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**Datasheet for the decision
of 4 March 2008**

Case Number: T 0510/06 - 3.4.01

Application Number: 01982434.1

Publication Number: 1436858

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Language of the proceedings: EN

Title of invention:
Multiband Antenna

Appellant (Applicant):
Fractus, S.A.

Opponent:
-

Headword:
-

Relevant legal provisions:
RPBA Art. 13

Relevant legal provisions (EPC 1973):
EPC Art. 83

Keyword:
"Sufficiency of disclosure (no)"

Decisions cited:
T 0292/85; T 0032/85

Catchword:
-



Case Number: T 0510/06 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 4 March 2008

Appellant: Fractus, S.A.
Alcalde Barnils, s/n
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 23 January 2006
refusing European application No. 01982434.1
pursuant to Article 97(1) EPC 1973.

Composition of the Board:

Chairman: B. Schachenmann
Members: P. Fontenay
H. Wolfrum

Summary of Facts and Submissions

- I. The appeal lies from the decision of the Examining Division, notified on 23 January 2006, refusing the European patent application EP-01982434.1 (published under the PCT as WO-03/034544).

The appellant (applicant) filed the appeal and paid the corresponding appeal fee on 14 March 2006. A written statement setting out the grounds of appeal was filed on the same day.

- II. In the "Reasons" for its decision the Examining Division held that the subject-matter of independent claim 1 was not inventive in the sense of Article 56 EPC having regard to document EP-A-997 974 (D1).

- III. By a communication dated 25 October 2007, issued under Article 11(1) RPBA (OJ EPO 2004, 541) the appellant was informed of the provisional opinion of the Board regarding the main and auxiliary requests then on file.

With a letter dated 25 January 2008 the appellant reiterated its request that the decision under appeal be set aside and further requested that a patent be granted on the basis of a set of claims according to a main request or, alternatively, on the basis of sets of claims according to auxiliary requests I to VII.

Oral proceedings before the Board of Appeal were held at the request of the appellant on 4 March 2008. During the oral proceedings two new sets of claims were filed as auxiliary requests VIII and IX.

IV. The wording of independent claim 1 according to **the main request** reads as follows:

"A multiband monopole antenna,

comprising a conducting surface constituted of a set of conducting polygons (101-108) defining a multilevel structure (1-4), all of said polygons (101-108) featuring the same number of sides, wherein said polygons (101-108) are electromagnetically coupled either by means of a capacitive coupling or ohmic contact, wherein the ohmic contact region between ohmicly connected polygons is narrower than 50% of the perimeter of said polygons in at least 75% of said polygons,

at least two of said polygons being separated by a non-conducting gap in said conducting surface, said gap being delimited by facing sides of said polygons, said sides comprising a plurality of segments, characterized in that

said gap is shaped as a curve composed by at least ten segments which are connected in such a way that each segment forms an angle with adjacent segments so that no pair of adjacent segments defines a larger straight segment, and wherein, if the curve is periodic along a fixed straight direction of space, the corresponding period is defined by a non-periodic curve composed by at least ten connected segments of which no pair of adjacent ones of said connected segments defines a straight longer segment; and wherein the curve does not intersect with itself at any point or intersects with itself only at an initial and final point of the curve, and wherein the segments of the curve are shorter than a tenth of the free-space operating wavelength of the antenna."

In the following, any reference to a multilevel antenna structure is intended to define, in the context of the present decision, a set of polygons as recited in the preamble of claim 1 of the main request. This corresponds to the definition given to that concept in page 2, lines 20-26, of the published PCT application. Moreover, a Space-Filling Curve is intended to define a curve as defined in the characterising clause of claim 1 of the main request in accordance with the definition provided in page 4, lines 7-19, of the published application.

The main request further includes claims 7 and 16 directed, respectively, to a method of manufacturing a multiband monopole antenna and a method of increasing the flexibility and functionality of a wireless device, and a plurality of claims 2-6 and 8-15 referring back, respectively, to claims 1 and 7.

Auxiliary request I differs from the main request in that the wording: "at least two of said polygons being separated by a non-conducting gap in said conducting surface" has been amended to read "two of said polygons being separated by a gap in said conducting surface". A similar amendment has been carried out in relation with independent claim 7 as to the method of manufacturing a multiband monopole antenna.

Claim 1 according to **auxiliary request II** differs from claim 1 of the foregoing auxiliary request I in that the wording "and further characterized in that the antenna comprises a ground-plane comprising at least two conducting surfaces, said conducting surfaces being

connected by at least a conducting strip, said strip being narrower than the width of any of said two conducting surfaces" has been added at the end of claim 1. The added wording corresponds to the wording of claim 2 according to auxiliary request I. Similar amendments have been carried out in relation with the independent method claim as to the manufacturing method: independent claim 6 according to auxiliary request II resulting from a combination of claims 7 and 8 of auxiliary request I.

