

**United States Court of Appeals
for the Federal Circuit**

**ERICSSON INC., TELEFONAKTIEBOLAGET LM
ERICSSON,**
Appellants,

v.

INTELLECTUAL VENTURES I LLC,
Appellee

2017-1521

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. IPR2015-
01367.

Decided: August 27, 2018

STEVEN GARRETT SPEARS, Baker & Hostetler LLP,
Houston, TX, argued for appellants. Also represented by
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BYRON LEROY PICKARD, Sterne Kessler Goldstein &
Fox, PLLC, Washington, DC, argued for appellee. Also
represented by LORI A. GORDON.

Before REYNA, TARANTO, and CHEN, *Circuit Judges.*

REYNA, *Circuit Judge*.

Ericsson Inc. and Telefonaktiebolaget LM Ericsson appeal the final written decision of the U.S. Patent and Trademark Office’s Patent Trial and Appeal Board, finding that claims 1–3, 6–9, and 12–14 of U.S. Patent No. 5,602,831 are not unpatentable under 35 U.S.C. § 103. Because we conclude that the Board improperly did not consider portions of Ericsson’s Reply, we vacate and remand.

I. THE ’831 PATENT

Appellee Intellectual Ventures I LLC (“Intellectual Ventures”) owns U.S. Patent No. 5,602,831 (“the ’831 patent”), entitled “Optimizing packet size to eliminate effects of reception nulls.” The ’831 patent expired on March 31, 2015.

The ’831 patent is directed to increasing the reliability of a wireless communications system when a wireless receiver is moving by minimizing the effects of burst errors that occur at the receiver. ’831 patent, Abstract; *id.* col. 1 ll. 5–8. The moving wireless communications devices disclosed in the ’831 patent transmit information via packets containing bits of information. Signal fading or signal drop-outs result in transmission errors in which some or all of the bits in the packet are not successfully received by the receiver. The ’831 patent refers to these transmission errors as “burst errors” or “nulls.” *Id.* col. 1 ll. 23–29. Although nulls occur randomly, they can be predicted based on various signal drop characteristics, such as the speed the receiver is moving. For instance, at slow speeds, nulls are generally wider and the amount of time between nulls is longer, whereas at higher receiver speeds, the nulls are narrower and occur more frequently. *See id.* col. 2 ll. 24–28.

The ’831 patent describes various techniques in the prior art for reducing the effects of burst errors and nulls,

including error correction techniques, retransmission, transmitting over multiple frequencies, and using multiple transmitter stations in various locations. *Id.* col. 1 l. 35–col. 2 l. 11. The patent further notes that “[a]nother technique for reducing the effects of burst errors involves interleaving multiple message packets together thus creating better burst error correction capabilities.” *Id.* col. 2 ll. 4–6. Interleaving is a coding technique by which data is read into a two-dimensional register (e.g., columns of characters) column-by-column, and then read out of the register row-by-row. J.A. 4. Interleaving multiple packets spreads out the effect of errors due to signal drops, such that any dropped signal will, at most, create only a loss of a small portion in each packet, rather than the loss of an entire packet. Regarding the prior art, the ’831 patent notes that the efficacy of interleaving in reducing the effects of burst errors for portable receivers is limited when the size of the interleaved packet does not change: “transmitting a single interleaved packet size for varying signal drop-out conditions is not completely effective in minimizing burst error effects.” ’831 patent col. 2 ll. 4–11.

The ’831 patent discloses new methods of mitigating the effects of signal drops, specifically by encoding packets into packet blocks by interleaving the packets together into a register, and varying the number of packets encoded into each packet block according to signal drop characteristics, such as the speed at which the receiver is moving. *Id.* col. 2 ll. 17–21, 34–48. Because of the interleaving, any burst errors are distributed between all packets in the packet block, which can then be decoded more easily. *Id.*, Abstract; *id.* col. 7 ll. 17–38. The ’831 patent makes clear that the technique of “interleaving” was known in the art:

Interleaving packets together is known in the art. However, varying the number of bytes in each packet interleaved together according to re-

ceiver speed is novel and provides substantial advantages over existing interleaving techniques.

Explaining further, the interleaving process discussed above increased the number of bytes in each packet successfully received by the receiver. However, if the speed of motion of the receiver changes, the signal drop-out characteristics also change as previously shown in FIGS. 3-5. Thus, the packet block size shown in FIG. 9 (9 packets) may not improve reception reliability at a new receiver travel speed.

....

To prevent more than one burst error (null) from occurring in any one packet block, the transmitter again adjusts the packet block size according to the new travel speed of the receiver.

Id. col. 6 l. 42–col. 7 l. 26 (emphasis added).

