

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.: IPR2024-00189

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.

CONTENTS

I. BACKGROUND AND QUALIFICATIONS	3
II. LEGAL STANDARDS.....	14
A. Terminology	14
B. Legal Standards for Obviousness	14
C. Level of Ordinary Skill in the Art	19
III. THE '340 PATENT	20
A. Overview of the '340 Patent.....	20
B. Prosecution History of the '340 Patent	24
IV. BACKGROUND KNOWLEDGE OF A POSITA AT THE TIME OF THE CLAIMED INVENTION.....	26
V. APPLICATION OF PRIOR ART TO THE '340 PATENT CLAIMS	32
A. Ground 1: Claims 1-9 are rendered obvious over Fujiwara.....	32
1. Overview of Fujiwara.....	32
2. Analysis	37
B. Ground 2: Claims 1-9 are rendered obvious over Fujiwara and Arntzen	87
1. Overview of Arntzen	88
2. Analysis	90
C. Ground 3: Claims 1-5 and 8-9 are rendered obvious by Bandy in combination with Fowler (the “Bandy-Fowler” combination).....	93
1. Overview of Bandy.....	93
2. Overview of Fowler.....	96

3. Analysis	100
D. Ground 4: Claims 1-9 are rendered obvious over Bandy in combination with Fowler and Arntzen.....	138
1. Analysis	138
VI. CONCLUSION	139

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 1008.

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	Certified translation of Japan Patent Application Publication No. 2008-77131A by Fujiwara (“Fujiwara”)
1004	Japan Patent Application Publication No. 2008-77131A by Fujiwara

1005	International Patent Application Publication No. WO 2010/082835 A1 by Arntzen (“Arntzen”)
1006	U.S. Patent Application Publication No. 2007/0024436 A1 by Bandy (“Bandy”)
1007	U.S. Patent Application Publication No. 2008/0231228A1 by Fowler (“Fowler”)

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 1-9 are rendered obvious by Fujiwara;
- Claims 1-9 are rendered obvious by Fujiwara and Arntzen;
- Claims 1-5 and 8-9 are rendered obvious by Bandy and Fowler;
- Claims 1-5 and 8-9 are rendered obvious by Bandy, Fowler and Arntzen.

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.

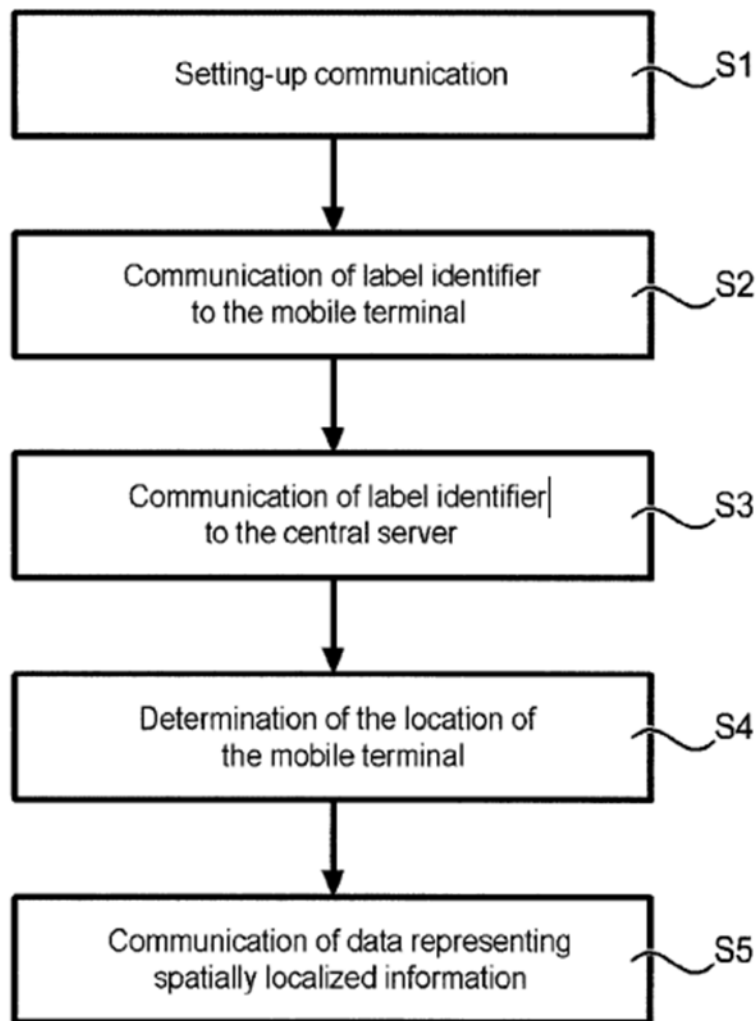
III. THE '340 PATENT

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, at [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, at [2:8-12].

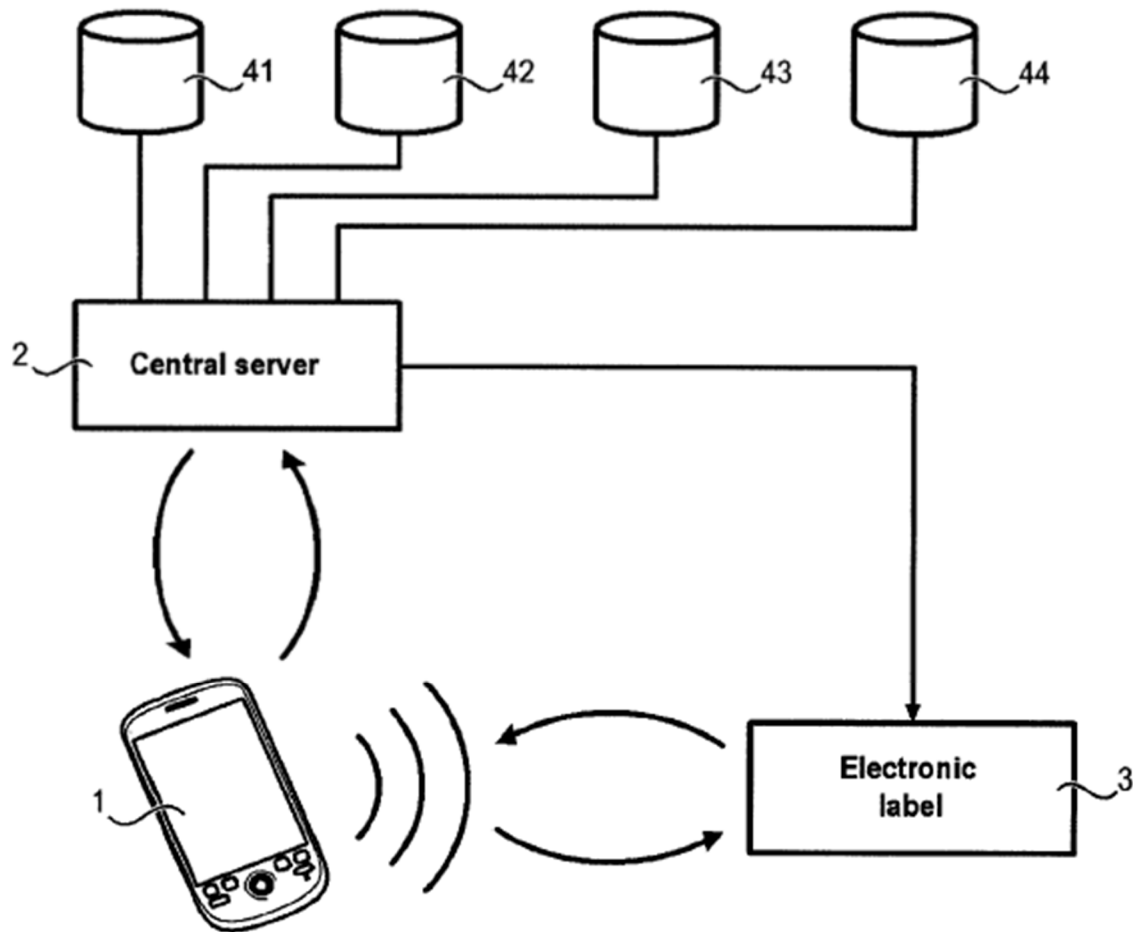
FIG. 4



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.

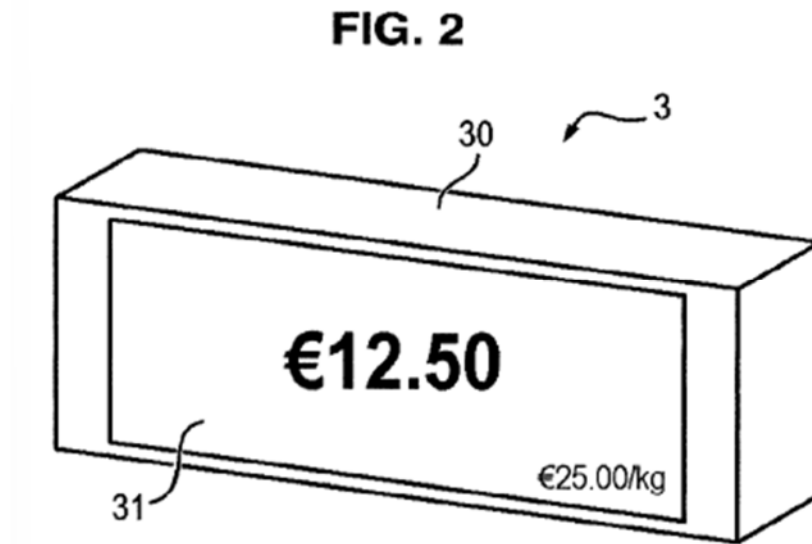
FIG. 1



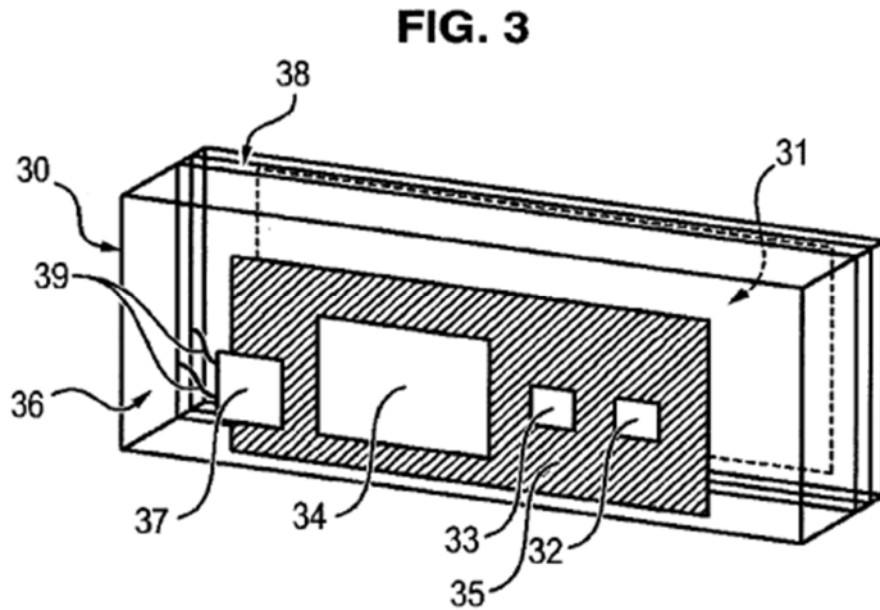
The '340 Patent, FIG. 1.

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].



The '340 Patent, FIG. 2.



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, Japan Patent Application Publication No. 2008-77131A (“Fujiwara”) discloses “a collaborative system of electronic shelf label and mobile information terminal” wherein the mobile information terminal comprises “information presenting means for displaying information about items associated with the electronic shelf label ID received from the store server.” Ex. 1003, [0015]. In another example, U.S. Patent App. Pub. No. 2008/0231228 A1 (“Fowler”) discloses a system of displaying localized advertisements (spatially localized information) on a media enhanced shopping cart (mobile terminal). Ex. 1007, [Abstract].

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). In my opinion, POSITA would further understand that, because of the existence and wide adoption of international standards for NFC technology such as ISO 14443, NFC peripherals such as NFC tags and tag readers are readily available and readily replaceable, and further have standardized built-in support for heightened security in communications.

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”), one of the prior art references used in this petition, 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.” Ex. 1005, [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. Ex. 1005, [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. In particular, a POSITA would also know that ISO 14443 describes providing power to the tag through electromagnetic waves, and therefore NFC tags conformant with ISO 14443 are necessarily passive RFID tags that are powered and activated by electromagnetic waves received by the tags.

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. 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. 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.

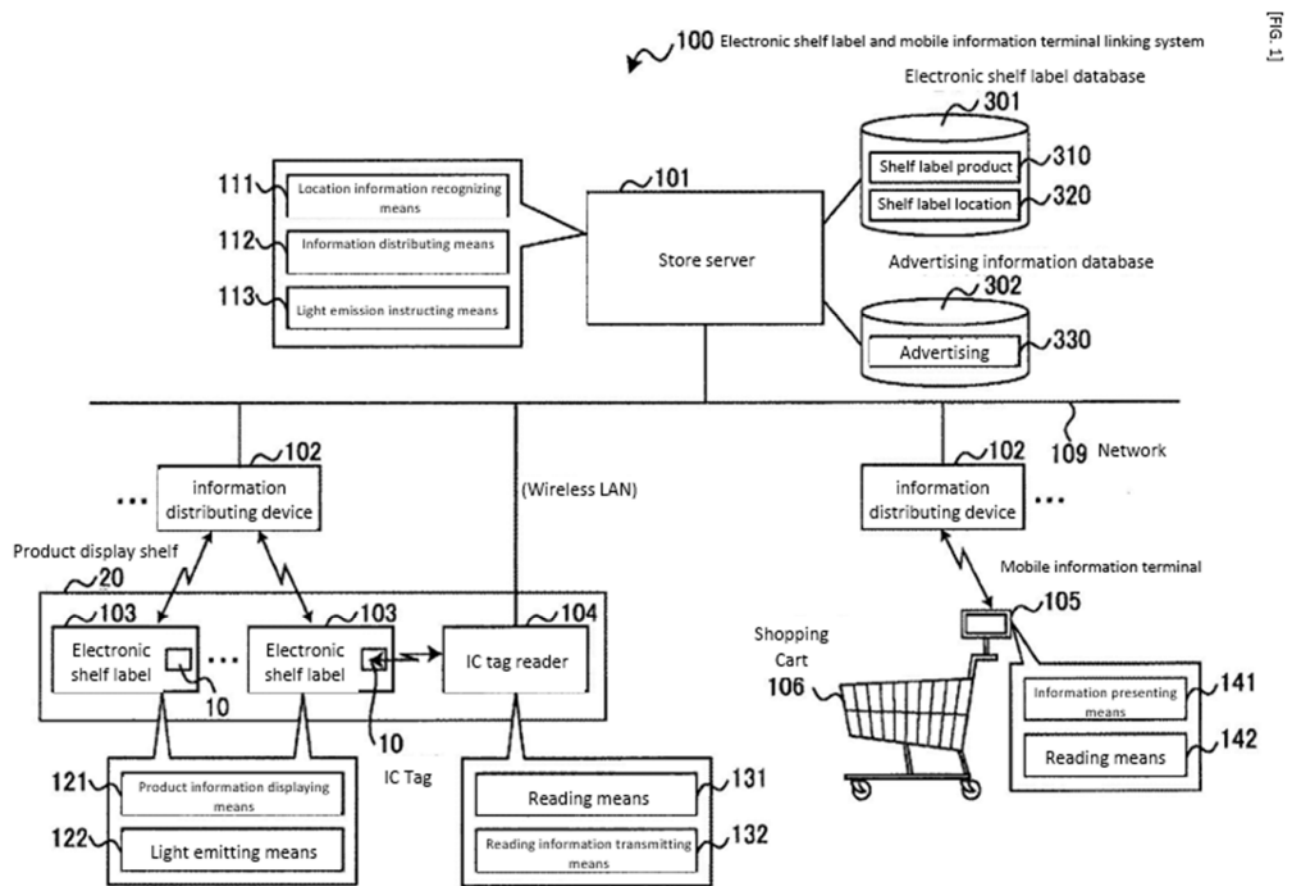
V. APPLICATION OF PRIOR ART TO THE '340 PATENT CLAIMS

A. Ground 1: Claims 1-9 are rendered obvious over Fujiwara

1. Overview of Fujiwara

55. Japan Patent Application Publication No. 2008-77131A by Fujiwara (“Fujiwara”) is directed to providing “a collaborative system of electronic shelf label and mobile information terminal, and the like, that provides a function for locating a product in a store and presenting the location of the product.” Ex. 1003, [0006]. Fujiwara further discloses a “location recognizing system” that identifies the

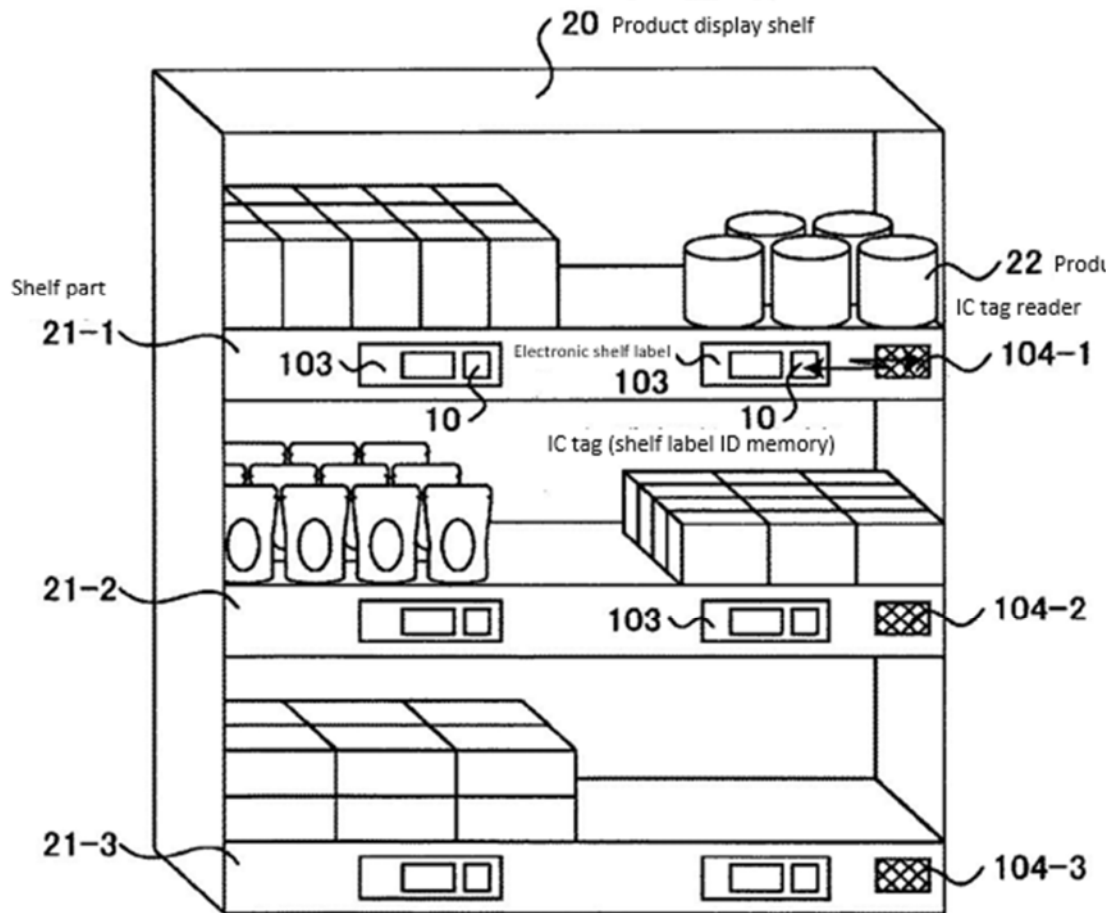
location information of a reading device (Ex. 1003, [0008]) and a store server that “transmits the information related to the product, based on both the shelf label product information and the shelf label location information, to the mobile information terminal” (Ex. 1003, [0016]). FIG. 1 of Fujiwara, reproduced below, is a diagram of the collaborative system 100 of electronic shelf label and mobile information terminal of one embodiment.



Ex. 1003 (Fujiwara), FIG. 1.

56. FIG. 4 of Fujiwara, reproduced below, depicts the arrangements of electronic shelf labels 103 on a product display shelf 20 in one embodiment.

[FIG. 4]

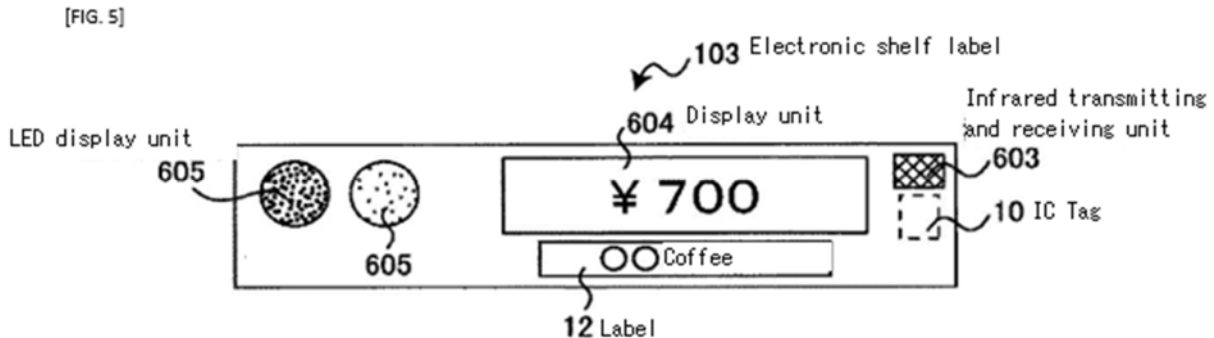


Ex. 1003 (Fujiwara), FIG. 4

57. It is my understanding that although FIG. 4 depicts fixed “IC tag readers” on the shelf, such fixed IC tag readers are not present in nor material to the disclosures of Fujiwara used in the current petition, and the above FIG. 4, with the “IC tag readers” removed, would equally serve the purposes of the current petition.

58. Fujiwara discloses the components wireless transmitting and receiving unit (infrared transmitting and receiving unit) 603, a display unit 604, one or more LED

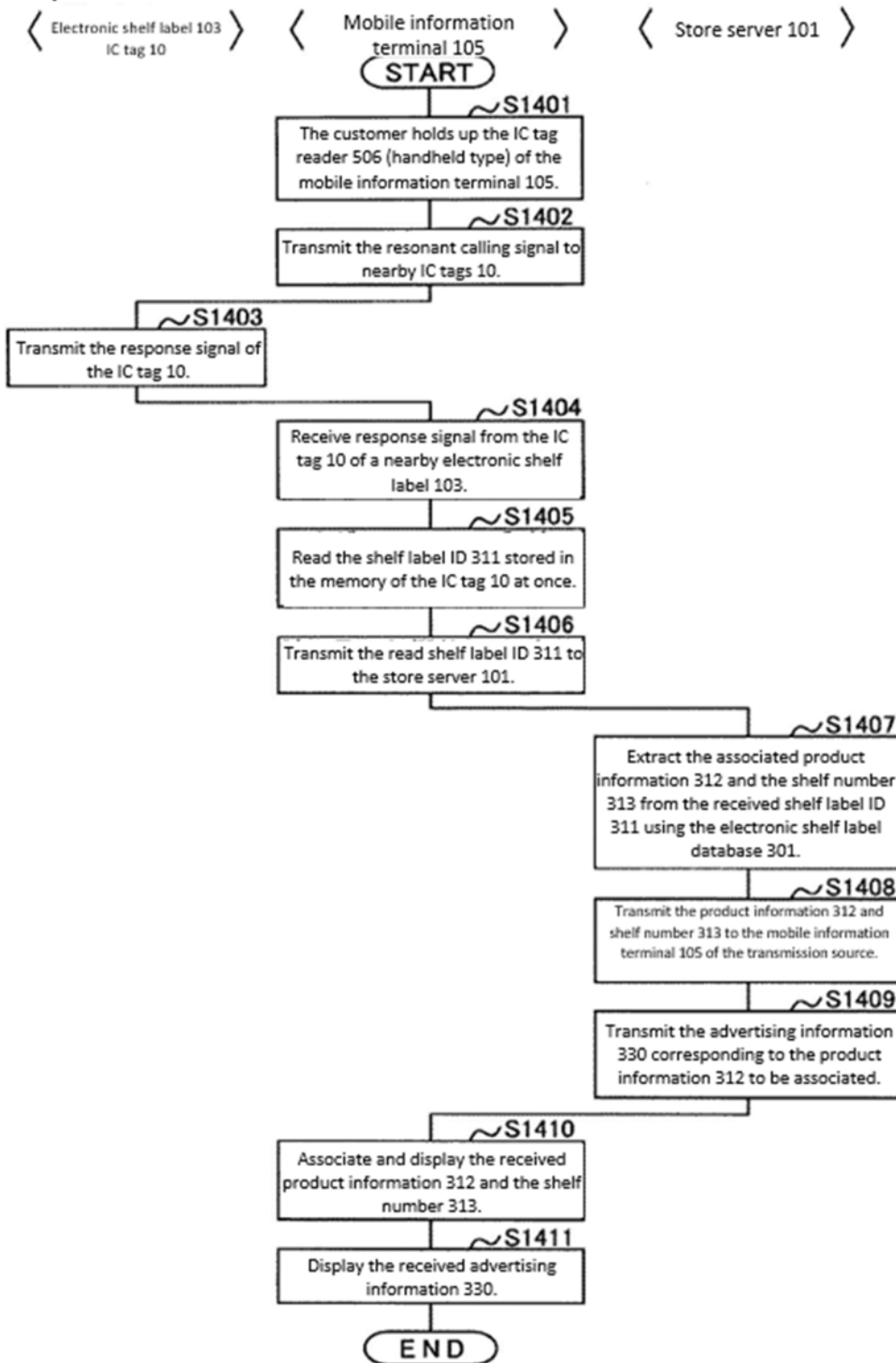
display units 605, a label 11, and the like, of the electronic shelf label 103. Ex. 1003, [0067]. FIG. 5 of Fujiwara, reproduced below, depicts an electronic shelf label 103.



