

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NXP USA, INC.,
Petitioner,

v.

INSIDE SECURE and NFC TECHNOLOGY, LLC,
Patent Owner.

Case IPR2016-00683
Patent 7,098,770 B2

Before KEN B. BARRETT, PATRICK M. BOUCHER, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

NXP USA, Inc.¹ (“NXP”) filed a Petition for *inter partes* review of claims 1–3, 6–8, 10, 11, 28–31, 34, and 35 of U.S. Patent No. 7,098,770 B2 (Ex. 1201, “the ’770 patent”). Paper 3 (“Pet.”). On September 8, 2016, we issued a Decision granting institution of *inter partes* review of claims 1–3, 6–8, 10, 11, 28–31, 34, and 35 of the ’770 patent on certain of the grounds asserted. Paper 10 (“Dec. on Inst.”), 27. Exclusive licensee NFC Technology, LLC (“NFCT”)² then filed a Patent Owner’s Response (Paper

¹ According to updated mandatory notice information filed under 37 C.F.R. § 42.8, “effective November 7, 2016, original petitioner NXP Semiconductors USA, Inc. merged with and into original petitioner Freescale Semiconductor, Inc., which then changed its name to ‘NXP USA, Inc.’” Paper 18, 1. We have updated the caption accordingly.

² U.S. Patent and Trademark Office assignment records indicate that the inventors assigned the ’770 patent to Inside Technologies, in an assignment recorded on April 10, 2003 (Reel/Frame 13959/852). A name change of Inside Contactless to Inside Secure was recorded on October 28, 2013 (Reel/Frame 31505/332); and a license of the ’770 patent from Inside Secure and France Telecom S.A. to France Brevets SAS was recorded on October 1, 2013 (Reel/Frame 31317/264). Additionally, although not recorded in connection with the ’770 patent, a name change of Inside Technologies to Inside Contactless S.A., executed on August 28, 2003, was recorded on August 25, 2016, in connection with certain other patents (Reel/Frame 39542/0427). In disclosures filed in this proceeding, NFCT asserts that it and its parent company, France Brevets SAS, are the real parties in interest. Paper 6, 2. NFCT further asserts that it “possesses all substantial rights to the ’770 Patent,” “exclusively owns ‘the right to defend the validity and/or enforceability’” of the ’770 Patent,” and “has standing to step into the shoes of the Patent Owner in this proceeding.” *Id.* at 2–3. NFCT also provides

15, “PO Resp.”), and NXP filed a Reply (Paper 20, “Pet. Reply”). A consolidated hearing for this proceeding and related Cases IPR2016-00681, IPR2016-00682, and IPR2016-00684 was held on June 9, 2017. A transcript of that hearing is included in the record. Paper 26 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we determine that NXP has shown by a preponderance of the evidence that claims 1–3, 6–8, 10, 11, 28–31, 34, and 35 of the ’770 patent are unpatentable on the grounds upon which we instituted *inter partes* review.

II. BACKGROUND

A. *Real Parties in Interest and Related Proceedings*

NXP identifies NXP Semiconductors N.V., NXP B.V., and NXP Semiconductors Netherlands B.V. as real parties in interest with itself for this proceeding. Paper 18, 1. NFCT identifies France Brevets, S.A.S., as a real party in interest with itself for this proceeding. Paper 6, 2; *see supra* note 2.

evidence to support these assertions, namely documents that purport to be license agreements between NFCT and Inside Secure. *See* Ex. 2001; Ex. 2002. In light of NFCT’s representations, we have treated NFCT as Patent Owner throughout this proceeding and continue to do so for purposes of this Decision, as reflected by the caption.

The parties identify *NFC Technology, LLC v. Samsung Electronics Co.*, No. 2:15-cv-00283 (E.D. Tex.), as a related case. Pet. 7; Paper 6, 3. NXP also filed three other petitions challenging certain subsets of claims of the '770 patent. Case IPR2016-00681, Paper 5 (Corrected Petition); Case IPR2016-00682, Paper 5 (Corrected Petition); IPR2016-00684, Paper 3 (Petition).

B. The '770 Patent

The '770 patent, titled “Contactless Integrated Circuit Reader,” was issued on August 29, 2006, and claims the benefit of a French patent application filed on October 16, 2000. Ex. 1201, [30], [45], [54], [63]. The '770 patent describes a contactless integrated circuit (“CIC”) reader that includes circuits for simulating the operation of a CIC, such that the CIC reader is able to send data to another CIC reader by inductive coupling. *Id.* at [57]. Figure 1 of the '770 patent is reproduced below.

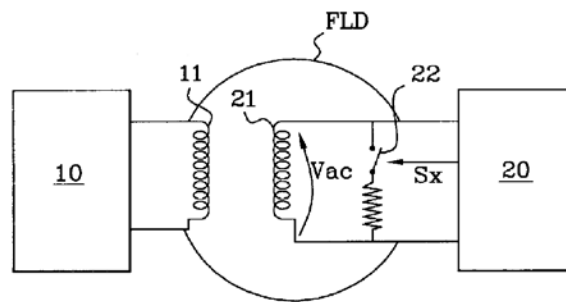


Fig. 1

Figure 1 is a schematic representation of a CIC reader and CIC. *Id.* at 5:6–8. With reference to Figure 1, CIC reader 10 produces alternating magnetic field FLD by means of antenna circuit 11, and transmits data by modulating

field FLD's amplitude. *Id.* at 1:15–19. Field FLD causes induced alternating voltage V_{ac} to appear in antenna circuit 21 of passive CIC 20, copying the amplitude modulations of field FLD and enabling the CIC to receive the data sent by the reader after filtering and demodulating induced voltage V_{ac} . *Id.* at 1:25–30. CIC 20 sends data to CIC reader 10 via load modulation by short circuiting antenna circuit 21 by means of a switch driven by load modulation signal S_x . *Id.* at 1:31–34. The short circuiting of antenna circuit 21 cause a disturbance of field FLD that is detected by antenna circuit 11 of reader 10. *Id.* at 1:34–36. Reader 10 can extract load modulation signal S_x by filtering the signal present in antenna circuit 11, and deduce from it the data sent by CIC 20. *Id.* at 1:36–39.

According to the '770 patent, in applications that involve several terminals, it is sometimes desirable for this information to be collected by a data centralization system. *Id.* at 2:9–11. However, collecting such data manually can be tedious or costly. *Id.* at 2:11–22. To address this issue, the '770 patent describes a CIC reader capable of switching to a passive operating mode, in which the reader operates like a CIC in communicating with another reader. *Id.* at 2:29–33. “In other terms, this reader is capable of sending data to another reader according to the load modulation principle, and of receiving data that the other reader sends by modulating the magnetic field it sends out.” *Id.* at 2:33–37. Two contactless readers can, thus, communicate by having one of the two readers switch to the passive operating mode, allowing data to be exchanged without any physical contact between them. *Id.* at 2:38–42.

The '770 patent, thus, describes a CIC reader configured to operate in two different modes. In a first mode, the CIC reader generates and modulates a magnetic field to transmit data to another device, such as a CIC. *Id.* at 6:46–8:16. In the second mode, the CIC reader transmits data by applying a load modulation signal to its antenna circuit that disturbs the magnetic field generated by a second CIC reader. *Id.* at 8:17–9:62.

