

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY MOBILE COMMUNICATIONS AB, SONY MOBILE
COMMUNICATIONS, INC., SONY ELECTRONICS INC., and
SONY CORPORATION,
Petitioners

v.

ANCORA TECHNOLOGIES, INC.,
Patent Owner

Case IPR2021-00663
Patent No. 6,411,941

**DECLARATION OF DR. DAVID MARTIN ON *INTER PARTES* REVIEW
OF U.S. PATENT NO. 6,411,941**

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List of Exhibits

Exhibit No.	Description	Date
2001	Scheduling Order, <i>Ancora Technologies, Inc. v. Sony Mobile Communications AB et al.</i> , Case No. 19-1703-CFC (Dkt. #24)	Sept. 16, 2020
2002	Sony's Invalidity Contentions, <i>Ancora Technologies, Inc. v. Sony Mobile Communications AB et al.</i> , Case No. 19-1703-CFC	Dec. 18, 2020
2003	Sony's Appendices A-E to Invalidity Contentions, <i>Ancora Technologies, Inc. v. Sony Mobile Communications AB et al.</i> , Case No. 19-1703-CFC	Dec. 18, 2020
2004	Apple Patent L.R. 3-3 Disclosures, <i>Ancora Technologies, Inc. v. Apple, Inc.</i> , Case No. 4:11-cv-06357 (Dkt. #171-3)	Aug. 25, 2015
2005	Order Setting Patent Case Schedule, <i>Ancora Technologies, Inc. v. HTC America, Inc.</i> , Case No. 2:16-cv-01919 (Dkt. #56)	Mar. 11, 2019
2006	E-mail from Canavera to trials@uspto.gov	Feb. 19, 2021
2007	Complaint, <i>Ancora Technologies, Inc. v. Sony Mobile Communications AB et al.</i> , Case No. 19-1703-CFC (Dkt. #1)	Sept. 11, 2019
2008	Judge Connolly Docket Navigator Statistic	Apr. 15, 2021
2009	Scheduling Order, <i>Ancora Technologies, Inc. v. LG Electronics, Inc. et al.</i> , Case No. 1:20-cv-00034 (WDTX) (Dkt. #129)	Jan. 28, 2021
2010	Expert Report of Suzanne Barber, <i>Ancora Technologies, Inc. v. LG Electronics, Inc. et al.</i> , Case No. 1:20-cv-00034 (WDTX)	Jan. 22, 2021
2011	Declaration of Erez Zadok, <i>Ancora Technologies, Inc. v. LG Electronics, Inc. et al.</i> , Case No. 1:20-cv-00034 (WDTX) (Dkt. #45-1)	Mar. 20, 2020

Exhibit No.	Description	Date
2012	Joint Claim Construction Chart, <i>Ancora Technologies, Inc. v. Sony Mobile Communications AB et al.</i> , Case No. 19-1703-CFC (Dkt. #34, 34-1, 34-2)	April 6, 2021
2013 NEW	Ancora's Preliminary Response to Petition, Case No. IPR2020-01609 (Dkt. 6)	Dec. 17, 2020
2014 NEW	Decision Granting Institution, Case No. IPR2020-01609 (Dkt. 7)	Feb. 16, 2021
2015 NEW	Declaration of Dr. David Martin, Ph.D.	
2016 NEW	<i>Ancora Techs., Inc. v. Apple, Inc.</i> , 744 F.3d 732 (Fed. Cir. 2014)	
2017 NEW	Phil Croucher, "The BIOS Companion," Tri-Tam Enterprises Inc. 1997	
2018 NEW	Telephonic Markman Hearing Tentative Ruling, <i>Ancora Technologies, Inc. v. TCT Mobile (US), Inc. et al.</i> , Case No. 8:19-cv-02192 (CDCA) (Dkt. #60)	Oct. 15, 2020
2019	RESERVED	
2020	RESERVED	
2021	RESERVED	
2022 NEW	US Patent 6,189,146 B1 ("Misra")	Feb. 13, 2001
2023 NEW	US Patent 5,479,639 ("Ewertz")	Dec. 26, 1995
2024 NEW	Microsoft Corporation's Request for <i>Ex Parte</i> Reexamination Image File Wrapper, Control No. 90010560	
2025 NEW	Final Rulings on Claim Construction, <i>Ancora Technologies, Inc. v. TCT Mobile (US), Inc. et al.</i> , Case No. 8:19-cv-02192 (CDCA) (Dkt. #66, #69)	Nov. 12, 2020; Nov. 19, 2020

I, David Martin, hereby declare as follows:

1. I am making this declaration at the request of Patent Owner, Ancora Technologies, Inc., to investigate and opine on certain issues relating to the *Inter Partes* review of U.S. Patent No. 6,411,941 (“the ’941 patent”). The Petition requests that the Patent Trial and Appeal Board (“PTAB” or “Board”) review and cancel claims 1–3, 6–14, and 16 of the ’941 patent.

2. I am being compensated for my work in this matter at a rate of \$525 per hour. My compensation in no way depends on the outcome of this proceeding.

3. In preparation of this declaration, I have studied the exhibits as listed in the Exhibit List shown above in my report.

4. In forming the opinions expressed below, I have considered:

- a. The documents listed above as well as additional patents and documents referenced herein;
- b. The relevant legal standards, including the standard for obviousness provided in *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), and any additional documents cited in the body of this declaration; and
- c. My knowledge and experience based upon my work and study in this area as described below.

I. Qualifications and Professional Experience

5. I have provided my full background in the curriculum vitae that is attached to this Declaration as Appendix A.

6. In this report, I respond to the expert opinions originally provided in the report by Dr. Andrew Wolfe (“Wolfe Declaration”) that was submitted by the TCT petitioners in IPR2020-01609 (Ex. 1003) from which Sections I.C-IV have been adopted by Dr. Erez Zadok (Ex. 1015) in a separate declaration (“Zadok Declaration”) that was submitted by the Petitioner.

7. This report is based on my study of the material that was available to me at the time of its writing. I reserve the right to update, supplement, or amend this rebuttal expert report in view of additional information obtained through discovery or other information that might become available between now and trial that is significant to the opinions set forth in herein.

8. In this report, due to my understanding of the law, I am not offering an opinion regarding each cited reference or combination of references beyond responding to the opinions and evidence identified in the Wolfe Declaration as adopted by the Zadok Declaration. Further, I have not responded to each and every assertion made in the Wolfe Declaration and instead have focused on what I consider to be the clearest faults in its arguments and proofs. My decision not to address an issue or argument thus should not be understood as a tacit admission

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that I agree with or do not dispute the positions of the Sony petitioners.

9. I further note that, except where stated otherwise, I have assumed for purposes of my analysis that each reference or combination cited in the Wolfe Declaration as adopted by the Zadok Declaration actually constitutes prior art.

II. Background of this Matter

10. It is my understanding TCT Mobile (US) Inc., Huizhou TCL Mobile Communication Co., Ltd., and Shenzhen TCL Creative Cloud Technology Co., Ltd. (collectively, “TCT”) filed a Petition in IPR2020-01609 (“the ’1609 IPR”), requesting an *inter partes* review (“IPR”) of claims 1–3, 6–14, and 16 (“the Challenged Claims”) of U.S. Patent No. 6,411,941. It is my understanding Ancora filed a preliminary response challenging certain issues of the TCT petition but did not file an expert declaration rebutting any arguments set forth by Dr. Wolfe. It is further my understanding the Patent Trial and Appeal Board instituted TCT’s petition on February 16, 2021.

11. It is my understanding that several parties sought to “join” TCT’s instituted petition, including: HTC Corporation and HTC America, Inc. (collectively, “HTC”) in IPR2021-00570 (“the ’570 IPR”); LG Electronics, Inc. and LG Electronics U.S.A., Inc. (collectively, “LG”) in IPR2021-00581 (“the ’581 IPR”); and Sony Mobile Communications AB, Sony Mobile Communications, Inc., Sony Electronics Inc., and Sony Corporation (collectively, “Sony”) in

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IPR2021-00663 (“the ’663 IPR”).

12. Lastly, it is my understanding the Board allowed Ancora to file a preliminary response by April 23, 2021. I have therefore been asked to respond to the invalidity theories, contentions, and opinions set forth within the Wolfe Declaration.

III. Summary of Opinions Regarding the Validity of the ’941 Patent

13. In the Wolfe Declaration, Dr. Wolfe opined that various references are invalidating prior art to the Challenged Claims of the ’941 patent under 35 U.S.C. §§ 102 (anticipation) and 103 (obviousness).

14. In this declaration, I provide my opinions in response to the various allegations of invalidity made in the Wolfe Declaration, as well as the bases for my opinions. Based on my review of the ’941 patent, the Wolfe Declaration, and the references addressed therein, it is my opinion that the Wolfe Declaration does not overcome the presumption of validity for the Challenged Claims. To the contrary, and as I explain below, it only further reinforces that the Asserted Claims of the ’941 patent are valid and patentable.

15. My opinion is supported by the fact that the purported anticipatory references relied upon in the Wolfe Declaration did not disclose every limitation of each of the Challenged Claims. In fact, I have found at least one limitation for each of the Challenged Claims that the Wolfe Declaration fails to show was disclosed

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by each of the cited references. I identify those undisclosed limitations on a claim-by-claim, reference-by-reference basis below.

16. It is also my opinion that the Wolfe Declaration does not show that the Challenged Claims are obvious in view of any reference, combination of references, or general knowledge of one of ordinary skill in the art.

17. All of the opinions contained within this declaration are based on my own personal knowledge and professional judgment. If called as a witness in this matter, I am prepared to testify about these opinions.

IV. High-Level Description of Materials Studied

18. Before writing this declaration, I studied the '941 patent and its file history. I also studied the Wolfe Declaration and the references cited therein. I further considered additional material noted in this report.

19. It is my understanding that this Board has provided a preliminary claim construction for the term “license record.” It is also my understanding that Ancora and Petitioners have provided certain claim construction positions in the underlying district court litigation.

