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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/922.681	09/14/2010	Woo Suk Ko	2080-3758	2332
35884	7590	10/27/2016	EXAMINER	
LEE, HONG, DEGERMAN, KANG & WAIMEY 660 S. FIGUEROA STREET Suite 2300 LOS ANGELES, CA 90017			HARLEY, JASON A	
			ART UNIT	PAPER NUMBER
			2468	
			NOTIFICATION DATE	DELIVERY MODE
			10/27/2016	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WOO SUK KO and SANG CHUL MOON

Appeal 2014-009519
Application 12/922,681
Technology Center 2400

Before ALLEN R. MACDONALD, ROBERT E. NAPPI, and
DEBRA K. STEPHENS, *Administrative Patent Judges*.

STEPHENS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a Final Rejection of claims 1, 3–5, 7, 12, and 14. Claims 2, 6, 8–11, and 13 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE INVENTION

According to Appellants, the claims are directed to an apparatus for and a method of transmitting and receiving a signal which includes a Layer 1 (L1) signaling region where the L1 signaling has an adaptive L1 block

structure (Abstract). Claim 1, reproduced below, is representative of the claimed subject matter:

1. A method of transmitting at least one broadcasting signal frame having Physical Layer Pipe (PLP) data and preamble data, the method comprising:

mapping bits of the PLP data into PLP data symbols and bits of the preamble data into preamble data symbols;

building at least one data slice based on the PLP data symbols;

building a signal frame based on the preamble data symbols and the at least one data slice, the at least one data slice carrying one or multiple PLPs, the preamble data symbols including Layer-1 (L1) signaling information for signaling the at least one data slice;

modulating the signal frame by an Orthogonal Frequency Division Multiplexing (OFDM) method; and

transmitting a broadcasting signal including data of the modulated signal frame,

wherein the L1 signaling information includes data slice ID information that identifies the at least one data slice and PLP ID information that identifies each PLP carried in the at least one data slice, and

wherein a length of the data slice ID information is 8 bits.

12. A receiver for receiving a broadcasting signal, the receiver comprising:

a demodulator configured to demodulate the received broadcasting signal by use of an Orthogonal Frequency Division Multiplexing (OFDM) method;

a frame parser configured to obtain a signal frame from the demodulated broadcasting signal, the signal frame comprising preamble data symbols and at least one data slice, the at least one data slice including Physical Layer Pipe (PLP) data symbols of one or multiple PLPs, the preamble data symbols including L1

signaling information, wherein the L1 signaling information includes data slice ID information that identifies the at least one data slice and PLP ID information that identifies each PLP carried in the at least one data slice and wherein a length of the data slice ID information is 8 bits;

a symbol demapper configured to demap the preamble data symbols into preamble data bits and the PLP data symbols into PLP data bits; and

a low density parity check (LDPC) decoder configured to decode the preamble data bits by a shortened and a punctured LDPC scheme.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Vare	US 2009/0103649 A1	Apr. 23, 2009
Pekonen	US 2010/0085985 A1	Apr. 8, 2010

REJECTIONS

Claims 12 and 14 are rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph (Final Act. 2).

Claims 1, 3–5, 7, 12, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vare and Pekonen (Final Act. 3–8).

We have only considered those arguments that Appellants actually raised in the Briefs. Arguments Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. See 37 C.F.R. § 41.37(c)(1)(iv) (2012).

ISSUES

35 U.S.C. § 112, second paragraph: Claims 12 and 14

Appellants argue their invention, as recited, is not indefinite as the Specification describes corresponding structure (Br. 11–14). The issue presented by the arguments is

Issue 1: Has the Examiner erred in concluding the recitation of claim 12 is indefinite?

ANALYSIS

Appellants argue their Specification discloses corresponding structure for the recited “demodulator configured to demodulate,” “frame parser configured to obtain,” “symbol demapper configured to demap,” and “low density parity check (LDPC) decoder configured to decode” (Br. 11). Appellants identify paragraphs and Figures of the Specification as disclosing various modules and elements that describe the corresponding structure (*id.* at 11–12).

Our analysis proceeds in two steps. Initially, we determine whether the disputed limitation is recited in means-plus-function form pursuant to 35 U.S.C. § 112, sixth paragraph. If we determine the relevant claim limitation recites a means-plus-function limitation, a second inquiry is undertaken to “attempt to construe the disputed claim term by identifying the corresponding structure, material, or acts described in the specification to which the claim term will be limited” (*Advanced Ground Info. Sys., Inc. v Life360, Inc.*, 830 F.3d 1341 (Fed. Cir. 2016) (internal quotation marks and citation omitted)).