Ex. 1003 (Fujiwara), FIG. 5

59. FIG. 14 of Fujiwara, reproduced below, is a flow chart depicting the procedure for the information acquiring process based on the location information of the product in one embodiment.

[FIG. 14]



Ex. 1003 (Fujiwara), FIG. 14

60. I have been informed by counsel that Fujiwara qualifies as prior art under pre-AIA 35 U.S.C. § 102(b) because it was published on April 3, 2008, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1003, (43).

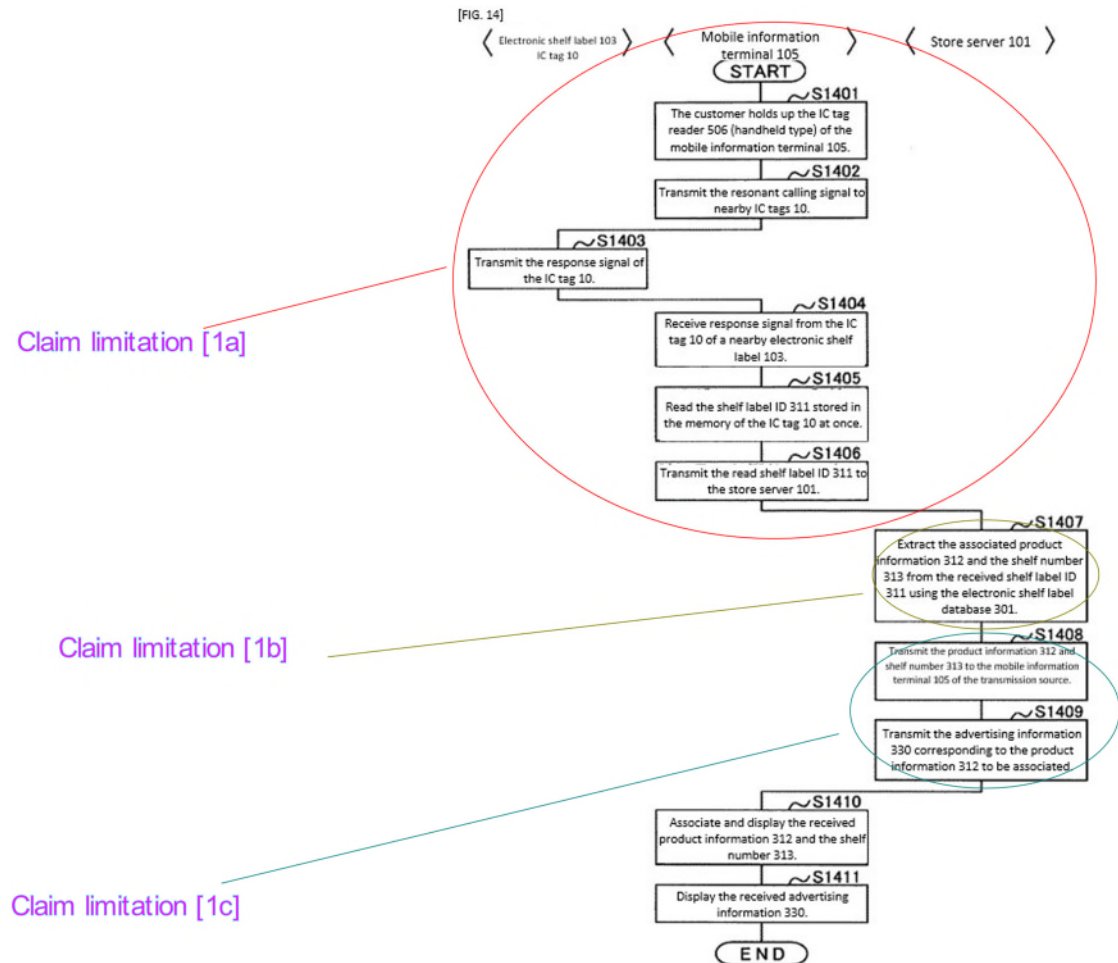
61. It is my opinion that Fujiwara is analogous prior art to the '340 Patent. The '340 Patent is directed to “means for providing consumers with spatially localized information, in relation to the place and context of a consumer, which complements the information already visually available in a sales area” (Ex. 1001, [2:8-12]) while Fujiwara is directed to providing “a collaborative system of electronic shelf label and mobile information terminal, and the like, that provides a function for locating a product in a store and presenting the location of the product” (Ex. 1003, [0006]) and discloses a store server that “transmits the information related to the product, based on both the shelf label product information and the shelf label location information, to the mobile information terminal” (Ex. 1003, [0016]). Thus, both Fujiwara and the '340 Patent are in the same field of endeavor for providing consumers with spatially localized information.

2. Analysis

62. As set forth in detail below, it is my opinion that a POSITA reading Fujiwara will find each and every limitation recited by Claims 1-9 either expressly disclosed in Fujiwara or obvious over Fujiwara's disclosure.

Claim 1

63. The annotated figure below is a high-level overview of the correspondence between Fujiwara's disclosures and the main steps of Claim 1 of the '340 Patent. More details are set forth below.



Ex. 1003, FIG. 14

[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:”

64. It is my opinion that the preamble 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 Fujiwara teaches this portion, please refer to my discussions of limitation [1c] below.

65. Fujiwara discloses “one or more mobile information terminals installed in self-service transporters for storing and transporting products in a store.” Ex. 1003, [0015]. It is my opinion that these mobile information terminals teach the claimed **mobile terminal**.

66. Fujiwara discloses a store server. Ex. 1003, [0015]. It is my opinion that this store server teaches the claimed **central server**.

67. Fujiwara discloses “one or more electronic shelf labels corresponding to each product on the sales floor and displaying information about the product.” Ex. 1003, [0015]. Fujiwara discloses that an IC tag 10 is provided inside the electronic shelf

label 103. Ex. 1003, [0067]. Fujiwara discloses that IC tag 10 is a non-contact IC tag that comprises a coil-shaped antenna and may communicate with IC tag reader 104 at a distance of several to several tens of centimeters. Ex. 1003, [0071], [0072].

68. While Fujiwara discloses that IC tag reader uses a microwave transmitting and receiving unit to communicate with the IC tag (Ex. 1003, [0076]), it is my opinion that a POSITA would understand that this is merely a preferred embodiment of Fujiwara and does not limit the communication protocol between the IC tag reader and the IC tag to that of microwave communication, especially as Fujiwara explicitly negates any example as limiting (Ex. 1003, [0112]).

69. Thus, it is my opinion that a POSITA who, as I have discussed in the backgrounds section, is familiar with the well-known and conventional radio frequency communication, and in particular with the widespread use of low-cost RFIDs in electronic shelf labels, would find it obvious to implement Fujiwara's IC tag (which interacts with Fujiwara's IC tag reader in communication to send identifier to the IC tag reader, Ex. 1003, [0072]) as a well-known, conventional, and low-cost RFID tag (which interacts with a tag reader in communication to send identifier to the tag reader), thus simplifying the design of the electronic shelf label by utilizing mature and conventional components, and saving costs. This is no more than a mere substitution of one element for another known in the field, and thus a POSITA would have a reasonable expectation of success in doing so. As the

electronic shelf label 103 integrates the ID tag (Ex. 1003, [0046], [0107]), it is my opinion that, as a POSITA would find it obvious to implement Fujiwara's IC tag with the well-known, conventional, and low-cost RFID tag (that engages in radio-frequency communication, as a POSITA is knowledgeable about), a POSITA would then find the claimed **radio-frequency peripheral** of [1pre] obvious over Fujiwara's disclosures of electronic shelf label integrating an IC tag because of such obvious modification of implementing the IC tag as an RFID tag.

70. Further, it is my opinion that a POSITA, possessing knowledge of the well-known and conventional NFC tags adopted in the relevant industry, would recognize that the distance of several to several tens of centimeters is a distance for which the NFC technology is well-suited. A POSITA would thus find it obvious to substitute the ID tag (which interacts with Fujiwara's IC tag reader in near-range communication over a range of several to several tens of centimeters to send identifier to the IC tag reader, Ex. 1003, [0072]) with the well-known and conventional NFC tag (which interacts with NFC tag reader in near-field communication over a range of less than twenty centimeters to send identifier to the NFC tag reader) and achieve the advantages of increased communication security (because of the close communication range and standardized support for security) and easy massive deployment and maintenance (because of the ready availability/replaceability and standard conformity of NFC tags). This is no more

than a mere substitution of one element for another known in the field, and thus a POSITA would have a reasonable expectation doing so. In my opinion, a POSITA would thus further find it obvious to implement Fujiwara's IC tag as not just any RFID tag, but an NFC tag suitable for close-range communication, such as an NFC tag conformant with ISO 14443 that has a communication range of less than twenty centimeters, as such tags are readily available and readily replaceable as mass products, and are suitable for Fujiwara's expressly taught purposes of location finding through near-range tag-reader interaction, as well as providing additional advantages of increased and standardized security in communication and reduced interference, advantages that are well known to a POSITA. Thus, it is also my opinion that a POSITA would find the claimed **radio-frequency peripheral** of [1pre] obvious over Fujiwara's disclosures of electronic shelf label integrating an IC tag because of such obvious modification of implementing the IC tag as an NFC tag.

71. Fujiwara discloses that the store server possesses "an electronic shelf label database storing the shelf label product information associating the electronic shelf label information with the product information, and storing the shelf label location information identifying the location of the electronic shelf label." Ex. 1003, [0015]. Fujiwara discloses that the electronic shelf label database 301 includes a plurality of shelf label product information 310 and shelf label location information 320. Ex. 1003, [0062]. Fujiwara further discloses that shelf label product information 310 has

shelf label ID 311, product information 312, and the like. Ex. 1003, [0062]. Fujiwara discloses that the shelf label location information 320 includes shelf label ID 311, shelf number 313, and the like. Ex. 1003, [0062]. Fujiwara discloses that the store server may acquire the shelf label product information and the shelf label location information associated with the electronic shelf label IDs from the one or more electronic shelf label IDs received from the mobile information terminal using the electronic shelf label database. Ex. 1003, [0015].

72. Fujiwara explicitly discloses that “[t]he shelf label ID 311 is the identification information of the electronic shelf label 103.” Ex. 1003, [0062]. Thus, it is my opinion that the shelf label ID 311 teaches the claimed **unique identifiers of radio-frequency peripherals** of [1pre].

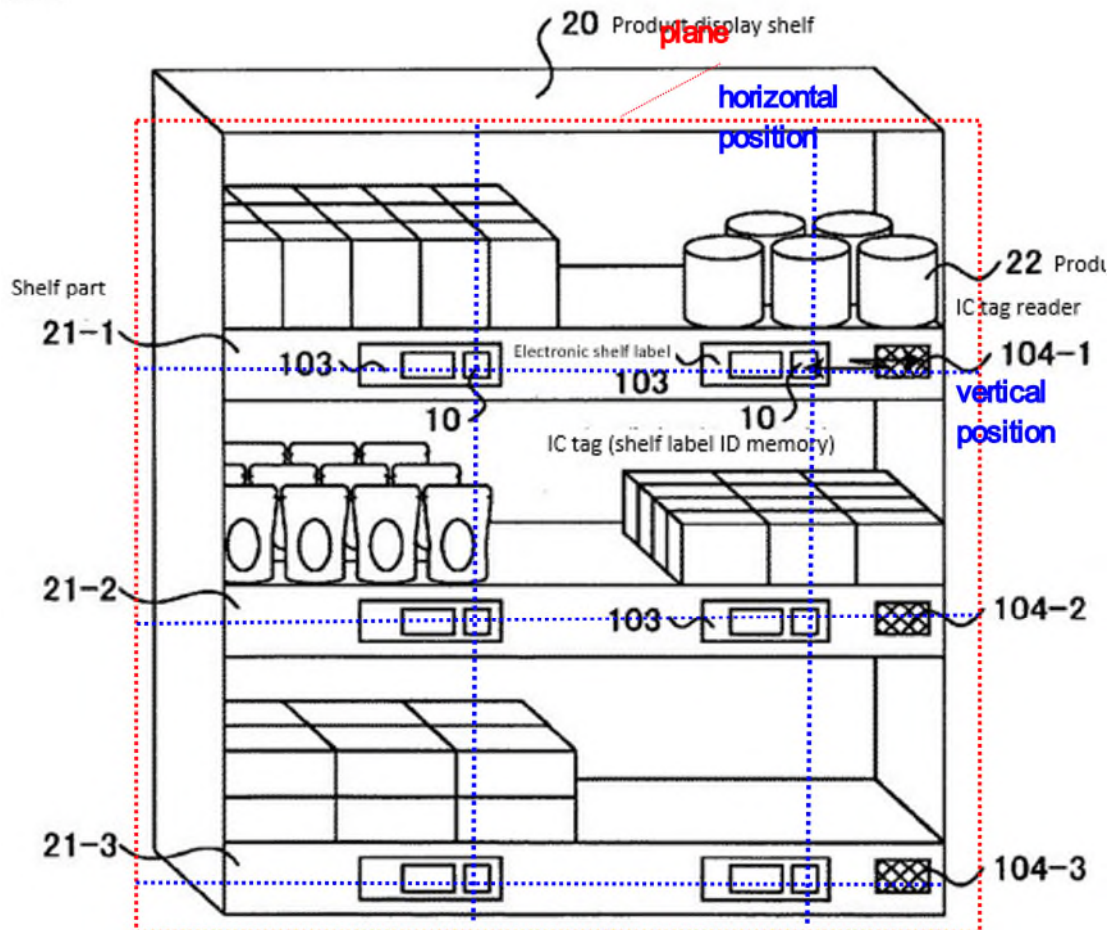
73. Thus, it is my opinion that a POSITA would recognize that the electronic shelf label database 301 teaches the claimed **planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations (shelf label location) within a predetermined area** (the sales floor) of [1pre]. Fujiwara discloses that the store server (**central server**) is configured to access this planogram. Ex. 1003, [0015]-[0016]. Thus, it is my opinion that Fujiwara teaches the claimed “**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**” of [1pre].

74. Further, as Fujiwara discloses “the shelf label product information and the shelf label location information associated with the electronic shelf label IDs” (Ex. 1003, [0015]), it is my opinion that a POSITA would find this to be an obvious and inherent disclosure that each of the plurality of shelf label location is **associated one-to-one with** an electronic shelf label ID, because Fujiwara has taught that the shelf label ID is the identification information of the label, and further that the shelf label location information comprises the label ID itself, and a POSITA would understand that this necessarily and inherently means that the location information is associated one-to-one with the ID. *See* Ex. 1003, [0015]-[0016], [0062]. Thus, it is my opinion that Fujiwara teaches the claimed “**each of the plurality of locations being associated one-to-one with a corresponding unique identifier**” of [1pre].

75. Fujiwara further discloses that shelf label location information includes shelf label ID 311, shelf number 313, and the like, and that the shelf number 133 is the location information for each shelf part 21 of the product display shelf 20. Ex. 1003, [0062]. It is my opinion that this, together with FIG. 4 of Fujiwara, discloses that each of the plurality of locations is defined by a **vertical position** (represented by shelf number 313 that indicates the shelf part 21 within the product display shelf 20 on which the electronic shelf label is located, as shown in annotated FIG. 4 below) and a **horizontal position** (the horizontal position of the electronic shelf label along the horizontal shelf part 21, as shown in annotated FIG. 4 below) **within a**

plane (“the front side of the shelf”, *see* Ex. 1003, [0084], as shown in annotated FIG. 4 below) **perpendicular to a floor of the predetermined area** (the sales floor). Thus, it is my opinion that a POSITA would find that Fujiwara teaches the claimed “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” of [1pre] under this understanding of vertical and horizontal positions.

[FIG. 4]



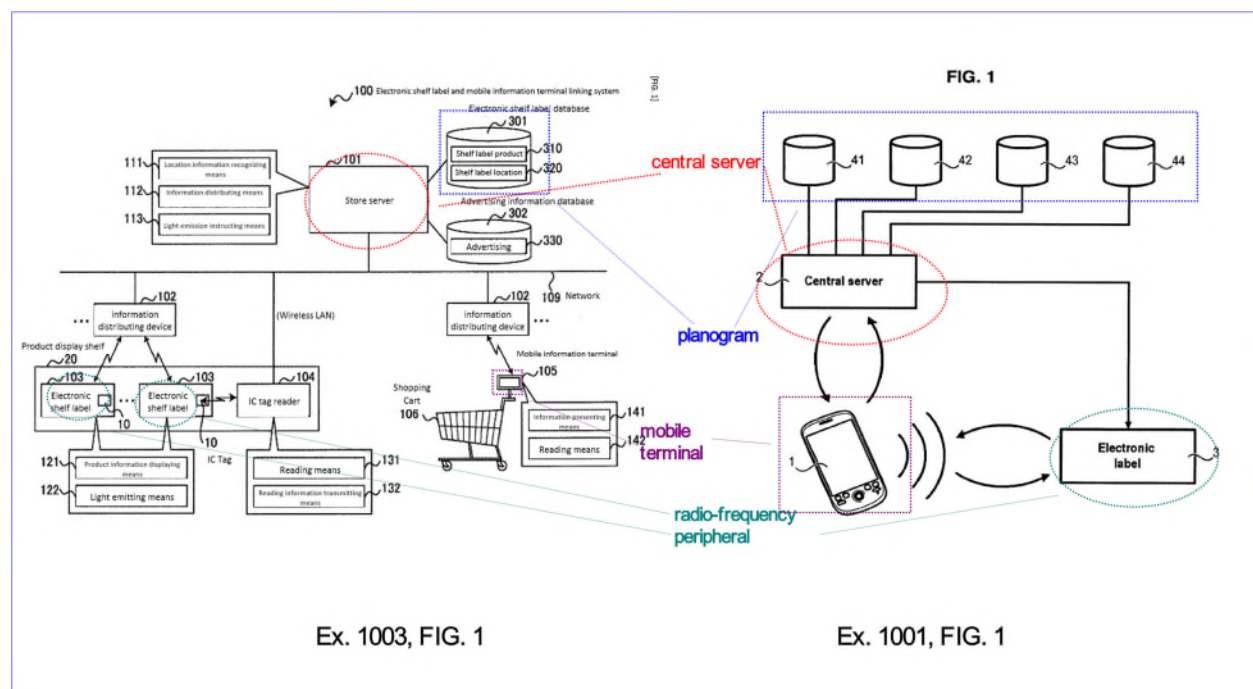
Ex. 1003 (Fujiwara), FIG. 4 (annotated)

76. It is my alternative opinion that a POSITA, familiar with the typical layout of a retail store, would find it obvious that multiple product display shelves 20 (and Fujiwara discloses a plurality of product display shelves in Ex. 1003, [0097]) can be placed side by side within an aisle, and thus the horizontal position of a product display shelf 20 within the aisle is the claimed **horizontal position**, while the shelf number 313 has already been disclosed as the **vertical position**, and the **plane** is the front plane of the whole aisle. Thus, it is my opinion that a POSITA would find that Fujiwara teaches the claimed “**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**” of [1pre] under this alternative understanding of vertical and horizontal positions.

77. Therefore, it is my opinion that a POSITA would find the claimed “[a] method for communicating spatially localized information (*not limiting, and see my discussions of [1c] below*) to a mobile terminal (*mobile information terminal*), the method being performed by a central server (*store server*) configured to access a planogram (*electronic shelf label database 301*) associating a plurality of unique identifiers (*shelf label ID 311*) of radio-frequency peripherals (*electronic shelf labels 103, integrating the IC tags that are implemented with RFID tags or NFC tags*) with a plurality of locations (*shelf label location information*) within a predetermined area (*sales floor*), 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” obvious over Fujiwara after making the obvious modification of implementing Fujiwara’s IC tag 10 with an RFID tag, or more specifically with an NFC tag conformant to NFC standards such as ISO 14443. Thus, it is my opinion that Fujiwara renders [1pre] obvious.

78. The following annotated figure shows the correspondence between the components of Fujiwara and the components of the '340 Patent.



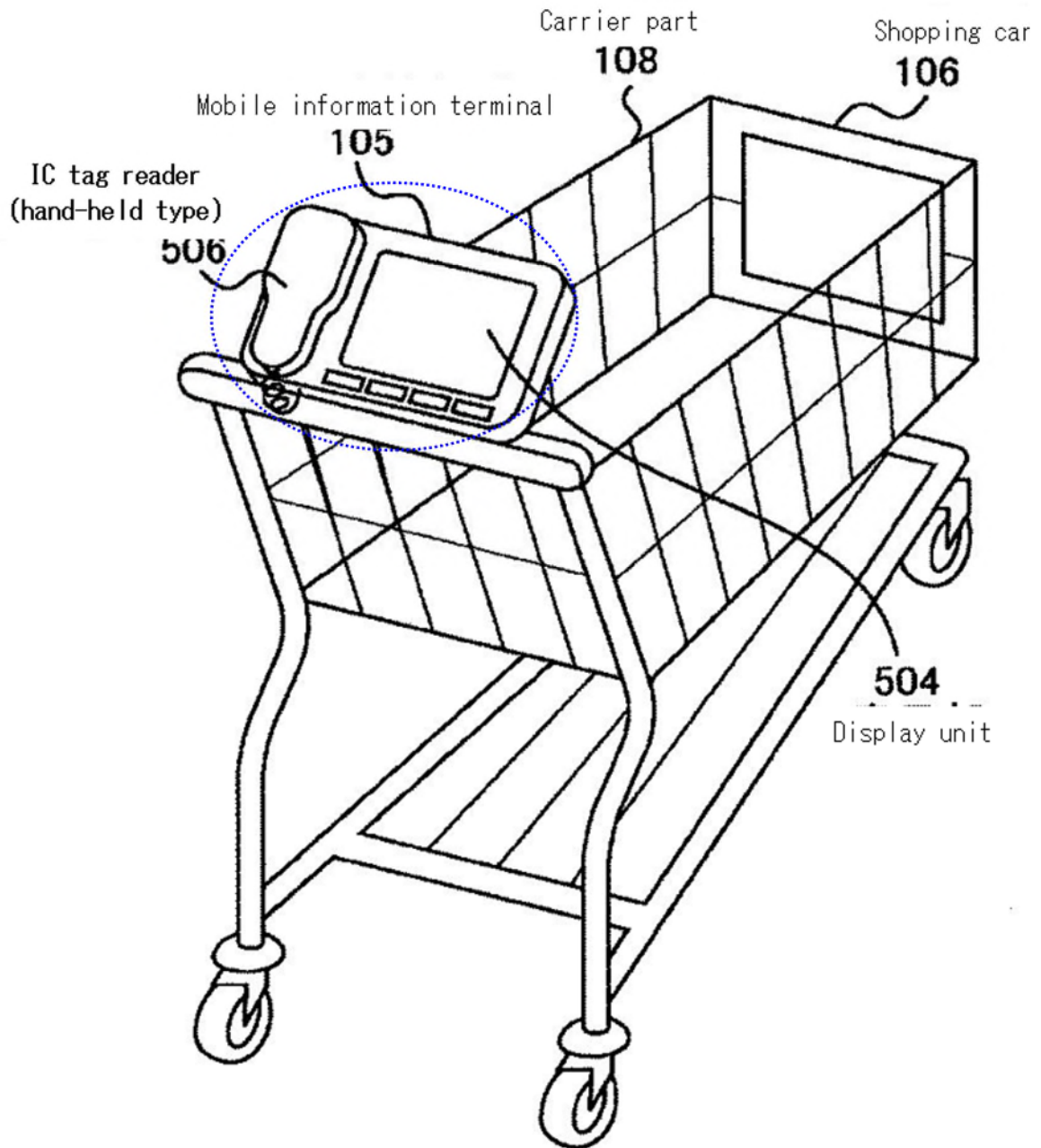
[1a] “receiving a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral, wherein the radio-

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;”

79. Fujiwara discloses “mobile information terminals.” Ex. 1003, [0015]. Fujiwara discloses that the mobile information terminal 105 has a display unit 504 and an IC tag reader 506. Ex. 1003, [0079]. Fujiwara discloses that the IC tag reader 506 is a handheld type IC tag reader and can be held over the product display shelf 20. Ex. 1003, [0103]. It is my opinion that the mobile information terminal 105 teaches the claimed **mobile terminal**.

