UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ericsson Inc.
(“Ericsson”),

Petitioner,

v.

UNILOC 2017 LLC (“Uniloc”),

Patent Owner

U.S. Patent No. 7,016,676

PETITION FOR *INTER PARTES* REVIEW UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104

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August 29, 2019

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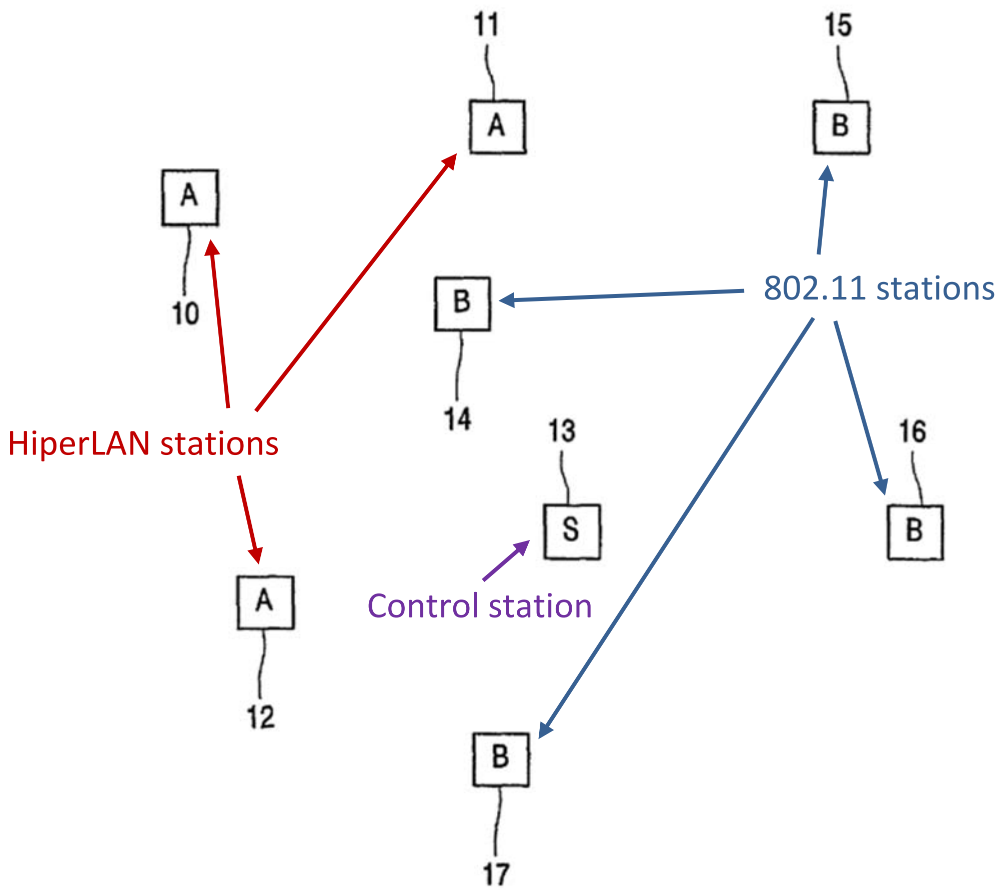
Note that the following analysis will cite to the page numbers of the exhibits themselves, as opposed to the page numbers provided within the exhibit (since not all exhibits have such original page numbers). Also, the following analysis may bold, underline and/or italicize quotations and add color or annotations to the figures from these exhibits for the sake of emphasis, unless otherwise indicated.

I. INTRODUCTION

The challenged claims of the U.S. Patent No. 7,016,676 ("the '676 Patent," Ex. 1001) are directed to a method of controlling wireless devices of different "radio interface standards" sharing the same frequency band. An example of a "radio interface standard" in the '676 Patent is known as the 802.11 communication standard. A "standard" is a formal specification that provides for interoperability between devices from different manufacturers. Ex. 1003, ¶ 176.

Annotated Fig. 3 of the '676 patent, reproduced below, illustrates a control station "S" coordinating the use of a shared frequency band by stations "A" utilizing the HiperLAN communication standard and stations "B" utilizing the 802.11 communication standard.



Ex. 1001, Fig. 3 (annotated in color); Ex. 1003, ¶ 45

However, it was well known for a control station to control the alternate use of a common frequency band by devices using two different communication standards, along with the other properties of claims 1, 2 and 8. For example, Shellhammer (Ex. 1006) discloses an access point that controls alternate use of a shared frequency band by a device that complies with the 802.11 communications standard and by a device that complies with the Bluetooth communication standard. Annotated Fig. 1 of Shellhammer is reproduced below.

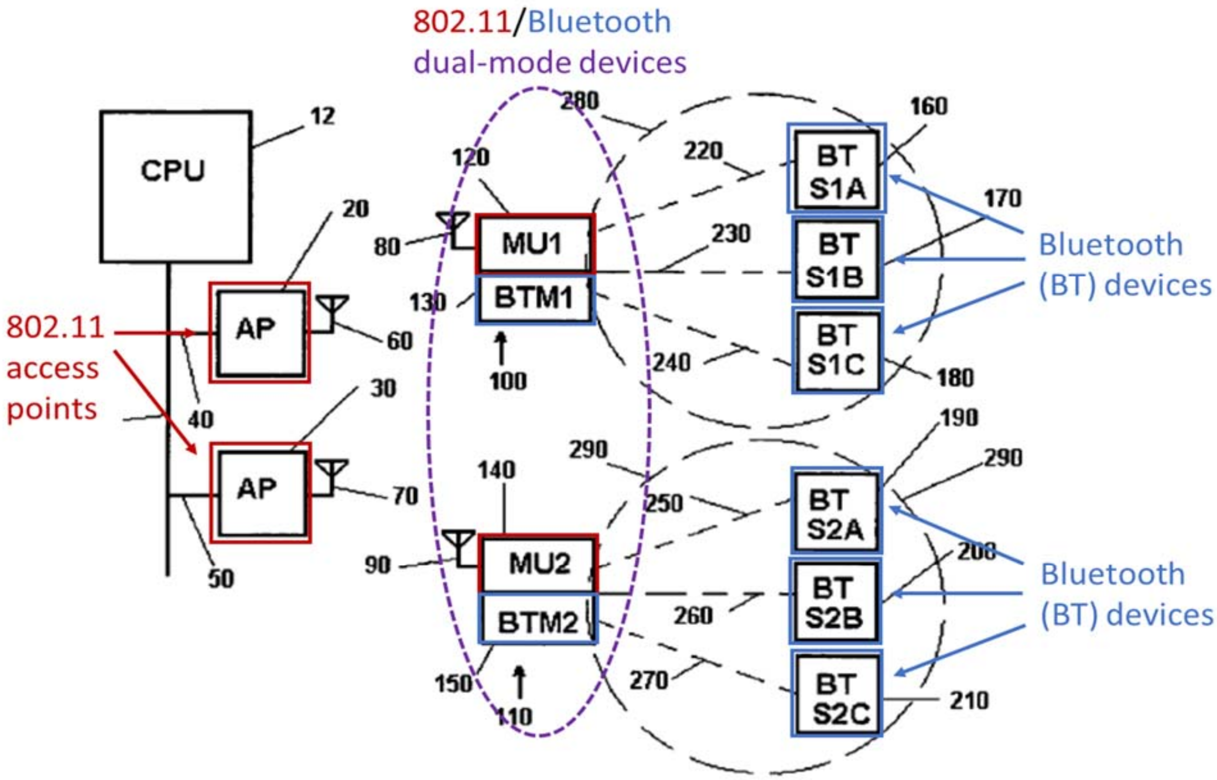


FIG. 1

Ex. 1006, Fig. 1 (annotations in color); Ex. 1003, ¶ 55

In Shellhammer's system, an access point controls the alternate use of the frequency band by directing: 802.11 devices to communicate during a first time period, Bluetooth devices to communicate during the next time period, and 802.11 devices to communicate during a final time period. Thus, Shellhammer discloses protocol methods like those of the '676 patent.

As another example, Lansford (Ex. 1005) discloses a controller that controls the alternate use of a shared frequency band by a device utilizing the HomeRF standard and a device utilizing the Bluetooth standard.

Given this knowledge of controllers controlling the use of shared spectrum to accommodate at least two different radio communication standards, at least claims 1, 2, and 8 of the ’676 patent would have been obvious to a person of skill in the art. Accordingly, Petitioner requests that the Board review and cancel as unpatentable claims 1, 2, and 8.

II. MANDATORY NOTICES

A. Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Ericsson Inc. (“Ericsson” or “Petitioner”) and corporate parent Telefonaktiebolaget LM Ericsson are each a real party-in-interest.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the ’676 Patent is involved in the following cases involving Petitioner as an intervenor:

- *Uniloc 2017 LLC et al. v. AT&T, Inc. et al.*, Case No. 2:18-cv-00379, Eastern District of Texas
- *Uniloc 2017 LLC et al. v. Verizon Communications Inc. et al.*, Case No. 2:18-cv-00380, Eastern District of Texas

Further, to the best knowledge of the Petitioner, the ’676 Patent is involved in the following additional cases not involving Petitioner:

- *Uniloc 2017 LLC v. Microsoft Corporation*, Case No. 8:18-cv-02053, Central District of California
- *Uniloc 2017 LLC et al. v. Google LLC*, Case No. 2:18-cv-00495, Eastern District of Texas
- *Uniloc 2017 LLC v. Verizon Communications Inc. et al.*, Case No. 2:18-cv-00513, Eastern District of Texas
- *Uniloc 2017 LLC v. AT&T Services, Inc. et al.*, Case No. 2:18-cv-00514, Eastern District of Texas
- *Uniloc 2017 LLC et al. v. Google LLC*, Case No. 2:18-cv-00448, Eastern District of Texas
- *Uniloc 2017 LLC et al. v. Microsoft Corporation*, Case No. 2:18-cv-01279, Eastern District of Texas
- *Microsoft Corporation et al. v. Uniloc 2017 LLC*, IPR2019-01116
- *Microsoft Corporation et al. v. Uniloc 2017 LLC*, IPR2019-01125
- *Marvell Semiconductor, Inc. v. Uniloc 2017 LLC*, IPR2019-01349
- *Marvell Semiconductor, Inc. v. Uniloc 2017 LLC*, IPR2019-01350

The '676 Patent is at issue in the four above-noted *inter partes* reviews: IPR2019-01116, IPR2019-01125, IPR2019-01349, and IPR2019-01350. The Board has not issued Institution Decisions, and no patent owner preliminary responses have been filed, in these IPRs.

Pursuant to 37 C.F.R. § 42.8(b)(3), Petitioner identifies the following counsel. A power of attorney accompanies this Petition.

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Please address all correspondence to lead and back-up counsel. Petitioner consents to electronic service.

III. GROUNDS FOR STANDING

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the ’676 Patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the Challenges identified herein.

IV. THE ’676 PATENT AND PROSECUTION HISTORY

A. Summary of the ’676 Patent

The ’676 Patent “relates to a method of alternate control of radio systems of different standards in the same frequency band.” Ex. 1001, 1:5-7.

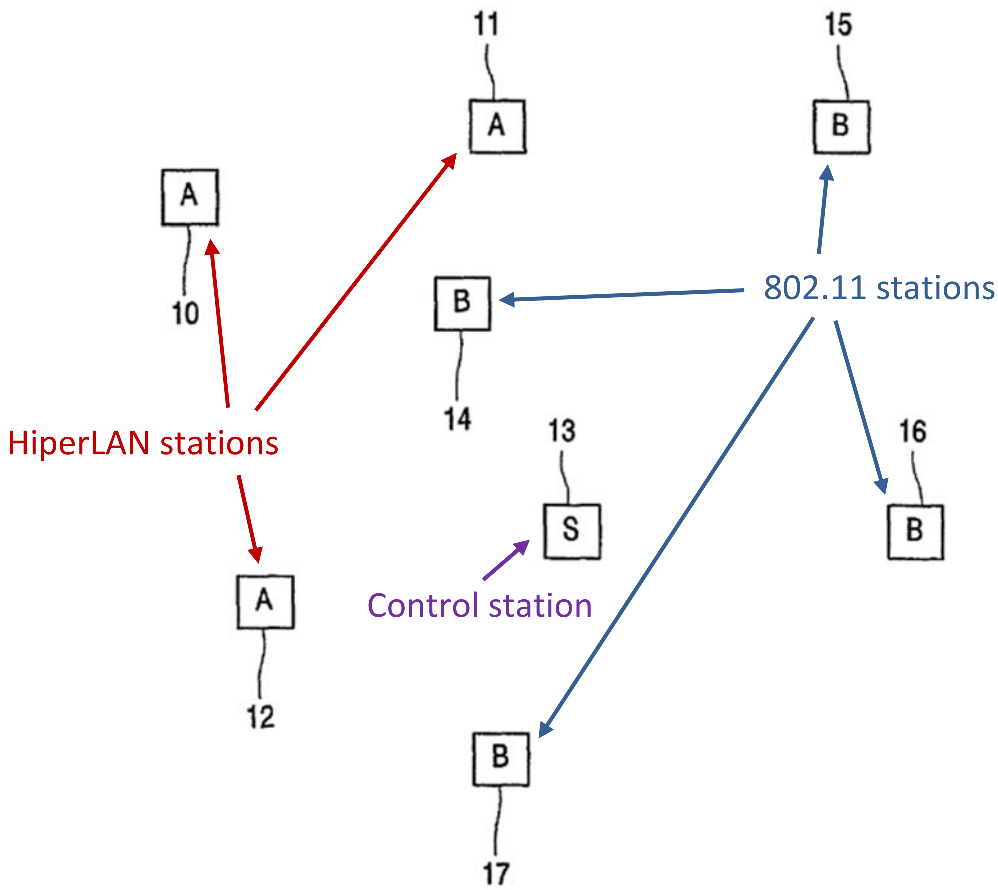
According to the ’676 Patent, “[w]ideband LANs in accordance with the HiperLAN/2 and 802.11a standards will operate in the same frequency band in the future” but schedule transmissions differently. Ex. 1001, 1:65-67, 1:34-47; Ex. 1003, ¶¶ 41-42. The ’676 Patent proposes a system where devices using first and second radio standards both use the same frequency band, and “a control station is provided that controls the two-way alternate utilization of the frequency band.” Ex. 1001, Abstract; Ex. 1003, ¶ 43.

The ’676 Patent provides the following example of operation:

> [I]t is possible to provide certain predefinable time intervals for the use of the first and second radio interface standard and allocate the frequency band alternately to the first radio interface standard and then to the second radio interface standard in a kind of time-division multiplex mode.

Ex. 1001, 2:52-57.

In annotated Fig. 3 shown below, the ’676 Patent illustrates devices operating in accordance with different standards—where devices labeled “A” (10, 12, 14) use a first standard such as HiperLAN, devices “B” (14, 15, 16) use another standard such as 802.11, and the control station "S" (13) controls the alternate use of the frequency band.



Ex. 1001, Fig. 3 (annotations in color); Ex. 1003, ¶ 45

Representative claim 1 of the '676 Patent is reproduced below:

> **1**. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:
> stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and
> a control station which controls the alternate use of the frequency band,
> wherein the control station controls the access to the common frequency band for stations working in accordance with the first radio interface standard and—renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.

Ex. 1001, Claim 1

Notably, as demonstrated below, there is nothing novel about at least claims 1-2 and 8 of the ’676 Patent because all of the elements were taught in the prior art and it would have been obvious to combine the relevant teachings. Ex. 1003, ¶¶ 46-47.

