

Filed on behalf of: Netgear, Inc.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TP-LINK CORPORATION LIMITED,
Petitioner,

v.

NETGEAR, INC.,
Patent Owner.

Case IPR2023-01469
Patent 10,681,698 B2

**DECLARATION OF ZYGMUNT J. HAAS, PH.D.
IN SUPPORT OF PATENT OWNER'S
PRELIMINARY RESPONSE**

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I. Introduction and Qualifications

1. I have been retained by Netgear, Inc. (“Patent Owner”) to provide my opinion concerning the validity of U.S. Patent No. 10,681,698 (Ex. 1001).

2. I am a Professor and Distinguished Chair in Computer Science at the University of Texas in Dallas. I am also a Professor Emeritus at the School of Electrical and Computer Engineering at Cornell University. In addition, I have provided technical consulting services on intellectual property matters, during which I have written expert reports and provided deposition and trial testimony involving, among others, wireless communication technologies.

3. My academic credentials include a Bachelor of Science Degree in Electrical Engineering, summa cum laude, from Technion (IIT), Israel, in 1979 and a Master of Science Degree in Electrical Engineering, summa cum laude, from Tel Aviv University, Israel, in 1985. I subsequently authored the thesis titled “Packet Switching in Fiber-Optic Networks” as part of earning my Ph.D. in Electrical Engineering from Stanford University in 1988.

4. I am being compensated at the rate of \$500 with reimbursement for actual expenses for my work related to this matter. My compensation is not dependent on, and in no way affects, the substance of my statements in this Declaration.

5. I have worked or consulted for about 35 years in the fields of Electrical Engineering and Computer Science. My professional focus has been, among a number of fields, on communication and networking systems, with an emphasis on wireless communication networks. I have authored and co-authored numerous technical papers and book chapters related to wireless communication networks. I hold over twenty patents in the fields of high-speed networking, wireless networks, and optical communication/switching. My employment history following my graduation from Stanford University began at the Network Research Department of AT&T Bell Laboratories in 1988. At AT&T Bell Laboratories, I pursued research on wireless communications, mobility management, fast protocols, optical networks, and optical switching. During my tenure at AT&T, I also worked for the AT&T Wireless Center of Excellence, where I investigated various aspects of wireless and mobile networks.

6. In 1995, I joined the faculty of the School of Electrical & Computer Engineering at Cornell University, and in time I was promoted to a Full Tenured Professor. At Cornell, I headed the Wireless Networks Lab, a research group with extensive contributions in the area of wireless communication systems and networks. In 2013, I retired from Cornell University with the title of Emeritus Professor, and I joined the Computer Science Department at the University of Texas at Dallas with the title of Professor and Distinguished Chair in Computer

Science. At Cornell University and at the University of Texas, I have taught dozens of courses related to computer networking and wireless communications. I have also served on various committees for the benefit of the scientific community.

7. I am a member of a number of professional societies, including the Institute of Electrical and Electronic Engineers (IEEE) and the Association for Computing Machinery (ACM). In 2007, I was elevated to an IEEE Fellow, and in 2022, I was elevated to an ACM Fellow, both well-known distinctions. For example, the total number of IEEE Fellows which are selected in any given year does not exceed 0.1% of the total number of voting members of IEEE. With respect to the ACM Fellow grade, ACM states that “ACM’s most prestigious member grade recognizes the top 1% of ACM members for their outstanding accomplishments in computing and information technology and/or outstanding service to ACM and the larger computing community.” See <https://awards.acm.org/fellows>.

8. I have delivered numerous tutorials at major IEEE and ACM conferences. I served as editor of several publications including the IEEE Transactions on Networking, the IEEE Transactions on Wireless Communications, the IEEE Communications Magazine, the Springer “Wireless Networks” journal, the Elsevier “Ad Hoc Networks” journal, the “Journal of

High Speed Networks,” and the Wiley “Wireless Communications and Mobile Computing” journal. I was also a guest editor of IEEE Journal on Selected Areas in Communications for the issues on “Gigabit Networks,” “Mobile Computing Networks,” and “Ad-Hoc Networks.” Finally, I served as the Chair of the IEEE Technical Committee on Personal Communications (TCPC), today known as Wireless Communications Technical Committee (WTC).

9. I have received several awards in the field of wireless communications and network technology. In 2016, I received the IEEE ComSoc AHSN Recognition Award “for outstanding contributions to securing ad hoc and sensor networks”. In 2012, I received the IEEE ComSoc WTC Recognition Award, which recognizes individuals “for outstanding technical contributions in the field for their service to the scientific and engineering communities.” In 2021, I received the “Best Paper Award” for coauthoring the paper “Engineering a Network in the Sky” from the 35th International Conference on Information Networking, (ICOIN21). In 2012, I received the “Best Paper Award for co-authoring “Collaborating with Correlation for Energy Efficient WSN” directed at Wireless Sensor Networking. I previously received the “Best Paper Award” for co-authoring “Optimal Resource Allocation for UWB Wireless Ad Hoc Networks” directed at personal indoor and mobile radio communications. Finally, in 2003, I received the “Highly Commended Paper Award” for co-authoring

“Performance Evaluation of the Modified IEEE 802.11 MAC for Multi-Channel Multi-Hop Ad Hoc Network,” directed at advanced information networking and applications.

10. Additional information regarding my education, technical experience and publications, including a list of the U.S. patents of which I am an inventor/coinventor, is included in my *Curriculum Vitae*, which I understand is attached at Exhibit 2002.

II. Summary Of Materials Reviewed And Considered

11. The opinions contained in this Declaration are based on the documents that I reviewed, my knowledge, and professional judgment. In forming the opinions expressed in this Declaration, while drawing on my experience in the field of wireless communications, I reviewed the following documents¹:

Ex.	Description
1001	United States Patent No. 10,681.698 (“the ’698 patent”)
1002	Declaration of Dr. Zhi Ding (“Ding Declaration”)
1004	File History for the ’698 patent (“’698 FH”)
1005	U.S. Patent 9,001,767 (“Gatewood”)
1006	U.S. Patent 7,366,120 (“Handforth”)
1008	U.S. Patent Application Publication No. 2008/0304485 (“Sinha”)

¹ The table of the Exhibits and Exhibit numbers were supplied to me by Counsel.

Ex.	Description
1009	U.S. Patent 9,247,440 (“Ho”)
1014	U.S. Patent Application Publication No. 2016/0007273 (“Farid”)
1017	Amended Joint Chart of Agreed and Disputed Claim Terms for Construction (ITC)
1018	Complainant Netgear’s Opening Claim Construction Brief (ITC)
1019	TP-Link’s Initial Claim Construction Brief (ITC)
1021	Channel Bonding in WiFi: Rules and Regulations (January 25, 2016)
2003	Order Construing Certain Claim Terms (ITC)

12. My opinions are additionally guided by my appreciation of how a person of ordinary skill in the art (“POSITA”) would have understood the claims of the ’698 patent at the time of the invention, which I have been asked to assume is November 10, 2015.²

III. Understanding of Legal Standards

13. I am not an attorney, and in this Declaration, I do not opine on matters of law. For the purposes of this Declaration, I have been informed about

² I note that my opinions in this declaration would not change if the date of the invention were May 13, 2016 (the filing date of U.S. Provisional 62/336,503) or September 21, 2016 (the filing date of parent application 15/271,912).

certain aspects of the law that are relevant to my analysis and opinions. My understanding of these principles is set forth below.

14. I have been informed by Counsel that the validity analysis is a two-step process. First, the patent claims are construed to ascertain their proper scope. Second, the construed claims are compared to the identified prior art to determine if the claims are valid over the prior art.