80. FIG. 8 of Fujiwara shows a mobile information terminal 105 on a shopping cart 106, with a handheld type IC tag reader 506.

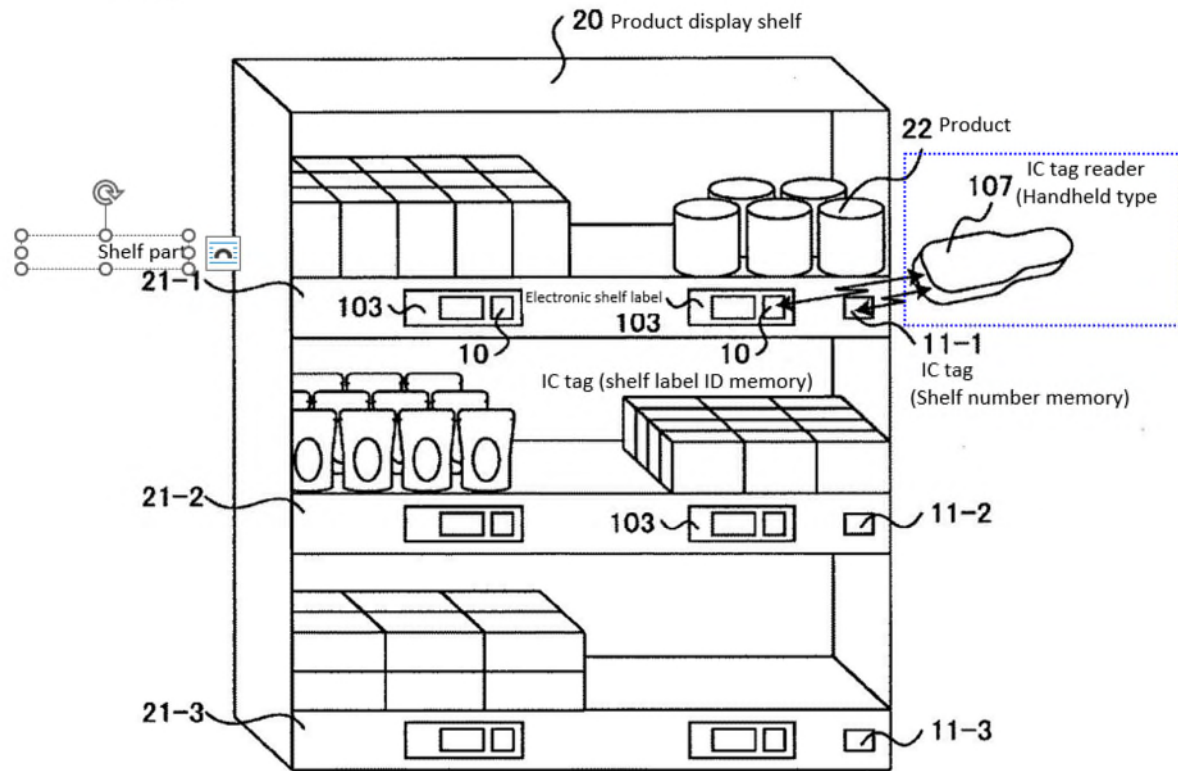
[FIG. 8]



Ex. 1003 (Fujiwara), FIG. 8 (annotated)

81. FIG. 11 of Fujiwara shows the operation of a handheld type IC tag reader, where it is being held over an IC tag 10 and is in communication with the IC tag 10.

[FIG. 11]



Ex. 1003 (Fujiwara), FIG. 11 (annotated)

82. Fujiwara discloses that “[w]hen acquiring the location of a product while moving, the handheld type IC tag reader 506 of the mobile information terminal 105 provided on the shopping cart 106 is held over the product display shelf 20 (step S1401).” Ex. 1003, [0103]. It is my opinion that a POSITA would understand that this operation is essentially the same as the one depicted in FIG. 11 (except that the sequence described in [0103]-[0106] and FIG. 14 does not involve the tags labeled 11-1, 11-2 and 11-3 in FIG. 11, and these tags may be removed from the picture for the purposes of this sequence).

83. Fujiwara discloses that the IC tag reader 506 then “transmits a resonant call-up signal to the IC tag 10 (step S1402).” Ex. 1003, [0103]. Fujiwara further discloses that “[t]he IC tag 10 of the electronic shelf label 103 receives the call-up signal and transmits a response signal (step S1403).” Ex. 1003, [0104]. Fujiwara discloses that, as the next step, “[t]he IC tag reader 506 receives a response signal from the IC tags 10 of the surrounding electronic shelf labels 103 (step S1404), and collectively reads the shelf label IDs 311 stored in the memories of the IC tags 10 (step S1405).” Ex. 1003, [0104]. Thus the mobile information terminal 105, of which the IC tag reader 506 is a part, receives a shelf label ID 311 (**unique identifier**) from at least one electronic shelf label 103 (**radio-frequency peripheral**). Therefore, it is my opinion that Fujiwara teaches the claimed “**a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area**” of [1a].

84. As Fujiwara discloses that shelf label ID 311 is the identification information of the electronic shelf label 103 (Ex. 1003, [0062]), it is my opinion that a POSITA would recognize that the shelf label ID 311 is **particular to** the associated electronic shelf label 103. Therefore, it is my opinion that Fujiwara teaches the claimed “**the unique identifier being particular to the radio-frequency peripheral**” of [1a].

85. It is my opinion that a POSITA would recognize that the sequence of the IC tag reader 506 transmitting a resonant call-up signal to the IC tag 10 and then the IC

tag 10 receiving the call-up signal and transmitting a response signal is a sequence whereby the **radio-frequency peripheral** is **activated** by the **mobile terminal**. Therefore, it is my opinion that Fujiwara teaches the claimed **“the radio-frequency peripheral... is configured to be activated by the mobile terminal”** of [1a].

86. Fujiwara discloses that “[t]he IC tag reader 506 transmits a call-up signal resonant with respect to the IC tags 10, 11, reads the response signal from the IC tags 10, 11 at a distance of several to several tens of centimeters, and reads the shelf label IDs, shelf numbers, and the like, which are the information recorded in the IC tags 10, 11.” Ex. 1003, [0082]. It is my opinion that this teaches a **communication range** of “several to several tens of centimeters.” *See id.* Therefore, it is my opinion that Fujiwara teaches the claimed **“when the radio-frequency communication peripheral is within a communication range of the mobile terminal”** of [1a].

87. The range of “several to several tens of centimeters” disclosed by Fujiwara (Ex. 1003, [0082]) significantly overlaps with the claimed **“less than twenty centimeters”** of [1a]. While the ’340 Patent claims that a range of less than twenty centimeters brings the advantage of ensured match, limited interference, and deliberate action, *see* Ex. 1001, [6:52-65], the ’340 Patent nowhere explains why the arbitrary choice of the cutoff point of twenty centimeters, as opposed to a slightly longer distance, is critical to such benefits. Furthermore, as I explained earlier in the backgrounds section, a POSITA would not have considered the particular cutoff

point of twenty centimeters to be critical. Therefore, it is my opinion that the claimed range of less than twenty centimeters is obvious over the disclosure in Fujiwara of the significantly overlapping range of several to several tens of centimeters.

88. While Fujiwara discloses the reading of multiple IC tags within the communication range of several to several tens of centimeters, it is my opinion that Fujiwara does not disparage or in any way teach away from the reading of the IC tags within a range of less than twenty centimeters, or from the reading of a single IC tag.

89. In fact, it is my opinion that reading a number of IC tags within a relatively small communication range (of less than twenty centimeters), or reading a single IC tag, would equally advance, or even better serve, Fujiwara's explicitly disclosed objective of recognizing the location of the reading device and transmitting location-associated information to the mobile device, *see* Ex. 1003, [0006], [0016]. Thus, in my opinion, a POSITA would not consider Fujiwara's disclosure of "several to several tens of centimeters" to be teaching away from a communication range at the lower end of such disclosure.

90. Further, as I have explained, and as the '340 Patent itself acknowledges, the NFC standard ISO 14443 was well-known and being widely adopted by the relevant industry at the time of the claimed invention. As I have discussed for [1pre] above, a POSITA would find it obvious to modify Fujiwara by implementing Fujiwara's IC

tag 10 with the ubiquitous, readily available, readily replaceable, standardized and conventional NFC tags conformant to standards such as ISO 14443 that has a communication range of less than twenty centimeters, in order to achieve advantages such as increased and standardized communication security, reduced interference, and easy mass deployment and easy maintenance.

91. Therefore, it is my opinion that a POSITA would find the claimed “**wherein the communication range is less than twenty centimeters**” of [1a] obvious over Fujiwara after making the obvious change of implementing Fujiwara’s IC tag 10 with NFC tags conformant to standards such as ISO 14443 that has a communication range of less than twenty centimeters, as such standards, which a POSITA is knowledgeable about, readily teach this claimed limitation.

92. Fujiwara further discloses that an IC tag 10 comprises a coil-shaped **antenna**. Ex. 1003, [0071]. Fujiwara further discloses that an IC tag 10 comprises an IC **chip**. Ex. 1003, [0071]. As Fujiwara discloses a communication range of “several to several tens of centimeters” (Ex. 1003, [0082]), it is my opinion that a POSITA would find that the lower end of this range falls within the range of near-field communication, and therefore the antenna and the chip are **configured for near-field communication**.

93. In fact, as I have explained, the NFC standards such as ISO 14443 and their advantages (such as increased security) have been within common knowledge of a

POSITA at the time of the claimed invention, and there is a trend towards utilizing NFC standards in the relevant industry. And as I have further discussed for [1pre], it is my opinion that a POSITA would find it obvious to modify Fujiwara by implementing Fujiwara's IC tag 10 with the ubiquitous, readily available, readily replaceable, standardized and conventional NFC tags conformant to standards such as ISO 14443 so as to achieve Fujiwara's explicitly disclosed functionality of communication within a range of "several to several tens of centimeters", and thus implement the antenna and the chip as **configured for near-field communication**.

94. Further, Fujiwara is explicitly directed to a need in the relevant industry for "means to automatically detect the location of the corresponding product in the store" and "function to inform [the customers] of the location of the relevant product in the store." Ex. 1003, [0005]. While Fujiwara's IC tag reader 506 interacts with a plurality of IC tags within a range of several to several tens of centimeters (Ex. 1003, [0082]), or "the IC tags 10 in the range of a one-third part of the product display shelf 20", and sends the unique identifiers of all these IC tags to the central server (Ex. 1003, [0104]), it is my opinion that a POSITA would understand that, by employing the well-known NFC standards such as ISO 14443 and reducing the communication range to less than twenty centimeters, Fujiwara's system can be improved in the precision of product locating and can provide more targeted "information related to the product[]" based on both the shelf label product

information and the shelf label location information” (Ex. 1003, [0016]) to the mobile terminal, thus achieving the universal, obvious and expressly disclosed objectives of easy shopping and effective sales promotion effect (Ex. 1003, [0108]). Such improvement in the precision of product locating will also improve the other embodiments of Fujiwara, such as the planogram maintenance embodiment (Ex. 1003, [0090]-[0095]), thus achieving the universal, obvious, and expressly disclosed objective of reducing the burden on the person in charge of product management (Ex. 1003, [0108]).

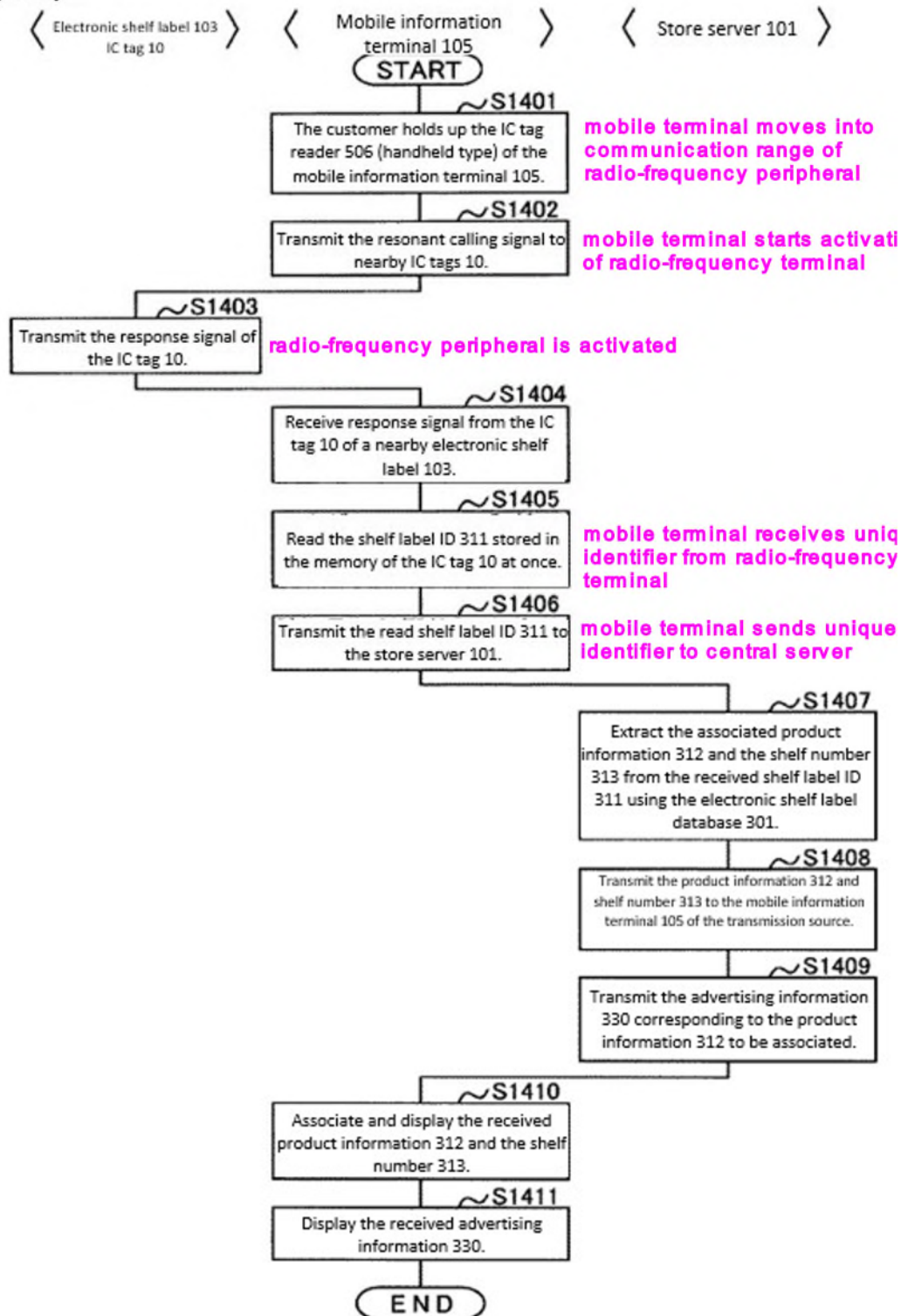
95. Therefore, it is my opinion that a POSITA would find the claimed **“the radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication”** of [1a] obvious over Fujiwara after the obvious change of implementing Fujiwara’s IC tag 10 with NFC tags conformant to standards such as ISO 14443.

96. Fujiwara further discloses that “The control unit 501 of the mobile information terminal 105 transmits the 1 or more shelf label IDs 311 that were read to the store server 101 (step S1406).” Ex. 1003, [0104]. Therefore, it is my opinion that Fujiwara teaches the claimed **“[the central server] 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”** of [1a].

97. Thus, it is my opinion that Fujiwara renders the claimed “[the central server (*store server 101*)] receiving a communication from a mobile terminal (*mobile information terminal 105*), the communication comprising a unique identifier (*shelf label ID 311*) received by the mobile terminal from a radio-frequency peripheral (*electronic shelf label 103*) located in the predetermined area (*sales floor*), the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna (*coil-shaped antenna*) and an electronic chip (*IC 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 (*several to several tens of centimeters*)” of [1a] obvious.

98. Thus, it is my opinion that a POSITA would find each and every limitation of [1a] obvious over Fujiwara after making the obvious modification of implementing Fujiwara’s IC tag 10 with an NFC tag conformant to NFC standards such as ISO 14443 with a communication range of less than twenty centimeters. The correspondences are shown in the annotations to FIG. 14 of Fujiwara below:

[FIG. 14]



Ex. 1003 (Fujiwara), FIG. 14 (annotated)

[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”

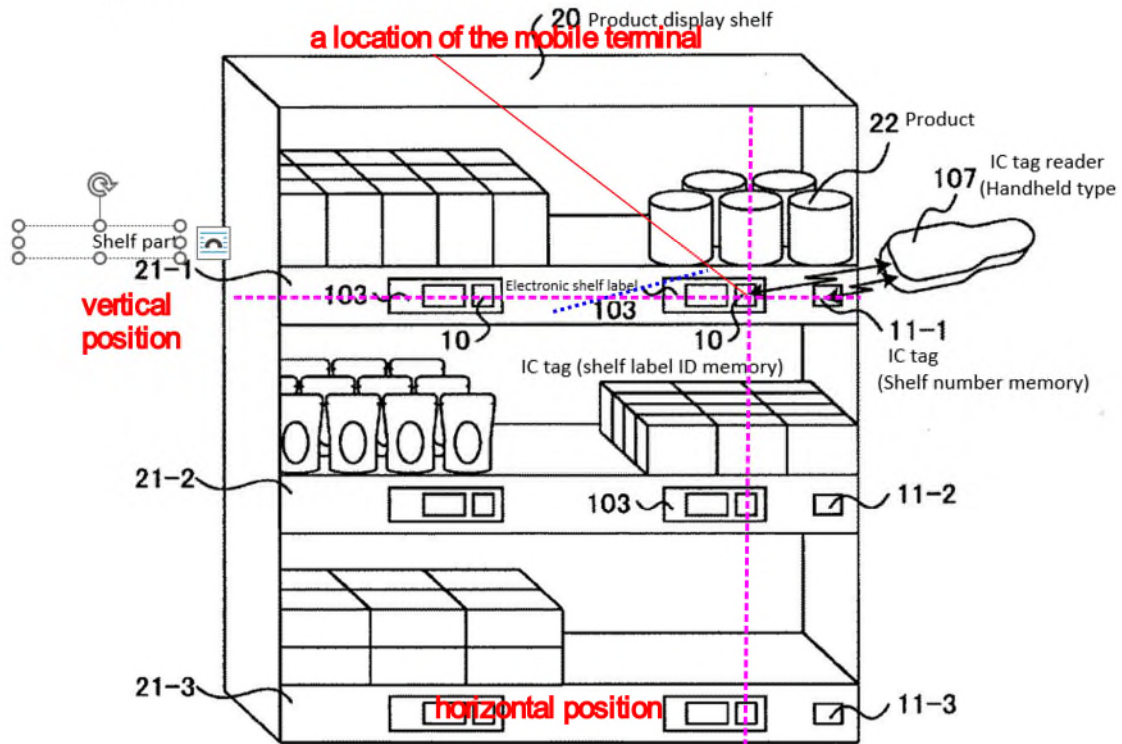
99. Fujiwara discloses that the store server comprises an “acquiring means for acquiring the shelf label product information and the shelf label location information associated with the electronic shelf label IDs from the one or more electronic shelf label IDs received from the mobile information terminal using the electronic shelf label database.” Ex. 1003, [0015]. Thus, the central server is configured to access the **planogram** (electronic shelf label database) to determine a location associated with a **unique identifier** (electronic shelf label ID) of the **received communication** (the IDs are received from the mobile information terminal). Therefore, it is my opinion that Fujiwara teaches the claimed **“determining a location... based on the location associated with the unique identifier of the received communication in the planogram”** of [1b].

100. Fujiwara discloses that “[t]he control unit 201 of the store server 101 extracts the associated product information 312 and shelf number 313 from the one or more shelf label IDs 311 that were received using the electronic shelf label database 301 (step S1407).” Ex. 1003, [0105]. Shelf number 313 and shelf label ID 311 form shelf location information 320. Ex. 1003, [0062]. As I have discussed above, it is

my opinion that this information teaches the claimed **“location associated with the unique identifier of the received communication in the planogram”** of [1b].

101. Fujiwara discloses that the received shelf label ID 311 is from the IC tags 10 of the surrounding electronic shelf labels 103. Ex. 1003, [0104]. Fujiwara discloses that the IC tag reader 506 and electronic shelf label 103 must be within a communication range of several to several tens of centimeters. Ex. 1003, [0082]. It is my opinion that a POSITA would understand this to mean that retrieving the location associated with the unique identifier is necessarily **determination of a location** of the mobile information terminal, namely, the location of the IC tag reader 506 of that mobile information terminal 105, within the predetermined area of the sales floor, especially because the '340 Patent employs the same rationale in its specification related to this limitation (Ex. 1001, [6:48-51]). As I have discussed above, and as depicted in the annotated FIG. 11 of Fujiwara below, this location comprises **vertical** and **horizontal** positions. Therefore, it is my opinion that Fujiwara teaches the claimed **“determining a location of the mobile terminal within the predetermined area..., the location of the mobile terminal comprising the vertical and horizontal position of said location”** of [1b].

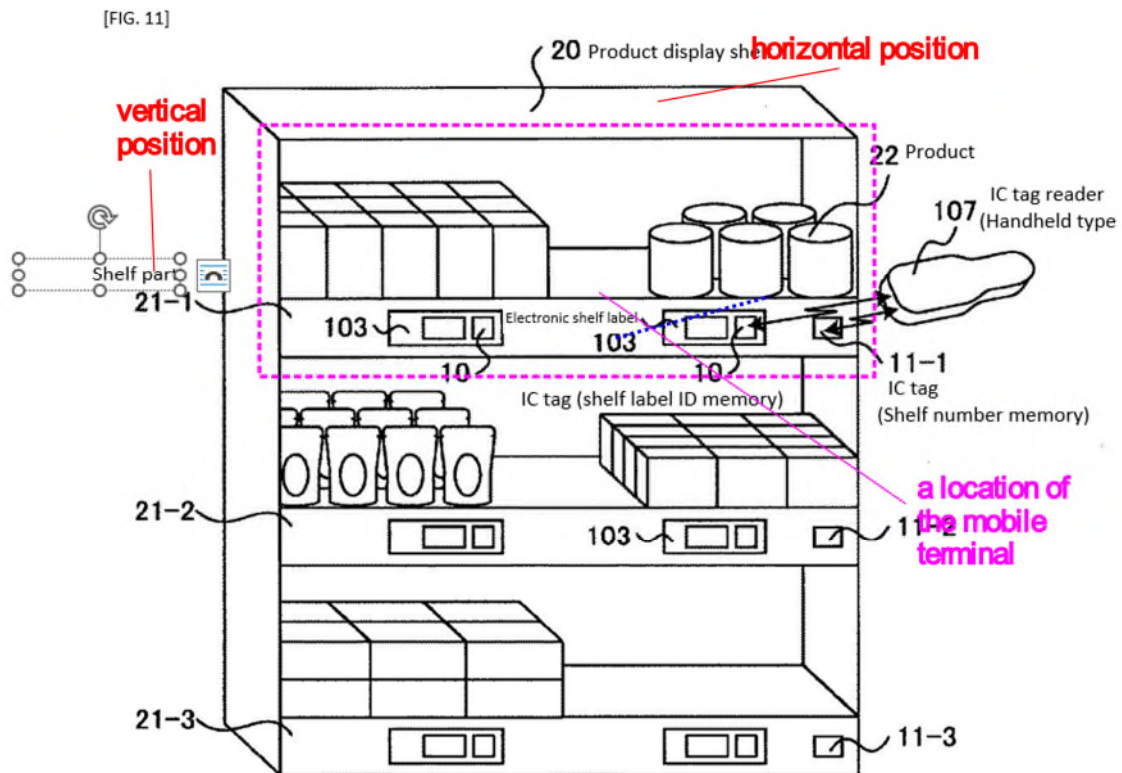
[FIG. 11]



Ex. 1003 (Fujiwara), FIG. 11 (annotated)

102. Fujiwara also discloses that an IC tag reader 506 may interact with the IC tags 10 in the range of a one-third part of the product display shelf 20 (Ex. 1003, [0104]), a POSITA looking at this disclosure, in view of the disclosure of interacting with “the IC tag 10 integrated in one or more electronic shelf labels 103 on the same shelf part 21 on the front side of the shelf” in Ex. 1003, [0084], as well as in view of FIG. 11, would find it obvious that this one-third part corresponds with one shelf part in the product display shelf 20 depicted in the alternatively annotated FIG. 11 below (namely, shelf part 21-1 in that figure). Thus, it is also my opinion that a POSITA would further understand that this range (one shelf part) is **a location of the mobile terminal**, and this range/location comprises a **vertical position** (the

vertical placement of the shelf part). As I have discussed above, the product display shelf 20 itself is a **horizontal position** within a plane (face of aisle) perpendicular to a floor of the predetermined area (the sales floor). It is my opinion that a POSITA would further understand that, by extracting shelf number 313 and shelf tag label 311 (Ex. 1003, [0105]), this location (shelf part) is necessarily **determined**. Therefore, it is my opinion that Fujiwara teaches the claimed “**determining a location of the mobile terminal within the predetermined area..., the location of the mobile terminal comprising the vertical and horizontal position of said location**” of [1b] under this alternative understanding.

