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Datasheet for the decision of 13 March 2015

Case Number: T 2130/12 - 3.5.05

Application Number: 06705497.3

Publication Number: 1980030

IPC: H04L7/04, H04L27/26, H04B7/00

Language of the proceedings: EN

Title of invention:
METHOD FOR IMPROVED SYNCHRONIZATION AND INFORMATION TRANSMISSION IN A COMMUNICATION SYSTEM

Patent Proprietor:
Huawei Technologies Co., Ltd.

Opponents:
Zhou, Xing
ZTE Deutschland GmbH
ZTE Corporation

Headword:
Synchronisation and cell identification signal in OFDM/HUAWEI

Relevant legal provisions:
EPC 1973 Art. 54, 56, 111(1)
EPC Art. 123(2)
RPBA Art. 12(4)

Keyword:
Intervention of assumed infringer - notice of intervention
Added subject-matter - main request (yes)
Novelty- auxiliary request 1 (no)
Resubmission of request withdrawn in the first instance (no)
Remittal to the department of first instance

Decisions cited:

Catchword:

Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T 2130/12 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 13 March 2015

Appellant: (Patent Proprietor)	Huawei Technologies Co., Ltd. Huawei Administration Building Bantian Longgang District Shenzhen, Guangdong 518129 (CN)
Representative:	Körber, Martin Hans Mitscherlich PartmbB Patent- und Rechtsanwälte Postfach 33 06 09 80066 München (DE)
Respondent 1: (Opponent 1)	Zhou, Xing ZhaoDong building, Shenzhen, Guangdong Province (HK)
Respondent 2: (Intervenor/Opponent 3)	ZTE Deutschland GmbH Am Seestern 18 40547 Düsseldorf (DE)
Respondent 3: (Intervenor/Opponent 4)	ZTE Corporation No. 55, Hi-Tech Road South Shenzhen, Guangdong 518057 (CN)
Representative:	Vossius & Partner Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 10 August 2012**

revoking European patent No. 1980030 pursuant to Article 101(3)(b) EPC.

Composition of the Board:

Chair	A. Ritzka
Members:	P. Cretaine
	G. Weiss

Summary of Facts and Submissions

I. This appeal is against the decision of the opposition division, dispatched on 10 August 2012, to revoke the European patent No. 1 980 030. The opposition was based on the grounds of Articles 100(a), 100(b) and 100(c) EPC. The patent was revoked for non-compliance with Article 123(2) EPC of dependent claim 6 according to the main request and to auxiliary request 1, for lack of novelty (Article 54 EPC 1973) of auxiliary requests 2 to 5 and for lack of inventive step (Article 56 EPC 1973) of auxiliary requests 6 and 7, having regard to the disclosure of

E1: US 2003/0072256.

II. An intervention under Article 105 EPC 1973 was filed by opponent 4 (respondent 3) on 22 August 2012, within the 2-month time limit for appeal. The intervention was based on the opposition grounds of Articles 100(a) (Articles 54 and 56 EPC 1973), 100(b) and 100(c) EPC and the following documents were cited:

El,

E2: Jin-Woo Lee et al.: “Rapid cell search in OFDM-based cellular systems”, Vehicular Technology Conference, 2005, IEEE 61 st, IEEE, Piscataway, NJ, USA, vol. 2, 30 May 2005, pages 1273 to 1277;

E3: B. Park et al., "A Novel Timing Estimation Method for OFDM Systems", IEEE Communications Letters, 1 May 2003 (2003-05-01), Vol. 7(5), pages 239-241, IEEE SERVICE CENTER, PISCATAWAY, NJ, US;

E4: MOTOROLA: "Cell Search and Initial Acquisition for OFDM Downlink", 3GPP DRAFT; R1-051329_CELL_SEARCHINITIAL_ACQUISITION, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE, SOPHIA-ANTIPOLIS, FRANCE, vol. RAN WG1, 7-11 November 2005, pages 1/7 to 7/7;

E5: CDMA Interactive, "PN Sequences and Generators", 1999, published on http://www.cdmaonline.com/members/workshops/terms1/1008.htm;

