



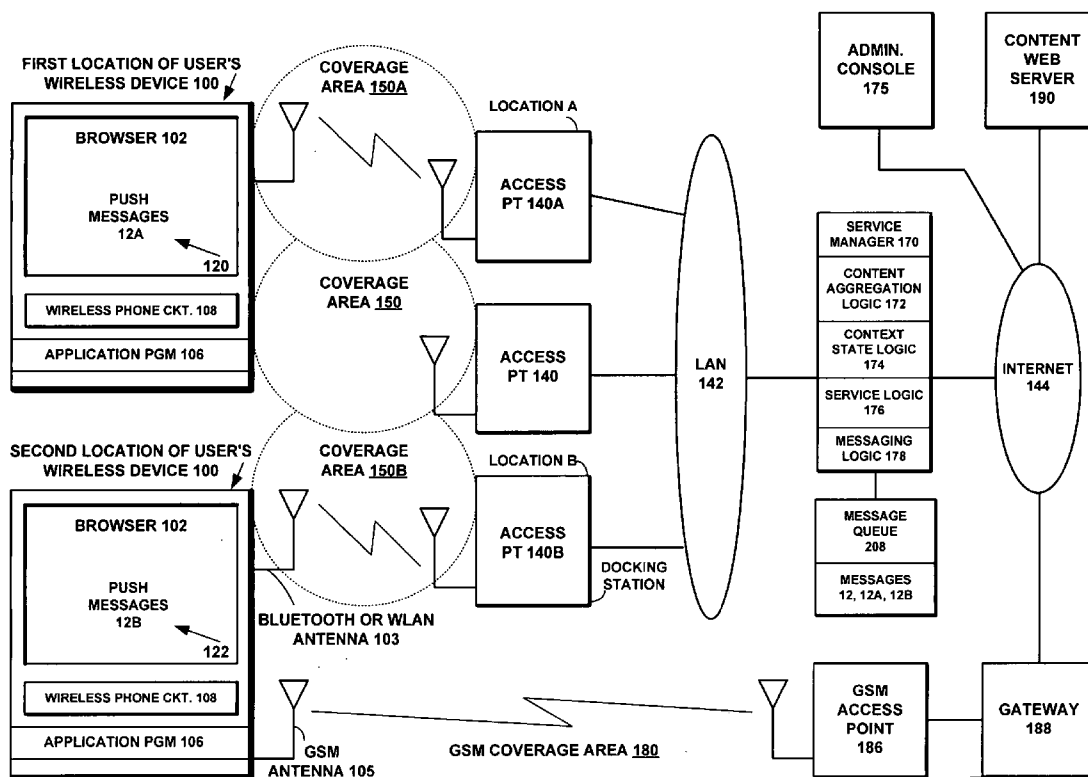
US 20070214245A1

(19) **United States**(12) **Patent Application Publication**
Hamalainen et al.(10) **Pub. No.: US 2007/0214245 A1**(43) **Pub. Date: Sep. 13, 2007**(54) **METHOD AND SYSTEM FOR
CONTROLLING CONTEXTUAL
INFORMATION PUSH SERVICES**

(57)

ABSTRACT(76) Inventors: **Mikko Hamalainen**, Helsinki (FI);
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New York, NY 10281-2101 (US)(21) Appl. No.: **11/368,395**(22) Filed: **Mar. 7, 2006****Publication Classification**(51) **Int. Cl.**
G06F 15/173 (2006.01)(52) **U.S. Cl.** **709/223**

A system, server, method, and computer program product are disclosed for facilitating the creation of push messages pertaining to context dependent services and managing their delivery to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements. A web-based interface is presented on an administrator console for defining profiles specifying content delivery characteristics for a plurality of mobile wireless devices. The profiles can include a recipient characteristic, a message delivery mode characteristic, and a bearer characteristic. A Service Manager is coupled to the web-based interface and to a plurality of access points, for pushing a message via a specified bearer, using a specified delivery mode, to one of the plurality of mobile wireless devices of a specified recipient satisfying one of the defined profiles of content delivery characteristics when the one device is located within a coverage area of one of the plurality of access points.



