

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. IPR2024-00189

Patent No. 10,674,340

PATENT OWNER'S RESPONSE

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Exhibit List

Exhibit	Reference
2001	Declaration of Rajeev Surati, Ph.D., in Support of Patent Owner's Response
2002	Curriculum Vitae of Rajeev Surati, Ph.D.
2003	U.S. Patent No. 8,049,621 (the "'621 patent")
2004	U.S. Patent No. 7,949,568 (the "'568 patent")
2005	U.S. Patent No. 7,957,998 (the "'998 patent")
2006	Kumar et al., Overview of RFID Technology and Its Applications in the Food Industry, 74 J. FOOD SCIENCE 8 (2009) ("Kumar")
2007	Rohde & Schwarz, Near Field Communication (NFC) Technology and Measurements, White Paper (2011) ("Rohde")
2008	ISO/IEC 14443-2 (2010)
2009	ISO/IEC 15693-2 (2006)
2010	Alva, A seminar report on Near Field Communication, S.D.M COLLEGE OF ENGINEERING AND TECHNOLOGY, DHARWAD (2010) ("Alva")
2011	ISO/IEC 18092 (2004)
2012	ECMA-340 (2004)
2013	U.S. Pat. No. 6,002,344 ("Bandy-344")
2014	Excerpt of Meriam-Webster's Collegiate Dictionary, 11 th ed. (2014)
2015	U.S. Patent No. 8,923,893 (the "'893 patent")
2016	Edwin Bergsma, Planogram Data Requirements, Global Retail Business Solutions (2011)
2017	"Planograms 101: What They Are and Why They're Important for Your Brand," ePac (2024) (available at https://epacflexibles.com/en-

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2018	Erwin Bergsma, Analyzing your first planogram, Global Retail Business Solutions (Aug. 2015)
2019	Violino and Roberti, The History of RFID Technology, RFID J. (Jan. 16, 2005) (“Violino”) (2005)
2020	U.S. Patent Application Publication No. 2010/0190484 (the “484 publication”)
2021	U.S. Patent No. 7,809,402 (the “’402 patent”)
2022	U.S. Patent No. 7,546,948 (the “’948 patent”)
2023	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)
2024	Deposition transcript of Dr. Emmanouil M. Tentzeris (“Tentzeris Dep. Tr.”)
2025	Opposition against European Patent 3 883 277
2026	Google translation of JP2014/222374

LISTING OF CHALLENGED CLAIMS

Claim 1	
[1pre]	A method for communicating spatially localized information to a mobile terminal, the method being performed by a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined area, each of the plurality of locations being defined by a vertical and horizontal position within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier, the method comprising:
[1a]	receiving a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral, wherein the radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters;
[1b]	determining a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and
[1c]	transmitting to the mobile terminal spatially localized information associated with the location of the mobile terminal.
Claim 2	
[2]	The method according to claim 1, further comprising: when the mobile terminal is positioned relative to the radio-frequency communication peripheral within the communication range, energy of electromagnetic waves emitted by the mobile terminal activating the radio-frequency communication peripheral, thereby setting-up a radio-frequency communication between the mobile terminal and the radio-frequency peripheral, wherein the communication range

	is a range of the electromagnetic waves emitted by the mobile terminal.
Claim 3	
[3]	The method according to claim 1, wherein the central server receiving the communication from the mobile terminal is via the Internet.
Claim 4	
[4]	The method according to claim 1, wherein the spatially localized information is further associated with account data specific to the user of the mobile terminal previously stored in a database accessible to the central server via a communication network.
Claim 5	
[5pre]	A system for communicating spatially localized information to a mobile terminal, the system comprising:
[5a]	a central server configured to access a planogram associating a plurality of unique identifiers of radio-frequency peripherals with a plurality of locations within a predetermined area, each of the plurality of locations being defined by a vertical and horizontal position within a vertical plane of the predetermined area, and each of the plurality of locations being associated one-to-one with a corresponding unique identifier;
[5b]	a mobile terminal configured to communicate with the central server; and
[5c]	a plurality of radio-frequency peripherals distributed throughout the predetermined area, wherein each radio-frequency peripheral includes an antenna and an electronic chip configured for near-field communication, and is configured to be activated by the mobile terminal when the radio-frequency communication peripheral is within a communication range of the mobile terminal, wherein the communication range is less than twenty centimeters,
[5d]	wherein the central server is configured to:
[5e]	receive a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in the predetermined area, the unique identifier being particular to the radio-frequency peripheral;

[5f]	determine a location of the mobile terminal within the predetermined area based on the location associated with the unique identifier of the received communication in the planogram, the location of the mobile terminal comprising the vertical and horizontal position of said location; and
[5g]	transmit to the mobile terminal spatially localized information associated with the location of the mobile terminal.
Claim 6	
[6pre]	The system according to claim 5, wherein at least one radio-frequency peripheral is an electronic label which comprises:
[6a]	a radio-frequency communication module configured to receive data representing information relating to an item from a central server;
[6b]	a memory to store said data;
[6c]	a microcontroller to control the display of information relating to an item;
[6d]	a display screen to display said item-related information.
Claim 7	
[7]	The system according to claim 6, wherein the mobile terminal is adapted to transmit data to the electronic label via the radio-frequency communication module of said electronic label.
Claim 8	
[8]	The system according to claim 5, wherein the chip and the antenna are arranged at different points of the radio-frequency peripheral, and wherein the radio-frequency peripheral comprises connections configured to ensure a communications link between the antenna and the chip.
Claim 9	
[9]	The system according to claim 8, wherein the chip is connected to a microcontroller of the radio-frequency peripheral, and wherein the antenna is arranged on or within a case inside which the microcontroller is housed.

PETITIONER'S ASSERTED GROUNDS

Ground	Petitioner's Asserted Art
1	Claims 1-9: Fujiwara
2	Claims 1-9: Fujiwara, Arntzen
3	Claims 1-5, 8-9: Bandy, Fowler
4	Claims 1-5, 8-9: Bandy, Fowler, Arntzen

I. INTRODUCTION

U.S. Patent No. 10,674,340 (Ex-1001, “’340 Patent”) is directed to an electronic shelf label (“ESL”) system for retail stores that not only displays product and price information—like their paper predecessors—but can also track a customer’s location and provide “spatially localized information” about nearby products. The prior art proffered by Petitioners simply does not teach this. Petitioner recasts the claims to fit the art, ignoring plain-stated requirements, and steeps the combinations in hindsight, divorcing them from the real-world constraints overcome by the ’340 Patent.

At the heart of the ’340 Patent is a need for precision: The system needs to know *precisely* what products the customer is interested in, in order to provide localized information about them. If a customer is lactose intolerant, for instance, they need to receive information that the product they are looking at has dairy. The claims accomplish this precision by reciting two at least key requirements: (1) a planogram that tracks *both* the horizontal *and* vertical positions of ESLs and products throughout the store, establishing a “one-to-one” correspondence between ESL and location; and (2) using NFC technology to provide precise location information. Petitioners’ art misses both key elements.

At best, Petitioner’s art discloses a database that tracks the shelf numbers of products. But this mere database is not a “planogram” as a POSITA would

understand it—a “planogram” has a well-understood meaning and a database that just tracks shelf numbers of products is not one. And anyway, the prior art’s database fails to provide the precision necessary to meet the claims because it indisputably does not teach tracking both horizontal and vertical positions with a one-to-one correspondence, as expressly recited in the challenged claims.

Moreover, Petitioner lumps all manner of wireless communications together—microwave, ultrahigh-frequency RFID and NFC—and treats them all as interchangeable. But they are not interchangeable, as using some forms of wireless communication involves significant and unavoidable tradeoffs, which Petitioner and its expert simply ignore. While Petitioners *say* it would have been obvious to replace prior-art RFID systems with NFC, making such modifications would destroy core functionality of the prior art, and Petitioner offers no justification for making such modifications—save Petitioner’s conclusory expert declaration. Petitioner does not—and cannot—identify any support in the relevant art for its suggested modifications.

Petitioners have failed to meet their burden to prove any claims are unpatentable, and the Board should affirm the patentability of all challenged claims.

II. BACKGROUND

A. Overview of the Technology

In brick-and-mortar retail stores, products are displayed on shelves, and their locations can be pre-planned and tracked using a “planogram.” Ex-2001, ¶¶40-41 (citing Ex-2003, 6:58-7:6). To identify products, shelves are typically provided with labels displaying information about the goods, such as the product name and price. Ex-1001, 1:19-24; Ex-2001, ¶40 (citing Ex-2004, 7:64-8:8). If a store manager needs to change the price of a product, or add, remove, or move a product at a given location, store clerks or managers must change the labels in accordance with an updated planogram to reflect the new arrangement of products on the store shelves. Ex-2001, ¶40 (citing Ex-2005, 9:56-62; Ex-2004, 1:19-43, 1:57-60).

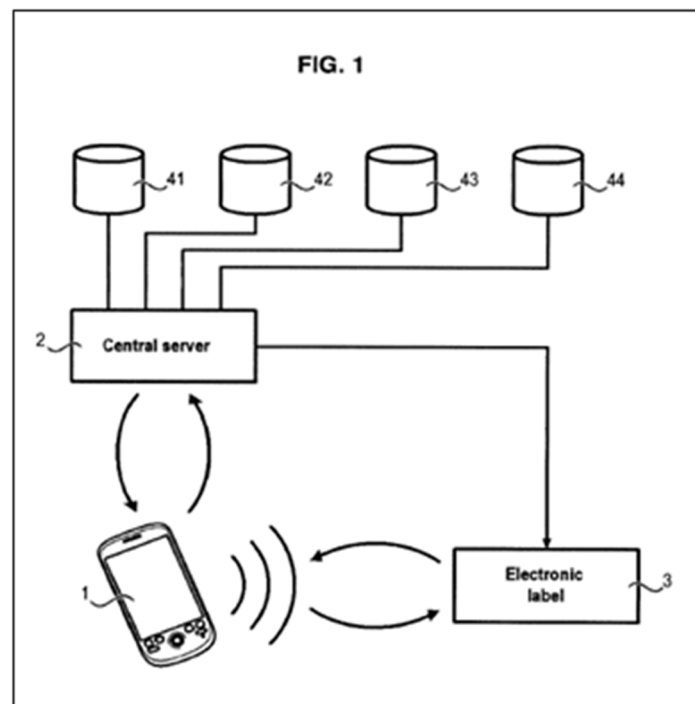
With the proliferation of low-powered microelectronics, however, stores have begun transitioning to electronic shelf labels (“ESLs”) to replace traditional labels that require manual updating. Ex-1001, 1:13-2:4. But, as of the ’340 Patent, electronic label systems were “relatively rigid” and often could only update price. *Id.*, 1:48-56.

B. Overview of the ’340 Patent

One of the central points of patentability of the ’340 Patent was the ability to provide customers with “spatially localized information” complementing the information the consumer typically sees in a retail area. *Id.*, 2:8-14. For instance, “spatially localized information” may include health data, contra-indications, and/or

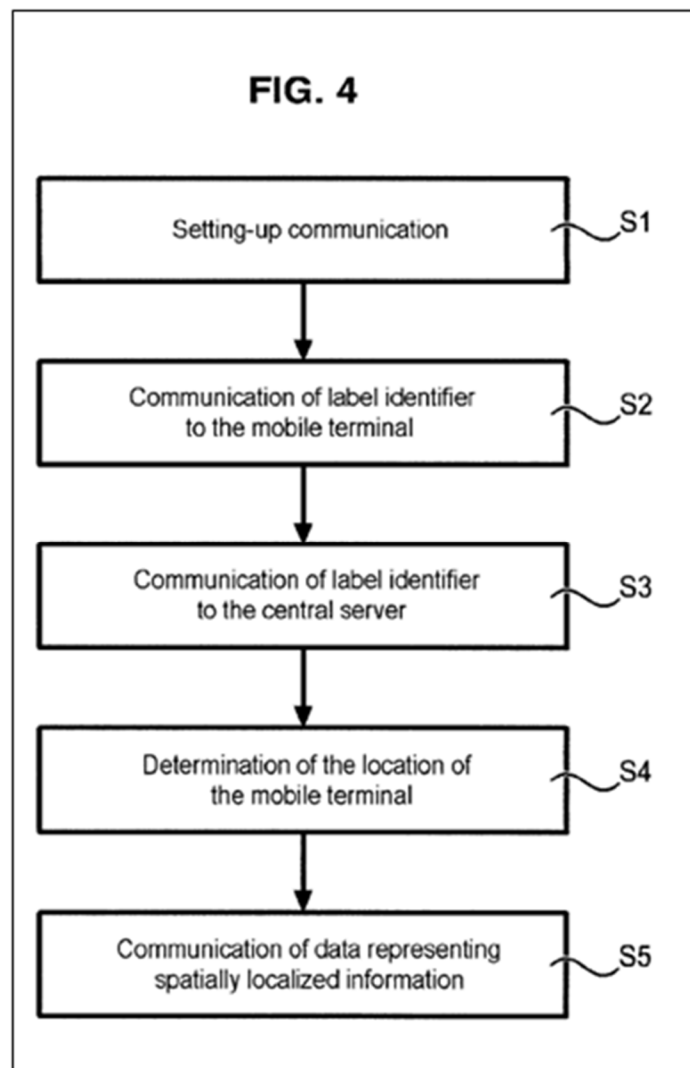
allergens associated with particular products. *Id.*, 7:9-15. But providing such information requires knowing a shopper's precise location relative to the product. Ex-2001, ¶¶42-47. The '340 Patent describes a way to determine precise locations—including both vertical and horizontal positions—so that information relevant to the shopper at that location can be provided with high precision. Ex-1001, 7:55-59; Ex-2001, ¶42. The exact location is known based on a planogram. Ex-1001, 6:29-36; Ex-2001, ¶42.

Figure 1 is a non-limiting example of such a system. A customer with a “mobile terminal”—e.g., smartphone—can communicate with a central server in a store through wireless communications. Ex-1001, 3:59-4:28. ESLs having unique “label identifier[s]” are distributed throughout the sales area. *Id.*



Ex-1001, Fig. 1.

The mobile terminal activates and communicates with the ESL by emitting electromagnetic waves. *Id.*, 6:6-10. The ESL may operate at frequencies that enable NFC or high-frequency RFID (“RFID HF”). *Id.*, 4:50-56. When activated, the ESL provides its unique identifier to the mobile terminal, which then communicates with a server. *Id.*, 6:11-20.



Ex-1001, Fig. 4.

The server determines the precise location of the mobile terminal “using the data of a planogram associating a location with the label identifier.” *Id.*, 6:29-35. As explained in §II.A, “[a] planogram lists the locations of all the electronic labels 3 and of the items on sale in a sales area.” *Id.*, 6:35-37. The “uniqueness of the label identifier and of the location associated with each electronic label 3 allows unambiguous determination of the location of the electronic label,” and therefore, the location of the shopper. *Id.*, 6:43-51; Ex-2001, ¶45. Once the “unique” location of the mobile terminal is identified (based on the unique location of the label), specific relevant information can be provided to the shopper via the mobile terminal. Ex-1001, 7:50-59; Ex-2001, ¶45.

The communication range between the ESL and mobile terminal is critical. Ex-2001, ¶¶46-47. Specifically, the '340 Patent discloses “in all cases, [the] communication distance with the radiofrequency peripheral 36 must be chosen to be relatively short, less than 20cm, and further preferably less than 10 cm from the antenna 38.” Ex-1001, 5:45-48; *see also id.*, 6:52-54.

This “relatively short” communication range is necessary for three reasons. First, it “ensures matching between the location of the electronic label 3 and the mobile terminal 1.” *Id.*, 6:54-56. Second, it “allows interference to be limited between electronic labels when they are positioned close to one another.” *Id.*, 6:56-58. And third, it is important for security: “a short range requires deliberate action by

the user” such that “[t]he user then has no reason to fear for the protection of private life.” *Id.*, 6:59-65.

C. Prosecution history of the '340 Patent

The '340 Patent was filed on Feb. 21, 2019, and issued on June 2, 2020. Ex-1001, Cover. It claims priority to International Application No. PCT/FR2012/050791, filed on April 11, 2012. *Id.*; EX-2001, ¶48.

During prosecution, Applicant submitted an information disclosure statement identifying Fujiwara, the same reference relied upon by Petitioners in Grounds 1-2. Ex-1002, 102. The Examiner did not apply Fujiwara against the claims. Ex-1002, 59; Ex-2001, ¶49. Instead, the Examiner issued a single non-final Office Action rejecting all claims as obvious over three other references, EX-1002, 39-48, which was overcome without amending the claims and by arguing several distinguishing features of the then-pending claims, *id.*, 32-37; Ex-2001, ¶¶50-52.