E6: B. M. Popovic: "Generalized Chirp-Like Polyphase Sequences with Optimum Correlation Properties", IEEE TRANSACTIONS ON INFORMATION THEORY, IEEE, US, vol. 38, no. 4,1 July 1992 (1992-07-01), pages 1406-1409;

E7: IEEE Standards 802.16, Part 16: "Air Interface for Fixed Broadband Wireless Access Systems", IEEE Computer Society and the IEEE Microwave Theory and Techniques Society,IEEE, NY, USA, 2004;

E8: TSG-RAN WG1 #42bis "Basic Structure of Control Channel and Synchronization Channel for Scalable Bandwidth in Evolved UTRA Downlink", R1 -051147, NTT DoCoMo, Fujitsu, Mitsubishi Electric Corporation, NEC, Panasonic, SHARP, Toshiba Corporation, San Diego, USA, October 10-14, 2005;

E9: Richard van Nee, Ramjee Prasad, “OFDM for wireless multimedia communications”, Artech House, ISBN 0-89006-530-6, © 2000, title pages, and page 86.

E2 to E7 were cited in the decision under appeal. E8 was not admitted in the proceedings by the opposition division.

The opponent 4 (respondent 3) requested maintenance of the decision to revoke and, as an auxiliary measure, oral proceedings.

III. The patentee's notice of appeal was received on 28 September 2012 and the appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 20 December 2012. The appellant (patentee) requested that the decision of the opposition division be set aside and that the patent be maintained as granted, as a main request, or on the basis of the claims of one of first to twelfth auxiliary requests (auxiliary requests 1 to 12), submitted with the statement setting out the grounds of appeal. Oral proceedings were requested on an auxiliary basis.

IV. By letters dated 13 May 2013 and issued by their common representative, the respondent 1 (opponent 1), the respondent 2 (opponent 3) and the respondent 3 (opponent 4) requested that the appeal be dismissed since none of the main request or the twelfth auxiliary requests were allowable. In addition, oral proceedings were requested as an auxiliary measure.

V. By letters dated 16 July 2013 and issued by their common representative, the respondents requested accelerated processing of the appeal. They further presented observations and comments, partly referring to submissions made in the proceedings before the opposition division. An objection under Article 83 EPC was raised against the main request. Objections under Article 123(2) EPC were raised against the main request and auxiliary requests 1 and 5 to 10. Objections under Article 54 EPC 1973 in view of E1 or E3 were raised

against the main request and auxiliary requests 1 to 4. Objections under
Article 56 EPC 1973 using E1, E3, E4 and the common knowledge of the skilled person, as illustrated by E7 and E8, were raised against the main request and the auxiliary requests 1 to 12.

VI. A summons to oral proceedings scheduled to be held on 12 and 13 March 2015 was issued on 15 October 2014. In an annex to this summons, the board listed the points to be discussed during the oral proceedings.

The board also expressed its preliminary opinion that the intervention under Article 105 EPC 1973 of opponent 4 (respondent 3) was admissible. Further, the board expressed its preliminary opinion that the auxiliary requests 1 to 12, filed with the statement setting out the grounds of appeal, were admissible.

VII. With letters dated 12 February 2015 and issued by their common representative, the respondents presented observations in response to the summons to oral proceedings. All the objections previously raised against the requests on file were maintained and further substantiated. In addition, a new objection under Article 84 EPC 1973 was raised against auxiliary requests 6 and 7 and the following documents were submitted as illustration of the skilled person's general knowledge:

E10: Paul N. Swarztrauber: "Symmetric FFTs", Mathematics of Computation, Volume 47, Number 175, July 1986, pages 323-346;

E11: D.S. Kwon et al.: "Preamble Structure for Single Frequency Cellular Systems Using Orthogonal Frequency

Division Multiplexing", IEEE Transactions on Consumer Electronics, Volume 50, Number 1, February 2004, pages 115-118.

