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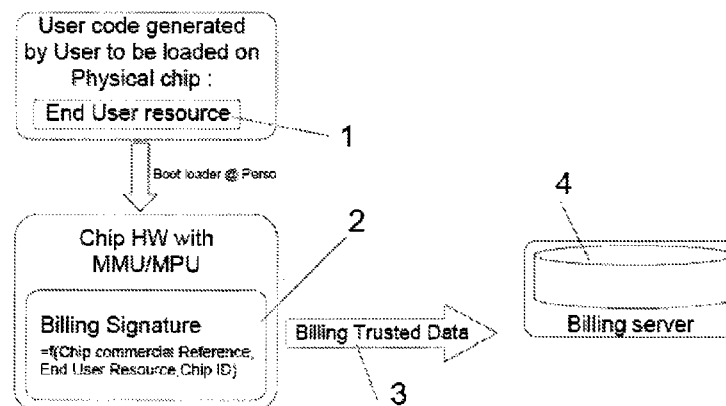
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(54) Title: METHOD OF SELECTION OF AN AVAILABLE MEMORY SIZE OF A CIRCUIT INCLUDING AT LEAST PRO-
CESSOR AND A MEMORY AND CORRESPONDING PROGRAM AND SMART CARD

FIG.2



(57) Abstract: The invention relates to a method for selecting an available memory size of a circuit including at least a CPU and a total memory, the method including a stage for the selection of an available memory size that is smaller than or equal to that of the total memory. The invention is characterised in that the selection stage is implemented by the manufacturer of the product incorporating the said circuit, different from the circuit manufacturer, and in that it includes a stage for the generation of a configuration signature intended for the circuit manufacturer, which information is representative of the size of available memory size selected in this way by the product manufacturer.

Method of selection of an available memory size of a circuit including at least a processor and a memory and corresponding program and smart card

This invention relates to a method for the selection of an available memory size of a circuit including at least a processor (for example a CPU, a microprocessor or a processing unit) and a memory.

This invention will be described here in the context of the manufacturing of a particular product, the smart card, but it may be applied to other products incorporating an electronic circuit, such as an integrated circuit, including a processor and a total memory. In this same example, a non volatile memory (NVM) may be mentioned, but the invention applies to all types of memory (NVM, RAM etc.)

Figure 1 illustrates three suppliers of integrated circuits according to the earlier technique, X1, X2 and X3, supplying products to a smart card manufacturer. Each supplier has several products. In practice, however, the different products have the same processor and are only differentiated by different available memories in each product. That is the case, for example, in this Figure 1, with supplier X1, and product numbers 300K, 320K, 340K and 360K. These products 300K, 320K, 340K and 360K each have the same processor but different available memory sizes, namely 300Kbytes, 320Kbytes, 340Kbytes and 360Kbytes respectively.

Further, in reality, the products have the same total memory size of 360Kbytes, but in an ultimate stage of manufacturing/testing the circuit, the circuit manufacturer has elected to make only part of the memory available for addressing a specific need of its customers. In such a case, the circuit manufacturer "blocks" and makes inaccessible (and does not for instance test) that portion of the memory that is not made available and defined in this particular case by a memory size that is equal to the difference between (a) - 360Kbytes and (b) – the size of the memory made available.

The problem with this solution according to the earlier technique is as follows:

- the selection by the circuit manufacturer of an available memory size for each circuit makes it necessary for the circuit manufacturer to implement elaborate personalisation stages (different tests, different production lines) while manufacturing the circuit, making the process more complex.

5

The invention is aimed at remedying the problems. To that end, a method for selecting an available memory size has been devised for a circuit comprising at least a processor and a total memory. The method includes a stage involving the selection of an available memory size that is smaller than or equal to the total
10 memory. In the invention, the selection stage is implemented by a manufacturer of a product incorporating the said circuit, different from the circuit manufacturer, and a stage involving the transmission via a communication network to a piece of equipment, for example a server, accessible by the circuit manufacturer, of information representing the available memory size selected in this way by the
15 product manufacturer.

The invention also offers the benefit of remedying the major difference between customers' needs as perceived by the circuit supplier and the reality, and thus makes it easier for the circuit supplier, and possibly also the buyer of the circuits, to manage their inventory.

20 The invention is thus a method for configuring an available memory size of an integrated circuit with at least a processor and a total memory. The method comprises a stage for the configuration of an available memory size that is smaller than or equal to the total memory. The configuration stage is carried out by a circuit user, different from the circuit manufacturer. That configuration stage
25 includes a stage for the selection of the memory size of the integrated circuit; a stage for registering and locking the selected memory size, such registration being locked permanently; and a stage for the generation by the integrated circuit of a signature representative of the selected memory size.

Advantageously, the configuration stage may involve a transmission stage for sending the said signature through a communications network to a piece of equipment of the circuit manufacturer.

5 In respect of another aspect, the invention is an integrated circuit comprising a total memory that is configurable so as to have an available memory that is smaller than the total memory. The integrated circuit comprises at least one memory zone to indelibly store a piece of setting up information, to define the configuration size of the memory, and a means to generate a signature representative of the configuration of the memory size.

10 On a preferential basis, the integrated circuit may comprise a communication interface capable of transmitting the signature. The integrated circuit may include blocking/unblocking means that block the normal working of the integrated circuit till an unblocking command is sent in response to the sending of the signature.

15 The invention also relates to a smart card with an integrated circuit as previously defined.

Other characteristics and advantages of this invention will become clearer in the description below, to be read in relation with the corresponding drawings attached, where:

20 - Figure 1, already commented, is an illustration of the circuits manufactured by three suppliers, the circuits of each supplier being grouped in the figure by processor identity; and

- Figure 2 is a block diagram of the elements for the implementation of the method according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

25 By reference to Figure 2, according to the invention, the use of a development tool supplied by the circuit manufacturer is proposed. To return to the example in figure 1, according to the invention, the supplier will supply its customer, for any given

processor, undifferentiated circuits with an identical processor and a total memory of 360 Kb (unlike circuits with the same processor and different available memory sizes, namely 300Kbytes, 320Kbytes, 340Kbytes and 360Kbytes respectively, with the same total memory size, according to the earlier technique).

- 5 The development tool supplied by the circuit supplier is used by its customer, the product manufacturer, to select an available memory size that is smaller than or equal to that of the total memory. Indeed, it is proposed that the circuits supplied are initially in a "blocked" state and the development tool is required to unblock the circuit through the selection of the memory size. The development tool asks the
- 10 product manufacturer to enter/send to the undifferentiated circuit information about the required available memory size. For example, the following data are sent to the circuit:

- Start address, end address and possibly
- Configuration parameters for a memory management unit (MMU) in the circuit.

- 15 The Start address and End address data define a selected available memory size in the circuit, for example 300Kbytes, or another size, smaller than or equal to 360Kbytes (size of the total memory of the circuit in question).

- A boot loader, which is also supplied by the circuit supplier, loads the data into the circuit to configure the circuit. Depending on the data, the circuit memory
- 20 management unit particularly locks the read and/or write accessibility to only that zone of the available memory out of the total memory with a size matching the selected size. That stage, where a circuit memory management unit locks the read and/or write accessibility to the available memory zone out of the total memory, with a size that matches the selected size, is important to allow the circuit supplier
- 25 to limit the use of the memory to only the available memory size. A memory management unit takes charge of managing the memory, the abstraction of addressing (conversion of logical addresses into physical addresses). However, there are a number of specific implementations. The memory management unit is nevertheless adapted to include a function for denying read/write access to any

address that does not belong to all the addresses of the available memory size defined by the product supplier.

- That information for setting up the selected memory size, "Start address, End address" may optionally be stored indelibly and clearly in the circuit in the OTP (One Time
- 5 Programming) memory.

From this information for setting up the selected memory, a security signature 2 is also calculated on the basis of the information "Start address, End address", but also typically from a circuit serial number and possibly also an identifier of the commercial part number of the circuit.

- 10 The information including the "Start address", "End address", "Circuit serial number" and the associated signature is then sent via a communication network to a server 4, accessible by the circuit manufacturer.

- In that way, information representing the available memory size thus selected by the product manufacturer is sent to the circuit supplier identified by its serial
- 15 number, particularly for the purpose of charging the price. Such transmission may be done at any time, particularly during product manufacturing. A return receipt by the server 4 may also constitute a condition for allowing the overall working of the circuit, with only the elementary functions of reporting the aforementioned information to the server 4 being allowed prior to the return receipt.

