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Datasheet for the decision of 7 November 2019

Case Number: T 0856/17 - 3.5.05

Application Number: 09752992.9

Publication Number: 2359558

IPC: H04L27/26, H04L5/00, H04J11/00

Language of the proceedings: EN

Title of invention:
Method and system for receiver synchronization

Applicant:
Advanced Micro Devices, Inc.

Headword:
Gold sequences/MICRO

Relevant legal provisions:
EPC Art. 83, 84, 123(2)

Keyword:
Added subject-matter - (no, after amendments)
Clarity - (yes, after amendments)
Sufficiency of disclosure - (yes, after amendments)
Remittal to the first instance for further prosecution - (yes)

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Case Number: T 0856/17 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 7 November 2019

Appellant: (Applicant)	Advanced Micro Devices, Inc. 2485 Augustine Drive Santa Clara, CA 95054 (US)
Representative:	Williams, Michael David Marks & Clerk LLP 1 New York Street Manchester M1 4HD (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 21 October 2016 refusing European patent application No. 09752992.9 pursuant to Article 97(2) EPC**

Composition of the Board:

Chair	A. Ritzka
Members:	K. Bengi-Akyuerek
	G. Weiss

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division to refuse the present European patent application for lack of clarity (Article 84 EPC), insufficiency of disclosure (Article 83 EPC) and added subject-matter (Article 123(2) EPC) with respect to the independent claims of a sole set of claims.

II. With the statement setting out the grounds of appeal, the appellant filed amended sets of claims according to a main request and first to fifth auxiliary requests. It requested that the examining division's decision be set aside and that a patent be granted on the basis of any of those claim requests.

III. In a communication under Rule 100(2) EPC, the board gave its preliminary opinion on the appeal. In particular, it raised objections under Articles 123(2) and 84 EPC with respect to the main request and first to third auxiliary requests. It also indicated that the fourth and fifth auxiliary requests were considered to be allowable under Articles 123(2), 83 and 84 EPC and that it was minded to exercise its discretion under Article 111(1) EPC to remit the case to the examining division for further prosecution, on the basis of the claims of the present fourth or fifth auxiliary requests.

IV. With a letter of reply, the appellant requested that the case be remitted to the examining division for further prosecution on the basis of the claims of the fourth and fifth auxiliary requests on file. It further indicated that in the event of such a "remittance" the request for oral proceedings was withdrawn.

V. Claim 1 of the **fourth auxiliary request** reads as follows:

"A method (500) for synchronizing a multiple carrier receiver to receive a transmitted signal, comprising:

determining a location of one or more scattered pilot carriers in a received symbol sequence (502);

modulating (504) the scattered pilot carriers in accordance with a pseudorandom binary sequence to form modulated scattered pilot carriers, wherein the pseudorandom binary sequence is a Gold sequence at least twice as long as a symbol included in the symbol sequence, and wherein the modulating comprises cross-correlating the scattered pilot carriers with an FFT of the Gold sequence over a time period of two symbol durations; and

performing phase error correction via the modulated scattered pilot carriers (506)."

Claim 1 of the **fifth auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the fourth auxiliary request highlighted):

"A method (500) for synchronizing a multiple carrier receiver to receive a transmitted signal, comprising:

determining a location of one or more scattered pilot carriers in a received symbol sequence (502);

modulating (504) the scattered pilot carriers in accordance with a pseudorandom binary sequence to form modulated scattered pilot carriers, wherein the pseudorandom binary sequence is a Gold sequence at least twice as long as a symbol included in the symbol sequence, and wherein the modulating comprises cross-correlating the scattered pilot carriers with an

FFT of the Gold sequence over a time period of two symbol durations, and wherein the cross-correlation provides an output that includes an identifiable peak indicative of where a symbol begins in the received symbol sequence; and

performing phase error correction via the modulated scattered pilot carriers (506)."

The further independent **claims 2 and 7** of the fourth and fifth auxiliary requests are directed to a corresponding computer program and to a corresponding apparatus respectively.

Reasons for the Decision

1. *The present application*

The present application is concerned with demodulating OFDM symbols including scattered pilot symbols based on using cross-correlated Gold sequences.

According to the present description, the technical problem to be solved by the present application is to provide "an improved technique for performing receiver synchronization using a single pilot sequence in time domain" (see paragraph [0012] of the application as originally filed).

2. *Allowability of the Fourth and Fifth Auxiliary Requests*

Process claim 1 of the **fourth auxiliary request** comprises the following limiting features, as labelled by the board (amendments compared with claim 1 of the main request underlying the appealed decision being highlighted):

A method for synchronising a multiple-carrier receiver to receive a transmitted signal, comprising the steps

A) determining a location of one or more scattered pilot carriers in a received symbol sequence;
B) ~~de~~modulating the scattered pilot carriers in accordance with a ~~first~~ pseudorandom binary sequence (PRBS) to form ~~de~~modulated scattered pilot carriers,
C) wherein the ~~first~~ PRBS ~~includes at least two groups of symbols and each of the two groups of symbols has a symbol duration~~ is a Gold sequence at least twice as long as a symbol included in the symbol sequence,
D) wherein the modulating comprises cross-correlating the scattered pilot carriers with an FFT of the Gold sequence over a time period of two symbol durations;
E) performing phase error correction via the ~~de~~modulated scattered pilot carriers.

Claim 1 of the **fifth auxiliary request** further adds that

F) the cross-correlation provides an output that includes an identifiable peak indicative of where a symbol begins in the received symbol sequence (see e.g. paragraph [0059], last sentence of the application as originally filed).

Independent claims 2 and 7 of both auxiliary requests are directed to corresponding features of a computer program and an apparatus.

2.1 *Added subject-matter (Article 123(2) EPC)*

2.1.1 The examining division held that former features B) and C) contravened Article 123(2) EPC due to the previously recited features "demodulating the scattered pilot carriers in accordance with a first PRBS to form demodulated scattered pilot carriers" and "the first PRBS includes at least two groups of symbols and each of the two groups of symbols has a symbol duration" (see appealed decision, Reasons 16.1 to 16.3).

2.1.2 As regards present features B) and E), they now indicate that the scattered pilot carriers are "modulated" rather than "demodulated" in accordance with the teaching of the application as originally filed (see e.g. paragraph [0065], second sentence and claim 1, in conjunction with Fig. 5, steps 504 and 506).

2.1.3 As regards features B) and C), they now indicate that a, i.e. only one, PRBS is used in the modulation process in accordance with the teaching of the application as filed (see e.g. paragraph [0065], second sentence and claim 1, in conjunction with Fig. 5, step 504).

2.1.4 In view of the above, the objections raised under Article 123(2) EPC no longer apply.

2.2 *Clarity and sufficiency of disclosure (Articles 84 and 83 EPC)*

2.2.1 The examining division held that former features B) and C) did not comply with Articles 84 and 83 EPC due to the previously recited features "the first PRBS includes at least two groups of symbols and each of the

two groups of symbols has a symbol duration" and "demodulating the scattered pilot carriers in accordance with a first PRBS to form demodulated scattered pilot carriers" (see appealed decision, Reasons 15.1 to 15.3).

2.2.2 As regards present features B) and C), they no longer include the objected features and further specify that the relevant PRBS is a Gold sequence whose fast fourier transform (FFT) is to be cross-correlated. Hence, the board is satisfied that present claim 1 now includes the essential features to achieve the desired result of the present invention (i.e. improved receiver synchronisation in the time domain; see e.g. paragraphs [0012], [0058] and [0059] of the underlying description as filed).

2.3 Following the amendments made with respect to the independent claims, the board holds that the objections under Articles 123(2), 83 and 84 EPC are overcome.

2.4 In conclusion, the fourth and fifth auxiliary requests are allowable under Articles 123(2), 84 and 83 EPC.

3. *Remittal of the case for further prosecution*

3.1 As the grounds for refusal (i.e. added subject-matter, lack of clarity and insufficiency of disclosure) no longer apply for the present fourth and fifth auxiliary requests, the decision under appeal has to be set aside.

3.2 The appellant requested that the case be remitted to the examining division for further prosecution on the basis of the claims of the fourth and fifth auxiliary

requests (see point IV above).

3.3 Although the grounds for refusal (non-compliance with Articles 84, 83 and 123(2) EPC) are overcome as regards the fourth and fifth auxiliary requests, the board cannot finally decide on the patentability of those claim sets. This is because the compliance with the requirements of Article 52 EPC, in particular novelty and inventive step, was neither discussed nor decided in the appealed decision. The board therefore takes the view that under the present circumstances it is not appropriate to take a final decision on the matters of novelty and inventive step for the first time in these appeal proceedings.

3.4 In view of the above, the board has decided, in the exercise of its discretion under Article 111(1) EPC and in accordance with the appellant's request, to remit the case to the examination division for further prosecution on the basis of the claims of the fourth and fifth auxiliary requests on file.

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 on the basis of claims 1 to 9 of the fourth and fifth auxiliary requests submitted with the statement setting out the grounds of appeal.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated