

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Petitioner,

v.

SES-IMAGOTAG INC.,

Patent Owner.

Case No. IPR2024-00208

Patent No. 11,010,709

**DECLARATION OF DR. RAJEEV SURATI,
IN SUPPORT OF PATENT OWNER RESPONSE**

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CLAIM LISTING

Claim 1	
[1a]	A method for updating a planogram registered in a computer system, to reflect an addition of a shelf label in a shelf of a retail area,
[1b]	wherein the planogram comprises association data between articles of the retail area and locations of the retail area, the method comprising:
[1c]	acquiring, by a reading device, a sequence of label identifiers comprising a label identifier of an added shelf label reflecting an addition of the shelf label in the shelf of the retail area, and also comprising a label identifier of an adjacent shelf label which is adjacent to the added shelf label
[1d]	according to a scrolling direction of the locations of the retail area,
[1e]	the retail area having a plurality of shelf labels distributed in the retail area,
[1f]	each of the shelf labels being associated with a respective article and being disposed near a respective location associated with the article,
[1g]	each of the shelf labels being associated with a label identifier of its own,
[1h]	wherein the adjacent shelf label is either the preceding shelf label or the following shelf label in the shelf according to the scrolling direction and in relation to the added shelf label, wherein
[1i]	a location of the adjacent shelf label is preliminarily known in the planogram;
[1j]	identifying a location corresponding to the added shelf label in the shelf of the retail area, comprising:
[1k]	transmitting, by the reading device, the sequence of label identifiers to the computer system,
[1l]	updating, by the computer system, the planogram on the basis of the sequence of label identifiers, by determining:
[1m]	articles associated with the labels of the sequence of label identifiers, and
[1n]	locations of the articles, on the basis of an obtained location of the added shelf label, wherein

[1o]	the obtained location is a location in the planogram which is adjacent to the preliminarily known location of the adjacent shelf label.
Claim 2	
[2a]	The method according to claim 1, wherein
[2b]	acquiring the sequence of label identifiers comprises receiving, by the reading device, an indication of relative positioning, relative to the location of the added shelf label to be located, and the adjacent label whereof the location is known to the computer system, the indication of relative positioning being transmitted by the reading device to the computer system.
Claim 3	
[3a]	The method according to claim 2, wherein
[3b]	receiving the indication of relative positioning comprises: identifying, from the acquisition order of the label identifiers of the sequence of label identifiers, the indication of relative positioning of the added shelf label, relative to the location of the adjacent label.
Claim 4	
[4a]	The method according to claim 1, further comprising:
[4b]	transmitting, by the reading device and to the computer system, data corresponding to an association between the label identifier of the added shelf label and a reference of an article with which the added shelf label is associated with.
Claim 5	
[5a]	The method according to claim 1, wherein
[5b]	the added shelf label is one of a plurality of electronic shelf labels to be located, the electronic shelf labels to be located being adjacent to each other in the scrolling direction of the locations of the retail area, and
[5c]	wherein the acquiring comprises acquiring the label identifiers of the plurality of electronic shelf labels to be located in the order of their arrangement.

Claim 6	
[6a]	The method according to claim 5, wherein
[6b]	each electronic shelf label of the sequence is fitted with a radiofrequency peripheral, and wherein
[6c]	the acquiring comprises acquiring, by the reading device, the label identifiers of the electronic shelf labels by setting up
	communication via radiofrequency with the electronic shelf labels and the reading device.
Claim 7	
[7a]	The method according to claim 1, wherein
[7b]	the reading device comprises a displacement measuring member, and the method further comprises:
[7c]	determining, by the reading device, the displacement between the label identifier of the adjacent shelf label whereof the location is preliminarily known and the label identifier of the added shelf label.
Claim 8	
[8a]	The method according to claim 7, further comprising:
[8b]	determining, by the reading device, the distance between the adjacent shelf label whereof the location is known and the added shelf label to be located from the displacement of the reading device between the identifier of the adjacent shelf label whereof the location is known and the identifier of the added shelf label, and
[8c]	wherein the identifying further comprises obtaining the location of the added shelf label, by the computer system, and using the distance to update the planogram.
Claim 9	
[9a]	The method according to claim 1, further comprising:
[9b]	acquiring, by the reading device, a label identifier of the adjacent shelf label,
[9c]	acquiring, by the reading device, a characteristic dimension of the location associated with the shelf label acquired the reading device,

[9d]	transmitting, by the reading device, the characteristic dimension of the location with the label identifier to the computer system.
Claim 10	
[10a]	A non-transitory computer program product comprising program code instructions for updating a planogram registered in a computer system to reflect an addition of a shelf label in a shelf of a retail area, comprising:
[10b]	acquiring, by a reading device, a sequence of label identifiers comprising a label identifier of an added shelf label reflecting an addition of the shelf label in the shelf of the retail area, and also comprising a label identifier of an adjacent shelf label which is adjacent to the added shelf label
[10c]	according to a scrolling direction of the locations of the retail area,
[10d]	the retail area having a plurality of shelf labels distributed in the retail area,
[10e]	each of the shelf labels being associated with a respective article and being disposed near a respective location associated with the article,
[10f]	each of the shelf labels being associated with a label identifier of its own, wherein
[10g]	the adjacent shelf label is either the preceding shelf label or the following shelf label in the shelf according to the scrolling direction and in relation to the added shelf label, wherein
[10h]	a location of the adjacent shelf label is preliminarily known in the planogram;
[10i]	identifying a location corresponding to the added shelf label in the shelf of the retail area, comprising:
[10j]	transmitting, by the reading device, the sequence of label identifiers to the computer system,
[10k]	updating, by the computer system, the planogram on the basis of the sequence of label identifiers, by determining:
[10l]	the articles associated with the labels of the sequence of label identifiers, and
[10m]	the respective locations of the articles, on the basis of an obtained location of the added shelf label, wherein
[10n]	the obtained location is a location in the planogram which is adjacent to the preliminarily known location of the adjacent shelf label.

Claim 11	
[11a]	A system for managing a planogram,
[11b]	the planogram comprising association data between articles of a retail area and locations of the retail area, the system comprising:
[11c]	a plurality of electronic shelf labels,
[11d]	each of the shelf labels being associated with a label identifier of its own,
[11e]	a reading device adapted to acquire the label identifiers of the plurality of electronic shelf labels and
[11f]	to acquire the references of the articles associated with the electronic shelf labels,
[11g]	a computer system in which the planogram is registered,
[11h]	the computer system being configured to receive, from the reading device, a transmitted sequence of label identifiers, and
[11i]	being further configured to update the planogram by determining an obtained location of an added shelf label reflecting an addition of a shelf label of the retail area, wherein
[11j]	the obtained location is a location in the planogram which is immediately adjacent to the known location of the adjacent shelf label,
[11k]	the reading device being configured to: acquire a sequence of label identifiers comprising the label identifier of the added shelf label, and further comprising the label identifier of an adjacent shelf label which is adjacent to the added shelf label
[11l]	according to a scrolling direction of the locations of the retail area, wherein
[11m]	the adjacent shelf label is either the preceding shelf label or the following shelf label in the shelf according to the scrolling direction and in relation to the added shelf label, wherein
[11n]	a location of the adjacent shelf label is preliminarily known in the planogram, and
[11o]	transmit the sequence of label identifiers to the computer system.
Claim 12	

[12a]	The system of claim 11, wherein
[12b]	the reading device is further configured to: acquire an indication of relative positioning, relative to the location of the added shelf label and the adjacent label; and transmit the indication to the computer system.
Claim 13	
[13a]	The system of claim 12, wherein
[13b]	the reading device is further configured to: identify, from the acquisition order of the label identifiers of the sequence of label identifiers, the indication of relative positioning of the added shelf label, relative to the location of the adjacent label.
Claim 14	
[14a]	The system of claim 11, wherein
[14b]	the reading device is further configured to: transmit to the computer system data corresponding to an association between
	the label identifier of the electronic and a reference of an article with which the added shelf label is associated with.
Claim 15	
[15a]	The system of claim 11, wherein
[15b]	the added shelf label is one of a plurality of electronic shelf labels to be located, the electronic shelf labels to be located being adjacent to each other in the scrolling direction of the locations of the retail area, and
[15c]	wherein the reading device is further configured to: acquire the label identifiers of the plurality of electronic shelf labels to be located in the order of their arrangement.
Claim 16	
[16a]	The system of claim 15, wherein
[16b]	each electronic shelf label identified in the sequence is fitted with a radiofrequency peripheral, and wherein
[16c]	the reading device is further configured to acquire the label identifiers of the electronic shelf labels by setting up

	communication via radiofrequency with the electronic shelf labels and the reading device.
Claim 17	
[17a]	The system of claim 11, wherein
[17b]	the reading device comprises a displacement measurement member, and wherein
[17c]	the reading device is further configured to: Determine the displacement between the label identifier of the adjacent shelf label whereof the location is preliminarily known and the label identified of the added shelf label.
Claim 18	
[18a]	The system of claim 17, wherein
[18b]	the reading device is further configured to determine the distance between the adjacent shelf label and the added shelf label from the displacement of the reading device between the label identifier of the adjacent shelf label whereof the location is known, and the added shelf label.
Claim 19	
[19a]	The system of claim 18, wherein
[19b]	the computer system is configured to obtain the location of the added shelf label as a function of the preliminarily known location of the adjacent shelf label and as a function of the determined distance.
Claim 20	
[20a]	The system of claim 11, wherein
[20b]	the computer system is further configured to: update the planogram on the basis of the sequence of label identifiers, by determining: articles associated with the labels of the sequence of label identifiers, and locations of the articles, on the basis of the obtained location of the added shelf label.

I, Dr. Rajeev Surati, do hereby declare as follows:

I. INTRODUCTION

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters stated herein.

2. I have been asked by SES-Imagotag SA (“SES”) to provide my expert opinion in connection with the *Inter Partes* Review (“IPR”) of U.S. Patent No. 11,010,709 (Ex-1001, “’709 Patent”). This declaration is a statement of my opinions on issues relating to the patentability of claims 1–20 of the ’709 Patent, which are all claims of the ’709 Patent. As I explain more fully below, it is my opinion that all of the claims would not have been obvious to a person of ordinary skill in the art (“POSITA”) based on the prior art Petitioners identify.

3. I am being compensated for my work in this matter at my standard hourly rate of \$650. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the specifics of my testimony.

4. I have reviewed and considered at least the following documents in connection with my analysis of the ’709 Patent:

- U.S. Patent No. 11,010,709 (Ex-1001)
- File History of the ’709 Patent (Ex-1002);
- U.S. Patent No. 9,378,513 (“Wu”) (Ex-1003);

- U.S. Patent Application Publication No. 2017/0293959 (“Itou”) (Ex-1004);
- U.S. Patent Application Publication No. 2013/0325638 (“Auclair”) (Ex-1005);
- U.S. Patent Application Publication No. 2009/0231135 (“Chaves”) (Ex-1006);
- Certified translation of Japan Patent Application Publication No. 2008-77131A by Fujiwara (“Fujiwara”) (Ex-1007);
- Japan Patent Application Publication No. 2008-77131A by Fujiwara (Ex-1008);
- Declaration of Dr. Manos M. Tentzeris (Ex-1009);
- U.S. Patent App. Pub. 2011/0102144 (“Okina”) (Ex-2012);
- U.S. Patent App. Pub. 2008/0198001 (“Sarma”) (Ex-2013);
- Article: “Basic Principles of the Main Cadastral Systems in the World” (Ex-2014);
- Graphic: “Cadastre” (Ex-2015);
- Merriam Webster Dictionary: “Interpolate,” “Extrapolate,” “Planogram” (Ex. 2016);
- U.S. Patent 8,923,893 (“Austin”) (Ex-2017);
- U.S. Patent 7,957,998 (“Riley”) (Ex-2018);
- Article by Erwin Bergsma: “Planogram Data Requirements” (Ex-2019);
- U.S. Patent 7,949,568 (Ex-2020);
- EPAC article, “Planograms 101: What They Are And Why They’re Important For Your Brand” (Ex-2021);

- Erwin Bergsma, *Analyzing your first planogram*, Global Retail Business Solutions (Aug. 2015) (Ex-2022);
- U.S. Pat. App. Pub. 2021/0182774 (Ex. 2023); and
- Masao Ohta & Yoshiyuki Higuchi, *Study on the Design of Supermarket Store Layouts: The Principle of “Sales Magnet,”* 7 Int’l J. of Econ. Mgmt. Eng. 209 (2013) (Ex-2024);
- A. Deepak Gupta, *Media Access Control (MAC): MAC Spoofing and its Countermeasures*, 2 Int’l J. Recent Trends in Eng., 17 (Nov. 2009) (Ex-2025); and
- Deposition Transcript of Emmanouil (Mano) M. Tentzeris, PhD (Aug. 23, 2024) (Ex-2026).

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

- a) the documents listed above and any other documents cited or discussed throughout this declaration;
- b) the relevant legal standards, including the standard for obviousness, and any additional authoritative documents as cited in the body of this declaration; and
- c) my own knowledge and experience based upon my work in the field of software systems as described below, as well as the following materials.

6. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

7. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in Exhibit 2011. The following is a brief summary of my relevant qualifications and professional experience.

8. I have over thirty years of experience in electrical engineering and computer science.

9. I attended the Massachusetts Institute of Technology (MIT) from 1988 to 1999. I earned a Bachelor of Science in 1992, Master of Science in 1995, and a Doctor of Philosophy in 1999 in electrical engineering and computer science, all from MIT. During my studies, I took many classes where I built fully integrated hardware and software systems and worked on several projects involving RF (radio-frequency), proximity, IP (infrared), and microcontrollers. I also taught courses at MIT on electronics, circuit design, signal processing, RF, electromagnetic systems, and other similar courses to undergraduates.

10. My Ph.D. thesis, “Scalable self-calibrating display technology for seamless large-scale displays,” focused on a system that took multiple projectors and calibrated them using optical feedback and user input to create imagery that looked like a single image across multiple projected images. My thesis resulted in a patent that is owned by MIT.

11. In 1996, I founded Flash Communications, a company focused on technology related to U.S. Patent No. 5,943,478 and associated technology that I had developed related to pop-up two-way messaging over the Internet. Flash Communications was sold to Microsoft Corporation in 1998.

12. In 2000, I started a company, photo.net, which was a large online photography community. Photo.net was also known as one of the earliest photo sharing web sites. During this time, I worked with consumer electronics manufacturers in the digital camera business.

13. I also founded Scalable Display Technologies in 2004 and have been the President and Chairman ever since. The products and services of the company are based on technologies developed for my Ph.D. thesis and related patents.

14. Since 2008, I have been working with many technologies for the purpose of tracking items such as blue tooth, Wi-Fi, and other frequencies, as well as writing several applications for iOS and mobile phones. My projects also involve near-field communication (“NFC”) and radio-frequency identification (“RFID”) tags.

15. I am an inventor on several patents and have created several products that utilize optical feedback to control contrast and brightness of projectors at a display and per pixel level.

16. For my contributions as an inventor and entrepreneur, I have received several awards, including the Global Indus Technovator Award 2009 and Laureate of 2009 Computerworld Honors Program.

17. I have authored and co-authored over ten publications and presented talks on various aspects of electrical engineering and computer science, including my Bachelor of Science thesis entitled “A Parallelizing Compiler based on Partial Evaluation,” which was awarded the Best Undergraduate Thesis in Computer Science in 1992 at MIT.

18. I am on the advisory boards of several technology companies, including UnifySquare, a unified communications/Realtime collaboration consultancy; Paneve, a developer of general-purpose ASICs coupled with compiler technology; Nexaweb, a developer of Realtime web application frameworks using HTTPS; Antix Labs, a developer of compiler technology for universal gaming platform; and Permabit, a provider of an online to offline bridge for marketing using blue tooth beacons.