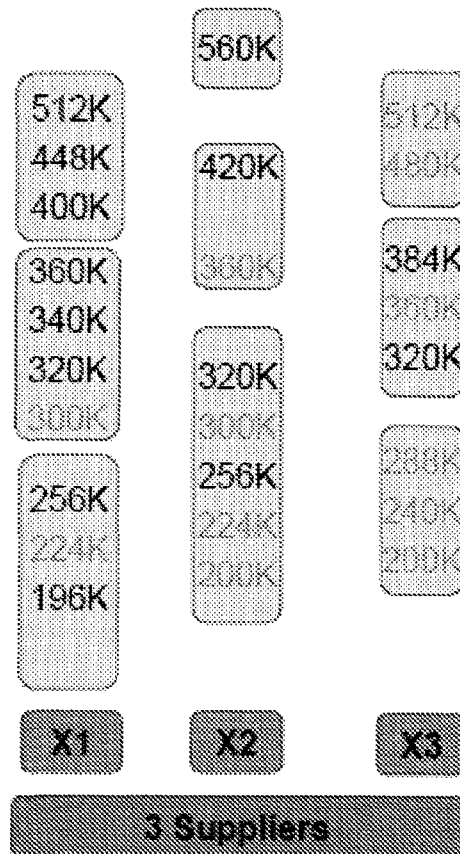
CLAIMS

- 1 – A method for configuring an available memory size of a integrated circuit comprising at least a processor and a total memory, the method comprising a stage for the configuration of an available memory size smaller than or equal to
5 that of the total memory, characterised in that the configuration stage is carried out by a circuit user other than the circuit manufacturer, and in that the configuration stage includes:
- a stage for selecting the memory size of the integrated circuit,
 - a stage for registering and locking the selected memory size, where such
10 registration is locked permanently, and
 - a stage for the generation by the integrated circuit of a signature representative of the selected memory size.
- 2 - A method of configuration according to claim 1 where the configuration stage further comprises a transmission stage where the said signature is transmitted via
15 a communications network to a piece of equipment of a circuit manufacturer.
- 3 – An integrated circuit including a total memory that is configurable so as to obtain an available memory with a size smaller than the total memory, characterised in that it comprises:
- at least one memory zone to indelibly store setting up information that
20 defines the configuration size of the memory, and
 - means to generate a signature representative of the configuration of the memory size.
- 4 – An integrated circuit according to claim 3, which further includes a communication interface capable of transmitting the signature.
- 25 5 – An integrated circuit according to claim 4, which further comprises the blocking/unblocking means that block the normal working of the integrated circuit till an unblocking command is sent back in response to the sending of the signature.

6 – A smart card characterised in that it comprises an integrated circuit according to any claim from 3 to 5.

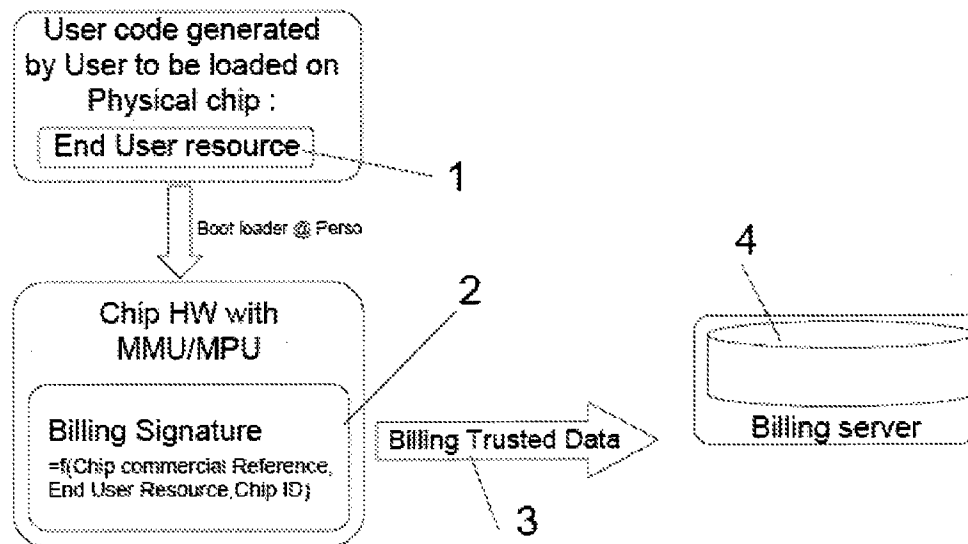
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FIG.1



2/2

FIG.2



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. G11C7/10

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)
G11C

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 practical, search terms used)

EPO-Internal, 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	ANONYMOUS: "Verigy InstaPin (PRODUCT OVERVIEW -5989-2597EN)" INTERNET ARTICLE, [Online] 1 June 2006 (2006-06-01), pages 1-4, XP002530937 Retrieved from the Internet: URL: http://www.verigy.com/content/dav/verigy/Internet/Products/V93000_SOC_Series/Licensing/InstaPin_HW_Licensing/V5989-2597EN.pdf [retrieved on 2010-04-14] the whole document ----- -/-	1-6

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ANONYMOUS: "Verigy V93000 Pin Scale 800 digital card (PRODUCT OVERVIEW - 5989-2596EN)" INTERNET ARTICLE, [Online] 1 June 2006 (2006-06-01), pages 1-4, XP002530938 http://www.verigy.com/content/dav/verigy/Internet/Products/V93000 SOC Series/Digital Pins/Pin Scale 800 Digital Card/V5989-2596EN.pdf Retrieved from the Internet: URL:http://www.verigy.com/content/dav/verigy/Internet/Products/V93000 SOC Series/Digital Pins/Pin Scale 800 Digital Card/V5989-2596EN.pdf> the whole document	1-5
A	ANONYMOUS: "FlexNet Licensing End User Guide (VERSION 11.3, DOCUMENT REVISION 01)" INTERNET ARTICLE - MACROVISION, [Online] 30 June 2006 (2006-06-30), pages 1-40, XP002531465 Retrieved from the Internet: URL:http://www.vrcontext.com/download/customerhelp/FlexNet.LicensingEndUserGuide.pdf> the whole document	1-6
A	EP 1 906 312 A1 (FUJITSU LTD [JP]) 2 April 2008 (2008-04-02) paragraph [0013] - paragraph [0021]; figures 1A,1B	1-6
A	US 5 353 431 A (DOYLE PATRICK F [US] ET AL) 4 October 1994 (1994-10-04) column 4, line 15 - column 8, line 34; figures 1,2	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1906312	A1	02-04-2008	NONE
US 5353431	A	04-10-1994	NONE