

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte AMER A. HASSAN

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Appeal No. 2000-1900  
Application No. 08/669,937

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ON BRIEF

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Before RUGGIERO, DIXON, and GROSS, Administrative Patent Judges.  
RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal from the final rejection of claims 1, 3, 4, 7, 9-12, and 14-21. Claim 8 has been canceled and claims 2, 5, 6, and 13 have been indicated to be allowable subject to being rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

The claimed invention relates to a method and apparatus for decoding digitally encoded communication signals transmitted over a fading channel. More particularly, a sequence of test bits are

Appeal No. 2000-1900  
Application No. 08/669,937

transmitted in each time slot in a coded time-division multiple access (TDMA) communication system, and a mathematical distance between the transmitted known test bits and the corresponding received bits is determined by the receiver to indicate whether the corresponding time slot is reliable. Alternatively, a concatenated coding scheme can be used to transmit digital communication signals, and reliability information can be generated by using an inner code and the output of an inner decoder.

Claims 1 and 7 are illustrative of the invention and read as follows:

1. A method for generating reliability information indicative of the reliability of data transmitted over a TDMA communication channel, comprising the steps of:

transmitting one or more of a sequence of test bits in each time slot of the TDMA communication channel, the test bits being known to the receiver prior to the step of transmitting;

determining, at the receiver, a mathematical distance between the sequence of test bits as known to the receiver and the sequence of test bits as received by the receiver; and

generating, at the receiver, reliability information indicative of the reliability of data transmitted over the TDMA communication channel based on the mathematical distance, and information estimates of the transmitted data.

7. A method for transmitting, comprising the steps of:
- performing a first coding of bits to be transmitted, using a first code, to generate first coded bits;
  - performing a second coding of the first coded bits, using a second code, to generate second coded bits;
  - transmitting the second coded bits over a TDMA communication channel to a receiver;
  - receiving the second coded bits at the receiver as one or more possibly corrupted codewords; and
  - decoding the second coded bits by correcting, in a first decoder, corrupted codewords within a threshold mathematical distance or generating, in the first decoder, erasures for all corrupted codewords not within the threshold mathematical distance; and
  - correcting, in a second decoder, errors and erasures generated by the first decoder.

The Examiner relies on the following prior art:

Saleh et al. (Saleh)	5,048,057	Sep. 10, 1991
Wei	5,088,113	Feb. 11, 1992
McConnell	5,206,864	Apr. 27, 1993

Boyd et al. (Boyd), "A Concatenated Coding Approach for High Data Rate Applications," NTC '77 Conference Record, Vol. 3, pp.36:2-1 to 36:2-7 (1977).

Hassan et al. (Hassan), "On Decoding Concatenated Codes," 36 IEEE Transactions on Information Theory, No. 3, pp. 677-83 (May 1990).

Claims 1, 3, 4, 12, and 14-16 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Wei in view of Saleh. Claims 7, 9-11, and 17-21 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Hassan in view of

Appeal No. 2000-1900  
Application No. 08/669,937

Boyd. In a separate rejection under 35 U.S.C. § 103(a), claims 7, 9, 11, 17, 19, and 21 also stand finally rejected as being unpatentable over McConnell in view of Boyd.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the Brief (Paper No. 17) and Answer (Paper No. 18) for their respective details.

#### OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner, the arguments in support of the rejections and the evidence of obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellant's arguments set forth in the Brief along with the Examiner's rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in claims 1, 3, 4, 7, 9-12, and 14-21. Accordingly, we affirm.

Appeal No. 2000-1900  
Application No. 08/669,937

Appellant's arguments in response to the Examiner's rejection of the appealed claims are organized according to a suggested grouping of claims indicated at page 5 of the Brief. We will consider the appealed claims separately only to the extent separate arguments for patentability are presented. Any dependent claim not separately argued will stand or fall with its base claim. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983).

We consider first the Examiner's 35 U.S.C. § 103(a) rejection of claims 1, 3, and 4 as being unpatentable over Wei in view of Saleh. After reviewing the Examiner's analysis (Answer, pages 3 and 4)<sup>1</sup>, it is our view that such analysis carefully points out the teachings of the Wei and Saleh references, reasonably indicates the perceived differences between this prior art and the claimed invention, and provides reasons as to how and why the prior art teachings would have been modified and/or combined to arrive at the claimed invention. In our opinion, the Examiner's analysis is sufficiently reasonable that we find that the Examiner has at least satisfied the burden of presenting a

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<sup>1</sup> The Answer makes reference to the statement of the rejection appearing at pages 2 and 3 of the final Office action mailed March 29, 1999 (Paper No. 12).

Appeal No. 2000-1900  
Application No. 08/669,937

prima facie case of obviousness. The burden is, therefore, upon Appellant to come forward with evidence and/or arguments which persuasively rebut the Examiner's prima facie case of obviousness. Only those arguments actually made by Appellant have been considered in this decision. Arguments which Appellant could have made but chose not to make in the Brief have not been considered (see 37 CFR § 1.192(a)).

In response, Appellant contends (Brief, pages 7-9) that the Examiner has not established a prima facie case of obviousness since the proposed combination of Wei and Saleh does not teach or suggest all of the limitations of appealed independent claim 1, the representative claim for Appellant's first suggested grouping (including claims 1, 3, and 4). Initially, Appellant argues (id., at page 8) that, in contrast to the language of claim 1, the Wei and Saleh references are not directed to TDMA communication systems. Further, Appellant asserts, pointing to language at column 4, lines 54-68 in Wei and column 5, lines 24-35 in Saleh, that ". . . both Wei and Saleh disclose "hard" decision features and do not disclose or suggest soft decision features as claimed . . . ." (Id., Appellant's emphasis).

After careful review of the applied Wei and Saleh references in light of the arguments of record, we are in general agreement

Appeal No. 2000-1900  
Application No. 08/669,937

with the Examiner's position as stated in the Answer. At the outset, we note that we find Appellant's assertions to be unpersuasive with respect to the alleged lack of disclosure of TDMA communication systems in the applied prior art. Our review of the disclosure of Saleh reveals a clear indication of the applicability of the described frequency hopping technique to TDMA communication systems.

We further are in agreement with the Examiner with respect to the interpretation of the "hard" decision operations disclosed by both Wei and Saleh as related to the language of representative claim 1. In our view, Appellant's arguments (Brief, page 9) merely repeat the critical language of claim 1, i.e., "determining, . . . , a mathematical distance between the sequence of test bits as known to the receiver and the sequence of test bits as received by the receiver," and draw the unsupported conclusion that Wei and Saleh do not teach or suggest such a claimed limitation. As such, we do not find such arguments to be convincing of any error in the Examiner's position.

The "hard" decision operation performed on the interference signal points disclosed at column 4, lines 6-14 of Wei is contrasted with "soft" decisions in the sense that signal points

Appeal No. 2000-1900  
Application No. 08/669,937

are examined in isolation rather than including a consideration of plural signal points. In describing the "hard" decision operation, Wei discloses (column 4, lines 57-67) the comparison of received signal points with the known transmitted points and the resultant determination of the number of errors in each sequence pattern.<sup>2</sup> We agree with the Examiner that, despite the fact that signal points are examined in isolation, the skilled artisan would recognize this "hard" decision decoding as involving a determination of a "mathematical distance" of the received bit sequence pattern with a known bit sequence pattern in relation to a threshold distance such as a Hamming distance.<sup>3</sup>

In this regard, we also point out that Appellant's own specification (page 6, lines 7-10) recognizes that in conventional hard decision decoders, a mathematical distance determination is made using a minimum Hamming distance threshold. Given this evidence before us, our review of the language of claim 1 reveals nothing which would require a "soft" decision operation, as asserted by Appellant, or, for that matter, any

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<sup>2</sup> Saleh has a similar disclosure at column 5, lines 18-43 and column 10, lines 63-68.

<sup>3</sup> See discussion of "Hamming distance" or "signal distance" at page 131 of Weik's Standard Dictionary of Computers and Information Processing, (2<sup>nd</sup> Ed., Hayden Book Co., Inc., Rochelle Park, NJ (1977)), a copy of which is enclosed with this decision.

Appeal No. 2000-1900  
Application No. 08/669,937

language which would distinguish over the "hard" decision operation disclosed by Wei and Saleh. In our view, to whatever extent Appellant's disclosed "soft" decision decoding distinguishes over the "hard" decision decoding of the prior art, such distinctions do not appear in the claims. As such, Appellant's arguments improperly attempt to narrow the scope of the claim by implicitly adding disclosed limitations which have no basis in the claim. See In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997).

