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(54) **HIGH-SPEED SECURE CONTENT TRANSFER TO SD CARD FROM KIOSK**

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G06F 17/30 (2006.01)
G06Q 30/06 (2012.01)

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CPC ***G06F 17/30038*** (2013.01); ***G06F 17/30058*** (2013.01); ***G06Q 30/06*** (2013.01)
USPC **710/13**

(58) **Field of Classification Search**
USPC 710/13
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,697,944 B1 2/2004 Jones et al.
6,859,791 B1 2/2005 Spagna et al.
7,360,088 B2 4/2008 Mishina et al.
7,505,584 B2 3/2009 Kamibayashi et al.
7,779,064 B2 8/2010 Phillips
7,844,831 B2 11/2010 Benhammou et al.
RE42,019 E 12/2010 Tagawa et al.
8,306,918 B2 * 11/2012 Farrugia et al. 705/57
8,312,294 B2 11/2012 Sato et al.
2002/0126841 A1 9/2002 Arai
2003/0220835 A1 11/2003 Barnes, Jr.
2004/0010601 A1 1/2004 Afergan et al.
2005/0044280 A1 2/2005 Reisman
2006/0156355 A1 7/2006 Kawasaki et al.
2007/0033344 A1 2/2007 Tanaka
2007/0192634 A1 * 8/2007 Cheon et al. 713/193

(Continued)

OTHER PUBLICATIONS

Young; International Search Report for PCT/US07/22007; mailed May 5, 2008; 1 page.

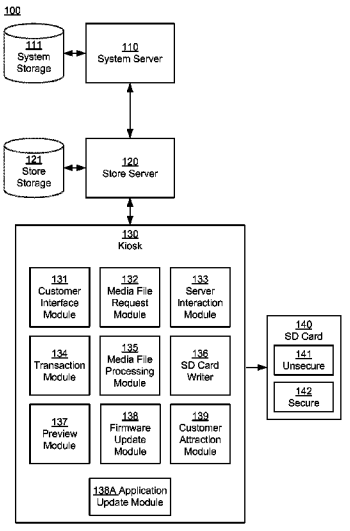
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(57) **ABSTRACT**

A system and a method are disclosed for quickly and securely transferring media files to an SD card from a kiosk. The kiosk includes a customer interface module for receiving a selection of a media file to transfer, a transaction module for accepting payment, a media file processing module for preparing the media file to be written to the SD card, and a high-speed secure SD card writer that can write to both an unsecure area and a secure area of the SD card. All data is written to the unsecure area before data is written to the secure area to improve speed. Optionally, the kiosk includes a firmware update module for distributing firmware updates through the SD cards, and the ability to play previews to attract customers and entertain them while transferring media files to the SD card.

18 Claims, 3 Drawing Sheets



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(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0234341	A1	10/2007	Chang et al.	
2008/0075437	A1	3/2008	Hamada et al.	
2008/0098239	A1	4/2008	Wada et al.	
2008/0133546	A1	6/2008	Phillips	
2008/0270796	A1	10/2008	Suu et al.	
2008/0271154	A1	10/2008	Kamada et al.	
2009/0086978	A1*	4/2009	McAvoy et al.	380/279
2009/0164709	A1	6/2009	Lee et al.	
2009/0282454	A1	11/2009	Ekstrand	
2009/0313432	A1	12/2009	Spence et al.	
2010/0127013	A1*	5/2010	Butler	221/1
2010/0262912	A1	10/2010	Cha	
2010/0293581	A1	11/2010	Robert	
2010/0297933	A1	11/2010	Sim	
2011/0091187	A1	4/2011	Duffin et al.	
2011/0197131	A1	8/2011	Duffin et al.	
2012/0124390	A1	5/2012	Zipperer et al.	
2012/0137135	A1	5/2012	Kasahara et al.	
2012/0254629	A1	10/2012	Zipperer et al.	
2012/0272065	A1	10/2012	Matsukawa et al.	
2012/0315019	A1	12/2012	Zipperer et al.	
2012/0324244	A1	12/2012	Zipperer et al.	

OTHER PUBLICATIONS

Android Developers Guide, Android Software Developers Kit (SDK), Android Version 1.543, Nov. 13, 2009, pp. 1-24. Available online at >netmite.com/android/mydroid/1.6/out/target/common/docs/offline-sdk/offline.html<.

