

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ST. JUDE MEDICAL, INC., ST. JUDE MEDICAL S.C., INC.,
PACESETTER, INC., and BIOTRONIK, INC.,
Petitioner,

v.

ATLAS IP LLC,
Patent Owner.

Case IPR2014-00916¹
Patent 5,371,734

Before BARBARA A. BENOIT, LYNNE E. PETTIGREW, and
GEORGIANNA W. BRADEN, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Case IPR2015-00534 has been joined with this proceeding.

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, Petitioner has shown by a preponderance of the evidence that claims 6, 11, 14, and 21 of U.S. Patent No. 5,371,734 are unpatentable.

A. Procedural History

St. Jude Medical, Inc., St. Jude Medical S.C., Inc., and Pacesetter, Inc. (collectively, “St. Jude”) filed a Petition for *inter partes* review of claims 6, 11, 14, 21, and 44 of U.S. Patent No. 5,371,734 (Ex. 1001, “the ’734 patent”). Paper 2 (“Pet.”). Atlas IP LLC (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). On December 8, 2014, we instituted an *inter partes* review of claims 6, 11, 14, and 21 of the ’734 patent on asserted grounds of unpatentability. Paper 7 (“Dec.”).

Subsequent to institution, Biotronik, Inc. (“Biotronik”) filed a Petition and a Motion for Joinder with the instant proceeding. *Biotronik, Inc. v. Atlas IP LLC*, Case IPR2015-00534, Papers 1, 2. We instituted an *inter partes* review and granted the Motion, joining Biotronik with St. Jude (collectively, “Petitioner”) in this *inter partes* review. Paper 17.

Patent Owner filed a Patent Owner Response to the Petition, Paper 16 (“PO Resp.”), and Petitioner filed a Reply to the Patent Owner Response, Paper 18 (“Reply”). An oral hearing was held on July 15, 2015, and a transcript of the hearing was entered into the record. Paper 22.

On October 29, 2015, the United States Court of Appeals for the Federal Circuit issued precedential opinions in appeals from decisions in two district court cases involving the ’734 patent. *See Atlas IP, LLC v.*

Medtronic, Inc., No. 2015-1071, 2015 WL 6550622 (Fed. Cir. Oct. 29, 2015) (“*Medtronic*”); *Atlas IP, LLC v. St. Jude Med., Inc.*, 804 F.3d 1185 (Fed. Cir. 2015) (“*St. Jude*”). Pursuant to our authorization, the parties filed supplemental briefing addressing the impact of the *Medtronic* and *St. Jude* Federal Circuit opinions on this proceeding. Papers 24, 25, 27.

B. Related Matters

The parties indicate that the ’734 patent has been asserted in several district court actions. Pet. 1; Paper 5, 1. In one of those cases, Patent Owner asserted the ’734 patent against St. Jude. *Atlas IP, LLC v. St. Jude Med., Inc.*, No. 1:14-cv-21006 (S.D. Fla.). The Federal Circuit recently vacated the district court’s summary judgment of non-infringement in that case and remanded for further proceedings. *St. Jude*, 804 F.3d at 1190. The other recent Federal Circuit decision was an appeal from summary judgment rulings by the district court in *Atlas IP, LLC v. Medtronic, Inc.*, No. 1:13-cv-23309. In that case, the Federal Circuit affirmed the district court’s summary judgment of non-infringement, reversed the district court’s summary judgment of no anticipation or obviousness, and remanded for further proceedings. *Medtronic*, 2015 WL 6550622, at *10.

C. The ’734 Patent

The ’734 patent relates to a medium access control (“MAC”) protocol for use in wireless network communications. Ex. 1001, 1:16–30. According to the Summary of the Invention, the MAC protocol described in the ’734 patent combines beneficial aspects of time division multiple access (“TDMA”) techniques, such as predictable transmission opportunities, with aspects of packet reservation multiple access (“PRMA”) techniques, such as effective allocation of available bandwidth. *Id.* at 5:14–19. The Summary

of the Invention further states that the disclosed protocol “obtains significant reductions in battery power drain by permitting the receivers as well as the transmitters of the communicator stations to be powered off during a majority of the time, but selectively and predictably powered on to send or receive relevant communications.” *Id.* at 5:25–33.

For communication among a group of communicators, one communicator is designated as a “hub” and the remaining communicators are designated as “remotes.” *Id.* at 5:42–44. Figure 3 of the '734 patent, reproduced below, illustrates a communication cycle in accordance with the MAC protocol described in the '734 patent:

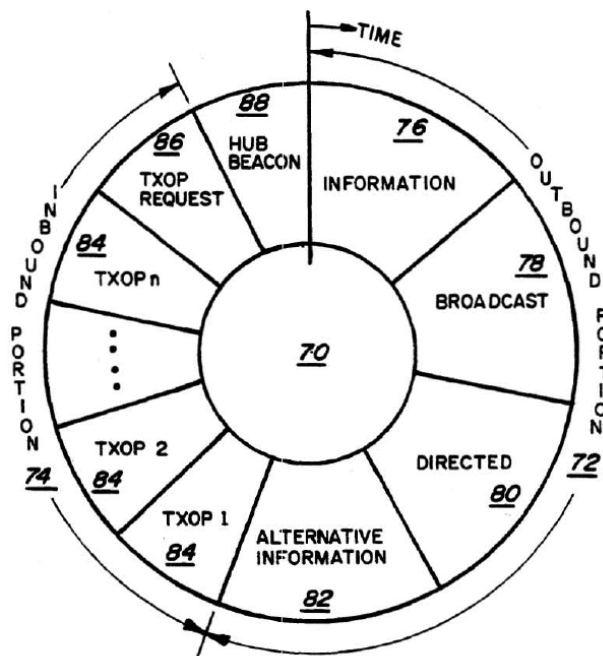


Fig_3

Figure 3 illustrates communication cycle 70 established by the hub to control outbound transmissions from the hub to the remotes and to control inbound transmissions from the remotes to the hub. *Id.* at 7:12–18. Outbound

