



- (51) International Patent Classification:  
H04N 7/167 (2011.01)
- (21) International Application Number:  
PCT/US2012/052011
- (22) International Filing Date:  
23 August 2012 (23.08.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/526,665 23 August 2011 (23.08.2011) US  
13/302,852 22 November 2011 (22.11.2011) US
- (71) Applicant: ECHOSTAR TECHNOLOGIES L.L.C.  
[US/US]; 100 Inverness Terrace East, Englewood, Colorado 80112 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): MARTCH, Henry Gregg [US/US]; 23244 Barnsley Lane, Parker, Colorado 80138 (US). KUMMER, David A. [US/US]; 8947 South Green Meadows Lane, Highlands Ranch, Colorado 80126 (US). KENNEDY, John T. [US/US]; 1264 South Corona Street, Denver, Colorado 80210 (US).
- (74) Agents: GRAY, Charles et al.; Eighth Floor, Two Embarcadero Center, San Francisco, CA 94111 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: STORING MULTIPLE INSTANCES OF CONTENT

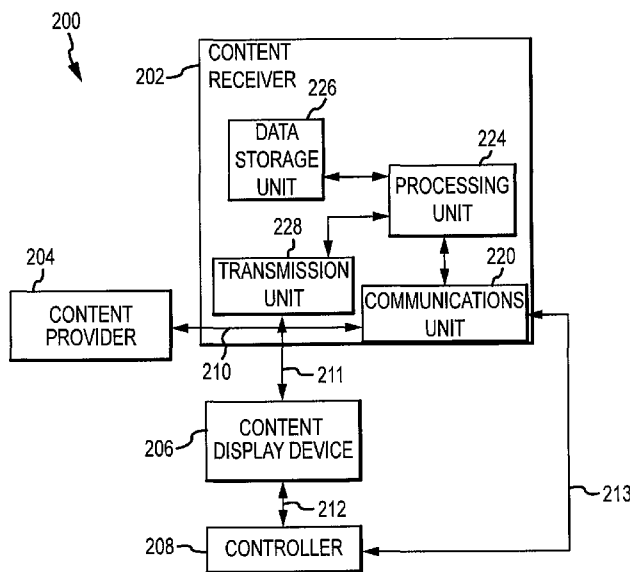


FIG.2

(57) Abstract: Content receivers may simultaneously record multiple instances of content for multiple programming channels based on content provider instructions. Systems and methods utilize the content receivers to record these multiple instances from at least a single transponder. In some instances, multiple transponders may have a common control word so that content carried on each such transponder may be simultaneously received, decoded and recorded. Further, a single demodulator may be associated with multiple tuners, so that the single demodulator processes all content received from transponders with common control words and/or other encryption mechanisms.

WO 2013/028835 A1



---

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))* — *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))*

**Published:**

— *with international search report (Art. 21(3))*

## STORING MULTIPLE INSTANCES OF CONTENT

### CROSS REFERENCE TO RELATED APPLICATION

The PCT application claims priority to U.S. Application No. 13/302,852 filed November 22, 2011 which claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Patent Application No. 61/526,665, which was filed on August 23, 2011, and entitled “Storing Multiple Instances of Content,” which is incorporated by reference into the present application in its entirety..

### FIELD OF THE INVENTION

This disclosure relates generally to utilizing content receivers to view multiple instances of content, often recorded simultaneously.

### SUMMARY

The present disclosure discloses systems and methods for storing multiple instances of content utilizing a content receiver. One embodiment takes the form of a method for recording multiple instances of content, comprising: receiving, at a content receiver, an instruction to initiate recording; in response to the instruction, setting a first tuner to a first carrier frequency; further in response to the instruction, setting a second tuner to a second carrier frequency; receiving a first set of content at the first tuner, the first set of content encrypted with a control word; receiving a second set of content at the second tuner, the second set of content encrypted with the control word; and recording the first and second sets of content on a storage medium.

Another embodiment may take the form of an apparatus for receiving multiple instances of content, comprising: a first communications unit operative to receive a first set of instances of content transmitted on a first transponder; a second communications unit operative to receive a second set of instances of content transmitted on a second transponder; a processing unit operatively connected to the first and second communications unit, the processing unit operative to control the first and second communications unit; a descrambler operative to descramble the first and second instances of content; and a data storage unit operative to receive and store the first and second instances of content.

Still another embodiment may take the form of a method for decrypting content, comprising: receiving a first set of encrypted content modulated with a first carrier frequency; substantially simultaneously, receiving a second set of encrypted content modulated with a second carrier

frequency; and decrypting both the first and second sets of encrypted content with a common control word, thereby producing a first and second set of decrypted content.

