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Wilkins et al.

(54) CONTACT MANAGEMENT SYSTEM AND METHOD

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(21) Appl. No.: **12/116,862**

(22) Filed: **May 7, 2008**

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Publication Classification

(51) **Int. Cl.**

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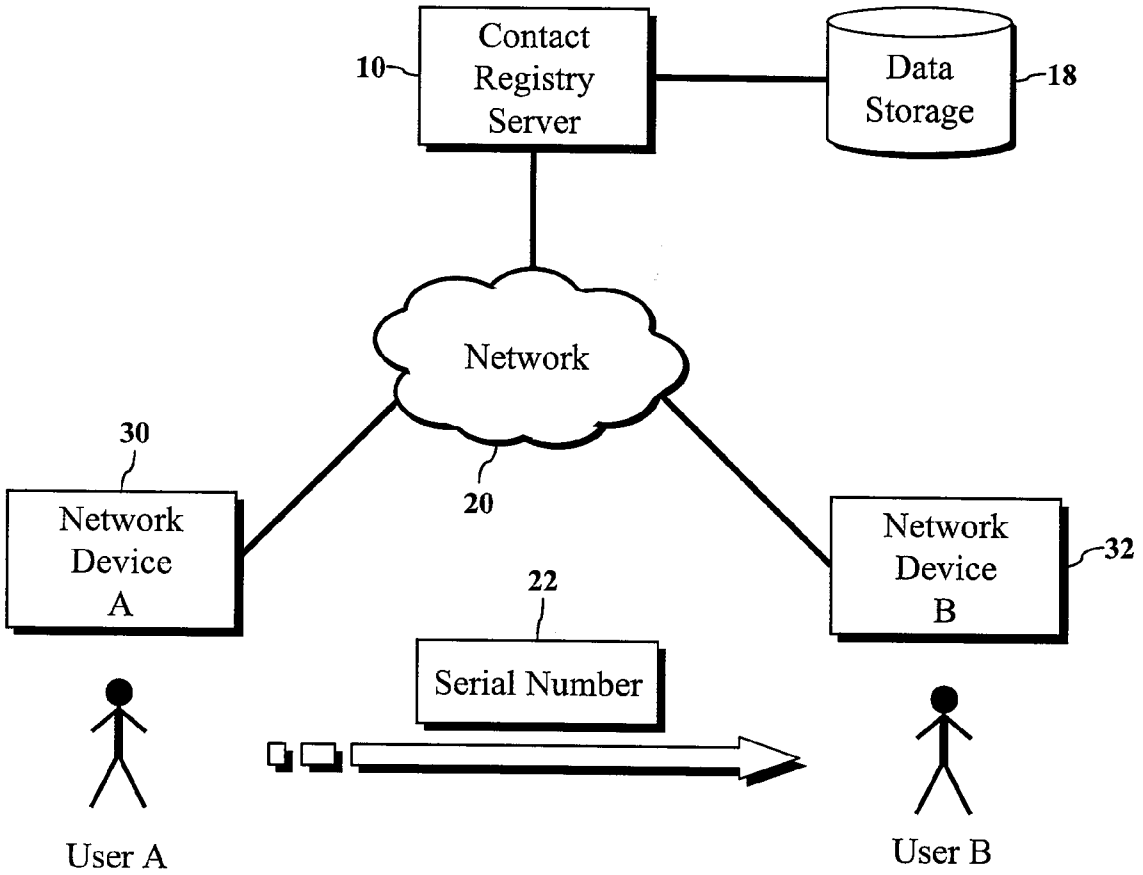
G06F 7/08	(2006.01)
G06F 15/16	(2006.01)

(52) **U.S. Cl.** **380/279**; 707/5; 707/7; 709/203; 709/206; 707/E17.014; 707/E17.108

(57) **ABSTRACT**

In an embodiment of a method of providing contact information, the method includes creating a contact record in a contact management system, where a process associated with a subject of the contact record and/or a recipient of data associated with the contact record is included in creating the contact record. A unique serial number is generated corresponding to the contact record and the serial number is conveyed to the recipient. A request by an application is received for the contact record from the contact management system corresponding to the serial number and data associated with the contact record is transmitted to the application.



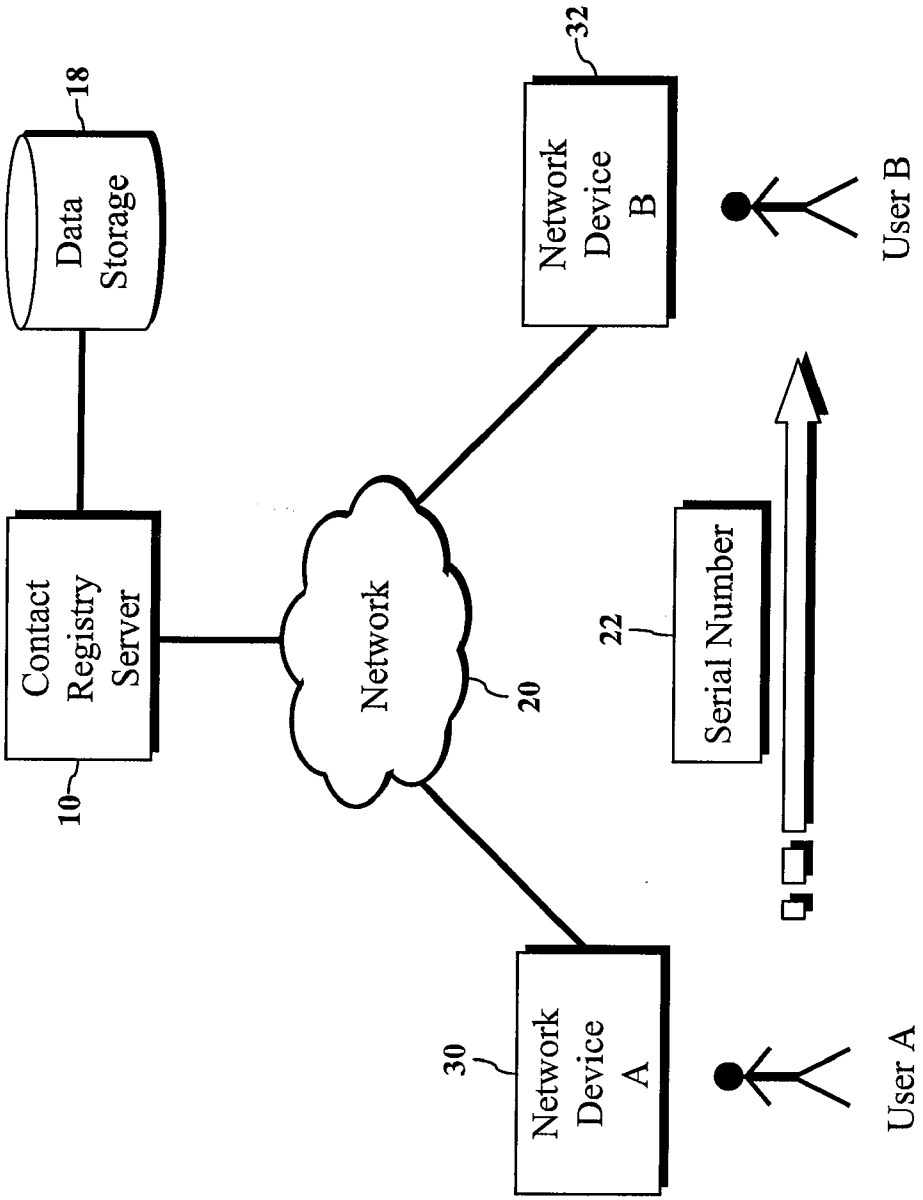

Contact Registry Server
10
Data Storage
18
Network
20
Network Device A
30
Network Device B
32
Serial Number
22
User A
User B

Fig. 1

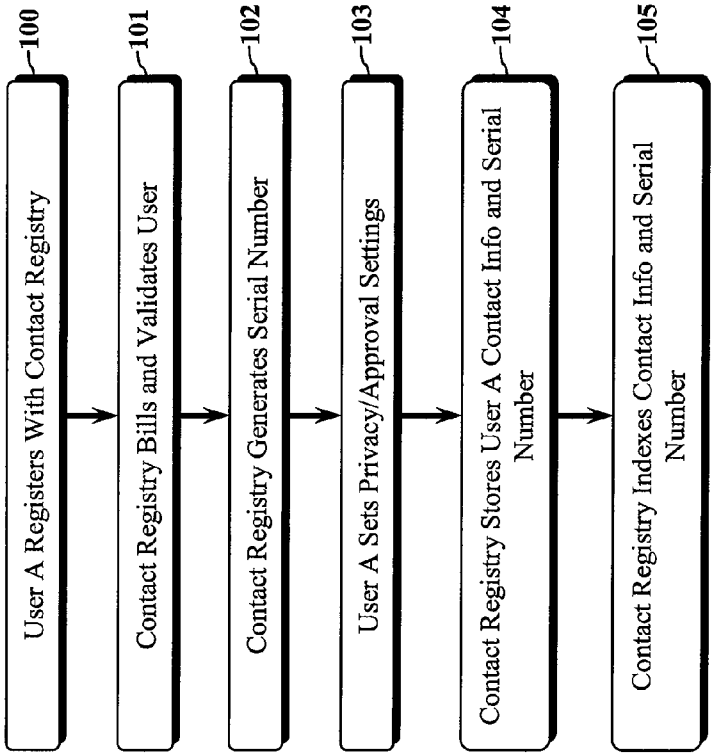

100
User A Registers With Contact Registry
101
Contact Registry Bills and Validates User
102
Contact Registry Generates Serial Number
103
User A Sets Privacy/Approval Settings
104
Contact Registry Stores User A Contact Info and Serial Number
105
Contact Registry Indexes Contact Info and Serial Number

Fig. 2b

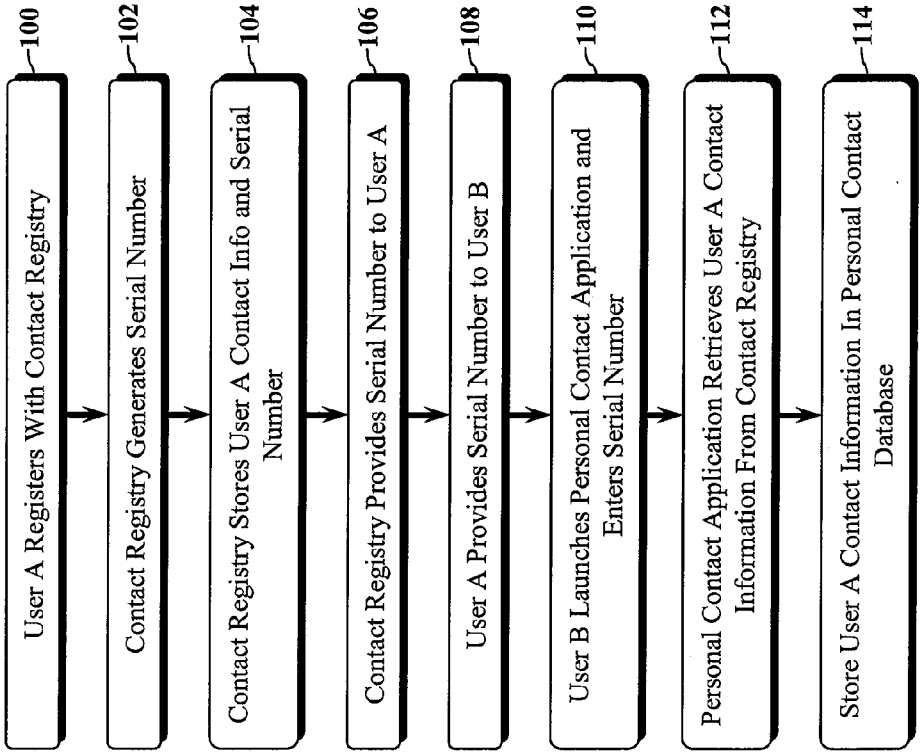

100
User A Registers With Contact Registry
102
Contact Registry Generates Serial Number
104
Contact Registry Stores User A Contact Info and Serial Number
106
Contact Registry Provides Serial Number to User A
108
User A Provides Serial Number to User B
110
User B Launches Personal Contact Application and Enters Serial Number
112
Personal Contact Application Retrieves User A Contact Information From Contact Registry
114
Store User A Contact Information In Personal Contact Database

Fig. 2a

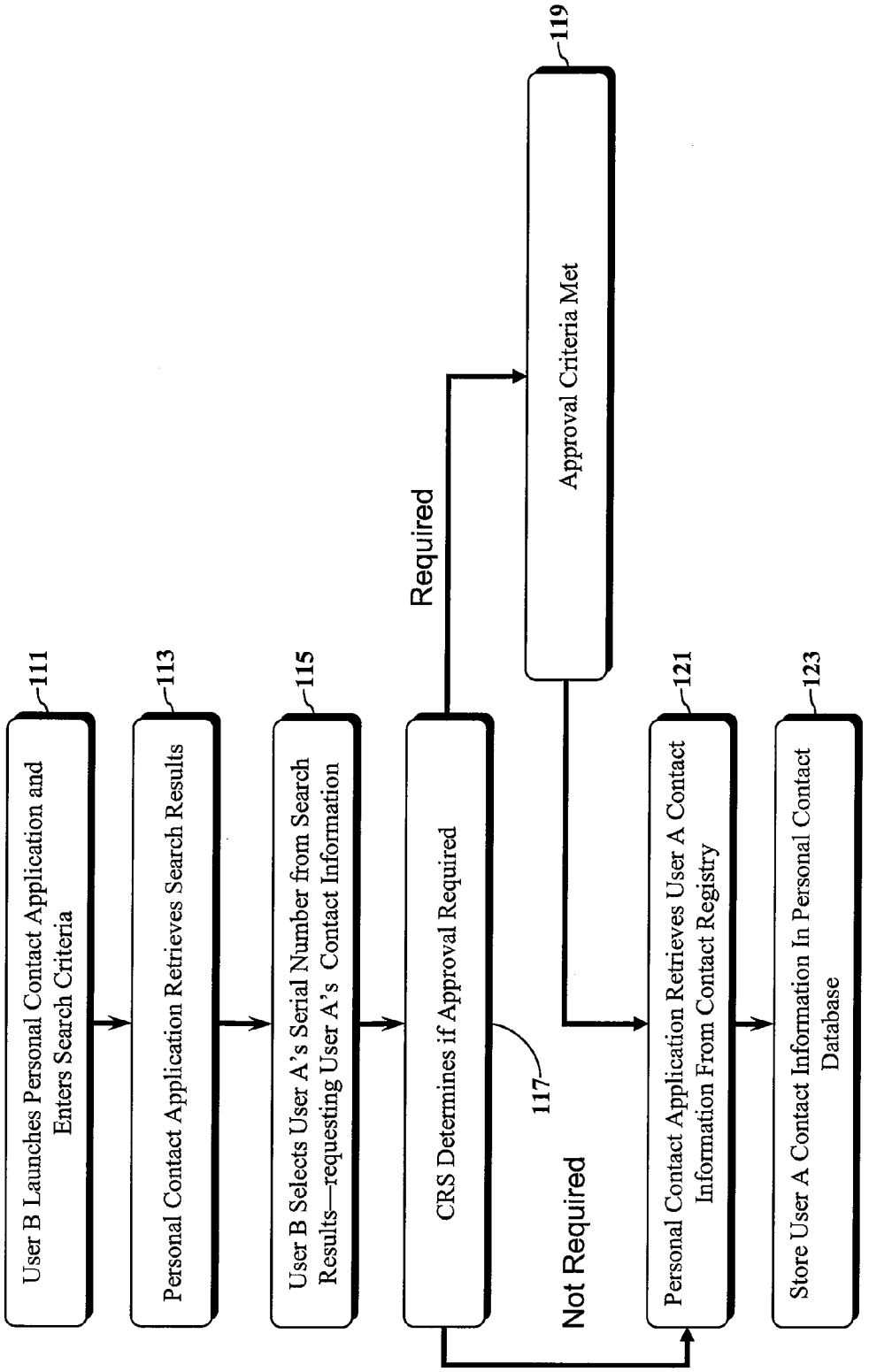

User B Launches Personal Contact Application and Enters Search Criteria
111
Personal Contact Application Retrieves Search Results
113
User B Selects User A's Serial Number from Search Results—requesting User A's Contact Information
115
CRS Determines if Approval Required
117
Required
Not Required
Approval Criteria Met
119
Personal Contact Application Retrieves User A Contact Information From Contact Registry
121
Store User A Contact Information In Personal Contact Database
123

Fig. 2c

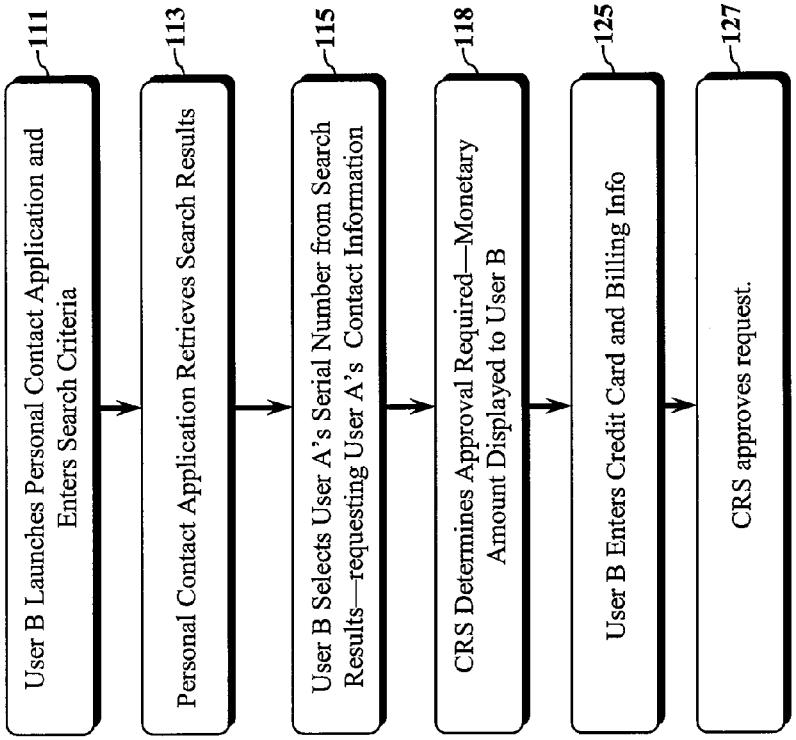

111
User B Launches Personal Contact Application and Enters Search Criteria
113
Personal Contact Application Retrieves Search Results
115
User B Selects User A's Serial Number from Search Results—requesting User A's Contact Information
118
CRS Determines Approval Required—Monetary Amount Displayed to User B
125
User B Enters Credit Card and Billing Info
127
CRS approves request.

Fig. 2e

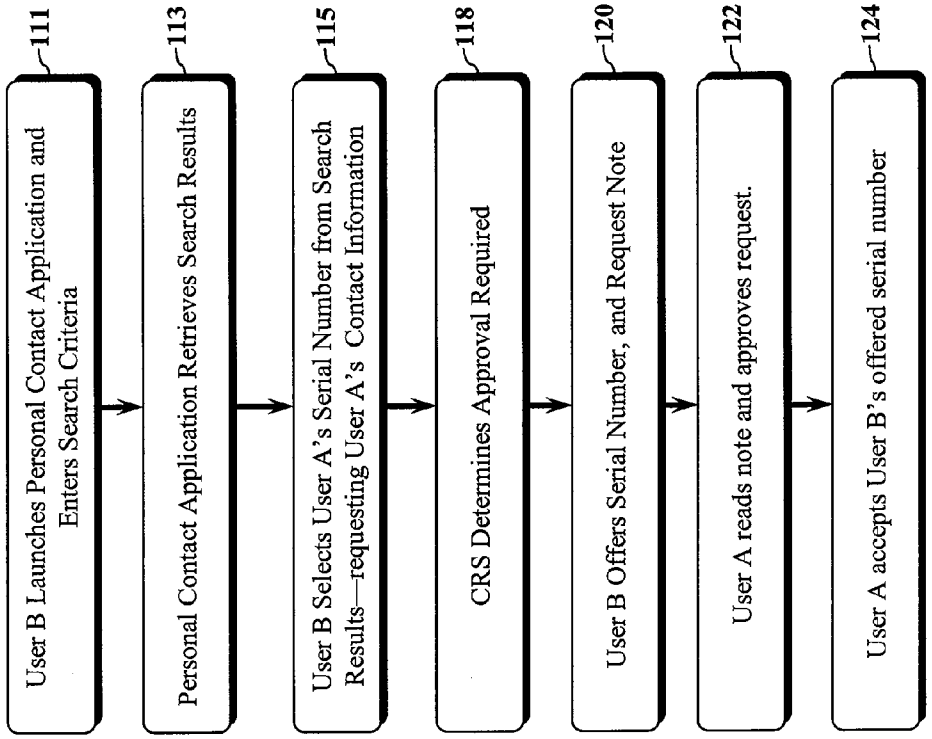

111
User B Launches Personal Contact Application and Enters Search Criteria
113
Personal Contact Application Retrieves Search Results
115
User B Selects User A's Serial Number from Search Results—requesting User A's Contact Information
118
CRS Determines Approval Required
120
User B Offers Serial Number, and Request Note
122
User A reads note and approves request.
124
User A accepts User B's offered serial number

Fig. 2d

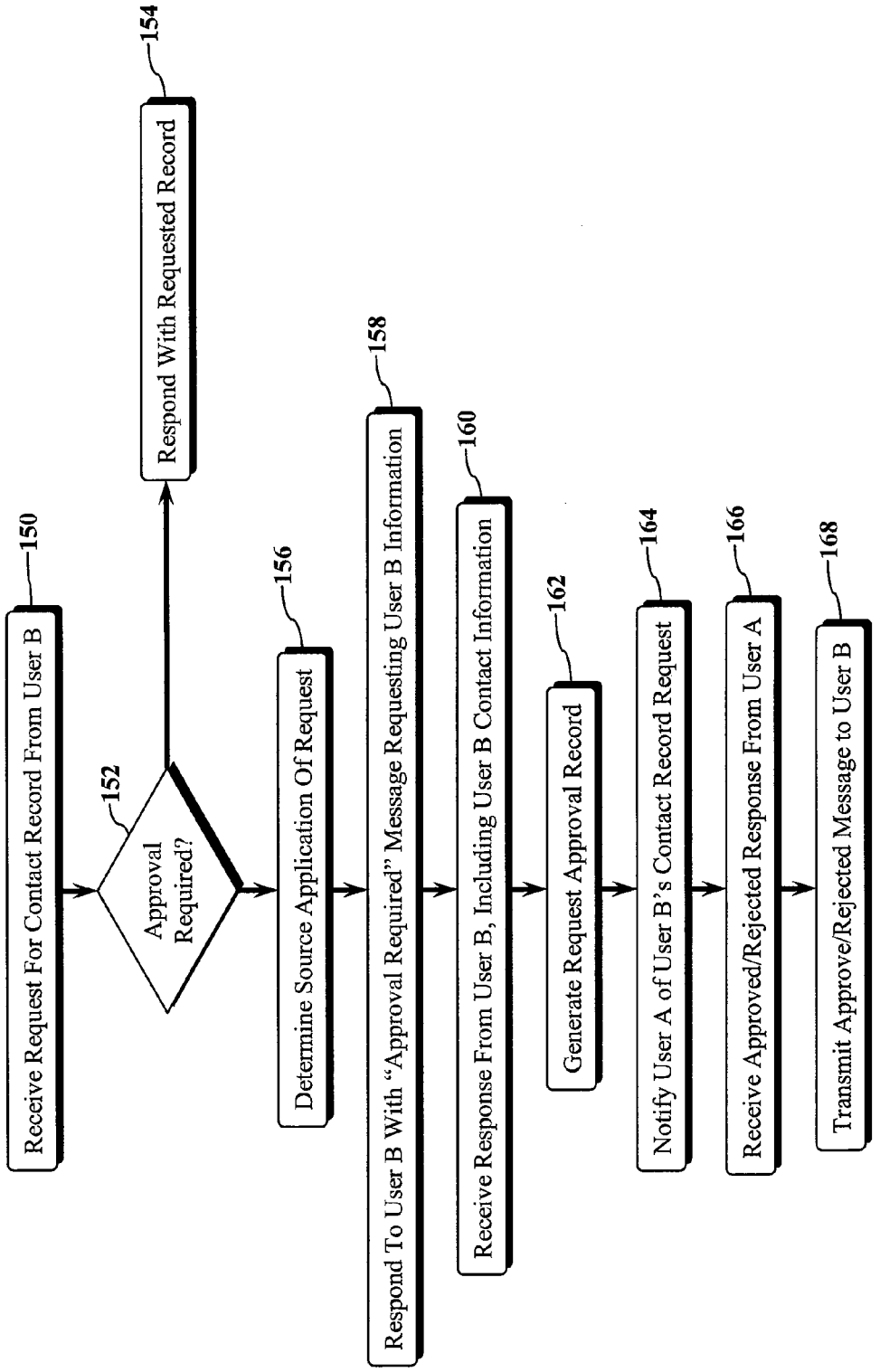

150
Receive Request For Contact Record From User B
152
Approval Required?
154
Respond With Requested Record
156
Determine Source Application Of Request
158
Respond To User B With "Approval Required" Message Requesting User B Information
160
Receive Response From User B, Including User B Contact Information
162
Generate Request Approval Record
164
Notify User A of User B's Contact Record Request
166
Receive Approved/Rejected Response From User A
168
Transmit Approve/Rejected Message to User B

