.g., Mifare) or applications of similar type.” Ex. 1001 ('724 patent), code (54), 1:8–11. The patent states “there is a need for solutions to make an NFC device with an emulator to support or function as many Mifare cards as possible.” *Id.* at 1:36–41.

The '724 patent describes “a mobile device embedded with an emulator is loaded with a plurality of software modules or applications, each emulating or simulating one card or one type of contactless cards.” *Id.* at 1:54–57.

When the mobile device is to be used as a contactless card to perform a set of monetary functions, a corresponding application is loaded into and executed in the emulator. When the mobile device is to be used to perform another set of monetary functions, a corresponding application is loaded into the replace the previous application entirely or partially in the emulator. As a result, the mobile device can be used as a monetary device in lieu of multiple contactless cards.

Id. at 1:61–2:3.

Figure 1A, reproduced below, is a schematic of an embodiment.

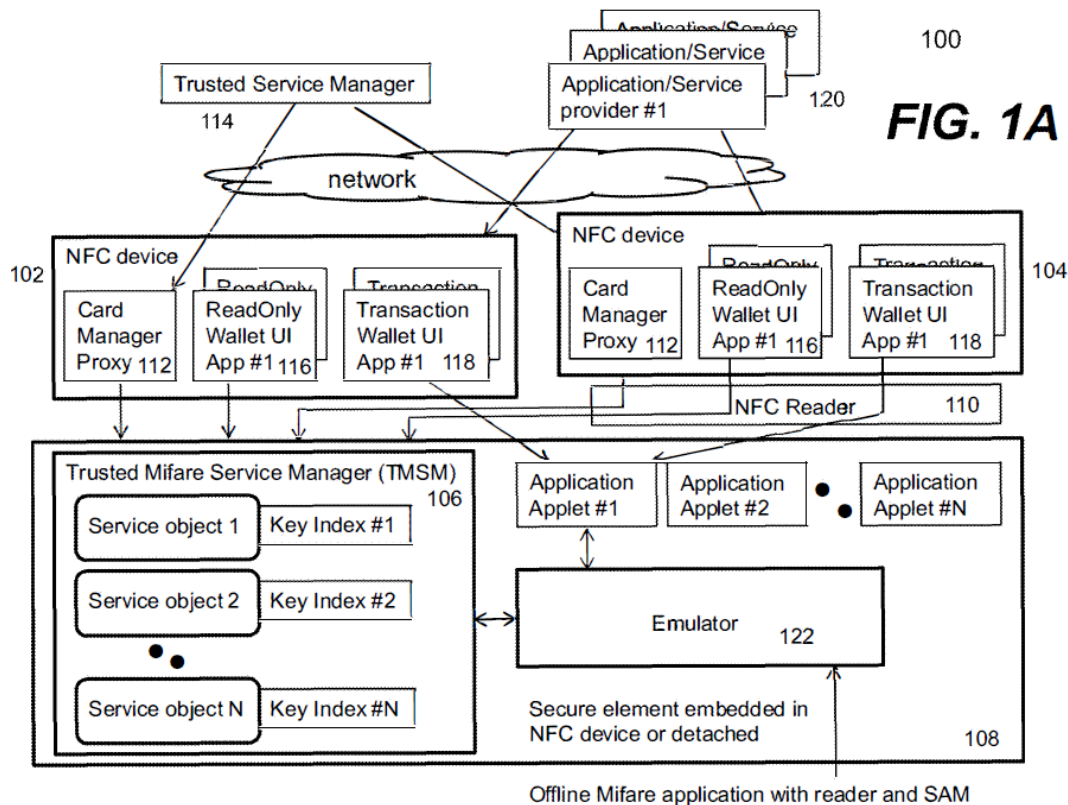


Figure 1A shows “secure element (SE) 108,” which can be embedded in a near-field communication (NFC) device 102 or 104, or on a detachable card in either device. *Id.* at 6:20–23. SE 108 includes Trusted Mifare Service Manager (TSTM) 106, and emulator 122. *Id.* at 6:17–20. The patent discloses that “the TSM 106 is a component or applet configured to be responsible for installing and personalizing the applications, and swapping one or another application into or out an emulator 122 as long as one the applications remains activated.” *Id.* at 7:8–12. The emulator is “a hardware device or a program that pretends to be another particular device or program that other components expect to interact with. In one embodiment, the emulator 122 emulates the Mifare classic operating system by providing the exact same hardware and/or software functionality.” *Id.* at 7:12–17. The TSTM 106 permits a wallet application to swap an application in and out of

emulator 122 so that NFC device 102 or 104 is able to support more than one Mifare card or application. *Id.* at 7:23–28. The applications may be swapped in entirety, or only a portion may be swapped, and “some data sets may be retained for use with the activated application loaded into the emulator.” *Id.* at 7:29–40.

E. *Illustrative Claim*

Petitioner challenges claims 1–11 of the ’724 patent. Pet. 1. Of the challenged claims, claims 1 and 8 are independent. Claim 1, reproduced below, is illustrative of the subject matter recited in the challenged claims (bracketing added).

[1P]. A mobile device for emulating a plurality of cards, the mobile device comprising:

[1(a)] a display screen showing a list of a plurality of applications for a user of the mobile device to select one therefrom, each application corresponding to one card in the plurality of cards;

[1(b)(i)] a secure element (SE) including:

[1(b)(ii)] an emulator device;

[1(b)(iii)] a memory storing a module, when the module is executed by the secure element, the secure element configured to:

[1(c)] receive and install key sets of a Supplementary Secured Domain (SSD);

[1(d)] establish, by the secure element based on the key sets, a secure communication channel with a dedicated server;

[1(e)] receive and install an application from the dedicated server, each application including corresponding application data sets and a locked or unlocked status;

[1(f)] receive, from the plurality of applications, a user selection of a first application corresponding to a first card;

- [1(g)] determine that the first application has a locked or unlocked status and is activated, [1(h)] in response to said determining that the first application has an unlocked status and is activated, load the first application to the emulator device, along with corresponding first application data sets;
- [1(i)] receive, from the plurality of applications, a user selection of a second application corresponding to a second card;
- [1(j)] determine that the second application has a locked or unlocked status and is activated;
- in response to said determining that the second application has an unlocked status and is activated, replace out of the emulator device, a portion of or in entirety, the first application, wherein said replacing out of the emulator device a portion of the first application further comprises retaining the portion of the corresponding first application data sets to be utilized by the second application;
- [1(k)] load the second application to the emulator device along with corresponding second application data sets; and
- [1(l)(i)] increment a counter for each successful application replacement, [1(l)(ii)] wherein the mobile device performs functions of the second card when the first application is replaced out of the emulator device and the second application is loaded in the emulator device.

Ex. 1001, 32:26–33:9; Pet. 26–47.