First Inquiry: 35 U.S.C. § 112, sixth paragraph

For our first inquiry, we note 35 U.S.C. § 112, sixth paragraph provides:

[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function *without the recital of structure, material, or acts in support thereof*, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof

(35 U.S.C. § 112, sixth paragraph (emphasis added)).

The Federal Circuit has established use of the term “means” is central to the analysis of whether a claim limitation should be interpreted in accordance with 35 U.S.C. § 112, sixth paragraph. Use of the word “means” creates a rebuttable presumption that the inventor intended to invoke 35 U.S.C. § 112, sixth paragraph, whereas failure to use the words “means for” creates a rebuttable presumption that the inventor did not intend the respective claim limitations to be governed by 35 U.S.C. § 112, sixth paragraph (*Personalized Media Commc’ns, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 703–704 (Fed. Cir. 1998)). However, this presumption against its invocation can be overcome and 35 U.S.C. § 112, sixth paragraph applied, if the “claim term fails to ‘recite [] sufficiently definite structure’ or else recites ‘function without reciting sufficient structure for performing that function’” (*Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc) (quoting *Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2000))).

First, we determine claim 12 does not recite the terms “means for” in each element; rather, each limitation recited an element “configured to” perform a function. More specifically, the limitations recite (emphases

added): “a demodulator *configured to demodulate*,” “a frame parser *configured to obtain a signal frame*,” “a symbol demapper *configured to demap*,” and “a low density parity check (LDPC) decoder *configured to decode*” (claim 12). Thus, we look to determine if the presumption against invocation of 35 U.S.C. § 112, sixth paragraph has been overcome and more specifically, whether each of the limitations of claim 12 fails to recite sufficiently definite structure for performing the function (*Williamson*, 792 F.3d at 1348 (citation omitted)). We therefore address each limitation individually.

a demodulator configured to demodulate the received broadcasting signal:

The first limitation recites “a demodulator configured to demodulate the received broadcasting signal by use of an Orthogonal Frequency Division Multiplexing (OFDM) method” (Claim 12).

In *Aristocrat Technologies Australia. Pty Ltd. v. International Game Technology*, 521 F.3d 1328 (Fed. Cir. 2008), the Court set forth that for a claim to a programmed computer, a particular algorithm may be the corresponding structure under 35 U.S.C. § 112, sixth paragraph:

For a patentee to claim a means for performing a particular function and then to disclose only a general purpose computer as the structure designed to perform that function amounts to pure functional claiming. Because general purpose computers can be programmed to perform very different tasks in very different ways, simply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to “the corresponding structure, material, or acts” that perform the function, as required by section 112 paragraph 6

(*id.* at 1333). The Court went on to point out:

Thus, in a means-plus-function claim “in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm.” [*WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999)]

(*id.*); (See also, *Ex Parte Rodriguez*, 92 USPQ2d 1395 (BPAI 2009) (precedential); *Ex parte Catlin*, 90 USPQ2d 1603 (BPAI 2009) (precedential)).

Here, the claim limitation recites demodulating using an algorithm — an Orthogonal Frequency Division Multiplexing (OFDM) method, which is known in the art, see for example the teachings of Pokenen. As a result, we determine the disclosed structure (demodulator) is a special purpose computer programmed configured to demodulate the broadcast signal using the OFDM method. It follows, we determine the first limitation, “a demodulator configured to demodulate the received broadcasting signal by use of an Orthogonal Frequency Division Multiplexing (OFDM) method,” does *not* invoke 35 U.S.C. § 112, sixth paragraph.

a symbol demapper configured to demap the preamble data symbols:

We next look to the limitation “a symbol demapper configured to demap the preamble data symbols into preamble data bits and the PLP data symbols into PLP data bits” (claim 12) to determine “whether the term is one that is understood to describe structure, as opposed to a term that is simply a nonce word or a verbal construct that is not recognized as the name of structure and is simply a substitute for the term ‘means for’” (*Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1360 (Fed. Cir.

2004) *overruled on other grounds by Williamson*, 792 F.3d at 1348–49). As the Federal Circuit stated in *Lighting World*:

In *Greenberg* and subsequent cases, we have looked to the dictionary to determine if a disputed term has achieved recognition as a noun denoting structure, even if the noun is derived from the function performed. *See Greenberg*, 91 F.3d at 1583 (“Dictionary definitions make clear that the noun ‘detent’ denotes a type of device with a generally understood meaning in the mechanical arts, even though the definitions are expressed in functional terms.”); *Linear Tech. Corp.*, 379 F.3d at 1311 (technical dictionary makes clear that “circuit” is structural); *CCS Fitness*, 288 F.3d at 1369 (dictionary definitions consulted to determine that an artisan of ordinary skill would understand the term in question to have an ordinary meaning); *Personalized Media Communications*, 161 F.3d at 704 (same).

