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(54) **SYSTEM FOR BROADCASTING SOFTWARE APPLICATIONS AND PORTABLE DATA COMMUNICATIONS DEVICE FOR USE IN SUCH A SYSTEM**

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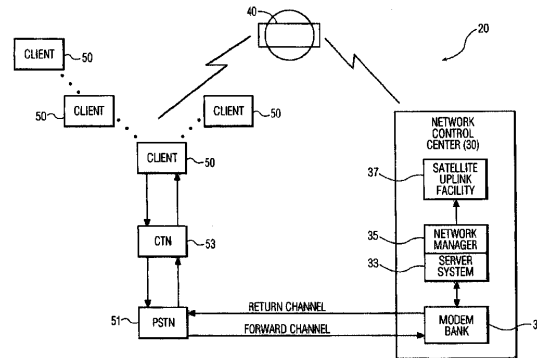
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(57) **ABSTRACT**

A communications system consisting of a server system that stores software applications, a broadcast system that broadcasts the software applications, and a multiplicity of portable clients that each include a receiver having a tuner that is selectively tunable to receive a selected one of the software applications broadcasted by the broadcast system. The portable clients can be any type of portable data communications device, such as a hand-held, palm-top, or notebook computing device, a PDA, an intelligent cellular phone, or any other personal multimedia appliance or Network Computer (NC). The broadcast system can be any suitable satellite or terrestrial air or cable broadcast system. The software applications can consist of a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like. Each of the portable data communications devices includes a receiver that has a tuner that is selectively tunable to receive a selected one of a plurality of software applications broadcasted by a broadcast system, a user-interface that enables a user to select one of the broadcasted software applications for downloading, a processor for executing the downloaded software applications, and a modem for establishing a two-way communications link with a network control system. The two-way communications link includes a forward channel over which the portable data communication device can transmit client data to the network control system, and a return channel over which the network control system can transmit system data to the portable data communication device. The client data can include requests for unrecoverable software application data and client software download request data.

