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D E C I S I O N
of 3 March 2004

Case Number: T 0153/99 - 3.5.3

Application Number: 87309122.7

Publication Number: 0265178

IPC: H04B 7/185

Language of the proceedings: EN

Title of invention:

Spread spectrum multiple access communication using satellite
or terrestrial repeaters

Patentee:

QUALCOMM, INC.

Opponent:

Motorola Inc.

Headword:

Spread Spectrum Communication/QUALCOMM

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (main and auxiliary request, no)"

Decisions cited:

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Catchword:

-



Case Number: T 0153/99 - 3.5.3

D E C I S I O N
of the Technical Board of Appeal 3.5.3
of 3 March 2004

Appellant: QUALCOMM, INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 29 January 1999
revoking European patent No. 0265178 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: F. van der Voort
M.-B. Tardo-Dino

Summary of Facts and Submissions

- I. This appeal is against the decision of the Opposition Division to revoke European patent No. 0 265 178. The opposition was filed against the patent as a whole and on the grounds set out in Article 100(a) - (c) EPC.

- II. The opponent referred *inter alia* to the following prior art document:

D2: *G.R. Cooper and R.W. Nettleton, "A Spread-Spectrum Technique for High-Capacity Mobile Communications", IEEE Transactions on Vehicular Technology, Vol. VT-27, No. 4, November 1978, pages 264 to 275.*

- III. The Opposition Division held that the subject-matter of independent claims 1 and 29 according to the main request and three auxiliary requests did not involve an inventive step (Article 56 EPC) having regard to the disclosure of D2. A fourth auxiliary request was deemed inadmissible (Rule 71a(1) EPC).

- IV. The proprietor lodged an appeal against the decision and paid the prescribed fee. A statement of grounds of appeal was subsequently filed together with sets of claims of a main request and several auxiliary requests. Oral proceedings were conditionally requested.

- V. In reply to observations filed by the respondent (opponent), the appellant filed a response with letter of 20 July 2000.

- VI. By letter of 5 December 2000, the respondent withdrew the opposition.
- VII. The appellant was summoned by the Board to oral proceedings. In a communication accompanying the summons, the Board gave a preliminary opinion on the case.
- VIII. In preparation of the oral proceedings, the appellant with letter of 3 February 2004 filed a revised main request, replacing all previously filed main and auxiliary requests.
- IX. Oral proceedings took place on 3 March 2004. In the course of the oral proceedings, the appellant amended the main request by deletion of claim 58 and filed an auxiliary request based solely on this claim. At the end of the oral proceedings the Chairman announced the Board's decision.

The appellant's requests

- X. The appellant requested that the decision of the Opposition Division be set aside and that the patent be maintained on the basis of a main request or, failing that, of an auxiliary request, both as formulated at the oral proceedings.

The main request includes independent claims 1 and 29 as filed during the oral proceedings and dependent claims 2 to 25, 27, 28 and 30 to 57 as granted.

The auxiliary request includes a single claim as filed during the oral proceedings.

Claim 1 of the main request reads as follows:

"A multiple access, spread-spectrum communication system (10, 30), comprising

- means for communicating information signals between at least two of a plurality of system users (20, 22, 24, 26) using corresponding direct sequence code-divisional-spread-spectrum communication signals,*
- and isolation means coupled to the means for communicating, for unequally weighting incident received signal power of the interfering spread-spectrum communication user signals, and for providing marginal isolation between said user signals as small as 1 dB in order to enable an increase in capacity."*

Claim 29 of the main request reads as follows:

"A method of providing high capacity multiple access communications to a plurality of communication service users, comprising the steps of:

- converting a plurality of narrow band input information signals into a plurality of wide band user addressable direct sequence code-division-spread-spectrum communication signals, using an assigned spreading function, and a predetermined carrier frequency; and*
- communicating the direct sequence code-division-spread-spectrum communication signals between users; and characterised by the steps of:*
 - weighting incident received signal power unequally in communication of the spread-*

spectrum communication signals, with signals directed to an intended recipient user of greater average signal strength with respect to interfering signals directed to other users, providing marginal isolation between said user signals as small as 1 dB in order to enable an increase in capacity and

- *converting each received address corresponding code-division-spread-spectrum communication signal to a corresponding narrow band information signal."*

The sole claim of the auxiliary request reads as follows:

"Use of isolation means in a multiple access, spread-spectrum communication system (10, 30) for increasing capacity, said system (10, 30) comprising means for communicating information signals between at least two of a plurality of system users (20, 22, 24, 26) using corresponding direct sequence code-divisional-spread-spectrum communication signals, wherein the isolation means are coupled to the means for communicating, unequally weight incident received signal power of the interfering spread-spectrum communication user signals, and thereby provide marginal isolation between said user signals as small as 1 dB."

Reasons for the Decision

1. *Amendments*

1.1 The amendments made to the claims as granted do not give rise to objection under Articles 84 and 123(2),(3) EPC.

1.2 At the oral proceedings the question was discussed of whether the added feature "providing marginal isolation between said user signals as small as 1 dB in order to enable an increase in capacity" actually constituted a limiting feature. In the Board's view, the phrase "in order to enable an increase in capacity" neither explicitly nor implicitly defines a technical, constructional feature of the claimed system (claim 1 of the main request) or of a corresponding method step (claim 29 of the main request), but merely indicates a reason for using the isolation means in the communication system or method; it is accordingly without limitative effect.

Further, the Board notes that the isolation means as defined in the claims are not limited to providing marginal isolation as small as 1 dB; higher isolation values between certain user signals and achieved by the same isolation means or by providing a plurality of cascaded marginal isolation means are not excluded.

2. *Novelty (claim 1, main request)*

2.1 The system as defined in claim 1 differs from the system disclosed in D2 in that the claimed system uses **direct sequence** code-division-spread-spectrum

communication signals. The subject-matter of claim 1 is therefore novel with respect to the disclosure of D2 (Articles 52(1) and 54 EPC).

2.2 At the oral proceedings and in the letter of 3 February 2004, page 28, 2nd paragraph, and pages 31 to 33, point (b), the appellant argued that the system of claim 1 was furthermore distinguished from the system of D2 by the fact that the isolation means provided marginal isolation as small as 1 dB. He argued that the isolation means disclosed in D2, namely the sectorized base station antenna, provided a high level of isolation between user signals, typically in the order of 15 dB, which could not be considered "marginal". Further, in the system of D2, marginal isolation would be of no use, since the system was based on a frequency-hopping spread-spectrum technique, requiring a high level of isolation between the users.

2.3 The Board cannot follow these arguments for the following reasons. The base station antenna in the system of D2 can indeed have sectoral beam patterns, illuminating three rhomboidal subcells or six triangular ones with 120° or 60° patterns, respectively (page 265, section II, lines 3 to 7). The half-power beamwidth θ° of the antenna by definition corresponds to the -3 dB antenna gain points, *i.e.* the angles $\pm q^\circ/2$ from boresight where the gain is reduced by 3 dB (see page 272, right column, last paragraph, and also the appellant's letter dated 3 February 2004, page 26, 2nd paragraph). This reduction in gain, however, implies that at a certain intermediate angle α° , where $0^\circ < \alpha^\circ < \theta^\circ/2$, the antenna gain is reduced by an intermediate amount of 1 dB. It follows that signal power incident

at the base station and originating from a user at boresight is unequally weighted by the base station antenna as compared to incident signal power from a user at α° such that an attenuation or isolation of 1 dB is provided between the two users. Further, if the user at α° is not in communication with the user at boresight, for the latter the signal sent by the former is an interfering spread-spectrum communication user signal.

2.4 The Board therefore concludes that D2 inevitably also discloses the feature that the system comprises isolation means for unequally weighting incident received signal power of the interfering spread-spectrum communication signals and for providing marginal isolation between the user signals as small as 1 dB. From the foregoing, it follows that the subject-matter of claim 1 differs from the system disclosed in D2 only by the feature as referred to under point 2.1.

3. *Inventive step (claim 1, main request)*

3.1 The patent in suit is concerned with the problem of providing a multiple-access communication system having high simultaneous user capacity, see the specification as published at page 4, lines 29 to 30. Document D2 is also concerned with this problem, see the title, the abstract and page 265, section I, last paragraph. D2 is therefore considered to represent the closest prior art.

3.2 The distinguishing feature referred to under point 2.1, namely the use of direct sequence, constitutes an alternative modulation technique to the frequency hopping used in D2 for achieving a spreading of the

narrow-band input signals, e.g. speech, over the entire available bandwidth. Starting from D2, the technical problem underlying the claimed subject-matter may thus be seen in providing an alternative modulation technique for the multiple-access spread-spectrum communication system disclosed in D2. The formulation of this problem does not contribute to an inventive step, since it is a matter of routine for a person skilled in the art to consider alternative solutions whenever the circumstances (availability of circuit components, cost calculations, etc.) make this desirable.

