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Datasheet for the decision
of 7 September 2017

Case Number: T 2027/12 - 3.4.03
Application Number: 03023441.3
Publication Number: 1414015
IPC: G09G5/36, H04N7/58, H04N5/04
Language of the proceedings: EN

Title of invention:
Video bus for a video decoding system

Applicant:
Avago Technologies General IP
(Singapore) Pte. Ltd.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56, 84
EPC Art. 123(2)

Keyword:
Inventive step - (yes)
Amendments - added subject-matter (no) - after amendment
Decisions cited:

Catchword:
DECISION
of Technical Board of Appeal 3.4.03
of 7 September 2017

Appellant: Avago Technologies General IP
(Singapore) Pte. Ltd.
1 Yishun Avenue 7
Singapore 768923 (SG)

Representative: Jehle, Volker Armin
Bosch Jehle Patentanwaltsgesellschaft mbH
Flüggenstrasse 13
80639 München (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 3 April 2012
refusing European patent application No.
03023441.3 pursuant to Article 97(2) EPC.

Composition of the Board:
Chairman G. Eliasson
Members: M. Papastefanou
T. Bokor
Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing the European patent application No. 03 023 441.3 on the ground that the subject matter of both the Main and the Auxiliary requests before it did not involve an inventive step within the meaning of Article 56 EPC.

II. The following documents, cited during the first instance examination proceedings, are referred to in this decision:
D1: US 5 602 878 A
D2: LIM T S, "Parallel communication with handshake between two microcomputers", SOUTHEASTCON '93, PROCEEDINGS., IEEE CHARLOTTE, NC, USA, 4-7 April 1993, NEW YORK, NY, USA, IEEE 4 April 1993 (XP010146734)

III. In a communication pursuant to Rule 100(2) EPC, the Board indicated that the Main request filed with the statement of the grounds of appeal met the requirements of Article 52(1) EPC but raised objections under Article 123(2) EPC because claims 1 and 6 comprised subject matter going beyond the originally filed content of the application. In addition, objections under Article 84 EPC 1973 in combination with Rule 27 EPC 1973 were raised because the description was not adapted to the claims and comprised ambiguous statements ("incorporated by reference") as well an incomprehensible term ("analog hynecs").

IV. In reaction to this communication by the Board, the Appellant filed an amended Main request taking into account the Board's objections.
V. The Appellant requests that the decision under appeal be set aside and that a patent be granted in the following version:

Claims: 1-10 filed with letter dated 26 July 2017;
Description:
    Pages 1-24 filed with letter dated 26 July 2017;
Drawings: Sheets 1/13-13/13 as originally filed.

VI. Independent claim 1 of the Main request has the following wording:

A method of transmitting data using a bus (612) in a network comprising:
    transmitting (710) the data over the bus (612) at a first rate, wherein a sender module (610) is transmitting said data in response to an incoming accept signal (611);
    receiving (712) the data at a processing module (630) in the network;
    storing (714) the data in a storage module (632) in said processing module (630);
    preventing data overrun of said storage module (632) by monitoring a state of said storage module and stalling the data flow by shutting off said accept signal (611); and
    processing the data stored in said storage module (632) at a second rate.

VII. Independent claim 6 is worded as follows:

A system for transmitting data in a network from a sender module (610) to a processing module (630) wherein
the sender module (610) is adapted and configured for transmitting (710) the data over a bus (612) at a first
rate in response to an incoming accept signal (611), and wherein the processing module (630) is adapted and configured for receiving (712) the data and for storing (714) the data in a storage module (632) in said processing module (630), and for preventing (716) data overrun of said storage module by monitoring a state of said storage module (632) and stalling the data flow by shutting off said accept signal (611); and for processing the data stored in said storage module at a second rate.

Reasons for the Decision

1. The appeal is admissible.

2. Claims - Amendments

2.1 The amended claims overcome the objection under Article 123(2) EPC raised by the Board in its communication since the feature objected to ("transmitting a burst of data") has been removed from the claims.

2.2 The term "plurality of data words" was also removed from the independent claims; this amendment is not objected to since it finds basis in original claim 7.

2.3 In a further amendment, the term "control information" has been removed from the claims. This term is present in original claim 7 ("transmitting data and control information") but the Appellant has indicated as basis for its removal Figure 7 and line 9 on page 25 of the originally filed application.

2.3.1 The passage on page 25, lines 9-13 of the originally filed description reads as follows:
Fig. 7 illustrates one embodiment of a high level flow diagram for a method of transmitting data over a bus or link, generally designated 700, in accordance with one embodiment of the present invention. More specifically, the pixels or other data and the control information are transmitted over the bus...." (emphasis by the Board).

A similar sentence is also to be found on page 25, lines 27-31 with reference to Figures 8A and 8B.

The Board understands the term "data" in the first instance (sentence) to indicate everything that is transmitted over the bus (or link). In the second instance (sentence), it is specified what these transmitted data consist of: pixels or other (image/video) data and control information.

This interpretation is consistent with the rest of the description. In page 22, lines 15-16 it is explained that "...the bus is adapted to carry or transmit a data structure containing control and video (or data) information...".

In a similar way, it is explained that "...the field of data is sent as a contiguous array of data on the bus..." (page 27, line 10).

The Board considers, thus, that this amendment finds basis in the originally filed application as indicated by the Appellant.

2.4 The Board is satisfied that the requirements of Article 123(2) EPC are met.

3. Inventive Step
3.1 The invention

The invention relates to the transmission of data from a sender video module to a receiver video module over a bus in a network. The particularity of the method and the system of the application is that there are (at least) two different clocks (rates) present: one is for the transmission of data and the other for the processing of the data. The bus that connects the two modules provides for a synchronous transmission of data, so that the transmitter on the sender video module and the receiver on the receiver video module are synchronized by the same clock. On the receiver module, the received data are stored at a storage module at the rate they are received (and transmitted). The data are then retrieved from the storage module and processed at a different rate, which may be lower than the receiving rate (see paragraphs [0081], [0088]). In order to prevent data overrun at the storage module, an incoming accept signal is used. When the signal is asserted (on), data are transmitted from the sender video module. When the storage module at the receiver module is full, the incoming accept signal is shut off and data transmission is stalled.

3.2 State of the art

3.2.1 The prior art documents cited during the first instance examination proceedings, in particular D1 and D2, address the problem of asynchronous data transmission between two modules that operate under different clocks (rates).

3.3 The Examining Division considered document D1 as closest prior art. This selection was not disputed by
the Appellant and the Board does not see any reason to put it into question, either.

3.3.1 D1 describes the use of a handshake protocol in the data transmission between two modules using different clocks (rates). When the sender module, which operates at a first rate, is ready to transmit data, it emits a signal to the receiver module, which operates at a second rate. The data are transmitted and the receiver module will emit a reception acknowledgement signal to the sender module when data are received successfully. Only when such an acknowledgement signal is received at the sender module the next data package will be prepared for transmission (see Figures 1, 2 and column 2, line 43 - column 4, line 48).

3.3.2 D2 describes a similar system with parallel, asynchronous data transmission using a handshake protocol (see section II and Figure 1).

3.4 Main request

3.4.1 Contrary to the arguments of the Appellant in the grounds of appeal, the independent claims of the Main request do not define the identified particularity of the transmission method of the application, i. e. that the transmission and reception of the data are synchronous but the processing of the received data by the processing module is done at a different rate. The claims define only that data are transmitted from a sender module at a first rate and that they are processed by the processing module at a second rate. This is valid also for the system and method described in D1, since the modules operate at different rates.
3.4.2 What distinguishes the claimed method from the one described in D1 is the use of the accept signal: data are transmitted from the sender module in response to this incoming accept signal and data flow is stalled (stopped) when this signal is shut off so that data overrun at the storage module is prevented.

3.5 The Examining Division considered that the signal of acknowledgement of data reception in D1 corresponded to the incoming accept signal of the claims. According to the decision, the sender module in D1 would transmit data only when the acknowledgement signal coming from the received module was asserted, so that this signal was also commanding the transmission of data as the accept signal in the claim. In addition, the Examining Division found that the possible use of buffers, if higher data transfer rate was required (column 4, lines 33-48), would be sufficient to lead the skilled person to the obvious conclusion that one of the possible reasons the receiver module would not be available for receiving data – and thus not emitting/asserting the reception acknowledgement signal – would be that the buffers were full. Hence, the de-assertion (shutting off) of the data reception acknowledgement signal would also protect the buffer (that would correspond to the storage module of the claims) from data overrun. The Examining Division concluded that claim 1 was obvious in view of D1.

3.6 The Board cannot follow this argumentation. The handshake protocol in an asynchronous data transmission between two modules is known in the state of the art and it is also described in the first part of D1 (see Figure 2) as indicated by the Examining Division. It is evident that the data reception acknowledgement signal is asserted (emitted) once data are received
successfully by the receiver module. At the moment when data are transmitted by the sender module this signal is not asserted since data reception cannot be acknowledged before data are actually received. Hence, the transmission of the data is triggered before the assertion of this signal, i.e. while this signal is shut off. Moreover, after each reception is acknowledged by the receiver module, the acknowledgement signal must be shut off so that the reception of the next piece of transmitted data can be acknowledged. Compared to this operation in D1, the accept signal in the claimed method is generally and constantly asserted (on) and it is shut off only when the flow of data is to be stalled. There is no acknowledgement of data reception at all in the claimed method and the signal is only used to allow or stop the flow of data between the two modules. Hence, the Board concludes that the accept signal in the claimed method is not equivalent to the data reception acknowledgement signal in D1. In addition, even if it were to be accepted that the buffers mentioned in D1 corresponded to the storage module of the claim, there is no indication in D1 that the state of the buffer(s) is monitored in order to prevent data overrun.

3.7 The differentiating features of claim 1 with regard to D1 are, therefore, the nature and function of the accept signal and the monitoring of the state of the storage module. The technical effect provided by these features is already stated in the claim: data overrun in the storage module is prevented. This improves the control of the data flow from the sender module to the processing module and the overall data transmission between the two modules.
3.8 As already stated above, given the structure and operation of the system in D1, the data reception acknowledgement signal in D1 cannot be considered to correspond to the incoming accept signal of the claims. The skilled person starting from D1 and wishing to improve the data flow from one module to the other would not be incited to modify the operation of the described system since any modification of the handshake protocol would affect negatively the data transmission from one module to the other. This is because the data transmission is asynchronous since the two modules operate under different clocks (rates). Nor would D2 provide any help to the skilled person since it also describes handshake protocols for asynchronous data transmission between two modules operating under different clocks (rates). The conclusion is that the method in claim 1 cannot be considered to be obvious to the skilled person taking into account the teachings of D1 and/or D2.

The same is also valid for independent claim 6, which defines the corresponding system.

3.9 Consequently, the Board concludes that claims 1-10 of the Main request involve an inventive step within the meaning of Article 56 EPC 1973.

4. Documents D1 and D2 are mentioned in the description (paragraphs [0001] and [0002] respectively), the description has been adapted to the claims and the objected ambiguous and incomprehensible terms have been deleted.

5. The Board is, hence, satisfied that the application meets the requirements of the EPC and EPC 1973.
Order

For these reasons it is decided that:

1. The appealed decision is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

   Claims: 1-10 filed with letter dated 26 July 2017;
   Description:
   Pages 1-24 filed with letter dated 26 July 2017;
   Drawings: Sheets 1/13-13/13 as originally filed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated