

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

FASTVDO LLC,
Patent Owner.

Case IPR2016-01203
Patent 5,850,482

Before KARL D. EASTHOM, JEFFREY S. SMITH, and PATRICK M.
BOUCHER, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner filed a Petition for *inter partes* review of claims 1–3, 5–14, 16, 17, 22–26, 28, and 29 of U.S. Patent No. 5,850,482 (Ex. 1001, “the ’482 patent”). Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 10 (“Prelim. Resp.”). We instituted trial for claims 1–3, 5–14, 16, 17, 22–26, 28, and 29. Paper 14. Patent Owner filed a response. Paper 27 (“PO Resp.”). Petitioner filed a reply. Paper 30 (“Reply”). The record includes a transcript of the oral hearing. Paper 36.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision issues pursuant to 35 U.S.C. § 318(a). Petitioner has shown by a preponderance of the evidence that claims 1–3, 5, 7–10, 12–14, 16, 22–25, 28, and 29 of the ’482 patent are unpatentable.

A. *Related Matters*

The ’482 patent is the subject of the following related litigations:

FastVDO LLC v. AT&T Mobility LLC et al., Case No. 3:16-cv-00385 (S.D. Cal.), filed Feb. 11, 2016;

FastVDO LLC v. LG Electronics, Inc. et al., Case No. 3:16-cv-00386 (S.D. Cal.), filed Feb. 11, 2016;

FastVDO LLC v. NEC Corp. et al., Case No. 3:16-cv-00389 (S.D. Cal.), filed Feb. 11, 2016 (terminated);

FastVDO LLC v. Nokia Corp. et al., Case No. 3:16-cv-00390 (S.D. Cal.), filed Feb. 11, 2016;

FastVDO LLC v. ZTE Corp. et al., Case No. 3:16-cv-00394 (S.D. Cal.), filed Feb. 11, 2016;

FastVDO LLC v. Dell Inc. et al., Case No. 3:16-cv-00395 (S.D. Cal.), filed Feb. 11, 2016; and

FastVDO LLC v. Huawei Technologies Co., et al., Case No. 3:16-cv-00396 (S.D. Cal.), filed Feb. 11, 2016. Pet. 1; Paper 6 (Patent Owner's Mandatory Notice).

The '482 patent is also the subject of IPR2016-01179. Paper 6 (Patent Owner's Mandatory Notice).

B. The '482 Patent

The '482 patent relates generally to error resilient methods and apparatus for entropy coding, and the application of error resilient coding to image compression. Ex. 1001, 1:5–11. Entropy coding reduces the number of bits required to represent a data set by using variable length coding in a manner that exploits the statistical probabilities of various symbols in the data set. *Id.* at 4:36–39. For example, entropy coding assigns shorter code words to those symbols that occur frequently, and assigns longer code words to those symbols that occur less frequently. *Id.* at 4:40–43. Error resilient entropy coding can utilize unequal error protection techniques, isolate effects of a bit error to a single code word, and constrain the resulting error to an interval. *Id.* at 6:33–47.

The error resilient method and apparatus include a code word generator that encodes data pursuant to split field coding, in which each code word includes a prefix field and an associated suffix field. *Id.* at Abstract. The prefix field includes information representing a characteristic of the suffix field, such as the length. *Id.* The suffix field includes information representing at least some of the original data. *Id.* If the prefix field is

decoded without any errors, the method and apparatus can correctly determine the length of the suffix field and the range of values represented by the suffix field such that the suffix field is resilient to errors. *Id.* To increase the probability that the prefix field is correctly decoded, the prefix field is protected to a greater degree than the suffix field, such that the data can be more efficiently compressed. *Id.* Figure 1 of the '482 patent is reproduced below.

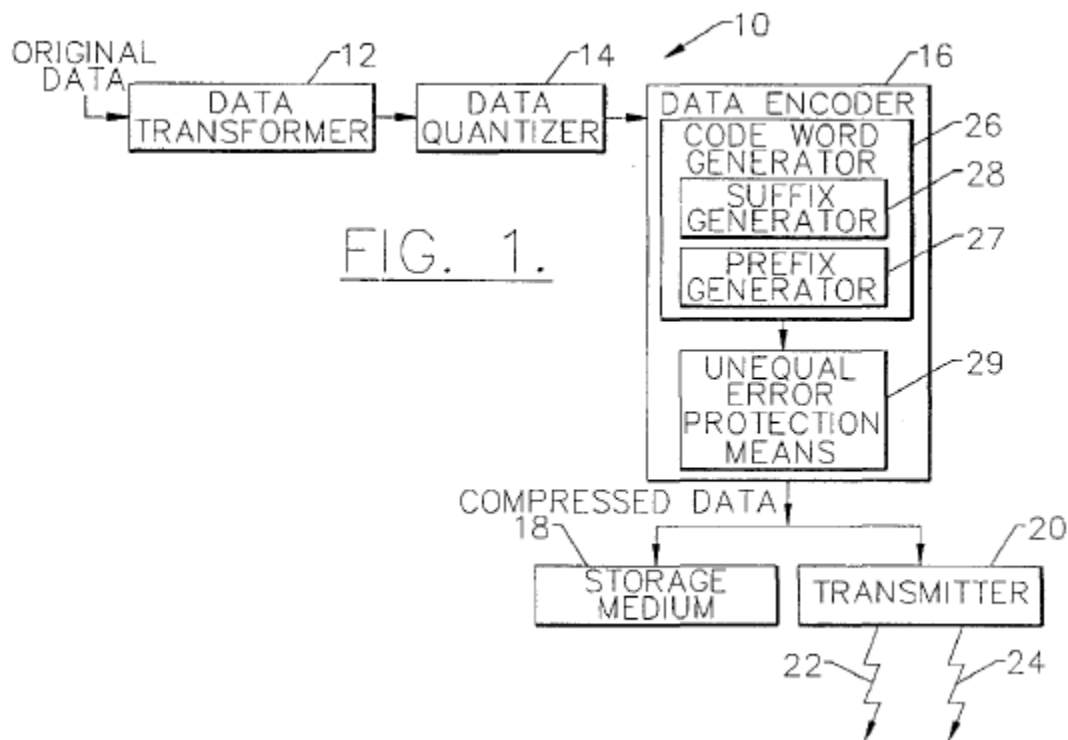


Figure 1 above shows a block diagram of error resilient data compression apparatus 10, including error resilient data encoder 16. *Id.* at 8:48–51. Original data is initially transformed by data transformer 12. *Id.* at 9:30–32. The original data can be transformed based upon one of a number of predetermined functions, such as a cosine function, a complex exponential function, or a wavelet transform. *Id.* at 9:41–52. The transformed data is then quantized by data quantizer 14 such that the

quantized data has fewer unique data values or coefficients than the transformed data. *Id.* at 11:36–38. In one embodiment, transformed coefficients whose magnitudes fall below a certain level, called a clipping threshold, are designated as insignificant and set to zero. *Id.* at 11:55–61.

Entropy encoder 16 shown in Figure 1 above includes code word generator 26 to generate code words that represent the quantized significant coefficients. *Id.* at 13:36–39. Each code word includes a first portion, or prefix field, and an associated second portion, or suffix field. *Id.* at 13:41–43. Code word generator 26 includes prefix generator 27 for generating the prefix field of each code word and suffix generator 28 for generating the associated suffix field of each code word. *Id.* at 13:44–48. Since each code word is formed of two fields, this method of coding is termed split field coding. *Id.* at 13:48–50.

According to split field coding, the prefix field includes information representative of the associated suffix field, such as the number of characters that form the suffix field, or the range of coefficient values represented by the suffix field. *Id.* at 13:51–63. If the prefix field is decoded correctly, the length of the suffix field and the range of values represented by the suffix field can be determined. *Id.* at 15:61–66. Bit errors within the suffix field will not result in loss of code word synchronization, but instead will be isolated to that single code word. *Id.* at 16:1–4. Also, the resulting error will be within the range of coefficient values included in the prefix field. *Id.* at 16:4–9.

The prefix fields are encoded at an appropriately high level of error protection in order to provide a high probability that the prefix fields will be decoded correctly. *Id.* at 16:15–18. The suffix field can be encoded with a

lower level of error protection, which reduces storage requirements and transmission bandwidth while still providing error resiliency. *Id.* at 16:18–27. To provide error protection, entropy encoder 16 includes unequal error protection means 29 for providing appropriate levels of error protection to the encoded data. *Id.* at 17:1–4.

C. Illustrative Claim

Claims 1, 7, 12, 22, and 28 of the challenged claims of the '482 patent are independent. Claims 1 and 7 are illustrative of the claimed subject matter:

1. An error resilient method of encoding data comprising the steps of:

generating a plurality of code words representative of respective portions of the data, wherein each code word comprises a first portion and an associated second portion, and wherein said code word generating step comprises the steps of:

generating the first portion of each code word, wherein said first portion generating step comprises the step of including information within the first portion that is representative of a predetermined characteristic of the associated second portion; and

generating the second portion of each code word, wherein said second portion generating step comprises the step of including information within the second portion that is representative of the respective portion of the data; and

providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated with the at least one first portion at a lower level than the error protection provided to the respective first portion.

7. A data encoding apparatus comprising:

code word generating means for generating a plurality of code words representative of respective portions of the data, wherein each code word comprises a first portion and an associated second portion, and wherein said code word generating means comprises:

first generating means for generating the first portion of each code word, said first generating means comprising means for including information within the first portion that is representative of a predetermined characteristic of the associated second portion; and

second generating means for generating the second portion of each code word, said second generating means comprising means for including information within the second portion that is representative of the respective portion of the data; and

error protection means for providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated with the at least one first portion at a lower level than the error protection provided to the respective first portion.

Ex. 1001, 18:8–29; 19:9–30.

D. References

Petitioner relies on the following references. Pet. 18.

Kato	US 5,392,037	Feb. 21, 1995	Ex. 1003
Fazel '622	US 5,218,622	June 8, 1993	Ex. 1006

Fiala et al., *Data Compression with Finite Windows*, COMMUNICATIONS OF THE ACM, Vol. 32, No. 4, 490–505 (1989) (Ex. 1004; “Fiala”).

Fazel et al., *Application of Unequal Error Protection Codes on Combined Source-Channel Coding of Images*, International Conference on

Communications, Including SuperComm Technical Sessions (IEEE), Atlanta, Vol. 3, 898–903 (April 15–19, 1990) (Ex. 1005; “Fazel”).