portion 72 begins with information interval 76, during which the hub transmits control and other information to the remotes. *Id.* at 11:56–59. This information indicates the predetermined times when each remote will be able to participate in the communication cycle. *Id.* at 11:60–62. Broadcast interval 78 allows the hub to broadcast the same information to all of the remotes. *Id.* at 11:62–66. Directed packet interval 80 allows the hub to transmit frames to specifically identified remotes. *Id.* at 11:67–12:1. Outbound portion 82 concludes with alternative information interval 82, during which the hub repeats the information provided in information interval 76. *Id.* at 12:1–9.

During inbound portion 74, those remotes that have requested a transmission opportunity to transmit messages to the hub are provided with an opportunity to do so. *Id.* at 12:14–17. Figure 3 shows transmission opportunities 84, labeled “TXOP 1” to “TXOP n.” *Id.* at Fig. 3. All remotes initially receive a transmission opportunity (or “Txop”) “with (at least) a predefined minimum duration on each communication cycle 70, whether or not they have any frames to transmit.” *Id.* at 12:27–30. The hub may adjust the duration of transmission opportunities based on observed traffic patterns and information received from the remotes regarding the amount of data each remote has queued for transmission. *Id.* at 12:30–34. In addition, if a transmission opportunity is not used by a remote for a predefined number of communication cycles, the hub may cancel the transmission opportunity for that remote in subsequent cycles. *Id.* at 12:41–46. Following transmission opportunities 84 in inbound portion 74, Txop request interval 86 allows remotes that recently have joined the group or have not been allocated a transmission opportunity to transmit messages to the hub to request

allocation of a transmission opportunity in the next communication cycle.
Id. at 12:47–53.

Based on information about the intervals in a communication cycle received from the hub, the remotes can determine in advance when they should expect to receive frames transmitted from the hub and when they may transmit frames to the hub. *Id.* at 5:47–54, 13:29–33. As a consequence, remotes can power down their receivers and transmitters at other times to conserve battery power. *Id.* at 5:54–66, 13:33–36.

D. Illustrative Claim

Claims 6, 11, 14, and 21 of the '734 patent are independent and contain many of the same limitations. Claim 6 is illustrative of the claimed subject matter:

6. A communicator for wirelessly transmitting frames to and receiving frames from a[t] least one additional communicator in accordance with a predetermined medium access control protocol, the communicators which transmit and receive the frames constituting a Group, each communicator including a transmitter and a receiver for transmitting and receiving the frames respectively, the medium access control protocol controlling each communicator of the Group to effect predetermined functions comprising:

designating one of the communicators of the Group as a hub and the remaining the [sic] communicators of the Group as remotes;

the hub establishing repeating communication cycles, each of which has intervals during which the hub and the remotes transmit and receive frames;

the hub transmitting information to the remotes to establish the communication cycle and a plurality of predeterminable intervals during each communication cycle, the intervals being ones when the hub is allowed to transmit frames to the remotes, when the remotes are allowed to transmit frames

to the hub, and when each remote is expected to receive a frame from the hub;

the remotes powering off their transmitters during times other than those intervals when the remote is allowed to transmit frames to the hub, by using the information transmitted from the hub;

the remotes powering off their receivers during times other than those intervals when the remote is expected to receive a frame from the hub, by using the information transmitted from the hub;

the hub assigning transmission opportunities to the remotes, each transmission opportunity being an interval for a remote to transmit frames to the hub;

the hub transmitting transmission opportunity allocation information in a frame transmitted by the hub; and

the hub allocating a number of transmission opportunities during at least one communication cycle which is at least one less in number than the number of remotes in the Group.

Ex. 1001, 46:16–58.

E. Grounds of Unpatentability

We instituted an *inter partes* review of claims 6, 11, 14, and 21 of the '734 patent on the following grounds of unpatentability:

Reference(s)	Basis	Challenged Claim(s)
Natarajan 1992 ²	35 U.S.C. § 102(a)	6, 14, and 21
Natarajan 1992 and Bella ³	35 U.S.C. § 103(a)	11
Natarajan '542 ⁴ and Bantz ⁵	35 U.S.C. § 103(a)	6, 14, and 21
Natarajan '542, Bantz, and Bella	35 U.S.C. § 103(a)	11

II. DISCUSSION

A. Claim Construction

The '734 patent expired on January 29, 2013. *See* Pet. 14; Ex. 1001. For claims of an expired patent, the Board's claim construction analysis is similar to that of a district court. *See In re Rambus*, 694 F.3d 42, 46 (Fed. Cir. 2012). In this context, claim terms "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the

² K.S. Natarajan et al., *Medium Access Control Protocol for Wireless LANs (An Update)*, IEEE P802.11/92-39, Mar. 9, 1992 (Ex. 1011, "Natarajan 1992").

³ U.S. Patent No. 4,542,499, issued Sept. 17, 1985 (Ex. 1026, "Bella").

⁴ U.S. Patent No. 5,241,542, issued Aug. 31, 1993 (Ex. 1003, "Natarajan '542").

