

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

VUSIONGROUP SA,

Petitioner

v.

HANSHOW TECHNOLOGY CO., LTD.,

Patent Owner

Case No.: IPR2024-00857

Patent No. 11,540,216

**DECLARATION OF GAVIN D. SCOTT, PH.D. IN SUPPORT OF PATENT OWNER'S
RESPONSE FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,540,216**

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I. INTRODUCTION

1. I, Gavin D. Scott, Ph.D., am currently a Senior Managing Scientist at Exponent, an engineering and scientific consulting firm with corporate headquarters at 149 Commonwealth Drive, Menlo Park, CA 94025. I am based in Exponent's New York office, located at 485 Lexington Avenue, Suite 2200, New York, NY 10017.

2. Exponent, Inc. ("Exponent") was retained by Arch & Lake LLP on behalf of Plaintiffs Hanshow Technology Co., Ltd. ("Patent Owner" or "Hanshow") to provide technical services and independent opinions pertaining to the above-captioned matter before the Patent Trial and Appeal Board ("PTAB"). In particular, I have been asked by Hanshow Technology Co., Ltd. to provide my expert opinion in connection with the *Inter Partes* Review ("IPR") of U.S. Patent No. 11,540,216 (Ex-1001, "'216 Patent"). This declaration is a statement of my opinions on issues relating to the patentability of Claims 1–19 ("the Challenged Claims") of the '216 Patent. As I explain more fully below, it is my opinion that all of the Challenged Claims would not have been unpatentable to a person of ordinary skill in the art ("POSITA").

3. I am a full-time salaried employee of Exponent. Exponent charges \$525 per hour for my services in 2025, plus expenses for my work performed, regardless of the task performed. I have received no additional compensation for my work in this litigation, and my compensation does not depend upon the content of this declaration, any testimony I may provide, or the ultimate outcome of this matter.

4. My opinions, as expressed in this declaration, are based on my education, career, and relevant experience, as set forth in my curriculum vitae, attached hereto as Appendix A, as well as the materials I have reviewed and considered for this matter as listed in Appendix B. These materials include, the '216 Patent and its file history, VusionGroup's Petition for *inter partes* Review of U.S. Patent No. 11,540,216, the Petitioner's expert's declaration, titled *Declaration Of*

Andrew Wolfe, Ph.D. In Support Of Petition For Inter Partes Review Of U.S. Patent No. 11,540,216, dated May 1, 2024 (the “Wolfe Declaration”), the cited references relied upon within the Wolfe Declaration, and other materials, if applicable, as cited throughout my declaration.

5. I reserve the right to supplement, update, or revise my opinions and analyses as appropriate, and reserve the right to rebut any opinion offered by Petitioner or its expert. And, I reserve the right to create graphics or demonstratives to support my opinions if called to testify at any hearing, trial, or other proceeding.

6. My analysis and opinions presented herein are technical in nature. I am not a lawyer, and I am not offering legal opinions.

II. EXPERIENCE

7. My education, experience, and qualifications are set forth in my curriculum vitae, attached hereto as Appendix A. A summary of my relevant experience is provided herein.

8. I received a Bachelor of Science degree in Physics from the University of California at Santa Barbara, and both a Master of Science degree and a Ph.D. in Physics from the University of California at Los Angeles.

9. My experience with semiconductor technology, electromagnetics and wireless communication, consumer electronics, interconnected devices and distributed computing systems, and information science spans from my formal advanced education during my M.S. and Ph.D. studies, and throughout my professional experience as a postdoctoral research fellow at Rice University in Houston, Texas, as a research scientist at Bell Labs in Murray Hill, New Jersey, and as a consulting scientist at Exponent in New York.

10. For instance, during my undergraduate and graduate level studies I completed formal courses in a range of physics areas of relevance to low-powered wired and wireless, such as: advanced electromagnetism, including both analog and digital encoding within electromagnetic

waveguides (e.g., coaxial cables) and free-propagating waves (e.g., antennas), and significant work addressing electronic, magnetic, and optical interactions and signal analysis; advanced semiconductor physics and quantum mechanics, including fabrication techniques for integrated circuitry; as well as work with programming languages and configuring remote sensing devices and data acquisition systems for experimentation.

11. During my Ph.D. and as a postdoctoral research scientist, I studied quantum mechanical effects and emergent properties of novel transistor devices, involving a variety of materials characterization techniques as well as the development of extensive data acquisition systems and quantitative data analysis approaches. This work also involved the design, fabrication, and implementation of low power electronic devices. Prior to joining Exponent, I was employed as a research scientist (Member of Technical Staff) at Nokia Bell Laboratories where, as the principal investigator, I engineered sophisticated control systems incorporating an extensive array of instrumentation in the development a laboratory for analyzing complex electronic and magnetic interactions.

12. At Exponent, I provide a range of professional technical services to a variety of clients, many of which have involved my expertise in software controls, computer hardware, and signal processing techniques. For example, I have served as a consulting expert for hardware- and software-related litigation, including in intellectual property disputes involving distributed communication networks and systems, control software embedded in integrated circuitry, computer hardware components including computer processors and memory, integrated circuits (“ICs”) and semiconductor components, light emitting diodes (“LEDs”), smart home devices, industrial control systems, optical sensing components, power control circuitry, and wireless communication protocols.

13. I have additionally investigated consumer and industrial products relating to Bluetooth and Wi-Fi communication, infrared thermometry, semiconductor chip manufacturing facilities, industrial power generation facilities, and thermal management of lighting systems and hand-held mobile devices. This work has included both quantitative modeling and electromagnetic field measurements.

14. I am also a Senior Member of the Institute of Electrical and Electronics Engineers (“IEEE”), which is the world’s largest technical professional organization dedicated to advancing technology for the benefit of humanity. Senior members of IEEE represent about 8 percent of the approximately half-million members of IEEE, and they obtain that recognition by being a scientist or engineer in professional practice for at least 10 years and showing significant performance in an area over a period of at least 5 years in their profession.

III. LEGAL STANDARDS

15. I have been informed by Counsel and understand that a claim is unpatentable for obviousness under 35 U.S.C. § 103 (in the AIA form of that statute that applies to the ’216 Patent) “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.”

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

17. I have been informed by Counsel and understand that documents and materials that qualify as prior art can render a patent claim unpatentable as obvious. I am informed by Counsel and understand that all prior art references are to be looked at from the viewpoint of a person of ordinary skill in the art at the time of the invention, and that this viewpoint prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious. I understand that the words of a claim are generally given their ordinary and customary meaning as understood by a POSITA in view of the entire patent specification in which they are present and the prosecution history of the patent.

18. I understand, nevertheless, that a claim's words may be given a meaning different than their plain and ordinary meaning if: (1) a patentee explicitly and unambiguously defined a term in a different manner as compared to its plain meaning; or (2) a patentee "disclaims" the full scope of a claim term's plain meaning, such as, by clearly and unambiguously stating during prosecution that a claim term does or does not encompass certain subject matter that may otherwise be encompassed by the plain words of the claim.

19. I am informed by Counsel and understand that when a patented invention is a combination of known elements, the Patent Trial and Appeal Board ("PTAB") must determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue by considering the teachings of prior art references, the effects of demands known to people working in the field or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art.

20. I am informed by Counsel and understand that a patent claim composed of several limitations is not proved obvious merely by demonstrating that each of its limitations was independently known in the prior art. I am informed by Counsel and understand that identifying a

reason those elements would be combined can be important because inventions in many instances rely upon building blocks long since uncovered and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known. I am informed by Counsel and understand that it is improper to use hindsight in an obviousness analysis, and that a patent's claims should not be used as a "roadmap."

21. I have been informed by Counsel and understand that in *inter partes* review proceedings, the Petitioner bears the burden of proof to prove that the claims that were challenged in the Petition and for which the Board instituted review are unpatentable. It is my understanding that the Petitioner also bears the burden of proving a proposition of unpatentability by a preponderance of the evidence. I have been informed that the preponderance of the evidence standard requires that a reasonable factfinder would find a material fact more probable than the nonexistence of that fact. I understand that this standard does not permit speculation concerning particular facts and is rather focused on whether the evidence more likely than not demonstrates the existence or non-existence of particular material facts. I have been informed that "preponderance of the evidence" is a lower standard than "clear and convincing evidence" (which requires a fact to be substantially more likely to be true than untrue), or "beyond a reasonable doubt" (which is an exceedingly high standard that I understand is usually used in criminal matters). Throughout my Declaration, I have applied the "preponderance of the evidence" standard.

IV. PERSON OF ORDINARY SKILL IN THE ART

22. I understand that a person of ordinary skill in the art ("POSITA") is a hypothetical person skilled in the art, not a judge, a layperson, or a genius in the art at hand.

23. I am informed and understand that the following factors may be considered in determining the level of ordinary skill in the art: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rate at which innovations were

made in the field; (5) sophistication of the technology; and (6) educational background and experience of those who were actively working in the field during the relevant time period (priority date).

24. In ¶29 of his declaration, Dr. Andrew Wolfe opines that a POSITA for the '216 Patent “would have had a Bachelor’s Degree in electric or computer engineering, computer science, or a similar field with two or more years of work experience with low-powered connected devices” and that “[a]dditional education in a relevant field or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements” (Wolfe Declaration ¶29). For the purposes of my analysis, I have applied this definition for a POSITA.

25. For purposes of this declaration, I have been asked to assume that priority date of the '216 Patent is July 2, 2018. When I refer to a POSITA, I am referring to one of ordinary skill in the art as of July 2, 2018, unless otherwise specified.

26. My level of skill in the art was, at the priority date of July 2018, and is still, in excess of that of a POSITA. Accordingly, I am qualified to opine as to the knowledge and understanding of a POSITA at the priority date of the '216 Patent, and my analysis, conclusions, and opinions presented herein are considered from the perspective of a POSITA at this date.

V. SUMMARY OF OPINIONS

27. For the reasons discussed below, the challenged claims of the '216 Patent are not rendered obvious by any combination of prior art asserted in the Petition or addressed in Dr. Wolfe’s declaration.

VI. OVERVIEW OF THE '216 PATENT

28. The '216 Patent is titled “Interactive Electronic Tag Device Communication System and Method,” and I understand that the priority date is July 2, 2018. Broadly, the '216 Patent is directed towards an electronic tag device system that facilitates communication with an external device

through one communication pathway and a base station and subsequent background server through a different communication pathway, whilst improving upon efficiency considerations over prior art systems. By setting a normal monitoring mode and a fast monitoring mode in an electronic tag device, and setting a normal wake-up mode and a fast wake-up mode in a base station, the '216 Patent allows the customer experience requirements to be met without shortening the monitoring periods of all electronic tag devices, without increasing battery power consumption, and without increasing labor costs. (Ex. 1001, 2:7-15).

29. The '216 Patent presents a “background” in which certain then-current approaches, and some drawbacks thereof, are described. In particular, the '216 Patent describes a common approach for increasing battery life in wireless devices whereby communications are monitored periodically so as to save energy relative to if communications were monitored constantly, stating “a conventional practice is that a radio frequency module of the electronic tag device automatically wakes up every other time period ... to monitor whether there is a communication request” (Ex. 1001, 1:24-29). Moreover, the '216 Patent addresses the compromise between increased battery life, which is associated with longer delays between monitoring periods, and increased responsiveness, which is associated with shorter delays between monitoring periods, as summarized below.

30. Describing then-current systems, the '216 Patent explains a common approach is to use longer monitoring periods to prolong battery lifetime, stating: “[i]n order to take into account communication speed and battery life, a longer monitoring period (such as 20 s) is usually adopted to reduce the power consumption, so as to improve the battery life)” (Ex. 1001, 1:46-50). Some drawbacks with this then-current typical approach are discussed within the '216 Patent, whereby a longer monitoring period that is better for battery life can be inappropriate for situations in which

a user interacts with the device. For example, the '216 Patent describes that “[i]n actual usage scenarios, for example, when the operator operates in front of the electronic tag device ... it is hoped that the electronic tag device can provide immediate feedback (usually within 3 s). In order to improve the response speed of the electronic tag device, it is required to shorten the monitoring period (for example, 1 s)” (Ex. 1001, 1:51-57); and explains the consequences of the shorter monitoring period, whereby “the battery power consumption is 20 times” increased for the shortened 1 s monitoring period relative to the longer 20 s period (*see* Ex. 1001, 1:51-2:3). Thus, to address the above-described compromise between battery lifetime and response speed, the '216 Patent discloses various improvements over the then-current system whereby the monitoring period duration may be dynamically varied.

31. For instance, in summarizing the embodiments presented therein, the '216 Patent described that in the electronic tag device communication system and associated methods, there is “a normal monitoring mode and a fast monitoring mode” for the electronic tag device (*see*, e.g., Ex. 1001, 2:23-24); and explains that, within a system involving “a background server, a base station, an electronic tag device and an external device” the electronic tag has “a normal monitoring mode and a fast monitoring mode.” The '216 Patent further describes, broadly, that the electronic tag enters the fast monitoring mode when it receives data from an external device—via a “second communication path”—to allow the tag to provide increased response speed whilst the system handles the interaction via a “first communication path” between the tag, base station, and server, and then the electronic tag returns to the normal monitoring mode after completing the interaction (*see* e.g., Ex. 1001, 2:7-48).

32. More specifically, the '216 Patent describes that the interaction between the external device and the electronic tag device through the second communication path is envisioned as a wireless

communication protocol using for instance a magnetic switch, near-field communication (“NFC”), an infrared switch, or others, and involves the external device transmitting a first data to the electronic tag device (*see*, e.g., Ex. 1001, 4:8-10, 4:41-44). The ’216 Patent explains that the system then works as follows: upon an interaction between an external device and the electronic tag device through the second communication path, the electronic tag device forwards the first data received from the external device to the base station through the first communication path, and the first communication path of the electronic tag device enters the fast monitoring mode; in the fast monitoring mode, the time period of monitoring is comparatively short to allow for more rapid communication, a mode that would use more power than the normal monitoring mode due to the increased electronic activity in the fast monitoring mode (*see* e.g., Ex. 1001, 1:55-57, 4:8-14); the base station receives the first data from the electronic tag device and forwards the first data on to the background server which generates a control instruction and a second data, generated according to the first data. The control instruction and second data are then sent by the background server to the base station, and the base station in the fast wake-up mode transmits a fast wake-up instruction, the control instruction, and the second data to the electronic tag device through the first communication path. The electronic tag device receives the fast wake-up instruction, the control instruction, and the second data, and once communication is complete, returns to the normal monitoring mode to conserve power (*see*, e.g., Ex. 1001, 4:8-30). The process flow for this sequence is illustrated in FIG. 2 of the ’216 Patent, as reproduced below.

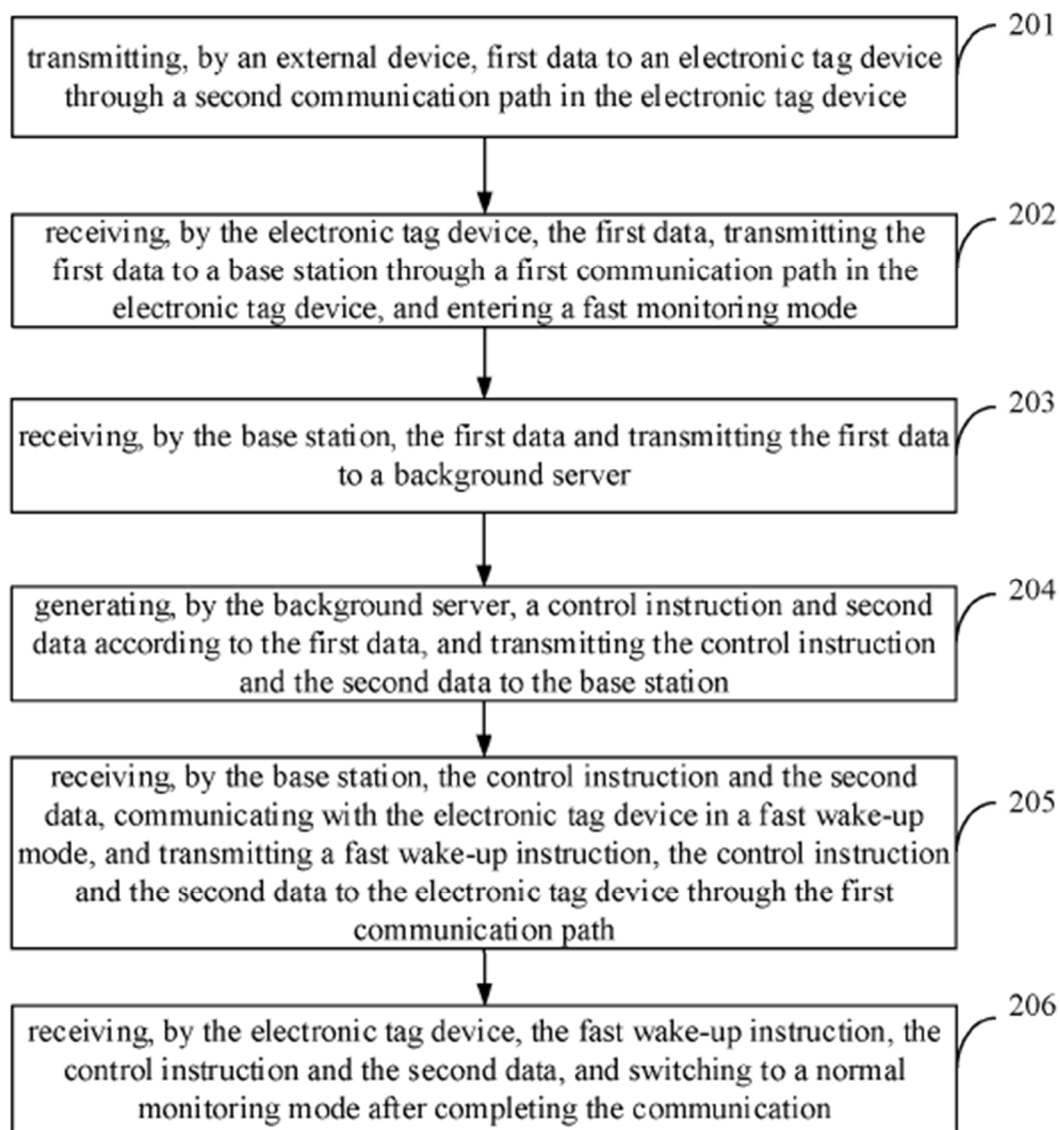


FIG. 2

'216 Patent, Ex. 1001, FIG. 2.

33. Consistent with the goal of improved battery life discussed therein, the '216 Patent additionally considers the possible situations where only a portion, or none, of the expected message or messages are successfully transmitted by the base station and received by the electronic tag device (e.g., where communications are, for some reason, unsuccessful or interrupted), and described that in such situations the electronic tag should return to the normal monitoring mode to conserve power after a time-out period, stating, for example, “the electronic tag device cannot be

in the fast wake-up mode all the time” and that in situations in which communications are not completed as expected “within a preset time range” the “electronic tag will switch to normal monitoring mode” (*see, e.g., Ex. 1001, 5:11-19*).

VII. OVERVIEW OF THE CITED REFERENCES

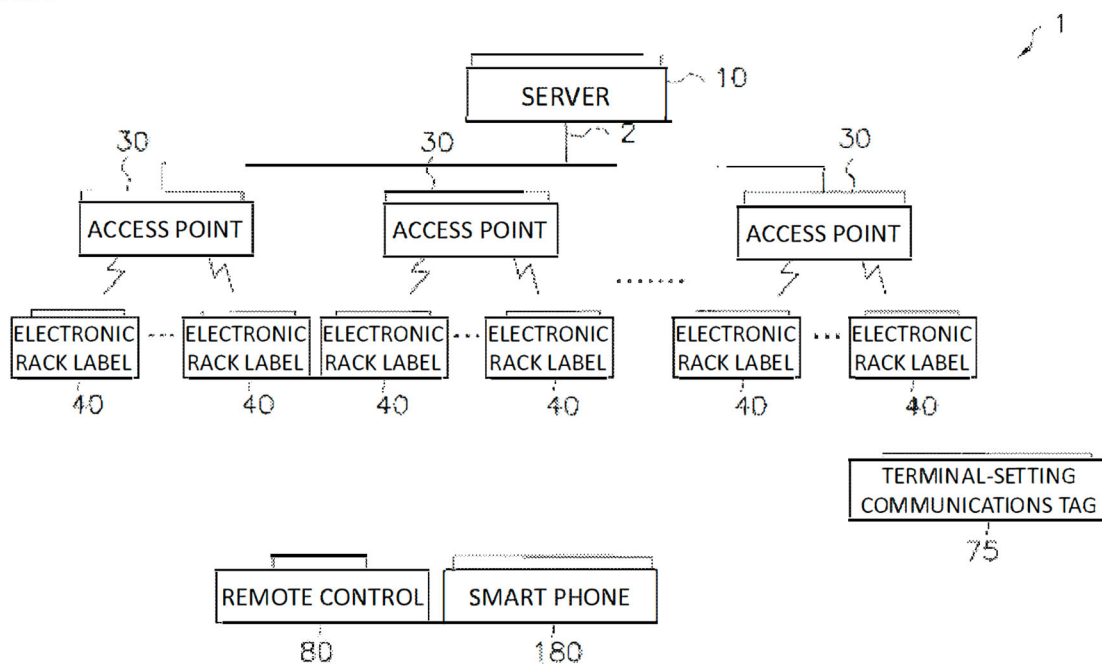
34. A summary of the cited references relied upon by the Wolfe Declaration is included below.

A. NAGATA

35. Japan Patent Office’s Published Unexamined Patent Application No. JP 2017-126872 A (“Nagata”), titled “Wireless Display System,” is directed to a wireless display system “in which notification of an instruction [from] a user or the like is sent from a wireless display device to a host server” without “the provision of a switch on the wireless display device” (Nagata, Abstract, [0001], [0004], [0006], [0023]). Nagata discloses a system comprised of “a server 10, a plurality of electronic rack labels 40, ... a plurality of access points 30, ... and a terminal-setting communications tag 75,” that can communicate with portable terminals including “a remote control 80 and a smart phone 180” (Nagata, Abstract, [0027], [0035]).

36. Nagata explains that the disclosed system intends to bypass the need for a switch in a wireless display device. Nagata describes that a switch in a wireless display device can complicate the structure and increases the cost and size of a wireless display device. Figure 1 of Nagata is a schematic diagram of the overall wireless display system, which consists of a first communications part that “performs near-field communication” to “receive instruction information from [a] portable terminal,” such as the remote control 80 and the smart phone 180; a second communications part that “performs radio-wave-type wireless communication” and “exchanges information with the server 10 via the corresponding access point 30;” and a switching part that “switches the operation state of the second communications part between a sleep state and an awake state” (Nagata [0005], [0051]-[0052], [0061]).

FIG. 1



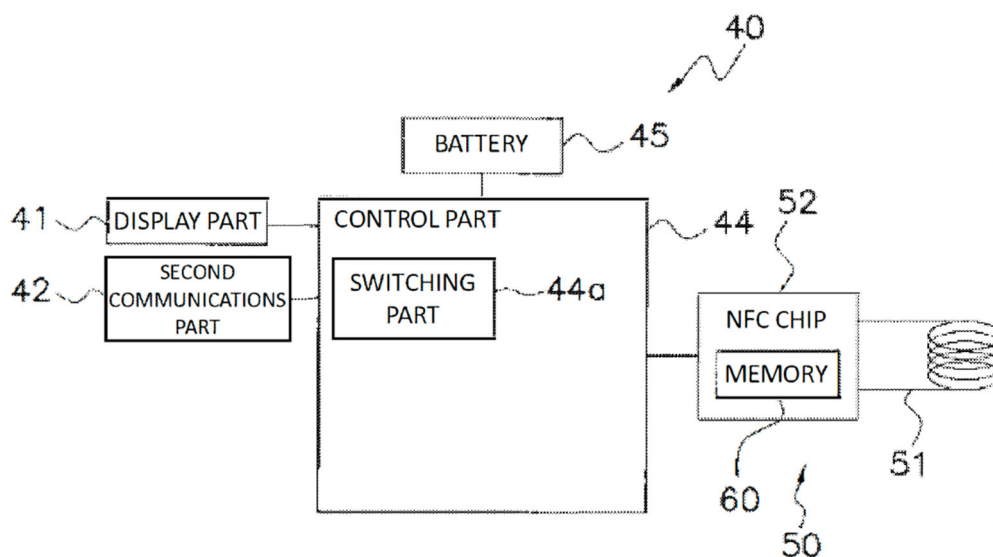
Nagata FIG. 1.

37. Figure 5 of Nagata illustrates a representative embodiment of the disclosed system in which a store's electronic rack label, primarily comprised of "the display part 41, the first communications part 50, the second communications part 42, memory 60, a control part 44, and the battery 45," is a wireless display device that displays information corresponding to a product (Nagata [0049]).

38. Nagata explains that the first communications part 50 is "a passive-type RF tag that receives" power via "non-contact, electric-power transmission" and the instruction information selected from the remote control 80 or the smart phone 180 (Nagata [0051]-[0052]). The first communications part 50 contains "an antenna 51 and an NFC chip (near-field communication chip) 52," and "is configured to transmit, to the smart phone 180, various information stored in the memory 60" (Nagata [0053]-[0054]). Nagata further describes the three operation states of the second communications part 42: "the sleep state, the awake state, and the stopped state" (Nagata [0081]). The second communications part 42 receives power from the battery 45 and

communicates with the corresponding access point 30 in the awake state. Nagata discloses that in the sleep or stopped states, electric power is not supplied from the battery and communication with the corresponding access point 30 is not possible. Nagata explains that in the sleep state, the switching part 44a automatically switches the operation state to the awake state after a prescribed amount of time elapses. During normal operation, the operation state of the second communications part 42 alternates between the sleep and awake states at a regular, prescribed time interval.

FIG. 5



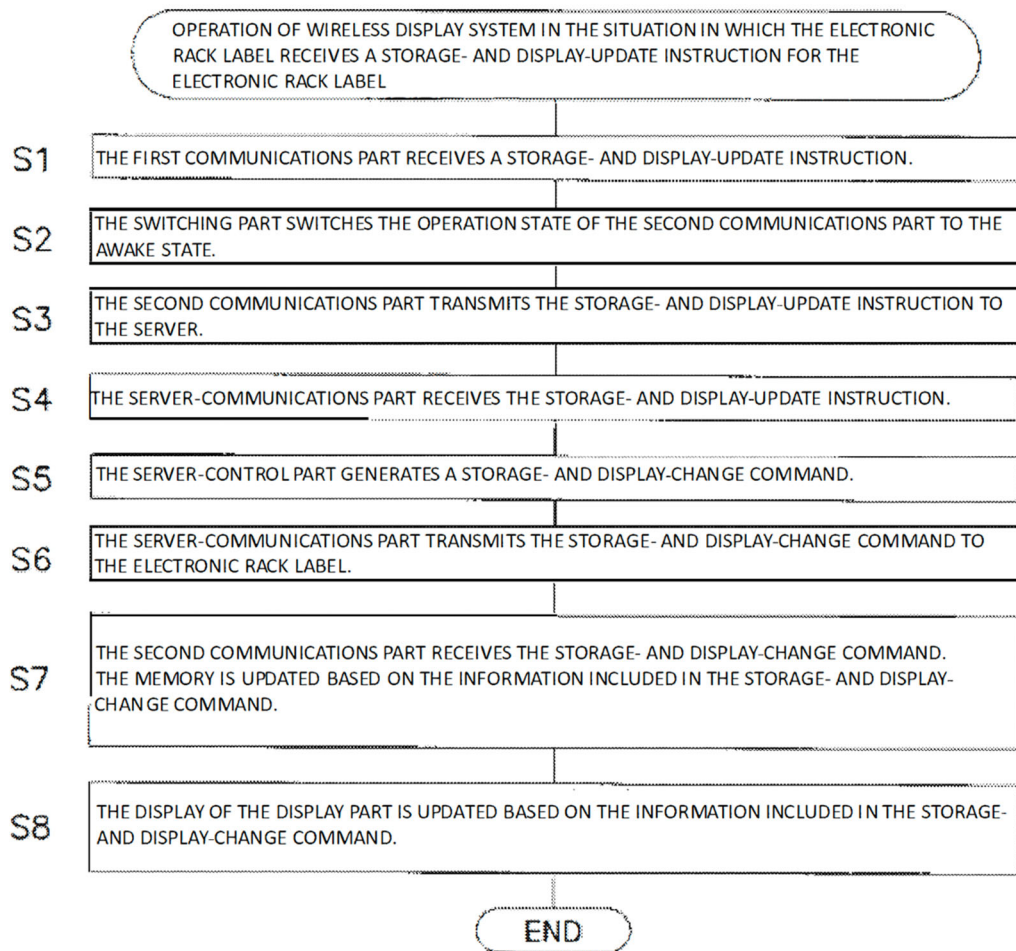
Nagata FIG. 5.

39. Nagata discloses that each of the system's access points 30 is a communications apparatus capable of performing radio-wave-type wireless communications with both the corresponding electronic rack labels 40 and the server 10. Nagata explains that each access point 30 uses radio waves to transmit information transmitted from the server 10 to the corresponding electronic rack labels 40, receive information from the corresponding rack labels 40, and transmit "that received information back to the server 10" (Nagata [0031]). When the second communications part 42 of the electronic rack labels 40 enters the awake state, the corresponding access point 30 transmits at

a prescribed time interval a signal called a beacon to the respective electronic rack labels 40 to “report ... the presence or absence of information transmission” (Nagata [0033]). Nagata describes that in the presence of information transmission, i.e., “[an] electronic rack label 40 has received a beacon reporting that information will be transmitted,” the electronic rack label 40 “maintains the operation state of the second communications part 42 in the awake state without immediately returning to the sleep state for a prescribed [time] interval.” (*Id.*, see also Nagata [0083]).

40. Figure 8 of Nagata is one of many embodiments that summarize typical operations of the wireless display system disclosed therein. The flow chart in Figure 8 specifically describes the situation in which the electronic rack label 40 receives “a storage- and/or display-update instruction” (Nagata [0114]). In multiple tasks, the first communications part 50 of an electronic rack label receives an instruction from the remote control 80 via near-field communication. The instruction is “stored in the memory 60 of the electronic rack label 40” (Nagata [0115]). The switching part 44a then switches the operation state of the second communications part 42 to the awake state “for a prescribed interval” or “may instead maintain the operation state ... in the awake state” until a storage- and display-change command is received (*see, e.g.,* Nagata [0116], [00128]). Nagata discloses that throughout an operation, access point 30 is used to facilitate communications between the electronic rack label 40 and the server 10.

FIG. 8



Nagata FIG. 8.

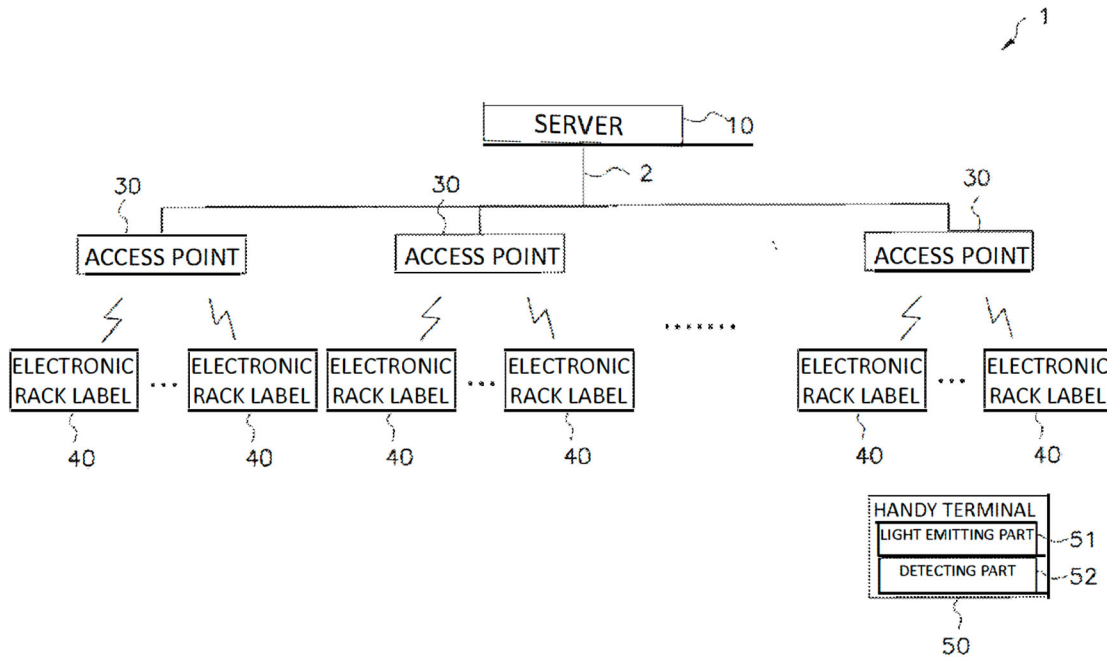
B. HASHIGUCHI

41. Japan Patent Office’s Published Unexamined Patent Application No. JP 2016-140368 A (“Hashiguchi”), titled “Wireless Display System,” is directed to a wireless display system “that can ensure high responsiveness of wireless devices ... while curtailing the electric power consumption of those ... devices” (Hashiguchi, Abstract). Hashiguchi discloses that the system is comprised of “a plurality of wireless display devices, a server that stores item information, and a

transmitting apparatus that transmits to the wireless display devices” the item information (Hashiguchi [0007]-[0008]).

42. Figure 1 of Hashiguchi is a schematic diagram illustrating a representative embodiment of the disclosed system wherein the wireless display system is an electronic rack label system, which primarily consists of “a plurality of electronic rack labels 40, ... a server 10, ... a plurality of access points 30, ... and a handy terminal 50” (Hashiguchi [0028]). Hashiguchi describes that each of the electronic rack labels 40 is a wireless display device and “a portable apparatus” that displays product information related to the corresponding product, and each of the access points 30 is a “transmitting/receiving apparatus” that “transmit[s] to the electronic rack labels 40 signals (including commands) transmitted from the server 10” via radio wave type wireless communication (Hashiguchi [0031]). A signal called a beacon is transmitted by the access points 30 at prescribed intervals, and it is used to inform the electronic rack labels 40 of “the presence/absence of command transmission.” *Id.*

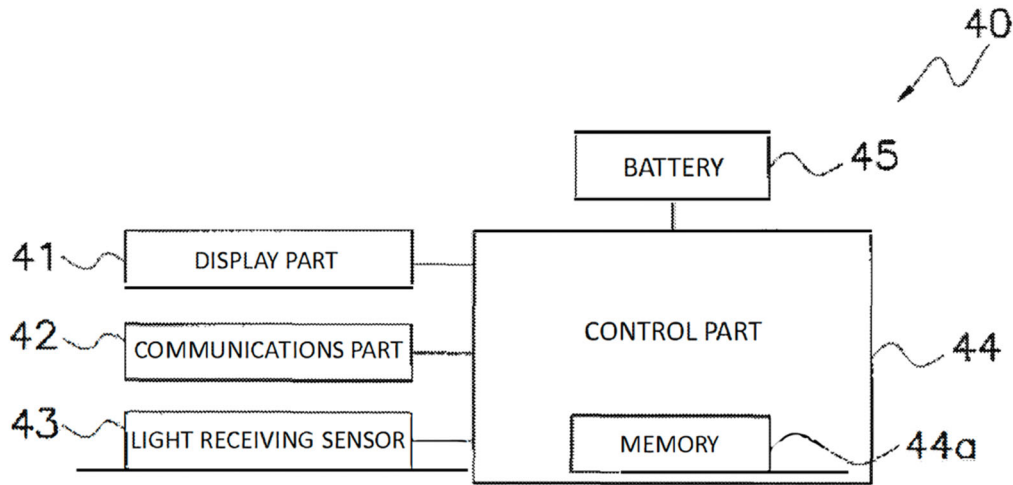
FIG. 1



Hashiguchi FIG. 1.

43. Figure 4 of Hashiguchi is a “schematic configuration of the electronic rack label [40] of the electronic rack label system,” which typically includes “a display part 41, a communications part 42, a light receiving sensor 43, a control part 44, and a battery 45” (Hashiguchi [0023], [0037]). The communications part 42 of the electronic rack label 40 receives a command including “the image formation of the [corresponding] product information” from the access point 30, relays the command into the control part 44, and transmits a response signal (ACK) to the server 10 “inform[ing] the server 10 that a command ... has been received” (Hashiguchi [0037]).

FIG. 4



Hashiguchi FIG. 4.

44. Hashiguchi discloses that the electronic rack labels 40 have control modes that are “divided largely into two modes, the energy-saving mode and the active mode, in accordance with the time ratio of the awake state” (Hashiguchi [0067]). In the awake state, “the electronic rack label 40 can communicate with the access point 30 via the communications part 42” *Id.* Hashiguchi describes an awake operation as the state change “from the sleep state to the awake state such that commands [including] product information ... transmitted from the access point 30 can be received” (Hashiguchi [0068]). Hashiguchi discloses that “control is performed so that beacon transmission timing of the access point 30” and the timing of an awake operation are synchronized (*Id.*, *see also* Hashiguchi [0139]). Hashiguchi further discloses that the electronic rack label 40 enters the awake state for a fixed, prescribed period Δt for every awake operation. In the energy-saving mode, an awake operation is “performed at comparatively long intervals of time $T1$,” which makes the time ratio of the awake state $\Delta t/T1$ short; whereas in the active mode, an awake operation is “performed at comparatively short intervals of time $T2$,” which yields a longer awake state time ratio $\Delta t/T2$ (Hashiguchi [0068], [0070]). Hashiguchi additionally discloses that the active mode “has a plurality of sub-modes that differ by the awake state time ratio” and that the control part 44

switches the control mode based on the amount of light “detected by the light receiving sensor 43” (Hashiguchi [0071], [0073]).

45. Hashiguchi describes an alternative embodiment of the system wherein the server 10 includes a server control part that instructs the access point 30 to transmit a command at different speeds. In the normal command transmission mode, the server control part instructs the access point 30 to “transmit a command, following one of the beacons among the beacons (which are transmitted from the access point 30 at 4 s intervals) over a 20 s interval” (Hashiguchi [0127]). When the handy terminal performs the linking operation, which “associates the apparatus IDs of the electronic rack labels 40 with the product IDS of the products,” the server control part instructs the access point 30 to “transmit a command following a beacon, the beacons being transmitted from the access point 30 at 4 s intervals” in a rapid command transmission mode, potentially reducing the average command transmission time (Hashiguchi [0128]). Notably, the fixed interval of beacon transmission of Hashiguchi has the electronic rack labels wake up according to a fixed pattern, such that the wake up is synchronized with, and coincides with, a periodic beacon signal from a connected access point or similar device, but they do not adjust the response speed of the system because communication is still restricted to periodic intervals defined by the fixed beacon signal period.

C. THUBERT

46. United States Patent Application Publication No. 2018/0123887 A1 (“Thubert”), titled “Full Path Diversity for Virtual Access Point (VAP) Enabled Networks,” is directed to a computer communication network system wherein “a supervisory device ... assigns different access points in the network to different access point groupings,” each with “a different network path to communicate with a given endpoint in the network” (Thubert [0016]). In the disclosed

system therein, the supervisory device “selects ... access points in each ... access point groupings for mapping to a virtual access point (VAP) ... as part of a VAP mapping.” *Id.*

47. Thubert discloses embodiments where the supervisory device “instructs the selected access points to form a VAP for the node,” and the node “treats the access points in the VAP mapping as a single access point for the purposes of communicating with the network.” *Id.* Figure 3A of Thubert illustrates the formation of a virtual access point (VAP) in accordance with multiple embodiments of the system. Thubert describes “a portion 300 of a network that includes a plurality of [access points] 302 ... that are located in different physical locations through an area,” and explains that access points 302 “may be in communication with a supervisory device 304 in the network” (Thubert [0052]). A node 306 “may broadcast a network availability request 308,” which “any of the [access points] 302” may receive and subsequently “trigger the formation of a VAP for node 406” (Thubert [0053]). Thubert further discloses that “a VAP may also be formed at any time after node 306 associates with the network.” *Id.*

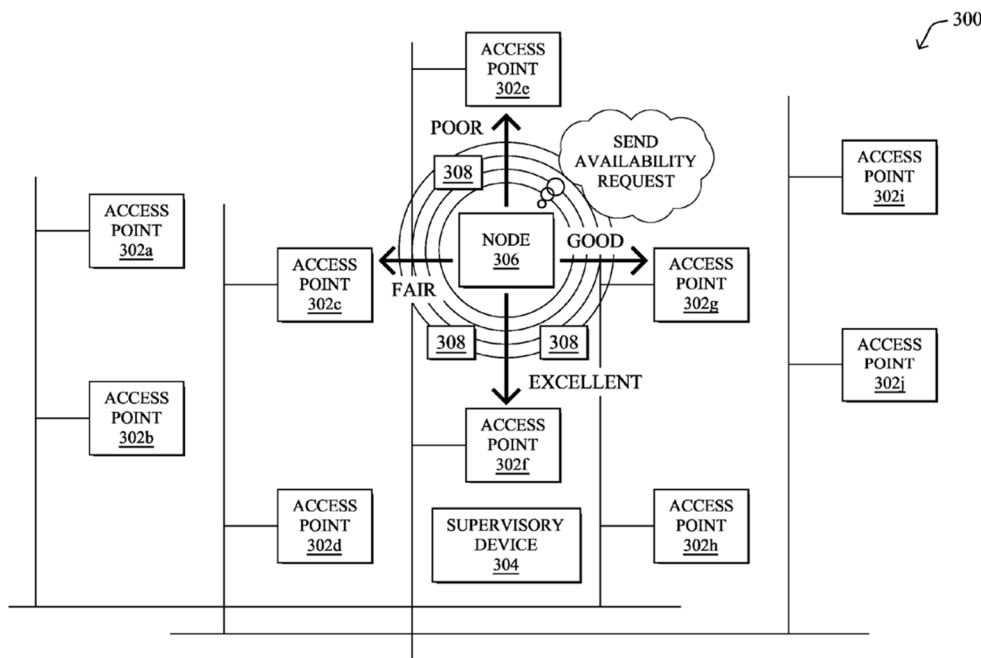


FIG. 3A

Thubert FIG. 3A.

48. Thubert discloses that results may vary when “a plurality of [access points] 302” receives the broadcast network availability request 308 from a node 306 (Thubert [0054]). When this node 306 is attempting to join the network by broadcasting a network availability request 308, access points 302 “within range of [the] node 306 may, by virtue of receiving request 308, capture data” related to the network availability request 308, including the request’s content and “other characteristics such as, but not limited to, a link quality indicator (LQI), a signal[-]to[-]noise ratio (SNR), or received signal strength indicator (RSSI)” (*Id.*). Thubert explains that the access points 302 receiving the request 308 may “instead report the captured data” directly to the supervisory device 304 (Thubert [0055]). The supervisory device 304 may also create a VAP “that is unique to node 306” by selecting a set of access points 302 for the node 306 and “designat[ing] one of the selected [access points] 302 as the primary [access point] 302 for the VAP” (Thubert [0056]-[0057]). Thubert additionally explains that “in order to exchange configuration and data packets with the [access points] 302,” the supervisory device 304 may “employ a VAP protocol” to “implement the VAP in the network” (Thubert [0058]).

VIII. CLAIM CONSTRUCTION

49. I have been asked to provide my opinion on the proper meanings of the following selected claim terms, including “normal monitoring mode”, “fast monitoring mode”, “normal wake-up mode”, “fast wake-up mode” and “fast wake-up instruction,” as recited in independent Claims 1, 7 and 14 of the ’216 Patent. For the purposes of this declaration, I have construed all other claim terms of the Challenged Claims according to their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art, at the time of the alleged invention, which I understand is July 2, 2018, for all claims.

A. A “MONITORING MODE” REQUIRES A PERIODIC CYCLE

50. It is my opinion that a “monitoring mode” requires a periodic cycle formed by monitoring intervals separated by non-monitoring intervals – i.e., awake intervals separated by asleep intervals.

51. The '216 Patent explains that “a radio frequency module of the electronic tag device automatically wakes up every other time period (hereinafter referred to as a ‘monitoring period’ of the electronic tag device, such as 30 s) to monitor whether there is a communication request.” (Ex. 1001, 1:25-29). It further explains that “frequent monitoring of the electronic tag device will cause an increase of power consumption. In order to take into account communication speed and battery life, a longer monitoring period (such as 20 s) is usually adopted to reduce the power consumption, so as to improve the battery life” (Ex. 1001, 1:42-50). Thus, an electronic tag device described in the '216 Patent “monitors” incoming communication requests on its first communication path in “monitoring modes” described within the Patent’s specification.

52. It is my opinion that the specification describes a periodic behavior, wherein the first communication path of the electronic tag device exhibits a periodic cycle formed by monitoring (awake) intervals separated by non-monitoring (asleep) intervals. Thus, a mode exhibiting a continuously-awake state not punctuated with any asleep interval, or a non-periodic composition of awake and asleep intervals, would be inconsistent with a “monitoring mode” of the '216 Patent.

53. For instance, in a mode comprising a continuously awake state, the electronic tag device would not “automatically wake[] up” at all, as it remains in an awake state and does not take any action of “wak[ing] up.” Further, in a mode exhibiting a non-periodic composition of awake and asleep intervals, the electronic tag device would not automatically wake up *every other time period*, as “every other time period” connotes periodic behavior.

54. It is my opinion that a periodic cycle formed by monitoring (awake) intervals separated by non-monitoring (asleep) intervals achieves the objective of monitoring for incoming communication requests and allowing the electronic tag device to react to them. Such a periodic cycle allows the electronic tag device to manage its energy consumption through, for example, adjustment of the period, as disclosed in the '216 Patent.

55. It is also my opinion that this periodic-cycle arrangement is a conventional, well-known method to implement monitoring in the first communication path of the electronic tag device, as disclosed by the '216 Patent itself (Ex. 1001, 1:24). I understand that the European Patent Office ("EPO"), in an opposition proceeding involving a related patent, also found that "an operation state in which the tag is permanently awake cannot be considered as a tag in a *'fast monitoring mode'* because it shows no time period separating moments in which the tag wakes up" (Ex. 2009, 10) (formatting original). I agree with the findings of the EPO.

56. Therefore, a "monitoring mode" of the first communication path of the electronic tag device requires a periodic cycle formed by monitoring (awake) intervals separated by non-monitoring (asleep) intervals.

B. THE "NORMAL MONITORING MODE" AND THE "FAST MONITORING MODE" DIFFER IN THEIR MONITORING PERIODS

57. It is my understanding that in clarifying the term "monitoring mode", the '216 Patent's specification also defined the term "monitoring period" of a monitoring mode as the time period between the consecutive waking-up points in the monitoring mode, that is, the length of a periodic cycle, equal to the sum of the length of one monitoring (awake) interval plus the length of one non-monitoring (asleep) interval (Ex-1001, 1:25-29). I understand that Petitioner and Patent Owner have both confirmed this understanding of the term "monitoring period" in the District Court Action. *See* Ex. 2007, 16 n.4. I further understand that the EPO has adopted this same

understanding. See Ex. 2009, 10 (“It is therefore clear...that a “monitoring period” is a time period separating the moments in which a tag...will automatically wake up”) (formatting original).

58. The '216 Patent then specifies that “[i]n order to improve the response speed of the electronic tag device, it is required to shorten the monitoring period (for example, 1 s). In a usage scenario of a large-scale electronic tag device, since it is uncertain which electronic tag devices need to interact, the monitoring periods of all electronic tag devices have to be shortened to meet customer experience requirements. In this way, the power consumption of monitoring the wake-up signal in the electronic tag device will increase significantly. For example, the original monitoring period is 20 s, while the existing monitoring period is 1 s. Under the existing monitoring period, the battery power consumption is 20 times of the original power consumption, and this situation will have a great impact on the battery life. For the usage scenarios of the large-scale electronic tag device, it will cause more frequent replacements and increase labor costs” (Ex-1001, 1:55-2:3).

59. The '216 Patent further explains that “[i]t only needs to set a normal monitoring mode and a fast monitoring mode in an electronic tag device, and set a normal wake-up mode and a fast wake-up mode in a base station, then the customer experience requirements can be met without shortening the monitoring periods of all electronic tag devices, without increasing battery power consumption, and without increasing labor costs” (Ex-1001, 2:9-14).

60. It is my opinion that the preceding disclosures both discuss monitoring modes and monitoring periods in the context of response speed, battery power consumption and labor costs. The existence of normal and fast monitoring modes in *an electronic tag device* allow customer experience requirements to be met without shorting the monitoring periods *of all electronic tag*

devices by carefully adjusting the monitoring mode in *the* electronic tag device without requiring any change to the monitoring periods of *the other electronic tag devices*.

61. It is further my opinion that, in view of the earlier disclosure regarding monitoring periods affecting response speed, battery power consumption and labor costs, that the normal and fast monitoring modes differ in their monitoring periods, with the normal (fast) monitoring mode possessing a longer (shorter) monitoring period and therefore lower (higher) battery power consumption and lower (higher) labor cost but slower (faster) response speed. This same understanding was expressly adopted by the EPO, stating “it [is] unambiguously clear for a skilled reader that a shorter ‘*monitoring period*’ of the electronic tag results in that the tag ‘*wakes-up*’ periodically faster, and that the tag is configured to operate in a ‘*normal*’ monitoring mode and a ‘*fast*’ monitoring mode (that is, in a mode with a shorter monitoring period than in the ‘*normal*’ mode).” (Ex-2009, 7, formatting original).

62. I understand that the District Court, in the District Court Action, reached the same conclusion in its preliminary constructions (*see* Ex. 2006, 2, differing the two terms based on monitoring period length). However, I understand that, following the *Markman* hearing in which Petitioner argued that the preliminary construction does not necessarily result in the fast monitoring mode having a faster responsive speed than the normal monitoring mode (Ex. 2005, 36:9-40:19), the District Court decided that the normal and fast monitoring modes differ not in the monitoring periods, but in their “duration[s] of the wake-up period” (*see* Ex. 2007, 19, construing “normal monitoring mode” as “a normal mode that is configured to wake-up the tag for a duration that is shorter than the duration of the wake-up period of the fast monitoring mode” and “fast monitoring mode” as “a mode configured to wake-up the tag for a duration that is longer than the

duration of the wake-up period of the normal monitoring mode, which increases power consumption when compared to the normal monitoring mode”).

63. I disagree with the District Court’s constructions of “normal monitoring mode” and “fast monitoring mode” as it introduces the term “wake-up period”, which is a term that does not appear in the specifications or in the Parties’ briefings, and is inconsistent with the example offered by the specification itself (Ex. 1001, 1:61-67) where nothing is said about the supposed change in “wake-up period”, yet the monitoring period (a term that is explicitly defined in the specification and on the meaning of which the Parties largely agree) clearly changes. In my opinion, the District Court thus misconstrued the claim language.

64. Additionally, it is my opinion that the District Court’s erroneous construction fails to properly address the issue of how the fast monitoring mode is faster, because, in the mirror image of Petitioner’s example, a mode with a longer wake-up period (according to the District Court’s meaning of this term) but also longer monitoring period can also be slower. Thus, in my opinion, the District Court’s constructions do not give effect to the terms chosen by the patentee.

65. Further, I do not agree with Petitioner’s argument against the (correct) preliminary constructions. In my opinion, the monitoring period is the only variable mentioned in the specification between the two monitoring modes, and therefore everything else stays the same. I understand that the District Court found, and VusionGroup conceded that, in this scenario, the fast monitoring mode would indeed be “faster” (Ex. 2005, 37:12-38:3).

66. Therefore, it is my opinion that “normal monitoring mode” and the “fast monitoring mode” differ in their monitoring periods, such that the “fast monitoring mode” possesses a shorter monitoring period than the “normal monitoring mode.”

C. A “WAKE-UP MODE” IS ASSOCIATED WITH A TRANSMISSION DURATION (“WAKE-UP DURATION”)

67. It is further my opinion that a “wake-up mode” of a base station of the ’216 Patent is associated with a duration (termed “wake-up duration” in the specification) of the transmission (by the base station) of a “wake-up instruction.”

68. The ’216 Patent specifies that “[i]f a base station device which communicates with the radio frequency module intends to communicate with a certain electronic tag device, the electronic tag device needs to be waked up at first for a period (hereinafter referred to as a ‘wake-up duration’ of the base station device, such as 35 s) longer than the monitoring period of the electronic tag device, and then instructions and data can be transmitted. In this case, it requires at least a duration longer than the ‘wake-up duration’ to transmit an instruction to an electronic tag device, so as to complete the communication with the electronic tag device” (Ex. 1001, 1:32-42). The specification thus defines the term “wake-up duration” as a characteristic of the base station (Ex. 1001, 1:35-37).

69. It is my opinion that this language in the ’216 Patent pertaining to “wake-up duration” indicates the electronic tag device needs to be waked up through an instruction the transmission of which lasts for the “wake-up duration.” That is, the transmission of the instruction needs to last for the “wake-up duration.” In other words, the duration of the instruction transmission is the “wake-up duration.”

70. An interpretation of “wake-up duration” as a length of time for which an electronic tag device must remain in the awake state is incorrect, because it makes the “wake-up duration” a characteristic of the behavior of the *electronic tag device*, instead of the base station, thus contradicting the explicit disclosure (*see* Ex. 1001, 1:36) and the claim language (*see e.g.*, Ex. 1001, 7:42-44). This (incorrect) interpretation also conflicts with the subsequent disclosure that

the communication must be “at least ... longer than the ‘wake-up duration’” (Ex. 1001, 1:39-40). An electronic tag device will not be able to complete a communication process that lasts longer than the “wake-up duration” if it only stays awake for the “wake-up duration.”

71. Conversely, the interpretation of “wake-up duration” as the duration of the instruction transmission is compatible with the invention claimed by the ’216 Patent. Since an electronic tag device in a monitoring mode only stays awake for a fraction of its monitoring period, a base station initiating communication with the electronic tag device will not be able to know whether the electronic tag device is awake or asleep at any particular moment. However, in the invention of the ’216 Patent, the base station will know the actual monitoring mode (and therefore the actual monitoring period associated with that monitoring mode) of the electronic tag device that it is about to communicate with, because the ’216 Patent provides for a normal and a fast monitoring mode in the first communication path of the electronic tag device, as well as a normal and a fast wake-up mode in the base station, and accordingly, intends the two “normal” modes to work together and the two “fast” modes to work together.

72. In fact, the ’216 Patent clearly contemplates that a base station would employ its “fast wake-up mode” when communicating with an electronic tag device that is in its “fast monitoring mode” (Ex-1001, 2:30-48, 2:53-3:4, 4:11-30, 5:37-56, 6:7-21, 7:50-60, 8:43-53, FIG. 2). It is my opinion that, by implication, a base station would employ its “normal wake-up mode” when communicating with an electronic tag device that is in its “normal monitoring mode.” This is also consistent with the EPO’s decision indicating that “operating the tag in a ‘*normal*’ monitoring mode together with the base station in ‘*fast*’ wake-up mode (and, similarly operating the tag in ‘*fast*’ mode together with the base station in ‘*normal*’ mode) would not make any sense in the context of the claimed invention for a skilled reader.” (Ex-2009, 7). This is how the ’216 Patent

achieves its objective of meeting the customer experience requirements “without shortening the monitoring period of all electronic tag devices, without increasing battery power consumption, and without increasing labor costs” through “only” setting the two monitoring modes in the electronic tag device and setting the two wake-up modes in the base station (Ex. 1001, 2:7-15, 6:35-42).

73. Therefore, it is my opinion that a base station initiating communication with the electronic tag device would know the actual monitoring period of the electronic tag device, but it would not know precisely where within that period the electronic tag device is in an awake interval. Since the monitoring period is the period of the cycle of awake and asleep intervals, the base station ensures communication with the electronic tag device by setting the transmission duration of its wake-up instruction to be longer than the monitoring period of the electronic tag device, since the electronic tag device would be certainly awake *at some point* during a time interval equal in duration to the monitoring period, and thus be able to receive the wake-up instruction at that point.

74. It is my opinion that this comports with the disclosure that the wake-up duration should be longer than the monitoring period of the electronic tag device (*see* Ex. 1001, 1:37-38). This further comports with the disclosure that the communication lasts longer than the wake-up duration, since the wake-up instruction, which takes up the wake-up duration, is only a part of the communication (which also includes further instruction and data, *see* Ex-1001 [1:38-39]; *see* Ex-1001, 1:39-42).

75. In addition, it is my opinion that, since the “normal wake-up mode” is intended to work with the “normal monitoring mode” and the “fast wake-up mode” is intended to work with the “fast monitoring mode”, in each wake-up mode, the wake-up duration is set accordingly. Since the fast monitoring mode possesses a shorter monitoring period, the wake-up duration of the fast wake-up mode only needs to be set longer than this shorter monitoring period of the fast monitoring mode, but shorter than the monitoring period of the normal monitoring mode (thus further shorter

than the wake-up duration of the normal wake-up mode). This allows the '216 Patent to achieve its objective of meeting customer experience requirements, since if the fast wake-up mode still employs a wake-up duration that last longer than the monitoring period of the normal monitoring mode, then the electronic tag device (in fast monitoring mode) will not be able to process instruction and data until this wake-up duration ends, thus the response will appear on the electronic tag device at least after the monitoring period of the normal monitoring mode, which can be as long as 20 or 30 seconds. (*see* Ex-1001, 1:25-27, 1:55-57, 1:63-65, 2:7-15, 6:35-42).

76. Therefore, it is my opinion that, in the context of the specification, a “wake-up mode” is associated with a duration (“wake-up duration”) of the transmission of a “wake-up instruction” transmitted by a base station.

D. THE “NORMAL WAKE-UP MODE” AND THE “FAST WAKE-UP MODE” SET REQUIREMENTS ON THEIR WAKE-UP DURATIONS

77. I understand that the District Court construed “the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode” as “the base station comprises two wake-up modes, a normal wake-up mode wherein the base station is configured to have a wake-up duration that is at least longer than a wake-up duration of the normal monitoring mode of the electronic tag device, and a[the] fast wake-up mode wherein the base station is configured to have a wake-up duration that is at least longer than a wake-up duration of the fast monitoring mode of the electronic tag device.” I disagree with this construction for the following two reasons.

78. First, in my opinion, the Court’s construction erroneously introduced the term “a wake-up duration of the [normal/fast] monitoring mode”, whereas the '216 Patent specification is clear that “wake-up duration” is a characteristic of the base station, not of the monitoring mode of the electronic tag device (Ex. 1001, 1:36, 7:42-44). Nowhere in the '216 Patent specification is the monitoring mode described as possessing a “wake-up duration.” Thus, it is my opinion that this

construction improperly rewrites the claim and fails to give effect to the terms chosen by the patentee.

79. Second, it is my opinion that the District Court’s construction failed to account for the fact that the wake-up duration in the fast wake-up mode needs to be shorter than the monitoring period of the normal monitoring mode so as to achieve the objectives of the ’216 Patent of meeting customer experience requirements (as discussed above in Section VIII.B).

80. Therefore, it is my opinion that the District Court erred in its construction. It is further my opinion that the “normal wake-up mode” is associated with a wake-up duration longer than the monitoring period of the “normal monitoring mode”, and the “fast wake-up mode” is associated with a wake-up duration longer than the monitoring period of the “fast monitoring mode” but shorter than the monitoring period of the “normal monitoring mode.”

E. THE TRANSMISSION DURATION OF A “FAST WAKE-UP INSTRUCTION” IS THE WAKE-UP DURATION OF THE “FAST WAKE-UP MODE”

81. As discussed above, it is my opinion that the “wake-up duration” is simply the transmission duration of the “wake-up instruction” sent by the base station in a particular “wake-up mode” in order to wake up an electronic tag device. Therefore, in my opinion, a “fast wake-up instruction” is a wake-up instruction transmitted in a “fast wake-up mode” and its transmission persists for the “wake-up duration” associated with the base station’s “fast wake-up mode” – longer than the monitoring period of the “fast monitoring mode” but shorter than the monitoring period of the “normal monitoring mode.”

82. I understand that the District Court construed “fast wake-up instruction” as “instruction from the base station to the electronic tag device requiring the electronic tag device to wake-up for a period that is longer than the wake-up period of the fast monitoring mode” (Ex. 2008, 23-24). It is my opinion that by focusing on the *effect* of the wake-up instruction instead of on the

transmission duration of the instruction, the District Court erroneously interpreted the language for “wake-up duration.” Further, it is my opinion that the District Court’s erroneous construction also relies upon the so-called “wake-up period” of monitoring periods, yet this term has no support in the specifications. Additionally, I understand that, in the parallel proceeding, Petitioner argued that the so-called “plain and ordinary meaning” of the term “fast wake-up instruction” should be construed as “instruction from the base station to the electronic tag device requiring the tag to remain in fast monitoring mode such that data can be received by the electronic tag device” (Ex-2004, vii.). I do not agree with Petitioner’s proposed construction for at least the reasons above in this section, and for the reasons discussed above in Section VIII.C, with respect to the term “wake-up mode” and its associated “wake-up duration.” That is, the Petitioner’s proposed construction fails to properly consider the specification language pertaining to different transmission lengths of wake-up instructions corresponding to respective wake-up modes and the associated “wake-up duration.”

83. Therefore, it is my opinion that a “fast wake-up instruction” is a wake-up instruction transmitted in a “fast wake-up mode” and its transmission lasts for the “wake-up duration” of the “fast wake-up mode.”

IX. PETITIONER AND ITS EXPERT HAVE NOT ESTABLISHED BY A PREPONDERANCE OF THE EVIDENCE ANY CLAIM IS UNPATENTABLE

84. Petitioner identifies several grounds by which the claims of the ’216 Patent are rendered obvious. Dr. Wolfe similarly identifies the same several grounds by which the claims of the ’216 Patent are rendered obvious. In ¶55 of his declaration, Dr. Wolfe opines “that claims 1–19 of the ’216 Patent are disclosed in and rendered obvious by the prior art” discussed above, and in Section XI of his declaration. More specifically, Petitioner and Dr. Wolfe assert that Nagata or

Nagata in view of Hashiguchi would render Claims 1, 2, 5, 6, 7, 8, 11, 12, 13, 14, 15, 18, and 19 of the '216 Patent to a POSITA at the time of the invention. Similarly, Petitioner and Dr. Wolfe asserts that Nagata in view of Thubert or Nagata in view of Hashiguchi in further view of Thubert would render obvious dependent Claims 3, 4, 9, 10, 16, and 17 of the '216 Patent. However, for at least the reasons detailed below in this section, with respect to each of the presented grounds, it is my opinion that the cited references, alone or in combination, do not disclose, suggest, or render obvious to a POSITA each and every limitation of the challenged claims of the '216 Patent.

A. GROUND 1: NAGATA DOES NOT RENDER OBVIOUS THE CHALLENGED CLAIMS

85. Petitioner and Dr. Wolfe contend that the limitations of the challenged claims would have been obvious to a POSITA in view of the disclosures of Nagata. It is my opinion that Petitioner and Dr. Wolfe fail to show that Nagata discloses multiple limitations of the challenged claims of the '216 Patent. Additionally, it is also my opinion that Petitioner and Dr. Wolfe fail to support the position that a POSITA looking to the Nagata reference would have been motivated to independently arrive upon the novel system and method that the '216 Patent introduces to the field of the invention (i.e., low-power device networking communications as applied to wireless electronic shelf label systems); and further, they fail to support the position that said POSITA would have implemented the teachings of Nagata in a manner that satisfies each and every limitation of the challenged claims.

86. As will be discussed in more detail below, Petitioner and Dr. Wolfe's obviousness arguments rely on the wireless electronic shelf label communication system disclosed by Nagata that implements an approach for cost savings via energy saving techniques. Although both Nagata and the '216 Patent address preservation of battery energy for electronic shelf labels, the approach disclosed by the '216 Patent is substantially distinct and fundamentally different from that in

Nagata. More specifically, as detailed above in Section VI, the '216 Patent seeks to improve over the then-current approaches that utilized fixed periodic communications that necessarily have to compromise between responsiveness and battery life; and, the '216 Patent, broadly, addresses this problem using a system in which the monitoring period of the electronic tag device and associated wake-up mode of a connected base station are dynamically adjusted out of normal modes—which are less responsive but preserve battery life—into faster modes with increased energy consumption only when required to interact with a user. In contrast, as detailed above in Section VII.A, Nagata discloses a system that is predicated upon the use of a fixed compromise between energy efficiency and responsiveness, based on a prescribed time interval referred to therein as a “beacon,” such that the electronic rack labels (or electronic tag devices) are synchronized with the connected base stations and communicate only in a fixed, periodic way, thus maintaining a consistent clock-cycle. In other words, Nagata is an example of the kind of prior art system that the '216 Patent sought to improve.

87. Accordingly, although Petitioner and Dr. Wolfe both present conclusory statements that suggest the approaches used by Nagata and the '216 Patent are broadly similar, they are wrong. Put simply, any similarity between the claimed inventions within Nagata and the '216 Patent is limited to the fact that both publications address wireless connected devices and thus must consider battery usage and performance issues. Indeed, the approach disclosed by the '216 Patent is distinct from that of Nagata at least because the '216 Patent explicitly describes certain problems inherent to fixed communication interval systems such as Nagata, and because the '216 Patent is directed towards improving such systems by adopting a different communication system that is incompatible with the use of fixed communication intervals.

88. Thus, Petitioner and Dr. Wolfe’s conflation of the disclosures of Nagata with those of the ’216 Patent amounts to disregarding the problems that the ’216 Patent are directed towards addressing, the solutions proposed in the ’216 Patent for how to overcome specific shortcomings like those within Nagata, and the language of the ’216 Patent claims that require switching between different modes of communication to allow increased responsiveness when needed without increasing energy usage when such responsiveness is not needed. In other words, in arguing that a POSITA would arrive at the ’216 Patent from Nagata, Petitioner and Dr. Wolfe are neglecting the entire premise and purpose of the ’216 Patent and ignoring the disclosures within the ’216 Patent that specifically seek to improve over systems of Nagata.

89. Even disregarding the above-discussed fundamental deficiency in Petitioner and Dr. Wolfe’s premise, for at least the reasons below they have failed to show that certain limitations of the ’216 Patent claims are disclosed or obvious to a POSITA in view of Nagata.

i. Nagata fails to disclose or render obvious limitations pertaining to “a normal monitoring mode” and a “fast monitoring mode” ([1.2.1], [7.7], [14.7])

90. Claim elements 1.2.1, 1.4, and 1.8 of the ’216 Patent recite:

[1.2.1] “the first communication path supports two monitoring modes: a normal monitoring mode and a fast monitoring mode;”

[1.4] “the electronic tag device is configured to receive the first data, transmit the first data to the base station through the first communication path, and enter the fast monitoring mode;”

[1.8] “the electronic tag device is further configured to receive the fast wake-up instruction, the control instruction and the second data, and switch to the normal monitoring mode after completing the communication” (emphasis added).

91. Thus, Claim 1, as well as Claims 7 and 14, require that the first communication path utilized by the electronic tag device supports both a normal monitoring mode and a fast monitoring mode, wherein the electronic tag device enters the fast monitoring mode after transmitting first data

(received from an external device) to the base station via the first communication path, and the electronic tag device changes back to the normal monitoring mode after receiving a fast wake-up instruction, the control instruction, and the second data from the base station via the first communication path. It is my opinion that neither Petitioner nor Dr. Wolfe have shown that the cited reference discloses, suggests, or renders obvious to a POSITA the limitations of claim elements 1.2.1, 1.4, and 1.7, as well as the corresponding elements of Claims 7 and 14.

92. In ground 1, Petitioner argues that Nagata's label has two "monitoring modes", "(i) a monitoring mode that operates in accordance with a relatively short prescribed duration at elongated intervals (e.g., once every minute for one second), with slower communications because the access point must wait to communicate with the electronic rack label until the next waking period; and (ii) a monitoring mode where the second communications part may enter and maintain the awake state to keep the path active for faster communications that avoid the delay of waiting for the next interval to start" (Paper 2, 23; Ex. 1003 [104]). Petitioner argues that these "monitoring modes" teach the recited "normal monitoring mode" and "fast monitoring mode" (Paper 2, 23; Ex. 1003, [105]). It is my opinion that this argument is incorrect.

93. To start with, Petitioner's argument lacks support in Nagata. Petitioner identified [0029] and [0083] of Nagata as disclosing the two "monitoring modes" (Paper 2, 23; Ex. 1003 [104]). The former discusses the switching between a sleep state and an awake state *at a prescribed-time interval*, without mentioning any variation from this fixed periodic behavior. (Ex. 2010 [0029]). The latter specifies that the label "normally performs. . . repetitively" a switch from the sleep state to the awake state for just 1 second once a minute. (Ex-2010 [0083]). It further specifies that "in the situation in which the second communications part 42 has entered the awake state and the second communications part 42 has received a beacon notifying it to the effect that information to

be transmitted from the access point 30 has been transmitted, the switching part 44a, for example, maintains the operation state of the second communications part 42 as is in the awake state for 30 s.” (Ex-2010 [0083]). The latter disclosure offers the only support for Petitioner’s “identification” of the second “monitoring mode”, which Petitioner presents as teaching the claimed “fast monitoring mode.” (Paper 2, 23: “keep the path active for *faster* communications,” emphasis added; Ex. 2012, 70:6-71:13: “it is descriptive of one aspect of the fast monitoring mode).

94. However, it is my opinion that this does not disclose the “fast monitoring mode” of the ’216 Patent. Rather, it discloses an action of *maintaining* the awake state, not of “enter[ing] and maintain[ing] the awake state” (Paper 2, 23). Additionally, this discloses an *aperiodic*, not periodic behavior, and thus it fails to include any periodic cycle of monitoring intervals separated by non-monitoring intervals, which, as discussed above, is required by a “monitoring mode” of the ’216 Patent.

95. Even if one accepts Petitioner’s “identification” of the two “monitoring modes,” Petitioner’s argument still fails. Petitioner argues that “Nagata’s monitoring mode with a longer prescribed time interval (i.e., period) and shorter awake time (i.e., wake-up duration)” teaches the claimed “normal monitoring mode” and that “Nagata’s monitoring mode with an increased awake time” teaches the claimed “fast monitoring mode” (Paper 2, 24; Ex. 1003 [106]). A “monitoring mode with a longer prescribed time interval” is still missing from Nagata, since Nagata only discloses a single example of such an interval (one minute) and nowhere discloses any variation to this interval (Ex. 2010 [0083]).

96. It is further my opinion that Nagata does not disclose dynamic adjustments of the interval parameter because Nagata’s access points rely on the predictability offered by a fixed, prescribed,

system-wide waking-up period in order to effectively communicate with their corresponding electronic rack labels (Ex. 2010 [0033]). Nagata explicitly disclosed that the access points send beacons at such a prescribed time interval so that the sending is “timed to when the operation state of the second communications parts 42 of the electronic rack labels 40 becomes the awake state.” (Ex. 2010 [0033], note the single “operation state” for the plural “electronic rack labels 40”). If any electronic rack label were allowed to carry on a periodic cycle with a different period, its corresponding access point would then not be able to correctly time the beacon to when its second communications part 42 becomes the awake state, and would not be able to correctly effect the communication with it. Even Petitioner acknowledged this fact by stating “POSITAs would have recognized Nagata’s label-server communications through the access points require *system-wide* timing” (Paper 2, 27, emphasis added; Ex. 1003, [111]).

97. Dr. Wolfe agrees that the “monitoring period” of the ’216 Patent is “referring to how frequently the tag is awake,” (Ex. 2012, 72:16-18) as discussed further below in this section. That is, the period between the periodic waking-up instances in Nagata corresponds to the “monitoring period” of the ’216 Patent. Accordingly, Nagata’s interval parameter (that is, the period between waking-up instances of a label), or “monitoring period” in the parlance of the ’216 Patent is fixed, and there cannot be a mode with “a longer prescribed time interval” (that Petitioner argues to be “normal monitoring mode”) in Nagata. In this respect, Petitioner’s identification fails because its so-called “normal monitoring mode” does not exist given that there is no other monitoring mode compared to which this one is considered “normal.”

98. Furthermore, I disagree with Dr. Wolfe’s opinion regarding “a normal monitoring mode and a fast monitoring mode” for the following additional reasons. In ¶102 of his declaration, Dr. Wolfe states that “Nagata’s labels include a ‘switching part’ that switches the operation of the

second communications part from a ‘sleep state’ to an ‘awake state’ to communicate with an access point” and “[t]he time and duration of the awake state can be adjusted to conserve battery power of the label (low power) or communicate quickly with the access point (high power).” Whilst the time between periodic activation of the awake state and duration of the awake state may indeed constitute parameters reflecting design choices that a POSITA could make within the system as disclosed by Nagata, I disagree that a POSITA would have selected values “to conserve battery power of the label (low power) or communicate quickly with the access point (high power)” in a manner commensurate with the limitations of the challenged claims of the ’216 Patent for several reasons.

99. First, as an initial matter, Nagata contemplates adopting a *fixed communication interval*, and thus the design choices that a POSITA makes in determining how to set this interval—e.g., setting the parameters noted by Dr. Wolfe—result in adoption of a single setting that provides a set battery usage corresponding to a particular communication responsiveness. In other words, this is an example of the kind of compromise between battery life and response speed that the ’216 Patent describes as a problem in prior art systems, and it is not at all a disclosure of switching between two different modes as implied by Dr. Wolfe.

100. Indeed, other features of Nagata are predicated upon the fixed communication interval paradigm therein, and thus the system of Nagata is designed around this communication concept such that a POSITA would not readily recognize Nagata as pertaining to systems with varying communication intervals. For example, Nagata comprises a local memory within the NFC component of the label specifically to facilitate its fixed communication interval. More specifically, in Nagata’s system the memory within the NFC component enables data exchanged via NFC to be stored until the next communication transmission occurs. Thus, this memory of

Nagata is explicitly required because event-driven communications—such as those in the ’216 Patent in which NFC interactions trigger communication transmissions—are not needed within the fixed communication interval paradigm of Nagata. Indeed, in the system of the ’216 Patent in which communication transmissions are triggered by NFC interactions, writing information into and then reading it back out from the memory of Nagata may even *increase* power consumption relative to the system of the ’216 Patent. In other words, because Nagata is designed around the concept of fixed communication intervals, it includes hardware components such as memory for storing NFC-acquired information that facilitate this approach to communication, and that may be detrimental to a system that adopts varying communication intervals, triggered communication, or other ways of compromising between responsiveness and battery lifetime.

101. Second, the beacon signals of Nagata that are sent from the access points to the electronic rack labels are programmed to be sent at specific, prescribed intervals, which would not allow for “faster” communications to be transmitted from the access points, regardless of how often the electronic shelf labels wake up.

102. In more detail, Dr. Wolfe argues that Nagata’s labels have two “parameters” that may be tuned or configured to create more than one “monitoring mode.” According to Dr. Wolfe, these two parameters correspond to “(i) an interval at which the label automatically switches between the sleep (low power mode) and awake (high power mode) state, and (ii) the duration the label will remain in the awake state (e.g., duration of high power mode)” (*see* Wolfe Declaration ¶103). As such, he argues that a POSITA may be motivated to configure these parameters to define what a POSITA would have understood to effectively constitute two “monitoring modes.” Dr. Wolfe contends these would correspond to “(i) a monitoring mode that operates in accordance with a relatively short prescribed duration at elongated intervals,” and “(ii) a monitoring mode where the

second communication part may enter and maintain the awake state to keep the path active for faster communication that avoid the delay of waiting for the next interval to start” (*see* Wolfe Declaration ¶104). I disagree that a POSITA would recognize Dr. Wolfe’s mode with a “short prescribed duration at elongated intervals” and a mode “where the second communication part may enter and maintain the awake state” as the claimed “normal monitoring mode” and a “fast monitoring mode,” respectively. Indeed, as discussed above, I disagree with Dr. Wolfe’s premise that a POSITA would contemplate establishing two different settings that the system of Nagata could automatically switch between, because the paradigm of Nagata is predicated upon establishing a single fixed communication interval and the hardware of the system is designed around this paradigm.

103. In any event, even setting aside Dr. Wolfe’s fundamentally flawed premise, Nagata does not teach, suggest, or imply the use of a normal monitoring mode and a fast monitoring mode, as required by independent Claims 1, 7, and 14. Rather, Nagata focuses on embodiments that discuss electronic rack labels that make use of two states—i.e., “a sleep state, in which the second communications part 42 cannot communicate with the access point 30, and an awake state, in which the second communications part 42 can communicate with the access point 30” (Nagata [0029]), which are used to implement a single fixed communication interval that is periodically repeated without change.

