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(54) DATA TERMINAL DEVICE

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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G06F 1/32 (2006.01)

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(57) ABSTRACT

A cellular phone in the form of a shell downloads and reproduces encrypted content data distributed from a distribution server. The cellular phone includes a detection unit detecting whether its casing in the form of the shell is open/closed. If with the cellular phone currently downloading or reproducing encrypted content data its casing in the form of the shell is closed, a controller controls a power supply unit to supply power required for completing the download process or the reproduction process. Thus if the casing is closed the cellular phone still can complete the download or reproduction process. Thus with the casing having been closed the cellular phone can download or reproduce data.

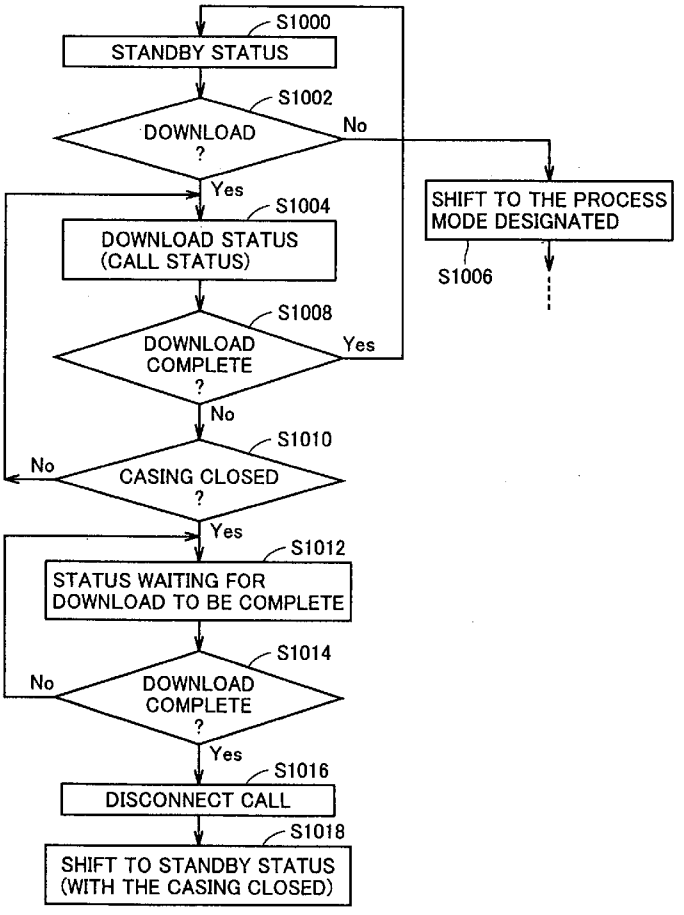


FIG.1

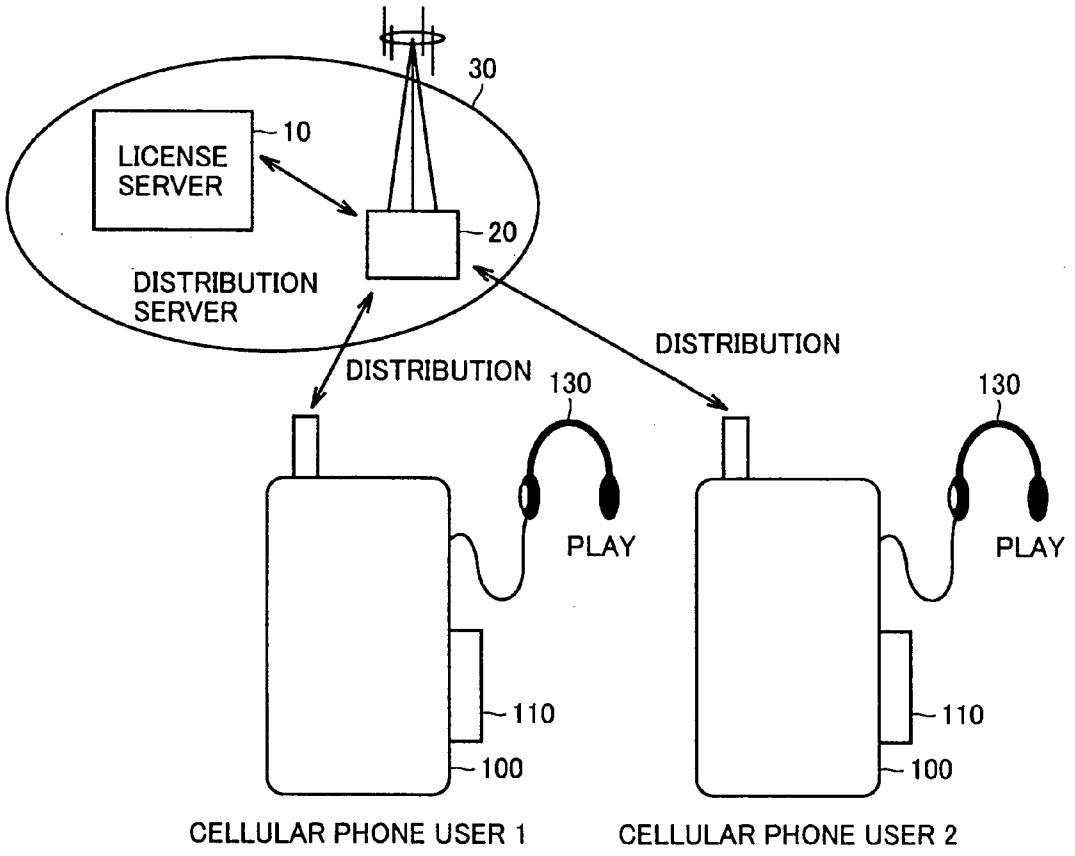

30
LICENSE SERVER
10
20
DISTRIBUTION SERVER
DISTRIBUTION
DISTRIBUTION
130
130
PLAY
PLAY
110
110
100
100
CELLULAR PHONE USER 1
CELLULAR PHONE USER 2

FIG.2A

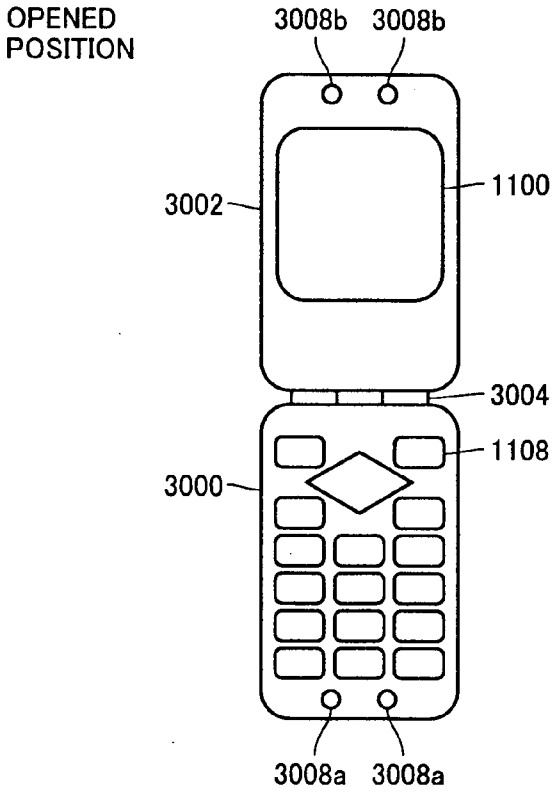


FIG.2B

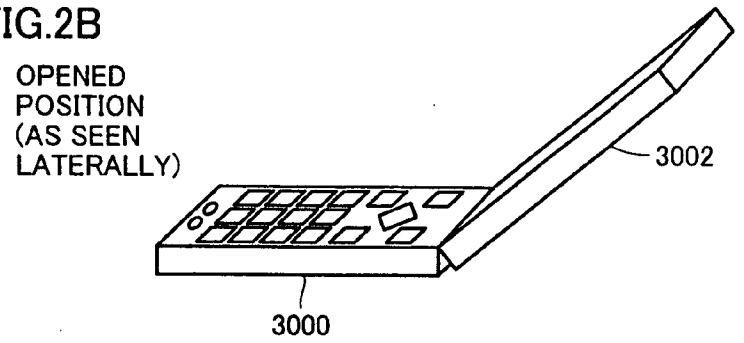


FIG.2C

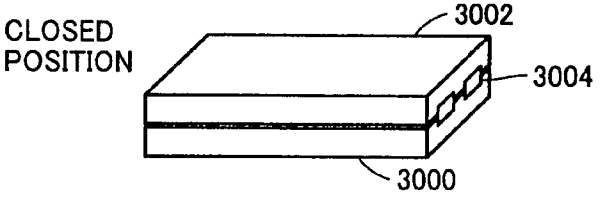


FIG.3

NAME	ATTRIBUTE	HELD/PRODUCED AT	FUNCTION & CHARACTERISTIC
Data	CONTENT DATA	DISTRIBUTION SERVER	E.G., MUSIC DATA
Kc	LICENSE KEY		KEY FOR DECRYPTING ENCRYPTED CONTENT DATA
[Data]Kc	ENCRYPTED CONTENT DATA		CONTENT DATA ENCRYPTED DECRYPTABLE WITH COMMON KEY Kc. DISTRIBUTED IN THIS FORM FROM DISTRIBUTION SERVER.
Data-inf	ADDITIONAL INFORMATION		E.G., COPYRIGHT OF CONTENT DATA OR PLAINTEXT INFORMATION RELATED TO SERVER ACCESS
CONTENT ID	INFORMATION ON CONTENT		CODE FOR IDENTIFYING CONTENT DATA Data
LICENSE ID	INFORMATION OF LICENSE		MANAGEMENT CODE CAPABLE OF SPECIFYING ISSUANCE OF LICENSE (ALSO CAPABLE OF IDENTIFYING IT INCLUDING CONTENT ID)
AC	LICENSE PURCHASING CONDITION		DESIGNATED BY USER (E.G., NO. OF LICENSES, LIMITATION ON FUNCTION)
AC1	ACCESS RESTRICTION INFORMATION		RESTRICTION ON MEMORY ACCESS (E.G., NO. OF TIMES OF REPRODUCTION ALLOWED)
AC2	REPRODUCTION CIRCUIT CONTROL INFORMATION		CONTROL INFORMATION IN CONTENT REPRODUCTION CIRCUIT (CELLULAR PHONE) (E.G., WHETHER REPRODUCTION IS ALLOWED/DISALLOWED)

FIG.4

NAME	ATTRIBUTE	HELD/PRODUCED AT	FUNCTION & CHARACTERISTIC
CRL	INFORMATION OF CLASS REVOCATION LIST	DISTRIBUTION SERVER MEMORY CARD	DATA OF CLASSES ON CLASS REVOCATION LIST
CRL_dat		DISTRIBUTION SERVER	INFORMATION FOR UPDATING THE VERSION OF CLASS REVOCATION LIST (IN THE FORM OF DIFFERENTIAL DATA)
CRL_ver		MEMORY CARD	INFORMATION OF VERSION OF CLASS REVOCATION LIST
KPpn	PUBLIC ENCRYPTION KEY (ASYMMETRIC KEY)	CELLULAR PHONE	DECRYPTABLE WITH Kpn. RECORDED IN THE FORM OF {KPpn//Crtfn}KPma WHEN SHIPPED. * DIFFERENT FOR EACH CELLULAR PHONE TYPE n.
KPmci	PUBLIC ENCRYPTION KEY (ASYMMETRIC KEY)	MEMORY CARD	DECRYPTABLE WITH Kmci. RECORDED IN THE FORM OF {KPmci//Cmci}KPma WHEN SHIPPED. * DIFFERENT FOR EACH MEMORY CARD TYPE i.
Kpn	SECRET DECRYPTION KEY	CELLULAR PHONE	DECRYPTION KEY UNIQUE TO CONTENT REPRODUCTION CIRCUIT (CELLULAR PHONE). * DIFFERENT FOR EACH CELLULAR PHONE TYPE n.
Kmci	SECRET DECRYPTION KEY	MEMORY CARD	DECRYPTION KEY UNIQUE TO MEMORY CARD. * DIFFERENT FOR EACH MEMORY CARD TYPE i.
Crtfn	CLASS CERTIFICATE	CELLULAR PHONE	CONTENT REPRODUCTION CIRCUIT CLASS CERTIFICATE.HAS AUTHENTICATION FUNCTION. RECORDED IN THE FORM OF {KPpn//Crtfn}KPma WHEN SHIPPED. * DIFFERENT FOR EACH CELLULAR PHONE CLASS n.
Cmci		MEMORY CARD	MEMORY CARD CLASS CERTIFICATE.HAS AUTHENTICATION FUNCTION. RECORDED IN THE FORM OF {KPmci//Cmci}KPma WHEN SHIPPED. * DIFFERENT FOR EACH MEMORY CARD CLASS i.

FIG.5

NAME	ATTRIBUTE	HELD/PRODUCED AT	FUNCTION & CHARACTERISTIC
Ks1	COMMON KEY	DISTRIBUTION SERVER	GENERATED FOR EACH DISTRIBUTION SESSION
Ks2		MEMORY CARD	GENERATED FOR EACH DISTRIBUTION/REPRODUCTION SESSION
Ks3		CELLULAR PHONE	GENERATED FOR EACH REPRODUCTION SESSION
Km	SECRET DECRYPTION KEY	MEMORY CARD	DECRYPTION KEY UNIQUE TO EACH MEMORY CARD DATA ENCRYPTED WITH KPm IS DECRYPTABLE WITH Km.
KPm	PUBLIC ENCRYPTION KEY (ASYMMETRIC KEY)	MEMORY CARD	ENCRYPTION KEY UNIQUE TO EACH MEMORY CARD
KPma	PUBLIC AUTHENTICATION KEY	DISTRIBUTION SERVER	SHARED THROUGHOUT THE DISTRIBUTION SYSTEM.

