

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

G+ COMMUNICATIONS, LLC,
Patent Owner.

IPR2022-01598
Patent 10,594,443 B2

Before GREGG I. ANDERSON, SCOTT B. HOWARD, and
JASON M. REPKO, *Administrative Patent Judges*.

ANDERSON, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Samsung Electronics Co. Ltd., (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1,2, 6, 8–11, 15, 17, and 18 of U.S. Patent No. 10,594,443 B2 (Ex. 1001, “the ’443 patent”). Paper 1 (“Pet.”). We instituted *inter partes* review on April 4, 2023. Paper 10 (“Inst. Dec.”). G+ Communications, LLC (“Patent Owner”) filed a Response. Paper 14 (“PO Resp.”). Petitioner filed a Reply. Paper 24 (“Pet. Reply”). Patent Owner filed a Sur-reply. Paper 29 (“Sur-reply”).

A hearing was held on January 18, 2024, and a transcript has been made of record. Paper 37 (“Tr.”). After the hearing, we ordered supplemental briefing directed to construction of the claim term “transmission blocks.” Paper 33 (“Construction Order”). Petitioner and Patent Owner filed simultaneously supplemental briefs per the Construction Order. Paper 35 (“Pet. Supp. Br.”); Paper 34 (“PO Supp. Br.”).

We have jurisdiction under 35 U.S.C. § 6. Upon considering the record, for the reasons discussed below, we find Petitioner has not shown by a preponderance of the evidence that claims 1,2, 6, 8–11, 15, 17, and 18 are unpatentable.

II. BACKGROUND

A. Real Parties in Interest

Petitioner states it and Samsung Electronics America, Inc. are the real parties in interest. Pet. 1. Patent Owner asserts it is the real party in interest. Paper 4, 1.

B. Related Matters

Both parties list a lawsuit filed by Patent Owner asserting the ’443 patent against Petitioner in the Eastern District of Texas captioned *G+ Communications, LLC v. Samsung Electronics Co., Ltd.*, Case No. 2:22-cv-

0078-JRG (E.D. Tex.). Pet. 1; Paper 4, 1. The parties identify no other related matters. *Id.*

C. The '443 Patent

The application for the '443 patent was filed as national stage application No. 15/749,354 on January 31, 2018, from PCT/CN2016/089196 filed on July 7, 2016. Ex. 1001, codes (21), (22), (86). The PCT application claims priority to Chinese application 2015 1 0466184.5, filed July 31, 2015. *Id.* at 1:7–12. Petitioner “assumes the earliest effective filing date of the '443 patent is July 31, 2015.” Pet. 2.¹

1. Background Technology

The '443 patent relates to “wireless communication technology, particularly to a method for transmitting hybrid automatic repeat request (HARQ) information . . . and a node.” Ex. 1001, 1:16–20. A first node receives data transmitted by a second node over one or more carrier waves or progresses. *Id.* at 1:24–27. Each node may be a base station or terminal. *Id.* If a transmission block is detected and correctly received, an “acknowledgement (ACK) is fed back; otherwise, a negative acknowledgement (NACK) is fed back.” *Id.* at 1:32–34. Every carrier wave has one transmission block unless in the spatial-multiplexing transmission mode. *Id.* at 1:35–45.

Related technologies include long term evolution (LTE), spatial multiplexing, and time division multiplexing (TDD) modes. Ex. 1001, 1:35–2:11. The related technologies provide 32 feedback bits of HARQ for 32 carrier waves when not transmitting in a multiplexing mode. *Id.* at 1:66–

¹ Patent Owner does not dispute the prior art status of the references relied on. *See* Section II.E below.

2:11. For purpose of saving control signaling overhead, coverage, power consumption, and the like, the receiving node usually needs to reduce the number of bits of the HARQ information which is fed back to the transmitting node. *Id.* at 2:12–16. In the related technologies, if one of the transmission blocks is incorrectly received, then the receiving node has to retransmit all of the blocks “because the [transmitting] node 2 cannot determine which one of the transmission blocks is erroneous according to the HARQ information fed back by the [receiving] node 1.” *Id.* at 2:31–33.

2. The '443 Patent's Error Detection Method

The '443 patent describes and claims “a method for receiving HARQ information and a node, which does not require strong correlation for the channel, and can conserve transmission resources and improve system throughput while reducing the HARQ information feedback overhead.” Ex. 1001, 2:54–58. In addition, the '443 patent describes “a method for transmitting HARQ information” where a “first node detects N transmission blocks received from a second node and generat[es] M bits of HARQ information according to a detection result.” *Id.* at 2:60–64. Six embodiments are described, all of which disclose that the “16 transmission blocks are transmitted over different carrier waves.” *Id.* at 10:35–38, 11:26–29. 11:54–58, 12:13–16, 13:22–25, 14:23–26.

[A]mong the M bits, there are M2 bits used to indicate positions of k erroneous transmission blocks in the N transmission blocks, $M2 \leq M$; a length type of M2 includes a first length type or a second length type; the first length type indicates that a value of M2 is predefined, and the second length type indicates that a value of M2 is determined based on k.

Ex. 1001, 2:66–3:5.

The '443 patent teaches that the first predefined length type of M2 may be “configured by a radio resource control (RRC) signaling transmitted by the second node; or configured by a downlink control information (DCI) signaling transmitted by the second node; or determined by the first node,” and is predefined. Ex. 1001, 6:45–50. The second length type based on k may be determined when the number of erroneous transmission blocks in the N transmission blocks (k) is less than or equal to a first threshold (kT1) and greater than or equal to a second threshold (kT2), where the value of M2 is determined based on k. *Id.* at 6:51–55.

D. Illustrative Claim

Claims 1, 2, 6, 8–11, 15, 17, and 18 of the '443 patent are challenged. Pet. 4. Claims 1, 8, 10, and 17 are independent. Claims 1 and 8 claim a method, and claims 10 and 17 claim a node. Claims 2 and 6 depend from claim 1. Claim 9 depends from claim 8. Claims 11 and 15 depend from claim 10. Claim 18 depends from claim 17. Claim 1 is reproduced below as illustrative.

[1.pre]² A method for transmitting hybrid automatic repeat request (HARQ) information, comprising:

[1.a] detecting, by a first node, N transmission blocks received from a second node and generating M bits of HARQ information according to a detection result;

[1.b] the M bits of HARQ information being used to indicate a receiving status of the N transmission blocks; among the M bits, M2 bits being used to indicate positions of k erroneous transmission blocks in the N transmission blocks, $M2 \leq M$;

²For purposes of this Decision, we follow Petitioner's format as shown in the Petition, where each claim is identified by claim number followed by a letter for each claim limitation. *See, e.g.*, Pet. 15–23 (claim 1). Patent Owner also uses the format. *See* PO Resp. ix–xii (“CLAIM LISTING”).

[1.c] a length type of M2 including a first length type or a second length type; the first length type indicating a value of M2 being predefined, and the second length type indicating a value of M2 being determined based on k; and

[1.d] transmitting, by the first node, the HARQ information to the second node.

Ex. 1001, 16:23–37.

E. Evidence of Record

This proceeding relies on the following prior art references and expert testimony:

Kannan, US 2016/0233999, filed February 1, 2016, published August 11, 2016 (Ex. 1006, “Kannan”³);

Petitioner relies on the Declaration of Dr. Zhi Ding in Support of Petition for *Inter Partes* Review of U.S. Patent No. 10,594,443 (Ex. 1003, “Ding Declaration”) and the Rebuttal Declaration of Dr. Zhi Ding (Ex. 1016, “Ding Rebuttal Declaration”); and

Patent Owner relies on the Declaration of Robert Akl in Support of Patent Owner’s Preliminary Response (Ex. 2001, “Akl Declaration”) and the Declaration of Dr. Robert Akl in Support of Patent Owner’s Response (Ex. 2007, “Akl Rebuttal Declaration”).

³ The following priority applications are related to Kannan but are no longer relevant to our Decision because the prior art status of Kannan is not in dispute: “Kannan Provisional Application,” Application No. 62/112,310, filed February 5, 2015 (Ex. 1007); “Kannan Publication,” WO 2016/126653 A1, filed February 2, 2016, published August 11, 2016 (Ex. 1011). *See* Inst. Dec. 5–6 (identifying related applications).