104. That Nagata utilizes the two electronic rack label states therein (i.e., the “awake state” and the “sleep state”) to set a single periodic communication interval that occurs for a fixed duration and fixed period is detailed extensively within the disclosures of Nagata. For instance, Nagata discloses that “[w]hen the second communications part 42 is in the awake state, electric power is supplied from the battery 45 to the second communications part 42, and the second

communications part 42 can communicate with the corresponding access point 30” (Nagata [0081]); and that when the second communications part 42 is in the sleep state, “electric power is not supplied from the battery 45, and the second communications part 42 cannot communicate with the corresponding access point 30” (Nagata [0081]). Nagata also discloses that “switching part 44a switches the operation state of the second communications part 42” (Nagata [0080]). When describing this control part 44 in relation to the behavior of the operation states, Nagata describes switching between a sleep state and an awake state at a prescribed time interval (*see*, e.g., Nagata [0029] and [0081]), without contemplating any usage indicating or suggesting dynamic changes to the timing of the respective operation states resulting from the application of an alternate set of time and duration parameters. Put simply, the repetition period of a typical low-energy communications interaction with an access point, and the duty cycle of the communication interval, are fundamentally constant within the disclosures of Nagata—or, put another way, although the wait between awake periods and the duration of each wake period may be configured for a given situation, the resulting pattern of when the device is asleep and awake is then fixed and not intended to be varied dynamically. As an example, Nagata states that “[t]he switching part 44a switches the operation state of the second communications part 42 from the sleep state to the awake state for just 1 s, for example, once a minute. The switching part 44a normally performs this repetitively” (*see* Nagata [0083]).

105. In another example, Nagata further specifies that “in the situation in which the second communications part 42 has entered the awake state and the second communications part 42 has received a beacon notifying it to the effect that information to be transmitted from the access point 30 has been transmitted, the switching part 44a, for example, maintains the operation state of the second communications part 42 as is in the awake state for 30 s” (Nagata [0083]). This

communication scheme also fails to disclose the switching between a normal and fast monitoring mode as required by the '216 Patent; and, to the extent that Dr. Wolfe implies that this example corresponds to Dr. Wolfe's monitoring mode (ii) he is mistaken. Indeed, this example is yet another illustration of the fundamental incompatibility of Nagata with the claimed invention of the '216 Patent for at least the following reasons.

106. Even in examples where the electronic rack label of Nagata remains in an awake mode for a predetermined duration if the beacon signal conveys that information will be transmitted, this occurs only at a fixed responsiveness determined by the beacon signal period. More specifically, the fixed interval communication paradigm of Nagata has the electronic rack labels wake up according to a fixed pattern, such that the wake up is synchronized with, and coincides with, a periodic beacon signal from a connected access point or similar device. Although Nagata contemplates the beacon signal causing the electronic rack label to remain awake in instances when a communication transmission from the access point to the label will occur, such events can only occur during the already established and fixed periods of the preconfigured pattern. Put simply, such extended wake-up periods do serve to increase battery life within the fixed communication interval paradigm because they allow less energy to be consumed over periods in which no communication is required, but they do **not** adjust the response speed of the system because communication is still restricted to periodic intervals defined by the fixed beacon signal period. Accordingly, such examples do not involve triggering *changes in the state or mode of the electronic label device based on detecting an external device or NFC interaction* to increase responsiveness, and are merely an embellishment of the fixed communication interval approach of Nagata based on whether or not the *base station or access point intends to transmit information*

to the electronic label. Thus, such examples are unrelated to, and do not disclose to a POSITA, the normal and fast monitoring modes of the '216 Patent.

107. In ¶105 of his declaration, Dr. Wolfe admits that “the '216 patent does not expressly explain ‘normal’ and ‘fast’ monitoring,” and continues to explain that “[the '216 Patent] does explain [that] the electronic tag device may have a ‘monitoring period’ and ‘wake-up duration’ that can be changed based on the speed of communication with the base station.” Nevertheless, Dr. Wolfe concludes that “a POSITA would have understood faster communication could be achieved by either shortening the monitoring period or lengthening the wake-up duration.” However, in making this observation, Dr. Wolfe is merely rewording the well-established engineering compromise between faster communication, which in the fixed interval communication paradigm of Nagata necessitates a higher rate of energy consumption due to longer duty cycles or shorter periods, and battery life that is increased with shorter duty cycles and longer periods. For instance, in the context of describing the background of the invention therein, and outlining the problems with prior art solutions, the '216 Patent does indeed address relationships between the frequency of the monitoring periods, the length of wake-up durations, and energy usage (and battery life), as well as the ability to complete communications with the electronic tag device.

108. Similarly, Dr. Wolfe continues in ¶106 of his declaration to opine that “Nagata’s monitoring mode with a longer prescribed time interval (i.e., period) and shorter awake time (i.e., wake-up duration) teaches with '216 patent’s ‘normal monitoring mode’” and further that “[a] POSITA would have also recognized Nagata’s monitoring mode operating for an increased duration of time and/or at an increased frequency of awake time” would correspond to the fast monitoring mode of the '216 Patent. I disagree, for at least the following reasons.

109. As an initial matter, Dr. Wolfe admits that Nagata only has one monitoring mode, albeit configurable; however, his position that this single configurable monitoring mode purportedly discloses the use of two distinct monitoring modes of the '216 Patent is predicated upon a POSITA taking it upon themselves, in view of Nagata alone, to program more than one set of prescribed time intervals and corresponding shorter awake times to achieve two separate patterns of monitoring, and to configure switching between these two separate patterns as required by the '216 Patent. I disagree that a POSITA would be motivated to make such substantial modifications to Nagata, at least because, as discussed above, the dynamic switching between different communication intervals is incompatible with the approach of Nagata, both because it contradicts the fixed communication interval period paradigm of Nagata and because the hardware of Nagata is designed around servicing this fixed interval paradigm.

110. In any event, as described above, Nagata's access points transmit regularly scheduled beacon signals, which limit the speed of communications between the access points and electronic shelf labels, and thus even if a POSITA were to take it upon themselves to configure two separate combinations of sleep time interval and awake time duration, communication with the access points would still not occur "faster." Therefore, as overall communication speed of the electronic tag labels is limited by the prescribed beacon interval of the access point, a POSITA would not have been motivated by using the system of Nagata to program the electronic shelf labels to consume more power when this would not result in increased responsiveness.

111. In more detail, the solutions of the '216 Patent in which the electronic label switches into a faster monitoring mode to receive near-real-time communications from the base station in its corresponding faster wake-up mode, are very different and incompatible with the system of Nagata. For instance, Dr. Wolfe ignores his discussion with respect to Claim element 1.2.1,

wherein he addresses a key feature of how the systems of Nagata communicate—i.e., via a regularly scheduled beacon signal.

112. More specifically, the communication system disclosed by Nagata would not be able to achieve the kind of near real-time communications response envisaged by the '216 Patent, nor would a POSITA have been motivated to implement such a method based on the teachings of Nagata, at least because the responsiveness of Nagata is fundamentally limited by the fixed beacon signal period therein. Put another way, in order to achieve increased responsiveness as suggested by Dr. Wolfe, in addition to an electronic shelf label needing to dynamically vary between two monitoring modes, a corresponding base station must also provide wake-up instructions specific to each of these monitoring modes to complete the required transaction for the electronic shelf label. Instead, the system of Nagata discloses electronic shelf labels that may have configurable time intervals and wake-up durations, and base stations that rely on beacon transmissions that are transmitted from base stations to electronic shelf labels at specific, constant intervals. Nagata states “[i]t is noted that the access points 30 transmit at prescribed intervals (e.g., at 4 s intervals) a signal, which is called a beacon, for informing the electronic rack labels 40 of the presence/absence of a command transmission. In the situation in which a command is to be transmitted to one of the electronic rack labels 40, that command is transmitted following a beacon” (*see* Nagata [0032]). As the access points of Nagata transmit beacon signals at specific, constant time intervals, near real-time communications could not be realized at least because this beacon signal interval limits the speed with which communications can occur in the system of Nagata. That is, by using a prescribed interval to transmit beacons, even if the electronic shelf labels are awake for more time (and using more power), the transaction would not occur any faster than with a shorter awake duration.

113. In effect, the responsiveness of the communications within Nagata are limited by the fixed beacon period, and the use of such a fixed beacon period is both (i) consistent with the fixed communication interval paradigm of Nagata, and (ii) contradictory and incompatible with the claimed invention of the '216 Patent. As such, it is my opinion that Nagata does not disclose two monitoring periods as Dr. Wolfe suggests at least because there is no motivation for a POSITA to modify Nagata as suggested by Dr. Wolfe to configure two separate communication intervals.

114. Consequently, for at least the reasons detailed above, Petitioner and Dr. Wolfe have failed to show that Nagata discloses, suggests, or renders obvious to a POSITA both a “normal monitoring mode” and a second “fast monitoring mode,” as required by the limitations of the Claim elements 1.2.1, 7.7, and 14.7. Indeed, Petitioner and Dr. Wolfe could not have shown that Nagata discloses, suggests, or renders obvious to a POSITA two such monitoring modes, at least because Nagata describes a single monitoring mode based on a prescribed beacon signal transmission that can occur between an electronic rack label and a corresponding access point and the approach of Nagata is fundamentally incompatible with the use of varying communication periods. Accordingly, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that the limitations of Claim elements 1.2.1, 7.7, and 14.7 of the '216 Patent are disclosed, suggested, or rendered obvious to a POSITA by Nagata, and thus he has not shown that Claims 1, 7, or 14 of the '216 Patent are unpatentable.

ii. Nagata fails to disclose or render obvious “a normal wake-up mode and a fast wake-up mode” ([1.2.2], [7.7], [14.7])

115. Claim element 1.2.2 recites:

[1.2.2] and the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode;

116. Thus, Claim 1, as well as Claims 7 and 14, requires that the base station supports both a normal wake-up mode and a fast wake-up mode.

117. It is my opinion that neither Petitioner nor Dr. Wolfe have shown that the cited reference discloses, suggests, or renders obvious to a POSITA the limitations of Claim element 1.2.2, as well as the corresponding elements of Claims 7 and 14.

118. Petitioner argues that “POSITAs would have understood the access points necessarily operate in a coordinated mode with the labels because the access points can only communicate with the labels when the labels are awake in those modes. Indeed, Nagata’s access points have modes corresponding to the labels’ modes so they can exchange transmissions” (Paper 2, 25; Ex. 1003 [108]). Petitioner cites Nagata [0033] for support (Paper 2, 25; Ex. 1003 [108]). But Nagata [0033] does not disclose any such “modes [of access points] corresponding to the labels’ modes.” It only discloses that “each of the access points 30 transmits at a prescribed-time interval a signal called a beacon timed to when the operation state of the second communications parts 42 of the electronic rack labels 40 becomes the awake state” (Ex. 2010 [0033]). As discussed above, this prescribed-time interval is by design fixed and system-wide. Thus, contrary to Petitioner’s faulty summarization, Nagata [0033] only discloses *one* mode of the access points—to send beacons on a fixed, prescribed, system-wide time interval (Ex. 2012, 78:11-13, admitting that “the interval between beacons is fixed”).

119. Petitioner’s supposition (Paper 2, 25-27; Ex. 1003 [109]-[111]) that embodiments of Nagata relate to remote control interactions does not change this fact. In fact, Petitioner ultimately admits that “POSITAs would have recognized Nagata’s label-server communications through the access points require *system-wide* timing” (Paper 2, 27, emphasis added; Ex. 1003 [111]). Thus, there are no such “modes” in the access points.

120. Still, Petitioner asserts—without explaining how this relates to its earlier discussions of “modes”—that “POSITAs would have recognized Nagata’s label-server communications through

the access points require system-wide timing that causes the access points to switch into an active state (“wake up”) at different rates of communication (“normal” and “fast”) according to the rate of communications of the labels to avoid wasted power and transmissions” (Paper 2, 27; Ex. 1003 [111]). This assertion is wrong on two accounts.

121. First, Petitioner never identified any disclosure in Nagata of the *access points* having multiple states (“active state” or other) they can switch between. Dr. Wolfe cites [0033], [0065], [0083], and [0111], but these disclosures, as he summarized, relate to the management of a *label’s* state or to the handshake protocol for server-access point-label communications, not to any state of the *access points* (Ex. 1003 [111]). Second, Petitioner has not identified any disclosure of “different rates of communication” in Nagata.

122. Petitioner also points to Nagata’s communication process where the access points “receive instructions ... via the labels” and the server “generates and transmits a command back to the access points” (Paper 2, 25-27; Ex-1003 [109]-[110]). But these “instructions” and “commands” are for the *labels* to change their behavior, not the *access points* (see e.g., Ex. 2010 [0114], [0123]). These disclosures do not and cannot create “states” or “switches” in the access points. Thus, Petitioner failed to identify any disclosure in Nagata of the access points switching “into an active state”.

123. Further, I also disagree with Dr. Wolfe’s opinion regarding “a normal wake-up mode and a fast wake-up mode,” and that “Nagata discloses and/or suggests this limitation” (Wolfe Declaration ¶108), for the following additional reasons.

124. In ¶91 of his declaration, Dr. Wolfe broadly opines that Nagata’s access points disclose to a POSITA the “base stations” of the ’216 Patent. In particular, Dr. Wolfe states “[a] POSITA would have recognized Nagata’s access points as base stations because they receive and transmit

information between the electronic rack label and server in the same manner as the ‘base stations’ transmit and receive information between the tag and background server in the ’216 patent” (Wolfe Declaration ¶91). Additionally, in ¶108 of his declaration, with respect to Claim element 1.2.2, Dr. Wolfe opines that “a POSITA would have understood the access points operate in a coordinate [*sic*] mode with the labels because the access points can only communicate with the labels when the labels are awake in those modes. Specifically, Nagata’s access points have modes corresponding to the labels’ modes so they can exchange transmissions. *Id.*, [0033].” In other words, Dr. Wolfe observes that Nagata’s electronic labels communicate with access points, and he then jumps to an unwarranted conclusion that such coordination purportedly involves the access points having the claimed two distinct wake-up modes. I disagree. Indeed, not only has Dr. Wolfe failed to support the above-mentioned conclusion, he is also wrong; and, as explained below, the communication approach of Nagata is fundamentally incompatible with base stations that have more than one wake-up mode.

125. Dr. Wolfe’s position that Nagata purportedly discloses the two base station wake-up modes of the ’216 Patent is broadly based on his mischaracterization of the fixed interval communication approach used within Nagata. For instance, in ¶111 of his declaration, in relation to the above-discussed observation that Nagata’s electronic labels coordinate communication with access points using a fixed synchronization approach involving beacon signals, Dr. Wolfe opines that “[t]herefore, a POSITA would have recognized Nagata’s label-server communications through the access points require system-wide timing that causes the access points to switch into an active state (‘wake up’) at different rates of communication (‘normal’ and ‘fast’) according to the rate of communications of the labels to avoid wasted power and transmissions” (*see* Wolfe Declaration, ¶111). However, Dr. Wolfe is simply wrong. As explained below, a POSITA would not recognize

Nagata's communication system to involve different wake-up modes for base stations; and, moreover, a POSITA would not be motivated to modify Nagata to include such wake-up modes because doing so would be fundamentally detrimental to the communication approach of Nagata.

126. First, as discussed in my analysis above with respect to Claim element 1.2.1, Dr. Wolfe has not shown that Nagata discloses, suggests, or renders obvious to a POSITA electronic shelf labels within a communication system comprising two separate monitoring modes including a "fast monitoring mode" and a "normal monitoring mode," nor has he shown that a POSITA would have been motivated to program more than one kind of monitoring mode for the electronic shelf labels disclosed by Nagata. Indeed, also as discussed in my analysis above, such an approach involving two separate monitoring modes is fundamentally incompatible with the beacon system of Nagata and modification of the electronic shelf labels to implement two monitoring modes would increase power consumption without increasing communication response speed and thus would be detrimental. Thus, to the extent that Dr. Wolfe is opining that a POSITA would implement two wake-up modes for Nagata's access points to accommodate his proposed modification of Nagata's electronic labels to include two monitoring modes, I disagree with his premise at least because such a modification to the electronic labels would be deleterious and therefore a POSITA would not make such modification, and thus there is not a need for a corresponding modification to add two base station wake-up modes.

127. Second, I disagree with Dr. Wolfe's position that Nagata discloses "modes [of access points] corresponding to the labels' modes so they can exchange transmissions. *Id.*, [0033]" (Wolfe Declaration ¶108). Nagata merely discloses that "each of the access points 30 transmits at a prescribed-time interval a signal called a beacon timed to when the operation state of the second communications parts 42 of the electronic rack labels 40 becomes the awake state" (Nagata

[0033]). As discussed within Nagata, this prescribed time interval at which beacon signals are transmitted to an electronic shelf label from its corresponding access point is a system-wide time interval that is fixed and consistent, by design, in order to maintain overall system operations in a synchronized fashion. A POSITA would have understood that it would not have been beneficial for one of Nagata's labels to deviate from this system-wide time interval for any amount of time, as it would then require that a change be made to an access point to modify the timing of its beacon signals asynchronously from the other access points, which would have resulted in deviation from the system-wide continuity that Nagata teaches. Thus, a POSITA would not have been motivated to program more than one time interval at which a label could transition to an awake state, at least because this time interval would not align with the frequency of the beacon signals from the corresponding access point. In other words, the beacon approach of Nagata, whilst complementary to the fixed communication interval approach therein, is fundamentally incompatible with the use of varying monitoring modes within electronic shelf labels at least because the beacon approach is predicated upon constant periodic intervals for synchronized communications.

128. Third, although Dr. Wolfe opines that “a POSITA would have recognized Nagata's label-server communications through the access points require system-wide timing that causes the access points to switch into an active state (‘wake up’) at different rates of communication” (Wolfe Declaration ¶111), he has neglected to identify any disclosure within Nagata indicating that access points are operable to switch states to a different rate of communication. Yet further, he has also neglected to identify one or more disclosure within Nagata of access points switching their states in any capacity. Thus, Dr. Wolfe's position that Nagata purportedly renders obvious the two claimed base station wake-up modes is dependent upon a POSITA modifying the system of Nagata to add these two distinct wake-up modes, which, for at least the reasons above, a POSITA would

not be motivated to do. Indeed, it is my opinion that a POSITA would recognize that the communication approach of Nagata is predicated upon maintaining a regular, constant, beacon period that maintains synchronized communications over the system; and, accordingly, a POSITA would not expect modification of the system to switch between varying beacon periods to yield a successful result.

129. Fourth, even in the event a POSITA were motivated to modify Nagata's system to program what Dr. Wolfe describes as two different monitoring modes of the electronic labels, this would not have necessitated two different, respectively corresponding, wake-up modes of the access points. Indeed, Nagata discusses the NFC part of its electronic rack labels comprising a memory to store information. Nagata teaches that "[t]he NFC chip 52 is an integrated circuit that performs control of the first communications part 50 in various ways. The NFC chip 52 comprises the memory 60, which stores information" (*see* Nagata [0056]). A POSITA would have recognized that this memory 60 within the NFC chip 52 could be used within the system of Nagata to at least temporarily store information received by the first communications part 50. In this way, the electronic rack label of Nagata would be able to maintain its typical communications performance with respect to the access points and server. Therefore, even under Dr. Wolfe's proposed modification to the electronic labels of Nagata such that they have two different monitoring modes—with which I disagree and do not believe a POSITA would be motivated to implement—it is my opinion that a POSITA making such modifications would still not have been motivated to further modify the access points of Nagata to have two wake-up modes at least because the POSITA would recognize that the existing NFC memory of Nagata could be used to store instructions for communication to the access points at the next regularly scheduled time. In other words, a POSITA would recognize the importance of maintaining a regular beacon period, and

given this importance and the existing mechanism within Nagata for storing information until the next regularly scheduled access point communication, would not seek to add multiple different wake-up modes to the access points. Put more simply, there is no need within Nagata to implement two access point wake-up modes even if the electronic labels were counterintuitively, and deleteriously, modified to implement two monitoring modes; thus, at least because introducing two wake-up modes would interfere with the system-wide synchronization of the beacon approach within Nagata, a POSITA would not implement such different wake-up modes even if there were two monitoring modes for the electronic labels.

130. With regard to the overall operations of the system of Nagata, in his deposition, Dr. Wolfe conceded that the interval between beacon signals is fixed and prescribed in the system disclosed by Nagata:

Q: So in Paragraph 33, in part, Nagata's disclosing the access points transmit beacons at a pre-described time intervals; is that right?

A: Correct.

Q: So this just -- is this transmitting a beacons at a fixed pre-described time interval just one of the modes that we were just discussing?

A: No, it does that in both modes. In one mode, it sends the stay-awake beacon during that interval, and in the other mode it sends the go-to-sleep beacon during that interval.

Q: And are those intervals fixed, or does Nagata disclose dynamically changing them?

A: The interval between beacons is fixed, but during any particular interval, the base station can be in one mode or the other and will send a beacon that is indicative of its mode" (*see* Wolfe Deposition, 77:22-78:16).

131. As such, it is clear that Dr. Wolfe understands that the system of Nagata relies upon the fixed timing required by the beacon signals in order to facilitate communications between its devices. It is therefore unclear why he would suggest that a POSITA would be motivated to deviate from this system-wide operation for a single tag, as opposed to temporarily storing data that could be used within the system-wide timing considerations.

132. Also during his deposition, Dr. Wolfe stated, “what I’m doing here [in Ex-1003, ¶111] is distinguishing the state where [the access point] is actively preparing to send a message to the tag as opposed to an alternative state where it is not actively preparing to send a message to the tag” and “the [tag’s] monitoring mode determines, at least probabilistically the rate at which [the tag and the access point] can communicate. If the tag is awake for large periods of time, it’s likely that the communication will be completed fast. If the tag is asleep most of the time, it’s likely that the communication will be completed more slowly” (*see* Wolfe Deposition 84:18-85:9, 80:20-81:6). However, as previously explained, given the fixed nature of the beacon signal timing of the access points, it is unclear why Dr. Wolfe would rely on a “probabilistic” description of the clearly *deterministic* behavior of electronic rack labels that explicitly utilize periodic and pre-determined communication intervals.

133. Additionally, Dr. Wolfe fails to explain why he believes this would demonstrate that the access points comprise two distinct modes of operation. More specifically, in his deposition, he describes how such probabilistic “rates of communication” allow an avoidance of wasted power through sleeping (*Id.*, 80:17-83:20). However, in the disclosures of Nagata, it is only the electronic rack labels that can be in sleep or awake states, not the access points. In other words, to the extent that the behavior of the electronic rack labels of Nagata can be considered “probabilistic rates of communication” that could be adjusted by a POSITA as Dr. Wolfe appears to suggest, this

functionality would apply only to the rack labels, and not the access points. Indeed, Dr. Wolfe has not shown that Nagata discloses access points that comprise a “normal wake-up mode” and a “fast wake-up mode.” He has further not shown that an access point of Nagata has any behavior or functionality where it can “switch into an active state (‘wake up’) at different rates of communication (‘normal’ and ‘fast’)” (see Wolfe Declaration ¶111). Nor could he, as Nagata’s access points do not have more than one mode of operation and instead are always operating within the confines of a fixed beacon signal period according to a fixed, prescribed, system-wide time interval used to maintain synchronization. Thus, despite his attempt to clarify his positions within his deposition, Dr. Wolfe failed to show that the access points of Nagata comprise two separate modes of operation or would have any reason to operate in more than its singular disclosed mode.

134. In ¶111 of his declaration, Dr. Wolfe cites to Laroia’s disclosure of “reducing base station transmissions in terms of frequency and/or power level.” It is unclear why Dr. Wolfe has pointed to this reference, as within the context of his analysis in ¶111 of his declaration, he has not presented any basis or reasoning as to why a POSITA would have been motivated to look to references beyond Nagata. To the extent that Dr. Wolfe suggests that a POSITA would find it obvious to modify Nagata according to the disclosures of Laroia and implement base station operations in Nagata’s access points so as to incorporate Laroia’s methods in the access point-label communications, he has not introduced Laroia as an additional reference to be considered as part of a specific combination of prior arts. Additionally, to the extent that Dr. Wolfe is suggesting that a POSITA would reach an understanding of Nagata’s access points that involves multiple “states” based on Laroia’s disclosures, he has failed to explain how or why a POSITA would reach such an understanding. Dr. Wolfe has also failed to present an argument as to why a POSITA would look to Laroia, a patent directed to problems posed by “some cellular coverage areas” where

reduction of transmission power and/or interference is desirable (*see* Laroia, 1:35-40), to gain an understanding of Nagata's access points, which would be in a controlled retail environment, and thus unrelated to the reliability or variation of cellular coverage. Furthermore, the method disclosed in Laroia relies on wireless terminals to trigger the switching between modes of base stations, which is different from the automatic server interactions disclosed by Nagata (*see* Laroia, 31:54-63). Thus, Dr. Wolfe has not presented an argument as to why a POSITA would look to Laroia to gain an understanding of Nagata's communication operations or for potential modification of these operations.

135. In ¶¶112-113 of his declaration, Dr. Wolfe opines that a POSITA would have found it obvious look to standards such as "IEEE 802.15.4 and/or ZigBee™" and Bluetooth, without explaining what specifically a POSITA would have incorporated from these standards. At most, he states that "a POSITA would have recognized that both Nagata's access point (device 1) and electronic rack label (rack 2) would have used power-managed communication modes" (*see* Wolfe Declaration ¶113). Dr. Wolfe provides no explanation, analysis, or descriptions as to what specific information or features disclosed by the "IEEE 802.15.4 and/or ZigBee™" standards that, in his opinion, a POSITA would have incorporated into the teachings of Nagata, nor does he account for how any specific information or features in these standards would map to the operational modes required by the challenged claims of the '216 Patent such that a POSITA would find it obvious to configure the access points of Nagata with both a normal wake-up mode and a fast wake-up mode. For example, while he does cite without specificity to the "Enhanced Power Control" feature of the Bluetooth standard (*see* EX-1016, § 4.1.3.1), he recognizes that this feature is an optional feature of the Bluetooth standard (i.e., "but only if *both* devices ... support that feature power control" (*see* Wolfe Declaration ¶113). He further omits that the feature he cites to is applicable to

power control functionality and does not relate to *modes of communication* of the devices. Therefore, it is unclear how this reference to an optional Bluetooth power control feature relates to his identifications of the “modes” and “rates of communication” which Dr. Wolfe purports a POSITA would find obvious in view of Nagata. In my opinion Dr. Wolfe has not shown that these industry standards would have rendered obvious to a POSITA that two modes of communication operation could have been employed by the access points to benefit the system of Nagata. Indeed, for at least the reasons I discussed above, it is my opinion that a POSITA would recognize that modifying access points of Nagata to introduce variations in the period of beacon signals is undesirable.