D. Overview of RFID

RFID is a wireless technology that uses radio waves to communicate with low-powered devices. It can be used to track people or objects. Ex-2001, ¶¶53-62 (citing Ex-2006, Ex-2019).

RFID systems are generally made up of three components: tags, readers, and a backend system. *Id.*, ¶55 Tags can store a variety of information. *Id.* (citing Ex-2007, 12). Readers emit radio waves and receive signals back from tags. *Id.* The

backend system manages and processes the information collected by tags and readers. *Id.* (citing Ex-2003, 4:35-54).

RFID tags are categorized according to the frequency at which they operate, and generally fall into one of four groups: (1) Low frequency (“LF”) (30-300KHz); (2) High frequency (“HF”) (3-30MHz); (3) Ultra high frequency (“UHF”) (300-1000MHz); and (4) Microwave frequency (“Microwave”) (1-10GHz). Ex-2001, ¶56 (citing Ex-2006, R101). Moreover, RFID tags can be either active (i.e., self-powered) or passive (i.e., powered by the reader). *Id.*, ¶¶56-57 (citing Ex-2006, R101). Whereas active RFID tags will actively emit their own signal to a reader, passive tags use the energy provided by the reader for communication—e.g., using inductive coupling or backscatter—which significantly reduces communication range compared to active RFID tags. *Id.*, ¶57.

RFID HF readers and devices conform to standards, such as ISO/IEC 15693 (Ex-2009) and ISO/IEC 14443 (Ex-2008). Ex-2001, ¶58 (citing Ex-2010, 3). Passive HF tags can communicate up to about 20cm and generally operate at 13.56Mhz, using inductive coupling, which is omnidirectional (or direction agnostic) and provides power to the tag. *Id.*, ¶¶58-59 (citing Ex-2010, 4). Communication occurs by changing current flow or impedance of the transmit and receive circuits. *Id.*, ¶58 (citing Ex-2006, R102). Passive Microwave and UHF tags can communicate up to

several feet and use directional antennas and radiative coupling for communication.

Id., ¶60 (citing Ex-2006, R102).

E. Overview of NFC

NFC is a short-range wireless technology that allows two devices to exchange data. *Id.*, ¶¶63-67 (citing Ex-2007, 3). Today, NFC is commonly used for contactless or “cashless payment” but can also be used for keyless entry to buildings or rooms. *Id.*, ¶63.

NFC standards are governed by the NFC Forum, and readers and devices conform to the ISO/IEC 18092 specification (Ex-2011) (also known as ECMA-340 (Ex-2012)). Ex-2001, ¶64 (citing Ex-2007, 3). NFC can be described as a subset of high-frequency RFID HF, which has been used for decades. *Id.* However, NFC's range is typically on the order of centimeters. *Id.* (citing Ex-2007 and Ex-2010). Although the range of NFC is limited to a few centimeters, standard NFC is susceptible to security breaches. *Id.* (citing Ex-2010, 11-12).

Because the distances involved are tiny compared to the wavelength of the radio waves used (e.g., NFC with a wavelength of 13.56MHz produces a wave that repeats at approximately 22 meters), the interaction is described as “near field.” *Id.*, ¶66. Communication with a passive NFC tag occurs by inductive coupling of an alternating magnetic field and almost no power is radiated in the form of radio

waves. *Id.* (citing Ex-2010, 4). This minimizes interference with other RF devices at the same frequency. *Id.*

Because NFC uses a magnetic field for coupling, standard NFC tags fail to read when put on a metal surface or near liquids. *Id.*, ¶67. Special materials or spacing between the antenna and the metal surface or liquid must be used to read an NFC tag. *Id.*; Ex-2021, 32:13-33:13. Furthermore, orientation of the reader to the tag is critical to reading an NFC tag. The tag cannot be read if the antenna is oriented perpendicular to the reader or if the reader is side-by-side at a distance to the tag. Ex-2021, 33:15-31:14. (explaining antenna coils should be aligned and coplanar). These constraints are in addition to the communication range. Ex-2001, ¶67.

III. ASSERTED PRIOR ART REFERENCES¹

A. Fujiwara (Ex-1003)

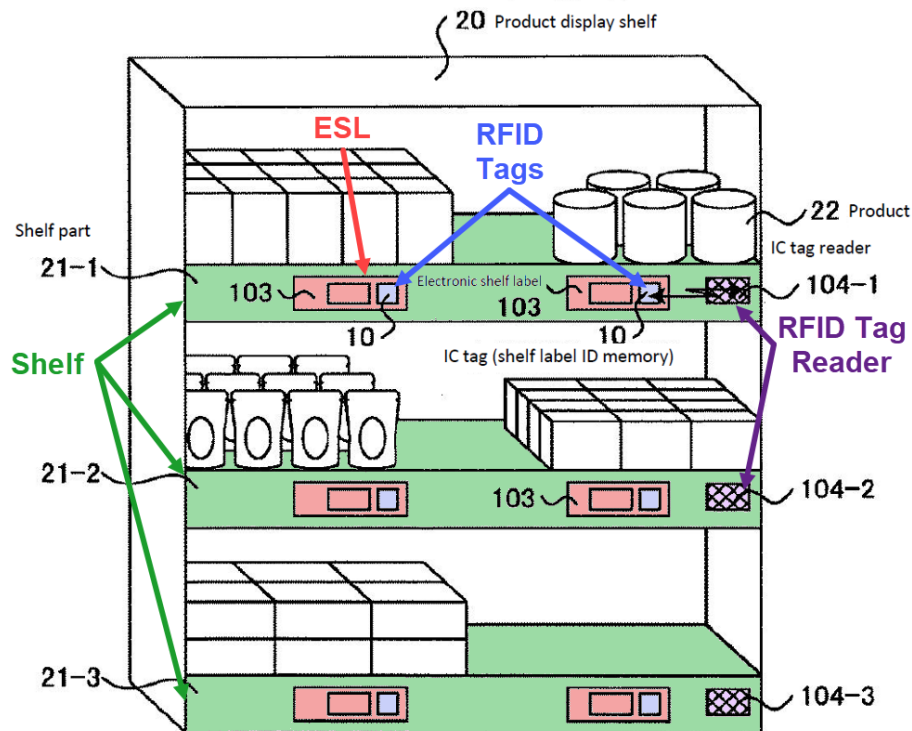
Fujiwara discloses a system that uses microwaves to read ESLs with an integrated circuit (“IC”) tag. Ex-1003, Abstract, [0072], [0076]; Ex-2001, ¶¶84-86. Fujiwara’s system includes a store server with an ESL database that stores, *inter alia*, sender IDs, shelf label IDs, shelf label product information, and shelf label location

¹ Petitioners and/or their expert identify several background references that were not submitted as exhibits. Any reliance on unsubmitted references is improper. 37 C.F.R. §42.63(a)

information. Ex-1003, [0060]-[0062], Fig. 3. Fujiwara expressly defines “location information” as “the shelf number of the product display shelf” and consistently describes the shelf number as the location of the shelf label ID. *Id.*, [0009], [0044], [0062], [0086], [0093].

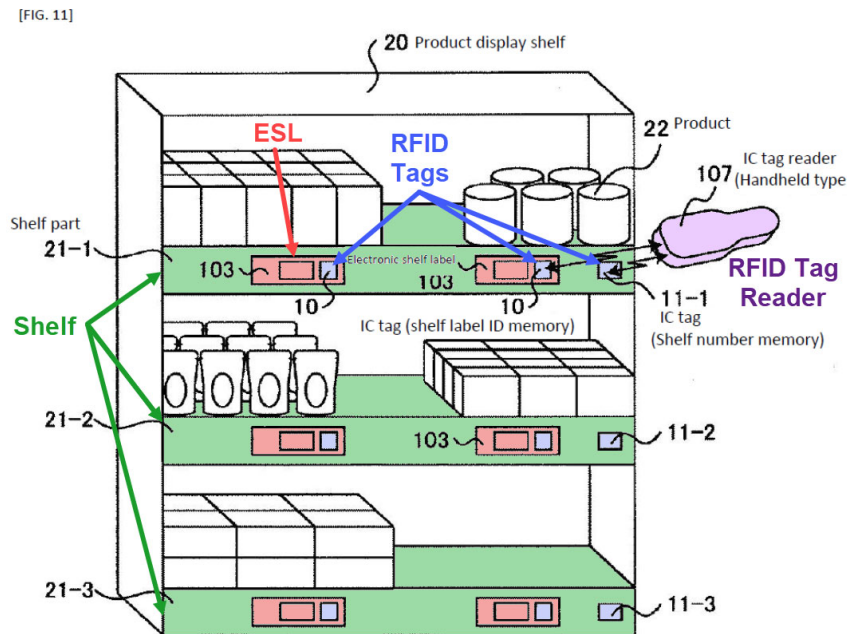
Fujiwara explains in its embodiments that more than one tag is read from a reader simultaneously. Ex-1003, [0082], [0090]-[0091], [0104]. Fujiwara's Figure 4 illustrates an embodiment where the tag reader is on the shelf and adjacent to the tags it is reading. *Id.*, [0066].

[FIG. 4]



Ex-1003, Fig. 4 (annotated).

A separate embodiment, shown in Figure 11, illustrates Fujiwara's system utilizing a handheld reader that scans multiple tags simultaneously. *Id.*, [0090]-[0091].



Ex-1003, Fig. 11 (annotated).

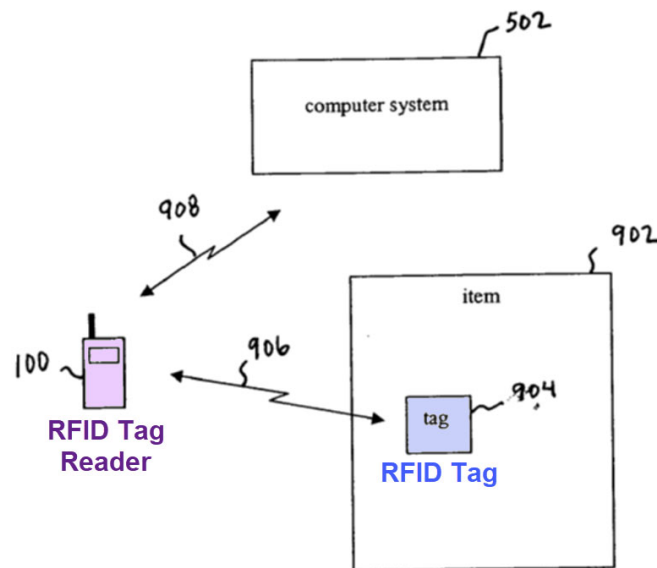
Fujiwara's microwave communication system operates up to "several to several tens of centimeters." *Id.*, [0072], [0082]. POSITAs would have understood this range was consistent with microwave RFID. Ex-2001, ¶85. POSITAs would have understood reading multiple tags simultaneously at such a range (e.g., the entire shelf) would again require longer-range communication provided by Fujiwara's disclosed microwave RFIDs. *Id.*

B. Bandy (Ex-1006)

Bandy discloses a mobile device that downloads a merchant's product database. Ex-1006, [0012], [0034]. Specifically, the mobile device downloads the

product database “when the user nears or enters the store” and before the user interacts with any product tags. *Id.*, [0008], [0034]; Ex-2001, ¶¶87-90.

Bandy further discloses using the mobile device to read RFID tags associated with an “item of interest” to the user. Ex-1006, [0034]. Bandy's Figure 9, annotated, illustrates mobile device (100) interacting with an RFID tag associated with an item. *Id.*, [0054].²



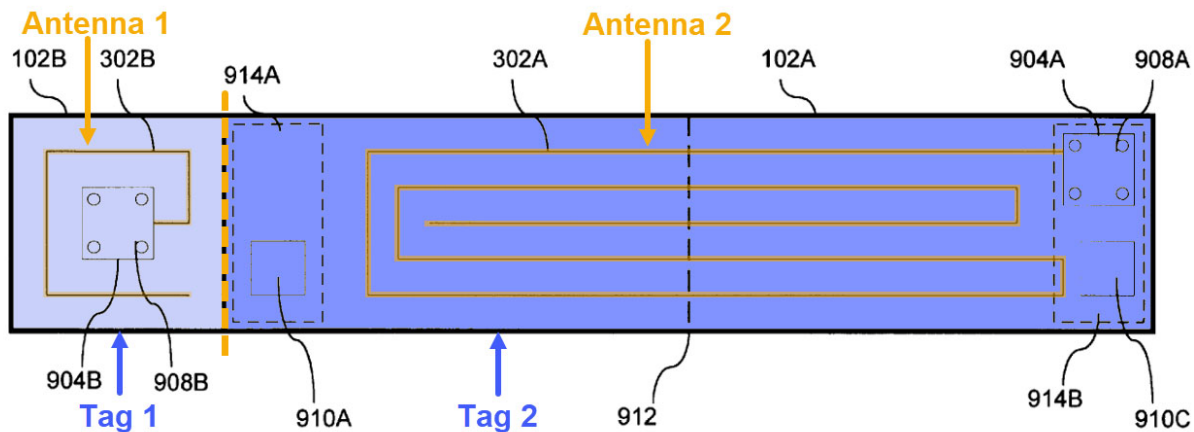
Ex-1006, Fig. 9 (annotated).

Bandy explains the tags “may be attached directly to item 904, or may be located nearby and be intended to identify item 904.” *Id.*, [0054], [0076]. Items include “airline baggage, retail inventory, warehouse inventory, automobiles, compact discs (CDs), digital video discs (DVDs), video tapes, other goods, and other

² The reference designators “902” and “904” appear to be reversed. Ex-2001, ¶88.

objects.” *Id.*, [0076]. Bandy further discloses the tags may be read using “one or more interrogation/read protocols,” such as “binary protocols, slotted aloha protocols, and those required by the following standards: Class 0, Class 1, and Gen 2.” *Id.*, [0055], [0077].

Bandy also incorporates U.S. Patent 6,002,344 (“Bandy-334” or Ex-2013), which describes the manufacture of Bandy’s tags. Bandy-344 depicts a method of manufacture (Fig. 8) and a pair of tags (Fig. 9). Ex-2013, 9:47-54.

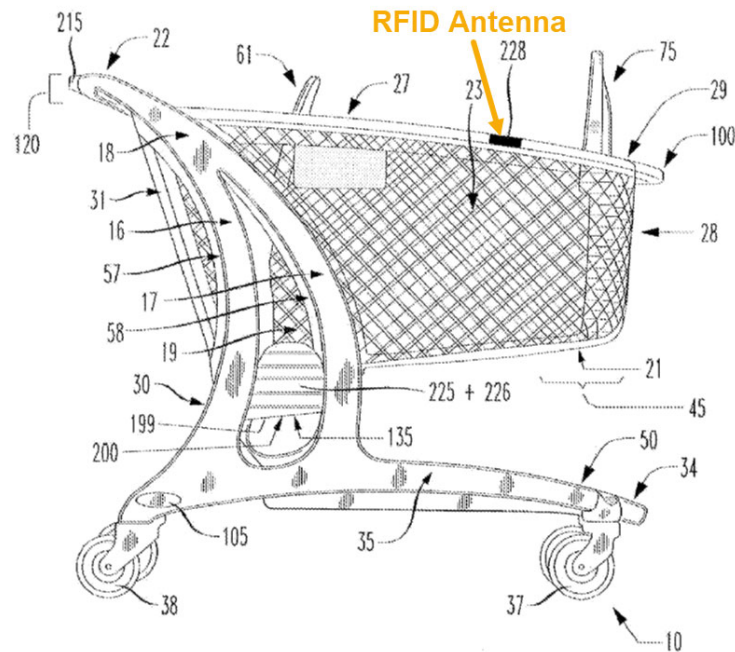


Ex-2013, Fig. 9 (annotated).

