



(19) **United States**

(12) **Patent Application Publication**  
**Schmidt**

(10) **Pub. No.: US 2011/0213823 A1**

(43) **Pub. Date: Sep. 1, 2011**

(54) **DYNAMIC CREATION OF CONTENT CHANNELS**

**Publication Classification**

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(51) **Int. Cl.**  
**G06F 15/16** (2006.01)

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(52) **U.S. Cl.** ..... **709/202**

(21) Appl. No.: **13/102,724**

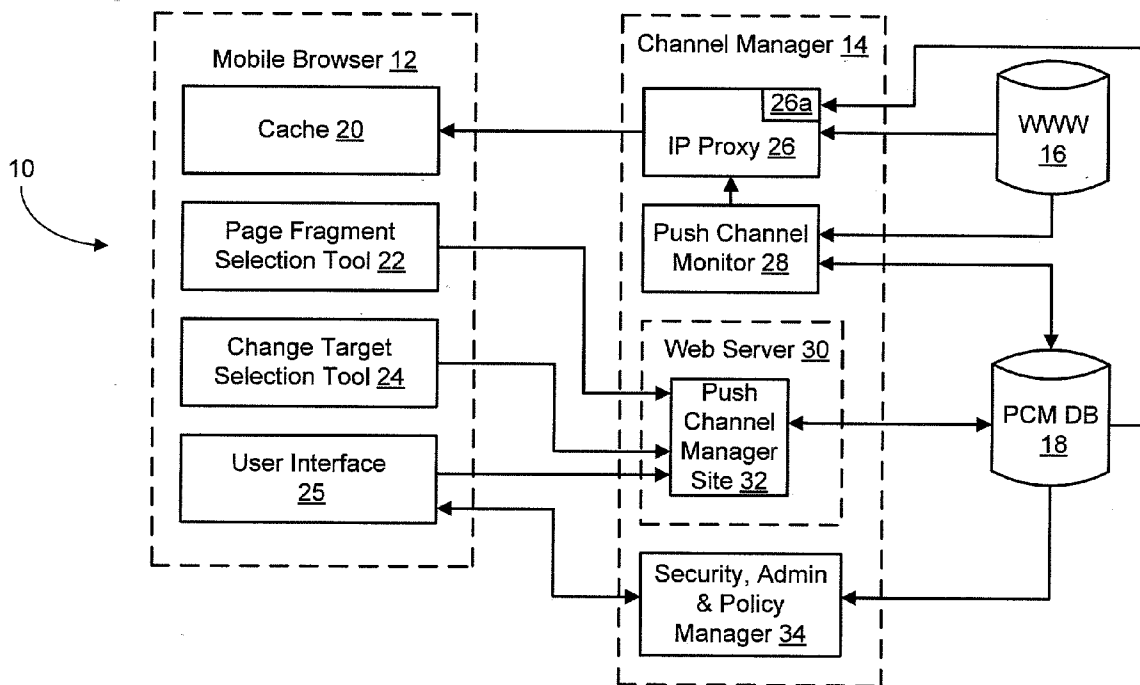
(57) **ABSTRACT**

(22) Filed: **May 6, 2011**

A system and method are provided for allowing a user to define and subscribe to channels of information to be pushed to a wireless device. In defining a channel a specific area of a web page is selected by the user to be monitored for change. The user may also select data to be pushed should a change be detected. A regular expression is created to match the area of interest for changes and if changes occur to push the desired content to the wireless device. Icons on the wireless device alert the user to any unread pushed content. Users may also subscribe to predefined channels, or modify predefined channels should they have the security authorization to do so.

**Related U.S. Application Data**

(63) Continuation of application No. 11/677,844, filed on Feb. 22, 2007, now Pat. No. 7,941,497.