B. Prosecution and Priority Date of the ’676 Patent

The ’676 Patent issued on March 21, 2006, from a PCT application filed on August 8, 2001 that lists a German foreign priority application filed August 8, 2000. However, the foreign priority was never perfected in the ’676 Patent file history. Specifically, the Notice of Allowance indicates the following:

3. ☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☑ None of the:
1. ☑ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Ex. 1002, p. 282. Accordingly, the priority date for the '676 Patent is the filing date of the PCT application, which is August 8, 2001.

None of the prior art used for the invalidity grounds herein was considered during prosecution of the '676 Patent.

V. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art may be reflected by the prior art of record. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). However, to the extent a definition is needed, a Person of Ordinary Skill In The Art ("POSITA") at the time of the filing would have had a bachelor's degree in electrical engineering, computer engineering, computer science or similar field, and three years of experience in wireless communications systems and networks, or equivalent. Furthermore, a person with more technical education but less experience could also meet the relevant standard for POSITAs. Petitioner's technical expert, Jeffrey Fischer, whose declaration this Petition cites, was at least a POSITA at the time of filing. Ex. 1003, ¶¶ 21-25.

VI. CLAIM CONSTRUCTION

During IPR, claims are construed according to the standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). *See* 83 Fed. Reg. 51341 (Oct. 11, 2018). Petitioner believes that, for the purposes of this proceeding and the analysis presented herein, no claim term requires express construction. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). Accordingly, this Petition analyzes the claims consistent with ordinary and customary meaning as would be understood by a POSITA in light of the specification. *Phillips*, 415 F.3d at 1314-17; Ex. 1003, ¶¶ 37-40.

VII. REQUESTED RELIEF

Petitioner asks that the Board review the accompanying prior art and analysis, institute a trial for *inter partes* review of claims 1, 2 and 8 and cancel those claims as unpatentable.

VIII. IDENTIFICATION OF CHALLENGE

A. Challenged Claims and Statutory Grounds

This Petition challenges claims 1, 2 and 8 of the '676 Patent on the following grounds.

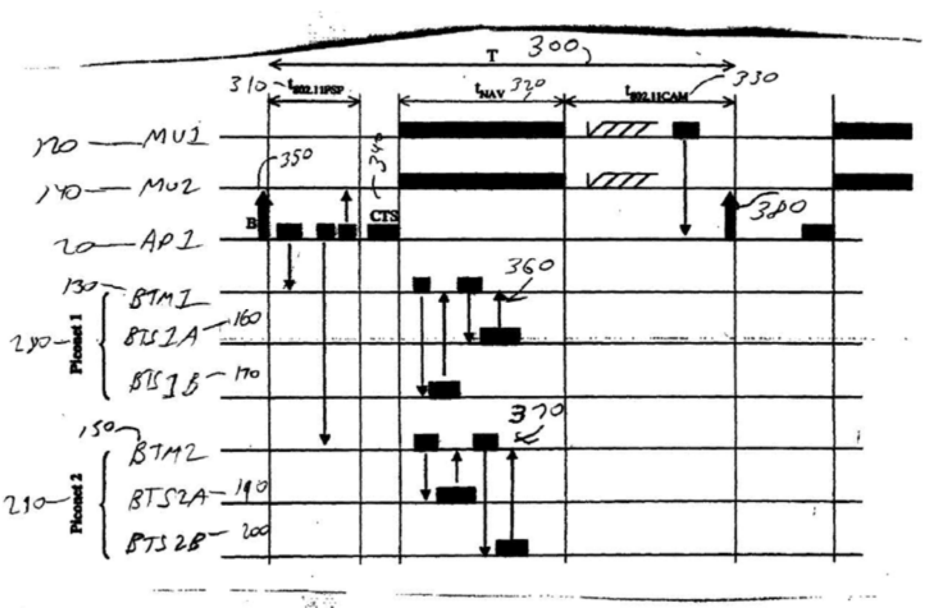
Ground	**Claim(s)**	**Basis**
Ground 1	1-2	35 U.S.C. § 103 over U.S. Patent No. 7,039,358, Ex. 1006 ("Shellhammer")
Ground 2	8	35 U.S.C. § 103 over Shellhammer in combination with U.S. Patent No. 7,280,580, Ex. 1008 ("Haartsen")
Ground 3	8	35 U.S.C. § 103 over Shellhammer in combination with U.S. Patent No. 6,643,278, Ex. 1009 ("Panasik")
Ground 4	1-2	35 U.S.C. § 103 over U.S. Patent No. 6,937,158, Ex. 1005 ("Lansford")

B. Status as Prior Art

As explained in Section IV.B, the priority date for the '676 Patent is August 8, 2001. Even assuming Patent Owner can demonstrate priority to August 8, 2000, Shellhammer filed Nov. 16, 2000 is still prior art under at least U.S.C. § 102(e). Shellhammer claims the benefit of U.S. Provisional Application 60/196,979 ("Shellhammer Provisional"), filed on April 13, 2000. Because at least one claim of Shellhammer is supported by disclosure in the Shellhammer Provisional, teachings common to Shellhammer and the Shellhammer Provisional are available as prior art as of Shellhammer Provisional's filing date. *Benitec Biopharma Ltd. v. Cold Spring Harbor Lab.*, IPR2016-00014, Paper 7 at 7 (PTAB Mar. 23, 2016) (noting that a provisional must provide "written descriptive support for at least one claim" of the prior art patent) (citing *Dynamic Drinkware*, 800 F.3d at 1381).

For example, Shellhammer claim elements [1.0], [1.1], [1.2] are found nearly verbatim in the Shellhammer Provisional. Ex. 1007, pp. 3-8, 10, 14, Fig. 1, Fig. 2; Ex. 1003, Appendix A (mapping claim 1 to disclosure of Shellhammer Provisional). The remaining claim elements [1.3] and [1.4] are also disclosed as demonstrated below and explained more fully in Dr. Fischer's declaration. Ex. 1003 ____

[1.3] wherein a first communication utilizing the first communication protocol and a second communication utilizing the second communication protocol are carried out at the same time, and:	" [B]oth Bluetooth and 802.11 enabled devices, may operate robustly in the same frequency band at the same time." Shellhammer Provisional, p. 6. "Since the two devices operate in the same 2.4 GHz ISM frequency band the BTM 130, 150 and the MU 120, 140 may severely interfere with one another, especially if they are housed in a dual mode device 100, 110. Therefore, there is a need for coordination between the two devices. One such coordination scheme is primarily based on time multiplexing of the 802.11 and BT radios, which is especially suitable for a controlled environment…." Shellhammer Provisional, p. 8.
[1.4] further wherein the second radio transceiver only transmits while the first radio transceiver is not transmitting and the first radio transceiver only transmits while the second radio transceiver is not transmitting.	"Once all the PSP MU's 120, 140 receive their packets, the AP 20, will send a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period. At this point the 802.11 MUs 120, 140 will enable the BTMs … After completion of the NAV period 320 the BTMs 130, 150 radio are disabled and all BT communications is ceased." Shellhammer Provisional, p. 10. "One such coordination scheme is primarily based on time multiplexing of the 802.11 and BT radios … In this embodiment, the Bluetooth systems are enabled or disabled according to a global/central signal from the 802.11 AP as described herein." Shellhammer Provisional, p. 8.

	 Shellhammer Provisional, Fig. 2.

Further, Appendix B of Mr. Fischer's declaration maps the portions of Shellhammer that are cited to show invalidity to the supporting disclosure in the Shellhammer Provisional. Ex. 1003, Appendix B. The following table identifies where the relevant Shellhammer disclosure can be found in the Shellhammer Provisional. *Id*.

Shellhammer (Ex. 1006)	**Shellhammer Provisional pages (Ex. 1007)**
1:21-31	3
1:34-41	3-4
1:46-48	4
1:61-64	4
1:67-2:2	4
2:20-24	5
2:59-62	6
5:67-6:11-18	7-8
6:29-41	8
8:52-9:23	9-10

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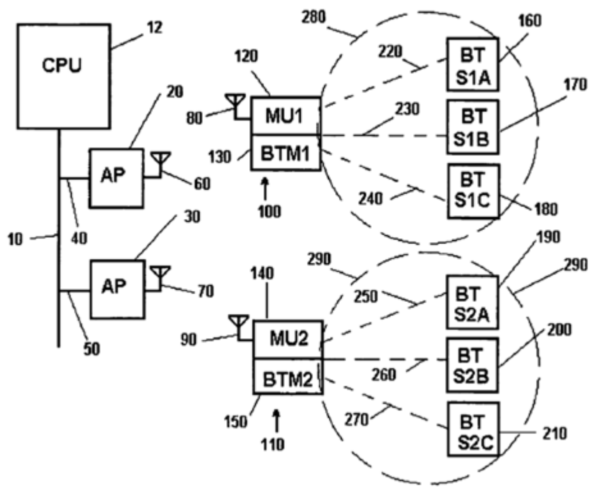
<tr><td>

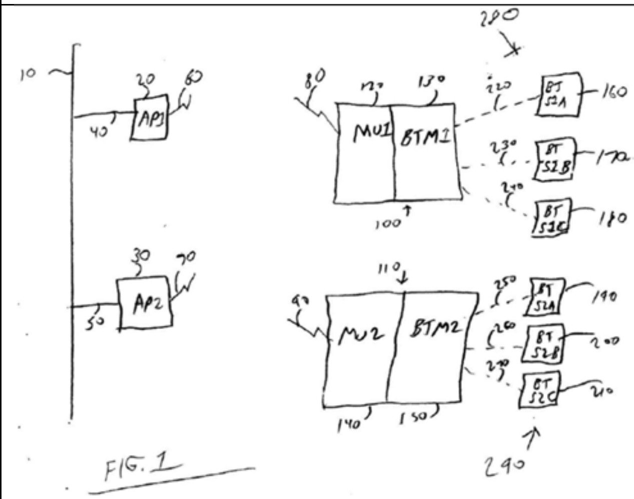
Fig. 1</td><td>

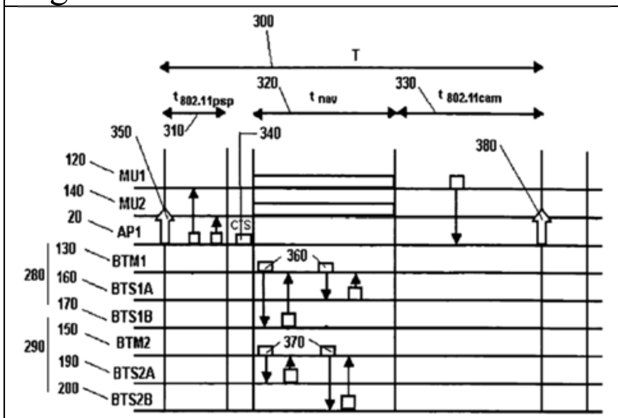
Fig. 1</td></tr>
<tr><td>

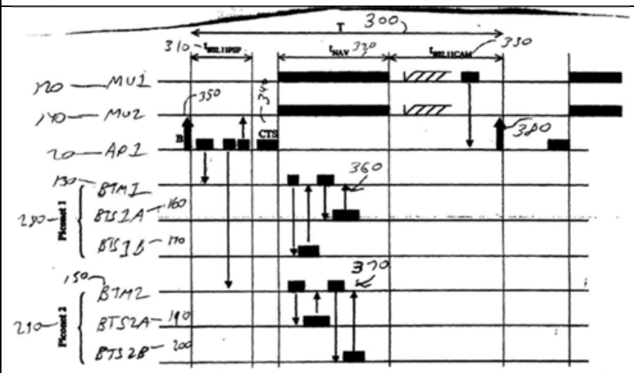
Fig. 3</td><td>

Fig. 2</td></tr>
</table>

Accordingly, Shellhammer pre-dates even the earliest possible alleged priority date of the ’676 Patent and is prior art under at least 35 U.S.C. § 102(e). Ex. 1003, ¶¶ 50-52.

Lansford filed December 29, 1999, Haartsen filed October 15, 1999, and Panasik filed December 28, 1999 are all U.S. patents with filing dates before the ’676 Patent, making them prior art under at least 35 U.S.C. § 102(e).

IX. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1-2 are unpatentable as obvious over Shellhammer

1. Summary of Shellhammer

Shellhammer (U.S. Pat. No. 7,039,358; Ex. 1006) is directed to a wireless radio network in which both 802.11 devices and Bluetooth devices share "the same frequency band at the same time." Ex. 1006, 2:59-62.

Shellhammer teaches an example system that includes the following devices: (1) devices only capable of Bluetooth communications, (2) dual-mode devices capable of both 802.11 and Bluetooth communications, and (3) an 802.11 access point (AP), which coordinates the devices' access to a shared frequency band. Ex. 1006, 5:67-6:11, 6:16-18, 6:29-41[1]; Ex. 1003, ¶¶ 53-54.

Shellhammer explains that for the AP to coordinate access to the shared frequency band, the system uses a "coordination scheme [that] is primarily based on time multiplexing of the 802.11 and BT radios." Ex. 1006, 6:35-36. The time-multiplexing coordination scheme includes having the time period "divided into three time intervals": the first interval includes only 802.11 communications; the second interval includes only Bluetooth communications (called a NAV period);

[1] The system may include other device, *i.e.*, 802.11 only mobile devices, which are "not shown" in Fig. 1. Ex. 1006, 9:10-10.

and the third interval includes only 802.11 communications *Id.*, 8:52-9:23; Ex. 1003, ¶¶ 55-58.

2. Claim 1

a) [1.0] *An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:*

First, Shellhammer explains that its object is to allow both Bluetooth and 802.11 enabled devices to share the "same frequency band," thereby disclosing a radio system with devices using different radio interface standards and "*at least one common frequency band*," as claimed:

> It is therefore an object of this invention to utilize coordination techniques to ensure that, for example, both Bluetooth and 802.11 enabled devices, may operate robustly **<u>in the same frequency band</u>** at the same time.

Ex. 1006, 2:59-62; Ex. 1003, ¶ 59.

Second, Bluetooth and 802.11 are each a radio interface standard. Bluetooth devices operate according to a radio interface standard, for example Bluetooth specification, version 1.1, in the 2.4 GHz ISM frequency band. Ex. 1006, 1:61-67 ("Another example of a **wireless specification** that also uses the **2.4 GHz ISM frequency band is Bluetooth™**."). Likewise, IEEE 802.11 devices operate according to a radio interface standard, for example the "IEEE 802.11 Standard," which also uses the "2.4 GHz ISM frequency band." *Id.*, 1:21-31. Thus, both

802.11 and Bluetooth are "*radio interface standards*," as claimed. The labels "*first*" and "*second*" are arbitrary labels and can be applied to either standard for the purposes of analyzing [1.0]. Ex. 1003, ¶¶ 60-62.

Shellhammer discloses the alternate use of the same frequency band. For example, Shellhammer discloses an interface-control protocol for "time multiplexing of the 802.11 and BT [Bluetooth] radios" operating "in the same 2.4 GHz ISM frequency band." Ex. 1006, 6:29-41. Shellhammer discloses a specific embodiment of "time multiplexing 802.11 and BT radios." For example, Shellhammer discloses that the radio system first conducts communication in accordance with 802.11 using power-saving mode, then communication in accordance with Bluetooth during a NAV period, followed by communication in accordance with 802.11 using active mode:

> Referring now to the schematic of FIG. 3 in conjunction with the physical layout shown in FIG. 1. There is shown another technique to coordinate transmissions. Every 802.11 beacon time period, T 300, may be divided into three time intervals: **802.11 communications** in the power saving (PSP) mode—$t_{802.11PSP}$ 310, **Bluetooth communications**—t_{NAV} 320, and **802.11 communications** in the active mode CAM—$t_{802.11CAM}$ 330.

Ex. 1006, 8:52-9:13; Ex. 1003, ¶¶ 63-65.

Accordingly, Shellhammer's disclosure of an interface-control protocol method for alternating (time multiplexing) between 802.11 and Bluetooth devices in the same 2.4 GHz frequency band discloses [1.0]. Ex. 1003, ¶ 66.

b) [1.1] *stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and*

Shellhammer discloses a "coordination scheme [] primarily based on time multiplexing of the 802.11 and BT [Bluetooth] radios." Ex. 1006, 6:29-41. For example, in Fig. 1 and its associated discussion, Shellhammer discloses access points (APs) (20, 30) that utilize the 802.11 radio interface standard, mobile units (120, 140) that utilize both the 802.11 and Bluetooth radio interface standards, and Bluetooth devices (160, 170, 180, 190, 200, 210) that use only the Bluetooth radio interface standard. Ex. 1006, 6:3-15. Annotated Fig. 1 of Shellhammer is shown below. Ex. 1003, ¶¶ 67-68.

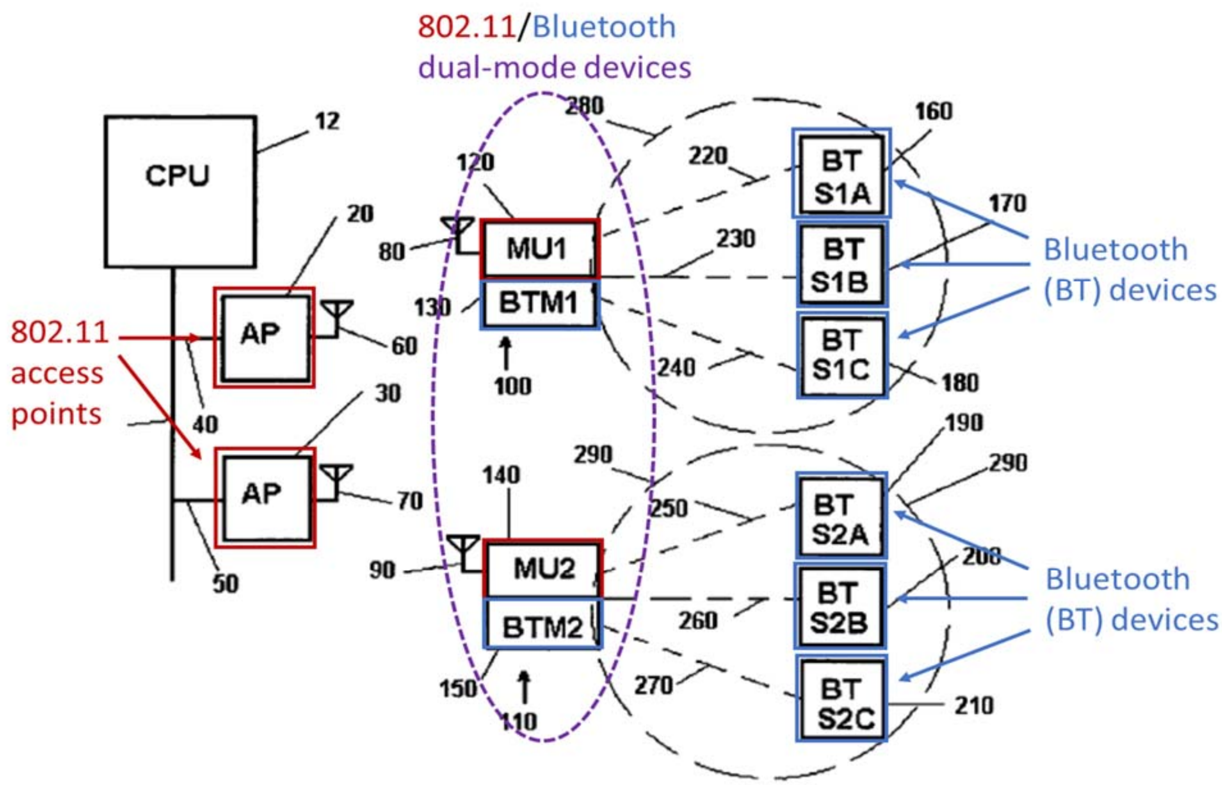


FIG. 1

Ex. 1006, Fig. 1 (annotations in color); Ex. 1003, ¶ 68

Thus, Shellhammer teaches stations (APs) that communicate using 802.11 protocols, stations that communicate using both 802.11 and Bluetooth protocols, and stations that communicate using Bluetooth protocols, which discloses [1.1]. Bluetooth and 802.11 are each "*radio interface standards*," as claimed, and "*first*" and "*second*" are arbitrary labels that could be applied to either standard. Ex. 1003, ¶ 69.

c) [1.2] *a control station which controls the alternate use of the frequency band,*

d) [1.3] *wherein the control station controls the access to the common frequency band for stations working in accordance with the first radio interface standard and—*

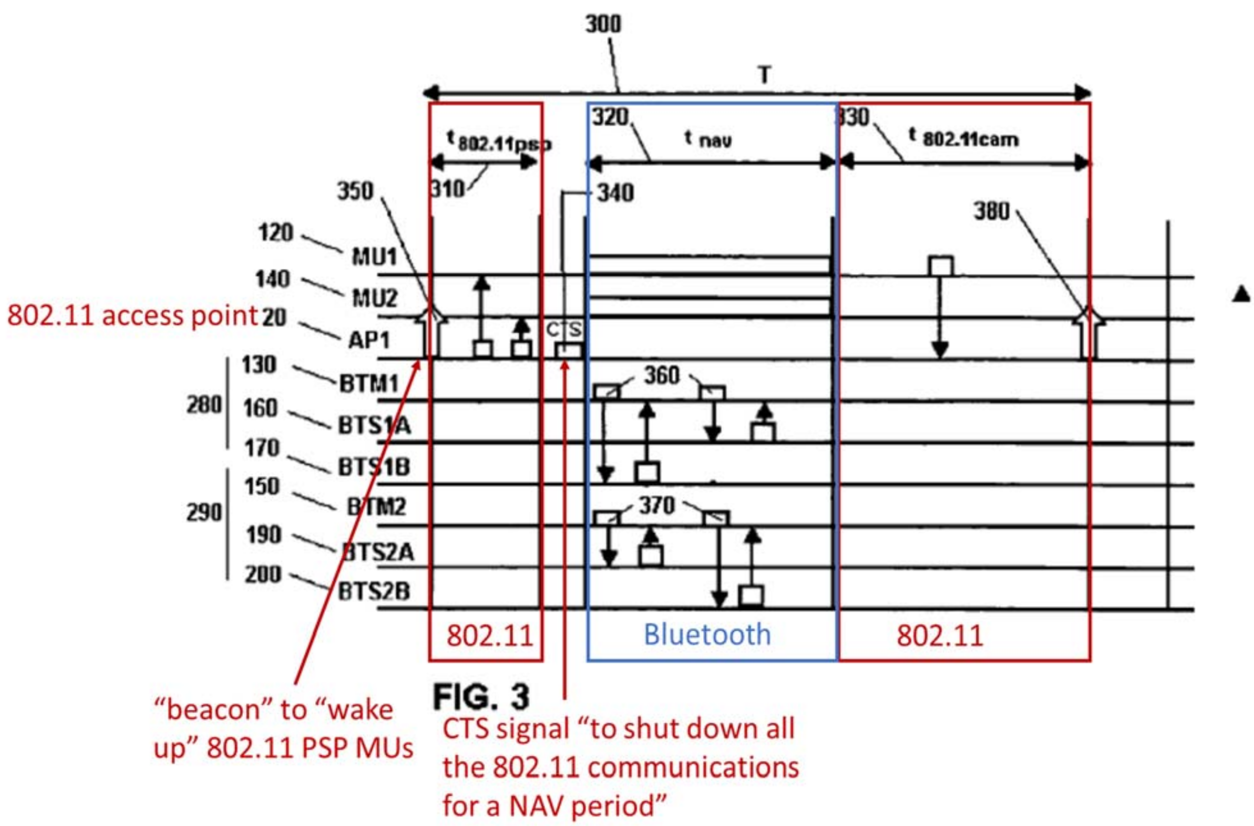
Shellhammer discloses an embodiment, illustrated in Fig. 3, that includes an 802.11 access point (AP 20 in Fig. 3) as an example of a "*control station*." Ex. 1003, ¶ 70.

In Shellhammer's system, an 802.11 access point controls the alternate use of the frequency band by (1) first directing 802.11 devices to communicate during a first time period ($t_{802.11PSP}$), (2) next directing Bluetooth devices to communicate during the next time period (t_{NAV}), and (3) then directing 802.11 devices to communicate during a final time period ($t_{802.11CAM}$):

> Every 802.11 beacon time period, T 300, may be divided into three time intervals: 802.11 communications in the power saving (PSP) mode—$t_{802.11PSP}$ 310, Bluetooth communications—t_{NAV} 320, and 802.11 communications in the active mode CAM—$t_{802.11CAM}$ 330. … **[1] At the beginning of each beacon period 300, <u>AP 20</u> sends a beacon signal 350 to the 802.11 PSP MU's 120, 140 that wake up in this period** … **[2] Once all the PSP MU's 120, 140 receive their packets, the <u>AP 20</u>, may optionally send a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period**. At this point the 802.11 MUs 120, 140 will enable their associated BTMs 130, 150 … After completion of the NAV period 320 the BTM 130, 150 radios are

> disabled and all BT communications is ceased. **[3] The rest of the time (until the next beacon 380) is dedicated for 802.11 Continuously Aware Mode (CAM) MU's (not shown) that operate according to the 802.11 protocol**.

Ex. 1006, 8:54-9:13. Figure 3 is reproduced and annotated below according to these teachings. Ex. 1003, ¶ 71.



Ex. 1006, Fig. 3 (annotations in color); Ex. 1003, ¶ 72

The embodiment of Fig. 3 illustrates a single AP, "AP1," controlling the network by shutting down all 802.11 communications during the T_{NAV} period to allow Bluetooth communications.

Thus, the 802.11 AP ("*control station*") that "shut[s] down all the

802.11 communications for a NAV [] period," by the sending of a CTS signal, controls access to the 2.4 GHz band for both stations operating in accordance with 802.11 as well as stations operating in accordance with Bluetooth (either of which constituting "*stations working in accordance with the first radio interface standard*" for the purpose of analyzing [1.2] and [1.3]), thereby disclosing [1.2] and [1.3]. Ex. 1003, ¶ 72.

e) [1.4] *renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.*

For the purposes of analyzing [1.4] in the present Ground #1, 802.11 is the "*first radio interface standard*," and Bluetooth is the "*second radio interface standard*."

Shellhammer teaches dividing each beacon time period T into two or three time intervals. While the present analysis will focus on the embodiment with three-time-intervals, the analysis is substantially the same for the two-time-interval embodiments. Ex. 1003, ¶¶ 73-74.

Shellhammer teaches that the 802.11 CTS signal blocks 802.11 stations from using the channel "once" all PSP MUs have received their packets, *i.e.*, once there are no longer any pending 802.11 transmission requests. Ex. 1006, 8:65-9:8; Ex. 1003, ¶ 74. If no 802.11 stations (including the AP) request access to the frequency band during the $t_{802.11PSP}$ interval—for example, by contending for the medium—then there would be no transmissions. Shellhammer further teaches that the duration of the 802.11 PSP and NAV times intervals ($t_{802.11PSP}$ and t_{NAV}) are not fixed and instead depend on "traffic characteristics." Ex. 1006, 8:59-61 ("The duration of time intervals T, $t_{802.11PSP}$, t_{NAV}, and $t_{802.11CAM}$ depend on traffic characteristics and application needs…"). Indeed, while Shellhammer does not disclose all implementation details of 802.11, a POSITA understood that there were mechanisms within the 802.11 standard for the access point to determine when 802.11 PSP MUs were finished with their requests. Given Shellhammer's teachings, if no 802.11 PSP stations (including the AP) request access to the frequency band during the $t_{802.11PSP}$ interval by contending for the medium, then it would have been obvious to a POSITA for the AP to determine after a short amount of time, such as a multiple of distributed interframe space (DIFS) intervals[2] without activity, that no packets or transmission requests are pending. After some period of inactivity on the band, the CTS signal is sent from the AP, reserving the band, thereby rendering it available for access by Bluetooth stations. Ex. 1003, ¶ 74.

[2] It was well-known in IEEE 802.11 for a station with data to transmit to monitor the frequency band during a DIFS interval to determine whether to access the band. Ex. 1003, ¶ 74, n. 2.

Thus, Shellhammer teaches an 802.11 AP ("*control station*") that renders the frequency band available for access by Bluetooth stations ("*stations working in accordance with the second radio interface standard*") if 802.11 stations ("*stations working in accordance with the first radio interface standard*") have communicated all their packets, thereby rendering obvious [1.4]. Ex. 1003, ¶ 78.

3. Claim 2

a) [2.0] *The method as claimed in claim 1,*

Shellhammer renders obvious [2.0]. *See* analysis of claim 1 above; Ex. 1003, ¶ 79.

b) [2.1] *herein the control station determines the respective duration in which the stations working in accordance with the second radio interface standard are allowed to utilize the frequency band.*

Shellhammer teaches that an 802.11 control station (AP) determines the duration (t_{NAV}), which is the duration the stations working in accordance with the second radio interface standard (Bluetooth) are allowed to utilize the frequency band (2.4 GHz ISM band). Ex. 1003, ¶ 80.

In particular, Shellhammer divides each beacon period T into two or three intervals. *See supra*, Elements [1.2] and [1.3]; Ex. 1006, 8:52-9:13, 9:19-23, Fig. 3. In both the two- and three-interval configurations, the AP initiates the NAV interval (t_{NAV}) by "send[ing] a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period."

Ex. 1006, 9:1-3. Bluetooth stations are only allowed to utilize the frequency band during the t_{NAV} (320) interval. Ex. 1006, 9:8-13 ("After completion of the NAV period 320 the BTM 130, 150 radios are disabled and all BT communications is ceased."), 4:62-5:9, 5:5-26; Ex. 1003, ¶ 81.

Shellhammer assumes familiarity with the 802.11 standard, including that the 802.11 standard defines a variable NAV field conveyed in the CTS signal, and the CTS signal is used in Shellhammer to indicate to the 802.11 stations that the frequency band is busy. Ex. 1003, ¶ 83. Thus, a POSITA would have understood that the AP determines the length of the NAV period and includes it in the CTS broadcast. Ex. 1003, ¶¶ 82-83.

Thus, Shellhammer discloses a time period t_{NAV}, determined by an 802.11 AP ("*control station*"), where this period is the duration for which Bluetooth stations ("*stations working in accordance with the second radio interface standard*") are allowed to communicate using the 2.4 GHz frequency band, which discloses [2.1]. Ex. 1003, ¶ 84.

B. Ground 2: Claim 8 is unpatentable as obvious over the combination of Shellhammer and Haartsen

1. Summary of Haartsen

Haartsen (U.S. Pat. No. 7,280,580, Ex. 1008) is directed to "[h]op sequence adaptation in a frequency-hopping communications system," Ex. 1008, Title.

Haartsen's technique includes specifying a frequency hop sequence of the 802.11 standard. *Id.*, 11:5-17.

