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Datasheet for the decision of 17 January 2017

Case Number: T 2142/11 - 3.5.03
Application Number: 00110027.0
Publication Number: 1154585
IPC: H04B1/707
Language of the proceedings: EN

Title of invention:
Receiver for a communication device for a multi-path radio channel

Patent Proprietor:
IPCom GmbH & Co. KG

Opponent:
Microsoft Mobile Oy

Headword:
Communication device for a multi-path radio channel/IPCOM

Relevant legal provisions:
EPC Art. 56, 83, 123(2)
Keyword:
Inventive step – main request (no)
Added subject-matter – first auxiliary request (yes)
Sufficiency of disclosure – second auxiliary request (no)

Decisions cited:
T 0225/93, T 0260/10
DECISION
of Technical Board of Appeal 3.5.03
of 17 January 2017

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Decision under appeal: Decision of the Opposition Division of the European Patent Office posted on 29 July 2011 revoking European patent No. 1154585 pursuant to Article 101(3)(b) EPC.

Composition of the Board:
Chairman F. van der Voort
Members: A. Madenach
T. Karamanli
Summary of Facts and Submissions

I. The present appeal arises from the decision of the opposition division posted on 29 July 2011 revoking European patent No. 1 154 585.

II. The opposition was based on the grounds of lack of novelty and lack of inventive step under Article 100(a) EPC in combination with Articles 52(1) and 54 and 56 EPC.

III. The opposition division came to the conclusion that the subject-matter of claims 1, 9 and 12 of the main request and claims 1, 9 and 11 of auxiliary requests 1, 2 and 4 did not involve an inventive step (Articles 52(1) and 56 EPC) having regard to document D3 or D4 and "the knowledge of the skilled person".

Claims 1, 9 and 11 of auxiliary requests 3, 5 and 6 were held to lack clarity (Article 84 EPC).

In an obiter dictum, the opposition division held, inter alia, that the subject-matter of claims 1, 9 and 11 of auxiliary requests 3, 5 and 6 also did not involve an inventive step (Articles 52(1) and 56 EPC) having regard to document D3 or D4 and "the knowledge of the skilled person".

IV. In a communication pursuant to Article 15(1) RPBA accompanying a summons to oral proceedings, the board gave its preliminary opinion.

V. Oral proceedings were held on 17 January 2017.

The parties confirmed their final requests as follows:
The appellant (patent proprietor) requested that the decision under appeal be set aside and that, as a main request, the opposition be rejected or, in the alternative, that the patent be maintained in amended form on the basis of the claims of a first or a second auxiliary request, both auxiliary requests filed with the statement of grounds of appeal.

The respondent (opponent) requested that the appeal be dismissed.

At the end of the oral proceedings, after deliberation, the chairman announced the board's decision.

VI. Claim 1 of the granted patent (main request) reads as follows:

"Receiver arrangement (2), in particular for a mobile communication device (1), comprising

a signal generator (22) for generating at least m locally generated signals \( S_{L1}, \ldots, S_{Lm} \), which are time delayed by a delay time from each other, and

a correlator for obtaining m correlated signals \( S_{C1}, \ldots, S_{Cm} \) by correlating a received identification signal with the m locally generated signals \( S_{L1}, \ldots, S_{Lm} \),

characterized in that

the receiver arrangement (2) comprises

a ranking arrangement (23) for identifying j correlated signals \( S_{R1}, \ldots, S_{Rj} \) of highest power out of the m correlated signals \( S_{C1}, \ldots, S_{Cm} \), and
an evaluation arrangement (25) for selecting n correlated signals of the i [sic] correlated signals \((S_{R1}, \ldots, S_{Rj})\) of highest power, wherein \(n\) is less than or equal \(j\)."

