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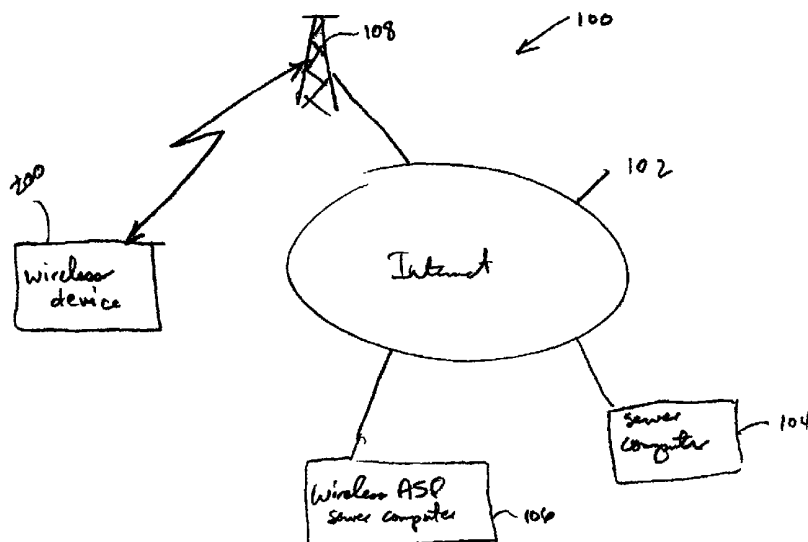
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(54) Title: WIRELESS COMMUNICATIONS INVISIBLE PROXY AND HOOKING SYSTEMS AND METHODS



(57) Abstract: An communications service provider provides wireless access to a packetized data network, such as the Internet (102). The service provider includes a server computer (104) and a wireless ASP server computer (200). The wired network is connected to a cellular wireless communication system. A method of the network includes a client device (200) that communicates with the server computer. The wireless device runs standard applications programs, such as browser, ftp, and e-mail. The method includes serving a first information by the server computer to the wireless device according to a specialized protocol, determining that the first information accords with the specialized protocol, and proxying the first information to the standard programs in a standard protocol readable by the standard programs.



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WIRELESS COMMUNICATIONS INVISIBLE PROXY AND HOOKING SYSTEMS AND METHODS

Cross-Reference to Related Applications

The present application is related to U.S. Patent Registration (CPA) No. 6,166,729, entitled "Remote Digital Image Viewing System and Method", issued December 26, 2000 (CPA filed October 26, 1999); U. S. Provisional Patent Application No. 60/177,329, entitled "Wireless Network System and Method", filed January 21, 2000; U.S. Provisional Patent
5 Application No. 60/180,649, entitled "Digital Image Transfer System and Method", filed February 7, 2000; and U.S. Provisional Patent Application No. 60/220,730, entitled "Wireless Network System and Method," filed July 26, 2000, each of the same inventor hereof, and those respective applications are incorporated herein. The present application is also related to U. S. Provisional Patent Application No. 60/241,096, entitled "Wireless ASP
10 Systems and Methods," filed October 17, 2000, U. S. Provisional Patent Application No. 60/241,095, entitled "E-Mail and Messaging Systems and Methods," filed October 17, 2000, U. S. Provisional Patent Application No.60/241,087, entitled "Wireless Communications Protocols and Architectures Systems and Methods," filed October 17, 2000, and U.S. Provisional Patent No. 60/240,985, entitled "Browser and Network Optimization Systems
15 and Methods," filed October 17, 2000.

Background of the Invention

The present invention generally relates to wireless communications systems and methods and, more particularly, relates to systems and methods for wireless packetized data
20 communications using specialized protocols and integration interfaces for operations of standard applications.