F. *Priority Date of the Challenged Claims*

Petitioner argues that the earliest priority date the '724 patent is entitled to is March 4, 2012, the filing date of Provisional Application No. 61/605,451 (“the '451 Provisional”). Pet. 3. Petitioner asserts that “[a]lthough the '724 Patent also claims priority to two other applications,

neither provides written description support for replacing applications using an emulator—a concept in all the Challenged Claims.” *Id.* Petitioner notes that the Examiner made a similar conclusion during the prosecution of the ’724 patent. *Id.* at 3–4 (citing Ex. 1002 (’724 patent File History), 497). Petitioner submits that this is consistent with the disclosure in the ’451 Provisional, which describes the replacing as “extend[ing]” the solution described in prior applications. *See id.* at 4 (citing Ex. 1003 (’451 Provisional), 7).

Patent Owner does not raise any arguments regarding the priority date in its Patent Owner Response. *See* PO Resp.

We turn to the question whether there is sufficient support in the earlier applications, in particular Application No. 11/534,653 (“the ’653 application”), which issued as U.S. Patent No. 8,118,218 B2 (“the ’218 patent”). “‘It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. § 112.’” *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008). The test for determining compliance with the written description requirement under § 112(a) is whether the original disclosure of the earlier-filed application reasonably would have conveyed to one with ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of the earlier-filed application. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). It is well settled that “[e]ntitlement to a filing date does not extend to subject matter which is not disclosed but would be obvious over what is expressly disclosed.” *Lockwood v. Am.*

Airlines, Inc., 107 F.3d 1565, 1571–72 (Fed. Cir. 1997). “It is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to modifications that the inventor might have envisioned, but failed to disclose.” *Id.*

We agree with Petitioner there does not appear to be support for limitation [1(j)] in the ’653 application. We find that the disclosure of the ’653 application—limited to general teachings of a smart card, an operating system, and a smart card manager—is insufficient to show possession of limitation [1(j)]. *See* Ex. 2001 (’218 patent), 4:47–56. As we explained above, “[e]ntitlement to a filing date does not extend to subject matter which is not disclosed but would be obvious over what is expressly disclosed.” *Lockwood*, 107 F.3d at 1571–72. The ’653 Application contains no disclosure of replacing applications, even if the disclosure might render such replacing obvious, it is not sufficient to show the possession required to establish entitlement to a priority date. Accordingly, we agree with Petitioner that the challenged claims of the ’724 patent are entitled to a priority date no earlier than March 4, 2012.

G. *Testimonial and Prior Art Evidence*

Petitioner submits the following evidence:

Evidence	Exhibit No.
Buhot et al., US 2010/0207742 A1 (published Aug. 19, 2010, filed Jan. 26, 2010) (“Buhot”)	1004
“GlobalPlatform Card Specification,” Version 2.2.1, GlobalPlatform, Inc., Jan. 2011 (“GPC”)	1005
Zhu, US 8,249,654 B1 (issued Aug. 21, 2012, filed Sept. 27, 2007) (“Zhu”)	1006
Declaration of Gerald W. Smith (“Smith Decl.”)	1007

Evidence	Exhibit No.
Alfred C. Weaver Deposition Transcript, dated February 7, 2023 (“Weaver Tr.”)	1027
Supplemental Declaration of Gerald W. Smith (“Smith Supp. Decl.”)	1033

Patent Owner submits the following testimonial evidence:

Evidence	Exhibit No.
Declaration of Alfred C. Weaver, Ph.D. (“Weaver Decl.”)	2003
Deposition Transcript of Gerald W. Smith, taken May 11, 2023 (“Smith Tr.”)	2004

H. *Asserted Unpatentability Challenges*

We instituted an *inter partes* review of the challenged claims on the following grounds of unpatentability:

Claims Challenged	35 U.S.C. §¹	References/Basis
1–11	103(a)	Buhot, GPC, Zhu

II. ANALYSIS

A. *Legal Standards*

To prevail in its challenge, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d) (2020). A claim is unpatentable under

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. The ’724 patent claims benefit of a September 24, 2006, filing date, which is before the effective date of the applicable AIA amendments. Ex. 1001, (63). Petitioner states that “Petitioner applies March 4, 2012 as the priority date for the Challenged Claims.” Pet. 4–5. Thus, we refer to the pre-AIA version of 35 U.S.C. § 103. Our decision would be the same were we to apply the AIA version of the statute.

35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Subsumed within the *Graham* factors is the requirement that the skilled artisan would have had a reasonable expectation of success in combining the prior art references to achieve the claimed invention. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007). “Obviousness does not require absolute predictability of success. . . . [A]ll that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988).

Moreover, “[the] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416. “If a person of ordinary skill can implement a predictable variation, . . . § 103 likely bars its patentability.” *Id.* at 417.

B. *Level of Ordinary Skill in the Art*

We consider the asserted grounds of unpatentability in view of the understanding of a person of ordinary skill in the art. In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those

problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “[O]ne or more factors may predominate.” *Id.*

Relying on the declaration testimony of Mr. Smith, Petitioner contends that an ordinarily skilled artisan for the ’724 patent “would have had at least a bachelor’s degree in computer engineering, computer science, electrical engineering, or a related field, with at least one year of experience in the field of mobile payment technology. Additional pertinent education might substitute for the requisite experience and vice versa.” Pet. 6–7 (citing Ex. 1007 (Smith Decl.) ¶¶ 34–35). Patent Owner states that “[t]he parties agree on the level of skill in the art.” PO Resp. 11.

Accordingly, we adopt Petitioner’s articulation of the level of ordinary skill in the art, which is consistent with the ’724 patent and the asserted prior art, and we apply it in our obviousness evaluations below. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art, itself, can reflect appropriate level of ordinary skill in art).

C. *Claim Construction*

In an *inter partes* review, we construe claims “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Furthermore, we expressly construe the claims only to the extent necessary to resolve the issues presented in this case. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in

controversy, and only to the extent necessary to resolve the controversy.”
(quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803
(Fed. Cir. 1999))).

Petitioner contends that it applies “the plain and ordinary meaning as understood by a [person of ordinary skill in the art] for all terms not expressly construed below,” and indicates that in parallel District Court litigation, the parties agreed to claim construction for the term “emulator device” to mean “hardware device, alone or containing software, that pretends to be another particular device or program that other components expect to interact with.” Pet. 8. Petitioner proposes that the term “application” should be construed to mean ““software program suitable for being executed on a portable device,”” but that the “distinction between the parties’ respective proposals need not be resolved for this proceeding.” *Id.* at 8–9. Petitioner finally contends that the phrase “a portion of or in entirety” in each independent claim means “in its entirety or partially,” but not both. *Id.* at 9.

Patent Owner submits that “[t]he parties agree that the Board should construe ‘emulator device’ as ‘hardware device, alone or containing software, that pretends to be another particular device or program that other components expect to interact with.’” PO Resp. 11. Patent Owner “does not believe that any other terms require construction to resolve the issues presented in this proceeding.” *Id.*

We apply the agreed upon constructions above, but otherwise find that no express constructions are necessary for this decision.