Claim 1 of the first auxiliary request reads as follows:

"Receiver arrangement (2) for a mobile communication device (1) comprising

a signal generator (22) for generating at least \(m\) locally generated signals \((S_{L1}, \ldots, S_{Lm})\), which are time delayed by a delay time from each other, and

a correlator for obtaining \(m\) correlated signals \((S_{C1}, \ldots, S_{Cm})\) by correlating an identification signal received from a base station with the \(m\) locally generated signals \((S_{L1}, \ldots, S_{Lm})\),

characterized in that

the receiver arrangement (2) comprises

a first filter (21) for removing noise from the correlated signals \((S_{C1}, \ldots, S_{Cm})\) and for outputting \(m\) filtered correlated signals \((S_{CF1}, \ldots, S_{CFm})\),

a ranking arrangement (23) for identifying \(j\) correlated signals \((S_{R1}, \ldots, S_{Rj})\) of highest power out of the \(m\) filtered correlated signals \((S_{CF1}, \ldots, S_{CFm})\),

a second filter (24) for obtaining \(j\) filtered correlated signals \((S_{RF1}, \ldots, S_{RFj})\) of the \(j\) correlated signals \((S_{R1}, \ldots, S_{Rj})\), wherein the second
filter (24) is a more complex filter for removing noise than the first filter (21), and

an evaluation arrangement (25) for selecting n correlated signals of the j filtered correlated signals \(S_{RF1}, \ldots, S_{RFj}\) of highest power, wherein n is less than or equal to j."

Claim 1 of the second auxiliary request differs from claim 1 of the main request in that "in particular" has been deleted, "a received identification signal" has been replaced by "an identification signal received from a base station", and the following feature has been added:

"and wherein
the evaluation arrangement (25) generates m control parameters \(C_{T1}, \ldots, C_{TM}\) for controlling the signal generator (22)".

**Reasons for the Decision**

1. **Main request: inventive step (Article 100(a) EPC 1973, Article 52(1) EPC and Article 56 EPC 1973)**

1.1 For the present decision it is necessary to determine whether or not the feature "in particular for a mobile communication device (1)" alone or in the context of the claim, limits the receiver arrangement of claim 1 to one for a mobile communication device, as argued by the appellant. In the board's view, all the features of claim 1 can be implemented either in a mobile communication device or in a base station. Further, the board does not accept the appellant's argument that the identification signal would only be received by the receiver arrangement of a mobile communication device,
i.e. not by the base station. The board notes that a mobile communication device must also be identified by a base station. Hence, the base station too must receive an identification signal. Hence, the specific context of the claim, contrary to the situation underlying T 260/10 (reasons 2.2) referred to by the appellant, does not limit the receiver arrangement to one for a mobile communication device.

1.2 It is further necessary to determine whether the ranking arrangement is to be more narrowly construed than an arrangement for identifying \( j \) correlated signals of highest power out of the \( m \) correlated signals, and whether the evaluation arrangement is to be more narrowly construed than an arrangement for selecting \( n \) correlated signals of the \( j \) correlated signals of highest power, wherein \( n \) is less than or equal to \( j \).

With respect to the ranking arrangement, the appellant argued that, apart from identifying \( j \) correlated signals of highest power, a ranking of these signals was implied by the terminology. The board does not accept this argument, since the term "ranking arrangement" does not specify what is to be ranked and according to which criteria. The board notes that the correlated signals of highest power are the object of the identifying action and, therefore, need not necessarily be considered to be the object of the alleged ranking action. Hence, the term "ranking arrangement" must be given the meaning as defined in claim 1, i.e. an arrangement for identifying \( j \) correlated signals of highest power out of the \( m \) correlated signals.
Likewise, with respect to the evaluation arrangement, the appellant argued that, apart from selecting n correlated signals of the j correlated signals of highest power, wherein n is less than or equal to j, an evaluation of these signals was implied by the terminology. The board does not accept this argument, since the term "evaluation arrangement" does not specify what is to be evaluated and how. The board notes that the n correlated signals are the object of the selecting action and, therefore, need not necessarily be considered to be the object of the alleged evaluation action. Hence, the term "evaluation arrangement" must be given the meaning as defined in claim 1, i.e. an arrangement for selecting n correlated signals of the j correlated signals of highest power, wherein n is less than or equal to j.

The interpretation of the above features of claim 1 is corroborated by independent method claim 12, according to which "correlated signals (S_{R1}, ..., S_{Rj}) of highest power out of the m correlated signals (S_{C1}, ..., S_{Cm}) are identified and n correlated signals of the j correlated signals (S_{R1}, ..., S_{Rj}) of highest power are selected, wherein n is less than or equal j", i.e. without mentioning ranking and evaluation actions.