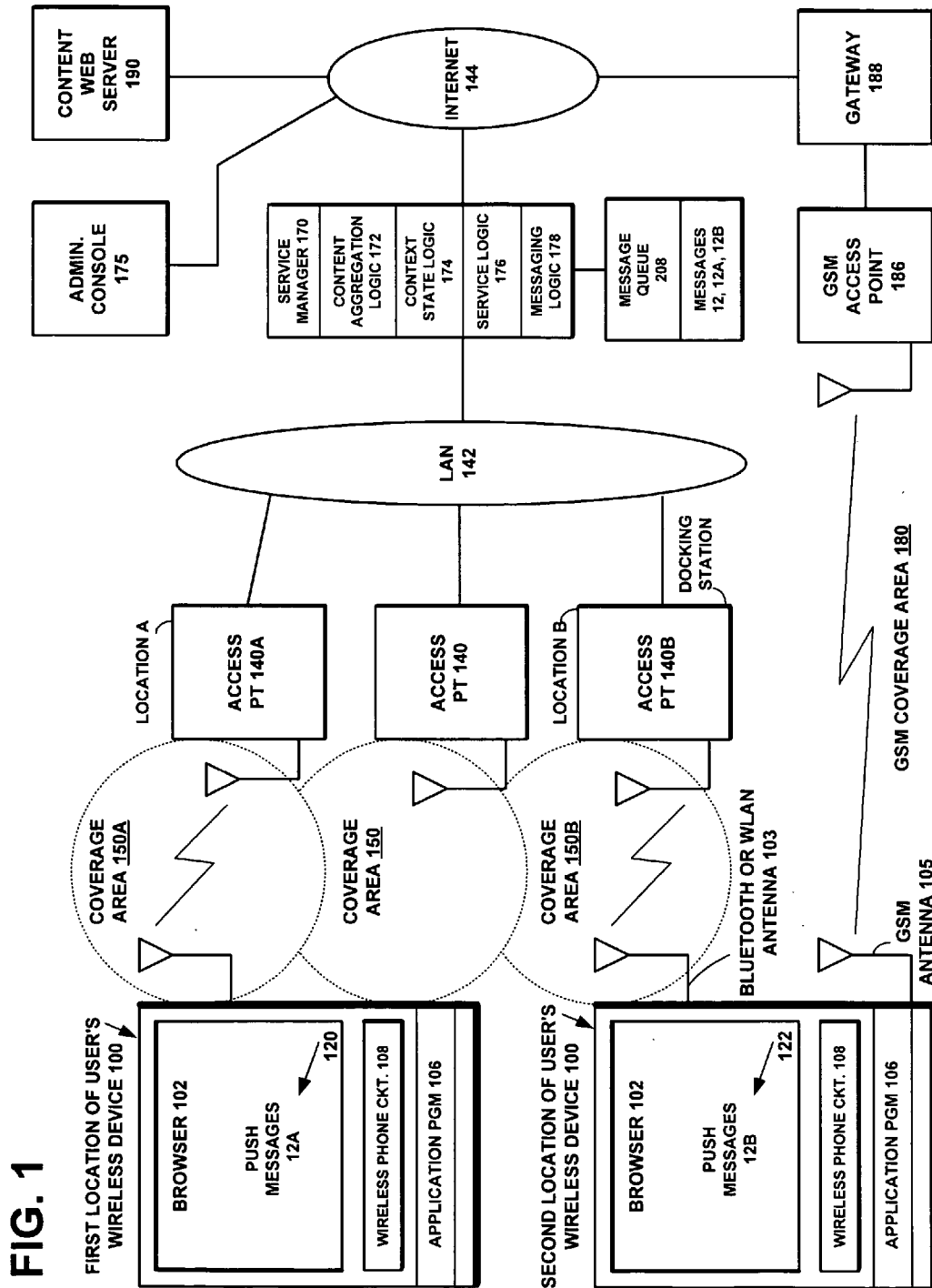


FIG. 2

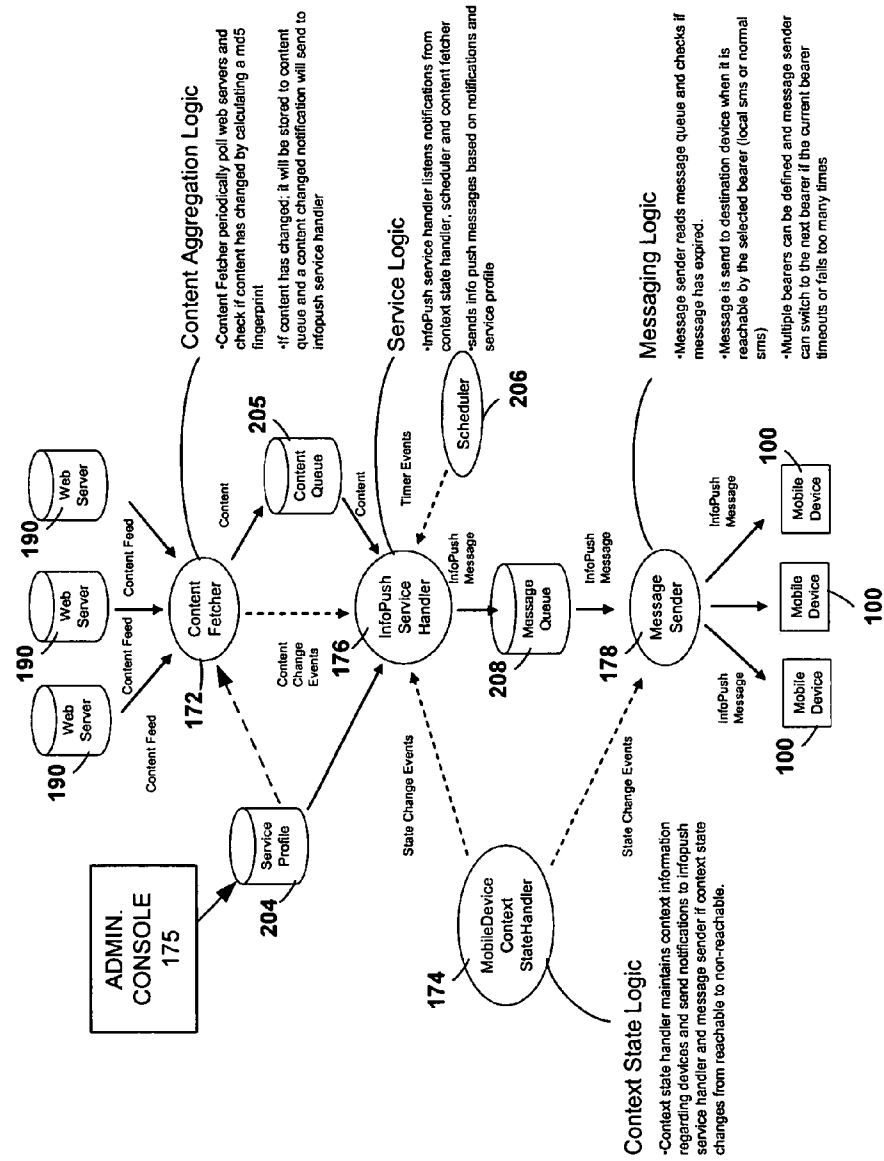


FIG. 4

ADMIN. CONSOLE 175

WEB-BASED INTERFACE 400

Channel Details: Static text

Name: Static text

Enabled: ☒

Primary bearer: Local SMS Timeout (min): 10 Retry interval (sec): 60

From: Help desk

Subject: Welcome visitor

Source type: ☒ Text ☐ URL ☐ RSS

Content text: Welcome to building X. The help desk is located on second floor, room 123.