A. Claim construction

15. I have been informed by Counsel that the claims of a patent define the limits of the patentee's exclusive rights. I have been informed by Counsel that to determine the scope of the claimed invention, courts typically construe claim terms, the meaning of which the parties may dispute. I have been informed by Counsel that claim terms should generally be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of filing of the patent application, after reading the patent and its prosecution history. I also have been informed by Counsel that a basic tenet of claim construction presumes that different words in a claim have different meanings, unless there is evidence to the contrary.

16. I have been informed by Counsel that claims must be construed in light of, and consistent with, the intrinsic evidence. In this context, I have been informed by Counsel that intrinsic evidence includes the claims themselves, the

written disclosure in the specification, and the patent's prosecution history, including prior art that was considered by the United States Patent and Trademark Office ("USPTO"). I have been informed by Counsel that the specification is always highly relevant to the claim construction analysis and often is the single best guide to the meaning of a disputed term. I have been informed by Counsel that extrinsic evidence may also be considered when construing claims and may include, for example, technical dictionaries, technical publications and books, treatises, and expert testimony.

B. Obviousness

17. I have been informed by Counsel that patent claims can be deemed invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the pertinent art. While such conclusions are often based on more than one piece of prior art, only one is required. It is not sufficient that a collection of prior art references merely recites the various elements of a challenged patent claim. Rather, as I have been informed by Counsel, the prior art must present the elements in a manner that is consistent with their arrangement or use in the challenged claims. I have been informed by Counsel that obviousness cannot be based on the hindsight combination of components selectively culled from the prior art.

18. I have been informed by Counsel that a person having ordinary skill in the art (i.e., a POSITA) is a hypothetical person who is presumed to have known the relevant art at the time the invention was made. I have been informed by Counsel that the condition “at the time the invention was made” is imposed to rule out impermissible hindsight. I also have been informed by Counsel that an expert is to analyze the prior art from the perspective of a person of ordinary skill in the art at the time the invention was made, and not simply to provide his/her own personal conclusions.

19. I also have been informed by Counsel that an obviousness determination includes several factual inquiries, including (1) determining the scope and content of the prior art; (2) ascertaining the differences between the claimed invention and the prior art; (3) resolving the level of ordinary skill in the pertinent art; and (4) taking into consideration any objective indicia of nonobviousness.

20. I have been informed by Counsel that obviousness must be determined as of the date of the invention (i.e., the effective filing date or priority date of the patent). Thus, in considering the reason or motivation to combine references, it is essential to avoid using hindsight. For example, the problem examined when considering obviousness is the general problem that confronted the inventor before the invention was made, not the specific problem solved by

the invention. Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness. Further, an overly narrow statement of the problem can represent a form of hindsight, because often the inventive contribution lies in defining the problem in a new revelatory way. Similarly, an assertion that a person of ordinary skill could combine the references, rather than that they would have been motivated to do so, is an impermissible form of hindsight. Moreover, knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references to reach the particular claimed invention.

21. I have been informed by Counsel that a motivation to solve a problem (or issue) is not the same as a motivation to have combined references. I have been informed by Counsel that whether a skilled artisan would be motivated to make a combination includes whether he/she would select particular references in order to combine their elements.

22. I have been informed by Counsel that the analysis of the motivation to combine should be explicit. Additionally, it must include articulated reasoning with rational underpinnings to support the conclusion of obviousness. Providing a full explanation of the motivation to combine the references and the reasonable expectation of success is a necessary component of the obviousness inquiry, as inventions in most, if not all, 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. However, conclusory statements fail to adequately explain why a person of ordinary skill would have a motivation to combine the potential prior art references.

23. I have been informed by Counsel that common sense, common wisdom, and common knowledge may be used to support a motivation to combine, so long as the use of common sense in the analysis is explained with sufficient reasoning. But, common sense can only be used to supply a limitation missing from the prior art where the technology is unusually simple and straightforward.

24. I also have been informed by Counsel that evidence suggesting reasons to combine cannot be viewed apart from evidence suggesting reasons not to combine. In analyzing motivation, both advantages and disadvantages must be considered. Teaching away, for example, is a statement in the prior art that either (i) discourages one from following the path of the claimed invention, or (ii) encourages one to follow a path that diverges from the path of the claimed invention. The concept of teaching away bears directly on whether there was a reason to combine prior art. Known disadvantages in prior art technology or devices which would naturally discourage a search for new inventions may also be taken into account in determining obviousness.

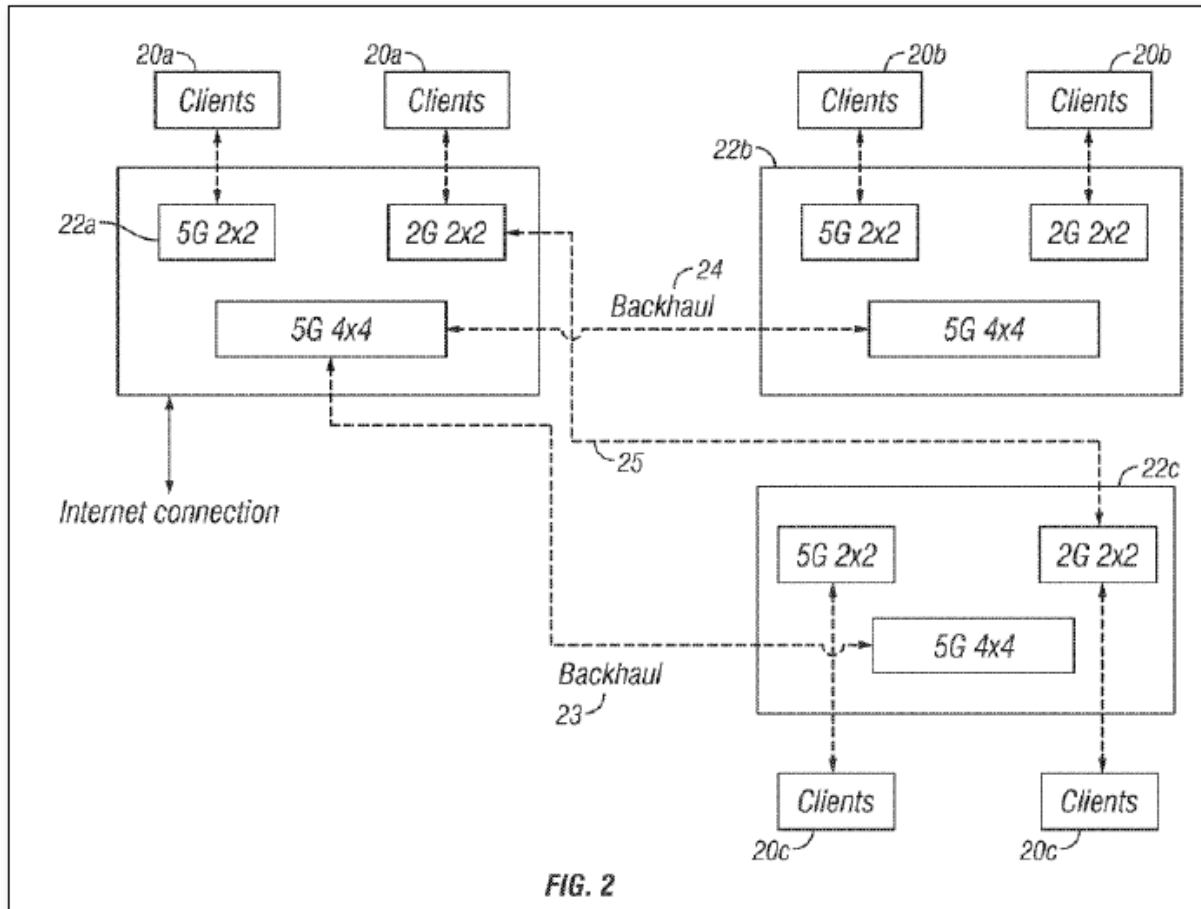
IV. Level of Ordinary Skill in the Art

25. For the '698 patent, a person of ordinary skill in the art ("POSITA") would have a bachelor's degree in a technical field such as electrical engineering, computer engineering, computer science, or physics, and/or 2-3 years of relevant practical experience in data communication, wireless communication, or wireless networking systems.

V. Overview of the '698 Patent

26. The '698 Patent generally relates to wireless mesh networks and their ability to provide Internet services to clients via one or more mesh points, or nodes. '698 Patent, 1:31-37, 3:52-65, Fig. 2. Generally, a mesh point, or node, will have a direct connection to the Internet. '698 Patent, 1:31-37. This mesh node may be referred to as the main access point ("AP"), base AP, or router, and the mesh node in the network without a direct Internet connection may be referred to as satellites, repeaters, or simply APs. '698 Patent, 1:31-37, 2:38-47; 4:21-27, 3:22-28. The base AP provides Internet to other mesh points. '698 Patent, 1:34-37, 2:36-47. The communication established between the mesh nodes in the network is known as backhaul. *Id.*, 1:31-37, 2:36-47, 3:52-4:7, Figs. 1, 2. Client devices, such as smartphones or laptops, can connect to any one of the mesh points for access to the Internet. '698 Patent, 1:32-34, 3:52-65, Fig. 2.

These connections between the mesh nodes, and between the mesh nodes and client devices, is depicted in below in Figure 2:



27. The '698 Patent teaches systems and methods of implementing and optimizing the backhaul connection between the mesh nodes. '698 Patent, 3:54-55, 4:1-2. Specifically, the '698 patent discloses techniques for implementing a dedicated backhaul connection (i.e., communication that is dedicated to back-end data traffic) between the mesh points. *Id.*, 2:36-54, 3:45-4:7, Figs. 1, 2, 3. The '698 Patent also teaches that the mesh nodes are equipped with one or more radios for establishing the backhaul communications and client-facing

communications, including one or more 2.4 GHz radios and one or more 5 GHz radios. *Id.*, 3:55-65, 7:19-27, Figs. 2, 3. The dedicated backhaul connection is separate from the method of communication between the access point and the client devices. '698 Patent, 3:51-61. The claims of the '698 Patent refer to this communication between the clients and a mesh point in the network as “front haul.” '698 Patent, 11:1-3.

28. Although a dedicated backhaul is the preferred method of communication between access points, the '698 Patent teaches “using the 5 GHz high band or low band as a dedicated backhaul; using the 2.4 GHz band as backup if the 5 GHz band fails to reach between nodes; using Ethernet when it is better than the 5 GHz and 2.4 GHz bands and it is available; and using a spanning tree protocol or variant to avoid loops.” '698 Patent, 1:47-51, 2:48-54. The '698 Patent further teaches that “[t]hose skilled in the art will appreciate that any other connection may be substituted for the 5 GHz backhaul connection when such connection is not available, including for example another 5 GHz radio, a radio in a band other than 5 GHz and 2.4 GHz, etc.” '698 Patent, 3:61-65. The patent also teaches that “[w]hen a 2.4 GHz connection is used as the backhaul it is shared for both clients and backhaul.” '698 Patent, 3:59-61.

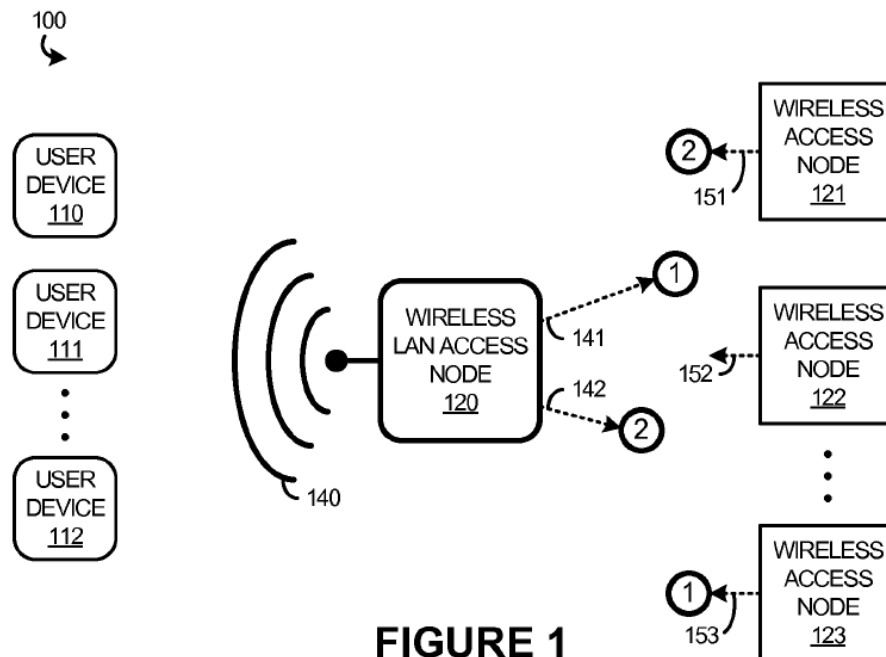
29. The '698 patent further discloses example operational flows for establishing a backhaul communication between mesh nodes. *See, e.g.*, '698

Patent, 4:28-31, 4:42-5:28, 7:48-8:6. “In some embodiments of the invention, the dedicated backhaul is used if the received signal strength indication (RSSI) of the dedicated channel is above a threshold. The threshold is a parameter that can be defined and modified on the hardware after hardware qualification is done.” ’698 Patent, 3:6-10. However, “[i]f the dedicated wireless link [i.e., the backhaul] falls below the quality threshold, the 2.4 GHz band may be used as a backup option. The decision as which band is used for backhaul may differ from satellite to satellite.” ’698 Patent, 3:48-51.

VI. A POSITA would not have found claims 1 and 12 obvious based on Ground I.

A. Overview of Gatewood’s use of backhauls to different nodes.

30. Gatewood is titled “Selection of Wireless Backhaul Links Based on Uptime Factors.” Figure 1 of Gatewood, reproduced below, shows a communication system with user devices 110-112 that communicate over WLAN 140 with WLAN access node 120. Gatewood, 2:23-27.



Gatewood, Figure 1

31. The WLAN access node communicates with wireless access nodes 121-123 over wireless backhaul links 141-142. Gatewood, 2:27-29. “In some examples, WLAN access node 120 and wireless access nodes 121-123 comprise similar devices or equipment, such as in a mesh wireless local area network.” Gatewood, 2:29-32.

32. Figure 3 of Gatewood, reproduced below, illustrates communication system 300 including “various user devices 310-312 and wireless local area network (WLAN) access nodes 330-334.” Gatewood, 3:45-49. “WLAN access node 330 comprises a wireless local area network access point and wireless router, such as an IEEE 802.11 wireless router.” Gatewood, 3:49-52. “In some examples, WLAN access nodes 331-334 comprise similar devices or equipment

as WLAN access node 330, such as in a mesh wireless local area network. In other examples, WLAN access nodes 331-334 can comprise cellular voice and data base station equipment, or other wireless equipment.” Gatewood, 3:52-57.

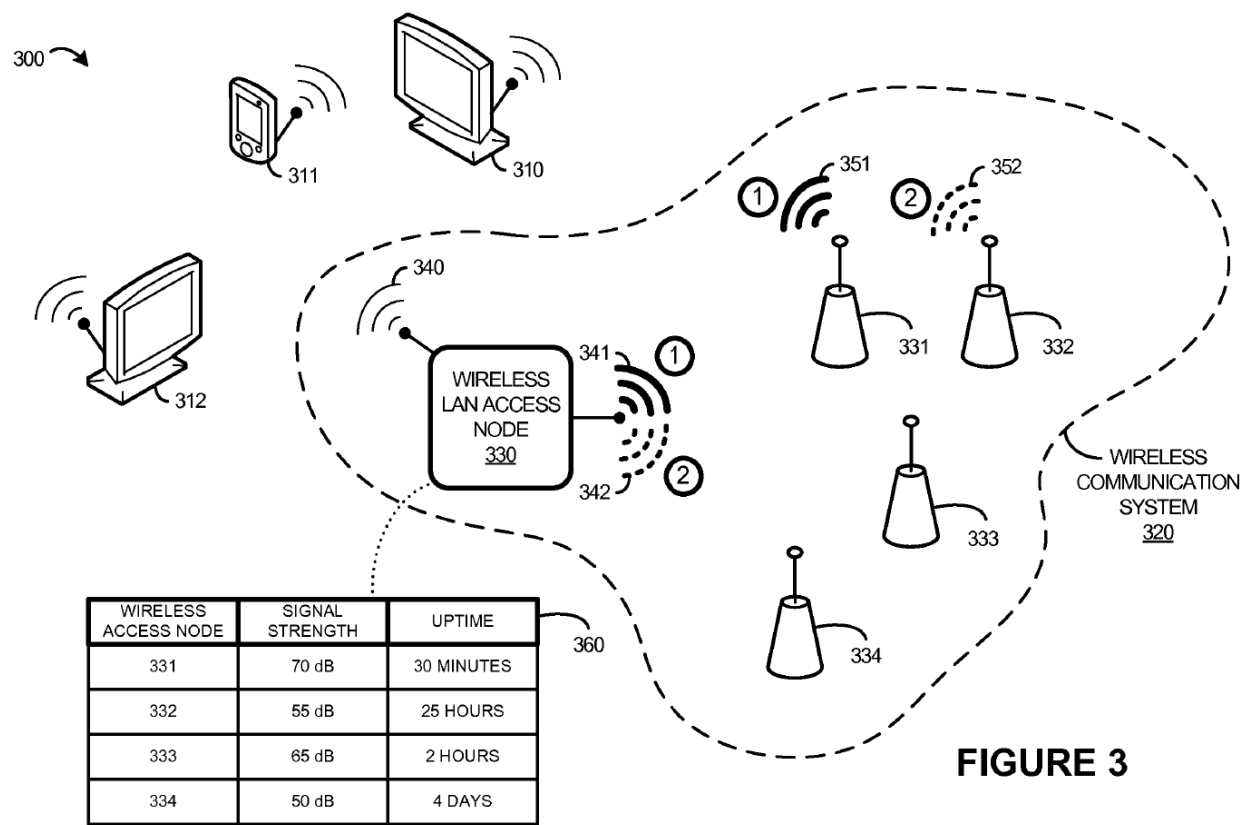


FIGURE 3

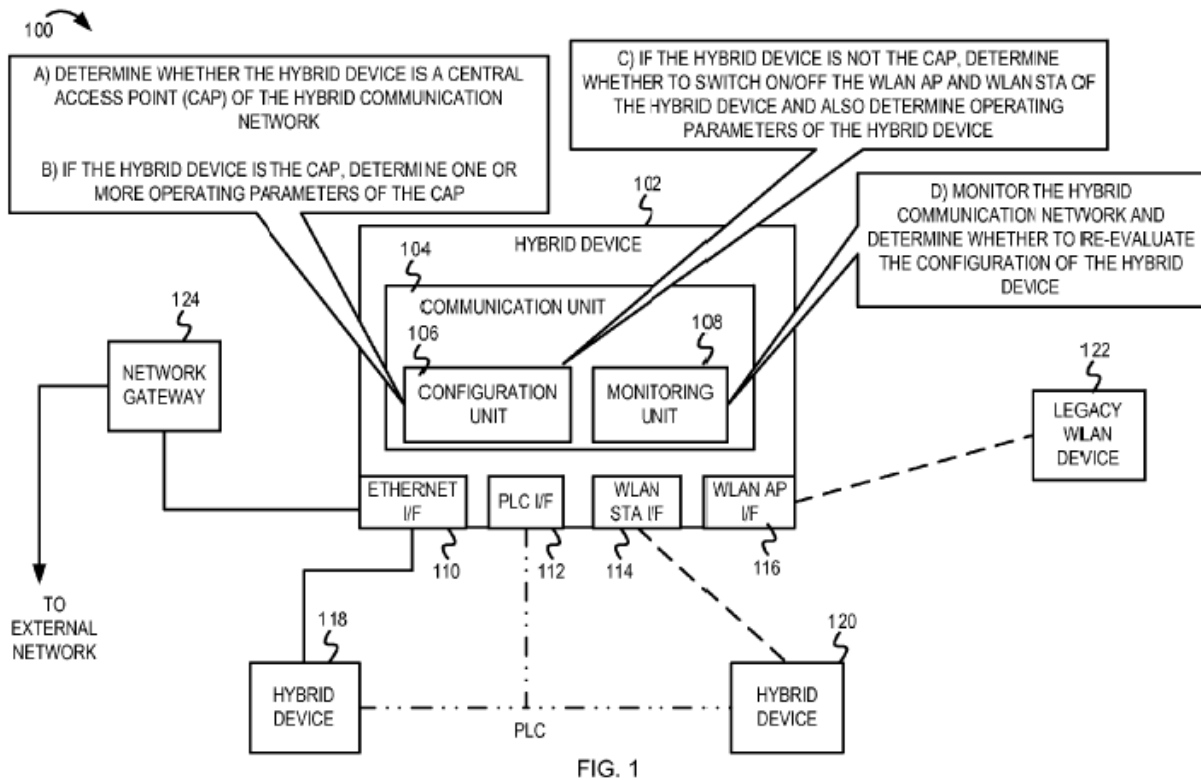
Gatewood, Figure 3

33. A POSITA would have understood that Gatewood’s network in Figure 3 does not use or need multi-hop paths between WLAN access node 330 and any other WLAN access node 331-334, because each of the WLAN access nodes 331-334 already provides connectivity to other networks such as the Internet. As Gatewood discloses, “WLAN access nodes 331-334 are also communicatively coupled to further networks, communication links, and systems

which can provide communication with other networks such as the Internet, corporate networks, Internet service providers, cellular voice and data core networks, and the like.” Gatewood, 3:58-62. “Although not shown in FIG. 3, each of WLAN access nodes 331-334 can have one or more additional wired or wireless links for communication with these further networks or communication links.” Gatewood, 3:63-66. “Thus, any communications backhauled through ones of WLAN access nodes 331-334, as discussed in FIG. 4, can be further exchanged over these additional wired or wireless links with the further networks or communication links.” Gatewood, 3:66-4:3.

B. Overview of Ho’s hybrid network

34. Ho is titled “Automatic Configuration of a Network Device.” Ho discloses “[h]ybrid communication networks [that] typically comprise multiple network devices that implement multiple networking technologies (e.g., wireless local area network (WLAN) technologies, powerline communication technologies, Ethernet, etc.).” Ho, 1:9-13. For example, as shown in Ho’s Figure 1, below, hybrid devices can have multiple connections to each other over multiple interfaces. In Figure 1, for example, hybrid devices 102, 118, and 120 are connected via powerline communication (PLC); hybrid devices 102 and 120 are also connected via WLAN. The hybrid devices can be laptops, mobile phones, gaming consoles, or other client equipment. Ho, 4:9-14.

