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Datasheet for the decision of 19 November 2008

Case Number: T 0258/08 - 3.5.03

Application Number: 98918637.4

Publication Number: 0983654

IPC: H04J 11/00

Language of the proceedings: EN

Title of invention:
Synchronous coherent orthogonal frequency division multiplexing system

Applicant:
MOTOROLA, INC.

Opponent:
-

Headword:
SC-OFDM system/MOTOROLA

Relevant legal provisions:
EPC Art. 84, 106(1), 110, 123(2)

Keyword:
"Clarity and support (no)"
"Added subject-matter (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0258/08 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 19 November 2008

Appellant: MOTOROLA, INC.
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Decision under appeal: **Decision of the examining division of the European Patent Office posted 16 August 2007 refusing European application No. 98918637.4 pursuant to Article 97(1) EPC 1973.**

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 examining division refusing European patent application No. 98918637.4 (publication number EP 0983654), which was originally filed as international application PCT/US98/08208 (publication number WO 98/59450 A).

II. The reasons given for the refusal were that claims 1 and 8 were unclear and that claim 1 was not supported by the description. The claims did not therefore meet the requirements of Article 84 EPC. The subject-matter of claims 1 and 8 was also said to lack an inventive step.

III. With the statement of grounds of appeal the appellant filed a main request consisting of claims 1 to 10 and submitted arguments in support. The appellant requested that a patent be granted on the basis of the main request. Oral proceedings were conditionally requested.

IV. The appellant was summoned to oral proceedings. In a communication accompanying the summons, the board, without prejudice to its final decision, raised objections which it intended to discuss with the appellant at the oral proceedings.

Those parts of the communication which relate to objections under Articles 84 and 123(2) EPC, i.e. points 4 and 5, are reproduced below, in which D5 and D6 refer to the following documents:

D5: K.L. Baum, "Synchronous Coherent OFDM for Broadband Cellular Radio Systems", Proceedings of the 35th Annual Allerton Conference on

Communication, Control, and Computing, Monticello, Illinois, USA, 29 September to 1 October 1997, pages 719 to 728; and

D6: K.L. Baum, "A Synchronous Coherent OFDM Air Interface Concept for High Data Rate Cellular Systems", Proceedings of the IEEE Vehicular Technology Conference, Ottawa, Canada, 18 to 21 May 1998, pages 2222 to 2226.

Points 4 and 5 of the communication read as follows:

"4. *Article 84 EPC*

4.1 In the board's view, in order to comply with the requirements of Article 84 EPC, the claims should be clear in themselves, i.e. the reader should be able to understand the claims and, hence, be able to determine the matter for which protection is sought without a need for him/her to refer to the description and drawings, since, in accordance with Article 84 EPC, the claims rather than a combination of the claims and the description define the matter for which protection is sought.

Hence, the argument set out in the statement of grounds of appeal in support of the clarity of the term "SC-OFDM" in which reference is made to the description (see point 4 ("As clearly described within the description ...")) is not convincing. Further, since neither the abbreviation "SC-OFDM" nor the wording "synchronous coherent" in "synchronous coherent orthogonal frequency division multiplexing"

appears to have a well-recognized meaning within the relevant art (cf. D5 and D6, the abstracts, both published after the claimed priority date of the present application; see also the present description as originally filed, page 6, lines 19 and 20), the term "SC-OFDM" in all of the claims 1 to 10 is not clear.

According to the description as originally filed (see page 10, lines 4 to 16, and page 46, lines 5 to 10) "SC-OFDM", which is said to be the invention (see page 6, line 19, to page 7, line 5), is based on the combination of the following elements/requirements:

"1. OFDM signal transmissions which are synchronized in time between co-channel transmitters.

2. A cyclic extension of sufficient length to absorb both delay spread and the propagation delay difference between co-channel transmitters and the receiver (e.g., inter-cell propagation delay).

3. Reference/pilot signals in the transmitted OFDM signals which are orthogonal between co-channel transmitters (e.g., between cells).

4. A common transmission format among co-channel transmitters."

In the board's view, the term "combination" implies that all four elements are present in SC-

OFDM. In order to meet the requirements of Article 84 EPC (clarity and support) it therefore appears to be necessary that the independent claim(s) include(s) each one of these features in order to properly define "SC-OFDM". Present independent claims 1 and 8 do not however include these features.