III. LEVEL OF ORDINARY SKILL IN THE ART

19. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the

sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

20. For purposes of this *inter partes* review I have been instructed to apply Petitioners’ definition of a person of ordinary skill in the art (“POSITA”): that a POSITA would 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.

21. As of July 27, 2015—the priority date of the ’709 Patent—I met, and in fact exceeded, the qualifications of a person of ordinary skill in the art.

22. For purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my experience and the understanding of a POSITA generally (and specifically related to the references I consulted herein), reflect the knowledge that existed in the field as of the earliest

proper priority date of the '709 Patent (i.e., July 27, 2015). Unless otherwise stated, when I provide my understanding and analysis below, it is consistent with the level of a POSITA prior to the earliest alleged priority date of the '709 Patent.

IV. RELEVANT LEGAL STANDARDS

23. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '709 Patent, I am relying on certain basic legal principles that counsel have explained to me. These principles are discussed below.

24. I understand that for an invention claimed in a patent to be found patentable, it must be, among other things, new and not obvious in view of what was known before the invention was made.

25. I understand the information used to evaluate whether an invention is new and not obvious is generally referred to as “prior art” and generally includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

26. I understand that in this proceeding the Petitioner has the burden of proving that the claims of the '709 Patent are anticipated by or obvious in view of the prior art by a preponderance of the evidence. I understand that “a preponderance of the evidence” is evidence sufficient to show that a fact is more likely true than it is not.

27. I understand that prior art to the '709 Patent in this proceeding includes patents and printed publications in the relevant art that predate the proper priority date of the alleged invention recited in the '709 Patent.

28. I understand that in an IPR proceeding, terms appearing in the patent claims are to be interpreted according to their “ordinary and customary meaning,” subject to a few exceptions, such as if a patent applicant clearly redefines a term or makes statements during prosecution that changes the scope of the term’s meaning. In determining the ordinary and customary meaning, the words of a claim are first given their plain meaning as they would have been understood by a POSITA at the time of the alleged invention, in light of the specification and file history. I understand that treatises and dictionaries in some circumstances may help illuminate the meaning attributed by a POSITA at the time of the alleged invention. I have followed this approach in my analysis and have applied the ordinary and customary meaning of those terms throughout my analysis in this Declaration.

29. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to “anticipate” the claim. Second, the prior art can be shown to have made the claim “obvious” to a person of ordinary skill in the art. In this declaration I focus on “obviousness” because the Petition and expert declaration rely solely on “obviousness.” My understanding of the legal standard for “obviousness” is set forth below.

30. I have been informed that a claimed invention is unpatentable as obvious if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis takes into account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

31. Specifically, I understand that the obviousness question requires consideration of four factors (although not necessarily in the following order):

- The scope and content of the prior art;
- The differences between the prior art and the claims at issue;
- The knowledge of a person of ordinary skill in the pertinent art; and
- Whatever objective factors indicating obviousness or non- obviousness may be present in any particular case.

32. I have been informed by counsel that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to

obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

33. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such “secondary considerations” include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention.

34. I understand that, even if a prior art reference does not expressly disclose a claim element, it can be argued that the missing element is “inherent” in the prior art. However, I understand that there is a high standard before a party can rely on inherency to establish the existence of a claim limitation in the prior art in an

obviousness analysis. I also understand that an element can only be inherent if it is necessarily present in the prior art, not just probably or possibly present. Even if a certain thing may result from a given set of circumstances, I understand that is not enough to render the result inherent. Yet, even if an element is inherent, I understand that it is not necessarily obvious.

35. I understand that it is not permissible to use hindsight after viewing a claimed invention to then determine whether it is obvious. In other words, I understand that it is impermissible to engage in hindsight reconstruction of the claimed invention using the application as a template and using elements from references to fill in any gaps. I also understand the inventor's own path never leads to obviousness. Even defining a problem in terms of its solution, I understand, will reveal improper hindsight in selecting the prior art relevant to obviousness.

36. I further understand that a petitioner may not prove obviousness with mere conclusory statements. I understand that obviousness must be supported by some articulated reasoning with some rational underpinning such that conclusory expert testimony is inadequate to support an obviousness determination. I understand that merely repeating an argument from the petition in a declaration is insufficient and lacks probative value.

V. OVERVIEW OF THE TECHNOLOGY

37. In retail stores, goods are displayed in a way that tries to maximize sales. *See* Ex-2024, 209. To assist with that, retailers can plan and track the placement of products throughout the store using a “planogram.” *See generally, e.g.,* Ex-2017, 1:12-21; Ex-2018, 1:27-40; Ex-2019, 2022.

38. Shelf fronts may include labels displaying information about the goods (e.g., the name of the product and price). Ex-1001, 1:21-43. Traditionally, stores use paper or sticker labels to identify the products and prices of those products at their locations on the store shelves. When the price of a product changes, or if a product is moved, added to, or removed from a shelf, the labels would also need to be manually replaced, moved, added, or removed. Ex-2018, 9:56-62 (discussing pre-printed labels needing to be replaced); Ex-2020, 1:19-43, 1:57-60 (describing the labor-intensive process of managing out of stock displays and display tasks).

39. More recently, however, Electronic Shelf Labels (“ESLs”) allow for the automation of many of these processes. Ex-1001, 1:21-37. There are several advantages to using ESLs over their paper cousins, including allowing automated price changes. *Id.*, 1:38-43. ESLs generally present customers with the same information as traditional labels, such as the product name, price, and other relevant information, but will often have digital screens and wireless communication features, which allows store managers to control the ESLs and update prices or

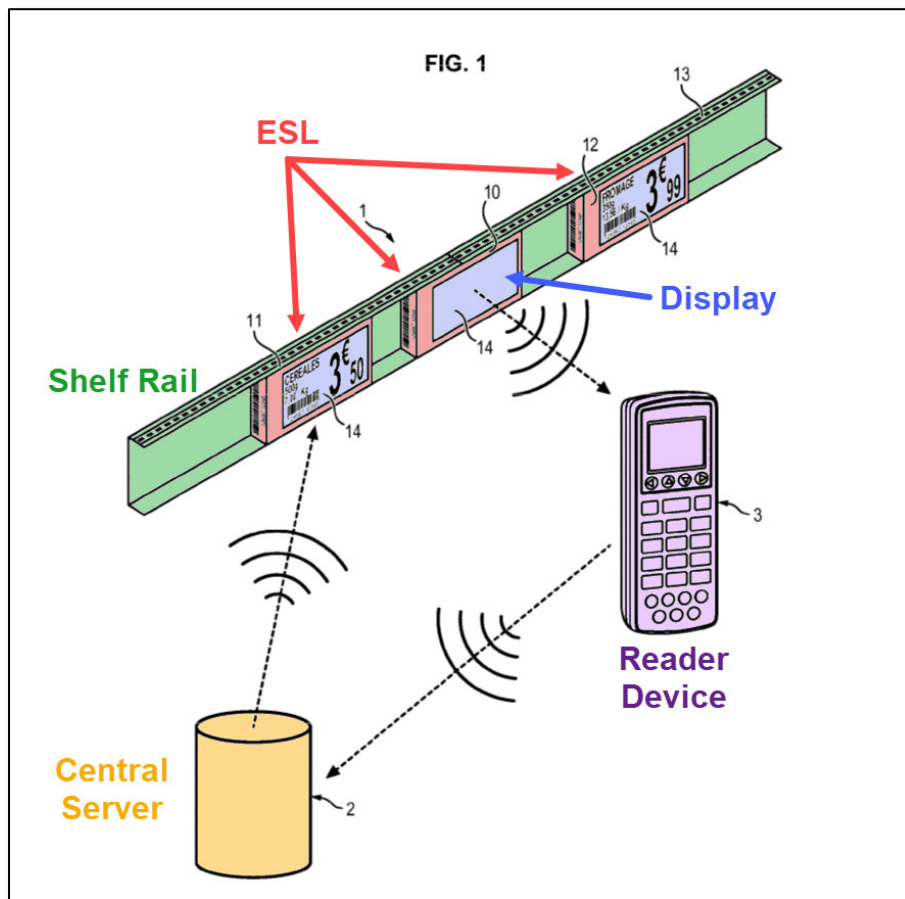
product identifiers remotely, such as from a mobile device or central computer system. *Id.*, 1:26-30, 1:49-52.

A. Overview of the '709 Patent

40. The '709 Patent was first filed as an international application (PCT/FR2016/051930) filed on July 25, 2016, and then filed specifically in the United States on January 25, 2018. Ex-1001, Cover. The '709 Patent states that it has priority to an earlier French Patent Application (No. 1557153) filed on July 27, 2015. *Id.*

41. Although ESLs existed before the '709 Patent, the '709 Patent provides a system and method of using ESLs that not only allows ESLs to adaptively display product and price information, but are also configured to automatically update store planograms. *Id.*, 2:6-9, 2:40-44. Specifically, the '709 Patent describes a process of using a mobile reading device (such as a cell phone) to track ESL locations in a store and which products those ESLs identify at a particular location. *Id.*; *see also id.*, 4:47-54, 4:64-5:15, 5:21-27. The '709 Patent explains that knowing a product's location has many advantages when deploying and updating ESLs, including the ability to advise consumers and employees of the locations of products, better management of the products for sale, and better productivity of the store. *Id.*, 9:61-67, 10:1-9.

42. The '709 Patent also describes the structures of the ESL (e.g., 10, 11, 12): they each contain a casing, a microprocessor, memory, a display screen (14) for displaying product pricing and other relevant information, and a radiofrequency communication module for wireless communication with “reader” devices (3) and/or central servers (2), and is placed along a shelf rail (13). *Id.*, 4:55-5:27.



Ex-1001, Fig. 1 (annotated)

43. The '709 Patent also describes how the store planogram can be automatically updated using the described ESL system. To add a new ESL (10) to a shelf that already has existing ESLs (11 and/or 12) installed on the shelf rail (13), a

few steps are followed. *Id.*, 5:60-67. First, an operator (such as a store manager or clerk) “uses the reading device 3 to acquire (step S1) a label identifier of an ESL 11 or 12 adjacent to the location of the added ESL 10.” *Id.*, 6:25-29. The ’709 Patent notes that the “label identifier” is like a sort of serial number that is specific to each ESL. *Id.*, 2:50-51 (“each of said shelf labels being fitted with a label identifier of its own.”), 4:49-53 (“This label identifier therefore identifies unequivocally a single ESL only”), 9:28-32 (explaining each label has a “label number, i.e., the label identifier”). Next, the operator “points out an indication of relative positioning” between the new ESL (10) and an existing ESL (11 and/or 12) to characterize the location of the new ESL (10) on the shelf. *Id.*, 6:35-54. The operator then “uses the reading device 3 to acquire the label identifier of the added ESL 10,” although the order in which the label identifiers is inconsequential. *Id.*, 6:55-64. The reading device (3) then “transmits (step S2) to the computer 2 the sequence of label identifiers,” including both the existing (11 and/or 12) and new (10) ESL identifiers, and “the indication of relative positioning” between the new and existing ESLs. *Id.*, 7:9-17. The computer (2) then uses this information to update the planogram. *Id.*, 8:25-39.

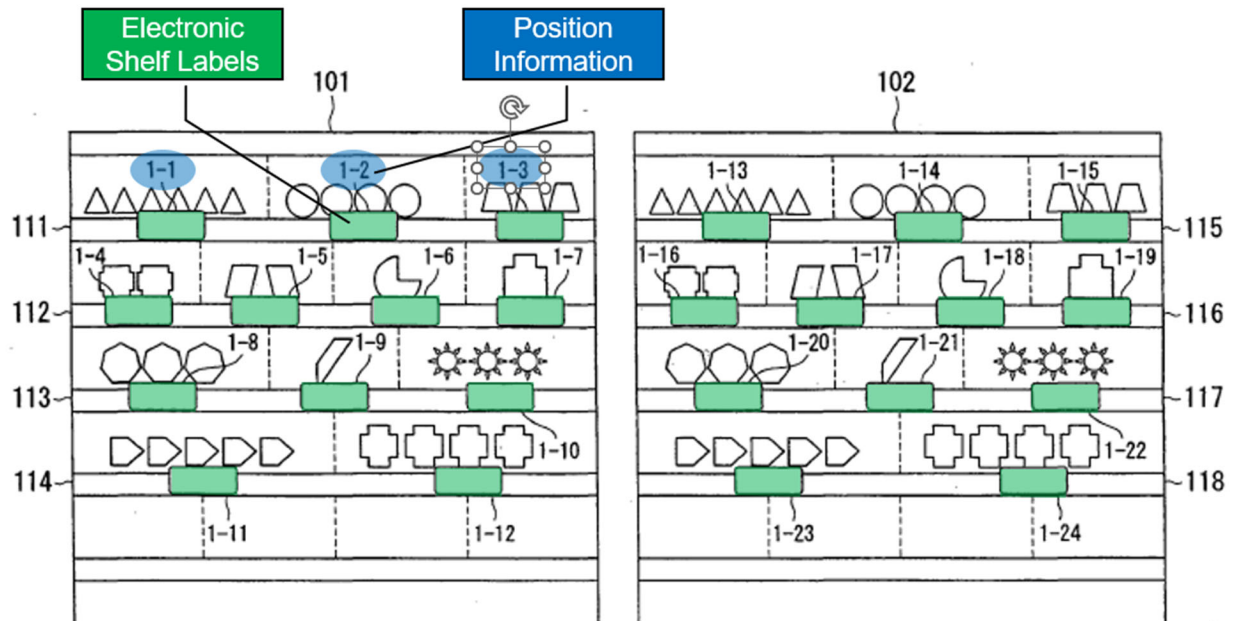
B. Prosecution History

44. Based on my review of the prosecution history, I understand that the applications that led to the ’709 Patent were examined twice before issuance.

45. First, the parent application of the '709 Patent (PCT/FR2016/051930 ("PCT App.)) was filed with the World Intellectual Property Organization ("WIPO"), it underwent a foreign examination. Ex-1002, 139. During that examination, the international examiner expressly mapped a patent application (U.S. App. Pub. No. 2015/178767 ("Wu Application"))—which I understand later became the same Wu patent Petitioners rely on here—to the claims, and found that the Wu Application failed to teach several limitations required by the claims. And although the examiner was evaluating claim limitations that also required "locations," the examiner ultimately found the Wu Application did not disclose or suggest the claims of that application, and specifically, "updating data of associations relating to the association between articles of a retail area and locations of said retail area, by way of the acquisition, by a reading device, of a sequence of at least two label identifiers whose labels are adjacent, in a direction of sweeping of the locations of the retail area, and one of whose identifiers corresponds to the label to be located, and the other to a label whose location is known." *Id.*

46. Second, the '709 Patent application was then filed specifically in the United States. At the time, the U.S. examiner had access to the international examiner's full search report that provided the mapping of the Wu Application to the claims. *Id.*, 80. Rather than apply the Wu Application, though, the Examiner applied other prior art—Okina (U.S. Pat. App. Pub. 2011/0102144, Ex-2003)—that,

like Wu, taught labels with relative order information (e.g., 1-1, 1-2, 1-3) associated with the shelf labels, rather than location information. I have provided an annotated version of Okina's Figure 5, below:



Ex-2012, Fig. 5 (annotated), [0056], [0059], [0114], [0111], [0116]-[0119], [0125].

47. In response, the Applicant amended the claims to remove a reference to “determining...locations of articles...*from the order of the labels in the sequence of labels,*” to instead recite “identifying a location corresponding to the added shelf label ... on the basis of an obtained location of the added shelf label” that is “adjacent” a known “reference label.” Ex-1002, 38-39. With this change (and several others), the examiner allowed the claims over prior art that disclosed a mere ordering of ESLs. *Id.*, 12-15.

VI. CLAIM CONSTRUCTION

48. It is my understanding that in order to properly evaluate the '709 Patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this inter partes review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would have been understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term.

49. I have been asked to provide my opinion on the proper meaning of “location(s)” as recited in independent claims 1, 10, and 11 (and several dependent claims). I have also been asked to provide my opinion on the proper meaning of “planogram” as it is recited in independent claims 1, 10, and 11. Furthermore, I have been asked to assume the preamble of the independent claims 1, 10, and 11 are limiting. I understand that when a preamble is limiting, it limits the claim and the prior art must disclose or render the preamble obvious in order to render the claim obvious.

50. For the purposes of this declaration, I have given all other claim terms their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art, at the time of the alleged invention, which I understand is July 27, 2015 for all claims.

A. “location(s)”

51. The term “location(s)” appears throughout the claims. *See, e.g.*, Ex-1001, claim 1 (“the planogram comprises association data between articles of the retail area and **locations** of the retail area ... the shelf labels being ... disposed near a respective **location** associated with the article ... wherein a **location** of the adjacent shelf label is preliminarily known... identifying a **location** corresponding to the added shelf label in the shelf of the retail area, comprising: ... updating, by the computer system, the planogram on the basis of the sequence of label identifiers, by determining: ... **locations** of the articles, on the basis of an obtained **location** of the added shelf label, wherein the obtained **location** is a **location** in the planogram which is adjacent to the preliminarily known **location** of the adjacent shelf label.”)¹ (my emphasis added); *see also id.*, claims 10, 11.

52. In my opinion, a POSITA would have understood that the plain and ordinary meaning of “locations” requires that a representation in units that allows distance from a point of reference in the retail area to be determined.

53. Based on my review of the Petition, it does not appear Petitioners formally offered a construction for this term, and instead state that they are applying the term’s “plain and ordinary meaning.” Paper 2 (“Petition”), 4. However, it seems

¹ All emphasis is mine unless noted otherwise.

Petitioners have implicitly construed “location(s)” when applying the prior art to the claims because the Petition asserts that a “label location” code that indicates only an order of shelf tags on a given shelf—regardless where that shelf is located, or where exactly the label sits on the shelf—constitutes a “location.” *See, e.g.*, Petition, 8-9 (identifying Fig. 5C as showing “association data between products and locations” comprising a serialized, unitless “label location” code); Paper 12 (“Reply”), 9 (“Wu’s label location table fits th[e] definition [of planogram] – comprising association data between products and locations.”). And in its Institution Decision, the Board preliminarily agreed that Wu’s “label location” codes provide “locations.” *See* Paper 14 (“Institution Decision”), 15-16 (“Recognizing that [Wu’s] label content table 122 associates labels and locations, Petitioner correctly refers to label content table 122 as the planogram.”). I disagree that these sorts of “label location” codes constitute a “location,” as the term would be understood in the context of the ’709 Patent.

54. In my opinion, the intrinsic record supports the meaning I provide above because the ’709 Patent describes a “planogram” as including “a set of association data among articles of a retail area and locations of said retail area.” Ex-1001, 2:6-7. *Additionally*, a POSITA would have understood that the ’709 Patent discloses that such “locations” must be represented in units that allow distance from a point of reference in the retail area to be determined as I explain below.

55. Looking to the “General Technical Field and Context of the Invention,” the ’709 Patent discloses that a planogram enables users to “determine[] which products must be **at which height**, on which shelves and **over how many linear meters.**” *Id.*, 2:7-9. The only way that I am aware to determine dimensions such as height or distance is by using units of measure, and the ’709 Patent even provides meters as one example unit of measure (although a POSITA would be aware of many other units of measure, such as imperial units, or even longitude and latitude). *See id.* The ’709 Patent further explains that, through the use of wireless communications protocols (such as near-field communications (“NFC”) and radio frequency identification (“RFID”)), **the location of each product can be measured** with “considerable precision, of the order of a few centimeters,” again using the metric system as its unit of measure. *Id.*, 1:44-2:2. The ’709 Patent’s specification contrasts this with other prior-art “triangulation” methods that “at best enable precision of the order of a meter only, which prevents knowing which product the client *is located*,” meaning general, loosely defined regions do not constitute a “location.” *Id.* Therefore, to “measure” a location with “precision, of the order of a few centimeters,” a location must be represented in units that allow distance from a point of reference to be determined.

56. I note that the ’709 Patent also describes mobile-device accelerometers—which measure the acceleration of the device as a function of

movement and time—can be used to measure precise displacements “for deducing the distance” between product labels, *id.*, 8:7-17.

57. Also, the '709 Patent explains that having locations represented in units that allow distance from a point of reference in the retail area to be determined, can produce a planogram, such as in the “form of a cadastre”—a French term that refers to detailed property-boundary maps , Ex-2014, 5; Ex-2015—that treats planogram locations as “a referential or a set of coordinates representative of the spatial organization of the retail area,” Ex-1001, 8:40-44.



Ex-2015 (depicting a generic “cadastre” map identifying the exact locations of a given property). By providing such “location” information, the '709 Patent explains that store managers will have “highly precise knowledge of the location of product” needed for “order picking, for a cycle counting, or even tidying away articles left around the shop *out of their location.*” Ex-1001, 10:5-9. Generating such a map would not be possible with just relative order information.

58. Accordingly, the term “locations” should be construed to require a representation in units that allow distance from a point of reference in the retail area to be determined.

B. “planogram”

59. The term “planogram” also appears throughout the claims. *See, e.g.*, Ex-1001, cl. 1 (“the **planogram** comprises association data between articles of the retail area and locations of the retail area ... updating, by the computer system, the **planogram** on the basis of the sequence of label identifiers, by determining: ... locations of the articles, on the basis of an obtained location of the added shelf label, wherein the obtained location is a location in the **planogram** which is adjacent to the preliminarily known location of the adjacent shelf label.”); *see also id.* cl. 10, 11.

60. As anyone who visits supermarkets would likely recognize, it is common for products to be grouped together and placed in specific locations in the store. For instance, all produce is generally provided in the same area, and the produce section is typically placed close to the entrance of the supermarket. *See* Ex-2024, 210. Within the produce section, then products are further grouped by type—such as popular fruits (apples, bananas, etc.), citruses (lemons, limes, oranges), in-ground produce (potatoes, onions), and herbs (basil, parsley, dill, etc.)—and then each product is given some defined amount of space in the produce section. Retail stores from electronics to hardware generally follow this same approach of grouping

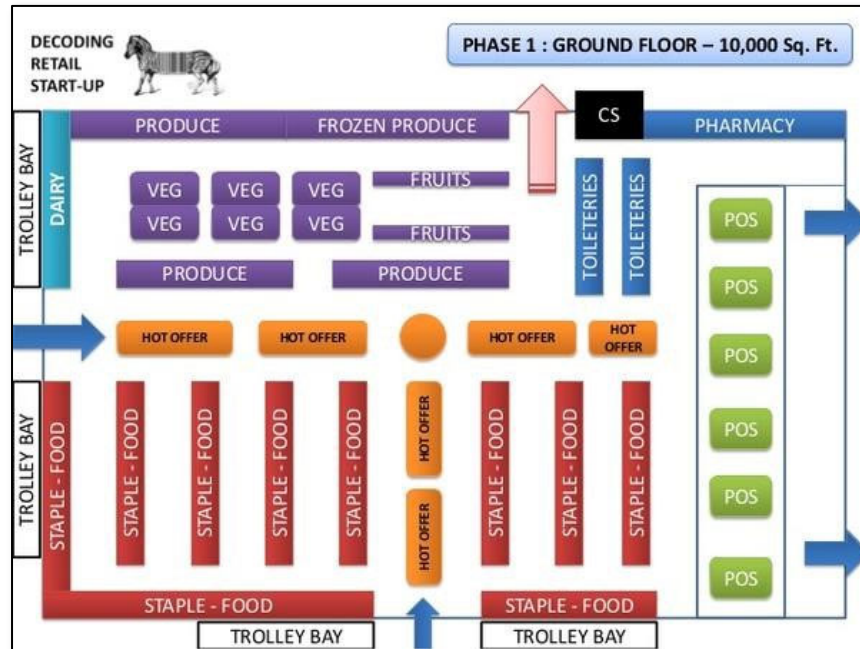
similar products and assigning each production the group a defined amount of shelf space.

61. The term “planogram” is a well-known term used in the retail arts to generally describe a dataset, map, diagram, schematic, or similar types of information, that allows retailers to accurately plan out the placement of products in a retail store in an effort to maximize sales. For instance, Merriam-Webster defines “planogram” as “*a schematic drawing or plan* for displaying merchandise in a store so as to maximize sales” (emphasis added). Ex-2016, 948. Moreover, the term is used throughout other patents as some sort of detailed schematic or plan that represents a retail area and how products are displayed. *See, e.g.*, Ex-2017, 1:12-21 (“A planogram...is a diagram of fixtures, fittings and products that illustrates how and where retail products should be displayed.” (emphasis added)); Ex-2018, 1:31-36 (“A planogram is a layout, or ‘blueprint’, that assigns a specific display location on a specific display fixture within a retail store to each product to be displayed.” (emphasis added)).

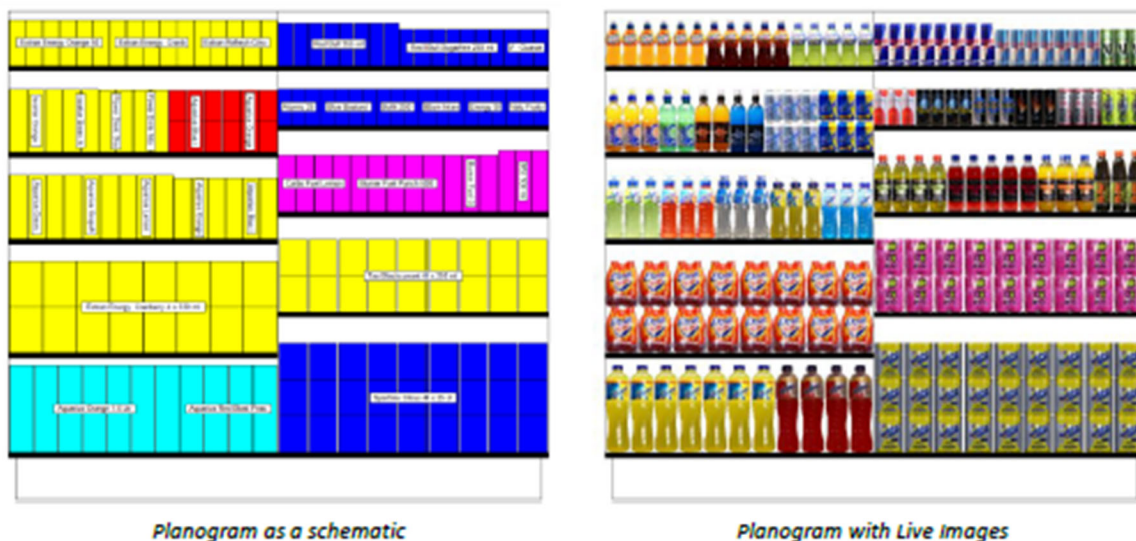
62. Although there are many different ways to characterize a planogram throughout the art, they all share common features. Specifically, “planograms” generally include information regarding: (1) how similar products are grouped together and where these groups of products are placed in the retail store; (2) where each product is placed on a retail shelf-segment, including relative to other products

(e.g., how high off the ground, how prominent a position, which products are nearby, etc.); (3) and how much shelf space is dedicated to each product. *See, e.g.,* Ex-2010, 4-10 (providing an overview of the different layers of data used to build a planogram, depending on the need and data available, including how products are grouped, how much space should be allocated to each product, and product-performance data to decide which products to prioritize); Ex-2020, 5:57-61 (“a planogram is, at a minimum, a list of products..., *positions of the products (e.g., x, y, z coordinates for the center of product)* and orientations...”); Ex-2017, 1:12-21 (“An essential part of creating a planogram is collecting information about the geometry of the underlying retail space (floor levels, walls, doors, obstructions, etc.) and location and size of fixtures (shelves, racks, display cases, etc.) and fittings (power outlets, communication devices, points-of-sale, etc.).”); Ex-2018, 1:31-36 (“[A] planogram may assign each product to a specific location on specific shelf or to a specific hook of a specific peg grouping of a particular display fixture within the retail store.”).

63. A “planogram” can also be presented in several ways, such as a top-down map that depicts how products are grouped together:



Ex-2021, 2 (depicting an exemplary top-down planogram). Additionally or alternatively, a “planogram” can depict a shelf segment that shows exactly which products are supposed to be at which locations, and over how much shelf space:



Ex-2019, 5.

64. Thus, although there are a variety of definitions of “planogram,” and a “planogram” can take on many forms, they all generally share a few common features, such as how products are grouped, where they are placed, and how much space they are provided. I also understand “planograms” to generally serve a common purpose: so that retailers can plan, track, and make decisions about the placement of products throughout a retail store in an effort to maximize sales. Ex-2022, 4 (providing example questions planograms can help answer, such as “Do my products get their fair share of shelf space?” and “Is the planogram that I made implementable in the stores?”).

65. In my opinion, a POSITA would understand that the ’709 Patent uses the word “planogram” consistent with this general understanding. For instance, the ’709 Patent explains how, with prior-art systems, “the planogram never complies with reality,” but that accurately representing where products are located throughout a retail area and on shelves is extremely important. Ex-1001, 2:28-36. The ’709 Patent thus describes a “planogram [that] comprises association data between articles of the retail area and locations of the retail area” that can be automatically updated when altering product placements and their associated ESLs. *See, e.g., id.*, cl. 1. And the ’709 Patent explains that these associations produce a planogram that can be used to “determine[] ***which products must be at which height, on which shelf, and over how many linear meters,***” Ex-1001, 2:7-9 (emphasis added), and

can ultimately “present[] a listing of the locations of the retail area taking the form of a cadastre,” *id.*, 8:40-44, like the top-down map I have provided above.

