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Datasheet for the decision
of 25 September 2012

Case Number:	T 0694/11 - 3.5.05
Application Number:	05855326.4
Publication Number:	1834436
IPC:	H04L 9/00, H04L 12/00, H04B 7/26, H04B 1/713

Language of the proceedings: EN

Title of invention:
Methods and apparatus for flexible hopping in a multiple-access communication network

Applicant:
QUALCOMM INCORPORATED

Headword:
Random hopping patterns of sub-carriers

Relevant legal provisions:
EPC Art. 83, 84

Keyword:
"Sufficiency of disclosure (yes)"
"Clarity - Main request- No"
"Auxiliary request - clarity (yes, after amendments)"
"Remittal for further prosecution"

Decisions cited:
-

Catchword:
-

C8543.D
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             It can be changed at any time and without notice.

Case Number: T 0694/11 - 3.5.05

D E C I S I O N
of the Technical Board of Appeal 3.5.05
of 25 September 2012

Appellant: (Applicant)	QUALCOMM INCORPORATED 5775 Morehouse Drive San Diego CA 92121 (US)
Representative:	Heselberger, Johannes Bardehle Pagenberg Partnerschaft Patentanwälte, Rechtsanwälte Postfach 86 06 20 D-81633 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted 4 November 2010 refusing European application No. 05855326.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman:	F. Blumer
Members:	P. Cretaine
	P. Corcoran

C8543.D

Summary of Facts and Submissions

I.   The appeal is against the decision of the examining
        division, posted on 4 November 2010, refusing European
        patent application No. 05855326.4 on the grounds of
        insufficiency of disclosure (Article 83 EPC) and lack
        of clarity and support of the claims (Article 84 EPC).

II.   Notice of appeal was received on 12 January 2011 and
        the appeal fee was paid on the same day. The statement
        setting out the grounds of appeal was received on
        11 March 2011. The appellant requested that the
        decision of the examining division be set aside and
        that a patent be granted on the basis of a set of
        amended claims 1 to 34 submitted as a new main request
        with the statement setting out the grounds of appeal.
        In addition, oral proceedings were requested as an
        auxiliary measure. By letter received 28 April 2011,
        the appellant further requested to take into account
        the documents cited in the parallel US case.

III.   A summons to oral proceedings scheduled for
        25 September 2012 was issued on 9 July 2012. In an
        annex to this summons pursuant to Article 15(1) RPBA,
        the board expressed its preliminary opinion that the
        application did not meet the requirements of
        Articles 83 and 84 EPC. The board further indicated its
        intention to remit the case to the department of first
        instance for further prosecution if, during the oral
        proceedings, it came to the conclusion that the
        application fulfilled the requirements of
        Articles 83 and 84 EPC.

IV.   With a letter received 24 August 2012, the appellant
        filed a set of amended claims 1 to 34 as an auxiliary
        request. The appellant further submitted arguments in
        support of the main and auxiliary requests.

V.   Oral proceedings were held as scheduled on
        25 September 2012. 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 setting out the grounds of appeal on
        11 March 2011 or on the basis of the auxiliary request
        as filed with letter dated 24 August 2012. At the end
        of the oral proceedings, the decision of the board was
        announced.

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

        "A method for generating random hopping patterns,
        comprising:
        determining a first number of sub-carriers;
        determining a second number of hop ports;
        determining a third number of seeds;
        generating at least one hopping pattern based on the
        first number of sub-carriers, the second number of hop
        ports, and the third number of seeds wherein the
        hopping pattern is generated using a Feistel Network;
        and
        transmitting a signal with a transmitter unit according
        to the hopping pattern."

        The main request includes further independent claims
        12, 23, and 34 seeking protection for a corresponding

processor, apparatus and computer-readable medium, respectively.

Independent claim 1 of the auxiliary request reads as follows:

"A method for generating random hopping patterns for mapping a second number of hop ports to a first number of subcarriers for forward link data transmission from an access point to an access terminal and/or for reverse link data transmission from an access terminal to an access point, comprising:
determining the first number of sub-carriers;
determining the second number of hop ports;
determining a third number of seeds; and
generating at least one hopping pattern based on the first number of sub-carriers, the second number of hop ports, and the third number of seeds, wherein the hopping pattern is generated using a Feistel Network."

The auxiliary request includes further independent claims 12, 23, and 34 seeking protection for a corresponding processor, apparatus and computer-readable medium, respectively.

Reasons for the Decision

1.   The appeal is admissible.

2.   Clarity of the term "hop port"

2.1   The application has been refused based, inter alia, on the reasons that the term hop port present in the

claims had no well-defined meaning in the field of
telecommunications at the priority date and was not
defined or explained in the description.

2.2   The appellant filed several documents providing a
        definition and explanation of the concept of hop ports,
        none of them however having being published before the
        priority date of the present application
        (22 December 2004). In particular, the appellant argued
        that the inclusion of the term hop port in the
        terminology of the Ultra Mobile Broadband (UMB) portion
        of the 3GPP2 specification in August 2007 and its use
        in an IEEE presentation dated November 2005 evidenced
        that the term hop port has been known and used in
        common practice by skilled persons well before the
        publication dates of these documents. The board is not
        convinced by this argument since the lapse of eleven
        months between the priority date of the present
        application and the IEEE presentation represents a
        rather important amount of time in the rapidly evolving
        field of mobile communications.

2.3   The appellant however convincingly argued that the
        meaning of the term hop port is explained in the
        description itself.

        In that respect, the appellant first pointed out to the
        paragraphs [002], [005] and [0102] of the application
        as published, wherein it is stated that the invention
        relates to the generation of random hopping patterns in
        a multiple-access communication system, in particular
        patterns of nearby frequency sub-carriers for block
        hopping, the aim of the hopping being to ensure
        frequency diversity. Thus, the described hopping was

clearly recognizable by a skilled person as a frequency
hopping, a conclusion to which the board adheres.

The appellant further based its argumentation on the
paragraphs [024] and [025] which define the hop ports
by their properties. These passages teaches that a set
of hop ports, numbered 0 to NFFT-NGUARD-1, is mapped,
according to a hopping sequence, to a set of usable
sub-carriers and that a subcarrier index $H_{ij}(p)$
corresponds to a hop port index "p" for the jth
modulation symbol in superframe index "i", p being an
index between 0 and NFFT-NGUARD-1. The parameters NFFT
and NGUARD have a well-established meaning in the field
of OFDM, referred to throughout the description, and
designate the number of sub-carriers and the number of
guard sub-carriers, i.e. sub-carriers which are not
modulated, respectively. There are thus NFFT-NGUARD
usable sub-carriers which are mapped, according to
paragraph [025], to the same number of hop ports. It is
further well known in OFDM that data is transmitted in
superframes consisting in sequences of OFDM symbols,
and that an OFDM symbol is modulated by using
NFFT-NGUARD subcarriers.

The person skilled in the art of OFDM would directly
deduce from the above mentioned paragraphs that an OFDM
symbol, defined by the time indices i (numbering of the
superframe) and j (numbering of the symbol within the
superframe), is assigned a set of NFFT-NGUARD hop ports
numbered 0 to NFFT-NGUARD-1 and that the hopping
sequence, or mapping between these hop ports and
subcarriers, defines which subcarrier $H_{ij}(p)$ among the
usable subcarriers will be used as p^{th} subcarrier for

the symbol, thereby achieving a frequency hopping of the subcarriers.

2.4   Thus, the board judges that the term "hop port" has a clear meaning for the skilled person, based on the description, and that the use of this term in the claims does not render their subject-matter unclear (Article 84 EPC).

3.   Insufficiency of disclosure

The application has also been refused because the application did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person (Article 83 EPC). In particular, the decision under appeal stated that the calculation defined in paragraph [025] could not be seen to result in any hopping and could not be carried out since the calculation was based on parameters NFFT, NGUARD, HijGLOBAL and H_{ij}SECTOR which were unknown to the skilled person.

The appellant demonstrated (see section 2.3 above) that the mapping of a set of hop ports to a set of subcarriers defined by the paragraphs [024] and [025] represents a frequency hopping of the subcarriers used to transmit a symbol when the mapping changes from one symbol to the next according to the generated hopping patterns. Moreover the appellant plausibly argued that the paragraphs [024] to [034] disclose an embodiment enabling the skilled person to calculate the hopping pattern used to map the hop ports to the usable subcarriers, by using the formula

Hij(p)= NGUARD/2 + H_{ij}GLOBAL(H_{ij}SECTOR(p)) (see paragraph
[025]).

H_{ij}SECTOR(.) and H_{ij}Global(.) are permutation functions
of the set {0,1,2,...NFFT-NGUARD-1}. The parameters
NFFT and NGUARD had a well-known meaning in the field
of OFDM at the priority date of the present application
(see section 2.3 above).
FLSectorHopSeed, SECTOR-PN-OFFSET, and
FLIntraCellCommonHopping are parameters defined in
paragraphs [026] to [034] and used in the generation of
the permutation functions H_{ij}SECTOR(.) and H_{ij}Global(.):
- SECTOR-PN-OFFSET is an offset parameter used in the
calculation of HijSECTOR(p) (see paragraph [026], first
sentence) and in the generation of seeds for the
Feistel network (see paragraph [028], alinea 2.);
- FLIntraCellCommonHopping is a boolean parameter
having the values "off" or "on" used in the calculation
of the permutation H_{ij}SECTOR(.) (see paragraphs [026],
[030] and [032]);
- FLSectorHopSeed is a seed used in the Feistel
network.
The calculation of the permutation function
H_{ij}SECTOR(.), or sector dependent permutation, is
described in paragraphs [027], [030] and [032].
The calculation of the permutation function H_{ij}GLOBAL(.)
is described in paragraphs [028] and [029], based on a
three stage Feistel network, known per se.

The board therefore judges that the description is
clear and sufficient enough to enable the skilled
person to carry out the calculation of H_{ij}(p) defined in
paragraph [025].

4.   Main request

Claim 1 according to the main request relates to a
method for generating random hopping patterns. The
method comprises steps for determining a number of sub-
carriers, a number of hop ports and a number of seeds
and generating a hopping pattern based on these numbers
and using a Feistel network. Claim 1 however does not
define what is being hopped by the generated pattern,
i.e. claim 1 does not define clearly that the hopping
pattern represents a mapping between the hop ports and
the subcarriers, as it is described throughout the
description.

Moreover, claim 1 contains a step of transmitting a
signal according to the hopping pattern. Since the
pattern is not defined clearly (see the above
paragraph), this step also lacks clarity.

For these reasons, presented to the appellant during
the oral proceedings, the board judges that claim 1
does not meet the requirements of Article 84 EPC and
that, as a consequence, the main request is not
allowable.

5.   Auxiliary request

Claim 1 according to the auxiliary request does define
that the random hopping pattern achieves a mapping
between the hop ports and the subcarriers, the
subcarriers being used for data transmission. The
objections raised in section 4 above are thus overcome
by the wording of claim 1. Independent claims 1, 12, 23
and 34 contain the same features as claim 1 but

expressed in terms of claims for a programmed processor, an apparatus and a computer readable medium. The board therefore judges that the auxiliary request meets the requirements of Article 84 EPC.

6.   Conclusion

The application and the claims according to the auxiliary request meet the requirements of Articles 83 and 84 EPC. Since no search and no examination with respect to novelty and inventive step have been performed so far, the board decides, as indicated in the annex accompanying the summons to oral proceedings (see section 4), to remit the case to the department of first instance for further prosecution.

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 for further prosecution on the basis of the
       auxiliary request as filed with letter dated 24 August
       2012.

The Registrar   The Chairman:

K. Götz   F. Blumer