It also appears that the above-mentioned elements, each of which concerns the interrelationship between a receiver and a plurality of transmitters, imply that any independent claim must be directed to a system including a plurality of SC-OFDM transmitters and at least one SC-OFDM receiver. Claims 1 and 8 are however directed to a single transmitter and a single receiver, respectively.

4.2 The references in claims 1, 3 and 5 to 8 to other entities, such as other co-channel SC-OFDM transmitters, other pilot code sequences, an SC-OFDM system, and SC-OFDM receivers, render the claims unclear in that it gives rise to doubts about the matter for which protection is sought. In the present case, it is not clear which limitations in terms of constructional features the above references impose on the claimed transmitter and receiver.

4.3 Claim 1 is unclear in that it is unclear which features of the transmitter make the transmitter suitable "for synchronizing to a local reference signal" (lines 1 and 2). It is also unclear what is synchronized to the local reference signal and

whether or not the source for supplying a time reference signal (see claim 1, lines 3 and 4) is part of the claimed transmitter. The latter objection also applies to claim 3 (see 3C)), claim 5 (see 5D)), and claim 7 (see 7E)).

The wordings "in accordance with" and "a predetermined pilot code scheme" in "providing an OFDM signal in accordance with a predetermined pilot code scheme" (lines 9 and 10) are unclear. It is noted that the claim does not even define that the OFDM signal includes a pilot code (cf. claim 1 as originally filed).

The wording "using a cyclic extension" (lines 11 and 12) is unclear in that it is not defined what a cycle is (e.g. a frame, a slot, a symbol, or a pilot code) and which part of the OFDM signal is extended. It is also unclear whether or not the extension is actually to be included in the OFDM signal by the cyclic extension unit. Further, it is unclear whether or not "a cyclic extension" in line 21 is the same one as referred to in lines 11 and 12.

In claim 1, lines 16 to 18, it is unclear to which entity the transmission timing of the at least one SC-OFDM signal is to be synchronized.

Further, it appears that the claimed transmitter is for transmitting SC-OFDM signals which all include the same OFDM signal provided by the modulator (cf. lines 5 and 6, 8, and 20). This does not seem to make sense.

There appears to be no antecedent for "the at least one pilot code" in claim 1 (see line 22). This objection also applies to claim 7 (line 21).

The relative term "minimal" in "minimal cross-correlation" in claim 1, line 25, has no precise meaning within the relevant art and therefore makes the claim unclear. It is also unclear whether or not the "predetermined set of symbol locations" relates to the SC-OFDM signal.

4.4 Claims 3, 5 and 7 each define a practically indefinite number of alternative embodiments, which makes the claims obscure and difficult to construe and therefore unclear. Further, the expression "based on" in "the cyclic extension has a duration based on ..." and in "the cyclic extension is based on ..." is vague (see claim 3 (features 3A, 3B), claim 5 (features 5B, 5C), and claim 7 (features 7A, 7D)).

4.5 In claim 3, feature 3B, it is unclear which channel impulse response is referred to, since the claim refers to a number of transmitters. Further, the expression "wireline" (feature 3C2)) does not appear to have a generally recognized meaning.

4.6 It is unclear which additional constructional features of the SC-OFDM transmitter of claim 1 are defined in claim 6, since the transmitter of claim 1 appears to be suitable for the stated use already.

4.7 In claim 8 the term "composite" in "composite SC-OFDM signal", "composite SC-OFDM pilot code" and "composite SC-OFDM symbol" does not appear to have a well-recognized meaning. It is also unclear which quantity is to be measured by the measurement unit and which means provided for computing channel response measurements.

4.8 The board is therefore of the view that the claims violate the requirements of Article 84 EPC.

5. *Article 123(2) EPC*

5.1 Claims 1 and 3 as originally filed referred to "a common source" and included the feature that each SC-OFDM signal included at least one pilot code. Present claims 1 and 3 do not include these features. There appears to be no basis in the application documents as originally filed for these deletions.

5.2 Claim 8 includes the feature that the receiver is arranged to demodulate and parse the composite SC-OFDM signal. The board notes however that according to the description, see page 63, line 20, to page 64, line 13, and Fig. 16 ("plurality of composite SC-OFDM symbols"), the receiver receives the demodulated and parsed SC-OFDM signal. There appears to be no basis in the application documents as originally filed for the feature that the receiver is arranged to demodulate and parse the composite SC-OFDM signal.

5.3 The board is therefore of the view that the amendments to the claims add subject-matter which extends beyond the content of the application as filed and, hence, violate the requirements of Article 123(2) EPC."

V. In response to the summons to oral proceedings, the appellant informed the board, one day before the oral proceedings, that the appellant would be represented at the oral proceedings. No amendments and no substantive submissions in reply to the communication were filed.

VI. Oral proceedings were held on 19 November 2008. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request as filed with the statement of grounds. At the end of the oral proceedings, after deliberation, the board's decision was announced.

VII. The main request includes claims 1 to 10.

Claim 1 reads as follows:

"An SC-OFDM transmitter (1504, 1804) for synchronizing to a local reference signal where the local reference signal is derived from a time reference signal received from a source that supplies the time reference signal to one or more distinct SC-OFDM transmitters, for transmitting SC-OFDM signals, the SC-OFDM transmitter characterized by:

A) a modulator (1506, 1806), coupled to receive data and predetermined pilot codes, for providing an OFDM signal in accordance with a predetermined pilot code scheme;

B) a cyclic extension unit (1508, 1808), coupled to the modulator, for extending the OFDM signal using a cyclic extension; and

C) a synchronizing unit (1510, 1810), coupled to the cyclic extension unit and to receive the time reference signal, for deriving the local reference signal from the time reference signal and synchronizing the transmission timing of at least one SC-OFDM signal of the SC-OFDM transmitter, which includes the OFDM signal that has been extended,

wherein, each SC-OFDM signal includes the OFDM signal, which has been extended with a cyclic extension, and wherein the at least one pilot code is comprised of a sequence from a set of sequences, where each of the sequences in the set of sequences with respect to other sequences in the set of sequences have minimal cross-correlation and the predetermined pilot code scheme places each pilot code in a predetermined set of symbol locations."

In view of the board's decision it is not necessary to give details of the remaining claims 2 to 10.

Reasons for the Decision

1. *Procedural matters*

1.1 At the oral proceedings the appellant informed the board that a divisional application had been filed the previous day and that in his view most of the objections raised in the board's communication were of such a nature that, if these objections were to be raised in the examination proceedings concerning the divisional

application, they could easily be overcome by making appropriate amendments to the claims and/or the description of that application. The appellant explained that he wished to obtain suggestions for amendments to be made in relation to the divisional application in the case that the board would not allow the present main request.

1.2 The subject of the appeal proceedings is however the decision of the examining division to refuse the application in suit (see point I above and Articles 106(1) and 110 EPC). It is therefore not the task of the board to give an opinion, let alone make suggestions, in relation to anything other than the request(s) on file. The filing of amendments in proceedings relating to a divisional application has, in any case, no relevance to the objections raised in relation to the application in suit.

2. *Articles 84 and 123(2) EPC*

2.1 In relation to the application in suit, the appellant did not submit any amendments to the claims but merely commented on and discussed with the board at the oral proceedings the objections which were set out in the communication annexed to the summons to oral proceedings, in particular those relating to the requirements of Articles 84 and 123(2) EPC (see point IV). Even though the appellant made it clear that he did not agree with all of the objections raised in the communication, he accepted that in view of some of the objections, i.e. at point 4.3, penultimate paragraph, and point 5.2 of the communication (see point IV above), further amendments were necessary. No further arguments in respect of the

objections under Article 84 and 123(2) EPC were submitted which went beyond those as already set out in the statement of grounds of appeal and addressed in the board's communication.

2.2 The board does not therefore see any reason to deviate from its preliminary opinion and, hence, maintains the objections under Articles 84 and 123(2) EPC as expressed in the communication (see point IV above).

Accordingly, the board concludes that claims 1, 3 and 8 do not comply with the requirements of Article 123(2) EPC and that claims 1, 3 and 5 to 8 do not comply with the requirements of Article 84 EPC. The main request is therefore not allowable.

3. In the absence of an allowable request, the board concludes that the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Magliano A. S. Clelland