

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

HANSHOW AMERICA INC.,
HANSHOW TECHNOLOGY CO., LTD.,

Petitioners

v.

SES-IMAGOTAG INC.

Patent Owner

Case No.: IPR2024-00190

Patent No. 10,674,340

DECLARATION OF DR. MANOS M. TENTZERIS
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,674,340

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

By: / Manos M. Tentzeris /

Manos M. Tentzeris, Ph.D.

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I. BACKGROUND AND QUALIFICATIONS

1. I am currently Ken Byers Professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. I received my Bachelor of Science degree in Electrical Engineering from the National Technical University of Athens in Greece in 1992. I received my Master's degree and Ph.D from the University of Michigan at Ann Arbor in 1994 and 1998, respectively. A complete list of my academic positions, activities, and publications is set out in my *curriculum vitae*, attached as Exhibit 1010.

2. As described in my *curriculum vitae*, I have more than 30 years of industry and academic experience. I have experience with antennas, fractal RF structures and circuit design for these systems. As a professor of Electrical and Computer Engineering, I have taught courses relating to antenna and electromagnetic technologies. A complete list of my teaching positions, honors, and classes taught is set out in my *curriculum vitae*. As a professor, I collaborated with over 130 Undergraduate, Masters and Doctoral students, as well as visiting students, post-doctoral fellows, and other researchers.

3. I have served as the Head of the Electromagnetics Technical Interest Group of the School of ECE, Georgia Tech. I have also served as the Georgia Electronic Design Center Associate Director for RFID/Sensors research from 2006-2010 and

as the GT-Packaging Research Center (NSF-ERC) Associate Director for RF research and the leader of the RF/Wireless Packaging Alliance from 2003-2006.

4. I have made extensive contributions to professional societies in my field, including the Institute of Electrical and Electronics Engineers (IEEE). I am the Founder and Chair Emeritus of the IEEE MTT-S (Microwave Theory and Techniques Society) TC-24 (RFID Technologies). I am a member of the technical program committees of IEEE-IMS (International Microwave Symposium), IEEE-AP (Antennas and Propagation Society) and IEEE-ECTC (Electronic Components and Technology Conference) Symposia. I was the General Co-Chair of IEEE APS 2019 (Antennas and Propagation Symposium). I was also the TPC (Technical Program Competitions) Chair for the IMS (International Microwave Symposium) 2008 Conference and the Co-Chair of the ACES (Applied Computational Electromagnetics Society) 2009 Symposium. I was also the Chairman for the 2005 IEEE CEM-TD (Computational Electromagnetics in Time-Domain) Workshop. I was the Chair of IEEE-CPMT TC16 (Components, Packaging, and Manufacturing Technology) (RF Subcommittee) as well as the Chair of IEEE MTT/AP (Microwave Theory and Techniques / Antennas and Propagation) Atlanta Sections for 2003.

5. Throughout my career, I have received a variety of awards. I am a Fellow of IEEE, a member of the MTT-15 Committee, an Associate Member of European Microwave Association (EuMA), a Fellow of the Electromagnetics Academy, and a

member of Commission D, URSI and of the Technical Chamber of Greece. In recognition of my world-leading achievements in the area of antennas and miniaturized/fractal RF structures, I served as an IEEE C-RFID (Committee on RFID technologies) Distinguished Lecturer from 2016-2022 and I served as an IEEE MTT Distinguished Microwave Lecturer (DML) from 2010-2012. I have won awards for my contributions in developing various technologies, including numerous multiband antenna topologies operating at different frequencies and integrated RF modules up to sub-THz frequencies. My achievements include the following:

- IEEE fellow — a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. IEEE, About the IEEE Fellow Program, <http://www.ieee.org/membership/fellows/>.
- 2021 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award (co-authored).
- 2019 Humboldt Research Prize.
- 2019 IEEE Antennas and Propagation (APS) Conference Co-Chair.
- 2018 Intel IEEE ECTC 2018 Best Student Paper Award.
- 2015-present IEEE CRFID Distinguished Lecturer.
- 2010-2012 IEEE MTT-S Distinguished Microwave Lecturer.

- 2017 Georgia Tech Outstanding Achievement in Research Program Development Award.
- 2017 Archimedes IP Salon Gold Medal.
- 2016 Bell Labs Prize Third Award.
- 2015 IET Microwaves, Antennas and Propagation Premium Award.
- 2014 Georgia Tech ECE Distinguished Faculty Achievement Award.
- 2014 IEEE RFID-TA Best Student Paper Award.
- 2013 IET Microwaves, Antennas and Propagation Premium Award.
- 2012 Finland Distinguished Professor (Fi.Di.Pro.) Award.
- 2012 Architecture Award of Excellence, Architecture World Summit.
- 2010 IEEE Antennas and Propagation Society Piergiorgio L. E. Uslenghi Letters Prize Paper Award.
- 2010 Georgia Tech Senior Faculty Outstanding Undergraduate Research Mentor Award.
- 2009 IEEE Transactions on Components and Packaging Technologies Best Paper Award.
- 2009 IEEE Antennas and Propagation Symposium (APS) Second Best Student Paper Award.
- 2009 E.T.S. Walton Award from Science Foundation Ireland.

- 2007 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award.
- 2007 IEEE International Microwave Symposium (IMS) Third Best Student Paper Award.
- 2007 IEEE International Symposium on Antennas and Propagation (ISAP) Poster Presentation Award.
- 2006 Asian-Pacific Microwave Conference (APMC) Award.
- 2006 IEEE-MTT Outstanding Young Engineer Award.
- 2004 IEEE Transactions on Advanced Packaging Commendable Paper Award.
- 2003 NASA Godfrey “Art” Anzic Collaborative Distinguished Publication Award.
- 2003 IBC International Educator of the Year Award.
- 2003 IEEE-CPMT Outstanding Young Engineer Award.
- 2002 International Conference on Microwave and Millimeter-Wave Technology Best Paper Award (Beijing, China).
- 2002 Georgia Tech-ECE Outstanding Junior Faculty Award.
- 2001 ACES Conference Best Student Paper Award.
- 2000 NSF CAREER Award.

- 1999 Technical Program Co-Chair of the 54th ARFTG Conference, Atlanta, GA.
 - 1997 Best Paper Award, International Hybrid Microelectronics and Packaging Society.
 - 1989 Papastavridios Greek Mathematics Excellence Fellowship.
 - 1988-1992 Greek Government Academic Excellence Fellowships.
6. In Google scholar, there are over 27,810 citations to my work and my work has an h-index of 83. An h-index represents the number of papers with the same number of citations, meaning I have over 83 papers with 83 citations.
7. I have authored or contributed to over 30 books and 850 refereed journal and conference papers; spoke in over 140 presentations, many of which relate to antennas, antenna arrays, RFID systems, and other modes of wireless communication and electronics design. A complete list of my publications and conference presentations is included in my *curriculum vitae*.
8. A selection of my recent journal publications is as follows:
- H.-R.Ahn and M.M.Tentzeris, “A Novel Wideband, Compact, Microstrip Coupled-Line Ring Hybrid for Arbitrarily High Power-Division Ratios,” IEEE Transactions on Circuits and Systems II, Vol. 64, No. 6, pp. 630-634, June 2017.

- J.G.D.Hester, J.Kimionis and M.M.Tentzeris, “Printed Motes for IoT Wireless Networks: State of the Art, Challenges and Outlooks,” IEEE Transactions on Microwave Theory and Techniques, Vol. 65, No. 5, pp. 1819-1830, May 2017.
- A.Georgiadis and M.M.Tentzeris, “Guest Editorial for the Special Issue on Radio-Frequency Identification (RFID), Sensing and Imaging,” IEEE Transactions on Microwave Theory and Techniques, Vol. 64, No. 7, pp. 2292-2293, July 2016.
- H.Lee, B.S.Cook, K.P.Murali, M.Raj and M.M.Tentzeris, “Inkjet Printed High-Q RF Inductors on Paper Substrate with Ferromagnetic Material,” IEEE Microwave and Wireless Components Letters, Vol. 26, No. 6, pp. 419- 421, June 2016.
- Y.He, Z.Pan, X.Cheng, J.Qiao and M.M.Tentzeris, “A Novel Dual-Band, Dual-Polarized, Miniaturized and Low-Profile Base Station Antenna,” IEEE Transactions on Antennas and Propagation, Vol.63, No. 12, pp.5399-5408, December 2015.
- M.Yoo, H.K.Kim, S.Kim, M.Tentzeris and S.Lim, “Silver Nanoparticle-Based Inkjet-Printed Metamaterial Absorber on Flexible Paper,” IEEE Antennas and Wireless Propagation Letters, Vol. 14, pp. 1718- 1721, June 2015.

9. A selection of my recent publications in conference proceedings is as follows:

- M.M.Tentzeris, R.A.Bahr, A.D.Papadopoulos and E.N.Glytsis, “Multi-Domain Modeling of 3D Printed, Nanotechnology and Morphing/Origami-Based RF Modules,” Proc. of the 2016 IMS Symposium, San Francisco, CA, May 2016, pp. 1-4.
- B.K.Tehrani, B.S.Cook and M.M.Tentzeris, “Inkjet-Printed 3D Interconnects for Millimeter-Wave System-on-Package Solutions,” Proc. of the 2016 IMS Symposium, San Francisco, CA, May 2016, pp. 1-4.
- K.A.Nate, J.Hester, M.Isakov, R.Bahr and M.M.Tentzeris, “A Fully Printed Multilayer Aperture-Coupled Patch Antenna Using Hybrid 3D/Inkjet Additive Manufacturing Techniques,” Proc. of the 2015 EuMW Symposium, September 2015, Paris, FRANCE, pp. 610-613.

10. I am a named inventor on 20 patents in the US and in Europe. In particular, I am a named inventor on patents relating to antenna design, RF systems, and means of reducing signal interference in RF applications. A complete list of my patents and published applications is included in my *curriculum vitae*.

11. In addition to gaining expertise via my academic training, professional experiences, and research accomplishments described above, I have kept abreast of various sub-disciplines within the antennas space, by reading technical literature, attending and presenting at conferences, and attending and presenting at symposia.

I have served as an editor for various journals and participated in the peer review process for various technical journals and conferences, and have reviewed manuscripts submitted by other scholars relating to antenna topologies. I have contributed further to the profession by chairing conference committees and planning conferences and panels. Furthermore, I have collaborated with or have communicated with many of the scholars and engineers in the field of antennas systems.

12. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a POSITA.

13. I have been retained on behalf of Hanshow America Inc. and Hanshow Technology Co., Ltd. (collectively, “Hanshow” or “Petitioners”) to offer technical opinions relating to U.S. Patent No. 10,674,340 (“the ’340 Patent”) and prior art references relating to its subject matter. I have reviewed the ’340 Patent (Ex.1001), and relevant excerpts of the prosecution history of the ’340 Patent (Ex.1002). I have also reviewed the following prior art and corroborating references:

Exhibit	Description
1003	U.S. Patent Application Publication No. 2010/0070365 A1 by Siotia (“Siotia”)

1004	Certified translation of Japan Patent Application Publication No. 2009-064316 A by Akao (“Akao”)
1005	Japan Patent Application Publication No. 2009-064316 A by Akao
1006	U.S. Patent No. 7,283,036 B2 by Chen (“Chen”)
1007	U.S. Patent Application Publication No. 2012/0095805 A1 by Ghosh (“Ghosh”)
1008	Certified translation of Japan Patent Application Publication No. 2007-155383 A by Sakata (“Sakata”)
1009	Japan Patent Application Publication No. 2007-155383 A by Sakata

14. I have also reviewed various supporting references and other documentation as further noted in my opinions below.

15. Counsel has informed me that I should consider these materials through the lens of one of ordinary skill in the art related to the ‘340 Patent at the time of the earliest possible priority date of the ‘340 Patent, and I have done so during my review of these materials. The application leading to the ‘340 Patent was filed April 11, 2012 (“the Critical Date”). Counsel has informed me that the Critical Date represents the earliest possible priority date to which the claims 1-9 of ‘340 Patent are entitled, and I have therefore used that Critical Date in my analysis below.

16. I have no financial interest in the parties or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

17. In writing this declaration, I have considered the following: my own knowledge and experience, including my work experience in the fields of computer science, computer engineering and electrical engineering; my experience in teaching those subjects; and my experience in working with others involved in those fields. In addition, I have analyzed various publications and materials, in addition to other materials I cite in my declaration. My opinions, as explained below, are based on my education, experience, and expertise in the fields relating to the '340 Patent. Unless otherwise stated, my testimony below refers to the knowledge of one of ordinary skill in the fields as of the Critical Date, or before. Any figures that appear within this document have been prepared with the assistance of Counsel and reflect my understanding of the '340 Patent and the prior art discussed below.

18. This declaration explains the conclusions that I have formed based on my analysis. To summarize those conclusions, based upon my knowledge and experience and my review of the prior art publications listed above, I believe that:

- Claims 1-5, 8 are rendered obvious by Siotia and Sakata;
- Claims 6-7, 9 are rendered obvious by Siotia, Sakata, and Akao;

- Claims 8-9 are rendered obvious by Siotia, Sakata, Akao, and Chen;
- Claims 1-3, 5, 8 are rendered obvious by Ghosh and Sakata;
- Claims 6-7, 9 are rendered obvious by Ghosh, Sakata, and Akao;
- Claims 8-9 are rendered obvious by Ghosh, Sakata, Akao, and Chen.

II. LEGAL STANDARDS

A. Terminology

19. I have been informed by Counsel and understand that the best indicator of claim meaning is its usage in the context of the patent specification as understood by one of ordinary skill. I further understand that the words of the claims should be given their plain meaning unless that meaning is inconsistent with the patent specification or the patent's history of examination before the Patent Office. Counsel has also informed me, and I understand that, the words of the claims should be interpreted as they would have been interpreted by one of ordinary skill at the time of the invention was made (not today). Because I do not know at what date the invention as claimed was made, I have used the earliest possible priority date of the '340 Patent as the point in time for claim interpretation purposes. That date was April 11, 2012, the Critical Date.

B. Legal Standards for Obviousness

20. I have been informed by Counsel and understand that documents and materials that qualify as prior art can render a patent claim unpatentable as obvious.

I am informed by Counsel and understand that all prior art references are to be looked at from the viewpoint of a person of ordinary skill in the art at the time of the invention, and that this viewpoint prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious.

21. I have been informed by Counsel and understand that a claim is unpatentable for obviousness under 35 U.S.C. § 103 (in the AIA form of that statute that applies to the '340 Patent) "if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains." I am informed by Counsel and understand that obviousness may be based upon a combination of references. I am informed by Counsel and understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. However, I am informed by Counsel and understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.

22. I am informed by Counsel and understand that when a patented invention is a combination of known elements, a court must determine whether there was an apparent reason to combine the known elements in the fashion claimed by the

patent at issue by considering the teachings of prior art references, the effects of demands known to people working in the field or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art.

23. I am informed by Counsel and understand that a patent claim composed of several limitations is not proved obvious merely by demonstrating that each of its limitations was independently known in the prior art. I am informed by counsel for the Petitioner and understand that identifying a reason those elements would be combined can be important because inventions in many instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known. I am informed by Counsel and understand that it is improper to use hindsight in an obviousness analysis, and that a patent's claims should not be used as a "roadmap."

24. I am informed by Counsel and understand that an obviousness inquiry requires consideration of the following factors: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) any objective indicia of non-obviousness, such as commercial success, long-felt but unresolved need, failure of others, industry recognition, copying, and unexpected results. I understand that the foregoing factors are sometimes referred to as the "Graham factors."

25. I have been informed by Counsel and understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but that the nexus linking two or more prior art references is sometimes simple common sense. I have been informed by Counsel and understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

26. I have been informed by Counsel and understand that if a technique has been used to improve one device, and a person of ordinary skill at the time of invention would have recognized that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

27. I have been informed by Counsel and understand that practical and common sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I have been informed by Counsel and understand that a person of ordinary skill looking to overcome a problem will often be able to fit together the teachings of multiple prior art references. I have been informed by Counsel and understand that obviousness analysis therefore takes into account the inferences and creative steps that a person of ordinary skill would have employed at the time of invention.

28. I have been informed by Counsel and understand that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill at the time of invention, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

29. I have been informed by Counsel and understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense of one of skill in the art.

30. I have been informed by Counsel and understand that secondary indicia of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the invention; (7) failure of others to find a solution to the long felt need; and (8) skepticism by experts. I understand that evidence of secondary indicia of non-obviousness, if available, should be considered as part of the obviousness analysis.

31. I have been informed by Counsel and understand that there must be a relationship between any such secondary considerations and the invention, and that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

32. In sum, my understanding is that prior art teachings are properly combined where one of ordinary skill having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of elements recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of multiple prior art references in the claimed manner.

33. I have been informed by Counsel and understand that in an *inter partes* review, “the petitioner shall have the burden of proving a proposition of unpatentability,” including a proposition of obviousness, “by a preponderance of the evidence.” 35 U.S.C. §316(e).

C. Level of Ordinary Skill in the Art

34. In my opinion, a person of ordinary skill in the art (“POSITA”) relating to, and at the time of, the ‘340 Patent’s Critical Date would have been have had at least a Master of Science Degree in an academic area emphasizing electrical engineering, computer engineering, wireless telecommunication systems, or an equivalent field

(or a similar technical Master's Degree, or higher degree). Alternatively, a POSITA would have had a Bachelor's Degree (or higher degree) in an academic area emphasizing electrical engineering, computer engineering, wireless telecommunication systems, or an equivalent field with two or more years of work experience in electrical engineering, wireless telecommunication systems, computer engineering, or an equivalent field. Additional education in a relevant field or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.

35. Based on my knowledge, skill, and experience, I have a good understanding of the capabilities of a POSITA. Indeed, I have taught, participated in organizations, and worked closely with many such persons over the course of my career. For example, from my industry experience, I am familiar with what an engineer would have known and found predictable in the art. From teaching and supervising my post-graduate students, I also have an understanding of the knowledge that a person with this academic experience possesses. Furthermore, I possess those capabilities myself.

III. THE '340 PATENT

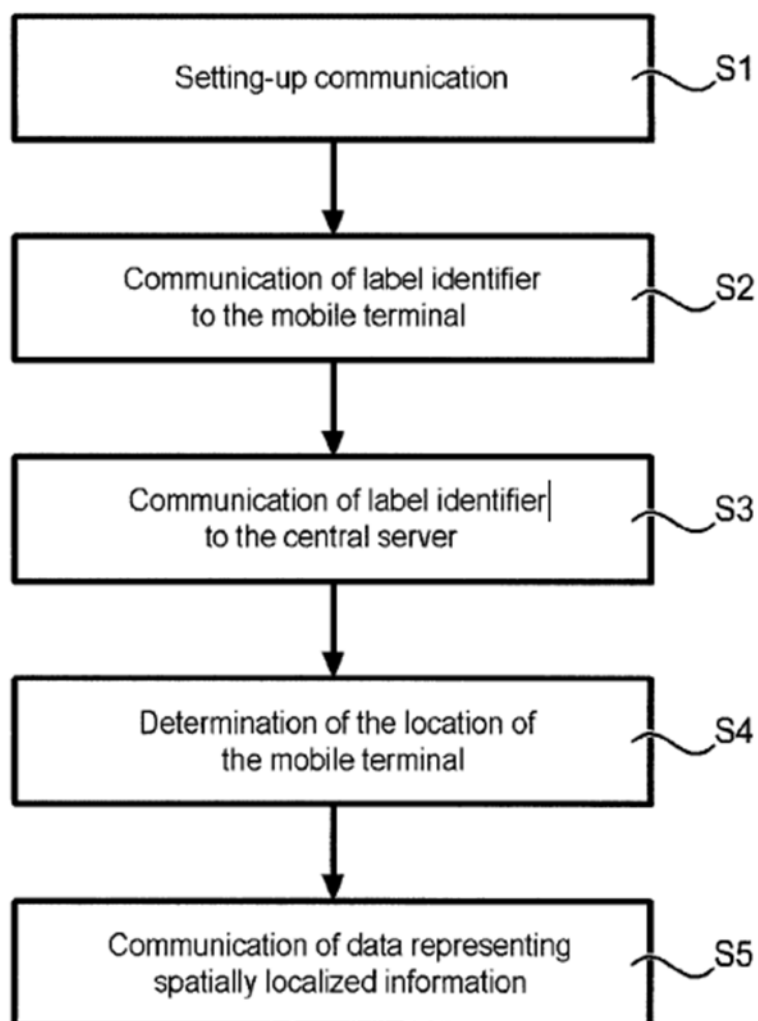
A. Overview of the '340 Patent

36. Prior to the Critical Date of the '340 Patent, numerous products, publications, and patents existed that implemented or described the functionality claimed in the

'340 Patent. The methodology of the '340 Patent was therefore well-known in the prior art as of the Critical Date. Further, to the extent there was any problem to be solved in the '340 Patent, it had already been solved in the prior art systems before the Critical Date of the '340 Patent as I discuss below.

37. The '340 Patent is directed to “the display of information in the sales area.” Ex. 1001, [1:18-19]. As illustrated in FIG. 4 reproduced below, the '340 Patent alleges the invention of a “means for providing consumers with spatially localized information, in relation to the place and context of a consumer, which complements the information already visually available in a sales area.” Ex. 1001, [2:8-12].

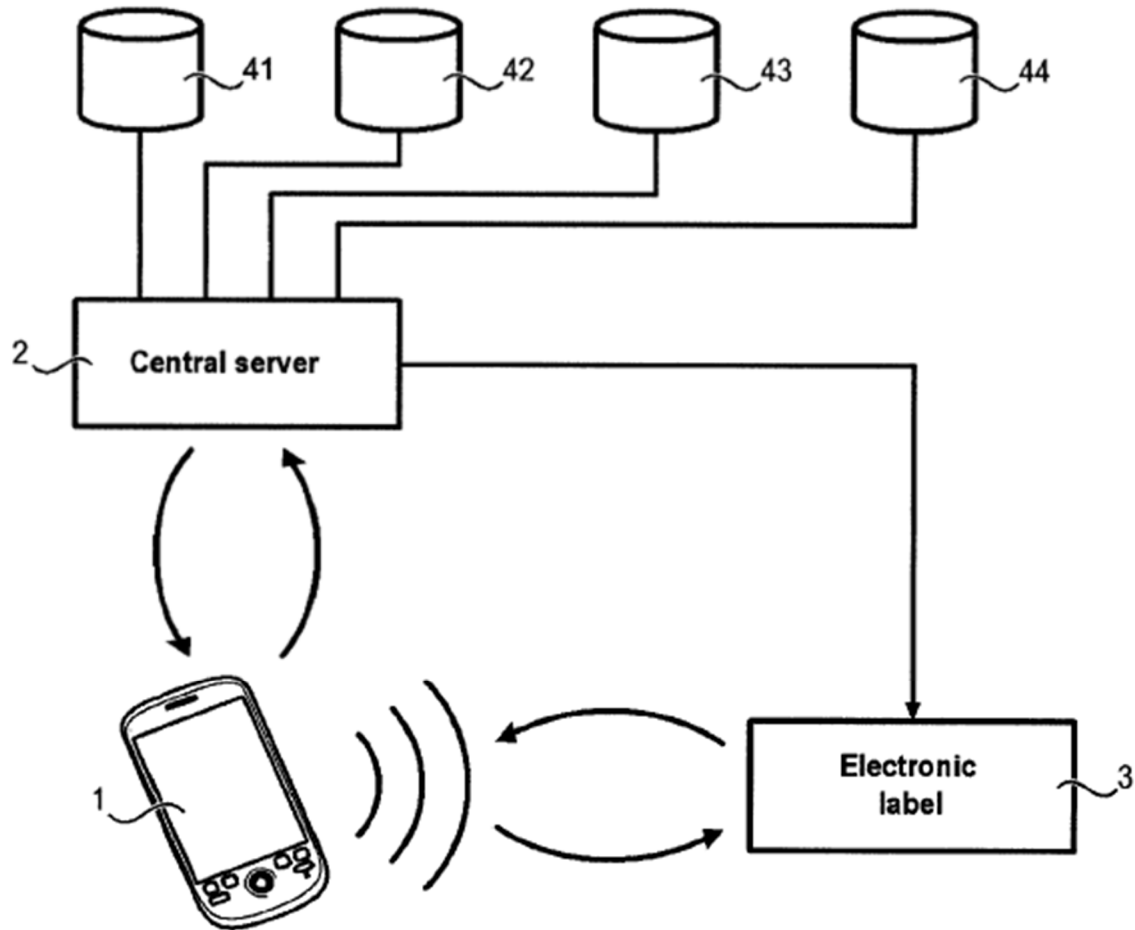
FIG. 4



The '340 Patent, FIG. 4.

38. The '340 Patent claims to have invented a system to carry out such a method, comprising a mobile terminal 1, a central server 2, an electronic label 3 comprising a radio-frequency peripheral 36, and databases 41 through 44, as shown in FIG. 1, reproduced below.

FIG. 1

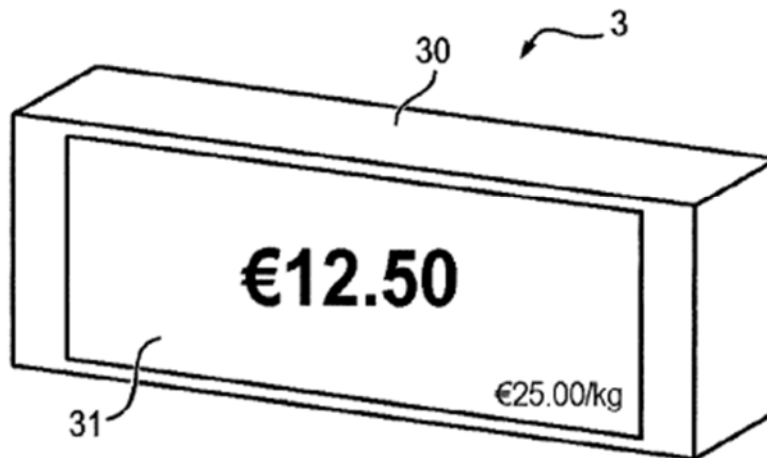


The '340 Patent, FIG. 1.

39. The '340 Patent claims to have invented a method for communicating spatially localized information to such a mobile terminal that employs NFC technology with a communication range of less than twenty centimeters in the electronic labels. Ex. 1001, [Claims 1-5].

