SERVER PROCESSING FOR UPDATING DATASET VERSIONS RESIDENT ON A WIRELESS DEVICE

BACKGROUND OF THE INVENTION

I. Field of the Invention

[0001] The present invention generally relates to wireless networks and computer communications across wireless networks. More particularly, the invention relates to the updating of the version of an application or data resident on a wireless device when the wireless device connects to a download server that has a more recent version of the wireless device resident application or data.

II. Description of the Related Art

[0002] Wireless devices, such as cellular telephones, communicate packets including voice and data over a wireless network. Cellular telephones themselves are being manufactured with increased computing capabilities and are becoming tantamount to personal computers and hand-held personal digital assistants ("PDAs"). Some wireless devices, such as select cellular telephones, may have an installed application programming computer platform that allows software developers to create software applications that operate on the wireless device.

[0003] It is anticipated that systems and methods will be developed to download applications to a wireless device. Accordingly, it is desirable to have a system and method by which applications and data on a wireless device may be updated efficiently, taking into account the environment, constraints and impacts of transferring information in a wireless network.

SUMMARY OF THE INVENTION

[0004] In one embodiment of the present invention, a method for updating a dataset on a wireless device comprises storing on a server in a version associated with the dataset, transmitting the version destined for the wireless device, updating the dataset and recording the version associated with the dataset, transmitting the updated version destined for the wireless device in response to a request by the wireless device, and transmitting the updated dataset to the wireless device in response to the wireless device requesting the updated dataset based on a comparison of the version and the updated version.

[0005] In another embodiment of the present invention, a method for updating a dataset on a wireless device comprises storing a plurality of dataset versions each associated with a dataset in a download server dataset update summary file, transmitting the download server dataset update

summary file destined for a wireless device, updating one of the datasets and recording the associated one of the plurality of dataset versions with the updated, and in response to a request from a wireless device to update a dataset based on an evaluation of the download server dataset update summary file and a wireless device dataset version summary indicating that at least one of the datasets have been updated, transmitting the dataset destined for the wireless device.

[0006] Objects, advantages, and features of the present invention will become apparent after review of the hereinafter set forth Brief Description of the Drawings, Detailed Description of the Invention, and the Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Fig. 1 is a representative diagram of a wireless network and the computer hardware and wireless devices that can be used within the system.

[0008] Fig. 2 is a block diagram of the hardware components of the wireless network providing communication between different wireless devices, an application download server, a second network server, and the stored application database.

[0009] Fig. 3 is a file tree illustrating an exemplary file structure resident on the computer platform of the wireless device.

[0010] Fig. 4 illustrates the download server dataset update summary file and wireless device dataset version summary file, which are compared to determine if new versions of wireless device resident datasets are present on the download server.

[0011] Fig. 5 is a flowchart illustrating the process executing on the wireless device in updating the wireless device resident datasets with newer versions present on a download server when the wireless device initially contacts the download server.

[0012] Fig. 6 is a flowchart illustrating the process executing on the download server in maintaining the most recent version of the download server resident datasets in the update summary file.

DETAILED DESCRIPTION OF THE INVENTION

Introduction

[0013] Systems and methods are anticipated that provide for the downloading of software applications to a wireless device. Software applications can come pre-loaded at the time the wireless device is manufactured, or the user may later request that additional programs be downloaded over cellular telecommunication carrier networks, where the programs are executable on the wireless device. As a result, users of wireless devices can customize their

wireless devices with programs, such as games, printed media, stock updates, news, or any other type of information or program available for download from application download servers through the wireless network.

[0014] In one scenario, if the user of the wireless device desires to download and use a software application or other data using a wireless network, the user will typically either call a service provider or contact the service provider through other means, such as through an Internet access, and the service provider will either transmit the application or data to the wireless device across the wireless network or allow the user access a network site where the application or data is downloadable or accessible. To connect to the application download server, the wireless device bridges a communication connection to the wireless network, such as a cellular network, and then attempts to contact an application download server where the desired software application is resident. Once the wireless device contacts the application download server, an initial connection is made and the application download server determines what applications and data are available to the wireless device and sends the appropriate information, such as a menu, for display on the wireless device so the user can learn of the available applications and data. After access is provided to the downloadable applications, the user of the wireless device can download or any of the available applications or data.