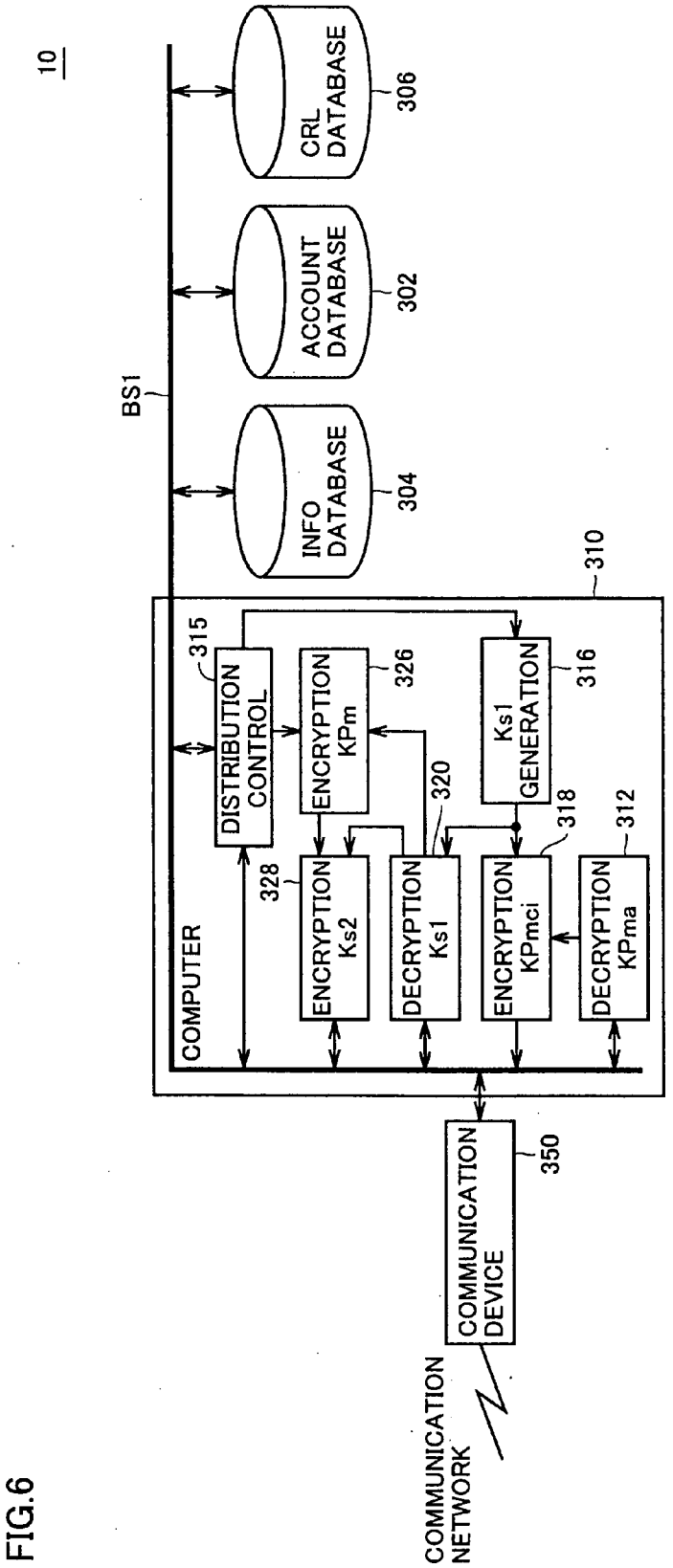
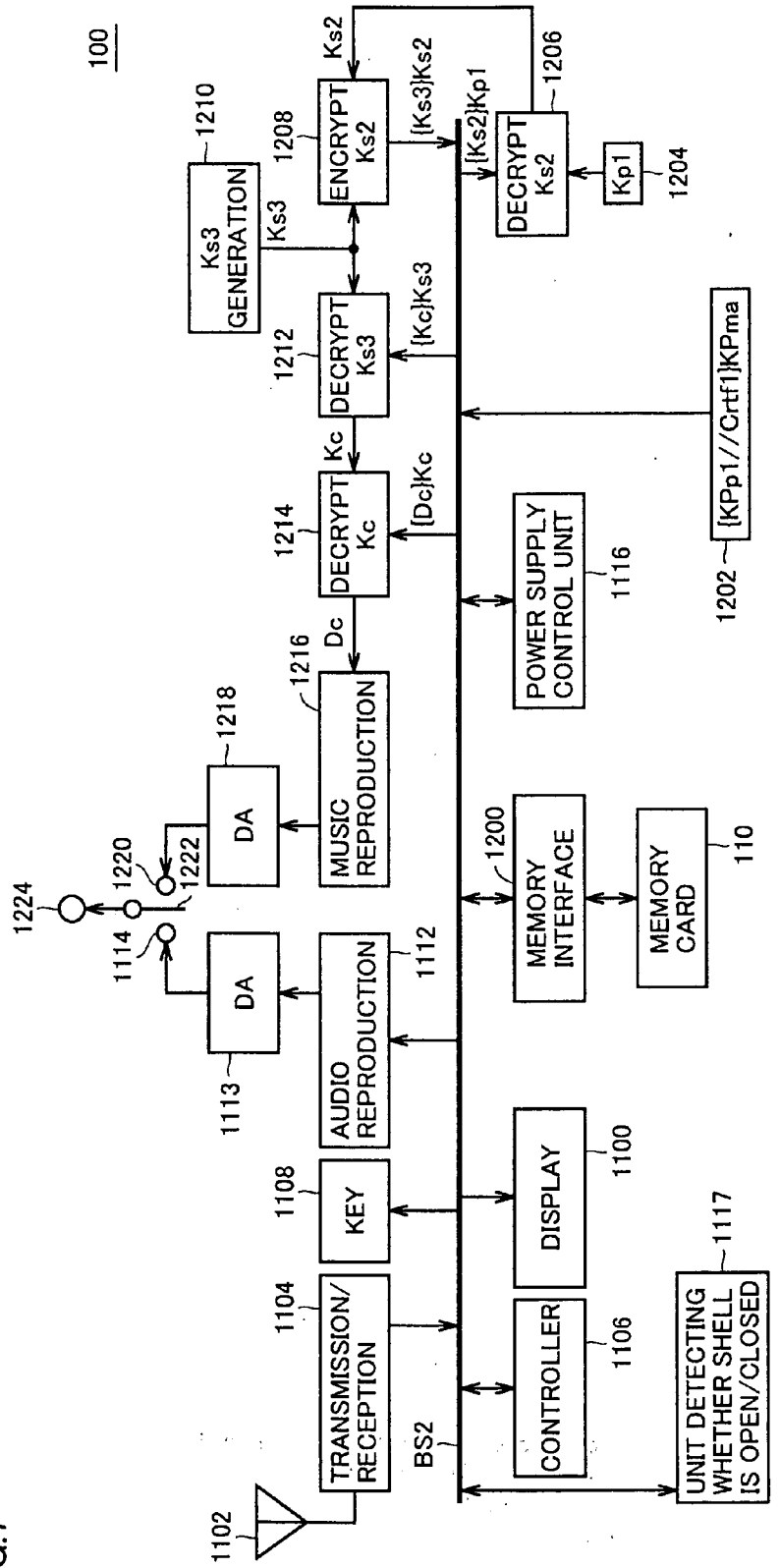

10
BS1
CRL DATABASE
306
ACCOUNT DATABASE
302
INFO DATABASE
304
310
COMPUTER
315
DISTRIBUTION CONTROL
326
ENCRYPTION KPm
316
Ks1 GENERATION
320
318
312
328
ENCRYPTION Ks2
DECRYPTION Ks1
ENCRYPTION KPmci
DECRYPTION KPma
COMMUNICATION DEVICE
350
COMMUNICATION NETWORK

FIG.6

FIG.7


100
1102
TRANSMISSION/ RECEPTION
1104
BS2
KEY
1108
AUDIO REPRODUCTION
1112
1113
DA
1114
1220
1222
1224
DA
1218
MUSIC REPRODUCTION
1216
Dc
DECRYPT Kc
1214
Kc
[Dc]Kc
DECRYPT Ks3
1212
[Kc]Ks3
Ks3 GENERATION
1210
Ks3
ENCRYPT Ks2
1208
[Ks3]Ks2
Ks2
[Ks2]Kp1
DECRYPT Ks2
1206
Kp1
1204
[KPp1//Crtf1]KPma
1202
POWER SUPPLY CONTROL UNIT
1116
MEMORY INTERFACE
1200
MEMORY CARD
110
DISPLAY
1100
CONTROLLER
1106
UNIT DETECTING WHETHER SHELL IS OPEN/CLOSED
1117

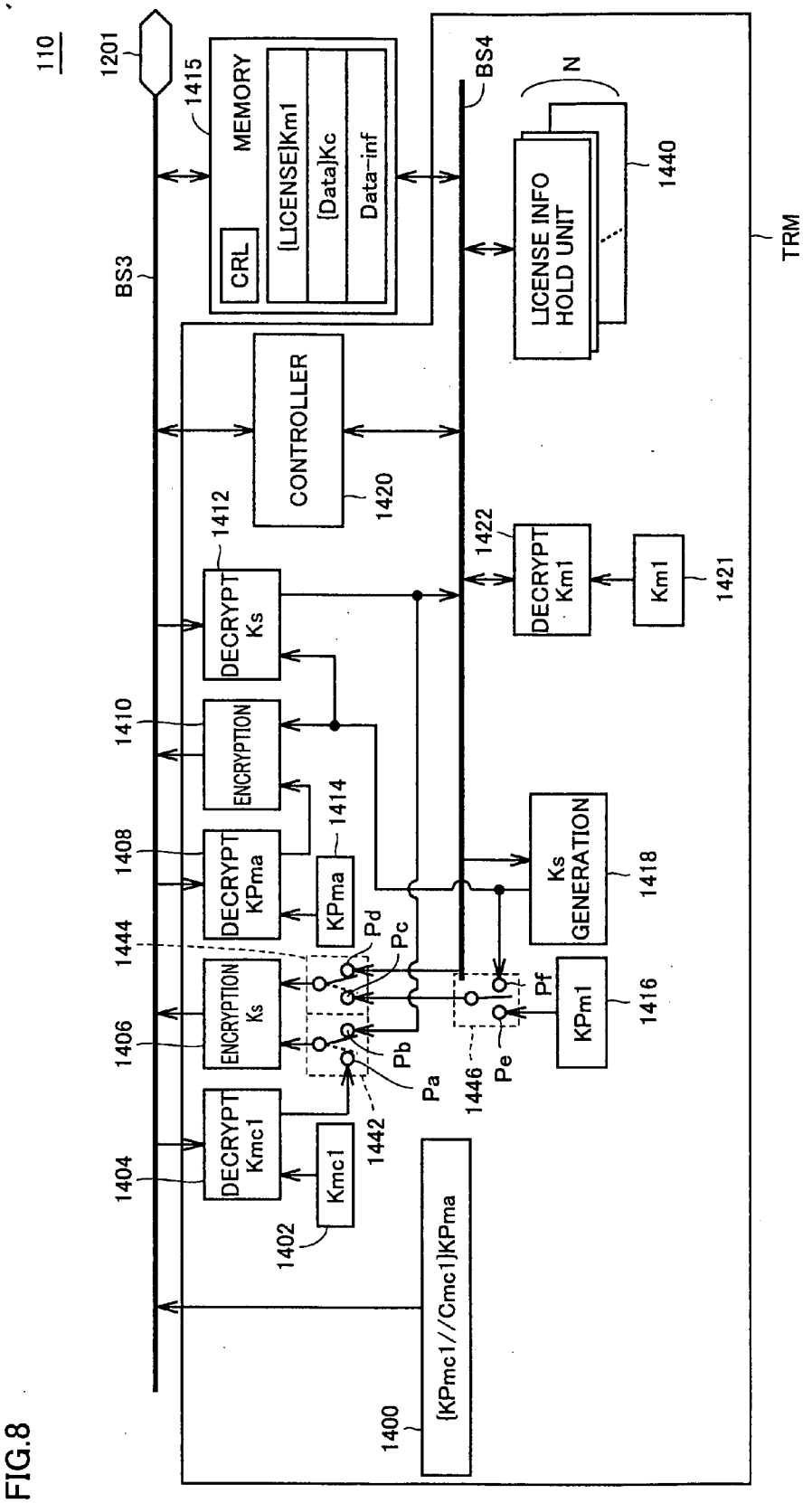

110
1201
1415
MEMORY
CRL
[LICENSE]Km1
[Data]Kc
Data-inf
BS3
BS4
N
1440
LICENSE INFO HOLD UNIT
TRM
CONTROLLER
1420
1412
DECRYPT Ks
1422
DECRYPT Km1
Km1
1421
1410
ENCRYPTION
1414
1408
DECRYPT KPma
KPma
Pd
Pc
Ks GENERATION
1418
1444
1406
ENCRYPTION Ks
Pb
Pa
Pf
KPm1
1416
1446
Pe
1404
DECRYPT Kmc1
1442
Kmc1
1402
{KPmc1//Cmc1]KPma
1400

FIG.8

FIG.9

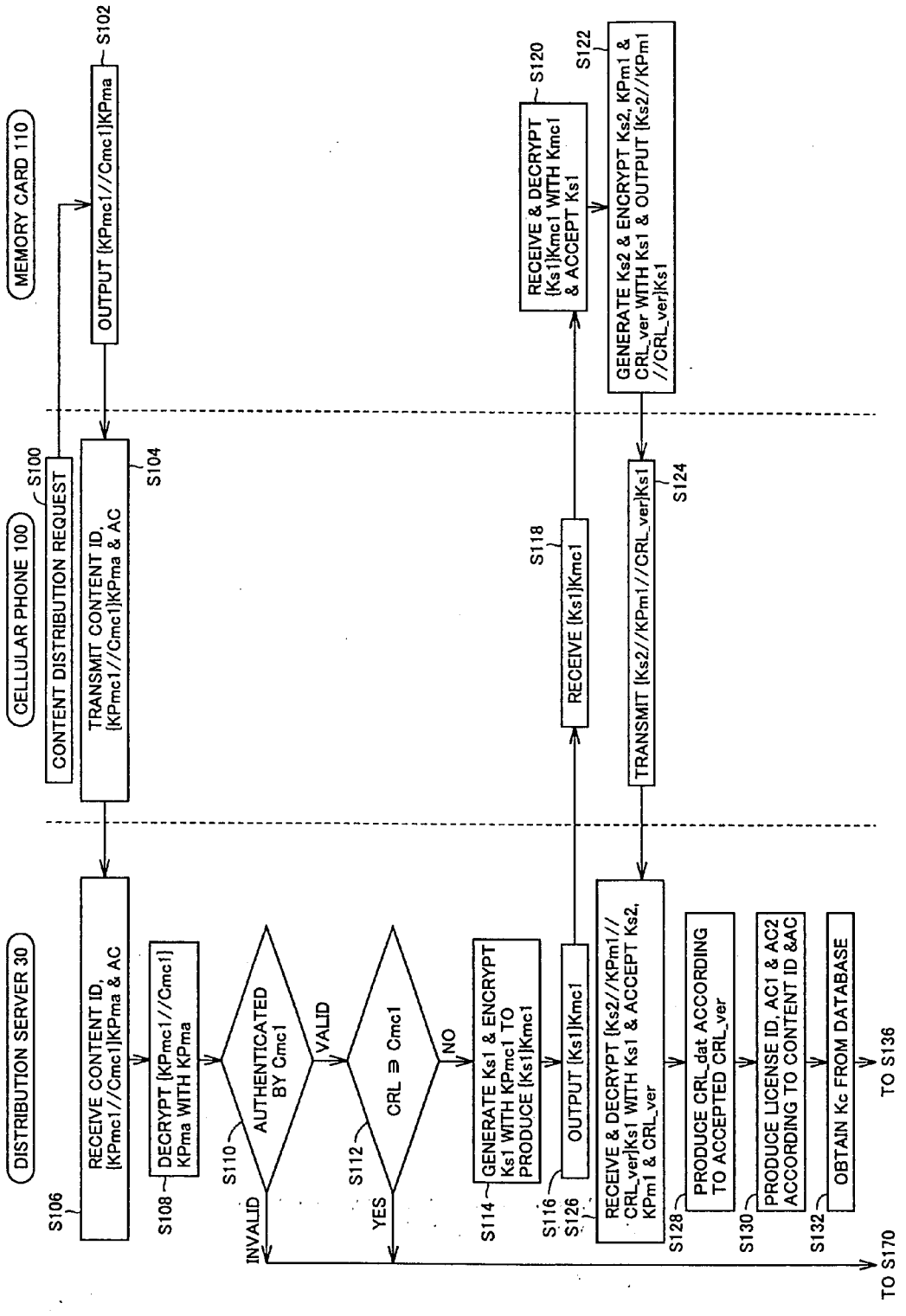

DISTRIBUTION SERVER 30
CELLULAR PHONE 100
MEMORY CARD 110
CONTENT DISTRIBUTION REQUEST
S100
OUTPUT [KPmc1//Cmc1]KPma
S102
TRANSMIT CONTENT ID, [KPmc1//Cmc1]KPma & AC
S104
RECEIVE CONTENT ID, [KPmc1//Cmc1]KPma & AC
S106
DECRYPT [KPmc1//Cmc1] KPma WITH KPma
S108
AUTHENTICATED BY Cmc1
S110
INVALID
VALID
CRL ∋ Cmc1
S112
YES
NO
GENERATE Ks1 & ENCRYPT Ks1 WITH KPmc1 TO PRODUCE [Ks1]Kmc1
S114
OUTPUT [Ks1]Kmc1
S116
RECEIVE [Ks1]Kmc1
S118
RECEIVE & DECRYPT [Ks1]Kmc1 WITH Kmc1 & ACCEPT Ks1
S120
GENERATE Ks2 & ENCRYPT Ks2, KPm1 & CRL_ver WITH Ks1 & OUTPUT [Ks2//KPm1 //CRL_ver]Ks1
S122
TRANSMIT [Ks2//KPm1//CRL_ver]Ks1
S124
RECEIVE & DECRYPT [Ks2//KPm1// CRL_ver]Ks1 WITH Ks1 & ACCEPT Ks2, KPm1 & CRL_ver
S126
PRODUCE CRL_dat ACCORDING TO ACCEPTED CRL_ver
S128
PRODUCE LICENSE ID, AC1 & AC2 ACCORDING TO CONTENT ID &AC
S130
OBTAIN Kc FROM DATABASE
S132
TO S136
TO S170

FIG.10

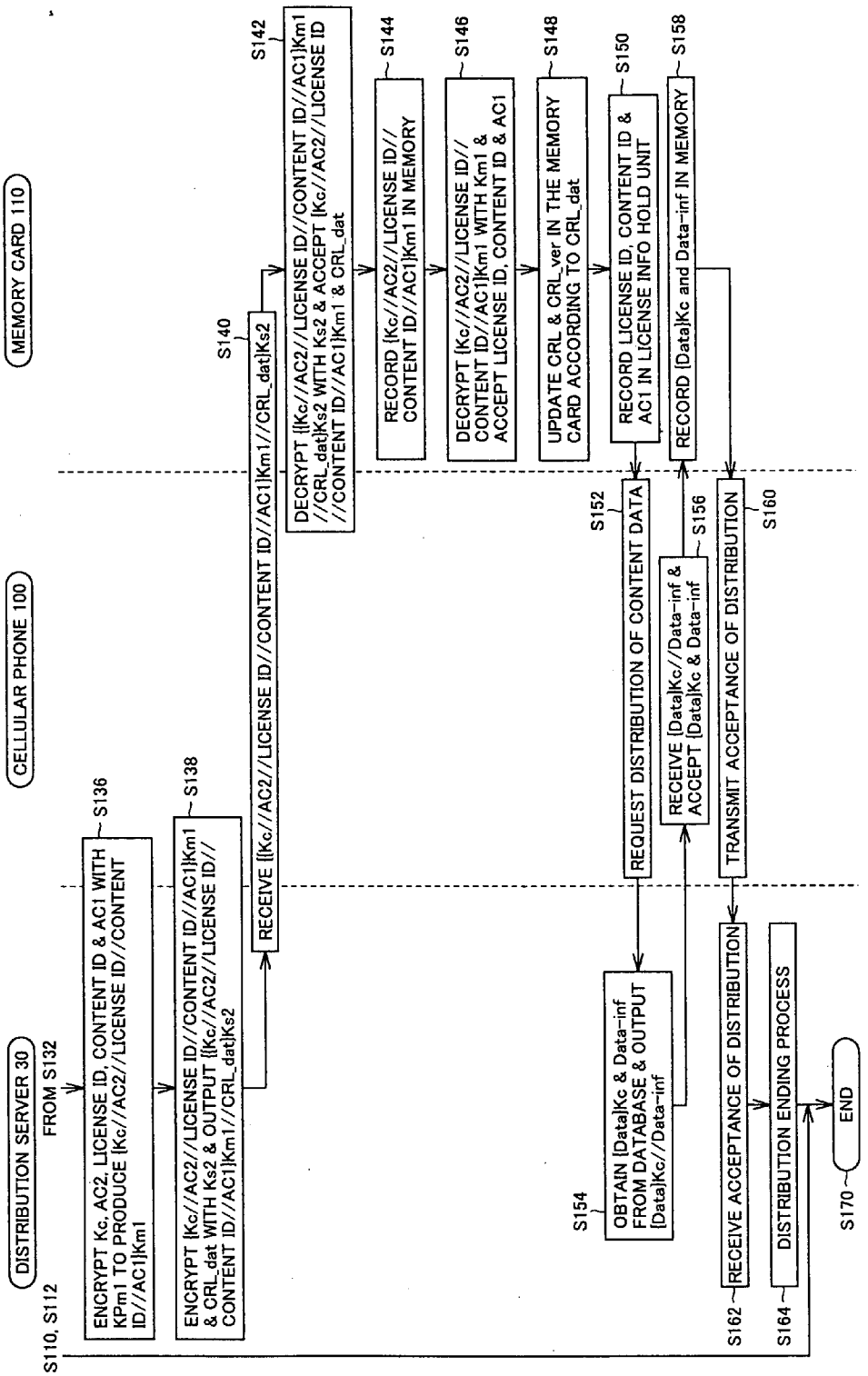

FROM S110, S112
DISTRIBUTION SERVER 30
CELLULAR PHONE 100
MEMORY CARD 110
FROM S132
ENCRYPT Kc, AC2, LICENSE ID, CONTENT ID & AC1 WITH KPm1 TO PRODUCE [Kc//AC2//LICENSE ID//CONTENT ID//AC1]Km1
S136
ENCRYPT [Kc//AC2//LICENSE ID//CONTENT ID//AC1]Km1 & CRL_dat WITH Ks2 & OUTPUT [[Kc//AC2//LICENSE ID// CONTENT ID//AC1]Km1//CRL_dat]Ks2
S138
RECEIVE [[Kc//AC2//LICENSE ID//CONTENT ID//AC1]Km1//CRL_dat]Ks2
S140
DECRYPT [[Kc//AC2//LICENSE ID//CONTENT ID//AC1]Km1 //CRL_dat]Ks2 WITH Ks2 & ACCEPT [Kc//AC2//LICENSE ID //CONTENT ID//AC1]Km1 & CRL_dat
S142
RECORD [Kc//AC2//LICENSE ID// CONTENT ID//AC1]Km1 IN MEMORY
S144
DECRYPT [Kc//AC2//LICENSE ID// CONTENT ID//AC1]Km1 WITH Km1 & ACCEPT LICENSE ID, CONTENT ID & AC1
S146
UPDATE CRL & CRL_ver IN THE MEMORY CARD ACCORDING TO CRL_dat
S148
RECORD LICENSE ID, CONTENT ID & AC1 IN LICENSE INFO HOLD UNIT
S150
RECORD [Data]Kc and Data-inf IN MEMORY
S158
REQUEST DISTRIBUTION OF CONTENT DATA
S152
RECEIVE [Data]Kc//Data-inf & ACCEPT [Data]Kc & Data-inf
S156
TRANSMIT ACCEPTANCE OF DISTRIBUTION
S160
OBTAIN [Data]Kc & Data-inf FROM DATABASE & OUTPUT [Data]Kc//Data-inf
S154
RECEIVE ACCEPTANCE OF DISTRIBUTION
S162
DISTRIBUTION ENDING PROCESS
S164
END
S170

FIG.11

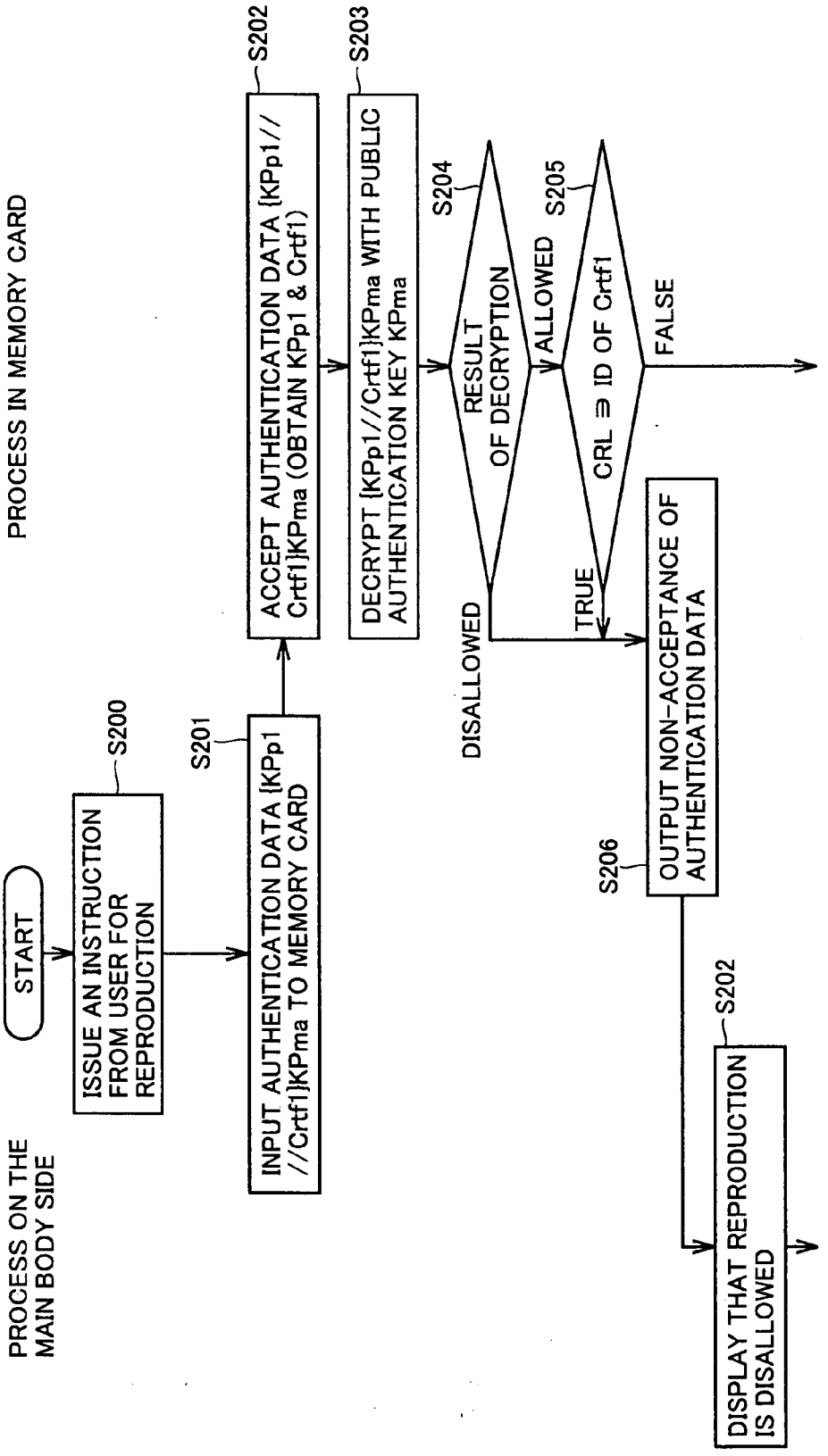

PROCESS ON THE MAIN BODY SIDE
PROCESS IN MEMORY CARD
START
ISSUE AN INSTRUCTION FROM USER FOR REPRODUCTION
S200
INPUT AUTHENTICATION DATA {KPp1 //Crtf1}KPma TO MEMORY CARD
S201
ACCEPT AUTHENTICATION DATA {KPp1// Crtf1}KPma (OBTAIN KPp1 & Crtf1)
S202
DECRYPT {KPp1//Crtf1}KPma WITH PUBLIC AUTHENTICATION KEY KPma
S203
RESULT OF DECRYPTION
S204
DISALLOWED
ALLOWED
CRL ∋ ID OF Crtf1
S205
TRUE
FALSE
OUTPUT NON-ACCEPTANCE OF AUTHENTICATION DATA
S206
DISPLAY THAT REPRODUCTION IS DISALLOWED
S202

FIG.12

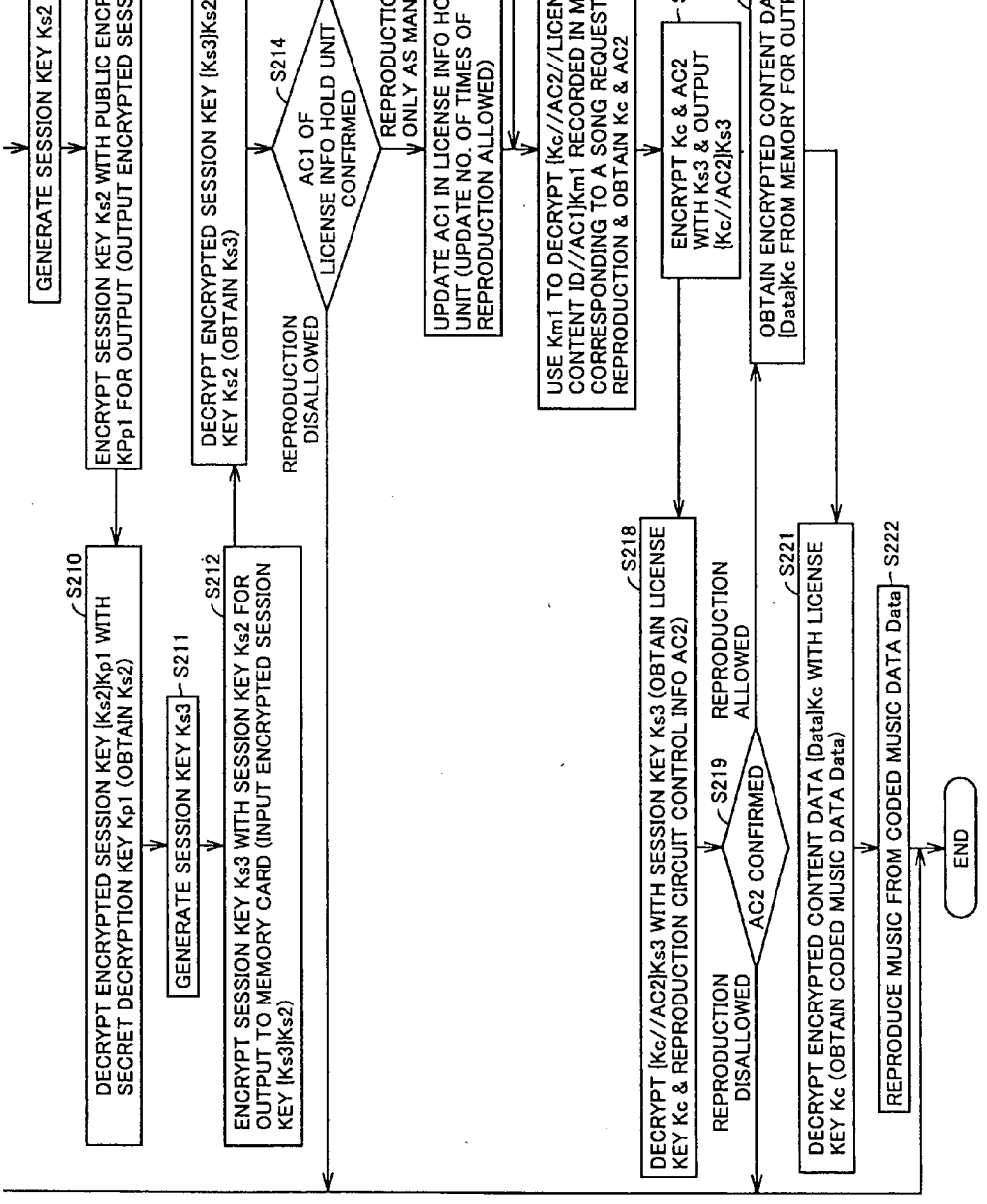

PROCESS ON THE MAIN BODY SIDE
PROCESS IN MEMORY CARD
GENERATE SESSION KEY Ks2
S208
S209
ENCRYPT SESSION KEY Ks2 WITH PUBLIC ENCRYPTION KEY KPp1 FOR OUTPUT (OUTPUT ENCRYPTED SESSION KEY {Ks2}Kp1
S213
DECRYPT ENCRYPTED SESSION KEY {Ks3}Ks2 WITH SESSION KEY Ks2 (OBTAIN Ks3)
S214
AC1 OF LICENSE INFO HOLD UNIT CONFIRMED
REPRODUCTION ALLOWED AS MANY TIMES AS DESIRED
REPRODUCTION DISALLOWED
REPRODUCTION ALLOWED ONLY AS MANY TIMES AS LIMITED
S215
UPDATE AC1 IN LICENSE INFO HOLD UNIT (UPDATE NO. OF TIMES OF REPRODUCTION ALLOWED)
S216
USE Km1 TO DECRYPT {Kc//AC2//LICENSE ID// CONTENT ID//AC1}Km1 RECORDED IN MEMORY & CORRESPONDING TO A SONG REQUESTED FOR REPRODUCTION & OBTAIN Kc & AC2
S217
ENCRYPT Kc & AC2 WITH Ks3 & OUTPUT {Kc//AC2}Ks3
S220
OBTAIN ENCRYPTED CONTENT DATA {Data}Kc FROM MEMORY FOR OUTPUT
S210
DECRYPT ENCRYPTED SESSION KEY {Ks2}Kp1 WITH SECRET DECRYPTION KEY Kp1 (OBTAIN Ks2)
S211
GENERATE SESSION KEY Ks3
S212
ENCRYPT SESSION KEY Ks3 WITH SESSION KEY Ks2 FOR OUTPUT TO MEMORY CARD (INPUT ENCRYPTED SESSION KEY {Ks3}Ks2)
S218
DECRYPT {Kc//AC2}Ks3 WITH SESSION KEY Ks3 (OBTAIN LICENSE KEY Kc & REPRODUCTION CIRCUIT CONTROL INFO AC2)
S219
AC2 CONFIRMED
REPRODUCTION DISALLOWED
REPRODUCTION ALLOWED
S221
DECRYPT ENCRYPTED CONTENT DATA {Data}Kc WITH LICENSE KEY Kc (OBTAIN CODED MUSIC DATA Data)
S222
REPRODUCE MUSIC FROM CODED MUSIC DATA Data
END

FIG.13

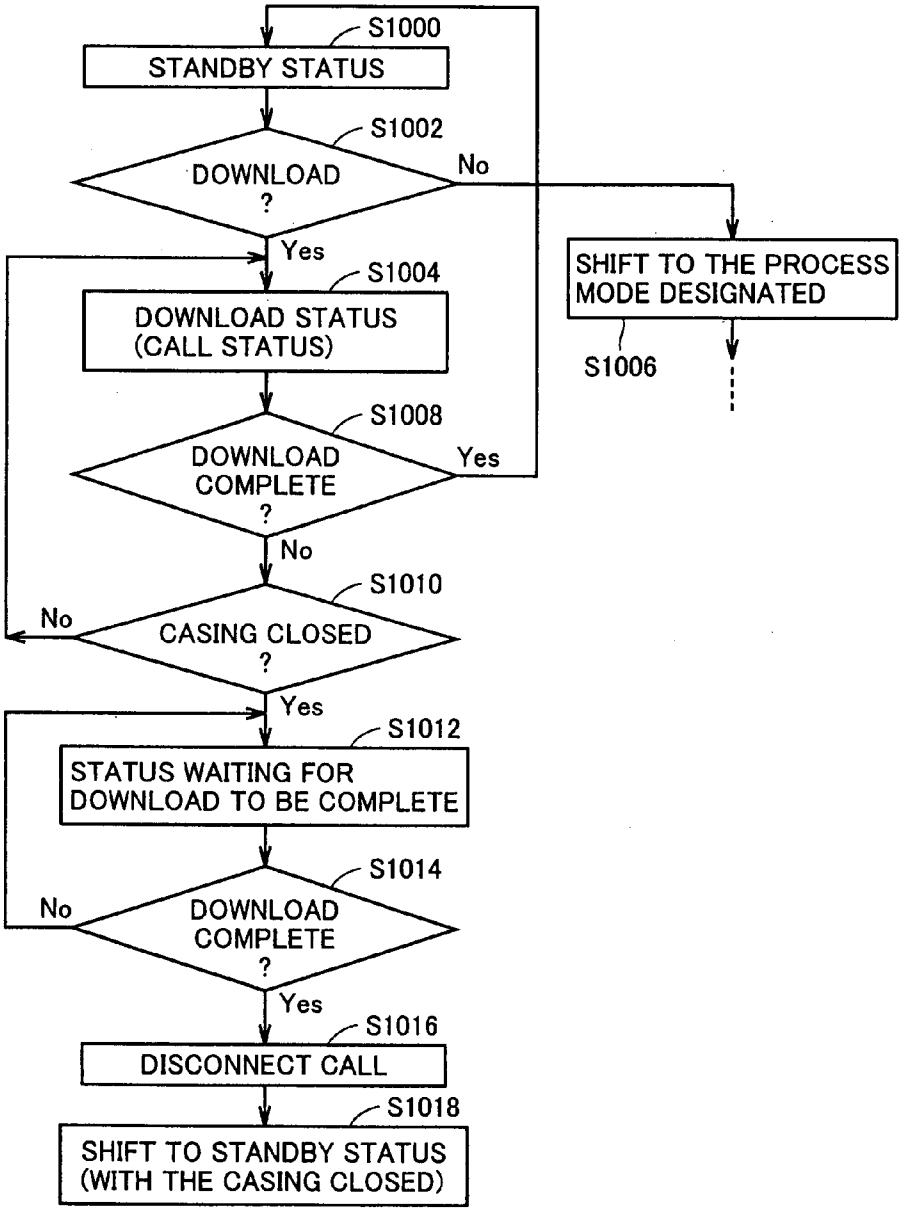

S1000
STANDBY STATUS
S1002
DOWNLOAD ?
No
Yes
SHIFT TO THE PROCESS MODE DESIGNATED
S1006
S1004
DOWNLOAD STATUS (CALL STATUS)
S1008
DOWNLOAD COMPLETE ?
Yes
No
S1010
CASING CLOSED ?
No
Yes
S1012
STATUS WAITING FOR DOWNLOAD TO BE COMPLETE
S1014
DOWNLOAD COMPLETE ?
No
Yes
S1016
DISCONNECT CALL
S1018
SHIFT TO STANDBY STATUS (WITH THE CASING CLOSED)

FIG.14

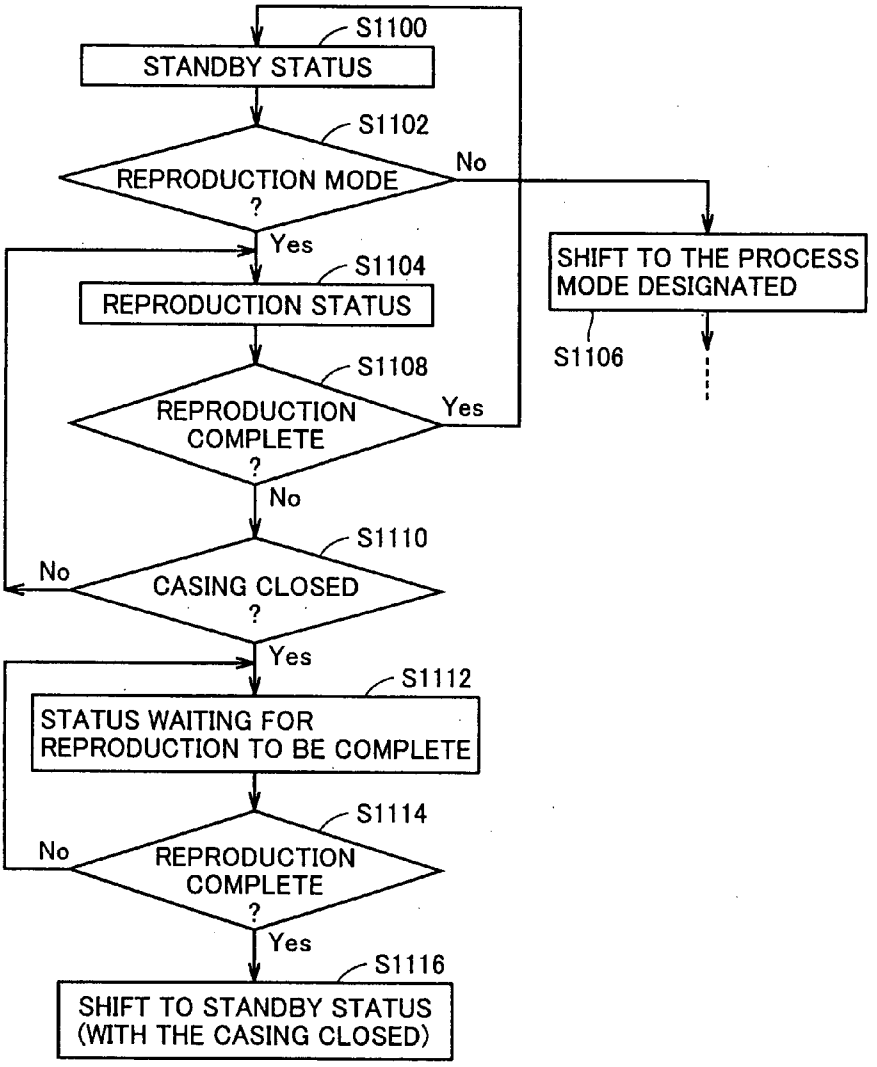

S1100
STANDBY STATUS
S1102
REPRODUCTION MODE ?
No
Yes
SHIFT TO THE PROCESS MODE DESIGNATED
S1106
S1104
REPRODUCTION STATUS
S1108
REPRODUCTION COMPLETE ?
Yes
No
S1110
CASING CLOSED ?
No
Yes
S1112
STATUS WAITING FOR REPRODUCTION TO BE COMPLETE
S1114
REPRODUCTION COMPLETE ?
No
Yes
S1116
SHIFT TO STANDBY STATUS (WITH THE CASING CLOSED)

FIG.15

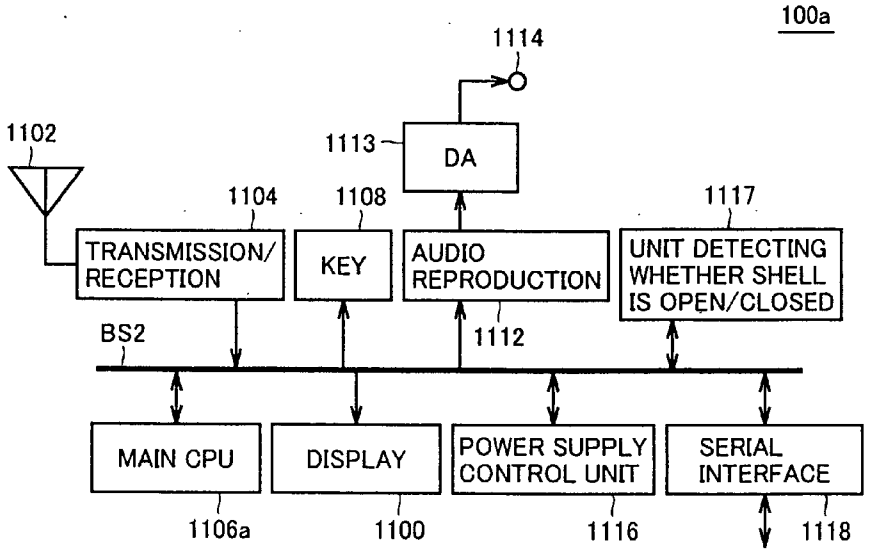
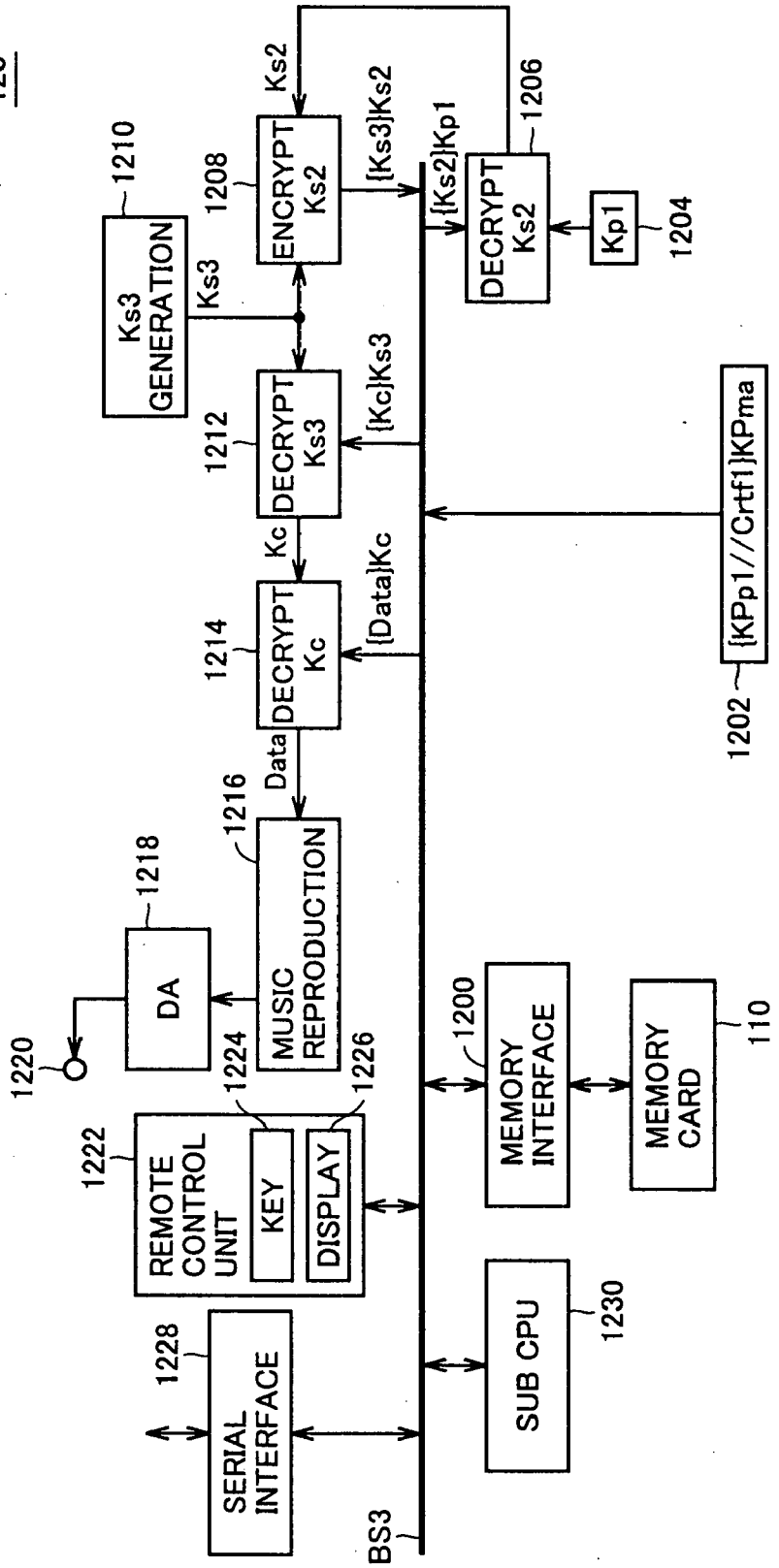

100a
1114
1102
1113
DA
1104
1108
1117
TRANSMISSION/ RECEPTION
KEY
AUDIO REPRODUCTION
UNIT DETECTING WHETHER SHELL IS OPEN/CLOSED
BS2
1112
MAIN CPU
DISPLAY
POWER SUPPLY CONTROL UNIT
SERIAL INTERFACE
1106a
1100
1116
1118

FIG.16


120
1210
Ks3 GENERATION
Ks3
1208
ENCRYPT Ks2
Ks2
1206
[Ks3]Ks2
[Ks2]Kp1
DECRYPT Ks2
Kp1
1204
1212
DECRYPT Ks3
[Kc]Ks3
Kc
1214
DECRYPT Kc
[Data]Kc
Data
1216
MUSIC REPRODUCTION
1218
DA
1220
1224
1226
1222
REMOTE CONTROL UNIT
KEY
DISPLAY
1200
MEMORY INTERFACE
MEMORY CARD
110
1228
SERIAL INTERFACE
SUB CPU
1230
BS3
[KPp1//Crtf1]KPma
1202

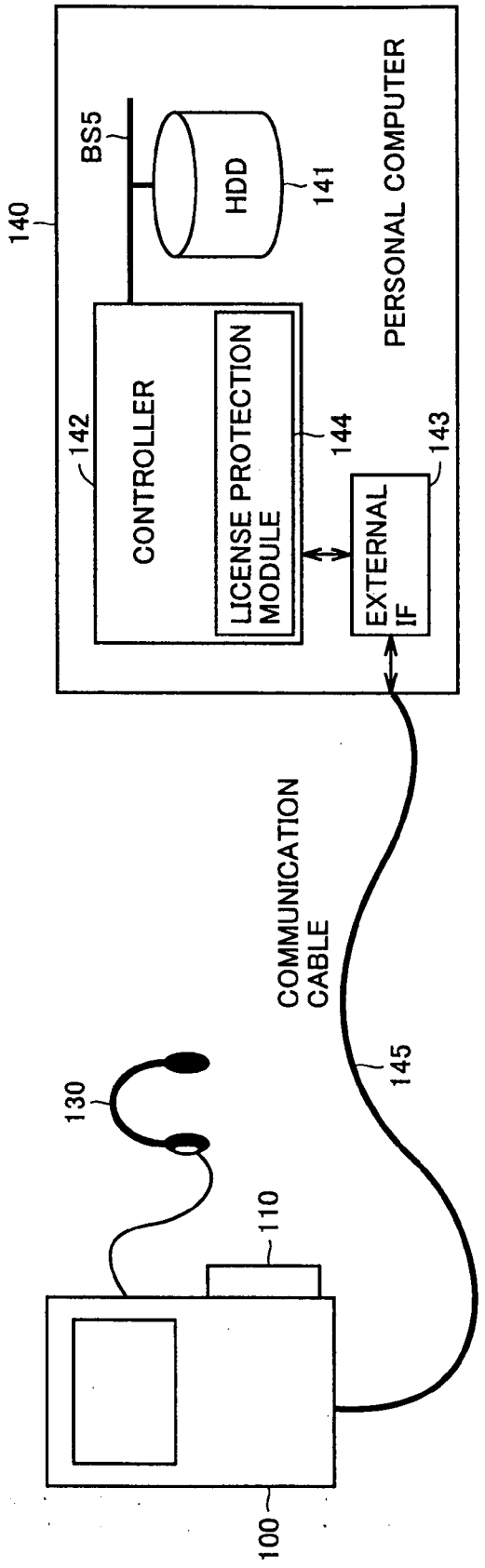

PERSONAL COMPUTER
140
BS5
HDD
141
CONTROLLER
142
LICENSE PROTECTION MODULE
144
EXTERNAL IF
143
COMMUNICATION CABLE
145
130
110
100

FIG.17

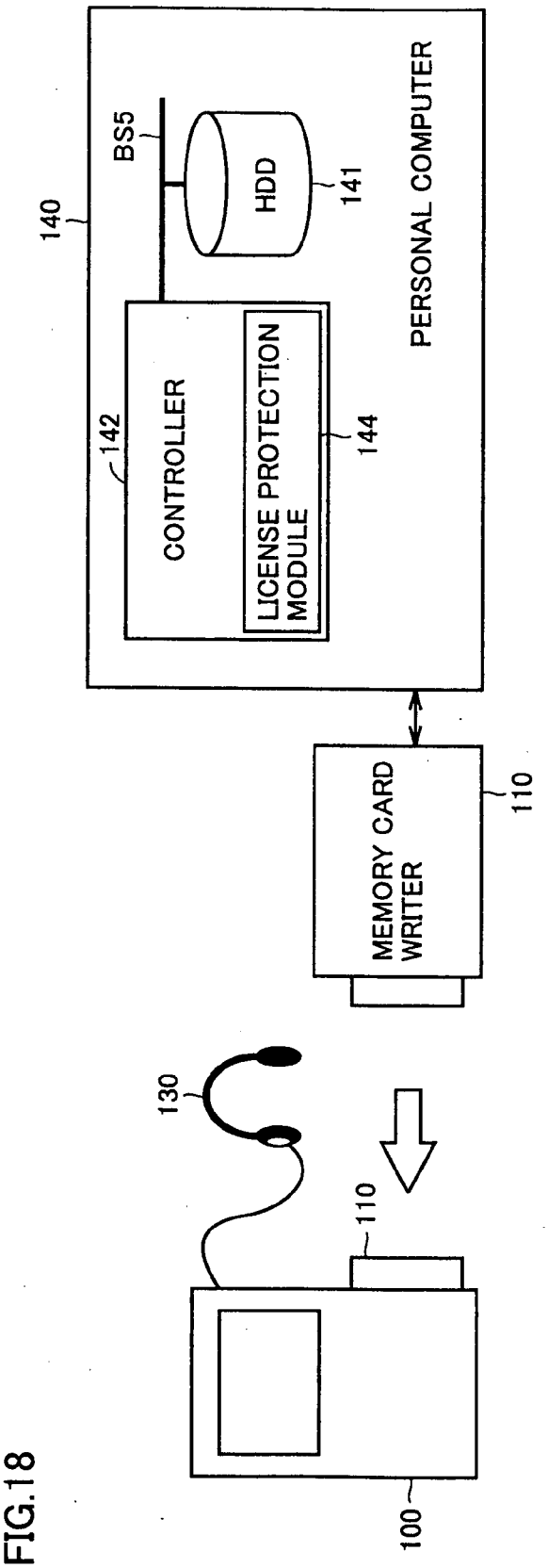

PERSONAL COMPUTER
140
BS5
HDD
141
CONTROLLER
142
LICENSE PROTECTION MODULE
144
MEMORY CARD WRITER
110
130
110
100

FIG.18

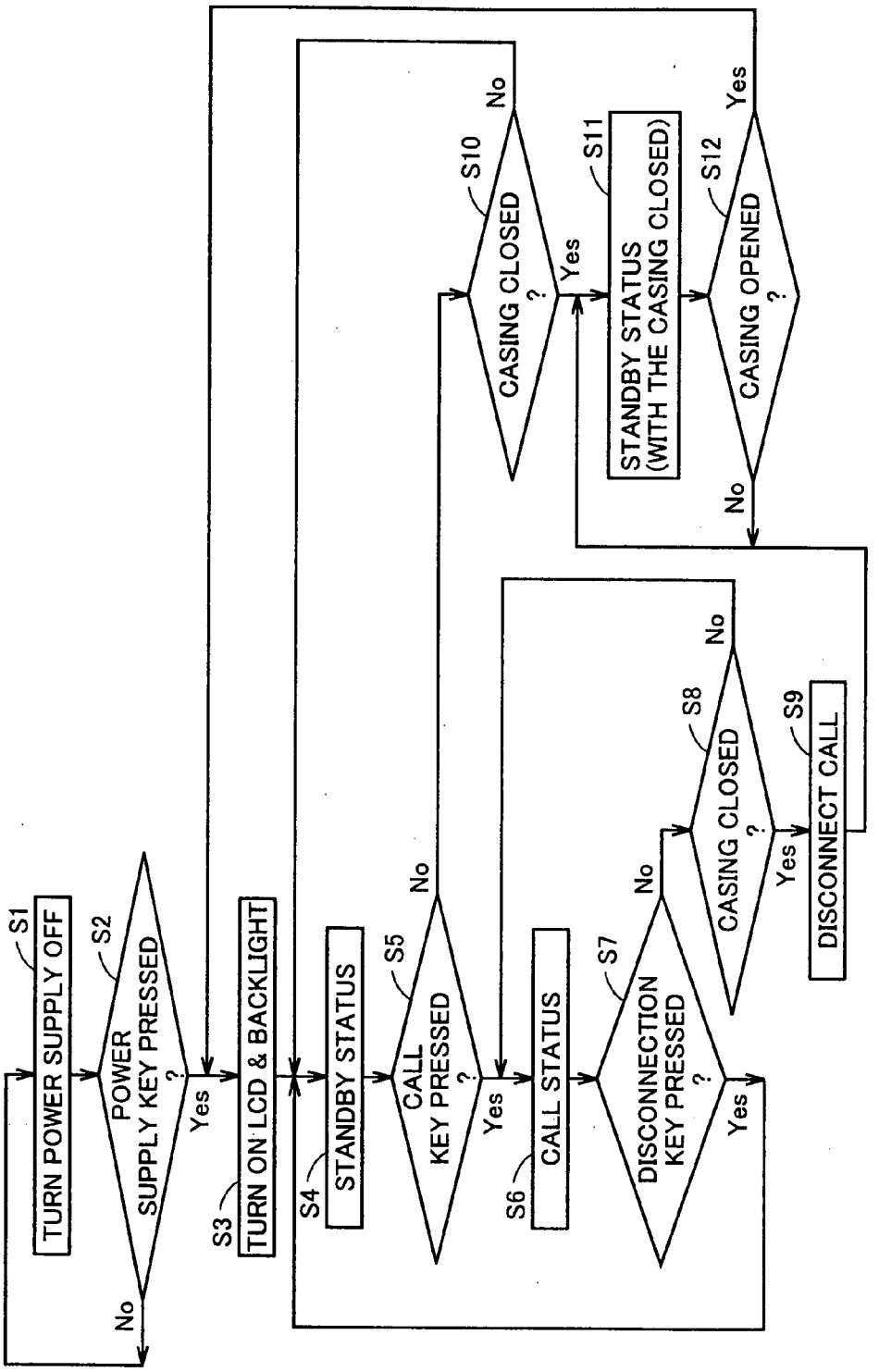


FIG.19 PRIOR ART

DATA TERMINAL DEVICE

[0001] This application is a Continuation application of application Ser. No. 09/931,858, filed Aug. 20, 2001 and claims the benefit of priority of Japanese Application No. 2000-286582(P), filed on Sep. 21, 2000, the contents of which are incorporated by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to data terminal devices used in data distribution systems capable of protecting the copyright of copied information.

[0004] 2. Description of the Background Art

[0005] In recent years the Internet and other similar information communication networks have advanced and a cellular phone or the like is used for a personal terminal to allow the user to readily access network information.

[0006] On such an information communication network a digital signal is used to transmit information. As such, if a user copies music, video data or the like transmitted on such an information communication network as described above, each individual user can copy such data almost free of significant degradation in the quality of sound, image and the like.

[0007] Thus, if music data, image data or other similar creations in copyright are transmitted on such an information communication network without any appropriate approach taken to protect the copyright, the copyright owner may have his/her right infringed significantly.

[0008] However, prioritizing copyright protection and preventing distribution of copyrighted data on a rapidly expanding digital information communication work, is disadvantageous to copyright owners, who basically can collect a predetermined copyright fee for copying copyrighted data.

[0009] In contrast, if digital data recorded in a recording medium, e.g., music data recorded in a normally sold compact disc (CD), is copied to a magneto-optical disk (such as an MD), it may be copied, as desired, as long as the copied data is solely for personal use, although an individual user who example digitally records data is required to indirectly pay as a bond to the copyright owner a predetermined portion of the price of the exact digital recording equipment, MD or any other similar media used by the user.

[0010] In addition, if music data in a digital signal is copied from a CD to an MD the information is digital data copied without significant degradation and accordingly equipment is configured to prevent copying music data from a recordable MD to another MD and thus protect copyright.

[0011] As such, distributing music data, image data and other similar data to the public on a digital information communication network is itself a behavior subject to a restriction attributed to a public transmission right of a copyright owner and a sufficient approach is accordingly required for protection of copyright.

[0012] Conventional cellular phones have a casing in the form of a shell. When the casing is closed, the current telephone call is disconnected and the cellular phone enters a low power consumption mode.

[0013] More specifically, with reference to FIG. **19**, the cellular phone is powered off (step S**1**). Whether or not the power supply key has been pressed, is detected (step S**2**). If so then a liquid crystal display, a backlight and the like are turned on (step S**3**). If not then the control returns to step S**1**.

[0014] Then a standby status is conferred (step S**4**) and the control determines whether a call key has been pressed (step S**5**). If so then a call status is conferred (step S**6**). If not then the control moves on to step S**10** to determine whether the casing in the form of the shell is open or closed.

[0015] During a call, the control determines whether a disconnection key has been pressed to disconnect the call (step S**7**). If so then the control returns to step S**4**.

[0016] If not then the control determines whether the casing has been closed (step S**8**). If not then the control returns to step S**6**.

[0017] If so the call is disconnected (step S**9**) and the cellular phone is conferred a standby status on with the casing closed (step S**11**). In the step S**11** condition a low power supply consumption mode is set.

[0018] At step S**10** if the control determines that the casing has been closed then the control moves on to step S**11** and if the control determines that the casing is open then the control moves on to step S**4**.

[0019] In the step S**11** condition, the control determines whether the casing is open or closed (step S**12**) and if the casing is closed then the control stays at step S**11** and if the casing is opened then the control moves on to step S**3**.

[0020] In other words, to continue a call (including mails, communications via personal computers, and the like) the conventional cellular phone in the form of a shell must have its casing in the form of the shell kept open.

[0021] Conventional cellular phones in the form of a shell cannot download or reproduce encrypted content data with a copyright sufficiently protected, a license key and the like. If the encrypted content data, the license key and the like are configured to be downloaded and reproducible, the cellular phone still needs to have its casing in the form of the shell kept open while it downloads or reproduces the data, the key and the like. Such is particularly inconvenient if a large amount of data such as music content is downloaded and reproduced as the casing needs to be kept open for a long period of time.

SUMMARY OF THE INVENTION

[0022] Therefore the present invention contemplates a data terminal device having a casing and capable of continuing to download encrypted content data, a license key and the like or reproduce encrypted content data with the casing closed.

[0023] The present invention in one aspect provides a data terminal device accommodated in a casing, including: a detection unit detecting whether the casing is open/closed; and a control unit supplying power required for downloading content data, even if the detection unit detects that the casing is closed after downloading the content data has started.

[0024] Preferably when the data terminal device with the casing closed completes downloading the content data, the

control unit for example stops supplying the power and controls a standby mode function of various components internal to the data terminal device to shift the data terminal device to a low power consumption mode.

[0025] The present invention in another aspect provides a data terminal device accommodated in a casing, including: a detection unit detecting whether the casing is open/closed; and a control unit continuing downloading content data, even if the detection unit detects that the casing is closed after downloading the content data has started.

[0026] The present invention in still another aspect provides a data terminal device accommodated in a casing, including: a detection unit detecting whether the casing is open/closed; and a control unit supplying power required for reproducing content data, even if the detection unit detects that the casing is closed after reproducing the content data has started.

[0027] Preferably when the data terminal device with the casing closed completes reproducing the content data, the control unit for example stops supplying the power and controls a standby mode function of various components internal to the data terminal device to shift the data terminal device to a low power consumption mode.

[0028] The present invention in still another aspect provides a data terminal device accommodated in a casing, including: a detection unit detecting whether the casing is open/closed; and a control unit continuing reproducing content data, even is the detection unit detects that the casing is closed after reproducing the content data has started.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] In the drawing:

[0030] FIG. **1** is a schematic diagram illustrating a concept of a data distribution system;

[0031] FIGS. **2**A, **2**B and **2**C show a cellular phone with its casing in the form of a shell opened and closed;

[0032] FIGS. **3**-**5** are tables of data, information and the like used in the FIG. **1** data distribution system for communication;

[0033] FIG. **6** is a schematic block diagram showing a configuration of a license server;

[0034] FIG. **7** is a block diagram showing a configuration of a cellular phone;

[0035] FIG. **8** is a block diagram showing a configuration of a memory card;

[0036] FIGS. **9** and **10** are first and second flow charts, respectively, for illustrating a distribution operation in the FIG. **1** data distribution system;

[0037] FIGS. **11** and **12** are first and second flow charts, respectively, for illustrating a reproduction operation in a cellular phone;

[0038] FIG. **13** is a flow chart representing a relationship between opened and closed positions of a casing of a cellular phone in the form of a shell in the first embodiment and a download process;

[0039] FIG. **14** is a flow chart representing a relationship between the opened and closed positions of the casing of cellular phone in the form of the shell in the first embodiment and a reproduction process;

[0040] FIG. **15** is a block diagram showing a configuration of a main body of a cellular phone in a second embodiment;

[0041] FIG. **16** is a block diagram showing a configuration of a music reproduction module in the second embodiment;

[0042] FIG. **17** is a schematic diagram for illustrating a concept of distributing encrypted content data by means of a computer;

[0043] FIG. **18** is another schematic diagram for illustrating a concept of distributing encrypted content data by means of a computer; and

[0044] FIG. **19** is a flow chart for illustrating a power supply to a conventional cellular phone in the form of a shell.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] The embodiments of the present invention will now be described with reference to the drawings more specifically. In the figures, like portions are denoted by like reference characters.

First Embodiment

[0046] FIG. **1** is a schematic diagram for illustrating a concept of a general configuration of a data distribution system wherein a distribution server distributes encrypted content, which a data terminal device of present invention reproduces, to a memory card.

[0047] Note that hereinafter a description will by way of example be provided of a configuration of a data distribution system distributing digital music data to each cellular phone user on a cellular phone network, although, as will be apparent from the following description, the present invention is not limited thereto and it is also applicable to distributing content data corresponding to other types of creations, such as image data, animated image data, and the like. Furthermore the present invention is also applicable to distribution on different information communication networks.

[0048] With reference to FIG. **1**, license server **10**, managing copyrighted music data, is accessed by a cellular phone user **1** requesting a data distribution via a cellular phone **100** having a memory card **110** attached thereto. The server effects an authentication process to determine whether memory card **110** holds proper authentication data or memory card **110** is a proper memory card and if so then it uses a predetermined encryption system to encrypt music data (hereinafter also be referred to as content data) and provides such encrypted content data to a cellular phone company corresponding to a distribution carrier **20** distributing data.

[0049] Distribution carrier **20** receives a distribution request from each cellular phone user and relays it via its cellular phone network to license server **10**. License server **10**, in response to the distribution request, confirms whether the memory card or the like is proper equipment and if so then license server **10** encrypts the requested content data and distributes the encrypted content data on the cellular

phone network of distribution carrier **20**. The data is thus distributed to the cellular phone of the cellular phone user and thus received by the memory card attached thereto.

[**0050**] In FIG. **1**, for example a cellular phone user **1** uses a cellular phone **100** with a detachable memory card **110** attached thereto. Memory card **110** receives the encrypted content data received by cellular phone **10** and stores the data. Furthermore, memory card **110** receives a license key through an authentication process effected for the aforementioned distribution and stores data. Then memory card **110** decrypts encrypted data and provides the decrypted data to a music reproduction unit (not shown) of cellular phone **100**.

[**0051**] Furthermore, a cellular phone user can listen, for example via a headphone **130** connected to cellular phone **100**, to encrypted content data that is decrypted with a license key and thus "reproduced."

[**0052**] Hereinafter, such license server **10** and distribution carrier **20** will generally be referred to as a distribution server **30**.

[**0053**] Furthermore, a process of transmitting content data from distribution server **30** for example to each cellular phone will be referred to as "distribution."

[**0054**] Cellular phone **100** has a casing in the form of a shell, as shown in FIGS. **2**A-**2**C. The casing is formed of a main body **3000**, a flap **3002** and a movable joint **3004**. For example, main body **3000** has keys **1108** arranged to allow a user to input data, and flap **3002** has a display **1100** arranged to display data. Movable joint **3004** allows cellular phone **100** to be closed from an opened position as shown in FIGS. **2**A and **2**B to a closed position as shown in FIG. **2**C and also opened from the FIG. **2**C closed position to the FIGS. **2**A and **2**B opened position.

[**0055**] As will be described hereinafter, a detection unit **1117** detects whether the casing in the form of the shell is open or closed. For example, it determines that the casing is closed when a specific portion **3008***a* on a surface of main body **3000** is brought into contact with a specific portion **3008***b* on a surface of flap **3002**.

[**0056**] As has been described above, when it has been confirmed that memory card **110** attached to cellular phone **100** is a proper memory card, distribution server **30** distributes content data. As such, first of all, if memory card **110** is not used, content data distributed by distribution server **30** can hardly be received or reproduced as music.

[**0057**] Furthermore, if whenever distribution carrier **20** distributes the content data of a single piece of music the distribution frequency increments and whenever a cellular phone user receives or downloads the content data a copyright fee incurs and it is collected by distribution carrier **20** together with the phone toll of the cellular phone, the copyright owner can readily collect the copyright fee.

[**0058**] In such a configuration, to allow encrypted and distributed content data to be reproduced on the side of a cellular phone user, a system is initially required to be a system for distributing an encryption key in a communication, secondly the exact system encrypting content data to be distributed, thirdly a configuration implementing content data protection for preventing such distributed content data from being copied without permission, and fourthly a configuration capable of completing a currently continuing process (e.g., a download process, a reproduction process) with the casing in the form of a shell closed.

[**0059**] In the first embodiment, in particular when any of distribution and reproduction sessions occurs, whether or not the content data's destination is a proper destination can be determined and checked severely, and for any recording devices and content reproduction devices (cellular phones) that are not authenticated or are with a decryption key broken, outputting the content data thereto can be prevented and the copyright of the content data can thus more firmly be protected, and furthermore in a cellular phone with the casing in the form of a shell closed a currently continuing download process or reproduction process still can be completed.

[**0060**] FIG. **3** is a list of characteristics of data, information and the like used in the FIG. **1** data distribution system for a communication.

[**0061**] Initially, data distributed from distribution server **30** will be described. "Data" is content data such as music data. Content data Data is encrypted, decryptable with a license key Kc. It is encrypted with license key (hereinafter also be referred to as a "content key") Kc to be decryptably encrypted content data {Data} Kc which is in turn distributed from distribution server **30** to a cellular phone user.

[**0062**] Note that hereinafter, a representation {Y} X will refer to data Y encrypted decryptable with a decryption key X.

[**0063**] Furthermore, distribution server **30** distributes together with the encrypted content data additional information Data-inf corresponding to plaintext information on the copyright of content data, server access, and the like. Furthermore, as the license information, there exist a content ID serving as a code for identifying content data Data and a license ID serving as a management code capable of specifying an issuance of a license, and access restriction information AC**1** and reproduction circuit control information AC**2** generated from license purchasing condition AC including a number of licenses, a limitation on a function and other similar information that are determined as designated by a user. Hereinafter license key Kc, the content ID, the license ID, access control information AC**1** and reproduction circuit control information AC**2** will generally be referred to as a license.

[**0064**] Reference will now be made to FIG. **4** to describe characteristics of data, information and the like used in the FIG. **1** data distribution system for an authentication and operating a revocation class list.

[**0065**] In the first embodiment a class revocation list (CRL) is used to revoke content data distribution and reproduction for each recording device (memory card) class and each content data reproducing, data terminal device (cellular phone) class. Hereinafter, CRL will also represent data in the class revocation list, as required.

[**0066**] Information related to the class revocation list includes class revocation list data CRL listing classes of data terminal devices and memory cards that are revoked from license distribution and reproduction.

[**0067**] Class revocation list data CRL is managed in distribution server **30** and also recorded and thus held in a memory card. Such a class revocation list needs to be

upgraded, as appropriate, to update data. To change the data, distribution server **30** generates differential data CRL_dat basically reflecting only the changed portion(s) of the data and class revocation list CRL in the memory card is rewritten accordingly. Furthermore, the version of the class revocation list is managed by distribution server **30**, which receives and confirms CRL.sub.13 ver output from the memory card. Differential data CRL.sub.13 dat also includes information on a new version. Furthermore the version information may includes a date and time when the data is updated.

[**0068**] Thus class revocation list CRL can be held and managed not only in a distribution server but also in a memory card to revoke distributing a license key to a data terminal device and memory card with a decryption key unique to the class, or a decryption key unique to the type of the data terminal device and memory card, broken. Thus the data terminal device cannot reproduce content data and the memory card cannot transfer content data.

[**0069**] Thus, class revocation list CRL in a memory card is configured to have data updated successively when distribution is effected. Furthermore in a memory card class revocation list CRL is managed for example by recording it in a memory card at a tamper resistant module independently of the upper level(s) to prevent class revocation list data CRL from being improperly changed from the upper level(s) by means for example of file systems, application programs and the like. Thus, protection of copyright of data can further be enhanced.

[**0070**] A data terminal device (a cellular phone) and a memory card are provided with unique public encryption keys KPpn and KPmci, respectively. Public encryption keys KPpn and KPmci are decryptable with a secret decryption key Kpn unique to the data terminal device and a secret decryption key Kmci unique to the memory card, respectively. These public encryption and secret decryption keys each have a different value for each data terminal device type and each memory card type. These public encryption and secret decryption keys will generally be referred to as a class key.

[**0071**] Furthermore, there are also provided class certificates Crtfn and Cmci for a reproduction circuit and a memory card, respectively.

[**0072**] These class certificates have different information for each memory card class and each content reproduction unit (cellular phone) class. A class key with an encryption thereby broken, i.e., that with a secret decryption key obtained is listed on the class revocation list and thus prevented from license issuance.

[**0073**] The public encryption keys and class certificates unique to the memory card and the content reproduction unit are recorded in a memory card and a cellular phone in the form of authentication data {KPmci//Cmci}KPma and {KPpn//Crtfn}KPma, respectively, when they are shipped. As will be described more specifically, KPma represents a public authentication key shared throughout a distribution system.

[**0074**] FIG. **5** collectively describes characteristics of keys relating to an encryption process in the FIG. **1** data distribution system.

[**0075**] When a memory card externally communicates data, encryption keys Ks**1**-Ks**3** are used to keep the secret. Keys Ks**1**-Ks**3** are common keys generated by server **30**, cellular phone **100**, and memory card **110** whenever content data is distributed and reproduced.

[**0076**] Herein, common keys Ks**1**-Ks**3** are unique common keys generated for each "session" corresponding to a unit of communication or a unit of access between a server, a cellular phones and a memory cards and hereinafter will also be referred to as "session keys."

[**0077**] Session keys Ks**1**-Ks**3** each have a unique value for each communication session and thus managed by a distribution server, a cellular phone and a memory card. More specifically, session key Ks**1** is generated by the distribution server for each distribution session. Session key Ks**2** is generated by the memory card for each distribution session and each reproduction session, and session key Ks**3** is generated in the cellular phone for each reproduction session. In each session, these session keys can be communicated at a session key generated by other equipment can be received and used to effect encryption and a license key and the like can then be transmitted to enhance security in the session.

[**0078**] Furthermore, as a key for managing a data-processing in memory card **110**, there exist a public encryption key KPm set for each medium corresponding to a memory card and a secret decryption key Km unique to each memory card and capable of decrypting data encrypted with public encryption key KPm.

[**0079**] FIG. **6** is a schematic block diagram showing a configuration of the FIG. **1** license server **10**.

[**0080**] License server **10** includes an information database **304** provided to hold content data encrypted in a predetermined system, information on distribution for example of a license ID and the like, an account database **302** provided to hold account information for each cellular phone user starting an access to content data, a CRL database **306** provided to manage class revocation list CRL, a data processing unit **310** receiving data from information database **304**, account database **302** and CRL database **306** via a data bus Bs**1** and processing the received data, as predetermined, and a communication device **350** communicating data between distribution carrier **20** and data processing unit **310** on a communication network.

[**0081**] Data processing unit **310** includes a distribution control unit **315** receiving data on data bus BS**1** and accordingly controlling an operation of data processing unit **310**, a session key generation unit **316** controlled by distribution control unit **315** to generate session key Ks**1** in a distribution session, a decryption unit **312** receiving via communication device **350** and on data bus BS**1** authentication data {KPmci//Cmci}KPma for authentication transmitted from a memory card and a cellular phone, and decrypting the received data with public authentication key KPma, an encryption unit **318** encrypting session key Ks**1** generated by session key generation unit **316**, with public encryption key KPmci obtained by decryption unit **312**, for output on data bus BS**1**, and a decryption unit **320** receiving and decrypting data encrypted with session key Ks**1** and then transmitted on data bus BS**1**.

[**0082**] Data processing unit **310** further includes an encryption unit **326** encrypting license key Kc and repro-

duction circuit control information AC2 received from distribution control unit **315** with public encryption key KPm obtained by decryption unit **320** that is unique to a memory card, and an encryption unit **328** further encrypting an output of encryption unit **326** with session key Ks**2** received from decryption unit **320**, for output on data bus BS**1**.

[**0083**] License server **10** in a distribution session operates, as will later be described with reference to a flow chart.

[**0084**] FIG. **7** is a schematic block diagram for illustrating a configuration of the FIG. **1** cellular phone **100**.

[**0085**] Cellular phone **100** includes an antenna **1102** receiving a signal transmitted on a cellular phone network by wireless, a transmission and reception unit **1104** receiving a signal from antenna **1102** and converting the received signal to a baseband signal or modulating data received from the cellular phone and providing the modulated data to antenna **1102**, a data bus BS**2** allowing data communication between components of cellular phone **100**, and a controller **1106** controlling an operation of cellular phone **100** via data bus BS**2**.

[**0086**] Cellular phone **100** further includes a key operation unit **1108** operated to input an external instruction to cellular phone **100**, a display **1100** presenting information output for example from controller **1106** to a cellular phone user visibly, and an audio reproduction unit **1112** operative in a normal conversation operation to reproduce speech based on data received on data bus BS**2**.

[**0087**] Cellular phone **100** also includes a DA converter **1113** converting an output of audio reproduction unit **1112** from a digital signal to an analog signal, and a terminal **1114** outputting an output of DA converter **1113** for example to an external output device.

[**0088**] Cellular phone **100** further includes a detachably attachable memory card **110** storing and decrypting content data (music data) received from distribution server **30**, and a memory interface **1200** controlling data communication between memory card **110** and data bus BS**2**.

[**0089**] Cellular phone **100** further includes an authentication data hold unit **1202** holding authentication data {KPp1// Crtf1}KPma, an encryption of public encryption key KPp**1** and class certificate Crtf**1** set for each cellular phone type (or class) that has its authenticity verified when they are decrypted with public decryption key KPma.

[**0090**] Cellular phone **100** further includes a Kp1 hold unit **1204** holding a decryption key Kp**1** unique to the class of the cellular phone (the content reproduction circuit), and a decryption unit **1206** using decryption key Kp**1** to decrypt data received on data bus BS**2**, and obtaining session key Ks**2** generated by memory card **110**.

[**0091**] Cellular phone **100** further includes a session key generation unit **1210** using a random number or the like to generate session key Ks**3** for encrypting data communicated with memory card **110** on data bus BS**2** in a reproduction session reproducing content data stored in memory card **110**, and an encryption unit **1208** using session key Ks**2** obtained by decryption unit **1206**, to encrypt generated session key Ks**3** for output on data bus BS**2**.

[**0092**] Cellular phone **100** further includes a decryption unit **1212** using session key Ks**3** to decrypt data on data bus BS**2** for output.

[**0093**] Cellular phone **100** further includes a decryption unit **1214** receiving encrypted content data {Data}Kc on data bus BS**2**, decrypting the received data with license key Kc obtained from decryption unit **1212**, and outputting content data, a music reproduction unit **1216** receiving an output of decryption unit **1214** and reproducing content data, a DA converter **1218** converting an output of music reproduction unit **1216** from a digital signal to an analog signal, a switch **1222** receiving outputs of DA converters **1113** and **1218** for selective output depending on the mode of operation through terminal **1114** or **1220**, and a connection terminal **1224** receiving and connecting an output of switch unit **1222** to a headphone **130**.

[**0094**] Cellular phone **100** also includes a power supply control unit **1116** controlled by controller **1106** to control whether or not to supply power applied to operate each circuit in cellular phone **100**, and a detection unit **1117** detecting whether cellular phone **100** has its casing in the form of the shell in a closed position or an opened position. Detection unit **1117** outputs a result of detection which is in turn transferred on data bus BS**2** to controller **1106**.

[**0095**] As will be described hereinafter, controller **1106** is driven by the result received from detection unit **1117**, to control a power supply control block **1116** effecting a power supply process, a data download process, a data reproduction process, and the like.

[**0096**] Note that for the purpose of simplifying the description, FIG. **7** only shows a cellular phone at a block relating to distribution and reproduction of music data in accordance with the present invention. The cellular phone of course has a block relating to conversation, which is only partially described herein.

[**0097**] In cellular phone **100** each component operates in each session, as will later be described more specifically with reference to a flow chart.

[**0098**] FIG. **8** is a schematic block diagram for illustrating a configuration of memory card **110**. As has been described previously, there are provided public encryption key and secret decryption key KPmci and Kmci unique to each memory card and a memory card class certificate Cmci and for memory card **110** natural number i=1 for the sake of convenience.

[**0099**] Thus memory card **110** includes an authentication data hold unit **1400** holding authentication data {KPmc1// Cmc1}KPma, a Kmc hold unit **1402** holding a unique decryption key Kmc**1** set for each memory card type, a Km1 hold unit **1421** holding secret decryption key Km**1** set unique to each memory card, and a KPm1 hold unit **1416** holding public encryption key KPm**1** decryptable with Km**1**. Authentication data hold unit **1400** holds public encryption key KPmc**1** and class certificate Cmc**1** set for each memory card type and class, in the form of authentication data {KPmc1//Cmc1}KPma, an encryption of the key and the certificate that has its authenticity verified when it is decrypted with public authentication key KPma.

[**0100**] By thus providing an encryption key of a recording device corresponding to a memory card, distributed content data, an encrypted license key and the like can be managed for each memory card.

[**0101**] Memory card **110** further includes a data bus BS**3** communicating a signal with memory interface **1200** via a

terminal **1201**, a decryption unit **1404** receiving data on data bus BS**3** via memory interface **1200** and secret decryption key Kmc**1** unique to each memory card type from Kmc1 hold unit **1402**, and outputting to a contact Pa session key Ks**1** generated by distribution server **30** in a distribution session, a decryption unit **1408** receiving public authentication key KPma from KPma hold unit **1414**, using public authentication key KPma to decrypt data received on data bus BS**3**, and outputting a result of the decryption to encryption unit **1410**, and an encryption unit **1406** using a key selectively provided via switch **1442**, to encrypt data selectively provided via switch **1444**, for output on data bus BS**3**.

[**0102**] Memory card **110** further includes a session key generation unit **1418** generating session key Ks**2** in each of distribution and reproduction sessions, a encryption unit **1410** encrypting session key Ks**2** output from session key generation unit **1418**, with public encryption key KPpn or KPmci obtained by decryption unit **1408**, for output on data bus BS**3**, and a decryption unit **1412** receiving on BS**3** the data encrypted with session key Ks**2**, decrypting the received data with session key Ks**2** obtained from session key generation unit **1418**, and outputting a result of the decryption on data bus BS**4**.

[**0103**] Memory card **110** further includes a decryption unit **1422** decrypting data on data bus BS**4** with secret decryption key Km**1** unique to memory card **110** and paired with public encryption key KPm**1**, and a memory **1415** receiving on data bus BS**3** and storing therein license key Kc, reproduction circuit control information AC**2** and reproduction information (a content ID, a license ID, access control information AC**1**) encrypted with public encryption key KPm**1** and class revocation list data CRL updated, as appropriate, by differential data CRL.sub.13 dat provided to update a version of the class revocation list that is not encrypted, and also receiving and storing therein encrypted content data {Data}Kc and additional information Data-inf transmitted on data bus BS**3**. Memory **1415** is for example a semiconductor memory device.

[**0104**] Memory card **110** further includes a license information hold unit **1440** holding a license ID, a content ID and access restriction information AC**1** obtained by decryption unit **1422**, and a controller **1420** communicating data externally on data bus BS**3** and receiving reproduction information and the like on data bus BS**4** to control an operation of memory card **110**.

[**0105**] License information hold unit **1440** is capable of transmitting and receiving the data of a content ID, a license ID, access control information AC**1** on data bus BS**4**. License information hold unit **1440** has N banks, wherein N represents a natural number, and holds for each bank the license information corresponding to each license.

[**0106**] Note that in FIG. **8**, the portion surrounded by a solid line is adapted to be incorporated in memory card **110** at a module TRM so that for example when it is externally, improperly opened, internal data is erased or internal circuitry is destroyed to prevent a third party from reading for example data in a circuit existing in the portion surrounding by the solid line. Such a module is typically the tamper resistant module.

[**0107**] Of course memory **1415** may also together be incorporated into module TRM, although in the FIG. **8** configuration, with memory **1415** holding reproduction information required for reproduction, all in the form of encrypted data, a third party simply having the data in memory **1415** cannot reproduce music and furthermore it is not necessary to arrange memory **1415** in the expensive tamper resistance module and the production cost can thus be reduced.

[**0108**] The FIG. **1** data distribution system operates in each session, as will now be described more specifically with reference to a flow chart.

[**0109**] FIGS. **9** and **10** are first and second flow charts, respectively, for illustrating a distribution operation (hereinafter also referred to as a distribution session) provided in purchasing content in the FIG. **1** data distribution system.

[**0110**] In FIGS. **9** and **10** is described an operation when cellular phone user **1** uses memory card **110** to receive via cellular phone **100** content data corresponding to music data distributed from distribution server **30**.

[**0111**] Initially, cellular phone user **1** of cellular phone **100** for example presses a key button on key operation unit **1108** to issue an request to distribute data (step S**100**).

[**0112**] In memory card **110** responds to the distribution request by allowing authentication data hold unit **1400** to output authentication data {KPmc1//Cmc1}KPma (step S**102**).

[**0113**] Cellular phone **100** transmits authentication data {KPmc1//Cmc1}KPma received from memory card **110** for authentication, as well as a content ID and license purchasing condition data AC to distribution server **30** (step S**104**).

[**0114**] Distribution server **30** receives the content ID, authentication data {KPmc1//Cmc1}KPma and license purchasing condition data AC from cellular phone **100** (step S**106**) and decryption unit **312** effects a decryption process using public authentication key KPma to decrypt the authentication data output from memory card **110** (step S**108**).

[**0115**] Distribution control unit **315** is driven by a result of the decryption process in decryption unit **312** to effect an authentication process to determine whether the process of interest has been normally effected, i.e., to authenticate that memory card **110** holds public encryption key KPmc**1** and certificate Cmc**1** of a proper memory card. In doing so, distribution control unit **315** in the authentication process determines whether authentication data encrypted by an authorizer to verify its authenticity is received (step S**110**). If so then distribution control unit **315** approves and accepts public encryption key KPmc**1** and certificate Cmc**1** and moves on to a subsequent step (step S**112**). If not then the control does not approve or accept public encryption key KPmc**1** or certificate Cmc**1** and terminates the process (step S**170**).

[**0116**] When the authentication process reveals that the equipment of interest is proper equipment, distribution control unit **315** sends to CRL database **306** a query as to whether memory card **110** has class certificate Cmc**1** listed on class revocation list CRL. If so then the distribution session ends (step S**170**).

[0117] If not then the control moves on to a subsequent step (step S112).

[0118] If the authentication process reveals that a cellular phone having a memory card with proper authentication data is demanding an access and that the class is not found on the class revocation list then in distribution server **30** session key generation unit **316** produces session key Ks1 for distribution. Session key Ks1 is encrypted by encryption unit **318** using public encryption key KPmc1 obtained by decryption unit **312** and corresponding to memory card **110** (step S114).

[0119] Encrypted session key Ks1 is externally output as {Ks1}Kmc1 on data bus BS1 and via communication device **350** (step S116).

[0120] When cellular phone **100** receives encrypted session key {Ks1}Kmc1 (step S118), in memory card **110** the received data received via memory interface **1200** and transmitted on data bus BS3 is decrypted by decryption unit **1404** using secret decryption key Kmc1 held in Kmc1 hold unit **1402** and unique to memory card **110** and session key Ks1 is thus decrypted and extracted (step S120).

[0121] When controller **1420** confirms that session key Ks1 generated by distribution server **30** has accepted, it instructs session key generation unit **1418** to generate session key Ks2, which memory card **110** generates in a distribution session.

[0122] Furthermore, in the distribution session, controller **1420** extracts version data CRL.sub.13 ver of the class revocation list stored in memory **1415** and outputs the data on data bus BS4. Data CRL.sub.13 ver is information on a condition (a version) of the class revocation list recorded in memory card **110** at memory **1415**.

[0123] Encryption unit **1406** uses session key Ks1 received from decryption unit **1404** via a contact Pa of switch **1442**, to encrypt session key Ks2, public encryption key KPm1 and class revocation list version data CRL.sub.13 ver provided via switches **1444** and **1446** having their respective contacts switched successively and provide them in a series of data and output encrypted data {Ks2//KPm1//CRL_ver}Ks1 on data bus BS3 (step S122).

[0124] Encrypted data {Ks2//KPm1//CRL.sub.13 ver}Ks1 output on data bus BS3 is output therefrom via terminal **1201** and memory interface **1200** to cellular phone **100** and transmitted from cellular phone **100** to distribution server **30** (step S124).

[0125] Distribution server **30** receives encrypted data {Ks2//KPm1//CRL.sub.13 ver}Ks1, in decryption unit **320** decrypts the data with session key Ks1, and accepts session key Ks2 generated in memory card **110**, public encryption key KPm1 unique to memory card **110**, and class revocation list version data CRL.sub.13 ver in memory card **110** (step S126).

[0126] Class revocation list version information CRL.sub.13 ver is transmitted on data bus BS1 to distribution control unit **315**, which generates differential data CRL.sub.13 dat according to the accepted version data CRL.sub.13 ver (step S128). Differential data CRL.sub.13 dat represents a variation between the version of the CRL.sub.13 ver of interest and the current version of the class revocation list data in CRL database **306**.

[0127] Furthermore, distribution control unit **315** generates a license ID, access restriction information AC1 and reproduction circuit control information AC2 according to content ID and license purchasing condition AC obtained at step S106 (step S130). Furthermore it obtains license key Kc from information database **304** to decrypt encrypted content data (step S132).

[0128] With reference to FIG. **10**, distribution control unit **315** provides a generated license, i.e., license key Kc, reproduction circuit control information AC2, a license ID, a content ID and access restriction information AC1 to encryption unit **326**, which in turn encrypts the license with public encryption key KPm1 obtained by decryption unit **320** and unique to memory card **110** (step S136). Encryption unit **328** receives an output of encryption unit **326** and differential data CRL.sub.13 dat of the class revocation list output from distribution control unit **315** on data bus BS1 and encrypts them with session key Ks2 generated in memory card **110**. Encryption unit **328** outputs the encrypted data which is in turn transmitted on data bus BS1 and via communication device **350** to cellular phone **100** (step S138).

[0129] Thus, a distribution server and a memory card generate encryption keys, respectively, mutually communicate the encryption keys, use them to effect encryption, and mutually transmit the encrypted data. Thus in transmitting and receiving their respective encrypted data a mutual authentication can in effect also be achieved to enhance the security of the data distribution system.

[0130] Cellular phone **100** receives encrypted data {{Kc//AC2//license ID//content ID//AC1}Km1//CRL.sub.13 dat}Ks2 transmitted (step S140) and outputs it to memory card **110** via memory interface **1200**. In memory card **110** decryption unit **1412** decrypts the data transmitted via memory interface **1200** and on data bus BS3. Decryption unit **1412** uses session key Ks2 received from session key generation unit **1418** to decrypt the received data on data bus BS3 for output on data bus BS4 (step S142).

[0131] Output at this stage on data bus BS4 are encrypted license {KC//AC2//license ID//content ID//AC1}Km1 decryptable with secret decryption key Km1 held in Km1 hold unit **1421**, and CRL.sub.13 dat. According to an instruction from controller **1420**, encrypted license {KC//AC2//license ID//content ID//AC1}Km1 is recorded in memory **1415** (step S144). On the other hand, encrypted license {KC//AC2//license ID//content ID//AC1}Km1 is decrypted by decryption unit **1422** using secret decryption key Km1, and of the license, only the license ID, the content ID and access restriction information AC1, which are referenced in memory card **110**, are accepted (step S146).

[0132] Controller **1420** is driven by the received CRL.sub.13 dat to update class revocation list data CRL in memory **1415** and the version thereof (step S148). The license ID, the content ID and access restriction information AC1 are recorded in license information hold unit **1440** (step S150).

[0133] When the process up to step S150 normally completes in a memory card, cellular phone **100** sends a request to distribution server **30** to distribute content data (step S152).

[0134] Distribution server **30** receives the content data distribution request, obtains encrypted content data

{Data}Kc and additional information Data-inf from information database **304** and outputs these data on data bus BS**1** and via communication device **350** (step S**154**).

[**0135**] Cellular phone **100** receives {Data}Kc//Data-inf and accepts encrypted content data {Data}Kc and additional information Data-inf (step S**156**). Encrypted content data {Data}Kc and additional information Data-inf are transmitted via memory interface **1200** and terminal **1201** to data bus BS**3** of memory card **110**. Memory card **110** records the received encrypted content data {Data}Kc and additional information Data-inf in memory **1415** as they are (step S**158**).

[**0136**] Furthermore, memory card **110** transmits to distribution server **30** a notification that the distribution has been accepted (step S**160**) and when distribution server **30** receives the notification (step S**162**) a process to complete the distribution is carried out including e.g., storing account data to account database **302** (step S**164**) and the entire process ends (step S**170**).

[**0137**] Thus memory card **110** attached to cellular phone **110** is confirmed as proper equipment and public encryption keys KPp**1** and KPmc**1** successfully encrypted and transmitted together with class certificate Cmc**1** are also confirmed valid, and only then can content data be distributed in response only to a distribution request from a memory card without class certificate Cmc**1** found in the class revocation list, i.e., a class certificate list with encryption by means of public encryption keys KPp**1** and KPmc**1** that is broken. Thus, distribution to an improper memory card and distribution using a deciphered class key can be prevented.

[**0138**] Reference will now be made to FIGS. **11** and **12** to describe a reproduction operation of cellular phone **100** reproducing content data distributed to memory card **110**. With reference to FIG. **11**, when the reproduction operation starts, user **1** of cellular phone **100** operates a key operation unit **1108** to input an instruction to cellular phone **100** to reproduce content data (step S**200**). Then controller **1106** reads authentication data {KPp1//Crtf1}KPma from authentication data hold unit **1202** via data bus BS**2** and input authentication data {KPp1//Crtf1}KPma to memory card **110** via memory interface **1200** (step S**201**).

[**0139**] Then memory card **110** accepts authentication data {KPp1//Crtf1}KPma (step S**202**). Then in memory card **110** decryption unit **1408** decrypts the accepted authentication data {KPp//Crtf1}KPma with public authentication key KPma held in KPma hold unit **1414** (step S**203**) and controller **1420** effects an authentication process from a result of a decryption process effected by decryption unit **1408**. More specifically, controller **1420** effects an authentication process to determine whether authentication data {KPp1//Crtf1}KPma is proper authentication data (step S**204**). If the data cannot be decrypted, controller **1420** provides an output indicative of non-acceptance of the authentication data via data bus BS**3** and terminal **1201** to memory interface **1200** of cellular phone **100** (step S**206**). If the authentication data can be decrypted, controller **1420** determines whether the obtained certificate Crtf**1** is included in the class revocation list data read from memory **1415** (step S**205**). Since certificate Crtf**1** has been provided with an ID and controller **1420** thus determines whether the received certificate Crtf**1** has an ID existing in the class revocation list data. If controller **1420** determines that certificate Crtf**1** is included in the class revocation list data then controller **1420** provides an output indicative of non-acceptance of the authentication data via data bus BS**3** and terminal **1201** to memory interface **1200** of cellular phone **100** (step S**206**).

[**0140**] If at step S**204** authentication data cannot be decrypted with public authentication key KPma and certificate Crtf**1** accepted at step S**205** is included in the class revocation list data, an output is provided indicating that the authentication data is not accepted. In cellular phone **100** when controller **1106** receives via memory interface **1200** the output indicating that the authentication data is not accepted, it displays on display **1100** that the data of interest cannot be reproduced owing to the non-acceptance of the authentication data (step S**207**).

[**0141**] If at step S**205** the control determines that certificate Crtf**1** is not included in the class revocation list data then, with reference to FIG. **12**, in memory card **110** a session key generation unit **1418** generates a session key Ks**2** for a reproduction session (step S**208**). Then encryption unit **1410** outputs on data bus BS**3** the session key Ks**2** output from session key generation unit **1418** that is encrypted with public encryption key KPp**1** decrypted by decryption unit **1418**, i.e., encrypted data {Ks2}Kp1 (step S**209**). Then controller **1420** outputs encrypted data {Ks2}Kp1 to memory interface **1200** via terminal **1201** and controller **1106** in cellular phone **100** obtains encrypted data {Ks2}Kp1 via memory interface **1200**. Then Kp**1** hold unit **1204** outputs secret decryption key Kp**1** to decryption unit **1206**.

[**0142**] Decryption unit **1206** decrypts encrypted data {Ks2}Kp1 with secret decryption key Kp**1** output from Kp1 hold unit **1204** that is paired with public encryption key KPp**1**, and decryption unit **1206** outputs session key Ks**2** to encryption unit **1208** (step S**210**). Then session key generation unit **1210** generates session key Ks**3** for a reproduction session and outputs session key Ks**3** to encryption unit **1208** (step S**211**). Encryption unit **1208** receives session key Ks**3** from session key generation unit **1210** and encrypts it with session key Ks**2** received from decryption unit **1206** and thus outputs encrypted data {Ks3}Ks2 and controller **1106** outputs encrypted data {Ks3}Ks2 on data bus BS**2** and via memory interface **1200** to memory card **110** (step S**212**).

[**0143**] In memory card **110** decryption unit **1412** receives encrypted data {Ks3}Ks2 via terminal **1201** and data bus BS**3** and decrypts encrypted data {Ks3}Ks2 with session key Ks**2** generated by session key generation unit **1418** and thus obtains session key Ks**3** generated in cellular phone **100** (step S**213**).

[**0144**] In response to the acceptance of session key Ks**3**, controller **1420** confirms the corresponding access restriction information AC**1** existing in license information hold unit **1440** (step S**214**).

[**0145**] At step S**214** is confirmed access restriction information AC**1**, the information on a restriction imposed on memory access. If it indicates that reproduction is disallowed then the control terminates the reproduction operation. If it indicates that reproduction is allowed only as many times as limited then the control updates data of access restriction information AC**1** to update the frequency of reproduction allowed and then moves on to a subsequent step (step S**215**). If access restriction information AC**1** does

not limit a reproduction frequency then the control skips step S215 and without updating reproduction control information AC1 moves on to a subsequent step (step S216).

[0146] If license information hold unit 1440 does not hold the content ID of a song requested, the control also determines that reproduction is disallowed and the control terminates the reproduction session.

[0147] If at step S214 the control determines that reproduction is possible in the reproduction operation of interest, then a decryption process is effected to decrypt a license including license key Kc recorded in memory 1415 and associated with a song requested to be reproduced. More specifically, in response to an instruction from controller 1420, encrypted license {Kc//AC2//license ID//content ID//AC1}Km1 read from memory 1415 onto data bus BS4 is decrypted by decryption unit 1422 using secret decryption key KM1 unique to memory card 110, and license key Kc and reproduction circuit control information AC2 required for a reproduction process are output on data bus BS4 (step S216).

[0148] License key Kc and reproduction circuit control information AC2 output are transmitted via a contact Pd of switch 1442 to encryption unit 1406, which in turn encrypts license key Kc and reproduction circuit control information AC2 received on data bus BS4, with session key Ks3 received from decryption unit 1412 via contact Pd of switch 1442, and outputs encrypted data {Kc//AC2}Ks3 on data bus BS3 (step S217).

[0149] The encrypted data {Kc//AC2}Ks3 output on data bus BS3 is transmitted via memory interface 1200 to cellular phone 100.

[0150] Encrypted data {Kc//AC2}Ks3 received by cellular phone 100 via memory interface 1200 is transmitted on data bus BS2 and decrypted by decryption unit 1212 and license key Kc and reproduction circuit control information AC2 are accepted (step S218). Decryption unit 1212 transmits license key Kc to decryption unit 1214 and outputs reproduction circuit control information AC2 onto data bus BS2.

[0151] Controller 1106 accepts reproduction circuit control information AC2 on data bus BS2 and confirms whether reproduction is allowed (step S219).

[0152] If at step S219 the control determines from reproduction circuit control information AC2 that reproduction is disallowed, the reproduction operation ends.

[0153] If at step S219 controller 1106 determines that reproduction is allowed, controller 1106 issues a request to memory card 110 via memory interface 1200 to provide encrypted content data {Data}Kc. Then in memory card 110 controller 1420 obtains encrypted content data {Data}Kc from memory 1415 and outputs encrypted content data {Data}Kc to memory interface 1200 on data bus BS3 and via terminal 1201 (step S220).

[0154] In cellular phone 100 controller 1106 obtains encrypted content data {Data}Kc via memory interface 1200 and feeds encrypted content data {Data}Kc on data bus BS2 to decryption unit 1214. Decryption unit 1214 decrypts encrypted content data {Data}Kc with license key Kc output from decryption unit 1212 and thus obtains content data Data (step S211).

[0155] The decrypted content data Data is output to music reproduction unit 1216. Music reproduction unit 1216 reproduces the content data and DA converter 1218 converts a digital signal to an analog signal for output to terminal 1220. Then switch 1222 selects terminal 1220 and the music data is output to headphone 130 via terminal 1224 and thus reproduced (step S222). Thus the reproduction operation completes.

[0156] User 1 of cellular phone 100 can uses cellular phone 100 to receive encrypted content data {Data}Kc and license key Kc distributed from distribution server 30, and use license key Kc to decrypt and thus reproduce encrypted content data {Data}Kc.

[0157] Note that cellular phone 100 of user 1 can also have cellular phone 100 of user 2 transfer encrypted content data {Data}Kc (and it can thus receive the data). In this case, when user 2 confirms that license key Kc decrypting encrypted content data {Data}Kc received is not recorded in memory card 110, user 2 requests distribution server 30 to distribute license key Kc.

[0158] Similarly, cellular phone 100 of user 2 can receive the license key from distribution server 30 and the license key can be used to encrypt and reproduce encrypted content data.

[0159] Reference will now be made to FIG. 13 to more specifically describe a relationship between opened and closed positions of the casing of cellular phone 100 in the form of the shell in the first embodiment, and a download process.

[0160] Initially, cellular phone 100 has the casing in an opened position and it also has a standby status (step S1000). In this condition, the control determines whether a download process is designated to record requested content data in memory card 110 (step S1002). If so and the authenticity of the request for the distribution is also confirmed, cellular phone 100 is conferred a download or call status on (step S1004). If for example a reproduction mode or any other process mode than the download process is designated then the mode as designated is set (step S1006).

[0161] The amount of data distributed or the like is monitored by controller 1106 to determine whether the downloading has completed (step S1008).

[0162] If the control determines that the downloading has completed, cellular phone 100 is again conferred the standby status on (step S1000).

[0163] If the control determines that the downloading still continues, detection unit 1117 determines whether the casing of cellular phone 100 has been closed (step S1010).

[0164] If not then the download status is held (step S1004).

[0165] If the casing is closed, the cellular phone is conferred a status on to continue a download process until the current downloading completes (step S1012). With this status, power supply control unit 1116 continues to supply each circuit with a power supply voltage required for the call.

[0166] Then the amount of data distributed or the like is monitored by controller 1106 to determine whether the downloading has completed (step S1014).

[0167] If not then the cellular phone is conferred the aforementioned status on to wait for the current downloading to complete (step S1012).

[0168] If the control determines that the downloading has completed, the call is disconnected (step S1016).

[0169] Then the cellular phone is conferred a standby status on with the casing closed, when power supply control unit 1116 controls cellular phone 100 to enter a low power consumption mode, a mode minimizing power consumption.

[0170] Reference will now be made to FIG. 14 to more specifically describe a relationship between the opened and closed positions of the casing of cellular phone 100 in the form of the shell in the first embodiment, and a data reproduction process. Memory card 110 is assumed to have recorded therein content data to be reproduced.

[0171] Initially, cellular phone 100 has the casing in an opened position and it also has a standby status (step S100). In this condition, the control determines whether a reproduction mode is designated to reproduce the content data (step S1102). If so then cellular phone 100 is conferred a reproduction status on to reproduce content data designated (step S1104). If a process mode other than the reproduction mode is designated, such as a download process, then the mode as designated is set (step S1106).

[0172] Once a reproduction process starts, controller 1106 determines whether the reproduction has completed (step S1108).

[0173] If so then the cellular phone is again conferred the standby status on (step S1100).

[0174] If the reproduction still continues, detection unit 1117 determines whether the casing of cellular phone 100 has been closed (step S1110).

[0175] If not then the reproduction status is held (step S1104).

[0176] If the casing has been closed, then the cellular phone is conferred a status on to continue the reproduction process until the content data is completely reproduced (step S1112). With this status, power supply control unit 1116 continues to supply each circuit with a power supply voltage required for the reproduction process.

[0177] Then controller 1106 determines whether the reproduction has completed (step S1114).

[0178] If not then the cellular phone is conferred the aforementioned status on to continue the reproduction process until the content data is completely reproduced (step S1112).

[0179] If the control determines that the reproduction has completed, then the cellular phone is conferred a standby status on with the casing closed, when power supply control unit 1116 controls cellular phone 100 to enter a low power consumption mode, a mode minimizing power consumption.

[0180] In the first embodiment the cellular phone can reproduce encrypted content data while the copyright of the data can sufficiently be protected.

[0181] Furthermore if its case in the form of the shell is closed while data is being downloaded, cellular phone 100 can complete downloading the data. In particular, it is no longer necessary to leave the cellular phone with its casing open to download a large amount of data such as music content. Furthermore, if its casing is closed while music is being reproduced, cellular phone 100 still can continue to reproduce the music.

Second Embodiment

[0182] A second embodiment describes another exemplary configuration of cellular phone 100 of the first embodiment. Note that the present embodiment employs a data distribution system, license server and memory card having the configuration as has been described in the first embodiment.

[0183] The second embodiment provides a cellular phone having a circuit separated into communication process system circuitry and a reproduction system. More specifically, a communication function is provided to a main body of the cellular phone, configured as shown in FIG. 15, which will be referred to as a main body 100*a* of the cellular phone. Separated from main body 100*a*, a music reproduction module 120 is provided, as shown in FIG. 16. Controller 1106 is separated into a main CPU 1106*a* of main body 100*a* and a sub CPU 1230 of audio reproduction module 120.

[0184] Main body 100*a* and audio reproduction module 120 are both incorporated into the casing in the form of the shell as described above. They may be separated as of a remote control type and in that case, for example as shown in FIG. 16, a remote control unit 1222 may be employed, with a key operation unit 1224 and a display 1226 included.

[0185] With reference to FIG. 15, main body 100*a* includes an antenna 1102, a transmission and reception unit 1104, a data bus BS2, a main CPU 1106*a* controlling a circuit operation of main body 100*a* via data bus BS2, a key operation unit 1108, a display 1100, an audio reproduction unit 1112, a DA converter 1113, and a terminal 1114 receiving an output of the DA converter.

[0186] Main body 100*a* also includes a power supply control unit 1116, a detection unit 1117 detecting whether the shell is open or closed, and a serial interface 1118. Via serial interface 1118 main body 100*a* communicates data with audio reproduction module 120.

[0187] As has been described previously, detection unit 1117 detects whether the casing in the form of the shell enclosing main body 100*a* and audio reproduction module 120 has an opened position or a closed position. Detection unit 1117 outputs a result which is in turn transferred to main CPU 1106*a* on data bus BS2. Power supply control unit 1116 is controlled by main CPU 1106*a* to supply main body 100*a* and/or audio reproduction module 120 with an operating power supply.

[0188] With reference to FIG. 16, audio reproduction module 120 includes an authentication data hold unit 1202, a Kp1 hold unit 1204, decryption units 1206, 1212 and 1214, an encryption unit 1208, a session key generation unit 1210, a music reproduction unit 1216, a DA converter 1218, a connection terminal 1220, and a serial interface 1228.

[0189] Audio reproduction module 120 also includes a data bus BS3, a sub CPU 1230 controlling an operation of

audio reproduction module **120**, a memory card **110**, and a memory interface **1200** arranged between memory card **110** and data bus BS**3**. Via serial interface **1228**, audio reproduction module **120** communicates data with cellular phone **100***a*.

[**0190**] The opened and closed positions of the casing in the form of the shell and a process effected to download content data, have the relationship as has been described in the first embodiment. Furthermore, the opened and closed positions of the casing and a process effected to reproduce content data has the relationship as has been described in the first embodiment.

[**0191**] Thus the second embodiment can also provide a cellular phone, having a communication process system and a reproduction process system separated from each other, that is as effective as the first embodiment.

Third Embodiment

[**0192**] Reference will now be made to FIGS. **17** and **18** to describe a third embodiment of the present invention. Cellular phone **100** can receive new encrypted content data {Data}Kc from memory card **110** attached to another cellular phone **100**. In doing so, it issues a request to distribution server **30** to receive license key Kc corresponding to encrypted content data {Data} Kc. In the third embodiment, cellular phone **100** receives encrypted content data {Data}Kc for example distributed on the Internet via a computer and records the received encrypted content data in memory card **110** and requests distribution server **30** to distribute license key Kc corresponding to the encrypted content data, as will exemplarily be described hereinafter.

[**0193**] With reference to FIG. **17**, encrypted content data {Data}Kc is distributed via a computer **140**, as will now be described. Cellular phone **100** allows memory card **110** to be detachably attached thereto and it has headphone **130** connected thereto for reproducing music. Furthermore, cellular phone **100** is connected to computer **140** via a communication cable **145**.

[**0194**] Computer **140** includes a hard disk **141**, a controller **142**, and an external interface **143**. Hard disk **141** is connected to controller **142** via data bus BS**5**. Controller **142** includes a license protection module **144**.

[**0195**] Hard disk **141** stores via data bus BS**5** encrypted content data {Data}Kc distributed on the Internet to computer **140**. When controller **142** receives a request from user **1** of cellular phone **100** via communication cable **145** and external interface **143** to transmit encrypted content data {Data}Kc, controller **142** reads encrypted content data {Data}Kc from hard disk **141** and outputs the data externally via external interface **143**.

[**0196**] External interface **143** inputs to controller **142** a signal input to computer **140** from cellular phone **100** via communication cable **145** and it also externally outputs a signal received from controller **142**.

[**0197**] License protection module **144** has a configuration identical to that of the FIG. **6** data processing unit **310** and, to transmit encrypted content data {Data}Kc to memory card **110** attached to cellular phone **100**, communicates public encryption keys, session keys and the like with cellular phone **100** and memory card **110**, as has been described previously, while protecting and thus transmitting encrypted content data {Data}Kc to memory card **110**.

[**0198**] On the Internet from distribution server **30** to computer **140** encrypted content data {Data}Kc is distributed and stored at hard disk **141** in computer **140** via data bus BS**5**.

[**0199**] When user **1** of cellular phone **100** operates key operation unit **1108** to input a request for transmission, the request for transmission is input to controller **142** via communication cable **145** and external interface **143**. When controller **142** receives the request for transmission, controller **142** reads requested, encrypted content data {Data}Kc from hard disk **141** via data bus BS**5** and inputs it to license protection module **144**.

[**0200**] As has been described previously, license protection module **144** communicates public encryption keys, session keys and the like with memory card **110** via communication cable **145** and transmits encrypted content data {Data}Kc to memory card **110**.

[**0201**] After the transmission, user **1** of cellular phone **100** have distribution server **30** to distribute license key Kc for encrypted content data {Data} Kc, as has been described previously, and reproduces encrypted content data {Data}Kc.

[**0202**] Furthermore, computer **140** is not limited to receiving encrypted content data {Data}Kc distributed on the Internet, and it may also read encrypted content data {Data}Kc recorded on a CD-ROM set in a CD-ROM drive (not shown) connected to computer **140** and transmit the data to memory card **110**. Furthermore, encrypted content data {Data}Kc recorded on the CD-ROM may once be stored on hard disk **141**.

[**0203**] Furthermore, computer **140** may produce encrypted content data {Data}Kc by CD-ripping. "Ripping" means converting music data obtained from a music CD, so as to be reproducible by a music reproduction module. Initially, a license is produced for music data obtained. Then the obtained music data is converted to content data reproducible by music reproduction unit **1216** and it is then encrypted to be decryptable with a license key included in the produced license. The license produced to decrypt encrypted content data obtained by ripping, is managed to be non-replicable. Thus, the CD-ripping, corresponding to a primary replication from a music CD, is a legal activity protecting a copyright by encrypting content and providing a non-replicable license including a license key corresponding to a key used to decrypt the encrypted content.

[**0204**] If a CD is used, encrypted content data {Data}Kc obtained from a music CD and generated may once be recorded on hard disk **141** and thereafter transmitted to memory card **110** or it may not be recorded on hard disk **141** and instead directly be transmitted to memory card **110**.

[**0205**] Encrypted content data {Data}Kc may be recorded directly in memory card **110** attached to computer **140**, as shown in FIG. **18**. In this case, controller **142** of computer **140** records encrypted content data directly in memory card **110** via license protection module **144**.

[**0206**] In FIG. **18**, computer **140** also obtains encrypted content data {Data}Kc by a method identical to that shown in FIG. **17**.

[0207] Cellular phone **100** requests distribution server **30** to distribute license key Kc corresponding to encrypted content data {Data}Kc additionally received and it reproduces the additionally received encrypted content data {Data}Kc, as represented in the flow charts referred to in the first embodiment.

[0208] In the third embodiment when a cellular phone receives additional encrypted content data on the Internet, by CD-ripping or the like, it automatically issues a request to a distribution server to receive a license key decrypting the encrypted content data. As such, if a user of the cellular phone receives only encrypted content data distributed for example on the Internet it can reproduce the encrypted content data.

[0209] Note that while in the above description a cellular phone in the form of a shell is referred to by way of example, the present invention is not limited thereto and it is also applicable to any data terminal devices that do not receive power supply when the flap is flipped closed.

[0210] Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

What is claimed is:

1. A data terminal device accommodated in a casing, comprising:

a detection unit detecting whether said casing is open/closed; and

a control unit supplying power required for downloading content data, even if said detection unit detects that said casing is closed after said downloading said content data has started.

2. The data terminal device of claim 1, wherein when the data terminal device with said casing closed completes said downloading said content data, said control unit for example stops supplying said power and controls a standby mode function of various components internal to the data terminal device to shift the data terminal device to a low power consumption mode.

3. A data terminal device accommodated in a casing, comprising:

a detection unit detecting whether said casing is open/closed; and

a control unit continuing downloading content data, even if said detection unit detects that said casing is closed after said downloading said content data has started.

4. The data terminal device accommodated in a casing, comprising:

a detection unit detecting whether said casing is open/closed; and

a control unit supplying power required for reproducing content data, even if said detection unit detects that said casing is closed after said reproducing said content data has started.

5. The data terminal device of claim 4, wherein when the data terminal device with said casing closed completes said reproducing said content data, said control unit for example stops supplying said power and controls a standby mode function of various components internal to the data terminal device to shift the data terminal device to a low power consumption mode.

6. A data terminal device accommodated in a casing, comprising:

a detection unit detecting whether said casing is open/closed; and

a control unit continuing reproducing content data, even if said detection unit detects that said casing is closed after said reproducing said content data has started.

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