* cited by examiner

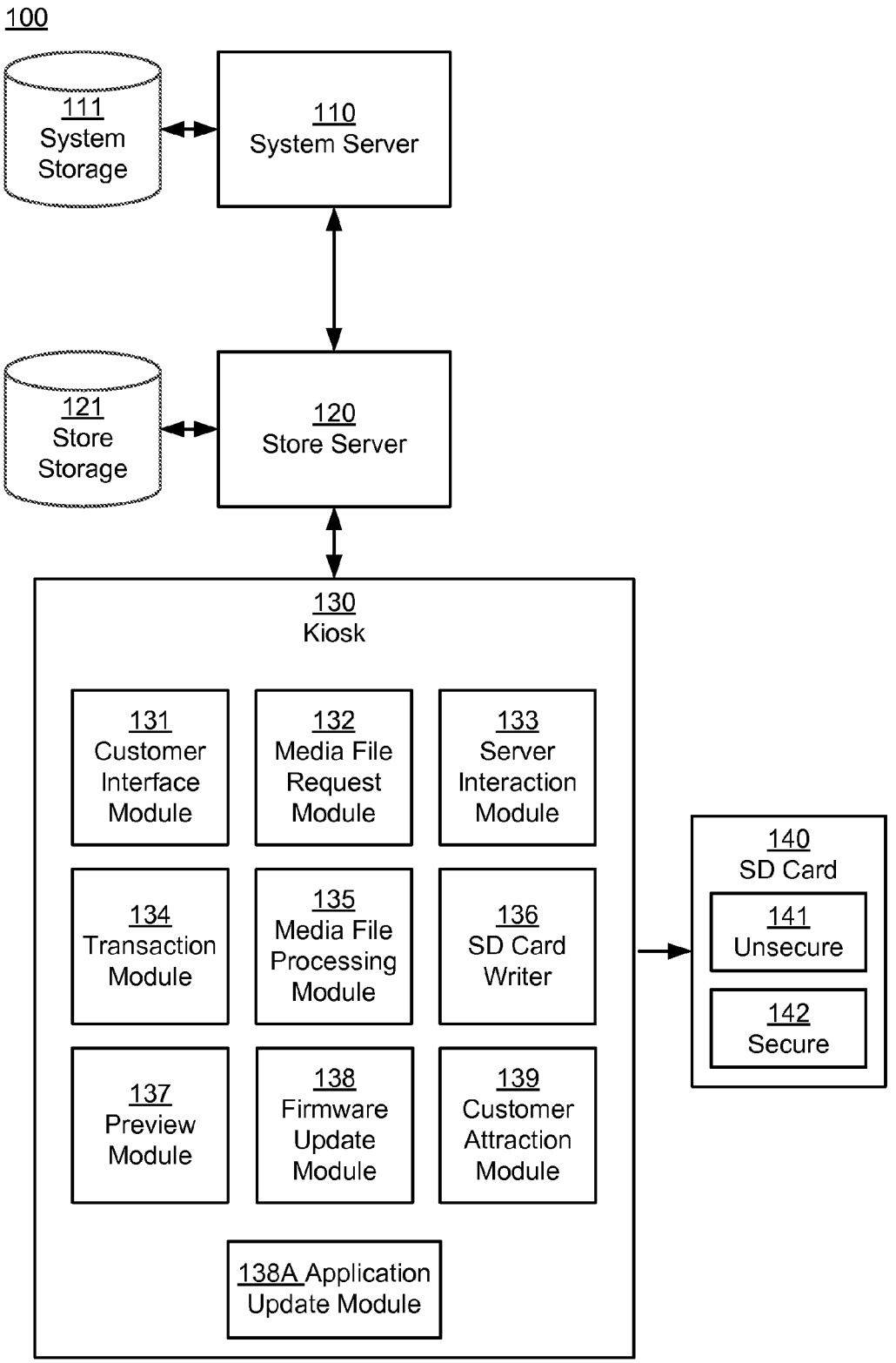

100
111
System
Storage
110
System Server
121
Store
Storage
120
Store Server
130
Kiosk
131
Customer
Interface
Module
132
Media File
Request
Module
133
Server
Interaction
Module
134
Transaction
Module
135
Media File
Processing
Module
136
SD Card
Writer
137
Preview
Module
138
Firmware
Update
Module
139
Customer
Attraction
Module
138A Application
Update Module
140
SD Card
141
Unsecure
142
Secure

FIG. 1

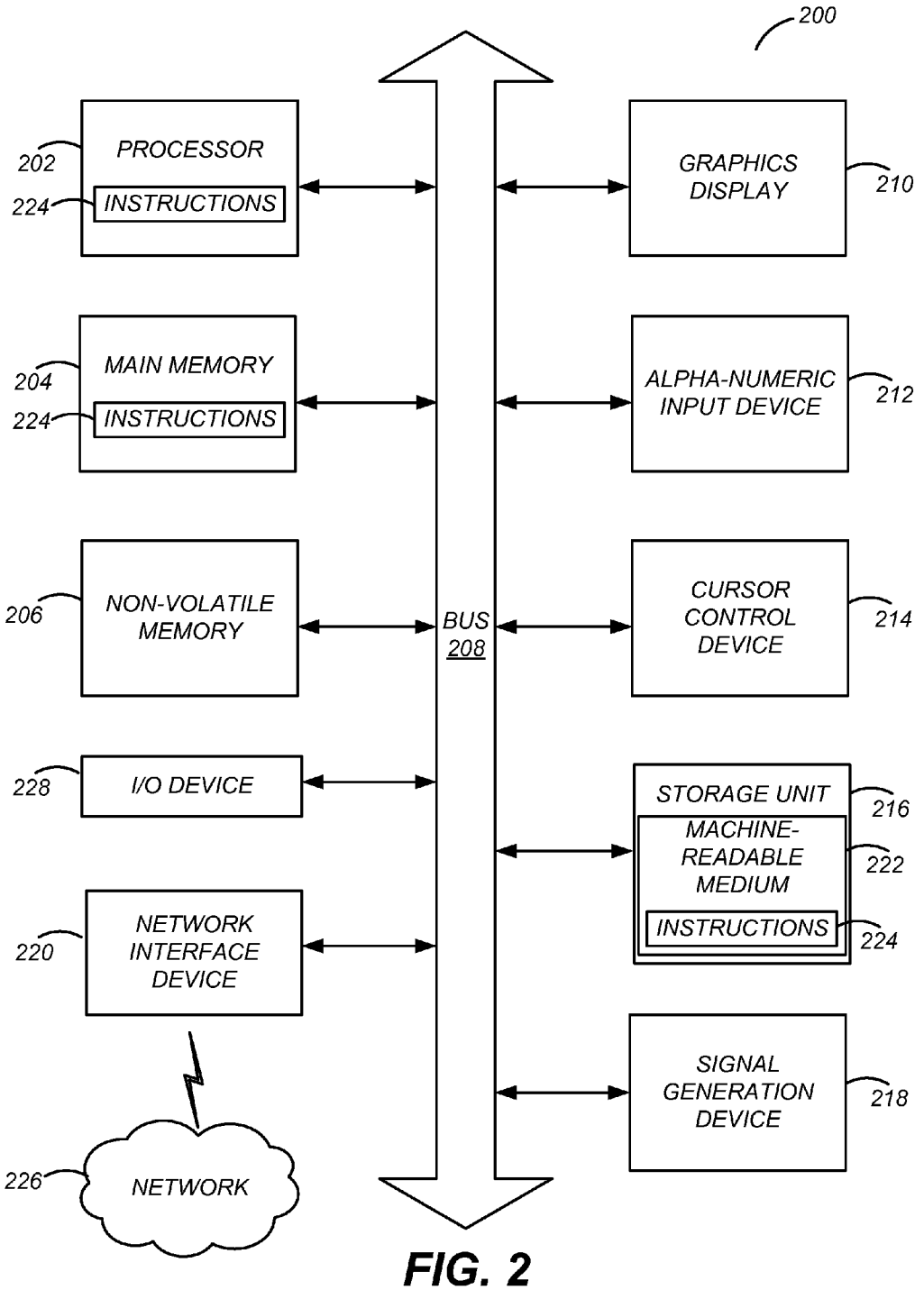

200
PROCESSOR
202
INSTRUCTIONS
224
MAIN MEMORY
204
INSTRUCTIONS
224
NON-VOLATILE MEMORY
206
I/O DEVICE
228
NETWORK INTERFACE DEVICE
220
NETWORK
226
BUS
208
GRAPHICS DISPLAY
210
ALPHA-NUMERIC INPUT DEVICE
212
CURSOR CONTROL DEVICE
214
STORAGE UNIT
216
MACHINE-READABLE MEDIUM
222
INSTRUCTIONS
224
SIGNAL GENERATION DEVICE
218