**Ho, Figure 1**

35. Ho relates to automatic configuration of the hybrid devices in the network. For example, a hybrid device can configure itself to be one of two main personalities: a central access point (CAP) or a non-CAP hybrid device. Ho, 8:1-9. Ho also describes configuration of a non-CAP hybrid device into four second-level personalities: 1) access point; 2) relay; 3) sink, and 4) disabled. Ho, 8:13-21. The differences in these personalities generally relate to whether the non-CAP hybrid device has its WLAN STA module(s) and WLAN AP module(s) is enabled or disabled. Ho, 8:13-23. Thus, Ho's hybrid devices are not necessarily mesh access points, for example, as they might not have any WLAN connection

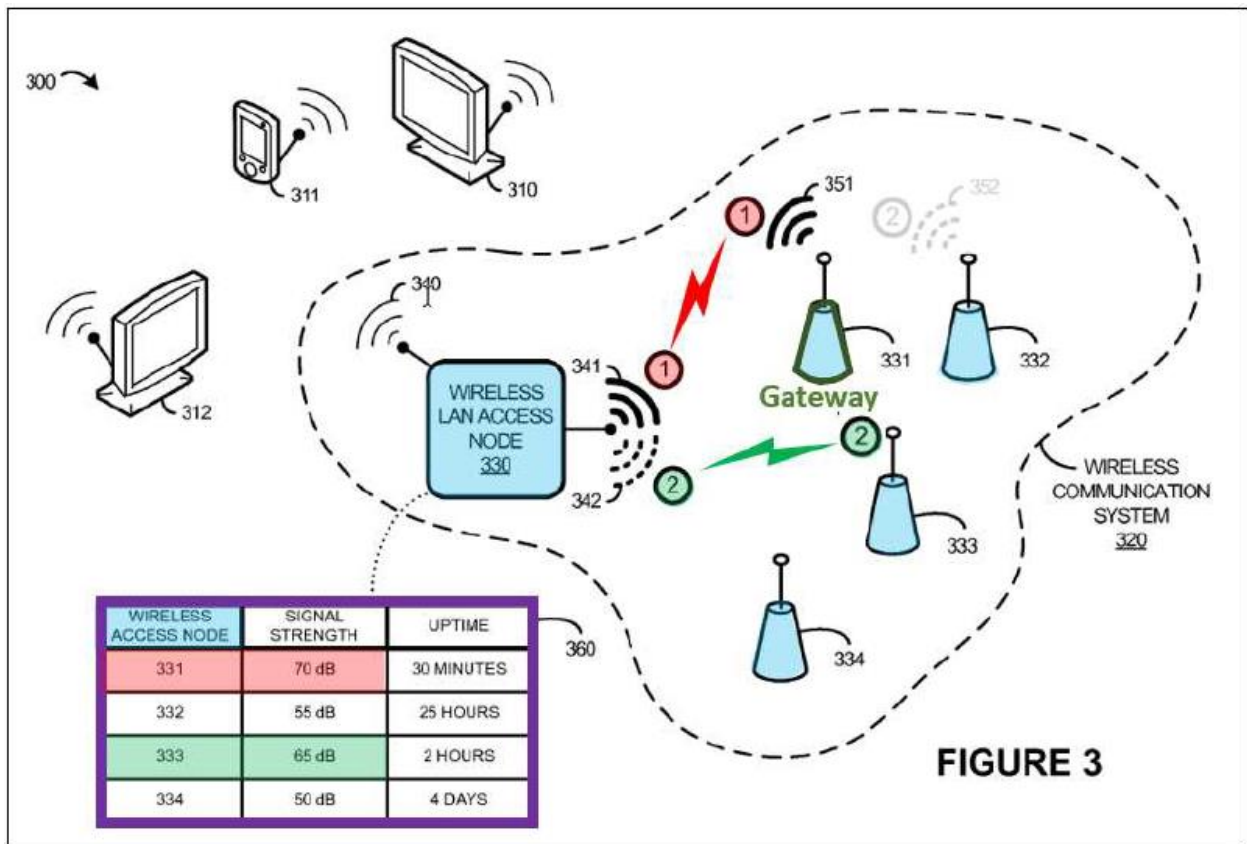
to the CAP, or might not serve as an access point to any other clients. A sink, for example, acts as a client because it has a WLAN STA connection but disables its WLAN AP module. Ho, 8:19-22. When a non-CAP hybrid device is configured as an access point, its WLAN STA module is disabled. Ho, 8:14-17. In this case, the non-CAP hybrid device can use its PLC connection to communicate to the CAP, which is why Ho discloses disabling the AP when the PLC connection to the CAP is weak. Ho, 17:31-34; 18:58-60.

C. Petitioner's combination of Gatewood and Ho does not disclose or suggest two attempts to establish a backhaul between the same two nodes ([1.1]/[12.1] and [1.2]/[12.2]).

36. Claims and 12 recite two attempts to establish a backhaul with the same “second node.” These claims both recite a first attempt: “performing an attempt to utilize a first channel in a default frequency band as a **backhaul with second node** in the network”; and a second attempt: “performing an attempt to utilize a different channel in the default frequency band and/or a channel in a different frequency band that has a lower frequency range than the default frequency band, to establish **the backhaul with the second node**.”

37. Gatewood does not disclose multiple attempts to establish backhaul with a same “second node.” Rather, Gatewood uses backhaul links to different nodes for redundancy. This is shown in the Petition, which maps the claimed “attempt to utilize a first channel” for the backhaul to a “first wireless backhaul

link 341” in Figure 3. Petitioner, 18. Petitioner’s annotation of Figure 3 is reproduced below showing that the first wireless backhaul link is to node 331 (annotating this link with a red (1)). I note that the label “Gateway” was added by Petitioner to node 331—this label does not appear in Gatewood’s Figure 3. Petitioner, 27.



Petitioner’s annotation of Gatewood Figure 3. Petitioner, 27.

38. For the second attempt—the claimed “attempt to utilize a different channel in the default frequency band”—Petitioner cites to “second wireless backhaul link 342” which terminates at node 333, shown above annotated with a green (2). Petitioner, 29. As clearly shown in Petitioner’s annotation, these two

backhaul links are with different nodes (331 and 333, respectively). Petition, 26-27, 29 (“[T]he first wireless backhaul link and second wireless backhaul link connect MAP.330 to MAP.331 and MAP.333, respectively.”) This does not satisfy the claim requirement that the “attempt to utilize a first channel” and the “attempt to utilize a different channel in the default frequency band” are to establish a backhaul with “the [same] second node.”

39. Petitioner asserts that the second wireless backhaul link (2) is actually a backhaul communication to node 331 where node 331 acts as a gateway and the link (2) to node 333 is used as a first hop to gateway node 331. Petition, 29 (“The second wireless backhaul link 342 is part of a multi-hop backhaul path (*e.g.*, MAP.330-to-MAP.333-to-MAP.331) to the same gateway.”). I disagree that the link (2) is part of a two-hop path to node 331. As I explained in my Overview of Gatewood above, each of the WLAN access nodes 331-334 has connections to other networks such as the Internet, thus there is no disclosure or need for two-hop communication in Gatewood’s network. See Gatewood, 3:58-4:3. Not only does Gatewood not designate node 331 as any different than any other node, to the extent Petitioner calls node 331 a gateway, all of the nodes 331-334 are gateways, and no communications are needed between them for the client data to get to other networks, *e.g.*, the Internet, as each of these nodes already has a connection to the other networks, *e.g.*, the Internet.