Conventional packetized data communications protocols and network architectures were developed primarily for use in wired networks and conditions. The protocols and

networks are not optimized for the peculiarities of wireless communications environments. Networks, particularly client-server networks such as the Internet, are commonly designed to conform to standardized protocols, for example, the Transport Control Protocol/Internet Protocol (TCP/IP). Software and hardware applications of client devices that are connected
5 to and communicate over these networks, therefore, generally are capable of communicating according to the TCP/IP or other standard protocol.

Where specialized or non-standard protocols are employed in communications on networks, these applications typically are not readily susceptible to communicating according to the specialized protocols. In the past, the applications have generally been re-written or
10 modified to adapt to specialized protocol platforms and other communications nuances. For example, conventional practice has been to replace system DLL files or to use a proxy changing application (e.g., a browser) settings. Of course, such modifications are often costly, time-consuming, or inconvenient. Moreover, the general trend and concern of the communications industry is often expressed to be standardization and integration among
15 multiple platforms and scenarios.

It would be a significant improvement in the art and technology to provide systems and methods for enabling standard software and hardware applications capable of communicating with certain protocols to be capable of communicating with other specialized protocols of networks, such as the Internet and particularly wireless environments, without
20 requiring significant modification of the applications themselves.

Summary of the Invention

An embodiment of the invention is a wireless communications network. The network includes a wireless communications channel, a wireless application service provider (ASP)
25 server computer communicatively connected to the wireless communications channel, and a client device communicatively connected via the wireless channel to the wireless ASP server

computer. The wireless ASP server computer communicates with the client device over the wireless communications channel by a specialized protocol. In certain embodiments, a hooking layer of the client device translates the specialized protocol to a standard protocol for use by standard applications programs of the client device.

5 Another embodiment of the invention is a method of wireless communications. A client device communicates wirelessly with a wireless application service provider (ASP) server computer. The client device runs standard programs. The method includes serving a first information by the wireless ASP server computer to the client device according to a specialized protocol, determining that the first information accords with the specialized
10 protocol, and proxying the first information to the standard programs in a standard protocol readable by the standard programs.

Brief Description of the Drawings

The present invention is illustrated by way of example and not limitation in the
15 accompanying figures, in which like references indicate similar elements, and in which:

FIG. 1 illustrates a network, for example, the Internet, including a wireless communications portion and a wireless application service provider (ASP) system including a wireless ASP server computer in wireless communications with a wireless device;

FIG. 2 illustrates a hooking layer for intercepting standardized format
20 communications and serving as an invisible proxy to specialized format communications, according to embodiments of the present invention; and

FIG. 3 illustrates a method of operation of the hooking layer of FIG. 2, according to embodiments of the present invention.

Detailed Description of Preferred Embodiments

25 Network with Wireless ASP System

Referring to FIG. 1, a communications system 100 includes a wireless communications portion and a wired communications portion. The system 100 includes a network, such as the Internet 102. The network is operable according to a particular packetized data protocol, such as transport control protocol/Internet protocol (TCP/IP) or
5 some other network protocol. The network, such as the Internet 102, interconnects various computing and communications devices, for example, among other devices, a server computer 104 and a wireless ASP server computer 106. The server computer 104 and the wireless ASP server computer 16 are each one or more server computers including a microprocessor, memory storage, and communications capabilities via wire or wireless
10 connection with the Internet 102. The server computer 104 and the wireless ASP server computer 106 communicate over the Internet 102 or other network via the particular protocol of the network, such as the standard Internet network protocol TCP/IP.

The network, such as the Internet 102, is also connected with a wireless communications service provider 108. The wireless communications service provider 108 is,
15 for example, a cellular or other packetized data wireless communications network. The wireless service provider 108 connects by wire connection with the network, such as the Internet 102. Alternatively, the wireless communications service provider 108 could connect with the network 102 by other communications connection, such as fiber optic, coax cable, wireless channel, or other communications connection. Furthermore, although the wireless
20 communications service provider 108 is illustrated as a single particular communications channel, multiple links and multiple channels of those links, for example, communications links of wired and wireless channels, can alternatively provide the same functions and are included for purposes of the description.

The wireless service provider 108 is capable of communicating through wireless
25 channels with various devices, such as a wireless device 200. The wireless device 200 is a

processing device, such as a data-enabled cellular telephone, a personal digital assistant, a laptop computer, or any of a wide variety of other processing devices that can wirelessly communicate with the wireless service provider 108. Of course, the wireless device 200 includes communications equipment for accomplishing the wireless communication with the wireless service provider 108, such as wireless modem.

The wireless device 200 communicates through the wireless service provider 108 and over the network, such as the Internet 102, with the wireless ASP server computer 106. The wireless ASP server computer 106 serves as a dedicated server for the wireless device 200 in its communications. The wireless ASP server computer 106 sends and receives communications to and from the wireless device 200 over the network, such as the Internet 102, and on through the wireless service provider 108. The wireless ASP server computer 106 also communicates over the network, such as the Internet 102, with other network connected devices, such as the server computer 104, via particular protocols in communications channels enabled for such communications on the network. In certain embodiments, for example, the wireless ASP server computer 106 and the wireless device 200 communicate with specialized protocols, such as optimized packetized data protocols, for example, optimized TCP/IP protocols or other protocols such as described in the related patent applications.

Communications between the wireless ASP server computer 106 and the wireless device 200 over the network, including through the wireless service provider 108 and the wireless portion, are performed according to special optimized, non-standard protocols and formats. Communications between the wireless ASP server computer 106 and other portions and elements of the Internet, for example, with the server computer 104, are performed according to different protocols and formats, such as standard networking formats like TCP/IP. For purposes of example here, the network protocol is that of the Internet 102 (i.e.,

TCP/IP) and certain embodiments of non-standard protocols and formats, for the wireless communications between the wireless ASP server computer 106 and the wireless device 200, are described in the related patent applications. The optimized protocols and formats are not limited to those of the related applications, however, and the same principles and concepts
5 described herein apply to other situations and designs, as well.

Referring to FIG. 2, the wireless device 200 of FIG. 1 includes various standard or typical application programs 202. These programs 202 include, for example, a browser (e.g., Internet Explorer™), an FTP application (e.g., Bullet Proof™ FTP), and an e-mail client application (e.g., Eudora™). The programs 202 can, of course, be software applications, or
10 firmware or hardware implementations. In any event, the programs 202 receive or use communications over the network's typical protocols, such as TCP/IP, which differ from the specialized protocols of communications between the wireless device 200 and the wireless ASP server computer 106. The wireless device 200 also includes communications elements
15 204, such as a wireless modem and applications for communicating with the wireless ASP server computer 106 over the wireless portions of the network 200. The communications elements 204 include features for communicating with the wireless ASP server computer 106 according to the specialized protocols for such communications, as previously mentioned and as described in the related patent applications.

Additionally, the wireless device 200 also includes a hooking layer 206, operably
20 connected between the programs 202 and the communications elements 204. The hooking layer 206 is implemented either in hardware or software and is resident on or communicatively connected to the wireless device 200. The hooking layer 206 functions to allow communications of signals received by the communications elements 204 to be communicated, via either an application-standard socket (e.g., Winsock) or a specialized
25 socket (i.e., Sockhook), between the communications elements 204 and the programs 202 in

forms acceptable to the programs 202. In effect, the application-standard protocol data received by the wireless device 200 is passed to the programs 202 via the standard sockets and any non-standard specialized protocol data received by the wireless device 202 is translated to be acceptable to the programs 202.

5 Particularly, the hooking layer 206 includes sets of the standard dynamic link libraries (DLLs) (e.g., Winsock.dll) associated with the programs 202. The hooking layer 206 also, however, includes a specialized set of non-standard DLLs (i.e., Sockhook.dll) that are specific for the specialized protocols and allow for appropriate action of the programs 202 in connection with communications according to the specialized protocols of the network 100.

10 As those skilled in the art will know and appreciate, the non-standard DLLs of the hooking layer 206 will depend upon the particular specialized protocols. In any event, the hooking layer 206 serves, in effect, as an invisible proxy to the programs 202 to make communications received by the wireless device 200 useable by the programs, whether such communications conform to standard network protocols or specialized optimized protocols.

15 Referring to FIG. 3, a method 300 of operation of the wireless device 200 and the hooking layer 206 is a form of switch that determines the applicable DLLs for the protocols of the communications and then provides an applicable socket for the programs 202. The method 300, when a communication is received by the wireless device 200, for example, a wireless communication, commences with a step 302 of receiving the communication 302.

20 The communication is received in the step 302 by the modem and other communication elements of the wireless device 200.

 In a step 304, the hooking layer 206 determines whether standard or non-standard sockets are appropriate, based on whether the received communication conforms to standard protocols or non-standard protocols, respectively. If the communication conforms to

25 standard protocols of the network 100, for example, TCP/IP protocols of the Internet, then

the hooking layer 206 invokes the standard sockets and standard DLLs, such as Winsock sockets and Winsock.dll. The communication is then conveyed via the socket to the programs 202, and the application performed by the programs 202 is run in a step 308.

If, on the other hand, the communication is determined by the hooking layer 206 to be
5 non-standard protocols, such as optimized wireless protocols of the related patent applications or others, then the hooking layer 206 invokes appropriate non-standard DLLs and acts as an invisible proxy in a step 312. As an invisible proxy in the step 312, the hooking layer 206 serves to interact with the received communication and the programs 202 by providing the information of the communication to the programs in form acceptable to the
10 programs 202. In acting as an invisible proxy, the hooking layer 206 sets up a non-standard socket (i.e., Sockhook) and uses the non-standard DLLs (i.e., Sockhook.dll). In effect, the hooking layer 206 in the step 312 receives the communication information in the form of the non-standard protocols, such as of the wireless portion of the network 100, and manipulates the information to the form of the standard protocols of the network 100, such as TCP/IP.
15 The hooking layer 206, acting as invisible proxy in the step 312, provides the communicated information to the programs 202 for a step 308 of running the programs 202 using the information in acceptable form to the programs 202.

In transmission communications of the wireless device 200, the substantial reverse of the method 300 occurs. The application is run in a step 308, and the result is delivered to the
20 hooking layer 206. At the hooking layer 206, the hooking layer 206 again serves as an invisible proxy in a step 312, although this time the hooking layer 206 manipulates the information from a standard protocol form to the non-standard protocols. The hooking layer 206 invokes the specialized socket and specialized DLLs for the manipulation, in the steps 304, 310, 312. The wireless device 200 then transmits in a step 302 the information,
25 formatted according to the specialized protocols, for example, the optimized wireless

protocols. These specialized protocols are, thus, employed over the wireless portion of the network 100 in communications both ways between the wireless device 200 and the wireless ASP server computer 106.

In operation of the systems 100, 200 and the method 300, numerous alternative
5 business and technical arrangements are possible. Of course, the wireless ASP server computer 16 must be capable of communicating via typical network protocols with other network connected devices in order to receive and deliver messages from and to those network connected devices, and then transfer those messages on or receive those messages from the wireless device 20, as appropriate. Moreover, although only particular devices of a
10 communications network and its nodes are herein described and discussed, particularly, primarily the wireless device 200 and the wireless ASP server computer 106, the wired device 240 and the network 100, such as the Internet, have been described with regard to the embodiments, it is to be expressly understood that combinations of those elements, such as a plurality of any, certain ones, all of those elements, and even additional or alternative
15 elements, is possible in keeping with the scope of the embodiments herein.

The network could be an intranet, or even an intranet combination or intranet-extranet combination. Numerous banks of the wireless ASP server computer 16 can be possible for receiving communications from pluralities of wireless devices, and the wireless ASP server computers can be centrally located or distributed through a wide geographic area. In the case
20 of a global network such as the Internet, the network is capable of communicating by its protocols, which may include other specialized protocols for specific situations.