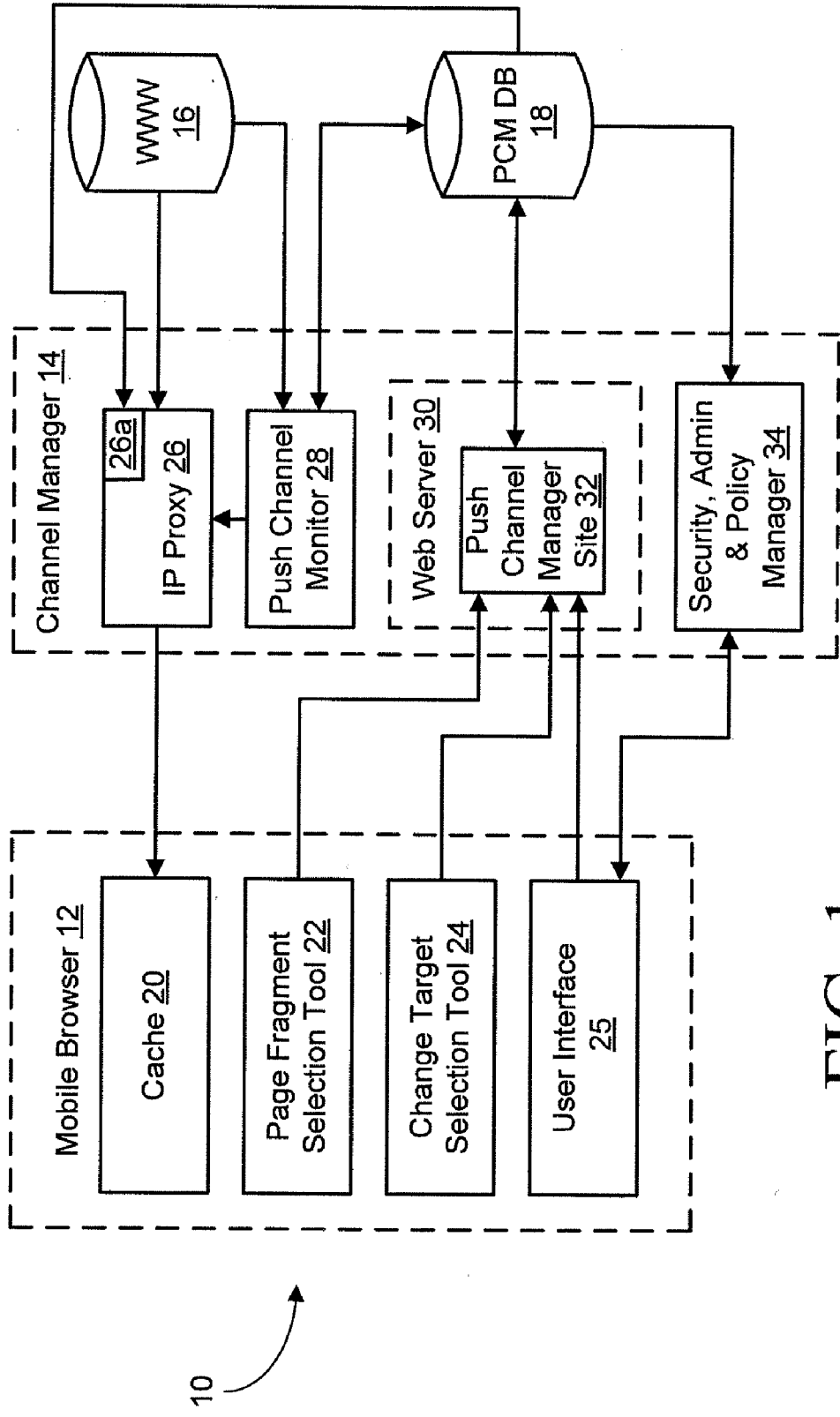


FIG. 1

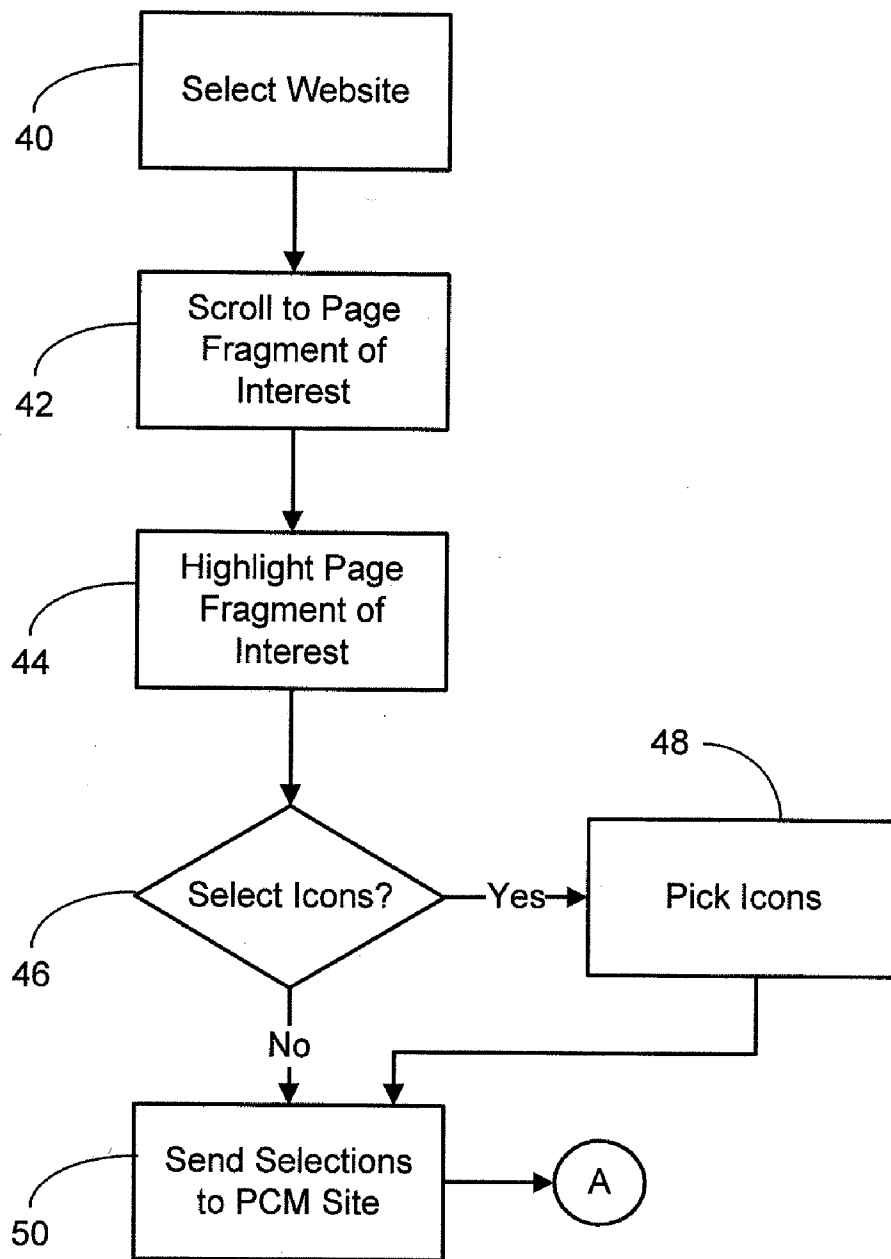


FIG. 2

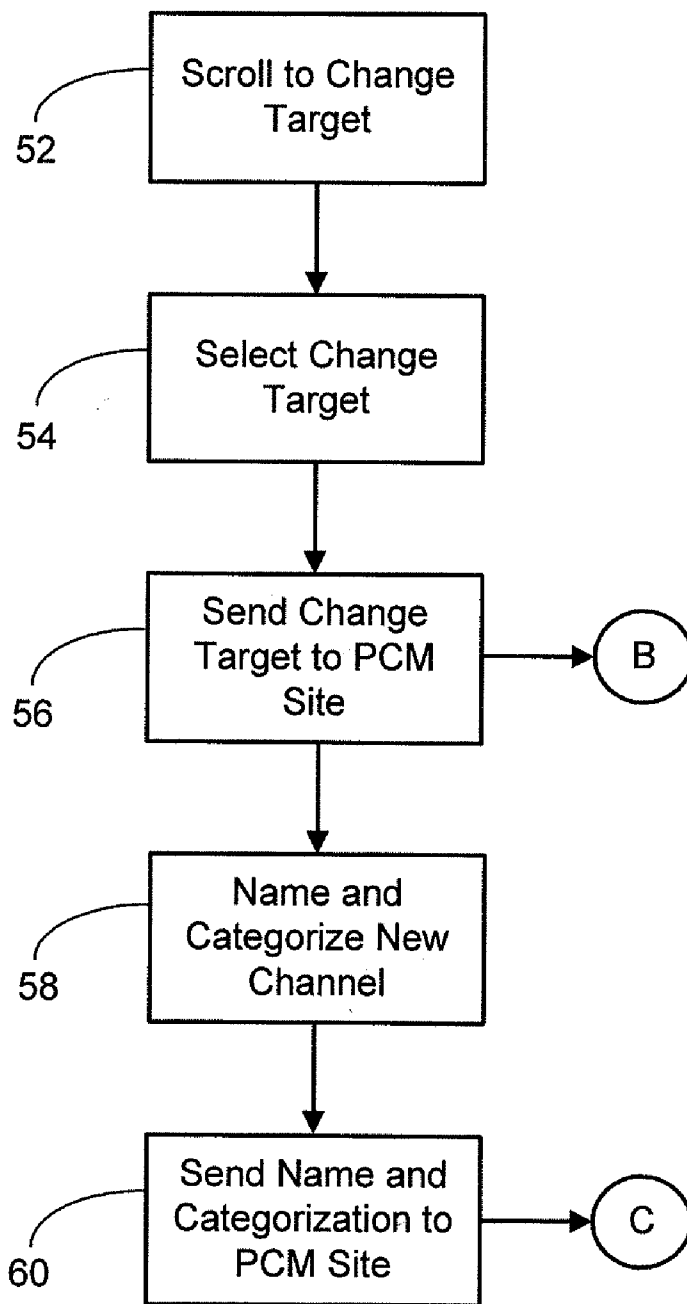


FIG. 3

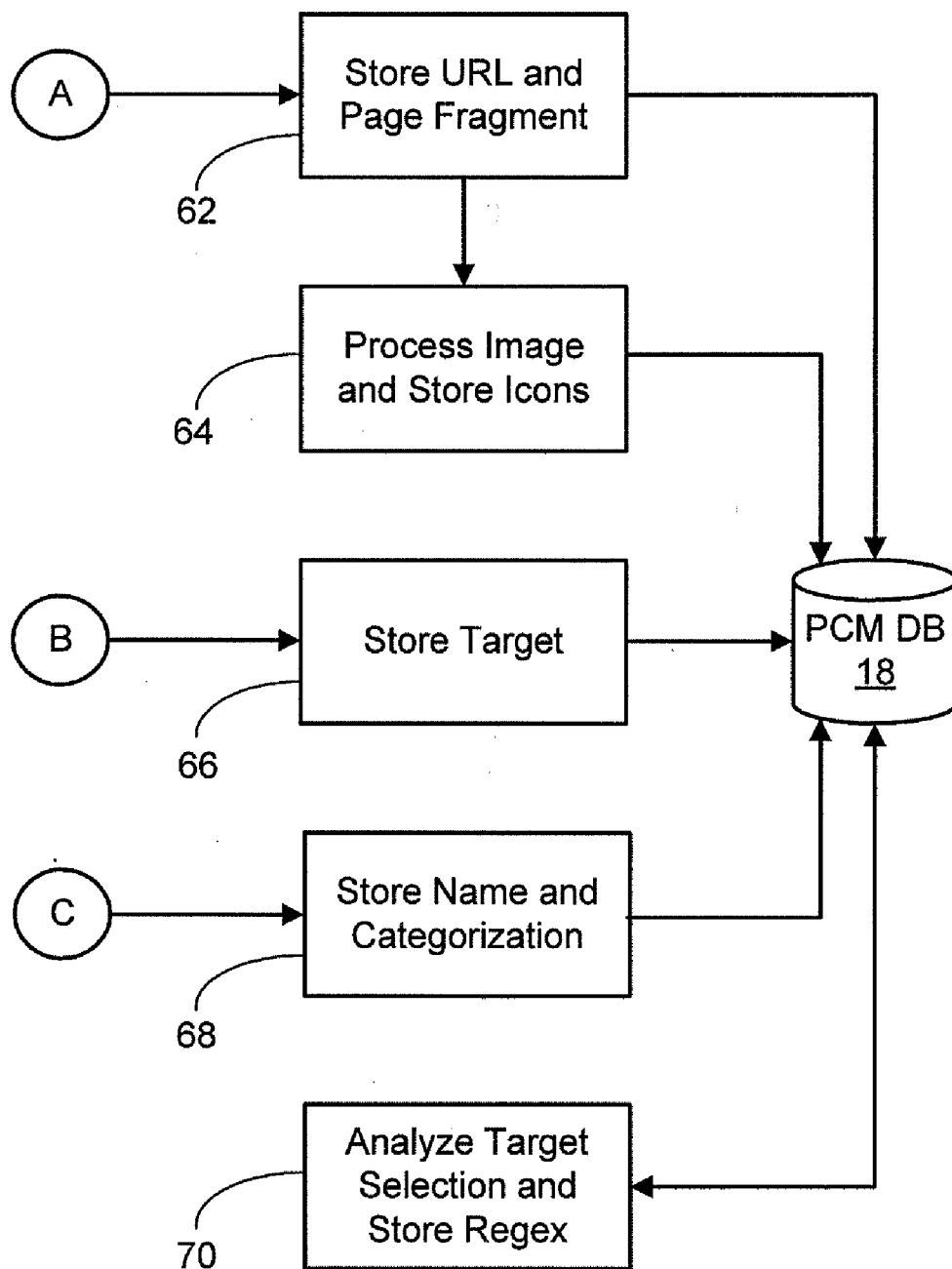


FIG. 4

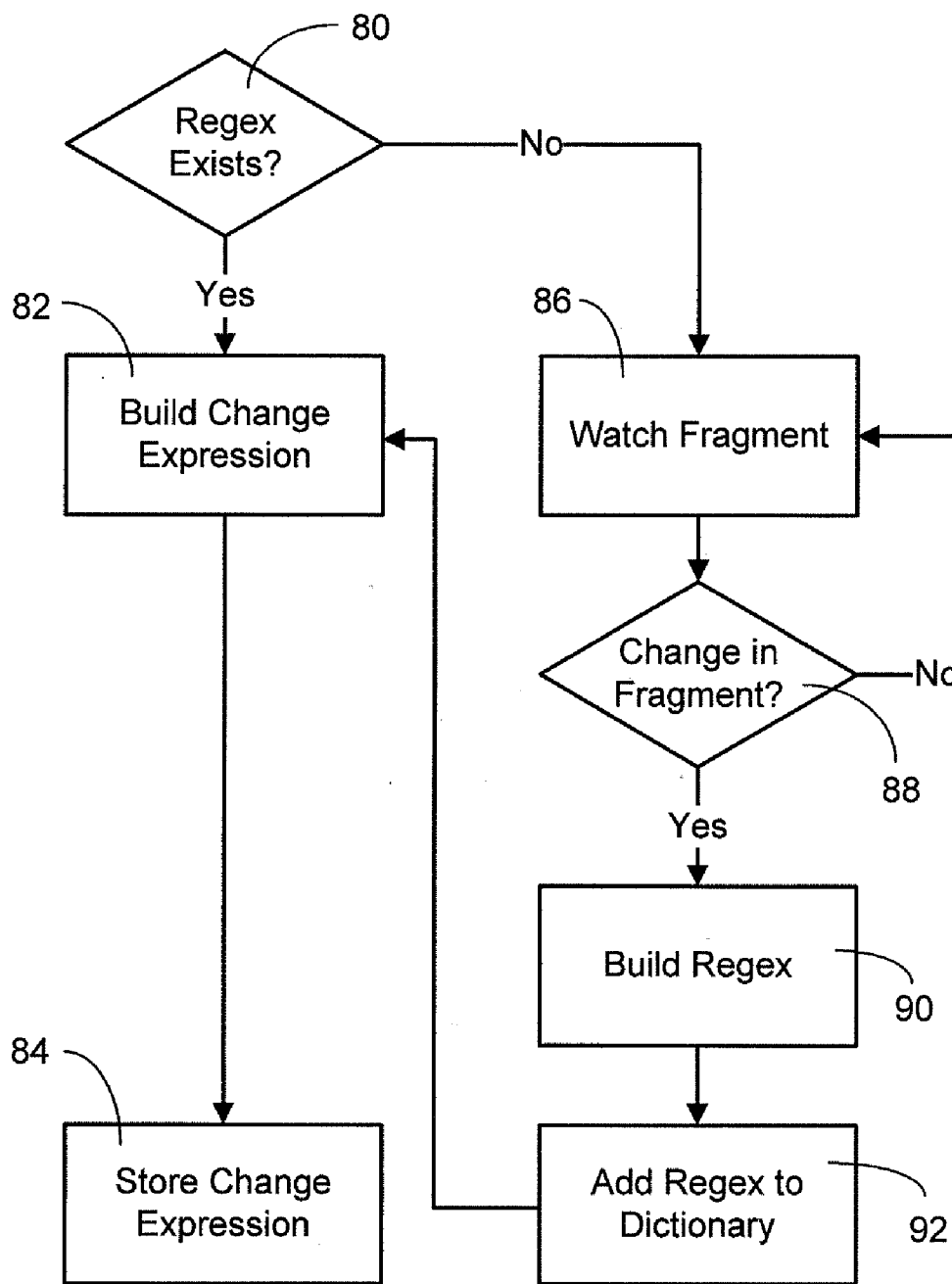


FIG. 5

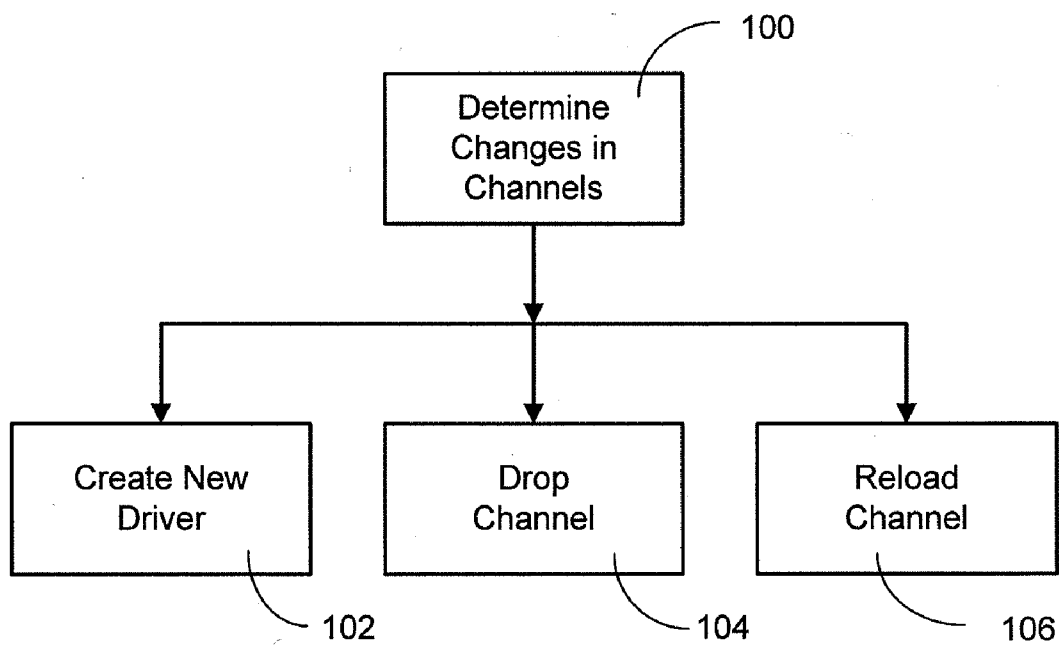


FIG. 6a

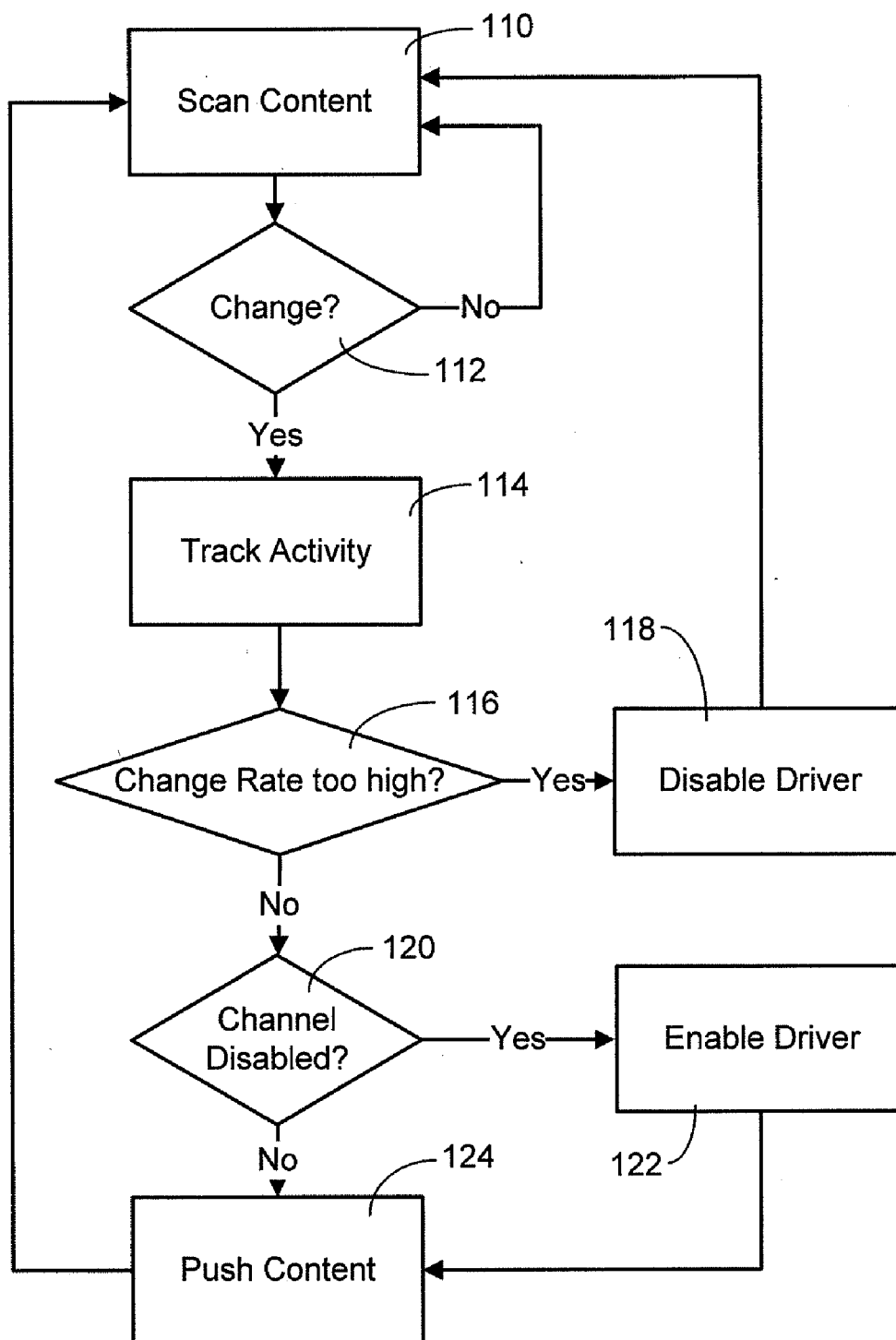


FIG. 6b



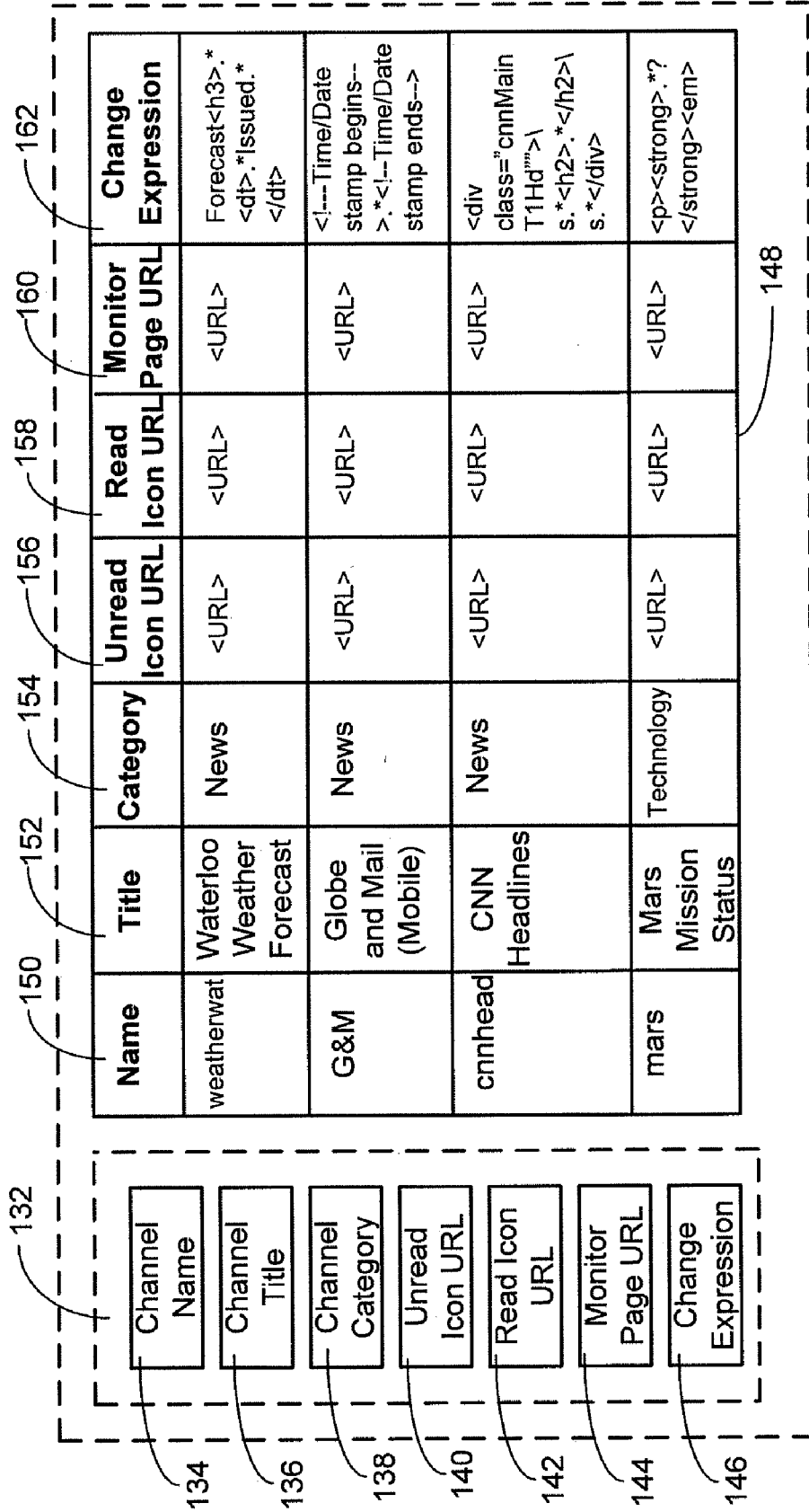


FIG. 7

130

**DYNAMIC CREATION OF CONTENT CHANNELS**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This is a continuation of U.S. patent application Ser. No. 11/677,844, titled “Community-based Method and System for Creating and Subscribing to Dynamic Push Channels,” filed on Feb. 22, 2007, the entirety of which is hereby incorporated by reference.

**BACKGROUND**

[0002] In using wireless computing devices, a user may wish to have content pushed to them via a channel. Each channel is specific to the type of content. Examples of content delivered by a channel are updates on stock market prices, sports scores or news. The prior art requires that a channel be established by a software developer familiar with the programming needed to create a channel and determine which content should be pushed to the user of a computing device.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0003] Embodiments are illustrated by way of example and without limitation in the figures of the accompanying drawings, in which like reference numerals indicate corresponding, analogous or similar elements, and in which:

[0004] FIG. 1 is a block diagram of a system comprising components of an embodiment of the present invention;

[0005] FIG. 2 a flowchart of the function of a page fragment selection tool;

[0006] FIG. 3 is a flowchart of the function of a change target selection tool;

[0007] FIG. 4 a flowchart of the function of a PCM site;

[0008] FIG. 5 is a flowchart of the function of a selection analyzer;

[0009] FIGS. 6a and 6b are flowcharts of the processes of a push channel monitor; and

[0010] FIG. 7 is a screen mockup of a channel management interface.

**DETAILED DESCRIPTION**

[0011] Embodiments of the invention described herein provide the ability for a user to simply create a channel and select the content to be pushed.

[0012] Referring first to FIG. 1, a block diagram of a system comprising components of an embodiment of the present invention is shown generally as 10. System 10 comprises a mobile browser 12, a channel manager 14 and two persistent database sources. The first database source is shown as feature 16 and indicates data available on the World Wide Web. Push Channel Manager (PCM) database 18 is a repository for channel and access information stored by Push Channel Manager (PCM) site 32.

[0013] Mobile browser 12 resides on a computing device utilizing wireless technology and comprises a memory cache 20, a page fragment selection tool 22, a change target selection tool 24 and a user interface 25.

[0014] Cache 20 is a memory cache to store information provided by channel manager 14 to be viewed by a user. Page fragment selection tool 22 provides a user with the functionality to select the information on a website for which they wish to establish a channel to provide updates should the information change, the selected information hereinafter

referred to as a fragment. Change target selection tool 24 allows the user to select what information on the website they wish to be pushed on the channel should a change occur. In one case it would be the Uniform Resource Locator (URL) of the page selected by page fragment selection tool 22. In another case it would be a specific area of the website, for example the text only, excluding such features as menu items, graphics or sidebars. User interface 25 allows the user of mobile browser 12 to invoke and utilize page fragment selection tool 22 and change target selection tool 24. In addition user interface 25 may provide the user with a channel manager interface to allow the user to directly create channels or to modify the information on a channel provided they have the authority to do so. This additional functionality is discussed in more detail with reference to FIG. 7.

