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Datasheet for the decision of 18 October 2017

Case Number: T 1532/12 - 3.4.01

Application Number: 08000696.8

Publication Number: 2081251

IPC: H01Q1/24, H01Q9/04, H01Q19/00

Language of the proceedings: EN

Title of invention:
Patch antenna

Applicant:
HMD Global Oy

Headword:

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

Keyword:
Claims - essential features
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 1532/12 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 18 October 2017

Appellant: (Applicant	HMD Global Oy Karaportti 2 02610 Espoo (FI)
Representative:	Papula Oy P.O. Box 981 00101 Helsinki (FI)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 30 January 2012 refusing European patent application No. 08000696.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Assi
Members:	P. Fontenay
	J. Geschwind

Summary of Facts and Submissions

I. The examining division refused European patent application No. 08 000 696.

II. The decision of the examining division relied on the findings that the subject-matter of independent claim 1 of the sole request on file was not inventive in the sense of Art. 56 EPC.

The objection was based, more specifically, on the combination of documents:

D1: J. Säily: "Proximity-coupled and Dual- polarized Microstrip Patch Antenna for WCDMA Base Station Arrays, Proceedings of Asia-Pacific Microwave Conference, 2006 (12 December 1006), pages 628-631, XP002476331, and
D2: EP-A-0 154 858.

D1 was considered to define the closest prior art.

As an alternative to document D2, reference was made to further documents:

D3: WO-A-91/12637,
D4: US-A-6 407 705,
D5: US-A-5 955 994,
D6: GB-A-2 067 842 and
D7: JP-A-9-246852,

which disclosed similar structures incorporating parasitic patches on opposite sides of a main radiating element.

III. The appellant (applicant) filed an appeal against the decision to refuse the application.

IV. The appellant requested that the decision to refuse the application be set aside in its entirety and that a patent be granted on the basis of a set of claims according to a main request or auxiliary requests 1 to 4, as filed with the statement of grounds.

V. In accordance with an appellant's request, a summons to attend oral proceedings was issued.

VI. In a communication pursuant to Art. 15(1) RPBA, the appellant was informed of the provisional opinion of the Board with regard to the requests then pending. The attention of the appellant was, more specifically, drawn to the fact that the effect relied upon in order to justify the existence of an inventive step did not necessarily result from the configurations of the patch antenna as defined in claim 1 of the main request and auxiliary request 4. In this respect, an essential feature of the invention appeared to be missing in the claims' definitions (Art. 84 EPC).

As a consequence, the broad definition of the objective problem to be solved by the invention, relied upon by the examining division in order to refuse the application, appeared fully justified.

VII. With a letter dated 14 September 2017, the appellant filed amended main request and auxiliary request 4 which, should they be admitted into the proceedings, would replace the previous main and auxiliary request 4. The appellant took due account of the Board's criticisms with regard to the non fulfillment of the requirements of Art. 84 EPC as to clarity.

VIII. Oral proceedings before the Board were held on 18 October 2017 in presence of the appellant's representative.

In the course of the oral proceedings, the appellant filed an amended main request which replaced all previous requests on file. The request stemmed from auxiliary request 4 filed with the letter dated 14 September 2017.

IX. Claim 1 of the appellant's sole request reads:

"*1. A patch antenna for dual polarized operation comprising*

a primary radiator (106),

a dual microstrip feed line (104) configured to utilize corner-feeding to enable substantially diagonal radiating modes,

characterized by

the patch antenna further consisting of

two parasitic patches (107, 108) that are arranged adjacent and on opposite sides to the primary radiator (106) for shaping the beamwidths of both polarizations at the same time, wherein the patch separation is chosen to be so that the currents in the primary radiator and the induced currents in the parasitics are in opposite phase at operating frequency".

Claims 2 to 17 depend on claim 1.

More specifically:
Claims 2 to 11 relate to an antenna and depend on claim 1;

Claim 12 concerns an "*array of antennas comprising at least one antenna according to any of the preceding claims*";
Claim 13 relates to an "*access point comprising at least one of the antennas according to any of claims 1 to 11*";
Claim 14 depends on claim 13;
Claim 15 concerns a "*base station comprising at least one of the antennas according to any of claims 1 to 11*";
Claim 16 depends on claim 15;
Claim 17 relates to a "*mobile terminal comprising at least one of the antennas according to any of claims 1 to 11*".