(*Lighting World*, 382 F.3d at 1360–61). Here, we look to both general and subject matter specific dictionaries¹ and find no evidence that the term “symbol demapper” has achieved recognition as a noun denoting structure. We further reviewed prior art, but are unable to find evidence to support the limitation denotes structure. Therefore, based upon our review of the record before us, consultation of dictionaries, and a search of the prior art patents in this field, we conclude the term “symbol demapper” is not an art-recognized structure to perform the claimed function of demapping the preamble data symbols, and further, determine claim 12 does not recite any other structure that would perform the claimed function.

Next, we look to Appellants’ Specification and determine the term “symbol demapper” is not explicitly defined. Indeed, the Specification does

¹ *Microsoft Computer Dictionary*, Microsoft Press (5th ed, 2002); *Merriam-Webster’s Collegiate Dictionary*, Merriam-Webster, Inc. (11th ed. 2007); Harry Newton, *Newton’s Telecom Dictionary*, CMP Books (21st ed. 2005).

not provide a description sufficient to inform one of ordinary skill in the art, the meaning of the term. Thus, unlike, for example, the term “detector” as used in the claim at issue in *Personalized Media Communications, LLC v. International Trade Commission*, 161 F.3d 696 (Fed. Cir. 1998), we have no basis for concluding the “symbol demapper” limitation evokes, for one of ordinary skill in the art, either a particular structure or a variety of structures. Instead, like the phrase “lever moving element” addressed in *Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206 (Fed. Cir. 1998), the “symbol demapper” limitation does not denote a device(s) that takes its name from the functions being performed or have a generally understood relevant meaning in the art. Rather, the “symbol demapper” limitation could mean every conceivable way or means of performing the “demap” function.

Accordingly, we conclude no structural context for determining the characteristics of the claim element “a symbol demapper configured to demap the preamble data symbols” exists other than to describe the function of the element. We further conclude the claim element “symbol demapper configured to” is a verbal construct not recognized as the name of a structure and instead, is simply a substitute for a limitation in “means for” format.

It follows, we determine the limitation “symbol demapper configured to demap the preamble symbol,” invokes the application of 35 U.S.C. § 112, sixth paragraph because the limitation fails to describe sufficient structure; rather, the limitation recites abstract elements “configured to” (i.e., “for”) causing actions (*Advanced Ground Info. Sys.*, 830 F.3d at 1347).

a frame parser configured to obtain a signal frame and a low density parity check (LDPC) decoder configured to decode the preamble data bits:

With respect to the two remaining limitations, we again review general and technical specific dictionaries², prior art, and Appellants' disclosure in their Specification. More specifically, our search of the dictionaries does not provide evidence that either of the two limitations has achieved recognition as a noun denoting structure. We additionally searched the prior art and have not found evidence that either the recited "frame parser" or "low density parity check" limitations is used by ordinarily skilled artisan as a noun to denote structure. Therefore, based upon our review of the record before us, consultation of dictionaries, and a search of the prior art patents in this field, we conclude neither of the limitations, "a frame parser configured to obtain a signal frame" and "a low density parity check (LDPC) decoder configured to decode the preamble data bits," is an art-recognized structure to perform the claimed functions of obtaining a signal frame and decoding the preamble data bits, respectively. Further, claim 12 does not recite any other structure that would perform the claimed function.

Moreover, upon review of Appellants' Specification, we are unable to identify either explicit definitions or a description sufficient to inform one of ordinary skill in the art, the meaning of the term. Thus, we have no basis for concluding either limitation evokes for one of ordinary skill in the art, a particular structure or a variety of structures.

Accordingly, we conclude no structural context exists for determining the characteristics of the claim elements, "a frame parser configured to

² *Microsoft Computer Dictionary*, Microsoft Press (5th ed, 2002); *Merriam-Webster's Collegiate Dictionary*, Merriam-Webster, Inc. (11th ed. 2007); Harry Newton, *Newton's Telecom Dictionary*, CMP Books (21st ed. 2005).

obtain a signal frame” and “a low density parity check (LDPC) decoder configured to decode the preamble data bits,” other than to describe the respective function of each of the elements. Therefore, we further conclude each of the claim elements is a verbal construct not recognized as the name of a structure and instead, is simply a substitute for a limitation in “means for” format.

In conclusion, Appellants have not persuaded us any of the recited limitations, “frame parser,” “symbol demapper,” and “low density parity check decoder,” identifies or connotes a definite structure. More specifically, we are not persuaded any of the terms “frame parser,” “symbol demapper,” or “low density parity check (LDPC) decoder,” is used in “common parlance or by persons of skill in the pertinent art to designate structure,” such that it connotes sufficient structure to avoid the application of 35 U.S.C. § 112, sixth paragraph (*Lighting World*, 382 F.3d at 1359, *overruled on other grounds by Williamson*, 792 F.3d at 1348–49).