20. I have used this Board’s preliminary construction and the constructions provided by Ancora and Petitioners in forming the opinions of validity that are set forth in this declaration. For all other terms found in the Challenged Claims, I have used the plain and ordinary meaning of the term as it

would be understood by a person of ordinary skill in the art as of the time of the invention of the '941 patent.

21. My conclusion is that the Challenged Claims of the '941 patent are valid in view of the Board's preliminary construction of "license record, Ancora's proposed constructions, and Sony's proposed constructions.

V. Relevant Legal Principles

22. Although I am not an attorney, I have been advised by the attorneys for Ancora of certain legal principles as they relate to forming opinions as to the issues of validity of the Asserted Claims. I have applied this law to the facts set forth in this report in rendering my opinions. This section of my expert report provides my understanding of the legal principles that I have used in formulating my opinions.

A. Presumption of Validity

23. It is my understanding that an issued patent and the claims within it are presumed valid. It is my further understanding that the basis for that presumption of validity is that the allowed claims went through a rigorous examination process at the U.S. Patent Office.

B. Anticipation

24. I understand that "anticipation" under 35 U.S.C. § 102 exists only if a single prior art reference or product discloses or contains, expressly or inherently,

each and every limitation of the claim at issue. In other words, every limitation of the claim must identically appear in a single prior art reference for the reference to anticipate that claim.

25. I also understand that all elements of the claim must be disclosed in the reference as they are arranged in the claim. I also understand that, to be considered anticipatory, the prior art reference must be enabling and must describe the patentee's claimed invention sufficiently to have placed it in the possession of a person of ordinary skill in the field of invention. I further understand that the relevant standards for what constitutes "prior art," for purposes of anticipation under the relevant paragraphs of §102, are as follows (emphases added):

(a) [T]he invention was ***known or used by others*** in this country, or patented or described in a ***printed publication*** in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) [T]he invention was patented or described in a ***printed publication*** in this or a foreign country or ***in public use or on sale*** in this country, more than one year prior to the date of the application for patent in the United States, or

. . .

(e) [T]he invention was described in—(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) ***a patent granted on an application for patent by another filed in the United States***

before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language

...

(g)(2) [B]efore such person's invention thereof, the ***invention*** was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

26. To be “known or used by others in this country” under § 102(a), the knowledge or use of the invention must be accessible to the public. If a process is used in secret, and if the public is unable to learn the process by examining the product that is eventually sold, then that process is not publicly accessible.

27. I understand that a “public use” under 35 U.S.C. § 102(b) may be established by showing a public, non-secret, non-experimental use of the invention in the United States prior to the critical date. Use of an invention may be public where it is exposed or demonstrated to persons other than the inventor, who are under no obligation of secrecy and where there is no attempt to keep the device

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from the public.

28. I understand that, for purposes of § 102, the term “printed publication” means a publication that is sufficiently accessible to the public interested in the art. I understand that the critical factor for determining whether a reference constitutes a “printed publication” under § 102 is “public accessibility.” I further understand that a reference is “publicly accessible” only if Petitioners make “a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without the need of further research or experimentation.” *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006) (quoting *I.C.E. Corp. v. Armco Steel Corp.*, 250 F. Supp. 738, 743 (S.D.N.Y. 1966)).

C. Obviousness

29. I understand that, in order to be considered as “prior art” for purposes of the § 103 obviousness inquiry, a reference must first qualify as “prior art” under one of the definitions stated above in the context of § 102.

30. In order to be considered as “prior art” for purposes of the § 103 obviousness inquiry, a reference must also be “analogous” to the Patent-in-Suit. I understand that a reference is “analogous” if (1) the reference is from the same

field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

31. I understand that the relevant standard for obviousness is as follows:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

35 U.S.C. § 103(a) (pre-America Invents Act); Manual of Patent Examining Procedure § 2141.

32. Stated another way, to show that a patent is “obvious” based on an alleged prior art reference or a combination of such references, it must be shown that a person of ordinary skill in the art would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that such person of ordinary skill in the art would have had a reasonable expectation of success in doing so. To do this, a Defendant must show how and why a skilled artisan would have had a reason to combine the interrelated teachings of the prior art references.

33. Petitioners may show that a claim is invalid for obviousness under 35 U.S.C. § 103 if they demonstrate that two or more prior art references in combination disclose, expressly or inherently, every claim limitation so as to render the claim, as a whole, obvious. Alternatively, Petitioners may show that a claim is invalid for obviousness under 35 U.S.C. § 103 if a single prior art reference combined with the knowledge of one of ordinary skill in the art discloses every claim limitation so as to render the claim, as a whole, obvious.

34. It is my understanding that in assessing the obviousness of claimed subject matter, one should evaluate obviousness over the prior art from the perspective of one of ordinary skill in the art at the time that invention was made (and not from the perspective of either a layman or a genius in that art). The question of obviousness is to be determined based on:

- (a) The scope and content of the prior art;
- (b) The difference or differences between the subject matter of the claim and the prior art (whereby in assessing the possibility of obviousness one should consider the manner in which a patentee and/or a Court has construed the scope of a claim);
- (c) The level of ordinary skill in the art at the time of the alleged invention of the subject matter of the claim; and,
- (d) Any relevant objective factors (the “secondary considerations”) indicating non-obviousness. It is also my understanding that the United States Supreme Court clarified the law of obviousness in *KSR*

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Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007) (“KSR” herein). I have read that opinion and incorporate it here by reference. Based on KSR, it is my understanding that to determine whether it would have been obvious to combine known elements in a manner claimed in a patent, one may consider such things as the interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace, and the background knowledge of one with ordinary skill in the art. The secondary considerations at issue may include commercial success of a product using the invention, if that commercial success is due to the invention; long-felt need for the invention; evidence of copying of the claimed invention; industry acceptance; initial skepticism; failure of others; and praise of the invention. (I discuss these secondary considerations below.)

35. I also understand that while an analysis of any teaching, suggestion, or motivation to combine elements from different prior art references is useful in an obviousness analysis, the overall inquiry must be expansive and flexible.

36. I further understand that it is impermissible to use a hindsight reconstruction of references to reach the claimed invention without any explanation as to how or why the references would be combined to produce the claimed invention.

37. Moreover, I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. But multiple prior art references or elements

may, in some circumstances, be combined to render a patent claim obvious. I understand that I should consider whether there is an “apparent reason” to combine the prior art references or elements in the way the Challenged Claim does. Requiring a reason for the prior art combination protects against distortion caused by hindsight. Along the same lines, one cannot use the Patent-in-Suit as a blueprint to piece together the prior art in order to combine the right ones in the right way as to create the claimed invention(s).

38. To determine whether there is such an “apparent reason” to combine the prior art references or elements in the way that an Challenged Claim does, it may be necessary to look to the interrelated teaching of multiple references, to the “effects of demands known to the design community or present in the marketplace, and to the background knowledge possessed by a person having ordinary skill in the art.” *KSR* at 418.

39. I also understand that when the prior art teaches away from combining prior art references or certain known elements, discovery of a successful means of combining them is more likely to be non-obvious. A prior art reference may be said to teach away from a claim when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the claim or would be led in a direction divergent from the path that was taken by the claim. Additionally, a prior art reference may teach away from a claimed invention when

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substituting an element within that prior art reference for a claim element would render the claimed invention inoperable.

40. It is my further understanding that given the presumption that an allowed patent claim is valid, in order to assert that an allowed patent claim is invalidated by one or more prior art references, it is necessary to show that a reference (or an appropriate combination of references):

- (a) Is (are) properly considered as being prior art to the patent containing the claim, and
- (b) Discloses (disclose) each and every limitation of that claim either expressly or inherently.

D. Prior Art Considered by the Examiner, and Prior Art that Is Cumulative to the Prior Art Considered by the Examiner

41. I understand that, when Petitioners rely upon a prior art reference that was also before the USPTO Examiner for consideration, weight may be given to the Examiner's view of the reference, as not invalidating the patent, regardless of whether invalidity has been proved by a preponderance of the evidence. The burden on Petitioners—of proving invalidity by a preponderance of evidence—is particularly heavy when the prior art reference at issue was also considered by the Examiner.

42. That heavy burden also applies when Petitioners rely upon a prior art reference that is “cumulative” to the prior art references that were considered by

the USPTO Examiner. A prior art reference is considered “cumulative” if it teaches no more than what a reasonable Examiner would consider to be taught by the prior art already before the Patent Office.

E. Claim Construction

43. To determine whether the Challenged Claims are valid in light of the prior art, it is necessary to understand the meaning of the various claim terms. I understand that claims of a patent are to be construed based on their claim language, the patent’s specification, and the patent’s file history. I understand that one also may look at extrinsic evidence to help decipher the meaning and construction of the claims, including, but not limited to, sources such as appropriate dictionaries, the general knowledge of one skilled in the art, treatises, white papers, relevant journals, etc., as long as that extrinsic evidence does not contradict the patent’s claims, file history, or specification.

44. I further understand that a patentee may choose to be his/her own lexicographer and define a term differently than the term’s plain and ordinary meaning in the art and that, under such circumstances, the patentee’s own definition should control. Additionally, a claim term may not be entitled to its plain and ordinary meaning in the art, when the patentee has expressly disclaimed the scope under such plain and ordinary meaning through descriptions in the specifications or statements made during prosecution of the patent applications.

45. I have been informed that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the term appears, but also in the context of the entire patent, including the specification, other claims, and prosecution history.

46. I understand that a dependent claim is a claim that incorporates by reference all limitations of its independent claim and of any intervening claims. As a general guideline, the scope of a dependent claim is narrower than that of its independent claim.

47. For purposes of my opinions in this report, I have been asked to assume a priority date of at least March 31, 1997, based on the Ancora source code productions, or at least May 21, 1998, based on the Israeli Patent Application No. 124571.

48. When I refer to one of ordinary skill in the art in my opinion below, I am referring to one of ordinary skill in the art as of the relevant date set forth above.

