

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* DAVID J. THOMSON

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Appeal 2007-0759  
Application 10/177,732  
Technology Center 2600

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Decided: May 25, 2007

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Before KENNETH W. HAIRSTON, HOWARD B. BLANKENSHIP, and ALLEN R. MACDONALD, *Administrative Patent Judges*.

HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL  
STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from a final rejection of claims 1 to 20. We have jurisdiction under 35 U.S.C. § 6(b).

Appellant has invented a method of estimating a channel. The method employs one or more basis functions that describe the channel based on statistics of the channel, and the method employs one or more waveforms

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that are matched to the channel. The method estimates coefficients for the basis functions using real-time data by solving a set of linear equations to thereby estimate the channel (Specification 2 and 3).

Claim 1 is representative of the claims on appeal, and it reads as follows:

1. A method for estimating a channel, comprising the steps of:

employing one or more basis functions that describe said channel based on statistics of said channel;

employing one or more waveforms that are matched to said channel; and

estimating coefficients for said basis functions using real-time data by solving a set of linear equations to estimate said channel.

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

Alard	US 6,263,029 B1	Jul. 17, 2001
Siala	US 6,674,740 B1	Jan. 6, 2004
		(filed Aug. 13, 1999)

The Examiner rejected claims 1 to 17 under 35 U.S.C. § 101 as being directed to nonstatutory subject matter. The Examiner rejected claims 1, 2, 4 to 9, 13, and 17 to 20 under 35 U.S.C. § 102(e) based upon the teachings of Siala. The Examiner rejected claim 10 under 35 U.S.C. § 103(a) based upon the teachings of Siala and Alard.

Appellant contends that the nonstatutory subject matter rejection is without merit because the claimed “transformation to a channel estimate or in-band estimate provides a useful, concrete and tangible result” (Br 5; Reply Br. 3). With respect to the prior art rejections, Appellant contends

that Siala does not solve a set of linear equations to estimate the channel (Br. 6; Reply Br. 4 and 5).

We hereby sustain the nonstatutory subject matter rejection, and reverse the prior art rejections.

#### ISSUE (1)

Is the claimed method of estimating a channel directed to statutory subject matter under 35 U.S.C. § 101?

#### FINDINGS OF FACT (1)

According to Appellant's disclosure, the first step of employing one or more basis functions that describe said channel based on statistics of the channel is determined by solving a Karhunen-Loeve expansion algorithm (Specification 2). The step of employing one or more waveforms that are matched to the channel uses Slepian mathematical sequences or similar sequences (Specification 2). The step of solving linear equations to estimate the channel is performed by solving channel estimation coefficient equations (Specification 8 to 13). After solving the algorithms and equations, the result can be used as one of the inputs to the multiplexer 430 in the transmitter (Figure 4).

#### PRINCIPLE OF LAW (1)

A method or process claim that applies a mathematical algorithm to "produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face the claimed process comfortably falls within the scope of § 101." *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999).

### ANALYSIS (1)

Appellant's disclosed and claimed invention is completely silent as to what is used to solve the algorithms and mathematical equations. The Examiner mentions a computer, but we find no mention in the disclosure of the use of such a device to solve the algorithms and equations (Answer 3). Thus, the disclosure does not rule out the use of a pencil and paper to solve the algorithms and equations. Even if a computer was used by Appellant, we find that the solved result of the algorithms and equations is merely a solved mathematical result that is never applied to something to produce some kind of response or result. Thus, we agree with the Examiner that the claimed invention is directed to a series of steps that are performed as a "purely mathematical algorithm" (Answer 3). We additionally agree with the Examiner's conclusion that method claims that "merely manipulate an abstract idea or perform a purely mathematical algorithm is [sic, are] non-statutory despite the fact that it might inherently have some usefulness" (Answer 3).

### ISSUE (2)

Does Siala solve a set of linear equations to estimate a channel?

### FINDINGS OF FACT (2)

Siala uses an Estimation-Maximization (EM) algorithm to construct the most likely channel (col. 3, ll. 35 to 42). Siala is silent as to the use of linear versus non-linear equations to construct the most likely channel. The only mention of linear in Siala is in connection with a conventional Code Division Multiple Access (CDMA) receiver that uses a linear estimation algorithm (col. 13, l. 63 to col. 14, l. 7).

## PRINCIPLE OF LAW (2)

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *See Atlas Powder Co. v. IRECO Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1946 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

## ANALYSIS (2)

Appellant contends that the EM algorithm described by Siala is an iterative and nonlinear algorithm (Br. 6; Reply Br. 4).

In view of the lack of a disclosure in Siala as to the type of equation used to arrive at the likely channel, and the mention of linear only in connection with a conventional receiver and algorithm, we agree with the Appellant that Siala neither expressly nor inherently discloses the use of linear equations to solve the EM algorithm.

## CONCLUSIONS

The Examiner has established that claims 1 to 17 are directed to nonstatutory subject matter. Anticipation has not been established by the Examiner for claims 1, 2, 4 to 9, 13, and 17 to 20 because Siala lacks the required linear equations to estimate the channel. Obviousness of the claimed subject matter set forth in claim 10 has not been established by the Examiner because Alard fails to cure the noted shortcoming in the teachings of Siala.

## DECISION

The nonstatutory subject matter rejection of claims 1 to 17 is affirmed. The anticipation rejection of claims 1, 2, 4 to 9, 13, and 17 to 20 is reversed, and the obviousness rejection of claim 10 is reversed.

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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)(1)(iv).

**AFFIRMED-IN-PART**

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