D. *Overview of the Prior Art*

1. *Buhot (Ex. 1004)*

Buhot is a published U.S. patent application entitled “Wireless Communication Device for Providing at Least One Near Field Communication Service.” Ex. 1004 (Buhot), code (54). Bohut “relates to a wireless communication device for providing at least one Near Field Communication service to a user and a method for updating at least one Near Field Communication service to be provided by a wireless communication device.” *Id.* ¶ 1. “Near Field Communication (NFC) is a short-range wireless communication technology which enables the exchange of data between devices allowing users of NFC enabled devices to use NFC services such as performing contactless transactions, accessing digital content and connecting devices with a single touch.” *Id.* ¶ 2.

Bohut describes that current main use cases for NFC in a mobile phone include card emulation (the NFC-enabled device can behave like an existing contactless NFC card), and payment services where the mobile phone acts like a debit or credit payment card, or electronic money. *Id.* ¶¶ 4–10. Bohut also describes that, currently,

When for example the mobile phone is in the card emulation mode and acts like a contactless card, a contactless reader can select the contactless NFC application elements stored in the secure element of the mobile phone and exchange Application Protocol Data Unit (APDU) commands with the NFC application elements so as to proceed with contactless transactions (as defined by the ISO14443-4 standard).

Id. ¶ 17.

Bohut discloses a mobile device which “comprises a[n] NFC unit 218 which can act as a secure element to store at least one NFC application

element for use in providing at least one NFC service.” *Id.* ¶ 37.

“[T]ypically, the NFC unit 218 will store a plurality of NFC application elements associated with a plurality of NFC services,” such as “contactless payment application elements from different service providers such as Master Card®, Visa®, and American Express®.” *Id.* Bohut’s device “enables the user to select one of the NFC services . . . and once selected, the user interface element 224 manages the selected NFC application element via the respective mobile application element to provide the selected service.” *Id.* ¶ 47.

2. GPC (Ex. 1005)

GPC, titled “GlobalPlatform Card Specification,” is a technical specification for a smart chip card architecture. Ex. 1005 (GPC), 2. GPC describes “a missing and critically important chip card standard — a hardware-neutral, vendor-neutral, Application-independent card management specification.” *Id.* The “specification is intended primarily for card manufacturers and application developers developing GlobalPlatform card implementations.” *Id.* at 3.

The GPC standard provides that each application is associated with at least one security domain, which are “[s]pecial key and security management applications called Security Domains are created to ensure complete separation of keys between the Card Issuer and multiple other Security Domain providers.” *Id.* at 39–40, 79. Security domains “act as the on-card representatives of off-card authorities” and “support security services such as key handling, encryption, decryption, digital signature generation and verification for their providers’ (Card Issuer, Application Provider or Controlling Authority) applications.” *Id.* at 40. For example,

security domains “hold cryptographic keys which can be used to support Secure Channel Protocol operations and/or to authorize card content management functions.” *Id.* at 79.

First, a Secure Channel is initiated, which involves an exchange of information that allows the performance of cryptographic functions, including the authentication of the off-card entity. *Id.* at 132, 81. Once initiation is completed, Secure Channel Operation occurs, which involves exchanging data between the on-card Application and off-card entity within the cryptographic protection of the Secure Channel Session. *Id.* at 132. During a Secure Channel Session, the Security Domain unwraps received commands by verifying its integrity and/or decrypting the original data in the case of controlling the sequence of APDU commands. *Id.* at 81. Supplementary security domains (“SSD”) are one type of security domain and serve as on-card representatives of Application Providers. *Id.* at 40. Each SSD corresponds to an application provider and allows the application provider to manage its own Applications and provide cryptographic services using keys that are completely isolated from security domains of other entities (e.g., Card Issuer, Controlling Authority). *Id.* at 40, 79.

Security domains proceed through a series of life cycle states when they are established: INSTALLED, SELECTABLE, PERSONALIZED, and LOCKED. *Id.* at 57–58. Security domains must first be installed, made selectable, and personalized before they can be associated with an application and become an entry in the GlobalPlatform registry. *Id.* at 58. In the first stage, a security domain is installed on the card. *Id.* Following installation, the security domain becomes SELECTABLE. *Id.* In this stage,

the security domain is able to receive commands, such as personalization commands, from off-card entities. *Id.*

Personalization is the process by which an application, including a security domain, obtains personalization data, including specific keys. *Id.* Following personalization, the security domain is in the PERSONALIZED state, indicating that it has all the necessary personalization data and keys for full runtime functionality. *Id.* In this stage, the security domain may also be associated with an application. *Id.*

GPC describes APDU commands used to manage the operation of applications, including a SELECT (or SELECT FILE) command with which applications are selected on a basic logical channel (which is a permanently available interface of a GlobalPlatform card). *Id.* at 65–66, 181. To process a SELECT command, the system determines if the requested Application Identifier (AID) matches or partially matches an entry within the GlobalPlatform Registry and whether this entry is selectable. *Id.* at 66. An Application is selectable if it is in the correct life cycles state and has no restrictions due to multi-selection. *Id.* GPC makes clear that the card may not be selected if it is in the LOCKED Life Cycle State or an inactive (e.g., INSTALLED) Life Cycle State. *Id.* at 66–67.

GPC teaches a Confirmation Counter that is incremented each time a receipt is generated. *Id.* at 206–07. The standard contemplates a number of different receipt types, including Load Receipts, Install/Make Selectable Receipts, and receipts indicating that the GlobalPlatform Registry data for a given Application has been updated. *Id.* at 207–09. GPC teaches that the GlobalPlatform Registry data associated with an Application may be updated in response to certain actions. *Id.* at 71. Following a registry

update, a registry update receipt is generated. *Id.* at 117. “The Registry Update Receipt provides confirmation that GlobalPlatform Registry data (Privileges and/or Registry Update Parameters) for the identified Application was modified to the specified values on a specific card.” *Id.* at 209. Receipts are optional and are generated by the Security Domain with Receipt Generation privilege. *Id.* at 97, 206.

GPC teaches that a Security Domain with Receipt Generation privilege also keeps track of a Confirmation Counter. *Id.* at 207. The Confirmation Counter is incremented by (1) following generation of a receipt. *Id.* at 97, 207. Further, the confirmation counter value is included in each receipt generated. *Id.* at 143–44.

3. *Zhu (Ex. 1006)*

Zhu is titled “Dynamic Smart Card Application Loading,” and concerns mobile devices, such as mobile phones, which “may include an integrated contact-less smart card.” Ex. 1006 (*Zhu*), code (54), 1:53–54.

Zhu describes that a “mobile device may make payments, provide access to restricted areas, and perform other functions or transactions typically performed by smart cards if appropriate smart card applications are resident on the integrated contact-less smart card, such as a payment application.” *Id.* at 1:54–61.