Fig. 2f

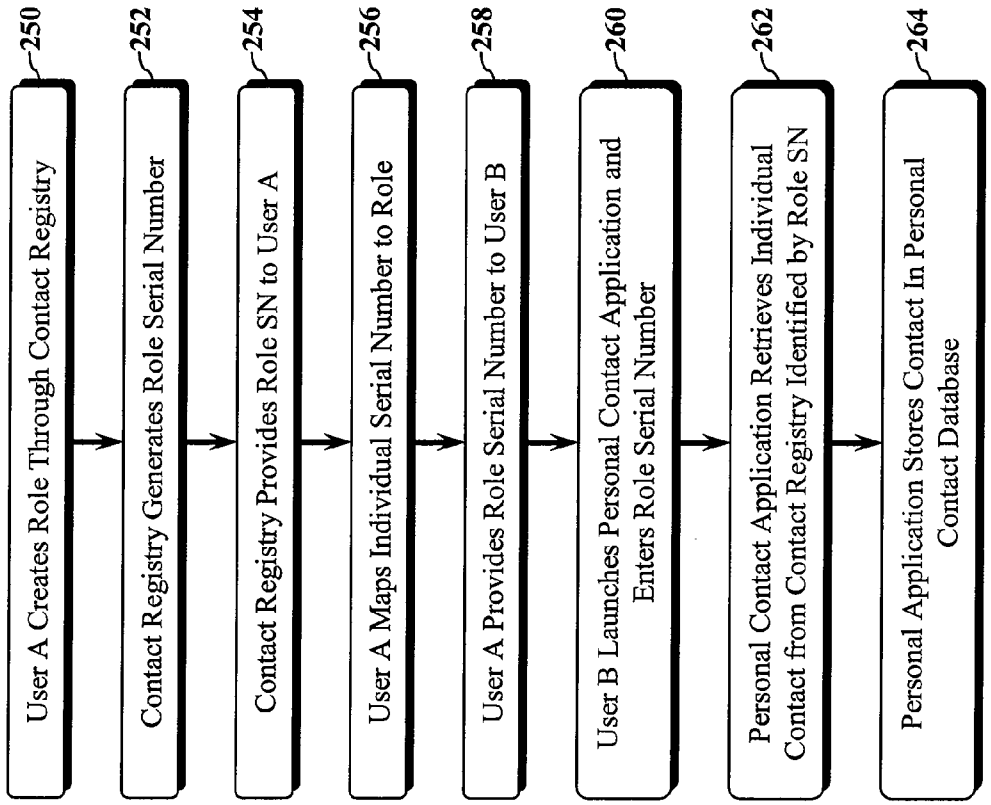

250
User A Creates Role Through Contact Registry
252
Contact Registry Generates Role Serial Number
254
Contact Registry Provides Role SN to User A
256
User A Maps Individual Serial Number to Role
258
User A Provides Role Serial Number to User B
260
User B Launches Personal Contact Application and Enters Role Serial Number
262
Personal Contact Application Retrieves Individual Contact from Contact Registry Identified by Role SN
264
Personal Application Stores Contact In Personal Contact Database

Fig. 4

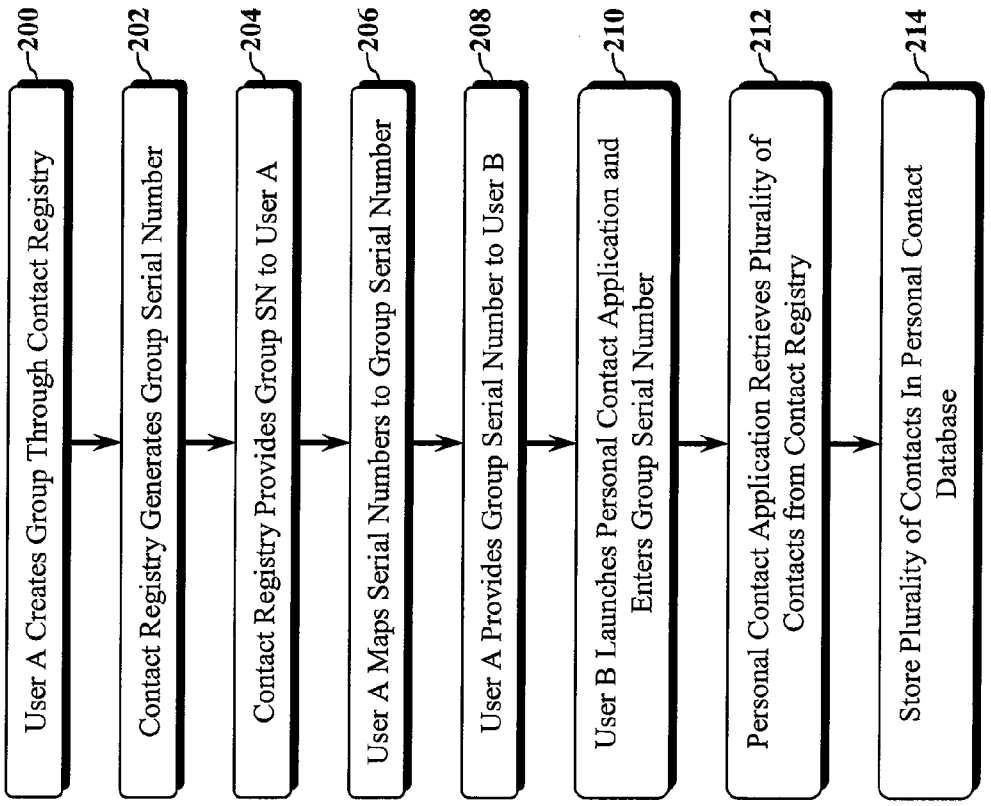

200
User A Creates Group Through Contact Registry
202
Contact Registry Generates Group Serial Number
204
Contact Registry Provides Group SN to User A
206
User A Maps Serial Numbers to Group Serial Number
208
User A Provides Group Serial Number to User B
210
User B Launches Personal Contact Application and Enters Group Serial Number
212
Personal Contact Application Retrieves Plurality of Contacts from Contact Registry
214
Store Plurality of Contacts In Personal Contact Database

Fig. 3

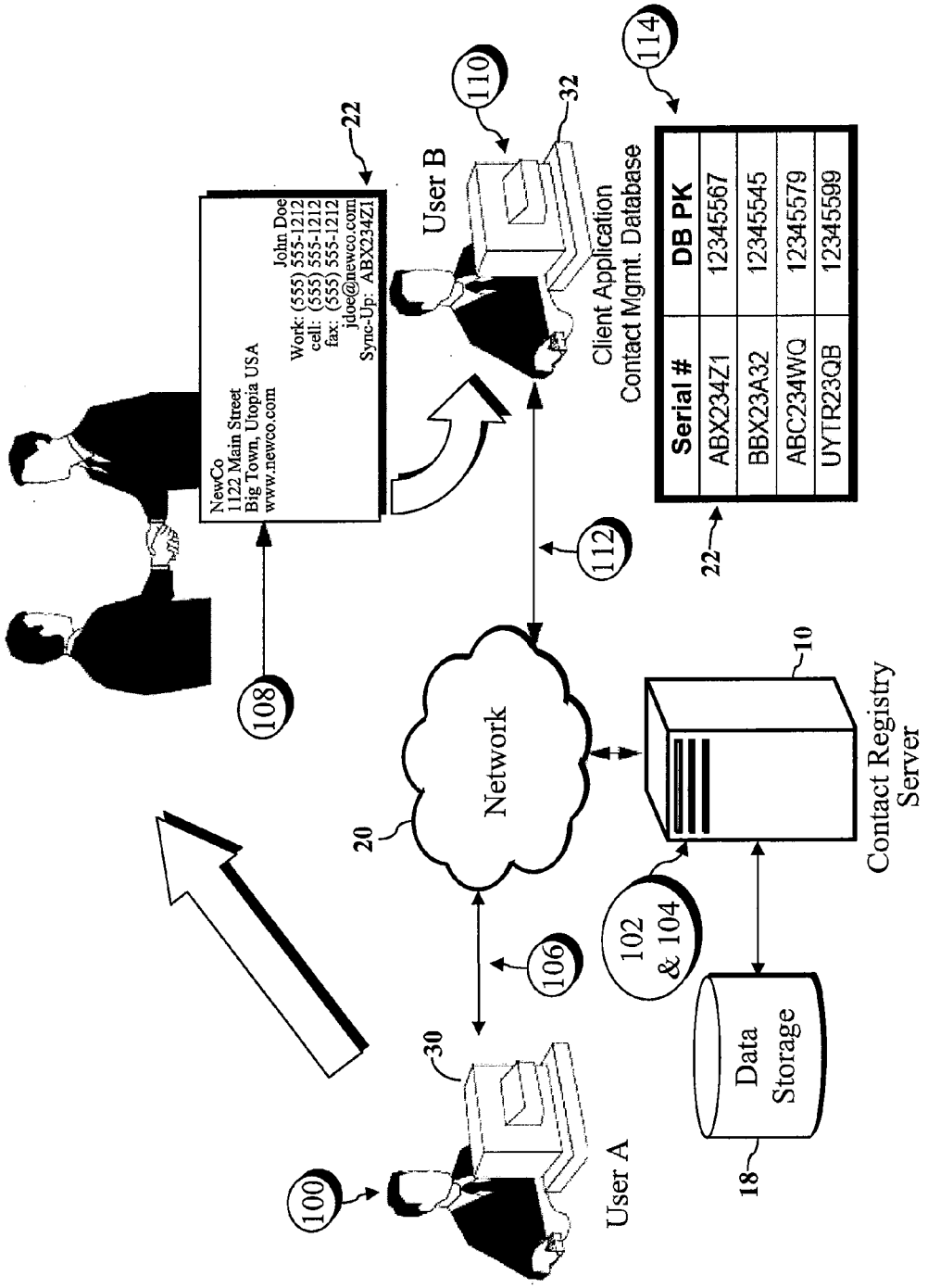

NewCo
1122 Main Street
Big Town, Utopia USA
www.newco.com
John Doe
Work: (555) 555-1212
cell: (555) 555-1212
fax: (555) 555-1212
jdoe@newco.com
Sync-Up: ABX234Z1
22
108
User B
110
32
Client Application
Contact Mgmt. Database
114
Serial # | DB PK
ABX234Z1 | 12345567
BBX23A32 | 12345545
ABC234WQ | 12345579
UYTR23QB | 12345599
22
112
Network
20
106
10
Contact Registry
Server
102
& 104
Data
Storage
18
30
User A
100

Fig. 5

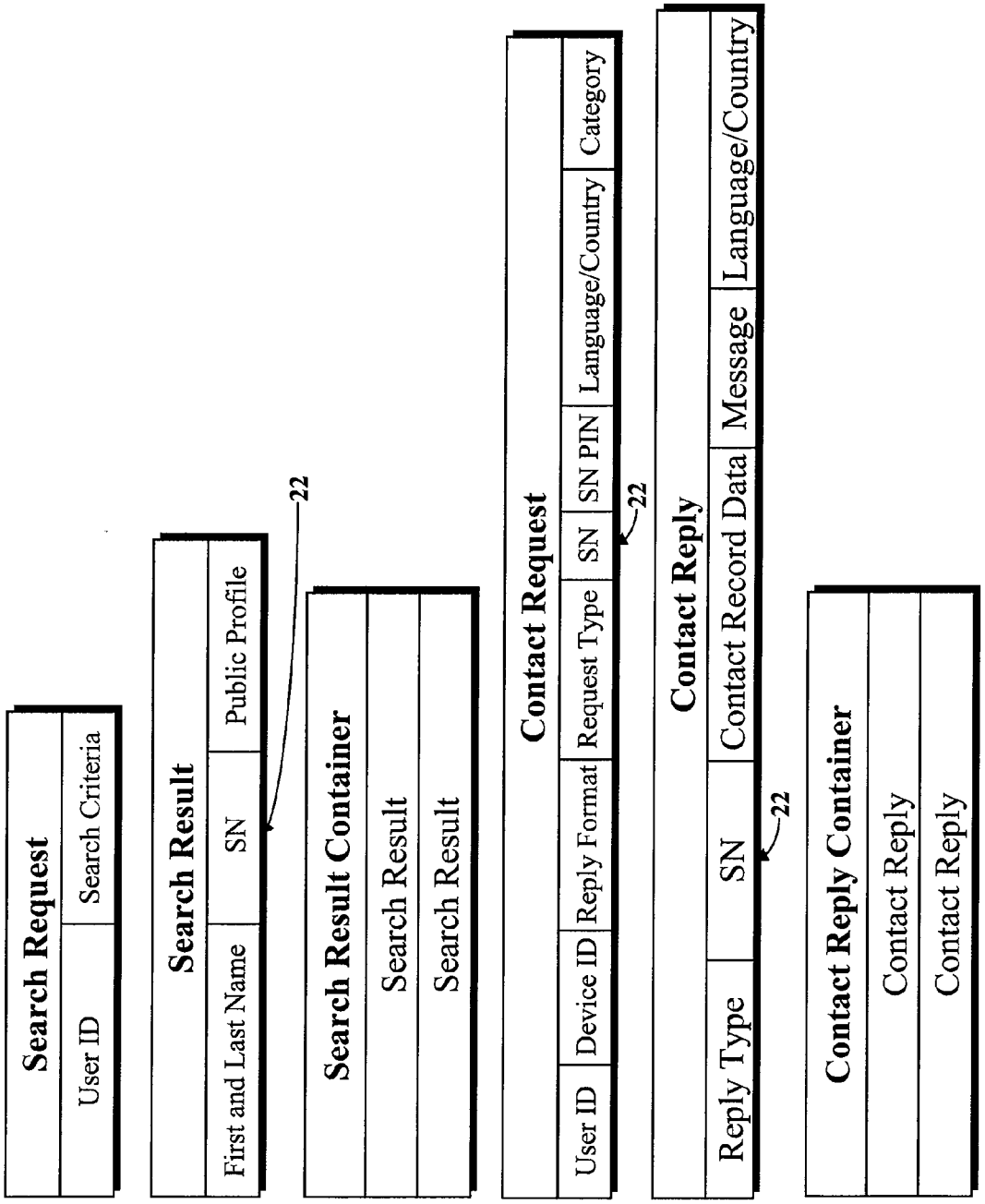


Fig. 6a

Fig. 6b

Fig. 6c

Fig. 7a

Fig. 7b

Fig. 7c

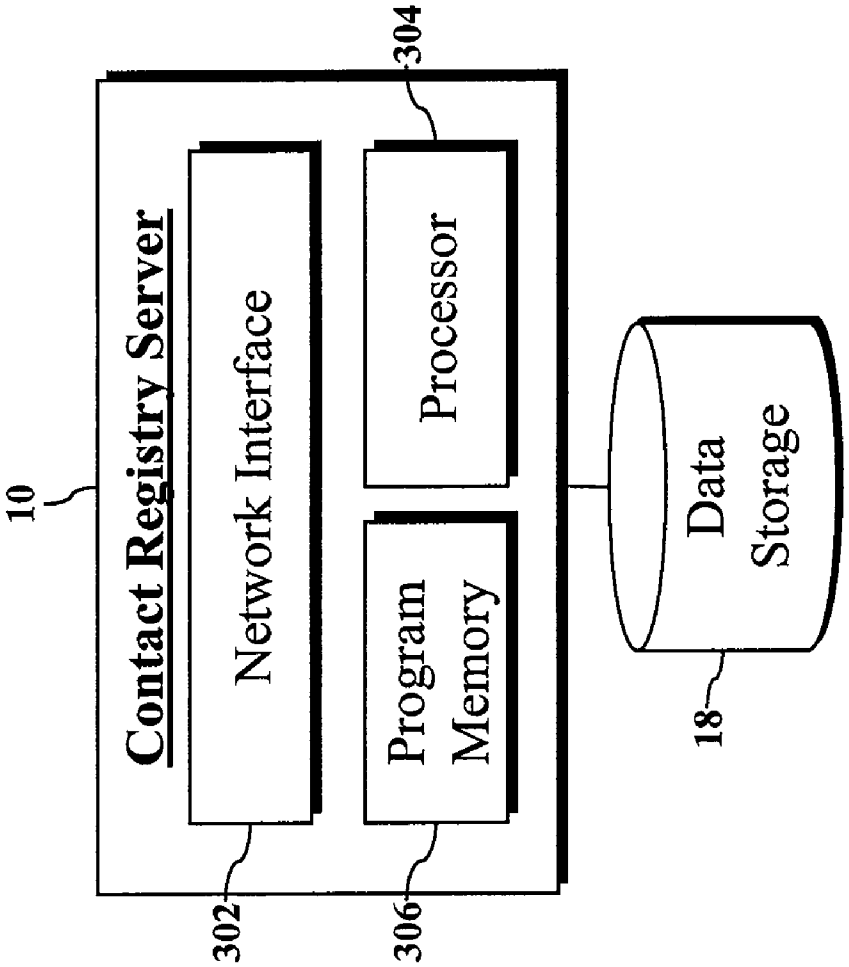

10
Contact Registry Server
Network Interface
302
Program Memory
306
Processor
304
Data Storage
18

Fig. 8a

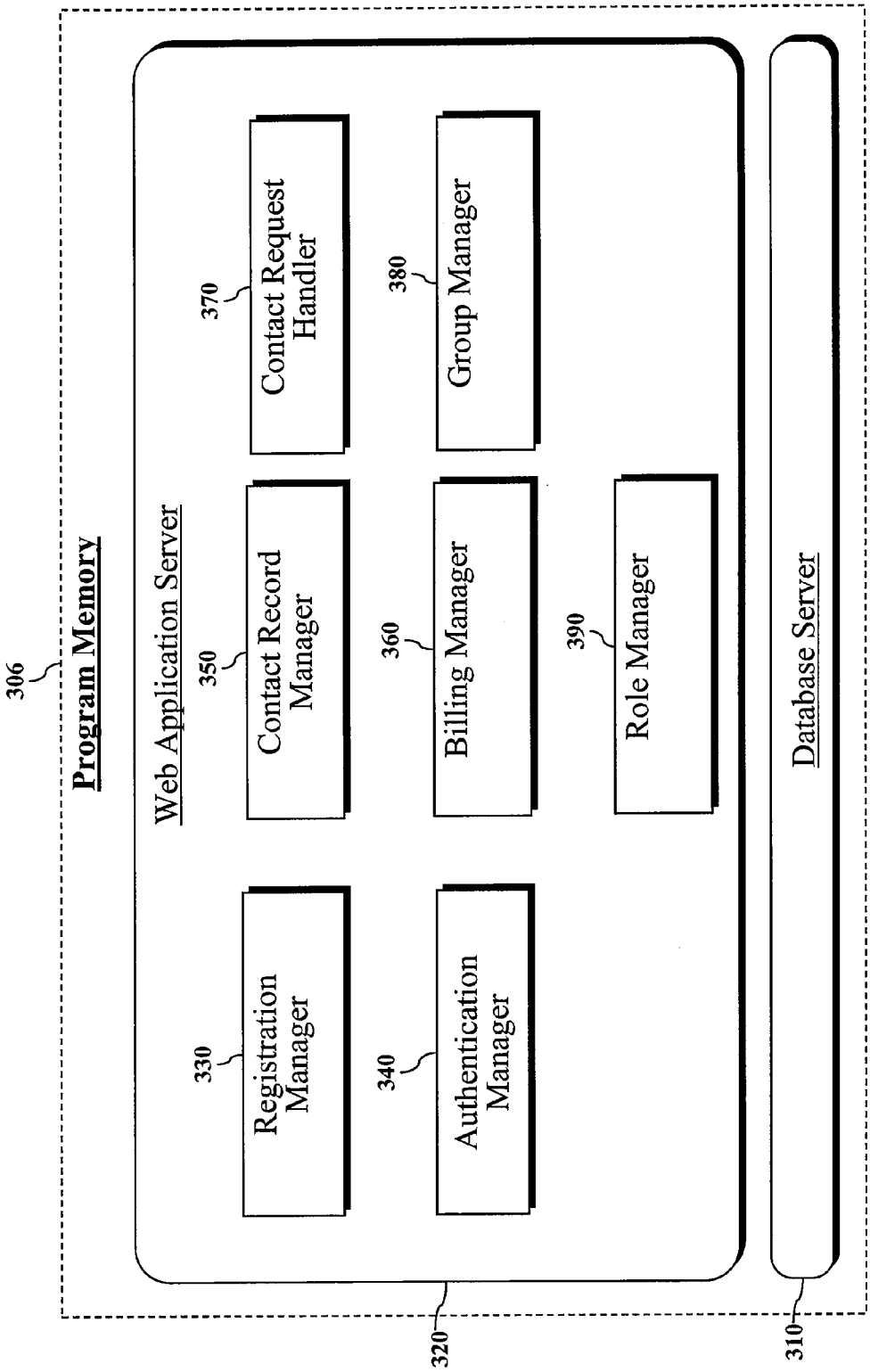

306
Program Memory
Web Application Server
330
Registration Manager
350
Contact Record Manager
370
Contact Request Handler
340
Authentication Manager
360
Billing Manager
380
Group Manager
390
Role Manager
320
Database Server
310

Fig. 8b

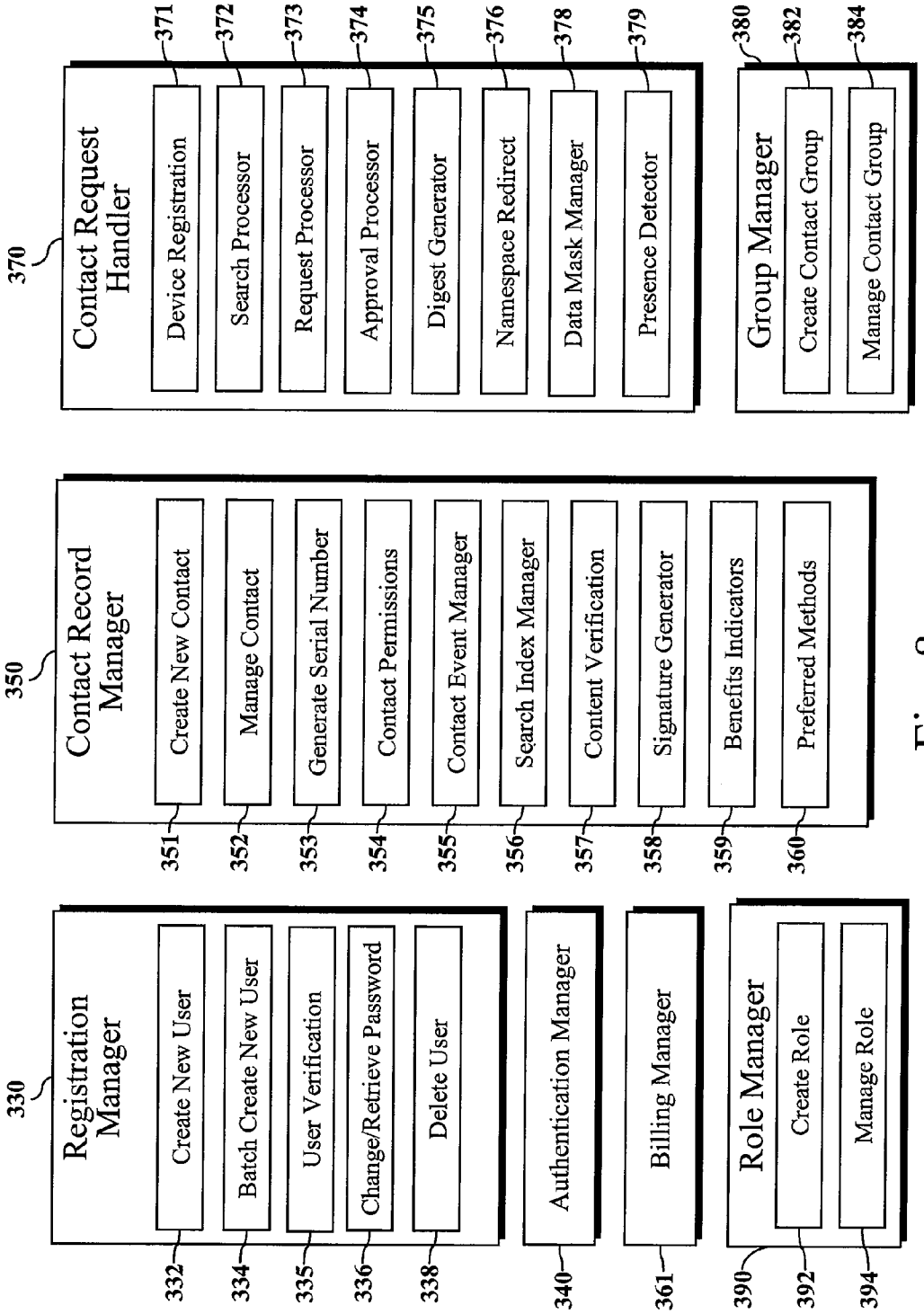

370
Contact Request Handler
371
Device Registration
372
Search Processor
373
Request Processor
374
Approval Processor
375
Digest Generator
376
Namespace Redirect
378
Data Mask Manager
379
Presence Detector
380
Group Manager
382
Create Contact Group
384
Manage Contact Group
350
Contact Record Manager
351
Create New Contact
352
Manage Contact
353
Generate Serial Number
354
Contact Permissions
355
Contact Event Manager
356
Search Index Manager
357
Content Verification
358
Signature Generator
359
Benefits Indicators
360
Preferred Methods
330
Registration Manager
332
Create New User
334
Batch Create New User
335
User Verification
336
Change/Retrieve Password
338
Delete User
340
Authentication Manager
361
Billing Manager
390
Role Manager
392
Create Role
394
Manage Role