40. Petitioner next asserts that apart from Figure 3, which illustrates a single link between WLAN access node 330 and the other respective nodes, “Gatewood teaches forming multiple parallel wireless links (channels) between any two MAPS—such as between MAP.330 (first node) and MAP.331 (second node).” Petition, 30. Petitioner cites column 10, lines 23-31 of Gatewood (Petition, 30), which states:

Although one main wireless link for each of wireless links 140-142 and 151-153 is shown in FIG. 1, it should be understood that wireless links 140-142 and 151-153 are merely illustrative to show communication modes or wireless access pathways for user devices 110-112 and associated backhaul. *In other examples, further wireless links can be shown, with portions of the further wireless links shared and used for different communication sessions or different content types, among other configurations.*

Gatewood, 10:23-31 (emphasis added).

41. I disagree that this passage of Gatewood teaches “multiple parallel wireless links (channels) between any two MAPs—such as between MAP.330 (first node) and MAP.331 (second node).” Petition, 30. Although Gatewood discloses that “further wireless links can be shown” in Figure 1 (and does not reference Figure 3 in this passage), Gatewood does not disclose that these “further wireless links” are between the WLAN access node and the same other wireless nodes; i.e., duplication of the labeled links.

42. Nor does Gatewood disclose that these “further wireless links” are for backhaul, but rather discloses that when “further wireless links” are shown, “portions of the further wireless links [are] shared and used for different communication sessions or different content types, among other configurations.” Gatewood, 10:28-31. But even if this passage of Gatewood did disclose multiple links between access nodes, and even if those multiple links were for backhaul, there is no teaching or suggestion that they would be alternative backhaul links such that if one failed, Gatewood’s system would choose another link *to the same node* as the backup wireless backhaul. For example, although Petitioner equates these links as being on different “channels,” Gatewood does not use the term “channel” in this context. *See* Petition, 30. Gatewood does not provide a POSITA with any reason that such links would even be serviceable as backups (e.g., that they would have enough capacity to serve as backhauls, that they would have performance decoupled from the other links such that they would still be serviceable if a first link to the node failed, etc.). Petitioner reads much more from this single sentence of Gatewood than a POSITA would have understood.

43. Petitioner states that “Ho further confirms Gatewood’s teachings” and characterizing that reference as “forming multiple parallel backhaul connections (‘upstream links’) between a non-CAP hybrid device and a CAP using different frequency channels.” Petition, 31 (citing Ho, 21:7-12). I disagree

with Petitioner's assertion that Ho teaches multiple parallel backhaul connections "using different frequency channels." Petition, 31. Rather, Ho teaches using a variety of network interfaces to establish "redundant upstream links." Ho, 20:66-21:12; *e.g.*, 24:42-46. These different interfaces include powerline communication (PLC) and Ethernet connections. Ho, 24:58-63. Ho does not teach availability of multiple connections to a central access point (CAP) on different channels within the same band. To the contrary, the CAP selects its operating channel (*see, e.g.*, Figure 4), and if the WLAN quality from the non-CAP to the CAP is inadequate, the non-CAP operates without a link to the CAP by turning off its WLAN STA module. *See* Ho, 15:38-43. It can do this because it has other connections to the CAP such as PLC. *See* Ho, Figure 1, 11:58-12:2; 14:47-63; 18:58-60. The specific passage of Ho that Petitioner cites for "redundant upstream links" supports that these links are formed by different network interfaces, not different channels within the same frequency band.

Although examples refer to determining the personality of the non-CAP hybrid device based on the WLAN connection quality to the CAP, the PLC connection quality to the CAP, the 2.4 GHz (and/or the 5 GHz) WLAN coverage, embodiments are not so limited. In other embodiments, in addition to the aforementioned inputs, the operations for determining the personality of the non-CAP hybrid device can also take into consideration whether the non-CAP hybrid device is connected to an end-device. For example, if the non-CAP hybrid

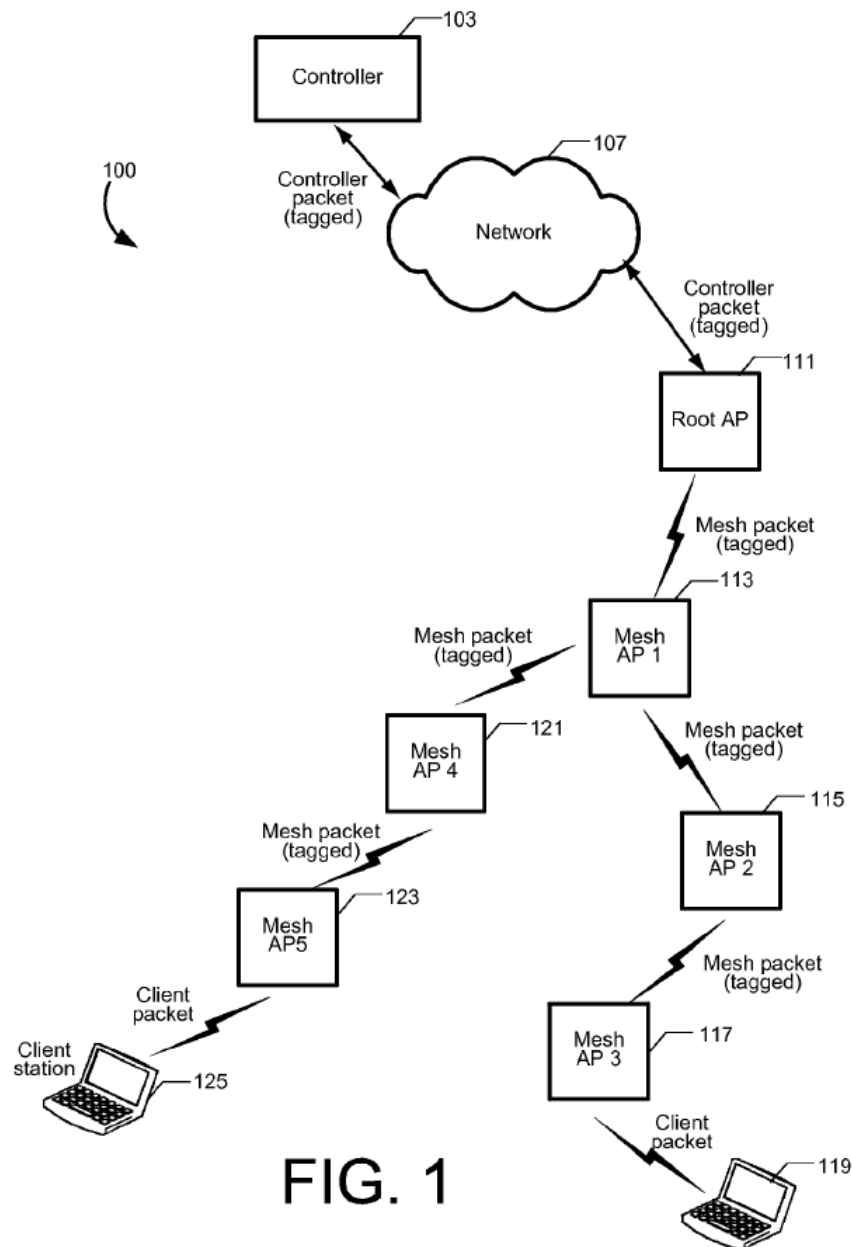
device is connected to an end-device (e.g. an Ethernet device) that will consume data generated by (or relayed by) the non-CAP hybrid device, the non-CAP hybrid device may choose to establish redundant upstream links over improving WLAN coverage.