Accordingly, we determine the each of the limitations, “frame parser configured to obtain,” “symbol demapper configured to demap,” and “low density parity check (LDPC) decoder configured to decode,” invokes the application of 35 U.S.C. § 112, sixth paragraph because each of the limitations fails to describe sufficient structure and instead, recites abstract elements “configured to” (i.e., “for”) causing actions (*see Advanced Ground Info. Sys.*, 830 F.3d at 1347).

Second Inquiry: 35 U.S.C. § 112, second paragraph

As we have determined the recited limitations, the “frame parser,” the “symbol demapper,” and the “low density parity check decoder” invoke 35 U.S.C. § 112, sixth paragraph, we next “construe the disputed claim term by identifying the corresponding structure, material, or acts described in the specification to which the claim term will be limited” (*Robert Bosch, LLC v. Snap-On Inc.*, 769 F.3d 1094, 1097 (Fed. Cir. 2014) (internal quotation marks and citation omitted)). If Appellants’ Specification fails to set forth adequate disclosure of the structure corresponding to the claimed function, Appellants will have failed to particularly point out and distinctly claim the invention, thereby rendering the claim indefinite (*Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1382 (Fed. Cir. 2009) (internal quotation marks and citation omitted)).

Thus, for each recited limitation, we determine if Appellants’ Specification provides sufficient disclosure.

a frame parser configured to obtain a signal frame:

Appellants argue the structure of the recited “a frame parser” is described in paragraph 173 and Figure 63 of published application US 2011/0044393, which corresponds to paragraph 178 of their Specification (App. Br. 12). More specifically, Appellants assert the recited frame parser is disclosed as including modules (“pilot removing module r404,” “freq deinterleaving module r403,” and “frame header removing module r401”) and a merger (“OFDM symbol merger r402”) (*id.*).

Figure 63 is reproduced below:

[Fig. 63]

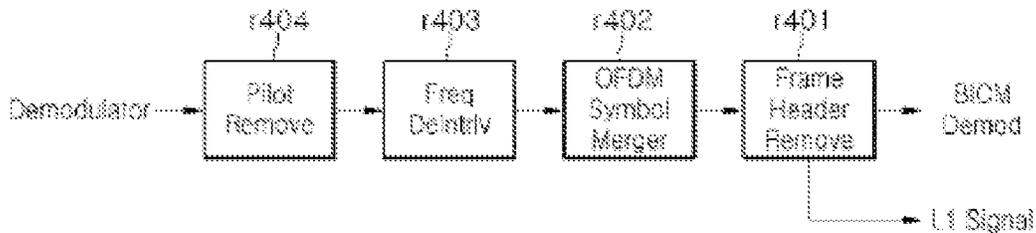


Figure 63 is an example of a frame parser (Spec. ¶ 61). Paragraph 178 of Appellants’ Specification describes Figure 63:

FIG. 63 shows an example of frame parser. A pilot removing module **r404** can remove pilot symbol. A freq deinterleaving module **r403** can perform deinterleaving in the frequency domain. An OFDM symbol merger **r402** can restore data frame from symbol streams transmitted in OFDM symbols. A frame header removing module **r401** can extract physical layer signaling from header of each transmitted frame and remove header. Extracted information can be used as parameters for following processes in the receiver.

We agree with the Examiner that Appellants’ Specification fails to disclose the recited “frame parser” has sufficient structure (Ans. 3–4). Instead, we determine the claim limitation is a computer-implemented claim limitation. For a computer-implemented claim limitation interpreted under 35 U.S.C. § 112, sixth paragraph, the corresponding structure must include the algorithm needed to transform the general purpose computer or processor disclosed in the specification into the special purpose computer programmed to perform the disclosed algorithm (*Aristocrat Tech.*, 521 F.3d at 1333; *see also Function Media, L.L.C. v. Google, Inc.*, 708 F.3d 1310, 1318 (Fed. Cir. 2013)). An algorithm is defined, for example, as “a finite sequence of steps for solving a logical or mathematical problem or

performing a task” (*Microsoft Computer Dictionary* 23 (5th ed. 2002) (*see also Merriam-Webster’s Collegiate Dictionary* 30 (11th ed. 2007) defining algorithm as “a step-by-step procedure for solving a problem or accomplishing some end esp. by a computer”). An applicant may express the algorithm in any understandable terms including as a mathematical formula, in prose, in a flow chart, or “in any other manner that provides sufficient structure” (*Finisar Corp. v. DirectTV Group, Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008)).

Thus, because we determine the recited “frame parser” claim limitation recites a computer-implemented function, we look to Appellants’ Specification for an algorithm for performing the claimed function of “obtain[ing] a signal frame” (*see* claim 12). “An indefiniteness rejection under § 112, second paragraph, is appropriate if the specification discloses no corresponding algorithm associated with a computer or processor” (*Aristocrat Tech.*, 521 F.3d at 1337–38).

