US 20100009662A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0009662 A1

(43) Pub. Date: Jan. 14, 2010

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(54) DELAYING INTERACTION WITH POINTS OF INTEREST DISCOVERED BASED ON DIRECTIONAL DEVICE INFORMATION

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(21) Appl. No.: **12/437,863**

(22) Filed: **May 8, 2009**

**Related U.S. Application Data**

(60) Provisional application No. 61/074,415, filed on Jun. 20, 2008, provisional application No. 61/074,590, filed on Jun. 20, 2008.

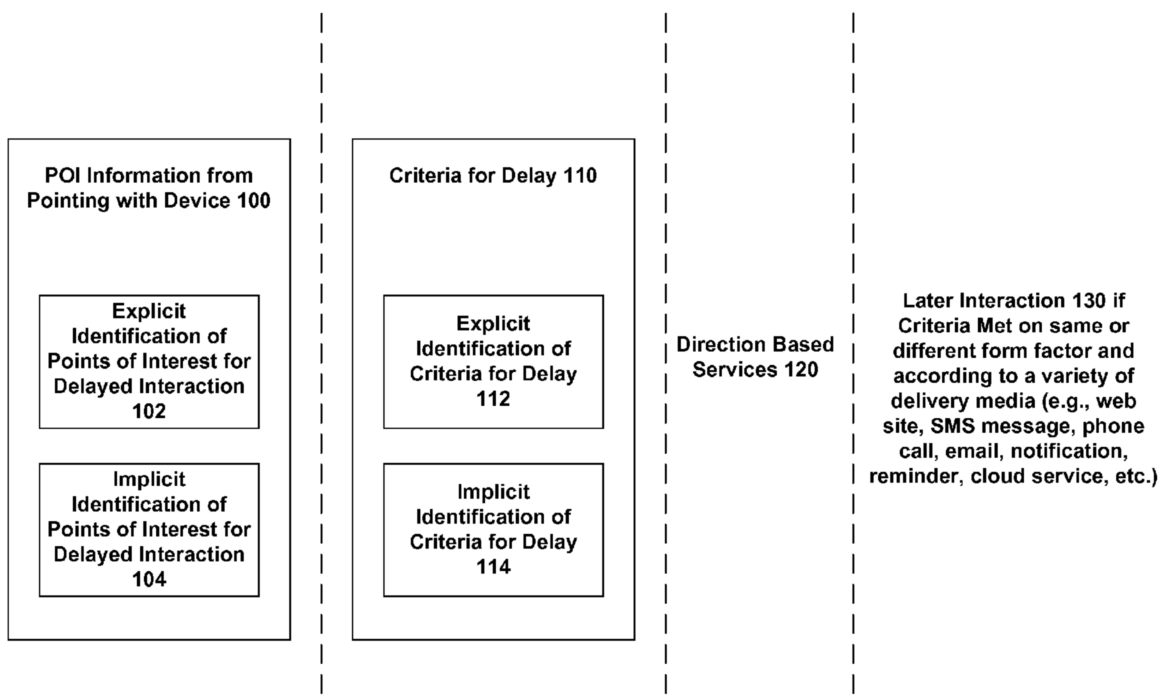
**Publication Classification**

(51) **Int. Cl.**
*H04M 3/42* (2006.01)

(52) **U.S. Cl.** ..................................................... **455/414.1**

(57) **ABSTRACT**

With the addition of directional information in the environment, a variety of service(s) can be provided on top of user identification or interaction with specific object(s) of interest by pointing at the objects. Sometimes either the device user and/or the publishers of content associated with a POI with which a user interacts will wish to delay the interaction with the POI and associated content. For such scenarios, items discovered through direction-based location services can be designated for later interaction, e.g., according to pre-defined criteria that define explicitly or implicitly when the later interaction will occur. Device users are thus provided with relevant content about endpoints of direction based services at relevant times, which may not be the time of initial contact with the POI.



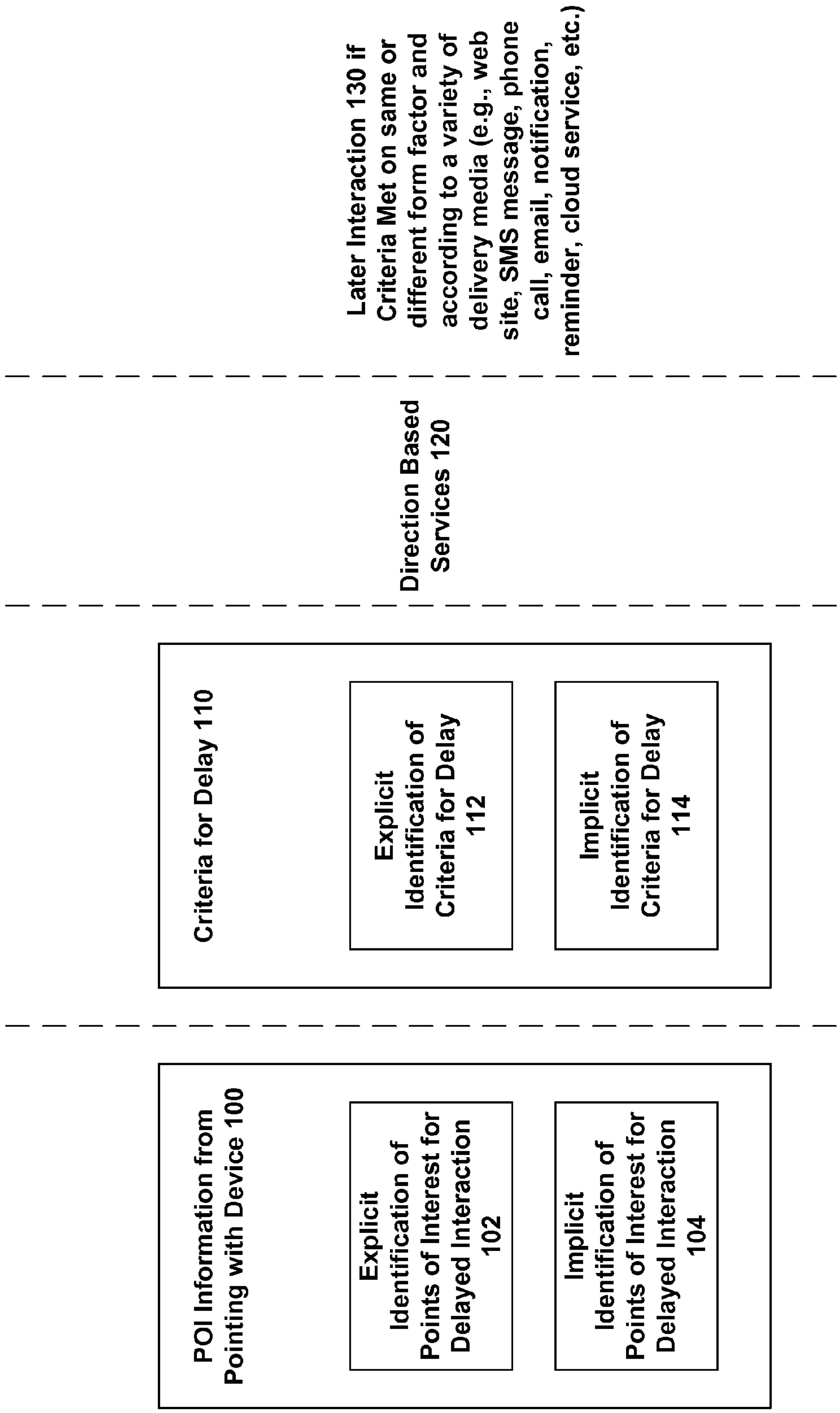

POI Information from Pointing with Device 100
Explicit Identification of Points of Interest for Delayed Interaction 102
Implicit Identification of Points of Interest for Delayed Interaction 104
Criteria for Delay 110
Explicit Identification of Criteria for Delay 112
Implicit Identification of Criteria for Delay 114
Direction Based Services 120
Later Interaction 130 if Criteria Met on same or different form factor and according to a variety of delivery media (e.g., web site, SMS message, phone call, email, notification, reminder, cloud service, etc.)

FIG. 1

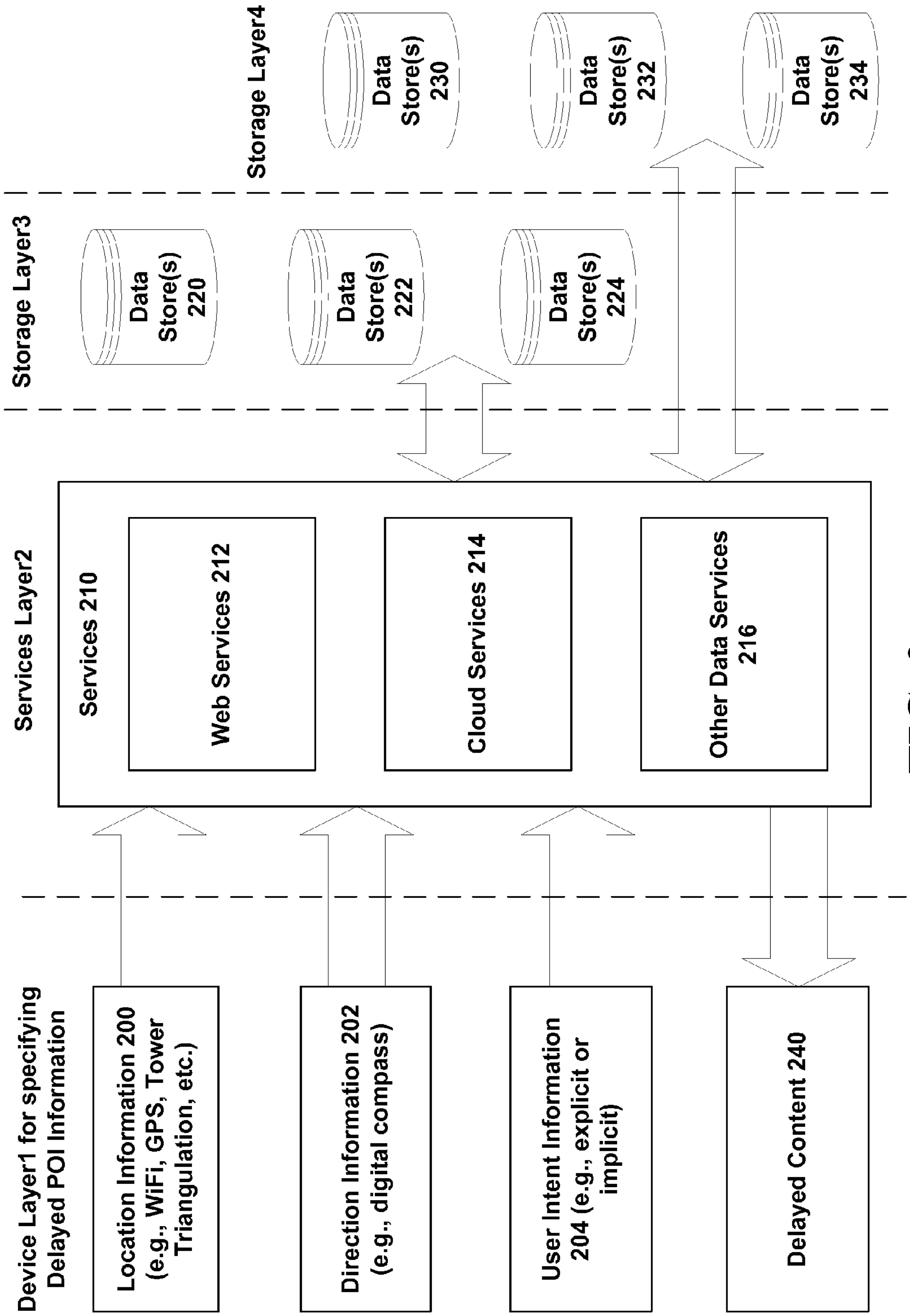

Storage Layer4
Data Store(s) 230
Data Store(s) 232
Data Store(s) 234
Storage Layer3
Data Store(s) 220
Data Store(s) 222
Data Store(s) 224
Services Layer2
Services 210
Web Services 212
Cloud Services 214
Other Data Services 216
Device Layer1 for specifying Delayed POI Information
Location Information 200 (e.g., WiFi, GPS, Tower Triangulation, etc.)
Direction Information 202 (e.g., digital compass)
User Intent Information 204 (e.g., explicit or implicit)
Delayed Content 240

FIG. 2

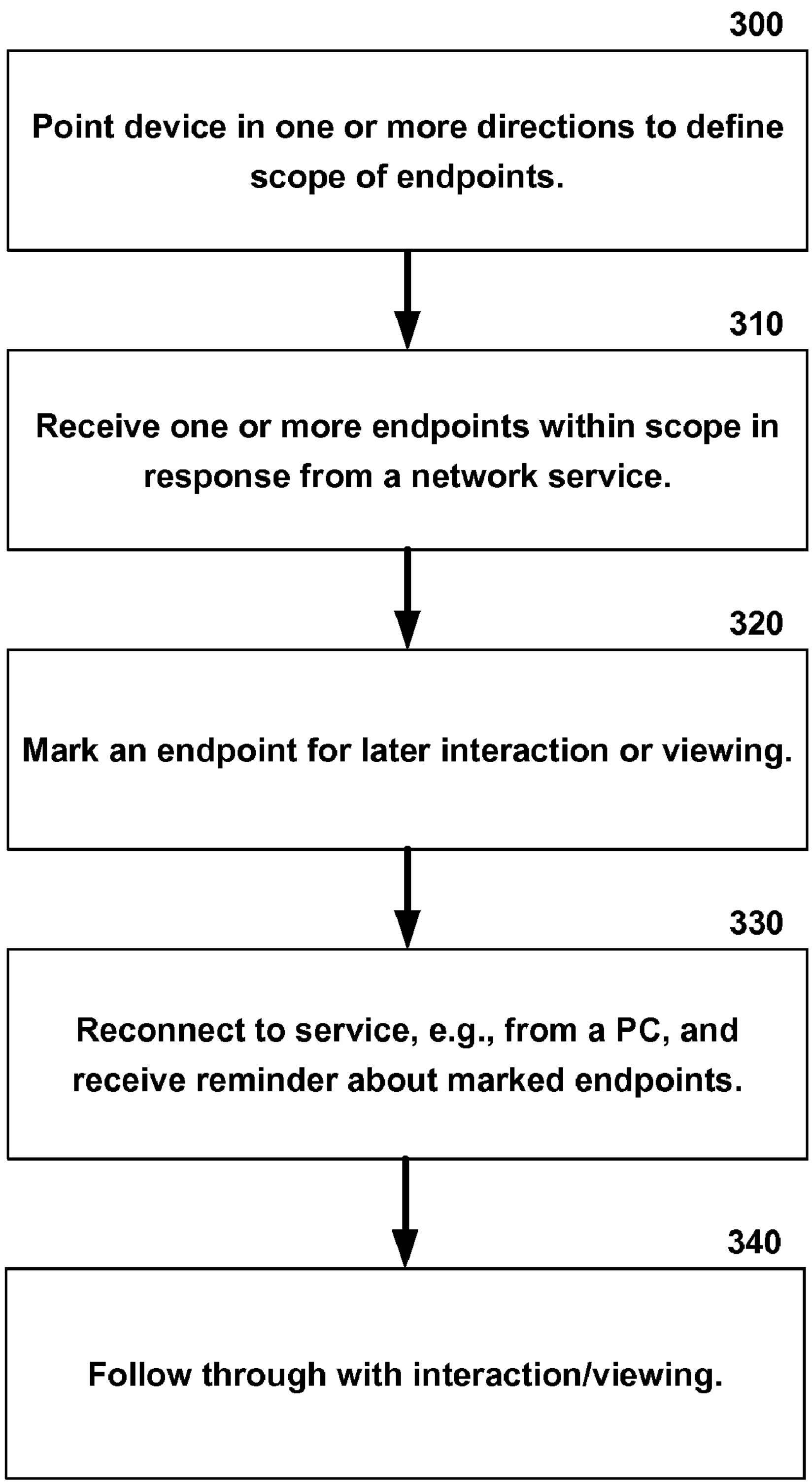

300
Point device in one or more directions to define scope of endpoints.
310
Receive one or more endpoints within scope in response from a network service.
320
Mark an endpoint for later interaction or viewing.
330
Reconnect to service, e.g., from a PC, and receive reminder about marked endpoints.
340
Follow through with interaction/viewing.

FIG. 3

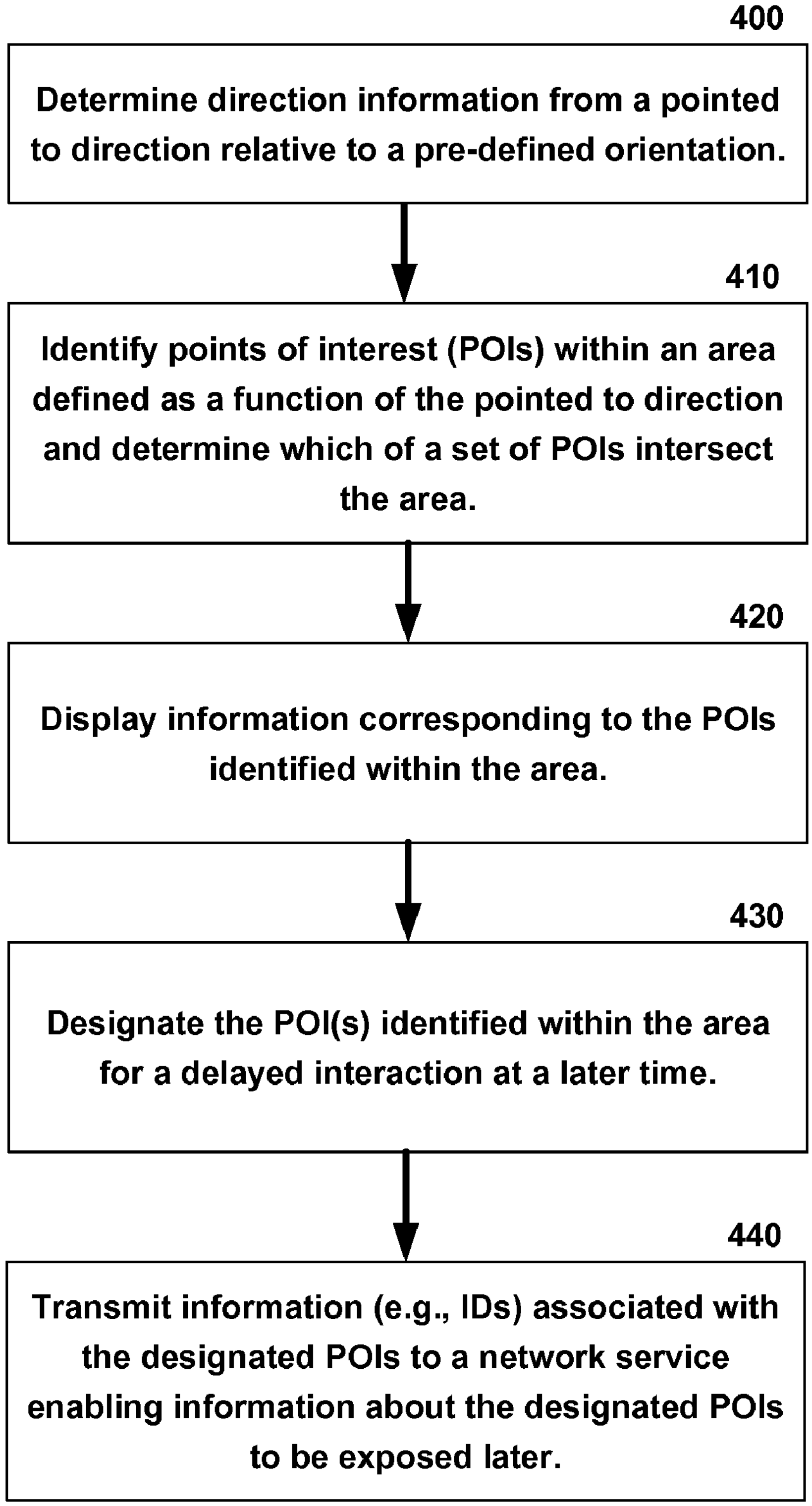

400
Determine direction information from a pointed to direction relative to a pre-defined orientation.
410
Identify points of interest (POIs) within an area defined as a function of the pointed to direction and determine which of a set of POIs intersect the area.
420
Display information corresponding to the POIs identified within the area.
430
Designate the POI(s) identified within the area for a delayed interaction at a later time.
440
Transmit information (e.g., IDs) associated with the designated POIs to a network service enabling information about the designated POIs to be exposed later.

FIG. 4

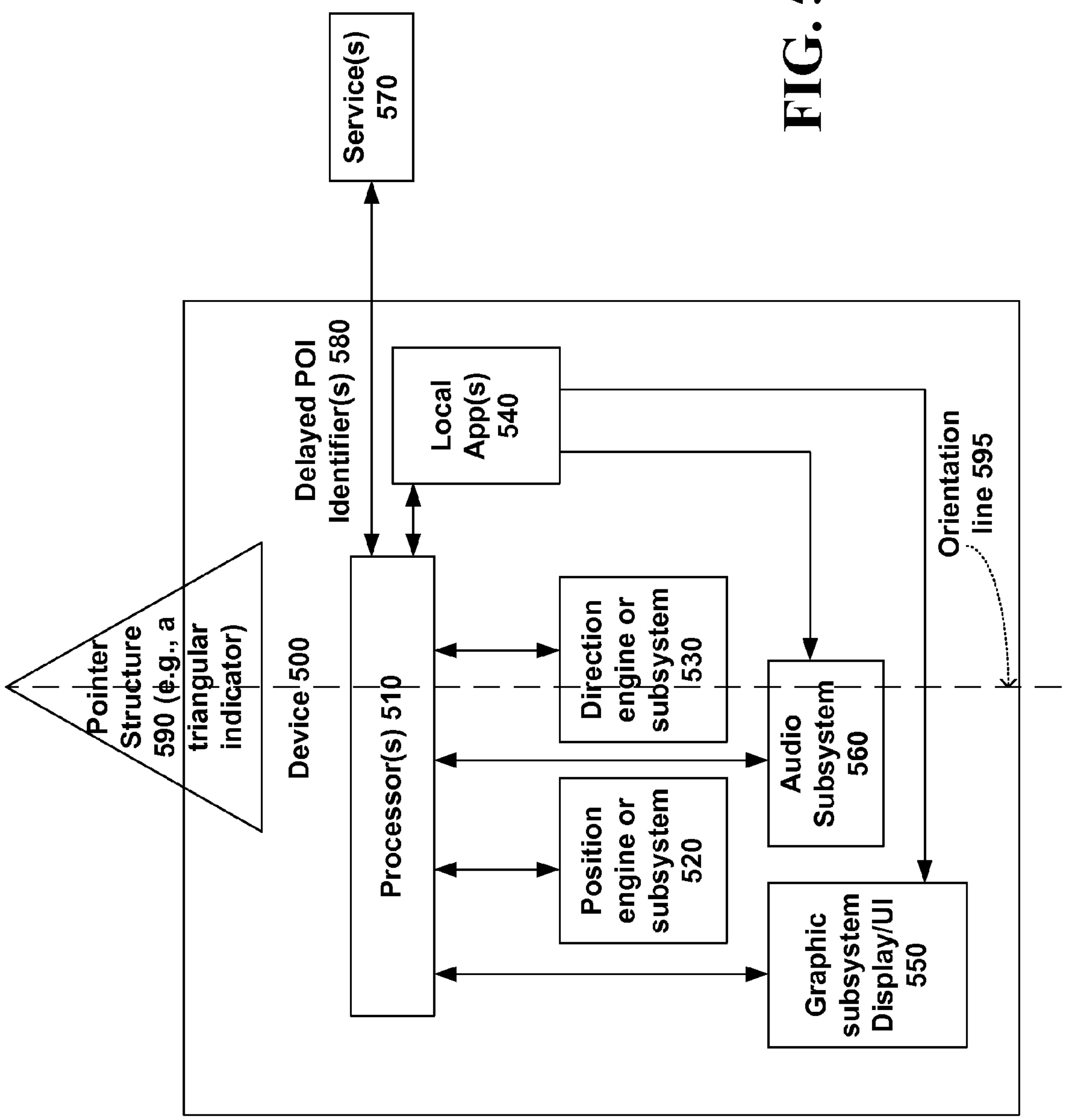

Service(s) 570
Delayed POI Identifier(s) 580
Local App(s) 540
Pointer Structure 590 (e.g., a triangular indicator)
Device 500
Processor(s) 510
Direction engine or subsystem 530
Position engine or subsystem 520
Audio Subsystem 560
Graphic subsystem Display/UI 550
Orientation line 595

FIG. 5

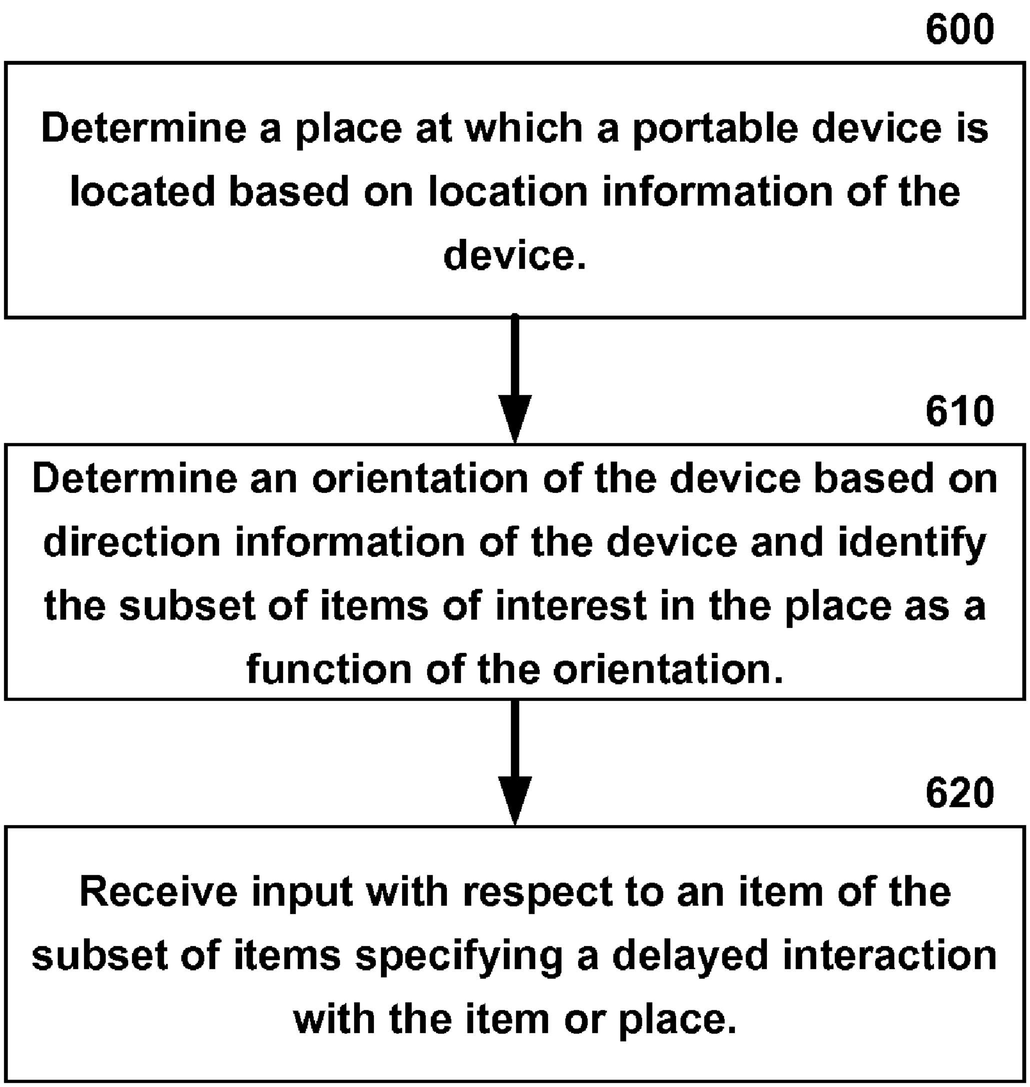

600
Determine a place at which a portable device is located based on location information of the device.
610
Determine an orientation of the device based on direction information of the device and identify the subset of items of interest in the place as a function of the orientation.
620
Receive input with respect to an item of the subset of items specifying a delayed interaction with the item or place.

FIG. 6

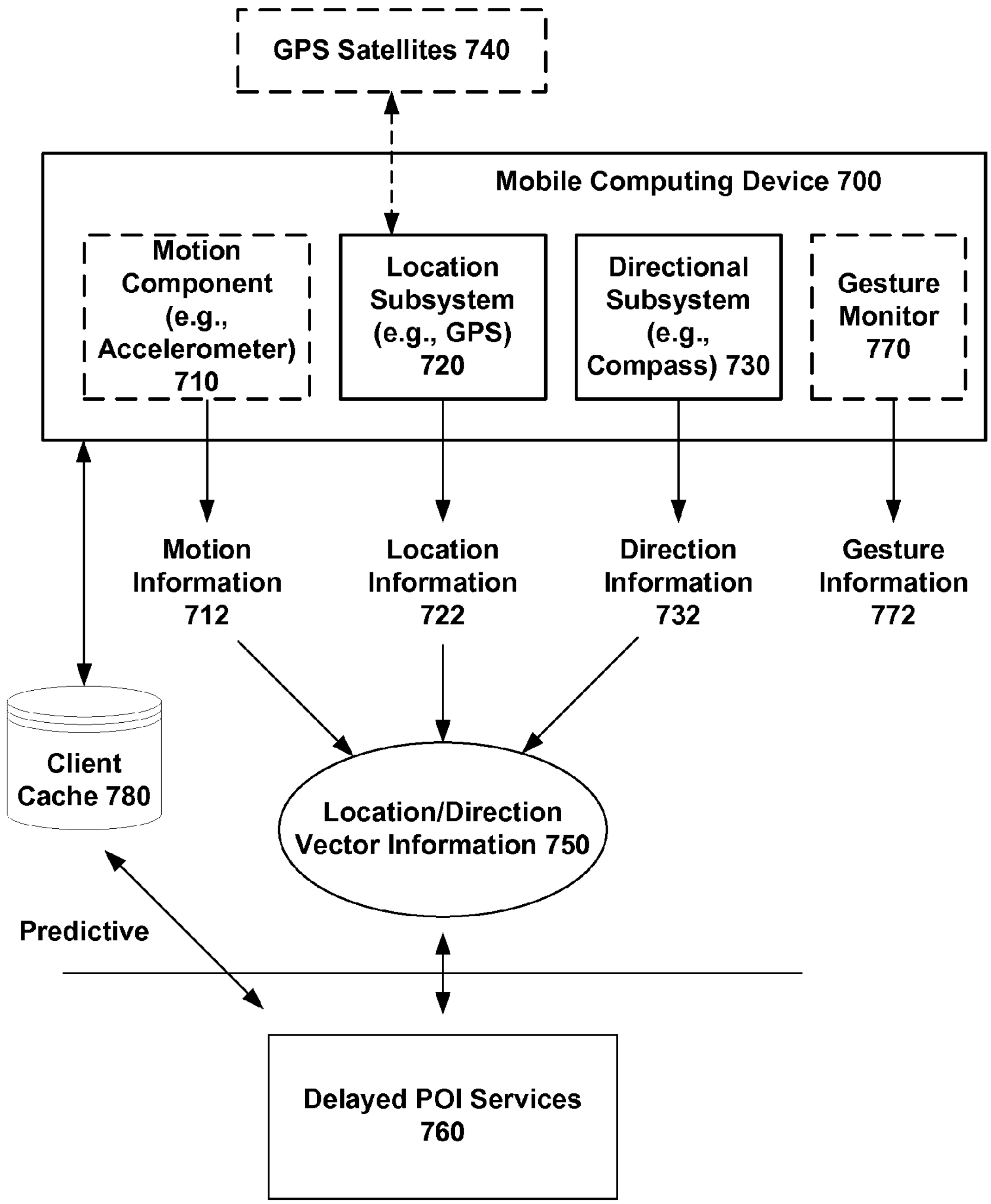

GPS Satellites 740
Mobile Computing Device 700
Motion Component (e.g., Accelerometer) 710
Location Subsystem (e.g., GPS) 720
Directional Subsystem (e.g., Compass) 730
Gesture Monitor 770
Motion Information 712
Location Information 722
Direction Information 732
Gesture Information 772
Client Cache 780
Location/Direction Vector Information 750
Predictive
Delayed POI Services 760

FIG. 7

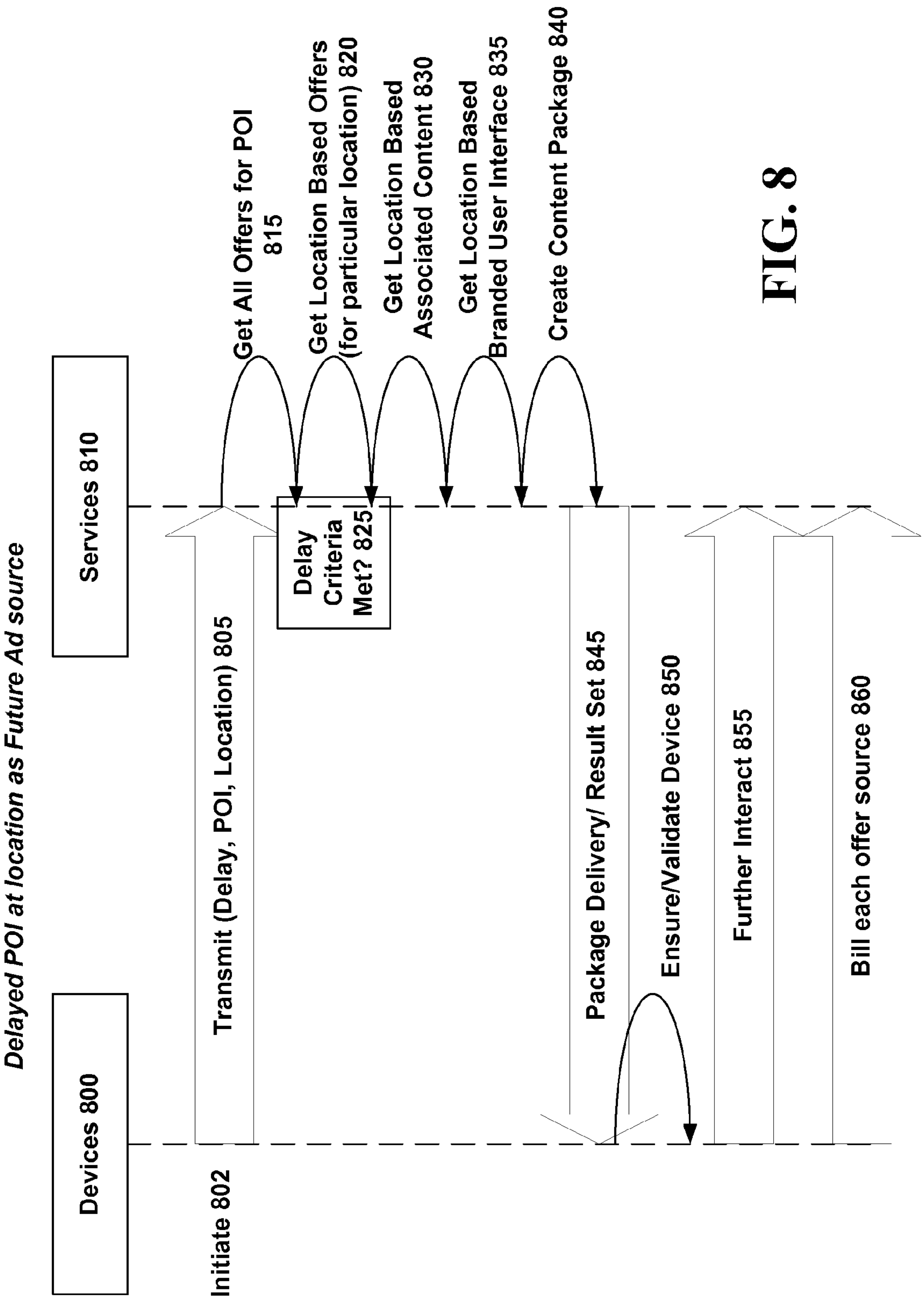

Delayed POI at location as Future Ad source
Devices 800
Services 810
Initiate 802
Transmit (Delay, POI, Location) 805
Delay Criteria Met? 825
Get All Offers for POI 815
Get Location Based Offers (for particular location) 820
Get Location Based Associated Content 830
Get Location Based Branded User Interface 835
Create Content Package 840
Package Delivery/ Result Set 845
Ensure/Validate Device 850
Further Interact 855
Bill each offer source 860

FIG. 8

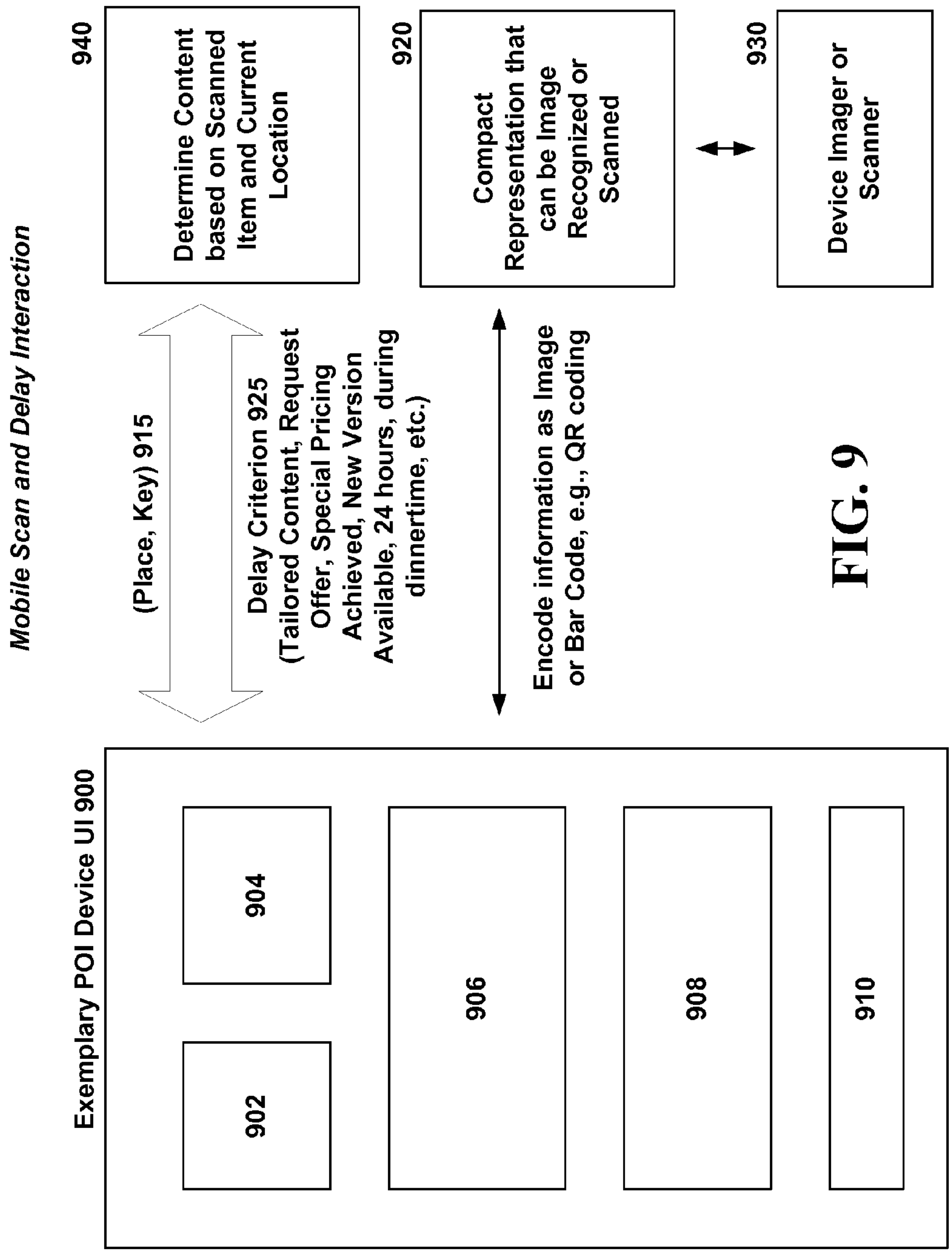

Mobile Scan and Delay Interaction
Exemplary POI Device UI 900
902
904
906
908
910
(Place, Key) 915
Delay Criterion 925 (Tailored Content, Request Offer, Special Pricing Achieved, New Version Available, 24 hours, during dinnertime, etc.)
Encode information as Image or Bar Code, e.g., QR coding
940
Determine Content based on Scanned Item and Current Location
920
Compact Representation that can be Image Recognized or Scanned
930
Device Imager or Scanner

FIG. 9

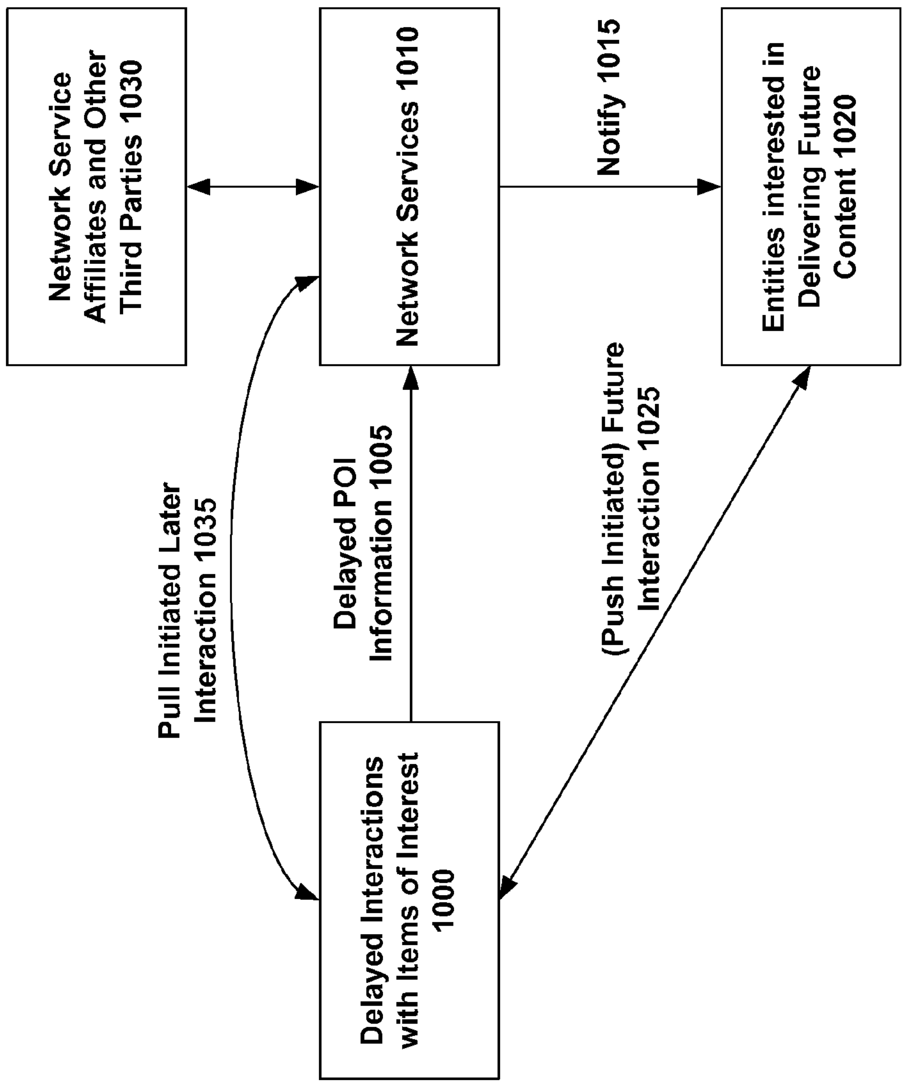

Network Service Affiliates and Other Third Parties 1030
Network Services 1010
Notify 1015
Entities interested in Delivering Future Content 1020
Pull Initiated Later Interaction 1035
Delayed POI Information 1005
(Push Initiated) Future Interaction 1025
Delayed Interactions with Items of Interest 1000