⁵ U.S. Patent No. 5,123,029, issued June 16, 1992 (Ex. 1014, "Bantz").

prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

1. “repeating communication cycles, each of which has intervals during which the hub and the remotes transmit and receive frames”

Each challenged claim includes the following limitation, referred to by the parties as the “each” limitation: “repeating communication cycles, each of which has intervals during which the hub and the remotes transmit and receive frames.” *E.g.*, Ex. 1001, 46:29–31 (claim 6). In the Decision on Institution, we construed this claim limitation “to require that each communication cycle include intervals during which the hub and remotes are allowed to transmit and receive, without requiring actual transmission of frames.” Dec. 12. We based our construction on the language of the claims, including additional language referring to “intervals . . . when the hub is *allowed to* transmit frames to the remotes [and] when the remotes are *allowed to* transmit frames to the hub.” *Id.* at 10 (citing Ex. 1001, 46:36–39). We also considered the written description of the ’542 patent, which speaks of transmission opportunities during which remotes are provided an opportunity to transmit messages to the hub. *Id.* (citing Ex. 1001, 12:14–17).

After institution, Patent Owner argued that this *inter partes* review turns on a single claim construction issue—whether the recited limitation “requires that, in each communication cycle, there be at least one interval in which a remote transmits frames to the hub, or whether there need only be an ‘opportunity’ for such transmission.” PO Resp. 1 (emphasis omitted). In advocating for the former construction, Patent Owner relied on the district

court's holding in *Atlas v. Medtronic* that “[t]he plain meaning necessitates the hub and the remotes transmit and receive frames during each communication cycle, not that the hub and the remotes simply *may* do so during a communication cycle as Medtronic argues.” *Atlas IP, LLC v. Medtronic, Inc.*, No. 1:13-cv-23309, 2014 WL 5305577, at *3 (S.D. Fla. Oct. 15, 2014); *see* PO Resp. 2.

After the oral hearing in this proceeding, the Federal Circuit addressed the proper construction of the “each” limitation in claims of the ’734 patent. On appeal from summary judgment in the *Medtronic* case, the Federal Circuit rejected the district court’s so-called “plain meaning” construction, also urged by Patent Owner here. *Medtronic*, 2015 WL 6550622, at *10. Instead, the Federal Circuit determined that context was necessary to resolve the facial uncertainty of the claim language. *Id.* at *8. The court analyzed the relevant contextual evidence, including the additional claim language and references to transmission opportunities in the written description that we cited in our claim construction discussion in the Decision on Institution. *Id.* at *9. With analysis similar to ours, the Federal Circuit held, as we did, that the claim language, properly construed, requires only that each cycle have one or more intervals in which remotes are allowed to transmit frames. *Id.*

Thus, the Federal Circuit, in a precedential opinion, rejected the same “plain meaning” claim construction argument made by Patent Owner in this proceeding. Also, as in this proceeding, Patent Owner provided no extrinsic evidence, so the court construed the disputed limitation based on intrinsic evidence—the claim language and the written description. Moreover, the court used the same *Phillips*-based claim construction approach that the

Board applies when a patent has expired. Accordingly, in our patentability analysis we will apply the Federal Circuit’s construction of the “each” limitation, which, with respect to transmission by remotes, requires only that each cycle have one or more intervals during which remotes are *allowed* to transmit.

2. *“the hub transmitting information to the remotes to establish the communication cycle and a plurality of predeterminable intervals during each communication cycle”*

Each challenged claim includes the following limitation: “the hub transmitting information to the remotes to establish the communication cycle and a plurality of predeterminable intervals during each communication cycle.” *E.g.*, Ex. 1001, 46:32–35 (claim 6). Petitioner proposed that this “transmitting” limitation be construed as “the hub transmitting to the remotes information necessary to know *in advance* the starting time and duration for the communication cycle and the plurality of predesignated intervals during each communication cycle.” Pet. 19 (emphasis added). We did not construe this limitation expressly in the Decision on Institution, and Patent Owner did not propose a construction in either the Preliminary Response or the Patent Owner Response. Indeed, the “transmitting” limitation was not a point of contention during the trial, as the parties maintained that the proceeding turned on the correct construction of the “each” limitation and whether the prior art disclosed that limitation. See PO Resp. 1; Reply 1.

The “transmitting” limitation, however, was at issue in the two district court non-infringement summary judgment rulings reviewed by the Federal Circuit. In *Medtronic*, the Federal Circuit construed the “transmitting” limitation (in conjunction with “the hub establishing repeating

communication cycles”) to “require the hub to define and transmit the start time and duration of each communication cycle and its constituent intervals *in advance*,” i.e., before the transmission opportunities for the remotes begin. *Medtronic*, 2015 WL 6550622, at *6 (emphasis added). In *St. Jude*, vacating summary judgment of non-infringement under the district court’s erroneous construction, the Federal Circuit further held that the “transmitting” limitation “does not require that the cycle’s starting time and duration be communicated to the remotes even earlier, *i.e.*, before the communication cycle begins.” *St. Jude*, 804 F.3d at 1188.

The Federal Circuit’s construction of the “transmitting” limitation is consistent with that proffered by Petitioner in this proceeding in that both constructions require the hub to transmit the start time and duration of the communication cycle and its constituent intervals in advance. The Federal Circuit’s opinions clarify that start time and duration must be transmitted “in advance” of the time at which the remotes may begin transmitting, but need not be transmitted “in advance” of the communication cycle. Because the Federal Circuit construed the “transmitting” limitation in precedential opinions under the same claim construction standard the Board uses for expired patents, we will apply the court’s construction of the “transmitting” limitation in our patentability analysis.

3. “*frame*”

The parties do not dispute the proper construction of the claim term “frame,” which we construed in the Decision on Institution as “an ordered group of bits, such as a packet, used to carry information between network stations.” Dec. 9. We address this term here only to highlight that “frame” is used in the ’734 patent in a manner different from how it is used in some

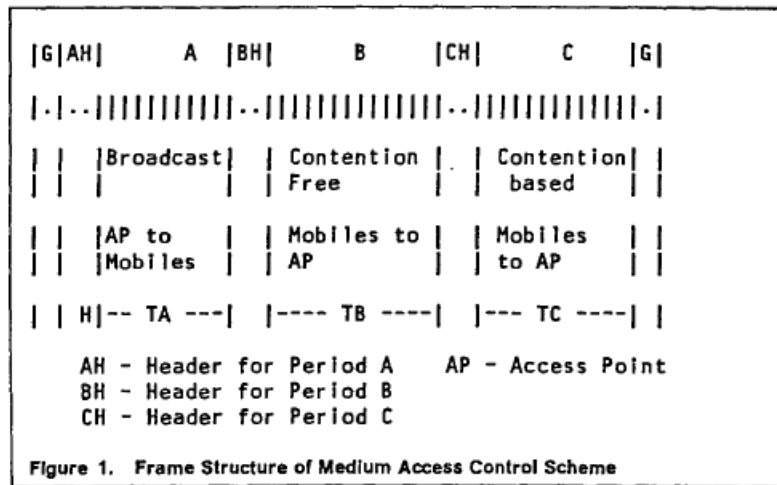
of the prior art. *Id.* (citing Pet. 16). Specifically, a “frame” in Natarajan 1992 and Natarajan ’542 is similar to a “communication cycle” in the ’734 patent, whereas a data “packet” in Natarajan 1992 and Natarajan ’542 is equivalent to a “frame” in the ’734 patent. *Id.* (citing Pet. 16); *see* Ex. 1002 ¶ 99.

B. Anticipation by Natarajan 1992—Claims 6, 14, and 21

Petitioner contends that claims 6, 14, and 21 are unpatentable under 35 U.S.C. § 102(a) as anticipated by Natarajan 1992, relying on declaration testimony of Dr. Zygmunt Haas. Pet. 20–34 (citing Ex. 1002 ¶¶ 78–147). Patent Owner responds, arguing only that under the proper claim construction, Natarajan 1992 does not disclose the “each” limitation. PO Resp. 5–7. Having considered the parties’ contentions and supporting evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 6, 14, and 21 are unpatentable as anticipated by Natarajan 1992.

1. Natarajan 1992

Natarajan 1992 describes a MAC protocol for wireless local area networks (LANs). Ex. 1011, 1. The network architecture includes a finite number of Access Points through which mobile stations communicate. *Id.* at 2. Inbound and outbound communication between an Access Point and mobile stations is structured as a sequence of frames. *Id.* at 3. Figure 1 shows the frame structure of the MAC protocol described in Natarajan 1992:



Id. at 3. As shown in Figure 1, a frame contains three time intervals—Periods A, B, and C. *Id.* In the first interval (Period A), outbound traffic is transmitted from the Access Point to mobile stations. *Id.* In the second interval (Period B), bandwidth is allocated for contention-free inbound data transmitted from mobile stations to the Access Point. *Id.* The third interval (Period C) is used for contention-based transmission from mobile stations to the Access Point. *Id.* During this interval, mobile stations can submit requests for bandwidth in subsequent frames. *Id.* at 7.

Immediately before each of Periods A, B, and C, the Access Point broadcasts control information to the mobile stations in a header, shown as AH, BH, and CH in Figure 1. *Id.* at 4. Header AH identifies the start of the information frame and contains, among other control data, the lengths of Periods A, B, and C (TA, TB, and TC in Figure 1), as well as the lengths of Headers AH, BH, and CH (TAH, TBH, and TCH). *Id.* (Fig. 2 showing control information in Header AH). These parameters inform the mobile stations how much time is allocated to each of the intervals and headers in the current frame. *Id.* at 4–5. The lengths of the intervals are adjusted to enable bandwidth to be allocated on a demand-driven basis. *Id.* at 6.

Header AH also includes a list of mobile stations that will receive data packets from the Access Point during Period A. *Id.* at 4–5. On correct reception of Header AH, each mobile station can determine whether it will receive packets from the Access Point during Period A. *Id.* at 5. A mobile station that does not expect to receive data during Period A can power down its receiver at the beginning of Period A, and set a timer to power on the receiver at the end of Period A, just in time to receive Header BH. *Id.* at 20.

Header BH identifies the beginning of Period B. *Id.* at 5. The control information in Header BH includes a list of ordered pairs indicating the mobile stations that are allowed to transmit data packets to the Access Point during Period B, and the number of time slots in Period B allocated to each mobile station. *Id.* at 5–6. Based on the information in Header BH, a mobile station can determine whether it has been allocated slots during Period B and will power on its transmitter and transmit packets according to the ordered slot allocation information. *Id.* at 6, 20.