Zhu describes that,

Due to the limited memory of a smart card and/or a smart card integrated into a mobile device, the number of smart card applications and the amount of smart card data that may be stored on the smart card, or in the memory space allocated for a smart card integrated into a mobile device, is limited.

Id. at 2:67–3:5.

“If a user of the mobile device selects a smart card application for a transaction, and the selected smart card application is not in the smart card’s memory, the selected smart card application has to be loaded to the smart card’s memory.” *Id.* at 3:6–12. However, if there is not sufficient memory to load the application, “the mobile device user needs a quick and easy way to access more smart card applications than can be stored in the smart card at one time.” *Id.* at 3:15–24. Figure 1, reproduced below, shows a schematic diagram of a smart card application loading embodiment.

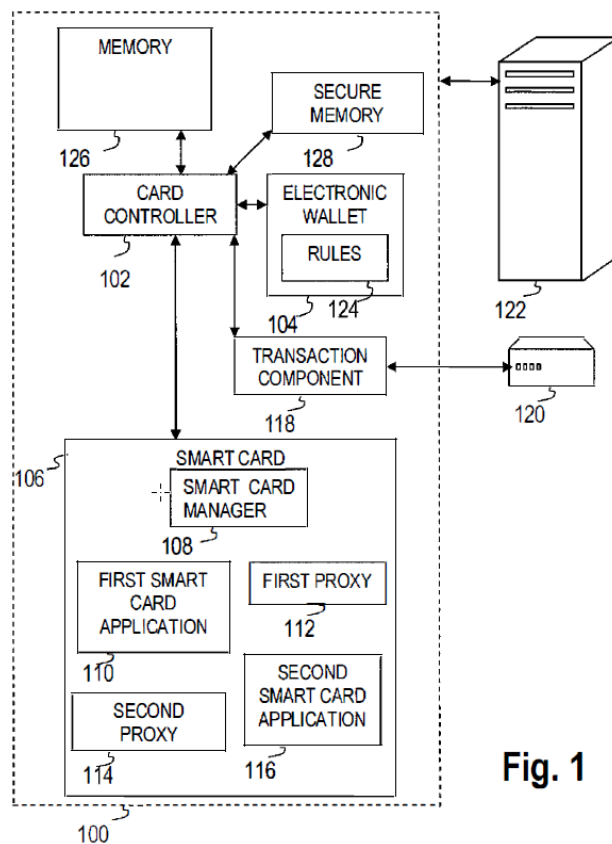


Fig. 1

Figure 1 illustrates mobile device 100, which contains card controller 102, electronic wallet 104, smart card 106, and smart card manager 108, within the smart card. *Id.* at 4:13–24. The electronic wallet 104 provides a user with information about financial accounts, and “may enable the user to

access and select smart card applications on the smart card 106.” *Id.* at 4:28–31.

E. *Alleged Obviousness of Claims 1–11 over Buhot, GPC, and Zhu*

Petitioner contends that claims 1–11 of the ’724 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Buhot, GPC, and Zhu. Pet. 10–57. Patent Owner opposes. PO Resp. 11–24; Sur-reply 1–20. Having considered the arguments and evidence before us, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–11 would have been obvious over the combination of Buhot, GPC, and Zhu.

1. *Claim 1*

a) *Petitioner’s Contentions*

With respect to claim 1 of the ’724 patent, Petitioner maps the limitations of claim 1 to the teachings of the combined references. Pet. 26–47. For example, Petitioner contends that Buhot teaches “[a] mobile device for emulating a plurality of cards” (limitation [1(P)]), Pet. 26–27 (citing Ex. 1004 (Buhot) ¶¶ 4, 5, 16, 17, 29, 30, 37, 45, Fig. 2), “a display screen showing a list of a plurality of applications for a user of the mobile device to select one therefrom, each application corresponding to one card in the plurality of cards” (limitation [1(a)]), Pet. 27–28 (citing Ex. 1004 (Buhot) ¶¶ 35, 47, 49; Ex. 1007 (Smith Decl.) ¶ 85), a “secure element (SE)” (limitation [1(b)(i)]), *id.* at 28–29 (citing Ex. 1004 (Buhot) ¶¶ 37, 38), and “an emulator device” (limitation [1(b)(ii)]), *id.* at 29–31 (citing Ex. 1004 (Buhot), Figs. 2, 3, 4, ¶¶ 37, 38, 45; Ex. 1007 (Smith Decl.) ¶ 86).

Claim 1 also recites “a memory storing a module, when the module is executed by the secure element, the secure element configured to”

(limitation [1(b)(iii)]) and a number of functions performed by this configured memory (limitations [1(c)], [1(d)], [1(e)], [1(f)], [1(g)], [1(h)], [1(j)], [1(k)], [1(l)(i)], and [1(l)(ii)]). Petitioner relies on Buhot, GPC, and Zhu in various combinations for these limitations, as set forth below. *See id.* at 31–47.

In particular, for limitations [1(c)]—“receive and install key sets of a Supplementary Secured Domain (SSD),” [1(d)]—“establish by the secure element based on the key sets, a secure communication channel with a dedicated server,” [1(e)]—“receive and install an application from the dedicated server, each application including corresponding application data sets and a locked or unlocked status,” and [1(g)]—“determine that the first application has a locked or unlocked status and is activated,” Petitioner relies on the combined teachings of Buhot and GPC. *See* Pet. 37–38 (citing Ex. 1004 (Buhot) ¶¶ 48–51, 53–56, 62, 63, 82; Ex. 1005 (GPC), 57–58, 65–67; Ex. 1007 (Smith Decl.) ¶¶ 95, 96). With respect to limitation [1(f)]—“receive, from the plurality of applications, a user selection of a first application corresponding to a first card” and limitation [1(i)]—“receive, from the plurality of applications, a user selection of a second application corresponding to a second card,” Petitioner relies on the teachings of Buhot. *See* Pet. 39 (citing Ex. 1004 (Buhot) ¶¶ 49, 81), 42 (citing Ex. 1004 ¶ 67; Ex. 1007 (Smith Decl.) ¶ 99).

