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# United States Patent [19]

## Haserodt

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[54] **WEB-PAGE INTERFACE TO TELEPHONY FEATURES**

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[51] **Int. Cl.**[7] ........................... **H04M 11/00**; H04M 3/42; H04L 12/28; G06F 15/163

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[58] **Field of Search** ...................................... 370/352, 353, 370/380, 389, 392, 396, 401, 404, 427, 435, 450, 465, 485; 379/90.01, 93.01, 93.05, 93.09, 100.15, 100.16, 201, 210; 709/217, 223, 230

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[57] **ABSTRACT**

A method is provided for clients to access server-based telephony features in the Internet or other non-telephony client-server network, in a platform-independent and network-independent fashion and without modification of the clients. A user of a client (**101**) uses the client's World Wide Web (**WWW**) browser (**113**) to download from a WWW server (**104**) a page (**115**) that defines a blank feature form that has virtual actuators and associated parameters fields for the telephony features. The user marks up the downloaded page via the WWW browser to indicate feature selection and any feature parameters, and uploads the marked up page to the WWW server. A form-interpreting script (**116**) executed by the WWW server interprets the marked up page, and the WWW server sends a feature request that corresponds to the user's feature selection and user-specified parameters to a telephony feature server (**105**). The telephony feature server responds to the request by providing the requested feature to the user's client. If needed, the WWW server also requests the client to establish a TCP/IP connection with the telephony feature server.
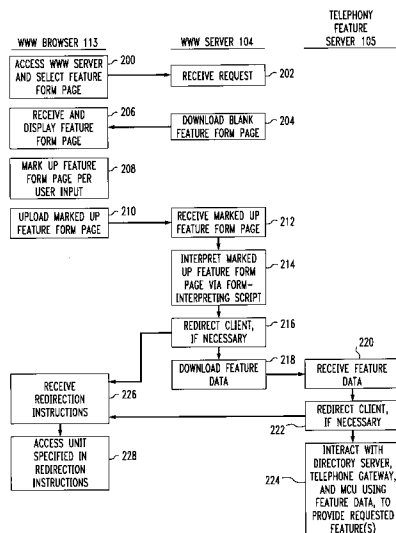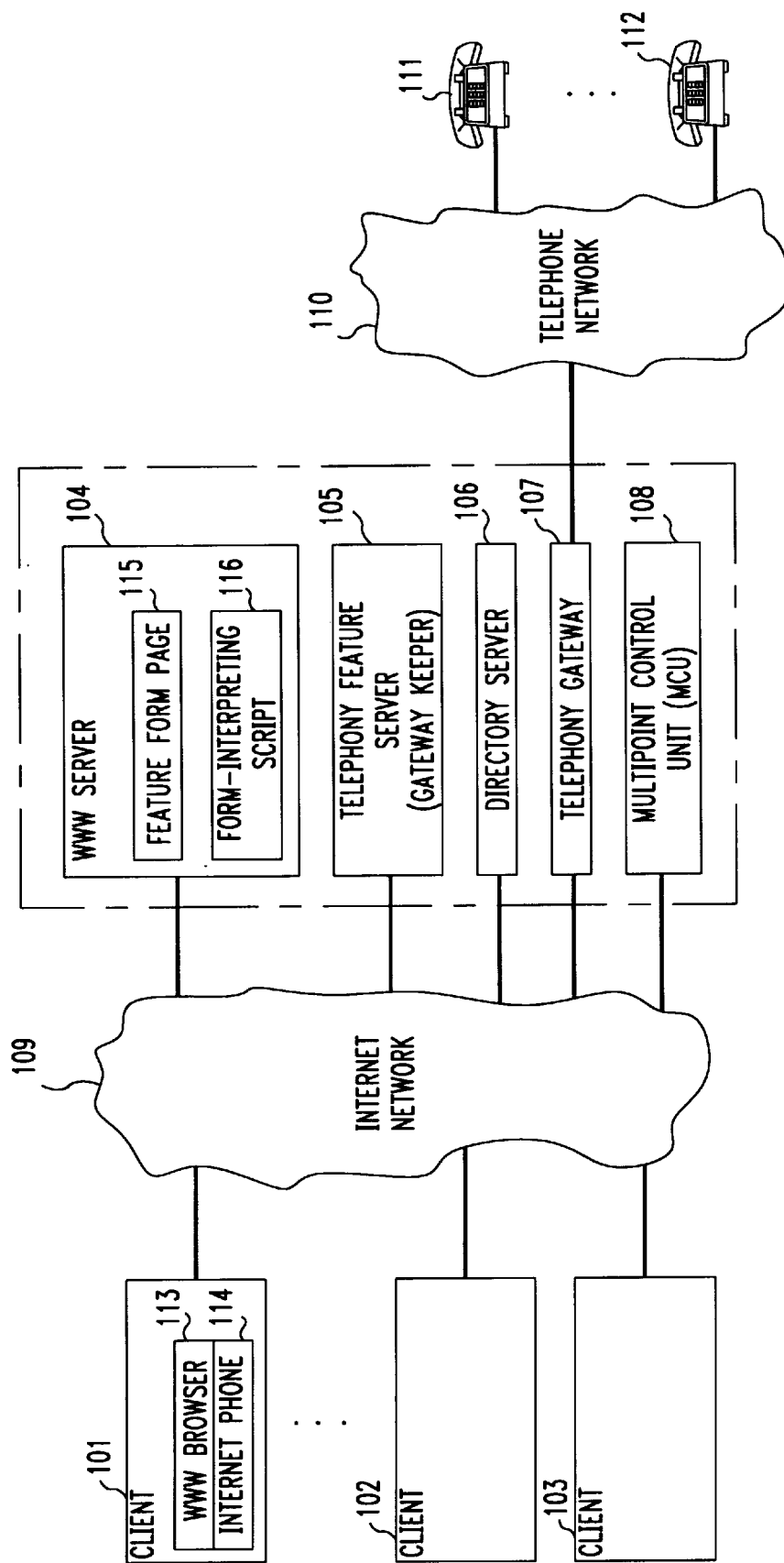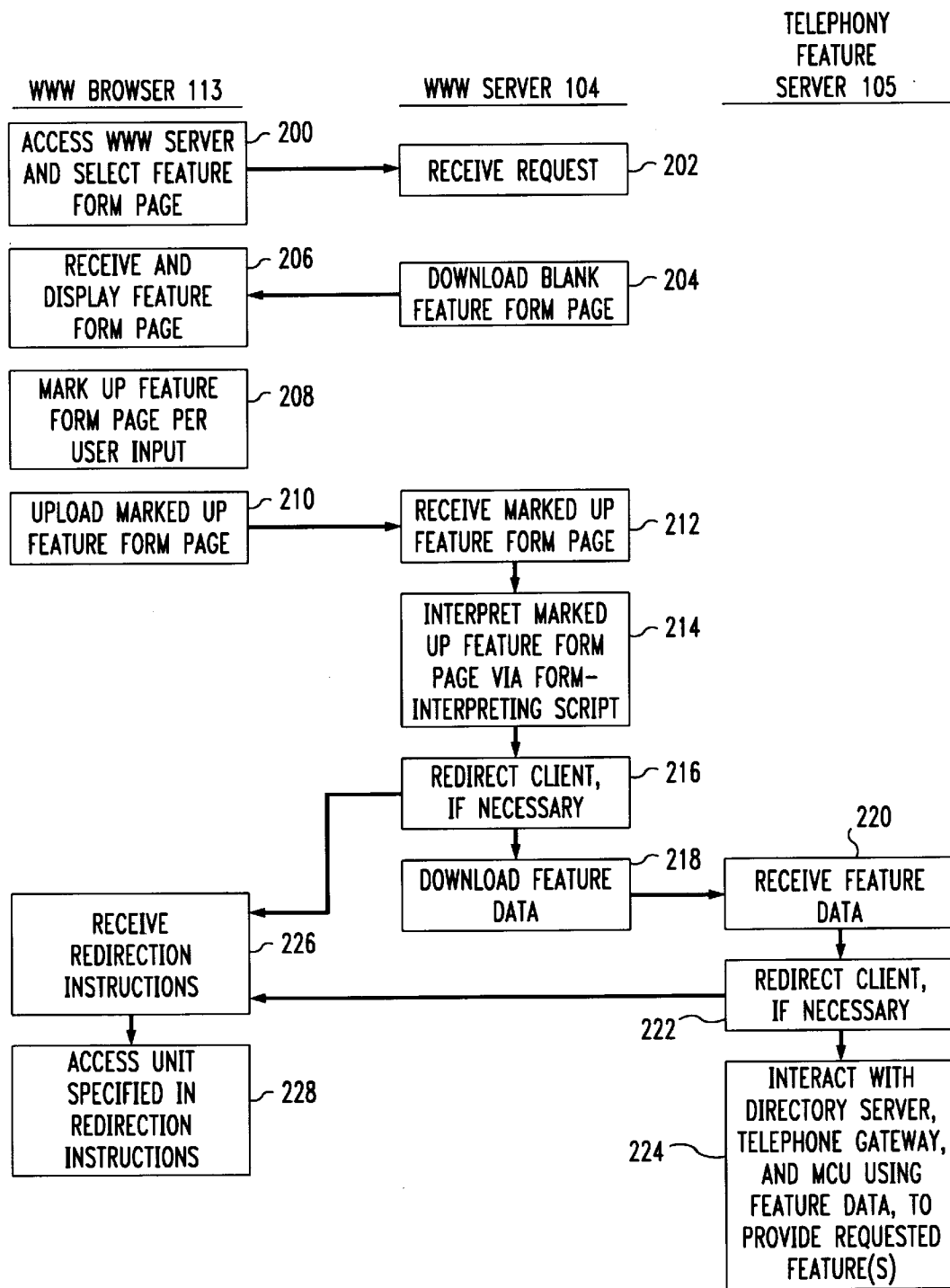
**10 Claims, 2 Drawing Sheets**