2. Limitations Common to Claims 6, 14, and 21

We begin our anticipation analysis with the limitations that independent claims 6, 14, and 21 have in common. Natarajan 1992 discloses a “communicator” (i.e., mobile station or Access Point) for wirelessly transmitting to and receiving “frames” (i.e., packets) from an “additional communicator” (i.e., mobile station or Access Point) “in accordance with a predetermined medium access control protocol” (i.e., a MAC protocol for wireless LANs). Ex. 1011, 3; see Pet. 21–22; Ex. 1002 ¶¶ 98–99. Natarajan 1992 also discloses communicators “constituting a Group,” e.g., two mobile stations registered with the same Access Point, as shown in Figure 7. Ex. 1011, 10; see Pet. 22–23; Ex. 1002 ¶¶ 102–03. Each of

Natarajan 1992's communicators (i.e., mobile stations and Access Points) includes "a transmitter and a receiver for transmitting and receiving frames respectively." See Ex. 1011, 20 (mobile stations have transmitters and receivers); *id.* at 12 (mobile station units can be Access Points); Pet. 23; Ex. 1002 ¶¶ 105–06. The MAC protocol disclosed in Natarajan 1992 "designat[es] one of the communicators of the Group as a hub and the remaining communicators of the Group as remotes" when it explicitly designates a mobile station to provide the control functions of an Access Point, leaving the remaining mobile stations to act as remotes. Ex. 1011, 12; see Pet. 24; Ex. 1002 ¶¶ 109–14; Ex. 1001, 10:39–41 (the '734 patent indicating that communicators other than the hub are designated as remotes).

Natarajan 1992 also discloses the "each" limitation. In the MAC protocol described in Natarajan 1992, the "hub establish[es] repeating communication cycles" (i.e., sequences of frames having the structure shown in Figure 1 of Natarajan 1992). Ex. 1011, 3; see Pet. 26; Ex. 1002 ¶¶ 115–16. Each communication cycle (frame) has "intervals" during which the hub transmits frames received by the remotes—Period A (the period for outbound traffic from the Access Point to the mobile stations), as well as Headers AH, BH, and CH. Ex. 1011, 4–6; see Pet. 26–27; Ex. 1002 ¶ 117.

With respect to transmission by the remotes, the proper construction of the "each" limitation requires only that each cycle have one or more intervals during which remotes are *allowed* to transmit. See *supra* Section II.A.1. Period B is such an interval, as it contains allocated slots during which individual mobile stations are allowed to transmit packets to the Access Point. See Ex. 1011, 5–6; Pet. 27; Ex. 1002 ¶ 118. The individual slots within Period B are also intervals. See Pet. 27; Ex. 1002

¶ 122. Patent Owner’s argument that Period B is not an interval meeting the requirements of the claim is unpersuasive because it is premised on an incorrect claim construction requiring at least one interval in which a remote actually transmits to the hub. *See* PO Resp. 5–7. As explained previously, the Federal Circuit has rejected Patent Owner’s proffered construction of the “each” limitation. *See supra* Section II.A.1.

The MAC protocol described in Natarajan 1992 also satisfies the “transmitting” limitation. As construed by the Federal Circuit, this limitation requires the hub to define and transmit the start time and duration of each communication cycle and its constituent intervals before the time at which the remotes may begin transmitting. *See supra* Section II.A.2. Additional claim language requires that the intervals be “ones when the hub is allowed to transmit frames to the remotes, when the remotes are allowed to transmit frames to the hub, and when each remote is expected to receive a frame from the hub.” *E.g.*, Ex. 1001, 46:36–40 (claim 6).

First, Natarajan 1992 discloses the three different types of intervals recited in the “transmitting” limitation. Period A and Headers AH, BH, and CH are intervals when the hub (Access Point) is allowed to transmit to the remotes (mobile stations). Ex. 1011, 4–6; *see* Pet. 29; Ex. 1002 ¶¶ 124–25. Period B and its individual slots are intervals when the remotes (mobile stations) are allowed to transmit to the hub (Access Point). Ex. 1011, 5; *see* Pet. 29; Ex. 1002 ¶ 126. Headers AH, BH, and CH are intervals when each remote is expected to receive a frame from the hub (i.e., when the Access Point broadcasts control information to the mobile stations). Ex. 1011, 4–6; *see* Pet. 29–30; Ex. 1002 ¶ 127.

Next, Natarajan 1992's hub (Access Point) defines and transmits the start time and duration of a communication cycle (frame) before the transmission opportunities for the remotes (mobile stations) begin. Specifically, Header AH, transmitted by the Access Point to the mobile stations at the beginning of a frame, includes parameters identifying the lengths of Periods A, B, and C (i.e., TA, TB, and TC) and the lengths of Headers AH, BH, and CH (i.e., TAH, TBH, and TCH). Ex. 1011, 4–5; *see* Pet. 27–28; Ex. 1002 ¶¶ 119–20. According to Natarajan 1992, Header AH identifies the start of the information frame, and the information contained therein (i.e., TA, TB, TC, TAH, TBH, and TCH) tells the mobile stations the duration of the frame. Ex. 1011, 4–5; *see* Pet. 27–28; Ex. 1002 ¶ 120. The Access Point broadcasts Header AH prior to the time at which the remotes may begin transmitting, which occurs during Period B. *See* Ex. 1011, 3 (Fig. 1).

