



US 20070042755A1

(19) **United States**

(12) **Patent Application Publication**
Singhal

(10) **Pub. No.: US 2007/0042755 A1**

(43) **Pub. Date: Feb. 22, 2007**

(54) **SYSTEMS AND METHODS FOR TWO-FACTOR REMOTE USER AUTHENTICATION**

(52) **U.S. Cl. 455/411**

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(57) **ABSTRACT**

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This invention discloses a system of remote user authentication to an authentication server, with a telephone interface to the authentication server that only receives routed calls that have originated from a cell phone in a cellular network and a call handling logic function which routes only those calls to the authentication server over the interface that have originated from a cell phone with a subscriber identity module (SIM) card and for which the cellular company maintains an individual subscriber identification data. In a different embodiment a remote user authentication system has different interfaces and different authentication processes that correspond with a telephone network interface and with a cellular telephone company network interface, enabling the authentication system to have different methods of authentication depending upon which interface a remote user connection authentication request originated from. The method uses the SIM card of a cell phone as a "something you have" factor as part of a two-factor authentication mechanism to an authentication server. The telephone network uses a call back feature.

(21) **Appl. No.: 11/503,825**

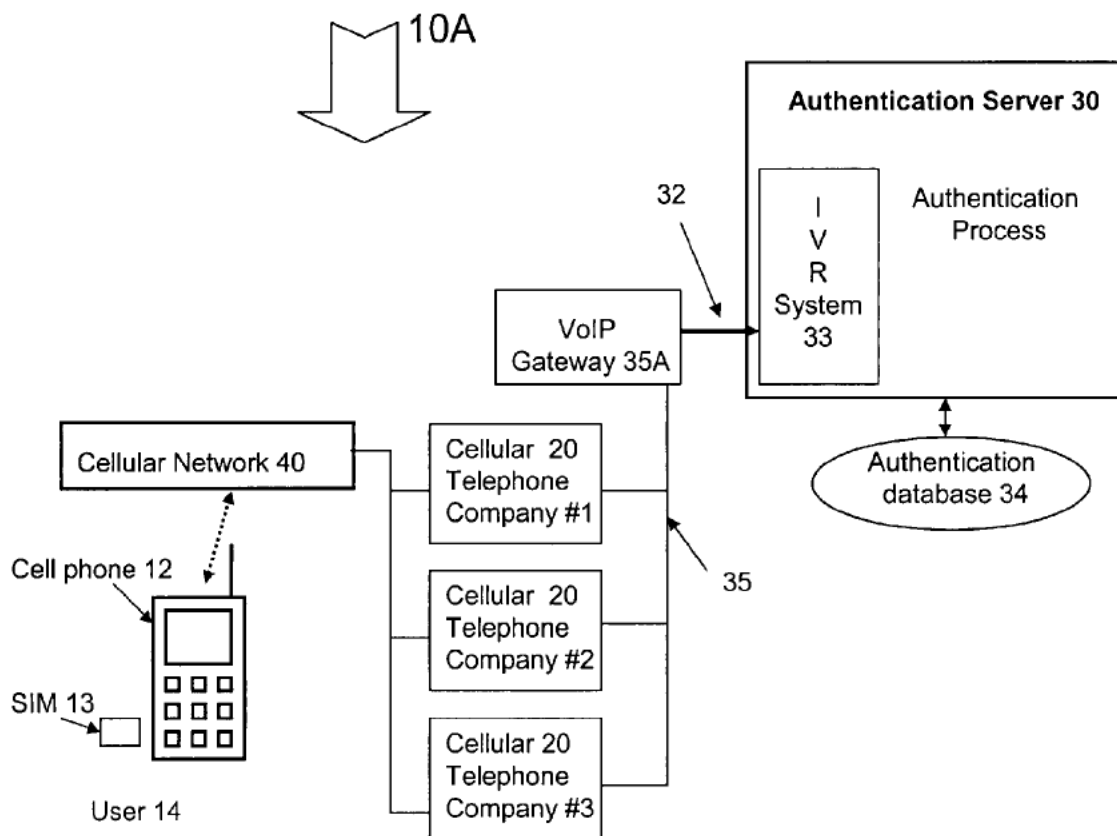
(22) **Filed: Aug. 13, 2006**

Related U.S. Application Data

(60) **Provisional application No. 60/709,955, filed on Aug. 20, 2005.**

Publication Classification

(51) **Int. Cl. H04M 1/66 (2006.01)**



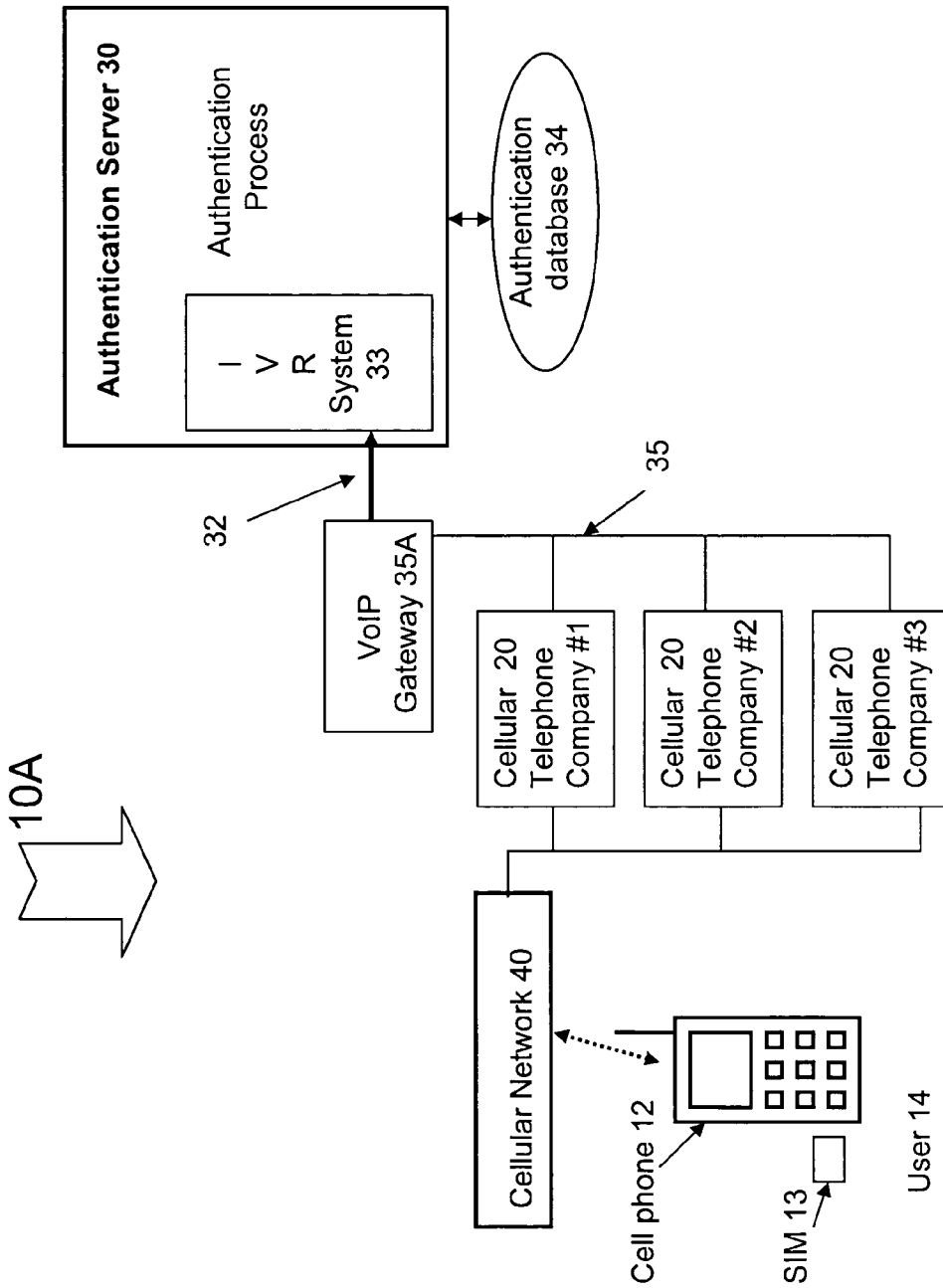


Figure 1

Adapting a server to receive only those incoming telephone calls from a service customer that are originated by the customer on a cellular network	52
Forwarding, by the cellular network only those calls that have been verified by the cell service provider having a customer identity verified account with the cell company.	54
Matching the caller id of the incoming call with a caller id that is pre-stored in database 34, as an equivalent to a "what you have" factor of remote user authentication.	56
Annunciating an "unauthorized call" message if not matched, otherwise a greeting message for the service.	58
Prompting by the IVR 33, for entry of PIN as a second factor of "what you know" of remote user authentication.	60
Verifying the service customer by entry of a personal identification number matching it in the stored database before authenticating the user.	62
Providing a service to the service customer.	64

Figure 2

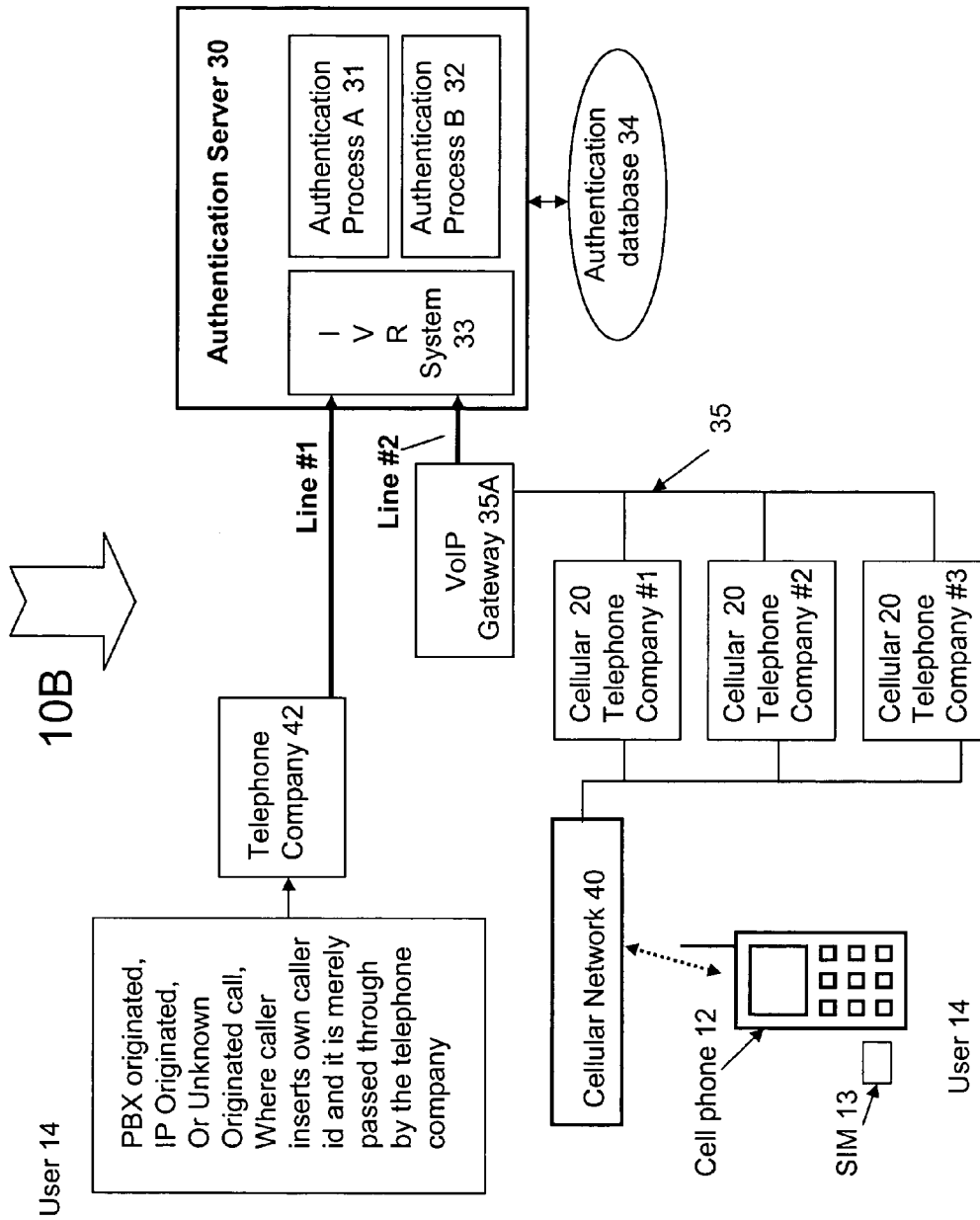


Figure 3

Authentication Process A 31

Prompting by an interactive response system of the authentication system, for entry of a PIN-1. 31A

Verifying PIN-1 in an authentication database and delivering a message of an "To hang up now" otherwise a message of "an unauthorized call". 31B

Calling back by the system on a caller id that is present for this PIN-1 in the database immediately after step 31B. 31C

Prompting for entry of PIN-2, and checking it in database to Authenticate to authenticate the remote user. 31D

Authentication Process B 32

Verifying and Checking the incoming caller id for a match in an authentication system database. 32A

Prompting by an interactive response system of the system, if caller id is in database for entry of a PIN, otherwise delivering a message of an unauthorized call. 32B

Verifying the PIN in the database to authenticate the remote user. 32C

Figure 4

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