Claims 1 and 9 are the independent claims and, for purposes of this appeal, are illustrative:

1. A method for transmitting a message packet to a receiver, comprising:

identifying changes in signal drop-out characteristics each associated with the receiver;

encoding packets into packet blocks;

transmitting each packet block to the receiver;
and

varying the number of packets encoded in the packet block according to the changes in the signal drop-out characteristics.

9. A system for transmitting messages, comprising:

a receiver having a variable speed of motion, the receiver receiving packet blocks containing the messages;

a transmitter for transmitting the packet blocks to the receiver; and

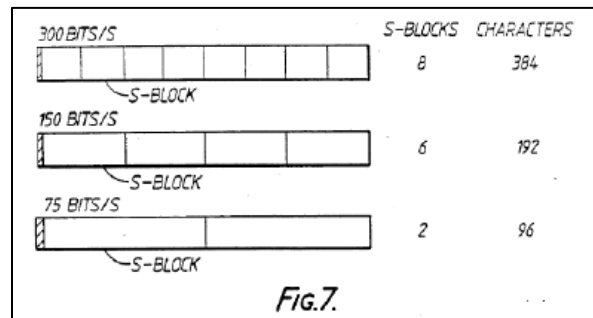
an encoder for combining and varying the number of packets transmitted in each of the packet blocks according to the variable speed of the receiver.

Id. col. 8 ll. 47–55, col. 9 ll. 27–34.

II. PRIOR ART

A. Reed

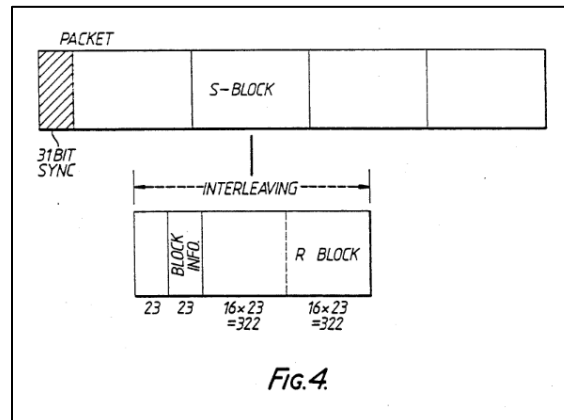
U.S. Patent No. 4,939,731 (“Reed”) describes a data transmission protocol in which data signals are transmitted as a data packet. Each packet includes one or more blocks of data, called “send blocks” or “S-blocks,” each encoded with an error correcting code, or “codeword.” The exact number of S-blocks within each data packet depends on the baud rate in use—i.e., as baud rate increases, the number of S-blocks increases, as shown in Figure 7 below:



J.A. 906.

The codewords are further divided into numbered “Repetition blocks,” referred to as R-blocks. R-blocks can be concatenated with additional codewords to create an S-block. Reed describes how, during transmission, a data

bit interleaving scheme is employed over each S-block. For instance, Figure 4 shows a diagram of a packet of data comprised of a plurality of concatenated S-blocks, each S-block being formed of a plurality of interleaved R-blocks:



J.A. 904.

Reed describes how “further protection against burst errors may be provided by interleaving two or more blocks of data within each packet of data so that should burst errors occur these will be spread equally over the interleaved blocks so that the blocks may nevertheless be recoverable.” Reed, col. 2 ll. 62–68 (J.A. 907).

B. Mahany

U.S. Patent No. 5,425,051 (“Mahany”) describes a “Radio frequency communication network having adaptive parameters,” and teaches that changing the size of data packets can reduce the amount of data loss caused by fluctuations in signal energy and signal fading in RF communication.

III. PTAB PROCEEDING

Appellants Ericsson Inc. & Telefonaktiebolaget LM Ericsson (collectively, “Ericsson”) petitioned for *inter partes* review of the ’831 patent on June 10, 2015. Alt-

though the '831 patent had expired prior to Ericsson's Petition, Ericsson proposed constructions in the Petition for various terms under the broadest reasonable interpretation standard, rather than the standard elucidated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

The Board instituted *inter partes* review of the '831 patent on two grounds: (1) that claims 1–3, 6, 7, 9 and 12–14 were likely obvious over Reed and Mahany, and (2) that claim 8 was likely obvious over Reed, Mahany, and Webb. Webb is not relevant to this appeal. J.A. 2, 19. In its Institution Decision, the Board concluded that independent claims 1 and 9, which recite “encoding packets into packet blocks” and an “encoder for combining and varying the number of packets transmitted in each of the packet blocks,” respectively, do not require interleaving, and that Intellectual Ventures did not explain in its Preliminary Response why the Board should construe “encode” as requiring interleaving. J.A. 35. The Board additionally construed the terms “interleaving portions of each of the packets together,” and “common portions of each message packet are interleaved together” in explaining why it did not institute review on dependent claims 10, 11, and 15. Although neither party requested construction of these terms, the Board construed these terms under the broadest reasonable interpretation standard to require interleaving portions from each of the packets in the packet block together, but not interleaving *within* a packet. J.A. 30–31. In finding that Ericsson had not established a reasonable likelihood of success in showing claims 10 and 11 to be unpatentable over the combination of Reed and Mahany, the Board explained that Reed teaches interleaving R-blocks, which involves interleaving portions of the same packet together, and not a portion of a first packet with a portion of a second packet, as required by the Board's construction. The Board further found that S-blocks are concatenated, and not interleaved.

