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**Datasheet for the decision  
of 23 October 2018**

**Case Number:** T 0778/17 - 3.5.06

**Application Number:** 10004490.8

**Publication Number:** 2383648

**IPC:** G06F9/50, G06F9/48, G06T1/20,  
G06T15/00

**Language of the proceedings:** EN

**Title of invention:**  
Technique for GPU command scheduling

**Applicant:**  
Telefonaktiebolaget LM Ericsson (publ)

**Headword:**  
GPU idle period/ERICSSON

**Relevant legal provisions:**  
EPC R. 137(3)  
EPC Art. 83, 84, 111(2)

**Keyword:**  
Sufficiency of disclosure - (yes)  
Claims - clarity (yes)  
Remittal to the department of first instance

**Decisions cited:**

T 2026/15

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
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Case Number: T 0778/17 - 3.5.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.06**  
**of 23 October 2018**

**Appellant:** Telefonaktiebolaget LM Ericsson (publ)  
(Applicant) 164 83 Stockholm (SE)

**Representative:** Röthinger, Rainer  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 11 November  
2016 refusing European patent application No.  
10004490.8 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** W. Sekretaruk  
**Members:** M. Müller  
S. Krischer

## Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division, despatched with reasons dated 11 November 2016, to refuse European patent application No. 10 004 490. The main request was found not to comply with Articles 83 and 84 EPC, and the three auxiliary requests were not admitted pursuant to Rule 137(3) EPC. Although a number of documents were mentioned in the decision, none of them was relied upon in the reasons. In particular, neither novelty nor inventive step was discussed or decided upon.
- II. Notice of appeal was filed on 9 December 2016, the appeal fee being paid on the same day. A statement of grounds of appeal was received on 10 March 2017. The appellant requests that the decision be set aside and that a patent be granted on the basis of claims 1-24 of a main request or one of auxiliary requests 1-4, which were all the subject of the refusal and were re-filed with the grounds of appeal, the other application documents being
- | description, pages |  |
|--------------------|--|
| 1, 4, 7-16         | as originally filed,                     |
| 2, 2a              | filed by letter of 16 December 2010,     |
| 3a, 5a, 6, 6a      | filed by letter of 23 September 2011,    |
| 3, 5               | filed by letter of 20 November 2012, and |
| drawings           |  |
| 1-8                | as originally filed.                     |
- III. Independent claims 1 and 14 of the main request read as follows:

"1. A method of scheduling the dispatching of Graphical Processing Unit, GPU, commands, the method comprising

the following steps being performed by a scheduler (140):

receiving (302) commands from a plurality of applications;

buffering (304) the received commands; and  
**characterized by** dispatching (306) the buffered commands as a command batch towards a GPU (180), wherein the dispatching is controlled based on a scheduling and independently from processing requests initiated by the GPU (180) itself, the scheduling being determined to control creation of a GPU idle period between two successive command batches dispatched towards the GPU (180) in which the GPU (180) enters a low power mode or goes to sleep."

"14. A scheduler (140) for Graphical Processing Unit, GPU, commands,

the scheduler (140) comprising:

an interface (220) adapted to receive commands from a plurality of applications; a buffer (240) adapted to buffer the received commands;

**characterized by**

a controller (260) adapted to dispatch the buffered commands as a command batch towards a GPU (180),

wherein the controller (260) is adapted to control the dispatching based on a scheduling and independently from processing requests initiated by the GPU (180) itself, the scheduling being determined to control creation of a GPU idle period between two successive command batches dispatched towards the GPU (180) in which the GPU (180) enters a low power mode or goes to sleep."

The wording of the claims of the auxiliary requests is immaterial for this decision.

- IV. In an annex to a summons to oral proceedings, the board informed the appellant of its preliminary opinion that the claims, properly construed, complied with Articles 83 and 84 EPC and of its intention to remit the case to the examining division for further prosecution. The appellant was also informed that the oral proceedings could be avoided if it did not wish to challenge the claim interpretation on which the board's conclusion was based.
- V. In a letter dated 18 July 2018, the appellant informed the board that it did not intend to provide further arguments and would not be attending the scheduled oral proceedings. Accordingly, the oral proceedings were cancelled.

## **Reasons for the Decision**

### *The invention*

1. The application relates to a graphics processor (GPU) used by several applications in parallel (see figures 1 and 2). It discloses that it was known in the art that schedulers could be used in order to prevent the GPU being monopolised by one of the applications (see page 2, paragraphs 3 and 4, of the application as originally filed). It states that the conventional, "application-centred" scheduling approach is disadvantageous and should be improved (page 2, paragraphs 6 and 7).
- 1.1 It is proposed that commands to the GPU are buffered and sent to the GPU in batches (see figure 2, box 240 and the arrow emanating from it; figure 3). This is

said to be done "such that a GPU idle period is created between two successive command batches", during which the GPU could reduce its power consumption (see page 3, paragraphs 1 and 3; page 8, paragraph 2; page 9, paragraph 4; page 10, paragraph 3; figure 4). The idle period could be extended by, for instance, analysing the command batches and excluding some of the commands from being despatched to the GPU (see page 3, paragraph 4, and page 8, paragraph 3).

- 1.2 It is also specified that the "display update rate" may have to be adjusted, in particular "pro-actively limited by the OS" in view of the "overall load and power consumption" of the system (see paragraph bridging pages 10 and 11).

*The decision under appeal*

2. The examining division found that the claimed invention (according to all requests pending at the time) was insufficiently disclosed and thus did not comply with Article 83 EPC due, in particular, to the feature of "the scheduling being determined to control the creation of a GPU idle period between two successive command batches dispatched towards the GPU (180)" (see the decision, points 3.1, 5.1 and 6.1 of the reasons). The same feature was also found to be deficient under Article 84 EPC because it attempted to define the subject-matter in terms of the result to be achieved, although it appeared possible to define the subject-matter in more concrete terms (see points 4.1 and 4.2 of the reasons).

*Article 83 EPC*

3. In the board's judgment, the invention, which according to Article 83 EPC must be disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, is the invention as claimed.

3.1 This means that deficiencies of the application may be immaterial under Article 83 EPC if and as long as they have no bearing on the claimed subject-matter.

3.2 From that perspective, assessing whether the claimed invention complies with Article 83 EPC entails determining exactly what the claimed invention implies.

4. Claim 1 of the main request requires commands to be buffered and despatched to the GPU in batches, according to some "scheduling". The "processing requests initiated by the GPU itself" are not subject to this scheduling. In the board's view, this much is clear, even though virtually no detail of the scheduling is specified. The board also has no doubt that this part of the claimed subject-matter is straightforward to carry out.

4.1 The scheduling is then claimed to be "determined to control creation of a GPU idle period" between batches. The examining division was correct in finding that the claim does not specify any detail about the "control" being exerted or the length of the idle period desired or obtained.

4.2 The board takes the view that the skilled person would understand the feature in question as requiring the



scheduler to do something more than only create command batches in order to create idle periods.

- 4.3 Claim 1 leaves open exactly what the scheduler does in order to create the idle period. On the other hand, it does not specify any desired property of the idle period or any property of the overall system that may have to be maintained even in the presence of an idle period.
- 4.4 It is therefore straightforward for the skilled person to carry out the invention. The scheduler could, for instance, despatch a new batch only after the previous one has been processed by the GPU and, in addition, after some - fixed or random - idle period has elapsed.
- 4.5 The board concedes that the enforcement of idle periods as just sketched may be problematic in situations in which the GPU is used to full capacity. If, in such a situation, an idle period is enforced, not all work will be done (or not promptly). It may, for instance, become impossible to draw 60 frames per second, and so the frame rate may go down. Firstly, however, the claim does not exclude this from happening, and secondly the application discloses it to be normal GPU behaviour that the frame rate may go down - i.e. that frames may be missed - when the load is too high.
- 4.6 The board therefore concludes that the invention according to claims 1 and 14 is sufficiently disclosed within the meaning of Article 83 EPC.

*Article 84 EPC*

5. The examining division's objection under Article 84 EPC is substantially based on the same perceived

deficiency, namely the lack of detail in the claims as to how the scheduling is to determine the GPU idle period.

- 5.1 As already stated above (see point 4.3), the claims do not specify any property of the system that has to be achieved or maintained in view of the idle period thus created. In other words, the claims effectively require the creation of an idle period of any length, without any further "result" having to be achieved.
- 5.2 The board takes the view that in these circumstances the lack of detail as to idle period creation does not render claims 1 and 14 unclear, Article 84 EPC.

*Remittal for further prosecution*

- 6. The decision under appeal was based solely on the examining division's finding that claim 1 of the main request did not comply with Articles 83 and 84 EPC. Even the non-admission of the auxiliary requests was based on the fact that the auxiliary requests were found to share these deficiencies with the main request.
  - 6.1 Since the board comes to a different conclusion than the examining division, the decision must be set aside. Furthermore, because the decision did not discuss or decide upon novelty or inventive step, the board considers it appropriate to remit the case to the examining division for further prosecution.
  - 6.2 The board stresses that it disagrees with the objections under Articles 83 and 84 EPC in the decision only on the basis of a broad claim interpretation. This

interpretation is *ratio decidendi* for the board's decision, and the examining division will be bound by it under Article 111(2) EPC.

6.3 As a consequence, the appellant will not be able to rely on the subject-matter of claims 1 and 14 according to the main request having any specific effects that go beyond this interpretation.

6.4 For instance, the claims do not imply any consideration of the frame rate vis-à-vis the batch size, nor any specific length of the idle period. In particular, the claims do not specify that the scheduling is performed in view of any predetermined and desired effect on the frame rate. It would also seem to be impossible to determine the power-saving effect of the claimed scheduling or its exploitation by the GPU by entering a low-power mode or going to sleep. Obviously, either of these measures saves power in comparison with not taking them. To the extent, however, that the effect is achieved only by doing less work, which the claim language does not seem to exclude, it would appear to be trivial.

#### *Auxiliary requests*

7. In its decision not to admit the auxiliary requests under Rule 137(3) EPC, the examining division stated that "the same objection made under Article 83 EPC request still holds prima facie" for the auxiliary requests (see points 5.1 and 6.1 of the reasons, paragraph 1). However, it also stated that the "objection under Article 83 EPC made for the main request is still valid", which makes it unclear whether the substantive finding underlying the non-admission decision was a mere *prima facie* finding or not. As

explained in T 2026/15 (see points 2 to 3 of the reasons), the board considers this to be crucial for the question of whether or not the non-admission decision was correct.

- 7.1 Either way, however, the board takes the view that, by deciding not to admit the auxiliary requests, the examining division effectively decided that it was justified to decide about the patent application as a whole without going further into the details of the auxiliary requests (see also T 2026/15, point 2.3 of the reasons).
- 7.2 With the decision being set aside, the examining division's decision not to admit the auxiliary requests is also set aside. This does not mean that the auxiliary requests are, *ipso facto*, admitted, but the examining division may have to assess their admission again during further prosecution.

**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:



B. Atienza Vivancos

W. Sekretaruk

Decision electronically authenticated