FIG. 10

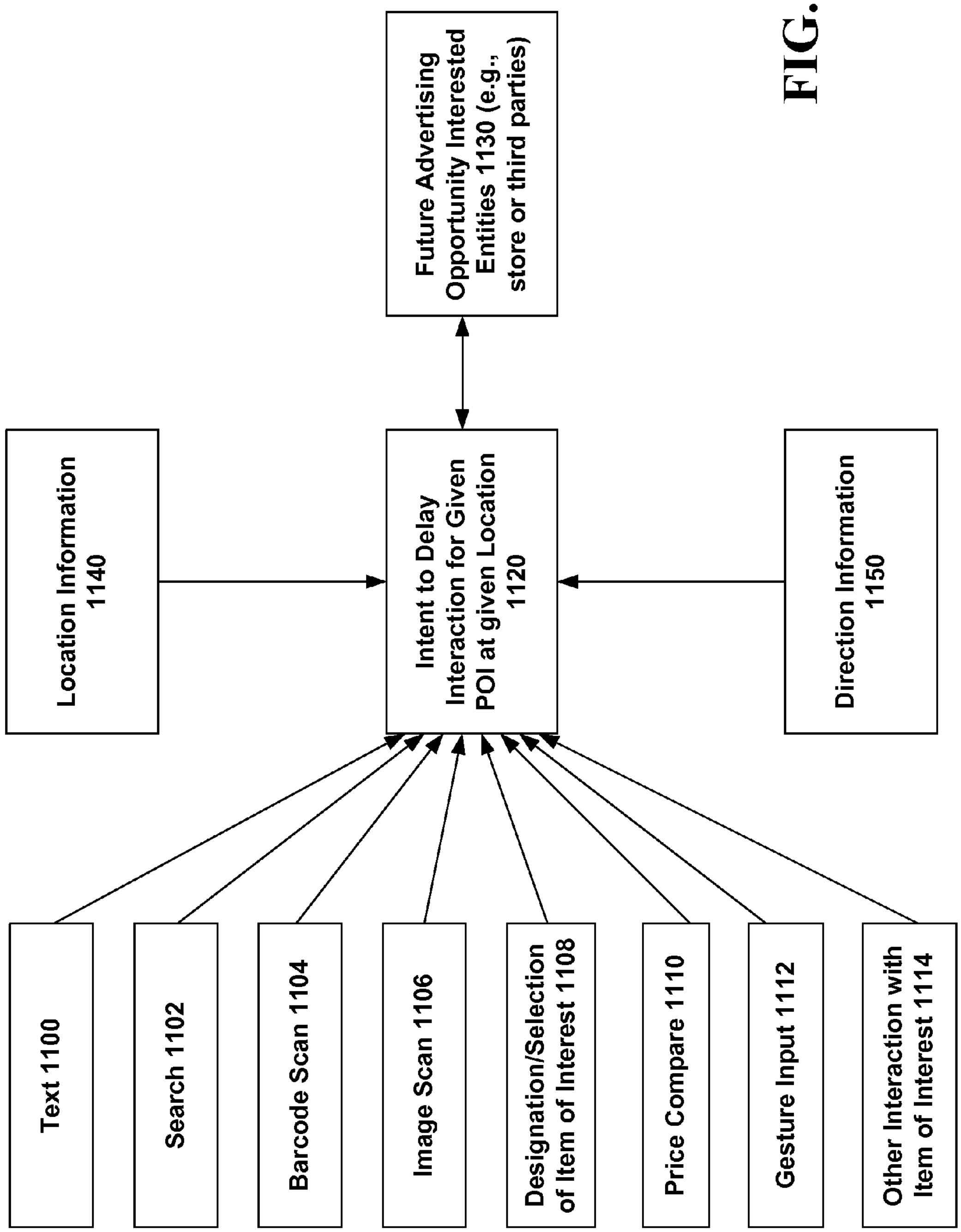

Future Advertising Opportunity Interested Entities 1130 (e.g., store or third parties)
Location Information 1140
Intent to Delay Interaction for Given POI at given Location 1120
Direction Information 1150
Text 1100
Search 1102
Barcode Scan 1104
Image Scan 1106
Designation/Selection of Item of Interest 1108
Price Compare 1110
Gesture Input 1112
Other Interaction with Item of Interest 1114

FIG. 11

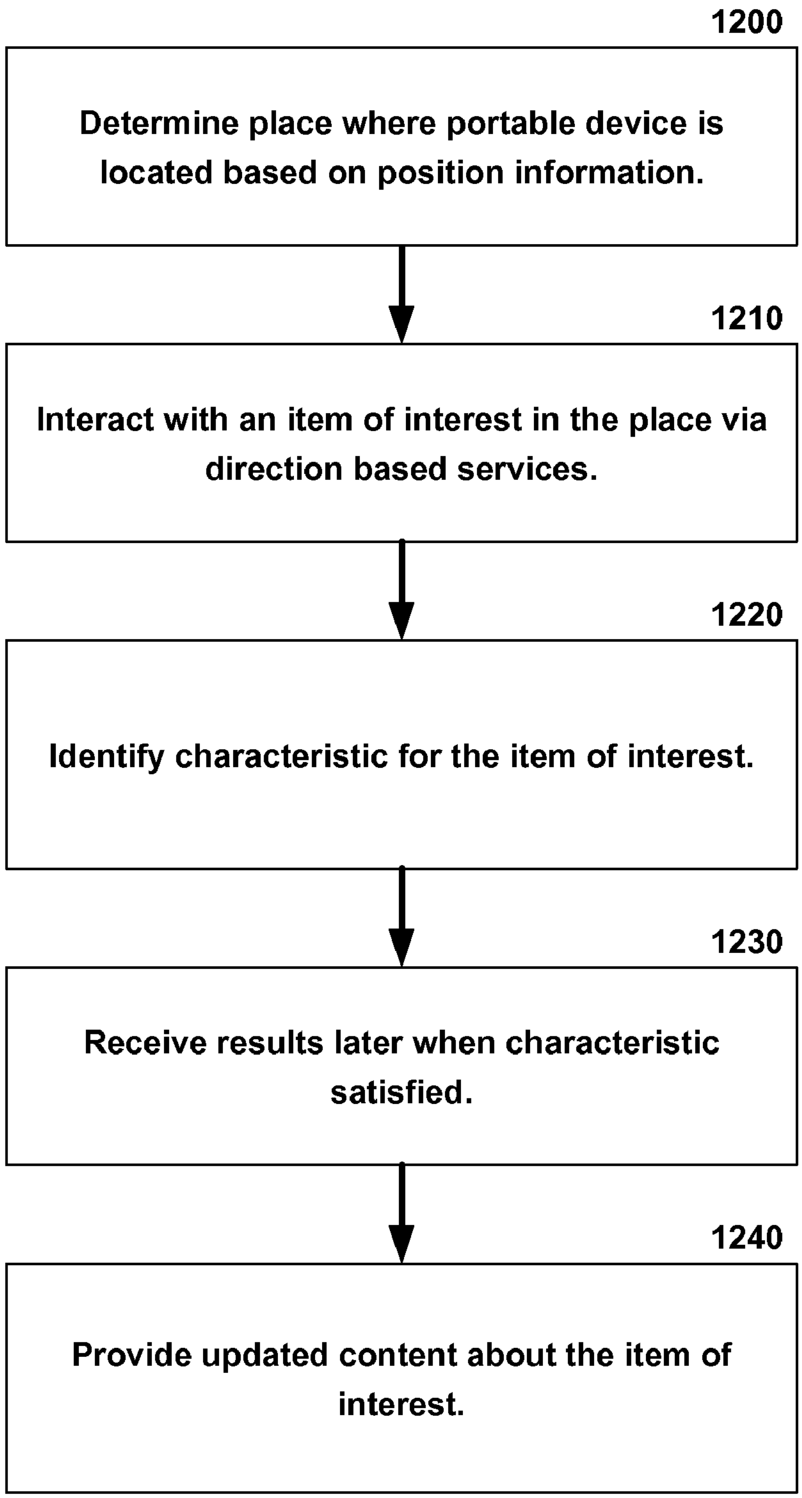

1200
Determine place where portable device is located based on position information.
1210
Interact with an item of interest in the place via direction based services.
1220
Identify characteristic for the item of interest.
1230
Receive results later when characteristic satisfied.
1240
Provide updated content about the item of interest.

FIG. 12

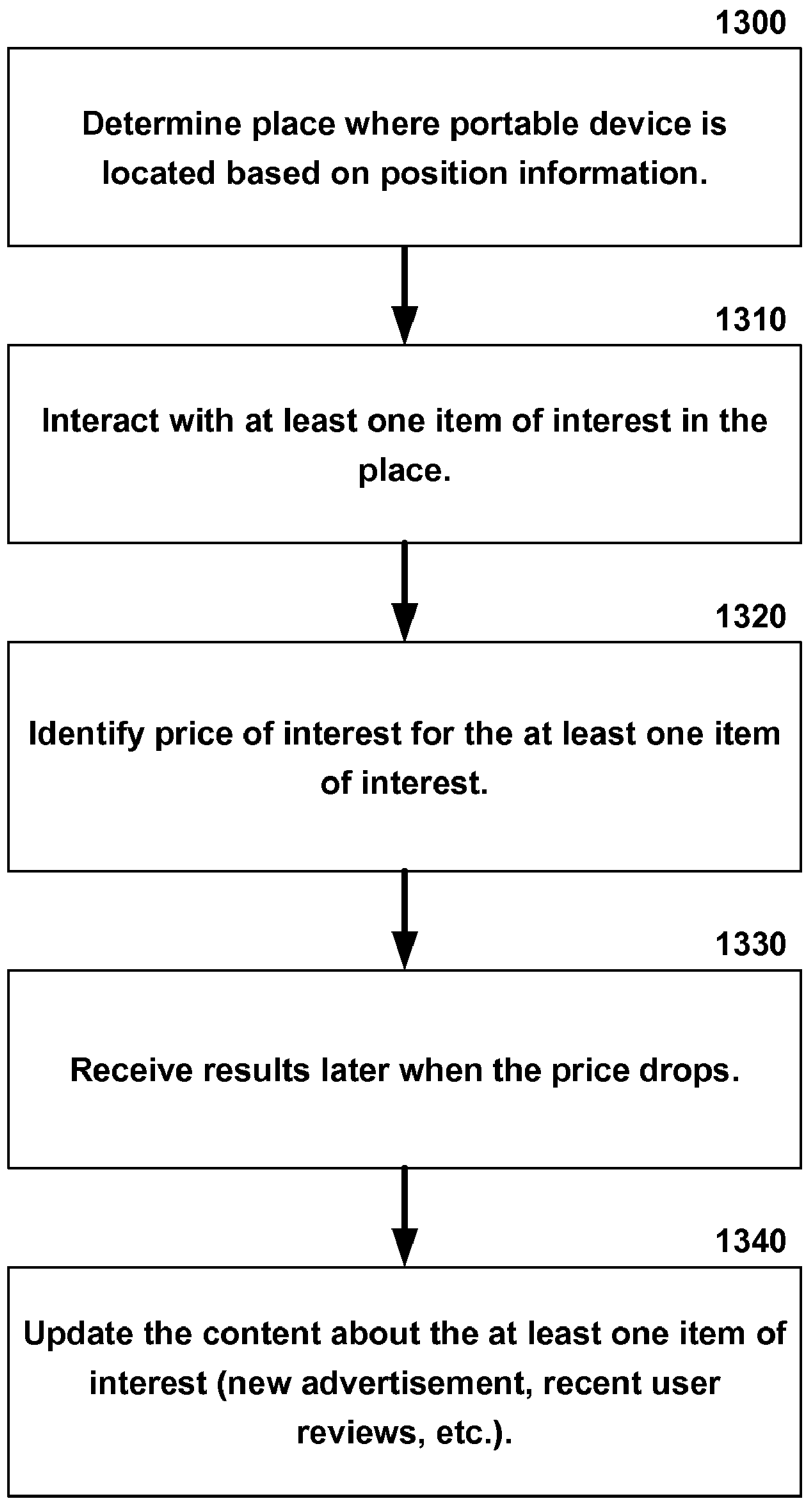
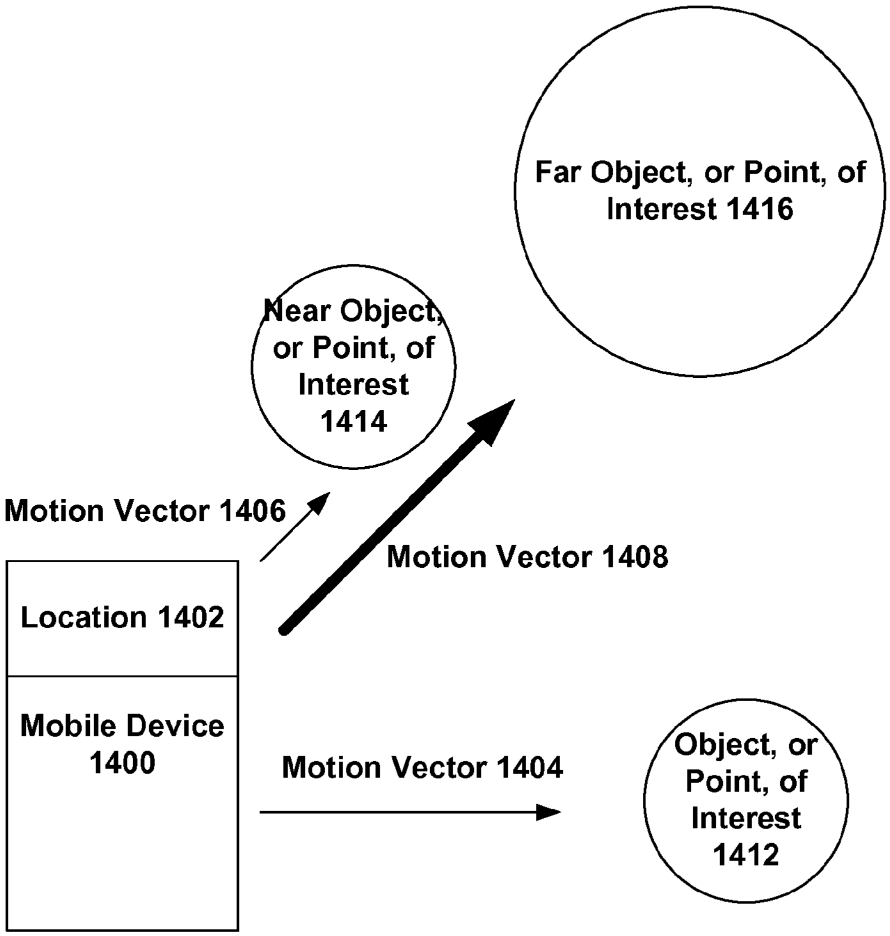

1300
Determine place where portable device is located based on position information.
1310
Interact with at least one item of interest in the place.
1320
Identify price of interest for the at least one item of interest.
1330
Receive results later when the price drops.
1340
Update the content about the at least one item of interest (new advertisement, recent user reviews, etc.).

FIG. 13




*Determine Object at which Mobile Device is Pointed based on Location (e.g., GPS) and Motion Vector (e.g., Compass, Accelerometer, etc.)*

FIG. 14

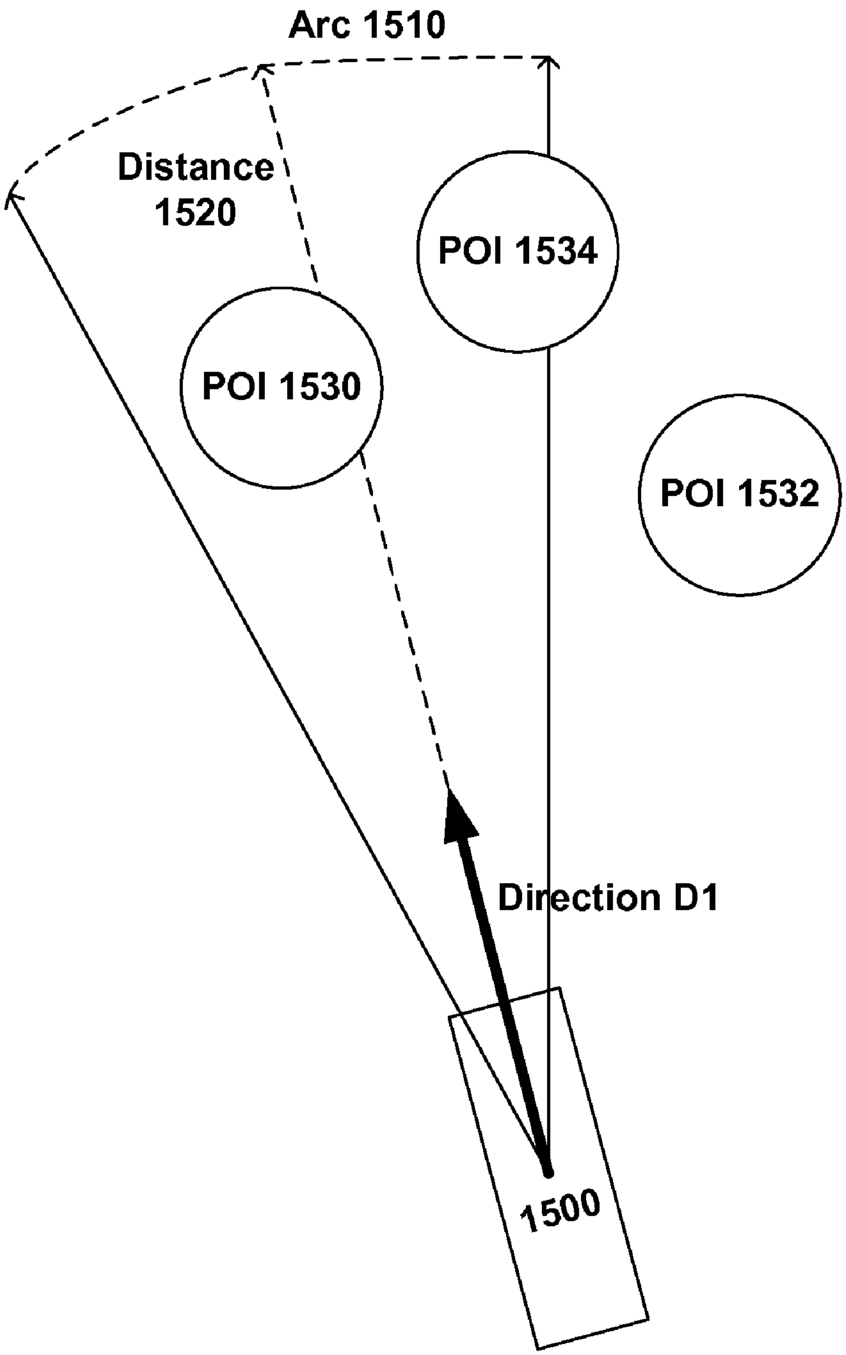
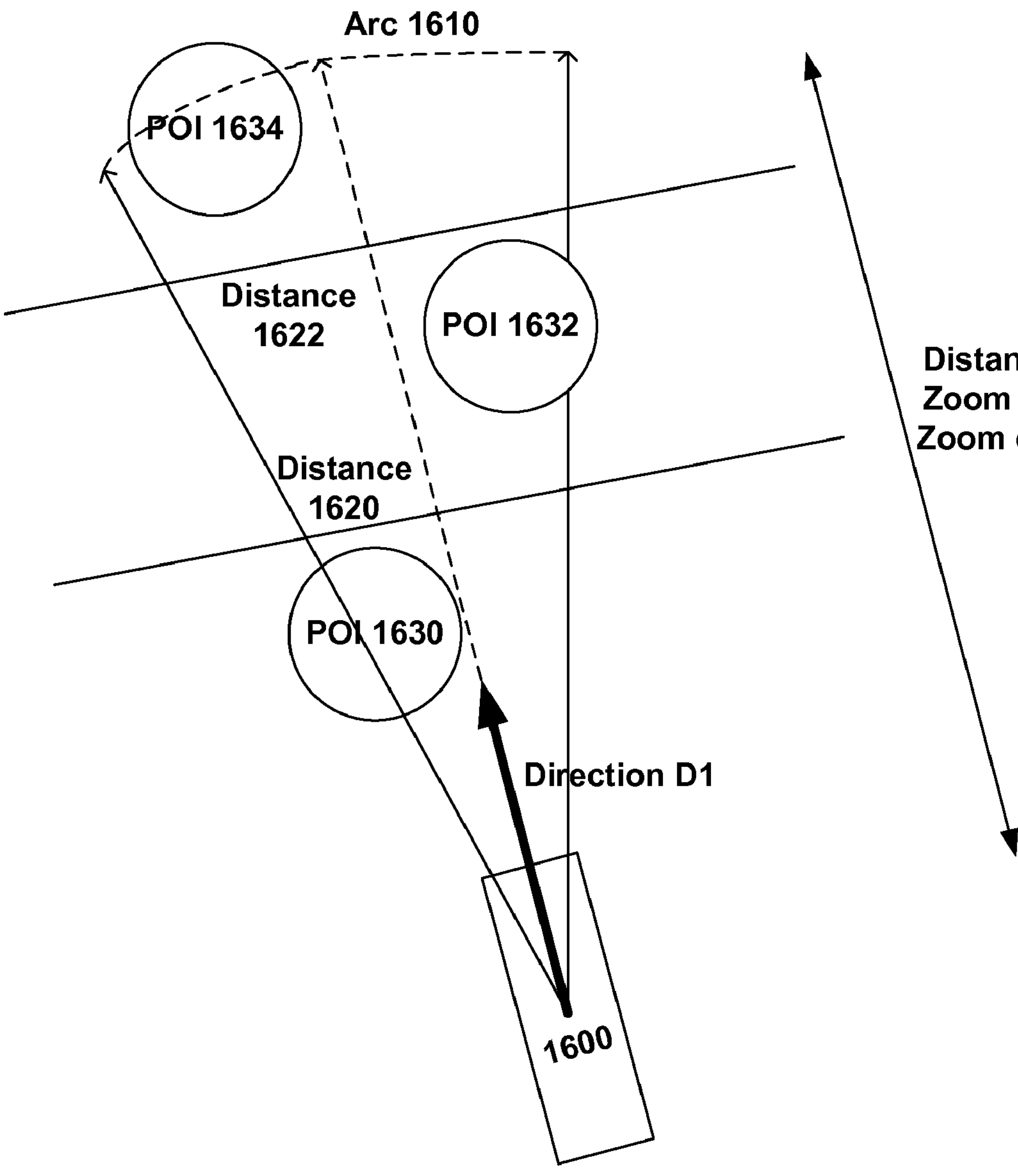

Arc 1510
Distance
1520
POI 1534
POI 1530
POI 1532
Direction D1
1500

FIG. 15



Arc 1610
POI 1634
POI 1632
Distance
1622
Distance
1620
POI 1630
Direction D1
1600
Distance
Zoom in/
Zoom out