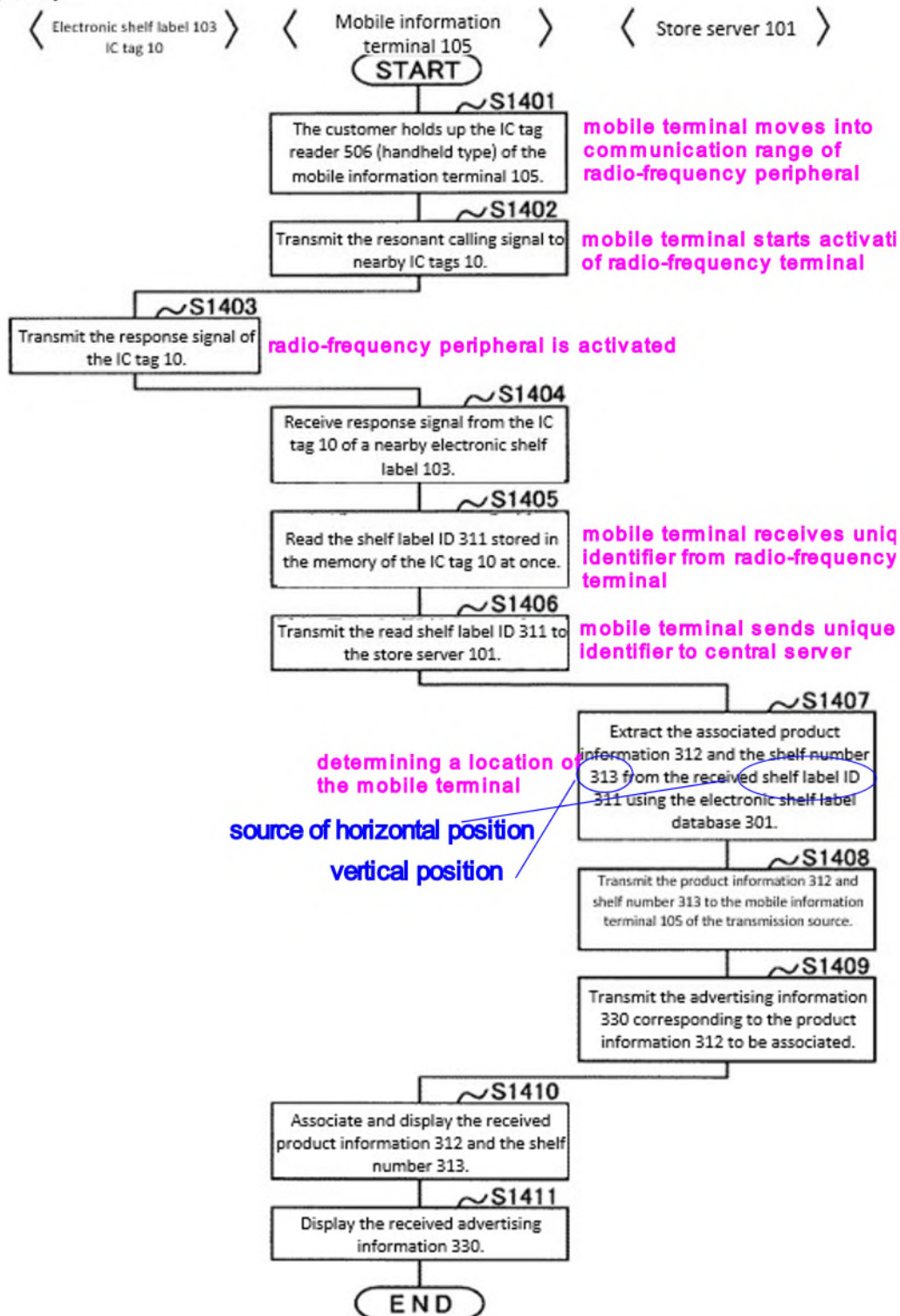


Ex. 1003 (Fujiwara), FIG. 11 (annotated)

103. Thus, it is my opinion that Fujiwara teaches the claimed “[the central server (*store server 101*)] determining a location (*electronic shelf label location, or alternatively, one shelf part*) of the mobile terminal (*mobile information terminal 105*) within the predetermined area (*sales floor*) based on the location (*electronic shelf label location*) associated with the unique identifier (*shelf label ID 311*) of the received communication in the planogram (*electronic shelf label database*), the location of the mobile terminal comprising the vertical and horizontal position of said location” of [1b].

104. Thus, it is my opinion that Fujiwara teaches each and every limitation of [1b]. The correspondences are shown in the annotations to FIG. 14 of Fujiwara below:

[FIG. 14]



Ex. 1003 (Fujiwara), FIG. 14 (annotated)

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

105. Fujiwara discloses that “[t]he control unit 201 transmits the associated product information 312 and the shelf number 313 to the mobile information terminal 105 of the transmission source (step S1408). Furthermore, the control unit 201 transmits advertising information 330 corresponding to the product information (product ID) to be associated (step S1409).” Ex. 1003, [0105]. Therefore, it is my opinion that Fujiwara teaches the claimed **“transmitting to the mobile terminal”** of [1c].

106. Fujiwara discloses that “product information 313” (from the context, a POSITA would find this to be obviously a typo of “product information 312”) is “information related to the product to be displayed on the electronic shelf label 103 (product ID, product price, and the like).” Ex. 1003, [0062]. Fujiwara further discloses that “[t]he advertising information 330 is information provided from advertisers/store such as advertisements, pop content, in-store information, and contains advertising information ID, advertisement data (video, still image, character data, and the like), and the like.” Ex. 1003, [0063].

107. It is my opinion that, from these disclosures, together with the explicit disclosure that the central server “transmits the information related to the product, based on both the shelf label product information and the shelf label location information, to the mobile information terminal” (Ex. 1003, [0016]), a POSITA

would recognize that the product information 312 and advertising information 330 teach the claimed “**spatially localized information associated with the location of the mobile terminal**” of [1c], as these are “data to the mobile terminal concerning the item in whose vicinity the mobile terminal -- therefore the user thereof — is positioned” in the words of the ’340 Patent itself. Ex. 1001, [7:23-25].

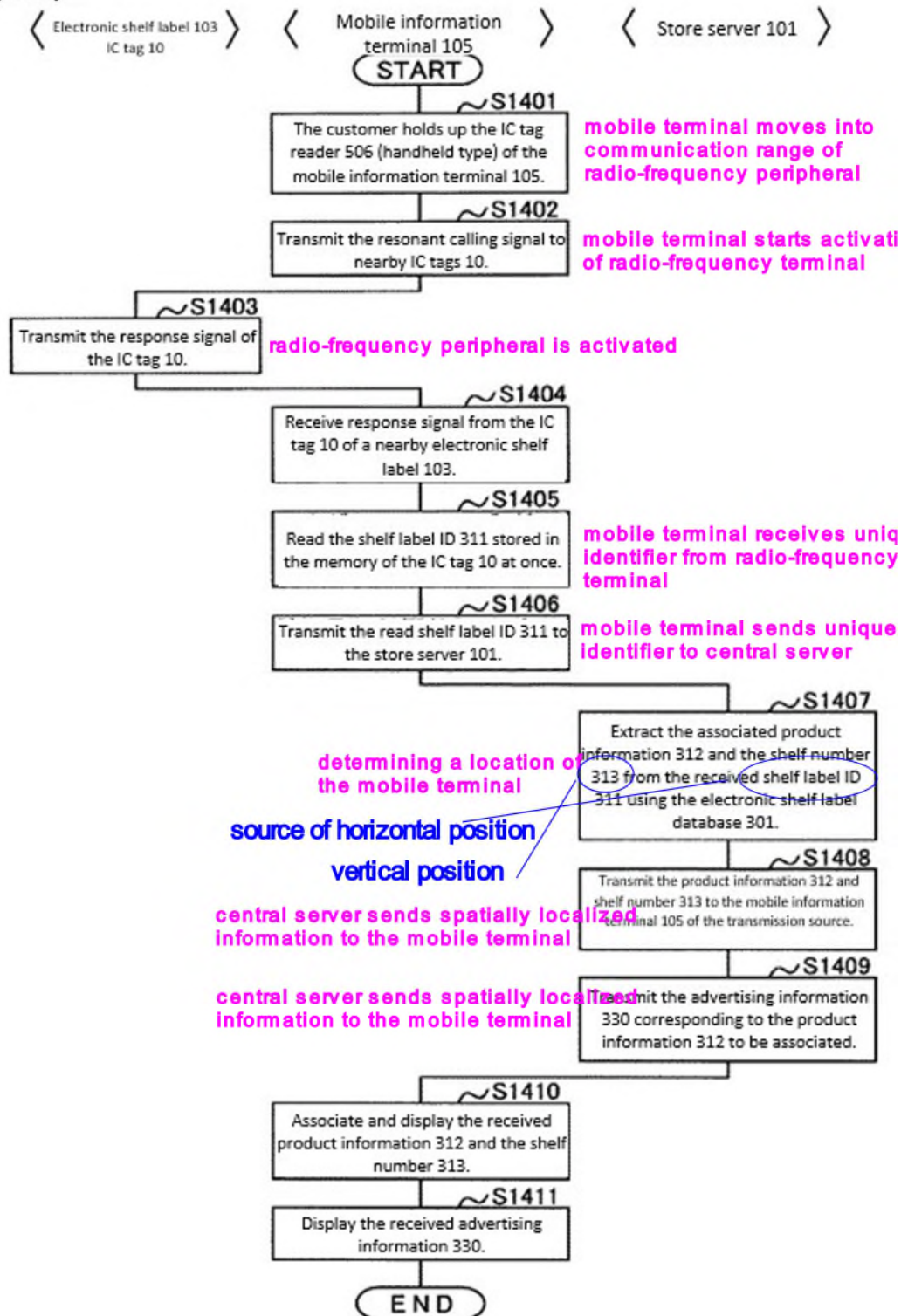
108. Further, in a separate embodiment also directed to the same universal, conventional and explicitly disclosed objectives of easy shopping and effective sales promotion (Ex. 1003, [0108]), Fujiwara discloses a product location present procedure that presents product location to the customer. Ex. 1003, [0095]. It is my opinion that a POSITA, in view of such disclosure, would find it obvious to have the store server also transmit, to the mobile information terminal, the relative positions of the products inside the product display shelf 20 relative to the determined location of the mobile terminal, as well as the direction to locate such products relative to the determined location of the mobile terminal. This involves no more than a small addition to the product information and advertising information already set to be transmitted to the mobile information terminal, and the mobile terminal is well configured to display such information, as it is already configured to display advertising information in the form of “video, still image, character data, and the like.” Ex. 1003, [0063]. Such a small modification represents nothing more than the combination of known elements to achieve predictable results, and would have been

well within the skills of a POSITA. It is my opinion that such relative location information further teaches the claimed “**spatially localized information associated with the location of the mobile terminal**” of [1c], in particular because the '340 Patent provides an explicit example of “the path to be followed to reach a specific item” for “spatially localized information.” Ex. 1001, [7:43-44].

109. Therefore, it is my opinion that Fujiwara teaches the claimed “[the central server (*store server 101 that includes control unit 201*)] transmitting to the mobile terminal (*mobile information terminal 105*) spatially localized information associated with the location of the mobile terminal” of [1c].

110. Thus, it is my opinion that Fujiwara teaches each and every limitation of [1c]. The correspondences are shown in the annotations to FIG. 14 of Fujiwara below:

[FIG. 14]



Ex. 1003 (Fujiwara), FIG. 14 (annotated)

111. Thus, it is my opinion that a POSITA would find each and every limitation of Claim 1 obvious over Fujiwara after making the obvious modification of implementing Fujiwara's IC tag 10 with an NFC tag conformant to NFC standards such as ISO 14443 with a communication range of less than twenty centimeters. Thus Fujiwara 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."

112. Claim 1 has already been addressed above.

113. As I have discussed above for Claim 1, a POSITA would find it obvious to implement Fujiwara's IC tag 10 with an NFC tag conformant to NFC standards such as ISO 14443 with a communication range of less than twenty centimeters. As I have discussed earlier in the backgrounds section, a POSITA would also know that NFC tags conformant with ISO 14443 are passive RFID tags powered and activated by

electromagnetic waves received by the tags, in the way claimed by Claim 2. Thus, it is my opinion that a POSITA would find the claimed **“when the mobile terminal is positioned relative to the radio-frequency communication peripheral (*electronic shelf label 103, or more particularly, IC tag 10 thereof*) within the communication range, energy of electromagnetic waves emitted by the mobile terminal (*mobile information terminal 105, or more particularly, handheld type IC tag reader 506 thereof*) 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”** of [2] obvious over Fujiwara after this obvious modification. Therefore, it is my opinion that Fujiwara renders obvious each and every limitation of Claim 2, and thus 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.”**

114. Claim 1 has already been addressed above.

115. Fujiwara discloses that the collaborative system 100 of electronic shelf label and mobile information terminal includes a network 109. Ex. 1003, [0041], [0042].

Fujiwara further discloses that network 109 is a network such as a local area network (LAN), in-house LAN, or the like, and can be wired or wireless. Ex. 1003, [0042].

116. It is my opinion that a POSITA would also have been motivated and able to modify Fujiwara so as to implement Fujiwara's network 109 with the universal and conventional element of **the Internet** with a POSITA's background knowledge, and to use **the Internet** for the communications between Fujiwara's mobile information terminal and the store server. Fujiwara already discloses that network 109 can be one of a broad range of wired or wireless networks. Ex. 1003, [0042]. Fujiwara further discloses that IC tag readers 104 and the store server may communicate through network 109. Ex. 1003, [0042], [0055]. 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 Fujiwara's network 109 via the Internet 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 Fujiwara to effect communications between the mobile terminal and the central server. Further, using the Internet-implemented network 109 for the communications between IC tag reader 506 of the mobile information terminal 105 and the store server is a mere substitution of one element (IC tag reader 506) for another known in another embodiment (IC tag reader 104) that serves the same objectives of easy shopping

and effective sales promotion (Ex. 1003, [0108]). Implementing Fujiwara's network 109 with the Internet and using the Internet for the communications between IC tag reader 506 and store server would have been well within the skill of a POSITA because of the ubiquity of the Internet and because the wild-spread knowledge of Internet technology.

117. Thus, it is my opinion that a POSITA would find the claimed "the central server receiving the communication from the mobile terminal is via the Internet" of [3] obvious over Fujiwara after making the obvious modification of implementing Fujiwara's network 109 via the well-known and conventional Internet, and thus Fujiwara renders obvious each and every limitation of Claim 3, and thus renders 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."

118. Claim 1 has already been addressed above.

119. Fujiwara discloses that "the advertising information 330 is delivered based on the attribute information of the customer. For example, some information is distributed only to women in their 20s and 30s, and some information is distributed

according to the number of purchasing points, and the like.” Ex. 1003, [0098]. Fujiwara further discloses that the attribute information is customer information that may be acquired from a customer card. Ex. 1003, [0098]. Thus, it is my opinion that such attribute information as the customer’s gender and age and purchasing point history, which can be obtained from the customer’s card, teaches the claimed **“account data specific to the user of the mobile terminal”** of [4]. And since Fujiwara discloses that the advertising information 330 (which, as discussed above for [1c], is the claimed **“spatially localized information”**) is delivered based on the attribute information, it is further my opinion that Fujiwara teaches that the claimed **“the spatially localized information is further associated with account data specific to the user of the mobile terminal”** of [4].

120. Fujiwara discloses that “[r]egarding the attribute information of the customer, when a customer enters the store and pushes the shopping cart 106 to make a purchase, for example, the customer information (attribute information) can be acquired by holding a customer card over the IC tag reader 506 of the portable information terminal 105 provided on the shopping cart 106.” Ex. 1003, [0098]. Thus, it is my opinion that Fujiwara teaches that the account data was previously stored in a database (inside the portable information terminal 105) that is now accessible to the store server via a communication network (the network over which the mobile information terminal 105 and the store server communicates), and thus

teaches the claimed **“previously stored in a database accessible to the central server via a communication network”** of [4].

121. Therefore, it is my opinion that Fujiwara renders Claim 4 obvious.

Claim 5

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

122. Claim 5 recites a system analogous to method claim 1, and is rendered obvious by Fujiwara for same reasons set forth for claim 1. 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;”

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

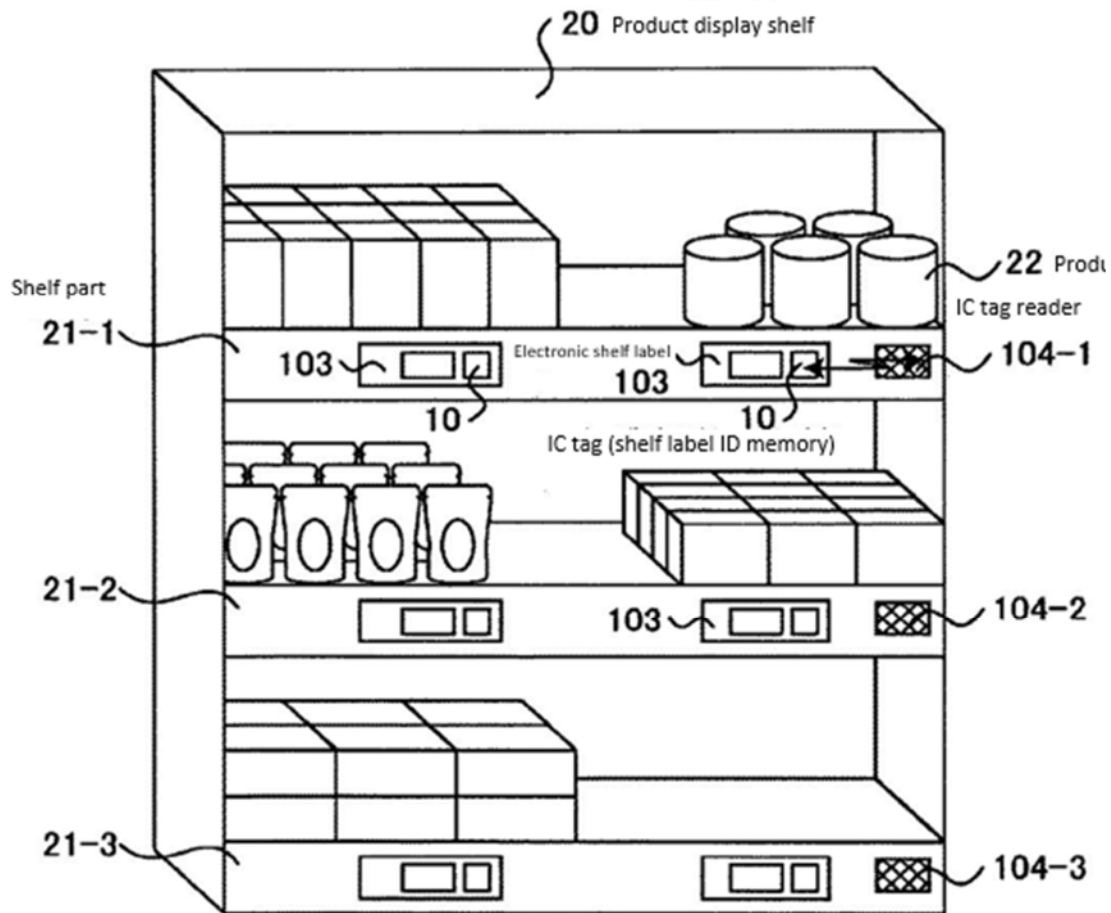
[5b] “a mobile terminal configured to communicate with the central server; and;”

124. [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,”

125. 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. Fujiwara (with the obvious modifications discussed for [1]) discloses that the plurality of IC tags (**radio-frequency peripherals**) are **distributed throughout** the predetermined area through figures such as FIG. 4.

[FIG. 4]



Ex. 1003 (Fujiwara), FIG. 4

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

126. [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;”

127. 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;”

128. 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.”

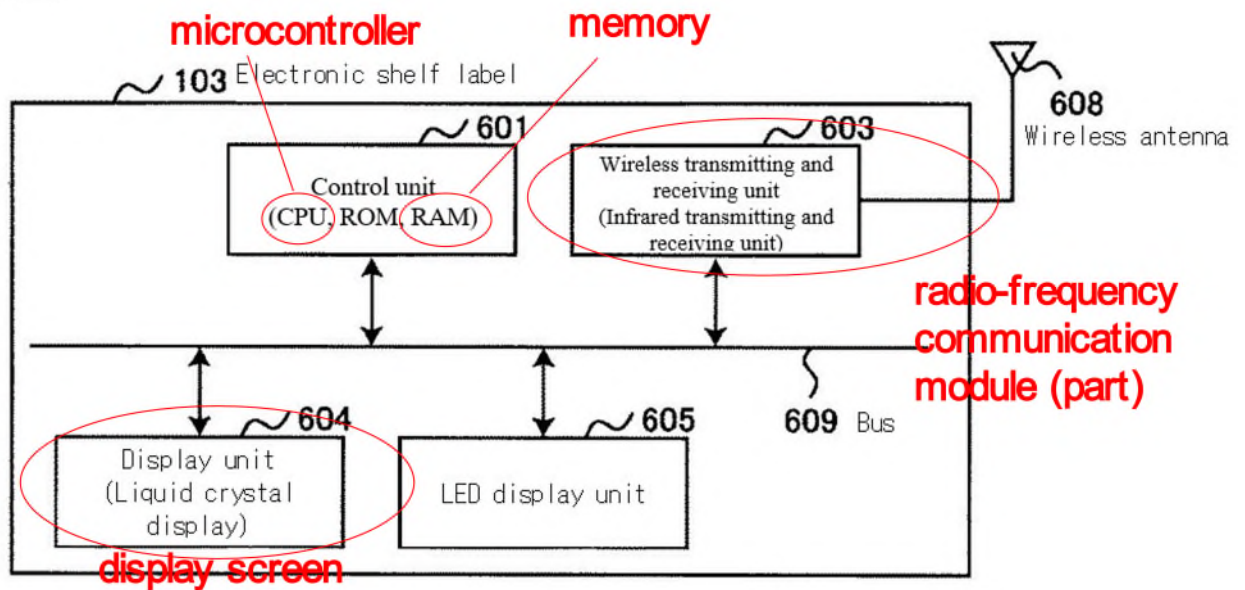
129. The limitations of [5g] are substantially the same as the corresponding limitations of [1c]. Please refer to the discussions for [1c] above.

130. Therefore, it is my opinion that Fujiwara renders obvious each and every limitation of Claim 5, and thus renders Claim 5 obvious.

Claim 6

131. The annotated figure below is a high-level overview of the correspondence between Fujiwara’s disclosures and Claim 6. More details are set forth below.

[FIG. 6]



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

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

132. Claim 5 has already been addressed above.

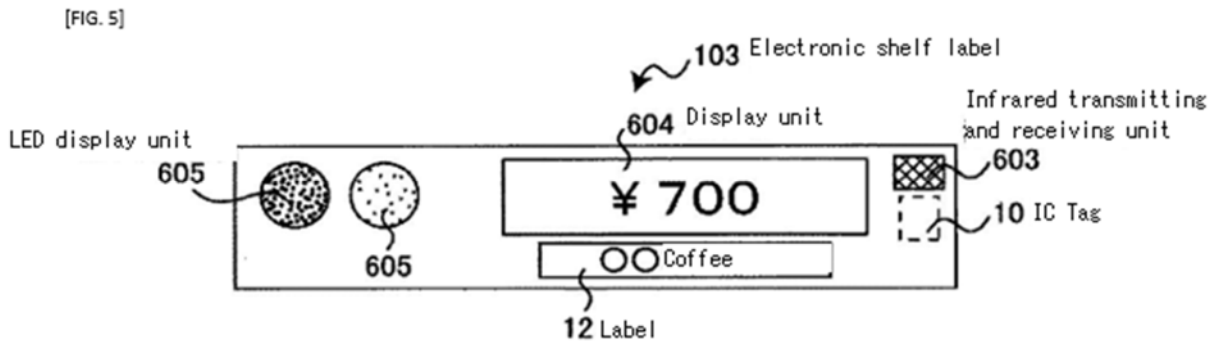
133. As discussed for Claim 1, a POSITA would find the claimed radio-frequency peripheral obvious over Fujiwara’s disclosure of an **electronic shelf label** integrating an IC tag. Thus, it is my opinion that Fujiwara renders obvious the claimed “**at least one radio-frequency peripheral is an electronic label**” of [6pre] and therefore renders obvious 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;”

134. Fujiwara discloses that the electronic shelf label 103 comprises wireless transmitting and receiving unit 603. Ex. 1003, [0067]. It is my opinion that, while Fujiwara discloses an embodiment of wireless communication as infrared communication, a POSITA would understand that infrared communication is only provided as one possible example of wireless communication, a point that is made clear by Fujiwara's wording of "for example". Ex. 1003, [0067]. Thus, it is my opinion that a POSITA, familiar with the well-known and conventional radio frequency communication, and in particular with the widespread use of low-cost RFIDs in electronic shelf labels, would find it obvious to substitute infrared communication with well-known and conventional radio frequency communication, thus simplifying the design of the electronic shelf label by utilizing mature and conventional component, and saving costs. This would also harmonize the internal design of two different components (wireless transmitting and receiving unit 603 and IC tag 10) of Fujiwara's electronic shelf label 103 by employing one single communication method (radio-frequency communication) for both, instead of two methods (infrared for the former, microwave for the latter as originally disclosed or radio-frequency for the latter after making the obvious modification of implementing IC tag 10 as NFC tag conformant with ISO 14443), and thus allow a POSITA to reuse hardware and software solutions for both, simplifying the design, reducing the cost, and facilitating maintenance. This is no more than a mere substitution of one

element (infrared communication) for another known in the field (radio-frequency communication), and a POSITA would have a reasonable expectation of success in doing so. Not only would this have been obvious to try, but it would also have yielded no more than predictable results due to the combination of familiar elements in a known way. In my opinion, a POSITA would thus find the claimed **radio-frequency communication module** obvious over Fujiwara through the modified wireless transmitting and receiving unit 603.

135. As discussed for [1pre], it is my opinion that a POSITA would find it obvious to modify Fujiwara by implementing the IC tag integrated inside the electronic shelf label as an NFC tag conformant to NFC standards such as ISO 14443. As I have discussed in the backgrounds section, a POSITA would know that such NFC tags are a subset of RFID tags, which engage in radio-frequency communication. Thus, it is my opinion that a POSITA would further find the claimed **radio-frequency communication module** obvious over Fujiwara through the modified IC tag (which is integrated into the electronic shelf label and thus forms an integral part of the label).



Ex. 1003 (Fujiwara), FIG. 5

136. Therefore, it is my opinion that a POSITA would find the claimed “**radio-frequency communication module**” of [6a] obvious Fujiwara through the modified wireless transmitting and receiving unit 603 and the modified IC tag 10.

137. Fujiwara discloses that the wireless transmitting and receiving unit is configured to communicate with information distributing device 102. Ex. 1003, [0070]. Fujiwara discloses that information distributing device 102 wirelessly transmits information sent from the store server 101 to the electronic shelf labels 103. Ex. 1003, [0045]. Fujiwara further discloses that the electronic shelf label 103 receives product information (product price, and the like) by wireless communication from the store server 101 via the information distributing device 102. Ex. 1003, [0046]. Thus, it is my opinion that a POSITA would understand that the wireless transmitting and receiving unit is configured to receive **data representing information relating to an item**, and therefore find that Fujiwara, after the obvious modification to use radio-frequency communication, teaches the claimed

“configured to receive data representing information relating to an item from a central server” of [6a].

138. Therefore, it is my opinion that a POSITA would find each and every limitation of [6a] obvious over Fujiwara after the obvious modifications to the wireless transmitting and receiving unit 604 and to the IC tag 10.

[6b] “a memory to store said data;”

139. Fujiwara discloses that the electronic shelf label 103 includes a control unit 601. Ex. 1003, [0068]. Fujiwara discloses that the control unit 601 includes a CPU, ROM, RAM, and the like. Ex. 1003, [0069]. It is my opinion that the RAM teaches the claimed **“memory”** of [6b]. Fujiwara discloses that “product prices, information for customers, and the like” are **stored** in RAM. *Id.* Thus Fujiwara also teaches the claimed **“to store said data”** of [6b]. Therefore, it is my opinion that Fujiwara teaches each and every limitation of [6b].

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

140. Fujiwara discloses that the electronic shelf label 103 includes a control unit 601. Ex. 1003, [0068]. Fujiwara discloses that the control unit 601 includes a CPU. Ex. 1003, [0069]. It is my opinion that the CPU teaches the claimed **“microcontroller”** of [6c]. Fujiwara discloses that the CPU controls each device connected via the bus 609. Ex. 1003, [0069]. It is my opinion that a POSITA would

find it obvious that the CPU controls the display unit 604 (disclosed in Ex. 1003, [0067]) which **displays the information relating to an item** (*see* Ex. 1003, [0046], [0067]), thus Fujiwara teaches the claimed **“to control the display of information relating to an item”** of [6c]. Therefore, it is my opinion that Fujiwara teaches each and every limitation of [6c].

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

141. Fujiwara discloses that the electronic shelf label 103 comprises a display unit 604, which is a liquid crystal display or the like, and presents customers with (displays) product price and information for customers. Ex. 1003, [0067]. It is my opinion that the display unit 604, being a liquid crystal display, teaches the claimed **“display screen to display said item-related information”** of [6d]. Therefore, it is my opinion that Fujiwara teaches each and every limitation of [6d].

142. Therefore, it is my opinion that a POSITA would find each and every limitation of Claim 6 obvious over Fujiwara. Thus Fujiwara 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.”

143. Claim 6 has already been addressed above.

144. Fujiwara discloses that “[t]he IC tag reader 506 of the mobile information terminal 105 transmits a resonant call-up signal to the IC tag 10 (step S1402).” Ex. 1003, [0103]. As discussed for [6a] above, a POSITA would find it obvious that the IC tag 10, after the obvious modification of implementing it as an NFC tag conformant with NFC standards such as ISO 14443, forms a part of the radio-frequency communication module. Thus a POSITA would understand that the mobile terminal is adapted to transmit data (resonant call-up signal) to the electronic label via the radio-frequency communication module (taught in part by the modified IC tag 10). Thus, it is my opinion that Fujiwara renders obvious the claimed “the mobile terminal (*mobile information terminal 105*) is adapted to transmit data (*resonant call-up signal*) to the electronic label (*electronic shelf label 103*) via the radio-frequency communication module (*of which IC tag 10 is a part*) of said electronic label” of [7]. Therefore, it is my opinion that Fujiwara renders obvious each and every limitation of Claim 7, and thus renders Claim 7 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.”

145. Claim 5 has already been addressed above.

146. Fujiwara discloses that “[t]he IC chip is connected to both end parts of the antenna.” Ex. 1003, [0071]. Thus, it is my opinion that a POSITA would understand that the antenna and the chip are inherently arranged at different points of the radio-frequency peripheral, as the chip is connected to the two ends of the antenna, which is not possible when the chip and the antenna are arranged at the same point, and therefore Fujiwara teaches the claimed **“the chip and the antenna are arranged at different points of the radio-frequency peripheral”** of [8]. It is my further opinion that such connection teaches the claimed **“connections configured to ensure a communications link between the antenna and the chip”** of [8]. Therefore, it is my opinion that Fujiwara teaches each and every limitation of Claim 8, thus rendering Claim 8 obvious.

Claim 9

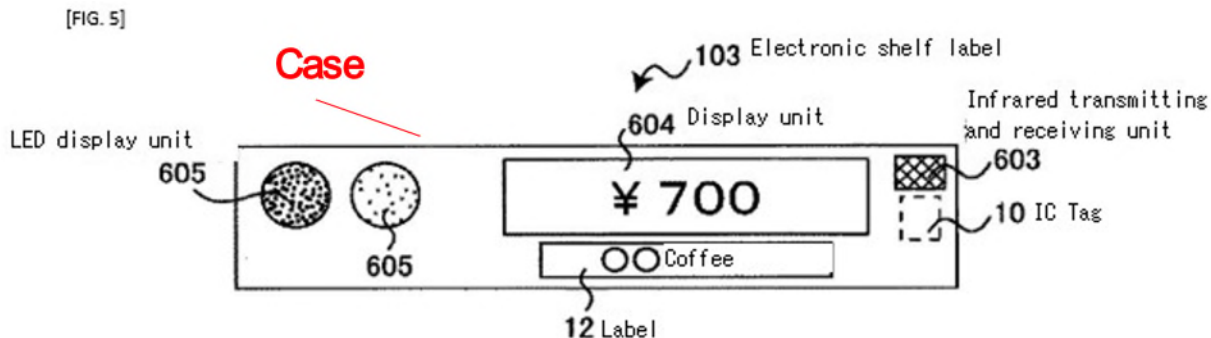
[9] **“The system according to claim 8, wherein the chip is connected to a microcontroller of the radio-frequency peripheral, and wherein the antenna is arranged on or within a case inside which the microcontroller is housed.”**

147. Claim 8 has already been addressed above.

148. Fujiwara discloses that the CPU “controls each device connected via the bus 609.” Ex. 1003, [0069]. Thus, it is my opinion that a POSITA would find it obvious that the CPU (**microcontroller**) is connected through bus 609 with other parts of the electronic shelf label 103 such as the wireless transmitting and receiving unit

603. As IC tag 10 is an integrated part of electronic shelf label 103, and forms the radio-frequency communication module together with the wireless transmitting and receiving unit 603 (*see* discussions in Section III.E.2.f.(2) above), it is my opinion that a POSITA would find it obvious that the CPU is also connected through bus 609 with IC tag 10 and its chip. Such an arrangement will serve to simplify the design of the electronic shelf label by integrating all needed control functionalities for the IC tag inside the central place of the CPU, and represents no more than arranging old elements with each performing the same function it had been known to perform and yielding no more than one would expect from such an arrangement. Such an arrangement would have been well within the skills of a POSITA, for example, in Japan Patent Application Publication 2009-64316A, there is an electronic shelf label with a short-range communication section (functionally analogous to the IC tag 10) and a wireless communication section (functionally analogous to the wireless transmitting and receiving unit 603) both controlled by a same CPU. Therefore, it is my opinion that a POSITA would find the claimed **“the chip is connected to a microcontroller of the radio-frequency peripheral”** to be obvious over Fujiwara.

149. FIG. 5 of Fujiwara (annotated below) shows the electronic shelf label to be enclosed inside a **case** (the enclosing case of the label).



Ex. 1003 (Fujiwara), FIG. 5 (annotated)

150. It is my opinion that a POSITA, looking at this figure, would know that the **antenna** (part of IC tag 10) is **arranged within** this **case** inside which the **microcontroller** is also housed, as all the components of the electronic shelf label, including both the antenna and the microcontroller, are enclosed within this case.

151. Therefore, it is my opinion that Fujiwara teaches the claimed “**the antenna is arranged on or within a case inside which the microcontroller is housed**” of [9].

152. Therefore, it is my opinion that Fujiwara renders obvious each and every limitation of Claim 9, thus rendering Claim 9 obvious.

B. Ground 2: Claims 1-9 are rendered obvious over Fujiwara and Arntzen

153. As discussed in Ground 1 above, Claims 1-9 are rendered obvious by Fujiwara after the obvious modifications of (1) implementing IC tag 10 as an NFC tag conformant with NFC standards such as ISO 14443 with a communication range of less than twenty centimeters (the “NFC tag modification”); and (2) implementing

the wireless transmitting and receiving unit 603 to use radio-frequency communication method (the “RF modification”).

154. It is my opinion that, Arntzen explicitly teaches these two modifications and their advantages, and a POSITA would have been motivated to combine Fujiwara with Arntzen and implement these two modifications from Arntzen in Fujiwara, and would have a reasonable expectation of success in doing so. Therefore, it is my opinion that, for the same reasons that Claims 1-9 are obvious over Fujiwara, and also because of Arntzen’s explicit disclosures, Claims 1-9 are obvious over Fujiwara in combination with Arntzen.

1. Overview of Arntzen

155. International Patent App. No. WO 2010/082835 A1 (“Arntzen”) is directed to a “system and method for displaying and updating price and product related information.” Ex. 1005, [Title]. Arntzen further discloses that the system comprises “a number of price labels in the form of an electronic display, for display of relevant information.” Ex. 1005, [1:4-6]. FIG. 2 of Arntzen, reproduced below, is a schematic diagram of the system.

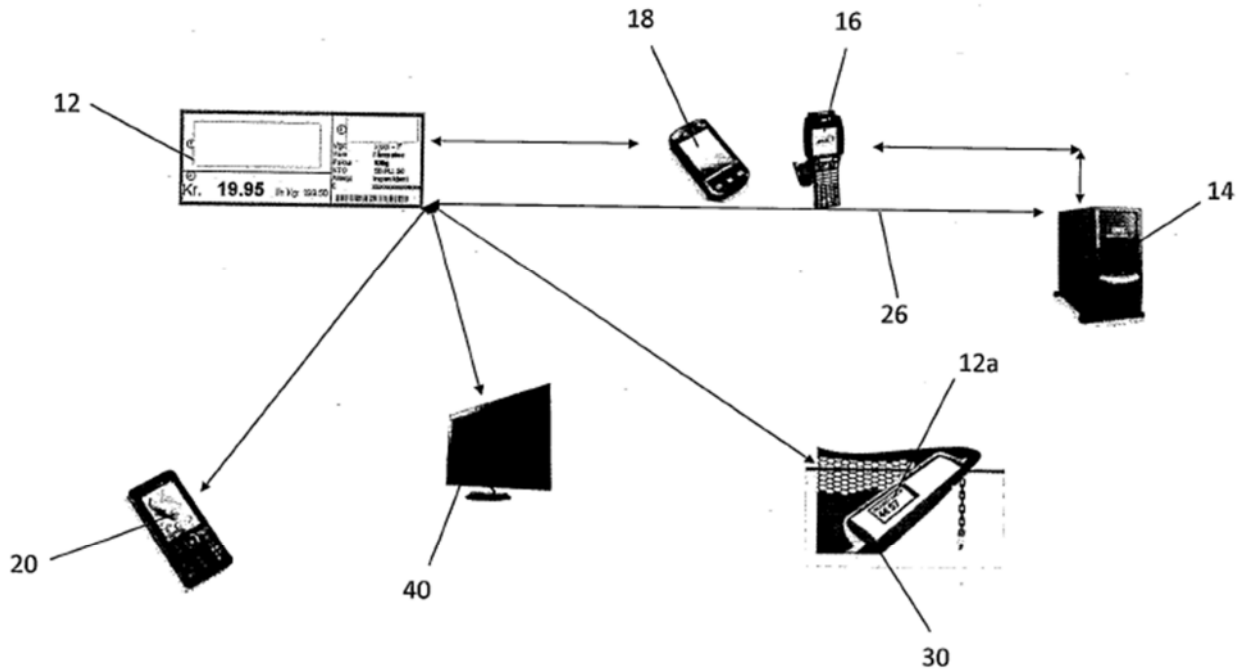


Fig. 2

Ex. 1005 (Arntzen), FIG. 2

156. I have been informed by counsel that Arntzen qualifies as prior art under pre-AIA 35 U.S.C. § 102(b) because it was published on July 22, 2010, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1005, (43).

157. It is my opinion that Arntzen is analogous prior art to the '340 Patent. The '340 Patent is directed to "the display of information in a sales area" (Ex. 1001, at [1:18-19]) while Arntzen is directed to "system and method for displaying and updating price and product related information." (Ex. 1005, [Title]). Thus, both

Arntzen and the '340 Patent are in the same field of endeavors for displaying information in a sales area.

2. Analysis

The NFC tag modification

158. Arntzen discloses electronic displays 12 adjoining goods on shelves. Ex. 1005, [11:9-12]. Arntzen discloses that these electronic displays 12 can be ESL-displays with an internal memory to be able to store all necessary information about the goods and which are also equipped with wireless communication equipment. Ex. 1005, [11:15-20]. Arntzen discloses that the ESL-displays communicate with a central server. Ex. 1005, [11:22-23]. Arntzen discloses that the electronic displays shall also be able to communicate with handheld units. Ex. 1005, [12:15-17]. Arntzen discloses that such communication is intended to be via NFC on 13.56MHz. Ex. 1005, [5:34-35], [12:15-20]. Arntzen discloses that products with built-in NFC simplify the way units communicate with each other. Ex. 1005, [5:31-32]. Arntzen discloses that the communication range of NFC is within a radius of four centimeters. Ex. 1005, [6:1-3]. Arntzen discloses that the short range of NFC is advantageous because the transactions are inherently secure and because the users have the reassurance of having control. Ex. 1005, [6:8-11]. Arntzen discloses that the NFC communications are established via a simple wave or touch. Ex. 1005, [6:4]. It is my opinion that a POSITA would understand that such establishment of NFC

communication is covered by well-known and conventional standards such as ISO 14443, which employs the claimed electromagnetic wave activation.

159. Thus, Arntzen teaches electronic displays that are functionally and structurally analogous to Fujiwara's IC-tag-embedded electronic shelf labels, and Arntzen's electronic displays are implemented with the claimed NFC technology. Therefore, it is my opinion that Arntzen teaches the NFC tag modification.

The RF modification

160. Arntzen discloses that the wireless communication between the electronic displays and the central server is via ZigBee, which, in my opinion, a POSITA would know to employ radio frequency communication. Arntzen further discloses that price display systems with RF communications present significant advantages such as cost reduction, easy installation, and centralized control over those with infrared communications. Ex. 1005, [4:3-5], [4:30-5:6]. Arntzen further discloses that systems with RF communications are becoming adopted by the industry. Ex. 1005, [4:1-5].

161. Therefore, it is my opinion that Arntzen teaches the RF modification.

Motivation to modify Fujiwara with Arntzen

162. As discussed for Ground 1 above, it is my opinion that a POSITA would have reason to make the NFC tag modification and the RF modification from background knowledge and would have a reasonable likelihood of success in doing so. For the

same reasons, and for the additional reason that Arntzen discloses further advantages for NFC technology (such as simplified communication, improved security and improved user assurance, Ex. 1005, [5:31-32], [6:8-11]) and RF technology (such as cost reduction, easy installation, and centralized control, Ex. 1005, [4:3-5], [4:30-5:6]), it is my opinion that a POSITA would have reason to modify Fujiwara and implement Arntzen's NFC technology for communication with mobile terminal as well as Arntzen's RF technology for communication with central server in Fujiwara's electronic shelf label. As I have discussed in Ground 1, Fujiwara already discloses IC tag 10 and wireless transmitting and receiving unit 603, and a POSITA would already know the advantages of implementing the NFC tag modification and RF modification over them. Arntzen then explicitly confirms these advantages and discloses the appropriate technology for these two modifications. A POSITA reading Fujiwara in view of Arntzen would thus have been motivated to use Arntzen's explicitly disclosed technology to carry out these two modifications to realize the known and explicitly confirmed advantages. This represents nothing more than the combination of known elements to achieve predictable results, and is well within the skills of a POSITA, particularly because NFC and RF technologies are well known (as evidenced by Arntzen's discussions of their merits), and there are only a finite number of predictable solutions for the relevant problems (IR or RF for

communication with server, NFC or microwave for communication with reading device).

C. Ground 3: Claims 1-5 and 8-9 are rendered obvious by Bandy in combination with Fowler (the “Bandy-Fowler” combination)

1. Overview of Bandy

163. U.S. Patent Application Publication No. 2007/0024436 A1 by Bandy (“Bandy”) is directed to “methods, systems, and apparatuses to improve an interface between customers and products in warehouse, shopping, and additional environments, including an improved interface with items associated with RFID tags.” Ex. 1006, [0007]. In particular, it discloses a mobile device that is configured to “read a radio frequency identification (RFID) tag associated with an item to determine an identification number corresponding to the RFID tag” and “transmit the identification number of the RFID tag to a computer system of the merchant, and to receive a response from the computer system that includes information regarding the item.” Ex. 1006, [0013].