In view of the above discussion and the totality of the evidence on the record, it is our opinion that the Examiner has established a prima facie case of obviousness which has not been rebutted by any convincing arguments from Appellant. Accordingly, the Examiner's 35 U.S.C. § 103(a) rejection of representative independent claims 1, as well as dependent claims 3 and 4 which fall with claim 1, is sustained.

Turning to a consideration of the Examiner's obviousness rejection of independent claim 12, the representative claim for Appellant's suggested grouping (including claims 12 and 14-16), we sustain this rejection as well. Representative claim 12 is a system counterpart to previously discussed method claim 1. In asserting the patentability of claim 12, Appellant reiterates the

arguments which assert the alleged distinction between his "soft" decision decoding and the "hard" decision decoding of the applied prior art. We find such arguments to be unpersuasive for all of the reasons discussed supra.

We next consider the Examiner's 35 U.S.C. § 103(a) rejections of independent claim 7, the representative claim for Appellant's suggested grouping (including claims 7 and 9-11), and independent claim 17, the representative claim for the group including claims 17-21, based on the combination of McConnell in view of Boyd or, in the alternative, Hassan in view of Boyd. We sustain these rejections as well. In response to the rejection, Appellant initially contends (Brief, page 16) that McConnell lacks a teaching or suggestion of application of concatenated coding schemes to TDMA channels. Further Appellant asserts (id.) that, unlike the present claimed invention, McConnell ". . . performs a second coding of the first coded bits and the original data to generate second coded bits." In addition, McConnell is attacked by Appellant as failing to teach the use of a threshold mathematical distance in performing soft decisions, while Boyd is asserted as lacking a disclosure of the correction of erasures as claimed. (Id.)

Appeal No. 2000-1900  
Application No. 08/669,937

After careful review of the McConnell and Boyd references, we find none of Appellant's arguments to be persuasive. In our view, Appellant's arguments focus on the individual differences between the limitations of representative claims 7 and 17 and each of the applied references. It is apparent, however, from the Examiner's line of reasoning in the Answer, that the basis for the obviousness rejection is the combination of McConnell and Boyd. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 1097, 231 USPQ 375, 380 (Fed. Cir. 1986).

In other words, while Appellant contends that McConnell lacks a teaching of a TDMA channel application, the suggestion to apply concatenated coding schemes to TDMA systems is clearly provided by Boyd. Further, although Appellant argues that Boyd has no disclosure of the correction of erasures, this feature is clearly taught by McConnell in which, as disclosed at column 5, lines 40-60, erasures for a block of symbols are marked or generated at the first (inner or Hamming) decoder, and corrected at the second (outer or Reed-Solomon) decoder.

Appeal No. 2000-1900  
Application No. 08/669,937

Further, in our view, regardless of the merits of Appellant's argument that, in contrast to their invention, McConnell performs a second coding of the first coded bits and the original data, we find no claim language that precludes a second encoding of original data. As to Appellant's contention that McConnell does not disclose the use of a threshold mathematical distance in determining errors, we refer to our earlier discussion where we found that a skilled artisan would appreciate and recognize that "hard" decision decoding, such as involved in the Hamming decoder of McConnell, would involve a consideration of a "threshold mathematical distance" as claimed.<sup>4</sup>

With regard to the Examiner's alternative obviousness rejection based on the combination of Hassan and Boyd, we note that Appellant, with respect to Hassan, has reiterated the arguments previously made against McConnell. For all of the reasons discussed supra, we find such arguments to be unpersuasive.

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<sup>4</sup> We also observe that, while it is our opinion that the language of appealed claims 7 and 17 does not require the use of "soft" decision decoding, the concatenated coding scheme of Boyd discloses the use of "soft" decisions at the inner decoder (Boyd, page 36:2-2, left column).

Appeal No. 2000-1900  
Application No. 08/669,937

In summary, we have sustained the 35 U.S.C. § 103(a) rejection of all of the claims on appeal. Therefore, the decision of the Examiner rejecting claims 1, 3, 4, 7, 9-12, and 14-21 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

JOSEPH F. RUGGIERO	)	
Administrative Patent Judge	)	
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	)	
	)	
JOSEPH L. DIXON	)	BOARD OF PATENT
Administrative Patent Judge	)	APPEALS AND
	)	INTERFERENCES
	)	
	)	
ANITA PELLMAN GROSS	)	
Administrative Patent Judge	)	

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Appeal No. 2000-1900  
Application No. 08/669,937

MYERS BIGEL SIBLEY & SAJOVEC, P.A.  
P.O. BOX 37428  
RALEIGH, NC 27627