The wireless ASP server computer in such instance can communicate with various devices on the network according to those other specialized protocols, if properly equipped as would be known to those skilled in the art. In general, the communications between the
25 wireless device or devices and the wireless ASP server computer or computers occurs

according to optimized protocols for wireless communications. These optimized protocols can be implemented entirely in software or alternatively can be hardware, combinations of hardware and software, or other mechanisms. The protocols of the hardware or software, as the case may be, for the wireless communications will, in any event, provide increased
5 communications efficiency, speed, and adaptation for the wireless environment.

In the foregoing specification, the invention has been described with reference to specific embodiments. However, one of ordinary skill in the art appreciates that various modifications and changes can be made without departing from the scope of the present invention as set forth in the claims below. Accordingly, the specification and figures are to
10 be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of the present invention.

Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments. However, the benefits, advantages, solutions to problems and any element(s) that may cause any benefit, advantage, or solution to occur or become
15 more pronounced are not to be construed as a critical, required, or essential feature or element of any or all the claims. As used herein, the terms "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process,
20 method, article, or apparatus.

ClaimsWhat is Claimed is:

1. A wireless communications network, comprising:
a wireless communications channel;
a server computer communicatively connected to the wireless communications channel; and
a client device communicatively connected via the wireless channel to the server computer;
wherein the server computer communicates with the client device over the wireless communications channel by a specialized protocol.
2. The wireless communications network of claim 1, further comprising a hooking layer for translating the specialized protocol to a standard protocol.
3. The wireless communications network of claim 2, further comprising a program that requires input of information according to the standard protocol.
4. The wireless communications network of claim 3, further comprising a program that outputs for communication by the client device information according to the standard protocol and wherein the client device communicates the information to the server computer via the specialized protocol.
5. The wireless communications network of claim 2, wherein the hooking layer switches between a standard socket and a specialized socket.

6. The wireless communications network of claim 1, wherein the wireless channel is a cellular packetized data system.

7. The wireless communications network of claim 1, wherein the wireless channel is a CDPD system.

8. A method of wireless communications, wherein a client device communicates wirelessly with a server computer, and wherein the client device runs standard programs, comprising the steps of:

serving a first information by the server computer to the client device according to a specialized protocol;

determining that the first information accords with the specialized protocol;

and

proxying the first information to the standard programs in a standard protocol readable by the standard programs.

9. The method of claim 9, wherein the step of proxying includes the steps of invoking non-standard dynamic link libraries.

10. The method of claim 10, wherein the step of proxying includes the step of creating a non-standard socket.

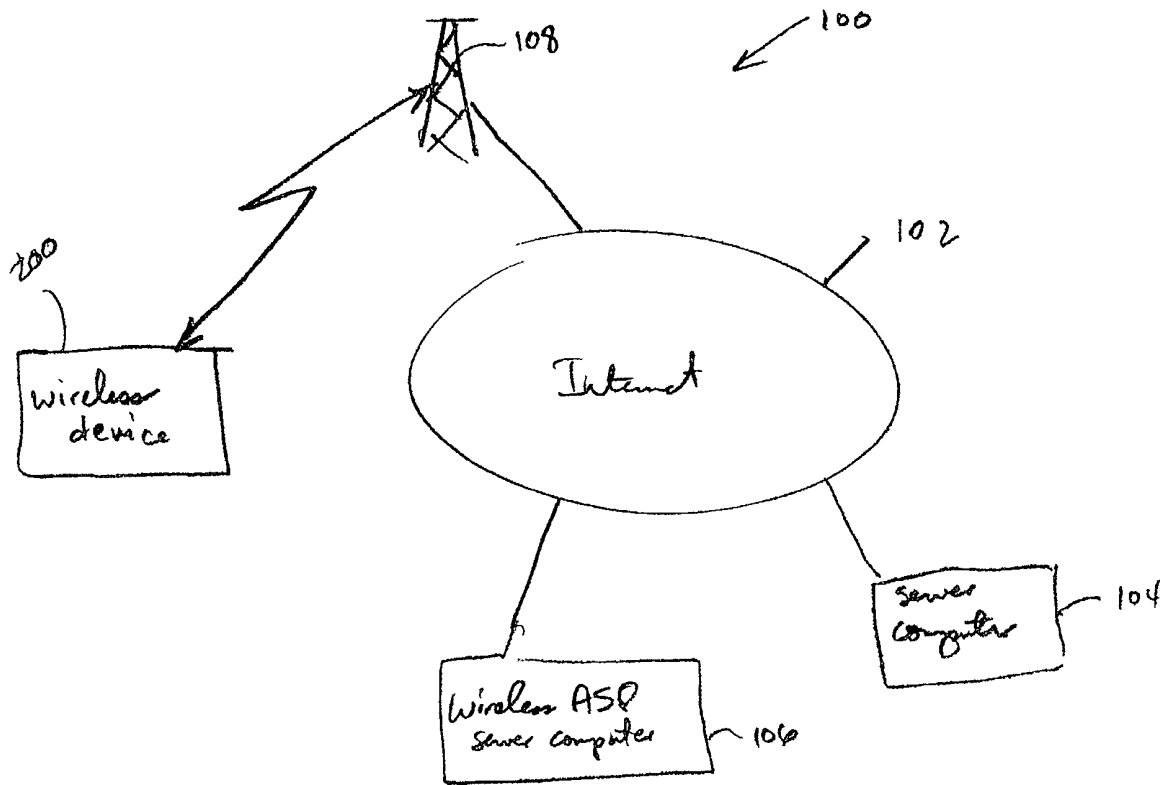


Fig. 1

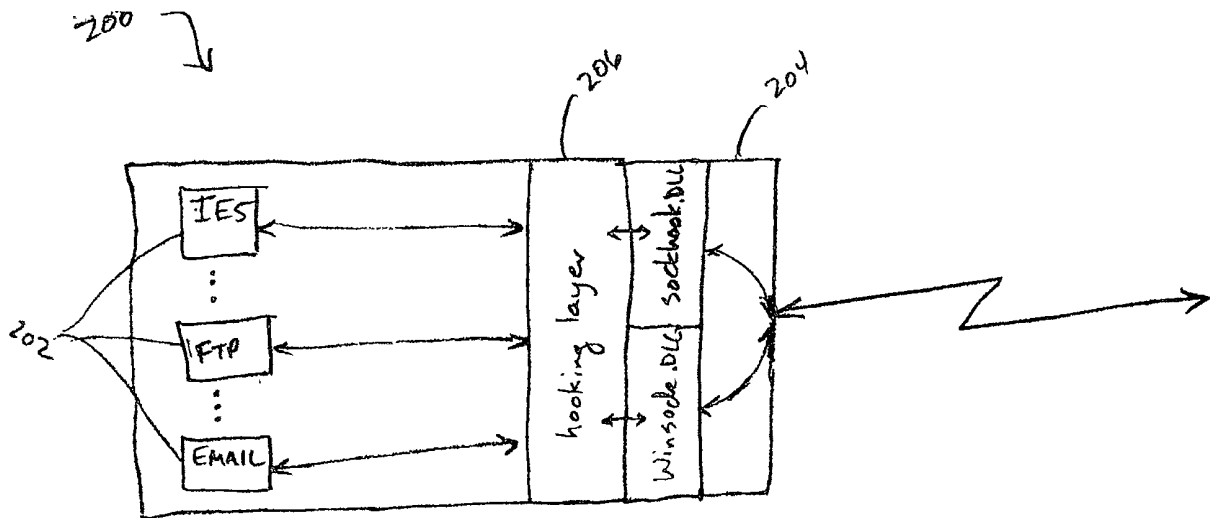


Fig. 2

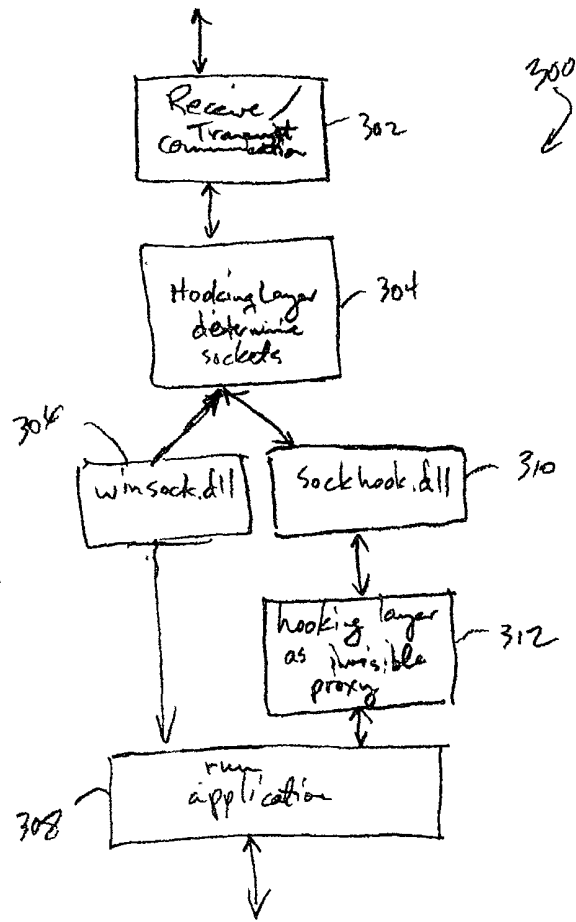


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/32473

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 15/16

US CL :709/203, 230, 246; 370/465, 466, 467, 469; 455/3.01; 379/93.15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/203, 230, 246; 370/465, 466, 467, 469; 455/3.01; 379/93.15

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6,304,881 B1 (HALIM et al) 16 OCTOBER 2001, ABSTRACT, FIGURE 1A, COL. 4, LINES 33-67, COL. 5, LINES 1-67, COL. 6, LINES 48-67, COL. 7, LINES 1-61.	1-10
Y	US 6,058,422 A (AYANOGLU et al) 02 MAY 2000, ABSTRACT, FIGURE 2, COL. 1, LINES 64-67, COL. 2, LINES 1-64, COL. 3, LINES 1-67, COL. 4, LINES 1-65.	1-10
Y, P	US 6,275,693 B1 (LIN et al) 14 AUGUST 2001, ABSTRACT, COL. 1, LINES 22-67, COL. 2, LINES 1-19, COL. 2, LINES 35-67, COL. 3, LINES 1-54	1-10
Y	US 5,673,322 A (PEPE et al) 30 SEPTEMBER 1997, COL. 5, LINES 32-67, COL. 6, LINES 1-30, COL. 7, LINES 1-67, COL. 8, LINES 1-67	1-10

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

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01 MAR 2002

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/32478

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,065,120 A (LAURSEN et al) 16 MAY 2000, FIGURE 1, 2, 3, COL 2, LINES 1-67, COL 3, LINES 1-67, COL 4, LINES 1-35	1-10
Y, P	US 6,336,137 B1 (LEE et al) 01 JANUARY 2002, WHOLE DOCUMENT	1-10
Y, P	US 6,292,833 B1 (LIAO et al) 18 SEPTEMBER 2001, ABSTRACT, FIGURE 1, COL 4, LINES 10-67, COL 9, LINES 10-67, COL 10, LINES 1-24,	1-10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/32473

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

EAST, INTERNET, IEEE

search terms: wireless, cellular, network, browser, protocol, conversion, translation, layers, cdpd, socket, port, server, client