*FIG. 1*

*FIG. 2*

# WEB-PAGE INTERFACE TO TELEPHONY FEATURES

## TECHNICAL FIELD

This invention relates to communication systems, including telephone systems and the Internet.

## BACKGROUND OF THE INVENTION

It is known in the communications arts that voice calls can be carried by the Internet (or some other data transport network) between a pair of Internet phones or voice-enabled computers. It is also known that voice calls carried by the Internet can be interfaced by a gateway to the telephone network so that an Internet phone or a voice-enabled computer connected to the Internet can engage in a voice call with a standard telephone connected to the telephone network. Illustrative examples of such capabilities are disclosed in "Netspeak's Hot Internet Sun Product", *Computer Telephony,* Vol. 5, Issue 8 (August 1996), pp. 120–124, and in "Internet Hop Off", *Computer Telephony,* Vol. 4, Issue 3 (March 1996), pp. 10–11. It is further known that telephony features can be provided to computers or terminals on a local area network (or some other data transport network) via a feature server. An illustrative example of such capability is disclosed in U.S. Pat. No. 5,550,906. Telephony features are features that are provided to telephones and telephone calls by modern telecommunications switching systems, such as the Lucent Technologies Inc. Definity® private branch exchange. They may include, by way of example and without limitation, features such as call redirection (e.g., call forwarding, call coverage), multiple call appearances (e.g., hold, drop, transfer, conference), call center agent features (e.g., agent login, agent logout, after-work mode, etc.), call center management information features (e.g., maximum time in queue, queue length, skill-based split staffing levels, etc.), and calling party information features (e.g., position in queue, advertising-on-hold, etc.). Providing a Web-page-like interface for system management and administration of Internet-accessible systems is also known. An example thereof may be found in the router products of the Advanced Computer Communications company.

Standards have not been developed for protocols by which computers, terminals, Internet phones, and other devices—jointly referred to as clients—can interact with feature servers over the Internet and other non-telephony communications networks in order to access telephony features. Consequently, the clients and the servers must be specifically designed and configured to work with each other, typically via a proprietary protocol that includes telephony feature access commands, and they typically are unable to work with servers or clients of a different design or configuration—other manufacturers' equipment, for example. This has the serious and unfortunate consequence that the use of feature servers is limited to "closed" networks that are controlled by a single entity—e.g., a single company's local area network—that can dictate what equipment and feature-access protocol is used on the network, and that the use of feature servers is not possible on "open" networks such as the Internet.

