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(54) METHOD AND SYSTEM FOR POPULATING A CONTENT REPOSITORY FOR AN INTERNET RADIO SERVICE BASED ON A RECOMMENDATION NETWORK

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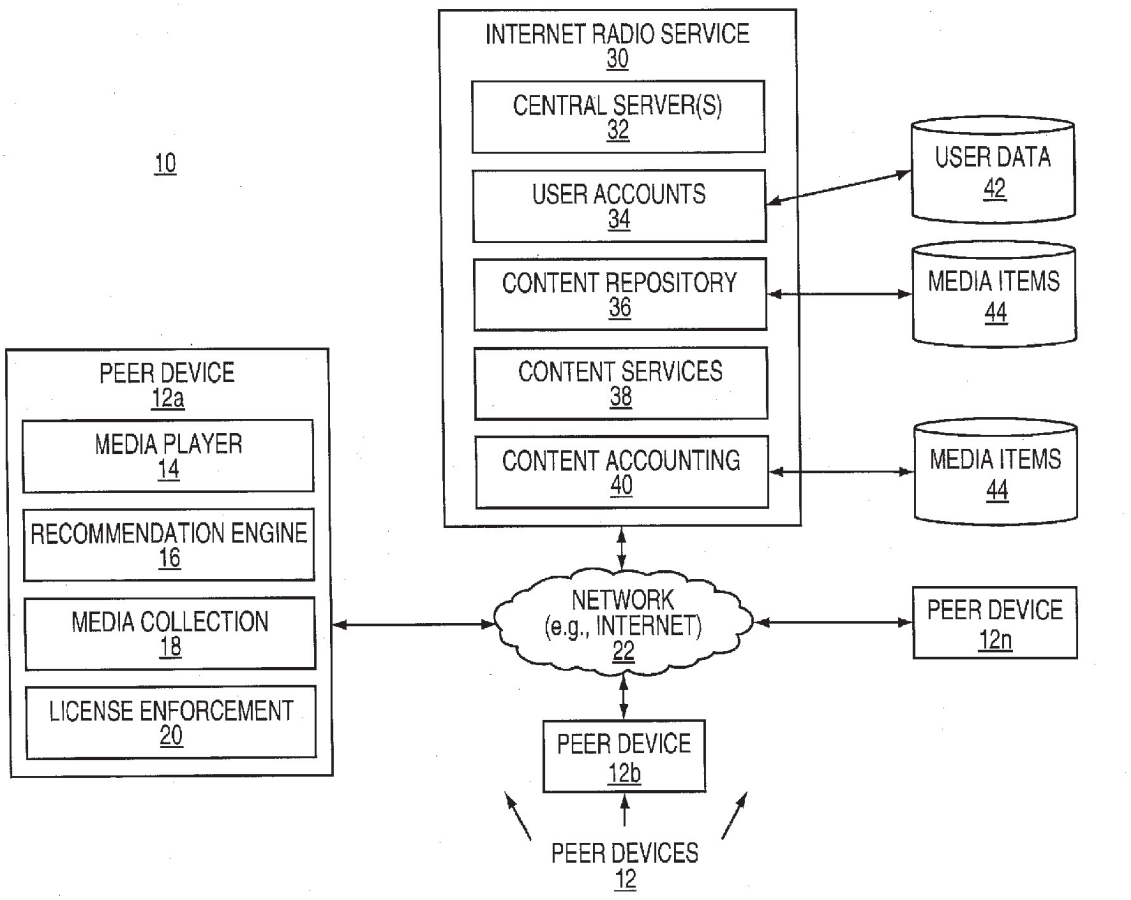
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(57) **ABSTRACT**

A computer-implemented method, system and computer readable medium storing software are provided for operating a media service based on a media recommendation network comprising a plurality of devices. Aspects of the method and system include receiving a recommendation of a media item from one of the plurality of devices for a media item that is intended for a recipient; determining if the media item is present in the content repository; requesting, in response to determining that the media item is not present in the content repository, upload of the media item; and storing, in response to the media item being uploaded, the media item in the content repository.



Wildseed Mobile EX2016
Google v. Wildseed Mobile
IPR2023-00246

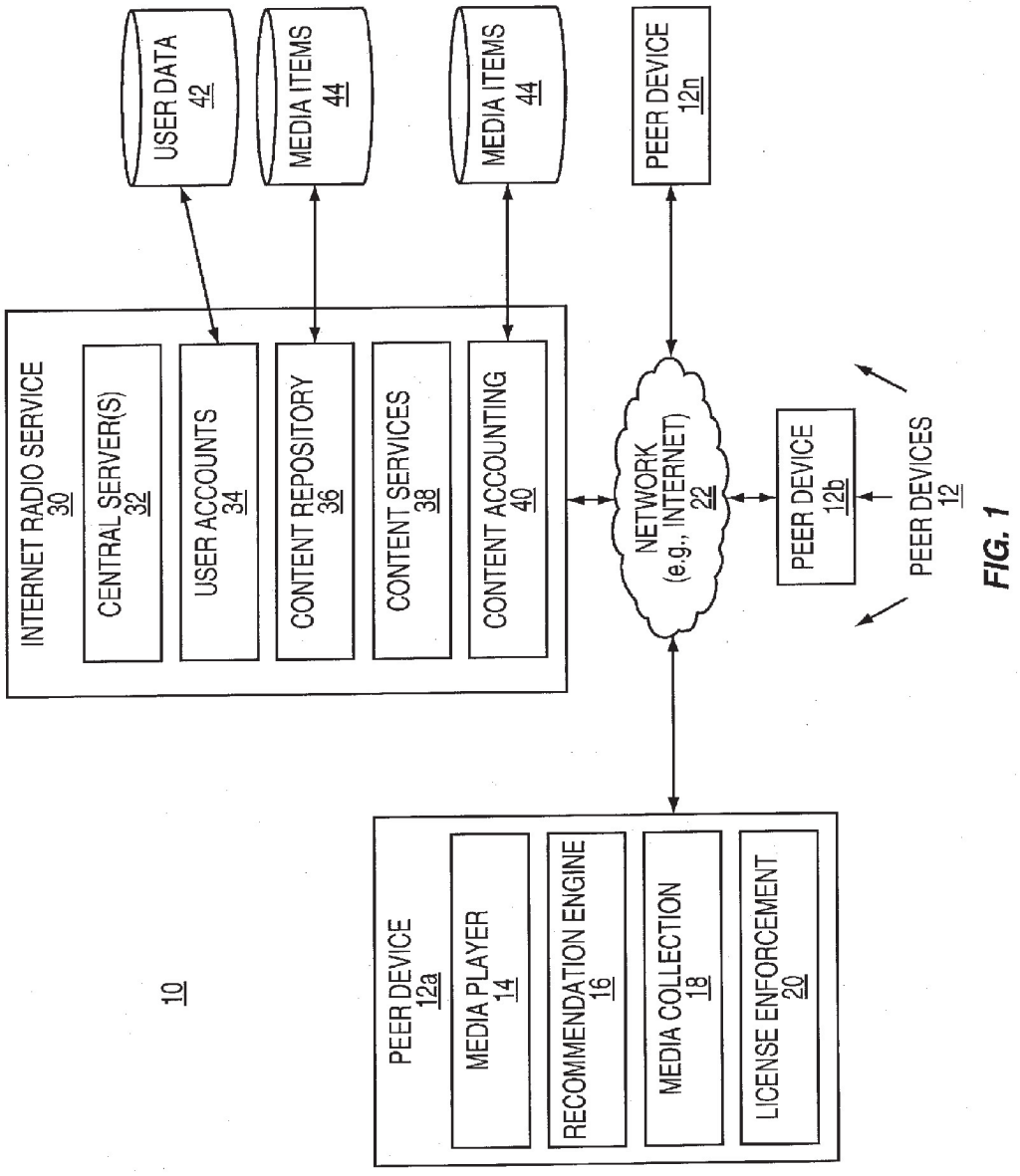

10
PEER DEVICE 12a
MEDIA PLAYER 14
RECOMMENDATION ENGINE 16
MEDIA COLLECTION 18
LICENSE ENFORCEMENT 20
NETWORK (e.g., INTERNET) 22
INTERNET RADIO SERVICE 30
CENTRAL SERVER(S) 32
USER ACCOUNTS 34
CONTENT REPOSITORY 36
CONTENT SERVICES 38
CONTENT ACCOUNTING 40
USER DATA 42
MEDIA ITEMS 44
MEDIA ITEMS 44
PEER DEVICE 12n
PEER DEVICE 12b
PEER DEVICES 12

FIG. 1

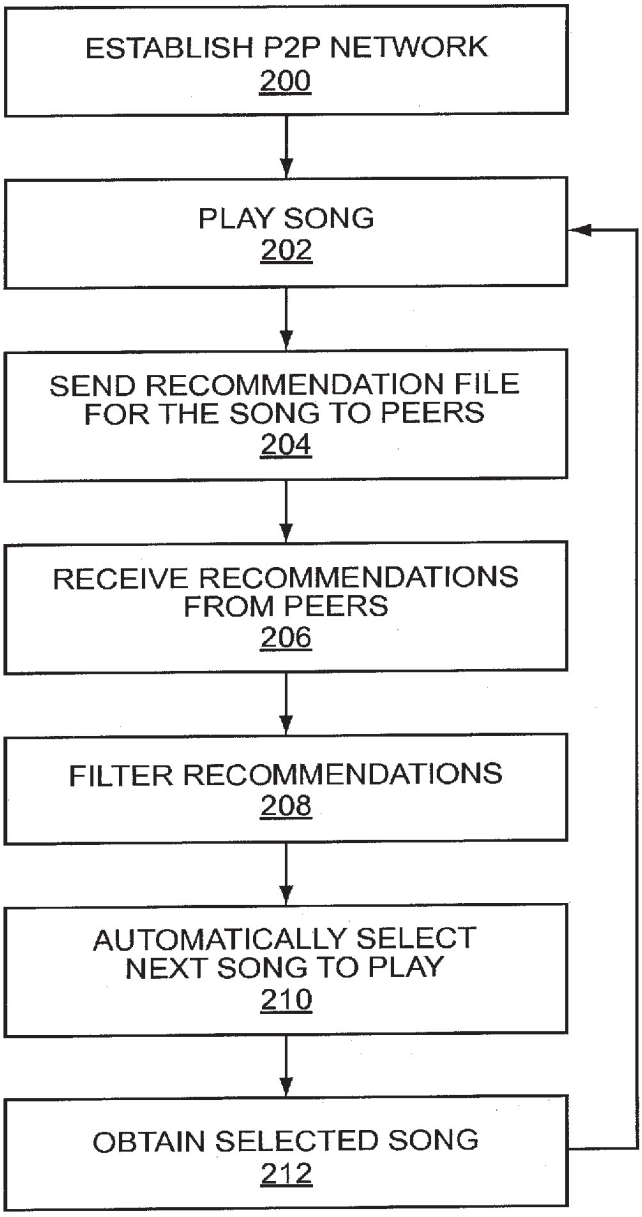

ESTABLISH P2P NETWORK
200
PLAY SONG
202
SEND RECOMMENDATION FILE FOR THE SONG TO PEERS
204
RECEIVE RECOMMENDATIONS FROM PEERS
206
FILTER RECOMMENDATIONS
208
AUTOMATICALLY SELECT NEXT SONG TO PLAY
210
OBTAIN SELECTED SONG
212

FIG. 2

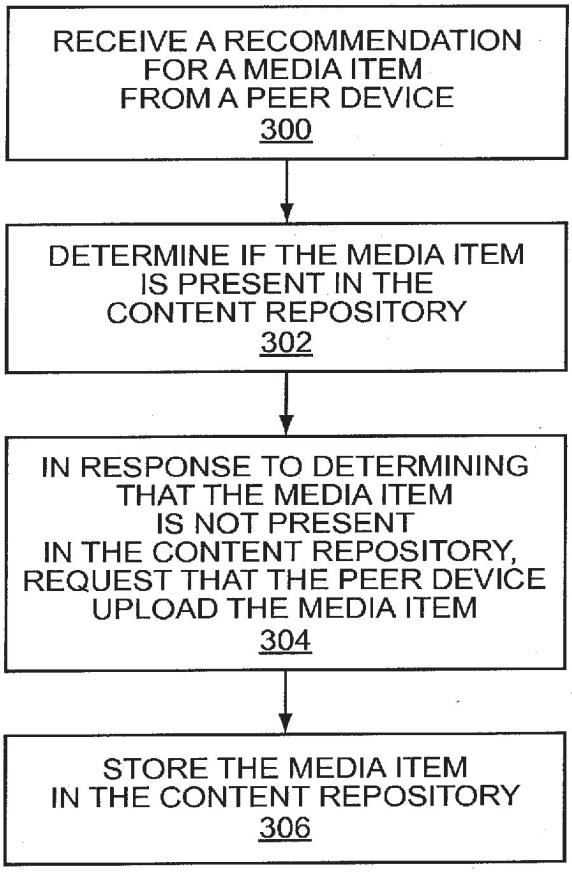

RECEIVE A RECOMMENDATION FOR A MEDIA ITEM FROM A PEER DEVICE
300
DETERMINE IF THE MEDIA ITEM IS PRESENT IN THE CONTENT REPOSITORY
302
IN RESPONSE TO DETERMINING THAT THE MEDIA ITEM IS NOT PRESENT IN THE CONTENT REPOSITORY, REQUEST THAT THE PEER DEVICE UPLOAD THE MEDIA ITEM
304
STORE THE MEDIA ITEM IN THE CONTENT REPOSITORY
306