FIG. 16

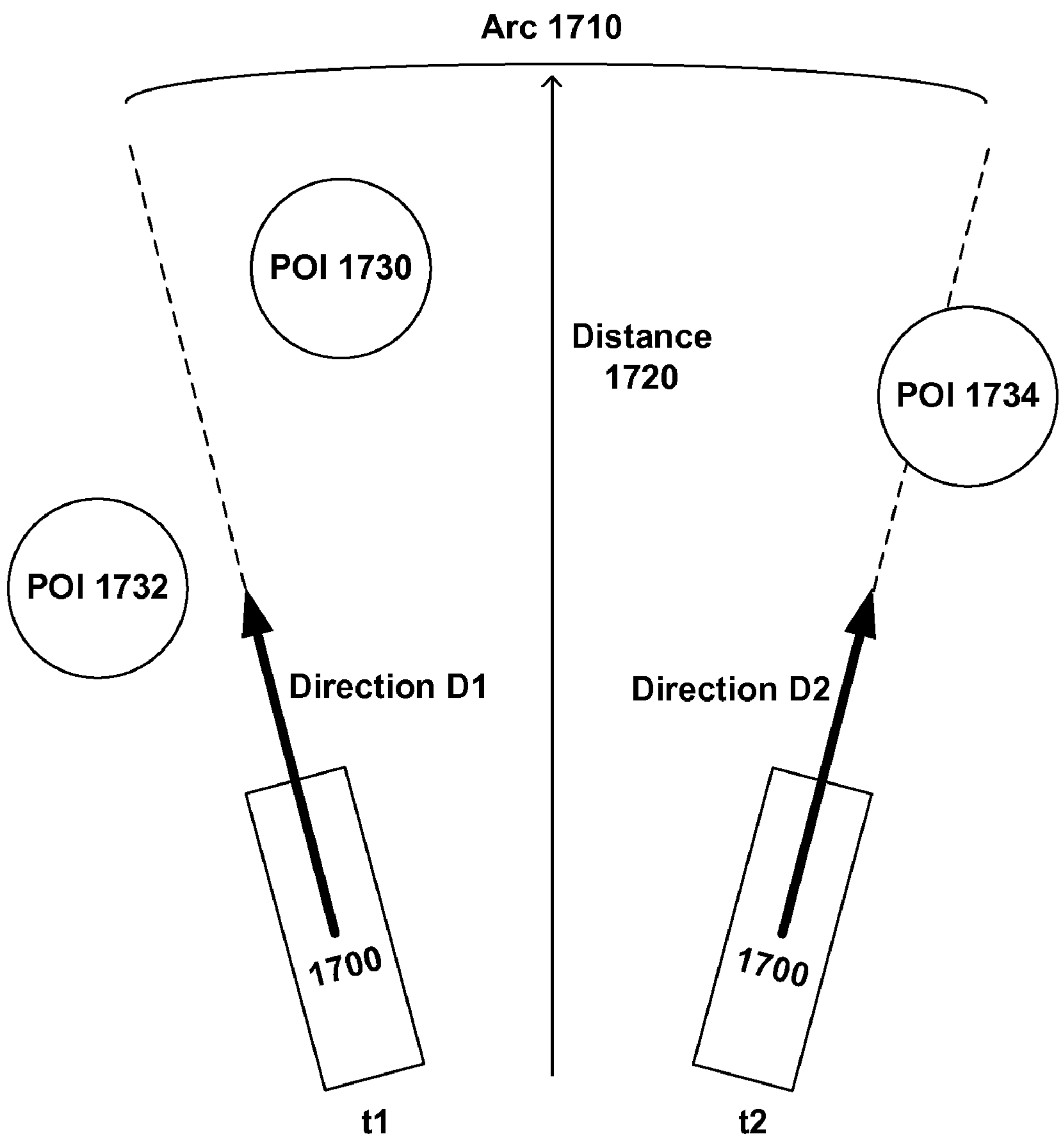

Arc 1710
POI 1730
Distance
1720
POI 1734
POI 1732
Direction D1
Direction D2
1700
1700
t1
t2

FIG. 17

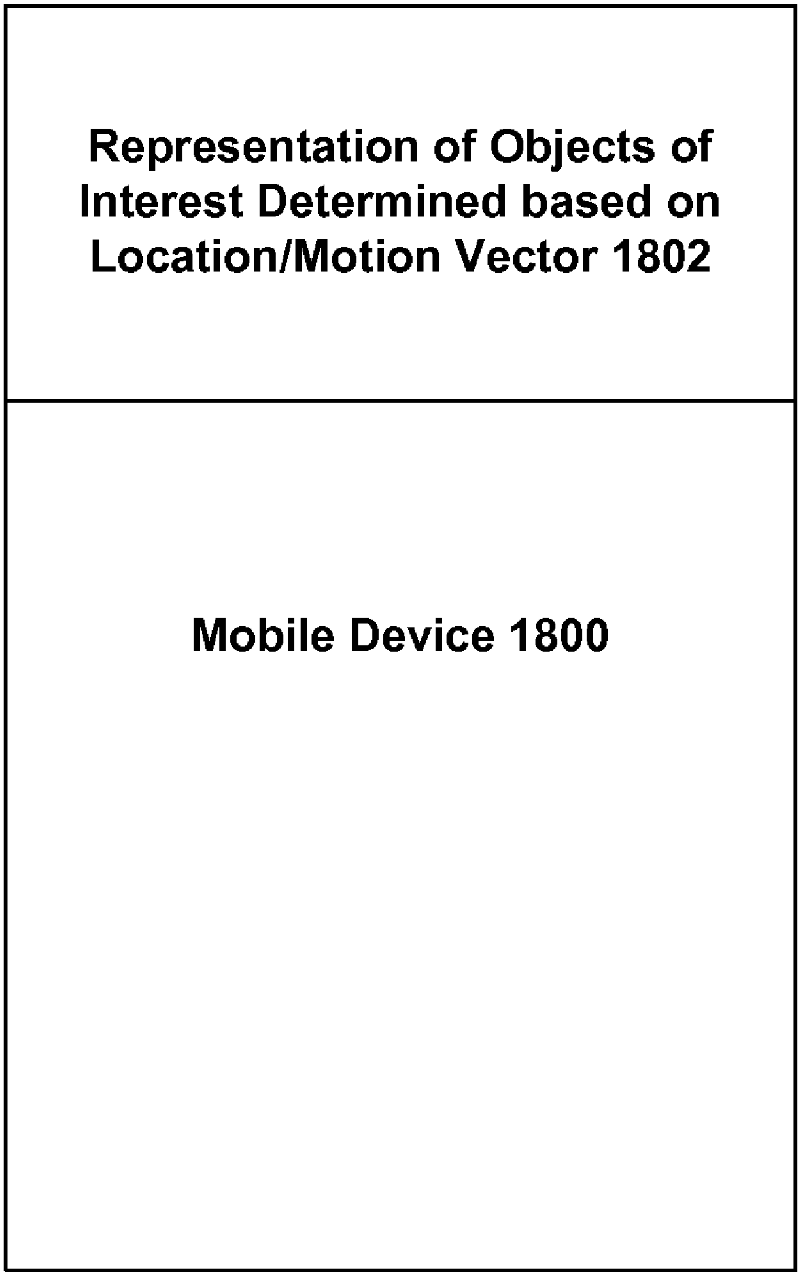

Representation of Objects of Interest Determined based on Location/Motion Vector 1802
Mobile Device 1800

FIG. 18

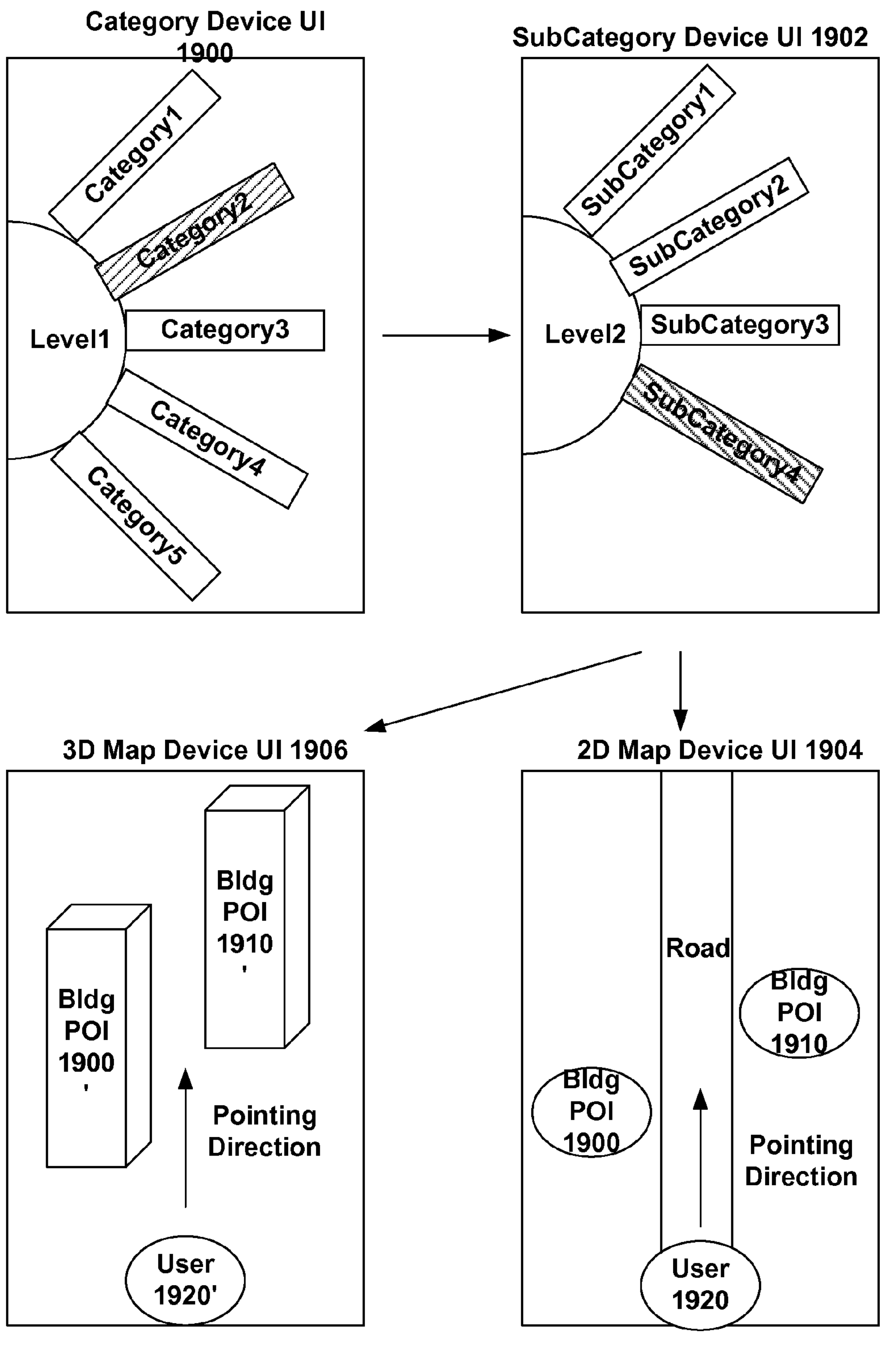

Category Device UI 1900
Category1
Category2
Level1
Category3
Category4
Category5
SubCategory Device UI 1902
SubCategory1
SubCategory2
Level2
SubCategory3
SubCategory4
3D Map Device UI 1906
Bldg POI 1910'
Bldg POI 1900'
Pointing Direction
User 1920'
2D Map Device UI 1904
Road
Bldg POI 1910
Bldg POI 1900
Pointing Direction
User 1920

FIG. 19

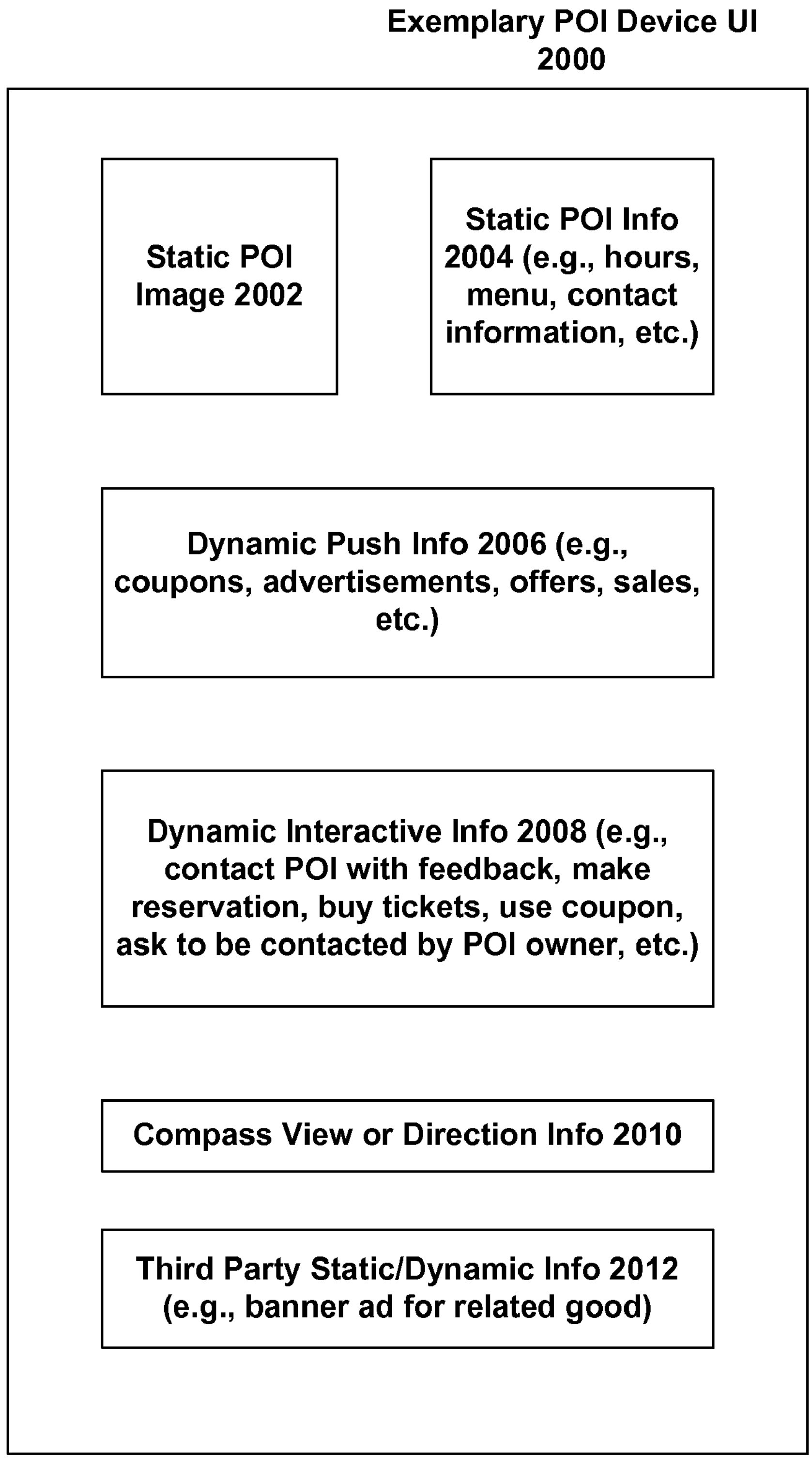

Exemplary POI Device UI
2000
Static POI Image 2002
Static POI Info 2004 (e.g., hours, menu, contact information, etc.)
Dynamic Push Info 2006 (e.g., coupons, advertisements, offers, sales, etc.)
Dynamic Interactive Info 2008 (e.g., contact POI with feedback, make reservation, buy tickets, use coupon, ask to be contacted by POI owner, etc.)
Compass View or Direction Info 2010
Third Party Static/Dynamic Info 2012 (e.g., banner ad for related good)

FIG. 20

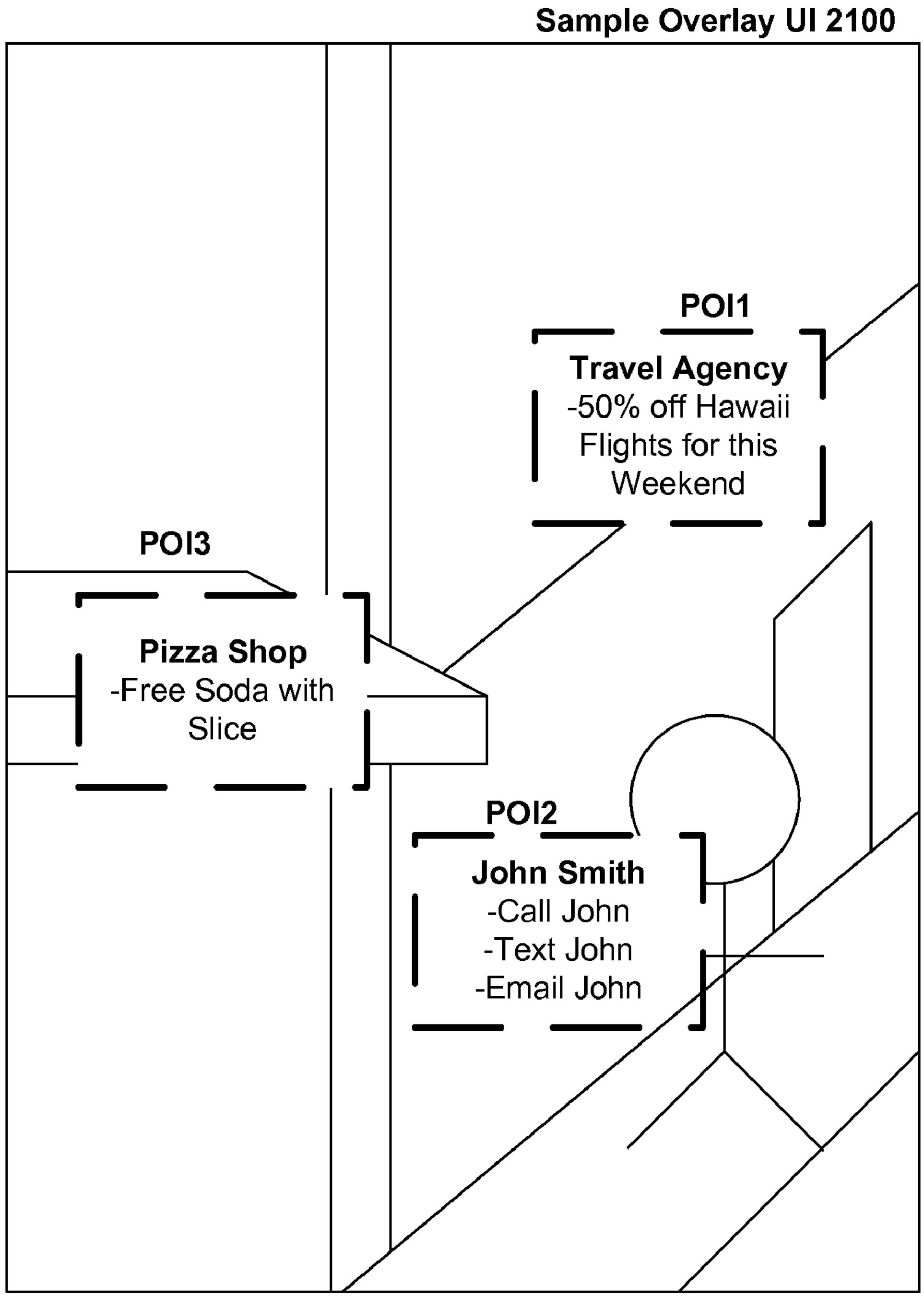

Sample Overlay UI 2100
POI1
Travel Agency
-50% off Hawaii
Flights for this
Weekend
POI3
Pizza Shop
-Free Soda with
Slice
POI2
John Smith
-Call John
-Text John
-Email John

FIG. 21

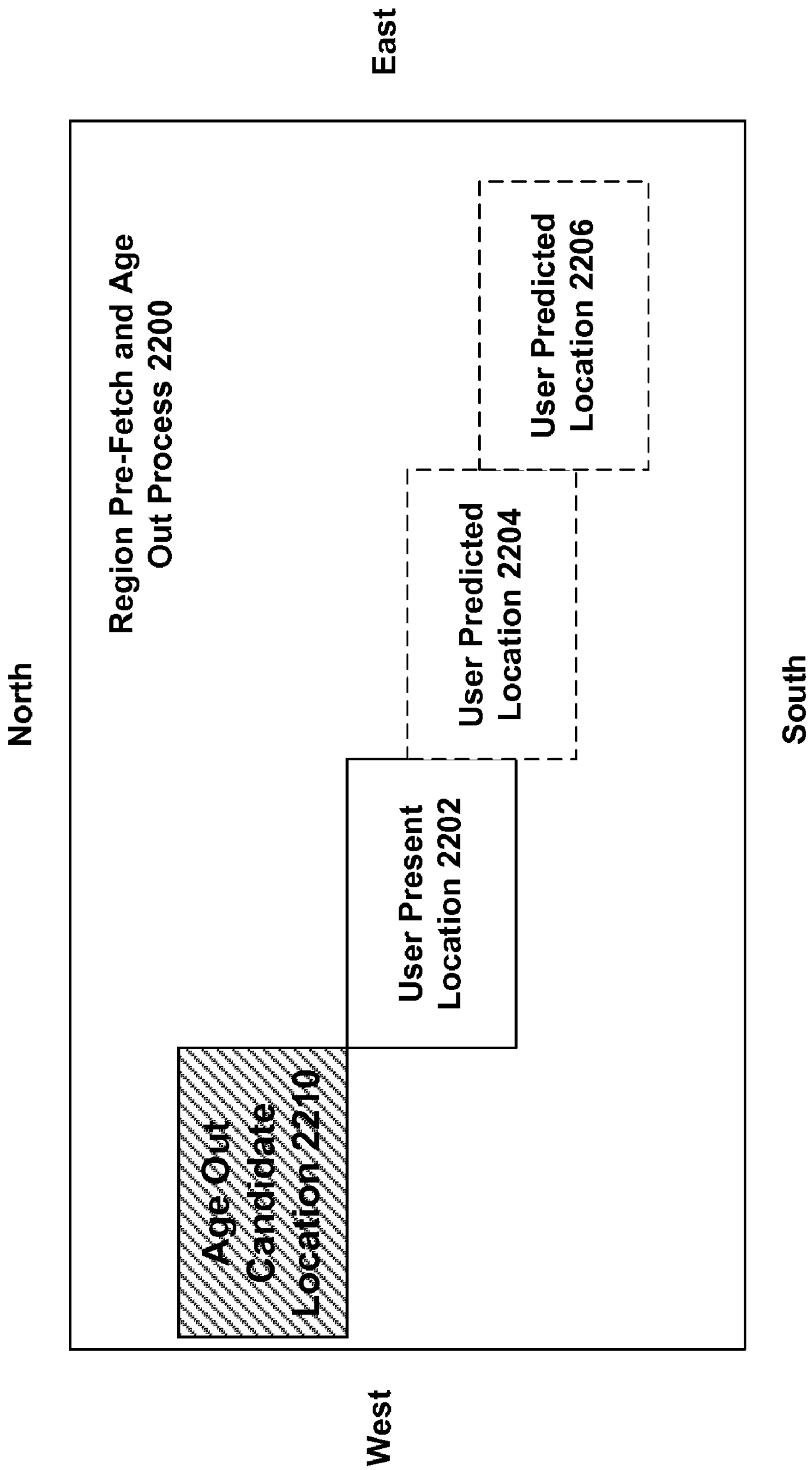

East
North
West
South
Region Pre-Fetch and Age Out Process 2200
User Predicted Location 2206
User Predicted Location 2204
User Present Location 2202
Age Out Candidate Location 2210

