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Ho et al.

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(54) **TELEPHONE WITH A UNIVERSAL PHONE NUMBER**

(71) Applicant: **TP Lab Inc.**, Palo Alto, CA (US)

(72) Inventors: **Chi Fai Ho**, Palo Alto, CA (US); **Shin Cheung Simon Chiu**, Palo Alto, CA (US)

(73) Assignee: **TP Lab Inc.**, Palo Alto, CA (US)

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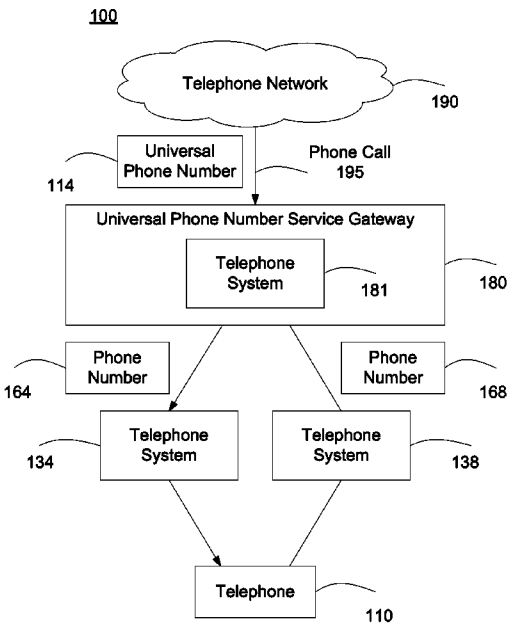
Primary Examiner — Ahmad F. Matar
Assistant Examiner — Kharye Pope
(74) *Attorney, Agent, or Firm* — North Shore Patents, P.C.; Michele Liu Baillie

(57) **ABSTRACT**

A universal phone number service and method of providing a universal phone number service that allows a user to receive phone calls on any phone service with a single phone number. A telephone is disclosed that is associated with more than one phone number and a universal phone number, wherein any phone call placed to the universal phone number results in the call being completed to the telephone regardless of the service associated with the more than one phone number.

7 Claims, 6 Drawing Sheets



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H04L 29/12 (2006.01)
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(52) **U.S. Cl.**
CPC ***H04L 61/2596*** (2013.01); ***H04M 3/42229*** (2013.01); *H04Q 2213/13034* (2013.01); *H04Q 2213/13097* (2013.01); *H04Q 2213/13098* (2013.01); *H04Q 2213/13196* (2013.01); *H04Q 2213/13389* (2013.01)

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USPC 455/406, 433; 370/352
See application file for complete search history.

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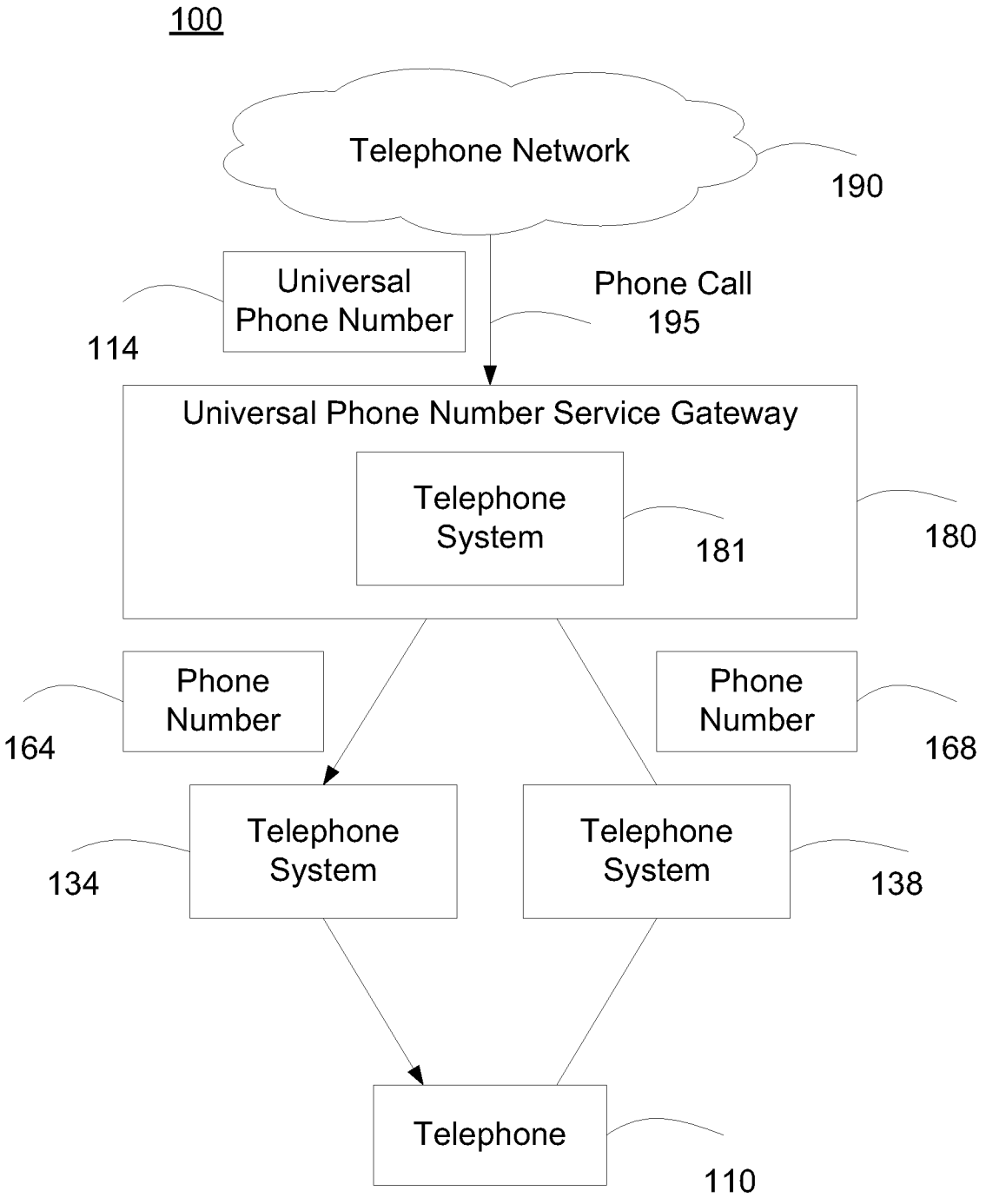
100
Telephone Network
190
Universal Phone Number
114
Phone Call
195
Universal Phone Number Service Gateway
Telephone System
181
180
Phone Number
164
Phone Number
168
Telephone System
134
Telephone System
138
Telephone
110