Fig. 8c

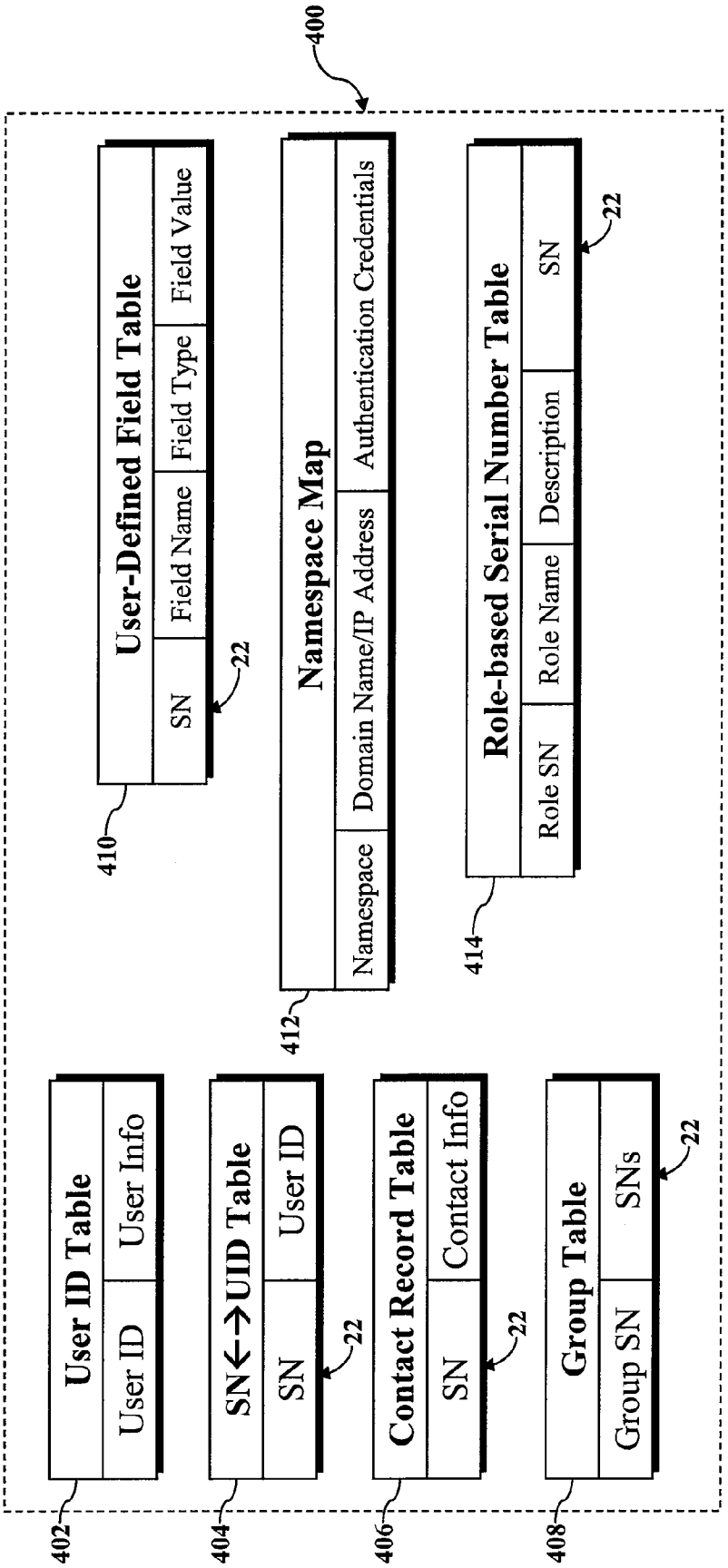

400
User-Defined Field Table
SN
Field Name
Field Type
Field Value
22
410
Namespace Map
Namespace
Domain Name/IP Address
Authentication Credentials
412
Role-based Serial Number Table
Role SN
Role Name
Description
SN
22
414
User ID Table
User ID
User Info
402
SN←→UID Table
SN
User ID
22
404
Contact Record Table
SN
Contact Info
22
406
Group Table
Group SN
SNs
22
408

Fig. 9a

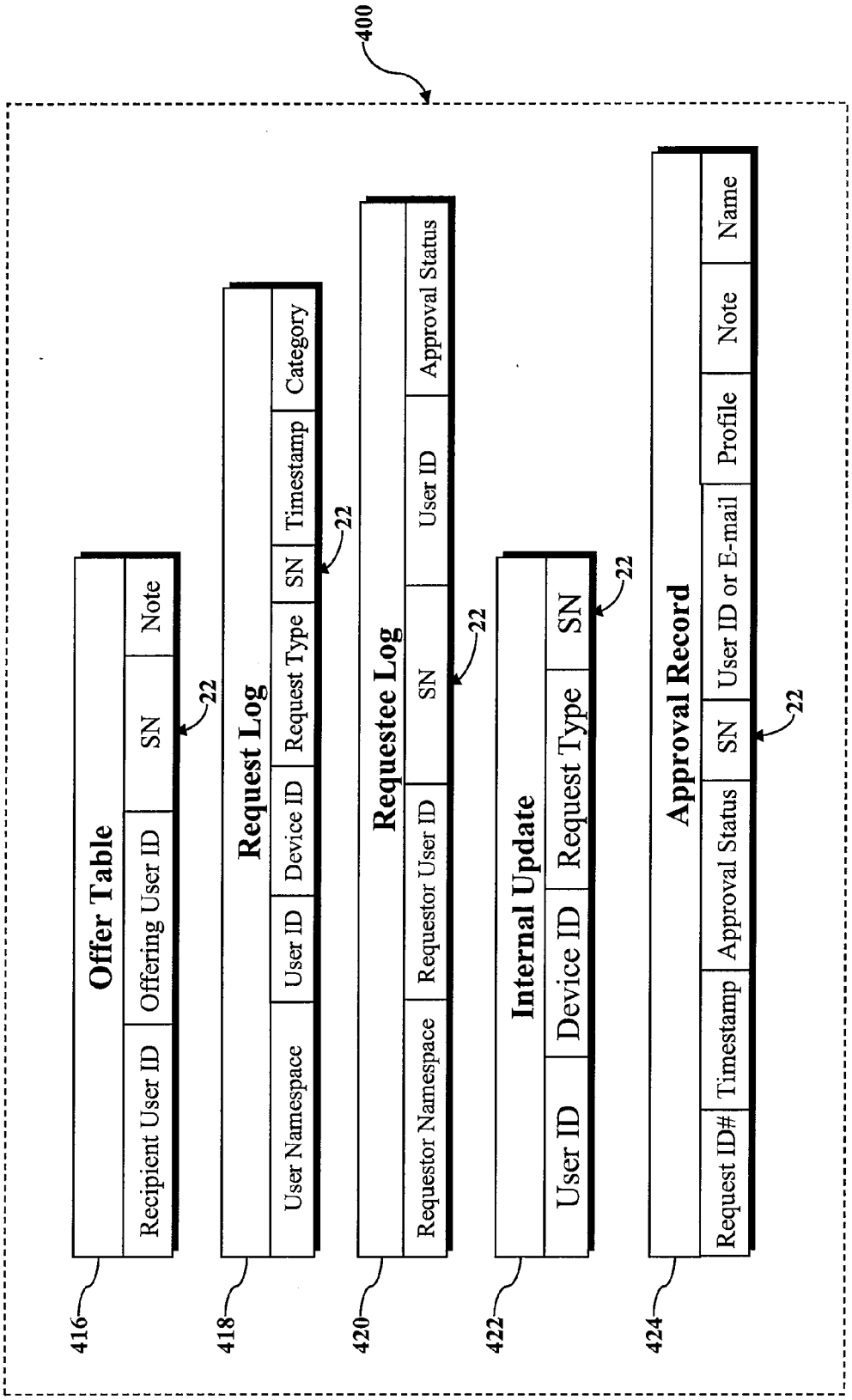

400
Offer Table
Recipient User ID
Offering User ID
SN
Note
22
416
Request Log
User Namespace
User ID
Device ID
Request Type
SN
Timestamp
Category
22
418
Requestee Log
Requestor Namespace
Requestor User ID
SN
User ID
Approval Status
22
420
Internal Update
User ID
Device ID
Request Type
SN
22
422
Approval Record
Request ID#
Timestamp
Approval Status
SN
User ID or E-mail
Profile
Note
Name
22
424

Fig. 9b

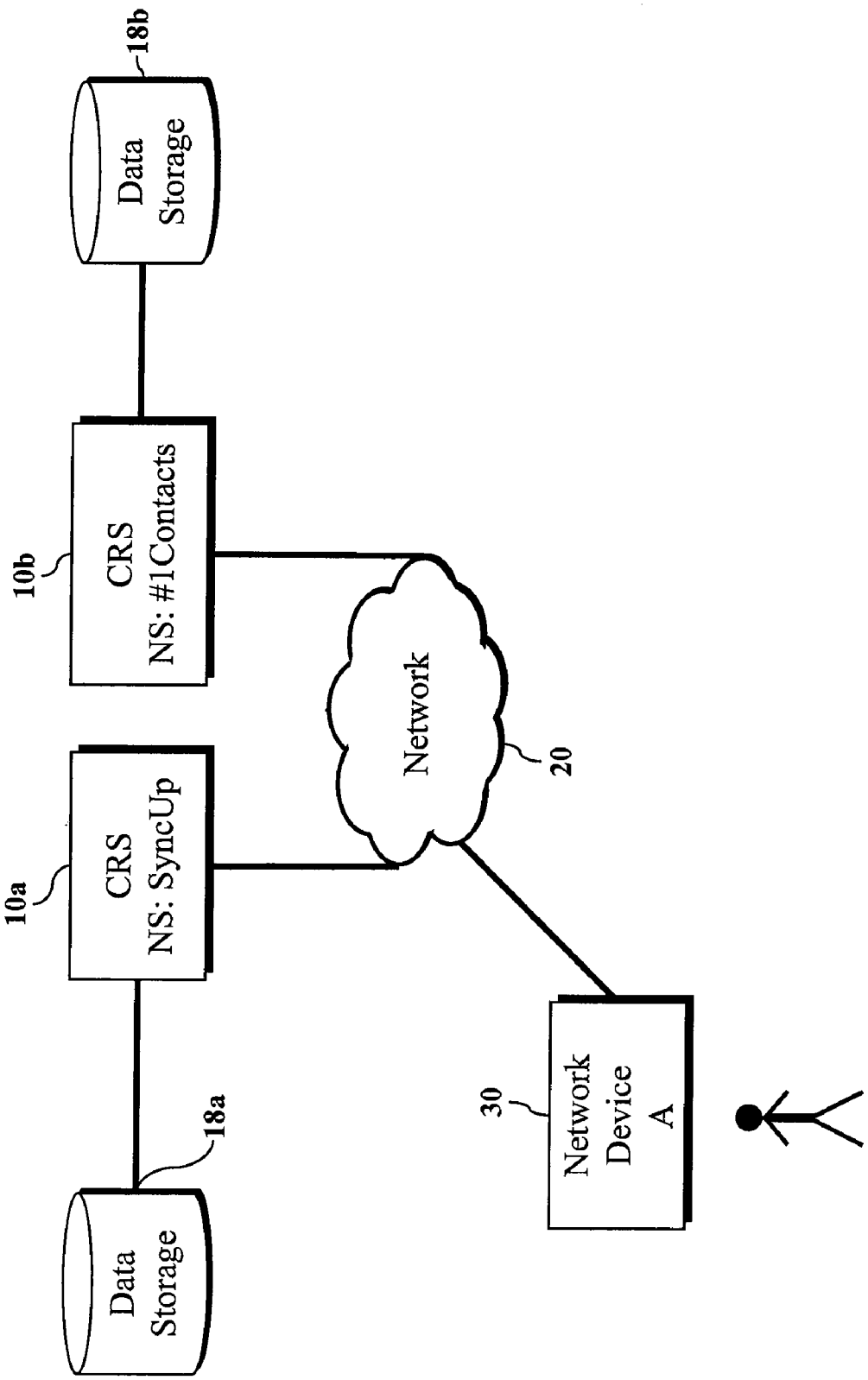

18b
Data Storage
10b
CRS
NS: #1Contacts
10a
CRS
NS: SyncUp
Network
20
18a
Data Storage
30
Network Device A

Fig. 10

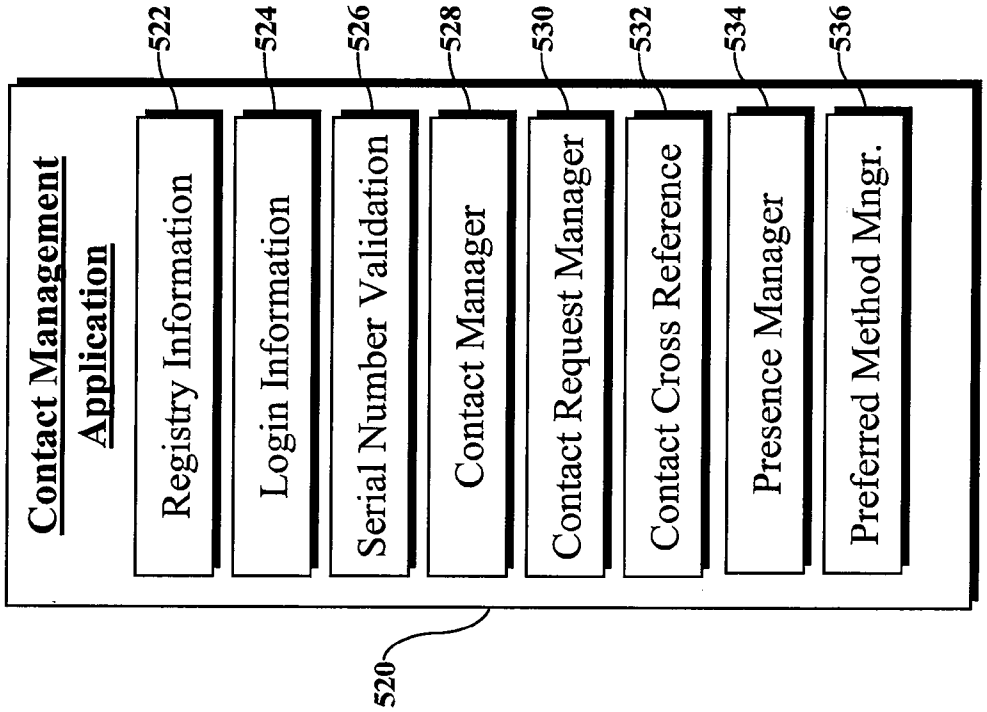


Fig. 11b

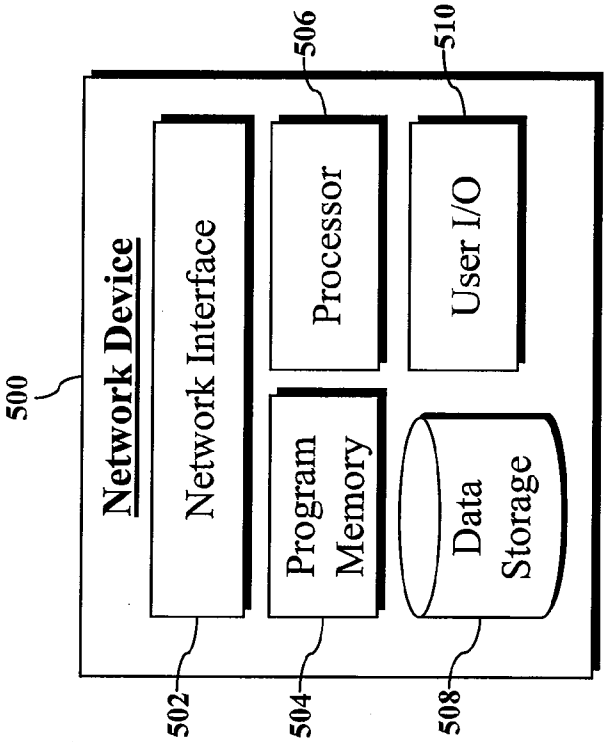


Fig. 11a

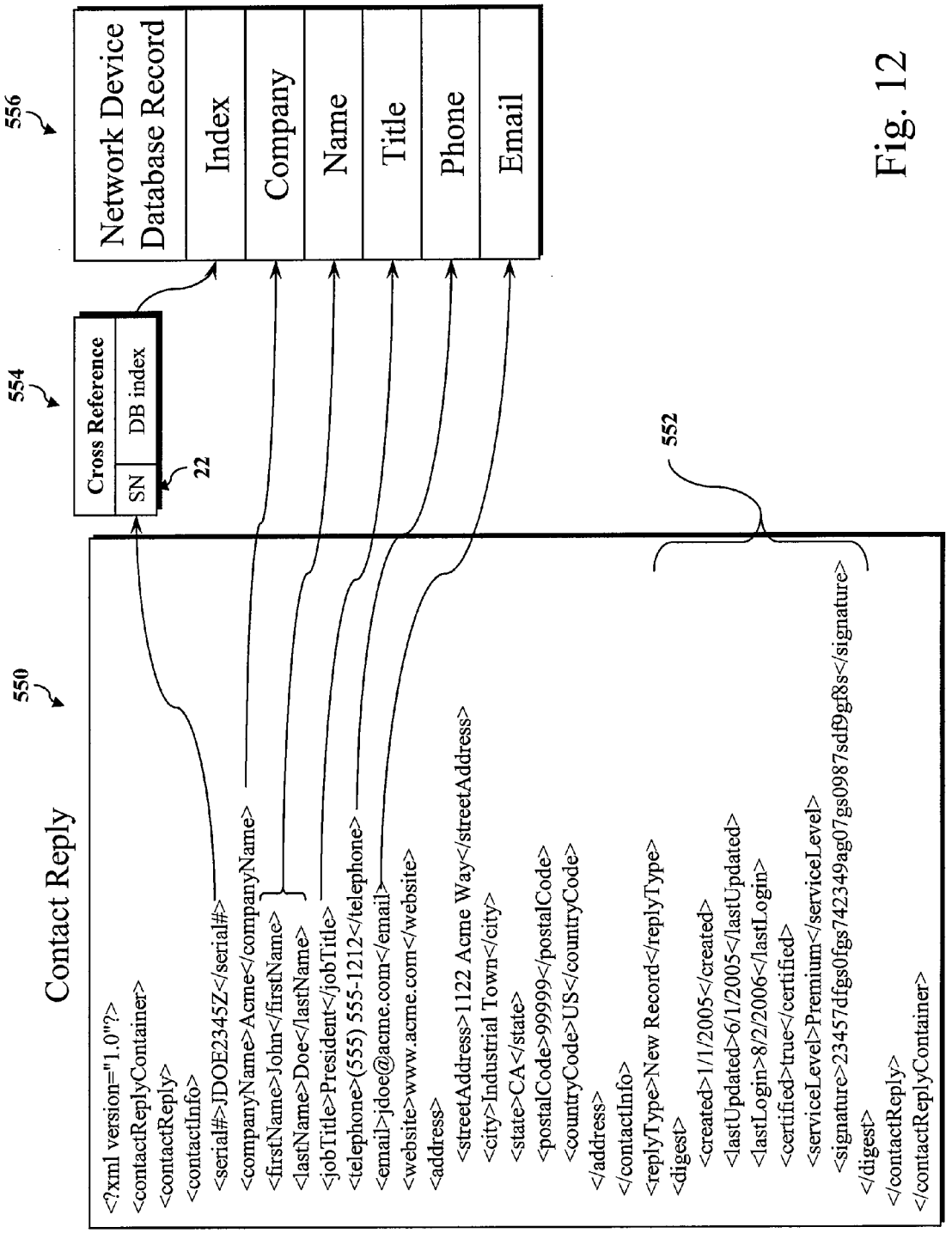

556
Network Device Database Record
Index
Company
Name
Title
Phone
Email
554
Cross Reference
SN
DB index
22
550
Contact Reply
552
<?xml version="1.0"?>
<contactReplyContainer>
<contactReply>
<contactInfo>
<serial#>JDOE2345Z</serial#>
<companyName>Acme</companyName>
<firstName>John</firstName>
<lastName>Doe</lastName>
<jobTitle>President</jobTitle>
<telephone>(555) 555-1212</telephone>
<email>jdoe@acme.com</email>
<website>www.acme.com</website>
<address>
<streetAddress>1122 Acme Way</streetAddress>
<city>Industrial Town</city>
<state>CA</state>
<postalCode>99999</postalCode>
<countryCode>US</countryCode>
</address>
</contactInfo>
<replyType>New Record</replyType>
<digest>
<created>1/1/2005</created>
<lastUpdated>6/1/2005</lastUpdated>
<lastLogin>8/2/2006</lastLogin>
<certified>true</certified>
<serviceLevel>Premium</serviceLevel>
<signature>23457dfgs0fgs742349ag07gs0987sdf9gf8s</signature>
</digest>
</contactReply>
</contactReplyContainer>

Fig. 12

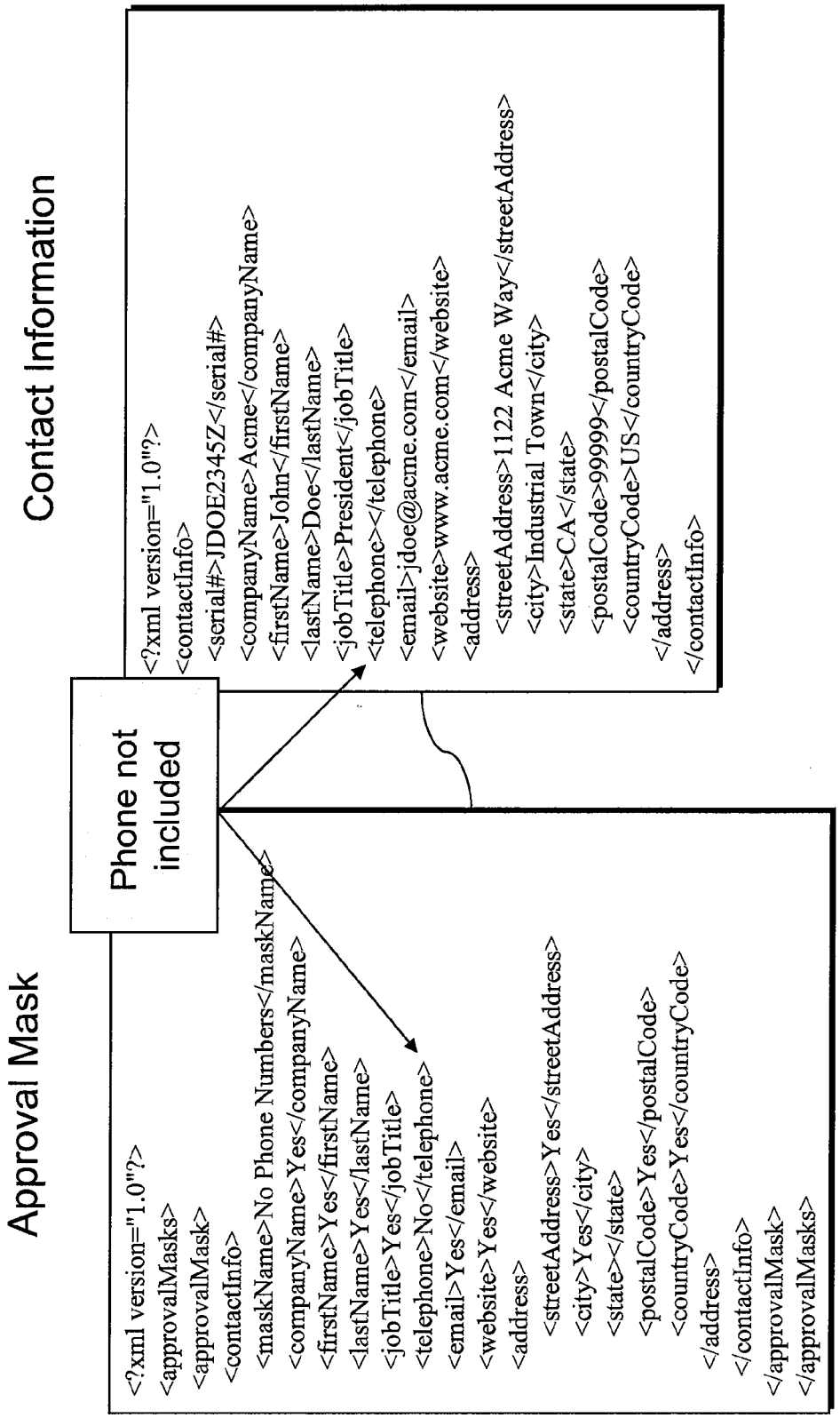

Approval Mask
Contact Information
Phone not included
<?xml version="1.0"?>
<approvalMasks>
<approvalMask>
<contactInfo>
<maskName>No Phone Numbers</maskName>
<companyName>Yes</companyName>
<firstName>Yes</firstName>
<lastName>Yes</lastName>
<jobTitle>Yes</jobTitle>
<telephone>No</telephone>
<email>Yes</email>
<website>Yes</website>
<address>
<streetAddress>Yes</streetAddress>
<city>Yes</city>
<state></state>
<postalCode>Yes</postalCode>
<countryCode>Yes</countryCode>
</address>
</contactInfo>
</approvalMask>
</approvalMasks>
<?xml version="1.0"?>
<contactInfo>
<serial#>JDOE2345Z</serial#>
<companyName>Acme</companyName>
<firstName>John</firstName>
<lastName>Doe</lastName>
<jobTitle>President</jobTitle>
<telephone></telephone>
<email>jdoe@acme.com</email>
<website>www.acme.com</website>
<address>
<streetAddress>1122 Acme Way</streetAddress>
<city>Industrial Town</city>
<state>CA</state>
<postalCode>99999</postalCode>
<countryCode>US</countryCode>
</address>
</contactInfo>

Fig. 13

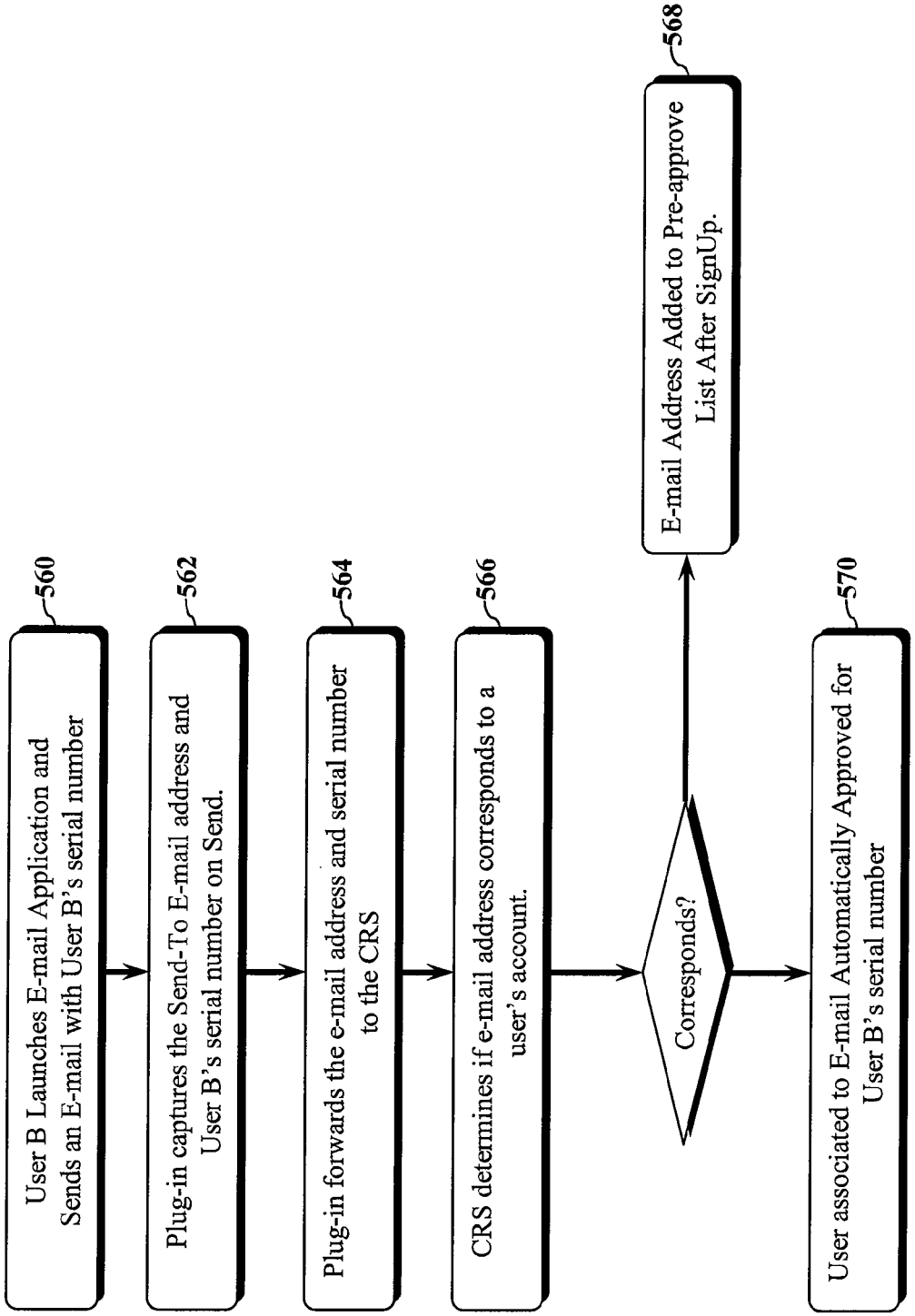

560
User B Launches E-mail Application and Sends an E-mail with User B's serial number
562
Plug-in captures the Send-To E-mail address and User B's serial number on Send.
564
Plug-in forwards the e-mail address and serial number to the CRS
566
CRS determines if e-mail address corresponds to a user's account.
Corresponds?
568
E-mail Address Added to Pre-approve List After SignUp.
570
User associated to E-mail Automatically Approved for User B's serial number

Fig. 14

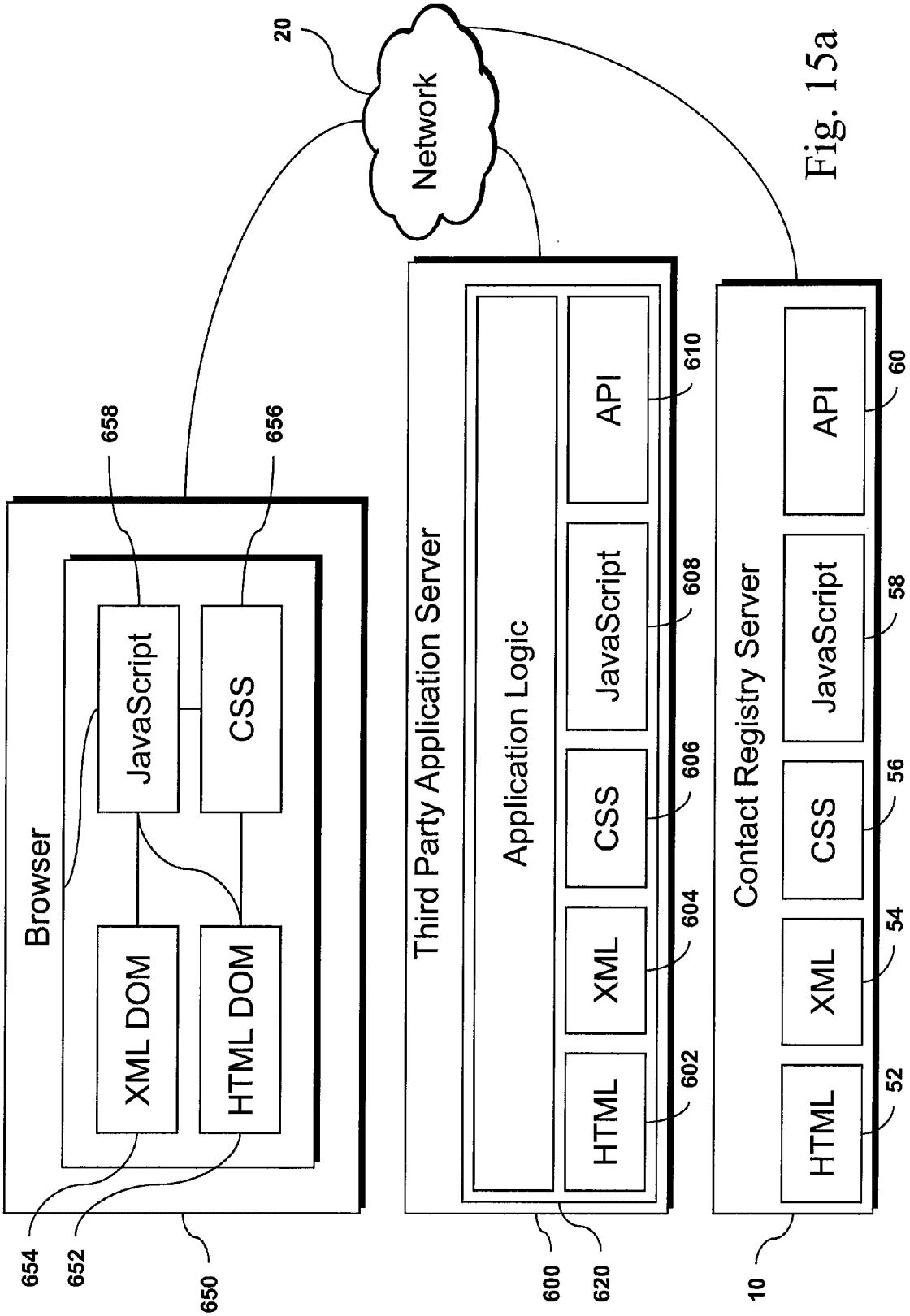

20
Network
Browser
JavaScript
CSS
XML DOM
HTML DOM
658
656
654
652
650
Third Party Application Server
Application Logic
API
JavaScript
CSS
XML
HTML
610
608
606
604
602
600
620
Contact Registry Server
API
JavaScript
CSS
XML
HTML
60
58
56
54
52
10

Fig. 15a

```
<html>
<body>
<input type="text" id="company" />
<input type="text" id="fname" />
<input type="text" id="lname" />
</body>
</html>
```

670

```
<?xml version="1.0"?>
<dataMap>
<contactInfo>
<companyName src="syncConame" targetId="company" />
<firstName src="syncFirstName" targetId="fname" />
<lastName src="syncLastName" targetId="lname" />
</contactInfo>
</dataMap>
```

672

```
<?xml version="1.0"?>
<contactInfo>
<serial id="serialNum">JDOE2345Z</serial>
<companyName id="syncConame">Acme</companyName>
<firstName id="syncFirstName">Jack</firstName>
<lastName id="syncLastName">Frost</lastName>
</contactInfo>
```

674

```
<script>
var coName = doc.getElementById('company');
coName.value = doc.getElementById('syncConame').value;
</script>
```

676

Fig. 15b

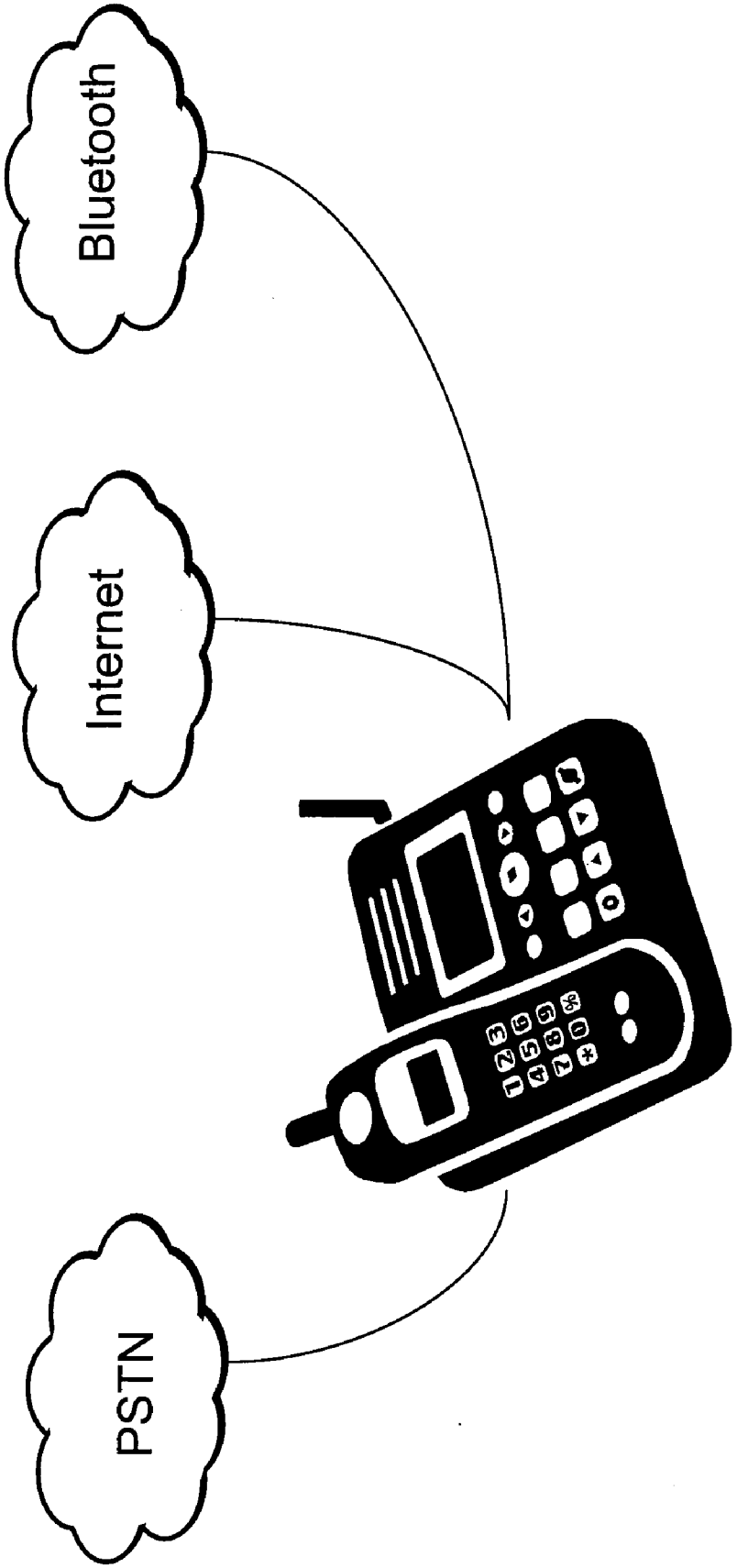


Fig. 16

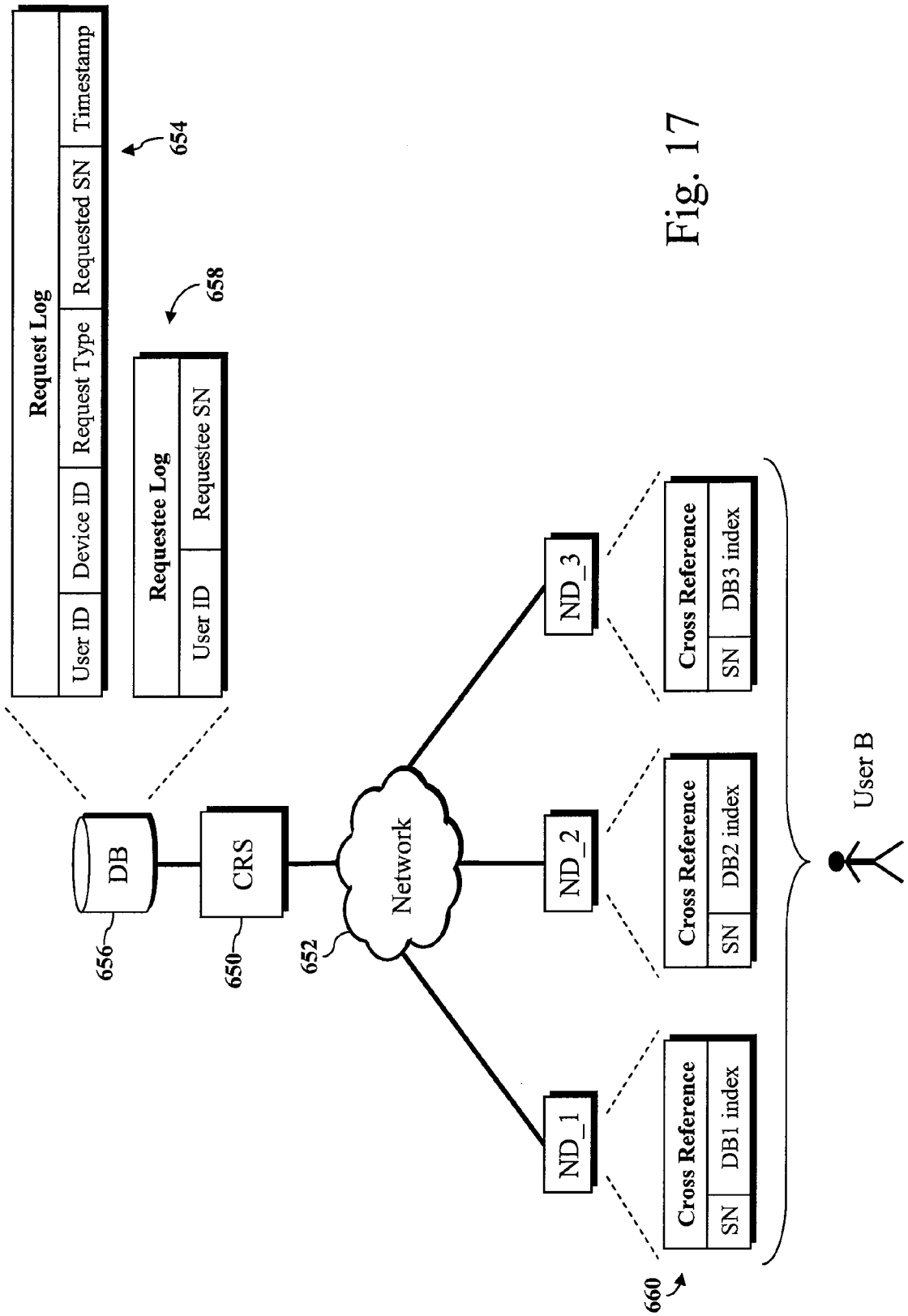

Request Log
User ID
Device ID
Request Type
Requested SN
Timestamp
654
Requestee Log
User ID
Requestee SN
658
DB
656
CRS
650
Network
652
ND_1
ND_2
ND_3
Cross Reference
SN
DB1 index
Cross Reference
SN
DB2 index
Cross Reference
SN
DB3 index
660
User B

Fig. 17

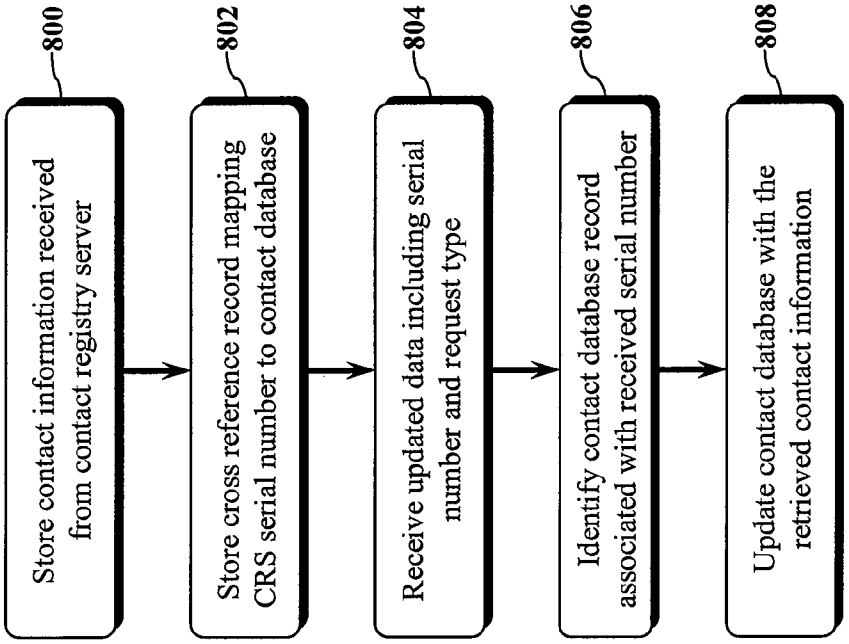

800
Store contact information received from contact registry server
802
Store cross reference record mapping CRS serial number to contact database
804
Receive updated data including serial number and request type
806
Identify contact database record associated with received serial number
808
Update contact database with the retrieved contact information

Fig. 19

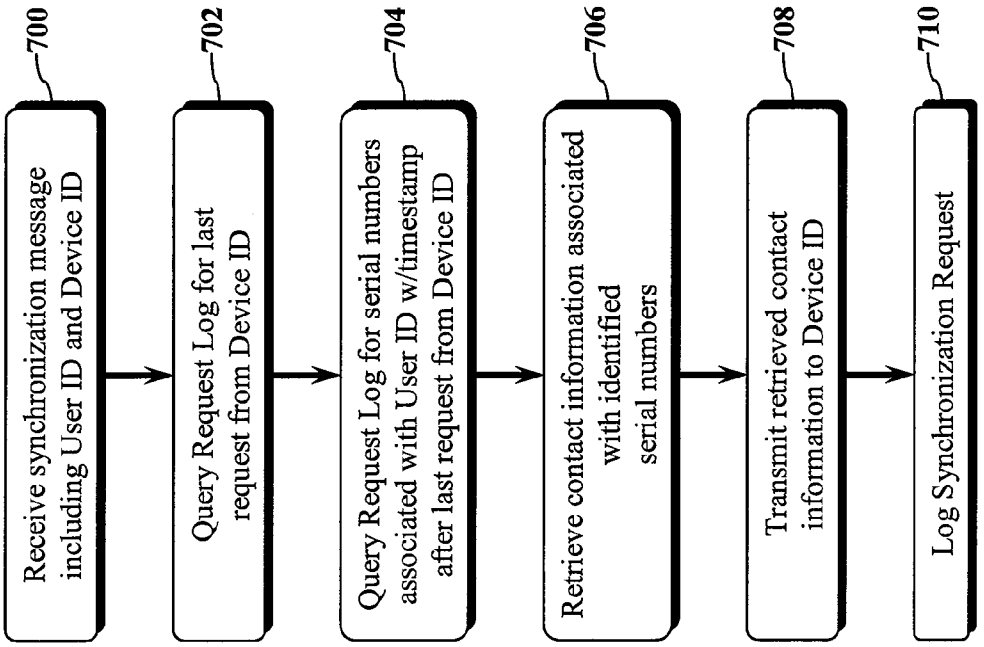

700
Receive synchronization message including User ID and Device ID
702
Query Request Log for last request from Device ID
704
Query Request Log for serial numbers associated with User ID w/timestamp after last request from Device ID
706
Retrieve contact information associated with identified serial numbers
708
Transmit retrieved contact information to Device ID
710
Log Synchronization Request

Fig. 18

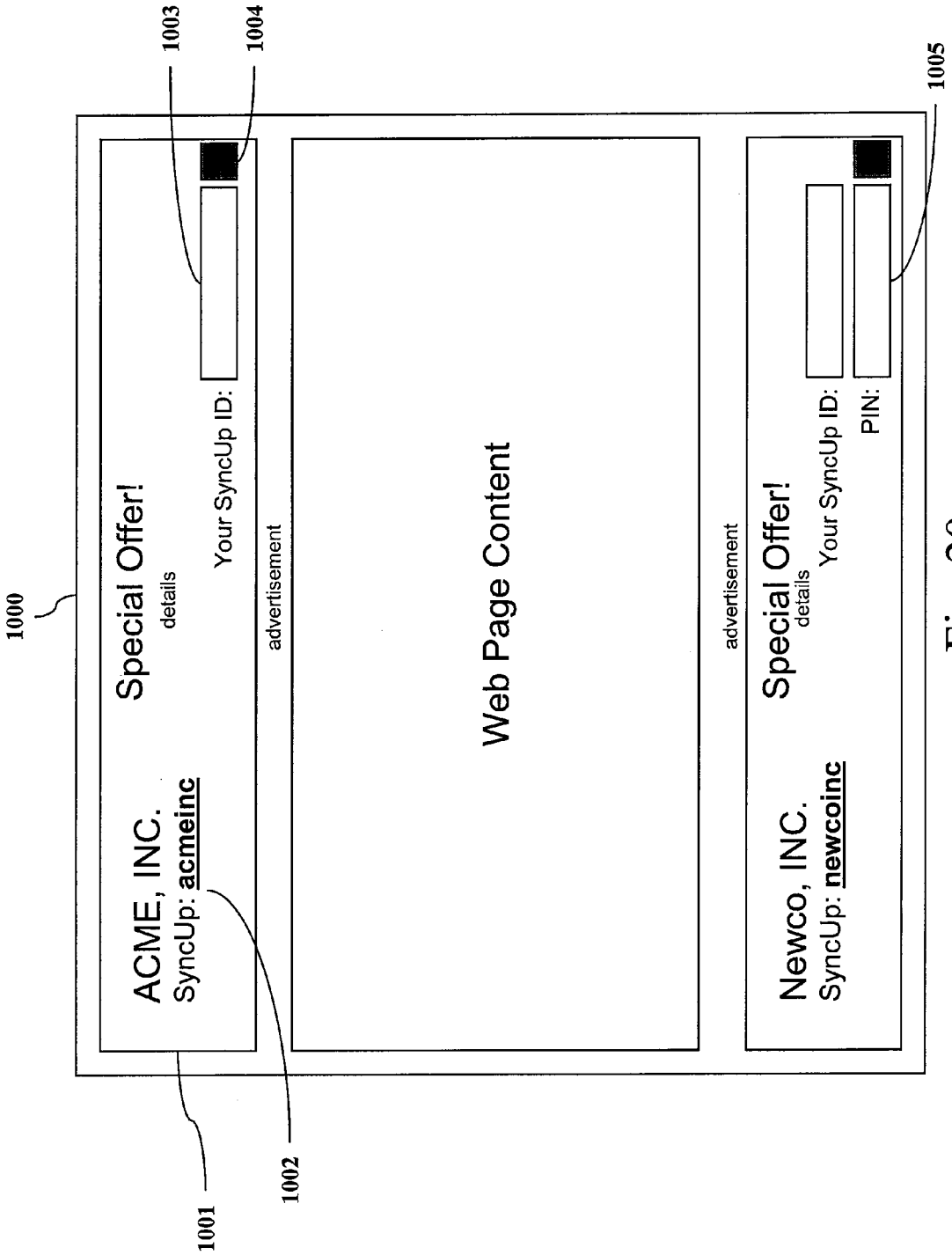

1000
1001
1002
1003
1004
1005
ACME, INC.
SyncUp: acmeinc
Special Offer!
details
Your SyncUp ID:
advertisement
Web Page Content
advertisement
Newco, INC.
SyncUp: newcoinc
Special Offer!
details
Your SyncUp ID:
PIN:

Fig. 20

CONTACT MANAGEMENT SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent application Ser. No. 11/713,475, filed Mar. 2, 2007, which is a continuation-in-part of U.S. patent application Ser. No. 11/431,886, filed May 9, 2006, both of which are incorporated by reference herein.

FIELD OF THE INVENTION

[0002] The present invention relates generally to contact management systems and, more particularly, to systems and methods for selectively disseminating personal contact information.

BACKGROUND OF THE INVENTION

[0003] It is customary for individuals involved in personal, commercial or professional activities to exchange contact information with their associates. In a typical exchange, parties convey company names, personal names, job titles, telephone numbers, mailing addresses, email addresses, web page addresses and other contact information. The mode of exchange usually includes stating the information verbally, writing down the information or exchanging business cards or stationery. Traditionally, people have recorded and organized contact information manually by writing contact information into an address book or by affixing a business card or a contact entry to a record keeping system such as Rolodex®.

[0004] Today's computer-based contact management applications provide powerful search and retrieval capabilities and user friendly application interfaces, which make it convenient for individuals to enter contact information into their personal computers. Contact management applications are also found on portable devices including cellular telephones, hand-held computers, VoIP (Voice over Internet Protocol) telephones, and web-based applications. Additionally, many businesses employ enterprise resource planning systems, customer relationship management systems, sales force automation systems and other systems having contact management functionality. As a result, a large number of contact management applications are available for personal and business use, and individuals regularly utilize more than one contact management application to store and maintain their contact information.

[0005] Entering contact information into multiple contact management applications requires a time-consuming and redundant manual data entry process. The high costs associated with manual data entry are well-understood, and many prior art systems have been designed to address these concerns. For example, creating an electronic backup file of a contact information database enables contact data to be automatically restored to a contact management application if the application's database becomes corrupt. Backup files also enable data from one application to be imported into another application, provided the file formats are compatible or translation from one format to another is feasible.

[0006] Some prior art systems were designed to minimize the burden of manually entering contact information through use of specialized hardware and software. In one approach, a business card scanner is used to scan the characters on a printed business card, and specialized Optical Character Recognition (OCR) software attempts to identify the scanned characters and assign the identified characters to appropriate data fields in a contact management application. These systems require the purchase of expensive hardware and software, and human oversight is needed to ensure accuracy of the recognized characters and placement of the data in the appropriate contact information field (e.g., the software may mistakenly assign a fax phone number to a voice phone number field). These scanning systems are typically adapted to work with personal computers and may not be compatible with small computing devices such as personal digital assistants (PDAs), handheld computers, and cellular telephones. These scanning systems are further limited to scanning printed business cards, thus contact information received through other conveyances (e.g., verbal or handwritten) will still require manual data entry.

[0007] In another approach, a Uniform Resource Locator ("URL") for an HTML web page is encoded into barcode format onto a business card. A recipient of the business card scans the barcode into a web browser application to access a corresponding web page containing personal contact information. This type of system is described in Software Patent Institute Serial Number TDB0901.0055, entitled "E-Business Card System," and Serial Number TDB1093.0202, entitled "Coded Business Cards." Drawbacks of this approach include high equipment costs and the inability to use the system to input data into existing contact management applications.