Trigger: MD join

Occurrence: ☒ Once ☐ Always ☐ Content updated

Ok Close Apply

FIG. 5

ADMIN. CONSOLE 175

WEB-BASED INTERFACE 400'

Channel Details: <New Channel>

Name

Enabled ☒

Primary bearer Timeout (min) Retry interval (sec)

From

Subject

Source type ☐ Text ☒ URL ☐ RSS

Content URL

URL polling period minutes

XSL Stylesheet

Trigger

Occurrence ☒ Instant ☐ Interval

User status ☐ Any ☒ Online ☐ Offline

FIG. 6

ADMIN. CONSOLE 175

WEB-BASED INTERFACE 400"

Channel Details: Digest text

Name

Enabled ☒

Primary bearer Local SMS Timeout (min) 10 Retry interval (sec) 60

From News Service

Subject Latest Headlines

Source type ☐ Text ☒ URL ☐ RSS

Content URL http://newsservice.com/latestnews

URL polling period 10 minutes

XSL Stylesheet

Trigger Content updated

Occurrence ☐ Instant ☒ Interval

Message Interval 240 minutes

User status ☐ Any ☒ Online ☐ Offline

METHOD AND SYSTEM FOR CONTROLLING CONTEXTUAL INFORMATION PUSH SERVICES

FIELD OF THE INVENTION

[0001] The invention disclosed broadly relates to context-dependent services for mobile terminals and more particularly relates to facilitating the creation of push messages pertaining to context dependent services and managing their delivery to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements.

BACKGROUND OF THE INVENTION

[0002] Contextual information push service systems can involve a large set of attributes to control their service operations. System complexity is unavoidable where there are many types of service messages that need to be provided based on diverse routing, scheduling, and context or event-triggering requirements. From the end-users' point of view, the service must be accurate, easy to use, and non-intrusive. From the system administrator's point of view, the system complexity needs to be hidden so that the administrator can easily specify push messages pertaining to context dependent services and easily manage their delivery to a large population of mobile wireless devices.

[0003] What is needed in the prior art is an improved system and method to facilitate the creation of push messages pertaining to context dependent services and to manage their delivery to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements.

SUMMARY OF THE INVENTION

[0004] A system, server, method, and computer program product are disclosed for facilitating the creation of push messages pertaining to context dependent services and managing their delivery to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements.

[0005] In one aspect of the invention, a web-based interface is presented on an administrator console for defining profiles specifying content delivery characteristics for a plurality of mobile wireless devices. The profiles can include a recipient characteristic, a message delivery mode characteristic, and a bearer characteristic. A Service Manager is coupled to the web-based interface and to a plurality of access points, for pushing a message via a specified bearer, using a specified delivery mode, to one of the plurality of mobile wireless devices of a specified recipient satisfying one of the defined profiles of content delivery characteristics when the one device is located within a coverage area of one of the plurality of access points.

[0006] In another aspect of the invention, a web-based user interface is provided for an administrator to facilitate the creation and management of push messages to mobile wireless devices pertaining to context dependent services. An administrator can log onto the system's management console using a web browser and with the user interface, can perform management operations for the system. In another aspect of the invention, the push messages thus specified by the administrator are managed in their delivery to mobile wireless devices having diverse routing, scheduling, and event-triggering requirements.

[0007] The service profile prepared by the system administrator on the console using the web-based interface can specify Information Push message delivery formats, such as Short Messaging Service (SMS) messages, Multimedia Messaging Service (MMS) messages, emails, and the like. The service profile can specify scheduled delivery or delivery triggered by certain specified events. The service profile can specify delivery to the mobile device using a short-range wireless access point or optionally a GSM, GPRS, or 3 G telephone network. Additionally, the service profile can specify backup delivery channels if the specified primary channel fails to send the user the push message.

[0008] In another aspect of the invention, a service manager server manages the delivery of push messages to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements. The service manager server includes a service profile server for storing a plurality of service profiles of content delivery characteristics. The profiles each specify a bearer, using a specified delivery mode, for pushing a message to one of a plurality of mobile wireless devices of a specified recipient satisfying one of the plurality of service profiles when the one mobile wireless device is located within a coverage area of one of a plurality of access points. The service manager server also includes a content aggregation logic coupled to the service profile server, for polling web servers identified by a content characteristic in a service profile, accessing content from the web servers, and storing the content in a content queue. The service manager server also includes a service logic coupled to the content aggregation logic, the content queue, and the service profile server, for receiving a notification that content has been accessed and handling the accessed content in accordance with the service profiles in the service profile server. The service manager server also includes a context state logic coupled to the service logic and to the plurality of access points, for maintaining context information about the plurality of mobile wireless devices, including whether a specified mobile device can be reached over a communications link. The service manager server further includes a messaging logic coupled to the context state logic for selecting a specified primary bearer to send the push message to the specified mobile device if the specified mobile device can be reached over the primary bearer.