Looking at Appellants’ Specification, we determine the Specification fails to provide instructions on how the claimed modules r401, r403, and r404 along with the “OFDM symbol merger” r402, which could be part of a general purpose computer, are actually capable of performing the claimed function of obtaining a signal frame. Rather, for each of the modules and the merger that form the “frame parser,” only the function is described, with no disclosure of any algorithm or how the various modules work together in a sequence of steps to obtain a signal frame from the demodulated broadcasting signal.

Mere reference to a general purpose computer or processor with appropriate programming without providing an explanation of the

appropriate programming or to “software” without providing detail about the means to accomplish the software function is not an adequate disclosure (*Aristocrat Tech.*, 521 F.3d at 1334; *Finisar*, 523 F.3d at 1340–41).

Indeed, the Specification simply recites the functions of the modules and provides no guidance about how the described modules ensures that those functions are performed, i.e., no algorithm is disclosed (*See Advanced Ground Info. Sys.*, 830 F.3d at 1349 (“A patentee cannot claim a means for performing a specific function and subsequently disclose a ‘general purpose computer as the structure designed to perform that function’ because this ‘amounts to purely functional claiming’” (citing *Aristocrat Tech.*, 521 F.3d at 1333))).

Appellants’ Specification simply recites the claimed functions of the frame parser, while providing no disclosure about how the computer or processor ensures that those functions are performed; therefore, we determine the disclosure is not sufficient for an algorithm which, by definition, must contain a sequence of steps (*Blackboard*, 574 F.3d at 1371 (Fed. Cir. 2009)).

The primary purpose of the definiteness requirement is to ensure that the claims are written in such a way that they give notice to the public of the extent of the legal protection afforded by the patent, so that interested members of the public, e.g., competitors of the patent owner, can determine whether or not they infringe (*All Dental Prodx, LLC v. Advantage Dental Prods., Inc.*, 309 F.3d 774, 779–80 (Fed.Cir.2002) (citing *Warner–Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 28–29, 117 S.Ct. 1040, (1997))).

Here, we are not persuaded an ordinarily skilled artisan reading the recited “frame parser” of claim 12, “would understand the bounds of the

claim when read in light of the specification” (*Miles Labs., Inc. v. Shandon Inc.*, 997 F.2d 870, 875 (Fed.Cir.1993). *See also, Research Corp. Techs. v. Microsoft Corp.*, 627 F.3d 859, 869 (Fed.Cir.2010)).

As such, Appellants’ Specification simply describes the “frame parser” in terms of functions and provides no guidance about how the described modules and the described merger ensures that those functions are performed, i.e., provides no algorithm or sequence of steps in sufficient detail, for performing the function. Accordingly, we conclude the claim limitation, “a frame parser configured to obtain a signal frame” is indefinite under 35 U.S.C. § 112, second paragraph.

a symbol demapper configured to demap the preamble data symbols:

Appellants further argue the recited “symbol demapper” has sufficient support for structure in paragraphs 174 to 176 and Figure 64 of published application US 2011/0044393, which correspond to paragraphs 179 and 181 of their Specification (App. Br. 12). According to Appellants, the disclosed “symbol deinterleaver r308,” “ModCod extract r307,” “Symbol demapper r306,” “bit mux r305,” “Inner deinterleaver r304,” “bit mux r305,” “inner decoder r303,” “outer deinterleaver r302” and “outer decoder r301” are sufficient to support the structure of the recited symbol demapper (*id.*).

Figure 64 is reproduced below:

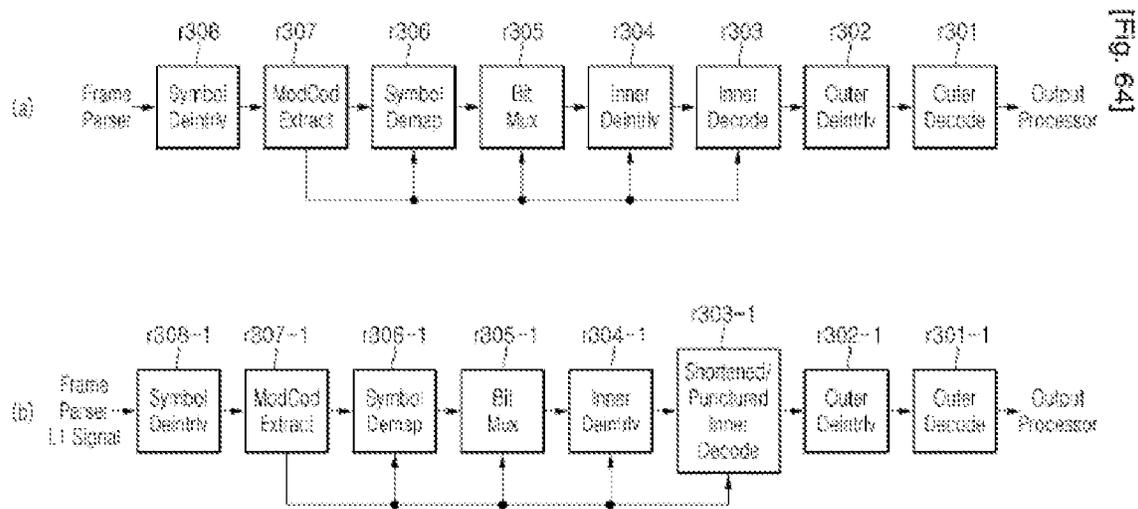


Figure 64 is an example of a Bit Interleaved Coded Modulation (BICM) demodulator (Spec. ¶ 62). Paragraphs 179–181 of the Specification, describe Figure 64 and more specifically, describe a data path in Figure 64a and an L1 signaling path in Figure 64b (*id.* ¶ 179). As seen in Figure 64 and described in paragraphs 179–181, the data path includes various elements that are described in functional terms (*id.* ¶¶ 179–181). However, the claim recites only a symbol demapper. The symbol demapper r306 is described in Appellants’ Specification:

A Symbol demapper **r306** can demap input symbol streams into bit Log-Likelihood Ratio (LLR) streams. The Output bit LLR streams can be calculated by using a constellation used in a Symbol mapper **306** of the transmitter as reference point. At this point, when the aforementioned MQAM or NU-MQAM is used, by calculating both I axis and Q axis when calculating bit nearest from MSB and by calculating either I axis or Q axis when calculating the rest bits, an efficient symbol demapper can be implemented. This method can be applied to, for example, Approximate LLR, Exact LLR, or Hard decision.

When an optimized constellation according to constellation capacity and code rate of error correction code at the Symbol

mapper **306** of the transmitter is used, the Symbol demapper **r306** of the receiver can obtain a constellation using the code rate and constellation capacity information transmitted from the transmitter.

Spec. ¶¶ 179–180.

The Examiner determines Figure 64 and paragraphs 174–176 published application US 2011/0044393 (which correspond to paragraphs 179 and 181 of Appellants Specification) cited by Appellants, fail to disclose any structure of the symbol demapper (Ans. 3–4). We agree with the Examiner and additionally, determine the “symbol demapper” limitation recites a computer-implemented limitation. We find, however, Appellants’ Specification fails to provide instructions on how the claimed symbol demapper, which could be part of a general purpose computer, is actually capable of performing the claimed function of demapping the preamble data symbol. Rather, only the function is described, with no disclosure of any algorithm or structure. In particular, Appellants’ Specification describes demapping input symbol streams into bit LLR streams, by performing a calculation using a constellation used in the symbol *mapper* of the transmitter (Spec. ¶ 174)(emphasis added). The Specification further describes calculating both I axis and Q axis when calculating the rest bits (*id.*). However, Appellants’ Specification does not provide any description, algorithm, or sequence of steps for how those calculations are performed.

Thus, we determine the Specification simply describes functions and provides no guidance about how the module (Symbol Demapper) is “configured to demap the preamble data symbols.” Accordingly, we conclude the claim limitation, “a symbol demapper configured to demap the

preamble data symbols,” is indefinite under 35 U.S.C. § 112, second paragraph.

a low density parity check (LDPC) decoder configured to decode the preamble data bits:

Lastly, Appellants contend the structure of the recited LDPC decoder is supported by Figure 65 and paragraph 177 of published application US 2011/0044393, which corresponds to paragraph 182 of the Specification (App. Br. 12). More specifically, Appellants argue the described “demux r301a,” a “zero padding r302a,” a “parity depuncturer r303a,” “LDPC decoding r304a” and “zero removal r305a” provide sufficient support (*id.*).

The Examiner determines the cited portions do not disclose structure (Ans. 4–5). We determine a “decoder” is “a device or program routine that converts coded data back to its original form” (*Microsoft Computer Dictionary* 149 (5th Ed. 2002)); thus, we determine the claimed “LDPC decoder” would not necessarily be construed as hardware. Appellants’ Specification is silent on any structure.