## SUMMARY OF THE INVENTION

This invention is directed to solving these and other problems and disadvantages of the prior art. According to the invention, there is provided a way for clients to access server-based telephony features in a non-telephony client-server network, such as the Internet, in a platform-

independent and network-independent fashion and without need for any modifications to the clients. Illustratively, World-Wide Web (WWW) browsers allow Internet clients to access WWW information servers over the Internet in a platform-independent and network-independent fashion, and this capability is exploited by the invention in that clients use browsers to access server-based telephony features via the Internet in a manner similar to how they conventionally access information via the WWW. As a consequence, the feature accesses are affected in a platform-independent and network-independent fashion by conventional Internet clients.

Specifically according to an aspect of the invention, a method of accessing telephony features in a non-telephony client-server network (e.g., the Internet) wherein clients and servers communicate with each other via a predefined communications protocol (e.g., the WWW) that lacks telephony feature-access commands comprises the following steps. The client requests an individual telephony feature by communicating data (e.g., a marked up feature-form page) that correspond to that feature with the server via the predefined protocol. Hence, no changes are required either to the client or to the network's protocol. The server then responds to the communicated data by requesting a provider of the telephony features to provide the individual telephony feature to the client, and the provider does so. The server thus does for the client what the client was not able to do itself. Hence, the capability to access telephony features is easily implementable in and retrofittable into conventional networks, such as the Internet, without modification of either the Internet or its communication protocol, or the clients.

Specifically according to another aspect of the invention, a method of accessing telephony features over the Internet by using the World Wide Web (WWW) comprises the following steps. A WWW browser of a client requests a WWW page that defines a telephony feature form from a WWW server via the Internet. The WWW server responds by providing the requested WWW page to the client via the Internet. The WWW browser indicates selection of an individual telephony feature by marking up the telephony feature form of the received WWW page, and the client sends the marked up WWW page via the Internet to an interpreter (e.g., to the WWW server). The interpreter interprets the marked up telephony feature form to determine the selected individual telephony feature. In response to the determination, a provider of the telephony features then provides the selected individual telephony feature. Thus, the conventional WWW and WWW browsers are used without modification to access telephony features via the Internet

These and other features and advantages of the invention will become more apparent from the following description of an illustrative embodiment of the invention taken together with the drawing.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a block diagram of a communications network that implements an illustrative embodiment of the invention; and

FIG. **2** is a diagram of operations of units of the communications network of FIG. **1** that implement the illustrative embodiment of the invention.

## DETAILED DESCRIPTION

FIG. **1** shows a combined data-and-telephony communications network. The non-telephony portion of the communications network of FIG. **1** comprises a plurality of clients

101–103 and servers 104–106 interconnected by the Internet network 109, and a multipoint control unit (MCU) 108 for providing multipoint connections (conference calls, for example). The telephony portion of the communications network of FIG. 1 comprises a plurality of telephones 111–112 interconnected by a telephone network 110, and a telephony gateway 107 that interconnects the Internet network 109 with telephone network 110.

Servers 104–106 include a World-Wide Web (WWW) server 104. The World-Wide Web is a de-facto standard protocol for finding and transferring information on the Internet between information-requesting clients and information-sourcing servers. Information is typically transferred in data entities known as pages. The World Wide Web is based on (includes) the Transmission Control Protocol/internet Protocol (TCP/IP) for effecting communications connections over the Internet. The World Wide Web also provides a means for client interactions with pages of information, known as the hypertext mark-up language (HTML).

Servers 104–106 further include a directory server 106 which provides conventional directory services to clients 101–103, and a telephony feature server 105 which provides telephony features to clients 101–103. Telephony feature server 105 also functions as a "gateway keeper", in the parlance of the ITU H.323 protocol standard, for telephony gateway 107 which is a "gateway" in the parlance of the H.323 protocol standard. Units 104–108 may either be individual entities, or they may comprise a single entity that performs all of their functions. An illustrative such single entity is the Lucent Technologies Inc. Multi Media Communications eXchange (MMCX).

For interacting with WWW server 104 and other WWW servers (not shown) on the Internet network 109, each client 101–103 is equipped with a WWW browser 113, such as a Netscape Navigator or a Microsoft Internet Explorer. For carrying on voice communications with other clients and with telephones 111–112, each client 101–102 is equipped with an Internet phone 114, such as the Intel Iphone, or the Netscape CoolTalk or LiveMedia products.