66. The prosecution history further clarifies that the '709 Patent uses the term “planogram” consistent with its plain meaning by providing examples of what does and does not constitute a planogram. For instance, in one office action, I understand that the Examiner rejected the then-pending claims for several reasons, one of which was in view of the prior art. Ex-1002, 56-67. At the time of the rejection, only dependent claim 8 appeared to contain a requirement for a “planogram.” *Id.*, 199-201. To make the rejection, the Examiner relied upon Okina, which disclosed a database that assigned each ESL positional codes reflecting the relative **order** of ESLs like Wu does here. *Id.*, 58-67. But I do not see any instance in which the Examiner cited Okina as teaching the “planogram” of dependent claim 8. *Id.*, 58-67. I have provided Okina’s Figure 16 (annotations added) below, which in my opinion contains positional information like Wu:

Fig.16

ESL INFORMATION			POSITION INFORMATION			PRODUCT INFORMATION				DISPLAY ATTRIBUTE
ESL CODE	SIZE	COLOR	PRODUCT SHELF NUMBER	ROW (VERTICAL DIRECTION)	COLUMN (LATERAL DIRECTION)	PRODUCT CODE	PRODUCT NAME	DESCRIPTION	PRICE	
1001	M	MONOCHROME	101	1	1	10501	SAUCE FOR SWEET AND SOUR PORK	SICHUAN FLAVOR	420	1
1002	M	MONOCHROME	101	1	2	10689	SAUCE FOR MAPO DOUFU	SICHUAN FLAVOR	380	0
1003	M	MONOCHROME	101	1	3	10605	SAUCE FOR SAUTERED SHREDDED BEEF WITH GREEN PEPPER	AUTHENTIC CANTONESE FLAVOR	380	0
1004	M	MONOCHROME	101	2	1	10566	SAUCE FOR TWICE COOKED PORK	AUTHENTIC CANTONESE FLAVOR	400	0
1005	S	COLOR	101	2	2	10802	STAR ANISE	MUST FOR CHINESE FOOD	580	0
1006	S	COLOR	101	2	3	10803	CHILI BEAN SAUCE	AUTHENTICALLY SUPER HOT	720	0
1007	S	COLOR								
1008	S	COLOR								
1009	S	COLOR								
1010	S	COLOR								
1011	S	COLOR								
1012	S	COLOR								
1013	M	MONOCHROME	102	1	1					
1014	M	MONOCHROME								
1015	M	MONOCHROME								
1016	M	MONOCHROME								

Ex-2003, Fig. 16 (annotated)

Above, Okina's row and column "position information" is nearly identical to that of Wu's disclosed shelf code (S01) and location code (R1):

122

label location information	label displaying information
S01_R1	product A
S01_R1.5	product B
S01_R2	product C
S02_R1	product D
S02_R1.5	product G
S02_R2	product E
S02_R3	product F

Ex-1003, Fig. 5C (annotated)

See also *id.*, 3:27-28. The Examiner, however, relied upon a different prior-art reference ("Sarma") as teaching a planogram (even though the Examiner never expressly applied Sarma to claim 8). Ex-1002, 63-64. Sarma—consistent with the

general understanding of the term “planogram”—described it as “a schematic drawing of fixtures that illustrate product placement.” Ex-2013, [0005].

67. After that rejection, the Applicant amended the claims to recite the term “planogram” through the independent and dependent claims, and further clarified that “[a] planogram *is a digital representation of the layout of a retail area*,” and must “accurately relate to the retail area” to provide various benefits, such as “‘estimat[ing] the number of articles on the shelves, based on theoretical extent of their presence[.]” Ex-1002, 46; *see also id.*, 47-48 (noting benefits of accurate planograms). After this amendment, the Examiner appears to have allowed the ’709 Patent to issue. *Id.*, 12-15. In my opinion, this speaks to the fact that at least both the Examiner and Applicant understood that a set of ordered positional codes as disclosed in both Okina and Wu *does not* constitute a planogram, but that instead the term required additional features consistent with its plain meaning.

68. I understand, however, the Board has at least preliminarily suggested that the ’709 Patent redefined the term “planogram” to require only “association data between articles of the retail area and locations of the retail area” based on the language of the claims. Institution Decision, 14-15 (quoting cl. 1). I would respectfully disagree because, in my opinion, this definition is improper and unduly broad, and the rest of the ’709 Patent and prosecution history would convey to a

POSITA that the term was being used consistent with its proper meaning generally understood in the art.

69. For these reasons, in my opinion, a POSITA would understand that the term “planogram” has a plain, generally understood meaning in the art that has a set of common features (which I have described above), and that the ’709 Patent was using the term consistent with that plain meaning.

VII. ASSERTED PRIOR ART REFERENCES

A. Wu (Ex-1003)

70. Wu is a U.S. Patent that was filed on July 17, 2014 and issued on June 28, 2016. Ex-1003, Cover.

71. Wu discloses “an electronic shelf label controlling system” that includes “at least one electronic shelf label 110, a controlling device 120, a deploying device 130, and a communication gateway device 140,” as well as “installing method” for additional ESLs on a shelf. *Id.*, 1:37-39, 2:51-3:15.

72. Wu explains that “[t]he controlling device 120 stores a label location table 121,” which “records a label identifying information and a label location information of the electronic shelf label 110,” *id.*, 3:16-19, and depicts an example of such a “label location table”:

label identifying information	label location information
ESL-1	S01_R1

Id., Fig. 1.

73. Wu explains that “[t]he label identifying information is used for identifying the electronic shelf label 110, such as ‘ESL-1,’” and the “label location information” is used “for recording the shelf 901 [(e.g., ‘S01’)] where the electronic shelf label 110 is disposed and the *relative position* on the shelf [(e.g., ‘R01’)] in the form of a code.” *Id.*, 3:23-28.

74. When installing a new ESL on a shelf that already has existing ESLs, Wu explains that, first, “the deploying device 130 obtains the label identifying information of the electronic shelf label 110 to be installed.” *Id.*, 3:59-61. Next, either the “deploying device 130 or the controlling device 120 creates the label location information of the electronic shelf label 110 to be installed. *Id.*, 4:9-11.

75. If only one ESL is already installed on the shelf, Wu discloses that the “label location” code for the new ESL is generated by obtaining **the location code**—not its label identifier—of an existing ESL, and “performing a mathematical extrapolation” to obtain a location code for the new ESL. *Id.*, 4:15-20. For instance, if the existing ESL (“ESL-1”) has a location code of “S01_R1,” the new ESL (“ESL-2”) can be assigned a location code of “S01_R2” by acquiring the location code “S01_R1” from the existing ESL and merely “adding 1 to R1.” *Id.*, 4:53-5:11.

76. But if the new ESL is intended to be installed **between** two existing ESLs, the new ESL can be assigned a location code by “performing a mathematical

interpolation on the [ESLs] which are already installed.” *Id.*, 4:20-25. For example, if the existing ESLs (“ESL-1” and “ESL-2”) have location codes of “S01_R1” and “S01_R2,” respectively, the new ESL (“ESL-3”) can be assigned a location code of “S01_R1.5” by merely “dividing the sum of the number of ‘R1’ and ‘R2’ by 2.” *Id.*, 5:37-63.

77. Thus, in my opinion, a POSITA would have understood that Wu discloses an ESL-installation process that characterizes the **relative order** of ESLs on a shelf, but not their locations in a retail area or on a store shelf. *See id.*, 3:23-27.

B. Chaves (Ex-1006)

78. Chaves is a U.S. Patent Application published on September 17, 2009. Ex-1006, Cover.

79. Chaves discloses a system and method to query information about an article using an RFID device, such as “to determine which items or products are expected at a given location.” Ex-1006, [0003]. Specifically, Chaves envisions using an RFID reader for a range of purposes, including: checking products in specific locations, tracking the location and quantity of inventory items, ensuring compliance with planograms, checking for incorrectly-placed items, and filtering which RFID tags are read when users walk through various locations. *Id.*, [0020], [0022], [0024], [0025]-[0031], [0037]-[0038]. Chaves does not envision the use of ESLs, or updating planograms after installing or removing ESLs.

C. Auclair (Ex-1005)

80. Auclair is a U.S. Patent Application published on December 5, 2013. Ex-1005, Cover.

81. Auclair discloses a software-based process of updating an existing planogram for a store to account for changing the placement of particular products. *See* Ex-1005, Abstract, [0063]. Specifically, Auclair’s software takes an existing planogram and a user-defined “new assortment of products” as inputs, the software evaluates the organizational structure of how products are grouped together using a set of categories (such as how products are grouped together in one section of a shelf and/or brand), and then the software outputs a new planogram that accounts for the “new assortment of products” consistent with the organizational structure. *Id.*, [0063]-[0073]. Auclair does not envision the use of ESLs, or updating planograms after installing or removing ESLs.

D. Itou (Ex-1004)

82. Itou is a U.S. Patent Application published on October 12, 2017. Ex-1004, Cover.

83. Itou discloses a process of ensuring products on shelves are placed near their associated ESLs by taking a picture of the product shelves with the ESLs, performing image processing to identify the products in the image, the “label ID” of the ESLs in the image, and then comparing the products recognized in the image to

the products associated with the ESLs to ensure there is a match between the two. *See, e.g., id.*, [0005], [0007]-[0009], [0044]-[0050], Figs. 2, 10. In one embodiment, Itou suggests that, if there is a mismatch between a product and its ESL, the ESL can be updated to match the product closest to it on the shelf. Ex-1004, [0139]. Itou does not envision updating a planogram after adding or removing an ESL from a shelf.

E. Fujiwara (Ex-1007)

84. Fujiwara is an English translation of a Japanese Patent Application published on April 3, 2008. Ex-1007, Cover.

85. Fujiwara discloses a system of wirelessly reading and transmitting ESL information, including a “electronic shelf label ID” to inform customers about the locations of products in a store. *Id.*, Abstract, ¶¶ [0005]-[0006], [0072], [0076]. Fujiwara explains that the “location information” provided is “the shelf number of the product display shelf,” and consistently describes the shelf number as the location of the electronic shelf label ID. *Id.*, [0009], [0044], [0062], [0086], [0093]. Fujiwara does not envision updating a planogram after adding or removing an ESL from a shelf.

VIII. CLAIMS 1-20 ARE NOT UNPATENTABLE

86. I have been asked to provide my opinion as to whether any of the claims of the '709 Patent would have been unpatentable. The discussion below provides a

detailed analysis of how the prior art references identified below do not teach the limitations of the claims of the '709 Patent.

87. As part of my analysis, I have considered the scope and content of the prior art used by Petitioners and any differences between the alleged invention and the prior art. I describe in detail below the scope and content of the prior art, as well as any differences between the alleged invention and the prior art, with respect to certain elements for each claim of the '709 Patent. I further explain why a person of skill in the art would not have modified and/or combined the prior art to arrive at the claimed invention.

88. As described in detail below, the alleged invention of the claims would not have been obvious in view of the teachings of the identified prior art references as well as the knowledge of a POSITA. Petitioner asserts the following grounds, which together cover every claim of the '709 Patent:

Ground	Petitioner's Asserted Art
1	Claims 1–5, 10–15, 20: Wu
2	Claims 1–6, 10–16, 20: Wu, Chaves
3	Claims 1–5, 7–15, 17–20: Wu, Itou, Auclair
4	Claims 1–5, 10–15, 20: Wu, Fujiwara

89. In Ground 1, Petitioners rely upon Wu as rendering every limitation in claims 1-5, 10-15, and 20 obvious. In Ground 2, Petitioners then contend that if Wu does not render certain limitations obvious—and specifically the claimed (1) “retail

area,” (2) “acquiring” and “transmitting ... [a] sequence of label identifiers,” and/or (3) “transmitting ... a reference of an article”—Wu combined with Chaves would, as well as claims 6 and 16. In Ground 3, Petitioners similarly contend that the combination of Wu, Itou, and Auclair further renders the same “retail area” and “acquiring” and “transmitting” limitations obvious, as well as claims 7-9, 17, and 19. And finally, in Ground 4, Petitioners again contend that Wu combined with Fujiwara further renders the same “retail area” and “acquiring” and “transmitting” limitations obvious.

90. For the reasons I explain in further detail below, I disagree. But, to summarize, first, I do not agree with Petitioners that the prior art teaches “locations,” as claimed, because the prior art relied upon (Wu) teaches only the relative order of labels on a shelf. Second, I do not agree with Petitioners that the prior art teaches a “planogram,” as claimed, because a database that contains only the relative order of labels on a shelf would not be understood by a POSITA to constitute a “planogram” as it is ordinarily understood. Third, I do not agree with Petitioners that any of the prior art relied upon for Grounds 1-4 disclose a process to install a new shelf label by acquiring and transmitting *a sequence* of label identifiers. Wu, for instance, discloses acquiring just a single label identifier, and even if the secondary references in Grounds 2-4 acquire multiple label identifiers, they do so for entirely different reasons and would not have motivated a POSITA to modify Wu accordingly.

Finally, Petitioners appear to misunderstand what dependent claims 7, 8, 17, and 18 require to measure displacement and distance between labels, pointing to teachings in the prior art that, in my opinion, are irrelevant. For these reasons, it is my opinion for all these reasons that none of the claims are unpatentable.

A. Grounds 1-4: Wu fails to disclose “locations” consistent with the ’709 Patent (all claims)

91. For Ground 1, based on my review of the Petition, I understand that Petitioners rely on Wu for every element of every independent claim. Petition, 10-32 (claim 1), 37-42 (claims 10-11). And Petitioners offer Grounds 2-4 only as additional or alternative support for discrete limitations, to the extent Wu is found not to teach those discrete limitations. Petition, 52-56 (Ground 2 addressing “retail area” (limitation 1[a]); “acquiring ... a sequence of label identifiers,” (limitation 1[c]); “transmitting ... the sequence of label identifiers,” (limitation 1[k]))²; 70-72 (Ground 3 same); 84-87 (Ground 4 same). But when properly construed as discussed in Section VI.A, in my opinion, Wu does not teach “location(s).”

² Petitioners also address “transmit[ting] ... a reference of an article” found in the dependent claims as part of Ground 2 (limitations [4b], 14[b]).

1. Wu does not disclose “locations” because Wu discloses a system for tracking the order of shelf labels.

92. Based on my review, I understand that the independent claims of the '709 Patent (and most of their dependents) call for “location(s).” I have provided a table below showing how the independent claims refer to “locations” throughout:

Independent Claim 1	
[1b]	wherein the planogram comprises association data between articles of the retail area and <i>locations of the retail area</i> , the method comprising:
[1f]	each of the shelf labels being associated with a respective article and being disposed near a respective <i>location associated with the article</i> ,
[1i]	<i>a location of the adjacent shelf label</i> is preliminarily known in the planogram;
[1j]	identifying <i>a location corresponding to the added shelf label</i> in the shelf of the retail area, comprising:
[1n]	<i>locations of the articles</i> , on the basis of an obtained <i>location of the added shelf label</i> , wherein
[1o]	the obtained location is <i>a location in the planogram</i> which is adjacent to the preliminarily known location of the adjacent shelf label.
Independent Claim 10	
[10c]	according to a scrolling direction of <i>the locations of the retail area</i> ,
[10e]	each of the shelf labels being associated with a respective article and being disposed near <i>a respective location associated with the article</i> ,
[10h]	<i>a location of the adjacent shelf label</i> is preliminarily known in the planogram;
[10i]	identifying <i>a location corresponding to the added shelf label</i> in the shelf of the retail area, comprising:
[10m]	the respective <i>locations of the articles</i> , on the basis of an obtained <i>location of the added shelf label</i> , wherein
[10n]	the obtained location is <i>a location in the planogram</i> which is adjacent to the preliminarily known location of the adjacent shelf label.

Independent Claim 11	
[11b]	the planogram comprising association data between articles of a retail area and <i>locations of the retail area</i> , the system comprising:
[11i]	being further configured to update the planogram by determining an obtained <i>location of an added shelf label</i> reflecting an addition of a shelf label of the retail area, wherein
[11j]	the obtained location is <i>a location in the planogram</i> which is immediately adjacent to the known <i>location of the adjacent shelf label</i> ,
[11l]	according to a scrolling direction of <i>the locations of the retail area</i> , wherein
[11n]	<i>a location of the adjacent shelf label</i> is preliminarily known in the planogram, and

The term “location” also appears throughout the dependent claims.

93. In my opinion, however, Wu does not disclose any “locations,” as claimed, because Wu merely discloses a way to track the **order** of labels.

94. Although Wu nominally uses the term “location” when describing its invention, and presents codes that are described as tracking a “location,” Wu actually uses the term “location” in a way that refers only to the **order** of labels on a given shelf. That is because Wu discloses a process to produce only a one-dimensional, unitless, linear order of shelf labels by using simple extrapolation (e.g., using addition or multiplication when a new ESL is being added next to just one existing ESL) or interpolation (e.g., using averaging when a new ESL is being added *between* two existing ESLs) to maintain a database that ultimately only tracks the order of shelf labels when the labels are changed on the shelf.

95. For instance, Wu discloses that, when adding a new shelf label next to an existing label that has a “label location” code of “S01_R1”—with “S01” representing a shelf number, and “R1” representing a numerical index of the order of labels—the new label can be provided a “label location” code of “S01R2” by simply adding “1” to the existing label code’s numerical index. Ex-1003, 5:3-11. And when adding a new shelf label *between* two existing shelf labels (e.g., with “label location” codes R1 and R2, respectively), Wu uses simple averaging to assign the new label a code (e.g., R1.5, or $\frac{R1+R2}{2}$) *between* the existing ones. Therefore, this mathematical process creates new “label location” codes using a one-dimensional, unit-agnostic progression that serves no purpose other than to maintain a system with the correct **order** of labels as shown in my annotated version of Fig. 5C, below:

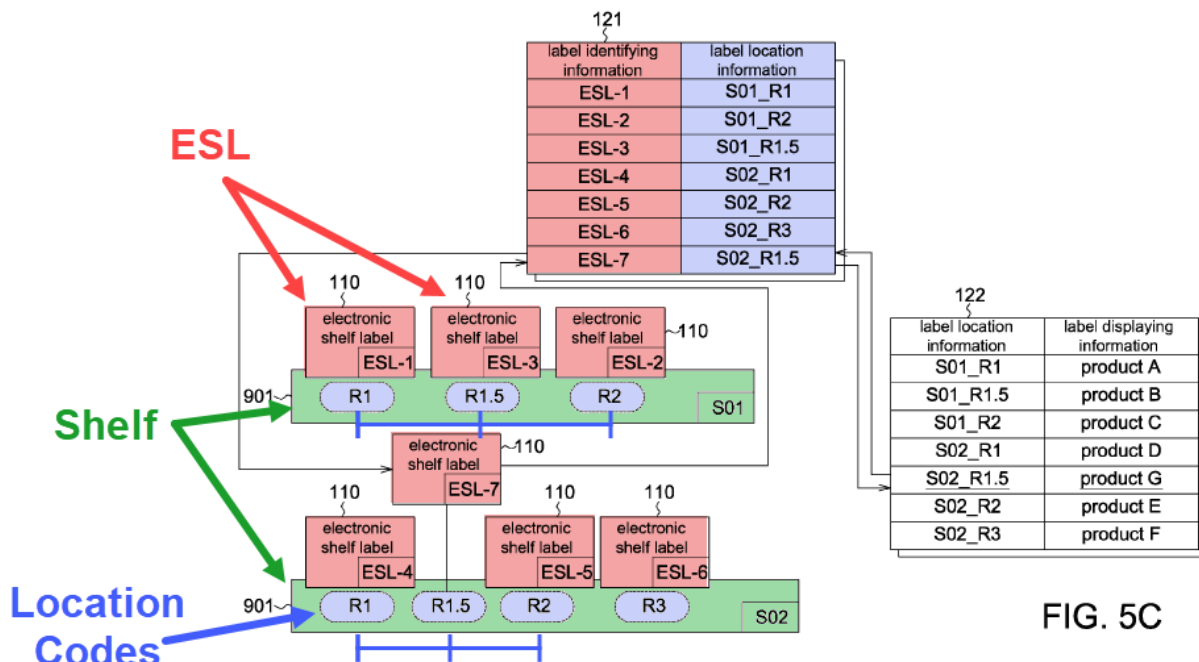


FIG. 5C

Ex-1003, Fig. 5C (annotated)

96. However, Wu does not disclose any use of these “label location” codes to define a “location,” as properly construed. Wu’s shelf codes (“S01,” “S02”), for instance, do not provide any information about the location *of the shelf* in the retail area (e.g., where the shelf is located, or how high off the ground the shelf is). And the relative positional codes (“R1,” “R1.5,” “R2”) do not represent the location of a label by any unit of measure, because the same codes “R1,” “R1.5,” and “R2” represent different distances on different shelves, as shown in the annotated length lines above (in blue). That is because Wu’s “label location” codes do not provide a representation of a location in units that allow distance from a point of reference in the retail area to be determined, consistent with how the ’709 Patent uses the term “location” as I explained in the claim construction section above. Ex-1001, 2:6-9 (explaining a “planogram” has “association data among articles of a retail area and locations of said retail area,” and “determines which products must be at which height, on which shelves and over how many meters.”); 8:40-50 (explaining how planograms use a coordinate system for locations that can be used to produce a “cadastre”-type map of the retail area); Section VI.A.

97. I understand, however, that during the deposition of Dr. Tentzeris, Dr. Tentzeris took the position that Wu’s use of the terms “extrapolation” and “interpolation” would have conveyed to a POSITA that not only did Wu envision

complex operations to determine location codes, such as using linear-slope functions and “cubic spline,” but that “extrapolation” and “interpolation” would have also required an evaluation of position and distances between labels. *See, e.g.*, Ex-2026, 10:4-14:19, 17:5-19:4 (“Extrapolation requires known point, requires known position, and also requires directionality.”), 23:9-26:24 (noting use of distance). Although I agree that the terms “extrapolate” and “interpolate” are broad enough to encompass both simple examples such as those described in Wu, as well as more-complex functions, I disagree that these terms—alone or as used in Wu—also convey (let alone requires) a notion of units, position, or distance, because that is inconsistent with the plain meaning of these terms and nowhere suggested in Wu.

98. In my opinion, Wu uses the terms “extrapolate” and “interpolate” consistent with their far more general understanding: extrapolate is generally understood to mean **projecting** based on known values, and interpolation is generally understood to mean calculating values **between** known values. *See, e.g.*, Ex-2016, 444 (defining “extrapolate” to mean “to infer...from values within an already observed interval” or to “project, extend, or expand (known data or experience) into an area not known....”), 654 (defining “interpolate” to mean “to insert between other things or parts” or “to estimate values of (data or a function) between two known values”). Wu’s exemplary processes to extrapolate and interpolate “label location” codes is consistent with these more general meanings of these terms.

99. What Wu fails to disclose—and what Dr. Tentzeris suggests is required by Wu’s use of the words “extrapolate” and “interpolate”—however, is a unit measure of distance: that a POSITA reading Wu would understand that to “extrapolate” or “interpolate” must be able to determine location codes that are based on a shelf’s location (in units) and/or reflect distances from or between adjacent labels. *See, e.g.*, Ex-2026, 17:5-19:4 (“Extrapolation requires known point, requires known position, and also requires directionality.”), 23:9-26:24’ *see also* Ex-1009 ¶245 (“a POSITA would understand that [Wu’s] interpolation method necessarily involves measurements ... of relative distances between the labels.”). But having a known value does not *require* the value be one of units, position, or distance. And Wu does not suggest otherwise. Wu describes only unitless “location codes” such as R0.5, R1, R1.5 that, as I explained previously, are nothing more than an arbitrary number that represents the relative *order* of the shelf labels untethered to any unit of measure. Nor does Wu ever suggest tying these location codes to any particular unit (such as distance), or that the location codes should reflect a distance between labels. Moreover, a POSITA would have understood that if one were to begin with a unitless value (e.g., R1, R2, etc.), then any extrapolation or interpolation of other values would *also* be unitless (e.g., R0.5, R1.5), because the processes of extrapolation and interpolation do not impart units that do not exist in the original values themselves. To the extent Dr. Tentzeris is contending that it would be obvious to modify Wu to

incorporate units of measure and/or distance, he identifies no evidence and provides no reasoning supporting such a modification of Wu.

100. Thus, a “location” of the ’709 Patent must provide more detail than Wu’s simple ordering of labels. A location must provide units that allow distance to be determined from a reference point so that the actual location of a label and/or article can be determined in a retail area, which Wu does not disclose.

2. Petitioners do not rely upon the prior art in Grounds 2-4 to cure the deficiencies in Wu’s disclosure of “location”

101. Based on my review, although I understand that Petitioners present three additional grounds to fill in gaps in Wu’s disclosure, these additional prior-art references do not disclose “locations” consistent with the ’709 Patent, let alone identify any motivation to modify Wu to create a dataset of “locations” as opposed to an order of labels. *See* Petition, 52-56 (Ground 2 relying on Chaves to teach “retail area” (limitation 1[a]); “acquiring ... a sequence of label identifiers,” (limitation 1[c]); “transmitting ... the sequence of label identifiers,” (limitation 1[k])) ; 70-72 (Ground 3 relying on Auclair and Itou to teach same); 84-87 (Ground 4 relying on Fujiwara to teach same).

102. For these reasons, in my opinion, Grounds 2-4 do not rectify the deficiencies in Wu’s teachings regarding the claimed “locations” But even if they did in theory, Petitioners do not explain how Wu would be modified to incorporate those teachings.

B. Grounds 1-4: Wu fails to disclose the claimed “planogram” of a retail area (all claims).

103. The ’709 Patent also uses the term “planogram” throughout the claims, which I have identified below:

Independent Claim 1	
[1a]	A method for updating <i>a planogram</i> registered in a computer system, to reflect an addition of a shelf label in a shelf of a retail area,
[1b]	wherein <i>the planogram</i> comprises association data between articles of the retail area and locations of the retail area, the method comprising:
[1i]	a location of the adjacent shelf label is preliminarily known in <i>the planogram</i> ;
[1l]	updating, by the computer system, <i>the planogram</i> on the basis of the sequence of label identifiers, by determining:
[1o]	the obtained location is a location in <i>the planogram</i> which is adjacent to the preliminarily known location of the adjacent shelf label.
Dependent Claim 8	
[8c]	wherein the identifying further comprises obtaining the location of the added shelf label, by the computer system, and using the distance to update <i>the planogram</i> .
Independent Claim 10	
[10a]	A non-transitory computer program product comprising program code instructions for updating <i>a planogram</i> registered in a computer system to reflect an addition of a shelf label in a shelf of a retail area, comprising:
[10h]	a location of the adjacent shelf label is preliminarily known in <i>the planogram</i> ;
[10k]	updating, by the computer system, <i>the planogram</i> on the basis of the sequence of label identifiers, by determining:
[10n]	the obtained location is a location in <i>the planogram</i> which is adjacent to the preliminarily known location of the adjacent shelf label.
Independent Claim 11	
[11a]	A system for managing <i>a planogram</i> ,

[11b]	<i>the planogram</i> comprising association data between articles of a retail area and locations of the retail area, the system comprising:
[11g]	a computer system in which <i>the planogram</i> is registered,
[11i]	being further configured to update <i>the planogram</i> by determining an obtained location of an added shelf label reflecting an addition of a shelf label of the retail area, wherein
[11j]	the obtained location is a location in <i>the planogram</i> which is immediately adjacent to the known location of the adjacent shelf label,
[11n]	a location of the adjacent shelf label is preliminarily known in <i>the planogram</i> , and
Dependent Claim 20	
[20b]	the computer system is further configured to: update <i>the planogram</i> on the basis of the sequence of label identifiers, by determining: articles associated with the labels of the sequence of label identifiers, and locations of the articles, on the basis of the obtained location of the added shelf label.

104. In my opinion, not only does Wu not disclose “locations” consistent with the ’709 Patent, but, for the reasons I explain in further detail below, Wu also does not disclose a “planogram” as the term would typically be understood by those in the art.

1. Wu does not disclose a “planogram ” because Wu’s system for tracking the order of shelf labels is insufficient to constitute, and serves none of the purposes of, a planogram.

105. I understand that Petitioners contend that Wu’s “label content table 122” teaches the claimed planogram. Petition, 12 (identifying Wu’s table 122 in Fig. 5C, contending “[t]his table is the claimed planogram.”); Reply, 9 (“Wu’s label location table fits th[e] definition [of planogram] – comprising association data

between products and locations.”). In my opinion, Wu’s “label content table 122” does **not** constitute a planogram as the term is ordinarily understood.

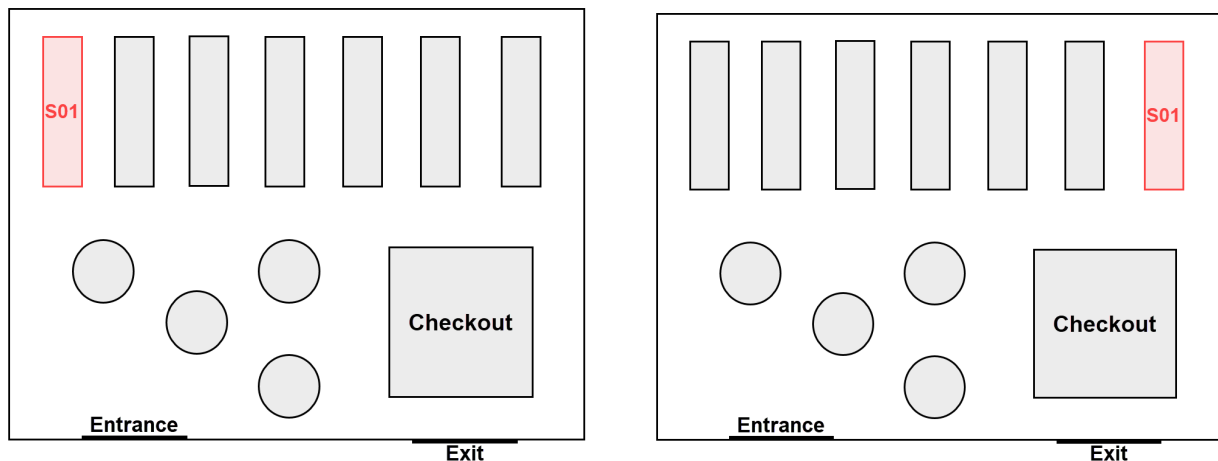
106. Specifically, I have reproduced Wu’s “label content table 122” below:

122
}

label location information	label displaying information
S01_R1	product A
S01_R1.5	product B
S01_R2	product C
S02_R1	product D
S02_R1.5	product G
S02_R2	product E
S02_R3	product F

Ex-1003, Fig. 5C. This table includes just two pieces of information: (1) label displaying information with an identification of the product; and (2) label location information made up of “label location” codes. *Id.*, Fig. 5C. But, as I explained above, in my opinion, the “label location” codes (e.g., “S01_R1,” “S01_R1.5,” etc.) do not provide any tangible unit of measure, but instead merely represent an ordering of labels and products on a shelf tied to an arbitrary starting point. *See* Section VIII.A.1. By that, I mean that Wu discloses a location code is either first manually entered using an arbitrary initial code (e.g., R1), and then subsequent codes on the same shelf are “extrapolated” or “interpolated” using that initial code in a way that only preserves the order of the codes, but does not provide any additional location or planographic information about the products. *See id.*

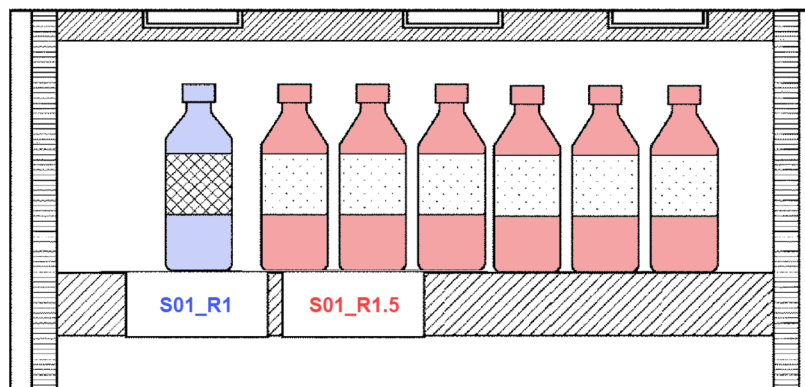
107. In my opinion, having just the relative order of labels and products on a given shelf cannot constitute a “planogram.” For instance, having just the relative order of products on a given shelf does not provide any information as to how products are grouped together, or where products are located in the retail area. Shelf codes (e.g., “S01,” “S02,” etc.) in Wu’s “label content table 122,” for instance, may sit anywhere in the retail area because Wu does not provide any positional information about the shelves themselves. I have created an example image showing how shelf “S01” can be anywhere in the retail area:

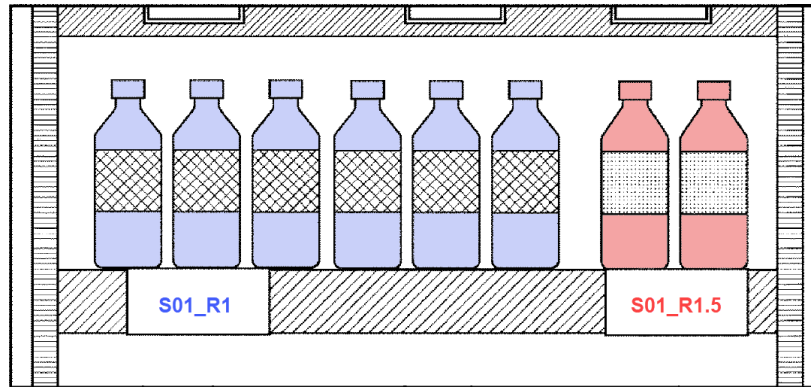


Relatedly, Wu’s shelf codes do not even say how different shelves relate to one another. For instance, are shelves S01 and S02 located on the same shelf segment, but at different heights? Or are they in different shelf segments in different parts of the retail store? Or, even if they are in the same shelf segment, how high does each shelf sit (because one consideration provided by planograms is the ability to plan the placement of high-interest products at eye level or within arm’s length)? Because

Wu discloses only numerically incrementing, arbitrary shelf codes without specifying a location of those shelves in the retail store or relative to one another that would typically be expected of a planogram, in my opinion, as POSITA would not understand Wu's "label content table 122" to constitute a planogram.