12 Claims, 2 Drawing Sheets

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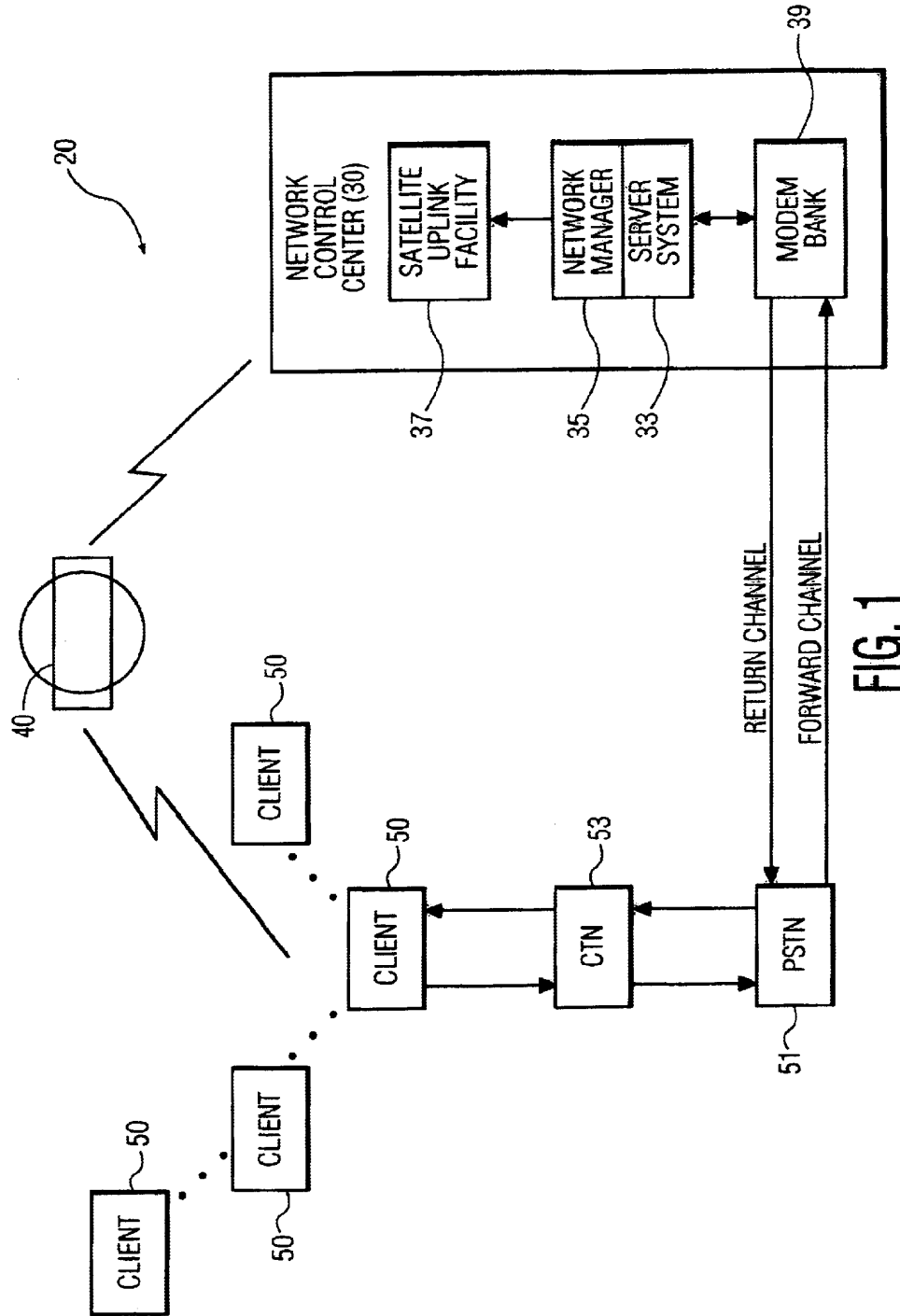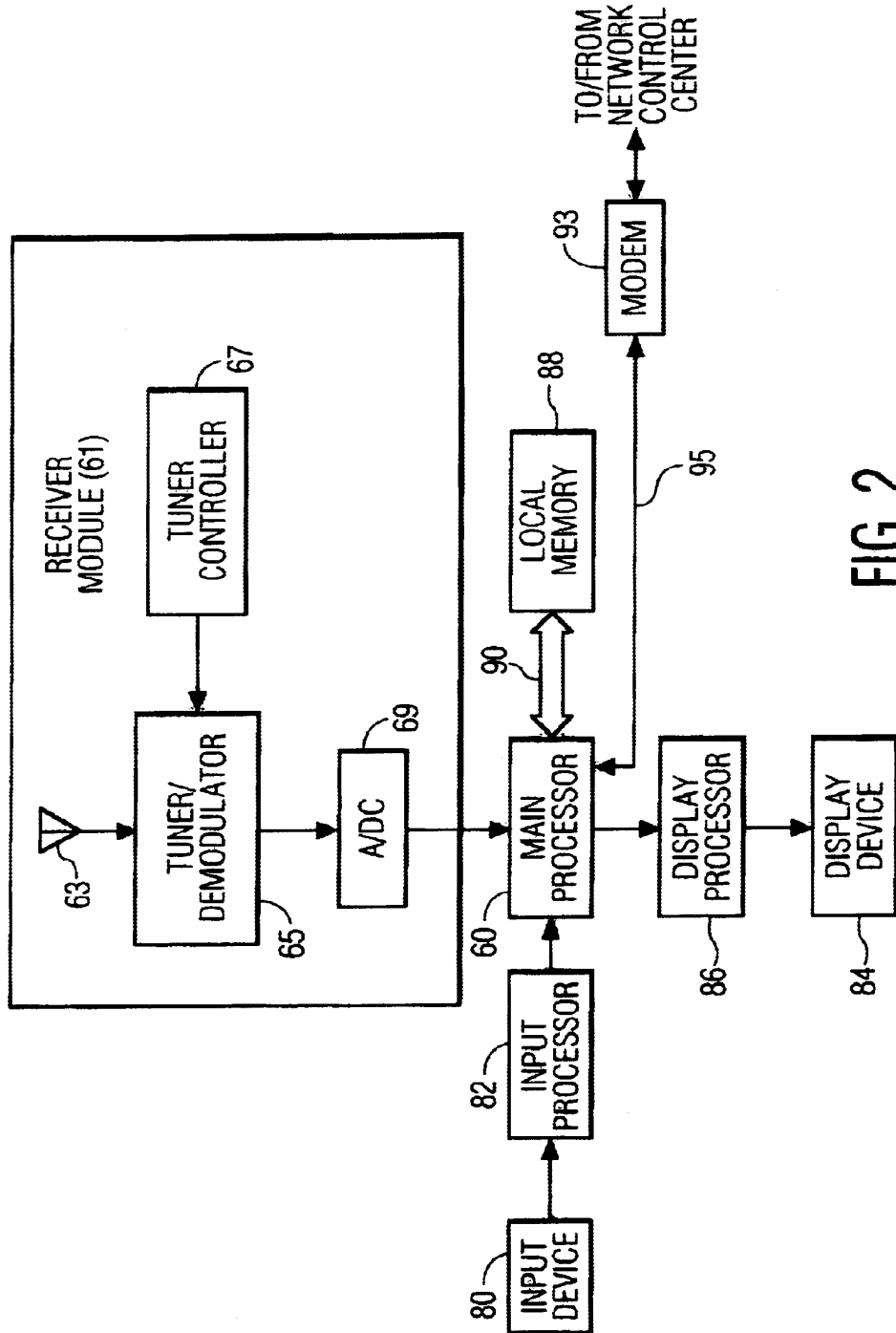
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FIG. 1

FIG. 2

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SYSTEM FOR BROADCASTING SOFTWARE APPLICATIONS AND PORTABLE DATA COMMUNICATIONS DEVICE FOR USE IN SUCH A SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates generally to the field of data communications, and more particularly, to the field of portable data communications devices.