As for the remaining limitations, Petitioner notes that “among the functions attributed to the secure element in the subsequent limitations, limitations [1(h)], [1(j)], [1(k)], [1(l)(i)], and [1(l)(ii)] each include language directed to loading and unloading applications into and out of the

emulator.”² *Id.* at 31. Petitioner submits that “[a]lthough Buhot describes an emulator that runs payment card applications and permits a user to select which application is run for any given transaction, it does not expressly describe the process of loading and unloading applications.” *Id.* at 31–32. Petitioner relies on Zhu for its teachings of loading and unloading applications. *Id.* at 32. For example, Petitioner contends that the combination of Buhot, GPC, and Zhu discloses limitations [1(h)]—“in response to said determining that the first application has an unlocked status and is activated, load the first application to the emulator device, along with corresponding first application data sets,” limitation [1(j)]—“determine that the second application has a locked or unlocked status and is activated; in response to said determining that the second application has an unlocked status and is activated, replace out of the emulator device, a portion of or in entirety, the first application, wherein said replacing out of the emulator device a portion of the first application further comprises retaining the portion of the corresponding first application data sets to be utilized by the second application,” limitation [1(k)]—“load the second application to the emulator device along with corresponding second application data sets,” limitation [1(l)(i)]—“increment a counter for each successful application replacement,” and limitation [1(l)(ii)]—“wherein the mobile device performs functions of the second card when the first application is replaced out of the emulator device and the second application is loaded in the emulator device.” Pet. 41–42 (limitation [1(h)]) (citing Ex. 1007 (Smith Decl.) ¶ 98; Ex. 1006 (Zhu), 8:62–67), 43–44 (limitation [1(j)]) (citing

² The Petition here lists “limitations [1(h)], [1(k)], [1(l)], and [1(m)(ii)],” but the order appears to skip limitation [1(j)] and we have corrected it here.

Ex. 1007 (Smith Decl.) ¶ 100; Ex. 1006 (Zhu), 3:61–65, 7:3–10:1), 44 (limitation [1(k)], 45–46 (limitation [1(l)(ii)]) (citing Ex. 1007 (Smith Decl.) ¶ 102; Ex. 1005 (GPC), 206–209), 46–47 (citing Ex. 1004 (Buhot) ¶¶ 16, 17, 30, Ex. 1007 (Smith Decl.) ¶ 104).

Petitioner submits that there is a motivation to combine the references. Pet. 17–26, 35–36. With respect to Buhot and GPC, Petitioner notes that Buhot “does repeatedly recommend implementing its device in accordance with the Global Platform Card (GPC) standards.” *Id.* at 17 (citing Ex. 1004 (Buhot) ¶¶ 45, 55). Petitioner also provides a detailed explanation why a person of ordinary skill in the art would have been motivated to include GPC’s secure communications, life cycles, and counter in Buhot. *Id.* at 23–26 (citing Ex. 1007 (Smith Decl.) ¶¶ 80–83; Ex. 1004 (Buhot) ¶¶ 16, 45, 49–51, 55, 62–65). With respect to the combination of Buhot and GPC with Zhu, Petitioner argues that

a [person of ordinary skill in the art] would have recognized that Zhu’s smart card manager 108 would benefit Buhot’s similar multi-application smart card device in the same way it benefits Zhu, increasing capacity by allowing Buhot to store smartcard applications in separate memory on the mobile device. [Ex. 1007 (Smith Decl.)] ¶ 90. A [person of ordinary skill in the art] would have recognized that such functionality would be desirable to a user because it would allow for the use of a greater number of smartcard applications. *Id.* As Zhu expressly recognizes, it was well understood in the art that smart cards integrated into mobile devices had limited memory, which restricted the number of applications they could support. [Ex. 1006] Zhu, 2:64-3:5. A POSITA would have recognized that the same memory restrictions would have impacted Buhot’s smart card and, accordingly, would have been motivated to implement a solution to support many applications despite the limited memory. [Ex. 1007 (Smith Decl.)] ¶ 90.

Pet. 35. Petitioner further contends that a person of ordinary skill in the art would have had a reasonable expectation of success in making the combination. *Id.* at 25–26, 36.

b) Patent Owner's Arguments

Patent Owner raises several arguments regarding Petitioner's contentions. PO Resp. 11–24. First, Patent Owner argues that that person of ordinary skill would not have combined Buhot and GPC with Zhu. *Id.* at 12–16. Second, Patent Owner asserts that the proposed combination would be incompatible and inoperative. *Id.* at 16–20. Third, Patent Owner contends that Petitioner fails to account for the claimed “emulator device.” *Id.* at 21–22. Finally, Patent Owner asserts that Petitioner fails to account for the claim limitation “in response to said determining that the first application has an unlocked status and is activated, load the first application to the emulator device, along with corresponding first application data sets.” *Id.* at 23–24.

c) Analysis

With respect to the undisputed limitations, we have reviewed Petitioner's contentions and evidence and find them sufficient. Therefore, we adopt Petitioner's contentions as our own. *See* Pet. 26–29, 31–42, 44–47. We also find that Petitioner has shown an adequate motivation to combine Buhot and GPC, which Patent Owner does not dispute. *See* Pet. 17–26. We focus our analysis on the motivation to combine Buhot and GPC with Zhu and the disputed limitations.

(1) *Motivation to Combine Buhot and GPC with Zhu*

A motivation to combine may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)). “The motivation-to-combine analysis is a flexible one.” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1379 (Fed. Cir. 2023). And “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421.

(a) *Buhot’s and GPC’s Alleged Teaching Away*

Patent Owner disputes that Petitioner has shown adequately that a person of ordinary skill in the art would have been motivated to combine Buhot and GPC with Zhu. PO Resp. 12–20. In particular, Patent Owner argues Buhot and GPC are focused on security and accordingly only install and store applications into a smart card or secure element. *Id.* at 14. Patent Owner contends that, in the proposed combination, payment applications would be stored within the general memory of the mobile device. *Id.* However, Patent Owner argues that “[t]he general baseband memory of a mobile device is not well protected from unauthorized access,” and “such memory could be accessed by either malware installed onto the device, or an unscrupulous device owner.” *Id.* at 15 (citing Ex. 2002 (Weaver Decl.) ¶ 68). Patent Owner asserts that “Zhu’s only nod to security is to either

encrypt the application or to request a digital certificate from the application provider server,” and that a person of ordinary skill in the art “would not find either approach satisfactory in view of the need for high security.” *Id.* (citing Ex. 2002 (Weaver Decl.) ¶ 69; Ex. 1006 (Zhu), 6:14–32, 9:28–33). Patent Owner submits that “encrypting the application while storing it outside of the secure element still exposes it to copying to another system, where decryption can proceed,” and “requesting a digital certificate would: i) introduce extra time in processing, ii) require an active internet connection, and iii) not prevent other parties from copying the proprietary software.” *Id.* Patent Owner asserts that given these security concerns, a person of ordinary skill in the art would not have been motivated to combine Zhu’s smart card manager with the Buhot/GPC system. *Id.* at 15–16.