The Access Point in Natarajan 1992 also defines and transmits the start time and duration of the intervals in the communication cycle (frame) prior to the time at which the remotes may begin transmitting. As noted, Header AH, transmitted at the beginning of the frame, contains the timing information for Periods A, B, and C and for Headers AH, BH, and CH. Ex. 1011, 4–5; *see* Pet. 27–28; Ex. 1002 ¶¶ 119–20. In addition, Header BH contains the timing information for the individual slots in Period B in the form of an ordered list of mobile stations and the number of slots allocated to each mobile station, allowing each mobile station to know when and for how long it may transmit to the Access Point. Ex. 1011, 5–6; *see* Pet. 28; Ex. 1002 ¶ 122. Header BH is sent immediately before Period B, and thus is transmitted before the first remotes (mobile stations) are permitted to

transmit. *See* Ex. 1011, 3 (Fig. 1). Because the Access Point transmits the start time and duration of the frame and all relevant intervals—Periods A, B, and C; Headers AH, BH, and CH; and the individual slots in Period B—before the transmission opportunities for the mobile stations begin, Natarajan 1992 discloses the “transmitting” limitation as construed by the Federal Circuit.

In supplemental briefing that we authorized after the Federal Circuit decided the *Medtronic* and *St. Jude* appeals, Patent Owner contends Petitioner did not account for the Federal Circuit’s construction of the “transmitting” limitation in its unpatentability analysis. Paper 25, 5. We are not persuaded by Patent Owner’s argument. The Petition, with ample citation to Natarajan 1992 and to Dr. Haas’s testimony for support, provided a detailed explanation of when the hub (Access Point) in Natarajan 1992 transmits the start time and duration of both the communication cycle (frame) and its constituent intervals. *See* Pet. 26–29 (citing Ex. 1002 ¶¶ 115–23). As discussed above, Natarajan 1992’s Access Point transmits all the relevant timing information in advance of the time at which the remotes (mobile stations) may begin transmitting (i.e., Period B), which is all that is required under the Federal Circuit’s construction of the “transmitting” limitation. For purposes of determining whether Natarajan 1992 anticipates, it is immaterial that the “transmitting” limitation does not require the timing information to be transmitted even earlier, i.e., before the communication cycle begins.

Finally, Natarajan 1992 discloses the remotes (mobile stations) “powering off their transmitters during times other than those intervals when the remote is allowed to transmit frames [and] powering off their receivers

during times other than those intervals when the remote is expected to receive a frame from the hub, by using the information transmitted from the hub.” As set forth in Natarajan 1992, a mobile station uses knowledge of receiver and transmitter schedules, based on the information transmitted from the hub in Headers AH, BH, and CH, to minimize power consumption “when the mobile station is neither actively transmitting nor actively receiving information.” Ex. 1011, 20; *see* Pet. 30; Ex. 1002 ¶¶ 129–33. More specifically, a mobile station turns its transmitter off except (i) during the slots allocated to the mobile station for transmission during Period B according to the information received in Header BH, and (ii) if the mobile station wishes to transmit during contention-based Period C. Ex. 1011, 20. Similarly, a mobile station turns its receiver off except (i) when it expects to receive Headers AH, BH, and CH, and (ii) during Period A if the mobile station is in Header AH’s list of mobile stations that will receive data during Period A. *Id.*; *see* Ex. 1002 ¶ 132.

3. Remaining Limitations in Claims 6, 14, and 21

In addition to the limitations that appear in all of the challenged claims, Natarajan 1992 discloses the remaining limitations recited in claims 6, 14, and 21. First, as recited in claim 6, Natarajan 1992 discloses “the hub assigning transmission opportunities to the remotes, each transmission opportunity being an interval for a remote to transmit frames to the hub” (i.e., the slots allocated in Period B for mobile stations to transmit to the Access Point). Ex. 1011, 5–6; *see* Pet. 31. Natarajan 1992 also discloses “the hub transmitting transmission opportunity allocation information in a frame transmitted by the hub” (i.e., slot allocation information transmitted to the mobile stations in Header BH). Ex. 1011, 5–6; *see* Pet. 31. Lastly, with

respect to “the hub allocating a number of transmission opportunities during at least one communication cycle which is at least one less in number than the number of remotes in the Group,” Natarajan 1992 explains that some mobile stations do not have allocated slots in Period B during a particular frame (i.e., do not have transmission opportunities) and put their receivers to sleep for the entire length of Period B. Ex. 1011, 20; *see* Pet. 31–32; Ex. 1002 ¶¶ 136–37.

Natarajan 1992 also discloses the additional limitations in claim 14 (Ex. 1001, 49:63–68): “the hub establishing the length of each communication cycle” (i.e., the lengths of Periods A, B, and C, and lengths of headers AH, BH, and CH) and “the hub transmitting a frame containing information describing the length of the communication cycle prior to the end of the communication cycle whose length is established” (i.e., Header AH, sent at the beginning of a frame, containing the lengths of Periods A, B, and C, and lengths of headers AH, BH, and CH). Ex. 1011, 4 (Fig. 2); *see* Pet. 32–33; Ex. 1002 ¶¶ 140–44.

Finally, Natarajan 1992 discloses “the hub transmitting two frames containing information to establish the plurality of predeterminable intervals during each communication cycle,” as recited in claim 21. *See* Ex. 1001, 51:3–9. Header AH is a first frame containing timing information for Periods A, B, and C, and for Headers AH, BH, and CH. Ex. 1011, 4–5; *see* Pet. 33; Ex. 1002 ¶ 146. Header BH is a second frame containing timing information for the allocated slots in Period B. Ex. 1011, 5–6; *see* Pet. 33; Ex. 1002 ¶ 146. The second frame (Header BH) also “occur[s] before the intervals in which the remotes are allowed to transmit frames to the hub,” as

required by claim 21, because it is transmitted before Period B. Ex. 1011, 3 (Fig. 1); *see* Pet. 34; Ex. 1002 ¶ 147.