In more detail, Haartsen teaches that its hop-sequence adaption technique includes avoiding sources of interference that are detected on one or more frequency hopping channels[3] by marking those channels as "forbidden":

> **[I]f the hop selection mechanism visits a 'forbidden' hop, an offset may be temporarily added to the phase such that an allowed hop is instead selected**. … For example, the detection of a substantial amount of **interference on a hop channel may make it desirable to avoid use of that hop channel**, at least until the interference subsides.

Ex. 1008, 7:67-8:11; Ex. 1003, ¶¶ 86-87.

Because the frequency hopping procedure in 802.11 includes the network selecting one hopping sequence out of a set of pre-defined sequences that are stored in each device, Haartsen teaches that its technique can be applied via a "post-processing function" that makes adjustments to the selected pre-stored 802.11 frequency hopping sequence. Ex. 1008, 11:5-17; Ex. 1003, ¶¶ 88-89.

[3] **Frequency hopping** includes the procedure where data "transmitted for a certain period of time in a particular channel and, following a pseudorandom [frequency hopping] sequence, continues transmission at a different channel for the same predetermined length of time." Shellhammer, 1:36-39.

2. Reasons to Combine Shellhammer and Haartsen

A POSITA would have looked to Haartsen to improve Shellhammer because they are analogous art, as both are directed to wireless communications networks, and specifically to 802.11 network performing frequency hopping. Ex. 1003, ¶ 90.

Shellhammer provides control over devices operating under two different standards to mitigate interference between transmissions. Shellhammer expressly mentions the use of frequency hopping in 802.11 communications. Ex. 1006, 1:34-41 ("One method is to use a frequency hopping spread spectrum (FHSS) mechanism…."). Shellhammer discusses the general need to reduce interference in wireless networks such as 802.11, which is a design principle well-known to a POSITA, but does not consider the potential for interference at various hopping channels and how to avoid such a problem. Ex. 1006, 1:46-48, 2:20-24; Ex. 1013, 1:54-61. Given the stated desire to reduce interference in Shellhammer's network, a POSITA would have been motivated to modify Shellhammer's 802.11 frequency hopping procedure to include Haartsen's techniques for interference avoidance, based on Haartsen's explicit teachings, thereby beneficially improving network performance. Ex. 1003, ¶¶ 91-95.

As explained herein, a POSITA would have found it obvious to include, in Shellhammer's system, Haartsen's technique of modifying the frequency hopping sequence to avoid channels with interference. In the resulting combination, the access point (AP) would measure interference on the frequency hopping channels, and the frequency hopping sequence determined by the AP and communicated to Shellhammer's dual-mode devices (which use 802.11) would include the substitution in the hopping sequence of interfered channels with non-interfered channels. The combination would have been predictable and have an expectation of success because both Shellhammer's and Haartsen's teachings regard frequency hopping in an 802.11 network. Ex. 1006, 9:47-48; Ex. 1008, 11:5-17. Moreover, a POSITA would have been motivated to modify the pre-determined hopping sequence used by Shellhammer's system because performance can be improved by avoiding interference, and "the **throughput of the [] channel can especially be improved**." Ex. 1008, 3:20-28. Thus, the combination of Shellhammer and Haartsen yields the obvious, predicable and beneficial result of reducing interference in Shellhammer's system, thereby increasing throughput and decreasing transmission errors. Ex. 1003, ¶¶ 92, 96.

A POSITA also would have found additional motivation to make the combination based on Haartsen's teaching that its interference avoidance technique beneficially avoids having to change the allowed 802.11 hopping sequences that are pre-stored in an 802.11 device's hop sequence generator. Ex. 1008, 7:63-65. That is, Haartsen's technique beneficially allows a device to remain synchronized to the pre-defined sequence even if it misses a hop. *Id.*, 8:49-55; Ex. 1003, ¶ 97.

Haartsen further provides motivation for the combination by teaching additional benefits to its interference avoidance technique, as explained in Mr. Fischer's declaration. Ex. 1003, ¶¶ 98-101.

The teachings of others also would have motivated the combination. For instance, it was known from the writings of others in the art that, because interference can cause a packet to not be received correctly, delays due to packet re-transmissions can beneficially be avoided by interference avoidance techniques, such as by an AP selecting and communicating the hopping sequence to be used by the network. Ex. 1003, ¶¶ 102 (citing Ex. 1009, 5:8-18; Ex. 1016, 1:36-47; Ex. 1013, 1:54-61; Ex. 1017, pp. 139, 144, 164), 105.

This combination also would have been predictable and would have an expectation of success also because it was known from the writings of others in the art to detect interference on a channel and replace that channel(s) with another channel. Ex. 1003, ¶ 103 (citing Ex. 1009, 11:24-28; Ex. 1014, 56:39-44).

The combination—which includes Shellhammer's AP that detects interference—would also have an expectation of success because it was known to POSITAs to configure the AP of an 802.11 or wireless LAN network to detect interference. Ex. 1014, 5:9-10; Ex. 1003, ¶ 104.

Therefore, it would have been obvious to a POSITA to incorporate the teachings of Haartsen in the system of Shellhammer. Ex. 1003, ¶¶ 106-107.

3. Claim 8

a) [8.0] ***An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:***

b) [8.1] ***stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and***

c) [8.2] ***a control station which controls the alternate use of the frequency band,***

Elements [8.0]-[8.2] are identical to [1.0]-[1.2]. Therefore, for the reasons provided in the analysis of [1.0]-[1.2] in Ground #1, Shellhammer discloses [8.0]-[8.2]. Ex. 1003, ¶ 108.

d) [8.3] ***wherein the control station, in addition to functions in accordance with the second radio interface standard,***

Shellhammer discloses this element. Ex. 1003, ¶ 109.

As explained in the analysis of [1.0]-[1.2] in Ground #1, Shellhammer discloses each of 802.11 and Bluetooth as a "*radio interface standard*." The labels "*first*" and "*second*" could be applied to either standard for the purposes of analyzing [8.0]-[8.2] (which are identical to [1.0]-[1.2]). For the purpose of analyzing [8.3] and [8.4], Bluetooth is an example of the "*first radio interface* *standard*,” and 802.11 is an example of the “*second radio interface standard*.[4]” Ex. 1003, ¶ 110.

In Shellhammer’s system, the 802.11 access point (AP) (“*control station*”) carries out RF transmission and reception functions in accordance with the 802.11 standard: “Each **AP** contains apparatus 60,70 for the **transmission and reception of RF signals under the 802.11 protocol**.” Ex. 1006, 6:3-5; Ex. 1003, ¶ 111.

Each AP further performs communication functions in accordance with the 802.11 standard as it communicates with the mobile units (MUs): “The **MU 120 then communicates 450 using the 802.11 protocol with the AP 20**.” Ex. 1006, 9:47-48; Ex. 1003, ¶ 112.

Thus, Shellhammer teaches an AP performing the transmission and reception of RF signals under the 802.11 protocol, as well as the AP communicating with the MUs using the 802.11 protocol, which discloses element [8.3]. Ex. 1003, ¶ 113.

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[4] Note that in claim 1, the labels applied to Bluetooth and 802.11 are reversed in the analysis of claim element [1.5], where Bluetooth is the “*second [] standard*” and 802.11 is the “*first [] standard*.” However, that analysis of [1.5] is not contradictory to the analysis of claim 8, which only relies on the analysis of claim elements [1.0]-[1.2], for which either standard can be labeled as the “*first*” or “*second*” standard.

e) [8.4] ***also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.***

Shellhammer in view of Haartsen renders obvious this element. Ex. 1003, ¶ 114.

Shellhammer teaches that devices operating in accordance with the 802.11 standard perform frequency hopping, which includes communicating for "a certain period of time in a particular channel" and then switching in unison to the next radio channel in the hopping sequence "for the same predetermined length of time." Ex. 1006, 1:34-41; Ex. 1003, ¶ 115.

It was known to a POSITA that the frequency hopping algorithm in accordance with the 802.11 standard includes the devices using a pre-defined hopping pattern that is selected from a set of pre-defined hopping patterns. Ex. 1008, 11:4-8 ("[A]n original hop selection function 601, based on **pre-stored sequences as in IEEE 802.11** … generates a present hop from a phase value and a sequence selector."); Ex. 1003, ¶ 116.

It was further known to POSITAs that the access point (AP) dictates, to all devices in the network, which of the hopping patterns that the network is going to use. Ex. 1003, ¶ 117 (citing Ex. 1013, 1:54-61; Ex. 1016, 1:36-47; Ex. 1017, pp. 139, 144, 164). As a result of the AP dictating the hopping sequence to the network, all devices in the radio system operating in accordance with the 802.11

standard use the same hopping pattern, such that the AP and MUs hop to the same channel at the same time. Ex. 1003, ¶ 118 (citing Ex. 1016, 2:24-29; Ex. 1017, p. 144).

Therefore, a POSITA would understand Shellhammer's teaching that 802.11 devices perform frequency hopping includes the AP controlling the hopping sequence for the entire 802.11 network (both AP and MUs), thereby causing the radio stations of 802.11 radio systems to repeatedly switch to another radio channel to operate including sending and receiving transmissions, thereby seizing the channel (*i.e.*, "*the control station* [] *carries out functions which cause radio systems in accordance with the second radio interface standard* [] *to seize another radio channel for its own operation*" as claimed). Ex. 1003, ¶ 119.

It was well known to POSITAs that interference in communications channels can degrade the communications session and should be avoided if possible. Ex. 1003, ¶¶ 102-103. To the extent Shellhammer does not explicitly teach that the control station (AP) causes 802.11 radio systems to seize another radio channel as a result of "*interpret[ing] the radio channel as interfered*," this limitation was taught by Haartsen. Ex. 1003, ¶ 120.

Haartsen is directed to improving a frequency hopping procedure—including 802.11 frequency hopping—by avoiding channels in the hop sequence experiencing continuous interference:

> **[P]erformance can be improved if the FH [*i.e.*, frequency hopping] channel can avoid those hop frequencies associated with heavy interference**. In particular, if there are narrowband interference sources ("jammers") that continuously occupy one or more hop channels[.]

Ex. 1008, 3:20-24; Ex. 1003, ¶ 121.

In particular, Haartsen's procedure includes substituting the interfered channels of a hopping sequence with a non-interfered channel:

> **[I]f the hop selection mechanism visits a 'forbidden' hop, an offset may be temporarily added to the phase such that an allowed hop is instead selected**. … For example, the detection of a substantial amount of **interference on a hop channel may make it desirable to avoid use of that hop channel**, at least until the interference subsides.

Ex. 1008, 7:67-8:11; Ex. 1003, ¶ 122.

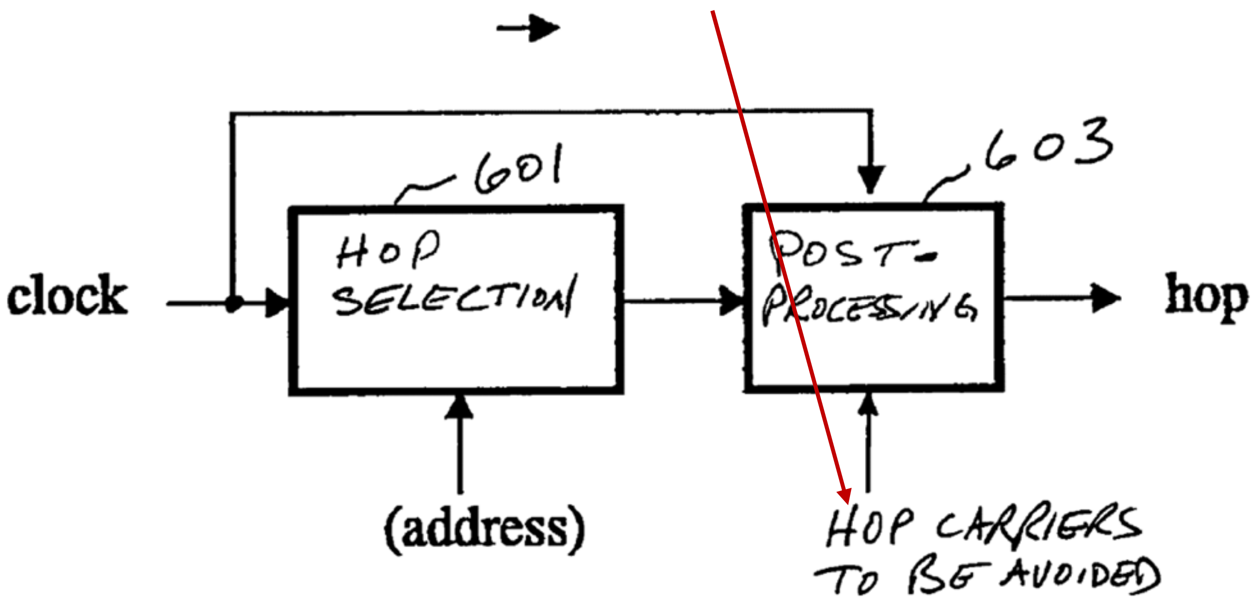
To implement this channel-avoidance procedure, Haartsen teaches that each of the transmitters and receivers in the network—which have the allowed set of 802.11 hopping sequences pre-stored, and where the AP dictates which of these hopping sequences to use—additionally include "post-processing functionality" that inputs data regarding the set of hop carriers to be avoided and adjusts the hop sequence accordingly. Haartsen describes this "post-processing" of pre-stored hop sequences in Fig. 6 and its associated discussion. Ex. 1003, ¶ 123.

> [A]n original hop selection function 601, based on pre-stored sequences as in **IEEE 802.11** or on a dedicated selection algorithm as

> in Bluetooth, generates a present hop from a phase value and a sequence selector. … The output from the original hop selection function 601 is supplied to a **post-processing function 603, which additionally receives as input the phase and the set of hop carriers, S, to be avoided**. Both the transmitter and receiver preferably have the same input parameters to this selection operation, so that at any moment in time, the same hop will be selected and the radios will remain in synchrony.

Ex. 1008, 11:5-17; Ex. 1003, ¶ 123.

Each device in the 802.11 network receives a list of frequency hopping carriers (*i.e.*, channels) to be avoided due to interference as input data for the post-processor 603. The post-processor then modifies the original pre-defined hopping sequence determined by the hop selector 601 so that the carriers to be avoided are substituted for carriers that are not interfered.



Haartsen, Fig. 6 (annotations in color); Ex. 1003, ¶ 123

Here, Haartsen teaches that the set of hop channels to be avoided is a data element "S" that is received by devices in the network and input to their respective post-processors. Ex. 1008, 11:5-17. Further, for devices using Haartsen's post-processing technique, the set of hop channels to be avoided "S" is determined based on whether a channel has been detected as having "a substantial amount of interference." *Id.*, 8:6-11. Therefore, a POSITA would have understood that both the AP and MUs of an 802.11 network using Haartsen's technique would interpret the channels within the forbidden set "S" as being interfered (*i.e.*, "*cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered*," as claimed). Ex. 1003, ¶ 124.

A POSITA would have been motivated to combine Shellhammer and Haartsen at least for the reasons provided above at Section IX.B.2, Reasons to Combine Shellhammer with Haartsen. Ex. 1003, ¶ 125.

Thus, Shellhammer teaches that 802.11 devices perform frequency hopping, where it was known to POSITAs that the access point (AP) controls the frequency hopping sequence according to the 802.11 standard, and Haartsen teaches measuring interference on 802.11 hopping channels and changing the hopping sequence accordingly, such that channels interpreted as interfered are forbidden and substituted with another hop channel, which in combination renders obvious element [8.4]. Ex. 1003, ¶ 126.