[0015] Channel manager 14 comprises a plurality of components that may reside on a single computing device or be distributed. In the embodiment shown, IP Proxy 26 is responsible for pushing content on the channel defined by the user. Modules such as IP Proxy 26 that are able to push updated information to mobile devices are known in the art. What information to push is determined by a Change Target Transcoder (CTT) 26a which takes information indicating a change on a website has occurred from push channel monitor 28 and scans PCM database 18 for a definition of what information should be pushed. When a change target is less than the complete URL, CTT 26a ensures that only the content of the change target is pushed to subscribers of the channel.

[0016] Push Channel Monitor 28 is responsible for detecting changes in the content selected by the user and informing IP Proxy 26 of the changes so they may be pushed to the channel defined by the user. Webserver 30 is where the Push Channel Manager site 32 resides. PCM site 32 receives a request to define a channel from change target selection tool 24 or user interface 25 and in turn stores this request information in PCM database 18 as channel definition information. Channel definition information stored in PCM database 18 may include:

- a) A short name of the channel, for example “weathcam”.
- b) A longer name, for example “Cambridge Weather Forecast”.
- c) A category, for example “weather”.
- d) A link to an icon to be displayed on user interface 25 indicating that information from the channel is unread.
- e) A link to an icon to be displayed on user interface 25 indicating that all information from the channel has been read.
- f) The URL of the page to monitor.
- g) A change expression utilized to determine when changes have occurred in the fragment to be monitored.

[0017] Examples of values of this information are shown in FIG. 7.

[0018] Security, administration and policy manager 34 is responsible for ensuring secure access to the modules of channel manager 14. Examples would include storing rules in PCM database 18 on who can access a channel, who can modify channel definition information and how a channel may be deleted.

[0019] For the reader to better understand the interactions of the above referenced features we provide the following overview.

1) Page fragment selection tool **22** permits the user to select a page fragment on a website that they wish to have monitored for changes and passes information to identify the page fragment to PCM site **32**.

2) Change target selection tool **24** permits the user to select what information they wish to receive once the page fragment selected through the use of page fragment selection tool **22** has changed and passes that information to PCM site **32**.

3) PCM site **32** maintains user registration, subscriptions and channel definition information in PCM database **18**.

4) Push channel monitor **28** scans both databases **16** and **18** and sends directives on any changes relative to a channel to IP Proxy **26**.

**[0020]** We will now discuss how each of the above referenced features accomplishes the functions described in points 1) to 4) above.

**[0021]** Referring now to FIG. 2 a flowchart of the function of page fragment selection tool **22** is shown. At step **40** through the use of user interface **25**, a user selects a website containing information for which they wish to create a channel. At step **42** the user through user interface **25** scrolls to a page fragment of interest to be monitored for changes. Examples of page fragments include text such as a headline on a news site, an image or any other content on the site the user wishes to monitor for changes. At step **44** the user through user interface **25** highlights the page fragment of interest. Step **44** obtains all related HTML tags such as: `<a>`, `<div>`, `<td>`, `<tr>`, and others to identify the page fragment. At step **46** the user may optionally select two icons, to serve as read and unread icons for the new channel to be displayed on user interface **25**. Alternatively a single icon could be selected with the checkmark or other indicia to indicate read or unread status. If the user wishes to select an icon processing moves to step **48** where the user selects a website containing the icons to be used, and picks the icons this may be same website selected when creating the channel or could be another website, for example a page containing a set of icons. After step **48** is complete, processing then moves to step **50**. If at step **46** the user declines to select icons processing a default icon is created and processing moves to step **50**. At step **50** information regarding the page fragment of interest and icon(s) are sent to PCM site **32**.

**[0022]** Referring now to FIG. 3 a flowchart of the function of the change target selection tool **24** is shown. Beginning at step **52** through the use of user interface **25** the user scrolls to a change target area on the website of interest that they wish to have pushed to mobile browser **12**. The change target area defines the information that the user wishes to receive on mobile browser **12**. At step **54** the change target is selected through the use of user interface **25**, this step allows the user to select specific text or images, for example a change target may be the text in the body of a website, not the images, sidebars or menu items. In this case the change target will include immediately surrounding HTML tags and embedded tags in the change target and the URL of the change target. Alternatively it may simply be a URL. At step **56** the information defining the change target is sent to PCM site **32**. At step **58** the user is prompted by user interface **25** to provide a name and category for the new channel. The name is a user defined name for the channel and the category may be unique or selected from a list such as “weather”, “news”, “technology” or others. At step **60** the name and categorization information provided at step **58** is sent to PCM site **32**.

**[0023]** Referring now to FIG. 4 a flowchart of the PCM site **32** is shown. At step **62** the output of step **50** of FIG. 2 is received. The URL of the website containing the page fragment of interest and the page fragment of interest is stored in PCM database **18**. At step **64** any icons selected to indicate if information remains read or unread in the channel is processed to reformat it to the desired size for user interface **25** and stored in PCM database **18**.

**[0024]** At step **66** the target selected at step **56** of FIG. 3 is received and stored in PCM database **18**. The information defining the URL of the website containing the target information and the target information is stored in PCM database **18**.

**[0025]** At step **68** the name and categorization of the new channel provided by step **60** of FIG. 3 is stored in PCM database **18**.

**[0026]** As can be appreciated by one skilled in the art if the information required to complete steps **62**, **64**, **66** and **68** is not provided to PCM site **32** processing will end and a channel will not be created. If all information is provided step **70** is invoked and is described with reference to FIG. 5.

**[0027]** Referring now to FIG. 5 a flowchart of the function of a selection analyzer is shown, this corresponds to the function implemented by step **70** of FIG. 4. Beginning at step **80** a test is made to determine if the fragment of interest matches a regular expression (regex). A regular expression is well known in the computing arts and can take on many forms. In essence it is a string of characters that describes or matches a set of strings, depending upon the syntax used. A set of regular expressions is stored in an HTML pattern dictionary (not shown). The HTML pattern dictionary is stored in PCM database **18** and comprises entries for regular expressions (regexes) that match dynamic content between static demarcation tags or content. Examples would be:

- regexes that match a variety of standard, common and previously encountered date/time text strings such as “last updated Thurs. Jan. 11, 2007”.
- regexes of typical HTML tag sequences such as `<a>`, `<div>`, `<tr>`, `<td>` and others.
- computed regexes created by the selection analyzer as shown beginning at step **86** of FIG. 5.

**[0028]** If a matching regex is found at step **80**, processing moves to step **82** where a change expression is built utilizing the text in the fragment of interest that precedes the regex located, the regex located, and text in the target selection that follows the regex located. Processing then moves to step **84** where the change expression is stored in PCM database **18** for use by Push Channel Monitor **28**.

**[0029]** Returning to step **80** if a regex is not found in the HTML pattern dictionary, processing moves to step **86**. At step **86** the fragment of interest is monitored on a regular basis while polling the website on which it resides at a user configurable rate, for example every 30 minutes. At this step, in order to provide feedback to the user that a channel is being created, a temporary icon is created on the user interface **25** of mobile device **12** such as an unread icon with a question mark on it. When the icon is selected a message such as “Channel Activation Not Complete” would be displayed.

**[0030]** After each polling attempt a test is made at step **88** to determine if a change has occurred in the fragment of interest. If a certain number of detected changes have been found (perhaps two to three) and they are of the same format, processing moves to step **90**. This step involves comparing samples with a constant prefix and suffix to the substrings

contained between them. The substrings are then compared to create a regex substring including “match any” operators in the regex.

[0031] At step 90 a regex is built based upon the changes identified in step 86, keeping the static information in the page fragment and utilizing wildcards such as “.\*” to match changing information. At step 92 the newly created regex is stored in the pattern dictionary in PCM database 18. Over time regex entries will build up in the pattern dictionary thus saving time in creating a change expression. Processing then moves to step 82 where utilizing the new regex a change expression is created. Processing then moves to step 84 where the change expression is stored in PCM database 18 for use by Push Channel Monitor 28.

[0032] Referring now to FIGS. 6a and 6b flowcharts of the processes of a push channel monitor are shown. Beginning with FIG. 6a a process for maintaining channels is shown. As discussed earlier PCM database 18 contains information defining a channel. Beginning at step 100 the definitions of the channels the last time the process was run are compared with the current definitions stored in PCM database 18. If a new channel is found, processing moves to step 102 where a new channel driver is created. Each channel has a channel driver associated with it for the purpose of monitoring changes on that channel in order to instruct IP Proxy 26 to push information. This process of determining what to push is described in FIG. 6b. If a channel has been deleted processing moves to step 104 where the channel driver is deleted. If the channel is an existing channel, processing moves to step 106 where the channel definition in the driver is reloaded (as it may have changed) and any subscriber information is updated. A channel definition comprises the channel definition data stored in PCM database 18 which is copied to a memory resident object instantiated by the channel and controlled by the channel driver. Step 100 runs continually looking at the list of channels and determining the appropriate action to take.

[0033] Referring now to FIG. 6b a process for pushing content to a channel is shown. As described earlier each channel has its own channel driver. Beginning at step 110 the channel driver for a channel scans for any changes to content on a web page as found in WWW database 18 (a URL of the WWW), utilizing the change expression stored in PCM database 18. At step 112 a test is made to determine if a change has occurred. If not processing returns to step 110. If a change has been detected processing moves to step 114 where the change activity for the channel is tracked. The purpose of this is to determine if content changes for this channel may be exceeding thresholds that indicate the changes being pushed may be utilizing too many system and network resources. At step 116 a test is made to determine if the change rate is beyond a desired threshold. If this is the case processing moves to step 118 where the channel driver is disabled. An example of disabling a channel driver would include abnormal amounts of traffic to a channel that could be interpreted as a Denial of Service (DOS) attack by the change target website. After step 118 no changed content is pushed and processing returns to step 110. If at step 116 it is determined that the change rate is not beyond a desired threshold, processing moves to step 120. At step 120 a test is made to determine if the channel driver has been disabled. If not, processing moves to step 124 where an indication of the changed content is sent to IP Proxy 26 to have the content pushed to all subscribers of the channel. If at step 120 it is determined that the channel has been disabled, it

is reenabled at step 122 and processing moves to step 124. From step 124 processing returns to step 110.

[0034] Referring now to FIG. 7 a screen mockup of a channel management interface is shown generally as 130. Channel management interface 130 may be accessible to a user through user interface 25 or to a system administrator via security, administration and policy manager 34. FIG. 7 serves as an example of the type of information that may be presented in creating or modifying a channel.

[0035] Feature 132 indicates a portion of the screen that may be used to add a new channel as an alternative to having the user select a page fragment and change target by selecting text. In field 134 a name for the new channel is entered. In field 136 a title for the channel is entered. In field 138 a channel category is entered or selected from a set provided. In field 140 the URL of an icon to indicate unread items is entered. In field 142 the URL of an icon to indicate read items is entered. In field 144 the URL of the page to monitor for changes is entered. In field 146 the change expression to determine if changes of interest have occurred is entered. The fields of feature 132 correspond to the information entered by the user or generated by the system as described in FIGS. 2 through 5.

[0036] Feature 148 illustrates a table of the information on channels, the information being modifiable with the correct security authority. Column 150 contains the name field, column 152 contains the title field, column 154 contains the category field, column 156 contains the URL of the unread icon, column 158 contains the URL of the read icon, column 160 contains the URL of the page to monitor for changes and column 162 contains the change expression. The information displayed in feature 148 is provided to aid the reader in understanding the information stored in PCM database 18 to define a channel.

[0037] Although embodiments of the invention have been described as being implemented in software, one skilled in the art will recognize that embodiments may be implemented in hardware as well. Further, it is the intent of the inventor to include computer readable forms of the invention. Computer readable forms meaning any stored format that may be read by a computing device.

[0038] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the following claims.

What is claimed is:

1. A method in a server, the method comprising:
  - receiving, from a wireless device, information about a fragment of interest from a web page to be monitored for changes;
  - receiving, from the wireless device, information about a change target area, the change target area defining what content is to be pushed should a change occur in the fragment of interest;
  - building a change expression based on static content in the fragment of interest and a matching pattern expression from a pattern dictionary; and
  - creating a new content channel based on the change expression, wherein when changes in the web page are detected using the change expression said content is pushed to at least one subscriber of the new content channel.

- 2. The method of claim 1, further comprising:  
 prior to building the change expression, comparing the fragment of interest to the pattern dictionary to determine if the matching pattern expression exists in the pattern dictionary; and  
 if the matching pattern expression does not exist in the pattern dictionary:  
   monitoring the fragment of interest for a predetermined number of detected changes;  
   building a pattern expression based on the detected changes, wherein the pattern expression includes wildcards for detected changes of the same format and static information from the monitored fragment of interest; and  
   adding the pattern expression to the pattern dictionary.
- 3. The method of claim 1, wherein the matching pattern expression is a regular expression and the regular expression matches dynamic content and static content of the fragment of interest.
- 4. The method of claim 1, further comprising:  
 receiving, from the wireless device, a name and categorization for the new content channel.
- 5. The method of claim 1, further comprising:  
 storing the change expression in a content channel manager database, wherein the content channel manager database includes information about subscriptions to various content channels.

- 6. The method of claim 1, wherein building the change expression includes text in the fragment of interest that precedes the matching pattern expression, the matching pattern expression, and text in the fragment of interest that follows the matching pattern expression.
- 7. The method of claim 1, further comprising:  
 scanning for changes to content of the web page utilizing the change expression; and  
 pushing changed content to subscribers of the new content channel.
- 8. A method in a wireless device, the method comprising:  
 receiving, via a user interface of a mobile browser, a selection of a fragment of interest from a web page to be monitored for changes;  
 receiving, via the user interface, a selection of a change target area, the change target defining what content is to be pushed to the wireless device should a change occur in the fragment of interest; and  
 sending information about the fragment of interest and information about the change target area to a server configured to create a new content channel based on the fragment of interest and the change target area.
- 9. The method of claim 8, further comprising:  
 subscribing to the new content channel; and  
 receiving changed content via the new content channel, when changes occur to the fragment of interest.

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