49. For ease of reference, below is a reproduction of each of the Challenged Claims of the '941 patent.

Claim	Language
1[a]	A method of restricting software operation within a license for use with a computer including an erasable, non-volatile memory area of a BIOS of the computer, and a volatile

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Claim	Language
	memory area; the method comprising the steps of:
1[b]	selecting a program residing in the volatile memory,
1[c]	using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS, the verification structure accommodating data that includes at least one license record,
1[d]	verifying the program using at least the verification structure from the erasable nonvolatile memory of the BIOS, and
1[e]	acting on the program according to the verification.
2	A method according to claim 1, further comprising the steps of: establishing a license authentication bureau.
3	A method according to claim 2, wherein setting up a verification structure further comprising the steps of: establishing, between the computer and the bureau, a two-way data-communications linkage; transferring, from the computer to the bureau, a request-for-license including an identification of the computer and the license-record's contents from the selected program; forming an encrypted license-record at the bureau by encrypting parts of the request-for-license using part of the identification as an encryption key; transferring, from the bureau to the computer, the encrypted license-record; and storing the encrypted license record in the erasable non-volatile memory area of the BIOS.
6	A method according to claim 1 wherein selecting a program includes the steps of: establishing a licensed-software-program in the volatile memory of the computer wherein

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Claim	Language
	said licensed-software-program includes contents used to form the license-record.
7[a]	A method according to claim 6 wherein using an agent to set up the verification structure includes the steps of:
7[b]	establishing or certifying the existence of a pseudo-unique key in a first non-volatile memory area of the computer; and
7[c]	establishing at least one license-record location in the first nonvolatile memory area or in the erasable, non-volatile memory area of the BIOS.
8	A method according to claim 6 wherein establishing a license-record includes the steps of: forming a license-record by encrypting of the contents used to form a license-record with other predetermined data contents, using the key; and establishing the encrypted license-record in one of the at least one established license-record locations.
9[a]	A method according to claim 7 wherein verifying the program includes the steps of:
9[b]	encrypting the licensed-software-program's license-record contents from the volatile memory area or decrypting the license-record in the erasable, non-volatile memory area of the BIOS, using the pseudo-unique key; and
9[c]	comparing the encrypted licenses-software-program's license-record contents with the encrypted license-record in the erasable, non-volatile memory area of the BIOS, or comparing the license-software-program's license-record contents with the decrypted license-record in erasable non-volatile memory area of the BIOS.
10	A method according to claim 9 wherein acting on the program includes the step: restricting the program's operation with

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Claim	Language
	predetermined limitations if the comparing yields non-unity or insufficiency.
11	A method according to claim 1 wherein the volatile memory is a RAM.
12	The method of claim 1, wherein a pseudo-unique key is stored in the non-volatile memory of the BIOS.
13	The method of claim 1, wherein a unique key is stored in a first non-volatile memory area of the computer.
14	The method according claim 13, wherein the step of using the agent to set up the verification record, including the license record, includes encrypting a license record data in the program using at least the unique key.
16	The method according to claim 13, wherein the step of verifying the program includes a decrypting the license record data accommodated in the erasable second non-volatile memory area of the BIOS using at least the unique key.

50. As the above chart makes clear, each of the Challenged Claims is dependent on claim 1 of the '941 patent.

51. Below is a table that I understand summarizes the claim construction orders from various district court's and a preliminary construction provided by the Patent Trial and Appeal Board.

Term	Definition	Case
a computer including an erasable, non-volatile memory area of the BIOS of the computer, and a	this portion of the preamble is limiting	Ex. 1012 at 5 [LG CASE]

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Term	Definition	Case
volatile memory area (preamble of claim 1)		
a method of restricting software operation within a license ... (preamble of claim 1)	not limiting; the term "license" does not need to be construed	Ex. 1012 at 2 [LG CASE]
acting on the program according to the verification	Plain and ordinary meaning, wherein the step of “acting on the program” may include, but is not limited to, “restricting the program's operation with predetermined limitations, informing the user on the unlicensed status, halting the operation of the program under question, and asking for additional user interactions.”	Ex. 1012 at 4 [LG CASE]
All Asserted Claims	The steps of the Claim do not need to be performed in the order recited.	Ex. 1011 at 19-20, 21 [APPLE CASE]
BIOS	An acronym for Basic Input/Output System. It is the set of essential startup operations that run when a computer is turned on, which tests hardware, starts the operating system, and supports the transfer of data among hardware devices.	Ex. 1011 at 8-11, 20 [APPLE CASE]
BIOS	Plain and ordinary meaning wherein the plain and ordinary meaning is “An acronym for Basic Input / Output System. It is the set of essential startup operations that begin to run automatically when a computer is turned on, which test	Ex. 1012 at 2 [LG CASE]

Term	Definition	Case
	hardware, starts the operating system, and support the transfer of data among hardware devices”	
BIOS (Basic Input/Output System)	An acronym for Basic Input/Output System. It is the set of essential startup operations that run when a computer is turned on, which test hardware, starts the operating system, and support the transfer of data among hardware devises	Ex. 2025 at 4; <i>see also</i> Ex. 2018 at 4 [TCL CASE]
first non-volatile memory area of the computer	plain and ordinary meaning	Ex. 1012 at 5 [LG CASE]
first non-volatile memory area of the computer	a non-volatile memory that is different from the erasable, non-volatile memory of the BIOS	Ex. 2025 at 14-18, 20; <i>see also</i> Ex. 2018 at 18 [TCL CASE]
license	does not need to be construed	Ex. 1012 at 2 [LG CASE]
license record	A record from a licensed program with information for verifying that licensed program.	Ex. 1011 at 16-17, 20 [APPLE CASE]
license record	data associated with a licensed program with information for verifying that licensed program	Ex. 1012 at 2 [LG CASE]
license record	a record from a licensed program with information for verifying that licensed program	Ex. 2025 at 9-11, 20; <i>see also</i> Ex. 2018 at 9-12, 19 [TCL CASE]
license record	a record having information for verifying that licensed program	Ex. 2014 at 9 [TCT Institution Decision]
memory of the BIOS	does not require construction	Ex. 1012 at 3 [LG CASE]
memory of the BIOS	plain and ordinary meaning, i.e., a memory that stores the BIOS	Ex. 2025 at 11-14, 20; <i>see also</i>

Term	Definition	Case
		Ex. 2018 at 12-14, 20 [TCL CASE]
non-volatile memory	memory whose data is maintained when the power is removed or voltage is too low	Ex. 1012 at 1 [LG CASE]
non-volatile memory area of the BIOS	memory area of BIOS whose data is maintained when the power is removed	Ex. 2025 at 4; <i>see also</i> Ex. 2018 at 4 [TCL CASE]
non-volatile memory of the BIOS	does not require construction	Ex. 1012 at 3 [LG CASE]
non-volatile memory	Memory whose data is maintained when the power is removed.	Ex. 1011 at 5-7, 20 [APPLE CASE]
order of steps (claim 1)	Use of the verification structure, as described in Limitation 3, cannot complete until the "set up a verification structure" step has completed, as described in Limitation 2. "Acting on the program according to the verification," as described in Limitation 4, cannot complete until the "verifying the program" is completed as described in Limitation 3. The "selecting a program residing in the volatile memory" as described in Limitation 1 can occur at any time. (<i>See also</i> footnotes on Ex. 1012 at 5)	Ex. 1012 at 5 [LG CASE]
order of steps (claim 1)	Claim 1 presents restrictions only on when certain actions must complete before another is also completed; therefore the order of claim 1 steps are as follows:	Ex. 1013 at 7-10, 37 [LG CASE]

Term	Definition	Case
	Use of the verification structure, as described in Limitation (c), cannot complete until the “set up a verification structure” step has completed, as described in Limitation (b); “acting on the program according to the verification,” as described in Limitation (d), cannot complete until the “verifying the program” is completed as described in Limitation (c); the “selecting a program residing in the volatile memory,” as described in Limitation (a), can occur at any time¹ ¹ Limitation [a] = “selecting a program residing in the volatile memory; Limitation [b] = “using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS, the verification structure accommodating data that includes at least one license record; Limitation [c] = “verifying the program using at least the verification structure from the erasable non-volatile memory of the BIOS,” and Limitation [d] = “acting on the program according to the verification”	
program	a set of instruction that can be executed by a computer	Ex. 1012 at 3 [LG CASE]
selecting a program	plain and ordinary meaning	Ex. 1012 at 3

Term	Definition	Case
residing in the volatile memory		[LG CASE]
selecting a program residing in the volatile memory	no construction	Ex. 2025 at 20; <i>see also</i> Ex. 2018 at 19 [TCL CASE]
set up a verification structure	“establishing or certifying the existence of a pseudo-unique key and establishing at least one license-record location”¹ ¹ Footnote not for jury. "Establishing at least one license-record location" may include the steps of “forming a license-record by at least partially encrypting the contents used to form a license-record with other predetermined data contents, using at least part of the pseudo-unique key; and storing the encrypted license-record”	Ex. 1012 at 4 [LG CASE]
set up a verification structure	no construction	Ex. 2025 at 20; <i>see also</i> Ex. 2018 at 19 [TCL CASE]
using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS	Plain and ordinary meaning, wherein the plain and ordinary meaning of “agent” is “a software program or routine”	Ex. 1012 at 3 [LG CASE]
using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS	plain and ordinary meaning, wherein the plain and ordinary meaning of “agent” is a software program or routine (§112 ¶ 6 does not apply)	Ex. 1013 at 28-36, 37 [LG CASE]
using the key	using a pseudo-unique key	Ex. 1012 at 5 [LG CASE]

Term	Definition	Case
verifying the program using at least the verification structure	Confirming whether a program is licensed using at least the verification structure.	Ex. 1011 at 18-19, 21 [APPLE CASE]
verifying the program using at least the verification structure	confirming whether a program is licensed using at least the verification structure	Ex. 1012 at 4 [LG CASE]
volatile memory	Memory whose data is not maintained when the power is removed.	Ex. 1011 at 5-7, 20 [APPLE CASE]
volatile memory	Plain and ordinary meaning wherein the plain and ordinary meaning is “memory whose data is not maintained when the power is removed” ¹ ¹ Footnote not for the jury. “For the corner case where the hard disk drive is used as virtual RAM, the data is not accessible by normal means after the power is removed.”	Ex. 1012 at 2 [LG CASE]
volatile memory	“memory whose data is not maintained when the power is removed,” with the exception that “where the hard disk drive is used as virtual RAM, the data is not accessible by normal means after the power is removed”	Ex. 2025 at 4-5, 20; <i>see also</i> Ex. 2018 at 4-5, 19 [TCL CASE]
wherein establishing a license - record includes the steps of: forming a license - record by encrypting of the contents used to form a license - record with other predetermined data contents, using the key;	no construction	Ex. 2025 at 18-19, 20; <i>see also</i> Ex. 2018 at 19-20 [TCL CASE]

Term	Definition	Case
and establishing the encrypted license - record in one of the at least one established license - record locations		

52. INTENTIONALLY BLANK

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F. Abstract Ideas

55. I have been informed and understand that abstract ideas are not patentable. However, I also understand that, at some level, all inventions embody, use, reflect, rest upon, or apply abstract ideas, and that an invention is not removed from patentability simply because an abstract idea is in some way involved.

56. I am aware that the Federal Circuit held in *Ancora Technologies, Inc. v. HTC America, Inc.*, 908 F.3d 1343 (Fed. Cir. 2018) that claim 1 of the '941 patent—the claim on which the other Challenged Claims depend—satisfies 35 U.S.C. § 101 as a matter of law.

G. The Manner of Rebuttal

57. Unlike the standard for proving infringement, to rebut an assertion of invalidity, it is sufficient to show that at least one of the limitations of an allowed

claim has not been shown to be found in the prior art. That is what I have done for each Challenged Claim and for each item of allegedly invalidating prior art, and for each combination of items of allegedly invalidating prior art addressed in the Wolfe Declaration. In other words, in rebutting allegations of invalidity, it is not necessary to demonstrate that each and every limitation of a Challenged Claim is missing from the art and/or combinations of art cited in the Wolfe Declaration.

H. The Level of Ordinary Skill in the Art and Person of Ordinary Skill in the Art

58. When interpreting a patent, I understand that it is important to view the disclosure and claims of that patent from the level of a person of ordinary skill in the relevant art (a “POSITA” hereafter) at the time of the invention.

59. My opinion of the level of ordinary skill in the art of the ’941 patent is informed by my personal experience working in the fields of computer software, the Internet, and associated technologies, my knowledge of colleagues and others working in those fields as of and for several years before the time frame applicable to the ’941 patent, and my study of the patent and its file history.

60. Taking the above factors into account and based on my review of the specification of the ’941 patent and my knowledge and experience of the field, I believe that a POSITA of the ’941 patent would be an individual who, as of the 1997/1998 time frame, had earned an accredited Bachelor’s degree in electrical

engineering, computer engineering, or computer science, or an equivalent education or level of knowledge, and two years of industrial experience with computer hardware, software, and operating systems.

61. I understand that Dr. Wolfe stated in his report that “a person of ordinary skill with respect to the subject matter of the ’941 Patent at the time of the alleged invention would have had at least a B.S. degree in computer science, computer engineering, or electrical engineering (or equivalent experience) and would have had at least two years of experience with computer science and computer engineering, including information encryption, computer architecture, and firmware programming. This definition is approximate, and additional educational experience in computer science and computer engineering could make up for less work experience and vice versa.” Ex. 1003, Wolfe Declaration at ¶ 24.

62. While Dr. Wolfe’s standard is not identical to mine, none of my opinions set forth in this report would be different under their standards.

I. Avoidance of Impermissible Hindsight

63. It is my further understanding that although the *KSR* decision discussed above has led to the elimination of the “teaching, suggestion or motivation” test as the sole test for judgment whether art can be combined for the purposes of an obviousness assertion, the use of “impermissible hindsight” is still inappropriate when making such an assertion. I note that § 2142 of the Manual of

Patent Examining Procedure includes this direction to patent examiners:

The tendency to resort to “hindsight” based upon applicant’s disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

J. Requirements for Asserting Obviousness

64. It is my further understanding that when assertions of invalidity are based on a combination of references that allegedly disclose a given patent claim, such assertions must include a discussion of the likelihood that the proposed combinations can be made by those of ordinary skill and, if made, will have a likelihood of success.

65. Section 2143 of the Manual of Patent Examination Procedure states:

E. “Obvious To Try” – Choosing From a Finite Number of Identified, Predictable Solutions, With a Reasonable Expectation of Success
[...]

The rationale to support a conclusion that the claim would have been obvious is that “a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely that product [was] not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.” *KSR*, 550 U.S. at 421, 82 USPQ2d at 1397.

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66. Section 2143.02 of the Manual of Patent Examination Procedure states:

I. OBVIOUSNESS REQUIRES A REASONABLE EXPECTATION OF SUCCESS

Where there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success.

[...]

67. Obviousness does not require absolute predictability, however, at least some degree of predictability is required.

VI. Technology Background

68. Entitled “Method of Restricting Software Operation within a License Limitation,” the abstract of the ’941 patent explains that the invention concerns:

A method of restricting software operation within a license limitation that is applicable for a computer having a first non-volatile memory area, a second non-volatile memory area, and a volatile memory area. The method includes the steps of selecting a program residing in the volatile memory, setting up a verification structure in the non-volatile memories, verifying the program using the structure, and acting on the program according to the verification.

Ex. 1001, ’941 patent at Abstract.

69. Briefly stated another way, the '941 patent teaches a new method for restricting software operation within a license for use and restricting an unauthorized software program's operation. Prior art approaches to the problem required using a hardware attachment (such as a "dongle") or recording license information in an area of a device such as a hard disk drive that is easily accessible to hackers. In the '941 patent, the inventors teach storing license records identifying and enabling the use of software in an area separate and apart from the area normally accessible to programs running on the computer, in BIOS storage.

70. Both Ancora and Petitioners have agreed that BIOS is "An acronym for Basic Input/Output System. It is the set of essential startup operations that run when a computer is turned on, which test hardware, starts the operating system, and supports the transfer of data among hardware devices." BIOS determines how an operating system is launched, and importantly, which operating systems it is willing to launch. A BIOS may, for example, be configured to launch only operating systems that it recognizes as ones that will not directly change certain security-sensitive areas of the device's non-volatile memory but instead will consult BIOS in order to do so.

71. By storing license records outside the normal reach of the operating system, it is that much harder for an attacker (described in the patent as encompassing a "hacker," a "skilled system's [sic] programmer," an "ordinary

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software hacker,” and a “professional-like hacker”) to employ ordinary operating system programs to tamper with a computer’s operation and/or install unauthorized software. As the ’941 patent explains, “An important advantage in utilizing non-volatile memory such as that residing in the BIOS is that the required level of system programming expertise that is necessary to intercept or modify commands, interacting with the BIOS, is substantially higher than those needed for tampering with data residing in volatile memory such as hard disk.” Ex. 1001, ’941 patent at 3:4-9.

72. Further, the Federal Circuit has also twice identified at least the following novel aspects of the ’941 patent, including by describing “[t]he inventive method” of the ’941 patent as: “us[ing] a modifiable part of the BIOS memory—not other computer memory—to store the information that can be used, when a program is introduced into the computer, to determine whether the program is licensed to run on that computer. BIOS memory is typically used for storing programs that assist in the start-up of a computer, not verification structures comparable to the software-licensing structure embodied by the claimed invention. Using BIOS memory, rather than other memory in the computer, improves computer security, the patent indicates, because successfully hacking BIOS memory (i.e., altering it without rendering the computer inoperable) is much harder than hacking the memory used by the prior art to store license-verification

information.” *Ancora Techs., Inc. v. HTC Am., Inc.*, 908 F.3d 1343, 1345 (Fed. Cir. 2018), as amended (Nov. 20, 2018).

73. As the Federal Circuit has also observed, “[t]he prosecution history reinforces what the patent itself indicates about the change in previous verification techniques for computer security”; indeed, the USPTO Examiner’s Reasons for Allowance of the ’941 patent emphasized the patent’s solution of “using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS.” *Id.* at 1349 (quotation marks omitted).

74. Specifically, as the applicants for the ’941 patent explained, “BIOS is a configuration utility. Software license management applications, such as the one of the present invention, are operating system (OS) level programs. Therefore, BIOS programs and software licensing management applications do not ordinarily interact or communicate because when BIOS is running, the computer is in a configuration mode, hence OS is not running. Thus, BIOS and OS level programs are normally mutually exclusive.” Ex. 1002, ’941 patent file history at 49 (Feb. 5, 2002).

75. Further, the applicants distinguished prior art (including prior art BIOS) by explaining, for example, that

[T]he present invention proceeds against conventional wisdom in the art. Using BIOS to store application data such as that stored in [a]

local cache for licenses is not obvious. The BIOS area is not considered a storage area for computer applications. An ordinary skilled artisan would not consider the BIOS as a storage medium to preserve application data for at least two reasons.

First, OS does not support this functionality and is not recognized as a hardware device like other peripherals. Every OS provides a set of application program interfaces (APIs) for applications to access storage devices such as hard drives, removable devices, etc. An ordinary person skilled in the art makes use of OS features to write data to storage mediums. There is no OS support whatsoever to write data to the system BIOS. Therefore, an ordinary person skilled in the art would not consider the BIOS as a possible storage medium. Furthermore, it is common that all peripheral devices in the PC are listed and recognized by the OS except for the BIOS. This supports the fact that the BIOS is not considered a peripheral device. Accordingly, an ordinary person skilled in the art would not consider the BIOS for any operation, including writing to the BIOS.

Second, no file system is associated with the BIOS. Every writable device connected to the PC is associated with an OS file system to arrange and manage data structures. An example for such a file system would be FAT, FAT32, NTFS, HPFS, etc. that suggests writing data to the writable device. No such file system is associated with the BIOS. This is further evidence that OS level application programmers would not consider the BIOS as a storage medium for license data.

Ex. 1002, '941 patent file history at 50. In this excerpt, the applicants described some aspects of BIOS that were familiar to practitioners and that would have contributed to practitioners' approaches to system design even as BIOS continued to evolve.

76. The USPTO Examiner agreed with the applicants that the inventors' invention was neither anticipated nor rendered obvious by the prior art. As the Examiner summarized in the Reasons for Allowance of the '941 patent, "the key distinction between the present invention and the closest prior art, is that the [prior art] systems... run at the operating system level and BIOS level, respectively. More specifically, the closest prior art systems, singly or collectively, do not teach licensed programs running at the OS level interacting with a program verification structure stored in the BIOS to verify the program using the verification structure and having a user act on the program according to the verification. Further, it is well known to those of ordinary skill of the art that a computer BIOS is not setup to manage a software license verification structure. The present invention overcomes this difficulty by using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS." Ex. 1002, '941 patent file history at 34 (March 28, 2002).

77. In another decision regarding the '941 patent, the Federal Circuit has also explained that "the applicants distinguished their invention over a combination

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of two references: one disclosed storage in the BIOS memory area by the BIOS software itself; the other disclosed software implemented in or through an operating system. The applicants explained that their invention differed from the prior art in that it both operated as an application running through an operating system and used the BIOS level for data storage and retrieval—a combination that was not previously taught and that an ordinarily skilled application writer would not employ.” *Ancora Techs., Inc. v. Apple, Inc.*, 744 F.3d 732, 735-36 (Fed Cir. 2014).

78. At least one court has described characteristics of the “agent.” (Ex. 1012 at 3; Ex. 1013 at 28-37.) That Court stated that “[t]he specification only describes the use of an agent to write to the BIOS memory. See ’941 Patent at 6:64–65. The agent may operate at the OS-level, but the agent is not an application. See *id.* In addition, the other steps (‘selecting,’ ‘verifying,’ and ‘acting’) do not use an agent. See *id.* at 6:63, 7:1–4. The Court is unaware of any OS-level application, as applications run on top of the OS, while OS-level software is either the OS or the drivers. . . . Moreover, the Examiner understood that the [‘acting on the program according to the verification’] operation does not require an OS-level agent.” (Ex. 1013 at 26-27.) The Court also stated that:

the [prosecution] history clearly recites an agent as a ‘licensed program[] running at the OS level interacting with a program

verification structure stored in BIOS.’ *See* ECF No. 44, Ex. 2 at 7. The patentees emphasized this point during prosecution that agent was added to overcome the prior art, not to disclose additional hardware. *See* ECF No. 50 at 8. The Examiner also shared this understanding when referring to agent. *See* ECF No. 44, Ex. 9 at 4. A person of ordinary skill in the art would understand that agent is referring to software because of its complete interaction with the OS. *See* ’941 Patent at 6:18-28; ECF No. 44, Ex. 2 at 7.

Ex. 1013 at 34; *see also* Ex. 1002 at 33.

VII. The References Addressed in the Wolfe Declaration

79. In his declaration, Dr. Wolfe addressed the following references in making his assertions regarding the ’941 patent:

- U.S. Patent No. 4,658,093 to Hellman (“Hellman”);
- U.S. Patent No. 5,892,906 to Chou, et al. (“Chou”); and
- U.S. Patent 5,933,498 (“Schneck”).

VIII. General Comments on the Wolfe Declaration

A. Frequent Use of Impermissible Hindsight

80. Having reviewed the assertions of obviousness made in the Wolfe Declaration, it is my opinion that the assertions of obviousness suffer from the evident use of impermissible hindsight. In short, Dr. Wolfe’s report shows that someone appears to have looked at the limitations of the Challenged Claims and then used them to search for unrelated disclosures in order to patch together a

combination of references that, when combined, allegedly render obvious the Challenged Claims of the '941 patent.

81. Aside from offering conclusory statements that a POSITA would have found it obvious to combine such references, Dr. Wolfe offers very little to explain how any of the proposed combinations of references would have been able to function—either in theory or, more importantly, in practice. Dr. Wolfe does not explain how any of those proposed combinations actually could be implemented, identify any possible complications or further design considerations that must be met, or claim what likelihood of success would have been expected had a POSITA attempted to implement any of the proposed combinations. Dr. Wolfe also provides very little detail around the motivation that any person would have had to combine references.

B. Inadequacy of Addressing the Expectation of Success

82. As I noted above, it is my understanding that—when asserting invalidity based on a combination of references that allegedly disclose a given patent claim—such assertions must include a discussion of the likelihood that the proposed combinations can be made by those of ordinary skill and, if made, will have a likelihood of success.

83. I address some likely outcomes of the attempted combinations below. But even if one simply assumes that Dr. Wolfe's proposed combinations could be

technically achieved, the results do not demonstrate an OS role in “using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS” under the construction provided by the Court, which recognized that the claimed agent operates at the operating-system level as explained in ¶ 78 above. Rather, the proposed combinations only attempt to show that a BIOS component can be made to store certain information in BIOS memory as opposed to the memory identified in Dr. Wolfe’s analysis of Hellman, Chou, and Schneck. The references show no OS-to-BIOS interaction, no such interaction for purposes of storing data in the BIOS, and no such interaction for purposes of storing, specifically, a license record in the BIOS. Nor do the references even acknowledge, as the ’941 patent does, one of the benefits of using BIOS for this purpose: that “that the required level of system programming expertise that is necessary to intercept or modify commands, interacting with the BIOS, is substantially higher than those needed for tampering with data residing in volatile memory such as hard disk.” Ex. 1001, ’941 patent at 3:5-9. Ultimately, success in making Dr. Wolfe’s claimed combinations does not result in a system that meets the requirements of the ’941 patent.

IX. Rebuttal to Dr. Wolfe’s Opinions Regarding the ’941 Patent

84. In this section of my declaration, I state and explain my opinion that Dr. Wolfe failed to show that the prior art addressed in his report invalidates any of the Challenged Claims of the ’941 patent, as well as providing the bases for my

opinions.

85. The Wolfe Declaration appears to agree that the '941 patent is entitled at least to a priority date of May 21, 1998. *See* Ex. 1003, Wolfe Declaration ¶ 25.

86. I further note that, due to my understanding of the law, I am not offering an opinion regarding each cited reference or combination of references beyond responding to the opinions and evidence identified by Dr. Wolfe.

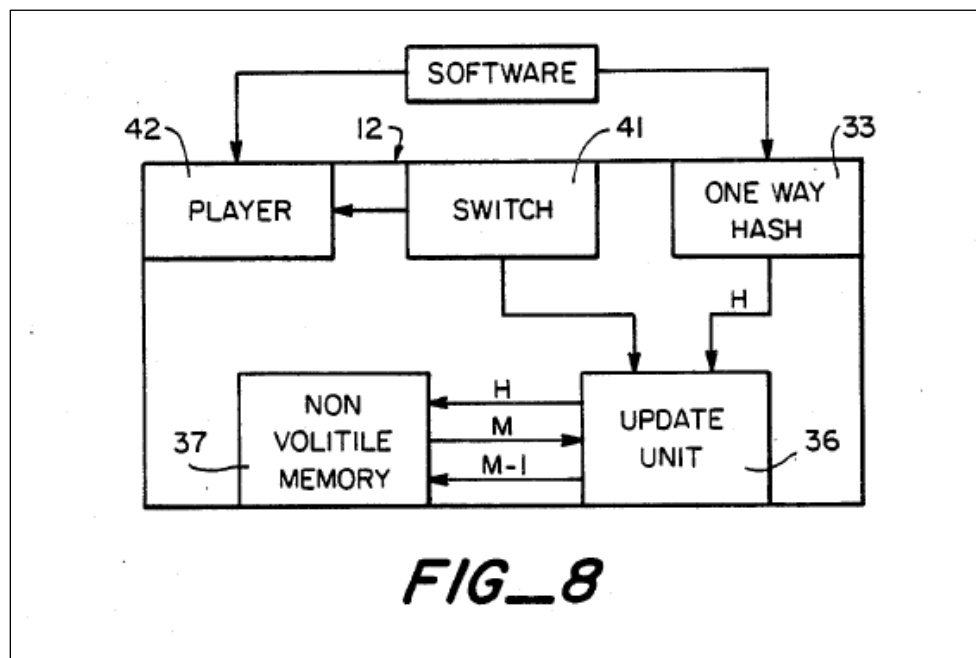
87. Finally, I note that I agree with the analysis of the '941 patent applicants, the USPTO Examiner, and the Federal Circuit recited above at § VI.

A. Hellman, Chou, and/or Schneck Does Not Invalidate the Asserted Claims of the '941 Patent

88. Beginning at ¶ 98, Dr. Wolfe opines that Hellman in combination with Chou and/or Schneck renders obvious each Challenged Claim of the '941 patent. I disagree. It is my opinion that Dr. Wolfe has not shown that the challenged combinations make obvious claim 1 (or the remaining Challenged Claims, which depend on claim 1), including for the reasons I explain above at § VIII.

89. First, I note that the Hellman disclosure is expressly predicated on the use of additional hardware including wires, switches, and glue. Hellman first introduces some of the components, writing “FIG. 8 depicts an implemenation [sic] of the base unit 12 during use of a software package. Software package 17 is connected to the base unit 12 and a signal representing said software package is

operated on by the one-way hash function generator 33 to produce an output signal which represents the hash value H. The signal H is transmitted to update unit 36 to indicate which software package is being used. Update unit 36 uses H as an address to non-volatile memory 37, which responds with a signal representing M, the number of uses of software package 17 which are still available.” Ex. 1004, Hellman Patent at 10:33-43. In addition, “For example, if the software is recorded music then software player 42 would be a record player; if the software is a computer program, then software player 42 would be a microprocessor or central processing unit (CPU).” Ex. 1004, Hellman Patent at 10:66-11:3.



90. Continuing, Hellman discusses the physical construction of the base unit, including its wires, switches, and glue. “Base unit 12 should be physically constructed so that switch 41 is not readily accessible to the user. Otherwise a user

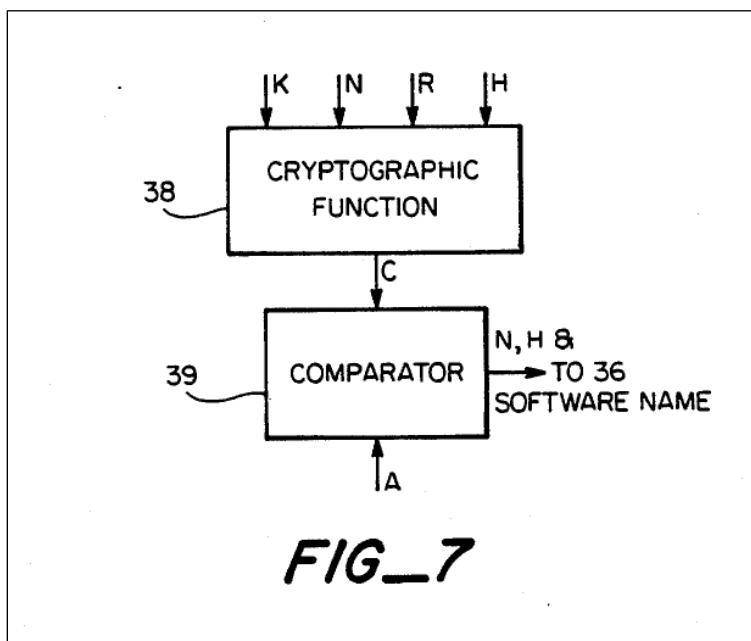
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could cut the wire sending the control signal from update unit 36 to software player 42 and force the control signal to always activate software player 42.¹ The use of epoxy to encapsulate switch 41 and the wire connecting it to update unit 36 would be one such approach. It may suffice only to detect if a base unit 12 has been tampered with if the user signs a license agreement which says he will not open the base unit. Detection of tampering is a simpler task and techniques are well known for accomplishing this task. For example, many warranties are void if equipment is opened by the user. Manufacturers of such equipment use special factory seals or a dab of paint across a joint to tell if a piece of equipment has been opened.” Ex. 1004, Hellman Patent at 11:4-19.

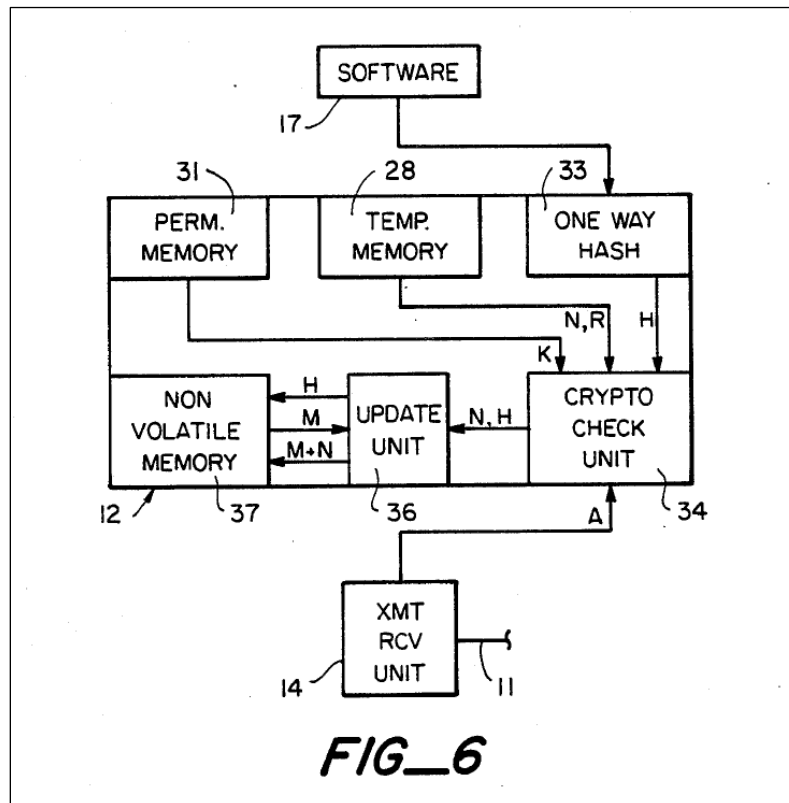
91. Describing the procedure used to modify Hellman’s non-volatile memory in response to a new authorization, Hellman describes its cryptographic check unit and its comparator and input and output signals: “FIG. 7 depicts an implementation of the cryptographic check unit 34. Signals representing K, N, R, and H are applied as inputs to a cryptographic function generator 38 which generates a check value C as an output signal. Signals C and A are input to a

¹ A POSITA would understand that this sentence misidentifies the connection at issue. As the following sentence of Hellman indicates, the wire between switch 41 and base unit 36 is the one under discussion.

comparator 39. If each bit of C matches the corresponding bit of A then the comparator 39 and the cryptographic check unit 34 generate a signal which indicates that A is to be considered a proper authorization and that the update unit 36 is to add N authorized uses to the software package with hash value H.” Ex. 1004, Hellman Patent at 10:14-24.



92. The output of the comparator shown above includes “N, H & Software name” and leads to Update Unit 36 shown in Figure 6.



93. In fact, every use of the word “software” in Hellman refers to the software package being authorized for use a given number of times by a base unit. Therefore, Hellman does not disclose a “software program or routine” (agent) that is used to set up a verification structure. Dr. Wolfe admits this. He states at ¶ 137 that “Hellman does not specifically disclose how update unit 36 is implemented” and simply speculates that “a POSA would have recognized that the update unit 36 would have been implemented by a software routine, potentially along with a hardware module.”

94. Dr. Wolfe is incorrect. First, as I explained above, the “update unit 36” is a hardware unit that is connected by “wires” to “switches.” Hellman also

says that data can be “stored in” the update unit, further suggesting that it is not a “software program or routine,” but rather something with memory, like a processor: “The fixed value of N would only have to be stored in update unit 36.” Ex. 1004, Hellman at 12:34-36.

95. In addition, Hellman teaches away from implementing its invention in software. Its abstract describes the base unit as a “computer, video game base unit, record player, videorecorder or video disk player,” clearly indicating that the base unit is a hardware device. Corresponding to this, the “software” that Hellman may authorize for use a given number of times includes “records,” e.g., LPs: “In the record industry, illegal home and commercial taping of records is depriving artists, recording studios, and manufacturers of significant income which is rightfully due them.” Ex. 1004, Hellman at 1:10-13. “Software copy protection does not currently exist in the record industry.” Ex. 1004, Hellman at 1:28-29.

96. Since a record player is a hardware device, not a general-purpose computer, this disclosure would not bring to mind a pure software implementation. Record players are not programmable and do not have “software” that can be adapted to Hellman’s invention. Hellman’s inclusion of videorecorders and video disk players in its Abstract reinforces this, as does Hellman’s reference to “videotape” and “disk” media as “software” (e.g., “Control of software is a major problem in the record, movie (videotape and disk), computer, and videogame

industries. In the record industry, illegal home and commercial taping of records is depriving artists, recording studios, and manufacturers of significant income which is rightfully due them. A similar problem exists with illegal taping of movies in the videotape and videodisk industries.” Ex. 1004, Hellman at 1:8-15.

97. But even a POSITA who does happen to wonder whether the Hellman system could be adapted to pure software would immediately have to grapple with the question of how a software solution could isolate and protect itself from the very software packages whose authorization is at issue. This is a complicated problem, and the universe of wildly different designs to address problems of software isolation indicate that the results of attempting it are highly unpredictable. To suggest that it is simply obvious to deploy Hellman as “software program or routine” *and* combine that highly underspecified system with Chou or Schneck to result in a “software program or routine” that operates at the OS-level to set up a verification structure in memory of the BIOS is highly implausible.

98. Therefore, Dr. Wolfe’s alleged combinations of Hellman with Chou or Schneck must be understood as combinations of *a fundamentally transformed, software-implemented Hellman* with Chou or Schneck—one that Dr. Wolfe has not even fully described.

1. Alleged Memory of the BIOS

99. Dr. Wolfe recognizes that Hellman is also silent on BIOS, writing at

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¶105 regarding the preamble of claim 1 that “Hellman does not disclose that the non-volatile memory 37 is a BIOS, or that the base unit 12 included BIOS.” Dr. Wolfe argues at ¶107 “A POSA would have found it obvious to include BIOS in the base unit 12 of Hellman.”

100. In ¶ 109, Dr. Wolfe attempts to justify Hellman’s silence on BIOS by writing that BIOS terminology “was not as consistently used for other types of electronic devices” such as a videogame bas unit or a videorecorder. However, a POSITA would not take Hellman’s silence on BIOS to be an indication of a vacuum that must be filled. Rather, a POSITA would take Hellman’s lack of BIOS as an indication that BIOS and memory of the BIOS are simply irrelevant to Hellman’s aims. Even if a POSITA did for some reason decide to combine Hellman with a BIOS stored in erasable, non-volatile memory, that combined system reveals nothing about “using an agent to set up a verification structure in the erasable, non-volatile memory of the BIOS” beyond what the Examiners of the ’941 patent already considered when allowing the ’941 claims.

101. This is reinforced by the fact that Hellman is very explicit about the types of memories it uses and the purposes those memories serve, but never discusses BIOS memory or suggests that it could or would serve any use or purpose for accomplishing Hellman’s objectives. For instance, in addition to the non-volatile memory identified at Ex. 1004, Hellman at 10:1-5, Hellman discloses

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that “Authorization and billing unit 13 contains a memory 18 having a table of serial numbers and secret keys which allows authorization and billing unit 13 to determine a base unit’s secret key, SK, from knowledge of the base unit’s public serial number.” Ex. 1004, Hellman at 6:16-21.

102. Hellmann also discloses “Authorization and billing unit 13 also contains in another portion of the memory or in an additional memory 19 a table of software which allows authorization and billing unit 13 to determine the complete contents of software package 17 from knowledge of the much smaller information SOFTWARE NAME.” Ex. 1004, Hellman at 6:21-27. It also discloses the base unit 12’s temporary memory as “Base unit 12 stores these values in a temporary memory 28, for example a RAM.” Ex. 1004, Hellman at 8:66-67. And Hellman also discloses “permanent memory 31” as “a secure memory, inaccessible to the user,” adding that “Encapsulating the base unit permanent memory 31 in epoxy or other means can be used to deter all but a very small percentage of users from learning their secret keys.” Ex. 1004, Hellman at 9:30-47.

103. Hellman’s omission of any discussion of BIOS or BIOS memory is thus more pronounced given Hellman’s very specific description and identification of the range of memory types to be used in the invention as well as the purpose that each one serves. Nor does Hellman even suggest using the only “inaccessible” memory it discloses—permanent memory 31—as a location for the verification

structure. Ex. 1004, Hellman at 9:29-49. Rather, Hellman discloses using such memory only for storing the “base unit key, K” to ensure that the key is “inaccessible to the user” and to prevent all but a “small percentage of users go to the trouble of learning their secret keys.” Ex. 1004, Hellman at 9:35-44.

104. According to Dr. Wolfe in ¶ 136, however, Hellman teaches that update unit 36 to “sets up a structure... in the non-volatile memory 37” Notably, despite expressly disclosing the use of memory normally “inaccessible” to users to store “base unit key, K,” Hellman never teaches or suggests using similarly inaccessible or protected memory to set up a verification structure. As I explain in ¶ 71 above, and as the ’941 patent explains, “An important advantage in utilizing non-volatile memory such as that residing in the BIOS is that the required level of system programming expertise that is necessary to intercept or modify commands, interacting with the BIOS, is substantially higher than those needed for tampering with data residing in volatile memory such as hard disk.” Ex. 1001, ’941 patent at 3:4-9. Dr. Wolfe’s reference to “non-volatile memory 37” does not provide this property.

105. At ¶ 120, Dr. Wolfe argues that a POSITA combining Hellman with Chou would have decided to store Hellman’s authorization value M in memory inspired by Chou, which Dr. Wolfe characterizes as “memory of the BIOS.” But Dr. Wolfe cites no motivation, teaching, or suggestion to do either of these things,

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other than speculating that there may be EEPROM with varying memory space to permit it. And Dr. Wolfe does not opine on whether a POSITA would understand these operations to take place at the BIOS level or any other software level. There is certainly no reason to think that the asserted combinations would inevitably result in using OS-level software to set up a verification structure in a memory of the BIOS. Hellman mentions neither BIOS nor operating system.

106. Hellman discloses that its non-volatile memory's memory 37 is constructed as a hash table over software packages, wherein memory address H denotes the hash value of a software package and that memory location H stores the number of remaining authorizations M of that software package's use. Ex. 1004, Hellman at 10:33-43; Ex. 1003, Wolfe Declaration at ¶ 142. This architecture is completely incompatible with memory that stores BIOS instructions and memory that is used for BIOS functions like loading, finding, detecting and/or updating the OS.

107. For example, BIOS may store critical information such as the number of cylinders and heads on a computer's attached hard drives or the order in which BIOS will search devices for a bootable operating system.² If BIOS memory such

² See Phil Croucher, "The BIOS Companion," Tri-Tam Enterprises Inc. 1997, pp. 63, 72. (Ex. 2025.)

as this is also taken to be addressable by hash values and used for storage of authorization counts based solely on the output of a hashing algorithm (hash value H), then the purchase of a software package with an unfortunate hash value H could cause a base unit to overwrite the BIOS instructions or other critical BIOS information with the number of remaining authorizations of that software package's use, rendering the entire system unusable. Thus, any successful use of Hellman's non-volatile memory for BIOS purposes requires abandoning the use that is actually taught by Hellman. Therefore, no POSITA would have combined Hellman and Chou as claimed.

108. Even assuming against the evidence that a POSITA would make the combinations that Dr. Wolfe describes and thereby find some "memory of the BIOS," one cannot conclude that the POSITA would arrive at a system that results in using OS-level software to set up a verification structure in a memory of the BIOS.

109. Indeed, Ewertz was before the U.S. Patent Office during examination and reexamination of the '941 patent. And the Examiner wrote "Ewertz et al. (US 5,479,639) teach the use of BIOS memory for storing licensing numbers." Ex. 1002, '941 file history at 34. In addition, an Examiner considered Lewis (US 5,734,819) in the *ex parte* reexamination of the '941 patent. Ex. 2024 at 164. Thus, the use of Chou to find "BIOS memory" is merely cumulative to Ewertz and other

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art previously considered by the U.S.P.T.O.

2. No Motivation to Combine

110. Dr. Wolfe appears to be silent on any possible motivation that a POSITA would have to combine the fundamentally transformed software-oriented Hellman with Chou. This silence makes sense. The purpose of Chou is to discourage computer theft, whereas the purpose of Hellman is to detect whether software is authorized for use a given number of times by a base unit. Ex. 1005, Chou at Abstract; Ex. 1004, Hellman at Abstract. The benefits of Chou most clearly go to the computer's authorized user, whereas the benefits of Hellman most clearly go to the software publisher. The fact that both systems rely on cryptographic techniques does not justify that a POSITA would be motivated to combine them.

3. Dependent Claims

a. Claim 2

111. Claim 2 is dependent on claim 1, and Dr. Wolfe's analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 2, including for the reasons discussed above.

b. Claim 3

112. Claim 3 is dependent on claim 2, and Dr. Wolfe's analysis of this

claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 3, including for the reasons discussed above.

113. In ¶ 178, Dr. Wolfe asserts that “a POSA would have found it obvious to use a public key for the base unit 12 as the ‘identification of the computer’ in the request for software use. As discussed above for element 3.b, a POSA would have found it obvious to make this modification because it would allow the authorization and billing unit 13 to use the public key as the encryption key for forming authorization A instead of a locally-maintained secret key. For at least those reasons, a POSA would have found it obvious to use ‘part of the identification as an encryption key.’”

114. However, Dr. Wolfe appears to have misunderstood Hellman. Hellman does not teach the use of a public key for encryption of messages transferred from the billing unit 13 to the computer; rather, it teaches that its public key is stored in the computer base units 12: “The use of such a public key cryptosystem has the advantage of allowing all users to have the same base unit key in memory 31 and the same secret key SK, which would be the public key.” Ex. 1004, Hellman at 11:20-32. For the resulting system to operate at all, this means that the billing unit 13 must encrypt messages that are to be readable by base units using the *private* key. But no private key is transferred from the

computer to the bureau, and Dr. Wolfe does not attempt to argue otherwise. He does not even attempt to argue that a public key is transferred from the computer to the bureau. Ultimately, Dr. Wolfe has not identified any “identification” that is first transferred and then used as part of an encryption key.

c. Claim 6

115. Claim 6 is dependent on claim 1, and Dr. Wolfe’s analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 1, including for the reasons discussed above.

d. Claim 7

116. Claim 7 is dependent on claim 6, and Dr. Wolfe’s analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 7, including for the reasons discussed above.

e. Claim 9

117. Claim 9 is dependent on claim 7, and Dr. Wolfe’s analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 9, including for the reasons discussed above.

f. Claim 10

118. Claim 10 is dependent on claim 9, and Dr. Wolfe's analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 10, including for the reasons discussed above.

g. Claim 11

119. Claim 11 is dependent on claim 1, and Dr. Wolfe's analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 11, including for the reasons discussed above.

h. Claim 12

120. Claim 12 is dependent on claim 1, and Dr. Wolfe's analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 12, including for the reasons discussed above.

121. Dr. Wolfe points to the combination of Hellman with Schneck and Chou as disclosing the additional limitation of claim 12, which reads: "A method according to claim 1, wherein a pseudo-unique key is stored in the nonvolatile memory of the BIOS."

122. Note that the "the nonvolatile memory of the BIOS" refers to claim 1's recitation of "an erasable, non-volatile memory area of a BIOS of a computer."

However, a POSITA combining Hellman with Chou would not lead to storage of a pseudo-unique K in erasable, non-volatile memory such as EEPROM. Rather, a POSITA motivated to consider moving K from PROM to EEPROM would recognize the security value of leaving it in PROM. This is because Hellman teaches that its key K is stored in “permanent memory 31, for example, a PROM which is burned in during manufacture of the base unit.” Ex. 1004, Hellman at 9:30-32. Moving the key K from PROM to EEPROM enables an attacker to defeat Hellman’s authorization limits, because once K is stored in EEPROM, it is much easier for an attacker to copy software (along with its authorizing K) from one device onto another.

123. Without acknowledging this problem, Dr. Wolfe speculates at ¶ 227 that it “may be beneficial to change a key periodically, including a public key, such as to prevent a brute force attack attempting to determine the private key being used by the base unit 12” and offers that as a motivation to move the key K from PROM to EEPROM. This suggestion is incorrect. First, in Dr. Wolfe’s scenario, the private key is not used by the base unit 12—the base unit uses a *public* key. Ex. 1004, Hellman at 11:20-41. It makes no sense to conduct a “brute force attack” against a public key that can be simply read out of memory. Perhaps Dr. Wolfe meant to address a possible attack against the billing unit 13’s *private* key. But if the billing unit 13’s private key can be successfully attacked in a world where the

base units 12 store their public keys in EEPROM as Dr. Wolfe suggests rather than PROM as Hellman teaches, then the attacker may use any such stolen private key to forge authorizations and cause base units to accept them by overwriting their public keys stored in their overwritable EEPROM memories. In other words, the attack resistance that Dr. Wolfe sees in being able to “change a key periodically” is much weaker than suggested. In my opinion, a POSITA combining Hellman with Chou would leave Hellman’s K in PROM, and this combination does not suggest the requirements of claim 12.

i. Claim 13

124. Claim 13 is dependent on claim 1, and Dr. Wolfe’s analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 13, including for the reasons discussed above.

j. Claim 14

125. Claim 14 is dependent on claim 13, and Dr. Wolfe’s analysis of this claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 14, including for the reasons discussed above.

k. Claim 16

126. Claim 16 is dependent on claim 13, and Dr. Wolfe’s analysis of this

claim is substantially dependent on his analysis of prior claims. It is my opinion that Dr. Wolfe has not shown that the asserted combination makes obvious dependent claim 16, including for the reasons discussed above.

I declare under penalty of perjury that the foregoing is true and accurate to the best of my ability.

Executed on: April 23, 2021



Dr. David Martin

APPENDIX A

David Martin, Ph.D.
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January 4, 2021

CURRICULUM VITAE

X. SUMMARY

I have been working in the computer software field for over 40 years, in the roles of developer, designer, professor, and expert consultant. I hold a Ph.D. in computer science and a B.S. in mathematics and computer science.

XI. EDUCATION AND ACADEMIC QUALIFICATIONS

A. Education

1999 Ph.D. Department of Computer Science, Boston University

1993 B.S. Iowa State University, *summa cum laude*
Major: Mathematics
Major: Computer Science
Minor: German

B. Faculty Experience

2002-2007 Assistant Professor, Department of Computer Science
University of Massachusetts Lowell
(On leave of absence during 2005-2006)

2001-2002 Research Assistant Professor, Department of Computer Science
Boston University

1998-2001 Assistant Professor, Department of Mathematics and Computer Science
University of Denver

C. Courses Taught

Computer Networking	Unix Software Tools	Advanced Unix Programming
Cryptography and Network Security	Introduction to Computer Science I (C++)	Introduction to Object Oriented Programming (C++)
Applied Computer Security	Introduction to Computer Science II (C++)	Foundations of Theoretical Computer Science
Special Topics in Systems: Computer Security	Introduction to Computer Science (C)	Formal Languages and Automata

XII. OTHER PROFESSIONAL ACTIVITIES

A. Government Service

2018-present City Councilor, Ames, Iowa (population 66,191 as of 2016; home of Iowa State University of Science and Technology). The Council is the elected government of the City.

B. Other Work Experience

2005-2008 **Cofounder**, Boston Software Forensics. Developed software analysis and protective tools for software publishers and OEMs and provided software forensics consulting services.

1997 **E-mail survey programmer and administrator**, Boston University School of Management, Summer

1996 **Student researcher**, Bellcore Inc., Summer
Conducted research in firewall technology, Java security, and cryptography.

1995 **Contract programmer**, BitFlow Inc., Summer
Ported device drivers for a digital camera interface board to Windows NT and Windows 95.

1995 **Database and statistical consultant** for Boston University expert witness, Spring

1987-1993 **System programmer and administrator**, Iowa State University.
Wrote administration and support code for ISU's distributed network of hundreds of Unix systems. Provided programming and system administration support to Computer Science faculty.

1989 **Student intern programmer**, Hewlett-Packard Germany, Spring
Designed and implemented a hypertext help system based on a precursor of Motif for the X Window System under HP Unix while participating in a foreign exchange program.

1986 **Contract programmer**, Lucasfilm Ltd., Fall
Designed and implemented a sound sequencer for a computer game in 6502 assembler; arranged music and sound effects for the soundtrack.

1985-1986 **Lead programmer**, Sensor Scan Inc.
Designed and implemented object-oriented system and application software for a custom microcomputer-based security control device in 6303 assembler.

1984-1985 **Programmer**, Waveform Corp.
Developed software infrastructure for home computer music products in 6502 assembler.

1979-1983 **Part-time programmer**, Cyberia, Inc.
Contributed to development of microcomputer software products in BASIC and 6502 assembler, including peripheral-sharing technologies, farm management software, and games.

C. Representative Testifying Expert Engagements (listed by date of initial engagement by underlined party)

2018 Corus Realty Holdings, Inc. v. Zillow Group, Inc., et al. (submitted expert report; testified at deposition in 2019; W.D. Washington Case No. 2:18-cv-00847-JLR)

2015 ContentGuard Holdings, Inc. v Amazon.com, Inc., et al. (submitted expert report, testified at deposition and trial in 2015; E.D. Tex. Case 2:13-cv-01112-JRG)

2012 Droplets, Inc. v. Overstock.com, Inc., et al. (submitted expert reports; testified at deposition in 2014; testified at trial in 2015; E.D. Tex. Case 2:11-cv-401)

2010 The Apple iPod iTunes Anti-trust Litigation (engaged by plaintiffs; submitted expert reports, testified at depositions in 2011 and 2013; testified at trial in 2014; N.D. Cal. Case 4:05cv00037)

2009 University of California and Eolas Technologies Inc. v. Adobe Systems Inc. et al. (submitted expert reports, testified at depositions in 2011 and 2012, testified at trial in 2012; E.D. Tex. Case 6:2009cv00446)

2008 Northeastern University and Jarg Corporation v. Google, Inc. (submitted expert report, testified at deposition in 2011; E.D. Tex. 2:2007cv00486)

2007 i4i Limited Partnership v. Microsoft Corporation (submitted expert report, testified at deposition in 2009, testified in trial in 2009; E.D. Tex. Case 6:07cv00113)

2004 Lingo et al. (California Consumer Class) v. Microsoft Corporation (submitted expert report, testified at deposition in 2003)

D. Representative Consulting Expert Engagements (listed by date of initial engagement by underlined party)

2016 Rovi Guides Inc., et al. v. Comcast Corp., et al., No. 2:16-cv-321 (EDTX); Rovi Guides Inc. v. Comcast Corp., et al., No. 2:16-cv-322 (EDTX); Certain Digital Video Receivers and Hardware and Software Components Thereof, Inv. No. 337-TA-1001 (ITC); Comcast Corp., et al. v. Rovi Corp., et al., No. 1:16-cv-03852 (S.D. New York)

2015 Zix Corp. v. Echoworx Corp. v. Microsoft Corp., Case No. 2:15-cv-01272-JRG (E.D. Tex.); Case No. 3:2016cv01886 (N.D. Tex.)

2012 VirnetX Inc. and Science Applications International Corporation v. Microsoft Corporation, Civil Action No. 6:13-cv-351 (E.D. Tex.)

2010	TiVo, Inc. v. <u>EchoStar et al.</u>
2009	Prism Technologies LLC v. <u>Research in Motion, Ltd.</u> and Microsoft Corporation
2008	<u>Peer Communications, LLC</u> v. Skype Technologies SA et al.
2008	Sun Microsystems v. <u>Versata Enterprises</u>

E. Memberships

Association for Computing Machinery
National League of Cities Information Technology and Communications Committee

F. Honors and Awards

2007, 2004	Teaching Excellence Award for U. Mass Lowell Computer Science Department
1996	Outstanding Teaching Fellow, Department of Computer Science, Boston University
1993-1994	University Graduate Fellowship, Boston University
1993	Top Graduating Senior in Mathematics, Iowa State University, Spring
1993	Top Graduating Senior in Computer Science, Iowa State University, Spring
1990	Phi Beta Kappa membership (liberal arts honor society)
1990	Phi Kappa Phi membership (engineering honor society)
1990	Pi Mu Epsilon (mathematics honor society)
1990	Upsilon Pi Epsilon (computer science honor society)
1989-1990	Barry M. Goldwater Scholarship (first recipient at Iowa State University)
1988-1989	Participated in Congress-Bundestag Youth Exchange to Germany

G. Academic and Professional Publications

Refereed Publications

2008	Stanley J. Barr, Samuel J. Cardman, and David M. Martin Jr., <i>A Boosting Ensemble for the Recognition of Code Sharing in Malware</i> . Journal of Virology 4:4, 2008.
2005	Jesse M. Heines and David M. Martin Jr., <i>Development and Deployment of a Web-based Course Evaluation System</i> . In Proceedings of the 2005 International Conference on Web Information Systems and Technologies.

- 2003 D. Martin, H. Wu, A. Alsaid, *Hidden Surveillance by Web Sites: Web Bugs in Contemporary Use*, Communications of the ACM 46:12ve, December 2003.
- 2002 D. Martin and A. Schulman, *Deanonymizing Users of the SafeWeb Anonymizing Service*. In Proceedings of the 11th USENIX Security Symposium, August 2002.
- 2002 A. Alsaid and D. Martin, *Detecting Web Bugs With Bugnosis: Privacy Advocacy Through Education*. In Privacy Enhancing Technologies, Springer Lecture Notes in Computer Science volume 2482, 2002.
- 2001 J. Burns, P. Gurung, D. Martin, S. Rajagopalan, P. Rao, D. Rosenbluth, and A.V. Surendran, *Automatic Management of Network Security Policy by Self-securing Networks*, Proceedings of DISCEX II, 2001.
- 2000 D. Martin, R. Smith, M. Brittain, I. Fetch, and H. Wu, *The Privacy Practices of Web Browser Extensions*, Communications of the ACM, February 2001. Extended version available from Privacy Foundation, December 2000.
- 1998 A. Bestavros, M. Crovella, J. Liu, and D. Martin, *Distributed Packet Rewriting and its Application to Scalable Server Architectures*, Proceedings of the 1998 International Conference on Network Protocols, October 1998.
- 1997 D. Martin, S. Rajagopalan, and A. Rubin, *Blocking Java Applets at the Firewall*, Proceedings of the Internet Society Symposium on Network and Distributed System Security, January 1997.
- 1995 R. Book, J. Lutz, and D. Martin, *The Global Power of Additional Queries to Random Oracles*, Information and Computation 120:1, July 1995.

Book Chapters

- 2004 D. Martin, "Privacy Analysis for the Casual User with Bugnosis", in *Designing Security Systems That People Can Use*, O'Reilly and Associates, 2005.

Book Editor

- 2005 Privacy Enhancing Technologies, 4th International Workshop, David Martin and Andrei Serjantov (eds.), Lecture Notes in Computer Science 3424, Springer-Verlag 2005.
- 2006 Privacy Enhancing Technologies, 5th International Workshop, George Danezis and David Martin (eds.), Lecture Notes in Computer Science 3856, Springer-Verlag 2006.

Software Distributions

- 2001 A. Alsaid, J. Boak, and D. Martin, The Bugnosis Web Bug Detector (Web site and downloadable software), www.bugnosis.org, June 2001.

Magazine and Web site articles

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| 2001 | D. Martin, “TiVo’s Data Collection and Privacy Practices”, <i>Privacy Foundation</i> , March 2001. |
| 2001 | R. Smith and D. Martin, “E-Mail Wiretapping”, <i>Privacy Foundation</i> , February 2001. |
| 1998 | D. Martin, “Internet Anonymizing Techniques”, <i>login: Magazine</i> , May 1998. |

Technical Reports

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| 2007 | S. Barr, S. Cardman, and D. Martin, Matching Global Data References in Related Executables. Computer Science Department Technical Report No. 2007-003. |
| 1999 | D. Martin, <i>Local Anonymity in the Internet</i> , Ph.D. thesis, May 1999. |