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**Datasheet for the decision
of 11 May 2007**

Case Number: T 1272/04 - 3.5.03

Application Number: 00988342.2

Publication Number: 1266499

IPC: H04L 27/233

Language of the proceedings: EN

Title of invention:

Carrier tracking loop for direct sequence spread spectrum systems

Applicant:

Thomson Licensing

Opponent:

-

Headword:

Carrier tracking loop/THOMSON LICENSING

Relevant legal provisions:

EPC Art. 123(2), 84, 52(1), 54, 56

Keyword:

"Added subject-matter - no (after amendment)"

"Clarity - yes (after amendment)"

"Novelty and inventive step - yes (after amendment)"

Decisions cited:

-

Catchword:

-



Case Number: T 1272/04 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 11 May 2007

Appellant: Thomson Licensing
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Representative: Berthier, Karine
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 13 May 2004
refusing European application No. 00988342.2
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: D. H. Rees
R. Moufang

Summary of Facts and Submissions

I. This is an appeal against the decision of the examining division, dispatched on 13 May 2004, to refuse the European patent application number 00 988 342.2, originally filed as International application PCT/US00/35224, with publication numbers 1 266 499 and WO 01/50631 respectively. The reasons given for refusing the application were that the subject-matter claimed was not clear (Article 84 EPC), the subject-matter of one independent claim was not novel (Articles 52(1) and 54 EPC) and the subject-matter of the other independent claim did not involve an inventive step (Articles 52(1) and 56 EPC). In addition the two independent apparatus claims were considered to infringe Rule 29(2) EPC.

II. Notice of appeal was filed and the fee paid on 12 July 2004. A statement setting out the grounds of the appeal and including a new set of claims was submitted on 13 September 2004.

III. The board issued a communication giving its preliminary assessment of the case and citing the documents

D1: WO 99/59259 A

D2: EP 0 847 169 A

D3: WO 99/31817 A

In response a new set of claims was filed. The board then issued a summons to oral proceedings with an accompanying communication giving a further preliminary

assessment. The appellant filed new amendments and requested that the oral proceedings be cancelled if the application was now allowable. The board decided to cancel the oral proceedings. A further communication noting a lack of clarity in dependent claims 6 to 8 was issued. The applicant filed a new set of claims in response. In response to a query from the rapporteur whether the intended claims had been filed the appellant submitted a further new set.

IV. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of:

claims: 1 to 8 received on 02 May 2007;

description: pages 1, 2 and 6 to 13 as published, and pages 3 to 5 filed on 8 December 2006 (pages 10 to 12 of the fax); and

drawing: sheets 1 to 5 as published.

V. Claim 1 reads as follows:

"A receiver for receiving a spread-spectrum signal representing symbol data from a transmitter, said spread-spectrum signal being a direct-sequence spread-spectrum (DSSS) signal representing a series of chips which represent symbols, the receiver comprising:
(a) a derotator (403) that derotates the spread-spectrum signal in accordance with a counter-rotating signal to provide a phase corrected signal;

(b) a correlator (404) for receiving the phase corrected signal and for providing output symbol data based on the phase corrected signal;

(c) a carrier tracking loop (CTL) phase error estimator (405) for receiving the output symbol data and for generating a CTL phase error signal in response to a rotation of the spread-spectrum signal; and

(d) a CTL (430) for generating the counter-rotating signal based on the CTL phase error signal,

wherein the CTL (430) comprises an error update circuit (431) operating at an integer multiple of a symbol rate, a loop filter (432) operating at an integer multiple of a chip rate, and a numerically-controlled oscillator (NCO)(433) operating at the integer multiple of the chip rate, and the CTL phase error generated by the CTL phase error estimator is computed at the integer multiple of the symbol rate and is applied in the CTL as a step error introduced at the beginning of each spreading sequence."

Claim 6 is directed to a wireless telephone system comprising a plurality of transceivers having a receiver according to any of claims 1 to 5.

Reasons for the Decision

1. *Disclosure in the original application*
- 1.1 Present claim 1 is derived from original claims 1, 3, 6 and 7, with some further amendments.
- 1.1.1 It is clarified that the direct-sequence spread-spectrum (DSSS) signal (original claim 3) represents a

- series of chips which represent symbols. This, apart from being a matter of common general knowledge, was disclosed in the original application, e.g. as a feature of original claim 5.
- 1.1.2 "Multiple" has been replaced by "integer multiple" throughout. Thus for example "an error update circuit operating at a multiple of a symbol rate," has become "an error update circuit operating at an integer multiple of a symbol rate." The original application uses the expression "multiple", without qualification, throughout. However it would be clear to the person skilled in the art that references to multiples at least in the description are in fact consistently intended to mean integer multiples (e.g. page 9, lines 12 to 29 of the published application), so that this amendment does not add matter to the application as filed.
- 1.1.3 The phrase "to provide a derotated signal" (part of feature (a) of original claim 1) has been replaced by "to provide a phase corrected signal", with consequent amendments throughout the claim. The present formulation is literally disclosed at page 9, lines 6 and 7 of the published application.
- 1.1.4 In feature (c) the expression "based upon the rotation of the spread-spectrum signal," has been replaced by the more precise "in response to a rotation of the spread-spectrum signal."
- 1.1.5 In the final clause of the claim, "the CTL phase error ... is computed at the symbol rate" has become "the CTL phase error ... is computed at the integer

multiple of the symbol rate." This correction is supported by page 9, lines 27 to 29 and by Figure 5.

1.1.6 Reference signs have been introduced.

1.2 The present dependent claims are directly derived from the original dependent claims. Claims 6 to 8 have been amended to be directed to the wireless telephone system of which the receiver of claims 1 to 5 is a part. Support for this change is provided by e.g. the "Summary" given on page 5 of the published application. The only other amendments to the dependent claims are consequences of the amendments to claim 1 or the addition of reference signs.

1.3 The description has been amended to introduce references to documents D1 and D3 and to bring the "Summary" into line with the present independent claim.

1.4 Hence the board concludes that the application in its present form satisfies the requirements of Article 123(2) EPC.

2. *Clarity*

2.1 The examining division objected that the term "derotator" and its cognates were unclear. The appellant has argued in response that the term is well known in the art, citing D3. This is not convincing, being a single reference to a patent application rather than a textbook or dictionary, and moreover to an application from the appellant itself. However, the board takes the view that the skilled person would be familiar with the representation of phase difference as

an angle, so that he or she would have no difficulty in deducing what was meant by "rotation". Furthermore it would be understood that "derotating" and "counter-rotating" referred in this context to the process of correction of a phase error.

- 2.2 The examining division further objected to the clarity of the terms "multiple of the symbol rate" and "multiple of the chip rate", arguing that absent a restriction to integer multiples, "multiple of" was not a meaningful limitation. The present claim has been restricted to integer multiples. The board has given its reasons for finding this amendment allowable under Article 123(2) EPC above, at point 1.1.2. The examining division further expressed doubt as to whether even this restriction would be clear, since "the chip rate and the symbol rate of a direct sequence spread spectrum are such that the former is an integer multiple of the latter." The board does not follow this argument. It is true that any multiple of the chip rate is necessarily also a multiple of the symbol rate but nonetheless the restriction to an integer multiple of the chip rate is not meaningless - there are integer multiples of the symbol rate which are not integer multiples of the chip rate, so that the two terms "integer multiple of the symbol rate" and "integer multiple of the chip rate" define clearly two different sets of frequencies, even though one is a subset of the other.

3. *Novelty and inventive step*

- 3.1 It would appear to be known to carry out phase correction derived from symbols after they have been

extracted from their pseudo-noise sequences, as pointed out with respect to D1 by the examining division (see in particular D1, page 13, line 18 to page 14, line 2 and Figure 10), or also disclosed in D2 at page 9, line 5 to page 10, line 33 and Figures 18 to 20. However these documents do not discuss how frequently or when the correction is updated. According to the invention as now claimed, the correction is applied all at once at the beginning of the pseudo-noise sequence. Hence the subject-matter claimed is novel. The appellant has argued that such a correction would conventionally be applied by small adjustments in the chip timing over the whole symbol period. In the view of the board it is arguable that it would be natural to apply the whole correction as soon as it becomes available, i.e. once per symbol period, but there is at least no indication in the prior art documents that it would be advantageous (as explained at page 11, lines 7 to 13 of the description) to make that correction at the beginning of a pseudo-noise sequence, in other words at the beginning of a symbol. Thus the board considers that the currently claimed subject-matter satisfies the requirement for an inventive step.

4. The board sees no further reasons to object to the application in its present form. The appeal is therefore to be allowed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the following documents:

claims: 1 to 8 received on 2 May 2007;

description: pages 1, 2 and 6 to 13 as published, and pages 3 to 5 filed on 8 December 2006;
and

drawing: sheets 1 to 5 as published.

The Registrar:

The Chairman:

D. Magliano

A. S. Clelland