108. In my opinion, Wu's positional codes (e.g., "R1," "R1.5," "R2," etc.) also do not provide information sufficient to render the "label content table 122" a planogram. As I again explained above, these positional codes reflect only the relative order of labels and products on a given shelf. *See* Section VIII.A.1. They do not, for instance, indicate *where* a given product or label is on the shelf, or the amount of shelf space the product is provided. But, in my opinion these are fundamental aspects of a planogram. Yet, when using Wu's positional codes "R1" and "R1.5," these codes may just be millimeters apart from each other, or on opposite ends of a shelf. I have heavily modified Itou's Figure 10 for demonstration purposes only to depict how Wu's "label location" codes can reflect any number of positions on a shelf with any number of products associated with each label:





Ex-1004, Fig. 10 (modified and annotated)

Because Wu discloses position codes that only preserve the order of the labels and products on a shelf, but do not provide information generally required of a planogram, such as where each product is located on the shelf and how much shelf space each product is given, for this reason as well, I do not consider Wu's "label content table 122" to constitute a "planogram" as claimed.

109. Although I understand that Petitioners and Dr. Tentzeris contend the "label content table 122" *is* a planogram, I have not seen any evidence or support for this position. Instead, Dr. Tentzeris appears to just cite the disputed portion of the specification to conclude that it is. See Ex-1009, ¶64 (stating only that Wu's "table is the claimed planogram. See Ex-1001, [2:6-7] (defining a planogram as 'a set of association data among articles of retail area and locations of said retail area'")). This does not show either how the plain meaning of "planogram" would be understood by a POSITA to encompass data tables that provide only an order of

labels such as Wu, or that the inventors of the '709 Patent somehow redefined the term different from its ordinary understanding.

2. Petitioners do not rely upon the prior art in Grounds 2-4 to cure the deficiencies in Wu's disclosure of "planogram"

110. As with the "location" limitations, Petitioners do not rely upon any of the additional prior art identified in Grounds 2-4 to teach the claimed "planogram," or provide any motivation to modify Wu's "label content table 122" to include sufficient information to constitute a "planogram." *See* Section VIII.A.2. For these reasons, in my opinion, Grounds 2-4 do not rectify the deficiencies in Wu's teachings regarding the claimed "planogram." But even if they did in theory, Petitioners do not explain how Wu would be modified to incorporate those teachings.

C. Grounds 1-4: Petitioners do not show that Wu combined with any other art teaches or suggests "acquiring, by a reading device, a sequence of label identifiers" or "transmitting, by the reading device, the sequence of label identifiers" (all claims)

1. Ground 1: Wu does not disclose acquiring or transmitting more than one label identifier as required by all claims

111. In my opinion, Petitioners cannot demonstrate that any of the claims are unpatentable because each of the independent claims requires a "reading device" that acquires and transmits a "**sequence** of label identifiers" when adding a new shelf label adjacent an existing, already-installed label, and Petitioners do not identify any art that acquires and transmits such a sequence.

112. I have provided a table below showing how independent claims 1, 10, and 11 each require acquiring and transmitting a “**sequence of label identifiers**,” including a label identifier of both “an added [(new)] shelf label” *and* “an adjacent [(existing)] shelf label”:

Independent Claim 1	
Limitation [1c]	acquiring, by a reading device, <i>a sequence of label identifiers comprising a label identifier of an added shelf label</i> reflecting an addition of the shelf label in the shelf of the retail area, <i>and also comprising a label identifier of an adjacent shelf label</i> which is adjacent to the added shelf label
Limitation 1[k]	transmitting, by the reading device, <i>the sequence of label identifiers</i> to the computer system,
Independent Claim 10	
Limitation [10b]	acquiring, by a reading device, <i>a sequence of label identifiers comprising a label identifier of an added shelf label</i> reflecting an addition of the shelf label in the shelf of the retail area, <i>and also comprising a label identifier of an adjacent shelf label</i> which is adjacent to the added shelf label
Limitation [10j]	transmitting, by the reading device, <i>the sequence of label identifiers</i> to the computer system,
Independent Claim 11	
Limitation [11e]	a reading device adapted to acquire <i>the label identifiers of the plurality of electronic shelf labels</i> and
Limitation [11h]	the computer system being configured to receive, from the reading device, a transmitted <i>sequence of label identifiers</i> , and
Limitation [11k]	the reading device being configured to: acquire <i>a sequence of label identifiers comprising the label identifier of the added shelf label, and further comprising the label identifier of an adjacent shelf label</i> which is adjacent to the added shelf label
Limitation [11o]	transmit <i>the sequence of label identifiers</i> to the computer system.

113. The '709 Patent explains how a “label identifier” is used to identify each ESL, which I understand refers specifically the *hardware* of the ESL itself. For instance, the specification explains that each ESL “is identified by a unique label identifier of its own” and that the “label identifier therefore identifies unequivocally a single ESL only, of the retail area.” Ex-1001, 4:49-53; *id.*, 2:50-51. In other words, a POSITA would have understood that the '709 Patent is characterizing the “label identifier” as if it were a unique serial number for each ESL. This is akin to a “MAC address” which is a unique code that is associated with only one piece of network hardware and used to direct network communications only to that hardware.³ Ex-2025, 17. By knowing the “label identifier,” then, a POSITA would have understood that one would be able to identify the exact ESL to which that identifier is associated.

114. The '709 Patent also explains that the label identifier is different from other relevant information about the ESL, such as its location on a particular shelf. *See, e.g.*, Ex-1001, 5:21-25 (“The memory ... stores data relative to the association

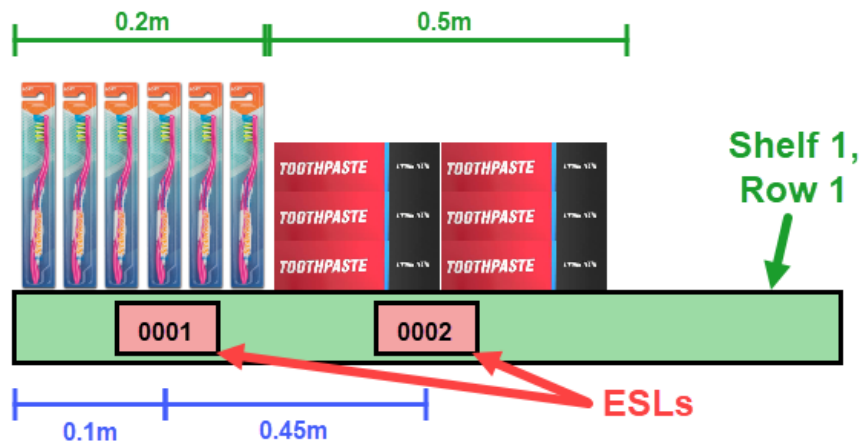
³ Although MAC addresses are *globally* unique, meaning only one piece of hardware in the world has that address, I do not mean to suggest each ESL would have a globally unique serial number. Instead, a POSITA would understand that different retail stores may use the same “label identifiers,” but each ESL in any given retail store has its own unique identifier.

between the label identifier and a location.”), 5:25-27 (“[B]y way of the label identifier, the location of the ESL identified by said identifier and the article to which it refers can be found.”), 7:9-17 (explaining how the reading device transmits “the sequence of label identifiers” and “relative positioning” of the shelf labels), 8:25-30 (“By way of the sequence of label identifiers, the computer system determines the location of the added ESL 10.”). The ’709 Patent also describes using the “label identifier” to associate other types of relevant information, including not only the location, but also specifications (dimensions, shelf space, etc.) about the article or product associated with that ESL to improve the representation of a digital planogram to match the actual arrangement of products on a shelf. *Id.*, cl. [11]-[1o] (claiming updating a planogram using label identifiers by determining “articles associated with the labels ... and, locations of the articles.”) (emphasis added), cl. [10k]-[10n], 2:10-27 (describing the need for updating a theoretical planogram to reflect the actual arrangement of products on a shelf), 9:6-17 (noting how “characteristics of the articles” impacts location information to “further improve[] the representativeness and performance of the planogram.”).

115. Specifically, the ’709 Patent explains that the system may use the label identifiers, combined with information about their location on the shelf and product-specific information (such as how much space each product is afforded on the shelf) to create a “planogram” of the store with increased accuracy. *See id.*, 2:3-9, 8:40-50.

In other words, there are multiple different *categories* of information that are each attributed to a “label identifier.” I have provided an example of the different types of categories that may be associated with a “label identifier” consistent with the ’709 Patent below, as well as an image depicting how that information is reflected in reality:

Label Identifier	Position	Article	Package Dimensions	Shelf Space
0001	Shelf 1, Row 1 Ref. Distance: 0.1 m	Toothbrushes	Length: 0.01m Width: 0.02m Height: 0.20m	0.2 m
0002	Shelf 1, Row 1 Ref. Distance: 0.45 m	Toothpaste	Length: 0.2m Width: 0.05m Height: 0.05m	0.5 m



This example is not intended to suggest, however, that this is the only information needed to build an accurate planogram.

116. The '709 Patent then explains that when a new ESL is intended to be added to a shelf with existing ESLs, an “operator” uses a reader device to acquire specific information to ensure the labels and their associated articles are properly tracked in a planogram. Specifically, the '709 Patent states that the operator uses the reader device “to acquire (step S1) a label identifier of an ESL 11 or 12 adjacent to the location of the added ESL 10,” so that “[t]his adjacent ESL becomes the reference label” to establish the location of a different “added ESL.” Ex-1001, 6:25–34. Then, the operator “points out an indication of relative positioning” of the two labels before the operator then “uses the reading device 3 to acquire the label identifier of the added ESL 10.” *Id.*, 6:35–64. The reading device then transmits the identifiers of at least the “adjacent” (existing) and “added” (new) ESLs, along with “the indication of relative positioning” to create a new entry for the added ESL. *Id.*, 7:9–17. The '709 Patent therefore requires *at least two* “label identifiers” to record the location of a new label when added to a shelf with existing labels—the new “added label” and existing “adjacent label.” These exact requirements are reflected in the claim limitations I identified above.

117. In my opinion, none of the identified prior art, alone or in combination, teaches or suggests acquiring and transmitting through a “reading device” a *sequence* of label identifiers, as required by each of the independent claims of the '709 Patent.

118. I understand that Petitioners first rely on Wu as teaching or suggesting limitation [1c] (“acquiring, by a reading device, a sequence of label identifiers”), and then refers back to this same analysis for limitations [10b] and [11k] in the other independent claims.

119. Wu teaches that when a new shelf label is to be installed alongside an existing shelf label, a reader device is used to acquire “the label identifying information of the electronic shelf label 110 *to be installed*,” which I understand Petitioners contend corresponds to the claimed “added shelf label.” Petition, 14-15 (citing Ex-1003, 3:59-61, Fig. 2) (emphasis added).

label identifying information	label location information
ESL-1	S01_R1
ESL-2	S01_R2

Ex-1003, Fig. 3B. To provide an example of Wu’s teachings, when installing a new shelf label (e.g., “ESL-2”) next to an existing shelf label (e.g., “ESL-1”), Wu’s reader first acquires the “label identifying information” (e.g., “ESL-2”) from that label. *See, e.g., id.*, 3:59-61, Fig. 2.

120. From my review, however, Wu does not disclose that the reader acquires a label identifier of an adjacent, already installed shelf label, as claim limitations [1c], 10[b], and 11[k] also require. Instead, Wu acquires location information of an already installed shelf label (e.g., Wu’s “label location” codes),

which is not the same as acquiring its unique label identifier. This is distinguishable from the '709 Patent, which specifies that the label location code and its label identifier are distinct pieces of information. Ex-1001, 2:50-51, 4:49-53, 5:21-27, 7:9-17, 8:25-30, 9:28-32.

121. I see that Petitioners contend that a “POSITA would understand that, without acquiring this second identifier in the sequence...the reading device could not possibly ‘create the relationship between the label identifying information and the label location information.’” Petition, 16 (quoting Wu, 4:26-28, cleaned up). I disagree for several reasons.

122. First, if Petitioners are contending that “this second identifier” refers to Wu’s “label location” codes, neither Petitioners nor Dr. Tentzeris explain how Wu’s “label location” codes constitute “label identifier[s]” as claimed. As noted, they are not the same. Wu, for instance, describes its label identifiers and “label location” codes as distinct pieces of information. See, e.g., Ex-1003, 3:16-31, Figs. 1, 3A-D, 5A-E. I see no evidence that Wu’s “label location” codes are unique to each shelf label as the '709 Patent specifies. See Ex-1001, 2:50-51, 4:49-53, 9:28-32. Nor do I see any see any explanation of why Wu aligns with the '709 Patent’s use of the term “label identifier” as being distinct from the label’s location. *See id.*, 5:21-25, 5:25-27, 7:9-17, 8:25-30. Indeed, if the “label location” codes were unique to each of Wu’s shelf labels, or the “label location” codes and label identifier could be

considered one-and-the-same, then there would be no need for Wu's separate label identifiers (e.g., "ESL-1" and "ESL-2").

123. If instead Petitioners are implicitly contending that "this second identifier" refers not to Wu's "label location" codes, but Wu's label identifiers, and that Wu must inherently acquire a label identifier in addition to a "label location" code for an existing shelf label, then this is also incorrect. Wu suggests that only the "label location" codes of an existing shelf label is acquired, and discloses nothing regarding acquiring a label identifier of the existing shelf label. *See, e.g.,* Ex-1003, 4:9-25, Fig. 2 (S103-105).

124. After acquiring the "label identifying information" of the *new* label, Wu explains how the "label location information" of the adjacent, already-installed label(s) is used to extrapolate or interpolate "**label location information**" to associate with the new label's identifying information. *See, e.g.,* Ex-1003, 4:53-5:11 ("the shelf code of the electronic shelf label 110 to be installed can be set as [the same as the shelf code of an existing shelf label and] ... [t]he location code ... can be obtained by performing a mathematical extrapolation, such as addition or multiplication on the electronic shelf label 110 which is already installed, such as the location codes are incremented[.]"), Figs. 3A-D.

