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**Datasheet for the decision
of 6 May 2021**

Case Number: T 2296/14 - 3.5.06

Application Number: 03768034.5

Publication Number: 1576468

IPC: G06F9/445

Language of the proceedings: EN

Title of invention:

ENCAPSULATED HARDWARE CONFIGURATION/CONTROL

Applicant:

Partners for Corporate Research International

Headword:

Encapsulated hardware configuration/PARTNERS FOR CORPORATE
RESEARCH INTERNATIONAL

Relevant legal provisions:

EPC Art. 123(2)
EPC 1973 Art. 84, 111(1)
RPBA 2020 Art. 11

Keyword:

Amendments - added subject-matter (no)
Claims - clarity (yes)
Remittal to the department of first instance - (yes)

Decisions cited:

T 1742/12

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 2296/14 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 6 May 2021

Appellant: Partners for Corporate Research International
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 21 July 2014
refusing European patent application No.
03768034.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman M. Müller
Members: A. Teale
A. Jimenez

Summary of Facts and Submissions

- I. This is an appeal against the decision, dispatched with reasons on 21 July 2014, to refuse European patent application No. 03 768 034.5 on the basis that claims 1 and 6 of the main and auxiliary requests did not comply with Article 123(2) EPC. In a section entitled "Obiter Dictum", the examining division also raised a clarity objection, Article 84 EPC, against claims 1 and 6 of both requests.
- II. Amongst others, the following documents were cited during examination proceedings:
- D1: EP 0 661 850 A
D4: US 6 222 757 B1
D6: US 6 061 748 A (initially referred to as D3)
D7: "8237A HIGH PERFORMANCE PROGRAMMABLE DMA CONTROLLER", INTEL data sheet, 30 September 1993, pages 1 to 19, XP055096426, retrieved from the Internet URL <https://pdos.csail.mit.edu/6.828/2004/readings/hardware/8237A.pdf> on 14 January 2014 (initially referred to as D4).
- III. A notice of appeal and the appeal fee were received on 29 September 2014, the appellant requesting that the decision be set aside and a patent granted.
- IV. With a statement of grounds of appeal, received on 28 November 2014, the appellant refiled the main request upon which the decision was based and submitted a new auxiliary request, replacing that dealt with in the decision. The appellant requested that the decision be set aside and the case remitted to the examining division for further prosecution on the basis of either

the main or the auxiliary request. In the case of the auxiliary request, the board was requested to consider the requirements of Articles 123(2) and 84 EPC.

- V. In an annex to a summons to oral proceedings the board set out its provisional opinion on the appeal that it had doubts whether the independent claims of both requests satisfied Article 123(2) EPC regarding added subject-matter. It was also doubtful whether the independent claims of both requests were clear, Article 84 EPC 1973. Furthermore the subject-matter of the independent claims of both requests seemed to lack inventive step, Article 56 EPC 1973, in view of the combination of D1 with either D6 or D7.
- VI. With a response received on 1 April 2021 the appellant submitted amended claims according to a main and first and second auxiliary requests and corresponding amended description pages.
- VII. At the end of the oral proceedings the appellant submitted amended claims according to a new main request and requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims of said new main request filed during the oral proceedings and the description and drawings according to the second auxiliary request filed on 1 April 2021 and that the case be remitted to the examining division for further prosecution.
- VIII. The application is thus being considered in the following form:

Description:

page 1, received on 3 May 2007, and pages 1a and 2 to 4 (second auxiliary request), received on 1 April 2021.

Claims:

1 to 10, submitted in the oral proceedings before the board.

Drawings:

Page 1, as originally filed.

IX. The two independent claims read as follows.

"1. A method of operating an apparatus for performing configuration or control of a subsystem, wherein the apparatus comprises the subsystem and a configuration/control unit encapsulated within the subsystem, the configuration/control unit having a controller portion (113) and a storage portion (115) storing configuration parameters; the method comprising:

- the configuration/control unit receiving a Configuration/Control ID; and
- the configuration/control unit, in response to the Configuration/Control ID, performing configuration or control of the subsystem (110), including storing at least one configuration parameter at a location (111) within the subsystem; and
- wherein the configuration/control unit is adapted to perform different corresponding configuration or control actions with respect to the subsystem (110) in response to different Configuration/Control IDs, wherein the subsystem is a USB controller, and characterized in that the subsystem comprises a DMA controller being configurable to automatically reinitialize after successfully receiving a USB packet, the method further comprising enabling and disabling said automatic reinitialization with respective Configuration/Control IDs."