In addition to any other pages of information that it may provide, WWW server 104 includes a feature-form page 115 and an associated form-interpreting script 116. Page 115 allows users of clients 101–102 to select and activate or deactivate telephony features and to specify and enter parameters for those features via browsers 113, and script 116 interprets the users' selections and entries.

Illustratively, page 115 presents users of clients 101–102 with a plurality of virtual (graphical-display) actuators each corresponding to, and labeled with, a corresponding feature, and for each feature that has user-specifiable parameters, provides one or more fill-in-the blank fields in which the users can enter desired parameter values (e.g., telephone numbers).

The use that is made of page 115 by clients 101–103 to access telephony features is flowcharted in FIG. 2. To access page 115, a user of a client 101 uses browser 113 to access server 104 and select page 115 in a conventional WWW manner, at step 200. Server 104 receives the request, at step 202, and in response conventionally downloads page 115 to client 101, at step 204. The downloaded page 115 carries a blank feature form—one on which features are not selected and parameters are not filled out. Browser 113 receives page 115, and presents (displays) page 115 to the user via a display of client 101, at step 206, again in a conventional manner. The user then uses browser 113 to mark up the feature form: the user selects individual features and fills in parameter values on the feature form of page 115, at step 208. When the user is finished, browser 113 uploads the marked up page 115 back to server 104, at step 210, again in a conventional WWW manner.

Server 104 receives the marked up page 115, at step 212, and in response executes form-interpreting script 116 to interpret the marked up page 115, i.e., to determine from the feature form which features the user selected, whether the user selected to activate or deactivate selected features, and what parameters the user has specified for selected features, at step 214. Based on this determination, server 104 may find that client 101 may need to be connected to server 105. In that case, server 104 communicates in the conventional Internet manner (using the TCP/IP protocol) with client 101 to cause it to redirect its connection to server 105, at step 216. Client 101 responds to any received redirection instructions from server 104, at step 226, by terminating its connection to server 104 and establishing a new connection to server 105, at step 228, again conventionally (by using the TCP/IP protocol). Server 104 then downloads the data that it derived from marked up page 115 to telephone feature server 105 as a feature access request, at step 218. If necessary, server 105 responds to receipt of this request, at step 220, by again redirecting the data (but not the control) portion of the connection of client 101 to another entity, such as gateway 107 or MCU 108, at step 222. Server 105 also interacts with server 106, gateway 107, and MCU 108 and uses the received data in the interactions in a conventional manner to effect the feature and parameter selections made by the user, at step 224. Client 101 responds to any received redirection instructions from server 105, at step 226, by terminating its data (media) connection to server 105 and establishing a new data connection to the entity indicated by the redirection instructions, at step 228. However, client 101 maintains its control connection to server 105, whereby server 105 can send conventional Internet network 109 commands to client 101.

Some specific examples of features are given below to illustrate the general procedure described above.

To place a telephone call to a telephone 111, user of client 101 uses browser 113 to click on a "telephone call" feature virtual button of downloaded feature form page 115, and fills in the telephone number of telephone 111 in a corresponding field. Upon receipt of the marked up page 115, server 104 responds to the user's selection of a telephone call by sending directions to client 101 to connect to telephony feature server 105, and sends a telephone call request along with an identifier of client 101 and the called telephone number to server 105. When client 101 accesses server 105 through Internet network 109, server 105 correlates client 101 with the telephone call request and sends directions to client 101 to access telephony gateway 107. Server 105 also sends an identifier of client 101 and the called telephone number to gateway 107. In response, gateway 107 establishes a call to telephone 111 through telephone network 110, and when client 101 accesses gateway 107 through Internet network 109, gateway 107 correlates client 101 with the telephone call and interfaces the Internet connection with the telephone call.

To place a conference call to a plurality of other clients 102–103 and/or telephones 111–112, user of client 101 uses browser 113 to click on a "conference call" feature virtual button of downloaded page 115 and fills in the universal resource locator (URL, an Internet address) or "handle" (an Internet identifier) of each called client 102–103 and/or the telephone number of each called telephone 111–112 in

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