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(54) **SYSTEM FOR PROVIDING POLICY BASED CONTENT SERVICE IN A MOBILE NETWORK**

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H04W 8/24	(2009.01)
G06F 17/30	(2006.01)
H04L 29/06	(2006.01)

(52) **U.S. Cl.**
CPC *H04W 8/24* (2013.01); *G06F 17/30905* (2013.01); *H04L 67/42* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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(57) **ABSTRACT**

A policy based content delivery system is provided. The system includes a mobile device configured to select and receive content and a content source configured to provide content selected by the mobile device to a content server. The content source is further configured to modify content selected by the mobile device prior to the content server providing the selected content to the mobile device. A content server is configured to discover content at a content source and provide a list of detected content to the mobile device for selection. The content server is further configured to instruct the content source to provide the content in accordance with a policy. The content server includes a policy enforcement engine configured to implement a policy.

3 Claims, 5 Drawing Sheets
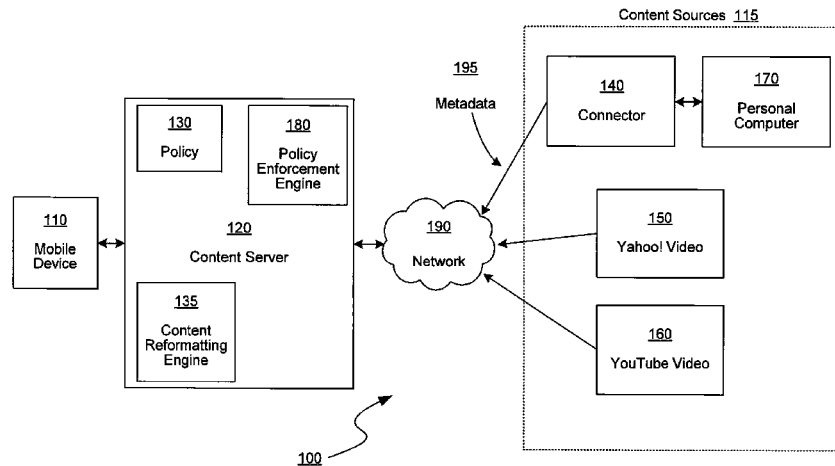
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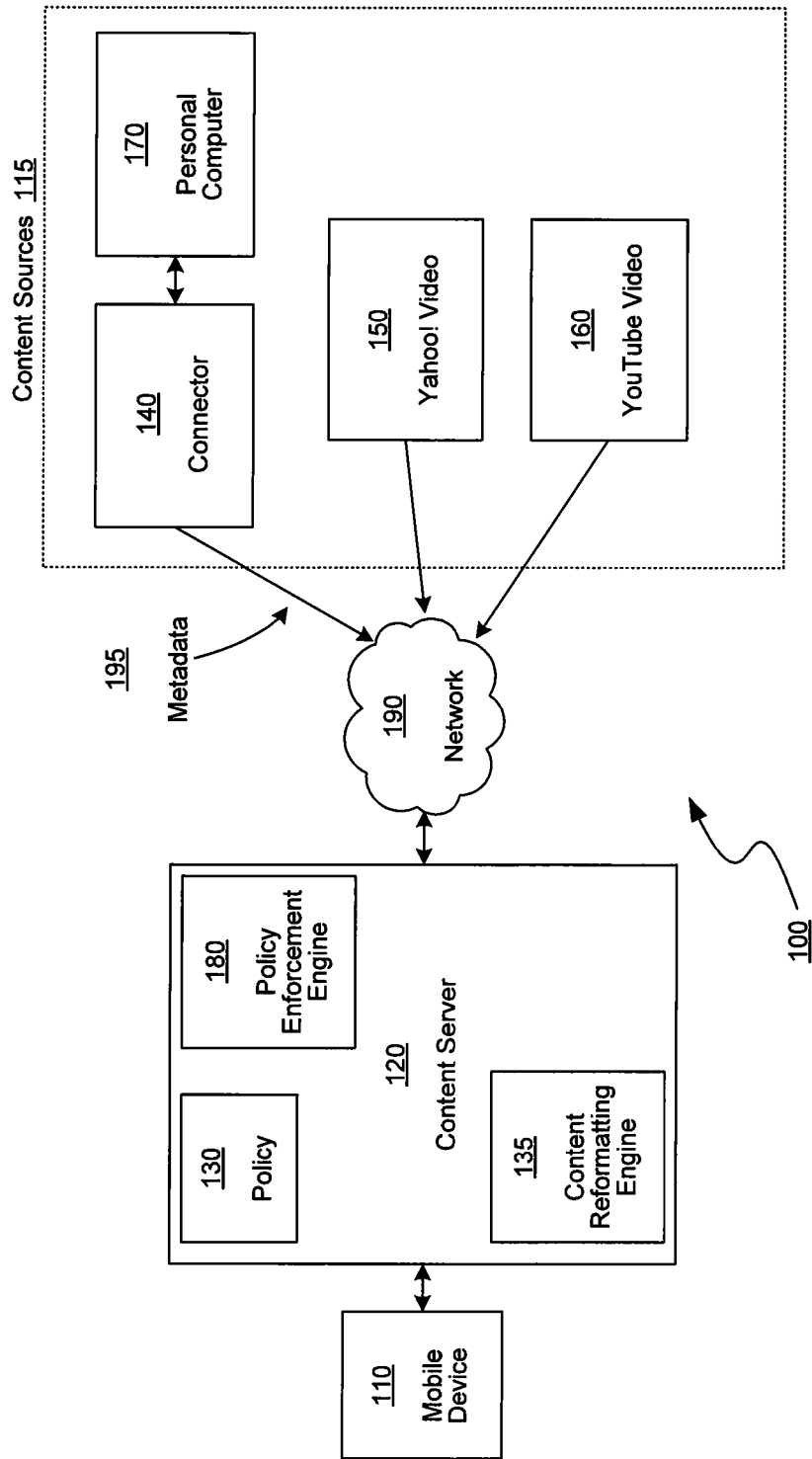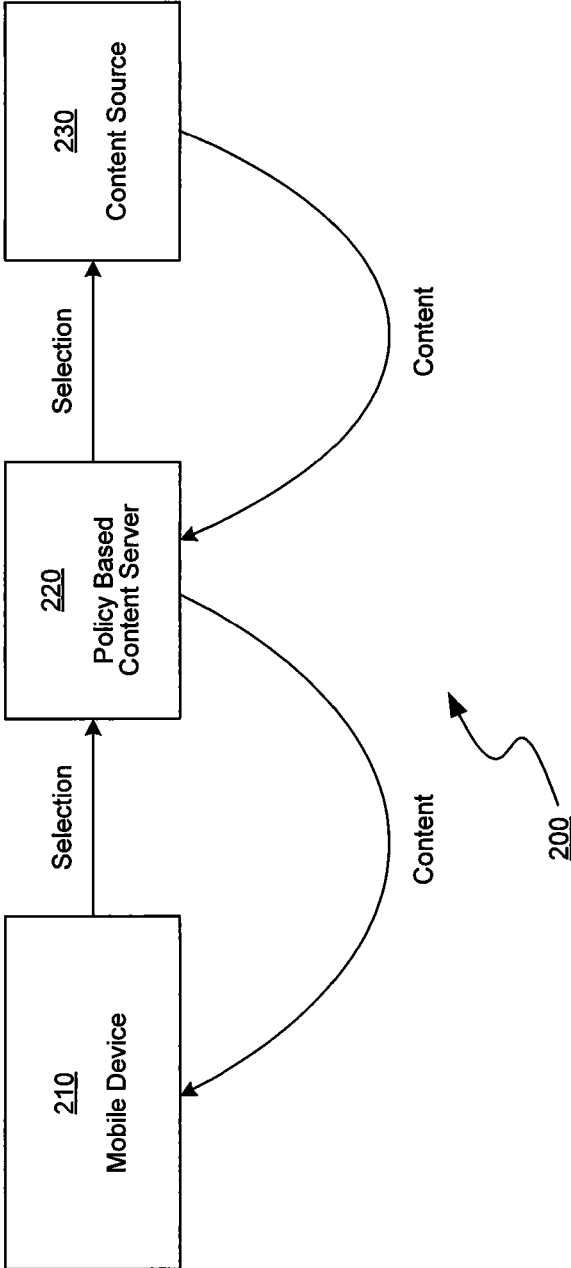
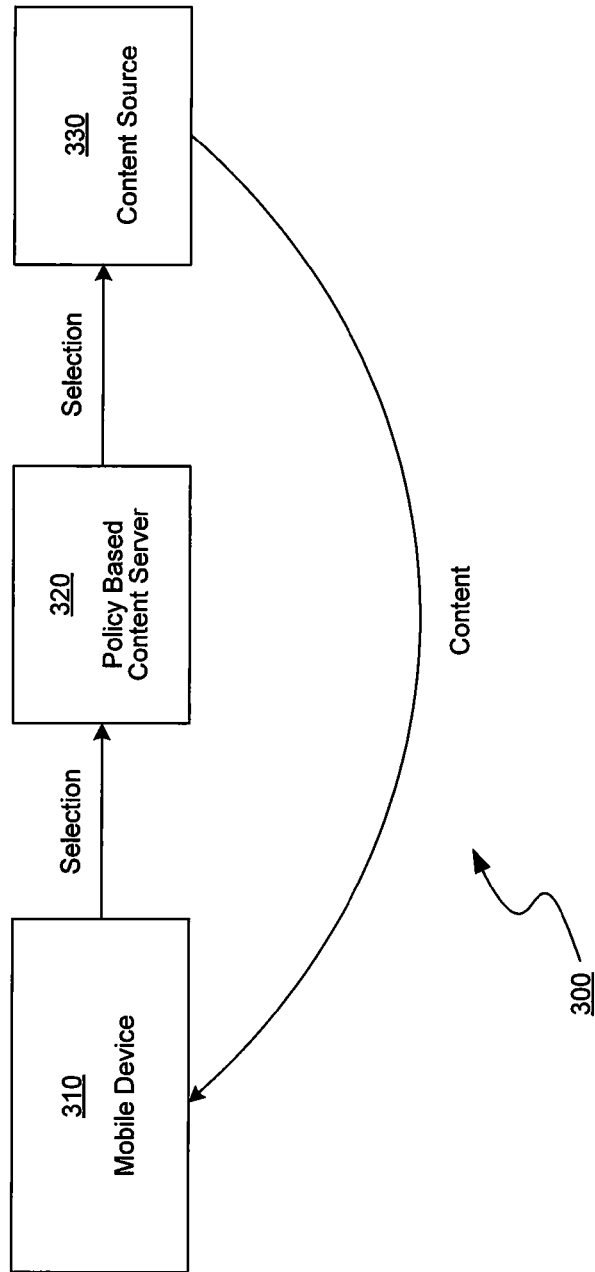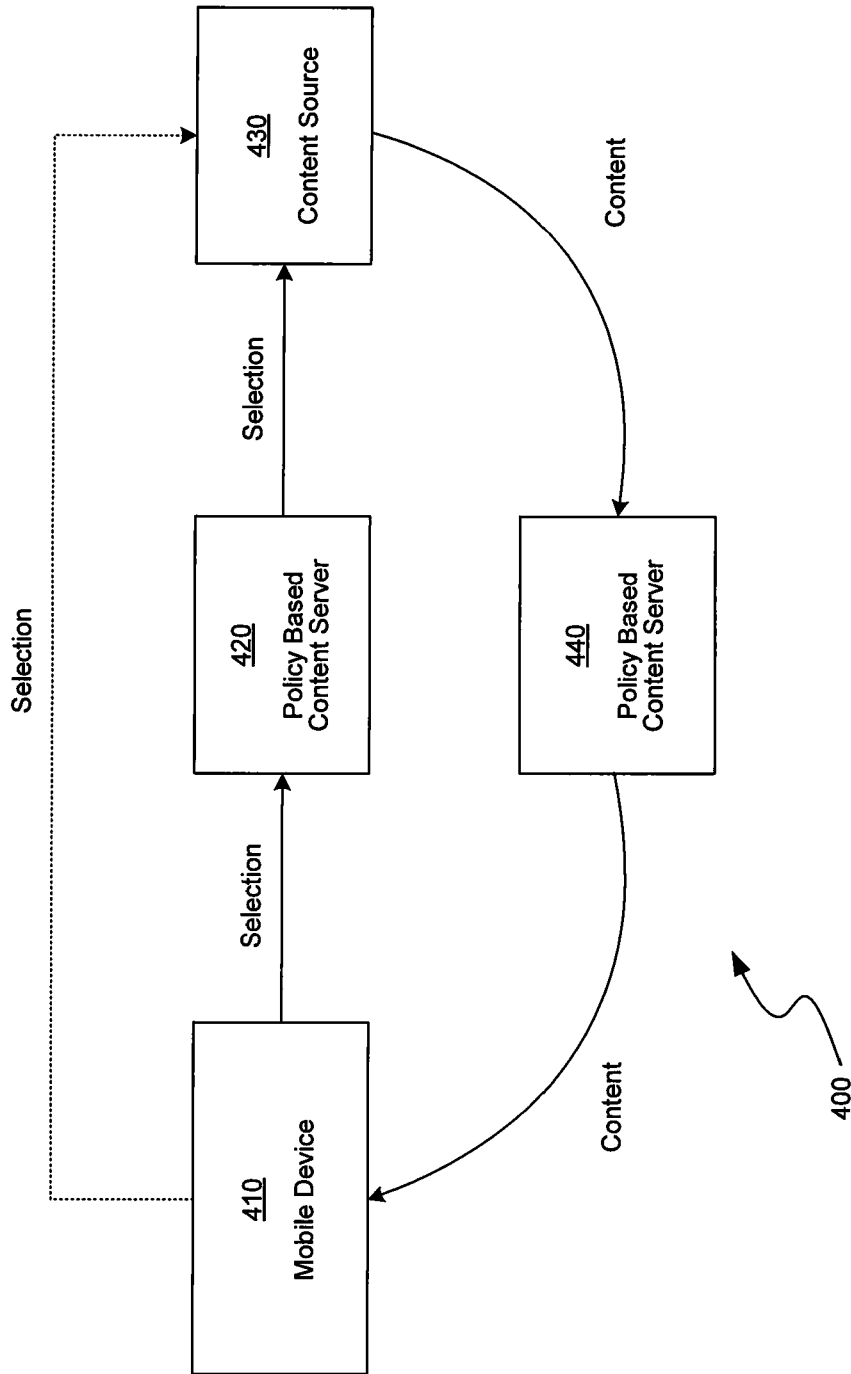* cited by examiner