C. Ground 3: Claim 8 is unpatentable as obvious over the combination of Shellhammer and Panasik

1. Summary of Panasik

Panasik (U.S. Pat. No. 6,643,278; Ex. 1009) is directed to improving frequency hopping in a network via a technique that "modifies the newly-entering network's hopping sequence [] to avoid any channels detected to have fixed interference." Ex. 1009, 11:20-22. Panasik's technique includes deriving a favorable hopping sequence for the frequency hopping procedure of the 802.11 standard. *Id.*, 13:45-47; Ex. 1003, ¶ 128.

Panasik's technique includes the steps of, first, "scanning a plurality of frequency channels," "detecting whether a signal [*i.e.*, interference] exists on [a] channel and recording information corresponding to each channel on which a signal is detected." Ex. 1009, 6:12-22. Then, "if fixed or packet interference has been detected, then **information has been stored regarding such interference and step 30 derives a favorable hopping sequence** from that information." *Id.*, 9:36-39; Ex. 1003, ¶ 129.

In particular, "deriv[ing] a favorable hopping sequence" includes avoiding interfered channels in the sequence by replacing each with another channel that is not interfered:

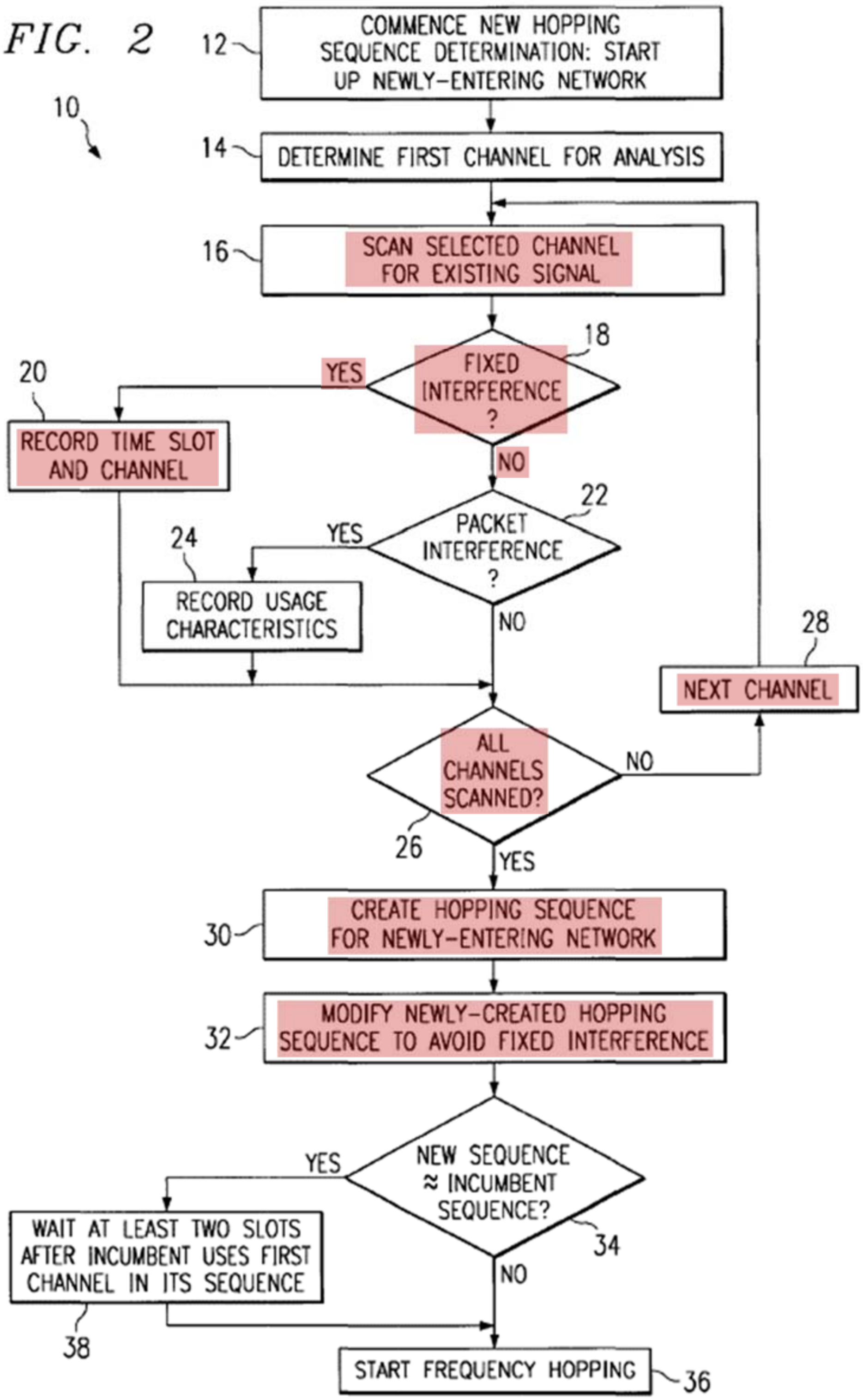
> More particularly, **for each channel in the newly-entering network's hopping sequence that corresponds to a frequency in**

which there is fixed interference, then that channel in the sequence is not used and instead a <u>replacement channel</u> is selected … [for] which there has not been a detection of fixed interference.

Ex. 1009, 11:23-31; Ex. 1003, ¶ 130.

Panasik illustrates the steps of its technique in Fig. 2 shown below, where the steps relevant to the present claim 8 analysis are highlighted in color.

FIG. 2



Panasik, Fig. 2 (relevant steps highlighted); Ex. 1003, ¶ 131

2. Reasons to Combine Shellhammer and Panasik

Shellhammer's system includes devices operating according to the 802.11 standard that perform frequency hopping. Ex. 1006, 1:34-41. Although well known to a POSITA, Shellhammer does not address limiting interference in the communications by selecting those frequencies with less interference. Panasik is analogous art and improves the 802.11 portion of Shellhammer's system by mitigating the impact of an unknown interference source. Ex. 1003, ¶ 132. Combining Panasik's technique with Shellhammer's system would yield the obvious, beneficial and predictable result of devices using 802.11 frequency hopping and Bluetooth standards on the same frequency band with the 802.11 devices avoiding the unknown interference source. Ex. 1003, ¶¶ 133-134; *see also id.*, ¶ 147.

In the resulting combination, the access point (AP) of Shellhammer's system would measure interference on the frequency hopping channels. Further, the frequency hopping sequence determined by the AP and communicated to the 802.11 devices would include the substitution of interfered channels with non-interfered channels. Ex. 1003, ¶ 135.

In more detail, Panasik teaches that an 802.11 network such as Shellhammer's selects a hopping sequence out of a set of pre-defined hopping sequences. Ex. 1009, 2:11-12 Panasik's technique is directed to avoiding interference in an 802.11 network. Ex. 1009, 11:20-22, 13:45-47. A POSITA would have been motivated by Panasik's express teachings to incorporate its technique in Shellhammer's system to improve 802.11 communications by reducing the negative effects of interference. Interference on a channel of the pre-determined hopping sequence can cause a packet to not be received correctly, and delays due to packet re-transmissions can be prevented by avoiding such interference. Ex. 1009, 5:16-18 ("[F]ixed interference FI interferes with packet $P2_5$ [from a 802.11 network], thereby **requiring it to be <u>re-transmitted</u>**[.]"). Moreover, the combination would have been predictable and have an expectation of success because both Shellhammer's and Panasik's teachings regard frequency hopping in an 802.11 network. Ex, 1006, 6:3-5, 9:47-48; Ex. 1009, 13:45-47; Ex. 1003, ¶¶ 136-140.

Shellhammer provides additional explicit motivation for a POSITA to make the combination. For example, Shellhammer, as well as the writings of other POSTIAs, state the general desire to reduce interference in wireless networks such as 802.11. Ex. 1006, 1:46-48, 2:20-24; Ex. 1003, ¶ 138 (citing Ex, 1013, 1:54-61).

The explicit teachings of others in the art, such as Haartsen, also would have motivated the combination of Panasik's teachings with Shellhammer's system. For example, it was known that an interference avoidance technique beneficially avoids having to change the allowed 802.11 hopping sequences that are pre-stored in an 802.11 device's hop sequence generator when the technique includes avoiding interfered channels by substituting them with non-interfered channels, which also beneficially allows a device to remain synchronized even if it misses a hop. Ex. 1008, 7:63-65 ("The techniques described herein achieve the skipping of certain hops in a hop sequence **without having to change the hop sequence generator**.), 8:52-54 ("**This** allows slave units participating on the hopping channel to **remain synchronized even if once in a while, they miss a hop**[.]"); Ex. 1003, ¶ 141. Haartsen also provides additional motivations to combine, as discussed at Section IX.B.2, Reasons to Combine Shellhammer and Haartsen. Ex. 1003, ¶¶ 142-143.

The combination of Shellhammer and Panasik would have been predictable and would have an expectation of success because it was known from the writings in the prior art to detect interference on a channel and replace that channel with another channel. Ex. 1003, ¶ 144 (citing Ex. 1008, 7:63-8:11; Ex, 1014, 5:9-10, 6:39-44). It was also known to POSITAs to configure the AP of an 802.11 or wireless LAN network to detect interference. Ex. 1003, ¶ 145 (citing Ex. 1015, 36:40-45; Ex. 1014, 5:9-10).

Therefore, it would have been obvious to a POSITA to include the teachings of Panasik in the system of Shellhammer. Ex. 1003, ¶¶ 147-148.

3. Claim 8

a) [8.0] *An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:*

b) [8.1] *stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and*

c) [8.2] *a control station which controls the alternate use of the frequency band,*

Elements [8.0]-[8.2] are identical to [1.0]-[1.2]. Therefore, for the reasons provided in the analysis of [1.0]-[1.2] in Ground #1, Shellhammer discloses [8.0]-[8.2]. Ex. 1003, ¶ 149.

d) [8.3] *wherein the control station, in addition to functions in accordance with the second radio interface standard,*

For the reasons provided in the analysis of [8.3] in Ground #2, Shellhammer discloses [8.3]. Ex. 1003, ¶ 150.

e) [8.4] [*wherein the control station*] *also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.*

Shellhammer in view of Panasik renders obvious this element. Ex. 1003, ¶ 151.

For the analysis of claim 8 in this Petition, the 802.11 access point (AP) of Shellhammer's system is an example of the "*control station*" of limitations [8.2]-

[8.4], as discussed above at Section IX.A.2 regarding Shellhammer's disclosure of limitation [1.2]. Ex. 1003, ¶ 152.

Also, for the present analysis, the Bluetooth standard is an example of the "*first radio interface standard*" of limitations [8.0]-[8.1], and the 802.11 standard is an example of the "*second radio interface standard*" of limitations [8.0]-[8.1] and [8.3]-[8.4], as discussed above at Section IX.A.2 regarding Shellhammer's disclosure of limitation [1.0]. Ex. 1003, ¶ 153.

Shellhammer further teaches that devices operating in accordance with the 802.11 standard perform frequency hopping, which means devices communicate on a channel for a period of time and then switch in unison to the next radio channel in the hopping sequence:

> One method is to use a **frequency hopping** spread spectrum (FHSS) mechanism wherein data is transmitted for a certain period of time in a particular channel and, following a pseudorandom sequence, continues transmission at a different channel for the same predetermined length of time. As currently designed, **802.11 devices** operate at a frequency hopping rate of 10 hops/second.

Ex. 1006, 1:34-41; Ex. 1003, ¶ 154.

It was known to a POSITA that the frequency hopping algorithm in accordance with the 802.11 standard includes the devices using a pre-defined hopping pattern that is selected out of a set of pre-defined hopping patterns, as discussed above at Ground 2, Section IX.B.3 regarding limitation [8.4]. Ex. 1008, 2:4-9, 11:4-8; Ex. 1003, ¶ 155. It was further known to POSITAs that the access point (AP) dictates, to all devices in the network, which of the hopping patterns that the network is going to use. Ex. 1003, ¶ 156 (citing Ex. 1013, 1:54-61; Ex. 1016, 1:36-47; Ex. 1017, pp. 139, 144, 164). As a result, all devices in the radio system operating in accordance with the 802.11 standard use the same hopping pattern, such that the AP and MUs hop to the same channel. Ex. 1003, ¶ 156 (citing Ex. 1016, 2:24-29; Ex. 1017, p. 144).

Therefore, a POSITA would understand Shellhammer's teaching that 802.11 devices perform frequency hopping includes the AP dictating the hopping sequence for the network (both AP and MUs), thereby causing the radio stations of 802.11 radio systems to repeatedly switch to another radio channel for operation including transmitting and receiving communications (*i.e.*, "[*wherein the control station*] *carries out functions which cause radio systems in accordance with the second radio interface standard* [] *to seize another radio channel for its own operation*" as claimed). Ex. 1003, ¶ 157.

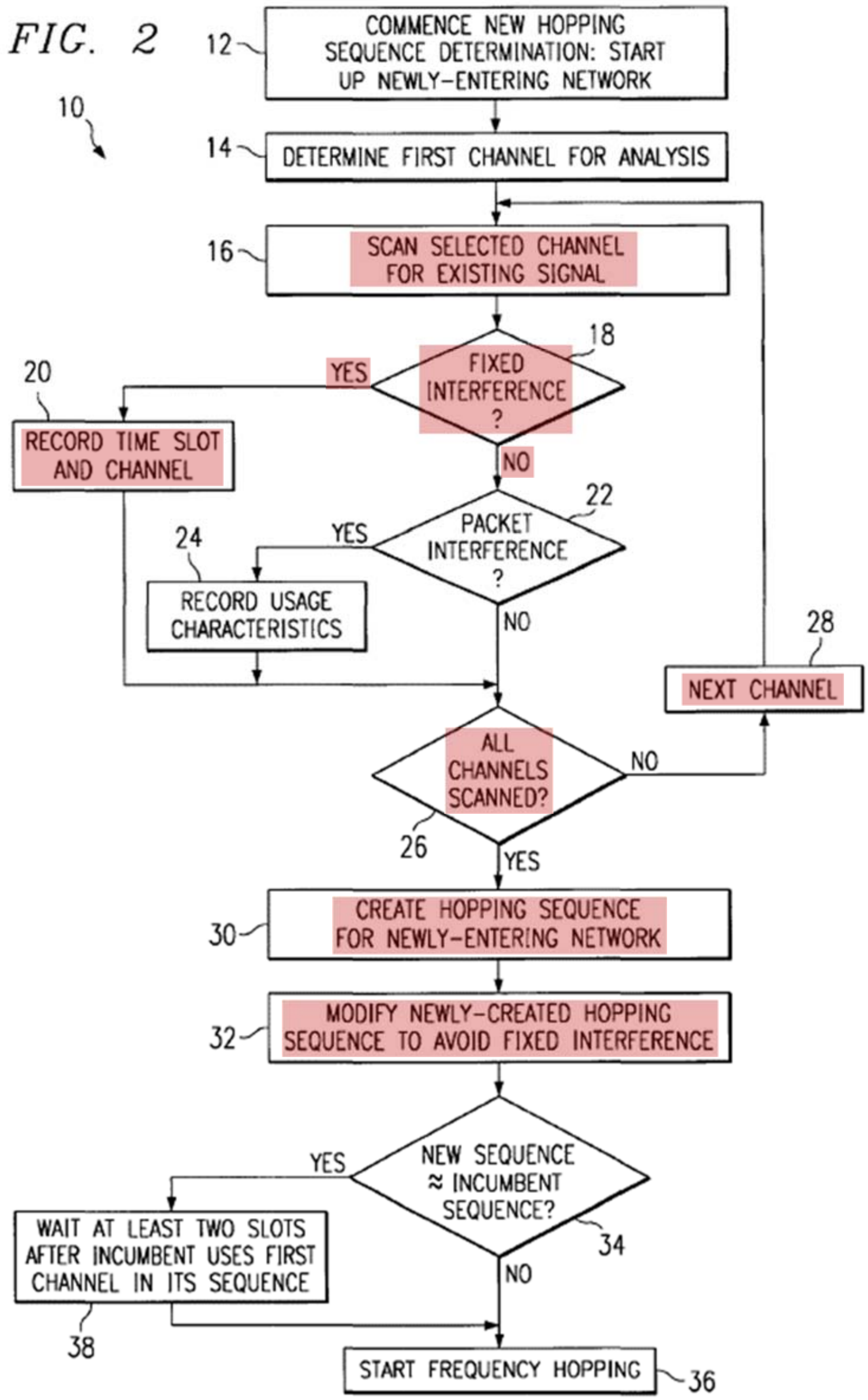
To the extent Shellhammer does not explicitly teach that the control station (AP) causes 802.11 radio systems to seize another radio channel as a result of interpreting the radio channel as interfered, this limitation was taught by Panasik. Ex. 1003, ¶ 158.

