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Datasheet for the decision of 28 August 2012

Case Number: T 0895/09 - 3.5.05

Application Number: 04774329.9

Publication Number: 1623549

IPC: H04L27/26, H04Q7/36

Language of the proceedings: EN

Title of invention:
SUB-CARRIER ALLOCATION METHOD FOR REDUCING INTER-CELL INTERFERENCE IN OFDM CELLULAR ENVIRONMENT

Applicant:
LG Electronics, Inc.

Headword:
Sub-carrier allocations/LG ELECTRONICS

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Added subject-matter - inadmissible combination of embodiments (yes)

Decisions cited:

Catchword:

Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T0895/09 - 3.5.05

D E C I S I O N
of the Technical Board of Appeal 3.5.05
of 28 August 2012

Appellant: (Applicant)	LG Electronics, Inc. 20, Yeouido-dong Yeongdeungpo-gu Seoul 150-010 (REPUBLIQUE DE COREE)
Representative:	Katérle, Axel Wuesthoff & Wuesthoff Patent- und Rechtsanwälte Schweigerstraße 2 81541 München (ALLEMAGNE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted 20 November 2008 refusing European patent application No. 04774329.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair: A. Ritzka
Members: K. Bengi-Akyuerek
D. Prietzel-Funk

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division, posted on 20 November 2008, refusing the European patent application No. 04774329.9 on the ground of lack of inventive step (Article 56 EPC 1973), having regard to the disclosure of

D1: I. Katzela and M. Naghshineh: "Channel Assignment Schemes for Cellular Mobile Telecommunication Systems: A Comprehensive Survey", IEEE Personal Communications, June 1996

and the skilled person's common general knowledge as evidenced by

D2: WO-A-02/49306.

II. Notice of appeal was received on 20 January 2009. The appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 18 March 2009. The appellant requested that the decision of the examining division be set aside in its entirety and a patent be granted based on a new set of claims (claims 1 to 8) submitted with the statement setting out the grounds of appeal. In addition, oral proceedings were requested as an auxiliary measure.

III. A summons to oral proceedings scheduled for 28 August 2012 was issued on 29 May 2012. In an annex to this summons pursuant to Article 15(1) RPBA, the board expressed its preliminary opinion on the appeal. In particular, an objection was raised under Article 52(1) EPC and 56 EPC 1973 mainly in view of D2.

IV. With a letter of reply dated 4 July 2012, the appellant submitted a new set of claims (claims 1 to 3) and requested that a patent be granted based on this claim set as a sole request.

V. Oral proceedings were held as scheduled on 28 August 2012, during which the sole request was discussed. The appellant finally requested that the decision of the examining division be set aside and that a patent be granted on the basis of claims 1 to 3 of the sole request. At the end of the oral proceedings, the decision of the board was announced.

VI. Independent claim 1 of the sole request reads as follows:

"A sub-carrier allocation method for an Orthogonal Frequency Division Multiplexing, OFDM, cellular environment having a plurality of cells which are divided into sectors, the sectors being set up by directional antennas, comprising the following steps carried out by a Radio Network Controller, RNC:

determining what type of antenna is being used in the OFDM cellular environment (S10);

selecting a target sector in a cell and determining sectors in neighbouring cells having a strongest inter-cell interference with the target sector, the sectors are determined depending on the number of sectors set up by the determined directional antenna (S11), wherein, if the type of antenna being used is determined to be an omni-directional antenna, the number of cells having the strongest inter-cell interference is seven, if the type of antenna being used is determined to be a 120°-directional antenna, the number of cells having the strongest inter-cell interference is three, if the type of antenna being

used is determined to be a 60°-directional antenna, the number of cells having the strongest inter-cell interference is two;

selecting mutually exclusive sub-carrier subsets for the target sector and the determined sectors (S12);

allocating the selected mutually exclusive sub-carrier subsets to the target sector and the determined sectors (S13);

obtaining for each of the target sector and the determined sectors a total number of sub-carriers requested by terminals in the respective sectors (S20);

determining for each of the target sector and the determined sectors whether the obtained total number of sub-carriers exceeds the number of sub-carriers of the allocated mutually exclusive sub-carrier subset (S21); and

if it is determined that the obtained total number of sub-carriers exceeds the number of sub-carriers of the allocated mutually exclusive sub-carrier subset,

calculating a requested transmission power of each of the terminals (S22);

allocating sub-carriers of the allocated mutually exclusive sub-carrier subsets with a preference to the terminals requesting a high transmission power; and then

allocating sub-carriers other than the allocated sub-carriers to other remaining terminals requesting less transmission power (S23)."

Reasons for the Decision

1. Admissibility of the appeal

The notice of appeal and the statement setting out the grounds of appeal were submitted validly and in due

time. The appeal fee was also paid in due time. The appeal is therefore admissible.

2. Sole Request

The claim set of this request differs from the set of claims on which the appealed decision was based in that claim 1 further specifies that

(a) all the recited steps are carried out by a Radio Network Controller (RNC),

(b) it is also determined what type of antenna is being used in the OFDM cellular environment, and

(c) with regard to the step of determining sectors in neighbouring cells having a strongest inter-cell interference with the target sector, the number of cells having the strongest inter-cell interference is respectively seven, three or two, if the type of antenna being used is determined to be an omni-directional antenna, a 120°-directional antenna or a 60°-directional antenna, respectively.

The added feature (b) is based, e.g., on paragraph [45] and Fig. 9, step S10.

2.1 Article 123(2) EPC

In the board's judgment, claim 1 of this request does not comply with the provision of Article 123(2) EPC for the following reasons:

2.1.1 Based on the wording of claim 1, the skilled reader would understand that all the features related to the claimed sub-carrier allocation method are exclusively performed by the RNC (cf. feature (a) above). In particular, claim 1 requires that the RNC first determines the type of antenna to be used in the OFDM

system (i.e. feature (b)) and selects a target sector in a cell before determining the sectors in neighbouring cells having the strongest inter-cell interference based on the used antenna type determined by the RNC. This implies that the antenna-dependent number of cells having the strongest inter-cell interference with the selected target sector (i.e. feature (c)) is also supposed to be determined by the RNC. Otherwise, the claimed step of "determining sectors in neighbouring cells having a strongest inter-cell interference with the target sector" would not be entirely carried out by the RNC, in contradiction to feature (a) of claim 1. From this, the skilled reader would deduce that the numbers of cells having the strongest inter-cell interference are also determined and set by the RNC before the respective mutually exclusive sub-carrier subsets are accordingly allocated to the selected sectors. However, this is not directly and unambiguously derivable from the application as filed.

The initial allocation of sub-carrier subsets to the selected cells or sectors in the OFDM system under consideration is described mainly in paragraph [45] and Fig. 9 of the application as filed. Concerning the determination of the cells or sectors having the strongest inter-cell interference, it is taught therein that the RNC first determines what type of antenna is used in the respective multi-cell system and then selects the target cell or sector and the other neighbouring cells or sectors having the strongest inter-cell interference with the selected target cell or sector (cf. paragraph [45], first sentence in conjunction with Fig. 9, steps S10 and S11). However, according to this embodiment, there is no detailed instruction given as to the determination of the actual number of cells or sectors which in fact have the

strongest inter-cell interference. More specifically, it is not taught that the RNC is responsible for determining the number of cells or sectors based on the determined type of antenna used in the underlying system. Rather, any component of the system in question could, either statically or dynamically, configure the respective number of interfering cells or sectors based on the original teaching.

Therefore, the combination of the added features (a) and (c) amounts to an unallowable extension of the original subject-matter.

2.1.2 The appellant argued that the added feature (c) was in particular supported by claims 4 to 7, paragraphs [38], [39], [47] to [50], and Figs. 9 and 13 of the application as originally filed.

The board does not agree with the appellant that the above basis is a valid support for claim 1 as amended, the reasons being as follows:

a) Claims 4, 5, 6, and 7 as originally filed are only dependent on original claim 1. Claim 1 specifies that a number of cells having a strongest inter-cell interference among cells in a multiple-cell environment are selected before selecting mutually exclusive sub-carrier sets for each selected cell having the strongest interference. Dependent claim 4 specifies that the type of antenna being used in the multiple-cell environment is determined. Dependent claims 5, 6, and 7 further specify that the number of cells selected having the strongest inter-cell interference is respectively seven, three or two, if the type of antenna used is determined to be an omni-directional, 120°-direc-

tional or 60°-directional antenna, respectively.

However, it is not directly and unambiguously derivable from this basis that it is the RNC which in fact determines the number of cells having the strongest inter-cell interference based on the determined type of antenna used in the OFDM system.

b) Paragraphs [38] and [39], referring to Fig. 4 of the original application, teach that each cell is divided into a certain number of sectors depending on the type of antenna used in a cellular system and that the frequency efficiency is increased by the use of directional antennas compared to omni-directional antennas. Moreover, paragraphs [47] to [50], referring to Figs. 10 to 12, teach that different numbers (i.e. seven, three or two) of mutually exclusive sub-carrier subsets are selected according to the antenna used and that the RNC allocates these subsets to the selected cells (i.e. seven, three or two cells).

Thus, this basis is related to the selection of the sub-carrier subsets to be allocated rather than to the selection of the cells or sectors. Nor can it be directly and unambiguously derived from these passages that the RNC determines the number of cells having the strongest inter-cell interference based on the determined type of antenna used in the OFDM system.

c) Fig. 9 depicts the sub-carrier allocation to cells or sectors but does not provide any detailed instruction as to the determination of the actual number of cells or sectors having the strongest

inter-cell interference (cf. point 2.1.1 above), while Fig. 13 is solely related to the sub-carrier allocation to terminals within an already selected cell.

Hence, these drawings do not represent a valid support either for the step of determining, by the RNC, the actual number of cells having the strongest inter-cell interference based on the determined type of antenna.

2.1.3 The appellant also submitted that, by adding feature (a) to claim 1, the entire sub-carrier allocation intelligence was provided on the network side, i.e. by the RNC, for *inter alia* performing an automatic antenna-dependent sub-carrier allocation according to the wording of this claim (cf. section III.1, first paragraph and section III.2.5 of the letter of reply dated 4 July 2012).

This argument is seen by the board as additional evidence for interpreting claim 1 such that it is indeed the "intelligent" RNC which automatically determines and sets the number of cells having the strongest inter-cell interference. The latter is, however, not derivable from the original teaching.

2.1.4 In view of the above, claim 1 contains subject-matter which extends beyond the content of the application as filed.

2.2 In conclusion, the sole request is not allowable under Article 123(2) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Götz A. Ritzka

Decision electronically authenticated