ATTACHMENT 6

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Paper 18
Entered: April 27, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUGHES NETWORK SYSTEMS, LLC and
HUGHES COMMUNICATIONS, INC.,
Petitioner,

v.

CALIFORNIA INSTITUTE OF TECHNOLOGY,
Patent Owner.

Case IPR2015-00081
Patent 8,284,833 B2

Before KALYAN K. DESHPANDE, GLENN J. PERRY, and TREVOR M. JEFFERSON, *Administrative Patent Judges*.

DESHPANDE, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Hughes Network Systems, LLC and Hughes Communications, Inc. (collectively, "Petitioner") filed a Corrected Petition requesting an *inter partes* review of claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 of U.S. Patent No. 8,284,833 B2 (Ex. 1007, "the '833 patent"). Paper 4 ("Pet."). California Institute of Technology ("Patent Owner") timely filed a Preliminary Response. Paper 13 ("Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." After considering the Petition, the Preliminary Response, and associated evidence, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing unpatentability of all the challenged claims. Thus, we deny institution of an *inter partes* review of claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 of the '833 patent.

A. Related Proceedings

Petitioner indicates that the '833 patent is the subject of the proceedings in *California Institute of Technology v. Hughes Communications, Inc. et al.*, No. 13-cv-07245 (Ca.C.D.). Pet. 1–2.

The '833 patent is also the subject of IPR2015-00061. Additionally, Petitioner indicates that the '833 patent is related to U.S. Patent No. 7,116,710, U.S. Patent No. 7,421,032, and U.S. Patent No. 7,916,781, which are the subject of IPR2015-00059, IPR2015-00060, IPR2015-00067, and IPR2015-00068.

B. The '833 Patent

The '833 patent describes the serial concatenation of interleaved convolutional codes forming turbo-like codes. Ex. 1007, Title. It explains some of the prior art with reference to its Figure 1, reproduced below.

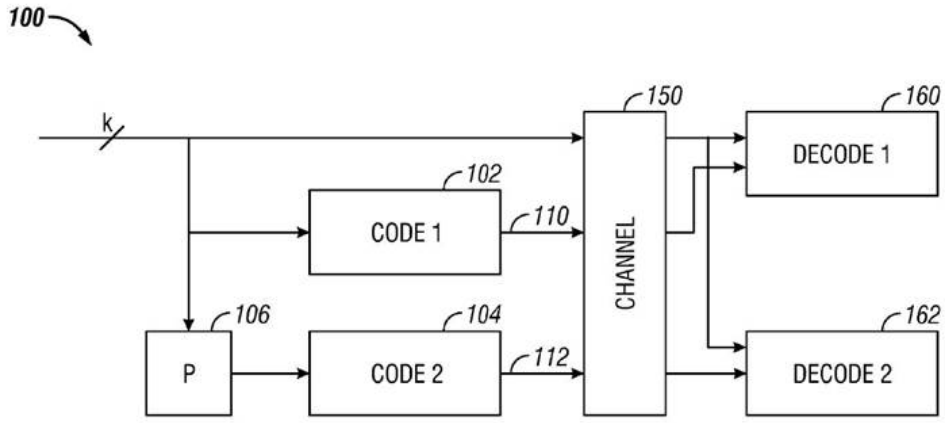


FIG. 1
(Prior Art)

Figure 1 is a schematic diagram of a prior "turbo code" system. *Id.* at 2:20–21. The '833 patent specification describes Figure 1 as follows:

> A block of k information bits is input directly to a first coder 102. A k bit interleaver 106 also receives the k bits and interleaves them prior to applying them to a second coder 104. The second coder produces an output that has more bits than its input, that is, it is a coder with rate that is less than 1. The coders 102,104 are typically recursive convolutional coders.
>
> Three different items are sent over the channel 150: the original k bits, first encoded bits 110, and second encoded bits 112. At the decoding end, two decoders are used: a first constituent decoder 160 and a second constituent decoder 162. Each receives both the original k bits, and one of the encoded portions 110, 112. Each decoder sends likelihood estimates of the decoded bits to the other decoders. The estimates are used to decode the uncoded information bits as corrupted by the noisy channel.

Id. at 1:46–60 (emphasis omitted).