3.3 It is common general knowledge that several modulation techniques exist which can be used in a multiple-access code-division-spread-spectrum system. In particular, as acknowledged by the appellant in the statement of grounds of appeal, page 10, point 30, and during the oral proceedings, frequency hopping and direct sequence were well-known at the priority date as examples of such spread-spectrum systems. Furthermore, D2 discusses spread-spectrum communication in general terms and is thus not restricted to frequency hopping (see, e.g., pages 265 to 266, section III, and section V, lines 15 to 18; see also the appellant's letter of 3 February 2004, page 36, point (c)).

3.4 A person skilled in the art, starting from D2 and faced with the above-mentioned technical problem, would therefore consider the use of direct sequence as an alternative modulation technique to be used in D2. Furthermore, the Board does not see any reason for the skilled person, on applying direct-sequence modulation to the system of D2, to assume then that, for technical

reasons, the sectoral illumination by the antenna as described in D2 cannot be maintained and neither has the appellant presented any such reasons.

3.5 Consequently, the person skilled in the art starting from D2 would, without applying any inventive skill, arrive at a multiple-access, spread-spectrum communication system which includes all the features as defined in claim 1.

3.6 The subject-matter of claim 1 of the main request therefore lacks an inventive step (Articles 52(1) and 56 EPC).

4. *Inventive step (claim 29, main request)*

4.1 Apart from defining method steps corresponding to the features of claim 1, independent method claim 29 of the main request additionally defines the step of converting the narrow band input information signals into a plurality of wide band user addressable direct sequence code-division-spread-spectrum communication signals, using an assigned spreading function and a predetermined carrier frequency, and the step of converting each received address corresponding communication signal to a corresponding narrow band information signal.

4.2 These additional features are inherent to a communication system based on a spread-spectrum technique and are, with the exception of the direct sequence modulation technique, at least implicitly known from D2 (see page 265, left column, section II, lines 16 to 27, right column, section III, first two

paragraphs, page 266, section V, 3rd paragraph, and pages 274 and 275, section XIII).

4.3 Consequently, the subject-matter of claim 29 of the main request lacks an inventive step for the same reasons, applied *mutatis mutandis*, as given in respect of claim 1.

5. *Inventive step (auxiliary request)*

5.1 The sole claim of the auxiliary request is directed to the use of the isolation means in a system including all the features of the system according to claim 1 of the main request for increasing capacity.

5.2 As follows from point 2.3 above, the base station antenna in the system of D2 includes all the features of the isolation means as defined in the last four lines of claim 1 of the auxiliary request. Furthermore, Table III of section XII of D2 (see page 274) illustrates the improvement ratio in terms of U/B, i.e. number of simultaneous users per cell per total available bandwidth, of spread-spectrum (SS) versus FM systems for different sectoral illuminations. Hence, D2 also discloses the use of the sectorized base station antenna as a means for increasing the system capacity.

5.3 Therefore, the subject-matter of the claim of the auxiliary request lacks an inventive step for the same reasons, applied *mutatis mutandis*, as given in respect of claim 1 of the main request.

6. At the oral proceedings and in the letter of 3 February 2004 (pages 32 to 33), the appellant argued that the

person skilled in the art would not be able to derive from D2 that marginal isolation can be used to increase the system capacity, since D2 conveyed two messages which were inconsistent. On the one hand, an infinite amount of isolation between sectors was implied, as follows from the sentence part "... *the antenna will receive the "wanted signal" in full, but only approximately $\theta/360$ of the interference.*", whereas, on the other hand, in view of the reference to the half-power beamwidth of the antenna beam pattern, the borderline between adjacent sectors represented half power of the beam, which implied that there was no infinite isolation. The skilled person "would therefore design the sectorized antennas according to the conventional wisdom, i.e. providing at least the required 15 dB isolation between the sectors." (see page 35, penultimate line, to page 36, line 2 of the letter of 3 February 2004).

- 6.1 In the Board's view, as set out under point 2.3, the sectorized base station antenna according to D2, even if considered to constitute high-level isolation means, inherently encompasses marginal isolation in that between certain user signals a 1 dB marginal isolation is inevitably provided. Further, an inconsistency in D2 with respect to the description of the sectorized antenna cannot be found, since the reference to the half-power beamwidth of the antenna does not mean that the sectors must be overlapping with a 3 dB isolation at the borderline between the sectors and, further, the expression "approximately" in the above-mentioned sentence part referred to by the appellant clearly indicates that the value $\theta/360$ merely is an

approximation of the isolation achieved and, hence,
that the actual isolation need not be infinite.

7. Since claims 1 and 29 of the main request and the claim of the auxiliary request are not allowable, it follows that each of the main and auxiliary requests as a whole is not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Magliano

A. S. Clelland