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D E C I S I O N
of 7 November 2005

Case Number: T 1017/02 - 3.5.03

Application Number: 90917730.5

Publication Number: 0500761

IPC: H04L 27/30

Language of the proceedings: EN

Title of invention:
Diversity receiver in a CDMA cellular telephone system

Patentee:
QUALCOMM Incorporated

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
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Case Number: T 1017/02 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 7 November 2005

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the opposition division of the European Patent Office posted 18 July 2002 revoking European patent No. 0500761 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: A. S. Clelland
Members: F. van der Voort
R. Moufang

Summary of Facts and Submissions

I. This appeal is against the decision of the opposition division revoking European patent No. 0 500 761 for the reasons that the subject-matter of claim 1 of a main request was not novel and the subject-matter of claim 1 of an auxiliary request did not involve an inventive step (Article 100(a) EPC). Four notices of opposition had been filed. In the course of the opposition proceedings two of the four opponents withdrew their opposition.

II. The following documents were referred to by the opposition division in their decision:

O2: US 4 653 069 A;
O3: US 4 601 047 A;
O6: "Theory of Spread-Spectrum Communications - A Tutorial", R.L. Pickholtz *et al*, IEEE Transactions on Communications, Vol. 30, No. 5, May 1982, pages 855 to 884; and
O8: "MATS-D Radio Transmission", R. Beck *et al*, Proceedings of the 2nd Nordic Seminar on Digital Land Mobile Radio Communications, 14 - 16 October, 1986, Stockholm, Sweden, pages 1 to 10.

III. With letter of 30 September 2002 the proprietor (appellant) lodged an appeal against the decision. With the statement of grounds of appeal, filed with letter of 28 November 2002, the appellant requested that the decision be set aside and the patent be maintained on the basis of claims of a main request or, alternatively, those of one of two auxiliary requests. Oral proceedings were conditionally requested.

IV. With letters of 13 November 2002 and 17 December 2002 the two remaining opponents (respondents) withdrew their oppositions.

V. The appellant was summoned by the board to oral proceedings. In a communication accompanying the summons, the board gave a preliminary opinion and drew attention to issues to be discussed at the oral proceedings. Reference was made to O3 and O8 as well as to the following document, also cited in the course of the opposition proceedings:

O16: "Rationale and potential of the hybrid system approach MATS-D for future digital mobile communication", A. Eizenhöfer *et al*, International Zurich Seminar on Digital Communication, 11 - 13 March, 1986, IEEE Proceedings, pages 53 to 59.

VI. In response to the summons the appellant filed new sets of claims of a main request and three auxiliary requests and requested that the impugned decision be set aside and the patent be maintained on the basis of the claims of the main request or, alternatively, on the basis of the claims of one of the three auxiliary requests.

VII. Oral proceedings were held on 11 August 2005 during which the appellant withdrew all existing requests and requested that the decision be set aside and the patent be maintained on the basis of claim 1 of a main request filed during the oral proceedings. By way of an auxiliary request, the appellant requested that the case be remitted to the department of first instance

for further prosecution on the basis of claims 15 to 17 of the set of claims filed with letter of 22 May 2001. At the end of the oral proceedings it was decided that the proceedings would be continued in writing.

VIII. In a communication dated 19 August 2005 the board raised objections under Articles 84 and 123(2) EPC in respect of claim 1 of the main request.

IX. With a reply letter dated 17 October 2005 the appellant filed an amended set of claims, consisting of claims 1 to 3, and requested that the patent be maintained on the basis of these claims.

Claim 1 reads as follows:

"1. A direct sequence spread spectrum receiver subsystem, comprising:

a control processor (46);

searcher means (44) for receiving multipath signals corresponding to multipath propagations, wherein each multipath propagation contains a direct sequence spread spectrum information signal together with a pilot signal, wherein pilot signals from different cell-sites are of the same spreading code but with a different predetermined code phase offset, and multipath signals received from the same cell-site have a resultant time difference with respect to one another, for demodulating said received multipath signals, for determining in each received multipath signal a signal strength of the respective pilot signal by a correlation process for each code phase and a corresponding time relationship between pilot signals in said received multipath signals, and for providing

to said control processor (46) a searcher signal indicative of pilot signals of greatest signal strength and corresponding time relationship; and

receiver means (40, 42) for receiving and demodulating respective ones of said multipath signals of greatest signal strength, wherein said receiver means (40, 42) is responsive to control signals provided by said control processor (46) for demodulating respective ones of said multipath signals corresponding to ones of said pilot signals of greatest signal strength to provide an information signal, and the pilot signal of the greatest signal strength is used as a carrier phase reference for synchronous detection of the respective multipath signal; and

wherein said control processor (46) serves to control said searcher means (44) and said receiver means (40, 42) and to distinguish from one another, based on their different predetermined code phase offsets, pilot signals from different cell-sites."

Claims 2 and 3 are dependent on claim 1.

Reasons for the Decision

1. *Amendments*

1.1 Claim 1 corresponds to granted claim 7, when dependent on claims 1 and 3, in which the features have been slightly reordered and further features have been added. These additions are based on the application as filed, in particular page 18, line 2 (re. direct sequence), page 19, lines 7 to 17 and Fig. 2 (re. control processor 46), page 8, lines 33 to 35 (re. correlation

process), page 18, lines 28 to 30 (re. synchronous detection), and page 8, lines 29 to 31 (re. distinguishing between pilot signals of different cell-sites). Claims 4 and 5 as granted have been renumbered to claims 2 and 3 and define further additional features, the combination of which with the subject-matter of present claim 1 being based on the application as filed, in particular page 12, lines 8 and 9, page 19, lines 24 to 32 and Fig. 2. The remaining claims were deleted.

1.2 The amendments therefore do not give rise to objections under Article 123(2) and (3) EPC. The board is also satisfied that the amendments do not give rise to objections under Article 84 EPC.

2. *Inventive step*

2.1 The subject-matter of claim 1 involves an inventive step having regard to O2, O3, O6 and O8, which were referred to by the opposition division in their decision, as well as having regard to O16, for the following reasons:

2.2 Both the opposition division and the appellant considered O8 to represent the closest prior art; the board agrees.

2.3 O8 discloses a hybrid system (*i.e.* frequency division for the uplink, code division for the downlink) including a wideband receiver (Figs 3 and 4) for receiving multipath signals corresponding to multipath propagations of a signal transmitted by a single cell-site, *i.e.* a base station (Figs 1 and 2). Each

multipath propagation contains a spread spectrum information (speech) signal together with a pilot signal ("synchronisation symbol"; see page 1, section 2.1, lines 1 to 6, and page 2, lines 26 and 27), in which multipath signals received from the base station have a resultant time difference with respect to one another. Searcher means (Fig. 4: "Receiver", "ADC", "Sync Correlator" and "Profile Analysis") are provided for demodulating the received multipath signals and for determining, in each received multipath signal, a signal strength of the respective path signal by a correlation process and a corresponding time relationship between synchronisation symbols in the received multipath signals (page 2, lines 21 to 29). Receiver means ("path receivers 1, 2") are provided for receiving and demodulating respective ones of the multipath signals corresponding to path signals of greatest signal strength to provide an information signal (page 2, lines 27 to 29 and 32 to 35). The synchronisation symbols are used as carrier phase references for synchronous detection of the respective multipath signals (page 2, lines 32 to 34, page 3, lines 11 and 12).

2.4 The subject-matter of claim 1 particularly differs from the receiver disclosed in O8 in that according to claim 1 a control processor is provided which serves to distinguish pilot signals from different cell-sites from one another, based on their different predetermined code phase offsets, and, correspondingly, in that the searcher means and receiver means are adapted to receive multipath signals from different cell-sites. The information signal provided by the receiver means may therefore be based on the

demodulation of multipath signals of greatest signal strength and simultaneously received from different cell-sites.

2.5 Starting out from O8 the problem underlying the claimed subject-matter may therefore be seen in expanding the system of O8 in order to make it suitable for use with a plurality of cell-sites or base stations.

2.6 O16 relates to the same hybrid system ("MATS-D") as disclosed in O8. However, in O16 it is described that the system includes a plurality of base stations (Fig. 1a), in which adjacent base stations use different FDMA-blocks, *i.e.* different carrier frequencies, according to a 3-cell reuse cluster (page 57, section 2.2, first paragraph, and Fig. 3). Since O8 explicitly refers to O16 as describing the principles of the MATS-D hybrid system (O8, page 1, section 1), it would have been obvious to a skilled person faced with the above-mentioned problem to consider O16. However, since according to O16 different carrier frequencies are used for the base stations, this document teaches to distinguish between the base stations on that basis rather than by using different code phase offsets of the respective pilot signals as in the claimed receiver subsystem. Further, if in accordance with O16 different carrier frequencies were used in the system of O8, the receiver of O8 (see Fig. 3) would only receive the signal from one base station at a time and therefore be incapable of simultaneously receiving multipath signals from different base stations.

2.7 In their decision the opposition division additionally referred to O2 and O3 in relation to the subject-matter of claim 1 of an auxiliary request. With respect to the subject-matter of claim 1 at issue, in the board's view, a person skilled in the art, starting out from O8 and, for the sake of argument, assuming that the teaching of O2 and O3 should be taken into account, would not arrive at the claimed subject-matter for the following reasons:

O2 discloses a spread spectrum correlation receiver capable of receiving multipath signals transmitted by a plurality of stationary independent transmitters which all use the same pseudo-noise (PN) coded carrier (col. 20, lines 61 to 65, col. 21, lines 31 to 34 and Figs 17 and 18, col. 23, lines 50 to 68). It follows that the receiver cannot distinguish between signals from different transmitters, in particular not on the basis of different predetermined code phase offsets of the PN code.

O3 discloses a system including a plurality of receivers which are each set to a different shift of a common maximum length code (col. 3, lines 7 to 9). The same shifts are used at corresponding transmitters. Each receiver is thereby synchronised to one predetermined transmitter (see the abstract). This permits the transmission of a plurality of signals at the same frequency and at the same time without interference (col. 7, lines 3 to 9). O3 does not relate to a cellular system; at col. 11, lines 55 to 58, a commercial power line is mentioned as an example of the transmission medium. If, nevertheless, the teaching of O3 were to be applied to the receiver of O8, it follows

that the wideband receiver would be able to handle the multipath signals from one corresponding transmitter, *i.e.* base station, at a time only.

2.8 O6 was also cited by the opposition division, but merely as a reference source for a definition of direct sequence spread spectrum (page 368, section V, 1st and 2nd para.). It is no more relevant than the other documents cited above.

2.9 The board therefore concludes that the subject-matter of claim 1 is neither disclosed nor suggested by any one of, or any combination of, O8, O2, O3, O6 and O16 and that, consequently, the impugned decision is to be set aside.

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 maintain the patent with claims as filed with the letter of 17 October 2005, subject to the description and drawings being adapted to these claims.

The Registrar: The Chairman:

D. Magliano A. S. Clelland