Reasons for the Decision

1. The appeal is admissible.

2. *Clarity - Art. 84 EPC*

As emphasized by the appellant in the statement of grounds of appeal and corroborated by the description, a main object of the invention is to enlarge the sector coverage of dual-polarized patch antenna arrays (cf. paragraphs [0005] to [0007], [0010], [0023], [0024], [0037], [0038], [0049] and [0050] of the published application).

All the technical features actually required in order to achieve said purpose are reproduced in claim 1. This applies, in particular, to the indication contained in paragraphs [0024] and [0038] according to which the effect relied upon can only be achieved by appropriate selection of the distance between the primary radiator and the adjacent parasitic patches, that is, by

separating said patches by a distance such that the currents in the primary radiator and the induced currents in the parasitic patches are in opposite phase at the operating frequency.

Claim 1 includes all the essential features for the definition of the invention. The objection raised by the Board in its provisional opinion with regard to the former main request is thus obsolete.

The claims of the appellant's request meet the requirements of Art. 84 EPC as to clarity and support by the description.

3. *Novelty - Art. 54(1),(2) EPC*

3.1 Document D1, which is an article originating from the inventor of the present application, discloses a patch antenna as defined in the preamble of claim 1. Concretely, D1 discloses a patch antenna for dual polarized operation (cf. Abstract, Section "*Introduction*", right-hand column, lines 7-9). The patch antenna comprises a primary radiator and a dual microstrip feed line configured to utilize corner-feeding to enable substantially diagonal radiating modes (cf. Abstract, Section "*Introduction*", right-hand column, lines 10-17, Figure 2).

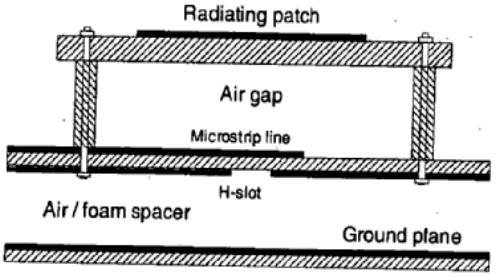

Figure 2 of D1

The claimed subject-matter differs from this known patch antenna by the characterising features of claim 1, that is, in that the patch antenna further consists of two parasitic patches that are arranged adjacent and on opposite sides to the primary radiator for shaping the beamwidths of both polarizations at the same time, wherein the patch separation is chosen to be so that the currents in the primary radiator and the induced currents in the parasitics are in opposite phase at operating frequency.

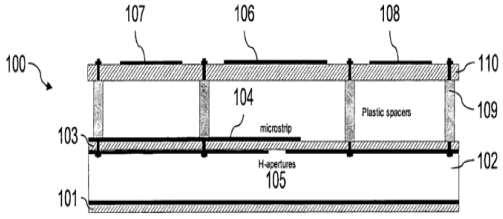

Figure 1 of the present application

3.2 None of the other available prior art documents discloses the recited combination of features. In particular, none of them discloses a patch antenna with a dual microstrip feed configured to utilize corner feeding to enable diagonal radiating modes, the antenna further including parasitic patches.

3.3 The claimed subject-matter is thus new in the sense of Art. 54(1)(2) EPC.

4. *Inventive step - Art. 56 EPC*

4.1 As already stated, the patch antenna of D1 reproduces all the features of the preamble of claim 1. It is stressed, in this respect, that D1 shares a common purpose with the claimed invention in that it enables the generation of diagonal radiating modes.

For these reasons, document D1 discloses the closest prior art with regard to the claimed invention.

4.2 The presence of two parasitic patches arranged adjacent and on opposite sides to the primary radiator combined with the feature regarding the separation of the parasitic patches from the primary radiator have the effect of generating induced currents in the parasitic patches that are in opposite phase at the operating frequency to the currents in the primary radiator.

These phenomena within the patches affect the radiating field resulting therefrom thus producing a widening of the beamwidths, that is, an enlargement of the coverage obtained by the antenna (cf. paragraphs [0023], [0024], [0037], [0038]).