Claim 1 according to **auxiliary request III** differs from claim 1 of the foregoing auxiliary request II in that the wording: "and further characterized in that the antenna operates at five bands and is placed inside a cellular phone or handheld wireless terminal, wherein said ground-plane has a rectangular shape, and wherein the multilevel structure is placed at one end of said ground-plane and parallel to said ground-plane" has been further added at the end of claim 1 of auxiliary request II. The added wording corresponds to the features recited in claim 2 of auxiliary request II. Independent method claim 5 reflects similar amendments in that it corresponds to the combination of claims 6 and 7 of auxiliary request II.

Auxiliary requests IV to VII differ from the main and auxiliary requests I to III, respectively, in that the method claims have been deleted.

Auxiliary requests VIII and IX which have been filed during the oral proceedings before the Board of Appeal differ from auxiliary requests II and III, respectively, in that the reference to a "multiband monopole antenna"

in the claims relating to the antenna and the method of manufacturing has been replaced by a reference to a "multiband antenna".

All requests include ten pages of description, as amended during oral proceedings held on 13 January 2006 before the Examining Division, and seven sheets of drawings, corresponding to a set of Figures 1-7, as published under the PCT. The appellant/applicant has specified in its modified description that the embodiments corresponding to Figures 3-7 do not fall under the scope of the claimed invention but are considered helpful for the understanding of the general principles underlying it.

- V. During the oral proceedings, the Board raised objections under Article 123(2) EPC as well as objections of insufficiency of disclosure under Article 83 EPC 1973 and lack of clarity under Article 84 EPC 1973 against all requests filed with letter of 25 January 2008, i.e. the main and auxiliary requests I to VII.

As a reaction to the objections raised by the Board, the appellant presented arguments which in his view supported the allowability of the filed requests with respect to Article 123(2) EPC and Articles 83 and 84 EPC 1973. The additional requests (auxiliary requests VIII and IX) were filed, as a precautionary measure, in case the Board was not convinced by the submissions of the appellant regarding the issue of added matter under Article 123(2) EPC.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC 1973 and is, therefore, allowable.

2. *Main request - Sufficiency of disclosure*
 - 2.1 Pursuant to Article 83 EPC 1973 an invention must be disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. According to the case law of the boards of appeal these requirements are in principle met if at least one way is clearly indicated enabling the person skilled in the art to carry out the invention (cf. T 292/85, OJ EPO 1989, 275).

As a consequence of the amendments made to the claims, all embodiments which were originally disclosed in the application in relation with Figures 3-7, have been excluded from the definition of the invention as it results from the wording of claim 1 of the main request. In particular, the meander patterns separating two polygons in the antennas according to Figures 3-7 do not correspond to a Space-Filling Curve as specified in claim 1 of the main request. Moreover, Figures 1 and 2 relate to prior art geometries illustrating multilevel antennas and do not, as such, constitute examples of the claimed antenna.

Rule 27(1)(e) EPC 1973 only requires the inclusion of examples in the description "where appropriate". The question to be answered is therefore whether the inclusion of examples would have been appropriate in

the present case, i.e. whether the skilled person would have been able to identify in the sole disclosure, possibly supplemented by his common general knowledge, at least one way enabling him to reproduce the claimed invention.

2.2 Claim 1 according to the main request, although drafted in terms of technical features, includes a definition as to the geometry of the antenna which is essentially of an abstract nature without bearing on the actual physical entities constituting it. This view is corroborated by the examples of Figure 1. Although referring to prior art geometries, the drawings 1-4 in Figure 1 disclose multilevel antenna structures in the sense of the present application (cf. page 2, lines 30, 31). The mere visualisation of the drawings does not, however, permit to immediately recognize polygons as defined in claim 1, i.e. as required in a multilevel structure.

It follows that one difficulty that the skilled person would encounter when trying to carry out the invention resides in apprehending geometries fulfilling the requirements set out in claim 1 of the main request.

This difficulty will be illustrated more specifically in the following sections in relation with the step consisting in identifying, in predetermined geometries, the distribution of polygons which could fulfil the conditions set out in claim 1. Such an identification is the result of mental processes of a cognitive and conceptual nature taking place in the human mind which is directly influenced by a multiplicity of parameters. In particular, the category of polygons, their number,

size and possible distribution within the candidate structure render this exercise quite complex. This will be particularly apparent from a discussion of the examples of multilevel structures disclosed in Figure 1.

