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(54) DIGITAL CONTENT DISTRIBUTION AND SUBSCRIPTION SYSTEM

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(52) **U.S. Cl.** **705/37**

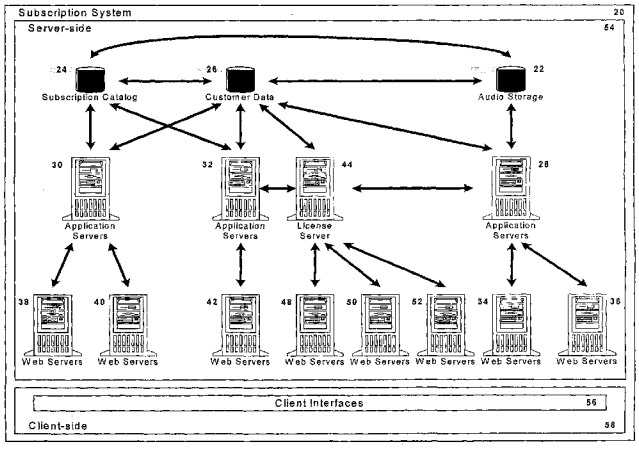
(57) **ABSTRACT**

A digital content distribution and subscription system for digital data files, such as digital audio and video data files, which provides subscribers, for example, with music or video from locally-stored digital files or on demand for a fee. The system may optionally provide streaming digital data as well as locally-stored digital files. After registration onto the system, a subscriber may select from a relatively wide variety of available digital content, for example, music content ripped from a high-quality digital source to provide relatively consistent digital quality to subscribers. In one exemplary implementation, subscribers may subscribe to a predetermined number of songs slots for a period of time, for example, about 200-400 song slots per month. The subscriber may then select songs from various playlists which causes encrypted digital audio files for the selected music to be downloaded to the subscribers's PC. A license key is downloaded to the subscribers' PC to "unlock" the selected songs to enable them to be decoded and played on the subscriber's personal computer or remote audio equipment for a predetermined time period. At the expiration of the predetermined time period, the license key expires, thereby preventing further playback of the encrypted audio data files. The selections of each subscriber are tabulated for the purpose of royality tracking and payment of an appropriate license fee to the holders of copyright rights for the selections. The system may also be used to provide additional digital information, such as special events which may be live or pre-recorded. The digital content distribution and subscription system includes a digital content management system, a system for token-based authentication allowing secure data retrieval and a royality administration system.

The digital content management system manages the amount of digital content data delivered to a client over a predetermined period. The server manages the number client access devices, such as personal computers (PC), which can access the digital content over a predetermined time period.

The token-based authentication system/The token-based authentication system provides for anonymous authentication that does not require knowledge of the individual user requesting the download of digital content data or real-time access to user account information. Instead, the token-based authentication system embeds the authentication information, or token, in the download request information itself. In this way, the download or content server authenticates the download request using the token contained in the download request information and therefore does not require any additional information to carry out this authentication, such as access to user account information.

The royality administration system operates as part of a digital content subscription service to track usage of digital



GOOGLE EXHIBIT 1010

content, for example, music, by subscribers of the digital content subscription service and to calculate royalty payments to, for example, publishing and performance rights holders of the digital music. The digital content subscription service makes available to subscribers a plethora of, for example, digital music. Legally a music subscription service is required to compansate rights holders of the digital content for use of their works. In order to accurately provide compensation, the digital content subscrition service must track usage of the digital music by subscribers of the digital content subscription service. The digital content subscription service also maintans accurate information on the rights holders of the digital music in order to facilitate calculation of royalty payments. With the digital music usage information and the rights holder information, the digital content subscription service is able to effectively and accurately calculate payment to the digital music rights holders for use of their works.

The current system provides subscribers with relatively high-quality consistent digital audio files and allows subscribers to select from a relatively wide range of stored digital audio files on demand while not violating copyright laws.

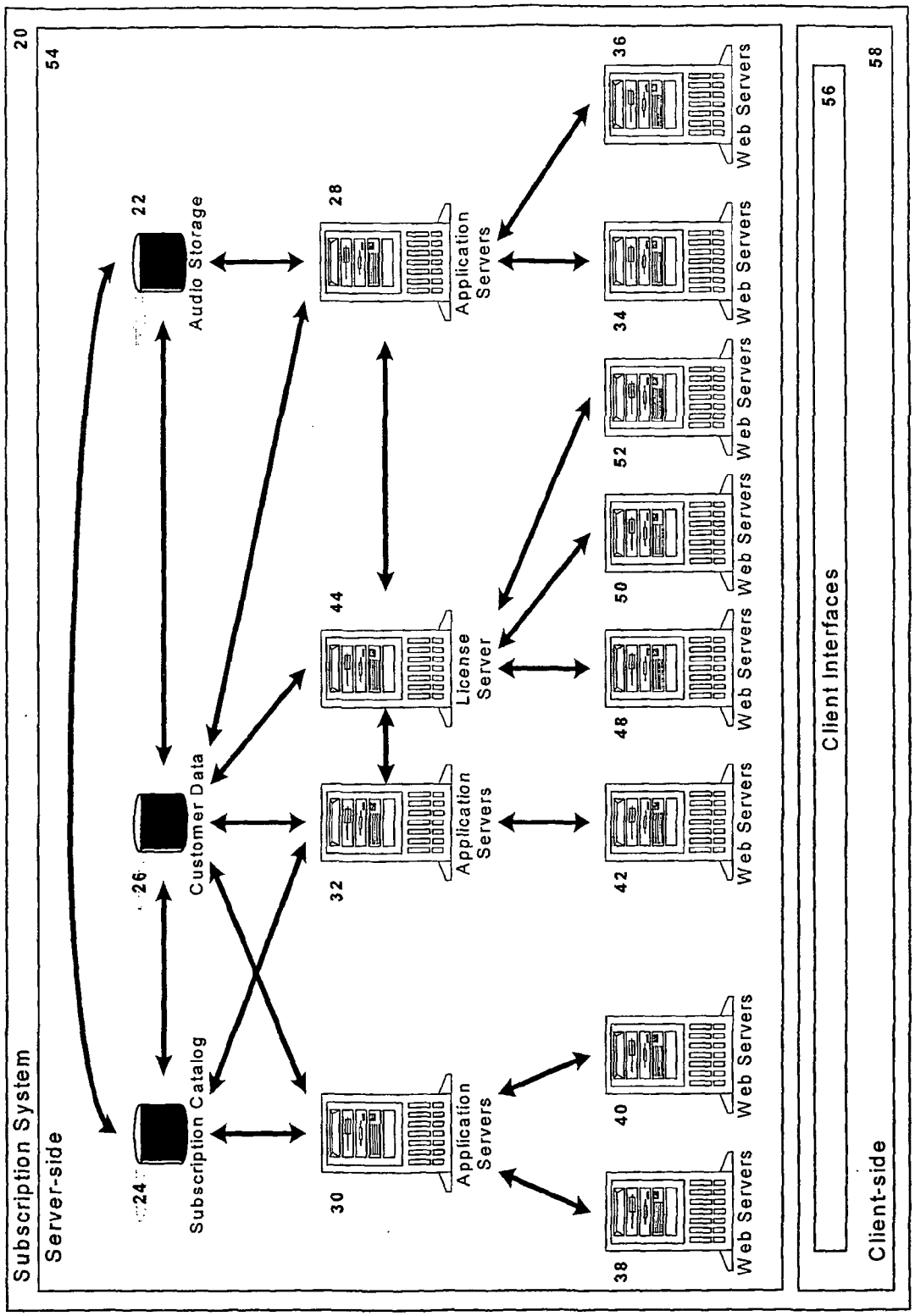

Subscription System
20
Server-side
54
Subscription Catalog
24
Customer Data
26
Audio Storage
22
Application Servers
30
Application Servers
32
Application Servers
28
License Server
44
Web Servers
38
Web Servers
40
Web Servers
42
Web Servers
48
Web Servers
50
Web Servers
52
Web Servers
34
Web Servers
36
Client Interfaces
56
Client-side
58

Figure 1

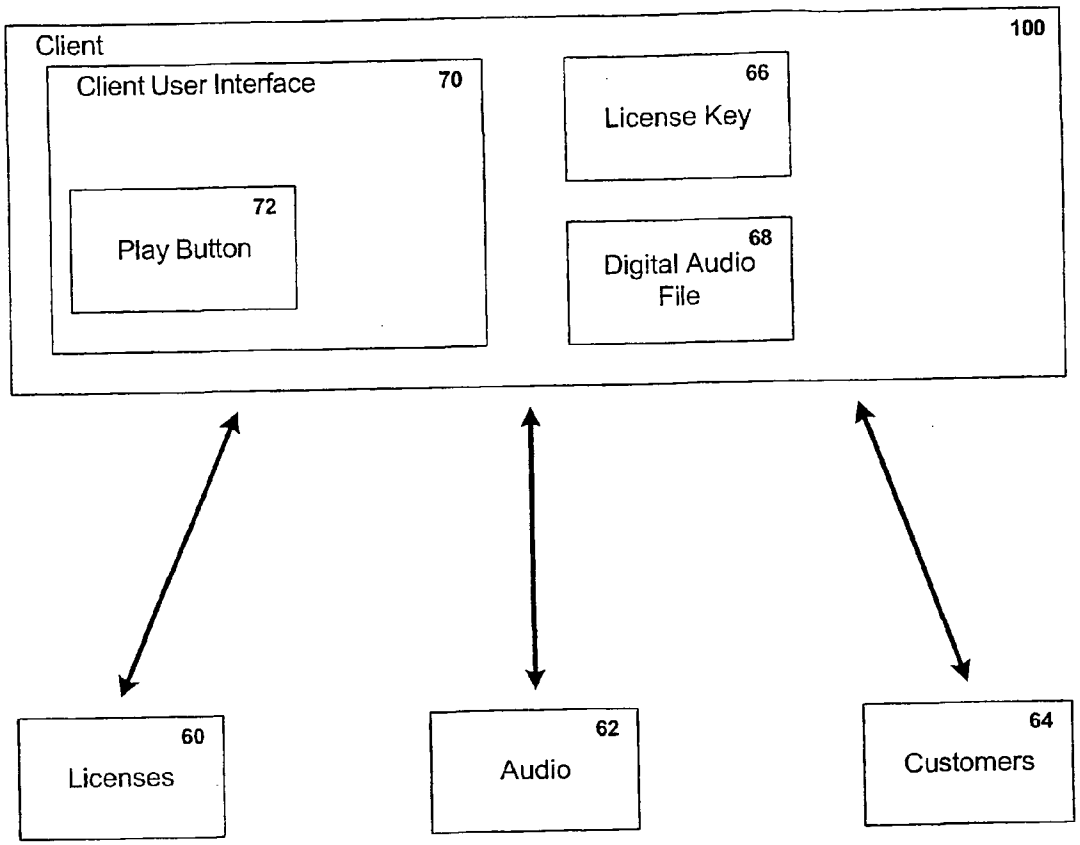

Client
100
Client User Interface
70
Play Button
72
License Key
66
Digital Audio File
68
Licenses
60
Audio
62
Customers
64

Figure 2

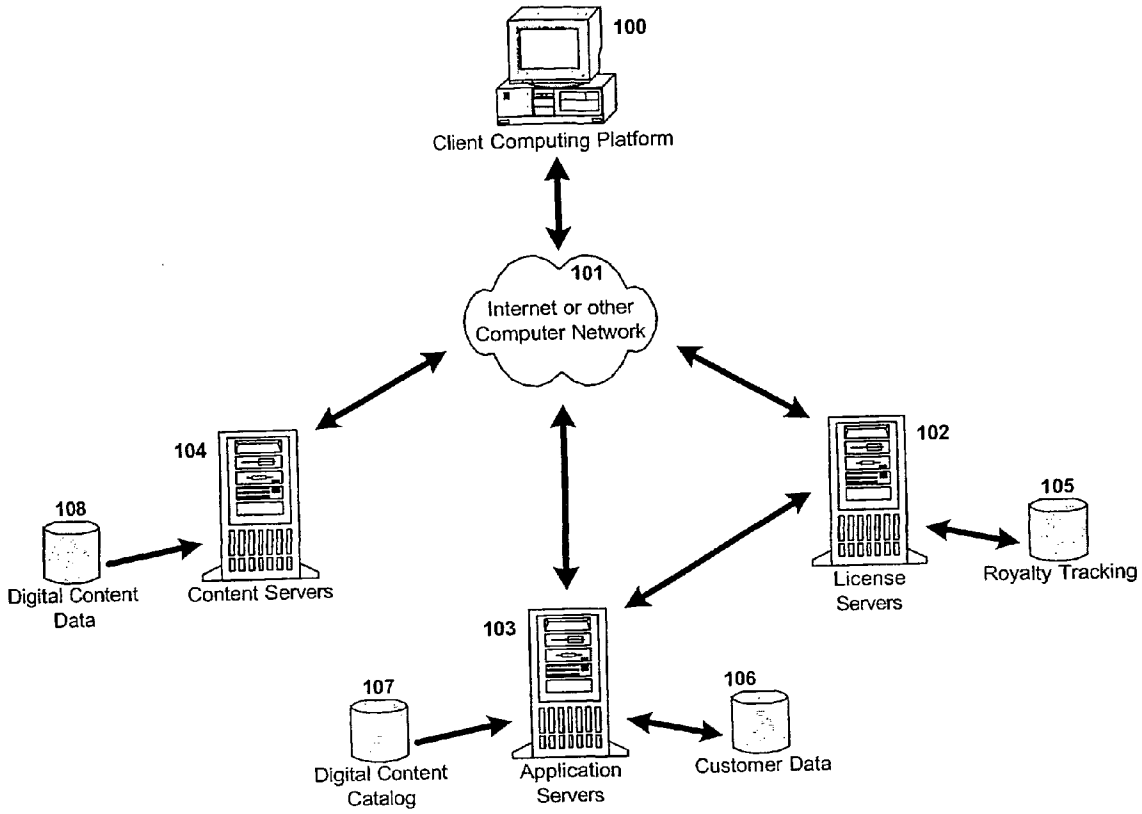

100
Client Computing Platform
101
Internet or other Computer Network
104
108
Digital Content Data
Content Servers
102
105
License Servers
Royalty Tracking
103
107
Digital Content Catalog
Application Servers
106
Customer Data

Figure 3

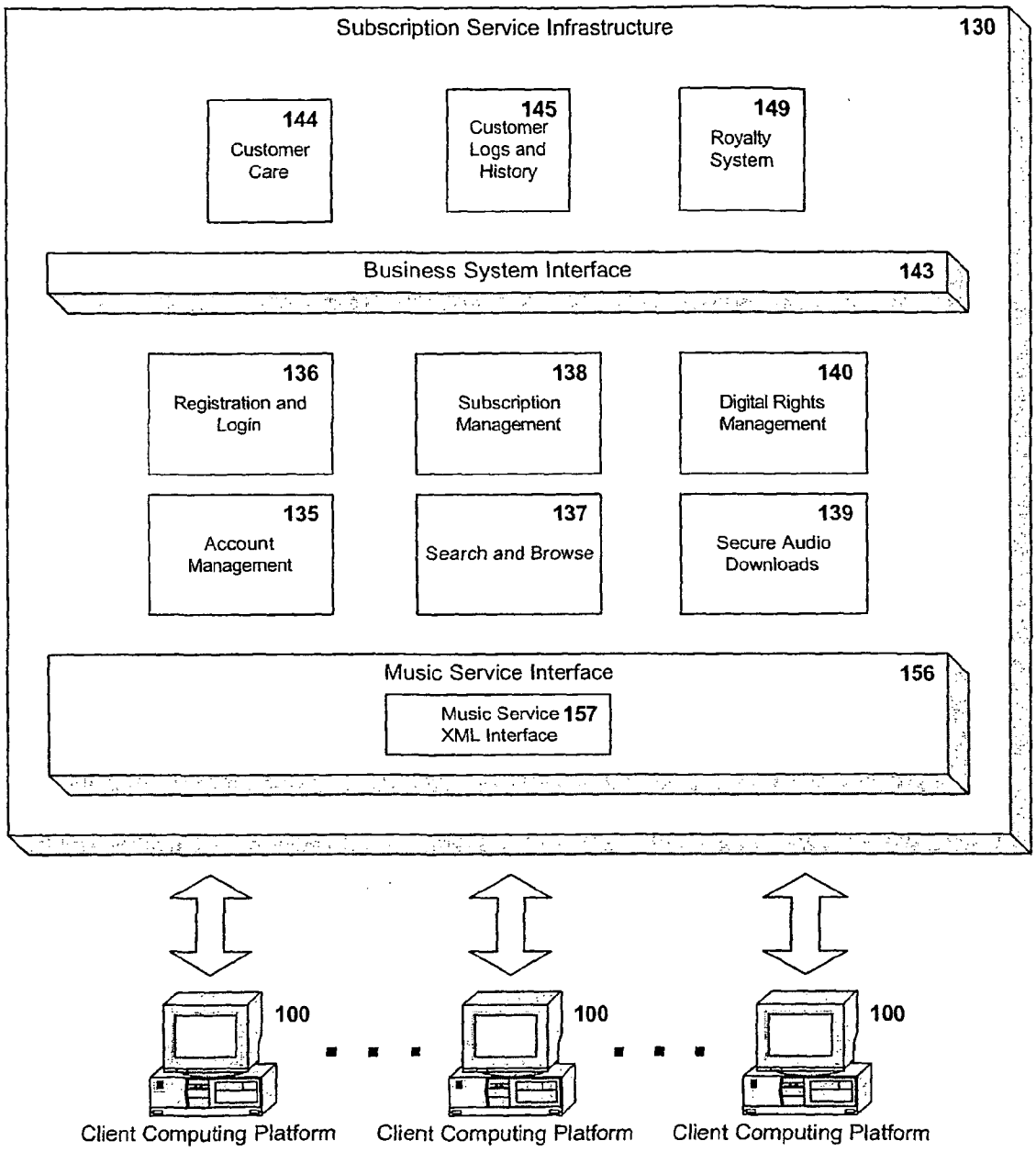

Subscription Service Infrastructure
130
144
Customer Care
145
Customer Logs and History
149
Royalty System
Business System Interface
143
136
Registration and Login
138
Subscription Management
140
Digital Rights Management
135
Account Management
137
Search and Browse
139
Secure Audio Downloads
Music Service Interface
156
Music Service XML Interface
157
100
100
100
Client Computing Platform
Client Computing Platform
Client Computing Platform

Figure 4

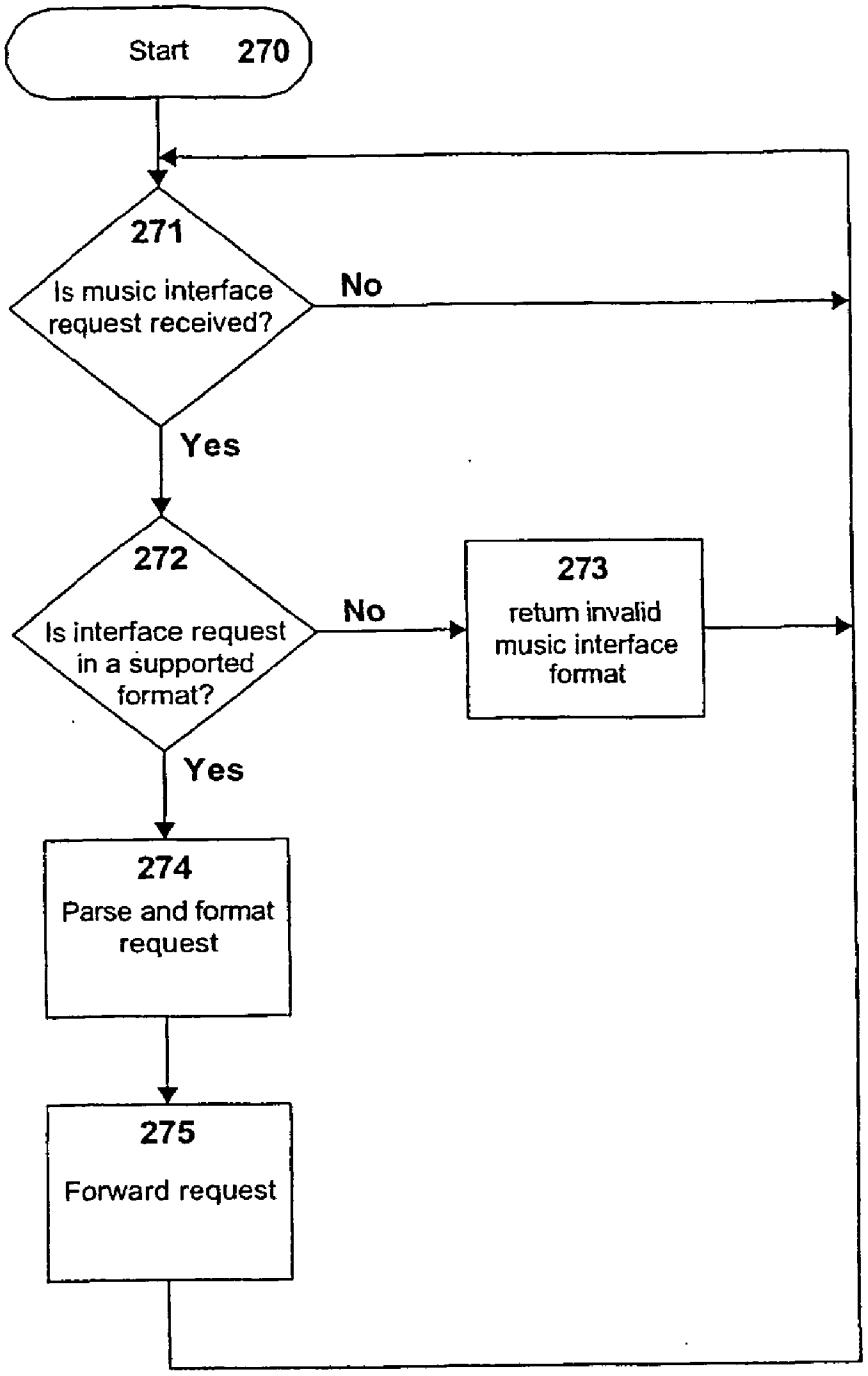

Start 270
271
Is music interface request received?
No
Yes
272
Is interface request in a supported format?
No
273
return invalid music interface format
Yes
274
Parse and format request
275
Forward request

Figure 5

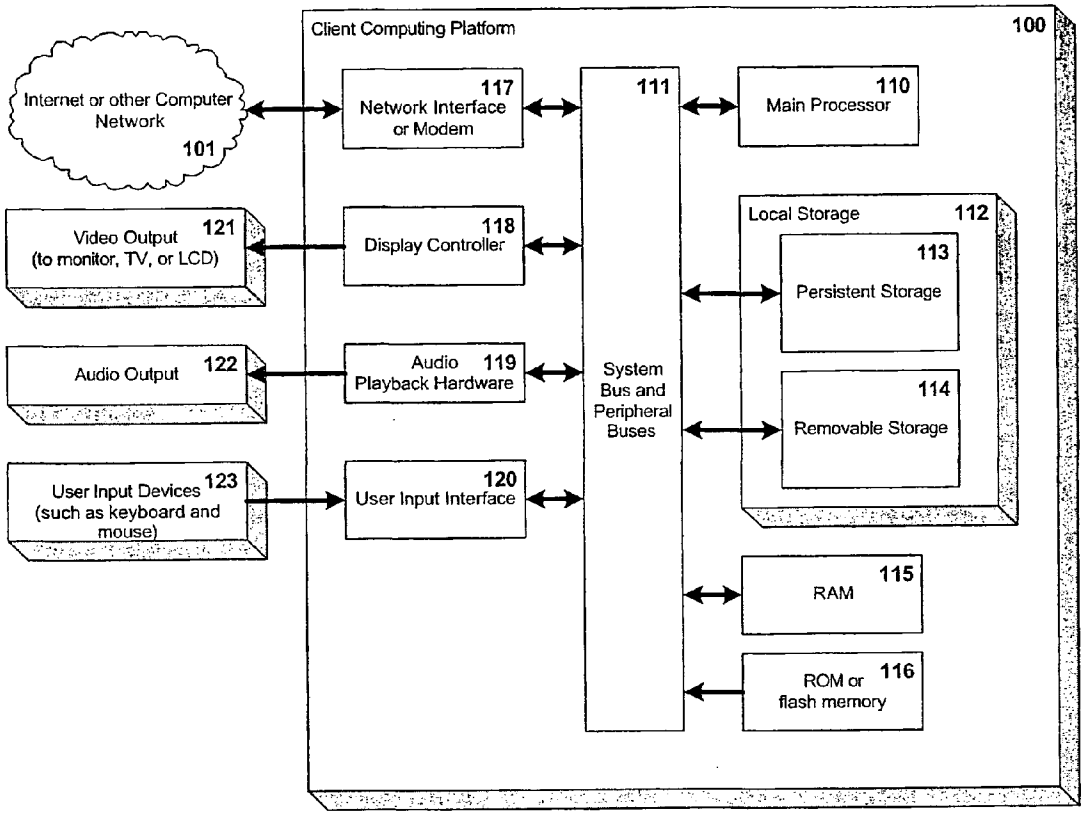

Client Computing Platform
100
Internet or other Computer Network
101
117
Network Interface or Modem
111
110
Main Processor
Video Output
121
(to monitor, TV, or LCD)
118
Display Controller
Local Storage
112
113
Persistent Storage
Audio Output
122
Audio
119
Playback Hardware
System Bus and Peripheral Buses
114
Removable Storage
User Input Devices
123
(such as keyboard and mouse)
120
User Input Interface
115
RAM
ROM or
116
flash memory

Figure 6

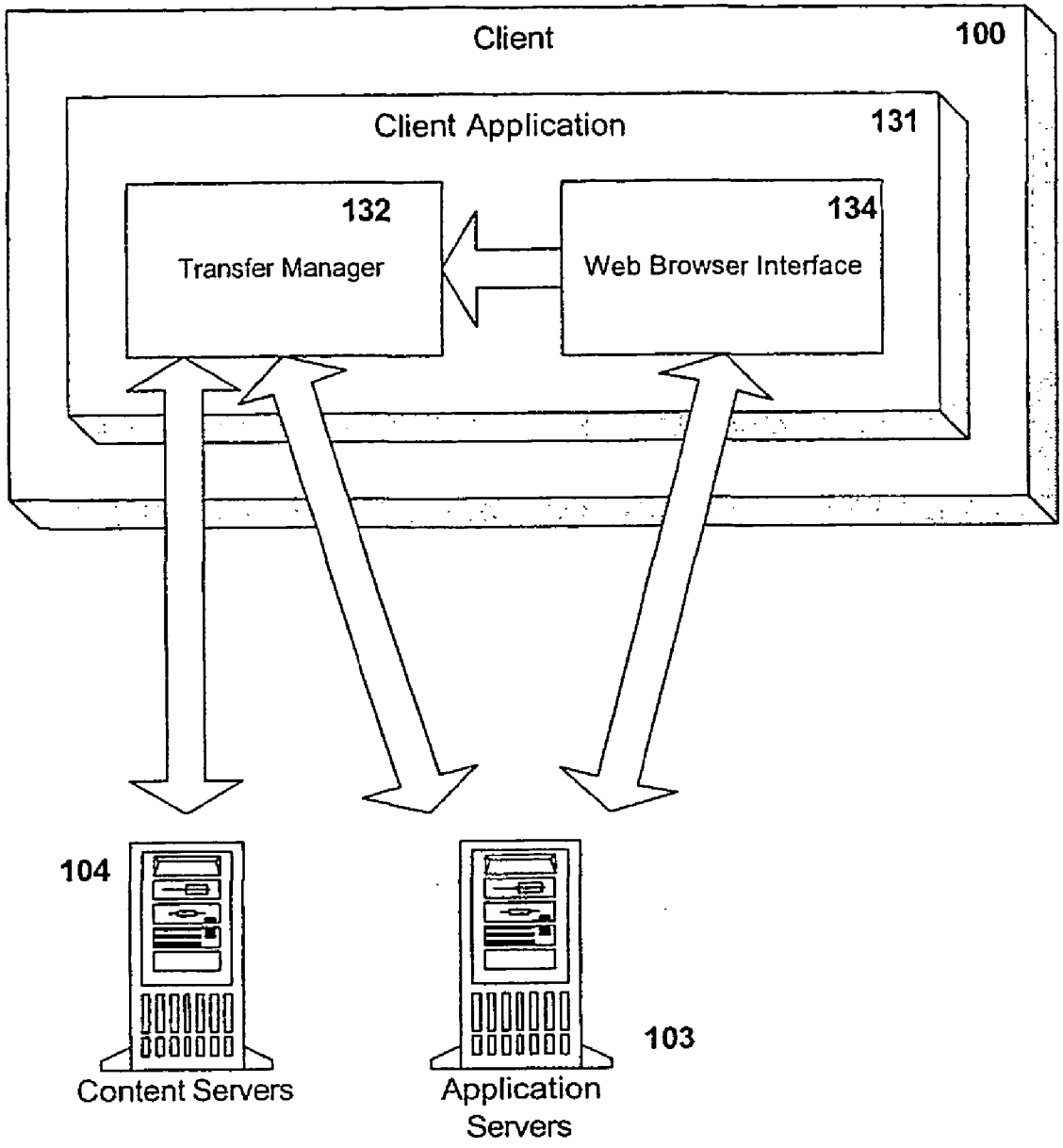

Client
100
Client Application
131
132
Transfer Manager
134
Web Browser Interface
104
Content Servers
Application Servers
103

Figure 7

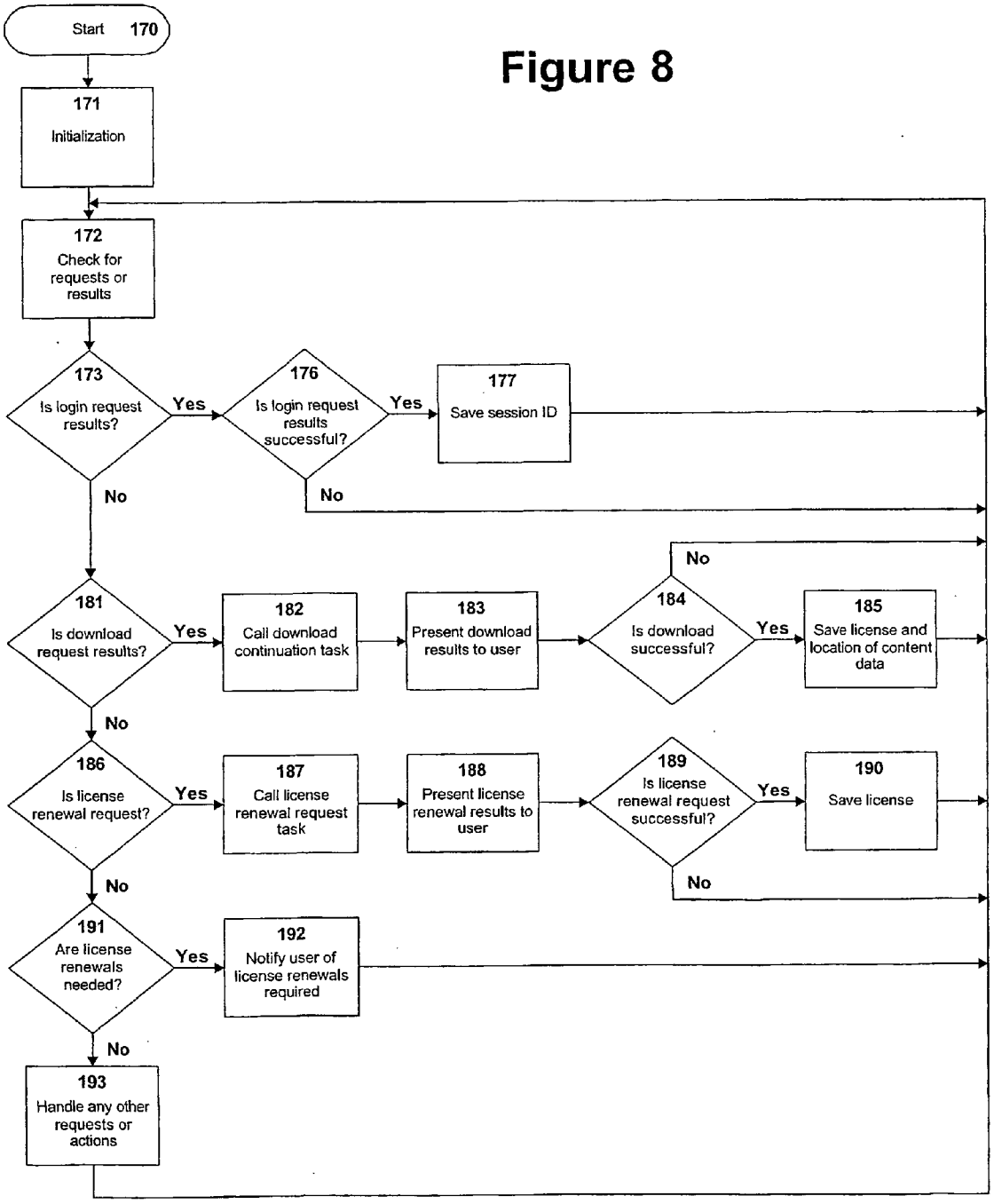

Start 170
171
Initialization
172
Check for requests or results
173
Is login request results?
Yes
176
Is login request results successful?
Yes
177
Save session ID
No
No
181
Is download request results?
Yes
182
Call download continuation task
183
Present download results to user
184
Is download successful?
No
Yes
185
Save license and location of content data
No
186
Is license renewal request?
Yes
187
Call license renewal request task
188
Present license renewal results to user
189
Is license renewal request successful?
Yes
190
Save license
No
No
191
Are license renewals needed?
Yes
192
Notify user of license renewals required
No
193
Handle any other requests or actions

Figure 8

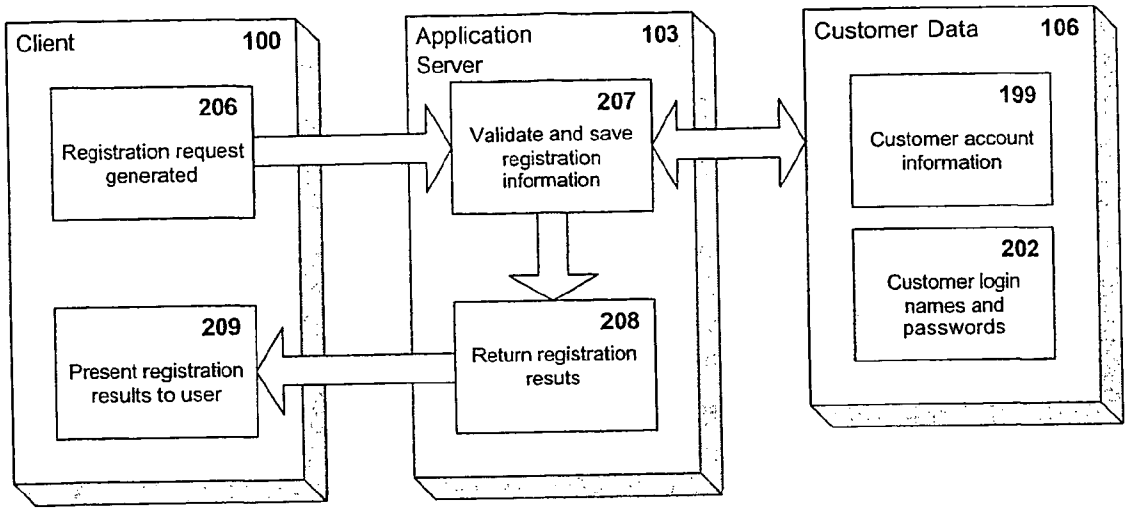

Client
100
206
Registration request generated
209
Present registration results to user
Application Server
103
207
Validate and save registration information
208
Return registration resuts
Customer Data
106
199
Customer account information
202
Customer login names and passwords

Figure 9

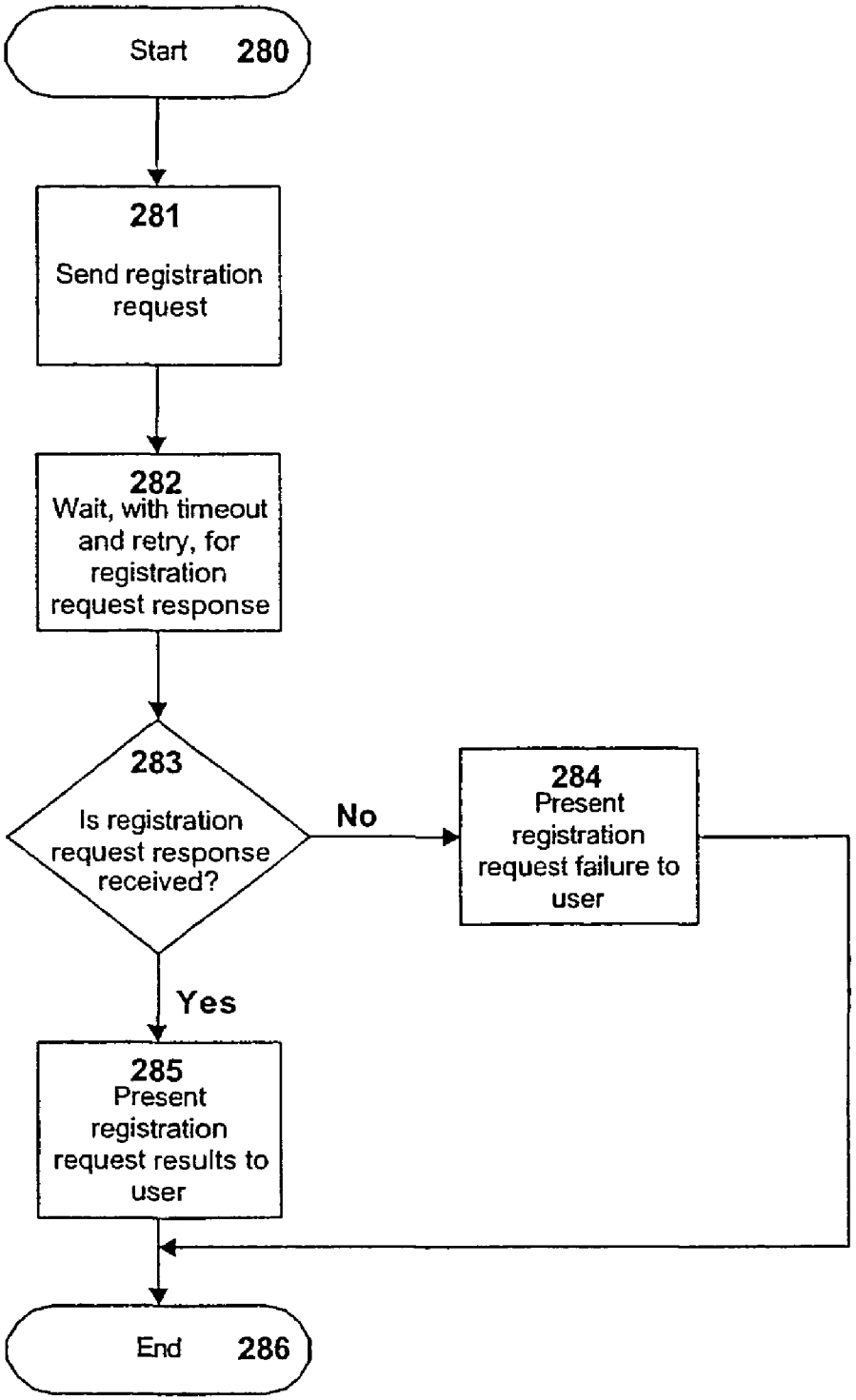

Start 280
281
Send registration request
282
Wait, with timeout and retry, for registration request response
283
Is registration request response received?
No
284
Present registration request failure to user
Yes
285
Present registration request results to user
End 286

Figure 10

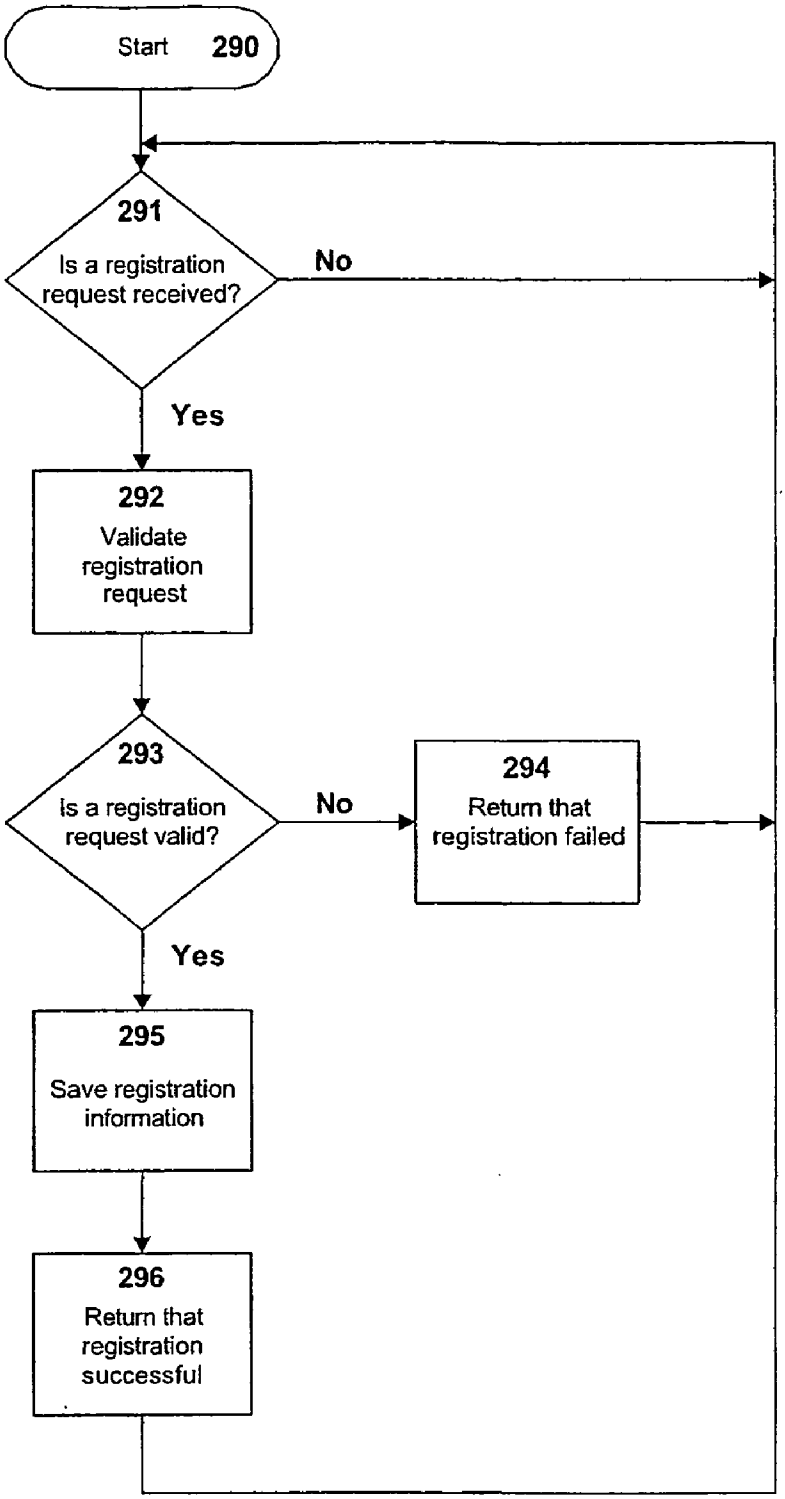

Start 290
291
Is a registration request received?
No
Yes
292
Validate registration request
293
Is a registration request valid?
No
294
Return that registration failed
Yes
295
Save registration information
296
Return that registration successful

Figure 11

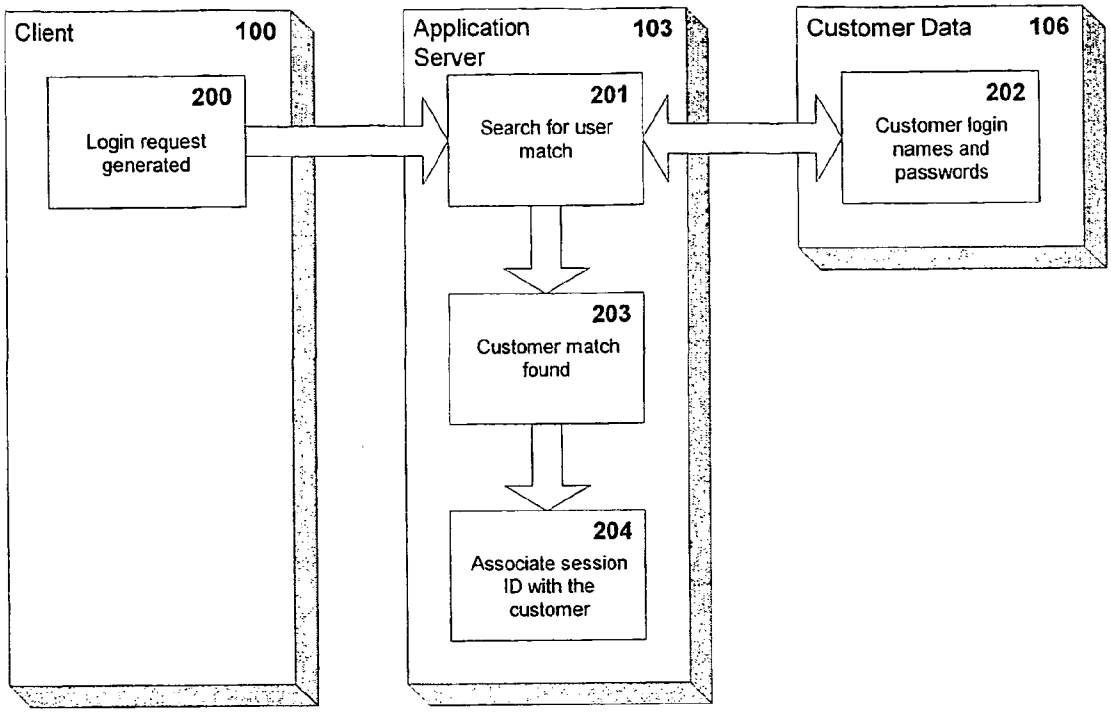

Client
100
200
Login request generated
Application Server
103
201
Search for user match
203
Customer match found
204
Associate session ID with the customer
Customer Data
106
202
Customer login names and passwords

Figure 12

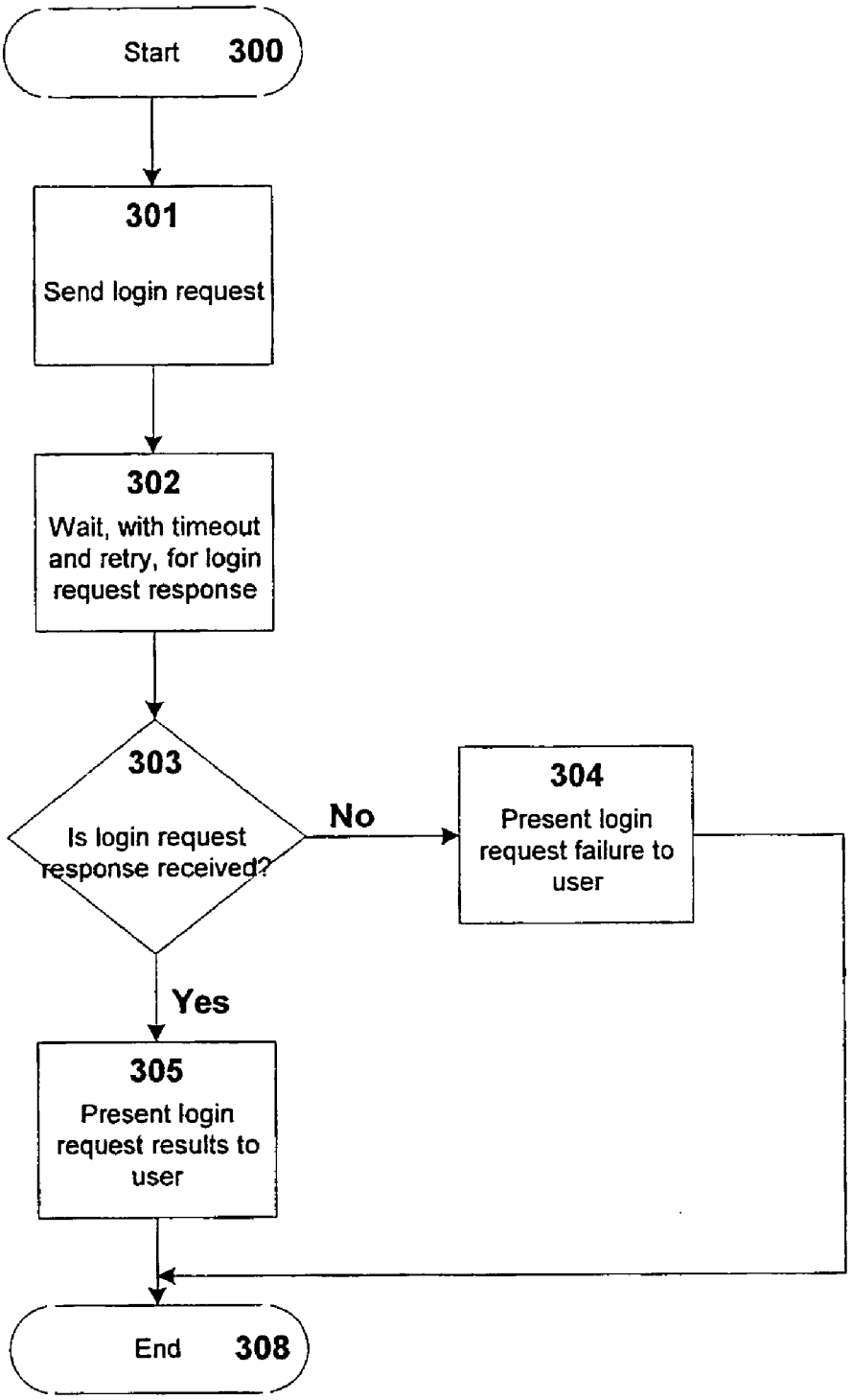

Start 300
301
Send login request
302
Wait, with timeout and retry, for login request response
303
Is login request response received?
No
304
Present login request failure to user
Yes
305
Present login request results to user
End 308

Figure 13

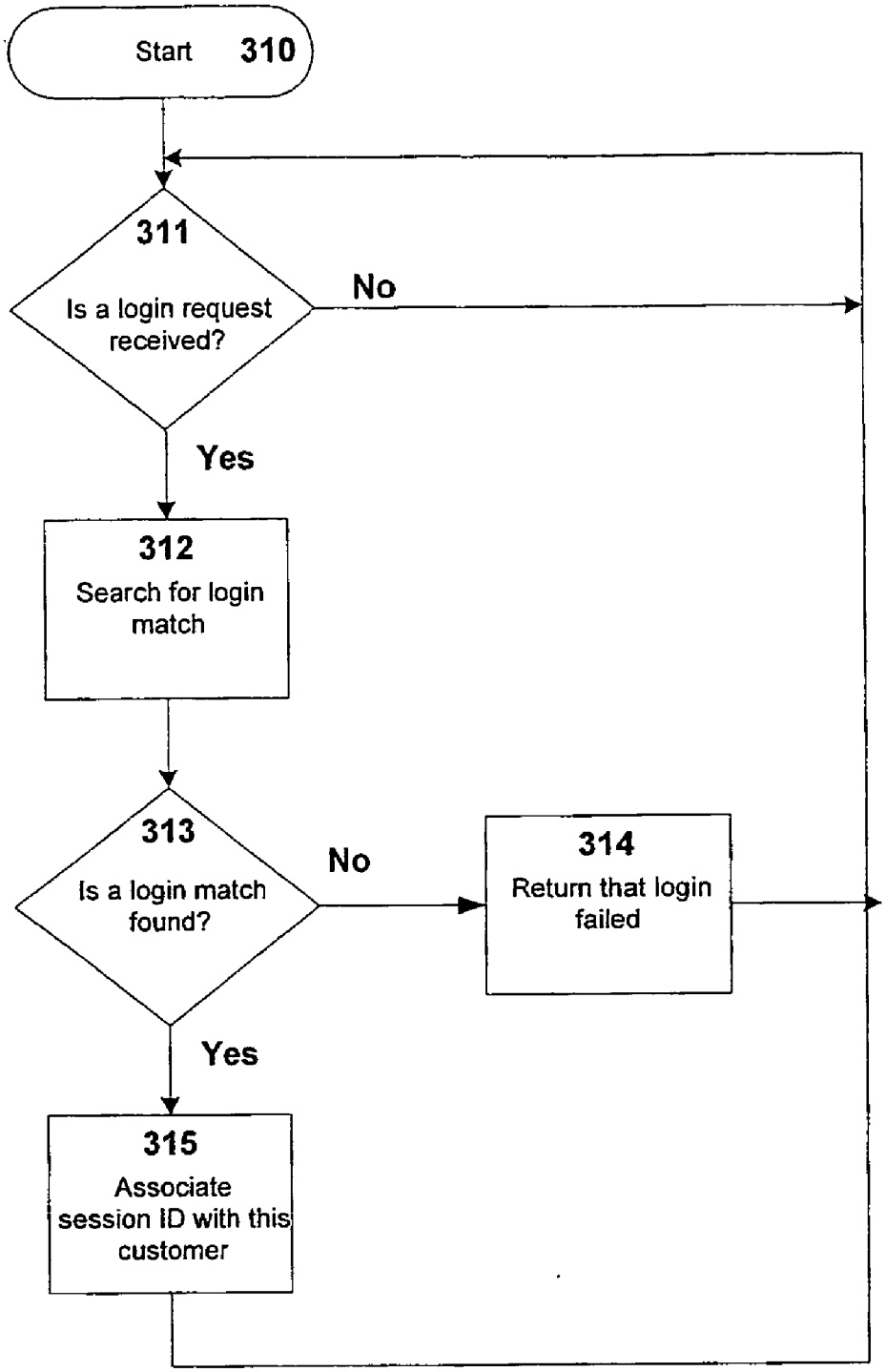

Start 310
311
Is a login request received?
No
Yes
312
Search for login match
313
Is a login match found?
No
314
Return that login failed
Yes
315
Associate session ID with this customer

Figure 14

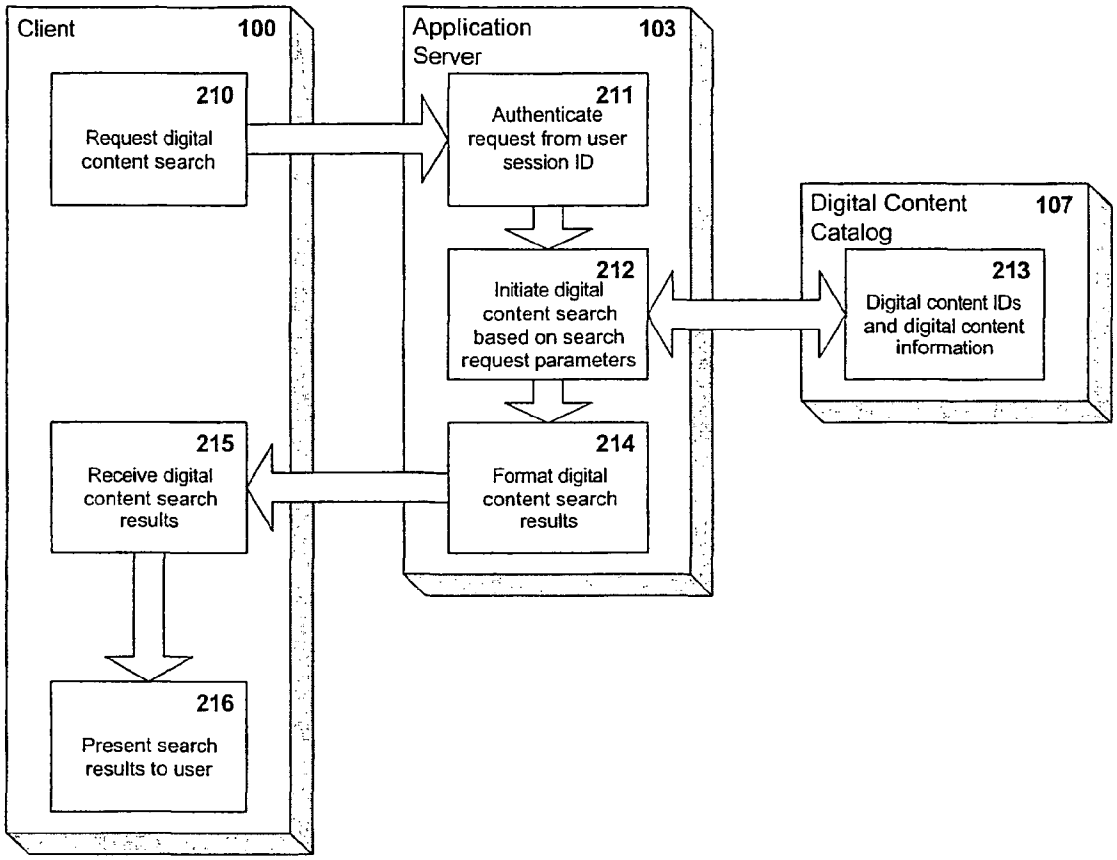

Client
100
210
Request digital content search
215
Receive digital content search results
216
Present search results to user
Application Server
103
211
Authenticate request from user session ID
212
Initiate digital content search based on search request parameters
214
Format digital content search results
Digital Content Catalog
107
213
Digital content IDs and digital content information

Figure 15

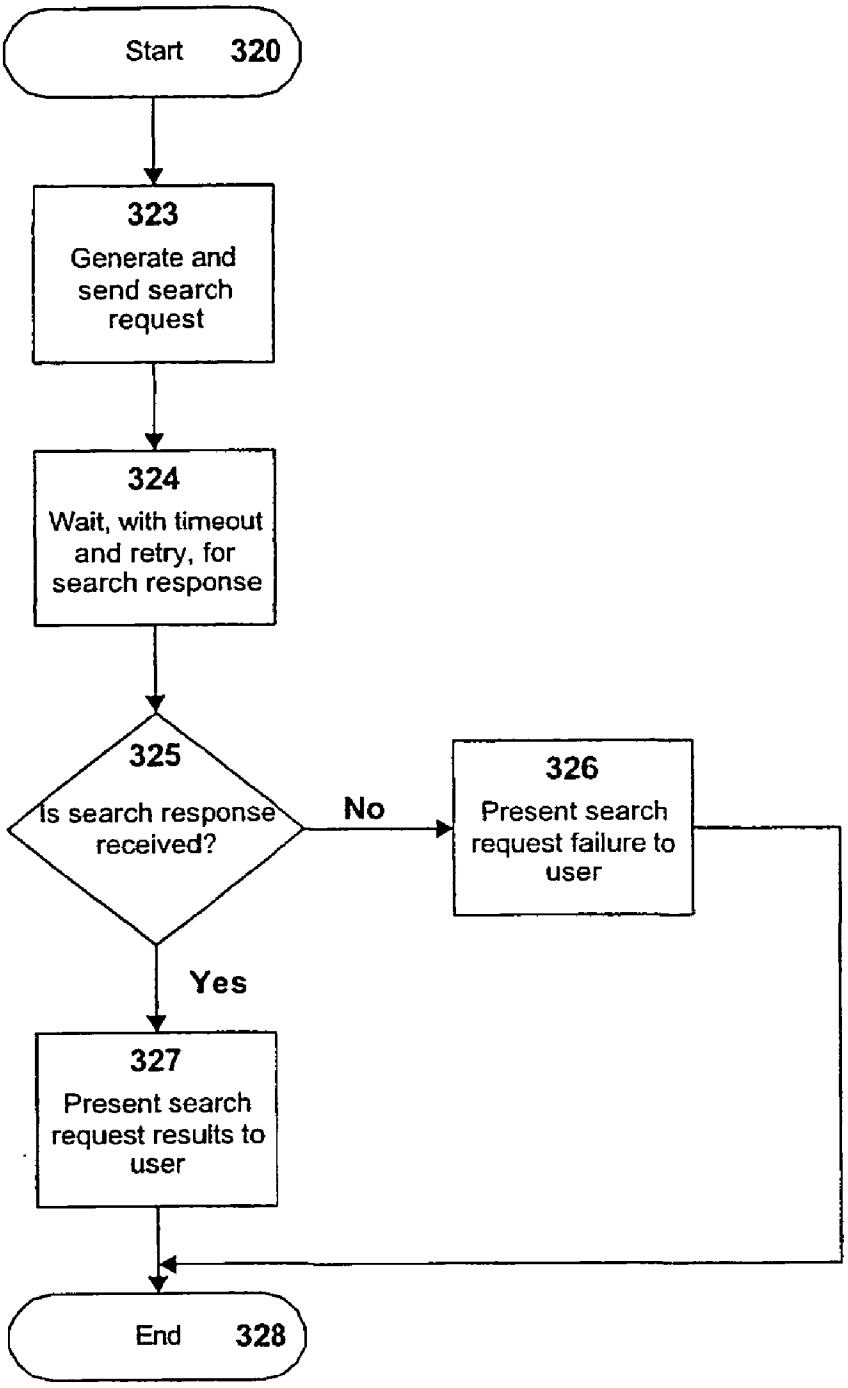

Start 320
323
Generate and send search request
324
Wait, with timeout and retry, for search response
325
Is search response received?
No
326
Present search request failure to user
Yes
327
Present search request results to user
End 328

Figure 16

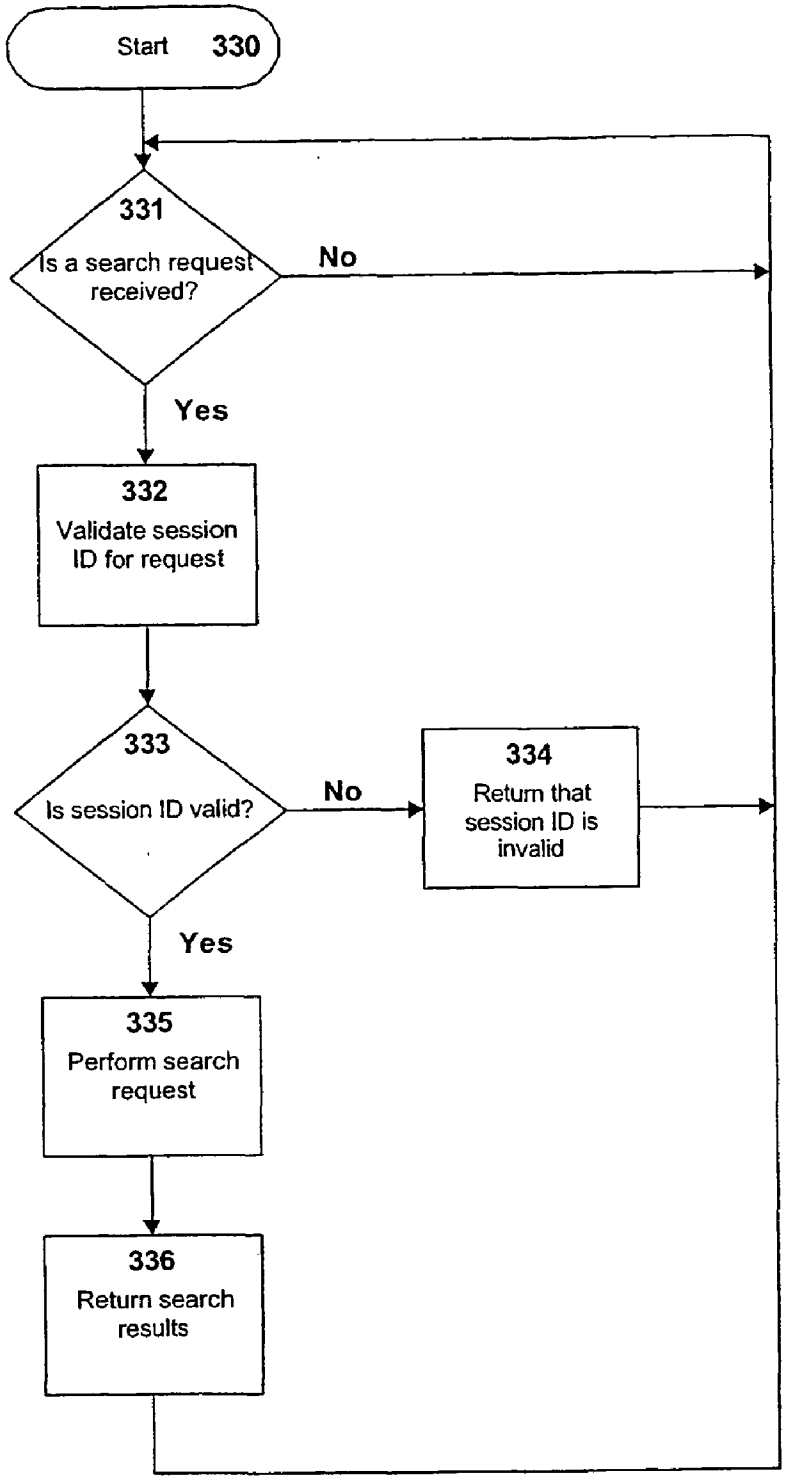

Start 330
331
Is a search request received?
No
Yes
332
Validate session ID for request
333
Is session ID valid?
No
334
Return that session ID is invalid
Yes
335
Perform search request
336
Return search results

Figure 17

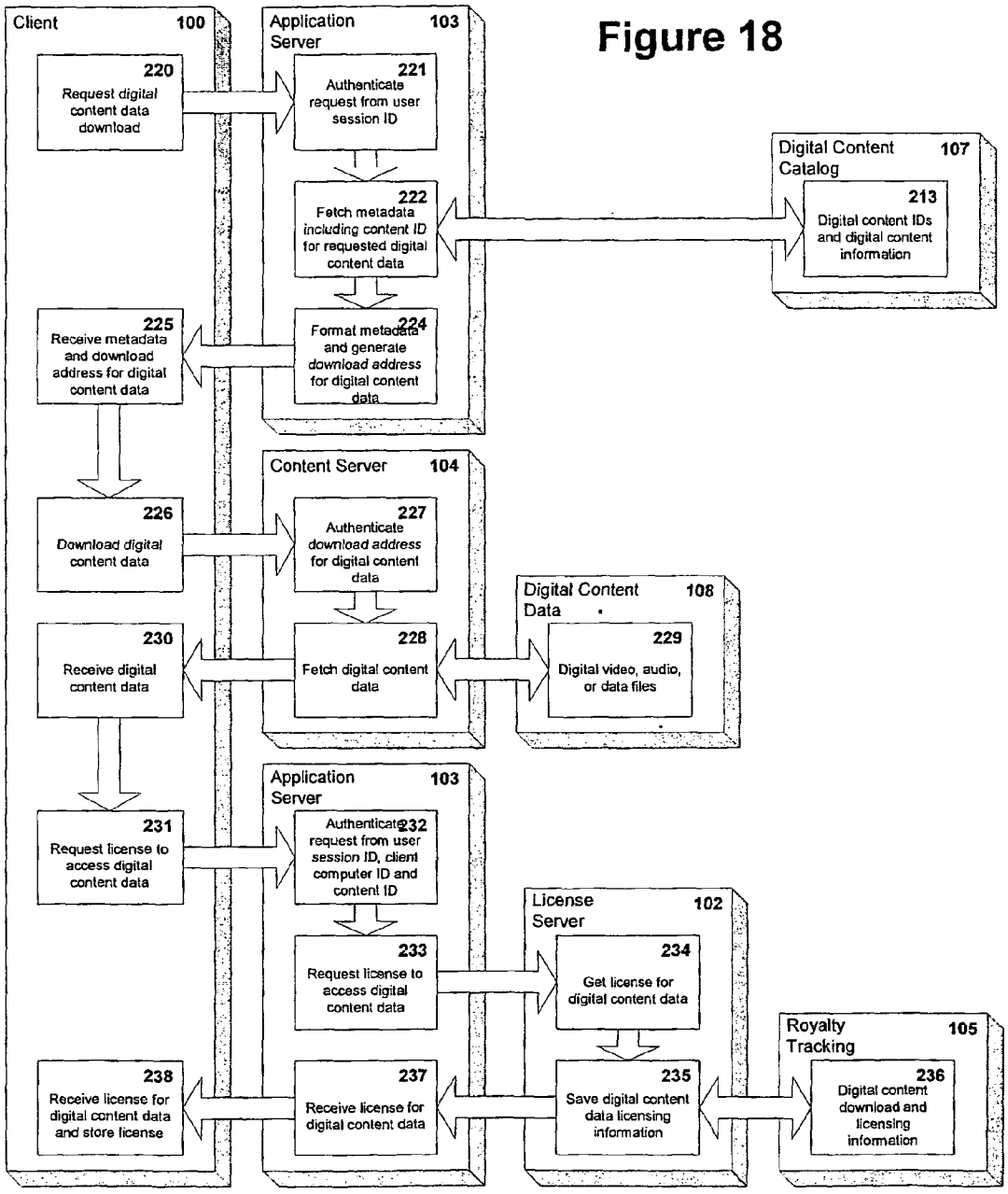


Figure 18
Client 100
220 Request digital content data download
Application Server 103
221 Authenticate request from user session ID
222 Fetch metadata including content ID for requested digital content data
Digital Content Catalog 107
213 Digital content IDs and digital content information
224 Format metadata and generate download address for digital content data
225 Receive metadata and download address for digital content data
Content Server 104
226 Download digital content data
227 Authenticate download address for digital content data
Digital Content Data 108
228 Fetch digital content data
229 Digital video, audio, or data files
230 Receive digital content data
Application Server 103
231 Request license to access digital content data
232 Authenticate request from user session ID, client computer ID and content ID
License Server 102
233 Request license to access digital content data
234 Get license for digital content data
Royalty Tracking 105
235 Save digital content data licensing information
236 Digital content download and licensing information
237 Receive license for digital content data
238 Receive license for digital content data and store license

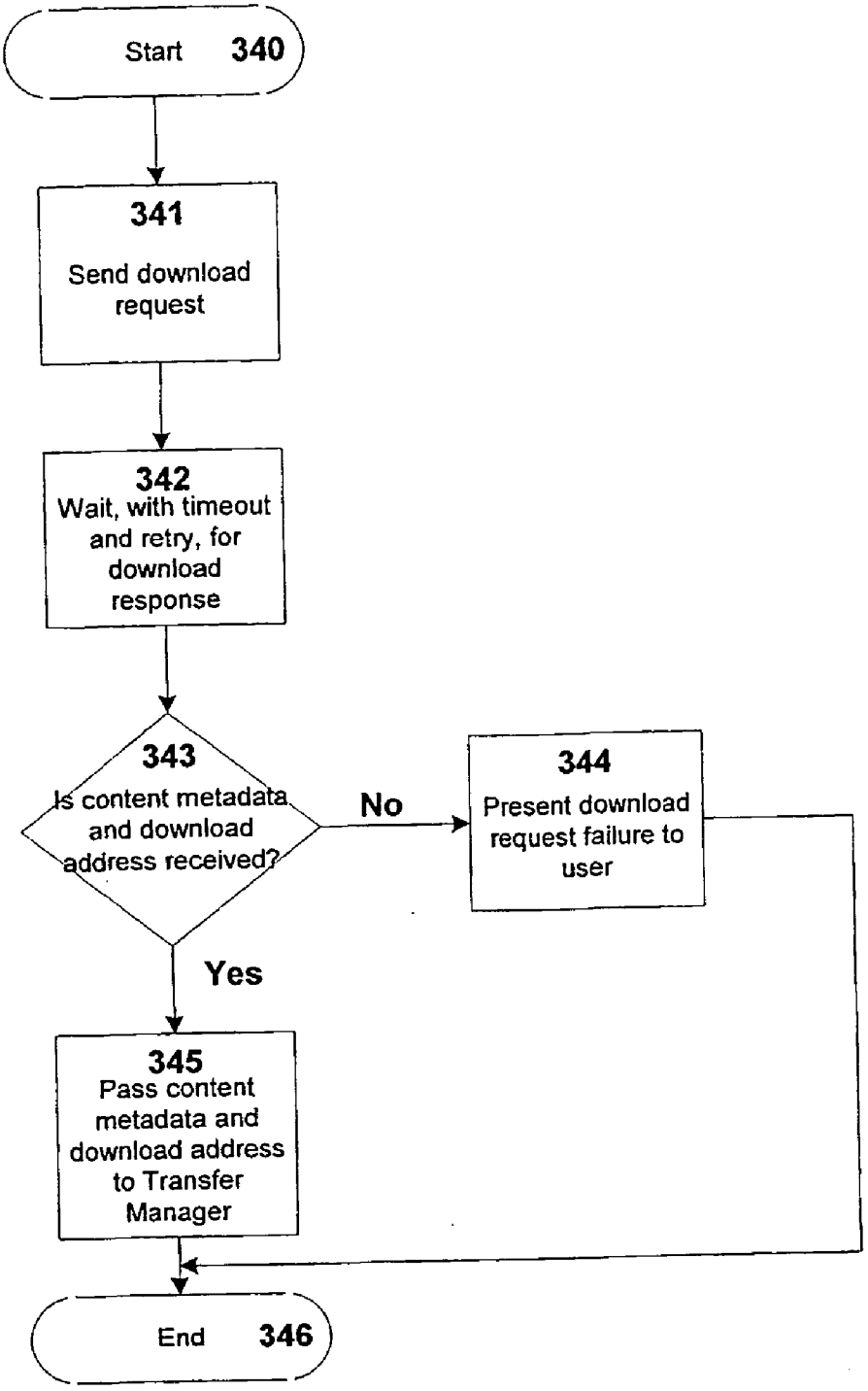

Start 340
341
Send download request
342
Wait, with timeout and retry, for download response
343
Is content metadata and download address received?
No
344
Present download request failure to user
Yes
345
Pass content metadata and download address to Transfer Manager
End 346

Figure 19

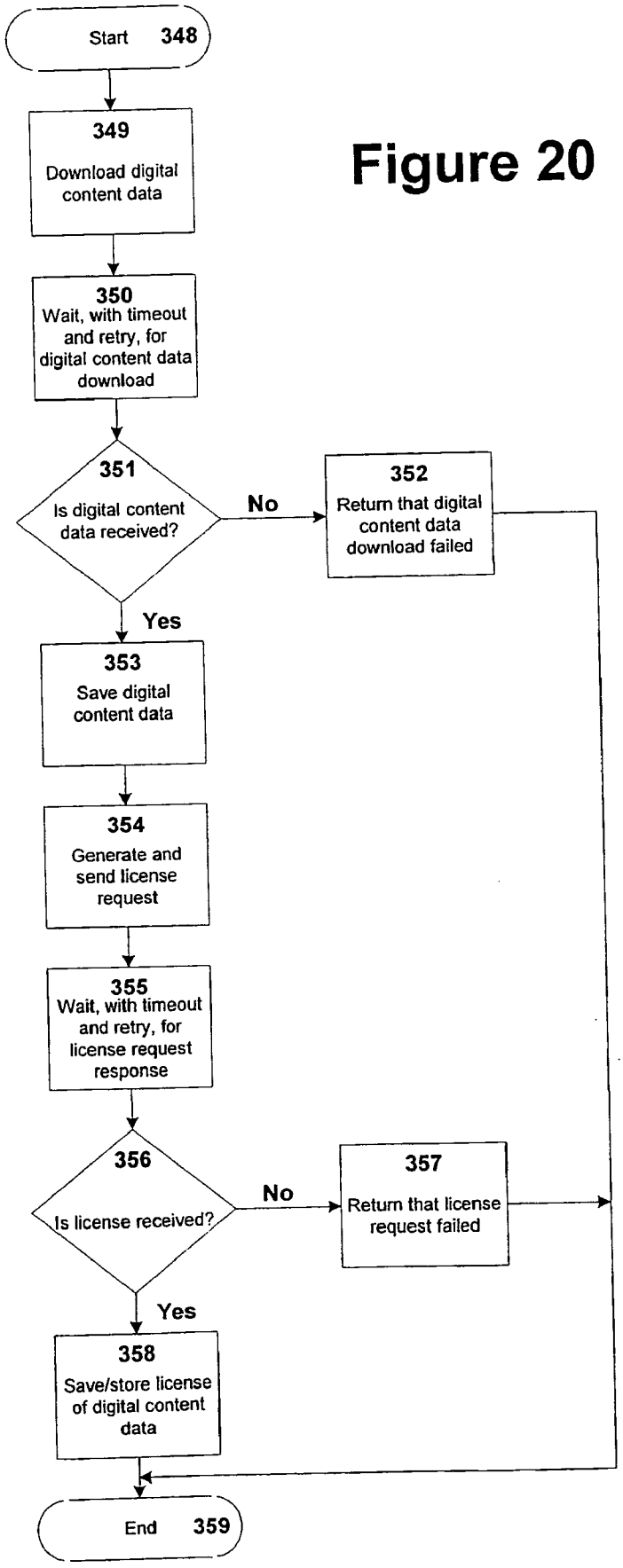

Start 348
349
Download digital content data
350
Wait, with timeout and retry, for digital content data download
351
Is digital content data received?
No
352
Return that digital content data download failed
Yes
353
Save digital content data
354
Generate and send license request
355
Wait, with timeout and retry, for license request response
356
Is license received?
No
357
Return that license request failed
Yes
358
Save/store license of digital content data
End 359

Figure 20

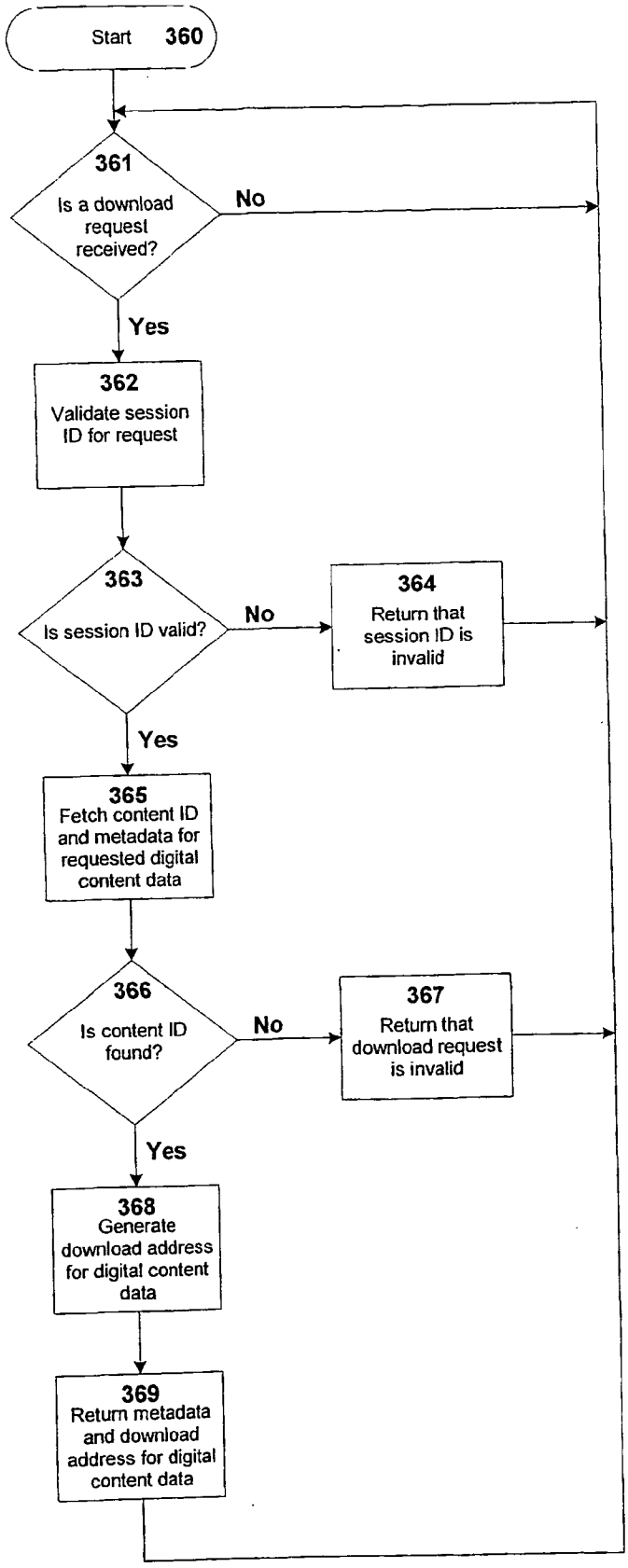

Start 360
361
Is a download request received?
No
Yes
362
Validate session ID for request
363
Is session ID valid?
No
364
Return that session ID is invalid
Yes
365
Fetch content ID and metadata for requested digital content data
366
Is content ID found?
No
367
Return that download request is invalid
Yes
368
Generate download address for digital content data
369
Return metadata and download address for digital content data

Figure 21

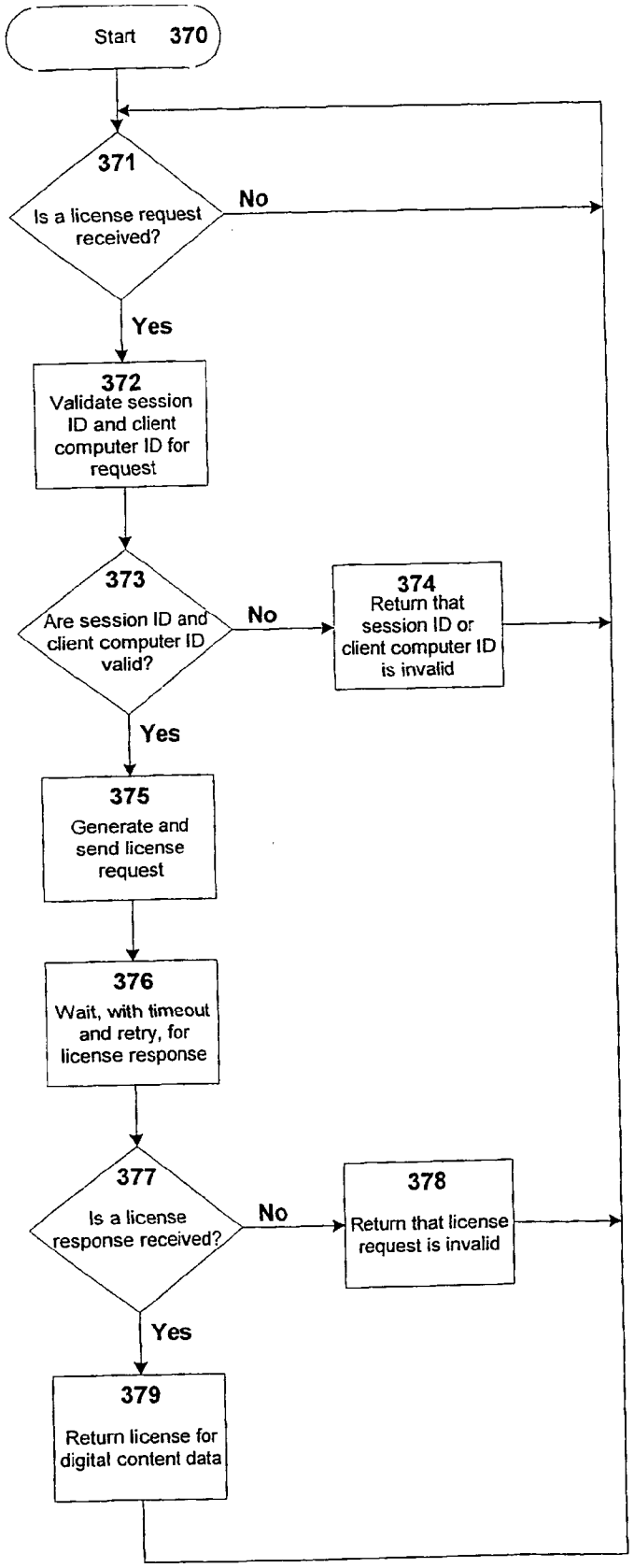

Start 370
371
Is a license request received?
No
Yes
372
Validate session ID and client computer ID for request
373
Are session ID and client computer ID valid?
No
374
Return that session ID or client computer ID is invalid
Yes
375
Generate and send license request
376
Wait, with timeout and retry, for license response
377
Is a license response received?
No
378
Return that license request is invalid
Yes
379
Return license for digital content data

Figure 22

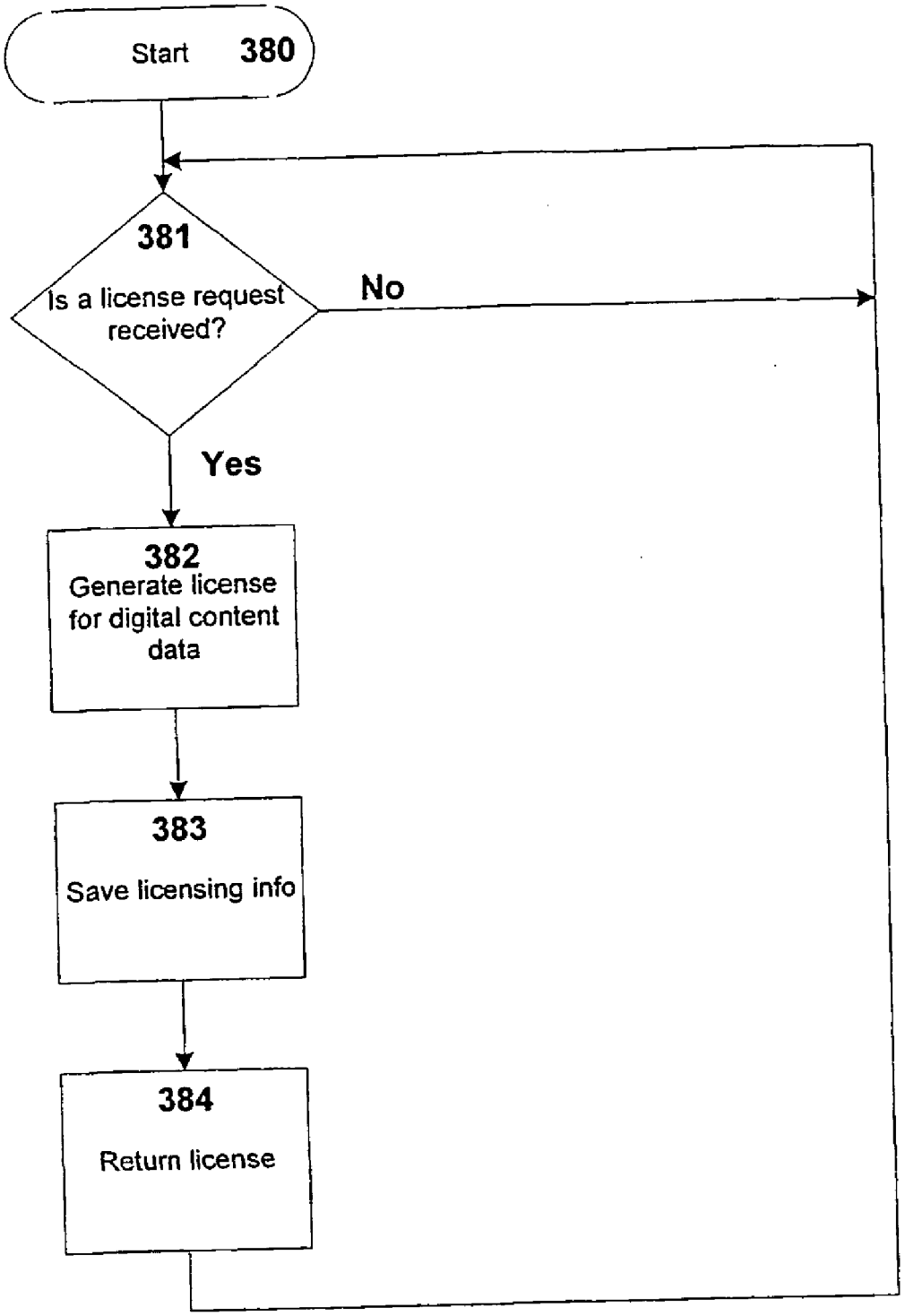

Start 380
381
Is a license request received?
No
Yes
382
Generate license for digital content data
383
Save licensing info
384
Return license

Figure 23

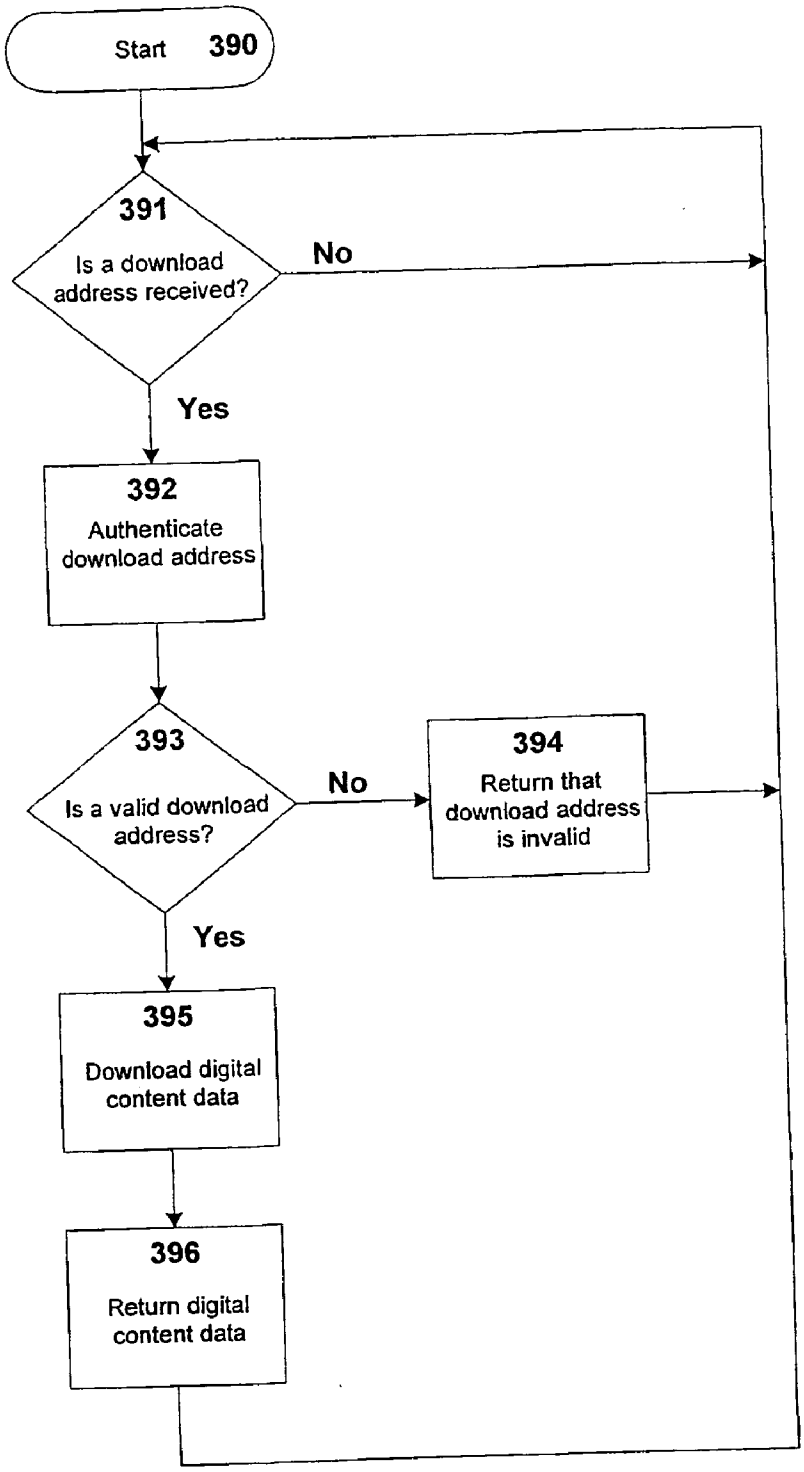

Start 390
391
Is a download address received?
No
Yes
392
Authenticate download address
393
Is a valid download address?
No
394
Return that download address is invalid
Yes
395
Download digital content data
396
Return digital content data

Figure 24a

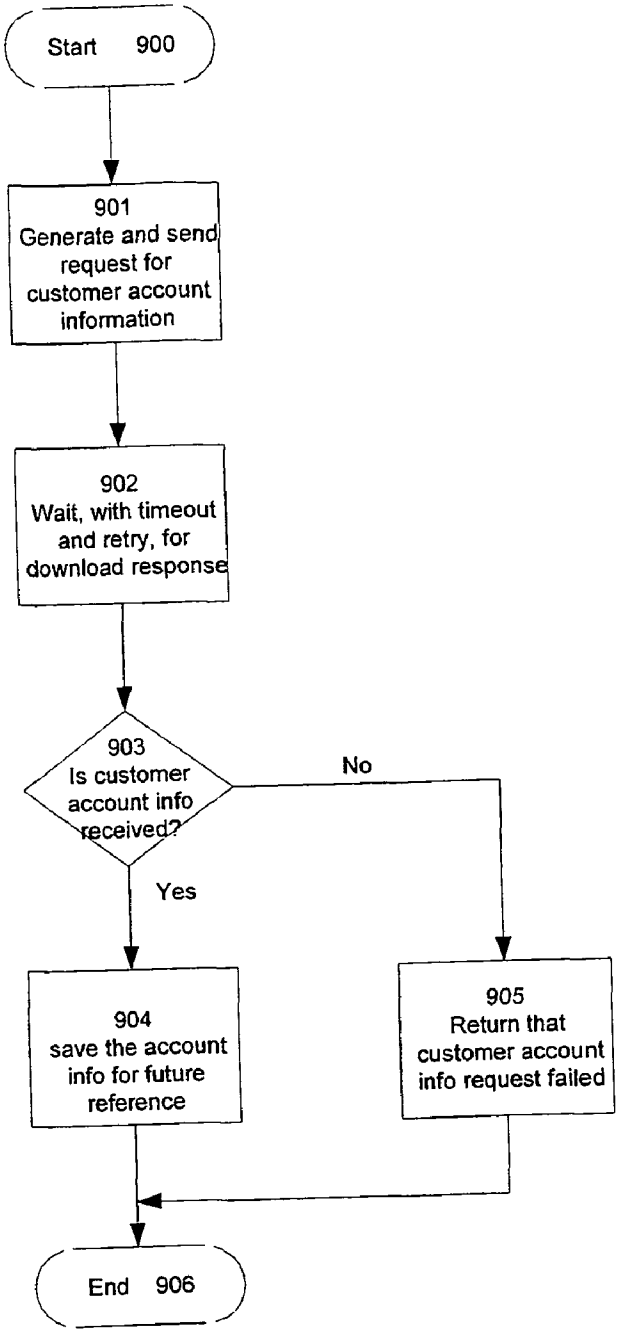

Start 900
901
Generate and send request for customer account information
902
Wait, with timeout and retry, for download response
903
Is customer account info received?
No
Yes
904
save the account info for future reference
905
Return that customer account info request failed
End 906

Figure 24b

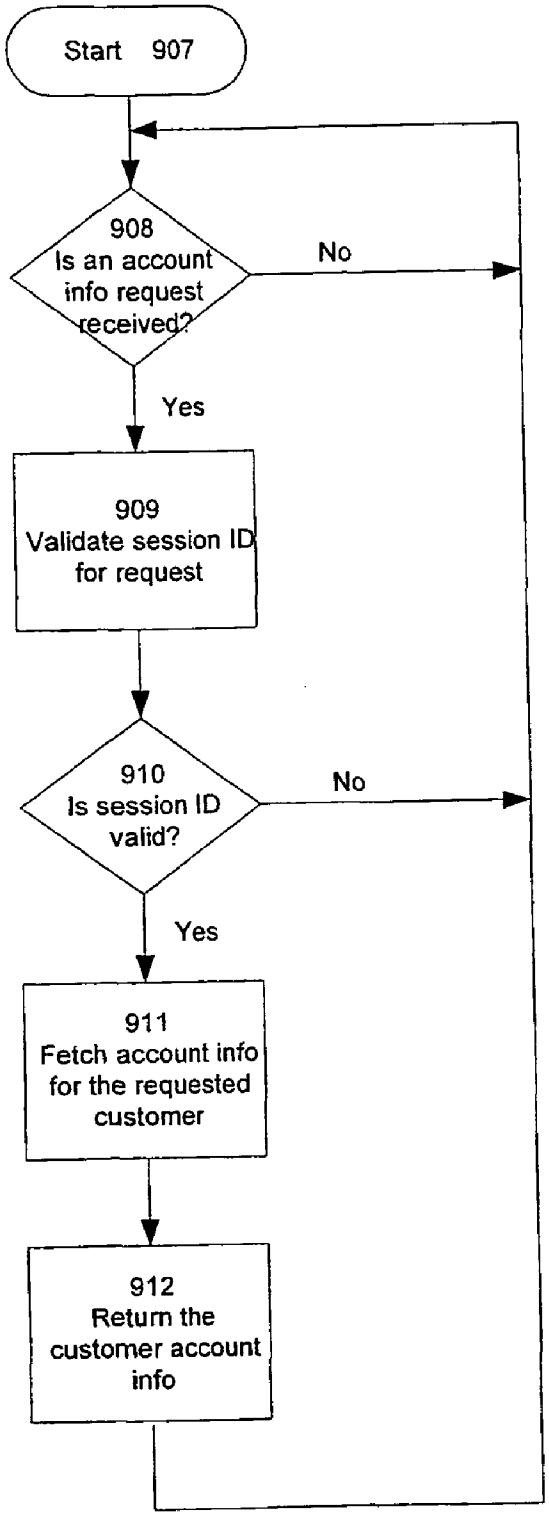

Start 907
908
Is an account info request received?
No
Yes
909
Validate session ID for request
910
Is session ID valid?
No
Yes
911
Fetch account info for the requested customer
912
Return the customer account info

Figure 24c

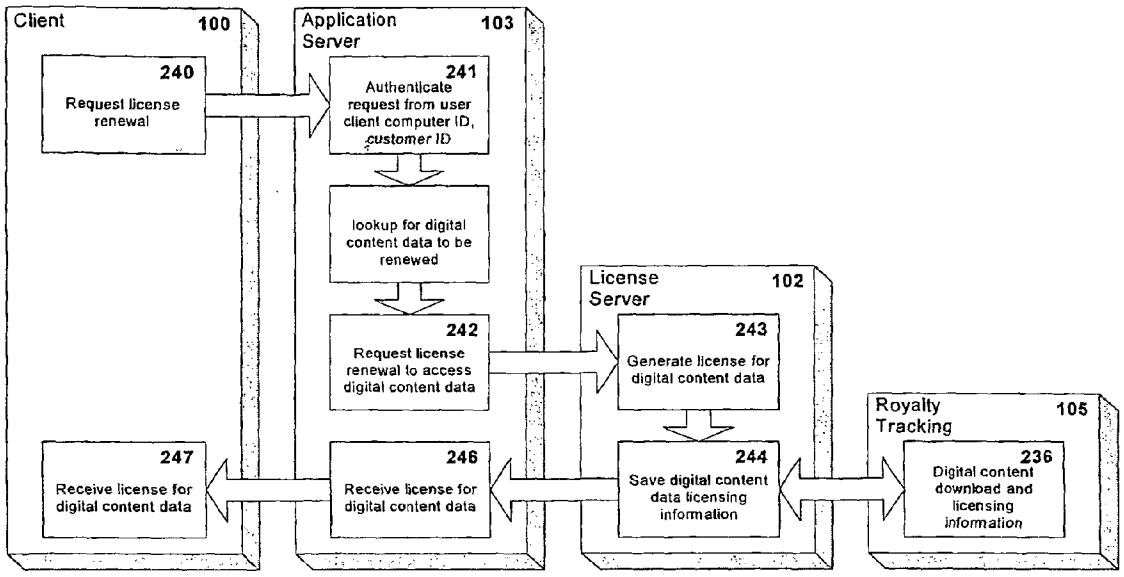

Client
100
240
Request license renewal
Application Server
103
241
Authenticate request from user client computer ID, customer ID
lookup for digital content data to be renewed
242
Request license renewal to access digital content data
License Server
102
243
Generate license for digital content data
244
Save digital content data licensing information
Royalty Tracking
105
236
Digital content download and licensing information
246
Receive license for digital content data
247
Receive license for digital content data

Figure 25

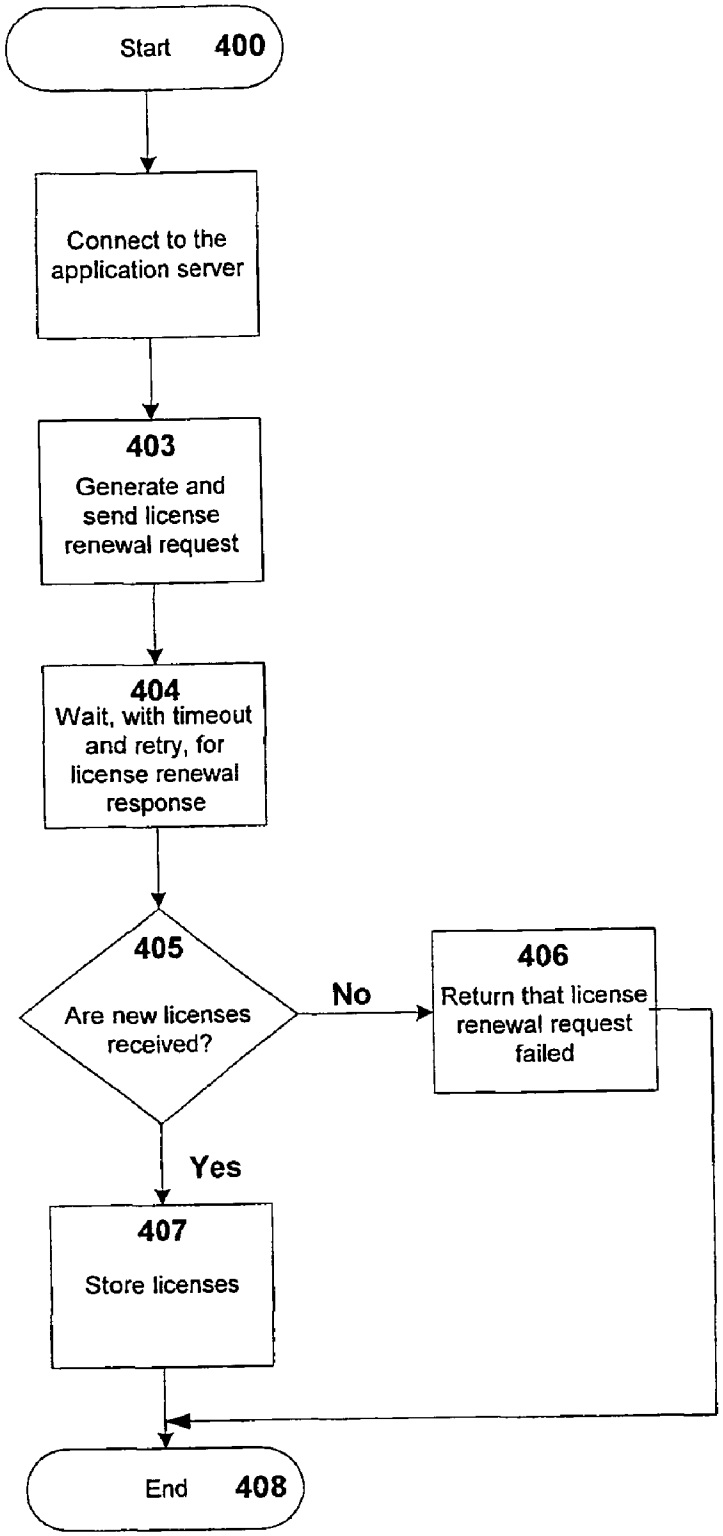

Start 400
Connect to the application server
403
Generate and send license renewal request
404
Wait, with timeout and retry, for license renewal response
405
Are new licenses received?
No
406
Return that license renewal request failed
Yes
407
Store licenses
End 408

Figure 26

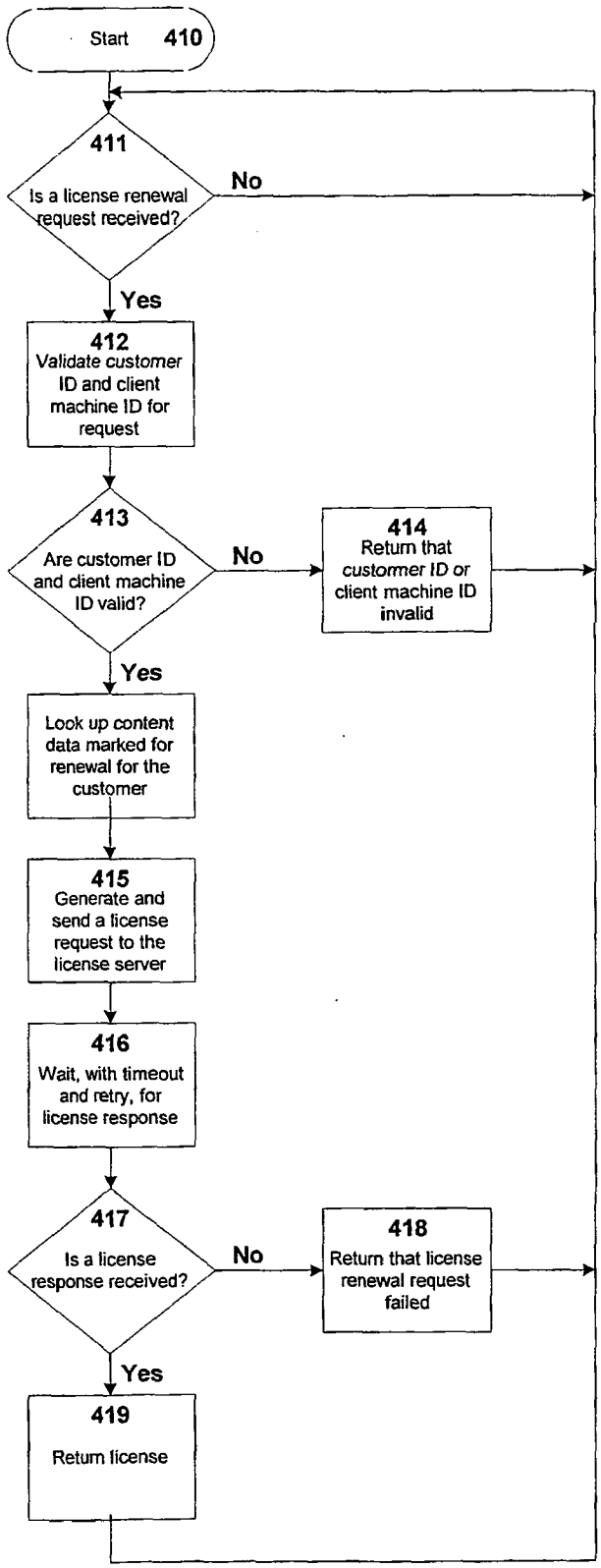

Start 410
411
Is a license renewal request received?
No
Yes
412
Validate customer ID and client machine ID for request
413
Are customer ID and client machine ID valid?
No
414
Return that customer ID or client machine ID invalid
Yes
Look up content data marked for renewal for the customer
415
Generate and send a license request to the license server
416
Wait, with timeout and retry, for license response
417
Is a license response received?
No
418
Return that license renewal request failed
Yes
419
Return license

Figure 27

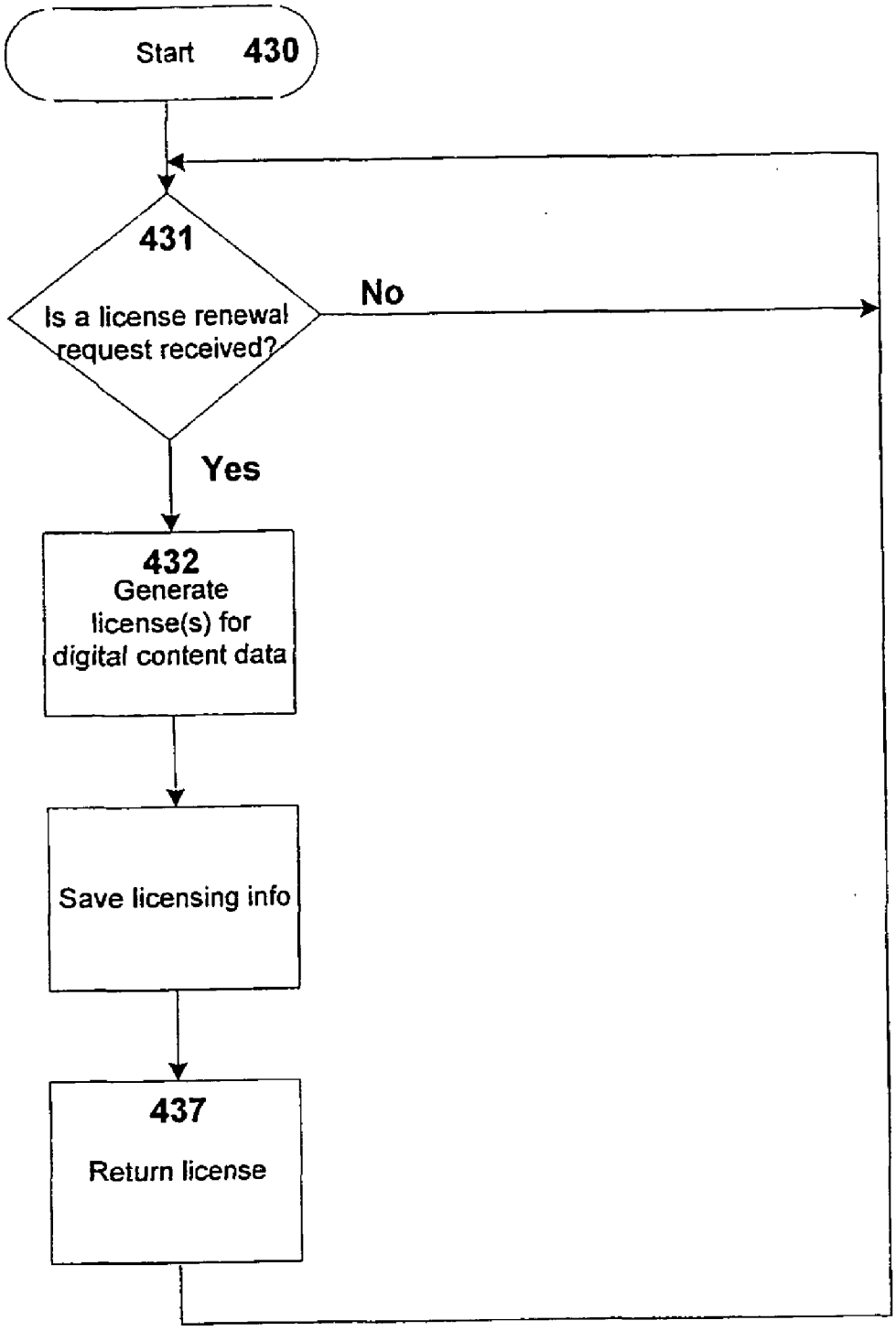

Start 430
431
Is a license renewal request received?
No
Yes
432
Generate license(s) for digital content data
Save licensing info
437
Return license

Figure 28

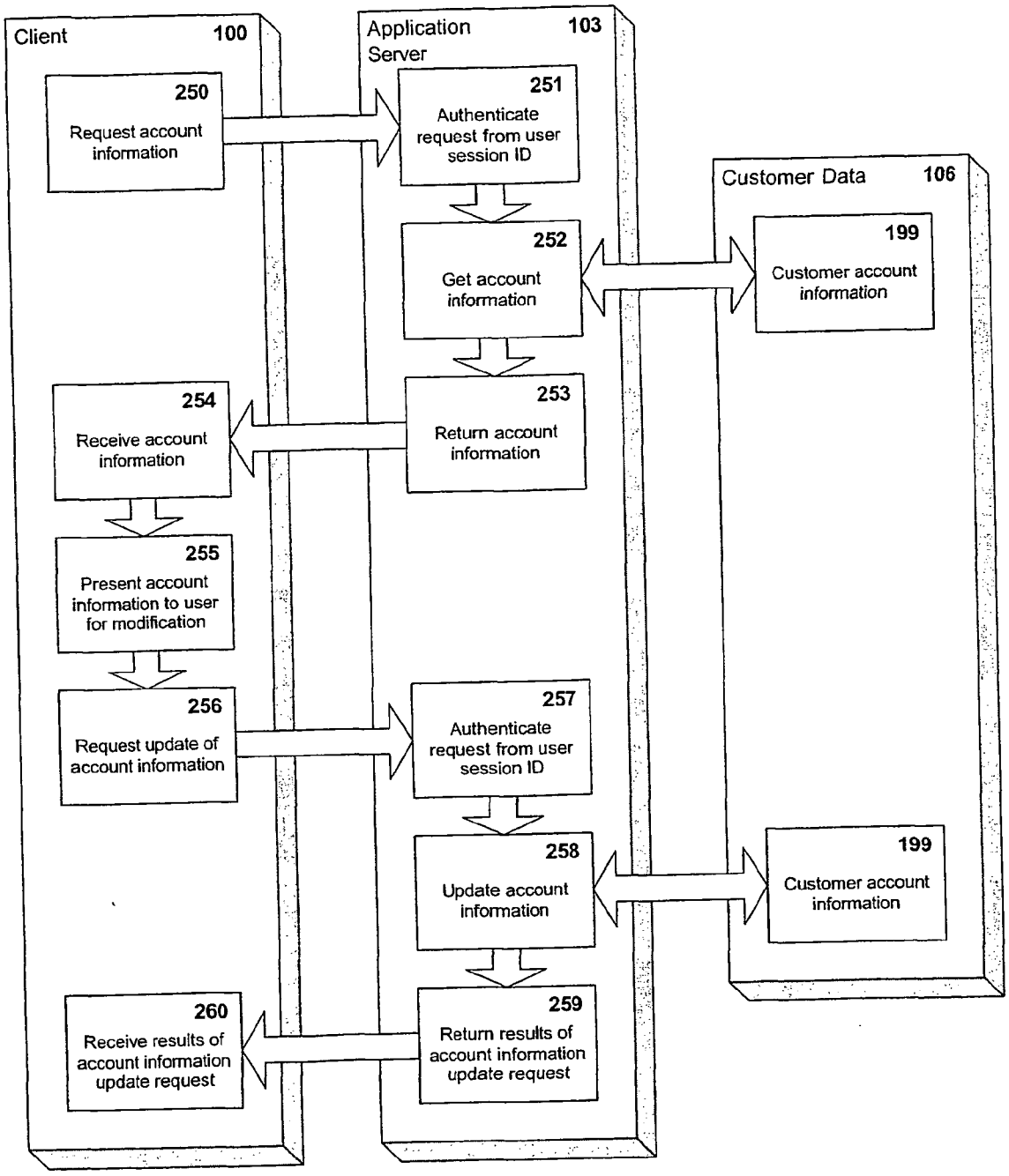

Client
100
Application Server
103
Customer Data
106
250
Request account information
251
Authenticate request from user session ID
252
Get account information
199
Customer account information
253
Return account information
254
Receive account information
255
Present account information to user for modification
256
Request update of account information
257
Authenticate request from user session ID
258
Update account information
199
Customer account information
259
Return results of account information update request
260
Receive results of account information update request

Figure 29

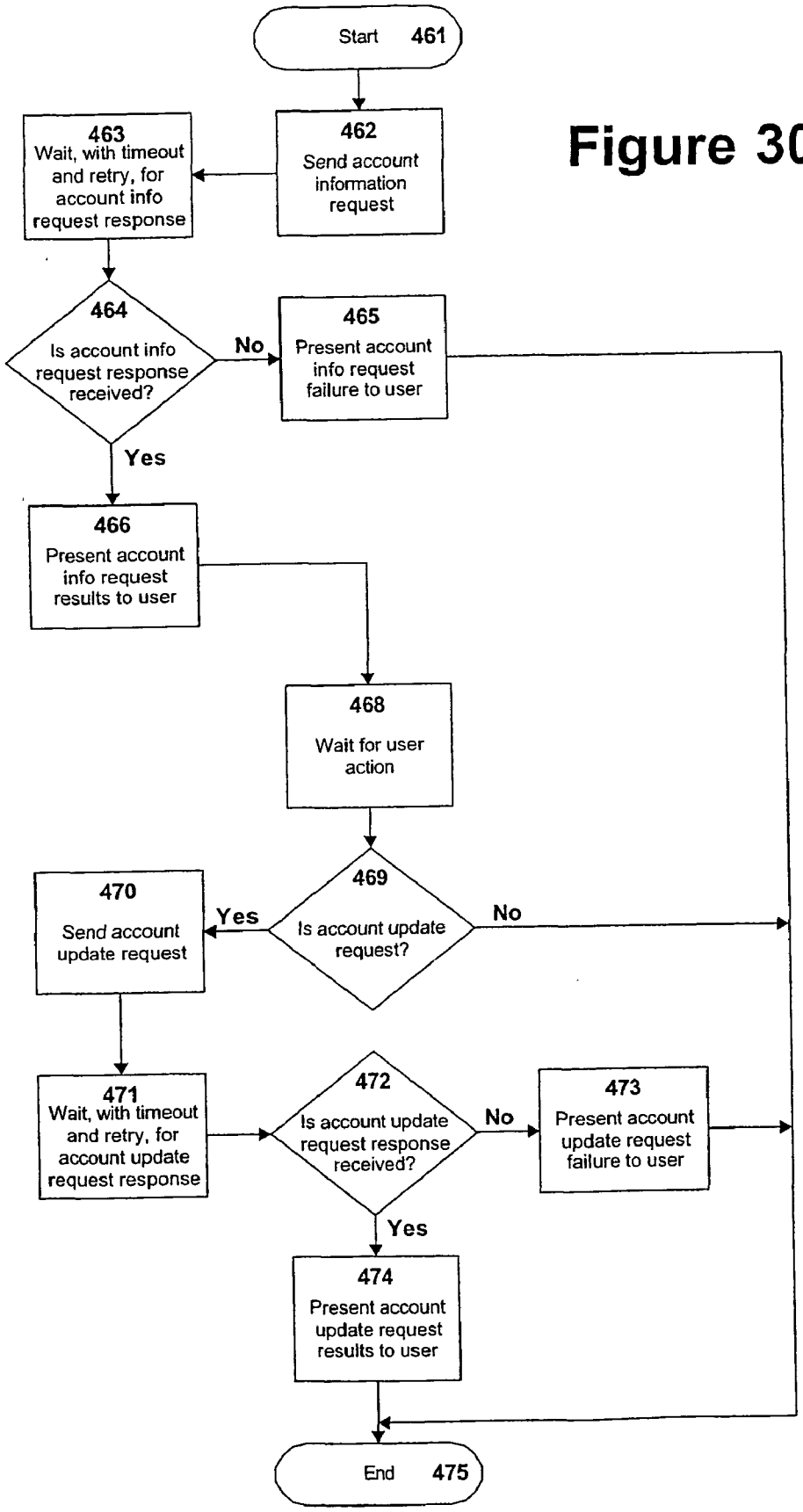

Start 461
462
Send account information request
463
Wait, with timeout and retry, for account info request response
464
Is account info request response received?
No
465
Present account info request failure to user
Yes
466
Present account info request results to user
468
Wait for user action
469
Is account update request?
Yes
No
470
Send account update request
471
Wait, with timeout and retry, for account update request response
472
Is account update request response received?
No
473
Present account update request failure to user
Yes
474
Present account update request results to user
End 475

Figure 30

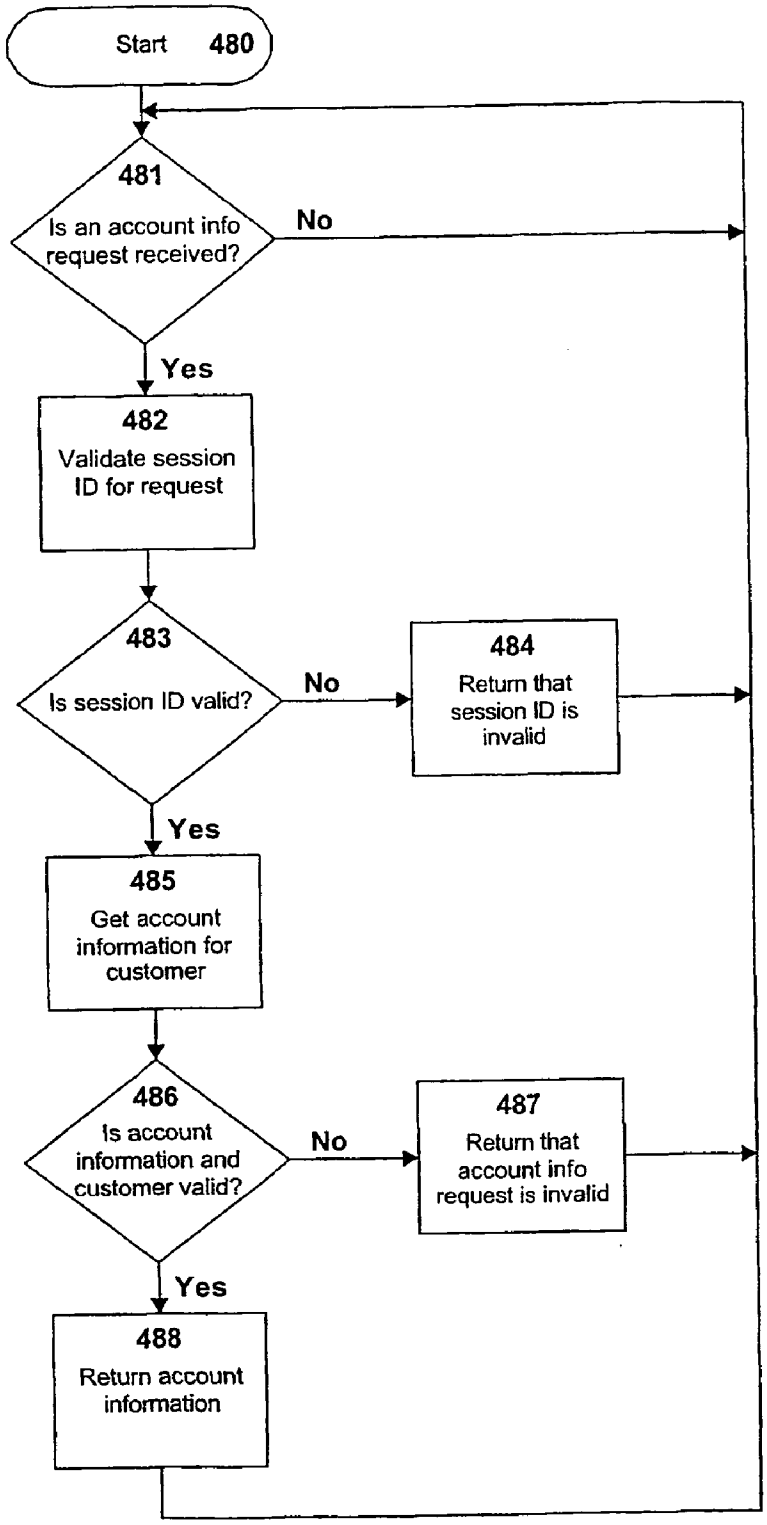

Start 480
481
Is an account info request received?
No
Yes
482
Validate session ID for request
483
Is session ID valid?
No
484
Return that session ID is invalid
Yes
485
Get account information for customer
486
Is account information and customer valid?
No
487
Return that account info request is invalid
Yes
488
Return account information

Figure 31

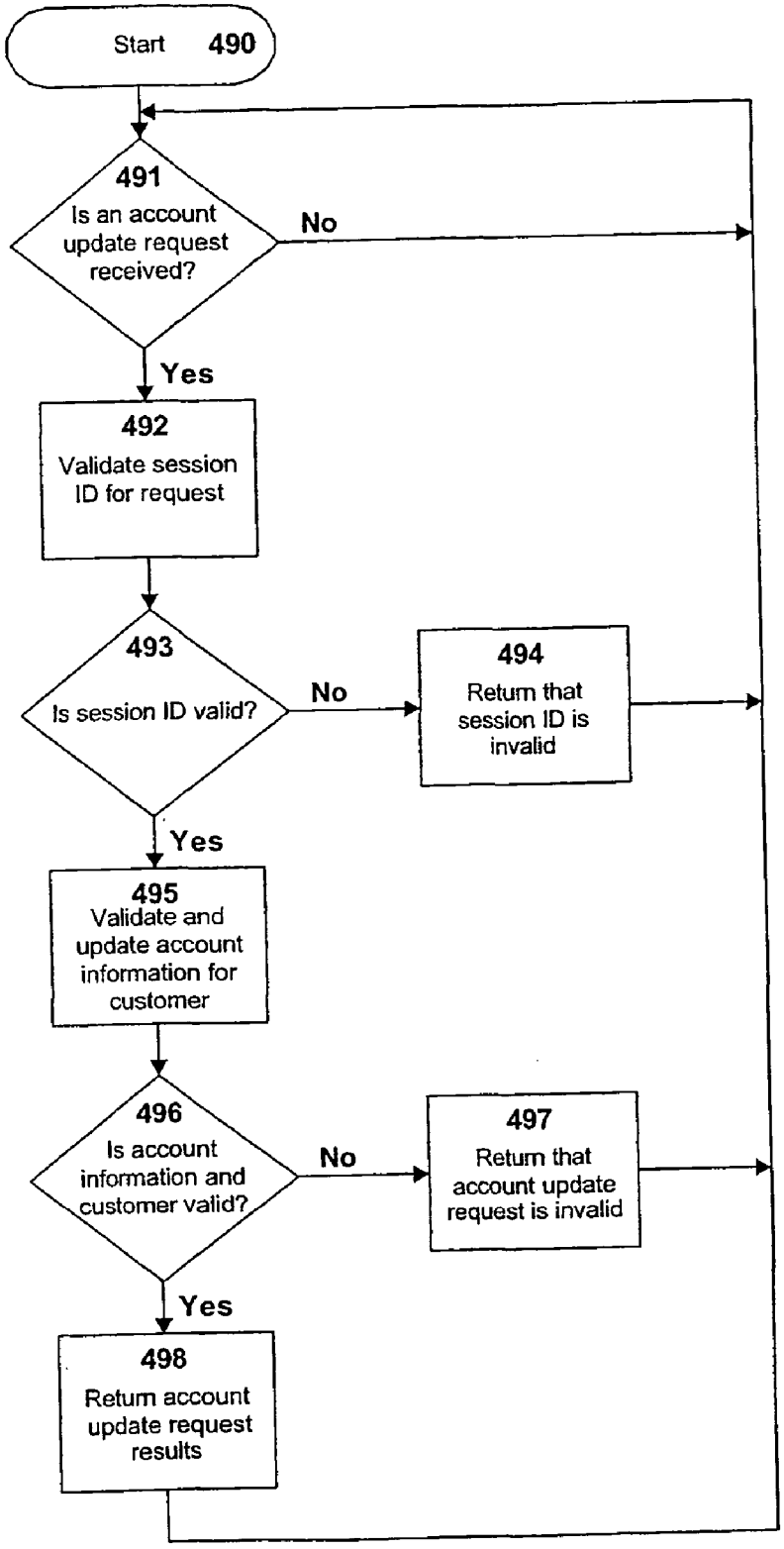

Start 490
491
Is an account update request received?
No
Yes
492
Validate session ID for request
493
Is session ID valid?
No
494
Return that session ID is invalid
Yes
495
Validate and update account information for customer
496
Is account information and customer valid?
No
497
Return that account update request is invalid
Yes
498
Return account update request results

Figure 32

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit

Address https://trial.fullaudio.com/FullAudio/en/register.html Go Links

FullAudio
The Next Way To Experience Music

REGISTER

Registration

Welcome! To become a FullAudio Subscriber and begin enjoying your music collection today, please complete the information below and press 'Submit'. You'll then be able to download the FullAudio Companion software and select from thousands of music tracks.

FullAudio strongly respects the privacy and protects the security of your personal information. (Read Privacy Policy.)

* indicates a required field

Personal Information

First Name: *
Last Name: *
Email Address: *
Username: *
Password: *

Billing Information

Address: *
City: *
State: AL *
Zip Code: *
Home Phone: ( ) - *
Work Phone: ( ) - ext:

Credit Card Information

Name on Card: *
Credit Card Type: American Express *
CreditCard Number: *
Expiration Date: 01 2001 *

Music Preferences

Please indicate your favorite music genres.

Country
Jazz
Pop/Rock
Rap/Hip-Hop
Dance/Electronica
Latin/World
R & B/Blues
Specialty

Subscription Plan

Silver — Our simplest plan is perfect for light listeners of music. You'll get up to 5 Hits and 50 Favorites each month. For Tracks in addition to those included in your plan, pay only $.40 per Hit and $.20 per Favorite. $4.95 per month*

Gold — Upgrade to our mid-level plan for even more listening pleasure each month. This Plan provides up to 10 Hits and 100 Favorites each month. Tracks in addition to those included in your plan cost only $.30 per Hit and $.15 per Favorite. $9.95 per month*

Platinum — Our ultimate plan offers you the best in music enjoyment each month. Get up to 15 Hits and 150 Favorites each month. Tracks additional to those in your plan cost only $.20 per Hit and $.10 per Favorite. $14.95 per month*

*You must register as a Music Discovery Member and pay a $3 monthly fee in order to subscribe to a FullAudio plan.

submit

Internet

504 505 506 507 508 509 522 523 524 525 526 527 528 529 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 560 561 562

Figure 33

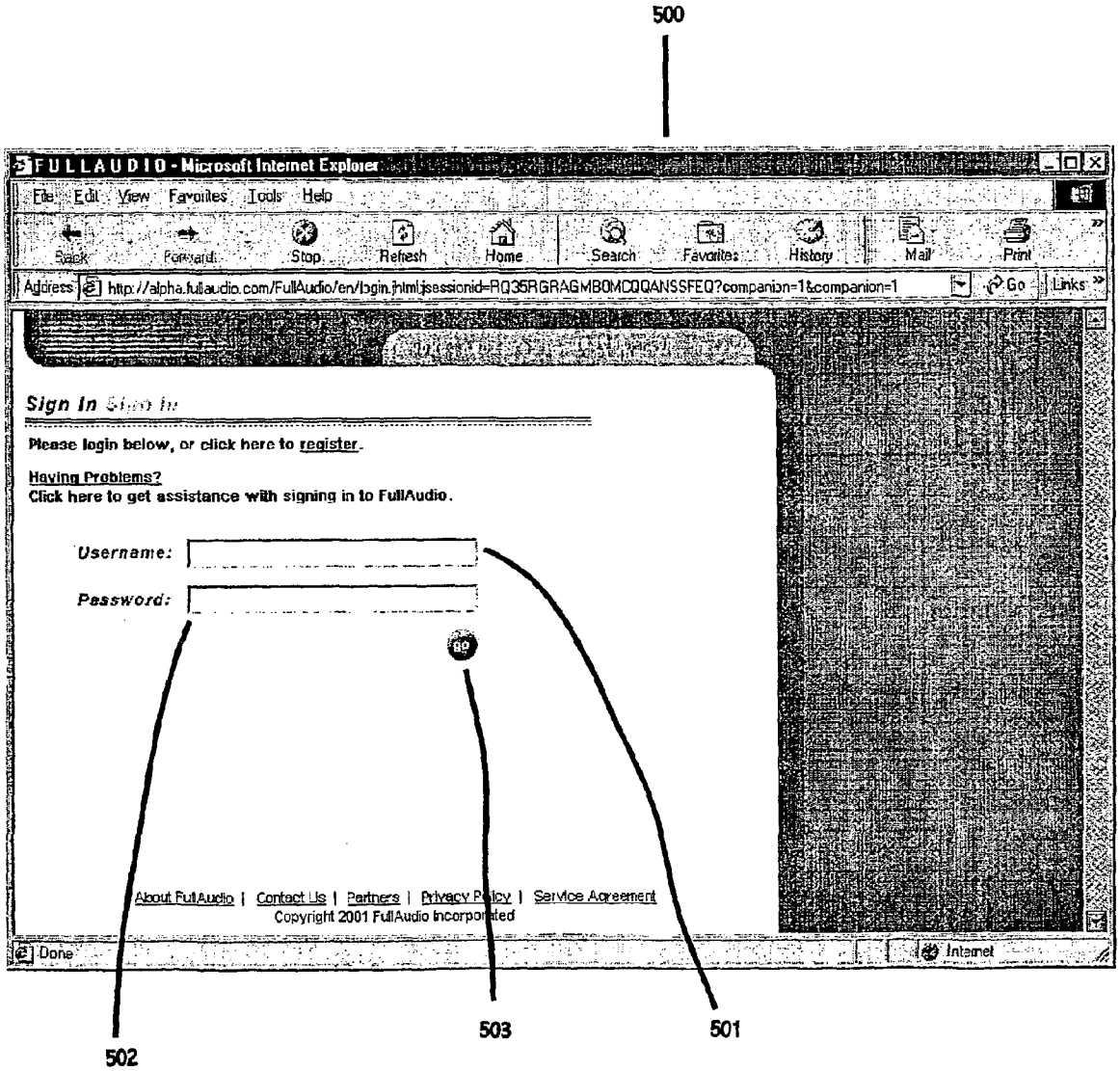

500
FULLAUDIO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print
Address http://alpha.fullaudio.com/FullAudio/en/login.jhtml;jsessionid=RQ35RGRAGMBOMCQQANSSFEQ?companion=1&companion=1
Go Links
Sign In
Please login below, or click here to register.
Having Problems?
Click here to get assistance with signing in to FullAudio.
Username:
Password:
About FullAudio | Contact Us | Partners | Privacy Policy | Service Agreement
Copyright 2001 FullAudio Incorporated
Done
Internet
502
503
501

Figure 34

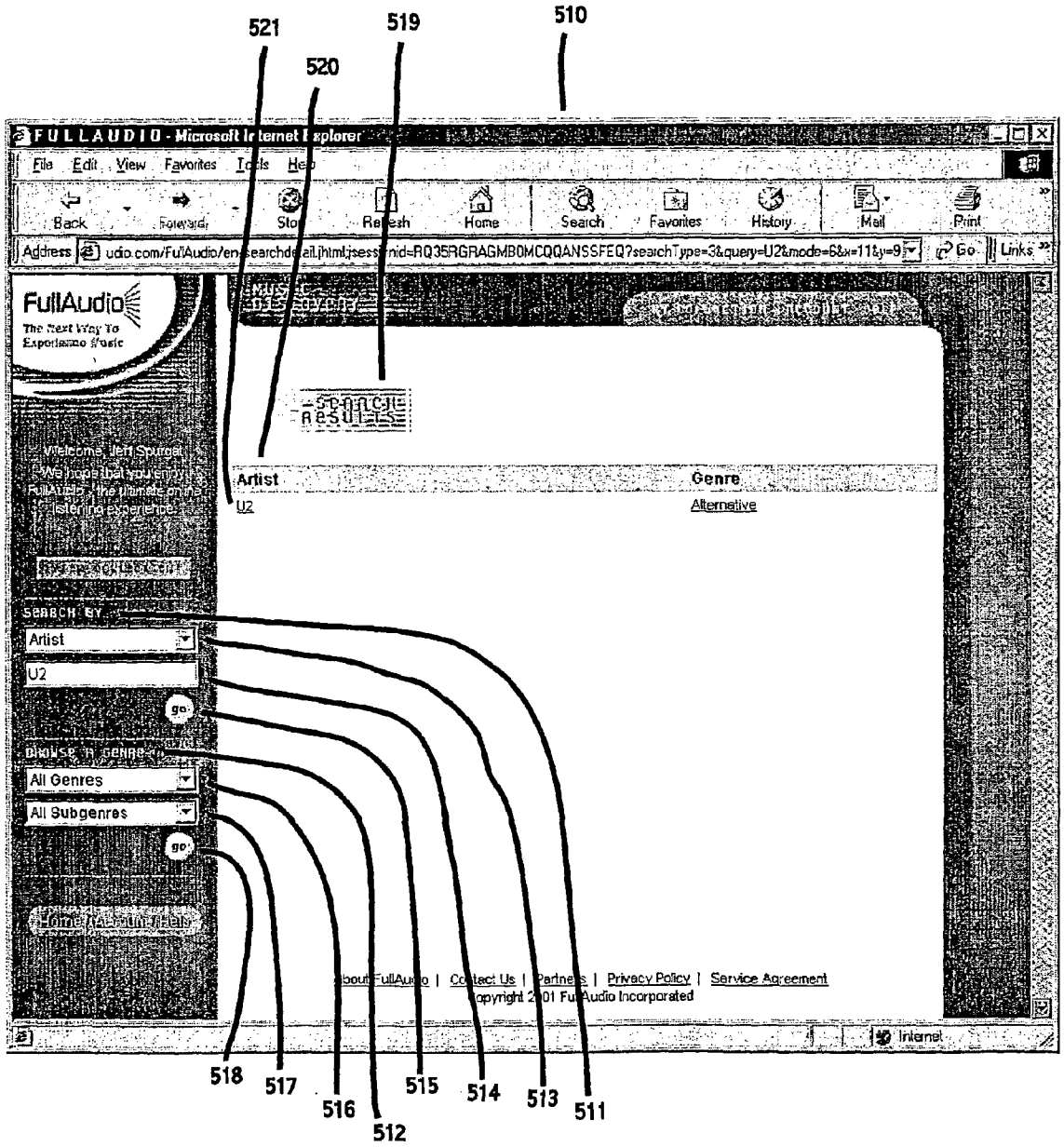

510
519
520
521
FULLAUDIO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print
Address
Go
Links
FullAudio
The Next Way To Experience Music
SEARCH RESULTS
Artist
Genre
U2
Alternative
SEARCH BY
Artist
U2
go
BROWSE BY GENRE
All Genres
All Subgenres
go
Home Account Help
Privacy Policy | Service Agreement
Internet
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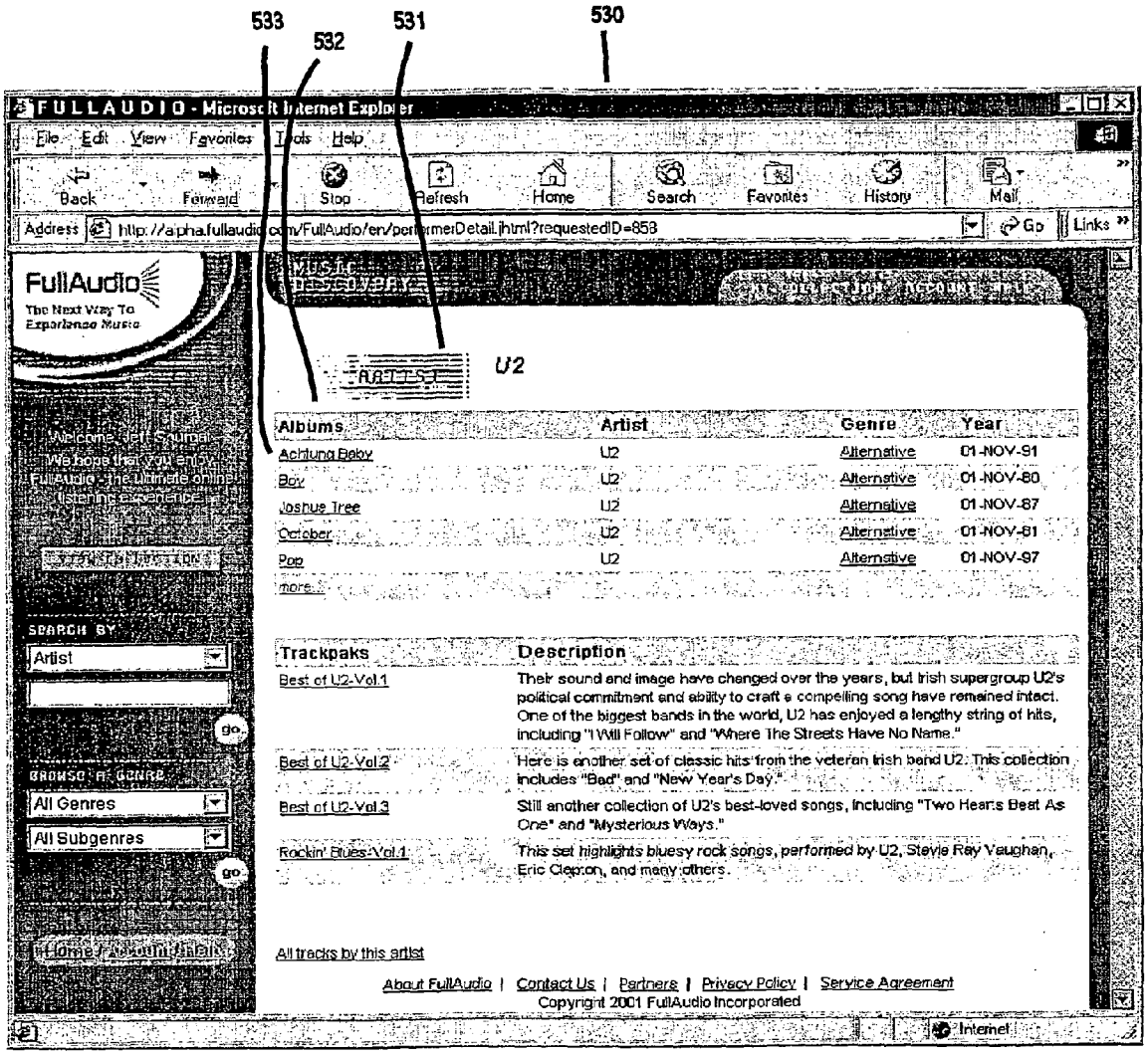
Figure 35


533
532
531
530
FULLAUDIO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail
Address http://alpha.fullaudio.com/FullAudio/en/performerDetail.jhtml?requestedID=853
Go Links
FullAudio
The Next Way To Experience Music
U2
Albums Artist Genre Year
Achtung Baby U2 Alternative 01-NOV-91
Boy U2 Alternative 01-NOV-80
Joshua Tree U2 Alternative 01-NOV-87
October U2 Alternative 01-NOV-81
Pop U2 Alternative 01-NOV-97
more...
SEARCH BY
Artist
go
BROWSE BY GENRE
All Genres
All Subgenres
go
Trackpaks Description
Best of U2-Vol.1 Their sound and image have changed over the years, but Irish supergroup U2's political commitment and ability to craft a compelling song have remained intact. One of the biggest bands in the world, U2 has enjoyed a lengthy string of hits, including "I Will Follow" and "Where The Streets Have No Name."
Best of U2-Vol.2 Here is another set of classic hits from the veteran Irish band U2. This collection includes "Bad" and "New Year's Day."
Best of U2-Vol.3 Still another collection of U2's best-loved songs, including "Two Hearts Beat As One" and "Mysterious Ways."
Rockin' Blues-Vol.1 This set highlights bluesy rock songs, performed by U2, Stevie Ray Vaughan, Eric Clapton, and many others.
All tracks by this artist
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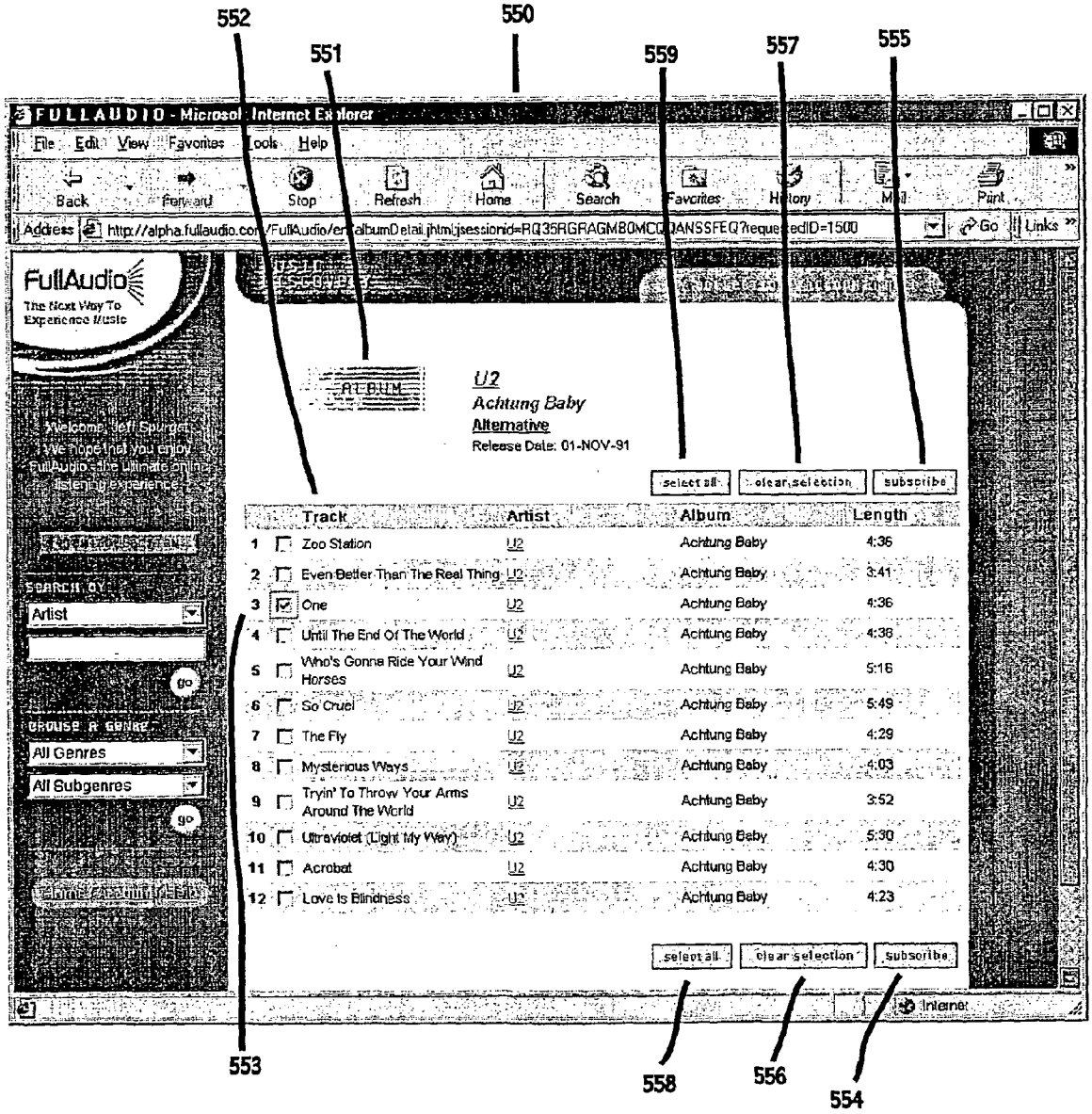
Copyright 2001 FullAudio Incorporated
Internet

Figure 36


552
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555
FULLAUDIO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print
Address http://alpha.fullaudio.com/FullAudio/en/albumDetail.jhtml;jsessionid=RQ35RGRAGMB0MCQANSSFEQ?requestedID=1500
Go Links
FullAudio
The Next Way To Experience Music
ALBUM
U2
Achtung Baby
Alternative
Release Date: 01-NOV-91
select all
clear selection
subscribe
Track Artist Album Length
1 Zoo Station U2 Achtung Baby 4:36
2 Even Better Than The Real Thing U2 Achtung Baby 3:41
3 One U2 Achtung Baby 4:36
4 Until The End Of The World U2 Achtung Baby 4:38
5 Who's Gonna Ride Your Wind Horses U2 Achtung Baby 5:16
6 So Cruel U2 Achtung Baby 5:49
7 The Fly U2 Achtung Baby 4:29
8 Mysterious Ways U2 Achtung Baby 4:03
9 Tryin' To Throw Your Arms Around The World U2 Achtung Baby 3:52
10 Ultraviolet (Light My Way) U2 Achtung Baby 5:30
11 Acrobat U2 Achtung Baby 4:30
12 Love Is Blindness U2 Achtung Baby 4:23
SEARCH BY
Artist
go
BROWSE A GENRE
All Genres
All Subgenres
go
Internet
553
558
556
554

Figure 37

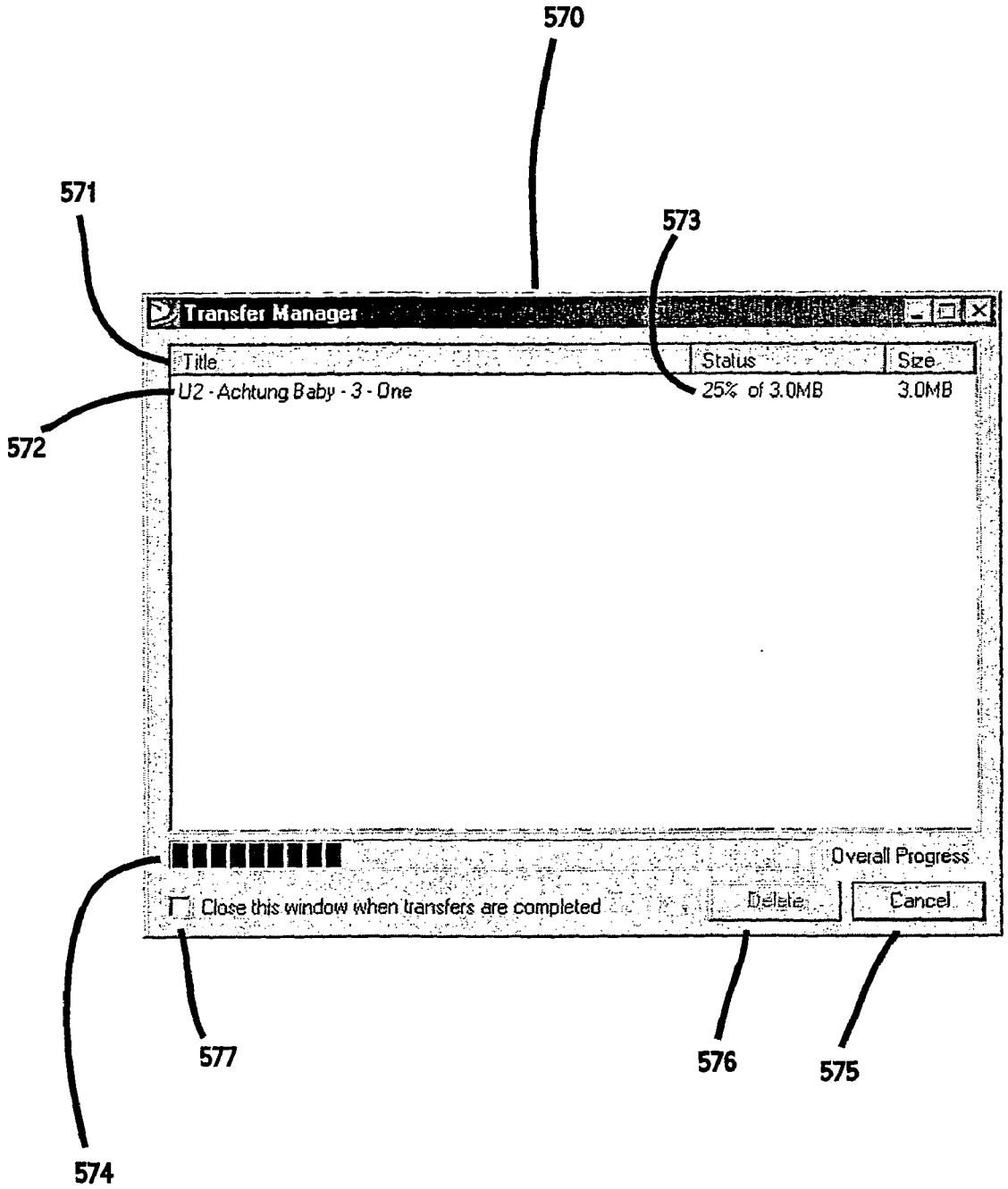
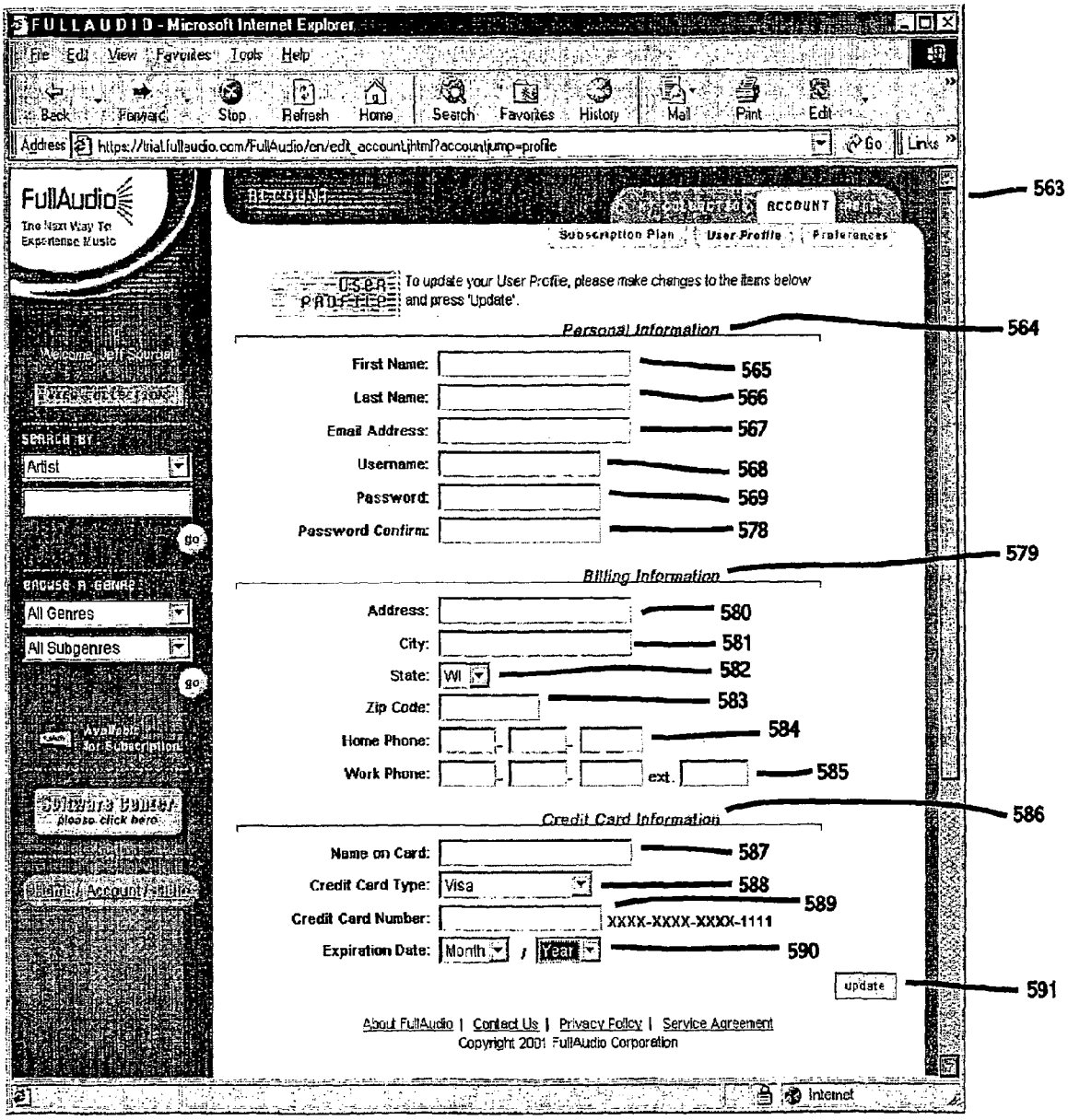

570
571
573
Transfer Manager
Title
Status
Size
U2 - Achtung Baby - 3 - One
25% of 3.0MB
3.0MB
572
Overall Progress
Close this window when transfers are completed
Delete
Cancel
577
576
575
574

Figure 38


FULLAUDIO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print Edit
Address https://trial.fullaudio.com/FullAudio/en/edit_account.jhtml?account.jump=profile
Go Links
FullAudio
The Next Way To Experience Music
ACCOUNT
Subscription Plan
User Profile
Preferences
USER PROFILE
To update your User Profile, please make changes to the items below and press 'Update'.
Personal Information
First Name:
Last Name:
Email Address:
Username:
Password:
Password Confirm:
Billing Information
Address:
City:
State:
WI
Zip Code:
Home Phone:
Work Phone:
ext.
Credit Card Information
Name on Card:
Credit Card Type:
Visa
Credit Card Number:
XXXX-XXXX-XXXX-1111
Expiration Date:
Month
Year
update
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Internet
563
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Figure 39

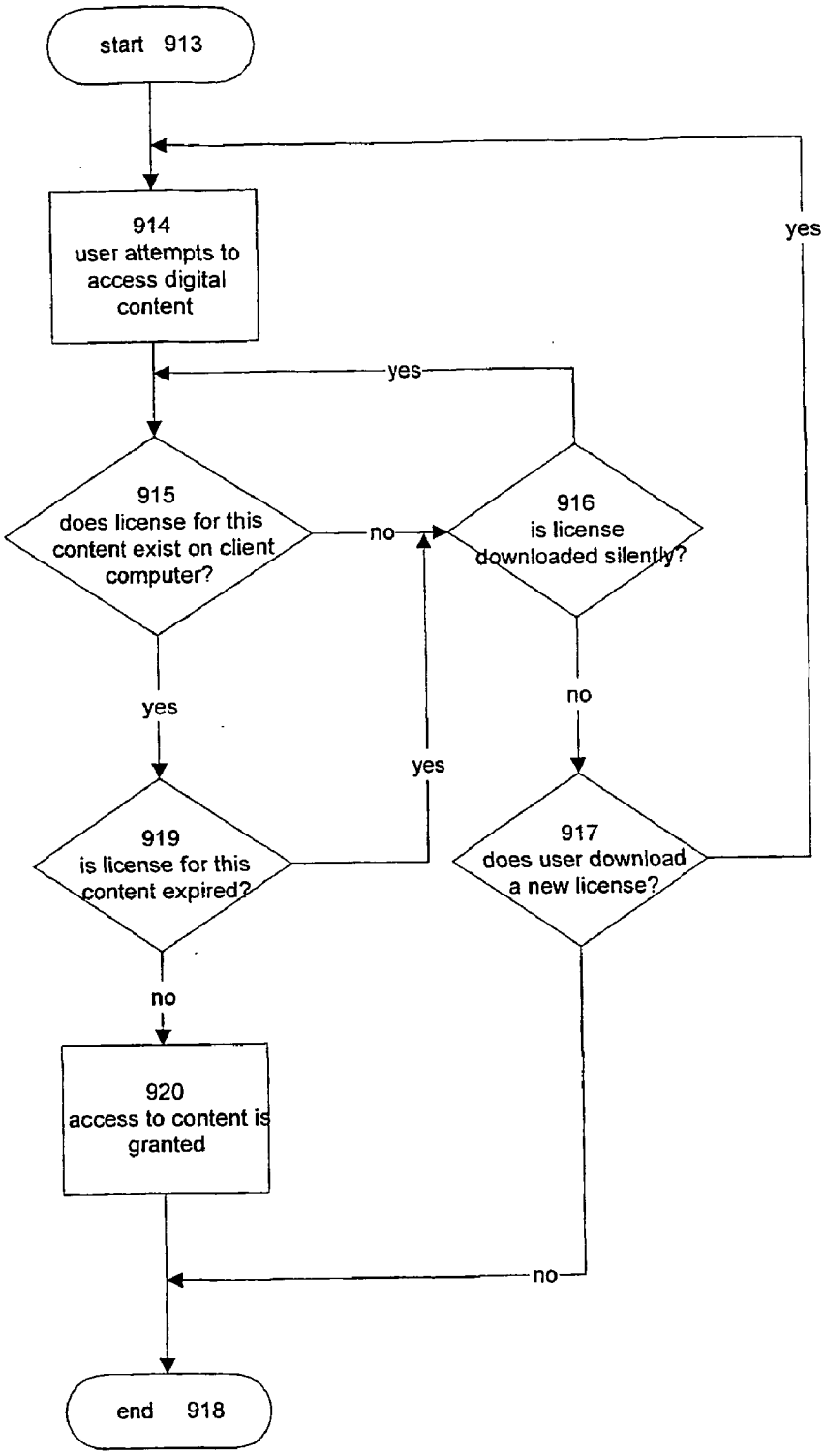
start 913
914
user attempts to access digital content
yes
yes
915
does license for this content exist on client computer?
no
916
is license downloaded silently?
yes
no
yes
919
is license for this content expired?
917
does user download a new license?
no
920
access to content is granted
no
end 918

Figure 40

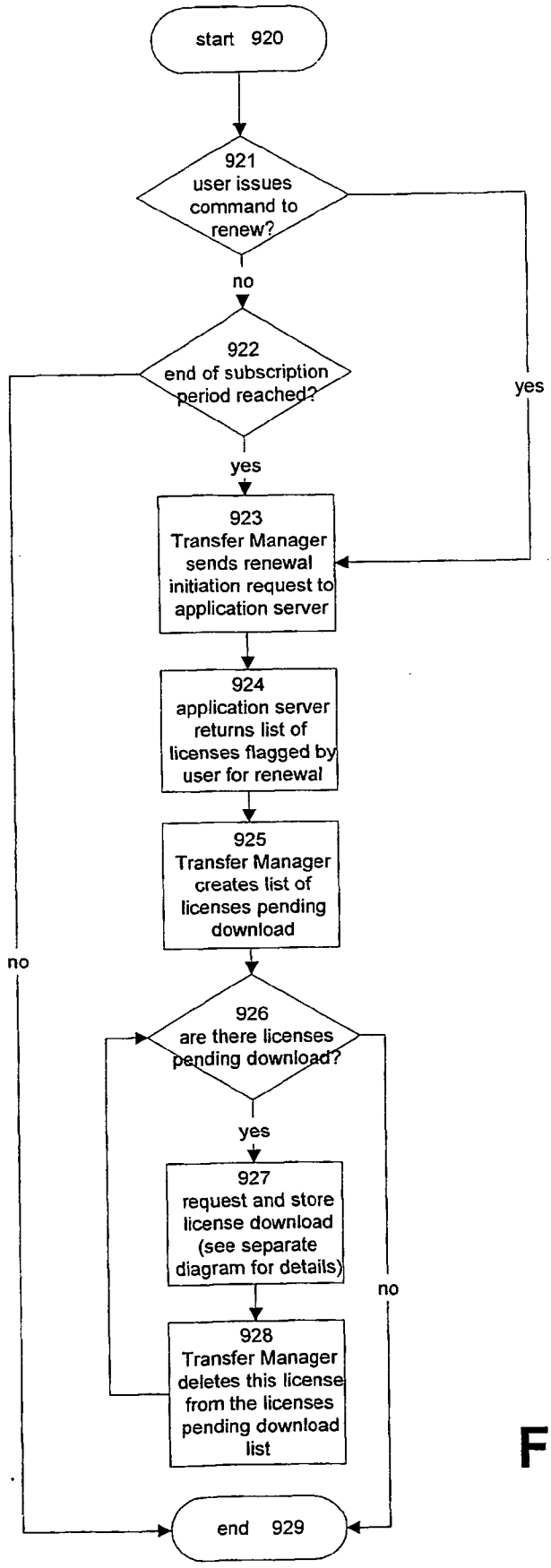
start 920
921
user issues command to renew?
no
yes
922
end of subscription period reached?
yes
no
923
Transfer Manager sends renewal initiation request to application server
924
application server returns list of licenses flagged by user for renewal
925
Transfer Manager creates list of licenses pending download
926
are there licenses pending download?
yes
no
927
request and store license download (see separate diagram for details)
928
Transfer Manager deletes this license from the licenses pending download list
end 929

Figure 41

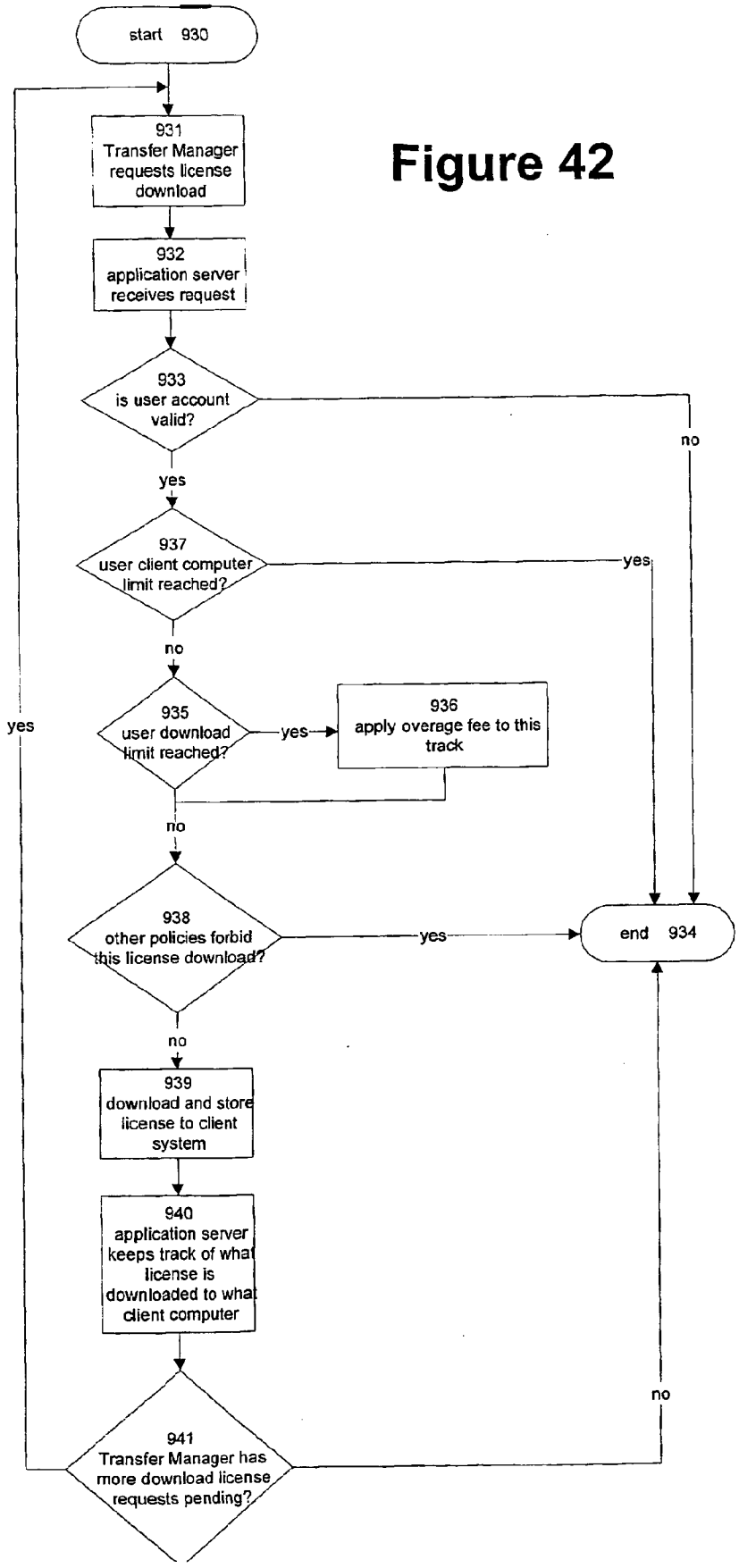
start 930
931
Transfer Manager requests license download
932
application server receives request
933
is user account valid?
no
yes
937
user client computer limit reached?
yes
no
935
user download limit reached?
yes
936
apply overage fee to this track
no
938
other policies forbid this license download?
yes
end 934
no
939
download and store license to client system
940
application server keeps track of what license is downloaded to what client computer
941
Transfer Manager has more download license requests pending?
yes
no

Figure 42

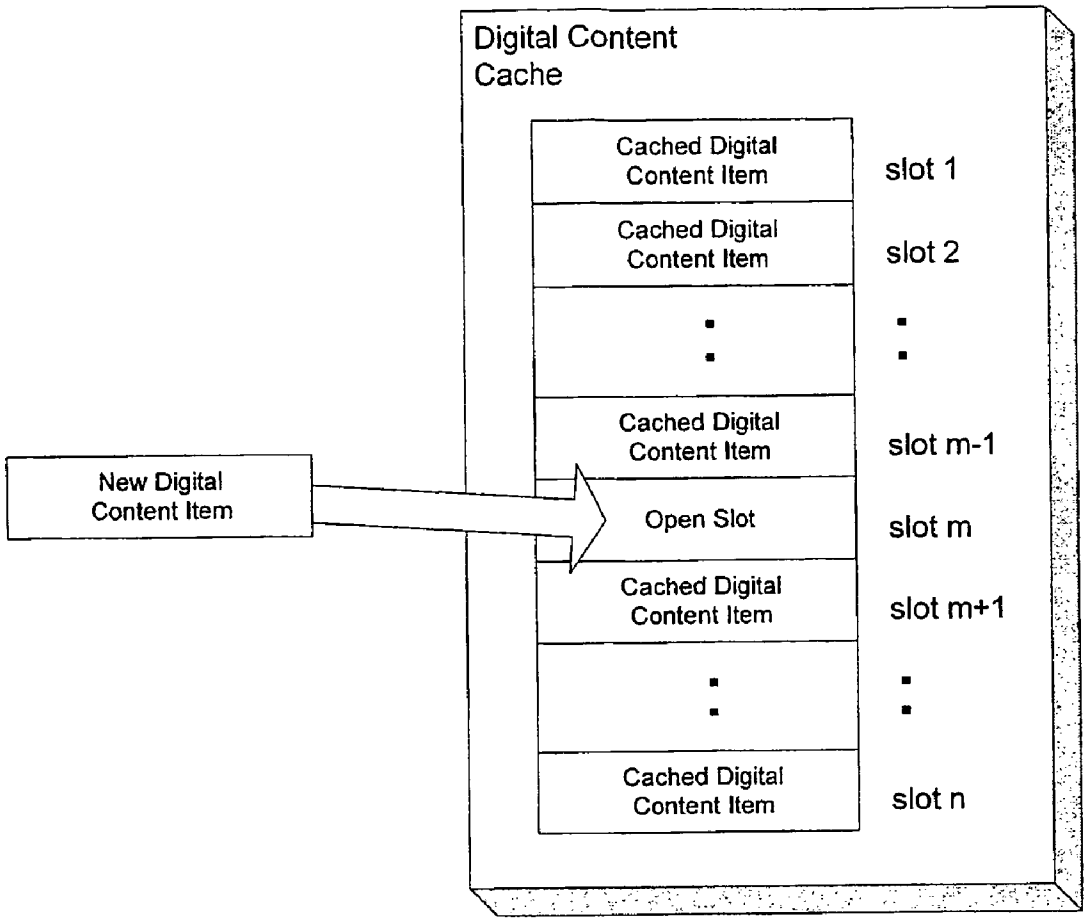
Digital Content
Cache
Cached Digital
Content Item
slot 1
Cached Digital
Content Item
slot 2
Cached Digital
Content Item
slot m-1
New Digital
Content Item
Open Slot
slot m
Cached Digital
Content Item
slot m+1
Cached Digital
Content Item
slot n

Figure 43

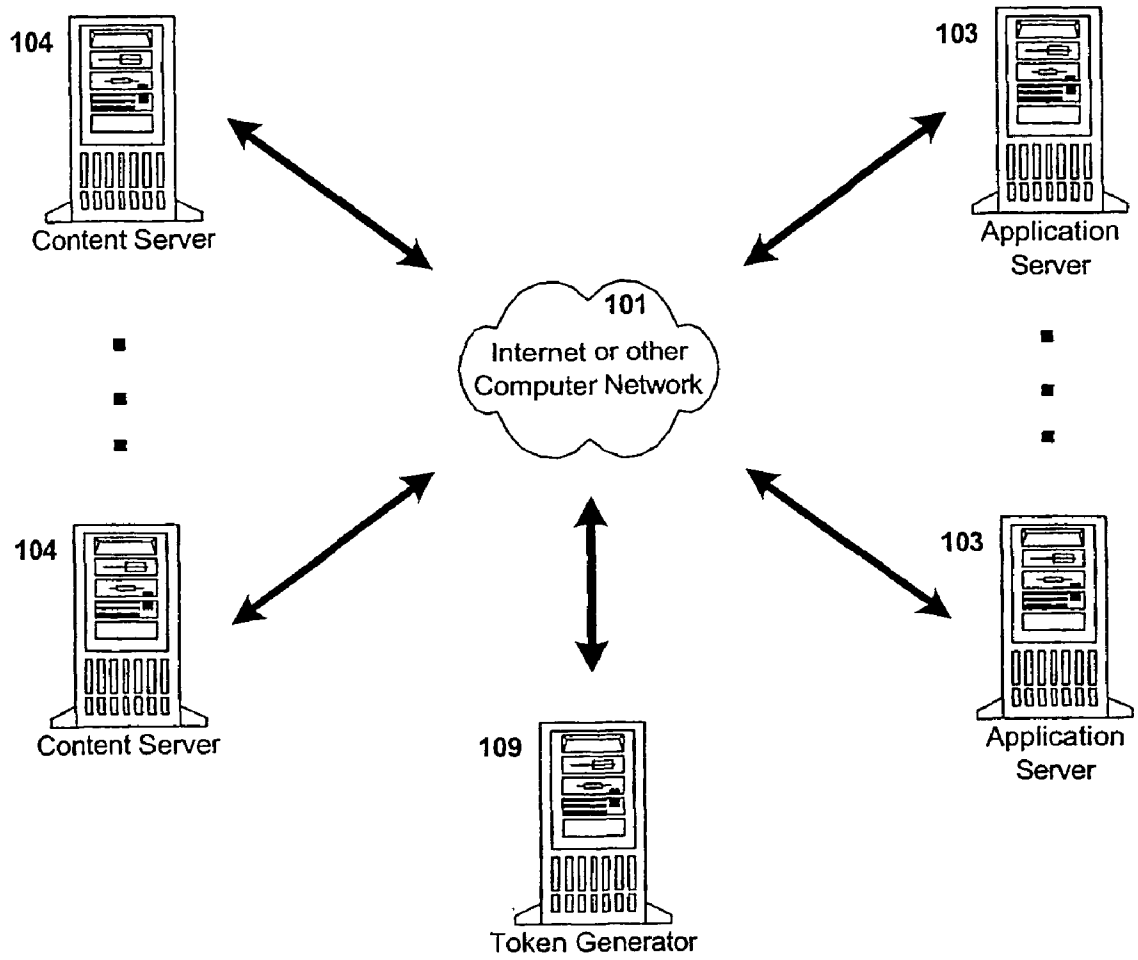
104
Content Server
103
Application Server
101
Internet or other Computer Network
104
Content Server
103
Application Server
109
Token Generator

Figure 44

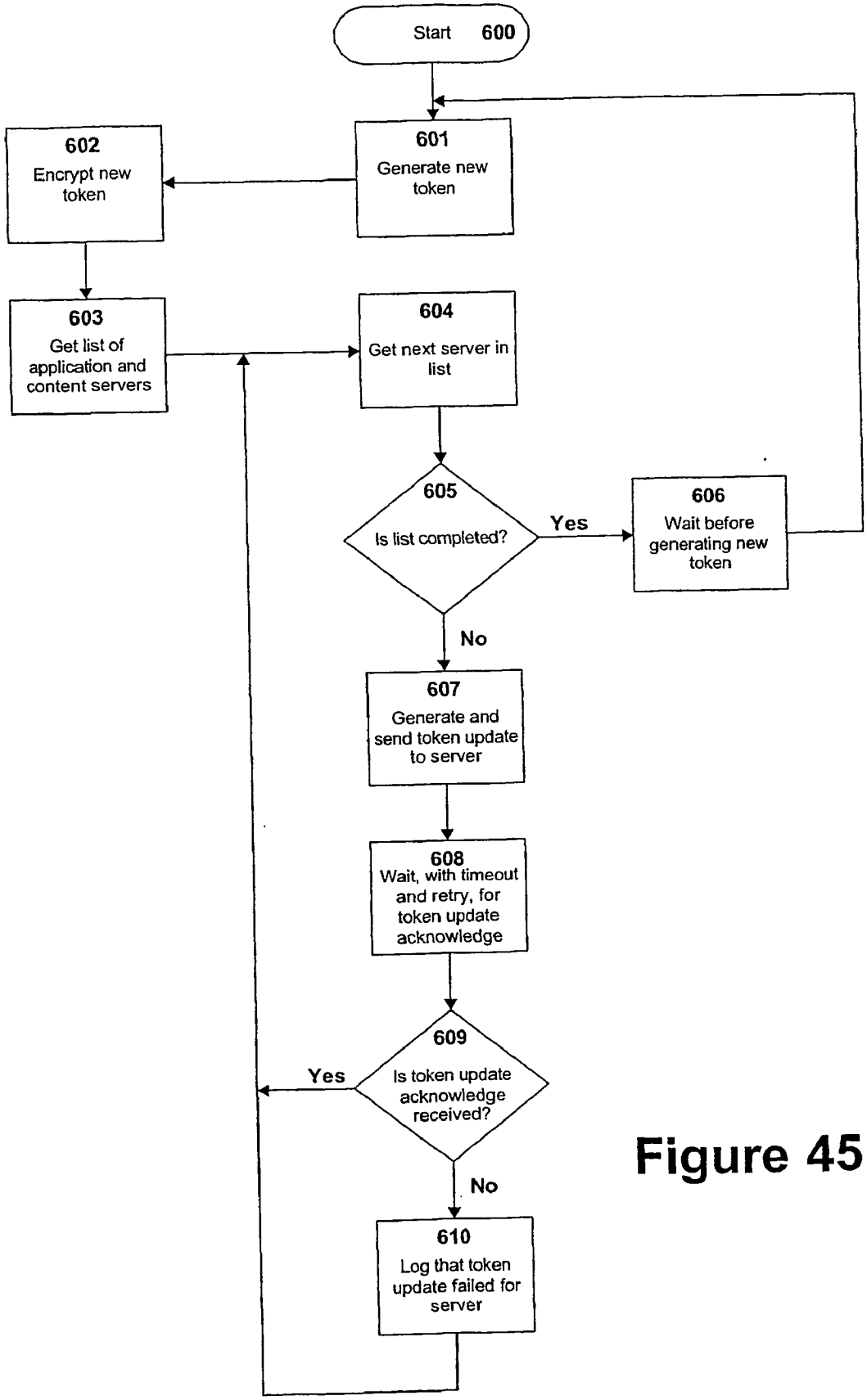
Start 600
601
Generate new token
602
Encrypt new token
603
Get list of application and content servers
604
Get next server in list
605
Is list completed?
Yes
606
Wait before generating new token
No
607
Generate and send token update to server
608
Wait, with timeout and retry, for token update acknowledge
609
Is token update acknowledge received?
Yes
No
610
Log that token update failed for server

Figure 45

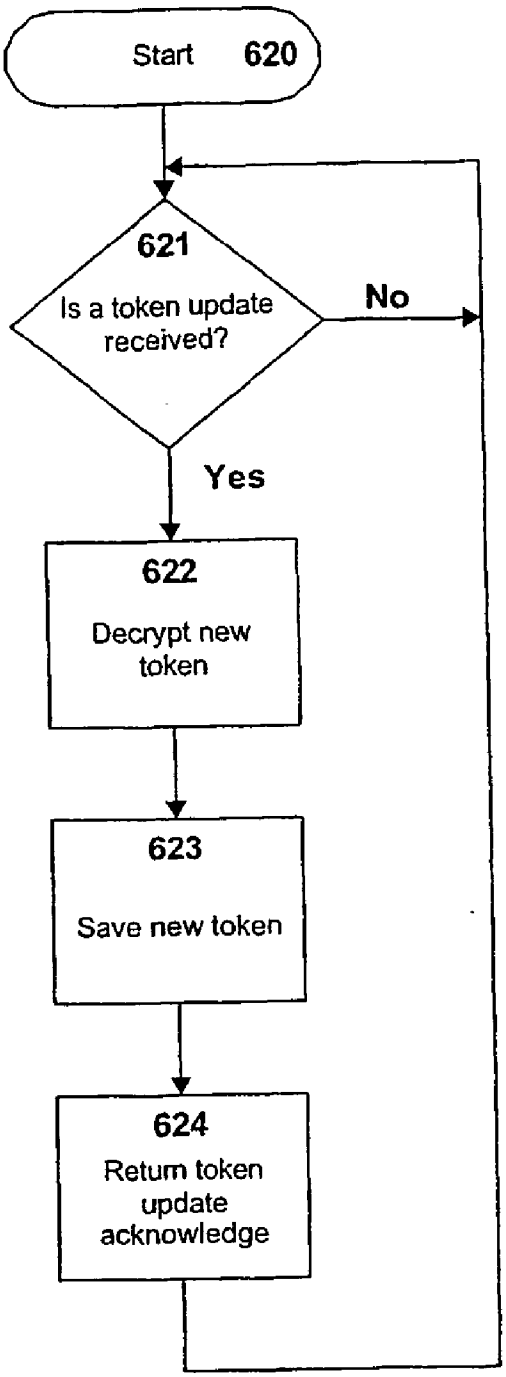
Start 620
621
Is a token update received?
No
Yes
622
Decrypt new token
623
Save new token
624
Return token update acknowledge

Figure 46

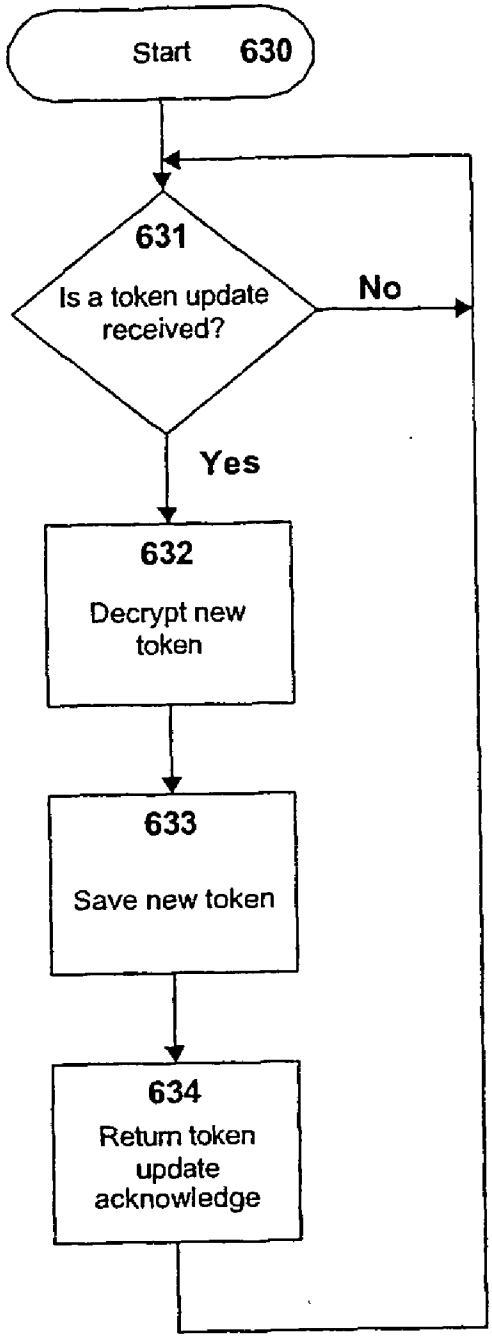
Start 630
631
Is a token update received?
No
Yes
632
Decrypt new token
633
Save new token
634
Return token update acknowledge

Figure 47

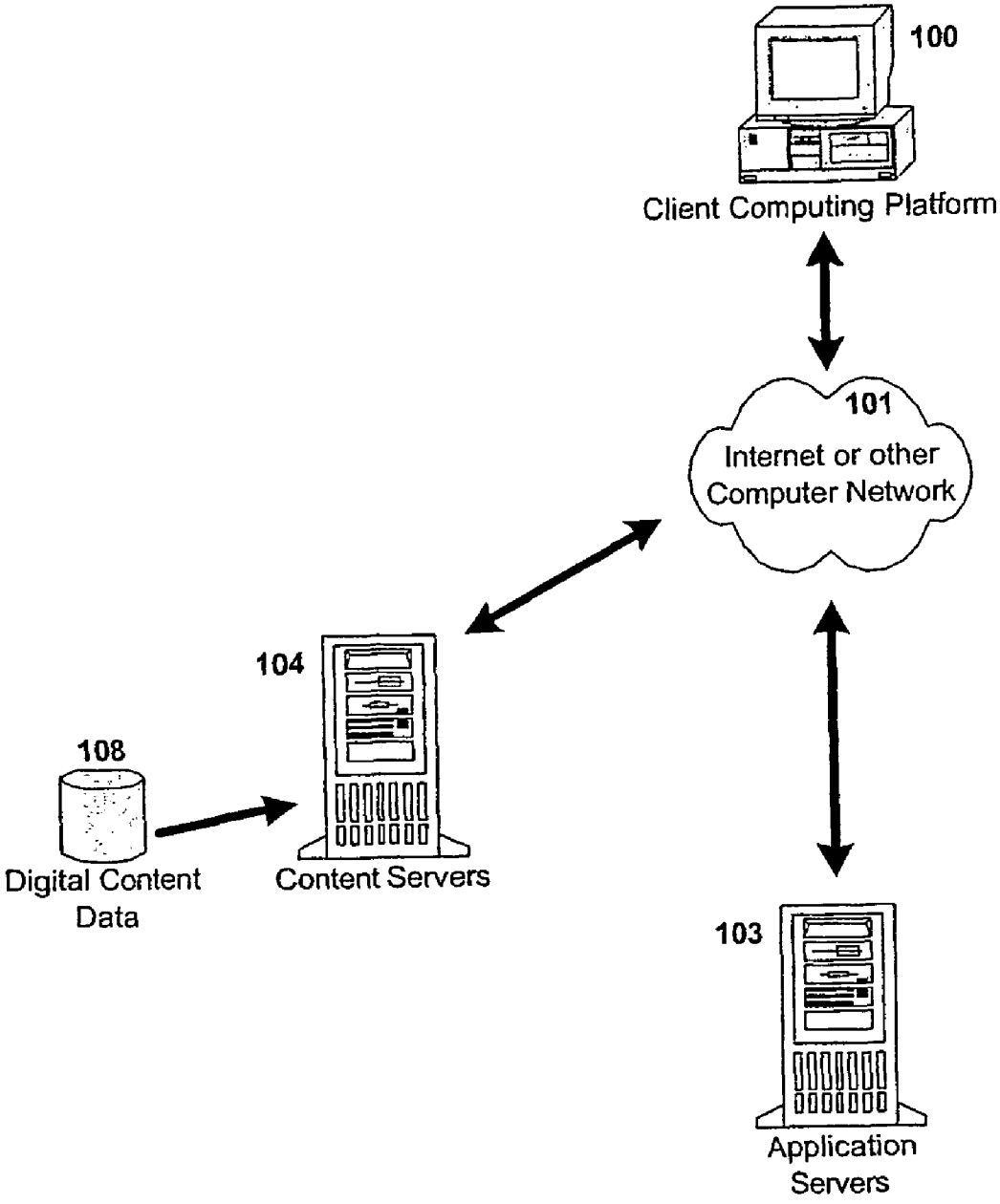
100
Client Computing Platform
101
Internet or other
Computer Network
104
108
Digital Content
Data
Content Servers
103
Application
Servers

Figure 48

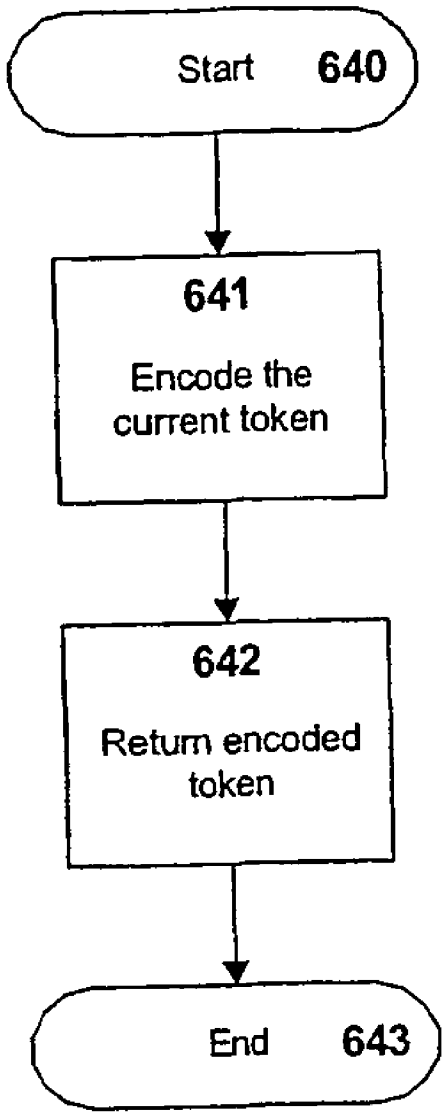
Start 640
641
Encode the current token
642
Return encoded token
End 643

Figure 49

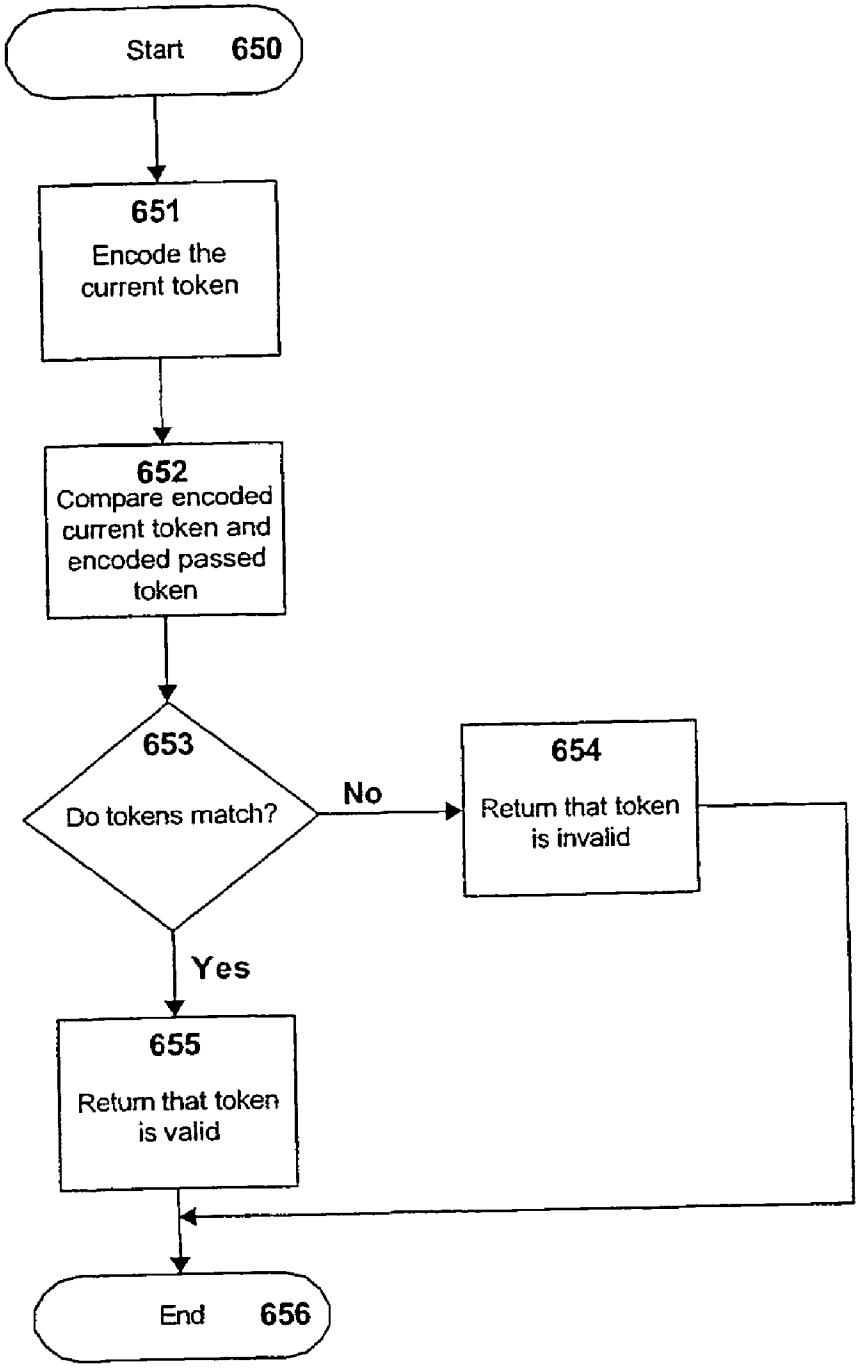
Start 650
651
Encode the current token
652
Compare encoded current token and encoded passed token
653
Do tokens match?
No
654
Return that token is invalid
Yes
655
Return that token is valid
End 656

Figure 50

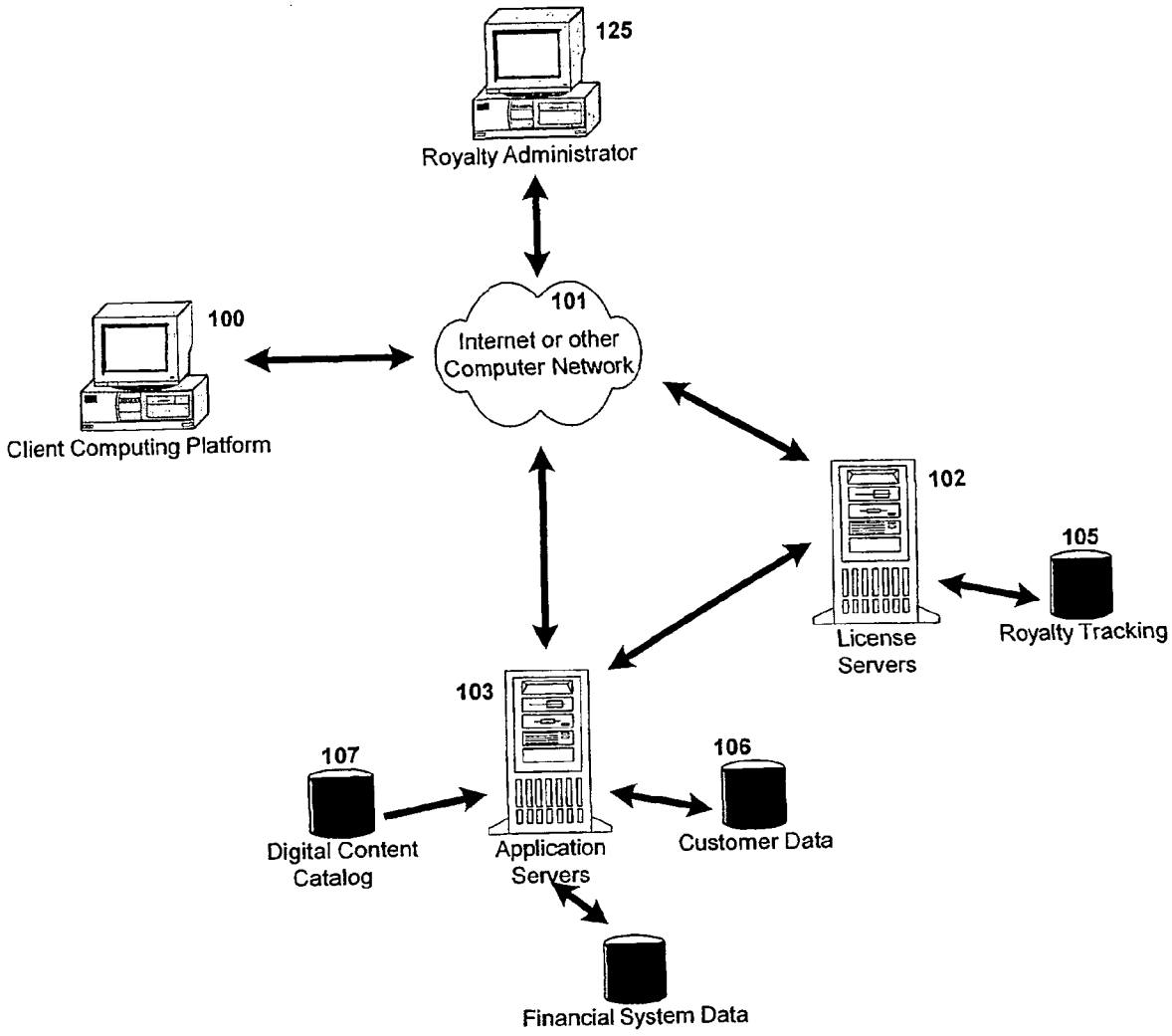
125
Royalty Administrator
101
Internet or other Computer Network
100
Client Computing Platform
102
License Servers
105
Royalty Tracking
103
Application Servers
107
Digital Content Catalog
106
Customer Data
Financial System Data

Figure 51

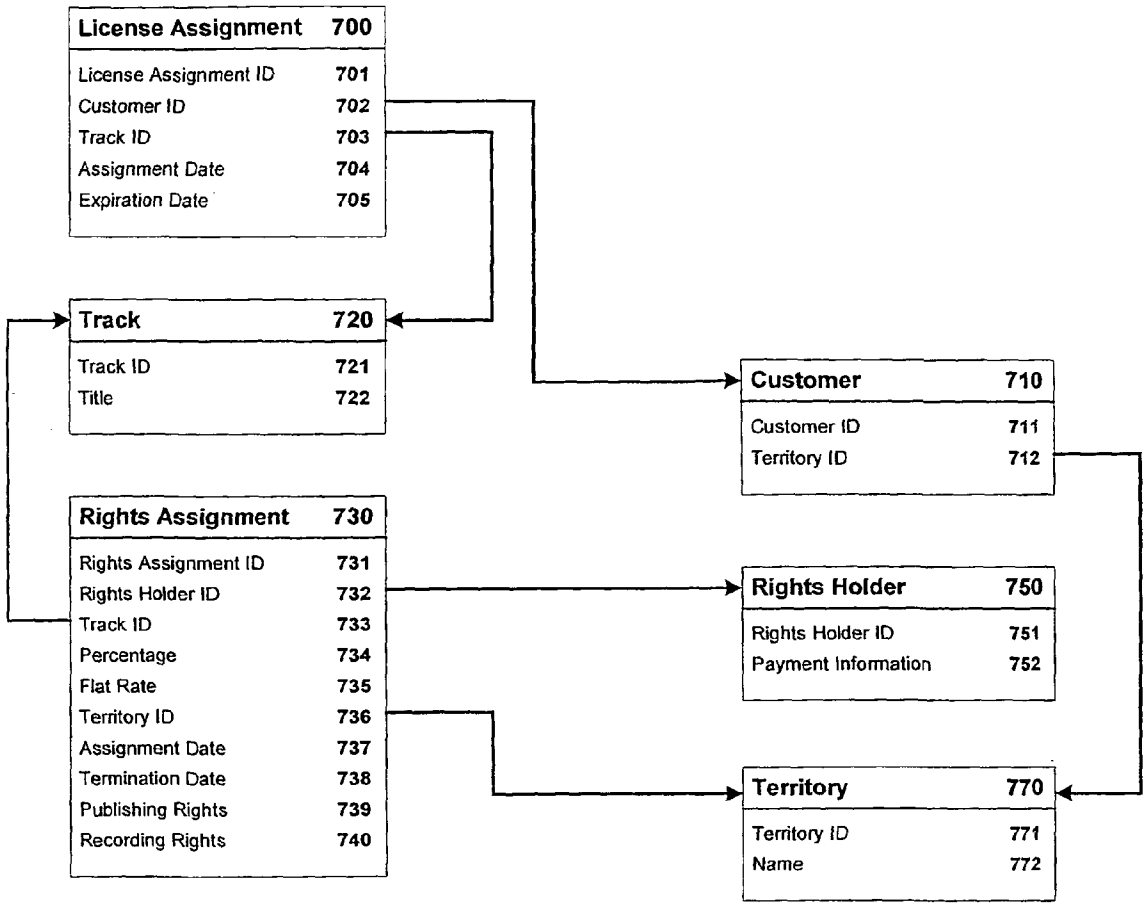
License Assignment 700
License Assignment ID 701
Customer ID 702
Track ID 703
Assignment Date 704
Expiration Date 705
Track 720
Track ID 721
Title 722
Customer 710
Customer ID 711
Territory ID 712
Rights Assignment 730
Rights Assignment ID 731
Rights Holder ID 732
Track ID 733
Percentage 734
Flat Rate 735
Territory ID 736
Assignment Date 737
Termination Date 738
Publishing Rights 739
Recording Rights 740
Rights Holder 750
Rights Holder ID 751
Payment Information 752
Territory 770
Territory ID 771
Name 772

Figure 52

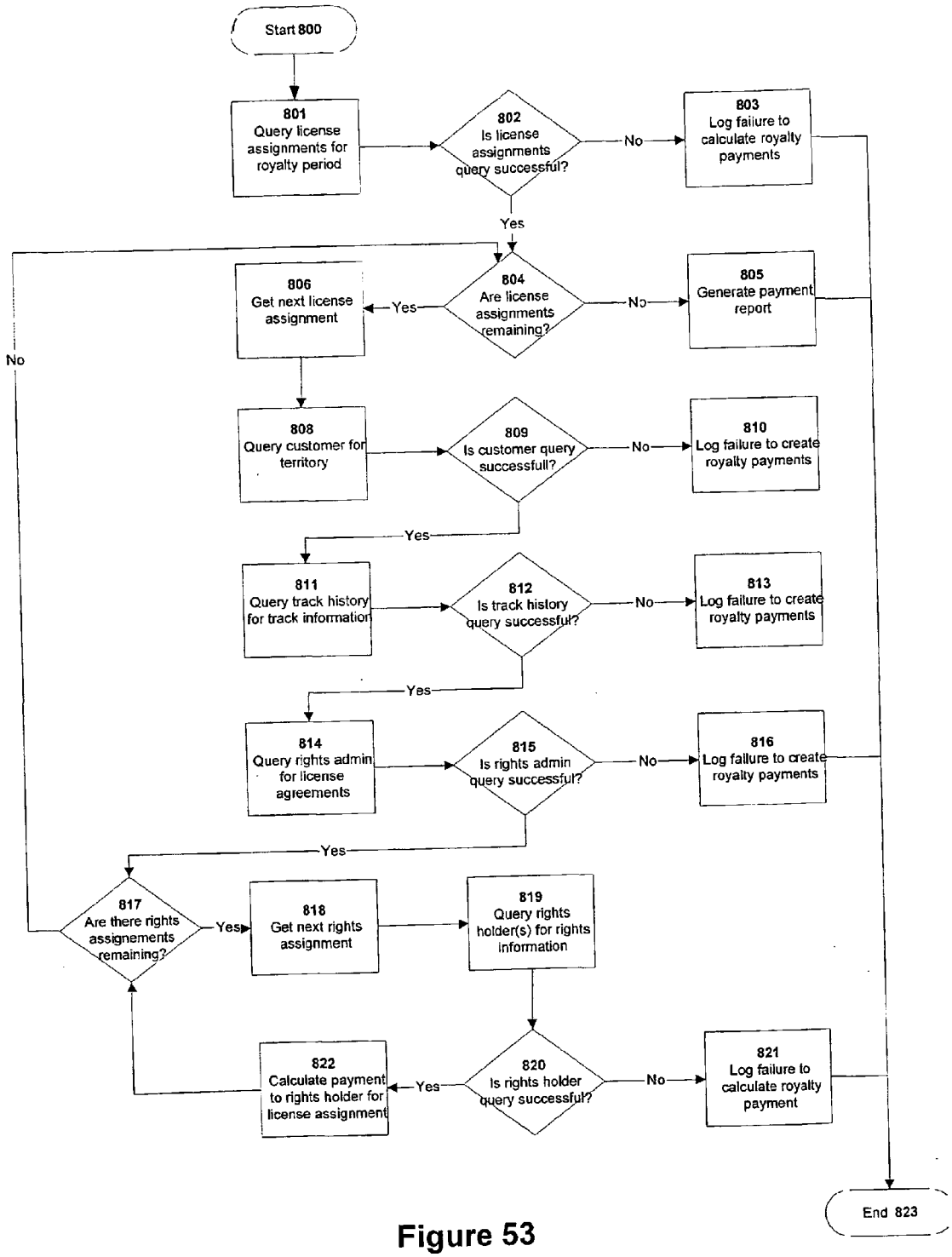
Start 800
801 Query license assignments for royalty period
802 Is license assignments query successful?
No
803 Log failure to calculate royalty payments
Yes
804 Are license assignments remaining?
Yes
806 Get next license assignment
No
805 Generate payment report
No
808 Query customer for territory
809 Is customer query successfull?
No
810 Log failure to create royalty payments
Yes
811 Query track history for track information
812 Is track history query successful?
No
813 Log failure to create royalty payments
Yes
814 Query rights admin for license agreements
815 Is rights admin query successful?
No
816 Log failure to create royalty payments
Yes
817 Are there rights assignements remaining?
Yes
818 Get next rights assignment
819 Query rights holder(s) for rights information
820 Is rights holder query successful?
No
821 Log failure to calculate royalty payment
Yes
822 Calculate payment to rights holder for license assignment
End 823

Figure 53

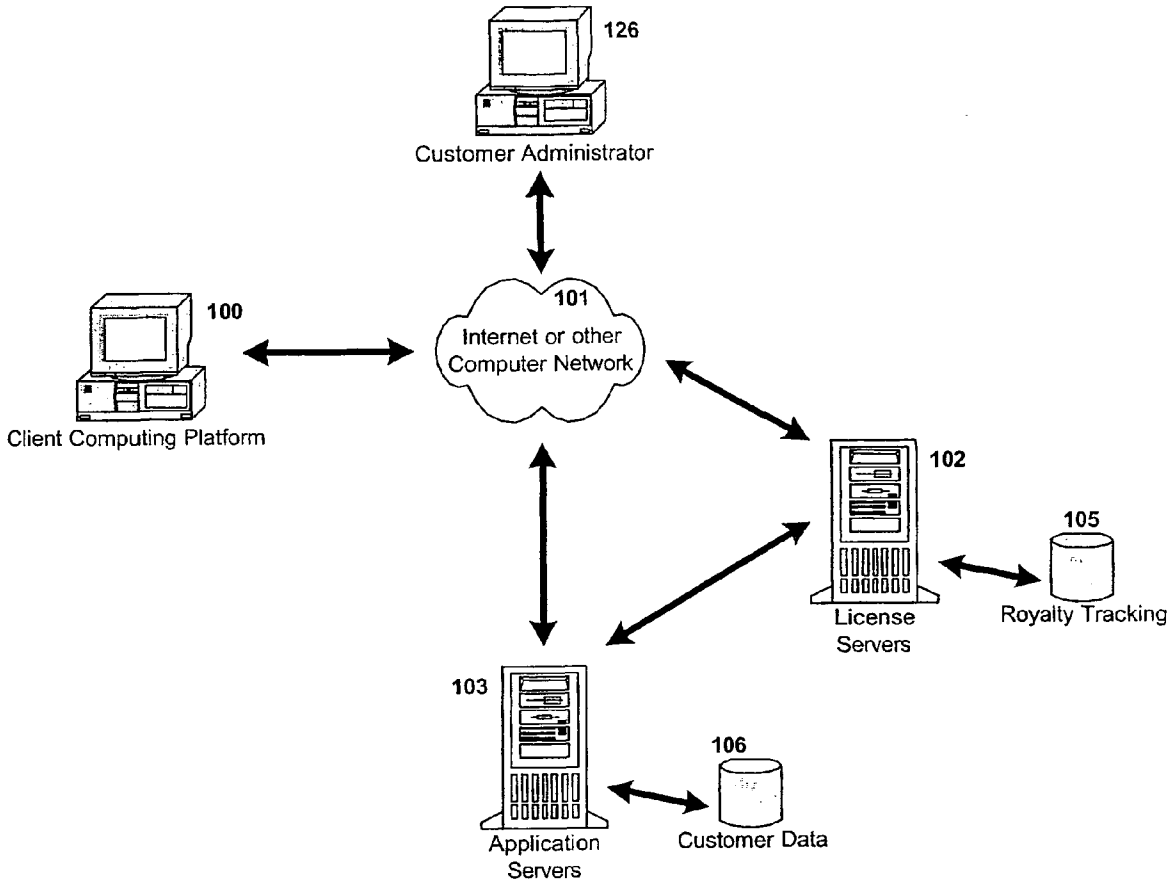
126
Customer Administrator
100
Client Computing Platform
101
Internet or other
Computer Network
102
License
Servers
105
Royalty Tracking
103
Application
Servers
106
Customer Data

Figure 54

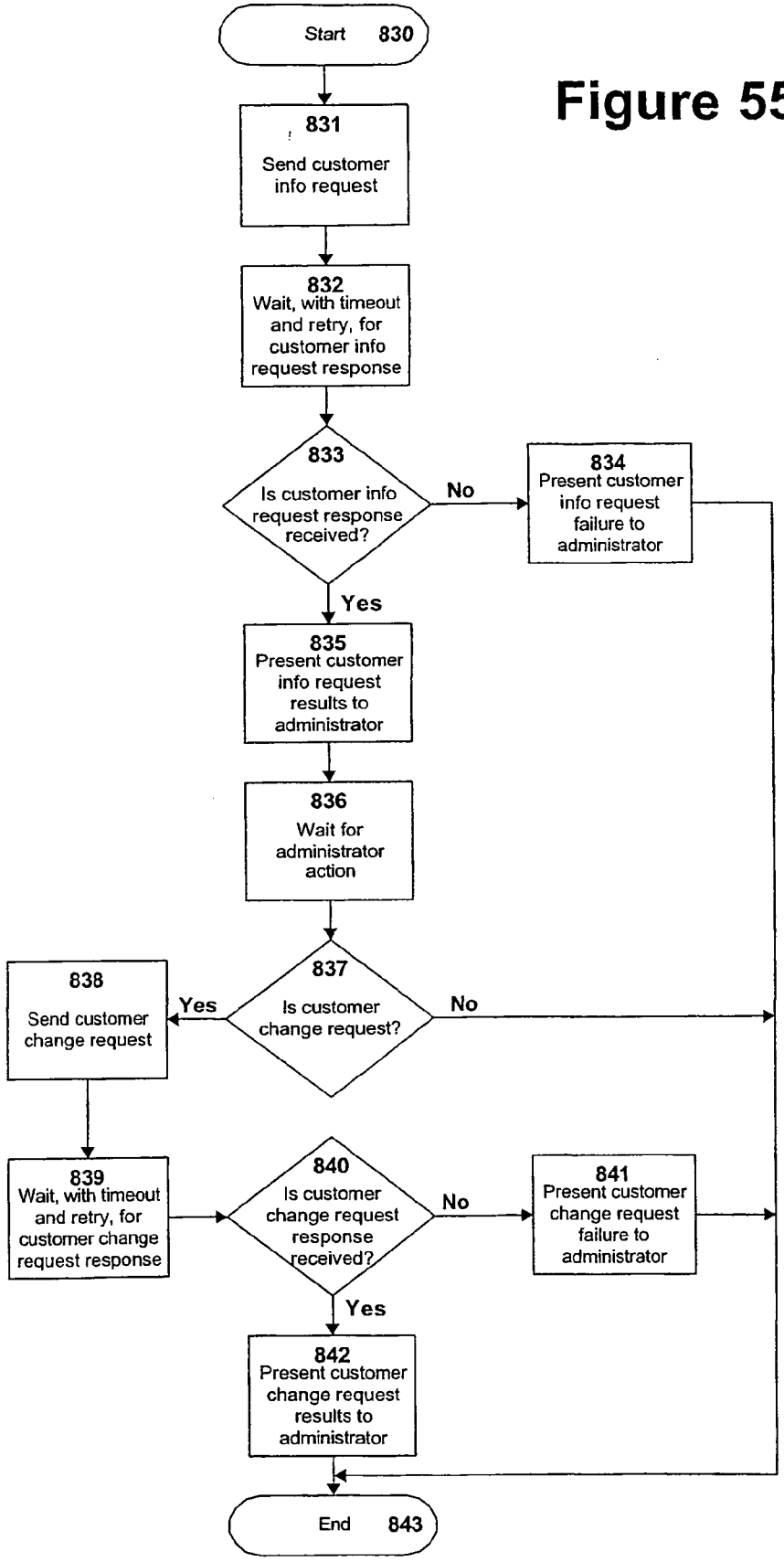
Start 830
831
Send customer info request
832
Wait, with timeout and retry, for customer info request response
833
Is customer info request response received?
No
834
Present customer info request failure to administrator
Yes
835
Present customer info request results to administrator
836
Wait for administrator action
837
Is customer change request?
Yes
838
Send customer change request
No
839
Wait, with timeout and retry, for customer change request response
840
Is customer change request response received?
No
841
Present customer change request failure to administrator
Yes
842
Present customer change request results to administrator
End 843

Figure 55

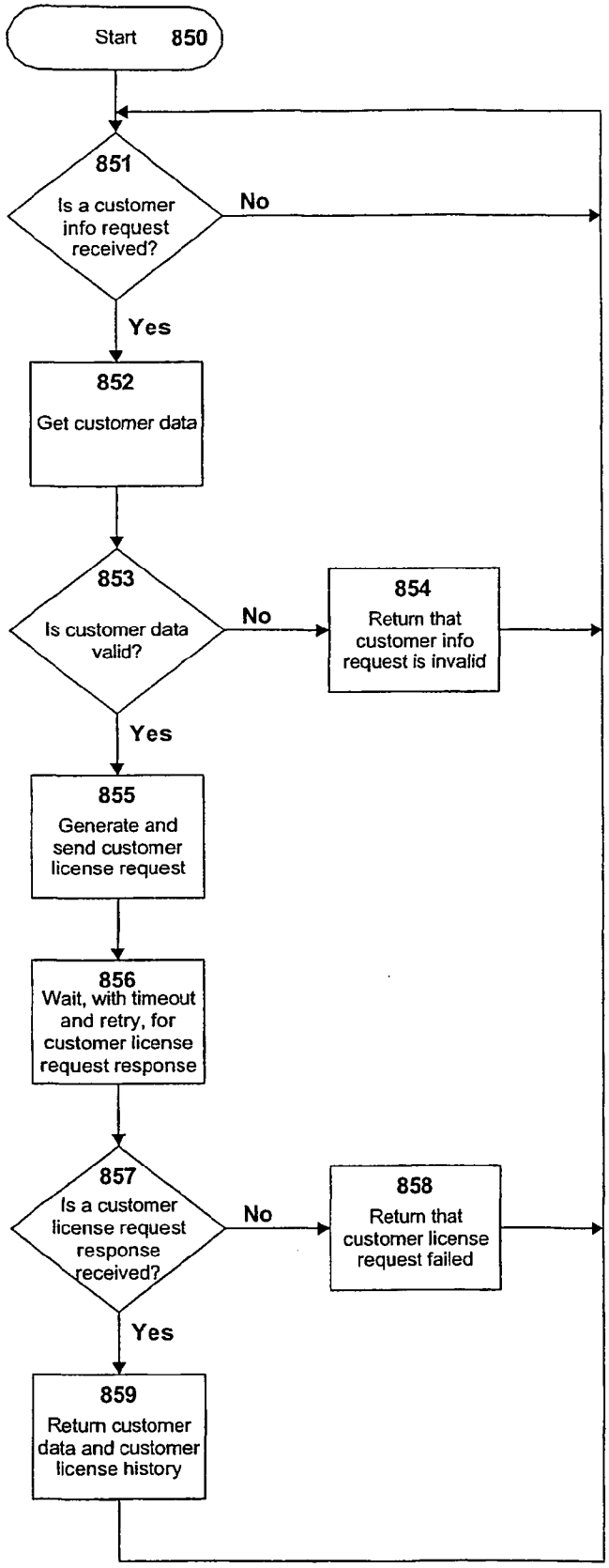
Start 850
851
Is a customer info request received?
No
Yes
852
Get customer data
853
Is customer data valid?
No
854
Return that customer info request is invalid
Yes
855
Generate and send customer license request
856
Wait, with timeout and retry, for customer license request response
857
Is a customer license request response received?
No
858
Return that customer license request failed
Yes
859
Return customer data and customer license history

Figure 56

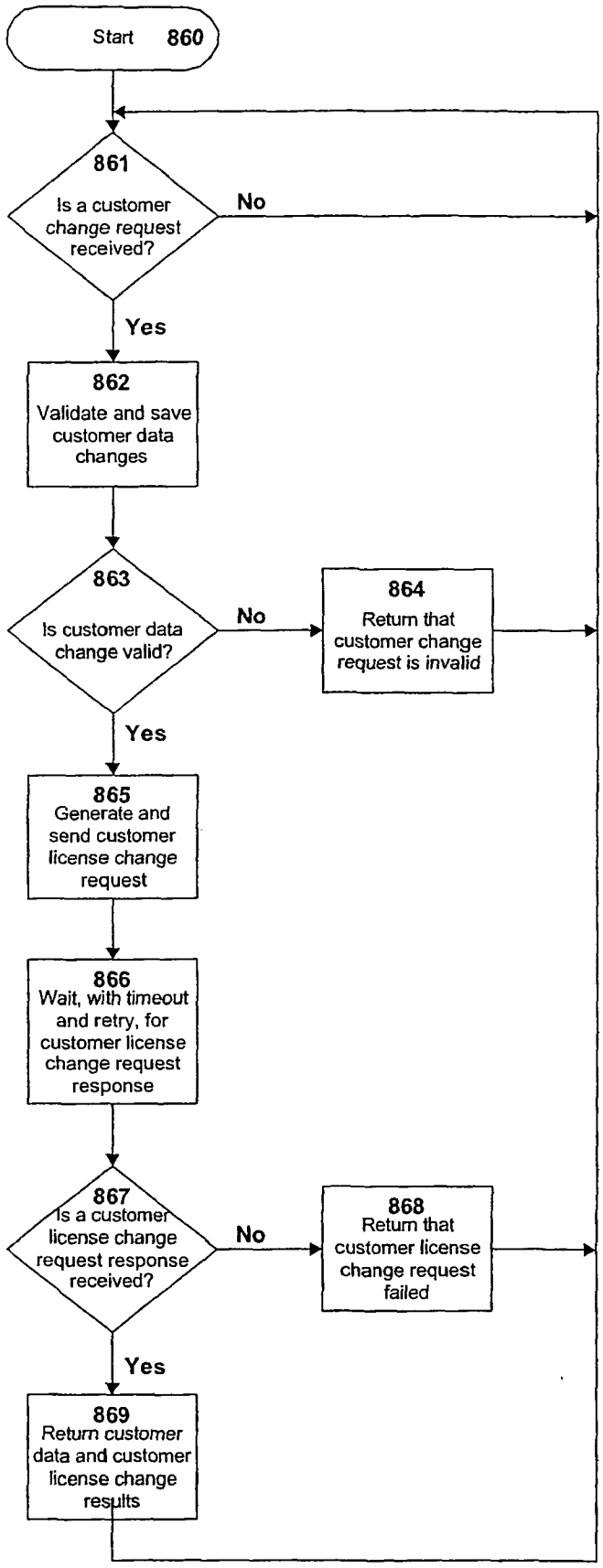
Start 860
861
Is a customer change request received?
No
Yes
862
Validate and save customer data changes
863
Is customer data change valid?
No
864
Return that customer change request is invalid
Yes
865
Generate and send customer license change request
866
Wait, with timeout and retry, for customer license change request response
867
Is a customer license change request response received?
No
868
Return that customer license change request failed
Yes
869
Return customer data and customer license change results

Figure 57

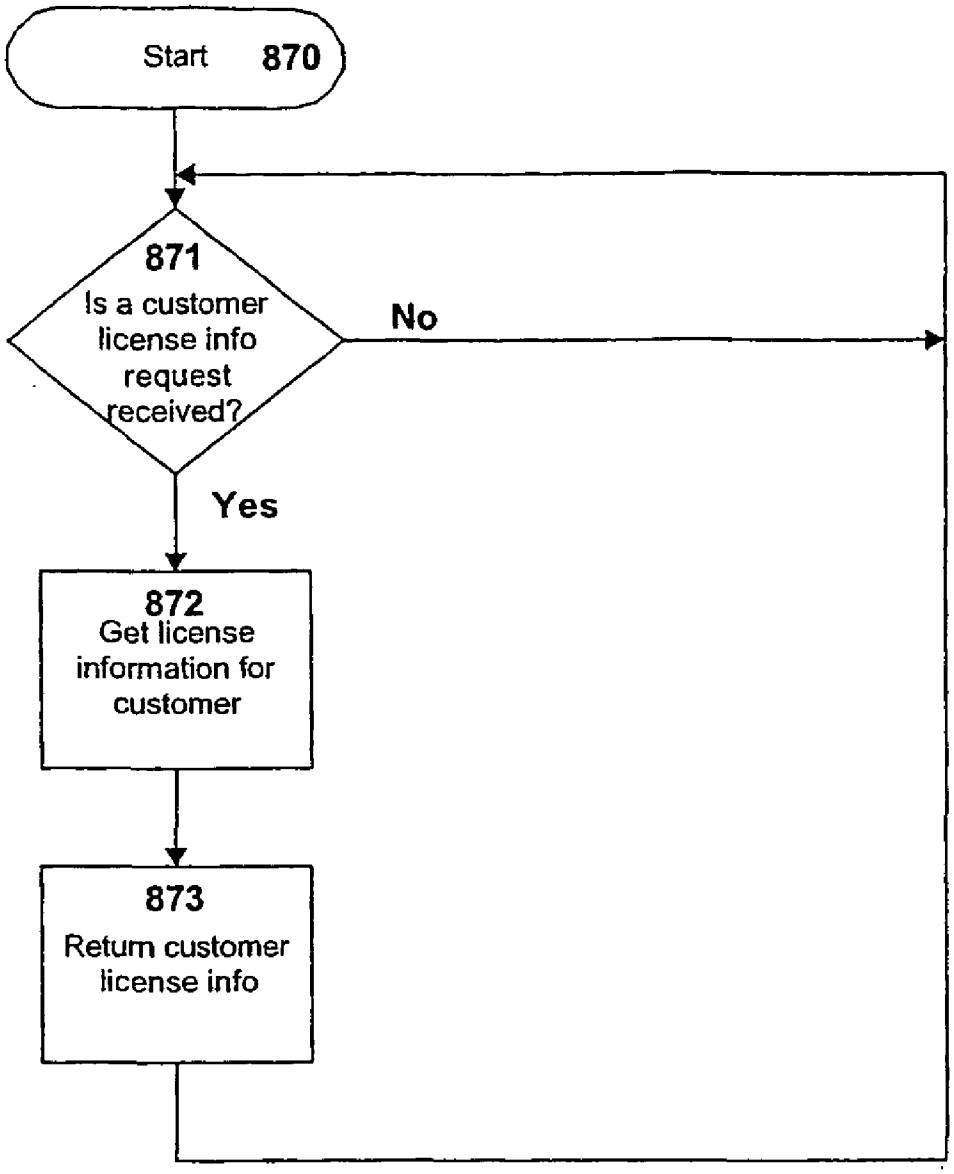
Start 870
871
Is a customer license info request received?
No
Yes
872
Get license information for customer
873
Return customer license info

Figure 58

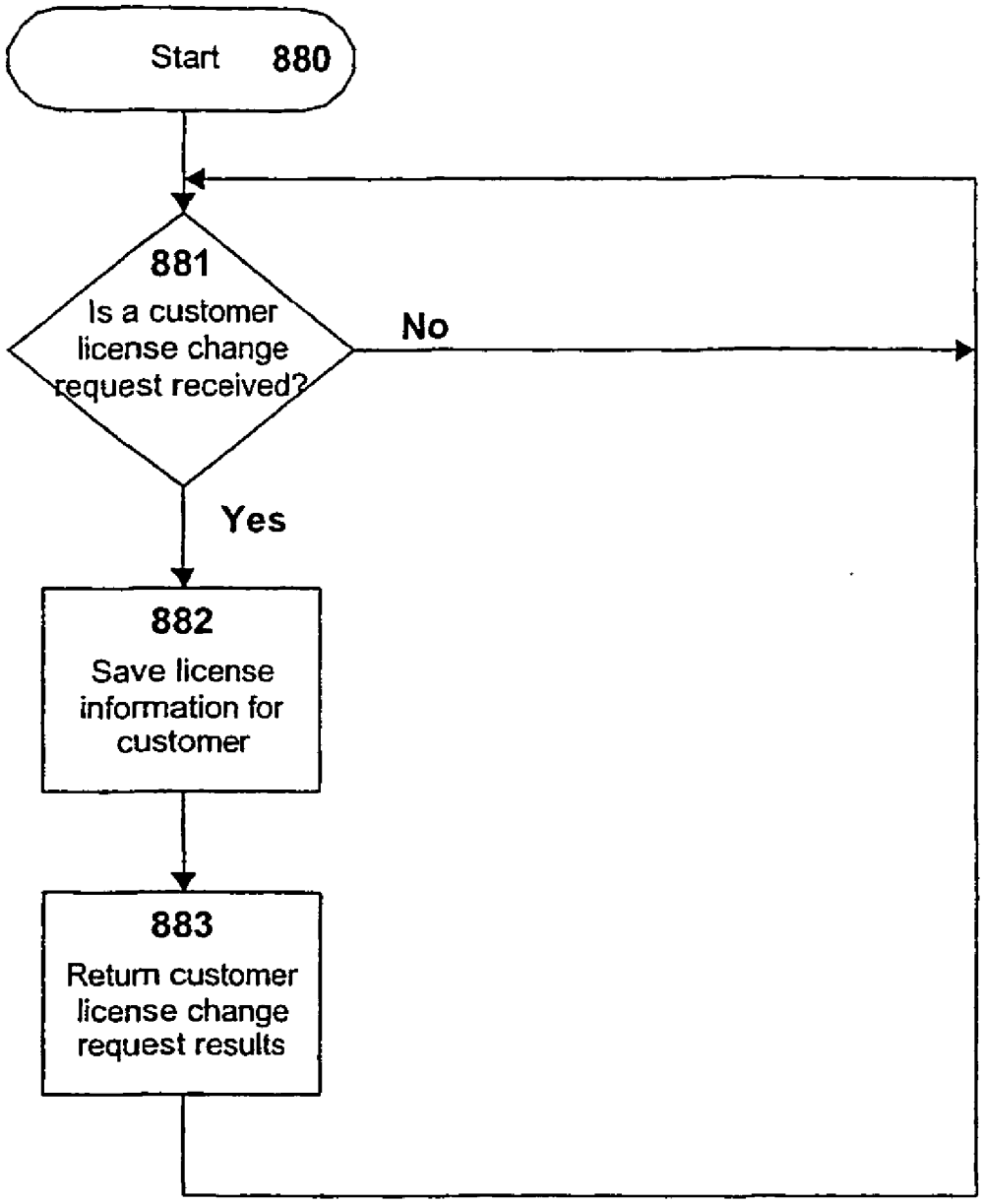
Start 880
881
Is a customer license change request received?
No
Yes
882
Save license information for customer
883
Return customer license change request results

Figure 59

DIGITAL CONTENT DISTRIBUTION AND SUBSCRIPTION SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a digital content distribution and subscription system for digital data files, such as digital, audio or video files, which provides users or subscribers, with, for example, music or video, either streaming data files or locally stored digital files, for a fee.

[0003] 2. Description of the Prior Art

[0004] There is an ever-increasing amount of audio and video content, available as digital computer files, for example, in MP3 format, like those found at www.mp3.com or as streaming digital audio content, for example, as disclosed in U.S. Pat. No. 5,579,430. These new types of audio content can be played on a personal computer with a sound card, but cannot be played on a radio or stereo that is designed to receive and amplify analog audio signals. Although there are several techniques for converting digital audio content to an analog signal so that it can be used by an analog amplifier, these techniques are known to interfere with the operation of the host PC and require the host PC for the selection and control of the audio files.

[0005] Digital audio content is currently available from a number of sources on the Internet. Both streaming audio data as well as stored digital audio files in various formats, such as MP3, are available. In particular, various Internet radio stations are known to provide streaming audio data that is amenable to being played on various streaming audio players. Some streaming audio players are normally under the control of the host PC and thus tie up the host PC while music is being played. Moreover, the song quality of such streaming audio players is relatively low. As such, attempts have been made to provide an interface between the host PC and a conventional stereo. One such interface is available from AudioRequests.com. Although such an interface improves the broadcast sound quality of the music, the system only enables users to play streaming audio files that are broadcast on the Internet.

[0006] In order to provide users more capability to select music over the Internet, a number of websites have been developed which provide users the capability to select among various stored digital music files. One example of such a website is the Napster website. The Napster website allowed users to download digital music files from other users that were logged onto the Napster website at the time the request is made. The Napster website did not locally store digital audio files, but merely allowed searches of other user's computers logged onto Napster which matched the requested song. Unfortunately, the quality of the digital audio files varied. Also, digital audio files were only available when other users are logged onto the Napster website. In addition, the Napster model was adjudged to involve illegal copying of copyrighted music works. Thus, there is a need to provide a system for providing digital audio files with a consistent quality without violating copyright laws.

SUMMARY OF THE INVENTION

[0007] The present invention relates to a digital content distribution and subscription system for digital data files, such as digital audio and video data files, which provides subscribers, for example, with music or video from locally-stored digital files or on demand for a fee. The system may optionally provide streaming digital data as well as locally-stored digital files. After registration onto the system, a subscriber may select from a relatively wide variety of available digital content, for example, music content ripped from a high-quality digital source to provide relatively consistent digital quality to subscribers. In one exemplary implementation, subscribers may subscribe to a predetermined number of songs slots for a period of time, for example, about 200-400 song slots per month. The subscriber may then select songs from various playlists which causes encrypted digital audio files for the selected music to be downloaded to the subscribers's PC. A license key is downloaded to the subscribers' PC to "unlock" the selected songs to enable them to be decoded and played on the subscriber's personal computer or remote audio equipment for a predetermined time period. At the expiration of the predetermined time period, the license key expires, thereby preventing further playback of the encrypted audio data files. The selections of each subscriber are tabulated for the purpose of royality tracking and payment of an appropriate license fee to the holders of copyright rights for the selections. The system may also be used to provide additional digital information, such as special events which may be live or pre-recorded. The digital content distribution and subscription system includes a digital content management system, a system for token-based authentication allowing secure data retrieval and a royality administration system.

[0008] The digital content management system manages the amount of digital content data delivered to a client over a predetermined period. The server manages the number client access devices, such as personal computers (PC), which can access the digital content over a predetermined time period.

[0009] The token-based authentication system The token-based authentication system provides for anonymous authentication that does not require knowledge of the individual user requesting the download of digital content data or real-time access to user account information. Instead, the token-based authentication system embeds the authentication information, or token, in the download request information itself. In this way, the download or content server authenticates the download request using the token contained in the download request information and therefore does not require any additional information to carry out this authentication, such as access to user account information.

[0010] The royality administration system operates as part of a digital content subscription service to track usage of digital content, for example, music, by subscribers of the digital content subscription service and to calculate royalty payments to, for example, publishing and performance rights holders of the digital music. The digital content subscription service makes available to subscribers a plethora of, for example, digital music. Legally a music subscription service is required to compansate rights holders of the digital content for use of their works. In order to accurately provide compensation, the digital content subscrition service must track usage of the digital music by subscribers of the digital content subscription service. The digital content subscription service also maintans accurate information on the rights holders of the digital music in

order to facilitate calculation of royalty payments. With the digital music usage information and the rights holder information, the digital content subscription service is able to effectively and accurately calculate payment to the digital music rights holders for use of their works.

[0011] The current system provides subscribers with relatively high-quality consistent digital audio files and allows subscribers to select from a relatively wide range of stored digital audio files on demand while not violating copyright laws.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] These and other advantages of the present invention will be readily understood with reference to the following specification and attached drawings wherein:

[0013] **FIG. 1** is a block diagram of the server side of a digital content distribution and subscription system in accordance with the present invention.

[0014] **FIG. 2** is a simplified block diagram illustrating the interface between the server side and the client side of the system illustrated in **FIG. 1**.

[0015] **FIG. 3** is a block diagram that provides an overview of the client and server side of the digital content distribution and subscrition service illustrated in **FIGS. 1 and 2**.

[0016] **FIG. 4** is a block diagram of the organization and architecture of a digital content distribution and subscription service infrastructure illustrated in FIGS. **1-3**.

[0017] **FIG. 5** is a software flow diagram on an application server for a music service interface which forms a part of the distribution and subscription service infrastructure.

[0018] **FIG. 6** is a block diagram of a client computing platform for use with the digital content distribution and subscription system.

[0019] **FIG. 7** is a block diagram for a client application on the client computing platform which forms a part of the digital content distribution and subscription system.

[0020] **FIG. 8** is a software flow diagram for a Transfer Manager software system of the client application which forms a part of the digital content distribution and subscription system.

[0021] **FIG. 9** is a system level software flow diagram for a client registration request which forms a part of the digital content distribution and subscription system.

[0022] **FIG. 10** is a software flow diagram of an interface browser component of the client application for the client registration request which forms a part of the digital content distribution and subscription system.

[0023] **FIG. 11** is a software flow diagram on an application server for a client registration request which forms a part of the digital content distribution and subscription system.

[0024] **FIG. 12** is a system level software flow diagram for a client login request which forms a part of the digital content distribution and subscription system.

[0025] **FIG. 13** is a software flow diagram of an interface browser component of the client application for a client login request which forms a part of the digital content distribution and subscription system.

[0026] **FIG. 14** is a software flow diagram on an application server for a client login request which forms a part of the digital content distribution and subscription system.

[0027] **FIG. 15** is a system level software flow diagram for a digital content search request which forms a part of the digital content distribution and subscription system.

[0028] **FIG. 16** is a software flow diagram of the interface browser component of a client application for a digital content search request which forms a part of the digital content distribution and subscription system.

[0029] **FIG. 17** is a software flow diagram on the application server of a digital content search request which forms a part of the digital content distribution and subscription system.

[0030] **FIG. 18** is a system level software flow diagram for a digital content download request which forms a part of the digital content distribution and subscription system.

[0031] **FIG. 19** is a software flow diagram of an interface browser component of a client application for a digital content download request which forms a part of the digital content distribution and subscription system.

[0032] **FIG. 20** is a software flow diagram of a transfer manager software component of a client application for a digital content download request which forms a part of the digital content distribution and subscription system.

[0033] **FIG. 21** is a software flow diagram on an application server for handling the downloading portion of a digital content download request which forms a part of the digital content distribution and subscription system.

[0034] **FIG. 22** is a software flow diagram on an appliation server for handling the licensing portion of a digital content download request which forms a part of the digital content distribution and subscription system.

[0035] **FIG. 23** is a software flow diagram on a license server for handling the licensing portion of a digital content download request which forms a part of the digital content distribution and subscription system.

[0036] **FIG. 24A-24C** are software flow diagrams on a content server for a digital content download request which forms a part of the digital content distribution and subscription system.

[0037] **FIG. 25** is a system level software flow diagram for a license renewal request which forms a part of the digital content distribution and subscription system.

[0038] **FIG. 26** is a software flow diagram of a transfer manager software component of a client application for a license renewal request which forms a part of the digital content distribution and subscription system.

[0039] **FIG. 27** is a software flow diagram on an application server for a license renewal request which forms a part of the digital content distribution and subscription system.

[0040] **FIG. 28** is a software flow diagram on a license server for a license renewal request which forms a part of the digital content distribution and subscription service.

[0041] **FIG. 29** is a system level software flow diagram for an account update request which forms a part of the digital content distribution and subscription system.

[0042] **FIG. 30** is a software flow diagram of an interface browser component of a client application for an account update request which forms a part of the digital content distribution and subscription system.

[0043] **FIG. 31** is a software flow diagram on an application server for an account information request which forms a part of the digital content distribution and subscription system.

[0044] **FIG. 32** is a software flow diagram on an application server for an account update request which forms a part of the digital content distribution and subscription system.

[0045] FIGS. **33-39** are exemplary screen shots for implementing a client application on the client computing platform which forms a part of the digital content distribution and subscription system.

[0046] FIGS. **40-42** are software flow diagrams for digital content management which forms a part of the digital content distribution and subscription system.

[0047] **FIG. 43** is a block diagram of a digital content cache slot for digital content management which forms a part of the digital content distribution and subscription system.

[0048] **FIG. 44** is a block diagram that illustrates an overview of token distribution on the server side for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0049] **FIG. 45** is a software flow diagram on a token generator of token distribution for a token-based authentiation system which forms a part of the digital content distribution and subscription system.

[0050] **FIG. 46** is a software flow diagram on an application server illustrating token distribution for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0051] **FIG. 47** is a software flow diagram on a content server illustrating token distribution for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0052] **FIG. 48** is a block diagram that illustrates an overview of token authentication for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0053] **FIG. 49** is a software flow diagram on the application server of token authentication for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0054] **FIG. 50** is a software flow diagram on a content server of token authentication for a token-based authentication system which forms a part of the digital content distribution and subscription system.

[0055] **FIG. 51** is a block diagram that illustrates an overview of a royalty administration system which forms a part of the digital content distribution and subscription system.

[0056] **FIG. 52** is a block diagram of royalty tracking and payment data organization for a royalty administration system which forms a part of the digital content distribution and subscription system.

[0057] **FIG. 53** is a software flow diagram on a royalty administrator of royalty payment calculation for a royalty administration system which forms a part of the digital content distribution and subscription system.

[0058] **FIG. 54** is a block diagram that provides an overview of a customer care and customer logs and history component which forms a part of the digital content distribution and subscription system.

[0059] **FIG. 55** is a software flow diagram of a customer administrator for customer care and customer logs and history which forms a part of the digital content distribution and subscription system.

[0060] **FIG. 56** is a software flow diagram on an application server of a customer information request which forms a part of the digital content distribution and subscription system.

[0061] **FIG. 57** is a software flow diagram on an application server of a customer update request which forms a part of the digital content distribution and subscription system.

[0062] **FIG. 58** is a software flow diagram on a license server of a customer license request which forms a part of the digital content distribution and subscription system.

[0063] **FIG. 59** is a software flow diagram on a license server of a customer license change request which forms a part of the digital content distribution and subscription system.

DETAILED DESCRIPTION

[0064] The present invention relates to a digital content distribution and subscription system for digital data files, such as audio or video data files, which enables subscribers to subscribe to high-quality digital files for a fee. Various technical implementations of the system are contemplated. An exemplary implementation of the system is ilustrated in **FIG. 1** and generally identified with the reference numeral **20**. The system **20** illustrates the server side of the system. An exemplary client side of the system is described in detail in copending commonly-owned patent application, entitled "Structure and Method for Selecting, Controlling and Sending Internet-Based or Local Digital Audio to an AM/FM Radio or Analog Amplifier", Ser. No. 09/709,772, filed on Nov. 10, 2000, hereby incorporated by reference.

[0065] The digital content distribution and subscription system includes a digital content management system; a token-based authentication system and a royalty administration system. The digital content management system is described in connection with FIGS. **40-43**. The token-based authentication system is described in connection with FIGS. **44-50**. FIGS. **51-53** illustrate the royality administration system.

[0066] **FIGS. 1 and 2** are simplified block diagrams of the invention. FIGS. **3-60** represent more detailed diagrams of the present invention. The system is illustrated and described in terms of a distribution and subscription service or system

of digital audio files, however, the principles of the present invention are equally applicable to other digital files, such as digital video files.

[0067] Referring to **FIG. 1**, the server side of the system is illustrated. As shown, the server side of the system **20** may include one or more data stores **22**, **24** and **26**, which may be implemented as databases on one or more servers in a conventional manner. The data store **26** is a Customer data store, used to store various types of customer information, such as the name of customer, the type of subscription and the subscribed digital files. The Customer data store **26** may also include royalty tracking logs. The data store **24** is a Subscription Catalog data store, which may include various subcription catalog information, such a meta information regarding the stored digital audio files such as tracks, artists, albums and playlists for stored digital files. The data store **22** is a Digital Content data store, which may include the stored digital audio files as well as digital rights management (DRM) software, for example, Microsoft DRM or Intertrust DRM software. The digital rights management software may be used to enable decrypting of digital files downloaded to a subscriber's personal computer.

[0068] The data stores **22**, **24** and **26** may be interfaced to one or more subscribers or clients by one or more application servers **28**, **30** and **32**, as well as one or more web servers **34**, **36**, **38**, **40** and **42**. In addition, one or more license servers **44** may be connected to the Customer data store **26** and interfaced to the client side by way of one or more web servers **48**, **50** and **52**. As will be described in more detail below, after a registration process, a subscriber may simply log onto the digital content service provider's website, for example, as illustrated in the exemplary web pages in FIGS. **33-39**.

[0069] In one embodiment of the invention, subscribers may purchase a number of time slots for a predetermined time period, for example, a month, for a fee. The time slots may include, for example, various stored digital audio or video files, which may include new releases as well as other files, such as live or pre-recorded special events, for example, concerts and other events. Alternatively, the plan may allow for providing pay-per-play digital audio or video files.

[0070] Subscribers may select music or video content from a list, such as a playlist to fill up the time slots for the predetermined period. For example, a subscriber may subscribe to, for example, 230 song slots for a one-month period for a monthly fee. In particular, the subscriber may select from various digital audio or video files by way a website, the digital files to be downloaded to the subscriber's personal computer for play anytime during the month. Optionally, a subscriber, after first selecting a number of digital audio files, may select an auto renewal feature for one or more of those files which causes the subscription of the selected audio files to be automatically renewed on a periodic basis, such as a subscription or billing period, on the subscriber's PC.

[0071] An important aspect of the invention is that the selected digital audio or video files are downloaded in an encrypted format. As will be described in more detail below, a "key" is also downloaded to the subscriber's PC which enables the downloaded digital audio or video files to be decrypted. The "key" may be valid for only a predetermined time period, for example, one month. A separate "key" may be issued for each selected digital audio or video file. Thus, at the end of the time period, the "key" expires to prevent decryption of the selected digital audio or video files beyond the subscription period.

[0072] Referring to **FIG. 1, a** subscriber, connected to the client side, makes selections by viewing various playlists and meta information from the subscription Catalog data store **24** by way of the web pages illustrated in FIGS. **33-39**. The subscriber information is verified by the Customer data store **26**. As discussed above, the Customer data store **26** is a database which contains various customer information, as well as the type of subscription and the number of tracks in the subscription. In addition, the Customer data store **26** may also maintain royalty tracking logs for the purposes of paying royalties to the appropriate parties. Once the customer information is verified, the selected digital audio files are downloaded from the Digital Content Storage data store **22** as well as a "key" is downloaded from the license server **44** to the subscriber's computing platform **100 (FIG. 6)**, such as a PC. As mentioned above, the license "key" is used to decode or decrypt the encrypted digital audio files.

[0073] An exemplary user interface is illustrated in **FIG. 2**. As shown, the exemplary user interface, generally identified with the reference numeral **70**, is located on a client computing platform **100** and is described in detail in the above-mentioned co-pending application, hereby incorporated by reference and as described below in connection with FIGS. **33-39**. The user interface **70** may include a play button **72**. In an exemplary embodiment, a subscriber may select the play button **72** to initiate opening of a downloaded digital audio or video file **68**, which, as mentioned above, is downloaded in encrypted format to the subscribers personal computer. If a license "key"**66** has also been downloaded, the system utilizes the "key" to decrypt or unlock the file **68** to enable the digital audio file **68** to be played by various players, such as Windows Media Player, or remote audio equipment, as described in detail in the above-mentioned commonly-owned co-pending patent application.

[0074] FIGS. **3-60** represent a more detailed embodiment of the invention. Referring to **FIG. 3, a** digital content distribution and subscription system provides access by a client computing platform **100** to digital content data **108** over the Internet or other computer network **101**. An overview of a digital content distribution and subscription system, illustrated in **FIG. 3**, shows the relationship and interaction between the client computing platform **100**, the digital content data **108**, various servers **102**, **103**, and **104**, and various data sources, identified with the reference numerals **105**, **106**, and **107**, that may encompass the digital content distribution and subscription system.

[0075] In the digital content distribution and subscription system, the client computing platform **100** initiates requests for digital content data **108**, such as digital video or music files. Before these requests can be made, the user on the client computing platform **100** may need to be authenticated through interaction with one or more of the application servers **103**. The application servers **103** compare user information received from the client computing platform **100** with customer information in one or more Customer data stores **106**.

[0076] User authentication, though only optionally required in a digital content distribution and subscription

system, provides the capability to record user download histories for billing of the user. User authentication also provides a higher level of security for the digital content data **108**, if it is required that the download of the digital content data **108** be restricted exclusively to authorized users.

[**0077**] Once a user is authenticated or if the user does not require authentication, a user on a client computing platform **100** may access a digital content catalog **107** through one or more of the application servers **103**. The digital content catalog **107** contains information about the digital content data **108**, with the primary purposes of the digital content catalog **107** being to simplify searches by the user of digital content data **108** and to obtain more specific information about the digital content data **108**. For example, where the digital content data **108** is digital music, the digital music may be organized as individual tracks or songs and the digital content catalog **107** may contain information about each track, such as the artist, track name, album name, and musical genre, among other things. After a user on a client computing platform **100** has determined what digital content data **108** to download, the client computing platform **100** accesses this digital content data **108** through one or more content servers **104**. In addition, where the digital content data **108** is kept in a secure or protected format, the client computing platform **100** must also obtain access or playback licenses for the digital content data **108** in order to access or playback the digital content data **108**, for example, when the digital content data **108** is digital video or music files. The client computing platform **100** accesses the license servers **102** to obtain these access or playback licenses, using, for example, Microsoft Windows Media Rights Manager, for digital rights management. In order to simplify operation of the license servers **102**, the client computing platform **100** may be forced to access the license servers **102** indirectly through one or more of the application servers **103**, since the application servers **103** already need to handle user authentication. This configuration may thus be used to eliminate the need for the license server **102** to also handle user authentication. The license servers. **102** may also be used to save information about licensing for royalty tracking **105**, used for determining royalty payments to rights holders of the digital content data **108**. Once the digital content data **108** is downloaded onto the client computing platform **100**, and, if necessary, the proper access or playback licenses are obtained from the license server **102**, the user may access the digital content data **108** locally on the client computing platform **100**. For example, the user may playback digital music files using, for example, Microsoft Windows Media Player. The user may also download the digital content data **108** from the client computing platform **100** to another device such as a Pocket PC device for example, Compaq's iPAQ device for access or playback on the device.

[**0078**] It should be noted that the various servers **102**, **103**, and **104**, shown in **FIG. 3**, could physically represent many different servers in geographically disparate locations and need not be limited to a single server or a group of servers in a single geographic location. It should also be noted that one or more other servers may exist in the connection between the client **100** and the various servers **102**, **103**, and **104** with it being understood that these other servers are collectively represented within the Internet or other computer network **101**.

[**0079**] Subscription Service Architecture

[**0080**] The block diagram in **FIG. 4** demonstrates one embodiment of the organization and architecture of a subscription service infrastructure **130** for digital music, which forms a part of the digital content distribution and subscription system. The subscription service infrastructure **130** may be implemented across the various servers **102**, **103**, and **104** and various data stores **105**, **106**, **107**, and **108** (**FIG. 3**) in a manner that may be transparent to the one or more client computing platforms **100** that access the subscription service infrastructure **130**.

[**0081**] In particular, one or more client computing platforms **100** may access the subscription service infrastructure **130** through a music service interface **156**, which may be supported using industry standard technologies, for example, XML. The music service interface **156** includes, in this embodiment, a music service XML interface **157**. The music service XML interface **157** allows the client computing platform **100** to communicate with the subscription service infrastructure **130** of the digital content distribution and subscription system using the industry standard XML protocol, for example, using the exemplary web pages illustrated in FIGS. **33-39** and discussed below. Other interfaces using industry standard technologies, such as Java, may be supported in other embodiments. The music service interface **156** acts to abstract and encapsulate the subscription service infrastructure **130** of the digital content distribution and system for the client computing platform **100**. This allows the client computing platform **100** to be able to access service features and capabilities without requiring a detailed understanding of the internal workings of the subscription service infrastructure **130**.

[**0082**] There are many features and capabilities of the subscription service infrastructure **130**, collectively referred to as the digital content management system. For example, before a subscriber on a client computing platform **100** can access the various features and capabilities in the subscription service infrastructure **130** of the digital music subscription service, the subscriber may optionally require registration and login **136**. Registration allows the subscriber to submit billing and profile information, for example, music preferences, and also to provide a login name and password. The billing, profile, and login information is stored as part of customer data **106**. Login may be required whenever the subscriber accesses the features and capabilities in the subscription service infrastructure **130** of the digital content distribution and subscription system. This allows the subscription service infrastructure **130** to authenticate and authorize subscribers in order to prevent unauthorized access to the digital music subscription service, as discussed in more detail below.

[**0083**] An Account Management software system **135** may also be provided to allow a subscriber of the digital music subscription service using a client computing platform **100** to make changes to their profile, for example, their address, phone number, and music preferences. The Account Management software system **135** may also be configured to enable the subscriber to make changes to their subscription plan, for example, the number of songs per month to be included in the subscription.

[**0084**] A Search and Browse software system **137** may also be provided to allow a subscriber to search the digital

content catalog **107** to determine what digital content data **108** the subscriber may wish to download as discussed in detail below. Once a subscriber has selected digital content data **108** to download, the secure downloads software system **139** in the subscription service infrastructure **130** ensures that downloads of the digital content data **108** are only made by authenticated and authorized subscribers. Authentication for secure audio downloads may not only be done using the subscriber login but also by identifying the digital content data **108** to download in a dynamic manner, for example, by way of unique identifiers or tokens, described below in connection with **FIG. 44**, so that a download address is only valid for download by a specific subscriber during a specific time period.

[**0085**] A Digital Rights Management software system **140** may also be provided and functions as an additional level of protection for the digital content data **108** to prevent access to or playback of the digital content data **108** through encryption of the digital content data **108** and the use of access or playback licenses. Decryption of the digital content data **108** for access to or playback of the digital content data **108** requires the subscriber on the client computing platform **100** to have specific access or playback licenses for the digital content data **108**. The access or playback licenses are obtained from license servers **102** and are handled in a manner corresponding to the specific requirements of the digital rights management **140** implementation used, for example, Microsoft Windows Media Rights Manager. These access or playback licenses may have an expiration or lifetime associated with them so that a subscriber must renew licenses periodically in order to continue to access or playback the digital content data **108**. The renewal process is handled by a Subscription Management software system **138**, which works in conjunction with the Digital Rights Management software component **140** to provide updated or new access or playback licenses as existing licenses expire and when the subscriber requests continued access to or playback of the digital content data **108**.

[**0086**] Just as the music service interface **156** simplifies access to the music services **135-140** of the subscription service infrastructure **130** from client computing platforms **100**, a Business System Interface software system **143** simplifies access to the music services **135-140** by one or more of a plurality of business software systems **144**, **145**, and **149**. For example, a Customer Care software system **144** may be provided to enable subscription service support personnel to provide technical and system support for subscribers. This may include handling questions and issues related to account management **135** and registration and login **136**. A Customer Logs and History software system **145** may be provided to track customer or subscriber access to the digital music subscription service and subscriber activity, such as account management **135** to record subscriber plan and profile changes. This information can be used as part of the Customer Care software system **144** to facilitate support for subscribers. The Customer Logs and History software system **145** may also be used to track subscriber secure audio downloads, used for royalty tracking **105**. Royalty tracking **105** information may be used by a Royalty System software system **149** as described in detail in connection with **FIG. 51**, which is responsible for determining royalty payments to rights holders of the digital content data **108** that are assigned licenses and downloaded.

[**0087**] Music Service Interface

[**0088**] The Music Service Interface **156** acts to abstract and encapsulate the subscription service infrastructure **130**, described previously in connection with **FIG. 4**, of the digital music subscription service for access by a client computing platform **100**. This allows a client computing platform **100** to be able to access service features and capabilities without requiring a detailed understanding of the internal workings of the subscription service infrastructure **130**. The music service interface **156** includes, in this embodiment, a music service XML interface **157**. The music service XML interface **157** allows the client computing platform **100** to communicate with the subscription service infrastructure **130** of the digital music subscription service using the industry standard XML protocol. Other interfaces using industry standard technologies, such as Java, can be supported in other embodiments.

[**0089**] **FIG. 5** provides the software flow diagram for the Music Service Interface **156** running on an application server **103**, called the music service interface handler. In this example, the music service interface handler is a continuously running process on the application server **103**. "Start" in step **270** represents the beginning of the music service interface handler routine. If a music service interface request is received from a client computing platform **100** in step **271**, the music service interface handler checks if the music service interface request is in a supported format in step **272**. Supported formats may include XML protocol, a computing industry standard. If the format of the music service interface request is not supported in step **272**, the music service interface handler returns that the music interface format is invalid to the calling client computing platform **100** in step **273** and the music service interface handler checks for music service interface requests in step **271** again. If the music service interface request is in a supported format in step **272**, the music service interface handler parses and formats the interface request in step **274**, as necessary. Then the music service interface handler forwards in step **275** the request to the appropriate handler, discussed below in connection with **FIGS. 11, 14, 17, 21, 22, 27, 31**, and **32**). Finally, the music service interface handler checks for music service interface requests in step **271** again. In this way, the music service interface handler operates in a manner transparent to the client computing platform **100** and to other handlers on the application server **103**.

[**0090**] Client Computing Platform

[**0091**] **FIG. 6** illustrates an exemplary architecture for a client computing platform **100**, which can encompass anything from general-purpose devices, such as a personal computer, to open fixed function devices, such as a set-top box that connects to a television set. However, a client computing platform **100** is not restricted to these examples. In general, the client computing platform **100** includes a main processor **110**, for example, an Intel Pentium III, for executing various software components. The various software components are typically stored in read only memory, or ROM, or flash memory **116**, or local storage devices **112**. The local storage devices **112** can consist of persistent storage **113**, such as hard drives or flash memory, or removable storage devices **114**, such as floppy drives, CD-ROM drives, or DVD drives. The software components may be executed by the main processor **110** directly from their

storage location or are loaded into random access memory (RAM) **115** to be executed from the RAM **115** by the main processor **110**. The local storage **112** can also be used to cache digital content data **108**, such as digital music files, and other information.

[**0092**] The client computing platform **100** also includes a network interface or modem **117** to access various servers **102**, **103**, and **104** on the Internet or other computer network **101** in order to download digital audio content data **108** and other information. The network interface or modem **117** may be connected internally or externally to the client computing platform **100** using a system bus or peripheral bus **111**. The system bus and peripheral buses **111** are provided for connecting internal and external devices to the client computing platform **100** in a conventional manner. Typical system and peripheral buses **111** that may be used include a Universal Serial Bus, commonly referred to as USB, an IEEE **1394** bus, commonly referred to as FireWire, and a Peripheral Connect Interface bus, commonly referred to as a PCI bus. The client computing platform **100** may also support connection through a user input interface **120** to external or integrated user input devices **123**, such as a keyboard and mouse. For output to the user, the client computing platform **100** may contain a display controller **118**, for example, an NVIDIA model GeForce2, which stores graphical data, such as windows, bitmaps and text. The display controller **118** outputs the graphical data in a video output **121** format that is typically displayed to the user on a video monitor, television, or LCD panel. The client computing platform **100** may also be configured to provide audio output **122** either in addition to or in lieu of the video output **121**. The audio output is handled by the audio playback hardware **119**.

[**0093**] It should be noted that a client computing platform **100** is not limited to the capabilities and features listed in this description, but may contain a subset of the described features or may contain additional capabilities or features not listed. It should also be noted that the client computing platform **100** may also be referred to as a client **100** in the various diagrams and descriptions provided here.

[**0094**] Client Software Architecture

[**0095**] **FIG. 7** illustrates an exemplary embodiment of the architecture for a client application software component **131** running on the client **100** as part of a digital content distribution and subscription system. This particular embodiment takes advantage of commonly available software, for example, on a personal computer by integrating the functionality of the client application component **131** with an existing web browser interface **134**, for example, Microsoft Internet Explorer. The web browser interface **134** provides a graphical user interface to enable a user to directly interact with the application servers **103** to access some features and capabilities of the digital content distribution and subscription service using standard Internet and World Wide Web communication protocols, such as HTTP. The Web Browser Interface software system **134** can be configured to pass other information received from the application servers **103** to a Transfer Manager software module **132**, the other main component of the client application **131**.

[**0096**] The Transfer Manager software system **132** provides an additional graphical user interface that allows the user to interact with and access the various features and capabilities of the digital content distribution and subscription service on the application servers **103** as well as the content servers **104**. In addition, the Transfer Manager software system **132** can provide automated access to the digital content distribution and subscription service and automated notifications to the user. The details of the operation of the components of the client application **131** within the digital content distribution and subscription system are discussed below.

[**0097**] Software Diagrams

[**0098**] FIGS. **8-32** provide system level and device specific block diagrams and software flow diagrams of the features and capabilities of a digital content distribution and subscription system. Some of these features and capabilities may be unique to a secure distribution and subscription service where access to and playback of the digital content data **108** is restricted to authenticated clients **100** and authorized users. The features and capabilities demonstrated in these diagrams include logging into the service, searching the digital content catalog **107**, downloading digital content data **108**, and renewing playback licenses. It should be noted that these software flow diagrams represent only one of a plethora of possible embodiments for a digital content distribution and subscription system.

[**0099**] Client Transfer Manager

[**0100**] A client application **131** (**FIG. 7**) is used as an interface running on the client **100** to allow a user to interact with the digital content distribution and subscription system running on various servers **102-104** (**FIGS. 3 and 7**). In this embodiment, the client application **131** leverages an existing web browser interface **134** (**FIG. 7**), for example, Microsoft Internet Explorer. In addition, the client application **131** also includes the Transfer Manager software system **132** as illustrated in **FIG. 8**. As a part of the interface to the user, the Transfer Manager software system **132** in the client application **131** handles user inputs and requests. The Transfer Manager software system **132** then converts these inputs and requests into interactions with the digital content distribution and subscription system. Finally, the Transfer Manager software system **132** presents the results of these inputs and requests back to the user on the client **100**. In this example, the Transfer Manager software system **132** in the client application **131** is a continuously running process on the client computing platform **100**.

[**0101**] "Start" in step **170** (**FIG. 8**) represents the beginning of the Transfer Manager software system **132**. Next, the Transfer Manager software system **132** goes through a initialization in step **171**, which may include, for example, verifying a connection on the client computing platform **100** to the Internet or other computer network **101** in order to be able to access various servers **102-104**. Then the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172**. These requests may include, for example, license renewals. Other requests, such as login, search, and download are typically initiated by the user from the Web Browser Interface software module **134** (**FIG. 7**) with the results of, for example, the login and download requests then being handled by the Transfer Manager software system **132**. If there are login request results in step **173**, (**FIG. 8**) and if the login request results are successful in step **176**, then a session identifier is saved

in step **177**. As described in connection with **FIG. 12**, the application server **103** returns the session identifier to the client application **131** for use by the client **100** in future requests. After the session identifier is saved in step **177** or the login request results were not successful in step **176**, the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172** again. If there were no login request results in step **173** and if there are download request results in step **181**, the Transfer Manager software system **132** calls a download continuation task handler, described below in connection with **FIG. 20**, in step **182**. The results of the download are presented to the user in step **183**. If the download is successful in step **184**, then an access or playback license for the digital content data **108** and the location of the downloaded digital content data **108** are saved in step **185**. After the access or playback license and digital content data location are saved in step **185** or the download was not successful in step **184**, the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172** again. If there were no download request results in step **181** and if there is a license renewal request in step **186**, then the Transfer Manager software system **132** calls a license renewal request task handler, described below in connection with **FIG. 26**, in step **187**. The results of the license renewal request are presented to the user in step **188**. If the license renewal request is successful in step **189**, then the access or playback license for the digital content data is saved in step **190**. After the access or playback license is saved in step **190** or the license renewal request was not successful in step **189**, the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172** again. If there was no license renewal request in step **186** and if there is a license renewal needed in step **191**, that is to say some of the licenses have expired for any of the digital content data **108** stored on the client **100**, then the Transfer Manager software system **132** notifies the user that license renewals are required in step **192**. Then the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172** again. If there were no license renewals needed in step **191**, then the Transfer Manager software system **132** handles any other requests or actions in step **193**. Then the Transfer Manager software system **132** checks for requests by the user or results to the user in step **172** again.

[**0102**] Registration Request

[**0103**] Registration and user login, allows registered subscribers to access the digital content distribution and subscription system. **FIG. 9** provides a block diagram or system level software flow diagram for a registration request, while **FIGS. 10 and 11** provide specific software flow diagrams for a registration -request on the client **100** and on the application server **103**, respectively.

[**0104**] Registration, shown in **FIG. 9**, begins with the generation of a registration request in step **206** by the client **100**. The registration request in step **206** is sent to an application server **103**, which then validates and saves the passed registration information in step **207**. The saved registration information in step **207** is customer account information **199**, which includes customer name, geographic location for royalty tracking, and billing information, and customer login names and passwords **202**, all of which are part of customer data **106**. The application server **103** then returns the registration results in step **208** to the client **100** and the client **100** presents the registration results to the user in step **209**.

[**0105**] **FIG. 10** is a client specific software flow diagram for a registration request, called the registration request task. In this embodiment, the registration request task is handled within the web browser interface **134**, a component of the client application **131**, described previously in connection with **FIG. 7**. A user on a client **100** initiates a registration request task through, for example, a manual registration attempt. "Start" in step **280** represents the beginning of the registration request task on the client **100**. Next, a registration request is generated and sent in step **281** to the application server **103**. The registration request may include the user's name, geographic location, and billing information. The registration request task then waits with some timeout, for example, 2 seconds, and possibly with multiple retries for a registration request response in step **282** from the application server **103**. If a registration request response is not received in step **283**, then the registration request task presents the registration request failure to the user in step **284** and the task ends in step **286**. If a registration request response is received in step **283**, then the registration request task presents the registration request results to the user in step **285** that were received from the application server **103** and the task ends in step **286**.

[**0106**] **FIG. 11** is an application server specific software flow diagram for a registration request, called the registration handler. The registration handler is a continuously running process on the application server **103**. "Start" in step **290** represents the beginning of the registration handler which enters a state waiting for registration requests. If a registration request is received in step **291** from a client **100**, the registration request is validated in step **292**. If the registration request is not valid in step **293**, the registration handler returns that the registration failed in step **294** to the calling client **100**. The registration handler then checks for any registration requests received in step **291** again. If the registration request is valid in step **293**, the registration handler saves the registration information in step **295** to customer data **106**. Finally, the registration handler returns that the registration was successful in step **296** to the calling client **100** and checks for any registration requests received in step **291** again.

[**0107**] Login Request

[**0108**] **FIG. 12** is a system level software flow diagram for a login request, while **FIGS. 13 and 14** provide specific software flow diagrams for a login request on the client **100** and on the application server **103**, respectively. Logging in is an important capability in a digital content distribution and subscription service, especially for ensuring the security of the digital content data **108**. Forcing the user of a digital content distribution and subscription service to log into the service before allowing access to the digital content data **108** provides authentication of the user and supports tracking of use of the service for billing and royalty payments. Among other things, user login also allows for recommendations to be made based on a specific user's data access habits, for example, music recommendations based on a user's digital music download history.

[**0109**] The system level software flow diagram for a login request, shown in **FIG. 12**, begins with the generation of a

login request in step **200** either by the client **100**, or by the application server authentication process. In the latter case, the application server tries to verify the user by redirecting the user to the login process before preceding with other user requests. The login request in step **200** may involve the passing of a unique user name and/or an identifier unique to the client machine, such as the unique identifier available in an Intel Pentium III processor or the serial number of a hard drive in the client **100** or a unique identifier assigned by the application server. A password may also be required in order to provide a greater level of certainty for the authenticity of the user or client **100** making the login request as well as to reduce the risk of fraud to a particular user or on a particular client **100**. The login request in step **200** is sent to an application server **103**, which initiates a search for a user match in step **201** of the passed user or client identifier and password. The search for a user match in step **201** is done of customer login names and passwords **202**, which are part of the Customer data store **106**. The Customer data store **106** may include, in addition to that information required for login, detailed information about the customer, such as name and address as well as possibly geographic location for royalty tracking, and account information for billing purposes. When the client **100** connects to the application server **103**, a session is created and a session identifier is generated for future client request. The session identifier may represent, for example, an arbitrary sequence of letters and numbers, an encryption and decryption key, or a unique identifier for a session or process started on the application server by the calling client **100**. If a customer match is found with the login information, then the session identifier is associated with the matching customer, so that the client **100** can access the customer's data, such as music collection and account status, with future requests. To provide a higher level of security, the application server **103** can assign to the session identifier an expiration time or lifetime, for example, one hour, within which the session identifier is valid. This expiration time on session identifiers reduces the likelihood of random matches of active session identifiers by someone seeking to circumvent user authentication, since the set of active session identifiers is limited to the number of active users rather than the total number of users. The expiration time on session identifiers also reduces the value of the session identifier if an unauthorized person is able to obtain a particular session identifier.

[**0110**] **FIG. 13** is a client specific software flow diagram for a login request, called the login request task. In this embodiment, the login request task is handled within the web browser interface **134**, a component of the client application **131** described above in connection with **FIG. 7**. A user on a client **100** may explicitly initiate a login request task through, for example, a manual login attempt, or implicitly through, for example, an attempt to search the digital content catalog **107**, described in connection with **FIG. 15**, or download digital content data **108**, described in connection with **FIG. 18**.

[**0111**] "Start" in step **300** represents the beginning of the login request task on the client **100**. Next, a login request is generated and sent in step **301** to the application server **103**. The login request may consist of a unique user name or an identifier unique to the client **100** as well as a password. The login request task waits for a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a login request response in step **302** from the application server **103**. If a login request response is not received in step **303**, then the login request task presents a login request failure message to the user in step **304** and the task ends in step **308**. If a login request response is received in step **303**, then the login request task presents the login request results to the user in step **305** that were received from the application server **103**. The client user interface then presents the user with the results of login request, for example, a message of user login invalid, or in the case of a successful login, a proper web page on the application server depending on the previous state before the login request.

[**0112**] **FIG. 14** is an application server specific software flow diagram for servicing a login request, called the login handler. In this example, the login handler is a continuously running process on the application server **103**.

[**0113**] "Start" in step **310** represents the beginning of the login handler. If a login request is received in step **311** from a client **100**, a search is done for a login match in step **312** from the customer login names and passwords **202** in the Customer data store **106**. If a login match is found as determined in step **313**, then the session identifier of the connection between the client and the application server is associated with the customer being matched in step **315**. Any future request with the session identifier is considered as a request made by the particular customer for many purposes, for example, tracking the use of service. If a login match is not found, then the login handler returns that the login failed to the client in step **314**, but allows the user to try to login again.

[**0114**] Search Request

[**0115**] **FIG. 15** is system level software flow diagram for a search request, while **FIGS. 16 and 17** are specific software flow diagrams for a search request on the client **100** and on the application server **103**, respectively. Searching is an important capability in a digital content distribution and subscription service, especially since there may be thousands or even millions of unique instances of digital content data **108**, for example, digital music. Searching through a digital content catalog **107**, such as a catalog of digital music, may include the capability to search by artist, album name, track name, and musical genre, among others.

[**0116**] The system level software flow diagram for a search request, shown in **FIG. 15**, begins with a digital content search request in step **210** by the client **100**. The search request involves passing of various search parameters and, for example, may require a valid session identifier obtained from a previously successful login request, described above in connection with **FIG. 12**. The search request in step **210** is sent to an application server **103**, which, may first authenticate the request in step **211** using the passed session identifier. If the session identifier is valid, the application server **103** initiates a digital content search in step **212** based on the search parameters passed by the client **100**. The search is done of the digital content catalog **107** and more specifically of the digital content identifiers and digital content information **213**, such as artist, album name, and track name for the example of digital music. When the digital content search is completed in step **212**, the application server **103** formats the results of the digital content search in step **214** and passes the formatted results back to the calling client **100**. The client **100** receives the digital content search results in step **215** from the application server

103 and presents these results to the user in step **216**, possibly with some additional formatting of the results in order to present the results in the most useful manner.

[**0117**] **FIG. 16** is a client specific software flow diagram for a search request, called the search request task. In this embodiment, the search request task is handled within the Web Browser Interface software **134**, a component of the client application **131**, described above in connection with **FIG. 7**. A user on a client **100** may initiate a search request of the digital content catalog **107** in order to find a specific instance or group of related instances of digital content data **108**. For example, with digital music, a user may search for a specific music track, music by a particular artist, or music on a particular album, among other things.

[**0118**] "Start" in step **320** represents the beginning of the search request task on the client **100**. The search request task generates and sends a search request in step **323** to the application server **103**. In addition to the session identifier, the search request includes the search parameters. For example, for digital music, the search parameters may be a partial or complete track name, artist, or album name. The search request task then waits for a predetermined timeout, for example, 2 seconds, optionally with multiple retries for a search response in step **324** from the application server **103**. If a search response is not received in step **325**, the search request task presents the search request failure to the user in step **326** and the task ends in step **328**. If a search response is received in step **325**, then the search request task presents the search response results to the user in step **327** that were received from the application server **103** and the task ends in step **328**.

[**0119**] **FIG. 17** is an application server specific software flow diagram for a search request, called the search handler. In this embodiment, the search handler is a continuously running process on the application server **103**. "Start" in step **330** represents the beginning of the search handler. If a search request is received in step **331** from a client **100**, then the session identifier, passed as part of the search request is validated in step **332**. This validation may be optional, if the search capability is available to the general public instead of restricting it to paid customers. If the session identifier is not valid in step **333**, then the search handler returns that the session identifier is not valid in step **334** to the calling client **100**. The search handler then checks for any search requests received in step **331** again. If the session identifier is valid in step **333**, then the search handler performs the search request in step **335**. The search uses the search parameters passed by the client **100** as part of the search request and is done of the digital content catalog **107** and more specifically of the digital content identifiers and digital content information **213**, such as artist, album name, and track name, for the example of digital music. Finally, the search handler returns the results of the search, with some possible reformatting of the results data in step **336** and checks for any search requests received in step **331** again.

[**0120**] Digital Content Download Request

[**0121**] Downloading digital content data **108** is an essential part of a digital content distribution and subscription system. A digital content download request may involve significantly more than simply downloading the digital content data **108**. The client **100** may require an access or playback license in order to use the digital content data **108**. The process of downloading the digital content data **108** may involve authentication of the user or client **100** requesting the download in order to prevent unauthorized download of the digital content data **108** from the content server **104**.

[**0122**] **FIG. 18** is a system level software flow diagram for a download request, while FIGS. **19-24** are device specific software flow diagrams for a download request. In particular, **FIG. 19** is a software flow diagram for a download request on the client **100**, **FIG. 20** is a software flow diagram for download continuation on the client **100**, **FIG. 21** is a software flow diagram for a download request on the application server **103**, **FIG. 22** is a software flow diagram for a license request on the application server **103**, **FIG. 23** is a software flow diagram for a license request on the license server **102**, and **FIG. 24** is a software flow diagram for a download request on the content server **104**.

[**0123**] The system level software flow diagram for a download request, shown in **FIG. 18**, begins with a download request by the client **100** for digital content data **108** in step **220**. The download request involves the client **100** identifying the specific digital content data **108**, such as digital video, audio, or data files **229**, desired for download, and, in this example, also requires the client **100** to provide a valid session identifier obtained from a previously successful login request, described previously in connection with **FIG. 12**. Specifying the digital content data **108**, such as a video, audio, or data file **229**, can be done based on information in the results from a previously successful search request, described previously in connection with **FIG. 15**, and can correspond to digital content identifiers and digital content information **213** in the digital content catalog **107**. The download request in step **220** is sent to an application server **103**, which, in this example, first authenticates the request in step **221** using the passed session identifier. If the session identifier is valid, the application server **103** fetches the content metadata from the digital content catalog **107** in step **222** for the specific digital content data **108** that the client **100** requested. The content metadata includes a content identifier, and may also include other information about the content, such as name, size, and author name of the content. The digital content identifier **213** indicates to the content server **104** what specific digital content data **108** is desired and can be an actual file name or some unique identifier associated with the specific digital content data **108** to be downloaded, such as a video, audio, or data file **229**. After the content metadata is fetched in step **222**, the application server **103** generates a download address for the specific digital content data **108** to be downloaded from the content server **104** in step **224**. It also formats the content metadata to be sent to the client. In the digital content distribution and subscription system that provides protection of the digital content data **108** from unauthorized access, such as the example described here, the download address may not only correspond to the specific digital video, audio or data file **229** to be downloaded. The download address may also contain some additional information, for example, a checksum or token that is used by the content server **104** to authenticate the download. The client **100** then receives the download address and content metadata in step **225** from the application server **103**. The client uses the download address to request download of the specific digital content data **108** in step **226** from the content server **104**. The content server **104** uses the download address from the client **100** to authenticate the download of

the specific digital content data **108** in step **227**. Once the download address is authenticated in step **227**, the content server **104** fetches the specific digital content data **108** in step **228**, such as a digital video, audio, or data file **229**. The client **100** receives the specific digital content data **108** in step **230** from the content server **104**. In a secure digital content distribution and subscription system, the digital content data is encrypted and is not usable without a license. Once the digital content data **108** is received in step **230**, the client **100** requests a license to access or playback the specific digital content data **108** from the application server **103** in step **231**. Since the license request from the client **100** to the application server **103** in step **231** is separate from the download request from the client **100** to the application server **103** in step **220**, the application server **103** must again authenticate the license request from the client **100** in step **232** using the passed session identifier and a unique client machine identifier that specifies the machine on which the license for the digital content data is going to be stored. If the session identifier and the client machine identifier are valid, the application server **103** requests a license to access or playback the specific digital content data **108** in step **233** from a license server **102**. The license server **102** obtains the license for the specific digital content data **108** in step **234** in a manner corresponding to the requirements of the digital rights management implementation used, for example, Microsoft Windows Media Rights Manager. Next, the license server **102** saves the digital content data download and licensing information **236** in step **235** for royalty tracking **105**, which involves determining royalty payments to rights holders of the digital content data **108** that are assigned licenses and downloaded. The application server **103** then receives the license for the specific digital content data **108** in step **237** from the license server **102**. The client **100** then receives the access or playback license in step **238** from the application server **103**, which the client **100** then saves along with the corresponding digital content data **108**.

[**0124**] **FIG. 19** is a the client specific software flow diagram for a download request, called the download request task. In this embodiment, the download request task is handled within the web browser interface **134**, a component of the client application **131**, described previously in connection with **FIG. 7**. A user on a client **100** typically initiates a download request of specific digital content data **108** in order to access or playback the specific digital content data **108**, such as video, audio, or data files **229**.

[**0125**] "Start" in step **340** represents the beginning of the download request task on the client **100**. The download request task generates and sends a download request in step **341** to the application server **103**. In addition to the session identifier, required in this example, the download request also includes one or many content object names or content identifiers **213**, obtained from the results of a previous search request, described previously in connection with **FIG. 15**. The download request task then waits with a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a download response in step **342** from the application server **103**. If a digital content download address is not received as part of the download response in step **343**, the download request task presents the download request failure to the user in step **344** and the task ends in step **346**. If a download response, which may include multiple download addresses and metadata for multiple digital content data, for the specific digital content data **108** is received in step **343** from the application server **103**, then the download request task passes the digital content download address and metadata to the Transfer Manager software system **132** of the client application **131**, described previously in connection with **FIG. 8**, in step **345** and the task ends in step **346**.

[**0126**] **FIG. 20** is a the client specific software flow diagram for download continuation, called the download continuation task. The download continuation task is called within the Transfer Manager software system **132** (**FIG. 8**, step **182**), a component of the client application **131**, described previously in connection with **FIG. 7**. The Transfer Manager software system processes the results received from the download request task, described above in connection with **FIG. 19**. It then runs in a loop to call the download continuation task with the download address and metadata for each of the multiple digital content data it receives. The download continuation task thus continues the download process by handling the download of the digital content data **108** and the retrieval of the access or playback license for the digital content data **108**.

[**0127**] "Start" in step **348** represents the beginning of the download continuation task on the client **100**. The download continuation task downloads the digital content data **108** in step **349** from the content server **104** using the passed digital content download address. The download continuation task waits with some timeout and possibly with multiple retries for the specific digital content data to download in step **350**. The timeout, in this case, can be some fixed amount, for example, 5 minutes, or can be automatically calculated based on the size of the specific digital content data **108** to be downloaded and the download data rate of the connection from the client **100** to the Internet or other computer network **101**. If the specific digital content data **108** is not received in step **351**, then the download continuation task returns that the download of the digital content data **108** failed in step **352** to the calling Transfer Manager software system **132** and the task ends in step **359**. If the specific digital content data **108** is received in step **351** from the content server **104**, then the download continuation task saves the specific digital content data **108** in step **353** on the client **100**.

[**0128**] In another embodiment, rather than downloading the entire digital content data at once, the download continuation task divides the digital content data into smaller chunks of a fixed size, and runs in a loop to download the digital content data one chunk at a time until the entire content data is received. As soon as one chunk is received, it is saved and appended to the file for the specific content data to be downloaded. All the timeout, retry and error reporting rules described above, apply to each chunk of the data to the downloaded. Next, the download continuation task generates and sends a license request in step **354** to the application server **103**. The download continuation task then waits for a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a license request response in step **355** from the application server **103**. If a license request response is not received in step **356**, then the download continuation task stores the license in a manner corresponding to the requirements of the digital content management implementation used, for example. Microsoft Windows Media Rights Manager, and the task ends in step **359**.

[0129] **FIG. 21** is an application server specific software flow diagram for a download request, called the application download handler. In this embodiment, the application download handler is a continuously running process on the application server **103**.

[0130] "Start" in step **360** represents the beginning of the application download handler. If a download request is received in step **361** from a client **100**, then the session identifier, passed as part of the download request, is validated in step **362**. If the session identifier is not valid in step **363**, the application download handler returns that the session identifier is not valid in step **364** to the calling client **100**. The application download handler then checks for any download requests received in step **361** again. If the session identifier is valid in step **363**, then the application download handler fetches the content metadata including content identifier in step **213** in step **365** from the digital content catalog **107** for the requested digital content data **108**. The digital content identifier **213** indicates to the content server **104** what specific digital content data **108** is desired and can be an actual file name or some unique identifier associated with the specific digital content data **108** to be downloaded, such as a video, audio, or data file **229**. If the content identifier **213** is not found in the digital content catalog **107** in step **366**, then the application download handler returns that the download request is not valid in step **367** to the calling client **100**. The application download handler then checks for any download requests received in step **361** again. If the content identifier **213** is found in step **366**, then the application download handler generates the download address for the specific digital content data **108** to be downloaded using the content identifier **213**. The download address may not only correspond to a specific digital video, audio or data file **229** in the digital content data **108** to be downloaded, but may also contain some additional information, for example, a checksum or token, that is used by the content server **104** to authenticate the download. Authentication of the download by the content server **104** can prevent unauthorized download of the digital content data **108**. Each download request may include requests for multiple digital content data. When the application download handler finishes processing for all digital content data in one download request, it then returns the download addresses and metadata for the specific digital content data **108** to be downloaded in step **369** to the calling client **100** and checks for any download requests received in step **361** again.

[0131] **FIG. 22** is an application server specific software flow diagram for a license request, called the application license handler. The license request is one part of the overall digital content download request, described previously in connection with **FIG. 18**. In this embodiment, the application license handler is a continuously running process on the application server **103**.

[0132] "Start" in step **370** represents the beginning of the application license handler. If a license request is received in step **371** from a client **100**, then the session identifier then the session identifier and client machine identifier, passed as part of the license request, are part of the license request, are validated in step **372**. If the session identifier or the client machine identifier is not valid in step **373**, then the application license handler returns that the session identifier is not valid in step **374** to the calling client **100**. The application license handler checks for any license requests received in step **371** again. If the session identifier and the client machine identifier are both valid in step **373**, the application license handler generates and sends a license request in step **375** to the license server **102** in order to obtain a license for access to or playback of the specific digital content data **108**. The application license handler then waits for a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a license response in step **376**. If a license response is not received in step **377**, the application license handler returns that the license request failed in step **378** to the calling client **100**. The application license handler then checks for any license requests received in step **371** again. If a license response is received in step **377**, then the application license handler returns the access or playback license for the specific digital content data **108** in step **379** to the calling client **100** and checks for any license requests received in step **371** again.

[0133] **FIG. 23** is a license server specific software flow diagram for a license request, called a license request handler. The license request is one part of the overall digital content download request, described above in connection with **FIG. 18**. In this embodiment, the license request handler is a continuously running process on the license server **102**.

[0134] "Start" in step **380** represents the beginning of the license request handler. If a license request is received in step **381** from an application server **103**, then the license request handler generates the access or playback license in step **382** for the specific digital content data **108**, according to the digital rights management implementation used, for example, Microsoft Windows Media Rights Manager. The license request handler then saves information about licensing in step **383** for royalty tracking **105**, which is then used for determining royalty payments to rights holders of the digital content data **108**. Finally, the license request handler returns the access or playback license in step **384** to the calling application server **103** and checks for any license requests received in step **381** again.

[0135] FIGS. **24A-24C** are content server specific software flow diagrams for a download request, called the content download handler. In this embodiment, the content download handler is a continuously running process on the content server **104**.

[0136] Referring to **FIG. 24A**, "Start" in step **390** represents the beginning of the content download handler. If a download address is received from a client **100** in step **391**, then the content download handler authenticates the download address in step **392**. In this embodiment, the download address contains is encrypted with the content identifier **213**, which can be an actual file name or some unique identifier associated with the specific digital content data **108** to be downloaded, such as a video, audio, or data file **229**. In addition, the download address may contain additional information, for example, a checksum or token. The content download handler uses the content identifier **213** and the additional information, such as a checksum or token, in order to authenticate the download and thus prevent unauthorized access to the digital content data **108**. If the download address is not valid in step **393**, then the content download handler returns that the download address is not valid in step **394** to the calling client **100**. The content download handler then checks for any download addresses

received in step **391** again. If the download address is valid in step **393**, which means that the content identifier **213** found in the download address represents specific digital content data **108** and the download address is authenticated, then the content download handler downloads the specific digital content data **108** in step **395** and returns this digital content data **108** in step **396** to the calling client **100**. The content download handler then checks for any download addresses received in step **391** again.

[**0137**] The Transfer Manager may make additional requests to the application server automatically when a user makes a download request as illustrated in **FIGS. 24B and 24C**. In this embodiment, if it is the first time the user is making a download request as illustrated in **FIG. 24**B, the Transfer Manager may send a request for customer account information as indicated by steps **900-906** of **FIG. 24B**. As indicated in steps **907-912** of **FIG. 24**C, the application server validates the session identifier sent with the request. If the session identifier is valid with a previously successful login request, the application server looks up the customer associated with the session identifier from the customer database, and retrieves certain customer information, for example, a unique customer identifier assigned by the server, then sends the customer information back to the Transfer Manager. When the Transfer Manager receives the customer information, it stores the customer information for future reference. If the session identifier is not valid, the application server responses with error message to the Transfer Manager.

[**0138**] License Renewal Request

[**0139**] Renewing licenses for digital content data **108** is necessary in a digital content distribution and subscription system when access or playback licenses are required on the client **100** for the digital content data **108** and these access or playback licenses have an expiration time or lifetime. Having an expiration time or lifetime associated with access or playback licenses for digital content data **108** not only prevents unauthorized access to or playback of the digital content data **108**, but also provides time restrictions on access to or playback of the digital content data **108** by authorized users. These time restrictions are essential in any subscription service, since they ensure that a user may not continue to access or playback the digital content data **108** after their subscription has expired. A user can set up the automatic license renewal process to ensure uninterrupted access or playback rights to the digital content data. In this embodiment, a user may mark the digital content data that has been downloaded, to be renewed when the current licenses expire, through the client web interface. The application server maintains the records, for each customer, of the digital content data downloaded or subscribed by the customer and its renewable status.

[**0140**] **FIG. 25** is a system level software flow diagram for a license renewal request, while **FIG. 26** is a specific software flow diagram for a license renewal request on the client **100**. **FIG. 27** is a specific software flow diagram for a license renewal request on the application server **103**, while **FIG. 28** is a specific software flow diagram for a license renewal request on the license server **102**.

[**0141**] The system level software flow diagram for a license renewal request, shown in **FIG. 25**, begins with a license renewal request by the client **100** in step **240**. The license renewal request involves the client **100** identifying the specific digital content data **108**, such as a digital video, audio, or data file **229**, that requires a new license or simply providing the expired license for the specific digital content data **108**, depending on the requirements of the digital rights management implementation used, for example, Microsoft Windows Media Rights Manager. The license renewal request also requires the client **100** to provide a valid customer identifier obtained from a previously successful download request, and a unique client machine identifier of which the license of the digital content is going to be stored on. The license request in step **240** is sent to an application server **103**, which, in this embodiment, first authenticates the request in step **241** using the customer identifier and the client machine identifier. If the customer identifier and the client machine identifier are valid, the application server **103** sends the license renewal request to a license server **102** in step **242** in order to obtain new licenses for access to or playback of the digital content data **108** that the client **100** specified. The license server **102** generates the licenses for the specific digital content data **108** in step **243** in a manner corresponding to the digital rights management implementation used, for example, Microsoft Windows Media Rights Manager. Next, the license server **102** saves the digital content data licensing information **236** in step **244** for royalty tracking **105**, which involves determining royalty payments to rights holders of the digital content data **108** that are assigned licenses. The application server **103** then receives the licenses for the specific digital content data **108** in step **246** from the license server **102**. The client **100** then receives the access or playback licenses in step **247** from the application server **103**, which the client **100** then saves.

[**0142**] **FIG. 26** is a the client specific software flow diagram for a license renewal request, called the license renewal request task. The license renewal request task is called within the Transfer Manager software system **132** (**FIG. 8**, step **187**), a component of the client application **131**, described above in connection with **FIG. 7**. A client **100** can automatically initiate or a user on a client **100** can manually initiate a license renewal request for specific digital content data **108** in order to continue to access or playback the specific digital content data **108**, such as video, audio, or data files **229**.

[**0143**] "Start" represents the beginning of the license renewal request task on the client. Since the client may not be connected to the application server at the time when the renewal process start, the license renewal request task first makes a connection to the application server through standard Internet connection protocol. Then, the license renewal request task generates and sends a license renewal request to the application server with the customer identifier obtained from previously successful request and a unique client machine identifier. The license renewal request task then waits for a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a license renewal response in step **404** from the application server **103**. If a license renewal response is not received in step **405**, then the license renewal request task returns that the license renewal request failed in step **406** to the calling Transfer Manager software system **132** and the task ends in step **408**. If a license renewal response, which includes the new access or playback licenses, is received in step **405** from the application server **103**, then the license renewal request task returns the new access or playback licenses for the specific digital

content data **108** in step **407** to the calling Transfer Manager software system **132** and the license renewal request task ends in step **408**.

[**0144**] **FIG. 27** is an application server specific software flow diagram for a license renewal request, called the application renewal handler. In this embodiment, the application renewal handler is a continuously running process on the application server **103**.

[**0145**] "Start" in step **410** represents the beginning of the application renewal handler. If a license renewal request is received in step **411** from a client **100**, then the customer identifier and the client machine identifier, passed as part of the license renewal request, are validated. If either of the identifiers is not valid, the application renewal handler returns that the customer identifier or the client machine identifier is not valid to the calling client. The application renewal handler then checks for any license renewal requests received again. If the identifiers are both valid, then the application renewal handler looks up records of the digital content data downloaded or subscribed by the particular customer that are marked for renewal. The application renewal handler then generates and sends a license request to the license server with those content data identifiers. The application renewal handler then waits for a predetermined timeout, for example, 2 seconds, and optionally with multiple retries for a license renewal response in step **416**. If a license renewal response is not received in step **417**, then the application renewal handler returns that the license renewal requests failed in step **418** to the calling client **100**. The application renewal handler then checks for any license renewal requests received in step **411** again. If a license renewal response, which includes the access or playback licenses for renewed digital content data, is received in step **417**, then the application renewal handler returns the access or playback licenses for the specific digital content data **108** in step **419** to the calling client **100** and checks for any license renewal requests received in step **411** again.

[**0146**] **FIG. 28** is a license server specific software flow diagram for a license renewal request, called the license renewal handler. In this embodiment, the license renewal handler is a continuously running process on the license server **102**.

[**0147**] "Start" in step **430** represents the beginning of the license renewal handler. If a license renewal request is received in step **431** from an application server **103**, then the license renewal handler generates one or multiple access or playback licenses based on the information that is passed as part of the license renewal request and what the requirements are of the digital rights management implementation used, for example, Microsoft Windows Media Rights Manager. This passed information may specify the digital content data **108**, such as a digital video, audio, or data file **229**, which requires the license renewal or may be an expired license for the specific digital content data **108**. The license renewal handler then saves information about licensing in step **436** for royalty tracking **105**, which may be used for determining royalty payments to rights holders of the digital content data **108**. Finally, the license renewal handler returns the new access or playback licenses in step **437** to the calling application server **103** and checks for any license renewal requests received in step **431** again.

[**0148**] Account Update Request

[**0149**] Updating account information for a user is important if a user's billing information changes, if a user's geographic location changes, and to a lesser extent, if a user's preferences change. **FIG. 29** is a system level software flow diagram for an account update request, while FIGS. **30-32** are device specific software flow diagrams for an account update request. In particular, **FIG. 30** is a software flow diagram for an account update request on the client **100**. **FIG. 31** is a software flow diagram for an account information request on the application server **103**. **FIG. 32** is a software flow diagram for an account update request on the application server **103**.

[**0150**] The system level software flow diagram for an account update request, shown in **FIG. 29**, begins with an account information request by the client **100** for customer account information **199** in step **250**. The account information request requires the client **100** to provide a valid session identifier obtained from a previously successful login request, described above in connection with **FIG. 12**. The account information request in step **250** is sent to an application server **103**, which, first authenticates the request in step **251** using the passed session identifier. If the session identifier is valid, the application server **103** gets the customer account information **199** in step **252** from customer data **106** that the client **100** requested. After the customer account information **199** is fetched in step **252**, the application server **103** returns the customer account information **199** in step **253**. The client **100** then receives the customer account information **199** in step **254** from the application server **103**. The client **100** then presents the customer account information **199** to the user for modification in step **255**. The client **100** then takes any changes of customer account information **199** and sends an account update request in step **256** to the application server **103**. Since the account information request from the client **100** to the application server **103** in step **250** is separate from the account update request from the client **100** to the application server **103** in step **256**, the application server **103** must again authenticate the account update request from the client **100** in step **257** using the passed session identifier. If the session identifier is valid, the application server **103** updates the customer account information **199** in step **258** to customer data **106**. The application server **103** then returns the results of the account update request to the client **100** in step **259**. The client **100** receives the results of the account update request in step **260** from the application server **103**, which the client **100** then can present to the user.

[**0151**] **FIG. 30** is a client specific software flow diagram for an account update request, which in the example described henceforth, is called the update request task. In this embodiment, the update request task is handled within the Web Browser interface **134**, a component of the client application **131**, described above in connection with **FIG. 7**. A user on a client **100** typically initiates an account update request in order to update account information specific to the user. "Start" in step **461** represents the beginning of the update request task on the client **100**. The update request task generates and sends an account information request in step **462** to the application server **103**. The update request task then waits with some timeout, for example, 2 seconds, and optionally with multiple retries for an account information request response in step **463** from the application server

103. If an account information request response is not received in step **464**, then the update request task presents the account information request failure to the user in step **465** and the task ends in step **475**. If an account information request response, which includes the customer account information **199**, is received in step **464** from the application server **103**, then the update request task presents the customer account information **199** to the user in step **466**. Then the update request task waits for action from the user to update the customer account information **199** in step **468**. If the user does not request an update of the customer account information **199** in step **469**, then the update request task ends in step **475**. If the user does request an update of the customer account information **199** in step **469**, then the update request task sends an account update request, which includes the updated customer account information **199**, in step **470** to the application server **103**. The update request task then waits with some timeout, for example, 2 seconds, and possibly with multiple retries for an account update request response in step **471** from the application server **103**. If an account update request response is not received in step **472**, then the update request task presents the account update request failure to the user in step **473** and the task ends in step **475**. If an account update request response is received in step **472** from the application server **103**, then the update request task presents the results of the account update request to the user in step **474** and the update request task ends in step **475**.

[0152] **FIG. 31** is an application server specific software flow diagram for an account information request, which in the example described henceforth, is called the application information handler. In this example, the application information handler is a continuously running process on the application server **103**. "Start" in step **480** represents the beginning of the application information handler. If an account information request is received in step **481** from a client **100**, then the session identifier, passed as part of the account information request, is validated in step **482**. If the session identifier is not valid in step **483**, then the application information handler returns that the session identifier is not valid in step **484** to the calling client **100**. Optionally, the server may direct the user to the login process. The application information handler then checks for any account information requests received in step **481** again. If the session identifier is valid in step **483**, then the application information handler gets the requested customer account information **199** in step **485** from customer data **106**. If the customer account information **199** is not found in customer data **106** in step **486**, then the application information handler returns that the account information request is not valid in step **487** to the calling client **100**. The application information handler then checks for any account information requests received in step **481** again. If the customer account information **199** is found in step **486**, then the application information handler returns the customer account information **199** in step **488** to the calling client **100** and checks for any account information requests received in step **481** again.

[0153] **FIG. 32** is an application server specific software flow diagram for an account update request, which in the example described henceforth, is called the application update handler. In this example, the application update handler is a continuously running process on the application server **103**. "Start" in step **490** represents the beginning of the application update handler. If an account update request is received in step **491** from a client **100**, then the session identifier, passed as part of the account update request, is validated in step **492**. If the session identifier is not valid in step **493**, then the application update handler returns that the session identifier is not valid in step **494** to the calling client **100**. The application update handler then checks for any account update requests received in step **491** again. If the session identifier is valid in step **493**, then the application update handler validates and saves the updated customer account information **199** in step **495** to customer data **106**. If the updated customer account information **199** is not valid in step **496**, then the application update handler returns that the account update request is not valid in step **497** to the calling client **100**. The application update handler then checks for any account update requests received in step **491** again. If the updated customer account information **199** is valid in step **496**, then the application update handler returns the results of the account update request in step **498** to the calling client **100** and checks for any account update requests received in step **491** again.

[0154] Digital Music Subscription Service Screen Shots

[0155] An exemplary user interface for a digital content distribution and subscription system, is illustrated in FIGS. **33-39**. This user interface is accessible on the client **100** as part of the client application **131**, described above in connection with **FIGS. 2 and 7**.

[0156] The registration user interface **504**, shown in **FIG. 33**, is handled in the Web Browser interface **134** part of the client application **131**. The registration user interface **504** receives registration information from the user and passes this on to the application server **103** to store customer account information **199** in customer data **106**. The system level software flow diagram for a registration request is described above in connection with **FIG. 9**. In this embodiment, there are multiple edit fields that the user must enter. The first group of fields is for personal information **505**, which may include first name **506**, last name **507**, e-mail address **508**, username **509**, and password **522**. The username **509** and password **522** fields are used for login and are described below in connection with **FIG. 34**. Other exemplary groups of fields in the registration interface **504** for the user to enter are billing information **523** and credit card information **534**. Billing information **523** may include the user address **524**, city **525**, state **526**, zip code **527**, home phone number **528**, and work phone number **529**. The credit card field **534** may include the name on the credit card **535**, credit card type **536**, credit card number **537**, and credit card expiration date **538**. An exemplary group of music preferences **539** check boxes allows a user to specify their favorite musical genres, which may include Country **540**, Jazz **541**, Pop/Rock **542**, Rap/Hip-Hop **543**, Dance/Electronica **544**, Latin/World **545**, R & B/Blues **546**, and Specialty **547**. The music preferences can be used in a digital music subscription system for simplifying user searches and music recommendations. A subscription plan field **548** may offer various subscription options, such as Silver **549**, Gold **560**, and Platinum **561**, which in this embodiment are used to provide three levels of subscription service at different price levels. Finally, the button 'submit'**562** allows the user to submit their registration.

[0157] The login or sign in user interface **500**, shown in **FIG. 34**, is handled in the Web Browser interface **134** part

of the client application **131**. The login user interface **500** receives login information from the user and passes this on to the application server **103** for authentication. The system level software flow diagram for a login request is described above in connection with **FIG. 12**. In this embodiment, two exemplary edit fields may be provided that the user must enter. In the edit field **501**, identified as "Username", the user enters their designated user name, previously created by the user. In the edit field **502**, identified as "Password", the user enters the password associated with the user name entered in the edit field Username **501**. The password entry was also previously created by the user or generated automatically as part of registration for the digital music subscription service. Once the edit fields Username **501** and Password **502** are entered by the user, the user then selects the "go" button **503** in order to send this login information to the application server for authentication.

[**0158**] Once authenticated, a search user interface **510**, shown in **FIG. 35**, is displayed under the control of the Web Browser interface **134** part of the client application **131**. The search user interface **510** receives search requests from the user and passes this on to the application server **103**, which then initiates a search of the digital content catalog **107**. The application server **103** then returns the results of the search request to the search user interface **510** where the results are presented to the user. The system level software flow diagram for a search request is described above in connection with **FIG. 15**.

[**0159**] In this embodiment, there are two types of searches available. The first type of request is a general search **511** by artist, album, or track name. The search by artist, album, or track name is selected from a drop down list box **513**. The search parameters are entered into an edit field **514** and the search request is initiated when the user selects the "go" button **515**. The other type of search to request is browse a genre **512**. When this search is selected, the system searches the digital content catalog **107** by musical genres, for example, pop/rock, country, or jazz. The musical genre is selected from a drop down list box **516**. In addition, the search can be further refined by subgenre, for example, alternative, folk, or metal/hard rock, for the genre pop/rock. The subgenre is selected from a drop down list box **517** and the search request is initiated when the user selects the "go" button **518**. The search results **519** are presented to the user in the search interface **510**. As shown, a general search **511** was requested for the artist U2, with the search results **519** presented specifically in the result list **520**. Selecting an artist **521**, for example, U2, from the result list **520** expands the results for that specific artist, which is shown as the artist results user interface **530**.

[**0160**] An artist results user interface **530**, shown in **FIG. 36**, is handled in the Web Browser interface **134** part of the client application **131**. The artist results user interface **530** presents search results by artist **531**, for example, U2, and more specifically by a list of albums **532** from the artist. Selecting an album **533**, for example, "Achtung Baby", from the list of albums **532** expands the results for that specific album, which is shown as the album tracks user interface **550**.

[**0161**] An album tracks user interface **550**, shown in **FIG. 37**, is handled in the Web Browser interface **134** part of the client application **131**. The album tracks user interface **550** allows the user to select specific songs or tracks for subscription. The album tracks user interface **550** presents album tracks **551**, for example, the album "Achtung Baby", and more specifically by a list of tracks **552** from the album. Selecting the check box for a track **553**, for example, the song "One", from the list of tracks **552** makes the selected track **553** available for download. In addition, the "Select All" buttons **558** and **559** make all the tracks in the list of tracks **552** available for download and the "Clear Selection" buttons **556** and **557** deselect all the tracks in the list of tracks **552** available for download. Selecting the "Subscribe" button **554** or **555** initiates the download or subscribe of the selected track **553**. The album track user interface **550** passes the download request information to the application server **103**, which, among other things, returns a download address for the selected track **533** to download.

[**0162**] A system level software flow diagram for a download request is described above in connection with **FIG. 18**. The download interface **570**, shown in **FIG. 38**, is handled in the Transfer Manager software system **132** part of the client application **131** and receives the download address from the application server **103** and initiates the track download from the content server **104** using the download address. The download interface **570** provides a list of tracks **571** that are to be downloaded. The track list **571** specifies the track title **572** and includes, for example, the artist name U2, the album name "Achtung Baby", the track number 3 in the album, and the track title "One". The track list **571** also includes the download status **573** for each track in the list. In addition, the download interface **570** includes an overall progress bar **574**, which indicates the overall progress of the track downloads. The download interface **570** has a cancel button **575** that terminates the download when selected and a delete button **576** that removes a track to be downloaded from the track list **571**. The check box **577** simply enables automatic closing of the download interface **570** when the track downloads complete.

[**0163**] An account update or user profile interface **563**, shown in **FIG. 39**, is handled in the Web Browser interface **134** part of the client application **131**. The account update or user profile interface **563** allows the user to edit and make changes to their customer account information **199** in customer data **106**. The system level software flow diagram for account update is discussed above in connection with **FIG. 29**. In this embodiment, various groups of are fields available for editing. The personal information **564** group of fields may include first name **565**, last name **566**, e-mail address **567**, username **568**, password **569**, and password confirmation **578** for password changes. The billing information **579** group of fields may include a user address **580**, city **581**, state **582**, zip code **583**, home phone number **584**, and work phone number **585**. Finally, a credit card information **586** group of fields may include a name on the credit card **587**, credit card type **588**, credit card number **589**, and credit card expiration date **590**. The "update" button **591** sends the updated account information to the application server **103** for updating.

[**0164**] Digital Content Management

[**0165**] As part of a digital content distribution and subscription system, a particular user may be restricted as to the amount of digital content data **108** available over a particular time period. This amount of digital content data **108** allowed

over a particular time period may be further restricted such that once this amount is reached, the user is not able to access any additional digital content data **108** until that time period is completed, without incurring any additional fees. For example, in a subscription service for digital music, a user may only be allowed access to a certain number of songs managed as cache slots (**FIG. 43**) during a certain time period, for example, 100 songs per month. Once the user has filled a slot, the user would then have to wait until their next renewal date before being able to put a different song in one of their slots. The user can get more songs than allocated by their current plan. These songs are charged on an individual basis. Those additional tracks may be swapped or not renewed at the next renewal cycle. The subscriber's of digital content may be distributed over one or more client computers from which the user accesses the subscription system, and it may be possible for a single user to download the same content to multiple client computers. The subscription system may allow this duplication of downloaded content but may restrict such duplication as deemed appropriate for the business by enforcing a limit on the number of client computers to which each user may download content.

[**0166**] Digital content management is implemented in a distributed manner such that access to downloaded digital content at a given point in time is restricted by software licenses operating on the client computer, while the acquisition, renewal, and tracking of these licenses is managed by the application server.

[**0167**] Licenses grant users the ability to access digital content which has already been or will be downloaded onto their client computer(s), and are set to expire at the end of each subscription period. If a license for content exists and is valid for the time period during which access is being attempted, access to the content will be granted. If an attempt is made to access content for which no license exists or for which an expired license exists, an attempt may be made to immediately retrieve a valid license for this content and allow access to the content, or the user may be notified that such content is inaccessible, and that access will be forbidden. In the latter case, the user may be given the opportunity to retrieve a license for the specific content at this time or at a later time.

[**0168**] The Transfer Manager automatically requests and downloads licenses from the application server whenever a user requests and downloads digital content. Which licenses may be granted during a given time period may be limited by any number of policies, such as the category of the content as compared to the user's subscription privileges. Other policies and restrictions not mentioned here may also be enforced by the application server. The application server keeps track of the number of licenses which each user has successfully downloaded for a given time period, and so is responsible for enforcement of all such policies and restrictions.

[**0169**] In order for users to continue to have access to the digital content they have downloaded once a given subscription period has ended, they must replace their licenses (i.e., renew) with subsequent licenses which are valid for the new subscription period. The licenses are provided by the application server response to renewal requests from the Transfer Manager. This process may be initiated automatically by the Transfer Manager as explained elsewhere in this document, or the user may manually start the process. Once the process is initiated, all content which is flagged as needing renewal will be renewed, as long as the user's account status continues to remain valid (reasons for an invalid account would include failure to pay the monthly subscription fee).

[**0170**] At any time over the course of the subscription period, the user, through a web browser interface to the application server, may indicate which content items they wish to have renewed the next time the renewal process takes place. The application server maintains a list of all digital content to which the user is or has been subscribed. Once that process occurs and the renewed licenses are downloaded, those specified items will be available for access by the user for the duration of the next subscription period. Should the user choose not to flag one or more content items for renewal, those items will only continue to be accessible until the end of the current subscription period, at which point they will cease to be accessible when their licenses expire.

[**0171**] Licenses are not readily transferable to other client computers, even if a single user owns both client computers. In order to gain access to the same digital content stored on a separate client computer, a new license must be downloaded from the application server. A user may be permitted to download digital content and its associated licenses to multiple client computers, but a system-wide maximum may limit the number of client computers to which a given user may perform such duplicate downloads. The number of systems to which a given user has downloaded licenses is maintained by the application server, based on unique identifiers which are generated and maintained via communications between the Transfer Manager and the application server.

[**0172**] Digital Content Access

[**0173**] Referring to **FIG. 40**, digital content access starts in steps **913** and **914** when the user attempts to access digital content, for example, when the user tries to play a protected music file through a supported media player, such as the Microsoft Windows Media Player. In the next step **915**, the digital content management software running on the client computer checks to see if a license exists for this content. If not, the Transfer Manager may attempt to acquire a license for this content automatically as indicated in step **916**, without requiring the user to have knowledge of or intervene in this process (i.e., "silently"). If the Transfer Manager successfully downloads a license silently then flow goes back to step **915** to the point at which the system checks to see if the license exists (i.e., was the license which was just downloaded really for the content in question?). If the Transfer Manager fails to download a license silently, then the user may be given the opportunity to choose in step **917** whether to download a new license for this content. If they choose not to download a new license, the process ends in step **918** and the user cannot access the content. If they choose to proceed with the download of a new license, then flow goes back to step **914** to the point at which the system checks to see if the license exists. If the system determines that a license for the content does exist, in step **915** flow moves to the next step **919**, at which point the system checks whether the license has expired. If the license has expired, the Transfer Manager may attempt to download a new license (i.e., "renew") for this content silently in step **916**. If

the Transfer Manager successfully downloads a license silently then flow returns to the point where the system checks to see if the license exists in step **915**. If the Transfer Manager fails to download the license silently, then the user may be given the opportunity to renew the license in step **917**. If the user chooses not to renew the license in step **917**, the process ends and the user cannot access the content. If the user chooses to renew the license in step **917**, flow returns to step **915** to the point at which the system checks to see if the license exists. If, at step **919** where it is determined whether the license is expired, it is found not to have expired, then access is granted for the content in step **920**. For example, in the case of a protected music file, the file would begin playback through the user's media player.

[**0174**] License Renewal Process

[**0175**] Referring to **FIG. 41, a** license renewal process is initiated by "Start" in step **920**. This process is initiated when the user manually chooses in step **921** to renew their digital content licenses, or automatically by the Transfer Manager at a predetermined renewal date, such as at or near the end of a subscription period (i.e., at or near when existing licenses expire as in step **922**). In either case, the Transfer Manager will notify the application server that the renewal process should initiate in step **923**. The application server will respond with a list of licenses for digital content in step **924** which should be renewed, based on which items the user has previously flagged for renewal. Starting from this list, the Transfer Manager in step **925** builds an internally maintained list of licenses to request for download. In the next step **926**, the Transfer Manager checks to see whether there are any licenses in this list. If there are, the Transfer Manager sends a request to download the license for the specific content item in step **927**. The details of the process by which the license is downloaded (or not) and stored to the client computer are specified below, in License Download Request Process. After the request to download is processed (successfully or not), the Transfer Manager deletes from its internally maintained list of licenses to request for download the license which was just requested for download in step **928**. Next, flow returns to step **926** where the Transfer Manager checks to see whether there are any more license download request remaining in the list. The process continues until this list is empty in step **929**.

[**0176**] License Download Request Process

[**0177**] Referring to **FIG. 42, a** license download request is indicated by "Start" in step **930**. This process is initiated in step **931** when the Transfer Manager issues a request to the application server to download a license for a specific digital content item. When the application server receives this request in step **932**, it determines in step **933** whether the user's account is valid (i.e., the user has paid for the current subscription period). If not, the process ends in step **934**. If so, the flow continues to the step **937**, where the application server determines whether the client computer to which the licenses are requested to be downloaded has been used for previous license downloads, or whether it is a new client computer. If it is new, then the application server checks to see whether downloading to this new system would exceed the maximum limit on the number of client computers to which any given user (i.e., user account) may download licenses. Next, in step **935**, the system checks whether the user download limit has been reached. If so, an overage fee is applied to the requested track in step **936**. If this limit has already been reached, then the process ends. Flow continues to step **938**, where the application server enforces any additional policies which might restrict the user from downloading the license in question. If such policies would, in fact, prohibit the user from being allowed to download the license, then the process ends. If not, then flow continues to step **939**, at which point the application server and Transfer Manager perform the license download and the license is stored on the client computer. After the license has been downloaded, the application server keeps track not only of which content item has been downloaded, but also which user and client computer received this download in step **940**, so that future license download requests may be restricted based on aforementioned maximum limits. The step **941** is to determine whether there are any further license download requests which need to be processed. If so, flow returns to step **931**. If not, the process ends.

[**0178**] Token-Based Authentication

[**0179**] In order to provide additional protection of the digital content data **108** in a digital content distribution and subscription system, the download address provided to a user for downloading of the digital content data **108** can include a token. This token can be, for example, a randomly generated alphanumeric string of a predetermined or random length, that is used to authenticate the download when the download request is made by a user of the digital content distribution and subscription service. In addition, the token may have a lifetime or expiration time, for example, 5 minutes, for which the token is valid. When the current token has expired, a new token is generated and provided for download requests. The dynamic and frequently changing nature of the token in the download address for digital content data **108** helps prevent unauthorized downloads of the digital content data **108** by making the download address for digital content data **108** dynamic in nature as well as valid for only a short period of time.

[**0180**] FIGS. **44-50** provide an embodiment for token-based authentication of digital content data **108** download requests in a digital content distribution and subscription system. In this particular embodiment, there are two components to the token-based authentication system. One component is token distribution, shown in FIGS. **44-47**, and the other component is token authentication, which is shown in FIGS. **48-50**.

[**0181**] The token distribution overview block diagram, illustrated in **FIG. 44**, shows the relationship and interaction between the token generator **109** and the application servers **103** and content servers **104** with respect to token distribution. The token generator **109** is responsible for generating tokens. Tokens can be, for example, randomly generated alphanumeric strings of predetermined or random length. The token generator **109** is then responsible for distributing the tokens to the application servers **103** and the content servers **104**, where the tokens are actually used, described below in connection with **FIG. 48**. If the tokens are distributed over a public network, such as the Internet, then the tokens may be encrypted using, for example, public key encryption, before being distributed. It should be noted that the token generator **109** may exist as a separate server or may run on an existing server, for example, on one of the application servers **103**.

[0182] **FIG. 45** is a token generator specific software flow diagram for token distribution is called the token generation handler. In this example, the token generation handler is a continuously running process. "Start" in step **600** represents the beginning of the token generation handler. The token generation handler generates a new token in step **601**. Next, the token generation handler encrypts the new token in step **602**, using, for example, public key encryption, in order to secure the token if the token is distributed over a public network such as the Internet. Then the token generation handler gets the locally stored list of application servers **103** and content servers **104** that need to receive the new token in step **603**. Steps **604** through **610** represent the actual distribution of the token to each server in the list of servers. In step **604**, the next server to send the token is retrieved from the list of servers. If the list is completed in step **605** and there are no more servers to send the token, then the token generation handler waits, for example, 5 minutes, in step **606** before generating and distributing a new token in step **601** again. If the list of servers is not completed in step **605** and the next server to distribute the token was retrieved in step **604**, then the token generation handler generates and sends a token update to the server in step **607**. Next, the token generation handler waits for a predetermined timeout period, for example, 2 seconds, and possibly with multiple retries for a token update acknowledge in step **608** from the server. If a token update acknowledge is not received in step **609**, then the token generation handler logs that the token update failed for the particular server in step **610**. Logging the failure allows a system administrator to quickly identify possible problems with a server or the computer network. After the token update failure is logged in step **610** or if the token update acknowledge was received in step **609**, then the token update handler gets the next server in the list of servers to distribute the token in step **604** again.

[0183] **FIG. 46** is an application server specific software flow diagram for token distribution, called the application token distribution handler. In this embodiment, the application token distribution handler is a continuously running process on the application server **103**.

[0184] "Start" in step **620** represents the beginning of the application token distribution handler. If a token update is received in step **621** from the token generator **109**, then the token, passed as part of the token update, is decrypted in step **622**, in accordance with the encryption process used by the token generator **109**. Next, the application token distribution handler saves the decrypted token in step **623** for later use by the application server **103** during download address generation, described below in connection with **FIG. 49**. Then the application token distribution handler returns a token update acknowledge in step **624** to the calling token generator **109** and checks for a token update received in step **621** again.

[0185] **FIG. 47** provides the content server specific software flow diagram for token distribution, called the content token distribution handler. In this example, the content token distribution handler is a continuously running process on the content server **104**. "Start" in step **630** represents the beginning of the content token distribution handler. If a token update is received in step **631** from the token generator **109**, then the token, passed as part of the token update, is decrypted in step **632**, in accordance with the encryption process used by the token generator **109**. Next, the content token distribution handler saves the decrypted token in step **633** for later use by the content server **104** during download address authentication, described below in connection with **FIG. 50**. Then the content token distribution handler returns a token update acknowledge in step **634** to the calling token generator **109** and checks for a token update received in step **631** again.

[0186] The token authentication overview block diagram, illustrated in **FIG. 48**, shows the relationship and interaction between the client **100** and the application servers **103** and content servers **104** with respect to token authentication. When a client **100** makes a digital content data **108** download request, described above in connection with **FIG. 18**, the application server **103** uses the currently saved token from the token generator **109**, as well as a content file name or content identifier **213** to generate the download address. The application server **103** passes this download address back to the client **100** and the client **100** then requests the digital content data **108** from the content server **104**, passing this download address. The content server **104** authenticates the download request using the token that the content server **104** extracts from the download address and compares this token with the token that the content server **104** received from the token generator **109**.

[0187] **FIG. 49** is an application server specific software flow diagram for token authentication, called the application token authentication handler. In this example, the application token authentication handler is called as part of the digital content download request, and more specifically, when the download address is generated on the application server **103** by the application download handler, described above in connection with **FIG. 21**, step **368**. The application token authentication handler thus provides the token to the application download handler, which uses the token to generate the download address that the application server **103** passes to the client **100**, described above in connection with **FIG. 18**.

[0188] "Start" in step **640** represents the beginning of the application token authentication handler on the application server **103**. The application token authentication handler encodes the token in step **641** that was saved on the application server **103** by the application token distribution handler, described above (**FIG. 46**, step **623**). The token can be encoded using, for example, the MD5 message-digest algorithm. Then the application token authentication handler returns the encoded token in step **642** to the calling application download handler and the application token authentication handler ends in step **643**.

[0189] **FIG. 50** provides the content server specific software flow diagram for token authentication, called the content token authentication handler. In this example, the content token authentication handler is called as part of the digital content download request, and more specifically, when the download address is authenticated on the content server **104** by the content download handler, described above (**FIG. 24**, step **392**). The content token authentication handler thus authenticates the encoded token for the content download handler as part of download address authentication on the content server **104** before the content server **104** allows downloading of the digital content data **108**. The encoded token is included as part of the download address passed by the client **100** to the content server **104**, described above in connection with **FIG. 18**.

[0190] "Start" in step **650** represents the beginning of the content token authentication handler on the content server **104**. The content token authentication handler encodes the token in step **651** that was saved on the content server **104** by the content token distribution handler, described above (**FIG. 47**, step **633**). This step is necessary, since the encoding process, for example, the MD5 message-digest algorithm, may not be reversible, thus requiring comparison of encoded tokens rather than the actual tokens themselves. Next the content token authentication handler compares in step **652** the encoded token generated in step **651** and the encoded token passed by the calling content download handler, extracted from the download address passed to the content server **104** by the client **100**. If the encoded tokens do not match in step **653**, then the content token authentication handler returns that the token is invalid in step **654** to the calling content download handler and the content token authentication handler ends in step **656**. If the encoded tokens do match in step **653**, then the content token authentication handler returns that the token is valid in step **655** to the calling content download handler and the content token authentication handler ends in step **656**.

[0191] Royalty Administration

[0192] Royalty administration for a digital content distribution and subscription system involves tracking licensing of digital content data **108** by users of the digital content distribution and subscription service and periodically calculating royalty payments to rights holders of the digital content data **108**. Tracking the licensing of digital content data **108** is handled during a download request when the license server **102** provides the license for the digital content data **108** to the client **100**, described above in connection with **FIG. 18**. The licensing information is used to calculate royalty payments to the rights holders of the digital content data **108**. In this way, rights holders of digital content data **108** can be properly compensated for the use of their digital content data **108**, thus providing a digital content distribution and subscription system that follows and honors existing copyrights to the digital content data **108**. The particular embodiment of a royalty administration system described here is intended specifically for a digital music subscription system.

[0193] The royalty administration overview block diagram, illustrated in **FIG. 51**, shows the relationship and interaction between the royalty administrator **125** and the application servers **103** and the license servers **102** and in particular access to the information in the digital content catalog **107**, customer data **106**, and royalty tracking **105** by the royalty administrator **125**. The royalty administrator **125** uses this information for calculating royalty payments to the rights holders of digital content data **108**. As described above in connection with **FIG. 18**, when the client **100** initiates a download request, the license server **102** provides a license to the client **100** for access to or playback of the digital content data **108**. The assignment of this license is saved in royalty tracking **105**. The royalty administrator **125** then uses the information in royalty tracking **105**, as well as customer data **106** and the digital content catalog **107**, to periodically, for example, every quarter, calculate royalty payments to rights holders of the digital content data **108** that was licensed to users of the digital content distribution and subscription service. In this way, rights holders of the digital content data **108**, for example, digital music, are properly compensated for access to or playback of their digital works. It should be noted that the royalty administrator **125** might exist as a separate computing platform or server or run on an existing server, for example, on an application server **103**.

[0194] **FIG. 52** is an exemplary block diagram of the royalty tracking and payment calculation data organization for a royalty administration system. In this particular embodiment, the royalty administration system supports royalty administration for a digital music subscription service. Contained in royalty tracking **105** are the license assignment records **700** for the digital content data **108**, and in particular for digital music. These license assignment records **700** are generated and stored in royalty tracking **105** during a download request when the license server **102** creates the access or playback license, described above in connection with **FIG. 18**. The license assignment record **700** contains various fields to support royalty calculations, with only those relevant fields being shown and discussed here. The license assignment ID **701** is a unique identifier assigned to each license assignment record **700**. The customer ID **702** identifies the customer record **710** for the customer that received the playback license. The track ID **703** identifies the track record **720** for the music track that was licensed to the customer. The assignment date **704** indicates the date the license was assigned. The expiration date **705** indicates the date the license expires. Using these dates, the time period, during which the track was cached in the given royalty period, can be calculated. Using the customer ID **702**, the royalty administrator **125** can access the customer records **710** stored in customer data **106** to access information about the customer that received the license. The customer record **710** contains territory information to support royalty calculations, with only those relevant fields being shown and discussed here. The customer ID **711** is a unique identifier assigned to each customer record **710**. The territory ID **712** identifies the territory record **770**, which indicates the region or country that the customer lives in since rights assignments for royalty calculations may vary from country to country. Using the track ID **703** and the territory ID **712**, the royalty administrator **125** can access the rights assignment records **730** stored in the digital content catalog **107** to search for rights assignments for the track and region or country specified. The rights assignment record **730** contains various fields to support royalty calculations, with only those relevant fields being shown and discussed here. The rights assignment ID **731** is a unique identifier assigned to each rights assignment record **730**. The rights holder ID **732** identifies the rights holder record **750** for the rights holder assigned to this particular rights assignment. The track ID **733** identifies the track record **720** for the track assigned to this particular rights assignment. The percentage **734** indicates what percentage of the total rights this rights assignment is given. The flat rate **735** indicates that a flat royalty rate is paid to this rights holder. Either the percentage **734** or the flat rate **735** is used in royalty calculations. The percentages and rates are applied against the revenue pool value residing in the financial system. The territory ID **736** identifies the territory record **770**, which indicates the region or country where the right assignment is valid. The assignment date **737** indicates the starting date that the rights assignment is effective. The termination date **738** indicates the date the rights assignment ended, which may be ongoing.

[0195] For music, there are two types of rights assignments. One type is publishing rights, which are the rights to the written lyrics and music. The other type is recording rights, which are rights to a particular recording of the music. The publishing rights **739** field indicates that this rights assignment is for publishing rights. The recording rights **740** field indicates that this rights assignment is for recording rights. Only one of the publishing rights **739** or recording rights **740** fields can be set for a particular rights assignment record **730**. Using the rights holder ID **732**, the royalty administrator **125** can access the rights holder records **750** stored in the digital content catalog **107** to search for the rights holder of a particular rights assignment record **730**. The rights holder record **750** contains various fields to support royalty calculations, with only those relevant fields being shown and discussed here. The rights holder ID **751** is a unique identifier assigned to each rights holder record **750**. The payment information **752** provides information on how the rights holder should be paid, for example, a bank account to credit or an address to send payment. Track records **720** are contained in the digital content catalog **107** and contain information on the digital music tracks, with only those fields relevant for supporting royalty calculations being shown and discussed here. The track ID **721** is a unique identifier assigned to each track record **720**. The title **722** indicates the title of the track. Territory records **770** are contained in one of the data storage locations, such as the digital content catalog **107**, customer data **106**, or royalty tracking **105**, and contain information about a region or country, with only those fields relevant for supporting royalty calculations being shown and discussed here. The territory ID **771** is a unique identifier assigned to each territory record **770**. The name **772** corresponds to the name of the region or country specified for the territory record **770**. It should be noted that only information in the various records discussed above that is directly relevant to royalty administration has been included and it is understood that other information may exist in these various records for other purposes.

[0196] As indicated in the royalty tracking and payment data organization block diagram in **FIG. 52**, calculation of royalty payments is a complex process. **FIG. 53** is a software flow diagram of royalty payment calculation by the royalty administrator **125**, called the payment calculation handler. In this example, the payment calculation handler may be initiated automatically on a periodic basis, for example, every quarter, or manually as part of royalty administration or auditing. "Start" in step **800** represent the beginning of the payment calculation handler. The payment calculation handler queries in step **801** the license assignment records **700** for license assignment records **700** which are valid during the desired time period for which royalty calculations are being made. If the license assignment query is not successful in step **802**, then the payment calculation handler logs the failure to calculate royalty payments in step **803** and the payment calculation handler ends in step **823**. If the license assignment query is successful in step **802**, then the payment calculation handler checks if there are license assignment records **700** remaining to calculate in step **804** from the query in step **801**. If there are no more license assignment records **700** to calculate in step **804**, then the payment calculation handler generates a payment report in step **805** and the payment calculation handler ends in step **823**. The payment report generated in step **805** can then be used for issuing the proper payments to the various rights holders. If there are more license assignment records **700** to calculate in step **804**, then the payment calculation handler gets the next license assignment record **700** to calculate in step **806**. Next, the payment calculation handler queries in step **808** the customer records **710** for the customer record **710** matching the license assignment record **700** customer ID **702** field. From the customer record **710**, the payment calculation handler attains the territory ID field and stores it for later use. If the customer query is not successful in step **809**, then the payment calculation handler logs the failure to calculate royalty payments in step **810** and the payment calculation handler ends in step **823**. If the customer query is successful in step **809**, then the payment calculation handler queries in step **811** the track history for track information. If the track history query is not successful in step **812**, then the payment calculation handler logs the failure to calculate royalty payments in step **813** and the payment calculation handler ends in step **823**. If the track history query is successful in step **812**, then the payment calculation handler queries in step **814** the rights assignment records **730** for the rights assignment record or records **730** matching the license assignment record **700** track ID **703** field and the customer record **710** territory ID **712** field stored earlier and which are valid during the desired time period for which royalty calculations are being made. If the rights assignments query is not successful in step **815**, then the payment calculation handler logs the failure to calculate royalty payments in step **816** and the payment calculation handler ends in step **823**. If the rights assignments query is successful in step **815**, then the payment calculation handler checks if there are rights assignment records **730** remaining to calculate in step **817** from the query in step **814**. If there are no more rights assignments records **730** to calculate in step **817**, then the payment calculation handler checks if there are more license assignment records **700** to calculate in step **804** again. If there are more rights assignments records **730** to calculate in step **817**, then the payment calculation handler gets the next rights assignment record **730** to calculate in step **818**. Next, the payment calculation handler queries in step **819** the rights holder records **750** for the rights holder record **750** matching the rights assignment record **730** rights holder ID **732** field. If the rights holder query is not successful in step **820**, then the payment calculation handler logs the failure to calculate royalty payments in step **821** and the payment calculation handler ends in step **823**. If the rights holder query is successful in step **820**, then the payment calculation handler calculates the payment to the rights holder for the license assignment in step **822** and checks if there are there are more rights assignment records **730** to calculate in step **817** again.

[0197] Royalty payment calculation for a particular license assignment record **700** in step **822** of **FIG. 53** to a particular rights holder specified in a rights holder record **750** involves multiple variables and conditions. In particular, the payment calculation example described below assumes that license assignments are valid only during all or part of a given month, that rights assignments are valid for full month time periods only, and that the time period for royalty calculations are made based on multiples of full month time periods only. First, a license assignment time frame is calculated using the time period marked by the license assignment record **700** assignment date **704** and expiration date **705** fields. Since the license assignments are valid

during all or part of a given month and royalty calculations are made over multiples of full month time periods, there is no risk in this example of the license assignment time frame extending outside the royalty calculation time period. Next the license assignment pro-ration is calculated by dividing the license assignment time frame by the total number of days in the subscription record **760** billing period **764** field, which is always one month in this example. The number of days in the particular month is determined from the month in which the license assignment time frame falls. If the rights assignment uses a flat rate, as indicated in the rights assignment record **730** flat rate **735** field, then the royalty payment calculation for a particular license assignment record **700** to a particular rights holder, as indicated in the rights holder record **750**, is the amount of the flat rate **735** field value times the license assignment pro-ration. If the rights assignment is not based on a flat rate, then the royalty payment calculation for a particular license assignment record **700** to a particular rights holder, as indicated in the rights holder record **750**, is the percentage **734** value times the license assignment pro-ration times a royalty payment constant, for example, $0.01 for publishing rights as indicated by the publishing rights **739** field or $0.05 for recording rights as indicated by the recording rights **740** field. The financial system provides the revenue pool from which these funds are disbursed. Since the rights assignments are valid for full month time periods, there is no risk in this example of the license assignment time frame extending outside the rights assignment time frame, as calculated by the rights assignment record **730** assignment date **737** and termination date **738** fields. It should be noted that using the given information in the various records, more complex royalty payment calculation systems with fewer or no assumptions are possible.

[**0198**] Customer Care aid Customer Logs, and History

[**0199**] Customer care **144** and customer logs and history systems **145** are related aspects of the subscription service infrastructure **130**, described previously in connection with **FIG. 4**. The customer care system **144** enables subscription service support personnel to provide technical and system support for subscribers. The customer logs and history system **145** tracks customer or subscriber access to the digital music subscription service and includes subscriber activity such as account management **135** to record subscriber plan and profile changes. The customer logs and history system **145** information can then be used as part of customer care **144** to facilitate support for subscribers. The customer logs and history system **145** also tracks subscriber secure audio downloads **139**, which are used for royalty tracking **105**.

[**0200**] The customer administration overview block diagram, illustrated in **FIG. 54**, shows the relationship and interaction between the customer administrator **126** and the application servers **103** and license servers **102** and in particular access to the information in customer data **106**, and royalty tracking **105** by the customer administrator **126**. When a customer, on a client computing platform **100**, of the digital music subscription service requires customer support from the customer administrator **126**, the customer administrator **126** is able to access, using, for example, Siebel Systems customer relationship management software, customer data **106** to correct, edit, or update customer account information, for example, to update customer address changes. The customer administrator **126** may also access royalty tracking **105** to correct, edit, or update customer download and licensing information, for example, to update customer billing errors.

[**0201**] FIGS. **55-59** provide software flow diagrams for the customer care system **144** and access to customer logs and history system **145** on the customer administrator **126**, application servers **103**, and license servers **102**.

[**0202**] **FIG. 55** is a customer administrator specific software flow diagram for a customer information request, called the customer information task. In this embodiment, the customer information task is handled within a standard web browser, for example, Microsoft Internet Explorer. The customer administrator **126** typically initiates a customer information request in order to access information on a specific customer as part of customer support. "Start" in step **830** represents the beginning of the customer information task on the customer administrator **126**. The customer information task generates and sends a customer information request in step **831** to the application server **103**. The customer information task then waits with some timeout, for example, 2 seconds, and possibly with multiple retries for a customer information request response in step **832** from the application server **103**. If a customer information request response is not received in step **833**, then the customer information task presents the customer information request failure to the customer administrator **126** in step **834** and the task ends in step **843**. If a customer information request response, which includes the customer logs and history **145**, is received in step **833** from the application server **103**, then the customer information task presents the customer information to the customer administrator **126** in step **835**. Then the customer information task waits for action from the customer administrator **126** to update or change the customer information in step **836**. If the customer administrator **126** does not request to change the customer information in step **837**, then the customer information task ends in step **843**. If the customer administrator **126** does request to change the customer information in step **837**, then the customer information task sends a customer change request, which includes the changed customer information and changed customer logs and history **145**, in step **838** to the application server **103**. The customer information task then waits with some timeout, for example, 2 seconds, and possibly with multiple retries for a customer change request response in step **839** from the application server **103**. If a customer change request response is not received in step **840**, then the customer information task presents the customer change request failure to the customer administrator **126** in step **841** and the task ends in step **843**. If a customer change request response is received in step **840** from the application server **103**, then the customer information task presents the results of the customer change request to the customer administrator **126** in step **842** and the customer information task ends in step **843**.

[**0203**] **FIG. 56** is an application server specific software flow diagram for a customer information request, which in the example described henceforth, is called the application customer information handler. In this example, the application customer information handler is a continuously running process on the application server **103**. "Start" in step **850** represents the beginning of the application customer information handler. If a customer information request is received

in step **851** from the customer administrator **126**, then the customer data **106** that was requested is retrieved in step **852**. If the customer data **106** is not valid in step **853**, then the application customer information handler returns that the customer information request is not valid in step **854** to the customer administrator **126**. The application customer information handler then checks for any customer information requests received in step **851** again. If the customer data **106** that was retrieved is valid in step **853**, then the application customer information handler generates and sends a customer license request in step **855** to the license server **102** in order to obtain license history information for a specific customer. The application customer information handler then waits with some timeout, for example, 2 seconds, and possibly with multiple retries for a customer license request response in step **856**. If a customer license request response is not received in step **857**, then the application customer information handler returns that the customer license request failed in step **858** to the customer administrator **126**. The application customer information handler then checks for any customer information requests received in step **851** again. If a customer license request response is received in step **857**, then the application customer information handler returns the customer data **106** and customer license history for the specific customer in step **859** to the customer administrator **126** and checks for any customer information requests received in step **851** again.

[**0204**] **FIG. 57** provides an application server specific software flow diagram for a customer change request, which in the example described henceforth, is called the application customer change handler. In this example, the application customer change handler is a continuously running process on the application server **103**. "Start" in step **860** represents the beginning of the application customer change handler. If a customer change request is received in step **861** from the customer administrator **126**, then the changed customer data **106** is validated and saved in step **862**. If the changed customer data **106** is not valid in step **863**, then the application customer change handler returns that the customer change request is not valid in step **864** to the customer administrator **126**. The application customer change handler then checks for any customer change requests received in step **861** again. If the changed customer data **106** is valid in step **863**, then the application customer change handler generates and sends a customer license change request in step **865** to the license server **102** in order to change license history information for a specific customer. The application customer change handler then waits with a predetermined timeout, for example, 2 seconds, and possibly with multiple retries for a customer license change request response in step **866**. If a customer license change request response is not received in step **867**, then the application customer change handler returns that the customer license change request failed in step **868** to the customer administrator **126**. The application customer change handler then checks for any customer change requests received in step **861** again. If a customer license change request response is received in step **867**, then the application customer change handler returns the customer data **106** and customer license history change results for the specific customer in step **869** to the customer administrator **126** and checks for any customer change requests received in step **861** again.

[**0205**] **FIG. 58** is a license server specific software flow diagram for a customer license information request, which in the example described henceforth, is called the license customer information handler. In this example, the license customer information handler is a continuously running process on the license server **102**. "Start" in step **870** represents the beginning of the license customer information handler. If a customer license information request is received in step **871** from an application server **103**, then the license customer information handler gets the license history information for the specific customer in step **872**. The license customer information handler then returns the license history information in step **873** to the calling application server **103** and checks for any customer license information requests received in step **871** again.

[**0206**] **FIG. 59** provides a license server specific software flow diagram for a customer license change request, which in the example described henceforth, is called the license customer change handler. In this example, the license customer change handler is a continuously running process on the license server **102**. "Start" in step **880** represents the beginning of the license customer change handler. If a customer license change request is received in step **881** from an application server **103**, then the license customer change handler saves the changed license history information for the specific customer in step **882**. The license customer change handler then returns the results of license change request in step **883** to the calling application server **103** and checks for any customer license change requests received in step **881** again.

[**0207**] Obviously, many modifications and variations of the present invention are possible in light of the above teachings. Thus, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.

[**0208**] What is claimed and desired to be covered by a Letters Patent is as follows:

We claim:

1. A digital content distribution system comprising:

a plurality of data stores implemented as databases on one or more servers, said plurality of data stores including a digital content data store for storing selectively accessible digital content, a customer data store for storing customer data and subscription data store for storing data which identifies the selectively accessible digital content;

a digital content management system implemented on said one or more servers for displaying available in said digital content data store and enabling downloading of selected digital content to a remote client computing platform in response to a request from a remote client computing platform, electronically coupled to said digital content distribution system over a network; and

a royalty administration system for tracking downloaded digital content.

2. The digital content distribution system as recited in claim 1, wherein said digital content is audio data.

3. The digital content distribution system as recited in claim 1, wherein said digital content is video data.

4. The digital content distribution system as recited in claim 1, wherein said network is a private network.

5. The digital content distribution system as recited in claim 1, wherein said network is a public network.

6. The digital content distribution system as recited in claim 5, wherein said public network is the Internet.

7. The digital content distribution system as recited in claim 1, wherein said royalty administration system is configured to calculate royalties for downloaded digital content.

8. The digital content distribution system as recited in claim 1, wherein said digital content management system is configured to download selected digital content in an encrypted format defining encrypted digital content.

9. The digital content distribution system as recited in claim 8, wherein said digital content management system is configured to generate a key that is downloaded with said selected digital content for decrypting said digital content.

10. The digital content distribution system as recited in claim 9, wherein said key is only valid for a predetermined time period.

11. The digital content distribution system as recited in claim 9, wherein a separate key is downloaded for each item of digital content selected.

12. The digital content distribution system as recited in claim 1, wherein said digital content distribution system includes a user interface for enabling connection of said remote client computing platforms to connect to said digital content distribution system with standard technology to enable remote computing platforms to communicate with said digital content management system by way of a standard web browser.

13. The digital content distribution system as recited in claim 1, wherein said digital content distribution system includes a digital content catalog data store.

14. The digital content distribution system as recited in claim 13, wherein said digital content management system includes a search and browse system which enables users to search and browse the contents of said digital content catalog data store.

15. The digital content distribution system as recited in claim 1, wherein said digital content management system including a digital rights management system for preventing access and playback of digital content under predetermined conditions.

16. The digital content distribution system as recited in claim 1, wherein said digital content management system includes a registration and login system for enabling registration and login of remote client computing platforms.

17. A process for distributing digital content, the process comprising the steps of:

(a) downloading predetermined digital content stored in one or more data stores in response to a request; and

(b) automatically tracking the downloaded digital content for purposes of royalty administration.

18. A process for distributing digital content as recited in claim 17, wherein step (a) further includes the step:

(1) encrypting the selected digital content before downloading.

19. A process for distributing digital content as recited in claim 18, wherein step (a) includes the steps:

(2) generating a key for decrypting said selected digital content; and

(3) downloading said key with said selected digital content.

20. A process for distributing digital content as recited in claim 19, wherein said key is generated to be valid for a predetermined time.

21. A process for distributing digital content as recited in claim 17, further including the steps of:

(c) registering predetermined users;

(d) downloading said digital content in response to a login request.

22. A process for distributing digital content as recited in claim 17, wherein step (a) includes downloading a predetermined number of units of digital content in response to a request.

23. A process for distributing digital content as recited in claim 22, wherein step (a) also includes downloading a predetermined number of units of digital content in a predetermined time period for a predetermined fee in response to a request.

24. A client interfacing system for interfacing a client computing platform with a digital content service provider, the system comprising:

a client computing platform, configured to be connected to a digital content service provider over a predetermined network;

a user interface for interfacing with said digital content service provider;

a transfer manager system for connecting to a digital content service provider by way of a network and storing a session identifier, received from said digital content service provider, once connection is successfully established; and

managing communication with said digital content service provides after passing said previously stored session identifier to said digital content service provider.

25. A client interfacing system for interfacing a client computing platform with a digital content service provider as recited in claim 24, wherein said network is a private network.

26. A client interfacing system for interfacing a client computing platform with a digital content service provider as recited in claim 24, wherein said network is a public network.

27. A client interfacing system for interfacing a client computing platform with a digital content service provider as recited in claim 26, wherein said public network is the Internet.

28. A client interfacing system for interfacing a client computing platform with a digital content service provider as recited in claim 24, wherein said client interfacing system further includes a registration and login system for connecting to said digital content service provider.

29. A process for enabling connection to a digital content service provider over a network, the process comprising the steps of:

(a) authenticating clients attempting to connect to said digital content service provider;

(b) passing a session identifier to a client that has been authenticated; and

(c) responding to a client request only if said client passes a valid session identifier with said request; and

(d) automatically tracking digital content downloaded to said client for royalty purposes.

30. A process for enabling connection to a digital content service provider over a network as recited in claim 29, wherein step (c) includes the step of:

(1) downloading digital content to said client.

31. A process for enabling connection to a digital content service provider over a network as recited in claim 29, wherein step (c) comprises the steps of:

(2) encrypting said digital content to be downloaded defining encrypted digital content;

(3) generating a key for decrypting said encrypted digital content; and

(4) downloading said key with said encrypted digital content.

32. A process for enabling connection to a digital content service provider over a network as recited in claim 31, wherein said step (3) further includes generating one or more keys that are valid for only a predetermined time period.

33. A process for enabling connection to a digital content service provider over a network as recited in claim 31, wherein step (3) further includes generating a separate key for each unit of digital content.

34. A process for enabling connection to a digital content service provider over a network as recited in claim 29, wherein step (b) further includes passing a session identifier that is valid for a predetermined time period.

35. A process for enabling connection to a digital content service provider over a network as recited in claim 29, wherein said step (c) includes the steps of:

(4) responding to search requests; and

(5) downloading digital content in response to downloaded requests.

36. A process for enabling connection to a digital content service provider over a network as recited in claim 29, further including the step:

(e) providing an industry standard interface for establishing sessions with said client.

37. A process for enabling connection to a digital content service provider over a network as recited in claim 35, further including the step of:

(f) storing client requests.

38. A process for enabling connection to a digital content service provider over a network as recited in claim 37, further including the step of:

(g) limiting the number of downloaded requests to a predetermined number in a predetermined time period.

39. A digital content management system for use with a digital content distribution and subscription system which includes stored digital content available for download on request, the digital content management system comprising:

a digital content download request system for passing user requests for stored digital content to said digital content distribution system;

an allocation system for allocating a cache for receiving downloaded digital data from said digital content distribution and subscription system; and

a management system for checking the availability of open cache slots in response to requests for stored digital content from said digital content from said digital content distribution and subscription system.

40. The digital content management system as recited in claim 39, wherein said allocation system is configured to provide a predetermined number of cache slots in order to restrict the amount of digital content downloaded by a user.

41. The digital content management system as recited in claim 39, wherein said allocation system is configured to provide a predetermined number of cache slots in order to restrict the amount of digital content downloaded by a user over a predetermined time period.

42. The digital content management system as recited in claim 39, wherein system management system is configured to check the availability of empty cache slots.

43. A token-based system for use with a digital content distribution and subscription service which includes stored digital content available for download on request, the token based authentication system comprising:

a digital content download request system for passing user requests for digital content defining requested digital content to said digital content distribution and subscription system;

a digital content download system for downloading the requested digital content;

a token generator for generating one or more tokens; and

a token distribution system for distributing one or more tokens for authenticating the requested digital content.

44. A token-based system as recited in claim 43, wherein said token distribution system distributes one or more tokens to one or more content servers used to store said digital content.

45. A token-based system as recited in claim 44, wherein said token distribution system returns a token with the download address of said requested digital content.

46. A token-based system as recited in claim 45, further including a token authentication system for comparing said tokens distributed to said one or more servers with said tokens returned with said download address and enabling download of said tokens match.

47. The token-based authentication system as recited in claim 43, wherein said tokens are alphanumeric strings.

48. The token-based authentication system as recited in claim 43, wherein said alphanumeric strings are randomly generated.

49. The token-based authentication system as recited in claim 46, wherein said alphanumeric string has a predetermined length.

50. The token-based authentication system as recited in claim 46, wherein said alphanumeric string has a random length.

51. The token-based authentication system as recited in claim 43, wherein said tokens are configured with a predetermined expiration time.

52. The token-based authentication system as recited in claim 43, further including a system for encrypting said tokens.

53. The token-based authentication system as recited in claim 43, further including a system for decrypting said tokens.

54. A method for preventing unauthorized access to stored digital content, the method comprising the steps of:

(a) generating one or more tokens when requests for stored digital content are received said tokens requiring

authentication before said requested stored digital content can be played back; and

(b) passing said one or more tokens along with digital data representing said requested digital content to the user that requested said stored digital content.

55. The method as recited in claim 54 further including the step of:

(c) passing said one or more tokens to one or more servers where said requested stored digital content is stored.

56. The method as recited in claim 54, wherein step (b) comprises passing a download address of said requested digital content.

57. The method as recited in claim 56, wherein step (b) comprises passing said requested digital content.

58. A method for authenticating digital content by user comprising the steps of:

(a) requesting stored digital content;

(b) receiving one or more first tokens in response to said request;

(c) receiving digital data representative of requested said stored digital content; and

(d) authenticating said one or more tokens to enable playback of said stored digital content.

59. The method as recited in claim 58, further including the step of receiving one or more second tokens with said digital data representative of said requested stored digital content.

60. The method as recited in claim 59, wherein said step (d) comprises comparing said one or more first tokens with said one or more second tokens and enabling said digital data representative of said requested stored digital content when said one or more first tokens match said one or more second tokens.

61. A royalty administration system for use with a digital content distribution and subscription system which includes stored digital content available for download on request, the royalty administration system comprising:

a download request system for receiving user requests for stored digital content;

a system for downloading the requested digital content in response to said requests; and

a tracking system for automatically tracking said downloaded digital content for royalty calculation purposes.

62. The royalty administration as recited in claim 61, wherein said tracking system includes one or more databases including a royalty tracking database.

63. The royalty administration as recited in claim 62, wherein further including a license platform for generating license assignment records.

64. The royalty administration as recited in claim 63, wherein said license assignment records include a predetermined number of data fields.

65. The royalty administration as recited in claim 64, wherein said predetermined data fields include one or more customer fields.

66. The royalty administration as recited in claim 64, wherein said predetermined data fields include one or more license assignments.

67. The royalty administration as recited in claim 64, wherein said predetermined data fields include one or more tracks.

68. The royalty administration as recited in claim **84**, wherein said predetermined data fields include one or more subscription plans.

69. The royalty administration as recited in claim 64, wherein said predetermined data fields include one or more rights holders.

70. The royalty administration as recited in claim 64, wherein said predetermined data fields include one or more territories.

71. The royalty administration as recited in claim 64, wherein the tracking system is configured to automatically calculate a predetermined royalty-based on the data in said one or more data fields.

72. The royalty administration as recited in claim 71, wherein said royalty includes royalties for publishing rights in said digital content.

73. The royalty administration as recited in claim 71, wherein said predetermined royalty is calculated for a predetermined time period.

74. The royalty administration as recited in claim 71, wherein said predetermined royalty is calculated for a predetermined time period.

75. The royalty administration as recited in claim 74, wherein said predetermined time period is one month.

76. The royalty administration as recited in claim 63, wherein said license platform is a server.

77. A method for calculating royalty payments for a digital content distribution and subscription system, the method comprising the steps of:

(a) generating a license assignment record when digital content is downloaded to a user;

said license assignment record including one or more data fields; and

reading said one or more data fields to calculate said royalties.

78. The method for calculating royalty payments for a digital content distribution and subscription system recited in claim 17 further including the step of:

(b) accessing stored information regarding the digital content and the user to populate said data fields.

79. The method for calculating royalty payments for a digital content distribution and subscription system recited in claim 78, wherein step (b) includes the step of calculating publishing rights royalties.

80. The method for calculating royalty payments for a digital content distribution and subscription system recited in claim 78, wherein step (b) includes the step of calculating recording rights.

81. The method as recited in claim 39, wherein the system is configured to limit the number of personal computers that can access the digital content in a predetermined time period.

82. The method as recited in claim 42, wherein the system is configured to calculate an overage fee when no cache slots are available after a download request.

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