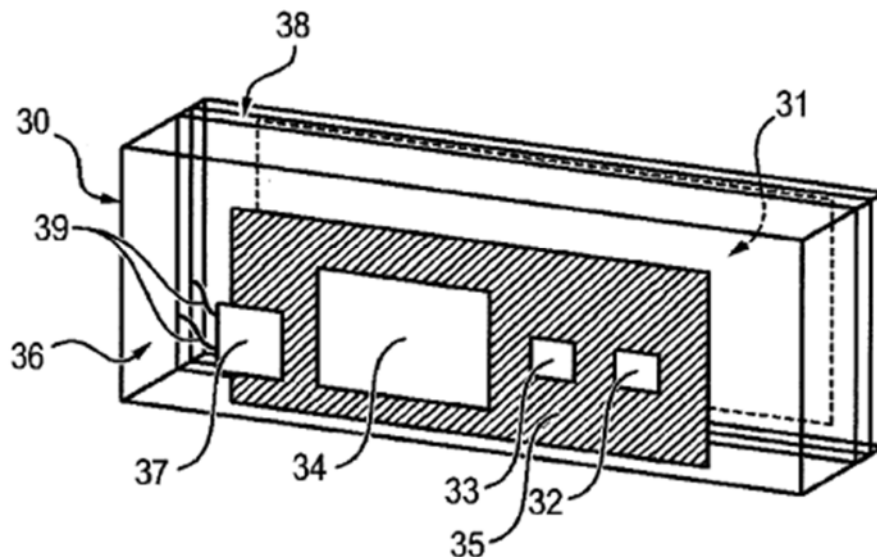
40. The '340 Patent further claims to have invented radio-frequency peripherals that are electronic labels capable of displaying information relating to an item, as well as certain structures of radio-frequency peripherals, as illustrated in FIGs. 2 and 3 reproduced below. Ex. 1001, [Claims 6-9].

FIG. 2



The '340 Patent, FIG. 2.

FIG. 3



The '340 Patent, FIG. 3

41. The '340 Patent includes 9 claims, of which claims 2 and 5 are independent. Ex. 1001, [8:17-10:30].

B. Prosecution History of the '340 Patent

42. The '340 patent was granted on June 2, 2020. The '340 patent was the continuation of a U.S. national phase application of International Application No. PCT/FR2012/050791, which was filed on April 11, 2012, with a U.S. Patent Application No. 16/281,190 ("the '190 application). Ex.1002. The Patent Office issued one office action during the prosecution of the '190 application. Ex.1002. In the non-final rejection issued on August 2, 2019, the Examiner rejected all claims 1-9 under 35 U.S.C. 103 as being unpatentable over three prior art references (none of which is referred to in the current petition). *Id.* After the applicant filed remarks on December 2, 2019, disputing the findings of the Examiner, the Examiner then allowed all claims over the prior art record. *Id.* However, as I have explained in detail in this declaration, there is nothing new about the claimed features because the prior art and analysis provided herein render obvious all the Claims 1-9 of the '340 Patent.

43. For purposes of my analysis in this IPR proceeding, I understand that the terms that appear in the claims of the '340 Patent should be interpreted according to their plain and ordinary meaning under the *Phillips* standard. In determining the ordinary and customary meaning, I understand that the words of a claim are first given their

plain meaning that those words would have had to one of ordinary skill at the time of the alleged invention. I also understand that the structure of the claims, the specification and file history also may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, I understand that even treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by one of ordinary skill to a claim term at the time of filing. I have followed this approach in my analysis, and for all of the claim terms considered in this declaration, I have applied the plain and ordinary meaning of those terms.

44. I also understand that the words of the claims should be interpreted as they would have been interpreted by one of ordinary skill at the time the invention was made (not today). For purposes of my analysis here, I have used April 11, 2012 as the date of invention. Without exception, however, my analysis of the proper meaning of the recited claim elements (under the *Phillips* standard) in this declaration would be correct if the date of invention was anywhere in the mid 2000s to the mid 2010s.

IV. BACKGROUND KNOWLEDGE OF A POSITA AT THE TIME OF THE CLAIMED INVENTION

45. It is my opinion that the claimed method and system of the '340 Patent are well established in the art at the time of the claimed invention. For example, U.S.

Patent App. Pub. No. 2010/0070365 A1 (“Siotia”) discloses a method and system of facilitating shopping within a store that provides guided shopping information (spatially localized information) to a wireless device (mobile terminal). Ex. 1003, [Abstract]. In another example, Japan Patent Application Publication No. 2009-064316 A (“Akao”) discloses an electronic shelf label system that “can provide the product information required by customers from electronic shelf label to the customer’s mobile device, increase the convenience of the customer, and promote the purchase of products.” Ex. 1004, [0011].

46. Furthermore, the claimed use of NFC technology is well established in the art at the time of the claimed invention. In particular, the standard ISO/IEC 14443 for proximity cards that operate within a communication range of less than twenty centimeters was well established before the Critical Date. *See* U.S. Patent App. Pub. No. 2012/059741 A1 (publication date Mar. 8, 2012), [0006] (describing the availability of the standard); *see also generally* U.S. Patent App. Pub. No. 2014/0195925 A1 (filing date Aug. 24, 2011), [0002] (describing NFC technology with a communication range of less than 20 centimeters as well-known background as of the filing date); U.S. Patent No. 7,937,107 B2 (granted May 3, 2011), [1:62-66] (disclosing “NFC may enable electronic devices to exchange data and/or initiate applications automatically when they are brought in close proximity, for example

ranging from touching, or 0 cm, to a distance of about 20 cm” as background of the invention).

47. In particular, the use of NFC technology, including the claimed communication range of less than twenty centimeters, was well established in the retail industry by the Critical Date. *See id.*, [0015]; U.S. Patent App. Pub. No. 2010/0161434 A1 (publication date Jun. 24, 2010), [0083] (relating to a retail checkout system and disclosing that “[t]ypically, the NFC tag 106 emits and receives electromagnetic radiation at 13.56 MHz with a 2.0 MHz bandwidth and usually supports data rates of 106 Kbps–1 using modified Miller coding with 100% modulation, or 212 or 424 Kbps–1 using Manchester coding with a 10% modulation ratio. A typical effective range of an NFC tag is between 5 and 20 cm, usually 15 cm or less.”); U.S. Patent App. Pub. No. 2008/0255947 A1 (publication date Oct. 16, 2008), [0025] (relating to a payment system and disclosing that “‘Near Field Communication’ (NFC) refers to short range (20 cm or less) wireless technology used to facilitate communication between electronic devices in close proximity as defined, for example, by the ISO 14443 standard. For example, embodiments of the present invention provide for the use of NFC and/or other relatively short range communications between a mobile device and a POS device such as when a user of the mobile device scans or waves or taps the mobile device in front of or near the POS device when paying for goods or services.”).

48. Furthermore, it is my opinion that, while certain prior art documents mention the particular length of 20 centimeters, a POSITA would understand that there is nothing critical in this particular choice of length, as can be learned from prior art that mention different communication ranges such as 15 centimeters. *See* U.S. Patent App. Pub. No. 2010/0161434 A1 (publication date Jun. 24, 2010), [0083].

49. The advantages of NFC technology in electronic shelf labels are also well known before the Critical Date. As International Patent Application Publication No. WO 2010/082835 A1 by Arntzen (“Arntzen”) describes more than two years before the Critical Date, “[t]he underlying layer of NFC technology follows universally implemented ISO, ECMA and ETSI standards. Because the range is so short, NFC-enabled transactions are inherently secure. Also, physical proximity of the unit to the reader gives users the reassurance of having control over the process.” Arntzen, [6:6-11]. Such disclosure well predates the ’340 Patent’s claimed discovery of the advantages of security and control offered by NFC technology. *See* Ex. 1001, [4:57-62], [6:52-65]. In particular, Arntzen disclosed a communication range of within four centimeters as instrumental for realizing such advantages. Arntzen, [6:1-11].

50. In fact, even the ’340 Patent itself acknowledges that the NFC standard ISO 14443 was well-known and being widely adopted by the relevant industry at the time of the claimed invention. Ex. 1001, [4:57-62].

51. In my opinion, a POSITA at the time of the claimed invention would also know that RFID is a well-established, ubiquitous and conventional technology that employs radio-frequency electromagnetic waves to identify or track tags attached to objects (such as merchandise items in a store). A POSITA would know that RFID tags are low-cost, mass-product items that can be easily obtained and easily installed in a wide range of settings, including retail store settings. In fact, a POSITA would know that RFIDs are being adopted for precise indoor location finding (for example as disclosed by Japan Patent Application Publication 2007-155383A or U.S. Patent Application Publication 2008/0231228 A1).

52. In my opinion, a POSITA would also know that RFID tags store information such as a unique identification code inside them and use an antenna to communicate with a reading device within a communication range, transmitting the information such as unique identification code to the reading device during the communication. A POSITA would also know that RFID tags are generally activated by reading devices when the reading devices move within the communication range of the RFID tags and initiate a communication sequence with the RFID tags, and after activation will transmit information such as the unique identification code to the reader devices in the subsequent communications. A POSITA would also know that RFID tags are generally classified into active and passive RFID tags, where the active RFID tags have their own electric power supply, but the passive RFID tags are powered by the

electromagnetic wave sent to them by the reading devices. A POSITA would know that because of this characteristic of passive RFID tags, the activation of passive RFID tags necessarily starts with the reading device transmitting electromagnetic waves to the passive RFID tags within a communication range so that the RFID tags can receive enough power to start communicating. A POSITA would further know that, while active RFID tags may have a longer communication range because of their own power supply, passive RFID tags have the advantage of lower cost and easier maintenance over active RFID tags, because the requirements for providing and maintaining a power source is eliminated.

53. In my opinion, a POSITA would further know that NFC tags are a subset of RFID tags that uses a particular radio frequency band (such as 13.56MHz) that is suitable for proximity communications. A POSITA would also know that, compared with other RFID tags, NFC tags have a shorter communication range that offers advantages such as increased security, reduced interference, better user control, and more precise positioning. A POSITA would also know that NFC tags are likely to be implemented as passive RFID tags that do not have their own power sources but rely upon electromagnetic waves from the reading devices for power.

54. In my opinion, a POSITA would also be familiar with the ubiquitous and conventional Internet at the time of the claimed invention, and would know the advantages of Internet in facilitating communications between devices.

55. Further, it is my opinion that a POSITA would know that Wi-Fi is a wireless networking technology that allows devices to connect to a local area network (LAN) or the Internet through a wireless network connection, and the most common standard for Wi-Fi is IEEE 802.11, which was released in 1997 and updated in 1999, well before the earliest claimed priority date of the '340 Patent. In my opinion, a POSITA would also have known that IEEE 802.11 employs radio-frequency communications. Further, in my opinion, a POSITA would know that in 1999, the Wi-Fi Alliance formed as a trade association to hold the Wi-Fi trademark under which most IEEE 802.11 products are sold. Therefore, in my opinion, a POSITA would have known that Wi-Fi is a standardized, conventional, and well-known technology that is suitable for communication via the Internet.

56. In fact, in my opinion, a POSITA at the time of the claimed invention would have treated Wi-Fi and the Internet as interchangeable terms because they had been frequently used in an interchangeable fashion over a long period before the time of the claimed invention. Further, a POSITA would know that wireless communication networks employing IP addresses and IP protocols are commonly implemented through Wi-Fi standards such as IEEE 802.11.

V. APPLICATION OF PRIOR ART TO THE '340 PATENT CLAIMS

A. Ground 1: Claims 1-5, 8 are rendered obvious over Siotia in combination with Sakata

1. Overview of Siotia

57. U.S. Patent App. Pub. 2010/0070365 A1 (“Siotia”) discloses a “method and system of facilitating shopping within a store.” Ex. 1003, [Abstract]. In particular, it discloses detection of a wireless device and provision of guided shopping information to the wireless device by accessing item location data. Ex. 1003, [Abstract]. FIG. 6 of Siotia, reproduced below, depicts an embodiment of the system.

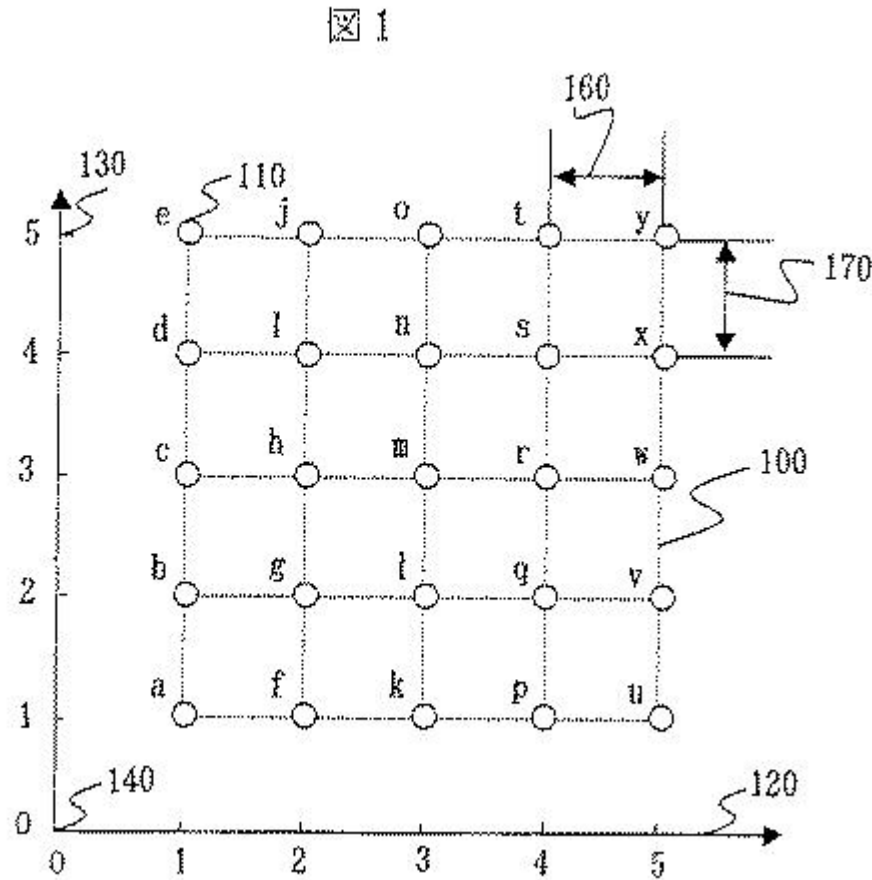
58. I have been informed by counsel that Siotia qualifies as prior art under pre-AIA 35 U.S.C. § 102(b) because it was published on March 18, 2010, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1003, (43).

59. It is my opinion that Siotia is analogous prior art to the '340 Patent. The '340 Patent alleges an invention of “means for providing consumers with spatially localized information, in relation to the place and context of a consumer, which complements the information already visually available in a sales area.” (Ex. 1001, [2:8-12]) while Siotia is directed to “the provision of guided shopping information to [the consumer's] wireless device by accessing item location” (Ex. 1003, [Abstract]). Thus, it is my opinion that both Siotia and the '340 Patent are in the same field of endeavor for providing customers with spatially localized information.

2. Overview of Sakata

60. Japan Patent Application Publication No. 2007-155383 A by Sakata (“Sakata”) discloses “a position information identifying member that can be easily installed at an arbitrary location or position, and can accurately identify position information both outdoors and indoors without radio wave interference.” Ex. 1008, [0007]. Sakata discloses that the invention “is based on the idea that by arranging IC tags (RFID: Radio Frequency Identification), each of which has a unique ID, in a matrix pattern based on a two-dimensional coordinate system, and by mapping the

unique ID of an IC tag to an address (x, y) in the coordinate system.” Ex. 1008, [0012]. Sakata discloses that such two-dimensionally arranged IC tags can be spread on a wall of a building. Ex. 1008, [0011], [0019]. FIG. 1 of Sakata shows a diagram of such two-dimensional arrangement.



Ex. 1008 (Sakata), FIG. 1

61. Sakata further discloses that the readable distance of the IC tags must be kept sufficiently smaller than the coordinate point interval, and the latter can be as low as 1cm. Ex. 1008, [0015], [0022]. Sakata discloses that the IC tags are read non-contact, using the radio waves received as operating power. Ex. 1008, [0022].

62. I have been informed by counsel that Sakata qualifies as prior art under pre-AIA 35 USC § 102(b) because it was published on June 21, 2007, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1008, (43).

63. It is my opinion that Sakata is analogous prior art to the '340 Patent. The '340 Patent discloses methods and systems involving short-range communication via radio-frequency between a mobile terminal and a radio-frequency peripheral for the purposes of location identification (Ex. 1001, [5:45-48], [5:65-67], [6:48-51]) while Sakata is directed to a position information identifying member that utilizes RFIDs with short communication ranges that may communicate with reader devices for the purposes of location identification (Ex. 1008, [0007], [0012], [0022]). Thus, it is my opinion that both Sakata and the '340 Patent are in the same field of endeavor for short-range radio-frequency communications between reading devices and tags for

3. Analysis

64. As set forth in detail below, it is my opinion that Siotia in combination with Sakata ("Siotia-Sakata"), discloses each and every limitation recited by claims 1-5, 8. Furthermore, A POSITA would have had a reason to combine Siotia with Sakata and would have had a reasonable expectation of success in doing so.

Claim 1

[1pre] “A method for communicating spatially localized information to a mobile terminal, the method being performed by a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined area, each of the plurality of locations being defined by a vertical and horizontal position within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier, the method comprising:”

65. It is my opinion that the portion “A method for communicating spatially localized information” is not limiting, because it merely states the purpose or intended use of the alleged invention. It does not define any of the claim limitations, which are set forth fully in the body of the claim (i.e., a communicating method of spatially localized information). To the extent that this portion is limiting, it is my opinion that Siotia-Sakata teaches this portion, please refer to my discussions of limitation [1c] below.

66. Siotia discloses a store **planogram** containing data that indicates the **location** of store items. Ex. 1003, [0023]. Siotia discloses a store server 104 (**central server**) that may be configured to access the planogram. Ex. 1003, [0039]. Siotia discloses that the store items may have radio frequency identifications (RFIDs), and thus teaches the claimed **radio-frequency peripherals**. Ex. 1003, [0041].

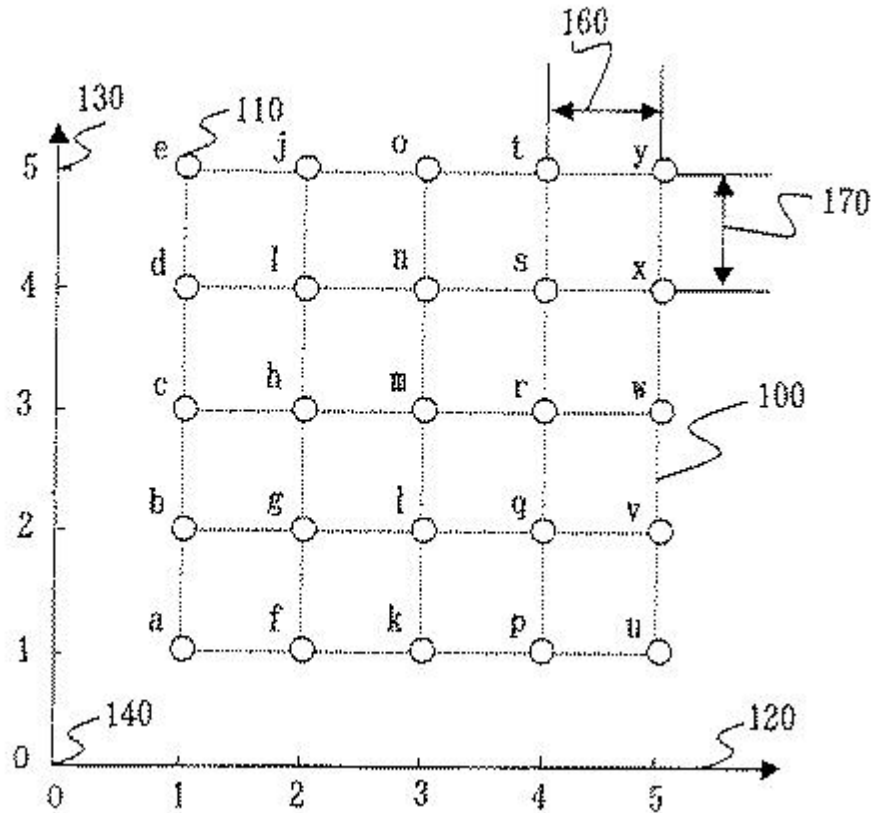
67. Sakata discloses “IC tags (RFID: Radio Frequency Identification), each of which has a unique ID.” Ex. 1008, [0012]. It is my opinion that a POSITA would recognize that Sakata’s IC tag (RFID) is functionally and structurally equivalent to Siotia’s RFID tag. Thus, it is my opinion that a POSITA would find it obvious to implement Sakata’s disclosures of RFIDs in Siotia’s RFID. Further, Sakata discloses “a coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300.” Ex. 1008, [0016]. It is my opinion that a POSITA would recognize that these tables are functionally and structurally analogous to Siotia’s planogram. Thus, it is my opinion that a POSITA would also find it obvious to implement Sakata’s disclosures of location-ID correspondence in Siotia’s planogram.

68. It is my opinion that, by thus implementing Sakata’s IC tags in Siotia’s RFID and Sakata’s location-ID correspondence in Siotia’s planogram, a POSITA would thus reach the Siotia-Sakata combination that teaches the claimed **radio-frequency peripherals** (RFIDs) with **unique identifiers** (the unique IDs of Sakata) that are **associated one-to-one** with the item locations and **particular to** the RFID (as disclosed by Sakata’s location-ID correspondence). It is further my opinion that the Siotia-Sakata combination also teaches that the planogram associates the unique identifiers with the **locations** of the item within the **predetermined area** of the store,

and that such association is **one-to-one**, as such association is inherent in Sakata's location-ID correspondence.

69. Sakata discloses that the IC tags are placed in a matrix pattern based on a two-dimensional coordinate system, with each tag placed on a coordinate point. Ex. 1008, [0012], [0015]. Sakata further discloses that “[t]he IC tag coordinate system... is constituted by a one-to-one correspondence between the unique ID held by each IC tag 110 located at each coordinate point of the two-dimensional coordinate IC tag location information holding means 100 and the address on the coordinate system (X coordinate system and Y coordinate system).” Ex. 1008, [0016]. FIG. 1 of Sakata shows the placement of IC tags on the coordinate system.

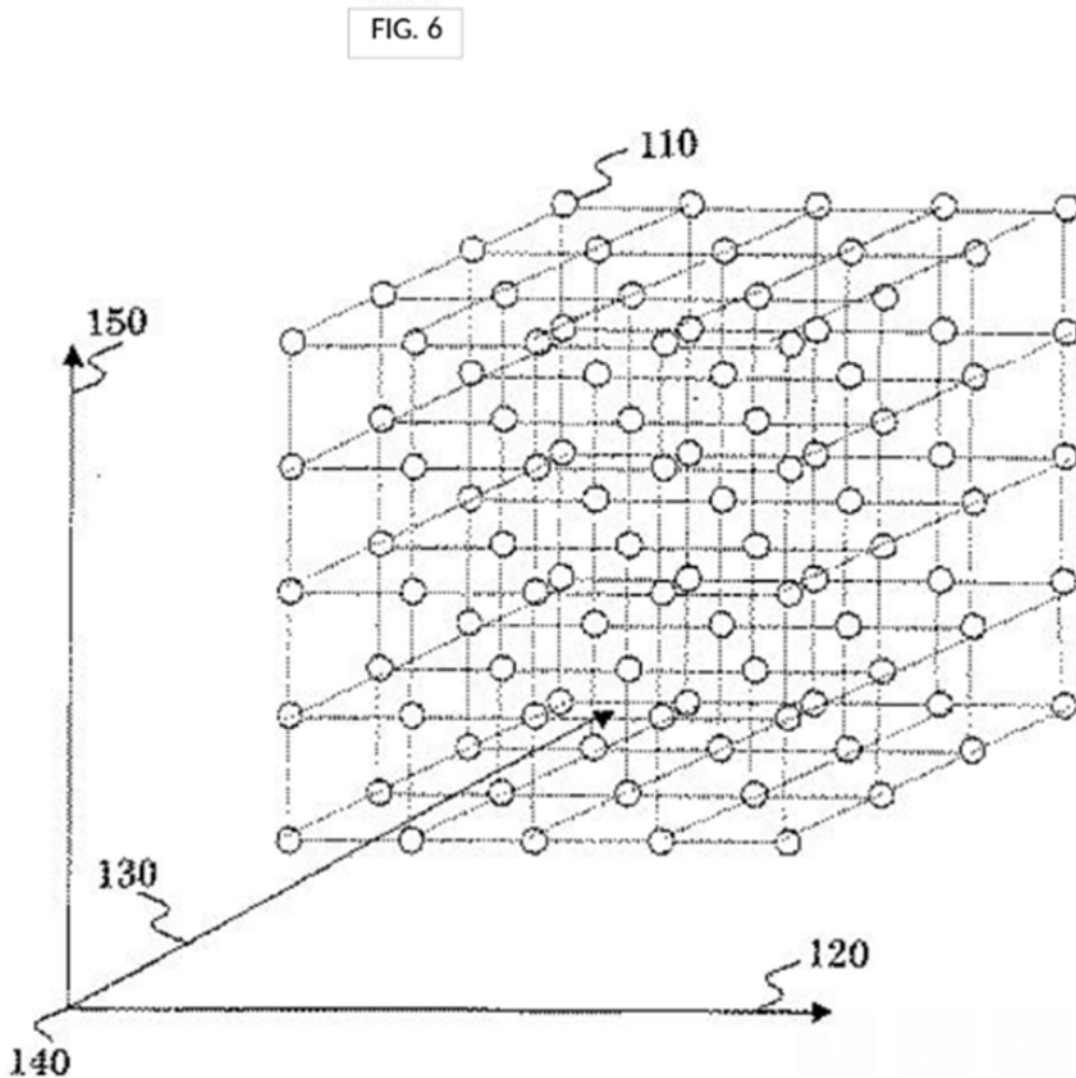
FIG. 1



Ex. 1008 (Sakata), FIG. 1

70. Sakata further discloses that the two-dimensional IC tag arrangement can be on a wall of a building. Ex. 1008, [0011], [0013], [0019]. Thus it is my opinion that Sakata teaches the claimed “each of the plurality of locations (*IC tag position*) being defined by a vertical (*y coordinate*) and horizontal (*x coordinate*) position within a plane (*the wall*) perpendicular to a floor of the predetermined area (*the building*)” of [1pre]. It is also my opinion that Sakata, through its disclosure that the IC tags can be arranged in a three-dimensional coordinate system (Ex. 1008, [0021], FIG. 6), further teaches this limitation, because a three-dimensional coordinate system

inherently includes at least one claimed two-dimensional vertical-plane coordinate system.



Ex. 1008 (Sakata), FIG. 6

71. Further, as I would discuss further below, a POSITA reading Siotia in view of Sakata would recognize that it is obvious to implement Sakata's 2-dimensional vertical arrangement of tags in Siotia's planogram, especially because Siotia already shows, through figures in the specification (such as Figure 6 attached and annotated

below), that the tags are placed at locations **defined by a vertical and horizontal position within a plane** (the display plane of the smart poster) **perpendicular to a floor of the predetermined area** of the store.

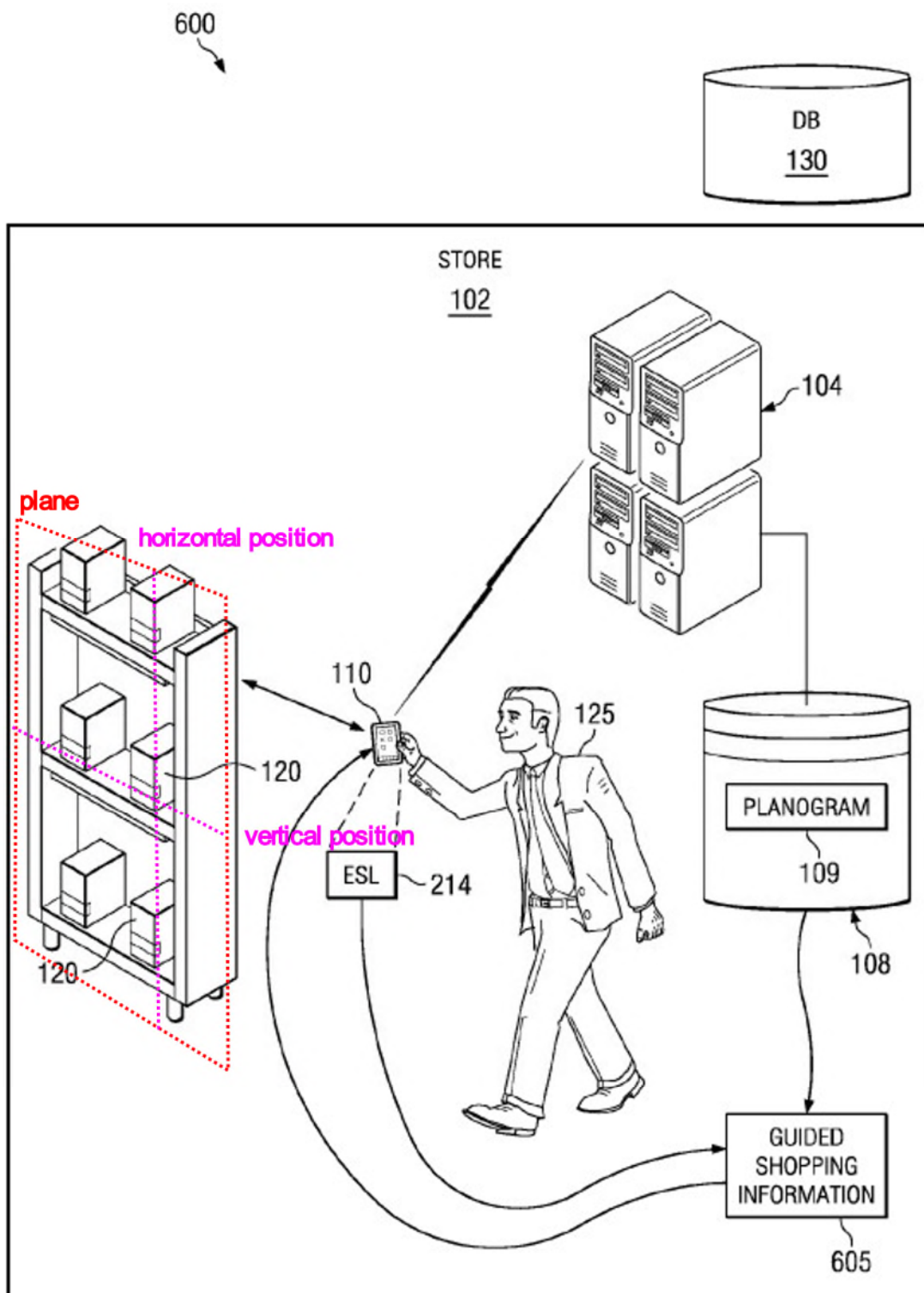


FIG. 6

Ex. 1003 (Siotia), FIG. 6 (annotated)

72. Siotia further teaches the claimed **mobile terminal** by its disclosure of a mobile device 110. Ex. 1003, [0041]. Sakata also discloses a reading device that can read the unique IDs of the IC tags. Ex. 1008, [0008], [0012]. Sakata discloses that the reading device can be “installed on a cane, footwear, cart, or self-propelled robot” and is therefore mobile. Ex. 1008, [0011]. Thus, it is my opinion that a POSITA would recognize that Sakata’s reading device is functionally and structurally analogous to Siotia’s mobile device 110, and would find it obvious to implement the reading device-IC tag interaction of Sakata in Siotia’s mobile device 110 and RFID device.

73. The following annotated figure shows the correspondence between the components of Siotia and the components of the ’340 Patent.

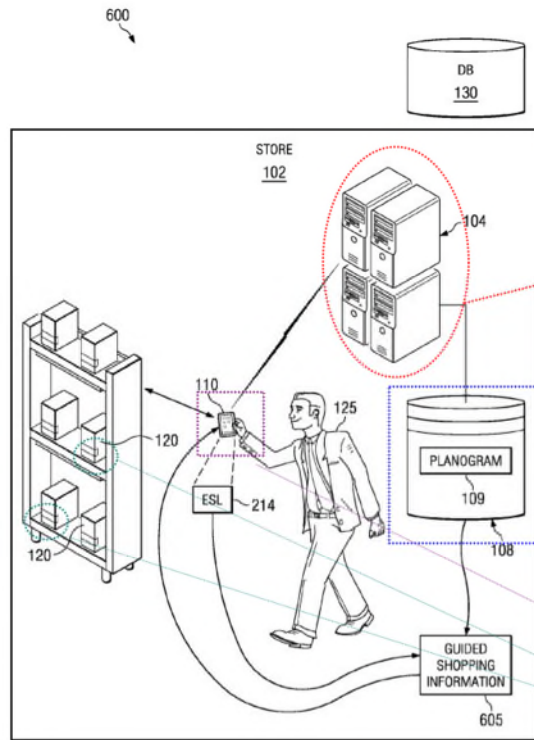


FIG. 6

Ex. 1003, FIG. 6

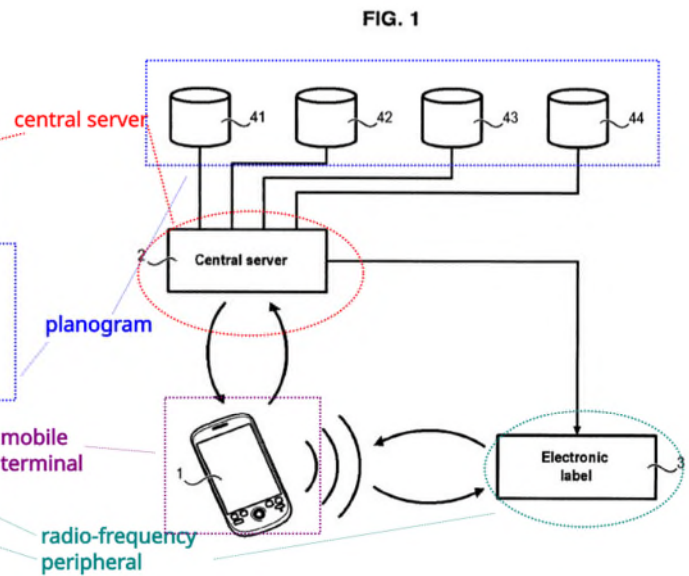


FIG. 1

Ex. 1001, FIG. 1

74. Thus, it is my opinion that Siotia-Sakata teaches “[a] method for communicating spatially localized information (*not limiting, and see my discussions of [1c] below*) to a mobile terminal (*mobile device 110 of Siotia/reading device of Sakata*), the method being performed by a central server (*store server 104 of Siotia*) configured to access a planogram (*store planogram of Siotia/coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300 of Sakata*) associating a plurality of unique identifiers (*unique IDs of Sakata*) of radio-frequency peripherals (*RFID device of Siotia/RFID IC tags of Sakata*) with a plurality of locations (*item location of Siotia/IC tag location of Sakata*) within a predetermined area (*store of Siotia/building of Sakata*), each of the

plurality of locations being defined by a vertical and horizontal position (*depicted by Siotia's figures/explicitly disclosed by Sakata*) within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier (*explicitly disclosed by Sakata*).” In particular, Siotia discloses the central server, the planogram, the radio-frequency peripherals, and the mobile terminal, Sakata then supplements Siotia by explicitly disclosing the vertical-plane placement of radio-frequency peripherals and the location-unique ID association.

75. Thus, it is my opinion that Siotia-Sakata teaches each and every limitation of [1pre].

[1a] “receiving a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters;”

76. Siotia discloses that a mobile device 110 (**mobile terminal**) may be utilized to detect a radio frequency identification (RFID) of a store item using RF module 230, and then transmit an event (the claimed **communication**) using wireless adapter 220 to store server 104 (**central server**). (Ex. 1003, [0041]). It is my opinion that a POSITA would find it obvious that the communication comprises a **unique identifier** received by the mobile terminal from the radio-frequency peripheral and that the unique identifier is **particular to** the peripheral.

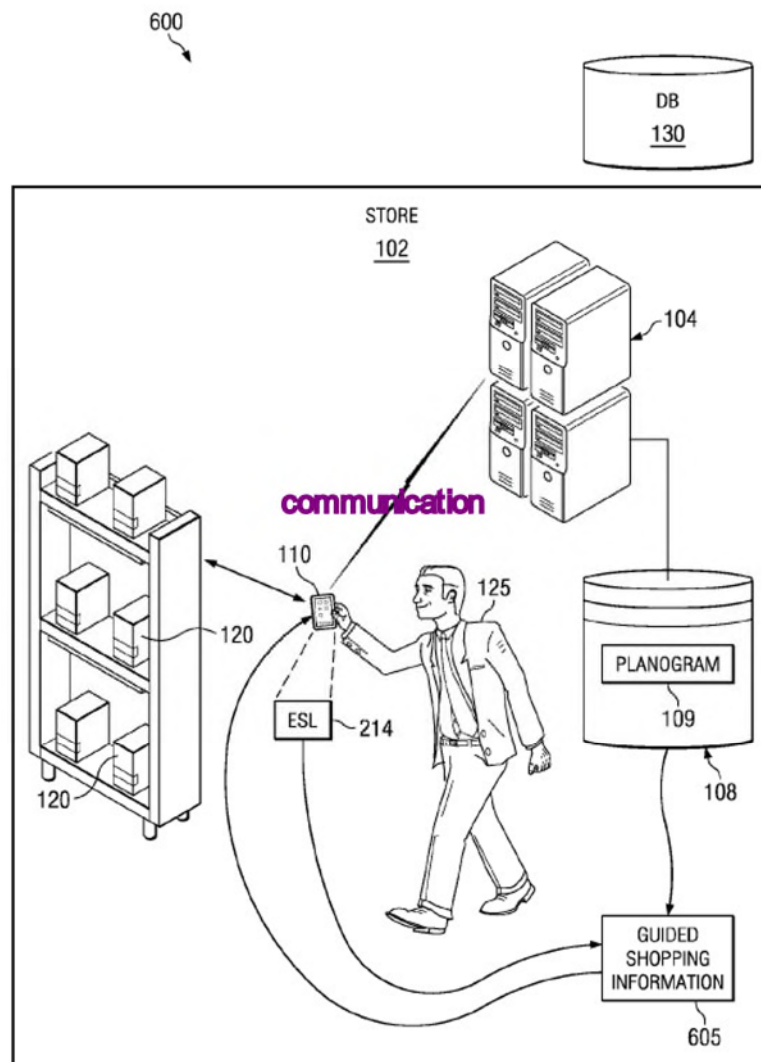


FIG. 6

Ex. 1003 (Siotia), FIG. 6 (annotated)

77. As I discussed earlier in the backgrounds section, a POSITA would further understand that RFID technology includes NFC technology as a subspecies, and that radio-frequency peripherals employing NFC technology will be implemented with the activation sequence, the communication range, and the antenna/chip configuration as claimed in [1a].

78. As I discussed earlier for [1pre], it is my opinion that a POSITA would find it obvious to implement Sakata's IC tags in Siotia's RFIDs. Further, Sakata discloses that each IC tag comprises an **antenna** and an IC **chip**. Ex. 1008, [0022]. Sakata teaches that the antenna and the chip are **configured for near-field communication** by its disclosure that "the reading range is restricted to the immediate vicinity of the IC tag." *Id.* Sakata further discloses that the reading range must be kept sufficiently smaller than the corresponding coordinate point interval to avoid incorrect reading of IC tags at adjacent coordinate points, and the latter interval can be as small as 1cm. Ex. 1008, [0015]. Thus, Sakata teaches a **communication range** that is **less than twenty centimeters**.

79. Sakata discloses that the IC tags can transmit its unique ID, "by non-contact, using the radio waves received by the antenna as operating power." Ex. 1008, [0022]. It is my opinion that a POSITA familiar with the activation sequence of passive RFID devices through received electromagnetic wave, as I discussed in the

backgrounds section, would recognize in this disclosure this well-known and standardized activation sequence, and thus understand that this inherently teaches that the tag **is configured to be activated** by a reader when it is within its communication range with the reader, through this well-known and standardized activation sequence. Further, in my opinion, a POSITA, familiar with the working mechanism of the ubiquitous, well-known and conventional RFID tags and their common working mechanism of transmitting unique IDs to readers for identifying themselves, would recognize this mechanism in the disclosures of Sakata as well as in Siotia's disclosure of the detection of the RFID in Siotia by the mobile device, thus a POSITA would find it obvious that the detection of Siotia would involve the same transmission of the unique ID by the RFID to the mobile device, and that the transmitted event of Siotia would include the unique ID, as the detection event of Siotia inherently includes the unique ID for identifying the detected RFID, and as this is the only possible way to match the detection event against the location-ID correspondence information in Siotia-Sakata's planogram.

80. Thus, it is my opinion that Siotia-Sakata teaches the claimed "[the central server (*store server 104 of Siotia*)] receiving a communication from a mobile terminal (*mobile device 110 of Siotia/reading device of Sakata*), the communication comprising a unique identifier (*unique identifier of Sakata*) received by the mobile terminal from a radio-frequency peripheral (*RFID device of Siotia/RFID IC tag of*

Sakata) located in the predetermined area (*store of Siotia/building of Sakata*), the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna (*antenna of Sakata*) and an electronic chip (*IC chip of Sakata*) configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters (*explicitly disclosed by Sakata*)” of [1a]. In particular, Siotia discloses the claimed communication sequence between the radio-frequency peripheral, the mobile device, and the central server, and Sakata discloses the transmission of unique ID, the activation, the communication range, and the antenna/chip. As I will discuss below, it is my opinion that a POSITA would have been motivated and able to modify Siotia by using Sakata’s IC tags for Siotia’s RFID device, and thus reach the Siotia-Sakata combination that discloses all of the limitations of [1a.].

81. Thus, it is my opinion that Siotia-Sakata discloses each and every limitation of [1a].

[1b] “determining a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and”

82. Siotia discloses “resolv[ing] user location within a store by making the store’s planogram or schematic accessible to the user’s mobile or wireless device.” Ex. 1003, [0024]. Siotia discloses that “[w]hen a shopping event, such as the mobile device interacting with a store item using the phone or the user moving an item from the ESL to a shopping cart, the shopping assistant may identify the location of the user from the store item involved in the shopping event.” *Id.* It is my opinion that a POSITA would understand that this resolving of user location within a store is **determining a location of the mobile terminal within the predetermined area, and it is necessarily based on the location associated with the unique identifier of the received communication in the planogram.**

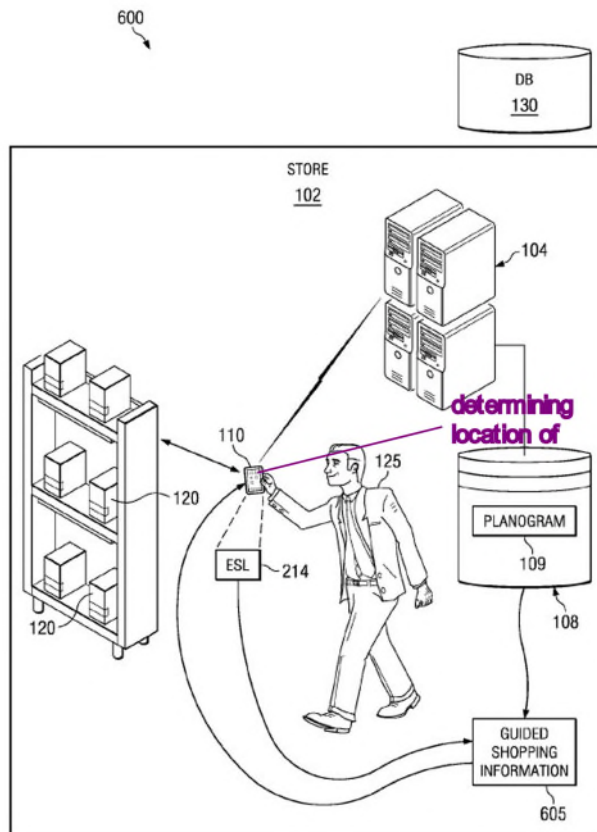


FIG. 6

Ex. 1003 (Siotia), FIG. 6 (annotated)

83. As I have discussed for [1pre], Siotia-Sakata teaches **the vertical and horizontal position**.

84. Further, Sakata is directed to location determination (Ex. 1008, [0008]) and teaches two-dimensional location determination in a vertical plane (Ex. 1008, [0011], [0012], [0013], [0019]) as well as location-identifier association (Ex. 1008, [0016]). As I will further discuss below, it is my opinion that a POSITA would have been motivated and able to use Sakata's two-dimensional location determination to

supplement Siotia's teachings, thus further strengthening Siotia-Sakata's disclosure of the "vertical and horizontal position" limitation.

85. Thus, it is my opinion that Siotia-Sakata teaches the claimed "[the central server (*store server 104 of Siotia*)] determining a location of the mobile terminal (*mobile device 110 of Siotia/reading device of Sakata*) within the predetermined area (*store of Siotia/building of Sakata*) based on the location associated with the unique identifier (*unique ID of Sakata*) of the received communication in the planogram (*store planogram of Siotia/coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300 of Sakata*), the location of the mobile terminal comprising the vertical and horizontal position of said location (*depicted by Siotia's figures/explicitly disclosed by Sakata*)" of [1b].

86. Thus, it is my opinion that Siotia-Sakata teaches each and every limitation of [1b].

[1c] "transmitting to the mobile terminal spatially localized information associated with the location of the mobile terminal."

87. Siotia discloses that server 104 may expose database 108, "which may include planogram 109, directly to shopping assistant 212 resident on mobile device 110 to provide guided shopping information 605." Ex. 1003, [0047]. Siotia discloses that "[g]uided shopping information 605 may include an image of a layout of store 102, the location of the mobile device in store 102, text based directions for navigating

store 102 to locate the items, and/or the ESL (electronic shopping list) sorted based on the location of the items in store 102.” Ex. 1003, [0048]. It is my opinion that such directions for navigating the store to locate the items teaches the claimed **spatially localized information associated with the location of the mobile terminal.**

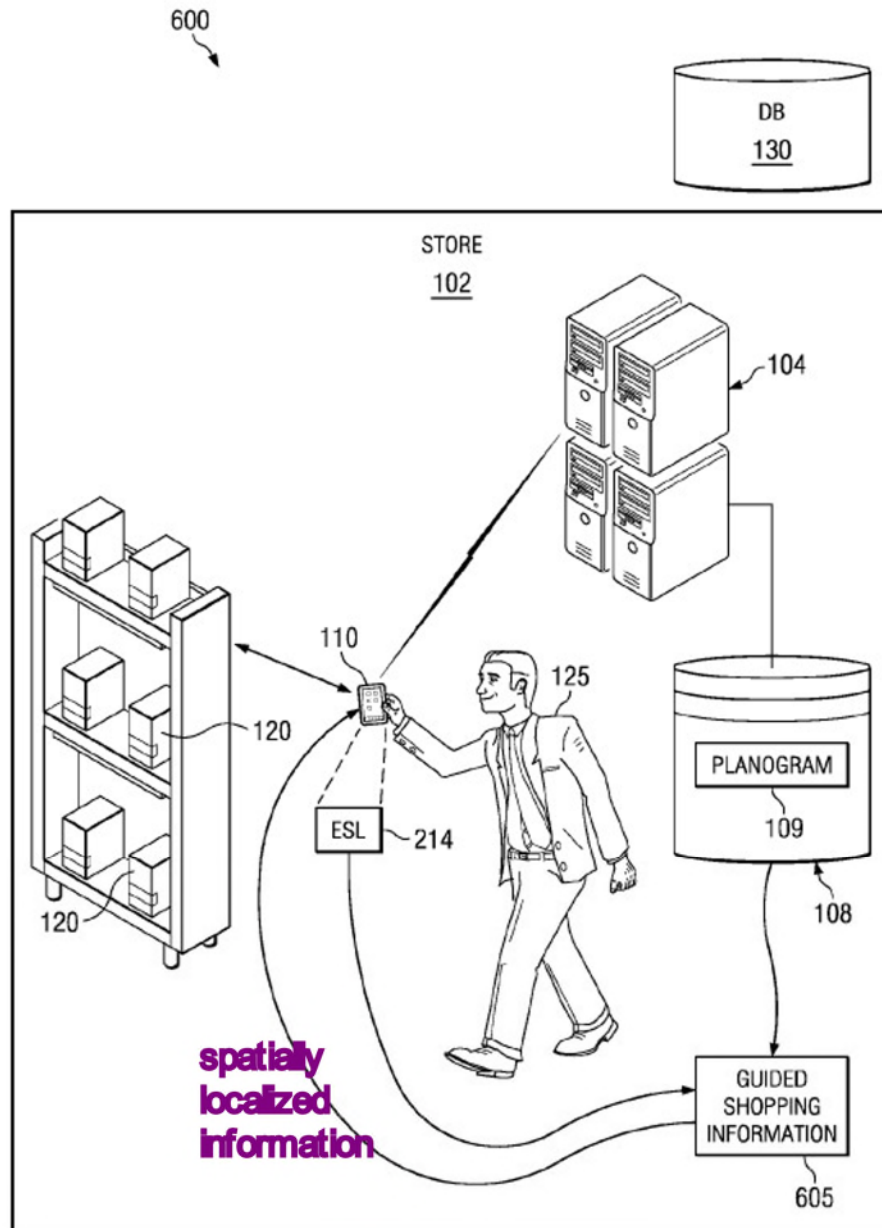


FIG. 6

Ex. 1003 (Siotia), FIG. 6 (annotated)

88. Therefore, it is my opinion that Siotia-Sakata teaches the claimed “[the central server (*store server 104 of Siotia*)] transmitting to the mobile terminal (*mobile device*

110 of Siotia/reading device of Sakata) spatially localized information associated with the location of the mobile terminal (*navigating directions of Siotia*)” of [1c].

89. Thus, it is my opinion that Siotia-Sakata teaches each and every limitation of [1c] as Siotia alone discloses all of them.

90. Thus, it is my opinion that Siotia-Sakata renders Claim 1 obvious.

Claim 2

[2] “The method according to claim 1, further comprising: when the mobile terminal is positioned relative to the radio-frequency communication peripheral within the communication range, energy of electromagnetic waves emitted by the mobile terminal activating the radio-frequency communication peripheral, thereby setting-up a radio-frequency communication between the mobile terminal and the radio-frequency peripheral, wherein the communication range is a range of the electromagnetic waves emitted by the mobile terminal.”

91. Claim 1 has already been addressed above.

92. Sakata teaches the claimed powering by electromagnetic wave through its disclosure of “using the radio waves received by the antenna as operating power.”

Ex. 1008, [0022]. As I discussed for [1a] above, Sakata discloses the claimed radio-frequency communication and the communication range. As Sakata discloses the use of the radio waves as operating power, it is my opinion that a POSITA would

find it obvious that the communication range is a range of the radio waves (electromagnetic waves) emitted by the source of the radio waves, which must necessarily be the reading device of Sakata (the mobile device of Siotia-Sakata).

93. Thus, it is my opinion that Sakata, through the disclosure of the claimed radio-frequency communication, the claimed communication range, and the claimed powering by electromagnetic waves, teaches each and every limitation of [2].

94. Therefore, it is my opinion that Siotia-Sakata teaches each and every limitation of Claim 2, thus rendering Claim 2 obvious, because Sakata teaches all of them.

Claim 3

[3] “The method according to claim 1, wherein the central server receiving the communication from the mobile terminal is via the Internet.”

95. Claim 1 has already been addressed above.

96. Siotia discloses that, after the detection of a radio frequency identification (RFID) of a store item using RF module 230, this event may be “transmitted by mobile device 110 using wireless adapter 220 to server 104.” Ex. 1003, [0041]. Siotia discloses that “wireless data communication includes Web communication, email communication, instant messaging communication, and the like.” Ex. 1003, [0040]. It is my opinion that a POSITA would recognize that Web communication, email communication, and instant messaging communication are **via the Internet**.

97. Thus, it is my opinion that Siotia-Sakata teaches claimed “the central server receiving the communication from the mobile terminal is via the Internet” of [3] because Siotia alone teaches it, thus Siotia-Sakata teaches each and every limitation of Claim 3, thus rendering Claim 3 obvious.

Claim 4

[4] “The method according to claim 1, wherein the spatially localized information is further associated with account data specific to the user of the mobile terminal previously stored in a database accessible to the central server via a communication network.”

98. Claim 1 has already been addressed above.

99. Siotia discloses server 104 detecting the presence of electronic shopping guide 214 in mobile device 110. Ex. 1003, [0047]. It is my opinion that the electronic shopping guide 214 is **account data specific to the user of the mobile terminal** and it is **previously stored in a database** (inside the mobile device). *See e.g.*, Ex. 1003, [0024]. It is further my opinion that when the server 104 detects the electronic shopping guide, this database is now **accessible to the central server via a communication network**. Siotia discloses that guided shopping information sent to the mobile device (the **spatially localized information**) may include text based directions for navigating store 102 to locate the items, and/or the ESL sorted based on the location of the items in store 102. Ex. 1003, [0048]. It is my opinion that by

this disclosure Siotia teaches that the spatially localized information is **associated with** the account data.

100. Therefore, it is my opinion that Siotia-Sakata teaches each and every limitation of Claim 4, thus rendering Claim 4 obvious.

Claim 5

[5pre] “A system for communicating spatially localized information to a mobile terminal, the system comprising:”

101. Claim 5 recites a system analogous to method claim 1, and is rendered obvious by the Siotia-Sakata combination for same reasons set forth for claim 1. In particular, the limitations of [5pre] are substantially the same as the corresponding limitations of [1pre]. Please refer to the discussions for [1pre] above.

[5a] “a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined area, each of the plurality of locations being defined by a vertical and horizontal position within a vertical plane of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier;”

102. The limitations of [5a] are substantially the same as the corresponding limitations of [1pre]. Please refer to the discussions for [1pre] above.

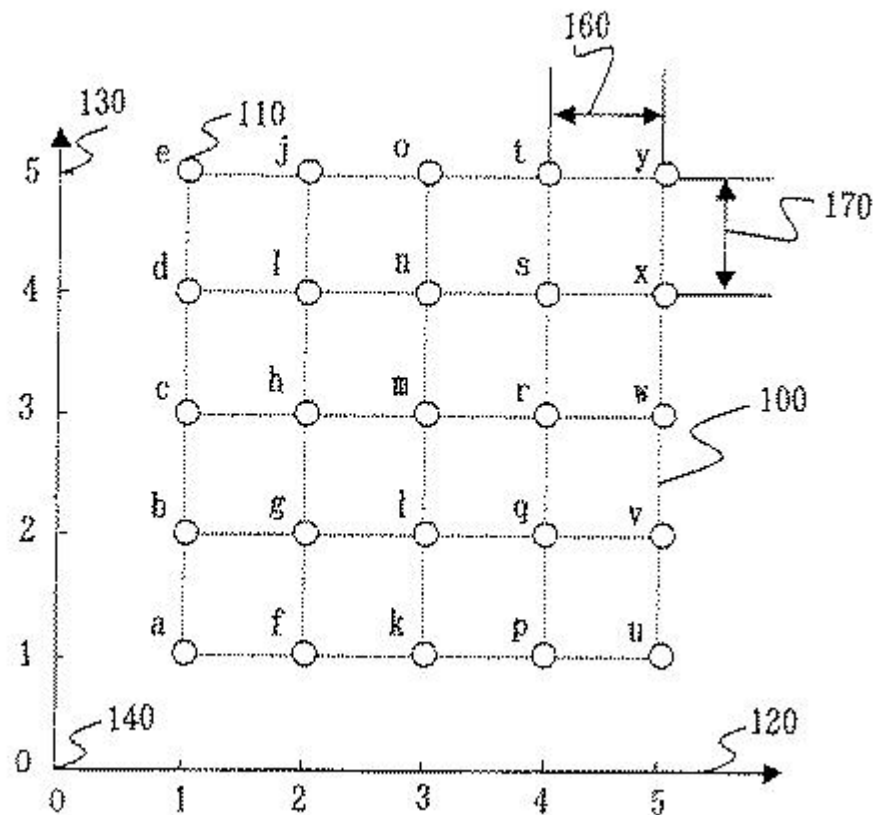
[5b] “a mobile terminal configured to communicate with the central server; and;”

103. [1pre] and [1a] claim the central server receiving a communication from the mobile terminal, therefore the mobile terminal is configured to communication with the central server. Please refer to the discussions for [1pre] and [1a] above.

[5c] “a plurality of radio-frequency peripherals distributed throughout the predetermined area, wherein each radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters,”

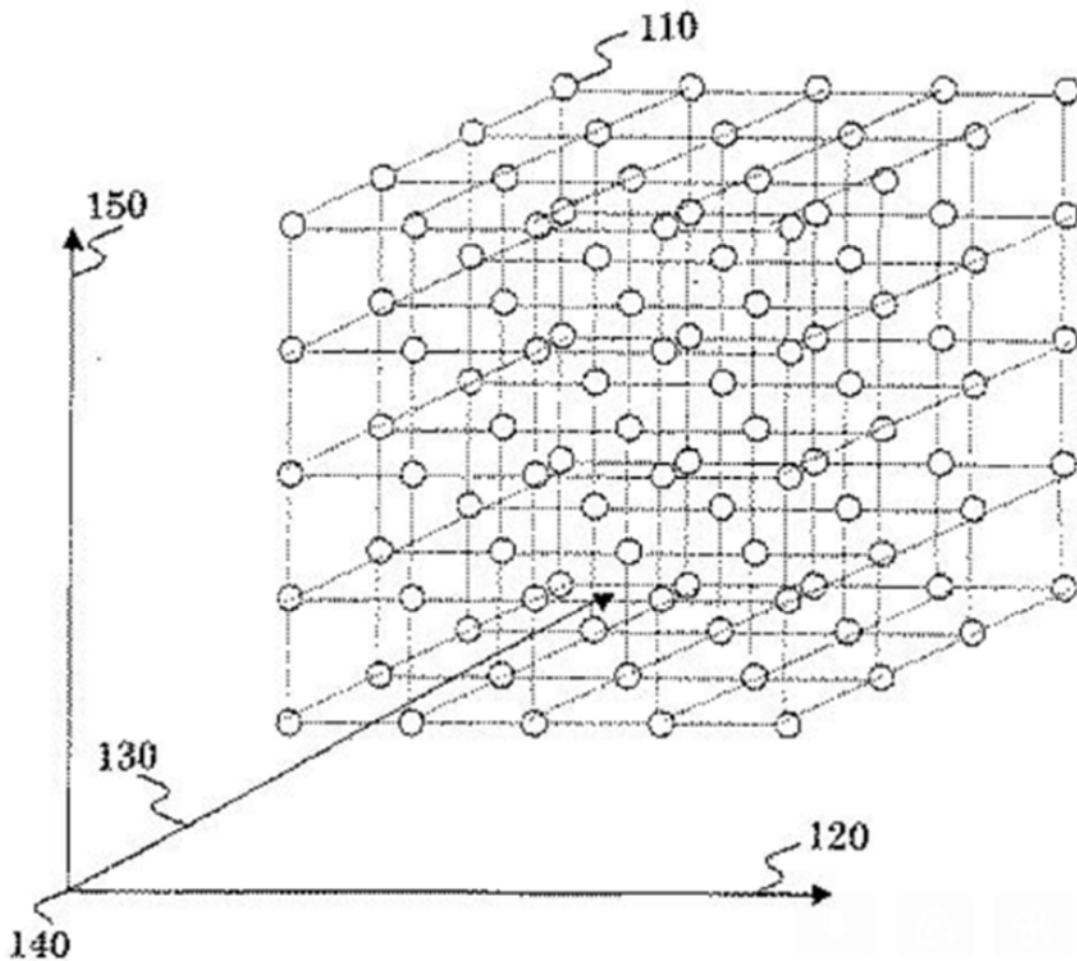
104. The limitations of [5c] are substantially the same as the corresponding limitations of [1pre] and [1a]. Please refer to the discussions for [1pre] and [1a] above. Further, Sakata discloses that the plurality of RFIDs (**radio-frequency peripherals**) are **distributed throughout** the predetermined area through FIGS. 1 and 6.

FIG. 1



Ex. 1008 (Sakata), FIG. 1

FIG. 6



Ex. 1008 (Sakata), FIG. 6

[5d] “wherein the central server is configured to:”

105. [5d] introduces no new limitation. Please also refer to the discussions for [1pre] above.

[5e] “receive a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-

frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral;”

106. The limitations of [5e] are substantially the same as the corresponding limitations of [1a]. Please refer to the discussions for [1a] above.

[5f] “determine a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and;”

107. The limitations of [5f] are substantially the same as the corresponding limitations of [1b]. Please refer to the discussions for [1b] above.

[5g] “transmit to the mobile terminal spatially localized information associated with the location of the mobile terminal.”

108. The limitations of [5g] are substantially the same as the corresponding limitations of [1c]. Please refer to the discussions for [1c] above.

109. Therefore, it is my opinion that Siotia-Sakata renders Claim 5 obvious.

Claim 8

[8] “The system according to claim 5, wherein the chip and the antenna are arranged at different points of the radio-frequency peripheral, and wherein the radio-frequency peripheral comprises connections configured to ensure a communications link between the antenna and the chip.”

110. Claim 5 has already been addressed above.

111. As I discussed for [1a] above, Sakata discloses the claimed **chip** and **antenna**. Sakata further discloses that the antenna is contained in a 0.4 mm square chip of its own. Ex. 1008, [0022]. As Sakata discloses the antenna chip and the IC chip separately (Ex. 1008, [0022]), it is my opinion that a POSITA would find it obvious to that these two chips are distinct and necessarily **arranged at different points of the radio-frequency peripheral**, as the two components necessarily need to occupy different physical locations inside the radio-frequency peripheral. It is further my opinion that a POSITA would also find that Sakata inherently discloses the claimed **“ensure a communications link between the antenna and the chip”** of [8] through the disclosure that the tag transmits the unique ID held within the IC chip through the antenna (Ex. 1008, [0022]).

112. Therefore, it is my opinion that Siotia-Sakata discloses each and every limitation of Claim 8, thus rendering Claim 8 obvious, because Sakata discloses all the additional limitations over independent claim 5.

Motivation to combine Siotia with Sakata

113. As would be further discussed below, it is my opinion that a POSITA would have had a reason to combine Siotia, the primary reference, with Sakata and would have had a reasonable expectation of success in doing so.

114. As I discussed for [1pre] above, each of Siotia and Sakata discloses RFIDs and mobile reading devices interacting with the RFIDs, and in my opinion, a POSITA would find it obvious to implement Sakata's teachings of the structural elements (antenna and chip) of the RFIDs and of the communication details between reading device and RFID in Siotia's RFID and mobile device, which is the mere substitution of one element for another known in the field or the mere application of a known technique to a piece of prior art ready for the improvement. Further, in my opinion, a POSITA would have been motivated to combine Siotia with Sakata to implement Siotia's expressly taught functionality of "providing shopping assistance to locate items within a retail shopping environment." Ex. 1003, [0003].

115. Specifically, in my opinion, a POSITA would have been motivated to modify Siotia by using Sakata's RFID IC tag (Ex. 1008, [0012]) for Siotia's RFID device (Ex. 1003, [0041]), thereby creating the Siotia-Sakata combination that discloses the NFC-related limitations (antenna, chip, communication range, and activation through electromagnetic wave) of [1a] and [2]. Siotia teaches detecting a radio frequency identification (RFID) of a store item using RF module 230 of the mobile device 110. Ex. 1003, [0041]. As I discussed in the backgrounds section above, a POSITA at the time of the claimed invention would be knowledgeable about NFC technology, which is a subspecies of the RFID technology. As I also discussed in the backgrounds section above, A POSITA would also be knowledgeable about NFC

standards such as ISO 14443 and ISO 18092. Thus, in my opinion, a POSITA would have been motivated and able to use the teachings of Sakata to modify Siotia such that the RFID of Siotia is implemented as a RFID IC tag of Sakata (*see* Ex. 1008, [0012], [0015], [0022]). Sakata has disclosed the advantages of such tags with short communication ranges for avoiding communication interference and more precise location finding (Ex. 1008, [0007], [0015], [0022]), therefore, it is my opinion that a POSITA would thus have been motivated and able to follow such trend and implement the RFID of Siotia as the RFIC IC tag of Sakata to realize such advantages. This would also address the expressly taught objective of Siotia of “determination of the user's location within the store and facilitate[ing] opportunities for providing targeted promotion and services to the user based on the user's location” (Ex. 1003, [0023]) because it would allow a more precise determination of the user's location.

116. In my opinion, a POSITA reading Siotia in view of Sakata would understand that such a modification involves no more than adopting Sakata's expressly disclosed RFID IC tags for Siotia's RFID device. At most, this is altering the structure of the mobile device-radio frequency peripheral system disclosed in Siotia by mere substitution of one element (the RFID tag) for another known in the field (the RFID IC tag of Sakata), and further, the RFID IC tag itself comes from another mobile device-radio frequency peripheral system disclosed in Sakata (Ex. 1008,

[0011], [0012], [0022]), and performs the same function in Sakata's system as the RFID tag performs in Siotia's system. Not only would this have been obvious to try, it would also have yielded no more than predictable results due to the combination of familiar elements in a known way. Thus, in my opinion, a POSITA would have a reasonable expectation of success in making this modification.

117. Furthermore, it is my opinion that a POSITA would also have been motivated to modify Siotia by combining Sakata's vertical arrangement of IC tags with Siotia's RFID devices, and thus supply this limitation and meet all of the limitations of [1pre] and [1b]. Siotia already discloses RFID devices associated with merchandise items (*see* Ex. 1003, [0041]), and further already shows, through figures in the specification, the arrangement of merchandise items on shelves, which represent planes perpendicular to the floor (*see* Ex. 1003, FIG. 1).

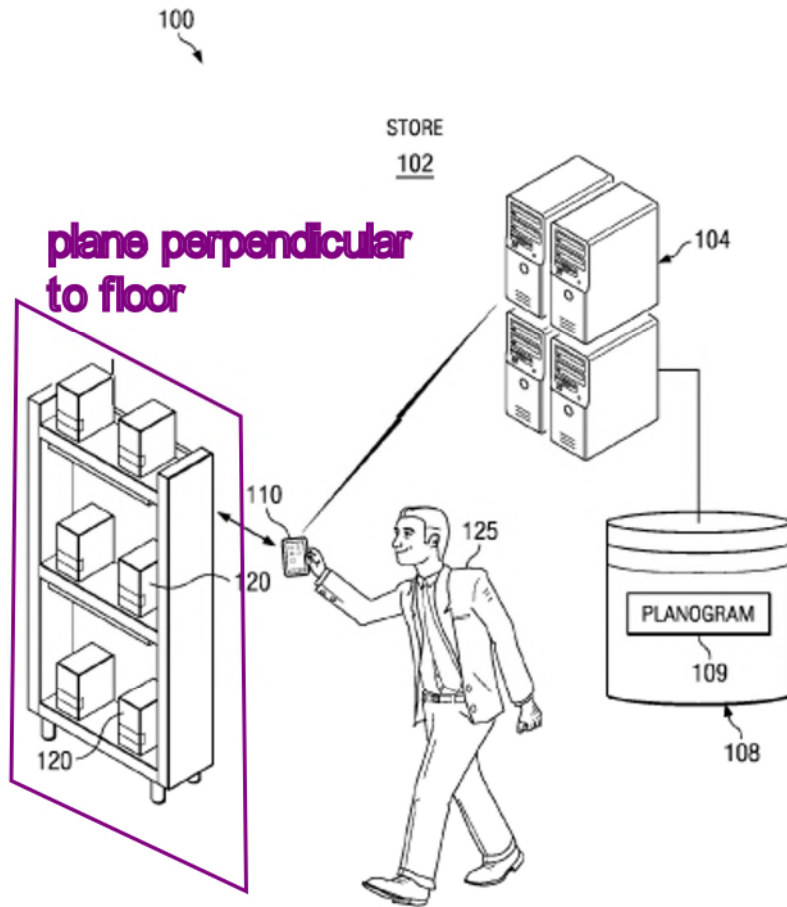


FIG. 1

Ex. 1003 (Siotia), FIG. 1 (annotated)

118. In my opinion, a POSITA reading Siotia in view of Sakata will realize that an association of each RFID device with a particular location defined with a vertical and horizontal position in this plane, just like the association of Sakata's IC tags with the vertical and horizontal coordinate points on a wall of a building, is a conventional and obvious way of arranging such devices, and this will address the universal and conventional goal, expressly taught in Siotia, to determine the user's location in the

store and provide providing targeted promotion and services to the user based on the user's location, since the introduction of an additional dimension (the vertical dimension) into the user's location would allow more precise determination of the location and more targeted promotion and services. *See* Ex. 1003, [0023]. Combining Sakata's vertical arrangement of smart tags with Siotia represents nothing more than a combination of known elements to achieve predictable results, and it is my opinion that a POSITA would have a reasonable expectation of success in doing so, and thus meeting the "vertical and horizontal position" limitation of [1pre] and [1b].

119. A diagram showing the implementation of Sakata's vertical arrangement in Siotia is shown below:

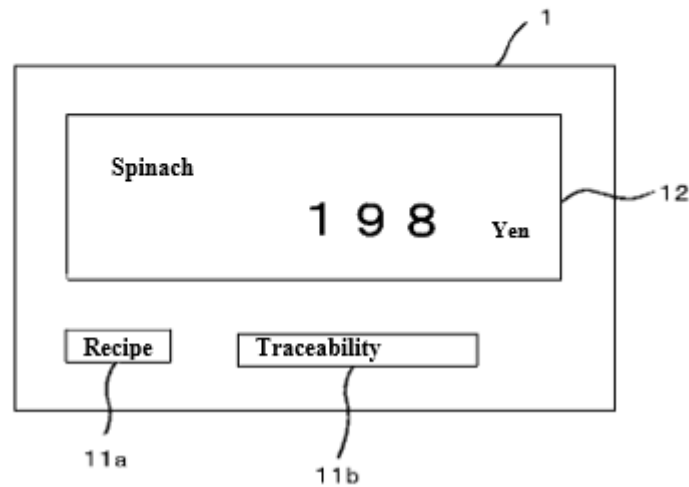
and thus reach the Siotia-Sakata combination that teaches each and every limitation of Claims 1-5 and 8.

B. Ground 2: Claims 6-7, 9 are rendered obvious over Siotia in combination with Sakata and Akao

1. Overview of Akao

121. Japan Patent Pub. 2009-64316 A (“Akao”) discloses “an electronic shelf label and an electronic shelf label system.” Ex. 1004, [0001]. In particular, it is directed to “provid[ing] the product information required by customers from electronic shelf label to the customer’s mobile device, increas[ing] the convenience of the customer, and promot[ing] the purchase of products.” Ex. 1004, [0004]. It claims, among others, “an electronic shelf label for displaying product price that is equipped with a memory means for storing product information; a short-range communication means for communicating with a customer’s mobile device; and a control means for transmitting the product information stored in the memory means to a customer’s mobile device by the short-range communication means.” Ex. 1004, [Claim 1], [0005]. FIG. 3 of Akao, reproduced below, is an external view showing the external appearance configuration of the claimed electronic shelf label in Akao.

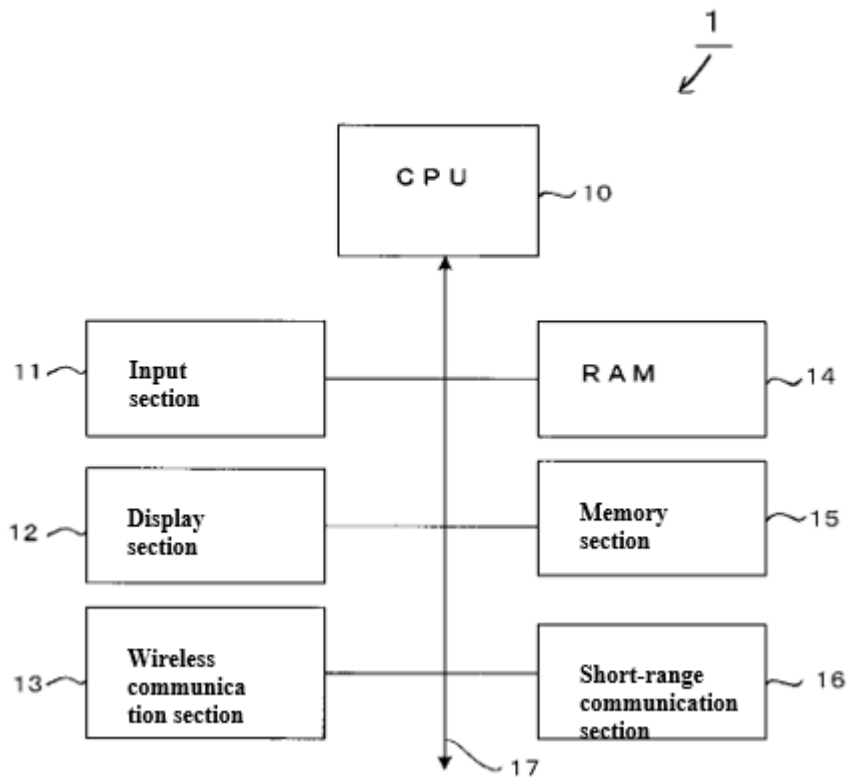
[FIG. 3]



Ex. 1004 (Akao), FIG. 3

122. FIG. 2 of Akao, reproduced below, is a block diagram showing the main configuration of the electronic shelf label.

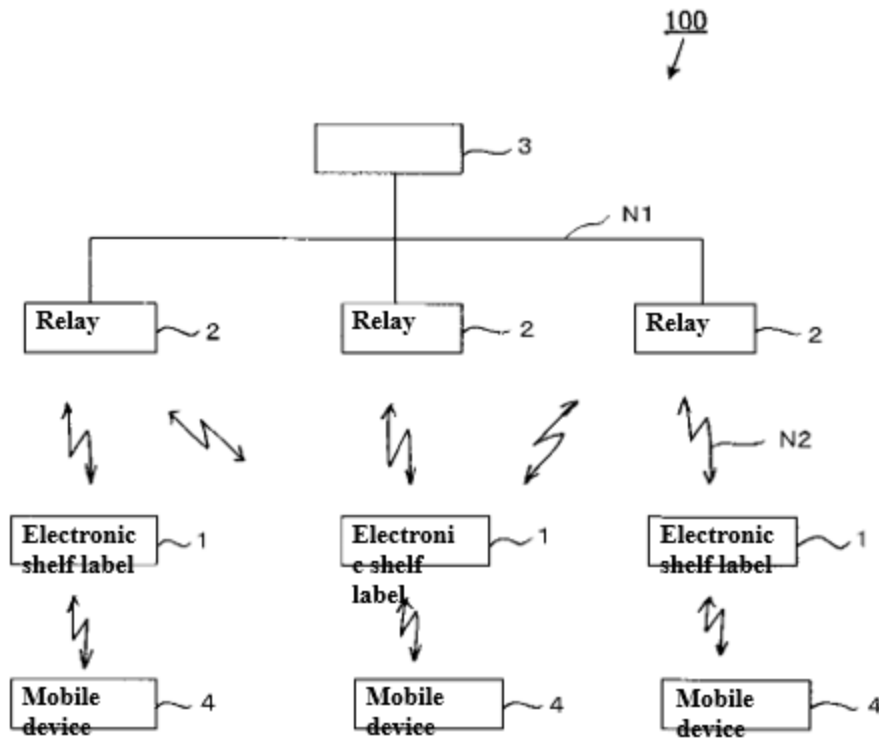
[FIG. 2]



Ex. 1004 (Akao), FIG. 2

123. The electronic shelf labels of Akao are intended to be used in a shopping setting where they communicate with a store server and with mobile devices, as illustrated in FIG. 1 of Akao, reproduced below.

[FIG. 1]



Ex. 1004 (Akao), FIG. 1

124. I have been informed by counsel that Akao qualifies as prior art under pre-AIA 35 U.S.C. § 102(b) because it was published on March 26, 2009, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1004, (43).

125. It is my opinion that Akao is analogous prior art to the '340 Patent. The '340 Patent is directed to "the display of information in a sales area" (Ex. 1001, [1:18-19]) while Akao is directed to electronic shelf label and electronic shelf label system (Ex. 1004, [Title]) which display information in a sales area. Thus, it is my opinion

that both Akao and the '340 Patent are in the same field of endeavor for displaying information in a sales area.

2. Analysis

126. As I would discuss in detail below, the combination of Siotia, Sakata and Akao (“Siotia-Sakata-Akao”) discloses each and every limitation recited by claims 6-7, 9. Furthermore, it is my opinion that a POSITA would have had a reason to further modify the Siotia-Sakata combination of Ground 1 with teachings of Akao and would have had a reasonable expectation of success in doing so.

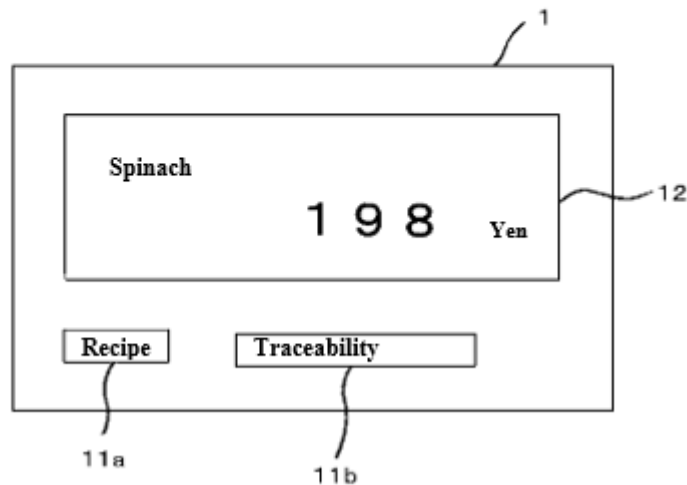
Claim 6

[6pre] “The system according to claim 5, wherein at least one radio-frequency peripheral is an electronic label which comprises:”

127. Claim 5 has already been addressed above.

128. Akao discloses an **electronic shelf label** configured to display a product name and a price. Ex. 1004, [0023].

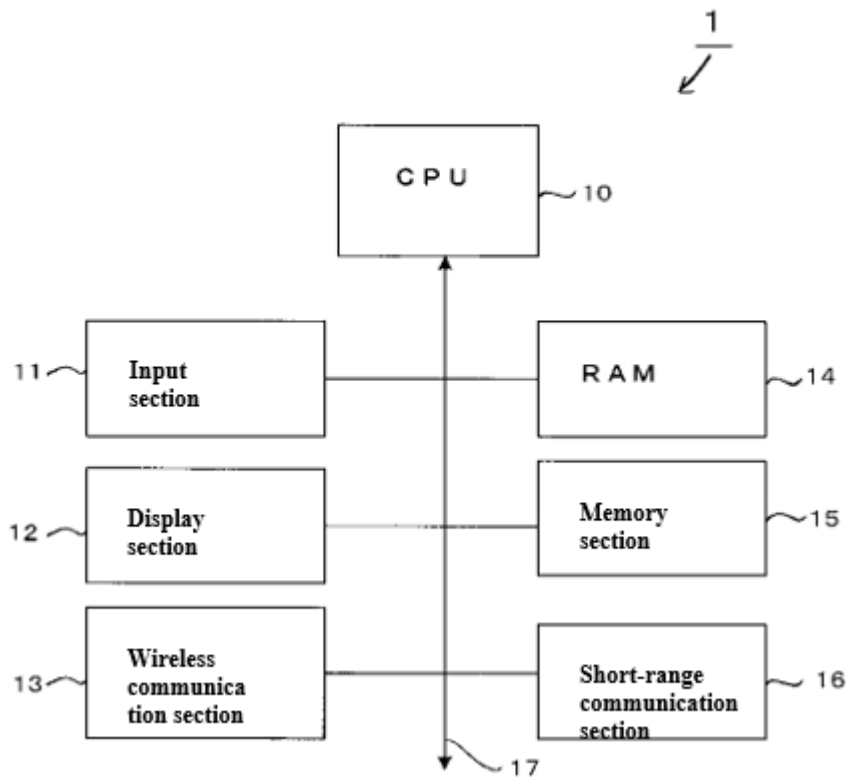
[FIG. 3]



Ex. 1004 (Akao), FIG. 3

129. Akao discloses that the electronic shelf label 1 is configured with a short-range communication section 16. Ex. 1004, [0015]. Akao discloses that the short-range communication section 16 comprises a short-range communication device that assumes communication at a short distance of 1m or less (which completely encompasses the claimed “less than twenty centimeters” of the ’340 Patent), such as Radio Frequency Identification (RFID). Ex. 1004, [0022]. Thus it is my opinion that the electronic shelf label of Akao teaches the claimed **radio-frequency peripheral**.

[FIG. 2]



Ex. 1004 (Akao), FIG. 2

130. Thus it is my opinion that Akao alone teaches each and every additional limitation of [6pre] over the limitations of independent Claim 5. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 5, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao's electronic shelf label into Siotia-Sakata's RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of [6pre].

[6a] “a radio-frequency communication module configured to receive data representing information relating to an item from a central server;”

131. Akao discloses a store server 3 (**central server**). Ex. 1004, [0012]. Akao discloses that store server 3 can send **data representing information relating to an item**, such as recipe information and traceability information, to a specified electronic shelf label 1. Ex. 1004, [0080].

132. Akao further discloses that an electronic shelf label 1 includes a wireless communication section 13 and a short-range communication section 16. Ex. 1004, [0015]. Akao discloses that the wireless communication section communicates through wireless communication network N2 with store server 3 based on an IP address. Ex. 1004, [0019]. A POSITA would find it obvious that such wireless communication based on IP address (and therefore IP protocol) is carried out via the Wi-Fi standard, which employs radio-frequency communications. Therefore a POSITA would find it obvious that wireless communication section 13 engages in radio-frequency communications. Akao discloses that short-range communication section 16 comprises “a communication device that assumes communication at a short distance of 1 m or less, such as Radio Frequency Identification (RFID).” Ex. 1004, [0022]. Therefore Akao teaches that the short-range communication section 16 engages in radio-frequency communication. It is thus my opinion that POSITA would find it obvious that the wireless communication section 13 and the short-range

communication section 16 together teach the claimed **“a radio-frequency communication module configured to receive data representing an item.”**

133. Thus it is my opinion that Akao alone teaches each and every limitation of [6a] over the independent claim 5. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 5, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao’s electronic shelf label into Siotia-Sakata’s RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of [6a].

[6b] “a memory to store said data;”

134. Akao discloses that an electronic shelf label 1 includes a memory section 15 (**memory**). Ex. 1004, [0015]. Akao discloses that “[i]n the electronic shelf label 1, the recipe information and traceability information sent from the store server 3 are **stored** in the recipe information file 15c and traceability information file 15b of the memory section 15.” Ex. 1004, [0080].

135. Thus it is my opinion that Akao alone teaches each and every limitation of [6b] over the independent claim 5. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 5, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao’s electronic shelf label into Siotia-Sakata’s RFID tags.

Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of [6b].

[6c] “a microcontroller to control the display of information relating to an item;”

136. Akao discloses that an electronic shelf label 1 includes a CPU (Central Processing section) 10 (**microcontroller**). Ex. 1004, [0015]. Akao discloses that the CPU 10 **controls the display of** the shelf label **information** (product name, price) stored in the memory section 15 on the display section 12. Ex. 1004, [0018].

137. Thus it is my opinion that Akao alone teaches each and every limitation of [6c] over the independent claim 5. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 5, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao’s electronic shelf label into Siotia-Sakata’s RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of [6c].

[6d] “a display screen to display said item-related information.”

138. Akao discloses that an electronic shelf label 1 includes a display unit 12 (**display screen**). Ex. 1004, [0015]. Akao discloses that the display unit 12 **displays** the shelf label **information** (product name, price) stored in the memory section 15. Ex. 1004, [0018].

139. Thus it is my opinion that Akao alone teaches each and every limitation of [6d] over the independent claim 5. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 5, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao's electronic shelf label into Siotia-Sakata's RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of [6d].

140. Thus, it is my opinion that Siotia-Sakata-Akao renders Claim 6 obvious.

Claim 7

[7] "The system according to claim 6, wherein the mobile terminal is adapted to transmit data to the electronic label via the radio-frequency communication module of said electronic label."

141. Claim 6 has already been addressed above.

142. Akao discloses that the electronic shelf label 1 can engage in mutual communication with the customer's mobile device 4 (**mobile terminal**) through short-range communication section 16. Ex. 1004, [0040], [0047], [0057], [0068]. Akao discloses various data such as customer attribute data that the customer's mobile terminal 4 will **transmit to the electronic shelf label 1**. Ex. 1004, [0041]. Such data is transmitted via the short-range communication section, which, as I

discussed for [6a] above, together with the wireless communication section 13, teaches the claimed **radio-frequency communication module**.

143. Thus, it is my opinion that the Akao teaches the claimed “the mobile terminal (*mobile device 4 of Akao*) is adapted to transmit data to the electronic label (*electronic shelf label 1 of Akao*) via the radio-frequency communication module (*of which short-range communication section 16 is a part*) of said electronic label” of [7].

144. Thus it is my opinion that Akao alone teaches each and every limitation of [7] over the dependent claim 6. As discussed above, Siotia-Sakata-Akao already teaches each and every limitation of Claim 6, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao’s electronic shelf label into Siotia-Sakata’s RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of Claim 7, thus rendering Claim 7 obvious.

Claim 9

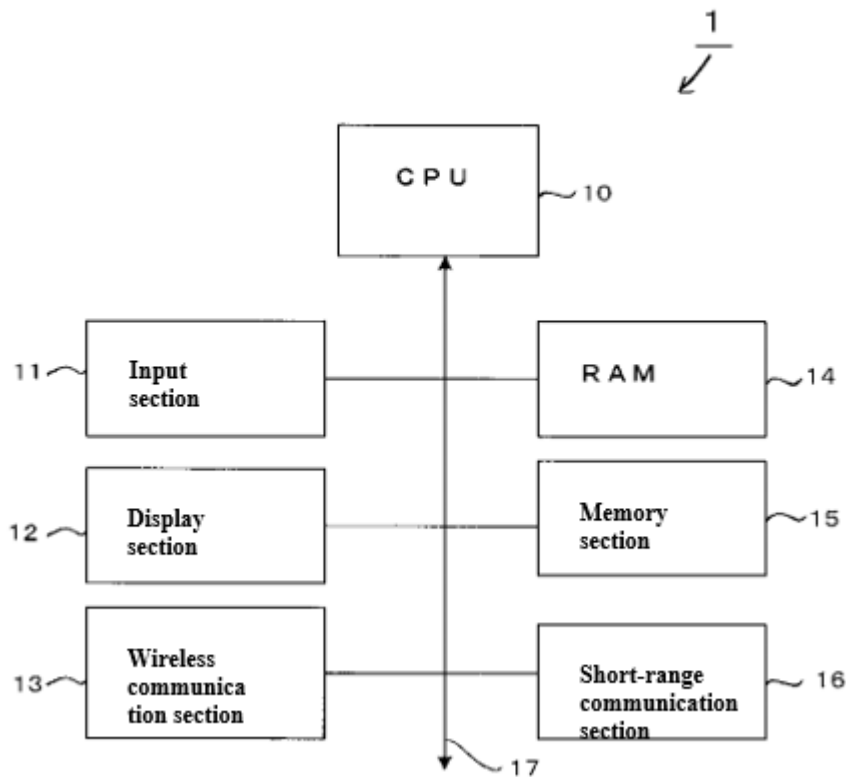
[9] “The system according to claim 8, wherein the chip is connected to a microcontroller of the radio-frequency peripheral, and wherein the antenna is arranged on or within a case inside which the microcontroller is housed.”

145. Claim 8 has already been addressed above.

146. FIG. 2 of Akao depicts the near-range communication section 16. It is my opinion that a POSITA would find it obvious that this near-range communication section 16, which comprises a short-distance communication device such as RFID (see Ex. 1004, [0022]), would have the **antenna** and **chip** of Siotia-Sakata's tag, in particular because, as I discussed in the backgrounds section, a POSITA would be familiar with the presence of antennas and chips in the ubiquitous and conventional RFID tags.

147. FIG. 2 of Akao shows the near-range communication section 16 as connected to CPU 10 (the **microcontroller**). It is my opinion that a POSITA would find it obvious that the chip inside the near-range communication section 16 is connected to CPU 10, because a POSITA would understand that the CPU 10 is connected to the near-range communication section 16 in order to interact with the section (see Ex. 1004, [0016]), and such intersection cannot occur without the necessary connection.

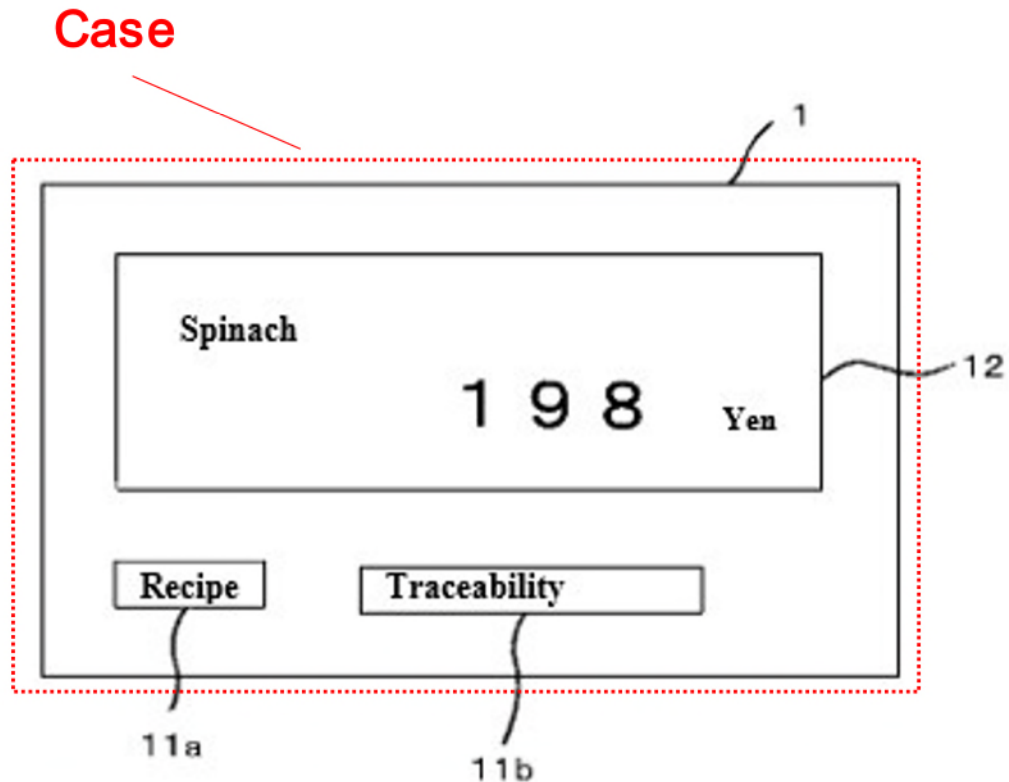
[FIG. 2]



Ex. 1004 (Akao), FIG. 2

148. Further, FIG. 3 of Akao, an external view of an electronic shelf label (the claimed **radio-frequency peripheral**), clearly shows that the label is enclosed inside a **case**. It is my opinion that POSITA would find it obvious that the **antenna** inside the near range communication range 16 of the label is arranged within this case and the **microcontroller** is also housed inside this case, since both the antenna and the microcontroller are marked as inside the case.

[FIG. 3]



Ex. 1004 (Akao), FIG. 3 (annotated)

149. Thus it is my opinion that Akao alone teaches each and every limitation of [9] over the dependent claim 8. As discussed above, Siotia-Sakata already teaches each and every limitation of Claim 8, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao's electronic shelf label into Siotia-Sakata's RFID tags. Thus, it is my opinion that Siotia-Sakata-Akao teaches each and every limitation of Claim 9, thus rendering Claim 9 obvious.

Motivation to combine Siotia-Sakata with Akao

150. As I would discuss in details below, it is my opinion that a POSITA would have had a reason to further combine Siotia-Sakata with Akao and would have had a reasonable expectation of success in doing so.

151. Specifically, a POSITA would have been motivated and able to modify Siotia-Sakata by integrating Akao's electronic shelf label into Siotia-Sakata's RFID tag, thus creating an electronic shelf label-tag that discloses all the limitations of [6] through [9]. In my opinion, POSITA reading Siotia and Sakata in view of Akao would understand that an electronic label with radio-frequency communication module, memory, microcontroller, and display screen, is an obvious way to enhance the interactions between such electronic label and a mobile device as already disclosed by Siotia and Sakata. Further, in my opinion, a POSITA reading Siotia and Sakata in view of Akao would understand that this involves no more than integrating information storage and display abilities into Siotia-Sakata's RFID tags (which already has information storage capacity because it stores the unique ID, *see* Ex. 1008, [0022]). Not only would this have been obvious to try, it also would have yielded no more than predictable results due to the combination of familiar elements in a known way. Further, like Siotia-Sakata's RFID tags, Akao's display-capable electronic shelf labels are also configured for short-range communications that has a range of 1 meter or less (*see* Ex. 1004, [0022]), and this range encompasses

completely the claimed “less than twenty centimeters”. It is thus my opinion that a POSITA would find it obvious to integrate Siotia-Sakata’s RFID tags with Akao’s short-range-communication-capable electronic shelf labels at the time of the alleged invention.

152. In my opinion, a POSITA would have been motivated to combine the Siotia-Sakata with Akao in this way to implement Siotia’s expressly taught functionality of providing information such as promotional materials to the user (Ex. 1003, [0041]).

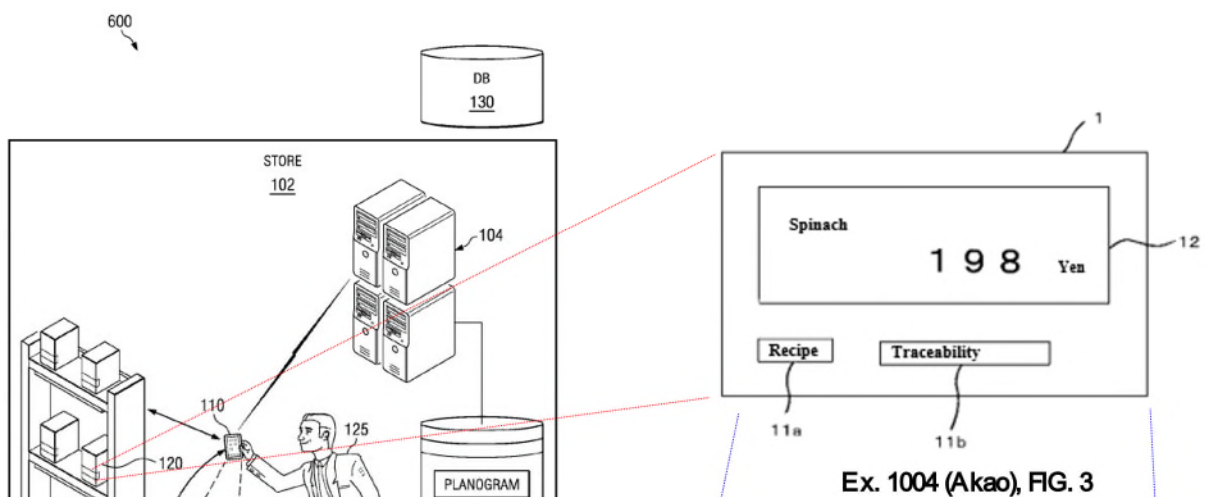
153. Specifically, Akao teaches radio-frequency electronic devices that possess capability to receive, store and display information relating to an item in a store. (Ex. 1004, [0012]-[0023], [0080]). Akao teaches a configuration of such radio-frequency electronic devices that involves radio-frequency communication module, memory, microcontroller, and display screen. (Ex. 1004, [0012]-[0023]). As such, in my opinion, a POSITA would have been motivated and able to use the teaching of Akao to modify Siotia-Sakata for purposes of displaying promotional materials and fulfilling Siotia’s expressly taught functionality of providing information such as promotional materials to the user (Ex. 1003, [0041]).

154. The combination of the Siotia-Sakata with Akao represents nothing more than the combination of known elements to achieve predictable results. Siotia, Sakata and Akao all teach the communications between radio-frequency peripheral and mobile

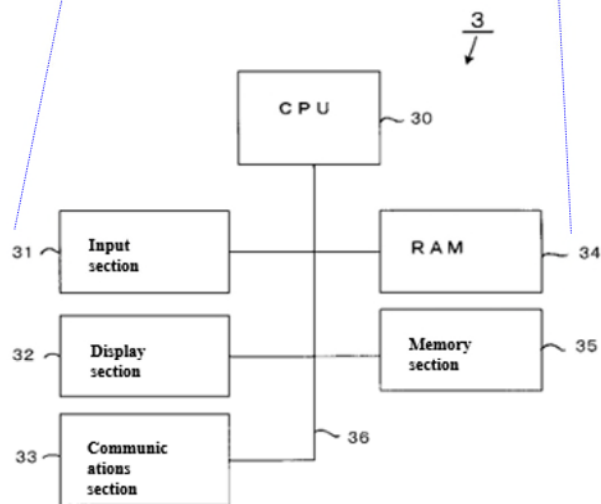
device. Ex. 1003, [0041]; Ex. 1008, [0022]; Ex. 1004, [0040-0047], [0054]-[0057], [0066]-[0068]. Akao then teaches a configuration involving the memory and the display in the smart tag. Ex. 1004, [0012], [0015], [0018]. In my opinion, a POSITA would have known this configuration as well as its predictable results. Using the configuration in Akao serves to address the universal and obvious goal to allow display or advertisement of product-related information. As such, combining the Siotia-Sakata combination with Akao by integrating Akao's electronic shelf label into Siotia-Sakata's RFID tag represents, at most, an obvious extension of the functionality expressly disclosed in Siotia-Sakata combination to address this universal and obvious objective. Further, Akao's electronic shelf label is a radio-frequency peripheral (like the RFID tag of Siotia-Sakata). Ex. 1004, [0015], [0022]. Akao also discloses a store server and a mobile device. Ex. 1004, [0004], [0012]. Thus Akao also discloses mobile device-central server-radio frequency peripheral system, structurally similar to the system in Siotia-Sakata. Integrating Akao's electronic shelf label into Siotia-Sakata's RFID tag is thus, at most, combining two pre-existing elements occupying similar positions in two similar structures, with each doing no more than they would in separate operation. It is thus my opinion that this modification would have been well within the skill of a POSITA.

155. A diagram showing the implementation of Akao's electronic shelf labels in Siotia-Sakata is shown below:

[FIG. 3]



[FIG. 4]



156. Therefore, in my opinion, a POSITA would have been motivated and able to integrate Akao's electronic shelf label into Siotia-Sakata's RFID tag, thus creating

the electronic shelf label-tag of Siotia-Sakata-Akao that discloses all the limitations of Claims 6-7 and 9.

C. Ground 3: Claims 8 and 9 are rendered obvious over Siotia in combination with Sakata, Akao, and Chen

1. Overview of Chen

157. U.S. Patent No. 7,283,036 B2 (“Chen”) is directed to “a display device” and in particular to “a wireless display device, which displays an image without the need for battery power or external power.” Ex. 1006, [1:7-10]. Chen discloses that the wireless display device “mainly includes an antenna unit, a processing unit, a display unit, and a power supply unit.” Ex. 1006, [1:50-52]. FIG. 2 of Chen shows such a wireless display device.

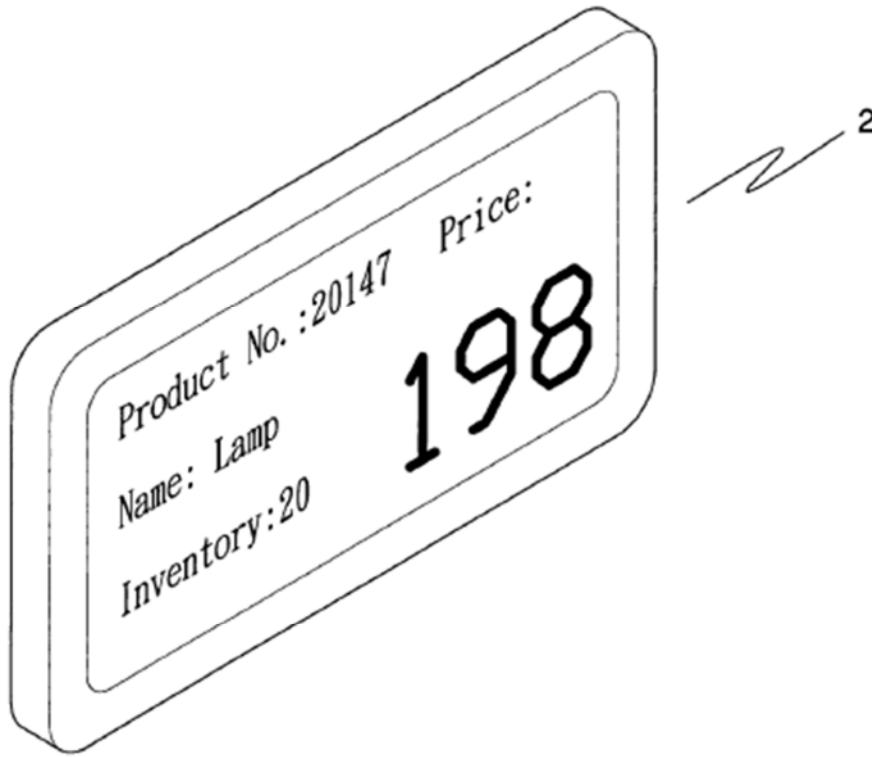


FIG. 2

Ex. 1006 (Chen), FIG. 2

158. Chen discloses that the invention can be “applied to an electronic shelf label (ESL) system and each of the wireless display devices 2 could be fixed on shelves respectively, so as to indicate information about merchandise placed on the shelves, and the information could include product numbers, names and prices etc.” Ex. 1006, [2:55-60].

159. FIG. 3 of Chen shows the internal structure of the wireless display device.

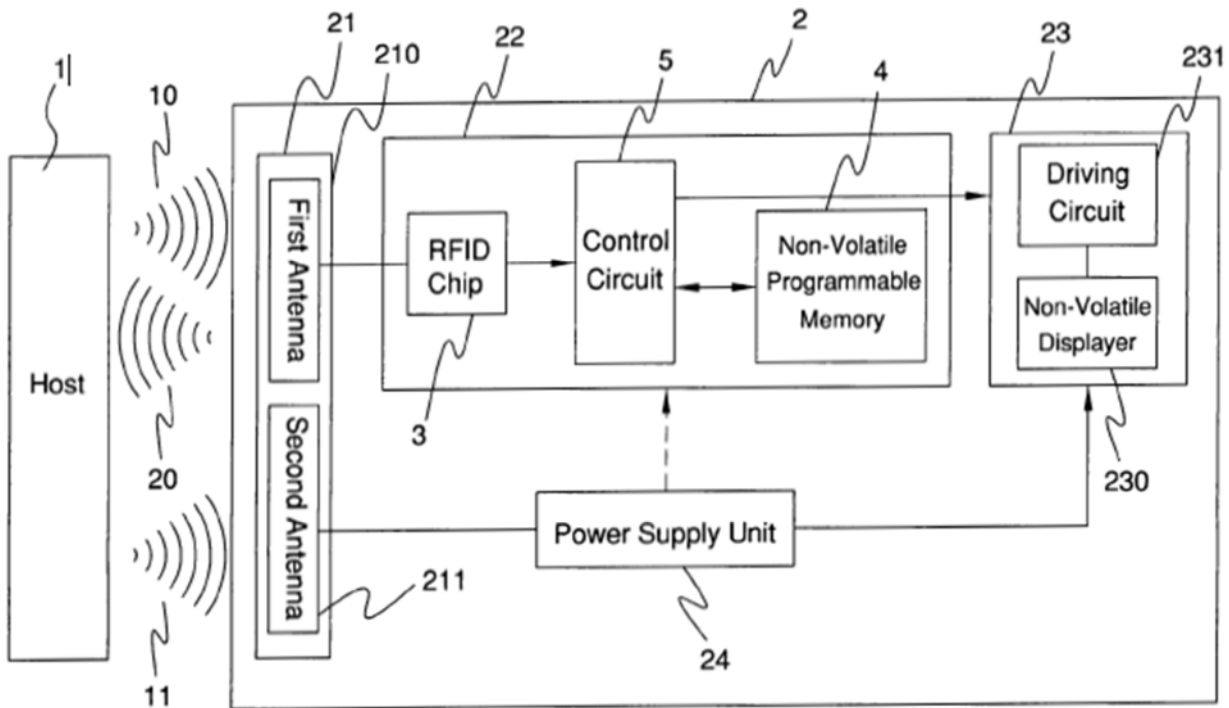


FIG. 3

Ex. 1006 (Chen), FIG. 3

160. I was informed by counsel that Chen qualifies as prior art under pre-AIA 35 U.S.C. § 102(b), because it was published on April 13, 2006 and granted on October 16, 2007, and both dates are more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1006, (45), (65).

161. It is my opinion that Chen is analogous prior art to the '340 Patent. The '340 Patent is directed to "the display of information in a sales area." Ex. 1001, [1:18-19]. Chen is directed to wireless display devices, and in particular wireless display devices 2 that could be fixed on shelves as part of an electronic shelf label system. Ex. 1006, [1:7-10], [2:55-60]. Thus, it is my opinion that both Chen and the '340 Patent are in the same field of endeavor for displaying information in a sales area.

2. Analysis

162. As I discussed earlier, the Siotia-Sakata-Akao combination of Ground 2 already teaches each and every element of Claims 8-9 (more particularly, Siotia-Sakata teaches Claim 8 and Siotia-Sakata-Akao teaches Claim 9). Furthermore, it is my opinion that Claims 8-9 are additionally unpatentable because they are obvious over the combination of Siotia-Sakata-Akao and Chen (“Siotia-Sakata-Akao-Chen”). As set forth in detail below, Siotia-Sakata-Akao-Chen discloses each and every limitation recited by Claims 8-9. Furthermore, in my opinion, POSITA would have had a reason to further modify Siotia-Sakata-Akao with teachings of Chen and would have had a reasonable expectation of success in doing so.

Claim 8

[8] **“The system according to claim 5, wherein the chip and the antenna are arranged at different points of the radio-frequency peripheral, and wherein the radio-frequency peripheral comprises connections configured to ensure a communications link between the antenna and the chip.”**

163. Claim 5 has already been addressed above.

164. Chen’s discloses a wireless display device that contains a radio-frequency identification chip 3. Ex. 1006, [4:25-27]. It is thus my opinion that Chen teaches the claimed **radio-frequency peripheral** through this wireless display device. Chen further teaches the claimed **chip** and **antenna** through its RFID chip 3 and first

antenna 210. As depicted in FIG. 3 of Chen, the RFID chip 3 and the first antenna 210 are **arranged at different points** of the radio-frequency peripheral (that is, the wireless display device), and the radio-frequency peripheral comprises **connections configured to ensure a communications link** between the antenna and the chip.

