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**Datasheet for the decision
of 5 June 2008**

Case Number: T 0317/06 - 3.4.01

Application Number: 02251450.9

Publication Number: 1239539

IPC: H01Q 1/24

Language of the proceedings: EN

Title of invention:
Antenna

Applicant:
Nokia Corporation

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 69
RPBA Art. 13(1)

Relevant legal provisions (EPC 1973):
EPC Art. 54(1), (2), 56, 84

Keyword:
"Novelty (no; main request)"
"Inventive step (no; first auxiliary request)"
"Clarity (no; third auxiliary request)"
"Added subject-matter (yes; third auxiliary request)"
"Late-filed request (not admitted; second auxiliary request)"

Decisions cited:
T 0190/99, T 0169/83

Catchword:

-



Case Number: T 0317/06 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 5 June 2008

Appellant: Nokia Corporation
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Representative: Geary, Stuart Lloyd
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 7 October 2005
refusing European application No. 02251450.9
pursuant to Article 97(1) EPC 1973.

Composition of the Board:

Chairman: B. Schachenmann
Members: G. Assi
H. Wolfrum

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal, received on 15 December 2005, against the decision of the examining division, dispatched on 7 October 2005, refusing the European patent application No. 02251450.9 (publication number 1 239 539). The fee for the appeal was paid on 15 December 2005. The statement setting out the grounds of appeal was received on 15 February 2006.

II. The application was refused by the examining division on the ground that the subject-matter of claim 1 then on file was not novel (Article 54, paragraphs 1 and 2, EPC 1973) with regard to the following document:
(D1) EP-A-0 986 130.

In the decision under appeal, the examining division also considered the further document:
(D3) EP-A-0 757 405.

III. On 21 November 2007 the appellant was summoned to oral proceedings scheduled to take place on 5 June 2008. Oral proceedings before the Board were held on the scheduled date.

IV. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of claims 1-9 filed with the grounds of appeal as main request (present main request), or claims 1-8 filed with the grounds of appeal as second auxiliary request (present first auxiliary request), or claims 1-8 filed at the oral proceedings before the Board (present second auxiliary request), or claims 1-5 filed with a

letter of 7 May 2008 as seventh auxiliary request
(present third auxiliary request).

V. The wording of claim 1 of the main request reads as follows:

*"An antenna comprising an element, **characterised in that** said element is formed from conductor patterns (42, 43b, ..., 43h) on a plurality of layers (40a, ..., 40h) of a multilayer PCB (40), the conductor patterns being in stacked relation and interconnected through the PCB at a plurality of locations."*

The wording of claim 1 of the first auxiliary request reads as follows:

*"An antenna comprising an element, said element being formed from conductor patterns (42, 43b, ..., 43h) on a plurality of layers (40a, ..., 40h) of a multilayer PCB (40), the conductor patterns being in stacked relation and interconnected through the PCB at a plurality of locations, **characterised in that** said antenna is an inverted-F antenna comprising an F-shaped conductor pattern (42) on a first layer (40a) of the PCB (40) and an I-, L- or F-shaped conductor pattern (43b, ..., 43h) on the or each other layer (40b, ..., 40h), wherein the or each I-shaped conductor pattern is substantially coextensive with the "upright" of the F-shaped conductor pattern."*

The wording of claim 1 of the second auxiliary request reads as follows:

"An antenna comprising an element, said element being formed from conductor patterns (42, 43b, ..., 43h) on a plurality of layers (40a, ..., 40h) of a multilayer PCB (40), the conductor patterns being in stacked relation and interconnected through the PCB at a plurality of locations along the length of the conductor patterns, wherein said antenna is an inverted-F antenna and the conductor patterns comprise an F-shaped conductor pattern (42) on a first layer (40a) of the PCB (40) and an I-, L- or F-shaped conductor pattern (43b, ..., 43h) on the or each other layer (40b, ..., 40h), wherein the I-shaped part of the or each I-, L- or F-shaped conductor pattern is substantially coextensive with the "upright" of the F-shaped conductor pattern."