Figure 1

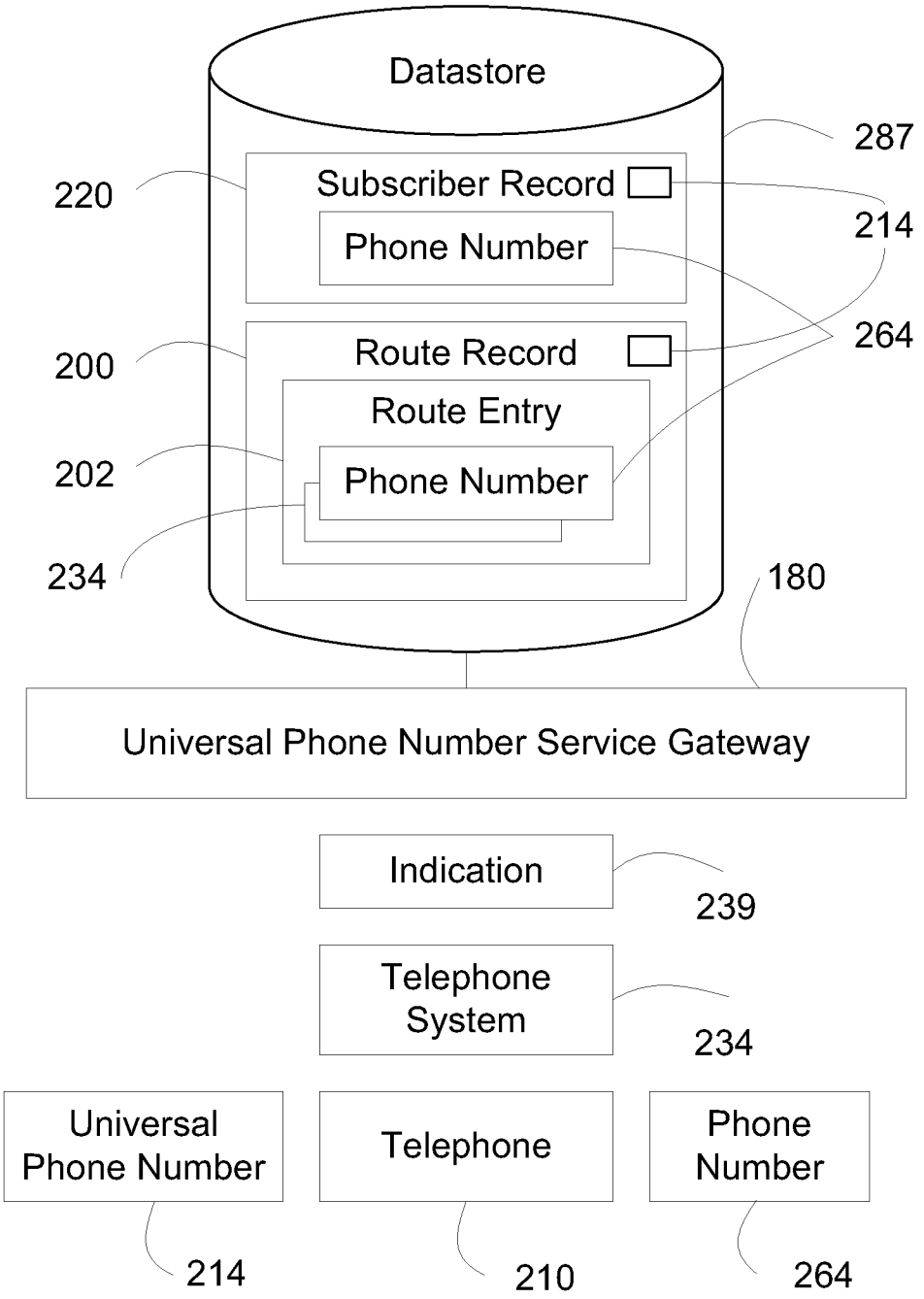
Datastore
287
220
Subscriber Record
Phone Number
214
264
200
Route Record
Route Entry
202
Phone Number
234
180
Universal Phone Number Service Gateway
Indication
239
Telephone System
234
Universal Phone Number
Telephone
Phone Number
214
210
264

Figure 2

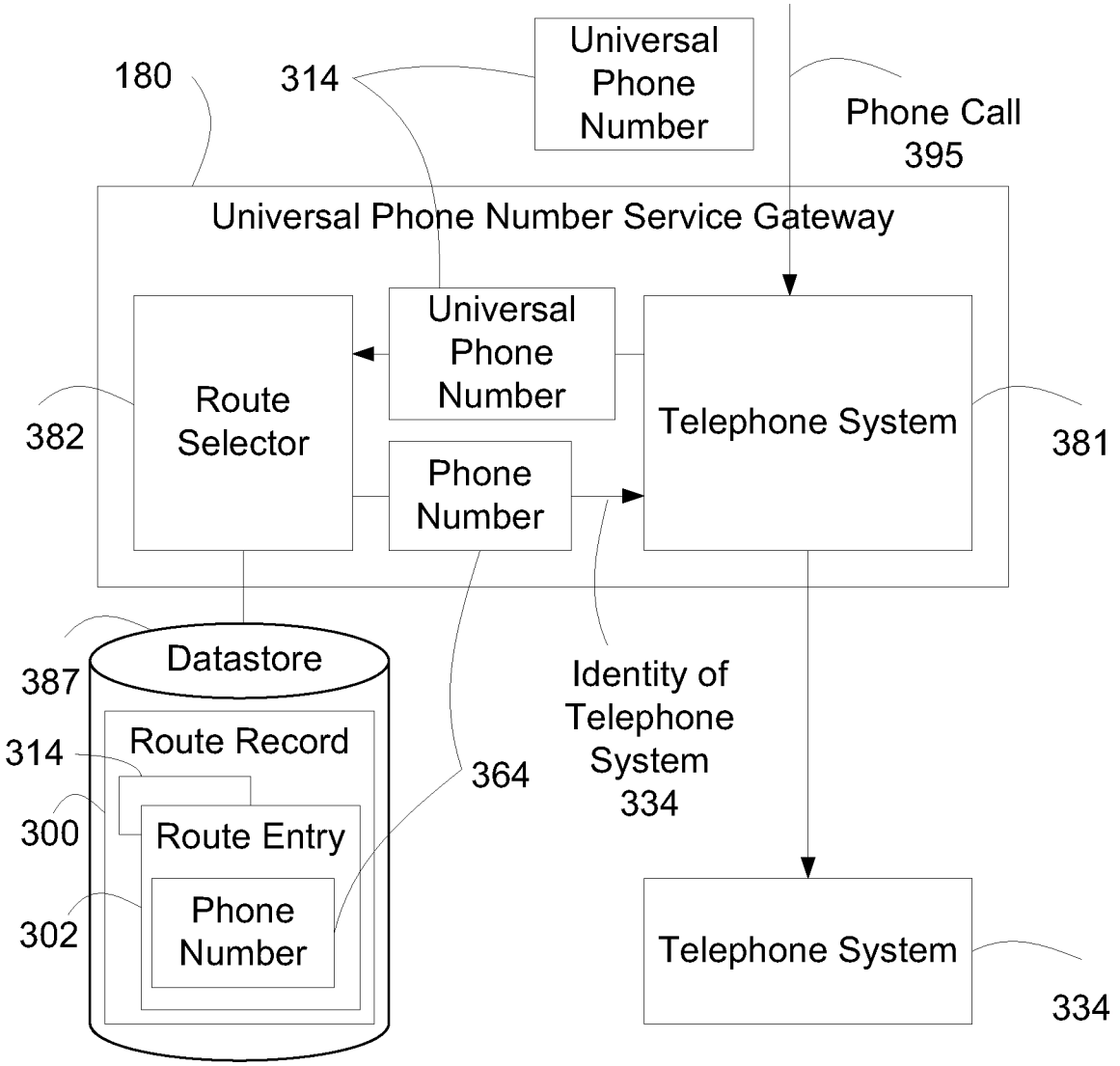
180
314
Universal Phone Number
Phone Call 395
Universal Phone Number Service Gateway
Route Selector
382
Universal Phone Number
Phone Number
Telephone System
381
Datastore
387
Route Record
314
Route Entry
300
Phone Number
302
364
Identity of Telephone System 334
Telephone System
334

Figure 3

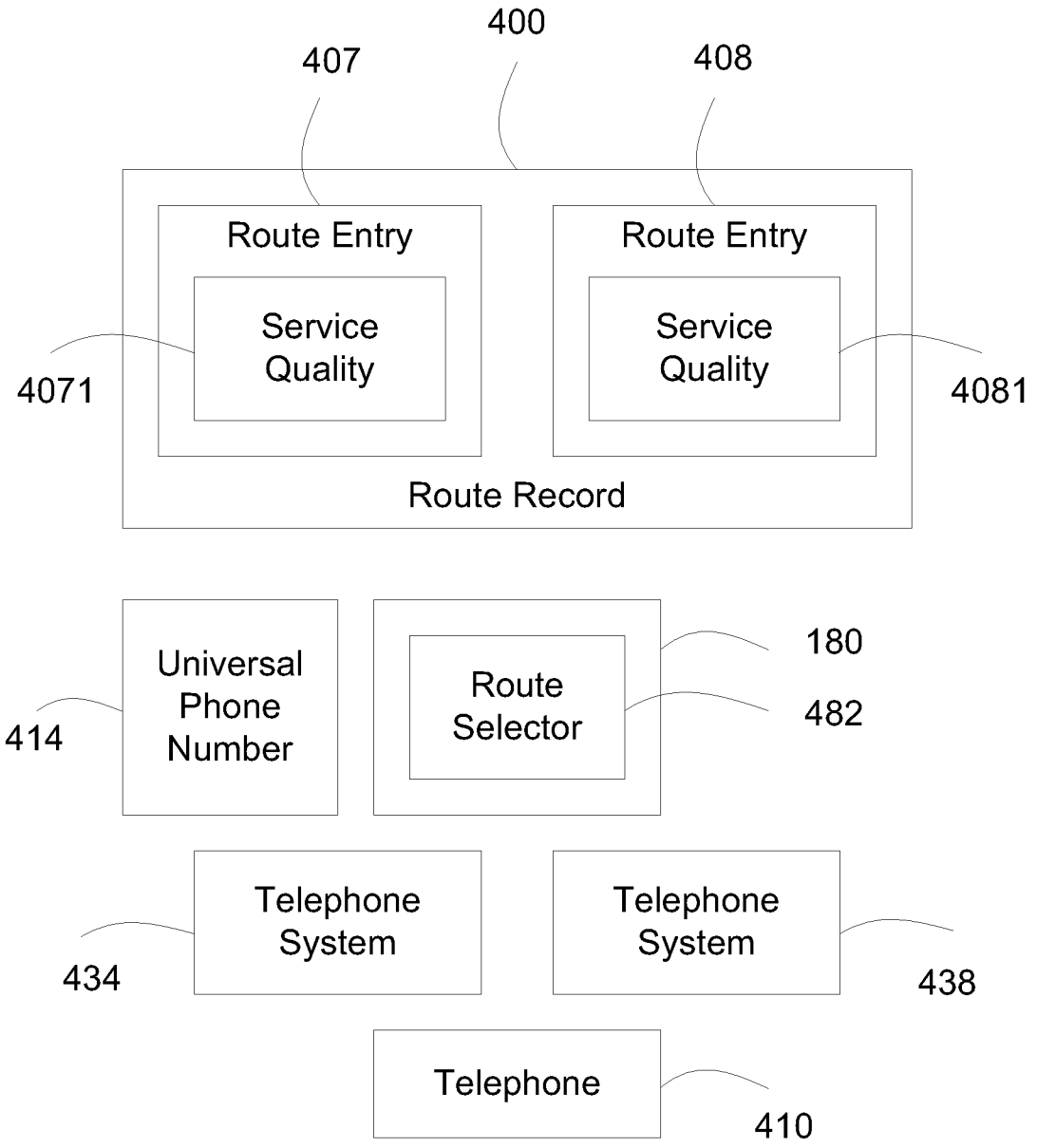
400
407
408
Route Entry
Service Quality
Route Entry
Service Quality
4071
4081
Route Record
Universal Phone Number
414
Route Selector
180
482
Telephone System
Telephone System
434
438
Telephone
410