136. Furthermore, Petitioner and Dr. Wolfe's arguments fail because nowhere did they identify any disclosure from Nagata that teaches different wake-up durations between their so-called “wake-up modes.” As discussed in Section VIII.C, above, the '216 Patent's “normal wake-up mode” and “fast wake-up mode” place requirements on their wake-up durations, and in particular, the wake-up durations need to be longer than the monitoring periods of the corresponding monitoring modes. A POSITA would realize that this requirement is fundamentally incompatible with Nagata, because the transmission length of Nagata's beacons cannot be lengthened to longer than the fixed interval Nagata teaches.

137. Consequently, for at least the reasons above, Petitioner and Dr. Wolfe have failed to identify, within the communication system of Nagata, a base station that comprises two separate modes of operation, namely a “normal wake-up mode” and a “fast wake-up mode,” as required by the limitation set by claim element 1.2.2 of the '216 Patent. They have further failed to demonstrate that a POSITA would have been motivated to arrive at this claim limitation of the '216 Patent, as the system of Nagata works in a specifically different way than that described by the '216 Patent,

in which there is a fixed, prescribed, system-wide synchronicity employed by the access points to communication with the electronic rack labels. Put more simply, for at least the reasons above the communication approach of Nagata is fundamentally incompatible with the proposed access point modifications suggested by Petitioner and Dr. Wolfe. Therefore, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that the '216 Patent would have been unpatentable.

iii. Nagata fails to disclose or render obvious “fast wake-up instruction” ([1.7], [1.8], [7.5], [7.6], [14.5], [14.6])

138. Claim elements 1.7 and 1.8 recite:

[1.7] the base station is further configured to receive the control instruction and the second data, communicate with the electronic tag device in the fast wake-up mode, and transmit a fast wake-up instruction, the control instruction and the second data to the electronic tag device through the first communication path; and

[1.8] the electronic tag device is further configured to receive the fast wake-up instruction, the control instruction and the second data, and switch to the normal monitoring mode after completing the communication.

139. Thus, Claim 1, as well as Claims 7 and 14, require that the base station is configured to transmit a fast wake-up instruction, as well as the control instruction and the second data, to the electronic tag device in the fast wake-up mode. Claim 1, as well as Claims 7 and 14, also require that the electronic tag device is configured to receive the transmitted fast wake-up instruction, as well as the control instruction and the second data, and switch to the normal monitoring mode after completing the communication. It is my opinion that neither Petitioner nor Dr. Wolfe has shown that the cited reference discloses, suggests, or renders obvious to a POSITA the limitations of Claim element 1.7 and 1.8, as well as the corresponding elements of Claims 7 and 14.

140. Petitioner, relying on disclosures of [0121] and [0133] of Nagata, argues that either the “presence”-indicating beacon or the “absence”-indicating beacon of Nagata discloses the “fast

wake-up instruction” of the ’216 Patent (Paper 2, 38-39, 41; Ex. 1003 [124]-[126], [129]). However, as discussed above, the transmission duration of the “fast wake-up instruction” of the ’216 Patent must be longer than the monitoring period of the fast monitoring mode. Petitioner has not identified any disclosure in Nagata where either of these beacon signals would have such a transmission duration. Further, Nagata’s system ensures that the beacons are only sent when the labels are in awake state—i.e., the beacon signal is “timed to when the operation state of the second communications parts 42 of the electronic rack labels 40 becomes the awake state” (Ex. 2010, [0033]). Thus, there is no need to use any significant transmission duration for Nagata’s beacons, because a shorter duration can still ensure receipt by the labels.

141. Moreover, Petitioner argues that “[b]ecause the [‘presence’-indicating] beacon is sent to maintain the label in the fast-monitoring mode, POSITAs would have understood the beacon teaches a ‘fast wake-up instruction’” (Paper 2, 39; Ex. 1003 [124]). However, as discussed above, the extended-awake state cannot be the claimed “fast monitoring mode” and the so-called “normal low-power mode” cannot be the claimed “normal monitoring mode.” Thus, Petitioner’s argument over what effect the beacon would have on the label’s monitoring state misses the point.

142. Further, I disagree with Dr. Wolfe’s opinion regarding “fast wake-up instruction” for the following additional reasons. For at least the reasons described with respect to Claim element 1.2.2 above, it is my opinion that Nagata does not disclose, suggest, or render obvious to a POSITA, an access point—which Dr. Wolfe believes satisfies the limitations of the claimed “base station”—comprising two modes of operation corresponding to the claimed wake-up modes. It is also my opinion that Dr. Wolfe has not shown that a POSITA looking to the Nagata reference would have been motivated to modify the teachings of Nagata to arrive at an access point satisfying the limitations of the claimed base station comprising two wake-up modes (i.e., a normal wake-up

mode and a fast wake-up mode). Therefore, at least because the access points of Nagata are not disclosed to comprise a “fast wake-up mode” in addition to a “normal wake-up mode,” nor would a POSITA be motivated to modify such an access point to comprise two such modes, Nagata does not disclose, suggest, or render obvious to a POSITA the limitations of Claim element 1.7 of the ’216 Patent, which requires that the base station be configured to communicate with the electronic tag device in the fast wake-up mode.

143. In ¶¶123-129 of his declaration, Dr. Wolfe presents arguments describing how he purports the system of Nagata to disclose or render obvious the limitations of Claim elements 1.7 and 1.8 regarding certain information communicated between the base stations and electronic tag devices, and the respective modes of communication used therein. More specifically, in ¶123, he opines that “a POSITA would have recognized the electronic rack label [of Nagata] remains in a longer awake transmission state *that is matched by access point 320* while the server processing occurs. The access point receives and transmits the server-generated command” as shown in his annotated figure. However, in the very next paragraph of his declaration, Dr. Wolfe states “Nagata’s access point precedes every information transmission to the electronic rack label with a timed beacon” (Wolfe Declaration ¶124), which directly contradicts his assertion that a “longer awake transmission state” (*Id.*, ¶123) would be employed by an access point. Rather, as detailed above, because Nagata utilizes a fixed, prescribed, system-wide time interval and is predicated upon maintaining system-wide synchronization, departure from the fixed timing of the beacon signals that are consistently sent from access points to electronic rack labels would have deleterious effects.

144. Dr. Wolfe continues in ¶124 of his declaration to purport that “[b]ecause the beacon is sent to maintain the label in the fast monitoring mode, a POSITA would have understood it to be a ‘fast

wake-up instruction.” However, as Dr. Wolfe himself explains in his descriptions of what a POSITA would have purportedly found obvious in view of Nagata, the electronic rack label of Nagata is already in the awake state in order to receive the instruction from the beacon signal to “*maintain the label*” in its awake state, as opposed to an undisclosed “fast monitoring mode” as required by the ’216 Patent. In other words, even under Dr. Wolfe’s position, the beacon signal merely causes the electronic label to remain in its current awake state, and thus it is unclear how such a signal can also cause the label to switch into a “fast monitoring mode.”

145. More specifically, in ¶124 of his declaration, Dr. Wolfe explains “[w]hen a remote control or smart phone sends a ‘storage- and/or display updated instruction’ or ‘display-switch instruction’ to the label ... the label switching part switches the second communications part into the longer duration awake state (‘fast mode’). *Id.*, [0113]–[0116], [0128]. That instruction is then sent to the access points.” In the example use case Dr. Wolfe describes that the longer duration awake state, which he contends constitutes the “fast mode,” is initiated when an instruction is transmitted to the label from an external, or remote, device like a phone. Thus, by his own account, the electronic label is already in an awake state when it receives a subsequent transmission of information from the access point. Put more simply, at most, Dr. Wolfe points to an “awake state maintenance instruction,” which is thus not the claimed “fast wake-up instruction.” Therefore, it is my opinion that Dr. Wolfe has not shown that Nagata discloses or renders obvious a “fast wake-up instruction” as required by the ’216 Patent.

146. Finally, in ¶125 of his declaration, Dr. Wolfe demonstrates his misunderstanding of the fundamental differences between the fixed communication interval approach of Nagata and the event-triggered state changing system of the ’216 Patent. More specifically, Dr. Wolfe characterizes instances in which Nagata’s electronic labels return to their periodic sleep state after

receiving an “‘absence’-indicating beacon” during a regularly scheduled awake period as somehow disclosing the claimed “fast wake-up instruction.” In other words, Dr. Wolfe appears to compare Nagata’s electronic labels returning to sleep mode if the beacon signal does not indicate an incoming transmission with the ’216 Patent’s electronic labels returning to normal monitoring mode after completing processing of the “fast wake-up instruction,” and—purportedly merely because the electronic labels end up back in sleep mode in each situation—opines that this shows that the “‘absence’-indicating beacon” of Nagata discloses the “fast wake-up instruction” of the ’216 Patent. Accordingly, Dr. Wolfe’s position is based on a false equivalency. Indeed, his position disregards the many systemic and fundamental differences between the two situations he is comparing—for example, to name just a few: (1) the periodic awakening to check whether an incoming communication expected of Nagata is distinct and different from the claimed system of the ’216 Patent in which the system reacts to an NFC interaction to trigger a more responsive state; (2) determining that no incoming communication is imminent and returning to sleep until the next regularly scheduled awake period in Nagata is different and distinct from the electronic labels of the ’216 Patent returning to a normal monitoring mode after completing an event-triggered server interaction; and (3) just because the end result of both sequences of events is similar (i.e., that both electronic labels return to a lower power mode) does not mean that the communication signals involved are similar or that the communication approach adopted for both sequences of events are comparable.

147. To finish his discussion of Claim element 1.7, Dr. Wolfe concludes in ¶126 by opining that an access point of Nagata transmitting a beacon would be the claimed fast wake-up instruction. For at least the reasons above, I disagree. Consequently, it is my opinion that Dr. Wolfe has not

shown that the access points of Nagata comprise “fast wake-up mode” of operation, nor has he shown that the access points transmit a “fast wake-up instruction” to the electronic rack labels.

148. Since Dr. Wolfe has not shown that the access points send a “fast wake-up instruction” to the electronic rack labels of Nagata, he has similarly failed to show that an electronic rack label would be configured to receive the said “fast wake-up instruction.” Therefore, it is my opinion that Dr. Wolfe has not demonstrated that Nagata discloses or renders obvious Claim 1 of the ’216 Patent.

149. Thus, for at least the reasons above, it is my opinion that neither Petitioner nor Dr. Wolfe has not shown that Nagata discloses, suggests, or renders obvious to a POSITA, access points configured to send a “fast wake-up instruction” while “in a fast wake-up mode.” They have also not shown that Nagata discloses, suggests, or renders obvious to a POSITA, access points that may operate in more than one mode (i.e., in which it repetitively transmits beacon signals at a fixed, prescribed time interval), nor has Petitioner or Dr. Wolfe shown why a POSITA would have been motivated to modify the access points of Nagata in order for them to operate in a second wake-up mode, given the system of Nagata behaves according to a fixed, timed interval paradigm akin to the prior arts that the ’216 Patent sought to improve upon. Consequently, it is my opinion that Dr. Wolfe has not demonstrated that Nagata has disclosed or rendered obvious Claim 1 of the ’216 Patent.

150. Accordingly, it is my opinion that Nagata fails to disclose or render obvious the claimed “fast wake-up instruction” of Claim elements 1.7, 1.8, 7.5, 7.6, 14.5, and 14.6.

151. Because Nagata fails to disclose or render obvious the above-discussed limitations, Petitioner has not shown that any of the Claims 1, 7, and 14 (the three independent claims) is

unpatentable under Ground 1. It follows that Petitioner and Dr. Wolfe have not shown that any of the remaining (dependent) claims are unpatentable under Ground 1

B. GROUND 2: NAGATA IN VIEW OF HASHIGUCHI DOES NOT RENDER OBVIOUS THE CHALLENGED CLAIMS

152. Petitioner and Dr. Wolfe contend that the limitations of the challenged claims would have been obvious to a POSITA in view of the disclosures of Nagata in further view of Hashiguchi. However, for all of the reasons detailed in Section IX.A above, it is my opinion that Petitioner and Dr. Wolfe fail to show that Nagata discloses these limitations of the challenged claims of the '216 Patent. It is further my opinion that Petitioner and Dr. Wolfe fail to demonstrate that Hashiguchi and the combination of Nagata and Hashiguchi render obvious these limitations of the '216 Patent for fundamentally similar reasons as that of Nagata. Additionally, it is also my opinion that Petitioner and Dr. Wolfe fail to support the position that a POSITA looking to the Hashiguchi reference, even in combination with Nagata, would have been motivated to independently arrive upon the novel system and method that the '216 Patent introduces to the field of the invention (i.e., low-power device networking communications as applied to wireless electronic shelf label systems); and further, they fail to support the position that said POSITA would have implemented the teachings of Hashiguchi in a manner that satisfies each and every limitation of the challenged claims.

153. As addressed in the previous section, and will be discussed further below, Petitioner and Dr. Wolfe's obviousness arguments rely on the same wireless electronic shelf label communication system disclosed by Nagata and Hashiguchi that implements an approach for cost savings via energy saving techniques. Although Nagata, Hashiguchi, and the '216 Patent address preservation of battery energy for electronic shelf labels, the approach disclosed by the '216 Patent is substantially distinct and fundamentally different from those in Nagata and Hashiguchi. More

specifically, as detailed above in Section VI, the '216 Patent seeks to improve over the then-current approaches that utilized fixed periodic communications that necessarily have to compromise between responsiveness and battery life. The '216 Patent broadly addresses this problem using a system in which the monitoring period of the electronic tag devices and associated wake-up mode of a connected base station are dynamically adjusted out of normal modes—which are less responsive but preserve battery life—into faster modes with increased energy consumption only when required to interact with a user. In contrast, as detailed above in Section VII, both Nagata and Hashiguchi disclose a system that is predicated upon the use of a fixed compromise between energy efficiency and responsiveness, based on a prescribed time interval referred to as a “beacon,” such that the electronic rack labels (or electronic tag devices) are synchronized with the connected access points and communicate only in a fixed, periodic way, thus maintaining a consistent clock-cycle. In other words, both Nagata and Hashiguchi are examples of the kind of prior art system that the '216 Patent sought to improve.

154. Accordingly, although Petitioner and Dr. Wolfe both present conclusory statements that suggest the approaches used by Hashiguchi and the '216 Patent are broadly similar, they are wrong. Put simply, any similarity between the claimed inventions within Hashiguchi and the '216 Patent is limited to the fact that both publications address wireless connected devices and thus must consider battery usage and performance issues. Indeed, the approach disclosed by the '216 Patent is distinct from that of Hashiguchi at least because the '216 Patent explicitly describes certain problems inherent to fixed communication interval systems such as Hashiguchi, and because the '216 Patent is directed towards improving such systems by adopting a different communication system that is incompatible with the use of fixed communication intervals.

155. Thus, Petitioner and Dr. Wolfe’s conflation of the disclosures of Hashiguchi with those of the ’216 Patent amounts to disregarding the problems that the ’216 Patent is directed towards addressing, the solutions proposed in the ’216 Patent for how to overcome specific shortcomings like those within Hashiguchi, and the language of the ’216 Patent claims that require switching between different modes of communication to allow increased responsiveness when needed without increasing energy usage when such responsiveness is not needed. In other words, in arguing that a POSITA would arrive at the ’216 Patent from Nagata in view of Hashiguchi, Petitioner and Dr. Wolfe are neglecting the entire premise and purpose of the ’216 Patent and ignoring the disclosures within the ’216 Patent that specifically seek to improve over the systems of Nagata and Hashiguchi.

156. Even disregarding the above-discussed fundamental deficiency in Petitioner and Dr. Wolfe’s premise, for at least the reasons below they have failed to show that certain limitations of the ’216 Patent claims are disclosed or obvious to a POSITA in view of Nagata in further view of Hashiguchi.

i. Nagata and Hashiguchi fail to disclose or render obvious limitations corresponding to a “normal monitoring mode” and a “fast monitoring mode” ([1.2.1], [7.7], [14.7])

157. Claim elements 1.2.1, 1.4, and 1.8 of the ’216 Patent recite:

[1.2.1] “the first communication path supports two monitoring modes: a normal monitoring mode and a fast monitoring mode;”

[1.4] “the electronic tag device is configured to receive the first data, transmit the first data to the base station through the first communication path, and enter the fast monitoring mode;”

[1.8] “the electronic tag device is further configured to receive the fast wake-up instruction, the control instruction and the second data, and switch to the normal monitoring mode after completing the communication.” (emphasis added)

158. Thus, as previously discussed with respect to my analysis of Nagata, Claim 1, as well as Claims 7 and 14, require that the first communication path utilized by the electronic tag device supports both a normal monitoring mode and a fast monitoring mode, wherein the electronic tag device enters the fast monitoring mode after transmitting first data (received from an external device) to the base station via the first communication path, and the electronic tag device changes back to the normal monitoring mode after receiving a fast wake-up instruction, the control instruction, and the second data from the base station via the first communication path. It is my opinion that neither Petitioner nor Dr. Wolfe have shown that the cited reference combination discloses, suggests, or renders obvious to a POSITA the limitations of Claim elements 1.2.1, 1.4, and 1.7, as well as the corresponding elements of Claims 7 and 14.

159. In Ground 2, Petitioner argues that “POSITAs would have been motivated to use Hashiguchi’s awake time ratios” and that “POSITAs would have been motivated to implement Hashiguchi’s increasingly frequent awake times into Nagata’s label switching processes at shorter durations” (Paper 2, 58; Ex-1003 [162]). But Petitioner refrained from explicitly identifying anything in Hashiguchi as teaching the “normal monitoring mode” and “fast monitoring mode” limitations until its discussion of dependent Claim 5, and even then through the use of brackets (Paper 2, 71; Ex. 1003 [194]).

160. Petitioner’s proposition fails because it never made clear *what* specific changes that POSITAs are supposed to make to Nagata. Moreover, Petitioner’s proffered motivation to combine the two references is unsound. As discussed above, Nagata adjusts the awake duration of its labels but keeps constant the period of the labels’ shared state-switching cycle. Hashiguchi, instead, describes embodiments where two periodic state-switching modes have different periods but the same awake state duration (Ex. 2011 [0127]-[0129]). Petitioner recognizes this (*see* Paper 2, 56-

57; Ex. 1003 [159]), but Petitioner does not show why a POSITA will implement Hashiguchi's method to replace Nagata's own method.

161. According to Petitioner, a POSITA would understand that "Hashiguchi's label communication components are able to communicate more often using less battery power" (Paper 2, 57; Ex-1003 [161]). But this is not correct. To the contrary, it is my opinion that Hashiguchi's label communication components are *not* meant to communicate more often than Nagata's.

162. Hashiguchi is concerned with responsiveness to communications from the server (Ex. 2011 [0007]), and the responsiveness requirement for such server-initiated communication is lower than that for a user-initiated command. In fact, Hashiguchi explicitly disclosed a wake-up period (and a server-transmission interval) of 4 seconds (Ex. 2011 [0071], [0127]). But, as discussed in the '216 Patent, such a delay may not be satisfactory when an operator operates in front of the label and expects immediate feedback (usually within 3 seconds) (Ex. 1001 [1:51-55]). Nagata, unlike Hashiguchi, is concerned with the latter scenario (*see e.g.*, Ex. 2010, [0115]; *see also* Ex. 2012, 102:11-14, "[Hashiguchi] has the disadvantage that, unlike Nagata, a typical customer can't walk up to the tag and cause the operation to begin"). Therefore, Hashiguchi offers a solution designed for *less* frequent communications than Nagata.

163. In addition, I disagree with Petitioner's argument that Hashiguchi allows the labels to communicate more often. Petitioner's argument is based upon a comparison of normal exemplary wake-up frequency only. Paper 2, 57; Ex-1003, ¶160. But this argument overlooks the fact that Nagata's labels are disclosed as capable of remaining awake for longer than Hashiguchi's (30 seconds or longer, as compared to 150ms). Ex-2010, [0116]; Ex-2011, [0068]. When implementing this capability, Nagata's labels can respond to incoming communications (generated in response to user commands) nearly instantaneously and without the same rate limitations during

such extended awake periods, thus resulting in much higher responsiveness. In my opinion, a POSITA would not be motivated to replace the behavior of Nagata's labels to match Hashiguchi's dual-periodic behavior, because this will result in less satisfactory responsiveness and lower supported communication frequency.

164. Petitioner argues that POSITAs would have also been motivated to combine Nagata and Hashiguchi—again, without clearly specifying *how* to combine them—because they “were compatible,” as evidenced by their shared “inventors, Applicants, content, and explanation for their similar disclosures” (Paper 2, 58-59; Ex. 1003 [163]). But this at most shows one of ordinary skill in the art *could* combine these references, not that they *would* have been motivated to do so. In addition, Petitioner failed to explain why the same inventor, having *already* known the methods of Hashiguchi (filing date January 29, 2015, *see* Ex. 2011, [cover]), would *deliberately* choose to implement the labels differently in Nagata (filing date January 13, 2016, *see* Ex. 2010, [cover]).

165. Therefore, Petitioner has not shown that Nagata and Hashiguchi disclose or render obvious the claimed “a normal monitoring mode and a fast monitoring mode” of Claim elements 1.2.1, 7.7, and 14.7.

166. Furthermore, I also disagree with Dr. Wolfe's opinion regarding “a normal monitoring mode and a fast monitoring mode” for the following additional reasons. Throughout ¶¶157–163 of his declaration, Dr. Wolfe describes the similarities shared between Hashiguchi and Nagata, including: “[l]ike Nagata, Hashiguchi discloses an electronic rack label 240 [] communication with an access point 30 [] via a communications part 42. Also, like Nagata, the label has a ‘sleep state’ where ‘electric power is not supplied’ to the communications part 42 and ‘an ‘awake state,’ where ‘electric power is supplied’ to ‘communications part 42’ to communicate with the access point 30” (Wolfe Declaration ¶157); “Hashiguchi's two modes are similar to Nagata's because they follow

a schedule and ‘repetitively’ performed rate of waking up an electronic rack label to check for information from an access point” (Wolfe Declaration ¶159); and “Hashiguchi and Nagata share inventors, Applicants, content, and explanation for their similar disclosures” (Wolfe Declaration, ¶163). As such, for at least the same reasons that Nagata fails to disclose or render obvious the challenged claims of the ’216 Patent, any contributions or additions to the disclosures of Nagata by that of Hashiguchi also fail to render obvious the same claims.

167. In ¶157 of his declaration, Dr. Wolfe states that “Nagata’s labels include a ‘switching part’ that switches the operation of the second communications part from a ‘sleep state’ to an ‘awake state’ to communicate with an access point” and “[t]he time and duration of the awake state can be adjusted to conserve battery power of the label (low power) or communicate quickly with the access point (high power).” While the time between periodic activation of the awake state and duration of the awake state may indeed constitute parameters reflecting design choices that a POSITA could make within the system as disclosed by Nagata, I disagree that a POSITA would have selected values “to conserve battery power of the label (low power) or communicate quickly with the access point (high power)” in a manner commensurate with the limitations of the challenged claims of the ’216 Patent for several reasons.

168. In ¶158 of his declaration, Dr. Wolfe points to two modes of Hashiguchi, “energy-saving mode” and “active” mode, wherein he opines that in the “label awakens every 20 seconds in energy-saving mode for a duration of time, Δt , which is 150 milliseconds” (Wolfe Declaration ¶158) and the “label awakens every 4 seconds in the active mode for the same duration, Δt ” (*Id.*). He opines that “[a] POSITA would have understood that Hashiguchi defines the term Δt as 150 milliseconds barring separate definition and because Hashiguchi discloses the ratio of Δt is smaller than Δt to T4 while only changing the denominator” (*Id.*). Dr. Wolfe continues in ¶159 to further

opine that a difference between the modes of Hashiguchi to that of Nagata is that “Nagata varies the *duration* characteristic of the label’s modes and holds the duration state constant,” whereas “Hashiguchi varies the *rate* characteristic of the label’s modes (i.e., how often the label switches into awake mode) and hold the duration of that mode constant (i.e., how long awake mode lasts)” (underline emphasis added). He then uses ¶160 to explain in more detail that the system of Nagata is set to awaken the labels once per 60 seconds, whereas Hashiguchi notes that this interval between wake-up times can be changed to other time intervals (e.g., 20 seconds or 4 seconds) (Wolfe Declaration ¶160). Whilst his characterization of the differences of modes that labels can take on in the disclosures of Nagata and Hashiguchi can likely be modified in the ways that he suggests, this representation of the labels of these systems would not comprise the claimed “normal monitoring mode” and “fast monitoring mode” of the ’216 Patent and such modifications would not be advantageous to the systems of Hashiguchi and Nagata, but instead deleterious.

169. First, as an initial matter, Hashiguchi (and Nagata) contemplates adopting a *fixed communication interval*, and thus the design choices that a POSITA makes in determining how to set this interval—e.g., setting the parameters noted by Dr. Wolfe—result in adoption of a single setting that provides a set battery usage corresponding to a particular communication responsiveness. In other words, this is an example of the kind of compromise between battery life and response speed that the ’216 Patent describes as a problem in prior art systems, and it is not at all a disclosure of switching between two different modes as implied by Dr. Wolfe.

170. Indeed, other features of Hashiguchi are predicated upon the fixed communication interval paradigm therein, and thus the system of Hashiguchi is designed around this communication concept such that a POSITA would not readily recognize Hashiguchi as pertaining to systems with varying communication intervals. For example, similar to Nagata, Hashiguchi comprises a local

memory within the NFC component of the label specifically to facilitate its fixed communication interval. More specifically, a POSITA would recognize that Hashiguchi discloses that the memory within the NFC component enables data exchanged via NFC to be stored until the next communication transmission occurs. Thus, this memory of Hashiguchi is explicitly required because event-driven communications—such as those in the '216 Patent in which NFC interactions trigger communication transmissions—are not needed within the fixed communication interval paradigm of Hashiguchi. Indeed, in the system of the '216 Patent in which communication transmissions are triggered by NFC interactions, writing information into and then reading it back out from the memory of Hashiguchi may even *increase* power consumption relative to the system of the '216 Patent. In other words, because Hashiguchi is designed around the concept of fixed communication intervals, it includes hardware components such as memory for storing NFC-acquired information that facilitate this approach to communication, and that may be detrimental to a system that adopts varying communication intervals, triggered communication, or other ways of compromising between responsiveness and battery lifetime.

171. Second, the beacon signals that are sent from the access points to the electronic rack labels are programmed to be sent at specific, prescribed intervals, which would not allow for “faster” communications to be transmitted from the access points, regardless of how often the electronic shelf labels wake up.

172. In any event, even setting aside Dr. Wolfe’s fundamentally flawed premise, Hashiguchi does not teach, suggest, or imply the use of a normal monitoring mode and a fast monitoring mode, as required by independent Claims 1, 7, and 14. That Hashiguchi utilizes the two electronic rack label states therein (i.e., the “awake state” and the “sleep state”) that are tuned according to a single periodic communication interval that occurs for a fixed duration and fixed period is detailed

extensively within the disclosures of Hashiguchi. More specifically, Hashiguchi teaches that a “sleep state is the state in which the communications part 42 cannot receive signals transmitted from the access point 30. When in the sleep state, the communications part 42 does not consume electric power of the battery 45. On the other hand, the awake state is the state in which the communications part 42 can receive signals transmitted from the access point 30. When in the awake state, the communications part 42 consumes electric power of the battery 45” (Hashiguchi [0042]). Hashiguchi also discloses a “control part 44 [that] performs control so as to switch the state of the communications part 42 between [the] sleep state and [the] awake state” (*Id.*), which are used to implement a single fixed communication interval that is periodically repeated without change. When describing this control part 44 in relation to the behavior of the operation states, Hashiguchi describes switching between a sleep state and an awake state at one or more time intervals such that the awake state is held constant in order to receive beacon signals and accompanying instructions, timed specifically according to the prescribed time interval of the beacons (see, e.g., Hashiguchi [0042] and [0071]), without contemplating any usage indicating or suggesting dynamic changes to the timing of the respective operation states resulting from the application of an alternate set of sleep time and duration parameters. As an example, Hashiguchi exclusively provides examples of sleep intervals that are multiples of the beacon signal time interval (e.g., 20 seconds and 4 seconds) (*see* Hashiguchi [0138]–[0139]).

173. Even in examples where the electronic rack label of Hashiguchi wakes up more times per minute in certain sub-modes of operation according to the predetermined duration of the beacon signal that conveys that information will be transmitted, this occurs only at a fixed responsiveness determined by the beacon signal period. More specifically, the fixed interval communication paradigm of Hashiguchi has the electronic rack labels wake up at least limited by the fixed beacon

signal pattern, such that the wake up is synchronized with, and coincides with, the periodic beacon signal from a corresponding access point or similar device. Accordingly, such examples do not involve triggering *changes in the state or mode of the electronic label device based on detecting an external device or NFC interaction* to increase responsiveness, and are merely an embellishment of the fixed communication interval approach of Hashiguchi based on whether or not the *base station or access point intends to transmit information to the electronic label*. Thus, such examples are unrelated to, and do not disclose to a POSITA, the normal and fast monitoring modes with corresponding wake-up modes of the '216 Patent. I note that in ¶158 of his declaration, Dr. Wolfe cites to two wake-up modes of the *access points*; however, this is an improper citation because the disclosures within Hashiguchi he cites to suggest that it is the *server*, not the access points, that comprise the “normal command transmission mode” and “rapid command transmission mode” within the system of Hashiguchi, as is described in greater detail in Section IX.B.ii below.

174. To the extent that Dr. Wolfe opines in ¶162 of his declaration that “a POSITA would have been motivated to implement Hashiguchi’s increasingly frequent awake times into Nagata’s label switching processes at shorter durations,” the resulting behavior of the combined communication would still be limited to the timing of the beacon signals, which, as previously discussed with respect to Nagata, would not result in faster, real-time communication as is required by the '216 Patent. As an initial matter, Dr. Wolfe purports that jointly incorporating both the stay awake time, which is triggered after receiving a beacon signal, with the configurable sleep time intervals of Hashiguchi would satisfy the claimed “normal monitoring mode” and “fast monitoring mode” of the electronic rack labels. However, it is my opinion that for all of the reasons why the two cited modes of Nagata fail to render obvious the normal and fast monitoring modes, the combination of

Nagata and Hashiguchi also fails to render obvious these two separate monitoring modes (*see* Section IX.A.i above). In ¶161 of his declaration, Dr. Wolfe acknowledges that Nagata discloses a sleep time interval of 60 seconds, whereas Hashiguchi suggests sleep time intervals of 20 seconds or 4 seconds, which would allow for more frequent “low-energy mode” communications from the tags of Nagata. This would not overcome the timing constraints due to the system-wide beacon timing, and thus would still not end up resulting in near real-time label updates as claimed by the ’216 Patent.

175. Thus, to the extent that Dr. Wolfe opines that the two cited modes of the tags of the Nagata-Hashiguchi combination he constructs would render obvious the normal and fast monitoring modes, in exactly the same way as Nagata, he is wrong. Rather, in exactly the same way as Nagata, the Nagata-Hashiguchi combination would only have one monitoring mode, albeit configurable; however, his position that this single configurable monitoring mode purportedly discloses the use of two distinct monitoring modes of the ’216 Patent is predicated upon a POSITA taking it upon themselves, in view of Nagata and Hashiguchi, to program more than one set of both prescribed sleep time intervals and corresponding different awake times to achieve two separate patterns of monitoring, and to configure switching between these two separate patterns as required by the ’216 Patent. I disagree that a POSITA would be motivated to make such substantial modifications to Nagata or Hashiguchi, at least because, as discussed above, the dynamic switching between different communication intervals is incompatible with the approach of Nagata or Hashiguchi, both because it contradicts the fixed communication interval period paradigm of Nagata and Hashiguchi and because the hardware of Nagata and Hashiguchi is designed around servicing this fixed interval paradigm.

176. In any event, as described above, like Nagata, Hashiguchi's access points transmit regularly scheduled beacon signals, which limit the speed of communications between the access points and electronic shelf labels, and thus even if a POSITA were to take it upon themselves to configure more than one separate combination of sleep time intervals (as suggested by Hashiguchi) and awake time durations (as suggested by Nagata), communication with the access points would still not occur "faster" than the beacon signal timing. Therefore, as overall communication speed of the electronic tag labels is limited by the prescribed beacon interval of the access point, a POSITA would not have been motivated by using the system of Nagata or Hashiguchi to program the electronic rack labels to consume more power when this would not result in increased responsiveness.

177. In more detail, the solutions of the '216 Patent in which the electronic label switches into a faster monitoring mode to receive near-real-time communications from the base station in its corresponding faster wake-up mode, are very different and incompatible with the system of Nagata or Hashiguchi. For instance, Dr. Wolfe ignores his discussion with respect to Claim element 1.2.1, wherein he addresses a key feature of how the systems of Nagata communicate—i.e., via a regularly scheduled beacon signal.

178. More specifically, the communication system disclosed by Hashiguchi would not be able to achieve the kind of near real-time communications response envisaged by the '216 Patent, nor would a POSITA have been motivated to implement such a method based on the teachings of Hashiguchi, at least because the responsiveness of Hashiguchi is fundamentally limited by the fixed beacon signal period therein. Put another way, in order to achieve increased responsiveness as suggested by Dr. Wolfe, in addition to an electronic shelf label needing to dynamically vary between two monitoring modes, a corresponding base station must also provide wake-up

instructions specific to each of these monitoring modes to complete the required transaction for the electronic shelf label. Instead, the contrived system of Nagata-Hashiguchi may suggest electronic rack labels that may have configurable sleep time intervals and wake-up durations, and base stations that rely on beacon transmissions that are transmitted from base stations to electronic shelf labels at specific, constant intervals. As the access points of Nagata and Hashiguchi transmit beacon signals at specific, constant time intervals, near real-time communications could not be realized at least because this beacon signal interval limits the speed with which communications can occur in the system of Nagata and Hashiguchi. That is, by using a prescribed interval to transmit beacons, even if the electronic shelf labels are awake for more time (and using more power), the transaction would not occur any faster than with a shorter awake duration or a shorter sleep time interval.

179. In effect, the responsiveness of the communications within Hashiguchi are limited by the fixed beacon period, and the use of such a fixed beacon period is both (i) consistent with the fixed communication interval paradigm of Nagata and Hashiguchi, and (ii) contradictory and incompatible with the claimed invention of the '216 Patent. As such, it is my opinion that the Nagata-Hashiguchi combination does not render obvious two monitoring periods as Dr. Wolfe suggests at least because there is no motivation for a POSITA to modify Nagata or Hashiguchi as suggested by Dr. Wolfe to configure two separate communication intervals.

180. Consequently, for at least the reasons detailed above, both Petitioner and Dr. Wolfe have failed to show that the Nagata-Hashiguchi combination suggests or renders obvious to a POSITA both a “normal monitoring mode” and a second “fast monitoring mode,” as required by the limitations of Claim elements 1.2.1, 7.7, and 14.7. Indeed, neither Petitioner nor Dr. Wolfe have shown that Nagata or Hashiguchi discloses, suggests, or renders obvious to a POSITA two such

monitoring modes, at least because the approaches of Nagata and Hashiguchi are fundamentally incompatible with the use of varying communication periods. Accordingly, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that the limitations of Claim elements 1.2.1, 7.7, and 14.7 of the '216 Patent are disclosed, suggested, or rendered obvious to a POSITA by Nagata in view of Hashiguchi, and thus they have not shown that Claims 1, 7, or 14 of the '216 Patent are unpatentable.

ii. Nagata and Hashiguchi fail to disclose or render obvious “the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode” ([1.2.2], [7.7], [14.7]).

181. Claim element 1.2.2 recites:

[1.2.2] and the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode;

182. Thus, Claim 1, as well as Claims 7 and 14, require that the base station supports both a normal wake-up mode and a fast wake-up mode. It is my opinion that neither Petitioner nor Dr. Wolfe have shown that the cited reference combination discloses, suggests, or renders obvious to a POSITA the limitations of Claim element 1.2.2, as well as the corresponding elements of Claims 7 and 14.

183. Petitioner points to Hashiguchi’s “normal command transmission mode” and “rapid command transmission mode” and argues that Nagata and Hashiguchi renders obvious the claimed “normal wake-up mode” and “fast wake-up mode.” (Paper 2, 59-64; Ex. 1003 [164]-[174]). However, with respect to Claim 1, Petitioner does not identify what teaches “fast wake-up mode”. (Paper 2, 64-65; Ex. 1003 [176], [178]). In addition, Petitioner *never* explicitly identified anything in Ground 2 as teaching “normal wake-up mode.” It is my opinion that Petitioner’s position is thus is vague and not clearly defined.

184. Petitioner acknowledges that Hashiguchi largely employs the same mechanisms as Nagata of beacons and prescribed time intervals for the communications from access points to labels (Paper 2, 55; Ex. 1003, [79]; Ex. 2011, [0127]-[0129]). However, Petitioner fails to identify any disclosure of different *transmission durations* of beacons (at least the beacon in the context of “rapid command transmission mode” has been identified by Petitioner as disclosing “fast wake-up instruction” (Paper 2, 65; Ex. 1003, [179]) in the two modes of Hashiguchi. As discussed in above, the “wake-up modes” of the ’216 Patent are associated with their transmission durations of wake-up instructions, with specific requirements for such durations in each wake-up mode. Because Petitioner failed to identify such durations in Hashiguchi, Petitioner has failed to show that Nagata and Hashiguchi disclose or render obvious the claimed “normal wake-up mode” and “fast wake-up mode.” Additionally, Nagata’s beacons cannot have the sufficiently long transmission duration required by ’216 Patent’s wake-up modes, because of the possibility of collision. Hashiguchi’s beacons are largely the same as Nagata’s and therefore cannot have the sufficiently long transmission duration required by ’216 Patent’s wake-up modes either.

185. Petitioner’s reference combination also fails to render obvious the claim limitations because the two command transmission modes of Hashiguchi belong to the server, not to the access point (base station) as required by the ’216 Patent. Hashiguchi explicitly discloses that it is the *server* that instructs the access points to transmit commands following beacons on a specified interval (Ex. 2011 [0127-0129]). Hashiguchi further discloses that the commands are transmitted from the *server* in the normal or rapid command transmission mode (Ex. 2011 [0143]). In contrast, Hashiguchi’s access points possess only one mode of operation—to send beacons that are timed to the awake state of the labels according to instructions from the server (Ex. 2011 [0031], [0127]-[0129]). Hashiguchi *never* described the normal or rapid command transmission modes as

belonging to the access point. Therefore, Petitioner has not shown that Nagata and Hashiguchi disclose or render obvious the claimed “the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode.”

186. Further, I do not agree with the Petitioner’s estimate of a POSITA’s expectation of success in implementing Hashiguchi’s rapid command transmission mode in Nagata’s access points. As I discussed above, it is the server, not the access points, of Hashiguchi that sets the transmission modes. In my opinion, a POSITA will likely find it necessary to change the server, the access points and the labels together to implement Hashiguchi’s rapid command transmission mode, because the transmission involves all three. In my opinion, Petitioner did not account for the complexity of such coordinated changes and therefore its estimate of a POSITA’s expectation of success is flawed.

187. In addition, Petitioner’s arguments that a POSITA would have been motivated to combine the cited references also fail. Petitioner argues that a POSITA would have been motivated to combine Nagata and Hashiguchi to implement Hashiguchi’s rapid command transmission mode in the access points of Nagata’s system “to improve the label’s communication responsiveness and curtail its battery power consumption” and so “the access point can transmit information more frequently (e.g., at 4 second intervals or less)” (Paper 2, 61-62; Ex. 1003 [168]-[169]). Even if this is true (a point with which I disagree), Petitioner has failed to show, or even argue, that POSITAs would have been motivated to implement Hashiguchi’s normal command transmission mode (or anything else that would form “normal wake-up mode”) in Nagata. In addition, as discussed above, it is my opinion that Hashiguchi’s teachings would not improve Nagata’s communication responsiveness or enable Nagata’s access points to transmit information more frequently.

188. Therefore, it is my opinion that Petitioner has not shown that Nagata and Hashiguchi disclose or render obvious the claimed “the base station comprises two wake-up modes: a normal wake-up mode and a fast wake-up mode” of Claim elements 1.2.2, 7.7, and 14.7.

189. Further, I also disagree with Dr. Wolfe’s opinion regarding “a normal wake-up mode and a fast wake-up mode,” and that “the Nagata-Hashiguchi combination teaches claim 1.2.2” (Wolfe Declaration ¶164), for the following additional reasons.

190. In the same ¶164, Dr. Wolfe opines that “Hashiguchi teaches that the access point communicates with the label using a ‘normal command transmission mode’ and a ‘rapid command transmission mode’” and that “[t]he access point’s normal and rapid command transmission modes communicate with the label in the label’s 20-second and 4-second time interval cadences.” However, upon an examination of the citations Dr. Wolfe points to in Hashiguchi with respect to the rapid command transmission mode, Dr. Wolfe is incorrect in his assertion that these transmission modes are operational modes of the access points. Rather, the rapid command transmission mode is a mode of operation that is specific to the *server* of the Hashiguchi communication system, not the access points.

191. In more detail, in Section (2-2-1) when explicitly discussing functionality of the “Server Control Part” of the Hashiguchi communication system (i.e., within the server), Hashiguchi states “**the server control part 215 instructs the access point 30 via the server communications part 11 to transmit a command following a beacon, the beacons being transmitted from the access point 30 at 4 s intervals following a beacon, (rapid command transmission mode)**” (Hashiguchi [0128], emphasis added). Hashiguchi further recites “[t]hat is, by using the rapid command transmission mode, it becomes possible to shorten the average time it takes until the completion of command transmission **at the server 210**” (Hashiguchi [0129], emphasis added). *See also*

Hashiguchi [0143], which states “[w]hen a trigger signal is transmitted from the handy terminal 250, normally, product information (a command) is subsequently transmitted **from the server 210 in the rapid command transmission mode**” and “... furthermore **a command is transmitted from the server 210 in the rapid command transmission mode, ...**” (emphasis added). As can be seen from the emphasis provided within the context of the disclosure (i.e., within the section specifically describing the control aspects of the server and not the access points), it would be clear to a POSITA that the rapid command transmission mode of Hashiguchi would be a mode of operation *of the server* and not of the access points.

192. Put another way, by emphasizing the behaviors of the access points within this exact same disclosure reads “the server control part 215 instructs **the access point 30** via the server communications part 11 **to transmit a command following a beacon, the beacons being transmitted from the access point 30 at 4 s intervals following a beacon**, (rapid command transmission mode)” (Hashiguchi [0128], emphasis added). This would further be clear to a POSITA that the beacons sent by access points of the Hashiguchi system would never deviate from their prescribed, fixed timing pattern. Thus, it is my opinion that Dr. Wolfe has inaccurately represented that the access points of Hashiguchi could operate in two communication modes, and further that a POSITA would have understood the disclosures within Hashiguchi pertaining to this rapid command transmission mode to be a mode of operation of the server, not the access points, as Dr. Wolfe purports. Therefore, it is my opinion that not only does Dr. Wolfe mischaracterize the rapid command transmission mode as presented in Hashiguchi to align with his positions, but based on what is actually disclosed in Hashiguchi, Dr. Wolfe has not shown that the *access points* have more than one mode. Indeed, the same citation upon which Dr. Wolfe relies to purport that the access points comprise more than one mode of operation actually shows the opposite, namely

that the “access points 30 ... transmit a command following a beacon, the beacons from the access point 30 at 4 s intervals following a beacon” (*Id.*), which is exactly consistent with the single operational mode of the access points also described in Nagata.

193. As such, Dr. Wolfe has not shown that the access points of Hashiguchi comprise more than one operational mode. Nor could he, for the Hashiguchi system behaves in the same manner as that of Nagata, and for all of the reasons that Nagata alone does not disclose or render obvious access points comprising two separate wake-up modes, Hashiguchi and the combination of Nagata and Hashiguchi similarly fail to render obvious the limitations of Claim element 1.2.2 of the '216 Patent. Throughout the remainder of his discussion of this claim limitation, Dr. Wolfe relies on his incorrect understanding of Hashiguchi teaching the rapid command transmission mode to be applicable to an access point as his fundamental basis for demonstrating obviousness and a motivation to combine Nagata with Hashiguchi. For example, Dr. Wolfe relies on this faulty premise in several paragraphs of his declaration for several claim elements (see e.g., ¶¶158, 164-165, 167-169, 172-173, and 177-182). For at least this reason, all of Dr. Wolfe's arguments in this section fail, including his argument regarding his motivation to combine Nagata and Hashiguchi.

194. Dr. Wolfe's position that Hashiguchi purportedly discloses the two base station wake-up modes of the '216 Patent is broadly based on his mischaracterization of the fixed interval communication approach used within Hashiguchi. For instance, in ¶167 of his declaration, in relation to the above-discussed observation that Hashiguchi's electronic labels coordinate communication with access points using a fixed synchronization approach involving beacon signals, Dr. Wolfe opines that “[t]herefore, a POSITA would have recognized Hashiguchi's access points transition between modes (‘wake up’) at the same times and for the same durations as the labels (‘normal’ and ‘fast’) according to the label awake ratios (e.g., wake every 20 seconds for

150 milliseconds in the normal, energy-saving mode and every 4 seconds for 150 milliseconds in the rapid transmission mode)” (see Wolfe Declaration ¶167). However, Dr. Wolfe is simply wrong. As explained below, a POSITA would not recognize Hashiguchi’s communication system to involve different wake-up modes for base stations; and, moreover, a POSITA would not be motivated to modify Hashiguchi to include such wake-up modes because doing so would be fundamentally detrimental to the communication approach of Hashiguchi.

195. First, as discussed in my analysis above with respect to Claim element 1.2.1, Dr. Wolfe has not shown that Hashiguchi discloses, suggests, or renders obvious to a POSITA electronic shelf labels within a communication system comprising two separate monitoring modes including a “fast monitoring mode” and a “normal monitoring mode,” nor has he shown that a POSITA would have been motivated to program more than one kind of monitoring mode for the electronic shelf labels disclosed by Hashiguchi. Indeed, also as discussed in my analysis above, such an approach involving two separate monitoring modes is fundamentally incompatible with the beacon system of Hashiguchi and modification of the electronic shelf labels to implement two monitoring modes would increase power consumption without increasing communication response speed and thus would be detrimental. Thus, to the extent that Dr. Wolfe is opining that a POSITA would implement two wake-up modes for Hashiguchi’s access points to accommodate his proposed modification of Hashiguchi’s electronic labels to include two monitoring modes, I disagree with his premise at least because such a modification to the electronic labels would be deleterious and therefore a POSITA would not make such modification, and thus there is not a need for a corresponding modification to add two base station wake-up modes.

196. Second, I disagree with Dr. Wolfe’s position that “a POSITA would have recognized Hashiguchi’s access points transition between modes (‘wake up’) at the same times and for the

same durations as the labels ('normal' and 'fast') according to the label awake ratios" (Wolfe Declaration ¶167). Hashiguchi discloses that "the access points 30 transmit at prescribed intervals (e.g., at 4 s intervals) a signal, which is called a beacon, for informing the electronic rack labels 40 of the presence/absence of a command transmission" (Hashiguchi [0031]). As discussed within Hashiguchi, this prescribed time interval at which beacon signals are transmitted to an electronic shelf label from its corresponding access point is a system-wide time interval that is fixed and consistent, by design, in order to maintain overall system operations in a synchronized fashion. Dr. Wolfe then argues that "Hashiguchi teaches that the access point communicates with the label using a 'normal command transmission mode' and a 'rapid command transmission mode'" where the "access point's normal and rapid command transmission modes communicate with the label in the label's 20-second and 4-second time interval cadences" (Wolfe Declaration ¶164), yet again ignoring the fixed beacon timing, and furthermore as discussed at length above, the rapid command transmission mode is a mode of operation that is specific to the server of the Hashiguchi communication system, not the access points. Thus, Dr. Wolfe's position that Hashiguchi purportedly renders obvious the two claimed base station wake-up modes is dependent upon a POSITA modifying the access points of Hashiguchi to add these two distinct wake-up modes, which, for at least the reasons above, a POSITA would not be motivated to do. Indeed, it is my opinion that a POSITA would recognize that the communication approach of Hashiguchi is predicated upon maintaining a regular, constant, beacon period that maintains synchronized communications over the system; and, accordingly, a POSITA would not expect modification of the system to switch between varying beacon periods to yield a successful result.

197. Third, even in the event a POSITA were motivated to modify Hashiguchi's system to program what Dr. Wolfe describes as two different monitoring modes of the electronic labels, this

would not have necessitated two different, respectively corresponding, wake-up modes of the access points. Indeed, Hashiguchi discusses the NFC part of its electronic rack labels comprising a memory to store information. Hashiguchi teaches that the NFC chip 246b contains a memory 246ba (*see* Hashiguchi [0119] and Figure 11). A POSITA would have recognized that this memory 246ba within the NFC chip 246b could be used within the system of Hashiguchi to at least temporarily store information received by the NFC part 246. In this way, the electronic rack label of Hashiguchi would be able to maintain its typical communications performance with respect to the access points and server. Therefore, even under Dr. Wolfe’s proposed modification to the electronic labels of Hashiguchi such that they have two different monitoring modes—with which I disagree and do not believe a POSITA would be motivated to implement—it is my opinion that a POSITA making such modifications would still not have been motivated to further modify the access points of Hashiguchi to have two wake-up modes at least because the POSITA would recognize that the existing NFC memory of Hashiguchi could be used to store instructions for communication to the access points at the next regularly scheduled time. In other words, a POSITA would recognize the importance of maintaining a regular beacon period and, given this importance and the existing mechanism within Hashiguchi for storing information until the next regularly scheduled access point communication, would not seek to add multiple different wake-up modes to the access points. Put more simply, there is no need within Hashiguchi to implement two access point wake-up modes even if the electronic labels were counterintuitively, and deleteriously, modified to implement two monitoring modes; thus, at least because introducing two wake-up modes would interfere with the system-wide synchronization of the beacon approach within Hashiguchi, a POSITA would not implement such different wake-up modes even if there were two monitoring modes for the electronic labels.

198. With regard to the overall operations of the system of Nagata, in his deposition, Dr. Wolfe conceded that the interval between beacon signals is fixed and prescribed in the system disclosed by Nagata. As explained previously, the system-wide beacon timing of Nagata is applicable to the beacon of Hashiguchi:

Q: So in Paragraph 33, in part, Nagata's disclosing the access points transmit beacons at a pre-described time intervals; is that right?

A: Correct.

Q: So this just -- is this transmitting a beacons at a fixed pre-described time interval just one of the modes that we were just discussing?

A: No, it does that in both modes. In one mode, it sends the stay-awake beacon during that interval, and in the other mode it sends the go-to-sleep beacon during that interval.

Q: And are those intervals fixed, or does Nagata disclose dynamically changing them?

A: The interval between beacons is fixed, but during any particular interval, the base station can be in one mode or the other and will send a beacon that is indicative of its mode” (*see* Wolfe Deposition, 77:22-78:16).

199. As such, it is clear that Dr. Wolfe understands that the system of Nagata relies upon the fixed timing required by the beacon signals in order to facilitate communications between its devices. It is therefore unclear why he would suggest that a POSITA would be motivated to deviate from this system-wide operation for a single tag, as opposed to temporarily storing data that could be used within the system-wide timing considerations.

200. Also during his deposition, Dr. Wolfe states, “what I’m doing here [in Ex-1003, ¶111] is distinguishing the state where [the access point] is actively preparing to send a message to the tag as opposed to an alternative state where it is not actively preparing to send a message to the tag”

and “the [tag’s] monitoring mode determines, at least probabilistically the rate at which [the tag and the access point] can communicate. If the tag is awake for large periods of time, it’s likely that the communication will be completed fast. If the tag is asleep most of the time, it’s likely that the communication will be completed more slowly” (see Wolfe Deposition 84:18-85:9, 80:20-81:6). However, as previously explained, given the fixed nature of the beacon signal timing of the access points, it is unclear why Dr. Wolfe would rely on a “probabilistic” description of the clearly *deterministic* behavior of electronic rack labels that explicitly utilize periodic and pre-determined communication intervals.

201. Additionally, Dr. Wolfe fails to explain why he believes this would demonstrate that the access points comprise two distinct modes of operation. More specifically, in his deposition, he describes how such probabilistic “rates of communication” allow an avoidance of wasted power through sleeping (*Id.*, 80:17-83:20). However, in the disclosures of Nagata, it is only the electronic rack labels that can be in sleep or awake states, not the access points. In other words, to the extent that the behavior of the electronic rack labels of Nagata can be considered “probabilistic rates of communication” that could be adjusted by a POSITA as Dr. Wolfe appears to suggest, this functionality would apply only to the rack labels, and not the access points. Indeed, Dr. Wolfe has not shown that Nagata discloses access points that comprise a “normal wake-up mode” and a “fast wake-up mode.” He has further not shown that an access point of Nagata has any behavior or functionality where it can “switch into an active state (‘wake up’) at different rates of communication (‘normal’ and ‘fast’)” (see Wolfe Declaration ¶111). Nor could he, as Nagata’s access points do not have more than one mode of operation and instead are always operating within the confines of a fixed beacon signal period according to a fixed, prescribed, system-wide time interval used to maintain synchronization. Thus, despite his attempt to clarify his positions within

his deposition, Dr. Wolfe failed to show that the access points of Nagata comprise two separate modes of operation or would have any reason to operate in more than its singular disclosed mode.

202. In ¶170 of his declaration, Dr. Wolfe cites to Laroia's disclosure of "managing the transmissions from multiple, adjacent base stations according to timing and conditional demand criteria to conserve transmissions power by preventing unnecessary (i.e., wasted) transmissions"

It is unclear why Dr. Wolfe has pointed to this reference, as within the context of his analysis of ¶¶170-171 of his declaration, he has not presented any basis or reasoning as to why a POSITA would have been motivated to look to references beyond Nagata and Hashiguchi. To the extent that Dr. Wolfe suggests that a POSITA would find it obvious to modify the combination of Nagata with Hashiguchi according to the disclosures of Laroia and implement base station operations in Hashiguchi's access points so as to incorporate Laroia's methods in the access point-label communications, he has not introduced Laroia as an additional reference to be considered as part of a specific combination of prior arts. Additionally, to the extent that Dr. Wolfe is suggesting that a POSITA would reach an understanding of Hashiguchi's access points that involves multiple "states" based on Laroia's disclosures, he has failed to explain how or why a POSITA would reach such an understanding. Dr. Wolfe has also failed to present an argument as to why a POSITA would look to Laroia, a patent directed to problems posed by "some cellular coverage areas" where reduction of transmission power and/or interference is desirable (*see* Laroia, 1:35-40), to gain an understanding of Hashiguchi's access points, which would be in a controlled retail environment, and thus unrelated to the reliability or variation of cellular coverage. Furthermore, the method disclosed in Laroia relies on wireless terminals to trigger the switching between modes of base stations, which is different from the automatic server interactions disclosed by Hashiguchi (*see* Laroia, 31:54-63). Thus, Dr. Wolfe has not presented an argument as to why a POSITA would

look to Laroia to gain an understanding of Hashiguchi's communication operations or for potential modification of these operations.

203. In ¶166, Dr. Wolfe points back to ¶¶112-113 of his declaration, where he opines that a POSITA would have found it obvious look to standards such as “IEEE 802.15.4 and/or ZigBee™” and Bluetooth, without explaining what specifically a POSITA would have incorporated from these standards. At most, he states that “a POSITA would have recognized that both Nagata's access point (device 1) and electronic rack label (rack 2) would have used power-managed communication modes” (*see* Wolfe Declaration ¶113). Dr. Wolfe provides no explanation, analysis, or descriptions as to what specific information or features disclosed by the “IEEE 802.15.4 and/or ZigBee™” standards that, in his opinion, a POSITA would have incorporated into the teachings of Nagata or Hashiguchi, nor does he account for how any specific information or features in these standards would map to the operational modes required by the challenged claims of the '216 Patent such that a POSITA would find it obvious to configure the access points of Hashiguchi with both a normal wake-up mode and a fast wake-up mode. For example, while he does cite without specificity to the “Enhanced Power Control” feature of the Bluetooth standard (*see* EX-1016, § 4.1.3.1), he recognizes that this feature is an optional feature of the Bluetooth standard (i.e., “but only if *both* devices ... support that feature power control”) (*see* Wolfe Declaration ¶113). He further omits that this feature that he cites to is applicable to *power control* functionality and does not relate to *modes of communication* of the devices. Therefore, it is unclear how this reference to an optional Bluetooth power control feature relates to his identifications of the “modes” and “rates of communication” which Dr. Wolfe purports a POSITA would find obvious in view of Hashiguchi. In my opinion Dr. Wolfe has not shown that these industry standards would have rendered obvious to a POSITA that two modes of communication operation

could have been employed by the access points to benefit the system of Hashiguchi. Indeed, for at least the reasons I discussed above, it is my opinion that a POSITA would recognize that modifying access points of Hashiguchi to introduce variations in the period of beacon signals is undesirable.

204. Furthermore, Petitioner and Dr. Wolfe's arguments fail because nowhere did they identify any disclosure from Nagata or Hashiguchi that teaches different wake-up durations between their so-called “wake-up modes.” As discussed in Section VIII.C, above, the '216 Patent's “normal wake-up mode” and “fast wake-up mode” place requirements on their wake-up durations, and in particular, the wake-up durations need to be longer than the monitoring periods of the corresponding monitoring modes. A POSITA would realize that this requirement is fundamentally incompatible with Nagata and or Hashiguchi, because the transmission length the beacons cannot be lengthened to longer than the fixed interval Nagata and Hashiguchi teaches.

205. Consequently, for at least the reasons above, Petitioner and Dr. Wolfe have failed to identify, within the communication system of Hashiguchi, a base station that comprises two separate modes of operation, namely a “normal wake-up mode” and a “fast wake-up mode,” as required by the limitation set by Claim element 1.2.2 of the '216 Patent. They have further failed to demonstrate that a POSITA would have been motivated to arrive at this claim limitation of the '216 Patent, as the system of Hashiguchi works in a specifically different way than that as described by the '216 Patent, in which there is a fixed, prescribed, system-wide synchronicity employed by the access points to communication with the electronic rack labels. Put more simply, for at least the reasons above the communication approach of Hashiguchi is fundamentally incompatible with the proposed access point modifications suggested by Petitioner and Dr. Wolfe. Therefore, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that the '216 Patent would have been unpatentable.

iii. Nagata and Hashiguchi fail to disclose or render obvious “fast wake-up instruction” ([1.7], [1.8], [7.5], [7.6], [14.5], [14.6])

206. Claim elements 1.7 and 1.8 recite:

[1.7] the base station is further configured to receive the control instruction and the second data, communicate with the electronic tag device in the fast wake-up mode, and transmit a fast wake-up instruction, the control instruction and the second data to the electronic tag device through the first communication path; and

[1.8] the electronic tag device is further configured to receive the fast wake-up instruction, the control instruction and the second data, and switch to the normal monitoring mode after completing the communication.

207. Thus, Claim 1, as well as Claims 7 and 14, require that the base station is configured to transmit a fast wake-up instruction, as well as the control instruction and the second data, to the electronic tag device in the fast wake-up mode. Claim 1, as well as Claims 7 and 14, also require that the electronic tag device is configured to receive the transmitted fast wake-up instruction, as well as the control instruction and the second data, and switch to the normal monitoring mode after completing the communication. It is my opinion that neither Petitioner nor Dr. Wolfe has shown that the cited reference combination discloses, suggests, or renders obvious to a POSITA the limitations of Claim element 1.7 and 1.8, as well as the corresponding elements of Claims 7 and 14.

208. Petitioner further points to Hashiguchi’s beacons in the rapid command transmission mode as disclosing “fast wake-up instruction” (Paper 2, 65-66, 68; Ex. 1003, [179-180], [184]). As Petitioner recognizes, Hashiguchi’s beacons are not qualitatively different from Nagata’s beacons. (Paper 2, 65; Ex. 1003 [179]). As discussed above in Section IX.A.iii, Nagata’s beacons cannot transmit the claimed “fast wake-up instruction” because they do not support transmissions in accordance with the required durations. The same reasoning applies unchanged to Hashiguchi’s

beacons. Moreover, as discussed above in Section IX.A.iii, Nagata does *not* disclose sending beacon signals to labels in the user-command-handling sequence. Modifying Nagata to implement Hashiguchi’s teachings (and use beacons for the transmission of server-generated commands in response to user commands) would result in less responsiveness and less communication frequency when handling user commands. Thus, contrary to Petitioner’s argument, it is my opinion that a POSITA would not find it advantageous to carry out this modification.

209. In addition, changing Nagata’s beacon-less mechanism of transmitting server-generated commands in response to user commands to a beacon-based mechanism (as in Hashiguchi) is not trivial because it will require Nagata’s system to postpone the transmission until the next beacon, instead of effecting the transmission immediately. Petitioner failed to address how a POSITA would have a reasonable expectation of success in making such modification. Thus, even setting aside Petitioner’s failure to identify disclosures for the required transmission duration, Petitioner’s argument still fails because Petitioner has failed to establish motivation and reasonable expectation of success for the combination.

210. Therefore, it is my opinion that Petitioner has not shown that Nagata and Hashiguchi disclose or render obvious the claimed “fast wake-up instruction” of [1.7], [1.8], [7.5], [7.6], [14.5], [14.6].

211. Further, I also disagree with Dr. Wolfe’s opinion regarding “fast wake-up instruction” for the following additional reasons.

212. For at least the reasons described with respect to Claim element 1.2.2 above, it is my opinion that the combination of Nagata with Hashiguchi does not disclose, suggest, or render obvious to a POSITA, an access point—which Dr. Wolfe believes satisfies the limitations of the claimed “base station”—comprising two modes of operation corresponding to the claimed wake-

up modes. It is also my opinion that Dr. Wolfe has not shown that a POSITA looking to the Hashiguchi reference would have been motivated to modify the teachings of Hashiguchi to arrive at an access point satisfying the limitations of the claimed base station comprising two wake-up modes (i.e., a normal wake-up mode and a fast wake-up mode). Therefore, at least because the access points of Hashiguchi are not disclosed to comprise a “fast wake-up mode” in addition to a “normal wake-up mode,” nor would a POSITA be motivated to modify such an access point to comprise two such modes, Hashiguchi does not disclose, suggest, or render obvious to a POSITA the limitations of Claim element 1.7 of the ’216 Patent, which requires that the base station be configured to communicate with the electronic tag device in the fast wake-up mode.

213. In ¶¶176-184 of his declaration, Dr. Wolfe presents arguments describing how he purports the system of Hashiguchi to disclose or render obvious the limitations of Claim elements 1.7 and 1.8 regarding certain information communicated between the base stations and electronic tag devices, and the respective modes of communication used therein. More specifically, in ¶177, he opines that “a POSITA also would have found it obvious to implement a beacon transmission, such as including an indicator to indicate whether information is to be transferred, (fast wake-up instruction) as part of the access point’s fast wake-up mode (either as disclosed or rendered obvious by Nagata or taught by Hashiguchi) to facilitate communications with the electronic rack label in its active mode” (Wolfe Declaration ¶177). Dr. Wolfe appears to ignore that the beacon transmission of Hashiguchi occurs in a repeating, periodic manner regardless of any purported mode of the access point. Indeed, this misunderstanding continues further as Dr. Wolfe states that “Hashiguchi explains, in the rapid command transmission mode (fast wake-up mode), access point 30 transmits ‘beacons’ ‘at 4 s[econd] intervals’ *synchronized* with the label’s active mode” (emphasis in original, Wolfe Declaration ¶178). The access point of Hashiguchi is configured to

continuously transmit beacons at a fixed, prescribed, system-wide time interval, and this does not change in the disclosed rapid command transmission mode, as the beacon timing is predicated upon maintaining system-wide synchronization, departure from the fixed timing of the beacon signals that are consistently sent from access points to electronic rack labels would have deleterious effects. Additionally, as discussed above, it is clear to a POSITA that the rapid command transmission mode of Hashiguchi would be a mode of operation of the server and not of the access points.

214. Since Dr. Wolfe has not shown that the access points send a “fast wake-up instruction” to the electronic rack labels of Hashiguchi, he has similarly failed to show that an electronic rack label would be configured to receive the said “fast wake-up instruction.” Therefore, it is my opinion that Dr. Wolfe has not demonstrated that Hashiguchi discloses or renders obvious Claim 1 of the '216 Patent.

215. Thus, for at least the reasons above, it is my opinion that Petitioner and Dr. Wolfe have not shown that Hashiguchi discloses, suggests, or renders obvious to a POSITA, access points configured to send a “fast wake-up instruction” while “in a fast wake-up mode.” They have also not shown that Hashiguchi discloses, suggests, or renders obvious to a POSITA, access points that may operate in more than one mode (i.e., in which is repetitively transmits beacon signals at a fixed, prescribed time interval), nor have they shown why a POSITA would have been motivated to modify the access points of Hashiguchi in order for them to operate in a second wake-up mode, given the system of Hashiguchi behaves according to a fixed, timed interval paradigm akin to the prior arts that the '216 Patent sought to improve upon. Consequently, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that Hashiguchi has disclosed nor rendered obvious Claim 1 of the '216 Patent.

216. Because Nagata and Hashiguchi fail to disclose or render obvious the above-discussed limitations, Petitioner and Dr. Wolfe have not shown that any of the Claims 1, 7, and 14 (the three independent claims) is unpatentable under Ground 2. It follows that Petitioner has also not shown that any of the remaining (dependent) claims is unpatentable under Ground 2.

C. GROUND 3A AND 3B: NAGATA IN VIEW OF THUBERT OR NAGATA IN VIEW OF HASHIGUCHI AND THUBERT DOES NOT RENDER OBVIOUS THE CHALLENGED CLAIMS

i. NAGATA IN VIEW OF THUBERT OR NAGATA IN VIEW OF HASHIGUCHI AND THUBERT DOES NOT RENDER OBVIOUS DEPENDENT CLAIMS 3, 9, and 16

217. Claim 3 recites:

[3.0] The interactive electronic tag device communication system according to claim 1, wherein when the first data is received by plurality of base stations, the plurality of base stations are configured to attach respective energy value information of the plurality of base stations to the first data when transmitting the first data to the background server;

[3.1] the background server is configured to determine an optimal base station among the plurality of base stations according to the respective energy value information of the plurality of base stations, and transmit the control instruction and the second data to the electronic tag device through the optimal base station.

218. Claim 3 of the '216 Patent depends upon Claim 1. Consequently, it is my understanding that Claim 3 includes each and every limitation of Claim 1, in addition to the limitations added by Claim 3. Thus, to be rendered obvious by a reference or combination of references, all limitations within Claim 1 must be disclosed by such reference or combination in addition to the limitations added by Claim 3. For at least the reasons detailed above, Petitioner and Dr. Wolfe have not shown that Nagata alone or together with Hashiguchi, in the combination which they contend a POSITA would have been motivated to make, renders obvious each and every limitation of Claim 1.

Therefore, because they have not shown that Claim 1 is rendered obvious by these prior art references, Petitioner and Dr. Wolfe have not shown that these prior art references render obvious Claim 3 of the '216 Patent. The same reasoning applies to Claims 9 and 16—i.e., because Petitioner and Dr. Wolfe have not shown that Claim 7 and Claim 14 are rendered obvious by the identified prior art reference combination, they cannot show that these prior art references render obvious Claims 9 and 16, respectively, of the '216 Patent.

219. First, Petitioner solely relies on its translation of Nagata [0032] and Hashiguchi [0031] to argue that a label in Nagata or Hashiguchi communicates with multiple access points simultaneously (Paper 2, 75, 83-84; Ex. 1003, [204], [222]). Petitioner's translation reads "[t]he installation locations and the installation spacing of the access points 30 are determined so that the electronic rack labels 40 installed inside the store can communicate with any of the access points 30." (Ex. 1005, [0032]; Ex. 1006, [0031], largely the same). Petitioner argues that because a label can communicate with "any of" the access points, more than one access point would be receiving a communication with the label (Paper 2, 75, 83-84; Ex. 1003, [204], [222]).

220. In ¶¶204-213 of his declaration, Dr. Wolfe discusses his analysis pertaining to Claims 3, 9, and 16 of the '216 Patent by introducing a third reference, Thubert, to his previous analyses regarding Nagata alone and Nagata in view of Hashiguchi. As discussed below, Dr. Wolfe also has also not shown that Nagata and Thubert (or Nagata and Hashiguchi and Thubert) disclose or render obvious the additional limitation added to Claims 1 by Claim 3.

221. Dr. Wolfe states in ¶205 of his declaration "[t]o the extent Nagata (or Nagata-Hashiguchi) does not expressly disclose or suggest attaching respective energy value information of the plurality of base stations to the first data when transmitting it to the background server, Thubert does." However, nowhere in his obviousness grounds in view of Nagata alone or in his obviousness

grounds in view of Nagata in combination with Hashiguchi does Dr. Wolfe provide an explanation or analysis as to why—nor does he present any opinion as to whether—Nagata or Nagata in combination with Hashiguchi discloses, suggests or renders obvious to a POSITA the limitations of Claims 3, 9 and 16. Moreover, even in his obviousness grounds 3A and 3B, addressing Nagata in view of Thubert and Nagata in view of Hashiguchi and Thubert, does Dr. Wolfe provide anything more than a conclusory statement that Nagata or Nagata in combination with Hashiguchi discloses, suggests, or renders obvious to a POSITA the limitations of Claims 3, 9, and 16 of the '216 Patent (*see*, Wolfe Declaration ¶204). For instance, with respect to Claim 3, Dr. Wolfe neglects to include any discussion as to why he believes Nagata or his contrived Nagata-Hashiguchi combination would disclose “attaching respective energy value information of the plurality of base stations to the first data when transmitting it to the background server” (*Id.*). As such, his phrasing in ¶205 of his declaration of “to the extent” is not reflected in his analysis given that he has performed no analysis and provided no explanation as to why Nagata or Nagata-Hashiguchi would satisfy the limitations of Claim 3 by themselves. Therefore, Dr. Wolfe is relying only upon the teachings of Thubert and combining those with his previous analyses to purport that Claim 3 would be rendered obvious to a POSITA. For at least the following reasons, I disagree.

222. As an initial matter, Petitioner and Dr. Wolfe rely only on translations of Nagata EX-1005, [0032] and Hashiguchi EX-1006, [0031] to argue that an electronic rack label in the systems of Nagata or Hashiguchi communicates with more than one access point. For example, Dr. Wolfe opines in ¶204 of his declaration that “Nagata further explains that a label may communicate with any of the access points” (*see* Nagata EX-1005, [0032]). The translations of Nagata used by Petitioner and Dr. Wolfe state “[t]he installation locations and the installation spacing of the access points 30 are determined so that the electronic rack labels 40 installed inside the store can

communicate with any of the access points 30” (*see* Nagata Ex-1005, [0032]; *see also* Hashiguchi Ex-1006, [0031]). Dr. Wolfe continues to purport “Nagata discloses or suggests more than one access point receiving a communication from a label because the label can communicate with all of the access points” (*see* Wolfe Declaration ¶204). Similarly, Petitioner argues that because a label can communicate with “any of” the access points, more than one access point would be receiving a communication with the label (Paper 2, 75, 83-84).

223. However, just because a label *can* communicate with more than one access point does not mean that a label *does* communicate with more than one access point. Moreover, even if a label were shown to be capable of communicating with more than one access point, this alone is not evidence that said label is capable of simultaneously communicating one transmission with more than one access point. Petitioner and Dr. Wolfe have not shown beyond this one citation (i.e., Nagata EX-1005, [0032]) that an electronic rack label of Nagata *does* transmit the data received by the NFC part to more than one access point. Indeed, evidence within both Nagata and Hashiguchi indicate that their respective system architectures would not motivate a system configuration in which data transmissions from a single rack label are simultaneously communicated to more than one access point. For example, the embodiment described by Fig. 1 of Nagata (reproduced below) indicates a communication architecture in which there is a single server 10 and several access points 30, wherein each access point is in further communication with several electronic rack labels 40. Wireless radio frequency communication pathways are shown between each electronic rack label 40 and a single corresponding access point 30. The translated text of Nagata further supports this architecture by stating, e.g., “a second communication part 42, which performs communication with the *corresponding access point 30*” (*see* Nagata EX-1005, [0030], *emphasis added*; *see also* Nagata EX-1005, [0032], [0061]-[0066], [0079], [0104], [0111],

[0121], [0122], [0144], [0145], [0163], [0165], [0172], and [0174]). As such, in my opinion a POSITA would have been inclined to understand that the systems disclosed by Nagata and Hashiguchi would not have enabled functionality wherein an electronic rack label simultaneously transmits one message to multiple access points.

FIG. 1

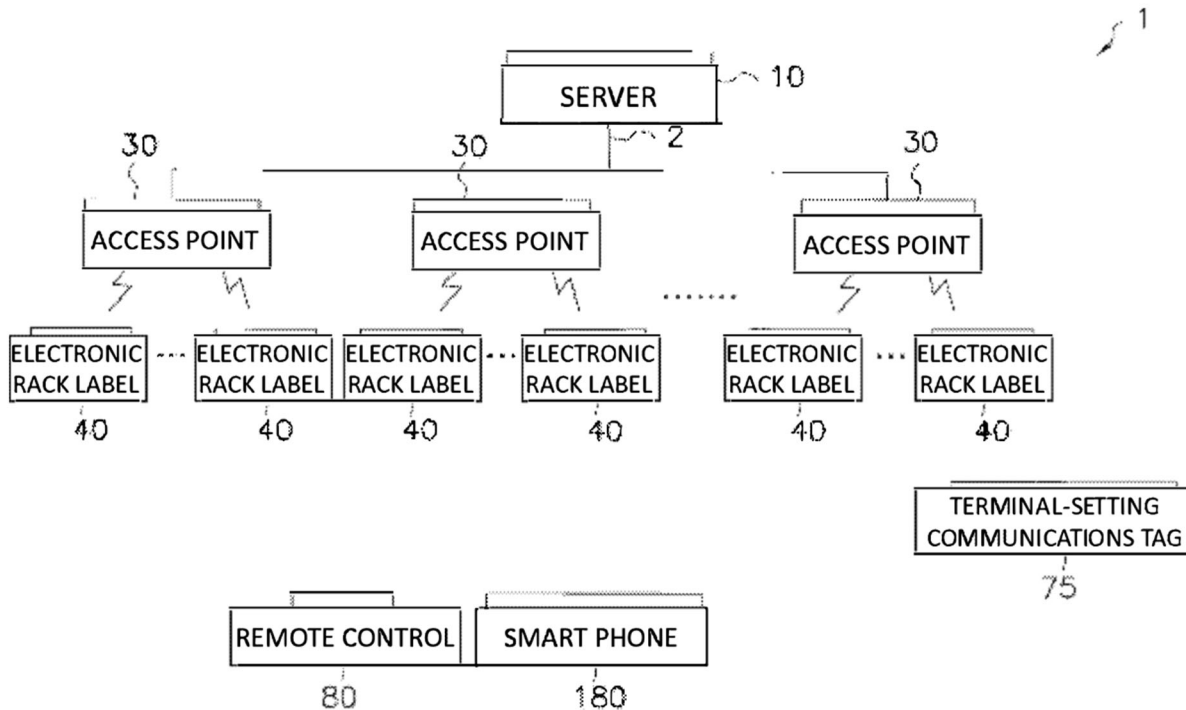


FIG.1 of Nagata (EX-1005).

224. I have been further informed by counsel that the translations of Nagata and Hashiguchi used by Petitioner and Dr. Wolfe are incorrect and that certified translations were performed on the original Japanese publications. As shown in Patent Owner’s certified translations, the disclosure to which Petitioner and Dr. Wolfe refers here states “[t]he installation locations and the installation spacing of the access points 30 are determined so that an electronic rack label 40 installed inside the store can communicate *with one* of the access points 30” (see Nagata EX-2010, [0032], emphasized to show difference); see also Hashiguchi EX-2011, [0031]). As described above, this translation is more consistent with the architecture shown in FIG.1 of Nagata

(reproduced above) and is also more consistent with the paragraphs of Nagata (and Hashiguchi) previously cited.

225. Another technical consideration that would be known by a POSITA when implementing a wireless electronic rack label system across a retail facility would be that using wireless technology, each access point and each label would have a limited communications range. In other words, if there is sufficient space within a facility, in order for every label to be able to communicate with “any of the access points,” then the wireless range of every pair of devices must be within the range of the limited communication range set by the radio frequency hardware and firmware that allows for wireless transmissions to occur. Indeed, even Thubert discloses such a range (*see* Thubert, [0054], [0086]). Therefore, if a POSITA were to look to Thubert to improve upon the systems of Nagata or Hashiguchi, then it would be obvious that, in order to implement a facility-wide communication system, it would require either extremely powerful communication units for all the labels and access points, with accompanying power consumption, complexity, and maintenance costs, or a very congested arrangement that is limited by the aforementioned power consumption and maintenance costs and unlikely to cover a typically sized retail space. Such an implementation of a high-power consumption system would actively go against the intent of Nagata (and Hashiguchi), which teach overall power saving technology within their respective systems. Put another way, for each label to be able to communicate with one access point in a low-energy and cost savings methodology, an even-spaced and hierarchical arrangement of labels and access points, well within the knowledge of any POSITA, would be beneficial to achieve the aims of the problems that Nagata (and Hashiguchi) attempt to solve.

226. Thus, I disagree with Petitioner and Dr. Wolfe that a POSITA would have looked to Thubert to improve upon the fixed, periodic time-interval paradigm of Nagata (and Hashiguchi),

that uses a hierarchical wireless communications approach to facilitate energy efficiency, at least for the reasons discussed above. Rather, a POSITA would have understood that the hierarchical design of the communication system shown in FIG. 1 of Nagata (and Hashiguchi) and additionally described through language such as “corresponding access point” is essential to a successful operation of the systems of Nagata and Hashiguchi in the way that those systems achieve low-energy system-wide functionality. A POSITA would have understood that in both Nagata and Hashiguchi, each access point must be kept in constant, periodic synchronization with all of the other access points and its corresponding labels for beacon signal transmissions (*see* Nagata EX-2010/EX-1005, [0033]; *see also* Hashiguchi EX-2011/EX-1006, [0127-0129]). Therefore, Petitioner and Dr. Wolfe’s assertion that a label in Nagata (or Hashiguchi) is disclosed to communicate with multiple access points simultaneously, is wrong.

227. Furthermore, I disagree with Dr. Wolfe that a POSITA would have been motivated to combine the teachings of Nagata (and Hashiguchi) with those of Thubert. Dr. Wolfe baselessly asserts in ¶205 that “[t]o the extent Nagata (or Nagata-Hashiguchi) does not expressly disclose or suggest attaching respective energy value information of the plurality of base stations to the first data when transmitting it to the background server, Thubert does.” He further purports in ¶212 that “[a] POSITA would have also had a reasonable expectation of success in implementing the signal strength reporting and access point selection ... in Nagata’s system (either alone or in combination with Hashiguchi) because it would have involved using only known techniques [] to improve similar devices [] in the same way as known in the prior art (selecting optimal AP to improve overall communications reliability).” As such, his motivation to combine Thubert’s disclosures with the system of Nagata (or Hashiguchi) are predicated on the idea that the systems disclosed by Nagata or Hashiguchi allow for or would encourage a label to communicate with multiple access

points, but, for at least the reasons described above, neither Nagata nor Hashiguchi disclose, suggest, or render obvious to a POSITA a system that would facilitate this type of communication, nor would a POSITA have been motivated to modify these systems to enable such communications. Therefore, it is my opinion that Dr. Wolfe does not show that a POSITA in possession of Nagata alone, or Nagata together with Hashiguchi, would have further looked to the teachings of Thubert and been motivated to combine their respective disclosures in such a way as to arrive at an invention that satisfies each and every limitation of independent Claim 1 as well as the additional limitations added to Claim 1 by Claim 3. Rather, as discussed above, with the fixed time-interval communication protocol paradigm employed by Nagata (or Hashiguchi), a dynamic selection of access points would not be needed within the hierarchical design of Nagata and Hashiguchi.

228. Consequently, for at least the reasons above, it is my opinion that Petitioner and Dr. Wolfe have not demonstrated that the limitations required by Claim element 3.0 would have been rendered obvious to a POSITA, either by Nagata (or Nagata and Hashiguchi) in view of Thubert. For the same reasons (i.e., no simultaneous communication with multiple base stations and no motivation to combine) it is also my opinion that Petitioner and Dr. Wolfe have not demonstrated that the limitations of Claim element 3.1, requiring server “to determine an optimal base station among the plurality of base stations,” would have been rendered obvious to a POSITA, either by Nagata (or Nagata and Hashiguchi) in view of Thubert. As the Petitioner and Dr. Wolfe rely on the same argument for Claims 9 and 16, it is also my opinion that they have not shown the limitations of Claims 9 and 16 would have been rendered obvious in view of the same cited prior art combination.

ii. NAGATA IN VIEW OF THUBERT OR NAGATA IN VIEW OF HASHIGUCHI AND THUBERT DOES NOT RENDER OBVIOUS DEPENDENT CLAIMS 4, 10, and 17

229. Claim 4 recites:

[4] The interactive electronic tag device communication system according to claim 3, wherein the background server is further configured to perform deduplication processing on the first data uploaded by the plurality of base stations.

230. Claim 4 depends on Claim 3 and Claim 3 depends on Claim 1. For at least the reasons discussed above with respect to Claims 1 and 3, Petitioner and Dr. Wolfe have failed to show that the identified reference combination renders obvious each and every limitation of Claim 1 and Claim 3. Therefore, because they have not shown that Claim 1 and 3 are rendered obvious by the prior art reference combination, Petitioner and Dr. Wolfe have not shown that these prior art references render obvious Claim 4 of the '216 Patent. Similarly, Petitioner and Dr. Wolfe have not shown that these prior art references render obvious Claims 10 and 17 of the '216 Patent.

231. Petitioner argues that “multiple mapped APs 302f and 302g [of Thubert] may receive duplicate copies of the same message 702 from mutually-mapped node 306” (Paper 2, 82; Ex. 1003, [221]). Petitioner further argues that “[Thubert’s] server-controlled traffic engineering enables egress 600 to eliminate duplicate copies of the same message by comparing timestamps, tokens, MAC addresses, and other information attributes of that message” (*Id.*). These are the only disclosures Petitioner identified with respect to the “deduplication processing” limitation.

232. However, these disclosures of Thubert occur in embodiments of “access points in a VAP mapping sending duplicate copies of a message received from a node” (Ex. 1007, [0089]). Thus, the VAP mapping is already established in these embodiments. But Thubert does not disclose taking measurements of energy values (as Petitioner maps this term, *see* Paper 2, 75) during the operations of already-established VAPs. Rather, Thubert only discloses taking such measurements

in the process of establishing or re-establishing VAPs (Ex. 1007, [0053-0057]). During such a process, the node 306 does *not* send message 702 to the yet-to-be-mapped APs, instead, it broadcasts network availability request 308 (Ex. 1007, [0054]). The APs 302 that received the request 308 will send data 310 regarding the request 308 to supervisory device 304, thereby triggering the formation of a VAP for node 306 (Ex. 1007, [0055]). Each data 310 may include the identity of the AP 302 and at least one metric of the quality of the communication. (*Id.*) Thus, the data 310 from APs 302 are not duplicate copies of a message received from the node, because request 308 is not a message and data 310 is not a copy. Additionally, data 310 from APs 302 are not duplicate copies among themselves because they contain different information such as the identities of the APs 302 and the metrics of quality.

233. Petitioner has not explained why a POSITA would be motivated to combine Thubert's disclosure of metric-taking (which appears in the VAP-establishing embodiment, without deduplication) and Thubert's disclosure of deduplication (which appears in another embodiment, without metric-taking). It is my opinion that a POSITA will not have been motivated to combine these references because there is nothing to deduplicate during the establishing of VAP, and there is no reason to take metrics for *data* transmission (as opposed to specialized *request* transmission designed for VAP establishment purposes) during operation of established VAP, when the metrics are only needed for determining how to establish a VAP.

234. Petitioner contends that a POSITA would be motivated and able to implement Thubert's disclosure of deduplication in Nagata (or Nagata and Hashiguchi) (Paper 2, 83-84; Ex. 1003, [221]-[223]). However, I understand that Claim 4 is dependent upon Claim 3, and as such requires the limitations of *both* deduplication *and* metric-taking. Petitioner relies on Thubert's disclosure of metric-taking for Claim 3 (Paper 2, 75-78; Ex. 1003, [205]-[213]). Thus, in order to reach a

combination that teaches Claim 4, Petitioner must show that a POSITA will be motivated and able to simultaneously implement Thubert's disclosures of *both* deduplication *and* metric-taking in Nagata (or Nagata and Hashiguchi) in the context of a *same* communication process involving the first data. As discussed above, it is my opinion that a POSITA would not be motivated to do so. In any case, Petitioner failed to make this argument.

235. Therefore, it is my opinion that Petitioner has not shown that Nagata and Thubert (or Nagata and Hashiguchi and Thubert) disclose or render obvious the additional limitations of Claim 4 over Claim 3. As Petitioner uses the same argument for Claims 10 and 17 (Paper 2, 85; Ex-1003, [224]), Petitioner has not shown the invalidity of Claims 10 and 17 either.

236. Furthermore, as discussed below, Dr. Wolfe also has not shown that Nagata and Thubert (or Nagata and Hashiguchi and Thubert) disclose or render obvious the additional limitation added to Claims 1 and 3 by Claim 4.

237. Dr. Wolfe discusses his analysis for Claim 4 in ¶¶218-224 of his declaration, in which he uses the same reference combinations as he used for his analysis in regard to Claims 3, 9, and 16. In more detail, in ¶222 of his declaration, Dr. Wolfe reiterates that "both Nagata and Hashiguchi disclose that each label can communicate with multiple access points." However, as discussed at length in my discussion with respect to Claim 3, this purported motivation to combine is based on his mischaracterization of what a POSITA would have understood from the systems of Nagata and Hashiguchi. Therefore, for at least the same reasons, Dr. Wolfe does not present a compelling motivation to combine Thubert's disclosures with the system Nagata (or Nagata and Hashiguchi) and thus has not shown that Claim 4 of the '216 Patent would have been rendered obvious. Dr. Wolfe presents an identical analysis for Claims 10 and 17, which rely on Claims 9 and 7 and

16 and 14, respectively, and has therefore also failed to show that Claims 10 and 17 are rendered obvious by his contrived combination of prior arts.

238. Consequently, for at least the reasons above, it is my opinion that Dr. Wolfe has not shown that a POSITA would have been motivated to combine the disclosures of Thubert in the systems of Nagata or Hashiguchi, as he suggests. Therefore, Dr. Wolfe has not demonstrated that Claim 4 of the '216 Patent would have been rendered obvious and thus unpatentable. Similarly, as Claims 10 and 17 recite similar limitations as to those disclosed in Claim 4, Claims 10 and 17 of the '216 Patent are also not shown to be unpatentable.

X. DECLARATION

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

2/28/2025

(Date)



Gavin D. Scott, Ph.D.

APPENDIX A

Curriculum Vitae of Gavin D. Scott



Exponent[®]
Engineering & Scientific Consulting

Gavin Scott, Ph.D., CFEI

Senior Managing Scientist | Electrical Engineering and Computer Science
New York
+1-212-895-8154 | gscott@exponent.com

Professional Profile

Dr. Scott is a physicist with over 20 years of experience in scientific research on topics including complex electronic, magnetic, and optical interactions, control systems, and quantum mechanical phenomena. He applies his expertise to the investigation of a wide range of technologies including consumer electronics, software controls, computer hardware, and industrial power distribution.

At Exponent, Dr. Scott provides scientific consultation for clients on matters ranging from litigation support and failure analysis, to product development and technical analysis of designs or proposals in relation to suitable industry standards.

Dr. Scott provides scientific and technical support to litigation involving intellectual property disputes, international arbitration, class-action lawsuits, and trade secret disputes. He has supported these matters by performing analyses of computer hardware components including computer processors and memory, mobile devices, integrated circuits (ICs) and semiconductor components, light emitting diodes (LEDs), solar cells, smart home devices, industrial control systems, optical sensing components, network security systems, LiDAR, and medical devices. He has also supported these matters by performing source code analysis and reviewing control software embedded in hardware devices.

Dr. Scott also provides an array of professional technical services to aid in product development and engineering applications including advising clients on matters of product reliability and performing root-cause failure analysis of multi-component systems. For instance, he has conducted investigations relating to Bluetooth communication, infrared thermometry, semiconductor chip manufacturing facilities, industrial power generation facilities, and thermal management of lighting systems and hand held mobile devices (i.e., analysis of heat generation and dissipation). His services also include both quantitative modeling and onsite measurements of electromagnetic fields for power transmission and offshore wind farms, the results of which have been used for EMF exposure assessments.

Dr. Scott additionally has extensive experience performing cause-and-origin assessments of fires, including those that may be related to arc-flash hazards, electrical wiring, and lithium ion batteries. He is also experienced investigating the technical aspects of claims relating to floods, explosions, and natural disasters.

Prior to joining Exponent, Dr. Scott worked as a research scientist at Nokia Bell Laboratories where, as the principal investigator for a low temperature experimental research effort, he engineered a sophisticated control system incorporating an extensive array of instrumentation designed to probe highly correlated electron states leading to collective effects (e.g., phase transitions) in magnetic nanostructures. He additionally advised management on quantum computing methodologies and quantum information processing applications aligned with their business strategies.

Dr. Scott worked as a postdoctoral research scientist at Rice University after receiving his Ph.D. in physics at UCLA where he studied charge transport in metallic nanogap devices, single molecule transistors, and electrostatically defined semiconductor quantum dots. He has broad practical experience

with a large range of semiconductor and nanofabrication processing techniques including lithographic processes and thin film deposition/etching. Dr. Scott has considerable experience with cryogenic systems, and related vacuum equipment, in addition to a variety of material characterization techniques including SEM, AFM, and STM. He is also highly skilled with data acquisition via data flow programming (e.g., LabVIEW) and quantitative data analysis techniques, and he has worked extensively with finite-element based modeling for micromagnetic simulations.

Academic Credentials & Professional Honors

Ph.D., Physics, University of California, Los Angeles (UCLA), 2007

M.S., Physics, University of California, Los Angeles (UCLA), 2001

B.S., Physics, University of California, Santa Barbara, 2000

W. M. Keck Postdoctoral Fellowship, 2007, 2008, 2009

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Research Scientist/Member of Technical Staff, Bell Labs, 2010-2017

Postdoctoral Research Fellow, Rice University, 2007-2010

Professional Affiliations

American Physical Society (APS) – member

American Chemical Society (ACS) – member

Institute of Electrical and Electronics Engineers (IEEE) – Senior member

National Association of Fire Investigators (NAFI) – member

Patents

Unites States Patent 9852833: Magnetization alignment in a thin-film device, 2017.

Publications

D'Andrade B, Scott GD. (2025). Health and Safety Advances in Power Engineering. In: The Sustainable Power Grid: Challenges, Applications, and Case Studies, Elsevier Publishing; DOI: 10.1016/B978-0-443-13442-5

Scott GD, Pooley MA, Ocola PL. (2024). Quantum Computation: From Hardware Challenges to Software Engineering Tools and Technologies. In: Computer Engineering Applications in Electronic, Biomedical, and Automotive Systems, Nova Science Publishers; DOI: 10.52305/XATK7438

Scott GD, Pooley MA, Cotts BRT. Numerical and Analytical Modeling of Electromagnetic Fields From Offshore Power Distribution Cables. IEEE Transactions on Magnetics 2023; 59:5900105.

Pooley M., Scott GD., Sourì SJ., Practical Pitfalls of Regulating Technology, Exponent Thought Leadership. February 18, 2021.

Scott G., Sorini A., PyLocky Ransomware Source Code Analysis. IEEE Symposium on Product

Compliance Engineering Proceedings. Portland, OR (Virtual). November, 2020.

Scott G., Pooley M., Murphy P., Infrared Thermometry Amid the COVID-19 Pandemic, Exponent Thought Leadership. July 30, 2020.

Scott GD, Hu T-C. Gate-controlled Kondo effect in a single-molecule transistor with elliptical ferromagnetic electrodes. *Physical Review B* 2017; 96:144416.

Scott GD, Hu T-C. Controlled Electrode Magnetization Alignment in Planar Elliptical Ferromagnetic Break Junction Devices. *Journal of Applied Physics* 2016; 120:164311.

Scott GD. Electrode Design for Antiparallel Magnetization Alignment in Nanogap Devices. *IEEE Transactions on Magnetics* 2016; 52:9600104.

Arvidson RS, Fischer C, Sawyer DS, Scott GD, Natelson D, Lüttge A. Lateral Resolution Enhancement of Vertical Scanning Interferometry by Sub-Pixel Sampling. *Microscopy and Microanalysis*, 2014; 20:90-98.

Scott GD, Natelson D, Kirchner S, Muñoz E. Transport Characterization of Kondo-Correlated Single Molecule Devices. *Physical Review B* 2013; 87:241104(R).

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Scott GD, Palacios JJ, Natelson D. Anomalous Transport and Possible Phase Transition Palladium Nanojunctions. *ACS Nano* 2010; 4:2831-2837.

Scott GD, Keane ZK, Ciszek JW, Tour JM, D. Natelson D. Universal Scaling of Nonequilibrium Transport in the Kondo Regime of Single Molecule Devices. *Physical Review B*, 2009; 79:165413.

Jiang HW, Yablonovitch E, Xiao M, Sakr MR, Scott GD, E. T. Croke ET. Single Electron Spin Measurements in Si-Based Semiconductor Nanostructures, chapter in book entitled *Electron Spin Resonance and Related Phenomena in Low Dimensional Structures* Fanciulli M, Editor, Springer-Verlag, TAP series 2009; 115.

Ward DR, Scott GD, Keane ZK, Halas NJ, Natelson D. Electronic and Optical properties of Electromigrated Molecular Junctions. *Journal of Physics: Condensed Matter* 2008; 20:374118.

Zhang XC, Scott GD, Jiang HW. NMR Probing Spin Excitations in the Ring Structure of a Two-Subband System. *Physical Review Letters* 2007; 98:246802.

Scott GD, Xiao M, Croke ET, Yablonovitch E, Jiang HW. Sputtered Gold as an Effective Schottky Gate for Strained Si/SiGe Nanostructures. *Applied Physics Letters* 2007; 90:032110.

Scott GD, Chichak K, Peters A, Cantrill SJ, Stoddart JF, Jiang HW. Mechanism of Enhanced Rectification in Unimolecular Borromean Ring Devices. *Physical Review B* 2006; 74:113404.

Selected Presentations

Scott G., Sorini A., "PyLocky Ransomware: Exploiting Implementation Errors." IEEE Symposium on Product Compliance Engineering Proceedings. Portland, OR (Virtual). November, 2020.

Scott G., Pooley M., Crump C., Lively E., McLean S. Critical Decision-Making and COVID-19: Contact Tracing, Temperature Checks, and Human Factors in the Workplace. Exponent Live Webinar. June 24, 2020.

Scott GD, Natelson D, Kirchner S, Muñoz E. Transport characterization of Kondo-correlated single molecule devices, Invited Presentation, Max Planck Institute for the Physics of Complex Systems,

Dresden, Germany, 2013.

Scott GD, Hu T-C. Kondo-correlated transport in single molecule ferromagnetic break junction devices with controllable electrode magnetization alignment, Contributed Presentation, March Meeting of the American Physical Society, Baltimore, MD, 2016.

Scott GD, Natelson, D. Conductance scaling and Kondo correlations in single molecule transistors, Contributed Presentation, March Meeting of the American Physical Society, Boston, MA, 2012.

Project Experience

Failure Analysis

- Root cause failure analysis of Bluetooth-enabled integrated circuits
- Root cause failure analysis of blood alcohol sensors
- Technical Analysis of thermal management capabilities and implementations in hand held portable electronic devices
- Root cause analysis of processing failures in a semiconductor device fabrication foundry

Consumer Electronics

- Engineering review and assessment of the design, development, and performance of technical home health products
- Implementation and oversight of user studies for electronic products
- Technical analysis of components and manufacturing processes for portable electronic devices such as smartphones

EMF Field Analysis

- Analytical model calculations of anticipated magnetic and electric field from planned power distribution equipment
- Calculation of radiation patterns for microwave tower links
- Onsite measurements of magnetic and electric fields

Fire and Explosion Investigation

- Root cause analysis of warehouse fire involving automated systems
- Root cause analysis of fire/explosion involving power transmission equipment
- Root cause analysis of fire/explosion involving consumer electronic products and associated batteries
- Flood damage assessment to electrical instrumentation, communication systems, and networking equipment

Legal Matters and Intellectual Property

- Patent Infringement analysis of LED lighting products
- Patent Infringement analysis of Smart Control System products
- Patent Infringement analysis of transportation safety systems
- Patent Infringement analysis of wireless telecommunication infrastructure and devices
- Patent validity investigations relating to LiDAR systems
- Technical investigation of product manufacturer's Reliability Engineering practices for a portable electronic device, as related to a class action lawsuit

- Patent analysis relating to semiconductor products with opto-electronic capabilities
- Patent analysis relating to medical devices
- Patent Infringement analysis of network security systems
- Patent Infringement analysis of malware protection systems
- Investigation and review of electrical engineering issues related to the design and installation of wireless network systems in a major transportation hub
- Technical analysis of design-related issues at nuclear power plants

Peer Reviews

Nature Nanotechnology

Nature Communications

Nano Letters

Journal of the American Chemical Society (JACS)

APPENDIX B

Materials Considered

Materials Considered

I have considered and/or relied upon all the materials provided by counsel, including the sources referenced below.

Exhibit	Description
Ex.1001	U.S. Patent No. 11,540,216 B2 to Liang <i>et al.</i> (“Liang”)
Ex.1002	Prosecution History of U.S. Patent No. 11,540,216
Ex.1003	Declaration of Andrew Wolfe, Ph.D.
Ex.1004	<i>Curriculum Vitae</i> of Andrew Wolfe, Ph.D.
Ex.1005	Japan Patent Office Published Unexamined Patent Application No. 2017-126872 to Nagata <i>et al.</i> (“Nagata”)
Ex.1006	Japan Patent Office Published Unexamined Patent Application No. 2016-140368 to Hashiguchi <i>et al.</i> (“Hashiguchi”)
Ex.1007	U.S. Patent Application Publication No. 2018/0123887 A1 to Thubert <i>et al.</i> (“Thubert”)
Ex.1008	Patent Owner’s April 17, 2023 Infringement Allegations Against Petitioner in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.)
Ex.1009	Waiver of the Service of Summons in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-00174 (E.D. Tex.), Document 6, May 25, 2023
Ex.1010	First Amended Docket Control Order in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-00174 (E.D. Tex.), Document 76, February 23, 2024
Ex.1011	Japan Patent Office Published Unexamined Patent Application No. 2017-126872 to Nagata <i>et al.</i> (“Nagata”) (Original Japanese Version)
Ex.1012	Japan Patent Office Published Unexamined Patent Application No. 2016-140368 to Hashiguchi <i>et al.</i> (“Hashiguchi”) (Original Japanese Version)
Ex.1013	U.S. Patent No. 7,567,791 B2 to Laroia <i>et al.</i> (“Laroia”)
Ex.1014	U.S. Patent Application Publication No. 2017/0011238 A1 to Rößl <i>et al.</i> (“Rößl”)
Ex.1015	Afroz <i>et al.</i> SINR, RSRP, RSSI and RSRQ Measurements in Long Term Evolution Networks. International Journal of Wireless & Mobile Networks (IJWMN), Vol. 7, No. 4, August, 2015
Ex.1016	Bluetooth Core Specification v 5.0
Ex.1017	Liu <i>et al.</i> A low power 2.4 GHz transceiver for ZigBee applications. Journal of Semiconductors, Vol. 34, No. 8, August, 2013
Ex.1018	Cook <i>et al.</i> Low-Power 2.4-GHz Transceiver With Passive RX Front-End and 400-mV Supply. IEEE Journal of Solid-State Circuits, Vol. 41, No. 12, December, 2006
Ex.1019	Chehri <i>et al.</i> Link-Quality Measurement and Reporting in Wireless Sensor Networks. Sensors, Vol. 13, No. 3, March, 2013
Ex.1020	Baidoo-Williams <i>et al.</i> PHY-layer link quality indicators for wireless networks using matched-filters. <i>arXiv preprint</i> , 2015

Ex.1021	U.S. Patent Application Publication No. 2017/0330064 A1 to Kim (“Kim”)
Ex.1022	U.S. Patent Application Publication No. 2015/0278890 A1 to Yang (“Yang”)
Ex.1023	U.S. Patent Application Publication No. 2003/0133468 A1 to Haulk <i>et al.</i> (“Haulk”)
	Petition for <i>Inter Partes</i> Review of U.S. Patent No. 11,540,216 IPR2024-00857
	PTAB Institution Decision in IPR2024-00857 (Paper No. 7)
Ex.2002	Joint Claim Construction Chart in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 123, November 27, 2024
Ex.2003	Plaintiff Hanshow Technology Co., Ltd.’s Opening Claim Construction Brief in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 116, November 04, 2024
Ex.2004	VusionGroup’s Claim Construction Brief in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 121, November 18, 2024
Ex.2005	Markman Hearing Transcript (12/13/24) and associated exhibits
Ex.2006	Preliminary Constructions in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 136-1, January 27, 2025
Ex.2007	Claim Construction Order in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 129, January 13, 2025
Ex.2008	Plaintiff Hanshow Technology Co., Ltd.’s Objections to Magistrate Judge’s Claim Construction Order in Hanshow Technology Co., Ltd. v. SES-imagotag SA and SES-imagotag GmbH, 2-23-cv-174 (E.D. Tex.), Document 136, January 27, 2025
Ex.2009	European Patent Office’s Preliminary Decision, August 07, 2024
Ex.2010	Certified Translation of Japan Patent Office Published Unexamined Patent Application No. 2017-126872 to Nagata <i>et al.</i> (“Nagata”)
Ex.2011	Certified Translation of Japan Patent Office Published Unexamined Patent Application No. 2016-140368 to Hashiguchi <i>et al.</i> (“Hashiguchi”)
Ex.2012	Deposition Transcript of Andrew Wolfe, Ph.D. (02/14/25) and associated exhibits
	All other documents cited in this declaration, to the extent not listed above