E. Instituted Grounds of Unpatentability

We instituted review of claims 1–3, 5–14, 16, 17, 22–26, 28, and 29 of the ’482 patent on the following specific grounds:

Reference(s)	Basis	Challenged Claims
Kato	§ 103	1–3, 5–14, 16, 17, 22–26, 28, and 29
Fiala, Fazel, and Fazel ’622	§ 103	1–3, 5–14, 16, 17, 22–26, 28, and 29

II. ANALYSIS

A. Claim Construction

The term of the ’482 patent expired April 17, 2016. See Pet. 8. For claims of an expired patent, the Board’s claim interpretation is similar to that of a district court. See *In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012). “[T]he words of a claim are generally given their ordinary and customary meaning . . . that the term would have to 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) (citations omitted). “[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which [it] appears, but in the context of the entire patent, including the specification.” *Phillips*, 415 F.3d at 1313. For example, a “claim construction that excludes [a] preferred embodiment [described in the specification] is rarely, if ever, correct and would require highly persuasive evidentiary support.” *Adams Respiratory Therapeutics, Inc. v. Perrigo Co.*, 616 F.3d 1283, 1290 (Fed. Cir. 2010) (citation omitted).

But “a claim construction must not import limitations from the specification into the claims.” *Douglas Dynamics, LLC v. Buyers Products Co.*, 717 F.3d 1336, 1342 (Fed. Cir. 2013) (citation omitted). Therefore, “it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Dealertrack, Inc. v. Huber*, 674 F.3d 1315, 1327 (Fed. Cir. 2012) (citation omitted).

1. *Claim 29*

The preamble for claim 29 reads “a computer readable memory for storing error resilient encoded data according to claim 21.” Petitioner contends claim 29 is indefinite, because claim 29 depends from claim 21, and claim 21 is directed to “an error resilient method of compressing data.” Pet. 50; Ex. 1001, 21:15. Petitioner also contends that Patent Owner has asserted in related litigation that claim 29 actually depends from claim 28, and the reference to claim 21 is a typographical error. Pet. 50. Petitioner provides an alternative construction of claim 29 as depending from claim 28. *Id.* Patent Owner submits Exhibit 2002, which provides us with its proposed construction of claim 29 presented to the District Court, namely, that claim 29’s reference to claim 21 is a typographical error. Ex. 2002, 12–14.

We agree with Patent Owner’s proposed construction of claim 29 presented to the District Court. In the ’482 patent, every dependent claim other than claim 29 depends from the nearest preceding independent claim. Further, claim 28 is the only independent claim that has the same preamble as claim 29. Neither claim 21 nor claim 12, the antecedent independent for claim 21, contains the preamble of “a computer readable memory for storing

error resilient encoded data.” Finally, to construe claim 29 as being dependent from claim 21, with intervening independent claims 22 and 28, would be inconsistent with the Manual of Patent Examining Procedure guidelines. See MPEP § 608.01(n) (“A claim which depends from a dependent claim should not be separated therefrom by any claim which does not also depend from said dependent claim.”). Therefore, from our review of the claim language in the ’482 patent, we conclude that claim 29’s reference to claim 21 is a typographical error. See *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1331 (Fed. Cir. 2005) (correcting a numbering error in a dependent claim).

Accordingly, we construe the term “a computer readable memory for storing error resilient encoded data according to claim 21” as “a computer readable memory for storing error resilient encoded data according to claim 28.”

2. Means-Plus-Function Claims

“Construing a means-plus-function claim term is a two-step process. The court must first identify the claimed function. Then, the court must determine what structure, if any, disclosed in the specification corresponds to the claimed function.” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351 (Fed. Cir. 2015) (en banc) (citation omitted).

a. “error protection means”

Independent claims 7 and 22 each recite “error protection means” with the function of

providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated

with the at least one first portion at a lower level than the error protection provided to the respective first portion.

Petitioner contends the specification of the '482 patent does not disclose any structure for performing the function. Pet. 10. In the proposed claim construction to the District Court, Patent Owner contends the corresponding structure disclosed in the '482 patent is the data encoder and the unequal error protector. Ex. 2002, 21–23.

A review of the claim language shows that the recited “error protection means” is part of the “data encoding apparatus” of claim 7 and part of the “data encoder” of claim 22. This is consistent with the specification, which explains that data encoder 16 can include unequal error protection means 29 for providing appropriate level of error protection to the encoded data. Ex. 1001, 17:1–4; Fig. 1. We construe the corresponding structure for the claim term “error protection means” as data encoder 16 and unequal error protection means 29.

Petitioner contends that the disclosure contained in the specification for the claim term “error protection means” is inadequate to provide structure for this limitation. Pet. 10. According to Petitioner, the statement that methods and apparatus for performing “unequal error protection” were “known to those skilled in the art” “as described, for example, in R. G. Gallager, ‘Information Theory and Reliable Communication’, Wiley and Sons (1968)” is a bare statement of the mere title of a book that does not adequately disclose any structure for unequal “error protection means.” *Id.* (citing Ex. 1001, 16:10–14).

In cases involving a special purpose computer-implemented means-plus-function limitation, the Federal Circuit requires “that the specification

disclose an algorithm for performing the claimed function.” *Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1374 (Fed. Cir. 2015). “A description of the function in words may disclose, at least to the satisfaction of one of ordinary skill in the art, enough of an algorithm to provide the necessary structure under § 112, ¶ 6.” *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1385 (Fed. Cir. 2011). “The law is clear that patent documents need not include subject matter that is known in the field of the invention and is in the prior art, for patents are written for persons experienced in the field of the invention.” *S3 Inc. v. NVIDIA Corp.*, 259 F.3d 1364, 1371 (Fed. Cir. 2001). Further, a “documentary source may be resorted to for such assistance.” *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1382 (Fed. Cir. 1999).

Here, the specification teaches that “the method and apparatus of the present invention is suitable for use with unequal error protection means as known to those skilled in the art and as described, for example, in [the Gallager textbook]” and provides examples of unequal error protection. Ex. 1001, 16:11–27. This discloses enough of an algorithm to allow a person of ordinary skill to discern the necessary structure for performing the claimed function of the “error protecting means.”

We therefore construe “error protection means” as being a means-plus-function limitation with the function of

providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated with the at least one first portion at a lower level than the error protection provided to the respective first portion

and with the corresponding structure of data encoder 16 and unequal error protector 29 and equivalents thereof.

b. “code word generating means”

Independent claims 7 and 22 recite “code word generating means.” Claim 7 recites the function of “generating a plurality of code words representative of respective portions of the data, wherein each code word comprises a first portion and an associated second portion.” Claim 22 recites a similar limitation. Petitioner contends these limitations are indefinite. Pet. 13–14. In its proposed claim construction to the District Court, Petitioner alternatively proposes that the corresponding structure is the prefix generator 27 and suffix generator 28 shown in Figures 1 and 5B of the ’482 patent. Ex. 2002, 14–15. Patent Owner proposes the corresponding structure is the data encoder 16 and code word generator 26. *Id.*

The specification discloses algorithms for generating code words when describing the prefix generator and the suffix generator. Ex. 1001, 15:12–60. Claim 7 and claim 22 each recite that the “code word generating means” comprises “means for including information within the first portion that is representative of a predetermined characteristic of the associated second portion,” and “means for including information within the second portion that is representative of the respective portion of the data.” Therefore, under the claim language, the prefix generator and the suffix generator are part of the “code word generating means.” This is supported by the specification, which discloses that the code word generating means includes prefix generating means and suffix generating means for generating the prefix and suffix fields of each code word, respectively. Ex. 1001, 7:5–8; Fig. 1. The structure for the prefix generator is the algorithm described by

the '482 patent at 15:12–54 and equivalents thereof. The structure for the suffix generator is the algorithm described by the '482 patent at 15:27–33 and equivalents thereof.

We construe the term “code word generating means” as a means-plus-function limitation with the function of generating a plurality of code words, representative of respective portions of the data, which have respective first and second portions, and with the corresponding structure of data encoder 16, code word generator 26, prefix generator 27 algorithm (described at Ex. 1001, 15:12–24), and suffix generator 28 algorithm (described at Ex. 1001, 15:27–33) and equivalents thereof.

Based on this construction of the term “code word generating means,” we also provide the following constructions. We construe the term “means for including information within the first portion” recited in claims 7 and 22 as a means-plus-function limitation with the function of “including information within the first portion that is representative of a predetermined characteristic of the associated second portion” and with the corresponding structure of data encoder 16, code word generator 26, and prefix generator 27 algorithm (described at 15:12–24) and equivalents thereof.

We construe the term “means for including information within the second portion” recited in claims 7 and 22 as a means-plus-function limitation with the function of including information within the second portion that is representative of a respective portion of the data and with the corresponding structure of data encoder 16, code word generator 26, and suffix generator 28 algorithm (described at 15:27–33) and equivalents thereof.

We construe the term “first generating means” recited in claim 7 as a means-plus-function limitation with the function of generating first portions which include information representative of the predetermined number of characters which comprise the associated second portion and with the corresponding structure of data encoder 16, code word generator 26, and prefix generator 27 algorithm (described at 15:12–24) and equivalents thereof.

We construe the term “second generating means” recited in claim 7 as a means-plus-function limitation with the function of generating second portions having predetermined number of characters and with the corresponding structure of data encoder 16, code word generator 26, and suffix generator 28 algorithm (described at 15:27–33) and equivalents thereof.

c. first and second “data link transmitting means”

Claim 11 recites “first data link transmitting means” having the function of “transmitting the at least one first portion of the plurality of code words via a first data link, wherein the first data link is error protected.” Claims 11 also recites “second data link transmitting means” having the function of “transmitting the respective second portion associated with the at least one first portion via a second data link, wherein any error protection provided by said second data link is at a lower level than the error protection provided by said first data link.” Claim 26 recites similar limitations.

Petitioner contends the corresponding structure in the specification is a transmitter. Pet. 15 (citing Ex. 1001, 17:26–37). According to Petitioner, these terms are indefinite because the specification explains that the error protection is provided by unequal error protection means 29, not transmitter

20. Pet. 15–16. In its proposed construction to the District Court, Patent Owner appears to agree that the error protection means performs the function of providing error protection, and the transmitter performs the transmitting function. Ex. 2002, 24–25.

The specification explains that

the present invention can include a transmitter 20 which transmits the respective run length code words and the prefix fields of the quantized coefficient code words via a first data link 22 which is error protected, and which transmits the respective suffix fields of the quantized coefficient code words via a second data link 24 which is not error protected or is error protected to a lesser degree than the first data link.

Ex. 1001, 17:28–37.

In light of this explanation, we construe the term “first data link transmitting means” as a means-plus-function limitation with the function of transmitting the at least one first portion of the plurality of code words via a first data link, wherein the first data link is error protected and with the corresponding structure of transmitter 20 and first data link 22 and equivalents thereof. We construe the term “second data link transmitting means” as a means-plus-function limitation with the function of transmitting the respective second portion associated with the at least one first portion via a second data link, wherein any error protection provided by the second data link is at a lower level than the error protection provided by the first data link and with the corresponding structure of transmitter 20 and second data link 24 and equivalents thereof.

d. “storage medium”

Patent Owner contends “storage medium” recited in claims 5, 16, and 28 should be construed as a physical storage device or memory, and should

not be construed so broadly as to cover a transmission channel, data link, or transmission media generally. PO Resp. 13–17. According to Patent Owner, the claims of the '482 patent distinguish between “storing” data “in a first data block of a storage medium” and “transmitting” data “via a first data link.” PO Resp. 16 (citing Ex. 1001, 18:57–59, 19:1–2). Patent Owner also relies on the '482 patent's distinction between the storage medium represented as module 18, and transmitter module 20 that accesses data links 22 and 24. PO Resp. 16–17 (citing Ex. 1001, Fig. 1, 17:15–19, 26–27; Ex. 2008 ¶¶ 34–36).

Petitioner agrees with Patent Owner that “storage medium” should be afforded its plain and ordinary meaning, and asserts that Petitioner has not argued that “storage medium” encompasses a transmission channel, data link, or transitory signal. Reply 4–5. Petitioner further asserts that neither Petitioner nor Dr. Lippman has ever suggested that transmission is the same as storage. Reply 5.

Differences among claims can “be a useful guide in understanding the meaning of particular claim terms.” *Phillips*, 415 F.3d at 1314–15. Here, claim 5 of the '482 patent, which depends from claim 1, recites “storing” data in “a storage medium,” while claim 6, which also depends from claim 1, recites “transmitting” data “via a first data link” and “via a second data link.” Given that the claims of the '482 patent distinguish between storing data in a storage medium and transmitting data over a transmission medium, we construe the claim term “storage medium” as excluding a transmission channel or a transmission medium.

Also, we read the claimed “storage medium” in view of the specification of the '482 patent, because the specification “is always highly

relevant to the claim construction analysis. Usually, it is dispositive, it is the single best guide to the meaning of the disputed term.” *Phillips*, 415 F.3d at 1315 (quotation and citation omitted). The ’482 patent discloses that a communications or storage medium is referred to as a channel. Ex. 1001, 4:66–5:3. We construe the scope of the claim term “storage medium,” read in view of the specification of the ’482 patent, as encompassing at least a channel other than a transmission channel.

We further determine that none of the other terms require express construction.

B. Asserted Obviousness over Kato: Claims 1–3, 5–11, 28, and 29

Petitioner, relying on the declaration of Andrew Lippman, Ph.D. (Ex. 1002), challenges claims 1–3, 5–11, 28, and 29 as obvious over the “fourth embodiment” of Kato. Pet. 19–33, 41–50 (citing Ex. 1002 ¶¶ 67–69, 77–83).

1. Kato (Ex. 1003) fourth embodiment

Kato provides a method of efficient encoding that encodes input data into variable-length code words each having a first portion and a second portion, wherein the first portion includes a bit pattern that can determine a code length of the related word, and wherein the second portion is equal to a part of the related word except the first portion. Ex. 1003, 4:31–42. The first portions are collected into a group and arranged into a data store region. *Id.* at 4:42–44. The second portions are also collected into a group and arranged into the data store region. *Id.* at 4:44–46. Figure 6(a) is reproduced below.

FIG. 6(a)

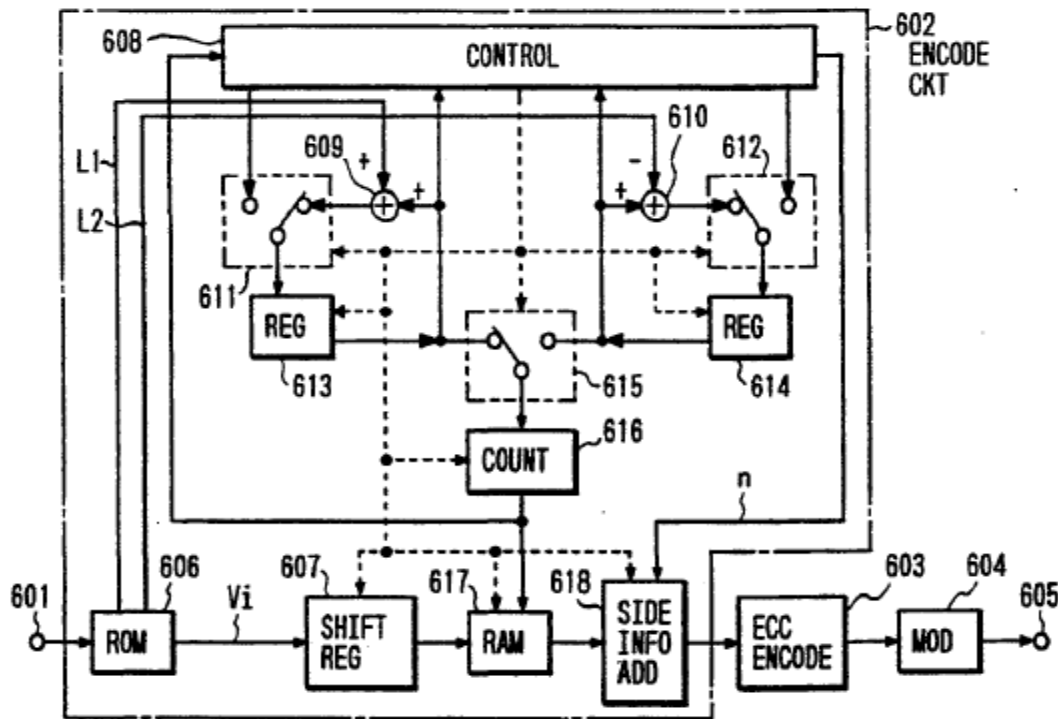


Figure 6(a) above shows a transmitter using an efficient coding method according to a fourth embodiment. Ex. 1003, 23:47–49. The transmitter includes encoding circuit 602, ECC (error correction code) encoder 603, and modulation circuit 604. *Id.* at 23:52–54. Encoding circuit 602 encodes input data D_i into a variable-length code, and places the variable-length code in a data store region within a transmission format. *Id.* at 23:54–57. ECC encoder 603 adds an error correction code to the data output from encoding circuit 602. *Id.* at 23:57–59. Modulation circuit 604 modulates the data from ECC encoder 603 and feeds the signal to output terminal 605. *Id.* at 23:59–62.

Encoding circuit 602 includes read only memory (ROM) 606, shift register 607, control circuit 608, addition circuit 609, subtraction circuit 610, selection circuit 611, selection circuit 612, register 613, register 614,

selection circuit 615, counter 616, random access memory (RAM) 617, and side information adding circuit 618. *Id.* at 23:62–24:21. ROM 606 receives input data D_i via input terminal 601 and encodes it into data V_i , and generates word length data $L1$ and $L2$. *Id.* at 24:2–5. Shift register 607 converts data V_i from bit-parallel format to bit-series format, which is stored in RAM 617. *Id.* at 24:7–10.

A first portion P_i of code word C_i has length $L1$. *Id.* at 25:20–21. When writing P_i to RAM 617, control circuit 608 controls register 613, selection circuit 615, and counter 616 to write the $L1$ bits into RAM 617. *Id.* at 25:45–58. A second portion R_i of code word C_i has length $L2$. *Id.* at 25:21–23. When the second portion R_i is written into RAM 617, control circuit 608 controls register 614, selection circuit 615, and counter 616 to write the $L2$ bites into RAM 617. *Id.* at 25:59–26:4.

Encoding circuit 602 encodes input data D_i into a variable length code word C_i and locates the code word C_i in a data store region within a data transmission format. *Id.* at 24:40–45. Figure 7 of Kato is reproduced below.

FIG. 7

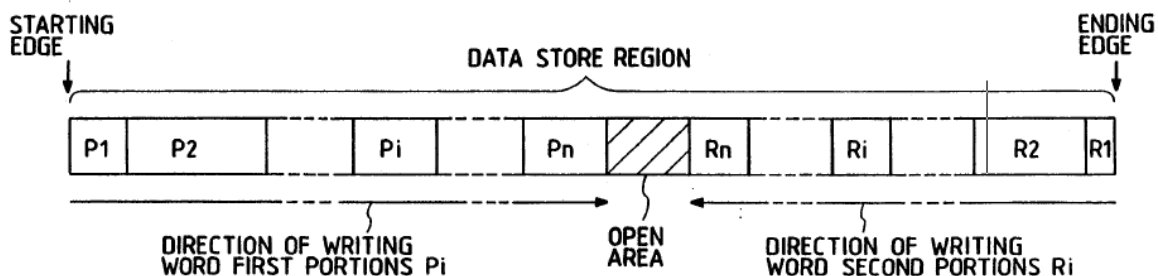


Figure 7 above shows an example of conditions of the arrangement of a variable-length code word in the data store region within the data transmission format. *Id.* at 24:46–48. Each variable length code word C_i is divided into a first portion P_i and a second portion R_i . *Id.* at 24:48–50. The

first portion P_i includes a bit pattern from which the code length L ($L=L_1+L_2$) of the word C_i can be detected. *Id.* at 24:50–53. The first portion P_i has L_1 former bits of word C_i , and the second portion R_i is equal to the remaining portion having L_2 remaining bits of word C_i . *Id.* at 24:53–58. First portions P_i and second portions R_i of respective code words C_i are arranged in the data store region. *Id.* at 24:58–63.

First portions P_i are sequentially arranged from the starting edge of the data store region toward the ending edge, and second portions R_i are sequentially arranged from the ending edge toward the starting edge. *Id.* at 24:63–25:8. First portions P_i are separated from second portions R_i . *Id.* at 31:51–55. This separating arrangement is adopted in view of the fact that an error can propagate through the first portions P_i , but cannot propagate through the second portions R_i . *Id.* at 31:55–58. ECC encoder 603 of Figure 6(a) adds error correction codes of higher ability to first portions P_i to increase the average number of code words which can be decoded correctly in the presence of a transmission error. *Id.* at 31:59–67.

2. Analysis of Claims 1–3, 5, and 6

Petitioner contends “[a]n error resilient method of encoding data” as recited in the preamble of claim 1 is disclosed by the fourth embodiment of Kato in describing an error resilient method of encoding data. Pet. 22 (citing Ex. 1003, 23:44–33:12; Figs. 6(a), 6(b), and 7).

Petitioner contends “generating a plurality of code words representative of respective portions of the data” is disclosed by the fourth embodiment of Kato in describing generating code words C_i representative of input data D_i , and word length data L_1 and L_2 corresponding to the input data. Pet. 22 (citing Ex. 1003, 24:2–5, 24:21–30, 24:46–25:23).