125. For instance, if an **existing** shelf label with an identifier of "ESL-1" has "label location" code of "**S01_R1**" (e.g., shelf 1, order 1), Wu obtains the "label

location” code, extrapolates a new “label location” code for the new label by adding “1” to “R1” to produce “R2,” and then associates this *new* “label location” code with the *new* identifier. Ex-1003, 5:1-5. I have provided an exemplary mapping of Wu’s process, as depicted in Wu’s Figure 2, to this example below:

Step No.	Action	Acquisitions/ Transmissions						
	Start	<table><tr><td>label identifying information</td><td>label location information</td></tr><tr><td>ESL-1</td><td>S01_R1</td></tr><tr><td></td><td></td></tr></table>	label identifying information	label location information	ESL-1	S01_R1		
label identifying information	label location information							
ESL-1	S01_R1							
S101	Obtain the label identifying information of the [ESL] to be installed.	<i>Acquire “ESL-2” from new label</i>						
S102	Which case the [ESL] to be used under? (another electronic shelf label is already disposed at one side of the [ESL] to be installed).	<i>(Adding new label next to one existing label)</i>						
S104	Obtain the location code by performing a mathematical extrapolation of the electronic shelf label which is already installed.	<table><tr><td>label identifying information</td><td>label location information</td></tr><tr><td>ESL-1</td><td>S01_R1</td></tr><tr><td></td><td></td></tr></table> <i>Acquire “S01_R1” from existing label</i> <i>Extrapolate new label location information “S01_R2” from “S01_R1”</i>	label identifying information	label location information	ESL-1	S01_R1		
label identifying information	label location information							
ESL-1	S01_R1							
S106	Create the relationship between the label identifying information and the label location information	<i>Associate S01_R2 to ESL-2.</i>						

S107	Change the label location table according to the relationship between the label identifying information and the label location information.	label identifying information	label location information
		ESL-1	S01_R1
		ESL-2	S01_R2
S108	Another new [ESL] is needed to be installed? (No)		
	End		

As this example shows, Wu never teaches or suggests acquiring identifier information for an existing shelf label. In Wu, identifier information for an existing shelf label is already known and mapped to its “label location” code in the label location table. Ex-1003, Fig. 5C (121), 3:16-31. Label identifier information need not be acquired and transmitted by a reader device during Wu’s process, because Wu’s controlling device (e.g., network server) can retrieve that information from the label location table on the basis of the acquired label location information. *Id.*; *see also id.*, 2:64-67. As such, Wu’s method does not need, let alone inherently disclose, acquiring a label identifier in addition to a “label location” code for an existing shelf label.

126. Nor could Wu’s “label location” code itself satisfy the “label identifier” limitation. Petitioners have not shown that Wu’s “label location” codes are unique to each shelf label, as the ’709 Patent specifies a label identifier must be. *See* Ex-1001, 2:50-51, 4:49-53, 9:28-32. From my review, Petitioners have not reconciled the fact that the ’709 Patent uses the term “label identifier” as being *distinct* from

the label's location. *See id.*, 5:21-25, 5:25-27, 7:9-17, 8:25-30. Wu itself describes label identifiers and "label location" codes as distinct pieces of information. *See, e.g.*, Ex-1003, 3:16-31, Figs. 1, 3A-D, 5A-E. And, if Wu's "label location" codes were unique to each of Wu's shelf labels, or the "label location" codes and label identifier could be considered one-and-the-same, then there would be no need for Wu's separate label identifiers (e.g., "ESL-1" and "ESL-2").

127. For this reason, in my opinion, Wu does not disclose either acquiring or transmitting **multiple** label identifiers, as claimed.

2. Grounds 2–4

128. In my opinion, the additional prior art cited in Grounds 2-4 do not disclose or suggest acquiring and transmitting a sequence of label identifiers either. The additional prior art cited in Grounds 2-4 also would not motivate a POSITA to modify Wu to acquire/transmit such a sequence when registering a new shelf label.

a) Ground 2: Wu combined with Chaves

129. I understand Petitioners and Dr. Tentzeris contend that Wu combined with Chaves disclose acquiring/transmitting a sequence of label identifiers. Petition, 53-56. I disagree.

130. In my opinion, Petitioners and Dr. Tentzeris do not identify any portion of Chaves that discloses acquiring label identifiers. Instead, the portions Petitioners and Dr. Tentzeris rely upon disclose using wireless RFID tags that are placed on

products—not labels—to acquire “location data” about the products, which Chaves states may include information “such as an item identifier 124 ..., a location 126 ..., and a timestamp 128.” Ex-1006, [0037]-[0038]; *see also id.*, [0023]-[0024] (noting the RFID reader can determine inventory levels or misplaced products based on the information it acquires). Chaves depicts this “location data” throughout Figures 1 and 2:

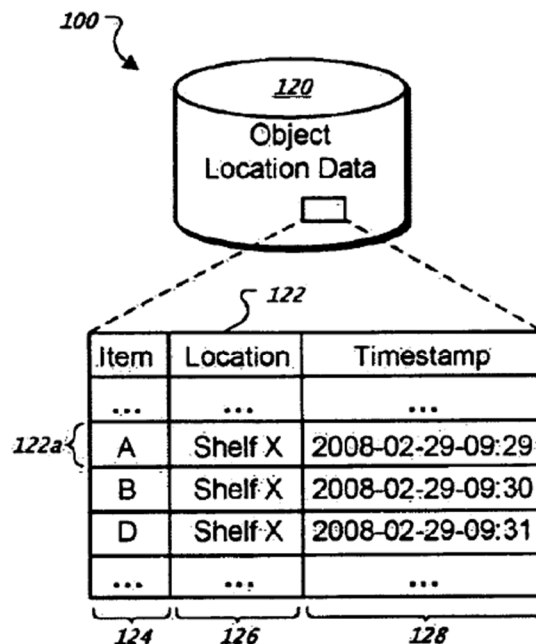


FIG. 1B

131. In my opinion, none of the “location data” disclosed by Chaves constitutes a “label identifier.” First, as stated, Chaves does not appear to use the RFID tags as shelf labels, but rather as product labels. Ex-1006, [0023]-[0024]. Second, none of the “location data” Chaves discloses serves as an identifier of the specific wireless RFID beacon. For instance, Chaves repeatedly describes how the

“item” information refers to *products* on the shelves, and not the identifier of the RFID beacon. *See, e.g., id.*, [0003] (“According to one general implementation, an RFID device is adjusted **to selectively query those items known to be within range of the device**... for example, to determine **which items or products** are expected at a given location.”), [0006] (“The indicia may further include *a quantity of the items* that response to the low-level query, or a unique identifier **of each of the items** that responds to the low-level query.”), [0020] (“RFID data **of item-level tagged goods** within a retail environment ... may be registered and read.”), [0024] (“For example, while in the pet-related aisles of the store, the RFID reader may scan for **items** that are not pet-related.”).

132. In my opinion, Chaves’s wireless RFID beacons are configured to broadcast, and Chaves’s RFID reader is configured to acquire **item, location, or timestamp** codes, among others, but there is no indication these systems are configured to broadcast and acquire, respectively, an identifier of the RFID beacon itself. In my opinion, this distinction is critical, because acquiring an item identifier alone may result in indicating multiple locations of a product (e.g., if a product is at one location on a store shelf, but then also placed in a special sale section at the end of a different aisle), as opposed to identifying the specific RFID beacon from which the item identifier is acquired. *See, e.g., Ex-1006*, [0039] (“multiple entries 122 may exist for the same item 124, such as candy bars that may be located at checkout

shelves in addition to the candy aisle.”). And acquiring location data alone simply represents the general position of the reader relative to the product.

133. Moreover, when Chaves acquires multiple “location data”-related information, it is simply because the RFID reading device picks up multiple broadcasts as it moves through the store aisles, or in response to specific queries from the reader, such as “find all products in range with a low-level indicator” or “find all pet-related products in range.” *See id.*, [0023]-[0024]. Chaves does not envision using multiple identifiers of the RFID tags to install additional RFID tags nearby.

134. In my opinion, therefore, Chaves’s use of RFID tags is for a fundamentally different purpose than Wu: to track the locations of specific products on an item-level basis (e.g., whether a given pet supply is in low stock on the shelf based on how many RFID tags are broadcasting in the area, or misplaced in the wrong shelf). Chaves does not use the RFID tags in any way to install new RFID tags nearby. For this reason, in my opinion, a POSITA would *not* have been motivated to modify Wu based on Chaves to acquire a sequence of *label* identifiers when installing a new label next to an existing label on the shelf.

135. I also disagree with Dr. Tentzeris’s proffered motivation to combine Wu and Chaves because it rests on a flawed premise. Specifically, Dr. Tentzeris wrongly assumes that “Wu already discloses acquiring, by a reading device, label

identifiers of a label to be added **as well as of at least one adjacent label.**” Ex-1009, ¶227. But for the reasons I discussed above, Wu does not teach this; Wu teaches acquiring a **single** label identifier from a new label and a “label location” code from an existing label. *See* Section VIII.C.1. Dr. Tentzeris wrongly assumes that “Chaves expressly discloses acquiring, by a reading device, **a sequence of label identifiers,**” Ex-1009, ¶227, because, again, Chaves only discloses receiving item or location codes from an RFID tag, not an identifier of the RFID tag itself. For these reasons, I also disagree with Dr. Tentzeris that “a POSITA would recognize that the labels/tags, reading devices, label identifiers, and computer systems of Wu and Chaves perform analogous functions and serve analogous purposes,” because as I explained above, they do not perform analogous functions or serve analogous purposes.

136. Because Dr. Tentzeris does not explain why a POSITA would have been motivated to take Chaves’s distinguishable teachings and modify Wu to arrive at the claims, I also cannot agree with his more generic motivations, such as achieving “simplified and streamlined communications” that are “more efficient and error resistant,” because Wu and Chaves do not teach or suggest acquiring a sequence of label identifiers during an ESL-installation procedure in the first instance.

137. I also do not agree with Dr. Tentzeris that modifying Wu to acquire and transmit a sequence of label identifiers would have been “obvious to try.” I understand that an “obvious to try” argument requires identifying a design need or market pressure to solve a problem with a finite number of predictable solutions. Dr. Tentzeris, however, does not identify any design need or market pressure, let alone that there were a finite number of predictable solutions to try upon combining Wu and Chaves. In fact, in my opinion, a POSITA would not know where to begin in modifying Wu in view of Chaves, or for what reason, because they are directed to fundamentally different issues. Wu already provided a complete process for tracking the order of labels—by extrapolating or interpolating “label location” codes using existing codes. I disagree that a POSITA would simply “try” to acquire a sequence of label identifiers when installing a new label next to an existing label in view of Chaves.

138. For these reasons, I do not agree that Wu combined with Chaves renders the claimed acquiring and transmitting limitations obvious.

b) Ground 3: Wu combined with Itou and Auclair

139. I understand Petitioners and their expert contend that Wu combined with Itou⁴ disclose acquiring/transmitting a sequence of label identifiers. Petition, 70-72. I disagree.

140. Although Itou discloses acquiring multiple label identifiers related to shelf labels, Itou acquires these label identifiers for a fundamentally different purpose than Wu. Specifically, Wu discloses a set of procedures to register the location of an electronic shelf label by acquiring a single label identifier and a “label location” code associated with an existing shelf label. *See, e.g.*, Ex-1003, 3:43-4:37, 4:53-5:11. Itou, however, is concerned only with ensuring products placed on a store shelf match the associated label. Ex-1004, Abstract (disclosing a system to determine whether or not products and their shelf labels match). Specifically, Itou explains how a user can take a picture of a shelf, and, using image processing software, determine the products closest to a given label as well as the label identifiers to perform a check to see whether the two match, and then correct the label if they do not match. *See, e.g.*, Ex-1004, [0007]-[0009], [0044]-[0049], Fig. 2.

⁴ Although Auclair appears in Ground 3 as part of the combination, Petitioners and their expert do not appear to rely on Auclair to teach the “acquiring” and “transmitting” limitations.

In my opinion, the only reason Itou may acquire multiple label identifiers is if the picture happens to include multiple label identifiers, in which case Itou explains that “the determination [of whether the product matches the label] is automatically performed for each of a plurality of pieces of relation information” to avoid having to check each product and label “one by one.” Ex-1004, [0049].

141. Furthermore, Itou does not acquire *and* transmit a sequence of label identifiers. Instead, Itou merely discloses that an “information processing apparatus” acquires a picture itself or using an external device (e.g., a camera), and performs image processing on a single device to not only extract the shelf label IDs, but also check to see if the products match their nearest labels. Ex-1004, [0043]-[0046], [0055]. Accordingly, because all processes—including acquiring the label identifiers through image processing and seeing if the products match the labels—are happening on a single device, Itou has no need to then transmit those identifiers.

142. In my opinion, a POSITA would not have been motivated to modify Wu’s process of determining a location code for a new shelf label based on Itou because they are concerned with fundamentally different problems. Specifically, Itou discloses acquiring multiple label identifiers simply for efficiency in checking whether each product on a store shelf matches its label. Itou does not envision using a sequence of label identifiers to determine the location of a new shelf label to be installed relative to an existing shelf label.

143. I also disagree with Dr. Tentzeris’s proffered motivation to combine Wu and Itou. Specifically, Dr. Tentzeris contends that “[a] POSITA would recognize that the ESLs, reading devices, label identifiers, and computer systems of Wu and Itou perform analogous functions and serve analogous purposes.” Ex-1009, ¶272. Dr. Tentzeris does not explain what he means by this, and for the reasons discussed above, I do not agree that “the ESLs, reading devices, label identifiers, and computer systems of Wu and Itou perform analogous functions and serve analogous purposes.” *Id.* Instead, Dr. Tentzeris suggests the benefits of combining Wu and Itou are the same as those of combining Wu and Chaves, but for the same reasons I discussed above, a POSITA would have no reason to combine Wu and Chaves in a way that arrives at the claimed acquiring and transmitting a **sequence of label identifiers**. *See* Section VIII.C.2.a).

144. For these reasons, I do not agree that Wu combined with Itou (and Auclair) renders the claimed acquiring and transmitting limitations obvious.

c) Ground 4: Wu combined with Fujiwara

145. I understand Petitioners and their expert contend that Wu combined with Fujiwara disclose acquiring/transmitting a sequence of label identifiers. Petition, 70-72. I disagree for many of the same reasons as I addressed above with respect to Ground 3.

146. In my opinion, although Fujiwara acquires and transmits multiple label identifiers, Fujiwara does so for a fundamentally different purpose than Wu—to read label identifiers and provide users the ability to “locat[e] a product in a store and present[] the location of the product.” Ex-1007, [0006]. Fujiwara does not, however, speak to acquiring and transmitting a sequence of label identifiers as part of an installation procedure to register a new shelf label relative to one or more existing shelf labels, and Petitioners and their expert do not explain why those teachings would apply to Wu’s registration procedure that looks only to a *single* label identifier of a new label and a “label location” code of an existing label. *See* Section VIII.C.2.b) (explaining why a POSITA would not combine Wu with art directed to fundamentally different purposes and uses of the label identifiers). In my opinion, therefore, as I already addressed above, I disagree Dr. Tentzeris’s conclusion that “Wu already discloses acquiring, by a reading device, label identifiers of a label to be added **as well as of at least one adjacent label.**” *See* Sections VIII.C.1, VIII.C.2.a). For this reason, I also disagree with Dr. Tentzeris’s proffered motivation that a POSITA would have combined the teachings of Fujiwara—which does not provide a label-installation method—with those of Wu, because they are not “perform[ing] analogous functions [nor] serve analogous purposes.” Ex-1009 ¶287; Section VIII.C.2.a). And as I also explained previously, a POSITA would not have

recognized any efficiency or error-resistant benefits that Dr. Tentzeris identifies, nor would they have been obvious to try. *See* Section VIII.C.2.a).

147. For these reasons, I do not agree that Wu combined with Itou (and Auclair) renders the claimed acquiring and transmitting limitations obvious.

* * *

148. Thus, it is my opinion that none of the additional prior art in Grounds 2-4 cure Wu's failure to disclose or suggest a reader that acquires and transmits a sequence of label identifiers as part of a label-registration process, as required by at least claim limitations [1c], [1k], [10b], [10j], [11e], [11k], and [11o].

D. Ground 3: Petitioners do not identify a “displacement measuring member” that measures displacement using “label identifiers,” or that measures distance using displacement of the reading device (dependent claims 7, 8, 17, and 18)

149. In my opinion, Petitioners cannot demonstrate that dependent claims 7, 8, 17, or 18 are unpatentable because they require a “displacement measuring member” that measures displacement using “label identifiers,” and distance using displacement of the reading device itself, and Petitioners do not identify any art that performs these measurements in the way required by the claims.

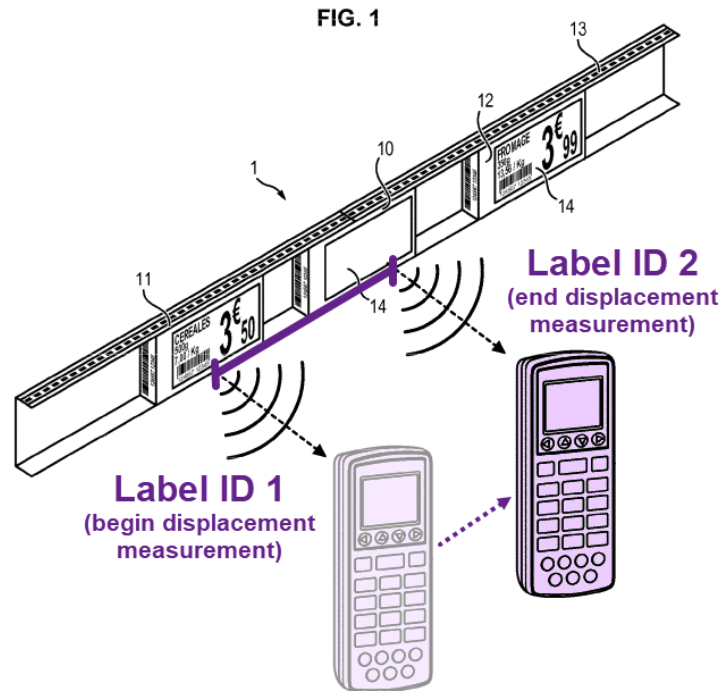
150. I have provided a table below showing how claims 7, 8, 17, and 18 refer to the “displacement measuring member” and the measurements the reading device acquires through that “displacement measuring member”:

Claim 7	Claim limitation
[7b]	the reading device comprises <i>a displacement measuring member</i> , and the method further comprises:
[7c]	<i>determining</i> , by the reading device, <i>the displacement between the label identifier of the adjacent shelf label</i> whereof the location is preliminarily known and <i>the label identifier of the added shelf label</i> .
Claim 8	Claim limitation
[8b]	<i>determining</i> , by the reading device, <i>the distance between the adjacent shelf label</i> whereof the location is known <i>and the added shelf label</i> to be located from <i>the displacement of the reading device</i> between the identifier of the adjacent shelf label whereof the location is known and the identifier of the added shelf label, and
Claim 17	Claim limitation
[17b]	the reading device comprises <i>a displacement measurement member</i> , and wherein
[17c]	the reading device is further configured to: <i>Determine the displacement between the label identifier of the adjacent shelf label</i> whereof the location is preliminarily known <i>and the label identified of the added shelf label</i> .
Claim 18	Claim limitation
[18b]	the reading device is further configured to <i>determine the distance between the adjacent shelf label and the added shelf label from the displacement of the reading device</i> between the label identifier of the adjacent shelf label whereof the location is known, and the added shelf label.

151. I understand that Petitioners and their expert contend that Itou and Auclair, when combined with Wu, teach these limitations. Specifically, Petitioners and their expert contend that Itou uses a camera that calculates the distance between two labels in the image, and Auclair teaches measuring the amount of shelf space a

product occupies, and that by combining these teachings with Wu, a POSITA would have arrived at the claims. Petition, 72-74. I disagree.

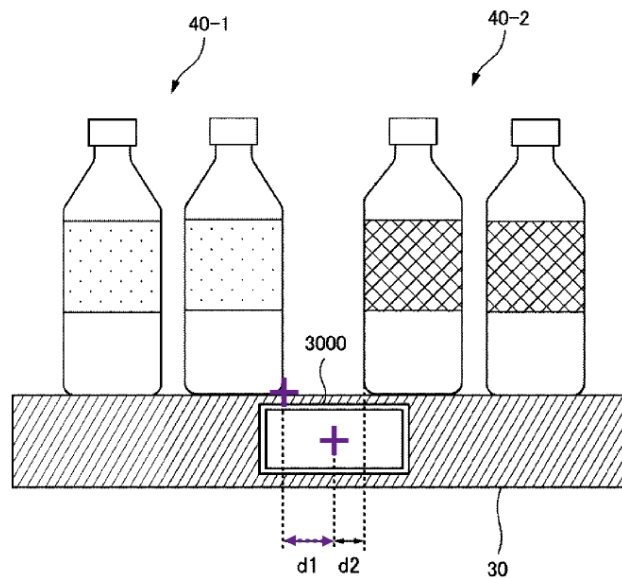
152. With respect to claims 7 and 17, I disagree that either Itou or Auclair teach or suggest what is required by the claims. Specifically, the claims refer to a “displacement measuring member” which determines displacement by referencing two “label identifiers”—those of the new label to be installed and the existing label on the shelf. As the ’709 Patent specification elaborates, the reading device may use “the moment when it acquires the identifier of an ESL” whose location is already known, and “the moment when it acquires the identifier of the ESL to be located” to delineate displacement. Ex-1001, 7:60-67. An example of how this may operate is provided below (using a modified version of the ’709 Patent’s Figure 1), and shows how the reader’s acquisition of the label identifiers for two labels delineate the displacement:



Ex-1001, Fig. 1 (modified and annotated)

153. Itou, however, teaches a “determination unit that can ‘calculate the distance *between a product and an electronic shelf label.*’” Petition, 72 (quoting Ex-1004, [0097] (cleaned up). Itou then explains how this calculation is performed using coordinates in a *picture* of the shelf:

FIG. 9



Ex-1004, Fig. 9 (annotations added); *see also id.*, [0097] (“the determination unit 2060 calculates a distance $d1$ between the product 40-1 and the electronic shelf label 3000, as a distance of a coordinate of the right end of the product group area of the product 40-1 and a coordinate of the center of the electronic shelf label 3000.”). Itou, therefore, does not teach or suggest using a *label identifier* to measure displacement, but instead coordinates of the product and shelf label itself in an image.

154. Relatedly, claims 8 and 18 require measuring distance between two labels through “the displacement **of the reading device.**” Ex-1001, cls. [8b], [18b]. The ’709 Patent specification explains that, as one example, the displacement of the reading device can be used by incorporating an accelerometer (a “displacement measuring member”) “for determining by [mathematical] integration the displacement from said reading device 3 between the two acquisitions [of label

identifiers].” Ex-1001, 8:7-14. But, again, Itou teaches taking a picture of a shelf in which the purported “reading device” (e.g., Itou’s camera) that does not move, and then measuring the distance between a given *product* and its associated *label* using image processing software. Ex-1004, [0097]. Itou does not teach or suggest measuring the distance between to labels, or using the displacement of the reading device itself (e.g., Itou’s camera) to do so.

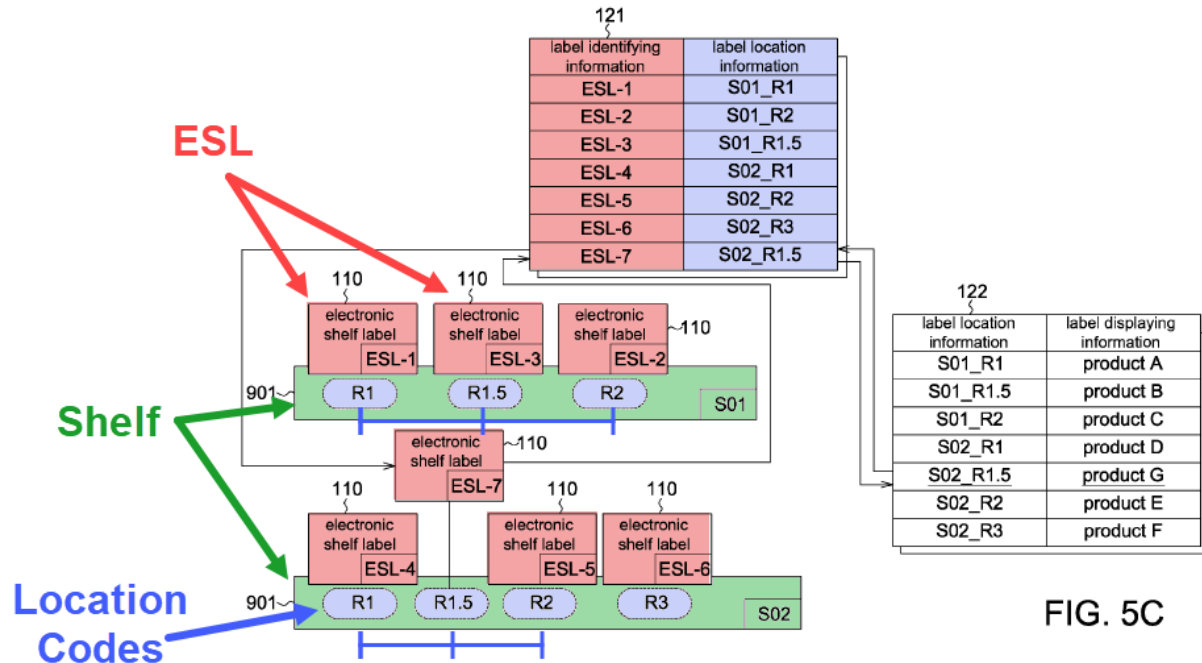
155. In my opinion, the same issues appear with Petitioners’ and their expert’s reliance on Auclair. Like Itou, Auclair does not measure displacement using label identifiers, as required by claims 7 and 17, and Auclair does not measure distance using the displacement of the reading device. Instead, Auclair evaluates “the position of the product on th[e] shelf and the length of linear the product occupies” by using “placement data” from a planogram. Ex-1005, [0037]; *see also id.*, [0088] (defining “placement data” as “geometrical properties describing [product] position in the existing planogram.”).

156. For these reasons, neither Itou nor Auclair disclose the processes of measuring displacement and distance between acquisitions of label identifiers and intermediate displacement of the reading device, as claims 7, 8, 17, and 18 require.

157. I disagree with Dr. Tentzeris’s analysis of claims 7, 8, 17, and 18, and his motivation to combine Wu, Itou and Auclair, for several reasons.

158. For claim 7,⁵ after summarizing Itou and Auclair’s teachings, Dr. Tentzeris contends that “a POSITA would understand that [Wu’s] interpolation method necessarily involves measurements ... of relative distances between the labels, as the mathematical interpolation necessarily and inherently uses such distances as input.” Ex-1009 ¶245. For support, Dr. Tentzeris cites only his own declaration, without identifying any specific paragraph. *Id.* I completely disagree with this analysis. As I explained above, Wu makes clear that the mathematical extrapolation and interpolation Wu teaches is performed using unitless codes, and has nothing to do with actual distances. *See* Section VIII.A.1. As I have already noted, for instance, adding a new label next to an existing label with a position code of “R1” can be extrapolated to be assigned a position code of “R2” by simply adding “1” to “R1.” Ex-1003, 4:53-5:5. And when adding a new shelf label *between* two existing labels with position codes of “R1” and “R2,” Wu’s interpolation process merely adds R1 and R2 and divides it by 2 to calculate an *average* positional code of R1.5. *Id.*, 5:37-63. In fact, Wu depicts the exact same position codes R1, R1.5, and R2 having **different** distances between each other:

⁵ Dr. Tentzeris refers back to this same analysis for claim 17. Ex-1009 ¶262-63.



Therefore, I do not understand and do not agree with Dr. Tentzeris's opinion that Wu's "interpolation method **necessarily** involves measurements ... of relative distances between the labels, as the mathematical interpolation **necessarily and inherently** uses such distances as input," Ex-1009 ¶245, because Wu teaches the exact opposite.

159. As for claim 8,⁶ Dr. Tentzeris first *assumes* that Wu must necessarily have an accelerometer built into the reader device, but identifies no evidence in support of that assumption. *Id.*, ¶251. But even if Wu could be considered as having an accelerometer, Dr. Tentzeris does not explain why a POSITA would configure

⁶ Dr. Tentzeris refers back to this same analysis for claim 18. Ex-1009, ¶265.

that accelerometer to measure the distance between two shelf labels by measuring the displacement of the reading device between its acquisition of label identifiers from the shelf tags. As noted, Itou teaches a stationary camera device that does not move, and measures distance between **products** and **shelf labels** using a coordinate system and image processing software. And Auclair just uses backend planogram information to determine how much space a product is provided on a shelf. In my opinion, neither of these references remotely suggest configuring an accelerometer (or any other “displacement measuring member,” as claimed) to monitor displacement of the reading device between two acquisitions of label identifiers.

160. Moreover, in opining that a POSITA would have been motivated to combine Wu, Itou, and Auclair to arrive at these limitations, *Id.*, ¶273, Dr. Tentzeris makes no attempt to account for the fact that Wu does not measure distance at all, and Itou and Auclair do not measure displacement, let alone using label identifiers to do so. As I’ve already noted, Wu performs unitless calculations to maintain a relative order of shelf labels without any notion of distance, and Itou and Auclair measure different distances than those claimed (e.g., between a product and its associated label (Itou) or of a product’s shelf space (Auclair), using different information (coordinates in a picture (Itou) or planogram information (Auclair), and do not measure **displacement** (e.g., of a reading device) at all, as required by the claims.

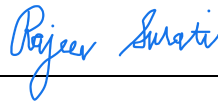
161. By failing to address these fundamental deficiencies in the prior art, and the differences as to how they operate, I see no reason why a POSITA would have nonetheless modified Wu to arrive at the claims based on these completely different processes. To me, Dr. Tentzeris's opinions are filled with conjecture and hindsight. In my opinion, Dr. Tentzeris offers no factually supported, justifiable reason why, based on the teachings of Itou and Auclair, a POSITA would have configured any accelerometer that **may or may not** be present in Wu to perform identically to the claims. Instead, Dr. Tentzeris repeatedly states that there are various benefits to “fully quantitative measuring of labels” (such as “avoiding mismatches and errors” in performing Wu's unitless extrapolation/interpolation processes, *Id.*, ¶274), yet never explains why modifying Wu to provide any “quantitative measuring” consistent with Itou and/or Auclair would result in the claimed invention. Such justifications are far too cursory and generic.

162. For these reasons, I do not agree that Wu combined with Itou and Auclair renders claims 7, 8, 17, or 18 obvious.

IX. CONCLUSION

This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. 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.

Date: September 6, 2024



Rajeev Surati, Ph.D.