1.3 Document D3, which is considered as representing the closest prior art, discloses a CDMA base station or CDMA mobile station and its RAKE receiver (see Figure 4 and page 2, lines 5-10 and claim 3) and, hence, a receiver arrangement which is for a base station or a mobile communication device.

1.4 The receiver arrangement shown in Figure 4 of D3 comprises a search and tracking unit STU (page 3, lines 8-11, page 4, lines 21-23, and page 7, lines 20 and 21)
which is shown in Figure 6. Whereas Figure 6 shows multiple searchers "S1, ..., SL" for corresponding sectors, it implicitly follows from claim 3 that D3 also embraces a search and tracking unit with only one searcher (see also page 11, lines 31-33). Figure 7 shows details of a single searcher S1, which comprises a code generator "PN-GEN" controlled by a control unit "CNTRL". According to feature c33 of claim 2 of D3, the control unit PN-CNTRL shifts the phase between a de-spreading sequence generated by a de-spreader PN-GEN and the extracted and stored pilot and data symbols (PSi and PDi) a given number of times. The same procedure is further described on page 9, lines 35-37 ("Durch diese Steuerung wird sichergestellt, dass die PN-Generator-Entspreizsequenz zeitlich ausgerichtet und - für die Berechnung des Verzögerungsprofils DPS - bezüglich der jeweiligen extrahierten Demodulatorausgabedaten verschoben ist." and on page 9, line 50, in combination with Figure 9 ("Der Startpunkt der PM-Sequenz wird durch die Phasensteuervorrichtung PH-CNTRL gesteuert." (obvious clerical error: PM should read PN)). This means that the search and tracking unit of D3 as part of a RAKE receiver comprises a signal generator PN-GEN for generating a given number, namely the number of times to shift the phase of the de-spreading sequence and designated m in claim 1, of locally generated signals, i.e. the de-spreading sequences, which are time-delayed by the phase shift from each other.

According to D3, a searcher comprises a de-spreader "DESP" (see Figure 7) for producing a delay profile "DPS" by correlating the pilot symbols, which are extracted from the signals received by the antennas (page 8, lines 28-30), with the generated PN sequence (Figure 9 and page 9, lines 46-50). Hence, D3 shows a
correlator (DESP) for obtaining m correlated signals by correlating a received signal with the m locally generated signals. Since the received signal can be de-
spread with the de-spreading code PN, there must be a unique relation with the mobile station within a given radio cell from which the received signal originates.
Hence, the received signal including the pilot symbols can be considered an "identification signal" identifying the originating mobile station.

D3 further discloses a path selection unit ("PSU" in Figure 6) for determining a number N of paths from the searchers which are the paths of highest power (page 7, lines 64-66: "Aus den Verzögerungsprofilen DPS wird im wesentlichen eine Interimszahl von N (vorzugsweise 8) Pfaden d₁'... d_N' (d. h. Verzögerungswerten) und entsprechende Sektorauswahlinformation s₁'... s_N' durch die Pfadauswahlheit PSU bestimmt."; page 11, lines 31-33: "Es wird jedoch darauf hingewiesen, dass jeder der Sucher 1 ... L getrennt die gleichen Vorrichtungen enthält, um jeweilig die dominierendsten (stärksten) Pfade in jeweiligen Sektoren auszugeben."; page 11, lines 40-42: "Die primäre Funktion dieser Pfadauswahlheit PSU, wie bereits mit Bezug auf Fig. 6 beschrieben, ist es, die N-stärksten Pfade d₁'... d_N' (d. h. Verzögerungswerte) aus den jeweiligen Verzögerungsprofilen DPS1, DPS2 durch ein Inbezugnehmen von Interferenz(rausch-)Schätzwerten zu extrahieren.

D3 also shows on page 12, lines 28-30, in combination with Figure 10, irrespective of the board's interpretation of the term "ranking arrangement" at point 1.2 above, a ranking of the correlated signals ("Die Maximaerfassungsvorrichtung ordnet die Maxima in einer absteigenden Reihefolge").
Hence, D3 discloses a ranking arrangement for identifying j (N in D3) correlated signals of highest power out of the correlated signals from all searchers.

Further, in the tracking and control unit TRCU of Figure 6, a final selection of P paths of the previously identified N paths is performed (page 8, lines 1-4, and page 12, lines 48-50).

Hence, D3 discloses an arrangement for selecting a given number of the correlated signals of highest power previously identified, where the given number is less than or equal to the number of previously identified signals.

