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Datasheet for the decision of 25 July 2024

Case Number: T 0284/21 - 3.5.06

Application Number: 13733435.5

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Language of the proceedings: EN

Title of invention:
INTEGRATED-CIRCUIT RADIO

Applicant:
Nordic Semiconductor ASA

Headword:
Radio communication device/NORDIC SEMICONDUCTOR

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13(2)

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0284/21 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 25 July 2024

Appellant: (Applicant)	Nordic Semiconductor ASA Otto Nielsens veg 12 7004 Trondheim (NO)
Representative:	Dehns St. Bride's House 10 Salisbury Square London EC4Y 8JD (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 12 November 2020 refusing European patent application No. 13733435.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	M. Müller
Members:	G. Zucka
	K. Kerber-Zubrzycka

Summary of Facts and Submissions

I. The appeal is against the decision by the examining division, dispatched with reasons on 12 November 2020, to refuse European patent application 13733435.5. The appealed decision is a "decision according to the state of the file". The reasons for the decision refer to communications dated 17 April 2020 and 18 June 2019, in which the main and the auxiliary request were found not to meet the requirements of Article 56 EPC.

II. The following documents are referred to in the present decision:

D1: US 2009/318078 A1;

D2: ARM: "Application Note 179 Cortex-M3 Embedded Software Development", March 2007 (2007-03), XP002713220, Retrieved from the Internet: URL:http://infocenter.arm.com/help/topic/com.arm.doc.dai0179b/AppsNote179.pdf [retrieved on 2013-09-18].

Document D2 is most likely the same as the document which the examining division also had referred to as "D2", although it had not indicated to what D2 corresponds. During the oral proceedings before the board, the appellant agreed with this assumption.

III. A notice of appeal was received on 21 January 2021, the appeal fee being paid on the same day. A statement of grounds of appeal was received on 22 March 2021.

IV. The board issued a summons to oral proceedings. In an annex to the summons, the board set out its preliminary

opinion, according to which the appealed decision should be upheld.

V. On 24 July 2024, the appellant filed two additional auxiliary requests. One more auxiliary request was filed during the oral proceedings before the board.

VI. The appellant requests that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 17 of the main request or claims 1 to 15 of auxiliary request 1, both re-filed with the statement of grounds of appeal, or on the basis of claims 1 to 16 of auxiliary request 2 or claims 1 to 14 of auxiliary request 3 filed with its response of 24 July 2024, or on the basis of claims 1 to 14 of auxiliary request 4 filed during the oral proceedings before the board.

The further text on file is:

description pages
1 to 15 received on 13 August 2015;

drawing sheets
1 to 8 as published.

VII. Independent claim 1 of the main request reads as follows:

"A method of configuring an integrated-circuit radio communication device (1), wherein:

the device comprises a processor (7), memory (13), and radio communication logic (17) integrated on a silicon chip;

the memory has a firmware module (23) stored at a firmware memory address, the firmware module comprising

instructions for controlling the radio communication logic according to a predetermined radio protocol; and

the processor is configured to receive supervisor call instructions, each having an associated supervisor call number, and to respond to a supervisor call instruction by (i) invoking a supervisor call handler in the firmware module, and (ii) making the supervisor call number available to the call handler,

the method comprising loading a software application (27) into the memory of the device, such that the application is stored at a predetermined application memory address, wherein the software application is arranged to invoke a radio communication function from the firmware module by issuing a supervisor call instruction having an associated predetermined supervisor call number corresponding to the function to be invoked."

VIII. Compared to the main request, claim 1 of auxiliary request 1 defines the firmware module as being a linked binary module, the software application not being linked to the firmware module.

IX. Compared to the main request, claim 1 of auxiliary request 2 specifies that the processor is an ARM processor that supports supervisor call SVC instructions, and adds the acronym "SVC" after each occurrence of the term "supervisor call".

X. Claim 1 of auxiliary request 3 combines the features of claim 1 of auxiliary requests 1 and 2.

XI. Claim 1 of auxiliary request 4 combines the features of claims 1, 10 and 11 of the main request, the additional features of the latter two claims corresponding to

those of claims 8 and 9 as originally filed. Claim 1 now incorporates the following additional clauses:

"... wherein the firmware module (23) and the software application (27) each has a respective interrupt vector table, wherein the device is configured to use the vector table of the firmware module when processing an interrupt, and wherein the firmware module is configured so that all interrupts that the firmware module is not programmed to handle itself are passed on to the software application; and

wherein the interrupt vector tables of the firmware module (23) and the software application (27) use the same offsets as each other."

XII. The subject-matter of the other claims is not relevant for the present decision.

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

Reasons for the Decision

1. The invention

The application relates to integrated-circuit radio communication (IC RC) devices, such as used for instance in wireless computer mice (description, page 1, lines 14 to 17).

According to the application, a software application written by the manufacturer of the product which incorporates the IC RC device is loaded onto the RC chip and interfaces with a firmware module providing

radio control functions via supervisor call instructions (page 3, lines 1 to 4).

In this manner, the software application does not need to be linked to a library or operating system supplied by the IC manufacturer. Since there is no need for re-linking the firmware module during application development, bugs are avoided and debugging is facilitated (page 3, lines 6 to 14).

2. *Auxiliary request 2 - inventive step; Article 56 EPC*

2.1 The board considered it expedient to discuss the issue of inventive step during the oral proceedings first on the basis of claim 1 of auxiliary request 2.

2.2 The board holds that the arrangement described as prior art in document D1, figures 1 and 2 and description paragraphs [0023] to [0033], is commonly known and constitutes a suitable starting point for an inventive step analysis.

2.3 According to what is described in said passages in D1, the known prior art relates to a method of configuring a radio communication device (24).

The device comprises a processor (mentioned in par. [0033], first sentence), memory (implied; but see also par. [0008]), and radio communication logic integrated in a module (24), which is disclosed as being "in the form of a single housing, preferably shielded, that may be integrated directly by device manufacturers" (see par. [0008]).

The memory has a firmware module stored at a firmware memory address, the firmware module comprising

instructions for controlling the radio communication logic according to a predetermined radio protocol (*ibid.*: "main radio communication application 24 which manages the radio communication software stack").

The method comprises loading a software application into the memory of the device, such that the application is stored at a predetermined application memory address (paragraphs [0028] and [0036] imply that the mentioned client application is loaded in memory).

The software application is arranged to invoke a radio communication function from the firmware module (containing the main radio communication application 212).

2.4 These findings were not disputed.

2.5 The following differences therefore exist between the subject-matter of claim 1 of auxiliary request 2 and the indicated generally known prior art:

(a) the processor, memory and radio communication logic are integrated on a silicon chip; and

(b) the processor is an ARM processor supporting SVC instructions and the software application invokes radio communication functions from the firmware module by issuing SVC instructions having an associated SVC number corresponding to the function to be invoked; the processor responds to such SVC instructions by invoking an SVC handler in the firmware module and makes the SVC number available to the call handler.

In acknowledging difference (a), the board disagrees with the decision under appeal that the module (24) was

disclosed in D1 to be an integrated circuit (see the communication dated 17 April 2020, point 3.1).

2.6 No synergistic effect arises from the combination of differences (a) and (b). They can therefore be considered separately.

2.7 Difference (a) provides the commonly known advantages of circuit integration such as reducing size and the number of the components and increasing speed. It can however be said that the skilled person has a natural tendency to achieve these objectives. This is particularly true in the context of the module of D1 which, albeit not an integrated circuit, is a separate device component. The measure of integrating components onto an integrated circuit, as a so-called "System-on-Chip" (SoC), is in fact part of normal technical evolution and poses no intrinsic difficulties to the skilled person.

2.8 Difference (b) solves the problem of concretely implementing the above-mentioned prior art arrangement, which requires the choice of a specific processor, the processor not being further defined in the above-cited passages.

2.9 In the context of said prior art, the skilled person would have considered choosing an ARM processor as one obvious choice out of several ones that are available.

2.10 Once the skilled person has chosen an ARM processor (supporting SVC instructions), such as disclosed in D2, to provide the desired functionality, it would be normal practice to use SVC instructions for the required access to radio communication logic, which is

considered to be a system resource (see D2, section 2.7, first paragraph).

More specifically, the software application would invoke radio communication functions from the firmware module by issuing SVC instructions having an associated SVC number corresponding to the function to be invoked, and the processor would respond to such SVC instructions by invoking an SVC handler in the firmware module and would make the SVC number available to the call handler (feature (b); *ibid.*, second paragraph).

The board thus considers difference (b) to be an obvious use of SVC instructions according to their intended purpose.

2.11 The skilled person would thereby arrive at the subject-matter of claim 1 of auxiliary request 2 without the need for any inventive activity.

2.12 That SVC instructions contribute to decoupling the calling application from the firmware accessing the system resources, and thus might alleviate the need for linking, is an effect intrinsic to their "call by reference" via the SVC number, which the board thus judges to be a mere bonus effect which does not withstand the board's finding on obviousness.

2.13 The appellant observed during the oral proceedings before the board that according to the cited passage in D2, "[s]upervisor calls are normally used to request privileged operations or access to system resources from an operating system", and that the above-mentioned prior art does not concern an operating system but a simple embedded system.

According to the board, however, the word "normally" renders it clear that the use of SVC instructions is not restricted to the context of operating systems. Rather, the board considers that D2 in section 2.7 at least suggests the use of SVC instructions also for providing applications with access to system resources that are not controlled by an operating system.

2.14 At one point during the oral proceedings, the arrangement described in figure 4 and corresponding description passages in D1 was used as a starting point for the inventive step assessment, and the appellant provided a number of arguments in that respect.

Especially, the appellant argued that the skilled person addressing the objective technical problem mentioned under point 2.8 above (but in the context of said figure 4 and corresponding description passages) would have chosen to follow the detailed disclosure of the "invention" according to D1, and argued with reference to par. [0054] that this invention would imply a tight integration - and linking - of the client applications with the firmware. This, in turn, would teach the skilled person away from using the SVC instructions which were chosen specifically in claim 1 to avoid the need for linking. Although the skilled person *could* have done what the board proposed, they *would* not have done it.

During the oral proceedings, the board expressed doubt as to whether D1 actually disclosed (in par. [0054]) that the client applications and the firmware were linked, but this need not be decided as the board disagrees that the only obvious way for the skilled

person to solve the proposed problem would have been along the lines of the disclosed invention.

At any rate, as the appellant's considerations related to the invention according to D1, they were not applicable to the prior art described in figures 1 and 2 and description paragraphs [0023] to [0033] in D1. They therefore need not be further discussed here.

2.15 For the above reasons, the board holds that auxiliary request 2 does not satisfy the requirements of Article 56 EPC.

3. *Main request*

The above arguments also apply to claim 1 of the main request, given that its subject-matter is more general than that of claim 1 of auxiliary request 2.

4. *Auxiliary requests 1 and 3*

It is apparent that if the desired functionality is achieved by means of SVC functions, only the firmware module needs to be a linked binary module, and the calls by the software application to the radio communication functions in the firmware can be resolved without requiring both to be linked.

As explained at 2.12 above, the feature added to claim 1 of auxiliary requests 1 and 3 compared to the same claim in respectively the main request and auxiliary request 2 therefore does not render the claim's subject-matter inventive. As a consequence, auxiliary requests 1 and 3 also do not satisfy the requirements of Article 56 EPC.

5. *Auxiliary request 4*

Auxiliary request 4 was filed after the notification of the summons to oral proceedings (Article 13(2) RPBA 2020). The board is of the opinion that the request is not *prima facie* patentable or would constitute a promising basis for a patentable request.

At least, the added features change the assessment of inventive step which the board was not prepared to carry out on the spot.

No exceptional circumstances exist which would justify admitting the request. The appellant argued that it constituted exceptional circumstances that the board had, during the oral proceedings, changed its tentatively positive position as expressed in its preliminary opinion. However, the board notes that it had marked its considerations in the preliminary opinion as just that, preliminary, so that the appellant could not have relied upon them (see also CLB 10th edition 2020 V.A.4.5.6 a) and i) with case law references).

Moreover, the board's findings correspond *grosso modo* with that of the examining division. As the appellant should generally be prepared for the board to follow the reasons in the decision under appeal, it should have filed its fallback position according to auxiliary request 4 with the statement of grounds of appeal. The board's preliminary opinion is immaterial in this regard (see CLB *ibid.* b)).

The request is therefore not admitted into the proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Stridde Martin Müller

Decision electronically authenticated