Panasik teaches improving frequency hopping in a network via a procedure that "modifies the newly-entering network's hopping sequence [] to avoid any channels detected to have fixed interference." Ex. 1009, 11:20-22; Ex. 1003, ¶ 159.

Panasik teaches that its technique is directed to improving frequency hopping in a network operating in accordance with the 802.11 standard. Ex. 1009, 13:45-47 ("the above teachings may be applied to other systems as well (*e.g.*, **IEEE 802.11) and combination of several Bluetooth and 802.11 frequency hopping devices**"); Ex. 1003, ¶ 160.

Panasik explains that its technique operates by first "scanning a plurality of frequency channels," "detecting whether a signal [*i.e.*, interference] exists on the channel and recording information corresponding to each channel on which a signal is detected," and modifying the hopping sequence to avoid the detected interference. Ex. 1009, 6:12-22, 11:23-31; Ex. 1003, ¶ 161.

The steps of this procedure—from detecting interference to modifying the hopping sequence—are illustrated in Fig. 2 of Panasik shown below, where the steps relevant to the present claim 8 analysis are highlighted in color:



Panasik, Fig. 2 (relevant steps highlighted); Ex. 1003, ¶ 162

In reference to Fig. 2, Panasik explains that during the scanning and detecting steps, "**an existing signal will be detected [] if there is fixed interference in the scanned channel**." Ex. 1009, 7:35-36; *see also id.*, 5:11-13 ("Such fixed interference may arise from various devices, such as a leaking microwave oven by way of example."); Ex. 1003, ¶ 163.

Next, "due to the detection of fixed interference existing in the scanned channel, [the] method **records an indication of the time slot and channel** in which the fixed interference was detected." Ex. 1009, 8:14-17. Then, based on the detected and recorded interference, "a favorable hopping sequence" is determined. *Id.*, 9:36-46; Ex. 1003, ¶ 164.

The modified hopping sequence "avoid[s] any channels detected to have fixed interference." Ex. 1009, 11:22-23. Specifically, an avoided channel having interference is replaced with a channel for which no interference was detected:

> More particularly, **for each channel in the newly-entering network's hopping sequence that corresponds to a frequency in which there is fixed interference, then that channel in the sequence is not used and instead <u>a replacement channel is selected</u>**. Further in this regard, note that in the preferred embodiment the replacement channel is selected from a rotation of channels in which there has not been a detection of fixed interference.

Id., 11:23-31; Ex. 1003, ¶ 165.

Panasik further teaches that the steps of detecting and recording interference, generating a favorable hopping sequence, and communicating the hopping sequence are performed beginning "at network start-up, such as when a **first transceiver** of the newly-entering network is turned on or is otherwise initialized." Ex. 1009, 7:10-12; *id.*, 12:8:15 ("[A] network transceiver 40 operable to perform method 10 shown in Fig. 2 … includes three primary operational blocks, namely, a radio 42, a physical engine 44, and a media access control ('MAC') controller 46, all of which are … described in the IEEE 802.11 standard.[.]"). It would have been obvious from the teachings of others in the art that this procedure of detecting interference and changing the hopping sequence accordingly would be continually performed by the network as it operates, not just at network initialization, in order to continue to provide the benefit of interference avoidance over time. Ex. 1008, 3:50-56 ("**[H]op removal must be adaptable because the interference cannot be predicted (the band is unlicensed and any radio can make use of it) and may vary over time[.]**"), claim 8; Ex. 1003, ¶ 166.

Panasik also teaches that the same transceiver device that detects interference and determines the new, favorable hopping sequence also communicates the new hopping sequence to the other network devices. Ex. 1009, 9:40-42 ("[G]iven the detected information, step 30 **generates a hopping sequence <u>that will thereafter be used</u> for transmission <u>by the newly-entering</u>**

network.”), 6:66-7-3 (“the wireless network begins the determination of a **new hopping sequence to be used** **for intercommunications** **on the network (*i.e.*, by all** **transmitters, receivers, and transceivers in the network**).”). Therefore, it would have been obvious to a POSITA that both the AP and MUs of an 802.11 network using Panasik’s technique to receive a new hopping sequence, which is based on detected interference, would thus interpret the avoided channels as being interfered (*i.e.*, “*cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered*,” as claimed). Ex. 1003, ¶ 167.

A POSITA would have been motivated to combine Shellhammer and Panasik at least for the reasons provided above at Section IX.C.2, Reasons to Combine Shellhammer with Panasik. Ex. 1003, ¶ 168.

Thus, Shellhammer teaches that 802.11 devices perform frequency hopping, where it was known to POSITAs that the access point controls the frequency hopping sequence according to the 802.11 standard, and Panasik teaches that in an 802.11 network interference is measured and the frequency hopping sequence is modified and communicated to all network devices so that an interfered hopping channel(s) is substituted with another replacement channel, which in combination renders obvious element [8.4]. Ex. 1003, ¶ 169.

D. Ground 4: Claims 1 and 2 are unpatentable as obvious over Lansford

1. Summary of Lansford

Lansford (U.S. Pat. No. 6,937,158; Ex. 1005) describes a method for HomeRF devices and Bluetooth devices to share a common frequency band "in the vicinity of 2.4 GHz." Ex. 1005, 3:20-22. HomeRF refers to protocols defined in a specification created by a standards body, including the "Shared Wireless Access Protocol (SWAP) Specification 1.0, released Jan. 5, 1999," and Bluetooth refers to protocols defined in a specification created by a standards body, including "the Bluetooth Specification, Version 1.0A, released Jul. 24, 1999." *Id.*, 2:44-52; Ex. 1003, ¶¶ 170-171.

Lansford teaches an embodiment that includes Device A, Device B, and Device C. Device A is a "controller," while Device B and Device C may be communication stations. Ex. 1003, ¶ 172.

Lansford explains that Device A, the controller, determines a "contention-free period" in which communication with Device B/HomeRF is "suspended" while Device A/controller communicates with Device C/Bluetooth. Ex. 1005, 4:27-5:10. Lansford uses the term "contention-free period" to refer the time that Device A communicates with device C. *Id.* A POSITA thus would have understood that "contention-free period" refers to the fact that the communications between Device A and device B do not contend for the same channel resources as the communications between device A and device C, since communications between A and B are "suspended." Ex. 1003, ¶ 173.

2. Claim 1

a) [1.0] *An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:*

Lansford discloses [1.0]. Ex. 1003, ¶ 174.

First, Lansford describes operating according to a "*first radio interface standard*" ("Bluetooth" or "HomeRF") and according to a "*second radio interface standard*" (the other one of "HomeRF" or "Bluetooth). Ex. 1005, 2:8-54 (discussing communication using a "first wireless communication protocol," which may be "HomeRF," and a "second wireless communication protocol," which may be "Bluetooth"). Both HomeRF and Bluetooth were well-known as referring to radio interface standards. Ex. 1018, 1:52-67 and 2:66-3:9 (referring to the "Bluetooth standard" and "HomeRF standard"). Moreover, both HomeRF and Bluetooth were formal specifications that were agreed upon within industry forums. *See, e.g.*, Ex. 1005, 2:45-54; Ex. 1003, ¶¶ 175-177.

Second, in Lansford's system, the HomeRF and Bluetooth devices operate in the same frequency band located at 2.4 GHz, which is an example of "*at least one common frequency band*" as claimed. Ex. 1005, 3:20-22 ("In accordance with both the **HomeRF and Bluetooth protocols**, each block frequency is **in the vicinity of**

2.4 GHz."). The description of a "block frequency" as being "in the vicinity of 2.4 GHz" refers to both HomeRF and Bluetooth utilizing what was known as the 2.4 GHz industrial, scientific and medical (ISM) band, *i.e.*, the same band of 2.4 GHz-2.483 GHz, for frequency hopping communications. Ex. 1003, ¶ 178 (citing Ex. 1011, Table 1 (teaching that both Bluetooth and HomeRF use the frequency range of "2.4-2.483 GHz")). That is, each radio system communicates over relatively narrow channels within the 2.4 GHz ISM frequency band for small periods of time, and the systems hop from channel to channel within the band. *Id.*

Third, Lansford teaches alternating between the first communication protocol (*e.g.*, HomeRF communication between Devices A and B) and the second communication protocol (*e.g.*, Bluetooth communication between devices A and C). Ex. 1003, ¶ 179.

For example, Lansford describes using a "first communication protocol during a first period of time" and using "a second communication protocol during a second period of time," where HomeRF and Bluetooth are examples of the different communication protocols. Ex. 1005, Abstract, 3:13-22. Lansford further explains that "[c]oordination of communication between the electronic devices of FIG. 1 may be controlled by Device A. For this reason, Device A may be referred to as a controller. For an embodiment of the present invention in which **Device B is**

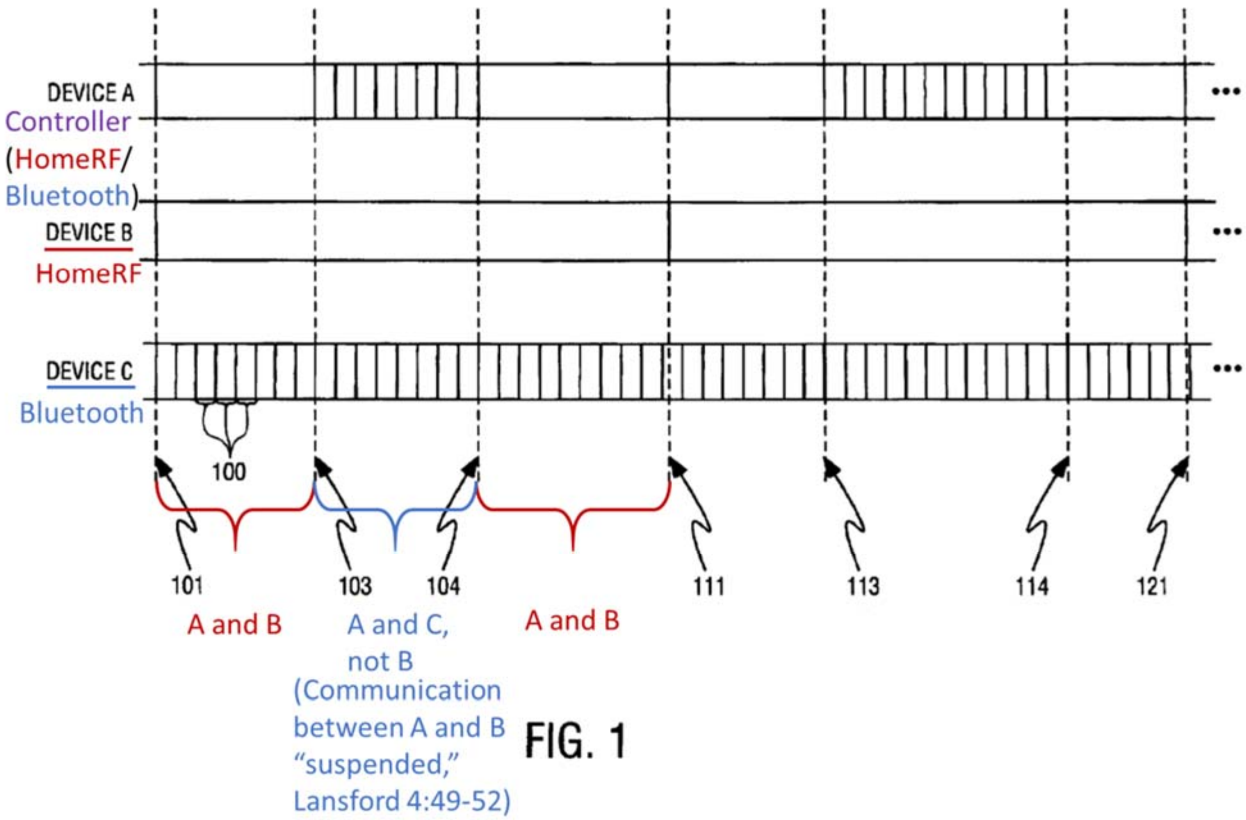
a HomeRF device and **Device C is a Bluetooth device**, Device A may be referred to as a connection point or master." Ex. 1005, 4:2-7.

Lansford describes these devices in reference to Fig. 1 (annotated and shown below):

> Within the first block of the first communication protocol, bounded by times 101 and 111 of FIG. 1, Device A switches to a second hopping frequency in accordance with the second communication protocol. During the period of time bounded by times 103 and 104, Devices A and C operate at the same hopping and block frequencies, and these devices may communicate with each other according to the second communication protocol.

Ex. 1005, 3:38-45. During the period from 103 to 104, "communication between Device A and Device B is suspended." *Id*. at 4:51-52; Ex. 1003, ¶ 180.

Lansford's Fig.1 is annotated below according to the disclosure above:



Ex. 1005, Fig. 1 (annotations in color); Ex. 1003, ¶ 181

Accordingly, Lansford's disclosure of a controller alternately communicating to different devices using the HomeRF and Bluetooth protocols, which use the frequency band 2.4 GHz to 2.483 GHz, discloses [1.0]. Ex. 1003, ¶ 182.

b) [1.1] *stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and*

As described in the analysis of [1.0] above, Lansford discloses a system that includes Device A (controller with HomeRF and Bluetooth capability), Device B

(HomeRF device) and Device C (Bluetooth device) in communication with each other.

Thus, Lansford discloses [1.1]. Ex. 1003, ¶¶ 183-184.

c) [1.2] ***a control station which controls the alternate use of the frequency band,***

d) [1.3] ***wherein the control station controls the access to the common frequency band for stations working in accordance with the first radio interface standard and—***

As explained in the analysis of [1.0], Lansford's Device A is an example of the claimed "*control station*," thereby disclosing [1.2]. Ex. 1003, ¶ 185.

For example, Lansford describes a scenario in which Device A and Device B are communicating using HomeRF (a "*radio interface standard*"), and Device A directs Device B to suspend communication while Devices A and C communicate using Bluetooth (another "*radio interface standard*):

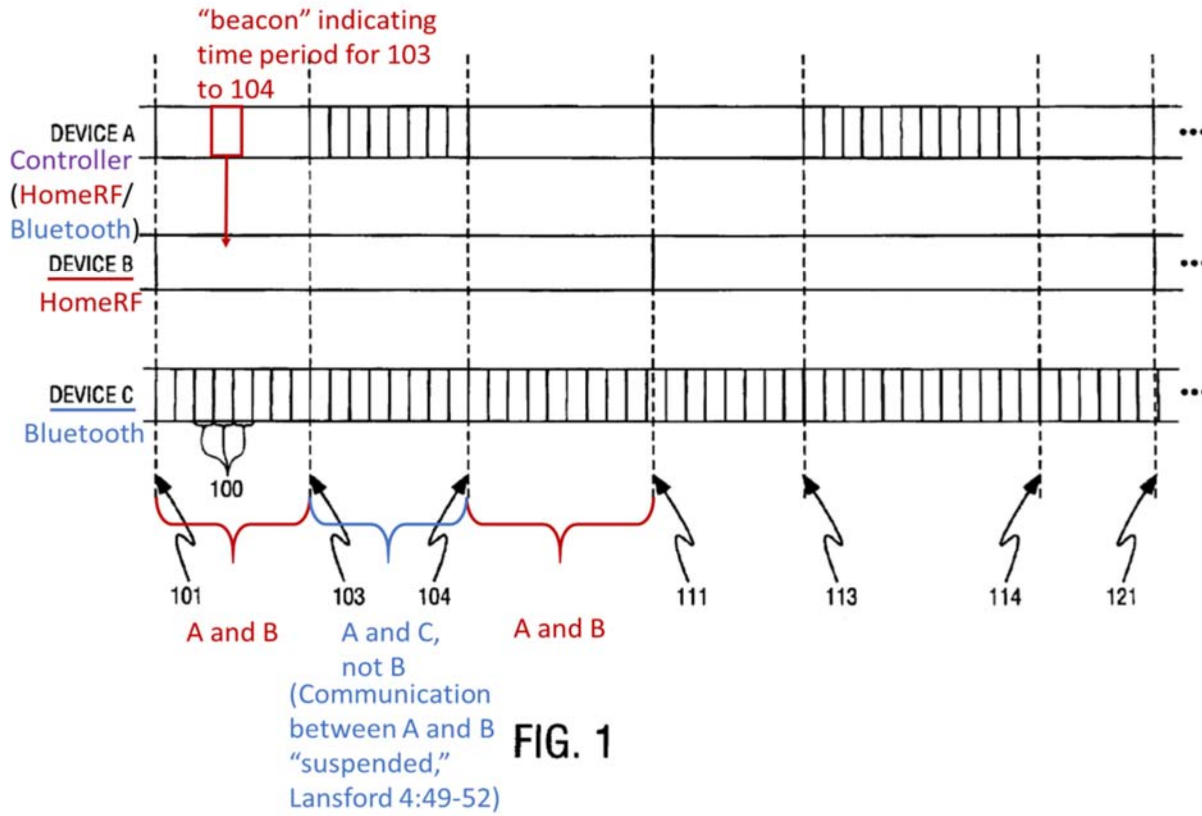
> After Device A of FIG. 1 receives the signal from Device C requesting communication, **Device A, as the controller, determines a time frame for a contention-free period**. This determination may be made based on information contained in the signal received from Device C, the available bandwidth, and the communication protocols.
>
> …
>
> Once determined, **Device A of FIG. 1 sends a signal to Device B indicating the time frame for the contention-free period**. ... **In accordance with an embodiment in which this communication protocol is HomeRF, the signal sent from Device A to Device B**

> **indicating the time frame for the contention-free period may be referred to as a beacon**.
>
> According to FIG. 1, the time frame for the first contention-free period begins at time 103 and ends at time 104. **During this contention-free period, communication between Device A and Device B is suspended**. …
>
> At time 103 of FIG. 1, both Device A and Device C hop to the same block frequency and begin the process of establishing a communication link between the devices.

Ex. 1005, 4:27-5:3; Ex. 1003, ¶ 186.

The disclosure of a period of time in which HomeRF communication between Device A and Device B is "suspended," while Device A and Device C engage in Bluetooth communication, discloses "*alternate use of the frequency band*." Lansford's system therefore includes a "*control station*" (Device A) controlling access to the "*common frequency band*" (a 2.4 GHz frequency band) for "*stations working in accordance with the first radio interface standard*" (*i.e.*, Device A controls both Device B/Bluetooth and Device C/HomeRF). Ex. 1003, ¶¶ 187-188.

Figure 1 of Lansford, which is presented above, is further annotated and shown below to illustrate the beacon transmitted from Device A to Device B.



Ex. 1005, Fig. 1 (annotations in color); Ex. 1003, ¶ 189

Thus, Lansford's controller/Device A controlling access to the frequency band for Bluetooth stations (*e.g.*, Device B) and HomeRF stations (*e.g.*, Device C) by providing alternate use of the frequency band discloses [1.3]. Either Bluetooth or HomeRF qualifies as the "*first radio interface standard*" for the purposes of [1.3]. Ex. 1003, ¶ 190.

e) [1.4] *renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band*

For the purposes of analyzing [1.4] in the present Ground #4, Bluetooth is the "*first radio interface standard*," and HomeRF is the "*second radio interface standard*." Ex. 1003, ¶ 191.

Figure 1 of Lansford illustrates communication between Devices A and B using HomeRF, and this communication is "suspended" (Ex. 1005, 4:49-52) if Device A receives a signal from Device C (a Bluetooth device) "requesting communication with device A" (*id.*, 4:15-26). Ex. 1003, ¶ 192.

Accordingly, if no Bluetooth devices request communication (*i.e.*, disclosing "*if stations working in accordance with the first radio interface standard do not request access to the frequency band*"), then a POSITA would have understood that Device A (disclosing the "*control station*") simply continues communication with Device B using HomeRF, which renders obvious "*renders the frequency band available for access by the stations working in accordance with the second radio interface standard*." Ex. 1003, ¶ 193.

Claim element [1.4] is also rendered obvious by the discussion of Lansford's Fig. 4 (shown below)—which discusses operation of devices with different hopping frequencies—combined with Lansford's disclosure that Bluetooth uses one hopping frequency and HomeRF uses a slower hopping frequency. Ex. 1003, ¶ 194 (citing Ex. 1005, 3:8-20 and 6:6-10). Lansford explains that Figure 4 is from the perspective of a controller communicating with a second hopping frequency, which is slower than the first hopping frequency. *Id*., 6:6-13 ("FIG. 4 describes the steps that may be taken at each block of the slower hopping frequency (which is the second hopping frequency in the example of FIG. 4)."). While Lansford does not specify, in the embodiment of Fig. 4, which standard corresponds to the first hopping frequency and which standard corresponds to the second hopping frequency, it would have been obvious to a POSITA to modify the embodiment of Fig. 4 so that Bluetooth corresponds to the first hopping frequency and HomeRF corresponds to the second hopping frequency.

A POSITA would have been motivated to make this modification to change generic standard labels to the particular standards Bluetooth and HomeRF because in the embodiment of Fig. 4, the second hopping frequency is slower than the first (Ex. 1005, 6:10-13)—and thus using HomeRF for the second standard and Bluetooth as the first is consistent, since HomeRF's hopping frequency is slower than that of Bluetooth. Moreover, the embodiment of Fig. 1 provides further motivation to make the modification because it already provides an example where Bluetooth is the first standard and HomeRF is the second. Ex. 1005, 4:1-7. Thus, implementing Fig. 4 in this manner is a simple substitution of one known element

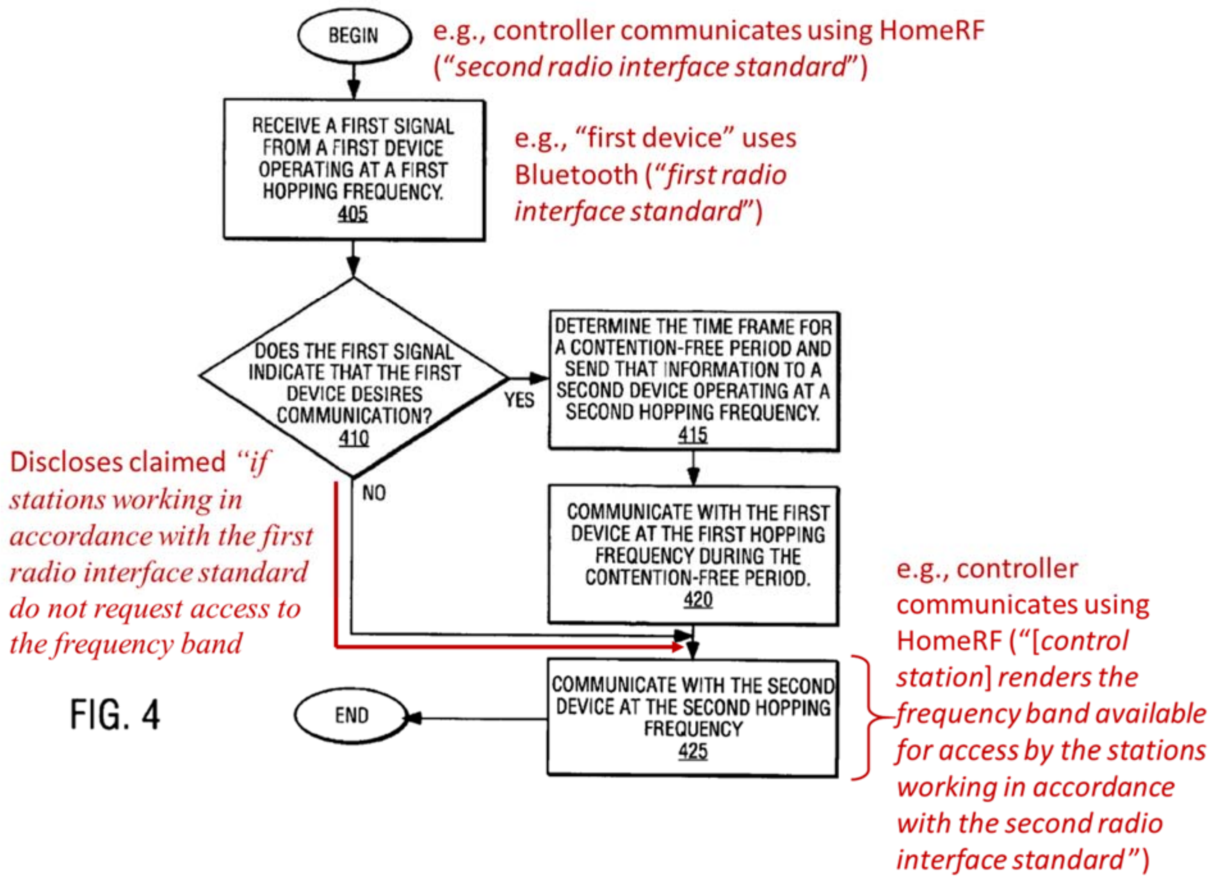
(Bluetooth and HomeRF devices) for another (generic devices operating at first and second hopping frequencies) to obtain the predictable results of HomeRF and Bluetooth devices sharing the frequency band. Ex. 1003, ¶ 196.

Lansford then teaches, in reference to Fig. 4, that a controller receives a signal from a first device operating at a first hopping frequency (*e.g.*, a Bluetooth device); if communication is not desired, the controller communicates with the second device (*e.g.*, a HomeRF device) at the second hopping frequency:

> At step 405 of FIG. 4 a first signal is received from a first electronic device operating at a first hopping frequency. At step 410 it is determined whether or not the first signal indicates that the first device desires communication with the controller. **<u>If communication is not desired</u>**, or communication is not possible or convenient, then the second device communicates with the controller at the second hopping frequency at step 425. If, however, the first signal indicates that communication between the first electronic device and the controller is desired, then the method proceeds to step 415.

Ex. 1005, 6:28-39; Ex. 1003, ¶¶ 195-197.

Figure 4 of Lansford, annotated according to the above teachings, is provided below:



Ex. 1005, Fig. 4 (annotated in color); Ex. 1003, ¶ 198

Thus, Lansford's disclosure of a controller receiving a signal from a first device using Bluetooth ("*first radio interface standard*"), determining that the first device does not require communication, and, based on that determination, communicating with the second device using HomeRF renders obvious [1.4]. Ex. 1003, ¶¶ 199-200.

3. Claim 2

a) [2.0] *The method as claimed in claim 1,*

Lansford renders obvious claim 1. *See* analysis of Ground #4, claim 1. Ex. 1003, ¶¶ 200-201.

b) [2.1] *herein the control station determines the respective duration in which the stations working in accordance with the second radio interface standard are allowed to utilize the frequency band.*

In the analysis of [1.4] above, Bluetooth is an example of the "first *radio interface standard*," and HomeRF is an example of the claimed "*second radio interface standard*." Ex. 1003, ¶ 202.

Lansford teaches that "blocks" of time are accorded to each of the two types of devices: "As used herein, a 'block' is the period of time between frequency hops in accordance with a communication protocol. For example, Device B of FIG. 1 operates in accordance with a first protocol, in which a single block lasts from time 101 to 111, and another block lasts from 111 to 121." Ex. 1005, 1:64-66. For HomeRF, "each block lasts 20 ms." *Id.*, 3:12-16; Ex. 1003, ¶ 203.

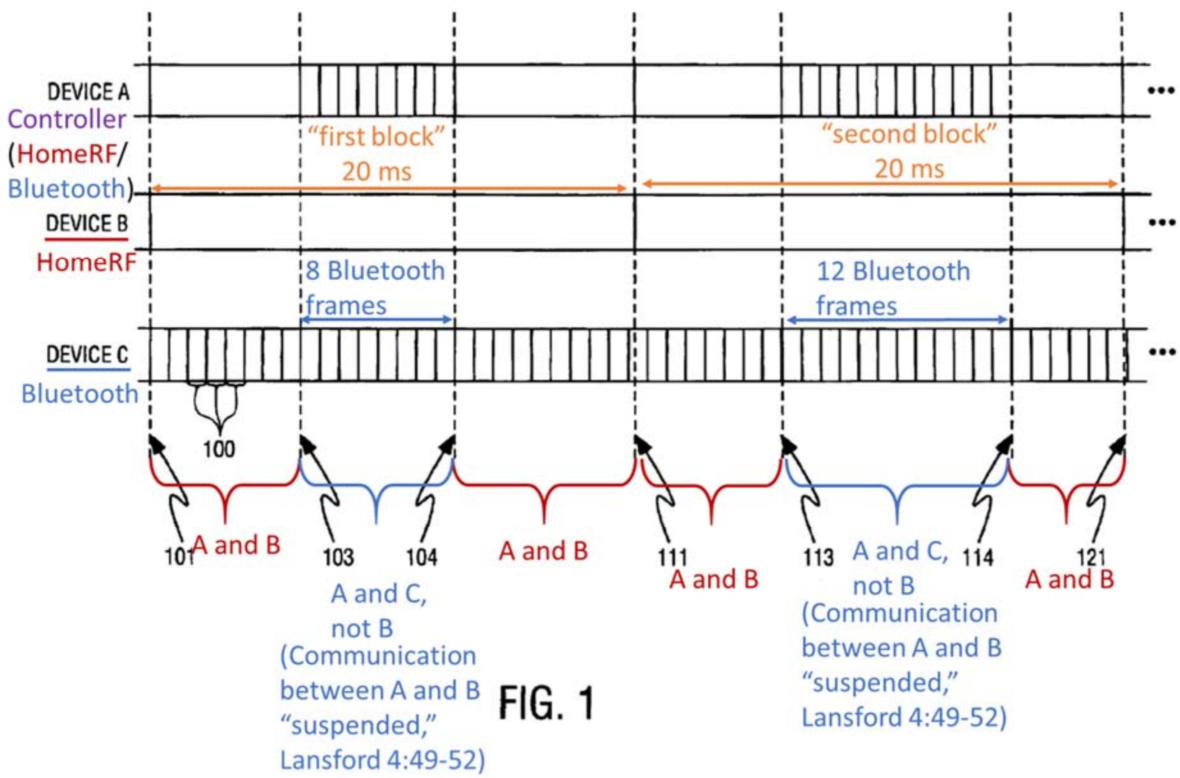
A POSITA would have understood that there are "blocks" for Device B in which Device C does not have any information to transmit, as Device C does not necessarily always need to communicate during each of Device B's blocks. In this scenario, the controller/Device A determines that Device B is allowed to utilize the frequency band for 20 ms before hopping to the next block at 111, yielding an example of [2.1], thus rendering [2.1] obvious. Ex. 1003, ¶ 204.