The load modulation of the second CIC reader's magnetic field can be accomplished in multiple ways, according to the '770 patent. The preferred embodiment of the '770 patent utilizes “pseudo active load modulation” in which the load modulation signal causes the antenna circuit to alternate between a ground state and an excitation state. *Id.* at 10:17–21. The '770 patent states that this method has the advantage of offering greater communication distance because the alternating signal pulses applied to the antenna circuit cause magnetic field pulses that can be detected by another reader at a greater distance than disturbances due to passive load modulation. *Id.* at 11:3–9. “By comparison with a classical load modulation, which is purely passive, the disturbance of the magnetic field obtained according to the third method can be qualified as ‘pseudo active load modulation’ due to the sending of the alternating magnetic field pulses.” *Id.* at 11:9–16.

C. Illustrative Claims

Of the challenged claims, claims 1 and 28 are independent. Each of challenged claims 2, 3, 6–8, 10, and 11 depends directly or indirectly from

claim 1, and each of challenged claims 29–31, 34, and 35 depends directly or indirectly from claim 28. Claims 1 and 28 are illustrative of the claimed subject matter and are reproduced below:

1. A device in order to transmit/receive data by inductive coupling comprising:

an antenna circuit to generate a magnetic field; and

an excitation circuit for delivering an alternating excitation signal to the antenna circuit,

the device being configured to operate in a first operating mode and a second operating mode,

when in the first operating mode, the device modulates the excitation signal when data is transmitted, and

when in the second operating mode, the device applies a load modulation signal with two states to the antenna circuit when data is transmitted, so as to simulate the operation of a contactless integrated circuit, the load modulation signal being configured to disturb a magnetic field generated by another device in order to transmit/receive data by inductive coupling and being configured to be detected by the other device as if the load modulation signal were a load modulation signal applied to an antenna load modulation switch of a contactless integrated circuit.

28. A contactless integrated circuit reader comprising:

an antenna circuit that generates a magnetic field; and

an excitation circuit to deliver an alternating excitation signal to the antenna circuit,

the reader including a first operating mode and a second operating mode,

when in the first operating mode, the reader is configured to exchange data with a contactless integrated circuit, and

when in the second operating mode, the reader is configured to exchange data with another contactless integrated circuit reader,

the reader includes one of a bit and a flag to switch the reader from one of the first and second operating modes to the other of the first and second operating modes.

Ex. 1201, 12:27–46, 15:21–34.

D. Evidence Relied Upon

The instituted grounds rely on the following references:

Reference		Exhibit
Ritter	Ritter, International Patent Publication WO 98/58510 (Dec. 23, 1998) (Ex. 1204B); English translation provided by NXP	Ex. 1204A
RH-E	Klaus Finkenzeller, <i>RFID Handbook: Radio-Frequency Identification Fundamentals and Applications</i> (Rachel Waddington trans., John Wiley & Son, Ltd. 1999)	Ex. 1206
RH-G	Klaus Finkenzeller, <i>RFID-Handbuch: Grundlagen und praktische Anwendungen induktiver Funkanlagen, Transponder und kontaktloser Chipkarten</i> (Carl Hanser Verlag 1998) (Ex. 1208B); English translation provided by NXP	Ex. 1208A
Bashan	Bashan et al., US 6,045,043 (Apr. 4, 2000)	Ex. 1211

NXP also relies on two declarations of Richard T. Mihran, Ph.D. (Exs. 1203, 1217) in support of its Petition and its Reply, respectively, and

NFCT relies on the Declaration of Alyssa B. Apsel, Ph.D. (Ex. 2004) in support of its Patent Owner Response.

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review of the challenged claims under 35 U.S.C. § 103(a) over the following combinations of references:

References	Claims Challenged
Ritter and either RH-E or RH-G ³	1–3, 6–8, and 11
Ritter, either RH-E or RH-G, and Bashan	10, 28–31, 34, and 35

Dec. on Inst. 26–27.

III. ANALYSIS

A. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest

³ NXP refers to RH-E and RH-G collectively as the “RFID Handbook” or simply as the “Handbook” and includes parallel citations to RH-E and RH-G throughout the Petition and Petitioner’s Reply. *See, e.g.*, Pet. 3; Pet. Reply 1. NXP asserts that the relied-upon portions of RH-E and RH-G are substantially similar and presents each ground in the Petition in the form of “counterparts” labeled as “A” and “B,” where the “A” counterpart relies on RH-E and the “B” counterpart relies on RH-G. Pet. 8–9. Except where otherwise noted, we follow NXP’s convention.

reasonable interpretation standard); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

In the Decision on Institution, we addressed four claim terms for which NFCT proposed constructions in its Preliminary Response (Paper 8)—“antenna circuit,” “load modulation signal,” “contactless integrated circuit,” and “contactless integrated circuit reader”—and determined that none required express construction at that stage of the proceeding. Dec. on Inst. 8–10.

1. *“contactless integrated circuit reader”*

NFCT in its Patent Owner Response again urges that construction of the term “contactless integrated circuit reader” is required. PO Resp. 5–12. NFCT contends that this term, which is recited in challenged claims 11 and 28, should be construed “in accordance with its broadest reasonable construction in light of the specification to be a ‘device that is configured to read data sent by load modulation from a contactless integrated circuit.’” *Id.* at 5–6. According to NFCT, this construction is consistent with the plain meaning of the term, which requires that a “contactless integrated circuit reader” be configured to read data from a “contactless integrated circuit.” Moreover, NFCT contends, the contactless integrated circuit reader must also be able to read data sent from the contactless integrated circuit “‘by load modulation,’ because that is how the contactless integrated circuit of the ’770 patent sends data to the contactless integrated circuit reader.” *Id.* at 6–7 (citing Ex. 2004 ¶ 30). NFCT cites two examples of a contactless integrated circuit from the specification of the ’770 patent and contends, “in each

instance, the contactless integrated circuit communicates data using load modulation.” *Id.* at 7–8 (citing Ex. 1201, 1:31–34, 6:56–7:2, Figs. 1, 2; Ex. 2004 ¶ 31). NFCT additionally points to disclosure in the specification of “extract[ing] the load modulation signal Sx by filtering the signal present in its antenna circuit 11 and deduc[ing] the data sent by the contactless integrated circuit from it,” and contends that “[t]he ’770 patent also explains that the contactless integrated circuit reader reads data sent by the contactless integrated circuit via load modulation.” *Id.* at 8–9 (citing Ex. 1201, 1:36–39). Finally, NFCT contends that the extrinsic evidence, including both Dr. Apsel’s and Dr. Mihran’s testimony and the RFID Handbook, supports this construction. *Id.* at 9–12 (citing Ex. 2004 ¶¶ 33–36; Ex. 1203 ¶¶ 33, 39, 40; Ex. 1206, 7–8, 38, 90–91, Figs. 1.6, 4.35; Ex. 1208A, 9–10, 38).