A coder 200, according to a first embodiment of the invention, is described with respect to Figure 2, reproduced below.

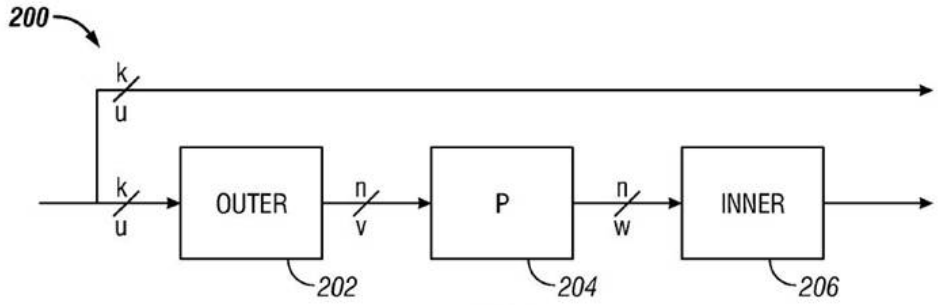


FIG. 2

Figure 2 of the '781 patent is a schematic diagram of coder 200.

> The coder 200 may include an outer coder 202, an interleaver 204, and inner coder 206… The outer coder 202 receives uncoded data. The data may be partitioned into blocks of fixed size, say k bits. The outer coder may be an (n,k) binary linear block coder, where n>k. The coder accepts as input a block u of k data bits and produces an output block v of n data bits and produces an output block v of n data bits. The mathematical relationship between u and v is $v=T_0u$, where T_0 is an n x k matrix, and the rate[1] of the coder is k/n.
>
> The rate of the coder may be irregular, that is, the value of T_0 is not constant, and may differ for sub-blocks of bits in the data block. In an embodiment, the outer coder 202 is a repeater that repeats the k bits in a block a number of times q to produce a block with n bits, where n=qk. Since the repeater has an irregular output, different bits in the block may be repeated a different number of times. For example, a fraction of the bits in the block may be repeated two times, a fraction of bits may be repeated three times, and the remainder of bits may be repeated four times. These fractions define a degree sequence, or degree profile, of the code.

[1] The "rate" of an encoder refers to the ratio of the number of input bits to the number of resulting encoded output bits related to those input bits.

> The inner coder 206 may be a linear rate-1 coder, which means that the n-bit output block x can be written as $x=T_I w$, where T_I is a nonsingular n x n matrix. The inner coder 210 can have a rate that is close to 1, e.g., within 50%, more preferably 10% and perhaps even more preferably within 1% of I.

Id. at 2:41–3:3 (emphasis omitted). Codes characterized by a regular repeat of message bits into a resulting codeword are referred to as "regular repeat," whereas codes characterized by irregular repeat of message bits into a resulting codeword are referred to as "irregular repeat." The second ("inner") encoder 206 performs an "accumulate" function. Thus, the two step encoding process illustrated in Figure 2, including a first encoding ("outer encoding") followed by a second encoding ("inner encoding"), results in either a "regular repeat accumulate" ("RRA") code or an "irregular repeat accumulate ("IRA") code, depending upon whether the repetition in the first encoding is regular or irregular.

Figure 4 of the '833 patent is reproduced below.

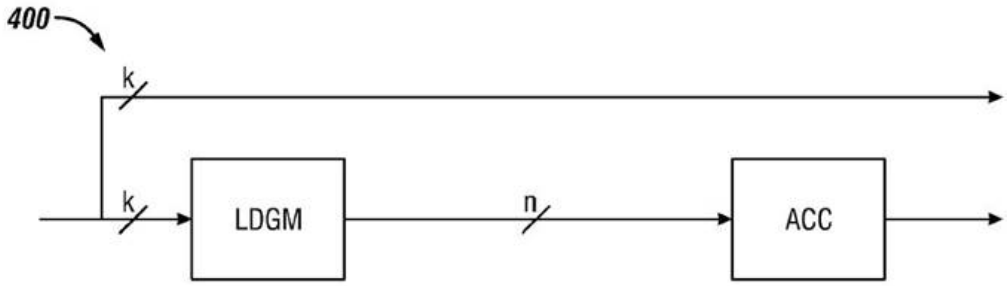


FIG. 4

Figure 4 shows an alternative embodiment in which the first encoding is carried out by a low density generator matrix. Low density generator matrix (LDGM)[2] codes are a special class of low density parity check codes that

[2] A "generator" matrix (typically referred to by "G") is used to create

allow for less encoding and decoding complexity. LDGM codes are systematic linear codes generated by a "sparse" generator matrix. No interleaver (as in the Figure 2 embodiment) is required in the Figure 4 embodiment because the LDGM provides scrambling otherwise provided by the interleaver in the Figure 2 embodiment. Ex. 1003, 3:55–64.