FIG. 2

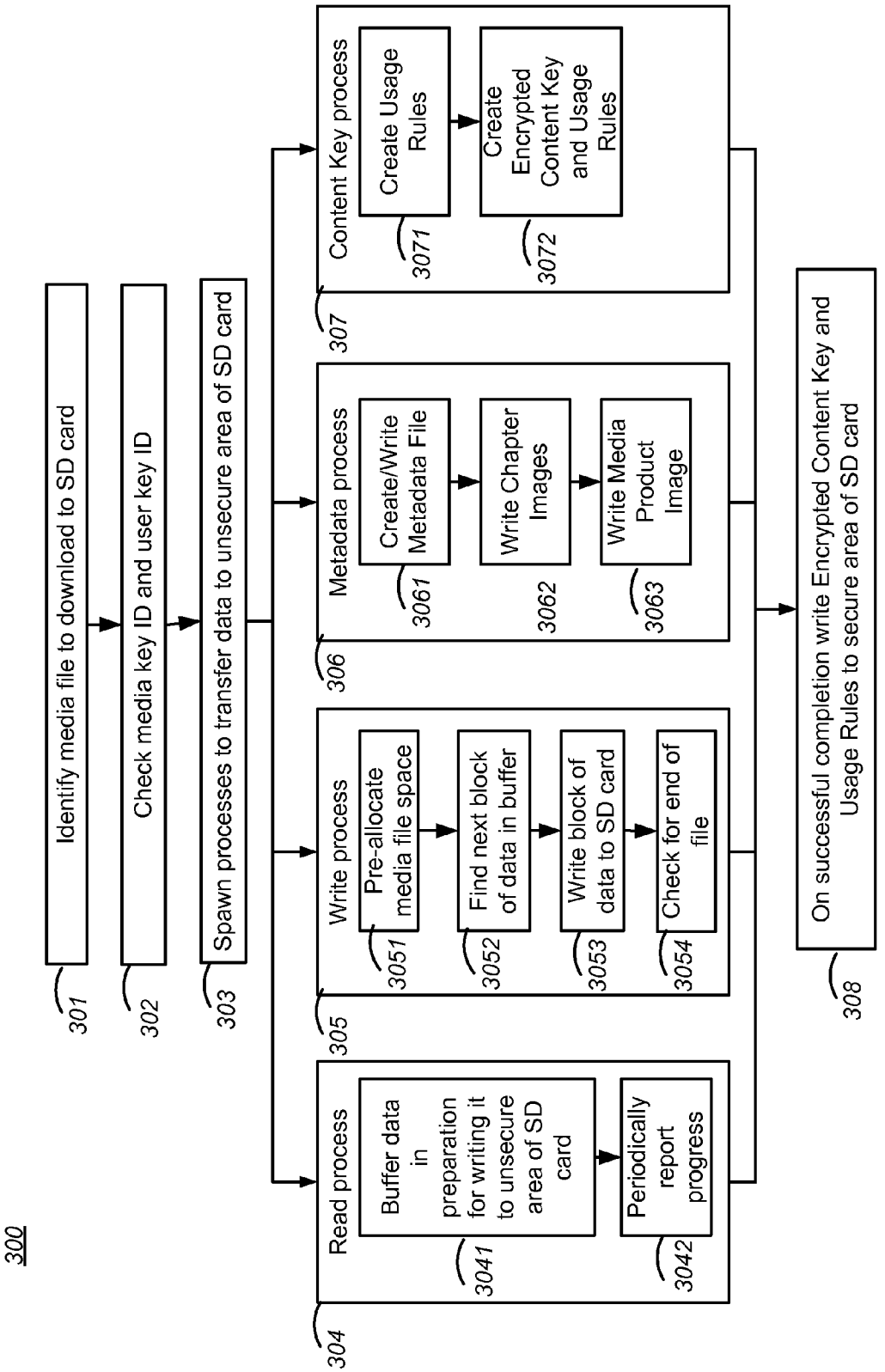

300
Identify media file to download to SD card
301
Check media key ID and user key ID
302
Spawn processes to transfer data to unsecure area of SD card
303
Read process
Buffer data in preparation for writing it to unsecure area of SD card
3041
Periodically report progress
3042
304
Write process
Pre-allocate media file space
3051
Find next block of data in buffer
3052
Write block of data to SD card
3053
Check for end of file
3054
305
Metadata process
Create/Write Metadata File
3061
Write Chapter Images
3062
Write Media Product Image
3063
306
Content Key process
Create Usage Rules
3071
Create Encrypted Content Key and Usage Rules
3072
307
On successful completion write Encrypted Content Key and Usage Rules to secure area of SD card
308

FIG. 3

HIGH-SPEED SECURE CONTENT TRANSFER TO SD CARD FROM KIOSK

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/253,789, filed Oct. 21, 2009, titled "High-Speed Secure Content Transfer to SD Card from Kiosk," the contents of which is incorporated by reference in its entirety.

BACKGROUND

1. Field of Art

The disclosure generally relates to the field of distributing digital media content via a kiosk.

2. Description of Art

As the popularity of digital media content has increased, so has the demand for acquiring digital media content in quick, convenient ways. One method of distributing digital media content is though kiosk systems. A kiosk is placed where it is accessible to customers. The kiosk is connected via a network to one or more servers having access to storage of digital media content. Customers can interact with the kiosk, for example through a touch screen interface, to select desired digital media content for purchase. The desired digital media content is located either in a storage local to the kiosk or in a remote storage and served to the kiosk. Then, the desired digital media content is downloaded to a storage medium, for example the memory in a customer's digital playback device that has been connected to the kiosk, or another computer-readable medium such as a CD or DVD.

BRIEF DESCRIPTION OF DRAWINGS

The disclosed embodiments have other advantages and features which will be more readily apparent from the detailed description, the appended claims, and the accompanying figures (or drawings). A brief introduction of the figures is below.

FIG. **1** illustrates an example embodiment of a kiosk distribution system.

FIG. **2** illustrates one embodiment of components of an example machine able to read instructions from a machine-readable medium and execute them in a processor (or controller) for use as a server or a kiosk.

FIG. **3** illustrates an example embodiment of a method of operating a media file processing module and an SD card writer.

DETAILED DESCRIPTION

The Figures (FIGS.) and the following description relate to preferred embodiments by way of illustration only. It should be noted that from the following discussion, alternative embodiments of the structures and methods disclosed herein will be readily recognized as viable alternatives that may be employed without departing from the principles of what is claimed.

Reference will now be made in detail to several embodiments, examples of which are illustrated in the accompanying figures. It is noted that wherever practicable similar or like reference numbers may be used in the figures and may indicate similar or like functionality. The figures depict embodiments of the disclosed system (or method) for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles described herein.

Configuration Overview

One embodiment of a disclosed system, method and computer readable storage medium includes expediting the download of digital media content from a kiosk to a secured digital (SD) card. A SD card comprises a media device having computer readable and writable storage areas with a secure area and an unsecure area thereon. In one embodiment the storage area is comprised of a flash memory.

A download (or write) of digital media content to the SD card comprises a manufacture or creation of an SD card with specified content. The download in one embodiment is by pre-allocating space for the digital media content and prioritizing the writing of the media file. After an initial set-up of the SD card by writing a user key, all data in an unsecure area of the SD card is written prior to writing any data in the secure area of the SD card. Thus, large media files can be written to removable media quickly with lower risk to the rights holders.

One embodiment of the system includes a configuration for high speed secure writing to an SD card. One implementation of the SD card writer contains the functionality to enable high-speed writing and the functionality to enable writing to a secure portion of the SD card.

Another embodiment includes the ability to distribute firmware updates for playback devices through downloads from a kiosk to the SD cards. When the SD card is inserted into a playback device, the playback device determines whether the version of the firmware on the SD card supersedes the version of the firmware on the playback device and if it does, the playback device installs the newer version from the SD card. In other embodiments, for example, configurations using a personal computer software playback player (or application) for playback of content from the SD card, the kiosk may download updates to the software playback player to the SD card. When the SD card is inserted into the personal computer and the playback player is ready to launch, the personal computer playback player installs the update of the playback player from the SD card. Likewise, other consumer applications may be loaded through the kiosk configuration described herein. It is noted that although reference is made to a personal computer, the personal computer includes devices having other form factors that may be configured with a software playback player, for example, a tablet computer, a netbook computer, a mobile phone or a smartphone. In addition, it is noted that the physical form factor of the SD card may be appropriately adjusted for the particular computing environment. For ease of discussion throughout the specification, reference to firmware update is understood to be software playback player updates for configurations using a personal computer playback player.

According to another embodiment, the kiosk can include digital sign and vending functionalities in a single unit. While not actively being used by a customer, the kiosk may function as a digital sign to attract customers by playing previews of media files that are currently available for download from the kiosk. Then, if a customer is attracted by the preview to the content on the kiosk, the customer can immediately purchase the item from the same kiosk.

According to yet another embodiment, the kiosk can allow a customer to preview other media content of the customer's choice while downloading content to the SD card. Thus, the customer can be entertained by content of the customer's choice while waiting.

Example Kiosk Distribution Configuration

FIG. **1** illustrates an example embodiment of a kiosk distribution system **100**. The kiosk distribution system **100** includes a system server **110** connected to a system storage **111**, at least one store server **120** connected to a store storage **121**, and at least one kiosk **130** connected to a store server **120**. Although only one store server **120** and one kiosk **130** are shown in the example system **100** of FIG. **1**, in some embodiments, the kiosk distribution system includes many store servers **120** at different retail locations. In addition, each retail location can include many kiosks **130** connected to a store server **120**. One or more communications networks, such as an intranet, the Internet, a local area network, a wide area network, a wireless network, or any other data network such as a cellular network connect the system server **110** to at least one store server **120** and the store server **120** to at least one kiosk **130**. The customer connects an SD card **140** to a kiosk **130** in order to download media content to the SD card through the kiosk **130** from the distribution system **100**. Kiosks and servers can be contained in one or more physical devices as necessary to meet cost, size, security, and other constraints.

The system storage **111** stores media files for distribution to stores through the system server **110**. In one embodiment, the system storage **111** includes a database, system files, and user files stored on any combination of storage media. The media files stored in the system storage **111** can include audio, visual, and audio-visual files, for example, music, music videos, movies, television shows, video games, electronic books, etc. The media files may be stored at various quality standards and in various formats in order to accommodate various playback devices. In one embodiment, the process of loading the media files into the system storage **111** is referred to as "ingesting." During the ingest process, the playable content of the media file is stored along with metadata. Metadata includes the title of the playable content, and expanded descriptive information about the content, such as the actors, the director, and/or other information that may appear on or inside a DVD box, for example. In one embodiment, during the ingest process, the industry standard Content Protection for Recordable Medium digital rights management (CPRM DRM) specification of information such as a content description, and a content key is also stored for each media file.

The system server **110** accesses the media files stored in the system storage **111** and distributes them to at least one store server **120** in response to a request for the media file from the store server **120**, or based on pre-established distribution policies under which the system server **110** operates. The pre-established distribution policies may be pre-stored in a storage device of the kiosk **120** or in the store server **120** (to which the kiosk is communicatively coupled).

The store server **120** receives media files from the system server **110**, either based on a request from the store server **120** or based on pre-established distribution policies, and the store server **120** stores the media files in the store storage **121**. In one embodiment, the store storage **121** includes a database, system files, and user files stored on any combination of storage media. The store server **120** also accesses the stored media files from the store storage **121** in order to deliver them to a kiosk **130** in response to requests from the kiosk **130**.

The kiosk **130** receives selections of media from customers, requests selected media files from the store server **120**, and receives the media files in response to the requests, and writes the media files to the customer's SD card **140**. In one embodiment, the kiosk **130** includes a customer interface module **131**, a media file request module **132**, a server interaction module **133**, a transaction module **134**, a media file processing module **135**, an SD card writer **136**, a preview module **137**, a firmware update module **138**, and a customer attraction module **139**.

The customer interface module **131** manages a graphical user interface presented to a customer, through which, the customer can select media to preview at the kiosk **130** or download to the customer's SD card **140**. The customer interface module **131** receives user selections of media for download, for example, by interpreting the user's interactions with a touch screen display of the kiosk **130** or though the user's alphanumeric input into a keyboard, button selections, or selections using a pointing device such as a computer mouse. The customer interface module **131** passes the user's selections to the media file request module **132**.

The media file request module **132** prepares requests for media files. The media file request module **132** receives the user's selections of media from the customer interface module **131** and prepares a request for the corresponding media files, for example, by performing a lookup of the selected media file.

The server interaction module **133** manages communications between the kiosk **130** and the store server **120**. Specifically, the server interaction module **133** receives requests for media files from the media file request module **132** (for example by content availability date) and communicates them to the store server **120**. The server interaction module **133** also receives media files from the store server **120** that are distributed to the kiosk **130**.

The transaction module **134** manages the payment details of the customer's purchase from the kiosk **130**. The transaction module **134** receives the customer's payment information, for example from information read from the swipe of a card through a card reader (not shown) of the kiosk **130**. Alternatively the transaction module **134** can receive the customer's payment information as entered by the customer through alphanumeric or other input into the kiosk **130**. The transaction module **134** then processes the customer's payment according to the payment information received. The transaction module **134** then verifies and confirms the customer's payment.

The media file processing module **135** processes media files in preparation for writing the files to SD cards **140**. The media file processing module **135** receives the requested media files from the store server **120** via the server interaction module **133**. The media file processing module **135** then queues the media file for download to the SD card **140**. It is noted that the SD card can be provided by the customer (for insertion into an SD card slot of the SD card writer **136** or otherwise communicatively coupled to the SD card writer, such as through a USB adaptor attached to a USB port of a kiosk **130**) or may be provided through a kiosk that includes a pre-retained (e.g., stacked) quantity of SD cards that can be inserted into the SD card writer **136** and subsequently discharged for the customer when the process described herein completes writing to the SD card.