The relied upon Figure 65 is reproduced below:

[Fig. 65]

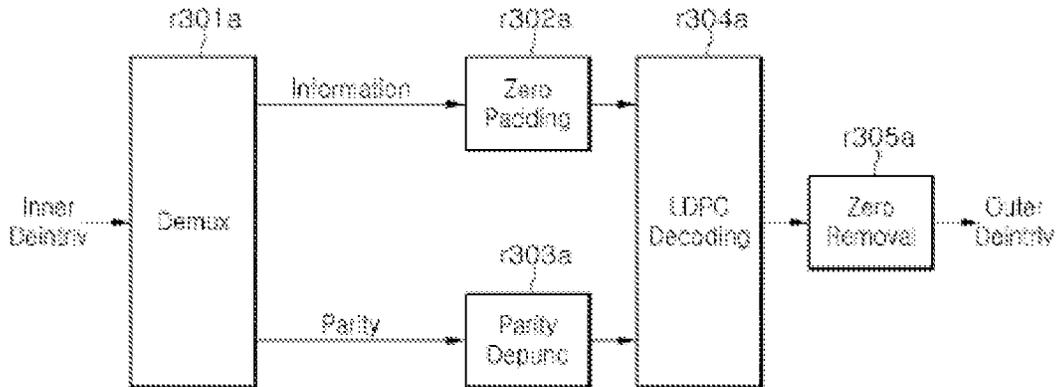


Figure 65 is an example of LDPC decoding using shortening/puncturing (Spec. ¶ 63). Paragraph 181 describes the example illustrated in Figure 65 (*id.* ¶ 181), the relevant portion disclosing “LDPC decoding (r304a) can be performed on generated bit streams, zeros in information part can be removed and output (r305a)” (*id.*).

Upon reading Appellants’ Specification, we determine the recited LDPC decoder recites a computer-implemented limitation. However, Appellants’ Specification does not describe any algorithm or structure for the LDPC decoder. Instead, Appellants’ Specification describes performing LDPC decoding on generated bit streams (*id.*). Again, Appellants’ Specification fails to provide instructions on how the claimed LDPC Decoding, which could be part of a general purpose computer, is actually performing the claimed function of decoding the preamble data bits using a LDPC scheme. More specifically, Appellants’ Specification does not describe the particular LDPC algorithm to be used. Rather, only the function is described, with no disclosure of any algorithm or structure.

Accordingly, we conclude the claim limitation, “a low density parity check (LDPC) decoder configured to decode the preamble data bits,” is indefinite under 35 U.S.C. § 112, second paragraph.

Summary

We determine Appellants’ Specification does not disclose a structure or an operative algorithm for any of the recited claim elements, “frame parser,” “symbol demapper,” and “low density parity check decoder.” Accordingly, because neither claim 12 as recited nor Appellants’ Specification discloses sufficient structure or algorithm for the recited “frame parser,” “symbol demapper,” and/or “low density parity check decoder” limitations, we conclude claim 12 is indefinite under 35 U.S.C. § 112, second paragraph. Claim 14 which depends from independent claim 12, was not separately argued, and thus, claim 14 falls with claim 12. Therefore, the Examiner did not err in rejecting claims 12 and 14 under 35 U.S.C. § 112, second paragraph as being indefinite.

35 U.S.C. § 103(a): Claims 1, 3–5, 7, 12, and 14

Appellants assert their invention is not obvious over Vare and Pekonen (Br. 14–24). The issues presented by the arguments are:

Issue 2: Has the Examiner erred in finding the combination of Vare and Pekonen teaches or suggests “building at least one data slice based on the PLP data symbols”; “building a signal frame based on the preamble data symbols and the at least one data slice”; “transmitting a broadcasting signal including data of the modulated signal frame”; and “wherein the L1 signaling information includes data slice ID information that identifies the at

least one data slice and PLP ID information that identifies each PLP carried in the at least one data slice,” as recited in claim 1?

Issue 3: Has the Examiner erred in finding the combination of Vare and Pekonen teaches or suggests “demodulating the received broadcasting signal by use of an Orthogonal Frequency Division Multiplexing (OFDM) method”; “obtaining a signal frame from the demodulated broadcasting signal, the signal frame comprising preamble data symbols and at least one data slice, the at least one data slice including Physical Layer Pipe (PLP) data symbols of one or multiple PLPs, the preamble data symbols including L1 signaling information”; and “wherein the L1 signaling information includes data slice ID information that identifies the at least one data slice and PLP ID information that identifies each PLP carried in the at least one data slice and wherein a length of the data slice ID information is 8 bits,” as recited in independent claims 5 and 12?

ANALYSIS

Independent Claim 1

Appellants contend the Examiner has not set forth with specificity where Pekonen teaches the disputed limitations, pointing only generally to several paragraphs (App. Br. 16–17). We are not persuaded by Appellants’ contention. We determine although the Examiner could have been more specific in the Final Action, the Examiner did set forth sufficient findings and provided further reasoning in the Answer; thus, we determine the Examiner has set forth with specificity the grounds of rejection (Final Act. 4–5; Ans. 6–12).

Appellants additionally argue Pekonen does not use the term “frame segment” and further, the Examiner’s citation to Pekonen paragraph 6 as teaching the disputed “frame segment” instead teaches “data frames” and “segments” separately, as two different embodiments, without explanation as to why an ordinarily skilled artisan would have been motivated to combine the different embodiments of Pekonen (*id.* at 17–18).

We are not persuaded by Appellants’ arguments. Initially, we are not persuaded paragraphs 33 and 37 discuss different embodiments. More specifically, paragraph 33 describes Figure 3 overall and paragraph 37 describes a specific aspect of Figure 3 (Pekonen ¶¶ 33, 37). We also agree with the Examiner that Pekonen teaches configurable data is segmented into data segments which correspond to frames (Ans. 7; Pekonen ¶ 36). Paragraph 63 of Pekonen is part of the description of Figure 9 which illustrates a flow diagram for decoding physical layer post-signaling data (Pekonen ¶ 19). Paragraph 43 discusses Figure 6 of Pekonen, which describes additional pre-signaling parameters. Thus, Appellants have not persuaded us the cited teachings are describing different embodiments of the invention. Instead, we agree with the Examiner and determine that these paragraphs describe different aspects of the invention.

Appellants next argue Pekonen fails to disclose “**both** ‘at least one data slice carrying one or multiple PLPs’ **and** ‘data slice ID information that identifies the at least one data slice and PLP ID information’” and thus, does not teach the disputed limitation “the LI signaling information includes . . .” (App. Br. 18–19).

We are not persuaded by Appellants’ arguments. More specifically, we are not persuaded the Examiner erred in finding Pekonen discloses “at

least one data slice carrying one or multiple PLPs” (Ans. 9; Pekonen ¶¶ 25, 39). Indeed, as set forth by the Examiner, Pekonen discloses data symbols convey data associated with different physical layer pipes (Ans. 9; Pekonen ¶ 25). Furthermore, Pekonen teaches the dynamic data may include additional dynamic PLP mapping information (Ans. 9; Pekonen ¶ 39). The Examiner additionally identifies paragraphs 74, 35, 37, and 63, respectively, as teaching the disputed limitation (Ans. 9–10). We agree with the Examiner’s findings. Moreover, Appellants have not proffered sufficient evidence or argument to persuade us the Examiner’s findings are in error.

Appellants next argue Pekonen fails to disclose “a length of the data slice ID information is 8 bits” (App. Br. 19). According to Appellants, the cited paragraphs of Pekonen do not teach the disputed limitation but instead teach that the size of each field varies from two to eighteen bits (*id.*). The Examiner identifies the FRAME_IDX parameter as teaching the disputed limitation (Ans. 11–12; Pekonen ¶ 63). Appellants have not proffered sufficient evidence or argument to persuade us of error in the Examiner’s finding. Accordingly, we are not persuaded the Examiner erred in finding the combination of Vare and Pekonen teaches or suggests the limitations as recited in independent claim 1.

Claims 5 and 12

In arguing the patentability of claims 5 and 12, Appellants contend the Examiner has not asserted specific disclosure in Pekonen as teaching the disputed limitations (App. Br. 20–21). Specifically, Appellants argue Pekonen does not teach “demodulating by use of an Orthogonal Frequency Division Multiplexing (OFDM) method” or “obtaining a signal frame from

the demodulated broadcasting signals, the signal frame comprising preamble symbols and at least one data slice, the at least one data slice including (Physical Layer Pipe) PLP data symbols of one or multiple PLPs, the preamble data symbols including L1 signaling information” (*id.* at 21). Appellants contend the cited paragraphs “cannot be asserted as analogous” to the argued limitations (*id.* at 21–22); however, Appellants have not proffered sufficient argument or evidence to persuade us of error in the Examiner’s findings. Indeed, the Examiner has set forth with specificity why Pekonen teaches the disputed limitations (Ans. 13–14; Final Act. 6–7) and Appellants have not persuaded us these findings are in error. Accordingly, we are not persuaded the Examiner erred in finding the combination of Vare and Pekonen teaches or suggests the limitations as recited in independent claims 5 and 12.

Dependent claims 3, 4, 7, and 14 are not separately argued, instead relying on their dependence from their respective independent claims to show error in the Examiner’s rejection (App. Br. 24); therefore, these claims fall with their respective independent claims. It follows, we sustain the rejection of claims 1, 3–5, 7, 12, and 14 under 35 U.S.C. § 103(a) for obviousness over Vare and Pekonen.

DECISION

The Examiner’s rejection of claims 12 and 14 under 35 U.S.C. § 112, second paragraph as being indefinite, is affirmed.

The Examiner’s rejection of claims 1, 3–5, 7, 12, and 14 under 35 U.S.C. § 103(a) as being unpatentable over Vare and Pekonen is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED