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United States Patent [19]

Van Wie et al.

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[45] **Date of Patent: Aug. 24, 1999**

[54] **STEGANOGRAPHIC TECHNIQUES FOR SECURELY DELIVERING ELECTRONIC DIGITAL RIGHTS MANAGEMENT CONTROL INFORMATION OVER INSECURE COMMUNICATION CHANNELS**

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[73] Assignee: **InterTrust Technologies Corp.**, Sunnyvale, Calif.

[21] Appl. No.: **08/689,606**

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[51] **Int. Cl.**^{6} **H04N 7/167**

[52] **U.S. Cl.** **380/9**; 380/5

[58] **Field of Search** 380/9, 20, 4, 5, 380/28; 382/232

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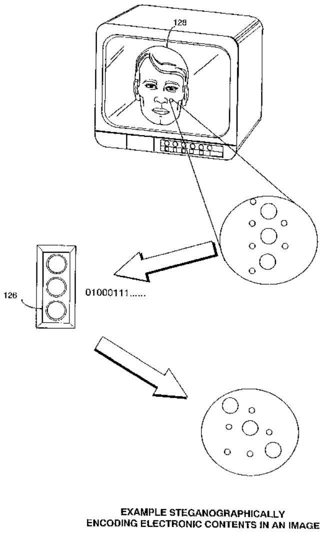
[57] **ABSTRACT**

Electronic steganographic techniques can be used to encode a rights management control signal onto an information signal carried over an insecure communications channel. Steganographic techniques ensure that the digital control information is substantially invisibly and substantially indelibly carried by the information signal. These techniques can provide end-to-end rights management protection of an information signal irrespective of transformations between analog and digital. An electronic appliance can recover the control information and use it for electronic rights management to provide compatibility with a Virtual Distribution Environment. In one example, the system encodes low data rate pointers within high bandwidth time periods of the content signal to improve overall control information read/seek times.

348 Claims, 30 Drawing Sheets



EXAMPLE STEGANOGRAPHICALLY ENCODING ELECTRONIC CONTENTS IN AN IMAGE

Roku Exhibit 1019
Roku v. Videolabs

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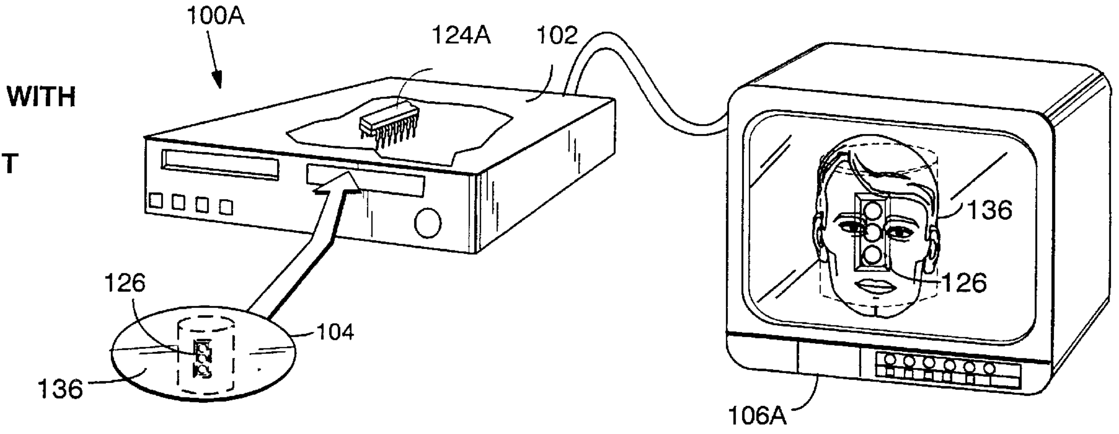

FIG. 1A
EXAMPLE MEDIA PLAYER WITH STEGANOGRAPHIC RIGHTS MANAGEMENT

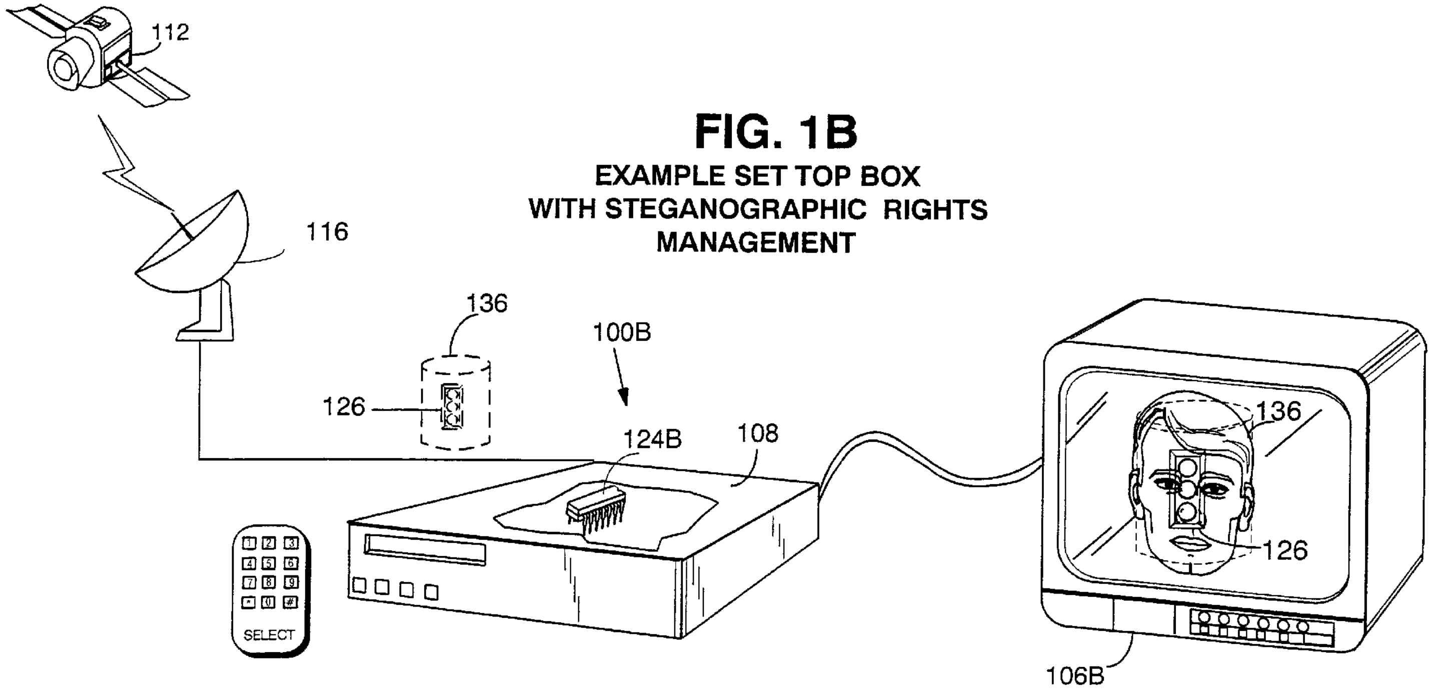

FIG. 1B
EXAMPLE SET TOP BOX WITH STEGANOGRAPHIC RIGHTS MANAGEMENT

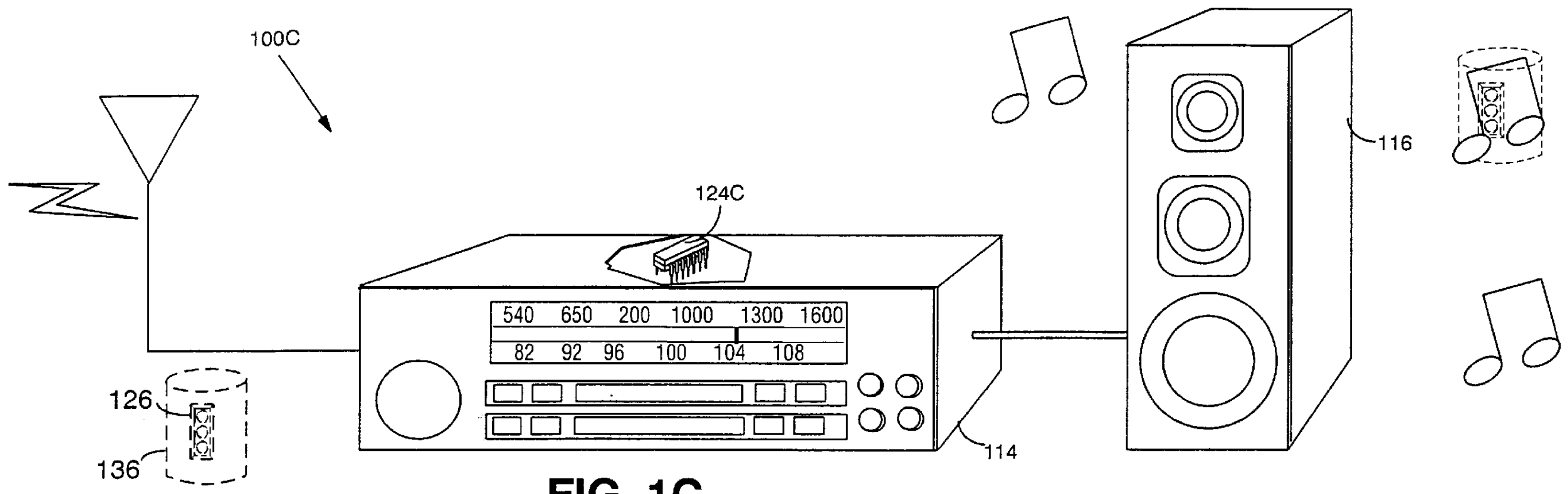

FIG. 1C
EXAMPLE RADIO RECEIVER WITH
STEGANOGRAPHIC RIGHTS MANAGEMENT

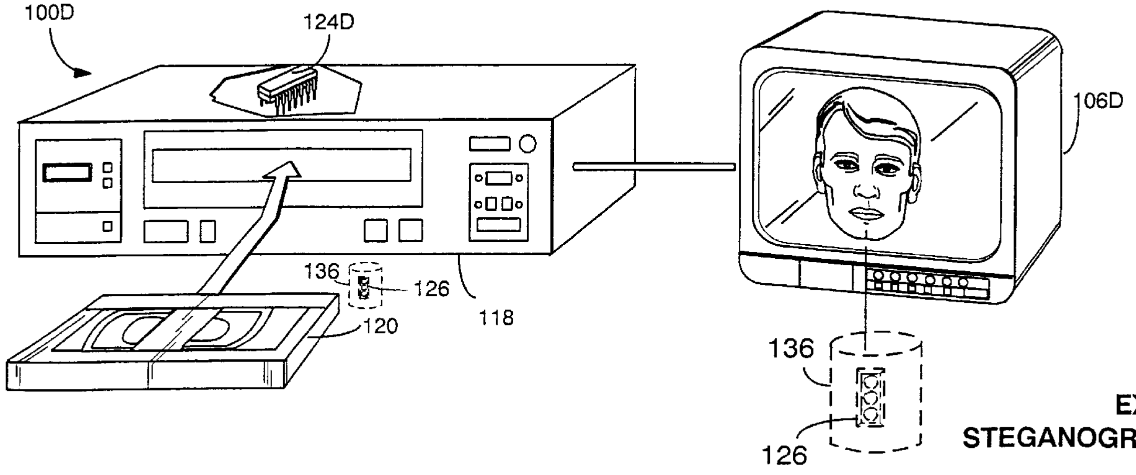

FIG. 1D
EXAMPLE VCR WITH
STEGANOGRAPHIC RIGHTS MANAGEMENT

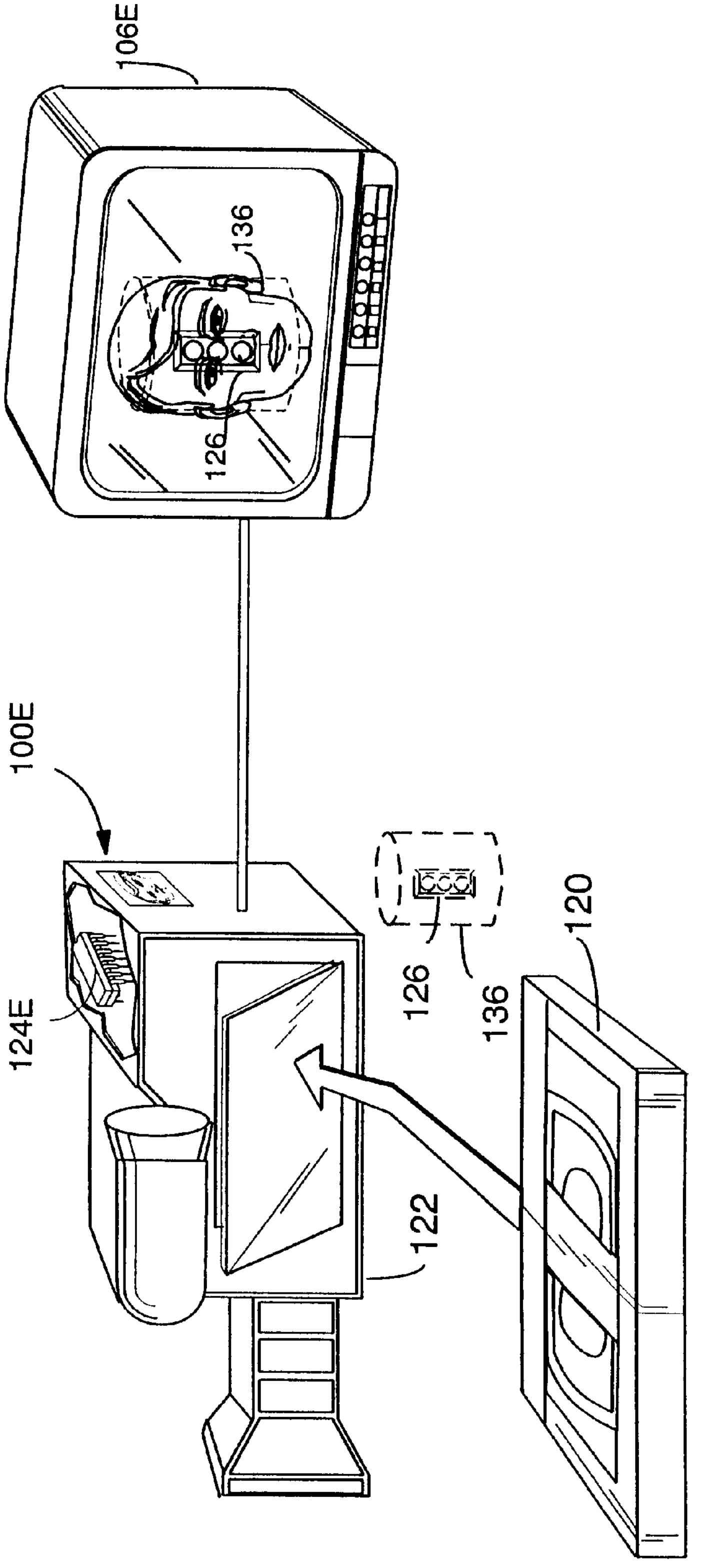

FIG. 1E

EXAMPLE CAMERA AND RECORDER WITH STEGANOGRAPHIC RIGHTS MANAGEMENT

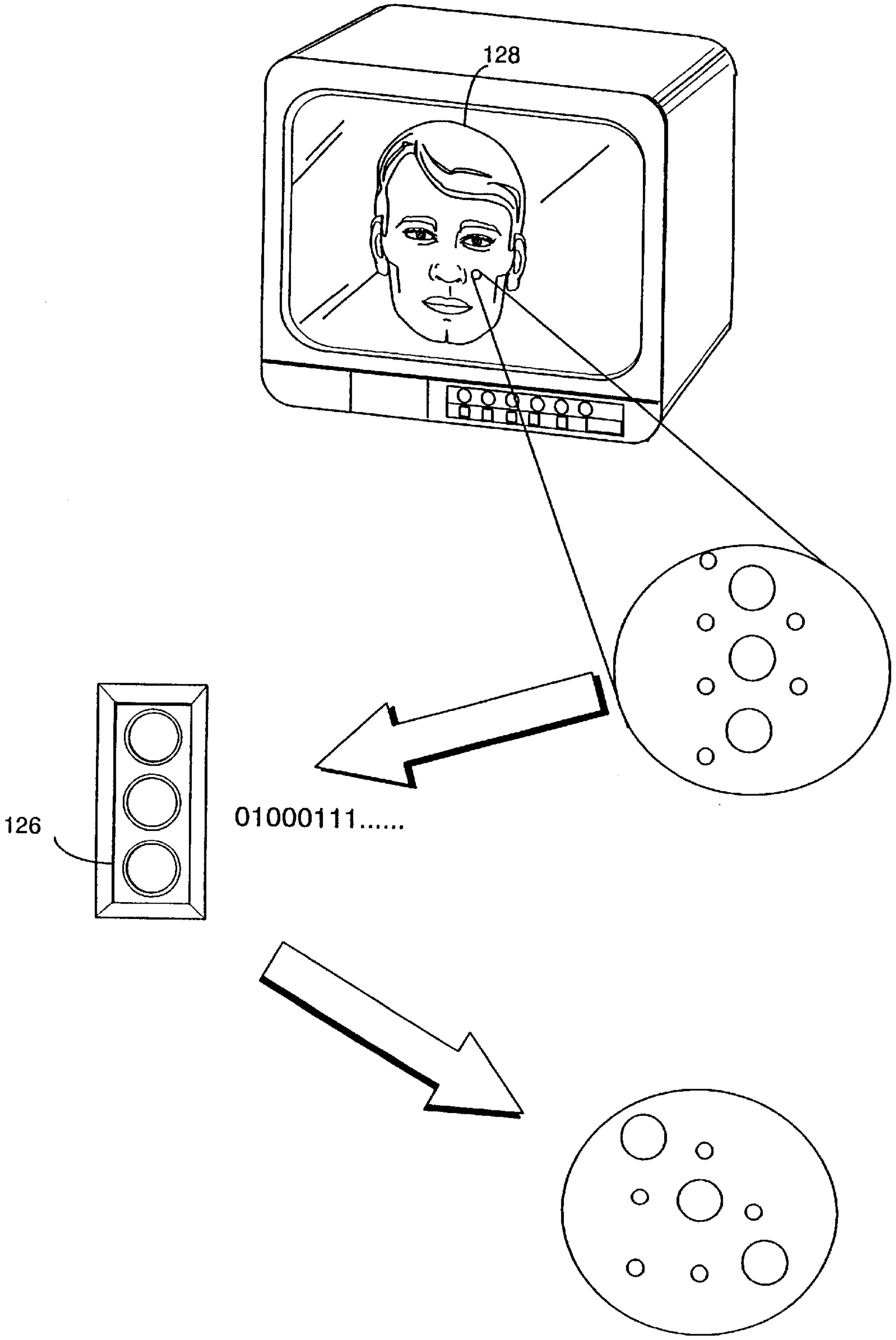

FIG. 2

EXAMPLE STEGANOGRAPHICALLY ENCODING ELECTRONIC CONTENTS IN AN IMAGE

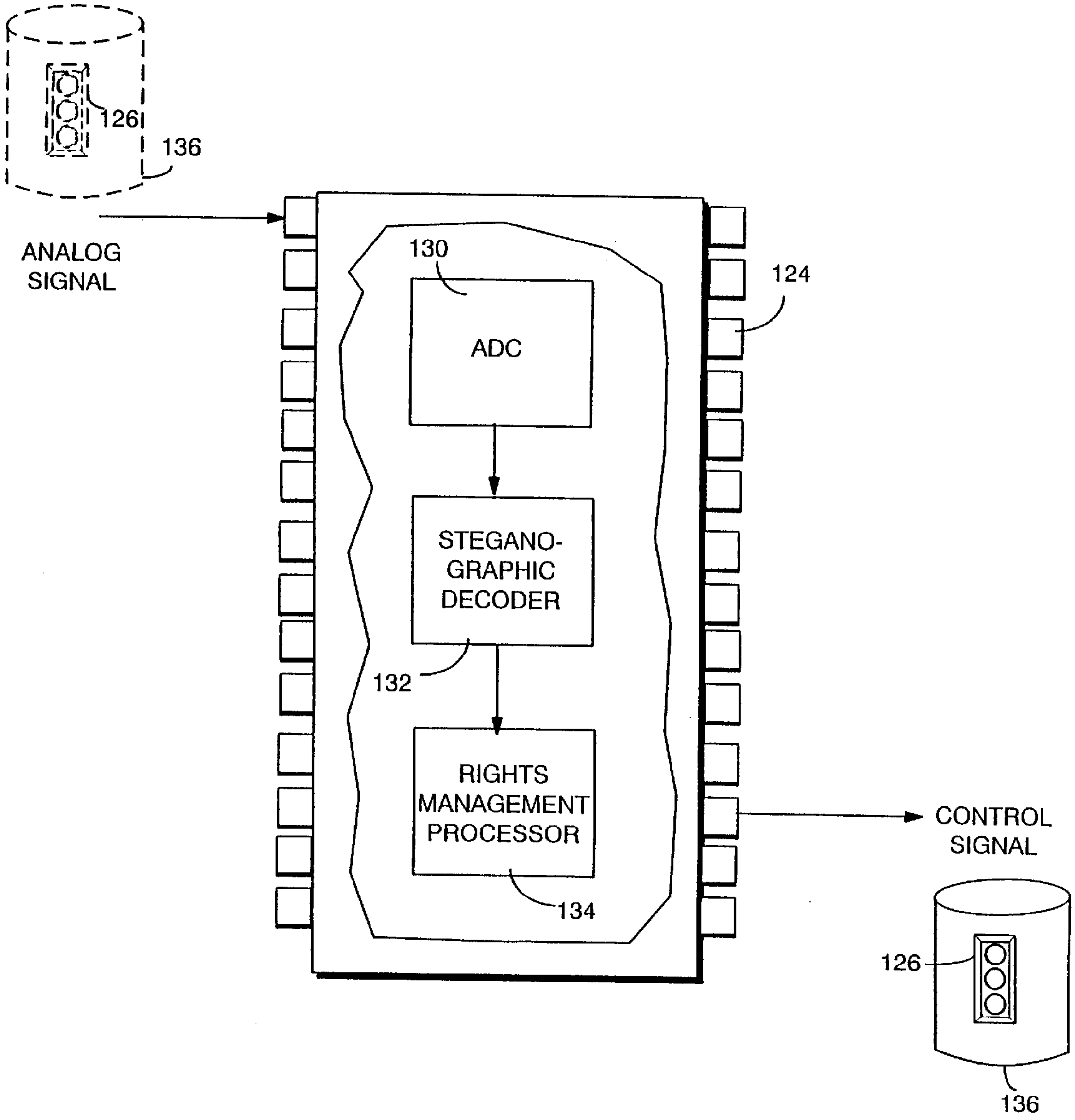

FIG. 3

EXAMPLE STEGANOGRAPHIC DECODER AND RIGHTS MANAGEMENT PROCESSOR

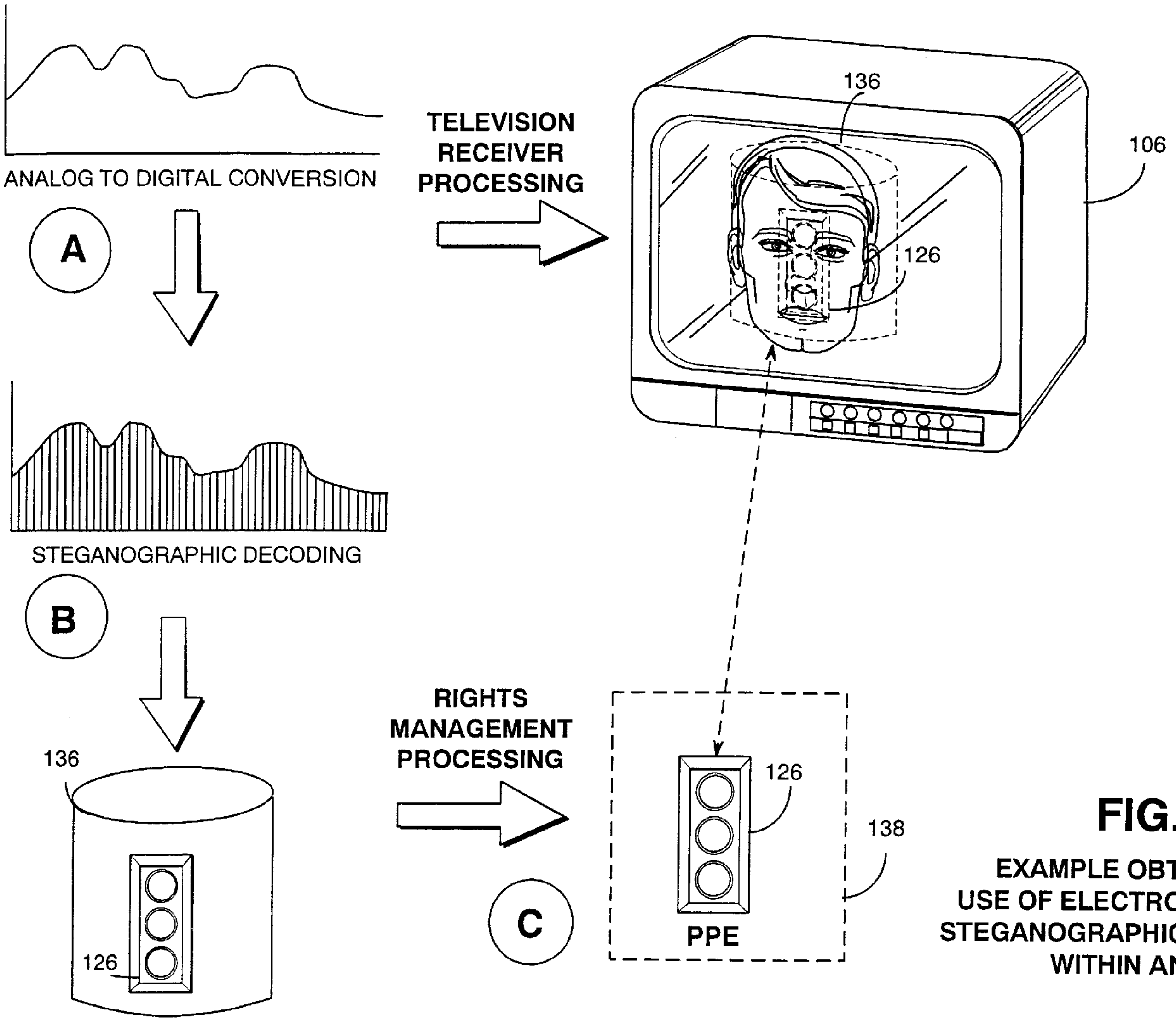
ANALOG TO DIGITAL CONVERSION
A
TELEVISION RECEIVER PROCESSING
136
106
126
STEGANOGRAPHIC DECODING
B
136
126
RIGHTS MANAGEMENT PROCESSING
C
126
138
PPE

FIG. 4

EXAMPLE OBTAINING AND USE OF ELECTRONIC CONTROLS STEGANOGRAPHICALLY ENCODED WITHIN AN IMAGE

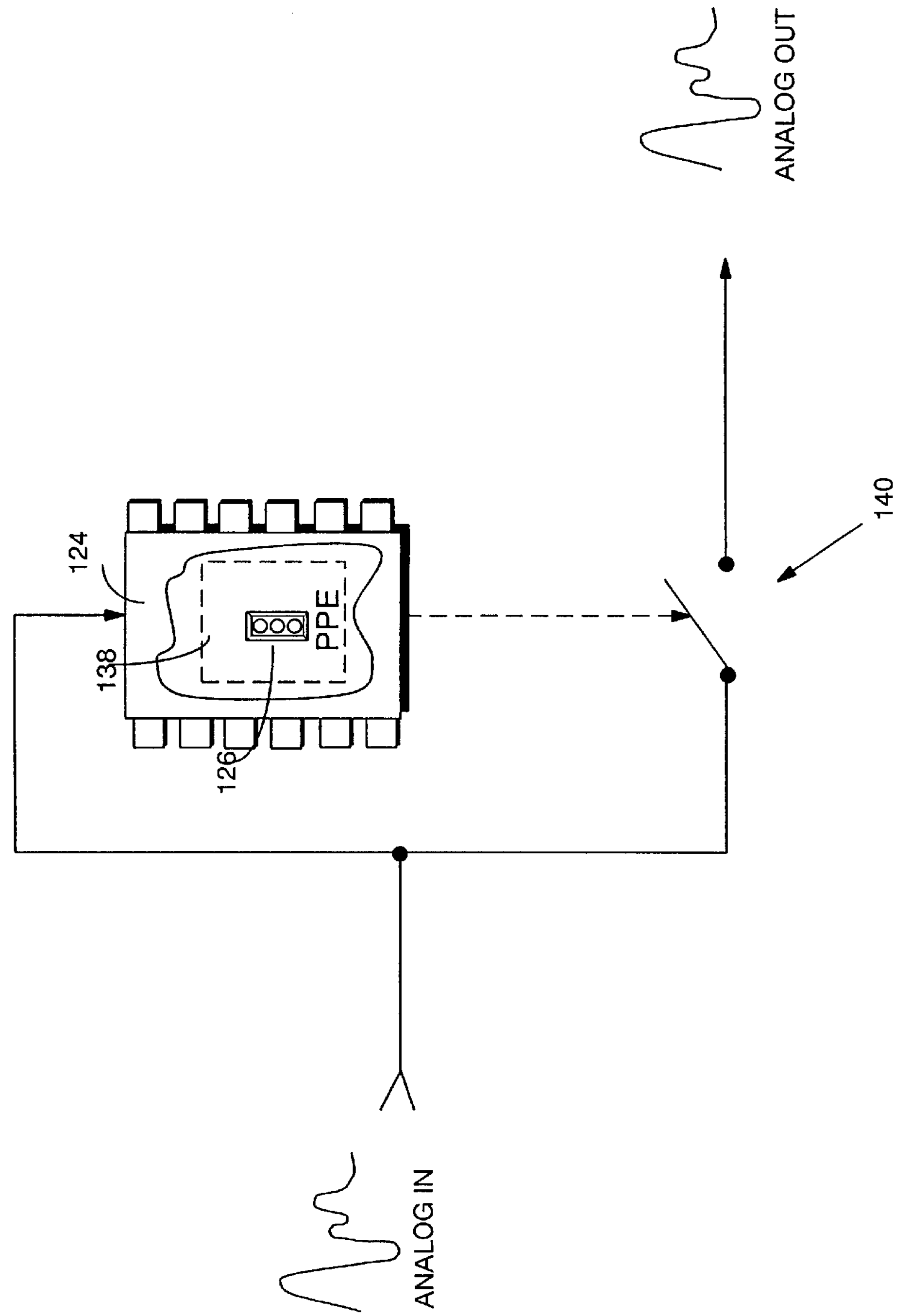

FIG. 5A

EXAMPLE ON/OFF CONTROL

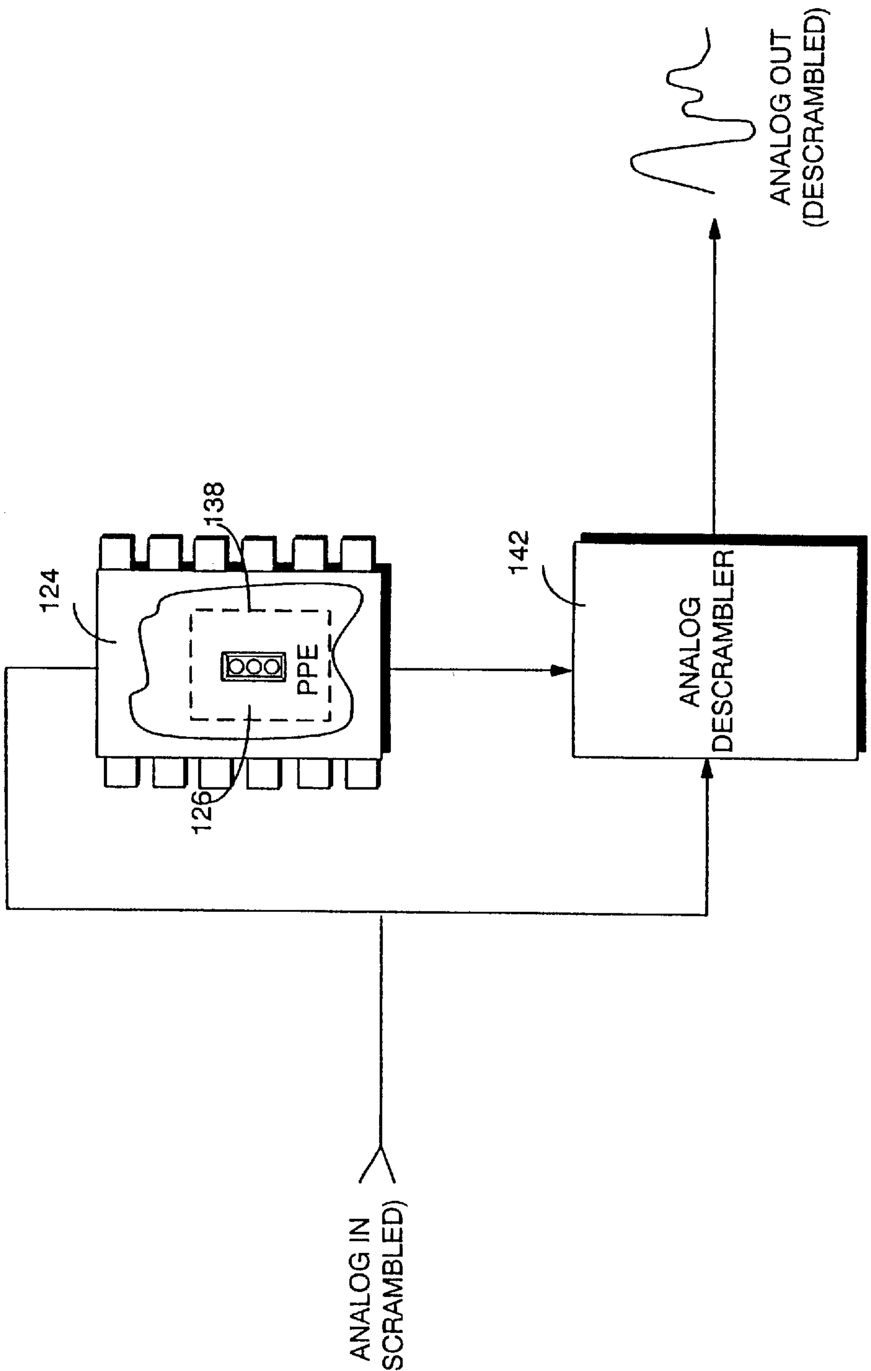

FIG. 5B EXAMPLE ANALOG DESCRAMBLING CONTROL

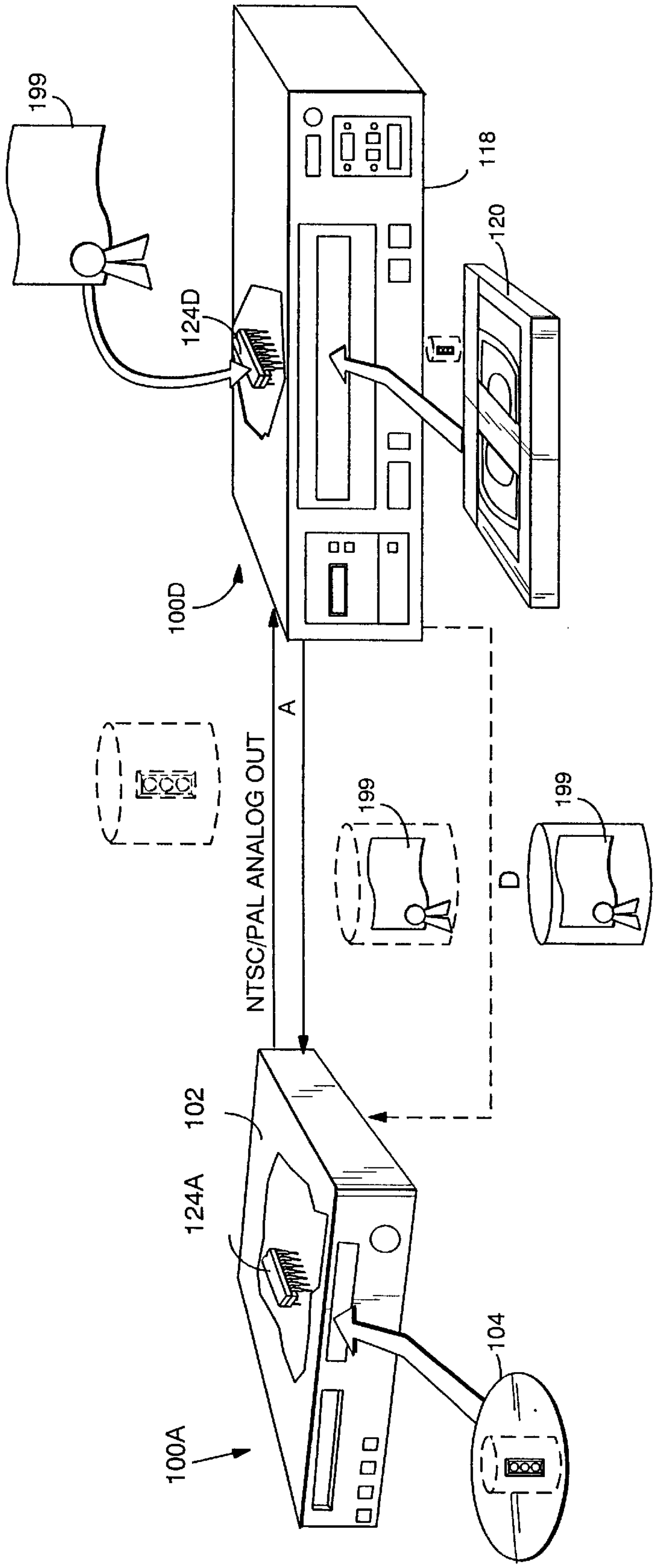

FIG. 5C

USE OF CERTIFICATES TO ENFORCE END-TO-END SECURITY

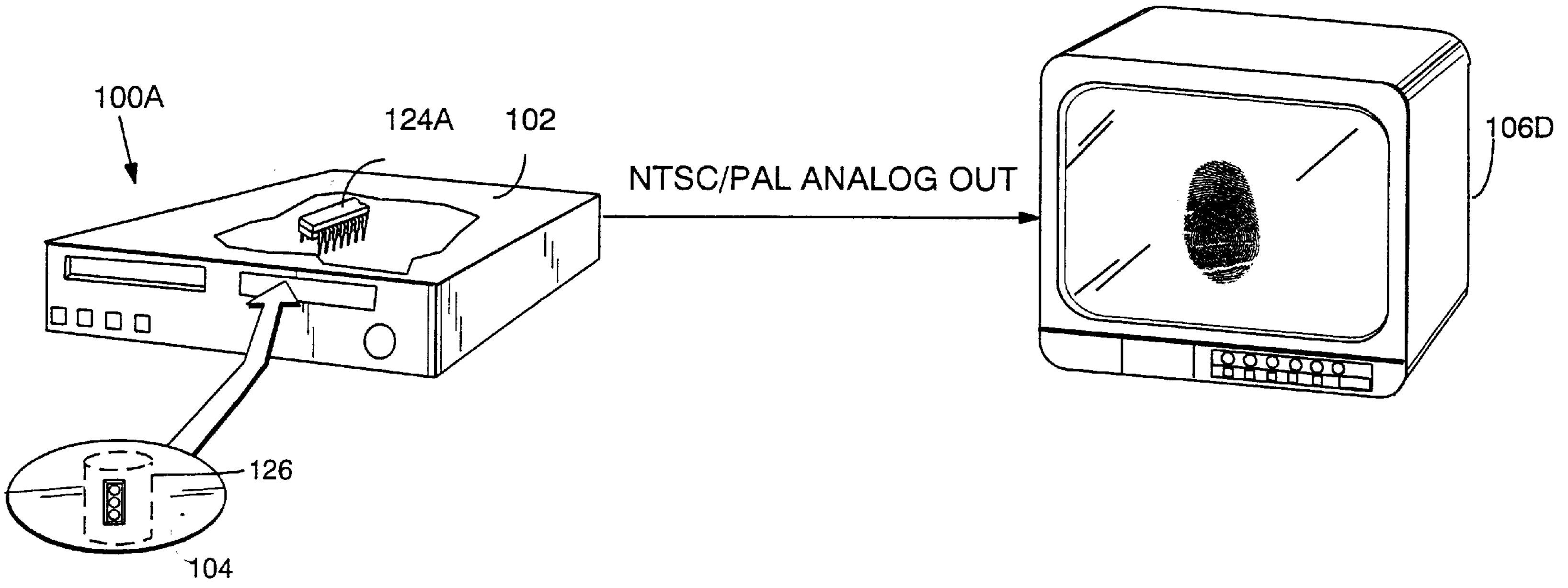

FIG. 5D

USE OF FINGERPRINTING FOR ENFORCING STEGANOGRAPHICALLY ENCODED RIGHTS MANAGEMENT CONTROLS

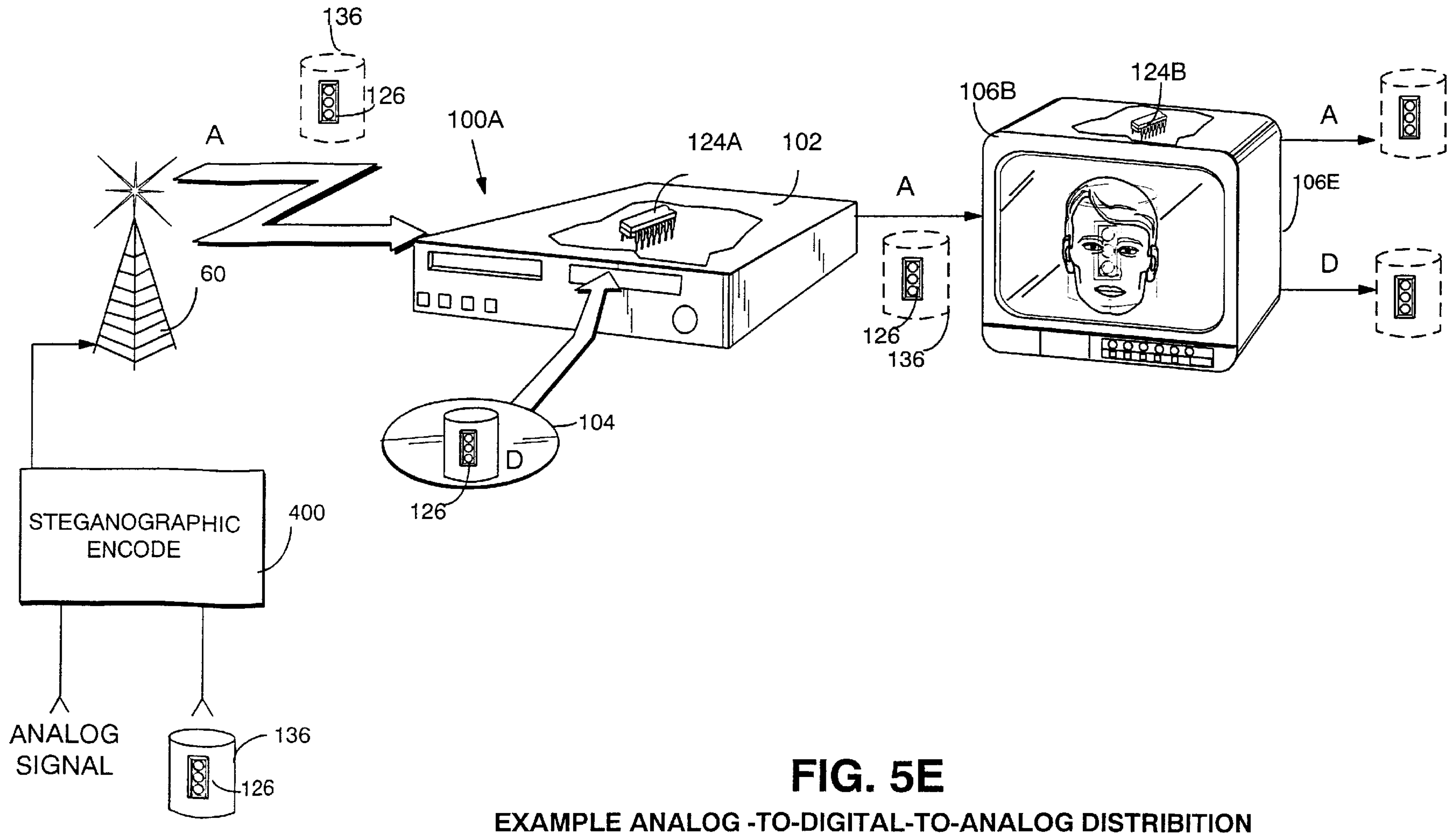

FIG. 5E

EXAMPLE ANALOG -TO-DIGITAL-TO-ANALOG DISTRIBITION

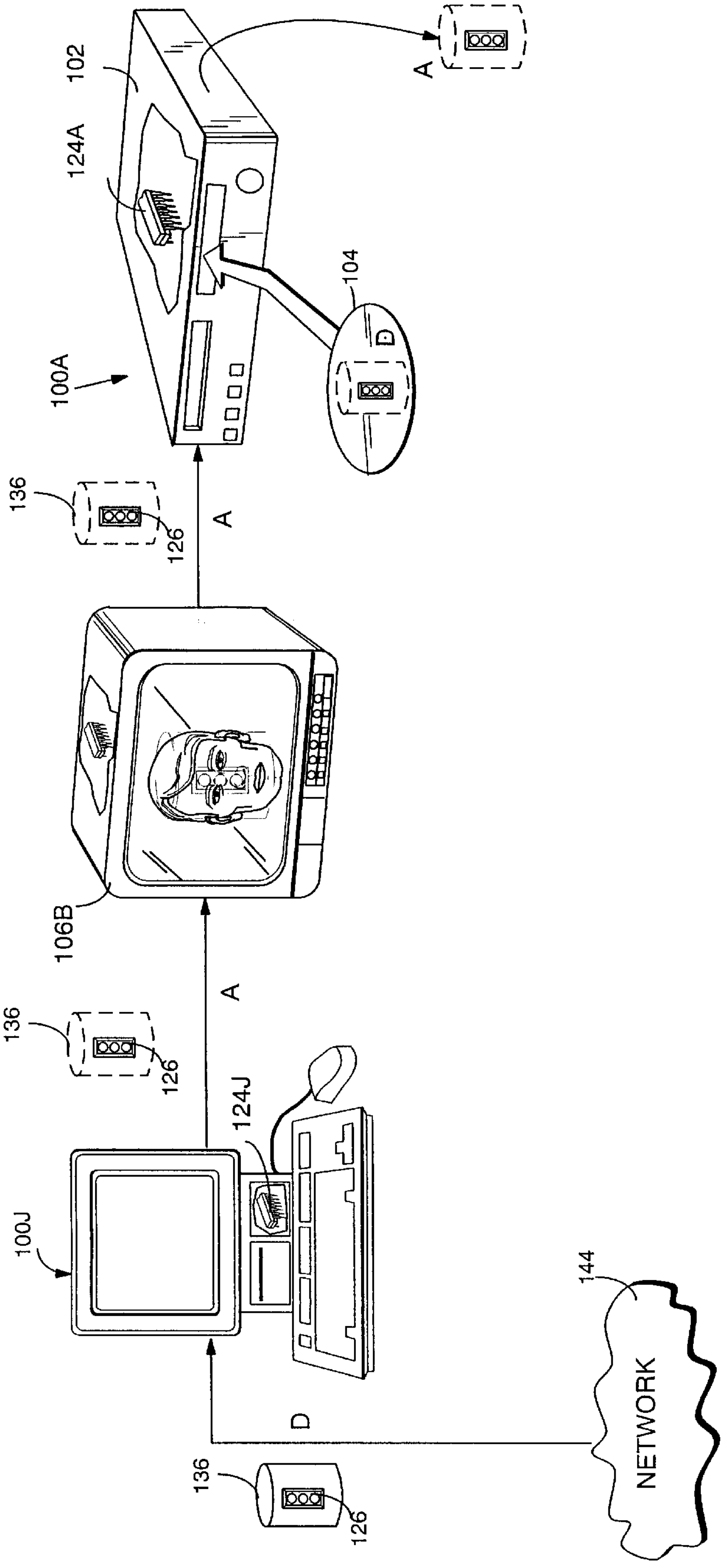

FIG. 5F

EXAMPLE DIGITAL -TO -ANALOG-TO DIGITAL DISTRIBUTION

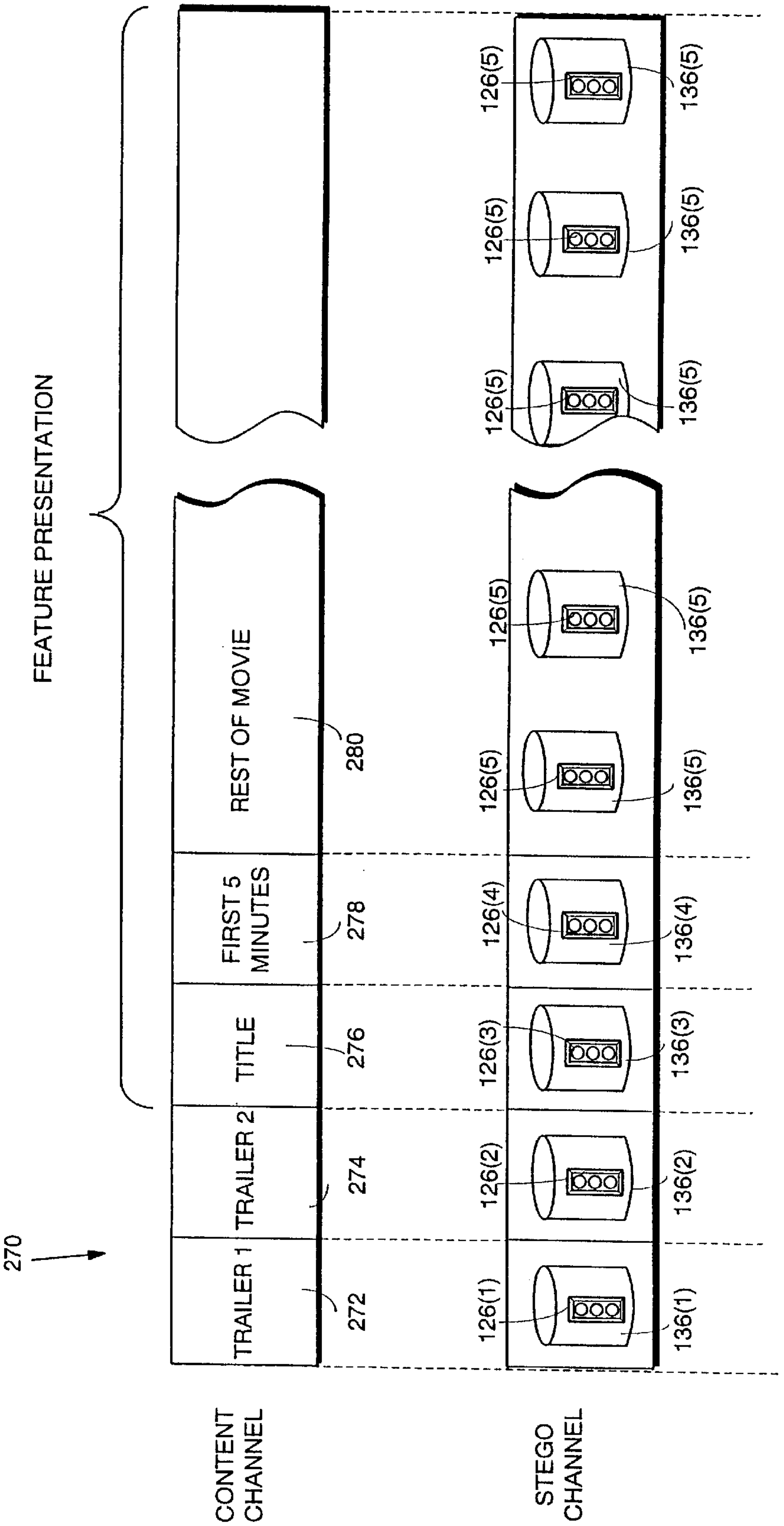

FIG. 6