1.5 The board concludes, as did the opposition division, that the subject-matter of claim 1 differs from the receiver arrangement of D3 at most in that in claim 1 the ranking arrangement is for identifying j correlated signals of highest power out of the m correlated signals of a single correlator, whereas in D3 the correlated signals of highest power of all searchers which perform the correlation are identified.

Considering that claim 6 of D3 makes explicit reference to the case of a single searcher ("der zumindest einen Suchseinheit"), the case of just one searcher, which corresponds to the subject-matter of claim 1 with just one correlator, is, if not disclosed, at least rendered obvious to the skilled person. This is further corroborated by the fact that D3 teaches to rank and select the best signals of a number of multipath signals in two stages. The number of finally selected signals corresponds to the number of RAKE fingers (page 8, lines 1-4, and page 13, lines 13-16). Given this teaching, the skilled person would use the solution
proposed in D3 also for a single searcher if the number of usable multipath candidates exceeds the number of RAKE fingers, without any inventive activity.

1.6 For the above reasons, the subject-matter of claim 1 of the granted patent does not involve an inventive step (Article 52(1) EPC and Article 56 EPC 1973).

1.7 The appellant's arguments other than those related to the interpretation of the features of claim 1, which have been dealt with in paragraphs 1.1 and 1.2 above, may be summarised as follows:

(i) D3 taught to correlate a **single** locally generated signal, i.e. the PN sequence, with a plurality of received identification signals, namely the demodulator output data, so as to generate a delay profile. A new PN sequence was not locally generated until a new set of demodulator output data requiring a different time alignment was to be processed. The claimed invention, however, taught correlation with at least m locally generated signals.

(ii) D3 disclosed a method for path delays selection based on the computation of a threshold. The claimed invention, however, taught the ranking of the signals.

(iii) D3 taught that pilot signals and additional data are used to obtain the delay profiles, whereas the claimed invention used only a received identification signal.

(iv) D3 taught that as many of the previously selected path delays were selected as there were fingers in the RAKE receiver, whereas the claimed invention required a
true evaluation going beyond the selection of a certain number of paths.

Re (i): The board notes that claim 1 does not require that the m locally generated signals are generated at once. The claim also embraces the possibility that the signals are generated in sequence in the same way as the appellant understands D3. The skilled person reading the patent would also understand the patent to describe both possibilities in view of Figures 3 and 4, which show serial correlation (Figure 3) and parallel correlation (Figure 4). Whereas parallel correlation might require the generation of the locally generated signals ($S_{L1}, \ldots, S_{Lm}$) at once, serial correlation does not.

Re (ii): As already discussed in point 1.1 above, in the board's view, the claimed receiver arrangement does not necessarily include means for ranking correlated signals. Hence, identifying correlated signals above a given threshold, as in D3, is embraced by the claim wording.

Re (iii): Claim 1 does not exclude the possibility that the received identification signal comprises additional data. Hence, the pilot symbols including additional data as in D3 are comprised in the wording of the claim.

Re (iv): As already discussed in point 1.1 above, in the board's view, the claimed receiver arrangement does not necessarily include means for evaluating correlated signals. Hence, selecting correlated signals in such a way that the number matches the number of RAKE fingers, as in D3, is embraced by the claim wording.
1.8 For these reasons, the ground for opposition according to Article 100(a) EPC 1973 in combination with Article 52(1) EPC and Article 56 EPC 1973 prejudices the maintenance of the European patent as granted.

2. Auxiliary request 1: amendments (Article 123(2) EPC)

2.1 Claim 1 of auxiliary request 1 comprises, compared to claim 1 of the patent, *inter alia* the added feature "for removing noise" as a property of the second filter.

2.2 The appellant relies on column 4, lines 27-37, of the application as published as a basis for this feature. This passage reads:

"They are inputs to a first filter 21 removing noise from the signals. The output signals of the filter are denoted $S_{C_{F1}}, ..., S_{C_{Fm}}$. These signals are fed into a ranking arrangement 23 which is shown in more detail in FIG. 5. The ranking arrangement 23 identifies the $j$ signals $S_{R1}, ..., S_{Rj}$ of highest power out of the $m$ correlated signals $S_{C_{F1}}, ..., S_{C_{Fm}}$. The signals of highest power $S_{R1}, ..., S_{Rj}$ are outputs of the ranking arrangement 23 and inputs to a second filter 24. The second filter 24 is preferably a more complex filter than the first filter 21."