In reply, NXP argues that NFCT’s construction improperly narrows the claims. Pet. Reply 1. According to NXP, this term can be understood under its plain and ordinary meaning and does not need construction, and NFCT’s construction is “inconsistent with the claims’ separate recitation of further requirement of ‘load modulation.’” *Id.* at 1–2. Specifically, NXP contends, “[s]everal of the claims directed to a ‘[CIC] reader’ separately recite a ‘load modulation signal’ (*e.g.*, claim 1⁴) while others do not (*e.g.*,

⁴ We assume that NXP’s reference to “claim 1” should instead be to “claim 11,” as the former does not recite a contactless integrated circuit reader.

claim 13).” *Id.* at 2. Moreover, NXP asserts, although the ’770 patent describes using load modulation for communicating data from a CIC to a reader in an inductively coupled system, it does not define a CIC as using load modulation, and instead “unequivocally states that the invention is not intended to be limited by embodiments disclosed.” *Id.* at 2–3 (citing Ex. 1201, 4:67–5:4, 11:58–12:25; Ex. 1217 ¶ 18). NXP further contends that other ways to couple readers with transponders or CICs in RFID systems were known, including microwave coupling, and the ’770 patent itself discloses that “[a] **reader** according to the present invention **may also** be provided to **operate exclusively in passive mode**,’ which would not involve generating a magnetic field.” *Id.* at 3–4 (quoting Ex. 1201, 11:65–12:1) (citing Ex. 1203 ¶¶ 30–38; Ex. 1206, 25, Fig. 3.1; Ex. 1208A, 25, Fig. 3.1; Ex. 1217 ¶¶ 18–19). Finally, NXP disputes NFCT’s contentions that the RFID Handbook and Dr. Mihran’s testimony define contactless integrated circuit reader to be limited to a device configured to receive data sent by load modulation. *Id.* at 4–5.

Having reviewed the parties’ arguments and the cited evidence, we conclude that the broadest reasonable construction of “contactless integrated circuit reader” is simply “device configured to read data from a contactless integrated circuit.” NFCT appears to concede that this construction represents the plain meaning of the term (*see* PO Resp. 6), and we agree with NXP that the record evidence does not support reading the language “sent by load modulation” into that plain meaning (Pet. Reply 1–5). Under the broadest reasonable construction standard, claim terms generally are

given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). The United States Court of Appeals for the Federal Circuit has “recognized ‘only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.’” *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1358 (Fed. Cir. 2016) (quoting *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)). Any special definition for a claim term must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Here, NFCT does not persuasively advance a disavowal or lexicography theory, which always requires exacting standards of clarity. *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (“The standards for finding lexicography and disavowal are exacting.”). Absent lexicography or disavowal, the plain meaning of the term governs. *See Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012); *see also In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004) (“We have cautioned against reading limitations into a claim from the preferred embodiment described in the specification, even if it is the only embodiment described, absent clear disclaimer in the specification.”). The case for not

reading “sent by load modulation” into the claims is particularly strong here, where, as NXP points out, certain claims of the ’770 patent reciting a contactless integrated circuit reader additionally recite load modulation, while others do not. Pet. Reply 2; *see also SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1122 (Fed. Cir. 1985) (“It is settled law that when a patent claim does not contain a certain limitation and another claim does, that limitation cannot be read into the former claim in determining either validity or infringement.”).

2. “load modulation signal”

Although neither NFCT in its Patent Owner Response nor NXP in its briefing in this case expressly requests construction of the term “load modulation signal,” we note that we determine in the Final Written Decision filed concurrently herewith in related Case IPR2016-00681 that the broadest reasonable construction of that term, as recited in challenged claims 1–3, 6, 8, and 29–31, is a “signal that transmits data by disturbing the magnetic field of another device.” *See* IPR2016-00681, slip op. at 13–21 (PTAB Aug. 30, 2017). We incorporate that analysis herein.

B. Legal Principles

To prevail in an *inter partes* review, a petitioner must prove the unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “[T]he petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review

petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”). The burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review). Furthermore, a petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of non-obviousness, i.e., secondary considerations.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In*

⁵ The parties do not address secondary considerations, which, accordingly, do not form part of our analysis.

re Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); *see also In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (“As part of the obviousness inquiry, we consider ‘whether a [person of ordinary skill in the art] would have been motivated to combine the prior art to achieve the claimed invention and whether there would have been a reasonable expectation of success in doing so.’” (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006))).

We analyze the instituted grounds of unpatentability in accordance with the principles stated above.

C. Level of Skill in the Art

Based on testimony of Dr. Mihran, NXP contends that the applicable person of ordinary skill in the art would have a minimum of a bachelor’s degree in electrical engineering, or an equivalent field, and approximately three to five years of industrial or academic experience in working with wireless communication technology, including radio frequency identification (RFID) devices and systems. Pet. 13 (citing Ex. 1203 ¶¶ 28–30). NFCT does not dispute this assessment of the level of skill and states that it and Dr. Apsel have used this definition in their analyses. PO Resp. 5 (citing Ex. 2004 ¶ 24).

We see no compelling reason to apply a different level of skill than that accepted by both parties and accordingly adopt the level of skill advocated by Petitioner.

D. Overview of the Prior Art⁶

1. Ritter

Ritter, titled “Mobile Device, Chip Card and Method of Communication,” relates to a mobile device comprising a removable SIM (Subscriber Identity Module) card that stores data, and a wireless interface for communicating bidirectionally with an external device. Ex. 1204A, [54], [57]. This contactless interface may be inductive. *Id.* Figure 1 of Ritter is reproduced below.

⁶ For consistency with the parties’ briefing, cited page numbers of Exhibits 1206 and 1208A herein refer to the RFID Handbook’s original page numbers, rather than the exhibit-stamped page numbers.

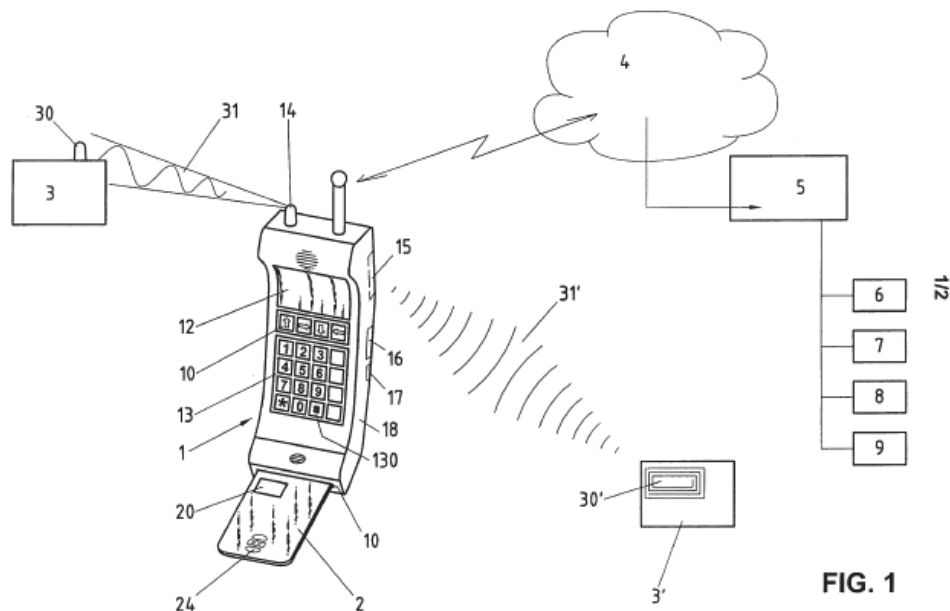


Figure 1 depicts SIM card 2, which is inserted into mobile device 1. *Id.* at 5. Mobile device 1 includes antenna 15, which “allows the mobile device to exchange data and programs inductively or in an electromagnetic manner directly with an external device 3’.” *Id.* at 7. Antenna 15 may, for example, be a coil, and is controlled by communication controller 16. *Id.* Communication controller 16 has communication means to exchange data with the chip card (i.e., the SIM card). *Id.* at 6. External device 3’ may consist of another mobile device such that data stored on the SIM cards of the two mobile devices may be exchanged. *Id.* at 13.

Several operating modes are described in Ritter. *Id.* at 11–13. In one mode, communication controller 16 may be “inductively fed by the external device 3’.” *Id.* at 11. In such a case, the external device “can feed the communication controller and the antenna 15 in order to read, for example,

identification data or electronic keys in the memory area of the communication controller.” *Id.* This mode may be useful, for example, “in order to use the mobile device, which is also switched off, as an electronic key with a physical access monitoring device.” *Id.* In another operating mode, the communication controller and antenna 15 are “fed by the main battery of the mobile device 1.” *Id.* at 12. Ritter explains that, “[a]s a result, the data and the programs can be inductively transmitted over greater distances.” *Id.*

2. *RFID Handbook*

Both versions of the RFID Handbook, i.e., RH-E and RH-G, relate to automatic identification procedures and technology and have similar disclosures. The RFID Handbook explains that although the most common form of electronic-data-carrying device in use in everyday life is the smart card, the mechanical contact used in the smart card is vulnerable to degradation, and a contactless transfer of data between a data-carrying device and its reader avoids these disadvantages while providing other benefits. Ex. 1206, 1, 4–7; Ex. 1208A, 5, 7–8. One type of contactless ID system is a radio-frequency identification (“RFID”) system. Ex. 1206, 6; Ex. 1208A, 7. The RFID Handbook explains that RFID systems are made up of two components: a transponder, which is located on an object to be identified and stores data, and an interrogator or reader, which may be read-only or may have read/write capabilities. Ex. 1206, 6–7; Ex. 1208A, 7, 9. The transponder includes a coupling element, which may be a coil or microwave antenna, and an electronic microchip. Ex. 1206, 8, Fig. 1.6;

Ex. 1208A, 9, Fig. 1.6. The power required to activate the transponder, which does not usually possess its own voltage supply, is supplied contactlessly through the coupling unit, as is the timing pulse and data; hence, the transponder is only activated when it is within the interrogation zone of a reader. Ex. 1206, 8; Ex. 1208A, 10. The transponder is totally passive when not within the interrogation zone of a reader. Ex. 1206, 8; Ex. 1208A, 10.

A transponder is depicted in Figure 1.8 of the RFID Handbook, which is reproduced below.

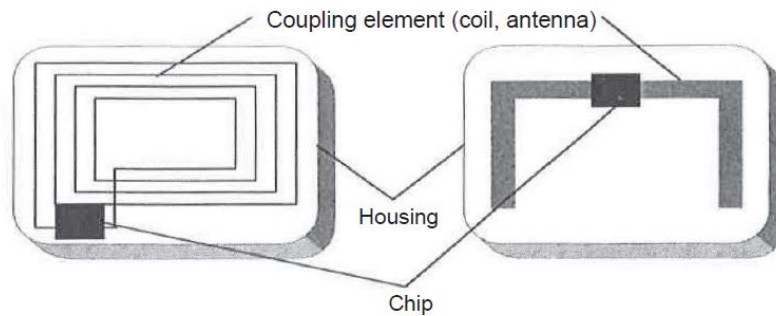


Figure 1.8 illustrates the basic layout of two types of transponders, including an inductively coupled transponder with an antenna coil on the left. Ex. 1206, 9; Ex. 1208A, 10. According to the RFID Handbook, in an inductive coupling system, “the reader’s antenna coil generates a strong, high frequency electro-magnetic field, which penetrates the cross-section of the coil area and the area around the coil,” and “[a] small part of the emitted field penetrates the antenna coil of the transponder,” generating “[a] voltage . . . in the transponder’s antenna coil by inductance.” Ex. 1206, 35; Ex. 1208A, 36. This voltage is rectified and serves as the power supply for a

microchip on the transponder. Ex. 1206, 35; Ex. 1208A, 36. Further, “[t]he switching on and off of a load resistance at the transponder’s antenna . . . effects voltage changes at the reader’s antenna and thus has the effect of an amplitude modulation of the antenna voltage by the remote transponder.” Ex. 1206, 38; Ex. 1208A, 38. “If the switching on and off of the load resistor is controlled by data, then this data can be transferred from the transponder to the reader,” and “[t]his type of data transfer is called *load modulation*.” Ex. 1206, 38; Ex. 1208A, 38.

3. *Bashan*

Bashan, titled “Contact/Contactless Data Transaction Card,” describes a “data transaction device having contact and contactless modes of operation, compris[ing] a semiconductor device for operating in contact and contactless modes in accordance with a respective contact or contactless data communications protocol.” Ex. 1211, [57]. A coil antenna allows contactless data transmission in accordance with the contactless protocol. *Id.* Bashan discloses that alternating current (AC) voltage rails are connected to the coil connection terminals “for feeding an AC voltage thereacross when the coil antenna . . . is inductively coupled to an electromagnetic field.” *Id.* at 5:1–4. In order to switch between contact and contactless modes of operation, Bashan discloses that the device contains a “mode status flag CM” that “is set to logic ‘0’ for contactless mode and is set to logic ‘1’ for contact mode.” *Id.* at 8:5–7. The mode status flag is “used by the control logic within the antenna interface . . . in order to dictate its manner of operation.” *Id.* at 8:8–10. Bashan further discloses that

operation of “antenna interface 16 may be controlled and customized by means of an EEPROM 53 and a programming unit 54,” and “in order that the output CM may be set to a desired logic level regardless of the presence or absence of the electromagnetic field across the coil antenna 15, the mode detector 52 is also responsively coupled to the EEPROM 53 so that its status can be programmed.” *Id.* at 6:34–36, 6:52–56.

E. Comparison of Claimed Subject Matter and Prior Art

1. Claims 1, 6–8, and 11 over Ritter and the RFID Handbook

NXP contends that Ritter teaches a device that transmits and receives data via inductive coupling, and has an antenna circuit to generate a magnetic field with an excitation circuit for delivering an alternating excitation signal to the antenna circuit, as recited by claim 1. Pet. 25–28. Additionally, NXP relies on the RFID Handbook for an additional teaching of the recited excitation circuit. *Id.* at 28. NFCT does not dispute these contentions, and a preponderance of the evidence supports NXP’s position. Specifically, mobile device 1 in Ritter includes antenna 15, which “allows the mobile device to exchange data and programs inductively” with external device 3’. Ex. 1204A, 7. Ritter further indicates “a coil may be used as an antenna,” and describes signals of particular frequencies for transmission via the coil, which teach the recited alternating excitation signal. *Id.* Similarly, the RFID Handbook describes an “oscillator” that delivers a “signal of the required operating frequency” to an antenna to communicate data inductively. Ex. 1206, 202; Ex. 1208A, 186. Dr. Mihran’s testimony is

credible and supports NXP's argument that the above disclosures of Ritter and the RFID Handbook teach the above limitations of claim 1, and that a person of ordinary skill would have been motivated to combine them because both references describe inductive communication via alternating signals of the same or similar frequencies. See Ex. 1203 ¶¶ 91–95.

With respect to the recited first and second operating modes of claim 1, NXP relies on Ritter's teachings relating to its first and third "operating modes." Pet. 29–36; Ex. 1204A, 11–12. NFCT, however, disputes that Ritter teaches the recited limitations. PO Resp. 16–36. In particular, NFCT argues Ritter lacks a teaching of the recited "load modulation signal" and, further, fails to teach a "reader" that sends data "like a transponder," i.e., via load modulation. *Id.* Based on the full record after trial and considering all of the arguments presented, a preponderance of the evidence supports NXP's contention that the asserted prior art teaches the first and second operating mode limitations of claim 1, as explained below in more detail.

Claim 1 recites, "the device being configured to operate in a first operating mode and a second operating mode." Ritter describes a mobile device with up to six "operating modes." Ex. 1204A, 10–13. NXP relies on Ritter's disclosure with respect to its first and third operating modes, in particular. Pet. 29–36 (citing Ex. 1204A, 11–12). The first of Ritter's operating modes is described as follows:

[T]he communication controller 16 or 21 respectively is inductively fed by the external device 3' or by means of the internal battery 17 or 26 respectively. . . . The external device can feed the communication controller and the antenna 15 in

order to read, for example, identification data or electronic keys in the memory area of the communication controller. . . . This mode may be useful, for example, in order to use the mobile device, which is also switched off, as an electronic key with a physical access monitoring device.

Ex. 1204A, 11. In addition, Ritter makes clear that external device 3' “may consist of an additional mobile device according to the invention [of Ritter].” *Id.* at 13 (adding that “[t]his arrangement allows the invention to exchange any desired type of data or programs that are stored on the SIM cards of the two mobile devices).

Thus, Ritter describes a situation where communication controller 16 and antenna 15 of mobile device 1 are inductively powered by another similar mobile device (external device 3'), even when mobile device 1 is switched off, such that the second mobile device (external device 3') can read data from mobile device 1. *See id.*; Ex. 1203 ¶¶ 96–97. In such a situation, external device 3' (the second mobile device) acts as an RFID reader that communicates and exchanges data with mobile device 1 by actively generating and modulating its own magnetic field that inductively powers mobile device 1. *See* Ex. 1203 ¶¶ 98–99; Ex. 1217 ¶¶ 26, 29, 31; *see also* Ex. 2004 ¶ 58 (Dr. Apsel testifying that Ritter's mobile devices “send data in the manner in which a reader would send data—by generating and modulating their own magnetic fields”). This finding is further supported by the RFID Handbook, which describes a modulated “oscillator signal” used to transmit data inductively. Ex. 1206, 202; Ex. 1208A, 186. Dr. Mihran explains a person of ordinary skill in the art would have been

motivated to apply these teachings of the RFID Handbook, which concern the operation of an RFID reader, to Ritter's description of a mobile device operating as an RFID reader. Ex. 1203 ¶ 101. As NXP contends (Pet. 30–32), these aspects of Ritter and the RFID Handbook teach the “first operating mode” limitations of claim 1.

With regard to the “second operating mode” limitations, claim 1 recites,

in the second operating mode, the device applies a load modulation signal with two states to the antenna circuit when data is transmitted, so as to simulate the operation of a contactless integrated circuit, the load modulation signal being configured to disturb a magnetic field generated by another device in order to transmit/receive data by inductive coupling and being configured to be detected by the other device as if the load modulation signal were a load modulation signal applied to an antenna load modulation switch of a contactless integrated circuit.

Ex. 1201, 12:36–46.

As noted above, we determine in the Final Written Decision filed concurrently herewith in related Case IPR2016-00681 that the broadest reasonable construction of “load modulation signal” is a “signal that transmits data by disturbing the magnetic field of another device.” *See* IPR2016-00681, slip op. at 13–21 (PTAB Aug. 30, 2017). Thus, in the recited “second operating mode” of claim 1, the device applies a signal that transmits data to another device inductively by disturbing the magnetic field generated by the other device.

In Ritter, as discussed above, mobile device 1 may operate in a mode wherein communication controller and antenna are “inductively fed” by external device 3' such that the data stored in mobile device 1 is communicated to external device 3', even when the mobile device is “switched off.” See Ex. 1204A, 11; Ex. 1203 ¶¶ 96–97. According to Dr. Mihran, a person of ordinary skill would have understood these disclosures to teach that mobile device 1 can act as an RFID transponder and transmit data (to external device 3') by load modulation. See Ex. 1203 ¶¶ 46–47, 76; *see also* Ex. 2004 ¶ 53 (Dr. Apsel testifying that the prior art indicated transponders communicate data by load modulation). In other words, external device 3' is a mobile device operating in the “first operating mode” of claim 1, whereas mobile device 1 is a mobile device operating in the “second operating mode” of claim 1, and both devices are capable of both operating modes because, as noted above, Ritter indicates both may be similar mobile devices (*see* Ex. 1204A, 13). See Pet. 34–35.

In addition, NXP contends that Ritter describes an alternative operating mode that also teaches the “second operating mode” recited in claim 1. Pet. 35. The specification of the '770 patent describes an embodiment in which the load modulation used in the second operating mode is accomplished through “pseudo active load modulation,” in which “alternating magnetic field pulses” are sent via the antenna circuit such that those pulses—rather than the antenna circuit directly—disturb the magnetic field of the other device. See Ex. 1201, 11:3–16. Indeed, the specification indicates this is the “preferred” embodiment, noting that pseudo active load

modulation “has the advantage of offering a maximum communication distance that is clearly greater” than conventional “passive” load modulation. *See id.*

Ritter describes an operating mode where “[t]he communication controller 16/21 and the inductive/electromagnetic interface 15 are fed by the main battery of the mobile device 1.” Ex. 1204A, 12. According to Ritter, the result of using this alternative mode is that “the data and the programs can be inductively transmitted over greater distances” to the external device. *Id.* Further, Ritter indicates that “[i]f the feed inside the device fails, for example, when the batteries of the mobile device are empty or when the mobile device is switched off, the first mode is activated preferably automatically” to transmit the data. *Id.* The “first mode” refers to the mode discussed above wherein the controller and antenna are “inductively fed” by the external device. *See id.* at 11. Thus, the alternative mode also involves *sending* data inductively (i.e., as a transponder) to an external device (i.e., the reader). As explained by Dr. Mihran, these disclosures teach pseudo active load modulation. *See* Ex. 1203 ¶¶ 53–54, 102–108.

NXP also articulates sufficient reasoning with a rational underpinning why a person of ordinary skill would have been led to combine the relevant teachings of these references. Pet. 22; *see KSR*, 550 U.S. at 418. Supported by the testimony of Dr. Mihran, NXP contends a person of ordinary skill would have understood Ritter to teach an RFID system for communication via inductive coupling and that the RFID Handbook is “a compendium

describing the fundamentals and applications” of such systems. Pet. 22 (citing Ex. 1203 ¶¶ 44–49, 101) (internal quotation marks omitted). NXP asserts that the RFID Handbook describes the advantages of the elements of inductively coupled RFID systems and that those advantages would have motivated a person of ordinary skill to combine its teachings with the Ritter system. *Id.* Further, the evidence of record supports a finding that a person of ordinary skill would have found implementing such a combination to be “routine” and “straightforward,” recognizing that it would have yielded expected, predictable results. *See id.* (citing Ex. 1203 ¶ 101).

According to NFCT, NXP’s arguments fail because Ritter does not teach the recited “load modulation signal” of claim 1 or, indeed, load modulation at all. PO Resp. 16–36. NFCT contends that Ritter is “silent regarding load modulation” and “does not describe *how* the data is communicated.” *Id.* at 18–19. NFCT dismisses Dr. Mihran’s testimony as “conclusory, unsupported, and inconsistent with the cited references.” *Id.* at 20–21. Finally, NFCT advances its own interpretation of Ritter purportedly demonstrating that it does not teach load modulation or an operating mode as an RFID transponder. *Id.* at 26–35. These arguments are unpersuasive.

As an initial matter, Dr. Mihran’s testimony is neither conclusory nor unsupported. For example, NFCT identifies Dr. Mihran’s testimony that Ritter’s device “simulates a CIC transponder” as conclusory. *Id.* at 21–22 (citing Ex. 1203 ¶¶ 44, 46). To the contrary, Dr. Mihran provides sufficient explanation for his opinion and identifies enough supporting evidence. Dr. Mihran explains that Ritter describes an operating mode where a mobile

device is “inductively fed” by another mobile device, which indicates that the second device “generates the magnetic field that powers” the first device. Ex. 1203 ¶¶ 46–47 (citing Ex. 1204A, 11, 13). He further explains that Ritter discloses this operating mode may be used to “exchange data inductively” between the devices, indicating that the second device generating the magnetic field is operating as a “reader” that powers the first device, which operates as a “transponder.” *Id.* ¶ 47 (citing Ex. 1204A, 13). Further, Dr. Mihran identifies specific disclosures in Ritter, as well as similar disclosures in the RFID Handbook, regarding both “passive” and “active” load modulation. *See id.* ¶¶ 47, 50–54, 76. In Dr. Mihran’s expert⁷ opinion, a person of ordinary skill in the art consequently would have understood Ritter to teach that the mobile device acts as a transponder and transmits data via load modulation, i.e., by disturbing the magnetic field generated by the device acting as a reader. *See id.* Upon review, we disagree with NFCT that Dr. Mihran’s testimony is “conclusory, unsupported, and inconsistent with the cited references.” *See* PO Resp. 20–21. To the contrary, we find Dr. Mihran’s expert testimony to be credible and persuasive.

⁷ After reviewing Dr. Mihran’s credentials and testimony, we conclude he is sufficiently qualified to provide the expert opinions set forth in his declarations. *See* Ex. 1203 ¶¶ 7–22. NFCT does not dispute Dr. Mihran’s qualifications, nor did NFCT file a motion to exclude Dr. Mihran’s testimony as improper expert testimony.

As a result, we also disagree with NFCT that NXP has not demonstrated Ritter teaches the recited second operating mode in which the device transmits data via a load modulation signal. In addition to the analysis of Ritter and Dr. Mihran's testimony discussed above, we also find the testimony of NFCT's expert, Dr. Apsel, to be less credible and less persuasive on these issues. Although Dr. Apsel appears to agree with Dr. Mihran that it was well-known that transponders typically send data via load modulation (*see* Ex. 2004 ¶ 49), her opinion that Ritter fails to teach load modulation is based on her view that Ritter's mobile device does *not* act as a transponder (*id.* ¶¶ 49–61). *See* PO Resp. 26–35 (relying on Dr. Apsel's testimony). Her opinions (and NFCT's arguments based on them), however, are not supported by the evidence of record for at least the following reasons.

First, Dr. Apsel testifies that Ritter's mobile devices do not send data like transponders (i.e., via load modulation) because they instead send data like readers, i.e., "by generating and modulating their own magnetic fields." *See id.* ¶¶ 58–59. This testimony, however, is inconsistent with Ritter's first mode in which the communication controller and antenna of the mobile device are powered inductively by the external device. *See* Ex. 1204A, 11 ("The external device can feed the communication controller and the antenna 15, in order to read, for example, identification data or electronic keys"). As discussed above, Ritter states that the external device reads data from the mobile device in this mode, even when the mobile device is switched off. *See id.* Dr. Apsel testifies that, in this mode, the external

device generates a magnetic field, and the mobile device “harvest[s] power from the received field” to store it in an “independent energy accumulator.” Ex. 2004 ¶ 60. According to Dr. Apsel, the mobile device would then use the power stored in the energy accumulator to generate its own magnetic field to send data, i.e., rather than by disturbing the magnetic field of the external device. *See id.* NFCT advances this interpretation of Ritter. PO Resp. 33.

Ritter, however, states that “communication controller 16 or 21 respectively is “inductively fed by the external device 3' or by means of [independent energy accumulator] 17 or 26 respectively.” Ex. 1204A, 11 (emphasis added). Thus, Ritter indicates the communication controller may be powered *solely* by the magnetic field of the external device *without* the energy accumulator. *See* Pet. Reply 18 (citing Ex. 1217 ¶ 58). Under NFCT’s interpretation of Ritter, the communication controller would be powered by the energy accumulator even when inductively fed power by the external device, which would render the above disclosure superfluous. *See* Ex. 2004 ¶ 60.

Dr. Apsel also implies that Ritter indicates the independent energy accumulator is necessary “so that the communication controller 21 can work.” Ex. 2004 ¶ 60 (quoting Ex. 1204A, 8). The quoted sentence in Ritter, however, states that “independent energy accumulator 26 . . . is preferably also *integrated in the card 2*, so that the communication controller 21 can work, *independently of the mobile device 1 and the GSM controller 20.*” Ex. 1204A, 8 (emphases added); *see also id.* Fig. 2

(depicting the described configuration). This disclosure relates to a particular embodiment of Ritter depicted in Figure 2 in which communication controller 21 is located on SIM/chip card 2, rather than as part of mobile device 1 itself (such as controller 16 depicted in Figure 1). *See id.* at 8, Fig. 2. Thus, this disclosure of Ritter indicates that in one particular embodiment, an independent energy accumulator is integrated on a SIM/chip card with a controller to enable that controller to function independent of the mobile device itself. *See Ex. 1217 ¶¶ 60–63.* This aspect of Ritter does not support a conclusion that the energy accumulator is necessary for the communication controller to function in other disclosed embodiments, or that Ritter’s first mode requires the controller to be powered by the energy accumulator rather than by the external device only. Similarly, whether the energy accumulator stores power derived from induction by an external device does not demonstrate it is necessary for Ritter’s first mode. *See Ex. 2004 ¶ 60 (citing Ex. 1204A, 8).*

The interpretation of Ritter’s other relevant operating mode, advanced by Dr. Apsel and NFCT, also is unpersuasive. As discussed above, Ritter discloses several modes, the third of which involves powering of the controller and the antenna by the main battery of the mobile device to transmit data inductively to the external device. *See Ex. 1204A, 12.* According to NFCT and Dr. Apsel, this mode also involves the mobile device sending data “in the same manner as a reader, by generating and modulating its own magnetic field.” PO Resp. 33–34 (citing Ex. 2004 ¶ 61). As NXP and Dr. Mihran explain, however, Ritter states that the mobile

device can switch automatically to the first mode to send the data should the main battery run out, which indicates the external device must be generating a magnetic field as would be necessary to inductively power the mobile device in the first mode. *See* Pet. Reply 7–8, 17–18 (citing Ex. 1217 ¶¶ 64–66). Because the external device is, therefore, generating a magnetic field as a reader even in Ritter’s third mode, the inductive signal generated by the mobile device in the third mode (powered by the main battery) is sending data by disturbing that magnetic field of the external device, i.e., by load modulation. *See id.* NFCT and Dr. Apsel do not account for these aspects of Ritter’s description of the third mode.

NFCT’s remaining arguments also are unpersuasive. As purported evidence that Ritter does not teach operating as a transponder, NFCT also relies on testimony from Dr. Mihran’s deposition in which he confirms that the mobile device of Ritter can send data by generating and modulating its own magnetic field. PO Resp. 24, 34 (citing Ex. 2005, 173:13–23). In context, however, it is clear that Dr. Mihran was testifying about Ritter’s teachings with respect to the “first operating mode” limitations of claim 1, which do not recite load modulation. *See* Ex. 2005, 172:6–173:23. Next, although NFCT does not dispute the motivation to combine asserted by NXP, NFCT argues that the asserted references “teach away” from the combination. PO Resp. 30. This argument is unpersuasive because NFCT fails to identify any aspect of Ritter or the RFID Handbook that criticizes or disparages such a combination. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be

discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”

Ricoh Co. v. Quanta Computer Inc., 550 F.3d 1325, 1332 (Fed. Cir. 2008) (quoting *Kahn*, 441 F.3d at 990). “A reference does not teach away, however, if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Finally, we give little weight to NFCT’s conclusory argument that NXP’s analysis improperly relies on hindsight. See PO Resp. 35.

In summary, based on the full record after trial and for the reasons explained above, we conclude that NXP has shown, by a preponderance of the evidence, that claim 1 of the ’770 patent is unpatentable over the combined teachings of Ritter and the RFID Handbook. We also are persuaded upon review of NXP’s arguments and cited supporting evidence that NXP has demonstrated by a preponderance of the evidence that claims 6–8 and 11, which depend from claim 1 and for which NFCT does not provide any separate argument, are unpatentable over the same combination. See Pet. 42–53.

2. *Claim 10 over Ritter, the RFID Handbook, and Bashan*

Claim 10 depends from claim 1 and further recites “one of a bit and a flag stored in a register to control switching from one of the first and second

operating modes to the other of the first and second operating modes.”

Ex. 1201, 13:25–28. We are persuaded by NXP’s arguments and evidence (see Pet. 51–52 (citing Ex. 1203 ¶¶ 148–150; Ex. 1204A, 4, 7, 8, 11–13, 15, 17; Ex. 1211, 6:52–56, 8:5–11)), which are not challenged by NFCT,⁸ that a person of ordinary skill in the art would have been motivated and found it obvious to use Bashan’s teachings of a flag or bit stored in a register for switching between communication modes in implementing Ritter’s two operating modes. Accordingly, we determine that NXP has established by a preponderance of the evidence that the subject matter of claim 10 would have been obvious over the combination of Ritter, the RFID Handbook, and Bashan.

3. *Claims 28, 29, 34, and 35 over Ritter, the RFID Handbook, and Bashan*

As reproduced in Section II.C. *supra*, independent claim 28 is directed to a dual-mode CIC reader that includes an antenna circuit and an excitation circuit, as recited in independent claim 1 further limited by dependent claim 11, where the reader is configured to exchange data with a CIC when in the first mode and with another CIC reader when in the second mode. The reader also includes “one of a bit and a flag” to switch between operating modes, as recited in dependent claim 10. NXP relies on its arguments and

⁸ NFCT does not present any arguments regarding this limitation, but instead notes that NXP does not rely on Bashan to teach the “load modulation signal feature” of independent claim 1, from which claim 10 depends, and contends that claim 10 is patentable on that basis. PO Resp. 36–37.

evidence with respect to the corresponding limitations of claims 1, 10, and 11, and additionally contends persuasively that “Ritter discloses when in the first operating mode, the reader (*e.g.*, ‘mobile device 1’, ‘external device 3’) is configured to exchange data with a contactless integrated circuit (*e.g.*, ‘chip card’)” and “when in the second operating mode, the reader (*e.g.*, ‘mobile device 1’, ‘external device 3’) is configured to exchange data with another contactless integrated circuit reader (*e.g.*, ‘allows the mobile device to exchange data and programs inductively or in an electromagnetic manner directly with an external device 3’).” Pet. 54–56 (citing Ex. 1204A, 3–8, 11–13, 15, 17; Ex. 1211, 6:52–56, 8:5–11; Ex. 1203 ¶¶ 157–163).

Dr. Mihran’s testimony is credible and supports NXP’s arguments. *See* Ex. 1203 ¶¶ 157–163. As discussed below, NFCT’s responsive arguments are not persuasive.

NFCT contends that claim 28 and its dependent claims “should be confirmed because the combination of Ritter and RFID Handbook does not render obvious one contactless integrated circuit reader that is configured to exchange data with another.” PO Resp. 37 (citing Ex. 2004 ¶¶ 64–71). According to NFCT, Ritter’s mobile device 1 and external device 3 “are not contactless integrated circuit readers because Ritter does not disclose that either device is ‘configured to read data sent by load modulation from a contactless integrated circuit,’ as required under the broadest reasonable interpretation.” *Id.* at 38. NFCT further contends, “while Ritter discloses that each device can communicate by generating and modulating its own magnetic field, Ritter does not disclose that either device can communicate

using load modulation.” *Id.* at 39. Instead, NFCT contends, “each device in Ritter reads data sent by the other mobile device using, e.g., the ASL, FSK, or PSK modulation techniques described in the RFID Handbook.” *Id.* at 39 (citing Ex. 2004 ¶¶ 66–67). For the reasons stated in the above discussion of NFCT’s similar arguments with respect to independent claim 1 (*see supra* § III.E.1.), NFCT’s contentions are unpersuasive. Notwithstanding NFCT’s contentions (PO Resp. 39–40), we also credit Dr. Mihran’s testimony that a person of ordinary skill in the art would understand from Ritter’s disclosures that Ritter’s mobile device 1 can exchange data with a contactless integrated circuit. Ex. 1203 ¶ 161 (citing Ex. 1204A, 5 (“mobile device 1 has a conventional receiving station for inserting a removable identification card 2, for example a SIM card”; “other card formats as well as contactless SIM cards may also be used”)).

NFCT further contends that the RFID Handbook also does not disclose or suggest a “[contactless integrated circuit] reader [that] is configured to exchange data with another contactless integrated circuit reader.” PO Resp. 40 (citing Ex. 2004 ¶ 70). Instead, NFCT contends, “the portions of RFID Handbook that NXP cites disclose only a *single* ‘reader (PCD)’ that communicates with a ‘smart card (PICC),’ not two contactless integrated circuit readers communicating with each other.” *Id.* Notwithstanding NFCT’s arguments, however, NXP relies on Ritter, not the RFID Handbook, for the teaching of a contactless integrated circuit reader configured to exchange data with another contactless integrated circuit reader (*see* Pet. 55). Moreover, as stated above, NXP articulates sufficient

reasoning with a rational underpinning why a person of ordinary skill would have been led to combine the relevant teachings of these references. *See supra* § III.E.1. (citing Pet. 22; *KSR*, 550 U.S. at 418). Accordingly, we are not persuaded by NFCT’s contentions that the RFID Handbook does not separately teach this limitation.

In summary, upon review of the parties’ respective arguments and evidence, we are persuaded that NXP has demonstrated, by a preponderance of the evidence, that claim 28 is unpatentable over the combined teachings of Gunnarsson, the RFID Handbook, and Bashan. We also are persuaded upon review of NXP’s arguments and cited supporting evidence that NXP has demonstrated by a preponderance of the evidence that claims 29, 34, and 35, which depend from claim 28 and for which NFCT does not provide any separate argument, are unpatentable over the same combination. *See* Pet. 56–59.

4. *Claims 2 and 3 over Ritter and the RFID Handbook; and Claims 30 and 31 over Ritter, the RFID Handbook, and Bashan*

Claim 2 depends from claim 1 and further recites “wherein the load modulation signal of the second operating mode comprises data representative pulses of the excitation signal, the duration of each data representative pulse being longer than the period of the excitation signal.” Ex. 1201, 12:47–51. Claim 30, which depends from claim 29, similarly recites “wherein the reader is configured to apply to the antenna circuit a load modulation signal comprising pulses of an alternating signal, the

duration of each pulse being longer than the period of the alternating signal.” *Id.* at 15:41–45. In the Petition, NXP asserts that a person of ordinary skill in the art would have understood Ritter’s disclosure of an interface that can be “fed by the main battery of the mobile device 1” as describing “active transmission,” similar to the ’770 patent’s “third method” or “pseudo active load modulation.” Pet. 35 (citing Ex. 1203 ¶¶ 103–104, 109–110; comparing Ex. 1204A, 11–12 with Ex. 1201, 9:58–62, 11:3–16). NXP asserts, with respect to claims 2 and 30, that a person of ordinary skill in the art would have understood Ritter’s active transmission to be pulses of the excitation signal. Pet. 38 (citing Ex. 1203 ¶ 115), 57 (relying on arguments with respect to claims 1 and 2). Further, according to NXP,

[i]t would have been obvious, in implementing Ritter’s mobile device, to use RFID Handbook’s teaching of using a “subcarrier . . . obtained by the binary division of the operating frequency,” thereby making the duration of each data representative pulse longer than the period of the carrier signal (*i.e.*, excitation signal), because use of such a signal format was “widespread” and offers the “great advantage” of more easily filtering out and detecting the transmitted signal, as taught by the RFID Handbook

(*id.* at 38 (quoting Ex. 1206, 134–35) (citing Ex. 1206, 134–36, Fig. 6.12; Ex. 1208A, 115–17, Fig. 6.12; Ex. 1203 ¶ 118)), and “[t]his combination . . . does no more than yield its predictable, expected result” (*id.* (citing Ex. 1203 ¶ 118)).

In response, NFCT argues again that Ritter’s mobile device does not simulate a transponder or disclose a load modulation signal—particularly a

load modulation signal that comprises pulses of the excitation signal. PO Resp. 43–45 (citing Ex. 2004 ¶¶ 72–73). NFCT contends that the RFID Handbook also fails to teach or suggest a load modulation signal comprising data representative pulses of the excitation signal. *Id.* (citing Ex. 2004 ¶ 74).

NFCT’s arguments notwithstanding, we are persuaded by NXP’s arguments, supported by Dr. Mihran’s testimony, that a person of ordinary skill in the art would have understood Ritter’s description of “mode 3,” in which the inductive interface is fed by the main battery of the mobile device to increase transmission distance (*see* Ex. 1204A, 11–12), to disclose the form of active transmission that the ’770 patent refers to as “pseudo-active load modulation” corresponding to the “data representative pulses of the excitation signal” recited in claims 2 and 30. Pet. 36 (citing Ex. 1203 ¶ 115).

We credit Dr. Mihran’s testimony as to the reasons that a person of ordinary skill in the art would have understood, for example, that Ritter’s description of utilizing the battery to feed the inductive interface “is disclosing the ‘pseudo active load modulation’ of the ’770 patent,” where “what the ’770 patent terms ‘pseudo active load modulation’ is simply active transmission using pulses or bursts of the excitation signal to drive an alternating current in the antenna coil.” Ex. 1203 ¶¶ 104–105. We also credit Dr. Mihran’s testimony that a person of ordinary skill in the art would have understood that Ritter’s mobile device would apply bursts or pulses of a locally generated excitation signal to the antenna, in order to simulate the response of a transponder, “in a pattern that simulates the expected

amplitude modulation pattern of the conventional load modulation,” and that “[a] person of ordinary skill in the art would have understood that this method applies data representative pulses of the excitation signal to the antenna circuit in the same way as the ‘third method’ or ‘pseudo active load modulation’ method of the ‘770 patent.” *Id.* ¶ 115; *see also id.* ¶ 118 (explaining why Ritter’s active transmission would have necessarily resulted in the data representative pulses having a duration that is longer than the period of the excitation frequency).

In contrast, we accord little weight to NFCT’s expert Dr. Apsel’s conclusory testimony on this point, which amounts to little more than the following circular pair of arguments: first, that the combination of Ritter and the RFID Handbook fails to teach or suggest a device that applies a load modulation signal comprising data representative pulses of the excitation signal “because none of the references teaches or suggests using an excitation signal to perform load modulation,” and, second, that Ritter does not disclose using a load modulation signal that includes pulses of an excitation signal because “Ritter does not disclose load modulation or a load modulation signal.” Ex. 2004 ¶¶ 72–73. We also are not persuaded by NFCT’s arguments that the RFID Handbook does not teach or suggest using an excitation signal to perform load modulation. The asserted ground of unpatentability is based on the combined teachings of Ritter and the RFID Handbook, and NXP persuasively cites Ritter as teaching use of a load modulation signal that includes pulses of an excitation signal. Pet. 36–38.

In summary, upon review of the parties' respective arguments and evidence, we are persuaded that NXP has demonstrated, by a preponderance of the evidence, that claim 2 is unpatentable over the combined teachings of Ritter and the RFID Handbook and that claim 30 is unpatentable over the combined teachings of Ritter, the RFID Handbook, and Bashan. We also are persuaded upon review of NXP's arguments and cited supporting evidence that NXP has demonstrated by a preponderance of the evidence that claims 3 and 31, which depend from claims 2 and 30, respectively, and for which NFCT does not provide any separate argument, are unpatentable over the same combinations. *See* Pet. 39–42, 57.

IV. CONCLUSION

Based on the evidence and arguments, NXP has demonstrated by a preponderance of the evidence that claims 1–3, 6–8, and 11 of the '770 patent are unpatentable under 35 U.S.C. § 103 over Ritter and RH-E, as well as over Ritter and RH-G; and that claims 10, 28–31, 34, and 35 are unpatentable under 35 U.S.C. § 103 over Ritter, RH-E, and Bashan, as well as over Ritter, RH-G, and Bashan.

V. ORDER

Accordingly, it is

ORDERED that claims 1–3, 6–8, 10, 11, 28–31, 34, and 35 of the '770 patent have been shown to be unpatentable; and

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

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Patent 7,098,770 B2

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