[0008] Small, portable devices such as PDAs, handheld computers or cellular phones present additional problems for users needing to manually enter contact information. Cellular phones, for example, include numeric keypads in which a single key is used for entry of a number and multiple letters. As a result, a user may need to press the same key three or four times to select a desired letter or number. Many pen-based PDAs do not include a physical keypad, but instead provide the user with a "virtual" keyboard on the PDA display that may be tapped with a pen. Some small computing devices include a miniaturized keyboard, but data entry remains more challenging than using a full-sized keyboard on a typical desktop or laptop computer. Because of the difficulty in entering and managing data on small devices, many users manage contact information using a software application on a desktop computer. The contact information can be entered and viewed through the desktop application and then downloaded to compatible contact management applications on PDAs, handheld computers and cellular phones via a cable or wireless network transmission.

[0009] To facilitate the electronic exchange of contact information, the Internet Mail Consortium developed a specification for an electronic business card data structure called a "vCard." Users typically exchange vCards as attachments to email messages. The recipient of a vCard may import the vCard data into a contact management application that supports the vCard format. Drawbacks of the vCard include the difficulty of maintaining up-to-date contact information once conveyed, and the lack of compatibility with traditional modes of conveyance such as a standard business card, which still requires manual input of contact information.

[0010] Web-based contact management applications have also been introduced, but these systems are not widely used due to drawbacks in the various approaches. In one approach, a subscriber enters contact information online, shares the information with other online subscribers, and may download

other subscribers' contact information to a proprietary application. Among the drawbacks of these systems are the use of proprietary contact management software and the requirement that both parties be subscribers to the web-based system.

[0011] Another approach offers add-on modules to contact management applications in widely-adopted email applications to assist in maintaining current contact information. Examples of this type of system are described in U.S. Pat. Nos. 6,694,353 and 6,701,348. In one approach, the contact management application notifies the user when the application sends an email message to a contact at an email address that is not valid. The stored contact information may then be updated using a secondary email address for the intended recipient. In another approach, a user of an email application transmits an email message to each member of the user's contact list requesting that each recipient verify the accuracy of the recipient's current contact information. One drawback to these approaches is that use is limited to certain software applications, such as Microsoft Outlook. Another drawback is that sending emails to recipients in a contact list may be inconvenient and annoying to the recipients, because the emails effectively serve as data entry forms. When a recipient's contact information is stored in multiple contact lists, the recipient may be inundated with email requests from the owner of each list to separately verify the recipient's stored contact information. Another drawback is that these systems require unique context-dependent identifiers for use in data lookup. Context-dependent identifiers include telephone numbers and email addresses. A user who lacks a required identifier cannot store and share contact information on these systems. Further, context-dependent identifiers are subject to change, for example, as the user moves or changes jobs.

[0012] Additional approaches involve generating a unique identifier for contact management records. One approach offers a service that creates a vCard record and attaches an identifier to the record. This approach does not appear to offer any means of augmenting an application such as an email application with data entry, update, synchronization or backup features—relying instead on the widespread support for the vCard data format for data entry.

[0013] There is a significant market for applications that "synchronize" contact records between different devices. The known solutions have some significant disadvantages. The object of the solutions typically involves copying a contact record from one device and adding it to another device. If the devices have the same record, these systems compare the records to find the most up-to-date version. If the solution cannot determine the most recent version, it typically presents a "conflict resolution" interface to the user, or provides a default setting that enables one system's record to prevail. As people attempt to synchronize more than two devices, the number of records to compare increases—impairing performance. When synchronization solutions attempt to retrieve data from applications behind corporate firewalls, the firewalls can undermine the synchronization solution by blocking inbound network requests. Additionally, as people increasingly adopt wireless communications devices, they may find that uploading data from these devices may also present significant performance issues. Prior art synchronization systems also have a tendency to create duplicate records, because users typically enter the minimum information necessary for a particular device (e.g., name and email address for email applications; name and phone number for phones).

[0014] Recent solutions have coupled synchronization solutions to electronic address book backup solutions. By providing a centralized server for synchronization solutions, the centralized server stores the most recent copy of each record on behalf of a user—enabling the user to enjoy synchronization and backup in a single application. By augmenting synchronization solutions with a user interface that enables the user to update a record, these solutions purport to offer updates, synchronization and backup in a single solution. The drawbacks to these solutions include limited update functionality (i.e., it is up to the user to enter the update), no ID-based automatic data entry, and reliance on traditional synchronization solutions.

[0015] Prior art also involves presence detection technologies that have the ability to provide information of the presence of a device or user at a particular location. U.S. Pat. Nos. 7,110,773 and 5,659,596 describe such technologies. Presence detection technologies are also common with instant messaging applications and VoIP solutions. However, presence detection technologies do not appear to aggregated presence indicators of a user or device for a variety of different technologies and make that information available to others directly in their contact address books.

[0016] Therefore, there is a need for an improved system and method for contact management.

SUMMARY OF THE INVENTION

[0017] In an embodiment of a method of providing contact information in the present invention, the method includes creating a contact record in a contact management system, where a process associated with a subject of the contact record and/or a recipient of data associated with the contact record is included in creating the contact record. A unique serial number is generated corresponding to the contact record and the serial number is conveyed to the recipient. A request by an application is received for the contact record from the contact management system corresponding to the serial number and data associated with the contact record is transmitted to the application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** illustrates an embodiment of the contact management system and method of the present invention;

[0019] FIGS. **2***a*-**2***f* illustrate embodiments of methods of the present invention;

[0020] FIG. **3** illustrates an embodiment of a method associated with a group serial number;

[0021] FIG. **4** illustrates an embodiment of a method associated with a role serial number;

[0022] FIG. **5** illustrates an embodiment of the contact management system and method of the present invention;

[0023] FIGS. **6***a*-**6***c* illustrate search request and result data structures;

[0024] FIGS. **7***a*-**7***c* illustrate contact request and reply data structures;

[0025] FIGS. **8***a*-**8***c* illustrate an embodiment of a contact registry server of the present invention;

[0026] FIGS. **9***a*-**9***b* illustrate data structures which may be used by the database server of the contact registry server for storing data in the data storage;

[0027] FIG. **10** illustrates a namespace redirect function of the present invention;

[0028] FIG. **11***a* illustrates an exemplary network device as utilized with the contact registry server of the present invention;

[0029] FIG. **11***b* illustrates a contact management application of the network device of FIG. **11***a;*

[0030] FIG. **12** illustrates an embodiment of a contact reply and an associated network device database record;

[0031] FIG. **13** illustrates an approval mask in accordance with the principles of the present invention;

[0032] FIG. **14** illustrates an email application adapted for interaction with the contact registry server;

[0033] FIG. **15***a*-**15***b* illustrate third party application interoperability with the contact registry server;

[0034] FIG. **16** illustrates an embodiment of a telephone that may be utilized with the contact management system of the present invention;

[0035] FIG. **17** illustrates an alternative embodiment of the contact management system and method of the present invention as used with multiple network devices of a user;

[0036] FIGS. **18** and **19** illustrate a synchronization process of the present invention; and

[0037] FIG. **20** illustrates an embodiment of a web page with a banner advertisement that incorporates the principles of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0038] As will be further described below, one aspect of the present invention includes a user creating and storing a contact record in a contact management system, the system generating and storing a unique serial number corresponding to the contact record, and the user conveying the serial number to a recipient. The recipient may then enter the serial number into a network-enabled computer application and request, via the application, the corresponding record from the contact management system. In response, the application receives data associated with the contact record and stores the data in the application's database, or receives an indication that approval from the owner of the contact record is required before the contact management system will transmit the requested contact record.

[0039] In another aspect of the present invention, the recipient enters a serial number into a network-enabled computer application and requests, via the application, associated contact information from the contact management system corresponding to the serial number. The contact management system determines whether approval is required, and if so, responds to the recipient indicating that the request requires prior approval from the owner of the contact information. Following an approval of the request, the contact management system provides a method to receive data associated with the contact information.

[0040] In another aspect of the present invention, a person does not have a serial number to enter into an application, and instead enters search criteria such as a person's name and phone number, email address, location (e.g., city, state and/or zip code), or other criterion. The contact management system responds by providing the serial numbers of potential matches. The person (now a serial number recipient) may select a serial number to request a contact record from one of the matching search results. In another aspect of the present invention, a user creates and stores a contact record and serial number that includes "keyword" entries that enables other users to search for the contact record by keywords (e.g., plumber, pizza, gardening services, etc.). Keywords enable people to search for contact records of other users they don't already know, thereby making the service useful for business vendors, affinity groups, and other population groups.

[0041] In another aspect of the present invention, a method for receiving data following a request for a contact record that requires the record owner's approval includes the steps of automatically creating and storing a request record with a unique serial number to identify the record. The date and time of the request is logged in the request record, and the requestor is prompted for additional information to be stored in the request record including the requestor's name, user name and contact information (such as an email address) and other information to facilitate the approval process, such as the requester's serial number or a note field for specifying the purpose of the request. Next, the user responsible for approving the request is notified and provided with an interface for approving or rejecting the request. The requester is provided with status updates of the approval process as needed. After the request is approved, the corresponding contact information is available to be received by the requester.

[0042] In other aspects of the present invention, a requestor may receive updates for requested records, synchronize multiple devices by replicating requests as an alternative to traditional synchronization, and restore an address book with previously requested records as an alternative method of backing up contact records. The present invention, therefore, provides a means of searching for contact records, exchanging contact information via serial numbers, approving requests, accelerating data entry, receiving updates, synchronizing multiple devices quickly and securely, and providing a means of backing up and restoring contact records in one solution.

[0043] In other aspects of the present invention, technology which indicates the presence of a user at a location on a network indicates to the recipient of the serial number and contact record where the user may be most easily reached.

[0044] Continuing with the description of the invention, an exemplary embodiment will be described with reference to FIG. **1**. A Contact Registry Server (CRS) **10** provides contact management services to a plurality of network devices, such as network devices **30** and **32**, through a network **20**. The CRS **10** includes at least one computer adapted for communication with the network **20**, and a data storage **18** storing contact information. The network **20** includes any system or systems capable of facilitating communications between the CRS **10** and the network devices **30** and **32** and, in various embodiments, may include the Internet, a wireless network, an intranet or a Public Switched Telephone Network (PSTN). Each network device **30** and **32** is adapted for communications with the CRS **10** through the network **20**, and may include a mobile telephone, personal digital assistant, vehicle navigation system, personal computer, portable computer, VoIP telephone or other network-enabled device.

[0045] Referring to FIGS. **2***a*-**2***b* and FIG. **5**, an operation of the embodiment of FIG. **1** will be described. In step **100**, a first user, User A, registers with the CRS **10**. Registration provides User A with permission to store, maintain and disseminate contact information via the CRS **10**. In one embodiment, User A establishes communication with the CRS **10** through the network device **30** by launching a web browser application and entering or selecting a Uniform Resource Locator (URL)

of the CRS **10**. Through web pages served by the CRS **10** to the network device **30**, User A invokes a new user registration process.

[0046] User A enters a unique username and password combination for use by the CRS **10** to identify and authenticate User A in subsequent visits to the CRS **10**. Alternatively, a temporary password is automatically generated by the CRS **10** and may be changed later by User A after the first login session. In one embodiment, communications between the network device **30** and the CRS **10** during the registration and login process are encrypted (e.g., using the Secure Socket Layer (SSL) protocol) providing a layer of protection against the unwanted access to, or dissemination of, personal contact information.

[0047] Referring to FIG. **1** and FIG. **2***b*, through web pages served by the CRS **10** to the network device **30**, User A may invoke a user billing and verification process **101** by providing credit/debit card billing information to the CRS **10**, including the name on User A's credit card. Through a gateway to a credit card transaction processor, the CRS **10** charges User A's credit card and verifies User A's name and billing information. If User A's name and billing information are successfully processed, the CRS **10** stores an attribute in the data storage **18** indicating that User A's name is verified. In one embodiment, the CRS **10** utilizes a third party address verification service. In one embodiment, the CRS **10** sends a confirmation email containing a hyperlink to the CRS **10** along with a confirmation code. When the user receives the email and clicks the hyperlink, the CRS **10** validates that the specified email is a valid email address. In another embodiment, the CRS **10** is adapted to periodically present a user interface to User A that prompts User A to certify that the information in User A's user profile and contact records is true and correct. In other embodiments, a user may mail, email, or fax an official document such as a telephone bill to confirm that User A is a real person. CRS **10** may provide various means of indicating to the recipient of a serial number and contact record that User A is a real and interested person (i.e., as distinguished from a trial user or a "bot" that registers a user for surreptitious purposes).

[0048] In step **102**, the CRS **10** generates a unique Serial Number (SN) **22** to identify User A's personal contact information. The SN **22** may be any unique identifier that is amenable for user input into a network device. It may include all numbers, all letters, an alphanumeric combination of numbers and letters, and is not limited to any particular sequence of numbers and/or letters. In the exemplary embodiment, the contact registry server **10** generates a 9-digit SN **22**. The SN **22** includes a concise 8-digit alphanumeric string that is automatically generated or alternatively entered by User A, and a 1-digit alphanumeric error detection code is appended. The CRS **10** queries the data storage **18** to ensure that the generated SN **22** is unique—i.e., is not already in use by the CRS **10** to identify personal contact information. An automatically generated serial number **22** may incorporate naming conventions such as portions of the user's name and/or company name. User selected serial numbers and the generation of serial numbers in accordance with naming conventions results in serial numbers being potentially easier to remember.

[0049] Alphanumeric characters enable the CRS **10** to issue concise serial numbers **22** with an extensive address space that can accommodate millions of users. For example, over 2.8 trillion serial numbers can be generated using only 8 digits of case-insensitive alphanumeric characters, where each character has 36 possible values (e.g., 0 through 9 and A through Z). Alternatively, the SN **22** may include characters from other character sets to accommodate different languages and cultures, including non-Western character sets such as Kanji. In one embodiment, an extended character set known as the Unicode character set is used.

[0050] When User B enters a 9-digit SN **22**, the network device **32** can detect certain data entry errors by verifying the accuracy of the error detection code and notify User B when an invalid SN **22** is detected. The error detection code may be generated using conventional error detection algorithms such as CRC-8 (Cyclical Redundancy Check), a parity bit algorithm, or other error detection algorithms.

[0051] In an alternate embodiment, the CRS **10** is adapted to generate serial numbers **22** of varying length, and further adapted to generate an error detection code that can check both the order of characters (e.g., as in Cyclical Redundancy Check (CRC) algorithms) and the length of the preceding string of characters—enabling the CRS **10** to set and determine valid lengths for serial numbers in a system of variable length serial numbers. The CRS **10** may also be adapted to receive a user-defined serial number **22**, where the user can create an easily remembered or "personalized" serial number **22** with or without the benefit of an appended error detection character.

[0052] In one embodiment, the CRS **10** is adapted to generate serial numbers **22** that are amenable to input on handheld devices such as mobile phones. In one embodiment, the CRS **10** generates a serial number that is easy to input when using Text on 9 Keys (T9). Since typing text on a cellular phone may require multiple key presses, for example, the number "2" may also represent the letters "a", "b", and "c" in ordinal precedence, the CRS generates a serial number **22** such that it prefers the first letter available on a T9 keyboard (e.g., the letters a, d, g, j, m, p, t, and w are preferred to letters c, f, i, l, o, s, v, and z).

[0053] After a unique serial number **22** is generated, a filtering function may be applied by the CRS **10** to determine whether the SN **22** is valid based on stored criteria. In one embodiment, the data storage **18** includes a table of offensive words, phrases and character patterns that are utilized by the filtering function to determine whether the SN **22** includes a word or pattern of characters that may be deemed offensive. If the SN **22** is not valid, then a new SN **22** may be selected.

[0054] In step **103**, User A may specify privacy and approval settings, which determine whether User B may make a contact request for the serial number **22** via the CRS **10**, and whether User A must approve a contact request before disseminating the contact record as a contact reply.

[0055] In step **104**, a data record is created in the contact management database of data storage **18** for User A, and the unique serial number **22** is stored therein. The record includes a field for the SN **22** and other fields that are common in contact management databases, such as name, address, telephone number and email address. In one embodiment, User A is provided an opportunity to populate the database record with personal contact information through a web browser interface. The CRS **10** may also store additional information, such as user account information and user preferences, including whether approval from User A is required before the CRS **10** disseminates User A's contact information to third party requesters.

[0056] Referring to step **106** of FIG. **2***a*, the CRS **10** communicates the serial number **22** to User A via the web browser interface on the network device **30** or, alternatively, via another supported method of conveyance, such as an email message to User A. In alternate embodiments of steps **100-106**, third party applications may be adapted via plug-in technologies, Web 2.0 mash-up technologies (Asynchronous JavaScript and XML) or other approaches to present the user interface for registering with the CRS **10** and generating a serial number **22** and contact record.

[0057] To protect against the unwanted dissemination of User A's unique serial number and contact information, the data may be encrypted before it is stored in the data storage **18**.

[0058] In one embodiment, User A may create and store one or more user-defined fields in a record by specifying a field name and a value, as illustrated in FIG. **9***a*. User-defined fields make it possible to customize a contact record (e.g., a contractor's license, an industry sector classification, etc.).

[0059] In one embodiment a search index manager processes the contents of the contact record and data is added to the data storage **18** for use with a search index processor. When a user submits search criteria in a search request that corresponds to data in the contact record, the search index processor may return the serial number **22** and other information associated to the contact record as a search result along with other matching search results. These functions enable a person to search the CRS **10** to find a serial number **22** associated to a user without first receiving the serial number **22** from that user.

[0060] In one embodiment, the CRS **10** and the network devices provide search field(s) enabling a user to submit a person's name, telephone number, email address or other criteria and retrieve an associated serial number(s). The CRS **10** optionally enables registered users to specify whether other users may search for their contact record by name, telephone number, email or other criteria to prevent undesired access to their serial number and contact record.

[0061] In one embodiment, the CRS **10** provides interfaces that enable leading search engines to generate and submit a search request and receive a search result or a list of search results. Leading search engines may be further adapted to make a contact request and receive a contact reply. Thus, a person may search for another person's contact information conveniently by using widely adopted search engines in lieu of accessing the CRS **10** directly.

[0062] In one embodiment, User A stores one or more text profiles in the contact record **406** (FIG. **9***a*) that provide User B with information distinguishing User A from other users (e.g., when User A has a common name such as "John Smith"). The text profile does not require approval from User A to view its contents. In one embodiment, User B searches for User A's contact record without the benefit of User A's serial number **22** by inputting search criteria and submitting a search request. The CRS **10** via a search index processor provides a search result with multiple records—e.g., numerous serial numbers from different users named "John Smith". Without additional information, User B may not know which serial number to request. User B can examine the profiles presented with the search results to help determine which serial number corresponds to User A. In another embodiment, User B receives a request from User A, but cannot distinguish User A from other users without the benefit of additional information. User B can examine the profile presented with the request to determine if the serial number corresponds to User A.

[0063] Referring to step **108** of FIG. **2***a* and FIG. **5**, User A conveys the serial number (SN) **22** to User B. User A may print the SN **22** on a business card and provide the business card to User B, type the SN **22** into an email message and send it to User B, verbally convey the SN **22** to User B or provide the SN **22** through another mode of conveyance. In one embodiment, the SN **22** is conveyed, along with an associated trademark that identifies the source of the SN **22** and the associated CRS **10**. For example, User A may convey the SN **22** in the form "SyncUp: JDOE25Z2C," where "SyncUp" is a promoted trademark identifying the source of the SN **22**, making it clear what the number conveys. In this embodiment the SN **22** isn't just a serial number printed on a business card, displayed in an email, or conveyed verbally, it is conveyed in association with a trademark to distinguish it from other serial numbers and addresses such as email addresses and phone numbers.

[0064] Referring to step **110** of FIG. **2***a* and FIG. **5**, User B enters the serial number into a contact management application on network device **32**. In one embodiment, User B launches the personal contact management application on the network device **32** that includes a blank serial number input field identified by a common name or trademark. The personal contact management application is adapted to transmit an entered serial number **22** to the CRS **10** and requests corresponding contact information associated with User A. User B can rely on the accuracy of the information entered into the CRS **10** by User A, which presumably has been verified and kept current by User A.

[0065] In one embodiment, another security measure implemented by the CRS **10** includes detecting contact requests with random or invalid serial numbers, and denying access to users and/or network devices **30-32** who attempt to access personal contact information without authorization from the CRS **10** or the user associated with the contact information. For example, a registered user of the CRS **10** may be denied access to the system after numerous failed attempts to enter a valid serial number **22**. Invalid serial numbers may be detected, for example, if the entered serial number **22** includes too many or too few digits, if the serial number **22** has not yet been assigned to a user, or if an error detection code is invalid. In one embodiment, the CRS **10** first processes each request as a search request, and the user may make a contact request by selecting a serial number **22** from the search results. The CRS **10** may employ search engine capability to ensure that a user never directly submits an invalid serial number **22**, thus, improving both performance and security.

[0066] The contact request is transmitted from the network device **32** to the CRS **10** and may include a "User ID" for authentication of the requestor, a "Device ID" to identify a network device for logging and synchronization of stored contact information, a "Reply Type" or a "Device Type" for identifying a data format or protocol associated with the network device **32**, a "Request Type" indicating if the contact request is for a new record, an update, or a deletion (among other possible request types), and the requested serial number **22**.

[0067] In another embodiment, the contact request includes a category (e.g., work, home, personal) to associate the requested serial number **22** with a request context. In this

embodiment, synchronization requests can filter contacts by category so that network clients **30** can synchronize only a subset of the contact records (e.g., only synchronize "work" contacts to the user's cellular phone). In one embodiment, a network device is adapted to provide a default categorization to a requested contact (e.g., if the network device is a social blog, the network device categorizes the requested contact as "friend" by default, etc.). In another embodiment, when User B requests a contact, the CRS **10** is adapted to categorize the contact automatically according to location-based attributes (e.g., all contacts within a particular city).

[0068] The contact requester may also offer one of his or her serial numbers when making a request for the contact information of another user. The CRS **10** may present the offered serial number to the user associated with the requested serial number, and the user may accept or decline the offered serial number. In one embodiment, the act of offering the serial number electronically serves as approval criteria if the offered serial number would otherwise require approval before disseminating contact information.

[0069] In one embodiment a request to the CRS **10** expresses the serial number **22** in Uniform Resource Name (URN) syntax (i.e., RFC 2141), such as "SyncUp://JDOE24Z/C," where the "SyncUp://" portion of the syntax represents a namespace. Referring to FIG. **10**, if the instant system **10***a* processing the contact request does not have records within that namespace, it may relay the request to a system **10***b* that does store records with the provided namespace. In one embodiment, a namespace redirect function looks for the address of a separate system using a namespace map record, and redirects the request to that system and provides the contact reply to the requester. Thus, with the present invention, users may utilize one service to access the records of another service via the namespace parameter (e.g., SyncUp://) prior to submitting the serial number **22**.

[0070] In one embodiment, the contact request and contact reply further include a 2-digit or 3-digit language abbreviation and a 2-digit country abbreviation. The 2-digit country code may be specified in accordance with International Standards Organization (ISO) ISO 3166-1 (e.g., US, UK, JP, etc.), and the language may also be specified in two digits in accordance with ISO 639-1 or three digits in accordance with ISO 639-2 (e.g., DUT: Dutch; ENG: English; FRA: French; JPN: Japanese.) Alternatively, the contact request and contact reply further include a character encoding in accordance with ISO 8859, UTF-8, UTF-16, ISO 2022, and others. For example, a request from a Russian-speaking user of a contact management application who resides in the United States may include the term "RUUS" (Russian+U.S.) or ISO 8859-5 (Cyrillic). In this manner, a user doing business in different countries, across different languages, can convey serial numbers **22** encoded in language character sets other than the Roman Alphabet, and the CRS **10** can correctly interpret the serial number **22**. Additionally, the contact record may similarly be encoded in different languages.

[0071] In one embodiment, a contact record is stored in a first language, such as English, and the CRS **10** receives a contact request identifying the contact record, the request including a code for a second language code, such as Japanese. In this embodiment, the CRS **10** is adapted to translate the stored contact record from the first language to the second language and return the contact record as a contact reply in a format associated with the second language code.

[0072] In one embodiment, User A resides in one country and User B resides in another country. When User B makes a request for User A's contact information, the CRS **10** appends international calling numbers (e.g., +39 in the case of Italy) and adds or removes any necessary prefixes to national area codes or local numbers as required by the conventions of the phone systems in various locales. In one embodiment, the CRS **10** is adapted to translate phone numbers using ITU-T E.164 country codes and identification codes. Adding international prefixes makes it possible for User B to call User A without the difficulties that could be associated with modifying a record to add an international prefix.

[0073] In alternate embodiments, approval processes limit access to User A's contact information by requiring prior approval before the contact information is disseminated in response to a user request. The approval processes allow registered users to control the dissemination of their contact information, while maintaining a desired degree of privacy and confidentiality.

[0074] Referring to FIGS. **2***c*-**2***f*, various approval processes may limit access to User A's contact information by requiring prior approval before the contact information is disseminated in response to a user request. The approval processes allow users to control the dissemination of their contact information, while maintaining a desired degree of privacy and confidentiality. In the various embodiments, User B launches a personal contact application on a network device **32** in step **111** and enters search criteria, which is submitted as a search request to the CRS **10**. In step **113**, the personal contact information application receives search results from the CRS **10**. In step **115**, User B selects User A's serial number **22** from the search results, thereby submitting a contact request for User A's serial number **22** to the CRS **10**.

[0075] In one embodiment, User A defines a set of approval criteria to be applied to one or more contact records by the CRS **10**. After receiving a contact request (FIG. **7***a*) for a contact record **406**, the CRS **10** determines at step **117** whether approval criteria have been specified for the contact record. If approval is required, the CRS **10** proceeds to step **119** until the approval criteria is met **119** (or disapproved). For example, manual approval by User A may be required prior to releasing the requested contact information in step **121**. While the CRS **10** awaits approval from User A, the CRS **10** may respond with an "approval pending" message to User B.

[0076] Referring to FIG. **2***d*, at step **118** the CRS **10** receives a contact request and determines that approval is required. At step **120**, User B is prompted to provide a note and to optionally offer one of User B's serial numbers **22** to User A. In step **122**, the CRS **10** presents User A with the contents of an approval record and User A approves the request, which spawns a contact reply to User B. In step **124**, the CRS **10** presents User A with the contents of an offer record and User A accepts the offer, which results in a contact request followed by a contact reply.

[0077] Referring to FIG. **2***e*, at step **118** the CRS **10** receives a contact request and determines that approval is required, where the criteria for approval is a monetary payment by User B. In step **125**, User B is presented with a user interface prompting User B to supply and/or authorize the use of credit card and billing information. Upon verification of payment, the CRS approves User B's request at step **127**. Such an approval process may generate revenue for the service provider, and/or User A.

[0078] Referring to FIG. **2***f*, an exemplary embodiment of a web browser-based approval process will now be described. In step **150**, User B requests a contact record by submitting a serial number **22** through a compatible end user application, such as by navigating a web browser application to the URL of a contact record request page or selecting a search result within a web page. If approval is required, User A, must approve the request before the CRS **10** can release the contact record to User B (step **152**), then the CRS **10** determines the source application of the contact record request in step **156** and responds to User B with an "Approval Required" message in step **158**. If no approval is required (step **152**), then the CRS **10** responds with the requested record in a format compatible with the requesting application in step **154**—a web page or a download for import into the requesting application. By contrast, other embodiments provide different formats such as an XML message, an email or SMS message, or an SS7 packet.

[0079] Similarly, the presentation format of the "Approval Required" message may be selected based on the source application. For example, if the CRS **10** determines that the contact request originated from a contact record request web page associated with the CRS **10**, the "Approval Required" message may include a web page that informs User B that approval by User A is required. The web page may include a name field identifying User B to User A, an email field indicating an email address where User A sends contact information if approved, and other fields for collecting information from User B to assist User A in approving or rejecting the contact request such as a note field for use by User B to provide an explanation or purpose for the contact record request to User A. In one embodiment, the web page includes a field for User B's serial number **22**, enabling User B to offer his or her contact serial number to User A.

[0080] In one embodiment, User B enters his or her name, email address, and other requested information into the "Approval Required" web page and submits the information to the CRS **10**, which receives the information in step **160**. In step **162**, the CRS **10** generates an approval record to track the request-approval process. The fields of the "Approval Required" page may contain pre-populated data if User B is logged into the CRS **10**, or if User B's contact information is available in a cookie or via auto-fill technologies.

[0081] In step **164**, the CRS **10** notifies User A that there is a pending request that requires User A's approval. In one embodiment, the CRS **10** sends an email notification to User A. In another embodiment, the CRS **10** notifies User A through an end user contact management application, such as upon login by User A onto the CRS **10** or through a resident service module on User A's network device **30**.

[0082] In step **166**, User A approves or rejects (or possibly ignores) User B's request. In one embodiment, User A approves or rejects User B's request by logging onto the CRS **10**, navigating to an approval/rejection web page, selecting the approval record **424** (FIG. **9***b*) submitted and pressing either an "Approve" or "Reject" user interface button. If User A approves or rejects the request, the CRS **10** changes an "Approval Status" field in record **424** depicted in FIG. **9***b* from "unapproved" to "approved", or alternately from "unapproved" to "rejected" if User A rejects User B's request.

[0083] In step **168**, the CRS **10** transmits a message to User B indicating the result of the approval process. In one embodiment, if User A approves User B's request, an email message is sent to User B including User A's contact information. The email may include the contact information as unstructured text, as a structured text record attachment (e.g., XML or vCard), or in another format. In alternate embodiments, the email message will include a URL or hyperlink to an approved request web page or a file that enables User B to retrieve the contact information from the contact registry server **10**. The messages transmitted between the CRS **10** and User B, including associated email and web pages, may further include advertising which generates revenue for the CRS **10** provider. In an alternate embodiment, a network device adapted for communication with the CRS **10** through an application plug-in receives the result of the approval process in a structured text record such as XML or vCard that is compatible with the requesting application.

[0084] In one embodiment, User A defines a Personal Identification Number (PIN) or concise password to be applied to one or more contact records by the CRS **10**. When receiving a request for a contact record, the CRS **10** may determine that approval criteria is met for the contact record if the request contains a valid PIN or password, and if so, will provide the requested information. This may be beneficial in a situation, for example, where a person may convey their serial number **22** for a record that requires approval and where the user is not able to make an immediate and needed approval electronically (e.g., when providing a serial number to a receptionist at a hotel, car rental agency, etc).

[0085] In an alternate embodiment of an approval process, User B may request access to and use of User A's contact information in accordance with legislative mandates requiring User B to provide User A with a means of controlling access and use of User A's information, such as the EU Directive on Data Privacy or the Health Insurance Portability and Accountability Act (HIPAA). In this embodiment, approval by User A effectuates a binding agreement whereby User A will continually provide User B with accurate information, and User B may only use User A's information in a manner specified by User A. In one embodiment, if User A rescinds approval to User B, User B is directed by a message from the CRS **10** to cease use of User A's information and possibly to remove User A's contact information from User B's devices.

[0086] In one embodiment, the CRS **10** provides a "Send to a Friend" feature that enables a user to send his/her serial number **22** to other individuals via email. In one embodiment, the CRS **10** accepts an email address from User A, and contains logic to determine if the submitted email address corresponds to a registered user, such as User B. If the submitted email address corresponds to a registered user, such as User B, the CRS **10** offers User A's serial number **22** to User B automatically using the offer process described herein instead of sending User B an email message. In another embodiment, the CRS **10** contains logic to determine if the email address exists in an anti-spam list, and prevents the sending of an email message if the email address is present in the anti-spam list. If the submitted email does not correspond to a registered user and is not present in an anti-spam list, the CRS **10** sends an email message including User A's serial number to User B. In one embodiment, the CRS **10** adds User B's email address to an approval record with its approval status set to "approved" on behalf of User A. This enables User B to request User A's contact information and receive immediate approval upon submitting the email address, or receive an offer for User A's contact information upon registering as a new user with the CRS.

[0087] Referring to FIG. **14**, in another embodiment User A has an email application adapted for interaction with the CRS

10. The email application contains logic to parse the email application's "Sent Email" folder for "Send-To" email addresses or alternatively to store a copy of sent email addresses as they are sent. In step **560**, User A launches the email application and sends an email. In step **562**, the plug-in that interacts with the CRS **10** stores a copy of a "Sent To" email address. In step **564**, the plug-in sends the email address along with User A's serial number **22** to the CRS **10**. In one embodiment, the email and serial number **22** are sent by the plug-in to the CRS **10** automatically. In another embodiment, the plug-in prompts User A asking if User A wants to pre-approve the person associated to the email address. In step **566**, the CRS receives an email address and generates an approval record with the approval status set to "approved" and determines whether the email address corresponds to a user's account. If the email address does not correspond to a user account, the email address is stored in the approval record and used to approve the person associated to the email address after they sign up at step **568**. In alternate embodiments, the approval record may be used to approve a non-user requesting a contact where the contact information is disseminated to the requester at the same email address. Alternatively, the CRS **10** disregards the email address if the person associated to the email address is not a user. In step **570**, the CRS **10** determines that the person associated to the email address is a user, such as User B, and pre-approves (or approves) a request by User B for the contact information associated to the serial number **22** submitted at step **564**.

[0088] In an alternate approach, User A via the email application sends a serial number **22** to User B in conjunction with a signed Triple Data Encryption Standard (DES) key generated by the CRS **10**, User B's email address (which can be used for authenticating User B with the CRS **10**), and a timestamp used to limit the duration of approval. Upon receipt of the message, User B may request the serial number from the CRS **10** via the key, and the CRS **10** may authenticate User B via the email portion of the key. Advantages of these approaches include approving anticipated requests before they occur (as User A may include a serial number **22** in the email); and User B may forward an email sent by User A to User C, but User C is not automatically approved by User A in spite of User C's knowledge of User A's serial number **22**.

[0089] In other embodiments, approval criteria include user specified rules for automatic approval. For example, approval may be limited to requesters who are registered users of the CRS **10**, to requesters whose contact information is stored in User A's address book, or other criteria specified by User A. User A may also set up approval levels that differ based on the content of the requested information. For example, User A may have business contact information via one serial number **22** that does not require approval and another contact record and serial number consisting of home information that does require approval.

[0090] Referring to FIG. **8***c*, in one aspect of the present invention, the CRS **10** contains "data mask" logic **378**, which enables User A to disseminate particular data attributes within a contact record while preventing the dissemination of other attributes (e.g., providing only phone numbers) by applying a data mask to a contact record prior to generating a contact reply. In one embodiment, the CRS **10** provides logic enabling User A to create a data mask, to specify data attributes to include in a response, to provide the data mask with a name, and to store the data mask in the CRS **10**. In one embodiment, the CRS **10** provides logic **378** enabling User A to select a data mask from a plurality of data masks, and to apply the selected data mask to a contact record prior to disseminating a response message to User B. Referring to FIG. **13**, a data mask may consist of all the attributes of a contact record where the field values are true/false or yes/no to indicate whether a contact reply should include the values. When assembling a contact reply, the data mask is applied as shown in FIG. **13**. User A may apply a default "data mask" to a record for added convenience. User A may also select a mask from a plurality of masks when approving a request for a contact record or when offering one of User A's contact records to another user such as User B. In an alternate embodiment, a data mask is used to determine which fields within a contact record may be searched by other users, such that the search index manager **356** only includes fields marked "true" or "yes" in the search index database.

[0091] In one scenario, User A is a privacy conscious person who may find approval processes unsuitable (e.g., a celebrity, a politician, etc.), because disseminating the serial number **22** may result in thousands of requests from unknown individuals—creating more labor than User A would find acceptable. In an alternate embodiment, User A may preclude requests for the serial number **22** altogether. Instead, User A may require User B to provide User B's serial number **22** or username to User A, and User A will offer one of User A's contact records to User B electronically by specifying the serial number **22** offered and either User B's username or one of User B's serial numbers **22** in an "offer" type request to the contact registry server **10**. User B may accept or decline the contact record offered by User A. User A may exercise the "offer" type request irrespective of whether User A precludes requests for User A's serial number and contact record.

[0092] In one scenario, User A wishes to refer User B's serial number and contact record to User C. User A selects User B's contact record and serial number from a list within the contact manager **528** (FIG. **11***b*) of a contact management application **520** on a network device and invokes a "refer" type request, which requires User A to further specify another user who will receive the referral. User A selects a contact record and serial number for User C. The contact management application via the contact request manager **530** submits the "refer" type request to the CRS **10**, which stores the "referral" in a record associated to User C, enabling User C to make a request for User B's contact record via the serial number. In one embodiment, the "refer" type request includes User A's name as the referring party. This notifies User B and User C that User A provided the referral.

[0093] In one scenario, User A and User B each have contact information records, which require their respective approvals before disseminating contact information to requesters. User A has previously requested User B's contact information and received approval, and User B has previously requested User A's contact information and received approval. In one embodiment, User A deletes the contact information he/she requested from User B. Referring to FIG. **8***c*, the CRS **10** is adapted to respond to this contact event by contact event manager **355** looking up requests made by User B for User A's contact information, and presenting User A with the opportunity to rescind approval to User B such that User B will not be able to receive updates to User A's contact record in the future. In another embodiment, User B is notified of User A's rescission of approval for User A's contact record. The CRS **10** is adapted to respond to this contact event

by looking up requests made by User A for User B's contact information, and presenting User B with the opportunity to rescind approval to User A such that User A will not be able to receive updates to User B's contact record in the future. Deleting a person's contact record or receiving a rescission of approval for a contact record may indicate the end of a personal relationship such that the CRS **10** should present users with the opportunity to rescind approvals reciprocally.

[0094] In one embodiment, the CRS **10** detects a contact event by contact event manager **355** (FIG. **8***c*) such as a contact record update and spawns additional processes. For example, the CRS **10** may present a user who updates his/her contact record with a list of additional processes the user may invoke, such as updates to tax authorities, postal authorities, or motor vehicle agencies to update tax forms, mailing addresses, or driver's licenses respectively. Other processes may involve enrolling in anti-spam lists, national do-not-call lists, or to provide direct mail marketers or other vendor relationships with updates to the user's contact information. The update contact event manager **355** (FIG. **8***c*) may present the user with commercial offers such as offers for new business cards or stationery. In another embodiment, the update manager **355** (FIG. **8***c*) helps to notify organizations of the user's new contact information in accordance with EU Directive on Data Privacy or the Health Insurance Portability and Accountability Act (HIPAA)—ensuring that organizations maintain accurate and up-to-date information on the user. In this embodiment, the update contact event manager **355** (FIG. **8***c*) may spawn emails or mail notices. Additionally, the CRS **10** may selectively present processes to users depending upon criteria within the contact record (e.g., a Pennsylvania resident changing an address within Pennsylvania would not find a California DMV update process useful). In another embodiment, the CRS **10** may be adapted to invoke the foregoing processes with Third Party Applications (TPAs) using Web 2.0, "mashup" or other integration techniques.

[0095] In one embodiment, a contact record may be requested through a hyperlink to a CRS **10** request page, including at least one search parameter. For example, a signature block in an outbound email may include a hyperlink to the CRS **10** request page along with the sender's contact serial number. An email recipient may make a contact record request by clicking the hyperlink.

[0096] Referring back to FIG. **2***a*, after access to User A's contact information is granted to User B, in step **112**, the CRS **10** retrieves User A's contact information—identified via the received serial number **22**—from the data storage **18**. The CRS **10** transmits the contact data (e.g., first name, middle name, last name, telephone number, email address, etc.) in a structured information record, such as an XML file, suitable for mapping to data fields in User B's contact database. The format may be specified by User B's contact management application through a code in the contact request.

[0097] Referring to FIG. **12**, the response message may contain a "digest" **552** that signs the contact information record using Public Key Infrastructure (PKI) signature technology. This "signature" authenticates the contents of the contact record and may indicate its creation date, last login date and last modified date among other attributes. This digest allows the receiving application to determine that the received contact information record was created and/or modified on the server by the registered user and not another party during transit. The digest may also enable the receiving application to determine whether the user associated to the contact record certified the contents of the information, identify the user's service level, or determine authorized uses of the information (e.g., the EU Directive on Data Privacy, HIPAA, etc.). The digest helps the recipient determine whether the contact record contains reliable information among other uses.

[0098] The received contact information is imported into User B's personal contact database in step **114** of FIG. **2***a*. As illustrated in FIG. **12**, the conveyed serial number **22** is stored in a database table **554** that at least includes an identifier of an associated contact record, such as a unique database record index or primary key. An example of a mapping from an XML-formatted contact reply message **550** to a network device database record **556** and cross-reference file **554** is also illustrated in FIG. **12**. In one embodiment, the received contact data is entered as a new record and the serial number **22** is stored in a cross-reference file **554** along with the record ID or index of the new record within the contact management application. The cross-reference file **554** facilitates a link between the contact data stored on each network device and the corresponding data stored in the CRS **10**, which is useful for updates, synchronization (i.e., the delete requests) and other linked requests.

[0099] In one embodiment, User A may wish to provide User B with an alternative contact record and serial number **22** to replace a previously requested contact record and serial number. The contact manager **350** (FIG. **8***c*) is adapted to enable User A to store a replacement serial number field in a previously requested contact record using the logic to manage the contact **352**. The contact request handler **370** is also adapted to enable the request processor **373** to request the alternative contact record in lieu of the original record. The contact request manager **530** and contact cross reference **532** of the contact management application **520** on the network device are modified to process a "replace" response type. In one embodiment, the network device prompts User B to allow one serial number and contact record to replace another serial number and contact record. The contact management application **520** facilitates the replace operation by removing the previous serial number from the cross reference record and replacing it with the alternate serial number, then, it proceeds to update and store the contact record contents.

[0100] In one embodiment, the CRS **10** is adapted to facilitate the synchronization of a plurality of personal contact databases associated with a user. The CRS **10** logs each request for contact information from each network device **32** application. When one of the network device applications sends a synchronization request to the CRS **10**, the requesting application will automatically receive contact information, deletion instructions, or other information requested by other network-enabled applications associated with that user. In one embodiment, a request results in a contact reply container with multiple contact replies.

[0101] In another embodiment, the CRS **10** includes a service providing for the remote deletion of contact information stored on network devices and applications. For example, if a user discontinues the use of an application, or if a network device **32** is lost or stolen, the user may wish to delete the associated contact information on that device and block future contact requests to the CRS **10** from the application or device to prevent misuse of the stored information. In operation, a registered user of the CRS **10** initiates the remote deletion service and identifies the applications and devices targeted for contact information deletion. The CRS **10** logs the identified devices and applications and prevents future

contact requests thereby. The deletion of the remote contact information may be implemented through the update and synchronization features described herein (e.g., by identifying the remote records as deleted or updated as blank records) or by adapting the CRS **10** to transmit deletion instructions to one or more of the network-enabled applications that support remote deletion of contact information.

[0102] In one embodiment, a serial number is used to identify a role within an organization (e.g., purchasing manager, accounts receivable clerk, etc.) rather than a contact record for a particular individual. A role serial number is assigned by the CRS **10** and mapped to an existing contact serial number in a role database record **414** (see FIG. **9***a*). A network device **32** requesting contact information associated with a role serial number will receive the contact information of the individual contact record in response. Referring to FIG. **8***c*, the role manager **390** includes program logic for creating a role **392** and managing a role **394**. In one embodiment, the "generate serial number" function **353** is adapted to generate a serial number for the role, and the request processor **373** is adapted to process role requests and replies.

[0103] Referring to FIGS. **1** and **4**, an embodiment of the operation of role serial numbers will be described. User A establishes a role through an interface on the CRS **10** in step **250**. The CRS **10** generates a unique role serial number in step **252** and transmits the role serial number to User A in step **254**. In step **256**, through a second interface on the CRS **10**, User A enters a serial number **22** associated to an individual contact record. The referenced individual contact serial number is mapped to the role serial number managed by User A. In one embodiment, the CRS **10** requests approval to include the individual contact in the role, as required. In step **258**, User A conveys the role serial number to a third party, such as User B, to disseminate contact information.

[0104] In step **260**, User B launches a personal contact management application and enters the role serial number. In step **262**, the personal contact management application retrieves individual contact information associated with the entered role serial number from the CRS **10**. The CRS **10** receives the role serial number from the personal contact management application and retrieves the corresponding contact record from the database. The individual contact record is transmitted to the personal contact management application, such as through a contact reply. In step **264**, the received contact record is stored in the personal contact database. User A may substitute serial numbers as individuals change roles within an organization.

[0105] In one embodiment, a plurality of contact serial numbers, such as those belonging to company employees, may be grouped under a single group serial number. A group serial number is assigned by the CRS **10** and mapped to a plurality of existing contact serial numbers or group serial numbers in a group database. Further, a network device requesting contact information associated with a group serial number will receive a plurality of associated contact records in response. Referring to FIG. **8***c*, the group manager **380** includes program logic for creating a contact group **382** and managing the contact group **384**. In one embodiment, the "generate serial number" function **353** is adapted to generate a serial number for the group, and the request processor **373** is adapted to process group requests and replies.

[0106] Referring to FIGS. **1** and **3**, an embodiment of the operation of group serial numbers will be described. User A establishes a contact group through an interface on the CRS **10** in step **200**. The CRS **10** generates a unique group serial number in step **202** and transmits the group serial number to User A in step **204**. In step **206**, through a second interface on the CRS **10**, User A enters one or more serial numbers **22** of potential group members. The group members may be referenced by individual contact serial numbers, role serial numbers and group serial numbers which are mapped to the group serial number managed by User A. In one embodiment, the contact registry server **10** requests approval to include individual contact or group serial numbers in the group, as required. In step **208**, User A conveys the group serial number to a third party, such as User B, to disseminate contact information for the group of users.

[0107] In step **210**, User B launches a personal contact management application and enters the group serial number. In step **212**, the personal contact management application retrieves individual contact information associated with the entered group serial number from the CRS **10**. The CRS **10** receives the group serial number from the personal contact management application and retrieves the corresponding contact records from the database. The group of individual contact records is transmitted to the personal contact management application, such as through a contact reply container. Through this process, the plurality of contact records (each of which may include more than 100 characters) associated with the group may be retrieved by entering a concise serial number saving a significant amount of time and effort. In step **214**, each of the received contact records is stored in the personal contact database. In one embodiment, the personal contact management application maintains a mapping of each contact record to its individual serial number, and each individual serial number to the group serial number.

[0108] Another embodiment of the present invention includes a Taskbar Service Module (TSM) such as those available on Windows-enabled computers, which allows the user to activate a taskbar service from a taskbar, search for or make requests for contact information, and approve requests for contact information without the aid of an internet browser. A TSM provides a convenient way to access application functionality available to the CRS **10** or a network device without requiring the user to open a browser, navigate to the CRS **10**, provide authentication credentials, and navigate to the particular functionality the user wishes to exercise. A taskbar module also alleviates the need to access other applications, such as email or cellular phone address books adapted for use with the CRS **10**. Instead, the user may click on an icon on the taskbar to launch a TSM that will maintain a session with the CRS **10**. In one embodiment, the user may enter a serial number **22** and request contact information through the TSM, or approve requests for the user's information as necessary. The TSM stores the username, password, and network address necessary to establish a connection to the CRS **10**.

[0109] The TSM further includes an Application Programming Interface (API) allowing contact management applications and plug-ins to access the CRS **10** through the established session. The TSM includes functionality to accept requests received through the API from a contact management application, and provides common functions described herein. The use of a TSM simplifies the development of contact management applications and associated application plug-ins and reduces the need to develop redundant functionality when numerous applications are supported for the same operating system.

[0110] In one embodiment, an email application may be further adapted to parse incoming email messages using a common protocol such as POP **3** to search for serial numbers **22** attached to or included in an email. If the email application locates a serial number **22**, it may determine via a cross-reference file **554** (FIG. **12**) if the application already has requested the serial number **22**. If the application hasn't requested the serial number **22**, the application may present a user interface dialog box offering to make a request, and the user may make the request or close the dialog box without making a request. If a contact serial number is not found in an incoming email, the email application may alternatively issue a search request to the CRS **10** using other identified criteria, such as the sender's email address or contact information identified by parsing the incoming email.

[0111] Referring back to FIG. **2***b* and FIG. **5**, in one aspect of the present invention, wireless network devices are adapted to select, send and receive serial numbers using infrared or radio waves. In one embodiment, User A and User B, each with their own wireless network devices, are within proximity of each other. User A selects one of his/her serial numbers for transmission to User B and invokes the transmission process. The wireless network device encodes the serial number such that the receiving wireless device may decode it and identify the serial number as belonging to the service (e.g., incorporated URN syntax, as described herein). User B's network device may present User B with the option of accepting or rejecting the transmission. If User B accepts the transmission, User B's network device receives and decodes the transmitted message. The wireless network device may then request the associated contact record from the CRS **10**. In one embodiment, the transmission also includes an approval password or pin so that User B's request does not require further approval from User A.

[0112] In another embodiment of the present invention, a network device, such as a public switched telephone network (PSTN) landline telephone using Signaling System Seven (SS7) or similar protocol, is adapted to transmit a request for contact information to the CRS **10** and receive a response containing the requested contact information or other messages using SS7 or a similar protocol. In one embodiment, a telephone network switch that supports SS7 is adapted to receive a request from a PSTN landline telephone and forward the request to the CRS **10**. The telephone network switch is also adapted to receive a response from the CRS **10** and forward the response to the PSTN landline telephone that made the request. The CRS **10** is adapted to receive requests and transmit responses using SS7. In an alternate embodiment, the network switch is adapted to convert the SS7 request to a network protocol supported by the contact registry server **10** (e.g., TCP/IP, HTTP).

[0113] Referring to FIG. **16**, an alternate approach to utilizing a protocol such as SS7 over a PSTN network involves adapting a telephone capable of PSTN (via SS7), Internet (TCP/IP, VoIP, etc), or Wireless (802.11, Bluetooth, etc.) network communication capability to transmit a request for contact information to the CRS **10** and receive a response containing the requested contact information or other messages using the phone's internet communications capability. In one embodiment, implementation leverages the Digital Enhanced Cordless Telecommunication (DECT) protocol for cordless phones. This approach may be more cost-effective and time-efficient compared to making modifications to PSTN networks.

[0114] In another embodiment of the present invention, the CRS **10** is adapted to receive and transmit Short Message Service (SMS) communications. A request for a contact record including at least the unique serial number **22** may be transmitted from an SMS-enabled device, such as mobile phone, to the CRS **10**. The CRS **10** includes logic to parse the SMS request, retrieve the contact record corresponding to the received serial number, and transmit an SMS message including the requested contact information in reply. The requested contact information may be transmitted as a vCard, unformatted text, or other predetermined format. In this manner, an SMS-enabled mobile device may be used to request and receive contact information from the contact registry server **10** without requiring modification of the software on the mobile device. Searches, search responses, and approval messages may be facilitated in a similar manner. SMS and vCard technologies are supported on most wireless devices worldwide, which would further reduce barriers to adoption of the present embodiment. Other communication protocols supporting the receiving and transmission of text messages over a network may be implemented in a similar manner.

[0115] Referring to FIG. **20**, in one embodiment a web page **1000** contains a banner advertisement **1001**, which provides the advertiser's serial number **22** as a clickable region **1002** that User A may click to receive the advertiser's contact information. Implementation methods may use a hyperlink, Adobe Flash, image map or other technologies to submit a search request or contact request to the CRS **10**, and receive a vCard, search result or contact reply respectively. In another embodiment, clicking on the serial number hyperlink presents a dialog box or web page enabling User A to select from a list of User A's serial numbers and provide other information requested by the advertiser.

[0116] In another embodiment, an advertisement **1001** on a web page **1000** or otherwise in a computer display may provide a serial number input field **1003** and a submit button **1004**, enabling the person viewing the advertisement to provide a serial number **22** corresponding to their contact information to the advertiser. In this embodiment, the advertising vendor may collect a serial number **22** from a prospective customer and request contact information via the serial number **22** from the CRS **10**. The advertisement **1001** may also contain an approval PIN input field **1005** so that the advertiser is automatically approved to receive the submitted serial number **22**. Submission of the information to the advertiser may be encrypted. In one embodiment, a request by an advertiser for User A's serial number from the CRS **10** always requires User A's approval.