VIII. Oral proceedings were held on 12 and 13 March 2015. During the course of the proceedings, the appellant presented the following documents:

A1: 3GPP TR 25.814 V1.0.1, 2005-11, pages 1 to 73;

A2: The Mobile Broadband Standard - 3GPP TR 25.814 - Physical layer aspect for evolved Universal Terrestrial Radio Access (UTRA);

A3: www.3gpp.org - /ftp/tsg_ran/wgl1_r11/TSGR1_43/Docs/.

The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims as granted (main request) or that the patent be maintained in amended form on the basis of the claims according to the auxiliary requests 1, 6, 7 to 12 filed with the statement setting out the grounds of appeal. The auxiliary requests 2 to 5 were withdrawn.

The respondents requested that the appeal be dismissed and that the auxiliary requests 1 to 12 filed with the statement setting out the grounds of appeal be not admitted in the proceedings or, as an auxiliary request, that the decision under appeal be set aside and that the case be remitted to department of first instance for further prosecution on the basis of auxiliary request 6.

IX. Claim 1 of the **main request** reads as follows:

"1. A method of synchronization in a communication system, characterized by the steps of generating a signal with a time symmetric property exploitable for synchronization, wherein the signal is based on a uniquely identifiable sequence c(l) from a set of sequences;
sending the signal over a communication channel; and, in the step of generating the signal, generating the signal with a centrally symmetric part, s(k), wherein the centrally symmetric part s(k) is centrally symmetric in the shape of the absolute value, and the centrally symmetric part s(k) is of arbitrary length N."

Dependent claim 6 of the **main request** reads as follows:

"6. The method according to any of claims 1 to 5, comprising generating the signal such that s(k) is obtained as the IDFT of the spectrum H(n) of N sub-carrier weights, the spectrum H(n) being generated by using the elements of a sequence c(l), l=0, 1, ...,L- 1 , $L \leq N$, as the Fourier coefficients at the occupied sub-carrier frequencies."

Claim 1 of **auxiliary request 1** is identical to claim 1 of the main request.

Dependent claim 6 of **auxiliary request 1** reads as follows:

"6. The method according to any of claims 1 to 5, comprising generating the signal such that s(k) is obtained as the IDFT of the spectrum H(n) of N sub-carrier weights, the spectrum H(n) being generated by using the elements of a sequence c(l), l= 0, 1, ..., L-1, $L \leq N_{OSC}$, as the Fourier coefficients at the

occupied sub-carrier frequencies, N_{OSC} being the maximum number of occupied sub-carriers."

Claim 1 of **auxiliary request 6** reads as follows:

"1. A method of synchronization in a communication system, characterised by the steps of
generating a signal with a time symmetric property exploitable for synchronization, wherein the signal is based on a uniquely identifiable sequence c(l) from a set of sequences;
sending the signal over a communication channel; and,
in the step of generating the signal, generating the signal with a centrally symmetric part, s(k), wherein the centrally symmetric part s(k) is centrally symmetric in the shape of the absolute value, and the centrally symmetric part s(k) is of arbitrary length N;
comprising generating the signal such that s(k) is obtained as the IDFT of the spectrum H(n) of N sub-carrier weights, the spectrum H(n) being generated by using the elements of a sequence c(l), l=0, 1 ,..., L- 1 , $L \leq N_{OSC}$, as the Fourier coefficients at the occupied sub-carrier frequencies, N_{osc} being the maximum number of occupied sub-carriers; and
comprising generating the signal such that s(k) is obtained as the IDFT of the spectrum H(n) of N sub-carrier weights, such that H(n)= H(N-n), n=O, 1,2,...,N-1, where H(N)= H(0) holds according to the periodicity of the DFT."

Reasons for the Decision

1. Admissibility of the appeal

The appeal complies with the provisions of Article 106 to 108 EPC (cf. point III above) and is therefore admissible.

2. Admissibility of the intervention of opponent 4

The intervention complies with the provisions of Article 105 EPC 1973 (cf. point II above) and is therefore admissible.