FIG. 1

FIG. 2

330
Content Source

Selection

320
Policy Based
Content Server

Selection

310
Mobile Device

Content

300

FIG. 3

FIG. 4

510

Discover available content

↓

520

Request content

↓

530

Process the request

↓

540

Request content source to provide content in accordance with enforcement policy

↓

550

Reformat content as necessary to conform to the enforcement policy

↓

560

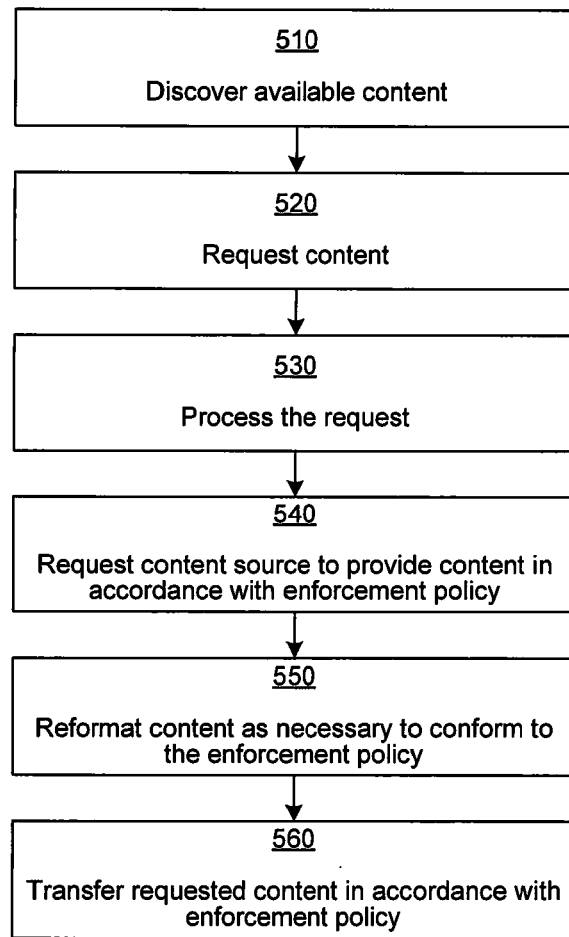Transfer requested content in accordance with enforcement policy

FIG. 5

SYSTEM FOR PROVIDING POLICY BASED CONTENT SERVICE IN A MOBILE NETWORK

CROSS-REFERENCE TO RELATED APPLICATION(S)

The present application is a Continuation Application of U.S. patent application Ser. No. 13/168,067, entitled "SYSTEM FOR PROVIDING POLICY BASED CONTENT SERVICE IN A MOBILE NETWORK," filed Jun. 24, 2011, which claims priority to Divisional Application of U.S. patent application Ser. No. 12/011,396, entitled "POLICY BASED CONTENT SERVICE," filed Jan. 25, 2008, which is incorporated herein by reference.

TECHNICAL FIELD

The present invention relates generally to the field of wireless mobile device network services. More specifically, the present invention relates to serving user selected content in accordance with an enforcement policy.

BACKGROUND

The Internet allows users to access data remotely through a computer. Traditionally, the computer has been a desktop unit or laptop. Mobile devices now have the computing power to access data remotely and effectively function as a desktop or laptop.

Notwithstanding, there are numerous issues related to serving content to mobile devices. Each mobile device will have varying capabilities such as resident software applications, screen size, memory capacity, and processing power. Additionally, there are many preferences that a user may have or be subject to that when incorporated into the content serving process, limit the ability to serve content.

Effectively managing mobile device capabilities and user preferences would provide improved and enhanced content access on a mobile device.

SUMMARY

A system for policy based content delivery includes a mobile device, a content source, and a content server. The mobile device selects and receives content. The content source provides content selected by the mobile device to the content server. The content source modifies content selected by the mobile device prior to providing the selected content to the mobile device. The content server detects content at the content source. The content server provides a list of detected content to the mobile device for selection by the user. The content server instructs the content source to provide the content in a manner that is in accordance with a policy.

A system for policy based content delivery includes a mobile device, a content source, and a content server. The mobile device selects and receives content. The content source provides content selected by the mobile device to the content server. The content server detects content at a content source. The content server provides a list of detected content to the mobile device for selection by the user. The content server requests content from the content source. The content server includes a content reformatting engine to modify selected content in a manner that is in accordance with a policy.

A system for policy based content delivery includes a mobile device, a content source, and a content server. The mobile device selects and receives content. The content source provides content selected by the mobile device to the content server. The content source modifies content selected by the mobile device prior to providing the selected content to the mobile device. The content server detects content at a content source. The content server provides a list of detected content to the mobile device for selection by the user. The content server instructs the content source to provide the content in a manner that is in accordance with a policy. The content server includes a content reformatting engine to modify selected content in a manner that is in accordance with a policy.

A method for providing content in accordance with a policy includes discovering available content at a content source, requesting content located on a content source from a mobile device, processing the request from the mobile device at a content server, requesting content source to provide content in a manner that conforms to the enforcement policy, and transferring the requested content from the content source in a manner that conforms to the enforcement policy.

A computer program is stored on a computer readable storage medium. The program is executable by a processor for performing a method for providing user selected content to a mobile device. The method includes discovering available content at a content source, requesting content located on a content source from a mobile device, processing the request from the mobile device at a content server, requesting content source to provide content in a manner that conforms to the enforcement policy, and transferring the requested content from the content source in a manner that conforms to the enforcement policy.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** depicts an exemplary system in which metadata is sent from a variety of content sources to a content server for content discovery.

FIG. **2** depicts an exemplary system in which user selected content is sent from a content source through a policy based content server to a mobile device.

FIG. **3** depicts an exemplary system in which user selected content is sent directly from a content source with a connector to a mobile device.

FIG. **4** depicts an exemplary system in which user selected content is sent from a content source with a connector through an approved external proxy to a mobile device.

FIG. **5** depicts an exemplary method for policy based service of content.

DETAILED DESCRIPTION

FIG. **1** depicts an exemplary system **100** in which metadata is sent through a network **190** from a variety of content sources to a content server **120** for content discovery. Mobile device **110** requests content from a content source **115** as may be identified through a catalog, listing, or web pages associated with content source **115** or content server **120**. Content source **115** may include a personal computer **170** or content portal such as Yahoo! Video **150** or YouTube Video **160**.

Content server **120** receives metadata **195** from the content source **115** and determines the information concerning the requested content such as file size, format, encoded bit

rate, and DRM limitations. Policy **130** is any one or combination of service provider restrictions, mobile device capabilities, and user preferences. The content server **120** uses policy **130** to identify what type of requested content may be transferred to the mobile device **110**.

Policy enforcement engine **180** ensures that requested content transferred to the mobile device **110** meets the requirements of the policy **130**. This enables the service provider, for example, to enforce the service policy on the user's transmissions. The content server **120** may then instruct the content source **115** whether the requested content should be provided.

For example, the requested content may be a still image. The content source will send metadata **180** to the content server **120** indicating, for example, the format and file size of the still image. In this example, the still image may have a file size of 4 MB and be in the bitmap format. The content server **120** will then use policy **130** and policy enforcement engine **180** to determine whether the requested content can be provided "as is" from the content server **115**. If not, the policy enforcement engine **180** and content reformatting engine **135** may attempt to reformat the content prior to transfer to the mobile device in order to comply with policy **130**.

In this example, the policy **130** may limit the file size to 2 MB and the picture format to jpeg. The content server **110** will instruct the content source **115**, if possible, to provide the requested content as 2 MB jpeg file. If not available as a 2 MB jpeg, the policy enforcement engine **180** may instruct content reformatting **135** to modify the content that is available for delivery in compliance with the policy **130**. In other situations, the policy **130** may limit the bit rate at which the transfer occurs, as well as resolution, total bandwidth, and transfer protocol.

Policy **130** may be modified or set according to personal user preferences. The user may add additional limits on the manner in which content is or is not provided to the mobile device **110**. For example, the user can control the quality of the audio playback and the audio format to use when receiving audio content.

In FIG. **1**, the personal computer **170** includes a connector **140**. The connector **140** is a software application that allows a user to configure the personal computer **170** to provide content to the mobile device **110** via content server **120**. The connector **140** may be configured by the user to allow desired folders and files on the personal computer to be accessible to the mobile device. In other embodiments, the connector **140** may be connected to other content sources. Personal computer **170**, in an alternate embodiment, may include the policy **130**, policy enforcement engine **180**, and content reformatting engine **190**.

The content server **120** may be configured to reformat downloaded digital content using the content reformatting engine **135**. The content reformatting engine **135** may decode, encode, transcode, or resample digital content. The content reformatting engine **135** may initiate reformatting of the downloaded content in response to a command issued by the policy enforcement engine **180** or by the mobile device **110**. Reformatting may also occur automatically according to user preferences reflected in the policy **130**. The content reformatting engine **135** may include copying a file while changing a file format from one format to another, or while changing a bit rate or resolution such that the copy has a different bit rate or resolution than the original.

In one example, the content reformatting engine **135** reformats an MPEG-2 encoded video file to a 3GP encoded video file by copying the MPEG-2 encoded video file and

saving the copied video file in the local content store **132** as a 3GP encoded video file. In a second example, the content reformatting engine **135** reformats an AVI encoded video file having a resolution of 720 by 480 pixels to an AVI encoded video file having a resolution of 360 by 240 pixels. In another example, the content reformatting engine **135** reformats an MPEG-4 encoded video file having a frame rate of approximately 30 frames per second (fps) to an MPEG-4 encoded video file having a frame rate of approximately 15 fps. By further example, the content reformatting engine **135** reformats an MP3 encoded audio file having a bit rate of 192 kilobits per second (kbps) to an MP3 encoded audio file having a bit rate of 128 kbps.

The content reformatting engine **135** may also reformat the content based upon a factor dependent on the mobile device **110**, a user-selectable preference, or a preset preference. The factor dependent on the mobile device **110** may further include supported codecs (e.g., MP3 and WMA), bit rates (i.e., bits per second), sampling rates (i.e., samples per second), sample resolutions (i.e., bits per sample), and video frame rates (i.e., frames per second). The factor dependent on the mobile device **110** may also include processing power, memory size, free available memory, screen size, and screen resolution.

The reformatting may be performed such that the reformatted digital content transferred to the mobile device **110** corresponds to an optimal data size range as determined by factors listed above. As an example, the downloaded content may be reformatted to more compact file sizes when free available memory at the mobile device **110** is low. Alternatively, the downloaded content may be reformatted to larger file sizes when free available memory at the mobile device is high. As another example, the downloaded content may be reformatted to a lower resolution screen size when the mobile device **110** is a cellular telephone than when the mobile device **120** is a PDA. The downloaded content may be reformatted to resolution somewhat larger (finer) than the screen size resolution to allow the downloaded content to be zoomed and cropped to a reasonable degree at the mobile device **110**.

FIG. **2** depicts an exemplary system **200** in which user selected content is sent from a content source **230** through the policy based content server **220** to a mobile device **210**. The policy based content server **220** corresponds to the content server **120** of FIG. **1**. In this embodiment, policy enforcement occurs at the policy based content server **220**.

FIG. **3** depicts an exemplary system **300** in which user selected content is sent directly from a content source with connector **330** to a mobile device **310**. In this embodiment, the policy enforcement occurs at the content source with connector **330** as the content is not sent back through the policy based content server **320**. A content source with connector **330** may be akin to the coupling or integration of the connector **140** and personal computer **170** in FIG. **1**. A connector coupled to or integrated with the content source may perform policy enforcement at the content source. In some embodiments, content selection may bypass the policy based content server **320** and occur by and between mobile device **310** and content source **330**.

FIG. **4** depicts an exemplary system **400** in which user selected content is sent from a content source with connector **430** through an approved external proxy **440** to a mobile device **410**. The policy enforcement may occur at the content source **430** or the external approved proxy **440**. Use

of the external approved proxy **440** may be subject to the proxy having a connector application. The approved external proxy **440** may be a server remote from the service provider. Alternately, the external proxy **440** may be a separate server located at the same data center as the content based content server **420**.

FIG. **5** depicts an exemplary method for policy based service of content. Step **510** is the discovery of available content on a content source. Step **520** is the requesting of content located on a content source from a mobile device. Step **530** is the processing of the request from a mobile device at a content server. Step **540** is requesting the content source to provide content in a manner that conforms to a service policy. Step **550** is the optional reformatting of the selected content as necessary to conform to the enforcement policy. Step **560** is the transferred of the requested content from the content source in a manner that conforms to the enforcement policy to the mobile device.

While the present invention has been described in connection with a series of preferred embodiment, these descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art.

I claim:

1. A policy-based content delivery system comprising:
   a mobile device selecting and receiving video content directly from a content source; and
   the content source providing video content selected by the mobile device directly to the mobile device, the content source further reformatting content selected by the mobile device prior to providing the selected content to the mobile device;
   wherein the content source provides a list of detected content to the mobile device for selection, the content source further provides the content in accordance with a service provider policy,
   wherein video content selected and received by the mobile device bypasses and is not sent through a policy-based content server, and
   wherein the service provider policy is based on a bandwidth allocation and a screen size of the mobile device, and the video content is automatically reformatted by transcoding to a larger resolution than a resolution for the screen size in order to allow the video content to be zoomed at the mobile device and satisfy the bandwidth allocation.

2. The system of claim **1**, wherein the policy encompasses user preferences.

3. The system of claim **1**, wherein the content source is a personal computer including a connector to provide user selected content to the mobile device.

*   *   *   *   *