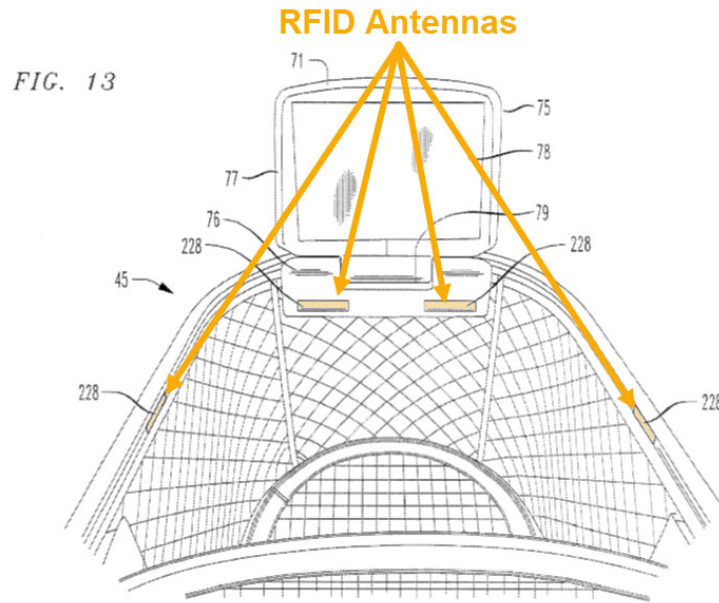
Bandy’s tags are printed on a thin, flexible substrate intended for placement on an item. *Id.*, 10:50-64; Ex-2001, ¶90. Bandy-344 further discloses the RFID tag is powered by a battery or capacitor and operates at 900MHz. Ex-2013, 4:29-37, 4:48-51, 5:38-40, 10:11-18. POSITAs would have understood Bandy’s RFID tags were either an active or passive RFID (UHF) tag and would have had a range of several feet. Ex-2001, ¶90.

C. Fowler (Ex-1007)

Fowler discloses a “media enhanced shopping cart.” Ex-1007, [0001]; Ex-2001, ¶¶91-92. Fowler’s shopping cart includes built-in RFID antennas (228) and optionally a video display. Ex-1007, [0097], [0136]-[0138], Figs. 1 & 13; Ex-2001, ¶91. Fowler further discloses an RFID reader that is located in various positions on the cart, such as “on the underside of the cart” or integrated with the video display. Ex-1007, [0097], [0136]-[0138].



Ex-1007, Fig. 1 (annotated).



Ex-1007, Fig. 13 (annotated).

Fowler's system is designed to read the RFID tags from a distance as the user pushes the cart. *Id.*, [0136]-[0138]; Ex-2001, ¶92. In particular, the RFID antennas have a beam covering an area that is six to eight feet tall—the complete height of a shelf—and eighteen inches wide. Ex-1007, [0137]-[0138], Figs. 20A-D. When a customer rolls the cart down an aisle, it picks up RFID tags placed at various heights on the shelf, even though the cart remains on the ground. Ex-2001, ¶92.

Because Fowler's tag reader uses directional antennas and has a range of several feet, POSITAs would have recognized that Fowler's system operates in UHF or microwave frequencies. *Id.*

D. Arntzen (Ex-1005)

Arntzen discloses a system for displaying and updating information on ESLs. Ex-1005, 1:1-10, 3:22-29; Ex-2001, ¶¶93-94. Arntzen discloses communicating with electronic displays (i.e., ESL displays) using handheld units via NFC and/or Bluetooth. Ex-1005, 12:15-21. Arntzen further discloses the displays can include a Zigbee module to communicate with a server. *Id.*, 11:16-26. Zigbee is a low-power, low-data-rate, personal area wireless network targeted at battery-powered devices. Ex-2001, ¶93.

Petitioners rely on Arntzen to supply “NFC tag modification” and “RF modification” to Fujiwara. Paper 2 (“Petition”), 52-56 (Ground 2). Petitioners also rely on Arntzen to supply “NFC tag modification” to the Bandy-Fowler combination. *Id.*, 91-92 (Ground 4).

IV. LEVEL OF SKILL IN THE ART

For purposes of this IPR only, Patent Owner applies Petitioners’ definition of a POSITA. Ex-2001, ¶¶20-24.

V. CLAIM CONSTRUCTION

Petitioners have not proposed to construe any claim terms, stating that all terms “should be given their ordinary and customary meaning.” Petition, 3. But Petitioners argue the preamble of claim 1 is not limiting. Petition, 17, 62. Not only is the preamble of claim 1 limiting, but the meaning of several terms is implicated by Petitioners’ challenge.

A. The preamble of claim 1 is limiting

The preamble of a claim is limiting if it recites essential structure or steps or gives life, meaning, and vitality to the claim. *Shoes by Firebug LLC v. Stride Rite Children's Grp., LLC*, 962 F.3d 1362, 1367 (Fed. Cir. 2020) (citing *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002)). Furthermore, where the preamble provides antecedent basis for a term in the body of the claim, the preamble is limiting because it indicates reliance on both the preamble and claim body to define the claimed invention. *Id.* A preamble, however, is not limiting if a structurally complete invention is recited in the claim body and the preamble only states a purpose or intended use for the invention. *Id.*

Here, claim 1's preamble recites the claimed method is “performed by a central server configured to access a planogram.” As explained in §V.A, a planogram is a well-known term of art that includes the location of items. Consistent with that meaning, the preamble recites the planogram (i) associates “a plurality of unique identifiers of radio-frequency peripherals with ***a plurality of locations*** within ***a predetermined area***,” (ii) defines each location “by a vertical and horizontal position within a plane perpendicular to a floor of the predetermined area,” and (iii) associates each location “one-to-one with a corresponding unique identifier.”³

³ Unless otherwise noted, all emphases have been added.

The preamble is limiting for several reasons. First, the preamble recites a central server performs the claimed method, whereas the subsequent limitations do not explicitly recite that they are performed by a central server. Thus, the preamble clarifies each step is performed by the central server and is necessary to give life, meaning, and vitality to the claim.

Second, the preamble provides antecedent basis for multiple terms recited in the body of the claim: “the predetermined area,” “the location associated with the unique identifier,” and “the planogram.” *See* Limitation [1a] (“receiving a communication from a mobile terminal, the communication comprising a unique identifier received by the mobile terminal from a radio-frequency peripheral located in *the predetermined area...*”); Limitation [1b] (“determining a location of the mobile terminal within *the predetermined area* based on *the location associated with the unique identifier* of the received communication in *the planogram...*”). Thus, contrary to Petitioners’ assertions (Petition, 17-18, 62-63), the preamble does not merely recite an intended purpose and does define claim limitations.

B. “planogram” is more than a list of label locations (Claims 1, 5)

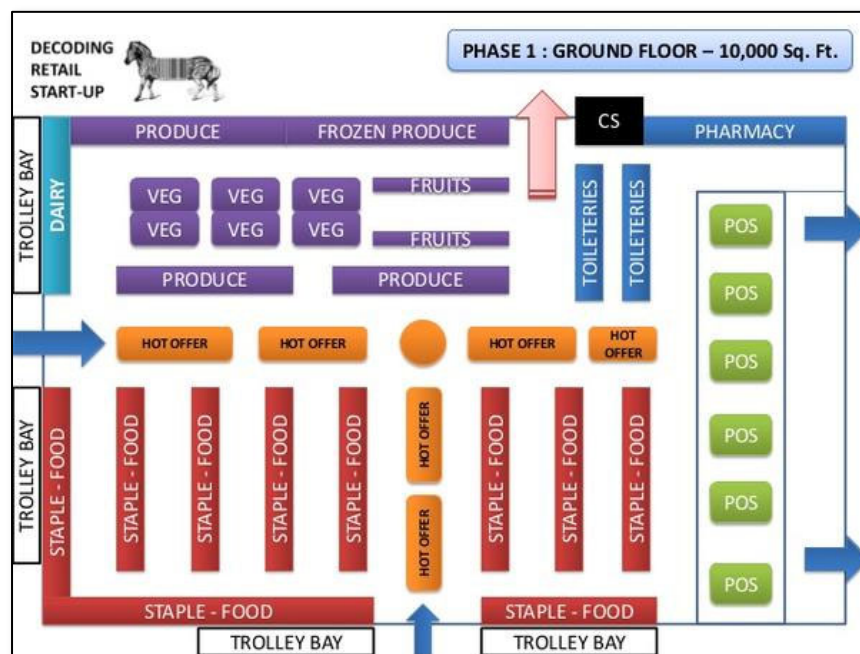
Another dispute between the parties is whether a prior-art reference Petitioners rely upon—Fujiwara—teaches a “planogram,” a term appearing in Challenged Claims 1 and 5.

The term “planogram” is a well-known and often-used term in the art. Ex-2001, ¶¶71-79. It is generally understood to refer to some form of dataset, map, diagram, schematic, or the like, that allows retailers to accurately plan out the placement of products in a retail store in an effort to maximize sales. *See* Ex-2014 (defining “planogram” as “***a schematic drawing or plan*** for displaying merchandise in a store so as to maximize sales”); Ex-2015, 1:12-21 (“A planogram...is a diagram of fixtures, fittings and products that illustrates how and where retail products should be displayed.”); Ex-2005, 1:31-34 (“***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.”); Ex-2023, 210; Ex-2001, ¶¶72-73.

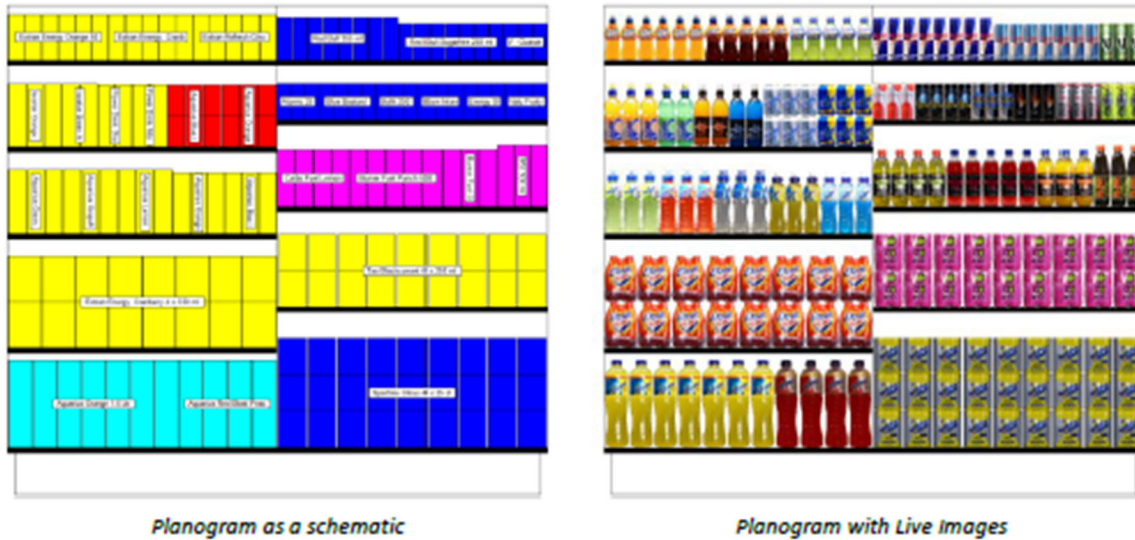
In particular, “planograms” generally include information regarding: (1) how similar products are grouped together and where these groups of products are placed; (2) where each product is placed on a shelf-segment, including relative to other products (e.g., how high off the ground, how prominent a position, which products are nearby, etc.); and (3) how much shelf space is dedicated to each product. *See* Ex-2016, 4-10 (noting the various layers of data used to build a planogram, 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-2004, 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-2015, 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-2005, 1:31-37 (“[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.”); Ex-2001, ¶74.

A “planogram” may take the form of a top-down map depicting the various groupings of products by type, as shown below:



Ex-2017 (depicting an exemplary top-down planogram). Or a “planogram” could be a depiction of a shelf segment intended to reflect reality, as shown below:



Ex-2016, 5.

“Planograms” at a minimum include information about how products are grouped, where they are placed, and how much space they are provided so that retailers can plan, track, and make decisions about their product placements to ensure each product is positioned in a way that will generate the most sales. Ex-2018, 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?”); Ex-2001, ¶76. Although there are many different definitions of “planogram” that exist throughout the art, they all share these same basic features. Ex-2001, ¶76.

The Board need not expressly construe the term “planogram” to define its outer bounds here, but resolving the parties’ dispute requires an understanding of what the plain meaning of “planogram” encompasses and what it does not. *See, e.g.,*

Realtime Data, LLC v. Iancu, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe only those terms...that are in controversy, and only to the extent necessary to resolve the controversy.” (internal quotation marks and citation omitted)). That is because, here, Petitioners contend a database that contains only label identifiers and a shelf number constitutes a “planogram.” *See, e.g.*, Petition, 20 (identifying Fujiwara’s database with a “shelf label ID 311” and shelf number). This view, however, is inconsistent with how the term “planogram” is understood and such a database is not encompassed by “planogram” as recited, which is all the Board needs to decide.

When the '340 Patent uses the term “planogram,” it does so consistent with its understood meaning in the art and nowhere suggests the term has taken on a different meaning. EX-2001, ¶¶77, 79. Specifically, in the '340 Patent, the claimed “planogram” is *at a minimum* directed to a shelf-segment-type planogram (as shown above) because the planogram defines locations “by a vertical and horizontal position within a plane perpendicular to a floor plan” (e.g., parallel to shelf faces) with each location “being associated one-to-one with a corresponding unique identifier” of an ESL. Ex-1001, cls. 1, 5; Ex-2001, ¶77.

Moreover, during prosecution, Applicant used the term “planogram” consistent with its plain meaning. Specifically, in response to an initial rejection of the claims, Applicant acknowledged one of the prior-art references (Egan) describes

“implementing a planogram *to collect and analyze sales data in order to optimize future product offerings (e.g., identifying particular product placement configurations, or adjacencies, that maximize sales)*,” but distinguished Egan from the claims on another basis. Ex-1002, 35; *see also id.* (“Egan generally describes a planogram that is implemented for planners to collect and analyze sales data to optimize future offerings.” (original emphases)); Ex-2001, ¶78.

Accordingly, the term “planogram” should be understood as having its plain meaning in the relevant art, and applied consistent with how the term is generally used throughout the art. If so applied, then for the reasons discussed in further detail below, Petitioners’ reliance on Fujiwara as teaching the claimed “planogram” is misplaced. Ex-2001, ¶79.

C. “activated”/“activating” requires powering a label (Claims 1, 2, 5)

The terms “activated” and “activating” appear in claims 1, 2, and 5. *E.g.*, Ex-1001, cls. 1 (“wherein the radio-frequency peripheral includes an antenna and an electronic chip ... configured to be *activated* by the mobile terminal”), 2 (“the mobile terminal *activating* the radio-frequency communication peripheral”), 5. In the context of the claimed invention, which is directed to passive “near-field communication” or NFC-type radio-frequency peripherals, the terms “activated” and “activating” should be construed to mean “powered” or “powering.” Ex-2001, ¶81.

The '340 Patent specification explains the radio-frequency peripheral uses NFC and sets up communication with the mobile terminal. Ex-1001, 5:65-67. The specification also explains that the radio-frequency peripheral is “activated” when it “comes within the range of the electromagnetic waves emitted by the mobile terminal 1,” and specifically “the energy of the electromagnetic waves emitted by the mobile terminal” is what activates the peripheral. *Id.*, 6:1-9. POSITAs would have understood this to be consistent with passive RFID and NFC tags, which receive power from the reader to operate. Ex-2001, ¶¶80-83; §§II.C, II.E. Thus, POSITAs would have understood “activating” the radio-frequency peripheral using NFC means powering it. Ex-2001, ¶81.

Petitioners appear to agree with this interpretation. *See* Petition, 39 (“NFC tags are activated passive RFID tags powered and activated by electromagnetic waves”), 54 (“NFC communication...employs the claimed electromagnetic wave activation”), 71 (referencing ISO 14443 standard), 90 (“ISO 14443 protocol and standard as well as Fowler’s passive RFID tags, which includes the claimed activation”); Ex-2021, 13:21-24 (“So talking about NFC and talking about possibly verifying this, you are talking about a lack of local power source.”); Ex-2001, ¶81 (citing Ex-2008, Ex-2011).

Furthermore, Hanshow Germany GmbH (a related entity to Petitioners) has argued in an opposition to EP3883277 (a related European patent claiming priority

to PCT/FR2012/050791) that the radio-frequency peripheral is in fact a *passive* device. Ex-2025, 14-27. In particular, after discussing the disclosure of the original PCT application, Hanshow stated:

Based on this technical knowledge on the priority date, the skilled person understands that the original disclosure relates to an electronic tag with a radio frequency peripheral device which communicates in passive mode and cannot establish communication itself because it has no power supply from the radio frequency peripheral device and is therefore dependent on the mobile terminal device to establish communication and activate it energetically.

Id., 25-26 (original emphasis). Hanshow goes on to state “[t]he skilled person understands that such a tag activated by electromagnetic induction refers to a passive RFID or NFC tag which does not have its own power supply for the radio frequency peripheral device. Without prior activation by external energy, a passive label cannot communicate.” *Id.*, 27. Thus, Hanshow agrees that to “activate” the radio-frequency peripheral is to “power” it.

Accordingly, POSITAs would have understood that, when using NFC and passive tags, the tags are “activated” when they are powered by the magnetic field. Ex-2001, ¶83.