Figure 4

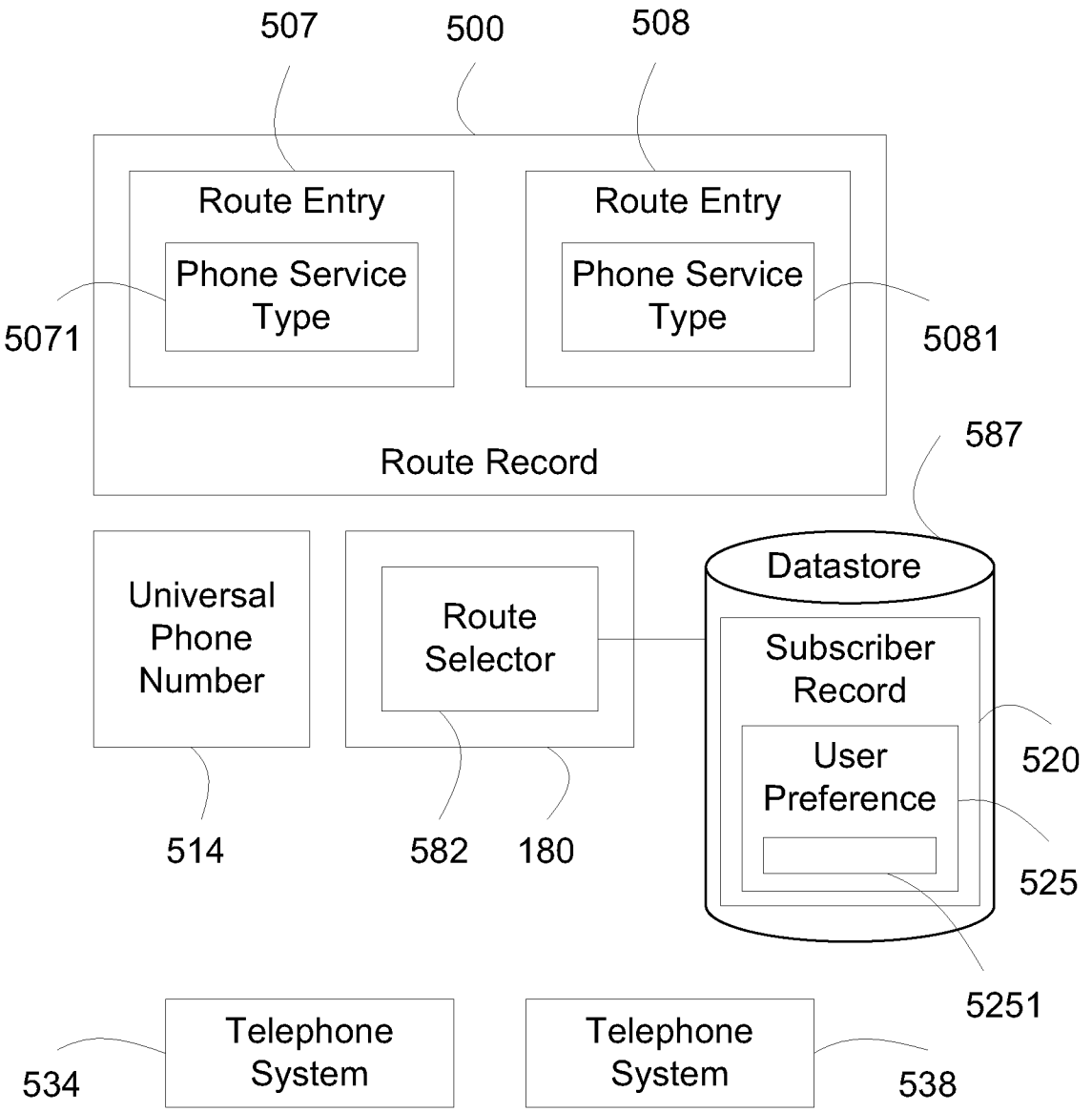
507
500
508
Route Entry
Phone Service Type
Route Entry
Phone Service Type
5071
5081
Route Record
587
Universal Phone Number
Route Selector
Datastore
Subscriber Record
User Preference
520
525
514
582
180
5251
Telephone System
Telephone System
534
538