Continuing on, the SD card writer **136** writes the media file to the SD card **140** in compliance with the standards of security known as Content Protection for Recordable Media (CPRM) for controlling the copying, moving, and deletion of digital media. In one embodiment, the SD card writer **136** is a high-speed writer capable of writing data to both an unsecured area (or user area) **141** of the SD card as well as a secure area (or protected area) **142** of the SD card as needed for CPRM for SD cards. The operation of the media file processing module **134** and the SD card writer **136** will be described in greater detail with reference to FIG. **3**.

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The preview module **137** manages the playback of previews of media files that are available for purchase. The preview module **137** can operate in parallel with the SD card writer **136** so that a customer can preview other media files of the customer's choice while the customer's selected media file is downloading to the SD card **140**. Alternatively, the preview module **137** can show a customer a preview selected randomly or selected based on the content that the customer is downloading. Previews may also constitute advertisements, training materials, or any such purpose that can be included into a video. Advantageously, the preview module **137** can show previews without affecting the performance of the SD card writer **136**. In one embodiment, the SD card write process is designed to use a low amount of resources to avoid contention with the preview module **137**.

The firmware update module **138** receives firmware updates (e.g., firmware software updates) (or application update module **138**A if software playback application is configured within system) for use in updating firmware on the playback devices that use the SD cards **140**. The firmware updates are disseminated by the system server **110** through the store server **120** to the kiosk **130**. The firmware update module **138** queues firmware updates to be written by the SD card writer **136** to the SD card **140**, for example during or after the media file is written. It is noted that the kiosk will only provide firmware update if the version stored on the kiosk is newer than the version on the SD card. In one embodiment, the firmware update code is obfuscated (e.g., scrambled, cryptographically concealed) and signed to prevent tampering. Subsequently, when the SD card **140** is inserted into a playback device, the playback device checks to see if the version of the firmware on the SD card supersedes the version of the firmware currently on the playback device, and if it does, then the firmware update is loaded onto the playback device. Thus, through the SD card, a mechanism is provided to update firmware present on a playback device without requiring the playback device to have any network connection. It is noted that this is an optional process to update firmware on devices that playback SD cards created (or manufactured) with stored media as described herein.

The customer attraction module **139** enables the kiosk **130** to function as a digital sign, for example, while a customer is not actively engaging in the selection or download of media files. Through the kiosk **130**, the customer attraction module **139** plays previews, such as movie previews, short segments of media files, and/or advertisements to download particular media files, in order to entice customers to make a purchase. Advantageously, the customer attraction module **139** can be programmed to only play previews from, segments of, or advertisement for media files, or training media files on how to use the system in addition to videos, that are currently available for download from the kiosk **130**. The customer attraction module **139** can be synchronized with the content of the system storage **111** so that the kiosk **130** is only attracting customers to purchase items that are available immediately for purchase. In one embodiment, the customer attraction module **139** plays a loop of previews configured based on data available at the store server **120**, which is a subset of the data available on the system server **110**. For example, an operator of the system server **110** uses the system server **110** to make updates to the list of previews and/or advertisements in the storage **111**. The system server **110** and the store server **120** work in concert to move these updates first to the store storage **121** and then to the kiosk **130**. These updates then propagate to the list of previews and/or advertisements displayed by the preview module **137**. This allows a system operator at a central location to update the previews and/or advertisements displayed in many kiosks **130** located in many different physical locations.

Computing Machine Architecture

FIG. **2** is a block diagram illustrating components of an example machine able to read instructions from a machine-readable medium and execute them in a processor (or controller). The example machine as described provides the machine structure for executing functionality of the components of the example kiosk distribution configuration. For example, the machine is configured for use as a system server **110**, a store server **120**, and/or kiosk **130**. Specifically, FIG. **2** shows a diagrammatic representation of a machine in the example form of a computer system **200** within which instructions **224** (e.g., software) for causing the machine to perform any one or more of the methodologies discussed herein may be executed. In alternative embodiments, the machine operates as a standalone device or may be connected (e.g., networked) to other machines. In a networked deployment, the machine may operate in the capacity of a server machine or a client machine in a server-client network environment, or as a peer machine in a peer-to-peer (or distributed) network environment.

The machine may be a server computer, a client computer, or any machine capable of executing instructions **224** (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute instructions **224** to perform any one or more of the methodologies discussed herein.

The example computer system **200** includes a processor **202** (e.g., a central processing unit (CPU), a graphics processing unit (GPU), one or more application specific integrated circuits (ASICs), one or more radio-frequency integrated circuits (RFICs), or any combination of these), a main memory **204**, and a non-volatile memory **206**, which are configured to communicate with each other via a bus **208**. The computer system **200** may further include graphics display unit **210** (e.g., a plasma display panel (PDP), a liquid crystal display (LCD), a projector, or a cathode ray tube (CRT)). The computer system **200** may also include alphanumeric input device **212** (e.g., a keyboard), a cursor control device **214** (e.g., a mouse, a trackball, a joystick, a motion sensor, or other pointing instrument), a storage unit **216**, a signal generation device **218** (e.g., a speaker), an input/output (I/O) device **228**, and a network interface device **220**, which also are configured to communicate via the bus **208**. It is noted that in one embodiment the I/O device **228** can be a hardware component configured to read and write to SD cards. The hardware component is configured to physically couple with the SD card so that the SD card communicatively couples with the computer system **200**.

The storage unit **216** includes a machine-readable medium **222** on which is stored instructions **224** (e.g., software) embodying any one or more of the methodologies or functions described herein. The instructions **224** (e.g., software) may also reside, completely or at least partially, within the main memory **204** or within the processor **202** (e.g., within a processor's cache memory) during execution thereof by the computer system **200**, the main memory **204** and the processor **202** also constituting machine-readable media. The instructions **224** (e.g., software) may be transmitted or received over a network **226** via the network interface device **220**.

While machine-readable medium **222** is shown in an example embodiment to be a single medium, the term

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"machine-readable medium" should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, or associated caches and servers) able to store instructions (e.g., instructions **224**). The term "machine-readable medium" shall also be taken to include any medium that is capable of storing instructions (e.g., instructions **224**) for execution by the machine and that cause the machine to perform any one or more of the methodologies disclosed herein. The term "machine-readable medium" includes, but not be limited to, data repositories in the form of solid-state memories, optical media, and magnetic media.