VI. PETITIONERS HAVE NOT ESTABLISHED BY A PREPONDERANCE OF THE EVIDENCE ANY CLAIM IS UNPATENTABLE

Petitioners present only obviousness grounds. Petition, 2-3. A claim is invalid under 35 U.S.C. §103(a) as obvious only if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a

whole would have been obvious at the time the invention was made” to the POSITA. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). An obviousness determination must be based on four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective indications of nonobviousness. *Id.* (citing *Graham v. John Deere Co. Kan. City*, 383 U.S. 1, 17-18 (1966)). A party alleging obviousness is “required to place themselves in the minds of those of ordinary skill in the relevant art *at the time the invention was made*, to determine whether that which is now plainly at hand would have been obvious at such earlier time.” *Millennium Pharms., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1367 (Fed. Cir. 2017). When a limitation is missing from the asserted prior-art references, this gap cannot be filled simply by blanket assertions of common sense, and “this is particularly true where the missing limitation goes to the heart of an invention.” *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362-63 (Fed. Cir. 2016).

Petitioners have not met this burden for any challenged claim under any ground of unpatentability (Grounds 1-4) as discussed in detail in §§VI.A-VI.C. Ex-2001, ¶¶95-97.

A. Grounds 1-2: Petitioners fail to show Fujiwara alone or in combination with Arntzen renders any challenged claim obvious

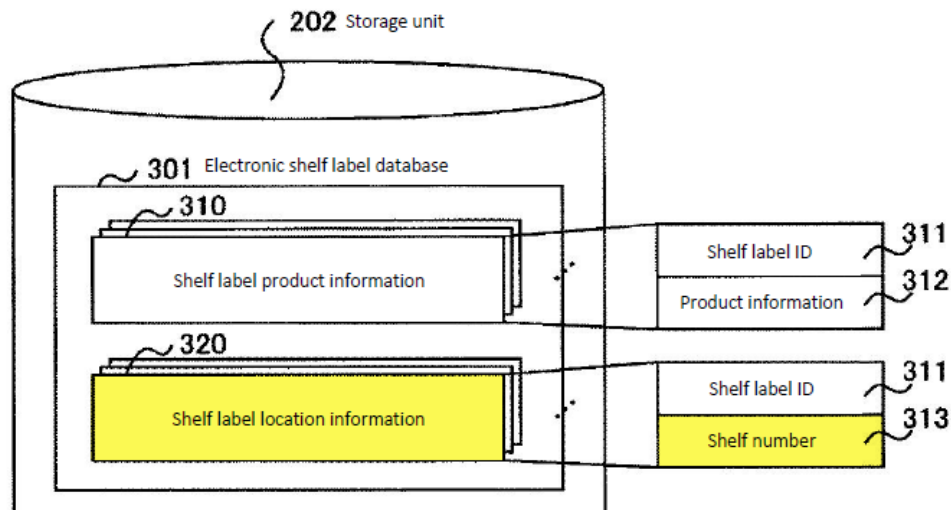
1. Claims 1 and 5 (and therefore all challenged claims)

a. Fujiwara does not disclose or renders obvious “planogram” ([1pre], [1b], [5a], and [5f])

In Grounds 1 and 2, Petitioners assert Fujiwara's database (310, 320) teaches the claimed “planogram.” Petition, 19-20, 31; Ex-1009, ¶¶73, 77, 99. Not so. Fujiwara's database does not constitute a “planogram” as the term is generally understood. Ex-2001, ¶¶98-106. Although Petitioners bore the burden to explain exactly why the database constitutes a “planogram,” they made no attempt to meet that burden.

Provided below is Fujiwara's database:

[FIG. 3]

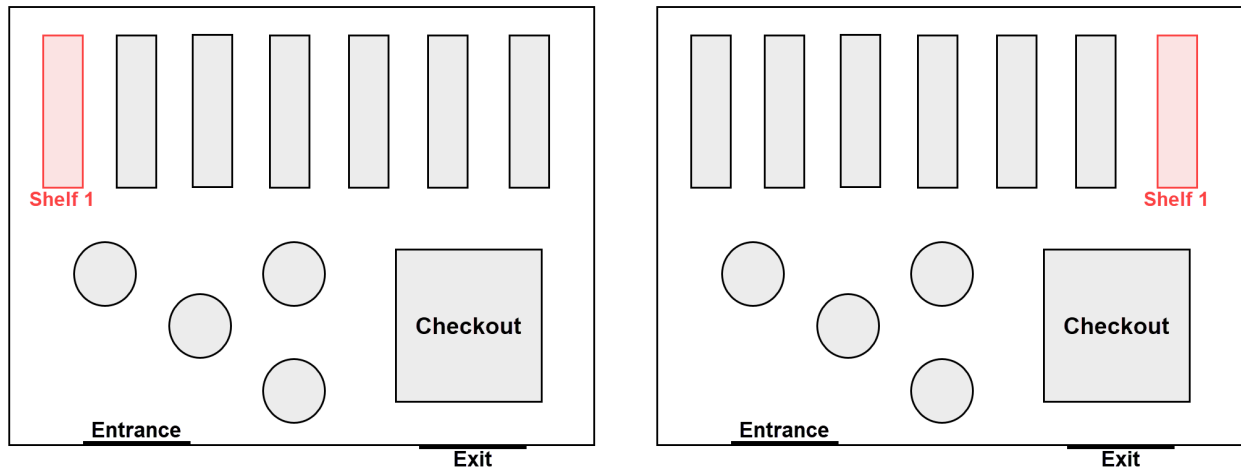


Ex-1003, Fig. 3 (annotated).

Fujiwara’s database has two components: (1) “shelf label product information” (310) that associates a “shelf label ID” (311) (e.g., a serial-like number for the ESL) to “product information” (312); and (2) “shelf label location information” (320) that associates the “shelf label ID” to a “shelf number.” Ex-1003, [0044], [0062], [0086], [0090], [0092], Figs. 3, 10, 12; Ex-1009, ¶71 (Plaintiffs’ expert recognizing Fujiwara discloses only “shelf label ID 311 and shelf number 313”); Ex-2001, ¶101. Using these two components (310, 320), the shelf number of a product can be determined. Ex-2001, ¶101.

But having only the shelf number of a label or product cannot constitute a “planogram” of the retail area for two reasons. *First*, a shelf number alone provides no information as to where products are located in the retail area. Ex-2001, ¶102. Fujiwara’s database does not, for instance, provide any information as to where the

shelf associated with each shelf number is located, or how each shelf code relates to one another (e.g., whether different shelf numbers are on the same shelf segment at different heights, or even the same aisle). Indeed, the shelf number can represent shelves in any conceivable location:



Ex-2001, ¶102. Because Fujiwara discloses only identifying the shelf number, without specifying a location of those shelves, or how each shelf is positioned relative to one another, Fujiwara's shelf numbers lack the sort of information considered necessary to plan product placement in a retail area, and therefore Fujiwara's database cannot constitute a "planogram." Ex-2001, ¶102.

Second, having only the shelf number of a label or product provides no information as to where a given product is on its assigned shelf, or the extent of shelf space each product is provided, which are also fundamental elements of a "planogram." See §V.B; Ex-2001, ¶103. Rather than track such information, Fujiwara simply discloses that, after a user finds the correct shelf number, a light indicator **on**

the shelf label itself indicates where along the shelf the product sits. *See, e.g.*, Ex-1003, [0006], [0046]. Thus, although Fujiwara discloses the location of a product can be determined in the retail area itself, the database is not what provides this information. Ex-2001, ¶103. Providing only a shelf number, as Fujiwara discloses, is again insufficient to enable retailers to plan out and track the particular arrangement of products on shelves, such as how much shelf space each product is given—the information planograms would have been understood to provide. *See* §V.B; Ex-2001, ¶103.

Critically, despite being a well-known term of art at the time, *see* §V.B, Fujiwara never uses the term “planogram.” But the Fujiwara applicant, at least, was aware of this term, as it filed another patent application around the same time directed to a “planogram information generation device.” *See, e.g.*, Ex-2026, Cover. And there, the Fujiwara applicant described a “planogram” as having a “product identifier and *coordinate information* in association with each another.” *Id.*, Abstract. This usage is consistent with the term’s plain meaning, and stands in stark contrast to Fujiwara itself, which chose *not* to describe its database the same way.

Because Fujiwara fails to use the well-known term “planogram,” the onus was on Petitioners to explain why Fujiwara’s database nonetheless constitutes one. Yet Petitioners identify *no* evidence or factual support explaining *why* POSITAs would have understood Fujiwara’s database to be a “planogram” apart from the opinion of

their expert, who simply recasts the shelf number as “locations” and summarily concludes the database is a “planogram.” *See* Ex-1009, ¶¶70-74. To prove obviousness, however, “a petitioner cannot employ mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016); *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (noting rejections based on obviousness must be supported by “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”); *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019) (stating “conclusory expert testimony is inadequate to support an obviousness determination” and reversing the Board’s decision since its obviousness determinations were based on conclusory expert testimony as opposed to substantial evidence). Petitioners’ expert’s opinion simply calling Fujiwara’s database a “planogram” therefore cannot suffice.

For this reason, POSITAs would not have understood Fujiwara’s database as constituting a “planogram,” as claimed. Ex-2001, ¶¶104-05. And because Petitioners offer no explanation for why such bare information would be considered a “planogram,” Petitioners have not shown any claim challenged in Grounds 1-2 is unpatentable.

b. Fujiwara does not disclose or render obvious “horizontal position” ([1pre], [1b], [5a], [5f]) or “associated one-to-one” ([1pre], [5a])

Limitation [1pre] recites, in relevant part, “each of the plurality of locations being defined by a vertical and *horizontal position* within a plane perpendicular to a floor of the predetermined area, and each of the plurality of locations being *associated one-to-one* with a corresponding unique identifier.” Limitation [1b] recites “determining a location of the mobile terminal within the predetermined area...*the location of the mobile terminal comprising the vertical and horizontal position of said location.*” In other words, the location associated with each “unique identifier” must include a vertical *and horizontal position*, and the association must be “one-to-one” between those positions and the “unique identifier.” Ex-2001, ¶¶107-108.

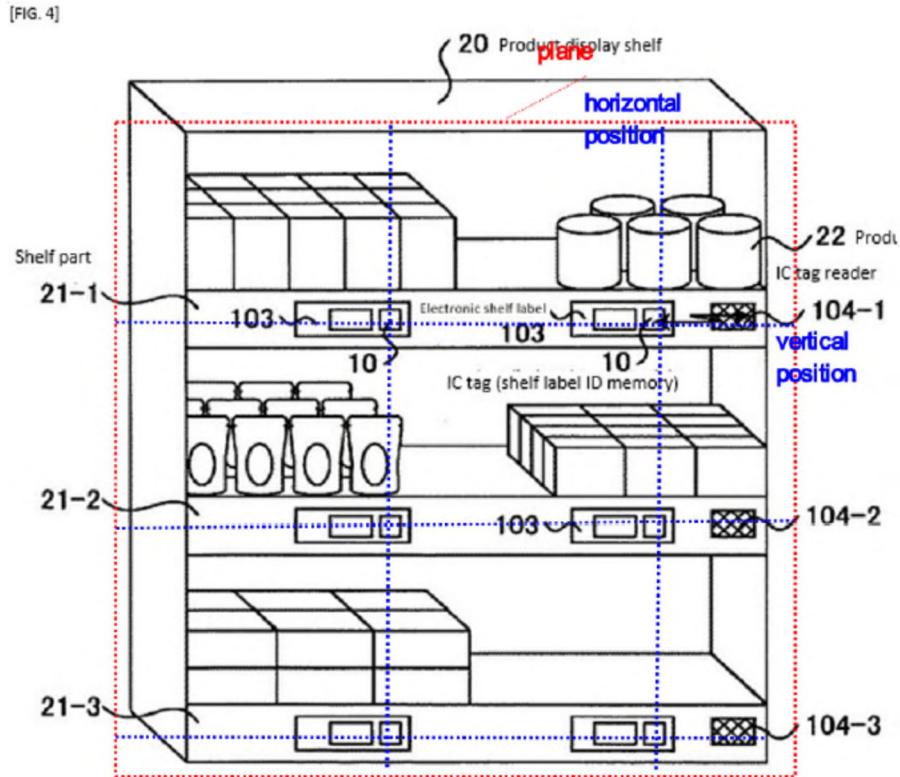
Even assuming Fujiwara's database (310) teaches a “planogram” (it does not, §VI.A.1), Fujiwara's database fails to associate a label's “unique identifier” with a horizontal position (as required by [1pre]) or have a central server determine a location that includes the horizontal position as part of the label location (as required by [1b]). Nor does Fujiwara disclose a one-to-one association between a label's “unique identifier” and the location with a vertical and horizontal position.

Because Petitioners have not sufficiently shown Fujiwara discloses the recited “horizontal position,” Petitioners have not shown any claim challenged in Grounds 1-2 is unpatentable.

(i) Fujiwara Only Tracks Shelf Numbers, and the Depiction in Figure 4 Does Not Represent the Contents of Fujiwara's Database

Petitioners contend Fujiwara's Figure 4 shows each label is provided with a vertical and horizontal position (Petition, 21), but this argument conflates an actual shelf according to Fujiwara's disclosure, Ex-1003, [0066], with the required *plano-gram*, which Petitioners argue is met by Fujiwara's the database (310). These are not the same thing, and Petitioners fail to articulate any basis on which to consider them as such.

Specifically, to contend Fujiwara discloses the claimed vertical and horizontal positions, Petitioners annotate Figure 4 (below) to include the identified "horizontal position." Petition, 22.



Ex-1003, Fig. 4 (annotated by Petitioners).

But simply drawing in a limitation (the horizontal position) that Fujiwara itself does not disclose in its database cannot satisfy Petitioners' burden. *See Advanced Lighting Concepts v. Mate, LLC*, IPR2023-01258, Paper 9, 16 (Feb. 13, 2024) (explaining petitioner failed to demonstrate the prior art disclosed a limitation because petitioner relied on part of the specification and figures that did not mention the limitation). Indeed, Fujiwara discloses Figure 4 is “a diagram **depicting the appearance configuration** of the electronic shelf label 103 and IC tag reader 104,” Ex-1003, [0066], [0113], and thus represents an actual shelf consistent with Fujiwara's disclosure. Ex-2001, ¶¶109-116. Fujiwara never suggests Figure 4 represents the

contents of database (310), or that database (310) contains all of the details shown in Figure 4. *Id.* The Board's reliance on Figure 4 in the Institution Decision was therefore respectfully misplaced. Paper 11, ("DI"), 27-28.⁴

With respect to **database** (310) (which Petitioners contend is the claimed "pl-nogram"), Fujiwara discloses only associating a "shelf label ID" to a shelf number (not a horizontal position). Ex-1003, [0009] ("'Location information' is the shelf number of the product display shelf"), [0066], Fig. 4; Ex-2001, ¶110. That is because Fujiwara is concerned only with providing a shelf number on request, and then using a light indicator on the label to draw attention to the more-specific location of a product along that shelf, *see, e.g.*, Ex-1003, [0006]; no more information is needed, Ex-2001, ¶114, and Petitioners never explain why Fujiwara would be modified to acquire any additional information such as a horizontal position. At base, Fujiwara does not associate a "unique identifier" with a horizontal position as required by the claim. Ex-2001, ¶114. And because Fujiwara never stores a horizontal position in

⁴ The Board's conclusion in the Institution Decision that "defining a location in a two-dimensional plane requires specifying [an X and Y coordinate]" is also not correct. Ex-2001, ¶111. Not only did Petitioners not make this argument, but a location in a two-dimensional plane can be defined other ways, such as through vectors and angles, or other shapes. Ex-2001, ¶111.

the database, there is no horizontal position available to determine a location of a mobile terminal, as required by limitation [1b]. Ex-2001, ¶115.