C. Illustrative Claim

Petitioner challenges claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 of the '833 patent. Pet. 13–59. Independent claim 1 is illustrative of the claims at issue and is reproduced below:

> 1. An apparatus for performing encoding operations, the apparatus comprising:
>
> a first set of memory locations to store information bits;
>
> a second set of memory locations to store parity bits;
>
> a permutation module to read a bit from the first set of memory locations and combine the read bit to a bit in the second set of memory locations based on a corresponding index of the first set of memory locations and a corresponding index of the second set of memory locations; and
>
> an accumulator to perform accumulation operations on the bits stored in the second set of memory locations,
>
> wherein two or more memory locations of the first set of memory locations are read by the permutation module different times from one another.

D. The Alleged Grounds of Unpatentability

The information presented in the Petition sets forth proposed grounds of unpatentability of claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 of the '833 patent as follows (*see* Pet. 13–59):

(generate) codewords. A parity check matrix (typically referred to by "H") is used to decode a received message.

Reference(s)	Basis	Claims Challenged
MacKay Software[3]	§ 102(b)	1, 2, 4, 6, 8, 9, 10, 11, and 13
MacKay Software and Kernighan[4]	§ 103(a)	1, 2, 4, and 6
The '710 patent[5] and Hennessy[6]	§ 103(a)	1, 2, 4, 6, 8, 9, 10, 11, and 13

II. ANALYSIS[7]

A. The '833 Patent Priority Date

The '833 patent is a continuation of application no. 12/165,606 (now U.S. Patent No. 7,916,781) filed on June 30, 2008, which is a continuation of application no. 11/542,950 (now U. S. Patent No. 7,421,023) filed on October 3, 2006, which is a continuation of application no. 09/861,102 (now the '710 patent) filed on May 18, 2001, which is a continuation-in-part of application no. 09/222,852 (now U.S. Patent No. 7,089,477) filed on August 18, 2000. Ex. 1007, 1:9–20.

Petitioner argues that the '833 patent claims "are the first written description of the claim limitations of independent claim 1 and 8" and, therefore, should be afforded the earliest priority date of March 28, 2011.

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[3] MacKay Ra.c Software File (Ex. 1019, "MacKay Software").
[4] Kernighan et al., THE C PROGRAMMING LANGUAGE, Prentice Hall Software Series, 1988 (Ex. 1067, "Kernighan").
[5] U.S. Patent No. 7,116,710 B1 (Ex. 1001, "the '710 patent").
[6] Hennessy et al., COMPUTER ORGANIZATION & DESIGN, THE HARDWARE / SOFTWARE INTERFACE, Morgan Kaufmann Publishers, Nov. 8, 1994 (Ex. 1020, "Hennessy").
[7] Patent Owner argues that, as a threshold matter, the Petition should be dismissed because Petitioner fails to identify all real parties in interest. Prelim. Resp. 3. Because we have determined that Petitioner has not demonstrated a reasonable likelihood of prevailing, we need not address the real parties in interest issue in this Decision.

Pet. 5 (citing Ex. 1010 ¶ 42). Petitioner specifically argues that "the ['710] patent specifications and provisional application [serial no. 60/205,095] do not include any disclosure of memory locations or indexes." *Id.* (citing Ex. 1010 ¶ 42).

Patent Owner argues that Petitioner has failed to precisely identify what "claim limitations" or "elements" of the '833 patent claims are unsupported by the '710 patent specification. Prelim. Resp. 17–18. Patent Owner argues that Petitioner fails to set forth the proper standard for assessing written description support and any corresponding analysis. *Id.* at 18–20.