The recent explosive growth of the Internet has given rise to the concept of "Network Computing". The basic idea of Network Computing is to store data and software applications on remote computers ("servers") rather than locally on user's computers ("clients"), with the clients only downloading the data and/or software applications from a server (s) on which they reside, as they are needed, thus dispensing with or greatly minimizing the client's memory and hard-disk drive resources. The clients in this Network Computing paradigm are sometimes referred to as "Network Computers" (NCs), or "thin clients". Ideally, all software applications and user data would be stored in secure, fault-tolerant, scalable servers and associated mass storage devices (e.g., Redundant Arrays of Inexpensive Drives—RAIDs), thereby completely eliminating the need for individual computer users to purchase, install, maintain, upgrade, and replace individual software applications and/or operating systems, and completely eliminating the need for individual computer users to store and back-up their data files.

Many, including large companies such as Oracle, Sun Microsystems, and IBM, have promoted a particular instantiation of this "network centric" paradigm in which all software applications are written in the Java programming language, and served in the form of Java "applets", to thereby enable real-time execution of any selected software application on any type of computer (mainframe, PC, laptop, etc.) running on any type of computer platform or operating system (e.g., Microsoft Windows, Apple Macintosh, Unix, etc.). In short, each client would be "Java-enabled", and could thus be regarded as a "Java virtual machine". Since Java is an open, hardware-independent, cross-platform ("open") programming language, the result would be that all clients would be capable of executing any software application. This "universal" client-server model is now regarded by many as the "holy grail" of the computing world.

Ideally, the user should be unaware that he/she is not working with a computer having little or no local storage and no resident software applications. However, this is only possible if the client has a continuous, broadband connection to the network (e.g., a private Intranet and/or the public Internet). While this is feasible in some professional and commercial settings, it is not generally feasible for the average home user/personal consumer. The typical PC user only has a narrowband connection, via telephone modem, to the Internet.

Moreover, recent dramatic technological advancements in the fields of computers, software, semiconductors, and communications have led to a proliferation of products that are capable of real-time processing of digitized streams of multiple data types, such as audio, video, graphics, and communications data streams. Such products are commonly referred to as "multimedia products". These multimedia products include PCs, television set-top boxes, videoconferencing systems, Internet (Web) Browsers, video arcade game systems, consumer video game consoles, and many others. In general, the downloading of multimedia content and software applications demands ever-increasing amounts of bandwidth.

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Moreover, there is a pronounced trend towards a convergence of these various multimedia data types, leading to an increased level of integration of multimedia processing capabilities in multimedia products. Further, there is an increasing consumer demand for "personal multimedia products" or "personal multimedia appliances" which are portable (mobile/transportable), and which preferably have at least a wireless mode of operation. Present-generation products of this type include intelligent cellular telephones (such as Nokia's Smart Phone), Personal Digital Assistants (PDAs), such as Philips' Nino and 3Com's Palm Pilot palm-top computing devices, laptop and notebook computers, digital mobile telephony devices for use in Personal Communications Systems (PCS), and the like. Typically, such hand-held devices are equipped (or can be equipped) with a wireless (and/or wireline) modem that enables the user to dial up a narrowband connection to an Integrated Services Digital Network (ISDN), a Public Switched Telephone Network (PSTN), a cellular telephone data network, such as the Cellular Digital Packet Data (CDPD) network, or the like, to enable the user to send and receive e-mail, and/or to surf the Web. In order to run software applications like word processing, video games, spreadsheets, address books, calendars, and the like, these hand-held devices must be equipped with a processor and sufficient memory to store and run these software applications.

It is becoming increasingly apparent that as the variety and complexity of multimedia data increases, the amount of processing power, memory resources, and communications bandwidth that will be required to transmit and to process this data and to run multimedia software applications will also increase. Inevitably, the line of distinction between a "computer" on the one hand, and a "personal multimedia appliance", on the other hand, will completely blur.

It is also becoming increasingly apparent that the amount of communications bandwidth available to personal multimedia appliances, such as hand-held, palm-top, and note-book computing devices, PDAs, and intelligent cellular phones, is much too narrow to enable the real-time downloading and execution of such software applications in accordance with the Network Computing paradigm.

However, there is an increasing consumer demand for a personal multimedia appliance that has fully integrated multimedia processing capabilities, that is compact and inexpensive, and that has the capability to run, in real-time, a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like, while preferably also having other capabilities, such as sending and receiving e-mail, surfing the Web, receiving and playing digital video (e.g., MPEG-2 or DVD-quality video) and digital audio (e.g., MP3 or CD-quality audio), and/or cellular telephony.

The present invention fulfills the need in the art for a portable data communications device that has the capability to download and run, in real-time, a broad spectrum of different software applications, such as word processing, video games, spreadsheets, address books, calendars, and the like, while preferably also having other capabilities, such as sending and receiving e-mail, surfing the Web, receiving and playing digital video (e.g., MPEG-2 or DVD-quality video) and digital audio (e.g., MP3 or CD-quality audio), and/or cellular telephony.

SUMMARY OF THE INVENTION

The present invention encompasses, in one of its aspects, a communications system consisting of a server system that

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