2.2.1 Insofar as the configurations corresponding to drawings 1, 2 and 4 in Figure 1 are concerned, the description does not contain any indication which would permit to verify the adequacy of the definition of a multilevel structure. In fact, the identification process consists essentially in trial and error until a configuration is obtained for which the definition would apply.

2.2.2 Figure 2 provides additional information regarding drawing 3 of Figure 1. It shows a specific distribution of polygons illustrating the validity of the definition as to the multilevel structure for this shape of antenna.

It is worth mentioning that a slightly different repartition of polygons, within the structure of Figure 2, would not permit to meet the conditions defined in claim 1 of the main request without changing the geometry of the antenna. For example, the geometry corresponding to item 3 in Figures 1 and 2 could also be considered to result from the juxtaposition of rectangles 102, 104, 106 and 106, with these rectangles extending over the complete width of the antenna like rectangle 101, and with three additional rectangles 103, 105 and 107 extending therebetween. This configuration would then imply that 3 rectangles out of a total of 8 would have a ohmic contact region larger

- than 50% of their perimeter, contrary to the definition of a multilevel structure.
- 2.2.3 It is further observed that the distribution of polygons which satisfies the conditions of a multilevel structure is not even unique for a predetermined geometry and a predetermined type of polygons. Moreover, it also depends on the nature of the polygons considered, i.e. whether the polygons are rectangles, pentagons, etc.
- 2.2.4 It should finally be emphasized that the process of reproducing the claimed invention differs from the mere identification process referred to above in relation to specific known geometries in that the shape of the final product, i.e. the multilevel structure incorporating a gap shaped as a Space-Filling Curve, has first to be determined. This requires from the skilled person a further level of abstraction when trying to conceive a geometry corresponding to the claimed wording thus rendering his task even more complicated.
- 2.3 In the absence of examples, a first consequence of the lack of direct correspondence between the features relied on when defining the final product and structural elements of the antenna is that such information, at least insofar as it refers to the geometry of the multilevel structure, is not exploitable by the skilled person in order to carry out the claimed invention. In other terms, the abstract concepts referred to when defining the multiband antenna do not permit to conceive, in the absence of

any additional adequate information, any tangible structure corresponding to the present wording.

On the contrary, with regard to the definition of the multilevel structure contained in claim 1 of the main request, the Board observes that this wording would even be misleading if used as a guideline when trying to carry out the invention. The skilled person who would equate the various elements referred to in claim 1 with concrete structural elements of the final product and would consequently conceive a structure resulting from the juxtaposition of polygons with the same number of sides in such a way that the ohmic contact region between ohmically connected polygons is narrower than 50% of the perimeter of said polygons in at least 75% of said polygons would hardly obtain an antenna with the required response characteristics as regards the expected multiple bands location and bandwidths.

2.4 The Board cannot identify in the disclosure any concrete teaching which could compensate for this lack of concrete definition, thus providing the necessary information to carry out the invention.

2.4.1 Furthermore, as stressed above, the more detailed discussion of Figure 2, which permits to verify the adequacy of the disclosed geometry with the definition of a multilevel structure, is not sufficient when trying to conceive a similar structure incorporating a gap shaped as a Space-Filling Curve. In particular, the identification of the rectangles in Figure 2 does not help, in this respect. Moreover, the presence of a gap shaped as a curve composed of a plurality of segments

in the configuration of Figure 2 would even seem to be in conflict with the requirement that all polygons should have the same number of sides.

Even if the embodiments of Figures 3-7 do not fall any more under the definition of the antenna according to claim 1 of the main request since the gaps disclosed therein do not correspond to a Space-Filling Curve, they nevertheless provide additional information as to the arrangement of gaps within the structure which could be taken into account by the skilled person.

However, the information gained from these embodiments leads to some confusion, since the two polygons 102 and 104 separated by the gap are equated in the description with "rectangles" of a multilevel structure having the same number of sides, although these elements feature, respectively, 16 and 14 sides.

2.4.2 The appellant points out, in this respect, that the apparently contradicting findings relating to Figures 3-7 merely reflect the fact that the definitions of the polygons and gap would refer to two different scales.

The Board does not accept this view and observes that claim 1 of the main request does not contain any indication in that direction.

Moreover, this line of argumentation is inconsistent with the passage in the description, page 2, lines 26-28, which specifies: *"In this definition of multilevel structures, circles and ellipses are included as well, since they can be understood as polygons with a very*

large (ideally infinite) number of sides". This statement implies, namely, that an infinitely short straight portion would also correspond to a side in the sense of the present application, thereby contradicting the position defended by the appellant.