4. Conclusion

For the foregoing reasons, we determine that Petitioner has shown by a preponderance of the evidence that claims 6, 14, and 21 are anticipated by Natarajan 1992.

C. Obviousness over Natarajan 1992 and Bella—Claim 11

Petitioner contends that claim 11 is unpatentable under 35 U.S.C. § 103(a) over the combination of Natarajan 1992 and Bella, relying on declaration testimony of Dr. Haas. Pet. 34–38 (citing Ex. 1002 ¶¶ 148–67). With regard to this ground and the other asserted obviousness grounds, Patent Owner argues only that none of the cited prior art teaches the “each” limitation under the district court’s construction, which the Federal Circuit has rejected. *See* PO Resp. 7–8. As discussed in the previous section, Natarajan 1992 discloses the “each” limitation under the proper claim construction.

In addition to reciting limitations included in claim 6, claim 11 requires the hub to “monitor[] the frames transmitted by each remote during its transmission opportunity” and to “revok[e] a previous transmission opportunity allocation of a remote which has not transmitted more than a predetermined number of frames during a previous number of communication cycles.” Ex. 1001, 48:31–36. For the reasons explained below, we are persuaded by Petitioner’s argument that the combination of Natarajan 1992 and Bella teaches these additional limitations and that a person of ordinary skill in the art would have combined the references in the manner asserted. *See* Pet. 34–38.

Bella describes a system for medium access control in a LAN that carries data and voice traffic. Ex. 1026, 1:9–16; *see* Ex. 1002 ¶ 150. Bella’s system combines contention-based communications with TDMA-like time slots that may be reserved for voice traffic. Ex. 1026, 2:3–34, 3:10–31; *see* Pet. 35; Ex. 1002 ¶¶ 153–54. A communicator device that has voice traffic to transmit sends a booking packet to reserve a time slot during which it will regularly transmit speech packets. Ex. 1026, 3:65–4:2, 9:50–55; *see* Ex. 1002 ¶ 154. This reservation persists until it is cancelled. Ex. 1026, 10:26–33; *see* Pet. 35; Ex. 1002 ¶ 154. Cancellation occurs when the communicator device that has reserved the time slot stops transmitting packets, so the time slot passes unused. Ex. 1026, 11:9–13; *see* Pet. 35; Ex. 1002 ¶ 155. Other stations monitor packets transmitted on the network and interpret the lack of packets in the time slot as a cancellation of the reservation. Ex. 1026, 11:9–13; *see* Pet. 35; Ex. 1002 ¶ 155.

Petitioner relies on a combination of Bella’s time slot cancellation method with the system of Natarajan 1992 to satisfy the additional limitations of claim 11. Pet. 34–38; Ex. 1002 ¶¶ 161–67. Like Bella, Natarajan 1992 describes a system in which mobile stations make reservation requests for slot allocation. Ex. 1011, 7–8; *see* Pet. 37–38; Ex. 1002 ¶ 165. If a mobile station requests isochronous service, the requested number of slots will be allocated to the mobile station in Period B of every frame until the mobile station cancels the allocation by sending a cancellation request. Ex. 1011, 8; *see* Pet. 36, 38; Ex. 1002 ¶ 166. Thus, Natarajan 1992 teaches “revoking a previous transmission opportunity allocation of a remote,” as recited in claim 11, when the hub receives a cancellation request from the remote. *See* Pet. 37–38; Ex. 1002 ¶ 166–67. If

the system of Natarajan 1992 instead utilized Bella's cancellation method, which revokes a previous transmission allocation when a remote transmits no packets in a communication cycle, we are persuaded by Petitioner's argument that the combination would result in "the hub revoking a previous transmission opportunity allocation of a remote which has not transmitted more than a predetermined number of frames" (zero) "during a previous number of communication cycles" (one). *See* Pet. 37–38; Ex. 1002 ¶ 167. Furthermore, if Natarajan 1992 employed the cancellation technique of Bella, the hub would be "monitoring the frames transmitted by each remote during its transmission opportunity." *See* Pet. 37; Ex. 1002 ¶¶ 162, 164.

Petitioner also has articulated sufficient reasoning with some rational underpinning to support the legal conclusion that the subject matter of claim 11 would have been obvious to one of ordinary skill in the art in view of the combined teachings of the references. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007); Pet. 35–37; Ex. 1002 ¶¶ 156–60. According to Petitioner, for example, the combination would simplify the cancellation method of Natarajan 1992 by allowing the hub to revoke a time slot allocation when the remote stops transmitting. Pet. 36; Ex. 1002 ¶ 158. Relying on Dr. Haas's testimony for support, Petitioner also asserts that using Bella's cancellation method makes even more sense when the remotes are mobile, as in Natarajan 1992, because they may move outside of the hub's range abruptly and be unable to cancel their own reservations. Pet. 37; Ex. 1002 ¶ 159. Moreover, we are persuaded by Petitioner's position that only ordinary skill would be required to implement the reservation and cancellation method of Bella in the Natarajan 1992 system. *See* Pet. 37; Ex. 1002 ¶ 160.

base station; and Period C is for contention-based inbound traffic. *Id.* As in Natarajan 1992, immediately preceding each interval is a header containing control information from which a mobile station can determine when to power on and off its transmitter and receiver. *Id.* at 4:41–5:60. Header BH contains an ordered list of mobile stations that are allowed to transmit data packets to the base station during Period B and the bandwidth allocated to each mobile station. *Id.* at 5:9–19.