Figure 5

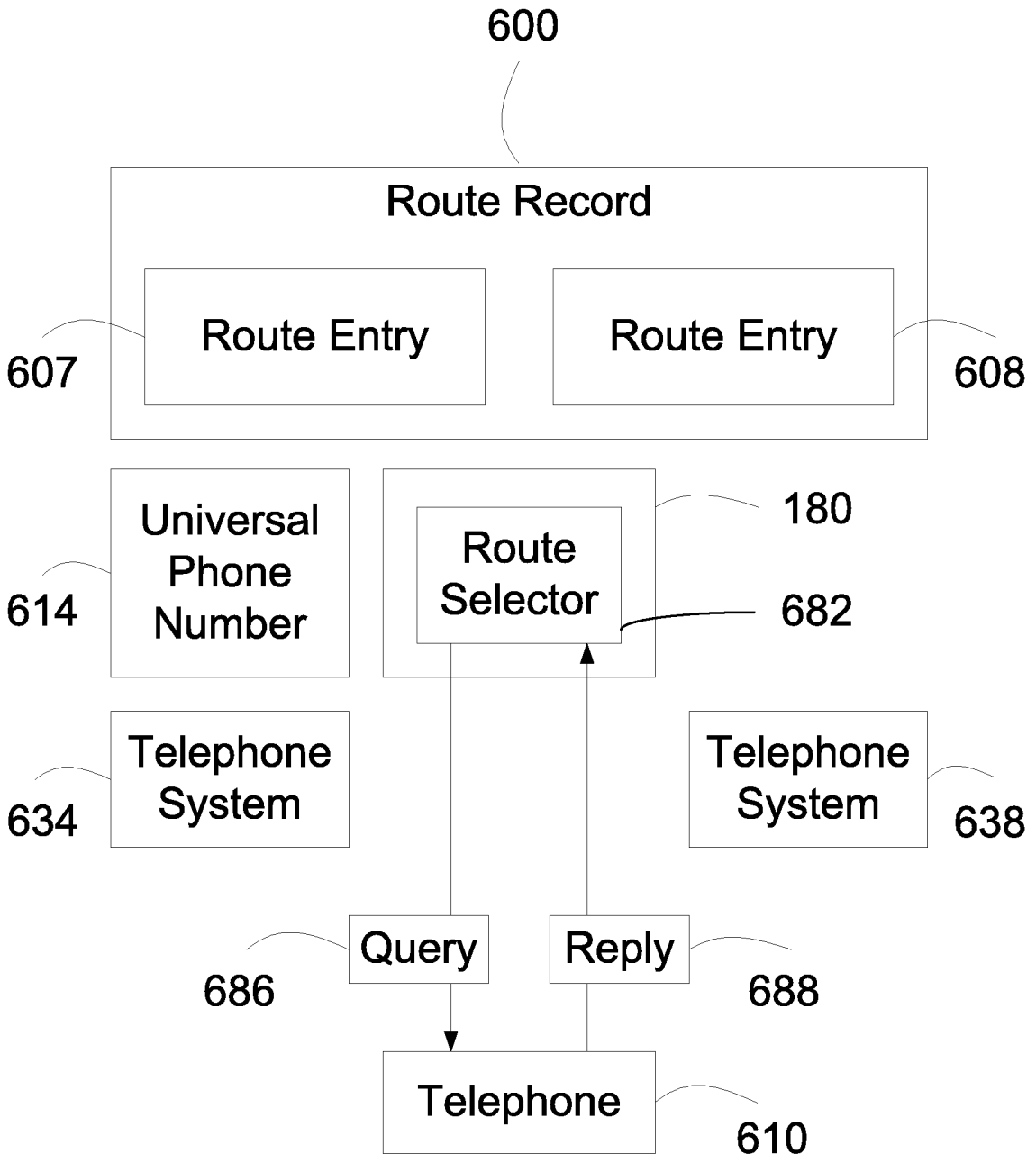
600
Route Record
Route Entry
Route Entry
607
608
Universal Phone Number
614
Route Selector
180
682
Telephone System
634
Telephone System
638
Query
686
Reply
688
Telephone
610

Figure 6

TELEPHONE WITH A UNIVERSAL PHONE NUMBER

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of U.S. patent application Ser. No. 11/559,570 filed Nov. 14, 2006, the entirety of which is incorporated herein by reference.

TECHNICAL FIELD

This invention relates generally to telecommunication, particularly to a system and method for providing a universal phone number service.

BACKGROUND

The proliferation of phone service, such as mobile phone service, Voice over IP (VoIP) service, SKYPE, or Instant Messaging (IM) based phone services such as those offered by Yahoo, MSN or Google, provides unprecedented convenience for a user to receive a phone call. For example, a user of a dual mode phone can receive a phone call from a mobile phone service while driving on a freeway and can receive another phone call from SKYPE service via a WiFi Hotspot while enjoying a relaxing afternoon in a downtown café.

Typically, each phone service is associated with a phone number with which a user receives the service. This nevertheless creates a profound problem for the user.

In one example, a user uses a WiFi-GSM dual mode phone to receive a GSM mobile phone service with a GSM phone number and Yahoo Phone In service with a Yahoo Phone In phone number. The user gives the GSM phone number to his stock broker while visiting his parents in a remote town in Kansas. The parents' house has broadband Internet access through the local cable company, but is outside of GSM signal coverage. The user uses his dual mode phone to sign on to Yahoo Phone In service using the broadband Internet access and is able to receive phone calls from his wife and children back home. Unfortunately, when his stock broker needs to consult with the user for an important stock purchase decision by dialing the GSM phone number, he is unable to reach the user.

In another example, a user uses a dual mode phone to receive a GSM mobile phone service, Yahoo Phone In service, SKYPE and two other phone services that are tailored to her participation in the local school and church. Each phone service is associated with a different phone number. A friend who knows only one of the five phone numbers can only reach the user if the associated phone service is available for her dual mode phone. A second friend who knows all five phone numbers will have to try calling the phone numbers one after another in order to reach the user.

Therefore, there is a need to provide a universal phone number service, that is, a service that allows a user to conveniently receive phone calls on any phone service with a single phone number.

SUMMARY OF THE INVENTION

In accordance with at least one aspect of the present invention a system is described for providing a universal phone number service having a universal phone number service gateway associated with at least one telephone system and a telephone associated with a universal phone number. In one embodiment the system includes a telephone connected to at least one telephone system to receive at least one phone service and is associated with at least one phone number for receiving the at least one phone service. In a preferred embodiment the telephone is connected to more than one telephone system, and the telephone is associated with more than one phone number.

In at least one embodiment a system is disclosed in which a universal phone number service gateway is provided that is associated with a datastore, the datastore optionally comprising a memory and optionally comprising a database. The datastore optionally further includes a route record associated with the universal phone number. The datastore may further include a subscriber record associated with the universal phone number, and the subscriber record preferably includes a phone number.

In another embodiment a method of routing a call to a telephone using a universal phone number is described whereby a telephone is connected to at least one telephone system to receive at least one phone service. Preferably the telephone is associated with a plurality of phone numbers, each of which is associated with a phone service. The universal telephone number is associated with the telephone and the telephone number(s), and calls destined for the universal telephone number are routed through a universal phone number service gateway using the telephone number to a telephone system associated with the telephone number. The universal phone number service gateway preferably routes a call to the telephone system using a standard-based protocol, a proprietary protocol, a corporate telephony trunking protocol or an Application Programming Interface.

In one embodiment the method includes creation of a route entry of a route record. In a preferred embodiment, the universal phone number service gateway connects to a datastore including the route record and a subscriber record, wherein the route record is associated with the universal phone number and the subscriber record is associated with the universal phone number and includes a phone number. In another embodiment, the method further includes obtaining an indication that the telephone system can route a phone call to the phone number; selecting a subscriber record based on the phone number; selecting a route record based on the universal phone number associated with the subscriber record; and creating a route entry in the route record. The route entry preferably includes the phone number and the identity of the telephone system.

Preferably the indication step takes place at the time of phone service subscription. However, this step may take place as further described herein.

In another embodiment the present invention includes a telephone associated with more than one phone number and a universal phone number, wherein any phone call placed to the universal phone number results in the call being completed to the telephone regardless of the service associated with the more than one phone number.

BRIEF DESCRIPTION OF DRAWINGS

For the purposes of illustrating the various aspects of the invention, there are shown in the drawings forms that are presently preferred, it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

FIG. **1** illustrates a universal phone number service in accordance with at least one aspect of the present invention;

FIG. **2** illustrates a route entry of a route record in accordance with at least one aspect of the present invention;

FIG. **3** illustrates a universal phone number service in accordance with at least one aspect of the present invention;

FIG. **4** illustrates a universal phone number service in accordance with at least one aspect of the present invention;

FIG. **5** illustrates a universal phone number service in accordance with at least one aspect of the present invention; and

FIG. **6** illustrates a universal phone number service in accordance with at least one aspect of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, for the purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the invention. It will be apparent, however, to a person of ordinary skill in the art, that these specific details are merely exemplary embodiments of the invention. In some instances, well known features may be omitted or simplified so as not to obscure the present invention. Furthermore, reference in the specification to "one embodiment" or "an embodiment" is not meant to limit the scope of the invention, but instead merely provides an example of a particular feature, structure or characteristic of the invention described in connection with the embodiment. Insofar as various embodiments are described herein, the appearances of the phase "in an embodiment" in various places in the specification are not meant to refer to a single or same embodiment.

With reference to the drawings, wherein like numerals indicate like elements, there is shown in FIG. **1** in accordance with at least one embodiment, a simplified block diagram depicting a system **100** providing a universal phone number service, the system **100** including a universal phone number service gateway **180** associated with at least one telephone system and a telephone **110** associated with a universal phone number **114**.

Telephone **110** is connected to at least one telephone system to receive at least one phone service and is associated with at least one phone number for receiving the at least one phone service. For example, telephone **110** connects to a first telephone system **134** to receive a first phone service, and is associated with a first phone number **164** for the first phone service. Telephone **110** connects to a second telephone system **138** to receive a second phone service and is associated with a second phone number **168** for the second phone service.

Telephone systems **134** and **138** are selected from, for example, a cellular phone system, such as a Global Service for Mobile Communications (GSM) system, or a W-CDMA (Wideband Code Division Multiple Access) system; a Voice over IP (VoIP) phone system; an Instant Message (IM) based phone system, such as, but not limited to Yahoo Phone In service; a public phone system; a corporate phone system; or a residential phone system.

A universal phone number service gateway **180** connects to a telephone network **190**. A phone call **195** through telephone network **190** destined to universal phone number **114** is routed to universal phone number service gateway **180**. Telephone network **190** may be without limitation a public telephony network such as Public Switched Telephone Network (PSTN), Voice over IP network (VoIP), or cellular telephony network; a corporate telephone network; or an IM based telephone network. Universal phone number **114** may be a public telephone number; a corporate telephone number; or an IM user identity, such as, but not limited to a screen name or a user name.

Universal phone number service gateway **180** includes the functionality of a telephone system **181** for receiving and routing a phone call. Universal phone number service gateway **180** receives phone call **195** using telephone system **181**.

In one embodiment, universal phone number service gateway **180** determines first telephone system **134** to route phone call **195**. An example of a process of determining a telephone system to route a phone call is illustrated in FIG. **1**. Universal phone number service gateway **180** routes phone call **195** to telephone system **134** using the first phone number **164**. First telephone system **134** receives phone call **195**. First telephone system **134** routes phone call **195** to telephone **110** based on first phone number **164**. Routing phone call **195** to telephone **110** from telephone system **134** is well known to those skilled in the art.

Depending on the application and particular embodiment, a universal phone number service gateway **180** may route a phone call to a telephone system **134** or **138** using a standard-based protocol such as Integrated System Digital Network (ISDN) Primary Rate (PRI) protocol, Signaling System 7 (SS7) ISDN User Part (ISUP) protocol, or Session Initiation Protocol (SIP). In another embodiment, a universal phone number service gateway **180** may route a phone call to a telephone system **134** or **138** using a proprietary protocol, such as a SIP protocol extension, or a corporate telephony trunking protocol. In yet another embodiment, and not by way of limitation, a universal phone number service gateway **180** may route a phone call using an Application Programming Interface (API).

By way of example, a caller using a universal phone number service in accordance with the present invention may use universal phone number **114** to send a short message or a multimedia message. Telephone **110** sends the message through a universal phone number service gateway **180**. In one embodiment, telephone **110** sends the message through first telephone system **134** to universal phone number service gateway **180**.