FIG. 22

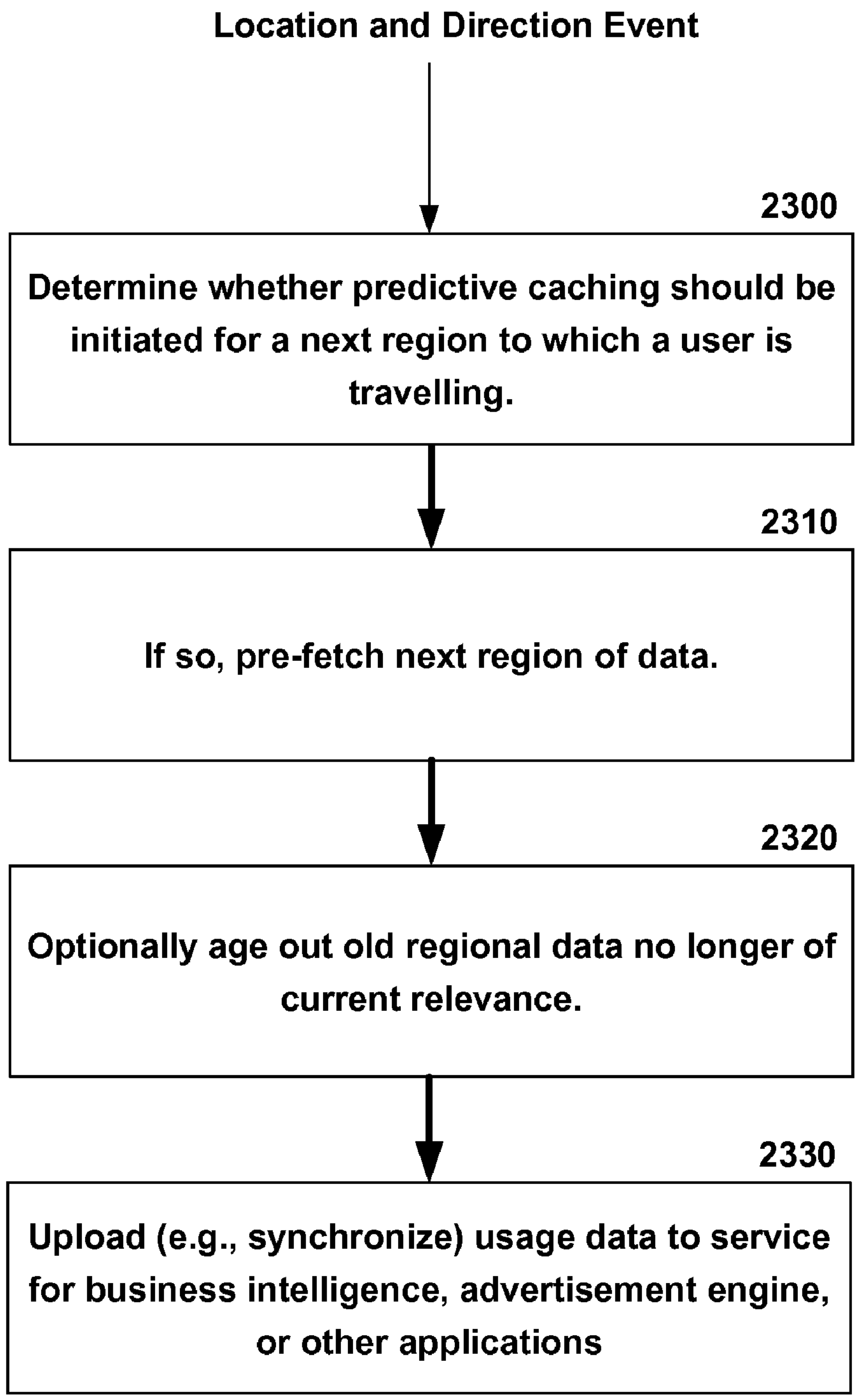

Location and Direction Event
2300
Determine whether predictive caching should be initiated for a next region to which a user is travelling.
2310
If so, pre-fetch next region of data.
2320
Optionally age out old regional data no longer of current relevance.
2330
Upload (e.g., synchronize) usage data to service for business intelligence, advertisement engine, or other applications

FIG. 23

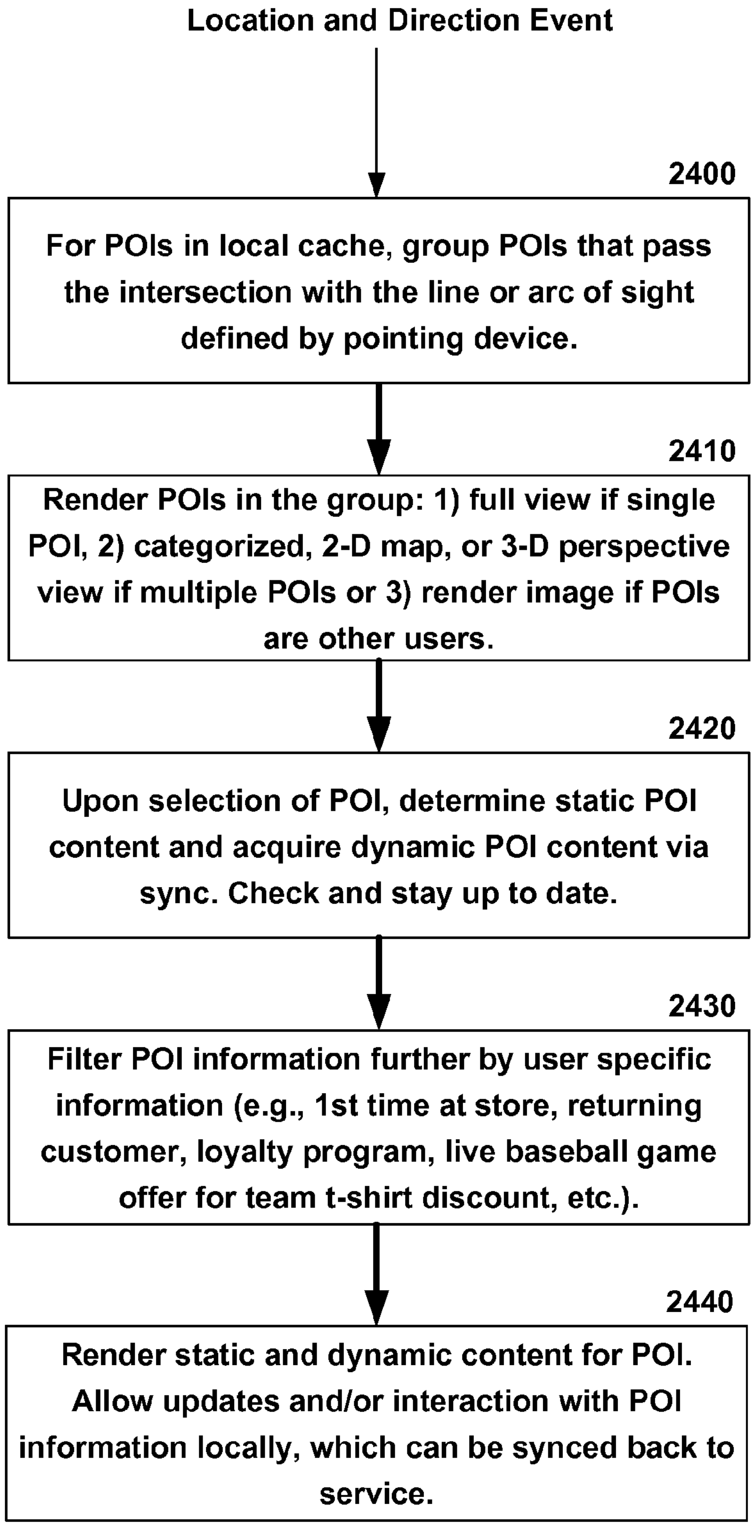

Location and Direction Event
2400
For POIs in local cache, group POIs that pass the intersection with the line or arc of sight defined by pointing device.
2410
Render POIs in the group: 1) full view if single POI, 2) categorized, 2-D map, or 3-D perspective view if multiple POIs or 3) render image if POIs are other users.
2420
Upon selection of POI, determine static POI content and acquire dynamic POI content via sync. Check and stay up to date.
2430
Filter POI information further by user specific information (e.g., 1st time at store, returning customer, loyalty program, live baseball game offer for team t-shirt discount, etc.).
2440
Render static and dynamic content for POI. Allow updates and/or interaction with POI information locally, which can be synced back to service.

FIG. 24

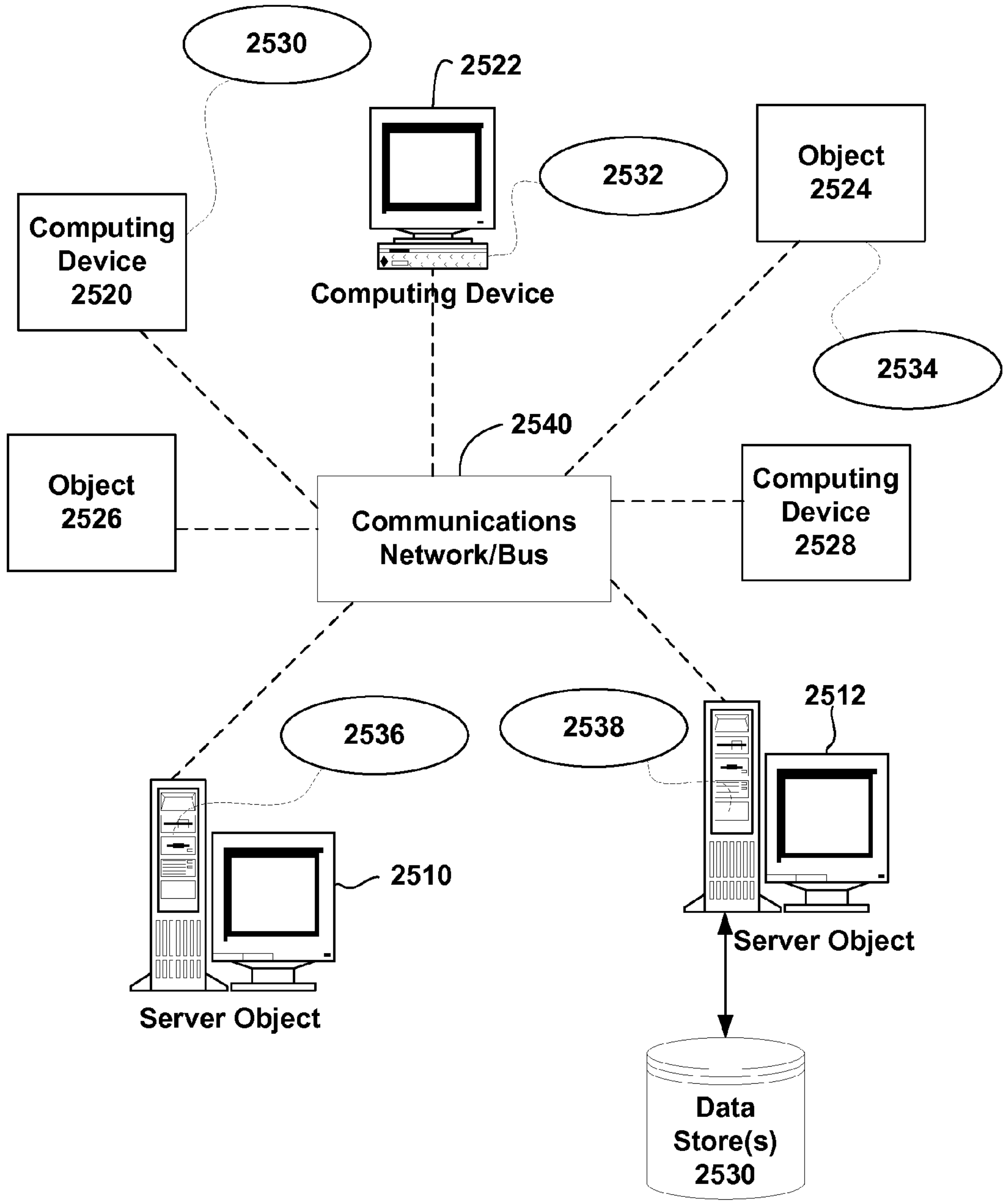

2530
2522
Computing Device
2520
2532
Object
2524
Computing Device
2534
2540
Object
2526
Communications
Network/Bus
Computing
Device
2528
2536
2538
2512
2510
Server Object
Server Object
Data
Store(s)
2530

FIG. 25

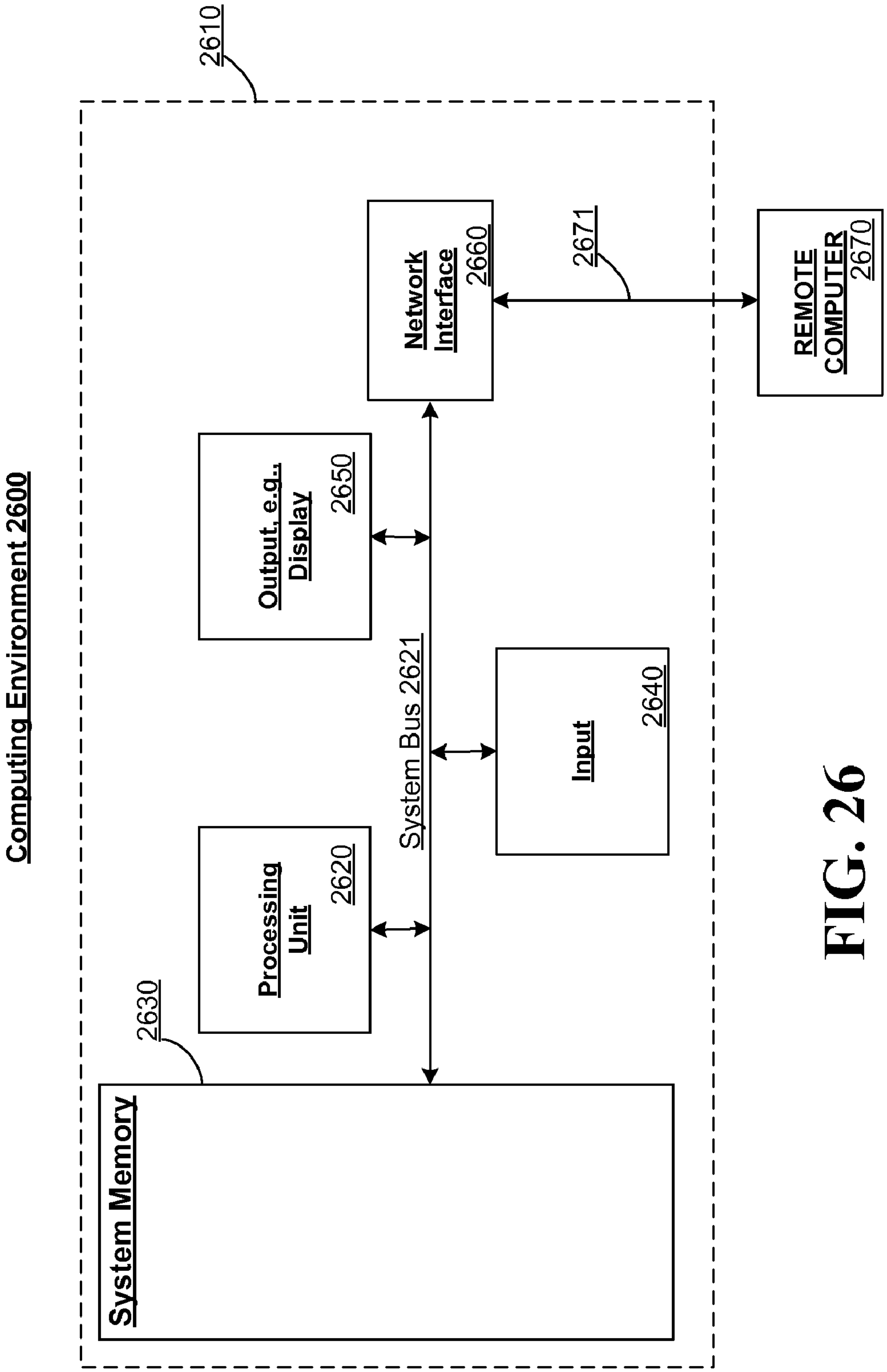

Computing Environment 2600
2610
System Memory
2630
Processing Unit
2620
System Bus 2621
Input
2640
Output, e.g., Display
2650
Network Interface
2660
2671
REMOTE COMPUTER
2670

FIG. 26

# DELAYING INTERACTION WITH POINTS OF INTEREST DISCOVERED BASED ON DIRECTIONAL DEVICE INFORMATION

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application Ser. No. 61/074,415, filed on Jun. 20, 2008, entitled "MOBILE COMPUTING SERVICES BASED ON DEVICES WITH DYNAMIC DIRECTION INFORMATION," and U.S. Provisional Application Ser. No. 61/074,590, filed on Jun. 20, 2008, entitled "MOBILE COMPUTING SERVICES BASED ON DEVICES WITH DYNAMIC DIRECTION INFORMATION," the entirety of which are incorporated herein by reference.

## TECHNICAL FIELD

[0002] The subject disclosure relates to the provision of direction-based services based on direction information and/or other information, such as location information, of a device and to designating points of interest discovered with the device for later interaction.

## BACKGROUND

[0003] By way of background concerning some conventional systems, mobile devices, such as portable laptops, PDAs, mobile phones, navigation devices, and the like have been equipped with location based services, such as global positioning system (GPS) systems, WiFi, cell tower triangulation, etc. that can determine and record a position of mobile devices. For instance, GPS systems use triangulation of signals received from various satellites placed in orbit around Earth to determine device position. A variety of map-based services have emerged from the inclusion of such location based systems that help users of these devices to be found on a map and to facilitate point to point navigation in real-time and search for locations near a point on a map.

[0004] However, such navigation and search scenarios are currently limited to displaying relatively static information about endpoints and navigation routes. While some of these devices with location based navigation or search capabilities allow update of the bulk data representing endpoint information via a network, e.g., when connected to a networked portable computer (PC) or laptop, such data again becomes fixed in time. Accordingly, it would be desirable to provide a set of richer experiences for users than conventional experiences predicated on location and conventional processing of static bulk data representing potential endpoints of interest.

[0005] Another problem is that a user on the go being informed of nearby points of interest (POIs) based on location information may not always have the time to interact with the POIs, or to sift through irrelevant information such as POIs away from which a user is moving. Moreover, even if the user does have time, the device may not have the capabilities to support a full user experience to engage the user with, e.g., due to limited hardware, such as a limited keypad, screen space, etc.

[0006] The above-described deficiencies of today's location based systems and devices are merely intended to provide an overview of some of the problems of conventional systems, and are not intended to be exhaustive. Other problems with the state of the art and corresponding benefits of some of the various non-limiting embodiments may become further apparent upon review of the following detailed description.

## SUMMARY

[0007] A simplified summary is provided herein to help enable a basic or general understanding of various aspects of exemplary, non-limiting embodiments that follow in the more detailed description and the accompanying drawings. This summary is not intended, however, as an extensive or exhaustive overview. Instead, the sole purpose of this summary is to present some concepts related to some exemplary non-limiting embodiments in a simplified form as a prelude to the more detailed description of the various embodiments that follow.

[0008] Direction based pointing services are provided for portable devices or mobile endpoints. Mobile endpoints can include a positional component for receiving positional information as a function of a location of the portable electronic device, a directional component that outputs direction information as a function of an orientation of the portable electronic device and a processing engine that processes the positional information and the direction information to determine a subset of points of interest relative to the portable electronic device as a function of the positional information and/or the direction information.

[0009] Devices or endpoints can include compass(es), e.g., magnetic or gyroscopic, to determine a direction and location based systems for determining location, e.g., GPS. To supplement the positional information and/or the direction information, devices or endpoints can also include component(s) for determining speed and/or acceleration information for processing by the engine, e.g., to aid in the determination of gestures made with the device.

[0010] With the addition of directional information in the environment, a variety of service(s) can be provided on top of user identification or interaction with specific object(s) of interest. For instance, when a user points at a particular item at a particular location or place, this creates an opportunity for anyone having an interest in that particular item to communicate with the user regarding that item or related items at a point in time when the user's focus is on the particular item. User context for the interaction can also be taken into account to supplement the provision of one or more interactive direction based services.

[0011] Moreover, sometimes either the device user and/or the publishers of content associated with a POI with which a user interacts, will wish to delay the interaction with the POI and associated content. For such scenarios, a variety of embodiments of a device provisioned for direction-based location services interact with items discovered through direction-based location services and then designate such items for later interaction, e.g., according to pre-defined criteria that define explicitly or implicitly when the later interaction will occur. Device users are thus provided with relevant content about endpoints at relevant times, which may not be the time of initial contact with the POI.

[0012] These and other embodiments are described in more detail below.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Various non-limiting embodiments are further described with reference to the accompanying drawings in which:

**[0014]** FIG. **1** is a block diagram of a non-limiting architecture for mobile device delayed interaction scenarios in accordance with one or more embodiments;

**[0015]** FIG. **2** is a block diagram of another non-limiting architecture for mobile device delayed interaction scenarios;

**[0016]** FIG. **3** is a flow diagram of a non-limiting process for marking points of interest for later interaction;

**[0017]** FIG. **4** is a flow diagram of a non-limiting process for designating points of interest for later interaction;

**[0018]** FIG. **5** is a block diagram of a device illustrating a specific apparatus for marking points of interest for delayed interaction in connection with direction based services;

**[0019]** FIG. **6** is a flow diagram of a non-limiting process for designating points of interest associated with a given place for later interaction;

**[0020]** FIG. **7** is a block diagram of an exemplary device architecture for device that supports direction based services in accordance with one or more embodiments;

**[0021]** FIG. **8** illustrates an exemplary sequence for delayed interaction with POIs at a location as a future advertising source;

**[0022]** FIG. **9** is a block diagram illustrating a non-limiting implementation in which POIs are scanned based on encoding information;

**[0023]** FIG. **10** is a block diagram illustrating market players in an overall advertising model established based on interest in satisfying the delayed interactions defined according to one or more embodiments herein;

**[0024]** FIG. **11** is a block diagram illustrating a variety of ways in which user intent can be inferred or implied with respect to points of interest;

**[0025]** FIGS. **12** and **13** illustrate representative scenarios where a delayed interaction facilitates a better timing for a transaction regarding a given item of interest;

**[0026]** FIG. **14** is a block diagram illustrating the formation of motion vectors for use in connection with location based services;

**[0027]** FIG. **15**, FIG. **16** and FIG. **17** illustrate aspects of algorithms for determining intersection endpoints with a pointing direction of a device;

**[0028]** FIG. **18** represents a generic user interface for a mobile device for representing points of interest based on pointing information;

**[0029]** FIG. **19** represents some exemplary, non-limiting alternatives for user interfaces for representing point of interest information;

**[0030]** FIG. **20** represents some exemplary, non-limiting fields or user interface windows for displaying static and dynamic information about a given point of interest;

**[0031]** FIG. **21** illustrates a sample overlay user interface for overlaying point of interest information over a camera view of a mobile device;

**[0032]** FIG. **22** illustrates a process for predicting points of interest and aging out old points of interest in a region-based algorithm;

**[0033]** FIG. **23** illustrates a first process for a device upon receiving a location and direction event;

**[0034]** FIG. **24** illustrates a second process for a device upon receiving a location and direction event;

**[0035]** FIG. **25** is a block diagram representing an exemplary non-limiting networked environment in which embodiment(s) may be implemented; and

**[0036]** FIG. **26** is a block diagram representing an exemplary non-limiting computing system or operating environment in which aspects of embodiment(s) may be implemented.

## DETAILED DESCRIPTION

### Overview

**[0037]** As discussed in the background, among other things, current location services systems and services, e.g., GPS, cell triangulation, P2P location service, such as Bluetooth, WiFi, etc., tend to be based on the location of the device only, and tend to provide static experiences that are not tailored to a user because the data about endpoints of interest is relatively static, or fixed in time.

**[0038]** At least partly in consideration of these deficiencies of conventional location based services, various embodiments of a portable device are provided that enable users to point a device in a direction, determine a set of system points of interest based on the direction pointed to by the device, but then also defer interaction with a point of interest of the set to a point later in time, enabling a rich set of scenarios empowering users of direction-based services to receive relevant information at optimal times. Such direction-based services can be offered as part of cloud services.

**[0039]** While each of the various embodiments herein are presented independently, e.g., as part of the sequence of respective Figures, one can appreciate that a portable device and/or associated network services, as described, can incorporate or combine two or more of any of the embodiments. Given that each of the various embodiments improve the overall services ecosystem in which users wish to operate, together a synergy results from combining different benefits. Accordingly, the combination of different embodiments described below shall be considered herein to represent a host of further alternate embodiments.

**[0040]** A non-limiting device provisioned for direction based services includes an engine for analyzing location information (e.g., GPS), direction information such as compass information (e.g., North, West, South, East), and optionally movement information (e.g., accelerometer information) to allow a platform for pointing to and thereby finding objects of interest in a user's environment. A variety of scenarios are contemplated based on a user finding information of interest about objects of interests, such as restaurants, or other items around an individual, or persons, places or events of interest nearby a user and tailoring information to that user (e.g., coupons, advertisements), however at a time later than the finding.

**[0041]** Accordingly, as part of various non-limiting embodiments and example scenarios discussed in more detail below, effective ways are provided to point in a direction, identify points of interest within scope of the pointed to direction, and to interact later with one or more of the points of interest by marking such POIs for later interaction in connection with the provision of direction-based services.

**[0042]** In this regard, sometimes an interested party, e.g., the device user and/or the publishers of content associated with a POI, will wish to delay interaction with respect to the POI or supplement a present interaction with respect to the POI with a later interaction. This could be for a variety of explicit or implicit reasons, which can be input or discerned by the device based on context. For instance, a user with limited screen space may wish to designate certain POIs for later interaction when the user can view information about the POI via a personal computer (PC) and a larger display.

**[0043]** For a non-limiting example scenario to demonstrate a benefit of delaying interaction, a user might pass a theater and want to go to one of the shows playing at the theater; however, the user might want to wait to reach home so she can ask her husband about availability and consult a rich Web based interface associated with the POI that clearly illustrates when the show is playing, how to buy tickets, etc. Thus, the user, with a simple designation of the POI for later interaction along with an explicit or implicit time for the future interaction, can ensure that the POI and its relevance to the user re-surface at a better time. This is in contrast to today where a user must remember to consult the web site when the user reaches home, or the user must try to figure out such information with small writing rendered by limited touch screens and input, or with limited time or network connectivity.

**[0044]** Moreover, the content providers, i.e., those wishing to convey information about the POI or information related to the POI, such as advertisements also benefit from the later interaction because they too can publish more content, and gather more information from the user, as well as update their content prior to publishing and also take more time to tailor the content to the user. Thus, both users and POI content providers alike benefit from the capability of users marking certain POIs for later interaction.

**[0045]** In another embodiment, a user marks a POI for later interaction, and additionally associates other information with the POI, e.g., in order to form lists. For instance, a user can designate a restaurant they walk by at lunch and mark it with a category such as "restaurant that I would like to try for dinner sometime." Thus, when the user later returns to the POI through some explicit or implicit route, the user has the chance to view the list of restaurants to try for dinner. This also implicitly sets information about when the delayed interaction should occur based on context.

**[0046]** Delayed interaction can be defined according to a variety of different criterion, e.g., explicit user choice, a preset amount of time (e.g., 10 hours later), or a pre-set time (e.g., 6 pm), etc. In this regard, any criterion or combination of criteria with respect to the POI, e.g., "device comes within 2 blocks of the POI and the time is between 5 pm and 9 pm," can be a set of criteria for notifying or reminding the user of the existence of the POI. Other information, such as device location, direction information, path information for walking to the POI can be provided as input to the delay criterion as well. In the above example, a restaurant that is not open for lunch as a user walks by, but is open for dinner, the restaurant finds a way to become relevant to the user again at a later time through the process of delayed interaction.

**[0047]** At any time, a user can explicitly request to view any of the POIs with which the user interacted with in the past, and this view can be with the same user device that discovered the POIs, e.g., notifications can be received at a later time or this can be with an entirely different form factor. For instance, the user can interact with the delayed set of POIs via a web site and associated storage and intelligence engine that aggregates POIs interacted with by the user, and keeps track of which POIs a user still wants to interact with, and under what delayed conditions.

**[0048]** Due to the nature of user desire for a POI to in effect "go away until later," for efficient operation, a user under certain circumstances will want to quickly and easily "mark" a point of interest for later review so as to waste a minimal amount of current time and energy. Accordingly, in one embodiment, a user can carry out a unique gesture that marks POIs based on direction and motion information (e.g., accelerometer information) available on the device, such that the user can easily repeat the unique gesture to mark other objects for later review. Such unique gestures can be pre-defined for the device or pre-defined by the user. For example, with a arm, elbow and/or wrist movement(s) defining a gesture, the gesture can be used to simultaneously target and mark an object or set of objects for later interaction, e.g., via the Web.

**[0049]** In one embodiment, a method for using a device provisioned for pointing based services comprises receiving direction information associated with a pointed to direction of the device. Next, points of interest are identified within an area defined by the direction according to an intersection test. Next, points of interest (POIs) can be marked by the user to delay interaction with the marked POIs, e.g., to a later time when the user again interacts with the pointing based services. Thus, a way to mark POIs for later interaction is provided, or a way that sets reminders or notifications regarding the POIs to interact with them later.

**[0050]** For instance, one non-limiting example is a delayed typing scenario. For instance, as a user drives or walks by some real estate, a delayed typing scenario may be appropriate since the user may not have the time or enough of a keypad, or screen to learn about particular real estate of interest. For instance, typing on a mobile device might be inconvenient. Thus, via the service, a user can point at a point of interest, and with a gesture, or other input, mark the point of interest for later action. Then, when the user reaches a PC, a reminder to interact with the point of interest is present and the user can type with a full keyboard.

**[0051]** Details of various other exemplary, non-limiting embodiments are provided below.

Delayed Interaction with Endpoints of Direction Based Services

**[0052]** As mentioned, one or more embodiments described herein provide the ability to identify endpoints with pointing interactions of direction based location services, and delay interaction to a more convenient moment or situation. For example, delayed editing of dynamic information about a point of interest is enabled by marking the location, and then later adding some information about the point of interest for use by the direction based services. For instance, a user does not always have time to manipulate or upload pictures, audio, automatic annotations, etc. with respect to a given point of interest at a time of creation. In such circumstances, a user can defer certain actions regarding a point of interest to a future time, e.g., create a reminder to the user as to why they wanted to add a particular point of interest for delayed interaction.

**[0053]** In this regard, leveraging digital compasses and location services to provide direction and location information enables a next-generation of direction or pointer based location search services, scan services, discoverability services, etc., where the digital compass and GPS can be used to point at objects of interest, thus defining the entry point for one or more data transactions between the device and one or more third party devices providing service(s) for the objects of interest at which the device is pointed. In the case of one or more embodiments described herein, a user can defer the entry point for the one or more data transactions to a later time. Using a digital compass, e.g., solid state, magnetic, sun/moon based, etc. on a mobile endpoint facilitates point and upload scenarios, point and synchronize geographical information to a Web service, cloud services or another endpoint.

**[0054]** As reflected in various embodiments, a device is provided that can hone in on, interact with, or otherwise transact with, a specific object or specific objects of interest by way of location and direction of the device, creating a new advertising model not previously known. As an example, when a user interacts with a particular product on a shelf at a retail store in connection with a direction based service, this creates an opportunity for anyone having an interest in the particular product to engage the user, e.g., communicate some information to that user. Any context that can be discerned from the user's actions and interactions can also be taken into account when acting on the opportunity. In the case of introducing a delay with respect to the opportunity by deferring interaction to a later time, a market is created for the future opportunity represented by the delay information, and in aggregate, can be predictive of early trends happening with products and services.

**[0055]** In this regard, users can interact with the endpoints in a host of context sensitive ways to provide or update information associated with endpoints of interest, or to receive beneficial information or instruments (e.g., coupons, offers, etc.) from entities associated with the endpoints of interest, and any of such actions can be deferred to a later or better time with one or more embodiments. With location services, it can be determined that a user's device is physically inside an actual store, or near a window display of a store. Coupling that to the user's interacting with an object of interest with direction information to enable direction-based services results in a new opportunity to take action based on the interaction with specific items.

**[0056]** In one embodiment, a portable electronic device is provided having a positional component for receiving position information as a function of a location of the portable electronic device; and at least one processor configured to process the position information to determine identifier(s) of points of interest associated with the location of the portable electronic device and based on intent information determined for the portable electronic device and the identifier(s), a set of delay criterion are set for later interaction with the given points of interest represented by the identifier(s).

**[0057]** As mentioned, a device can include a directional component that outputs direction information as a function of an orientation of the portable electronic device and that facilitates determining an intent of the device. The directional component can optionally be a digital compass that outputs the direction information. The device can determine a subset of items of interest relative to candidate items of interest within a 3-D space as a function of the positional information or the direction information.

**[0058]** The device can request delayed content based on a selection of an item of interest and the identifier(s). The request for the delayed content can be based on a scan of an encoding associated with an item of interest and the identifier (s). The request for delayed content can be based on a keyword received as input by the device and the identifier(s). The request for delayed content can be based on the intent information and the identifier(s) from at least one network service. The request for delayed content can also be automatic, or made by other explicit or implicit request by the user.

**[0059]** At a later time, and potentially from a different device, a content package can be received based on the request for the delayed content from the network service. The device can optionally include a display or sound devices, such as speakers, to display or render some or all of the graphical (e.g., text, icon, image data, video data, etc.) and/or audio content of the content package.

**[0060]** An initial interacting can include orientating the device toward some item(s) of interest and determining direction information associated with the orientation of the device from which a subset of the item(s) of interest are identified. For instance, interacting can include pointing the device in a direction defining a pointing line generally towards items of interest in the place(s) and determining a set of candidate items of interest as a subset of items of interest that substantially intersect with the pointing line, and enabling the selection of one or more items from the set of candidate items.

**[0061]** In one embodiment, a method for a device provisioned for direction based services comprises determining direction information associated with a pointed to direction relative to a pre-defined orientation of the device and identifying POIs within an area defined as a function of the pointed to direction including determining which of a set of POIs intersect with the area. Next, information corresponding to the POIs identified within the area is displayed, e.g., on a map or list, and POIs identified within the area can be designated for a delayed interaction at a later time. In one embodiment, IDs associated with the designated POIs are transmitted to a network service enabling information about the designated POIs to be exposed at the later time, e.g., from a different form factor device.

**[0062]** The designation of POIs for later interaction can include explicit input with respect to the designated one or more POIs, such as one or more of a gesture input, a keyword input, an audio input, a video camera input or a touchscreen input with respect to the one or more POIs. The designation of POIs for later interaction can include implicit input with respect to the designated one or more POIs including making inferences about the delayed interaction at the later time based on a context of present interaction.

**[0063]** The displaying of POI information can be made on a topographical map visually representing at least the area defined as a function of a pointed to direction and graphical indications of the POIs can be displayed within the area at corresponding locations on the topographical map view. The POIs can also be represented in a filtered list view, e.g., filtered by restaurants in the area. The designating of POIs can include designating pre-defined criteria explicitly or implicitly defining the delay of the delayed interaction. The designating can include marking one or more POIs with touchscreen input relating to the one or more designated POIs, tagging the one or more POIs with tag information defining the delayed interaction, or other ways to designate POIs for later interaction.

**[0064]** In another embodiment, a portable electronic device includes a positional component for receiving position information as a function of a location of the portable electronic device and a directional component that outputs direction information as a function of an orientation of the portable electronic device. In addition, the device includes a processor configured to process the position information and the direction information to determine identifiers or IDs of POIs within a pre-defined geographical area of the device, interact with a selected ID, receive information about the POI corresponding to the selected identifier, and receive input regarding the selected ID defining a future interaction.

**[0065]** Information about the selected ID defining the future interaction is transmitted along with the point of interest to a network service. In one embodiment, a pointer structure is provided on the device that visually indicates the orientation of the portable electronic device based upon which the directional component outputs the direction information. For example, this could be a triangular structure that comes to a point to show a primary orientation of the device. This could also be indicated on the display of the device during provision of direction based services.

**[0066]** In one embodiment, the position information and the direction information determine a pointing line and a set of candidate points of interest are determined as a subset of points of interest that substantially intersect with a function based on the pointing line. An intersection test for determining subsets of points of interest can include defining an arc based on an angle with respect to a pointing line, defining a cone based on an angle with respect to the pointing line, or a line function defining a rectangular space oriented along the pointing line (2-D or 3-D depending on the application). A speaker can render audio content if a condition upon which the future interaction is predicated occurs. The directional component can be a digital compass that outputs the direction information.

**[0067]** In another embodiment, a method comprises determining a place in which a portable device is located based on location information determined for the device and identifying a subset of items of interest in the place including determining an orientation of the device based on direction information of the device and determining the subset of items of interest in the place as a function of the orientation. Next, input with respect to an item of the subset of items is received as well as input defining a delayed interaction with the item or place.

**[0068]** The delayed interaction can include receiving a notification when a characteristic of the item meets a predefined condition, such as when a price of the item meets a target price condition, thereby initiating the delayed interaction. One way of identifying and designating an item for delayed interaction can be with a scan input from scanning or imaging a bar code associated with the item of interest.

**[0069]** FIG. **1** is a block diagram illustrating some concepts of one or more embodiments for enabling delayed interaction with endpoints in a direction based location system. In this regard, two main things are specified by the device participating in direction based services **120**. First, the device provides POI information **100** from pointing with the device, i.e., the device identifies nearby POIs of particular interest to a user. This can be done explicitly **102** or implicitly **104**. Also, the device associates criteria for delay **110** with the POIs. This too can be done explicitly **112** or implicitly **114**. Together, the POI information **100** and delay information **110** are transmitted to direction based services **120**, which enables a whole host of scenarios **130** for later interaction with the POIs **100** according to the criteria **110** being satisfied.

**[0070]** FIG. **2** is an exemplary non-limiting diagram of an architecture for achieving one or more embodiments described herein. At the device layer Layer**1** for specifying delayed POI information, location information **200**, direction information **202** and user intent information **204** can be input to a Layer**2** with various services **210**, including web services **212**, cloud services **214**, other data services **216**, etc. Any of services **210** can have input to a set of brick and mortar store databases in Layer**3**, such as data store(s) **220**, **222**, **224**, etc. or set of online or electronic retailer databases in Layer**4**, such as data store(s) **230**, **232**, **234**, etc. In this regard, user intent **204** coupled with a place of the device can be utilized by one or more services **210** to retrieve and deliver custom content **240** to the device based on the intent and place of the device, but at a later time according to a set of explicit or implicit criteria.

**[0071]** FIG. **3** is a flow diagram of a scenario where a user delays interaction with a point of interest. At **300**, a user points a pointer device in one or more directions to define scope of endpoints. At **310**, the user receives an indication of one or more endpoints within scope in response from a network service. At **320**, the user marks endpoint(s) for later interaction or viewing. At **330**, when the user reconnects to the service, e.g., from a PC, the user can receive reminders about marked endpoints. Other ways for triggering the interaction can be employed at **330** as described elsewhere herein. The user can follow through with interaction/viewing at **340**, as desired.

**[0072]** FIG. **4** is a flow diagram illustrating an exemplary process for designating POIs for delayed interaction in connection with direction based services. At **400**, direction information is determined from a pointed to direction relative to a pre-defined orientation. At **410**, POIs are identified within an area defined as a function of the pointed to direction and it is determined which POIs intersect the area and are within scope of a given user experience. At **420**, information corresponding to the POIs identified within the area is displayed, e.g., on a map or in a list. At **430**, the POI(s) identified within the area are designated for a delayed interaction at a later time. At **440**, the information (e.g., ID information) associated with the POIs designated for later interaction is transmitted to a network service enabling later interactions.

**[0073]** FIG. **5** illustrates an exemplary non-limiting device **500** including processor(s) **510** having a position engine or subsystem **520** for determining a location of the device **500** and a direction engine or subsystem **530** for determining a direction or orientation of the device **500**. Then, by interacting with local application(s) **540** and/or service(s) **570**, content can be delivered to the device, which is tailored to device intent and a place in which the device is present. The tailored content can be rendered by graphic subsystem or display/UI **550** or audio subsystem **560**. In one non-limiting embodiment, point structure **590** is included, e.g., a triangular piece that points along an orientation line **595** upon which directional calculations are based. Similarly, the orientation line **595** can be indicated by graphics subsystem display/UI **550** with or without point structure **590**. In this regard, various embodiments herein enable delayed POI ID information **580** to and from services **570** so that the delayed interactions can occur in the future as assisted by services **570**.

**[0074]** FIG. **6** is a flow diagram illustrating a process for delaying interaction with respect to a specific item within an identified place. At **600**, a place at which a portable device is located is determined based on location information of the device. At **610**, an orientation of the device is determined based on direction information of the device and a subset of items of interest are identified in the place as a function of the orientation. At **620**, an item of the subset of items can be selected and a delayed interaction with the item (or place) is thereby enabled by direction based services.

**[0075]** FIG. **7** illustrates a mobile computing device **100** according to an embodiment. In this regard, a set of services **760** that support delayed interaction with points of interest can be built based on location information **722** and direction information **732** collected by a mobile device, such as a phone. For instance, location information **722** can be recorded by a location subsystem **720** such as a GPS subsystem communicating with GPS satellites **740**. Direction or pointing information **732** can be collected by a direction subsystem **730**, such as a compass, e.g., gyroscopic, magnetic, digital compass, etc. In addition, optionally, movement information **712** can be gathered by the device **700**, e.g., via tower triangulation algorithms, and/or acceleration of the device **700** can be measured as well, e.g., with an accelerometer. The collective information **750** can be used to gain a sense of not only where the device **700** is located in relation to other potential points of interest tracked or known by the overall set of services **760**, but also what direction the user is pointing the device **700**, so that the services **760** can appreciate at whom or what the user is pointing the device **700**.

**[0076]** In addition, a gesture subsystem **770** can optionally be included, which can be predicated on any one or more of the motion information **712**, location information **722** or direction information **732**. In this regard, not only can direction information **732** and location information **722** be used to define a set of unique gestures, but also motion information **712** (such as speed and acceleration) can be used to define a more sophisticated set of gestures.

**[0077]** FIG. **7** thus illustrates a gesture subsystem **770** can optionally be included in a device **700**. In this regard, one can appreciate that a variety of algorithms could be adopted for a gesture subsystem **770**. For instance, a simple click-event when in the "pointing mode" for the device **700** can result in determining a set of points of interest for the user. Another gesture on top of that pointing gesture with respect to a POI can result in delaying interaction with that POI.

**[0078]** In this regard, a device can include a variety of spatial and map components and intelligence engines to determine intersections for directional arcs (or cones in 3-D). For instance, objects of interest could be represented with exact boundaries, approximated with spheres, subshells (stores in a mall) of a greater shell (mall), hierarchically arranged, etc. Dynamically generated bounding boxes can also be implemented work, i.e., any technique can be used to obtain boundary information for use in an intersection algorithm. Thus, such boundaries can be implicitly or explicitly defined for the POIs.

**[0079]** Thus, a device can include an intersection component that interprets pointing information relative to a set of potential points of interest. The engine can perform such intersections knowing what the resolution of the measuring instruments are on the device, such as a given resolution of a GPS system. Such techniques can include taking into account how far a user is from a plane of objects of interest, such as items on a shelf or wall, the size of the item of interest and how that is defined, as well as the resolution of location instrumentation, such as the GPS system. The device can also optionally include an altimeter, or any other device that gives altitude information, such as measuring radar or sonar bounce from the floor. The altitude information can supplement existing location information for certain specialized services where points of interest vary significantly at different altitudes. It is noted that GPS itself has some information about altitude in its encoding.

**[0080]** FIG. **8** is a block diagram illustrating an exemplary non-limiting exchange between a device **800** and service **810**. After start **802**, an example request for illustrative purpose is made by a device **800** to a service **810**, which includes data related to the location of the device, a given POI, and information about delaying the interaction. For instance, then, at **815**, the service **810** gets all offers for the POI **815** and/or at **820**, gets the offers for the given location. At **825**, or earlier, it is determined if the delay criteria have been met for the given POI, if so, the service **810** may get updated content associated with the location **830** along with an optional branded user interface at **835**. At **840**, assuming the delay criteria have been met, an updated content package is created and delivered to the device **800** at **845**. The device can undergo a check for the device at **850**. The delayed or future interaction can take place at **855**. Optionally, based on an advertising model, the content providers or owners can be billed at **860**.

**[0081]** FIG. **9** illustrates a general block diagram for an optional encoding technique for POI information. In this regard, various pieces of static and dynamic information **902**, **904**, **906**, **908**, **910**, etc. for a POI, which are normally represented in UI **900** of the device, can also be encoded as an image or a bar code **920**, or some other device readable compact encoding. Then, a user can scan an item of interest, and coupled with presence in a physical store, a request **915** can be made to a service **940** with a key representing the scanned item and information representing the place, whereby the service **940** determines content **925** to return to the device **900** based on the scanned item and the place. In addition, delay criterion **925** specify how to delay the interaction with the scanned item.

**[0082]** For instance, in an optional Quick Response (QR) support embodiment, decompression allows users to take pictures of a QR code and process its contents where information has been encoded into a sticker/printout for display outside of a business (e.g., in the form of a copyrighted URL). The code need not be a QR code, but could be any code that can be read or scanned or processed to determine its underlying content. For instance, with a visual representation, a picture can be taken and processed, or with the bar code, the device can scan it. RF identification technology could also be used. For the avoidance of doubt, any encoded image format can be used, like a bar code, only one example of which is a QR code.

**[0083]** In effect, this enables a query for POI information via a QR code or other encoding. The user scans or images the code with a device **930**, and then transmits the code to the service, which translates the code into static and dynamically updated user information for display as a UI **900** (or other user interface representation) so that the user can query about a POI merely by pointing at it. A URL for the POI can also be encoded in a format such as a QR code. In one non-limiting embodiment, the user can point the device at a QR code, and decode a given image with the QR code.

**[0084]** FIG. **10** illustrates at a high level, via a block diagram, a beneficial advertising model enabled by a direction/location based services with delayed interaction with endpoints as described in one or more embodiments herein. For instance, scanned items **1000** for delay, or pointed to items **1000** for delay, or any other action taken with respect to items **1000** for delay can be sent as information **1005** to a service **1010** that brokers interested third parties **1020** or **1030** who wish to advertise given the place and particular items **1000**. Accordingly, such third parties **1020** or **1030** (third parties may be misleading because third parties can include parties related to a retail establishment where the device is currently located) can provide content as part of interactions **1025** or

1035 as part of a push or pull experience from the user perspective. This opportunity to provide content in a delayed manner enables services 1010 to notify 1015 parties 1020 interested in the delayed interaction. This beneficial information provided to third parties 1020 or 1030 about potential delayed interactions with particular POIs and places is therefore an opportunity to monetize the transaction back to those who benefit from a resulting transaction or advertising opportunity.

[0085] FIG. 11 is a block diagram illustrating a vast wealth of actions and interactions that can help define intent/context 1120 to delay for a given POI and location at which the device is present. For instance, text 1100 may be received by the device, a product search query 1102 local to the store, bar code scan 1104, image scan 1106, explicit designation of a product (e.g., by pointing at a product, or taking an image of the product and performing image recognition) 1108, price compare request 1110, gesture input 1112, other interaction 1114, etc. can all be taken into account in discerning intent of the device at a given place, along with direction information 1150. This combined with location information 1140 for discerning the place in which the device is in results in advertising opportunities 1130 for a whole host of third party advertising transactions for delayed delivery to the device.

[0086] FIG. 12 is a flow diagram of an exemplary non-limiting process for using a device and services as described herein. At 1200, a place where a portable device is located is determined based on position information. At 1210, the device interacts with an item of interest in the place via direction based services. At 1220, a desired characteristic for the item of interest is indicated. At 1230, results regarding the item of interest are received later when the characteristic is satisfied. At 1240, updated content about the item of interest can be provided.

[0087] FIG. 13 is a flow diagram of a non-limiting scenario for the process of FIG. 12. At 1300, a place where the portable device is located is determined based on position information. At 1310, the device interacts with an item of interest in the place via direction based location services as described elsewhere herein. At 1320, the user identifies a target price for the item of interest. At 1330, results respecting the item of interest are delivered later when the price drops, e.g., 2 months later. At 1340, the content about the item of interest can be updated on an ongoing basis or at the time of delivery of the delayed content (e.g., new or updated advertisement, recent user reviews, etc.).

## Supplemental Context Regarding Pointing Devices, Architectures and Services

[0088] The following description contains supplemental context regarding potential non-limiting pointing devices, architectures and associated services to further aid in understanding one or more of the above embodiments. Any one or more of any additional features described in this section can be accommodated in any one or more of the embodiments described above with respect to delayed direction based services at a particular location for given POI(s). While such combinations of embodiments or features are possible, for the avoidance of doubt, no embodiments set forth in the subject disclosure should be considered limiting on any other embodiments described herein.

[0089] As mentioned, a broad range of scenarios can be enabled by a device that can take location and direction information about the device and build a service on top of that information. For example, by using an accelerometer in coordination with an on board digital compass, an application running on a mobile device updates what each endpoint is "looking at" or pointed towards, attempting hit detection on potential points of interest to either produce real-time information for the device or to allow the user to select a range, or using the GPS, a location on a map, and set information such as "Starbucks—10% off cappuccinos today" or "The Alamo—site of . . . " for others to discover. One or more accelerometers can also be used to perform the function of determining direction information for each endpoint as well. As described herein, these techniques can become more granular to particular items within a Starbucks, such as "blueberry cheesecake" on display in the counter, enabling a new type of sale opportunity.

[0090] Accordingly, a general device for accomplishing this includes a processing engine to resolve a line of sight vector sent from a mobile endpoint and a system to aggregate that data as a platform, enabling a host of new scenarios predicated on the pointing information known for the device. The act of pointing with a device, such as the user's mobile phone, thus becomes a powerful vehicle for users to discover and interact with points of interest around the individual in a way that is tailored for the individual. Synchronization of data can also be performed to facilitate roaming and sharing of POV data and contacts among different users of the same service.

[0091] In a variety of embodiments described herein, 2-dimensional (2D), 3-dimensional (3D) or N-dimensional directional-based search, discovery, and interactivity services are enabled for endpoints in the system of potential interest to the user.

[0092] The pointing information and corresponding algorithms depend upon the assets available in a device for producing the pointing or directional information. The pointing information, however produced according to an underlying set of measurement components, and interpreted by a processing engine, can be one or more vectors. A vector or set of vectors can have a "width" or "arc" associated with the vector for any margin of error associated with the pointing of the device. A panning angle can be defined by a user with at least two pointing actions to encompass a set of points of interest, e.g., those that span a certain angle defined by a panning gesture by the user.

[0093] In one non-limiting embodiment, a portable electronic device includes a positional component for receiving positional information as a function of a location of the portable electronic device, a directional component that outputs direction information as a function of an orientation of the portable electronic device and a location based engine that processes the positional information and the direction information to determine a subset of points of interest relative to the portable electronic device as a function of at least the positional information and the direction information.

[0094] The positional component can be a positional GPS component for receiving GPS data as the positional information. The directional component can be a magnetic compass and/or a gyroscopic compass that outputs the direction information. The device can include acceleration component(s), such as accelerometer(s), that outputs acceleration information associated with movement of the portable electronic device. The use of a separate sensor can also be used to further compensate for tilt and altitude adjustment calculations.

**[0095]** In one embodiment, the device includes a cache memory for dynamically storing a subset of endpoints of interest that are relevant to the portable electronic device and at least one interface to a network service for transmitting the positional information and the direction information to the network service. In return, based on real-time changes to the positional information and direction/pointing information, the device dynamically receives in the cache memory an updated subset of endpoints that are potentially relevant to the portable electronic device.

**[0096]** For instance, the subset of endpoints can be updated as a function of endpoints of interest within a pre-defined distance substantially along a vector defined by the orientation of the portable electronic device. Alternatively or in addition, the subset of endpoints can be updated as a function of endpoints of interest relevant to a current context of the portable electronic device. In this regard, the device can include a set of Representational State Transfer (REST)-based application programming interfaces (APIs), or other stateless set of APIs, so that the device can communicate with the service over different networks, e.g., Wi-Fi, a GPRS network, etc. or communicate with other users of the service, e.g., Bluetooth. For the avoidance of doubt, the embodiments are in no way limited to a REST based implementation, but rather any other state or stateful protocol could be used to obtain information from the service to the devices. For the avoidance of doubt, implementations of direction based services and devices are not dependent on REST based implementations, but could also be performed with REST, simple object access protocol (SOAP), really simple syndication (RSS), etc.

**[0097]** The directional component outputs direction information including compass information based on calibrated and compensated heading/directionality information. The directional component can also include direction information indicating upward or downward tilt information associated with a current upward or downward tilt of the portable electronic device, so that the services can detect when a user is pointing upwards or downwards with the device in addition to a certain direction. The height of the vectors itself can also be taken into account to distinguish between an event of pointing with a device from the top of a building (likely pointing to other buildings, bridges, landmarks, etc.) and the same event from the bottom of the building (likely pointing to a shop at ground level), or towards a ceiling or floor to differentiate among shelves in a supermarket. A 3-axis magnetic field sensor can also be used to implement a compass to obtain tilt readings.

**[0098]** Secondary sensors, such as altimeters or pressure readers, can also be included in a mobile device and used to detect a height of the device, e.g., what floor a device is on in a parking lot or floor of a department store (changing the associated map/floorplan data). Where a device includes a compass with a planar view of the world (e.g., 2-axis compass), the inclusion of one or more accelerometers in the device can be used to supplement the motion vector measured for a device as a virtual third component of the motion vector, e.g., to provide measurements regarding a third degree of freedom. This option may be deployed where the provision of a 3-axis compass is too expensive, or otherwise unavailable. In this regard, any type of compass, or combination of compasses can be used according to the sensitivity or degree of directional information for a given application or set of services. Thus, electromagnetic compass(es), digital compass (es), SW, etc., or any combination of compass(es) are all contemplated for a device in order to interact with POIs. Moreover, any one or more of the compass(es) can include support for 1, 2 or 3 axes.

**[0099]** In this respect, a gesturing component can also be included in the device to determine a current gesture of a user of the portable electronic device from a set of pre-defined gestures. For example, gestures can include zoom in, zoom out, panning to define an arc, all to help filter over potential subsets of points of interest for the user.

**[0100]** For instance, web services can effectively resolve vector coordinates sent from mobile endpoints into <x,y,z> or other coordinates using location data, such as GPS data, as well as configurable, synchronized POV information similar to that found in a GPS system in an automobile. In this regard, any of the embodiments can be applied similarly in any motor vehicle device. One non-limiting use is also facilitation of endpoint discovery for synchronization of data of interest to or from the user from or to the endpoint.

**[0101]** Among other algorithms for interpreting position/motion/direction information, as shown in FIG. **14**, a device **1400** employing the direction based location based services **1402** as described herein in a variety of embodiments herein include a way to discern between near objects, such as POI **1414** and far objects, such as POI **1416**. Depending on the context of usage, the time, the user's past, the device state, the speed of the device, the nature of the POIs, etc., the service can determine a general distance associated with a motion vector. Thus, a motion vector **1406** will implicate POI **1414**, but not POI **1416**, and the opposite would be true for motion vector **1408**.

**[0102]** In addition, a device **1400** includes an algorithm for discerning items substantially along a direction at which the device is pointing, and those not substantially along a direction at which the device is pointing. In this respect, while motion vector **1404** might implicate POI **1412**, without a specific panning gesture that encompassed more directions/vectors, POIs **1414** and **1416** would likely not be within the scope of points of interest defined by motion vector **1404**. The distance or reach of a vector can also be tuned by a user, e.g., via a slider control or other control, to quickly expand or contract the scope of endpoints encompassed by a given "pointing" interaction with the device.

**[0103]** In one non-limiting embodiment, the determination of at what or whom the user is pointing is performed by calculating an absolute "Look" vector, within a suitable margin of error, by a reading from an accelerometer's tilt and a reading from the magnetic compass. Then, an intersection of endpoints determines an initial scope, which can be further refined depending on the particular service employed, i.e., any additional filter. For instance, for an apartment search service, endpoints falling within the look vector that are not apartments ready for lease, can be pre-filtered.

**[0104]** In addition to the look vector determination, the engine can also compensate for, or begin the look vector, where the user is by establish positioning (~15 feet) through an A-GPS stack (or other location based or GPS subsystem including those with assistance strategies) and also compensate for any significant movement/acceleration of the device, where such information is available.

**[0105]** As mentioned, in another aspect, a device can include a client side cache of potentially relevant points of interest, which, based on the user's movement history can be dynamically updated. The context, such as geography, speed, etc. of the user can be factored in when updating. For instance, if a user's velocity is 2 miles an hour, the user may be walking and interested in updates at a city block by city block level, or at a lower level granularity if they are walking in the countryside. Similarly, if a user is moving on a highway at 60 miles per hour, the block-by-block updates of information are no longer desirable, but rather a granularity can be provided and predictively cached on the device that makes sense for the speed of the vehicle.

**[0106]** In an automobile context, the location becomes the road on which the automobile is travelling, and the particular items are the places and things that are passed on the roadside much like products in a particular retail store on a shelf or in a display. The pointing based services thus creates a virtual "billboard" opportunity for items of interest generally along a user's automobile path. Proximity to location can lead to an impulse buy, e.g., a user might stop by a museum they are passing and pointing at with their device, if offered a discount on admission.

**[0107]** In various alternative embodiments, gyroscopic or magnetic compasses can provide directional information. A REST based architecture enables data communications to occur over different networks, such as Wi-Fi and GPRS architectures. REST based APIs can be used, though any stateless messaging can be used that does not require a long keep alive for communicated data/messages. This way, since networks can go down with GPRS antennae, seamless switching can occur to Wi-Fi or Bluetooth networks to continue according to the pointing based services enabled by the embodiments described herein.

**[0108]** A device as provided herein according to one or more embodiments can include a file system to interact with a local cache, store updates for synchronization to the service, exchange information by Bluetooth with other users of the service, etc. Accordingly, operating from a local cache, at least the data in the local cache is still relevant at a time of disconnection, and thus, the user can still interact with the data. Finally, the device can synchronize according to any updates made at a time of re-connection to a network, or to another device that has more up to date GPS data, POI data, etc. In this regard, a switching architecture can be adopted for the device to perform a quick transition from connectivity from one networked system (e.g., cell phone towers) to another computer network (e.g., Wi-Fi) to a local network (e.g., mesh network of Bluetooth connected devices).

**[0109]** With respect to user input, a set of soft keys, touch keys, etc. can be provided to facilitate in the directional-based pointing services provided herein. A device can include a windowing stack in order to overlay different windows, or provide different windows of information regarding a point of interest (e.g., hours and phone number window versus interactive customer feedback window). Audio can be rendered or handled as input by the device. For instance, voice input can be handled by the service to explicitly point without the need for a physical movement of the device. For instance, a user could say into a device "what is this product right in front of me? No, not that one, the one above it" and have the device transmit current direction/movement information to a service, which in turn intelligently, or iteratively, determines what particular item of interest the user is pointing at, and returns a host of relevant information about the item.

**[0110]** One non-limiting way for determining a set of points of interest is illustrated in FIG. **15**. In FIG. **15**, a device **1500** is pointed (e.g., point and click) in a direction D**1**, which according to the device or service parameters, implicitly defines an area within arc **1510** and distance **1520** that encompasses POI **1530**, but does not encompass POI **1532**. Such an algorithm will also need to determine any edge case POIs, i.e., whether POIs such as POI **1534** are within the scope of pointing in direction D**1**, where the POI only partially falls within the area defined by arc **1510** and distance **1520**.

**[0111]** Other gestures that can be of interest in for a gesturing subsystem include recognizing a user's gesture for zoom in or zoom out. Zoom in/zoom out can be done in terms of distance like FIG. **16**. In FIG. **16**, a device **1600** pointed in direction D**1** may include zoomed in view which includes points of interest within distance **1620** and arc **1610**, or a medium zoomed view representing points of interest between distance **1620** and **1622**, or a zoomed out view representing points of interest beyond distance **1622**. These zoom zones correspond to POIs **1630**, **1632** and **1634**, respectively. More or less zones can be considered depending upon a variety of factors, the service, user preference, etc.

**[0112]** For another non-limiting example, with location information and direction information, a user can input a first direction via a click, and then a second direction after moving the device via a second click, which in effect defines an arc **1710** for objects of interest in the system as illustrated in FIG. **17**. For instance, via first pointing act by the user at time t**1** in direction D**1** and a second pointing act at time t**2** by the user in direction D**2**, an arc **1710** is implicitly defined. The area of interest implicitly includes a search of points of object within a distance **1720**, which can be zoomed in and out, or selected by the service based on a known granularity of interest, selected by the user, etc. This can be accomplished with a variety of forms of input to define the two directions. For instance, the first direction can be defined upon a click-and-hold button event, or other engage-and-hold user interface element, and the second direction can be defined upon release of the button. Similarly, two consecutive clicks corresponding to the two different directions D**1** and D**2** can also be implemented.

**[0113]** Also, instead of focusing on real distance, zooming in or out could also represent a change in terms of granularity, or size, or hierarchy of objects. For example, a first pointing gesture with the device may result in a shopping mall appearing, but with another gesture, a user could carry out a recognizable gesture to gain or lose a level of hierarchical granularity with the points of interest on display. For instance, after such gesture, the points of interest could be zoomed in to the level of the stores at the shopping mall and what they are currently offering.

**[0114]** In addition, a variety of even richer behaviors and gestures can be recognized when acceleration of the device in various axes can be discerned. Panning, arm extension/retraction, swirling of the device, backhand tennis swings, breaststroke arm action, golf swing motions could all signify something unique in terms of the behavior of the pointing device, and this is to just name a few motions that could be implemented in practice. Thus, any of the embodiments herein can define a set of gestures that serve to help the user interact with a set of services built on the pointing platform, to help users easily gain information about points of information in their environment.

**[0115]** Furthermore, with relatively accurate upward and downward tilt of the device, in addition to directional information such as calibrated and compensated heading/directional information, other services can be enabled. Typically, if a device is ground level, the user is outside, and the device is "pointed" up towards the top of buildings, the granularity of information about points of interest sought by the user (building level) is different than if the user was pointing at the first floor shops of the building (shops level), even where the same compass direction is implicated. Similarly, where a user is at the top of a landmark such as the Empire State building, a downward tilt at the street level (street level granularity) would implicate information about different points of interest that if the user of the device pointed with relatively no tilt at the Statue of Liberty (landmark/building level of granularity).

**[0116]** Also, when a device is moving in a car, it may appear that direction is changing as the user maintains a pointing action on a single location, but the user is still pointing at the same thing due to displacement. Thus, thus time varying location can be factored into the mathematics and engine of resolving at what the user is pointing with the device to compensate for the user experience based upon which all items are relative.

**[0117]** Accordingly, armed with the device's position, one or more web or cloud services can analyze the vector information to determine at what or whom the user is looking/pointing. The service can then provide additional information such as ads, specials, updates, menus, happy hour choices, etc., depending on the endpoint selected, the context of the service, the location (urban or rural), the time (night or day), etc. As a result, instead of a blank contextless Internet search, a form of real-time visual search for users in real 3-D environments is provided.

**[0118]** In one non-limiting embodiment, the direction based pointing services are implemented in connection with a pair of glasses, headband, etc. having a corresponding display means that acts in concert with the user's looking to highlight or overlay features of interest around the user.

**[0119]** As shown in FIG. **18**, once a set of objects is determined from the pointing information according to a variety of contexts of a variety of services, a mobile device **1800** can display the objects via representation **1802** according to a variety of user experiences tailored to the service at issue. For instance, a virtual camera experience can be provided, where POI graphics or information can be positioned relative to one another to simulate an imaging experience. A variety of other user interface experiences can be provided based on the pointing direction as well.

**[0120]** For instance, a set of different choices are shown in FIG. **19**. UI **1900** and **1902** illustrate navigation of hierarchical POI information. For instance, level**1** categories may include category**1**, category**2**, category**3**, category**4** and category**5**, but if a user selects around the categories with a thumb-wheel, up-down control, or the like, and chooses one such as category**2**. Then, subcategory**1**, subcategory**2**, subcategory**3** and subcategory**4** are displayed as subcategories of category**2**. Then, if the user selects, for instance, subcategory**4**, perhaps few enough POIs, such as buildings **1900** and **1910** are found in the subcategory in order to display on a 2D map UI **1904** along the pointing direction, or alternatively as a 3D virtual map view **1906** along the pointing direction.

**[0121]** Once a single POI is implicated or selected, then a full screen view for the single POI can be displayed, such as the exemplary UI **2000**. UI **2000** can have one or more of any of the following representative areas. UI **2000** can include a static POI image **2002** such as a trademark of a store, or a picture of a person. UI **2000** can also include other media, and a static POI information portion **2004** for information that tends not to change such as restaurant hours, menu, contact information, etc. In addition, UI **2000** can include an information section for dynamic information to be pushed to the user for the POI, e.g., coupons, advertisements, offers, sales, etc. In addition, a dynamic interactive information are 2008 can be included where the user can fill out a survey, provide feedback to the POI owner, request the POI to contact the user, make a reservation, buy tickets, etc. UI **2000** also can include a representation of the direction information output by the compass for reference purposes. Further, UI **2000** can include other third party static or dynamic content in area **2012**.

**[0122]** When things change from the perspective of either the service or the client, a synchronization process can bring either the client or service, respectively, up to date. In this way, an ecosystem is enabled where a user can point at an object or point of interest, gain information about it that is likely to be relevant to the user, interact with the information concerning the point of interest, and add value to services ecosystem where the user interacts. The system thus advantageously supports both static and dynamic content.

**[0123]** Other user interfaces can be considered such as left-right, or up-down arrangements for navigating categories or a special set of soft-keys can be adaptively provided.

**[0124]** Where a device includes a camera, in one embodiment shown in FIG. **21**, a representative non-limiting overlay UI **2100** is shown having 3 POIs POI**1**, POI**2** and POI**3**. The POIs are overlaid over actual image data being real time viewed on the device via an LCD screen or like display. The actual image data can be of products on a shelf or other display or exhibit in a store. Thus, as the user aims the camera around his or her environment, the lens becomes the pointer, and the POI information can be overlaid intelligently for discovery of endpoints of interest. Moreover, a similar embodiment can be imagined even without a camera, such as a UI in which 3-D objects are virtually represented based on real geometries known for the objects relative to the user.

**[0125]** Thus, the device UI can be implemented consistent with a camera, or a virtual camera, view for intuitive use of such devices. The pointer mechanism of the device could also switch based on whether the user was currently in live view mode for the camera or not. Moreover, assuming sufficient processing power and storage, real time image processing could discern an object of interest and based on image signatures, overlay POI information over such image in a similar manner to the above embodiments. In this regard, with the device provided herein, a variety of gestures can be employed to zoom in zoom out, perform tilt detection for looking down or up, or panning across a field of view to obtain a range of POIs associated with the panning scope.

**[0126]** With respect to a representative set of user settings, a number or maximum number of desired endpoints delivered as results can be configured. How to filter can also be configured, e.g., 5 most likely, 5 closest, 5 closest to 100 feet away, 5 within category or sub-category, alphabetical order, etc. In each case, based on a pointing direction, implicitly a cone or other cross section across physical space is defined as a scope of possible points of interest. In this regard, the width or deepness of this cone or cross section can be configurable by the user to control the accuracy of the pointing, e.g., narrow or wide radius of points and how far out to search.

**[0127]** To support processing of vector information and aggregating POI databases from third parties, a variety of storage techniques, such as relational storage techniques can be used. For instance, Virtual Earth data can be used for mapping and aggregation of POI data can occur from third parties such as Tele Atlas, NavTeq, etc. In this regard, businesses not in the POI database will want to be discovered and thus, the service provides a similar, but far superior from a spatial relevance standpoint, Yellow Pages experiences where businesses will desire to have their additional information, such as menus, price sheets, coupons, pictures, virtual tours, etc. accessible via the system.

**[0128]** In addition, a synchronization platform or framework can keep the roaming caches in sync, thereby capturing what users are looking at and efficiently processing changes. Or, where a user goes offline, local changes can be recorded, and when the user goes back online, such local changes can be synchronized to the network or service store. Also, since the users are in effect pulling information they care about in the here and in the now through the act of pointing with the device, the system generates high cost per thousand impression (CPM) rates as compared to other forms of demographic targeting. Moreover, the system drives impulse buys, since the user may not be physically present in a store, but the user may be near the object, and by being nearby and pointing at the store, information about a sale concerning the object can be sent to the user.

**[0129]** As mentioned, different location subsystems, such as tower triangulation, GPS, A-GPS, E-GPS, etc. have different tolerances. For instance, with GPS, tolerances can be achieved to about 10 meters. With A-GPS, tolerances can be tightened to about 12 feet. In turn, with E-GPS, tolerance may be a different error margin still. Compensating for the different tolerances is part of the interpretation engine for determining intersection of a pointing vector and a set of points of interest. In addition, as shown in FIGS. **4-6**, a distance to project out the pointing vector can be explicit, configurable, contextual, etc.

**[0130]** In this regard, the various embodiments described herein can employ any algorithm for distinguishing among boundaries of the endpoints, such as boundary boxes, or rectangles, triangles, circles, etc. As a default radius, e.g., 150 feet could be selected, and such value can be configured or be context sensitive to the service provided. On-line real estate sites can be leveraged for existing POI information. Since different POI databases may track different information at different granularities, a way of normalizing the POI data according to one convention or standard can also be implemented so that the residential real estate location data of Zillow can be integrated with GPS information from Starbucks of all the Starbucks by country.

**[0131]** In addition, similar techniques can be implemented in a moving vehicle client that includes GPS, compass, accelerometer, etc. By filtering based on scenarios (e.g., I need gas), different subsets of points of interest (e.g., gas stations) can be determined for the user based not only on distance, but actual time it may take to get to the point of interest. In this regard, while a gas station may be 100 yards to the right off the highway, the car may have already passed the corresponding exit, and thus more useful information to provide is what gas station will take the least amount of time to drive from a current location based on direction/location so as to provide predictive points of interest that are up ahead on the road, and not already aged points of interest that would require turning around from one's destination in order to get to them.

**[0132]** For existing motor vehicle navigation devices, or other conventional portable GPS navigation devices, where a device does not natively include directional means such as a compass, the device can have an extension slot that accommodates direction information from an external directional device, such as a compass. Similarly, for laptops or other portable electronic devices, such devices can be outfitted with a card or board with a slot for a compass. While any of the services described herein can make web service calls as part of the pointing and retrieval of endpoint process, as mentioned, one advantageous feature of a user's locality in real space is that it is inherently more limited than a general Internet search for information. As a result, a limited amount of data can be predictively maintained on a user's device in cache memory and properly aged out as data becomes stale.

**[0133]** While there are a variety of implementations, and ways to sub-divide regions, whether overlapping or not, predictive caching and aging **2200** is conceptually illustrated by FIG. **22** in which a user's present location **2202** is discerned. At this point, the local cache still includes age out candidate location **2210**, but as the velocity of the user indicates the user will be at predicted locations **2204** and **2206** in the future, these regions of POIs are downloaded to the mobile device. Accordingly, as the user travels to predicted location **2206**, it starts to be clear that the user no longer needs the data from the age out candidate location **2210**, which can then be removed, or flagged for removal when storage is challenged.

**[0134]** Accordingly, using the regional data cache, callbacks and an update mechanism that is updated dynamically based on movement, new point of interest can be added by a service or by a user. Update is thus performed continuously or substantially continuously based on updated travel, velocity, speed, etc. In this regard, a user can add a new point of interest in the region, add info to a local cache, and then upload to the zone. To appreciate the problem, the number of worldwide POIs is practically limitless, however only a small number of POIs will be relevant to a user at a given time. Thus, predictively, a cube of data can be taken to the device, the user can go offline such that when the user reconnects, the device is intelligent to figure out what has changed, been weighted, etc., so that the device can synchronize with the network services and expose the user's changes for other people.

**[0135]** The predictive algorithms again depend on what the user is interested in finding, what service the user may be using, the context of the user, etc. They can also be based on velocity, direction, time, etc. For instance, if it is nighttime, assumptions based on demographics or preferences may lead the device to return information about nightclubs or all night diners. Or, instead of giving directions as driving directions that calculate distances as absolute distances, i.e., as the crow flies, a device can take road curves into account since instantaneous pointing information on roads can be collected and handled by a corresponding service when giving driving directions. Or, as another alternative, the direction one is heading on a road, such as a highway with a concrete divider, is relevant to the directions that a navigation system should give. Where a U-turn is unavailable and user passes an exit with a point of interest, for instance, directions should take this into account and consider the heading of the vehicle.

**[0136]** Any device can include the embodiments described herein, including MP3 players, such as a Zune device, GPS navigation devices, bike computers, sunglass/visor systems, motor vehicles, mobile phones, laptops, PDA, etc.

**[0137]** One way to obtain the service applications, assuming the underlying measuring instruments to participate in the real-time gathering of directional information, is to message to a service to obtain the application, e.g., by text messaging to service, or getting a client download link. Another vehicle for enabling the service is to provide it natively in the operating system or applications of a mobile devices. Since a hardware abstraction layer accommodates different methods for collecting position, direction, acceleration information, the same platform can be used on any device regardless of the precise underlying hardware.

**[0138]** In another aspect of any of the embodiments described herein, because stateless messaging is employed, if communications drop with one network, the device can begin further communicating via another network. For instance, a device has two channels, and a user gets on a bus, but no longer have GPRS or GPS activity. Nonetheless the user is able to get the information the device needs from some other channel. Just because a tower, or satellites are down, does not mean that the device cannot connect through an alternative channel, e.g., the bus's GPS location information via Bluetooth.

**[0139]** With respect to exemplary mobile client architectures, a representative device can include, as described variously herein, client Side Storage for housing and providing fast access to cached POI data in the current region including associated dynamically updated or static information, such as annotations, coupons from businesses, etc. This includes usage data tracking and storage. In addition, regional data can be a cached subset of the larger service data, always updated based on the region in which the client is roaming. For instance, POI data could include as a non-limiting example, the following information:

| | |
|---|---|
| POI coordinates and data | //{−70.26322, 43.65412, "STARBUCK'S"} |
| Localized annotations | //Menu, prices, hours of operation, etc |
| Coupons and ads | //Classes of coupons (new user, returning, etc) |

**[0140]** Support for different kinds of information (e.g., blob v structured information (blob for storage and media; structured for tags, annotations, etc.)

**[0141]** A device can also include usage data and preferences to hold settings as well as usage data such as coupons "activated," waypoints, businesses encountered per day, other users encountered, etc. to be analyzed by the cloud services for business intelligence analysis and reporting.

**[0142]** A device can also include a continuous update mechanism, which is a service that maintains the client's cached copy of a current region updated with the latest. Among other ways, this can be achieved with a ping-to-pull model that pre-fetches and swaps out the client's cached region using travel direction and speed to facilitate roaming among different regions. This is effectively a paging mechanism for upcoming POIs. This also includes sending a new or modified POI for the region (with annotations+coupons), sending a new or modified annotation for the POIs (with coupons), or sending a new or modified coupon for the POI.

**[0143]** A device can also include a Hardware Abstraction Layer (HAL) having components responsible for abstracting the way the client communicates with the measuring instruments, e.g., the GPS driver for positioning and LOS accuracy (e.g., open eGPS), magnetic compass for heading and rotational information (e.g., gyroscopic), one or more accelerometers for gestured input and tilt (achieves 3D positional algorithms, assuming gyroscopic compass).

**[0144]** As described earlier, a device can also include methods/interfaces to make REST calls via GPRS/Wi-Fi and a file system and storage for storing and retrieving the application data and settings.

**[0145]** A device can also include user input and methods to map input to the virtual keys. For instance, one non-limiting way to accomplish user input is to have softkeys as follows, though it is to be understood a great variety of user inputs can be used to achieve interaction with the user interfaces of the pointing based services.

| | |
|---|---|
| SK up/down: | //Up and down on choices |
| SK right, SK ok/confirm: | //Choose an option or drill down/next |
| SK left, SK cancel/back, | //Go back to a previous window, cancel |
| Exit / Incoming Call events | //Exit the app or minimize |

**[0146]** In addition, a representative device can include a graphics and windowing stack to render the client side UI, as well as an audio stack to play sounds/alerts.

**[0147]** As mentioned, such a device may also include spatial and math computational components including a set of APIs to perform 3D collision testing between subdivided surfaces such as spherical shells (e.g., a simple hit testing model to adopt and boundary definitions for POIs), rotate points, and cull as appropriate from conic sections.

**[0148]** As described in various embodiments herein, FIGS. **23** and **24** illustrate two processes for a device when location (e.g., GPS) and direction (e.g., compass) events occur. In FIG. **23**, upon the occurrence of a location or direction event, at **2300**, it is determined whether predictive caching should be initiated for a next region to which a user is travelling. At **2310**, if so, then the next region of data can be pre-fetched. At **2320**, old regional data no longer of relevance can be aged out. At **2330**, any usage data can be uploaded to the service framework for business intelligence, input to an advertisement engine, etc.

**[0149]** FIG. **24** represents another process for filtering potential POIs after a pointing event. Upon the detection of a location and direction event, at **2400**, for POIs in the device's local cache, a group of POIs are determined that pass an intersection algorithm for the direction of pointing of the device. At **2410**, POIs in the group can be represented in some fashion on a UI, e.g., full view if only 1 POI, categorized view, 2-D map view, 3-D perspective view, or user images if other users, etc. The possibilities for representation are limitless; the embodiments described herein are intuitive based on the general notion of pointing based direction services.

**[0150]** At **2420**, upon selection of a POI, static content is determined and any dynamic content is acquired via synchronization. When new data becomes available, it is downloaded to stay up to date. At **2430**, POI information is filtered further by user specific information (e.g., if it is the user's first time at the store, returning customer, loyalty program member, live baseball game offer for team clothing discounts, etc.). At **2440**, static and dynamic content that is up to date is rendered for the POI. In addition, updates and/or interaction with POI information is allowed which can be synced back to the service.

Exemplary Networked and Distributed Environments

**[0151]** One of ordinary skill in the art can appreciate that the various embodiments of methods and devices for pointing based services and related embodiments described herein can be implemented in connection with any computer or other client or server device, which can be deployed as part of a computer network or in a distributed computing environment, and can be connected to any kind of data store. In this regard, the various embodiments described herein can be implemented in any computer system or environment having any number of memory or storage units, and any number of applications and processes occurring across any number of storage units. This includes, but is not limited to, an environment with server computers and client computers deployed in a network environment or a distributed computing environment, having remote or local storage.

**[0152]** FIG. **25** provides a non-limiting schematic diagram of an exemplary networked or distributed computing environment. The distributed computing environment comprises computing objects **2510**, **2512**, etc. and computing objects or devices **2520**, **2522**, **2524**, **2526**, **2528**, etc., which may include programs, methods, data stores, programmable logic, etc., as represented by applications **2530**, **2532**, **2534**, **2536**, **2538**. It can be appreciated that objects **2510**, **2512**, etc. and computing objects or devices **2520**, **2522**, **2524**, **2526**, **2528**, etc. may comprise different devices, such as PDAs, audio/video devices, mobile phones, MP3 players, laptops, etc.

**[0153]** Each object **2510**, **2512**, etc. and computing objects or devices **2520**, **2522**, **2524**, **2526**, **2528**, etc. can communicate with one or more other objects **2510**, **2512**, etc. and computing objects or devices **2520**, **2522**, **2524**, **2526**, **2528**, etc. by way of the communications network **2540**, either directly or indirectly. Even though illustrated as a single element in FIG. **25**, network **2540** may comprise other computing objects and computing devices that provide services to the system of FIG. **25**, and/or may represent multiple interconnected networks, which are not shown. Each object **2510**, **2512**, etc. or **2520**, **2522**, **2524**, **2526**, **2528**, etc. can also contain an application, such as applications **2530**, **2532**, **2534**, **2536**, **2538**, that might make use of an API, or other object, software, firmware and/or hardware, suitable for communication with or implementation of the delayed interaction model as provided in accordance with various embodiments.

**[0154]** There are a variety of systems, components, and network configurations that support distributed computing environments. For example, computing systems can be connected together by wired or wireless systems, by local networks or widely distributed networks. Currently, many networks are coupled to the Internet, which provides an infrastructure for widely distributed computing and encompasses many different networks, though any network infrastructure can be used for exemplary communications made incident to the techniques as described in various embodiments.

**[0155]** Thus, a host of network topologies and network infrastructures, such as client/server, peer-to-peer, hub and spoke, or hybrid architectures, can be utilized. In a client/server architecture, particularly a networked system, a client is usually a computer that accesses shared network resources provided by another computer, e.g., a server. In the illustration of FIG. **25**, as a non-limiting example, computers **2520**, **2522**, **2524**, **2526**, **2528**, etc. can be thought of as clients and computers **2510**, **2512**, etc. can be thought of as servers where servers **2510**, **2512**, etc. provide data services, such as receiving data from client computers **2520**, **2522**, **2524**, **2526**, **2528**, etc., storing of data, processing of data, transmitting data to client computers **2520**, **2522**, **2524**, **2526**, **2528**, etc., although any computer can be considered a client, a server, or both, depending on the circumstances. Any of these computing devices may be processing data, or requesting services or tasks that may implicate the delayed interaction model and related techniques as described herein for one or more embodiments.

**[0156]** A server is typically a remote computer system accessible over a remote or local network, such as the Internet or wireless network infrastructures. The client process may be active in a first computer system, and the server process may be active in a second computer system, communicating with one another over a communications medium, thus providing distributed functionality and allowing multiple clients to take advantage of the information-gathering capabilities of the server. Any software objects utilized pursuant to the direction based services can be provided standalone, or distributed across multiple computing devices or objects.

**[0157]** In a network environment in which the communications network/bus **2540** is the Internet, for example, the servers **2510**, **2512**, etc. can be Web servers with which the clients **2520**, **2522**, **2524**, **2526**, **2528**, etc. communicate via any of a number of known protocols, such as the hypertext transfer protocol (HTTP). Servers **2510**, **2512**, etc. may also serve as clients **2520**, **2522**, **2524**, **2526**, **2528**, etc., as may be characteristic of a distributed computing environment.

## Exemplary Computing Device

**[0158]** As mentioned, various embodiments described herein apply to any device wherein it may be desirable to perform pointing based services, and delay interactions with points of interest. It should be understood, therefore, that handheld, portable and other computing devices and computing objects of all kinds are contemplated for use in connection with the various embodiments described herein, i.e., anywhere that a device may request pointing based services. Accordingly, the below general purpose remote computer described below in FIG. **26** is but one example, and the embodiments of the subject disclosure may be implemented with any client having network/bus interoperability and interaction.

**[0159]** Although not required, any of the embodiments can partly be implemented via an operating system, for use by a developer of services for a device or object, and/or included within application software that operates in connection with the operable component(s). Software may be described in the general context of computer-executable instructions, such as program modules, being executed by one or more computers, such as client workstations, servers or other devices. Those skilled in the art will appreciate that network interactions may be practiced with a variety of computer system configurations and protocols.

**[0160]** FIG. **26** thus illustrates an example of a suitable computing system environment **2600** in which one or more of the embodiments may be implemented, although as made clear above, the computing system environment **2600** is only one example of a suitable computing environment and is not intended to suggest any limitation as to the scope of use or functionality of any of the embodiments. Neither should the computing environment **2600** be interpreted as having any dependency or requirement relating to any one or combination of components illustrated in the exemplary operating environment **2600**.

**[0161]** With reference to FIG. **26**, an exemplary remote device for implementing one or more embodiments herein can include a general purpose computing device in the form of a handheld computer **2610**. Components of handheld computer **2610** may include, but are not limited to, a processing unit **2620**, a system memory **2630**, and a system bus **2621** that couples various system components including the system memory to the processing unit **2620**.

**[0162]** Computer **2610** typically includes a variety of computer readable media and can be any available media that can be accessed by computer **2610**. The system memory **2630** may include computer storage media in the form of volatile and/or nonvolatile memory such as read only memory (ROM) and/or random access memory (RAM). By way of example, and not limitation, memory **2630** may also include an operating system, application programs, other program modules, and program data.

**[0163]** A user may enter commands and information into the computer **2610** through input devices **2640** A monitor or other type of display device is also connected to the system bus **2621** via an interface, such as output interface **2650**. In addition to a monitor, computers may also include other peripheral output devices such as speakers and a printer, which may be connected through output interface **2650**.

**[0164]** The computer **2610** may operate in a networked or distributed environment using logical connections to one or more other remote computers, such as remote computer **2670**. The remote computer **2670** may be a personal computer, a server, a router, a network PC, a peer device or other common network node, or any other remote media consumption or transmission device, and may include any or all of the elements described above relative to the computer **2610**. The logical connections depicted in FIG. **26** include a network **2671**, such local area network (LAN) or a wide area network (WAN), but may also include other networks/buses. Such networking environments are commonplace in homes, offices, enterprise-wide computer networks, intranets and the Internet.

**[0165]** As mentioned above, while exemplary embodiments have been described in connection with various computing devices, networks and advertising architectures, the underlying concepts may be applied to any network system and any computing device or system in which it is desirable to derive information about surrounding points of interest.

**[0166]** There are multiple ways of implementing one or more of the embodiments described herein, e.g., an appropriate API, tool kit, driver code, operating system, control, standalone or downloadable software object, etc. which enables applications and services to use the pointing based services. Embodiments may be contemplated from the standpoint of an API (or other software object), as well as from a software or hardware object that provides pointing platform services in accordance with one or more of the described embodiments. Various implementations and embodiments described herein may have aspects that are wholly in hardware, partly in hardware and partly in software, as well as in software.

**[0167]** The word "exemplary" is used herein to mean serving as an example, instance, or illustration. For the avoidance of doubt, the subject matter disclosed herein is not limited by such examples. In addition, any aspect or design described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other aspects or designs, nor is it meant to preclude equivalent exemplary structures and techniques known to those of ordinary skill in the art. Furthermore, to the extent that the terms "includes," "has," "contains," and other similar words are used in either the detailed description or the claims, for the avoidance of doubt, such terms are intended to be inclusive in a manner similar to the term "comprising" as an open transition word without precluding any additional or other elements.

**[0168]** As mentioned, the various techniques described herein may be implemented in connection with hardware or software or, where appropriate, with a combination of both. As used herein, the terms "component," "system" and the like are likewise intended to refer to a computer-related entity, either hardware, a combination of hardware and software, software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on computer and the computer can be a component. One or more components may reside within a process and/or thread of execution and a component may be localized on one computer and/or distributed between two or more computers.

**[0169]** The aforementioned systems have been described with respect to interaction between several components. It can be appreciated that such systems and components can include those components or specified sub-components, some of the specified components or sub-components, and/or additional components, and according to various permutations and combinations of the foregoing. Sub-components can also be implemented as components communicatively coupled to other components rather than included within parent components (hierarchical). Additionally, it should be noted that one or more components may be combined into a single component providing aggregate functionality or divided into several separate sub-components, and any one or more middle layers, such as a management layer, may be provided to communicatively couple to such sub-components in order to provide integrated functionality. Any components described herein may also interact with one or more other components not specifically described herein but generally known by those of skill in the art.

**[0170]** In view of the exemplary systems described supra, methodologies that may be implemented in accordance with the disclosed subject matter will be better appreciated with reference to the flowcharts of the various figures. While for purposes of simplicity of explanation, the methodologies are shown and described as a series of blocks, it is to be understood and appreciated that the claimed subject matter is not limited by the order of the blocks, as some blocks may occur in different orders and/or concurrently with other blocks from what is depicted and described herein. Where non-sequential, or branched, flow is illustrated via flowchart, it can be appreciated that various other branches, flow paths, and orders of the blocks, may be implemented which achieve the same or a similar result. Moreover, not all illustrated blocks may be required to implement the methodologies described hereinafter.

**[0171]** While the various embodiments have been described in connection with the preferred embodiments of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function without deviating therefrom. Still further, one or more aspects of the above described embodiments may be implemented in or across a plurality of processing chips or devices, and storage may similarly be effected across a plurality of devices. Therefore, the present invention should not be limited to any single embodiment, but rather should be construed in breadth and scope in accordance with the appended claims.

What is claimed is:

**1**. A method for a device provisioned for direction based services, comprising:

determining direction information associated with at least one pointed to direction relative to a pre-defined orientation of the device;

identifying points of interest (POIs) within an area defined as a function of the at least one pointed to direction including determining which of a set of POIs intersect the area;

displaying information corresponding to the POIs intersecting the area; and

designating one or more of the POIs intersecting the area for a delayed interaction at a later time.

**2**. The method of claim **1**, further comprising:

transmitting at least one identifier associated with the designated POIs to a network service enabling information about the designated POIs to be exposed at the later time.

**3**. The method of claim **2**, wherein the transmitting includes transmitting the at least one identifier associated with the designated POIs to the network service enabling information about the designated POIs to be exposed at the later time according to a different device form factor than a form factor of the device.

**4**. The method of claim **1**, wherein the designating includes receiving explicit input with respect to the designated one or more POIs including receiving at least one of a gesture input, a keyword input, an audio input, a video camera input or a touchscreen input with respect to the one or more POIs.

**5**. The method of claim **1**, wherein the designating includes receiving implicit input with respect to the designated one or more POIs including inferring the delayed interaction at the later time based on a context of present interaction.

**6**. The method of claim **1**, wherein the displaying includes displaying a topographical map view visually representing at least the area defined as a function of the at least one pointed to direction and displaying graphical indications of the POIs within the area at generally corresponding locations on the topographical map view.

**7**. The method of claim **1**, wherein the displaying information includes displaying information about the POIs in a filtered list view.

**8**. The method of claim **1**, wherein the designating includes designating at least one pre-defined criterion explicitly or implicitly defining the delay of the delayed interaction to the later time.

**9**. The method of claim **1**, wherein the designating includes marking the one or more POIs including receiving touchscreen input relating to the one or more designated POIs.

**10**. The method of claim **1**, wherein the designating includes tagging the one or more POIs with tag information defining the delayed interaction.

**11**. A portable electronic device, comprising:

a positional component for receiving position information as a function of a location of the portable electronic device;

a directional component that outputs direction information as a function of an orientation of the portable electronic device; and

at least one processor configured to process the position information and the direction information to determine at least one identifier of at least one point of interest within a pre-defined geographical scope of the device, to interact with a selected identifier of the at least one identifier, to receive information about the point of interest corresponding to the selected identifier, and to receive input regarding the selected identifier that defines a future interaction with the point of interest corresponding to the selected identifier.

**12**. The device of claim **11**, wherein the at least one processor is further configured to transmit information about the selected identifier defining the future interaction with the point of interest to at least one network service.

**13**. The device of claim **11**, further comprising:

a pointer that visually indicates the orientation of the portable electronic device based upon which the directional component outputs the direction information.

**14**. The device of claim **11**, further comprising:

at least one audio device for rendering audio content if a condition upon which the future interaction is predicated occurs.

**15**. The device of claim **11**, wherein the directional component is a digital compass that outputs the direction information.

**16**. The method of claim **11**, wherein the at least one processor is configured to process the position information and the direction information to determine a pointing line and to determine a set of candidate points of interest as a subset of points of interest that substantially intersect with a function based on the pointing line.

**17**. The method of claim **16**, wherein the at least one processor is configured to process the position information and the direction information to determine a pointing line and to determine a set of candidate points of interest as a subset of points of interest that substantially intersect with at least one of an arc function defining an arc based on an angle with respect to the pointing line, a conical function defining a cone based on an angle with respect to the pointing line, or a line function defining a rectangular space oriented along the pointing line.

**18**. A method, comprising:

determining a place in which a portable device is located based on location information determined for the device, the location information representing a position of the device;

identifying a subset of items of interest in the place including determining an orientation of the device based on direction information of the device and determining the subset of items of interest in the place as a function of the orientation; and

receiving input with respect to an item of the subset of items including receiving input defining a delayed interaction with the item or defining a delayed interaction with the place.

**19**. The method of claim **18**, wherein the receiving includes receiving a request for a notification when a characteristic of the item meets a pre-defined condition.

**20**. The method of claim **19**, wherein the receiving includes receiving a request for a notification when a price of the item meets a target price condition thereby initiating the delayed interaction.

**21**. The method of claim **18**, wherein the receiving input with respect to the item includes receiving scan input from scanning or imaging a bar code associated with the item of interest.

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