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Paper 17
Entered: June 30, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

CALIFORNIA INSTITUTE OF TECHNOLOGY,
Patent Owner.

Case IPR2017-00219
Patent 7,116,710 B1

Before KEN B. BARRETT, TREVOR M. JEFFERSON, and JOHN A. HUDALLA, *Administrative Patent Judges*.

JEFFERSON, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
35 U.S.C. § 314(a) and *37 C.F.R. § 42.108*

I. INTRODUCTION

Petitioner, Apple, Inc. ("Apple"), filed a Petition (Paper 5, "Pet.") requesting an *inter partes* review of claims 1–8, 10–17, and 19–33 of U.S. Patent No. 7,116,710 B1 (Ex. 1201, "the '710 patent") pursuant to 35 U.S.C. §§ 311–319. Apple relies on the Declaration of James A. Davis, Ph.D. (Ex. 1206) with its Petition. Patent Owner, California Institute of Technology ("Caltech"), filed a Preliminary Response (Paper 16, "Prelim. Resp.") to the Petition. Caltech relies on the Declaration of Dr. R. Michael Tanner (Ex. 2001) filed with its Preliminary Response.

We have jurisdiction under 37 C.F.R. § 42.4(a) and 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition "shows that 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 and associated evidence, we conclude that Apple has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of claims 1–8, 11–17, 19–22, and 24–33 of the '710 patent.

A. Related Proceedings

The parties indicate that the '710 patent was involved in the following active case, *Cal. Inst. of Tech. v. Broadcom Ltd.*, No. 2:16-cv-03714 (C.D. Cal. filed May 26, 2016), and in concluded cases, *Cal. Inst. of Tech. v. Hughes Commc'ns, Inc.*, No. 2:15-cv-01108 (C.D. Cal. filed Feb. 17, 2015); and *Cal. Inst. of Tech. v. Hughes Commc'ns, Inc.*, 2:13-cv-07245 (C.D. Cal. filed Oct. 1, 2013). Pet. 3, Paper 8, 2–3.

The parties also identify co-pending cases IPR2017-00210 and IPR2017-00211, in which Apple has filed a petition for *inter partes* review of the ’710 patent. Pet. 3; Paper 8, 2–3. *Inter partes* review of the ’710 patent was previously considered and denied in *Hughes Network Sys. v. Cal. Inst. of Tech.*, Case IPR2015-00067 (PTAB April 27, 2015) (Paper 18) (“IPR2015-00067”) and *Hughes Network Sys. v. Cal. Inst. of Tech.*, Case IPR2015-00068 (PTAB April 27, 2015) (Paper 18) (“IPR2015-00068”). Finally, certain patents related to the ’710 patent were challenged in IPR2015-00059, IPR2015-00060, IPR2015-00061, and IPR2015-00081. Pet. 3. A Final Written Decision cancelling claims 1 and 2 of U.S. Patent No. 7,916,781 B2 was issued in *Hughes Network Sys. v. Cal. Inst. of Tech.*, Case IPR2015-00059 (PTAB April 21, 2016) (Paper 42).

B. The ’710 Patent

The ’710 patent describes the serial concatenation of interleaved convolutional codes forming turbo-like codes. Ex. 1201, Title. It explains some of the prior art with reference to its Fig. 1, reproduced below.

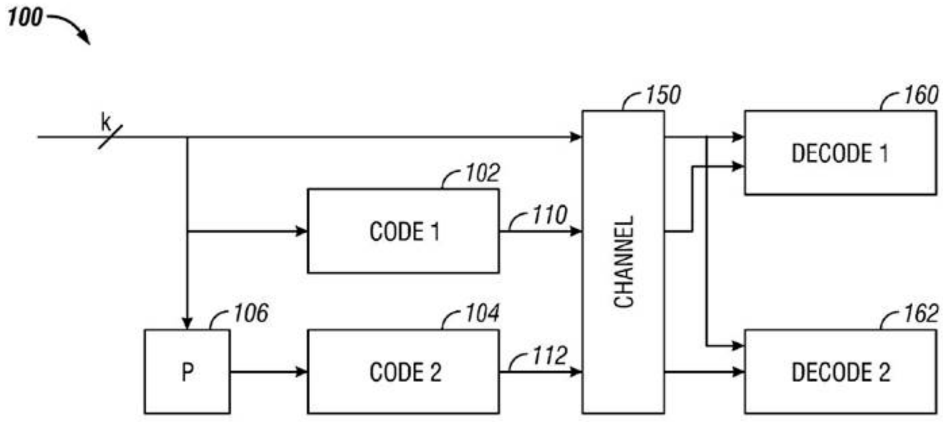

FIG. 1
(Prior Art)

Figure 1 is a schematic diagram of a prior "turbo code" system. *Id.* at 2:14–15. The '710 patent specification describes Figure 1 as follows:

> A standard turbo coder 100 is shown in FIG. 1. 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 1:38–53 (emphasis omitted).

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

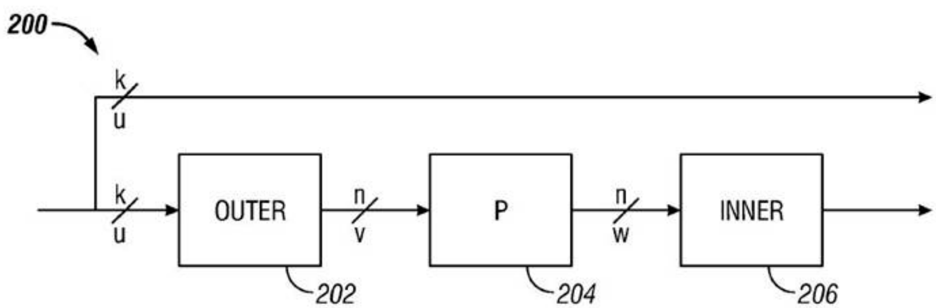

FIG. 2

Figure 2 of the '710 patent is a schematic diagram of coder 200. *Id.* at 2:16–17.

The specification states that "coder 200 may include an outer coder 202, an interleaver 204, and inner coder 206." *Id*. at 2:34–35. It further states as follows.

> 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. The mathematical relationship between u and v is $v=T_0u$, where T_0 is an n×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.
>
> The inner coder 206 may be a linear rate-1 coder, which means that then-bit output block x can be written as $x=T_Iw$, where T_I is a nonsingular n×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 1.

Id. at 2:41–64 (emphasis omitted). Codes characterized by a regular repeat of message bits into a resulting codeword are referred to as "regular repeat,"

[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. *See* Pet. 9.

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