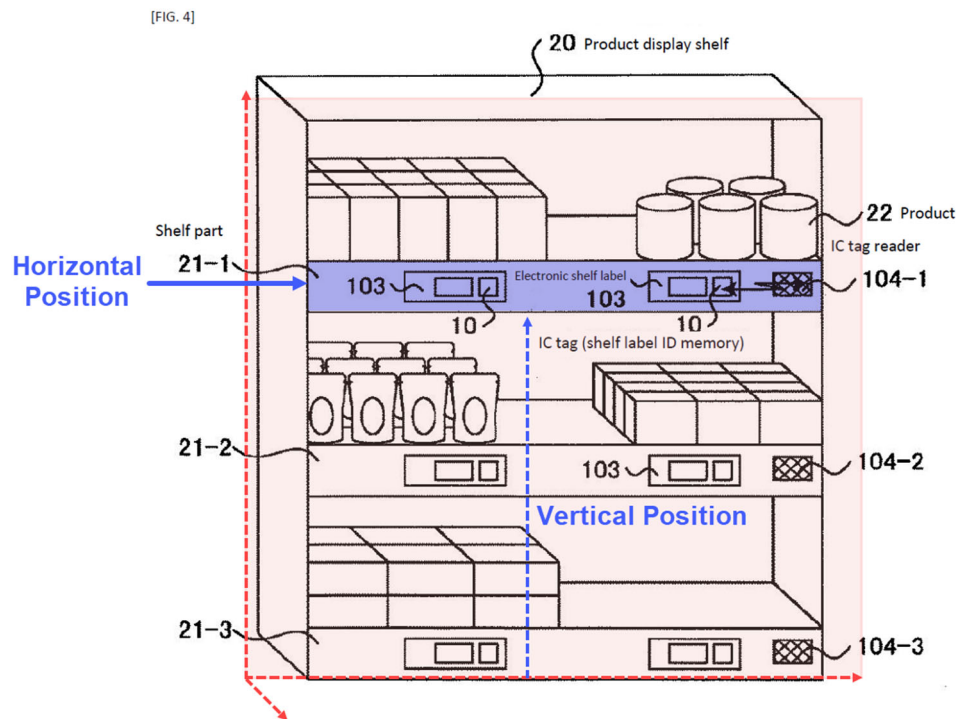
Finally, because Fujiwara defines “location information” as including only a shelf number, Fujiwara also fails to disclose the claimed “one-to-one” association between a “unique identifier” (i.e., Fujiwara’s “shelf label ID”) and the vertical and horizontal positions. Ex-2001, ¶116. As Fujiwara shows in Figure 4, multiple labels can be placed on a single shelf, and therefore they would have the exact same entries in the “location information” portion of database (310). This would, in turn, produce at least a two-to-one, or more, association between the unique identifier and vertical and horizontal positions.

(ii) Petitioners’ Alternative Theories Fail to Show Fujiwara Discloses Associating an Electronic Shelf Label with a Horizontal Position

Petitioners’ alternative theories are unclear and unsupported. Ex-2001, ¶¶117-122.

First, Petitioners argue the whole shelf (which provides the “vertical position”) can also be the horizontal position. *See* Petition, 32-34 (showing annotated Figure 11). But such a view would render the claimed “horizontal *position*” meaningless, as a shelf contains multiple “horizontal positions” along it. Ex-2001, ¶118; *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 951 (Fed. Cir. 2006) (rejecting claim construction that would have made limitation “meaningless”); *Exxon Chem. Pats.*,

Inc. v. Lubrizol Corp., 64 F.3d 1553, 1557 (Fed. Cir. 1995) (“We must give meaning to all the words in [patent] claims.”). Moreover, such a view would vitiate [1pre]’s further requirement that “each of the plurality of locations being associated **one-to-one** with a corresponding unique identifier,” because Fujiwara shows that each shelf has multiple labels with their own shelf label ID. *See, e.g.*, Ex-1003, Fig. 4 (annotated below). Petitioners’ view would therefore lack a “one-to-one” correspondence between unique identifiers and locations because all labels on the same shelf would have the same horizontal and vertical positions. Ex-2001, ¶118.



Ex-1003, Fig. 4 (annotated).

Second, Petitioners further speculate, and the Board agreed for institution purposes, that “a POSITA...would find it obvious that multiple product display shelves

20 can be placed side by side within an aisle, and thus the horizontal position of a product display shelf 20 within the aisle is the claimed horizontal position.” Petition, 22 (citing Ex-1009, ¶76). Not only would such a view fail to teach the “one-to-one” correspondence for the reasons discussed above (i.e., because each shelf segment in a line can have multiple labels), Ex-2001, ¶120, but Petitioners provide no support for this assumption.

The only support Petitioners cite is a repeat of the arguments in the Petition and one additional statement from their expert—Dr. Tentzeris—who opines that “Fujiwara discloses a plurality of product display shelves in Ex. 1003, [0097].” Ex-1009, ¶76. But paragraph [0097] merely discusses dividing the entire sales floor into zones, with each zone having multiple product display shelves. *See* Ex-1003, [0097]. Fujiwara never discloses that shelving units (whether in zones or not) are positioned side by side such that each shelf is associated with a “horizontal position.” Ex-2001, ¶121. Neither Petitioners nor their expert explain why shelves with particular numbers *must* be placed side-by-side in a way that sufficiently constitutes a “horizontal position,” let alone why POSITAs would be motivated to do so. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (stating that arguing one of skill “could” have made combination is insufficient). Dr. Tentzeris’s conclusory statements otherwise are wholly insufficient. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15-16 (Aug. 24, 2022) (precedential) (affording expert

opinion little to no weight or probative value when it replicates the flawed analysis of the petition verbatim and fails to “cite to any additional supporting evidence or provide any technical reasoning to support” the opinion); *TQ Delta*, 942 at 1362 (rejecting “*ipse dixit* declaration” that was “[u]ntethered to any supporting evidence, much less any contemporaneous evidence”); *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012) (rejecting “a conclusory statement” regarding what “a person of ordinary skill in the art would have known” as “not sufficient” and “fraught with hindsight bias”).

c. Neither Fujiwara nor Arntzen disclose or render obvious “activated” ([1a], 2, [5c])

Limitation [1a] recites, in relevant part, “wherein the radio-frequency peripheral...is configured to be *activated by the mobile terminal*...within a communication range...wherein the communication range is less than twenty centimeters.” Independent claim 5 recites a similar limitation in [5c], but Petitioners merely refer back to their analysis of claim 1. *See* Petition, 42-43. Claim 2 recites “...energy of electromagnetic waves emitted by the mobile terminal *activating* the radio-frequency communication peripheral...” When “activated” is properly construed, the radio-frequency peripheral must be powered by the mobile terminal at distances less than 20 centimeters from the radio-frequency peripheral. Ex-2001, ¶¶123-24. But neither Fujiwara alone (Ground 1) nor in combination with Arntzen (Ground 2) disclose a passive radio-frequency peripheral that “is configured to be activated by the mobile

terminal.” Ex-2001, ¶¶123-24. For this reason, Petitioners have not shown any claim challenged in Grounds 1-2 is unpatentable.

(i) Fujiwara

To teach the claimed “activated,” Petitioners cite Fujiwara’s steps S1402-S1405 (Ex-1003, [0104], Fig. 14) and provide a single-sentence analysis:

A POSITA would recognize that the sequence of the IC tag reader 506 transmitting *a resonant call-up signal* to the IC tag 10 and then the IC tag 10 receiving the call-up signal and transmitting a response signal is a sequence *whereby the radio-frequency peripheral is activated* by the mobile terminal.

Petition, 26. Petitioners’ expert declaration parrots this statement and then opines that the limitation is met. Ex-1009, ¶85. But Petitioners again provide no explanation of how or why Fujiwara’s “resonant call-up signal” would “activate” (i.e., power) its tags. Ex-2001, ¶¶125-129.

It would not. Fujiwara explains that its tags are *not* powered by its IC tag reader 506. *Id.*, ¶126. In describing tag 10, Fujiwara explains that “electronic shelf label 103 [which houses tag 10] has a solar cell or thin battery (not depicted) as a drive source.” Ex-1003, [0071]; *see also id.*, [0067]. POSITAs would have understood that, because tag 10 is incorporated into label 103 and the label is powered by a power source, tag 10 is *active*, not *passive*, and therefore need not be “activated” by an external source. Ex-2001, ¶126. Petitioners have not provided any evidence or argument to the contrary. Petition, 19, 26.

Moreover, while Fujiwara does not explain what a “resonant call-up signal” is, it does disclose the IC tag reader “*transmits* a call-up signal resonant with respect to the electronic shelf label 103 (with integrated IC tag 10)” and then reads the response signal from the tag. Ex-1003, [0072], [0082]. Fujiwara further discloses that in response to receiving the resonant call-up signal, tag 10 “transmits a response signal.” *Id.*, [0085], [0092], [0104]. As Dr. Surati explains, POSITAs would have therefore understood Fujiwara’s “resonant call-up signal” is merely an initial communication to resonate the antenna of the tag to tell the tag that it is being addressed, and not a means of activating the label to respond. Ex-2001, ¶¶127-28 (citing Ex-2020, [0003]-[0005]; Ex-2022, 7:26-41).

(ii) Arntzen

Petitioners’ combine Fujiwara with Arntzen in Ground 2 to incorporate NFC. Petition, 54-55. This does not save Petitioners’ obviousness case.

To start, POSITAs would not have modified Fujiwara to use NFC for multiple reasons, including because modifying Fujiwara’s tags to use NFC would render the embodiments on which Petitioners rely inoperable for their intended purposes. *See* §VI.A.1.e, *infra*. And anyway, taken together the combination fails to disclose the label is “activated.” Ex-2001, ¶¶130-32. Specifically, Arntzen, like Fujiwara, discloses only *active* labels—not *passive* ones that are activated through a wireless signal—because Arntzen discloses the labels are powered either by a battery or electric

rail in the shelf itself. Ex-1005, 9:17-18, 13:31-14:10; Ex-2001, ¶131. Petitioners never attempt to address this deficiency in their prior art.

d. Neither Fujiwara nor Arntzen render obvious the recited “communication range is less than twenty centimeters” ([1a], [5c])

Limitation [1a] requires the radio-frequency peripheral to be “activated” (i.e. powered) by the mobile terminal when the communication range of the radio-frequency peripheral is no more than 20 centimeters. Independent claim 5 recites a similar limitation in [5c], but Petitioners merely refer back to their analysis of claim 1. *See* Petition, 42-43. Neither Fujiwara alone (Ground 1) nor in combination with Arntzen (Ground 2) disclose or render this limitation obvious (Ex-2001, ¶¶133-34), and for this reason, Petitioners have not shown any claim challenged in Grounds 1-2 is unpatentable.

(i) Fujiwara

Fujiwara does not disclose that the “communication range is *less than twenty centimeters*.” *Id.*, ¶¶135-43. Petitioners rely on Fujiwara’s disclosure of the tag reader reading the “response signal from the IC tags 10, 11 at a distance of several to several tens of centimeters” as disclosing this limitation. Petition, 26. Petitioners argue the claimed range is not critical and thus “is *prima facie* evidence of obviousness for the claimed ‘less than twenty centimeters.’” *Id.*, 27. Petitioners’ expert attempts to support this assertion with an inapposite citation to a patent describing

NFC (which has a much shorter communication range than the microwave frequency of Fujiwara's tags). Ex-1009, ¶48; Ex-2001, ¶¶141, 143.

Contrary to Petitioners' assertions, the claimed range is critical to the inventions of the '340 Patent. The presumption of obviousness based on a claimed invention that falls within a prior art range can be rebutted by showing "(1) [t]hat the prior art taught away from the claimed invention...or (2) that there are new and unexpected results relative to the prior art." *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, (Fed. Cir. 2004).

The '340 Patent explains a communication range of less than 20cm "firstly ensures matching between the location of the electronic label 3 and the mobile terminal 1 and secondly allows interference to be limited between electronic labels when they are positioned close to one another." Ex-1001, 6:54-58. "[T]he uniqueness of the label identifier and of the location associated with each electronic label 3 allows unambiguous determination of the location of the electronic label 3 from its identifier, and as a result it is possible to determine the location of the mobile terminal 1." *Id.*, 6:43-47. The short range also prevents surreptitious use of the system. *Id.*, 6:59-65. Thus, POSITAs would have understood the claimed range is critical to the '340 Patent and must be less than 20cm; otherwise, its advantages could not be realized. Ex-2001, ¶138. These advantages were new over microwave RFID and would not have been realized with microwave RFID's comparatively long range. *Id.*

Moreover, the system disclosed in Fujiwara was intended to operate in exactly the opposite way as that of the '340 Patent. Whereas the '340 Patent reads one ESL at a time, Fujiwara was intended to read more than one label at a time. Ex-2001, ¶139; Ex-1003, [0072], [0082], [0090], [0103]-[0104], Figs., 4, 11, 12, 14. In that context, Fujiwara's disclosure of "several to several tens of centimeters" makes sense because Fujiwara's system was intended to read multiple labels at the same time. Unless all of Fujiwara's labels were spaced exceedingly close together, a reading range of less than 20 centimeters (approximately 8 inches) would undermine the ability of reading multiple labels together. Ex-2001, ¶142. But, at the same time, placing the tags very close together (e.g., less than 20cm) would cause substantial interference between labels that use NFC, requiring additional measures and protocol implementations to make NFC work. *Id.*, ¶142; Ex-2024 ("Tentzeris Dep. Tr."), 15:5-22 (explaining that in "an application where you have multiple transponders...interference would be an issue"). Petitioners completely ignore these issues in their proposed modification of Fujiwara. Ex-2001, ¶¶142-43.

(ii) Arntzen

Petitioners rely on Arntzen in Ground 2 to address NFC and the claimed communication range that is less than twenty centimeters. Petition, 54-55. As explained below in §VI.A.1.e, however, POSITAs would not have modified Fujiwara to use NFC in the first instance. Ex-2001, ¶144.

e. Neither Fujiwara nor Arntzen disclose or render obvious “an antenna and an electronic chip configured for near-field communication” ([1a], [5c])

Limitation [1a] recites that “the radio-frequency peripheral includes an antenna and an electronic chip configured for *near-field communication*.” Independent claim 5 recites a similar limitation in [5c], but Petitioners merely refer back to their analysis of claim 1. *See* Petition, 42-43. But neither Fujiwara alone (Ground 1) nor in combination with Arntzen (Ground 2) render obvious this limitation (Ex-2001, ¶¶145-46), and for this reason, Petitioners have not shown any claim challenged in Grounds 1-2 is unpatentable.

(i) Fujiwara

At bottom, Petitioners' arguments for this term fail because neither Petitioners nor their expert have provided any motivation for modifying Fujiwara's tags (10 or 11) to use NFC rather than the microwave communications that Fujiwara was specifically designed to use. Ex-2001, ¶¶147-53.

Petitioners initially argue for [1pre] that Fujiwara's use of a microwave frequency tag reader “is merely a preferred embodiment...and does not limit the communication **protocol** between the IC tag reader and the IC tag.” Petition, 18. Petitioners then make the logical leap that even though Fujiwara expressly discloses microwave tags, POSITAs would have found it obvious to implement Fujiwara using RFID tags and specifically as “NFC tag conformant with [the] ISO 14443” standard.

Petition, 18-19. Petitioners rely on Dr. Tentzeris, who states without any analysis that this is a “mere substitution” and a “POSITA would have a reasonable expectation of success in doing so.” Ex-1009, ¶¶69-70. This is not a simple substitution.

The difference between microwave-frequency tags and NFC tags is more than just a difference in communication protocol. Ex-2001, ¶148. The two have vastly different antennas, power requirements, and as explained in §§II.C, II.E, different communication principles and ranges. *Id.* POSITAs would not have had an expectation of success because substituting microwave RFID with NFC requires modifications to the entire communication system from hardware to transmission protocols and must account for the materials the tags are placed on and the desired distance of communication. *Id.*

As justification for the modification, Petitioners rely on Dr. Tentzeris's recitation of the reasoning disclosed in the '340 Patent. Petition, 19; *compare* Ex-1009, ¶70 (increased communication security), *with* Ex-1001, 4:57-59, 6:59-65. Dr. Tentzeris also states, at the time of the '340 Patent, NFC tags were readily available for this application as shelf labels. Ex-1009, ¶70. Not so; in 2011, NFC was primarily used for financial transactions and access control applications, not shelf labels in stores. Ex-2001, ¶149.