It is to be understood that both the foregoing general description and the following detailed description are for purposes of example and explanation and do not necessarily limit the present disclosure. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate subject matter of the disclosure. Together, the descriptions and the drawings serve to explain the principles of the disclosure.

### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating a system for automatically recording multiple instances of content from one or more programming providers.

Figure 2 is a block diagram illustrating a system for storing multiple instances of content.

### DETAILED DESCRIPTION OF THE EMBODIMENTS

The description that follows includes sample systems, methods, and computer program products that embody various elements of the present disclosure. However, it should be understood that the described disclosure may be practiced in a variety of forms in addition to those described herein.

Users of content receivers may desire to access different instances of content that are broadcast simultaneously and/or substantially contemporaneously by content providers. For example, many television programming viewers wish to watch different television programs that occupy the same broadcast time slot, such as the different television programs associated with the major television programs that are broadcast between seven PM and ten PM mountain time. Content receivers may attempt to address this issue by utilizing multiple tuners that can each separately present and/or record different, simultaneously broadcast instances of content. However, a separate tuner may still be required for each simultaneous or substantially contemporaneous instance of broadcast or otherwise received content that a content receiver user wishes to view and/or record. Further, in addition to separate tuners required for each instance of content, the content receiver may require sufficient resources to descramble, demodulate and store each of the instances of content desired by the user.

Figure 1 is a block diagram illustrating a system 100 for automatically recording multiple instances of content from one or more programming providers. The automatic recording of multiple instances of content provided by the system 100 may enable users of content receivers

to access different instances of content that are broadcast simultaneously and/or substantially contemporaneously by content providers. "Multiple instances of content" may be, for example, different programs, movies, program episodes, and so on. Thus, multiple instances of content may be different episodes of a program, or different programs. It should be appreciated that the multiple instances of content may be recorded simultaneously by the embodiments described herein.

Further, it should be appreciated that a first group of multiple instances of content may occupy a first time slot, while a second group of multiple instances of content may occupy a second time slot. Embodiments described herein may record the first group at the first time and the second group at the second time.

In various broadcast systems, content providers may broadcast content to a plurality of different content receivers via one or more frequency bands utilizing one or more satellites. Each multiplexed signal contained in the frequency band (sometimes referred to as a transponder) may be configured to include data related to one or more instances of content, such as one or more television programming channels. The data related to each of the instances of content included in each frequency may be scrambled utilizing one or more CWs (control words), which may then be encrypted to generate one or more ECMs (entitlement control messages) which may in turn be included with the data. A content receiver may typically tune to one or more of the frequency bands to receive the multiplexed signal that contains data for a particular programming channel, or group of channels, utilizing one or more tuners. The content receiver may process only a subset of the programming channels by keeping the data associated with the particular programming channel and discarding data received via the tuned frequency band and multiplexed signal associated with other programming channels. The content receiver may decrypt the ECM included with the data associated with the particular programming channel to obtain the CW, descramble the data utilizing the CW, and store and/or transmit the data (e.g., decompressed, reconstructed audio and video data) to one or more presentation devices.

As illustrated in Figure 1, in this implementation, one or more content providers may select multiple instances of content 101 to be automatically recorded such as by utilizing predefined recording parameters. For example, a content provider may select all of the television events defined as "primetime events" associated with all channels defined as "primetime television channels" for a particular period of time defined as "prime time" to be automatically recorded. In other examples, the content provider may select television events associated with programming channels for a particular time period (such as a half hour, multiple hours, and/or an entire programming day) in response to user selections. After the content provider selects the multiple instances of content, the multiple instances of content may be multiplexed utilizing a

multiplexer 102. The multiplexed signal (which includes the multiplexed selected multiple instances of content) may then be scrambled by a scrambler 105 utilizing one or more CWs 103. The CW may be encrypted to generate an ECM, which may be included with the multiplexed signal. The scrambled multiplexed signal may then be included in a broadcast on a frequency band (e.g., cable, satellite), which may then be transmitted to one or more satellites 106 for broadcast. The satellite 106 may receive the frequency band (uplink frequency band) and then broadcast the multiplexed signal to a number of content receivers on a translated frequency band (downlink frequency band), such as a content receiver that includes a tuner 107.