FIG. 3

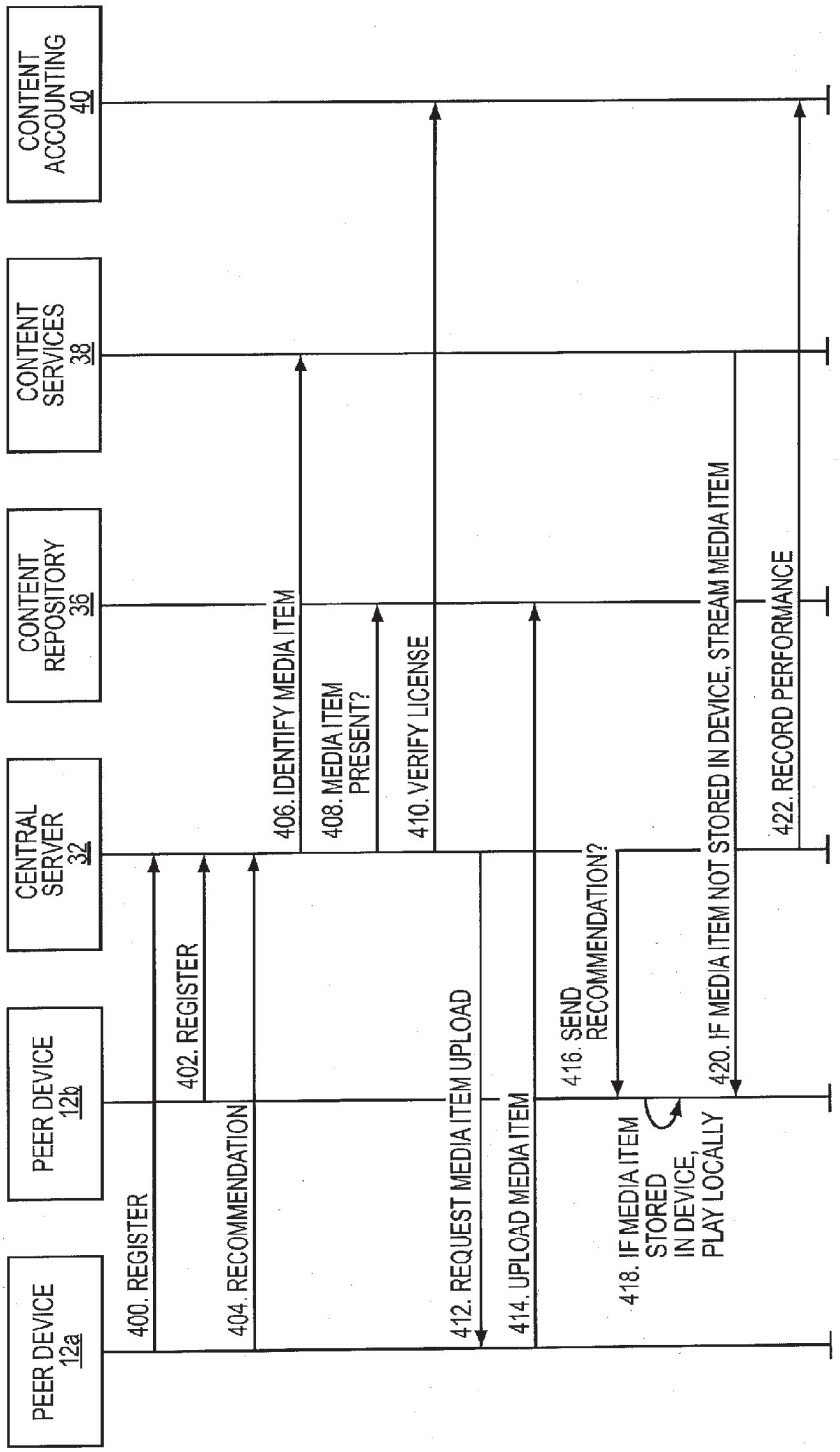

PEER DEVICE 12a
PEER DEVICE 12b
CENTRAL SERVER 32
CONTENT REPOSITORY 36
CONTENT SERVICES 38
CONTENT ACCOUNTING 40
400. REGISTER
402. REGISTER
404. RECOMMENDATION
406. IDENTIFY MEDIA ITEM
408. MEDIA ITEM PRESENT?
410. VERIFY LICENSE
412. REQUEST MEDIA ITEM UPLOAD
414. UPLOAD MEDIA ITEM
416. SEND RECOMMENDATION?
418. IF MEDIA ITEM STORED IN DEVICE, PLAY LOCALLY
420. IF MEDIA ITEM NOT STORED IN DEVICE, STREAM MEDIA ITEM
422. RECORD PERFORMANCE

FIG. 4

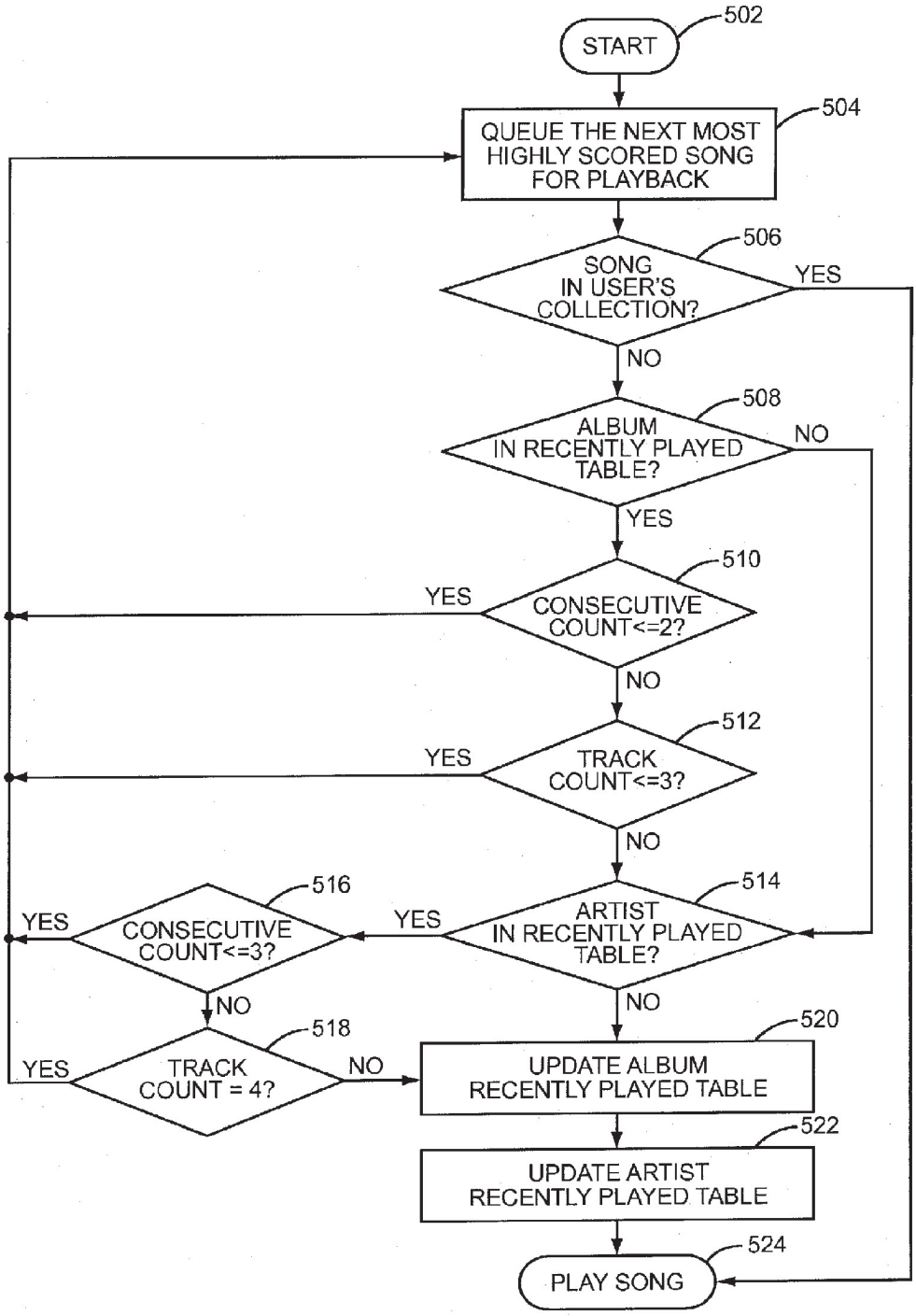

502
START
504
QUEUE THE NEXT MOST HIGHLY SCORED SONG FOR PLAYBACK
506
SONG IN USER'S COLLECTION?
YES
NO
508
ALBUM IN RECENTLY PLAYED TABLE?
NO
YES
510
CONSECUTIVE COUNT<=2?
YES
NO
512
TRACK COUNT<=3?
YES
NO
514
ARTIST IN RECENTLY PLAYED TABLE?
YES
516
CONSECUTIVE COUNT<=3?
YES
NO
518
TRACK COUNT = 4?
YES
NO
520
UPDATE ALBUM RECENTLY PLAYED TABLE
522
UPDATE ARTIST RECENTLY PLAYED TABLE
524
PLAY SONG

FIG. 5

User	Title	Artist	Album	Genre	Decade	Location	Score	Playback
Hugh	Sweet Emotion	Aerosmith	Toys in the Attic	Rock	1970's	Remote	95	1
Hugh	Walk This Way	Aerosmith	Toys in the Attic	Rock	1970's	Remote	95	2
Hugh	Round and Round	Aerosmith	Toys in the Attic	Rock	1970's	Remote	95	4
Hugh	No More No More	Aerosmith	Toys in the Attic	Rock	1970's	Remote	95	33
Waymen	So What	Miles Davis	Kind of Blue	Jazz	1960's	Remote	94	3
Gary	Dance in My Sleep	Dave Adams	Dancing in My Sleep	Alternative	1980's	Remote	92	5
Waymen	Come Away With Me	Norah Jones	Come Away With Me	Jazz	2000's	Remote	88	6
Mike	Walk the Line	Johnny Cash	Walk the Line	Country	1970's	Remote	86	7
Gene	Consider Me Gone	Sting	Dream of the Blue Turtles	Rock	1980's	Remote	85	8
Gene	Fortress Around Your Heart	Sting	Dream of the Blue Turtles	Rock	1980's	Remote	85	9
Gene	In the Moonlight	Sting	Sabrina	Rock	1990's	Remote	82	10
Gene	Windmills of My Mind	Sting	The Thomas Crown Affair	Rock	1990's	Remote	82	34
Gene	All for Love	Sting	Three Musketeers	Rock	1990's	Remote	82	35
Hugh	Say Hey	The Tubes	Love Bomb	Alternative	1980's	Local	86	11
Hugh	Dreamers Disease	New Radicals	Maybe You've Been Brainwashed Too	Alternative	1980's	Remote	83	12
Hugh	Tenderness	General Public	All the Rage	New Wave	1980's	Local	83	13
Hugh	Running With the Devil	Van Halen	Van Halen	Rock	1970's	Local	82	14
Gene	Rebel Yell	Billy Idol	Rebel Yell	Punk	1980's	Remote	81	15
Gene	Beautiful Day	U2	All That You Can't Leave Behind	Rock	1980's	Local	79	16
... assume another 16 songs played in 80 minutes with scores ranging between 78 and 61...								
Mike	Still Lovin' You	Scorpions	Bad for Good	Metal	1980's	Remote	60	36
Gene	True	Spandau Ballet	True	Dance	1980's	Remote	60	37
Gary	Heart of the Night	Poco	Alive in the Heart of the Night	Rock	1970's	Remote	58	38
Gary	Round About	Yes	Fragile	Rock	1970's	Remote	57	39
Gene	Allison	Elivs Costello	My Aim is True	Alternative	1980's	Remote	53	40
Gary	Run to the Hills	Iron Maden	The Number of the Beast	Metal	1970's	Local	49	41
Mike	Veronica	Elivs Costello	Veronica	Rock	1980's	Remote	37	42
Waymen	Something More	Sugarland	Twice the Speed of Life	Country	2000's	Remote	25	43

FIG. 6

METHOD AND SYSTEM FOR POPULATING A CONTENT REPOSITORY FOR AN INTERNET RADIO SERVICE BASED ON A RECOMMENDATION NETWORK

RELATED APPLICATIONS

[0001] This application is a continuation of U.S. patent application Ser. No. 11/961,105 (now U.S. Pat. No. _____), titled "METHOD AND SYSTEM FOR POPULATING A CONTENT REPOSITORY FOR AN INTERNET RADIO SERVICE BASED ON A RECOMMENDATION NETWORK" filed on Dec. 20, 2007, the entire disclosure of which is here incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] Internet radio is a broadcasting service transmitted via the Internet. Many internet radio stations are completely independent from traditional ("terrestrial") radio stations, and broadcast only on the Internet, which is usually referred to as streaming.

[0003] Examples of conventional Internet radio services include Pandora and YAHOO Launchcast Radio. Pandora is an Internet radio service that takes a seed song entered by a user and creates a customized radio station. The user can influence, but not control, the station by rating the songs that are suggested. The service operates under the compulsory license for Internet radio.

[0004] Yahoo! LAUNCHcast Radio is a streaming music service that allows users to create their own customized radio station tailored to their tastes. Users can rate artists and albums highly to hear them often and ban the ones they dislike. Users can also listen to a collection of more than 130 pre-programmed radio stations created by YAHOO! editorial staff. YAHOO! also offers a Music LAUNCHcast plugin for Yahoo! Instant Messenger (text messaging service). This plugin lets a user's buddies see what the user is currently listening to via LAUNCHcast Radio. The plugin also allows the user's friends to tune into the radio station so that they can listen to the music as well.

[0005] Thus, conventional Internet radio services may provide approaches for creating customized radio stations for a particular user that is based on input from that user (e.g., Pandora), or that influenced by a friend of the user (e.g., Yahoo!), but conventional Internet radio services fail to consider peer group influences. For example, the music that a particular teenager listens to may be highly influenced by the music listened to by a group of the teenager's peers, such as his or her friends.

[0006] In addition, the costs of starting and operating an Internet radio service can be significant. One significant cost is the cost to build and maintain the content repository of songs the Internet radio service intends to play. Typically, the content repository is populated by buying or otherwise licensing the rights to all the songs the station intends to offer, which could number in the millions. One problem with this is that many of the songs in the content repository may never be played, with much of the costs directed to incorporating new songs and/or one-of-a-kind songs that may turn out to have very limited audiences.

[0007] Another component of the costs to maintain the Internet radio service includes the royalties payable to performers of recorded works broadcast on the internet, which continue to increase. The rates currently include a minimum fee of $500 (U.S.) per year, per channel, with escalating fees for each song played. Since the inception of rates in 1998, webcasters have been charged on a per performance basis. For 2006 the applicable fee would be $0.0008 per performance. A performance is defined as streaming one song to one listener. A webcaster with 10,000 listeners would therefore pay 10,000 times the going rate for every streamed song. The fee increases in increments each year, which amounts to $0.0019 per song by 2010. If enforced, this decision could undermine the business models of many Internet radio stations, which had previously relied on the rate of $0.000768 per song that had been unchanged from 1998-2005.

[0008] Accordingly, a need exists for an improved method and system for populating the content repository of a media service, such as an Internet radio service, and for playback of the content.

BRIEF SUMMARY OF THE INVENTION

[0009] The exemplary embodiment provides a computer-implemented method and system for populating the content repository of a media service based on real-time media recommendation network comprising a plurality of peer devices. Aspects of the exemplary embodiment include receiving by a server a recommendation from one of the plurality of peer devices for a media item that is intended for a recipient; determining if the media item is present in the content repository; in response to determining that the media item is not present in the content repository, requesting that the peer device upload the media item; and in response to the media item being uploaded, storing the media item in the content repository.

[0010] According to the method and systems disclosed herein, the Internet radio service obtains media items and populates the content repository from the users of peer devices, thereby only requiring the media service to pay for costs associated with purchasing rights to the media items the members of the media service wish to hear. In addition, when a media item is requested to be played, the Internet radio service determines if the media item is stored on the peer device and if so, has the media item played locally on the peer device, eliminating the need to stream the media item and to pay the associated royalties for the media item that the recipient has already legally obtained.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[0011] FIG. **1** illustrates a system for populating a content repository of a media service based on a real-time media recommendation network according to one embodiment.

[0012] FIG. **2** is a flow diagram illustrating the operation of the peer devices of FIG. **1** according to one embodiment.

[0013] FIG. **3** is flow diagram illustrating a process for populating the content repository of the Internet radio service based on the real-time media recommendation network according to one embodiment of the present invention.

[0014] FIG. **4** is a flow diagram illustrating operation of the system for populating the content repository with media items based on recommendations received in the P2P network in further detail.

[0015] FIG. **5** is a diagram illustrating a process for determining media item playback within a peer device with respect to compulsory license restrictions for Internet radio in accordance with a further aspect of the exemplary embodiment.

[0016] FIG. **6** is a block diagram showing an example recommendation queue having an order of playback based on recommendations, user preferences and a license enforcement algorithm.

DETAILED DESCRIPTION OF THE INVENTION

[0017] The present invention relates to methods and systems for populating the content repository of a media service based on a real-time media recommendation network. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the embodiments and the generic principles and features described herein will be readily apparent to those skilled in the art. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles and features described herein.

[0018] The present invention is mainly described in terms of particular systems provided in particular implementations. However, one of ordinary skill in the art will readily recognize that this method and system will operate effectively in other implementations. For example, the systems, devices, and networks usable with the present invention can take a number of different forms. The present invention will also be described in the context of particular methods having certain blocks. However, the method and system operate effectively for other methods having different and/or additional blocks not inconsistent with the present invention.

[0019] FIG. **1** illustrates a system **10** for populating a content repository of a media service based on a real-time media recommendation network according to one embodiment. In general, the system **10** includes a number of peer devices **12***a*, **12***b*, and **12***n* (collectively referred to as peer devices **12**) that are capable of presenting or playing media items **44** and communicating with a media service, such as, but not limited to, Internet radio service **30**, via a network **22**, such as, but not limited to, the Internet. Note that while the exemplary embodiments may discuss media items **44** in terms of being songs, e.g., mp3s, for clarity and ease of discussion, the term media items **44** is equally applicable to other types of media, such as digital images, slideshows, and video presentations, for example. Exemplary video presentations are movies, television programs, music videos, and the like.

[0020] In this embodiment, the peer devices **12** form a peer-to-peer (P2P) network via the network **22**. In one embodiment, the peer devices **12** may form a P2P network through direct communication with one another, while in another embodiment, the peer devices **12** may form a P2P network via the Internet radio service **30**. The peer devices **12** may be any device having a connection to the network **22** and audio playback capabilities. For example, the peer devices **12** may be personal computers, laptop computers, mobile telephones, portable audio players, PDAs, or the like having either a wired or wireless connection to the network **22**.

[0021] Each of the peer devices **12** may include a media player **14**, a recommendation engine **16**, a media collection **18** and a license enforcement algorithm **20**. In general, the media player **14** operates to play media items, e.g., songs, from the media collection **18**. The media collection **18** includes any number of media items stored in one or more digital storage units such as, for example, one or more hard-drives, FLASH memories, memory cards, internal Random-Access Memory (RAM), external digital storage devices, or the like. The recommendation engine **16** provides recommendations identifying media items to the other peer devices **12**. The media player **14** and the recommendation engine **16** may be implemented in software, hardware, or a combination of hardware and software. The recommendation engine **16** may alternatively be incorporated into the media player **14**.

[0022] In operation, each time a song is played by the media player **14**, the recommendation engine **16** operates to provide a recommendation identifying the media item to the other peer devices **12***b*, **12***n* via the P2P network. The recommendation does not include the media item. In one embodiment, the recommendation may be a recommendation file including information identifying the media item. In addition, as discussed below in detail, the recommendation engine **16** operates to programmatically, or automatically, select a next media item to be played by the media player **14** based on the recommendations received from the other peer devices **12***b*, **12***n* identifying media items recently played by the other peer devices **12***b*, **12***n* and user preferences associated with the user of the peer device **12***a*.

[0023] In accordance with a further embodiment of the exemplary embodiment, the license enforcement algorithm **20** allows the media player **14** to play the highest recommended media items, while maintaining compliance with compulsory licenses for Internet radio, as explained further below.

[0024] The Internet radio service **30** may include one or more central servers **32** (collectively referred to as central server **32**) connected to the network **22**. The central server **32** may host a user accounts module **34**, a content repository **36**, a content services module **38**, and a content accounting module **40**. The user accounts module **34** may maintain information regarding members of the Internet radio service **30** in the form of user data **42**. The members of the Internet radio service **30** preferably correspond to the users of the peer devices **12**.

[0025] According to the exemplary embodiment, the content repository **36** is populated one media item **44** at a time (e.g., one song or track) as each user recommends media items **44** that are new to the Internet radio service **30**. The content repository **36** may maintain information identifying each newly added media item **44**. Rather than populating the content repository **36** with a large amount of media items for which rights have been purchased but that may never be requested or played, which can be expensive for a large library of media items **44**, the exemplary embodiment populates the content repository **36** only with media items **44** uploaded from users of the peer devices **12** as the users make recommendations to one another through the Internet radio service **30**. Since the Internet radio service **30** need only obtain rights for the recommended media items **44** that have been uploaded, the Internet radio service **30** may realize a significant cost savings in populating the content repository **36**.

[0026] The content services module **38** is responsible for identifying new media items **44**, and in the case of songs, streaming songs to end points, and generating previews from full length songs. The content accounting module **40** may be used to control licensing elements (e.g., royalty payments for broadcast music), including information about licensed media items **46** and labels with which the Internet radio service **30** has licensing arrangements and the licensing rules containing the parameters for controlling adherence to various licensing schemes. The licensed media items **46** represent

a list of media items for which rights have been obtained and are therefore a subset of the uploaded media items **44**. Also, the licensed media items **46** may be implemented as a table of GUIDs, rather than actual files.

[0027] FIG. **2** is a flow diagram illustrating operation of the peer devices of FIG. **1** according to one embodiment. In this example, the media item **44** is described as being a song. First, the peer devices **12** cooperate to establish a P2P network (block **200**). The P2P network may be initiated using, for example, an electronic or verbal invitation. Invitations may be desirable when the user wishes to establish the P2P network with a particular group of other users, such as his or her friends. Note that this may be beneficial when the user desires that the music he or she listens to be influenced only by the songs listened to by, for example, the user's friends. Invitations may also be desirable when the number of peer devices **12** within a local wireless coverage area of the peer device **12** is large. As another example, the peer device **12** may maintain a "buddy list" identifying friends of the user of the peer device **12**, where the peer device **12** may automatically establish a P2P network with the peer devices **12** of the users identified by the "buddy list" when the peer devices are within a local wireless coverage area of the peer device **12**.

[0028] Alternatively, the peer device **12***a* may establish an ad-hoc P2P network with the other peer devices **12***b*, **12***n* by detecting the other peer devices **12***b*, **12***n* within the local wireless coverage area of the peer device **12***a* and automatically establishing the P2P network with at least a subset of the detected peer devices **12***b*, **12***n*. In order to control the number of peer devices within the ad-hoc P2P network, the peer device **12***a* may compare user profiles of the users of the other peer devices **12***b*, **12***n* with a user profile of the user of the peer device **12***a* and determine whether to permit the other peer devices **12***b*, **12***n* to enter the P2P network based on the similarities of the user profiles.

[0029] At some point after the P2P network is established, the peer device **12** plays a song (block **202**). Initially, before any recommendations have been received from the other peer devices **12***b*, **12***n*, the song may be a song from the media collection **18** selected by the user of the peer device **12***a*. Prior to, during, or after playback of the song, the recommendation engine **16** sends a recommendation identifying the song to the other peer devices **12***b*, **12***n* (block **204**). In one embodiment, the recommendation is sent directly from the peer device **12***a* to one or more of the other peer devices **12***b*, **12***n*. In another embodiment, the recommendation is first sent from the peer device **12***a* to the central server **32**, which then forwards the recommendation to the intended recipients of the other peer devices **12***b*, **12***n*. In one embodiment, the user of the peer device **12***a* may select which other members of the P2P network to send the recommendation to by selecting names or IDs from a friend or buddy list.

[0030] The recommendation may include, but is not limited to, an identifier of the recipient(s) and information identifying the song. Information identifying the song may include a Globally Unique Identifier (GUID) for the song, a title of the song, or the like; a Uniform Resource Locator (URL) enabling other peer devices to obtain the song such as a URL enabling download or streaming of the song from the Internet radio service **30** or a URL enabling purchase and download of the song from an e-commerce service; a URL enabling download or streaming of a preview of the song from the Internet radio service **30** or a similar e-commerce service; metadata describing the song such as 103 tags including, for example, genre, the title of the song, the artist of the song, the album on which the song can be found, the date of release of the song or album, the lyrics, and the like.

[0031] The recommendation may also include a list of recommenders including information identifying each user having previously recommended the song and a timestamp for each recommendation. For example, if the song was originally played at the peer device **12***b* and then played at the peer device **12***n* in response to a recommendation from the peer device **12***b*, the list of recommenders may include information identifying the user of the peer device **12***b* or the peer device **12***b* and a timestamp identifying a time at which the song was played or recommended by the peer device **12***b*, and information identifying the user of the peer device **12***n* or the peer device **12***n* and a timestamp identifying a time at which the song was played or recommended by the peer device **12***n*. Likewise, if the peer device **12***a* then selects the song for playback, information identifying the user of the peer device **12***a* or the peer device **12***a* and a corresponding timestamp may be appended to the list of recommenders.

[0032] The peer device **12***a*, and more specifically the recommendation engine **16**, also receives recommendations from the other peer devices **12***b*, **12***n* (block **206**). The recommendations from the other peer devices **12***b*, **12***n* identify songs played by the other peer devices **12***b*, **12***n*. Optionally, the recommendation engine **16** may filter the recommendations from the other peer devices **12***b*, **12***n* based on, for example, user, genre, artist, title, album, lyrics, date of release, or the like (block **208**).

[0033] The recommendation engine **16** then automatically selects a next song to play from the songs identified by the recommendations received from the other peer devices **12***b*, **12***n*, optionally songs identified by previously received recommendations, and one or more songs from the media collection **18** based on user preferences (block **210**). In another embodiment, the recommendation engine **16** may consider all previously received recommendations, where the recommendations may expire after a predetermined or user defined period of time, or may consider only those songs identified by recommendations received since a previous song selection. This may be beneficial when the peer device **12** has limited processing and memory capabilities.

[0034] As discussed below, the user preferences used to select the next song to play may include a weight or priority assigned to each of a number of categories such as user, genre, decade of release, and location/availability. Generally, location identifies whether songs are stored locally in the media collection **18**; available via the Internet radio service **30**; available for download, and optionally purchase, from an e-commerce service or one of the other peer devices **12***b*, **12***n*; or are not currently available where the user may search for the songs if desired. The user preferences may be stored locally at the peer device **12** or obtained from a central server via the network **22**. If the peer device **12** is a portable device, the user preferences may be configured on an associated user system, such as a personal computer, and transferred to the peer device **12** during a synchronization process. The user preferences may alternatively be automatically provided or suggested by the recommendation engine **16** based on a play history of the peer device **12**. In the exemplary embodiment, the songs identified by the recommendations from the other peer devices **12***b*, **12***n* and the songs from the media collection

18 may be scored or ranked based on the user preferences. Then, based on the scores, the recommendation engine **16** selects the next song to play.

[0035] A process for scoring the recommended songs based on the user preferences is described in co-pending application Ser. No. 11/484,130 entitled "P2P Network for Providing Real Time Media Recommendations", filed on Jul. 11, 2006, which is incorporated herein by reference in its entirety.

[0036] Once the next song to play is selected, the peer device **12** obtains the selected song (block **212**). If the selected song is part of the media collection **18**, the peer device **12***a* obtains the selected song from the media collection **18**. If the selected song is not part of the media collection **18**, the selected song may be obtained from the Internet radio service **30** via streaming, or obtained from an e-commerce service or from one of the other peer devices **12***b*, **12***n*. For example, the recommendation for the song may include a URL providing a link to a source from which the song may be obtained, and the peer device **12** may obtain the selected song from the source identified in the recommendation for the song. Once obtained, the selected song is played and the process repeats (blocks **202-212**).

[0037] FIG. **3** is flow diagram illustrating a process for populating the content repository of the Internet radio service based on a real-time media recommendation network according to one embodiment of the present invention. The process begins by the central server **32** receiving a recommendation from a peer device **12** for a media item **44** that is intended for a recipient (block **300**). The central server **32** determines if the media item **44** is present in the content repository **36** (block **302**).

[0038] In response to determining that the media item **44** is not present in the content repository **36**, the central server **32** requests that the peer device **12** upload the media item **44** (block **304**). In response to the media item **44** being uploaded, the media item **44** is stored in the content repository **36** (block **306**). According to the method and systems disclosed herein, the Internet radio service **30** obtains media items **44** and populates the content repository **36** from the users of peer devices **12** thereby significantly reducing the upfront costs associated with purchasing rights to the media items **44**.

[0039] In a further aspect of the exemplary embodiment, the Internet radio service **30** may then play the media item **44** locally on the recipient's peer device if the media item **44** is stored locally on the recipient's peer device **12***b*, which should further reduce any royalty payments owed by the Internet radio service **30**.

[0040] As described above, the process for sending the recommendations between the peer devices **12** and the central server **32** may be implemented in different embodiments. In one embodiment of the P2P network, the peer device **12***a* may send recommendations to the central server **32** for forwarding to the other peer devices **12***b*, **12***n*, and the central server **32** may perform block **302** in response to receiving recommendations from the peer device **12***a*. In another embodiment of the P2P network, however, the peer devices **12** can send recommendations directly to one another, bypassing the central server **32**. In this case, after a receiving peer device **12***b* receives one of the recommendations from a sending peer device **12***a*, and either before or after the receiving peer device **12***b* plays the media item **44**, the receiving peer device **12***b* can forward the received recommendation to the central server **32**. The central server **32** may then perform block **302** in response to receiving the forwarded recommendation.

[0041] FIG. **4** is a flow diagram illustrating operation of the system **10** for populating the content repository with media items based on recommendations received in the P2P network in further detail. In this embodiment, the process begins with the peer devices **12***a* and **12***b* registering with a central server **32** (blocks **400** and **402**). Registration may include the users of the peer devices **12***a* and **12***b* establishing accounts and becoming members of the Internet radio service **30** and uploading information identifying their respective peer devices **12***a* and **12***b*.

[0042] The user of peer device **12***a* may then send a recommendation for a media item **44** to a user of peer device **12***b*, i.e., the recipient, via the central server **32** (block **404**). If the sending peer device **12***a* is able to determine the GUID of the media item **44** to identify the media item **44**, the peer device **12***a* would send the GUID of the media item **44** in the recommendation, and the central server **32** could use the GUID to query the content repository **36** to search for the media item **44**.

[0043] If the peer device **12** is unable to determine the GUID of the media item **44**, then the peer device **12***a* could generate an acoustic fingerprint for the media item **44**, and send the acoustic fingerprint in the recommendation. In this case, in response to receiving the recommendation, the central server **32** may request the content services module **38** to identify the media item **44** referred to in the recommendation by sending the acoustic fingerprint to a metadata service to retrieve metadata identifying the media item **44** (block **406**). Examples of the metadata identifying the media item **44** may include the GUID. An example of a commercially available metadata service is GRACENOTE.

[0044] The central server **32** then determines if the media item **44** referred to in the recommendation is present in the content repository **36** (block **408**) by querying the content repository **36** with metadata identifying the media item **44**.

[0045] Using the metadata identifying the media item **44**, the central server **32** may request the content accounting module **40** to perform license verification on the media item **44** (block **410**). This is accomplished by submitting the metadata identifying the media item **44** (e.g., the GUID) to a licensing clearinghouse, such as SOUNDEXCHANGE, which uses the metadata to query a licensing or copyright database to determine if an entity has rights to play a queried media item **44**. The licensing clearinghouse may return a value indicating whether the Internet radio service **30** has the requisite license to stream the media item **44** based on a compulsory license for Internet radio (described below). If the value is negative, then the Internet radio service **30** may discard the recommendation and notify the user of peer device **12***a* that sent the recommendation that the recommendation was rejected. Alternatively, the Internet radio service **30** may complete the transaction but take note of the license verification failure, and once the rights holders are correctly identified, pay the appropriate license at that time.

[0046] If the media item **44** is not present in the content repository **36** and/or if the media item **44** could not be identified in block **406**, then the central server **32** may send a request to the peer device **12***a* to upload the media item **44** (block **412**). The media item **44** is then uploaded from the peer device **12***a* to the content repository **36** (block **414**). In one embodiment, the media item **44** may be first received by the central server **32** and then stored in the content repository **36**.

In another embodiment, the request sent to the peer device **12***a* may include a URL of the content repository **36** for direct upload and storage.

[0047] In one embodiment (not shown), if the media item **44** fails either the identification or the license verification, then the media item **44** may be moved into a separate holding area for manual intervention, and the user of peer device **12***a* that sent the recommendation can be notified of the recommendation failure. However, such an unfulfilled recommendation can be fulfilled at a later date if and when the identification and/or license verification issue is/are resolved.

[0048] In response to the media item **44** being uploaded, the central server **32** may forward the recommendation to the recipient's peer device **12***b*, including the metadata identifying the media item **44**, such as the GUID (block **416**). In one embodiment (not shown), the central server **32** may also send a query asking whether the media item **44** is stored locally on the peer device **12***b*.

[0049] If the media item **44** is stored locally on the peer device **12***b*, then the media item **44** is played locally on the peer device **12***b* (block **418**). Playing the media item **44** locally on the peer device **12***b* has the advantage of saving the Internet radio service **30** money. Since the Internet radio service **30** is not streaming the media item **44**, play of the media item **44** should not factor into any Compulsory License for Internet Radio royalty calculations, and the Internet radio service **30** should not owe any royalty payments to any licensing clearinghouse. Playing the media item **44** locally and not streaming the media item **44** has an additional advantage of saving bandwidth costs and potentially providing an improved user experience depending on the speed and type of Internet connection used.

[0050] If the media item **44** is not stored locally on the peer device **12***b*, then the Internet radio service **30** streams the media item **44** to the recipient's peer device **12***b* via the content services module **38** (block **420**). Note, that if the media item **44** could not be identified in block **406**, then block **420** could include streaming a preview (e.g., a short clip) of the media item **44** to the recipient's peer device **12***b* and letting the recipient confirm whether the entire media item **44** should be streamed.

[0051] Finally, the Internet radio service **30** records performance of the streaming for royalty payment purposes (block **422**). That is, the compulsory Internet radio broadcast license is followed and royalty payments are made to corresponding copyright holders. Internet radio stations have to contend with two types of royalties when they broadcast music. They must pay a royalty to the composer of the music ("composer royalty"). They must also pay royalties to the performers of the music ("performer royalty"). An example of the difference would be the Internet streaming of the song "I'm a Believer" by Smash Mouth from the movie Shrek. Neil Diamond is the actual composer of the song, and so he is entitled to a composer royalty for the broadcast. But Smash Mouth is the performer, and so they are entitled to a performer royalty for the broadcast.

[0052] The performer royalty came about through two major laws, namely the Digital Performance in Sound Recordings Act of 1995 and the Digital Millennium Copyright Act of 1998. The performer royalty (less administration fees) is split 50% for the record labels, 45% for the featured artists, and 5% for non-featured artists. The performer royalty is a result of the compulsory license for Internet radio, as discussed below.

[0053] Composer royalties are paid to the traditional performing rights organizations: American Society of Composers, Authors, and Publishers (ASCAP), Broadcast Music Incorporated (BMI), and Society of European Stage Authors & Composers (SESAC).

[0054] The royalty schemes for each organization differ slightly, and they depend on whether or not the site is providing interactive services or non-interactive services (i.e. whether or not the user can control the music they are playing back). But they generally involve taking the largest fee of the following calculations: (1) a specified rate times the revenue generated by the website, either through user subscriptions or ad support, (2) a specified rate times the amount of internet radio streaming as measured by aggregate tuning hours (ATH), or (3) a minimum fee.

[0055] For example, an ATH of 2 represents either streaming for 2 hours to 1 user or streaming 1 hour for 2 users. As an example of the rate calculation, for ASCAP, the royalty for non-interactive services is based on the largest of either 0.0185 times the site revenue, 0.0006 times the ATH of the site, or a minimum fee of $288.

[0056] Performer royalties are paid to SOUNDEXCHANGE. Rates for this royalty are set by the Copyright Royalty Board. The current rates set for the years 2006-2010 are as follows. For commercial webcasters, there is a minimum annual fee of $500 per channel payable in advance against the royalties shown in Table 1 on a per play per listener rate:

TABLE 1

Year	2006	2007	2008	2009	2010
Rate	0.08	0.11	0.14	0.18	0.19

[0057] For non-commercial webcasters, there is an annual fee of $500 per channel, up to a total of 159,140 aggregate tuning hours ("ATH") per month. After this, the per-play rate for commercial webcasters applies.

[0058] In order to make it easier for Internet radio broadcasters to initiate their business without first obtaining explicit broadcasting rights from all artists and copyright holders, a Compulsory License for Internet Radio was established. If a webcaster adheres to strict regulations, then they are covered by the compulsory license and do not need to obtain explicit copyright permissions for their broadcasts.

[0059] The requirements for the compulsory license include the following: 1) The webcaster must register with the Copyright Office. 2) The webcaster must comply with performance restrictions. 3) The webcaster cannot provide an interactive service where the listener dictates the content of the stream. 3) The webcaster must identify the song title, album of origin, and featured artist at the time the song is played. 4) The webcaster cannot broadcast more than 3 selections from any one album in any 3 hour period and no more than 2 selections can be played consecutively. 4) The webcaster cannot broadcast more than 4 selections from the same featured artist from any album in any 3 hour period and no more than 3 selections can be played consecutively. 5) The webcaster cannot publish an advance program schedule which identifies when a specific song, album, or artist will be played. And 6) the webcaster must pay all applicable royalties to a clearinghouse, presently, SOUNDEXCHANGE.

[0060] In order for the Internet radio service **30** to be compliant with the Compulsory License for Internet Radio, then

the user of the peer devices **12** will lose the ability to choose which song to play in their queue of recommended items, as this would be an interactive service. Thus, the users of the peer devices **12** will be restricted to only playing the highest scored media item **44** according to their preferences.

[0061] According to a further aspect of the exemplary embodiment, however, the license enforcement algorithm **20** (FIG. **1**) will allow the users of the peer devices **12** to change their preferences and thus rearrange the queue, but before the highest scored media item **44** is played, the license enforcement algorithm **20** will check for compliance with compulsory license restrictions for Internet radio (within the peer device **12**) in accordance with the process shown in FIG. **5**, discussed below.

[0062] The restrictions set forth by the Compulsory License for Internet Radio currently apply to any given 3 hour window. As such, it is necessary for the peer device **12** to track specific information about songs from the same album that are streamed to the corresponding peer device **12**. By tracking this information, the peer device **12** is able to enforce compliance with the compulsory license, but make sure that the user of the peer device **12** is eligible to stream the media items most desired as soon as it is eligible.

[0063] In one embodiment, the license enforcement algorithm **20** may utilize tables to track the song and album information streamed to the peer device **12**. For example, the tables may include an Album Recently Played Table and an Artist Recently Played Table. The Album Recently Played Table, for example, may include the following fields:

1. Album Entered Time—the first time when a song from an album is streamed to the corresponding peer device.
2. Last Song Played Time—the time when the most recent song from the album has been streamed.
3. Consecutive Time—the time when the last consecutive song from the same album has been streamed.
4. Track Count—a count of songs from the same album that have been streamed.
5. Consecutive Count—a count of songs from the same album that have been streamed consecutively.

[0064] FIG. **5** is a diagram illustrating a process for determining media item playback within a peer device **12** with respect to compulsory license restrictions for Internet radio in accordance with a further aspect of the exemplary embodiment. In response to the process being initiated (block **502**), the next most highly scored media item **44** is queued for playback (block **504**). The license enforcement algorithm **20** determines if the media item **44** is in the media collection **18** (block **506**). The license enforcement algorithm **20** then determines if the album that the media item **44** belongs to is in the recently played table (block **508**). If yes, then the license enforcement algorithm **20** determines if the consecutive count for the artist less than or equal to two (block **510**). If not, then the license enforcement algorithm **20** determines if the track count less than or equal to three (block **512**).

[0065] If either the consecutive count for the artist is greater than two (blocks **510**) or the track count is greater than three (block **512**), then the compulsory license restriction is exceeded and the process proceeds to queuing the next most highly scored media item (block **504**).

[0066] If the track count is less than or equal to three (block **512**) or the album is not in the recently played table (block **508**), then the license enforcement algorithm **20** determines if the artist is in the recently played table (block **514**). If the artist is in the recently played table, then the license enforcement algorithm **20** determines if the consecutive count for the artist is less than or equal to three (block **516**). If not, then the license enforcement algorithm **20** determines if the track count less than or equal to four (block **518**).

[0067] If either the consecutive count for the artist is greater than two (blocks **516**) or the track count is greater than four (block **518**), then the compulsory license restriction is exceeded and the process proceeds to queuing the next most highly scored media item (block **504**).

[0068] If the artist is not in the recently played table (block **514**) or if the track count is greater than four (block **518**), then the license enforcement algorithm **20** updates the Album Recently Played Table (block **520**). The license enforcement algorithm **20** also updates the Artist Recently Played Table (block **522**). After the Artist Recently Played Table has been updated (block **522**) or if the media item **44** is determined to be already in the user's collection (block **506**), then the media player **14** plays media item **44** on the peer device **12**. Notice that in the case where the media item **44** is in the user's collection **44** and played locally, there is no need to track the album and artist information since nothing is being streamed from the Internet radio service **30**.

[0069] As an example of the overall system **10**, consider a user of the Internet radio service **30** who is just logged in for a new session and has the recommendation queue on his peer device **12** shown in FIG. **6**. FIG. **6** is a block diagram showing an example recommendation queue having an order of playback based on recommendations, user preferences and the license enforcement algorithm **20**.

[0070] The columns shown in white in the recommendation queue reflect what may be visible to the user in the graphical user interface (GUI) of the peer device **12**. A shaded playback column is added to show how the order of the playback of the items in the queue would be affected by the compulsory license for Internet radio. As shown in the example, the most highly scored song in the user's queue is the song "Sweet Emotion" by Aerosmith from the "Toys in the Attic" album. Note that this is a "remote" selection for the user, meaning that the user does not contain a local copy of this song and will need to have it streamed from the content repository **36** under the compulsory license.

[0071] Since this is a new session for the user, the license enforcement algorithm **20** determines that there are no restrictions yet as to which songs can be played, so, the song is played. The album is added to a Album Recently Played Table on the peer device **12** that is used to ensure compliance with the regulations for the compulsory license for Internet radio, as shown in Table 2.

TABLE 2

Album Entered Time	Song Played Time	Consecutive Time	Album	Track Count	Consecutive Count
1:02:16 p.m.	1:02:16 p.m.	0:00:00	Toys in the Attic	1	1

[0072] The next most highly scored song in the user's queue is another song by Aerosmith ("Walk this Way") from the same album. Again, no restrictions apply yet from the compulsory license and so the song is played. Note that the Album Recently Played Table is updated as shown in Table 3. Since the second song from the same album has been streamed consecutively, the Consecutive Time is entered and

the Consecutive Count is incremented. The Last Song Played Time is updated as well, as the Track Count.

TABLE 3

Album Entered Time	Song Played Time	Consec-utive Time	Album	Track Count	Consec-utive Count
1:02:16 p.m.	1:07:23 p.m.	1:07:23 p.m.	Toys in the Attic	2	2

[0073] As shown in FIG. **6**, the next most highly scored song in the user's queue is another song by Aerosmith ("Round and Round") from the same album. Since the compulsory license disallows more than 2 consecutive tracks from the same album in any given 3 hour window, the user is forced to play the next most highly scored song in their queue. Unfortunately, this too is an Aerosmith song from the same album ("No More No More"). Therefore, the license enforcement algorithm **20** skips the song "No More No More" and plays the next most highly scored song, which is "So What" by Miles Davis. Since this too is a remote track and must be streamed, this will break up the consecutive streaming of Aerosmith songs from the same album. After "So What" is streamed, the Album Recent Played Table is updated as shown in Table 4. Note that the table has been updated to show the addition of the "Kind of Blue" album.

TABLE 4

Album Entered Time	Song Played Time	Consec-utive Time	Album	Track Count	Consec-utive Count
1:02:16 p.m.	1:07:23 p.m.	1:07:23 p.m.	Toys in the Attic	2	1
1:12:43 p.m.	1:12:43 p.m.	0:00:0	Kind of blue	1	1

[0074] Note also that since the user has streamed a track from a different album, the Consecutive Count for the "Toys in the Attic" album has been decremented. But the Consecutive Time for this album still contains a value. Together, these two pieces of information indicate that a pair of songs has been streamed consecutively from this album in the 3 hour window, but that they have not been streamed most recently, and so the user can continue to stream songs from this album until the track count restriction is encountered. Continuing with the example, the next most highly scored song in the user's queue is still the Aerosmith song ("Round and Round"). Since a song from a different album has been streamed, the user is able to stream this song. After playing this song, the Last Song Played Time is updated in the table (see Table 5) as well as the Track Count.

TABLE 5

Album Entered Time	Song Played Time	Consec-utive Time	Album	Track Count	Consec-utive Count
1:02:16 p.m.	1:18:23 p.m.	1:07:23 p.m.	Toys in the Attic	3	1
1:12:43 p.m.	1:12:43 p.m.	0:00:0	Kind of blue	1	1

[0075] The next most highly scored song in the user's queue is the Aerosmith song ("No More No More"). However, since the user has now streamed 3 tracks from the same album in a given 3 hour period, the user will have to wait until the 3 hour window has expired before returning to this song in the queue. As the user approaches the end of the first 3 hours of their listening session, the times in the Album Recently Played Table are shuffled out so that the restrictions on songs from "Toys in the Attic" are gradually eliminated and the album is eventually removed from the Album Recently Played Table.

[0076] A method and system for populating a content repository of a media service based on a real-time media recommendation network has been disclosed. The present invention has been described in accordance with the embodiments shown, and one of ordinary skill in the art will readily recognize that there could be variations to the embodiments that would be within the spirit and scope of the present invention. For example, the present invention can be implemented using hardware, software, a computer readable medium containing program instructions, or a combination thereof. Software written according to the present invention is to be either stored in some form of computer-readable medium such as memory or CD-ROM, or is to be transmitted over a network, and is to be executed by a processor. Consequently, a computer-readable medium is intended to include a computer readable signal, which may be, for example, transmitted over a network. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.

We claim:

1. A computer-implemented method for operating a media service based on a media recommendation network comprising a plurality of devices, comprising:

receiving a recommendation of a media item from one of the plurality of devices for a media item that is intended for a recipient;

determining if the media item is present in the content repository;

requesting, in response to determining that the media item is not present in the content repository, upload of the media item; and

storing, in response to the media item being uploaded, the media item in the content repository.

2. The computer-implemented method of claim **1** further comprising:

receiving a request to stream the media item to a second device if the second device determines that the media item is not stored locally on the second device; and

streaming the media item to the second device.

3. The computer-implemented method of claim **2** further comprising recording performance of the streaming for royalty payment purposes.

4. The computer-implemented method of claim **1** further comprising forwarding the recommendation to a second device.

5. The computer-implemented method of claim **1** further wherein the received recommendation includes a GUID of the media item and an acoustic fingerprint of the media item.

6. The computer-implemented method of claim **5** further comprising sending the acoustic fingerprint to a metadata service to retrieve metadata identifying the media item.

7. The computer-implemented method of claim **6** further comprising if the media item fails the identification, then

moving the media item into a separate holding area for subsequent identification, and notifying the device that sent the recommendation of an identification failure.

8. The computer-implemented method of claim **6** further comprising if the media item fails the identification, then receiving a confirmation from a second device indicating that the media item should be streamed and streaming the media item to the second device.

9. The computer-implemented method of claim **1** further comprising using metadata identifying the media item to perform license verification on the media item.

10. The computer-implemented method of claim **9** further comprising if the media item fails the license verification, then moving the media item into a separate holding area for subsequent license verification, and notifying the device that sent the recommendation of a license verification failure.

11. A non-transitory computer readable medium storing software for instructing a controller of a computing device to:

receive a recommendation of a media item from one of the plurality of devices for a media item that is intended for a recipient;

determine if the media item is present in the content repository;

request, in response to determining that the media item is not present in the content repository, upload of the media item; and

store, in response to the media item being uploaded, the media item in the content repository.

12. The non-transitory computer readable medium of claim **11** storing software for further instructing the controller of the computing device to:

receive a request to stream the media item to the second device if the second device determines that the media item is not stored locally on the second device; and

stream the media item to the second device.

13. The non-transitory computer readable medium of claim **12** storing software for further instructing the controller of the computing device to record performance of the streaming for royalty payment purposes.

14. The non-transitory computer readable medium of claim **11** storing software for further instructing the controller of the computing device to forward the recommendation to the second device.

15. The non-transitory computer readable medium of claim **11** wherein the received recommendation includes a GUID of the media item and an acoustic fingerprint of the media item.

16. The non-transitory computer readable medium of claim **15** storing software for further instructing the controller of the computing device to send the acoustic fingerprint to a metadata service to retrieve metadata identifying the media item.

17. The non-transitory computer readable medium of claim **16** storing software for further instructing the controller of the computing device to:

if the media item fails the identification, then move the media item into a separate holding area for subsequent identification, and notify the device that sent the recommendation of an identification failure.

18. The non-transitory computer readable medium of claim **16** storing software for further instructing the controller of the computing device to:

if the media item fails the identification, then receive a confirmation from the second device indicating that the media item should be streamed; and

stream the media item to the second device.

19. The non-transitory computer readable medium of claim **11** storing software for further instructing the controller of the computing device to:

use metadata identifying the media item to perform license verification on the media item.

20. The non-transitory computer readable medium of claim **19** storing software for further instructing the controller of the computing device to:

if the media item fails the license verification, then move the media item into a separate holding area for subsequent license verification; and

notify the device that sent the recommendation of a license verification failure.

21. A computer-implemented method for operating a media service based on a media recommendation network comprising a plurality of devices, comprising:

receiving, on a first device, a recommendation of a media item based on the playing of the media item on at least one of a plurality of other devices;

determining the media item is stored on the first device;

playing the media item on the first device;

receiving, on the first device, a recommendation of a second media item based on the playing of the second media item on at least one of the plurality of other devices;

determining the second media item is not stored on the first device; and

sending, in response to determining that the second media item is not stored locally, a request to a media server to stream the media item to the first device from the media server.

22. The computer-implemented method of claim **21** further comprising recording performance of the streaming for royalty payment purposes.

23. A non-transitory computer readable medium storing software for instructing a controller of a computing device to:

receive, on a first device, a recommendation of a media item based on the playing of the media item on at least one of a plurality of other devices;

determine the media item is stored on the first device;

play the media item on the first device;

receive, on the first device, a recommendation of a second media item based on the playing of the second media item on at least one of the plurality of other devices;

determine the second media item is not stored on the first device; and

send, in response to determining that the second media item is not stored locally, a request to a media server to stream the media item to the first device from the media server.

24. A device comprising:

a communication interface communicatively coupling the device to a media server; and

a control system associated with the communication interface and adapted to:

receive a recommendation of a media item based on the playing of the media item on at least one of a plurality of other devices;

determine the media item is stored on the first device;

play the media item on the first device;

receive, on the first device, a recommendation of a second media item based on the playing of the second media item on at least one of the plurality of other devices;

determine the second media item is not stored on the first device; and

send, in response to determining that the second media item is not stored locally, a request to a media server to stream the media item to the first device from the media server.

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