We agree with Petitioner that, even if the applications were stored in “generic memory” as Patent Owner contends, Zhu provides adequate security and would not undermine Petitioner’s motivation to combine. *See Intel*, 61 F.4th at 1380 (“It’s not necessary to show that a combination is the best option, only that it be a suitable option.”). Indeed, Zhu addresses the problem Patent Owner contends it would cause in the combination.³ As Zhu

³ Patent Owner argues that Petitioner should be precluded from discussing Zhu’s encryption embodiment because it was not raised in the Petition. *See* Sur-Reply 6–7. We disagree. The claims do not recite anything about how the data should be stored. Thus, it is not surprising that the Petition did not address it. Patent Owner raised the teaching away argument regarding the security of the data. *See* PO Resp. 12–16. Petitioner relies on the exact same mapping, same motivation, and same arguments why Zhu accounted for certain limitations. *See* Reply 4–11. Petitioner’s Reply merely explained that Zhu did address the problem Patent Owner contended would “teach away” from the combination. Indeed, Patent Owner was aware of Zhu’s teachings and addressed them in their Patent Owner Response. The Federal

recognizes, “[l]oading one of the smart card applications already resident on the smart card to another memory location on the mobile device can provide sufficient memory for the selected smart card application, but can also create a security problem.” Ex. 1006 (Zhu), 3:25–34. To address this problem, Zhu proposes encrypting these applications in generic memory which “reduces the possibility of unauthorized access to the information.” *Id.* at 3:59–61, 8:30–55, 9:28–33; Ex. 1033 (Smith Supp. Decl.) ¶¶ 5–6. Although acknowledging this disclosure, Patent Owner’s expert, Dr. Weaver, testifies that Zhu’s encryption is inadequate and that encryption would have certain drawbacks. *See* Ex. 2002 (Weaver Decl.) ¶ 69. We find this testimony, which directly contradicts the teachings of Zhu that encryption is an adequate solution, lacks sufficient support to be entitled to much weight. Dr. Weaver provides no citations to support his contention that a person of ordinary skill at the time of the invention would find encryption so inadequate or problematic as he now contends. Moreover, we find that Dr. Weaver’s testimony on cross examination provides an additional, independent basis to give this testimony little weight. On cross examination, Dr. Weaver contended that there was nothing uniquely inadequate about the particular encryption scheme disclosed in Zhu, but rather that his “opinion was more general, that encryption schemes known in the 2012 time frame were all breakable with computing power and time,” and thus, inadequate

Circuit has explained that “the petitioner in an inter partes review proceeding may introduce new evidence after the petition stage if the evidence is a legitimate reply to evidence introduced by the patent owner.” *Anacor Pharm., Inc. v. Iancu*, 889 F.3d 1372, 1380–81 (Fed. Cir. 2018). That is the case here, so we find that Petitioner’s arguments and evidence regarding Zhu’s encryption are proper.

for storing payment applications in a mobile device's general memory. Ex. 1027 (Weaver Tr.), 26:11–23; *see also id.* at 23:3–8 (“[D]oes encryption ever provide a sufficiently high security to permit storing payment application on a mobile device's general memory? A. No”); 24:15–25:23 (testifying all publicly known encryption schemes in 2012 were breakable). However, when confronted with the fact that the '724 patent discloses storing payment application on general baseband memory using an encryption method that was breakable, *id.* at 26:24–29:7, Dr. Weaver testified that this encryption method was sufficient to allow storing payment applications in general baseband memory even though it was “not perfectly secure,” *id.* at 29:8–14. Dr. Weaver provides no explanation or rationale why the encryption method in the '724 patent, which he admits suffers from the same drawbacks he identified with respect to Zhu, is sufficient, but other encryption methods would not be sufficient. In its Sur-reply, Patent Owner attempts to rehabilitate Dr. Weaver's testimony with justifications and qualifications not found in his original testimony. Sur-Reply 7–8. Yet, Dr. Weaver's testimony discussed above was clear and unequivocal. *See* Ex. 1027 (Weaver Tr.), 24:15–29:14. Patent Owner made no effort to redirect his testimony at his deposition, so it cannot now do so through mere attorney argument. We find the inconsistency between Dr. Weaver's treatment of Zhu and his treatment of similar disclosure in the '724 patent exposes the insufficient reasoning supporting his opinions regarding the adequacy of Zhu's use of encryption in the combination. Accordingly, we give no weight to his testimony that a skilled artisan would not have combined Zhu with a Buhot/GPC system due to security concerns.

In contrast, we find the testimony of Mr. Smith regarding the use of encryption and the tradeoffs with the benefits of adopting Zhu’s memory management technique, which he offers in his Supplemental Declaration, to be well-reasoned, consistent with the disclosure of Zhu and the ’724 patent⁴, and entitled to substantial weight. *See* Ex. 1033 (Smith Supp. Decl.)

¶¶ 4–15. As Petitioner recognizes, “[a] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016). As Mr. Smith and Dr. Weaver testified, decryption without access to the security keys is an extremely computationally intensive and time-consuming process. Ex. 1033 (Smith Supp. Decl.) ¶¶ 6–8; Ex. 1027 (Weaver Tr.), 23:17–25:2; *see also* Ex. 1017⁵, 132. Mr. Smith testifies that the benefits of using encryption would be sufficient to resolve the security concerns Patent Owner raises, and that any burden of generating a certificate would be outweighed by the benefits of using encryption and the memory advantages Zhu’s technique would offer. *See* Ex. 1033 (Smith Supp. Decl.) ¶¶ 4–15. Accordingly, we find that Patent Owner’s security concerns would be

⁴ Patent Owner contends that Petitioner improperly “focuses on the ’724 Patent’s specification and not the perspective of a POSITA at the time of the invention.” Sur-reply 7. However, Petitioner is not using the invention as a template, but pointing out the tension in Patent Owner and Dr. Weaver’s contention that a person of ordinary skill in the art would find Zhu’s use of encryption unacceptable, but—without any justification—find the ’724 patent’s use of encryption acceptable. These seemingly inconsistent contentions are fair points to raise.

⁵ Zhiquan Chen, *Java Card™ Technology for Smart Cards* (Sun Microsystems 2000).

adequately addressed by encryption and do not outweigh the benefits of the combination.

(b) Inoperable Device Arguments

Patent Owner also argues that “[e]ven if a [person of ordinary skill in the art] would be otherwise motivated to combine Buhot, GPC, and Zhu, they would recognize that the resulting combination would be inoperable for its intended purpose because Zhu is not compatible with GPC’s lifecycles.” PO Resp. 16. In particular, Patent Owner contends that a person of ordinary skill in the art would understand under GPC’s lifecycles, an application must be “SELECTABLE” to be useable, and in order to be “SELECTABLE,” the application must be stored on the card (which in Petitioner’s combination is Buhot’s secure element). *Id.* at 19. Patent Owner argues that “when the application is SELECTABLE, there are links to the executable code and there is an allocated memory space within the card for the specific application.” *Id.* (citing Ex. 2002 (Weaver Decl.) ¶ 79). Patent Owner submits that, however, “the proposed combination would use Zhu’s smart card manager to store applications outside of the card,” and that a person of ordinary skill in the art “would recognize that such a combination is incompatible with GPC’s lifecycles.” *Id.* (citing Ex. 2002 (Weaver Decl.) ¶ 80). Patent Owner asserts that a person of ordinary skill in the art “would recognize that by reusing memory as Zhu teaches, an application using the GPC lifecycles would ‘break’ when dynamically loaded because the links to its executable code and allocated memory would point to the wrong location. *Id.* at 20 (citing Ex. 2002 (Weaver Decl.) ¶ 82). Thus, Patent Owner contends that the combination results in an inoperative device, so there is no motivation to combine. *Id.*

We begin by noting that Patent Owner’s arguments do not arise from any claim requirements for any particular memory management implementation, but rather on their contentions of how the combination would work. And “[o]bviousness does not require absolute predictability of success.” *In re O’Farrell*, 853 F.2d at 903. Moreover, “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421. Even if Dr. Weaver is correct in his description of how GPC operates, Mr. Smith persuasively testifies in his Supplemental Declaration that memory management solutions for smartcards were long-standing and well-known at the time of the priority date of the ’724 patent. *See* Ex. 1033 (Smith Supp. Decl.) ¶¶ 17–25; Reply 11–20. Indeed, Mr. Smith provides significant support for these contentions by identifying various references that support his contentions, so we give his testimony significant weight. Ex. 1033 ¶¶ 17–25 (citing Ex. 1028⁶; Ex. 1030⁷; Ex. 1031⁸; Ex. 1032⁹). As Petitioner explains, “GPC acknowledges the same memory management concerns and provides processes for managing smartcard memory, including the ‘GlobalPlatform Environment (OPEN)’ which ‘performs the application code loading and related Card Content management and memory management.’” Reply 14 (citing Ex. 1005 (GPC), 41, 44–45). Petitioner notes that “GPC does not describe the internal processing required to allocate memory to a new application and properly link its executable code.” *Id.* (citing Ex. 1005 (GPC), 103). We find that a

⁶ U.S. Patent No. 6,480,935 B1, filed Aug. 31, 1999, issued Nov. 12, 2002 (“Carper”).

⁷ WO 2009/031065 A1, filed Sept. 3, 2007, pub. March 12, 2009 (“Corda”).

⁸ NXP Memory Management Unit Overview (“NXP”).

⁹ EP 2 626 804 A1, filed Feb. 9, 2012, pub. Aug. 14, 2013 (“Lerch”).

person of ordinary skill would have had a number of existing solutions (either the solutions identified in the prior art cited by Mr. Smith) to the problem that Patent Owner contends would result from the combination. Ex. 1033 (Smith Supp. Decl.) ¶¶ 19–21; *see also id.* ¶¶ 22–25 (discussing Lerch’s solution to this problem). Thus, we agree with Petitioner that, given the state of the art at the time of the invention of the ’724 patent, a person of ordinary skill would have been motivated to combine the Buhot/GPC with Zhu and would not have been dissuaded from the combination.

Patent Owner argues we should not look to this evidence because Petitioner is “introducing an entirely new combination” and did not identify the knowledge of person of ordinary skill in the art as part of its ground. Sur-Reply 9–10. We disagree. “In *KSR*, the Supreme Court criticized a rigid approach to determining obviousness based on the disclosures of individual prior-art references, with little recourse to the knowledge, creativity, and common sense that an ordinarily skilled artisan would have brought to bear when considering combinations or modifications.” *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) (citing *KSR*, 550 U.S. at 415–22). Instead, “the Court required an analysis that reads the prior art in context, taking account of ‘demands known to the design community,’ ‘the background knowledge possessed by a person having ordinary skill in the art,’ and ‘the inferences and creative steps that a person of ordinary skill in the art would employ.’” *Id.* (citing *KSR*, 550 U.S. at 418). In keeping with this flexible approach, “[a]rt can legitimately serve to document the knowledge that skilled artisans would bring to bear in reading the prior art

identified as producing obviousness.”¹⁰ *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015).

We also disagree with Patent Owner that Petitioner failed to provide an adequate explanation of how the combination would work. *See* Sur-reply 11–12. On the contrary, Petitioner provided a detailed mapping of the references to the claimed invention and explained how the combination would work. *See* Pet. 17–47. Moreover, in response to Patent Owner’s contentions about inoperability due to unclaimed implementation details related to memory management, Petitioner and Mr. Smith have properly responded by providing a detailed portrait of the state of the art in smartcard memory management and have established that implementing the combination as proposed was well within the ability of a person of ordinary skill in the art. *See* Reply 11–20; Ex. 1033 (Smith Supp. Decl.) ¶¶ 11–28.

(c) *Conclusion as to Motivation to Combine*

As explained above, Patent Owner’s arguments why Petitioner has failed to show a motivation to combine are not persuasive. Considering all of the evidence, we find that Petitioner has shown sufficiently that there is adequate motivation to combine Buhot and GPC with Zhu. Ex. 1007 ¶¶ 87–

¹⁰ We note that even though Lerch itself does not qualify as prior art it still can serve as evidence of the state of the art at the time of the invention. *See Yeda Rsch. v. Mylan Pharms. Inc.*, 906 F.3d 1031, 1041 (Fed. Cir. 2018) (Board may rely on non-prior art as “the level of skill in the art”). We further note that Lerch was filed before the priority date of the ’724 patent, and thus, can serve to support Mr. Smith’s testimony as to the state of the art at priority date of March 4, 2012, a month after Lerch’s filing date. *See Plant Genetic Sys., N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1344 (Fed. Cir. 2003); *In re Farrenkopf*, 713 F.2d 714, 720 (Fed. Cir. 1983).

92. We agree that a person of ordinary skill in the art would have looked to Zhu to allow the smartcard of the Buhot and GPC to address the memory limitations of smartcards and to support many applications despite limited memory. *Id.* ¶ 90.

(2) “*Emulator Device*”

Patent Owner submits that “[t]he parties agree that an emulator device is a ‘hardware device, alone or containing software, that pretends to be another particular device or program that other components expect to interact with.’” PO Resp. 21. Patent Owner argues that “Petitioner and Mr. Smith do not identify any **hardware** that could be an emulator device.” *Id.* Patent Owner submits that “[i]nstead, they both identify Buhot’s ‘operating system’ as the emulator device ‘because it is a hardware device *or program* that executes NFC applications, allowing Buhot’s mobile phone to pretend to be a contactless card with which other components (e.g., card readers) may interact.’” *Id.*

We disagree with Patent Owner’s contention that Petitioner fails to identify hardware that is an “emulator device.” As the Petition states, “operating system 314 (running on processor 400) is an emulator device.” Pet. 31. Thus, the Petition clearly points, at least in part, to “processor 400,” i.e., a hardware component. As a result, we disagree with Patent Owner’s suggestion that the Petition only identifies software, not hardware, and therefore, does not meet the agreed upon construction. Furthermore, because we agree with Petitioner that this argument is raised in the Petition, we also disagree with Patent Owner’s contention that Petitioner is

attempting to revise its Petition.¹¹ *See* Sur-Reply 12–16. Instead, we agree with Mr. Smith that “[a person of ordinary skill in the art] would have understood that processor 400 executing operating system 314 facilitates the emulation functionality.” Ex. 1007 (Smith Decl.) ¶ 86. We further find that, as the Petition explains, the “NFC applications—the applications that allow the device to emulate payment cards—are stored in the memory 402 . . . and called by the processor 400.” Pet. 30 (citing Ex. 1004 (Buhot) ¶ 45). Petitioner also explains that “[o]perating system 314 may also be stored in the memory 402 or may be stored in memory that is part of the processor 400.” *Id.* (citing Ex. 1004 ¶ 45). We find Petitioner’s argument persuasive and sufficient to show that a person of ordinary skill in the art would have understood that operating system 314 (running on processor 400) is an emulator device because it is a hardware device with a program that executes NFC applications, allowing Buhot’s mobile phone to pretend to be a contactless card with which other components (e.g., card readers) may interact. *See* Pet. 31; Ex. 1007 ¶ 86.

(3) “in response to said determining that the first application has an unlocked status and is activated, load the first application to the emulator device, along with corresponding first application data sets”

Patent Owner argues that even if Petitioner is correct that Buhot’s “operating system 314” is the emulator device of the claims, Petitioner fails

¹¹ We note that, in its Preliminary Response, Patent Owner stated “Apple relies on Buhot’s discussion of an ‘operating system 314 (running on processor 400) for the ‘emulator device’ limitation (Pet. at 31).” Prelim. Resp. 26. Thus, Patent Owner was aware of Petitioner’s contentions before institution.

to show that any application is loaded into the operating system, as the claims require. PO Resp. 23–24. Patent Owner submits that Petitioner only describes Zhu as loading applications to smart card memory. *Id.* at 23. Patent Owner argues, however, that neither Zhu nor the Petition discuss or suggest loading the application into the “operating system.” *Id.* Patent Owner further asserts that, even accepting Petitioner’s contention that Zhu “governs the process of loading and unloading applications into and out of an emulator,” “‘loading and unloading applications into and out of *an* emulator’ does not show that it would be obvious to load and unload applications to the emulator device of the claims.” *Id.*

We find that Petitioner has sufficiently shown that the combination of Buhot and Zhu accounts for this limitation. The Petition explains in detail how the smartcard in the combination swaps in a new application into smartcard memory such that it can be loaded and executed by processor 400 and operating system 314:

When a user selects a new application (1) that is not on the smart card and (2) that requires removing existing application to make room, the smart card manager replaces the existing application with its proxy and loads the new application in its entirety. . (discussing Zhu at 7:3–10:1). Zhu’s proxies “facilitate re-loading the previously resident smart card application in the future” and serve as “a small placeholder for the [] application.” Zhu, 3:61–65. A POSITA would have understood that these proxies are not executable applications themselves that can be run to emulate a card [Ex. 1007] ¶ 100. Accordingly, when an existing application is replaced with its proxy a POSITA would understand that the existing application is removed from the emulator in its entirety, as claimed. Petition, 32-36, 43-44.

Reply 24 (quoting Pet. 43–44).

The Petition further explains that, in Buhot, “the applications that allow the device to emulate payments cards—‘are stored in the memory 402’” where operating system 314 is also stored. *Id.* at 30. The Petition notes that these applications are “called by the processor 400” and executed by operating system 314. *Id.* at 23, 30. Thus, Patent Owner’s arguments in its Patent Owner Response are not persuasive because (1) they ignore that the Petition explains that “emulator device” is not just the “operating system” but runs on the “processor” and works with the memory in order to operate, and (2) they fail to recognize that the Petition does not rely on Zhu alone but on the combined teachings of Zhu and Buhot to account for this limitation. *See* Pet. 23, 30, 32–36, 43–44. Moreover, we find that Petitioner’s analysis is consistent with the ’724 patent’s disclosures. *See* Reply 25. For instance, the ’724 patent describes embodiments where a “storage device [is] configured to store the multiple applications, anyone of the applications being loadable into the emulator when selectively activated[.]” Ex. 1001, 2:63–3:11; *see also id.* at 7:23–40 (describing a process for swapping an application on an emulator, where to swap an application means to “activate on an emulator”). In these disclosures, applications are stored elsewhere and “loaded” to an emulator when activated (i.e., called). Thus, we find that Petitioner has shown sufficiently that the combination accounts for this limitation.¹²

¹² Patent Owner raises a new argument in its Sur-reply that Petitioner “admits that the emulator functionality is performed by the applications.” Sur-reply 19. Even if we consider this argument, we do not find it persuasive. The claims are directed to a “mobile device for emulating a plurality of cards.” Ex. 1001, 32:26–27. The claimed limitations are all essential parts of that device, and, as described in the Specification, are part

(4) *Conclusion as to Claim 1*

For all of the foregoing reasons and in consideration of evidence favoring obviousness, we are persuaded by Petitioner’s arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the teachings of Buhot, GPC, and Zhu, with a reasonable expectation of success in arriving at the subject matter claim 1 recites. As noted above, we also agree with Petitioner’s arguments and evidence that the combination of Buhot, GPC, and Zhu teach or suggest all of the limitations of claim 1. As a result, Petitioner establishes, by a preponderance of evidence, that claim 1 would have been obvious over the combination of Buhot, GPC, and Zhu.

2. *Claims 2–11*

Petitioner has shown sufficiently that the combination of Buhot, GPC, and Zhu teaches or suggests the claimed subject matter of claims 2–11. Pet. 47–57. Besides the arguments considered above with claim 1, Patent Owner does not argue that the combination of Buhot, GPC, and Zhu fails to disclose the additional limitations recited by claims 2–11. Accordingly, Patent Owner has waived any argument directed to those limitations. *See* Paper 8, 9 (“Patent Owner is cautioned that any arguments for patentability not raised in the response will be deemed waived.”). We have reviewed

of performing the function of “emulating a plurality of cards.” *See id.* at code [57] (“[A] mobile device embedded with an emulator is loaded with a plurality of software modules or applications, *each emulating* one card or one type of contactless cards.” (emphasis added)). Thus, it is unsurprising that the application would be necessary for a mobile device to emulate a particular card, even though the “emulator device” functionality (as claimed and under the agreed construction) is performed by a particular component (in concert with the other components of the claimed device).

Petitioner's evidence and argument and adopt it as our own. For the reasons provided therein, Petitioner demonstrates that the combination of Buhot, GPC, and Zhu accounts for the limitations of claims 2–11, that a person of ordinary skill in the art would have been motivated to combine the references in the manner proposed, and would have had a reasonable expectation of success in doing so. Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claims 2–11 would have been obvious over the combination of Buhot, GPC, and Zhu. *See* Pet. 47–57; Ex. 1007 (Smith Decl.) ¶¶ 105–112.

III. CONCLUSION¹³

After reviewing the complete record developed during the course of the trial, we conclude that Petitioner demonstrates, by a preponderance of the evidence, that claims 1–11 of the '724 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner establishes by a preponderance of the evidence that claims 1–11 of the '724 patent are unpatentable; and

¹³ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–11	103	Buhot, GPC, Zhu	1–11	
Overall Outcome			1–11	

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Patent 11,018,724 B2

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