Downloading Media Files to an SD Card

FIG. **3** illustrates an example embodiment of a method **300** of operating a media file processing module **135** and an SD card writer **136**. The goal is to quickly and securely transfer media files, for example a digital version of a movie, from a kiosk **130** to an SD card **140**. The example method of FIG. **3** will be described herein with reference to transferring a selected movie purchased from a kiosk **130** to be loaded onto an SD card **140** to be watched later by a customer on a playback device. The method **300** described herein can also be used to transfer other media files from a kiosk **130** to an SD card **140** securely and at high-speed. Further, in this example, the method **300** configured to function within the kiosk **130** is configured with functional components of the machine, e.g., the computer system **200**, as described in FIG. **2**.

In step **301**, the media file to download to the SD card is identified. The media file may be identified by a customer through a selection using the customer interface module **131** of the kiosk **130**. In one embodiment, the media file to download includes three portions: 1) a playable content portion that contains the audio and/or video presentation of the content (i.e., the movie itself in this example); 2) a metadata portion that contains the metadata associated with the media file (e.g., metadata such as the title of the playable content, and expanded descriptive information about the content, such as the actors, the director, and/or other information that would normally appear on a DVD box, as described above); and 3) a portion that contains the information required by CPRM for SD cards to properly protect the playable content. In most instances, the playable content portion is vastly larger than the metadata portion and the CPRM for SD cards information portion.

Regarding the third portion, one example embodiment of CPRM for SD cards requires the playable content portion of the media file to be encrypted with a "content key." The content key cannot be stored in the clear or be easily obtainable or the playable content is not truly protected. Thus, CPRM for SD cards specifies the content key is encrypted with a "user key." This user key must also be encrypted. The user key is encrypted with the SD card's "media key" in an operation which can only be performed on the SD card through special interactions with the SD card's secured area **142**. In short, CPRM for SD cards specifies the SD card's media key encrypts the user key which encrypts the content key which encrypts the playable media. The kiosk **130** software modules do not access the actual keys because they are handled only in the secured area **142** of the SD card **140**, but refer to all these keys by identifiers: the media key ID, the user key ID and the content key ID. CPRM for SD cards specifies that the card's media key encrypts the user key which encrypts the content key which encrypts the playable media. The media key ID is a unique identifier for the SD card, such as a serial number. The user key ID is a unique identifier for a key required by CPRM for SD cards as part of the chain of protection for the content and is assigned the first time a user transfers content to a particular SD card from the kiosk distribution system **100** or whenever a compatible user key is not present. The content key ID is an identifier for a key that enables a playback device to playback the playable content portion of the media file.

The third portion of the media file to download also includes the usage rules. The usage rules are a set of rules specifying the access rights to the playable content portion of the media file that have been purchased by the customer. For example, the usage rules may specify the rental period, the number of times the movie can be watched, the period of time allowed between beginning to playable the movie and completing the playback of the movie, etc.

In step **302**, the media key ID and user key ID are checked. The media key ID is retrieved and the user key ID is retrieved or assigned so that they are available to be written to the SD card as part of the third portion of the media file. The user key is written to the secure area **142** of the SD card **140** as part of initial set-up of the SD card. Thereafter, it need not be written again for subsequent uses of the SD card **140**.

In step **303**, four processes are spawned to transfer data to an SD card **140**. First data is transferred to the unsecure area **141** of the SD card **140**. Thereafter, data is written to the secure area **142** of the SD card **140**.

In step **304**, the read process operates by first buffering **3041** data in preparation for writing it to the unsecure area **141** of the SD card **140**. In one embodiment, the read process **304** and the write process **305** share a circular buffer. The read process **304** must always stay at least one buffer ahead of the write process **305** so that the write process never pauses to wait for the read process **304** in order to obtain optimal speed. However, at the same time, the read process **304** must also not get too far ahead of the write process **305** because they share a circular buffer. The read process **304** should not delete data in a buffer (in order to refill it) unless the write process **305** has already written the data in the buffer to the SD card **140**.

As the read process **304** buffers **3041** data in preparation for writing, the read process **304** periodically reports **3042** the progress of the file transfer. Thus, the progress reports can be used to keep the customer updated on the status of the file transfer, in order to prevent the customer from becoming needlessly frustrated and aborting the transfer.

As the read process **304** is executing, the write process **305** begins executing. In step **3051**, space is optionally pre-allocated for the media file. Typically, a large media file stored on an SD card includes multiple directory blocks and many data blocks. Each directory block points to a plurality of data blocks. In one example embodiment, a data block is a 512-byte data block. If space is not pre-allocated, the directory blocks may be mixed in among the data blocks in the SD card. As a result, context switching from creating the directory blocks to writing data blocks may slow down the write process. By pre-allocating the space needed to write the media file, the storage blocks for all directory information are put together at the front, and they are followed by the blocks pointed to by the directory blocks sequentially in order. In this way, interruptions to the write process caused by switching between creating directory blocks and writing data blocks are avoided and speed is increased.

The write process **305** finds **3052** the next block of data in the circular buffer shared with the read process **304**, and then writes **3053** the block of data to the SD card **140**. After writing **3053** the block of data, the write process **305** checks **3054** for the end of the file. If the end of the file is not found, the write process returns to step **3052** to find the next block of data in the buffer and repeats steps **3052-3054** until the end of the file is found.

In one embodiment, the read process **304** and write process **305** operate in parallel to read and write data to the unsecure area **141** of the SD card **140**. In one embodiment, the read process **305** begins by reading the playable content portion of the media file first. Because the playable content portion of the file is the rate limiting step for the overall transfer of the media file (because of its relatively large size), the writing of the playable content portion is preferentially started first and runs essentially continuously until the playable content portion has be written to the unsecure area **141** of the SD card **140**. While the playable content portion is being written **305**, the metadata process **306** and the content key process **307** also execute.

The metadata process **306** begins with creating and writing **3061** the metadata file. The metadata file includes, for example, the metadata and the parts of DRM information that are written to the unsecure area **141** of the SD card **140**. Then chapter images are written **3062** to the SD card **140**, if any. The chapter images are images that represent the chapters in on-screen displays and/or menus and can be selected to navigate the playable content on a playback device. Then the media product image is written **3063**. The media product image may include images that would accompany the media sold or rented in conventional channels, for example the box cover art or the album cover.

As the metadata process is executing **306**, the content key process **307** also executes. In step **3071**, the usage rules are created. Recall the usage rules are a set of rules specifying the access rights to the playable content portion of the media file that have been purchased by the customer. A copy of the usage rules applicable to the playable content being transferred to the SD card **140** is obtained for transfer to the SD card **140** as well. Then, in step **3072**, an encrypted content key and an encrypted set of usage rules are created and queued for transfer to the SD card **140**.