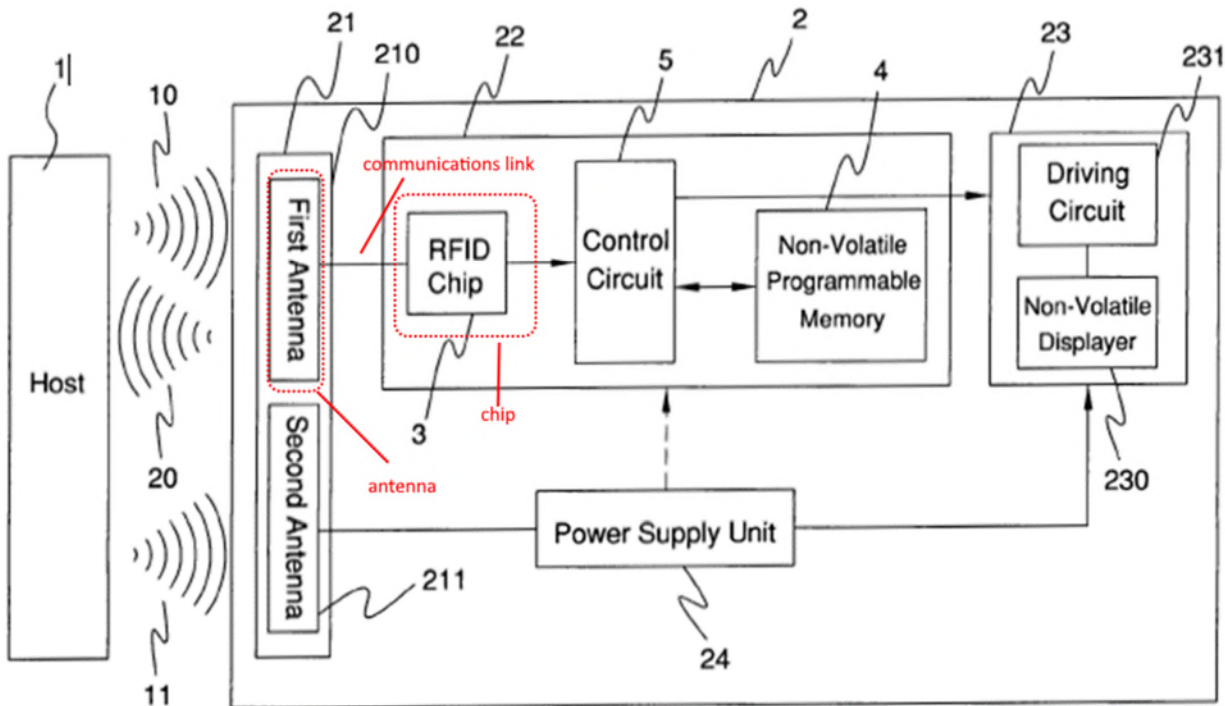


FIG. 3

Ex. 1006 (Chen), FIG. 3 (annotated)

165. Thus it is my opinion that Chen alone teaches each and every limitation of [8] over the dependent claim 7. As discussed above, Siotia-Sakata-Akao already teaches each and every limitation of Claim 7, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to implement Siotia-Sakata-Akao's electronic shelf label-tag in accordance with Chen's teachings. Thus,

it is my opinion that Siotia-Sakata-Akao-Chen teaches each and every limitation of Claim 8, thus rendering Claim 8 obvious.

Claim 9

[9] “The system according to claim 8, wherein the chip is connected to a microcontroller of the radio-frequency peripheral, and wherein the antenna is arranged on or within a case inside which the microcontroller is housed.”

166. Claim 8 has already been addressed above.

167. As depicted in FIG. 3 of Chen, the RFID chip 3 is **connected to** control circuit 5 (a **microcontroller**) of the radio-frequency peripheral (that is, the wireless display device), and the first antenna 210 is **arranged on a case** inside which the microcontroller is housed.

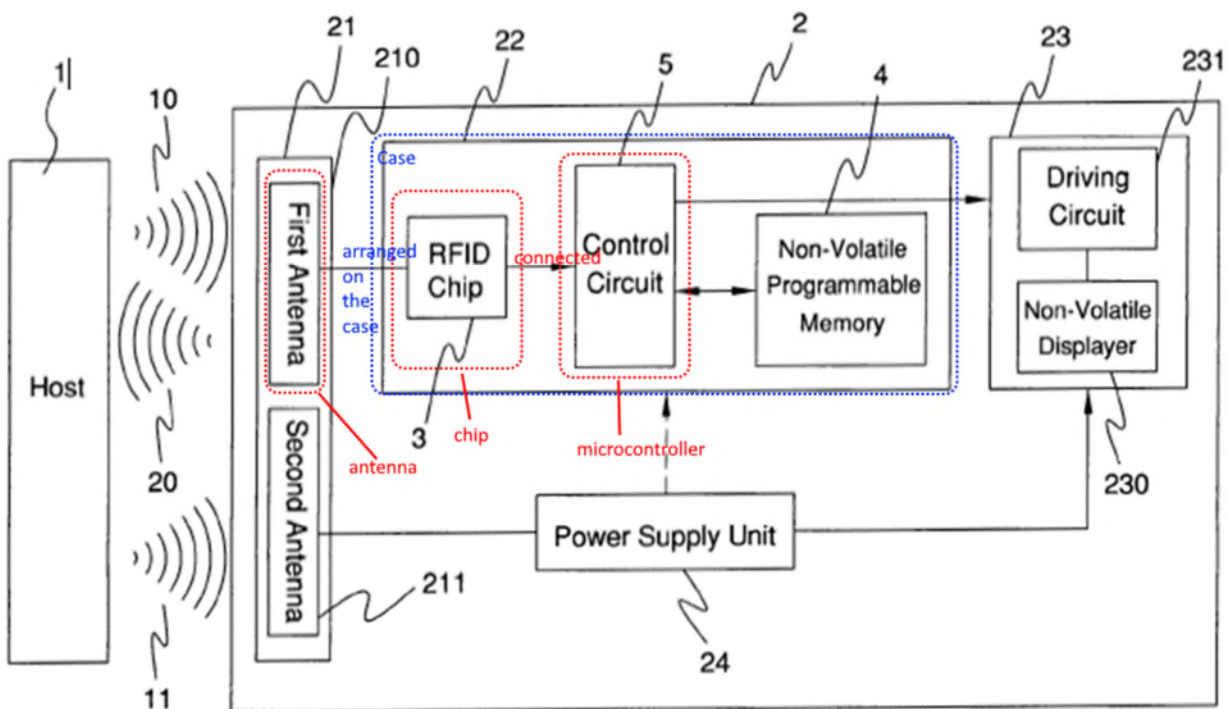


FIG. 3

Ex. 1006 (Chen), FIG. 3 (annotated)

168. It is further my opinion that the first antenna 210 of Chen is also **arranged within the case** of the whole wireless display device, inside which the microcontroller is also housed, as shown in FIG. 2 and FIG. 3 below.

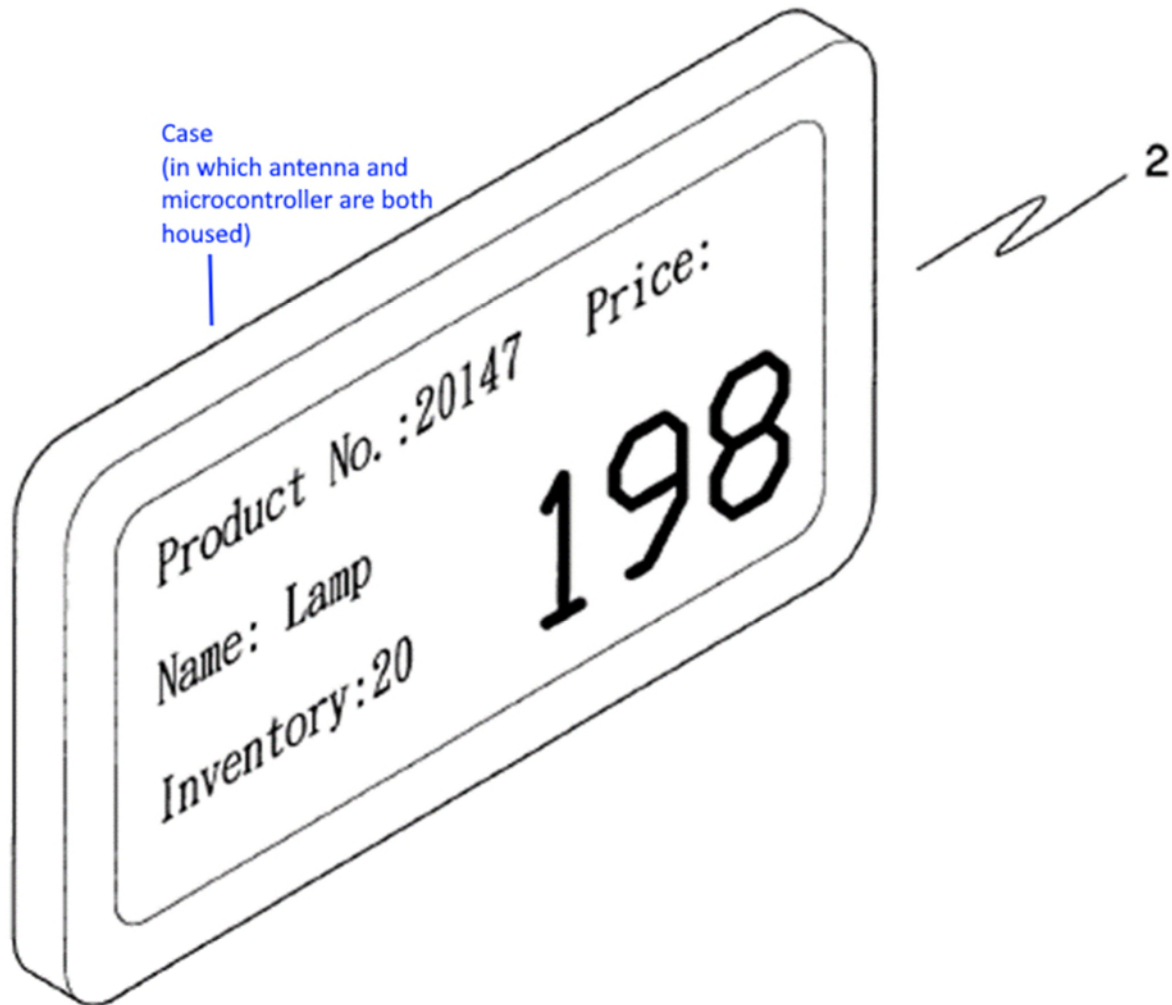


FIG. 2

Ex. 1006 (Chen), FIG. 2 (annotated)

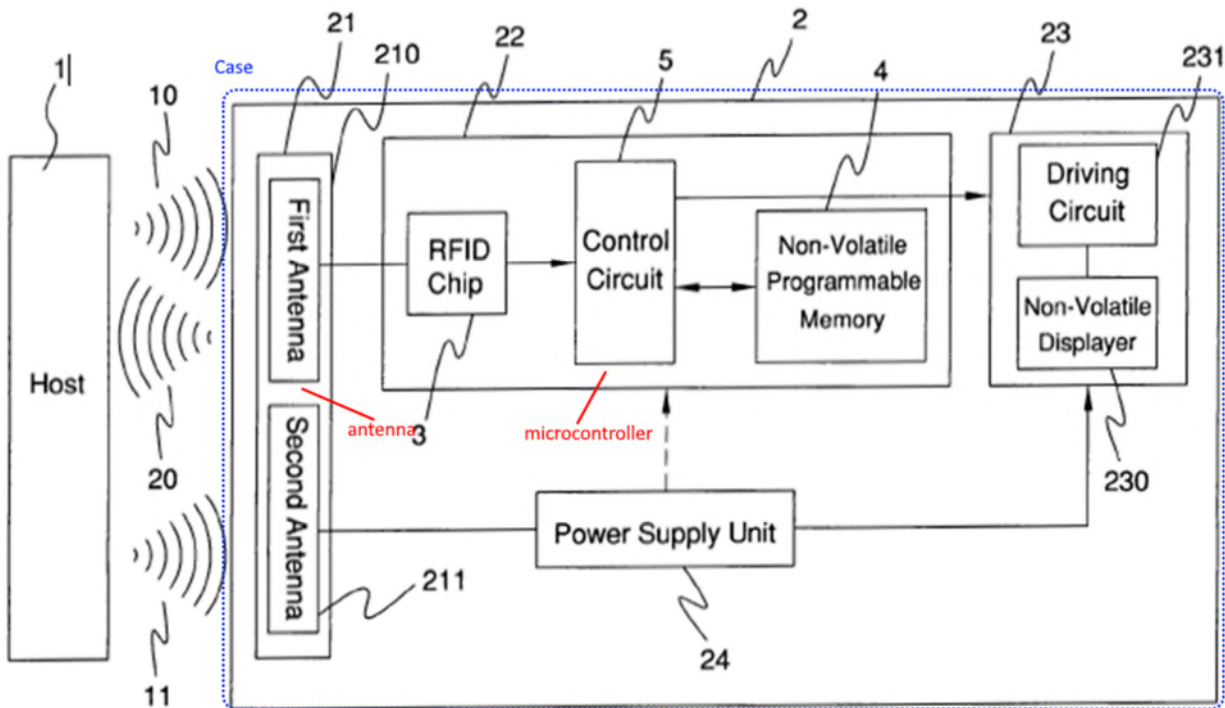


FIG. 3

Ex. 1006 (Chen), FIG. 3 (annotated)

169. With either of these two teachings of the claimed **case** it is my opinion that Chen alone teaches each and every limitation of [9] over the dependent claim 8. As discussed above, Siotia-Sakata-Akao-Chen already teaches each and every limitation of Claim 8, and as would be further discussed below, it is my opinion that a POSITA would have been motivated and able to implement Siotia-Sakata-Akao's electronic shelf label-tag in accordance with Chen's teachings. Thus, it is my opinion that Siotia-Sakata-Akao-Chen teaches each and every limitation of Claim 9, thus rendering Claim 9 obvious.

Motivation to combine Siotia-Sakata-Akao with Chen

170. As I would discuss in details below, it is my opinion that a POSITA would have had a reason to combine Siotia-Sakata-Akao with Chen by implementing Siotia-Sakata-Akao's electronic shelf label-tag in accordance with Chen's teachings, and would have had a reasonable expectation of success in doing so.

171. In my opinion, a POSITA would have had reason to implement the structure of Chen's wireless display devices to implement the electronic shelf label-tag of Siotia-Sakata-Akao. As discussed above, Siotia-Sakata-Akao already discloses an electronic shelf label-tag system, in which the electronic shelf labels-tags receive information from a central server and display such information. In my opinion, a POSITA would recognize certain obvious structural principles for the electronic shelf label-tag of Siotia-Sakata-Akao. It is my opinion that a POSITA reading Siotia, Sakata, and Akao in view of Chen would further find it obvious to use the detailed structure disclosed in Chen to implement the electronic shelf label-tag of Siotia-Sakata-Akao in actual realization of the system of Siotia-Sakata-Akao. Further, using Chen's wireless display device, with its avoidance of battery power (and thus smaller size of the label), would address Akao's express concern over "a large device configuration of the electronic shelf label and high cost" in the prior art electronic shelf systems (Ex. 1004, [0003]), as well as follow Sakata's express disclosure of using received radio waves to power the communication (Ex. 1008, [0022]). Thus, in my opinion, a POSITA would have been motivated to use Chen's teachings to

implement the electronic shelf label-tag of Siotia-Sakata-Akao in furtherance of these express disclosures of Sakata and Akao.

172. Further, in my opinion, the change would be obvious for a POSITA to try because Chen expressly teaches that the wireless display devices can be applied to an electronic shelf label system, *see* Ex. 1006, [2:55-60], and Siotia-Sakata-Akao discloses an electronic shelf label-tag system. In my opinion, this would be obvious to try for another reason, as several of the components disclosed in Chen (processing unit 22 including RFID chip 3/non-volatile programmable memory 4, display unit 23) all have their functionally corresponding components expressly disclosed in Siotia-Sakata-Akao, namely, the CPU 10, near-range communication section 16, memory section 15, display section 12 of Akao, *see* Ex. 1004, [0015]. As such, combining Chen's wireless display device structure with the Siotia-Sakata-Akao's electronic shelf label-tag represents nothing more than the mere application of a known technique to a piece of prior art ready for the improvement, and it is my opinion that a POSITA would have a reasonable expectation of success in doing so, and thus creating the Siotia-Sakata-Akao-Chen combination that explicitly discloses all the limitations of Claims 8-9.

173. It is my further opinion that, a POSITA familiar with the RFID/NFC technology and standards, including the powering and activation mechanisms for both active and passive RFID/NFC tags, would recognize that the electronic shelf

label/tag of Siotia-Sakata-Akao only requires a single antenna which facilitates both the communication with readers and the supply of power (and thus activation) through received electromagnetic waves, and would recognize that while Chen discloses two antennas, it is not necessary to implement Chen's second antenna (which provides an alternative powering mechanism) in Siotia-Sakata-Akao's electronic shelf label/tag. As discussed above, a POSITA only needs Chen's teachings of structural elements for reaching a concrete implementation of Siotia-Sakata-Akao's electronic shelf label/tag, and for this a POSITA would know that Chen's first antenna is analogous in its function of near range communication to Siotia-Sakata-Akao's antenna, and Chen's RFID chip, control unit and memory are analogous in their functions to their corresponding components of Siotia-Sakata-Akao's electronic shelf label/tag, while Siotia-Sakata-Akao's antenna already possesses power supply mechanisms (from Sakata's teaching) and therefore Chen's second antenna is not necessary for a concrete implementation of Siotia-Sakata-Akao's electronic shelf label/tag. Omitting Chen's second antenna in the concrete implementation would keep the existing integration in Siotia-Sakata-Akao's antenna of both functionalities, as well as reducing the overall components and complexity of the electronic shelf label/tag, thus reducing the scope of modification, simplifying the overall design, saving cost, and facilitating production and maintenance.

174. A diagram showing the implementation of Chen's structural elements in Siotia-Sakata-Akao is shown below:

[FIG. 3]

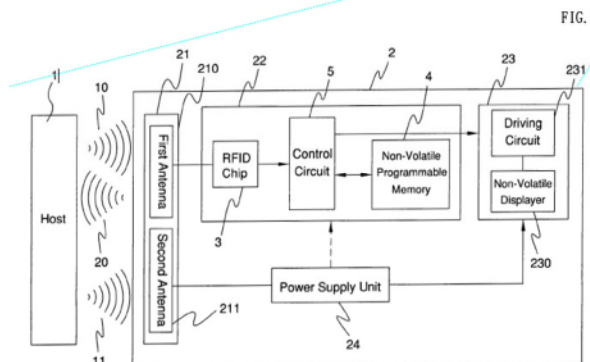
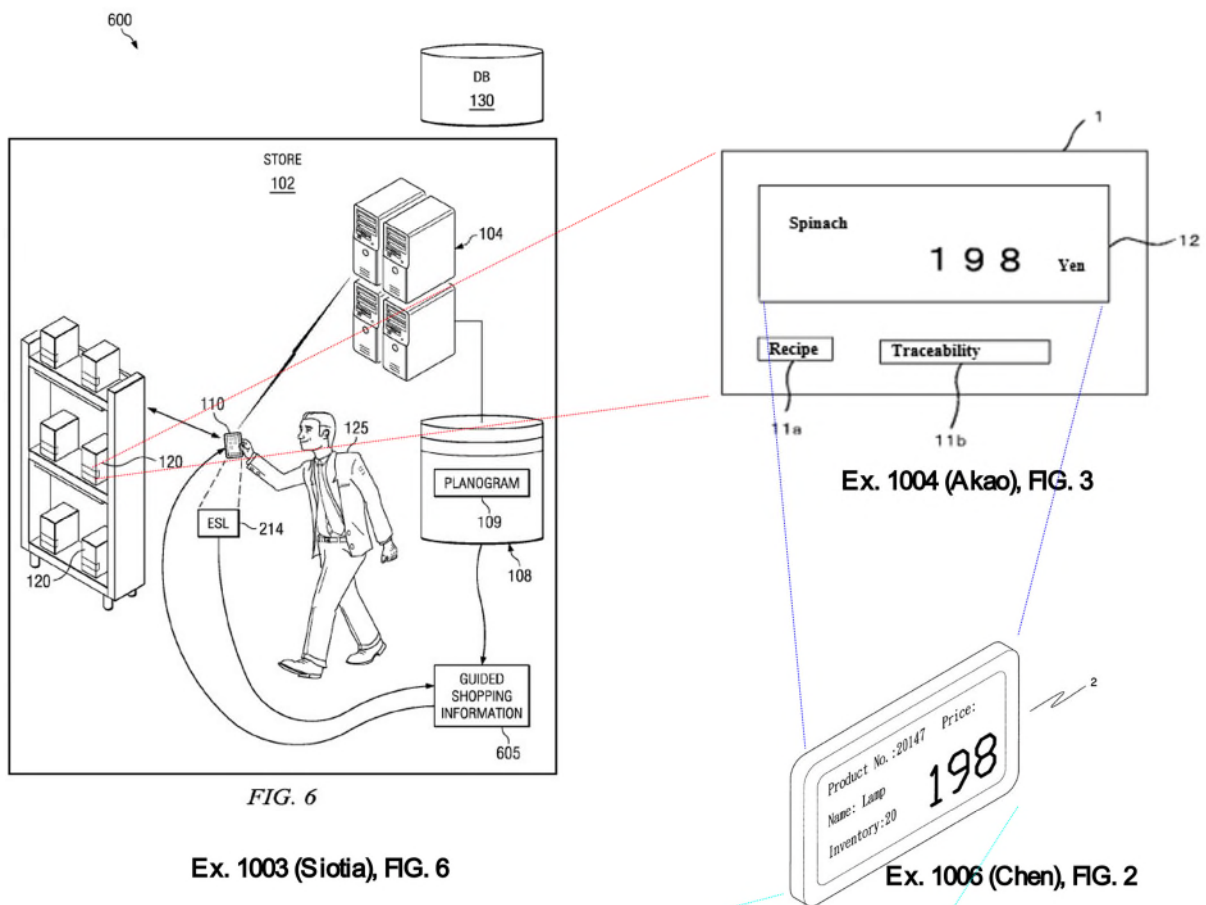


FIG. 3

Ex. 1006 (Chen), FIG. 3

D. Ground 4: Claims 1-3, 5, 8 are rendered obvious over Ghosh in combination with Sakata

1. Overview of Ghosh

175. U.S. Patent Application Publication No. 2012/0095805 A1 by Ghosh (“Ghosh”) discloses “a computer-implemented method of acquiring customer insight information in a retail environment.” Ex. 1007, [Abstract]. In particular, it discloses that the customer insight system can be used to track customer location and foot traffic within the retail environment, or to initiate personalized customer interactions such as targeted advertising and product offers, product information, customer assistance, and the like. Ex. 1007, [0008].

176. FIG. 1 of Ghosh is a prospective view of a retail environment that includes a customer insight system in accordance with the embodiments.

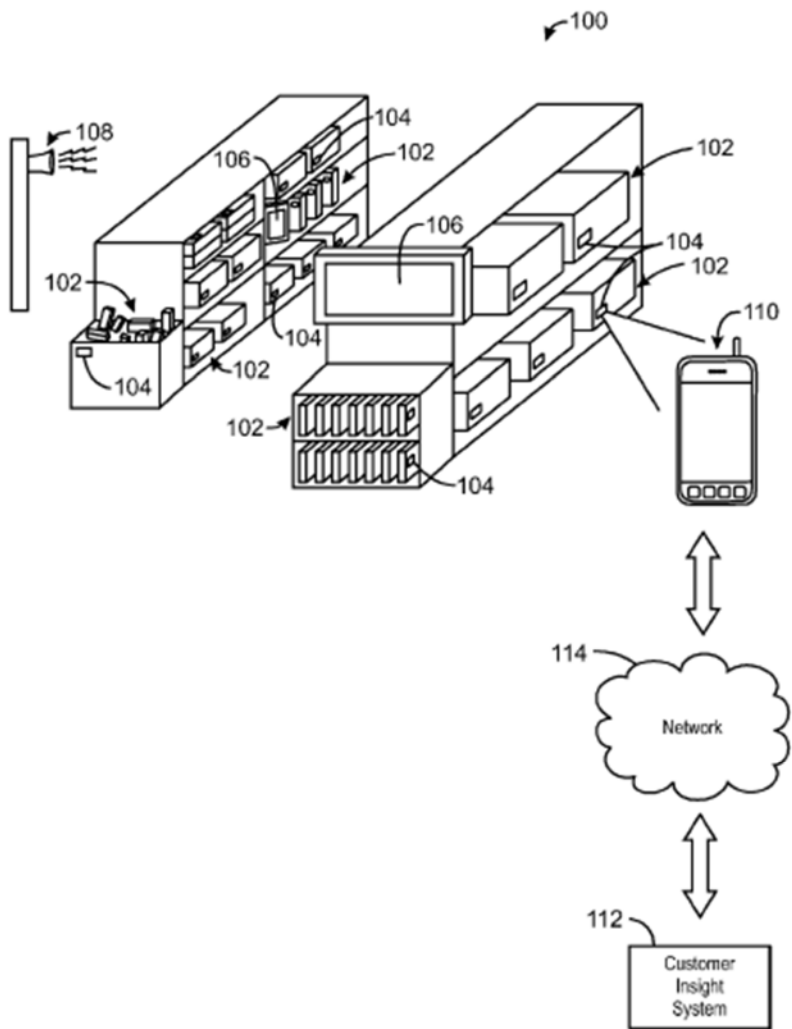
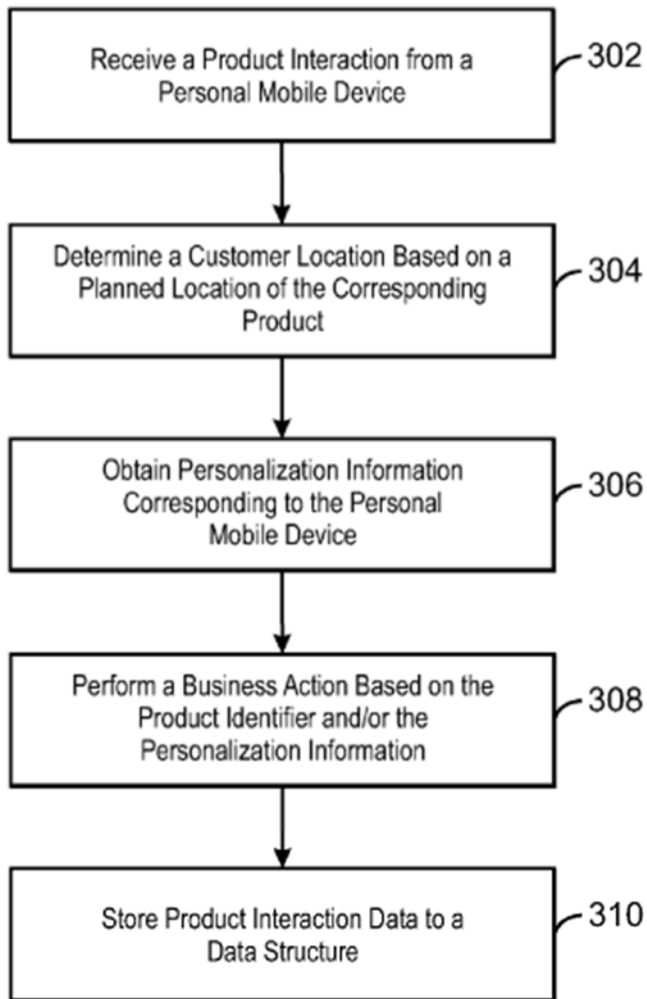


FIG. 1

Ex. 1007 (Ghosh), FIG. 1

177. FIG. 3 of Ghosh is a flow diagram showing one method in accordance with the embodiments.



300
FIG. 3

Ex. 1007 (Ghosh), FIG. 3

178. I have been informed by counsel that Ghosh qualifies as prior art under pre-AIA 35 U.S.C. § 102(e) because it was filed on October 18, 2010, before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1007, (22).