3. Main request

3.1 This request corresponds to the main request underlying the appeal decision (i.e. claims 1 to 16 as granted).

The opposition division considered that dependent claim 6 did not meet the requirements of Article 123(2) EPC because the mathematical inequality $L \leq N$ was not disclosed in the originally filed application documents.

L represents the length or size of a sequence c(l), the L elements of c(l) being used as Fourier coefficients of a spectrum H(n), n=1,...,N. The Inverse Digital Fourier Transform IDFT of H(n) represents the centrally symmetric part s(k) of a time domain synchronisation signal sent from the base station to mobile stations.

3.2 Article 123(2) EPC

3.2.1 The appellant first argued that the size L of the sequence c(l) should be less than or equal to the size N of the Fourier transform used in the OFDM communication system, bearing in mind that some of the Fourier coefficients may be set to zero. The appellant further held that the description as originally filed

described several embodiments wherein the value of L fulfills the mathematical inequality $L \leq N$. In particular, page 13, lines 1 to 20 showed an embodiment wherein the frequency band was 1,92 MHz, the transmission bandwidth was 1,25 MHz and the sub-carrier spacing was 15 kHz, thereby implying that the total number of sub-carriers and the number of occupied sub-carriers were $N = 128$ and $N_{osc} = 76$, respectively. Since the occupied sub-carriers were modulated by the elements of a pseudo-random sequence, as indicated in lines 9 to 11 of page 13, the length L of the sequence had to be equal to, or less than, N_{osc}, whereby $N_{osc} \leq N$ was always fulfilled. This was also clear from page 14, wherein line 17 stated that $L = N_{osc}$ and equation (13) showed that the mapping between c(l), of length L, and H(n), of length N, involved some Fourier coefficients equal to zero. Page 16, lines 4 to 9 further described that a sequence length L such that $L \leq N_{osc}$ can be achieved by discarding certain sequence elements. A second example on pages 20 and 21 described that for $N = 128$ and $N_{osc} = 64$, a sequence c(l) having a length $L = 37$ was mapped, by including zero values (see equation (17)), to a spectrum H(n) of length $N= 128$ in order to further obtain, by IDFT, a time sequence s(k) of 128 samples. Moreover, equation (20) was another example of a mapping between a sequence c(l) of length L with a spectrum H(n) of length N, with $L \leq N$. The appellant further mentioned that the example 1 in page 13 relied on the same assumptions in respect of the transmission bandwidth, 1,25MHz, and the number of occupied sub-carrier frequency, $N_{osc} = 76$, as the example given in page 4 of document E4, which was cited in the description. In that example, the number of active sub-carriers of the synchronisation symbol, 38,

corresponded to the length of the sequence c(l) which had been mapped to the spectrum H(n) in the application, thereby fulfilling the inequality $L \leq N$.

In support of its argumentation, the appellant further relied on documents A1, A2 and A3 for demonstrating that N represented the FFT size and that the number of occupied sub-carriers was always inferior to the FFT size.

3.2.2 Taking into account that the documents A1, A2 and A3 had been filed at a late stage of the appeal proceedings and that they were of minor relevance for the Article 123(2) EPC issue at stake, the board decided under Article 13(1) RPBA, not to admit these documents in the proceedings.

The board further agrees with the respondent's arguments that the inequality $L \leq N$ is neither disclosed in nor unambiguously derivable from the originally filed description. In that respect, the board first notes that the wording of dependent claim 6 is based on originally filed dependent claim 5 whereby the equality $L = N$ has been replaced by the inequality $L \leq N$. The summary of the invention describes only (see page 9) that $L = N$, whereas the specific examples do not provide support for the full range of values of L smaller than N. In particular, there is no example or support in the description for very small values of L. This is in conformity with the general principle that all sub-carriers should be used for the sake of spectrum efficiency and in agreement with the object of the invention to achieve synchronisation with decreased sensitivity to noise/interference (see page 7, lines 18 to 23). There is also no support in the description for values of L between N_{osc} and N when N_{osc} differs from N.

Claim 6 therefore does not meet the requirements of Article 123(2) EPC and the main request is thus not allowable.