[0117] In another embodiment, the advertiser utilizes a Customer Relationship Management (CRM) system or Sales Force Automation (SFA) system adapted for communication with the CRS **10**. The CRM or SFA system is further adapted to receive a serial number **22** submitted by a banner advertisement **1001**, and immediately generate a search request or a contact request to receive contact information associated to the submitted serial number **22**. The CRS **10** may also be adapted with a particular service level, which requires an advertiser or vendor utilizing a CRM or SFA adapted for communication with the CRS **10** to submit requests with an approval PIN or alternatively to require the approval of the user associated with the serial number before disseminating contact information to prevent vendors, advertisers and others from abusing a user's privacy. Prospective customers may be unwilling to enter complete information due to data entry

effort or other concerns, thus, submitting a serial number **22** mitigates data entry effort. An advertiser or other vendor may use contact information received from the CRS **10** for lead generation purposes, or to contact the prospective customer to provide product or service literature, price quotes, special offers or other information. Further, data entry and maintaining accurate and up-to-date information are significant issues for users of CRM or SFA systems. Referring back to FIG. **2***e*, at step **118**, approval criteria may involve a monetary payment by the advertiser. In another embodiment, approval criteria may involve the advertiser providing the prospective customer with another form of consideration, such as a coupon.

[0118] In one embodiment, the CRS **10** contains logic for benefits indicators **359** (FIG. **8***c*) that presents the labor savings associated with the use of the system. An exemplary embodiment finds the sum of characters incorporated into a contact record, and divides the sum by the number of characters in the serial number **22**. The CRS **10** or a network device presents the quotient to the user to indicate the estimated labor savings users will realize when requesting the serial number as compared to manual data entry. In one scenario, the CRS **10** computes this quotient for each request to account for benefit variations due to the application of a data mask that selectively restricts the dissemination of certain attributes within a contact record as described herein. In another embodiment, the CRS **10** compares the foregoing quotient with a minimum threshold. If the quotient falls below the threshold, the CRS **10** or a network device provides a message to the user indicating that adding additional data to the contact record will save other users data entry effort.

[0119] In another embodiment, the CRS **10** multiplies this quotient by the number of requests for a particular serial number **22**, and presents the product to the user to indicate the labor savings multiple requesters have enjoyed collectively. In another embodiment, the CRS **10** periodically sums the foregoing product of all serial numbers in the system to provide the general public with an estimate of the cumulative labor savings delivered by the system. Similarly, the CRS **10** may find the sum of quotients associated to the requests made by a user. The CRS **10** may present the labor savings in a user interface, or may send email reports to the user on a periodic basis. Users who are aware of the savings may use the service more frequently.

[0120] In a further embodiment, the CRS **10** logic of the benefits indicators **359** (FIG. **8***c*) maps each attribute or group of attributes in a contact record to one or more text messages that indicate the benefits users may accrue when receiving the contact information associated to those attributes. The CRS **10** benefits indicators **359** (FIG. **8***c*) also detects empty contact record attributes, and presents the corresponding text message to the user if an attribute is empty. Users may be inclined to forego data entry if they do not understand the benefits accrued to others (e.g., a record without an address is not useful for Global Positioning System (GPS) or mapping systems).

[0121] In one embodiment, use of certain contact management services, such as a request for contact information, is provided to users without charging a fee for the service. Providing services for free may be desirable because it promotes rapid and widespread adoption of the contact management services. The contact registry service provider may collect revenue through the placement of targeted advertisements (including the methods described herein and depicted in FIG. **20**) in messages and web pages (e.g., banner ads) transmitted to User B in response to searches for serial numbers, requests for contact records, or other service requests, such as contact record updates. The contact management provider may collect additional revenue by offering premium services on a pay-per-use or subscription basis.

[0122] In one embodiment of the present invention, the CRS **10** reserves a sequence of characters in a serial number **22** for the benefit of a user paying a premium, or for the benefit of a particular organization or group. In one embodiment, the beginning character of a serial number up to a terminating character such as a period (.) may indicate a domain. Within this domain, the CRS **10** may reserve one or more character sequences for a particular group. Exemplary embodiments of reserved keywords include company names or stock ticker symbols. In one embodiment, a registered user is only able to generate a serial number **22** with a reserved sequence of keywords if the registered user's account email is confirmed with a particular domain name.

[0123] There may be many advantages associated with embodiments of the present invention. For example, in an embodiment, as discussed previously, a contact record is stored in a centralized database **18**, and includes a unique, context-free serial number **22**. A concise context-free serial number (e.g., not an email address associated with an email account or a telephone number associated with a residence, etc.) is useful for conveyance, contact information requests, creating a request log and a requestee log, and creating a cross-reference **554** (FIG. **12**) between the contact record stored in the data storage **18** and a database index of the network device **32**'s contact management application.

[0124] Unlike a context-driven ID such as an email address or telephone number, or an ID that contains a network address or routing information, a user does not typically need to change the context-independent serial number over time, avoiding a break in cross-reference links that would often occur (e.g., when a person changes jobs and thus email addresses and telephone numbers). In this manner, the context-independent serial number is associated with a trademark making it more easily conveyed. Using alphanumeric characters for the serial number makes it possible to issue short, personalized serial numbers amenable to user input that identify an extensive address space. By contrast, a conventional contact record may have over 100 characters, each of which requires entry under a manual input system.

[0125] An embodiment also makes it possible retrieve updates and to synchronize many different types of devices and applications quickly, allowing a user to maintain consistent, up-to-date contact information across many different network devices.

[0126] In continuing with the description of the contact registry server (CRS) **10** of the present invention, in an embodiment, as shown in FIGS. **8***a*-**8***c*, the CRS **10** includes a network interface **302** to facilitate communications with network devices **30**, **32**, a processor **304**, and a program memory **306** that includes logic for instructing the processor **304** to facilitate the creation, storage, maintenance and retrieval of contact information in a data storage **18**.

[0127] The program memory **306** of the exemplary embodiment includes a database server **310** and a web application server **320**.

[0128] The database server **310** includes a series of data structures **400** (FIG. **9***a*-**9***b*) which the database server **310** may use for storing data in the data storage **18**. The data

structures **400** include a User ID table **402** for storing information about registered users, including a User ID and user information. In one embodiment, user information includes an account password and billing information, and may include additional data used by the CRS **10**. A second table **404** maps serial numbers to user IDs, allowing the system to track the user associated with each contact record, and allowing a single user to maintain contact information under multiple serial numbers. For example, as discussed previously, a single user may have a plurality of contact records to accommodate multiple languages (e.g., English, French or Japanese), countries and uses (e.g., business and personal). A contact record table **406** stores user contact information and an associated serial number. User contact information may include name, title, address, telephone numbers, email address, company name, web site, and other information. A user-defined field table **410** stores user-defined fields-enabling a user to add fields that are not part of the contact record **406**. A group table **408** stores a group serial number and a series of serial numbers associated to individual contact records **406**. A role-based serial number table **414** stores a role serial number, a role description and one serial number associated to an individual contact record **406**. The SN/UID table **404** may also be used to link the group table or the role-based serial number table to the user ID. A namespace map table **412** stores the namespace, network address, and authentication credentials for the CRS of other service providers offering the same service. An offer table **416** stores contact record offers made by one user to another user. A request log table **418** stores contact requests made by network devices. A requestee log table **420** stores the user IDs of the user who owns a contact record, the user ID of the requesting user, the requested serial number, and the approval status among other attributes. When User A updates a contact record, an internal update table **422** stores update notifications for User B, who previously requested the serial number. An approval record **424** stores the approval status and reply method of requests that require approval. The exemplary embodiment describes the various processes and implementation with various database technologies may lead to various configurations.

[0129] The web application server **320** includes a registration manager **330** for handling user registration, an authentication manager **340** for authenticating users and devices accessing the CRS **10**, a contact record manager **350** for handling the creation, storage and updating of contact information, a billing manager **361** for charging users, a contact request handler **370** for delivering contact information to requesting network devices, a group manager **380** for handling group creation and management, and a role manager **390** for handling role creation and management.

[0130] The registration manager **330** includes processes for creating a new user **332**, creating a plurality of new users through a batch process **334**, verifying users **335**, changing/retrieving a password **336** and deleting users **338**. In one embodiment, these processes may be invoked by a user of a network device **30** through a web page interface or via the interface of a contact management application.

[0131] In an alternate embodiment, the "new user" batch process **334** invokes the contact record manager **350** to create a plurality of contact records simultaneously. The batch process includes receiving, at the CRS **10**, a batch of input data consisting of contact information for a plurality of users. The batch process creates new users and generates batch output data, including the user ID, the temporary password, and the serial number **22**, as well as information from the batch of input data (e.g., an email address or a mailing address) that will assist in disseminating registration data to the newly registered users.

[0132] The contact record manager **350** generates the serial number **353** for each contact record and creates a new record to link the user ID and the contact record's serial number **404** (FIG. **9***a*). Invalid batch data can be logged and returned to the requestor in a report. The batch input and output data could come from a file, a database, a network, a directory service (e.g., Lightweight Directory Access Protocol (LDAP) or Active Directory) or other source.

[0133] Once a user completes the registration process and changes the assigned temporary password, the contact record may be published, which makes it possible for network devices **32** to request the contact record. Next, the user may set contact permissions **354** for the contact record, which makes it possible for the user to deliberately authorize or refuse each request for the contact record, or to automatically approve or reject requests.

[0134] The contact permissions process **354** restricts access of third-party users and network devices to particular contact records. When a contact record is published, the contact information is available for retrieval by any user who enters the corresponding serial number **22**. Through the permissions feature **354** and the approval processor **374**, a user may manually approve each request for the user's contact information, automatically approve each request, or establish rule-based conditions for approving access to the contact data. For example, the user can deny the provision of contact information to anonymous requestors. Referring back to FIG. **1**, when User B requests User A's contact record, the system can generate a response to User A indicating that it is awaiting approval from User A to release the requested information to User B. This would spawn follow-up requests for the record (if approved), a refusal message (if the request is rejected), or a "still waiting" message.

[0135] The delete users process **338** includes both single delete and batch delete capabilities. In one embodiment, a large entity such as a mobile telephone provider or Internet Service Provider (ISP) offers access to the CRS **10** as a value-added service bundled with other offerings. The batch delete would be used by large entities when access to the systems changes on a regular basis and may be part of standard integration of the contact registry service to the large entity. In another embodiment, an individual user deletes his or her registration, which is consistent with the EU Directive on Data Privacy or HIPAA that requires that a subject has the right to request the removal of his or her information from a third party server.

[0136] In another embodiment, an "existing user" batch process invokes the contact record manager **350** to update a plurality of contact records simultaneously. The batch process includes receiving, at the CRS **10**, a batch of input data consisting of contact information for a plurality of users. The batch process provides a user ID, one or more serial numbers and updated information for each serial number. Using the user ID and serial numbers, the batch process selectively retrieves a contact record associated to a serial number, then, updates the contact record with updated data and saves the record. Batch processes for registering users (and deleting registrations), and creating, updating and deleting contact records may reduce the effort associated with updating a

plurality of users simultaneously, such as the employees of a large corporation or the users of a third party service such as an Internet Service Provider (ISP) or a wireless network carrier.

[0137] The contact record manager **350** includes program logic for creating a new contact **351**, managing contacts **352**, generating serial numbers **353**, and managing contact permissions **354** such as making a contact record available for search and request, and setting request approval criteria. In one embodiment, the logic for generating serial numbers **353** includes a pattern recognition algorithm to filter out serial numbers including offensive or otherwise undesirable sequences of digits. A contact event manager **355** tracks contact record manager activity **350** and may be configured to invoke additional event-driven processes. A search index manager **356** parses a contact record and transforms it into a format suitable for a search engine. A content verification **357** function enables the contact record manager to invoke third party services to verify the content of a contact record (e.g., an address verification system). A signature generator **358** enables the contact record manager to sign digital works using the contents of a digital work, a user's serial number, and a private key such as a password to generate a hash code (e.g., MD5). A benefits indicator function **359** provides alerts and reports to users to indicate the benefits of using a serial number and including additional data in contact information within contact records. The user provides contact information through the contact record manager **350** which stores the contact information in the data storage **18** via the database server **310**. Personal contact information may be input and updated through the user interface of a network device **30**, including a web page interface.

[0138] The contact request handler **370** includes device registration **371** for uniquely identifying each network device **30**, **32** that communicates with the CRS **10**; a search processor **372** for processing search requests and generating search results (FIG. **6***a*-**6***c*); a request processor **373** for processing contact request and replies (FIG. **7***a*-**7***c*), generating request logs **418** and requestee logs **420**, and invoking the request processor **373** as needed; an approval processor **374** for managing the approval process of a request, including notifying users, generating approval records **424** (FIG. **9***b*), and providing replies; a digest generator **375** for signing contact replies; a namespace redirect **376** for looking up different namespaces **412** (FIG. **9***a*) and rerouting requests for records located within different servers; and a data mask manager **378** for selectively restricting access contact records on an attribute level.

[0139] An exemplary network device **500** is further illustrated in FIG. **11***a*. The network device **500** may be any device adapted to communicate with the CRS **10**, such as a personal computer, a personal digital assistant (PDA), a wireless phone, a VoIP phone, a landline phone (e.g., using SS7 protocol), or another type of network-enabled device. The network device **500** includes a network interface **502**, providing access to the CRS **10** through the network, a program memory **504** and processor **506** for controlling the network device **500**, a data storage **508** and a user input/output mechanism **510**, such as a display and keyboard.

[0140] Referring to FIGS. **11***a* and **11***b*, the program memory **504** includes a contact management application **520** which includes, or is enhanced with, registry information **522** and login information **524**, which enable the contact management application **520** to access the CRS **10**. A serial number validation function **526** checks the validity of a serial number format entered by a user. In the exemplary embodiment, the serial number validation function **526** verifies that the serial number entered by the user is a 9-digit alphanumeric string and that the error detection code is accurate. A contact manager function **528** provides an interface allowing a user to add, edit, delete and view a plurality of contacts. A contact request manager **530** enables a user to request contact records from the CRS **10**. The contact request manager **530** retrieves the network address of the CRS **10** from the registry information **522**, generates a request message, and transmits the message to the CRS **10** via the network device's network interface **502**, the network **20**, and the CRS **10**'s network interface **302**. A contact cross reference function **532** maintains a cross reference table mapping the serial numbers of retrieved contact records to the contacts stored by the network device.

[0141] In an alternate embodiment, the program memory **504** includes one or more network-enabled applications. For example, a graphics design application, such as Adobe Illustrator or Adobe InDesign, may include enhancements in the form of a plug-in allowing the application to receive a serial number, contact the CRS **10**, and retrieve associated contact information. Through a graphics design application, the user may create a graphic that includes graphic variables. Entering the serial number into the menu for the application plug-in will cause the graphic variables to be set in accordance with the current associated contact information. An employer could use this feature to manage and print business cards, or a printing company might operate as a retail point of sale for the service. When the user updates data, the graphic variables will update automatically.

[0142] In another embodiment, the serial numbers of the exemplary embodiment may also be used to aid the completion of online forms. For example, User A may register with a plurality of web sites, with each web site having its own registration screen seeking personal information from User A. Affiliated web sites may include a serial number input field allowing User A to complete the contact information aspects of the form merely by entering his serial number. The web site benefits by ensuring it maintains current customer data, and enticing new users due to the simplified registration process. In some applications, the serial number may be used for user authentication allowing the user to protect his/her email address (and limit spam) and reduce the risk of providing credit card information over the Internet (e.g., ID theft). Further, the contact registry server tracks who has access to the contact registry information, allowing the user to track web sites to which the user is a member and allows the commercial web sites to maintain current contact information for the user.

[0143] The serial numbers of the exemplary embodiment may be used anywhere that contact information is requested, including in commercial transactions. For example, User A may contact a customer service call center, or desire to facilitate a commercial transaction such as purchasing merchandise, renting a car, registering for a hotel room, or booking an airline flight. When contact information is requested through a web-based contact request screen, a field for entry of a contact registry serial number simplifies the contact information request process, allowing the remaining contact fields to be populated automatically with corresponding contact information received from the contact registry server. A customer service representative, whether via telephone or in person, may input a serial number from a user into an application adapted for communication with the contact registry server

10 to retrieve all required contact information from the contact registry server in lieu of manual data entry. Organizations benefit through the use of the serial number by reducing the amount of data entry required to acquire demographic information, including reducing the risk of repetitive stress injuries. Organizations also benefit by ensuring accurate data entry, and by receiving periodic updates to the contact information as customer contact information changes.

[0144] In another embodiment of the present invention, a commercial application suitable for creating electronic forms, such as Adobe Acrobat, may be adapted for communication with the CRS **10** to retrieve contact information from the CRS and populate the fields of the electronic form. In another example, a serial number may be embedded into a PDF, allowing the PDF to be updated as corresponding contact information changes. This embodiment may be used with employment forms, tax forms, loan applications, health care forms, and other forms that utilize software suitable for creating or editing forms, such as Adobe Acrobat.

[0145] Serial numbers may also be used to facilitate mapping, navigation and GPS-related services. In one embodiment, a user seeking directions between two addresses can enter the serial number for the source location and the serial number for the destination location (in contrast to entering two complete addresses) into a compatible internet mapping or navigation system to retrieve the desired directions. Up-to-date contact information can be provided to any Internet-enabled device, ensuring that the two contact addresses are current. Many wireless devices are GPS and Internet enabled allowing users to request real time and location-specific information for the wireless device. For example, a wireless device can determine its current GPS location and identify local services such as the closest movie theater and current movie times. Contact information for such establishments may include an associated contact serial number, allowing the establishment's contact information be easily added to a user's contact address book and the user to receive contact information updates. In one embodiment, an application on the GPS/Internet-enabled device is adapted to display serial numbers along with establishment contact information, and add the serial number to the user's contact management application upon user request. In another embodiment, the contact registry server includes a reverse lookup function that retrieves a current GPS location or address, and returns the identities, contact information and serial numbers of the closest publicly available contacts satisfying user-selected criteria (e.g., restaurants or movie theaters).

[0146] The contact registry server and compatible network applications may further include information retention services that are adaptable to an individual's or entity's document retention requirements. When a contact management application requests an update from the contact registry server and the contact registry server provides an updated contact record, the original contact information will be lost unless saved by the requesting application prior to the update. This poses a potential problem to a corporation having a document retention policy that requires such information to be retained for a certain period of time, or to an entity that is involved in public policy or litigation and may be required to preserve electronic information. In one embodiment, a contact request history is maintained by the service module in accordance with user preferences that may include identification of records to store in the history, corresponding data fields that should be stored, and the specification of a "delete after" date (e.g., delete after 5 years).

[0147] In another embodiment, the contact information includes substantive content for use by a network-enabled application. For example, a contact record may include a graphic or logo, audio data, or specify a certain font style associated with the contact information that will control the look and feel of material printed through the network-enabled application.

[0148] In another embodiment, the contact registry server is provided as an add-on service to the services offered by cellular networks or internet service providers for a nominal fee per subscriber. Revenue may be generated by charging users for information retrieval using such services.

[0149] In one embodiment, third party web sites and applications are adapted for use with the present invention using composite application methods popularly known as "Web 2.0" or "mashup." Technologies such as Asynchronous JavaScript and XML (AJAX), JavaScript Object Notation (JSON) and the Document Object Model (DOM) facilitate the incorporation of data and functionality available from the CRS **10** into the web user interfaces of third party applications.

[0150] Referring to FIG. **15***a*, a Third Party Application (TPA) **620** resides in a third party application server **600**, which serves as the application interface to a client browser **650** and accepts requests (and posts) from the browser **650** via a network **20**. The third party server **600** may provide the browser **650** with Hypertext Markup Language (HTML) data **602** to render a user interface, Extensible Markup Language (XML) data **604** to provide application data, Cascading Style Sheet (CSS) data **606** to aid in rendering the HTML and data, and JavaScript data **608** to manipulate and govern the behavior of the user interface (among other uses). The browser **650** may process and render the data accordingly using the Document Object Model (DOM) and a JavaScript interpreter among other technologies.

[0151] The TPA **620** also has an Application Programming Interface (API) **610** that enables other applications to interact with the TPA **620**. Similarly, the CRS **10** has an API **60** that may process requests from the third party application servers **600**, browsers **650**, or other network devices **30**, **32** (FIG. **1**).

[0152] In one embodiment, the TPA **620** is able to retrieve HTML data **52**, XML data **54**, CSS data **56**, and JavaScript data **58** from the CRS **10**. Using composite application techniques, the TPA **620** is adapted to serve web pages containing HTML (**52** and **602**), XML (**54** and **604**), CSS (**56** and **606**) and JavaScript (**58** and **608**) such that it is able to present functionality from the TPA **620** and the CRS **10** in a single web page. The TPA **620** is further adapted to receive requests intended for the CRS **10** from the browser **650** via the network **20**, then, the TPA may redirect requests to the CRS **10** via the API **60**, and finally, receive responses from the CRS **10**, which are sent to the browser **650**.

[0153] Referring to FIGS. **15***a*-**15***b*, in one embodiment, the TPA **620** is able to serve HTML data **602** containing an XML data map **672**, and contact information formatted in XML **674**. Using various script programming techniques, a script is able to detect the presence of a data element by its ID within the HTML **602** (e.g., "company"), then, determine if a corresponding target ID exists within the data map **672**. If a corresponding target ID exists in the data map **672**, the script retrieves a source ID. Finally, the script retrieves a value from contact information **674** and resets the value of the target ID within the HTML data **602**. Through these and other methods,

the CRS **10** and third party applications are capable of presenting CRS **10** functionality to third party web applications, and providing third party applications with contact information from the CRS **10**.

[0154] In one embodiment, a web page for a TPA **620** is adapted to accept a username or serial number (in lieu of the username) and password, which is sent to the CRS **10** to authenticate the user of the TPA **620** with the CRS **10**. In one embodiment, the CRS **10** responds with an access token, which authenticates the user in subsequent requests to the CRS **10** until the access token expires or the user logs out.

[0155] The third party application is further adapted to retrieve User A's personal serial numbers and the corresponding contact information. User A may create, edit or delete his or her serial numbers via the TPA's user interface. In one embodiment, the TPA **620** is adapted to present User A's serial numbers to other users of the TPA.

[0156] In one embodiment, a TPA **620** user interface is adapted to accept serial numbers, send requests to the CRS **10** and receive responses from the CRS **10**. In an exemplary embodiment, User B enters User A's serial number into the user interface of the TPA **620** and receives a contact record from the CRS **10**, which is rendered in the user interface of the TPA **620**. In another embodiment, User B enters search criteria and receives a list of serial numbers which match the search criteria in a search result, and User B may further request a specific serial number (a contact request) from among the search results and receive a contact reply.

[0157] In another aspect of the present invention, the CRS **10** contains a list of contact records User B requested from other users. A TPA **620** is adapted to retrieve User B's list of contact records from the CRS **10** and present the list of contacts to User B within the user interface of the TPA **620**.

[0158] In another aspect of the present invention, the CRS **10** contains a list of requests for User A's contact records. A TPA **620** is adapted to retrieve the pending requests for User A's contact records from the CRS **10** and present the list of requests to User A within the user interface of the TPA **620**. User A may approve or decline each request for a contact record within the user interface of the TPA **620**, and the TPA **620** will update the CRS **10** accordingly.

[0159] In another embodiment, User A may offer a serial number(s) to User B via the user interface of the TPA **620**, and User B may accept or decline the offer. If User B accepts the offered serial number, the TPA **620** requests the contact record from the CRS **10**.

[0160] In another aspect of the present invention, a TPA **620** with e-commerce capability is adapted to present CRS functionality that enables User A to register with the CRS **10**, create a serial number **22** and contact record, and if necessary to transmit the serial number and contact record back to the TPA **620** for further use. In one embodiment, the TPA **620** provides the CRS **10** with authentication credentials uniquely identifying the TPA **620**, and, the CRS **10** contains logic to record User A's activity. The CRS **10** is able to analyze User A's activity for future billing to the owner of the TPA **620**. In another embodiment, the TPA **620** is adapted to present the CRS **10**'s credit card billing fields, and to transmit billing information from the TPA **620** to the CRS **10** securely. These methods enable third party e-commerce applications to sell CRS **10** services to their customers.

[0161] Exemplary embodiments of the present invention may include integrating CRS **10** functionality with third party applications such as online email applications, social networks, online web meeting applications, mapping and driving direction sites, shipping sites, retail web sites, or auction sites among others. People utilize or otherwise exchange contact information when using these types of third party applications, and people may benefit substantially from the foregoing exemplary embodiments.

[0162] Various implementation techniques may include "toolbar" extensions to web browsers, portlets (e.g., JSR-168) within web pages, or fields and page areas "mashed up" into the user interface of the third party application. Other implementations may use XML derivations such as Simple Object Access Protocol (SOAP) and web services to facilitate interaction with third party applications.

[0163] In one embodiment, a web browser is adapted to retrieve each contact record User B requested, and to create a bookmark in User B's web browser using the URL attribute of the contact record. The "request replication" method of synchronization described herein may create useful records other than contact information records in a contact management application.

[0164] In an alternate embodiment, an online meeting application (e.g., WebEx) is adapted to authenticate a first meeting attendee with the CRS **10**, retrieve the first attendee's serial number(s), and present the serial number to second attendees. These other attendees may select the first attendee's serial number and thereby request the contact information of the first attendee. If the requesting attendee is authenticated with the CRS **10**, the request is recorded in the CRS **10** along with the attendee's authentication credentials automatically. If the attendee is not authenticated, the CRS **10** may prompt the attendee to provide a name, email address and note via the third party user interface to facilitate approval and update processes.

[0165] In one embodiment, a third party application such as an e-commerce site, an auction site, a mapping site, or a shipping site requires address information such as origination and destination addresses. The TPA **620** is adapted to enable User A to select a contact record from the list of contacts and to populate similar data fields presented in the user interface of the third party application. In one embodiment, the third party application is adapted to use drag-and-drop technology. "Auto-fill" technologies could thereby be augmented to retrieve contact information from the CRS **10** and automatically enter contact information for persons other than User A (e.g., entering a third person's information in a web-based mapping application, or in a mailing address field for the purposes of gift giving, drop ship, driving direction, etc.).

[0166] Referring to FIG. **17**, in one embodiment, User B operates a plurality of network devices ND_**1**, ND_**2** and ND_**3**, such as a personal computer, mobile phone and PDA device. In operation, User B enters a serial number in a first network device ND_**1**, which transmits a contact request message to a contact registry server (CRS) **650** through a network **652**. The CRS **650** returns a contact reply to ND_**1** including the requested contact information. The CRS **650** also creates an entry in a request log **654** in the database (DB) **656**, logging the time the contact request from ND_**1** was processed. ND_**1** receives the requested contact information from the CRS **650** and stores the received contact information locally in a memory or other data storage associated with the ND_**1**.

[0167] The request log **654** tracks contact information requests and may include a user ID, a device ID, a request type, the requested serial number, and a timestamp for the

request. The user ID uniquely identifies the requesting user and may include one of the user's personal serial numbers assigned by the CRS **650**, a login name or other identifier. The device ID uniquely identifies the requesting network device, and in one embodiment a unique identifier is provided in each copy of the network device software before it is deployed on a network device. The CRS **650** may associate a request log with one of the requesting user's categories when the request log includes the serial number for the requesting user's contact. In this manner, a user with more than one serial number, for example, a work serial number and a personal serial number, may manage the synchronization of separate contact lists. In an alternate embodiment, the request may contain a category attribute that enables the user to synchronize only a subset of the contacts requested by various devices (e.g., only synchronize contacts in the "work" category). In another embodiment, the request may contain a list of network device identifiers to synchronize only a subset of the contacts requested by various devices (e.g., only certain devices should synchronize the requested contact). In another approach, the network device software requests a unique identifier from the CRS **650**. Alternatively, the MAC address associated with the network device hardware may be used. Identifying each device facilitates the synchronization of contact records across multiple devices. For example, if a person requests a contact record with one device, another network device can request the same record without additional user effort.

[0168] The request type includes a code identifying whether the received request is for new contact information, an update to existing contact information, a request to delete contact information associated with User B or other type of request. When User B requests User A's serial number, the contact information is received and may be inserted as a new record into User B's contact management database. User B may later re-request User A's serial number, in which case the contact information is received, the corresponding contact record is located, and the stored contact information is updated with any changes. User B may also issue a request to delete User A's contact information, which causes the contact information record to be deleted from the contact management database. Each of these requests corresponds to database functions that may be implemented in this manner.

[0169] Initially, the requested contact information (stored on ND_**1**) is not stored on network devices ND_**2** and ND_**3**. User B may separately enter the serial number into the contact management applications of ND_**2** and ND_**3** to retrieve the contact information from the CRS **650**. In one embodiment, the network devices ND_**1**, ND_**2** and ND_**3** include a synchronization process that is automatically invoked when the respective network device contacts the CRS **650** with a contact request. The network devices may also be configured to periodically (e.g., daily, weekly, monthly, etc.) invoke the synchronization process to regularly check for updates. Further, it is contemplated that a user may manually invoke the synchronization process through the contact management application when desired.

[0170] The request log **654** enables User B to initiate a synchronization request to the contact registry server **650** from a network device to download new contact information, remove deleted contact information, and update modified contact information. In this manner, User B is not required to reenter contact serial numbers into each device. In one embodiment, the log's timestamp is used to limit synchronization to records that have been added, updated, or deleted since the device's last synchronization request. The network device may be identified through a device ID and the request log stores the timestamp of the last synchronization for each device ID.

[0171] Referring to FIGS. **18** & **19**, the synchronization process will be described. When the synchronization process is invoked, a synchronization request message, including the user ID and device ID, is transmitted from the ND_**2** to the CRS **650**. In one embodiment, the request message may include a serial number associated to a contact of the requesting user or a category. The CRS **650** receives the request in step **700** and queries the Request Log **654** to find the last time that ND_**2** contacted the CRS **650** in step **702**. In step **704**, the CRS **650** retrieves all the request types and serial numbers from the request log entries associated with requests by User B subsequent to ND_**2**'s last communication with the CRS **650**, which may be measured by a timestamp field in each entry or some other serial field. In step **706**, the CRS **650** retrieves the contact information for each serial number (not needed for request type "delete") and generates contact reply messages to transmit the contact information to ND_**2** in step **708**. In this case, since User B entered User A's serial number in ND_**1**, there is a request log entry for User A's serial number. When ND_**2** transmits a synchronization request, it receives User A's serial number and contact information from the CSR **650** in the reply. Finally, in step **710**, the synchronization request from ND_**2** is added to the Request Log **654**, along with a current timestamp.

[0172] The network device ND_**2** updates the contact information stored on ND_**2** in accordance with the received request type. In the exemplary embodiment, a serial number/database record cross-reference table facilitates the update of contact records. An embodiment of an update process with a cross-reference table will now be described with reference to FIG. **19**. When User B enters a serial number into the contact management application of a network device, a request is transmitted to the CRS **650**, which returns associated contact information. A new contact record is created in the local contact information database and the received contact information is stored (step **800**). When a new contact record is created, the contact management application assigns a local record identifier (or database index), which is stored as part of the record. In step **802**, an entry in a cross-reference database **660** (FIG. **17**) is added, mapping the local record identifier to the serial number associated with the contact information.

[0173] The cross reference table allows the contact management application to update contact records with information stored at the CRS **650**. For example, a single contact record stored on ND_**1** can be updated by querying the cross-reference table for the associated local record identifier, identifying the associated contact serial number, and specifying the contact serial number in an update request transmitted to the CRS **650**. In step **804**, contact information is received from the CRS **650**, and the contact serial number is used to retrieve the local record identifier from the cross-reference table in step **806**. Next, in step **808**, the contact record associated with that local record identifier is retrieved from the contact management application. The contact record stored on the network device may then be updated with new information (or deleted as required).

[0174] The contact records are updated according to the received "request type" associated with the contact information. Request types include "new record," "update" and

"delete" (among other possible request types). When a network device ND_**3** synchronizes its contact information with the CRS **650**, a "delete" request from ND_**1** will be invoked, and during synchronization the contact reply to ND_**3** will have a "reply type" of "delete" and the associated serial number. The contact record associated with the received serial number is then deleted from the contact information database and the cross-reference database.

[0175] In one embodiment, when records are added and then subsequently deleted before synchronization can take place, program logic at the contact registry server does not include the records in the replies to avoid unnecessary work by the network device. In another embodiment, the contact registry server further includes an approval log so that synchronization requests do not require User B to approve subsequent requests for every single network device that User A uses. For example, if User A has the serial number of User B, User B may have the option to disallow subsequent requests or updates from User A by removing User A from the Requestee log until User B approves the request subsequently.

[0176] As discussed previously, an exemplary contact reply data structure is illustrated in FIGS. **7***b* and **7***c*. A contact reply message includes a reply type, serial number and contact information fields. A plurality of updates may occur between sessions and the reply message may have more than one contact reply. To accommodate multiple contacts in a reply message, a contact reply container includes at least one contact reply message and facilitates the transmission of reply messages as a batch. A single contact reply container may include reply messages having different types, such as a contact record or a message to the user (e.g., "awaiting approval").

[0177] In one embodiment, when sending a reply message to the network device, the message is encrypted in a common encryption protocol such as MD-5, using the user's User ID as a public key and password as a private key. Using encryption for messaging and storage makes it more difficult for unauthorized users of the contact registry server to gain access to information by eavesdropping, "sniffing" or "spoofing" packet-switched network connections.

[0178] Further with respect to encryption, the data that is associated with a contact record that is transmitted to a network device in response to a request by the network device can also be encrypted. In this manner, the data can be used by the network device of the recipient for contacting the person associated with the contact record, however, the actual contact data itself cannot be learned by the recipient because it is encrypted. This can provide utility because it allows the subject of the contact record to provide the contact information to a recipient and allows the recipient to use the contact information, but yet, it protects the privacy of the data for the subject person of the contact record because the data is encrypted, and thus, cannot be known, and perhaps be further transferred, by the recipient themself. In this embodiment, a plug-in may be utilized with the recipient's network device such that the plug-in is able to contact the subject with the device by decrypting the encrypted data.

[0179] Referring back to FIG. **17**, in one embodiment a requestee log **658** is used to track and control access to user records. When User B requests User A's contact information, for example, a new record is added to the requestee log **658** that indicates that User B has User A's contact information. As illustrated, the "user's ID" is the serial number for User A and serves as a primary key in the database, and the "requestee serial number" is the serial number for User B. When User A makes a change to his or her contact record, the contact manager sends an internal update to each user linked to User A through the requestee log. The internal updates may be maintained in a database table **422** such as that illustrated in FIG. **9***b*. Where an internal update table is used, records are retrieved as part of the user's synchronization and converted to an entry in the request log to be downloaded the next time User B accesses the CRS **650**.

[0180] In another embodiment, a new device (e.g., ND_**4**) registers with the CRS **650**. Since it is a new device, there are no previous requests, thus, the synchronization process will retrieve all previously requested serial numbers and populate the new device with contact records. In an alternate embodiment, by specifying a new type of request such as "restore," the CRS **650** may be adapted to override the timestamp of the last synchronization for the device, and thereby retrieve all previously requested serial numbers to update and repopulate the device. Thus, CRS **650** may provide a means of backing up requests such that new devices, or devices that have malfunctioned, may retrieve all contacts.

[0181] In one embodiment, the network device is adapted to ensure that the "request replication" method of synchronization does not conflict with traditional methods of synchronization (e.g., the SyncML standard) that may operate concurrently. Prior to initiating a "request replication" synchronization request, the network device searches each contact record in a contact management application that does not have a corresponding entry in the cross-reference record to determine if the record contains a serial number and/or other digest information. If the network device finds a record that contains information generated by the CRS **10** (e.g., a serial number or digest), the network device may infer that the record corresponds to a record in the CRS **10**. The network device may then create an entry in the cross-reference record to prevent the synchronization process from creating a duplicate record.

[0182] In one embodiment, contact management application **520** (FIG. **11***b*) on a network device is adapted to detect when User B accesses a contact record that has a corresponding entry in the cross-reference **554** (FIG. **12**). The cross-reference is further adapted to store an attribute indicating the last time and date when User B accessed the contact record, and the total number of times User B accessed the contact record. Each time User B accesses a contact record with a corresponding entry in the cross-reference, the contact management application **520** resets the last accessed time and date and increments the total number of times accessed in the cross-reference **554**. The contact management application **520** is further adapted to forward these attributes for each contact record in the cross-reference to the CRS **10** periodically. The CRS **10** is adapted to enter the most recently accessed contact record at the top of a list of recently accessed records for the network device and to summarize the number of times User B accessed a particular contact record on a network device. The CRS **10** is further adapted to merge each list for all devices associated to User B. The CRS may be further adapted to store these ordinal rankings in request logs, or to automatically categorize requested contacts according to an ordinal classification such as "Most recently accessed" and "Top 10 Contacts." The CRS and network devices may present or organize records and execute functionality according to the most recent accessed record or how frequently User

B accesses particular contact records. For example, User B may have hundreds of records and may access one record via an email address book, which makes the accessed record appear in a "most recently accessed" list in a cellular phone, GPS system, etc. Additionally, the ordinal classification may occur irrespective of the type of device or contact management application used to access the record (e.g., cell phone, email, IM, etc.).

[0183] In another embodiment, User B may utilize remote deletion functionality in conjunction with ordinal rankings to remove all contacts in the contact management application of a network device, and then use synchronization functionality to populate the same contact management application with a subset of contacts available to User B at the CRS **10** using category attributes. In one embodiment, User B only wants "Top 10 Contacts" on a network device. In another embodiment, User B only wants location-based contacts on a network device. This may be desirable since network devices may have limited capacity and performance, and contact records may have limited utility. For example, a person on a business trip may wish to have a contact management database containing only "Top 10 Contacts," "Most Recently Accessed" and location-based contacts from the locale of the business trip for more rapid retrieval of relevant contact information.

[0184] In one embodiment of the present invention, User A creates a serial number **22** via the CRS **10** and inputs his or her contact information into the corresponding record **406** (FIG. **9***a*). The CRS **10** is further adapted to enable User A to specify preferred methods **360** (FIG. **8***c*) of contacting User A. The CRS **10** stores this information in the contact record and User A may update it on a regular basis. Preferred methods may include an ordinal list of preferences (e.g., email first, IM second, cellular phone third, etc.), rule-based preferences (e.g., do not call after 7:00 p.m.), or other methods such as presence detection (e.g., User A is logged into an Instant Message (IM) system, User A's GPS system provides coordinates to the CRS **10** indicating physical presence at User A's office, etc.).

[0185] A request by User B's network device for User A's serial number and contact record results in the dissemination User A's contact information to User B's network device along with the preferred methods of contacting User A. The network device is adapted with a preferred method manager **536** (FIG. **11***b*). When User B views User A's contact record, User B's network device may present the preferred method for contacting User A.

[0186] In one aspect of the present invention, User A's network devices are adapted to update User A's contact record **406** in the CRS **10** by providing information regarding User A's availability (e.g., User A's GPS system indicates physical presence near User A's home or office, User A's cell phone is on, User A is logged in to an IM system, etc.). The network device contains logic as a presence manager **534** (FIG. **11***b*) to determine User A's availability and notify the CRS **10**. The CRS **10** contains logic as presence detector **379** (FIG. **8***c*) to receive information from the network device and update User A's contact record. User B's network devices may receive updates from the CRS **10**.

[0187] In one embodiment, when User B attempts to contact User A by a text-based method (e.g., email, SMS, or IM), the network device retrieves the preferred method, and the address or network identifier for the preferred contact method from the contact record. User B may then send the text message to User A via that method.

[0188] In another embodiment, when User B attempts to contact User A by voice-based methods (e.g., telephone, wireless phone, or VOIP) the network device attempts to connect via preferred methods in an ordinal manner (e.g., via VOIP first, via PSTN second, via cellular phone third—where the ordinal preference reflects the increasing cost of each method).

[0189] In one embodiment, User B attempts to contact User A via a text-based message, and User A's preferred method for receiving a message is voice-based. The text message is converted to speech via text-to-speech technology, and left as a voice mail message for User A.

[0190] In one embodiment, User B attempts to contact User A by voice-based methods, and user A prefers to receive text messages. User B may create a voice message that is converted to an audio file and sent to User A via a preferred text method that is also capable of processing a voice file (e.g., email or IM).

[0191] If User A specifies that a user such as User B may view User A's contact information, the network device may decrypt and present User A's contact information to User B. Alternatively, User A may completely preclude User B from identifying User A's actual contact information. The network device may store the requested record, which User B's network device may access later, provided the stored copy of User A's contact record has not exceeded its expiration date/time. If User A's contact record has exceeded its expiration date/time, User B's network device may request an update from the CRS **10**.

[0192] In another aspect of the present invention, User A may further specify an expiration time/date for the record received by the network device. In this embodiment, User B's network device is adapted to receive contact information from the CRS **10** and to initiate communications with User A via that information. The network device may not present User A's contact information to User B, so User B may not have actual knowledge of User A's contact information. In this manner, some users will prefer to withhold their actual information from recipients of their contact information record.

[0193] In an embodiment, the CRS **10** enables User A to create a proxy email address and include it in his or her contact record along with User A's actual email address. The CRS **10** is further adapted to configure an email server to receive email messages at the proxy email address and forward received email messages to User A's actual email address. Thus, User A may keep his/her contact information completely private (indirectly available to User B), and simultaneously provide User B with the most convenient method of contacting User A by the mere conveyance of User A's serial number to User B, and User B's request for User A's serial number.

[0194] An embodiment of the present invention involves disseminating Public Key Infrastructure (PKI) keys (e.g., X.509). PKI involves generating two keys: a public key for encrypting communications; and, a private key for decrypting communications. A person may also use a private key to digitally "sign" a communication, and the public key may be used to authenticate the "digital signature." PKI technology is widely available for personal use, and is widely used by websites for Secure Socket Layer (SSL) encryption. Public keys are lengthy and cryptic; therefore, they are not amenable

to verbal, handwritten or printed conveyance, nor suitable for manual data entry. Conveying public keys via insecure email or network connections or making them freely accessible on a public server enables an unintended recipient to encrypt communications via the public key, or to authenticate communications signed with the private key via the public key. To enhance security, people who use PKI technology in their personal communications often change their public/private key pairs frequently.

[0195] Using the process described herein to convey public keys in the same manner as other contact information may provide at least the following benefits: a contact record may be searched and requested; a serial number **22** is easier to convey and enter when compared to a public key; a user may approve or reject a request for a contact record—thereby providing a level of access control to a public key; the process of transmitting the contact record (including the public key) may itself be encrypted—further preventing access to the public key by unauthorized persons; an update process enables a requester to receive updates to public keys when the user who controls the contact record changes the private/public key pair; and through request-replication, multiple network devices associated to the same user may receive access to the public key efficiently.

[0196] In one embodiment, the process of creating a record in step **104** includes a field for storing a public encryption key (e.g., using X.509 cryptography) in the contact record. User A may convey the associated serial number **22** to User B in lieu of a public key, and User B will receive the public key when User B requests and receives the contact record corresponding to the serial number **22**. As described herein, the request by User B may require User A's approval prior to disseminating the contact record, and by extension the public key also. In an alternate embodiment, the CRS **10** is adapted to generate a public key and a private key such that the public key is stored in a contact record, and the private key is conveyed to the user via an encrypted network connection (e.g., SSL).

[0197] In another embodiment, a network device **30** is adapted to detect the presence of a public key in a contact record stored on the network device. User B requests and receives User A's contact record, which contains a public key. In one embodiment, the network connection is encrypted—ensuring that the public key is transmitted securely. In another embodiment, when User B initiates electronic communication with User A, the network device **30** detects that the communication is intended for User A; that the network device **30** has a contact record for User A; and that the contact record contains a public key. The network device **30** may present User B with the option to encrypt User B's communication using User A's public key, or to digitally sign the communication using User B's private key. In one embodiment, when the network device detects a public key within the contact record, it initiates an "update" request to the CRS **10** to ensure that the public key is the most current version before encrypting the communication.

[0198] In another embodiment, User A invokes the process of generating a public/private key pair on the CRS **10** from a network device **30**, such that the private key is retrieved by the network device and stored securely. When User A receives a communication encrypted by User A's corresponding public key, the network device can retrieve the private key and decrypt the communication on behalf of User A. In one embodiment, the process of storing the private key involves storing the serial number **22** of the corresponding public key with the private key, and further encrypting the private key with a pass phrase; and requiring User A to provide the pass phrase in order to retrieve the private key. In an alternate embodiment, the network device is adapted to import the private key, pass phrase, and any other required data into an application or network device **30** that already supports PKI technology.

[0199] In another embodiment, a communication encrypted with a public key or "signed" with a private key may be transmitted along with the serial number **22** (e.g., via email or a network connection). When a network device receives a communication signed with a private key, it may retrieve the corresponding public key from the contact record associated to the serial number **22**. When a network device receives a communication encrypted with a public key, the network device may retrieve the corresponding private key or alternatively prompt the user for a pass phrase prior to retrieving the corresponding private key—thereby streamlining communications using PKI technology.

[0200] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

What is claimed is:

1. A method of providing contact information, comprising the steps of:

creating a contact record in a contact management system, wherein the step of creating the contact record includes a process associated with a subject of the contact record and/or a recipient of data associated with the contact record;

generating a unique serial number corresponding to the contact record;

conveying the serial number to the recipient;

receiving a request by an application for the contact record from the contact management system corresponding to the serial number; and

transmitting data associated with the contact record to the application.

2. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of:

registering the subject; and

verifying registration information of the subject.

3. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of submitting and storing keywords in the contact record.

4. The method of claim **1**, wherein the step of creating the contact record includes the steps of creating and storing a publicly available information profile of the subject of the contact record.

5. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of generating and presenting a message to the subject that indicates a utility of including contact information in the contact record.

6. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of specifying a preferred method of contacting the subject of the contact record.

7. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of creating and storing a data field defined by the subject.

8. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the steps of indexing data associated with the contact record and storing the indexed data within a search engine database.

9. The method of claim **8**, further comprising the steps of accepting a request from a third party search engine by the search engine database and providing a response to the third party search engine by the search engine database.

10. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the step of generating a public encryption key and a private encryption key pair.

11. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the step of storing a public encryption key in the contact record.

12. The method of claim **1**, wherein the step of creating the contact record in the contact management system includes the step of setting an approval criterion by the subject.

13. The method of claim **12**, wherein the approval criterion includes exchanging an item of value as consideration for approval.

14. The method of claim **12**, wherein the step of setting an approval criterion includes the step of setting a personal identification number (PIN) or a password for the contact record.

15. The method of claim **12**, wherein the step of setting the approval criterion includes the step of generating and storing a key or other identifier and wherein the step of receiving the request by the application for the contact record from the contact management system includes the step of receiving the key or other identifier such that the request for the contact record from the contact management system corresponding to the serial number is pre-approved.

16. The method of claim **12**, wherein the approval criterion includes establishing a binding agreement on a use of the data associated with the contact record following approval.

17. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes the step of providing the subject with a field to enter a unique serial number of variable length defined by the subject.

18. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes the step of generating a serial number that is conducive for data entry using a T9 keyboard.

19. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes the steps of creating a proxy serial number and referencing the unique serial number by the proxy serial number.

20. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes the step of reserving a preferred sequence of characters and/or numbers.

21. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the steps of:

inputting search criteria into a search input field by the recipient;

submitting the search criteria as a search request to a search engine; and

receiving a search result from the search engine in response to the submitting step, wherein the search result includes the serial number.

22. The method of claim **21**, wherein the step of receiving the search result includes receiving a publicly available information profile associated with the serial number.

23. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the step of entering a second serial number or selecting a second serial number by the recipient when making a request for the serial number.

24. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the step of transmitting the serial number by a first device to a second device using a short range wireless transmission protocol.

25. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the step of correlating the serial number to a second serial number associated with a second contact record.

26. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the step of substituting a second serial number for the serial number.

27. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the step of incorporating the serial number into an electronic banner advertisement.

28. The method of claim **27**, wherein the step of incorporating the serial number into the electronic banner advertisement includes the steps of creating a hyperlink for making the request for the contact record corresponding to the serial number from the contact management system.

29. The method of claim **1**, wherein the step of conveying the serial number to the recipient includes the steps of:

incorporating a form in an electronic banner advertisement;

entering the serial number into the form; and

conveying the serial number via the form and the electronic banner advertisement to the recipient.

30. The method of claim **29**, wherein the step of conveying the serial number via the form and the electronic banner advertisement generates the request for the contact record from the contact management system corresponding to the serial number.

31. The method of claim **1**, wherein the request for the contact record from the contact management system requires an approval for a grant of the request and wherein the request includes an offer of a thing of value as consideration for the approval of the request for the contact record.

32. The method of claim **30**, wherein the step of conveying the serial number via the form to the recipient operates in conjunction with an enterprise application for tracking an advertising campaign and generating a prospective customer lead.

33. The method of claim **1**, wherein the claimed steps are performed through a third party application using a composite application technology.

34. The method of claim **2**, wherein a third party application facilitates the step of registering the subject.

35. The method of claim **33**, wherein the third party application facilitates bill presentment and payment on behalf of the contact management system.

36. The method of claim **33**, wherein the third party application is an online meeting application.

37. The method of claim **33**, wherein the third party application is a web browser and wherein the step of transmitting

the data associated with the contact record to the application creates a bookmark entry in the web browser.

38. The method of claim **1**, wherein the step of transmitting the data associated with the contact record to the application includes the step of encrypting the data.

39. The method of claim **1**, wherein the step of transmitting the data associated with the contact record to the application includes the step of applying a data mask to the contact record such that the transmitted data associated with the contact record is a subset of data associated with the contact record.

40. The method of claim **8**, further including the step of applying a data mask to the contact record such that the indexed data is a subset of data associated with the contact record.

41. The method of claim **1**, wherein the step of transmitting the data associated with the contact record to the application includes the steps of generating a digest and verifying information associated with the data by the digest.

42. A method of sorting contact records in a contact management system, comprising the steps of:

detecting a user accessing the contact records;

updating a time variable, a date variable, and a total number of times accessed variable related to each of the contact records;

communicating the updated variables to the contact management system for the contact records;

processing by the contact management system the updated variables to form an ordinal list of the contact records based on recent access and frequency of access; and

making the ordinal list available for request by the network devices.

43. A method for detecting the presence of a user on a network device, comprising the steps of:

detecting a user activity on the network device;

communicating the user activity to a contact management system;

updating a contact record of the contact management system associated with the user with the user activity on the network device; and

receiving an update based on the updated contact record by a recipient.

44. A method of utilizing an update to contact information, comprising the steps of:

detecting an update to a contact record in a contact management system; and

providing an update to a process based on the step of detecting the update to the contact record.

45. The method of claim **44**, wherein the process is one or more of the processes of populating an electronic form, presenting a commercial offer, and updating a subscription-based service.

46. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes the step of utilizing the serial number to sign a digital work.

47. The method of claim **1**, wherein the step of receiving the request by the application for the contact record from the contact management system corresponding to the serial number includes the step of receiving a publicly available information profile of a requester.

48. The method of claim **1**, wherein the step of generating the unique serial number corresponding to the contact record includes a namespace identifier.

49. The method of claim **1**, wherein the step of receiving the request by the application for the contact record from the contact management system corresponding to the serial number includes the steps of receiving a namespace identifier for the serial number and directing the request to the contact management system corresponding to the namespace.

50. A method for retrieving a public key from a contact management system via a network device, comprising the steps of:

submitting a serial number corresponding to a contact record to the contact management system;

receiving the contact record from the contact management system corresponding to the serial number, the contact record containing a public encryption key;

storing the public encryption key in the network device; and

creating a cross reference between the public encryption key, the serial number and an electronic communication address found within the contact record.

51. A method for encrypting a communication on a network device, comprising the steps of:

detecting an electronic communication address or a serial number of a recipient of the communication;

detecting a public encryption key corresponding to the electronic communication address or the serial number of the recipient; and

presenting an interface to a user enabling the user to encrypt the communication using the public encryption key.

52. The method of claim **51**, wherein the step of detecting the electronic communication address or the serial number of the recipient includes the steps of:

requesting an update from a contact management system for a contact record corresponding to the public encryption key;

receiving the update for the contact record corresponding to the public encryption key from the contact management system, the contact record containing the public encryption key; and

updating a public encryption key record stored on the network device with the public encryption key contained in the update for the contact record.

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