164. FIG. 9 of Bandy, reproduced below, is a diagram showing an example embodiment.

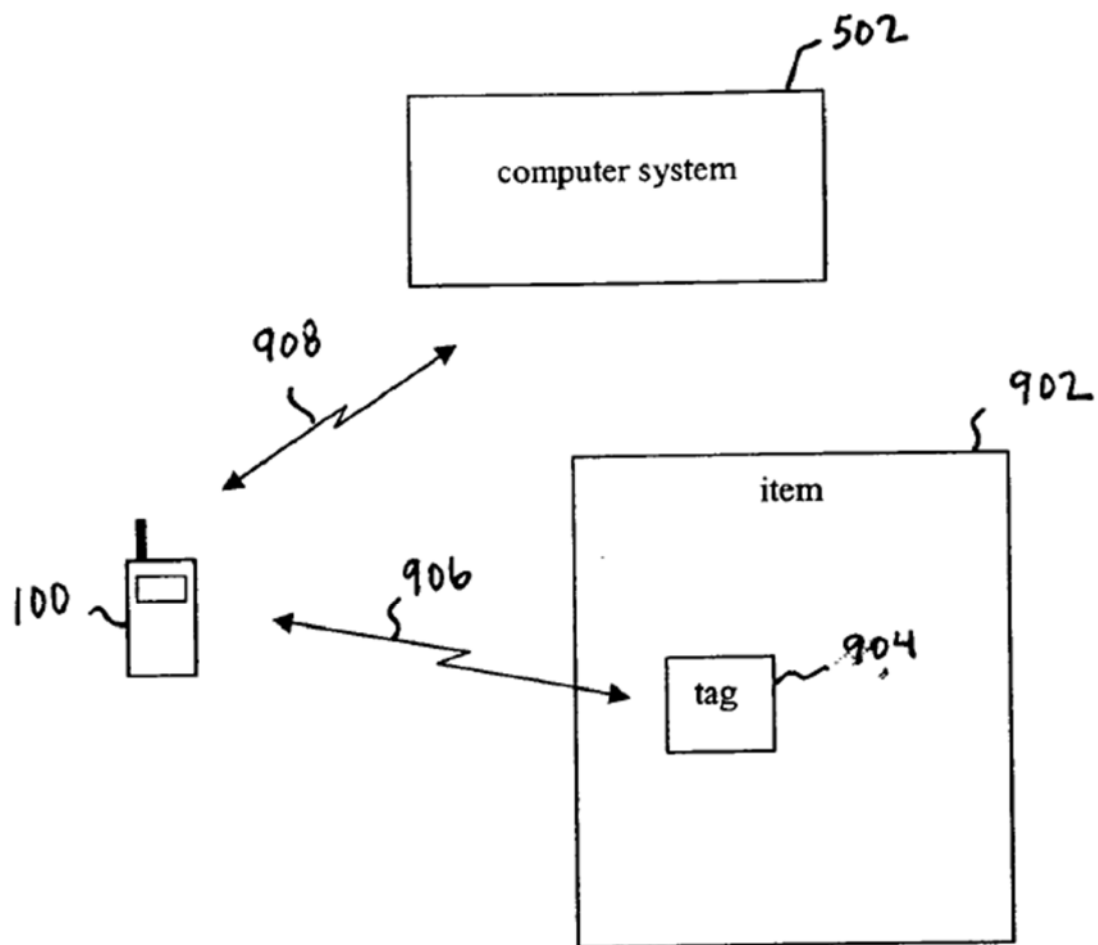
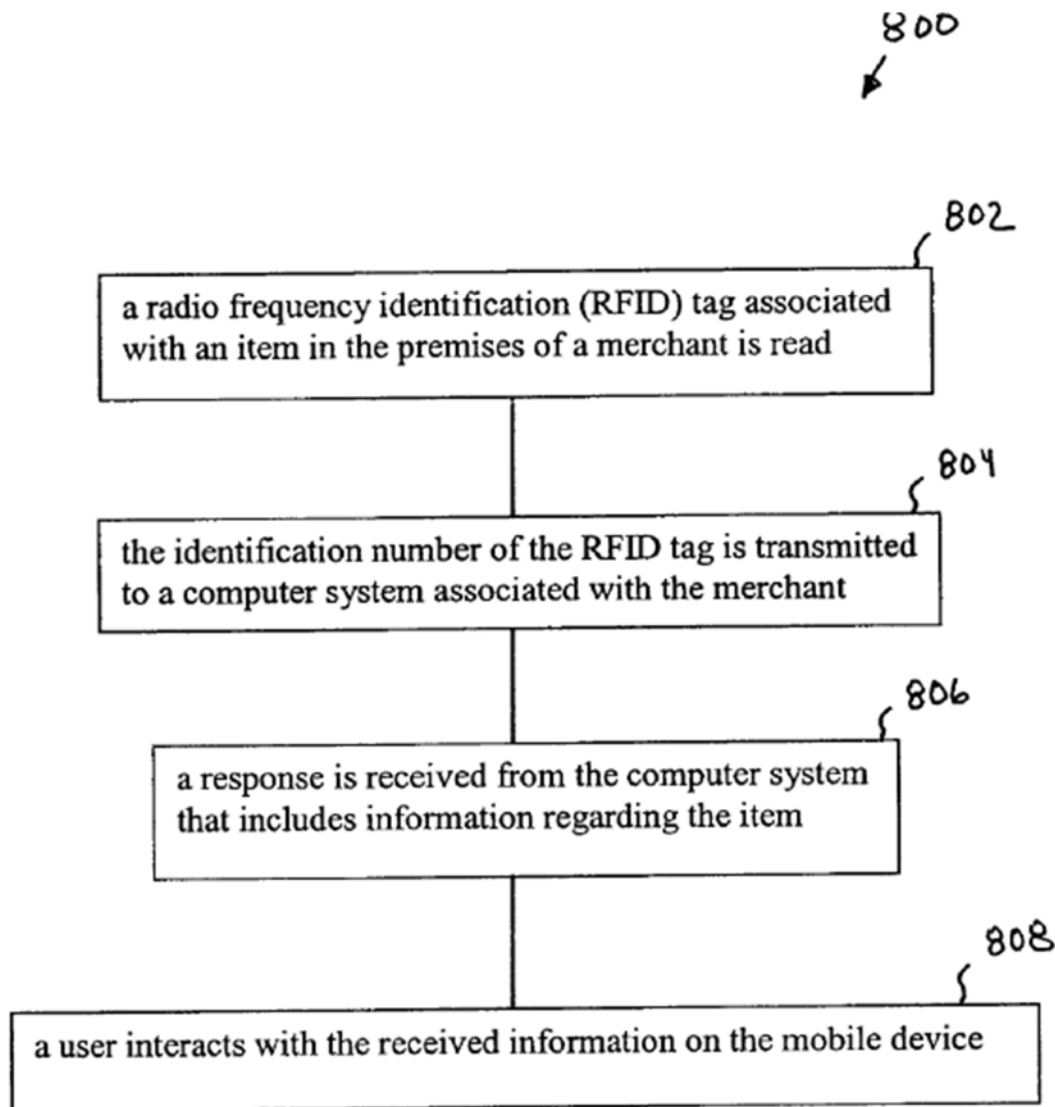


FIG. 9

Ex. 1006 (Bandy), FIG. 9

165. FIG. 8 of Bandy, reproduced below, is a flow diagram providing example steps for requesting information for an item associated with an RFID tag.



Ex. 1006 (Bandy), FIG. 8

166. I have been informed by counsel that Bandy qualifies as prior art under pre-AIA 35 U.S.C. § 102(b) because it was published on February 1, 2007, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1006, (43).

167. It is my opinion that Bandy 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 Bandy is directed to “improv[ing] an interface between customers and products in warehouse, shopping, and additional environments, including an improved interface with items associated with RFID tags” (Ex. 1006, [0007]). In particular, Bandy discloses methods for a user to “obtain information regarding the item, such as from a computer system” (Ex. 1006, [0010]) and specifically to obtain such information through RFID tag interactions (Ex. 1006, [0013]). Thus, both Bandy and the '340 Patent are in the same field of endeavor for providing consumers with information in shopping environments.

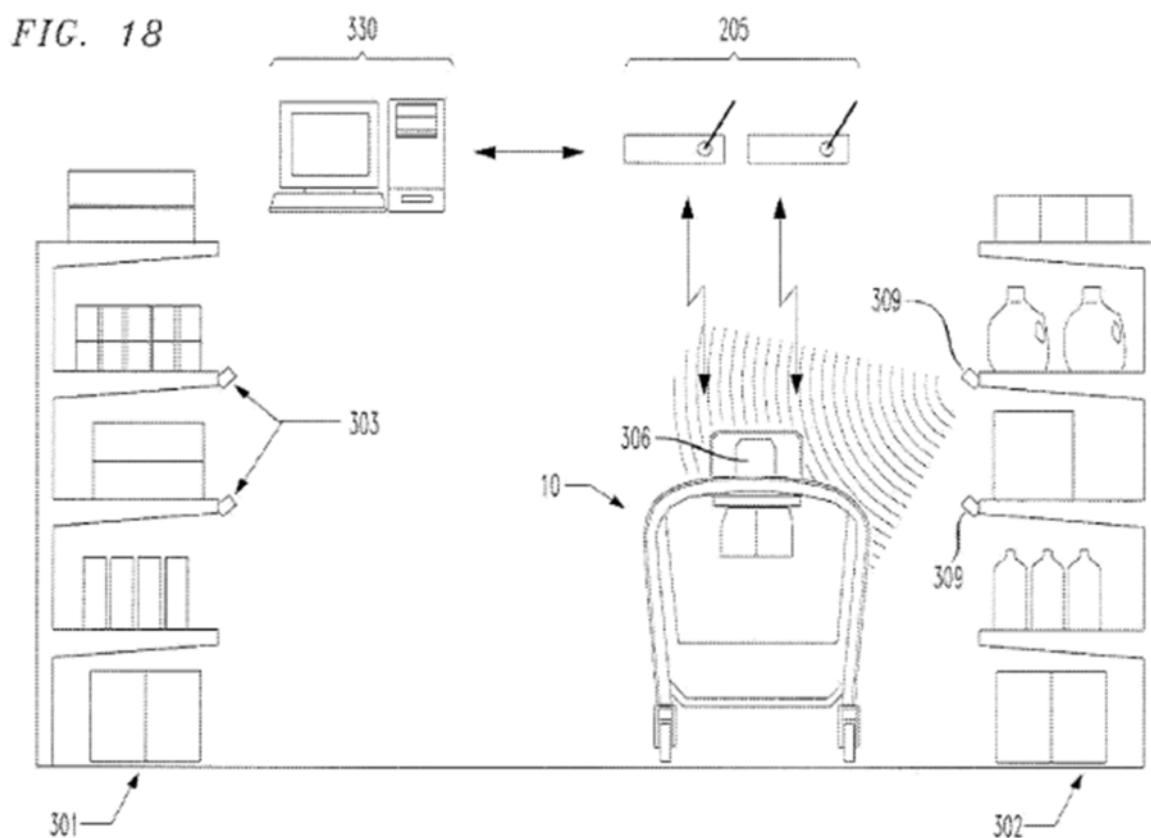
2. Overview of Fowler

168. U.S. Patent Application Publication No. 2008/0231228 A1 by Fowler (“Fowler”) is directed to “a media enhanced shopping cart system, and more particularly, but not by way of limitation, to a system and method for providing information such as advertising.” Ex. 1007, [0001]. In particular, Fowler discloses a method of “performing a proximity scan from a shopping cart, determining a location of the cart within a store based on the scan; displaying at least one product advertisement based on the location of the cart, correlating a location of an

advertised product with the location of the cart, and displaying an indication of the location of the advertised product with respect to the location of the shopping cart.”

Ex. 1007, [0005].

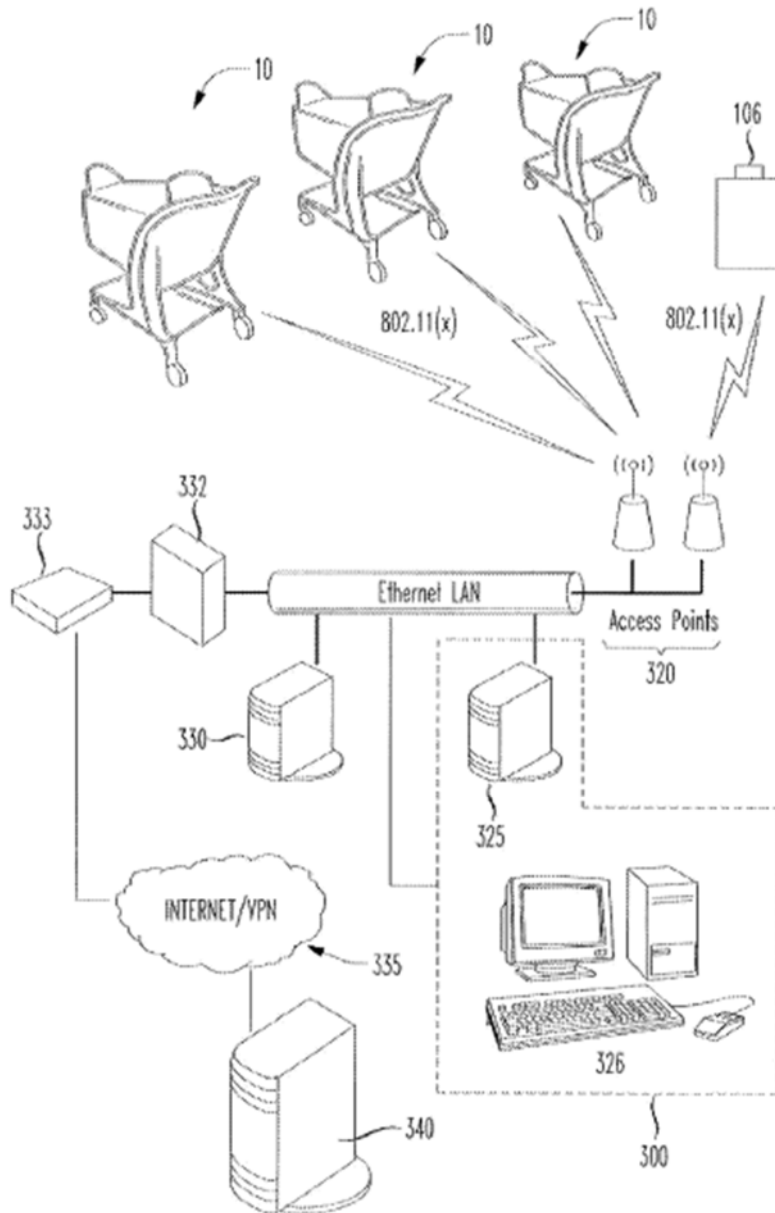
169. FIG. 18 of Fowler, reproduced below, is an illustrative view of the media enabled shopping cart in a store network system.



Ex. 1007 (Fowler), FIG. 18

170. FIG. 17 of Fowler, reproduced below, illustrates the overall system of the media enabled shopping cart in a store network system.

FIG. 17



Ex. 1007 (Fowler), FIG. 17

171. FIG. 28 of Fowler, reproduced below, is an exemplary display (on the video display of the smart shopping cart) including an item finder function.

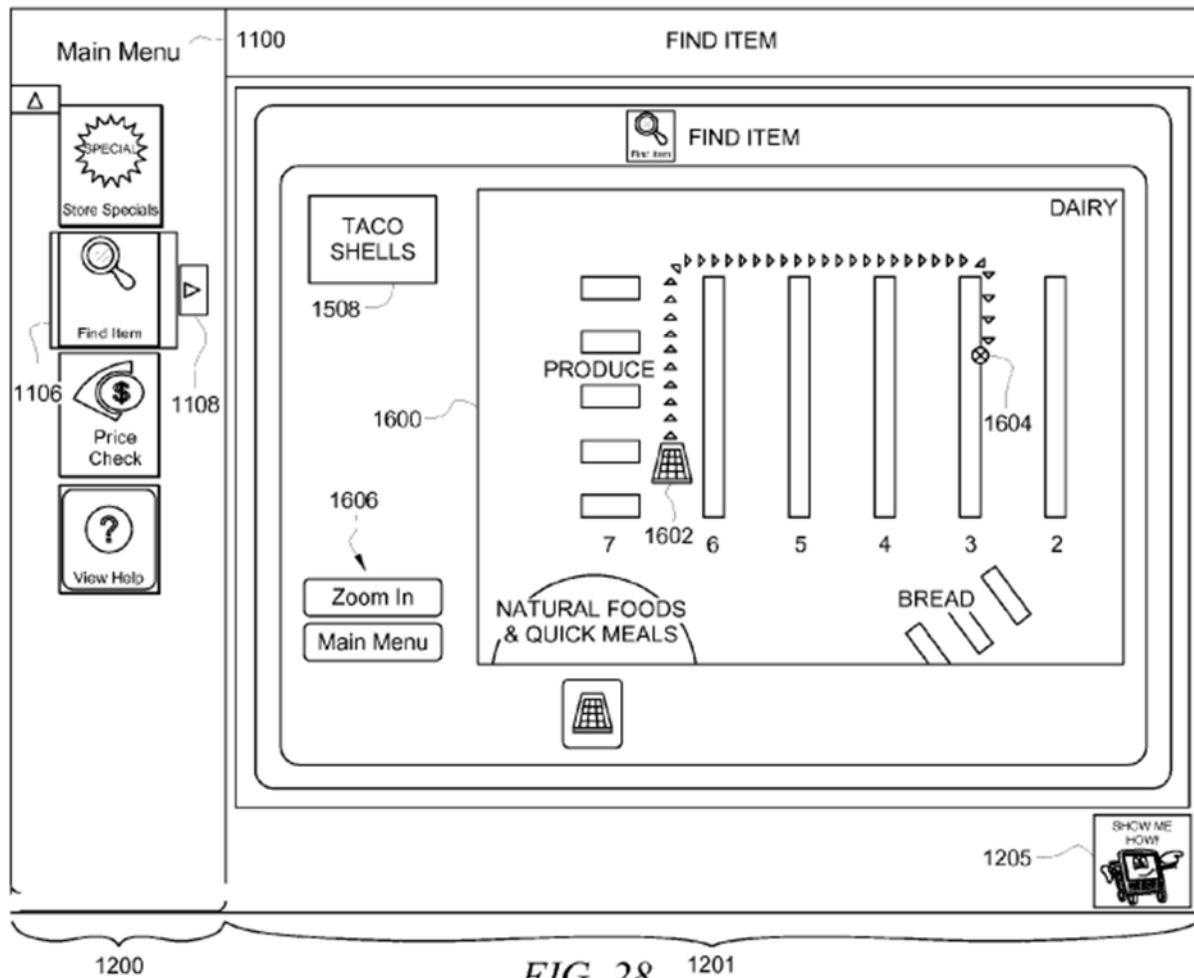


FIG. 28

Ex. 1007 (Fowler), FIG. 28

172. I have been informed by counsel that Fowler qualifies as prior art under pre-AIA 35 USC § 102(b) because it was published on September 25, 2008, which is more than one year before the '340 Patent's April 11, 2012 claimed priority date. Ex. 1007, at (43).

173. It is my opinion that Fowler 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

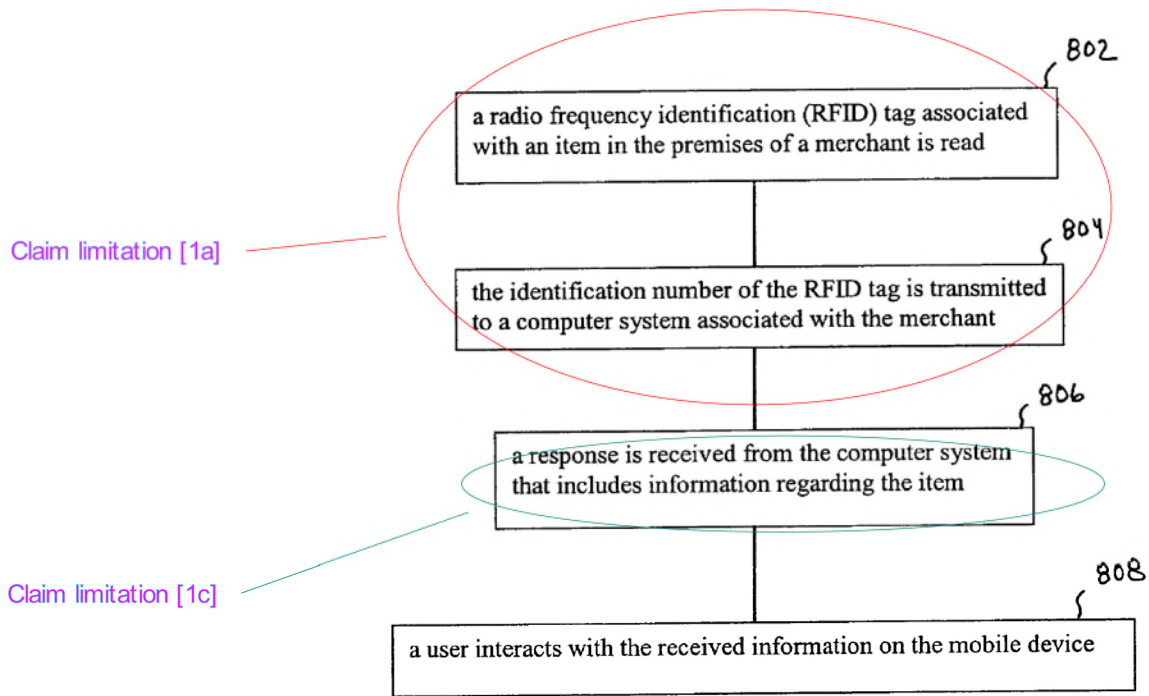
complements the information already visually available in a sales area” (Ex. 1001, [2:8-12]) while Fowler is directed to “a system and method for providing information such as advertising” (Ex. 1007, [0001]). Further, the ’340 Patent discloses methods to provide the user of a mobile terminal with spatially localized information such as the path to be followed to reach a specific item (Ex. 1001, [7:41-44]) while Fowler discloses a method to determine the location of the consumer’s shopping cart and indicating the location of advertised products with respect to the location of the shopping cart (Ex. 1007, [0005]). Thus, both Fowler and the ’340 Patent are in the same field of endeavor for providing customers with information (and in particular with item-finding information) in the shopping area.

3. Analysis

174. As set forth in detail below, it is my opinion that a POSITA reading Bandy in view of Fowler will find each and every limitation recited by claims 1-9 disclosed by the Bandy-Fowler combination.

Claim 1

175. The annotated figure below is a high-level overview of the correspondence between Bandy’s disclosures and the main steps of Claim 1. More details of the correspondence between Bandy-Fowler and Claim 1 are set forth below.



Ex. 1006, FIG. 8

[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:”

176. It is my opinion that the preamble portion “A method for communicating spatially localized information” is not limiting, because it merely states the purpose

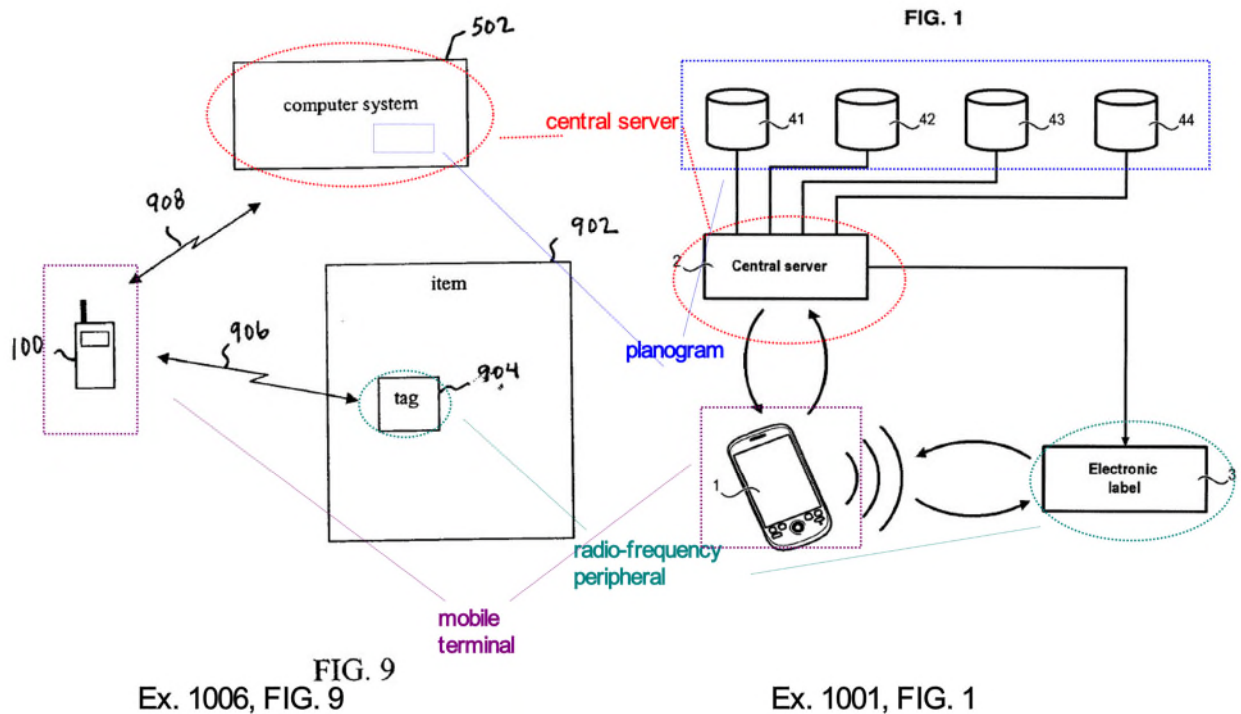
or intended use of the alleged invention. It does not define any of the claim limitations, which are set forth fully in the body of the claim (i.e. a communicating method of spatially localized information). To the extent that this portion is limiting, it is my opinion that Bandy-Fowler teaches this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

177. Bandy discloses a mobile communications device 100 (**mobile terminal**) that communicates with RFID tags (**radio-frequency peripheral**) and remote computer systems and/or networks. Ex. 1006, [0037]. In particular, Bandy discloses the mobile terminal communicating with a computer system associated with the merchant (**central server**). Ex. 1006, [0056]. Therefore, it is my opinion that Bandy-Fowler teaches the claimed “**mobile terminal**”, “**central server**” and “**radio-frequency peripheral**” of [1pre] because Bandy alone teaches them.

178. Bandy discloses an identification number (**unique identifier**) of the RFID. Ex. 1006, [0054], [0056]. Bandy discloses that computer system 502 associates the identification number with item 904 and is able to obtain further data related to item 904 after having received the identification number, due to this association. Ex. 1006, [0056]. Bandy discloses that the item data may comprise **location** data regarding the item in store 500 (**predetermined area**). Ex. 1006, [0057]. This association thus teaches the claimed **planogram**. It is my opinion that a POSITA would understand that the identification number must be **associated one-to-one**

with the location of the items for the system and method of Bandy to work as disclosed. Therefore, it is my opinion that Bandy-Fowler teaches the claimed “**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 associated one-to-one with a corresponding unique identifier**” of [1pre] because Bandy alone teaches it.

179. The following annotated figure shows the correspondence between the components of Bandy and the components of the '340 Patent.



180. Fowler discloses an in-store server (“ISS”) 330. Ex. 1007, [0062]. Fowler also discloses a Host Central Server (“HCS”) 340. Ex. 1007, [0259]. It is my opinion that these servers teach the claimed “**central server**”.

181. Fowler discloses a shopping cart 10 (**mobile terminal**). Ex. 1007, *passim*.

182. Fowler discloses “a number of reference or anchor RFID tags (e.g., shelf or fixture level tags) placed around the store in known locations.” Ex. 1007, [0144]. It is my opinion that the RFID tags teach the claimed “**radio-frequency peripheral**” of [1pre].

183. Therefore, it is my opinion that Fowler also teaches the claimed “**mobile terminal**”, “**central server**” and “**radio-frequency peripheral**” of [1pre], and a POSITA would look at the disclosures of Fowler to supplement their corresponding elements in Bandy, thus reaching the Bandy-Fowler combination, as this involves no more than the combination of familiar elements in a known way.