2. *Bantz*

Bantz, which shares a co-inventor with Natarajan '542, describes a MAC protocol for use in wireless networks. Ex. 1014. Like Natarajan '542, Bantz describes a frame (or communication cycle) with intervals for inbound and outbound traffic between a base station and mobile stations. *See id.* at Fig. 3A. Of particular note is Bantz's teaching that the protocol described therein "may be implemented in a distributed file system composed of only remote stations, one of which is designated as a base station. Moreover, the designation of the base station can be made to be dynamic" *Id.* at 11:53–57.

3. *Analysis*

Petitioner contends that Natarajan '542 teaches most of the limitations of claims 6, 14, and 21. Pet. 47–58. Petitioner's detailed analysis is similar to that presented with respect to anticipation of these claims by Natarajan 1992, a substantially similar reference. *Id.* The one exception is that Petitioner relies on Bantz for teaching the "designating" limitation recited in each of claims 6, 14, and 21. *Id.* at 44, 49. We agree with Petitioner that Bantz teaches designating a "hub" (i.e., base station that coordinates and relays communications between mobile stations) and

designating the remaining mobile stations as “remotes.” Ex. 1014, 4:1–18, 11:50–62; *see* Pet. 49; Ex. 1002 ¶¶ 224–25. We also are persuaded by Petitioner’s analysis that Natarajan ’542 discloses the remaining limitations of claims 6, 14, and 21, including the “each” limitation and “transmitting” limitation as properly construed, for reasons similar to those explained with respect to anticipation by Natarajan 1992. *See* Pet. 47–58.

Moreover, we are persuaded that Petitioner has provided sufficient reasoning with some rational underpinning to support the conclusion of obviousness based on the combination of Natarajan ’542 and Bantz, which Petitioner describes as “the incorporation of known techniques (those of Bantz) for their known functions with a known base system (described in Natarajan ’542), without unpredictable results.” *Id.* at 46–47 (citing *KSR*, 550 U.S. at 415–20); *see* Ex. 1002 ¶¶ 209–10. For example, Bantz teaches that the ability to designate a base station dynamically is advantageous in the event that a currently designated base station should fail, a feature that would have been desirable in the network disclosed in the related Natarajan ’542 reference. *See* Ex. 1014, 11:52–61; Pet. 44–45; Ex. 1002 ¶¶ 203–04.

Having considered the parties’ contentions and supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence that claims 6, 14, and 21 would have been obvious over the combination of Natarajan ’542 and Bantz.

E. Obviousness over Natarajan ’542, Bantz, and Bella—Claim 11

Petitioner contends that claim 11 is unpatentable under 35 U.S.C. § 103(a) over the combination of Natarajan ’542, Bantz, and Bella, relying on declaration testimony of Dr. Haas. Pet. 58–59; *see* Ex. 1002 ¶¶ 262–69.

Patent Owner makes no additional arguments directed specifically to this asserted ground. *See* PO Resp. 7–8.

For reasons discussed in the previous two sections, Natarajan ’542 teaches most of the limitations of claim 11, except for the “designating” limitation (taught by Bantz) and the “monitoring” and “revoking” limitations (taught by the combination of Natarajan ’542 and Bella). *See* Pet. 58–59. Also for reasons discussed previously, Petitioner has articulated sufficient reasoning with some rational underpinning to support a conclusion of obviousness in view of the combined teachings of the references. *See id.* As Petitioner points out, the only material difference between Natarajan ’542 and Natarajan 1992 is that although Natarajan ’542 discloses mobile stations sending bandwidth requests to the base station, it does not expressly disclose requests for isochronous service, in which bandwidth is reserved in all future frames until cancelled. *See* Pet. 58; Ex. 1002 ¶ 262; Ex. 1003, 5:63–64. Nevertheless, Petitioner contends, with support from Dr. Haas, that carrying voice and other isochronous traffic would have been desirable in the relevant timeframe, so that it would have been obvious to add the capability to Natarajan ’542 by using booking packets as taught by Bella, combined with Bella’s method for cancelling, or revoking, the reservation. *See* Pet. 58–59; Ex. 1002 ¶¶ 262–64.

Having considered the parties’ contentions and supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence that claim 11 would have been obvious over the combination of Natarajan ’542, Bantz, and Bella.

III. CONCLUSION

Based on the evidence and arguments, Petitioner has demonstrated by a preponderance of the evidence that (i) claims 6, 14, and 21 of the '734 patent are anticipated by Natarajan 1992, (ii) claim 11 is unpatentable for obviousness over the combination of Natarajan 1992 and Bella; (iii) claims 6, 14, and 21 are unpatentable for obviousness over the combination of Natarajan '542 and Bantz; and (iv) claim 11 is unpatentable for obviousness over the combination of Natarajan '542, Bantz, and Bella.

IV. ORDER

Accordingly, it is:

ORDERED that claims 6, 11, 14, and 21 of U.S. Patent No. 5,371,734 have been shown to be unpatentable.

This is a final written decision. Parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 5,371,734

FOR PETITIONERS:

Matthew A. Smith
Zhuanjia Gu
TURNER BOYD LLP
smith@turnerboyd.com
gu@turnerboyd.com

Jeffrey M. Olson
Matthew S. Jorgenson
SIDLEY AUSTIN LLP
jolson@sidley.com
mjorgenson@sidley.com

FOR PATENT OWNER:

Matthew Pasulka
ATLAS IP, LLC
mpasulka@hotmail.com

George C. Summerfield
STADHEIM AND GREAR, LTD.
summerfield@stadheimgear.com