The tuner 107 may tune to the frequency band that includes the multiple instances of content (which may be performed in response to one or more recording instructions received by the content receiver that includes the tuner from the content provider). The data received via the tuned frequency may be demultiplexed by a demultiplexer 109 and then descrambled by a descrambler 110 (e.g., decoder) utilizing the CW before being stored in a non-transitory storage medium 111 (which may take the form of, but is not limited to: a magnetic storage medium; optical storage medium; magneto-optical storage medium; random access memory; erasable programmable memory; flash memory; and so on) based on recording parameters, such as predefined recording parameters. The demultiplexer 109 may obtain the included ECM 104, and the ECM may be provided to a smart card 108 that may decrypt the ECM 104 to obtain the CW 103 for the descrambler 110. Hence, the multiple instances of content may subsequently all be available to a user of the content receiver (until such time as they are removed from the non-transitory storage medium) without requiring multiple tuners to receive each of the multiple instances of content, without requiring the smart card to decrypt multiple ECMs. In some implementations, the multiple instances of content may be stored in a single file. It should be appreciated that the tuner 107, smart card 108, demultiplexer 109, descrambler 110 and/or storage medium 111 may all be resident in a single enclosure or other housing. One example of a device that may incorporate such elements is the content receiver 202, discussed below with respect to Figure 2.

Although the system 100 is illustrated in Figure 1 and is described above as including a number of specific components configured in a specific arrangement, it is understood that this is for the purposes of example and other arrangements involving fewer and/or additional components are possible without departing from the scope of the present disclosure. For example, in various implementations, the multiple instances of content may be individually scrambled utilizing the code word prior to multiplexing. In another example, in some implementations, the data received via the tuned frequency may be demultiplexed before being individually descrambled utilizing the code word.

In some implementations of the system of Figure 1, multiple instances of content may be recorded simultaneously from a single transponder and stored in the non-transitory storage medium 111 of the content receiver as a single file of multiple recorded instances of content. Upon playing of one instance of content from the single file of the multiple recorded instances of content, the content receiver may read the file incrementally so as to play the one instance of content while filtering out the other file contents (e.g., the other instance of content within the file). For example, five instances of content may be received at a transponder and simultaneously recorded by the content receiver based on predefined recording parameters, and each of the instances of content may record at an average variable bit rate. More specifically, one instance of content may be received by the transponder and be recorded by the content receiver at an average of 1 Mb/sec (Megabits per second), a second instance of content at an average of 2 Mb/sec, a third at 3 Mb/sec, a fourth instance of content at an average of 4 Mb/sec, and a fifth instance of content at 5 Mb/sec. In this example, the transponder receives and the content receiver records the five instances of content at an aggregate bit rate of 15 Mb/sec (e.g., the aggregate of 1 Mb/sec, 2 Mb/sec, 3 Mb/sec, 4 Mb/sec, and 5 Mb/sec). Thus, playing one of the five instances of content involves utilizing the content receiver to read the full file at 15 Mb/sec but discarding all but the one instance of content that is desired. In alternative embodiments, each instance of content being simultaneously recorded may be written as a separate file in the storage medium 111.

In some implementations, the aggregate recording bit rate may be less than the maximum available recording bit rate. Thus, the aggregate bit rate of 15 Mb/sec for a transponder may be less than the maximum available bit rate of, for example, up to 40 Mb/sec. Accordingly, playing an instance of recorded content involves the content receiver determining the aggregate recording bit rate for the file of the simultaneously recorded multiple instances of content and playing the instance of content based on the aggregate recording bit rate.

In another example, a file of ten simultaneously recorded instances of content may be recorded at a bit rate of 40 Mb/sec (e.g., a maximum aggregate bit rate for the transponder), having a recording bit rate (or an average bit rate) of 4 Mb/sec playing one of the ten instances of content involves utilizing the content receiver to incrementally read the file in increments of 4 Mb/sec of the total 40 Mb/sec recorded. A first show may be associated with the content recorded at the first 4 Mb/sec (e.g., Mb 1-4) of the total 40 Mb/sec, a second show may be associated with the content recorded at the second 4 Mb/sec (e.g., Mb 5-8), and so on.

In the examples above, it will be appreciated that the multiple instances of content may be recorded based on statistical multiplexing utilizing communicatively coupled video compressors

that determine the bandwidth of data needed for compressing the instance of content to be recorded. This enables the recording (and replay) bit rate of an instance of content to be variable within the recording stream, and accordingly the multiple instances of content may be recorded each at varying bitrates. For a given transponder, as the percentage of the transport stream that is being recorded increases, the variability of the recording data drops. That is, if 100 percent of the stream is being recorded (e.g. at the maximum aggregate bit rate for the transponder), then the variability is zero. As a result, the average recording bit rate of many varying streams may be less noisy. In the examples above, it will also be appreciated that the aggregate recording bit rate may be calculated periodically or in real time.

Figure 2 is a block diagram illustrating a system 200, potentially including a content provider 204 and a content receiver 202. The system 200 may be at least partly incorporated into the system of Figure 1. The content receiver 202 (such as a set top box) may receive and, in some instances, transmit content (such as television programming and on screen display content) to other receivers to a remote viewer, and the like. The content provider 204 generally is as a satellite or cable programming service provider and transmits content to the receiver across a network, one example of which is the satellite(s) 106 shown in Fig. 1. Alternate networks may include a wired network, such as a cable network, a wireless network, such as a terrestrial broadcast network, the Internet, an Ethernet or other local network, combinations of any of the foregoing, and the like. It should be appreciated that the content receiver 202 may incorporate various elements of Figure 1, such as the tuner 107, demultiplexer 109, smart card 108, multiplexer 110 and/or storage 111. Such elements may not be shown specifically in Figure 2, insofar as they were discussed with respect to Figure 1. These elements may be controlled, for example, by the processing unit 224 of Figure 2. Likewise, the data storage unit 226 may be the same as the storage device 111 of Figure 1.

The system may also include, or be coupled to, a content display device 206 for receiving and displaying the content (such as a television), and a controller 208 (such as a remote control) for transmitting data such as control signals to the content receiver 202.

The content receiver 202 generally receives content from the content provider 204 and, optionally, from other external sources such as other content receivers and servers accessed across a network. The content receiver 202 may process and/or decode the content, as well as transmit the content to the content display device 206. The content receiver 202 may be, for example, a set top box, a television receiver, a digital video recorder, a computing device, a gaming device, or a television, which is generally located at a user's location (such as a user's residence or business). The content receiver 202 is operable to receive content from the content



provider 204 (and/or another external source) by way of the transmission link 210. Such content is received by the communications unit 220 of the content receiver 202; the communications unit 220 may be analogous to or include one or more of the tuner 107, demultiplexer 109, descrambler 110 and/or smart card 108. The processing unit 224 may execute instructions for causing the data storage unit 226 (such as the non-transitory storage medium 111) to record multiple instances of content for a plurality of programming channels simultaneously within a single file described above in connection with Figure 1, and/or to play one of the stored instances of content. The transmission unit 228 may be communicatively coupled to the content display device 206 by way of transmission link 211.

The content provider 204 (such as a satellite programming company, a cable company, an Internet service provider, e.g., an online video service or Internet video provider, and the like) is generally remotely located from the content receiver 202. The content provider transmits content to the communications unit 220 of the content receiver 202 via the transmission link 210. The content transmitted may include metadata specifying recording instructions for the content receiver 202 to automatically record multiple instances of content simultaneously for multiple programming channels as described elsewhere herein.

The content display device 206 is generally communicatively coupled to the content receiver 202 and displays content transmitted by the content receiver 202. While the content display device 206 and the content receiver 202 are depicted as separate components in Figure 2, the content receiver 202 may be incorporated with the content display device 206. The content display device 206 is, for example, a television, a computer screen, a video screen, or any other display device for displaying content. The content display device 206 is communicatively coupled to the content receiver 202 by way of the transmission link 211.

The controller 208 is generally provided in an area proximate the content receiver 202 and is communicatively coupled to the content display device 206 by way of the transmission link 212, and to the content receiver 202 by way of the transmission link 213. The controller 208 is, for example, a remote control, such as a universal remote control, a dedicated remote control, or a computing device programmed to send command signals (such as selection signals) to the content receiver 202. The controller 208 may be utilized to provide command signals instructing the content receiver 202 to record and/or reply one or more instances of content.

Returning to the content receiver 202, the processing unit 224 may be programmed to manage, initiate or otherwise facilitate recording and/or playback of one (or more) instances of content received from a number of programming channels carried on a single transponder. For example,

four programming channels and the corresponding four instances of content may be recorded simultaneously and stored in the data storage unit 226. Upon receipt of the appropriate command or commands, which may be transmitted from the controller 208, the processing unit 224 may retrieve data from the data storage unit 226 and format it for display on the content display device 206. It should be appreciated that such formatting and display may involve demodulating, decrypting, and/or other operations executed by one or more hardware, software and/or firmware elements (not necessarily shown) generally controlled by the processing unit 224. Accordingly, actions ascribed to the processing unit may be carried out by other portions of the content receiver 202 at the processing unit's direction.

Recording and playing back one or more of the multiple instances of content may involve the processing unit 224 reading metadata associated with an initial frame of the instance of content, such as a packet identifier ("PID") and a presentation timestamp ("PTS"). For example, while playing the instance of content, the processing unit 224 may select only the PID for the instance of content to be played, while ignoring other PIDs within the file of the plurality of simultaneously recorded instances of content. PIDs are generally identifiers associated with data streams, such as content streams and supplemental data streams, which identify a channel for the data stream. Several PIDs may be associated with one transponder controlled by the content provider 204 and simultaneously recorded utilizing the system of Figure 1. By identifying or selecting the correct PID for the instance of content being played back from the file, the content receiver 202 may navigate correctly determine which instance of the simultaneously recorded multiple instances of content is to be displayed.

Generally, the content receiver 202 may include multiple tuners 107, demultiplexers 109, descramblers 110 and/or other decoders. In some cases, content may be demodulated from a carrier wave or other signal in order to be reconstructed, recorded, and/or viewed. In many instances, demodulation occurs prior to descrambling. Demultiplexing and descrambling may be considered examples of decoding.

In some embodiments, a single decoder (such as a demultiplexer 109 and/or descrambler 110), or one decoder of any given type, (e.g., one demodulator and one descrambler) may be associated with multiple tuners 107. Each tuner may be adjusted to receive a specific frequency band or transponder. Thus, each tuner may receive a different transponder and thus a variety of instances of content on that transponder.

In such an embodiment, the transponders to which each tuner 107 is tuned may be encoded with a common control word. In this manner, each separate tuner may transmit the multiple instances

of content received on the corresponding transponder to a single decoder for processing. Because content associated with the various transponders is commonly encoded, the descrambler 110 may descramble all such content relatively efficiently. These multiple instances of content may then be recorded, as detailed previously. In this manner, multiple tuners may be associated with a single descrambler in order to receive and record multiple instances of content from more than one transponder/frequency band. Accordingly, multiple tuners may be used to receive a greater amount of content than may be carried on a single transponder and all such content may be demultiplexed and/or descrambled by elements common to, and shared by, the tuners. Since a common control word is used to encrypt the content carried on different transponders, a single decoder may handle it all. Thus, the multiple instances of content may be thought of as a first content set and a second content set, each commonly scrambled with a control word but carried on different carrier frequencies.

It should be appreciated that multiple transponders may use the same control word (or other decryption key) even if a single descrambler is not used. That is, multiple transponders may be scrambled with a single control word and one tuner 107 or communications unit 220 may receive corresponding data from each such transponder. Each tuner or unit may transmit the received signal to a descrambler dedicated to that tuner for descrambling, at which point each set of multiple instances of content may be recorded to a storage medium (either separately or in one or more aggregated files).

In alternative embodiments, the multiple instances of content received from multiple transponders may be recorded on the storage medium without descrambling or decryption. Descrambling may occur when the content is played back. That is, the entirety of the multiple instances of content received from the transponders may be stored as a single file (or one file per transponder, in some embodiments) on the storage unit 226 that is still encrypted. The descrambler may decrypt the content only upon playback. In such an embodiment, the scrambled content may be retrieved from the storage medium 226, sent to a single descrambler and descrambled before the operations of identifying and displaying particular content are performed, as described above.

In some embodiments, the system may check to see if content on multiple transponders is scrambled using the same control word. This may be indicated, for example, in metadata corresponding to one or more of the instances of content, or one or more of the transponders. The metadata may identify all content and/or all transponders scrambled with the same control word. Accordingly, the processing unit 224 may receive this metadata and, in response to it, instruct the communications unit 222 to receive data from each of the transponders. The

communications unit 222 may have multiple tuners 107 in such an embodiment. Received content may then be stored and replayed as described elsewhere herein. It should also be appreciated that certain embodiments may employ a user command in addition to metadata to instruct the communications unit 222 to receive data. Likewise, a command to receive and record instances of content may be initiated by the content provider 204.

It may be useful or desirable to secondarily encode some subset of the multiple instances of content in addition to encoding it with the common control word. For example, this may permit a subset of content to be delivered to certain users. This subset of content may be additional or enhanced content. As one example, the subset of content may be a “behind the scenes” presentation associated with some other portion of the multiple instances of content, and may be provided only to those users who have paid an additional fee. The subset of content may be related to one or more instances of the other multiple instances of content or may be wholly separate. The users that may access the subset of content may be those who have paid a fee, live in or are otherwise associated with a certain geographic area, users corresponding to certain demographics, and so on.

The subset of content may be scrambled twice- once with the control word common to the multiple instances of content and/or transponders, and once with a specific sub-key. Thus, the subset of content may be received and initially descrambled in accordance with other portions of this disclosure, but may remain scrambled by the sub-key although all other instances of content may be fully descrambled. The subset may be recorded along with the rest of the multiple instances of content. It should be appreciated that the descrambling of any or all content may occur either before or after recording the content to the data storage unit 226, as appropriate for the embodiment in question.

In one embodiment, the subset of content may not be played back by anyone other than an authorized user. The subset of content may be received and stored by all but inaccessible to unauthorized users. Unauthorized users may be prevented from playing the recorded subset of content, but may be able to see it in a list of recorded content. The unauthorized user may be presented with an option to unlock the content, such as purchasing it or performing some other action.

In alternative embodiments, the subset of content may be stored with the remainder of the multiple instances of content (either as separate files or in a single file, as appropriate), and be undetectable to unauthorized users. Thus, only authorized users may perceive and/or retrieve the subset of content.

In the present disclosure, the methods disclosed may be implemented as sets of instructions or software readable by a device. Further, it is understood that the specific order or hierarchy of steps in the methods disclosed are examples of sample approaches. In other embodiments, the specific order or hierarchy of steps in the method can be rearranged while remaining within the disclosed subject matter. The accompanying method claims present elements of the various steps in a sample order, and are not necessarily meant to be limited to the specific order or hierarchy presented.

The described disclosure may be provided as a computer program product, or software, that may include a non-transitory machine-readable medium having stored thereon instructions, which may be used to program a computer system (or other electronic devices) to perform a process according to the present disclosure. A non-transitory machine-readable medium includes any mechanism for storing information in a form (e.g., software, processing application) readable by a machine (e.g., a computer). The non-transitory machine-readable medium may take the form of, but is not limited to, a magnetic storage medium (e.g., floppy diskette, video cassette, and so on); optical storage medium (e.g., CD-ROM); magneto-optical storage medium; read only memory (ROM); random access memory (RAM); erasable programmable memory (e.g., EPROM and EEPROM); flash memory; and so on.

It is believed that the present disclosure and many of its attendant advantages will be understood by the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the components without departing from the disclosed subject matter or without sacrificing all of its material advantages. The form described is merely explanatory, and it is the intention of the following claims to encompass and include such changes.

While the present disclosure has been described with reference to various embodiments, it will be understood that these embodiments are illustrative and that the scope of the disclosure is not limited to them. Many variations, modifications, additions, and improvements are possible. More generally, embodiments in accordance with the present disclosure have been described in the context of particular embodiments. Functionality may be separated or combined in blocks differently in various embodiments of the disclosure or described with different terminology. These and other variations, modifications, additions, and improvements may fall within the scope of the disclosure as defined in the claims that follow.

**CLAIMS**

I claim:

1. A method for recording multiple instances of content, comprising:  
receiving, at a content receiver, an instruction to initiate recording;  
in response to the instruction, setting a first tuner to a first carrier frequency;  
further in response to the instruction, setting a second tuner to a second carrier frequency;  
receiving a first set of content at the first tuner, the first set of content encrypted with a control word;  
receiving a second set of content at the second tuner, the second set of content encrypted with the control word; and  
recording the first and second sets of content on a storage medium.
2. The method of claim 1, wherein the first and second sets of content are received substantially simultaneously.
3. The method of claim 2, wherein the first and second carrier frequencies are the same.
4. The method of claim 1, wherein the first and second sets of content are recorded as a single file on the storage medium.
5. The method of claim 1, further comprising descrambling the first and second sets of content prior to the operation of recording the first and second sets of content on the storage medium.
6. The method of claim 5, wherein the operation of descrambling the first and second sets of content is performed by a single descrambler associated with both the first and second tuner.
7. The method of claim 1, wherein the first set of content comprises a content subset further encrypted with a sub-key.

8. The method of claim 7, wherein the content subset is stored in a single file with the first and second sets of content.
9. The method of claim 7, wherein the content subset is accessible only by an authorized user.
10. The method of claim 9, wherein a presence of the content subset is visible only by an authorized user.
11. An apparatus for receiving multiple instances of content, comprising:
  - a first communications unit operative to receive a first set of instances of content transmitted on a first transponder;
  - a second communications unit operative to receive a second set of instances of content transmitted on a second transponder;
  - a processing unit operatively connected to the first and second communications unit, the processing unit operative to control the first and second communications unit;
  - a descrambler operative to descramble the first and second instances of content; and
  - a data storage unit operative to receive and store the first and second instances of content.
12. The apparatus of claim 11, wherein the descrambler is operative to use a single control word to descramble the first and second instances of content.
13. The apparatus of claim 12, wherein the descrambler is operative to descramble the first and second instances of content upon retrieval from the data storage unit.
14. The apparatus of claim 12, wherein:
  - the first communications unit is operatively connected to the descrambler; and
  - the second communications unit is operatively connected to the descrambler.
15. A method for decrypting content, comprising:
  - receiving a first set of encrypted content modulated with a first carrier frequency;

substantially simultaneously, receiving a second set of encrypted content modulated with a second carrier frequency; and

decrypting both the first and second sets of encrypted content with a common control word, thereby producing a first and second set of decrypted content.

16. The method of claim 15, further comprising storing the first and second sets of decrypted content on a storage medium.

17. The method of claim 16, wherein the first and second sets of decrypted content are stored in a single file.

18. The method of claim 17, wherein the first and second sets of decrypted content are stored in the single file in accordance with a timestamp scheme.

19. The method of claim 16, further comprising transmitting the first content to a display device while storing the first and second sets of decrypted content.

20. The method of claim 15, wherein the first and second frequencies are identical.



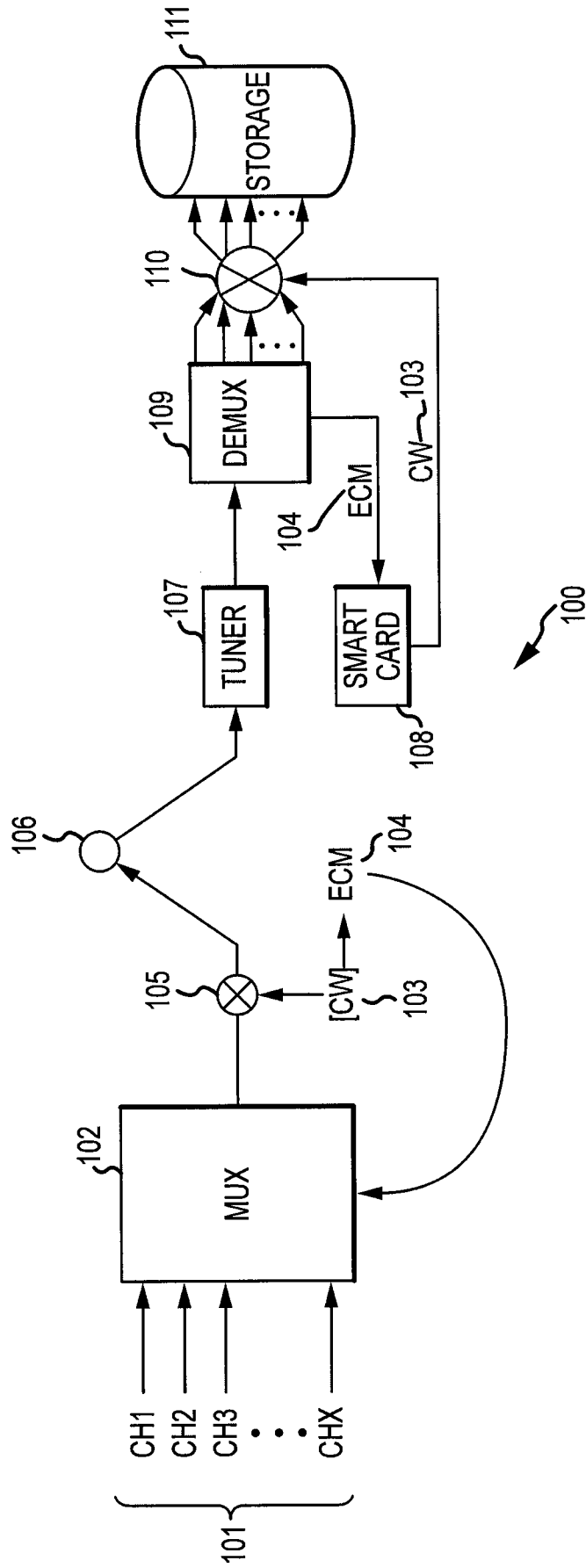


FIG.1

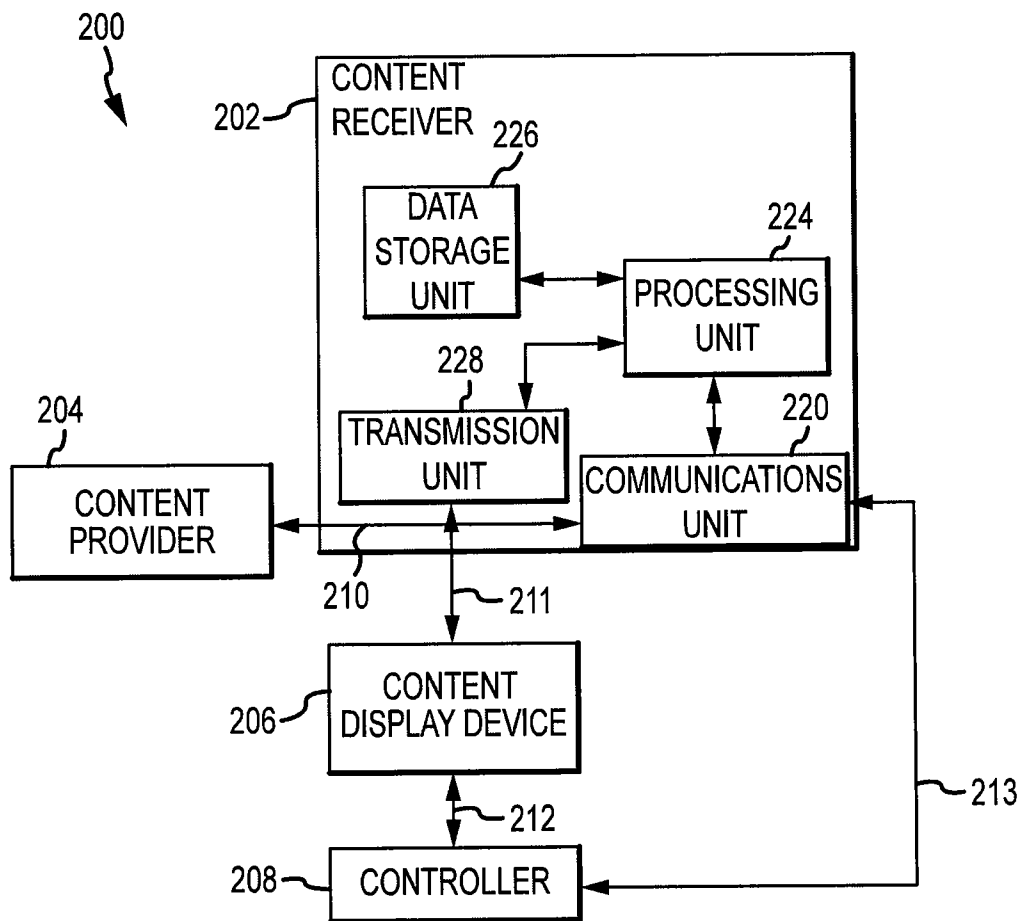


FIG.2

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US 12/52011

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - H04N 7/167 (2012.01)

USPC - 725/31

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)

IPC(8): H04N 7/167 (2012.01)

USPC: 725/31

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

IPC(8): H04N 7/167 (2012.01)

USPC: 725/31, 115, 145

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

PatBase(All); Google (Patents, Scholar). Search terms: record, simultaneous, contemporaneous, in parallel, same time, content, movie, episode, program, programme, programming, PPV, pay, view, video, demand, multiple, plural, multiplicity, plurality, many, several, two, second, instance, recording, set, encrypt, cryptography, decrypt, tuner, etc.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 6,701,528 B1 (Arsenault et al.) 02 March 2004 (02.03.2004), entire document, especially Fig. 2, 4A, 5; col. 1, ln 65 to col. 2, ln 18; col. 2, ln 22-25, 29-49, 53-55; col. 3, ln 33-37; col. 5, ln 16-27, 40-41; col. 6, ln 55 to col. 7, ln 9; col. 7, ln 25-28; col. 8, ln 12-15, 24-31, 52-61; col. 9, ln 38-45; col. 10, ln 22-33, 36-48; col. 10, ln 66 to col. 11, ln 6; col. 14, ln 33-36; col. 17, ln 24-28; col. 18, ln 14-30	1-4, 7-10, 15-20 ----- 5, 6, 11-14
Y	US 2010/0158480 A1 (Jung et al.) 24 June 2010 (24.06.2010), entire document, especially Fig. 2, 3, 5; para [0011], [0040], [0042], [0044]-[0045], [0049], [0093]-[0095]	5, 6, 11-14
A	US 2009/0178098 A1 (Westbrook et al.) 09 July 2009 (09.07.2009), entire document, especially Fig. 6; para [0125]-[0129], [0152]-[0155], [0224]; claims 1, 16	1-20
A	US 2005/0271365 A1 (Hisatomi) 08 December 2005 (08.12.2005), entire document, especially Fig. 2-4; para [0007], [0085], [0122]	1-20
A	WO 2011/027236 A1 (Ashley et al.) 10 March 2011 (10.03.2011), entire document	1-20
A	Jung et al. "Design and Implementation of a Multi-stream CableCARD with a High-Speed DVB-Common Descrambler" [online]. In: Proceedings of the 14th annual ACM international conference on Multimedia (MM'06), October 23-27, 2006, pages 165-168. Retrieved on 15 October 2012 (15.10.2012). Retrieved from the Internet at URL:<http://kusu.comp.nus.edu.sg/proceedings/mm06/mm/p165.pdf>, entire document	1-20

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 15 October 2012 (15.10.2012)	Date of mailing of the international search report <b>17 DEC 2012</b>
---	--

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young  PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
---	--