[0009] In an example of one aspect of the invention, Short Messaging Service (SMS) based news service messages can be created with the administrator's web-based user interface to send the latest headlines once a day to a number of mobile wireless device users who have subscribed to the service. The service can collect the news information from a plurality of sources and send it over SMS appropriately formatted to each of the subscribers, having diverse routing, scheduling, and context or event-triggering requirements for delivery. The information push service is performed for each subscriber when the subscriber's mobile device has a pre-specified context specified by the administrator's user interface, i.e., the message is sent only when certain conditions are met. Example of pre-specified context conditions specified by the administrator's web-based user interface can include either absolute location or "location class" of the mobile wireless device. The absolute location can be known with the granularity of a Wireless LAN or Bluetooth access point communications range, as for example, "Building in the address X, third floor, block A". Various absolute locations can be grouped by their class, for example, one

location class can be “meeting rooms”, another “office space”, and a third “home”. Other example pre-specified context conditions specified by the administrator’s web-based user interface can include contextual services being assigned to certain users or groups of users. The delivery of the service messages can be triggered when a certain user or member of a user group appears in a certain location or location class.

[0010] The resulting invention solves the problem of facilitating the creation of push messages pertaining to context dependent services and managing their delivery to mobile wireless devices having diverse routing, scheduling, and context or event-triggering requirements.

DESCRIPTION OF THE FIGURES

[0011] FIG. 1 is a network diagram according to an embodiment of the present invention.

[0012] FIG. 2 is a more detailed network diagram according to an embodiment of the present invention.

[0013] FIG. 3 is a flow diagram according to an embodiment of the present invention.

[0014] FIG. 4 is a first screen shot of the administrator’s web-based user interface according to an embodiment of the present invention.

[0015] FIG. 5 is a second screen shot of the administrator’s web-based user interface according to an embodiment of the present invention.

[0016] FIG. 6 is a third screen shot of the administrator’s web-based user interface according to an embodiment of the present invention.

DISCUSSION OF THE PREFERRED EMBODIMENT

[0017] FIG. 1 is a network diagram according to an embodiment of the present invention, showing a plurality of short-range wireless access points 140, 140A, and 140B connected to the local area network (LAN) 142. Each respective access point 140, 140A, and 140B has a corresponding coverage area 150, 150A, and 150B, respectively. The short-range wireless access points can be, for example, Bluetooth wireless devices, IEEE 802.11 Wireless LAN devices, HIPERLAN Wireless LAN devices, Ultra Wideband (UWB) radio Wireless LAN devices, or IrDA devices. Bluetooth wireless devices have a typical coverage area of a radius of 10 meters. IEEE 802.11 Wireless LAN devices and HIPERLAN Wireless LAN devices have a typical coverage area with a radius of 100 meters.

[0018] The LAN 142 of FIG. 1 interconnects the access points with the Service Manager 170, which in turn is connected to the Internet 144. The Internet 144 is connected to the telephone network gateway 188, which in turn is connected to a wireless telecommunication access point, such as the GSM access point 186. The GSM access point 186 is typically a base station transponder mounted on a tower or building, with a coverage area 180 ranging from city blocks to kilometers.

[0019] The user’s wireless device 100 in FIG. 1 includes short-range wireless communications circuits using, for example, the Bluetooth protocol, IEEE 802.11 Wireless

LAN protocol, HIPERLAN Wireless LAN protocol, Ultra Wideband (UWB) radio Wireless LAN protocol, or IrDA protocol. The user’s wireless device 100 includes a Bluetooth or Wireless LAN (WLAN) antenna 103. The user’s wireless device 100 also includes a wireless telephone circuit 108 and an antenna 105, such as a GSM circuit and antenna. The user’s wireless device 100 includes the micro-browser 102, a key pad, and an application program 106. The user’s wireless device 100 may be such as a mobile phone, a wireless communication device, a PDA, a portable audio device, a portable video device, a portable TV device, a digital camera, a digital camcorder, a wrist watch, a GPS device, or any combination of the aforesaid device. Depending on the device the content sent by system may be different. In one embodiment activating of the device may be happen via rfid. User has hid id card or padge where he has his id. Touching by rfid reader integrated to the mobile handset may activate one or more of the air interfaces available to the device and after that the service can be enabled to the user via e.g. short range coverage. The user may have own icon for the service. The service may be shown active or non-active on display of mobile handset.

[0020] The local area network (LAN) 142 interconnects the access points with the Service Manager 170, which in turn is connected to the message queue 208 buffering push messages 12, 12A, and 12B. The user’s wireless device 100 is shown at a first location A, where it is detected to be within the short-range coverage area of the first wireless access point 140A, which triggers the Service Manager 170 to push message 12A, for example, as a Short Message Service (SMS) like text message via the short-range wireless access point 140A or chain of text like messages. Then, at a later time, the device 100 is shown at a second location B, where it is detected to be within the short-range coverage area of the second wireless access point 140B, which triggers the Service Manager 170 to push message 12B, for example, as a Multimedia Messaging Service (MMS) like image message via the short-range wireless access points 140B or chain of multimedia messages to form a cartoon type experience e.g. Donald Duck cartoon in image or video format with some speech. E.g. the service may be updated time to time e.g. the web page and based on that new content user will be receiving updates from this same web page or the like source. The Service Manager 170 could have alternately chosen to push the messages 12A and 12B to the user’s wireless device 100 over the GSM network from GSM access point 186.

[0021] The Service Manager 170 pushes content, e.g. the messages 12A and 12B to the user’s wireless device 100 based on the characteristics of the context of the device 100 at the respective access points 140A and 140B. The characteristics of the contexts that trigger the Service Manager 170 to push messages 12A and 12B to device 100 are specified by a service profile prepared by the system administrator on the console 175 using e.g. the web-based interface 400, 400', or 400" shown in FIGS. 4, 5, and 6, respectively.