Following institution, Intellectual Ventures argued for the first time in its Response that the claims must be construed under *Phillips* because the patent expired prior to the filing of the present proceeding. J.A. 256. Intellectual Ventures proposed, and Ericsson did not dispute, that under the *Phillips* standard, the term “encoding packets into packet blocks” in claim 1 should be construed as “forming blocks by interleaving packets together,” and that claim 9’s “an encoder for combining . . .” limitation means “an encoder for forming blocks by interleaving packets together and varying the number of packets transmitted in each of the blocks.” J.A. 248. The adoption of these constructions would mean that both independent claims include a limitation requiring the formation of blocks by “interleaving packets together.”

After adopting the new constructions, the Board “re-visit[ed] whether the combination of Reed and Mahany teaches ‘encoding packets into packet blocks,’ . . . and ‘an encoder for combining and varying the number of packets transmitted in each of the packet blocks.’” J.A. 13–14. Specifically, the Board focused on “whether the prior art teaches interleaving packets together to form packet blocks in a way that results in varying the number of packets encoded in the packet blocks.” J.A. 15.

Ericsson’s Reply discussed how interleaving is known in the prior art, that Reed alone teaches interleaving packets together, and that Reed and Mahany together teach the “interleaving packets together” limitation.

In the Final Written Decision, the Board found that Ericsson had not proven the challenged claims obvious in light of Reed and Mahany. The Board’s decision relied entirely on its conclusion that Reed taught only one type of interleaving, interleaving of R-blocks *within* an S-block (or a “packet,” in the nomenclature of the ’831 patent), as opposed to the interleaving of packets with other packets within a packet block (*i.e.*, S-blocks with S-blocks) as

required in the '831 patent. In characterizing the issue, the Board conceded that “the issue is not whether the general concept of interleaving was known in the prior art—it was.” J.A. 15. “Rather, the issue is whether the prior art teaches interleaving packets together to form packet blocks in a way that results in varying the number of packets encoded in the packet blocks.” *Id.* In concluding that Reed did not teach this limitation, the Board rejected the portions of Ericsson’s Reply that argued that to a person of ordinary skill, given that interleaving packets together was known in the art, “[t]he difference between interleaving R-blocks together and interleaving S-blocks together is insubstantial at best,” holding that this was a new theory beyond the scope of a proper reply as defined in 37 C.F.R. § 42.23(b). The Board stated that the reply is “not an opportunity for Petitioner to identify, for the first time, new and different prior art elements that are alleged to satisfy the claim requirements,” and declined to consider pages 13–14 of Ericsson’s Reply. J.A. 18–19. The Board then concluded that Reed taught only the interleaving of R-blocks with R-blocks, and thus did not teach the required interleaving of S-blocks with S-blocks disclosed in claim 1 of the '831 patent. In light of its conclusion as to claim 1, the Board decided that Ericsson had not shown claims 1–3, 6–9, and 12–14 to be unpatentable. Ericsson appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

IV. DISCUSSION

Obviousness is a question of law with underlying factual findings relating to “the scope and content of the prior art, differences between the prior art and the claims at issue, the level of ordinary skill in the pertinent art, and any objective indicia of non-obviousness.” *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013); see *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966). We review the Board’s underlying factual findings for substantial evidence and its legal conclusion on obvi-

ousness de novo. *HTC Corp. v. Cellular Commc'ns Equip., LLC*, 877 F.3d 1361, 1369 (Fed. Cir. 2017); *In re Mouttet*, 686 F.3d 1322, 1330–31 (Fed. Cir. 2012). Decisions related to compliance with the Board's procedures are reviewed for an abuse of discretion. *Bilstad v. Waka-loupulos*, 386 F.3d 1116, 1121 (Fed. Cir. 2004). "An abuse of discretion is found if the decision: (1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact finding; or (4) involves a record that contains no evidence on which the Board could rationally base its decision." *Id.*

Under PTO regulations, the Board is entitled to strike arguments improperly raised for the first time in a reply. *See* 37 C.F.R. § 42.23(b) ("All arguments for the relief requested in a motion must be made in the motion. A reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response.").

Ericsson argued on pages 13 and 14 of its Reply that, given the admitted state of the art regarding interleaving disclosed in the '831 patent, Reed's teachings regarding interleaving rendered obvious the interleaving of packets described in the '831 patent. Specifically, the Reply argued that "[t]he difference between interleaving R-blocks together and interleaving S-blocks together is insubstantial at best," and that Reed "suggests that an added benefit would be obtained from interleaving larger data portions." J.A. 325–26. The Board characterized this portion of Ericsson's Reply as raising a new theory of obviousness, one that was not addressed in the Petition or responding to arguments raised in the Patent Owner Response. J.A. 19. We disagree.

Given the admissions within the '831 patent itself, the arguments raised in Ericsson's Petition, and the Board's own evolving understanding of whether claim 1 requires the formation of blocks by "interleaving packets together,"

the Board's decision not to consider portions of Ericsson's Reply was error. As an initial matter, the '831 patent discusses how interleaving was known in the prior art. In addition, Ericsson's Petition describes how one of skill in the art would be familiar with the concepts of interleaving. *See* '831 patent col. 2 ll. 4–6, col. 6 l. 42–col. 7 l. 26; J.A. 105–06, 108, 109. For instance, the Petition characterizes the description of interleaving in the '831 patent as “simply a recitation of a textbook block interleaving technique well-known to a POSA at the time the '831 Patent was filed.” J.A. 105–06. Similarly, the Petition identifies a person of ordinary skill in the art relative to the '831 patent as someone having “an understanding of . . . coding and interleaving, and the reverse processes of deinterleaving and decoding as used for wireless communications.” J.A. 109. The Petition expressly contemplated the possibility that “[t]o the extent that interleaving can also be considered encoding packets into blocks, this is also disclosed by [Reed].” J.A. 126. The portions of the Reply the Board declined to consider expressly follow from these contentions raised in the Petition—namely, that there is no substantial difference between interleaving R-blocks *within* S-blocks, and interleaving S-blocks *with* S-blocks.

The Board's error was parsing Ericsson's arguments on reply with too fine of a filter. Given the acknowledgment in the patent that interleaving was known in the art, Ericsson was entitled to argue on reply that the distinction in the specific type of interleaving between Reed and the '831 would have been insubstantial to a person of skill in the art. The error was exacerbated by the fact that the significance of interleaving arose *after* the Petition was filed, in that the Board adopted a different construction of the “encoding” terms after the Petition instituting *inter partes* review was granted. Additionally, as the missing interleaving limitation was the essential basis of the Board's decision in concluding that claim 1

had not been shown unpatentable, Ericsson should have been given an opportunity to respond. See 5 U.S.C. § 554(b)(3), (c) (The agency must “timely inform[]” the patent owner of “the matters of fact and law asserted,” and must provide “all interested parties opportunity . . . for the submission and consideration of facts [and] arguments . . . [and] hearing and decision on notice.”). Undoubtedly, this was a special case in which Petitioner, Patent Owner, and the Board all initially applied the broadest reasonable interpretation claim construction standard, and only after institution applied *Phillips* instead. In light of these changed circumstances, the Board revisited its approach to the claims in light of this error, and Ericsson likewise deserved an opportunity to do the same.

Our decision should not be viewed as changing or challenging the Board’s practice of limiting the scope of replies pursuant to its regulations. This court’s precedent supports the Board’s discretion to reject arguments raised for the first time in a reply. Under the PTO’s regulations, the Board has discretion to determine whether a petition for *inter partes* review identified the specific evidence relied on in a reply and when a reply contention crosses the line from the responsive to the new. *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359 (Fed. Cir. 2015). In *Ariosa*, this court upheld the Board’s rejection of a reply that relied on previously unidentified portions of a prior art reference to make a meaningfully distinct contention, because the cited portions of prior art were not identified or discussed in the petition or accompanying declarations. *Id.* at 1364, 1367–68. In contrast, Ericsson does not identify a previously unidentified piece of prior art to make a meaningfully distinct contention, but instead expands the same argument made in its Petition: that Reed discloses that its S-blocks (i.e., “packets”) are further encoded into packet blocks through interleaving. Nor does Ericsson’s arguments in its Reply

constitute an “entirely new rationale” worthy of being excluded, as in *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016). In *Intelligent Bio-Systems*, the petitioner supported its new theory of invalidity by reference to new evidence, citing “a number of non-patent literature references which were not relied upon to support unpatentability in the Petition.” *Id.* at 1366. This court upheld the Board’s decision refusing the reply because the petitioner “relied on an entirely new rationale to explain why one of skill in the art would have been motivated to combine” the relevant prior art references. *Id.* at 1370. Here, Ericsson cites no new evidence and merely expands on a previously argued rationale as to why the prior art disclosures are insubstantially distinct from the challenged claims.

We vacate the Board’s decision below and remand for the Board to consider all of the arguments in Ericsson’s Reply and the dependent claims.

VACATED AND REMANDED

COSTS

No costs.