Although Petitioners present a litany of advantages to using NFC in Fujiwara's system (Petition, 28-29), modifying Fujiwara's tags to use NFC would render

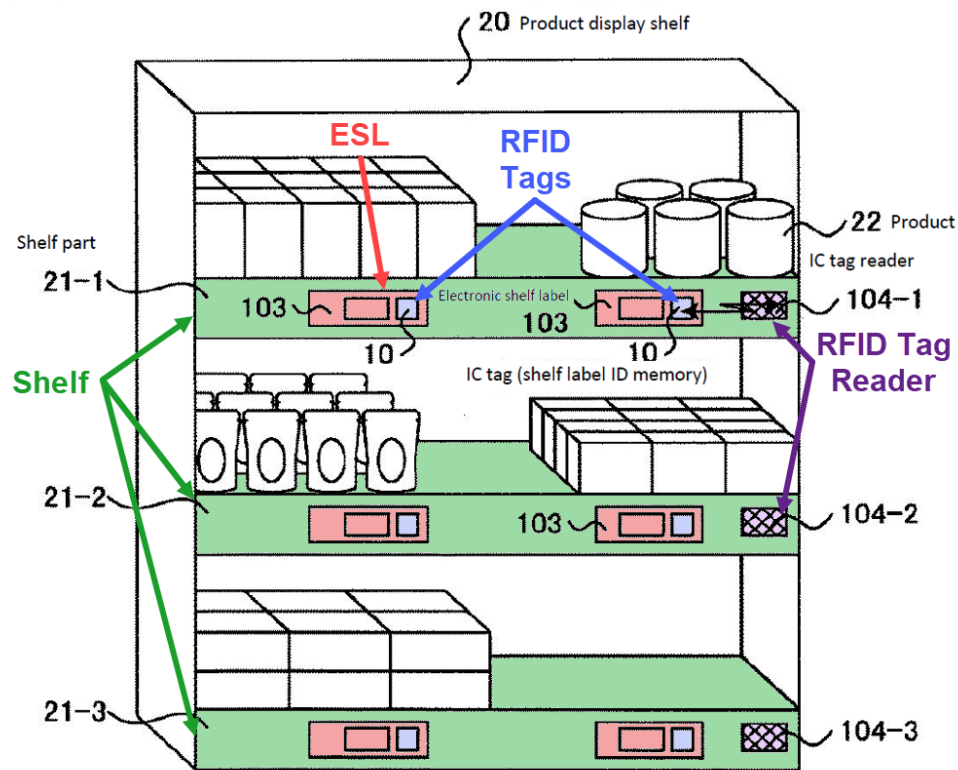
the embodiments on which Petitioners rely (Figures 4 and 11)⁵ inoperable for their intended purpose. *See* §VI.A.1.d(i) (explaining issues with spacing labels that use NFC); *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (no motivation to modify a device by making it “inoperable for its intended purpose”); *Cook Grp. Inc. v. Bos. Sci. Scimed, Inc.*, 809 F. App’x 990, 1001 (Fed. Cir. 2020) (“the Board may consider whether the modification renders the reference inoperable for its intended function in deciding whether a POSA would have a motivation to combine the references, even if that function is not a feature of the claimed device at issue”).

For the Figure 4 embodiment, Fujiwara’s tag readers (104) ***must*** be able to read tags over considerable distances beyond the capabilities of NFC. Ex-2001, ¶151. That is because Fujiwara discloses tag readers (104) “are provided in a state where the shelf label ID stored in the IC tag 10 integrated in one or more electronic shelf labels 103 **on the same shelf part 21 on the front side of the shelf** can be read collectively without contact at each shelf part 21-1, 21-2,...of the product display

⁵ For limitation [1pre], Petitioners rely on Fujiwara’s Figure 4 embodiment, and address NFC despite that limitation not appearing in [1pre]. Petition, 22. For limitation [1a], Petitioners rely on Fujiwara’s Figure 11 embodiment, and then address NFC again. Petition, 25.

shelf 20.” Ex-1003, [0066]. Accordingly, in the example shown below, reader (104) on shelf (21-1) must be able to read **both** tags (103) on that shelf. Ex-2001, ¶151.

[FIG. 4]

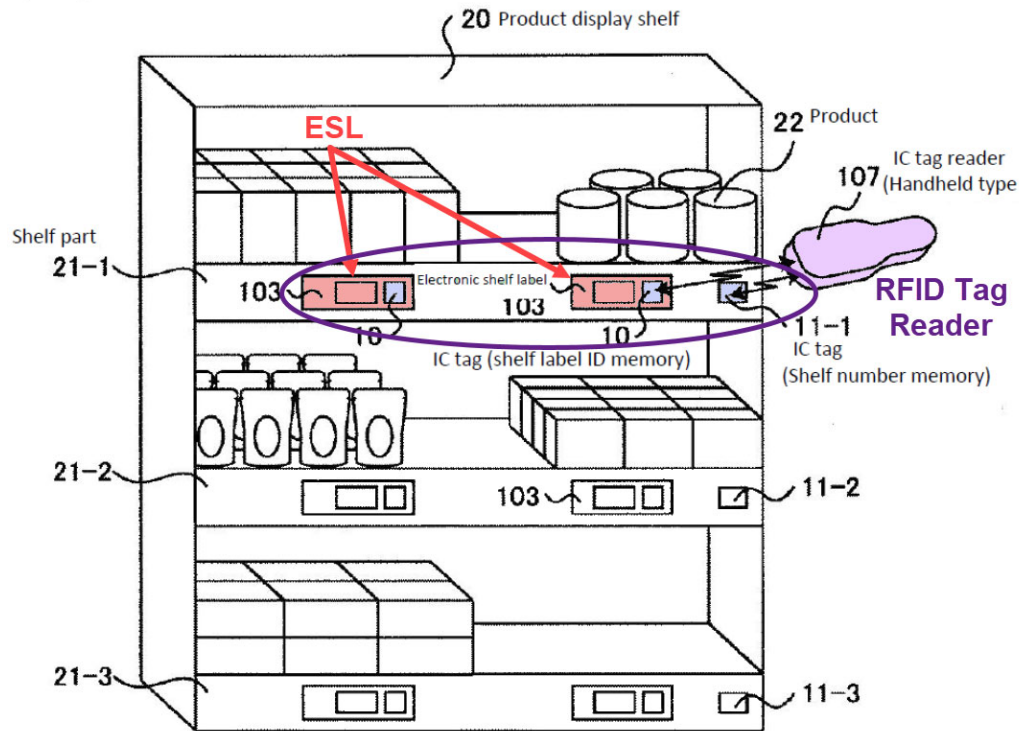


Ex-1003, Fig. 4 (annotated).

POSITAs would not have understood these tags to be spaced within NFC-communication range; rather they would have required Fujiwara's disclosed microwave frequency RFID. *Id.* Moreover, POSITAs would have recognized NFC would not allow reading of Fujiwara's tags because of its short range and because NFC requires inducing a magnetic field in the receiving tag, which is not possible at the shown distances (especially through a metallic shelf). *Id.*

The same is true of the Figure 11 embodiment. Ex-2001, ¶152. Specifically, Fujiwara explains multiple tags can be read by “manually hold[ing] the hand-held type IC tag reader 107 *over each shelf part 21 (IC tags 10, 11)* of the product display shelf 20 when confirming the location of the product (step S1201).” Ex-1003, [0091]; *see also id.*, [0090] (“[t]he hand-held type IC tag reader 107 reads the IC tags 10 (shelf label ID 311 memory) of *one or more electronic shelf labels 103* of each shelf part 21 of the product display shelf 20 *and the IC tag 11* (shelf number 313 memory).”). Fujiwara also explains reader 506 transmits a resonant call-up signal to tags 10 (S1402) and “receives a response signal from the IC tags 10 of the surrounding electronic shelf labels 103 (step S1404), and *collectively reads the shelf label IDs 311 stored in the memories of the IC tags 10* (step S1405).” Ex-1003, ¶104. Fujiwara thus discloses reading *multiple tags* simultaneously in these embodiments. Ex-2001, ¶152.

[FIG. 11]



Ex-1003, Fig. 11 (annotated).

POSITAs would have understood that reading multiple tags simultaneously at such a range (e.g., the entire shelf) would again require longer-range communication provided by Fujiwara's disclosed microwave RFIDs. *Id.* Substituting NFC for microwave RFID would have prevented Fujiwara's tag reader (107 and 506) from reading more than one tag at a time because (1) the tags would be too far apart and (2) even if the magnetic field could power more than one tag at a time, there would be interference for which Petitioners do not account. *Id.* Dr. Tentzeris acknowledged these concerns in deposition. Ex-2024, 12:5-8.

(ii) **Arntzen**

Petitioners also rely on Arntzen in Ground 2 to address NFC. Petition, 54-55. But Petitioners merely point to Arntzen's disclosure of NFC and state "Arntzen discloses electronic displays that are functionally and structurally analogous to Fujiwara's IC-tag-embedded electronic shelf labels, and Arntzen's electronic displays are implemented with the claimed NFC technology. Therefore, Arntzen supplies the NFC tag modification." Petition, 55. Petitioners' expert merely parrots this conclusion. Ex-1009, ¶159.

As an initial matter, Petitioners' assertions are deficient because they do not explain what part of Arntzen's electronic displays would modify Fujiwara's labels. Ex-2001, ¶¶154-55. Nor do they explain how such a modification would be accomplished. *Id.*, ¶155. Petitioners' mere conclusion that because NFC already existed and ***could*** be incorporated into Fujiwara is insufficient to meet Petitioners' burden. *See, e.g., Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 886 (Fed. Cir. 2024) ("It does not suffice to meet the motivation to combine requirement to recognize that two alternative[s]...were both known in the art."). Further, as explained in §VI.A.1.e(i), modifying Fujiwara's tags to use NFC would render it inoperable for its intended purpose. Ex-2001, ¶155.

2. Claim 6: Neither Fujiwara nor Arntzen render obvious “an electronic label which comprises: a radio-frequency communication module configured to receive data representing information relating to an item from a central server”

Claim 6 depends from claim 5, and so is not unpatenable under Grounds 1 and 2 for the reasons discussed above. In addition, as explained below, Fujiwara, either alone (Ground 1) or in combination with Arntzen (Ground 2), fails to render claim 6's additional limitations obvious. Ex-2001, ¶¶156-57.

a. Fujiwara

Limitation [6a] requires “an electronic label which comprises: a radio-frequency communication module configured to receive data...from a central server.” Petitioners acknowledge Fujiwara does not teach limitation [6a]—because Fujiwara discloses using *infrared*, not radio-frequency communications between a label and central server, Ex-1003, [0067], [0070], [0097]—but insist a POSITA's general knowledge of “conventional radio frequency communication” would render the claimed “radio-frequency communication module” obvious, Petition, 46. Specifically, Petitioners contend the modification would “harmonize the internal design of two different components (wireless transmitting and receiving unit 603 and IC tag 10) of Fujiwara's electronic shelf label 103 by employing one single communication method for both.” Petition, 46; Ex-2001, ¶¶158-61. Petitioners argue POSITAs would therefore replace Fujiwara's longer-distance infrared communication (Ex-

1003, [0067]) with short-range NFC to allow a label to communicate with a central server. Petition, 46-47.

That makes no sense. POSITAs would have understood modifying Fujiwara as Petitioners propose would undermine the entire point of Fujiwara. Ex-2001, ¶160. Fujiwara discloses longer-range communication between labels and the central server occurs through “distributing devices” (102)—not the reading device (131)—placed in various “zones” throughout the store that communicate with each label using infrared and then relay that information to the server. Ex-1003, [0045], [0097]; Ex-2001, ¶160. But, as discussed previously, NFC has a communication range limit on the order of centimeters. Ex-2001, ¶160. Under Petitioners’ proposed modification, therefore, for a label to communicate with the central server, the label would need to be taken off the shelf and brought into close proximity with either a “distributing device” (102) or central server to obtain any information from the server. *Id.*, ¶161. Petitioners offer no explanation why POSITAs would have been motivated to make such a change.

b. Arntzen

Petitioners further rely on Arntzen in Ground 2 to address the radio-frequency communication module in claim 6, arguing Arntzen would have motivated POSITAs to modify Fujiwara to use a specific “Zigbee” radio-frequency protocol to

communicate with a central server. Petition, 55. But Petitioners fail to explain why POSITAs would have been motivated to make this change.

Arntzen explains there are two communication methods known in the art: infrared (like Fujiwara) and radio signals. Ex-1005, 3:31-35. Arntzen further discloses infrared solutions are more prevalent and work well for their intended purpose. *Id.*, 4:26-28, 4:34-5:6. The only disadvantages of infrared Arntzen identifies is its cost and need for a central database/hub for integrating with a store's point-of-sale (POS) system. *Id.*, 4:34-5:6; Ex-2001, ¶¶162-67. But these disadvantages are not relevant to the proposed combination with Fujiwara, which already discloses a central database/hub for integrating with a POS system. Ex-1003, Fig. 1; Ex-2001, ¶163.

Petitioners articulate no reasoning to implement Arntzen's Zigbee in Fujiwara's labels, other than reciting a few disjointed advantages, while ignoring its disadvantages. Ex-2001, ¶¶164-65. *In re Schweickert*, 676 F. App'x 988, 996 (Fed. Cir. 2017) (vacating PTAB obviousness ruling for lack of substantial evidence because substitution would...solve no problem in primary reference, add unwanted cost and complexity, and be difficult to implement). Petitioners argue, for instance, that substituting infrared for ZigBee results in "cost reduction, easy installation, and centralized control over those with infrared communications." Petition, 55. But Arntzen further explains the ZigBee solution has "an uncertain degree of communication" and "reliability of the systems." Ex-1005, 4:5-9. Furthermore, the ZigBee "solution

is also dependent on its own software and PC unit...with the negative responses this often entails.” *Id.*, 4:9-13. And as with infrared systems, ZigBee must also be integrated with the POS system. *Id.* POSITAs would not have undertaken the expense and complexity of modifying Fujiwara’s system with Arntzen’s, especially when it provided no advantage because Fujiwara’s system was already integrated with the store server. Ex-2001, ¶165.

Petitioners further rely on their proffered motivations for Ground 1 (Fujiwara alone), Petition, 55-56, but, in Ground 1, Petitioners propose modifying Fujiwara to use NFC to “harmonize” the communication protocols, Petition, 45-50. Incorporating ZigBee—a different communication protocol—would therefore *undermine* Petitioners’ proffered Ground 1 motivations. Ex-2001, ¶166.

**3. Claim 7: Neither Fujiwara nor Arntzen Render Obvious
“the mobile terminal is adapted to transmit data to the electronic label via the radio-frequency communication module of said electronic label”**

Claim 7 depends from claim 6 and is thus not unpatentable for the same reasons.

Further, limitation [7a] requires that the mobile terminal also transmits to the labels using the radio-frequency communication module. Ex-2001, ¶¶168-71. As explained below, Fujiwara, either alone (Ground 1) or in combination with Arntzen (Ground 2), fails to render obvious this limitation. *Id.*

Petitioners argue that because they proposed modifying Fujiwara's infrared communication to use NFC to communicate with the store server, the mobile terminal would also communicate with the label using NFC. Petition, 49-50. As explained above for claim 6, using NFC to communicate with the store server would render Fujiwara inoperable. Ex-2001, ¶170.

As also explained above, Petitioners rely on Arntzen in Ground 2 to address the radio-frequency communication module in claim 6. Petition, 55. Even if Fujiwara's tag is modified to use Zigbee to communicate with the store server, Petitioners fail to address Fujiwara's mobile terminal communicating with Zigbee. Ex-2001, ¶171.

B. Grounds 3-4: Petitioners fail to show the Bandy-Fowler combination or those references in further combination with Arntzen renders any challenged claim obvious

1. Claims 1 and 5 (and therefore all challenged claims)

a. Bandy and Fowler do not disclose or renders obvious “vertical and horizontal positions” ([1pre], [1b], [5a], [5f])

Limitation [1pre]—which is limiting, §V.A—recites “a central server configured to access a planogram *associating a plurality of unique identifiers...with a plurality of locations...each of the plurality of locations being defined by a vertical and horizontal position within a plane perpendicular to a floor...* and each of the plurality of locations being associated one-to-one with a corresponding unique identifier.” Limitation [1b] recites “determining a location...*the location of the mobile*

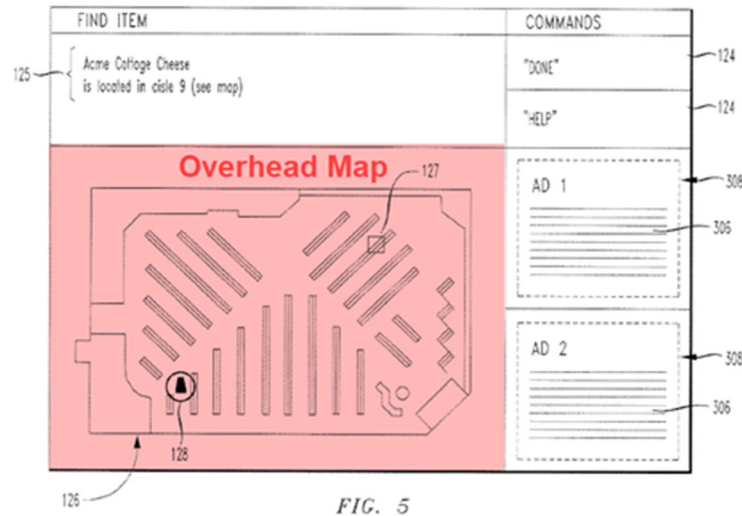
terminal comprising the vertical and horizontal position of said location.” Independent claim 5 recites similar limitations in [5a] and [5f], but Petitioners merely refer back to their analysis of claim 1. Petition, 82-83. Each of the remaining challenged claims depend from either claims 1 or 5. Bandy and Fowler (Grounds 3 and 4), however, fail to render obvious the claimed “vertical position” and “horizontal position.” Ex-2001, ¶¶172-82.⁶

Petitioners concede “Bandy alone discloses...every limitation of [1pre]...except for the ‘vertical and horizontal position’ limitation, while Fowler supplements that limitation.” Petition, 69. But Petitioners’ proposed Bandy-Fowler combination fails for several reasons.

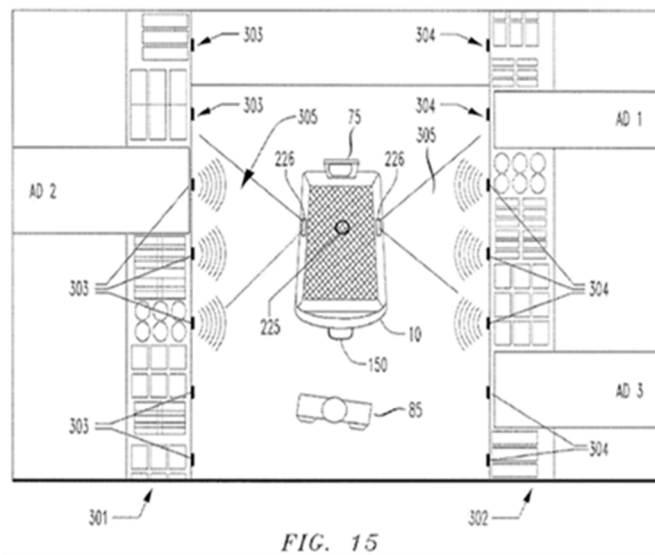
First, although Fowler mentions using a “planogram,” Ex-1007, [0221], Fowler never contemplates tracking *a vertical* position as part of the planogram. Instead, Fowler repeatedly and exclusively describes the purpose of the invention is to determine the location of a shopping cart in an x-y plane *parallel* to a store floor by reading RFID tags of nearby products and presenting relevant (advertisement) information based on the location in the store. *See, e.g.*, Ex-1007, Abstract, [0004]-[0005], [0081], [0088], [0097], [0142]-[0152], [0153] (“With the inventory of

⁶ Petitioners rely on Arntzen in Ground 4 only to address NFC, which does not address the deficiency regarding the claimed “position.” Petition, 91-92.

locations in the system, locations may then be evaluated to determine cart position as a relative x,y coordinate within store map.”). In other words, Fowler is concerned with presenting a top-down map of the store as shown in Figures 5 and 15 (annotated):

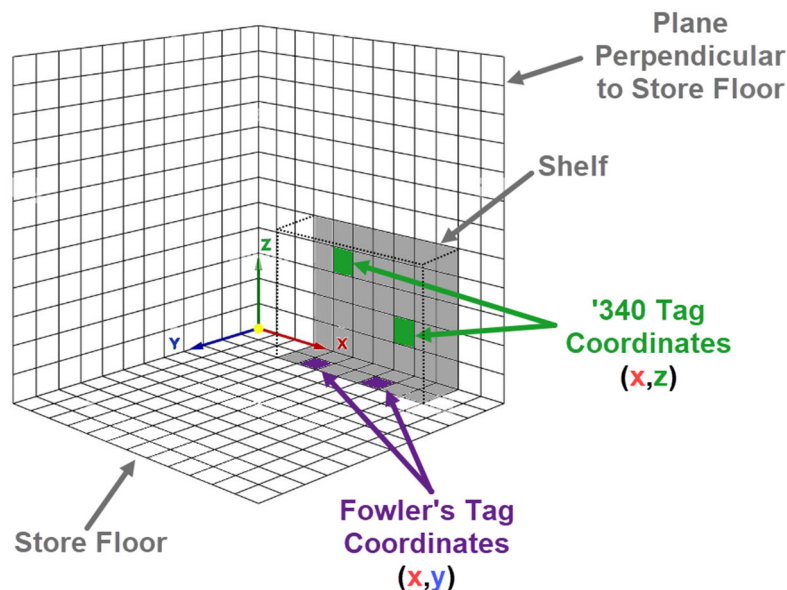


Ex-1007, Fig. 5 (annotated).



Ex-1007, Fig. 15.

POSITAs would have known, however, that to achieve Fowler's functionality, consistent with Fowler's own disclosure, all that is needed is to track the x,y positions of the tags in a plane *parallel* to the store floor. Ex-2001, ¶176. But the claims of the '340 Patent require tracking *vertical and horizontal* positions relative to a plane *perpendicular* to the store floor, e.g., Ex-1001, cl. 1, which Fowler nowhere discloses. For instance, below is an exemplary representation of the different information tracked by Fowler and the '340 Patent, which shows how Fowler fails to teach the missing *vertical* (z) position of a label in a plane perpendicular to the floor:



Ex-2001, ¶176.

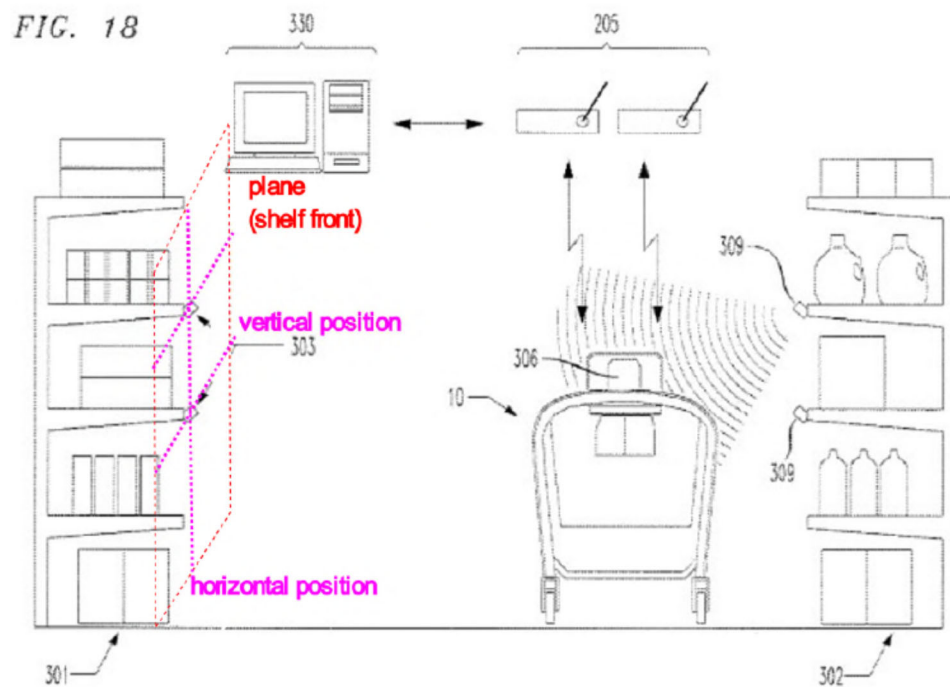
To account for this deficiency, Petitioners argue “[a] POSITA would understand that a location of a product on a shelf or bin *necessarily* comprises a vertical and horizontal position within a plane (the shelf front plane) perpendicular to a floor

of the predetermined area of the store.” Petition, 65 (citing Ex-1009, ¶185). This argument, however, makes the same error Petitioners made with respect to Fujiwara: the claims require a *planogram* that tracks the vertical and horizontal position of each label, not whether a store shelf has those positions in reality. See §VI.A.1.b. To the extent Petitioners contend Fowler’s planogram *inherently* includes vertical and horizontal positional information, neither Petitioners nor Dr. Tentzeris provide any supporting facts or technical basis to support their position. Indeed, Fowler expressly describes a system that does not need to track a vertical (z) position. And Petitioners’ other art, Fujiwara, has a database that tracks location differently using only shelf numbers, and never envisions tracking horizontal (e.g., x) positions. See §VI.A.1.b; Ex-2001, ¶¶177-78. Any inherency argument therefore fails. *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014) (“[I]nherency...may not be established by probabilities or possibilities.”).

Second, Petitioners argue that in creating Fowler’s “base map,” “reference or anchor RFID tags (e.g., shelf or fixture level tags) [are] placed around the store in known locations.” Petition, 66. Petitioners further argue that because ““RFID tags [are] located at various heights and locations along the shelves”” and tags can be attached to products, “the ‘known locations’ of the reference or anchor RFID tags that may be associated with each individual product and that may be at different heights and locations along the shelves *necessarily* comprises vertical and horizontal

positions of the locations.” Petition, 66-67 (citing Ex-1009, ¶186). Again, neither Petitioners nor Dr. Tentzeris provide any supporting facts or technical basis, and vertical and horizontal positions are not “the natural result of the combination of elements explicitly disclosed by the prior art.” *PAR Pharm., Inc.*, 773 F.3d at 1194-96; Ex-2001, ¶178. Simply put, it is not “necessary” to provide a horizontal and vertical position to determine a location as recited because Fowler concerns only generating a top-down map with no vertical (z) information, as discussed above. *Id.*

Third, Petitioners argue the Bandy-Fowler combination discloses the recited positions based on Fowler’s Figure 18 (Petitioners’ annotated version reproduced below) and paragraph [0137]. Petition, 65-66 (“Fowler further discloses ‘RFID tags located at various heights and locations along the shelves.’”) (citing Ex-1007, [0137]).



Ex-1007, Fig. 18 (annotated by Petitioners).

Petitioners are wrong. Ex-2001, ¶180. As with Grounds 1-2, Petitioners merely annotate a figure to supply the alleged vertical and horizontal positions on shelves when Fowler includes no such disclosure. Petition, 66; Ex-2001, ¶180. Petitioners point to no disclosure in Fowler suggesting a “planogram” with vertical and horizontal positions associated with Fowler’s RFID tags. Ex-2001, ¶181. Moreover, Petitioners allege that Bandy’s “item data” is the claimed “planogram,” but Petitioners provide no explanation why modifying Bandy’s “item data” with Fowler’s alleged vertical and horizontal positions of *tags* teaches the limitation, when Bandy teaches to “associate[] the identification number with *item 904*,” not tags. Petition, 63; Ex-2001, ¶180.

For limitation [1b], specifically, Petitioners rely on Fowler's disclosure of placing RFID tags at different heights on the shelf. Petition, 66. But Fowler discloses RFID tags are placed at different heights only to improve reception of the cart's RFID antennas. Ex-1007, [0137] (discussing "maximiz[ing] the effectiveness of the reader distribution pattern" and that "the RFID reader/antenna are positioned at approximately the middle of the shelf height, thereby allowing an about equidistant scan pattern above and below the position of the RFID reader/antenna to cover the complete height of the shelf"); Ex-2001, ¶181. Moreover, Petitioners map Fowler's cart as the recited "mobile terminal." Petition, 72, 74. But a cart always remains at a consistent vertical position, and it makes no sense to determine the vertical position of the cart based on the vertical position of radiofrequency peripherals (i.e., RFID tags) on the shelf. Ex-2001, ¶181. Rather, the cart's location is determined only in a plane *parallel* to the floor. Ex-2001, ¶180. Dr. Tentzeris's declaration on this point is conclusory and provides no analysis. Petition, 66-67 (citing Ex-1009, ¶186), 74-75 (citing Ex-1009, ¶203). Because Fowler has no need to determine the vertical position of the cart, Petitioners' proposed combination with Bandy fails. Ex-2001, ¶182.

b. Bandy and/or Fowler do not disclose or render obvious “an antenna and an electronic chip configured for near-field communication” ([1a], [5c])

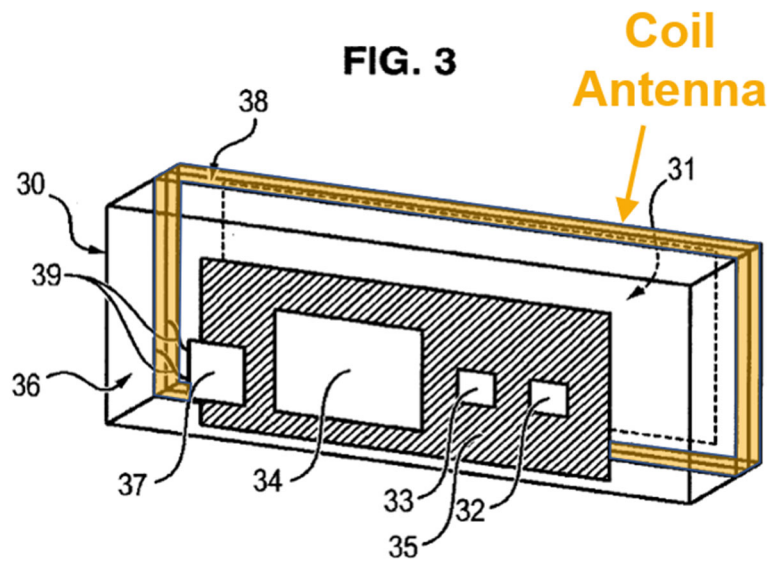
Limitation [1a] recites that “the radio-frequency peripheral includes an antenna and an electronic chip configured for *near-field communication*.” Independent claim 5 recites a similar limitation in [5c], but Petitioners merely refer back to their analysis of claim 1. *See* Petition, 82-83. The Bandy-Fowler combination, however, fails to disclose or render obvious using NFC in Bandy’s (or Fowler’s) RFID tags. Ex-2001, ¶¶183-90.

Petitioners rely on modifying Bandy to use NFC for the Bandy-Fowler combination to meet this limitation. Petition, 70-73 (“Bandy alone discloses all of [limitation [1a]] except for the ‘less than twenty centimeter’ limitation, while...a POSITA would have been motivated and able to use the well-known and conventional NFC standards to modify Bandy’s RFID tag.”), 90. Petitioners’ reliance is misplaced.

Petitioners first argue that because Bandy discloses “reader module 304 performs one or more interrogation/read protocols...a POSITA would be motivated and able to use the NFC standards.” Petition, 71. But Bandy discloses as examples, “binary protocols, slotted aloha protocols, and those required by the following standards: Class 0, Class 1, and Gen 2.” Ex-1006, [0055]. None of these are NFC protocols. Ex-2001, ¶186. Bandy further explains the various protocols can be found in

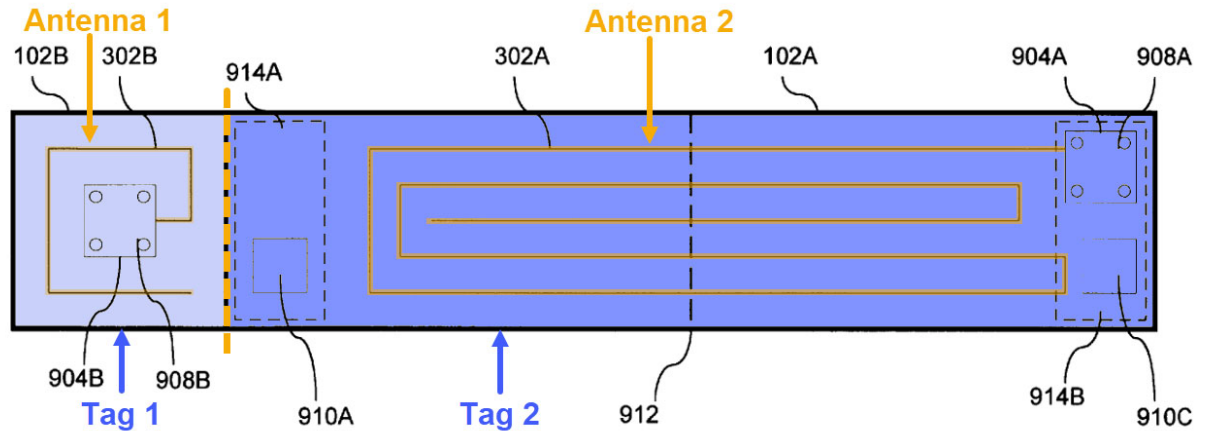
U.S. Pat. 6,002,344. Ex-1006, [0077] (incorporating Bandy-344 by reference). As explained in §III.B, POSITAs would have understood Bandy disclosed a UHF RFID tag, which uses Bandy's example protocols and standards. Ex-2001, ¶186. UHF RFID operates at different frequencies from NFC, uses backscatter instead of magnetic induction, and has a different antenna architecture. *Id.*; §§II.C, II.E. Thus, Bandy does not disclose using anything other than UHF RFID protocols, and POSITAs would not have been motivated to look outside UHF RFID protocols for one suitable for use with Bandy's RFID tag.

Furthermore, POSITAs would have recognized that NFC was not compatible with Bandy's disclosed RFID tag because the disclosed antennas are not compatible with NFC. Ex-2001, ¶187. As explained in §II.E, NFC uses magnetic induction to communicate with and power the tag. POSITAS would have known such a configuration requires a coil antenna (as shown in '340 Patent's Figure 3) with sufficient turns to receive the magnetic field. *Id.*; Ex-1001, Fig. 4, 5:38-44; Ex-2001, ¶187; Ex-2024, 12:12-14.



Ex-1001, Fig. 3 (annotated).

As shown below, the antennas in Bandy's RFID tag are configured for receiving radiated energy and could not have received magnetically coupled energy as NFC requires. Ex-2001, ¶188. Indeed, antenna #1 has incomplete turns and antenna #2 is a serpentine shape. *Id.* Neither antenna are coils required by NFC. *Id.* Thus, unlike the '340 Patent's coil antenna, Bandy's antenna could not effectively receive magnetically-coupled energy. Ex-2001, ¶188. POSITAs would not have been motivated to modify Bandy's antenna to work with NFC because doing so would have increased the size and stiffened the tag, making it unsuitable for Bandy's disclosed purpose of placing them on the items themselves. Ex-2001, ¶¶188-89.



Bandy-344, Fig. 9 (annotated).

Furthermore, modifying Bandy to use NFC would have been impractical. Ex-2001, ¶¶189-90. Specifically, Bandy discloses “[t]ag 902 may be *attached directly* to item 904.” Ex-1006, [0054]; *see also id.*, [0076]. Because the tags in Bandy can be attached directly to items, POSITAs would not have considered NFC because such tags would not have worked with items that are metallic (such as cans) or liquid (such as detergent) because of the interference metal and/or liquid surfaces cause. Ex-2001, ¶189. Dr. Tentzeris conceded as much in deposition. Ex-2024, 16:18-22, 17:12-18:8, 27:10-13 (“So if you place a bottle of detergent, then the range is 1 centimeter, always. **I want to stress that.**”). Moreover, because of NFC’s limited communication range, an item would need to be removed from the shelf to scan it, or the reader brought close to each item. Ex-2001, ¶189. Bandy’s UHF tags, however, had none of these issues. Ex-2001, ¶189.

POSITAs would have likewise not been motivated to use NFC with Fowler's RFID tags because Fowler's RFID reader is located on the shopping cart. Ex-1007, [0136]. The extremely short communication range of NFC (20cm or less) would mean the cart would have to be practically scraping the shelves and could read only tags at cart level. Ex-2001, ¶190. This would undermine the entire point of Fowler to scan a series of tags as a cart passes through aisles. *Id.*

c. The Bandy-Fowler-Arntzen combination does not render obvious “an antenna and an electronic chip configured for near-field communication” ([1a], [5c])

Petitioners further rely on Arntzen in Ground 4 to address NFC by merely cross-referencing its discussion of Arntzen combined with Fujiwara. Petition, 91-92. This is improper. *In re Magnum Oil Tools*, 829 F.3d at 1379 (referencing Alpha/Cockrell/Kristansen inadequate to show obviousness over Lehr/Cockrell/Kristansen); *Uber Techs., Inc. v. Surgetech LLC*, IPR2023-00738, Paper 8, 22-23 (Oct. 23, 2023) (“Petitioner does not separately discuss each individual ground” which “obscures the specific arguments advanced and the claims challenged in each individual ground.”).

Regardless, as explained in §VI.A.1.e(ii), Arntzen's mere disclosure of NFC does not provide a motivation to modify Bandy or Fowler because NFC would have rendered both inoperable. *Virtek Vision*, 97 F.4th at 886. Petitioners do not explain

what part of Arntzen's electronic displays would modify Bandy's labels, or how such a modification would be accomplished. Ex-2001, ¶¶191-92.

2. Petitioners fail to show POSITAs would have been motivated to combine Bandy with Fowler.

Petitioners assert that POSITAs would have been motivated to modify Bandy's reader-based system in view of Fowler's location data. Petition, 87-88. But these systems are fundamentally incompatible, and POSITAs would not have been motivated to combine them. Ex-2001, ¶¶193-202; *see Tri-Arc LLC v. Safe Rack LLC*, IPR2020-01566, Paper 12, 33 (Mar. 25, 2021) (finding it would not be obvious to combine "incompatible" "heavy" and "lightweight" systems).

Bandy discloses using an RFID reader to obtain information about specifically-scanned products but fails to disclose anything related to the location of the reader. Ex-2001, ¶194. Bandy describes the user utilizing a reader device (such as a cell phone or portable computer) to interact with items, such as by interrogating a tag associated with an item of interest. Ex-1006, [0034], [0036]. The purpose of Bandy is for the user to request, and the system to provide, information about a particular item that has been scanned. *Id.*, [0023]-[0024], [0049]-[0057], Figs. 7-8.

Fowler, on the other hand, uses RFID for an entirely different purpose. Ex-2001, ¶195. In Fowler, there is no hand-operated reader the user can move around freely. *Id.* Instead, Fowler discloses a shopping cart that comprises a number of RFID antennas with the reader built into the cart. Ex-1007, [0136]. According to Fowler,

the antennas may have a beam “approximately (18) inches wide and approximately six (6) to eight (8) feet high....” *Id.*, [0138]. The specific apertures and radiation patterns are shown in Figures 20A through 20D, reproduced below. *Id.*, [0031]-[0034], [0138].

FIG. 20A

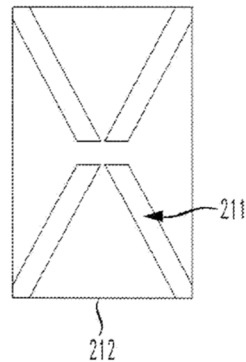


FIG. 20B

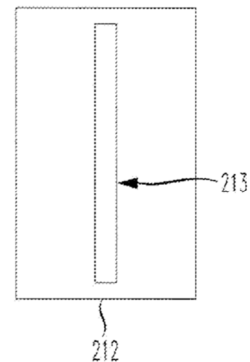


FIG. 20C

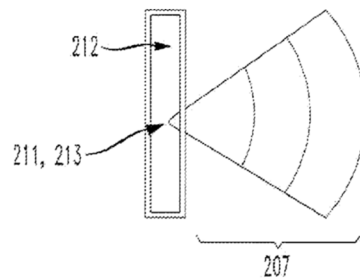
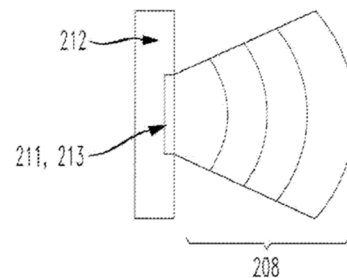


FIG. 20D



Ex-1007, Figs. 20A-D.

Figure 15 of Fowler, reproduced below, shows an overhead view of the system with RFID shelf tags (303, 304) and antennas on the cart (226).

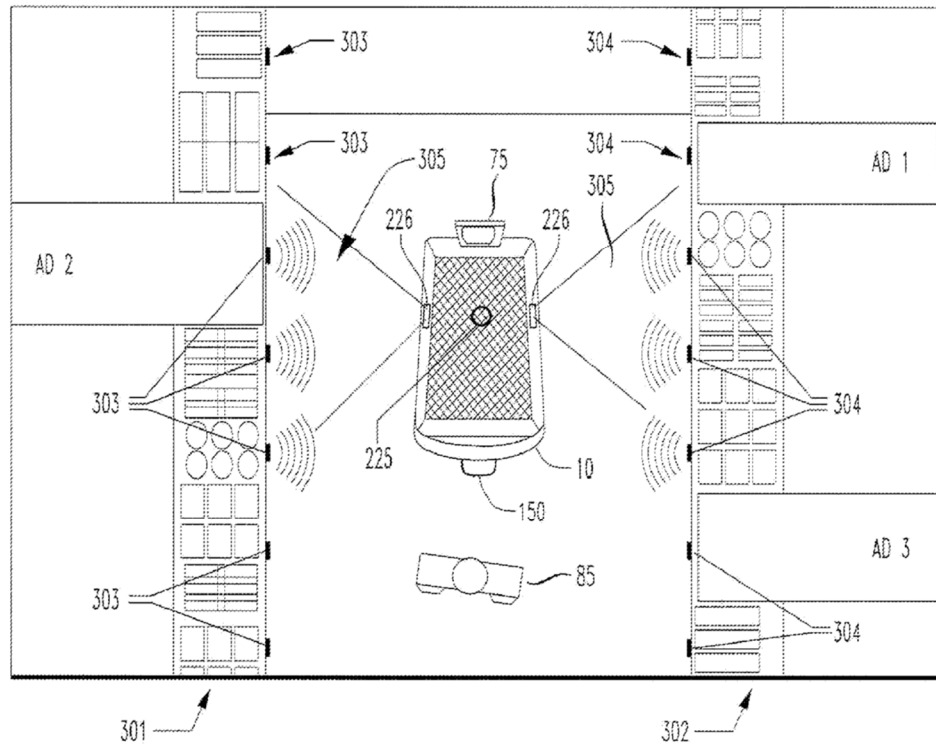


FIG. 15

Ex-1007, Fig. 15.

The purpose of Fowler's system is to determine the location of the shopping cart without user input based on the interaction of the RFID antennas and the RFID tags. *Id.*, [0004]; Ex-2001, ¶196.

Petitioners fail to provide any explanation for why POSITAs would have been motivated to take the user-driven, location-agnostic system of Bandy and combine it with the user-passive, location-based system of Fowler. According to Petitioners, the combination would “make it easier for the customer to find products.” Petition, 88. But Bandy discloses a system where the customer has already found the product and scanned it with the reader. Ex-1006, [0034], Fig. 8. And Petitioners do not

explain how this would be enhanced by Fowler in any way. There is no additional benefit at all. Ex-2001, ¶197.

Further, Petitioners fail to explain how the teachings of the two references would be combined. *Id.*, ¶198. Would the user have to steer the cart disclosed by Fowler towards specific products to get information on those products in the combination? If so, POSITAs would have considered this a worse solution than simply holding a handheld reader up to a product. *Id.* If on the other hand, Petitioners are proposing putting the location system of Fowler into a handheld device, Petitioners provide no explanation of how that would be accomplished, given Fowler's extensive and explicit use of multiple of specially designed antennas with a particular beam shape and size in order to properly scan RFID tags without user involvement. *Id.*; *see, e.g.*, Ex-1007, [0138].

Petitioners further fail to show how the purported Bandy-Fowler combination meets the limitations of the claims. Ex-2001, ¶199. Instead, Petitioners assert various portions of limitations are met by Bandy or Fowler alone. *Id.* For example, for [1a], Petitioners first assert that Bandy meets a portion of the limitation. Petition, 70-72. Petitioners then assert that Fowler meets some other portion of the limitation. *Id.*, 72-73. Then Petitioners take an improper logical leap by concluding "Bandy-Fowler discloses each and every limitation of [1a]...." *Id.*, 73; Ex-2001, ¶199. But Petitioners never described what the "Bandy-Fowler" combination is. Ex-2001, ¶199.

Beyond the general incompatibility of Bandy and Fowler, Petitioners fail to sufficiently support their statement that “a POSITA would have been motivated and able to use the command and background knowledge of NFC standards such as ISO 14443, as well as Fowler’s passive RFID tags, to implement Bandy’s RFID tags.” Petition, 90; Ex-2001, ¶200. As described above, Bandy and Fowler have different purposes and use RFID tags in very different ways. *TCL Indus. Holdings Co. v. Koninklijke Philips N.V.*, IPR2021-00496, Paper 13, 5-6 (May 10, 2022) (finding Petitioners failed to adequately show why POSITAs would have applied teaching of one reference to another reference that had “a different context and purpose”).

Moreover, as explained above, using NFC with either Bandy or Fowler would render their embodiments unworkable. Ex-2001, ¶201; DI, 49. In fact, POSITAs would have been dissuaded from a modification to Fowler that would reduce the communication range to less than twenty centimeters. *See Chamberlain Grp., LLC v. Overhead Door Corp.*, IPR2022-00842, Paper 9, 21 (Oct. 25, 2022). Fowler discloses specifically-designed antennas having “a beam approximately eighteen (18) inches wide and approximately six (6) to eight (8) feet high....” Ex-1007, [0138]. This would allow the RFID antennas, built into the shopping cart, to detect RFID tags farther away than twenty centimeters. Ex-2001, ¶201. Reducing the communication range to less than twenty centimeters would reduce the “effectiveness of the reader distribution pattern,” including by preventing the reader from “cover[ing] the

complete height of the shelf,” both of which are counter to Fowler’s stated goals. *Id.*, [0137]; Ex-2001, ¶201.

Therefore, because Petitioners fail to show POSITAs would have been motivated to combine Bandy and Fowler, or what such a combination would entail, Petitioners have failed to demonstrate by a preponderance of the evidence that any claim is unpatentable for Ground 3. Because Ground 4 also requires this combination (with the additional Arntzen reference) (Petition, 91), Petitioners also fail to demonstrate by a preponderance of the evidence that any claim is unpatentable for Ground 4.

3. Petitioners fail to show POSITAs would have been motivated to combine Bandy and Fowler with Arntzen.

In Ground 4, “Arntzen supplies the NFC tag modification.” Petition, 92. In other words, Ground 4 is essentially identical to Ground 3, except that where Ground 3 relies on the knowledge of POSITAs (and various NFC standards that Petitioners did not file as exhibits) to modify the purported Bandy-Fowler combination to implement NFC, Ground 4 relies on an explicit combination of Bandy, Fowler, and Arntzen to make that modification. Ex-2001, ¶¶203-05. And like Ground 3’s failure to show why POSITAs would have been motivated to make such a modification, Petitioners fail in Ground 4 to show why POSITAs would have been motivated to combine Bandy, Fowler, and Arntzen. *Id.*

Petitioners fail to provide any analysis for why POSITAs would have modified Bandy-Fowler to implement Arntzen's NFC technology. Instead, Petitioners rely entirely on their previous discussion in Ground 2 (Fujiwara in combination with Arntzen). Petition, 92 (citing Petition, §§III.F, III.G). But the argument regarding motivation to combine an entirely different primary reference (Fujiwara) cannot support Petitioner's argument regarding combining Bandy-Fowler with Arntzen. *In re Magnum Oil Tools*, 829 F.3d at 1379; *Uber*, IPR2023-00738, Paper 8, 22-23. Moreover, as shown above, POSITAs would not have modified either Bandy or Fowler with NFC. §VI.B.1.b.

Therefore, because Petitioners fail to show POSITAs would have been motivated to combine Bandy, Fowler, and Arntzen, Petitioners have not shown any claim is unpatentable for Ground 4.

C. Grounds 1-4: Petitioners rely on hindsight to modify Fujiwara and Bandy-Fowler to use NFC

Petitioners' proposed modification of Fowler to implement NFC in view of Bandy is riddled with hindsight. *TQ Delta*, 942 F.3d at 1361 (warning against the use of "impermissible ex post reasoning and hindsight bias that *KSR* warned against"). Instead of relying on the challenged patent, "[t]he references themselves must provide some teaching whereby the applicant's combination would have been obvious." *In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991).

Petitioners rely on the '340 Patent's disclosure of ISO14443 (Ex-1001, 5:1-4), increased security (4:56-59), reduced interference (6:54-58), adoption of NFC (4:59-62), and short communication distance (5:45-48, 6:52-54) for their proffered motivation. *See* Petition, 19 (“realizing the advantages of increased and standardized communication security and reduced interference”), 71, 90 (“A POSITA...would further have been familiar with the industry trend to implement RFID tags with NFC protocols and standards such as ISO 14443”). Petitioners used this disclosure in the '340 Patent to search for various prior art—quintessential hindsight analysis. Petition, 28 (citing Ex-1009, ¶¶46-53); Ex-2001, ¶¶206-08.

VII. CONCLUSION

For the reasons set forth above, Petitioners have not met their burden to show that any claim is unpatentable as obvious over the cited art.

September 6, 2024

Respectfully submitted,

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Lead Counsel for Patent Owner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), I, Jessica C. Kaiser, certify that PATENT OWNER'S RESPONSE contains 13,992 words, excluding those portions identified in 37 C.F.R. § 42.24(b), as measured by the word-processing system used to prepare this paper.

September 6, 2024

Respectfully submitted,

By: /Jessica Kaiser/

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Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on September 6, 2024, a copy of **PATENT OWNER'S RESPONSE** was served upon the below-listed counsel by electronic mail:

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