[0022] The service profile prepared by the system administrator on the console 175 using the web-based interface 400, 400', or 400" can specify Information Push content and message delivery formats e.g. SMS messages including text and binary messages (for example WAP Push messages), MMS messages, emails, IP data stream or files such as

audio, video and/or data content e.g. via FTP or DVB-H, etc. The service profile can specify scheduled delivery or delivery triggered by certain specified events. The service profile can specify delivery to the mobile device **100** using the short-range wireless access point **140** or optionally the wireless telecommunication, such as GSM, GPRS, or 3G telephone network. Additionally, the service profile can specify backup delivery channels if the specified primary channel fails to send the user the push content or message. Further, the system administrator can itself create ad hoc Information Push content and messages.

[0023] The Service Manager **170** in FIG. 1 includes Content Aggregation Logic **172**, Context State Logic **174**, Service Logic **176**, and Messaging Logic **178**. A more detailed system diagram of the components of the Service Manager **170** is shown in FIG. 2.

[0024] The Content Aggregation Logic **172**, also referred to herein as the Content Fetcher **172** in FIG. 2, in one embodiment of the present invention, periodically polls content servers **190**, such as web servers, and checks if content specified by the administrator's web-based console **175** has changed. The web servers **190** and specification of content are defined by the service profile in the Service Profile Server **204**. If the content has changed, it will be stored to the Content Queue **205** and a content changed notification will be sent to the Service Logic **176**, also referred to as the InfoPush Service Handler **176**.

[0025] The Context State Logic **174**, also referred to herein as the Context State Handler **174** in FIG. 2, maintains context information about the mobile devices **100** in the network. Context information includes the location of a mobile device **100** within the coverage area of an access point **140**, and/or the availability or reachability and/or device presence information of the mobile device **100** via the network. The Context State Handler **174** sends notifications to the InfoPush Service Handler **176** and Messaging Logic **178**, also referred to herein as the Message Sender **178**, if the context state of a mobile wireless device **100** changes, e.g. from a non-reachable state to a reachable state, or from the coverage area of a first access point **140A** to that of a second access point **140B** or changes in other presence information.

[0026] The following states are examples of availability/reachability information handled by the Context State Handler **174**:

[0027] LOST—indicates that the device **100** is not in the coverage area of any access point **140**.

[0028] FOUND—indicates that the device **100** is found.

[0029] ASSIGNED—indicates that the device **100** is in the process of joining the coverage area of an access point **140**.

[0030] JOINED—indicates that the device **100** has joined an access point **140** and is reachable.

[0031] ROAMING—indicates that the device **100** is temporarily out of coverage by any access point.

[0032] ERROR—indicates that the connection to the mobile device **100** has failed after several attempts. The connection to the device **100** will be retried after a predetermined timeout has occurred.

[0033] The Service Logic **176**, also referred to as the InfoPush Service Handler **176** in FIG. 2, listens to notifications from Context State Handler **174**, the Scheduler **206**, and the Content Fetcher **172**. The InfoPush Service Handler **176** sends information push messages based on notifications and Service Profile Server **204**.

[0034] The Scheduler **206** in FIG. 2 describes scheduled notifications or action requests that are based on a programmable timer or a calendar.

[0035] The Service Profile Server **204** in FIG. 2 stores the collection of service profiles prepared by the administrator on the console **175** using e.g. the web-based interfaces **400**, **400'**, or **400''** for individual user devices **100** or groups of user devices **100**. The Service Profile Server **204** defines the type of content (e.g. content source or defined messages) of services, the name of services, the subject of services, the update or occurrence intervals and/or context, the preferable bearer and/or access point **140** or points, and alternate bearers that are to be used.

[0036] The Messaging Logic **178**, also referred to herein as the Message Sender **178** in FIG. 2, reads the created messages in message queue **208** and checks if a previously defined information push Message has been sent, and if not then whether the Message expired. The Message is sent to a destination mobile device **100** when it is reachable by a selected bearer and/or access point **140**. Multiple bearers or access points **140** can be defined and Message Sender **178** can switch to the next bearer or access point **140** if the current bearer times out or fails too many times.

[0037] Messages sent in case of Bluetooth and WLAN (if needed)

[0038] Example 1*OS.MDFOUND.EVENT

[0039] This is used by the Service Point when it has discovered a new mobile device

[0040] Example for WLAN

[0041] OS.MDFOUND.EVENT 2@wrap42 OSTP/2.0

[0042] Device:WL-00:E0:03:35:47:E9

[0043] BSSID:001122334455

[0044] Example for Bluetooth

[0045] OS.MDFOUND.EVENT 2@wrap42 OSTP/2.0

[0046] Device:BT-00:10:03:35:47:88

[0047] The first example shows the message sent by a service point when it has discovered the device in wireless LAN infrastructure. The service point it is indicated by a session which is kept between service point and connectivity server.

[0048] The Device attribute specifies the MAC Layer2 address of the device. The BSSID specifies the WLAN Access point identifier (actually MAC-address).

[0049] For Bluetooth the message is similar but since the service point is also the access point no BSSID is provided in the message. The device address starts with BT for Bluetooth and WL for WLAN case.

[0050] FIG. 3, one embodiment of the present invention, is a flow diagram of the operation of the Service Manager **170**, comprising the Content Aggregation Logic **172**, also

referred to herein as the Content Fetcher 172, the Service Logic 176, also referred to as the InfoPush Service Handler 176, and the Messaging Logic 178, also referred to herein as the Message Sender 178, in transferring service message information from content sources to mobile devices. The flow diagram of FIG. 3 represents a computer program and the steps of the flow diagram represent programmed instructions of the computer program that, when executed by a computer program processor, carries out the functions of the invention.

[0051] In the Content Aggregation Logic 172, also referred to herein as the Content Fetcher 172 in FIG. 3, step 302 fetches content from the web servers 190. Step 304 checks and/or recognizes if the content has changed, updated, or if it is new. Step 306 then notifies the InfoPush Service Handler 176 of changed or new content.

[0052] In the Service Logic 176, also referred to as the InfoPush Service Handler 176 in FIG. 3, step 308 resolves recipients, delivery mode, and bearers for changed or new content. Step 310 provides input from the context state handler 174. Step 312 provides input from Service Profile Server 204. Step 314 provides input from the scheduler 206. Step 308 flows to the decision step 316 to determine the delivery mode. If the mode is an event, then the process flows to step 318 to store the content until a triggering event is received (the trigger can be a context state change or a timer event.) Step 320 then forwards the information push message to the message sender 178 when a triggering event is received. The triggering event may be immediate delivery.

[0053] In the Messaging Logic 178, also referred to herein as the Message Sender 178 in FIG. 3, step 322 then puts the information push message into the message queue 208. Step 322 flows to the decision step 324 to determine if the recipient is reachable. If so, then step 326 sends the message via the selected bearer. If the selected bearer is the Bluetooth or Wireless LAN network in coverage area 150, then the access point 140 is used to send the message to the mobile device 100. If the selected bearer is the GSM telephone network, then the GSM access point 186 is used to send the message to the mobile device 100 in the GSM coverage area 180.

[0054] If the decision step 324 of FIG. 3 determines that the recipient is not reachable, then the process flows to step 340 to keep the message in the content queue 205 until the message expires or until the recipient becomes reachable. Step 310' provides input from the context state handler 174. Step 340 then flows to the decision step 342 to determine if a secondary bearer has been defined in the event that the information push message expires. Step 312' provides an input from the Service Profile Server 204. If a secondary bearer has been defined, then the process flows to step 350 to resend the message using the secondary bearer. Step 350 flows back to step 322 to put the information push message into the message queue 208.

[0055] If decision step 342 of FIG. 3 determines that no secondary bearer has been defined, then step 352 discards the message.

[0056] Back in the InfoPush Service Handler 176 of FIG. 3, if the decision step 316 determines that the delivery mode is a content update, then the process flows to step 330 to resolve the delivery time. Then step 330 flows to either step

332 or to step 334. Step 332 schedules the timer if content is specified by the service profile to be delivered later. When a scheduled timer event occurs, then the information push message is forwarded. Step 314' provides input from scheduler 206. Instead, if step 330 flows to step 334, the information push message is forwarded if the content is specified by the service profile to be delivered immediately. Both step 332 and step 334 flow to step 322 to put the information push message into the message queue 208.

[0057] FIGS. 4, 5, and 6, one embodiments of the present invention, depict the web-based administrator's interfaces 400, 400', and 400'' that enable the administrator to configure information push services step-by-step for the following use cases.

[0058] FIG. 4 shows a screen shot of an administrator's interface 400 implemented as a web page on the administrator's console 175, configured to enable an administrator to send messages that contain static text, which can be typed in by the administrator. For example, a static welcome message: "Welcome to building X. Help desk can be found at floor 1, room 123". Only relevant input fields for each use case are shown at a time. Even the message may contain information in a map format so that user is visiting new office building of Morgan&Finnegan he will get information in a map format to find the entrance. The map may be different depending on the service point.

[0059] FIG. 5 shows a screen shot of an administrator's interface 400' implemented as a web page on the administrator's console 175, configured to enable an administrator to specify dynamic messages to be sent whose content is fetched from an Internet or intranet content web page server 190. The interface 400' contains text string (e.g. "security alert") that needs to be completely sent to the user's mobile device 100. When the content page is updated, the old text is replaced with new. The content source is specified with a URL. If the content is in XML-format, it can be formatted to text using an XSLT-stylesheet. Whenever the content specified by the interface 400' is changed, a new message is created, meaning that users should get one message per content change. The messages are queued on the server 205 until the user comes online in the local coverage of an access point 140 and the messages are then sent to the mobile device 100 to ensure that the user gets all information that has been updated while the user was offline. For example, content of a security alert web page specified by interface 400' can be sent to user's device 100 every time it is updated. It is important that the user's device 100 gets all alerts even if he has been away for a while.

[0060] FIG. 6 shows a screen shot of an administrator's interface 400'' implemented as a web page on the administrator's console 175, configured to enable an administrator to specify dynamic digest messages to be sent whose content is fetched from an Internet or intranet web page servers 190. In this use case, the interface 400'' contains a list of items (e.g. news headings) instead of one, and new items are added to the top of list, thus rolling the older items downwards. With this type of content, it is not necessary to send any intermittent versions of the page, but only the newest version, which contains also the older items. Whenever a user's mobile device 100 comes online, a message is generated from the current web page version. It is possible to specify the minimum time period between messages, e.g. the

web page may be updated with a new item once per hour, but users get updates only once per day. As an alternative, it is possible to specify the times of day (e.g. after 8:00, 12:00, and 16:00) after the users get updated information.

[0061] System Overview

[0062] The system may be a bridge between existing office or enterprise applications and servers to mobile devices such as mobile phones, smart phones, and other similar devices. The mobile devices communicate wirelessly with Nokia Service Points via Bluetooth and WLAN. The Service Points detect the presence of registered mobile devices in the coverage area and enable the mobile device users to access existing office or enterprise applications. The system uses a centralized Connectivity Server as the interface between the Service Points and the office/enterprise application servers. A Service Point, upon detecting a mobile device in its coverage area, receives the mobile device ID and transmits it to the Connectivity Server for authentication. The Service Point does not transmit any location information of itself or the mobile device to the Connectivity Server upon detection of the mobile device.

[0063] The “Access Points” in the System

[0064] The system uses a plurality of “multiradio Service Point[s] for connecting the mobile device to backend services.” The registered user is detected and authenticated when arriving in the Service Point coverage area. The Nokia Service Point has “Bluetooth, WLAN, LAN, and optionally also GPRS or SMS connectivity.

[0065] The Service Points do not attempt to identify the mobile device or user, but merely transmit the mobile device’s identifier to a Service Manager. As can be seen the Service Manager is the interface to the existing enterprise applications and servers. The Service Manager provides the Connectivity Server with static persistent data on authorized service points, provisioned mobile devices, users and services.

[0066] The following shows what happens when a mobile device enters a coverage area of a Service Point:

[0067] Mobile Device Joins the service

[0068] Actors: Mobile device, Service Point, Connectivity Server, Manager, External

[0069] Application

[0070] Precondition:

[0071] End-user and mobile device have been provisioned to system

[0072] Service point has established a connection to connectivity server

[0073] Connectivity server has already fetched service profiles from the Service Manager

[0074] Post condition

[0075] Mobile device has been assigned to a first service point that discovered it

[0076] Description

[0077] Mobile Device arrives to one or more Service Points’ coverage

[0078] One or multiple service points discover the mobile device

[0079] Service points send register mobile device message to connectivity server

[0080] Connectivity server fetches user profile from the Service Manager and authenticates the user

[0081] Connectivity server responses to first service point by sending assign message, which commands service point to join with the mobile device

[0082] Service point acknowledges that the mobile device has joined with the service point

[0083] This shows that the Service Point sends the Connectivity Server a message so that the Connectivity Server may authenticate the user.

[0084] Three scenarios—connectivity via Bluetooth where the Service Point initiates contact with the mobile device, connectivity via Bluetooth where the mobile device initiates contact with the Service Point, and connectivity via WLAN. It may be seen that all communications from the Service Points are directed to the Connectivity Server and the Service Manager, and the Connectivity Server authenticates the user using the mobile device’s device ID such as its MAC address.

[0085] Although specific embodiments of the invention have been disclosed, a person skilled in the art will understand that changes can be made to the specific embodiments without departing from the spirit and scope of the invention.

1. A system for content delivery to a one or more mobile wireless devices, comprising:

at least one service profile specifying content delivery characteristics for one or a plurality of mobile wireless devices, the at least one profile including a recipient characteristic, a message delivery mode characteristic, and a bearer characteristic;

one or a plurality of wireless access points distributed in a network; and

a service manager coupled to the one or plurality of access points, for pushing content via a specified bearer, using a specified delivery mode, to one of the plurality of mobile wireless devices of a specified recipient satisfying one of the defined profiles of content delivery characteristics when the one mobile wireless device is located within a coverage area of one of the plurality of access points.

2. The system of claim 1, which further comprises:

a service profile server coupled to the interface for storing the service profiles, the profiles including a content characteristic;

a content aggregation logic coupled to the service profile server, for polling content servers identified by the content characteristic in a service profile, and recognizing content from the content servers

3. The system of claim 2, which further comprises:

a service logic coupled to the content aggregation logic, the content queue, and the service profile server, for receiving a notification that content has been recog-

nized and handling the recognized content in accordance with the service profiles in the service profile server.

4. The system of claim 3, which further comprises:

a context state logic coupled to the service logic and to the plurality of access points, for maintaining context information about the one or more -mobile wireless devices, including whether a specified mobile device can be reached over a communications link.

5. The system of claim 4, which further comprises:

said service logic determining a delivery mode of the recognized content for the specified mobile device;

said service logic storing the recognized content until a triggering event if the delivery mode specified by the service profile is a specified event, and forwarding the recognized content as a push content to a messaging logic when the specified event occurs;

said service logic resolving a delivery time for the recognized content if the delivery mode specified by the service profile is that the content has been updated, and forwarding the recognized content as a push content to a messaging logic either when a scheduled timer event occurs or immediately, depending on the service profile.

6. The system of claim 5, which further comprises:

said messaging logic being coupled to the context state logic for selecting a specified primary bearer to send the push content to the specified mobile device if the specified mobile device can be reached over the primary bearer;

said messaging logic selecting a specified alternate bearer to send the push content to the specified mobile device if the specified mobile device cannot be reached over the primary bearer and can be reached over the alternate bearer.

7. The system of claim 6, which further comprises:

said primary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network;

said secondary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network.

8. The system of claim 1, which further comprises:

said service profiles including specifications selected from the group consisting of type of content, name of services, subject of services, update or occurrence intervals, update of context, preferable bearer, and alternate bearers.

9. The system/of claim 1, which further comprises:

an interface for defining at least one service profile being drawn from the group consisting interfaces configured to enable an administrator to send messages that contain static content, interfaces configured to enable an administrator to specify dynamic content to be sent whose content is fetched from an Internet or intranet content web page server, and interfaces configured to enable an administrator to specify dynamic digest content to be sent whose content is fetched from an Internet or intranet web page server.

10. The system of claim 1, which further comprises:

said content having a format drawn from the group consisting of SMS messages, MMS messages, and emails.

11. A service manager server for content delivery to a plurality of mobile wireless devices, comprising:

a service profile server for storing a plurality of service profiles of content delivery characteristics, the profiles each specifying a bearer, using a specified delivery mode, for pushing a message to one of a plurality of mobile wireless devices of a specified recipient satisfying one of the plurality of service profiles when the one mobile wireless device is located within a coverage area of one of a plurality of access points;

a content aggregation logic coupled to the service profile server, for polling web servers identified by a content characteristic in a service profile, accessing content from the web servers, and storing the content in a content queue;

a service logic coupled to the content aggregation logic, the content queue, and the service profile server, for receiving a notification that content has been accessed and handling the accessed content in accordance with the service profiles in the service profile server;

a context state logic coupled to the service logic and to the plurality of access points, for maintaining context information about the plurality of mobile wireless devices, including whether a specified mobile device can be reached over a communications link; and

a messaging logic coupled to the context state logic for selecting a specified primary bearer to send the push message to the specified mobile device if the specified mobile device can be reached over the primary bearer.

12. The server of claim 11, which further comprises:

said messaging logic selecting a specified alternate bearer to send the push message to the specified mobile device if the specified mobile device cannot be reached over the primary bearer and can be reached over the alternate bearer.

13. The server of claim 12, which further comprises:

said service logic determining a delivery mode of the accessed content for the specified mobile device;

said service logic storing the accessed content until a triggering event if the delivery mode specified by the service profile is a specified event, and forwarding the accessed content as a push message to a messaging logic when the specified event occurs;

said service logic resolving a delivery time for the accessed content if the delivery mode specified by the service profile is that the content has been updated, and forwarding the accessed content as a push message to a messaging logic either when a scheduled timer event occurs or immediately, depending on the service profile.

14. The server of claim 13, which further comprises:

said primary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network;

said secondary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network.

15. The server of claim 11, which further comprises:

said service profiles including specifications selected from the group consisting of type of content, name of services, subject of services, update or occurrence intervals, update of context, preferable bearer, and alternate bearers.

16. The server of claim 11, which further comprises:

said message having a format drawn from the group consisting of SMS messages, MMS messages, and emails.

17. A method for content delivery to a plurality of mobile wireless devices, comprising:

storing a plurality of service profiles of content delivery characteristics, the profiles each specifying a bearer, using a specified delivery mode, for pushing a message to one of a plurality of mobile wireless devices of a specified recipient satisfying one of the plurality of service profiles when the one mobile wireless device is located within a coverage area of one of a plurality of access points;

polling web servers identified by a content characteristic in a service profile, accessing content from the web servers, and storing the content;

receiving a notification that content has been accessed and handling the accessed content in accordance with the service profiles;

maintaining context information about the plurality of mobile wireless devices, including whether a specified mobile device can be reached over a communications link; and

selecting a specified primary bearer to send the push message to the specified mobile device if the specified mobile device can be reached over the primary bearer.

18. The method of claim 17, which further comprises:

selecting a specified alternate bearer to send the push message to the specified mobile device if the specified mobile device cannot be reached over the primary bearer and can be reached over the alternate bearer.

19. The method of claim 18, which further comprises:

determining a delivery mode of the accessed content for the specified mobile device;

storing the accessed content until a triggering event if the delivery mode specified by the service profile is a specified event, and forwarding the accessed content as a push message when the specified event occurs;

resolving a delivery time for the accessed content if the delivery mode specified by the service profile is that the content has been updated, and forwarding the accessed content as a push message either when a scheduled timer event occurs or immediately, depending on the service profile.

20. The method of claim 19, which further comprises:

said primary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network;

said secondary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network.

21. The method of claim 17, which further comprises:

said service profiles including specifications selected from the group consisting of type of content, name of services, subject of services, update or occurrence intervals, update of context, preferable bearer, and alternate bearers.

22. The method of claim 17, which further comprises:

said message having a format drawn from the group consisting of SMS messages, MMS messages, and emails.

23. A computer program product for providing content delivery to a plurality of mobile wireless devices, comprising:

a computer readable medium containing program code for execution by a computer program processor;

program code in said computer readable medium for storing a plurality of service profiles of content delivery characteristics, the profiles each specifying a bearer, using a specified delivery mode, for pushing a message to one of a plurality of mobile wireless devices of a specified recipient satisfying one of the plurality of service profiles when the one mobile wireless device is located within a coverage area of one of a plurality of access points;

program code in said computer readable medium for polling web servers identified by a content characteristic in a service profile, accessing content from the web servers, and storing the content;

program code in said computer readable medium for receiving a notification that content has been accessed and handling the accessed content in accordance with the service profiles;

program code in said computer readable medium for maintaining context information about the plurality of mobile wireless devices, including whether a specified mobile device can be reached over a communications link; and

program code in said computer readable medium for selecting a specified primary bearer to send the push message to the specified mobile device if the specified mobile device can be reached over the primary bearer.

24. The computer program product of claim 23, which further comprises:

program code in said computer readable medium for selecting a specified alternate bearer to send the push message to the specified mobile device if the specified mobile device cannot be reached over the primary bearer and can be reached over the alternate bearer.

25. The computer program product of claim 24, which further comprises:

program code in said computer readable medium for determining a delivery mode of the accessed content for the specified mobile device;

program code in said computer readable medium for storing the accessed content until a triggering event if the delivery mode specified by the service profile is a specified event, and forwarding the accessed content as a push message when the specified event occurs;

program code in said computer readable medium for resolving a delivery time for the accessed content if the delivery mode specified by the service profile is that the content has been updated, and forwarding the accessed content as a push message either when a scheduled timer event occurs or immediately, depending on the service profile.

26. The computer program product of claim 25, which further comprises:

said primary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network;

said secondary bearer being selected from the group consisting of said wireless access points and a wireless telephone communications network.

27. The computer program product of claim 23, which further comprises:

said service profiles including specifications selected from the group consisting of type of content, name of services, subject of services, update or occurrence intervals, update of context, preferable bearer, and alternate bearers.

28. The computer program product of claim 23, which further comprises:

said message having a format drawn from the group consisting of SMS messages, MMS messages, and emails.

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