"6. An apparatus comprising a subsystem having self-configuration capabilities, the subsystem being a USB controller, and the subsystem comprising:

- a register section (111) including multiple registers, the subsystem functioning differently depending on contents of the registers; and
- a configuration/control unit having a controller portion (113) and a storage portion (115) storing configuration parameters, wherein the configuration/control unit is encapsulated within the subsystem;

wherein the configuration/control unit is responsive to a Configuration/Control ID for performing configuration or control of the subsystem (110), including storing at least one configuration parameter at a location (111) within the subsystem (110), and wherein the configuration/control unit is responsive to multiple different configuration/control IDs for performing different corresponding configuration or control actions with respect to the subsystem, characterized in that the subsystem comprises a DMA controller being configurable to automatically reinitialize after successfully receiving a USB packet, wherein said automatic reinitialization is enabled and disabled by respective Configuration/Control IDs."

Reasons for the Decision

1. The admissibility of the appeal

In view of the facts set out at points I, III and IV above, the appeal complies with the admissibility criteria under the EPC and is therefore admissible.

2. A summary of the invention

2.1 The invention relates to a USB controller configured by setting the values in a plurality of its storage registers (see figure 1; 110 and page 3, line 12, to page 4, line 5). The USB controller is addressed by an external processor (101) via a system bus (103).

2.2 The problem arises that manually configuring such systems can be laborious and error-prone. The invention aims to automate such configuration, which can not only occur when the USB controller is initialized, termed "configuration" in the claims, but also during its operation, termed "control" in the claims.

2.3 The problem is solved by making the USB controller self-configuring by means of a configuration controller (113) (termed a "controller portion" in the claims and a "Configuration/Control State Machine" on page 2, lines 27 to 29) connected to the system bus and encapsulated in the USB controller. The configuration controller uses configuration parameters stored in ROM (115) (termed a "storage portion" in the claims) to configure/control the USB controller in response to a configuration/control ID from the external processor (101) indicating the desired configuration; see page 3, lines 1 to 3. The configuration controller configures/controls the USB controller subsystem by carrying out one or more write cycles of the subsystem registers (111; 1-4) via an internal subsystem bus (117).

2.4 The USB controller may be configured in one of several modes, in particular a "Control" mode and a "Bulk" mode", depending on the configuration/control ID that it receives; see page 3, lines 14 to 15. Depending on the selected mode, automatic re-initialization of a DMA

(Direct Memory Access) controller in the USB controller after a USB packet has been successfully received may be enabled or disabled; see pages 3, lines 24 to 30.

3. Added subject-matter, Article 123(2) EPC
- 3.1 According to the appealed decision, whilst the original application disclosed configuration/control IDs corresponding to **modes** (see page 3, lines 24 to 30), claims 1 and 6 according to *inter alia* the present main request had been amended to set out configuration/control IDs corresponding to configuration/control **actions** instead (emphasis added by the board).
- 3.2 The appellant has argued that a "Configuration/Control ID" causes a Configuration/Control action, as set out in original claims 4 and 5 and that the enable/disable re-initialisation options were disclosed on page 3, lines 28 to 30.
- 3.3 The board notes that original claims 5 and 10 both refer to the configuration/control unit being responsive to "multiple different configuration/control IDs for performing different corresponding configuration or control **actions** with respect to the subsystem (110)" (emphasis added by the board). Hence original claims 5 and 10 provide a basis for the passage at the end of present claim 1 (see lines 14 to 16) stating "wherein the configuration/control unit is adapted to perform different corresponding configuration or control actions with respect to the subsystem (110) in response to different Configuration/Control IDs". The same applies to the similar expression in claim 6; see lines 12 to 14. Hence the present independent claims overcome this reason for the decision.

3.4 The board also raised objections *ex officio* against previous versions of the claims. Claims 1 and 6 of those versions were based on original claims 1 and 6, respectively, restricted by setting out *inter alia* a DMA controller which could be automatically reinitialised after receiving a bus packet, as disclosed between page 3, line 12, and page 4, line 5. The original disclosure of the DMA controller was in the context of a USB controller receiving USB packets; see original page 3, lines 24 to 27. Claims 1 and 6 were however not restricted to a USB controller or USB packets and were thus directed to a non-disclosed intermediate generalisation, adding subject-matter, contrary to Article 123(2) EPC. The appellant has now amended claims 1 and 6 to set out that the subsystem is a USB controller and that it receives USB packets, thus overcoming these objections.

3.5 In the oral proceedings the board also raised the objection against a previous version of claim 1 that subject-matter had been added by setting out a (USB controller) subsystem "together with" a configuration/control unit, whilst claim 6 and the original description (see page 2, lines 5 to 7) both stated that the subsystem contained the configuration/control unit. In particular claim 6 set out "a subsystem having self-configuration capabilities" and the cited passage in the description referred to the configuration/control functionality being "encapsulated" within the hardware system itself ...". The expression "together with" had added the concept, not directly and unambiguously derivable from the original application, that the configuration/control unit could be outside the USB controller. The appellant has overcome this objection by setting out in claim 1 a "configuration/control unit

encapsulated within the subsystem". A similar expression has been added to claim 6.

4. Clarity, Article 84 EPC 1973

4.1 According to the section entitled "Obiter dictum" in the decision, claims 1 and 6 of *inter alia* the main request in the decision were unclear because they did not specify the connection between configuration/control IDs and configuration/control actions.

4.2 The board notes that the corresponding passages in claim 1 of the present request (and the corresponding expressions in claim 6)

"wherein the configuration/control unit is adapted to perform different corresponding configuration or control actions with respect to the subsystem (110) in response to different Configuration/Control IDs" and

"the method further comprising enabling and disabling said automatic reinitialization with respective Configuration/Control IDs"

cover the case where a Configuration/Control ID corresponds to a particular configuration (based on original claims 1 and 6) and the case where a Configuration/Control ID corresponds to particular actions" (based on original claims 5 and 10).

4.3 The application discloses the USB controller having four modes, namely "Control", "Interrupt", "Isochronous" and "Bulk"; see page 3, lines 12 to 14. The controller responds to the Configuration/Control ID corresponding to each of these modes by writing to a number of registers, for instance the "endpoint

enable", "endpoint interrupt" and "DMA control" registers; see page 3, lines 15 to 19. Also, depending on the selected mode, various subsystem hardware options can be set. For instance, a DMA controller can be enabled or disabled to automatically re-initialize after successfully receiving a bus packet; see page 3, lines 24 to 27. These are examples of a Configuration/Control ID corresponding to a mode.

- 4.4 The description also discloses an example of a Configuration/Control ID corresponding to what the board understands to be an "action". According to the paragraph bridging pages 3 and 4, a single Configuration/Control ID may put the subsystem into "Suspend" mode, thus reducing power consumption when there is no USB traffic.
- 4.5 Hence the board finds that the present claims make the connection between configuration/control IDs and configuration/control actions clear, overcoming the objection by the examining division.
- 4.6 An objection by the board, that the use of two different expressions, namely "activation signal" and "Configuration/Control ID", to refer to the same instruction received by the configuration control unit (113) via the system bus (103) from the processor (101) made claims 1 and 6 unclear, has now been overcome by deleting the expression "activation signal" from the claims.
- 4.7 The board also raised an objection, against a previous version of the independent claims, that they set out the feature that the DMA controller was configurable to enable or disable "automatically reinitializ[ing] after successfully receiving a bus packet", but did not set

out a bus or the reception of a bus packet, making the limitative effect of the term "bus packet" unclear. This objection has been overcome by setting out "receiving a USB packet" in claims 1 and 6.