It has been found that because the metadata process **306** and the content key process **307** treat relatively small amounts of data as compared to the playable content portion, the execution of these processes only mildly interferes with the continuous writing of the playable content portion. For example, although transferring a full-length movie to an SD card **140** may take approximately 2 minutes, the other smaller portions only mildly interfere with the writing of the movie for a few seconds. After the first few seconds of writing the movie to the SD card **140** during which the metadata is also written to the SD card **140**, the movie gets the benefit of exclusive access to the SD card writer **136** for the duration of the download.

Finally, in step **308**, if writing data to the unsecure area **141** of the SD card **140** successfully completes, the encrypted content key and usage rules are written to the secure area **142** of the SD card **140**. Although the data intended for the secure area is prepared in the content key process **307** that executes as the read process **304**, write process **305**, and metadata process **306** execute, so that there are no delays once the data finishes writing to the unsecure area **141** of the SD card **140**, the secure data is not written to the SD card **140** until the end of the method **300** for two main reasons. First, writing to the secure area **142** of the SD card slows down the write process **305**. Thus, any data (other than the user key which is written as part of an initial set-up of the SD card **140**) to be written to the secure area **142** is queued to be written at the end to avoid delays caused by switching back and forth between the unsecure area **141** and the secure area **142** of the SD card **140**. Secondly, by waiting until the end of the method **300**, if there is any kind of problem with the payment for the transaction through the transaction module **134** or with the transfer of the media file to the SD card **140**, the kiosk **130** can abort the transfer without writing the data to the secure area **142** of the SD card **140**. As a result, no matter what portion of the media file has been downloaded to the SD card **140** prior to the transfer process being aborted, the customer will not be able to playback any playable content that was downloaded to the SD card **140** without the data that needs to be in the secure area **142** (i.e., the encrypted content key and the usage rules). Thus, the owners of the intellectual property rights in the media file gain a measure of protection against people who may try to abscond with a copy of the media file without proper payment. As a result, using the method **300** described in FIG. **3**, media files can be quickly and securely transferred from a kiosk **130** to an SD card **140**.

The example method **300** described with reference to FIG. **3** can be adapted to describe the transfer of multiple media files. Steps **301-307** each run separately for each of the multiple media files, however step **302** need only be performed the first time to check the media key ID and the user key ID (because it will be the same for the subsequent media files). After all of the data is written to the unsecure area **141** of the SD card **140** for all of the multiple media files, step **308** is executed one time to write all the data to the secure area **142** of the SD card **140**, provided that the transaction successfully completes. As a result, according to an embodiment of the configurations noted, the process of transferring multiple media files to the SD card **140** avoids delays that would be caused by switching back and forth between writing to the unsecure **141** and secure **142** areas of the SD card **140**. The streamlined process increases efficiency and manufacturing (or creating) SD cards with desired content in real time (or "on the fly").

Additional Configuration Considerations

Throughout this specification, plural instances may implement components, operations, or structures described as a single instance. Although individual operations of one or more methods are illustrated and described as separate operations, one or more of the individual operations may be performed concurrently, and nothing requires that the operations be performed in the order illustrated, e.g., in FIGS. **1**, **2** and **3**. Structures and functionality presented as separate components in example configurations may be implemented as a combined structure or component. Similarly, structures and functionality presented as a single component may be implemented as separate components. These and other variations, modifications, additions, and improvements fall within the scope of the subject matter herein.

Certain embodiments are described herein as including logic or a number of components, modules, or mechanisms. Modules may constitute either software modules (e.g., code embodied on a machine-readable medium or in a transmission signal) or hardware modules. A hardware module is tangible unit capable of performing certain operations and may be configured or arranged in a certain manner. In example embodiments, one or more computer systems (e.g., a standalone, client or server computer system) or one or more hardware modules of a computer system (e.g., a processor or a group of processors) may be configured by software (e.g., an application or application portion) as a hardware module that operates to perform certain operations as described herein. The one or more processors **202** may also operate to support performance of the relevant operations in a "cloud computing" environment or as a "software as a service" (SaaS). For example, at least some of the operations may be performed by a group of computers (as examples of machines including processors), these operations being accessible via a

network (e.g., the Internet) and via one or more appropriate interfaces (e.g., application program interfaces (APIs)).

Modules may constitute either software modules (e.g., code embodied on a machine-readable medium or in a transmission signal) or hardware modules. A "hardware module" is a tangible entity, be that an entity that is physically constructed, permanently configured (e.g., hardwired), or temporarily configured (e.g., programmed) to operate in a certain manner or to perform certain operations described herein. As used herein, "hardware-implemented module" refers to a hardware module. Considering embodiments in which hardware modules are temporarily configured (e.g., programmed), each of the hardware modules need not be configured or instantiated at any one instance in time. For example, where the hardware modules comprise a general-purpose processor configured using software, the general-purpose processor may be configured as respective different hardware modules at different times. The hardware modules may be regarded as being communicatively coupled. Where multiple of such hardware modules exist contemporaneously, communications may be achieved through signal transmission (e.g., over appropriate circuits and buses) that connect the hardware modules. Software may accordingly configure a processor, for example, to constitute a particular hardware module at one instance of time and to constitute a different hardware module at a different instance of time.

The various operations of example methods described herein, e.g., in FIG. **3**, may be performed, at least partially, by one or more processors that are temporarily configured (e.g., by software) or permanently configured to perform the relevant operations. Whether temporarily or permanently configured, such processors may constitute processor-implemented modules that operate to perform one or more operations or functions. The modules referred to herein may, in some example embodiments, comprise processor-implemented modules.

Similarly, the methods described herein may be at least partially processor-implemented. For example, at least some of the operations of methods in FIGS. **1-3** may be performed by one or processors **202** or processor-implemented hardware modules. The performance of certain of the operations may be distributed among the one or more processors, not only residing within a single machine, but deployed across a number of machines. The one or more processors may also operate to support performance of the relevant operations in a "cloud computing" environment or as a "software as a service" (SaaS). For example, at least some of the operations may be performed by a group of computers (as examples of machines including processors), these operations being accessible via a network (e.g., the Internet) and via one or more appropriate interfaces (e.g., application program interfaces (APIs).)

The performance of certain of the operations may be distributed among the one or more processors, not only residing within a single machine, but deployed across a number of machines. In some example embodiments, the one or more processors or processor-implemented modules may be located in a single geographic location (e.g., within a home environment, an office environment, or a server farm). In other example embodiments, the one or more processors or processor-implemented modules may be distributed across a number of geographic locations.

Some portions of this specification are presented in terms of algorithms or symbolic representations of operations on data stored as bits or binary digital signals within a machine memory (e.g., a computer memory), for example, the process noted in FIG. **3**. These algorithms or symbolic representations are examples of techniques used by those of ordinary skill in the data processing arts to convey the substance of their work to others skilled in the art. As used herein, an "algorithm" is a self-consistent sequence of operations or similar processing leading to a desired result. In this context, algorithms and operations involve physical manipulation of physical quantities. Typically, but not necessarily, such quantities may take the form of electrical, magnetic, or optical signals capable of being stored, accessed, transferred, combined, compared, or otherwise manipulated by a machine. It is convenient at times, principally for reasons of common usage, to refer to such signals using words such as "data," and "content," or the like. These words, however, are merely convenient labels and are to be associated with appropriate physical quantities.

Unless specifically stated otherwise, discussions herein using words such as "processing," "computing," "determining," "presenting," "displaying," or the like may refer to actions or processes of a machine (e.g., a computer) that manipulates or transforms data represented as physical (e.g., electronic, magnetic, or optical) quantities within one or more memories (e.g., volatile memory, non-volatile memory, or a combination thereof), registers, or other machine components that receive, store, transmit, or display information.

As used herein any reference to "one embodiment" or "an embodiment" means that a particular element, feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

Some embodiments may be described using the expression "coupled" and "connected" along with their derivatives. For example, some embodiments may be described using the term "coupled" to indicate that two or more elements are in direct physical or electrical contact. The term "coupled," however, may also mean that two or more elements are not in direct contact with each other, but yet still co-operate or interact with each other. The embodiments are not limited in this context.

As used herein, the terms "comprises," "comprising," "includes," "including," "has," "having" or any other variation thereof, are intended to cover a non-exclusive inclusion. For example, a process, method, article, or apparatus that comprises a list of elements is not necessarily limited to only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. Further, unless expressly stated to the contrary, "or" refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

In addition, use of the "a" or "an" are employed to describe elements and components of the embodiments herein. This is done merely for convenience and to give a general sense of the invention. This description should be read to include one or at least one and the singular also includes the plural unless it is obvious that it is meant otherwise.

Upon reading this disclosure, those of skill in the art will appreciate still additional alternative structural and functional designs for a system and a process for a high-speed secure content transfer to an SD card from a kiosk through the disclosed principles herein. Thus, while particular embodiments and applications have been illustrated and described, it is to be understood that the disclosed embodiments are not limited to the precise construction and components disclosed herein. Various modifications, changes and variations, which

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will be apparent to those skilled in the art, may be made in the arrangement, operation and details of the method and apparatus disclosed herein without departing from the spirit and scope defined in the appended claims.

What is claimed is:

1. A kiosk for transferring content to a secure digital (SD) card, the kiosk comprising:

a customer interface module for receiving a customer's selection of a plurality of media files to transfer to the SD card;

a media file request module for requesting the plurality of media files and corresponding metadata file for each media file from a server communicatively coupled to the kiosk;

a server interaction module for receiving the requested plurality of media files and the corresponding metadata files from the server;

a transaction module for accepting payment from a customer for the customer's selection of the plurality of media files to transfer to the SD card;

an SD card writer for writing data to an unsecure user area of the SD card and a protected secure area of the SD card; and

a media file processing module for preparing the plurality of media files and the corresponding metadata files to be written to the SD card in cooperation with the SD card writer, wherein space is pre-allocated on the SD card for writing an encrypted playable content portion of each media file to an unsecure area of the SD card, and wherein, except for a user key, data to be written to the unsecure area of the SD card is queued for writing in advance of data to be written to a secure area of the SD card, such that the data to be written to the unsecure area is written in time before the data to be written to the secure area is written, and wherein the playable media files are encrypted by a content key that is encrypted by the user key.

2. The kiosk of claim **1**, further comprising a preview module for playing a preview of content of selected by the customer through the kiosk while the SD card writer writes the plurality of media files to the SD card, wherein the preview of content selected by the customer includes content from the plurality of media files being written to the SD card.

3. The kiosk of claim **1**, further comprising a firmware update module for transferring a firmware update to the SD card.

4. The kiosk of claim **1**, further comprising a software player update module for transferring a software player update to the SD card.

5. The kiosk of claim **1**, further comprising a customer attraction module for playing segments from media files currently available for download from the kiosk while the kiosk is not used for purchase of a media file.

6. The kiosk of claim **1**, further comprising a USB port to allow connection of the SD card with a USB adapter to the kiosk.

7. A method of quickly and securely transferring media files from a kiosk to a secure digital (SD) card, the method comprising:

identifying a media file for download to the SD card;

pre-allocating space on the SD card for a playable content portion of the media file, wherein the playable content portion of the media file is encrypted by a content key that is encrypted by a user key;

writing all directory blocks of the playable content portion of the media file together and, thereafter in time, writing all data blocks sequentially of the playable content portion of the media file; and

writing all data that is to be written to an unsecure area of the SD card, including the encrypted playable content, prior in time to writing any data to a secure area of the SD card, except for the user key.

8. The method of claim **7**, wherein, except for a user key, data is only written to the secure area of the SD card if a transaction for the media file successfully completes.

9. The method of claim **7**, wherein the SD card is pre-configured with the user key stored in the secure area of the SD card.

10. The method of claim **7**, further comprising:

writing the user key to the secure area of the SD card prior in time to writing all data to the unsecure area of the SD card; and

writing other data to the secure area of the SD card after in time writing all data to the unsecure area of the SD card.

11. The method of claim **7**, where the directory blocks are optionally written at once.

12. A non-transitory computer readable storage medium storing instructions thereon, the instructions when executed cause at least one processor to:

identify a media file for download to an SD card;

pre-allocate space on the SD card for a playable content portion of the media file, wherein the playable content portion of the media file is encrypted by a content key that is encrypted by a user key;

write all directory blocks together of the playable content portion of the media file and, thereafter in time, write all data blocks sequentially of the playable content portion of the media file; and

write all data that is to be written to an unsecure area of the SD card, including the encrypted playable content, prior in time to writing any data to a secure area of the SD card, except for the user key.

13. The computer readable storage medium of claim **12**, wherein, except for a user key, data is only written to the secure area of the SD card if a transaction for the media file successfully completes.

14. The computer readable storage medium of claim **12**, wherein the SD card is pre-configured with the user key stored in the secure area of the SD card.

15. The computer readable storage medium of claim **12**, further comprising instructions that when executed cause the at least one processor to:

write the user key to the secure area of the SD card prior in time to a write of all data to the unsecure area of the SD card; and

write other data to the secure area of the SD card after in time a write of all data to the unsecure area of the SD card.

16. The computer readable storage medium of claim **12**, where the directory blocks are optionally written at once.

17. The computer readable storage medium of claim **12** wherein the instructions cause the media file to be downloaded to the SD card in substantially 2 minutes.

18. The method of claim **7** wherein the media file is downloaded to the SD card in substantially 2 minutes.

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