184. Fowler discloses a **planogram** that involves the **location** of products within the store. Ex. 1007, [0221]. Fowler discloses that a planogram is a diagram of fixtures and products that illustrates how and where retail products should be displayed, usually on a store shelf, bin or counter in order to influence consumer selection. Ex. 1007, [0221]. It is my opinion that a POSITA would also look at the disclosures of Fowler to supplement the planogram of Bandy, as this involves no more than the combination of familiar elements in a known way.

185. It is my opinion that a POSITA would understand that a location of a product on a shelf or bin necessarily comprises a **vertical and horizontal position within a plane** (the shelf front plane) **perpendicular to a floor of the predetermined area** of the store. FIG. 18 of Fowler (annotated below) depicts such vertical and horizontal position as would be understood by a POSITA.

Ex. 1007 (Fowler), FIG. 18 (annotated)

store in known locations.” Ex. 1007, [0144]. Fowler further discloses “RFID tags located at various heights and locations along the shelves.” Ex. 1007, [0137]. Fowler also discloses that RFID tags may be attached at a product level, with a tag on each individual product or package. Ex. 1007, [0141]. It is my opinion that a POSITA would understand that the “known locations” of the reference or anchor RFID tags that may be associated with each individual product and that may be at different heights and locations along the shelves necessarily comprises **vertical and horizontal positions** of the locations.

187. Therefore, it is my opinion that Bandy-Fowler teaches the claimed “**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**” of [1pre] because Fowler teaches it.

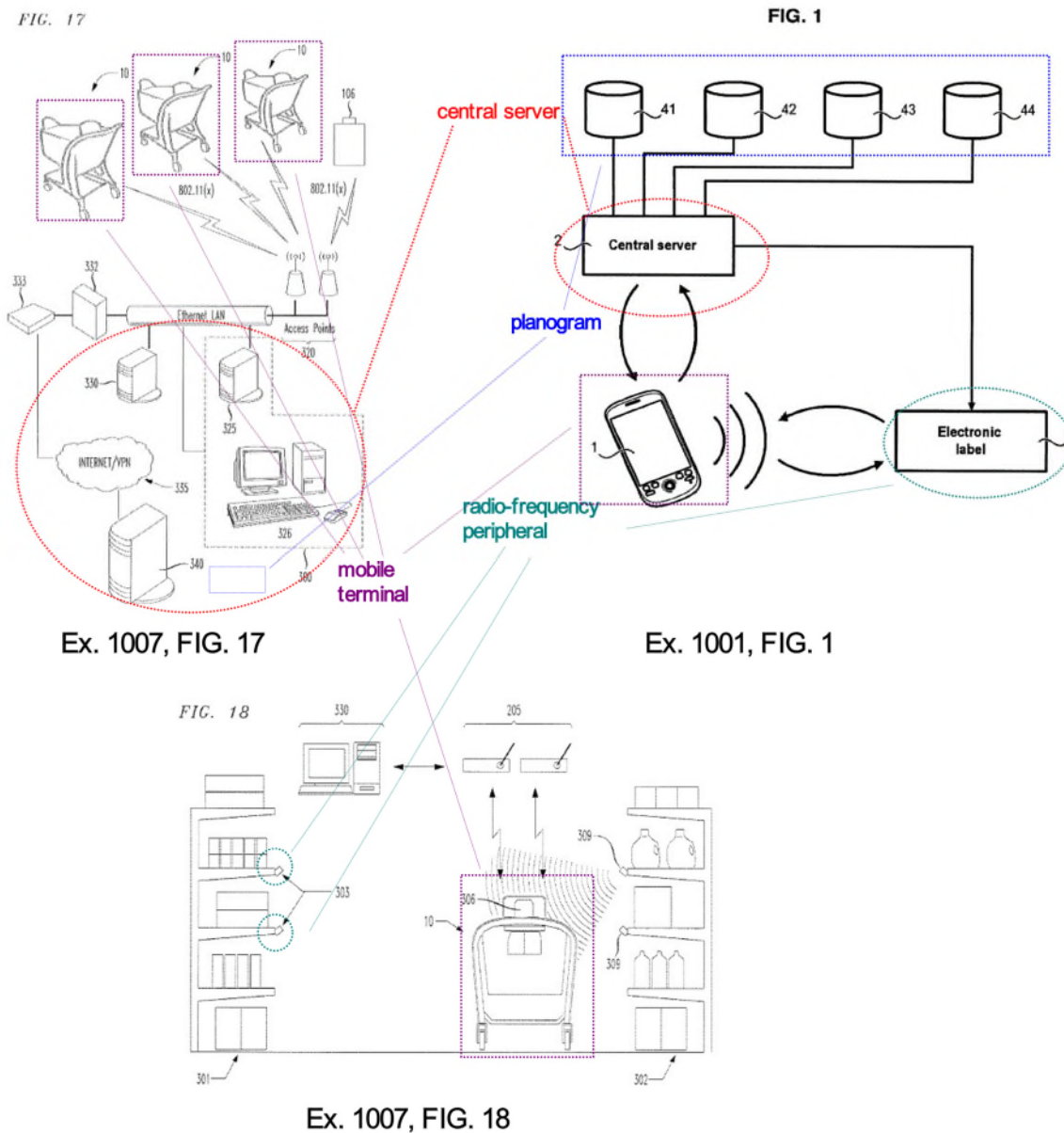
188. Fowler discloses that the RFID tags may be active or passive RFID tags. Ex. 1007, [0139]. Such RFID tags are **radio-frequency peripherals**. Further, as I discussed in the backgrounds section, a POSITA at the time of the invention would have been familiar with the advantages of passive RFID tags such as saved cost and easier maintenance due to the elimination of the requirement of power source, and therefore it is my opinion that a POSITA reading Bandy in view of Fowler at the time of the invention would be motivated to implement Bandy’s RFID tags, in view of Fowler’s disclosure of passive RFID tags, as passive RFID tags, in order to realize

such advantages, and would have a reasonable expectation of success in doing so because this is no more than a mere application of a known technique to a piece of prior art ready for the improvement.

189. Fowler further discloses that a cart RFID tag is associated with a serial or identification number. Ex. 1007, [0231]. A POSITA would find it obvious that the shelf RFID tags are also associated with such a **unique identifier**. Fowler further discloses that each product may be located by means of the RFID tag, enabling retailers to locate products throughout the store to manage, update, and design the store planogram. Ex. 1007, [0222]. It is my opinion that a POSITA would recognize that this necessarily means that the **planogram** associates the **unique identifiers** of RFID tags (**radio-frequency peripherals**) with **locations** of products within the **predetermined area** of the store, and such association is necessarily **one-to-one**.

190. In fact, Fowler expressly discloses that a series of virtual **locations** are created and positioned within the defined framework of the store, i.e., the base store map (**planogram**), with each location being “for example a shelf, freezer fixture, aisle, or produce bin” (Ex. 1007, [0145]) and defined as **associated with** one or more anchor RFID tags. It is my opinion that a POSITA would recognize this as a further disclosure of the claimed association in the planogram, as well as a further disclosure of **vertical and horizontal position** (as the location of a shelf or a produce bin is necessarily defined by a vertical and horizontal position).

191. The following annotated figure shows the correspondence between the components of Fowler and the components of the '340 Patent.



192. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of [1pre] because Bandy alone teaches all of them except for the “vertical and horizontal position” limitation, while Fowler teaches that limitation. Further, as

discussed below, a POSITA would have been motivated and able to modify Bandy by implementing the vertical plane positions of Fowler in Bandy's planogram, and thus meeting the "vertical and horizontal position" limitation.

[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;"

193. Bandy discloses the mobile communications device 100 (**mobile terminal**) reading a radio frequency identification (RFID) tag (**radio-frequency peripheral**) associated with an item in the store of a merchant. Ex. 1006, [0054]. Bandy discloses that tag 902 provides its identification number (**unique identifier**) (and/or other data) to mobile communications device 100. Ex. 1006, [0054]. It is my opinion that a POSITA would understand that such an identification number is necessarily **particular to** such a tag. Bandy discloses that the identification number of the RFID tag is transmitted to a computer system (**central server**) associated with the

merchant. Ex. 1006, [0056]. Therefore, it is my opinion that Bandy-Fowler teaches the claimed **“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”** of [1a] because Bandy alone teaches it.

194. Bandy discloses that the communication begins with the reader module 304 of the mobile communications device 100 interrogating a tag 902 associated with an item 904 using interrogation signal 906. Ex. 1006, [0054]. It is my opinion that a POSITA would understand that such the tag is configured to be **activated** by such interrogation and the tag necessarily has to be within a **communication range** of the mobile communications device for such activation to happen. Therefore, it is my opinion that Bandy-Fowler teaches the claimed **“the radio-frequency peripheral... is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal”** of [1a] because Bandy alone teaches it.

195. Further, Bandy discloses that reader module 304 performs one or more interrogation/read protocols, as would be known to persons skilled in the relevant art(s), to read tag 902. Ex. 1006, [0055]. As I have discussed in the background section, it is my opinion that a POSITA would have known the NFC protocols and

standards, including the ISO 14443 standard that is directed to proximity cards with a communication range of less than twenty centimeters, and would have known the advantages of protocols with such short communication ranges. Thus, it is my opinion that a POSITA would be motivated and able to use NFC standards such as ISO 14443 that teach the claimed **“communication range is less than twenty centimeters”** of [1a], to implement Bandy’s tag and reader module, and would have a reasonable expectation of success in doing so. Therefore, it is my opinion that a POSITA would find the claimed **“wherein the communication range is less than twenty centimeters”** of [1a] obvious over Bandy-Fowler.

196. Bandy discloses that an RFID tag 1600 includes a die 1604 and related electronics 1606 located on a tag substrate 1616. Ex. 1006, [0074]. Bandy discloses that die 1604 is an integrated circuit (**electronic chip**) that performs RFID operations, such as communicating with one or more tag readers (not shown) according to various interrogation protocols. Ex.1013, [0077]. Bandy discloses that related electronics 1606 includes an **antenna** 1614. Ex. 1006, [0074]. Thus, it is my opinion that a POSITA, with knowledge of NFC protocols and standards, would find it obvious that the antenna and the electronic chip are **configured for near-field communication**. Therefore, it is my opinion that Bandy-Fowler teaches the claimed **“the radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication”** of [1a] because Bandy teaches **“the**

radio-frequency peripheral includes an antenna and an electronic chip” and a POSITA would find the claimed “configured for near-field communication” obvious over Bandy.

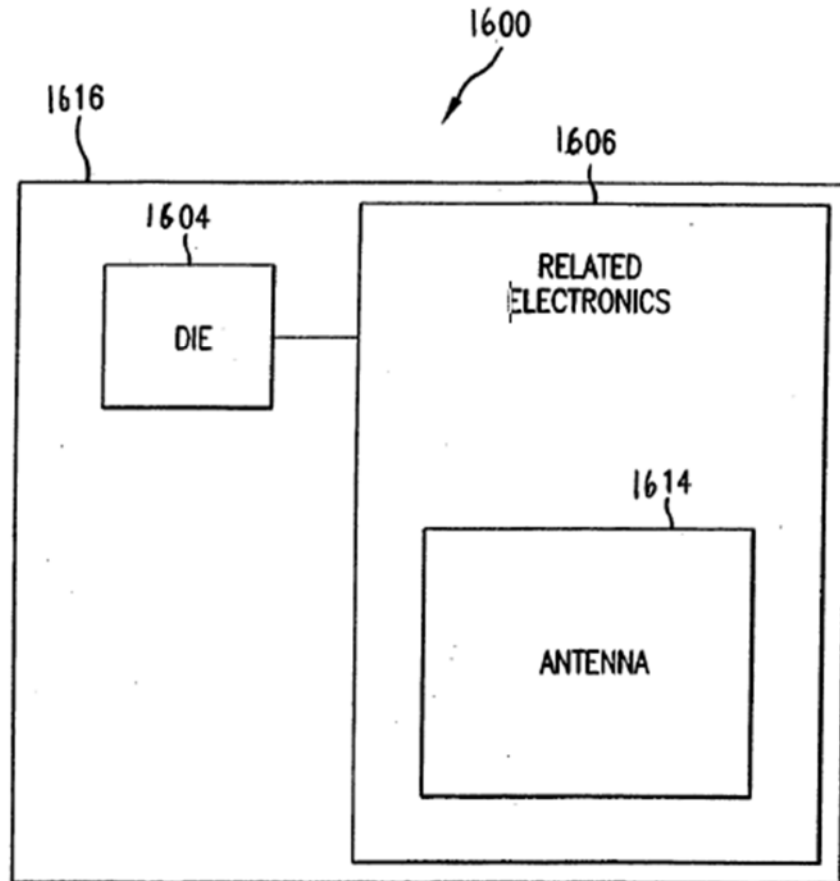


FIG. 16

Ex. 1006 (Bandy), FIG. 16

197. Fowler discloses the cart (**mobile terminal**) processing signals from RFID tags 303 and 304 (**radio-frequency peripheral**) that are within range (**communication range**) of the aisle RFID reader 225 of the cart. Ex. 1007, [0143].

Fowler discloses that various RFID data along with other positioning information (for example, motion sensor data) may be gathered and analyzed using software algorithms, for example operating on ECM 200 or a remote location such as a store server (**central server**) and provided to the cart. Ex. 1007, [0147]. It is my opinion that a POSITA would understand that this necessarily means that the cart will obtain the **unique identifiers** of the RFID tags (that must be **particular to** the RFID tags because they are unique identifiers) and **communicate** them to the central server for such processing, including the looking up of locations associated to the tags (*see* Ex. 1007, [0145]) in the “electronic representation of the store configuration” (Ex. 1007, [0144]), that is, the **planogram**.

198. Fowler further discloses that the RFID tags may be passive RFID tags. Ex. 1007, [0140]. Fowler discloses a range (**communication range**) of the RFID reader. Ex. 1007, [0142]. It is my opinion that a POSITA will understand that a passive RFID tag is configured to be **activated** by the cart (through the RFID reader) when the RFID tag is within a **communication range** of the cart.

199. Therefore, it is my opinion that Bandy-Fowler teaches the claimed “**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... is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal” of [1a] further because a POSITA would find these claimed limitations obvious over the teachings of Fowler.

200. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of [1a] because Bandy alone teaches all of them except for the “less than twenty centimeter” limitation (and a POSITA would also find many of these obvious over the teachings of Fowler), while, as discussed below, a POSITA would have been motivated and able to use the well-known and conventional NFC standards to modify Bandy’s RFID tag, thus meeting the “less than twenty centimeter” limitation.

[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”

201. Bandy discloses that computer system 502 (**central server**) associates the identification number (**unique identifier**) stored in tag 902 with item 904 and is able to obtain further data related to item 904 after having received the identification number, due to this association. Ex. 1006, [0056]. Bandy discloses that item data may include **location** data regarding the item in store 500. Ex. 1006, [0057]. It is my opinion that a POSITA would find it obvious that the central server necessarily

determines a **location of the mobile terminal** in this step through the looking up of the location data of the item in the **planogram** (the association disclosed in [0056]). Therefore, it is my opinion that a POSITA would find the claimed “**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**” of [1b] obvious over Bandy (and therefore over Bandy-Fowler).

202. Fowler discloses locating the cart in the store through the various RFID data gathered and analyzed in the central server. Ex. 1007, [0147]. It is my opinion that a POSITA would understand that such locating of the cart, or more specifically the locating of the aisle RFID reader 225 of the cart (*see* Ex. 1007, [0147]) is necessarily based on the location associated with the unique identifiers in the planogram. Therefore, it is my further opinion that a POSITA would find the claimed “**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**” of [1b] obvious over Fowler (and therefore over Bandy-Fowler), and further will use Fowler’s teachings to supplement Bandy because this involves no more than the combination of familiar elements in a known way.

203. Further, as I have discussed earlier for [1pre], a POSITA would have been motivated and able to implement Fowler’s vertical-plane placement of RFID tags in

Bandy, and thus reaching location data in the planogram that comprise vertical and horizontal positions. Since, as I discussed above, a POSITA would find it obvious over Bandy to determine a location of the mobile terminal based on such planogram location data, it is my opinion that a POSITA would also find it obvious that the determined location of the mobile terminal also includes the claimed **“the location of the mobile terminal comprising the vertical and horizontal position of said location”** of [1b].

204. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of [1b] because Bandy teaches all of them except for the “vertical and horizontal position” limitation, while a POSITA would have been motivated and able to modify Bandy by implementing the vertical plane positions of Fowler’s RFID tags in Bandy’s planogram, and finding it obvious that the “vertical and horizontal position” limitation is met by the determined mobile terminal location.

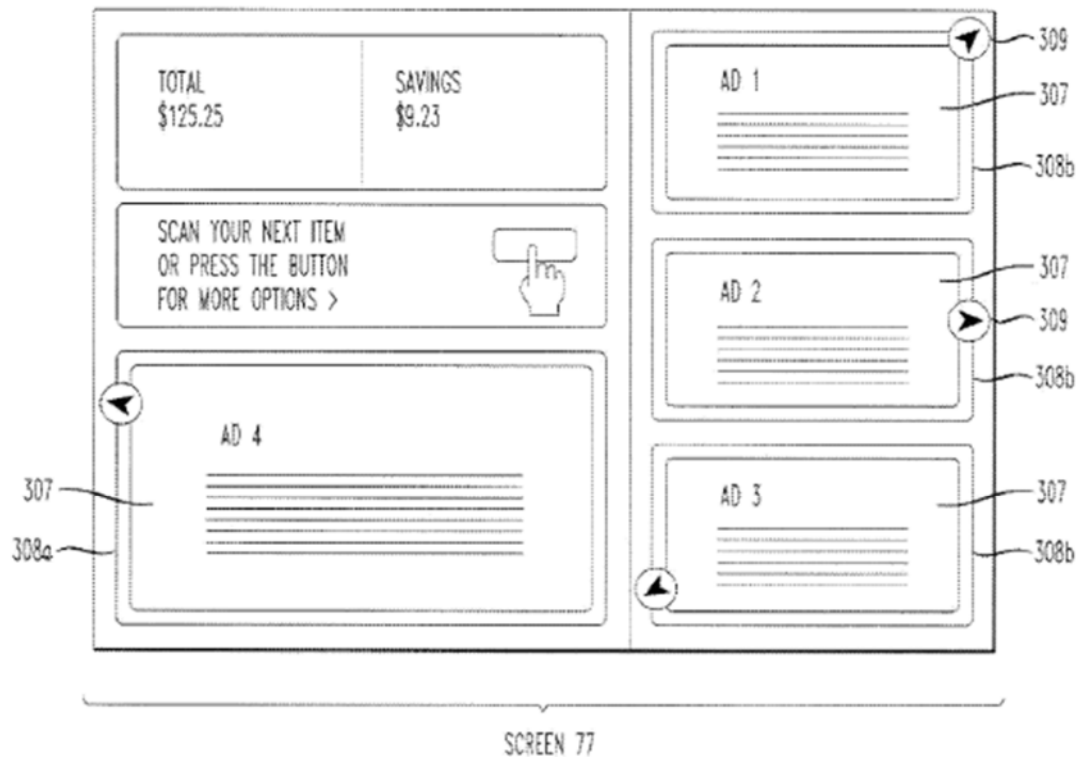
[1c] “transmitting to the mobile terminal spatially localized information associated with the location of the mobile terminal.”

205. Bandy discloses that the further data obtained by computer system 502 is then received from computer system 502 (**central server**) in step 806 by mobile communications device 100 (**mobile terminal**). Ex. 1006, [0056]. Bandy discloses that such data may include “one or more of price data for the item, special price data for the user regarding the item, alternate configurations for the item, specification

data for the item, performance data for the item, location data regarding the item in store 500, availability data for the item, and any other data related to the item.” Ex. 1006, [0057]. It is my opinion that a POSITA would recognize that such data are thus **spatially localized information** associated with the item near the mobile terminal and therefore associated with the location of the mobile terminal. Therefore, it is my opinion that Bandy-Fowler teaches the claimed “**transmitting to the mobile terminal spatially localized information associated with the location of the mobile terminal**” of [1c] because Bandy alone teaches it.

206. Fowler discloses that, upon determining the proximity of the cart 10 to any particular tag or tags 303 or 304, the ECM 200 causes at least one advertisement 306 to be displayed to the consumer 85 on the video display 75. Ex. 1007, [0166]. It is my opinion that such advertisement information teaches the claimed “**spatially localized information associated with the location of the mobile terminal** (*the cart*)” of [1c].

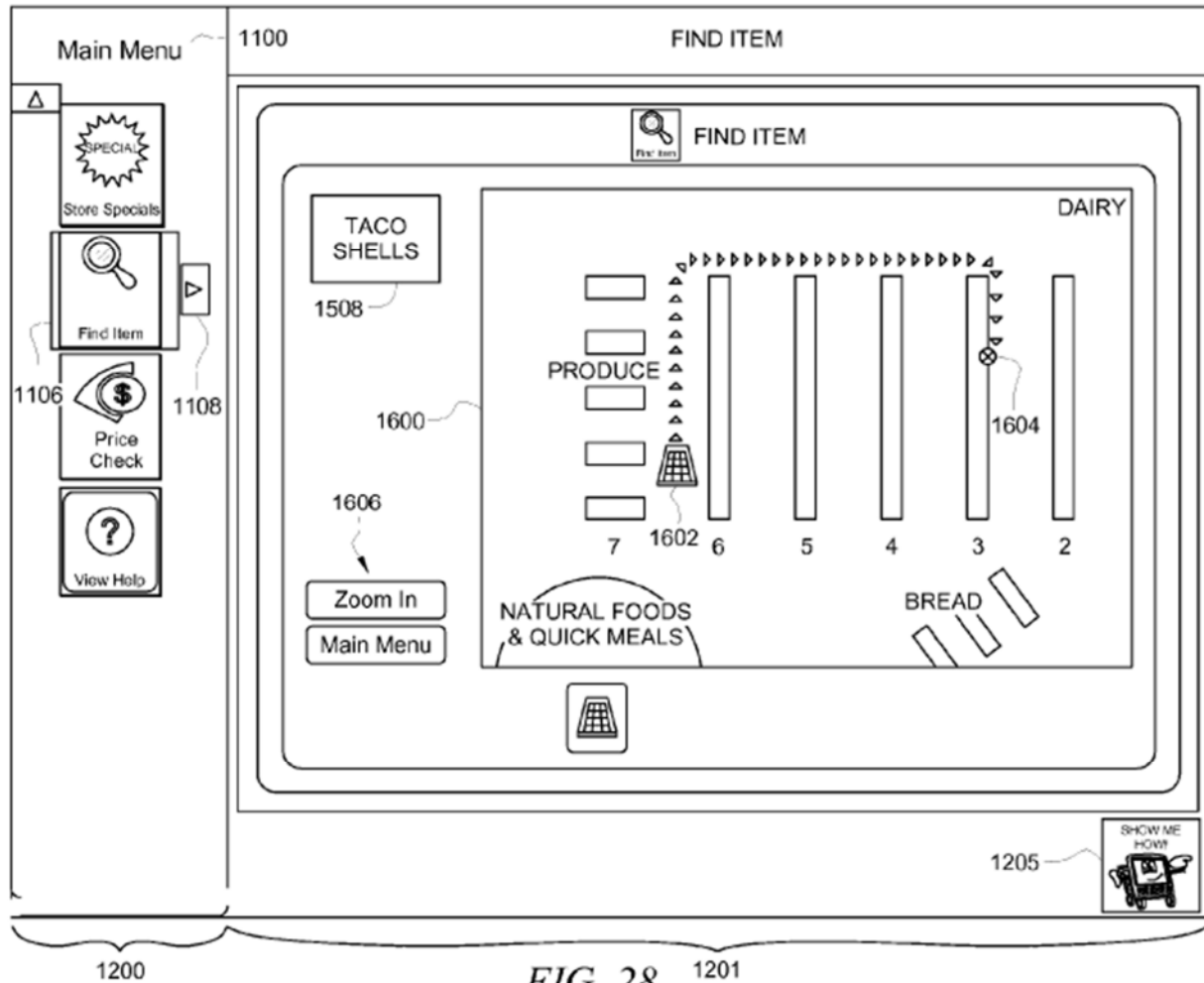
FIG. 16



Ex. 1007 (Fowler), FIG. 16

207. Fowler discloses that “the location of specific products can be provided relative to the known location of the cart within the store, and the consumer may be provided directions to such products.” Ex. 1007, [0145]. Fowler further discloses that “the location of the given product in relation to the location of the cart 10 may be graphically displayed on the video display 75 on a floor plan of the store, using an indicator to show the location of the cart 10 on the floor plan of the store and another indicator to show the location of the given product on the floor plan of the store.” Ex. 1007, [0164]. It is my opinion that such direction information further

teaches the claimed “**spatially localized information associated with the location of the mobile terminal (the cart)**”.