Ho, 20:66-21:12. Thus, in this passage Ho discloses that the non-CAP personality can be based on information besides “WLAN connection quality to the CAP” or WLAN coverage at 2.4 GHz or 5 GHz. Specifically, the non-CAP device “can also take into consideration whether [it] is connected to an end-device” for example via Ethernet. In such a case, the non-CAP device may choose to “establish redundant upstream links over improving WLAN coverage” which a POSITA would have understood to mean that the non-CAP may choose to turn off its WLAN access point in this scenario instead of “improving WLAN coverage.” This does not teach or suggest forming multiple WLAN connections to the CAP over different channels in a frequency band.

44. Petitioner also cites Sinha and Handforth as supporting its assertion that “[e]stablishing multiple redundant parallel backhaul links (over different frequency channels) between two nodes of a mesh network was in fact well-known and described in many other prior art references, and thus within the knowledge of a person of ordinary skill.” Petition, 31 (citing Sinha, ¶ 103 and Handforth, 4:54-63). I note that Petitioner does not assert that a POSITA would have modified Gatewood based on Sinha or Handforth, and in my opinion a

POSITA would have not made any such a modification based on Sinha or Handforth.

45. Sinha discloses redundant paths between nodes over multiple hops. See Sinha, ¶ 103 (“Several **routes** may be calculated between two end points....”) (emphasis added). This cited passage does not teach or suggest multiple direct backhaul links between two nodes on different frequency channels (which Petitioner asserts to be taught by Gatewood). For example, Figure 1 of Sinha, reproduced below, shows multi-hop paths from various mesh APs to a Root AP.



Sinha, Figure 1

46. Gatewood, however, does not need multiple hops as I explained above, and does not need additional redundancy. Notably, a POSITA would have understood that Gatewood already provides redundancy through the deployment of multiple wireless nodes 331-334, each having a separate link to the WLAN

access node 330 that serves client devices. *See* Gatewood, Figure 3. Additional redundancy is not needed when a single link fails, because WLAN access node 330 can choose a link to a different wireless node for backhaul, as Gatewood explicitly teaches. *See* Gatewood, 4:59-61 (“WLAN access node 330 selects (403) a second wireless backhaul link as a backup for first wireless backhaul link 341 based on signal strength and uptime information.”).

D. Petitioner’s combination of Gatewood and Ho does not disclose or render obvious a “backhaul . . . to provide communication of management functions between the nodes in the network” as recited in [1.1]/[12.1].

47. Petitioner asserts that “[a]s would be understood and found obvious by a POSITA, a backhaul communication provides MAP-to-MAP communication and is not a front-haul client-facing communication that provides wireless data communication to clients in the network.” Petition, 21-22.

Petitioner further states that “[a] backhaul also carries control and management information that communicate management functions such as MAP coordination functions, which Gatewood refers to as ‘overhead communications,’ between the nodes in the network.” Petition, 22 (citing Gatewood, 7:31-40). In other words, Petitioner asserts that every backhaul necessarily meets the claim element. I disagree. For one, Petitioner’s interpretation of “backhaul” would render the rest of the claim element superfluous—i.e., if every backhaul is “to provide communication of management functions between the nodes in the network, as

opposed to a front haul that provides wireless data communication to clients in the network,” then the inventors would have just claimed a “backhaul” without this extra language.

48. Second, Gatewood does not describe its backhaul links as being “to provide communication of management functions between the nodes in the network” Nor does Gatewood disclose backhaul that “carries control and management information that communicate management functions such as MAP coordination functions.” Petition, 22. Gatewood describes that “backhaul link[s] can be employed to transport the communications of the wireless local area network to other networks, such as the Internet or other local area networks and wide area networks.” Gatewood, 1:29-33.

49. Petitioner also asserts that “as would be well-known in the art and described in the IEEE 802.11s mesh networking standards, many management messages (frames) are exchanged between access points (APs) of a wireless mesh network over the backhaul to convey management function information, such as Root Announcement, Path Request/Reply, Mesh Link Metric Report, Probe Request/Response frames, etc.” Petition, 22 (citing Ex. 1016, 30-38). But neither Gatewood nor Ho disclose the use of IEEE 802.11s and Petitioner does not provide any motivation to apply any teachings of IEEE 802.11s to modify Gatewood and Ho.

- E. Petitioner's combination of Gatewood and Ho does not disclose or render obvious "an attempt to utilize a different channel in the default frequency band and/or a channel in a different frequency band that has a lower frequency range than the default frequency band" as recited in [1.2]/[12.2].**

50. The Petition assumes that the different links in Gatewood are on different channels in the default frequency band. Petition, 28 ("Gatewood teaches that the second wireless backhaul link is established using a different channel of the default 5 GHz band, Gatewood satisfies"). I disagree. Gatewood does not disclose that the different links constitute different channels in the same band—either in Gatewood embodiment where the links go to different nodes, or in Petitioner's added embodiment where multiple links connect the same two nodes together. Gatewood does not disclose using different channels for different links, and Petitioner makes no attempt to cite to Gatewood for such disclosure. See Petition, 28-29.

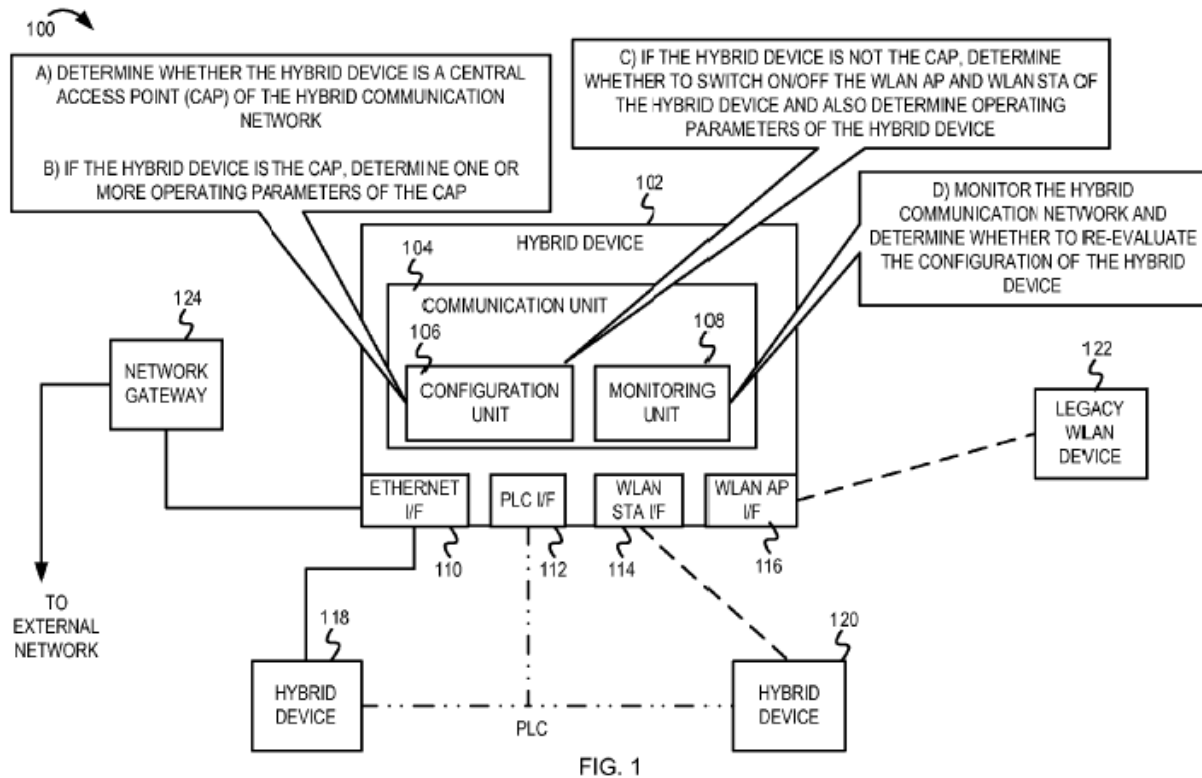
VII. A POSITA would not have found claims 1 and 12 obvious based on Ground II.

- A. Petitioner's application of Ho in Ground II does not disclose or suggest a "backhaul . . . to provide communication of management functions between the nodes in the network" as recited in [1.1]/[12.1].**

51. Petitioner relies on a link in Figure 1 of Ho between the WLAN STA module of hybrid device 102 and the WLAN AP module (not shown) of hybrid device 120 as the "backhaul . . . to provide communications of

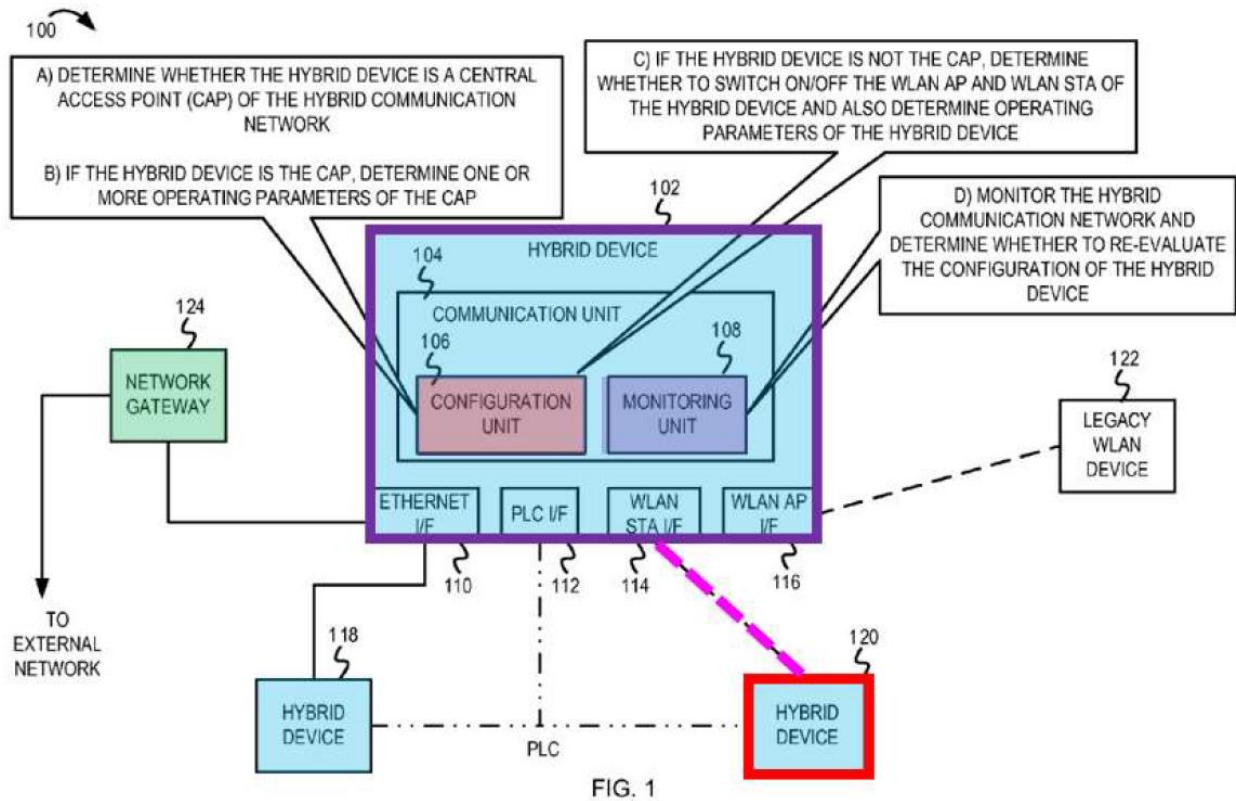
management functions between the nodes in the network” in claim element

[1.1]/[12.1]. Figure 1 of Ho is reproduced below.



Ho, Figure 1

52. Petitioner annotates Ho’s Figure 1 with various colors. For example, as shown below, Petitioner annotates the WLAN link between hybrid device 102 and hybrid device 120 with a magenta line. Petition, 49.



Petitioner's annotation of Ho, Figure 1 (Petition, 49)

53. However, the link represented by Petitioner's magenta line in Figure 1 is not a backhaul link. For example, hybrid device 120 is not shown as serving any other clients that would require a backhaul to, e.g., the external network that the gateway 124 connects to. Hybrid device can itself be a client device (e.g., a laptop computer, a gaming console, a mobile phone). Ho, 4:9-14. Thus there is no client data for the device 120 to forward on this link aside from its use as a front-haul link for the hybrid device's 120 own client data.

54. I also note that Petitioner assumes that hybrid device 102 is a CAP, and hybrid device 120 is a non-CAP device, but Ho does not describe them as

such. It is true that hybrid device 102 is illustrated as connected to network gateway 124 via an Ethernet interface. Based on that connection, the hybrid device 102 might configure itself as a CAP. However, once hybrid device 102 configures itself as a CAP it would disable its WLAN STA interface, as taught by Ho, because it will not need to connect to another AP for backhaul. Ho, 11:13-19. In that case, the magenta link in Petitioner's annotation of Figure 1 would no longer exist.

55. Petitioner also assumes that any WLAN link between a non-CAP device and a CAP constitutes backhaul. Petition, 49. I disagree. I note that Petitioner has ignored the various second-level personalities of a non-CAP that dictate whether the WLAN STA or WLAN AP modules are even enabled. Ho, 8:9-23. Further, Petitioner does not show that a "default frequency band" used for a non-CAP-to-CAP WLAN connection is not also used for "front haul" as recited in claim element [1.1]/[12.1]. For example, unlike the '698 patent (*see, e.g., '698 patent, 3:45-4:7 and Figure 2*), Ho does not teach any dedicated frequency band for backhaul; and therefore a POSITA would have understood that the same operating frequency band of the CAP is available for client and non-CAP connections via their respective WLAN STA modules. *See Ho, 6:45-49 ("[I]t may be assumed that all the WLAN client stations on the TCA-capable hybrid devices . . . are connected to a CAP or a non-CAP access point.")*: 5:56-57

(“WLAN STA module (e.g., a WLAN module configured as a client station)”);
6:49-57 (the WLAN STA module of a non-CAP device can connect to the
WLAN AP module of a CAP or a WLAN AP module of a non-CAP).

VIII. Dependent claims in Grounds I, II, and III

56. In Ground I, the Petition challenges dependent claims 2-5 and 13-17 as obvious in view of Gatewood alone or in combination with Ho. Petition, 2, 13. These claims depend on either claim 1 or claim 12 and are therefore not obvious for the same reasons that claims 1 and 12 are not obvious.

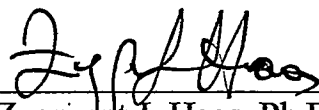
57. In Ground II, Petitioner challenges dependent claims 2-11 and 13-22 as obvious in view of Ho. Petition, 2. These claims depend on either claim 1 or claim 12 and are therefore not obvious for the same reasons that claims 1 and 12 are not obvious.

58. Finally, in Ground III, the Petition challenges dependent claims 9 and 20. Petition, 2. These dependent claims depend on either claim 1 or claim 12 and are therefore not obvious for the same reasons that claims 1 and 12 are not obvious.

IX. CONCLUSION

All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. Further, I am aware that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001. I declare under penalty of perjury that the foregoing is true and correct.

Executed on Jan 3, 2024 (date), in Richardson, TX (city, state).



Zygmunt J. Haas, Ph.D.