In another embodiment, a short message or a multimedia message is sent to universal phone number **114**. Universal phone number service gateway **180** delivers the message to telephone **110** as described herein. In another embodiment, universal phone number service gateway **180** delivers the message through second telephone system **138** to telephone **110**.

Now referring to FIG. **2** a process for a universal phone number service gateway **180** to create a route entry **202** of a route record **200** is depicted.

In accordance with one embodiment telephone **210** is associated with universal phone number **214** for the universal phone number service **100**. Telephone **210** is further associated with phone number **264** for receiving phone service from telephone system **234**. Universal phone number service gateway **180** connects to a datastore **287**. Datastore **287** may include a memory, a flash memory, a hard disk or the like. Datastore **287** may include a database. In one embodiment, universal phone number service gateway **180** includes datastore **287**.

Datastore **287** preferably includes route record **200** and subscriber record **220**. In one embodiment route record **200** is associated with universal phone number **214**. Subscriber record **220** is associated with universal phone number **214** and includes phone number **264**.

A universal phone number service gateway **180** obtains indication **239** that telephone system **234** can route a phone call to phone number **264**. Universal phone number service gateway **180** selects subscriber record **220** based on phone

number **264**. Universal phone number service gateway **180** further selects route record **200** based on universal phone number **214** associated to subscriber record **220**. Universal phone number service gateway **180** creates a route entry **202** in route record **200**. Route entry **202** includes phone number **264** and identity of telephone system **234**.

Universal phone number service gateway **180** may obtain indication **239** through a number of means. In one embodiment, telephone system **234** provides a phone service, such as Plain Old Telephone Service (POTS), or a residential Voice over IP (VoIP) service. Universal phone number service gateway **180** preferably obtains indication **239** at the time of the phone service subscription. In one embodiment, universal phone number service gateway **180** obtains indication **239** through a service ordering process by an operator.

By way of example only, in one embodiment, telephone system **234** provides a mobile phone service, such as GSM service. In this embodiment for example universal phone number service gateway **180** obtains indication **239** from a Home Location Register (HLR) or a Home Subscriber Server (HSS).

In another embodiment, telephone system **234** provides an Instant Message based phone service such as, but not limited to Google Talk, or Yahoo Phone In. In this embodiment, universal phone number service gateway **180** may obtain indication **239** from an Instant Message Presence Server for example.

In a further embodiment, telephone system **234** provides a phone service based on IP Multimedia Subsystem (IMS). In this embodiment, universal phone number service gateway **180** may for example obtain indication **239** from IMS. In another embodiment, universal phone number service gateway **180** obtains indication **239** from a Proxy Call Session Control Function (P-CSCF) serving telephone **210**.

In one embodiment, universal phone number service gateway **180** obtains an indication **239** periodically, such as every 2 minutes, 20 minutes or 2 hours. In one embodiment, universal phone number service gateway **180** obtains an indication **239** at a random time. In one embodiment, universal phone number service gateway **180** obtains an indication **239** when the location of telephone **210** has changed. In another embodiment, universal phone number service gateway **180** obtains indication **239** when the presence status of a phone number has changed.

Now referring to FIG. **3** an example of a process of routing a phone call by a universal phone number service gateway **180** is illustrated. Universal phone number service gateway **180** includes telephone system **381** and route selector **382**. Telephone system **381** receives a phone call **395** destined for universal phone number **314**. Telephone system **381** queries route selector **382** for a routing decision by sending universal phone number **314** to route selector **382**.

Route selector **382** receives universal phone number **314**. In one embodiment, route selector **382** connects to datastore **387**. Datastore **387** includes route record **300** associated with universal phone number **314**.

Route selector **382** selects route entry **302** in route record **300** in accordance with processes further exemplified and illustrated in FIGS. **4**, **5** and **6**. Route entry **302** includes phone number **364** and identity of telephone system **334**. Route selector **382** sends phone number **364** and identity of telephone system **334** to telephone system **381**. Telephone system **381** routes phone call **395** to telephone system **334** with phone number **364**.

Route selection may be based on a variety of criteria such as, but not limited to service quality, user preference, user input and the like. Now referring to FIG. **4**, a process of selecting a route entry based on service quality is illustrated. In this embodiment, route record **400** is associated with universal phone number **414** and preferably includes route entries such as route entries **407** and **408**. Route entry **407** includes identity of telephone system **434** and route entry **408** includes identity of telephone system **438**. Telephone **410** is associated with universal phone number **414**.

In one embodiment, route entries **407** and **408** include respective service qualities **4071** and **4081**. The service qualities **4071** and **4081** respectively indicate a voice quality of a phone call routed through telephone systems **434** and **438** to telephone **410**.

Service qualities **4071** and **4081** may represent various attributes. In one embodiment, service qualities **4071** or **4081** may represent the predicted signal strength of the radio link between a cellular telephone system **434** or **438** and telephone **410**. For example, service quality **4071/4081** may be considered "good" if the predicated signal strength is above 20 dB-microvolts per square meter ($dB\mu V/m^2$); "fair" if the predicted signal strength is between 10 to 20 $dB\mu V/m^2$; and "poor" if the predicted signal strength is below 10 $dB\mu V/m^2$.

In another embodiment, service quality **4071/4081** represents the average packet loss rate in a VoIP-based telephone system **434/438** respectively. For example, service quality **4071/4081** may be considered "good" if the predicted packet loss rate is below 1 percent; "fair" if the average packet loss rate is between 1-5 percent; and "poor" if the predicted packet loss rate is above 5 percent. In other embodiments, service quality **4071/4081** may represent the predicted jitter or predicted packet delay for the routed phone call.

In another embodiment, service quality **4071/4081** may represent the current network traffic load of a circuit switching based telephone system **434/438**. For example, service quality **4071/4081** may be considered "good" if the current network traffic load is below 20 percent; "fair" if the current network traffic load is between 20-80 percent; and "poor" if the current network traffic load is above 80 percent.

In another embodiment, route selector **482** queries for service quality **4071/4081** from telephone systems **434/438**. Route selector **482** compares service quality **4071** and service quality **4081**. For example, service quality **4071** may be found "fair" and service quality **4081** found "good". Route selector **482** determines service quality **4081** is better and selects route entry **408** based on service quality **4081**.

Now referring to FIG. **5** a process of selecting a route entry based on user preference is illustrated. In accordance with this embodiment, route record **500** is associated with universal phone number **514**. Route record **500** includes route entry **507** associated with telephone system **534** and route entry **508** associated with telephone system **538**. Subscriber record **520** is associated with universal phone number **514**, and includes a user preference **525**. In one embodiment, user preference **525** includes a preferred phone service type **5251**. Route entries **507** and **508** include phone service types **5071** and **5081** respectively.

In one embodiment, universal phone number service gateway **180** obtains phone service types **5071** and/or **5081** as an indication **239** as illustrated in FIG. **2**. For example, preferred phone service type **5251** may be "mobile phone services". In one scenario for example, wherein phone service type **5071** is "IM-based phone service" and phone service type **5081** is "mobile phone service", route selector **582** determines that phone service type **5081** matches preferred phone service type **5251**; route selector **582** selects route entry **508**.

In one embodiment, user preference **525** includes a preferred phone service type associated with a time. Route selector **582** connects to a clock that indicates the current time of day. Route selector **582** selects route entry **508** whose phone service type **5081** matches the preferred phone service type and the associated time matching the current time of day.

Now referring to FIG. **6** a process of selecting a route entry based on user input is depicted. In accordance with one embodiment route record **600** is associated with a universal phone number **614**. Route record **600** includes route entries such as for example route entry **607** associated with telephone system **634** and route entry **608** associated with telephone system **638**. Telephone **610** is associated to universal phone number **614**. It will be apparent to those skilled in the art route record **600** may include multiple route entries.

A universal phone number service gateway **180** includes route selector **682**. Route selector **682** connects to telephone **610**. In one embodiment, route selector **682** connects to telephone **610** over a network such as, but not limited to a network or cellular network; or using a message service such as, but not limited to paging service, Short Message Service, Multimedia Messaging Service (MIMS) or Instant Messaging (IM) service.

Route selector **682** sends a query **686** to telephone **610** for the selection of a telephone system. Query **686** includes information about telephone systems **634** and **638**, such as the identities of telephone systems **634** and **638**. By way of examples, route selector **682** may use a Short Message Service (SMS) or an IM service to send query **686**; or route selector **682** may send query **686** using a network or other protocol such as a proprietary protocol. Telephone **610** receives query **686**. In one embodiment, telephone **610** includes a graphic user interface (GUI) such as but not limited to a display screen (not shown). Telephone **610** displays the identities of telephone systems **634** and **638** on the GUI.

Telephone **610** provides input means, such as a dialpad, navigation keys or stylus, for a user to select a telephone system. In this illustration, telephone **610** receives from the input means that the user has selected telephone system **638**. Telephone **610** sends a reply **688** to route selector **682** indicating the selection of telephone system **638**. Route selector **682** receives reply **688**. Based on the indicated telephone system **638**, route selector **682** selects route entry **608**.

In accordance with one embodiment, route selector **682** may select a route entry **608** based on phone call type, such as a voice-only, or a video phone call. In another embodiment, a route entry **608** includes a plurality of phone call types supported by the associated telephone system. Route selector **682** in this embodiment selects a route entry **608** whose supported phone call types include the phone call type of the phone call.

In another embodiment, a preferred phone service type is associated with a caller identity. Route selector **682** selects a route entry **608** whose phone service type matches the preferred phone service type and the caller identity of phone call matches the associated caller identity.

Although the invention herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A system, comprising:

a single telephone of a user, the single telephone associated with a universal phone number and plural phone numbers,

the single telephone connected to a first telephone system of plural telephone systems to receive a first telephone service, the first telephone system associated with a first phone number of the plural phone numbers,

the single telephone further connected to a second telephone system of the plural telephone systems to receive a second telephone service, the second telephone system associated with a second phone number of the plural phone numbers, and

the single telephone associated with a user preference indicating a preference for the first telephone service, wherein the user preference is associated with the universal phone number and the plural phone numbers,

wherein in response to a phone call placed to the single telephone using the universal phone number, the single telephone receives the phone call from the first telephone system associated with the first telephone service matching the user preference,

wherein the universal phone number is associated with a universal phone number service gateway,

wherein the universal phone number service gateway is associated with at least one telephone network and comprises a route selector, and is associated with a datastore, the datastore comprising a memory and a database, the datastore further comprising a route record associated with the universal phone number and a subscriber record associated with the universal phone number, the subscriber record comprising the plural phone numbers and the plural telephone systems associated therewith,

wherein the universal phone number service gateway is operable to select a subscriber record based on a selected one of plural phone numbers and is further operable to select a route record based on the universal phone number associated with the selected subscriber record,

wherein the route selector is operable to select the route record to route an incoming call based on the user preference using the telephone system associated with the selected one of the plural phone numbers to the single telephone associated with the universal phone number.

2. The system according to claim **1** wherein the plural telephone systems are selected from a cellular phone system, a W-CDMA phone system, a VoIP phone system, an Instant Message based phone system, a public phone system, a corporate phone system and a residential phone system.

3. The system according to claim **1** wherein the at least one telephone network is selected from a public telephony network, voice over IP network (VoIP), cellular telephony network, a corporate telephone network and an Instant Message based telephone network.

4. The system according to claim **1** wherein the telephone is a land-line telephone or a cellular telephone.

5. The system according to claim **1** wherein the universal phone number is selected from a public telephone number, a corporate telephone number and an Instant Message user identity.

6. The system according to claim 1 wherein the universal phone number service gateway is operable to create a route entry comprising the selected one of the plural phone numbers and the telephone system associated therewith.

7. The system according to claim 1, wherein the universal phone number is associated with the universal phone number service gateway,

wherein in response to receiving the phone call placed to the single telephone using the universal phone number, the universal phone number service gateway:

selects the first telephone system associated with the first telephone service matching the user preference, and

routes the phone call to the first telephone system.

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