- 2.5 According to an alternative line of argumentation, the appellant stressed that it would generally not be a problem for the skilled person to devise a multiband antenna of a multilevel structure as defined in claim 1 of the main request, since the examining division was well able to identify, with regard to a gap comprising less than ten segments, a similar structure. In this respect, the appellant referred to a Figure submitted by the Examining Division during the oral proceedings held on 13 January 2006 in order to substantiate its analysis of Figure 8f in document D1 (cf. minutes of the oral proceedings before the examining division held on 13 January 2006, Annex 5).

The Board cannot concur with the appellant that this finding could compensate for the insufficiency of the disclosure. The intellectual exercise consisting in comparing the prior art with the wording of a claim in order to decide on patentability requirements such as novelty and inventive step fundamentally differs from the process consisting in elaborating a specific structure embodying the claimed subject-matter. While the former process could be compared with the process consisting in checking whether a key fits a specific lock, the latter would correspond to the realisation of that particular key actually able to fit the lock.

Both approaches might be straightforward in situations where claims recite technical features indeed corresponding to structural limitations of the claimed subject-matter: the recited combination of features would then directly provide a template to be referred to for comparing or reproducing purposes. The situation is quite different where the degree of abstraction relied on when defining the claimed subject-matter is such that it cannot be directly exploited by the skilled person in order to carry out the invention.

It should further be emphasized that the skilled person can only rely, when trying to clarify or complete the teaching provided in a patent application, on his general knowledge and not on specific documents which do not, as such, define said knowledge. The appellant, however, failed to provide evidence that the missing teaching would be part of this common knowledge. Under the present circumstances, this knowledge concerns more specifically the existence of geometries including a plurality of polygons featuring the same number of sides wherein at least two of said polygons would be separated by a gap shaped as a Space-Filling Curve which would permit simultaneous reception of signals within a plurality of predetermined frequency bands.

- 2.6 In conclusion, the skilled person would not find in the disclosure any clear teaching which could have compensated for the absence of examples. There was also no evidence produced that, according to common knowledge, the geometry defined in claim 1 would apply to known structures. As a consequence, the claimed invention could be carried out if at all, by mere trial and error which, in view of the large number of

parameters influencing the behaviour of an antenna, amounts to an undue burden (cf. T 32/85, point 5 of the decision).

3. *Auxiliary requests I to VII - Sufficiency of disclosure*

3.1 Claim 1 according to auxiliary request I differs from claim 1 according to the main request in that the feature "at least two of said polygons being separated by a non-conducting gap in said conducting surface" has been replaced by the feature "two of said polygons being separated by a gap in said conducting surface". This amendment does not, however, affect the analysis made above.

In particular, given that the objection under Article 83 EPC 1973 is based on the geometry of the antenna, it is not affected by the non-conductivity of the gap (which is anyway implicit). The reference in claim 1 of auxiliary request I to "two of said polygons" instead of "at least two of said polygons" restricts the wording of the claim to one of the configurations encompassed by the wording of claim 1 of the main request. However, since the objection raised above with regard to the main request relates to the fact that the disclosure does not provide one single complete way of carrying out the invention when encompassing a large variety of configurations, it also applies to a version of the claim limited to one of these possibilities.

3.2 Independent claims 1 according to auxiliary requests II and III differ from claim 1 of auxiliary request I in that the claims recite further limitations as to the

ground plane. These limitations do not affect the definition of the radiating portion of the antenna. In particular, the geometry of the radiating portion of the multiband monopole antenna according to the claims 1 of auxiliary requests II and III is identical to the geometry recited in claim 1 of auxiliary request I. Therefore it does not satisfy the requirements of Article 83 EPC 1973 for the reasons developed above.

3.3 The same finding applies to the claims 1 according to auxiliary requests IV to VII, which correspond to the claims 1 of the main request and auxiliary requests I to III, respectively.

4. *Auxiliary requests VIII and IX - Admissibility; Sufficiency of disclosure*

4.1 The claims 1 according to auxiliary requests VIII and IX differ from the claims 1 of auxiliary requests II and III, respectively, in that the term "monopole" has been deleted in the expression "multiband monopole antenna" in both the apparatus and method claims.

4.2 Although filed during the oral proceedings, the Board admitted these late-filed requests in the appeal proceedings, taking into account that the amendment was straightforward, addressed some of the issues raised by the Board under Article 123(2) EPC with regard to requests filed by the appellant with letter dated 25 January 2008, and did not require adjournment of the oral proceedings under Article 13 RPBA (OJ EPO 2007, 536).

4.3 The amendments carried out in relation with the claims 1 of auxiliary requests VIII and IX do not affect the geometry of the radiating portion of the multiband antenna as claimed in claim 1 of auxiliary request I. As a consequence, said requests do not meet the requirements of Article 83 EPC for the reasons mentioned above.

5. In consequence, none of the requests filed by the appellant has been found allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

R. Schumacher

B. Schachenmann