We agree with Patent Owner that Petitioner has failed to set forth a persuasive analysis supported by factual evidence in concluding that the '710 patent specification does not support the '833 patent claims, and, therefore, the '833 claims are not entitled to the priority claimed by the '710 patent. The '833 patent issued as a "continuation" of the '710 patent, thereby claiming the benefit of the '710 patent filing date. Petitioner merely alleges that the '710 specification fails to set forth "memory locations or indexes," but does not provide any further sufficiently persuasive analysis to demonstrate that the '833 patent claims should not be entitled to the '710 patent filing date. For example, Petitioner does not set forth, with specificity, which limitations in claims 1 and 8 are not supported by the '710 patent specification. The Petition cites to Dr. Pfister, who similarly conclusively asserts that the previous "patent specifications and provisional application do not include any disclosure of memory locations or indexes." Ex. 1010 ¶ 42. Accordingly, we are not persuaded by Petitioner that claims 1 and 8 of the '833 patent should be limited to a priority date of March 28,

2011.

B. Claims 1, 2, 4, 6, 8, 9, 10, 11, 13 – Anticipated by the Mackay Software and Claims 1, 2, 4, and 6 – Obvious the Mackay Software and Kernighan

Petitioner contends that claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 are unpatentable under 35 U.S.C. § 102(b) as anticipated by the Mackay Software. Pet. 13–39. Petitioner also contends that claims 1, 2, 4, and 6 are unpatentable under 35 U.S.C. § 103(a) as obvious over the MacKay Software and Kernighan. Pet. 39–40. Petitioner argues that the MacKay Software is prior art because the '833 patent is not entitled to claim priority to the '710 patent filing date. Pet. 2–3. Petitioner asserts that the MacKay Software is available as prior art under 35 U.S.C. § 102(b) because Dr. David J. MacKay testifies that the Mackay Software was "available to the public for download at least by December 9, 2006." *Id.*; Ex. 1060 ¶ 83.

Patent Owner argues that the '833 patent was part of a chain of continuation applications extending back to the '710 patent, which was filed on May 18, 2001. Prelim. Resp. 23. Patent Owner argues that the Petition alleges that the Mackay Software was available as of December 6, 2006,[8] and, therefore, does not qualify as prior art.

We agree with Patent Owner that the MacKay software does not qualify as prior art. As discussed above, the '833 patent is a continuation of the '710 patent, thereby claiming a priority date of at least May 18, 2001.

[8] Although the Petition alleges that the MacKay Software was available at least as of December 6, 2006, Dr. David J. MacKay testifies that the MacKay Software was available at least by December 9, 2006. For the purposes of this Decision, we credit Dr. MacKay's testimony as having the more accurate date. Therefore, we consider the MacKay software available at least by December 9, 2006.

See Section II.A. The MacKay software was available to the public at least by December 9, 2006. Ex. 1060 ¶ 83. Accordingly, the MacKay software does not qualify as prior art. Therefore, we are not persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing unpatentability of the challenged claims as anticipated by the MacKay software or obvious over the MacKay software and Kernighan.

C. Claims 1, 2, 4, 6, 8, 9, 10, 11, 13 –Obvious the '710 Patent and Hennessy

Petitioner contends that claims 1, 2, 4, 6, 8, 9, 10, 11, and 13 are unpatentable under 35 U.S.C. § 103(a) as obvious over the '710 patent and Hennessy. Pet. 40–60. Petitioner argues that the '710 qualifies as prior art under 35 U.S.C. § 102(b) because the '833 patent is not entitled to claim priority to the '710 patent. *Id.* at 3.

Patent Owner argues that the '710 patent has a specification that is substantially identical to that of the '833 patent because the '833 patent is a continuation of the '710 patent. Prelim. Resp. 29. Patent Owner further argues that Petitioner has not established that the '833 patent should not be entitled to the '710 patent filing date. *Id*.

We agree with Patent Owner. As discussed above, the '833 patent is a continuation of the '710 patent, thereby claiming a priority date of at least May 18, 2001. *See* Section II.A. Accordingly, both the '833 patent and the '710 patent have the same priority date and the '710 patent is not available as prior art under 35 U.S.C. § 102(b). Therefore, we are not persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing unpatentability of the challenged claims as obvious over the '710 patent and Hennessy.

III. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, an *inter partes* review is hereby denied as to all grounds raised in the Petition for the reasons stated above.

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