4. Auxiliary request 1

4.1 Admissibility

This request was filed with the statement setting out the grounds of appeal. The claims according to this request differ from the claims of the auxiliary request 1 already submitted in the proceedings before the opposition division only in that dependent claim 6 contains the mathematical inequality $L \leq N_{osc}$, instead of $L \leq N$, and the additional feature that N_{osc} is the maximum number of occupied sub-carrier. The board regarded this request as in accordance with the requirements of Article 12(4) RPBA and therefore admitted it to the proceedings.

4.2 Article 123(2) EPC

4.2.1 The description on page 13, lines 6 to 9, gives a clear definition for the numbers N_{osc}, maximum number of occupied subcarriers, with respect to N, total number of sub-carriers in the OFDM system. Furthermore, the description on page 16, lines 4 to 6 gives clear and unambiguous support for the mathematical inequality $L \leq N_{osc}$ between the sequence length and the maximum number of occupied subcarriers.

Therefore, dependent claim 6 meets the requirements of Article 123(2) EPC.

4.2.2 The respondents argued that the removal of the wording "for....information transmission" in the preamble of claim 1 with respect to claim 1 as originally filed contravenes Article 123(2) EPC because it had no support in the originally filed disclosure. The board however concurs with the appellant that the steps of claim 1, and not the general wording "for information transmission" in its preamble, define the subject-matter of the claimed invention. Therefore, the removal of the above-mentioned wording does not extend the subject-matter of claim 1 beyond the content of the application as filed. Moreover, even if it were considered that information transmission were an essential feature of the claimed invention, claim 1 still comprises the feature of sending a signal which is based on a uniquely identifiable sequence, i.e. which is carrying information.

For these reasons, the removal of the wording "for ...information transmission" in claim 1 does not contravene Article 123(2) EPC.

4.2.3 The respondents further argued that the insertion of the term "centrally" in front of the wording "symmetric in the shape of the absolute value" of claim 1 did not have any basis in the originally filed application documents. In that respect, the respondents stressed that a signal could be centrally symmetric and symmetric in the shape of the absolute value without being centrally symmetric in the shape of the absolute value, as exemplified by the signal shown in Figure 1 of E4.

The board however agrees with the appellant's argument that the signal shown in E4, Figure 1, does not present any centre or axis symmetry but is rather a repetitive

signal. Moreover, all centrally symmetric parts s(k) given as examples in the originally filed description and which are listed in the originally filed claim 2 have an absolute value presenting a symmetry around a vertical axis k = (N-1)/2.

Therefore the insertion of the term "centrally" in claim 1 does not contravene Article 123(2) EPC.

4.2.4 The respondents further objected that the deletion of the features related to the reception and decoding of the signal from original claim 1 did not comply with the requirements of Article 123(2) EPC. In that respect, the respondents argued that these features were described as essential to carry out the invention.

The board concurs with the appellant that originally filed claim 19 directed to a transmitter unit and the passage in page 7, lines 25 to 31 of the originally filed description clearly support a method claim directed to the transmission side only.

Therefore the absence of features related to the reception in claim 1 does not contravene Article 123(2) EPC.

4.2.5 Thus, for the reasons set out in paragraphs 4.2.1 to 4.2.4 above, the board judges that the claims of the auxiliary request 1 meet the requirements of Article 123(2) EPC.

4.3 Novelty - Article 54 EPC 1973

The board agrees with the opposition division and the respondents that E1 discloses all the features of claim 1.

E1 describes a method of synchronization in a communication system using a synchronisation preamble. The synchronisation preambles used in the two embodiments described in relation to paragraphs [0073] to [0097] and [0098] to [0135], respectively, are shown in Figures 5 and 11, respectively. The appellant did not challenge that these preambles were both based on sequences and centrally symmetric in the shape of the absolute value.

However, the appellant argued that the feature "wherein the signal is based on a uniquely identifiable sequence c(l) from a set of sequences" was not disclosed in E1 since this document only briefly mentioned in paragraph [0102] that the synchronization preamble is based on a pseudo noise sequence without giving any further explanations as to the sequence itself.