DIFFERENT ORGANIZATIONAL STRUCTURES FOR DIFFERENT CONTENT PORTIONS

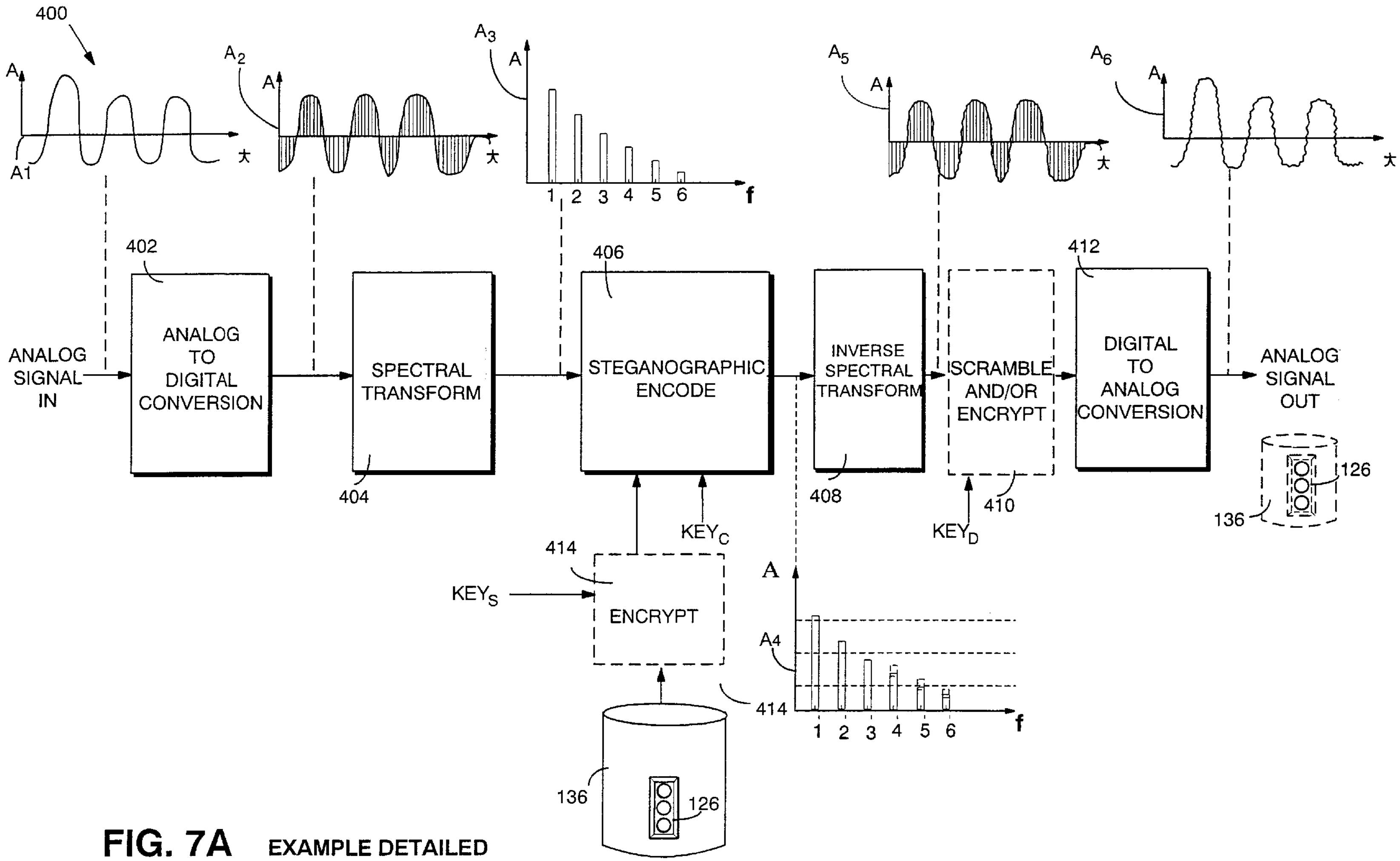

FIG. 7A EXAMPLE DETAILED STEGANOGRAPHIC ENCODING

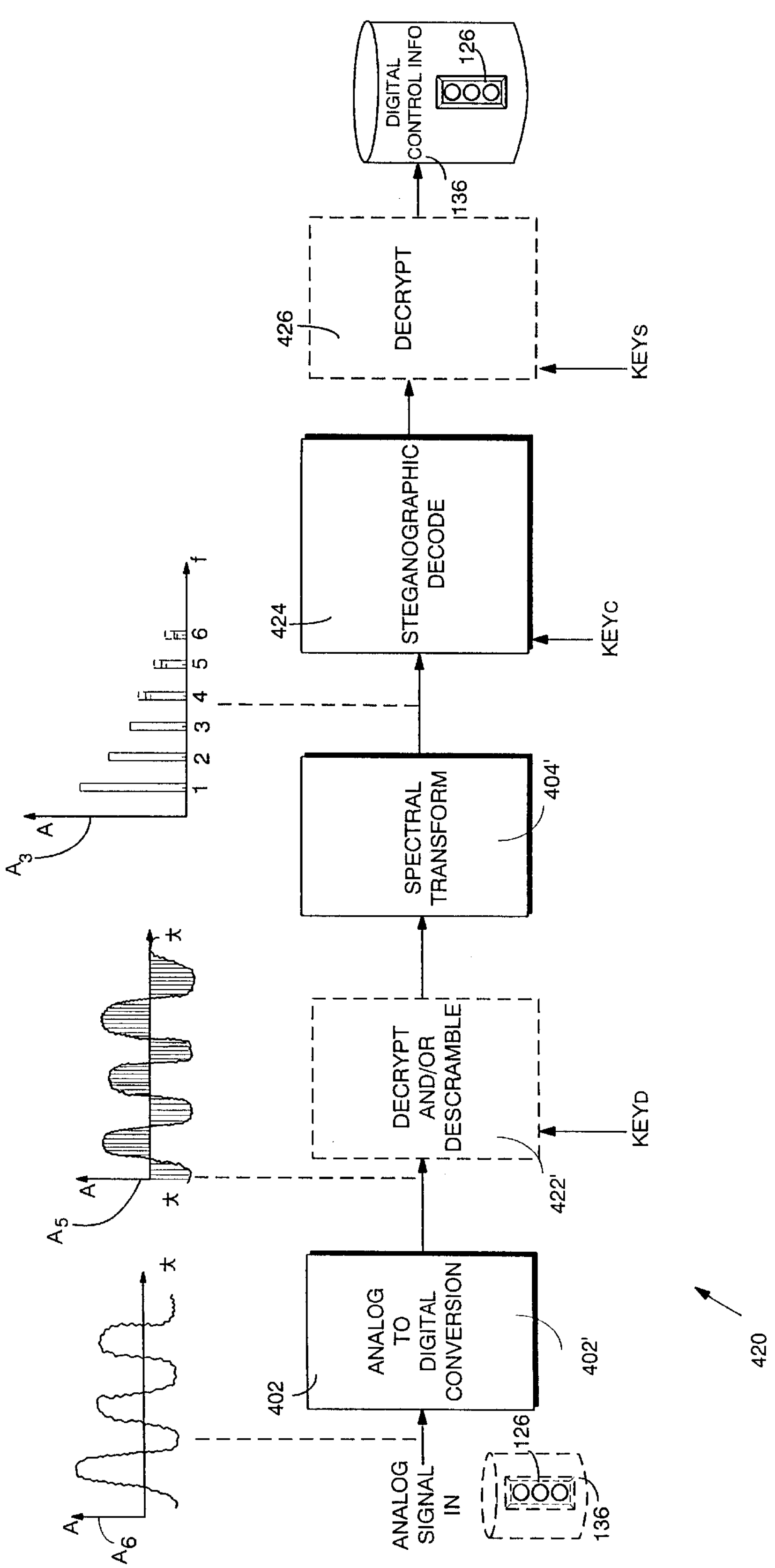

FIG. 7B EXAMPLE DETAILED STEGANOGRAPHIC DECODING

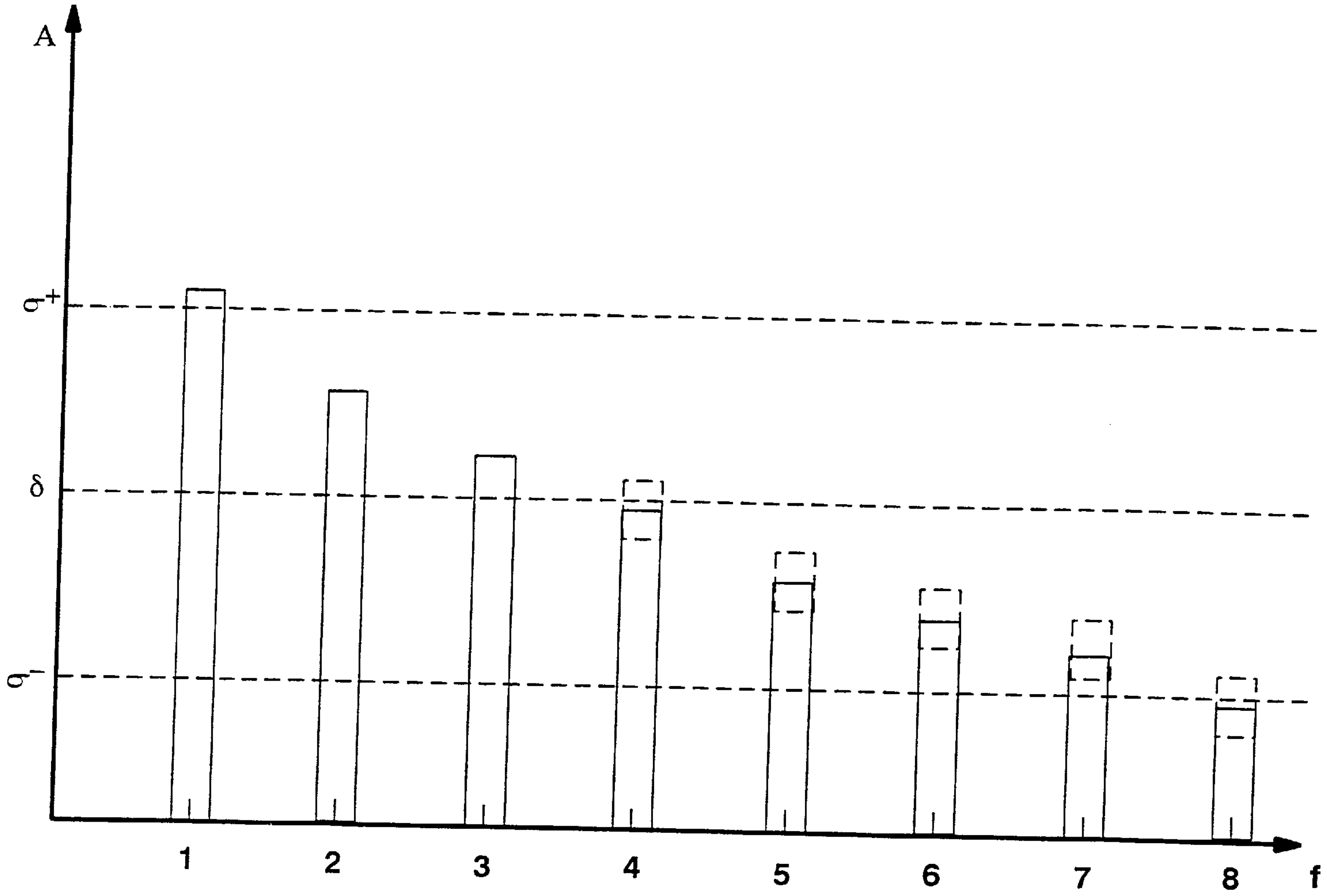

FIG. 8 EXAMPLE FREQUENCY DOMAIN VIEW OF STEGANOGRAPHICALLY ENCODED SIGNAL

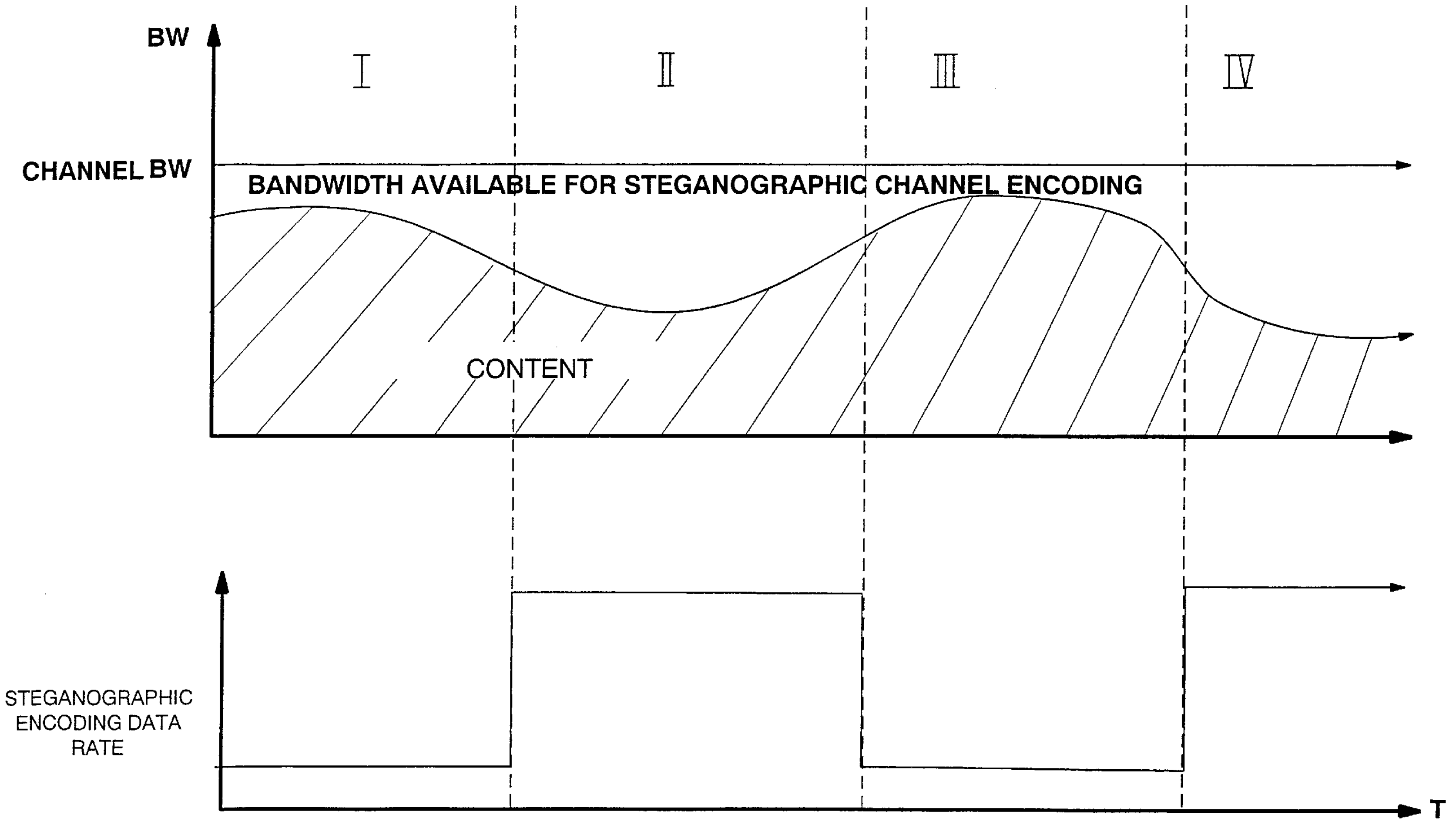

FIG. 9 EXAMPLE VARIABLE DATA RATE STEGANOGRAPHIC ENCODING WITHIN A LIMITED BANDWIDTH CHANNEL

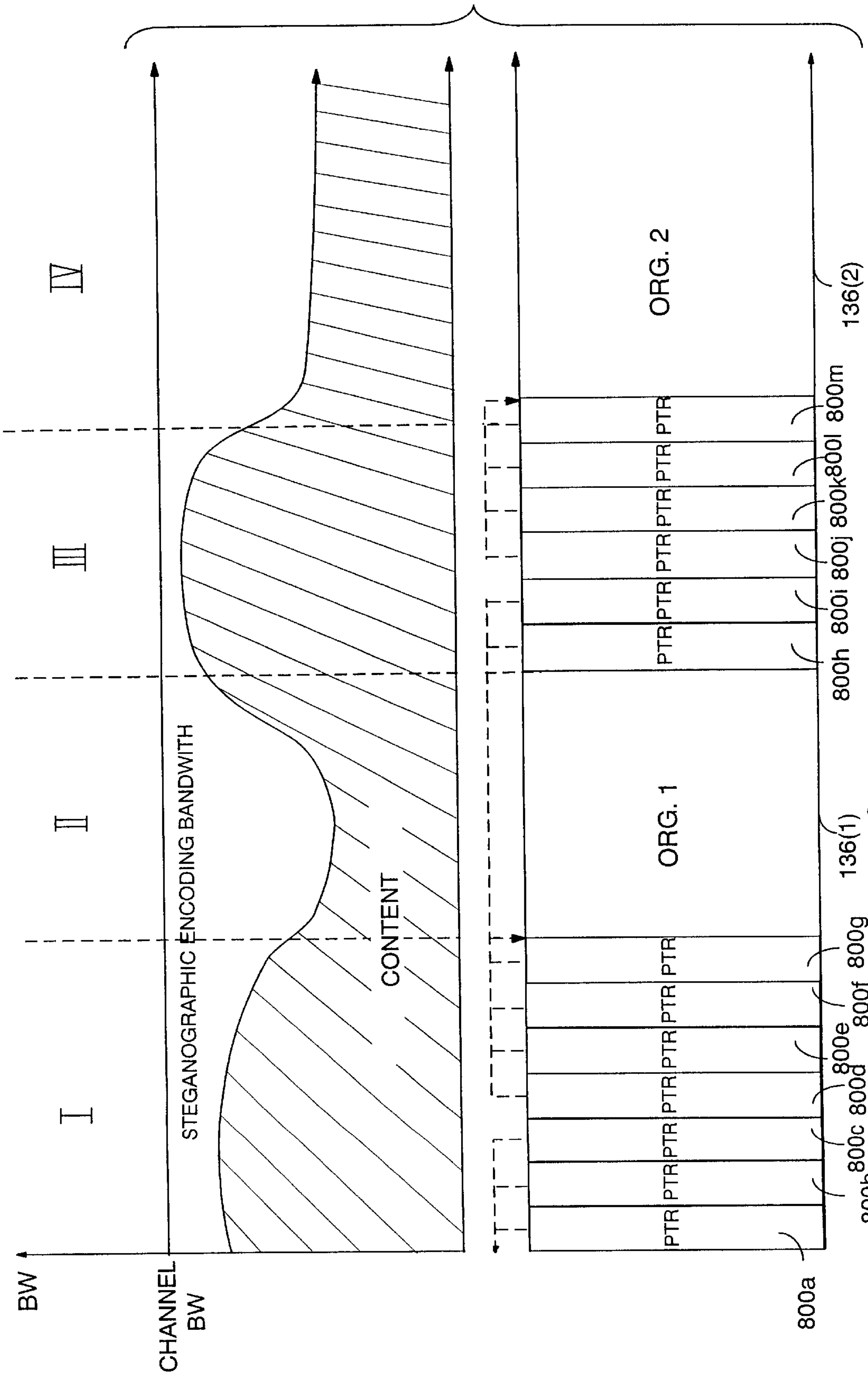

FIG. 10 EXAMPLE STEGANOGRAPHIC ENCODING WITHIN A LIMITED BANDWITH CHANNEL

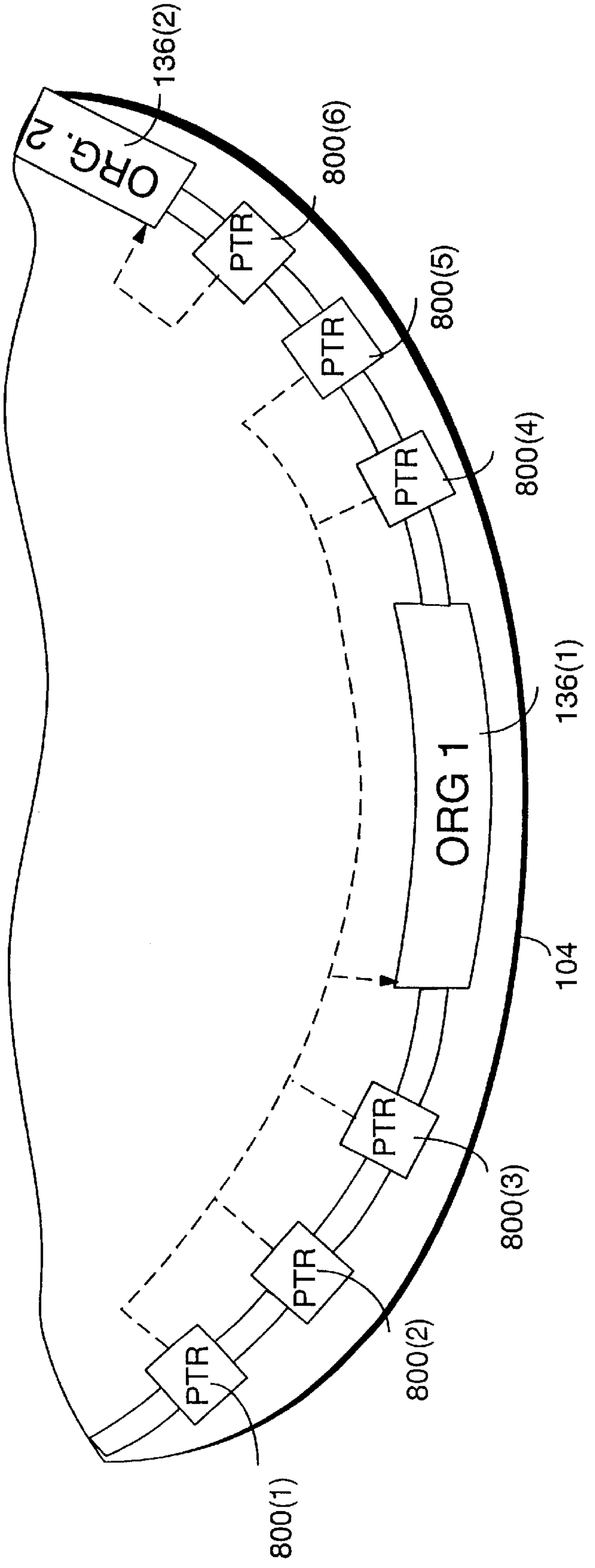
136(2)
ORG. 2
800(6)
PTR
800(5)
PTR
800(4)
PTR
ORG 1
136(1)
104
PTR
800(3)
PTR
800(2)
PTR
800(1)

FIG. 10A

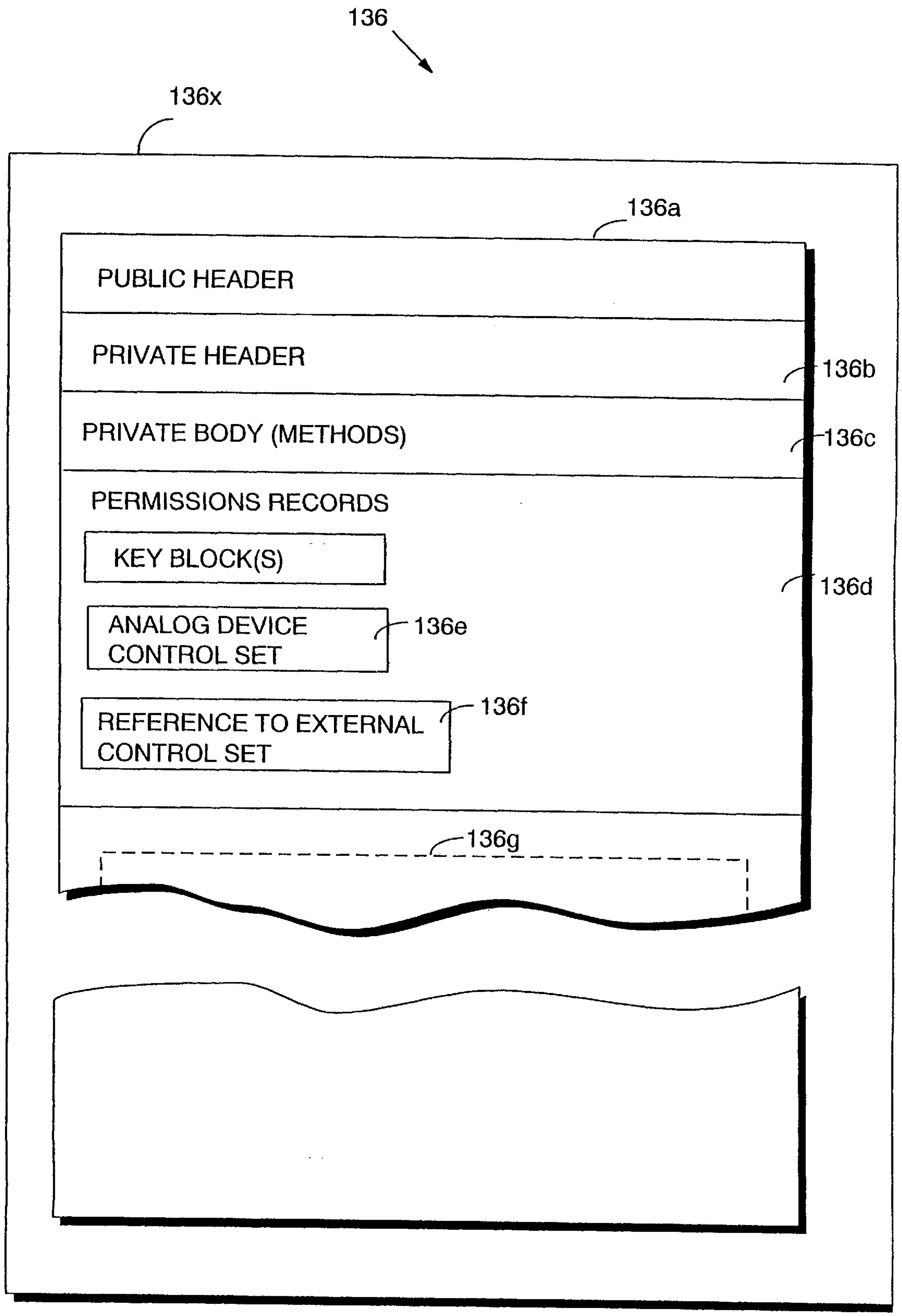

FIG. 11 EXAMPLE STEGANOGRAPHICALLY ENCODED ORGANIZATIONAL STRUCTURE

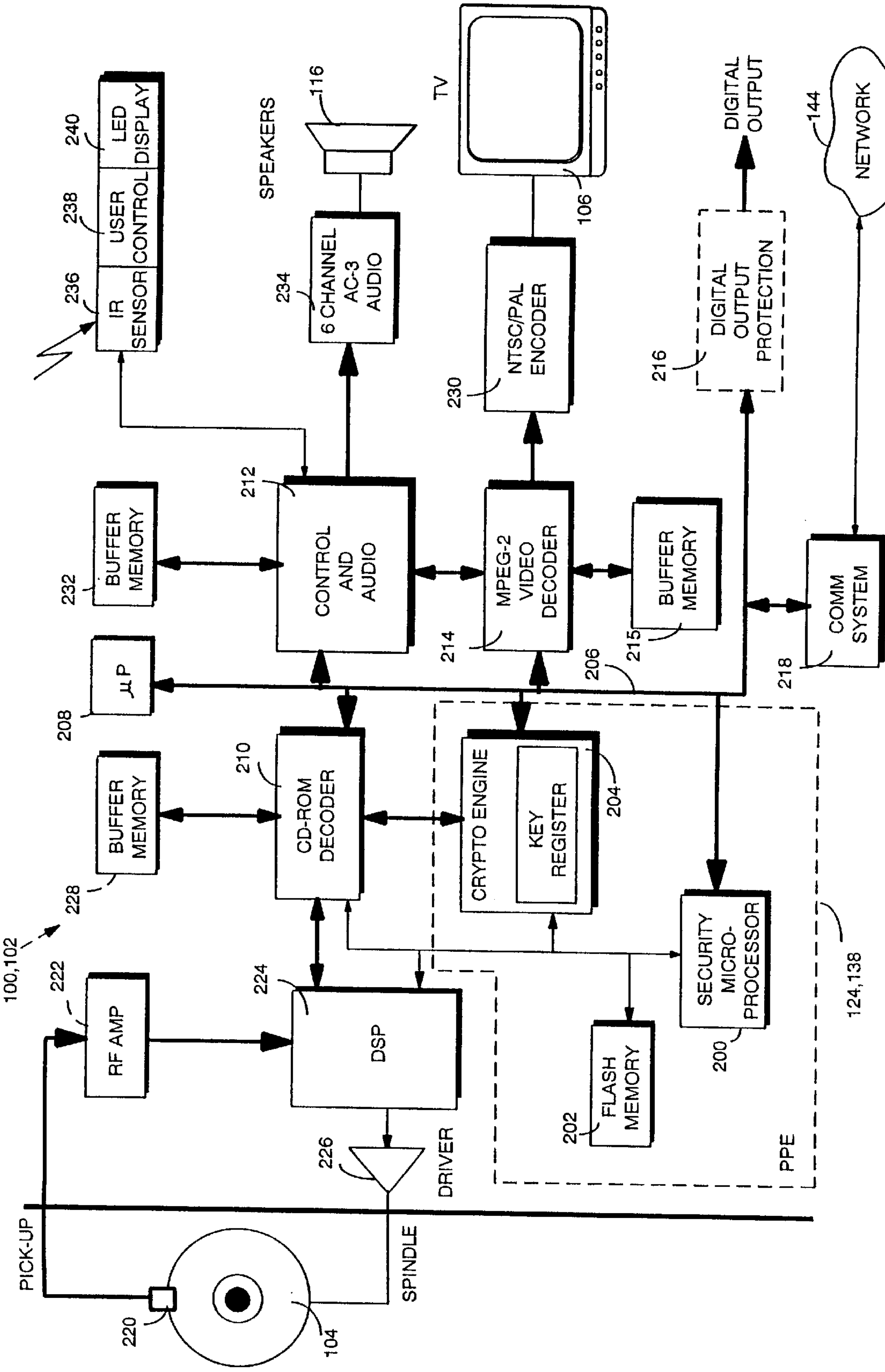

FIG. 12 EXAMPLE ELECTRIC APPLIANCE WITH STEGANOGRAPHIC RIGHTS MANAGEMENT

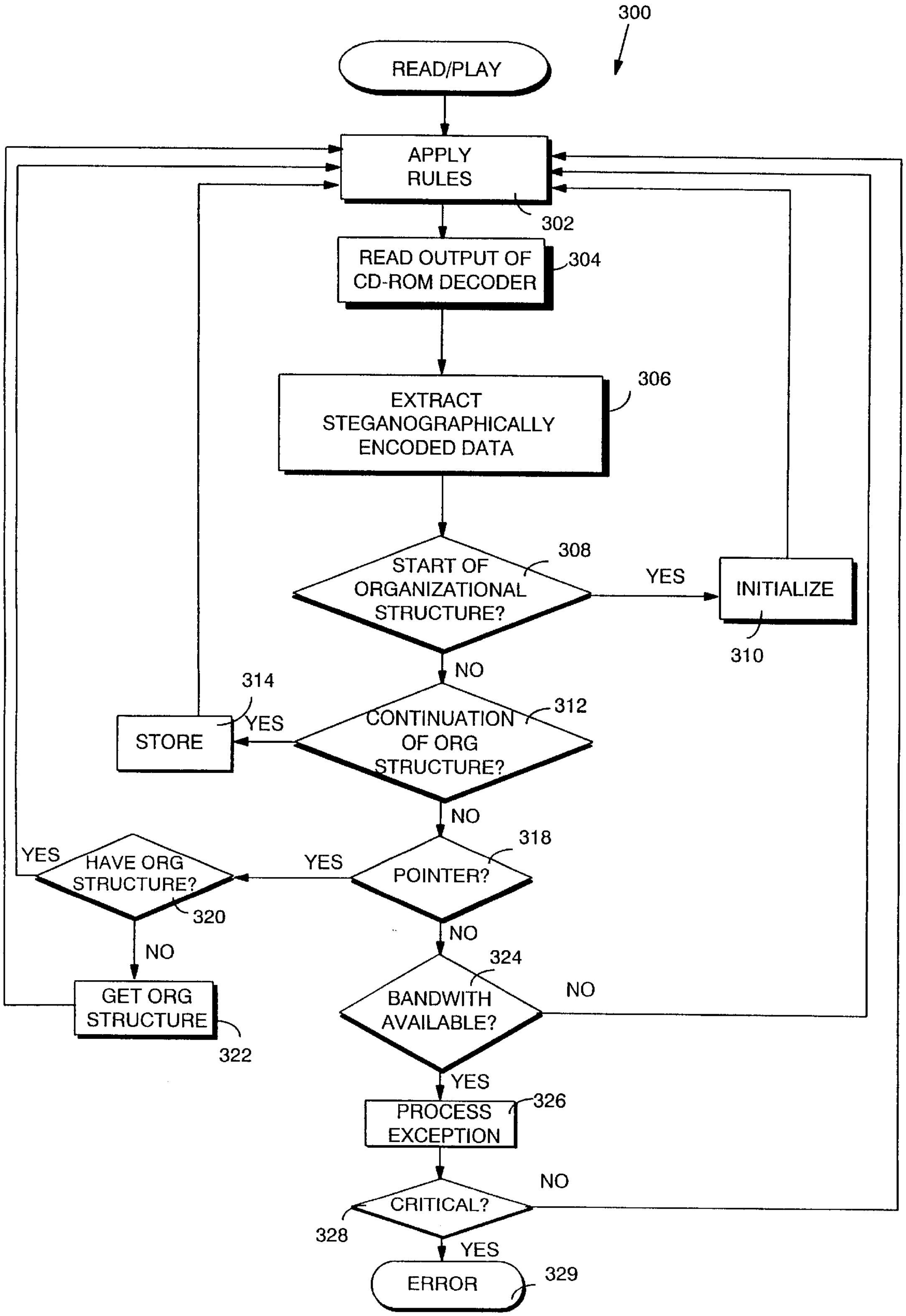

FIG. 13 EXAMPLE CONTROL STEPS

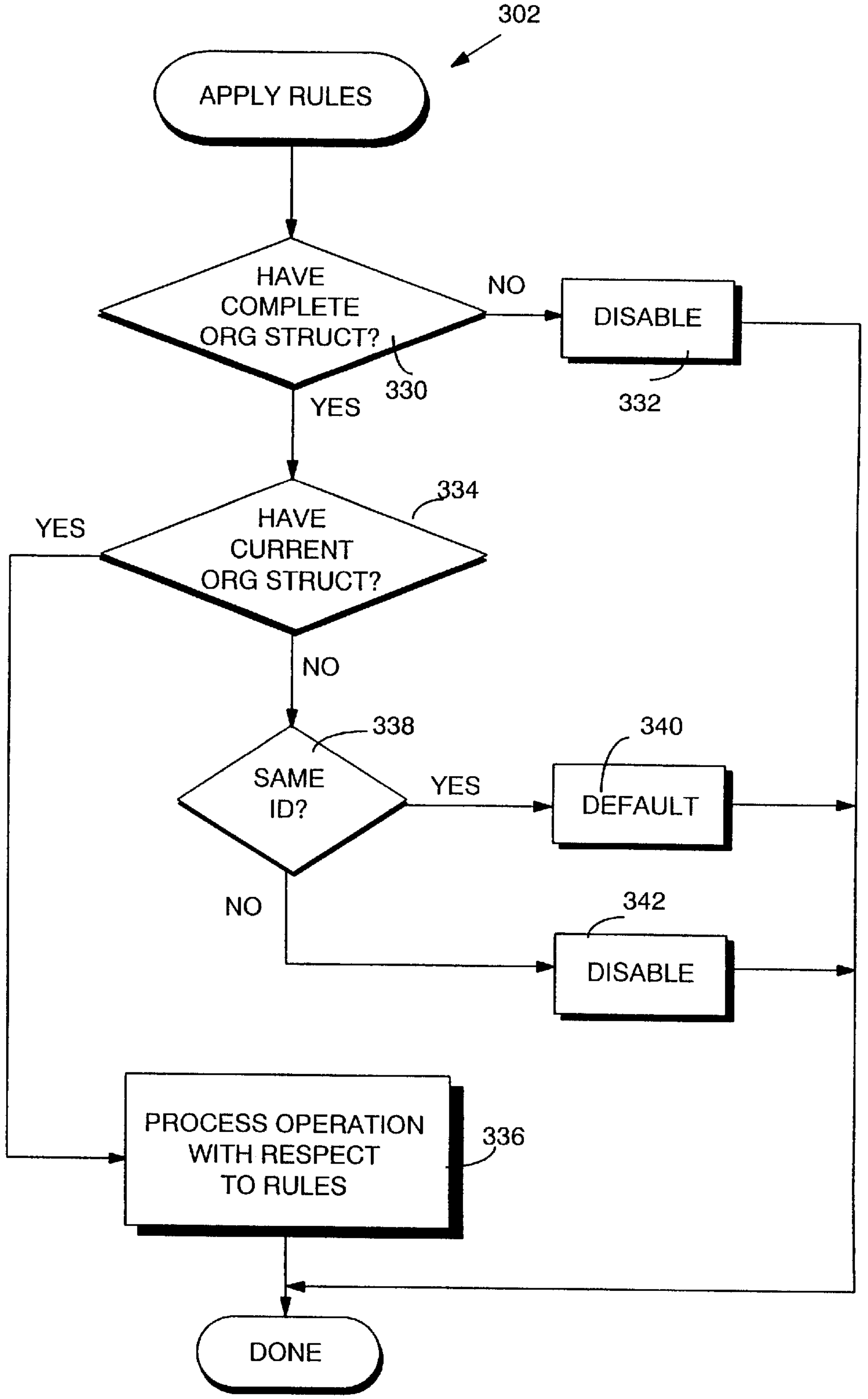

FIG. 13A EXAMPLE APPLY RULES ROUTINE

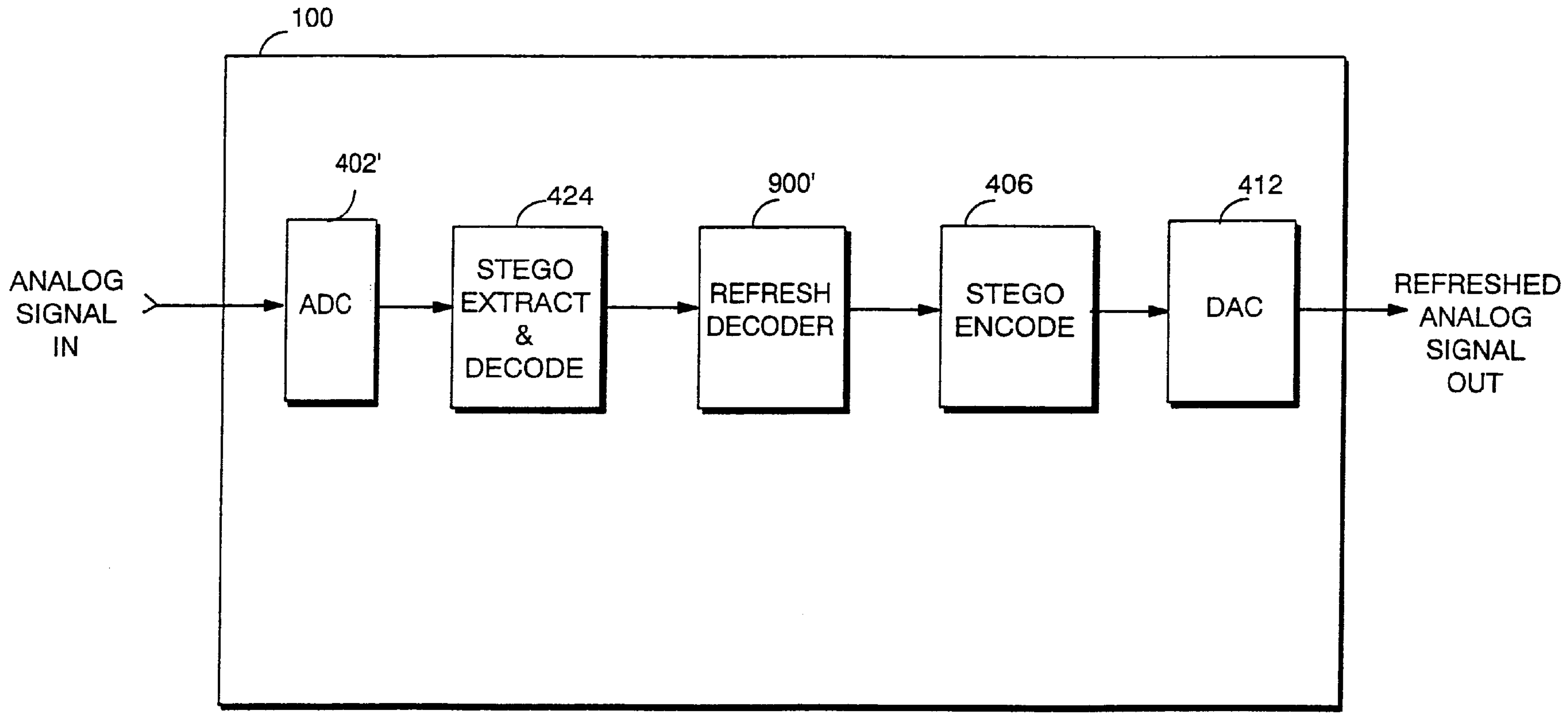

FIG. 14 EXAMPLE REFRESH ARRANGEMENT

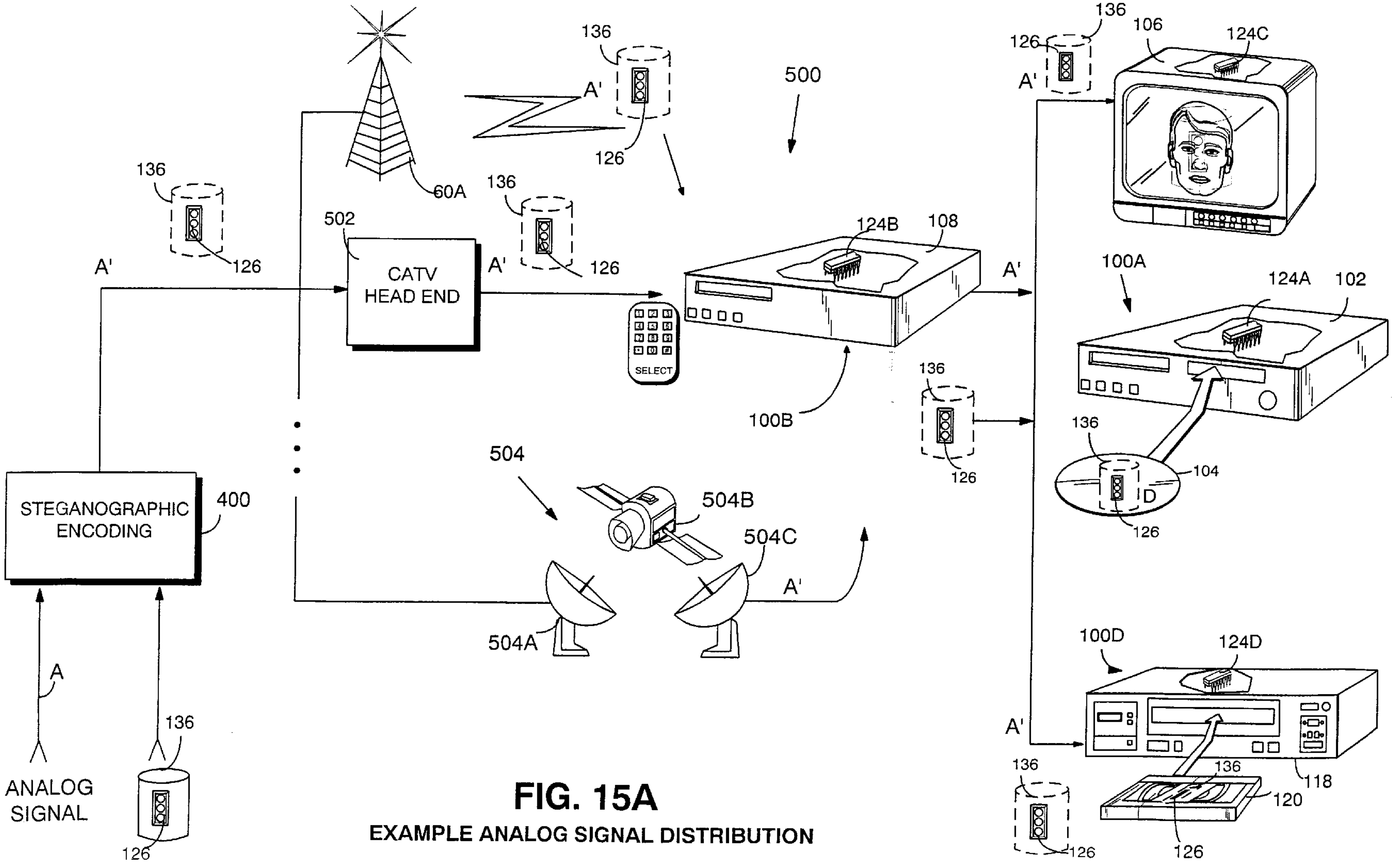

FIG. 15A
EXAMPLE ANALOG SIGNAL DISTRIBUTION

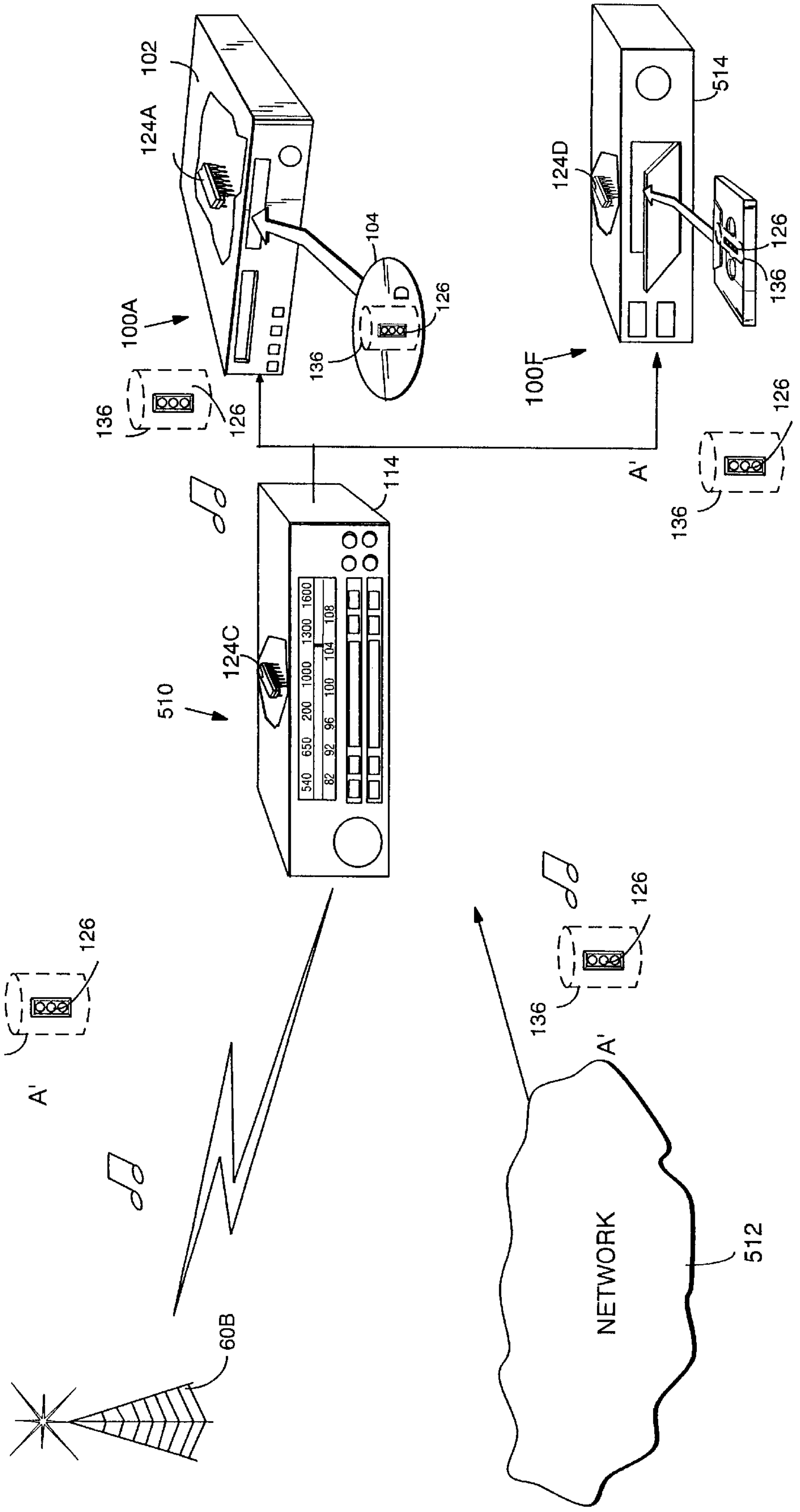

FIG. 15B

EXAMPLE ANALOG SIGNAL DISTRIBUTION

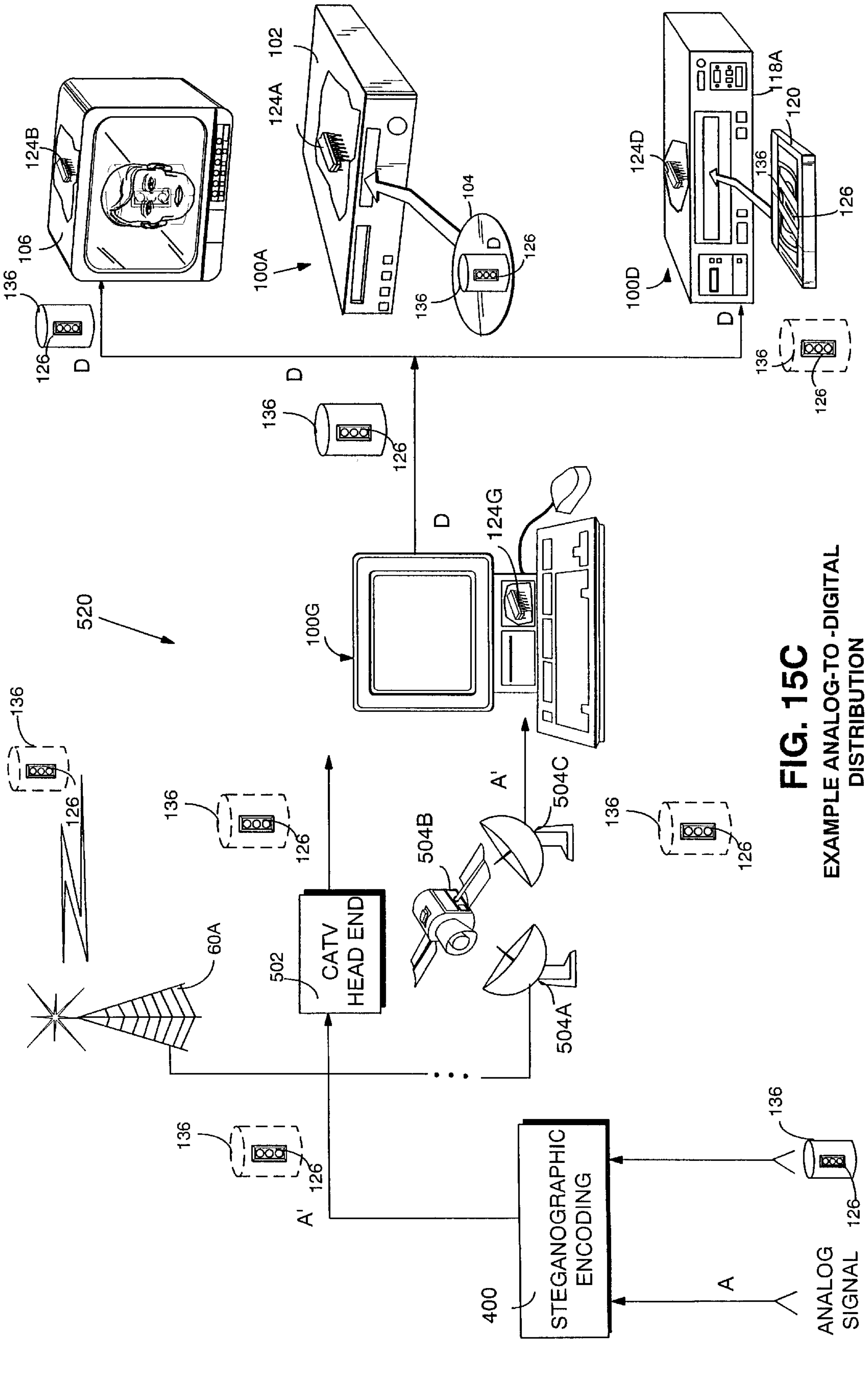

FIG. 15C
EXAMPLE ANALOG-TO -DIGITAL DISTRIBUTION

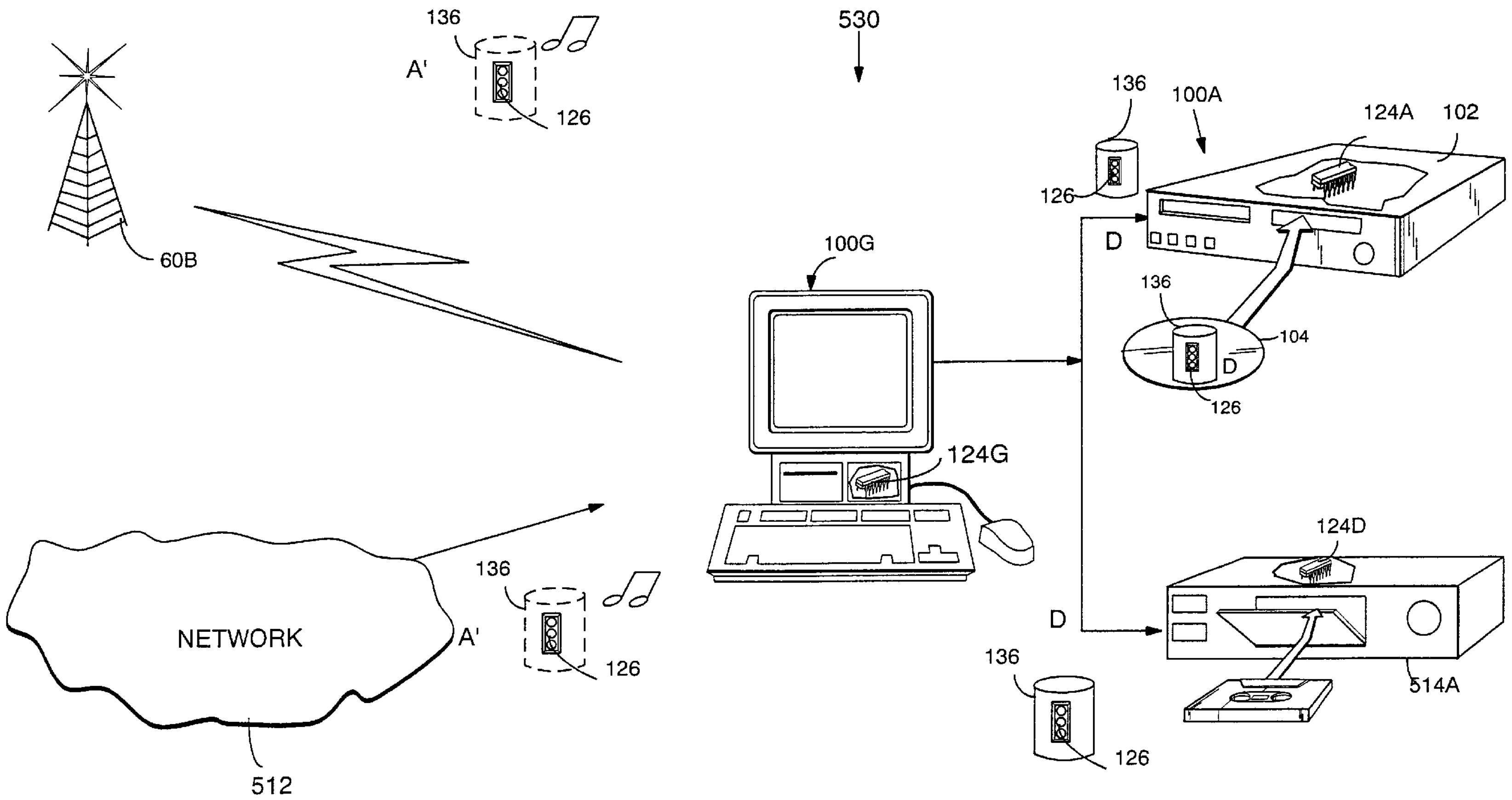

FIG. 15D
EXAMPLE ANALOG-TO -DIGITAL DISTRIBUTION

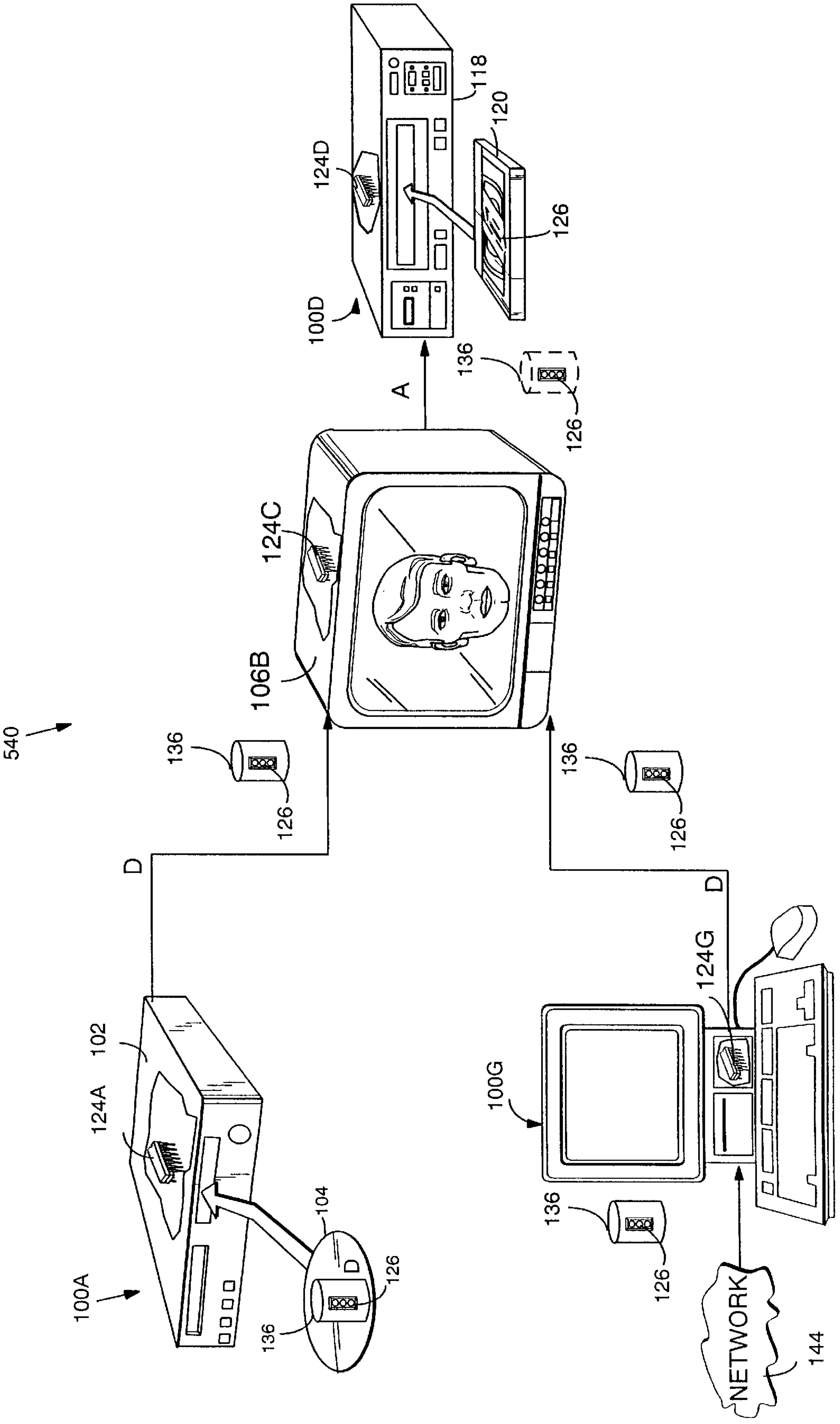

FIG. 15E

EXAMPLE DIGITAL-TO-ANALOG DISTRIBUTION

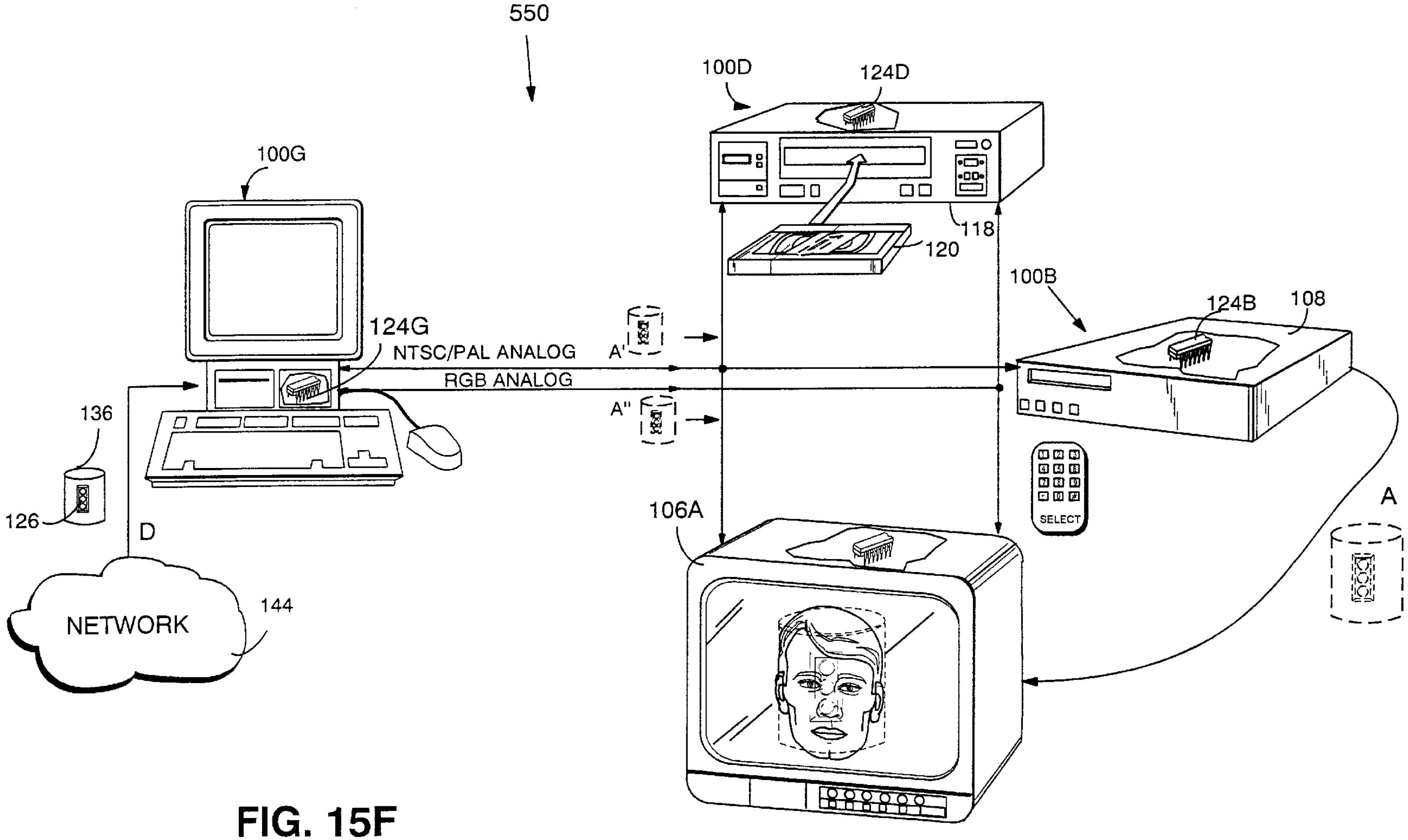

FIG. 15F

DIGITAL - TO -ANALOG DISTRIBUTION

STEGANOGRAPHIC TECHNIQUES FOR SECURELY DELIVERING ELECTRONIC DIGITAL RIGHTS MANAGEMENT CONTROL INFORMATION OVER INSECURE COMMUNICATION CHANNELS

CROSS REFERENCE TO RELATED APPLICATION

This application is related to commonly assigned application Ser. No. 08/388,107 of Ginter et al., filed Feb. 13, 1995, entitled "SYSTEMS AND METHODS FOR SECURE TRANSACTION MANAGEMENT AND ELECTRONIC RIGHTS PROTECTION" (attorney reference number 895-13) now abandoned. We incorporate by reference, into this application, the entire disclosure of this prior-filed Ginter et al. patent application just as if its entire written specification and drawings were expressly set forth in this application.

FIELD OF THE INVENTION

The present inventions relate generally to computer security, and more particularly to steganographic techniques for hiding or encoding electronic control information within an information signal carried by an insecure communications channel. Still more particularly, the present inventions relate to systems, methods and techniques that substantially invisibly and/or indelibly convey, over analog or other insecure communications channels, digital rights management control information for use within a virtual distribution environment electronic rights management system.

BACKGROUND AND SUMMARY OF THE INVENTION

The world is becoming digital. Digital signals are everywhere—in our computers, television sets, VCRs, home stereos, and CD players. Digital processing—which operates on information "bits" (numerical "on" or "off" values)—provides a degree of precision and protection from noise that cannot be matched by the older, "analog" formats we have used since the beginning of the electronic age.

Despite the clear advantage of digital communications, the older "analog" domain remains significant. Many of our most important information delivery mechanisms continue to be based on analog—not digital—signaling. In fact, most of our electronic entertainment, news, sports and music program material comes to us in the form of analog signals. For example:

Television remains largely analog. Although the distribution of television programming to local cable systems is increasingly digital and most modern television sets include digital signal processing circuits, the local cable television "head end" continues to send television signals to the subscriber's set top box and television in analog—not digital—form. It will cost a great deal to convert local cable distribution from analog to digital. In the United States, for example, the widespread conversion from analog to digital television is projected to take no less than 15 years and perhaps even longer.

In radio broadcasting, too, analog communication continues to reign supreme. Thousands of radio stations broadcast music, news and other programs every day in analog form. Except for a few experimental digital systems, practically all radio broadcasting is carried over analog communications channels.

The movies and videos we rent at the local video tape rental store are analog.

Commercially available music tape cassettes are recorded in analog formats.

Moreover, the "real world" is analog. Everything digital must ultimately be turned into something analog if we are to experience it; and conversely, everything analog must be turned into something digital if the power of modern digital technology will be used to handle it. Modern digital technology also allows people to get better quality for less money.

Despite the pervasiveness of analog signals, existing methods for managing rights and protecting copyright in the analog realm are primitive or non-existent. For example:

Quality degradation inherent in multigenerational analog copying has not prevented a multi-billion dollar pirating industry from flourishing.

Some methods for video tape copy and pay per view protection attempt to prevent any copying at all of commercially released content, or allow only one generation of copying. These methods can generally be easily circumvented.

Not all existing devices respond appropriately to copy protection signals.

Existing schemes are limited for example to "copy/no copy" controls.

Copy protection for sound recordings has not been commercially implemented.

A related problem relates to the conversion of information between the analog and digital domains. Even if information is effectively protected and controlled initially using strong digital rights management techniques, an analog copy of the same information may no longer be securely protected.

For example, it is generally possible for someone to make an analog recording of program material initially delivered in digital form. Some analog recordings based on digital originals are of quite good quality. For example, a Digital Versatile Disk ("DVD") player may convert a movie from digital to analog format and provide the analog signal to a high quality analog home VCR. The home VCR records the analog signal. A consumer now has a high quality analog copy of the original digital property. A person could re-record the analog signal on a DVD-R (a Digital Versatile Disk appliance and media supporting both read and write operations). This recording will in many circumstances have substantial quality—and would no longer be subject to "pay per view" or other digital rights management controls associated with the digital form of the same content.

Since analog formats will be with us for a long time to come, rightsholders such as film studios, video rental and distribution companies, music studios and distributors, and other value chain participants would very much like to have significantly better rights management capabilities for analog film, video, sound recordings and other content. Solving this problem generally requires a way to securely associate rights management information with the content being protected.

People have for many years been using various techniques allowing digital information to, in effect, ride "piggyback" on analog information signals. For example, since the 1960s, it has been common to digitally encode text information such as subtitles into otherwise unused portions of analog television signals (e.g., within the so-called "Vertical Blanking Interval").

Unfortunately, sending digital information using such known digital encoding techniques is problematic because the digital information is not persistent. It is relatively easy to strip out or eliminate digital information encoded using prior techniques commonly employed for superimposing digital signals onto an analog information signal. Analog communications channels may commonly be subjected to various signal processing that may (intentionally or unintentionally) strip out digital information added to the analog signal—defeating any downstream system, process or technique that depends on the presence and readability of the digital information. For example, the television vertical blanking signal—along with any signal components disposed within the vertical blanking interval—is typically routinely eliminated whenever a video signal is processed by a computer.

Attempting to use insecure techniques for providing rights management is at best ineffective, and can be worse than no rights management at all. Unscrupulous people can strip out insecure control information altogether so that the corresponding information signal is subject to no controls at all—for example, defeating copy protection mechanisms and allowing users to avoid paying for rights usage. More nefariously, an unscrupulous person could alter an insecure system by substituting false control information in place of the proper information. Such substitutions could, for example, divert payments to someone other than legitimate rights holders—facilitating electronic fraud and theft.

Prior, insecure techniques fail to solve the overall problem of how to provide and securely manage advanced automatic electronic rights management for analog and other information signals conveyed over an insecure communications channel. The lack of strong rights management for analog signals creates a huge gap in any comprehensive electronic rights management strategy, and makes it possible for consumers and others to circumvent—to at least some extent—even the strongest digital rights management technologies. Consequently, there is a real need to seamlessly integrate analog delivery models with modern electronic digital rights management techniques.

The present inventions solve these and other problems by providing "end to end" secure rights management protection allowing content providers and rights holders to be sure their content will be adequately protected—irrespective of the types of devices, signaling formats and nature of signal processing within the content distribution chain. This "end to end" protection also allows authorized analog appliances to be easily, seamlessly and cost-effectively integrated into a modern digital rights management architecture.

The present inventions may provide a Virtual Distribution Environment ("VDE") in which electronic rights management control information may be delivered over insecure (e.g., analog) communications channels. This Virtual Distribution Environment is highly flexible and convenient, accommodating existing and new business models while also providing an unprecedented degree of flexibility in facilitating ad hoc creation of new arrangements and relationships between electronic commerce and value chain participants—regardless of whether content is distributed in digital and/or analog formats.

The present inventions additionally provide the following important and advantageous features:

An indelible and invisible, secure technique for providing rights management information.

An indelible method of associating electronic commerce and/or rights management controls with analog content such as film, video, and sound recordings.

Persistent association of the commerce and/or rights management controls with content from one end of a distribution system to the other—regardless of the number and types of transformations between signaling formats (for example, analog to digital, and digital to analog).

The ability to specify "no copy/one copy/many copies" rights management rules, and also more complex rights and transaction pricing models (such as, for example, "pay per view" and others).

The ability to fully and seamlessly integrate with comprehensive, general electronic rights management solutions (such as those disclosed in the Ginter et al. patent specification referenced above).

Secure control information delivery in conjunction with authorized analog and other non-digital and/or non-secure information signal delivery mechanisms.

The ability to provide more complex and/or more flexible commerce and/or rights management rules as content moves from the analog to the digital realm and back.

The flexible ability to communicate commerce and/or rights management rules implementing new, updated, or additional business models to authorized analog and/or digital devices.

Briefly, the present inventions use "steganography" to substantially indelibly and substantially invisibly encode rights management and/or electronic commerce rules and controls within an information signal such as, for example, an analog signal or a digitized (for example, sampled) version of an analog signal.

The Greek term "steganography" refers to various "hidden writing" secret communication techniques that allow important messages to be securely carried over insecure communications channels. Here are some examples of steganography:

In ancient Persia an important message was once tattooed on a trusted messenger's shaved scalp. The messenger then allowed his hair to grow back—completely hiding the message. Once the messenger made his way to his destination, he shaved his hair off again—exposing the secret message so the recipient could read it on the messenger's shaved scalp. See Kahn, David, The Codebreakers page 81 et seq. and page 513 et seq. (Macmillan 1967). This unusual technique for hiding a message is one illustration of"steganography."

Another "steganographic" technique encodes a secret message within another, routine message. For example, the message "Hey Elmer, Lisa Parked My Edsel" encodes the secret message "HELP ME"—the first letter of each word of the message forming the letters of the secret message ("Hey Elmer, Lisa Parked My Edsel"). Variations on this technique can provide additional security, but the basic concept is the same—finding a way to hide a secret message within information that can or will be sent over an insecure channel.

Invisible ink is another commonly used "steganography" technique. The secret message is written using a special disappearing or invisible ink. The message can be written on a blank piece of paper, or more commonly, on the back or front of the piece of paper carrying a routine-looking or legitimate letter or other written communication. The recipient performs a special process on the received document (e.g., exposing it to a chemical or other process that makes the invisible ink visible) so that he or she can read the message. Anyone intercepting the paper will be unable to detect the secret message—or even know that it is there—unless the interceptor knows to look for the invisible message and also knows how to treat the paper to make the invisible ink visible

The present inventions use steganography to ensure that encoded control information is both substantially invisible and substantially indelible as it passes over an insecure communications channel. At the receiving end, a secure, trusted component (such as a protected processing environment described in Ginter et al.) recovers the steganographically-encoded control information, and uses the recovered information to perform electronic rights management (for example, on analog or other information signals carried over the same channel).

One specific aspect provided by the present inventions involve steganographically encoding digital rights management control information onto an information signal such as, for example, an analog or digitized television, video or radio signal. The steganographic encoding process substantially inextricably intertwines the digital control information with images, sounds and/or other content the information signal carries—but preferably without noticeably degrading or otherwise affecting those images, sounds and/or other content. It may be difficult to detect (even with educated signal processing techniques) that the analog signal has been steganographically encoded with a rights management control signal, and it may be difficult to eliminate the steganographically encoded control signal without destroying or degrading the other information or content the signal carries.

The present inventions also provide a secure, trusted protected processing environment to recover the steganographically-encoded control signal from the information signal, and to enforce rights management processes based on the recovered steganographically encoded control signal. This allows the information signal delivery mechanism to be fully integrated (and made compatible) with a digital virtual distribution environment and/or other electronic rights management system.

In accordance with yet another aspect provided by this invention, steganographically encoded, digital rights management control information may be used in conjunction with a scrambled and/or encrypted information signal. The scrambling and/or encryption can be used to enforce the rights management provided in accordance with the steganographically encoded rights management control information. For example, the control signal can be steganographically decoded and used to control, at least in part, under what circumstances and/or how the information signal is to be descrambled and/or decrypted.

In accordance with yet another feature provided by the invention, digital certificates can be used to securely enforce steganographically encoded rights management control information.

In accordance with still another feature provided by the invention, steganography is used to encode an information signal with rights management control information in the form of one or more protected organizational structures having association with electronic controls. The electronic controls may, for example, define permitted and/or required operation(s) on content, and consequences of performing and/or failing to perform such operations. The organizational structure(s) may identify, implicitly or explicitly, the content the electronic controls apply to. The organizational structure(s) may also define the extent of the content, and semantics of the content.

The type, amount and characteristics of the steganographically encoded rights management control information are flexible and programmable—providing a rich, diverse mechanism for accommodating a wide variety of rights management schemes. The control information can be used to securely enforce straightforward secure rights management consequences such as "copy/no copy/one copy" type controls—but are by no means limited to such models. To the contrary, the present invention can be used to enable and enforce much richer, more complex rights management models—including for example those involving usage auditing, automatic electronic payment, and the use of additional electronic network connections. Moreover, the rights management control arrangements provided by the present invention are infinitely extensible and scaleable—fully accommodating future models as they are commercially deployed while preserving full compatibility with different (and possibly more limited) rights management models deployed during earlier stages.

The organizational structure(s) may be steganographically encoded in such a way that they are protected for purposes of secrecy and/or integrity. The employed steganographic techniques may provide some degree of secrecy protection—or other security techniques (e.g., digital encryption, digital seals, etc.) may be used to provide a desired or requisite degree of security and/or integrity protection for the steganographically encoded information.

In one example, the organizational structure(s) may comprise digital electronic containers that securely contain corresponding digital electronic control information. Such containers may, for example, use cryptographic techniques. In other examples, the organizational structure(s) may define associations with other electronic control information. The other electronic control information may be delivered independently over the same or different communications path used to deliver the organizational structure(s).

In one example, the steganographic techniques employed may involve applying the organizational structure information in the form of high frequency "noise" to an analog information signal. Spectral transforms may be used to apply and recover such steganographically-encoded high frequency "noise." Since the high frequency noise components of the information signal may be essentially random, adding a pseudo-random steganographically encoded control signal component may introduce substantially no discernible information signal degradation, and may be difficult to strip out once introduced (at least without additional knowledge of how the signal was incorporated, which may include a shared secret).

In accordance with another aspect provided by the invention, a steganographic encoding process analyzes an information signal to determine how much excess bandwidth is available for steganographic encoding. The steganographic encoding process may use variable data rate encoding to apply more control information to parts of an information signal that use much less than all of the available communications channel bandwidth, and to apply less control information to parts of an information signal that use nearly all of the available communications channel bandwidth.

In accordance with still another aspect provided by the invention, multiple organizational structures may be steganographically encoded within a given information signal. The multiple organizational structures may apply to different corresponding portions of the information signal, and/or the multiple organizational structures may be repetitions or copies of one another to ensure that an electronic appliance has "late entry" and/or error correcting capability and/or can rapidly locate a pertinent organizational structure(s) starting from any arbitrary portion of the information signal stream.

In accordance with yet another aspect provided by this invention, an organizational structure may be steganographically encoded within a particular portion of a content-carrying information signal to which the organizational structure applies—thereby establishing an implicit correspondence between the organizational structure and the identification and/or extent and/or semantics of the information content to which the organizational structure applies. The correspondence may, for example, include explicit components (e.g., internally stated start/end points), with the storage or other physical association determined by convenience (i.e., it may make sense to put the organizational structure close to where it is used, in order to avoid seeking around storage media to find it).

In accordance with yet another aspect provided by this invention, pointers can be steganographically encoded into parts of an information signal stream that has little excess available bandwidth. Such pointers may be used, for example, to direct an electronic appliance to portions of the information signal stream having more available bandwidth for steganographic encoding. Such pointers may provide improved steganographic decode access time—especially, for example, in applications in which the information signal stream is stored or otherwise available on a random access basis.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages provided by this invention may be better and more completely understood by referring to the following detailed description of presently preferred example embodiments in conjunction with the drawings, of which:

FIG. **1** shows a virtual distribution environment providing steganographic encoding of digital rights management control information;

FIGS. **1**A–**1**E show example electronic appliances embodying aspects of this invention;

FIG. **2** shows an example of how electronic control information can be steganographically encoded within an image;

FIG. **3** shows an example rights management component providing a steganographic decoding function;

FIG. **4** shows an example of how steganographically encoded electronic control signals can be extracted and used for digital rights management;

FIGS. **5**A–**5**D show example techniques for enforcing steganographically encoded rights management control information;

FIGS. **5**E–**5**F show example "end to end" protected distribution systems provided in accordance with the invention;

FIG. **6** shows an example of multiple sets of digital rights management control information steganographically encoded onto different parts of the same information signal stream;

FIG. **7**A shows an example detailed steganographic encoding process;

FIG. **7**B shows an example detailed steganographic decoding process;

FIG. **8** shows an example frequency domain view of an example steganographic signal encoding technique;

FIG. **9** shows an example use of a variable steganographic encoding rate to avoid exceeding channel bandwidths;

FIGS. **10** and **10**A show how steganographically encoded pointers can be used to minimize access times to control signals steganographically encoded onto information signal streams available on a random access basis;

FIG. **11** shows an example steganographically encoded organizational structure;

FIG. **12** shows an example electronic appliance architecture having electronic rights management capabilities based at least in part on steganographically encoded control information;

FIGS. **13** and **13**A show example control steps that may be performed by the FIG. **12** appliance;

FIG. **14** shows an example steganographic refresh arrangement; and

FIGS. **15**A–**5**F show example distribution systems using steganographic encoding of rights management control information along at least one leg of an information distribution path.

DETAILED DESCRIPTION OF PRESENTLY PREFERRED EXAMPLE EMBODIMENTS

FIG. **1** shows an example Virtual Distribution Environment (VDE) **50** employing steganography to deliver electronic digital rights management control information over an insecure (e.g., analog) communications channel.

In this example, a provider **60** delivers an information signal **70** to multiple electronic appliances **100(1)**, . . . , **100**(N). In this particular example, provider **60** is shown as being a television broadcaster that delivers an analog television information signal **70** over a wireless or cable communications path, and appliances **100(1)**, . . . , **100**(N) are shown as being home color television sets **106**. As made clear by FIGS. 1A–1E, the present inventions may be used by a variety of different types of electronic appliances **100** receiving a variety of different types of information signals via a variety of different types of communications channels.

In the FIG. **1** example, provider **60** steganographically encodes electronic rights management control information **126** into the information signal **70**. This control information **126** is represented in this diagram as a traffic light because it may define permitted and/or required operation(s), and consequences of performing or failing to perform such operations. For example, control information **126** could specify that a viewer or class of viewers has permission to watch a particular program, is forbidden to watch a program, or may watch a program only under certain conditions (for example, based on paying a certain amount, being over a certain age, etc.). In this example the control information **126** is shown as being packaged within an electronic "container" **136**. Container **136** (which in at least one example is provided by steganographic encoding techniques) is used to protect the integrity of the control information **126**.

The provider **60** encodes the electronic rights management control information **126** onto information signal **70** using steganographic techniques that make the control information both:

substantially invisible, and

substantially indelible.

The control information **126** is substantially indelibly encoded because, in this example, it is substantially inextricably intertwined with the television images and/or sound—and can't easily be eliminated from information signal **70** without destroying the images, sound or other information carried by the information signal. For example, steganographically encoding rights management control information will generally survive compression and decompression of a digitized analog signal, and will also survive repeated analog/digital/analog conversion sequences.

Even though the steganographically encoded control information **126** is substantially indelible, the television viewer is not bothered by the steganographically encoded information because the steganographically encoded rights management control information is, in this example, also encoded substantially invisibly. In fact, the viewer may not be able to see the steganographic control information at all—and it may have no effect whatsoever on his or her viewing experience (other than in terms of the effect is has on associated rights management processes). The control information **126** is shown in dotted lines on the FIG. **1** screens of television sets **106** to emphasize that the control information is substantially inextricably intertwined with the television images and/or sounds—and yet can't really be seen or noticed by the television viewer.

FIG. **2** shows an example of how digital control information **126** may be encoded within an image **128** so that, in one particular example, it is both substantially invisible and substantially indelible. In this specific image context, for example, "substantially invisible" may refer to the characteristic of the encoded control information as not substantially interfering with or adversely affecting the viewer's experience in viewing image **128** or otherwise using the content carried by the information signal **70** and/or that it is difficult to detect using various types of signal processing techniques, for example. For example, invisibility can be a measurable quantity (measured in a number of processor instructions, such as MIPS years, for example), and can be related to signal processing as opposed to the naked eye. In this context, "substantially indelible" can mean, for example, that the encoded digital control information is substantially inextricably intertwined with the content information, making it difficult for example to strip out the encoded digital control information without also damaging or degrading the content. Degree of indelibility may, for example, be measured by the number of processor instructions required to strip the information out.

FIG. **2** shows that a slight rearrangement of picture element configuration in a small portion of image **128** is one way to steganographically encode electronic control information into the image to provide a substantially indelible, substantially invisible encoding. This encoding may be unnoticeable to the viewer, and yet it may be difficult to strip out or eliminate without also damaging the image. Steganographically encoding digital control information into the information signal **70** may effectively merge, from a practical standpoint, the digital control information with the other information carried by the signal (for example, television programming or other content). The steganographic techniques make it difficult for someone to intentionally or unintentionally eliminate the encoded control information without damaging the content, but may (in one example) nevertheless hide the encoded control information so that it does not unduly detract from the content.

Since indelibility of the steganographic encoding provides persistence, indelibility may be more important than invisibility in at least some applications. For example, it may be desirable in some applications to use a shared secret to decode and then remove the steganographically encoded control information **126** before presenting the information signal (or its content) to the user. The steganographically encoded information need not be particularly invisible in this scenario. Even though someone with knowledge of the shared secret can remove the steganographically encoded information, it may nevertheless remain substantially indelible to anyone who doesn't know the shared secret required to remove it.

Organization Structures

FIG. **1** shows that control information **126** may be packaged within one or more organizational structures such as secure digital containers **136**. Containers **136** may be, for example, of the type described in the Ginter et al. patent specification in connection with FIGS. **17–26**B. The organizational structure(s) may identify, implicitly or explicitly, the content the electronic controls apply to. The organizational structure(s) may also define the extent of the content, and semantics of the content.

The organizational structure(s) may be encoded in such a way that they are protected for purposes of secrecy, authenticity and/or integrity. The employed steganographic technique may provide such protection, or another security technique may be used in conjunction with steganography to provide a desired or requisite degree of protection depending on the application. Containers **136** may, for example, use mathematical techniques called "encryption" that help guarantee the integrity and/or secrecy of the control information **126** they contain.

Example Rights Management Component

Each of the FIG. **1** example appliances **100** may include a electronic digital rights management component **124**. Rights management component **124** may, for example, comprise one or more tamper-resistant integrated circuit "chips". Components **124** may, for example, be of the general type described in detail at FIG. **9** and following of the Ginter et al. patent specification. Briefly, Ginter et al. describes a Virtual Distribution Environment ("VDE") including multiple electronic appliances coupled together through a communications capability. Each electronic appliance has such a secure, tamper-resistant "protected processing environment" in which rights management processes may securely take place. The Virtual Distribution Environment delivers digital control information to the protected processing environments by packaging the control information within secure electronic digital containers. This delivered control information provides at least part of the basis for performing electronic rights management functions within the protected processing environments.

The ability to securely deliver digital control information to such protected processing environments as embodied with components **124** is important at least because it increases flexibility and enhances functionality. For example, different digital control information can be delivered for the same or different electronic content. As one specific example, one set of rules may apply to a particular television program, another set of rules might apply to a particular film, and a still different set of rules could apply to a particular musical work. As yet another example, different classes of users of the same electronic content can receive different control information depending upon their respective needs.

Rights management components **124** are able to steganographically decode the control information **126** carried by the information signal **70**. Components **124** use the decoded control information **126** to electronically manage rights. For example, components **126** may use the decoded control information **126** to control how the images and/or sound carried by information signal **70** may be used.

In one example, digital rights management component **124** may comprise or include one or more integrated circuit chips as shown in FIG. **3**. The FIG. **3** example rights management component **124** includes an analog-to-digital converter **130**, a steganographic decoder **132**, and a rights management processor **134**. Rights management processor **134** may include or comprise a protected processing environment **138** as described in Ginter et al. FIGS. **8–12**, for example, providing a tamper-resistant execution environment for effecting the operations provided by electronic controls **126**. Rights management component **124** may also include a steganographic encoder and a digital-to-analog converter (not shown).

The analog-to-digital converter (ADC) **130** shown in FIG. **3** takes the incoming information signal **70** and—if it is in analog form—converts it to a digital signal (see FIG. **4**, step "A"). Steganographic decoder **132** obtains the digital control information **126** from the resulting digital signal (FIG. **4**, step "B"). As mentioned above, digital control information **126** may define permitted and/or required operation(s) on the content carried by signal **70**, and may further define consequences of performing and/or failing to perform such operations. Rights management processor **134** may manage these rights and/or permissions and associated consequences (FIG. **4**, step "C").

Example Electronic Appliances

The present inventions may be used with all sorts of different kinds of electronic appliances **100** each of which may include a rights management component **124**. FIGS. 1A–1E show various example electronic appliances **100** embodying aspects of the present invention. For example:

FIG. **1**A shows an example media player **102** capable of playing Digital Versatile Disks (DVDs) **104** on a home color television set **106**. For example, media player **102** may provide analog output signals to television set **106**, and may also process digitized video and/or audio analog signals stored on optical disk **104**. Rights management component **124A** provides digital rights protection based on steganographically encoded controls **126**.

FIG. **1**B shows an example set top box **108** that can receive cable television signals (for example, via a satellite dish antenna **110** from a satellite **112**) for performance on home television set **106**. Set top box **108** shown in FIG. **1**B may receive television signals from antenna **110** in analog scrambled or unscrambled form, and provide analog signals to television **106**. Rights management component **124**B provides digital rights protection based on steganographically encoded controls **126**.

FIG. **1**C shows an example radio receiver **114** that receives radio signals and plays the radio sound or music on a loud speaker **116**. The radio receiver **114** of FIG. **1**C may receive analog radio signals, and provide analog audio signals to loud speaker **116**. Rights management component **124**C provides digital rights protection based on steganographically encoded controls **126**.

FIG. **1**D shows an example video cassette recorder **118** that can play back video and sound signals recorded on a video cassette tape **120** onto television **106**. In FIG. **1**D, the video tape **120** may store video and audio signals in analog form, which VCR **118** may read and provide to television **106** in analog form. Rights management component **124**D provides digital rights protection based on steganographically encoded controls **126**.

FIG. **1**E shows an example television camera that can capture video images and produce video signals for recording on a video cassette tape **120** and play back on television set **106**. The FIG. **1**E camcorder **122** may generate analog video and audio signals for storage onto video tape **120**, and/or may provide analog signals for processing by television **106**. Rights management component **124**E provides digital rights protection based on steganographically encoded controls **126**.

Example Rights Management Enforcement Techniques

Different rights holders want different types of rights management and control. For example, some rights holders may be completely satisfied with a relatively simple "copy/no copy/one copy" rights management control model, whereas other rights holders may desire a richer, more complex rights management scheme. The present inventions flexibly accommodate a wide variety of electronic rights management techniques—giving rightsholders extreme flexibility and programmability in defining, for example, commerce and rights management models that far exceed the simple "copy/no copy, one copy." Assuming a closed appliance, that is, one lacking at least an occasional connection to a payment method (e.g., Visa, MasterCard, American Express, electronic cash, Automated Clearinghouses (ACHs) and/or a Financial Clearinghouse that serves as the interface for at least one payment method), the following are non-limiting examples of steganographically encoded rights controls and associated consequences that can be accommodated by the present invention:

Limiting use of a given property to a specified number of times this property can be used on a given appliance;

Prohibiting digital to analog and analog to digital conversions;

Ensuring that one analog or digital appliance will communicate the protected property only to another appliance that is also VDE enabled and capable of enforcing the controls associated with that property;

Time-based rental models in which a consumer may "perform" or "play" the property an unlimited number of times in a given interval (assuming the appliance has a built-in secure time clock, can operatively connect itself to such a clock, or otherwise receive time from a reliable source);

Enforcing an expiration date after which the property cannot be performed (also assuming access to a reliable time source);

Associating different control sets with each of several properties on a single physical media. In one example, a "trailer" might have unlimited copying and use associated while a digital film property may have an associated control set that prevents any copying;

Associating multiple control sets with a given property regardless of media and whether the appliance is closed or has an occasionally connected communications "backchannel."

An even more flexible and diverse array of rights controls and associated consequences are enabled by the present inventions if at least one appliance is connected to some form of communications "backchannel" between the appliance and some form of payment method. This backchannel may be a telephone call, the use of a modem, a computer data network, such as the Internet, a communications channel from a settop box to the head end or some other point on a cable TV distribution system, or a hybrid arrangement involving high bandwidth distribution of analog properties with a slower return channel, a phone line and modem—just to name a few examples. Non-limiting examples of such more rights controls and associated consequences enabled by the present invention include the following:

Associating with a given property in analog format new, independently delivered controls obtained from a rightsholder or other authorized source;

A broad range of usage-based pricing models, including pay-per-view or pay-per-use;

Creating permissions enabling excerpting of properties in analog formats, maintaining persistent control over those excerpts, and charging for those excerpts;

- Pay-per-use models in which a customer pays a specified price for each use of the property and/or different unit prices depending on the number of uses. In one example, the customer might pay $3.99 for the first viewing and $2.99 for each subsequent viewing; and,
- Controls that prevent an analog property being converted to digital format and then being transmitted or communicated except in a container with controls and/or with a pointer to a source of controls, that apply in a digital environment.

FIGS. **5**A–**5**D show some examples of how rights management component **124** can enforce steganographically encoded digital rights management controls.

In the FIG. **5**A example, rights management component **124** controls an on/off switch **140** based on steganographically encoded electronic controls **126**. Component **124** turns switch **140** on (for example, to allow the analog television signal to pass to television set **106**) when electronic controls **126** permit, and otherwise opens (turns off) switch **140** to prevent the analog signal from reaching the output.

In a more secure example, the incoming analog signal is scrambled, and the FIG. **5**A on/off switch **140** is replaced by a FIG. **5**B descrambler **142** of conventional design. The descrambler **142** descrambles the analog input signal to provide a descrambled output under control of rights management component **124**. Rights management component **124** allows descrambler **142** to descramble the analog signal only under conditions specified by electronic controls **126** that the component **124** obtains from the analog input signal. Scrambling the analog signal gives the rights management component **124** a relatively secure way of enforcing electronic controls **126**—since the rights management component can prevent the descrambler from operating unless conditions set by the controls are satisfied. The rights management function and the descrambling function may be integrated into a single component in which the descramble and decrypt functions of the rights management component are essentially serving the same function, but may still be distinct to account for specialized approaches to descrambling that may not be sufficiently strong or interoperable with other environments to use generally. If they are separate components, the data path between them should be protected (for example, by ensuring that both components are in a tamper resistant enclosure, or using secure authentication and key exchange to send the descrambling sequence to the descrambler).

FIG. **5**C shows how digital certificates may be used to enforce steganographically encoded electronic controls **126**. In this example, appliance **100**A outputs content to another appliance **110**D only if appliance **100**D has a rights management component **124**D that can enforce the electronic controls **126**. In this example, there may be a “handshake” between the content supplying appliance **100**A and the content receiving appliance **100**D sufficient to ensure the content supplying appliance that the content receiving appliance will enforce the electronic controls **126**. For example, the supplying appliance **100**A’s rights management component **124**A may require the receiving appliance **100**D’s rights management component **124**D to present a digital certificate **199** attesting to the fact that the receiving appliance **100**D has a rights management component **124** fully capable of securely enforcing electronic controls **126**. Receiving appliance **110**D could present this digital certificate **199** by steganographically encoding it within an analog signal it provides to the supplying appliance over an analog signal channel for example (the analog signal channel could be the same one the supplying appliance will use to deliver the steganographically encoded content). If a digital channel is available, the handshake can be over a digital link between the two appliances using, for example, secure authentication techniques disclosed in Ginter et al. and/or for example in Schneier, *Applied Cryptography* (2d Ed. Wiley 1996) at page 52 et seq.

FIG. **5**D shows that rights management component **124**A can enforce electronic controls **126** by marking the content through “fingerprinting” and/or “watermarking” prior to releasing the content to a device that doesn’t have a rights management component **124**. See Ginter et al. patent specification, FIGS. **58**A–**58**C. Such fingerprinting could involve using steganographic techniques to fingerprint the content. For example, a movie delivered using “conventional” containers as disclosed in Ginter et al. could use steganographically encoded containers “on the way” to the display device. Furthermore, it could include the identity of the user, etc. as well as the control information appropriate for the device. Another case could be text sent to a printer, using different steganographic encoding techniques such as line and/or character shifting.

End to End Protection

FIGS. **5**E–**5**F illustrate how the persistent association with content provided by steganographically encoded electronic rights management control information **126** provides “end to end” protection within an arbitrary information signal distribution system—irrespective of the processes the information signal is subjected to as it travels to its final destination.

FIG. **5**E shows an example of how the present inventions can be used to maintain end-to-end rights management protection over content initially distributed in an analog signal format. FIG. **5**F shows an example of how the present invention can be used to maintain end-to-end rights management protection over content initially distributed in digital form.

In the FIG. **5**E example, an analog signal transmission site (e.g., a radio or television broadcaster) transmits an analog signal A steganographically encoded with an organizational structure **136** including electronic controls **126**. This analog signal A may be received by an electronic appliance **100**A having a rights management component **124**A as described above. Appliance **100**A may, for example, convert the signal into digital and/or digitized format, and store the digitized version of the signal onto a digital storage medium **104**. Electronic appliance **100**A may play back the recorded digitized signal, convert the signal back to analog form, and deliver the analog signal A to a further electronic appliance **106**B. In this example, electronic appliance **106**B also has a rights management component **124**B.

The steganographic techniques provided by the present invention ensure that the electronic controls **126** persist in the signal A delivered from appliance **100**A to appliance **106**B—and from appliance **106**B to still other appliances. Because of the substantial indelibility characteristics of the steganographically encoded control information **126**, this information persists in the signal as stored on recording medium **104**, in copies of the recorded signal produced by replaying the medium, and in further downstream versions of the signal.

This persistence will, for example, survive conversion from analog to digital format (e.g., sampling or “digitizing”), storage, and subsequent conversion from digital to analog format. For example, because the steganographically encoded control information **126** is substantially indelibly, substantially inextricably intertwined and integrated with the information signal A, the digitized version of the information signal that appliance **100**A records on medium **104** will also contain the steganographically encoded control information **126**. Similarly, when appliance **100**A plays back the recording from medium **104**, it will reproduce information signal A along with the steganographically encoded control information **126**. The steganographically encoded control information **126** thus persists irrespective of digitization (or other processing) of signal A. In some cases, lossy compression techniques used on the data may remove high frequency noise—thereby potentially damaging the steganographic channel. When these lossy compression techniques are used or may be encountered, the steganographic encoding function should be matched to the compression algorithm(s) using conventional signal analysis techniques to avoid this consequence.

Similarly, appliance **106**B may output further copies or versions of signal A in analog form and/or digital form. Because of its inherently persistent characteristics, the steganographically encoded control information **126** will be present in all subsequent versions of the signal outputted by appliance **106**B—be they in analog format, digital format, or any other useful format.

Degrading a digital signal carrying control information is fatal—the rights management system typically may no longer function properly if even a single bit is altered. To avoid this, the preferred embodiment provides redundancy (repeating pointers and the organizational structures and/or any control information incorporated into the organizational structures), and also uses conventional error correction coding such as, for example, Reed-Solomon (or similar) error correcting codes. Additionally, because the steganographically encoded control information **126** is substantially inextricably intertwined with the desired content carried by information signal A, any process that degrades the steganographically encoded control information **126** will also tend to degrade the information signal's desired content. Although the steganographically encoded information may degrade (along with the content) in multi-generation "copies" of the signal, degraded copies may not be commercially significant since the information content of the signal will be similarly degraded due to the substantially inextricable intertwining between the steganographically encoded control information **126** and the content carried by signal A. The refresh circuit shown in FIG. **14** with appropriate error correcting capabilities is one way to prevent the steganographically encoded information from being degraded even if the rest of the information the signal carries becomes degraded.

The FIG. **5**F example shows content being initially distributed in digital form over a network to an electronic appliance **100J** such as a personal computer. Personal computer **100J** may convert the digitally delivered content to an analog signal A for distribution to other appliances **106**B, **100**A. Personal computer appliance **100J** may include a rights management component **124J** that ensures, based on controls **126**, that appliance **100J** does not release a version of the content associated with controls **126** that is not protected by the controls. In this example, rights management component **124J** is capable of steganographically encoding the analog signal A with the control information **126** (e.g., it may perform the processes shown in FIG. **7**A below). Rights management component **124J** enforces controls **126**, at least in part, by ensuring that any analog version of the content associated with controls **126** is steganographically encoded with those controls. Further "downstream" appliances **106**B, **100**A may each include their own rights management component **124** for use in interacting with steganographically encoded controls **126**.

Example Control Information

FIG. **6** shows that a particular information signal **70** may be encoded with many different containers **136** and associated rights management control sets **126**. For example, different portions of an information signal **70** may be associated with different control information **126**. In this example of a movie **270**:

a first "trailer" **272** may be associated with control information **126(1)**,

a second trailer **274** may be associated with control information **126(2)**,

a title section **276** may be associated with control information **126(3)**,

the first five minutes of the movie may be associated with control information **126(4)**, and

the rest of the movie may be associated with control information **126(5)**.

Control information portions **126(1)**, **126(2)**, **126(3)**, **126 (4)** and **126(5)** may all be different. For example, control information **126(1)** may permit the user to copy trailer **272**, whereas control information **126(4)** may prohibit the user from copying the first five minutes **278** of the film.

As shown in FIG. **6**, multiple, identical copies of control information **126(5)** may be steganographically encoded onto the information signal **70**. For example, control information **126(5)** could be encoded once per minute onto the rest of movie **280**. This redundancy allows a media player **102** or other electronic appliance **100** to rapidly obtain a copy of the control information **126(5)** no matter where the user begins watching or playing the movie **270**, and also helps ensure that transmission errors will not prevent the rights management component **124** from recovering at least one "good" copy of the organizational structure.

Example Steganographic Encoding and Decoding Processes

FIGS. **7**A and **7**B show example overall steganographic encoding and decoding processes, respectively. The FIG. **7**A process may be used to steganographically encode digital control information onto an analog signal, and FIG. **7**B performs the inverse operation of steganographically decoding the control information from the analog signal. Generally, the FIG. **7**A process may be performed at a supply point, and the FIG. **7**B process may be performed at a usage point. An electronic appliance **100** can be both a supply point and a usage point, and so it may perform both the FIG. **7**A process and the FIG. **7**B process.

Referring to FIG. **7**A, the analog information signal **70** inputted to the steganographic encoding process may be any sort of information signal such as, for example, the analog signal shown in Graph **A1**. A conventional analog-to-digital conversion block **402** may be used, if necessary, to convert this analog input signal to a digitized signal (see Graph **A2**). A spectral transform block **404** may then be used to transform the digitized information from the time domain to the frequency domain. Spectral transform block **404** may be any conventional transformation such as, for example, a Fast Fourier Transform (FFT) or a Walsh Transform. An example of the resulting spectral information is shown in the **A3** graph.

A steganographic encode block **406** may be used to steganographically encode digital control information **126**, in clear text form and/or after encryption by a conventional digital encryption block **414** based on an encryption key Keys Steganographic information can be combined with a pseudo-random data stream (e.g. exclusive-or'd into the output of a DES engine)—in effect shuffling around the noise in the signal rather than replacing noise with the signal, per se. When protection is desired, the values in the pseudo-random stream can be protected by encryption (e.g. the key that initializes the DES engine should be protected). When the steganographic channel is "public" (e.g., unencrypted), the stream should be readily reproducible (e.g. by using one of a preset collection of values shared by every device). A small portion (a "public header"—see Ginter et al.) is always detectable using a shared preset value (that does not need to be protected, distinguishing it from the private header keys), may be provided to ensure that the rights management technology can be activated properly. Since the rights management component **124** at the receiving side needs to know how to descramble the signal, there normally will be an indication in the "public header" that names a key that will be used to unlock the private header (and so on, as described, for example, in Ginter et al.). Some publicly available, agreed upon preset values may be used to extract the "public header" information from the steganographically encoded channel.

Steganographic encode block **406** may be any conventional steganographic encoding arrangement capable of steganographically encoding a digital signal onto information signal **70**. Steganographic encode step **406** may be based on a key K_c—allowing the same basic steganographic encoding and decoding transformations to be used by a wide variety of different appliances while still maintaining individuality and secrecy through the use of different steganographic keys.

In one example, the steganographic encoding step **406** may introduce the (encrypted) digital control information into the high frequency spectrum portion of the spectrally transformed information signal **70**. The spectrally transformed signal with steganographic encoding is shown in the FIG. **7**A Graph A**4**, and is shown in more detail in FIG. **8**. As FIG. **8** shows, the steganographic encoding may affect the higher order frequency components of the spectrally transformed signal (see dotted perturbations in the fourth, fifth, sixth, seventh and eighth order components in FIG. **8**). The steganographic encoding may add to and/or subtract from the amplitudes of these higher order components. The effect of introducing high frequency steganographically encoded signal components may be to mask the steganographic encoding within the random high frequency noise inherently provided within information signal **70**—thereby providing substantial invisibility and substantial indelibility.

The amount of amplitude modification performed by steganographic encode step **406** may be limited in this example to ensure that the resulting steganographically encoded signal does not exceed the available channel bandwidth. See, for example,

J. Millen, "Covert Channel Capacity," *IEEE Symposium on Security and Privacy* (1987).

R. Browne, "An Entropy Conservation Law for Testing the Completeness of Covert Channel Analysis," *Fairfax* 94, pp 270–281 (1994).

Moskovitz et al., "The Channel Capacity of a Certain Noisy Timing Channel,", *IEEE Trans. on Information Theory* v IT-38 no. 4, pp. 1330–43, (1992).

Venkatraman, et al., "Capacity Estimation and Auditability of Network Covert Channels,", *Oakland* 95, pp. 186–298.

The following equations show the relationship between total bandwidth, bandwidth available for steganographic encoding, and the data rate of the steganographically encoded signal:

$$S = \int_{ta}^{tb} B(t)dt \tag{1}$$

$$\cong \sum_{i=a}^{b} B(i)\Delta t \tag{1 A}$$

where $\Delta t = t_{n+1} - t_n$ and

B is a function of time in bits/second.

In the above expressions, the function S corresponds to an area under a curve resulting from the product of B (bandwidth) and t (time). The parameter delta t refers to the "granularity" of the analog-to-digital conversion (i.e., 1/sampling rate).

FIG. **9** shows an example plot of information signal bandwidth versus time. The total bandwidth available is limited by the bandwidth of the transmission channel—including the bandwidth of the storage medium (if any) used to deliver the signal, and the bandwidth of the reproduction equipment. Since the total bandwidth depends on the inherent characteristics of the transmission channel used to communicate information signal **70**, it is typically a fixed constant. FIG. **9** shows that the bandwidth actually used by the information signal **70** typically varies with time. For example, although somewhat counterintuitive, the more complex an image, the more noise is typically available for "shuffling around" to create a steganographic channel. Of course, this isn't always true—a highly intricate geometric pattern may have very little noise available for encoding, and a simple picture of a cloud may have a great deal of noise available.

Steganographic encode block **406** can use an encoding rate and characteristic that ensures the steganographically encoded signal bandwidth doesn't exceed the total bandwidth available in the communication channel. Typically, the amount of bandwidth available for steganographic encoding may be on the order of on the average of 0.1% of the total transmission channel bandwidth—but as mentioned above, this bandwidth available for steganographic encoding may be unequally distributed with respect to time within the information signal stream **70** and may depend on the content of the information signal.

In this example, steganographic encode block **406** analyzes the content (e.g., by performing statistical weighted averaging), and provides a responsive variable steganographic encoding rate. For example, steganographic encoding block **406** can use a high data rate during example time periods "II" and "IV" in which the information signal **70** has characteristics that allow high steganographic rate encoding without the resulting signal exceeding the available overall channel bandwidth. Encoding block **406** can use a low data rate during time periods "I" and "III" in which the information signal **70** has characteristics that do not allow high data rate steganographic encoding without exceeding available overall channel bandwidth. Steganographic encoding block **406** may use any number of different variable rates to accommodate different relationships between information signal **70** characteristics and available channel bandwidth.

Referring again to FIG. **7**A, the steganographically encoded spectral information outputted by steganographic encode block **406** may be subjected to an inverse spectral transform **408**. Inverse spectral transform **408** in this example may perform the inverse of the transform performed by step **404**—outputting a version of the digitized time domain signal shown in Graph A**2** but now bearing the steganographically encoded information (Graph A**5**). The digital control information steganographically encoded by block **406** may be substantially indelible and substantially invisible with respect to the Graph **A5** signal—that is, it may be very difficult to eliminate the steganographically encoded information and it may also be very difficult to discern it.

This signal may be further scrambled and/or encrypted (e.g., based on a scrambling and/or encryption key Key_d) before being converted to analog form (shown in Graph **A6**) by a conventional digital-to-analog conversion block **412** (if necessary). Signal scrambling may be independent of steganographically encoded control information. For example, a good way to support existing devices is to not scramble the signal, and to use legislative means to ensure that each new device manufactured is equipped with rights management technology. Scrambling/encrypting of content, can be used to enforce use of rights management. If legislative means can enforce the use of rights management technology, encryption or scrambling of content may not be necessary (although a decision to provide cryptographic protection for the control information is independent of this factor and must be evaluated in light of protecting the rights management system). Rights holders can choose an enticement technique(s) based on their business model(s). The benefit of scrambling is that it provides technical means for enforcing rights management. The benefit of unscrambled content is support of hundreds of millions of devices in the installed base—with the promise that new devices (potentially including computers) will enforce the control information even though they don't "have to" from a technical perspective.

The resulting steganographically encoded information signal **70** may then be transmitted over an insecure communications channel. Digital-to-analog conversion step **412** may be omitted if a digital communications channel (e.g., an optical disk, a digital satellite link, etc.) is available to deliver the signal.

FIG. **7**B shows an example inverse process for recovering digital control information **126** from the steganographically encoded information signal **70**. In this recovery example, the steganographically encoded analog signal is converted to a digitized signal (if necessary) by an analog-to-digital conversion step **402**' and decrypted/descrambled (if necessary) by a decryption/descrambling block **422**' to yield a facsimile of the inverse spectral transform block **408** output shown in FIG. **7**A. In this FIG. **7**B example, the analog-to-digital conversion block **402**' is the inverse operation of FIG. **7**A, block **412**, and the decrypt/descramble block **422**' is the inverse of the FIG. **7**A scramble/encrypt block **410**.

The resulting digitized signal provided by FIG. **7**B block **422**' is spectrally transformed by step **404**' (this may be the same spectral transform used in FIG. **7**A, block **404**) to yield a steganographically encoded spectral signal A**3**. Steganographic decode block **424** may perform the inverse operation of the FIG. **7**A steganographic encode block **406** based on the same steganographic key Key_c (if a key-based steganographic encoding/decoding transformation is used). The output of steganographic decode block **424** may be decrypted by block **426** (the inverse of FIG. **7**A encrypt block **414** based on key Key_s) to provide recovered digital control information **126**. The resulting control information **126** may be used for performing electronic rights management functions Required keys may be delivered in containers and/or using the key distribution techniques and device initialization approaches disclosed in Ginter et al., for example.

Example Control Information Arrangements

In a further example shown in FIGS. **10** and **10**A, steganographic encode block **406** may encode control information organizational structures such as secure containers (see Ginter et al., FIGS. **17**–**26**B and associated text) during times when the content bandwidth is low relative to the total available bandwidth (see FIG. **10** regions II and IV), and may not attempt to encode such organizational structures during times when the content bandwidth is high relative to the total available bandwidth (see FIG. **10**, regions I, III). In this way, steganographic encode block **406** may maximize the total bandwidth use without causing the steganographically encoded signal to exceed available bandwidth. As an optimization for certain applications, steganographic encode block **406** may encode "pointers" or other directional information into the information signal **70** during times when the content is such that it doesn't allow high data rate steganographic encoding of organizational structures **136**. Multiple pointers and multiple "pointed to" locations can also help provide redundancy.

This particular FIG. **10** example involving steganographic encoding of pointers **800** may be especially suited for content delivery or presentation on random access storage media such as optical disks. Using such random access media, a content handling device may be able to rapidly "seek" to the place where an organizational structure is stored at a higher recorded bandwidth and then read the organizational structure at this higher bandwidth (See FIG. **10**A). For these example arrangements, steganographic encode block **406** in this example encodes, during periods when the content is such that it is not possible to steganographically encode organizational structures, pointers **800** that direct the content handling device to one or more places where the organizational structure appears in the content stream. In one example, pointers **800** might encode the location(s) on a storage medium (e.g., an optical disk **104**—see FIG. **10**A) at which the closest organizational structure is stored.

An optical disk player **102** with random access capability may "seek" to the place at which the closest organizational structure **136** is stored on the disk **104**, and rapidly read the organizational structure off of the disk in less time than might be required to read an organizational structure that steganographic encode block **406** encodes at a lower data rate during times when the content bandwidth occupies most of the available channel bandwidth. In such arrangements, the process of reading a pointer **800**, "seeking" to a position on the medium specified by the pointer, and then reading an organization structure **136** steganographically encoded at a high data rate may provide overall faster access times than if the organizational structure was itself encoded at a lower data rate within the parts of the information signal stream used in this example to encode only pointers.

FIG. **11** shows an example organizational structure **136** suitable for steganographic encoding similar to that shown in FIG. **17** of the co-pending Ginter et al. application. In the case of container **136** with controls for an analog property, the organizational structure may include one or more permissions records **136***d* providing control sets **136***e* providing electronic controls especially for an analog device(s). The permissions record **136***d* may also provide a reference **136***f* at least one location or other external source for additional controls. This reference may be to an Internet "Uniform Resource Locator" (URL), for example. The organizational structure **136** may optionally include a content block **136***g* providing digital content subject to the controls. In this example, organizational structure **136** is encased in a protective "wrapper" **136***x* provided by the steganographic technique used to encode the organizational structure **136**, digital encryption techniques, and/or a combination of the steganography and encryption. This protective wrapper **136***x* is used to ensure that the organizational structure **136** cannot be tampered with and maintains its integrity. Wrapper **136***x* may also provide a degree of confidentiality if required.

Detailed Example Electronic Appliance Architecture

FIG. **12** shows an example detailed internal architecture for an example electronic appliance **100** such as optical disk player **102**. In this specific example, rights management component **124** may be a tamper-resistant integrated circuit including internal microprocessor **200**, flash memory **202** and cryptographic engine **204** (see Ginter et al. FIGS. **9**–**15**B and associated text for a more detailed internal view of an example tamper-resistant rights management component **124** and a "protected processing environment" **138** it provides).

A main system bus **206** may couple rights management component **124** to a main system microprocessor **208** and various system components such as, for example, a CD-ROM decoder **210**, a control and audio block **212**, a video decoder **214**, a digital output protection block **216**, and a communications system **218**. In this example, main microprocessor **208** controls the overall operations of appliance **100**, with rights management component **124** performing security-related functions such as rights management and steganographic decoding.

In the FIG. **12** example appliance **102**, an optical pickup **220** reads information from optical disk **104** and provides it to RF amplifier **222**. RF amplifier **222** provides its output to digital signal processor (DSP) **224**, which processes the output in a conventional manner and also controls the orientation of the optical disk **104** relative to optical pickup **220** via a driver **226**. DSP **224** coordinates with a conventional CD-ROM decoder **210** to provide decoded digitized video and audio information. Decoder **210** operates in conjunction with a buffer memory **228**, and may also cooperate with cryptographic engine **204** to ensure that any encrypted video information is decrypted appropriately.

The video output of CD-ROM decoder **210** may be decompressed by MPEG-2 video decoder **214** and applied via an NTSC and/or PAL encoder **230** to television **106**. (In another example, the output could be in a non-interlaced format such as RGB rather than in interlaced formats such as NTSC and PAL.) Meanwhile, control and audio block **212** (which may operate in conjunction with its own buffer memory **232**) may receive digitized audio information recorded on optical disk **204** via DSP **224** and CD-ROM decoder **210**. Control and audio block **212** may provide this audio output to audio processing block **234** for output to loudspeakers **116**. Control and audio block **212** may also provide an interface to the user via an infrared sensor **236** (for a remote control, for example), front-panel user controls **238** and/or an LED display **240**.

In this example, security microprocessor **200** within rights management component **124** receives the digitized video and/or audio that DSP **224** reads from optical disk **104** via pickup **220** and RF amp **222**. Security microprocessor **200** steganographically decodes this digitized analog information signal to recover the digital control information **126** encoded onto the information signal. Security microprocessor **200** also performs rights management functions based on the digital control information **126** it recovers. In addition, if desired security microprocessor may remove the steganographic encoding from a received digitized analog signal (since it shares a secret such as the steganographic encoding key Key$_c$ with the steganographic encoding point, it can remove the steganographic encoding) and/or steganographically encode a signal with received, augmented and/or new rights management control information.

In this example, microprocessor **200** may selectively control cryptography engine **204** to decrypt encrypted content provided by optical disk **104**—thus enforcing the rights management activities provided in accordance with electronic controls **126**. Security component **124** may also control digital output protection block **216** in accordance with rights management control information **126**—thus, selectively permitting digital appliance **100** to output content in digital form. Rights management component **124** may take other steps (e.g., watermarking and/or fingerprinting information before releasing it) to provide a degree of copy protection and/or quality degradation to prevent or discourage someone from creating an unlimited number of high quality copies of the content of optical disk **104**. Rules contained in the control information can also govern how other parts of the system behave. For example, the control information could specify that no sound can be played unless the content is paid for. Another property may specify that certain copy protection schemes should be turned on in the NTSC encoder. Still another might disable the digital outputs of the device altogether, or unless an additional fee is paid.

Rights management component **124** (protected processing environment **138**) may, in this particular example, communicate over a network **144** (such as, for example, the Internet or other data communications path) with other rights management related entities, such as, for example, clearinghouses and repositories. This "back channel" allows rights management component **124** to, for example, report usage and payment information and/or to retrieve additional rights management control information **126** to augment or supplement the control information it steganographically decodes.

Example Control Steps

FIG. **13** shows example control steps that may be performed by protected processing environment **138** (e.g., security microprocessor **200**) to provide electronic digital rights protection. The FIG. **13** read/play routine **300** begins with protected processing environment **138** applying rules **126**—in effect, setting the initial state in which rights management can occur (FIG. **13**, block **302**). Protected processing environment **138** then reads the output of CD-ROM decoder **310** (FIG. **13**, block **304**) and obtains steganographically encoded data from the output stream (FIG. **13**, block **306**). If protected processing environment **138** encounters the beginning of the control information organizational structure ("yes" exit to decision block **308**), the protected processing environment performs an initialization step (FIG. **13**, block **310**) to begin receiving new control information **126** and then returns to block **302** to again apply current control information (FIG. **13**, block **302**). If, on the other hand, protected processing environment **138** encounters a continuation of an organizational structure ("yes" exit to decision block **312**, FIG. **13**), the protected processing environment stores the organizational structure information it has received (FIG. **13**, block **314**) and turns again to the apply rules step (FIG. **13**, block **302**).

If protected processing environment **138** encounters a pointer ("yes" exit to decision block **318**), then the protected processing environment determines whether it already has received the corresponding organizational structure pointed to by the received pointer (FIG. **13**, decision block **320**). The protected processing environment **138** retrieves the organizational structure if it does not already have it (FIG. **13**, block **322**)—for example, by controlling DSP **224** to seek to the corresponding location on optical disk **104** indicated by the pointer, and by reading the organizational structure from the disk beginning at that disk location (FIG. **13**, block **322**).

If protected processing environment **138** has received no organizational structures or pointers ("no" exits to each of decision blocks **308**, **312**, **318**), then the protected processing environment may determine whether there is any bandwidth available to carry control information. For example, some types of content stored on optical disk **104** may take up substantially all available channel bandwidths so that no bandwidth remains for steganographic encoding. If there is no available bandwidth for steganographic encoding ("no" exit to decision block **324**), then the protected processing environment **138** may return to the "apply rules" block **302** and repeat steps **304**–**324** to wait until bandwidth is available for steganographic encoding. On the other hand, if there is bandwidth available and still no steganographically encoded information has appeared ("yes" exit to decision block **324**, FIG. **13**), protected processing environment **138** performs an error handling routine that processes the exception (FIG. **13**, block **326**) and determines whether the exception is critical (decision block **328**). In some cases, protected processing environment **138** will continue to allow the appliance **100** to process the content, finding the error to be non-critical ("no" exit to decision block **328**). An example of this would be a timer that permits playing for a period of time. In other cases (e.g., if the error conditions indicate that optical disk **104** has been tampered with), protected processing environment **138** may halt processing and return an error condition ("yes" exit to decision block **328**, bubble **329**).

FIG. **13**A shows example steps that may be performed by the FIG. **13** "apply rules" routine **302**. In this example, protected processing environment **138** may determine if it has received a complete organizational structure on which to base rights management for the rights being read from optical disk **104** (FIG. **13**A, decision block **330**). If the protected processing environment **138** has not received a complete organizational structure ("no" exit to decision block **330**), it may disable content processing until it receives a complete organizational structure (FIG. **13**A, block **332**). If protected processing environment **138** has a complete organizational structure ("yes" exit to decision block **330**), it determines whether it has the current organizational structure (decision block **334**). If the current organizational structure is present ("yes" exit to decision block **334**), the protected processing environment **138** then processes the current operation with respect to the control information embodied in the organizational structure (FIG. **13**A, block **336**). If the protected processing environment **138** does not have the current organizational structure ("no" exit to decision block **334**), it determines whether it has an organizational structure that has the same identification as the current organizational structure (FIG. **13**A, decision block **338**). The protected processing environment **138** may use that matching organizational structure as a default ("yes" exit to decision block **338**, block **340**). Otherwise, protected processing environment **138** disables content operations until it receives a current organizational structure ("no" exit to decision block **338**, block **342**).

As mentioned above, protected processing environment **138** may also perform any or all of the FIG. **7**A steganographic encoding steps, and may also or alternatively remove the steganographic encoding from a signal by using a shared secret to generate a steganographic encoding stream and then subtracting that stream from the signal. Such techniques may be useful, for example, to allow protected processing environment **138** to encode new control information or to change the encoded control information. For example, the steganographically encoded control information might provide a chain of handling and control that authorizes certain protected processing environments to change some elements and add new elements to the control information **126**. Protected processing environment **138** could:

steganographically decode the signal using shared secrets to obtain the control information;

modify the control information to the extent authorized by the control information;

remove the steganographic encoding from the signal based on the shared secret; and

steganographically encode the signal with the modified control information.

Example Refresh Capability

FIG. **14** shows another example electronic appliance arrangement including a "refresh" capability involving both steganographic decoding and steganographic encoding. In this example, electronic appliance **100** includes a steganographic decoding block **424** as described above plus an additional steganographic encoding block **406**. The appliance **100** may obtain the digital control information from the content signal, and then may "refresh" the extracted information (e.g., using coding techniques, such as, for example, Reed-Solomon decoding based on Reed-Solomon codes applied to the signal by the steganographic encoding process) to correct errors and otherwise accurately recover the digital control information. The error-corrected digital control information outputted by refresh decoder **900** may be applied to a steganographic encoding circuit **406** which steganographically encodes the content signal with the refreshed control information.

The FIG. **14** refresh operation could, for example, be performed on a selective basis based on the encoded digital control information itself. For example, the control information might authorize appliance **100** to redistribute the content signal only under certain conditions—one of which is to ensure that a refreshed steganographic encoding of the same (or modified) digital control information is provided within the redistributed content signal.

EXAMPLES

FIG. **15**A shows an example analog signal distribution arrangement **500** provided in accordance with this invention. Within arrangement **500**, a steganographic encode block **400** encodes an analog information signal A with rights management control information **126** and associated organizational structure(s) **136**. The steganographically encoded information signal A' is distributed by various mechanisms to user electronic appliances **100**. For example, the encoded signal A' may be broadcast wirelessly over the air by a broadcaster **60**A, distributed over a cable television network by a cable television head end **502**, and/or distributed via a satellite communications network **504**. Encoded signal A' may, during the process of being distributed, be converted from analog to digital form and back again. For example, the satellite uplink **504**A may digitize signal A' before transmitting it to the satellite **504***b*, and the satellite downlink **504***c* may convert the signal back to analog before providing it to user appliances **100**. As explained above, the steganographically encoded control information **126** persists within the signal A' despite conversions between analog and digital formats.

In this example, an example set top box user appliance **108** may receive the distributed steganographically encoded analog signal A'. Set top box **108** may include a rights management component **124** as described above, and may perform rights management operations and/or processes in response to and based on steganographically encoded control information **126**.

Set top box **108** in this example may output the steganographically encoded analog signal (or a facsimile of it) to additional user electronic appliances such as, for example, a television set **106**, a digital optical recording device (e.g., DVD-R) **102**, and/or a video tape recorder **118**. Each of these additional appliances **106**, **102**, **118** may include a rights management component **124** that performs electronic rights management based on the steganographically encoded control information **126**. Any recordings made by recording devices **102**, **118** may also be steganographically encoded.

FIG. **15**B shows another example analog signal distribution arrangement **510**. In this example, a radio broadcaster **60**B broadcasts an analog radio signal A' that is steganographically encoded with associated rights management control information **126** and associated organizational structure(s) **136**. A wire network **512** such as a cable television system may similarly distribute the same or different steganographically encoded analog radio signal A'. Broadcaster **60**B and/or network **512** may deliver the steganographically encoded radio signal A' to a user receiving appliance **100**C such as a FM radio receiver **114**. In this example, radio receiver **114** has a rights management component **124** that processes and automatically manages rights based on steganographically encoded controls **126**. In this example, radio receiver **114** may (if permitted by controls **126**) output steganographically encoded analog signal A' to additional appliances such as, for example, a digital recorder **102** and/or an analog recorder **514**. In this example, each of appliances **100**A, **100**B has a rights management component **124** that electronically manages rights based on the steganographically encoded controls **126**. Because the steganographically encoded controls **126** persist, recording devices **102**, **514** record the steganographically encoded controls **126** in any recordings they make of signal A'. In one non-limiting example, when rights control information is encoded in steganographic sound recordings that are broadcast via radio or some other method, an airplay audit service can sample stations in a given market and identify particular properties being broadcast from "object identifier" information contained in the steganographically encoded VDE container.

FIG. **15**C shows an example signal distribution arrangement **520** in which the steganographically encoded analog signal A' is initially distributed in the same manner as shown in FIG. **15**A, and is then converted by an electronic appliance **100**G such as a personal computer, for example, into a digital signal D. In this example, appliance **100**G includes a rights management component **124** that manages rights based on steganographically encoded controls **126**. Appliance **100**G may convert received analog signal A' into digital form for distribution to and processing by digital appliances such as a digital high definition television **106**B, a digital optical disk recorder **102**, and/or a digital tape recorder **118***a*. In one example, the steganographically encoded control information **126** persists within the digitized signal D. In another example, appliance **100**G removes the steganographic encoding from received analog signal A' and outputs a digital signal D that is "clean" and free of steganographic encoding—but is otherwise protected so that it remains persistently associated with the now-digital control information **126** (which appliance **100**G may distribute, for example, within secure electronic containers **136** and digital, encrypted form. In one specific example, appliance **100**G may package the received, digitized content from analog signal A' within the same digital electronic container **136** that also contains associated control information that appliance **100**G steganographically decodes from analog signal A'. In another specific example, appliance **100**G may distribute controls **126** independently of the digital signal D—but under circumstances in which the rights management components **124** within each of digital appliances **106**B, **102** and **118**A all securely associate the control information with the now-digital content.

FIG. **15**D shows a similar distribution arrangement **530** for analog radio or other audio signals. In this example, appliance **100**G may include a digital radio receiver that receives analog radio signal A' and converts it into a digital information signal for distribution to digital recorders **102**, **514**A. As discussed above, appliance **100**G may distribute the digitized analog signal A' with steganographic encoding to appliances **102**, **514**A—each of which includes a rights management component **124** that may recover the steganographically-encoded control information **126** and perform rights management functions based thereon. In another particular example, appliance **100**G may remove the steganographic encoding from the content before distributing it in digital form—and user other techniques (such as those described in the above-referenced Ginter et al. patent specification) to provide a secure association between the now-digital content and the digital control information **126**.

FIG. **15**E shows yet another example distribution arrangement **540** in which digital appliances **102**, **100**G distribute information in digital form to a digital television **106**B. For example, appliance **102** may provide digital video signals D to digital television **106**B by playing them back form DVD **104**. DVD player **102** may provide controls **126** within electronic digital containers **136** to digital television **106**B. Digital television **106**B may include a rights management component **124**C that manages rights in the digital content based on digitally-provided control information **126**. Similarly, computer **100**G may receive digital content and associated control information **126** from a digital network **144**, and provide digital video signals D and associated controls **126** to digital television **106**B.

In this example, digital television **106**B includes an analog output that may provide analog television signals to additional devices, such as, for example, an analog video cassette recorder **118**. In this example, the rights management component **124**C within digital television **106**B may steganographically encode the analog television signal A with controls **126** and associated organizational structure(s) **136** before releasing the analog signal to the outside world.

FIG. **15**F shows a further example arrangement **550** in which a digital appliance **100**G such as a personal computer receives digital video signal D and converts it into various analog television signal formats (e.g., NTSC/PAL and/or RGB) for output to analog devices such as an analog VCR **118**, an analog set top box **108** and/or an analog television set **106**A. In this example, a rights management component **124**G within digital appliance **100**G steganographically encodes the received digital controls **126** onto the analog signal A', A" before releasing the analog signal to the additional appliances **118**, **106**A, **108**.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

1. A rights management method comprising:

(a) receiving an information signal;

(b) steganographically decoding the received information signal to recover digital rights management control information packaged within at least one secure digital container; and

(c) performing at least one rights management operation based at least in part on the recovered digital rights management control information.

2. A method as in claim **1** wherein the decoding step (b) includes the step of steganographically decoding information representing at least one permissions record.

3. A method as in claim **1** further including the step of decrypting contents of the digital container for use in performing step (c).

4. A method as in claim **1** wherein the information signal carries further information in addition to the steganographically encoded information, and the performing step (b) comprises the step of managing at least one right in respect of the further information.

5. A method as in claim **1** wherein the decoding step (b) includes the step of analyzing the information signal using a spectral transform.

6. A method as in claim **1** wherein the decoding step (b) includes the step of analyzing the information signal using a key-based steganographic decoder.

7. A method as in claim **1** wherein the decoding step (b) includes the step of steganographically decoding a pointer that points to another portion of the information signal.

8. A method as in claim **1** wherein the steganographically encoded container includes at least one organization structure, and the decoding step (b) comprises steganographically decoding the organizational structure.

9. An electronic appliance comprising:

decoding means for steganographically decoding a signal to provide control information packaged within at least one secure digital container; and

rights management means coupled to the decoding means for performing at least one rights management operation based at least in part on the control information.

10. An appliance as in claim **9** wherein the rights management means includes means for means for selectively blocking the signal.

11. An appliance as in claim **9** wherein the rights management means includes means for selectively descrambling the signal.

12. An appliance as in claim **9** wherein the rights management means includes means for authenticating a further appliance before delivering the signal to said further appliance.

13. An appliance as in claim **9** wherein the rights management means includes means for requiring that a further appliance present an appropriate digital certificate before delivering the signal to said further appliance.

14. An appliance as in claim **9** wherein the right management means includes means for fingerprinting the signal based at least in part on the control information.

15. An appliance as in claim **9** wherein the right management means includes means for further steganographically encoding the signal based at least in part on the control information.

16. An electronic appliance comprising:

a steganographic decoder that steganographically decode a signal to provide control information packaged within at least one secure digital container; and

rights management component coupled to the decoder, the rights management component performing at least one rights management operation based at least in part on the control information.

17. An appliance as in claim **16** wherein the rights management component includes or controls a signal blocking circuit that selectively blocks the signal.

18. An appliance as in claim **16** wherein the rights management component includes or controls a signal descrambler.

19. An appliance as in claim **16** wherein the rights management component includes an authenticating circuit for authenticating a further appliance before delivering the signal to said further appliance.

20. An appliance as in claim **16** wherein the rights management component includes a circuit for requiring that a further appliance present an appropriate digital certificate before delivering the signal to said further appliance.

21. An appliance as in claim **16** wherein the rights management component includes a circuit for fingerprinting the signal based at least in part on the control information.

22. An appliance as in claim **16** wherein the rights management component includes a circuit for further steganographically encoding the signal based at least in part on the control information.

23. A rights management method comprising:

(a) receiving a signal comprising

governed information and

a first rule steganographically incorporated into said signal;

(b) steganographically decoding said signal to recover said first rule; and

(c) at a first apparatus, performing at least one operation on said governed information, said operation governed, at least in part, by said first rule,

said at least one operation comprising at least:

identifying at least one attribute of a user or viewer of said governed information, and

allowing said user or viewer to gain access to said information based on said identification.

24. A method as in claim **23**, in which:

said at least one attribute comprises the identity of said user or viewer.

25. A method as in claim **23**, in which:

said at least one attribute comprises the age of said user or viewer.

26. A method as in claim **23**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said rule.

27. A method as in claim **23**, further comprising:

(d) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(e) releasing said watermarked or fingerprinted governed information to a second apparatus.

28. A method as in claim **27**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

29. A method as in claim **27**, further comprising:

prior to said releasing step (e), said first apparatus receiving a certificate from said second apparatus.

30. A method as in claim **29**, in which:

said certificate specifies at least one attribute of said second apparatus.

31. A method as in claim **30**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

32. A method as in claim **31**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

33. A method as in claim **23**, in which:

said governed information is received in an encrypted or scrambled form; and

said gaining access at least in part comprises decrypting or unscrambling said information.

34. A method as in claim **23**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

35. A method as in claim **23**, further comprising:

following said step (b), creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

36. A method as in claim **23**, further comprising:

(d) under control of said first rule, making a copy of at least a portion of said governed information; and

(e) transferring said copy to a second apparatus, said transferred copy not including said first rule.

37. A method as in claim **23**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

38. A method as in claim **37**, further comprising:

transmitting said generated signal from said first apparatus to a second apparatus.

39. A rights management method comprising:

(a) at a first apparatus, receiving a signal comprising governed information and

at first rule steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule; and

(c) at said first apparatus, performing at least one operation on at least a portion of said governed information, said operation governed, at least in part, by said first rule,

said at least one operation comprising at least:

determining whether said governed information has been accessed or used more than a specified number of times, and

allowing access or use of said governed information if said number of accesses or uses is less than or equal to said specified number, or

blocking access or use if said number of accesses or uses is greater than said specified number.

40. A method as in claim **39**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said first rule.

41. A method as in claim **39**, further comprising:

(d) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(e) releasing said watermarked or fingerprinted governed information to a second apparatus.

42. A method as in claim **41**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

43. A method as in claim **39**, further comprising:

(d) at said first apparatus, receiving a certificate from said second apparatus; and

(e) releasing at least a portion of said governed information to a second apparatus.

44. A method as in claim **43**, in which:

said certificate specifies at least one attribute of said second apparatus.

45. A method as in claim **44**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

46. A method as in claim **45**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

47. A method as in claim **39**, further comprising:

following said step (b), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

48. A method as in claim **39**, further comprising:

(d) under control of said first rule, making a copy of at least a portion of said governed information; and

(e) transferring said copy to a second apparatus, said transferred copy not including said first rule.

49. A method as in claim **39**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

50. A method as in claim **49**, further comprising:

transmitting said generated signal from said first apparatus to a second apparatus.

51. A rights management method, comprising:

(a) at a first apparatus, receiving a signal comprising governed information and

a first rule steganographically incorporated into said signal,

said first rule specifying a time;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule;

(c) at said first apparatus, attempting to access said governed information;

(d) at said first apparatus, checking to determine if said time has been reached or exceeded; and

(e) at said first apparatus, allowing said access to complete if said time has not been reached or exceeded, but blocking said access if said time has not been reached.

52. A method as in claim **51**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said first rule.

53. A method as in claim **51**, further comprising:

(f) at said first apparatus, applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(g) releasing said watermarked or fingerprinted governed information to a second apparatus.

54. A method as in claim **53**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

55. A method as in claim **53**, further comprising:

prior to said releasing step (g), said first apparatus receiving a certificate from said second apparatus.

56. A method as in claim **55**, in which:

said certificate specifies at least one attribute of said second apparatus.

57. A method as in claim **56**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

58. A method as in claim **57**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

59. A method as in claim **51**, in which:

said governed information is received in an encrypted or scrambled form; and

said completion of said access at least in part comprises decrypting or unscrambling said governed information.

60. A method as in claim **51**, in which:

said steps (b)–(e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

61. A method as in claim **51**, further comprising:

following said step (b), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

62. A method as in claim **51**, further comprising:

(f) under control of said first rule, making a copy of at least a portion of said governed information; and

(g) transferring said copy to a second apparatus, said transferred copy not including said first rule.

63. A method as in claim **51**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising said first governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

64. A method as in claim **63**, further comprising:

transmitting said generated signal from said first apparatus to a second apparatus.

65. A rights management method operating at least in part on a first apparatus, said first apparatus including a communications port and means for accessing information on a removable memory device, said method comprising:

(a) at said first apparatus, receiving a removable memory device containing a signal, said signal comprising governed information and

a first rule steganographically incorporated into said signal,

(b) at said first apparatus, steganographically decoding said signal to recover said first rule;

(c) at said first apparatus, using said communications port to initiate communication with a second apparatus remote from said first apparatus;

(d) at said first apparatus, receiving at least a second rule from said second apparatus;

(e) at said first apparatus, using said first rule or said second rule to govern at least one aspect of access to or use of said governed information.

66. A method as in claim **65**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said first rule.

67. A method as in claim **66**, in which:

said second rule is received in an encrypted form, and

said method further comprises:

decrypting said second rule prior to using said second rule.

68. A method as in claim **65**, further comprising:

(f) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(g) releasing said watermarked or fingerprinted governed information to a second apparatus.

69. A method as in claim **68**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

70. A method as in claim **65**, further comprising:

(f) at said first apparatus, receiving a certificate from said third apparatus; and

(g) releasing at least a portion of said governed information to said third apparatus.

71. A method as in claim **70**, in which:

said certificate specifies at least one attribute of said third apparatus.

72. A method as in claim **71**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said third apparatus.

73. A method as in claim **72**, in which:

said determination is based on whether said digital certificate indicates that said third apparatus includes specified rights management functionality.

74. A method as in claim **65**, in which:

said governed information is received in an encrypted or scrambled form; and

said at least one aspect of access to or use of said governed information at least in part comprises decrypting or unscrambling said governed information.

75. A method as in claim **65**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

76. A method as in claim **65**, further comprising:

following said step (b), creating a signal comprising at least a portion of said governed information and

said second rule, steganographically encoded.

77. A method as in claim **65**, further comprising:

(f) under control of said first rule or said second rule, making a copy of at least a portion of said governed information; and

(g) transferring said copy to a remote apparatus, said transferred copy not including said first rule or said second rule.

78. A method as in claim **65**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

79. A method as in claim **78**, further comprising:

transmitting said generated signal from said first apparatus to said second apparatus.

80. A rights management method operating at least in part on a first apparatus, said first apparatus including a communications port and means for accessing information on a removable memory device, said method comprising:

(a) at said first apparatus, receiving a removable memory device containing a signal, said signal comprising

governed information and

a first rule steganographically incorporated into said signal, said first rule requiring that payment be made at a remote site in return for use of or access to at least a portion of said governed information;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule;

(c) at said first apparatus, initiating at least one access to or use of at least a portion of said governed information;

(d) at said first apparatus, initiating communication, through said communications port, with a second apparatus remote from said first apparatus;

(e) providing information from said first apparatus to said second apparatus, said information comprising or enabling payment for said at least one access or use.

81. A method as in claim **80**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said rule.

82. A method as in claim **80**, further comprising:

(f) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(g) releasing said watermarked or fingerprinted governed information to a second apparatus.

83. A method as in claim **82**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

84. A method as in claim **80**, further comprising:

(f) at said first apparatus, receiving a certificate from said second apparatus; and

(g) releasing at least a portion of said governed information to a second apparatus.

85. A method as in claim **84**, in which:

said certificate specifies at least one attribute of said second apparatus.

86. A method as in claim **85**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

87. A method as in claim **86**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

88. A method as in claim **80**, in which:

said governed information is received in an encrypted or scrambled form; said method further comprising:

following said providing step (e), decrypting or unscrambling at least a portion of said governed information.

89. A method as in claim **80**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

90. A method as in claim **80**, further comprising:

following said step (e), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

91. A method as in claim **80**, further comprising:

(f) at said first apparatus, under control of said first rule, making a copy of at least a portion of said governed information; and

(g) transferring said copy to a third apparatus, said transferred copy not including said first rule.

92. A method as in claim **80**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

93. A method as in claim **92**, further comprising:

transmitting said generated signal from said first apparatus to a third apparatus.

94. A rights management method comprising:

(a) at a first apparatus, receiving a signal comprising governed information and

a first rule steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule; and

(c) at said first apparatus, performing at least one operation on said governed information, said operation governed, at least in part, by said first rule,

said at least one operation comprising at least:

requiring a payment prior to releasing said information for access by a user or viewer;

(d) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(e) releasing said watermarked or fingerprinted governed information to a second apparatus.

95. A method as in claim **94**, in which:

said rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said rule.

96. A method as in claim **94**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

97. A method as in claim **94**, further comprising:

prior to said releasing step (e):

at said first apparatus, receiving a certificate from said second apparatus; and

releasing at least a portion of said governed information to a second apparatus.

98. A method as in claim **97**, in which:

said certificate specifies at least one attribute of said second apparatus.

99. A method as in claim **98**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

100. A method as in claim **99**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

101. A method as in claim **94**, in which:

said governed information is received in an encrypted or scrambled form; and

said releasing said governed information at least in part comprises decrypting or unscrambling said governed information.

102. A method as in claim **94**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

103. A method as in claim **94**, further comprising:

said step (d) further comprising steganographically encoding a second rule into said governed information, said second rule differing in at least one aspect from said first rule.

104. A method as in claim **94**, in which:

said watermarked or fingerprinted governed information released in said step (e) does not include said first rule steganographically encoded in said information.

105. A method as in claim **94**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

106. A method as in claim **105**, in which:

said applying step (d) further comprises applying said watermark or fingerprint to said corrected signal; and

said information released in said releasing step (e) said corrected signal.

107. A rights management method comprising:

(a) at a first apparatus, receiving a signal comprising governed information and

an organizational structure incorporated into said signal,

said organizational structure including a first rule governing at least one aspect of access to or use of said governed information;

said organizational structure comprising a secure container containing said first rule;

(b) at said first apparatus, steganographically decoding said signal to recover said organizational structure;

(c) at said first apparatus, accessing said first rule; and

(d) at said first apparatus, using said first rule to govern at least one aspect of access to or use of said governed information.

108. A method as in claim **107**, in which:

said secure container further contains identification information identifying said governed information.

109. A method as in claim **107**, in which:

said receiving step (a) further comprises receiving said secure container in an encrypted form; and

said method further comprises decrypting said secure container.

110. A method as in claim **109**, in which:

said secure container further contains a permissions record.

111. A method as in claim **110**, in which:

said permissions record contains or references said first rule.

112. A method as in claim **109**, in which:

said first rule controls, at least in part, use of an analog file on a device designed to render, display or play said analog file.

113. A method as in claim **108**, in which:

said governed information is contained within said secure container.

114. A method as in claim **107**, in which:

said organizational structure is received in an encrypted form,

said decoding step (b) further comprising decrypting said organizational structure.

115. A method as in claim **107**, further comprising:

(e) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(f) releasing said watermarked or fingerprinted governed information to a second apparatus.

116. A method as in claim **115**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

117. A method as in claim **107**, further comprising:

(e) at said first apparatus, receiving a certificate from a second apparatus,

(f) releasing said governed information to a second apparatus, said releasing step being based, at least in part, on information contained in said certificate.

118. A method as in claim **117**, in which:

said certificate specifies at least one attribute of said second apparatus.

119. A method as in claim **118**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

120. A method as in claim **119**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

121. A method as in claim **107**, in which:

said governed information is received in an encrypted or scrambled form; and

said at least one aspect of access to or use of said governed information at least in part comprises decrypting or unscrambling said governed information.

122. A method as in claim **107**, in which:

said steps (b) through (d) are securely performed, said secure performance occurring at least in part on a secure processing unit.

123. A method as in claim **107**, further comprising:

following said step (b), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

124. A method as in claim **107**, further comprising:

(e) under control of said first rule, making a copy of at least a portion of said governed information; and

(f) transferring said copy to a second apparatus, said transferred copy not including said first rule.

125. A method as in claim **107**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

126. A method as in claim **125**, further comprising:

transmitting said corrected signal from said first apparatus to a second apparatus.

127. A rights management method, comprising:

(a) at a first apparatus, receiving a signal comprising

governed information and

at least a first and a second rule steganographically incorporated into said signal,

(b) at said first apparatus, determining whether to use said first rule or said second rule to govern at least one operation on said governed information;

said determination based, at least in part, on information regarding the nature or identification of said first apparatus; and

(c) at said first apparatus, using said first rule or said second rule to govern said at least one operation.

128. A method as in claim **127**, in which:

said first and second rules are received in an encrypted form; and

said decoding step (b) further comprises decrypting said rules.

129. A method as in claim **127**, further comprising:

(d) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(e) releasing said watermarked or fingerprinted governed information to a second apparatus.

130. A method as in claim **129**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

131. A method as in claim **127**, further comprising:

(d) at said first apparatus, receiving a certificate from said second apparatus; and

(e) releasing at least a portion of said governed information to a second apparatus.

132. A method as in claim **131**, in which:

said certificate specifies at least one attribute of said second apparatus.

133. A method as in claim **132**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

134. A method as in claim **133**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

135. A method as in claim **127**, in which:

said governed information is received in an encrypted or scrambled form; and

said at least one operation at least in part comprises decrypting or unscrambling said governed information.

136. A method as in claim **127**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

137. A method as in claim **127**, further comprising:

following said step (c), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded third rule, said second rule differing in at least one aspect from said first rule and from said second rule.

138. A method as in claim **127**, further comprising:

(d) under control of said first rule, making a copy of at least a portion of said governed information; and

(e) transferring said copy to a second apparatus, said transferred copy not including said first rule or said second rule.

139. A method as in claim **127**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule and said second rule contain errors;

at said first apparatus, using said error correction information to correct errors in said first rule and/or said second rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule and/or said corrected second rule, said signal not including said erroneous version of said first and/or second rule.

140. A method as in claim **139**, further comprising:

transmitting said corrected signal from said first apparatus to a second apparatus.

141. A rights management method operating at least in part on a first apparatus, said first apparatus including a communications port, means for accessing information on a removable memory device, and steganographic encoding circuitry said method comprising:

(a) at said first apparatus, receiving a removable memory device containing a signal, said signal comprising

governed information and

a first rule steganographically incorporated into said signal, said first rule requiring that payment be made at a remote site in return for use of or access to at least a portion of said governed information;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule;

(c) at said first apparatus, initiating at least one access to or use of at least a portion of said governed information;

(d) at said first apparatus, making an analog copy of at least a portion of said governed information; and

(e) at said first apparatus, steganographically incorporating at least one rule into said analog copy, said rule governing at least one aspect of access to or use of said analog copy.

142. A method as in claim **141**, in which:

said rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said rule.

143. A method as in claim **141**, further comprising:

(f) applying a watermark or fingerprint to at least a portion of said analog copy, said application occurring at least in part under the control of at least one rule; and

(g) releasing said watermarked or fingerprinted governed information to a second apparatus.

144. A method as in claim **143**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

145. A method as in claim **141**, further comprising:

(f) at said first apparatus, receiving a certificate from said second apparatus; and

(g) releasing at least a portion of said governed information to a second apparatus.

146. A method as in claim **145**, in which:

said certificate specifies at least one attribute of said second apparatus.

147. A method as in claim **146**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

148. A method as in claim **147**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

149. A method as in claim **141**, in which:

said governed information is received in an encrypted or scrambled form; and

said at access to or use of said governed information specified in said step (c) at least in part comprises decrypting or unscrambling said governed information.

150. A method as in claim **141**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

151. A method as in claim **141**, in which:

said rule steganographically incorporated in said step (e) comprises a second rule, said second rule differing in at least one aspect from said first rule.

152. A method as in claim **141**, further comprising:

(f) transferring said analog copy to a second apparatus, said transferred copy not including said first rule.

153. A method as in claim **141**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

said rule steganographically incorporated in said step (e) comprising said corrected first rule.

154. A method as in claim **153**, further comprising:

(f) transmitting said analog copy from said first apparatus to a second apparatus.

155. A steganographic encoding method comprising:

(a) receiving information;

(b) transforming said information into a signal;

(c) selecting a first and a second location in said signal for the incorporation of steganographically encoded information, said selection being governed at least in part by an analysis of the bandwidth available at such location for such encoding;

(d) steganographically encoding a first rule in said first location, said first rule at least in part governing at least one aspect of use of at least a portion of said information;

(e) steganographically encoding a second rule in said second location, said second rule at least in part governing at least one aspect of use of at least a portion of said information.

156. A method as in claim **155**, further comprising:

prior to said steganographically encoding step (d), encrypting said first rule; and

prior to said steganographically encoding step (e), encrypting said second rule.

157. A method as in claim **155**, further comprising:

prior to said steganographically encoding step (d), incorporating said first rule into a secure container.

158. A method as in claim **155**, in which:

said first rule at least in part governs at least one aspect of use of a first portion of said information; and

said second rule at least in part governs at least one aspect of use of a second portion of said information, said second portion being different from said first portion.

159. A method as in claim **155**, in which:

said transforming step (b) further comprises encrypting or scrambling said information; and

said at least one aspect of access to or use of said information governed by said first rule at least in part comprises decrypting or unscrambling said governed information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

160. A rights management method operating at least in part on a first apparatus, said method comprising:

(a) receiving a signal comprising

governed information and

an organizational structure incorporated into said signal,

said organizational structure including a pointer to a first rule governing at least one aspect of access to or use of said governed information;

(b) steganographically decoding said signal to recover said organizational structure;

(c) accessing said pointer;

(d) using said pointer to locate said first rule; and

(e) using said first rule to govern at least one aspect of access to or use of said governed information.

161. A method as in claim **160**, in which:

said organizational structure comprises a secure container containing said pointer.

162. A method as in claim **161**, in which:

said secure container further contains identification information identifying said governed information.

163. A method as in claim **161**, in which:

said first apparatus includes a communications port; and

said locating step (d) further comprises

using said communications port to initiate communication with a second apparatus remote from said first apparatus; and

locating said first rule at said second apparatus.

164. A method as in claim **163**, in which:

said receiving step (a) further comprises receiving said signal from said second apparatus, through said communications port.

165. A method as in claim **163**, in which:

said receiving step (a) further comprises receiving said signal from a source other than said second apparatus.

166. A method as in claim **162**, in which:

said receiving step (a) further comprises receiving said secure container in an encrypted form; and

said method further comprises decrypting said secure container.

167. A method as in claim **162**, in which:

said secure container further contains a permissions record.

168. A method as in claim **167**, in which:

said permissions record contains or references said pointer.

169. A method as in claim **162**, in which:

said first rule controls, at least in part, use of an analog file on a device designed to render, display or play said analog file.

170. A method as in claim **160**, in which:

said pointer constitutes a URL.

171. A method as in claim **161**, in which:

said secure container contains said governed information.

172. A method as in claim **160**, in which:

said organizational structure is received in an encrypted form,

said decoding step (b) further comprising decrypting said organizational structure.

173. A method as in claim **160**, further comprising:

(f) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(g) releasing said watermarked or fingerprinted governed information to a second apparatus.

174. A method as in claim **173**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

175. A method as in claim **160**, further comprising:

(f) at said first apparatus, receiving a certificate from said second apparatus; and

(g) releasing at least a portion of said governed information to a second apparatus.

176. A method as in claim **175**, in which:

said certificate specifies at least one attribute of said second apparatus.

177. A method as in claim **176**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

178. A method as in claim **177**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

179. A method as in claim **160**, in which:

said governed information is received in an encrypted or scrambled form; and

said at least one aspect of access to or use of said governed information specified in said step (e) at least in part comprises decrypting or unscrambling said governed information.

180. A method as in claim **160**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

181. A method as in claim **160**, further comprising:

following said step (e), at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded pointer to a second rule, said second rule differing in at least one aspect from said first rule.

182. A method as in claim **160**, further comprising:

(f) under control of said first rule, making a copy of at least a portion of said governed information; and

(g) transferring said copy to a second apparatus, said transferred copy not including said pointer.

183. A method as in claim **160**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said pointer contains errors;

at said first apparatus, using said error correction information to correct errors in said pointer; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected pointer, said signal not including said erroneous version of said pointer.

184. A method as in claim **183**, further comprising:

transmitting said corrected signal from said first apparatus to a second apparatus.

185. A rights management method operating at least in part on a first apparatus, said first apparatus including a communications port, said method comprising:

(a) at said first apparatus, receiving a signal, said signal comprising

governed information and

a first rule steganographically incorporated into said signal, said first rule controlling whether said governed information may be transmitted through said communications port;

(b) at said first apparatus, steganographically decoding said signal to recover said at least one rule;

(c) at said first apparatus attempting to initiate a transfer of said governed information through said communications port;

(d) at said first apparatus, invoking said first rule,

(e) at said first apparatus determining, based on said first rule, whether said transfer is authorized; and

(f) completing said transfer if said transfer is authorized, otherwise aborting said transfer.

186. A method as in claim **185**, in which:

said first apparatus includes a removable memory device connected to said communications port; and

said transfer comprises a transfer through said communications port to said removable memory device.

187. A method as in claim **185**, in which:

said transfer comprises a transfer through said communications port to a second apparatus.

188. A method as in claim **185**, in which:

said first rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said first rule.

189. A method as in claim **185**, further comprising:

(g) applying a watermark or fingerprint to at least a portion of said governed information prior to said transfer, application occurring at least in part under the control of at least one rule.

190. A method as in claim **189**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

191. A method as in claim **187**, in which:

said determining step (e) is based, at least in part, on whether said second apparatus includes functionality designated by said first rule.

192. A method as in claim **191**, in which:

said designated functionality includes at least the ability of said second apparatus to protect said governed information in at least one respect.

193. A method as in claim **192**, in which:

said designated functionality further includes the ability of said second apparatus to use said rule to govern at least one operation occurring on said second apparatus, and

said method further comprises transferring a copy of said rule from said first apparatus to said second apparatus.

194. A method as in claim **193**, in which:

said rule requires that said second apparatus transfer a certificate to said first apparatus.

195. A method as in claim **194**, in which:

said rule further requires that said certificate identify said designated functionality.

196. A method as in claim **185**, in which:

said governed information is received in an encrypted or scrambled form.

197. A method as in claim **185**, in which:

said transfer transfers a copy of said governed information.

198. A method as in claim **185**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

199. A method as in claim **185**, further comprising:

prior to said step (c),

at said first apparatus, creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule;

said governed information referred to in said step (c) constituting said created signal.

200. A method as in claim **185**, further comprising:

said governed information transferred in said step (f) does not contain said first rule.

201. A method as in claim **185**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule, said corrected signal constituting said governed information referred to in said step (c).

202. A rights management method operating at least in part on a first apparatus, said first apparatus including a communications port and means for accessing information on a removable memory device, said method comprising:

(a) at said first apparatus, receiving a removable memory device containing a signal, said signal comprising

governed information and

a first rule steganographically incorporated into said signal, said first rule requiring that payment be made at a remote site in return for use of or access to at least a portion of said governed information;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule;

(c) at said first apparatus, initiating at least one access to or use of at least a portion of said governed information;

(d) at said first apparatus, initiating communication, through said communications port, with a second apparatus remote from said first apparatus;

(e) providing payment from said first apparatus to said second apparatus;

(f) checking to determine whether said payment has been provided; and

(g) allowing said at least one access to or use of at least a portion of said governed information to complete if said check reveals that said payment has been provided.

203. A method as in claim **202**, in which:

said governed information comprises video information and audio information; and

said portion of said governed information comprises said audio information, said step (g) further comprising:

allowing access at said first apparatus to said video and audio information if said payment is made and is sufficient for said access, and

allowing access to said video information but denying access to said audio information if said payment is either not made or is not sufficient.

204. A method as in claim **202**, further comprising:

(h) at said first apparatus, completing said at least one access or use.

205. A method as in claim **204**, further comprising:

(i) said second apparatus providing information to said first apparatus, which information enables or authorizes said at least one access or use of said at least a portion of said governed information; and

said completing step (h) occurs after said step (i).

206. A method as in claim **204**, in which:

said completing step (h) occurs prior to said step (i).

207. A method as in claim **204**, further comprising:

(h) said first apparatus storing information related to the number of times said governed information has been accessed or used; and

said payment information transmitted in said step (e) is dependent, at least in part, on the number of times said governed information has been accessed or used.

208. A method as in claim **207**, in which:

said payment is a first amount for a first access or use of said governed information, and a second amount for a second access or use of said governed information.

209. A method as in claim **208**, in which:

said first payment amount is higher than said second payment amount.

210. A method as in claim **202**, in which:

said rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said rule.

211. A method as in claim **202**, further comprising:

at said first apparatus applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

releasing said watermarked or fingerprinted governed information from said first apparatus to a third apparatus.

212. A method as in claim **211**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

213. A method as in claim **202**, further comprising:

at said first apparatus, receiving a certificate from a third apparatus; and

releasing at least a portion of said governed information to said third apparatus.

214. A method as in claim **213**, in which:

said certificate specifies at least one attribute of said third apparatus.

215. A method as in claim **213**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said third apparatus.

216. A method as in claim **215**, in which:

said determination is based on whether said digital certificate indicates that said third apparatus includes specified rights management functionality.

217. A method as in claim **202**, in which:

said governed information is received in an encrypted or scrambled form; and further comprising:

following said providing step (e) decrypting or unscrambling at least said portion of said governed information.

218. A method as in claim **202**, in which:

said steps (b) through (g) are securely performed, said secure performance occurring at least in part on a secure processing unit.

219. A method as in claim **202**, in which:

said at least one access to or use of referred to in said step (g) comprises:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

220. A method as in claim **202**, in which:

said at least one access to or use of referred to in said step (g) comprises:

under control of said first rule, making a copy of at least a portion of said governed information; and

said method further comprises:

(h) transferring said copy to a third apparatus, said transferred copy not including said first rule.

221. A method as in claim **202**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a corrected signal comprising said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

222. A method as in claim **202**, further comprising:

transmitting said corrected signal from said first apparatus to a third apparatus.

223. A rights management method comprising:

(a) at a first apparatus, receiving a signal comprising

governed information and

a first rule steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal to recover said first rule, said rule acting to prohibit conversion of said governed information from a first format to a second format; and

(c) at said first apparatus, performing at least one operation on said governed information, said operation governed, at least in part, by said first rule.

224. A method as in claim **223**, in which:

said first format comprises digital encoding, and said second format comprises analog encoding.

225. A method as in claim **223**, in which:

said first format comprises analog encoding, and

said second format comprises digital encoding.

226. A method as in claim **223**, in which:

said rule is received in an encrypted form; and

said decoding step (b) further comprises decrypting said first rule.

227. A method as in claim **223**, further comprising:

(d) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(e) releasing said watermarked or fingerprinted governed information to a second apparatus.

228. A method as in claim **227**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

229. A method as in claim **223**, further comprising:

(d) at said first apparatus, receiving a certificate from said second apparatus; and

(e) releasing at least a portion of said governed information to a second apparatus.

230. A method as in claim **229**, in which:

said certificate specifies at least one attribute of said second apparatus.

231. A method as in claim **230**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

232. A method as in claim **231**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

233. A method as in claim **223**, in which:

said governed information is received in an encrypted or scrambled form; and

said operation at least in part comprises decrypting or unscrambling said information.

234. A method as in claim **223**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

235. A method as in claim **223**, in which:

said at least one access to or use of referred to in said step (c) includes:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

236. A method as in claim **223**, in which:

said at least one access to or use of referred to in said step (c) includes:

under control of said first rule, making a copy of at least a portion of said governed information; and

said method further comprises:

(d) transferring said copy to a second apparatus, said transferred copy not including said first rule.

237. A method as in claim **223**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said received first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

238. A method as in claim **237**, in which:

said at least one access to or use of referred to in said step (c) includes:

transmitting said corrected signal from said first apparatus to a second apparatus.

239. A rights management method operating at least in part on a first apparatus, comprising:

(a) receiving a signal comprising

first governed information,

second governed information, and

at least a first and a second rule steganographically incorporated into said signal,

(b) steganographically decoding said signal to recover at least one of said rules;

(c) using said first rule to govern at least in part govern a first operation on said first governed information; and

(d) using said second rule to at least in part govern a second operation on said second governed information.

240. A method as in claim **239**, in which:

said first governed information includes a description of at least one aspect of said second information.

241. A method as in claim **240**, in which:

said second governed information comprises a movie, and

said first governed information comprises a trailer describing said movie.

242. A method as in claim **240**, in which:

said second rule is more restrictive than said first rule.

243. A method as in claim **242**, in which:

said first rule governs, at least in part, the ability to copy said first governed information; and said second rule governs, at least in part, the ability to copy said second governed information.

244. A method as in claim **243**, in which:

said first rule allows unlimited copying of said first governed information; and

said second rule restricts copying of said second governed information.

245. A method as in claim **239**, in which:

said first and second rules are received in an encrypted form; and

said decoding step (b) further comprises decrypting said rules.

246. A method as in claim **239**, further comprising:

(e) applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule; and

(f) releasing said watermarked or fingerprinted governed information to a second apparatus.

247. A method as in claim **246**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

248. A method as in claim **239**, further comprising:

(e) at said first apparatus, receiving a certificate from said second apparatus; and

(f) releasing at least a portion of said governed information to a second apparatus.

249. A method as in claim **248**, in which:

said certificate specifies at least one attribute of said second apparatus.

250. A method as in claim **249**, further comprising:

said first apparatus checking said digital certificate to determine whether said information should be released to said second apparatus.

251. A method as in claim **250**, in which:

said determination is based on whether said digital certificate indicates that said second apparatus includes specified rights management functionality.

252. A method as in claim **239**, in which:

said first governed information is received in an encrypted or scrambled form; and

said first operation at least in part comprises decrypting or unscrambling said first governed information.

253. A method as in claim **239**, in which:

said steps (b) through (e) are securely performed, said secure performance occurring at least in part on a secure processing unit.

254. A method as in claim **239**, in which:

said first operation includes:

creating a signal comprising at least a portion of said governed information and a steganographically encoded third rule, said third rule differing in at least one aspect from said first rule and from said second rule.

255. A method as in claim **239**, in which:

said first operation includes:

under control of said first rule, making a copy of at least a portion of said governed information; and

said method further comprises:

(e) transferring said copy to a second apparatus, said transferred copy not including said first rule.

256. A method as in claim **239**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule and/or said second rule contain errors;

at said first apparatus, using said error correction information to correct errors in said received first rule and/or said received second rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule and/or said corrected second rule, said signal not including said erroneous version of said first rule and/or said erroneous version of said second rule.

257. A method as in claim **256**, in which:

said first operation includes:

transmitting said corrected signal from said first apparatus to a second apparatus.

258. A rights management method comprising:

(a) at a first apparatus, receiving a signal comprising

governed information and

a first rule steganographically incorporated into said signal,

said first rule at least controlling the circumstances under which said governed information may be transferred to a second apparatus;

(b) steganographically decoding said signal to recover said first rule; and

(c) performing at least a first operation on said governed information, said first operation governed, at least in part, by said first rule,

said first operation comprising at least:

initiating an attempt to transfer said governed information to a second apparatus;

checking to determine whether said transfer is allowed by said first rule; and

completing said transfer if said transfer is allowed by said first rule, or

failing to transfer said governed information if said transfer is not allowed by said first rule.

259. A method as in claim **258**, in which:

said first rule allows transfer of said governed information to a second apparatus if said second apparatus includes functionality designated by said rule.

260. A method as in claim **259**, in which:

said designated functionality includes at least the ability of said second apparatus to protect said governed information in at least one respect.

261. A method as in claim **260**, in which:

said designated functionality further includes the ability of said second apparatus to use said first rule to govern at least one operation occurring on said second apparatus, and

said method further comprises transferring a copy of said first rule from said first apparatus to said second apparatus.

262. A method as in claim **261**, in which:

said first rule requires that said second apparatus transfer a certificate to said first apparatus.

263. A method as in claim **262**, in which:

said first rule further requires that said certificate identify said designated functionality.

264. A method as in claim **258**, in which:

said first rule is received in an encrypted form; and said decoding step (b) further comprises decrypting said first rule.

265. A method as in claim **258**, further comprising:

prior to completion of said transferring step, applying a watermark or fingerprint to at least a portion of said governed information, said application occurring at least in part under the control of at least one rule.

266. A method as in claim **265**, in which:

said watermark or fingerprint includes information at least in part identifying said first apparatus or a user of said first apparatus.

267. A method as in claim **258**, in which:

said governed information is received in an encrypted or scrambled form.

268. A method as in claim **258**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

269. A method as in claim **258**, in which:

said first operation further includes:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule;

said governed information referred to in said initiating step comprising said created signal.

270. A method as in claim **258**, in which:

said first operation further includes:

under control of said first rule, making a copy of at least a portion of said governed information; and

said governed information referred to in said initiating step comprises said copy, which copy does not include said first rule.

271. A method as in claim **258**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said received first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

272. A method as in claim **271**, in which:

said governed information referred to in said step (c) comprises said corrected signal.

273. A steganographic encoding method comprising:

(a) receiving information;

(b) transforming said information into a signal;

(c) selecting a first location in said signal for the incorporation of steganographically encoded information, said selection being governed at least in part by an analysis of the bandwidth available at such location for such encoding;

said first location being selected at least in part because it has a relatively high degree of available bandwidth for such encoding;

(d) steganographically encoding a first rule in said first location, said first rule at least in part governing at least one aspect of use of at least a portion of said information;

(e) selecting a second location in said signal for the incorporation of steganographically encoded information;

(f) analyzing said second location to determine the bandwidth available at said second location for steganographic encoding;

(g) determining that said second location has relatively less bandwidth available for such encoding; and

(h) steganographically encoding a pointer to a rule at said second location.

274. A method as in claim **273**, in which:

said pointer points to said first rule at said first location.

275. A method as in claim **273**, in which:

said analysis in said step (c) is based at least in part on statistically weighted averaging.

276. A method as in claim **273**, in which:

said transforming step (b) further comprises encrypting or scrambling said information; and

said at least one aspect of access to or use of said governed information governed by said first rule at least in part comprises decrypting or unscrambling said information.

277. A steganographic encoding method comprising:

(a) receiving information;

(b) transforming said information into a signal;

(c) commencing the steganographical encoding of a first rule beginning at a first location in said signal, said first rule at least in part governing at least one aspect of use of at least a portion of said information;

(d) following said commencement, steganographically encoding said first rule in said signal at a variable rate, said variable rate being determined, at least in part, by an analysis of the bandwidth available for said encoding;

(e) commencing the steganographical encoding of a second rule beginning at a second location in said signal, said second rule at least in part governing at least one aspect of use of at least a portion of said information;

(f) following said commencement step (e), steganographically encoding said second rule in said signal at a variable rate, said variable rate being determined, at least in part, by an analysis of the bandwidth available for said encoding.

278. A method as in claim **277**, further comprising:

prior to said commencing step (c), incorporating said first rule into a first secure container;

said steganographic encoding of said first rule comprising steganographically encoding said first secure container.

279. A method as in claim **278**, further comprising:

prior to said commencing step (e), incorporating said second rule into a second secure container;

said steganographic encoding of said second rule comprising steganographically encoding said second secure container.

280. A method as in claim **279**, further comprising:

prior to said commencing step (c), encrypting said first secure container; and

prior to said commencing step (e), encrypting said second secure container.

281. A method as in claim **277**, further comprising:

prior to said commencing step (c), encrypting said first rule; and

prior to said commencing step (e), encrypting said second rule.

282. A method as in claim **277**, in which:

said transforming step (b) further comprises encrypting or scrambling said information; and

said at least one aspect of access to or use of said governed information governed by said first rule at least in part comprises decrypting or unscrambling said information.

283. A method comprising the following steps:

(a) receiving information;

(b) transforming said information into a signal;

(c) selecting a first location in said signal for the incorporation of steganographic encoding, said selection being governed at least in part by an analysis of the bandwidth available at such location for such encoding;

said first location being selected at least in part because it has a relatively high degree of available bandwidth for such encoding;

(d) steganographically encoding a first rule in said first location, said first rule at least in part governing at least one aspect of use of at least a portion of said information;

(e) selecting a second location in said signal for the incorporation of steganographically encoding;

(f) analyzing said second location to determine the bandwidth available at said second location for steganographic encoding;

(g) determining that said second location has relatively less bandwidth available for such encoding; and

(h) steganographically encoding a pointer to said first rule at said second location;

(i) storing said signal, including said steganographically encoded information, on a portable memory;

(j) inserting said portable memory into a first appliance;

(k) said first apparatus reading from said second location prior to reading from said first location;

(l) following reading from said second location, said first apparatus following said pointer in order to read from said first location;

(m) said first apparatus retrieving said first rule from said first location; and

(n) said first apparatus using said first rule to govern at least one aspect of access to or use of said information.

284. A method as in claim **283**, further comprising:

prior to said steganographically encoding step (c), incorporating said first rule into a first secure container, said steganographic encoding step (c) comprising steganographically encoding said first secure container into said signal; and

said retrieving step (m) further comprising accessing said first rule from said first secure container.

285. A method as in claim **284**, further comprising:

prior to said steganographically encoding step (h), incorporating said pointer into a second secure container, said steganographic encoding step (h) comprising steganographically encoding said second secure container into said signal; and

said reading step (k) further comprising accessing said pointer from said first secure container.

286. A method as in claim **285**, further comprising:

encrypting said first secure container and said second secure container prior to steganographically encoding said first secure container and said second secure container into said signal;

said reading step (k) further comprising decrypting said second secure container; and

said retrieving step (m) further comprising decrypting said first secure container.

287. A method as in claim **283**, further comprising:

prior to said steganographically encoding step (c), encrypting said first rule; and

said retrieving step (m) further comprising decrypting said first rule.

288. A method as in claim **284**, further comprising:

prior to said steganographically encoding step (h), encrypting said pointer; and

said reading step (k) further comprising decrypting said pointer.

289. A method as in claim **283**, further comprising:

following said step (m), said first apparatus making a use of at least a portion of said signal, said first apparatus removing said steganographic encoding from said used portion prior to said use.

290. A method as in claim **283**, in which:

said first apparatus comprises an optical disk player; and

said portable memory comprises an optical disk.

291. A method as in claim **283**, in which:

said first rule governs the right to access at least a portion of said information; and

said using step (n) comprises said first apparatus determining whether said first rule allows an access to at least a portion of said information;

said first apparatus allowing said access if said first rule allows said access and denying said access if said first rule does not allow said access.

292. A method as in claim **283**, in which:

said transforming step (b) further comprises encrypting or scrambling said information; and

said at least one aspect of access to or use of said information in said governing step (n) at least in part comprises decrypting or unscrambling said information.

293. A method as in claim **283**, in which:

said step (n) is securely performed, said secure performance occurring at least in part on a secure processing unit.

294. A method as in claim **283**, in which:

said governing step (n) includes:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

295. A method as in claim **283**, in which:

said governing step (n) includes:

under control of said first rule, making a copy of at least a portion of said governed information; and

said method further comprises:

(o) transferring said copy to a second apparatus, said transferred copy not including said first rule.

296. A method as in claim **283**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said received first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

297. A method as in claim **296**, in which:

said governing step (n) includes:

transmitting said corrected signal from said first apparatus to a second apparatus.

298. A method comprising the following steps:

(a) receiving information;

(b) transforming said information into a signal;

(c) steganographically encoding a first rule at a first location in said signal, said first rule at least in part governing at least one aspect of use of at least a portion of said information;

(d) following said step (c), selecting a second location in said signal, said second location being selected at least in part based on its offset from said first location;

(e) steganographically encoding said first rule in said second location;

(f) repeating said location selection and steganographic encoding steps at least two additional times, in each case selecting the location for said steganographic encoding being based at least in part on an offset from at least one previously selected location;

(g) storing said signal, including said steganographically encoded information, on a portable memory;

(h) inserting said portable memory into a first apparatus;

(i) said first apparatus beginning reading from said portable memory at a point between said locations;

(j) said first apparatus continuing to read until one of said locations is encountered;

(k) said first apparatus retrieving said first rule from said encountered location; and

(l) said first apparatus using said first rule to govern at least one aspect of use of said information.

299. A method as in claim **298**, further comprising:

prior to said steganographically encoding step (c), incorporating said first rule into a first secure container;

said steganographic encoding steps (c), (e) and (f) comprising

steganographically encoding copies of said first secure container into said signal; and

said retrieving step (k) further comprising accessing said first rule from said first secure container.

300. A method as in claim **299**, further comprising:

prior to said steganographically encoding step (c), encrypting said first secure container;

said steganographic encoding steps (c), (e) and (f) comprising

steganographically encoding said encrypted first secure container into said signal;

said retrieving step (k) further comprising decrypting said first secure container.

301. A method as in claim **299**, further comprising:

prior to said steganographically encoding step (c), encrypting said first rule;

said steganographic encoding steps (c), (e) and (f) comprising steganographically encoding said encrypted first rule into said signal; and

said retrieving step (k) further comprising decrypting said first rule.

302. A method as in claim **298**, further comprising:

following said step (k), said first apparatus making a use of at least a portion of said signal, said first apparatus removing said steganographic encoding from said used portion prior to said use.

303. A method as in claim **298**, in which:

said first apparatus comprises an optical disk player; and

said portable memory comprises an optical disk.

304. A method as in claim **298**, in which:

said first rule governs the right to access at least a portion of said information; and

said using step (l) comprises said appliance determining whether said first rule allows an access to at least a portion of said information;

said first apparatus allowing said access if said first rule allows said access and denying said access if said first rule does not allow said access.

305. A method as in claim **298**, in which:

said transforming step (b) further comprises encrypting or scrambling said information; and

said at least one aspect of use of said information in said governing step (l) at least in part comprises decrypting or unscrambling said information.

306. A method as in claim **298**, in which:

said step (j) is securely performed, said secure performance occurring at least in part on a secure processing unit.

307. A method as in claim **298**, in which:

said governing step (l) includes:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

308. A method as in claim **298**, in which:

said governing step (l) includes:

under control of said first rule, making a copy of at least a portion of said governed information; and

said method further comprises:

(n) transferring said copy to a second apparatus, said transferred copy not including said first rule.

309. A method as in claim **298**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said received first rule; and

at said first apparatus, generating a corrected signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

310. A method as in claim **309**, further comprising:

(n) transmitting said corrected signal from said first apparatus to a second apparatus.

311. A method comprising:

receiving a first signal comprising first information, said first signal being encoded in a first format;

steganographically encoding a first rule in said first signal, said first rule governing at least one aspect of access to or use of said first information;

transforming said first signal into a second signal,

said second signal being encoded in a second format, said second signal containing said first information and said steganographically encoded first rule; and

at a first apparatus designed to use signals encoded in said second format:

steganographically decoding said second signal to obtain said first rule; and

using said first rule to govern at least one aspect of access to or use of said first information at said first apparatus;

said first apparatus including rights management functionality designed to interpret and execute rules, including said first rule.

312. A method as in claim **311**, in which:

said first format constitutes digital encoding and said second format constitutes analog encoding.

313. A method as in claim **311**, in which:

said first format constitutes analog encoding and said second format constitutes digital encoding.

314. A method as in claim **312**, further comprising:

at said first apparatus,

attempting to make a copy of at least a portion of said first information.

315. A method as in claim **314**, further comprising:

following the commencement of said attempt, said first apparatus using said first rule to at least in part determine whether said copy will be allowed;

said first apparatus proceeding to make said copy if said first rule indicates that said copy is allowed; and

said first apparatus failing to complete said copy process if said first rule indicates that said copy is not allowed.

316. A method as in claim **315**, in which:

if said copy is made, said copy includes said steganographically encoded first rule.

317. A method as in claim **316**, in which:

said step of proceeding to make said copy further comprises translating at least a portion of said second signal from said analog format to said digital format, said copy comprising said signal translated into digital format.

318. A method as in claim **311**, further comprising:

said step of using said first rule at said first apparatus including:

creating a signal comprising at least a portion of said governed information and a steganographically encoded second rule, said second rule differing in at least one aspect from said first rule.

319. A method as in claim **311**, further comprising:

at said first apparatus, under control of said first rule, making a copy of at least a portion of said governed information; and

transferring said copy to a second apparatus, said transferred copy not including said first rule.

320. A method as in claim **311**, in which:

said received signal further includes steganographically encoded error correction information;

said method further comprising:

at said first apparatus, steganographically decoding said signal to retrieve said error correction information;

at said first apparatus, using said error correction information to determine whether the received version of said first rule contains errors;

at said first apparatus, using said error correction information to correct errors in said first rule; and

at said first apparatus, generating a signal comprising at least a portion of said governed information and said corrected first rule, said signal not including said erroneous version of said first rule.

321. A method as in claim **320**, further comprising:

transmitting said generated signal from said first apparatus to a second apparatus.

322. A method comprising:

(a) at a first apparatus, receiving a signal comprising

governed information and

a first rule steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal and recovering said first rule;

(c) at said first apparatus, using said first rule to govern at least one aspect of access to or use of at least a portion of said governed information;

(d) at said first apparatus, making a copy of at least a portion of said governed information; and

(e) at said first apparatus, steganographically encoding at least a second rule into said copy, said second rule differing in at least one respect from said first rule.

323. A method as in claim **322**, in which:

said steganographic encoding step (e) further comprises steganographically encoding said first rule.

324. A method as in claim **322**, in which:

said second rule comprises a modified version of said first rule.

325. A method as in claim **322**, further comprising:

(f) transferring said steganographically encoded copy to a second apparatus.

326. A method as in claim **322**, further comprising:

at said first apparatus, checking said first rule to determine whether said steps (d) and (e) are allowed by said first rule; and

proceeding with said steps (d) and (e) only if said steps are allowed by said first rule.

327. A method as in claim **322**, in which:

a user of said first apparatus at least in part specifies at least one aspect of said second rule.

328. A method as in claim **322**, in which:

said first rule allows at least one copy of at least a portion of said governed information; and

said second rule prohibits the making of any copies.

329. A method comprising:

(a) at a first apparatus, receiving a signal comprising:

governed information and

a first rule steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal and recovering said first rule;

(c) at said first apparatus, using said first rule to govern at least one aspect of access to or use of at least a portion of said governed information;

(d) at said first apparatus, making a copy of at least a portion of said governed information, said copy not including any steganographically encoded information; and

(e) transferring said copy to a second apparatus.

330. A method as in claim **329**, further comprising:

at said first apparatus, checking said first rule to determine whether said first rule allows said steps (d) and (e); and proceeding with said steps (d) and (e) only if said first rule allows said steps.

331. A method comprising:

(a) at a first apparatus, receiving a signal comprising: governed information;

a first rule steganographically incorporated into said signal; and

a copy indicator steganographically incorporated into said signal;

(b) at said first apparatus, steganographically decoding said signal and recovering said first rule and said copy indicator;

(c) at said first apparatus, using said first rule to govern at least one aspect of access to or use of at least a portion of said governed information;

(d) at said first apparatus, making a copy of at least a portion of said governed information;

(e) at said first apparatus, altering said copy indicator to indicate that a copy has been made;

(f) at said first apparatus, steganographically encoding said altered copy indicator and at least one rule into said copied governed information portion; and

(e) transferring said copy, including said steganographic encoding, to a second apparatus.

332. A method as in claim **331**, in which:

said copy indicator received in said step (a) indicates that no copy has been made;

said first rule specifies that a copy of said governed information, or a portion thereof, may be made only if said copy indicator indicates that no copy has been made; and

said step (f) includes steganographically encoding a copy of said first rule into said copied governed information portion.

333. A method comprising:

(a) at a first apparatus, receiving a signal comprising first governed information and control information steganographically encoded in said first governed information;

said control information including a first rule and error correction information;

(b) at said first apparatus, steganographically decoding said signal to recover said control information;

(c) at said first apparatus, using said error correction information to analyze said recovered first rule to determine whether said recovered first rule contains errors;

(d) at said first apparatus, using said error correction information to correct at least one error in said first rule; and

(e) at said first apparatus, steganographically encoding said corrected first rule and error correction information in said first governed information.

334. A method as in claim **333**, further comprising:

(f) transferring said first governed information, including said steganographically encoded corrected first rule, to a second apparatus.

335. An apparatus comprising:

means for receiving a first signal, said first signal comprising governed information and a steganographically encoded first rule;

means for steganographically decoding said signal to recover said first rule;

means for using said first rule to at least in part govern at least one operation on said governed information;

means for inserting a watermark into at least a portion of said first signal, said watermark including identification information; and

means for transmitting said watermarked signal to a remote apparatus.

336. An apparatus as in claim **335**, in which:

said identification information comprises information identifying said apparatus and/or a user of said apparatus.

337. An apparatus as in claim **335**, in which:

said means for inserting includes means for steganographically encoding said watermark into said first signal.

338. An apparatus comprising:

means for receiving a first signal, said first signal comprising governed information and a steganographically encoded first rule;

means for steganographically decoding said signal to recover said first rule;

means for using said first rule to at least in part govern at least one operation on said governed information;

means for generating a second signal comprising at least a portion of said first governed information and a steganographically encoded second rule; and

means for transmitting said second signal to a remote apparatus.

339. An apparatus as in claim **338**, in which:

said means for receiving comprises an optical disk player; and

said apparatus further comprises a video display.

340. An apparatus as in claim **339**, in which said apparatus further comprises:

decryption means for decrypting said first rule; and

means for removing steganographic encoding from said first signal.

341. An apparatus as in claim **340**, in which:

said means for steganographically decoding further comprises means for searching through said first governed information until a location is reached containing said steganographically encoded first rule.

342. An apparatus as in claim **338**, in which said apparatus further comprises:

means for inserting a watermark or fingerprint into said second signal.

343. An apparatus as in claim **342**, in which:

said means for inserting includes:

means for including identification information in said watermark or fingerprint, and

means for steganographically encoding said watermark or fingerprint into said second signal.

344. An apparatus comprising:

means for receiving a first signal, said first signal comprising:

governed information and

steganographic encoding comprising a first rule and error correction information;

means for steganographically decoding said signal to recover said first rule and said error correction information;

means for using said error correction information to correct at least one error in said received first rule;

means for steganographically encoding said corrected first rule into said first signal, said corrected first rule replacing said originally received erroneous first rule; and

means for transmitting said first signal containing said corrected first rule to a remote apparatus.

345. An apparatus comprising:

means for receiving a first signal, said first signal comprising:

governed information and

steganographic encoding comprising a first rule and error correction information;

means for steganographically decoding said signal to recover said first rule and said error correction information;

means for using said error correction information to correct at least one error in said received first rule;

means for steganographically encoding said corrected first rule into said first signal, said corrected first rule replacing said originally received erroneous first rule;

means for steganographically encoding a watermark into said first signal, said watermark including identification information; and

means for transmitting said first signal containing said corrected first rule to a remote apparatus.

346. An apparatus comprising:

means for receiving a first signal, said first signal comprising governed information and a steganographically encoded first rule;

means for steganographically decoding said signal to recover said first rule;

means for using said first rule to at least in part govern at least one operation on said governed information;

means for making a copy of said governed information;

means for steganographically encoding a copy indicator in said copy of said governed information; and

means for transmitting said governed information copy, including said copy indicator, to a remote apparatus.

347. A method as in claim **39**, in which:

said governed information is received in an encrypted or scrambled form; and

said allowing access or use further comprises decrypting or unscrambling said portion of said governed information.

348. A method as in claim **39**, in which:

said steps (b) and (c) are securely performed, said secure performance occurring at least in part on a secure processing unit.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,943,422
DATED : August 24, 1999
INVENTOR(S) : Van Wie et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 27,
Line 44, after “includes means for”, delete the second occurrence of “means for”.
Lines 57-58 and 60-61, “right management means” should read -- rights manangement means --.
Line 65, “decode” should read -- decodes --.

Column 29,
Line 52, “at first rule” should read -- a first rule --.

Column 39,
Line 5, “said second rule” should read -- said third rule --.
Line 21, “received version” should read -- received versions --.
Line 38, after “circuitry”, insert a comma.

Column 40,
Line 25, “said at access” should read -- said access --.

Column 43,
Line 43 and 48, after “at said first apparatus”, insert a comma.

Column 46,
Line 6, after “at said first apparatus”, insert a comma.
Line 36, after “said providing step (e)”, insert a comma.

Column 48,
Line 51, after “at least in part”, delete “govern”.

Signed and Sealed this

Twenty-eighth Day of October, 2003

JAMES E. ROGAN
Director of the United States Patent and Trademark Office