[0015] A problem that may arise is that the version of the application or data that the wireless device downloads to be resident thereupon can be updated or altered at the application download server, and the wireless device resident application or data has no simple manner to be likewise updated. The update problem is exacerbated as the wireless device does not always communicate with the application download server every time the wireless device bridges a communication to the wireless network. Because the communication connection from the wireless device to the application download server can be expensive (especially in a cellular network), it is otherwise very expensive for the wireless device to periodically connect to the application download server and check for more recent version of application or software. Furthermore, while each wireless device resident application or data can be checked against its parallel version resident on the download server every time a connection is made to the download server, such checking would lengthen the connection time and cause more expense to the wireless device owner.

[0016] Accordingly, systems and methods consistent with the present invention include updating applications and data resident on a wireless device with the most recent version stored on a download server that the wireless device is connected to. Such systems and methods should be able to determine if more recent versions of the wireless device resident applications and data are

present on the download server without significantly lengthening the connection duration in order to effect a full comparison of all wireless device resident applications and data. It is thus to the provision of such a system and method of checking and updating wireless device resident applications and data that the present invention is primarily directed.

[0017] It is an object to provide systems and methods whereby the datasets, such as applications, information and other data, resident on a wireless device can be updated with the most recent version of the dataset resident on a download server that the wireless device is connected to. The present invention allows a rapid determination as to whether more recent versions of the wireless device resident datasets are present on the download server, and such determination does not significantly lengthen the connection duration between the wireless device and download server. The present invention thus provides an advantage in that it gives a wireless device the ability to quickly execute a full comparison of dataset versions with a download server and download any newer version of a wireless device resident dataset.

Exemplary Embodiment of the Present Invention

[0018] With reference to the figures in which like numerals represent like elements throughout, Fig. 1 illustrates an embodiment of a system 10 for providing subscribed software applications to one or more wireless devices, such as cellular telephone 12, in communication across a wireless network 14 with at least one network server, such as application download server 16, that selectively downloads or provided access to software applications or other data to the wireless devices across a wireless communication portal or other data access to the wireless network 14. As shown here, the wireless device can be a cellular telephone 12, a personal digital assistant 18, a pager 20, which is shown here as a two-way text pager, or even a separate computer platform 22 that has a wireless communication portal, and may otherwise have a wired connection 24 to a network or the Internet. The system 10 can thus be performed on any form of remote computer module including a wireless communication portal, including without limitation, wireless modems, PCMCIA cards, access terminals, personal computers, access terminals, telephones without a display or keypad, or any combination or sub-combination thereof.

[0019] The application download server 16 is shown here on a local server-side network 26 with other computer elements in communication with the wireless network 14, such as a database 28 with stored applications and data that contains software applications and data that are accessible and downloadable to the wireless devices 12,18,20,22. There is also shown other network servers, such as server 30 and stand-alone network server 32. The server 30 and 32 can be application or data download servers, or other types of servers that interact with the wireless

devices 12,18,20,22 as are known in the art. The servers 16,30,32 may have software applications, patches, files, keys, graphics data, compression algorithms, and any type of general data, collectively referred to hereinafter as "datasets," resident thereupon that can be accessed by the wireless devices 12,18,20,22 as is further described herein. It should be noted that server-side functions as described herein can be performed on one server, such as application download server 16. Further, a computer server-side computer platform can provide separate services and processes to the wireless devices 12,18,20,22 across the wireless network 14.

[0020] Fig. 2 is a block diagram that more fully illustrates the components of the wireless network 14 and interrelation of the elements of the system 10. The wireless network 14 is merely exemplary and can include any system whereby remote modules, such as wireless devices 12,18,20,22, communicate over-the-air between and among each other and/or between and among components of a wireless network 14, including, without limitation, wireless network carriers and/or servers, as well as including a non-wireless network alone or in combination with a wireless network. The application download server 16 and the stored applications database 28, other servers 30,32, will be present on the cellular data network with any other components that are needed to provide cellular telecommunication services. The application download server 16, and/or other servers 30,32 communicate with a carrier network 40, through a data link, such as the Internet, a secure LAN, WAN, or other network. The carrier network 40 controls messages (generally being data packets) sent to a messaging service controller ("MSC") 42. The carrier network 40 communicates with the MSC 42 by a network, the Internet and/or POTS ("plain ordinary telephone system"). Typically, the network or Internet connection between the carrier network 40 and the MSC 42 transfers data, and the POTS transfers voice information. The MSC 42 is connected to multiple base stations ("BTS") 44. In a similar manner to the carrier network, the MSC 42 is typically connected to the BTS 44 by both the network and/or Internet for data transfer and POTS for voice information. The BTS 44 ultimately broadcasts messages wirelessly to the wireless devices, such as cellular telephone 12, by short messaging service ("SMS"), or other over-the-air methods known in the art.

[0021] The wireless device, such as cellular telephone 12, has a computer platform 50 that can receive and execute software applications and display data transmitted from the application download server 16 or other network servers 30,32. The computer platform 50 may also include an application-specific integrated circuit ("ASIC") 52, or other processor, microprocessor, logic circuit, or other data processing device. The ASIC 52 or other processor executes the application programming interface ("API") layer 54 that interfaces with any resident programs in the memory 56 of the wireless device. The memory can be comprised of read-only or random-access

memory (RAM and ROM), EPROM, EEPROM, flash cards, or any memory common to computer platforms. The computer platform 50 also includes a local database 58 that can hold the software applications, file, or data not actively used in memory 56, such as the software applications or downloaded from the application download server 16. The local database 58 is typically comprised of one or more flash memory cells, but can be any secondary or tertiary storage device as known in the art, such as magnetic media, EPROM, EEPROM, optical media, tape, or soft or hard disk.

[0022] The wireless device, such as cellular telephone 12, can access and download many types of applications, such as games and stock monitors, or simply data such as news and sports-related data. The downloaded data can be immediately displayed on the display or stored in the local database 58 when not in use. The software applications can be treated as a regular software application resident on the wireless device 12,18,20,22, and the user of the wireless device can selectively upload stored resident applications from the local database 58 to memory 56 for execution on the API 56. The end-user of the wireless device 12,18,20,22 can also selectively delete a software application from the local database 58 whereby other applications and data can be downloaded into the cleared storage space.

[0023] With reference to Fig. 3, the computer platform 50 of the wireless device (such as cellular telephone 12) will have a data or file structure resident thereon. The category Files 60 within it the API file called BREW 62, representing the API in the platform, in this case the BREW™ API developed by QUALCOMM®, Incorporated, and BREW 62 contains an applications file 64 with a specific chess game held in a chess folder 66. All of these files can be "versioned" wherein updates to the data in each file give the file a different version to identify what changes have been made in the data. The server, such as application download server 16, will keep its own resident copy of the application and data files such that a wireless device 12,18,20,22 contacting the server can download copies of the applications and data to selectively overwrite the wireless device resident copy.

[0024] The present invention allows the creation of "summary files" of the versions of some or all datasets resident on the wireless device 12,18,20,22 or download server, such as application download server 16. As shown in Fig. 4, the download server 16,30,32 preferably maintains a download server dataset update summary file 70, and the wireless device 12,18,20,22 will maintain wireless device dataset version summary file 72 that contain or reference some or all files on the server or computer platform 50 respectively.

[0025] The system 10 thus selectively updates the versions of stored datasets on a wireless device 12,18,20,22 attempting to communicate with at least one download server (application download

server 16) across the wireless network 14, through the computer platform 50 of the wireless device comparing the version of each specific resident dataset listed in the resident dataset version summary file 72 with the version of the downloadable dataset resident on the download server, preferably stored in a download server dataset update summary 70, to thereby determine if the version of the wireless device resident dataset is different from the version of the download server resident dataset. And upon determining the version of the wireless device resident dataset is different from the version of the download server resident dataset, the computer platform 50 of the wireless device can download the download server resident dataset to overwrite the old version of the application or data resident and be executable on the wireless device 12,18,20,22. Other methods can be used on the download server 16,20,32 to provide version information to wireless devices 12,18,20,22, such as a header for each dataset file, a direct comparison of the dataset after a predetermined duration since download, or a command can be present in the wireless device-download server handshake that informs the wireless device to compare a specific dataset to determine if the wireless device has the most recent version.

[0026] The download server dataset update summary file 70 can identify the versions of files or datasets resident on the download server, such as a graphics data that is present in a welcome screen file, device drivers such as a graphics driver file, and the chess file 66. The wireless device dataset version summary file 72 has parallel files to those resident on the download server dataset update summary file 70 and can compare each version of the datasets through a simple file comparison between the download server dataset update summary file 70 and the wireless device dataset version summary file 72 and locate different version numbers. The summary files 70 and 72 are shown here as having a greater number indicating a more recent version of the dataset. Other systems and method could be used to indicate the version difference as would be known in the art, such as an alphanumeric or other symbolic system that is predefined such that the computer platform 50 of the wireless device 12,18,20,22 can determine if an individual download server resident dataset is a newer version than the wireless device resident dataset.

[0027] In the structure shown in Fig. 4, if a version number of the download server resident dataset is greater than the version number of the wireless device resident dataset, then the computer platform 50 of the wireless device 12,18,20,22 will download the newer version of the dataset from the download server 16,30,32. After it has been determined that a newer dataset version is on the download server, the computer platform 50 of the wireless device 12,18,20,22 can prompt the user of the wireless device 12,18,20,22 to communicate with the download server to download the different version of the download server resident dataset to be executable on the wireless device. The prompting of the user to make the communication may be important in

certain circumstances, such as if the owner of the wireless device 12,18,20,22 will be billed for the communication connection. Otherwise, upon the determination that the version of the wireless device resident dataset is different from the version of the download server resident dataset, the computer platform 50 of the wireless device 12,18,20,22 can automatically download the different download server resident dataset to overwrite the wireless device resident dataset.

[0028] The specific process executing on the wireless device, such as cellular telephone 12, is shown in the flowchart of Fig. 5. The wireless device 12,18,20,22 bridges a connection to an application download server 16 (or other network server) as shown in step 80, and then determine whether there is a download server version dataset update summary file 70 present, as shown by decision 82. If the download server keeps track of changes to resident dataset versions in a manner other than an update summary file 70, then decision 82 would be made in accord with the other method. If there is not a download server dataset update summary file 70 present at decision 82 (or other version comparison method present), then the connection to the application download server 16 is otherwise completed (step 84), and the version update process is terminated. If there is a download server dataset update summary file 70 present at decision 82, then the download server dataset update summary file 70 is retrieved by the wireless device 12,18,20,22 as shown at step 86, and the first parallel dataset version for which the wireless device has a resident copy of is fetched, as shown at step 88.

[0029] A determination is then made as to whether the download server resident dataset is a more recent version than the wireless device resident dataset, as shown at decision 90. If the download server dataset is not more recent at decision 90, then the process returns to step 88 to fetch the next download server resident dataset version. If the download server resident dataset is a more recent version at decision 90, then the wireless device downloads to the computer platform 50 the more recent version of the dataset from the download server, as shown at step 92. A check is made to determine if the more recent version of the dataset was downloaded, as shown at decision 94. If the more recent version of the dataset was not downloaded at decision 92, then the user of the wireless device is informed of the failure to download the more recent dataset version, as shown at step 96, and the process continues to decision 98. Otherwise, if the more recent dataset version was downloaded at decision 94, then a determination is made as to whether there are any further datasets resident on the download server that are parallel to datasets resident on the wireless device 12,18,20,22, as shown at decision 98.

[0030] If there are more parallel datasets on the download server at decision 98, then the process returns to step 88 wherein another parallel download server resident dataset is fetched. If there are no further parallel download server resident datasets present at decision 98, then the

downloaded datasets are installed and integrated on the computer platform 50 of the wireless device 12,18,20,22 as shown at step 100, and the interconnection between the wireless device and application download server 16 is begun, as shown at step 102. The interconnection between the wireless device and download server typically provides a menu or other data connectivity therebetween. After the interconnection is begun at step 102, the version update process is terminated.

[0031] Fig. 6 illustrates the process executing on the download server 16,30,32 to insure that the download server dataset update summary file 70 has the most current version information. A sub-routine executing on the download server 16,30,32 makes a first determination as to whether the download server resident dataset has been updated, as shown at decision 104. If the resident dataset has not been updated, then the process enters a wait state by returning to decision 104, until a resident dataset is updated. Otherwise, if the resident dataset has been updated at decision 104, then a decision is made as to whether the version of the dataset as listed in the download server dataset update summary requires updating, as shown at decision 106. If the version of the resident dataset does not require updating, then the process returns to the wait state at decision 106 until an update is made to resident datasets. And if the version of the resident dataset has changed at decision 106, then the version of the dataset in the download server dataset update summary 70 is overwritten so that connecting wireless devices 12,18,20,22 will be able to learn and download the newer version of the dataset.

[0032] The system 10 thus provides a method for selectively updating the versions of stored datasets on a wireless device 12,18,20,22 including communicating from the wireless device 12,18,20,22 to the download server 16,30,32 across the wireless network 14, comparing, at the computer platform 50 of the wireless device, the version of each specific resident dataset listed in the resident dataset version summary file 72 with the version of the downloadable dataset resident on the download server 16,20,22, and determining if the version of the wireless device resident dataset is different from the version of the download server resident dataset based upon the comparison. The method may further include downloading the different download server resident dataset to the computer platform 50 of the wireless device 12,18,20,22 from the download server 16,20,22 to be executable on the wireless device upon determining the version of the wireless device resident dataset is different from the version of the download server resident dataset.

[0033] If the download server 16,30,32 stores the record indicating the version of the download server resident dataset in a version update file 70 the step of comparing, at the computer platform 50 of the wireless device 12,18,20,22, the version of each specific resident dataset listed in the

resident dataset version summary file 72 with the version of the downloadable dataset resident on the download server, is comparing the update summary file 70 of the download server to the version summary file 72 of the wireless device to thereby determine if the versions of the wireless device resident datasets are different from the versions of the download server resident datasets. The method can also include either prompting the user of the wireless device 12,18,20,22 to communicate with the download server 16,30,32 to download the different version of the download server resident dataset to be executable on the wireless device, or automatically downloading the different download server resident dataset to the computer platform 50 of the wireless device upon determining the download server resident dataset is a different version than the wireless device resident dataset.

[0034] The invention further includes a wireless device 12,18,20,22 including a computer platform 50 with at least one file resident thereon where the wireless device 12,18,20,22 in selective communication to one or more network servers across a wireless network 14 with each network server selectively downloading datasets to the wireless device 12,18,20,22. Upon the wireless device 12,18,20,22 attempting to communicate with a download server 16,30,32 across the wireless network 13, the computer platform 50 of the wireless device compares the version of each specific resident dataset listed in the resident dataset version summary file 72 with the version of the downloadable dataset resident on the download server 16,30,32 to thereby determine if the version of the wireless device resident dataset is different from the version of the download server resident dataset. Preferably, upon determining the version of the wireless device resident dataset is different from the version of the download server resident dataset, the computer platform 50 of the wireless device downloads the download server resident dataset. The computer platform 50 of the wireless device can prompt the user of the wireless device 12,18,20,22 to communicate with the download server 16,30,32 to download the different version of the download server resident dataset, or automatically download the different download server resident dataset to be executable on the wireless device 12,18,20,22.