179. It is my opinion that Ghosh is analogous prior art to the '340 Patent. The '340 Patent alleges an invention of “means for providing consumers with spatially localized information, in relation to the place and context of a consumer, which complements the information already visually available in a sales area” (Ex. 1001, [2:8-12]) while Ghosh discloses methods to “track customer location and foot traffic within the retail environment” as well as “initiate personalized customer interactions such as targeted advertising and product offers, product information, customer assistance, and the like” (Ex. 1007, [0008]). Thus, it is my opinion that both Ghosh and the '340 Patent are in the same field of endeavor for determining customer location within the sales area and providing targeted information to customer.

2. Analysis

180. As set forth in detail below, it is my opinion that Ghosh in combination with Sakata (“Ghosh-Sakata”) discloses each and every limitation recited by claims 1-3, 5, and 8. Furthermore, A POSITA would have had a reason to combine Ghosh with Sakata and would have had a reasonable expectation of success in doing so.

Claim 1

[1pre] “A method for communicating spatially localized information to a mobile terminal, the method being performed by a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined

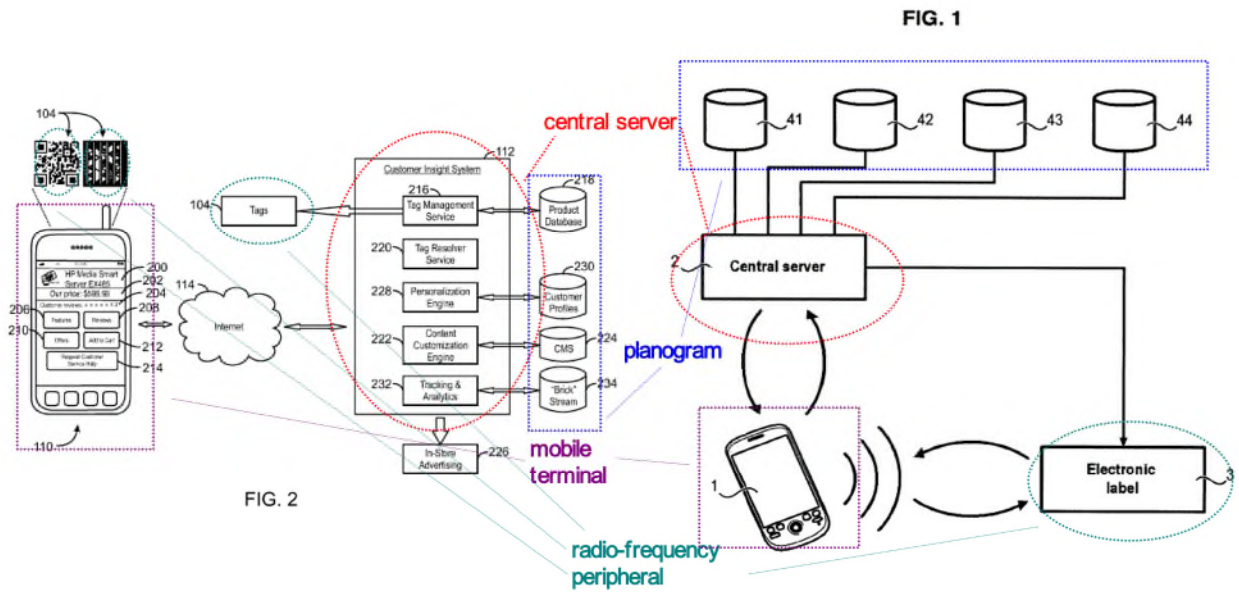
area, each of the plurality of locations being defined by a vertical and horizontal position within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier, the method comprising:”

181. It is my opinion that the portion “A method for communicating spatially localized information” is not limiting, because it merely states the purpose or intended use of the alleged invention. It does not define any of the claim limitations, which are set forth fully in the body of the claim (i.e. a communicating method of spatially localized information). To the extent that this portion is limiting, it is my opinion that Ghosh-Sakata teaches this portion, please refer to my discussions of limitation [1c] below.

182. Ghosh discloses a customer insight system 112 (**central server**) accessible through network 114 from mobile device 110 (**mobile terminal**). Ex. 1007, [0012]. Ghosh discloses a store **planogram** that is accessible by the customer insight system 112. Ex. 1007, [0009], [0013]. Ghosh discloses a product identification tag 104 that can be an RFID or NFC tag, that is, a **radio-frequency peripheral**. Ex. 1007, [0009], [0011], [0017]. Ghosh discloses a plurality of products 102 in the retail environment 100, “associated with product identification tags 104 that can be used to electronically identify the corresponding product 102.” Ex. 1007, [0009]. Ghosh discloses that “the location of products within the retail environment can be

determined according to a store planogram that indicates how and where the retail products are to be displayed.” Ex. 1007, [0009]. Ghosh discloses that the production identification tags 104 may include a **unique product identifier**. Ex. 1007, [0009]. Ghosh discloses that the product identification obtained from product identification tag 104 can be compared by the customer insight system 112 against the store planogram to accurately identify user location within the retail environment 100. Ex. 1007, [0013]. Thus, it is my opinion that the **unique product identifier** of Ghosh is inherently and necessarily **associated one-to-one** in the **planogram** with the product **locations** within the **predetermined area** of the retail environment, because otherwise the comparison against the store planogram and the accurate identification of user location cannot occur.

183. The following annotated figure shows the correspondence between the components of Ghosh and the components of the '340 Patent.



Ex. 1007, FIG. 2

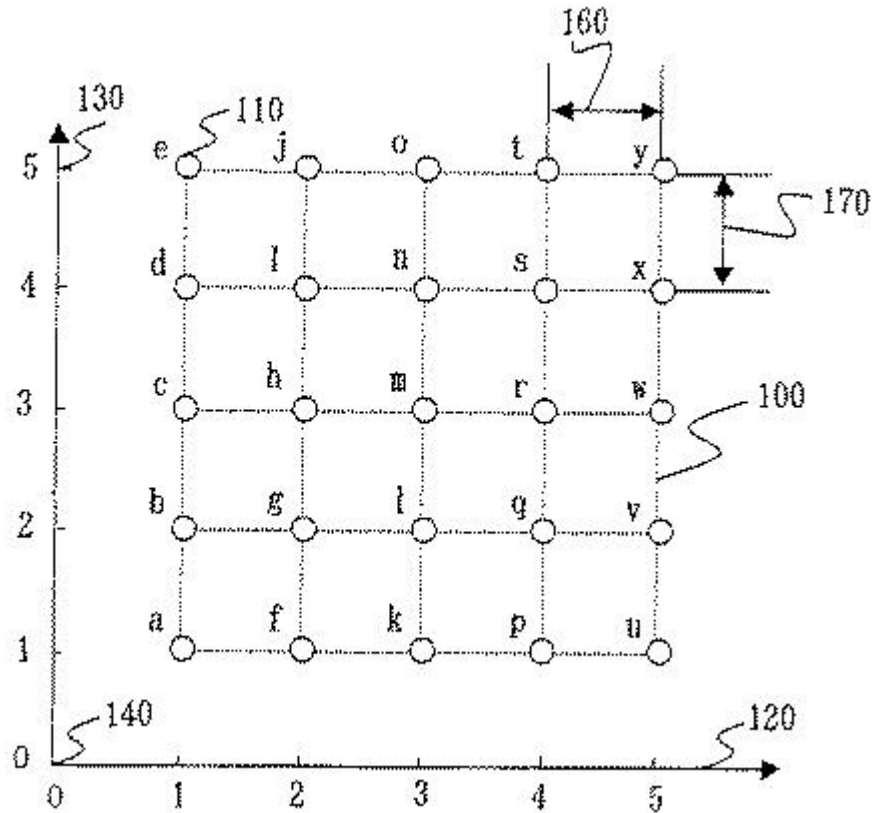
Ex. 1001, FIG. 1

184. Further, Sakata discloses “IC tags (RFID: Radio Frequency Identification), each of which has a unique ID.” Ex. 1008, [0012]. It is my opinion that POSITA would recognize that Sakata’s RFID tag and its unique ID are functionally and structurally analogous to Ghosh’s product identification tag 104 and unique product identifier, in particular because both uses RFID technology (while Ghosh’s tags could be NFC tags, as I have explained in the backgrounds section, a POSITA would know that NFC is a subset of RFID) to identify a particular location and both possess unique IDs. Sakata further discloses “a coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300.” Ex. 1008, [0016]. It is my opinion that a POSITA would recognize that these

tables are functionally and structurally analogous to Ghosh's store planogram, as both establish a location-ID correspondence.

185. Sakata then discloses that the IC tags are placed in a matrix pattern based on a two-dimensional coordinate system, with each tag placed on a coordinate point. Ex. 1008, [0012], [0015]. Sakata further discloses that "[t]he IC tag coordinate system... is constituted by a one-to-one correspondence between the unique ID held by each IC tag 110 located at each coordinate point of the two-dimensional coordinate IC tag location information holding means 100 and the address on the coordinate system (X coordinate system and Y coordinate system)." Ex. 1008, [0016]. FIG. 1 of Sakata shows the placement of IC tags on the coordinate system.

FIG. 1

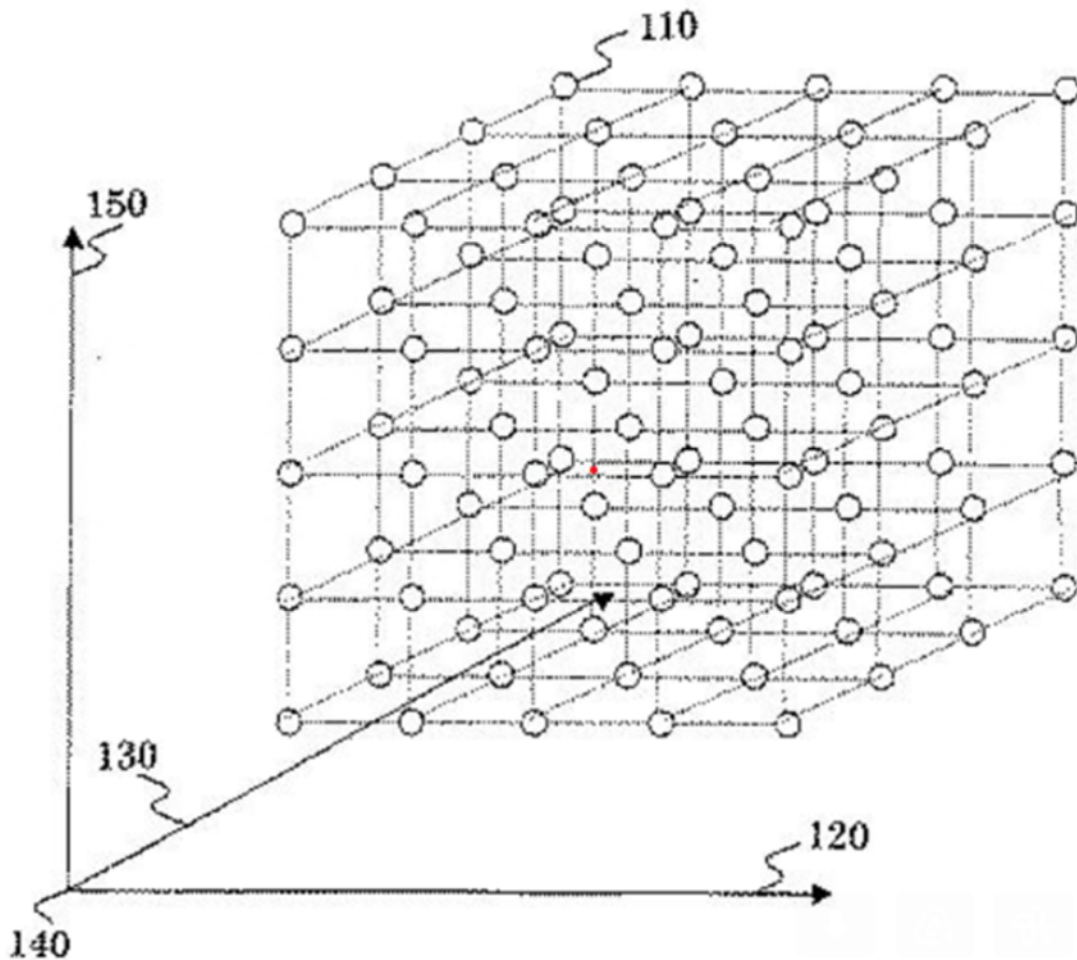


Ex. 1008 (Sakata), FIG. 1

186. Sakata further discloses that the two-dimensional IC tag arrangement can be on a wall of a building. Ex. 1008, [0011], [0013], [0019]. Thus Sakata teaches the claimed “each of the plurality of locations (*IC tag position*) being defined by a vertical (*y coordinate*) and horizontal (*x coordinate*) position within a plane (*the wall*) perpendicular to a floor of the predetermined area (*the building*)” of [1pre]. It is also my opinion that Sakata, through its disclosure that the IC tags can be arranged in a three-dimensional coordinate system (Ex. 1008, [0021], FIG. 6), further teaches

this limitation, because a three-dimensional coordinate system inherently includes at least one claimed two-dimensional vertical-plane coordinate system.

FIG. 6



Ex. 1008 (Sakata), FIG. 6

187. Further, Ghosh discloses that the product identification tags can be located on a display case or product shelving. Ex. 1007, [0009]. FIG. 1 of Ghosh (attached and annotated below) shows a plurality of product identification tags on several product shelves. As I would discuss further below, a POSITA reading Ghosh in view of

Sakata would recognize that it is obvious to implement Sakata's 2-dimensional vertical arrangement of tags in Ghosh's planogram, such that the location of products associated with the unique identifiers would be **defined by a vertical and horizontal position within a plane perpendicular to a floor of the predetermined area** of retail environment 100, especially because Ghosh already shows in FIG. 1 that the tags are placed at locations **defined by a vertical and horizontal position within a plane** (the display plane of the smart poster) **perpendicular to a floor of the predetermined area** of the retain environment 100.

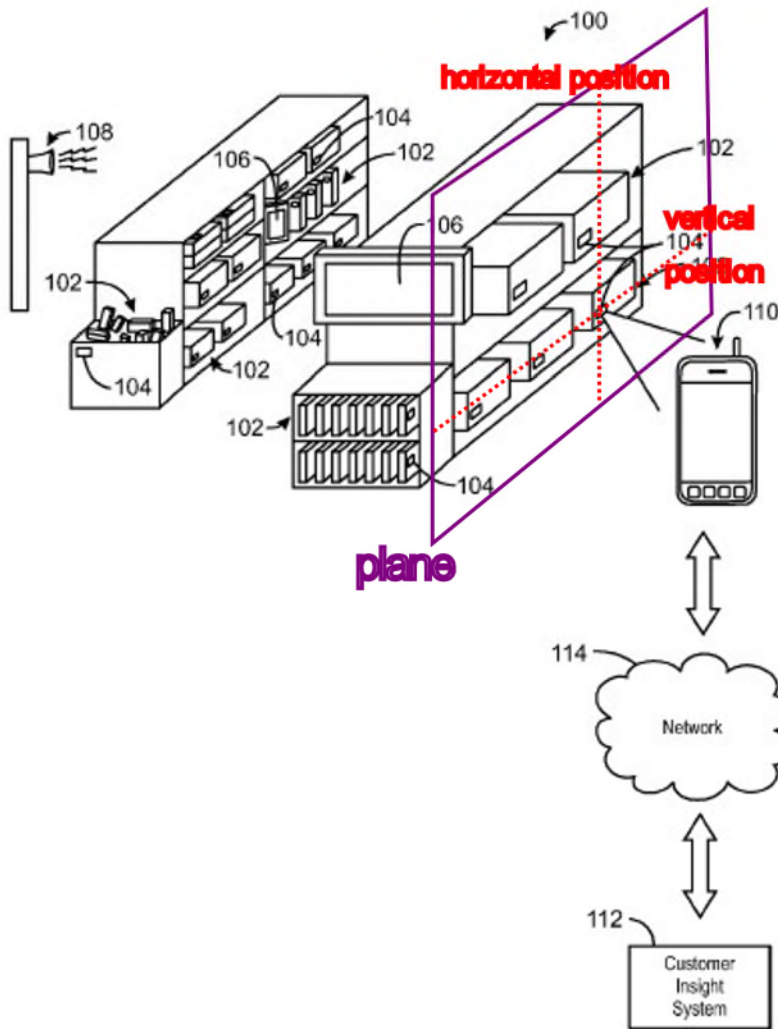


FIG. 1

Ex. 1007 (Ghosh), FIG. 1 (annotated)

188. Thus, it is my opinion that Ghosh-Sakata teaches “[a] method for communicating spatially localized information (*not limiting, and see my discussions of [1c] below*) to a mobile terminal (*mobile device 110 of Ghosh/reading device of Sakata*), the method being performed by a central server (*customer insight system 112 of Ghosh*) configured to access a planogram (*store planogram of*

Ghosh/coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300 of Sakata) associating a plurality of unique identifiers (unique product IDs of Ghosh/unique IDs of Sakata) of radio-frequency peripherals (RFID or NFC tag of Ghosh/RFID IC tags of Sakata) with a plurality of locations (product location of Ghosh/IC tag location of Sakata) within a predetermined area (retail area of Ghosh/building of Sakata), each of the plurality of locations being defined by a vertical and horizontal position (depicted by FIG. 1 of Ghosh/explicitly disclosed by Sakata) within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier (inherently disclosed by Ghosh/explicitly disclosed by Sakata)” of [1pre].

189. Therefore, it is my opinion that Ghosh-Sakata teaches each and every limitation of [1pre]. In particular, Ghosh alone teaches all of these limitations except that Ghosh only implicitly depicts the claimed “vertical and horizontal position” through FIG. 1, and Sakata supplements Ghosh and explicitly teaches this limitation. As I would further discuss below, a POSITA would have been motivated and able to modify Ghosh by implementing Sakata’s vertical-plane placement in Ghosh, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [1pre].

[1a] “receiving a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters;”

190. Ghosh discloses that the mobile device 110 can use RFID tag reader or NFC device to electronically communicate with product tags 104. Ex. 1007, [0011]. Ghosh discloses that the mobile device 110 (**mobile terminal**) then **communicates** the contents of the product identification tag 104 to customer insight system 112 (**central server**) through a network 114. Ex. 1007, [0012]. Ghosh discloses that such content may include the **unique** product **identifier**. Ex. 1007, [0009].

191. It is my opinion that a POSITA, possessing the background knowledge of NFC technology and standard as I have discussed in the backgrounds section, including the presence of antennae and chips in NFC tags and the activation sequence of NFC (or RFID) tags, would understand that a product tag 104 that communicates with mobile device 110 through NFC necessarily and inherently

includes **an antenna and an electronic chip configured for near-field communication**, and is configured to be **activated by the mobile terminal** when the radio-frequency communication peripheral is within a **communication range** of the mobile terminal. Further, it is my opinion that a POSITA with background knowledge of NFC technology and standard, as I discussed in the backgrounds section, would know that NFC standards such as ISO 14443 typically operate within a distance of less than twenty centimeters, therefore a POSITA would find that Ghosh's disclosure of NFC tags necessarily and inherently teaches the claimed communication range of **less than twenty centimeters**.

192. Sakata discloses that each IC tag comprises an **antenna** and an IC **chip**. Ex. 1008, [0022]. Sakata discloses that the reading range is restricted to the immediate vicinity of the IC tag, thus teaches that the antenna and the chip are **configured for near-field communication**. Sakata further discloses that the reading range must be kept sufficiently smaller than the corresponding coordinate point interval to avoid incorrect reading of IC tags at adjacent coordinate points, and the latter interval can be as small as 1 cm. Ex. 1008, [0015]. Thus, Sakata teaches a **communication range** that is **less than twenty centimeters**.

193. Sakata discloses that the IC tags can transmit its unique ID, "by non-contact, using the radio waves received by the antenna as operating power." Ex. 1008, [0022]. It is my opinion that a POSITA with background knowledge in passive RFID tags

and their operating modes, as I discussed in the backgrounds section, would recognize that this inherently teaches that the tag **is configured to be activated** by a reader when it is within its communication range with the reader.

194. Thus, it is my opinion that Ghosh-Sakata teaches the claimed “[the central server (*customer insight system 112 of Ghosh*)] receiving a communication from a mobile terminal (*mobile device 110 of Ghosh/reading device of Sakata*), the communication comprising a unique identifier (*unique product identifier of Ghosh/unique identifier of Sakata*) received by the mobile terminal from a radio-frequency peripheral (*RFID or NFC tag of Ghosh/RFID IC tag of Sakata*) located in the predetermined area (*retail environment of Ghosh/building of Sakata*), the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna (*inherently disclosed through NFC tag of Ghosh/explicitly disclosed as antenna of Sakata*) and an electronic chip (*inherently disclosed through NFC tag of Ghosh/explicitly disclosed as IC chip of Sakata*) configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal (*inherently disclosed through NFC tag of Ghosh/explicitly disclosed by Sakata*), wherein the communication range is less than twenty centimeters (*inherently disclosed through NFC tag of Ghosh/explicitly disclosed by Sakata*)” of [1a].

195. Therefore, it is my opinion that Ghosh-Sakata teaches each and every limitation of [1a]. In particular, Sakata supplements Ghosh through its explicit disclosures of NFC structural elements and communication capacities, which Ghosh implicitly discloses through its disclosure of NFC device, and Ghosh explicitly discloses all other limitations of [1a]. As I would further discuss below, a POSITA would have been motivated and able to modify Ghosh by implementing Ghosh's NFC device with Sakata's NFC structural elements and communication capacities, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [1a].

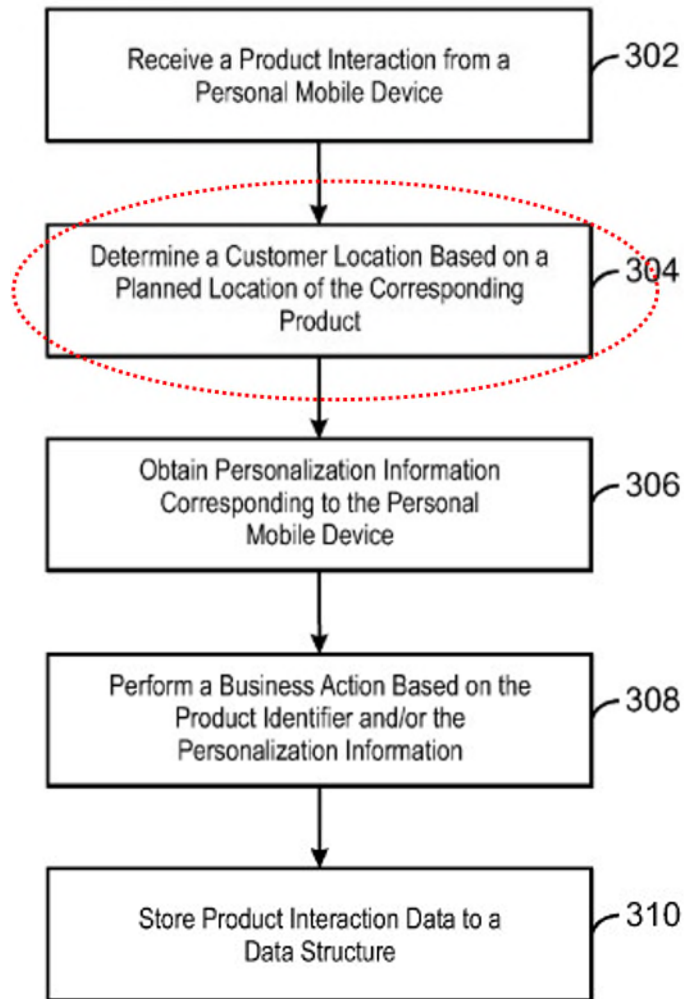
[1b] “determining a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and”

196. Ghosh discloses **determining** the customer's **location** within the retail environment 100. Ex. 1007, [0013]. Ghosh further discloses comparing the product identification (the **unique identifier**) obtained from the product identification tag 104 against the store **planogram** (product map) to accurately identify user location within the retail environment 100. Ex. 1007, [0013]. It is my opinion that a POSITA would understand that this necessarily and inherently means determining the location of the mobile device 110 of the customer based on the location associated

with the unique identifier in the planogram, because that is the only feasible way of achieving the functionality described in Ghosh.

197. As I have discussed for [1pre], in Ghosh-Sakarta, the location associated with the unique identifier comprises **the vertical and horizontal position of said location**. Because the mobile device is necessarily within a short range less than twenty centimeters of that location (*see* my discussions for [1a]), it is my opinion that a POSITA would find it obvious that the determined location of the mobile device necessarily and inherently comprises **the vertical and horizontal position of said location**. *See* Ex. 1001, [6:48-58] (providing a similar rationale).

198. FIG. 3 of Ghosh summarizes such determining of the location.



300
FIG. 3

Ex. 1007 (Ghosh), FIG. 3 (annotated)

199. Thus, it is my opinion that Ghosh-Sakata teaches the claimed “[the central server (*customer insight system 112 of Ghosh*)] determining a location of the mobile terminal (*mobile device 110 of Ghosh/reading device of Sakata*) within the predetermined area (*retail environment of Ghosh/building of Sakata*) based on the

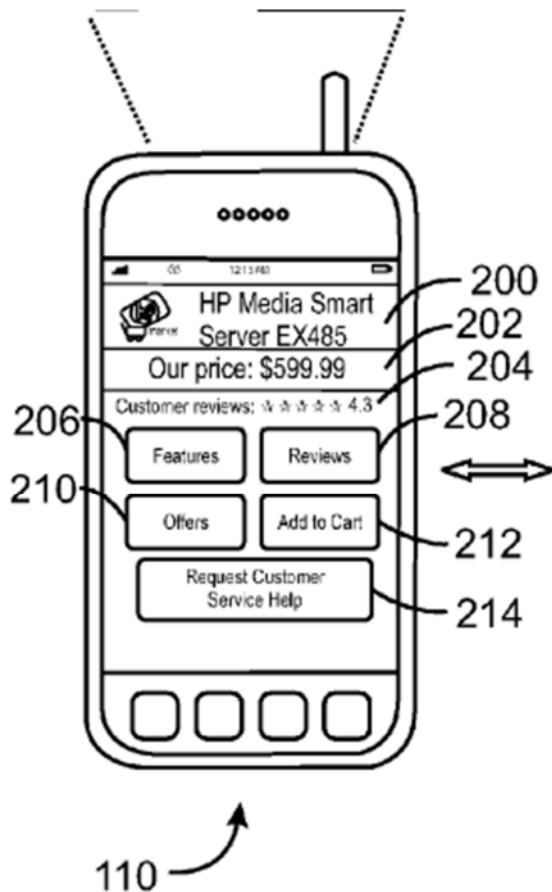
location associated with the unique identifier (*unique product identifier of Ghosh/unique ID of Sakata*) of the received communication in the planogram (*planogram of Ghosh/coordinate point-to-IC tag ID correspondence table 200 and a coordinate basic information management table 300 of Sakata*), the location of the mobile terminal comprising the vertical and horizontal position of said location (*depicted by FIG. 1 of Ghosh/explicitly disclosed by Sakata*)” of [1b].