The wording of claim 1 of the third auxiliary request reads as follows:

"An antenna comprising an element formed from conductor patterns (42, 43b, ..., 43h) on a plurality of layers (40a, ..., 40h) of a multilayer PCB (40), the conductor patterns being in stacked relation and interconnected through the PCB at a plurality of locations, the antenna comprising an F-shaped conductor pattern (42) on a first layer (40a) of the PCB (40) and an I-shaped conductor pattern (43b, ..., 43h) on the or each other layer (40b, ..., 40h), wherein the or each I-shaped conductor pattern is substantially coextensive with the "upright" of the F-shaped conductor pattern, the antenna including antenna ground plane regions (41a, ..., 41h) on respective PCB layers (40a, ..., 40h), the antenna ground plane on the first PCB layer being separated from the I-shaped part of the conductor pattern on the first layer by an amount approximately

equal to the length of the longest arm of the F-shaped conductor pattern, the antenna ground plane on the or each other layer being separated from the conductor pattern on that layer by an amount approximately equal to the length of the longest arm of the F-shaped conductor pattern, the antenna ground plane comprising a plurality of vias (51) connecting the ground plane regions (41a, ..., 41h), wherein the element is located at the edge of the PCB (40) and the or each I-shaped conductor pattern (43b, ..., 43h) extends along the edge of the PCB (40)."

VI. The revised version of the European Patent Convention or EPC 2000 entered into force on 13 December 2007. At that time, the present application was still pending. Pursuant to Article 7(1) of the Act, dated 29 November 2000, revising the European Patent Convention of 5 October 1973 (Special Edition No. 1 OJ EPO, 196), the revised version of the Convention shall not apply to European patent applications pending on 13 December 2007, unless otherwise decided by the Administrative Council of the European Patent Organisation. With a decision of 28 June 2001 (Special Edition No. 1 OJ EPO 2007, 197), the Administrative Council decided on the transitional provisions under Article 7 of the said Act of 29 November 2000. With a further decision of 7 December 2006 (Special Edition No. 1 OJ EPO 2007, 89), the Administrative Council decided on the Implementing Regulations to the EPC 2000.

Therefore, in the present decision, reference will be made to "EPC 1973" or "EPC" for EPC 2000 (EPC, Citation practice, pages 4-6) depending on the version to be

applied according to the Revision Act and the decisions of the Administrative Council mentioned above.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Claim 1 of the main request corresponds to claim 1 underlying the decision under appeal, the subject-matter of which was held by the examining division to lack novelty over D1. The Board agrees with this conclusion.

D1 (paragraphs [0001], [0009], [0011], [0015]; claims 1, 3, 9) discloses an antenna formed from emitting conductive paths ("*Leiterbahnen*") on a plurality of layers ("*Leiterplatten*") of a multilayer PCB ("*mehrlagige Leiterplatte*"), wherein the conductive paths are in stacked relation and interconnected through the PCB by means of various through-connections ("*Durchkontaktierungen*") at a plurality of locations. Using the terminology of claim 1, the known antenna may be considered as comprising an "*element*" formed from the interconnected conductive paths on the plurality of layers of the multilayer PCB. Therefore, D1 discloses an antenna comprising all the features of claim 1.

2.2 The appellant submitted that D1 was not a relevant prior art document because it concerned monopole antennas. Would this document nevertheless be considered, it had to clearly and unambiguously

disclose the subject-matter of claim 1 for novelty to be denied. In this respect, the term "element" in claim 1 should be given the usual meaning in the field of antenna engineering (published application, paragraph [0005]), according to which each element of an antenna defined an individual radiating part. In the light of this understanding, claim 1 recited an antenna comprising a single radiating element formed from a plurality of interconnected conductor patterns (grounds of appeal, page 4), whereas the antenna according to D1 comprised separate radiating elements formed from the plurality of the conductive paths, each operating in a different frequency band (grounds of appeal, page 7).