The board is not convinced by this argument since a pseudo noise sequence is, according to the general knowledge of a skilled person (see E5 in that respect), a sequence of binary numbers which appears to be random but is in fact perfectly deterministic. Such a sequence is thus uniquely identifiable by virtue of its deterministic nature.

The board therefore judges that claim 1 does not meet the requirements of Article 54 EPC 1973 and that, as a consequence, auxiliary request 1 is not allowable.

5. Auxiliary requests 2 to 5 were withdrawn.

6. Auxiliary request 6

6.1 Admissibility

This request has been filed with the statement setting out the grounds of appeal.

The respondents argued that auxiliary request 6 was substantially identical to the third auxiliary request (3rd auxiliary request) submitted by letter of 25 May 2012 and withdrawn during the oral proceedings before the opposition division, and should therefore not be admitted in the proceedings, according to the case law of the boards of appeal. According to the respondents, the appellant could have maintained this request after the amendment dealing with the Article 123(2) EPC objection related to the feature $L \leq N$ raised during the oral proceedings. The withdrawal was based only on tactical considerations to avoid a decision on that request and amounted to an abuse of procedure.

The appellant argued that claim 1 of auxiliary request 6 was based on a combination of granted claim 1 and granted dependent claims 6 and 7 and had been filed with the statement setting out the grounds of appeal. The appellant further stated that claim 1 was not identical to claim 6 of the above mentioned 3 rd auxiliary request since the mathematical inequality $L \leq N$ had been replaced by $L \leq N_{osc}$ and the definition "N_{osc} being the maximum number of occupied sub-carriers" had been added.

The board firstly notes that, as set out by the appellant, the amendments to claim 1 with respect to claim 1 of the previous 3rd auxiliary request are substantial, in the sense that they aim at overcoming the Article 123(2) EPC objection which was the basis for the rejection of the main request by the opposition

division. Moreover, the grounds of opposition based on Articles 54 and 56 EPC 1973 have not been discussed in relation to the 3rd auxiliary request during the oral proceedings before the opposition division.

The board acknowledges that, as a general principle established in the case law, a request which has been withdrawn in first instance opposition proceedings and which is resubmitted in unamended form in the appeal proceedings should not be admitted if the withdrawal was clearly aimed at preventing the first instance from giving a reasoned decision on the critical issues.

This is however not the case here for the following reasons. Firstly, claim 1 according to auxiliary request 6 has been substantially amended with respect to claim 1 of the previous 3rd auxiliary request in the sense that the amendments aim at overcoming the Article 123(2) EPC objection, which was the basis for the rejection of the main request by the opposition division. Secondly, the grounds of opposition based on Articles 54 and 56 EPC 1973 have not been discussed at all in relation to the 3rd auxiliary request during the oral proceedings before the opposition division.

The board has therefore decided, according to Article 12(4) RPBA, to admit the auxiliary request 6 into the appeal proceedings.

6.2 Request of the respondents for a remittal to the first instance

The respondents argued that claim 1 according to auxiliary request 6 contained technical features of granted claims 6 and 7 which were never discussed with respect to the requirements of

Articles 54 and 56 EPC 1973 during the first instance proceedings. Moreover, the appellant did not respond to the Article 56 EPC 1973 objection against auxiliary request 6 raised by the respondents in their responses to the statement setting out the grounds of appeal and to the summons to attend oral proceedings. The respondents further noted that the board did not express any preliminary view on that subject in the annex to the summons. For these reasons, the respondents considered it appropriate to remit the case in order to have two instances deciding on that issue.

The appellant did not object to the request of the respondents.

Based on the arguments put forward by the respondents, and in order not to deprive any party of an examination of the novelty/inventive step of the subject-matter of auxiliary request 6 on file by two instances, the board decided to exercise its discretion to remit the case to the department of first instance for further prosecution under Article 111(1) EPC 1973.

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 6 submitted with the statement setting out the grounds of appeal.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated