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[Continued on next page]

(54) Title: UNFOLDING ALGORITHM IN MULTIRATE SYSTEM FOLDING

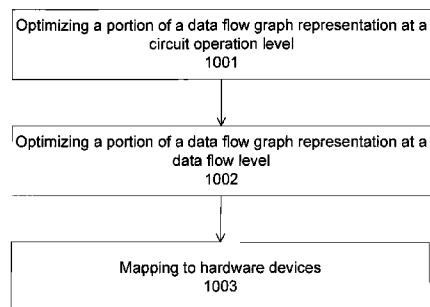


Fig. 18

(57) Abstract: Methods and apparatuses to optimize a circuit representation using unfolding as a preprocessing of the multirate folding. In at least one embodiment of the present invention, a portion of a data flow graph representation of a circuit is optimized using circuit operation level before using optimizing with data flow algorithm and mapping the design onto hardware. In an aspect, the present invention discloses circuit operation level optimization for data flow graph representations with optimizing zero inputs caused by the upsamplers, or with optimizing unused outputs caused by the downsamplers. In at least one embodiment of the present invention, multirate data graph is converted to a single rate data graph before data flow optimizing. In an aspect, converting a multirate data graph to a single rate data graph comprises unfolding the multirate data graph with minimum unfolding factors that are inversely proportional to the clock values.

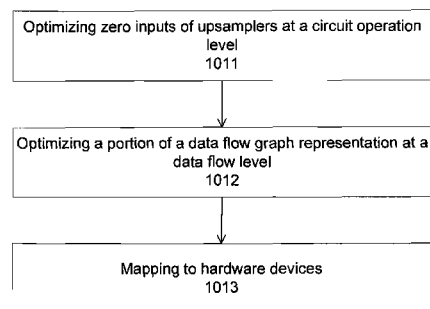


Fig. 19



MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: data, flow, optimize, circuit, design, graph.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003-0061576 A1 (SANJEEV SALUJA et al.) 27 March 2003 See the abstract, paragraphs [0008]-[0011], [0043]-[0047], claim 1, figure 3.	1-60
A	US 2004-0111684 A1 (ATSUSHI MASUDA) 10 June 2004 See the abstract, paragraphs [0007]-[0009], [0031]-[0068], figures 1 and 2.	1-60
A	US 2002-0188922 A1 (LUKAS P.P.P. VAN GINNEKEN et al.) 12 December 2002 See the abstract, paragraphs [0013]-[0023].	1-60
A	US 2007-0214447 A1 (KAZUHISA OKADA) 13 September 2007 See the abstract, paragraphs [0015]-[0056], claim 2, figure 1.	1-60
A	US 2002-0026305 A1 (PAUL PHILIP BOCA et al.) 28 February 2002 See the abstract, paragraphs [0026]-[0035].	1-60



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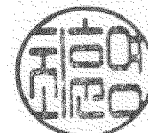
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