F. Asserted Ground

Claim(s) Challenged	35 U.S.C.⁴ §	Reference(s)/Basis
1, 2, 6, 8–11, 15, 17, 18	102	Kannan

III. PATENTABILITY ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner proposes that a person of ordinary skill in the art for the invention of the '443 patent “would have had an undergraduate degree in electrical engineering, computer engineering, computer science or a related field along with at least two years of work experience in the field of wireless communication technology.” Pet. 3–4 (citing Ex. 1003 ¶¶ 23–24).

Patent Owner does not propose a level of ordinary skill and “takes no position with respect to Petitioner’s proposed level of ordinary skill in the art” because “it does not affect the ultimate analysis.” PO Resp. 11–12.

For purposes of this Decision, we adopt Petitioner’s proposed level of ordinary skill because we are satisfied that it comports with the level of skill necessary to understand and implement the teachings of the '443 patent. The proposed level of skill is consistent with the field of the invention as indicated by the cited prior art.

B. Claim Construction

For petitions filed on or after November 13, 2018, a claim shall be construed using the same claim construction standard that would be used to

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. § 102 effective March 16, 2013. Because the challenged patent was filed after March 16, 2013, we refer to the current version of Section 102, but the findings and analysis in this Decision would be the same under the pre-AIA version of the statute.

construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100 (2022). The Petition was accorded a filing date of October 4, 2022. Paper 3. Thus, we apply the claim construction standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Petitioner asserts “claim terms are typically given their ordinary and customary meanings, as would have been understood by a [person of ordinary skill in the art] at the time of the invention, having taken into consideration the language of the claims, the specification, and the prosecution history of record.” Pet. 14 (citing *Phillips*, 415 F.3d at 1312–16); *see also* Pet. Reply 1. Thus, Petitioner deems that express construction is unnecessary and does not propose any term for construction. Pet. 14–15; Pet. Reply 1.

Patent Owner argues the term “N transmission blocks” requires construction. PO Resp. 15. Otherwise, Patent Owner “requests that the Board adopt the ordinary and customary meaning of the claim terms as understood by a person of ordinary skill in the art.” *Id.* at 14–15.

1. “transmission blocks”

The term “transmission blocks” is present in all independent claims, and thus all claims. Petitioner relies on Kannan to teach “transmission blocks.” Pet. 16–18 (citing, *inter alia*, Ex. 1006 ¶¶ 8–9, 64, 79–83, 90, Fig. 2; Ex. 1003 ¶¶ 42–44). The question becomes: does Kannan teach “transmission blocks,” as the term is properly construed? The construction of “transmission blocks” is therefore dispositive of this proceeding.

The '443 patent explains that “a node 1 (e.g., a terminal or a base station) usually receives data transmitted by a node 2 (e.g., a base station or a terminal) over one or more carrier waves or progresses.” Ex. 1001, 1:24–27. The '443 patent continues that a “first node detects N transmission blocks received from a second node and generat[es] M bits of HARQ information according to a detection result; wherein the M bits of HARQ information are used to indicate a receiving status of the N transmission blocks.” *Id.* at 2:62–66. Kannan uses the terms “code block” and “transport block” to “communicate control and data” from a transmitting device (“base station”) to a receiving device (“user equipment”). Ex. 1006 ¶ 52. We determine that the terms “transmission block,” “code block,” and “transport block” all relate broadly to communicating control information and/or data between two nodes or terminals, for example, a base station and user equipment. Neither party argues anything contrary to this determination.

With the above context, we advised the parties of our preliminary construction of “transmission blocks” following the final hearing. *See* Construction Order. In the Construction Order we preliminarily construed the term to mean a “single entity that can be transmitted on the physical (PHY) layer in the [Open Systems Interconnection (OSI)] model.” *Id.* (citing PO Resp. 23; *see also* Ex. 2006, 37–38 (describing the OSI model), *cited in* PO Resp. 17 n.2)).

Prior to entry of the Construction Order, Patent Owner contended that “a ‘code block’ is not a ‘transmission block.’” PO Resp. 23 (citing Ex. 1006 ¶ 63; Ex. 2007 ¶ 52). Patent Owner also argued “[a] ‘transport block’ [as described in Kannan] is also a single entity that can be transmitted on the PHY layer” while “[c]ode blocks are not separate entities on the PHY layer

(layer 1) and can only be transmitted as part of a transport block.” *Id.* at 23–24 (citing Ex. 1006 ¶ 63; Ex. 2007 ¶ 52).

Patent Owner argues the PHY layer is the physical layer of the OSI model. *See, e.g.*, PO Resp. 17 n.2 (citing Ex. 2007 ¶¶ 18–20; Ex. 2006,⁵ 37–38). Patent Owner contends that “unlike transmission blocks, the code blocks that are not received correctly will be retransmitted—**not on their own on the PHY layer, but as part of another (different) transport block.**” *Id.* at 24 (citing Ex. 1006 ¶¶ 52, 63, 73; Ex. 2007 ¶ 53); *see also* Sur-reply 15 (citing Ex. 1006, code (57), ¶¶ 8, 52, 80, 84–86, Fig. 3; Ex. 2007 ¶ 52).

Patent Owner contends “code blocks” are not transmitted alone but only as part of “transmission blocks,” i.e., Kannan’s “transport blocks.” PO Resp. (citing Ex. 1006, code (57), ¶¶ 8, 52, 80, 84–86, Fig. 3; Ex. 2007 ¶ 52). Patent Owner points out that Kannan uses the OSI medium access control (MAC) layer in the OSI model and “also use[s] HARQ to provide retransmission to improve link efficiency.” *Id.* (citing Ex. 1006 ¶ 63). According to Patent Owner, “a [person of ordinary skill in the art] would understand that ‘code blocks’ operate on a different OSI layer (MAC sublayer) than transfer/transmission blocks (physical layer).” Sur-reply 14 (citing Ex. 2007 ¶ 52).

Prior to entry of the Construction Order, and in response to Patent Owner’s proposed construction, Petitioner applied what it argues is the plain and ordinary meaning of “transmission block” as a “block received by a first node from a second node for which the first node indicates a receiving

⁵ Tanenbaum, *Computer Networks* (Pearson Education, Inc. 4th Ed. 2003) (“Tanenbaum reference”).

status.” Pet. Reply 1 (citing Ex. 1016 ¶¶ 4–14). According to Petitioner the ordinary meaning results in a “code block” being a “transmission block” and Kannan discloses the “N transmission blocks.” *Id.* at 2–8 (citing Ex. 1003 ¶ 42; Ex. 1016 ¶¶ 16–22; Ex. 1006 ¶¶ 8–9, 52–63, 79–83).

Petitioner’s Supplemental Brief argues that the preliminary construction should be rejected because the claims of the ’443 patent make no reference to the OSI model or the MAC or PHY layers. Pet. Supp. Br. 1. Petitioner argues that “[e]ven if transmission blocks are carried by carrier waves, the specification does not tie a carrier wave to a physical layer in the OSI model, which is ‘an abstract concept’ and ‘not all networks follow that.’” *Id.* at 2 (citing Ex. 2008, 23:11–16, 41:19–21). Petitioner further contends that the construction does not provide any connection between certain benefits⁶ of the ’443 patent and the preliminary construction. *Id.* Petitioner asserts we should give no weight to the Akl Rebuttal Declaration as it is “conclusory” and “divorced from the claims and specification.” *Id.* at 3 (citing Ex. 2007 ¶¶ 52–53). Petitioner notes that “single entity is not defined, asking rhetorically “is a single bit a ‘single entity.’”” *Id.* at 4 n.1.

Petitioner alleges our preliminary construction “does not require a transmission block to be a ‘separate entity’ on the PHY layer; it merely requires that the ‘transmission block’ be a ‘single entity.’” Pet. Supp. Br. 4. Petitioner disputes specifically that our construction requires that the “single entity” be “on the PHY layer.” *Id.* This argument is incorrect as our construction determined that the “single entity . . . can be *transmitted on the*

⁶ The benefits identified by Petitioner include efficiency gained by not retransmitting correctly decoded transmission blocks and “strong correlation for the channel.” Pet. Supp. Br. 2 (citing Ex. 1001, 12:13–13:19 (retransmission), 2:53–58 (strong correlation)).

physical (PHY) layer in the OSI model.” Construction Order 3 (emphasis added).

Patent Owner’s Supplemental Brief agrees with the preliminary construction and contends “the intrinsic evidence uniformly supports the idea that the recited ‘transmission blocks’ are transmitted on the PHY layer in the OSI model.” PO Supp. Br. 1 (citing Ex. 1001, 1:40–45, 1:66–2:11; 2:12–4, 2:53–58). Patent Owner highlights other aspects of the ’443 patent disclosing that a “transmission block” in the LTE system for feed back of HARQ information includes: 1) [o]ne HARQ bit transmission block (Ex. 1001, 1:43–45); 2) [t]wo bits for spatial multiplexed transmission blocks (*id.* at 1:39–43); and 3) [o]ne transmission block per subframe (*id.* at 1:59–60). PO Supp. Br. 1.

Patent Owner further contends the ’443 patent’s disclosure of “waves and transmission modes” indicates to a person of ordinary skill in the art that “transmission blocks carry data on the PHY layer of the Open Systems Interconnection (OSI) model.” PO Supp. Br. 1–2 (citing Ex. 2007 ¶¶ 18–21, 52; Ex. 2006, 69, 230–231). Patent Owner points to the ’443 patent’s explanation that “every carrier wave has 1 transmission block” as support for that portion of our preliminary construction that a “transmission block” is a single discrete entity. PO Supp. Br. 2 (quoting Ex. 1001, 1:45). Patent Owner argues that the plural form of “transmission blocks” requires two or more. *Id.* (citing PO Resp. 25–28).

We are not persuaded that Petitioner’s alleged plain and ordinary meaning construction is consistent with the ’443 patent specification. *See* Pet. Reply 1 (“[T]he plain and ordinary meaning of ‘transmission block’ is simply a ‘block received by a first node from a second node for which the first node indicates a receiving status.’”) (citing Ex. 1016 ¶¶ 4–14). In the

Construction Order we invited “arguments as to why our preliminary construction may be incorrect.” Construction Order 4. Petitioner only argues that the claims “do not mention the OSI model or any of its layers.” Pet. Supp. Br. 1.

The ’443 patent supports our preliminary construction. The ’443 patent does not expressly define “N transmission blocks” or “transmission blocks.” However, the ’443 patent Background relating to LTE explains that

When the transmission mode of the carrier wave is a spatial multiplexing mode, e.g., every carrier wave has 2 transmission blocks waves, each of the carrier wave(s) needs to feed back 2 bits of HARQ information; otherwise, *each of the wave(s) needs to feed back 1 bit of HARQ information (every carrier wave has 1 transmission block).*

Ex. 1001, 1:39–45 (emphasis added). Among other features of a “transmission block,” the ’443 patent explains that there are 9 downlink subframes to feedback HARQ information and there is one transmission block per subframe. Ex. 1001, 1:59–60; *see also* PO Supp. Br. 1 (identifying aspects of a “transmission block” in the LTE system). As will be explained further, the preceding supports both that a “transmission block” is a “single entity” and that it is “transmitted on the physical (PHY) layer in the OSI model.”

Concerning the “single entity” aspect of our preliminary construction, as per the above from the ’443 patent, “every carrier wave has 1 transmission block.” Ex. 1001, 1:35–45. In all six embodiments, “the 16 transmission blocks are transmitted over different carrier waves.” *Id.* at 10:35–38, 11:26–29, 11:54–58, 12:13–16, 13:22–25, 14:23–26. A “transmission block” in the LTE system for feed back of HARQ information includes: 1) [o]ne HARQ bit transmission block (*id.* at 1:43–45); 2) [t]wo

bits for spatial multiplexed transmission blocks (*id.* at 1:39–43); and 3) [o]ne transmission block per subframe (*id.* at 1:59–60). *See* PO Supp. Br. 1.

Contrary to Petitioner’s proposed construction, the transmission modes of the ’443 patent support that part of our preliminary construction that provides that “transmission blocks” are “transmitted on the physical (PHY) layer in the OSI model.” The ’443 patent’s Background explains that “node 2 transmits data to the node 1 over a plurality of carrier waves.” Ex. 1001, 2:39–41. The ’443 patent describes the invention as “a method for transmitting HARQ information, a method for receiving HARQ information and a node.” *Id.* at 2:53–57. The ’443 patent explains that HARQ bits are transmitted in the spatial multiplexing, time division duplexing (TDD), or frequency division duplexing (FDD) modes. *Id.* at 1:39–45 (spatial multiplexing transmission mode), 1:51–2:11 (FDD and TDD transmission modes)).

The extrinsic evidence also supports our conclusion that a “transmission block” is based on the OSI model and the associated MAC and PHY layers. We rely on the Akl Rebuttal Declaration (Ex. 2007), which we find credible, and the Tanenbaum reference (Ex. 2006), to determine that the ’443 patent’s disclosure of “waves and transmission modes” indicates to a person of ordinary skill in the art that “transmission blocks carry data on the PHY layer of the Open Systems Interconnection (OSI) model.” *See* Ex. 2007 ¶¶ 18–21, 52; Ex. 2006, 69, 230–231. FDD and TDD are two schemes used in the physical layer (PHY) of the OSI model. Ex. 2006, 30. “The lowest Physical OSI layer would be, for example, where the raw bits are actually transmitted and streamed on the physical medium between the nodes.” *See* PO Resp. 17 n.2 (citing Ex. 2007 ¶¶ 19–20).

We specifically note that the cited Tanenbaum reference teaches that the “Physical Layer” includes transmission in the form of “broadband wireless . . . in the 10-to-66 GHz range.” Ex. 2007, 230. The Akl Rebuttal Declaration also provides support for our determination that the recited “transmission block” or “N transmission blocks” are single entities on the PHY layer in the OSI model but “code blocks” are not. Ex. 2007 ¶ 52; *see also id.* ¶¶ 18–21 (describing OSI model as a seven layer telecommunications system)).

The Ding Rebuttal Declaration does not respond directly to Dr. Akl’s testimony, opining only that the testimony is “untethered” to the teachings of the ’443 patent. *See* Ex. 1016 ¶¶ 10–14. We are not persuaded by this argument. *Phillips*, 415 F.3d at 1318. *Phillips* restated prior holdings that

extrinsic evidence in the form of expert testimony can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.

Id. The Akl Rebuttal Declaration testimony does not need to be based on the ’443 patent in order to provide useful testimony.

The Ding Rebuttal Declaration also contends Dr. Akl cannot rely on Kannan to support the construction of “transmission blocks” based on the OSI model. Ex. 1016 ¶ 12. We disagree. Kannan is relevant to the claimed subject matter and is extrinsic evidence which the Akl Rebuttal Declaration uses to support its conclusion regarding the OSI model. Ex. 2007 ¶¶ 31–37, 49–50. Kannan is based on the OSI model and describes control and data transmission on the MAC and PHY layers. Ex. 1006 ¶ 63. We would reach

the same conclusion regarding claim interpretation would be reached regardless of whether Kannan is relied upon.

We are not persuaded that “single entity” requires a separate construction or additional clarification, presumably by “testimonial evidence.” *See* Pet. Supp. Br. 4 n.1. Here, we need not determine the precise outer bounds of the term “transmission block,” including all the different types of single entities, because the Board is required to construe the claim to only the extent necessary to resolve the dispute. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). The relevant context for understanding what is a single entity is the disclosures of Kannan and the ’443 patent regarding “code block,” “transport block,” and “transmission block.” Those are the “single entities” and are the focus of the dispute.

For the preceding reasons we adopt our preliminary construction of “transmission blocks” as our final construction. No additional terms are in dispute that require construction.

C. Legal Standard for Anticipation

In order for a prior art reference to serve as an anticipatory reference, it must disclose every limitation of the claimed invention, either explicitly or inherently. *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). We must analyze prior art references as a skilled artisan would. *See Scripps Clinic & Res. Found. v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991), *overruled on other grounds by Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282 (Fed. Cir. 2009) (to anticipate, “[t]here must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention”). As the Federal Circuit has held:

This modest flexibility in the rule that “anticipation” requires that every element of the claims appear in a single reference accommodates situations where the common knowledge of technologists is not recorded in the reference; that is, where technological facts are known to those in the field of the invention, albeit not known to judges. It is not, however, a substitute for determination of patentability in terms of § 103.

Cont’l Can Co. USA v. Monsanto Co., 948 F.2d 1264, 1268–69 (Fed. Cir. 1991). A claim limitation is inherent if it is necessarily present in the prior art, not merely probably or possibly present. *Akamai Techs., Inc. v. Cable & Wireless*, 344 F.3d 1186, 1192 (Fed. Cir. 2003).

D. Anticipation of Claims 1, 2, 6, 8–11, 15, 17, and 18 by Kannan

Petitioner alleges claims 1, 2, 6, 8–11, 15, 17, and 18 are anticipated by Kannan. Pet. 2–4, 15–54. The Ding Declaration is cited as support. Ex. 1003 ¶¶ 39–100.

1. Kannan (Ex. 1006)

Kannan was published on August 11, 2016. Ex. 1006, code (22). *See* Section II.E above. Kannan claims priority to the February 5, 2015, filing date of the Kannan Provisional. *Id.* at code (60). Petitioner contends that Kannan is prior art under 35 U.S.C. § 102. Pet. 2–3. Our Institution Decision determined preliminarily that Kannan was entitled to the filing date of the Kannan Provisional. Inst. Dec. 27. Patent Owner does not contest that Kannan is prior art to the ’443 patent. *See generally* PO Resp.

Kannan, titled “Efficient ACK/NACK Transmission,” relates to wireless communication, and more specifically, to code block (CB) level HARQ. Ex. 1006, code (54). The transport blocks are configured with subunits known as code blocks (CBs) and an ACK/NACK response may be sent for each CB. *Id.* ¶ 52. In wireless communication systems, a

transmitting device, such as a base station, may communicate control and data to a receiving device, such as a user equipment (UE), using Medium Access Control (MAC) layer units known as transport blocks. *Id.*

The receiving device may respond with an acknowledgement (ACK) or a negative acknowledgement (NACK) indicating whether the receiving device has successfully received and decoded each transport block. Ex. 1006 ¶ 52. Providing ACK/NACK feedback at the CB level “may be useful for implementations in which channel interference may occur in relatively short bursts that may last only a fraction of the length of a transport block.” *Id.* Such an implementation may “enhance channel efficiency” because it permits “[r]etransmissions of only the affected CBs, rather than retransmission of the entire transport block.” *Id.*

Base stations and UEs exchange data using transport blocks that include multiple CBs where the UE may attempt to decode a transport block and send ACK/NACK information to a base station based on whether each CB was successfully decoded. Ex. 1006 ¶ 75. The base station may receive the CB level ACK/NACKs, determine CBs that are indicated as being in error, and retransmit CBs that are indicated as being in error. *Id.* ¶ 82. Kannan discloses that ACK/NACKs may be sent in different formats. *Id.* ¶¶ 87–89. Figure 4B of Kannan is reproduced below.

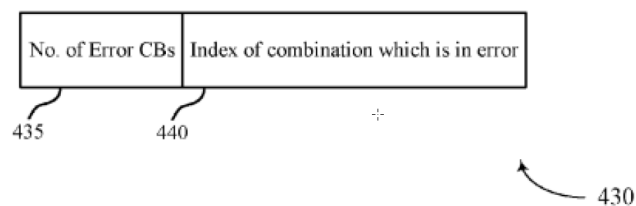


FIG. 4B

Figure 4B illustrates an example of a format for transmitting HARQ feedback.

As shown in Figure 4B, the ACK/NACK format 430 may be based on the number of transmitted CBs (referred to as “N”), a number of erroneous code blocks (referred to as “k”), and a predefined threshold of errors (referred to as “K*”). *Id.* ¶ 89. As shown in Figure 4B,

one or more dedicated bits 435 indicate a number of CBs that are in error, and a set of bits 440 [] provide an index identifying a combination of CBs that are in error The index may be, for example, an index into a lookup table that provides a bitmap of ACK/NACKs for the number of CBs indicated in the set of bits.

Id. ¶ 88.

2. Claims 1, 8, 10, and 17

Challenged claims 1, 8, 10, and 17 are all independent claims of the ’443 patent. Each independent claim recites “transmission blocks.” *See* Ex. 1001, 16:4 (claim 1), 17:7–8 (claim 8), 17:53 (claim 10), 18:45 (claim 17). Petitioner relies on Kannan to disclose “transmission blocks” for each independent claim. Pet. 16–18 (claim 1), 30 (claim 8), 40–41 (claim 10), 48 (claim 17).

Our construction of “transmission blocks” as meaning a “single entity that can be transmitted on the physical (PHY) layer in the [Open Systems Interconnection (OSI)] model” is dispositive of this proceeding. For reasons discussed below, Petitioner has not shown by a preponderance of the evidence that Kannan discloses “transmission blocks” as we have construed the term.

Limitation 1.a recites “detecting, by a first node, *N* transmission blocks received from a second node and generating M bits of HARQ information according to a detection result.” Emphasis added. In the Petition, Petitioner argues “a person of ordinary skill in the art would have

understood that a code block is a ‘transmission block.’” Pet. 17–18 (citing Ex. 1003 ¶¶ 42–44 (citing Ex. 1006 ¶ 64)). In the alternative, Petitioner also contends that Kannan’s transport block teaches the claimed “transmission block” because “the transport block may be represented by one CB.” *Id.* at 18 (quoting Ex. 1006 ¶ 64). In its supplemental brief Petitioner argues that Kannan’s “code blocks” meet our preliminary, now final, construction of “transmission block,” in part because a “code block” is a “single entity.” Pet. Supp. Br. 3 (citing Ex. 1016 ¶ 18; Ex. 1006 ¶¶ 8–9, 80–83; Ex. 1003 ¶ 43).

Patent Owner argues that our now final construction of “transmission blocks” requires us to find Kannan cannot anticipate any claim of the ’443 patent. PO Supp. Br. 2. The Akl Rebuttal Declaration adds that

Code blocks are not separate entities on the PHY layer (layer 1) and can only be transmitted as part of a transport block. Only in the higher layer 2 (MAC layer), is a transport block segmented into code blocks. Ex. 1006, Abstract (“Medium Access Control (MAC) layer units known as transport blocks which may include a number of code blocks (CBs).”); id., [0008], [0052].

Ex. 2007 ¶ 52 (emphasis added).

We agree with Patent Owner that because there are “N transmission blocks,” Petitioner’s “single code/transport block argument is contrary to the claim language and other intrinsic evidence and should be rejected.” PO Resp. 25–28. Further, we agree that N requires more than 1 because “[t]he applicants made clear in every embodiment that N transmission blocks is more than one, and they chose to specify in the claim language—not ‘one or more transmission blocks,’ but rather ‘N transmission blocks’ in the plural.” *Id.* at 27 (citing Ex. 1001, 10:35–38, 11:26–29, 12:13–16, 13:22–25, 14:23–26).

Petitioner argues that Patent Owner does not dispute that “Kannan discloses ‘N’ code blocks.” Pet. Reply 6. However, the question is whether Kannan’s “code blocks” are “transmission blocks” under our construction of the term as a “single entity that can be transmitted on the physical (PHY) layer in the OSI model.” *See* Section III.B.1 above; PO Supp. Br. 2.

Kannan is based on the OSI model and describes control and data transmission on the MAC and PHY layers. Ex. 1006 ¶ 63. Kannan explains that “[w]ireless devices may exchange data using Medium Access Control (MAC) layer units known as transport blocks that may include a number of CBs.” *Id.* ¶ 8. Further, at the PHY layer, “a transport block may be divided into CBs.” *Id.* ¶ 52. Kannan continues to describe that “code blocks” “may be bundled into multiple bundles having a certain number of CBs.” *Id.* These parts of Kannan support the Akl Rebuttal Declaration conclusion’s regarding the OSI model in Kannan. Ex. 2007 ¶¶ 31–37, 49–50. Thus, we credit the Akl Rebuttal Declaration on this issue (*id.*) over Dr. Ding’s testimony (Ex. 1016 ¶ 13) because it is better supported by Kannan.

Based on the preceding, we find that “code blocks” on the PHY layer are found only with “transport blocks” and are not a “separate entity.” *See* PO Supp. Br. 2.

Thus, Petitioner has not shown that claims 1, 8, 10, and 17 are unpatentable by a preponderance of the evidence.

3. Claims 2, 6, 9, 11, 15, and 18

Claims 2, 6, 9, 11, 15, and 18 all depend from one of independent claims 1, 8, 10, or 17. *See* Section III.D.2 above. As a result of their dependency on claims we have determined have not been shown to be unpatentable, claims 2, 6, 9, 11, 15, and 18 have likewise not been shown to be unpatentable.

Petitioner has not shown claims 2, 6, 9, 11, 15, and 18 are unpatentable by a preponderance of the evidence.

IV. CONCLUSION

For the reasons discussed above, Petitioner has not shown by a preponderance of the evidence that claims 1, 2, 6, 8–11, 15, 17, and 18 of the '443 patent are unpatentable as summarized in the table below.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not shown that challenged claims 1, 2, 6, 8–11, 15, 17, and 18 are unpatentable; and

FURTHER ORDERED that, because 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.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 6, 8–11, 15, 17, 18	102	Kannan		1, 2, 6, 8–11, 15, 17, 18

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