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Datasheet for the decision of 17 October 2013

Case Number: T 0994/09 - 3.5.02

Application Number: 06250538.3

Publication Number: 1691482

IPC: H03H7/12

Language of the proceedings: EN

Title of invention:
A tunable radio frequency filter

Applicant:
Alcatel Lucent

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

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Boards of Appeal
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Case Number: T 0994/09 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 17 October 2013

Appellant: (Applicant)	Alcatel Lucent 3, avenue Octave Gréard 75007 Paris (FR)
Representative:	Michalski Hüttermann & Partner Patentanwälte Speditionstraße 21 40221 Düsseldorf (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 10 December 2008 refusing European patent application No. 06250538.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: M. Ruggiu
Members: G. Flyng
P. Mühlens

Summary of Facts and Submissions

I. The applicant's appeal concerns the examining division's decision to refuse European patent application 06 250 538.3.

II. In the contested decision, the examining division established inter alia the following document references:

III.

D1: DE 198 44 143 A1 (Siemens AG) 20 April 2000

D2: US 2 196 881 (Wheeler Harold A) 9 April 1940

D6: XP002530525, "Novel Zeroth-Order Resonance in composite right/left handed Transmission Line Resonators", Sanada A., et al, 2003 Asia Pacific Microwave Conference, vol. 3, 4 - 7 November 2003, Seoul, Korea

D7: XP010721379, "Unusual propagation characteristics in CRLH structures", Caloz C et al, IEEE Antennas And Propagation Society Symposium, 2004, vol. 4, 20 June 2004, pages 3549-3552

D8: XP011119759, "Composite right/left-handed transmission line metamaterials", Caloz C et al, IEEE Microwave Magazine, vol. 5, no. 3, 1 September 2004, pages 34- 50

The contested decision referred to the reasoning given in the examining division's communication dated 18 July 2008, which was an annex to a summons to oral proceedings. In that communication the examining division stated that claim 1 filed with the telefax on 16 May 2008 did not involve an inventive step.

The examining division reasoned that the subject-matter of claim 1 differed from the disclosure of figure 2a of

document D7 only in that the capacitor was chosen to be variable and that this was a standard solution to a standard problem (e.g. multi-band operation or compensation of process variations), and as such an obvious, well-known constructional change envisaged by the skilled person according to circumstances (e.g. D1: figure 1a, D2: figure 1 with equation 2). Furthermore, the examining division maintained the inventive step objection based on document D6 that was raised in item 3.2 of the communication dated 21 November 2007.

IV. With the letter setting out the grounds for the appeal (letter dated 20 April 2009) the appellant filed a new set of claims 1 to 11.

V. The Board summoned the appellant to oral proceedings to be held on 17 October 2013. In an annex to the summons the Board made inter alia the following observations on the appeal.

The Board noted that in the grounds for appeal the appellant had not contested any of the reasons that the examining division gave in the communications dated 21 November 2007 and 18 July 2008 for the finding that the application did not meet the requirements of the European Patent Convention, but instead had filed amended claims.

Considering the amended independent claim 1 filed with the letter dated 20 April 2009, the Board observed that it seemed that the feature that had been added, namely:

> ".... and the zero order resonance frequency being tunable over one or more octaves without suffering substantial decreases in filter selectivity and/or

degradation of the Q factor of the filter unit cell",

attempted to define the invention in terms of a result to be achieved and thereby lacked clarity in the sense of Article 84 EPC as it did not specify the actual features of the claimed filter unit cell which allowed the result to be achieved.

The Board observed further that it seemed to be suggested in the application as filed (see published application EP 1 691 482 A1, paragraph [0026]) that the claimed result was one that would be achieved automatically by a zero-order resonance filter that was based on metamaterial structures. If that was the case, then it seemed that that result would also be achieved with a filter that would be obtained by the skilled person by starting from document D7 (or D8) and adapting that disclosure in the light of D1 or D2 to make the capacitance of the metamaterial structure of D7 (or D8) variable, as put forward by the examining division. Hence the subject-matter of amended claim 1 also appeared to be obvious and hence lacking an inventive step, Article 56 EPC.

Finally, the Board observed that the appellant had not suggested that there would be any technical difficulty involved in providing a metamaterial structure with a variable capacitance capable of achieving the claimed result. Indeed if that were to be the case, then there might be a question of whether the invention as claimed was sufficiently disclosed in the sense of Article 83 EPC.

VI. In a letter dated 17 September 2013 from the appellant's representative, the appellant requested that the decision under appeal be set aside and that a patent be granted:

- on the basis of claims 1 to 10 filed with letter dated 16 May 2008 (main request), or
- on the basis of claims 1 to 10 of auxiliary request I filed with letter dated 17 September 2013, or
- as auxiliary request II, on the basis of claims 1 to 11 of the request filed with letter dated 20 April 2009, or
- on the basis of auxiliary request III filed with letter dated 17 September 2013.

Claim 1 of the main request reads as follows:

"1. A filter unit cell, comprising:
a variable capacitor coupled in series between first and second nodes; and
an inductor coupled in series between the second node and a third node, the filter unit cell being a composite right-hand/left-hand metamaterial having a zero-order resonance at a frequency determined by the variable capacitor and the inductor."

Claim 1 of auxiliary request I differs from claim 1 of the main request only in that reference numerals have been added.

Claim 1 of auxiliary request II differs from claim 1 of the main request only in that at the end the following the feature has been added:

" and the zero-order resonance frequency being tunable over one or more octaves without suffering

substantial decreases in filter selectivity and/or degradation of the Q factor of the filter unit cell".

Claim 1 of auxiliary request III differs from claim 1 of auxiliary request II only in that reference numerals have been added.

VII. Oral proceedings were held before the Board as scheduled on 17 October 2013.

At the scheduled start of the oral proceedings (9:00), no one was present on behalf of the appellant. The Registry of the Board contacted the office of the appellant's representative by phone and was told that he would not be coming to the oral proceedings.

The Board noted from the file the appellant's requests submitted with the letter dated 17 September 2013 (see above).

After deliberation by the Board, the present decision was given.

VIII. The appellant has argued that claim 1 of the main request is new over the prior art and that the inventive step objection of the examining division was unjustified, because those skilled in the art would certainly simply add a conventional variable frequency dependent component to the composite right-hand/left-hand metamaterial filter unit cell shown in D6 or D7 to get a filter with variable resonance frequency instead of changing the structure of such a filter unit.

Reasons for the Decision

1. Main request

1.1 Document D8 discloses in figure 18 and the associated description (page 44, right column) a one-cell zeroth order resonator (ZOR) created using a composite right-hand/left-hand (CRLH) metamaterial.

According to the text, "The resonator consists of one unit cell of figure 8 open ended by capacitive slits with parameters shown in figure 18(b)".

Figure 8 shows an example of a distributed component based 1-D composite right-hand/left-hand (CRLH) transmission line (TL) implemented on microstrip with interdigital capacitors and stub inductors connected to the ground plane (see page 41, left column, second paragraph). According to the text, "The unit cell of the structure shown is equivalent to the circuit model of Figure 5(a)".

Figure 5(a) shows a unit cell of an LC-based CRLH TL. The unit cell includes a capacitor C_L that is coupled in series between first and second nodes and an inductor L_L that is coupled in series between the second node and a third node. In the associated text under the heading "LC Network" the unit cell is referred to as a "band-pass LC unit cell" (see page 38, right column, line 11) and on page 39, right column, lines 10 and 11 it is stated that "... the LC-based CRLH TL is essentially a band-pass filter..." (emphasis added). In the Board's view it is evident to the skilled reader that the resonant frequency of the unit cell depends on the capacitors and inductors present in the circuit.

1.2 From the above it is evident that document D8 discloses all of the features of main request claim 1 except for the feature that the capacitor is a variable capacitor.

1.3 It is well known in the field of LC filters to use a variable capacitance, for example to provide for multi-band operation or to compensate for process variations. Documents D1 and D2 demonstrate that this is the case (see D1, figure 1a and D2, figure 1).

Starting from the CRLH metamaterial filter of document D8 it would be obvious for the skilled person, seeking to provide for multi-band operation or to compensate for process variations, to consider using the well-known approach of making the capacitor variable.

The appellant has not suggested that there would be any technical difficulty involved in providing a metamaterial structure with a variable capacitance. Indeed, if that were to be the case, then it is questionable whether the invention as claimed could be considered to be sufficiently disclosed in the sense of Article 83 EPC, given that the application does not provide any teaching at all as to how the capacitor of the metamaterial structure might be made to be variable. Hence, the Board concludes that it would be obvious for the skilled person to actually make the capacitor of D8 variable. Thus, the subject-matter of claim 1 of the main request lacks an inventive step in the sense of Article 56 EPC.

1.4 The appellant has argued that the person skilled in the art would simply add a conventional variable frequency dependent component to the CRLH metamaterial filter unit cell to get a filter with variable resonance frequency, instead of changing the structure of such a

filter unit. The Board is not convinced that this is the case. Whilst it might also be considered obvious to vary the resonant frequency of the CRLH metamaterial filter unit cell by adding a conventional variable frequency dependent component, it would not necessarily follow that it would not also be obvious to vary the capacitance of the metamaterial structure itself. One obvious solution to a problem does not generally exclude the possibility that there are other obvious solutions.

2. Auxiliary request I

Claim 1 of auxiliary request I differs from that of the main request only by the addition of reference numerals. Given that this does not alter the substance of the claim, the reasons given above for the finding that claim 1 of the main request lacks inventive step apply equally to claim 1 of auxiliary request I.

3. Auxiliary request II

Claim 1 of auxiliary request II differs from that of the main request only in that at the end the following the feature has been added:

" and the zero-order resonance frequency being tunable over one or more octaves without suffering substantial decreases in filter selectivity and/or degradation of the Q factor of the filter unit cell".

This feature attempts to define the invention in terms of a result to be achieved and thereby lacks clarity in the sense of Article 84 EPC as it does not specify the actual features of the claimed filter unit cell which allow the result to be achieved. Furthermore, it is

suggested in paragraph [0026] of the application that the claimed result is one that would be achieved automatically by a zero-order resonance filter that is based on metamaterial structures. If that is the case, then that result would also be achieved with a filter obtained by the skilled person by starting from document D8 and adapting that disclosure in the light of D1 or D2 to make the capacitance of the metamaterial structure of D8 variable. Hence, the subject-matter of amended claim 1 of auxiliary request II is also obvious and hence lacking an inventive step, Article 56 EPC.

4. Auxiliary request III

Claim 1 of auxiliary request III differs from that of the auxiliary request II only by the addition of reference numerals. Again, given that this does not alter the substance of the claim, the reasons given above for the finding that claim 1 of auxiliary request II lacks inventive step apply equally to claim 1 of auxiliary request III.

5. Conclusion

The Board has found that claim 1 of every request lacks an inventive step. Hence, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

U. Bultmann M. Ruggiu

Decision electronically authenticated