Petitioner contends “wherein each code word comprises a first portion and an associated second portion” is disclosed by the fourth embodiment of Kato in describing that code word C_i comprises a first portion P_i and a second portion R_i . Pet 22–23 (citing Ex. 1003, 24:48–50). According to Petitioner, each first portion P_i is associated with the second portion R_i and indicates the number of bits in C_i . *Id.* (citing Ex. 1003, 24:2–5, 24:50–55, 29:26–29).

Petitioner contends “generating the first portion of each code word, wherein said first portion generating step comprises the step of including information within the first portion that is representative of a predetermined characteristic of the associated second portion” is disclosed by the fourth embodiment of Kato in describing generating the first portion P_i of code word C_i that includes information indicating the characteristic of the length L of code word C_i . Pet. 23–24 (citing Ex. 1003, 24:48–58, 25:13–21, 29:26–29). Petitioner contends Kato describes that P_i is written into a data store region, and includes information of code length L , which a decoder uses to determine L_1 and L_2 . *Id.* (citing Ex. 1003, 24:53–58, 29:26–31).

Petitioner contends “generating the second portion of each code word, wherein said second portion generating step comprises the step of including information within the second portion that is representative of the respective portion of the data” is disclosed by the fourth embodiment of Kato in describing that ROM 606 generates the second portion of each code word C_i , and writes the second portion into the data store region. Pet. 24 (citing Ex. 1003, 24:2–5, 24:55–58, 25:9–23, 25:59–26:9).

Petitioner contends

providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated with the at least one first portion at a lower level than the error protection provided to the respective first portion

is disclosed by the fourth embodiment of Kato in describing providing greater error protection to first portions P_i than to second portions R_i . Pet. 24–25 (citing Ex. 1003, 31:51–32:20).

Patent Owner contends the fourth embodiment of Kato does not teach “wherein said first portion generating step comprises the step of including information within the first portion that is representative of a predetermined characteristic of the associated second portion” as recited in claim 1. PO Resp. 39–40. According to Patent Owner, the first portion P_i of code word C_i described in the fourth embodiment of Kato includes information describing the length L of the code word C_i (where $L=L_1+L_2$), but does not include L_2 . *Id.* Patent Owner contends that because the length L of the code word C_i is not the same as the length L_2 of the second portion R_i , the first portion does not include information representative of a predetermined characteristic of the second portion. *Id.*

Petitioner, relying on testimony from Dr. Lippman, contends that the distinction between including either the bit length L_2 of the suffix R_i , or the bit length L of the entire code word C_i , in the prefix P_i would have been insignificant to a person of ordinary skill in the art. Pet. 45 (citing Ex. 1002 ¶ 77). According to Petitioner and Dr. Lippman, the decoder of Kato receives P_i (which contains information for L), identifies the length L_1 of P_i when decoding P_i , then determines L_2 by subtracting L_1 from L . *Id.*

We determine that the Petition and supporting declaration show by a preponderance of the evidence that Kato describes that the decoder determines the length L ($L=L_1+L_2$) of the code word C_i from a bit pattern included in P_i , identifies the length L_1 of P_i during decoding, and determines the length L_2 of R_i by subtracting L_1 from L . Pet. 23–24, 45 (citing Ex. 1003, 24:46–58, 25:13–23, 29:26–31; Ex. 1002 ¶ 77). We agree with Petitioner that including information for L and L_1 in first portion P_i of Kato teaches “including information within the first portion that is representative of a predetermined characteristic of the associated second portion” as recited in claim 1.

Dr. Lippman further testifies that including L_2 , instead of L , in the prefix P_i would provide the same information about L_2 to a decoder. Ex. 1002 ¶ 77. According to Dr. Lippman, using L_2 instead of L could have been achieved by substituting the known element of L with the known element of L_2 , and the result would have been predictable, namely, determining L_2 directly from a bit pattern included in P_i . *Id.*

Patent Owner contends that Petitioner does not provide evidence to show one of ordinary skill would have used L_2 in place of L in the first portion P_i . PO Resp. 42. According to Patent Owner, Kato does not disclose using L_2 , where $L_2=L-L_1$, in decoding P_i and R_i at the receiver, but instead uses $L_{\max}-L_1$. *Id.* at 42–43 (citing Ex. 1003, 29:41–52, 57–61, Fig. 7).

Petitioner contends Kato discloses using L_2 in decoding. Reply 6 (citing Ex. 1003, 29:22–24, 30–31, 30:4–9); Pet. 19–20 (citing Ex. 1003, 25:9–23, 30:54–68), Pet. 23–24 (citing Ex. 1003, 29:26–31, 50–64).

Although Kato does disclose using $L_{\max}$ -L1 to read data from RAM 635 into shift register 636 in a bit serial format (Ex. 1003, 29:45–52, 57–61, Fig. 6(b)), Kato further discloses that shift register 636 converts this data into bit parallel format data V_i' (Ex. 1003, 29:20–22), then sends data V_i' to ROM 637 (Ex. 1003, 29:22). Kato discloses ROM 637 uses data V_i' to output word length data L1 and L2, which are then used to recover data V_i (Ex. 1003, 29:22–24, 30) (where data V_i includes first code word portion P_i and second code word portion R_i (Ex. 1003, 25:16–23)). Kato discloses converting V_i into recovered data D_i . Ex. 1003, 29:62–63. Therefore, Patent Owner's contention that Kato uses $L_{\max}$ -L1, but not L2, in decoding P_i and R_i at the receiver is inconsistent with Kato's disclosure of using L1 and L2 to recover and decode V_i (which includes P_i and R_i), then converting V_i into recovered data D_i .

We agree with Petitioner that Kato discloses using L2 in decoding, because in order to decode the second portion R_i of the code word C_i , the decoder would need to know the length L2 of R_i . Pet. 21 (citing Ex. 1003, 31:51–32:20; Ex. 1002 ¶¶ 69–74); Reply 6 (citing Ex. 2014, 107:12–13, 18–19, 111:4–6).

We determine that the Petition and supporting declaration show by a preponderance of the evidence that substituting the known element L2 for the known element L in first portion P_i does no more than yield the predictable result of the decoder determining L2 from the value L2 contained in the first portion R_i , rather than from the difference of L and L1. Pet. 45–46 (citing Ex. 1002 ¶ 77). We agree with Petitioner that substituting the known L2 for the known L in P_i teaches “including

information within the first portion that is representative of a predetermined characteristic of the associated second portion” as recited in claim 1.

We determine that Petitioner has articulated sufficient reasoning to support its conclusion that claim 1 is obvious. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 1 obvious.

Claim 2 recites “said step of generating a plurality of code words comprises the step of entropy coding the data to thereby reduce the size of the resulting code words.” Ex. 1001, 18:30–32. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing encoding data D_i into variable-length code words C_i , which is entropy coding. Pet. 25 (citing Ex. 1003, 2:14–21, 10:44–46, 24:2–5, and 32:21–26).

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 2 obvious.

Claim 3 recites

wherein said step of generating the second portion of each code word comprises the step of generating second portions having predetermined numbers of characters, and wherein said step of generating the first portion of each code word comprises the step of generating first portions which include information representative of the predetermined number of characters which comprise the associated second portion.

Ex. 1001, 18:33–41. Petitioner persuasively shows the fourth embodiment of Kato discloses this limitation in describing that the associated second portion R_i has a bit length L_2 , where the predetermined length L of the code

word is equal to $L1+L2$ and is represented by $L1$. Pet. 25–26 (citing Ex. 1003, 24:55–58).

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 3 obvious.

Claim 5 recites

wherein said step of providing error protection comprises the steps of:

storing the at least one first portion of the plurality of code words in a first data block of a storage medium, wherein the first data block is error protected; and

storing the respective second portion associated with the at least one first portion in a second data block of the storage medium, wherein any error protection provided by the second data block is at a lower level than the error protection provided by the first data block.

Ex. 1001, 18:54–64.

Petitioner contends the fourth embodiment of Kato discloses these limitations in describing storing the first portions P_i in one data region and the second portions R_i in another. Pet. 26–27 (citing Ex. 1003, Fig. 7; 24:60–25:8, 32:35–39). Petitioner contends the fourth embodiment of Kato discloses providing error protection to the part of the data store region containing P_i . Pet. 26 (citing Ex. 1003, 31:51–67). Petitioner also contends the fourth embodiment of Kato discloses the second data store region, containing R_i , is error protected at a lower level than the first part. *Id.* According to Petitioner, Kato discloses the data store regions that separately store the first and second portions can be located in a storage medium. Pet. 47–48 (citing Ex. 1003, 32:35–39, 33:1–7); Ex. 1002 ¶ 80.

Patent Owner contends the fourth embodiment of Kato does not disclose the claimed features of storing a first portion of a code word in a first data block, and providing error protection to the first portion stored in the first data block. PO Resp. 26–30. According to Patent Owner, the data store region shown in Figure 7 of Kato is only in RAM 617 of encode circuit 602 shown in Figure 6(a), but the error correction codes (ECCs) are added by ECC 603, after data is output from RAM 617 and encode circuit 602. *Id.* at 28–29. Patent Owner also contends that Petitioner is incorrect in arguing that Kato’s data store region refers to both recording media and transmission media. PO Resp. 31–33.

Patent Owner further contends that there is no reason to modify Kato to apply error correction codes to stored data, because Kato only applies the error correction codes for transmitting data, and does not need to store data in a noisy storage medium. PO Resp. 33–37. According to Patent Owner, Kato does not identify any risk of errors to data stored in encoding circuit 602 due to channel noise. *Id.* Patent Owner contends that adding error correction codes to data stored in the encoding circuit would impose an additional cost of data expansion from redundancy without any benefit of overcoming channel noise or degradation. *Id.*

Patent Owner further argues Dr. Lippman’s testimony on this point should be given no weight. PO Resp. 35. According to Patent Owner, Dr. Lippman testifies that data is compressed so that it can be more efficiently stored or transmitted, but then contradicts this testimony by stating that modifying Kato to inefficiently store the data would have been recognized by a person of ordinary skill. PO Resp. 34–35 (citing Ex. 1002 ¶ 80).

Dr. Lippman testifies that

[m]oreover, even if Kato were somehow interpreted not to disclose these storage and transmission limitations, Kato would have rendered them obvious to one skilled in the art. The reason that data is compressed is so that it can be more efficiently stored or transmitted. Given Kato's teaching that the first portions P_i should be subjected to higher error protection than the second portions R_i , one of ordinary skill in the art would have recognized the importance of storing the P_i in a higher-error-protected data block of a storage medium than the R_i . Similarly, the person of ordinary skill would have recognized the importance of transmitting the P_i over a higher-error-protected data link. Kato could benefit from the higher-error protection for the important information with predictable results.

Ex. 1002 ¶ 80. In this paragraph, Dr. Lippman testifies that compressed data is either transmitted or stored. Dr. Lippman further testifies that the benefit of adding redundancy to portions of compressed data, namely, correcting for errors in storage or transmission to prevent error propagation to subsequent code words as taught by Kato, would have been recognized in the art. This testimony is supported by other portions of Dr. Lippman's testimony. Ex. 1002 ¶¶ 36–40, 72–74 (citing Ex. 1003, 31:59–67). Dr. Lippman's testimony is also consistent with the knowledge of a person of ordinary skill in the art, as disclosed by the '482 patent as follows:

Once an image is compressed, the compressed image is typically transmitted over a communications link or stored in a medium, such as a magnetic disk. In this context, the communications or storage medium is referred to as the "channel". A digital data set, such as a compressed image, conveyed through such a channel is subject to corruption of some of the bits, thereby creating erroneous bit values. . . .

. . . .

As known to those skilled in the art, another approach uses channel coding (also called forward error coding (FEC)) which further encodes the data so that channel errors may be detected

and, in some instances, corrected with high probability. Channel coding can detect and correct some bit errors by adding redundancy to the data in a controlled fashion. . . .

As known to those skilled in the art, one variant of channel coding uses an approach called Unequal Error Protection (UEP) which separates a data set into several subsets and provides different levels of error protection for each subset by varying the amount of redundancy for each subset. . . . By providing lower levels of protection to the less important subsets of the data, the amount of redundancy added by the channel coding can be reduced, and channel bandwidth may correspondingly be conserved.

Ex. 1001, 4:66–5:45.

Petitioner agrees with Patent Owner that Kato discloses encoding data with unequal error protection by ECC 603, but contends that Kato further teaches that the data encoded with unequal error protection of first portions P_i and second portions R_i would be stored in a data store region of a storage medium other than in RAM 617. Reply 10–11 (citing Ex. 1003, 31:51–67, 32:2–6; Fig. 7). According to Petitioner, Kato discloses the data store region includes a data region in a sector of a disk-shaped recording medium such as a hard drive, a region in a prior art encoder, or located in RAM 635 of decoder 622 of Figure 6(b). Reply 12–13 (citing Ex. 1003, 2:44–58, 28:62–64, 25:31–34, 33:2–7; Ex. 1014, 183:14–184:2).

We agree with Petitioner that a person of ordinary skill in the art would have recognized that data would be compressed to be transmitted or stored efficiently. Ex. 1002 ¶¶ 22, 38, 39, 80; Ex. 1001, 4:66–5:1. We determine that a person of ordinary skill in the art would have recognized that the compressed data, when stored, would be stored in a data store region of an encoder, a RAM in a decoder, or a sector of a disk-shaped recording medium. Ex. 1003, 2:44–58, 28:62–64, 25:31–34, 33:2–7, Fig. 6(b); Fig. 7.

We further determine that a person of ordinary skill in the art would have recognized that encoding the compressed data, to provide higher error protection to first portions P_i than to second portions R_i of code words C_i , before storing the compressed data, yields the predictable result of preventing error propagation to subsequent code words and increasing the number of code words that can be decoded correctly. Ex. 1002 ¶¶ 72–74, 80; Ex. 1003, 31:51–67.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 5 obvious.

Claim 6 recites “transmitting the at least one first portion of the plurality of code words via a first data link, wherein the first data link is error protected.” Ex. 1001, 19:1–3. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing that code words stored in separate data store regions may be transmitted in separate transmission packets, or data links. Pet. 27 (citing Ex. 1003, 32:35–39, 33:2–7). According to Petitioner, first portions P_i are located in one data store region, and ECC encoder 603 provides error correction and the code is transmitted, providing the first data link. Pet. 28 (citing Ex. 1003, Fig. 6(a); 23:57–63, 24:60–25:8, and 31:51–67).

Claim 6 also recites “transmitting the respective second portion associated with the at least one first portion via a second data link, wherein any error protection provided by the second data link is at a lower level than the error protection provided by the first data link.” Ex. 1001, 19:4–8. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing that second portions R_i are located in a second data store

region, which is error protected at a lower level than the first, providing a second data link. Pet. 28 (citing Ex. 1003, 24:60–25:8, 31:51–67, 32:35–39).

Patent Owner contends that Kato only discloses a single path from encoding circuit 602, to ECC encoder 603, to modulator, to output terminal 605, to a transmission line. PO Resp. 38 (citing Ex. 1003, 23:62, 27:36; Ex. 2008 ¶ 58). Patent Owner further contends that Kato does not suggest two unequal error-protected data links, because the coded data C_i of Kato is output in a bit serial format and transmitted using only a single transmission line. PO Resp. 38–39 (citing Ex. 1003, 11:5–11; Ex. 2008 ¶ 59). According to Patent Owner, neither the Petitioner nor Dr. Lippman have addressed how or why a person of ordinary skill in the art would split the coded data in a bit serial format into multiple unequal error-protected data links. PO Resp. 38–39.

Petitioner contends that Dr. Lippman provides unrebutted testimony that a person of ordinary skill in the art would have found it obvious to modify Kato to employ two data links. Reply 19. Dr. Lippman testifies that “Kato teaches that that first portions P_i and the second portions R_i can be located in separate data store regions--that is, different data blocks in a recording medium or different data links in a transmission medium.” Ex. 1002 ¶ 80 (citing Ex. 1003, 24:66–25:8, 32:35–39).

The cited portions of Kato disclose storing first portions P_i and second portions R_i in separate portions of the data store region, but do not disclose transmitting the first portions P_i and second portions R_i over different data links. We agree with Patent Owner that the Petition and supporting evidence do not address how or why a person of ordinary skill in the art would split a

bit serial format signal, which already has unequal error-protected coded data C_i , into multiple signals, and transmit the multiple signals over multiple data links.

Based on the foregoing discussion and the record, Petitioner has not shown by a preponderance of the evidence that Kato renders claim 6 obvious.

3. Analysis of Claims 7–11

Claim 7 recites “code word generating means for generating a plurality of code words representative of respective portions of the data, wherein each code word comprises a first portion and an associated second portion.” Ex. 1001, 19:9–14. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing encode circuit 602 and ECC encoder 603 generating a plurality of code words C_i corresponding to input data D_i , where each code word C_i comprises a first portion P_i and an associated second portion R_i , and each first portion P_i indicates the number of bits in C_i and thus the number of bits in R_i . Pet. 29 (citing Ex. 1003, 24:2–25:23, 29:26–29).

Claim 7 recites “first generating means for generating the first portion of each code word, said first generating means comprising means for including information within the first portion that is representative of a predetermined characteristic of the associated second portion.” Ex. 1001, 19:15–19. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing encode circuit 602 with ROM 606 operate by generating the first portion P_i of a code word, where first portion P_i is generated to include information including the sum L of its own bit length

L1 and the bit length L2 of associated second portion Ri. Pet. 29 (citing Ex. 1003, 24:50–55, 25:13–21, 53–58, 29:26–30:9).

Claim 7 recites “second generating means for generating the second portion of each code word, said second generating means comprising means for including information within the second portion that is representative of the respective portion of the data.” Ex. 1001, 1:20–24. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing encode circuit 602 with ROM 606 operate by generating the second portion Ri of a code word Ci, where second portion Ri includes information representative of input data Di. Pet. 30 (citing Ex. 1003, 24:2–5, 55–58, 25:21–23, 25:59–26:9, 30:54–68).

Claim 7 recites

error protection means for providing error protection to at least one of the first portions of the plurality of code words while maintaining any error protection provided to the respective second portion associated with the at least one first portion at a lower level than the error protection provided to the respective first portion.

Ex. 1001, 1:25–30. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing ECC encoder 603 providing error protection to first portions Pi of code word Ci while maintaining a lower level of error protection for associated second portions Ri of code word Ci. Pet. 30 (citing Ex. 1003, 31:51–32:20).

Patent Owner contends that Petitioner’s sole theory regarding the claimed “error protection means” is indefiniteness, which cannot form the basis of an IPR. PO Resp. 19. According to Patent Owner, Petitioner failed to provide a statement describing the structure, materials, or acts

corresponding to the means plus function limitations, and failed to provide a statement on how the construed claim is unpatentable. PO Resp. 18–20.

The Petition, when discussing the structure corresponding to the “error protection means” recited in claim 7, states that the ’482 patent discloses that methods and apparatus for performing the claimed “unequal error protection” were known to those skilled in the art. Pet. 10 (citing Ex. 1001, 16:10–14). The Petition then identifies where the claimed “error protection means” is taught by the prior art. Pet. 30, 59.

Given that the Petition’s discussion of the claimed “error protection means” identifies the ’482 patent’s disclosure of known unequal error protection means (Pet. 10), and given that the Petition identifies where the claimed “error protection means” is taught in the prior art (Pet. 30, 59), we determine that the Petition provided a statement describing the structure, materials, or acts corresponding to the claimed “error protection means,” and provided a statement on how the construed claim is unpatentable.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 7 obvious.

Claim 8 recites “entropy coding means for entropy coding the data to thereby reduce the size of the resulting code words.” Ex. 1001, 19:31–34. Petitioner persuasively shows Kato discloses this limitation in describing ROM 606 encodes data D_i into variable length code words C_i , using entropy codes such as Huffman codes, where short code words are assigned to data having high probabilities of occurrence, so that the total number of bits of generated code words can be reduced in time average. Pet. 30–31 (citing Ex. 1003, 2:14–21, 10:44–46, 24:2–5, 25:13–20).

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 8 obvious.

Claim 9 recites “said second generating means generates second portions having predetermined numbers of characters.” Ex. 1001, 19:35–40. Petitioner contends Kato discloses this limitation in describing each second portion R_i has a bit length L_2 . Pet. 31 (citing Ex. 1003, 24:55–58, 25:21–23). Claim 9 also recites “said first generating means generates first portions which include information representative of the predetermined number of characters which comprise the associated second portion.” Petitioner persuasively shows Kato discloses this limitation in describing each first portion P_i is generated to include information indicating the sum of its own bit length L_1 and the bit length L_2 of associated second portion R_i . Pet. 31–32 (citing Ex. 1003, 24:50–55, 29:26–30:9).

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 9 obvious.

Claim 10 recites

said error protection means comprises a storage medium for storing the plurality of code words, said storage medium being partitioned into a first data block which is error protected and a second data block, wherein any error protection provided by the second data block is at a lower level than the error protection provided by the first data block, wherein the at least first portion of the plurality of code words is stored in the first data block of the storage medium, and wherein the respective second portion associated with the at least one first portion is stored in the second data block of the storage medium.

Ex. 1001, 19:41–53. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing first portions P_i located in a first part of a data store region, second portions R_i located in a second part of the data store region, where the second part of the data store region is error protected at a lower level than the first part. Pet. 32 (citing Ex. 1003, 24:60–25:8, 31:51–67, 33:2–7). According to Petitioner, Kato discloses the data store region may be a portion of a disk-shaped storage medium. Pet. 32 (citing Ex. 1003, 33:2–7).

Patent Owner contends that the Petition maps the “error correction means” recited in claim 7 to ECC encoder 603 of Kato. PO Resp. 11 (citing Pet. 30). Patent Owner contends that the Petition then maps “wherein said error protection means comprises a storage medium” recited in claim 10 to data store region of encoding circuit 602, which is an irreconcilable inconsistency. *Id.* (citing Pet. 32).

Petitioner contends that the Petition is consistent in treating claims 7 and 10. Reply 2. According to Petitioner, Patent Owner’s argument is founded on the erroneous premise that the data store region disclosed by Kato is limited to RAM 617 in encoding circuit 602. *Id.* Petitioner contends that the data store region disclosed by Kato is not limited to RAM 617 in encoding circuit 602, but includes any region in which data is stored, such as a sector of a hard drive. Reply 2, 10–13 (citing Ex. 1003, Fig. 6(b), 28:62–64, 33:2–7).

The Petition states that claim 10’s recitation regarding data storage relates to the use of known channel coding discussed in the ’482 patent, and that a person of ordinary skill in the art would have recognized that the first and second compressed portions of Kato would be stored in different

channels, in view of the unequal error protection applied to the different portions. Pet. 47–48 (citing Ex. 1001, 5:35–46, 16:10–27; Ex. 1003, 32:35–39, 33:2–7; Ex. 1002 ¶¶ 78–80). We determine that Petitioner’s mapping of “said error correction means” as recited in claim 7 to ECC encoder 603 of Kato is consistent with Petitioner’s mapping of said “error correction means comprises a storage medium” as recited in claim 10 to Kato’s disclosure of storing error corrected data in a data store region, including any region in which data is stored.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 10 obvious.

Claim 11 recites “said error protection means comprises: first data link transmitting means for transmitting the at least one first portion of the plurality of code words via a first data link, wherein the first data link is error protected.” Ex. 1001, 19:56–59. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing a transmitter that transmits code words C_i comprising an encoding circuit, an ECC encoder, a modulation circuit, and an output terminal coupled to a transmission line. Pet. 33 (citing Ex. 1003, Fig. 6(a), 23:52–63). According to Petitioner, the first portions P_i of code word C_i are located in a first part of a data store region, where the data store region is a portion of a transmitted packet and the first part containing P_i is error protected.

Claim 11 also recites “said error protection means comprises:”

second data link transmitting means for transmitting the respective second portion associated with the at least one first portion via a second data link, wherein any error protection

provided by said second data link is at a lower level than the error protection provided by said first data link.

Ex. 1001, 19:60–65. Petitioner contends the fourth embodiment of Kato discloses this limitation in describing second portions Ri of code word Ci located in a second data store region that is error protected at a lower level than the first. Pet. 33 (citing Ex. 1003, Fig. 6(a), 23:52–63, 24:60–25:8, 31:51–67, 32:35–39).

Given our construction above of “first data link transmitting means” and “second data link transmitting means” as including first and second data links, we determine that Petitioner has not shown by a preponderance of the evidence that Kato renders claim 11 obvious for the reasons given in our analysis of claim 6 above.

4. Analysis of Claims 28 and 29

Petitioner contends the fourth embodiment of Kato discloses the computer readable memory for storing error resilient encoded data recited in claim 28 in describing a memory for storing data in a data store region. Pet. 41–42 (citing Ex. 1003, 33:2–7).

Claim 28 recites

a storage medium for storing the error resilient encoded data, said storage medium being partitioned into a first error protected data block and a second data block, wherein any error protection provided by said second data block is at a lower level than the error protection provided by said first data block.

Ex. 1001, 22:25–31. Petitioner contends Kato discloses this limitation in describing storing first portions Pi and second portions Ri of code words in different blocks of a data store region, where the block containing the second portions Ri is error protected at a lower level than the block containing the

first portions P_i . Pet. 42 (citing Ex. 1003, 31:51–67, 32:35–39, 33:2–7; Fig. 7).

Claim 28 recites

a plurality of code words, representative of respective portions of the original data, which have respective first and second portions, wherein the first portion of each code word includes information representative of a predetermined characteristic of the associated second portion, and wherein the associated second portion of each code word includes information representative of a respective portion of the original data.

Ex. 1001, 22:32–39. Petitioner contends Kato discloses this limitation in describing code words C_i of encoded data D_i , each code word C_i having a first portion P_i and second portion R_i , where each first portion P_i includes information indicating the sum of its own bit length L_1 and the bit length L_2 of the associated second portion, and the second portion R_i includes information representative of D_i . Pet. 42–43 (citing Ex. 1003, 24:2–5, 48–55, 29:26–29, 30:54–68).

Claim 28 recites

wherein at least one of the first portions of the plurality of code words is stored in the first data block of said storage medium such that the at least one first portion is error protected, and wherein the respective second portion associated with the at least one first portion is stored in the second data block of said storage medium such that any error protection provided to the respective second portion associated with the at least one first portion is at a lower level than the error protection provided to the respective first portion.

Ex. 1001, 22:40–49. Petitioner contends Kato discloses this limitation in describing storing first portions P_i in a first half of a data store region, second portions R_i in a second half of a data store region, and error

protecting the second half of the data store region at a lower level than the first half. Pet. 43–44 (citing Ex. 1003, 24:60–25:8, 31:51–67; Fig. 7).

Patent Owner contends that Kato fails to disclose a first data block of a storage medium that is error protected, and that the Petition fails to establish a reason to modify Kato to store error protected data. PO Resp. 26–37. Patent Owner’s contentions for claim 28 are the same as those presented for claim 5, which we disagree with for the reasons discussed in our analysis of claim 5.

Based on the foregoing discussion and the record, we determine that Petitioner has shown by a preponderance of the evidence that Kato renders claim 28 obvious.

Claim 29 recites “the second portion of each code word has a predetermined number of characters, and wherein the first portion of each code word includes information representative of the predetermined number of characters which comprise the associated second portion.” Ex. 1001, 22:50–56. Petitioner contends Kato discloses this limitation for the reasons given in the analysis of claims 3 and 28. Pet. 44.

Based on the foregoing discussion and the record, we determine that Petitioner has shown by a preponderance of the evidence that Kato renders claim 29 obvious.

C. Asserted Obviousness over Kato: Claims 12–14, 16, 17, and 22–26

Petitioner challenges claims 12–14 and 16 as obvious over Kato.
Pet. 38–41, 52–56.

1. Kato's third embodiment

Kato provides a method of efficient encoding that collects bits of input data into a block, subjects the input data to a transform that generates a DC coefficient and AC coefficients, quantizes the coefficients, and codes the coefficients. Ex. 1003, 3:44–65. Figure 4(a) of Kato is reproduced below.

FIG. 4(a)

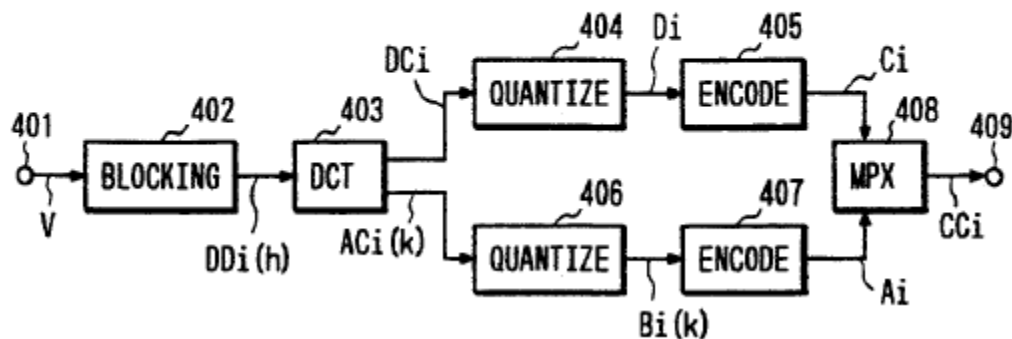


Figure 4(a) of Kato above shows an efficient encoding apparatus that uses an efficient encoding method according to a third embodiment. *Id.* at 19:39–41. The efficient encoding apparatus includes blocking circuit 402, DCT (Discrete Cosine Transform) circuit 403, quantization circuit 404, encoding circuit 405, quantization circuit 406, encoding circuit 407, and multiplexing circuit 408. *Id.* at 19:46–50.

Input image data V is fed via input terminal 401 to blocking circuit 402. *Id.* at 19:52–53. Blocking circuit 402 separates a frame represented by input data V into 8×8 blocks of pixels, and outputs data DDi(h) corresponding to each block, where h denotes an integer from 0 to 63. *Id.* at

19:53–60. DCT circuit 403 receives the block data $DD_i(h)$ and transforms the block data into a set of DCT coefficients, including one DC coefficient DC_i and 63 AC coefficients $AC_i(k)$, where i denotes a block identification number and k denotes an integer from 1 to 63. *Id.* at 19:60–68. DCT circuit 403 outputs the DC coefficient DC_i to quantization circuit 404, and outputs the AC coefficients $AC_i(k)$ to quantization circuit 406. *Id.* at 20:1–4.

Quantization circuit 404 quantizes the DC coefficient DC_i into data Di . *Id.* at 20:4–9. Encoding circuit 405 encodes data Di into coded data Ci . *Id.* at 20:9–11. Encoding circuit 405 is similar in structure to the encoding apparatus of Figure 1(a). *Id.* at 20:11–12. Quantization circuit 406 quantizes the AC coefficients $AC_i(k)$ into data $Bi(k)$. *Id.* at 20:25–28. Encoding circuit 407 receives data $Bi(k)$ from quantization circuit 406 and encodes it using Huffman encoding into coded data Ai . *Id.* at 20:30–34. Multiplexing circuit 408 receives coded data Ci , coded data Ai , and combines them into multiplexed coded data CCi , which is transmitted via output terminal 409. *Id.* at 20:34–41.

2. Analysis of Claims 12–14 and 16

Claim 12 recites “transforming the data based upon a predetermined transformation function.” Ex. 1001, 20:1–2. Petitioner contends the third embodiment of Kato discloses this limitation in describing a Discrete Cosine Transform (DCT) function to transform data. Pet. 33–34 (citing Ex. 1003, 19:51–68; Fig. 4(a)).

Claim 12 also recites “quantizing the transformed data such that the quantized data has fewer unique coefficients than the transformed data.” Ex. 1001, 20:3–5. Petitioner contends the third embodiment of Kato discloses

this limitation in describing quantizing data to reduce the number of coefficients. Pet. 34 (citing Ex. 1003, 20:1–9).

Claim 12 also recites “encoding the quantized data,” which Petitioner contends the third embodiment of Kato discloses in describing encoding quantized data. Pet. 34 (citing Ex. 1003, 20:9–11). Petitioner contends the remainder of the encoding step recited in claim 12 is similar to the steps recited in claim 1, which Petitioner contends are disclosed by the fourth embodiment of Kato. Pet. 34–35.

Patent Owner contends Petitioner does not provide a reason to combine the transform and quantizing steps of Kato’s third embodiment to the fourth embodiment of Kato. PO Resp. 44–48. According to Patent Owner, Dr. Lippman’s testimony seems to say no more than a person of ordinary skill in the art could have combined the third and fourth embodiments, but does not give a reason to combine the embodiments *Id.* at 45 (citing Ex. 1002 ¶ 83). Patent Owner also contends that Petitioner’s reason for transforming and quantizing input data of Kato’s fourth embodiment, namely, the benefit of compressing the input data, is already used in Kato’s fourth embodiment. *Id.* at 46–48. In particular, Patent Owner contends that quantization is different than compression. *Id.* at 46. According to Patent Owner, given the distinction between compression, which is representing data with fewer bits, and quantization, where information is lost, it does not follow that a person of ordinary skill in the art would add transform and quantization steps to compress data. *Id.* at 46–47.

Petitioner contends that a person of ordinary skill in the art would have compressed the input data D_i of the fourth embodiment of Kato using the transform and quantizing steps taught by the third embodiment, before

encoding the input data D_i using the variable-length coding taught by the fourth embodiment, for the benefit of compressing the input data. Pet. 49. Petitioner relies on testimony of Dr. Lippman, who testifies that the benefits of split-field coding and unequal error protection taught by the fourth embodiment of Kato are applicable to numerous types of data, including the transformed and quantized data of the third embodiment. *Id.* at 50 (citing Ex. 1002 ¶ 83). According to Dr. Lippman, it would have been obvious to encode transformed, quantized data of the third embodiment using split-field coding of the fourth embodiment for the benefits of reducing the impact of channel errors and using transmission bandwidth or storage space more efficiently as taught by Kato. Ex. 1002 ¶ 83.

Petitioner contends that the '482 patent discloses that transforming and quantizing data was known to those skilled in the art, and that the benefits of transforming and quantizing, namely, representing data with fewer bits, was also known in the art. Reply 20–21 (citing Ex. 1001, 2:1–14, 3:7–10, 3:29–32, 9:42–44, 11:36–41). Petitioner further contends that although entropy coding reduces the number of bits by using variable length coding, a person of ordinary skill in the art would have recognized the benefits of further compressing the data using transform and quantization steps. Reply 23 (citing Ex. 1002 ¶¶ 19, 21–37, Ex. 1001, 2:11–14).

The '482 patent discloses that a “common approach to image compression, called transform-based compression or transform coding, involves three primary steps, namely, a transform step, a quantization step, and an encoding step.” Ex. 1001, 2:11–14. The '482 patent further discloses that while “the quantized coefficient values have reduced precision, they also can be represented with fewer bits, thus allowing higher

compression at the expense of distortion in the reconstructed image.” *Id.*, 3:29–32.

We agree with Patent Owner that the fourth embodiment of Kato encodes input data D_i into a variable-length code. PO Resp. 47 (citing Ex. 1003, 23:54–55). However, we agree with Petitioner that the fourth embodiment of Kato does not exclude further compressing the input data using the transforming and quantizing steps. Reply 21 (citing Ex. 1014, 197:5–10). We also agree with Petitioner that a person of ordinary skill would recognize that further compressing the input data yields the benefit of representing the input data with fewer bits. Reply 22–23 (citing Ex. 1002 ¶¶ 19, 21–37, 83).

We determine that the Petition and supporting evidence establish, by a preponderance of the evidence, that a person of ordinary skill in the art, with knowledge of the transforming and quantizing steps of Kato’s third embodiment, and with knowledge that transforming and quantizing data yields the benefit of representing data with fewer bits, would compress the input data D_i of Kato’s fourth embodiment using the transforming and quantization steps taught by Kato’s third embodiment to yield the predictable result of representing the input data with fewer bits.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 12 obvious.

Petitioner persuasively shows the limitations recited in dependent claims 13, 14, 16, and 17 are similar to those of dependent claims 2, 3, 5, and 6 which are disclosed by Kato. Pet. 35–37. As discussed in our analysis of claims 2, 3, and 5 above, Petitioner has shown by a preponderance of the

evidence that Kato renders claims 13, 14, and 16, obvious. As discussed in our analysis of claim 6 above, Petitioner has not shown by a preponderance of the evidence that Kato renders claim 17 obvious.

3. Claims 22–26

Claim 22 recites “a data transformer for transforming the data based upon a predetermined transformation function.” Petitioner shows persuasively the third embodiment of Kato discloses this limitation in describing a data transformer to transform data based upon a predetermined DCT function. Pet. 37 (citing Ex. 1003, 19:60–68). Claim 22 recites “a data quantizer for quantizing the transformed data such that the quantized data has fewer unique coefficients than the transformed data.” Petitioner shows persuasively Kato discloses this limitation in describing the data quantizer of the third embodiment. Pet. 38 (citing Ex. 1003, 20:1–9). Claim 22 recites “a data encoder for encoding the quantized data.” Petitioner shows persuasively Kato discloses this limitation in describing the data encoder of the third embodiment. Pet. 38 (citing Ex. 1003, 20:9–11). Petitioner shows persuasively the remaining limitations of claim 22 are similar to those recited in claim 7, and are similarly disclosed by Kato. Pet. 38–39.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that Kato renders claim 22 obvious.

Petitioner persuasively shows the limitations recited in dependent claims 23–26 are similar to those recited in claims 7–11. Pet. 37–41. As discussed in our analysis of claims 7–10 above, Petitioner has shown by a preponderance of the evidence that Kato renders claims 23–25 obvious. As

discussed in our analysis of claim 11 above, Petitioner has not shown by a preponderance of the evidence that Kato renders claim 26 obvious.

D. Asserted Obviousness over Fiala, Fazel, and Fazel '622

Petitioner challenges claims 1–3, 5–14, 16, 17, 22–26, 28, and 29 as obvious over Fiala, Fazel, and Fazel '622. Pet. 54–65.

1. Fiala (Ex. 1004)

Fiala presents adaptive methods for data compression which can be used to reduce storage requirements for files, increase the communication rate over a channel, or reduce redundancy prior to encryption. Ex. 1004, 490. An adaptive method is a compression method that is widely applicable to different kinds of source data. *Id.* One method of encoding uses a unary code to specify field width, followed by the field itself. *Id.* at 496. This method uses variable-width unary-coded copy and literal code words to significantly increase compression. *Id.* at 502.

2. Fazel (Ex. 1005)

Fazel discloses the application of unequal error protection codes on combined source-channel coding of images. Ex. 1005, Title. A source encoder is based on the discrete cosine transform (DCT) adaptive quantization and variable length encoding (VLC), while a channel encoder is based on an unequal error protection (UEP) principle. *Id.*, Abstract. Fazel discloses that in many applications it is desirable to provide different protection levels for different components of a message word. *Id.* at 900. Fazel discloses that the bit stream after the source encoder has different levels of sensitivity to errors, hence a UEP code is required. *Id.* at 901.

Fazel notes that synchronization between frames has to be guaranteed to avoid spatial shift, and proposes transmitting the frame length in order to separate frames. *Id.* Fazel states that the frame-length, which is the most important information, has to be protected. *Id.* To protect information of the frames against channel errors, Fazel designs two UEP codes, where the first code has three levels of protection, and the second code has two levels of protection. *Id.*

3. Fazel '622 (Ex. 1006)

Fazel '622 relates to a system of encoding digital signals comprising a source encoder followed by a transmission channel encoder. Ex. 1006, 1:8–10. The source encoder is a variable-length encoding circuit. *Id.*, Abstract. The channel encoder comprises a sub-assembly with selective protection. *Id.*

4. Analysis of claims 1–3, 5–14, 16, 17, 22–26, 28, and 29

Petitioner contends the steps of generating a plurality of code words, generating the first portion of each code word, and generating the second portion of each code word recited in claim 1 are disclosed by Fiala in describing split-field coding in which a prefix represents the length of the suffix. Pet. 54, 57 (citing Ex. 1004, 496, 502; Ex. 1001, 16:28–32). Petitioner contends the step of providing error protection recited in claim 1 is disclosed by Fazel and Fazel '622 in describing unequal error protection. Pet. 54, 57 (citing Ex. 1005, Abstract, Introduction, Section IV; Ex. 1006, Figs. 2–5; 6:8–28, 6:49–8:10).

Patent Owner contends Petitioner has not explained why a person of ordinary skill in the art would have been motivated to use the error

protection taught by Fazel and Fazel '622 for transmitting or storing the code taught by Fiala. Prelim. Resp. 34–37.

Petitioner contends that it would have been apparent to one of ordinary skill in the art that the prefix in Fiala, which represents the length of the suffix, should be provided with a greater level of error protection provided by Fazel and Fazel '622 to minimize decoding errors. Pet. 55 (citing Ex. 1002 ¶¶ 94–96). Dr. Lippman testifies that

in Fiala the errors in one prefix field would corrupt a decoder's determination of where the corresponding suffix field ends and the next suffix field begins, causing errors to propagate to every subsequent suffix field. In fact, the Fazel article teaches that length-indicating information is the most important information and should be subject to the highest error protection, as does the Fazel '622 patent. Based on Fazel and Fazel '622, one of ordinary skill in the art would have recognized that applying greater error protection to the prefix fields than the suffix fields in Fiala would make the most efficient use of bandwidth or storage space.

Ex. 1002 ¶ 96 (internal citations omitted).

Patent Owner contends that the Petition does not establish a reason to provide unequal error protection to the split field coded data of Fiala. PO Resp. 49–51. According to Patent Owner, Fiala does not disclose or suggest using its split field coded data with noisy channels. *Id.* at 50. Petitioner shows persuasively that Patent Owner's contention is contradicted by Dr. Zeger, who testified that a person of ordinary skill in the art would have used Fiala's compression methods to transmit data over a noisy channel with error protection, such as the Internet or a radio link. Reply 7 (citing Ex. 1014, 223:6–12, 232:6–233:17, 235:5–18, 236:15–21). We agree with Petitioner and determine that a person of ordinary skill in the art would have applied the known technique of unequal error protection to the known method of

split field coding to yield the predictable result of protecting information stored or transmitted over a noisy channel such as the Internet or a radio link. Pet. 55 (citing Ex. 1002 ¶¶ 94–96).

Patent Owner contends that Fazel and Fazel '622 do not teach providing unequal error protection to a prefix and a suffix of a code word, but rather, teach code words corresponding to the lengths of the variable portions of the blocks, and code words resulting from the selective protection of the blocks. PO Resp. 52 (citing Ex. 1006, 10:23–32). Patent Owner also contends that Fiala does not teach the relative importance of the prefix and suffix of each code word. *Id.* at 53. Petitioner contends that a person of ordinary skill in the art would have recognized that more important data should receive higher error protection than less important data. Reply 7–8 (citing Ex. 1002 ¶¶ 44–45; Ex. 1014, 17:22–18:25, 24:12–19). Petitioner also contends that the prefixes of Fiala, which indicate the length of the code words, were more important than the suffixes, because errors in the prefixes lead to error propagation in subsequent code words. Reply 7–8 (citing Ex. 1002 ¶¶ 44–45, 95–96). According to Dr. Lippman, errors in one prefix field would corrupt a decoder's determination of where the corresponding suffix field ends, and where the next suffix field begins, causing errors to propagate in every subsequent suffix field. Ex. 1002 ¶ 96. Dr. Lippman testifies that one of ordinary skill in the art would have been motivated to apply greater error protection to the prefix fields in order to protect the length information of each corresponding suffix while efficiently using bandwidth and storage space. *Id.*

We agree with Petitioner and determine that a person of ordinary skill in the art would have applied the known technique of unequal error

protection to the known prefix of a split field code word to yield the predictable result of protecting the code word length information against channel errors while efficiently using bandwidth and storage space. Pet. 55; Ex. 1002 ¶ 96 (citing Ex. 1005 section 5; Ex. 1006, 3:16–24).

Patent Owner contends that the Petition lacks any discussion about how the combination of Fiala, Fazel, and Fazel '622 would operate. PO Resp. 56. According to Patent Owner, Fazel and Fazel '622 disagree about the most important information to be protected, and Fiala is silent about the most important information. PO Resp. 56–57. Fiala discloses that the “simplest method we tried uses a unary code to specify field width, followed by the field itself.” Ex. 1004, p. 496. Fazel discloses that the “frame-length, which is the most important information, has to be protected very efficiently.” Ex. 1005, section 5. Fazel '622 discloses that the “synchronizing information components which are the said block lengths are very important” and are protected from errors by encoding the lengths with selective protection. Ex. 1006, Abstract, 3:16–24.

We agree with Petitioner and determine that a person of ordinary skill in the art at the time of invention would protect length information in the unary field of Fiala with unequal encoding, because the length information is important information needed for synchronizing, as taught by Fazel and Fazel '622.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 1 obvious.

Petitioner contends the step of entropy coding recited in claim 2 is disclosed by Fiala in describing entropy coding to reduce the size of code

words. Pet. 57 (citing Ex. 1004, Section 5). Petitioner contends this limitation is also described by the variable length coding of Fazel and Fazel '622. *Id.* (citing Ex. 1005, Fig. 1; Ex. 1006, 6:8–13). Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 2 obvious.

Petitioner contends the limitations of claim 3 are disclosed by Fiala in describing a unary code to specify a width followed by the field itself. Pet. 58. Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 3 obvious.

Petitioner contends the limitations of claim 5 are disclosed by Fazel in describing error protection of a first data block at one level and a second data block at another unequal level. Pet. 58 (citing Ex. 1005, Abstract, Introduction, Section IV). Petitioner also contends the limitations of claim 5 are disclosed by Fazel '622 in describing storage of files with different error protected portions. *Id.* (citing Ex. 1006, 9:52–10:9). According to Petitioner, one of ordinary skill in the art would have understood that encoded data could appropriately be divided into different storage blocks or transmission links. Pet. 56 (citing Ex. 1002 ¶ 97). Dr. Lippman testifies that

one of skill in the art would have recognized that if data of different importance were separated into different storage blocks or data blocks, then different levels of error protection could be applied to the separated data as appropriate. Thus, in order to obtain the benefits of unequal error protection taught by Fazel and Fazel '622, one of ordinary skill in the art would have been motivated to separate the prefix and suffix fields of Fiala into different storage blocks or transmission links to facilitate applying unequal error protection.

Ex. 1002 ¶ 97.

Patent Owner contends that Fiala, Fazel, and Fazel '622 each lack any disclosure or suggestion of separate data blocks, separate data links, or applying unequal error protection to separate data blocks or separate data links. PO Resp. 55. According to Patent Owner, Dr. Lippman's testimony that one of ordinary skill would separate the prefix and suffix fields into different storage blocks or transmission links to facilitate applying unequal error protection does not address why one would want to apply unequal error protection, or how the different storage blocks or transmission links facilitate unequal error protection. PO Resp. 55–56, 60–61 (citing Ex. 1002 ¶ 97; Ex. 2008 ¶¶ 69–71).

Petitioner contends that Fazel '622 discloses storing unequal error protected data. Reply 17 (citing Ex. 1006 10:3–7). Petitioner further contends that Patent Owner's contention that Fazel '622 lacks any disclosure or suggestion of separate data blocks is incorrect. Reply 17–18. Petitioner, citing testimony of Dr. Zeger, contends that the two data blocks limitations simply require that the data not be stored on top of each other. Reply 18 (citing Ex. 1014, 248:9–249:1). Dr. Zeger testifies that

if you had a prefix and a suffix, as you said, stored at the same time in the same device, then you could logically conclude from that that they're not stored on top of each other hopefully. If they're not stored on top of each other in the same data block, then there would have to be different data blocks.

Ex. 1014, 248:20–249:1.

We determine that the Petition and supporting evidence provides a reason to apply the unequal error protection of Fazel and Fazel '622 to the prefix of the split field code word of Fiala for the reasons given in our analysis of claim 1. We determine that providing a prefix and suffix of the code word of Fiala with the unequal error protection of Fazel and Fazel

'622, and concurrently storing the prefix and suffix as taught by Fazel '622 yields the predictable result of storing the prefix and suffix in first and second data blocks, respectively.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 5 obvious.

Petitioner contends the limitations of claim 6 are disclosed by Fazel '622 in describing an encoder providing selective encoding with unequal error protection and transmitting the encoded signals via different data links. Pet. 58–59.

Patent Owner contends that Fiala, Fazel, and Fazel '622 each lack any disclosure or suggestion of separate data links. PO Resp. 55. Petitioner contends that Dr. Lippman testifies that a person of ordinary skill in the art would have been motivated to separate the prefix and suffix fields of Fiala into different transmission links to facilitate applying unequal error protection. Reply 19 (citing Ex. 1002 ¶ 97). However, Dr. Lippman's testimony does not explain why separate data links, rather than a single data link, would facilitate unequal error protection.

Based on the foregoing discussion and the record, Petitioner has not shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 6 obvious.

Petitioner contends the limitations of claims 7–10, 28, and 29 are taught by the combination of Fiala, Fazel, and Fazel '622 as explained in the analysis of claims 1–6. Pet. 59–60, 65. Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claims 7–10, 28, and 29 obvious.

Petitioner contends the first data link transmitting means and the second data link transmitting means of claim 11 are disclosed by Fazel '622 in describing encoder 20 providing selective encoding with unequal error protection. Pet. 61 (citing Ex. 1006, 6:8–28, 6:49–8:10; Figs. 2–5). According to Petitioner, Fazel '622 describes providing different data links at length encoding circuit 105, and each selective encoding circuit 211-214 provides different protection levels. *Id.* (citing Ex. 1006, 10:3–9). However, we disagree for the reasons given in our analysis of claim 6.

Based on the foregoing discussion and the record, Petitioner has not shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 11 obvious.

Petitioner contends the transforming and quantizing steps of claim 12 are disclosed by Fazel and Fazel '622. Pet. 61. Petitioner contends the remaining limitations of claim 12 are taught by the combination of Fiala, Fazel, and Fazel '622 as explained in the analysis of claim 1. *Id.*

Patent Owner contends Petitioner does not provide a reason why a person of ordinary skill in the art would combine the transforming and quantizing taught by Fazel and Fazel '622 with the method taught by Fiala. PO Resp. 58–59. Petitioner contends Fiala, Fazel, and Fazel '622 relate to data compression, the applications of which are relevant to storage and transmission of compressed data. Pet. 55–56 (citing Ex. 1002 ¶ 96). Petitioner also contends that a person of ordinary skill in the art recognized that transforming and quantizing data yields the benefit of representing data with fewer bits, thus allowing higher compression. Reply 20 (citing Ex. 1001, 3:29–32).

We determine that the Petition and supporting evidence establish, by a preponderance of the evidence, that a person of ordinary skill in the art, with knowledge of the transforming and quantizing steps of Fazel and Fazel '622, and with knowledge that transforming and quantizing data yields the benefit of representing data with fewer bits, would compress the data of Fiala using the transforming and quantization steps taught by Fazel and Fazel '622 to yield the predictable result of representing the input data with fewer bits.

Based on the foregoing discussion and the record, Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 12 obvious.

Petitioner contends the limitations of claims 13, 14, 16, and 17 are taught by the combination of Fiala, Fazel, and Fazel '622 as explained in the analysis of claims 2, 3, 5, and 6. Pet. 62–63. Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claims 13, 14, and 16 obvious.

Petitioner has not shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 17 obvious for the reasons given in our analysis of claim 6.

Petitioner contends the limitations of claims 22–26 are taught by the combination of Fiala, Fazel, and Fazel '622 as explained in the analysis of claims 11–14 and 16. Pet. 63–64. Petitioner has shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claims 22–25 obvious. Petitioner has not shown by a preponderance of the evidence that the combination of Fiala, Fazel, and Fazel '622 renders claim 26 obvious for the reasons given in our analysis of claim 11.

III. CONCLUSION

On this record, Petitioner has shown by a preponderance of the evidence that claims 1–3, 5, 7–10, 12–14, 16, 22–25, 28, and 29 of the '482 patent are unpatentable. Petitioner has not shown by a preponderance of the evidence that claims 6, 11, 17, and 26 of the '482 patent are unpatentable.

IV. ORDER

Accordingly, it is

ORDERED

1. Claims 1–3, 5, 7–10, 12–14, 16, 22–25, 28, and 29 of the '482 patent are unpatentable under 35 U.S.C. § 103 over Kato;
2. Claims 1–3, 5, 7–10, 12–14, 16, 22–25, 28, and 29 of the '482 patent are unpatentable under 35 U.S.C. § 103 over Fiala, Fazel, and Fazel '622;
3. Claims 6, 11, 17, and 26 of the '482 patent have not been proven to be unpatentable over Kato; and
4. Claims 6, 11, 17, and 26 of the '482 patent have not been proven to be unpatentable over Fiala, Fazel, and Fazel '622.

FURTHER ORDERED that because this Final Written Decision is final, a party to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2016-01203
Patent 5,850,482

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