4.3 Document D2 discloses a patch antenna comprising a plurality of parasitic patches arranged in rows and columns extending around a primary radiator, thus defining a sort of matrix.

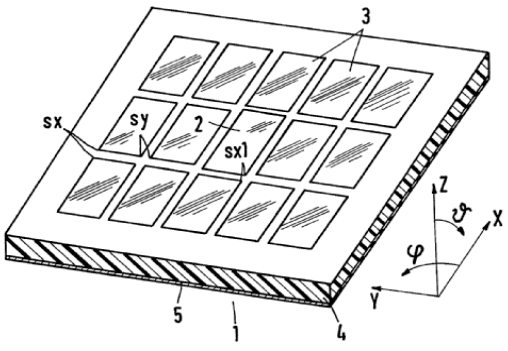

Figure 1 of D2

D2 explicitly refers to the possibility to shape the resulting beamwidth of the radiation pattern generated by the antenna by appropriate selection of various parameters of the antenna. In this respect, the length, the position of the parasitic patches relative to the

primary radiator and the number of rows and lines of such parasitic patches are considered to be particularly relevant (cf. page 10, lines 12-25). According to D2, reduced beamwidths may be achieved with a large number of parasitic elements in the antenna patch (cf. page 10, lines 20-25).

Since D2 concerns a patch antenna and explicitly addresses the need to shape the beamwidth (cf. page 2, lines 23-30), its teaching would have undoubtedly been considered by the skilled person in order to solve the objective problem of the invention. The indication in D2 that among other parameters the distance separating the parasitic patches from the primary radiator would have contributed to define radiation characteristic of the antenna constitutes a clear hint for the skilled reader to select the value of said distance (sy) adapted to the intended purpose, that is, to increase the beamwidth.

Similarly, the indication that an increased number of parasitic patch elements would have contributed to a reduction of the beamwidth would have constituted a clear hint for the skilled person that the opposite effect would have *a contrario* been achieved by reducing the number of parasitic elements.

As emphasized by the appellant during the oral proceedings, there is however no indication to be found in D2 that the patch antenna should include only two parasitic patches as results from the wording of claim 1. The statement in D2 regarding the number of parasitic patches would have implied in the context of D2 that the optimal effect regarding an increase of the beamwidth would have been obtained with no additional parasitic patch at all.

It is further observed that an essential feature of the antenna of D2 consists in incorporating parasitic patches in a set of rows and lines around the primary radiator. The selection of a configuration with two parasitic patches only, extending on two opposite sides of the radiator, would thus be contrary to said teaching since it would imply renouncing to the other rows of parasitic patches, for which no basis can be found in D2. Moreover, D2 is not concerned with a dual polarized antenna. It thus does not address any of the aspects regarding the need to avoid cross polarization of the diagonal radiation modes.

As a consequence, the skilled person would have been at a loss, when attempting to identify the features of D2 which would have actually been essential for the intended effect to be achieved and how they should have been adapted in order to shape the beamwidths of both polarisations at the same time.

4.4 Document D7 discloses a patch antenna consisting of a central primary radiator and two parasitic patch antennas arranged adjacent and on opposite sides to said primary radiator.

D7 relates to a circularly polarized wave antenna. There is accordingly no hint to be found in D7 as to why the skilled person would have considered said item of prior art in order to amend the patch antenna of D1, which primary purpose is to generate diagonal radiation modes.

4.5 Similar comments apply to document D5 which also does not refer to patch antennas adapted to generate diagonal radiation modes. Even though D5 suggests that

a clear relationship exists between the parasitic phase and the patch separation (cf. column 2, lines 59-65), nothing in D5 suggests that this effect could be relied upon in order to modify the beamwidth in the context of a dual polarized antenna design.

4.6 The other documents cited in the course of the examination proceedings are even less relevant.

4.7 Hence, the subject-matter of claim 1 does not result in an obvious manner from the prior art. It is thus inventive in the sense of Art. 56 EPC.

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 with the order to grant a patent on the basis of claims 1 to 17 filed during the oral proceedings before the Board and a description to be adapted thereto.

The Registrar: The Chairman:

R. Schumacher G. Assi

Decision electronically authenticated