Lansford also renders [2.1] obvious in other scenarios, including blocks for Device B that include contention-free periods for Device C. For instance, Lansford teaches that at some point in time, Device C/Bluetooth requests to utilize the frequency band for communication, and, as a result, Device A "determines a time frame for a contention-free period" for communication with Device C. Ex. 1005, 4:27-32. Lansford thus explicitly discloses a "*control station*" that determines how long the Bluetooth stations can use the frequency band. Fig. 4, block 415 similarly discloses that the controller "[d]etermine[s] the time frame for a contention-free period and send[s] that information to a second device." *Id.*, Fig. 4, Block 415. Lansford also teaches that the contention-free period that Device C (a Bluetooth device) uses to communicate is variable in length. *Id.*, 4:27-32; Ex. 1003, ¶ 205.

By Device A/controller determining the value of the start time and period of the contention-free period for Device C/Bluetooth, Lansford discloses or renders obvious the "*duration*" in which the stations using the "*second*" standard (HomeRF) have access to the band. The contention-free periods for Bluetooth communications, with examples being 103 to 104 and 113 to 114 in Fig. 1 (shown below), are variable from Device B block-to-Device B block, but the Device B block durations 101 to 111 and 111 to 121 are fixed at 20 ms. For instance, the complement of the contention-free period in a Device B block is a duration in which Device B is allowed to utilize the band. Ex. 1003, ¶ 206.

The computed contention-free period within the blocks 101 to 111 and 111 to 121 in Fig. 1 can be represented by the variable Y. The time available for data communication between Device A/controller and Device B/HomeRF is 20 ms minus Y, which the Device A/controller must keep track of. Device A/controller also must know the times represented by 101, 103, 104, and 111 (within an example Device B block). Knowing the start time 104 for transmission, and end time 111 discloses that the Device A/controller "*determines the respective duration in which the stations working in accordance with the second radio interface standard are allowed to utilize the frequency band*." Ex. 1003, ¶ 207.

Figure 1 of Lansford is annotated according to the teachings of Lansford for HomeRF and Bluetooth devices and presented below.



Ex. 1005, Fig. 1 (annotated in color); Ex. 1003, ¶ 208

As shown in Fig. 1, the time available for HomeRF communication is 20 ms minus 8 Bluetooth frames in the first block, and the time available for HomeRF communication is 20 ms minus 12 Bluetooth frames in the second block. While not necessarily the only way to implement such a system, basic knowledge of engineering would have informed a POSITA that one way to implement these transmissions at the controller is to determine how long—for example, using a timer based on number of cycles of a typical internal clock—to have the HomeRF transceiver switched on after the first contention-free period of eight Bluetooth frames ends in the first block; that is, the controller determines the length of 104 to 111 (*e.g.*, based on 8 Bluetooth frames equaling 20 ms, as shown for the time period 101 to 103 in annotated Fig. 1 above). To the extent it is argued that Lansford does not disclose [2.1] explicitly, this is nothing more than an "obvious to try" solution for implementing Shellhammer, *i.e.*, choosing from a finite number of identified, predictable solutions for implementation with a reasonable expectation of success. Ex. 1003, ¶ 209.

Accordingly, a POSITA's understanding of how to implement interrupting a fixed-duration HomeRF communication between Device A (controller) and Device B (HomeRF), by inserting a variable-duration Bluetooth window for communication between Device A and Device C (Bluetooth), with Device A determining the start and end times for communicating with Device B/HomeRF is an example rendering obvious [2.1]. Ex. 1003, ¶¶ 210.

X. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION UNDER 35 U.S.C. §§ 314 OR 325(d)

This is Petitioner's first Petition challenging the claims of the '676 patent. Although four other IPR petitions challenging various claims of the '676 patent have been filed by two other parties (Microsoft and Marvell), some of the more pressing reasons the Board should not use its discretion to deny this Petition are that: no patent owner preliminary response has been filed in any of the other four cases; there is no relationship between Petitioner and any other petitioner; and this Petition was filed promptly after learning of the Shellhammer reference. *See* PTAB Trial Practice Guide (July 2019), pp. 22-31. As explained below, in these circumstances, the Board should institute an IPR.

A. None of the *General Plastic* factors weigh in favor of denying institution

In *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, the Board presented a number of non-exclusive factors ("*General Plastic* factors") to inform the § 314(a) analysis. IPR2016-01357, slip. op. at 15-16 (PTAB Sept. 6, 2017) (Paper 19) (precedential in relevant part).

The first *General Plastic* factor asks whether the same petitioner previously filed a petition directed to the same claims of the same patent. Where different petitioners challenge the same patent, the Board considers "any relationship between those petitioners when weighing the *General Plastic* factors." *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, slip op. at 9 (PTAB Apr. 2, 2019) (Paper 11) (precedential) ("*Valve*"). In *Valve*, this factor disfavored institution because the two petitioners (a) challenged the same set of claims; (b) were co-defendants in district court litigation and accused of infringing the same patent based on the same product; and (c) shared a significant relationship because the first petitioner was a licensee of the second petitioner. *Id.* at 9-10 (finding a "complete overlap in the challenged claims and [a] significant relationship" between the two petitioners). Unlike in *Valve*, here, Petitioner challenges a different set of claims than has been challenged in any single pending petition. And in the present case, Patent Owner has asserted the '676 Patent against a variety of unrelated companies involving unrelated products. For example, the district court litigations involving Ericsson are unrelated to patent owner's separate district court assertions against non-Ericsson products involved in the Microsoft and Marvell litigation. Without any overlapping products or relationship between these parties, Petitioner should be given its own opportunity to be heard on its arguments challenging claims 1, 2, and 8—a set of claims that are not challenged in any other single petition. This factor weighs against denial.

General Plastic factor two addresses whether, at the time of filing of the earlier petitions, the petitioner knew or should have known of the prior art asserted in the later filed petition. In the present case, Petitioner conducted its own searching to locate relevant prior art and was aware of the Lansford, Panasik, and Haartsen references before Microsoft's petitions were filed. However, Petitioner only learned of the Shellhammer reference, utilized in the present Petition for three of the four grounds, by reviewing the Marvell petitions after they were filed on July 22nd. Thus, at least with respect to the Shellhammer reference, at the time of filing of the earlier petitions, Petitioner did not know of the prior art that is now being asserted in the present Petition. Given that the primary reference used in three of the four grounds, Shellhammer, was not known to petitioner when the earlier petitions were filed, while the other references were known, this factor is likely neutral and should carry little if any weight.

General Plastic factor three weighs strongly against denial. This factor addresses whether, at the time of filing of the second petition, the petitioner had the benefit of receiving the patent owner's preliminary response to the first petition or the Board's related institution decision. *General Plastic*, slip op. at 17. Here, no patent owner preliminary response or institution decision has been filed in any of the Microsoft or Marvell proceedings. Thus, no concerns of gamesmanship or road mapping exist in this case. *See Netflix, Inc. v. Realtime Adaptive Streaming LLC*, IPR2018-01630, slip op. at 11 (PTAB Apr. 19, 2019) (Paper 13).

General Plastic factors four and five address the length of time that elapsed between the time the petitioner learned of the prior art in its petition and the filing of the petition, as well as whether a petitioner provides an adequate explanation for the time elapsed. These factors, along with factor two, allow the Board to "assess and weigh whether a petitioner should have or could have raised the new challenges earlier." *General Plastic*, slip op. at 18. As mentioned above, Petitioner first learned of the Shellhammer reference by reading the petitions after they were filed by Marvell on July 22nd. Thus, with respect to grounds 1-3 utilizing the Shellhammer reference, the Petitioner could not have raised the new challenges earlier. Since learning of the Shellhammer reference identified in Marvell petitions filed July 22nd, Petitioner has been considering the newly identified prior art utilized by Marvell and drafting the present Petition, filed just over a month after learning of the reference.

With respect to ground 4 utilizing Lansford, the elapsed time is reasonable because Petitioner was not even part of the district court proceedings involving Verizon and AT&T until April 22 and 23, 2019, respectively, when Petitioner's corresponding motions to intervene were granted. *See* Exs. 1018-1019. Moreover, Patent Owner contributed to any delay in Petitioner becoming a part of the district court litigation involving Ericsson's products by opposing Ericsson's efforts to intervene in the district court action to protect its interests. Exs. 1021, 1024 (filed March 20, 2019). Since becoming a party to the litigation in late April, Ericsson diligently considered the asserted claims relation to the accused products as well as evaluated prior art encompassed by the same asserted claims and ultimately complied with the court's order to answer Uniloc's complaint within 14 days of the orders. Exs. 1022-1023 (Answers to Complaint). As demonstrated by the filing of the present Petition within four months since becoming a party to the district court litigation and a little over one month since learning of the primary Shellhammer reference, Petitioner filed its challenges promptly, and thus factors four and five both weigh against denial.

General Plastic factors six and seven address the finite resources of the Board, particularly in light of the statutory requirement to issue a final determination within one year of institution. In this case, institution would not tax the Board's resources or jeopardize the statutory timeline. First, given the overlap in art between this Petition and the earlier-filed petitions, instituting an IPR in this case would allow the Board to evaluate the petitions efficiently. *See Netflix*, IPR2018-01630, slip op. at 14 ("We note that the grounds asserted in this Petitioner's Petitions have similarities that will allow the Board to evaluate the two petitions efficiently."). In addition, unlike the other four petitions challenging the

’676 Patent, this Petition relies only on prior art documents that require no proof of public accessibility or proof of priority date to pre-date the August 8, 2001 priority date of the ’676 Patent, thus providing further efficiency for the Board’s evaluation.

Further, assuming the pending IPR petitions are instituted, the Board could adjust the deadlines in the cases to ensure all cases proceed on the same or similar procedural schedules. See *Netflix*, IPR2018-01630, slip op. at 12 (rejecting an argument that offset IPR schedules could prejudice patent owner by explaining that “any prejudice to Patent Owner can be minimized through the use of coordinated scheduling orders across the cases, such that certain due dates would run in parallel”).

In sum, every *General Plastic* factor except factor two weighs against denial.

B. The Office has not previously considered the challenges, so the *Becton Dickinson* factors weigh against denying institution

In determining whether to institute an IPR, the Board may also consider whether “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). In *Becton, Dickinson and Company v. B. Braun Melsungen AG*, the Board collected “common non-exclusive factors” (herein “*Becton Dickinson* factors”) to guide the § 325(d) analysis. IPR2017-01568 (PTAB Dec. 15, 2017) (Paper 8) (precedential).

The *Becton Dickinson* factors, consistent with the text of § 325(d), focus on avoiding reconsideration of arguments and art already analyzed by the Office. Specifically, factors one, two, and four address similarities between arguments, including (1) "the similarities and material differences between the asserted art and the prior art involved during examination," (2) "the cumulative nature of the asserted art and the prior art evaluated during examination," and (4) "the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art." *Id.* Meanwhile, factors three, five, and six focus on if and how fully the Office analyzed a particular reference or argument, including (3) "the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection," (5) "whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art," and (6) "the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments." *Id.*

In this case, although the references Petitioner relies on were used in various ways by either Microsoft or Marvell in their petitions, one of Petitioner's prior art combinations (Shellhammer and Haartsen) was not raised in the pending petitions for any claim. In fact, Haartsen was cited in just one petition, and it was used for a claim not challenged by Petitioner (claim 5). IPR2019-01125. Thus, declining to institute the current Petition would prevent Petitioner from raising an invalidity ground that no other party has argued. Even more critically, however, unlike the § 325(d) cases in which a party asks the Board to reconsider prior art or arguments the Office has already considered (*e.g.*, *Becton, Dickinson and Company*, slip op. at 18-28), here, as of the present filing the Office has not previously analyzed any of the references or arguments in this Petition—as none of the references were considered during prosecution of the '676 Patent. And although the Board will likely decide whether to institute the other four petitions by the time it considers this Petition, even then, the Board's preliminary institution decision will not represent the Board's full consideration of the art at issue, nor will it necessarily indicate that the art has been previously presented to the Office. *See Unified Patents Inc. v. Bradium Techs. LLC*, IPR2018-00952 (Paper 31) (PTAB Dec. 20, 2018) (noting that the "grounds were not fully presented to the Office" where the Board instituted an IPR and subsequently terminated proceedings before issuing a final written decision).

Indeed, even if the Board institutes those petitions, there is no guarantee that the Board will have an opportunity to issue a final written decision if, for example, the parties in those cases settle. *See Square Inc. Protegrity Corp.*, CBM2014-00182, slip op. at 8 (Paper 16) (PTAB Mar. 15, 2015); *Palo Alto Networks v. Finjan*, IPR2016-00159, slip op. at 7 (Paper 13) (PTAB June 23, 2016). And if the

Board does not institute, the Office will not have fully considered the art, given the limited opportunities for factual development pre-institution.

Thus, the concerns underlying the *Becton Dickinson* factors simply do not carry the same force where the Office has yet to consider the arguments raised. The Board should therefore decline to use § 325(d) as a basis to deny institution.

Conclusion

For the reasons detailed above, institution of *inter partes* review of claims 1, 2 and 8 of the ’676 Patent is requested.

Dated: August 29, 2019

Respectfully submitted,

By /J. Andrew Lowes/
J. Andrew Lowes
Registration No.: 40,706
Customer No. 27683
Attorney Docket No. 26069.57
Lead Counsel for Petitioner Ericsson

XI. CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner Ericsson, declares that the argument section of this Petition (Sections I, III–X) has a total of 13,633 words according to the word count tool in Microsoft Word™.

/J. Andrew Lowes/
J. Andrew Lowes
Registration No. 40,706
Lead Counsel for Petitioner Ericsson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of: Walke *et al.*	§	Petition for *Inter Partes* Review
	§	
U.S. Patent No. 7,016,676	§	Attorney Docket No.: 26069.63
	§	
Issued: March 21, 2006	§	Customer No.: 27683
	§	
Title: METHOD, NETWORK AND CONTROL STATION FOR THE TWO-WAY ALTERNATE CONTROL OF RADIO SYSTEMS OF DIFFERENT STANDARDS IN THE SAME FREQUENCY BAND	§ § § § § §	Real Parties in Interest: Ericsson Inc. and Telefonaktiebolaget LM Ericsson

CERTIFICATE OF SERVICE

The undersigned certifies, in accordance with 37 C.F.R. § 42.205, that service was made on the Patent Owner as detailed below.

Date of service	August 29, 2019
Manner of service	FEDERAL EXPRESS
Documents served	Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104; Petitioner's Exhibit List; Certificate of Word Count; Exhibits: Ex. 1001 through Ex. 1025
Persons served	Philips Intellectual Property & Standards 465 Columbus Avenue Suite 340 Valhalla NY 10595

The undersigned further certifies that a courtesy copy of the complete and entire Petition was provided by electronic service to counsel retained by Patent Owner in the Related Matters identified herein:

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