- 2.3 The appellant's argumentation is not convincing. First, apart from the fact that the subject-matter as claimed encompasses monopole antennas, the disclosure of D1 does not give any hint, explicit or implicit, permitting to conclude that the document only concerns monopole antennas. Moreover, with regard to the interpretation of claim 1, there is no difference from a structural point of view between the radiating element of the claimed antenna, which is formed from the interconnection of conductor patterns arranged on the layers of the multilayer PCB, and the emitting unit of the known antenna, which results from the interconnection of the conductive paths arranged on the layers of the multilayer PCB. From the point of view of the radiating characteristics, both the conductor patterns of the claimed antenna and the conductive paths of the known antenna radiate electromagnetic waves. Now, if it is concluded that the conductor patterns of the claimed antenna can be considered as an element, the same conclusion will have to apply for the

conductive paths of the known antenna. Thereby, the frequency band cannot constitute a difference between the antennas of claim 1 and D1 because claim 1 does not recite any feature in this respect.

2.4 In conclusion, the subject-matter of claim 1 of the main request lacks novelty (Article 54, paragraphs 1 and 2, EPC 1973) over D1.

2.5 Therefore, the main request is not allowable.

3. First auxiliary request

3.1 As compared to claim 1 of the main request, claim 1 of the first auxiliary request further recites the features that the antenna is an inverted-F antenna comprising an F-shaped conductor pattern on a first layer of the PCB and an I-, L- or F-shaped conductor pattern on the or each other layer, wherein the or each I-shaped conductor pattern is substantially coextensive with the upright of the F-shaped conductor pattern.

The case of an antenna comprising an I-shaped conductor pattern on the or each other layer of the PCB will now be considered.

3.2 Besides the general disclosure summarized above, the description of D1 briefly describes some embodiments of the known antenna. In particular, Figures 1, 3, 9C, 9D, 11C and 11D show examples of I-shaped conductive paths on a layer of the PCB.

Therefore, the novelty of the subject-matter of claim 1 consists in that:

- (a) the antenna is an inverted-F antenna comprising an F-shaped conductor pattern on a first layer of the PCB, and
- (b) the upright of the F-shaped conductor pattern is substantially coextensive with the I-shaped conductor pattern on the or each other layer.

At the oral proceedings, the appellant did not contest this finding.

3.3 With regard to the former feature (a), the appellant submitted at the oral proceedings that it provided an increased compactness. The antenna could thus be arranged on the PCB of the mobile phone in a small strip-shaped region to the side of the keypad (published application, paragraph [0021] and Figure 2).

As to the latter feature (b), the appellant submitted (letter of 7 May 2008, paragraph bridging pages 2 and 3) that it resulted in "*advantageous frequency characteristics*" of the conductor patterns, namely that "*the F- and I-shaped conductor patterns each have substantially the same characteristics*". This would imply that claim 1 pertained to a singleband antenna for Bluetooth applications (published application, paragraphs [0002], [0021], [0025]). Moreover, the appellant submitted (letter of 7 May 2008, page 3, first full paragraph) that the latter feature (b) also provided the antenna with "*increased conductivity, compared to the corresponding single conductor pattern antenna*".

3.4 The antenna according to D1 is formed from emitting conductive paths on a plurality of layers of a

multilayer PCB. According to one embodiment (D1, paragraph [0015], claim 9), the stacked conductive paths are interconnected through the PCB at a plurality of locations, so that the antenna has increased conductivity, compared to a corresponding single conductive path antenna. The known antenna requires a small amount of space (D1, paragraphs [0002], [0004], [0006]), i.e. it is compact. Moreover, the known antenna is intended for use in wireless mobile communication devices and should be configured to operate in several frequency bands or in a broadband frequency range (D1, paragraphs [0002], [0004], [0006], [0011]).

In view of the foregoing, starting from the antenna known from D1, the technical problem to be solved may be seen in providing a singleband (the Bluetooth band) antenna with a further increased compactness.

- 3.5 The solution according to claim 1 to this problem is obvious for a skilled person.

The appellant did not contest the fact that inverted-F antennas are well known and have found particular application in the field of wireless mobile communication devices. Document D3 (column 1, lines 6-58, column 3, lines 1, 2, and Figure 1 referring to a conventional inverted-F antenna) provides evidence for the knowledge of a skilled person, if needed at all. A first known aspect of inverted-F antennas consists in that they are suitable for applications where good frequency selectivity (in terms of a singleband) is required (D3, column 1, lines 32, 33, column 4, lines 24-30). A further known aspect is that they can

be placed inside the housing of a mobile telephone since they are relatively small at typical telephone frequencies (D3, column 1, lines 34-39). In particular, they may be fabricated on the printed circuit board of the mobile telephone (D3, column 1, line 42-46).

D1 does not disclose an inverted-F antenna. However, D1 (paragraph [0009]) gives a clear hint at the possibility that the illustrated conductive paths (Figures) may have other shapes. Hence, the skilled person starting from the disclosure of D1 and looking for a solution to the technical problem defined above would, in the expectation of advantages concerning frequency band selectivity and compactness, consider an antenna with an F-shaped conductive path on a layer of the multilayer PCB. As regards the conductive paths on the other layer(s), the choice of an I-shaped path is explicitly suggested by the disclosure of D1, as already stated above. The issue thus remains to be considered, whether it would be evident to interconnect an F-shaped conductive path on a layer with an I-shaped conductive path on the or each other layer of the PCB so as to obtain a single emitting element. Two considerations are relevant in this respect. First, the choice of an I-shaped conductive path among those disclosed by D1 appears particularly advantageous in view of its compactness in one direction. Second, this choice offers the further advantage that the I-shaped conductive path would be substantially coextensive with the upright part of the F-shaped conductive path, so that both paths would have substantially the same frequency characteristics. As a result of this approach, the skilled person would arrive at an antenna with the features of claim 1.

3.6 For these reasons, the subject-matter of claim 1 of the main request lacks inventive step (Article 56 EPC 1973) with regard to D1 together with the knowledge of the skilled person, for which D3 provides evidence.

3.7 Therefore, the first auxiliary request is not allowable.

4. Second auxiliary request

4.1 Claim 1 of the second auxiliary request is based on claim 1 of the first auxiliary request with the following amendments:

- (a) the conductor patterns are in stacked relation and interconnected through the PCB at a plurality of locations "*along the length of the conductor patterns*",
- (b) "*the conductor patterns comprise*" an F-shaped conductor pattern ... and an I-, L- or F-shaped conductor pattern ... ,
- (c) "*the I-shaped part of*" the or each "*I-, L- or F-shaped*" conductor pattern is substantially coextensive with the upright of the F-shaped conductor pattern.

4.2 A prima facie examination of claim 1, which was filed during the oral proceedings, reveals a lack of clarity (Article 84 EPC 1973) with regard to (c), in particular to the expression "*the I-shaped part of the or each I-shaped conductor pattern*" and to the fact that two different expressions are used for defining the same feature, namely "*upright of the F-shaped conductor pattern*" and "*I-shaped part of the or each F-shaped conductor pattern*".

Moreover, the objection of lack of inventive step raised against claim 1 of the first auxiliary request does not appear to be invalidated. In particular, the amendment (a) appears to be obvious to the skilled person.

4.3 Pursuant to Article 13, paragraph 1, RPBA, any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion. In the present case, the discretion is exercised in view of the fact that claim 1 still presents deficiencies, as stated above. The second auxiliary request is not considered as a successful attempt to meet all the requirements of the EPC, which would justify its late filing at the oral proceedings.

4.4 For these reasons, the second auxiliary request is not admitted (Article 13, paragraph 1, RPBA).

5. Third auxiliary request

5.1 Claim 1 of the third auxiliary request is substantially based on claim 1 of the first auxiliary request with the following amendments:

- (a) the antenna comprises "*an F-shaped conductor pattern ... and an I-shaped conductor pattern ...*",
- (b) the features "*the antenna including antenna ground plane regions (41a, ..., 41h) ..., wherein the element is located at the edge of the PCB (40) and the or each I-shaped conductor pattern (43b, ..., 43h) extends along the edge of the PCB (40)*" have been added.

5.2 Claim 1 lacks clarity (Article 84 EPC 1973).

5.2.1 First, two different expressions are used for defining the same feature, namely "*upright of the F-shaped conductor pattern*" and "*I-shaped part of the conductor pattern on the first layer*" which means "*I-shaped part of the F-shaped conductor pattern*".

5.2.2 Second, claim 1 includes the additional feature that the antenna ground plane on the first PCB layer is separated from the I-shaped part of the conductor pattern on the first layer by an amount approximately equal to the length of the longest arm of the F-shaped conductor pattern. This feature is not clear because it does not define the direction along which the separation should be considered.

5.2.3 The same objection applies to the further added feature that the antenna ground plane on the or each other layer is separated from the conductor pattern on that layer (i.e. the I-shaped conductor pattern) by an amount approximately equal to the length of the longest arm of the F-shaped conductor pattern.

5.3 Moreover, claim 1 has been amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123, paragraph 2, EPC).

5.3.1 The claimed antenna comprises an element formed from conductor patterns on a plurality of layers of a multilayer PCB, the conductor patterns being in stacked relation and interconnected through the PCB at a

plurality of locations. The claimed antenna also comprises an F-shaped conductor pattern on a first layer of the PCB and an I-shaped conductor pattern on the or each other layer. The wording of the claim, however, fails to define a link between the first mentioned conductor patterns of the element and the later defined F- and I-shaped conductor patterns. Thus, a definition of an antenna with the following possible structure results:

- (a) a conductor pattern as part of the said element and a further separate F-shaped conductor pattern are arranged on a first layer of the multilayer PCB,
- (b) a conductor pattern as part of the said element and a further separate I-shaped conductor pattern are arranged on the or each other layer of the PCB.

The application as filed does not, however, disclose such an antenna, either explicitly or implicitly.

5.3.2 The feature of claim 1 referred to in point 5.2.3 above cannot be derived, explicitly or implicitly, from the description and the drawings, in particular Figure 3, as filed. On the contrary, Figure 3 shows on layer 40d a ground plane which comes considerably closer to the I-shaped conductor pattern than on the other layers.

5.4 The applicant submitted that the raised objections were unjustified. A proper interpretation of claim 1 should be based on the principles laid down in T 190/99 (unpublished). Thus, the skilled person when considering the claim should try to arrive at an interpretation which was technically sensible and took into account the whole disclosure of the application,

in particular Figure 3 (Article 69 EPC). It was essential that the claim be construed by a mind willing to understand, not a mind desirous of misunderstanding. Moreover, since claim 1 was clear, there was no need to make it clearer.

5.5 Although the Board does not contest these principles, it holds that the clarity of the claims of an application is of the utmost importance in view of their function in defining the matter for which protection is sought. Thus, in *ex parte* proceedings it is mandatory that the claims meet the requirements of Article 84 EPC 1973. In particular, the meaning of the terms of a claim should, as far as possible, be clear for the person skilled in the art from the wording of the claim alone. This is essential in a case as the present one, in which a term ("*element*") is decisive for novelty. In such a case, a possible interpretation in the light of the description and drawings cannot lead to the conclusion that the requirement of clarity of the claims is met.

5.6 With regard to Figure 3, it only gives an approximate illustration of the antenna. This results e.g. from the description which explicitly warns that the eight layers 40a-40h are shown with exaggerated thickness (published application, paragraph [0022], first three lines). In view of this imprecision, it is reasonable to assume that other linear dimensions are also approximate, for example the distance between the ground planes 41b-41h and the I-shaped conductor patterns 43b-43h along the direction orthogonal to the edges of the layers 40b-40h. Therefore, Figure 3 cannot be used for deriving dimensional features (claim 1,

lines 11-13) which have not been mentioned expressis verbis in the description of the application.

The same conclusion would be reached in the light of the decision T 169/83 (EPO OJ 1985, 193), according to which the amendment of a claim to include features from drawings is not prohibited, provided that the structure and the function of such features were clearly, unmistakably and fully derivable from the drawings by the skilled person and not at odds with the other parts of the disclosure. In the present case, this condition is not met for the feature of claim 1 referred to in point 5.2.3 above.

5.7 For these reasons, claim 1 of the second auxiliary request does not meet the requirements of Article 84 EPC 1973 and Article 123, paragraph 2, EPC.

5.8 Therefore, the third auxiliary request is not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman:

R. Schumacher

B. Schachenmann