200. Therefore, it is my opinion that Ghosh-Sakata teaches each and every limitation of [1b] because Ghosh alone teaches all of them. Moreover, Sakata is directed to location determination (Ex. 1008, [0008]) and teaches two-dimensional location determination in a vertical plane (Ex. 1008, [0011], [0012], [0013], [0019]). As I would further discuss below, a POSITA would have been motivated and able to modify Ghosh by implementing Sakata’s two-dimensional location determination in Ghosh, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [1b].

[1c] “transmitting to the mobile terminal spatially localized information associated with the location of the mobile terminal.”

201. Ghosh discloses that, after the customer insight system 112 compares the product identification obtained from the product identification tag 104 against the store planogram (product map) to accurately identify user location within the retail environment 100, the location of the customer can be used to provide targeted, in-

store advertising and customer assistance. Ex. 1007, [0013]. Ghosh discloses sending product-related content to the customer's mobile device 110 and initiating in-store advertising. Ex. 1007, [0012]. Ghosh discloses that such content may include "name of the product 200, product pricing 202, overall customer review rating 204, and the like." Ex. 1007, [0016]. It is my opinion that such product-related content, associated with the location of product corresponding to the obtained product identification, and sent after determination of the user location, teaches the claimed **spatially localized information** of [1c]. *See* Ex. 1001, [7:25-27] (providing similar examples).



Ex. 1007 (Ghosh), FIG. 2 (portion)

202. Sakata discloses indicating object locations to the user through LED lamps to make it easier for the user to identify objects. Ex. 1008, [0025]-[0026]. It is my opinion that such indication of locations of objects to be found teaches the claimed **spatially localized information associated with the location of the mobile terminal** of [1c]. *See* Ex. 1001, [7:43-44] (providing pathfinding information as an example of spatially localized information).

203. Therefore, it is my opinion that Ghosh-Sakata teaches the claimed “[the central server (*customer insight system 112 of Ghosh*)] transmitting to the mobile terminal (*mobile device 110 of Ghosh/reading device of Sakata*) spatially localized information associated with the location of the mobile terminal (*targeted information of Ghosh*)” of [1c].

204. Therefore, it is my opinion that Ghosh-Sakata teaches each and every limitation of [1c] because Ghosh alone discloses all of them. As I would further discuss below, a POSITA would have been motivated and able to modify Ghosh by combining Ghosh’s disclosure of targeted information with Sakata’s disclosures of location indication, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [1c].

205. Thus, it is my opinion that Ghosh-Sakata renders Claim 1 obvious.

Claim 2

[2] “The method according to claim 1, further comprising: when the mobile terminal is positioned relative to the radio-frequency communication peripheral within the communication range, energy of electromagnetic waves emitted by the mobile terminal activating the radio-frequency communication peripheral, thereby setting-up a radio-frequency communication between the mobile terminal and the radio-frequency peripheral, wherein the

communication range is a range of the electromagnetic waves emitted by the mobile terminal.”

206. Claim 1 has already been addressed above.

207. It is my opinion that a POSITA, possessing the background knowledge of NFC technology and standard, as well as the background knowledge of passive RFID tags and their powering method, would find the claimed interaction between the mobile terminal and the radio-frequency communication peripheral, including the powering by electromagnetic waves, to be inherent in the NFC functionality (Ex. 1007, [0011]) disclosed by Ghosh.

208. Further, Sakata teaches the claimed powering by electromagnetic wave through its disclosure of “using the radio waves received by the antenna as operating power.” Ex. 1008, [0022]. As I discussed for [1a] above, Sakata discloses the claimed radio-frequency communication and the communication range. As Sakata discloses the use of the radio waves as operating power, it is my opinion that a POSITA would find it obvious that the communication range is a range of the radio waves (electromagnetic waves) emitted by the source of the radio waves, which must necessarily be the reading device of Sakata (the mobile device of Ghosh-Sakata).

209. Thus, it is my opinion that Ghosh-Sakata teaches each and every limitation of [2]. In particular, it is my opinion that Sakata supplements Ghosh through its explicit disclosures of the claimed activation by electromagnetic wave of [2]. As I would

further discuss below, a POSITA would have been motivated and able to modify Ghosh by using Sakata's IC tags for Ghosh's NFC device, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [2]. Therefore, Ghosh-Sakata renders Claim 2 obvious.

Claim 3

[3] “The method according to claim 1, wherein the central server receiving the communication from the mobile terminal is via the Internet.”

210. Claim 1 has already been addressed above.

211. Ghosh discloses that the mobile device 110 may communicate with the customer insight system 112 through a network 114. Ex. 1007, [0012]. Ghosh discloses that “[t]he network 114 can be any suitable type of wireless communication network, including a WiFi network.” Ex. 1007, [0012]. It is my opinion that a POSITA, with background knowledge of the ubiquitous and conventional Internet, as well as the knowledge of Wi-Fi technology and standards, and the knowledge that the terms Wi-Fi and Internet had been commonly used interchangeably, as I discussed in the backgrounds section, would find it obvious to use a WiFi network on **the Internet** to carry out such communication.

212. Sakata discloses using the Internet to provide the IC tag coordinate system. Ex. 1008, [0017].

213. Thus, it is my opinion that Ghosh-Sakata teaches claimed “the central server receiving the communication from the mobile terminal is via the Internet” of [4] because Sakata supplements Ghosh through its explicit disclosure of the use of the Internet. As I would further discuss below, a POSITA would have been motivated and able to modify Ghosh by implementing Ghosh’s WiFi network on Sakata’s Internet, and thus reach the Ghosh-Sakata combination that discloses all of the limitations of [3]. Therefore, Ghosh-Sakata renders Claim 3 obvious.

Claim 5

[5pre] “A system for communicating spatially localized information to a mobile terminal, the system comprising:”

214. Claim 5 recites a system analogous to method claim 1, and is rendered obvious by the Ghosh-Sakata combination for same reasons set forth for claim 1. In particular, the limitations of [5pre] are substantially the same as the corresponding limitations of [1pre]. Please refer to the discussions for [1pre] above.

[5a] “a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined area, each of the plurality of locations being defined by a vertical and horizontal position within a vertical plane of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier;”

215. The limitations of [5a] are substantially the same as the corresponding limitations of [1pre]. Please refer to the discussions for [1pre] above.

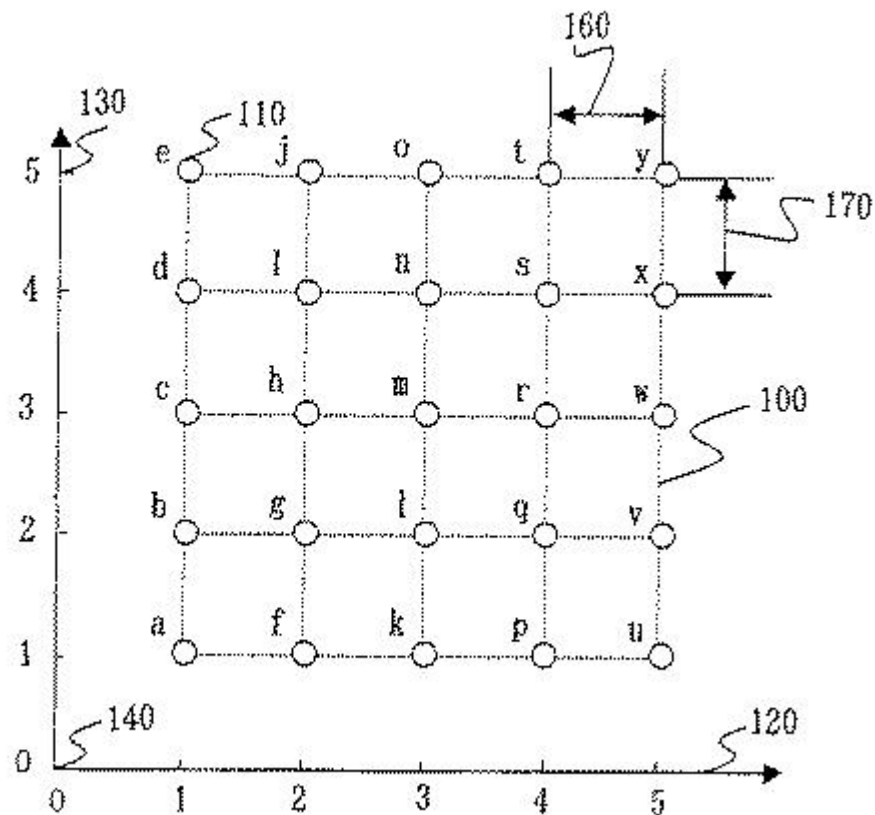
[5b] “a mobile terminal configured to communicate with the central server; and;”

216. [1pre] and [1a] claim the central server receiving a communication from the mobile terminal, therefore the mobile terminal is configured to communication with the central server. Please refer to the discussions for [1pre] and [1a] above.

[5c] “a plurality of radio-frequency peripherals distributed throughout the predetermined area, wherein each radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters,”

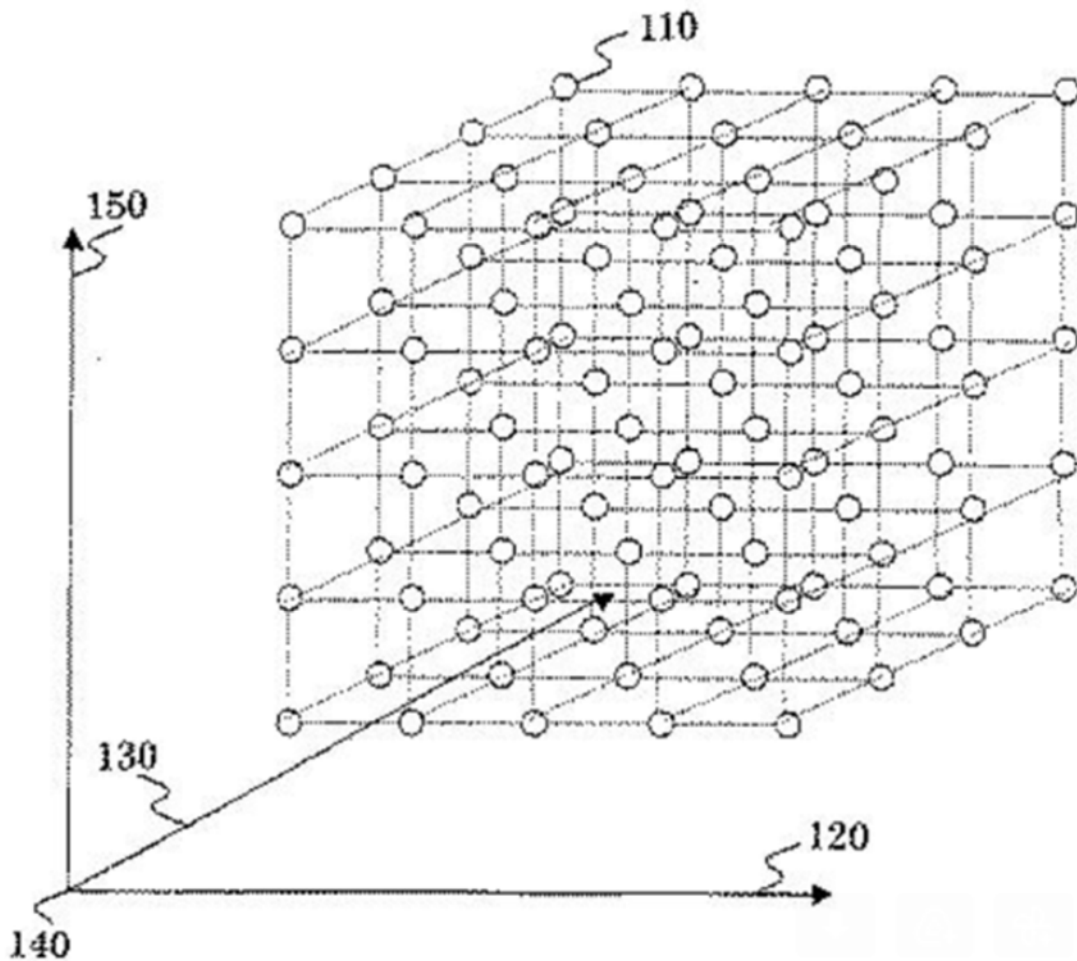
217. The limitations of [5c] are substantially the same as the corresponding limitations of [1pre] and [1a]. Please refer to the discussions for [1pre] and [1a] above. Further, Sakata discloses that the plurality of RFIDs (**radio-frequency peripherals**) are **distributed throughout** the predetermined area through FIGS. 1 and 6.

FIG. 1



Ex. 1008 (Sakata), FIG. 1

FIG. 6



Ex. 1008 (Sakata), FIG. 6

[5d] “wherein the central server is configured to:”

218. [5d] introduces no new limitation. Please refer to the discussions for [1pre] above.

[5e] “receive a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-

frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral;”

219. The limitations of [5e] are substantially the same as the corresponding limitations of [1a]. Please refer to the discussions for [1a] above.

[5f] “determine a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and;”

220. The limitations of [5f] are substantially the same as the corresponding limitations of [1b]. Please refer to the discussions for [1b] above.

[5g] “transmit to the mobile terminal spatially localized information associated with the location of the mobile terminal.”

221. The limitations of [5g] are substantially the same as the corresponding limitations of [1c]. Please refer to the discussions for [1c] above.

222. Therefore, it is my opinion that Ghosh-Sakata renders Claim 5 obvious.

Claim 8

[8] “The system according to claim 5, wherein the chip and the antenna are arranged at different points of the radio-frequency peripheral, and wherein the radio-frequency peripheral comprises connections configured to ensure a communications link between the antenna and the chip.”

223. Claim 5 has already been addressed above.

224. As I discussed for [1a] above, Sakata discloses the claimed **chip** and **antenna**. Sakata further discloses that the antenna is contained in a 0.4 square mm chip of its own. Ex. 1008, [0022]. As Sakata discloses the antenna chip and the IC chip separately (Ex. 1008, [0022]), it is my opinion that a POSITA would find it obvious to that these two chips are distinct and necessarily **arranged at different points of the radio-frequency peripheral**, as the two components necessarily need to occupy different physical locations inside the radio-frequency peripheral. It is further my opinion that a POSITA would also find that Sakata inherently discloses the claimed **“ensure a communications link between the antenna and the chip”** of [8] through the disclosure that the tag transmits the unique ID held within the IC chip through the antenna (Ex. 1008, [0022]).

225. Therefore, it is my opinion that Ghosh-Sakata discloses each and every limitation of Claim 8, thus rendering Claim 8 obvious, because Sakata discloses all the additional limitations over independent claim 5.

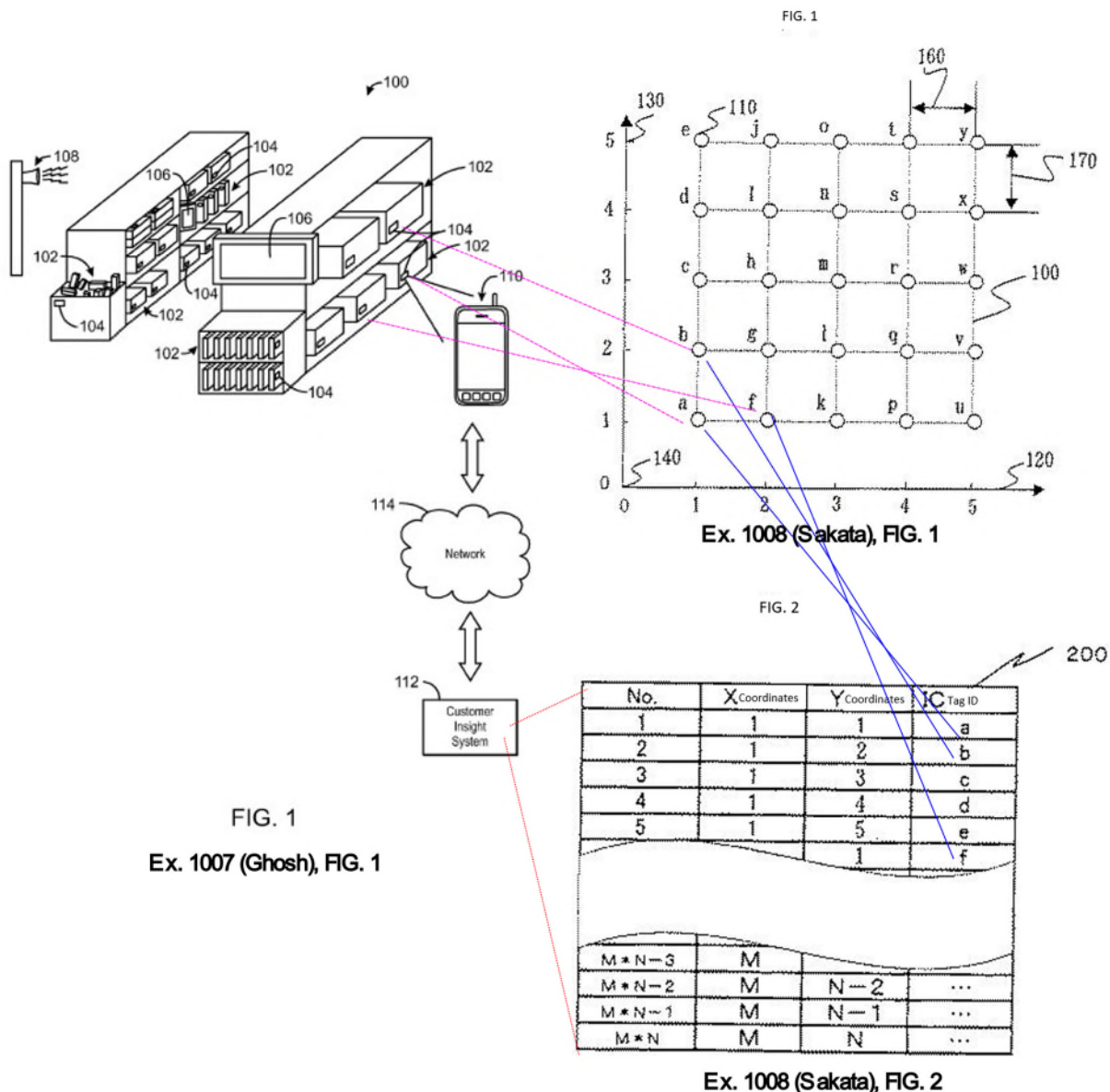
Motivation to combine Ghosh with Sakata

226. As would be further discussed below, it is my opinion that a POSITA would have had a reason to combine Ghosh, the primary reference, with Sakata and would have had a reasonable expectation of success in doing so.

227. In particular, it is my opinion that a POSITA would have been motivated to combine Sakata's disclosure of vertical positioning with Ghosh to implement Ghosh's expressly taught objectives of tracking customer location and foot traffic within the retail environment, initiating personalized customer interactions such as targeted advertising and product offers, as well as providing customer assistance. Ex. 1007, [0008]. Specifically, Ghosh teaches determining the precise location of the customer within the store through NFC interactions. Ex. 1007, [0020]. Ghosh further teaches providing targeted customer assistance. Ex. 1007, [0013].

228. Sakata teaches using 2-dimensionally arranged RFID tags that have a very short communication range (that is, NFC tags) to achieve precise location identification for an indoor environment. Ex. 1008, [0001], [0012], [0015], [0022]. In my opinion, a POSITA would thus have been motivated and able to use the teachings of Sakata to modify Ghosh such that the customer insight system of Ghosh (and the planogram of Ghosh that the customer insight system accesses) will implement the vertical positioning of Sakata to more precisely determine the location of the user (that would include the precise item location in the vertical plane, as depicted Ghosh through FIG. 1, which I have discussed above for [1pre]) and thus provide more targeted advertising, product offers and user assistance. This aids Ghosh's explicitly taught objective of tracking customer location and foot traffic within the retail environment and of providing targeted customer assistance.

229. A diagram showing the usage of Sakata's vertical arrangement to supplement Ghosh is shown below:



230. Further, in my opinion, a POSITA would also have been motivated and able to modify Ghosh so as to implement Ghosh's network 114 (Ex. 1007, [0012]) with Sakata's Internet (Ex. 1008, [0017]). Ghosh already teaches communications

between the mobile terminal and the central server through network 114, which can be any suitable type of wireless communication network, including a WiFi network. Ex. 1007, [0012]. Sakata then teaches explicitly communications through the Internet. Ex. 1008, [0017]. As I have discussed in the backgrounds section, the Internet is a well-known and conventional element to a POSITA at the time of the claimed invention. Thus, a POSITA would have known the Internet and its predictable results. Implementing Ghosh's network 114, which can be a WiFi network, via the Internet that is not only taught explicitly by Sakata but also a well-known and conventional element, represents no more than a mere application of a known technique to a piece of prior art ready for the improvement, and will serve the universal, conventional and expressly disclosed objective of Ghosh to effect communications between the mobile terminal and the central server. Implementing Ghosh's network 114 with the Internet would have been well within the skill of a POSITA.

231. In my opinion, a POSITA would also have been motivated and able to modify Ghosh so as to implement Sakata's location indication (Ex. 1008, [0025]-[0026]) in Ghosh. Ghosh teaches adding products to virtual shopping carts. Ex. 1007, [0016]. Ghosh further teaches that the virtual shopping carts can be used to identify the products that the customer intends to purchase. Ex. 1007, [0016]. Ghosh also teaches providing personalized content to the customer based on the known interests and

purchasing habits of the customer. Ex. 1007, [0014]. Sakata then teaches indicating the location of objects to make it easier to locate the objects from the location of the user. Ex. 1008, [0026]. In my opinion, a POSITA reading Ghosh in view of Sakata would thus find it obvious to have Ghosh's customer insight system sending location information (including routing information from the user's location) for products in Ghosh's virtual shopping cart. Provision of such information falls within the range of Ghosh's explicitly disclosed objective of providing personalized content to the customer based on the known interests and purchasing habits of the customer (as reflected from the customer's virtual shopping cart), and will aid Ghosh's explicitly disclosed objective of tracking customer location and foot traffic within the retail environment and of providing targeted customer assistance. In my opinion, a POSITA would further be motivated and able to use the teachings of Sakata to such routing information that takes the 3D location of the items into account, so as to provide more detailed and personalized routing information. A POSITA would have known this method and apparatus as well as its predictable results. This modification using Sakata's teachings of location indication serves to address the universal, obvious and expressly taught goals of customer assistance and customer tracking. As such, combining Ghosh with Sakata represents, at most, an obvious extension of the functionality expressly disclosed in Ghosh to address this universal and obvious

objective. Application of the known teachings by Sakata to Ghosh's method and system would have been well within the skill of a POSITA.

232. It is also my opinion that a POSITA would further have been motivated to implement Ghosh's expressly taught functionality of determining the precise location of the customer within the store through NFC interactions (Ex. 1007, [0020]) by utilizing Sakata's teachings of the structural details and communication capabilities of IC tags.

233. Specifically, Ghosh teaches NFC interactions between product identification tags and mobile devices. Ex. 1007, [0011]. As I discussed in the backgrounds section, a POSITA at the time of the claimed invention would be knowledgeable about NFC technology and NFC standards. As I also discussed there, a POSITA would also be knowledgeable of the short range (less than twenty centimeters) and radio the frequency (13.56MHz) of NFC standards such as ISO 14443, as well as the induction step of NFC communication. Sakata then explicitly teaches the short communication range of IC tags as well as the activation of IC tags by power from received electromagnetic waves. Ex. 1008, [0015], [0022]. Sakata further explicitly teaches the antenna and the chip for implementing the range and the activation. Ex. 1008, [0022]. Thus, a POSITA would have been motivated and able to use the teachings of Sakata to modify Ghosh such that the product identification tag of Ghosh is implemented as a short-range RFID tag (that is, an NFC tag) of Sakata, so

as to realize the advantages of less communication interference and more precise location finding that are explicitly taught by Sakata (Ex. 1008, [0007], [0015], [0022]). This would also address the expressly taught objective of Ghosh of determining the precise location of the customer within the store through NFC interactions.

234. In my opinion, a POSITA reading Ghosh in view of Sakata would understand that such a modification involves no more than adopting a specific configuration of the expressly disclosed NFC tag in Ghosh. Not only would this have been obvious to try, it would also have yielded no more than predictable results due to the combination of familiar elements in a known way. Thus, in my opinion, a POSITA would have a reasonable expectation of success in such a modification.

235. In all, in my opinion, by implementing the vertical positioning of Sakata in Ghosh's system (which supplements Ghosh's disclosures of "vertical and horizontal position" limitation in [1pre] and [1b]), and by implementing the NFC structural details and communication capacities of Sakata in Ghosh's NFC tags (which supplements various limitations in [1a] and [2]), a POSITA would reach the Ghosh-Sakata combination that discloses all of the limitations of Claims 1-2 and 4-5. Then, in my opinion, by implementing the location indication of Sakata in Ghosh's system, a POSITA would cause the combination to have a stronger disclosure of the "spatially localized information" limitation of [1c]). Further, in my opinion, by

implementing Ghosh's network 114 with Sakata's Internet (which supplements the "Internet" limitation of Claim 3), a POSITA would cause the combination to disclose all of the limitations of Claim 3.

E. Ground 5: Claims 6-7, 9 are rendered obvious over Ghosh in combination with Sakata and Akao

1. Analysis

236. As I have discussed for Ground 2 above, when the Siotia-Sakata combination is further combined with Akao, the resulting Siotia-Sakata-Akao combination discloses each and every limitation of claims 6-7, 9. As all the discussions regarding the limitations and the motivations to combine there can be directly applied to combining the Ghosh-Sakata combination of Ground 4 with Akao (with necessary and immediately obvious modifications), in my opinion, a POSITA would similarly reach a Ghosh-Sakata-Akao combination that renders Claims 6-7, 9 obvious.

F. Ground 6: Claims 8-9 are rendered obvious over Ghosh in combination with Sakata, Akao, and Chen

1. Analysis

237. As I have discussed for Ground 3 above, when the Siotia-Sakata-Akao combination is further combined with Chen, the resulting Siotia-Sakata-Akao-Chen combination discloses each and every limitation of claims 8-9. As all the discussions regarding the limitations and the motivations to combine there can be directly

applied to combining the Ghosh-Sakata-Akao combination with Chen (with necessary and immediately obvious modifications), in my opinion, a POSITA would similarly reach a Ghosh-Sakata-Akao-Chen combination that renders Claims 8-9 obvious.

VI. CONCLUSION

238. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information introduced throughout this proceeding.

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