[0035] In one embodiment with an update summary file 70 resident on the download server, the computer platform 50 of the wireless device 12,18,20,22 compares the update summary file 70 of the download server to the version summary file 72 of the wireless device to thereby determine if the versions of the wireless device resident datasets are different from the versions of the download server resident datasets.

[0036] The present invention includes a program resident in a computer readable medium, where the program directs a wireless device having a computer platform to perform the inventive steps of the method. The computer readable medium can be the memory 56 of the computer platform

50 of the cellular telephone 12, or other wireless device 18,20,22, or can be in a local database, such as local database 58 of the cellular telephone 12. Further, the computer readable medium can be in a secondary storage media that is loadable onto a wireless device computer platform, such as a magnetic disk or tape, optical disk, hard disk, flash memory, or other storage media as is known in the art.

[0037] The present invention may be implemented, for example, by operating portion(s) of the wireless network 14 to execute a sequence of machine-readable instructions, such as wireless platform 50, the application download server 16, and any other network server 30,32. The instructions can reside in various types of signal-bearing or data storage primary, secondary, or tertiary media. The media may comprise, for example, RAM (not shown) accessible by, or residing within, the components of the wireless network 14. Whether contained in RAM, a diskette, or other secondary storage media, the instructions may be stored on a variety of machine-readable data storage media, such as DASD storage (e.g., a conventional "hard drive" or a RAID array), magnetic tape, electronic read-only memory (e.g., ROM, EPROM, or EEPROM), flash memory cards, an optical storage device (e.g. CD-ROM, WORM, DVD, digital optical tape), paper "punch" cards, or other suitable data storage media including digital and analog transmission media.

[0038] While the foregoing disclosure shows illustrative embodiments of the invention, it should be noted that various changes and modifications could be made herein without departing from the scope of the invention as defined by the appended claims. Furthermore, although elements of the invention may be described or claimed in the singular, the plural is contemplated unless limitation to the singular is explicitly stated.

CLAIMS

WHAT IS CLAIMED IS:

1. A method for updating a dataset on a wireless device, said dataset having an associated version identifier, the method comprising:

updating a copy of the dataset on a server with a more recent version of the dataset, wherein said updating comprises recording, on the server, an updated version identifier;

transmitting, by the server, the updated version identifier to the wireless device; and

responsive to an update command identifying the copy of the dataset on the server made by the wireless device only when a comparison made by the wireless device between the associated version identifier and the updated version identifier indicates that the copy of the dataset on the server is more recent than the corresponding dataset resident in the wireless device, transmitting the updated server copy of the dataset to the wireless device.

2. The method of claim 1, wherein said step of transmitting is made in response to a request made automatically by the wireless device.

3. A method for updating a selected dataset from a plurality of datasets on a wireless device, each of said plurality of datasets having an associated version identifier, the method comprising:

storing, in a dataset update summary file on a server, a plurality of dataset version identifiers each associated with a respective server copy of the plurality of datasets on the wireless device;

transmitting to the wireless device said dataset update summary file; and

responsive to an update command made by the wireless device, said update command identifying the selected dataset and made by the wireless device only when a comparison made on the wireless device between the associated version identifier of the selected dataset and said dataset update summary file indicates that the server copy of the selected dataset is more recent than the selected dataset resident in the wireless device,

transmitting to the wireless device the server copy of the selected dataset.

4. The method of claim 3, wherein said step of transmitting is made in response to a request made automatically by the wireless device.

5. A computer-readable medium comprising instructions, which when executed by a computer causes the computer to perform operations, the instructions comprising:

at least one instruction for updating a copy of the dataset on the machine with a more recent version of the dataset, wherein the updating comprises recording, on the machine, an updated version identifier; and recording the version associated with the dataset;

at least one instruction for transmitting, by the server, the updated version identifier to the wireless device; and

responsive to an update command identifying the copy of the dataset on the machine made by the wireless device only when a comparison made by the wireless device between the associated version identifier and the updated version identifier indicates that the copy of the dataset on the server is more recent than the corresponding dataset resident in the wireless device, at least one instruction for transmitting the updated copy of the dataset on the machine to the wireless device.