Ex. 1007 (Fowler), FIG. 28

208. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of [1c] because Bandy alone teaches all of them, and Fowler teaches “**spatially localized information associated with the location of the mobile terminal**”. Further, as discussed below, it is my opinion that a POSITA would have been motivated and able to implement Fowler’s teachings of route finding in

Bandy's system, thus enhancing Bandy's teachings of the "spatially localized information" limitation of [1c].

209. Thus, it is my opinion that Bandy-Fowler discloses each and every limitation of Claim 1, thus rendering 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."

210. Claim 1 has already been addressed above.

211. It is my opinion that a POSITA would find the claimed interaction between the mobile terminal and the radio-frequency communication peripheral to be inherent in the interrogation/read protocols between the RFID tag and the mobile communications device (Ex. 1006, [0054]-[0055]) and obvious over Bandy-Fowler by implementing a POSITA's background knowledge in the well-known and conventional NFC technology and protocol as well as Fowler's passive RFID tags

(Ex. 1007, [0139]) in Bandy's RFID tags. In fact, it is my opinion that a POSITA would find the claimed interaction to be inherent in the interaction between the aisle RFID reader and the passive RFID tags (*see* Ex. 1007, [0140], [0143]) disclosed by Fowler, since, as I have discussed earlier, a POSITA would know that passive RFID tags are designed to be powered and activated through electromagnetic waves received from reading devices, in the way claimed by this claim [2].

212. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of Claim 2 because, as discussed below, a POSITA would have been motivated and able to use the well-known and conventional NFC standards and Fowler's passive RFID tags to modify Bandy's RFID tag, thus meeting all of the limitations of Claim 2. Therefore, it is my opinion that Bandy-Fowler 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.”

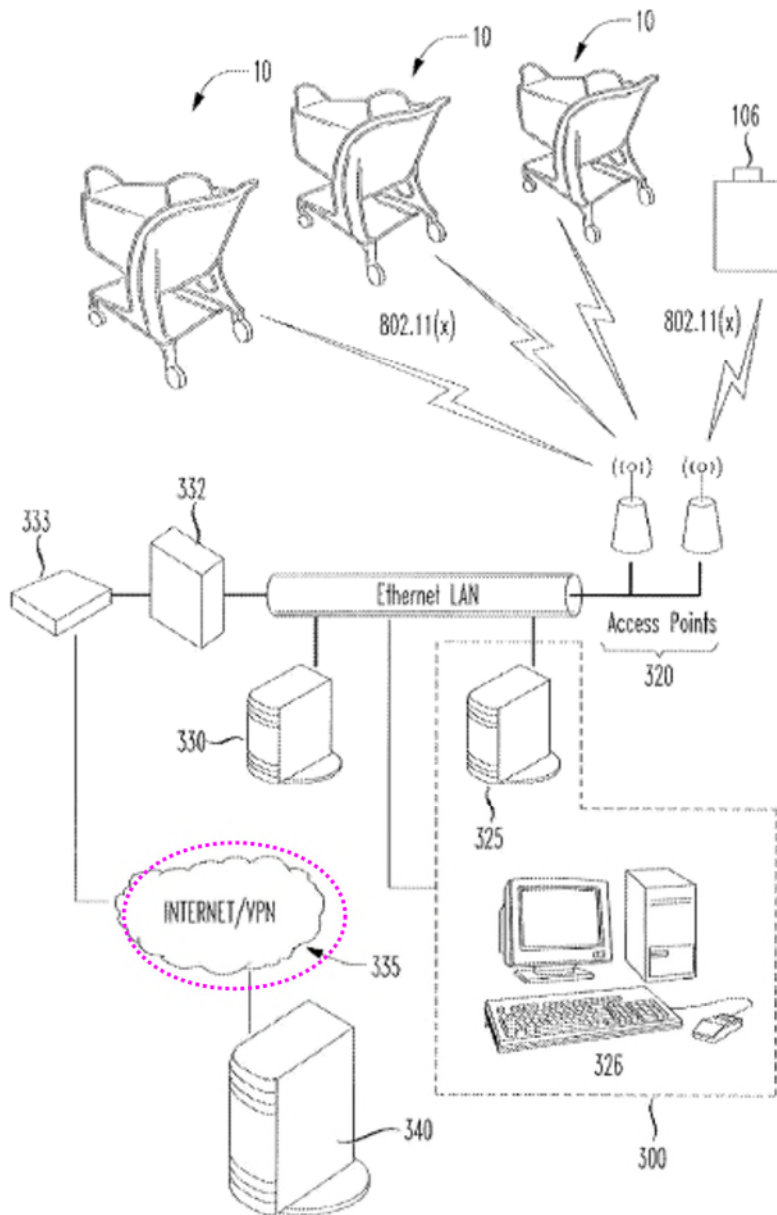
213. Claim 1 has already been addressed above.

214. Bandy discloses the use of the Internet by the mobile communications device. Ex. 1006, [0035], [0059]. Thus, it is my opinion that a POSITA would find it obvious to have the mobile communications device communicate with the central server via the Internet, and therefore find the claimed **“the central server receiving the**

communication from the mobile terminal is via the Internet” of [3] to be obvious over Bandy, and thus over Bandy-Fowler.

215. Fowler discloses that the cart connects to the store system via ISS, which in turn may connect to the HCS over the Internet. Ex. 1007, [0259]. Thus, HCS, part of the **central server**, receives the communication via the Internet. Further, Fowler discloses that ECM 200 has the ability to connect to the Internet. Ex. 1007, [0237]. Fowler also discloses that the cart connects to the store server wirelessly and has a connection to the Internet. Ex. 1007, [0240]. It is my opinion that a POSITA would thus find it obvious to have the cart communicate with the store server via the Internet. Thus, it is my further opinion that a POSITA would find the claimed “**the central server receiving the communication from the mobile terminal is via the Internet**” of [3] to be obvious over Fowler, and thus over Bandy-Fowler.

FIG. 17



Ex. 1007 (Fowler), FIG. 17 (annotated)

216. Therefore, it is my opinion that Bandy-Fowler teaches all of the limitations of Claim 3, thus rendering Claim 3 obvious, because Bandy and Fowler each alone teaches all the additional limitations of Claim 3 over Independent Claim 1.

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.”

217. Claim 1 has already been addressed above.

218. Fowler discloses correlating information to a specific consumer, for example via a loyalty card program. Ex. 1007, [0251]. Fowler discloses that advertising data may be correlated or integrated with sales data to determine the effectiveness of the ad on an identifiable consumer via further correlation of data provided via a loyalty program, and purchasing data may be tracked over time to determine the effectiveness of advertising and to determine whether additional and/or modified advertising (**spatially localized information**) is desired. Ex. 1007, [0256]. It is my opinion that a POSITA would understand that such sales data and purchasing data are **account data** that must necessarily be **stored in a database accessible to the central server via a communication network**. It is further my opinion that a POSITA would understand that the correlation or integration disclosed by Fowler is an **association** between the **spatially localized data** (advertising data) with such **account data**.

219. Therefore, it is my opinion that Bandy-Fowler teaches the claimed **“the spatially localized information is further associated with account data *s(sales data)* specific to the user of the mobile terminal previously stored in a database accessible to the central server via a communication network”** of [4].

220. Alternatively, Bandy discloses that the user may search for a particular item by inputting or selecting the item in a network accessible database (**database accessible to the central server via a communication network**) and/or website of merchant 1106. Ex. 1006, [0059], [0060]. It is thus also my opinion that such input, representing an electronic shopping list of the particular user, teaches the claimed **“account data specific to the user of the mobile terminal”** of [4]. Bandy further discloses that merchant 1106 determines one or more stores related to merchant 1106 that have the item in stock, and provides a list of the one or more stores to the user on mobile communications device 100. Ex. 1006, [0060]. It is thus also my opinion that such information teaches the claimed **“spatially localized information associated with account data”** of [4].

221. Therefore, it is also my opinion that Bandy-Fowler teaches the claimed **“the spatially localized information is further associated with account data (*the input or selected item*) specific to the user of the mobile terminal previously stored in a database accessible (*network accessible database*) to the central server via a communication network”** of [4] because Bandy alone teaches it.

222. Therefore, it is my opinion that Bandy-Fowler teaches all of the limitations of Claim 4, thus rendering Claim 4 obvious, because all the additional limitations of Claim 4 over Independent Claim 1 are either obvious over Fowler, or taught by Bandy.

Claim 5

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

223. Claim 5 recites a system analogous to method claim 1, and is rendered obvious by Bandy-Fowler for same reasons set forth for claim 1. 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;”

224. 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;”

225. [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,”

226. 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, Fowler discloses that that the plurality of RFIDs (**radio-frequency peripherals**) are **distributed throughout** the predetermined area as they are “placed around the store in known locations.” (Ex. 1007, [0144]).

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

227. [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;”

228. 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;”

229. 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.”

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

231. Therefore, it is my opinion that Bandy-Fowler 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.”

232. Claim 5 has already been addressed above.

233. FIG. 16 of Bandy shows the claimed arrangement of chip and antenna by disclosing a die 1604 and an antenna 1614 at different points of the RFID tag 1600. Bandy further teaches that the RFID tag 1600 includes “**connections configured to ensure a communications link between the antenna and the chip**” by disclosing that related electronics 1606 are connected to die 1604 through a plurality of contact pads of IC die 1604. Ex. 1006, [0078] and FIG. 16.

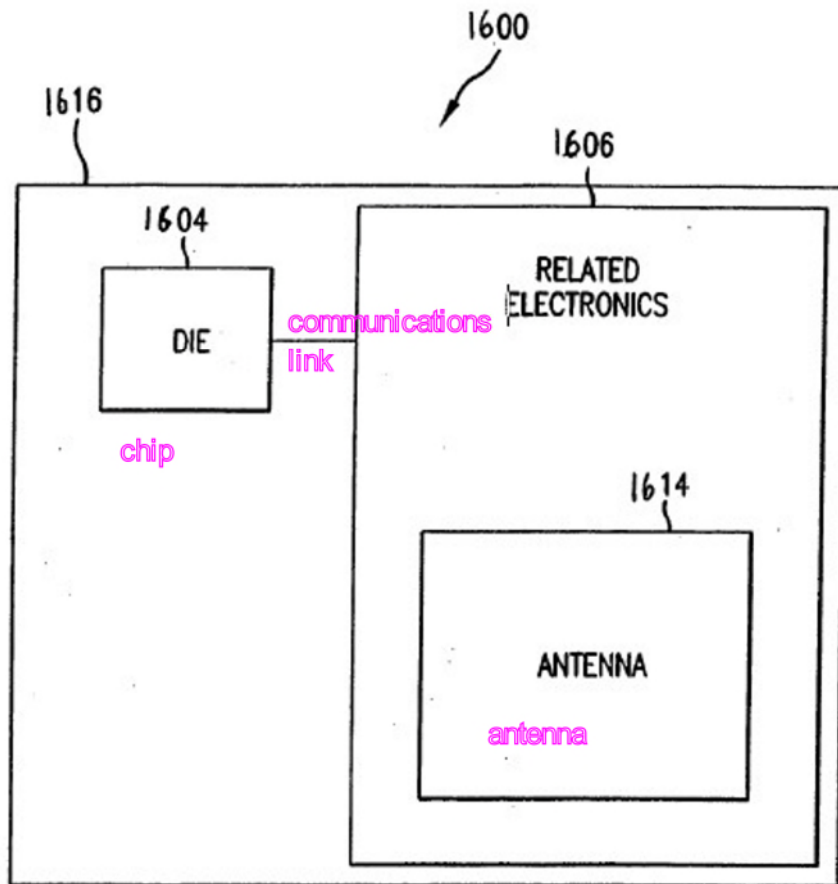


FIG. 16

Ex. 1006 (Bandy), FIG. 16 (annotated)

234. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of Claim 8, thus rendering Claim 8 obvious, because Bandy alone teaches all the additional limitations of Claim 8 over Independent Claim 5.

Claim 9

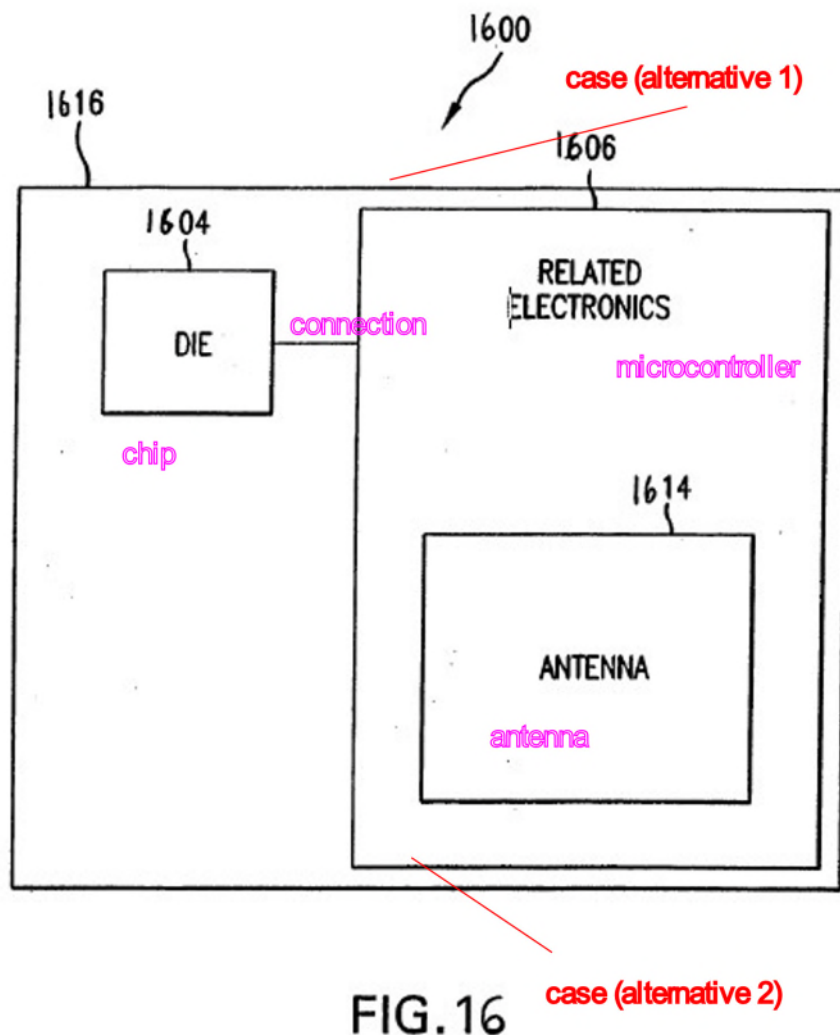
[9] **“The system according to claim 8, wherein the chip is connected to a microcontroller of the radio-frequency peripheral, and wherein the antenna is arranged on or within a case inside which the microcontroller is housed.”**

235. Claim 8 has already been addressed above.

236. Bandy discloses that the “related electronic 1606 provides one or more capabilities, including RF reception and transmission capabilities, impedance matching, sensor functionality, power reception and storage functionality, as well as additional capabilities.” Ex. 1006, [0078]. A POSITA would understand that some part of the related electronic 1606 must inherently control the RF reception and transmission capabilities and thus is the claimed **microcontroller of the radio-frequency peripheral**. Further, Bandy discloses that related electronics 1606 are connected to die 1604 through a plurality of contact pads of IC die 1604. Ex. 1006, [0078] and FIG. 16. Therefore, it is my opinion that Bandy-Fowler teaches the claimed **“the chip (IC die 1604) is connected to a microcontroller of the radio-frequency peripheral”** of [9] because Bandy alone teaches it.

237. Further, it is my opinion that FIG. 16 of Bandy also shows the claimed **“the antenna is arranged on or within a case inside which the microcontroller is housed”** of [9], as made clear by the annotations to the figure, where two alternative identifications of the claimed **“case”** are marked. In each alternative case, the

antenna is arranged within the identified case and the microcontroller is also housed inside the case.



Ex. 1006 (Bandy), FIG. 16 (annotated)

238. Therefore, it is my opinion that Bandy-Fowler teaches each and every limitation of Claim 9, thus rendering Claim 9 obvious, because Bandy alone teaches all the additional limitations of Claim 9 over Dependent Claim 8.

Motivation to modify Bandy with Fowler

239. It is my opinion that a POSITA would have had a reason to combine Bandy with Fowler, and would have had a reasonable expectation of success in doing so.

240. As discussed for [1pre] above, each of Bandy and Fowler discloses a mobile device-central server-radio frequency peripheral system, and it is my opinion that a POSITA would find it obvious to use Fowler's teachings of a particular component of that system in place of Bandy's corresponding component, which is the mere substitution of one element for another known in the field, or to use Fowler's teachings to enhance Bandy's corresponding component, which is no more than the mere application of a known technique to a piece of prior art ready for the improvement.

241. Further, it is my opinion that a POSITA would have been motivated to combine Fowler's disclosures of route finding and vertical positioning with Bandy, the primary reference, to implement Bandy's expressly taught objectives of "improv[ing] an interface between customers and products in warehouse, shopping, and additional environments, including an improved interface with items associated with RFID tags." Ex. 1006, [0007]. Specifically, Bandy teaches a mobile communications device interrogating an RFID tag associated with an item to obtain the identification number of the tag, sending the identification number to a computer system, and obtaining item data associated with such item including location data from the computer system. Ex. 1006, [0053]-[0057]. Bandy further teaches obtaining

location information for particular items. Ex. 1006, [0059]-[0060]. Bandy further teaches displaying item location data on the user interface of the mobile device. Ex. 1006, FIG. 6.

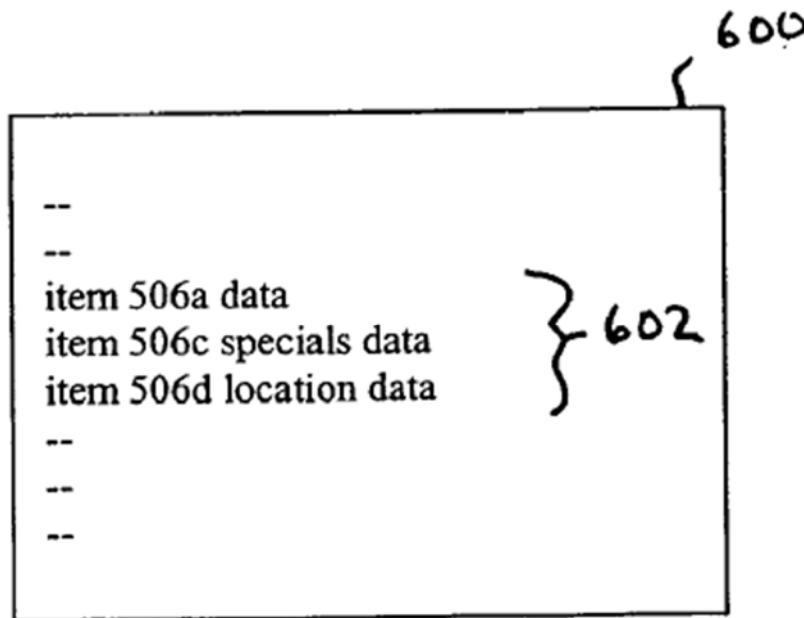


FIG. 6

Ex. 1006 (Bandy), FIG. 6

242. A POSITA reading Bandy in view of Fowler would thus have been motivated and able to use the teachings of Fowler to modify Bandy such that the location data of the item that is transmitted to and displayed on the mobile device further includes vertical and horizontal position of the item, and such that routing information based

on the present location of the mobile device (such as the graphical display of routes to reach the items as disclosed in [0164] and FIG. 28 of Fowler) be provided to and displayed by the mobile communications device to make it easier for the customer to find products. Provision of such information falls within the range of the universal, obvious and expressly disclosed objective of Bandy for an improved interface with items associated with RFID tags, and will aid Bandy's explicitly disclosed objective of improving an interface between customers and products in warehouse, shopping, and additional environments (by helping the customers to easily find the products). *Id.*

243. The combination of the Bandy with Fowler represents nothing more than the combination of known elements to achieve predictable results. Both Bandy and Fowler disclose central servers, mobile terminals, radio-frequency peripherals capable of interacting with mobile terminals, and planograms associating unique identifiers of such radio-frequency peripherals with locations. *See* discussions in Section III.G.3.a.(1) above. And a POSITA would have known the universal, conventional and obvious element of vertical positioning of product (there are only so many ways to describe where a product is on a shelf in a store) and routing information from a given location. Applying such universal, conventional and obvious element present in Fowler to the elements in Bandy that are fully analogous to their counterparts in Fowler represents, at most, an obvious extension of the

functionality expressly disclosed in Bandy to address the universal, obvious, and expressly taught objective of improving the interface between customers and products. Such an extension would have been well within the skill of a POSITA. Further, Bandy already teaches the display of location data on the mobile device, and it is well within the skills of a POSITA to display the additional data (vertical and horizontal position of the location data, routing information) on the mobile device by making routine and simple changes. 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, a POSITA would have a reasonable expectation of success in doing so.

244. Furthermore, it is my opinion that a POSITA would have been motivated and able to use the command and background knowledge of NFC standards such as ISO 14443, as well as Fowler's passive RFID tags, to implement Bandy's RFID tags. Bandy already discloses RFID tags that communicate with nearby mobile communications devices. Ex. 1006, [0054]. Bandy further teaches that the interrogation/read protocols between the mobile device and the RFID tag would be known to persons skilled in the relevant art(s), to read tag 902. Ex. 1006, [0055]. A POSITA would have been familiar with the NFC protocols and standards, and would further have been familiar with the industry trend to implement RFID tags with NFC protocols and standards such as ISO 14443. A POSITA would also have been

familiar with Fowler's passive RFID tags (Ex. 1007, [0139]) and, as I discussed earlier, familiar with the advantages of passive RFID tags over active RFID tags such as saved cost and easier maintenance due to the elimination of the requirement for a power source. Thus, a POSITA would be motivated and able to use the ISO 14443 protocol and standard as well as Fowler's passive RFID tags, which together teach the claimed **activation and communication range less than twenty centimeters** of [1a], as well as the claimed activating by **energy of electromagnetic waves** of [2], to implement Bandy's tag and reader module, and would have a reasonable expectation of success in doing so, since this represents no more than the mere application of a known technique to a piece of prior art ready for the improvement.

245. Therefore, it is my opinion that a POSITA would have been motivated and able to implement the ISO 14443 protocol and standard, a common and background knowledge of a POSITA, as well as Fowler's passive RFID tags, for Bandy's RFID tags, and meet the missing limitations of [1a] and [2]. Further, it is my opinion that a POSITA would have been motivated and able to implement the vertical placement and route finding of Fowler in Bandy's system, and meet the missing limitations of [1pre] and [1b] as well as supplement Bandy's disclosures of [1c]. Thus, a POSITA would find it obvious to reach the Bandy-Fowler combination that discloses each and every limitation of Claims 1-5 and 8-9.

D. Ground 4: Claims 1-9 are rendered obvious over Bandy in combination with Fowler and Arntzen

246. As discussed in Ground 3 above, Claims 1-5 and 8-9 are rendered obvious by Bandy in combination with Fowler, where a POSITA would also use the background knowledge of a POSITA that teaches the use of NFC technology that has a communication range of less than twenty centimeters and supports activation by electromagnetic wave to modify Bandy's passive RFID tags (the "NFC tag modification").

247. It is my opinion that, as an alternative to background knowledge, Arntzen also teaches the NFC tag modification, and a POSITA would have been motivated to further combine Bandy-Fowler with Arntzen and implement this modification from Arntzen in Bandy-Fowler, and would have a reasonable expectation of success in doing so. Therefore, it is my opinion that Claims 1-5 and 8-9 are additionally obvious over Bandy in combination with Fowler and Arntzen.

1. Analysis

The NFC tag modification

248. As discussed in Ground 2, Arntzen teaches ESL displays (price labels) that are functionally and structurally analogous to Bandy's RFID tags, and Arntzen's price labels are implemented with the claimed NFC technology. Therefore, it is my opinion that Arntzen teaches the NFC tag modification.

Motivation to modify Bandy-Fowler with Arntzen

249. As discussed for Ground 3 above, it is my opinion that a POSITA would have reason to make the NFC tag modification from background knowledge and would have a reasonable likelihood of success in doing so. For the same reasons as I discussed for the motivation to combination in Ground 2 above, it is my opinion that a POSITA would have reason to modify Bandy-Fowler and implement Arntzen's NFC technology for communication with mobile terminal in Bandy-Fowler's RFID tag. This represents nothing more than the combination of known elements to achieve predictable results, and is well within the skills of a POSITA.

VI. CONCLUSION

250. 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.

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