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- (71) **Applicant:** FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. [DE/DE]; Hansastraße 27c, 80686 München (DE).
- (72) **Inventors:** SCHIERL, Thomas; Dunckerstrasse 72, 10437 Berlin (DE). GEORGE, Valeri; John-Sieg-Str. 24, 10365 Berlin (DE). GRÜNEBERG, Karsten; Adickesstrasse 43, 13599 Berlin (DE). KIRCHHOFFER, Heiner; Gotzkowskystr. 5, 10555 Berlin (DE). HENKEL, Anastasia; Fahrenheitsstrasse 8, 10245 Berlin (DE). MARPE, Detlev; Südwestkorso 70, 12161 Berlin (DE).
- (74) **Agents:** SCHENK, Markus et al.; Schoppe, Zimmermann, Stöckeler & Zinkler, P.O. Box 246, 82043 Pullach (DE).

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Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

[Continued on next page]

(54) **Title:** CODING CONCEPT ALLOWING PARALLEL PROCESSING, TRANSPORT DEMULTIPLEXER AND VIDEO BIT-STREAM

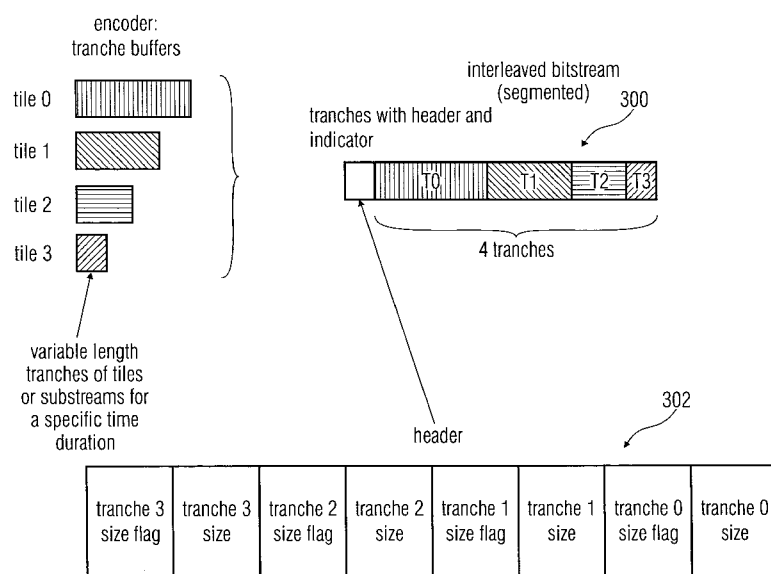


FIG 3

(57) **Abstract:** A raw byte sequence payload describing a picture in slices, WPP substreams or tiles and coded using context-adaptive binary arithmetic coding is subdivided or chopped into tranches with continuing the context-adaptive binary arithmetic coding probability adaptation across tranche boundaries. By this measure, tranche boundaries additionally introduced within slices, WPP substreams or tiles do not lead to a reduction in the entropy coding efficiency of these elements. On the other hand, however, the tranches are smaller than the original slices, WPP substreams or tiles and accordingly they may be transmitted earlier, i.e. with lower delay, than the unchopped original entities, i.e. slices, WPP substreams or tiles. In accordance with another aspect, which is combinable with the first aspect, substream marker NAL units are used within a sequence of NAL units of a video bitstream in order to enable a transport demultiplexer to assign data of slices within NAL units to the corresponding substreams or tiles so as to be able to, in parallel, serve a multithreaded decoder with the

corresponding substreams or tiles.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/051043

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/26
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, COMPENDEX, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GORDON C ET AL: "Wavefront Parallel Processing for HEVC Encoding and Decoding", 6. JCT-VC MEETING; 97. MPEG MEETING; 14-7-2011 - 22-7-2011; TORINO; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16), no. JCTVC-F274, 16 July 2011 (2011-07-16), XP030009297, abstract; figure 4 sections 1, 7.6, 8, 9, Appendix ----- -/--	1-10,18, 19, 21-25, 27-29



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Streich, Sebastian

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/051043

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ARILD FULDSETH (CISCO) ET AL: "Tiles", 5. JCT-VC MEETING; 96. MPEG MEETING; GENEVA; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16), no. JCTVC-E408, 11 March 2011 (2011-03-11) , XP030008914, ISSN: 0000-0005 the whole document -----	1-10,18, 19, 21-25, 27-29
A	CLARE G ET AL: "Wavefront and Cabac Flush: Different Degrees of Parallelism Without Transcoding", 6. JCT-VC MEETING; 97. MPEG MEETING; TORINO; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16), no. JCTVC-F275, 15 July 2011 (2011-07-15), XP030009298, the whole document -----	1-10,18, 19, 21-25, 27-29
A	HEINER KIRCHHOFFER ET AL: "CE1: Report of test results related to PIPE-based Unified Entropy Coding", 7. JCT-VC MEETING; 98. MPEG MEETING; GENEVA; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16), no. JCTVC-G633, 8 November 2011 (2011-11-08), XP030110617, the whole document -----	1-10,18, 19, 21-25, 27-29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2013/051043

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-10, 18, 19, 21-25, 27, 28(completely); 29(partially)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10, 18, 19, 21-25, 27, 28(completely); 29(partially)

tranche-based CABAC

2. claims: 11-17, 20, 26(completely); 29(partially)

bitstream transport with NAL unit markers