5. The prior art on file

5.1 Document D1 (EP 0 661 850 A)

5.1.1 D1 concerns a configuration management (CFM) state machine (figure 4; CFM) for use in a physical layer controller (figure 2; 10) for a node (also referred to as a "station" or "concentrator") in an FDDI (Fibre Distributed Data Interface) data transmission network. The physical layer controller comprises registers (figure 2; 17), comprising a null configuration register, a join configuration register and a loop configuration register, each register storing information (see figures 9 to 11) relating to the configuration of the controller when the CFM state machine is in a respective "null", "join" or "loop" configuration.

5.1.2 The CFM state machine is capable of automatically configuring/reconfiguring the CFM state machine in a "Null", "Join" or "Loop" configuration in response to CFM control flags (CF_Loop, CF_Join; see column 9, lines 14 to 18) received from the PCM (Physical Connection Management entity); see column 6, lines 20 to 24 and figure 4; PCM. The specific effects of the content of the three registers (see figures 9-11; 41, 43, 45) are set out from column 12, line 40, to column 13, line 52, and in column 14, lines 37 to 57.

5.1.3 The use of the three configuration registers allows the controller to change configuration without any software

intervention, thus allowing network connections to be quickly established; see column 15, lines 3 to 12.

- 5.1.4 In the annex to the summons the board argued that the CFM state machine known from D1 must store configuration parameters, this implying a storage portion. The appellant has disputed this, arguing that D1 did not disclose the CFM comprising a storage portion for at least one configuration parameter or the CFM, in response to a signal, storing at least one configuration parameters at a location within the subsystem. In particular, the configuration parameters stored in the Null, Join and Loop configuration registers were not written there by the CFM. Instead, these values were stored by the user in advance; see column 6, line 38 to 43. Moreover the three registers were not part of the CFM.
- 5.1.5 The board is persuaded by the appellant's arguments, in particular the reference to column 6, line 38 to 43, that D1 requires the user to set up the required configuration parameters in the Null, Join and Loop configuration registers, the PCM instructing the CFM which set of parameters to use by means of the CF_Loop and CF_Join flags; see column 6, lines 14 to 18.
- 5.1.6 The board regards the physical layer controller in D1 as a "subsystem" and the CFM state machine as a "configuration/control unit" in the sense of the claims. Consequently, in the terms of claim 1, D1 discloses a method of operating an apparatus for performing configuration or control of a subsystem (10) and a configuration/control unit (CFM) encapsulated within the subsystem, the configuration/control unit having a controller portion, the configuration/control unit receiving an activation signal (CF_Join, CF_Loop

flags; see column 4, lines 25 to 37); and the configuration/control unit, in response to the Configuration/Control ID, performing configuration or control of the subsystem, wherein the configuration/control unit is adapted to perform different corresponding configuration or control actions with respect to the subsystem in response to different Configuration/Control IDs; see column 4, lines 28 to 37.

5.2 Document D6 (initially D3) (US 6 061 748 A)

5.2.1 D6 was cited by the examining division as evidence that it would have been obvious to automatically re-initialise a DMA controller after a bus packet had been successfully received; see column 2, line 66, to column 3, line 29.

5.2.2 D6 relates to transmitting data packets between networks while minimizing CPU (Central Processing Unit) intervention, the system comprising a CPU bus (1) and a DMA (Direct Memory Access) bus (13); see figure 3 and column 4, lines 44 to 54.

5.2.3 The passage cited by the examining division concerns the prior art shown in figure 1 in D6 in which there is no separate DMA bus, meaning that the DMA controllers (A, B) (6, 7) must arbitrate with the CPU (5) for access to the CPU bus (1) in order to transfer a data packet from network A (3) via system memory (2) to network B (8). DMA controller B is initialised by the CPU before data is transferred from the system memory (2) to network B; see column 3, lines 17 to 29.

5.3 Document D7 (initially D4) (8237A High performance programmable DMA controller ...)

- 5.3.1 D7 is a data sheet for a programmable DMA controller having four independent DMA channels which can all independently auto-initialise; see top of page 1. According to the penultimate sentence of the summary, "Each channel can be individually programmed to Autoinitialize to its original condition following an End of Process (EOP)."
- 5.3.2 According to the table on page 2, an EOP concerns the completion of DMA services. Page 4 sets out four operation modes of the DMA controller. By setting a bit in the "Mode" register, a channel may be set up to autoinitialise after it has performed a DMA service; see page 5, section "Autoinitialize".
6. Inventive step, Article 56 EPC 1973
 - 6.1 Inventive step was not discussed in the appealed decision. However inventive step was questioned during examination proceedings. The communication dated 30 October 2006 raised an objection of lack of inventive step in view of what are now termed D1 and D4, D4 being cited concerning the memory portion. A subsequent communication dated 7 February 2014 raised an objection of lack of inventive step in view of what are now termed D1, D4 and D6, D6 being cited as evidence of re-initialising a DMA controller.
 - 6.2 The appellant has questioned whether D1 forms the closest prior art and whether D6 (previously called D3) disclosed configuration or control actions comprising enabling or disabling automatic re-initialization of a DMA controller after a bus packet had been successfully received dependent on the configuration/control ID. The appellant did not dispute that D6 disclosed automatic re-initialization *per se*. D6 did not however mention

multiple operating modes. The problem starting from D1 could be formulated as "how to switch a DMA controller of a subsystem configurable by Configuration/Control IDs to the correct reinitialization mode". The claimed invention was thus not obvious in view of the combination of D1 and D6. Moreover D7 (then called D4) disclosed a DMA controller with a mode register having a bit which enabled or disabled auto-initialisation. D7 however disclosed the register being written to directly; re-initialisation only then occurred when an EOP signal occurred.

- 6.3 Regarding the suitability of D1 as a starting document for assessing inventive step, the board takes the view that the skilled person can start from any prior art disclosure, including D1, inventive step depending on whether the skilled person would arrive at the claimed subject-matter in an obvious manner (see, e.g., T 1742/12, points 9 and 10).
- 6.4 The subject-matter of claim 1 differs from the disclosure of D1 in the following features:
- a. the configuration/controller unit also having a storage portion storing configuration parameters;
 - b. the configuration/control unit, in response to a Configuration/Control ID, storing at least one configuration parameter at a location within the subsystem;
 - c. the subsystem is a USB controller and
 - d. the subsystem comprises a DMA controller being configurable to automatically reinitialize after successfully receiving a USB packet, the method

further comprising enabling and disabling said automatic reinitialization with respective Configuration/Control IDs.

- 6.5 None of the difference features is completely known from the documents on file. In particular, although D6 and D7 disclose DMA controllers (feature "d"), neither does so in the context of a USB controller (difference "c").
- 6.6 The board is unaware of an obvious problem starting from D1 that would have caused the skilled person to turn the physical layer controller (10) into a USB controller and to also add a DMA controller. Furthermore, as the appellant has argued, there would have been no obvious reason starting from D1 for the skilled person to modify the CFM, whose role is to define the interconnections of ports and MACs within a FDDI node and to control the routing of data within the node, to also control the enabling/disabling of automatic reinitialisation of a DMA controller in response to a further flag from the PCM.
- 6.7 Hence the subject-matter of claim 1 involves an inventive step in view of the combination of D1 with either D6 or D7, Article 56 EPC 1973. The same argument applies to the corresponding apparatus claim 6. As explained below, the board however refrains from making a conclusive finding on inventive step in general.
7. Remittal, Articles 111(1) EPC 1973 and 11 RPBA 2020
- 7.1 The present independent claims have been greatly restricted, compared to those as originally filed, which neither set out a USB controller nor a DMA controller. It is thus likely that more relevant prior

art exists than could be initially included in the search. As D1, the starting point for assessing inventive step in this decision, discloses neither, the board refrains from making a conclusive finding on inventive step.

- 7.2 These circumstances constitute special reasons for remitting the case to the examining division, so that it can form an opinion on the amended claims and, if appropriate, search for more relevant prior art.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division for further prosecution.

The Registrar:

The Chairman:



A. Voyé

M. Müller

Decision electronically authenticated