Hence, in this passage, the feature "for removing noise" characterises only the first filter explicitly. The appellant argued that the statement that the second filter was preferably a more complex filter than the first filter made it clear that the increased complexity referred to the first filter's ability to remove noise. Hence, the second filter was also for removing noise.
2.3 The board does not accept this argument. The above-quoted passage does not give a direct and unambiguous disclosure for the complexity of the second filter being related to the first filter's noise removing ability. The quoted passage and the application as a whole do not specify what the complexity of the filter should be. The skilled person would consider various filter properties which could be qualified as more complex when comparing different filters, e.g. the number of poles, the number of adjustable parameters, the type of transfer function. These properties are not necessarily related to a filter's noise removing ability. Hence, in the absence of an unambiguous statement relating the second filter's complexity to the first filter's noise removing ability, there is no direct and unambiguous disclosure of the above-mentioned feature, contrary to the requirement of Article 123(2) EPC.

2.4 For this reason, the first auxiliary request is not allowable.

3. Auxiliary request 2: sufficiency of disclosure (Article 83 EPC 1973)

3.1 Claim 1 of auxiliary request 2 comprises, compared to claim 1 of the main request, *inter alia* the additional feature:

"and wherein

the evaluation arrangement (25) generates m control parameters \( C_{1}, \ldots, C_{m} \) for controlling the signal generator (22)".
3.2 The only disclosure for "m" control parameters is in Figure 3, where m control parameters are generated by the evaluation arrangement 25, which, on the basis of j output signals of the second filter 24, determines n delay times (cf. column 4, lines 53-55, of the patent specification). Claim 1 stipulates that n is less than or equal j. Further, since j signals out of m signals are identified, j must be less than or equal to m. Hence, claim 1 embraces situations in which n is less than j which, in turn, is less than m. The patent does not however disclose how m control parameters are generated when n is less than m. On the contrary, according to paragraph [0028] m control parameters C₁, ..., Cₘ are generated. In the absence of an explicit teaching as to how m control parameters are to be determined on the basis of j or n signals, in which m > j > n, the skilled person would be confronted with a variety of choices with different outcomes. One possibility would be to have a number of identical parameters for the same delay time. However, it would remain open whether such a method would lead to the intended result, i.e. an improved receiver (cf. paragraph [0006]). In addition, in view of the large number of possibilities even for this single example and in the absence of any guidance as to how to perform the determination, the skilled person would not arrive at the claimed result in an obvious manner. This case is thus comparable to the situation considered in T 225/93 (see reasons 2), in which different methods were known to the skilled person, whilst the choice of an appropriate method was considered to amount to an undue burden and contrary to the requirement of Article 83 EPC.

3.3 The appellant argued that the skilled person would understand the multipath identification arrangement
shown in Figure 3 of the patent to work iteratively in such a way that \( n \) control parameters would be generated on the basis of \( n \) delay times, which, in turn, would be renumbered to \( m \) in order to match in a subsequent iteration step the then reduced number of \( m \) locally generated signals. If the situation required an increase in the number of locally generated signals, e.g. in situations with an increased number of multipath interferences, the multipath identification arrangement would be reset to its initial state.

The board fails to see how the skilled person could arrive at such an interpretation. First of all, the patent does not mention an iterative process. This could only be inferred from the loop shown in Figure 3. More importantly, there is no indication in the patent that the control parameters would be renumbered from \( n \) to \( m \), nor could the appellant convincingly show that this would be the skilled person's interpretation of Figure 3. Likewise, a "reset" of the multipath identification arrangement, although technically possible, would not occur to the skilled person without any indication in the patent or the prior art.

3.4 For these reasons, the patent and the application from which it derives do not disclose the invention as claimed in claim 1 in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, contrary to the requirement of Article 83 EPC.

3.5 For these reasons, the second auxiliary request is not allowable.

4. Since one ground for opposition prejudices the maintenance of the European patent as granted and since
neither of the first and second auxiliary requests is allowable, the appeal is to be dismissed.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar: The Chairman:

N. Schneider F. van der Voort

Decision electronically authenticated